Lahontan Audubon Society
PO Box 2304
Reno, NV 89505

August 11, 2023

Bureau of Reclamation
Attn: Post-2026
Mail Stop 84-55000
PO Box 25007
Denver, CO 80225

Via mail and email: crbpost2026@usbr.gov

Re: Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

On behalf of the Lahontan Audubon Society, I am pleased to submit these scoping comments on the Bureau of Reclamation's (BOR) development of post-2026 Colorado River reservoir operational guidelines and strategies for Lake Powell and Lake Mead.

The Lahontan Audubon Society is a non-profit organization serving all of northwestern Nevada and represents a membership of conservation-minded individuals and families. We are conservationists, hikers, birders, and educators. And we share our experiences and values with others through a variety of nature-oriented programs. Our mission is to preserve and improve the remaining habitat of birds and other wildlife, restore historic habitat, and educate the public, with emphasis on children, providing vision to all about our unique Nevada environments.

While the Colorado River provides water to over 40 million people, it also provides essential habitat to hundreds of species of resident and migratory birds. Many of these migratory birds eventually become Nevada's breeding birds.

We strongly support replacing the current outdated and inefficient guidelines and strategies in order to achieve more sustainable use of the Colorado River in this time of extended droughts and climate change impacts of increased temperatures and reduced river flows. We also support actions to reduce the current demands for Colorado River water in order to increase the future availability of water for people and all life which depend on the river.

We urge the BOR to fully assess the environmental impacts of its proposed alternatives and require mitigation for unavoidable harmful environmental impacts. We also urge BOR to develop an environmentally preferable alternative on river operations and flows

which protects and restores natural river-dependent ecosystems and habitats.

Thank you for considering our comments. We look forward to reviewing the draft environmental impact statement.

Sincerely,

/s/ Rose Strickland

Rose Strickland, Chair
Conservation Committee
Lahontan Audubon Society

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Sent via eMail to: crbpost2026@usbr.gov August 15, 2023

Ms. Amanda Erath
Colorado River Post-2026 Program Coordinator
Bureau of Reclamation
(303) 445–2766

Re: Notice of Intent to Prepare an Environmental Impact Statement and Notice to Solicit Comments and Hold Public Scoping Meetings on the Development of Post- 2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead.

Dear Ms. Erath:

This scoping letter is provided by Living Rivers, Colorado Riverkeeper, Center for Biological Diversity, Great Basin Water Network, River Runners for Wilderness, Save The Colorado, Las Vegas Water Defender, Glen Canyon Institute, Utah Rivers Council and Waterkeeper Alliance in response to the Bureau of Reclamation's (Reclamation) Notice of Intent to Prepare an Environmental Impact Statement and Notice to Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead (Notice). 88 Fed. Reg. 39455-58 (June 6, 2023). We attended the formal scoping meetings and we also provided oral comments.

Thank you for this opportunity to provide written comments regarding the development of an Environmental Impact Statement (EIS) in accordance to the National Environmental Policy Act (NEPA). Our comments address the direct, indirect and cumulative effects of all of the relevant Reclamation operations and a range of alternatives that illuminates the consequences of the choices for decision-makers as they undertake in new management paradigms on the Colorado River into the future with declining flows and increasing temperatures.

Many of us provided pre-scoping comments to Reclamation regarding this project in 2022. In addition, we have submitted comments to Reclamation on earlier environmental reviews and studies closely related to the current process for the Post-2026 Operational Guidelines. Our earlier comments submitted to Reclamation are incorporated herein by reference and should be included as part of the administrative record of this Post-2026 EIS. Hyperlinks are provided below for your convenience.

2005 Scoping for Shortage Criteria	http://www.livingrivers.org/pdfs/TheOne-DamSolution.pdf
2007 Draft EIS for Shortage Criteria	http://www.livingrivers.org/pdfs/LR_Shortage_DEIS.pdf
2010 - 2012 Basin Study	http://www.riversimulator.org/Resources/USBR/BasinStudy/LivingRiversCommentsBasinStudyJuly2011.pdf
2010 - 2012 Basin Study	http://www.riversimulator.org/Resources/USBR/BasinStudy/Comments/LivingRivers.pdf
2012- 2016 Scoping LTEMP	http://www.riversimulator.org/Resources/NGO/LTEMP/LTEMPeisCommentsLivingRivers31Jan2012.pdf
2013 - 2015 Moving Forward	http://www.livingrivers.org/pdfs/MovingForwardComments11August2015LRandCBD.pdf
Letter to Secretary Salazar (LTEMP)	http://www.livingrivers.org/pdfs/LRtoSalazar2April2012.pdf
2016 LTEMP DEIS	http://www.livingrivers.org/pdfs/LRcommentsGCDltemp9May2016.pdf
Drought Contingency Planning	No opportunity provided for public participation
7.D. Review 01	http://www.riversimulator.org/Resources/USBR/7D/7DcommentsLivingRivers.pdf
7.D Review 02	http://www.riversimulator.org/Resources/USBR/7D/Final/Comments2020Nov/7DReportCommentsLivingRivers.pdf

Drought Response Operating Agreement (DROA); Lower Basin	No opportunity provided for public participation
DROA 01; Upper Basin	http://www.riversimulator.org/2025Guidelines/USBR/DROAub/DROAcommentsLRandCBD2022Jan21.pdf
DROA 02: Upper Basin	http://www.riversimulator.org/2025Guidelines/USBR/DROAub/DROAubCommentLetterLR2022Feb.pdf
Post-2026 Pre-scoping	http://www.riversimulator.org/2025Guidelines/PreScoping/PrescopeComments/LRetalPrescopingCommentsToReclamation31August2022.pdf

I. INTRODUCTION

The signatories of this scoping letter include stakeholders of various water delivery projects authorized by Congress in the 20th century and managed by Reclamation. These organizations also take interest in the ecosystems, species, habitats, and cultural landscapes that depend on the Colorado River and its tributaries throughout the basin.

Water scarcity is the prevailing need and purpose for this Post-2026 EIS in both the Upper and Lower Basins. Water scarcity in the Colorado River Basin (CRB) was the motivation for Lower Basin development in 1928 (Boulder Canyon Project Act) and Upper Basin development in 1956 (Colorado Rivers Storage Project Act), time has shown that building more dams did not solve the water scarcity problem.

We note there is growing imbalance between human demands and the natural supply, which is stressed by the acceleration of climate disruptions. There is a real risk of catastrophic collapse and system failure in the CRB in the near-future.

The next 120 years of the so-called Reclamation Era[1] will be very, very different than the past. Reclamation appears to acknowledge this in the Notice which carries encouraging statements for developing new operating criteria in the CRB:

- Support proactive management strategies.

[1] Speech by Reclamation Commissioner Gilbert G. Stamm in 1973 to California Water Resources Association. http://www.riversimulator.org/Resources/Planning/ReclamationOverviewNationalWaterCommission1973Stamm.pdf

- Avoid crisis-by-crisis management.
- Create more robust and adaptive strategies
- Incorporate a more holistic, resilient approach.
- Focus on long-term sustainability for citizens and the natural environment.
- Minimize system vulnerabilities.

During the three scoping webinars we were also encouraged by the following statements shared by Reclamation and the NEPA contractor, SWCA and Associates, and as follows:

- Develop alternative paradigms for coordinated reservoir elevations.
- Develop engagement opportunities with stakeholders, tribes, and the public.
- Develop education and outreach opportunities with stakeholders and tribes.

Despite these encouraging statements, we are also skeptical for the following reasons based on past Reclamation decision-making:

- Since 1922, the self-interest displayed by the seven states has impeded the emergence of holistic concepts.
- The public has submitted holistic strategies, as they did during scoping in 2005 for the Shortage Criteria EIS, that Reclamation ignored.
- In 2006, Reclamation defaulted to the alternative submitted by the seven states and dismissed the diverse strategies from the public.
- Reclamation's deference to the states has proven to be the wrong choice because the preferred alternative drained reservoirs Mead and Powell and created a shortage declaration well-before the expiration date of 2007 Interim Guidelines (Year 2026).[2] [3]
- The preferred alternative in the Lower Basin in 2007 did not address the structural deficit (evaporation to the points of diversion), which would have reduced their demand schedule by 1.2 million acre-feet (this evaporation number will increase in the future).
- The Upper Basin's preferred alternative in 2007 granted a depletion schedule that would incrementally increase system demands by one million acre-feet.
- Investments in system efficiencies justified the preferred alternative that unified the seven states. However, the efficiencies did not account for increased warming,

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[2] Archived press release; February 13, 2008; Larry Dozier, Deputy General Manager of Central Arizona Project; "Lake Mead Not Going Dry." http://www.riversimulator.org/Resources/Press/LakeMeadDryCAPdozierFulp.pdf

[3] When will Lake Mead Go Dry? Barnett and Pierce, 2008. http://www.riversimulator.org/Resources/ClimateDocs/2008BarnettPierce.pdf

aridification and other climate disruptions, which led us to the current failed state of management.

- The supplemental strategies since 2007 didn't close the widening gap of system demand, namely the Pilot System Conservation Program of 2014, Drought Contingency Planning in 2019 (DCP) and the Drought Response Operations Agreement of 2021 (DROA).
- In 2022, Reclamation initiated a Supplemental EIS (SEIS) process for the public to submit holistic and sustainable concepts to Reclamation.
- In 2023, Reclamation again yielded to an untimely proposal from the seven states with goals that were off-target, and suspending the SEIS process.

In light of this history, we are concerned that Reclamation will once again allow the states to monopolize the environmental review particularly in the formulation of meaningful alternatives, which in the past led Reclamation to the dismiss citizen and tribal proposals. The interests of the States should not be able to dominate and preclude consideration of Tribal water rights and environmental issues including instream needs for native fish and riparian resources or alternatives that include bypass or decommissioning of Glen Canyon Dam.

We are also concerned that some of the interim strategies and agreements including the so-called "intentionally created surplus," the DCP, and the other credit/surplus systems are not viable and could exacerbate future shortages. Reclamation's modeling for the EIS should look how any "calls" on that "credit" from all these agreements could affect the system as a whole. If this analysis is done, we believe it will be clear that the current credit/surplus structure is unworkable without additional sideboards and limitations.

If the preferred alternative for this EIS resembles the failed strategies of 2007, 2014, 2019, and 2021, then it is very reasonable to expect that the Record of Decision for the Post-2026 Operations will expedite system collapse and provoke public ire. We hope that this Post-2026 EIS process will be more robust and transparent than the NEPA reviews Reclamation has undertaken in the past. The scope of the analysis should be basin-wide and include Upper Basin dams that Reclamation has used to manage water shortages at Lakes Mead and Powell per the 2007 Interim Agreements and other agreements. Reclamation must start with a baseline that takes into account the water needed to preserve the ecosystem, endangered fish recovery, structural deficits due to evaporation and seepage, and reserved tribal water rights. A NEPA analysis of this sort fully considers alternatives that may include decommissioning existing dams to reduce water loss and impacts to the environment.

II. Scope of the Environmental Review

A. Geographic Scope

The analysis cannot be limited to operations of Glen Canyon Dam and Hoover Dam because those operations and contingency measures also involve the Bureau of Reclamation's operations at Flaming Gorge Dam, Blue Mesa Dam and Navajo Dam, which are utilized to avoid system risk and uncertainty. For example, in recent years changes in operations at these upper basin dams have been used to prevent the outlet works at Glen Canyon Dam from declining below targeted levels to shore up hydropower operations and protect equipment.

The scope of the Endangered Species Act consultation for the post-2026 operational guidelines must also consider all of the impacts of dam operations. Reclamation must consult with US Fish and Wildlife about the Biological Opinions for all the above mentioned federal dams in the upper basin as well as all operations affecting the lower basin species—the whole of the Colorado River and its tributaries that are affected by BOR operations. This would include, for example, an updated Biological Opinion for the Multi-Species conservation program in the reaches of the Lower Basin below Hoover Dam.

B. Issue Areas for Environmental Review

1. Baseline Water Use For Analysis

a. Baseline Must Include All Reserved Water Rights for Tribes and Reserved Water Rights For Federal Lands

b. Baseline Should Not Include the Upper Basin Depletion Schedule — only Perfected Rights

2. Future Estimated Water Flows and Water Availability Estimates Used for the Analysis Must Include Realistic Predictions in Light of Climate Change and Aridification including Increasing Losses to Evaporation from Storage

The Upper Basin Hydrologic Determination must be modified to reflect the current 30-year average. Reclamation cannot continue to ignore the structural deficit and evaporative losses which will increase in the future. Reclamation must also analyze all relevant science, especially including worst case scenarios for aridification flow declines. Reclamation must develop plans and strategies to limit Upper Basin Water use rather than increase it.

3. Endangered Fish Survival and Recovery Amidst Aridification

Under both NEPA and the ESA, Reclamation must consider effects on survival and recovery of endangered fish in the Colorado River system, and, in the context of this EIS and its accompanying Biological Opinion, must proactively plan infrastructure and flows to facilitate endangered fish recovery amidst aridification and climate-inevitable dead pool conditions.

a. *Given the relative lack of warm water non-native fish in the Colorado River through Grand Canyon, and given the downsteam fish barrier that Pearce Ferry rapid may provide, the Bureau of Reclamation, National Park Service, and U.S. Fish and Wildlife Service should plan now for managing the Colorado River through Grand Canyon National Park as a stronghold for endangered fish recovery amidst aridification, inevitable dead pool conditions, and a warm Colorado River through Grand Canyon.*

Reclamation and its sister agencies must ensure that the Colorado River through Grand Canyon remains relatively free of nonnative warm water invasive fish. The Colorado River through Grand Canyon is unique in the CRB for its relative lack of non-native warm-water fish. These fish, like smallmouth bass, catfish, and other species, pose a pronounced, ongoing threat to endangered fish that overwhelms and negates the provision of adequate habitat conditions.

Thus, the lack of nonnative warm water fish in the Colorado River through Grand Canyon creates a unique opportunity for endangered fish recovery in Grand Canyon, where: (1) together, the downstream fish barrier that Pearce Ferry may provide and an upstream barrier at the current site of Glen Canyon Dam, can provide for ongoing exclusion nonnative warm water fish from the Grand Canyon, and (2) in the relative absence of nonnative warm water fish, endangered fish may flourish in the Colorado River throughout all of Grand Canyon as aridification continues and the river warms, as has occurred in recent years in western Grand Canyon.

Given the climate inevitability of Glen Canyon Dam's obsolescence, Reclamation and its sister agencies must analyze in the context of this EIS and its accompanying Biological Opinion bypass and other post-dam river management systems at the current site of Glen Canyon Dam that, across alternatives, prevent passage of non-native fish downstream into the Colorado River through Grand Canyon to ensure the survival and recovery of endangered fish. Conversely, Reclamation's failure to prevent non-native fish invasion amidst a warming Colorado River through Grand Canyon will jeopardize endangered species like humpback chub.

b. BOR must consider current and ongoing effects of the lack of screens or other dam modifications to prevent passage of non-native fish through Glen Canyon Dam into the Colorado River and Grand Canyon.

Reclamation's operation of Glen Canyon Dam absent screens or other barriers to prevent non-native fish passage through the dam and into the Colorado River in Grand Canyon is discretionary action because the Bureau and the U.S. Fish and Wildlife Service have, since at least 2016 (1) been aware of the potential for non-native fish to pass through Glen Canyon Dam and into the Colorado River and designated critical habitat for humpback chub, particularly as the result of aridification and declining Lake Powell surface elevations, and (2) been aware and discussed the need to implement screens or other barriers on Glen Canyon Dam to prevent passage of non-native warm water fish into the Colorado River and designated critical habitat for humpback chub. The EIS must fully consider the need for screens under all operations scenarios as well as a decommissioning alternative (as detailed below).

c. **Adaptive Management and Mitigation for Upper Basin Fish:**

ESA Consultation for the post-2026 operations should include all 5 dams—consolidating the issues regarding listed fish in one consultation and Biological Opinion. Adaptive management structure has not achieved desired outcomes and the RIPRAP for fish protection in Upper Basin is opaque to the public. If management of all 5 dams (Hoover, Glen Canyon, Flaming Gorge, Blue Mesa, and Navajo) is consolidated together (which we suggest) with a comprehensive Biological Opinion, Reclamation may not need the separate RIPRAP decision-making structure and the required actions to support survival and recovery of listed fish would be more clearly defined and more transparent to the public.

d. **BOR, FWS, and NPS must analyze, monitor, and plan for the survival and recovery of threatened and endangered species occupying and/or re-occupying newly emergent portions of Glen Canyon and its tributaries.**

As aridification continues and Lake Powell recedes, rapid recovery of newly emergent canyon-bottom riparian habitats and their associated aquatic ecosystems will be occupied and re-occupied by threatened and endangered species. The EIS and Biological Opinion must therefore analyze and provide for the survival and recovery of threatened and endangered species re-occupying newly emergent portions of Glen Canyon. Federal agencies should therein set forth plans for monitoring, detecting, and managing threatened and endangered species as they re-occupy newly emergent

portions of Glen Canyon and its tributaries. The EIS and Biological Opinion should prohibit re-submersion of habitats newly occupied by threatened and endangered species.

4. Riparian and Aquatic Habitat Issues

As part of the EIS review, direct, indirect and cumulative impacts to riparian and aquatic habitats from operations must also be fully considered. Changes in water flow and seasonal releases can have profound affects on riparian and aquatic habitats, the species that depend on them, water temperature, stream structure and other factors that must be fully considered in the EIS.

5. Cultural Values

As aridification continues and Lake Powell recedes, newly emergent portions of Glen Canyon will reveal long-submerged cultural sites, such as rock art panels, granaries, habitation, and other sites. The EIS must analyze and provide for protection and conservation of those sites, consistent with applicable laws, as they emerge. The EIS must specifically analyze measures to protect sites against re-submersion and, in the absence thereof, the effects of repeated saturation and drying cycles on the integrity of cultural sites.

III. <u>Alternatives that Should be Considered</u>

A. Worst Case Scenario Alternative: Protecting the Ecosystem As Flows Decline

Reclamation must analyze and plan for worst-case scenarios for Colorado River flow declines given ongoing and anticipated future climate warming, regional aridification and consider ways to ensure the protection of the Colorado River ecosystem and not just dam operations. In providing robust and adaptive considerations, besides producing an operational strategy to avoid shortages and/or avoid a run of the river condition throughout the system of reservoirs, as Reclamation has proposed, the agency must set forth triggers and corresponding emergency plans to avoid a collapse of the ecosystem.

B. Alternatives Under Various Depletion Schedules and With Elimination of the Structural Deficit (evaporation)

The Bureau must analyze a range of depletion schedules, including:

(1) an alternative that eliminates the structural deficit;

(2) an alternative that prohibits any new Upper Basin Depletions or diversions from the baseline of current use and excludes the “depletion schedule”

(3) an alternative that ensures tribes receive and can utilize reserved water rights needed for their permanent homelands and to protect the environment. This alternative must consider a scenario in which reserved water is used in various ways, including for development and for instream support of ecosystems.

C. Alternatives that Consider Changes in Physical Infrastructure

The physical infrastructure of the Colorado River Basin dams is antiquated and, unless changed dramatically and quickly, damage to ecological and social systems will be severe and irreparable. To avoid these outcomes, Reclamation should analyze:

1. One-Dam Solution Alternative

A similar alternative was originally submitted during scoping for the Shortage Criteria EIS of 2005 and called The One-Dam Solution includes:

- Reducing the use of inefficient above-ground water storage facilities, while expanding the use of underground storage to minimize evaporation losses. Regional aquifers could provide greater storage capacity than Lake Powell and Lake Mead combined.
- Employ Lake Mead as the principal water storage and distribution facility for water delivery to the lower basin states. Lake Powell storage is resulting in unnecessary evaporative losses to a limited water supply.
- Employ Lake Mead as the starting point for transporting sediment around the lower Colorado River system.[4]

As system crisis is imminent and remedies are urgently needed, this proposed alternative addresses critical issues that must be considered in the DEIS:

- The legal structure in the CRB simultaneously creates solutions and looming problems.
- Though the legal structure is based on priority, the critical needs of the natural environment are displaced, as are the needs of the First Nations and equity in fulfilling reserved water rights.
- Additionally, the infrastructure that was built for solutions also caused looming problems. Therefore, past generations received the benefits at reasonable costs —while future generations will inherit the inequities and looming problems and at

[4] The One-Dam Solution; Living Rivers & Colorado Riverkeeper, July, 2005. http://www.livingrivers.org/pdfs/TheOne-DamSolution.pdf

greater costs. The DEIS must consider an alternative that is more equitable and provides long-term solutions for future generations.

2. Glen Canyon Bypass Alternative and Decommissioning and Mitigations Alternative

Ongoing and anticipated future climate warming, regional aridification, and Colorado River flow declines require a plan from Reclamation for dead pool conditions at Lake Powell, and Glen Canyon Dam obsolescence, during the horizon of this planning process. The Bureau must plan now for decommissioning Glen Canyon Dam and analyze a range of corresponding engineering alternatives for doing so. The Bureau must ensure that all engineering alternatives for decommissioning Glen Canyon Dam are designed to prevent passage of non-native fish into the Colorado River in Grand Canyon National Park.

The Bureau should, therefore, analyze an alternative or alternatives that (1) accept and plan for the inevitable obsolescence of Glen Canyon Dam and the end of hydropower production therefrom, (2) provide engineering solutions to manage and/or decommission Glen Canyon Dam as run of the river, such as and including bypass, and that (3) provide protections and barriers that prevent nonnative fish from entering Grand Canyon from upstream and impacting endangered fish downstream. Reclamation must analyze a range of design alternatives for preventing passage of non-native fish into the Colorado River in Grand Canyon. Reclamation should analyze bypass / nonnative fish barrier alternatives in the NEPA process, as emergency mitigation for Grand Canyon's endangered fish in the event of dead pool, and as a long-term management and engineering solution for the climate-inevitable obsolescence and decommissioning of Glen Canyon Dam.

3. Bureau of Reclamation must analyze options for replacement power for decommissioning Glen Canyon Dam

Replacement power can be found both through conservation and efficiency measures and through implementing renewable energy projects paired with electric storage. Such projects in the areas currently serviced by the Glen Canyon Dam hydropower could include, but are not limited to, creative solutions such as installing solar panels on the Central Arizona Project to reduce evaporation and generate new clean energy.

IV. STRATEGIES FOR PREPARING THE EIS AND IMPLEMENTING NEW OPERATIONAL DECISIONS

A. Process and Scope should be expanded.

We urge the Bureau to embrace the following suggestions for the upcoming NEPA process:

1. Provide more in-person and virtual meetings at multiple locations in each basin state of USA and Mexico to ensure a robust review of the DEIS, FEIS and ROD..
2. The scope of the analysis must be comprehensive, programmatic and basin-wide in scope (including Upper Basin dams and the counties with trans-basin and intra-basin diversion projects in existence and new proposals).
3. Assess and disclose the costs for full implementation of mitigation and adaptive management programs along with operations. Reclamation will need to ask Congress for consistent funding to implement post-2026 programs necessary to fulfill management responsibilities outlined in the Record of Decision.
4. Enlist the National Academy of Sciences to run focus groups regarding climate adaptation strategies and environmental effects of operations.
5. Enlist the Center for Climate Adaptation Science and Solutions (CCASS) at the University of Arizona to partner on the development of strategies that attract sustainability solutions.[5]
6. Collaborate with the US Geological Survey[6] and Surface Atmosphere Integrated Field Laboratory[7] for base flow analyses and additional groundwater assessments, including flow modeling, resource monitoring, eDNA sampling, and isotopic data collection.
7. Build models predicated on non-stationarity weather patterns.
8. Outline schedules of Lower Basin and Upper Basin curtailments.
9. Prepare for curtailments caused by climate extremes that may be required to favor senior water rights in the Lower Basin and analyze those potential effects on the environment. *See* U.S. Supreme Court's 2006 decree in *Arizona v California*.
10. List the schedule of priority rights in the Upper and Lower Basin to give the public a better understanding of the differences between the two basins. We believe this will highlight a significant discrepancy in record keeping.
11. Account for all proposed dams and diversions on all tributaries and the main stem to help the public better understand future depletions that could affect the outcomes considered in the DEIS.

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[5] Center for Climate Adaptation Science and Solutions (CCASS). https://ccass.arizona.edu/themes/water-security-planning-and-policy/colorado-river

[6] Colorado River Basin Focus Area Study. https://www.usgs.gov/mission-areas/water-resources/science/colorado-river-basin-focus-area-study

[7] Surface Atmosphere Integrated Field Laboratory (SAIL). https://sail.lbl.gov

12. Outline all mitigation programs currently financed by hydropower revenues and provide reports on outcomes.
13. Reassess the effect of sediment mobilization at Lake Powell on storage, recreation, wildlife habitat, water quality, water temperature and other such impacts related to Glen Canyon Dam operations.
14. Outline and assess costs and feasibility of abandoned recreational infrastructure at Lakes Mead and Powell.
15. Outline and assess new recreational opportunities at places such as Glen Canyon and Lake Mead NRAs if the system operations change.
16. Assess and evaluate the cumulative impacts of increasing aridity upon habitat for endangered species and water availability.
17. Perform CRB vegetation assessments that highlight the status of invasive, non-native and native species on water quantity and quality.
18. Consider new thresholds for tier measurements for implementing curtailment/ shortage schedules.

B. Use of Colorado River Simulation System (CRSS) and Colorado River Mid-term Modeling System (CRMMS) for Modeling Must Look at a Broader Range of Assumptions and Inputs

The modeling paradigm Reclamation is using may not be sufficient to address a changing future. In addition we suggest that other inputs and assumptions must be looked at and should be run through the models including a inputs that account for the structural deficit (seepage and evaporation) and assumptions that do not include new Upper Basin diversions under the depletion schedule.

For modeling climate projections and creating scenario planning exercises, we suggest the following criteria for base flow and snow melt volumes at Lee's Ferry, Arizona (Compact Point). The framework should be vetted with the community of physical and social scientists who understand all the physical characteristics of the CRB. The baseline of supply data from 1906 to 2021, is not representative of the effects of anthropogenic warming. The current 30-year average is the only acceptable baseline for long-term planning.

a. Modeling the natural flow in the 21st century

1. Scenario One (control): The current 30-year average of 9.6 million acre-feet (2021) for inflows into Lake Powell.

2. Scenario Two: The projected 30-year average in 2051.[8]

[8] Overpack and Udall; 2020, PNAS. http://www.riversimulator.org/Resources/ClimateDocs/ClimateChangeAndAridificationOfNorthAmerica2020Overpeck.pdf

3. Scenario Three: The projected 30-year average of 2081.[9]

*b. **Modeling for global temperature increases in the 21st century***

Present-day monitoring data of carbon molecules hovering in the atmosphere clearly indicates that, since the first Conference of the Parties (COP) held in Germany in Year 1995, absolutely no progress has been made to reduce or sequester global carbon emissions.[10] Therefore, the work completed for 2007 to demonstrate possible reductions in temperatures for scenario planning between 2005 and 2060 was not helpful to the formulating the 2007 Interim Guidelines, nor to the public.

Optimistically, we propose the following criteria for scenario planning:

1. Scenario One (the control): The business-as-usual trend of rising temperatures that continue unabated to Year 2101.

2. Scenario Two: The trend actually stabilizes by Year 2051.

3. Scenario Three: The trend begins to reverse itself by Year 2081.

The above example is a plain language approach, which is necessary because previous narratives and graphics for the public consumption of this information was either too vague or too busy. The writers of this NEPA process should explain to the public that efforts to reduce greenhouse gases and cool the atmosphere and ocean have lag times that last many centuries. Consider, for example, that the temperature regimes of the Medieval Warm Period and the Little Ice Age were persistent for time periods that lasted three to four centuries.[5]

In other words, we need to accept that the negative impacts of climate change will not reverse in this century, i.e., that the ocean will continue to rise and the Arctic tundra will continue to thaw.

C. INCORPORATE TRADITIONAL KNOWLEDGE AND WISDOM FROM THE TRIBAL COMMUNITY VISION: THE WATER AND TRIBE INITIATIVE AND THE BLUFF PRINCIPLES

When Reclamation convenes the promised engagement meetings with the tribes, we recommend that baseline and holistic discussions follow the Bluff Principles, which

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[9] Barnett and Pierce

[10] Carbon dioxide data at Mauna Loa Observatory. https://keelingcurve.ucsd.edu/

emerged from a series of conversations among Hopi, Ute and other tribal leaders in Moab and Bluff, Utah, in 2016. [11] [12] Many of these suggestions will help to define the goals to achieve sustainability and resiliency, as mentioned in the Notice of Intent.

1. Clean water for all peoples.
2. Honoring sacred sites and the religious beliefs of all peoples.
3. A holistic approach to water management that focuses on the ecosystem.
4. Educating the public on the value of water: water is life.
5. Using science to improve our understanding of water quality and quantity.
6. A focus on collaborative, inclusive policymaking.
7. A water regime free of racism and prejudice.
8. An ethic that emphasizes concern and caring for everyone, downstream and upstream.
9. A goal of stewardship; leave the Earth and its water systems better than we found them.
10. Equity and fairness should be basic features in all water allocation decisions.
11. Understand that traditional wisdom, especially from the Elders, is critical.
12. A sense of urgency; we must act now before the problems become overwhelming. I
13. We must think of the welfare of future generations, not just for our own time.
14. Water is a gift provided by the Creator and should be sacred, shared, and loved.

D. ADDRESS SYSTEM VULNERABILITIES AND IMPLEMENTING CLIMATE ADAPTATION STRATEGIES

Center for Climate Adaptation Science and Solutions (CCASS)

Beginning in October of 2017, several science meetings were convened at CCASS at the University of Arizona at Tucson, and convened by its director, Professor Kathy Jacobs.

The 35 scientists (including Reclamation staff) that were convened for this gathering articulated the system's vulnerabilities in great detail. In many ways, their report may be

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[11] A Common Vision for the Colorado River System: Toward a Framework for Sustainability; 2022, Policy Brief 3; Water and Tribe Initiative. http://www.riversimulator.org/Resources/Tribes/WTI/TribalVisionAndBluffPrinciples2022PolicyBrief3WTI.pdf

[12] Community in the Colorado River; Jason Robinson, Matthew McKinney and Daryl Vigil; 2021, Idaho Law Review. http://www.riversimulator.org/Resources/LawOfTheRiver/CommunityInTheColoradoRiverBasin2021RobisonIdahoLR.pdf

the best scoping document for the Post-2026 EIS, and this document is linked below for your convenience and this document will be submitted for the administrative record.

Reference: Colorado River: Building a Science Agenda; Final Workshop Report; Sponsored by the National Science Foundation Award Number 1644884, and the Janet Quinney Lawson Foundation; Oct. 10-12, 2017. http://www.riversimulator.org/Resources/University/CCASS/October2017ColoradoRiverWorkshopReport.pdf

E. ADDRESS THE INEVITABLE FAILURES IN INFRASTRUCTURE

The academic community recognizes that 20th Century Infrastructure likely won't serve its intended purposes by the end of the 21st Century. Reclamation must consider these realities in the DEIS, demonstrating to the public that we are preparing for a future with fewer reservoirs and hydropower units.

It is refreshing to see scholarship that iterates what certain NGOs have been saying for decades. Now, Reclamation must follow suit, accepting those potential outcomes and including alternatives in the DEIS that reflect the likelihood of events Americans may soon face.

Wheeler et al (2021) explained that combined storage in Lake Mead and Lake Powell will rarely exceed 50% of capacity — which will create a scenario that forces society to choose between protecting the natural environment or continuing to generate hydropower at certain facilities.[13] Reclamation must address this reality in the DEIS and consider significant reductions in hydropower in the alternatives.

Schmidt et al (2023) further explain that declining natural run off and "increasing evapotranspiration and dry soils associated with global climate change" mean it is highly likely there will be far less water to be stored in the basin in the future. As a result:

"To stabilize reservoir storage, basin-wide use needs to equal modern runoff. To recover reservoir storage, basin-wide use needs to decline even more. Based on 21st century average runoff, a 13%–20% decline in basin-wide use would allow for stabilization and some reservoir storage recovery. Future policy debate about reservoir operations will inevitably concern whether most, or all, reservoir storage should be in Lake Mead or in Lake Powell. The choice of one or the other will result in significantly

[13] Wheeler, K., Kuhn, E., Bruckerhoff, L., Udall, B., Wang, J., Gilbert, L., Goeking, S., Kasprak, A., Mihalevich, B., Neilson, B., Salehabadi, H., & Schmidt, J. C. (2021). Alternative management paradigms for the future of the Colorado and Green Rivers. Utah State University Center for Colorado River Studies white paper no. 6 (p. 90). https://qcnr.usu.edu/coloradoriver/files/CCRS_White_Paper_6.pdf

different environmental and recreational outcomes for Glen Canyon and the Grand Canyon." [14]

Reclamation can no longer pan as taboo or radical a reservoir management system that entirely abandons reservoir storage in Lake Powell. It is in the mainstream channels of academic research, scholarship and discourse.

F. NEW SCIENCE AND RESEARCH THAT MUST BE CONSIDERED

We have compiled recent science and research relevant to the analysis needed in the DEIS. The list below and the attached documents supplement the other research we provided in earlier comments.

2023 - Aridification of Colorado River Basin's snowpack regions has driven water losses despite ameliorating effects of vegetation. Bass. Authors find that the CRB has 10% less water due to warming since the 1880s.	2023 - The Colorado River water crisis: Its origin and the future. Schmidt. Based on 21st century average run-off, a 13%–20% decline in basin-wide use would allow for stabilization and some reservoir storage recovery.
2023 - An historical perspective on the accounting for evaporation and system losses in the Lower Colorado River Basin. Kuhn. Water management of the Lower Colorado River has long sidestepped the questions of how to account for and assess the impact of reservoir evaporation and system losses.	2023 - A survey of the Bureau of Reclamations Decree Accounting Reports in the Lower Colorado River Basin. McCoy for ASCE. As climate change continues to constrain Colorado River water supply, detailed accounting may help reveal areas for potential efficiencies or demonstrate where the greatest levels of savings have been reached while ensuring that environmental and social benefits are preserved.

[14] Schmidt, J. C., Yackulic, C. B., & Kuhn, E. (2023). The Colorado River water crisis: Its origin and the future. WIREs Water, e1672. https://doi.org/10.1002/wat2.1672

2022 - Causes of Missing Snowmelt Following Drought. Lapides for AGU. Depleted moisture storage reduced in 2021 forecasts from 60% to 20% at 15 minimally disturbed basins and from 18% to 2% at 6 water supply basins in the Sierra Nevada.	2022 - What will it take to stabilize the Colorado River? Wheeler. Current policies are inadequate to stabilize the Colorado River, but vigorous consumptive use strategies can stabilize the system.
2022 - An Assessment of Potential Severe Droughts in the ColoradoRiver Basin. Salehabadi. **&** xlsx data sheets**.** Modeling scenarios indicate considerable periods when Lake Powell falls below its hydropower penstocks, indicating a need to rethink management during these critical conditions.	2022 - Characterizing drought behavior in the Colorado River Basin using unsupervised machine learning. Talsma et al. We show that areas of the Upper CRB could experience a large reduction in available water for evapotranspiration.
2022 - Rapid Intensification of Emerging Southwestern North American megadrought in 2020 - 2021. Williams. Exceptional drought severity in 2021, ~19% of which is attributable to anthropogenic climate trends, 2000–2021 was the driest 22-yr period since at least 800 A.D.	2021 - Concurrent Changes in Extreme Hydroclimate Events in the Colorado River Basin. Bennett. Our results indicate that concurrent extreme hydroclimate events are projected to increase in the future and intensify within critical regions of the Colorado River basin.
2021 - Colorado Water: Climate Change and Adaptation. Climate documents compiled by Brad Udall and Jonathan Overpeck and useful for the administrative record.	2020 - Large Contribution From Anthropogenic Warming to Emerging North American Megadrought. Williams. Anthropogenic trends in temperature, relative humidity, and precipitation estimated from 31 climate models account for 47% (model interquartiles of 35 to 105%) of the 2000–2018 drought severity,

2023 - The Colorado River water crisis: Its origin and the future. Schmidt.

The authors note actual reductions in use would be necessary to stabilize the current system and recovery is unlikely even if there are some wet years.

V. WATER SHORTAGES WERE PREDICTED

Reclamation has historically ignored well founded predictions that the basin would have far less water in the future. There are lessons to be learned from those mistakes. We offer this look-back at some key studies to encourage Reclamation to look with fresh eyes at the current state of the basin in this DEIS. This is in stark contrast to the outdated assumptions long relied upon by Reclamation regarding water availability and management. The Colorado River is a living ecosystem that must be maintained and restored — not a series of pipes and tubes.

Wallace Earle Stegner supported holistic water resource planning efforts since the writing of his Master's thesis about Clarence E. Dutton, and his biography about the career of John W. Powell. Along with Grove K. Gilbert and Almon H. Thompson, these four scientists from the 19th century understood the limitations of geography and climate in the arid lands of the western USA, and thoughtfully prepared a document for the consideration of Congress in 1878, and called *Report on the Lands of The Arid Region of the United States.* These concepts were largely rejected by Congress and, as many historians concluded, are among the first national missteps in the management of water resources on a continental scale.

To this day, this nation does not have an equitable national water policy, nor do we incorporate sustainability and resiliency into a regional EIS in the Colorado River Basin. The EIS writing team for this analysis needs assistance from skilled academics and from the traditional knowledge that the tribes have possessed since time immemorial.

a. The Energy Security Act of 1980: Response from the National Academy of Sciences, and by Roger R. Revelle and colleagues from The Scripps Institute of Oceanography.

Reclamation can no longer ignore the harsh facts climate change imposes — nor can it ignore the effect of industries outside the purview of its regulatory capacity.

In the early 1980s there were concerns about the energy policy discussions that were underway, and specifically about developing the reserves of oil shale and oil sands in the Upper Basin states of the CRB: specifically in southwest Wyoming, northeast Utah and northwest Colorado.

The former science advisor to Interior Secretary Stewart Udall (1961 to 1969), Roger Revelle, PhD, worried about the massive domestic energy source unnecessarily accelerating the loading of greenhouse gases into the atmosphere by the mass production of a low-value fossil fuel that requires excessive amounts of water and energy to develop, process, and distribute.

Revelle and his colleagues had determined by 1956 that the ocean had already reached its limit at absorbing carbon molecules from the atmosphere. This assessment incited the installation of the carbon dioxide monitoring station at Mount Mauna Loa, Hawaii in 1958. This data documents the correlation between greenhouse gas emissions and the generation of excessive heat inputs that have subsequently disrupted the circulation patterns of ocean and atmosphere.[15]

The following three papers were written by the original committee members of the National Research Council in 1983, which require the attention of the writers of this Post-2026 EIS. The committee members back then included Roger R. Revelle, Paul Waggoner and Timothy P. Barnett. Since these gentlemen are no longer living, we suggest the EIS writers reach out to Daniel Cayan and David Pierce at The Scripps Institute in La Jolla, California. Many of the suggestions in these documents (below) resemble the goals and objectives that our found in the Notice of Intent for this EIS.

A. National Research Council 1983. Changing Climate: Report of the Carbon Dioxide Assessment Committee. Washington, DC: The National Academies Press. https://doi.org/10.17226/18714.
B. Effects of a Carbon Dioxide-Induced Climatic Change on Water Supplies in the Western United States (Chapter 7) by Roger R. Revelle and Paul E. Waggoner, 1983. http://www.riversimulator.org/Resources/ClimateDocs/EffectsOfACarboInducedClimaticChangeOnWaterSuppliesInTheWesternUSARevelle1983.pdf

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[15] Revelle, Roger and Suess, Hans E., *Carbon Dioxide Exchange Between Atmosphere and Ocean and the Question of an Increase of Atmospheric CO, during the Past Decades,* Scripps Institution of Oceanography, University of California, 1957. http://www.riversimulator.org/Resources/ClimateDocs/CarbonDioxideExchangeBetweenAtmosphereOceanIncreaseOfAtmosphericCO2Revelle1957.pdf

C. Sustainable water deliveries from the Colorado River in a changing climate. Tim P. Barnett. Proceedings of the National Academy of Sciences, 2009. http://www.riversimulator.org/Resources/ClimateDocs/PierceBarnett2009.pdf

VI. CONCLUSION

Again, we thank you for this opportunity to share our concerns and insights with Reclamation staff and SWCA and Associates. We look forward to reviewing a robust EIS that fully addresses the issues raised in these comments, which are of critical importance to the future of the Colorado River ecosystem.

In closing we submit a brief summary of the critical issues that must be addressed in this EIS, and as follows:

The need and purpose of this EIS is to reduce consumption, significantly, and better prepare our communities, ecosystems and cultural landscapes for a Colorado River System with significantly less water. There must be a legally compliant, basin-wide approach to reducing consumptive uses and prohibiting new diversions of the dwindling system. Reclamation and the seven states must not fall victim to heuristics. If past behavior is any indicator, allowing the seven states to control the process will lead to system failures, harm to tribal water rights, and impacts to the public interest, especially the environment. Reclamation can no longer ignore the scholarship and the real-world signals demonstrating that 20th Century infrastructure is not prepared for 21st Century hydrology, which is rapidly changing as a consequence of anthropogenic climate change.

We will be happy to provide any insights and to work with Reclamation on developing our vision for a more sustainable, resilient river.

In the near future, we intend to send more detailed comments via email. We will also submit relevant documents that support the comments we will be sharing with you.

Very truly yours,

John Weisheit, Living Rivers and Colorado Riverkeeper
Taylor McKinnon, Center for Biological Diversity
Kyle Roerink, Great Basin Water Network
Tom Martin, River Runners for Wilderness
Tick Segerblom, Las Vegas Water Defender
Gary Wockner, Save The Colorado

Eric Balken, Glen Canyon Institute
Zach Frankel, Utah Rivers Council
Kate Hudson, Waterkeeper Alliance

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Letter #: 11

Date Received: 7/18/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: CO River Public Scoping Meeting 7_18

Yes, thank you, Meg, Carly, Amanda and Russ. I appreciate your presentations.

Hold on there while I get my statement up here. I don't trying to be efficient.

I would like this analysis to be more than just about Glen Canyon Dam and Hoover Dam, because the Bureau of Reclamation involved the operations of Flaming Gorge dam, Blue Mesa Dam and Navajo dam to prevent the outlet works at Glen Canyon Dam from essentially sucking air.

This history of dam operations to avoid system, risk and uncertainty also means reclamation. Must consult the Us. Fish and wildlife service about the biological opinions for the above-mentioned Federal dams in the upper Basin.

I also take an analysis by the Fish and Wildlife Service should include an updated biological opinion for the Multi Species Conservation program in the reaches of the lower basin below Hoover dam on the issue of providing robust and adaptive considerations. The record of decision, besides producing an operational strategy to avoid short, is it shortages and or avoid a run of the river condition throughout the system of reservoirs.

There also needs to be in place in an emergency plan to avoid a collapse of the ecosystems. For instance, it essentially took 6 years 6 years to develop the drought contingency, planning documents, and that program as developed, did not succeed because additional measures were required, and they were called the Drought Response Operations agreements.
Therefore, the contingency plan needs to be effective immediately. The next time Lake Powell or Lake Me drops below elevations for safe hydropower operations.

Lastly, the physical infrastructure and the legal foundations of the Colorado River Basin are antiquated, and they're very unhelpful unless the physical infrastructure and the social frame works are changed dramatically and quickly. This society will not be crossing to safety before the 20 s century arrives.

Additionally, I think the structural deficit must be eliminated. The upper base and depletion schedule must be eliminated. This would include any and all water contracts from Flaming Gorge reservation reservoir. The upper base and hydrologic determination must be modified to reflect the current 30 year

There should be a schedule for the tribes to receive the water they need for their permanent homelands. Their water is currently being used by the dominant society.

This water must be transferred to the tribes into the environment. Thank you very much for this opportunity. I appreciate it greatly.

Letter #: 21170

Date Received: 8/17/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 07: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

To Reclamation staff

Attached is one zip file containing documents cited in our scoping letter (Post-2026).

I mentioned I would try and keep these files below 15 MB, however this file is 17.9 MB.

It only contains one large file. It is a report from the National Academy of Sciences.

This is the 2nd of 2 files and specifically for the references cited within the narrative itself (not in the footnotes or in tables).

Please do not hesitate to call me if you encounter any issues with these zip files.

This is the last zip file for the citations in our scoping letter.

Thank you for processing these documents into the administrative record.

All the best, John Weisheit
435-260-2590

[attachment is not a comment]

Letter #: 21171

Date Received: 8/17/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 06: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

To Reclamation staff

Attached is one zip file (2.2 MB) containing documents cited in our scoping letter (Post-2026).

Please include these documents for the administrative record.

This is the 1st of 2 files and specifically for the references cited within the narrative itself (not in the footnotes or in tables).

Please do not hesitate to call me if you encounter any issues with these zip files.

All the best, John Weisheit
435-260-2590

[attachment not a comment]

Letter #: 21172

Date Received: 8/17/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 05: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

To Reclamation staff

Attached is one zip file (6.6 MB) containing documents cited in our scoping letter (Post-2026).

Please include these documents for the administrative record.

This is the 2nd of 2 files and specifically for the Table that begins on Page 17 of our scoping letter.

Please do not hesitate to call me if you encounter any issues with these zip files.

All the best, John Weisheit
435-260-2590

[attachment not a comment]

Letter #: 21173

Date Received: 8/17/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 04: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

To Reclamation staff

Attached is one zip file (10.1 MB) containing documents cited in the footnotes in our scoping letter (Post-2026).

Please include these documents for the administrative record.

This is the 1st of 2 files and specifically for the Table that begins on Page 17 of our scoping letter.

Please do not hesitate to call me if you encounter any issues with these zip files.

All the best, John Weisheit
435-260-2590

[attachment not a comment]

Letter #: 21187

Date Received: 8/16/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 03: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

To Reclamation staff

Attached is one zip file (8.8 MB) containing documents cited in the footnotes in our scoping letter (Post-2026).

Please include these documents for the administrative record.

This is the 2nd of 2 files and specifically for footnotes #10 thru #15.

[attachment not a comment: articles and reports]

Letter #: 21188

Date Received: 8/16/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 02: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

To Reclamation staff

Attached is one zip file (11.6 MB) containing documents cited in the footnotes in our scoping letter (Post-2026). Please include these documents for the administrative record.

This is the 1st of 2 files and specifically for footnotes #1 thru #9. The next zip file will be footnotes #10 thru #15.

[attachment not a comment]

Letter #: 21199

Date Received: 8/16/2023

Sender Names: 19198: John Weisheit

Emails: 19198: john@livingrivers.org

Organizations: Living Rivers

Subject: 01: Documents cited in Living Rivers Scoping Comments for Post-2026 Operations

[attachment not a comment]

To Reclamation staff

Attached is a zip file (3.6 MB) of documents cited in a table on Page 2 and 3 in our scoping letter (Post-2026). Please include these documents for the administrative record.

1) A zip file of our comment letters to Reclamation about dam operations between 2005 to 2023

August 11, 2023

Amanda Erath
Colorado River Post-2026 Program Coordinator
Bureau of Reclamation
Attn: Post-2026 (Mail Stop 84–55000)
P.O. Box 25007
Denver, CO 80225

Via email: CRBpost2026@usbr.gov

Dear Ms. Erath:

With this letter, the National Audubon Society (Audubon) is providing comments for the U.S. Bureau of Reclamation's (Reclamation) **scoping process on the development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead** (as published in Federal Register Notice – 87 FR 39455 on June 16, 2023). Audubon appreciates the opportunity to provide comments as the Colorado River, lifeblood of the American West, has outsized significance for wildlife. Audubon protects birds and the places they need, today and tomorrow, throughout the Americas using science, advocacy, education, and on-the-ground conservation. Our 1.8 million members care deeply about birds, and these comments are submitted on their behalf. Audubon has also joined partners in other comments and this letter is meant to be complementary.

Audubon is deeply concerned about current Colorado River conditions, which are a product of the combined impacts of an extended drought – exacerbated by the climate crisis – and governance that has been unable to reduce water uses fast enough to avoid unacceptable risks to water supply reliability for birds and people. This past winter provided abundant precipitation in the Colorado River Basin, yet system reservoirs remain more than half empty. Forecasts indicate the basin will continue to dry and the water supply will continue to shrink. Current operating guidelines are not adequate to stem the continued decline of Colorado River reservoirs to the point of crisis, and that risk is wholly unacceptable for people and nature.

In addition to the climate crisis, we are in the midst of a biodiversity crisis. One million animal and plant species are at risk of extinction, many within decades, more than ever before in human history.[1] North American bird populations have declined by three billion, a 30% decline, since 1970.[2] The biodiversity crisis is largely driven by habitat loss, and Colorado River management has an outsized impact on habitats in the arid West. For example, the riparian forest that lines the waterways of the Colorado River Basin provides critical habitat for birds, including 400 species along the Lower Colorado River alone. Scores of dams and diversions have altered river flows, with the result that native tree species are unable to thrive and invasive shrubs grow in their place, diminishing habitat value. With less native habitat available, at least six breeding bird species

[1] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. https://doi.org/10.5281/zenodo.3831673
[2] K. V. Rosenberg et al., Science 10.1126/science.aaw1313 (2019).

that rely on the Colorado River Basin, including the Bell's Vireo, Summer Tanager, Yellow-breasted Chat, Yellow Warbler, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo, have experienced significant population declines.

Reclamation needs to adopt Colorado River management that responds to both crises. Audubon urges Reclamation to consider that post-2026 Colorado River operating guidelines are fundamentally a component of regional adaptation to climate change. Colorado River Basin communities, economies, and ecosystems need to become more resilient to climate impacts. This will require large-scale efforts. Specifically, we urge Reclamation to consider the following priorities in defining the purpose and need as well as the scope for Colorado River management post-2026:

1. Climate change will continue to erode the stability of the Colorado River water supply. Developing new management rules requires consideration of the hydrologic extremes that may be generated by the changing climate, and that these extremes are likely to evolve over time.
2. The stability of the Colorado River water supply is of paramount importance, both to water users who value certainty and to the environment, which depends on the political will of decision-makers who will be challenged to prioritize environmental resources in times of water supply crises. Reclamation's metrics for the Colorado River water supply should prioritize system stability over maximizing deliveries to water users.
3. There are a number of Colorado River-dependent habitats with outsized importance for birds. Reclamation's metrics for evaluating management action alternatives must be able to assess impacts to: habitats managed for endangered species such as the Upper Colorado River Basin and San Juan Recovery Implementation Programs and the Lower Colorado River Multi-Species Conservation Program; National Wildlife Refuges on the Colorado River and its tributaries; the Grand Canyon; the Salton Sea; the Cienega de Santa Clara; and habitat values of irrigated agriculture (which provides forage in many locations where native vegetation has disappeared).
4. Reclamation's study process should include consideration of actions designed to improve the health and sustainability of Colorado River-dependent habitats. For action alternatives that degrade the health and sustainability of these habitats, Reclamation should, as a component of action alternatives, define and evaluate the impact of habitat mitigation.
5. While there will be limits to the scope of Reclamation's post-2026 Colorado River guidelines, these guidelines should anticipate parallel processes such as extension of the Upper Basin Drought Response Operations Agreement, the successor to Minute 323 (the U.S.—Mexico Colorado River agreement), durable water conservation, investment in restoration and protection of watershed health, and others. If designed in tandem, the post-2026 Colorado River guidelines and these parallel processes could provide greater water supply reliability for human uses and for nature.
6. It is imperative that Tribal Nations be involved in crafting workable solutions with the federal government and the states and it is time to correct the historical wrong of Tribal exclusion.
7. We will need to bring all expertise and interests to bear to meet the challenges we face going forward. Reclamation's NEPA process must be transparent and inclusive to ensure the outcomes are truly adaptive for all stakeholders.

Below we provide additional details on these priorities and identify additional concerns. Thank you for inviting this input.

1. PROCESS

Be transparent – Reclamation's decision process must provide public access to options under consideration, evaluation criteria, and decisions at every step along the way. The changes in Colorado River hydrology are so large, with such far-reaching consequences for all water uses and potentially for other river basins, that the historic practice of back-room decision-making must be replaced with clear and thorough information-sharing throughout the decision process. For example, Reclamation could host monthly webinars discussing the status of negotiations, emerging reservoir and river management ideas, and updates regarding impacts analysis, and follow these webinars with opportunities for public comment. If the public is informed about these and other relevant issues on a regular cadence, Reclamation will have the opportunity to hear public input on a regular basis, rather than waiting for the infrequent, major milestones of the draft and final Environmental Impact Statements.

Be inclusive – Many historic laws, compacts, and treaties that form the foundation of Colorado River management were adopted when institutionalized exclusion of some peoples and interests, particularly Tribal sovereigns who have lived in the basin since time immemorial, was common. Reclamation's process must reverse those inequities and include representatives of Tribal sovereigns with Colorado River water rights, both settled and unsettled. Audubon cannot speak for the Colorado River Basin's Tribes, but we urge Reclamation to listen to the Tribes' suggestions for inclusion in the decision-making process.

Prioritize Mexico's role in Colorado River management – The benefits of increased collaboration with Mexico in recent treaty agreements (Minutes 316, 319, and 323) are broadly recognized, including increased supply reliability for all water users, increased water conservation, and binational collaboration to protect and restore habitat in the Colorado River Delta. While Reclamation must allow the International Boundary and Water Commission (IBWC) to lead Colorado River negotiations with Mexico, Reclamation should prioritize coordination with, and capacity support for, the IBWC to ensure the United States can prioritize future collaborative management with Mexico. Specific suggestions include:

- provide bilingual specialists dedicated to working with IBWC in the binational process to define management options for evaluation and metrics for impact assessment;
- in partnership with Mexico, evaluate the potential for a revised salinity agreement to result in conserved water for Lake Mead, and the potential for revised groundwater agreements to increase supply reliability for water users in both countries;
- ask Mexico for an inventory of projects that could conserve water (if needed, provide resources to develop this inventory); and
- ask Mexico for an inventory of needs related to Colorado River Delta habitat restoration including the dollars and water needed to extend and expand the benefits created under Minutes 319 and 323.

2. PURPOSE AND NEED

Adopt a broader "purpose and need" for the Post-2026 Operational Guidelines that are responsive to developments since the 2007 Guidelines were adopted. President Biden's 2023 Executive Order on Environmental Justice states: "To fulfill our Nation's promises of justice, liberty, and equality, every person must have clean air to breathe; *clean water to drink*; safe and healthy foods to eat; and an environment that is healthy, sustainable, climate-resilient, and free from harmful pollution and chemical exposure" (emphasis added). Reclamation historically used enormous federal financial subsidies to promote development of the Colorado River and spur economic growth in the Western United States. Today, it is broadly acknowledged

that this development also created significant negative outcomes for the region's Tribes as well as birds and other wildlife. As the agency now pivots to Colorado River management adaptive to climate change, the agency should adopt a purpose and need for management that improves the reliability of supplies for everyone and everything that depends on access to clean water, with emphasis on correcting past inequities.

Reclamation's purpose and need statement for development of the 2007 Colorado River guidelines[3] was narrowly focused, in essence to:

A. improve Reclamation's management of the Colorado River by considering the trade-offs between the frequency and magnitude of reductions of water deliveries, and considering the effects on water storage in Lake Powell and Lake Mead, water supply, power production, recreation, and other environmental resources;
B. provide mainstream United States users of Colorado River water, particularly those in the Lower Division states, a greater degree of predictability with respect to the amount of annual water deliveries in future years, particularly under drought and low reservoir conditions; and,
C. provide additional mechanisms for the storage and delivery of water supplies in Lake Mead.

Audubon suggests consideration of the following for the purpose and need for post-2026 Colorado River guidelines:

A. improve Reclamation's management of the Colorado River by considering management that does not exclude an equitable and sustainable supply of clean water to support vulnerable communities;
B. improve Reclamation's management of the Colorado River by considering management that is protective of remaining habitats;
C. improve Reclamation's management of the Colorado River by anticipating future flows impacted by climate change;
D. consider new governance and stakeholder processes that operate on a timeframe that allows adaptation to conditions that may evolve beyond the scope of what is considered in post-2026 guidelines, for example with biennial public review of the operating guidelines' adequacy in the context of current hydrologic conditions;
E. clarify how management of reservoirs above Lake Powell factor into water availability for the Basin, and consider how their operations might include efforts to improve aquatic and riparian habitats;
F. consider trade-offs between reliability of the Colorado River water supply stored in Colorado River reservoirs and the quantity of Colorado River water deliveries to water users, recognizing the effects of unpredictable water supplies on regional economies, vulnerable communities, and wildlife habitats;
G. provide all users of Colorado River water a greater degree of predictability with respect to the amount of annual water deliveries in future years, particularly under drought and low reservoir conditions;
H. provide additional flexible mechanisms that provide or support incentives to conserve consumptive uses of water throughout the basin; and

[3] U.S. Bureau of Reclamation, Final EIS – Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (2007).

I. define mitigation for avoidable impacts to habitats and natural systems.

3. SCOPE

The **geographic scope of the action alternatives** need not be limited to the scope of the 2007 guidelines, but rather should be defined as necessary to accomplish the purpose and need.

The **geographic scope of the impact analyses** must be broad enough to capture effects *wherever* they occur, including at resources reliant on Colorado River water and "downstream" from Colorado River water uses, such as the Salton Sea (downstream from irrigated agriculture in the Imperial Valley) and the Cienega de Santa Clara (downstream from irrigated agriculture in the Wellton-Mohawk Irrigation and Drainage District).

Other resource **impact analyses** should include (but not be limited to):

- Water quality;
- Reclamation's ability to comply with the requirements of Minute 242;
- Biological resources in the Colorado River and tributaries including riparian species and habitats;
- Ability of water users to comply with requirements of the Endangered Species Act;
- Impacts of fallowed agricultural lands, including dust emissions and public health as well as avian habitat loss;
- Tribal assets including lands and waters and cultural resources;
- Cultural resources including native plants used by Tribes to sustain traditional practices;
- National Parks, National Wildlife Refuges, state parks, and other lands with protective designations;
- Socioeconomic and environmental justice considerations including farm labor;
- Recreational resources;
- Hydropower;
- Emissions of carbon and other gases driving climate change; and
- Cumulative impacts.

The 2007 guidelines were given a **temporal scope** of 20 years, with a built-in provision for re-consultation if the water surface elevation at Lake Mead dropped below 1025' msl. History shows that the federal government, Colorado River Basin states, and water users found it necessary to adopt management measures to supplement the 2007 guidelines before the re-consultation provision was triggered, due to concerns about rapidly declining water storage. Audubon suggests that post-2026 guidelines include provisions for a regular process for assessing their adequacy during the period they are in effect. That could be incorporated as an expected, calendared assessment, or as a trigger for assessment such as the volume of water in system storage.

4. OTHER CONSIDERATIONS

Use sound science – Reclamation's decision process must be rooted in the best available science and reliable data, both regarding the range of future conditions in consideration of climate change impacts, as well as regarding the impacts of changes in river management.

Enable decision-making under uncertain future conditions – As stated in Reclamation's Federal Register notice, climate change makes future hydrologic conditions on the Colorado River unknowable. Reclamation has long relied on a probabilistic approach to projecting future hydrology, which has proven inadequate to capture the extent and pace of climate change impacts over recent decades. Reclamation's decision process will create a more sustainable operating framework – and a more sustainable Colorado River – if it considers hydrologic futures far more extreme than could be captured in a data-set premised on a river that provides a mean annual average of 11 million acre-feet, or 9 million acre-feet, or even 7 million acre-feet. The basin needs an operational regime that will stand up to the fullest range of future conditions imaginable.

Aim for management that avoids crises – Failure in this realm will perpetuate a crisis-based decision environment and continued uncertainty for all water users. In a perpetual crisis environment, water shortages – including in some cases potential loss of all surface water supply – will continue to threaten the economies of Western communities. In times of water supply crisis, water leaders at the local, state, and federal levels will have less latitude and time to consider impacts to vulnerable communities and environmental resources, as their attention will necessarily be directed to the largest water-shortage-related economic impacts. Rather than deferring decisions about shortage-sharing and reservoir management in the driest of future conditions, as was done in the 2007 Interim Guidelines, Reclamation's post-2026 management framework should provide certainty so that local, state, and federal water managers can create plans for those future conditions now, while they have more time to consider a full range of options and impacts.

Consider water supply reliability – Reclamation's evaluation of a future Colorado River reservoir management framework should consider the benefits of re-filling reservoirs in the near term as a way to increase the reliability of water supplies for all water users. If Reclamation's impacts analysis emphasizes maximizing volumes of water available for delivery to water users, it may miss the benefit of a more reliable supply.

Evaluate and communicate available reservoir water supplies – Each of Reclamation's Colorado River reservoirs has a total supply – the total volume of water in the reservoir – and an available supply – the volume of water that a reservoir can deliver downstream in consideration of "dead pool." Reclamation routinely reports on the total supply (as a percentage of full capacity) at its Colorado River reservoirs and does not routinely report on available supply. In 2022 Reclamation highlighted this discrepancy while making the emergency decision to reduce the volume of water to be released from Lake Powell. All of Reclamation's analyses, as well as all public communications about Colorado River reservoirs, should clearly communicate the available supply.

In addition, Reclamation should be transparent about any considerations of "paper water" or "miracle water" – in other words considerations of water as if it exists in a location when it does not in fact exist – in the context of modeling reservoir operations and shortages. The use of "miracle water" in the 2012 Colorado River Basin Study obscured water supply deficits in the basin, both in the Upper Basin where Compact delivery deficits were not calculated, and in the Lower Basin, where modeled shortages were based on the assumption that Upper Basin deliveries to the Lower Basin were successfully complying with delivery obligations in the Colorado River Compact. Given the broad public interest in Colorado River water availability under the terms of the Colorado River Compact, it will be extremely important for Reclamation to provide clear and thorough explanations for any modeling assumptions that could potentially obscure these results.

Reclamation should consider operating guidelines that rely on reservoir storage and recent historic hydrology to determine future releases, rather than on projections based on assumptions about future precipitation and climate. Under the 2007 interim guidelines, releases from Lakes Powell and Mead are determined by the prior-

year August 24-month study projection of reservoir elevations and did not adequately stem the decline of Colorado River supplies stored in reservoirs.
Reclamation should consider the potential to establish new accounting systems (in conjunction with clear and transparent reporting) that allow water users and federal facility managers greater flexibility in managing water supplies. Improved accounting as an alternative to measuring Compact deliveries at Lee Ferry could enable optimized flows through the Grand Canyon.

Evaluate the difference between water shortages and voluntary, compensated reductions in water use – Reclamation and the Colorado River Basin states have gained experience from system conservation pilot projects that date back at least 15 years. When water users engage in voluntary, compensated reductions in water use, the economic impacts are significantly different than when involuntary, uncompensated shortages are implemented, in terms of both the sectors and geographies that engage. A management framework based on voluntary and compensated reductions in water use can avoid shortages to water users least able to adapt to reduced water supplies, such as endangered species and critical urban water uses. Reclamation's analyses of management options should clearly distinguish these different approaches to reducing water uses in the Colorado River Basin, and evaluate a full range of impacts for both, including how the distribution of reduced water use would differ.

Consider increased flexibility in Colorado River management – One often-recognized challenge of Colorado River management is the sheer number of jurisdictions (irrigation districts, municipal water utilities, counties, states, Tribal sovereigns, countries) that share the water resource. Among these jurisdictions are vast differences in water availability, water prices, and economic productivity of water uses. Because of these differences, there are instances where one jurisdiction has invested in water conservation located in another jurisdiction, where such an investment might not otherwise be economically rational. Because water is not perfectly "liquid" in a market sense, Reclamation should consider developing new and expanded tools to promote this kind of flexibility, such as water banks, with appropriate safeguards for third-party environmental and community economic impacts.

Consider environmental water needs and environmental justice – Reclamation's decision should both include management options that intentionally improve freshwater-dependent habitats and the species that rely on them, and also fully evaluate the impacts of all management options on freshwater-dependent habitats and the species that rely on them. In addition, Reclamation must consider management impacts on vulnerable communities.

Habitats and species that depend on the Colorado River are jeopardized, as evidenced by the numerous endangered species designations in the basin, and climate change is further threatening their viability. Reclamation should create and evaluate at least one option for post-2026 management based on improving outcomes for freshwater-dependent habitats and species.

In addition, Reclamation's analysis should include use of metrics that evaluate how various management options impact freshwater-dependent habitats and vulnerable communities including:

- Upper Basin River habitats, including metrics for spring peak flows and fall base-flows;
- Grand Canyon habitats, including metrics for annual, minimum, and maximum flows;
- Lower Colorado River habitats by reach, including metrics used to establish "covered" conditions in permits obtained through the Lower Colorado River Multi-Species Conservation Program;

- Salton Sea habitats and environmental justice concerns, including inflows, water quality, lake levels, areas of exposed playa, and dust emissions; and
- Ciénega de Santa Clara habitats, based on changes in the quantity and quality of water the United States delivers to these habitats via the MODE canal.

Use both baseline conditions and a no action alternative as points of comparison for proposed action alternatives - The impacts of the climate crisis and the biodiversity crisis in the Colorado River Basin are already evident. While Reclamation is not required to mitigate the impacts of these crises, the agency's analyses can be a useful way for the public to understand how the Basin is expected to change over time. Reclamation's evaluation of action alternatives should include comparison to both a baseline and to a no action alternative. The baseline is comprised of the affected environment, a description of the environment as it exists today. The affected environment is essentially a snapshot in time. The no action alternative projects changes to baseline conditions that are not the result of the action alternatives but rather the result of other changing conditions, for example climate change. We urge Reclamation to include analyses that compare action alternatives to the baseline as a way to identify how conditions are expected to change in the Colorado River Basin. Stakeholders need this information to adapt to changing conditions and to understand how the impacts of proposed action alternatives will add to other impacts that will accrue over time.

Define possible mitigation actions that can be evaluated in tandem with the action alternatives – Reclamation's analyses of proposed action alternatives are expected to show negative impacts to Colorado River-dependent habitats and other environmental resources. We urge Reclamation to define mitigation actions as a component of action alternatives. It will be extremely helpful to understand if and where reasonable mitigation actions are available. Identifying these actions may allow environmental stakeholders to support action alternatives that might otherwise be unacceptable.

Consider how management options will interact with other responses to conditions on the Colorado River – Congress has made unprecedented appropriations in 2021 and 2022 to address Colorado River and other Western river conditions (i.e., through the Bipartisan Infrastructure Law and the Inflation Reduction Act). While we do not yet know the specifics of how these dollars will be used, the appropriations do come with authorizations and guidance, and some investment details will be known as Reclamation evaluates future management options. Reclamation's analysis would benefit from consideration of these investments (current and future), and Reclamation's post-2026 management decision should aspire to complement them.

Audubon is deeply appreciative of the opportunity to comment. We urge Reclamation to establish a process for developing a post-2026 Colorado River management framework that results in a resilient water supply and healthy rivers for all life – the people, the birds, and all the creatures that rely on this resource.

Sincerely,

Jennifer Pitt
Colorado River Program Director

cc: Camille Calimlim Touton, Commissioner, US Bureau of Reclamation
David Palumbo, Deputy Commissioner, US Bureau of Reclamation
Wayne Pullan, Regional Director, Upper Colorado River, US Bureau of Reclamation
Jaci Gould, Regional Director, Lower Colorado River, US Bureau of Reclamation

NRDC
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NATURAL RESOURCES DEFENSE COUNCIL

August 15, 2023

Bureau of Reclamation
Attn: Post-2026 (Mail Stop 84-55000)
P.O. Box 25007
Denver, CO 80225

via email: crbpost2026@usbr.gov

RE: EIS Scoping -- Colorado River Post-2026 Operations

Dear Reclamation Post-2026 EIS Scoping Manager:

We submit the following scoping comments for the development of the Environmental Impact Statement for Post-2026 Colorado River Operations as per the Federal Register notice of June 16, 2023.

We appreciate the leadership of Commissioner Touton in mobilizing an appropriate response to the diminished storage and flows in the Colorado River system, and we look forward to working with you as you develop and implement much-needed additional actions and policies to protect the system and the people and ecosystems that depend on it.

Overview

The current crisis facing the Colorado River system is a major test of the Nation's ability to respond to the effects of climate change that are already upon us. On June 14, 2022, Commissioner Touton publicly alerted the Colorado Basin states of the need to prepare for reductions of 2 to 4 million acre-feet of Colorado River water next year, or as much as 1/3 of the amount of water delivered in a typical year. Sharply declining water levels behind both Hoover Dam and Glen Canyon Dam raised alarms about the system's ability to continue to supply water and power, forcing the states to consider what was previously unthinkable.

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The writing has been on the wall for some time. It was long known that the Colorado was over-allocated during the interstate compact negotiations of the 1920's, and that both the Basin states and the Bureau of Reclamation ignored this reality for decades. Numerous studies, scientists, and engineers warned that diversions from the Colorado were unsustainable. The last 23 years of unparalleled drought have further demonstrated that the scientific community was correct in their concerns, but even the climate modelers didn't predict that the scope and scale of drought and extreme heat impacts would be so monumental, so quickly.

Ten years ago, the Bureau, in cooperation with the basin states, completed the Colorado River Basin Water Supply and Demand Study. This 2012 report was the first comprehensive effort by state and federal agencies to factor the impacts of climate change into long-term projections for the basin. While many scenarios were evaluated, the trend was clear. A comparison of the median water supply projections against the median water demand projections showed a projected imbalance in supply and demand reaching 3.2 million acre-feet by 2060.

Unfortunately, state leaders and stakeholders do not have 40 years to ponder and process the seismic shift that is now taking place. An opportunity to make the needed 2-4M AFY in cuts through the SEIS process was effectively deferred until post-2026 operations because of one above-average precipitation year in the Colorado River Basin: a short-sighted approach that will make the post-2026 cuts that much more challenging. In an ideal world, major cuts in water use would be phased in over a decade or more, with accommodations and adjustments made at a manageable pace. But the opportunity for gradual adjustments has passed, and a soft landing for every impacted water user may not be obtainable.

When the first shortage declaration for Lake Mead was made in 2021, California was spared while Nevada and Arizona were curtailed for 2022. Similarly, when the second shortage determination was made in 2022, California was again spared while Nevada and Arizona were further curtailed for 2023. Going forward, the DCP's asymmetric application of water reductions must give way to a more equitable apportionment of supply constraints to achieve the even larger reductions that will be necessary. As the largest user of Colorado River water by far, California must anticipate receiving its full and fair share of reductions. Fairness also demands that reductions must involve both the urban and agricultural sectors, and must involve permanent reductions in Colorado River withdrawals, not simply the adoption of short-term expedients, such as temporary fallowing of irrigated land. 2060 has arrived sooner than expected.

Recommendations for Post-2026 EIS Scoping

We offer comments on the following specific topics:

- Tribal water rights
- Reclamation's modeling assumptions with respect to Upper Basin depletions
- Modeling with evolving climate science

- Lake Mead shortage conditions
- Shortage measures
- Allocation of Lower Basin evaporation
- Community and environmental protections
- Duration of the Post-2026 operating plan

Tribal Water Rights

Provision must be made in this and future deliberations on Colorado River operations for the full and timely engagement of Tribal representatives and respect for Tribal water rights. In its role as Trustee, the Department of the Interior should ensure that Tribes receive support for independent analysis of the impact that any proposed modifications or alternatives will have on their individual water rights and interests, both immediately and in the longer term. This will require frequent and meaningful consultation with individual tribes whose interests are likely to be affected as alternatives are developed. And in all scenarios, executed Tribal water rights settlements must be fully honored, and resolution of pending claims not foreclosed.

Modeling Assumptions with Respect to Upper Basin Depletions

Reclamation should clearly describe all modeling assumptions and inputs used in its projections of unregulated inflows into Lake Powell. In particular, Reclamation should provide a table listing assumed annual Upper Basin depletions. Does Reclamation use the Upper Colorado River Commission's June 14, 2022, Updated Demand Schedule? An average of recent depletions reported in the provisional *Consumptive Uses and Losses reports*? Recent averages modified by presumed water availability under hotter and drier conditions? Clarifying these modeling assumptions will improve our understanding of potential inflows to Lake Powell and projected elevations at Powell and Mead.

Modeling with Evolving Climate Science

How will Reclamation utilize the latest climate modeling, including downscaling, to develop better, higher resolution, more protective estimates of the impacts of various future climate scenarios? Recent work from numerous researchers has demonstrated that increased temperatures, extreme heat, and reduced snow albedo have led to dramatic reductions in river flows. This must be analyzed and modeled under various climate futures, at least through 2060. Also, as the last 23 years of drought and this summer's record heat have demonstrated, scenarios must capture the outer range of projected outcomes because variability in climate conditions is so much greater than what was projected only a few short years ago. We suggest the analysis of a scenario with a 5-6M AFY reduction in water supply allocations in order to capture potential extreme drought and heat scenarios.

Lake Mead Shortage Conditions

The rapid and continuing loss of system storage has demonstrated that existing reservoir elevation-based shortage criteria are insufficient. A more aggressive set of Lower Basin

shortage criteria that also accounts for current and projected basin runoff should be implemented. Reclamation should consider an alternative that determines Lake Mead "Shortage Conditions" based on factors including estimates of current and future runoff under very dry conditions (such as 2002-2004 or 2020-2022 runoff), existing storage in Lake Mead and Lake Powell, Treaty obligations, contractors' annual water orders, and operational and regulatory constraints such as the federal Endangered Species Act and Grand Canyon Protection Act requirements.

Reclamation should also consider a shortage alternative that ignores Lake Mead elevation once an August 24-month minimum probable projection shows it falling below 1075' and simply limits Lake Mead releases to prior year inflows less reservoir evaporation.

Shortage Measures

Reclamation should expand the pool of parties eligible to create Intentionally Created Surplus (ICS) beyond existing Colorado River contractors to include water agencies and other entities with existing agreements to use Colorado River water, such as retail water agencies or sub-wholesale agencies. Reclamation should eliminate the existing limits on the total quantity of Extraordinary Conservation ICS and DCP ICS that may be accumulated in ICS and DCP ICS accounts, while maintaining existing limits on delivery of such water.

All scenarios should include more rigorous application of the Bureau's authority under 43 CFR Part 417 to reduce a contractor's water order for delivery from the Lower Colorado River to the amount that ensures the beneficial use of all water so withdrawn. Part 417 specifies that each year's water order shall be evaluated by the Bureau taking into account several specific factors, including a contractor's land classifications, the kinds of crops raised, the type of irrigation systems in use, the condition of distribution facilities, and the operating efficiencies of the water users. Excessive water duty, antiquated distribution systems, promotional water pricing, and injudicious crop selection can all contribute to excessive water use that should no longer be accommodated. The Bureau should identify and enforce best practices for the avoidance of waste by all Lower Colorado contractors. As part of this process, Reclamation should articulate the criteria or standards that will guide its determinations of beneficial use of water, in a form that lends itself to objective application, monitoring, and compliance assurance to eliminate wasteful use. Such savings should be part of the baseline of each action alternative described in the EIS.

As one example, Reclamation could evaluate a measure limiting deliveries to contractors to allow for no more than median levels of unrecovered system losses. That is, if median system losses for such contractors are currently 10% but a particular contractor's unrecovered system losses are 20%, Reclamation would reduce deliveries to that contractor by 10%. Such a measure could further encourage best practices and reduce system waste; when paired with federal water efficiency incentives, it could reduce system demands without affecting beneficial uses.

Best Practices for Water Efficiency and Wastewater Reuse

At least one action alternative in the Post-2026 EIS should include a scenario under which water withdrawals are conditioned upon the adoption of best practices for water efficiency and wastewater reuse that are already in use within the Colorado Basin states.

Many important policies to promote urban water efficiency have been developed in the Basin states, but most are not universally applied. A non-exhaustive list would include –

- Require removal of non-functional turf grass. (Nevada)
- Incentivize landscape conversion and turf removal statewide. (California, Utah)
- Adopt stronger efficiency standards for plumbing and equipment. (Colorado, California, and Nevada)
- Require urban utilities to report distribution system leakage, and to meet standards for reducing water losses. (California)
- Require all new urban landscapes to be water-efficient. (California)
- Require metering of landscape irrigation turnouts (Utah)
- Ensure that existing buildings are water-efficient when they are sold or leased. (Los Angeles, San Diego)
- Develop regulations for indirect (IPR) and direct potable reuse (DPR) of reclaimed wastewater. (California and Colorado for DPR, additional states for IPR)

Improved water efficiency in the agricultural sector has many practitioners and offers enormous additional potential through more widespread application of recognized practices, such as the elimination of flood irrigation, lining open ditch distribution systems, converting to pressurized pipe distribution and precision irrigation, delivery on demand, evaporation suppression through solar installation or other coverings, soil sensors for irrigation timing, improved moisture retention through soil health, more use of recycled water for irrigation, and requiring agricultural water deliveries to be metered and priced at least in part by volume.

The technologies and practices that save water in urban and agricultural contexts are well known and available today. Reclamation should collate the best practices found within the basin, and should model a scenario that will condition a portion of future withdrawals on the adoption of best practices by a date certain. Such measures alone may not provide the entire volume of water savings that is needed to protect critical reservoir elevations. Nevertheless, the avoidance of water waste and unnecessary consumption should be the *first* place to look for demand reductions, and these are concepts that should be integral to Colorado River operations going forward.

Water efficiency is a proven pathway to water reliability, and the tools are at our fingertips if we choose to use them. Los Angeles uses *less* water today than it did 50 years ago, even while supplying a population that has grown by nearly 50%. Yet even cities and states that have led the way in key areas of water efficiency still need to catch up in others. Now is the time to act on all reasonable options at hand.

Allocation of Lower Basin Evaporation

The scope of the Post-2026 EIS should include the allocation of Lower Basin Evaporation. While a portion of Upper Basin evaporation has been assigned to individual Upper Basin states, the entirety of Lower Basin evaporation – estimated at 0.8 MAF for 2021 -- is borne by the system, rather than that the states. This glaring difference between Upper and Lower Basin accounting hinders partnership and cooperation. Allocating evaporation from Lower Basin reservoirs to Lower Basin contractors at a rate proportional to their water use would address this inequity and provide a well-founded basis for retaining roughly 0.8 MAF annually in storage at current reservoir elevations. We commend the Commissioner's August 16 announcement that notes a likely federal rulemaking to "address evaporation, seepage and other system losses in the Lower Basin" and urge that necessary environmental evaluation be undertaken as part of this EIS.

Community and Environmental Protections

Communities and ecosystems should not suffer additional harms in the interests of protecting system storage and dam operations. Each action alternative in the Post-2026 EIS must include elements that fully mitigate the environmental and community impacts of water use reductions throughout the Colorado River Basin and the areas served by Colorado River supplies. The curtailment of water deliveries to irrigation districts will undoubtedly impact farm labor and farm worker communities. These impacts need to be assessed, minimized and fully mitigated. This EIS should consider and evaluate potential scenarios for repurposing of lands removed from irrigation, consistent with the views and preferences of impacted communities.

Existing recovery programs, such as the Lower Colorado River Multi-Species Conservation Program, should be reviewed and likely expanded to ensure that diminished flows do not further compromise species and habitat targets. The Post-2026 analysis should quantify and account for the impacts of reduced river flows, shallower reservoirs, and evaporation on water temperature and salinity concentrations, and their associated impacts on both instream aquatic life and off-stream beneficial uses. Reclamation and other federal agencies should also commit to the long-term protection of all Colorado River basin associated ecosystems, with restoration targets for success and milestones, such as the Salton Sea and the remnant Colorado River delta, that will suffer as contractors reduce their water use unless protective steps are taken concurrently. As part of the environmental review, management scenarios for the Colorado should be assessed in terms of the impacts on human health to nearby residents from increasing dust emissions in areas including the Salton Sea and the Delta as a result of decreased flows to those critical natural areas.

Duration of the Post-2026 Operating Plan

During the Post-2026 period, river operations must remain responsive to the pace and severity of the impacts of climate change on the river's hydrology. Under current

circumstances, it would be imprudent to commit to an operating plan with a duration longer than 10 years.

Thank you for your consideration of these comments.

Sincerely,

Edward R. Osann
Senior Policy Analyst
Natural Resources Defense Council

Mark Gold, D.Env.
Director of Water Scarcity Solutions
Natural Resources Defense Council

Thoughts for operating the Colorado River after 2026

Mark E. Capron, PE and Mohammed A. Hasan, PE

20 July 2023

Seek justice and truth with honest science and engineering for post-2026 Colorado River Management. Features of such an operating plan include:

- Federal funding for multi-benefit projects associated with the Colorado River.
- Either drop the concept of "senior water rights" or reassess who really has the most senior water rights. Either way, this is essential for adjusting the total amount of water that can be extracted from the Colorado River each year.
- Have Native Americans decide the total amount of water that can be extracted from the Colorado River each year.

Example multi-benefit Project (there are others)

About 20% of Colorado River water use is for municipal and industrial users (near 3 million acre-feet/year (AFY)). Municipal and industrial users can pay more for water than can agricultural users. Also, low-cost water for agriculture helps make lower cost food.

Projects should have multiple benefits, for example desalting 6 million AFY of the Sea of Cortez while refilling the Salton Sea with the reject brine. Reject brine into the ocean is normally a big environmental impact. In the Salton Sea, reject brine prevents toxic dust clouds, an huge economic and environmental benefit. Figure 1 shows this multi-benefit project replacing Arizona's 2023 plans for a desalination plant near Puerto Peñasco, Mexico with a pipeline through the Organ Pipe Cactus National Monument. The pure water from the pictured Desal Facility can be pumped to Lake Havasu for conveyance to Southern California, Arizona, and water trading to all Colorado River States and Mexico.

Figure 1 – Conceptual depiction of multi-benefit Colorado River project

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About 2 million acre-feet/year (AFY) of desal reject brine, and/or seawater, could grow the Salton Sea with more water than evaporates each year. The Desal Facility can be configured to produce reject brine that is less than 70 parts/thousand (ppt) of salt), less than the Salton Sea's current average. Gulf of California water is 35 to 35.8 ppt. The region has ample solar, geothermal, and tidal renewable energy. The Salton Sea is currently an ill-managed polluted salt dump. Reject brine could make it a well-managed salt disposal site for the farmers of California's Imperial Valley. A similar arrangement could be used to refill Great Salt Lake.

No, or different, "senior water rights"

A just rule would admit that Native Americans (including those in Mexico) have 100% of the senior water rights in the U.S. This based on many wrongs that need righting:

1) Colonizers, U.S. Federal, and State governments committed genocide while forcing natives to move. The genocide included biologic warfare (not often intentional) that killed 9 of 10 natives. Read Guns, Germs, and Steel (Jared Diamond) and others.
2) The 1862 Morrill Act "gave" unceded Native land, and mineral rights, to Union states. This theft of land was used to fund land grant colleges (such as the University of California). The theft included subsurface water and may have included surface water.
3) A 22 June 2023 Supreme Court decision denied a Navaho request for the U.S. Federal government to identify the water rights it holds for them.

Even without the injustices, the late 1800's and early 1900's concept of "senior water rights" could be considered as mechanism to drive investment in water and water-using infrastructure in Western States. That is, the investors were assured of recovering their investment. Large investments, such as dams and canals, might be justified with a 50-year economic life. The investors have been overcompensated with over 100 years of investment recovery.

Replacing "senior water rights"

Water from a more-expensive-than-river-water project, such as desalting the Gulf of California, can be allocated to states based on how much a state contributes to the cost (capital and operation) of the project. States might adjust their amount and/or fraction of project water annually by trading with each other or adding more desalting modules and conveyance capacity.

Mexico, ideally the Native Americans in the Colorado River Delta, should have the most senior rights. The amount could be the 1944 agreement's 1.5 million AFY or some faction of the total.

States could receive a fraction of the total natural flow proportional to their land that is irrigated with Colorado River water.

Native Americans would receive a fraction of the total natural flow proportional to their land and population that could be irrigated with and/or receive Colorado River water. The Native Americans select the total amount of water that can be withdrawn from the river each year as follows (fictious numbers for example): If the Native Americans decide to withdraw 2 million acre-feet from the Colorado River in 2035, the total withdrawal (perhaps excluding the flow to Mexico) in 2035 becomes 10 million acre-feet. Should Native Americans plan to use only 0.5 million AFY in 2037, then the total withdrawal (excluding Mexico) becomes 2.5 million AFY. Phase-in over a decade so that Native American's current lack of irrigated land does not constrain the total that can be withdrawn. (Yes. Making the total withdrawal proportional to Native American use leaves non-natives encouraging natives to use more water!)

PACIFIC INSTITUTE

Research for People and the Planet

September 1, 2022

Carly Jerla
Senior Water Resources Program Manager
Bureau of Reclamation

Via email: CRB-info@usbr.gov

RE: Request for Input on Development of Post-2026 Colorado River Reservoir Operational Strategies for Lake Powell and Lake Mead Under Historically Low Reservoir Conditions

Dear Ms. Jerla:

The Pacific Institute submits these comments in response to the above-referenced notice published in the June 24, 2022, Federal Register. The Institute has been actively engaged in the development of Colorado River policies and strategies for almost 25 years, participated in the development of alternative surplus and shortage guidelines for the river and the 2012 Basin Study, and has published many reports and articles on the sustainable use of Colorado River water. We focus our comments on potential substantive elements and strategies for Colorado River operations to address low-reservoir conditions in the Basin.

Despite the extraordinary conservation and cooperation of Colorado River water users and stakeholders over the past 15 years and the nearly three million acre-feet (MAF) of "Intentionally Created Surplus" (ICS) water stored in Lake Mead, Colorado River system storage continues to plummet. The August 24-month "minimum probable inflow" study projects the elevation of Lake Powell to drop below the minimum power pool elevation by the end of next year, requiring bypass flow releases that could damage pipes not designed for that purpose and threatening the water supply for Page, Arizona and the LeChee Chapter of the Navajo Reservation. Under this minimum probable scenario (based on the past 30 years of Colorado River flows, including the wetter pre-drought 1990s), the elevation of Lake Mead falls every month, dropping almost 50 feet over the next two years. Without significant and meaningful additional water reductions next year, continuing aridification of the basin means that the reality could be even worse than Reclamation's projections.

Time is of the Essence

The Colorado River system lost almost 5.5 MAF of storage in 2021. As of August 28, total system storage was below 20 MAF. Simple math suggests that we cannot wait until 2026 for new operational guidelines. Reclamation must act quickly and decisively to avert the impending crisis. We commend the Commissioner's June 14 call for an additional two to four MAF of water use reductions *next year* and thank her for the initial "administrative actions" announced on August 16. In light of the critical reservoir conditions projected by the most recent 24-month study and the still unmet need to reduce Colorado River water use by an additional two to four MAF, we urge Reclamation to consider our

recommendations, as well as the recommendations and suggestions others submit in response to Reclamation's "Request for Input," for implementation as soon as possible and not wait until 2026. Given the serious, near-term threats declining system storage poses to Colorado River users, we also urge Reclamation to broaden the scope of the proposed action beyond "Colorado River Reservoir Operational Strategies" to include the full spectrum of potential local, state, and federal actions that could decrease Colorado River use (assuming that federal funds could help support local and state actions).

Recommended Actions

We urge Reclamation to incorporate the following substantive elements and strategies for Colorado River operations to address low-reservoir conditions in the Basin as quickly as possible. We recognize that most of these will require additional rulemaking and agreement from the basin states and urge Reclamation to initiate such rulemaking procedures promptly.

- Support state and local water agency efforts to decarbonize their own operations;
- Allocate evaporation from Lower Basin reservoirs to Lower Basin contractors at a rate proportional to their water use;
- Accelerate canal lining projects;
- Fully mitigate environmental and public health impacts of water use reductions;
- Pursue alternatives to drought profiteering;
- Eliminate ICS/DCP ICS storage limits;
- Expand ICS/DCP ICS eligibility; and
- Explore opportunities for private investment in water use reductions.

Decarbonize Operations

During the continuing 23-year drought, Colorado River runoff has been almost 20% lower than it was last century – a loss of about 2.5 MAF annually. Udall and Overpeck, among others, estimate that a third or more of this loss can be attributed to anthropogenic climate change. Yet, discussions about appropriate elements and strategies to address low-reservoir conditions in the Basin ignore the carbon emissions driving aridification. Reclamation should work with other federal agencies to leverage funding available under the Inflation Reduction Act and other sources to support state and local water agency efforts to reduce energy use and decarbonize their own operations. This is especially critical as declining reservoir elevations depress hydropower generation, requiring some water users to purchase fossil fuel-generated electricity to power the pumps conveying Colorado River water to their service areas, as well as to treat and convey water within their service areas.

Reclamation and other federal agencies should do more to support efforts to recapture energy embedded in wastewater and help the water sector become an energy producer. For example, the East Bay Municipal Utility District's wastewater treatment facility in Oakland is now a net energy producer. The facility accepts food waste and fully offsets the energy required for wastewater treatment and for recycling water. Such energy recapture is becoming increasingly common in other parts of the world; federal support can accelerate its adoption in the Basin.

In addition to supporting agency efforts to decarbonize their energy sources for treatment and conveyance, Reclamation should support efforts to decarbonize local and state water agency fleets,

improve energy efficiency in their buildings, and promote end-use municipal water reductions for energy savings - including indoor use, even if indoor return flow credits would otherwise diminish the agency's consumptive use. Reclamation should also lead by example and accelerate its own efforts to implement the President's December 8, 2021, Executive Order, expediting the acquisition of zero-emission vehicles and reducing building emissions by at least 50 percent by 2026 in Regions 7 and 8.

Allocate Lower Basin Reservoir Evaporation

In 2020, the estimated main stem reservoir evaporation allocated to the Upper Basin as a whole was about 0.45 MAF, with an additional 0.24 MAF allocated to individual Upper Division states. In 2021, Lake Mead lost about 0.51 MAF to evaporation (and about 0.54 MAF in 2020), while Lake Mohave and Lake Havasu lost an additional 0.3 MAF, but these losses were borne by the system as a whole and not by the Lower Basin or individual states. This glaring difference between Upper and Lower Basin accounting hinders partnership and cooperation. Allocating evaporation from Lower Basin reservoirs to Lower Basin contractors at a rate proportional to their water use would address this inequity and would reduce total water use by roughly 0.8 MAF annually (at current reservoir elevations). We commend the Commissioner's August 16 announcement that notes a likely federal rulemaking to "address evaporation, seepage and other system losses in the Lower Basin." Agreement among the seven basin states to allocate Lower Basin reservoir evaporation should also include an Upper Division States agreement to limit their consumptive use (in years in which Lake Mead's elevation is projected to be below elevation 1,075 feet on January 1) to the volume reported for 2021, complementing the Upper Division States' July 18 5 Point Plan.

Reclamation could waive Lower Basin reservoir evaporation allocations when total Colorado River system storage is projected to exceed 60% on January 1 and decrease such allocations by 67% and 33% at the 55% and 50% capacity projections, respectively. To reduce the impact of such allocations on contractors, Reclamation should embark on an aggressive, large-scale program to line Lower Basin canals (see below). Protests about the potential impairment of the beneficial use of present perfected rights might be avoided by Interior's proposed prioritization and preparation "for additional administrative initiatives that would ensure maximum efficient and beneficial use of urban and agricultural water." Reconciling contractors' reliance on existing federal infrastructure and management for timely water deliveries in exchange for Lower Basin reservoir evaporation allocations could prove less objectionable and more conducive to long-term system stability than efforts to redefine and monitor efficient and beneficial use of practices such as filling residential swimming pools, watering non-functional turf, or irrigating forage crops for export.

Accelerate Canal Lining Projects

Canal lining and similar water efficiency projects can yield large volumes of water while minimizing or avoiding direct impacts to individual contractors (though, as noted below, such projects can generate significant adverse third-party impacts). For example, a former irrigation district general manager noted that lining the East Highline Canal in Imperial Valley could conserve on the order of 0.1 MAF per year. If Reclamation has not already done so, it should compile an inventory of major unlined conveyances in the Basin and volumes that could be conserved by upgrading this infrastructure. Reclamation should then invest directly in such projects – meeting federal goals to generate system water – or allow other contractors to create extraordinary conservation DCP ICS by investing in such projects.

Fully Mitigate Impacts of Water Use Reductions

Communities and ecosystems should not suffer additional harms in the interests of protecting system storage. Reclamation must fully mitigate the environmental and community impacts of water use reductions. Existing recovery programs, such as the Lower Colorado River MSCP, should be reviewed and likely expanded to ensure that diminished flows do not compromise species and habitat targets. Reclamation and other federal agencies should also commit to the long-term protection of other ecosystems, such as the Salton Sea and the remnant Colorado River delta, that will suffer as contractors reduce their water use to protect Colorado River system storage.

For example, Reclamation and other agencies at the Department of the Interior should increase their support for projects to protect public and environmental health in the Salton Sea region, including the State of California's Salton Sea Management Program (SSMP). This should include:

- Funding for the capital and long-term operations & maintenance costs of new habitat and dust suppression projects atop lakebed exposed due to extraordinary water conservation efforts in the region in response to the Commissioner's June 14 statement;
- Funding for new habitat and dust suppression projects atop the thousands of acres of federal lands currently exposed below the Sea's 2003 shoreline;
- Expedite federal action on land access and permitting for Salton Sea projects;
- Technical support from MSCP staff on SSMP habitat design and construction;
- Scientific support, in the form of a new, fully staffed USGS Salton Sea Science Office to coordinate ongoing and new research and manage air quality, biodiversity, and water quality monitoring;
- Transfer ownership of the former U.S. Naval test base to the state or county, for a SSMP headquarters and a research and visitor center;
- Federal funding support for at-risk and failing community water systems in the Imperial and eastern Coachella valleys;
- Potable water for the Torres-Martinez reservation; and
- Air filters for schools, public health clinics, libraries, and community centers in the Imperial and eastern Coachella valleys.

The Department of the Interior should memorialize the above commitments in a new MOU with California's Natural Resources Agency, to update the 2016/2017 state and federal Salton Sea MOU.

When utilities are faced with financing additional water infrastructure and water supplies, they typically pass down those costs to their consumers. As a result, communities may face problems with their access to safe, reliable, and affordable water bills. Federal funding for utility-level conservation, efficiency, and affordability programs will help low-income and disadvantaged communities maintain access to affordable water, while also ensuring affordable and sustainable water supplies for the community at large.

Drought Profiteering

The Paycheck Protection Program demonstrated that federal efforts to mitigate a crisis will incur some abuse. As others have noted, drought profiteering proposals do not promote cooperation. In reviewing proposals for temporary, compensated water use reductions, Reclamation should cap annual payments

for water in the context of the market price for land in the area. In some cases, it may be more cost effective for Reclamation to simply purchase available land in the area – or offer to purchase land in the area – than to pay exorbitant rates for temporary fallowing. Purchased land could be dedicated to local community uses and habitat mitigation.

Eliminate ICS/DCP ICS Storage Limits

Reclamation should eliminate the existing limits on the total quantity of Extraordinary Conservation ICS and DCP ICS that may be accumulated in ICS and DCP ICS accounts, while maintaining existing limits on delivery of such water.

Expand ICS/DCP ICS Eligibility

Dire conditions in the basin compel us to move beyond intra-state disputes and use every tool available to protect critical reservoir elevations. Reclamation should expand the pool of parties eligible to create ICS beyond existing Colorado River contractors to include water agencies and other entities with existing agreements to use Colorado River water, such as retail water agencies or sub-wholesale agencies. In instances where such entities are not able to reach an agreement to create a sub-account under that of the Colorado River contractor from which they currently purchase water, Reclamation should create such a sub-account directly, following existing rules for ICS/DCP ICS creation, review, and approval. One such water user has expressed an interest in storing 0.05 MAF annually in Lake Mead; presumably, other water users would also participate, benefitting the system as a whole.

Reclamation should also expand ICS/DCP ICS eligibility to enable participation from municipal water agencies for extraordinary conservation efforts, such as turf replacement and fixture retrofits, in their own service areas and investments in other municipalities' water conservation projects. Wealthier communities could then invest in conservation and efficiency projects in less wealthy communities, benefitting both. Reclamation should also explore methods to account for permanent and temporary regulatory actions, such as prohibitions on non-functional turf and emergency water conservation ordinances and declarations. Accounting for such pro-active measures with DCP ICS credits could incentivize water agencies to implement such measures more quickly, reducing demand.

Support Corporate Water Stewardship

Adjusting Basin water use to current and future supply requires an "all-of-the-above" approach, where each sector contributes toward a solution. Leading corporations using Colorado River water are acknowledging and responding to water stress in the Basin. They are engaging in water stewardship activities primarily by funding water replenishment projects. There is great potential to increase the impact of the corporate sector on reducing and replenishing basin-wide water use. Corporations need support from public and NGO actors to help improve water management in corporate facilities and help improve water management in corporate supply chains (especially for supply chains that involve agriculture). Supporting leading corporations in their existing and forthcoming water stewardship efforts can further educate customers, shareholders, and other corporations, which can precipitate large scale behavior changes in water use. Greater alignment between private, public, and philanthropic actors will help drive innovation, scale good practice, and increase corporate investments and engagement, reducing Colorado River water use.

Potential Reductions in Water Use

Lower Basin contractors and water users in Mexico have dramatically reduced their reliance on the Colorado River in recent years. Without these extraordinary efforts – and the domestic and international agreements that made them possible – Colorado River system storage would be millions of acre-feet lower and Reclamation would have already had to take unilateral action, likely leading to years of litigation, paralysis, and little hope for a solution. Yet these extraordinary efforts have not been sufficient to keep pace with the continuing aridification of the basin and the very real threat that reservoir elevations will continue to decline.

Reclamation must act quickly to implement the substantive elements and strategies described above. These elements and strategies would likely need to move forward as a package, to achieve the consensus necessary for implementation. A holistic approach will be needed to overcome opposition from different sectors and different geographies, demonstrating that each is contributing to the stability of the system and improving predictability and reliability.

The following table estimates existing and potential additional reductions to protect reservoir elevations. Actions and rules in black currently exist (2022 Lower Basin contributions are 0.533 MAF, plus 0.08 MAF from Mexico; provisional reports indicate that Upper Basin use in 2021 was 0.5 MAF lower than it was in 2020); *actions in blue* are potential additional reductions, some described above and some that could be generated (at least in part) by the actions recommended above.

Annual Action	**Volume (MAF)**
Assign reservoir evaporation	*0.8*
LB shortage + DCP	1.1
MEX shortage + DCP	0.275
UB reductions (in 2021)	0.5
Additional AZ+CA	*0.6*
Additional Mexico	*0.225*
Annual Total	**3.5**

These potential additional reductions illustrate the magnitude of additional actions and effort required to bring basin water use in line with recent runoff. Total reductions in Mexico shown above are roughly proportional to those in the Lower Basin; we recognize that discussions about Mexico's additional contributions are beyond Reclamation's authority and include them for illustration only.

We urge Reclamation to act quickly and initiate the additional rulemaking necessary to implement the elements and strategies we and others have recommended to address the immediate and worsening conditions in the Colorado River Basin. Thank you for your consideration of these comments.

Sincerely,

Michael Cohen
Senior Associate
mcohen@pacinst.org

PACIFIC INSTITUTE

August 13, 2023

Amanda Erath
Colorado River Post-2026 Program Coordinator
Bureau of Reclamation,
Attn: Post-2026 (Mail Stop 84–55000)
P.O. Box 25007
Denver, CO 80225

Via email: *crbpost2026@usbr.gov*

RE: Notice of Intent To Prepare an Environmental Impact Statement and Notice To Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

Dear Ms. Erath:

The Pacific Institute submits these comments in response to the above-referenced notice. The Institute has been actively engaged in the development of Colorado River policies and strategies for more than 25 years, participated in the development of alternative surplus and shortage guidelines for the river and the 2012 Basin Study, and has published many reports and articles on the sustainable use of Colorado River water. We submitted pre-scoping comments on the post-2026 guidelines on September 1, 2022 and scoping comments (with NRDC) on the supplemental environmental impact statement (SEIS) on December 20, 2022, both of which should be considered part of our comments on the post-2026 guidelines and are attached here for your convenience.

We commend the Bureau of Reclamation for its extensive outreach and engagement efforts around the post-2026 guidelines and around the SEIS process, including the Integrated Technical Education Workgroup sessions. We greatly appreciate this commitment to information-sharing and transparency and are hopeful that it will continue as the Department of the Interior and the basin states negotiate the post-2026 guidelines.

Seven months ago, media articles raised the specter of the potential loss of the power pool at Hoover Dam and Glen Canyon Dam; forecasts showed that even deadpool was a real near-term possibility. Barely a year ago, the Commissioner called for water users *across the basin* to reduce their use by 15-30%. This year's unusually high runoff brought the Colorado River system a brief reprieve, perhaps at the cost of the urgency required to address the over-

allocation of the river and the long-term decline in runoff due to climate change. While we do not know what next year's precipitation will be, we do know that hotter and drier conditions will continue to decrease the flow of the Colorado River, diminishing the predictability and reliability of the system and jeopardizing the water supply for people and the environment.

The post-2026 guidelines will be the core effort to address this inevitable decline in water supply and a critical opportunity to address historic river over-allocation within the context of unsatisfied tribal water rights and imperiled ecosystems. The magnitude of this task is exceeded by the risk of catastrophic system collapse: the post-2026 process must be much broader in scope than just operational guidelines and strategies for the two major reservoirs. Much as the 2007 Interim Guidelines expanded in scope to encompass innovative water conservation mechanisms, multi-year accounting, interstate storage agreements, reservoir re-operations, increasingly aggressive lower basin shortage reductions, and upper basin planning, (as well as prompting separate international agreements), the post-2026 guidelines must be sufficiently expansive in scope and purpose to encompass the many changes required to protect the stability and sustainability of the Colorado River. In the following we offer comments on the purpose and need and the scope of the post-2026 guidelines; we have attached our September 1, 2022 pre-scoping comments on the post-2026 guidelines and our December 20, 2022 scoping comments on the draft SEIS to highlight additional topics for your review.

Purpose and Need

We strongly encourage Reclamation to define the purpose and need of the post-2026 guidelines in the broadest possible terms. As the Department of the Interior announced in its 6/15 press release, the purpose of this process is "to develop future operating guidelines and strategies *to protect the stability and sustainability of the Colorado River*." [*emphasis added*] We believe that *protecting the stability and sustainability of the Colorado River* is an appropriate reflection of the Secretary's role as river master and the goal of managing the river to meet the needs of people and the environment. Ultimately, the objective of the post-2026 guidelines should be "to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans" (42 U.S.C. 4331(a)).

The purpose and need must be broader than just "Operational Guidelines and Strategies for Lake Powell and Lake Mead." The Notice of Intent states that "Future operational guidelines and strategies should incorporate a more holistic approach to Colorado River water management in a way that focuses on *the long-term sustainability of both the Basin's population and natural environment, minimizes system vulnerability, and increases system resiliency*." [*emphasis added*] Reclamation should prioritize long-term sustainability over narrowly-defined operating strategies for Lake Powell and Lake Mead. The reservoirs are a

means to an end, a tool to stabilize the system. Preserving reservoir elevations is not a higher priority than the people and the natural environment that depend on the river.

The withdrawn draft SEIS noted "the purpose of and need for Reclamation's action to protect both Glen Canyon Dam and Hoover Dam operations, system integrity, and public health and safety." But the description of the proposed SEIS action – to avoid "unacceptable risks to routine operations of Glen Canyon and Hoover Dams" – was not consistent with the magnitude and urgency of the 23-year drought and the expectation that climate change will cause Colorado River flows to continue to decline. Privileging routine dam operations over water delivery and environmental protection elevates the tool over the task. Seeking to preserve routine operations of the dams themselves while imposing draconian cuts on water users and the environment is inequitable and inappropriate. The post-2026 guidelines should not lose sight of the river for the dams.

Public health and safety – a phrase used several times in the draft SEIS – should be a higher priority than routine dam operations. We encourage Reclamation to define "public health and safety" in the post-2026 guidelines, to minimize the likelihood of conflict over inconsistent state- or contractor-based definitions.

Geographic Scope

Reclamation should define the system (for example, in "system vulnerability") to encompass more than just infrastructure. The Colorado River system includes the built and natural environments, including the tributaries and lands and cities outside the basin that rely on its water.

Reclamation should extend the geographic scope of its analysis to extend upstream beyond the full pool of Lake Powell. The Secretary of the Interior's authorities extend well beyond her role as River Master for the Lower Basin. A focus on the Lower Basin and coordinated reservoir operations would implicitly reflect the Upper Basin's contention that the Colorado River crisis is solely a Lower Basin responsibility. This will lead to limited solutions that will not solve the problem. The Basin has moved forward through negotiations and compromises and partnerships. Exacerbating divisions and picking sides will ensure crisis and litigation and failure.

In June 2022, Commissioner Touton testified before the U.S. Senate Committee on Energy and Natural Resources and called *on water users across the Basin* to take actions to prevent the reservoirs from falling to critically low elevations. Interior officials have noted that "*Every sector in every state* has a responsibility to ensure that water is used with maximum efficiency." The post-2026 guidelines should contemplate water use reductions from every sector in every state, including the Upper Division States (provisional reports indicate that Upper Basin use in 2021 was 0.5 MAF lower than it was in 2020; compensating Upper Basin users presumably could generate similar reductions in the future).

Extending the geographic scope beyond Lake Powell would also reflect federal authorities and actions under the Drought Response Operations Agreement (DROA); the possibility that some form of DROA will be part of the post-2026 guidelines should not be ignored. The 2022 DROA prompted the release of some 463,000 acre-feet of water from Flaming Gorge Dam that flowed more than 430 river miles into Lake Powell. The 2023 DROA will lead to the recovery of some 588,000 AF. Both of these federal actions – part of the 2019 Colorado River Drought Contingency Plan for the Upper Colorado River Basin (itself an extension of the 2007 Interim Guidelines) – significantly altered the timing and magnitude of river flow below Flaming Gorge Dam.

Section 3.10 of the draft SEIS ("Visual Resources") notes the potential for "Broader landscape modifications from reduced water availability, including in irrigated, agricultural landscapes within the Lower Division States." The geographic scope of the post-2026 guidelines should include landscapes irrigated with Colorado River system water within *both* the Upper and Lower Division States – including irrigated municipal landscapes likely affected by reduced water availability. The ecosystems that depend on runoff from these irrigated municipal and agricultural landscapes – notably the Salton Sea – will clearly be affected by the post-2026 guidelines and should be included in the analysis.

Conclusion

We commend Reclamation's efforts to promote transparency and inform stakeholders about modeling assumptions and look forward to the release of Reclamation's web-based modeling tool, enabling stakeholders to test various management alternatives. We are hopeful that Reclamation will broaden the purpose and need and the scope of the post-2026 guidelines sufficiently to avoid a set of deficient alternatives incapable of addressing the significant challenges facing the system, a deficiency that would prompt closed-door negotiations among the principals, betraying Reclamation's transparency and lead to a less durable solution. We urge Reclamation to broaden the scope of the proposed action to include the full spectrum of potential local, state, and federal actions that could decrease Colorado River use (assuming that federal funds could help support local and state actions).

Thank you for your consideration of these and the attached comments.

Sincerely,

Michael Cohen
Senior Associate

Attachments: September 1, 2022 pre-scoping comments on the post-2026 guidelines
December 20, 2022 scoping comments on the draft SEIS

December 20, 2022

Reclamation 2007 Interim Guidelines SEIS Project Manager
Upper Colorado Basin Region,
125 South State Street, Suite 8100
Salt Lake City, Utah 84138

via email: CRinterimops@usbr.gov

RE: Supplemental Environmental Impact Statement for Near-term Colorado River Operations

Dear Reclamation SEIS Project Manager:

We submit the following scoping comments for the development of the Supplemental Environmental Impact Statement for Near-term Colorado River Operations (87 FR 69042). We appreciate the leadership of Commissioner Touton in mobilizing an appropriate response to the rapidly declining storage in the Colorado River system, and we look forward to working with you as you develop and implement much-needed additional actions and policies to protect the system and the people and ecosystems that depend on it.

Several speakers at last week's conference of the Colorado River Water Users Association emphasized the importance of an "all hands on deck" approach to the current crisis, and we agree. As Interior and Reclamation consider new approaches and concepts, they should also coordinate with other federal agencies to leverage their respective authorities to address the crisis. This should include authorities for additional funding to incentivize additional water conservation and efficiency improvements and funding to mitigate the impacts to economic and public health and environmental resources from implementing durable solutions.

Overview

The current crisis facing the Colorado River system is a major test of the Nation's ability to respond to the effects of climate change that are already upon us. On June 14, 2022, Commissioner Touton publicly alerted the Colorado Basin states of the need to prepare for reductions of 2 to 4 million acre-feet of Colorado River water next year, or as much as 1/3 of the amount of water delivered in a typical year. Sharply declining water levels behind both Hoover Dam and Glen Canyon Dam raised alarms about the system's ability to continue to supply water and power, forcing the states to consider what was previously unthinkable.

The writing has been on the wall for some time. It was long known that the Colorado was over-allocated during the interstate compact negotiations of the 1920's, and that both the Basin states and the Bureau of Reclamation ignored this reality for decades. Numerous studies, scientists, and engineers warned that diversions from the Colorado were unsustainable.

Ten years ago, the Bureau, in cooperation with the basin states, completed the Colorado River Basin Water Supply and Demand Study. This 2012 report was the first comprehensive effort by state and federal agencies to factor the impacts of climate change into long-term projections for the basin. While

many scenarios were evaluated, the trend was clear. A comparison of the median water supply projections against the median water demand projections showed a projected imbalance in supply and demand reaching 3.2 million acre-feet by 2060.

Unfortunately, state leaders and stakeholders do not have 40 years to ponder and process the seismic shift that is now taking place. In an ideal world, major cuts in water use would be phased in over a decade or more, with accommodations and adjustments made at a manageable pace. But the opportunity for gradual adjustments has passed, and a soft landing for every impacted water user may not be obtainable in the near term.

When the first shortage declaration for Lake Mead was made in 2021, California was spared while Nevada and Arizona were curtailed for 2022. Similarly, when the second shortage determination was made in 2022, California was again spared while Nevada and Arizona were further curtailed for 2023. Going forward, the DCP's asymmetric application of water reductions must give way to a more equitable apportionment of supply constraints to achieve the even larger reductions that will be necessary. As the largest user of Colorado River water by far, California must anticipate receiving its full and fair share of reductions. Fairness also demands that reductions must involve both the urban and agricultural sectors. And 2023 should mark the beginning of permanent reductions in Colorado River withdrawals, not simply the adoption of short-term expedients, such as temporary fallowing of irrigated land. 2060 has arrived sooner than expected.

Recommendations for SEIS Scoping

We offer comments on the following specific topics:

- Tribal Water Rights
- Reclamation's modeling assumptions with respect to Upper Basin depletions,
- Determination of Lake Mead Operation "Shortage Conditions"
- Coordinated Operation of Lake Powell and Lake Mead
- Best Practices for Water Efficiency
- Allocation of Lower Basin Evaporation
- Community and environmental protections
- Off-Stream Storage

For inclusion in the record of this SEIS, we have also attached the Pacific Institute's September 1, 2022 "pre-scoping" comments on the post-2026 guidelines, most of which are applicable for near-term Colorado River operations.

Tribal Water Rights

Provision must be made in this and future deliberations on Colorado River operations for the full and timely engagement of Tribal representatives and respect for Tribal water rights. In its role as Trustee, the Department of the Interior should ensure that Tribes receive support for independent analysis of the impact that any proposed modifications or alternatives will have on their individual water rights and interests, both immediately and in the longer term. This will require frequent and meaningful consultation with individual tribes whose interests are likely to be affected as alternatives are

developed. And in all scenarios, executed Tribal water rights settlements must be fully honored, and resolution of pending claims not foreclosed.

Modeling Assumptions with Respect to Upper Basin Depletions

Reclamation should clearly describe all modeling assumptions and inputs used in its projections of unregulated inflows into Lake Powell. In particular, Reclamation should provide a table listing assumed annual Upper Basin depletions. Does Reclamation use the Upper Colorado River Commission's June 14, 2022, Updated Demand Schedule? An average of recent depletions reported in the provisional *Consumptive Uses and Losses reports*? Recent averages modified by presumed water availability under hotter and drier conditions? Clarifying these modeling assumptions will improve our understanding of potential inflows to Lake Powell and projected elevations at Powell and Mead.

Lake Mead Shortage Conditions

The rapid and continuing loss of system storage has demonstrated that existing reservoir elevation-based shortage criteria are insufficient. A more aggressive set of Lower Basin shortage criteria that also accounts for current and projected basin runoff should be implemented. Reclamation should consider an alternative that determines Lake Mead "Shortage Conditions" based on factors including estimates of current and future runoff under very dry conditions (such as 2002-2004 or 2020-2022 runoff), existing storage in Lake Mead and Lake Powell, Treaty obligations, contractors' 2023 water orders, and operational and regulatory constraints such as the federal Endangered Species Act and Grand Canyon Protection Act requirements.

Reclamation should also consider a shortage alternative that ignores Lake Mead elevation once an August 24-month minimum probable projection shows it falling below 1075' and simply limits Lake Mead releases to prior year inflows less reservoir evaporation. For example, under this alternative Reclamation would limit Lake Mead releases in 2023 to 7.77 MAF (equivalent to WY22 inflows to Lake Mead) minus Mead evaporation (about 0.5 MAF) for a total release of about 7.3 MAF.

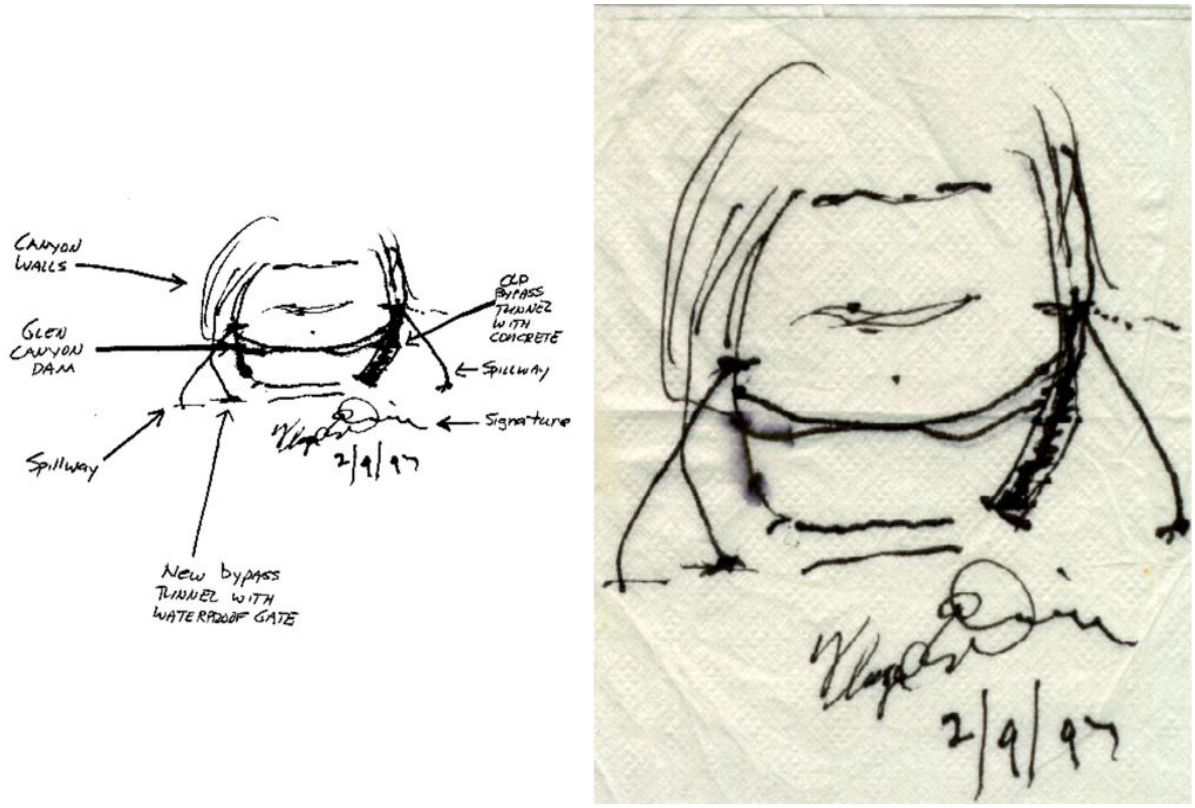
Shortage Measures

Reclamation should expand the pool of parties eligible to create Intentionally Created Surplus (ICS) beyond existing Colorado River contractors to include water agencies and other entities with existing agreements to use Colorado River water, such as retail water agencies or sub-wholesale agencies. Reclamation should eliminate the existing limits on the total quantity of Extraordinary Conservation ICS and DCP ICS that may be accumulated in ICS and DCP ICS accounts, while maintaining existing limits on delivery of such water.

As part of its efforts to "Prioritize and prepare for additional administrative initiatives that would ensure maximum efficient and beneficial use of urban and agricultural water, and address evaporation, seepage and other system losses in the Lower Basin," Reclamation should evaluate a measure limiting deliveries to contractors who do not receive return flow credits to allow for no more than median levels of system losses. That is, if median system losses for such contractors are currently 10% but a particular contractor's system losses are 20%, Reclamation would reduce deliveries to that contractor by 10%. Such a measure could further encourage best practices and reduce system waste; when paired with federal water efficiency incentives, it could reduce system demands without affecting productive uses.

Coordinated Operations

Reclamation should also include a modeling scenario that – for the purposes of improving our understanding of system resilience under a broad range of alternatives – consolidates storage at Lake Mead and uses Lake Powell as auxiliary storage. As former Reclamation Commissioner Floyd Dominy sketched more than twenty-five years ago (see image below), this modeling scenario would assume the construction of a new bypass tunnel around Glen Canyon Dam. This consolidated scenario would preferentially fill Upper Basin reservoirs first, then Lake Mead, before impounding water in Lake Powell. Under Reclamation's existing modeling scenarios and a continuation of recent low runoff, projected reservoir elevations hover at or below power pool. A consolidated reservoir modeling scenario presumably would ensure that at least one dam would still generate hydropower, providing a clear renewable energy benefit (and reducing carbon emissions) while supplying sediment and a more natural flow regime to the Grand Canyon. We are not advocating such a solution, but as part of the scoping process we encourage Reclamation to explore a broad range of modeling scenarios to better inform future decision-making.



Source: https://www.sltrib.com/news/environment/2022/08/28/floyd-dominy-built-glen-canyon/

Under the proposed consolidated reservoir modeling scenario, Reclamation would continue to model Lake Mead elevations using the 24-month study concept of "operational neutrality," to ensure that Lower Basin shortage criteria remain effective. Once storage is consolidated in Lake Mead, Reclamation could limit releases from Lake Mead based on inflows to Lake Mead less Mead evaporation, as described above.

Best Practices for Water Efficiency

When scoping the two action alternatives for this SEIS (Consensus-Based Agreement; Modification Under Secretarial Authorities), Reclamation overlooked an approach that straddles this binary choice: a scenario under which water withdrawals are conditioned upon the adoption of best practices for water efficiency that are already in use within the Colorado Basin states.

Many important policies to promote water efficiency have been developed in the Basin states, but most are not universally applied. A non-exhaustive list would include –

- Require removal non-functional turf grass. (Nevada)
- Incentivize landscape conversion and turf removal statewide. (California, Utah)
- Adopt stronger efficiency standards for plumbing and equipment. (Colorado, California, and Nevada)
- Require urban utilities to report distribution system leakage, and to meet standards for reducing water losses. (California)
- Require all new urban landscapes to be water-efficient. (California)
- Require metering of landscape irrigation turnouts (Utah)
- Ensure that existing buildings are water-efficient when they are sold or leased. (Los Angeles, San Diego)
- Require agricultural water deliveries to be metered and priced at least in part by volume. (California)

The technologies and practices that save water in urban and agricultural contexts are well known and available today. Reclamation should collate the best practices found within the basin, and fashion a third action alternative (or an "efficiency module" for the two currently proposed action alternatives) that will condition a portion of future withdrawals on the adoption of best practices by a date certain. Such measures alone are unlikely to provide the volume of water savings in the near-term that is needed to protect critical reservoir elevations. Nevertheless, the avoidance of water waste and unnecessary consumption should be the *first* place to look for demand reductions, and these are concepts that should be integral to Colorado River operations going forward.

Water efficiency is a proven pathway to water reliability, and the tools are at our fingertips if we choose to use them. Los Angeles uses *less* water today than it did 50 years ago, even while supplying a population that has grown by nearly 50%. Yet even cities and states that have led the way in key areas of water efficiency still need to catch up in others. Now is the time to act on all reasonable options at hand.

Allocation of Lower Basin Evaporation

The scope of this SEIS should include the allocation of Lower Basin Evaporation, to ensure that Reclamation is fully prepared to take this important step in the 2023-2024 timeframe along with other operational modifications under discussion in the FR notice. While a portion of Upper Basin evaporation has been assigned to individual Upper Basin states, the entirety of Lower Basin evaporation – estimated at 0.8 MAF for 2021 -- is borne by the system, rather than that the states. This glaring difference between Upper and Lower Basin accounting hinders partnership and cooperation. Allocating evaporation from Lower Basin reservoirs to Lower Basin contractors at a rate proportional to their water

use would address this inequity and provide a well-founded basis for retaining roughly 0.8 MAF annually in storage at current reservoir elevations. We commend the Commissioner's August 16 announcement that notes a likely federal rulemaking to "address evaporation, seepage and other system losses in the Lower Basin" and urge that necessary environmental evaluation be undertaken as part of this SEIS.

Community and Environmental Protections

As was noted in the September 1 letter from Pacific Institute (attached), communities and ecosystems should not suffer additional harms in the interests of protecting system storage. Each action alternative in this SEIS must include elements that fully mitigate the environmental and community impacts of water use reductions. The curtailment of water deliveries to irrigation districts will undoubtedly impact farm labor and farm worker communities. This SEIS should consider and evaluate potential scenarios for repurposing of lands removed from irrigation, consistent with the views and preferences of impacted communities.

Existing recovery programs, such as the Lower Colorado River Multi-Species Conservation Program, should be reviewed and likely expanded to ensure that diminished flows do not compromise species and habitat targets. Reclamation and other federal agencies should also commit to the long-term protection of associated ecosystems, such as the Salton Sea and the remnant Colorado River delta, that will suffer as contractors reduce their water use unless protective steps are taken concurrently.

Off-Stream Storage

Off-stream storage is antithetical to the concept of protecting critical reservoir elevations. Depleting system reservoirs to store Colorado River water elsewhere just exacerbates the current crisis. Reclamation should not authorize or deliver water for off-stream storage or groundwater recharge - including water exchanges used for such purposes - until system storage recovers.

We urge Reclamation to act quickly and initiate the additional rulemaking necessary to implement the elements and strategies we and others have recommended to address the immediate and worsening conditions in the Colorado River Basin.

Thank you for your consideration of these comments.

Sincerely,

Michael J. Cohen
Senior Researcher
Pacific Institute

Edward R. Osann
Senior Policy Analyst
Natural Resources Defense Council

August 15, 2023

Bureau of Reclamation
Attn: Post-2026 (Mail Stop 84–55000)
P.O. Box 25007
Denver, CO 80225

Via email: CRBpost2026@usbr.gov

To the U.S. Bureau of Reclamation:

Raise the River appreciates the opportunity to provide comments on the Bureau of Reclamation's (Reclamation) scoping process on the development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead (as published in Federal Register Notice – 87 FR 39455 on June 16, 2023). Raise the River is a binational coalition of six non-governmental organizations (National Audubon Society, Pronatura Noroeste, Redford Center, Restauremos el Colorado, Sonoran Institute, and The Nature Conservancy) working together to restore river flows and habitat in the Colorado River Delta.

We support Reclamation's efforts, alongside efforts from the Basin States and Mexico, to develop Colorado River management post-2026 that increases the reliability of water supplies and improves resilience of the Colorado River Basin in the face of climate change. While we do not wish to weigh in on how water use reductions should be allocated, we do have concerns about the potential impacts of Colorado River management and water use reductions in the United States to important resources in the Colorado River Delta in Mexico. These impacts have implications for wildlife that depend on what little habitat remains in the Colorado River Delta, which has been preserved and restored on the strength of the collaborative relationship that has been established between the United States and Mexico on the Colorado River in recent years.

The U.S. – Mexico collaborative relationship has produced Minutes 316, 319, and 323, agreements that significantly improved Colorado River management. These agreements have given Mexico its proper place as an equal partner in determining Colorado River management, have improved supply conditions for all water users in the basin by reducing shortage probabilities, and have set in motion binational, collaborative work to protect and restore habitat in the devastated Colorado River Delta ecosystem.

We hope Reclamation will consider it a priority to maintain the improved binational relationship on the Colorado River, and to ensure that future analyses of the Lower Basin Plan fully identify and describe potential impacts in Mexico, including impacts on water delivery and on habitat resources.

SCOPE

While there will be limits to the scope of Reclamation's post-2026 Colorado River guidelines, these guidelines will be better served if we all **anticipate parallel processes,** including the successor to Minute 323. If designed in tandem, the post-2026 Colorado River guidelines and these parallel processes could provide greater water supply reliability for human uses and for nature. Reclamation's consideration of parallel processes will be essential to preserving the improved United States – Mexico relationship on the Colorado River, including the progress made on equitable sharing of water shortages and on habitat restoration in the Colorado River Delta.

WATER DELIVERY

Changes to Colorado River management may change **salinity** of Colorado River water between Hoover Dam and the Northerly International Boundary. Salinity changes may be caused by reduced irrigation uses of Colorado River water that create return flows to the river, or by reduced releases from Lake Mead. Changes to the salinity of Colorado River water will change Reclamation's management of Colorado River water deliveries to Mexico, with possible implications for water quality as well as timing.

Under the terms of Minute 242, Reclamation must deliver water to Mexico at the Northerly International Boundary that does not exceed 115 +/-30 ppm the salinity of water as measured at the Imperial Dam. Reclamation's management includes both mainstem Colorado River water and Yuma-area pumped return flows as components of water delivery to Mexico at the Northerly International Boundary. Because the Lower Basin Plan may change the salinity of water measured at Imperial Dam due to changes in Hoover Dam releases and changes in return flows upstream from Imperial Dam, there are implications for how Reclamation delivers water to Mexico.

We recommend that Reclamation identify how action alternatives may change salinity in the Colorado River and how changed salinity may impact deliveries to Mexico. Impacts assessed should include the ability of the United States to comply with Minute 242, Reclamation's ability to use Yuma-area pumped return flows as a component of delivery to Mexico, Reclamation's ability to deliver water to Mexico at the rates and times requested (a key area of binational cooperation identified in Minute 323), implications for the volume of water Reclamation must release from Lake Mead for Mexico's delivery. Each of these potential impacts is of paramount importance to the Republic of Mexico and its Colorado River water users, and we suggest that a thorough assessment of impacts is important to ensure the United States and Mexico can continue to work collaboratively, with shared information, to maintain the benefits achieved under the terms of recent binational Colorado River agreements.

WATER SUPPLY FOR WETLANDS INCLUDING HABITAT FOR ENDANGERED SPECIES

The Ciénega de Santa Clara is the largest remaining wetland in the mostly desiccated Colorado River Delta, and Mexico has given it protected status with designation as a Biosphere Reserve. Hundreds of thousands of waterbirds use the Ciénega as winter habitat, and it supports 75% of all Yuma Ridgway's Rails, an endangered bird that hides in the reeds. While the Ciénega de Santa Clara is located in Mexico, it receives some 90% of its inflows from a canal that transports Colorado River water first used to irrigated farms in the region of Yuma, AZ. Reclamation's post-2026 action alternatives may result in water use reductions at those irrigated farms in Yuma, leading to reduced water in the canal flowing to the wetlands and the birds that depend on them.

In addition, as described in the water delivery discussion above, Reclamation's action alternatives may result in changes to Reclamation's management of Yuma-area pumped returned flows. Pumped return flows that cannot be delivered at the Northerly International Boundary due to compliance with Minute 242 are placed in the canal that supplies the Ciénega de Santa Clara.

Since 1979, federal agencies have been required by Executive Order 12114 to evaluate transboundary impacts of significant actions. We anticipate that Mexico and the United States will reach agreements about how Mexico shares in additional Colorado River shortages in separate, diplomatic processes. Independent of any such agreement, proposed domestic actions will continue to have an impact in Mexico, and the Ciénega is a case in point. It will be important for Reclamation to identify and describe any potential impacts of the action alternatives at the Ciénega. With information about these impacts, the United States and Mexico have the opportunity to use the existing collaborative framework on Colorado River management to protect the Ciénega. In 2010 the United States and Mexico negotiated terms to secure the quantity and quality of water flowing to the Ciénega in Minute 316.

Thank you for considering these suggestions, and please do not hesitate to contact us in the event that we can be helpful. Raise the River has worked in partnership with Reclamation, the U.S. and Mexican Sections of the International Boundary and Water Commission, and Conagua for many years to achieve improved Colorado River management at the border that benefits people and nature. We hope Reclamation can prepare post-2026 Colorado River operating guidelines and develop a course of action to improve the stability and resilience of the Colorado River Basin in a manner that supports the chances that this binational partnership can continue.

Sincerely,

Jennifer Pitt
Colorado River Program Director
National Audubon Society

Carlos de la Parra
Board Chair
Restauremos el Colorado

Miguel Angel Vargas
Regional Coordinator, Colorado River Delta
Pronatura Noroeste

John Shepard
Senior Advisor
Sonoran Institute

Lynne Bairstow
Communications Representative Redford Center

Nirari Cardenas
Ocean Program Director, Mexico
The Nature Conservancy

cc: Adriana Resendez, Commissioner, Comisión Internacional de Limites y Aguas
Maria Elena Giner, Commissioner, U.S. International Boundary and Water Commission
Wayne Pullan, Regional Director, Upper Colorado River, US Bureau of Reclamation
Jaci Gould, Regional Director, Lower Colorado River, US Bureau of Reclamation

Save The Colorado River Campaign, PO Box 1066, Fort Collins, CO 80522 SaveThe Colorado.org @SaveTheColorado 970-218-8310

Date: August 7, 2023

TO: U.S. Bureau of Reclamation, Post 2026 Colorado River Public Scoping

Delivered by email to: *crbpost2026@usbr.gov*

From: Save The Colorado, PO Box 1066, Fort Collins, CO 80522; Gary@SaveTheColorado.org

RE: 88 FR 39455, DEPARTMENT OF THE INTERIOR, Bureau of Reclamation: Notice of Intent To Prepare an Environmental Impact Statement and Notice To Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead[1],[2]

Dear U.S. Bureau of Reclamation,

On behalf of Save The Colorado's board of directors and our thousands of members and supporters throughout the Southwest U.S., we respectfully submit the following comments on the Post 2026 Colorado River Public Scoping. These comments add to, and build on, our pre-scoping comments that we sent you and appeared in your pre-scoping report[3].

1. **Generally:**

As the 2007 Interim Guidelines for management of the Colorado River are replaced, Save The Colorado believes the ecological health of the river must be given a center seat at the table because it is the health of the river that sustains almost all human and non-human life in the Southwest U.S. Further, only by happenstance – quirks of the Endangered Species Act or water rights that force water downstream – has the river's ecological health played any role in any past management plans or activities. That must change.

We strongly encourage you to consider and adopt solutions that are long-term, equitable, sustainable, and actually solve the problems on the Colorado River rather than kick the can down the road for a few years by simply tweaking the 2007 Interim Guidelines. The Colorado River not only needs to be "fixed," steps need to be taken – using Nature-Based Solutions – that are also "climate action" to mitigate, and allow adaptation to, climate change.

We watched the USBR webinar video to guide our comments and understand the process[4]. We point out that in the video, USBR Commissioner Touton said the 2026 Guidelines and Strategies would be a *"science-based decision-making process"* reflecting *"continued drought conditions"*. Our comments are 100% science-based reflecting continued drought conditions. We also point out that in the webinar video, it was stated by USBR staff that part of the intent of the Guidelines and Strategies is to provide *"long term sustainability of the environment"* and that *"alternative paradigms should be explored"*.

In the Notice of Intent[5], USBR states, *"Alternative paradigms, e.g., basing reservoir operations on combined reservoir or system storage, should be explored."* The Notice also states that post 2026 Guidelines and Strategies should *"be capable of both withstanding a broad range of future hydrologic and operating conditions and minimizing system vulnerability…"* and that management should focus on *"long-term sustainability of both the Basin's population [sic[6]] and natural environment…"*

Further, the Notice also says, the Guidelines and Strategies should, *"provide additional mechanisms for the storage and delivery of water supplies in Lake Mead to increase the flexibility of meeting water use needs from Lake Mead, particularly under drought and low reservoir conditions."*

We bring your attention to this story in the *Los Angeles Times*[7] dated July 30, 2023, and its reference to the UCLA study[8] in it. The study points out that temperatures across the Colorado River basin have already risen an average of 2.7 degrees F, and *"The scientists estimated that for each additional 1.8 degrees Fahrenheit of warming, the river's flow could shrink by about 7%."*

In the *LATimes* article, Jonathan Overpeck, a renowned climate scientist says*, "Half of the flow of the Colorado River may be lost due to climate change by mid-century. I think that would be a more prudent way to look at it. Because it's well within the scientific understanding at this point, and you don't want to assume that you have more water than you really do."*

All climate science indicates that the Colorado River will likely have significantly and consistently lower flows in the future, perhaps mirroring some of the lowest hydrology on record, like 2021. You must prepare and manage for worst-case scenarios.

We believe that the post 2026 Guidelines and Strategies must prepare for up to a 50% reduction in flow of water in the Colorado River by the year 2050, a mere 25 years in the future.

2. **Specifically:**

First, we bring to your attention a recent scientific paper published in April 2023 by Schmidt et al., titled, "The Colorado River water crisis: Its origin and the future"[9]. The paper supports the general thesis that climate-induced warming will further deplete flows in the Colorado River. In

addition, the paper's central point is that reduced flows will necessitate a rethinking of reservoir operations, and the authors propose a 'one reservoir solution' stating, *"Future policy debate about reservoir operations will inevitably concern whether most, or all, reservoir storage should be in Lake Mead or in Lake Powell. The choice of one or the other will result in significantly different environmental and recreational outcomes for Glen Canyon and Grand Canyon."*

We believe that the post 2026 Guidelines and Strategies must include an alternative that bypasses and decommissions Glen Canyon Dam, and drains what water is left in Lake Powell down into Lake Mead. This "one reservoir" solution will be dramatically cheaper, hugely environmentally beneficial to Glen and Grand Canyons, and less politically corrosive than drying up a ~million of acres of farms to try and temporarily save Lake Powell. This alternative is also a "Nature-Based Solution" that will not only repair the delicate ecology of Glen and Grand Canyons, but will provide a long-term climate solution for the Colorado River as flows decrease over time.

Further, we call this alternative the **"Grand Canyon Restoration Alternative"** because of its profound impacts on restoring the ecology of one of America's most renowned National Parks as well as one of the Seven Natural Wonders of the World.

Second, because of the currently depleted flows and predictions for future depletions of up to 50% of the entire river, USBR must stop all proposed new dams and diversions across the entire basin because they will divert more water out of the river, exacerbate ecological harm, and escalate political and management chaos.

Third, USBR must enact policies that try to save Lake Mead using drought plans, conservation plans, water allocation plans, reservoir-draining or farm-drying plans, crop switching plans, or augmentation through desalination.

Fourth, USBR must negotiate with Mexico to let an estimated 10% of the total water in the river flow through the Colorado River Delta to the Sea of Cortez every year. It's time to partially return the flora and fauna to the Delta described by Aldo Leopold over 100 years ago in 1922 in *The Sand County Almanac*:

> *"At each bend we saw egrets standing in the pools ahead, each white statue matched by its white reflection. Fleets of cormorants drove their black prows in quest of skittering mullets; avocets, willets, and yellow-legs dozed one-legged on the bars; mallards, widgeons, and teal sprang skyward in alarm."*

Further, the Schmidt et al. paper[10] states, *"Rehabilitation of dewatered ecosystems in the Colorado River Delta and in some Upper Basin tributaries will require continued commitment among users to protect existing environmental flows and to acquire additional water for the environment of an overallocated system.*

By partially restoring the Colorado River Delta, and more fully restoring Glen and Grand Canyons, this "rewilding" of the Colorado River will also serve as significant climate action that increases biodiversity, restores endangered fish, and helps the landscape sequester more carbon in vegetation, wetlands, mangroves, and riparian ecosystems.

Fifth, USBR must distribute Native American water rights settlements from, and subtract those rights from, currently diverted water users, not by or from new diversions or depletions of water out of the river. Alternatively, if tribes wish, they can be paid to keep their water in the river which would be a less impactful solution to all other users and hugely ecologically beneficial to the river itself.

Sixth and finally, USBR must divide the water in the river, on an average yearly basis, by distributing it out to water users based on **percentages**, not absolute amounts. The **percentages** shall be equitably distributed such that current users receive amounts of water equally proportional to their current diversion amounts.

These comments are posted here[11]. Thank you for considering our comments. Please reach out with any questions.

Gary Wockner, Director, Save The Colorado
970-218-8310
Gary@SaveTheColorado.org

Endnotes:

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[1] https://www.federalregister.gov/documents/2023/06/16/2023-12923/notice-of-intent-to-prepare-an-environmental-impact-statement-and-notice-to-solicit-comments-and

[2] https://www.usbr.gov/ColoradoRiverBasin/post2026/scoping/index.html

[3] See our comment letter in your pre-scoping report: https://www.usbr.gov/ColoradoRiverBasin/post2026/documents/Post-2026_Pre-Scoping%20Comment%20Summary%20Final_Updated1.30.2023_508.pdf

[4] The video we watched: https://www.youtube-nocookie.com/embed/sNh7S9HOKE8

[5] Ibid, i.

[6] We assume by "population" you mean "human population" as opposed to populations of non-human species.

[7] https://www.latimes.com/environment/story/2023-07-30/study-shows-how-warming-climate-is-sapping-the-colorado-river

[8] https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022WR033454

[9] http://www.riversimulator.org/Resources/ClimateDocs/TheColoradoRiverWaterCrisisItsOriginAndTheFuture2023Schmidt.pdf

[10] Ibid, ix.

[11] http://savethecolorado.org/wp-content/uploads/2023/08/STC-CORIVER-DEIS-Scoping-Comments.pdf

Grand Canyon Chapter
Protect the Grand Canyon Ecoregion Campaign
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August 15, 2023

Maria Camille Touton, Commissioner
Amanda Erath, Colorado River Post-2026 Program Coordinator
Bureau of Reclamation
Attn: Post-2026 (Mail Stop 84–55000)
P.O. Box 25007
Denver, CO 80225
Submitted via email to: crbpost2026@usbr.gov

Re: *Notice of Intent To Prepare an Environmental Impact Statement and Notice To Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead, "post-2026 operations"*

Dear Ms. Touton and Ms. Erath:

Thank you for the opportunity to comment on the *Notice of Intent To Prepare an Environmental Impact Statement and Notice To Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead* ("post-2026 operations").

The Sierra Club's mission is "to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments."

The Grand Canyon (Arizona) Chapter was formed in 1965 in order to focus attention on stopping dams in Grand Canyon. Our work to protect the Colorado River and Grand Canyon National Park continues today. Our nearly 35,000 members and supporters have a significant interest in the post-2026 operations and how they will affect the health of the Colorado River and water deliveries. Our members recreate in Grand Canyon and on the Colorado River, and many rely on Colorado River water for their drinking water and livelihoods.

We are submitting this letter in addition to the letter submitted by the Sierra Club's Colorado River Task Force and incorporate that letter by reference.

Background and Legal Framework

The post-2026 operations must prioritize endangered species restoration, the values within Grand Canyon National Park and Glen Canyon National Recreation Area, and equitable water distribution.

The Secretary of the Department of the Interior (DOI) and the National Park Service (NPS) have the responsibility to "conserve the scenery and the natural and historic objects and the wild life therein" (National Park Service Organic Act of 1916 (16 U.S.C. Sec. 1-18f, 39 Stat 535). Further, the Endangered Species Act (Endangered Species Act of 1973 [Public Law 93-205, 87 Stat. 884]) requires that:

> Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an ''agency action'') **is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species** which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. **In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.** (Sec. 7(2) [16 U.S.C. 1536], emphasis added)

The Grand Canyon Protection Act (GCPA) (1992) specifies that Glen Canyon Dam "shall" be operated in a manner that is protective of Grand Canyon National Park and Glen Canyon National Recreation Area:

> "The Secretary shall operate Glen Canyon Dam… in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use." (Grand Canyon Protection Act (GCPA) (1992), Section 1802(a))

When the GCPA was passed in 1992, it was passed with the intention of reversing damage that Glen Canyon Dam's hydropower production was inflicting on Grand Canyon. Senate bill sponsor Senator John McCain explained, "widely fluctuating water releases from the dam, primarily for the maximum generation of hydroelectric peaking power, are contributing to the irreversible erosion of river beaches. It is critical to recognize that river beaches are not merely convenient resting spots for river rafters, hikers, and Grand Canyon campers. The beaches are extremely valuable biological resources which support riparian vegetation and diverse forms of wildlife. They are precious and fragile ecosystems which are as vital a part of the canyon as a view from the South rim and just as

deserving of protection."[1]

Representative George Miller, who sponsored the bill in the House elaborated, "In the name of more electric power production mindless and unnecessary damage is being inflicted every day on the resources of the Grand Canyon, one of the most precious park resources in the world... the daily operation of Glen Canyon dam to produce hydroelectric power was wreaking havoc on the beaches and wildlife habitat at the bottom of Grand Canyon."[2]

The GCPA specifically mentions compliance with the Colorado River Storage Project Act of 1956 (Public Law 84-485) (CRSP), the law that authorized the construction of Glen Canyon Dam, in reference to water:

> Compliance With Existing Law. -- The Secretary shall implement this section in a manner fully consistent with and subject to the Colorado River Compact, the Upper Colorado River Basin Compact, the Water Treaty of 1944 with Mexico, the decree of the Supreme Court in Arizona v. California, and the provisions of the Colorado River Storage Project Act of 1956 and the Colorado River Basin Project Act of 1968 that govern allocation, appropriation, development, and exportation of the waters of the Colorado River basin. (GCPA Sec. 1802(b))

Regarding hydropower, GCPA only discusses the need to replace Glen Canyon Dam's power with other power supplies. Through the GCPA, "the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established" were further prioritized above Glen Canyon Dam's hydropower production:

> SEC. 1809. REPLACEMENT POWER.
>
> The Secretary of Energy in consultation with the Secretary of the Interior and with representatives of the Colorado River Storage Project power customers, environmental organizations and the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming shall identify economically and technically feasible methods of replacing any power generation that is lost through adoption of long-term operational criteria for Glen Canyon Dam as required by Section 1804 of this title. The Secretary shall present a report of the findings, and implementing draft legislation, if necessary, not later than two years after adoption of long-term operating criteria. The Secretary shall include an investigation of the feasibility of adjusting operations at Hoover Dam to replace all or part of such lost generation. The Secretary shall include an investigation of the modifications or additions to the transmission system that may be required to acquire and deliver replacement power. (GCPA, Sec. 1809)

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[1] USBOR. No date. "Grand Canyon Protection Act" PowerPoint presentation. Available at: https://www.usbr.gov/uc/rm/amp/amwg/mtgs/10aug24/Attach_07c.pdf, accessed 11/11/2016, attached as Ex. 1; p. 342 in Congressional Record: Proceedings and debates of the 101st Congress, Second Session. Thursday, June 28, 1990. Vol. 136 No. 85-Part II.

[2] USBOR. No date. "Grand Canyon Protection Act" PowerPoint presentation. Available at: https://www.usbr.gov/uc/rm/amp/amwg/mtgs/10aug24/Attach_07c.pdf, accessed 11/11/2016, attached as Ex. 1.

This need to protect Grand Canyon from damage associated with power production, while adhering to water delivery requirements, was emphasized in the words of Bill McDonald, Colorado River Basin States' Governors' Representative for Colorado River Reservoir Operations and the Upper Colorado River Commission:

> "Monthly and annual reservoir operations at Glen Canyon Dam are of the most concern to the States' Representatives and the Commission. Restrictions on within-the-month fluctuations for power releases are of concern only if those restrictions interfere with the volume of water to be released in any given month."[3]

The same sentiment is presented in this unattributed quote from a Bureau of Reclamation PowerPoint on the subject:

> "The purpose and intent of section 3 is simple. This language is intended as a clear, concise directive to the Secretary on how to operate Glen Canyon Dam. The Secretary must operate the dam to protect the downstream resources within the context of the Secretary's water compact responsibilities and other elements of the "Law of the River." For the last fifteen years, the Secretary appears to have ignored the resource protection responsibilities in favor of maximizing production of peaking power. Section 3 is intended to provide clear direction to the Secretary as to what his responsibilities are."[4]

Hydropower generation is intended to be "incident" to other purposes set forth in the Colorado River Storage Project Act of 1956 (Public Law 84-485), the act which authorized Glen Canyon Dam. The Secretary of the Interior was authorized to "construct, operate, and maintain" Glen Canyon Dam:

> ". . . for the purposes, among others, of regulating the flow of the Colorado River, storing water for beneficial consumptive use, making it possible for the States of the Upper Basin to utilize, consistently with the provisions of the Colorado River Compact, the apportionments made to and among them in the Colorado River Compact and the Upper Colorado River Basin Compact, respectively, providing for the reclamation of arid and semiarid land, for the control of floods, **and for the generation of hydroelectric power, as an incident of the foregoing purposes**…" (43 United States Code [U.S.C.] §620, emphasis added)

CRSP specifically demoted power production below other purposes:

> §620f. Powerplant operations
>
> The hydroelectric powerplants and transmission lines authorized by this chapter to be constructed, operated, and maintained by the Secretary shall be operated in conjunction with other Federal powerplants, present and potential, so as to produce

[3] Ibid.
[4] Ibid.

> the greatest practicable amount of power and energy that can be sold at firm power and energy rates, but in the exercise of the authority hereby granted he **shall not affect or interfere with the operation of the provisions of the Colorado River Compact, the Upper Colorado River Basin Compact, the Boulder Canyon Project Act [43 U.S.C. 617 et seq.], the Boulder Canyon Project Adjustment Act [43 U.S.C. 618 et seq.], and any contract lawfully entered into under said Compacts and Acts. Subject to the provisions of the Colorado River Compact, neither the impounding nor the use of water for the generation of power and energy at the plants of the Colorado River storage project shall preclude or impair the appropriation of water for domestic or agricultural purposes pursuant to applicable State law.** (43 U.S.C. §620f, emphasis added)

CRSP also authorizes and directs the Secretary to take actions necessary to conserve archaeology, wildlife, and scenic values. This authority was strengthened to a mandate to "protect, mitigate adverse impacts to, and improve" such values with the later passage of GCPA:

> §620g. Recreational and fish and wildlife facilities
>
> In connection with the development of the Colorado River storage project and of the participating projects, the Secretary is **authorized and directed to** investigate, plan, construct, operate, and maintain (1) public recreational facilities on lands withdrawn or acquired for the development of said project or of said participating projects, **to conserve the scenery, the natural, historic, and archeologic objects, and the wildlife on said lands**, and to provide for public use and enjoyment of the same and of the water areas created by these projects by such means as are consistent with the primary purposes of said projects; **and (2) facilities to mitigate losses of, and improve conditions for, the propagation of fish and wildlife**. (43 U.S.C. §620g, emphasis added)

Glen Canyon Dam's power production was always intended to be subordinate to water provision, and was always allowed to be subordinate to cultural and environmental needs. GCPA further subjugated power production to be inferior to protecting Grand Canyon National Park.

The Department of Interior (DOI) and Bureau of Reclamation (BOR) have a clear responsibility to use Glen Canyon Dam to manage water according to the obligations in CRSP and GCPA. Because hydropower cannot be prioritized above other purposes under CRSP and GCPA, BOR has the liberty to manage Glen Canyon Dam to effectively conserve water and natural resources without the additional burden of providing hydropower from the dam.

The Federal government must "protect, mitigate adverse impacts to, and improve" the Colorado River Ecosystem (CRE) in Grand Canyon.

1) Science and legal obligations should dictate the Purpose and Need and the Proposed Action.

We are encouraged by the language in the Notice of Intent to create the post-2026 operations saying that, "Future operational guidelines and strategies should incorporate a more holistic approach to Colorado River water management in a way that focuses on the long-term sustainability of both the Basin's population and natural environment…" The Purpose and Need statements in the Environmental Impact Statement (EIS) for development of the new post-2026 operations must include recognition that the CRE in Grand Canyon lies vulnerably between Powell and Mead reservoirs, a vital natural system that must be a forethought and not omitted from any Colorado River planning processes.

At least 13, and up to 22, animal species have been extirpated from the Colorado River ecosystem since Glen Canyon Dam closed in 1963[5], and non-native plant species are now prevalent in riparian habitats (at one time the razorback sucker was thought to be extirpated but it has since been found in newly exposed river segments above Lake Mead). Three of eight native main stem fish (Colorado pikeminnow, bonytail chub, roundtail chub) have been extirpated from Grand Canyon and four more (humpback chub, razorback sucker, flannelmouth sucker, and bluehead sucker) require intensive management to avoid serious decline.[6] Changes in all aspects of the natural flood regime threaten the survival of riparian and aquatic species: flow magnitude, frequency, duration, timing, and rate of change across hourly to century scales[7].

The effects of this problem were recognized decades ago, leading to the passage of GCPA.

Dam operations must protect wildlife and sediment resources. Sediment in Grand Canyon is severely limited by Glen Canyon Dam upstream. The sediment limitation has not only caused degradation of habitats, cultural sites, and recreational beaches, but it has also cost millions for studies and attempted remediation. Previous implementation of the Interim Guidelines via equalization flows between the reservoirs in 2011 caused irreparable damage to Grand Canyon by scouring sediment from beaches and sandbars that will never

[5] Stevens et al. No Date. AMP GOAL 3: Assessing Restoration Potential Of Taxa Of Management Concern In The Colorado River Ecosystem Downstream From Glen Canyon Dam. Available at https://www.usbr.gov/uc/progact/amp/twg/2011-06-28-twg-meeting/Attach_09b.pdf, accessed 12/20/22, attached as Ex. 2. Also see http://gcdamp.com/index.php/EXTIRPATED, accessed 12/20/22.

[6] https://www.nps.gov/grca/learn/nature/fish-native.htm, accessed 12/14/22.

[7] Poff, N.L., J.D. Allan, M.B. Bain, J.R. Karr, K.L. Prestegaard, B.D. Richter, R.E. Sparks, and J.C. Stromberg.1997. The natural flow regime. Bioscience 47:769-784, attached as Ex.3; Schmidt, J.C., and P.E. Grams. 2011. Understanding Physical Processes of the Colorado River. Chapter 2 in: Effects of Three High-Flow Experiments on the Colorado River Ecosystem Downstream from Glen Canyon Dam, Arizona. U.S. Geological Survey Circular 1366. T.E. Melis, ed., 147 pp., attached as Ex. 4.

be fully replaced.[8] Because the health of Grand Canyon depends upon proper dam management, unlike past guidelines, the new ones must be sensitive to resultant impacts on the river resource.

Colorado River experts have been asking for more holistic dam operations for years now, after observing the degradation that the Interim Guidelines caused. The 2019 *Colorado River Conversations Final Conference Report*, compiled by the University of Arizona Center for Climate Adaptation Science and Solutions, recorded the need identified by participants to see the river as a system, and to protect Grand Canyon's precious sediment:

> "Participants noted that the future management of the system must consider the river as a whole, not as two individual basins or as a series of separate segments between dams that are operated to optimize particular objectives. Considering the river as a whole requires accounting for groundwater, tributaries, sediment, temperature, salinity, the Salton Sea, and the Delta – not just the volumes of surface water that can be diverted from the mainstem under different flow regimes. It also means empowering the full array of stakeholders and affected parties to engage in discussions about the River's future…"[9]
>
> and
>
> "Sediment balance should be added into the management considerations. The fundamental dilemma for Grand Canyon is the stream water is out of balance with sediment supply… Equalization flows wipe out sand bars. There are ecological consequences of moving that much water all at once."[10]

The new post-2026 operations must address the river as a holistic system, and must protect Grand Canyon from further harm. Despite efforts to mimic flood flows, manage introduced species, and translocate native fish, the ecological integrity of the CRE in Grand Canyon continues to struggle.

The geography of Grand Canyon creates both opportunities for and challenges to protecting native fish species. Tributaries, many of which have retained their natural hydrography, water quality, and temperature regimes, remain as refugia for native fish and their food bases, including threatened species.[11] Lowered reservoir levels revealed more than 100km

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[8] Figure 8 in Ashley, T.C., B. McElroy, D. Buscombe, P.E. Grams, and M. Kaplinski. 2020. Estimating bedload from suspended load and water discharge in sand bed rivers. Water Resources Research 56:https://doi.org/10.1029/2019WR025883, attached as Ex. 5; p. 25 in Jacobs et al. 2019. Colorado River Conversations Final Conference Report. https://ccass.arizona.edu/sites/default/files/CRC_Conference_Report_Final_05.10.2020.pdf, accessed 12/13/22, attached as Ex. 6; Figure 2 in Grams, P.E., D. Buscombe, D.J. Topping, M. Kaplinski, and J.E. Hazel Jr. 2018. How many measurements are required to construct an accurate sand budget in a large river? Insights from analyses of signal and noise. Earth Surface Processes and Landforms 44:160-178, https://doi.org/10.1002/esp.4489, attached as Ex. 7.

[9] p. 4 in Jacobs et al. 2019. Colorado River Conversations Final Conference Report. https://ccass.arizona.edu/sites/default/files/CRC_Conference_Report_Final_05.10.2020.pdf, accessed 12/13/22, attached as Ex. 6.

[10] p. 25 in Id.

[11] Healy, B.D., R.C. Shelly, C.B. Yackulic, E.C. Omana Smith, and P. Buddy. 2020. Remarkable response of native fishes to invasive trout density, temperature, and annual hydrology. Canadian Journal of Fish and Aquatic Science 77:1446-1462, attached as Ex. 8; Healy, B.D., E.C. Omana Smith, R.C. Schelly, M.A. Trammell, and C.B. Nelson. 2019. Establishment of a Reproducing Population of Endangered Humpback Chub through Translocations to a Colorado River Tributary in Grand Canyon, Arizona. Journal of Fisheries

of aquatic habitat upstream of Lake Mead that is protected from most non-native fish invasions by Pearce Ferry Rapid, enabling western Grand Canyon to become "a rare contemporary example of native fish populations regaining dominance over invasive fishes in the desert southwest."[12] Simultaneously, lower reservoir levels above Glen Canyon Dam are allowing warmer waters into the CRE in Grand Canyon that benefit both native fish and warm water exotic species; unfortunately, warm water exotic species such as smallmouth bass (*Micropterus dolomieu*) are colonizing Grand Canyon and could greatly reduce native fish populations if they take hold.[13]

Experimentation, monitoring, and modelling reveal a number of factors that will optimize conditions for Grand Canyon's native fish assemblage. Maintaining a barrier to non-native fish migration at Pearce Ferry, preventing non-native fish from moving through Glen Canyon Dam, preserving natural flow regimes in tributaries, restoring a flow regime based upon pre-dam conditions in the mainstem, and protecting a Colorado River temperature that is too cold to allow warm water exotic species establishment in tributary streams are all essential to the CRE.[14]

As BOR figures out how much water it will annually release through Glen Canyon Dam, the agency should aim to release water in a way that mimics a historically-timed hydrograph. On other rivers where dams have been operated to mimic the historic hydrograph, benefits extended to a multitude of aquatic and riparian resources.[15] Evidence is accruing that the same would be true for Grand Canyon.[16] Likewise, when daily fluctuations are minimized in a manner more akin to pre-dam patterns, downstream primary productivity increases.[17] Unfortunately, the Glen Canyon Dam Long-Term Experimental and Management Plan (LTEMP) makes a historically timed, spring or early summer experimental flood pulse, difficult to implement.[18] The SEIS should create a way to operate Glen Canyon dam in a manner that is more similar to pre-dam conditions to favor the CRE in Grand Canyon.

Management 40:278-292, attached as Ex. 9; Sabo, JL, Caron, M, Doucett, R, et al. 2018. Pulsed flows, tributary inputs and food-web structure in a highly regulated river. J Appl Ecol. 2018; 55: 1884– 1895. https://doi.org/10.1111/1365-2664.13109, attached as Ex. 10.

[12] Keggeries, R.B., B. Albrecht, M.C. McKinstry, R.J. Rogers, R.A. Valdez, A.L. Barkalow, E.I. Gilbert, H.E. Mohn, B. Healy, and E.O. Smith. 2020. Small-bodied fish surveys demonstrate native fish dominance over 300 kilometers of the Colorado River through Grand Canyon, Arizona. Western North American Naturalist 80:146-156, attached as Ex. 11.

[13] Dibble, K.L., C.B. Yackulic, T.A. Kennedy, K.R. Bestgen, and J.C. Schmidt. 2021. Water storage decisions will determine the distribution and persistence of imperiled river fishes. Ecological Applications 31:1-9, attached as Exhibit 12.

[14] Ibid; Keggeries et al. (2020), attached as Ex. 11; Healy, B.D., P. Buddy, M.M. Conner, and E.C.O. Smith. 2022. Life and death in a dynamic environment: invasive trout, floods, and intraspecific drivers of translocated populations. Ecological Applications e2635; https://doi.org/10.1002/eap.2635, attached as Ex. 13; Healy, B.D., C.B. Yackulic, and R. Schelly. 2022. Impeding access to tributary spawning habitat and experimental fall-timed floods increases brown trout immigration into a dam's tailwater. Canadian Journal of Fisheries and Aquatic Sciences https://doi.org/10.1139/cjfas-2022-0231, attached as Ex. 14; Deemer, B.R., C.B. Yackulic, R.O. Hall, Jr., M.J. Dodrill, T.A. Kennedy, J.D. Muehlbauer, D.J. Topping, N. Voichick, and M.D. Yard. 2022. Experimental reductions in sub-daily flow fluctuations increased gross primary productivity for 425 river kilometers downstream. PNAS Nexus 1:pgac094, https://doi.org/10.1093/pnasnexus/pgac094, attached as Ex. 15; Healy, B.D., R.C. Shelly, C.B. Yackulic, E.C. Omana Smith, and P. Buddy. 2020. Remarkable response of native fishes to invasive trout density, temperature, and annual hydrology. Canadian Journal of Fish and Aquatic Science 77:1446-1462, attached as Ex. 8.

[15] Richter, B.D., R. Mathews, D.L. Harrison, and R. Wigington. 2003. Ecologically sustainable water management: managing river flows for ecological integrity. Ecological Applications 13:206–224, attached as Ex. 16; Rood, S.B., C.R. Gourley, E.M. Ammon, L.G. Heki, J.R. Klotz, M.L. Morrison, D. Mosley, G.G. Scoppettone, S. Swanson, and P.L. Wagner. 2003. Flows for Floodplain Forests: A Successful Riparian Restoration. BioScience 53:647- 656, attached as Ex. 17.

[16] Healy et al. (2022), attached as Ex. 13; Healy et al. (2020), attached as Ex. 8.

[17] Deemer et al. (2022), attached as Ex. 15.

[18] Healy et al, (2022), attached as Ex. 14.

Importantly, drought should not be used as an excuse to postpone or cancel any flow management action intended to benefit native fish or redistribute sediment in Grand Canyon. In 2021 and again in 2022, a High Flow Experiment (HFE) was skipped despite U.S. Geological Survey scientists reporting the proper conditions for a 192 hour (8 day) HFE for the first time ever under LTEMP, and while sandbar size was the lowest in ten years.[19] BOR decided not to implement the HFE because of "concerns about pool elevation and the Basin Fund, although there would have been a positive effect on sediments especially given the unprecedented drought conditions."[20] This is despite the acknowledgement that HFEs do not affect annual water release volumes.[21] Again, we point to the Grand Canyon Protection Act, which is clear about the obligation that the Secretary of Interior has to operate the dam "in such a manner as to protect, mitigate adverse impacts to, and improve" Grand Canyon. In this case, the Secretary had an unprecedented opportunity and let it pass without an adequate reason.

Ecologically beneficial flow implementation is more vital than ever as we face the changed circumstance of new warm water-adapted introduced fish species (such as smallmouth bass) which require an urgent response. Scientists are now developing plans to experimentally manage these species with flow actions, and those actions must not be delayed. We should listen to the capable scientists working on this problem. The process of developing new post-2026 operations should not interfere with the upcoming Environmental Assessment on warm water exotic species in Grand Canyon, nor with its implementation.

Of course, all of our recommendations depend upon the ability to move water through Grand Canyon. Regardless of how we choose to manage Glen Canyon and Hoover Dams, researchers warn us that the only way we will save the Colorado River or its reservoirs is to decrease the amount of water we remove from the river.[22] We must do away with piecemeal planning and rapidly devise a holistic plan that sees the river as an interconnected entity, inseparable from the people who live in the Basin and depend upon its water.

Recommendation: Include within the Purpose and Need statements for the post-2026 operations the protection and restoration of the CRE in Grand Canyon as required by the Grand Canyon Protection Act, the Endangered Species Act, and the purpose and significance of Grand Canyon National Park.

Recommendation: The post-2026 operations should require flows to be released from Glen Canyon Dam in a way that minimizes daily fluctuations, creates flood pulses in the

[19] pp. 11-12 in Glen Canyon Dam Adaptive Management Program Technical Work Group Meeting October 13-14, 2021. Available at https://www.usbr.gov/uc/progact/amp/twg/2021-10-14-twg-meeting/20211014-TWGMeeting-FinalMinutes-508-UCRO.pdf, accessed 12/14/22, attached as Ex. 17.
[20] Ibid.
[21] Ibid.
[22] Bruckerhoff, L.A., K. Wheeler, K.L. Dibble, B.A. Mihalevich, B.T. Neilson, J. Wang, C.B. Yackulic, and J.C. Schmidt. 2022. Water Storage Decisions and Consumptive Use May Constrain Ecosystem Management under Severe Sustained Drought. JAWRA Journal of the American Water Resources Association n/a–n/a. https://doi.org/10.1111/1752-1688.13020, attached as Ex. 19.

spring (similar to pre-dam flood pulse timing) when sediment levels are adequate, optimizes sediment retention downstream, and keeps water temperatures in the Colorado River through Grand Canyon as cold as possible.

Recommendation: The post-2026 operations must include clear and unambiguous language requiring flows that benefit the CRE, native fish, and/or sandbars in Grand Canyon to be implemented as advised in LTEMP, the Expanded Non-Native Aquatic Species Management Plan, or as analyzed in any other previous or future Environmental Assessment, Environmental Impact Statement, or management plan unless it is physically impossible to pass water through Glen Canyon Dam. Since "regulating flow" and "control of floods" are primary purposes of Glen Canyon Dam in CRSP, and hydropower is not a primary purpose of the dam, regulated flows and controlled floods should be incorporated into the new post-2026 operations as tools to further the intent of the GCPA. Low water levels and hydropower should not be an excuse to avoid actions that will have no net impact on total annual downstream water delivery.

2) BOR must plan for dam modifications now, before we are in an emergency situation.

We now understand that climate can cause reservoir levels to fluctuate beyond the levels anticipated at the time of dam construction. Significantly, a report by the National Research Council (NRC) that studied the Colorado River's flow over the last several hundred years with tree ring data has found that previous droughts were longer and more severe than anything in the historical record.[23] Current and future droughts will become longer and more intense because of a regional warming trend, and more challenging for native species to survive.[24] The NRC report also stated that "the preponderance of scientific evidence suggests that warmer future temperatures will reduce future Colorado River streamflow and water supplies. Reduced streamflow would also contribute to increasing severity, frequency, and duration of future droughts."[25] The BOR was one of the sponsors of this study.

The SEIS must specifically create a plan for providing water to the Colorado River in Grand Canyon during extended drought periods. The water must be of sufficient quality and appropriate temperature to protect Grand Canyon's native species, and delivered in such a manner as to protect the CRE in Grand Canyon.

To insure against the loss of a flowing river through Grand Canyon, BOR must create a plan for releasing water through Glen Canyon Dam if levels fall below the dam's intakes. BOR must include in its disclosure predictions for what the water quality and temperature will be when reservoir levels drop. In this regard, BOR should consider an alternative including dam modifications such as bypass tubes at or near the base of the dam, to enable flows when the reservoir level falls below dead pool. These tubes might pass through the dam or

[23] National Research Council. 2007. Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability. Washington DC: National Academies Press, attached as Ex. 20.
[24] Udall, B. and J. Overpeck. 2017. The twenty-first century Colorado River hot drought and implications for the future. Water Resources Research. 53:2404-2418, attached as Ex. 21.
[25] NRC (2007), attached as Ex. 20.

they might pass through the sandstone walls surrounding the dam. BOR must start planning now because we know that bypass development will take years to achieve.

As recent projections indicate, minimum power pool appears imminent and was narrowly avoided this year.[26] If we are interpreting the graphs correctly, BOR predictions of reservoir end of month elevations have overestimated observed annual means for some portion of the year in at least 15 out of the past 32 years, though BOR asserts, "The Probable Minimum inflow scenario reflects a dry hydrologic condition which statistically would be exceeded 90% of the time."[27] We recognize that long range hydrologic predictions are extremely difficult, but whether BOR's 24-month Lake Powell End of Month Elevations are correct or not, we must prepare for crisis.[28] It is time to speak frankly – and urgently – about the problem that BOR may have moving water through Grand Canyon in the very near future.

If Powell reservoir drops another 50-60 feet beyond minimum power pool, the Upper Basin will be unable to deliver water to the Lower Basin and Mexico as required by the Colorado River Compact, and if the reservoir drops 120 feet below minimum power pool, we will be in a deadpool situation.[29]

The Bureau should consider at what point river management — specifically, water and power needs — would be better served by maximizing water storage in Lake Mead rather than dividing it between the Mead and Powell reservoirs. The Bureau should assess the comparative loss of water from bank storage and evaporation between maintaining both reservoirs, maintaining only Lake Mead, and an alternative where Lake Powell is kept low to reduce losses to infiltration and evaporation. Hydropower needs may be more secure if water is concentrated above Hoover Dam, where it will have a higher hydraulic head. Installing river outlets low on Glen Canyon Dam would enable BOR to keep Powell reservoir low without risking the inability to pass water through Glen Canyon Dam. BOR should also consult with entities on the Navajo Nation who are planning solar energy projects adjacent to existing power lines and in already disturbed areas to determine what the electric capacity of those projects will be, and whether they might serve to replace hydropower losses, especially those with storage components.

Because Powell reservoir is likely to fluctuate around its current level into the future, continuing the risk of allowing more warm water non-native fish in Grand Canyon, BOR should also examine the potential for other dam modifications that will limit fish passage through the dam. One possibility is upstream screening. Because it will take some time to analyze the feasibility of this action, BOR should begin to study it now.

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[26] BOR. December 2022 24-Month Study Projections Lake Powell and Lake Mead: End of Month Elevation Charts, attached as Ex. 22.
[27] Id. at 1; NOAA National Weather Service Colorado River Basin Forecast Center GLDA3 Water Supply Verification Annual/Official Verification https://www.cbrfc.noaa.gov/rmap/wsup/point.php?rfc=cbrfc&mode=verif&id=GLDA3, accessed 12/12/22, attached as Ex. 23.
[28] BOR (December 2022), attached as Ex. 22.
[29] Figure 6, p. 19 in Utah Rivers Council, Glen Canyon Institute and the Great Basin Water Network. 2022. Antique plumbing and leadership postponed: How the Glen Canyon Dam's archaic design threatens the Colorado River water supply. https://www.glencanyon.org/wp-content/uploads/2022/08/Final-Antique-Plumbing-at-Glen-Canyon-Dam.pdf, accessed 12/12/22, attached as Ex. 24.

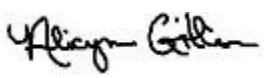
Recommendation: As part of this process, BOR must immediately begin to plan a way to move water around the dam at the base of Glen Canyon Dam. This will: 1) maintain flow through Grand Canyon and enable reliable water deliveries by eliminating the possibility of reaching dead pool, 2) enable water to be concentrated above Hoover Dam while maintaining the flexibility to move water downstream from a low Powell reservoir, and 3) allow cold water to be released from the deepest part of the reservoir, even when reservoir levels are low.

Recommendation: Assess the comparative loss of water from bank storage and evaporation between maintaining both reservoirs, maintaining only Lake Mead, and an alternative where Lake Powell is kept low to reduce losses to infiltration and evaporation.

Recommendation: As part of this process, BOR should implement screening upstream of Glen Canyon Dam to prevent future exotic species passage through the dam.

Thank you for your time and attention. Please keep us informed as this process moves forward.

Sincerely,



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SONORAN
INSTITUTE

August 15, 2023

Ms. Carly Jerla
Senior Water Resources Program Manager
Bureau of Reclamation
Crbpost2026@usbr.gov

Re: Notice of Intent to Prepare an Environmental Impact Statement and Notice to Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead.

Dear Ms. Jerla,

Sonoran Institute is a 33-year-old conservation organization that works to ensure that the Colorado River is managed in a more holistic, inclusive, and adaptive fashion to benefit communities and wildlife in the United States and Mexico.

The Sonoran Institute mission is to connect people and communities with the natural resources that nourish and sustain them. Our vision: A Colorado River Basin where rivers flow, landscapes are healthy, and all communities thrive.

Never in our 30-year history has our mission to connect people and communities with the natural resources that nourish and sustain them been as urgent. The Colorado River winds its way from the Rocky Mountains to the sea, providing a shared source of life for 40 million people. Today the future of our region is uncertain. Our success in managing water and the impacts of climate change--drought, heat, fire, and floods—will define growth and quality of life for the entire Colorado River community. Growing cities and towns as well as agriculture must use water more efficiently, the rivers and streams in the Colorado Basin must be protected and restored because warming temperatures are endangering plants, animals, and our communities now. Our programs provide communities the tools to manage water and reduce many of the harsh effects of rising temperatures and drought. And we have a proven track record of bringing rivers and landscapes back to life.

We have a long history of facilitating dialogue in the Colorado River Basin with rural landowners, small towns, water districts, cities, Tribal Nations, and government agencies in developing collaborative approaches to management of land, water, and the species they support. Through our Growing Water Smart Program, we provide training and technical assistance to communities in the Colorado River Basin to reduce municipal water demand and increase resilience through water conservation, efficiency, re-use, and integrated water resource management. We also have pioneered river restoration efforts in the Basin, including the

Colorado River Delta and Santa Cruz watershed, demonstrating the feasibility and benefits of large-scale restoration and policies that allocate water and funding for such efforts.

Building on these efforts, Sonoran Institute prepared these comments to the Bureau of Reclamation's (Bureau) "Notice of Intent," as published in Federal Register Notice – 88 FR 39455 on June 16, 2023.

We would like to thank the Bureau for acknowledging the seriousness of the problem we all face. As we develop policy that will govern the Colorado River in years to come, it is imperative that we acknowledge that the river has never had the volume originally apportioned under the 1922 Colorado River Compact, that the current volume is declining rapidly, and that we may never return to the flows that we have been accustomed to in previous decades.

We also want to thank the Bureau for recognizing the imperative of active and meaningful involvement by all sovereigns, including Mexico and the 30 Colorado River Basin Tribal Nations, as well as stakeholder groups, in developing and implementing river management policy from the outset of the development of the Post-2026 Colorado River operational strategies. Sonoran Institute has staff and programs in Mexico who work daily with people that live in the Delta region. We understand their personal relationship with the lower Colorado River and their desire to ensure the river's importance remains a key part of their culture and society.

Sonoran Institute acknowledges that the scoping effort initiates the Post-2026 NEPA process, with the goal of completing an Environmental Impact Statement by the end of 2024. We provide the following comments based on guiding principles of integrity, resilience, sustainability, and equity as defined in our August 26th pre-scoping letter.

Additionally, Sonoran Institute recognizes that, given the enormity and complexity of the challenges facing the Colorado River and implementation of a new management framework, there is a potential for Congressional action to provide the necessary authority and resources toward implementation. The implication here is that the NEPA Process should not be constrained to simply looking at management of Lake Mead and Powell and should encourage dialogue and innovative ideas that ensure the river's resilience and sustainability of the Basin's population and natural environment in the face of unprecedented drought.

Key Themes and Priorities for Colorado River Strategies and Operations

1. *NEPA Process Considerations:* As part of the NEPA process, the Bureau intends to design and implement the next Colorado River management framework using "a stakeholder engagement process that is inclusive, transparent, encourages and supports meaningful engagement." To achieve this goal, the NEPA process should, among other things:

    a. Ensure that there is consistent and transparent communication and consultation among all sovereigns (federal, state, and Tribal Nations) during the NEPA process. Basin Tribal Nations have recognized water rights to approximately 25%

of Colorado River water under senior or high priority reserved rights, and many Tribal Nations are in the process of quantifying additional rights to Colorado River water. It is imperative that Tribal Nations be involved with the federal government and the states in developing sustainable solutions to how the river is managed. We applaud the Bureau for actively initiating this type of communication and consultation by convening a meeting on August 10th in Phoenix to which all seven basin states and 30 Tribal Nations were invited. This should be the beginning of ongoing "sovereign to sovereign" engagement as part of the planning process.

b. Work toward integrating collaborative decision-making into the new management framework that provide Tribal Nations a shared role in decision-making processes that implicate and/or affect their respective rights, interests, and resources within the Basin.[1] Draw on lessons learned and best practices from other transboundary river basin commissions.[2]

c. Establish as part of the NEPA process working groups around particular areas of expertise and sectors that can assist with the development of the new framework and evolve into standing working groups that guide the framework's implementation.[3] Sonoran Institute specifically recommends that creation of three working groups, which the Sonoran Institute would be willing to participate in:

    i. A water resilience working group that explores strategies that allow municipalities, agriculture, Tribal Nations, and NGOs to enter into voluntary, temporary, and compensated agreements to share water supplies, storage, and infrastructure. Such agreements can contribute towards a more holistic, robust, and adaptive framework by providing communities with the tools to address immediate water-related impacts of drought. This working group could help inform accompanying Congressional legislation that would remove restrictions to Tribal participation in such agreements and ensure that any federal authorization

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[1] See Matthew McKinney, Jay Weiner & Daryl Vigil, *First in Time: The Place of Tribes in Governing the Colorado River System*, 63 Nat. Res. J. 153 (2023). for a discussion of the opportunities and challenges of implementing collaborative decision-making in managing the Colorado River.

[2] For example, in the Mackenzie River Basin, territorial governments have committed via a Master Plan to guiding cooperative management principles (equitable utilization, prior consultation, sustainable for present and future generations, and maintenance of ecological integrity). Developing shared principles for managing the Colorado River could help build collaboration and reduce conflict among sovereigns and stakekholders. (https://www.mrbb.ca/uploads/media/5d2e0d070f2cd/mackenzie-master-agreement-english.pdf?v1%20OR%20https://www.mrbb.ca/about-us).

[3] In the Mackenzie River Basin, multiple government entities collaborate on joint monitoring, reporting, and knowledge co-production led by federal, provincial, territorial, and Aboriginal governments, and environmental NGOs. This example of respectful dialogue to better understand the scope, meaning, and communication of indigenous knowledge and traditional use, as well as respecting ownership over traditional knowledge, provides a useful example for the Colorado River Basin in integrating many ways of knowing into decision making so that can draw on all of the best ideas and information available to respond to challenges (Kriwoken, L. (2019). Managing and Governing for Resilience: The Mackenzie River Basin Water Agreements. http://riverlab.berkeley.edu/wp/wp-content/uploads/Kriwoken_MRB-Water-Agreements_Berkeley_May-9-11-2019-FINAL.pdf; http://www.pademp.com/.)

or funding of such agreements does not limit participation by any interested party.[4]

ii. A working group that identifies impacts of reduced Colorado River water use on resources in Mexico and ways to avoid, minimize, or mitigate these impacts. While we recognize that the NEPA process is focused on domestic actions, since 1979 federal agencies have been required by Executive Order 12114 to evaluate transboundary impact of significant actions. This working group could suggest actions that Mexico and the United States could consider as part a successor agreement to Minute 323 critical to the successful implementation of the next Colorado River management framework.[5]

iii. A working group around outreach and engagement strategies that would be dedicated to jointly assessing, implementing, and evaluating public participation and transparency strategies. The goal would be to develop a holistic stakeholder engagement strategy to inform, increase awareness, and engage stakeholders in management planning.[6]

d. Proactively identify emerging topics or issues that could be the subject of convenings, research, or activities that generate innovative ideas to inform the process, and encourage universities, non-governmental organizations, and other stakeholder groups to lead such complimentary efforts. Such topics or issues could be identified as part of the Bureau's summary report on scoping comments.

e. Develop a sustained public engagement strategy that takes full advantage of Web-based and social media platforms (e.g., webinars, virtual/hybrid/recorded meetings, data hubs, online dashboards, and story maps) to update and educate the public on the process.[7]

2. *NEPA Analysis Considerations:* The NEPA process should consider future operations and management strategies under conditions of deep uncertainty and best available science. To further the substantive development of the next Colorado River management framework, the NEPA process should:

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[4] See Water & Tribes Policy Brief #5, *Developing the Next Framework to Manage the Colorado River: Flexible Tools to Benefit Tribes and the Basin.*

[5] See Raise the River's June 12, 2023, letter to Commissioner Touton for a description of some of the potential impacts to resources in Mexico as a result of reduced Colorado River water use.

[6] We can look to lessons from the Danube River where an international commission that operates at the Basin-scale. The international commission provides basin-scale management and engagement strategies. Initially, the Commission conducted rigorous stakeholder analysis, public awareness efforts, established mechanisms for participation, and developed networks of public participation experts and media (Rieu-Clarke, A. S. (2007). Overview of Stakeholder Participation-What Current Practice and Future Challenges-Case Study of the Danube Basin. *Colo. J. Int'l Envtl. L. & Pol'y*, *18*, 611.). While a basin-scale management entity may or may not be appropriate for the Colorado River Basin, a group focused on collaboration and engagement at the Basin-scale is appropriate, could reduce conflict, deepen engagement, and provides a forum for learning and adaptation.

[7] For an example, see: https://www.epa.gov/sfbay-delta. Also, efforts in the Mackenzie Basin have make information accessible via data sharing platforms (https://mackenziedatastream.ca/). This could be helpful to ensure transparency of information and accessibility to using such data in the Colorado River Basin.

a. *Clearly define a management goal or set of goals for the new framework.* The purpose of a goal is to clarify the ultimate end(s) to be achieved by the management framework and to assist with measuring progress in, and impact of the framework's implementation. It should specifically articulate how uses and evaporative and system losses will be balanced with supply and how depleted reservoir water levels will be recovered.

b. *Perform a comprehensive analysis*: All indications are that the Basin's hydrology will not improve anytime soon. Accordingly, the next Colorado River management framework cannot simply focus on short-term efforts to stabilize the system. It must also promote the long-term sustainability of the Basin's communities and natural environment in the United States and Mexico. To achieve this outcome, the NEPA process should:

    i. Identify, assess, and address the possible impacts not only to the operation of Colorado River reservoirs but also to the critical social, cultural, and environmental resources that define the river and its tributaries.
    ii. Build a range of modeling scenarios, including projected annual flows at Lee's Ferry of 12.5MAFY and lower annual estimates. These modelling scenarios should integrate used and unused Tribal water rights in projecting future water demands.
    iii. Consider various storage scenarios, including abandoning storage in Lake Powell, with management of these storage reservoirs based on hydrological conditions, not reservoir levels. These scenarios should explicitly consider impacts to existing environmental commitments, including habitat building flows in the Grand Canyon, the Lower Basin Multi-Species Conservation Plan, and Colorado River Delta restoration.
    iv. Develop, implement, and support an adaptive management framework that includes:
        1. Short-term adaptive actions in response to more immediate changing hydrologic conditions and longer-term mitigative measures that could be implemented to reduce the overall risk exposure and impacts to the public and the environment.
        2. Ecological and ecosystem critical aspects, specifically ESA driven issues, and ecosystem integrity thresholds that can be brought into the assessment and decision process, including all the major ESA focused adaptive management, mitigation and recovery programs that today are spread throughout the Basin.

c. *Work to complement essential parallel efforts:* We recognize the next Colorado River management framework may not encompass every issue plaguing the Basin. Future management strategies and operations, therefore, must be sufficiently complementary to parallel efforts that remain essential to the Basin's integrity and long-term sustainability. Such parallel efforts include, but may not be limited to:

i. Reaching agreement with Mexico on use of Colorado River resources after expiration of Minute 323 and a commitment to continue to have an open dialogue that encourages engagement. Specifically, engage the International Boundary Water Commission in this NEPA planning process.
ii. Securing reliable access to clean water for all Tribal members and other Colorado River Basin residents. This includes developing water infrastructure that allows for the delivery of water to Tribal members.
iii. Capitalizing on the Infrastructure Investment and Jobs Act, Inflation Reduction Act, and other funding opportunities, including watershed management, that will allow us to build the efficiency and conservation mechanisms needed to enable us to do more with less.
iv. Identifying other federal water programs that could be utilized to augment water supply for selected areas of the Basin. Expanding the water portfolio for urban, rural, agricultural, and Tribal communities and sectors is necessary. Programs such as stormwater capture, water reuse, recycling, agricultural efficiency technology, evaporation reduction—all can be used to augment water supplies to reduce the strain on the Colorado River.

Because these and similar efforts are of such great importance to the health of the Basin, our support for a future Colorado River management framework will be measured in part by how this framework works in concert and avoids conflict with other related efforts aimed at promoting greater certainty, building more resilient communities, ecosystems, and economies, and reducing potential conflict over water management decisions going forward.

In a constrained water future, communication and coordination between decision makers, stakeholders and the public will be critical. Creating and supporting forums that allow for quick and accessible levels of communication will be essential to maintaining a knowledgeable and supportive public.

d. *Allow for greater flexibility:* A key element of the next Colorado River management framework must also be flexibility—the framework must be able to quickly adjust to and account for changing hydrological conditions without requiring complete system overhaul in parts of, or throughout, the Basin. For the framework to provide flexible water management strategies that contribute to Basin-wide water security for all water users, including the environment, it must be based on a range of modeling scenarios.

Flexibility requires real time data and information. The present management of the Colorado River system is based on 24-month studies and restricted shifting from historical protocols. That worked fine when there was excess water in the system. With the structural water deficit that now exists in the Basin and shifting demands, a real-time approach that allows for daily and hourly fine tuning of water deliveries and reservoir management is required.

e. *Creatively utilize, conserve, and diversify local water portfolios within the Basin.* The future will include a less robust and more variable Colorado River water supply. Achieving water supply resilience requires integrated water resource management, or effective use of all forms of water to augment existing supplies, as well as increases in water conservation and efficiency. Support for rain and stormwater capture, water reuse and recycling, improved efficiency of fixtures, appliances, and urban irrigation are vital to support the new management framework and should be promoted as such.

Sonoran Institute values the opportunity to inform the processes for developing the NEPA efforts related to the next Colorado River management framework. Sonoran Institute is a part of the western landscape and community. We live and work here, and we are committed to being engaged in ensuring that our water future is based on good science, transparent process, equitable apportionment of impacts and benefits, and engaged decision-making. We look forward to working together in the months and years to come to meet the immediate needs in the Colorado River Basin and to ensure long-term sustainability for the people, plants, and other species within the Basin.

Signed,

Richard Schaefer (Aug 15, 2023 09:34 PDT)

Richard Schaefer
Chair, Board of Directors
Sonoran Institute

Mike Zellner
Chief Executive Officer
Sonoran Institute

Southwest Hydrology & Hydraulics, LLC

Experience in Water Resources

August 15, 2023

Southwest Hydrology & Hydraulics, LLC
PO Box 62233
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702-370-9852
dblatchford@swh20.net

Bureau of Reclamation
Attn: Post-2026
(Mail Stop 84–55000)
P.O. Box 25007
Denver, CO 80225

Sent by email to crbpost2026@usbr.gov
and letter mailed via U.S. Postal Service

Attention: Amanda Erath, Colorado River Post-2026 Program Coordinator

Re: Submittal of Comments in Response to June 16, 2023, *Federal Register* Notice of Intent to Prepare an Environmental Impact Statement and Notice to Solicit Comments and Hold Public Scoping Meetings on the Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead

Dear Ms. Erath,

Pursuant to the subject *Federal Register* notice dated June 16, 2023, Southwest Hydrology & Hydraulics, LLC is pleased to present the comments, suggestions and recommendations presented in this letter.

Slide 26 of the *Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead* presentation used for the July 2023 public scoping meetings indicates that Reclamation is seeking feedback in these requested scoping comments on:

- Operational guidelines and strategies
- Potential modifications to the purpose and elements of the 2007 Interim Guidelines
- Any other related issues that should be considered in the EIS.

This same July 2023 public scoping meeting presentation (slide 22) summarized the key themes presented in the January 2023 Pre-Scoping Summary Report with the following:

- **Robust and Adaptive:** Future operational guidelines must support proactive management to improve system stability. They must be capable of both withstanding a broad range of future hydrologic and operating conditions and minimizing system vulnerability.

- **Holistic Approach:** Future operational guidelines should focus on the long-term sustainability of both the Basin's population and natural environment, minimize system vulnerability, and increase system resiliency.

- **Alternative Paradigms:** The current tier-based approach to coordinated operation of Lake Powell and Lake Mead is one of multiple ways that the system can be managed. Alternative paradigms should be explored.

Bifurcation of the Post-2026 Operational Strategies and Guidelines Development DEIS and the near-term response actions and development of post-2026 operations SEIS processes will result in a flawed process and unsatisfactory results.

It is fair to state that the above points are contained within the statements found on page 8 of the Pre-Scoping Summary Report, however, the emphasis being placed on an administrative process to supersede the 2007 Interim Guidelines[1] is misguided in seeking to bifurcate post-2026 operational strategies and guidelines from what will be post-2026 Colorado River System accounting, water storage and distribution hierarchy, and water conservation operations. The clear statement of Reclamation's intention to do so is found in the paragraph beginning at the top of the left column of page 39456, the June 16, 2023, *Federal Register* notice makes the statement:

> With respect to the relationship between the ongoing SEIS process and the post-2026 process, the November 2022 Federal Register notice was clear that the SEIS: ''does not interfere with, supplant, or supersede that separate post-2026 guidelines development process. Rather, this SEIS will inform and complement the development of post-2026 guidelines.'' The SEIS is focused on limited sections of the 2007 Interim Guidelines to develop the operational tools necessary to address potential extreme drought conditions during the 2024 to 2026 timeframe. In contrast, the post-2026 process will address the subsequent timeframe and revisit all sections of the 2007 Interim Guidelines and other operating agreements that expire in 2026 (e.g., the DCP). The appropriate scope of post- 2026 operations will be determined after conclusion of the public scoping process.

Indeed, the June 16, 2023, *Federal Register* notice, i.e., (the subject of this letter) further notes this shortcoming in the paragraph beginning at the bottom of the left column of page 39456, wherein the notice states:

> The June 2022 **Federal Register** notice for pre-scoping for post-2026 operations anticipated "that near-term response actions and development of post-2026 operations will need to proceed on parallel timelines. The SEIS and post-2026 processes are now underway and proceeding simultaneously as predicted. Every effort will be made to provide clear and timely information regarding the milestones for public engagement in the post-2026 process to minimize the stakeholder and public burden of tracking and engaging in both efforts."

The notion expressed in these descriptions of overlain, multiple-ongoing NEPA actions proceeding on parallel timelines is not practical. This commenter believes the outlined process to be flawed. Reclamation cannot practicably separate considerations of the "near-term response actions and development of post-2026 operations" from the "river operational guidelines and strategies and modifications to the purpose and elements of the 2007 Interim Guidelines" and expect to derive a workable result. It was not possible to do this as the 2007 Interim Guidelines were developed, nor was it done with the 2019 Drought Contingency Plan efforts.

It is true that the words written in the several *Federal Register* notices state Reclamation's intention to take this course of action; however, nowhere has an attempt been made to describe **how** this will be done, the **bases** for why pursuing this course is appropriate or necessary, and the **administration** and **mechanics** of simultaneous processes[2].

Specifically, assumptions will have to be made as to the annual diversion demands below Hoover Dam for this effort without the benefit of the best available information. What are to be the basis for those assumptions and the reduction of those demands as time goes forward?

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[1] As noted on slide 16 of the *Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead* presentation used for the July 2023 public scoping meetings, there are four operational elements associated with the Interim Guidelines: Shortage Guidelines, Coordinated Reservoir Operations, Storage and Delivery of Conserved Water and Surplus Guidelines. *See* 73 Fed. Reg. 19873 (04/11/2008).

[2] Excepting the sentence quoted above: "Every effort will be made to provide clear and timely information regarding the milestones for public engagement in the post-2026 process to minimize the stakeholder and public burden of tracking and engaging in both efforts."

Regarding Footnote 2, it is apparent that the information and analysis compiled through the two studies will NOT be integrated one into the other. Accordingly, we fully anticipate the results of both studies will be unsatisfactory. There will be inconsistencies identified and additional analyses desired due to overlooking conceptual solutions to complex problems; typically, complex problems require solutions that are both well planned and laid out in specific detail. The suggested approach does not allow for this outcome.

Reclamation's April 2023 *Near-term Colorado River Operations Draft Supplemental Environmental Impact Statement* included analyses that properly must be considered in this *Development of Post-2026 Operational Guidelines and Strategies for Lake Powell and Lake Mead* DEIS.

Cursory review of the April 2023 DSEIS reveals that the "bright line" between the two efforts that Reclamation is attempting to distinguish is not real. As but one example, Section 2.8, Action Alternative 2 (page 2-14) sets forth significant analysis of what can only be described as operational strategies and post-2026 guidelines. Accordingly, the thesis that these efforts are currently, and can be appropriately kept, separate, is highly suspect. See also Table 2-11 to support this statement.

The key themes presented in the January 2023 *Pre-Scoping Summary Report*, as quoted above at the top of page 2 above, support our contention that the development of post-2026 operational guidelines and strategies needs to be done as part of the *Near-term Colorado River Operations Draft Supplemental Environmental Impact Statement* effort.

Given the significant financial resources (tens of millions of dollars from the BIL and the IRA), Reclamation needs to broaden the scope of actions proposed to be taken in support of Near-Term Colorado River Operations.

A comprehensive list of suggestions was submitted by this firm in response to the Friday June 24, 2022, the Department of Interior, Bureau of Reclamation issued a notice in the *Federal Register*,[3] requesting input on the development of post-2026 Colorado River reservoir operational strategies for Lake Powell and Lake Mead under historically low reservoir conditions. A copy of that submittal is attached for convenient reference.

Thank you for the opportunity to submit these scoping comments. If there are questions or concerns, or if I can be of further assistance, please do not hesitate to contact me at 702-370-9852.

Very truly yours,

Douglas B. Blatchford, PE, PH, CFM
President

Attachment (Down 3 in '23 document)

[3] https://www.federalregister.gov/documents/2022/06/24/2022-13502/request-for-input-on-development-of-post-2026-colorado-river-reservoir-operational-strategies-for

Southwest Hydrology & Hydraulics, LLC

Experience in Water Resources

DOWN 3 IN 23

Request for Input on Development of Post-2026 Colorado River Reservoir Operational Strategies for Lake Powell and Lake Mead Under Historically Low Reservoir Conditions

Prepared For: Department of Interior
Bureau of Reclamation
Washington, DC
August 2022

Prepared By: Southwest Hydrology & Hydraulics, LLC
PO Box 62233
Boulder City, NV 89005
702-370-9852
dblatchford@swh20.net

THE WHITE HOUSE

WASHINGTON

October 13, 2022

Douglas B. Blatchford
Boulder City, Nevada

Dear Douglas,

Thank you for writing to me about our environment. Our land, sea, and air are some of our most precious resources, and I believe we have a sacred duty to preserve America's natural wonders for all time and for all people.

My Administration is making historic progress in our fight to protect our environment and natural resources while creating economic opportunity and ensuring the health of the American people. New laws like the Inflation Reduction Act and the Bipartisan Infrastructure Law are delivering unprecedented investments of hundreds of billions of dollars that will protect our natural habitats, clean up toxic pollution, and help our Nation transition to a clean energy future.

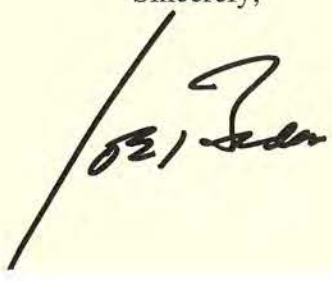
Together, these advances will create good-paying clean-energy jobs in every corner of the country. They will also put us on the path to meeting our ambitious environmental commitments to reduce greenhouse gas emissions by up to 52 percent by 2030, reach 100 percent carbon pollution-free electricity by 2035, and achieve net-zero emissions economy-wide by 2050.

We are putting the American people at the center of our efforts to protect the environment. Farmers, ranchers, fishers, Tribal Nations, and local communities came together to launch our America the Beautiful Initiative, which will conserve and restore 30 percent of America's lands and waters by 2030. Recently, I restored protection to cherished lands and waters that are deeply meaningful to Tribal communities—Bears Ears, Grand Staircase-Escalante, and the Northeast Canyons and Seamounts National Monuments.

And through our Justice40 commitment, we are making sure that communities that have long been overburdened by pollution experience meaningful benefits of our clean energy future, because everyone deserves to breathe clean air, drink clean water, and have a safe and healthy place to call home.

Together, we will safeguard our environment and preserve the natural wonders of our Nation for generations to come.

Sincerely,



Southwest Hydrology & Hydraulics, LLC

Experience in Water Resources

August 23, 2022

The Honorable Joseph R. Biden
President
The White House
1600 Pennsylvania Avenue, N.W.
Washington, D.C., 20500

The Honorable Debra Haaland
Secretary
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

The Honorable Tanya Trujillo
Assistant Secretary for Water and Science
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

The Honorable Camille Touton
Commissioner
U.S. Bureau of Reclamation
1849 C Street, NW
Washington, D.C. 20240

Dear President Biden, Secretary Haaland, Assistant Secretary Trujillo, and Commissioner Touton:

Given the dire conditions on the Colorado River, and clear lack of consensus, Southwest Hydrology & Hydraulics, LLC makes the following suggestions to close the gap between water supply and demand on the Colorado River (attached).

The following is recommended immediately:

- Create a *National Water Czar*

  To manage the Colorado River Basin's long-term water supply. various entities will require strong leadership at the Federal level; therefore, we suggest establishing a National Water Czar or equivalent that has authority to work across agencies at the Executive level, controlling both resources and funding. Maximizing the water storage capacity of the Colorado River Basin immediately is a challenging assignment that must coordinate the multi-agency, multi-Bureau, efforts.

- Invoke the Defense Production Act

  Another Federal authority that could be utilized is the Defense Production Act (DPA). Water insecurity on the Colorado River translates to a major national security challenge for the United States, given the economies of the Basin States and Tribes, especially the defense industries in southern California, Arizona, and New Mexico, among many other locations. Invoking DPA would give the president of the United States broad emergency powers that could be delegated to the Secretary of the Interior, above and beyond powers granted through existing authorities.

- Streamline permitting

  Specific authority should be provided to the National Water Czar or the Reclamation to expedite environmental permitting of water projects that enhance water supply and reduce water demand, with the intent to comply with the intent of environmental protections yet reduce the risk of third-party obstruction through environmental lawsuits.

Attached are letters outlining additional recommendations. Mr. John J. Entsminger, General Manager of the Southern Nevada Water Authority, notes the lack of political will to forge collective action. The Honorable Catherine Cortez Masto and Honorable Jackie Rosen recommend immediate implementation of SNWA's proposals. Additional recommendations from my experience on the Colorado River are attached.

With warm regards,

Douglas B. Blatchford, PE, PH, CFM
President, Southwest Hydrology & Hydraulics, LLC

Southwest Hydrology & Hydraulics, LLC *PO Box 62233, Boulder City, NV 89005*
702-370-9852 *dblatchford@swh20.net*

SOUTHERN NEVADA WATER AUTHORITY
1001 South Valley View Boulevard • Las Vegas, NV 89153
(702) 258-3939 • snwa.com

August 15, 2022

The Honorable Debra Haaland, Secretary of Interior
Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

The Honorable Tanya Trujillo, Assistant Secretary for Water and Science
Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

The Honorable Camille Calimlim Touton, Commissioner
Bureau of Reclamation
1849 C Street, NW
Washington, D.C. 20240

Dear Secretary Haaland, Assistant Secretary Trujillo, and Commissioner Touton:

Sixty-two days ago, Commissioner Touton and I sat side by side in the United States Senate and conveyed to the world that the Colorado River is on the brink of a crisis. She testified that between two and four million acre-feet of additional conservation is needed to protect critical elevations in Lakes Mead and Powell in 2023 and every single year thereafter, and I testified that what has been a slow-moving train wreck for twenty years in accelerating and that our moment of reckoning is near. We were both right then and we're both right now.

Yet despite the obvious urgency of the situation, the last sixty-two days produced exactly nothing in terms of meaningful collective action to help forestall the looming crisis. The unreasonable expectations of water users, including the prices and drought profiteering proposals, only further divide common goals and interests. Through our collective inaction, the federal government, the basin states and every water user on the Colorado River is complicit in allowing the situation to reach this point.

In the absence of the political will to forge collective action, Nevada will continue our efforts to ensure the security and sustainability of our community. We have been clear-eyed and pragmatic about the realities of the situation confronting the river from the beginning. Nevada has spent the last two decades and billions of local dollars preparing for precisely the scenario that confronts us now. The Southern Nevada Water Authority invested $1.4 billion engineering and constructing the third intake and low lake level pumping station to ensure our community's access to water in Lake Mead even if conditions deteriorate to the point that water cannot be released from Hoover Dam downstream to the country of Mexico and to water users in California and Arizona. Our community has blazed the trail for urban water conservation both nationally and internationally by reducing our consumptive use from the river by

26 percent while adding more than 750,000 people to our valley. This year alone, we will leave sixty-five thousand acre-feet of water in Lake Mead – water that we're legally entitled to divert and consume.

Nevadans are not the kind of people to rest on our laurels, and we are not stopping there. We have a workable plan to reduce water use from 110 gallons per capita per day to 86 gallons by 2035. These measures are not easy to implement. Every sector of our community has been – and will continue to be – required to make sacrifices, our elected officials will continue to make hard but necessary decisions, and we will continue to lead by example in the hopes that enough people of good will throughout the basin will join us on the path to water security.

To the broader river community, I say this: The Law of Mass Balance dictates that the Colorado River cannot provide enough water for the current level of use. The magnitude of the problem is so large that every single water user in every single sector must contribute solutions to this problem regardless of the priority system. The math is simple, even if the law and the politics are not: the bulk of the responsibility to reduce use falls upon water users downstream of Hoover Dam, because that is where the bulk of the water is used.

We are at the stage where basin-wide every drop counts, and every single drop we are short of achieving two to four million acre-feet in permanent reductions draws us a step closer to the catastrophic collapse of the system, as well as draconian water management practices to protect health and human safety that we have successfully staved off in the past through cooperation. Each temporary action must be a bridge to permanent reductions and must be implemented post-haste. We must not sit by and celebrate the small victories that fall short of the goal because to do so does a disservice to the communities we serve.

Our next chapter must be nimble, swift, decisive, and action-oriented. The Secretary of Interior has the tools to prevent the reservoirs' decline if there is the support and fortitude to use them. To that end, we recommend the following actions be taken to minimize the consumptive uses of water from the Colorado River through existing federal authorities, programs, and appropriations:

- Create new beneficial use criteria for Lower Basin water users, eliminating wasteful and antiquated water use practices and uses of water no longer appropriate for this Basin's limited resources
- Develop criteria for managing facilities, reservoirs, and projects for health and human safety operations in order to create certainty and predictability in the face of further reservoir declines
- Create a basin-wide municipal turf removal program to increase payments to customers where publicly available programs already exist
- Expand agricultural efficiency improvements that result in consumptive use reductions
- Eliminate wasteful municipal watering of non-functional turf and require seasonal irrigation schedules be implemented and enforced
- Invest in water reuse, water recycling, and desalination programs
- Purchase additional lands under the Lower Colorado River Multi-Species Conservation Program to prepare for habitat restoration under a significantly modified system
- Incentivize conversions to lower water-use crops
- Charge each contractor for evaporation and losses in the Lower Basin so that the Lower Basin can reduce its reliance upon excess water from the Upper Basin to balance reservoirs

- Reprioritize Salinity Control Act funding to only those projects that reduce consumptive uses of water, including fallowing agreements and the purchase of marginal lands
- Accelerate and fund necessary improvements and modifications at Glen Canyon Dam that will increase predictability and reliability of releases under low reservoir conditions
- Prioritize federal funding for drought mitigation to those projects that provide meaningful long-term and permanent reductions in use

Without active and aggressive federal leadership, the states have always wallowed. We welcome an expedient and aggressive approach to implementing these actions. Writing the next chapter will require each and every water manager to convince their elected officials and governing bodies that sacrificing something is the only way to save everything. Should these efforts fail, we are ready to work with any of our willing partners on common-sense federal legislation that helps bring water usage in line with the river's modern-day hydrology. By missing this deadline, we are doing a disservice to every person, city, ecosystem, farmer, rancher, and tribal nation that relies upon the Colorado River; however, through bold and decisive action, we still have a chance to ensure the safety of all our communities.

Nevada stands ready.

Sincerely,

John J. Entsminger
General Manager

United States Senate

WASHINGTON, DC 20510

August 16, 2022

The Honorable Debra Haaland
Secretary
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

The Honorable Tanya Trujillo
Assistant Secretary for Water and Science
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

The Honorable Camille Touton
Commissioner
U.S. Bureau of Reclamation
1849 C Street, NW
Washington, D.C. 20240

Dear Secretary Haaland, Assistant Secretary Trujillo, and Commissioner Touton:

We are writing to you regarding the worsening drought crisis in the Western U.S. and the recent actions taken by the Department of the Interior (DOI) to preserve the Colorado River System.

On June 14, 2022, Commissioner Touton testified before the Senate Energy and Natural Resources Committee about the urgent need for states and tribes throughout the Colorado River Basin to develop a plan to reduce water consumption to address the historic drought before an August 16, 2022 deadline.[1] Unfortunately, the deadline set by DOI has now passed without an agreement.[2] Following the recent announcement by the DOI asking Nevada, Arizona, and Mexico to make additional cuts to their water usage to conserve water along the Colorado River Basin,[3] we call on you to take additional federal actions and measures to ensure *all* Lower Basin states are contributing to the Basin-wide conservation required to meet the severity of this crisis.

To assist with these efforts, we believe Nevada's decades of leadership in water conservation can provide a vital blueprint for the Colorado River Basin's future. Accordingly, we urge the expedient implementation of the proposals put forward by the Southern Nevada Water Authority (SNWA). These proposals, laid out in an Aug 15, 2022 letter to you by SNWA General Manager

[1] U.S. Congress, Senate Committee on Energy and Natural Resources. "*Short And Long Term Solutions To Extreme Drought In The Western U.S.*", Statement of the Honorable Camille Touton, 117th Cong., 2nd sess., June 14, 2022. Hereinafter "2022 Drought Hearing."

[2] Lochhead, Colton. "*Water authority chief blasts other states that rely on Colorado River*." Las Vegas Review Journal. August 15, 2022. https://www.reviewjournal.com/news/politics-and-government/water-authority-chief-blasts-other-states-that-rely-on-colorado-river-2623823/.

[3] Department of Interior. "*Interior Department Announces Actions to Protect Colorado River System, Sets 2023 Operating Conditions for Lake Powell and Lake Mead*." August 16, 2022. https://www.doi.gov/pressreleases/interior-department-announces-actions-protect-colorado-river-system-sets-2023.

John Entsminger, will protect the near-term storage volumes across Western reservoirs along the Colorado River – including Lake Mead.[4] While these will be vital first steps, implementing sustainable solutions will require continued, firm federal leadership, collective action, and coordination at all levels of government.

In an effort to protect the critical reservoir storage that remains, we urge the DOI to expedite the congressionally approved drought funding in the recently passed *Inflation Reduction Act* to assist with ongoing conservation efforts. While we recognize that there is not a one-size-fits-all solution to the prolonged drought in the Colorado River Basin, the $4 billion provided via Section 50233 will create a critical pathway to permanent adaptation.

As you assess the proposals put forward by the partners in the region and establish guidelines for utilizing the drought mitigation resources provided in the *Inflation Reduction Act*, we also ask that you use DOI's authorities and influence to include all parties in the solution and provide Congress with routine updates on efforts, actions, and coordination underway at the Department. Moving forward, we look forward to continuing to work with you and our congressional colleagues on this critical matter, and echo SNWA General Manager Entsminger's message that Nevada stands ready to assist. We look forward to your prompt response.

Sincerely,

Catherine Cortez Masto
United States Senate

Jacky Rosen
United States Senate

[4] Entsminger, John. August 15, 2022. https://www.8newsnow.com/wp-content/uploads/sites/59/2022/08/SNWA-Letter-pdf-combined.pdf

TABLE OF CONTENTS needs revision

I. INTRODUCTION

A. Background

On Friday June 24, 2022, the Department of Interior, Bureau of Reclamation issued a notice in the *Federal Register*[1], requesting input on the development of post-2026 Colorado River reservoir operational strategies for Lake Powell and Lake Mead under historically low reservoir conditions (hereinafter referred to as '*Down 3 in 23*'). This paper is an effort to compile strategies that are both realistic and practical given dire circumstances on the Colorado River. Detailed background regarding previous decisional documents can be found in the *Federal Register* and online, including the *2007 Interim Guidelines*[2], *Minute 319*[3], *Minute 323*[4]*, Drought Contingency Plans*[5]*,* and other decisional documents.

B. Scope

The scope of this paper is limited to providing suggestions that could enhance water supply and reduce water demand, for both short term and long-term operations. The suggestions provided are by default conceptual and limited in detailed scope. Most of the technical suggestions have already been extensively studied and could possibly be used to ameliorate water supply and demand imbalances. As such solutions presented in this paper are more likely than not to be effective if implemented. The scope provided in this paper is limited to the framework of the *Law of the River*[6], and *Western Water Law(Figure 1)*[7], and is intended to include Indian Tribes[8] (Figure 2), the Republic of Mexico (Figure 3), and Non-Governmental Entities (NGO's). This paper is designed as a living document with the expectation that ideas set forth will likely change as more information becomes available.

C. Disclaimer

This paper offers conceptual solutions to complex problems; typically, complex problems require solutions that are both well planned and laid out in specific detail. The conceptual solutions presented are more likely than not to be effective but will require additional, detailed work to complex problems. Solutions presented do not favor one stakeholder over another and therefore are intended to be politically neutral. Solutions may rely on proprietary information but are not considered endorsements. Finally, opinions and suggestions are by Southwest Hydrology & Hydraulics, LLC, and do not represent other third parties, such as the Secretary of the Interior[9].

[1] https://www.federalregister.gov/documents/2022/06/24/2022-13502/request-for-input-on-development-of-post-2026-colorado-river-reservoir-operational-strategies-for
[2] https://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf
[3] https://ibwc.gov/Files/Minutes/Minute_319.pdf
[4] https://ibwc.gov/Files/Minutes/Min323.pdf
[5] https://www.usbr.gov/dcp/finaldocs.html
[6] https://www.crwua.org/law-of-the-river.html
[7] https://extension.unr.edu/publication.aspx?PubID=3750
[8] https://www.usu.edu/colorado-river-research-group/files/crrg_tribal_water_rights.pdf
[9] https://www.oge.gov/

Figure 1: Colorado River Basin exports (taken from Reclamation)

Figure 2: Colorado River Basin Indian Tribes (taken from UC Davis)

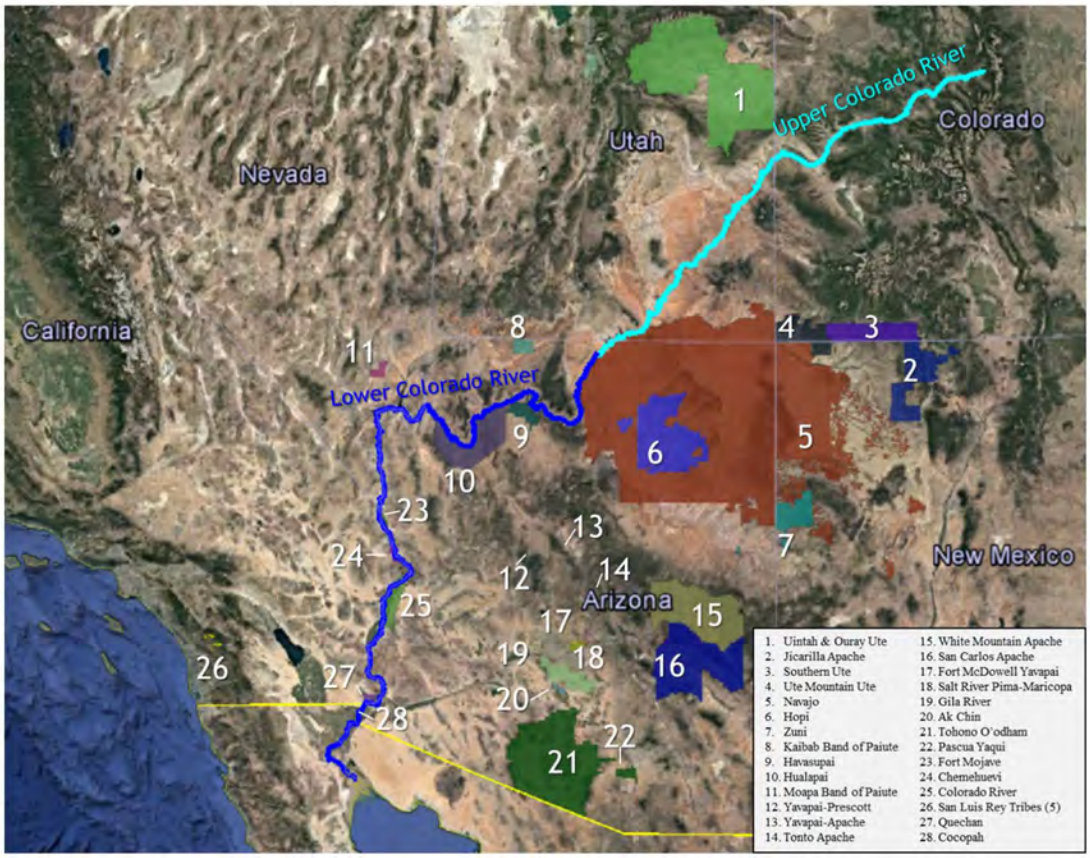
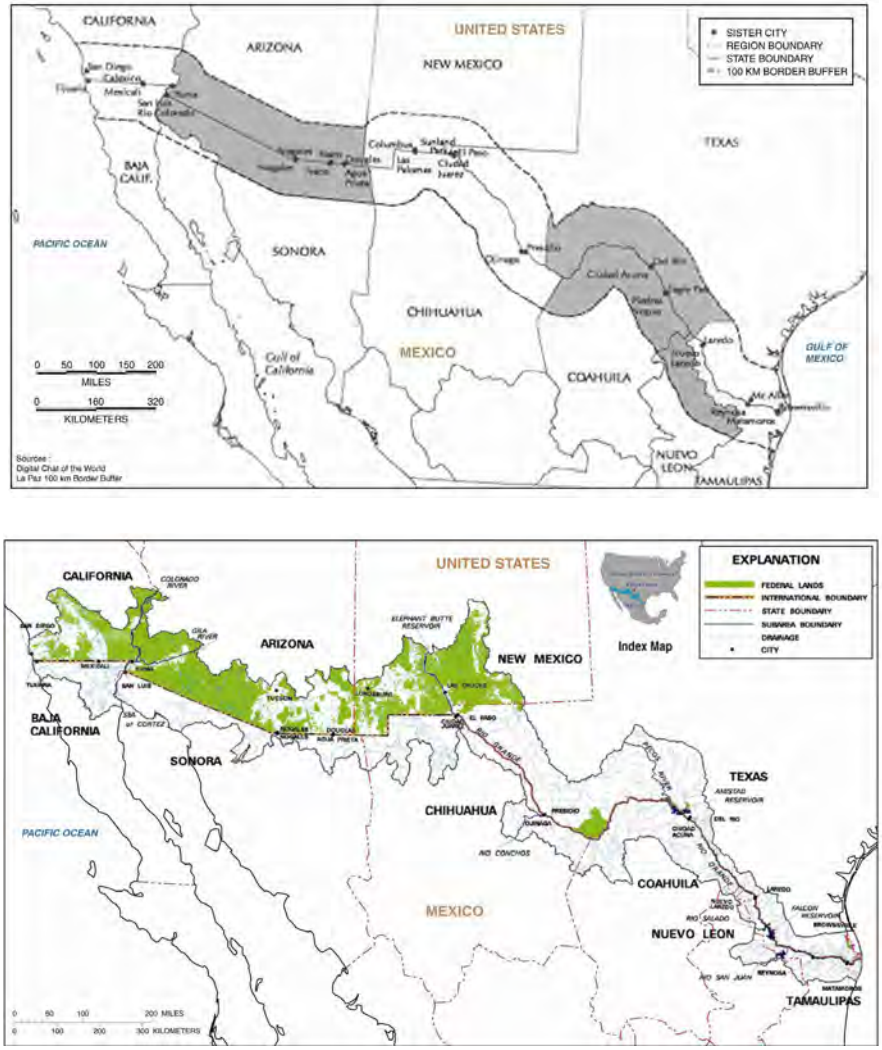


Figure 3: International Boundary with Mexico[10] (taken from Brown)



[10] https://journals.openedition.org/vertigo/1883

II. Operational Strategies

- Establish a National Water Czar
- Invoke the Defense Production Act
- Utilize the Defense Advanced Research Projects Agency
- Streamline the permit process
- Improve forecasting skill
- Expand scientific research and understanding in climate and hydrology.

A. Federal and Non-federal Integration

This strategy requires detailed coordination and integration of Federal Agencies, including but not limited to, the Department of Interior (DOI), the Department of Agriculture (USDA), Department of Commerce (Commerce), the Department of Defense, United States Army Corp of Engineers (USACE), Department of Homeland Security (DHS), Department of State, (State), the Environmental Protection Agency, (EPA), and others. As stated in the *Federal Register,* other non-governmental entities should also be involved including environmental and conservation groups, Indian Tribes, the Republic of Mexico, and the States.

To manage the Colorado River Basin's long-term water supply, various entities will require strong leadership at the Federal level; therefore, we suggest establishing a *National Water Czar*[11] or equivalent that has authority to work across agencies at the Executive level, controlling both resources and funding. Although the term *Czar* has different connotations, *Czar* is loosely defined as an individual or office who can spearhead major, authorized Federal action across multiple agencies, who has ultimate control over project funding, and has the authorization to prioritize or override disparate agency agendas. Establishing a *National Water Czar* may first be established at the Executive level but should also be authorized by an act of Congress and moved into a directorate free and independent of election cycles.

To be clear, an ideal office of *National Water Czar* should not be viewed as just another layer of Federal bureaucracy, rather, an instrument that assists the United States Government and the people of the United States in solving dire water related problems, especially on the Colorado River. It is recognized that the scope of this report is limited to the Colorado River; as such a *National Water Czar* would address the conditions on the Colorado River and other watersheds as well, such as the Columbia and Missouri watersheds. Maximizing the water storage capacity of the Colorado River Basin immediately is a challenging assignment that must coordinate the multi-agency, multi-Bureau, efforts.

[11] https://www.press.umich.edu/7774485/czars_in_the_white_house

B. Authorization

a. Federal law

Authorization for various projects should come from an act of Congress, or already exists under current Federal statute. For example, the 1968 Colorado River Basin Project Act[12] (Public Law 90-537), subparagraphs 102(a), and 102(b) read as follows, and could be amended to include specific action necessary to meet the 3 -4 MAF imbalance on the Colorado River:

"SEC. 102 (a) It is the object of this Act to provide a program for the further comprehensive development of the water resources of the Colorado River Basin and for the provision of additional and adequate water supplies for use in the upper as well as in the lower Colorado River Basin. This program is declared to be for the purposes, among others, of regulating the flow of the Colorado River; controlling floods; improving navigation; providing for the storage and delivery of the waters of the Colorado River for reclamation of lands, including supplemental water supplies, and for municipal, industrial, and other beneficial purposes; improving water quality; providing for basic public outdoor recreation facilities; improving conditions for fish and wildlife, and for the generation and sale of electrical power as an incident of the foregoing purposes.

(b) It is the policy of the Congress that the Secretary of the Interior (hereinafter referred to as the "Secretary") shall continue to develop, after consultation with affected States and appropriate Federal agencies, a regional water plan, consistent with the provisions of this Act and with future authorizations, to serve as the framework under which projects in the Colorado River Basin may be coordinated and constructed with proper timing to the end that an adequate supply of water may be made available for such projects, whether heretofore, herein, or hereafter authorized."

In addition to statute the Secretary of the Interior was designated by the Supreme Court as water master of the Colorado River below the compact point at Lee Ferry[13]. As such through delegated authority the Secretary of the Interior typically works with the Basin States to find water solutions, such as the recent Drought Continency Plan (DCP)[14]. Although a Basin States cooperative decision is desired, usually through difficult negotiation, the Secretary has the authority to make decisions on behalf of the States if agreements cannot be reached. For example, on May 3, 2022 the Secretary of the Interior decided to withhold releases from Lake Powell to maintain reservoir elevations[15]

b. Defense Production Act (DPA)

Another Federal authority that could be utilized is the Defense Production Act or DPA[16]. Water insecurity on the Colorado River translates to a major national security

[12] https://www.usbr.gov/lc/region/g1000/pdfiles/crbproj.pdf
[13] https://sgp.fas.org/crs/misc/R45546.pdf
[14] https://www.usbr.gov/dcp/
[15] https://www.usbr.gov/uc/water/crsp/cs/gcd.html
[16] https://uscode.house.gov/view.xhtml?path=/prelim@title50/chapter55&edition=prelim

challenge for the United States, given the economies of the Basin States and Tribes, especially the defense industries in southern California, Arizona, New Mexico, and many other locations. Invoking DPA would give the president of the United States broad emergency powers that could be delegated to the Secretary of the Interior, above and beyond powers granted already.

Recently the President has relied on the Defense Production Act to address national security, as related to the COVID-19 Pandemic. The DPA should be leveraged to spearhead solutions for the Colorado River and other areas under severe water stress. The DPA gives the executive branch the power to direct private companies through executive order to allocate materials, services, and facilities for national defense purposes.[17]

c. Defense Advanced Research Projects Agency (DARPA)

The Defense Advanced Research Projects Agency can be leveraged to advance science necessary to optimize operations or enhance existing ongoing research efforts.

The following is taken from the DARPA website:

> *"For sixty years, DARPA has held to a singular and enduring mission: to make pivotal investments in breakthrough technologies for national security.*
>
> *The genesis of that mission and of DARPA itself dates to the launch of Sputnik in 1957, and a commitment by the United States that, from that time forward, it would be the initiator and not the victim of strategic technological surprises. Working with innovators inside and outside of government, DARPA has repeatedly delivered on that mission, transforming revolutionary concepts and even seeming impossibilities into practical capabilities. The ultimate results have included not only game-changing military capabilities such as precision weapons and stealth technology, but also such icons of modern civilian society such as the Internet, automated voice recognition and language translation, and Global Positioning System receivers small enough to embed in myriad consumer devices.*
>
> *DARPA explicitly reaches for transformational change instead of incremental advances. But it does not perform its engineering alchemy in isolation. It works within an innovation ecosystem that includes academic, corporate and governmental partners, with a constant focus on the Nation's military Services, which work with DARPA to create new strategic opportunities and novel tactical options. For decades, this vibrant, interlocking ecosystem of diverse collaborators has proven to be a nurturing environment for the intense creativity that DARPA is designed to cultivate.*
>
> *DARPA comprises approximately 220 government employees in six technical offices, including nearly 100 program managers, who together oversee about 250 research and development programs.*

[17] https://www.cfr.org/in-brief/what-defense-production-act

> *DARPA goes to great lengths to identify, recruit and support excellent program managers—extraordinary individuals who are at the top of their fields and are hungry for the opportunity to push the limits of their disciplines. These leaders, who are at the very heart of DARPA's history of success, come from academia, industry and government agencies for limited stints, generally three to five years. That deadline fuels the signature DARPA urgency to achieve success in less time than might be considered reasonable in a conventional setting.*
>
> *Program managers address challenges broadly, spanning the spectrum from deep science to systems to capabilities, but ultimately, they are driven by the desire to make a difference. They define their programs, set milestones, meet with their performers and assiduously track progress. But they are also constantly probing for the next big thing in their fields, communicating with leaders in the scientific and engineering community to identify new challenges and potential solutions.*
>
> *Program managers report to DARPA's office directors and their deputies, who are responsible for charting their offices' technical directions, hiring program managers and overseeing program execution. The technical staff is also supported by experts in security, legal and contracting issues, finance, human resources and communications. These are the people who make it possible for program managers to achieve big things during their relatively short tenures.*
>
> *At the Agency level, the DARPA Director and Deputy Director approve each new program and review ongoing programs, while setting Agency-wide priorities and ensuring a balanced investment portfolio.*
>
> *DARPA benefits greatly from special statutory hiring authorities and alternative contracting vehicles that allow the Agency to take quick advantage of opportunities to advance its mission. These legislated capabilities have helped DARPA continue to execute its mission effectively."*

Clearly now is our "Sputnik moment" on the Colorado River –better late than never.

d. Permitting

Specific authority should be provided to Reclamation or the *National Water Czar* to expedite environmental permitting of water projects that enhance water supply and reduce water demand, with the intent to comply with the intent of environmental protections, yet reduce the risk of third-party obstruction through environmental lawsuits. The following illustrates one possible process associated with environmental permitting, taken from the July 14, 2022 Senate testimony of Mr. Patrick O'Toole[18]:

[18] https://www.c-span.org/video/?521021-1/senate-hearing-western-drought

"We will continue to advocate for [advancing Chairman Barrasso's initiative to] streamline the current multi-agency permitting processes that can delay the construction of new or expanded surface water storage projects by creating a "one-stop permitting shop" process through Reclamation. Past legislation driven by the Chairman (similar to that introduced by Rep. McClintock - H.R. 1621, above) set a schedule and timelines for agencies to consult and cooperate to complete environmental compliance analyses on these projects. This would also allow third parties to pay the costs of such permit processing to speed things up. Congress provided similar authorities to the Corps in the 2014 Water Resources Reform and Development Act (WRRDA 2014), P.L. 113-121, a law that was passed in both the House and Senate on a bipartisan basis and was signed into law by President Obama.

These provisions would direct the Secretary of the Interior (through Reclamation) to serve as a central hub for all federal permits, approvals, and decisions required related to new water storage projects. This includes permits for Clean Water Act (CWA), National Environmental Policy Act (NEPA), and Endangered Species Act (ESA) compliance, among the others. In carrying out this task, Reclamation would be directed to identify all federal agencies with permitting responsibilities or authority, notify them of pending applications, and direct a schedule by which all cooperating agencies must complete and submit their reviews and permits. Cooperating agencies would be required to adhere to the coordinated schedule and use one unifying document for all environmental reviews. These provisions would be intended to significantly reduce the time, cost, and inefficiencies associated with the existing multi-track, multi-agency NEPA analyses. Currently, each reviewing agency compiles its own data and reviews it separately in a vacuum.

These provisions should also allow willing states to participate as cooperating agencies. By allowing states to be involved at their discretion, the review process could include state developed science, data, and technical materials. This section should also require that, consistent with existing law, all relevant project data be made publicly available online. Finally, in order to help make multi-purpose surface storage projects more viable in an era of tightened federal budgets, this section of the bill should include a mechanism in which non-federal public entities are allowed to contribute financially to help defray the costs of the "one-stop shop" permitting review process.

An "opt-out" provision should be provided that would allow local project sponsors to proceed on a different project implementation path that had historically provided successful outcomes with another federal agency in the lead role. Meeting the challenge of expanding and modernizing the West's aging water infrastructure will require changes in priority. The coordinated considerations of highly qualified professionals serving both the public and private sectors are available to the Secretary in her Bureaus. Very rarely are there "one size fits all" templates that apply to management of Western water resources challenges but NOW there is a need to create additional storage capacity in the Colorado River Basin.

The need to reduce 2.0 to 4.0 MAF as testified to Congress requires a wholesale change in the DOI policy to encourage and proceed with increasing storage capacity at this time of priority NOW within the Colorado River Basin. The preceding multiple years of extreme drought (22 years) have created an imbalance in supply versus demand. The DOI responsibility is to now lead a coordinated approach across all agencies to prioritize their actions to increase water storage capacity in the Colorado River Basin.

In many cases, local water agencies have long-time relationships with local and regional Reclamation engineers and managers that have led to successfully completed projects, such as the ongoing collaborative work in the Yakima Basin in Washington State, where successful water and environmental projects are being completed with Reclamation functioning as the lead federal agency. In other cases, local entities have developed close working relationships with other federal water agencies such as the Corps. In these cases, local entities should be able to continue to work with the federal agency they successfully worked with in the past for projects of this nature. To cover this range of possibilities, the "opt-out" section should provide flexibility for local project sponsors to either l) engage with Reclamation in the facilitated permitting process articulated in this bill; or 2) opt-out, and proceed on a project implementation path that has historically provided successful outcomes with another federal agency such as the Army Corps in the lead role.

We believe provisions should be included that require the Secretary of the Interior to submit to the non-federal entity an estimate of the total cost of the federal administrative permitting process for the proposed projects and to provide a scheduled update on the actual administrative costs with an appropriate explanation of any major cost differences.

This section should also include language with a specific reference to non-federal state and local water supply projects that could be integrated with the operation of federally owned facilities. We want to ensure Reclamation is the lead agency in the case of permitting a non-federally built storage project that has a direct federal nexus with a Reclamation project – i.e., Sites Reservoir (California)– where it will be integrated into the operation of the Central Valley Project (as proposed by the local Joint Power Authority) but remain a non-federally developed and owned facility. We would be happy to work with Committee staff to prepare specific language that will address concerns as they arise.

The recent SCOTUS ruling on EPA limitations[19] would not apply to actions created through these programs authorized by the Congress.

C. Forecasting

[19] West Virginia v. EPA ruling by the Supreme Court of the United States in July 2022. No slip opinion yet.

a. Subseasonal to Seasonal (S2S) Forecasting

Increased forecasting skill[20] in both weather and climate forecasting is necessary for river operations such as on the Colorado River, and other river systems throughout the United States. Hydroclimatic conditions are changing rapidly, faster than expected for the 21st century. Rapid change in hydroclimatic conditions warrant faster adaptation, which in turn requires higher S2S forecast skill[21]. As operation of the Colorado River is a decision support system, having foreknowledge of seasonal water trends can influence risk, resource allocation, financing, contracts, permitting, construction, and agricultural related schedules.

The Western States Water Council issued a report titled I*mproving Sub-Seasonal to Seasonal Precipitation Forecasting for Water Management*[22]*,* which opens with the following:

"The Western States Water Council asks that the federal government provide resources for pilot projects to improve subseasonal to seasonal (S2S) precipitation forecasting to support water management in the western states, pursuant to the Weather Research and Forecasting Innovation Act. Pilot projects are needed for forecasts of winter precipitation (which provides the snowpack sustaining water supplies in mountain areas) throughout the West, and spring/ summer precipitation for agricultural water supply in the Plains states.

Western States experience great subseasonal, seasonal, and annual variability in precipitation, with serious impacts and consequences for water supply planning and management, drought and flood preparedness and response, water rights administration, and operation of water projects. Sound decision making to protect life and property by reducing flood risks and to inform decisions involving billions of dollars of economic activity for urban centers, agriculture, hydropower generation, and fisheries depends on our ability to observe, understand, model, predict, and adapt to precipitation variability on operational time scales ranging from a few weeks to a season or more.

Current skill in S2S forecasting is not adequate to support water management decision-making, and the federal government should place a priority on improving S2S precipitation forecasting capability to support water management."

Reclamation, Scripps Institution of Oceanography (Scripps)[23], and the University Corporation for Atmospheric Research[24] – among others—have made excellent progress toward increasing S2S forecasting skill. For example, Reclamation's Science and Technology Office has sponsored prize competition "rodeos" for subseasonal forecasting.[25] Reclamation's Boulder Canyon Operations Office (located in Boulder, Colorado) has sponsored *The Colorado River Basin*

[20] https://www.cpc.ncep.noaa.gov/products/predictions/90day/skill_exp.html
[21] https://westernstateswater.org/wp-content/uploads/2022/03/Jones_WSWC-S2S-san-diego-May-2022.pdf
[22] https://westernstateswater.org/wp-content/uploads/2020/03/Improving-S2S-Precip-Forecasting-for-Water-Mngmt_brochure_2.pdf
[23] https://scripps.ucsd.edu/
[24] https://www.ucar.edu/
[25] https://www.usbr.gov/research/challenges/forecastrodeo.html

Operational Prediction Testbed: A Framework for Evaluating Streamflow Forecasts and Reservoir Operations[26]. The Scripps Center for Western Weather and Water Extremes recently published *Understanding Relative Skill of Experimental S2S Forecasts: Winter 2021-2022 Review*[27].

Although these are all excellent efforts, more needs to done faster to implement S2S forecasting as applied to Reclamation and western reservoir operations, as outlined by the Western States Water Council. For example, more research is necessary to understand the teleconnection of Sea Surface Temperatures (SST) to El Nino and La Nina cycles in the Pacific, and other regional/global oscillations[28]. Federal funding associated with S2S forecasting should be increased with targeted expectations, within the context of applied scientific principles; although science cannot and should not be rushed, if more funding were available more resources could be applied to increasing forecast skill sooner rather than later. S2S funding has at times been overlooked for other projects, as S2S concepts are somewhat abstract to lawmakers, as compared to physically tangible projects such as a bridge project. DOI (Reclamation, USGS) and other federal agencies (NOAA, NASA, USACE, others) need to overcome communication barriers in Congress to expedite funding.

b. Short-term forecasting

Farmers in the Imperial and Coachella Valleys, and in southern Arizona often reset irrigation schedules based on rainstorm events. During a major rainstorm event, such as a North American monsoon, hurricane, or large Pacific driven storm, irrigation water is typically shut off creating the need to store water that has already been released from Parker Dam and is enroute to Imperial Dam for distribution to California, Arizona, and Mexican irrigators. Water ordered from Parker Dam, but not delivered because of a rainstorm, is stored either in Brock Reservoir or Senator Wash, or managed such that excess delivery to the southerly or northerly international border is minimized.

Although operation of Brock Reservoir and Senator Wash have minimized excess deliveries to Mexico, short term forecasting improvements could increase efficiencies in water use south of Parker Dam. For example, farmers in the Imperial Valley and Mexicali Valley rely on private[29] and/or non-Federal weather stations, and other weather data during a rainstorm, such as a localized microburst. These weather stations and services rely on federal forecast products which are post-processed into a usable format for real time visualization purposes. An extensive real time sensor network could be funded and established for the entire Imperial, Coachella, and Mexicali Valleys, and in southern Arizona that would provide operators real time data on the location, duration, and depth of precipitation. This network could then be fed to water control centers to inform Reclamation and other irrigators among others regarding releases from Hoover-Davis-Parker Dams, ideally saving water in Lake Mead.

[26] https://onlinelibrary.wiley.com/doi/full/10.1111/1752-1688.13038
[27] https://westernstateswater.org/wp-content/uploads/2022/03/wswc2022_deflorio_s2s-1.pdf
[28] https://westernstateswater.org/wp-content/uploads/2022/03/18May_Sengupta_Seasonal_Prediction.pdf
[29] https://www.wunderground.com/wundermap?lat=32.848&lon=-115.569&zoom=8&radar=1&wxstn=0

Although forecasting-based cuts to water use are beyond existing science, this ability is in the foreseeable future. Funding of short-term forecasting should be increased and integrated with S2S forecasting to optimize water operations. For example, should the skill associated with S2S forecasting increase to reliably forecast El Nino, or La Nina related events, such as atmospheric rivers, operators upriver, or at the water control center at IID, or at the Yuma Area Office, could adjust operational decisions to optimize the forecasted weather. The same concept would apply to forecasting the North American Monsoon, or microburst activity associated with Pacific (and occasional Atlantic) hurricane activity migrating north through the Gulf of Mexico to the Salton Trough.

c. Extreme events

Anecdotal evidence suggests that extreme events are increasing[30]. The Center for Climate Adaptation Science and Solutions (CCASS) associated with the University of Arizona recently published the following:

"Intersecting events such as major floods, decades-long megadroughts, and economic or governance upheavals could have catastrophic effects on the water supply for [the] 40 million people."

Not only are droughts becoming more extreme, the potential for large flood events on the mainstem of the Colorado River or its tributaries should be integrated into operations and dam safety preparations, mostly to optimize both water supply and dam safety.

Several extreme events have already occurred likely associated with climate change but captured in either Lake Powell or Lake Mead. A such the events were controlled and contributed the water supply. The events caused localized damage to infrastructure but did not pose dam safety risks to Glen Canyon Dam or Hoover Dam. For example, in the winter of 2005, the Meadow Valley Wash flood[31] was caused by a rain-on-snow event that pulsed into Lake Mead and caused lake levels to rise over two feet in three days[32]. Similarly, an extreme event occurred in October 2006 when an atmospheric river approached the continent at the international border with Mexico, then rotated north along the New Mexico/Arizona state line. Lake Powell increase over 7 feet in elevation between October 5 and October 18, 2006[33]. A rain-on-snow event causing flooding in Missouri River basin in May 2011 also contributed significantly to water supply in the Colorado River above Glenn Canyon Dam, where Lake Powell increased at least 36 feet over a 2-month period[34].

[30] https://eos.org/science-updates/reimagining-the-colorado-river-by-exploring-extreme-events

[31] https://pubs.usgs.gov/fs/2006/3124/fs2006-3124.pdf

[32] https://waterdata.usgs.gov/nwis/dv?cb_all_=on&cb_72036=on&format=gif_default&site_no=09421000&referred_module=sw&period=&begin_date=2005-01-10&end_date=2005-01-13

[33] https://www.usbr.gov/rsvrWater/HistoricalApp.html;jsessionid=zhbpkVauk_tTdU0QeLO9Egmy7KL2x0-4DPl9MLnt.lxwf01:prod_rsvrwater_ha

[34] https://en.wikipedia.org/wiki/2011_Missouri_River_Flood

Although these three examples occurred above Lakes Powell and Mead where the flooding was captured and controlled, dam operations at smaller facilities may not have fared so well. Dam safety operations should be adjusted at smaller facilities to accommodate extreme events. For example, at Lake Havasu the operating differential is approximately 4.5 feet. In January 2005 (an El Nino year) Lower Colorado water operations took the lake level to the top of the dam. Had an atmospheric river provided additional precipitation downstream of the USACE Alamo Dam flood control facility, a pulse through the lake could have surged over the top of Parker Dam. This did not occur; perhaps operations can be adjusted to build reservoir space in smaller reservoirs based on better short term and S2S forecast skill. Dam safety considerations involving risk estimation should also be updated based on increased risk of flooding.

Black swan hydrologic events are a serious concern and should be integrated to both operations and dam safety programs[35]. As quoted from Brad Udall:

> *"There is the sense that we will see things that aren't in the historical or paleo record and that's disturbing because it means unprecedented types of events could occur that our systems aren't designed for," said Brad Udall, senior research scientist at Colorado State University's Colorado Water Institute and a member of the Colorado River Research Group, a team of 10 veteran Colorado River scholars."*
>
> *"Perhaps less appreciated are the risks of catastrophic flooding in the basin. The spillways at Glen Canyon Dam were significantly eroded by cavitation in 1983, as were those at Oroville Dam (in California) in 2017, when floodwaters exposed weaknesses of existing infrastructure. Although weather prediction and water resource management plans have improved and been revised following the events at Glen Canyon Dam, there is nevertheless the possibility that an unusually large flood might occur in the basin headwaters. We know such great floods have occurred in the past (outside of the relatively short stream gauge period) based on field observations of the flood deposits and analysis of the paleohydrologic record. Even if Lake Powell and Lake Mead remain low, megaflood risk persists and is likely to be increasing. Precipitation intensity, and the amount of precipitation falling in the most intense events, are increasing globally and across the United States, in large part because sea surface temperatures and atmospheric water vapor content are both rising, increasing the odds of more extreme precipitation events. These trends will continue as long as emissions of greenhouse gases to the atmosphere continue[36].*

The USGS also simulated a megaflood in 2010 in its ARkStorm Scenario[37]. A recent publication in *Science Advances* by Xingying Huang and Daniel L. Swain titled

[35] https://www.watereducation.org/western-water/could-black-swan-events-spawned-climate-change-wreak-havoc-colorado-river-basin
[36] https://www.usu.edu/colorado-river-research-group/files/crrg_thinking_about_risk.pdf
[37] https://www.usgs.gov/programs/science-application-for-risk-reduction/science/arkstorm-scenario?items_per_page=6

Climate change is increasing the risk of a California megaflood[38] summarizes risk of extreme flooding in California and arguably the Colorado River Basin.

The following is taken from the introduction:

> *California is a region more accustomed to water scarcity than overabundance in the modern era. Between 2012 and 2021, California experienced two historically severe droughts—at least one of which was likely the most intense in the past millennium (1, 2)—resulting in widespread agricultural, ecological, and wildfire-related impacts (3, 4) and ongoing drought-focused public policy conversations. Yet, historical and paleoclimate evidence shows that California is also a region subject to episodic pluvials that substantially exceed any in the meteorological instrumental era (5)—potentially leading to underestimation of the risks associated with extreme (but infrequent) floods. Observed extreme precipitation and severe subregional flood events during the 20th century—including those in 1969, 1986, and 1997—hint at this latent potential, but despite their substantial societal impacts, none have rivaled (from a geophysical perspective) the benchmark "Great Flood of 1861–1862" (henceforth, GF1862). This event, which was characterized by weeks-long sequences of winter storms, produced widespread catastrophic flooding across virtually all of California's lowlands—transforming the interior Sacramento and San Joaquin valleys into a temporary but vast inland sea nearly 300 miles in length (6) and inundating much of the now densely populated coastal plain in present-day Los Angeles and Orange counties (7). Recent estimates suggest that floods equal to or greater in magnitude to those in 1862 occur five to seven times per millennium [i.e., a 1.0 to 0.5% annual likelihood or 100- to 200-year recurrence interval (RI)] (5, 8)."*

D. Practical Research Programs

Reclamation should consider re-instating its relationship with the University Corporation for Atmospheric Research (UCAR) Postdocs Applying Climate Expertise (PACE) fellowship program[39]. As described by UCAR:

> *"The goal of this postdoctoral program is to grow the pool of scientists qualified to transfer advances in climate science and climate prediction into climate-related decision framework(s) and decision tools. The program pairs early-career climate scientists with two co-hosting institutions: one host provides the climate research expertise guidance, and the other host is a decision-making institution that provides the opportunity for the PACE fellow to immerse themselves in a decision-making culture and learn from each other.*
>
> *Demand for research and guidance in climate-related risk management and decision-making has increased in recent years. This is due in part to the work of those involved in the NOAA RISA (Regional Integrated Sciences and*

[38] https://www.science.org/doi/10.1126/sciadv.abq0995
[39] https://cpaess.ucar.edu/pace

> *Assessments) program and to the efforts of a relatively small group of scientists working at the interface between climate science and its applications. A growing number of people and institutions are emerging to work at this interface, but demand for these people exceeds supply."*

Since 2016 there have been no new PACE Fellows due to lack of funding. Reclamation is in a unique position to provide practical experience as applied to climate science. For example, Reclamation could grow a group of climate scientists focused on operations such as S2S or short-term forecasting, attached to the Boulder, Colorado office of the Boulder Canyon Operations Office in Boulder City, Nevada. Staffing is typically problematic; ideally the PACE Fellowship should be under the purview of BCOO but work closely with climate modeling and forecasting as a separately staffed office lending climate science, practical support. A group of at least 5 sponsored scientists per year would grow the climate science community with practical applications to forecasting or other climate research needs as related to Reclamation operations.

Typically, the PACE Fellowship is co-sponsored by Reclamation and another Federal agency, through a Reclamation interagency agreement with UCAR. For example, in 2015 Reclamation funding was matched by a grant from NOAA Climate Prediction Office, to sponsor climate research on the Rio Grande River[40]. However, the PACE Fellowship does not necessarily require NOAA Climate Prediction Office matching funds, as other branches of NOAA could co-sponsor matching funds, or other agencies such as the US Air Force, US Naval Research Laboratory, the United States Geological Survey, or Lockheed Martin.

E. Hydrologic Work Group

> *"It strikes me as a forgivable failure of imagination," said historian Christian Harrison, who earned his doctorate from UNLV. "They probably thought they would land people on Mars before we had so many people living in this valley[41]."*
>
> *--taken from Christian Harrison*

The possibility of extreme black swan events, both in flooding and drought conditions, warrants staffing a permanent hydrologic work group that is integrated with the latest scientific understanding of Colorado Basin hydrologic conditions[42],[43]. This working group should ideally be working with latest climate research should the PACE Fellowship be reinstated, along with short term and long-term forecast research needs. The Hydrologic Work Group Charter from 2010 lists the following priorities[44], which needs to be reinstated:

[40] https://www.usbr.gov/research/publications/download_product.cfm?id=2760
[41] https://www.reviewjournal.com/news/the-water-question/part-2-future-no-one-could-see-capped-nevadas-share-of-colorado-river-water-1603391/
[42] https://wwa.colorado.edu/resources/colorado-river-resources/CRBreport
[43] https://wwa.colorado.edu/sites/default/files/2021-06/ColoRiver_StateOfScience_WWA_2020_FullReport_hi-res.pdf
[44] https://www.usbr.gov/lc/region/programs/climateresearch/Charter_CoRivHydroWG.pdf

- *Guided initially by the recommendations of the Climate Technical Work Group Final Report dated August 2007*
- *Pertinent to the Colorado River Basin*
- *Geared towards seeking the best available and most cost-efficient technology for midterm operations and long-term planning studies*
- *Brought into operations and long-term planning within a 1-to-3-year timeframe*

Reclamation brings valuable, practical operations experience to climate and hydrologic science, which should be leveraged to adjust operations models to reflect the latest state of the knowledge. Use of stress test hydrology from 1988 to 2019 to reflect low flows on the Colorado River system should be made a permanent part of operational models. Adjustments to the "stress test" hydrology needs to be made sooner rather than later to keep pace with the latest science, or possible low flow scenarios on the river. It is noted that stress test hydrology could have been used much earlier in this current drought cycle[45]:

> *"The method used to generate future inflows in the current projections includes resampling a subset of the historical natural flow record (1988-2019) using the Index Sequential Method (ISM), referred to here as "Stress Test" hydrology. In the past, the full historical record (1906-2019), known as the "Full" hydrology, was used to provide 5-year probabilistic projections. The Stress Tests hydrology scenario applies ISM to a shortened period of the natural flow record, 1988-2019, which removes the earlier portion of the natural flow record and focuses on the recent (approximately 30 years) hydrology. This period has a 10% drier average flow than the Full hydrology. Use of the Stress Test scenario is supported by multiple research studies that identified a shifting temperature trend in the Colorado River Basin in the late 1980s that affected runoff efficiency and resulted in lower average flows for the same amount of precipitation (McCabe et al. 2017, Udall and Overpeck 2017, Woodhouse et al. 2016)."*
>
> *John [Carron], Eric [Kuhn], and Dave [Kanzer] reasoned nearly a decade ago that using a shorter record, focused on our climate-changed Colorado, might better help managers think about and plan for what to expect next. (Dave also famously provided the memorable Homer Simpson image for Eric's CRWUA presentation)."*
>
> *--taken from John Fleck, September 2021*

F. Other Operational Considerations

Although Brock Reservoir and Senator Wash have considerably tightened excess deliveries to Mexico, plans should be made for construction of additional offline reservoir storage in Mexico to further operational flexibility. It may be necessary to plan for increased flow in the Gila River downstream of Painted Rock reservoir as a result of extreme events. Water delivered to Mexico is accounted for on a monthly basis, and reset every month. Should the Gila River start to see increased flow from

[45] http://www.inkstain.net/fleck/2021/09/taking-climate-change-seriously-the-colorado-river-stress-test/

extreme events, this water may be saved in Lake Mead if it can be stored in coordination with Yuma and Mexican operations.

III. Augmentation Projects

- Expedite a Salton Sea augmentation project
- Expedite State of Arizona and Mexico augmentation projects

Large capital improvement projects are suggested to provide a structural fix to the imbalance between supply and demand. Any large capital improvement project would require the leadership of the *National Water Czar* or other strong leadership authority.

> *"I know this is going to come up, somebody's going to say, 'Well, isn't that too expensive?' I think, sitting here today as we look at Lake Mead, the question isn't, 'Is it too expensive? It's, 'Can we afford to not do it? Is the price of not doing it much greater than the price of not doing it?"*
>
> *--Pat Mulroy*[46]

A. Salton Sea Pipeline

The Salton Trough and Gulf of California represent an important physiographic location of the Colorado River Basin that is exceptionally complex.[47] These complexities include water operations at the southerly and northerly international boundary that deliver water to agricultural users in Arizona, California, and Mexico, environmental considerations in the Limitrophe, environmental release flows, tribal lands, dust control, storage reservoirs such as Senator Wash[48] and Brock Reservoir[49], international relations with Mexico through the US and Mexican International Boundary and Water Commissions[50,51] decree accounting[52], geothermal energy sources, and more. As the Colorado River system is driven from the bottom up, this lower section of the river has comparatively greater control than upstream water users.

Since 2017 the Salton Sea has been shrinking, as a result of operational decisions and agreements to transfer water to other locations that would normally drain to

[46] https://knpr.org/knpr/2022-05/former-southern-nevada-water-authority-chief-very-worried-about-lake-mead-level
[47] https://www.usbr.gov/lc/yuma/programs/water_delivery.html
[48] https://www.usbr.gov/projects/index.php?id=328
[49] https://www.usbr.gov/lc/yuma/facilities/Brock/yao_brock.html
[50] https://ibwc.gov/Water_Data/Colorado/Index.html
[51] https://ibwc.gov/Files/1944Treaty.pdf
[52] https://www.usbr.gov/lc/region/g4000/wtraccttypes.html

the Salton Sea.[53] As water levels dropped in the Salton Sea the receding water exposed a polluted lakebed that dried and contributed to toxic dust and health related problems[54].

Given the complexity and severity of environmental and health issues, various action has been taken to remediate the Salton Sea[55,56]. Part of this effort was to solicit proposals from outside sources for innovative ideas to provide relief[57]. The first round of proposals was issued in 2018 by various consultants[58], followed by a second round of proposals which were either resubmitted or updated to the State of California for review[59]. The most recent review of proposals is a fatal flaw document, titled *Salton Sea Independent Review Panel Fatal Flaw Report[60] (Fatal Flaw Report).* The *Fatal Flaw Report* is an excellent document prepared by a panel of experts prepared for the Salton Sea Management Program, submitted by the University of California at Santa Cruz.

The central idea to Salton Sea proposals and the *Fatal Flaw Report* is pumping and transfer of sea water from the Gulf of California (Sea of Cortez) to the Salton Sea over the low topographic divide near the international boundary This capital improvement project would replenish the Salton Sea, managing dust control, and provide other fixes.

Although the *Fatal Flaw Report* is excellent and is an essential decision support document, it appears the scope of the review did not necessarily consider water supply to satisfy structural water deficits on the Colorado River. It is suggested here that – in addition to the ideas set forth the *Fatal Flaw Report*—a pipeline from the Gulf of California to the Salton Sea also supply sufficient volume of water to compensate for the existing and future water supply- demand deficit on the Colorado. This would therefore serve as a water augmentation project in addition to protecting the Salton Sea and environment of the Imperial Valley. In the *Fatal Flaw Report*, Response R5[61] planned for an import of 2.5 maf but was excluded because of construction in the Biosphere Reserve, use of unproven technology, and lack of longevity. Response R13[62] planned for an import of 3.5 maf, but was excluded because of unproven technology, flooding, and lack of longevity. Disposal of brine from desalinization of sea water is key to making this project a success, and still needs to be addressed in an environmentally responsible manner.

[53] https://www.watereducation.org/western-water/long-troubled-salton-sea-may-finally-be-getting-what-it-most-needs-action-and-money
[54] https://news.usc.edu/159380/salton-sea-shrinking-asthma-respiratory-health-air-quality/
[55] https://saltonsea.ca.gov/
[56] https://saltonsea.ca.gov/program/
[57] https://www.usatoday.com/in-depth/news/environment/2021/06/11/can-water-mexicos-sea-cortez-save-californias-salton-sea/4977601001/
[58] https://saltonsea.ca.gov/planning/2018-salton-sea-water-importation-proposals/
[59] https://saltonsea.ca.gov/2020/06/state-requests-proposals-for-water-importation-independent-review-panel/
[60] https://transform.ucsc.edu/wp-content/uploads/2022/07/Salton-Sea-Independent-Review-Panel-Fatal-Flaw-Report.pdf
[61]GEI Consultants and Michael Clinton Consulting, LLC
[62] Global Premier Development, Inc and Salton Power, Inc

A pipeline solution must also address and take into consideration (1) the Republic of Mexico, (2) Indian tribes, and (3) Environmental considerations. One weakness of the various proposals is lack of proactive planning with both Mexico and the IBWC. It is suggested that an amendment to the 1944 Treaty (a Minute to the Treaty) is negotiated to hammer out details acceptable to both Mexico, the United States, the Basin States, Tribes and NGO's. Indian tribes on both sides of the international border should be included in the pipeline talks, such as the Cocapah[63], Tohono O'Dham[64], Quechan[65] and other Indian nations along the international border. Ideally and Salton Sea pipeline would also integrate environmental remediation. For example, one drawback identified by the *Fatal Flaw Report* was construction within the Biosphere Reserve; perhaps if construction is allowed in the Biosphere Reserve the environmental impacts could be offset by annual pulse flows on the Lower Colorado, similar to what occurred in Minute 319[66]. Should annual pulse flows be established as part of the Salton Sea pipeline project, NGO's involved in Minute 319 such as the Sonoran Institute[67], Environmental Defense Fund[68], and/or Pronatura[69,70] should be proactively engaged. Restoration of the Colorado River delta should be part of the pipeline solution.

Creative solutions to construction of a Salton Sea pipeline should address California State and Federal environmental permitting requirements at the Federal and State executive levels. For example, the *National Water Czar* at the Federal executive level should take a lead, or delegate authority to Reclamation to expedite permitting. Much discussion has been made regarding the difficulty of permitting a Salton Sea pipeline, including challenges[71] as identified by the Pacific Institute[72,73]:

- *"Sea-to-Sea plans face many logistical, financial, and energy challenges.*
- *Designing, permitting, and acquiring rights of way for a project of this scale would be a tremendous undertaking that would require many years and multiple land use agreements.*
- *The costs of constructing a hundred or more miles of pipelines or canals would be measured in the billions of dollars.*
- *The additional energy demands of pumping tremendous amounts of heavy saltwater scores of miles and, in some configurations, up thousands of feet, would come at the same time that California seeks to reduce its carbon footprint.*

[63] https://www.cocopah.com/
[64] http://www.tonation-nsn.gov/
[65] https://www.quechantribe.com/
[66] https://pubs.er.usgs.gov/publication/70177847
[67] https://sonoraninstitute.org/
[68] https://www.edf.org/
[69] http://www.pronatura.org/en/
[70] https://sonoraninstitute.org/files/pdf/minute-319-factsheet-09152013.pdf
[71] https://pacinst.org/salton-sea-import-export-plans/
[72] https://pacinst.org/
[73] https://pacinst.org/salton-sea-import-export-plans/

- *Many of the proposed plans would require negotiations with Mexico, adding many unknowns to the equation, including the amount of time needed to come to an agreement.*

- *Perhaps the greatest challenge, however, is the amount of time required for the plan to show results at the Salton Sea. As shown in the timeline [in the infographic] given the most ambitious, accelerated schedule indicates that Sea-to-Sea plans would not meet their own goals for at least 30 years. If a Sea-to-Sea plan were approved and adopted this year, the elevation and salinity of the Salton Sea would not stabilize until 2050, at the earliest.*

- Such an approach would not solve the many short-term or medium-term problems of the declining Salton Sea, including the crash of the current ecosystem. It also means that public health would not be protected for a generation.

- ***One of the biggest problems is that Sea-to-sea plans distract attention from feasible, practical plans that can be built quickly and can show results in the near future.***

- *Although Sea-to-sea plans are intuitive and appealing, they are not the answer to the imminent collapse of the Salton Sea. "*

B. State of Arizona and Republic of Mexico suggestions

Other variations should be considered by the *National Water Czar* or others. For example, pipelines from the Pacific Ocean have been considered to feed the Salton Sea versus the Gulf of California. The State of Arizona is also considering desalination ideas[74] as an extension of Minute 323, such as the "Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Continency Plan in the Colorado River Basin[75] which considered the following:

- *Binational Desalination Plant at the Pacific Ocean coast*
- *Binational Desalination Plant in the New River*
- *Binational Desalination Plant at the Sea of Cortez*
- *Reuse of effluent from the Mexicali Valley wastewater treatment plants in wetlands or riparian restoration of the Colorado River*
- *Reuse in the United States of South Bay International Wastewater Treatment Plant effluent*

- *Planta Desalinizadora Binacional en la costa del Océano Pacífico*
- *Planta Desalinizadora Binacional en el Río Nuevo*
- *Planta Desalinizadora Binacional en el Mar de Cortés*

[74] https://www.azcentral.com/story/news/local/arizona-environment/2022/01/10/gov-doug-ducey-proposes-spending-1-billion-water-infrastructure/9164946002/
[75] https://library.cap-az.com/documents/departments/planning/colorado-river-programs/Binational-Desal-Study-Executive-Summary.pdf

- *Reuso del efluente de las plantas de tratamiento de en el Valle de Mexicali para humedales o para la restauración ribereña del Río Colorado*
- *Reuso en los Estados Unidos del efluente de la Planta Internacional de Tratamiento de Aguas Residuales de Tijuana (PITAR)*

Arizona, Salt River Project and partners in Mexico, California, Nevada and the federal government participated in a binational report on the desalination proposal in 2020. It is estimated that two plants, each situated on the sea's eastern shore south of Puerto Peñasco and each producing 100,000 acre-feet a year, would cost $3 billion to $4 billion in upfront costs. That and annual operating costs would create a price of $2,000-$2,200 per acre-foot, which consultants determined would be in line with other potential sources of new water[76].

These suggested structural solutions do not appear to be opposed by environmental groups, however it is noted that the time frame for implementation is a decade from now, and will provide only a partial fix to an overall structural solution to Colorado River water imbalances. The Environmental Defense Fund supported broader measures such as water recycling and groundwater management, in combination with desalination:

> *"In addition to desalination, augmentation must include projects that treat and reuse wastewater, replenish local groundwater, and capture and recharge stormwater to benefit communities and ecosystems," said Kevin Moran, senior director of EDF's Colorado River program. "State lawmakers need to authorize rural Arizona communities to begin managing and conserving groundwater and strengthen our Active Management Areas' programs and standards."*

IV. Watershed Management

- Enhance forest management
- Improve agricultural practices

At the June 14, 2022 Senate Committee on Energy and Natural Resources[77,78] Mr. Patrick O'Toole, President of the Family Farm Alliance[79] described as follows:

> *"The Alliance is a grassroots organization of family farmers, ranchers, irrigation districts, and allied industries in 16 Western states. The Alliance is focused on one mission: To ensure the availability of reliable, affordable irrigation water supplies to Western farmers and ranchers. We are also committed to the fundamental proposition that*

[76] https://www.azcentral.com/story/news/local/arizona-environment/2022/01/10/gov-doug-ducey-proposes-spending-1-billion-water-infrastructure/9164946002/
[77] https://www.epw.senate.gov/public/_cache/files/c/3/c39018de-9db6-4e05-a3d7-c7fcf18a9762/53C2423FA0A7969A7E00F4616F87E150.o-toole-testimony-09.18.2019.pdf
[78] https://www.energy.senate.gov/hearings/2022/6/full-committee-hearing-to-examine-short-and-long-term-solutions-to-extreme-drought-in-the-western-u-s
[79] https://www.familyfarmalliance.org/

Western irrigated agriculture must be preserved and protected for a host of economic, sociological, environmental, and national security reasons – many of which are often overlooked in the context of other national policy decisions."

a. Forest Management

During his June 14, 2022 Senate testimony, Mr. O'Toole indicated that substantial water savings could be realized through proper watershed and forest management.

Rancher Pat O'Toole presented data demonstrating the U.S. Forest Service's own projections that the amount of water runoff to the North Platte River basin could be increased by 160,000 acre-feet per year through appropriate forest management (*see* page 14 of O'Toole's testimony. Pat O'Toole wrote in his submitted testimony:

> *"Two years ago, I testified before this Committee, where I referenced the Forest Service's figure that 160,000 acre-feet (AF) of water is not going into the Platte River system because of invasive species such as the pine beetle. The study I referenced relates to research[80] conducted by the Forest Service on the Upper North Platte River in 2000 and 2003. It shows that management restricting timber harvest had already severely impacted the watershed and water yield to the tune of a minimum of 160,000 AF[4] per year. The Forest Service uses Equivalent Clear-cut Acres modeling to predict water yield associated with vegetation disturbance, primarily associated with timber harvest and wildfire. The literature and research show that implementing a 100-year rotation on all eligible timber lands would sustain an increase of 50-55,000 AF of water per year – for just one part of one forest in the state of Wyoming."*

The 160,000 AF estimate is based on scientific measurements from paired watershed experiments conducted in the Battle Mountain area. Based on the number of federal forests that contribute water to the Colorado River in Wyoming, Colorado, Utah and New Mexico in the Upper Colorado River Basin the amount of runoff increase that could be potentially created will be in the hundreds of thousands of acre-feet each year. Forest management activities need to get underway before this year's weather prevents it being done.

O'Toole also addressed forest floor management:

> *"Drought brings less snowfall in many areas. The snow that falls melts off up to 45 days earlier and runs off downstream on frozen ground. Therefore, the snowpack no longer functions as a reservoir delaying the release of water in a timely manner. However, the forest floor can be restored through thoughtful management. A responsible level of continuous fuels reduction includes a combination of robust mechanical thinning and prescribed fire. This can be employed to significantly reduce evapotranspiration, tree stress, disease, and pest infestation, preserve healthy forest conditions, and protect species and habitats."*

[80] https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5167188.pdf

b. Publicly owned and privately owned resources

Better watershed management may occur if activities on both public and private lands are integrated, which should require the active cooperation between local soil and water conservation districts and the USDA NRCS. Early involvement and collaboration with USFWS and Reclamation personnel, all appropriate state agencies, and other interested parties increases the likelihood of success.

c. Importance of soil restoration and forest management

Investments should be made in forest management to augment the water supply captured on public lands. Maintenance of proper forest management practices will be an ongoing investment as well.

Soil management across the Basin is wanting and lacking. The regenerative practices that can be implemented across the Colorado River Basin would have an enormous impact on many, many inputs and outputs from areas where it is practiced. Restoring back into balance requires patience and programs that incentivize soil restoration conservation measures. This effort requires recognizing the long-term value of the enhanced soil environment across the Colorado River Basin and the large value and nature of the investment.

d. Natural Features Resource Management

Natural features should be leveraged throughout the watershed, such as adopting or encouraging beaver dams and other natural means of conserving water. These include aquifer storage and recovery, water spreading, irrigation methods where appropriate, use of atmospheric modification techniques and other implementable practical solutions that prove effective.

e. USDA NRCS Management Activities

The EQIP[81] program priority needs to change to prioritize storage capacity development in the Colorado River Basin. The programs will increase recharge, storage capacity development and management thereof, resource management activities, and conservation measures across all resource management activities in the Colorado River Basin.

f. Authorization

Amendment of the Colorado River Basin Project Act to prioritize actions to ameliorate and increase the water holding and storage capacity increases of all resources, and in particular the soil resources of the lands within the Colorado River Basin. Forest management amendments to law from prior USDA authorizations must occur as well. The staff of the appropriate Subcommittees of the US Senate and House should be requested to coordinate the details of a Secretarial Plan as transmitted back to the Congress. As

[81] https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

identified, appropriate changes to the 1956 Colorado River Storage Project to prioritize the increase of water storage capacity across the Colorado River Basin should be addressed.

g. Record Keeping

Collect, compile and compare desert water use information, including consistent E crop coefficients for the major 10 crops (alfalfa, carrots, onions, sugar beets, crucifers, melons...), and classify all manners of sprinkler, drip, furrow irrigation and nutrient management, to include all conservation measures and prioritize the activities of all DOI agencies and those coordinating with other agencies and branches of the Executive Branch of the U.S. Government. These measures will increase the reliability and resilience that is required, by increasing water storage capacity in the Colorado River Basin. The Basin's resources must be operated in a coordinated manner across agencies to prioritize the Colorado River as never before. 90% of research data on farm fields and 10% on DR and EC fields, to include farm fields and district-measured applied water. Computations using the delivered water identify water conservation/distribution improvements that can be obtained through investments in conservation.

Accounting is critical to the functioning of these water management and water supply strategies. Accountability and transparency are key elements of these beyond current accounting actions that will be required.

h. Soil restoration

Farm regenerative agricultural practices and restorative soil management actions are necessary to improve water holding capacity on a per acre management unit basis. The USDA NRCS has the current staff and staffing capabilities to administer large numbers of EQIP82 applications for conservation measures in the Colorado River Basin.

i. Other practices

Other practices include exchange-level transfers, marketing of seasonal rights and water bank transactions. These approaches may consider a Super Ditch approach to properly account for individual water resources conservation transactions across the Lower Colorado River Basin, including virtual water exports. Agency coordination and creativity through value engineering approaches and inclusion of all Reclamation offices who have legitimate interests and resources to offer is suggested.

Virtual water exports outside the Colorado River Basin should be controlled or curtailed[83]. The following is taken from the Wall Street Journal, published by Culp& Kelly LLP[84]:

> *"In 2012, the drought-stricken Western United States will ship more than 50 billion gallons of water to China. This water will leave the country embedded in alfalfa—most of it grown in California—and is destined to feed Chinese cows. The strange*

[82] https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/
[83] https://www.wsj.com/articles/SB10000872396390444517304577653432417208116
[84] https://www.culpkelly.law/publications

situation illustrates what is wrong about how we think, or rather don't think, about water policy in the U.S."

V. Water Conservation

- Extend SNWA conservation practices on a basin wide scale
- Recycle water on a basin wide scale

Basin-wide water conservation should be implemented, similar to best practices established by the Southern Nevada Water Authority (SNWA). Although the magnitude of the required savings of 3-4 maf is beyond a sole water conservation fix, this method is a necessary part of the entire Colorado River Basin's portfolio. Generally, this means removal of outside landscaping such as ornamental grass, and recycling indoor water use on a basin wide scale for all urban areas (Denver to Tucson to San Diego to Los Angeles to Las Vegas to St George to Albuquerque to other areas interconnected with the basin)[85],[86].

Water recycling should be extended throughout the basin as a regional norm. Excellent examples of water recycling occur in San Diego County where the Padre Dam Municipal Water District, City of San Diego, and Orange County have demonstrated advanced capabilities[87,88,89]. Generally indoor water use should be recycled in one form or another; for example, indoor water use in Las Vegas is treated then returned to Lake Mead. In coastal California, wastewater can be treated and re-used to intercept the wastewater before it reaches the Pacific Ocean. Water recycling in eastern San Diego (Padre Dam MWD area) such as Santee is treated and re-used either for landscaping or drinking water through advanced treatment techniques and indirect potable reuse[90] .

Reclamation should continue its research in partnership with local agencies to ensure water recycling becomes standard practice throughout the basin. For example, Reclamation recently partnered with UNLV, the City of San Diego, the Lake Arrowhead Community Services District, and others to develop a standard for mixing and assimilation of reuse effluent in lakes, using Lake Arrowhead in southern California as a test case[91].

VI. Groundwater

- Extend an integrated water resource approach to both surface water and ground on a basin wide scale.

[85] https://www.snwa.com/rebates/wsl/index.html
[86] https://www.nytimes.com/2022/05/03/climate/las-vegas-lawn-grass-ban.html
[87] https://www.sandiego.gov/public-utilities/sustainability/pure-water-sd
[88] https://padredam.org/129/Recycled-Water
[89] https://www.ocwd.com/what-we-do/water-reuse/
[90] https://sites.sandiego.edu/sdpollutiontrackers/2018/05/09/toilet-to-tap-not-as-horrendous-as-youd-think/
[91] https://www.usbr.gov/research/projects/detail.cfm?id=1397

A basin wide groundwater strategy should be implemented and integrated into water conservation and water operation efforts. This strategy should include an integrated water resource approach where surface water and groundwater are managed together. The overall basin groundwater management scope should include the transboundary aquifers on both sides of the US- Mexican international boundary[92].

Aridification and drought is causing agricultural users and municipalities to mine groundwater. For example, groundwater withdraws, and depletion is occurring in Pinal County, Arizona, as a direct result of Colorado River drought contingency plan and shortage criteria implementation[93],[94],[95].

The Morison Institute for Public Policy recently published *The Myth of Safe Yield: Pursuing the Goal of Safe-Yield Isn't Saving Our Groundwater:*

- *Conservation, while necessary, is insufficient to achieve safe-yield.*
- *Too many users are allowed to pump groundwater in perpetuity, while others are allowed to initiate new uses of groundwater.*
- *Safe-yield has been subject to differing interpretations, complicating the assessment of meeting this goal.*
- *Achieving safe-yield will not prevent the lowering of groundwater levels in all areas of an AMA or the inherent consequences of long-term groundwater decline, including land subsidence, water quality degradation and aquifer compaction.*
- *Legislation since 1980 has created additional challenges for the sustainability of groundwater supplies in the AMAs.*

Given basin-wide aridification groundwater management on a basin-wide scale should be integrated into operations.[96] For example, an advantage of groundwater banking in Arizona is to store unused apportionment on the Colorado River where the water is stored and used against future uses. The following is taken from *Groundwater Recharge for Water Security: The Arizona Water Bank, Arizona*[97]

> *"The Arizona Water Banking Authority (AWBA) was established in 1996 to make full use of Arizona's Colorado River entitlement. It aims to address groundwater depletion in central Arizona and to protect Colorado River water users against future shortages due to interannual variability in water availability. Each year, the AWBA pays the costs to deliver any of the state's unused entitlement to Colorado River water into central and southern Arizona and to store that water underground. The AWBA stores water on behalf of Central Arizona Project municipal subcontractors, other mainstream municipal Colorado River water rights holders, and tribal entities. Through its interstate banking agreements, the AWBA can also store water on behalf of the states of Nevada and California. Water stored by the*

[92] https://wrrc.arizona.edu/taap
[93] https://new.azwater.gov/sites/default/files/media/CAP-FactSheet-CoRiverShortage-042721.pdf
[94] https://www.kunc.org/environment/2022-01-04/with-less-water-on-the-surface-how-long-can-arizona-rely-on-whats-underground
[95] https://morrisoninstitute.asu.edu/sites/default/files/the_myth_of_safe-yield_0.pdf
[96] https://www.coloradoriverdistrict.org/water-banking/
[97] https://online.ucpress.edu/cse/article/5/1/1113999/116771/Groundwater-Recharge-for-Water-SecurityThe-Arizona

AWBA is accounted for using Arizona's statutorily created system of long-term storage credits (LTSCs), which allow future pumping of stored water within the same hydrologic basin. During shortage conditions in the Lower Basin of the Colorado River, the AWBA will distribute the LTSCs, enabling recipients to pump groundwater that otherwise would not be permitted. In this way, the AWBA serves as a unique insurance mechanism against shortages for users of Colorado River water in Arizona and the Lower Basin. To date, the AWBA's focus has been on storage, yet in the coming years, its activities will shift to recovery, and it will need to confront additional challenges associated with matching supplies with demands and limitations on water available for recharge."

VII. Innovative Technologies

- Implement innovative technologies, such as:
  - Cloud streets
  - Cloud seeding
  - NASA's Earth Science Airborne Observatory
  - Data assimilation
  - N-DRIP technology

A few of many innovative technologies are suggested here, such cloud streets, cloud seeding, and irrigation practices such as N-DRIP®. This section is not an endorsement and does not take potential legal aspects into account with various technologies.

a. Cloud Streets

Cloud streets are a type of organized convection that forms as an extended line of cumulus clouds parallel to wind direction.[98] Usually this type of cloud forms over a water body such as the Atlantic or Pacific Ocean, the Black Sea, Great Lakes, or Hudson Bay.[99] It may be possible to inject vapor into the atmosphere off the shore of California and move the vapor onshore in the form of linear cloud formations such as "cloud streets." For example, NASA has created clouds using rocket technology[100]; it is likely that such cloud forming technology is feasible and could enhance water vapor flow from the Pacific Ocean.

b. Cloud Seeding

Cloud seeding is not a new technology and is routinely used to enhance precipitation at various locations, throughout the Colorado River Basin.[101],[102]. It appears more work needs to be done to expand on cloud seeding throughout the

[98] https://rammb.cira.colostate.edu/wmovl/vrl/tutorials/satmanu-eumetsat/satmanu/cms/clstr/index.htm
[99] https://earthobservatory.nasa.gov/images/82800/cloud-streets-over-the-atlantic-and-pacific-oceans
[100] https://www.space.com/7282-nasa-rocket-create-clouds-tuesday.html
[101] https://www.coloradoriverdistrict.org/cloud-seeding/
[102] https://www.coloradoriverdistrict.org/cloud-seeding/

basin, if not already, through expanded research and a greater basin-wide approach[103]

c. Earth Science Airborne Observatory

NASA's Airborne Snow Observatory has been providing LiDAR and spectrometry data for various watersheds in California to survey snowpack and burn areas. This level of survey should be extended basin wide to provide better insight on snow pack, and allow for better data collection and change management.

> *"The Airborne Snow Observatory is providing California water managers the first near-real-time, comprehensive determination of basin-wide snow water equivalent," said Frank Gehrke, mission co-investigator and chief of the California Cooperative Snow Surveys Program for the California Department of Water Resources. "Integrated into models, these data will enhance the state's reservoir operations, permitting more efficient flood control, water supply management and hydroelectric power generation[104]."*

e. Data assimilation

Use of massive data processing, especially in forecasting, can be utilized to enhance operations. Rather than waiting for attribution studies, data assimilation could be leveraged based on anecdotal evidence. For example, forecasting a river gage hydrograph 5 days out has large uncertainty, and is honed as the actual day of the event occurs. Data assimilation could be used to provide operators statistical data regarding the forecast uncertainty,

f. N-DRIP® Technology

N-DRIP® [105] is a proprietary, Israeli technology which has recently completed a pilot study in Arizona, in conjunction with the Central Arizona Project, University of Arizona, and the Colorado River Indian Tribes[106]. The N-DRIP pilot study focused on:

- *"Cost-effective, innovative, adaptable, accessible irrigation efficiency water conservation technology*
- *Sustaining agriculture*
- *Conserving Colorado River water to benefit the Colorado River system and provide resiliency to CAP's water supply"*

[103] https://www.mines.edu/undergraduate-research/wintertime-cloud-seeding-evaluating-the-cloud-seeding-renaissance-in-the-colorado-river-basin/
[104] https://www.nasa.gov/home/hqnews/2013/may/HQ_13-131_Airborne_Snow_Mission.html
[105] https://ndrip.com/
[106] https://civicclerk.blob.core.windows.net/stream/CAPAZ/e02c09a8-ec58-4b01-8f57-9645e8fad6b7.pdf?sv=2015-12-11&sr=b&sig=VRUbkkZi1Wmu1U5EpmyCOqkhBkWh47rleaiLyfFnu5M%3D&st=2021-10-07T18%3A49%3A23Z&se=2022-10-07T18%3A54%3A23Z&sp=r&rscc=no-cache&rsct=application%2Fpdf

Results of the pilot study indicated a water savings of over 50% versus flood irrigation, with no new infrastructure required. Water savings were demonstrated with over 50% growing cotton, 40% growing Sorgham, and 30% growing Cotton.

Current and/or future proposal locations are slated for:

- Harquahala Irrigation District
- Colorado River Indian Tribes
- Yuma Mesa Irrigation and Drainage District
- CAP Tribal Partners
- Mexicali Valley

A 2022-2023 Alfalfa Study Project is planned at Farm Scale which demonstrates the conversion of flood irrigating alfalfa fields to N-Drip®, summarized as follows:

Project Scope

- 200 acres total - 2 Separate Field Plots Of 100 Acre Each
- 2 equal size control fields
- Full monitoring of all fields, such as water consumption, yield, fertilizers and energy consumption
- 2 year project – determines feasibility and durability

Timeline

- Planting – Oct 2021
- End Of Monitoring Period – September 2023

Partners:

- CAWCD
- Central Utah Project
- Denver Water
- MWD
- SNWA
- N-drip
- University Of Arizona
- CRIT Farms & Bill Perry (growers)

Given the proven and tested technology N-DRIP® one solution to the supply and demand imbalance on the Colorado River would be to deploy N-DRIP® at greater scale. For example, existing water contracts on the Lower Colorado River could be honored by having the Federal Government subsidize the installation and maintenance of N-DRIP® systems at no cost to agricultural users, versus subsidizing users to fallow farmland.

VIII. International Considerations

- Showcase collaboration with Mexico, Tribes and NGO's in the Indo-Pacific

Although circumstances are dire in the Colorado River Basin the transboundary water collaboration between the United States, Mexico, Tribes, and NGO's. provides and excellent opportunity to showcase how neighboring countries can arrive at water solutions. The extensive collaboration between the United States and Mexico should be showcased by the State Department as an example for other global transboundary water flash point. For example, collaboration in the Colorado River Basin can be extended as soft diplomacy in the Indo-Pacific, Himalayan region, where rivers originating in Tibet cross from the Peoples Republic of China to southeast Asia. The Brahmaputra[107], Irrawaddy[108], and Mekong[109] originate in China and drain across the international boundaries with India, Bangladesh, Myanmar, Thailand, Vietnam, Laos and Cambodia. Climate stressors in southeast Asia such as drought and flood control need to be coordinated with river operations to ensure downstream water using nations have a guaranteed and predictable water supply. Currently water deliveries for downstream counties are controlled by China with little transparency.

Riverine systems in China are also seeing the affects of climate change; perhaps the dire situation along the Yellow or Yangtze Rivers could be a common point of collaboration between the two competitors.

In Africa the *Grand Ethiopian Renaissance Dam* [GERD] is another point of friction between Ethiopia and downstream water users on the Nile, such as Egypt[110]. Brooking's is quoted as follows[111] :

> *"Officials in Addis Ababa argue that the GERD will have no major impact on water flow into the Nile, instead arguing that the hydropower dam will provide benefits to countries in the region, including as a source of affordable electric power and as a major mechanism for the management of the Nile, including the mitigation of droughts and water salinity.*
>
> *Egypt, fearing major disruptions to its access to the Nile's waters, originally intended to prevent even the start of the GERD's construction. Indeed, Egypt has called the filling of the dam an existential threat, as it fears the dam will negatively impact the country's water supplies. At this point, though, the GERD is nearly completed, and so Egypt has shifted its position to trying to secure a political agreement over the timetable for filling the GERD's reservoir and how the GERD will be managed, particularly during droughts. One question that keeps coming up is: Will Ethiopia be willing to release enough water from the reservoir to help mitigate a drought downstream?*
>
> *Sudan is caught between the competing interests of Egypt and Ethiopia. Although Khartoum initially opposed the construction of the GERD, it has since warmed up to it, citing its potential to improve prospects for domestic development. Nevertheless, Khartoum continues to fear that the operation*

[107] https://warontherocks.com/2020/12/a-conflict-prone-river-takes-a-step-backwards/
[108] https://wle-mekong.cgiar.org/changes/where-we-work/irrawaddy-river-basin/#
[109] https://wle-mekong.cgiar.org/changes/where-we-work/mekong-river-basin/
[110] https://www.washingtonpost.com/world/interactive/2020/grand-ethiopian-renaissance-dam-egypt-nile/
[111] https://www.brookings.edu/blog/africa-in-focus/2020/08/05/the-controversy-over-the-grand-ethiopian-renaissance-dam/

of the GERD could threaten the safety of Sudan's own dams and make it much more difficult for the government to manage its own development projects.

Although talks chaired by President Cyril Ramaphosa of South Africa on behalf of the African Union have resolved many issues associated with the filling of the GERD's reservoir, there is still no agreement on the role that the dam will play in mitigating droughts. The three countries have agreed that "when the flow of Nile water to the dam falls below 35-40 b.c.m. per year, that would constitute a drought" and, according to Egypt and Sudan, Ethiopia would have to release some of the water in the dam's reservoir to deal with the drought. Ethiopia, however, prefers to have the flexibility to make decisions on how to deal with droughts. Afraid that a drought might appear during the filling period, Egypt wants the filling to take place over a much longer period."

To: The Bureau of Reclamation
crbpost2026@usbr.gov

RE: Input on Development of Post-2026 Colorado River Management Strategies (88 FR 39455)

August 14, 2023

To the Bureau of Reclamation:

I'm writing in response to the June 16, 2023 Federal Register notice by the Bureau of Reclamation (USBR or Reclamation) and the U.S. Department of the Interior (Interior) initiating the scoping process for development of post-2026 operational guidelines and strategies for management of the Colorado River (hereinafter "the Post-2026 Program").[1] For the reasons discussed below, I urge Interior and Reclamation to include permanent restoration of the Salton Sea and its essential ecosystem as a key element of the Post-2026 Program.[2]

Contents

I. The Relationship between the Colorado River and the Salton Sea Necessitates Permanent Restoration of the Lake and its Ecosystem

The Salton Sea is currently completely dependent on annual inflow into the central Salton Basin of about one million acre-feet of Colorado River wastewater. Most of that volume is agricultural drainwater from farms served by the Imperial Irrigation District (IID).[3] As Reclamation and all of the Colorado River Basin ("Basin") stakeholders are aware, IID—located in Imperial County, California adjoining the Salton Sea—holds senior rights to the single largest legal entitlement to Colorado River water. The river is IID's only source of water to serve the needs of all domestic, commercial, industrial, and agricultural users throughout Imperial County. IID's wastewater flows onward by gravity into the Salton Sea. Nearly all of the rest of the water currently sustaining the Salton Sea in its arid environment also originates from the Colorado River and consists of

[1] Please note that I do not have a direct personal stake in these issues, and I do not represent or speak for any interested individual, organization, or government entity. I submit these comments as someone who has spent many years objectively analyzing the numerous scientific, factual, legal, and policy issues concerning the past, present, and future of the Salton Sea and the Colorado River.

[2] Although Reclamation has primary responsibility for managing the Colorado River, I refer throughout these comments to "Interior and Reclamation" to emphasize the role of the Interior Secretary as well as the fact that other Interior agencies in addition to Reclamation have important expertise and responsibilities relevant to Salton Sea restoration.

[3] California's Salton Sea Management Program has estimated that the average annual inflow to the Salton Sea from IID's use of Colorado River water during 2015-2021 was about 929,800 acre-feet. (Salton Sea Management Program (2023), Draft Long-Range Plan, Appendix B, Table 14.) Total annual inflow to the Salton Sea from all sources during the same period—including regional watershed runoff, groundwater, and wastewater from IID, the Coachella Valley Water District, and northwest Mexico —was an average of approximately 1.09 million acre-feet. (Ibid.) That total annual inflow is considerably less than the amount historically received by the lake, and therefore the Salton Sea is shrinking.

wastewater from use of the river's water by the other Salton Trough rightsholders—the Coachella Valley Water District (CVWD) in Riverside County, California and the Republic of Mexico (Mexico).

What is not generally well-understood, and what has not been accounted for in an adequate manner by previous Colorado River operational strategies and management actions, is the fact that Colorado River water usage by Salton Trough rightsholders is tightly linked with the fate of the Salton Sea. Any federal actions that result in substantial reductions in use of Colorado River water by IID, CVWD, and Mexico will cause momentous negative impacts on the Salton Sea and consequently on the hundreds of wildlife species reliant on the Salton Sea ecosystem, as well as on the environment and climate across the surrounding region, and on the health of more than half a million people throughout the area adjacent to the lake—including numerous disadvantaged communities already suffering environmental injustice.

Contrary to widespread but mistaken popular belief, the Salton Sea is not a man-made body of water created accidentally at the beginning of the 20th century. Furthermore, it does not owe its existence to 20th-century Colorado River infrastructure, even though it is now dependent upon Colorado River wastewater. As I explained in a peer-reviewed scientific study published in 2020,[4] when the Colorado River flooded into the Salton Basin in 1905-1907, enhancing the size of a lake containing Colorado River water that already existed there,[5] the river was simply behaving in the same manner it had for millions of years. Geologic evidence establishes that the northern Salton Trough, containing the Salton Basin in which the Salton Sea lies, became a natural part of the Colorado River's hydrologic system about five million years ago when the river first arrived at the Gulf of California.[6] As the river meandered throughout its delta region, which gradually became uniquely bifurcated into northern and southern lobes as the result of tectonic processes,[7] its waters flowed into the Salton Basin and sustained estuarine, deltaic, lacustrine, and other wetland ecosystems. That important hydrologic connection between the Colorado River and the Salton Basin continued to exist for millions of years until the river was intentionally prevented from flowing into the Salton Basin anymore in the 20th century.

The Colorado River's natural hydrologic regime across its delta region, and the rich aquatic ecosystems in the Salton Basin—including enormous lakes—that the river created and supported, were abruptly altered forever when the river's route into the northern Salton Trough was deliberately and permanently blocked. Preventing the Colorado River from flowing naturally into the Salton Basin as it had done for millions of years—and as it

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[4] Ross, J.E. (2020). Formation of California's Salton Sea in 1905-07 was not "accidental." In: Miller, D.M. (Ed.), *Proceedings of the 2020 Desert Research Symposium*, Desert Symposium, Inc., pp. 217-230. (Available online at: https://www.researchgate.net/publication/340038533_Formation_of_California's_Salton_Sea_in_1905-07_was_not_accidental.)

[5] See, e.g., Bailey, G. E. (1902). *The Saline Deposits of California*. California State Mining Bureau Bulletin No. 24. 187 pages. The frontispiece relief map of this 1902 book depicts the large lake that was present in the Salton Basin prior to the 1905-1907 flooding. The text on pages 122-124 discusses that lake and the salt harvesting operations adjacent to it, and a photograph at the top of page 123 shows the lake in the distance and the salt deposits in the foreground. Note that the lake was already known as the "Salton Sea" prior to the 1905-1907 flooding. A large body of evidence (some of which is summarized in Ross, 2020 supra) contradicts the common but misguided notion that the 1905-1907 floodwaters flowed into a dry basin that had not held a lake since "ancient" times.

[6] Crow, R.S. et al. (2021). Redefining the age of the lower Colorado River, southwestern United States. *Geology* 49(6):635-640. https://doi.org/10.1130/G48080.1. See also: Dorsey, R.J., B. O'Connell, K. McDougall, and M.B. Homana (2018). Punctuated Sediment Discharge during Early Pliocene Birth of the Colorado River: Evidence from Regional Stratigraphy, Sedimentology, and Paleontology. *Sedimentary Geology* 363:1-33. https://doi.org/10.1016/j.sedgeo.2017.09.018.

[7] Tectonic processes occurring at the boundary of the Pacific and North American plates, primarily manifested by movement along faults in the San Andreas fault system, caused the Colorado River's delta region to gradually transform from a typical fan shape into two hydrologically connected lobes that are now located to the north and south of the U.S.-Mexico border. The northern delta lobe in the northern Salton Trough contains the below-sea-level Salton Basin and Salton Sea, as well as the Imperial Valley; the southern delta lobe contains the Mexicali Valley and the subaerial delta region typically referred to as "the Colorado River delta," as well as the subaqueous delta at the head of the Gulf of California. See, e.g., Winker, C.D., and Kidwell, S.M., 1986. Paleocurrent evidence for lateral displacement of the Pliocene Colorado River delta by the San Andreas fault system, southeastern California. *Geology* 14:788-791.

continued to do through the early 20th century—was a primary motivating factor for the Boulder Canyon Project Act and the construction of Hoover Dam and other key infrastructure on the river.[8] That 20th-century water-management infrastructure enabled the Colorado River Basin states to develop in the manner they have during the past one-hundred years. But fully controlling the Colorado River, permanently severing its natural connection with the Salton Basin, and exhaustively exploiting the river's water also sealed the fate of the Salton Sea; the demise of the lake and the collapse of its ecosystem were assured without additional human intervention.

Ever since full control of the Colorado River was attained using Reclamation's infrastructure, the Salton Sea and its essential ecosystem have been reliant on very large quantities of Colorado River wastewater flowing into the central Salton Basin as a result of the use of the river's water by IID, CVWD, and Mexico. Because IID's Colorado River water entitlement is by far the largest, that district's use of the river's water is crucial for sustaining the Salton Sea. During the 20th century and the early years of the 21st century, inflow of Colorado River wastewater enabled the Salton Sea to continue supporting millions of migratory and resident birds and hundreds of millions of fish, including threatened and endangered species. The Salton Sea is situated in a critical location for avian migration, at the juncture of the Pacific Flyway and the Intermountain West. Accordingly, more than 400 species of birds rely on the Salton Sea ecosystem—many of them the same species that have used lakes and wetlands in the Salton Basin for millions of years, as the fossil record shows. Moreover, as inland aquatic ecosystems across the western U.S. have withered since the 19th century, and many have vanished, the Salton Sea has transitioned from being ecologically important to being indispensable for the continued survival of numerous species.

Pursuant to the 2003 Quantification Settlement Agreement (QSA), during the past twenty years IID has conserved approximately 7.25 million acre-feet of Colorado River water that Imperial County would otherwise have been legally entitled to use based on the Law of the River. As required by the QSA, IID is annually transferring hundreds of thousands of acre-feet of Colorado River water to other Basin stakeholders in Southern California urban areas that have junior water rights. Those water transfers started in 2003 and will continue for decades to come. When the transfer amounts to all recipients are fully ramped up in a couple of years, they will total nearly 500,000 acre-feet annually.

As the amount of Colorado River wastewater flowing into the central Salton Basin shrinks, so does the Salton Sea. Thus, because of the major reductions in IID's use of Colorado River water mandated by the QSA, the Salton Sea is shriveling, its salinity is rapidly rising, the ecosystem is collapsing, and increasingly vast expanses of desiccated lakebed are polluting the air with hazardous dust containing toxic and carcinogenic components. Consequently, serious harm is occurring to hundreds of wildlife species dependent on the Salton Sea ecosystem as essential habitat, and the health of more than half a million people is in jeopardy throughout the region near the shrinking lake. The State of California is attempting to address the severe and worsening ecological and public health impacts of the Salton Sea's water-deprivation, but those efforts are being outpaced by the growing magnitude of the crisis.

Now, as the Colorado River faces its own water-supply emergency because of chronic overuse and the effects of climate change, the dire situation at the Salton Sea is poised to become even more grim. The Colorado River's severe supply-demand imbalance undeniably requires major modifications in the way the river's water is managed. Huge reductions in water allocations are necessary to limit consumptive use to match available supply, as well as to replenish severely depleted reservoirs.[9] Moreover, because climate change is

[8] See, e.g., LaRue, E.C. (1925). *Water, Power and Flood Control of Colorado River below Green River, Utah*. Washington: Government Printing Office. 171 pages.

[9] A recent study determined that continuation of hydrologic conditions comparable to those occurring in the first two decades of the 21st century would necessitate reducing Colorado River water use by 1.5 million acre-feet annually in order to match supply, and an additional usage reduction of 1 million acre-feet per year would be required to recover lost reservoir storage. (Schmidt, J.C., Yackulic, C.B., Kuhn, E. (2023). The Colorado River water crisis: Its origin and the future. *WIREs Water*, e1672. https://doi.org/10.1002/wat2.1672.)

projected to cause worsening aridity across the Colorado River Basin by mid-century,[10] everyone reliant on the river's water must adapt to the hydrologic reality of even greater decreases in streamflow over the longer term. There is a particularly critical need for the Lower Basin states to reduce their use of the river's water substantially, both now and in the future. However, significant reductions in Colorado River water apportionments to IID, CVWD, and Mexico will greatly decrease the amount of water flowing into the central Salton Basin that is necessary for sustaining the Salton Sea. Consequently, such allocation cutbacks will accelerate and exacerbate the dreadful ecological, environmental, public health, and socioeconomic consequences that are already underway at the Salton Sea because of the QSA water transfers, and that have been inadequately addressed for many years by the responsible federal and state government agencies.

Any action alternative for the Post-2026 Program that effectively addresses the Colorado River's chronic supply-demand imbalance by reducing water allotments for Lower Basin stakeholders including Salton Trough water users will necessarily compound and worsen the ongoing harmful effects of freshwater deprivation on the Salton Sea, the lake's wildlife, and people throughout the surrounding region. The ultimate outcome of such federal action will be complete destruction of the Salton Sea ecosystem, devastating impacts on hundreds of species including ones that are already at risk of extinction, and a public health catastrophe. The federal government is legally obligated to avert that disaster by avoiding or minimizing the foreseeable and significant negative impacts of federal actions *to the greatest feasible extent*, in compliance with the National Environmental Policy Act (NEPA),[11] the NEPA implementing regulations,[12] and other applicable statutes, regulations, and policies. The only way for the federal government to satisfy those crucial legal obligations over the long term is to accomplish permanent Salton Sea restoration as part of the Post-2026 Program.

II. Options for Permanent Salton Sea Restoration

When devising and implementing long-term approaches for addressing the Colorado River's severe water-supply deficit, it is essential for Interior and Reclamation to develop and undertake actions that will permanently restore the Salton Sea. I respectfully suggest this should be accomplished as part of the Post-2026 Program, in consultation or collaboration with the U.S. Army Corps of Engineers as appropriate.[13]

Numerous long-term plans have been proposed to address the Salton Sea crisis and revitalize or restore the lake's ecosystem in different ways and to varying degrees. The proposed plans fall into two general categories: (a) in-basin plans that use only the water already available as inflow into the central Salton Basin, nearly all of which is a shrinking supply of Colorado River wastewater,[14] to create impoundments on the Salton Sea lakebed for habitat and recreation; and (b) ocean water importation plans, which propose to refill

[10] For example, a 2020 study found that by mid-century (2036-2065) Colorado River streamflow could decrease more than 30% in relation to the 1913-2017 mean, and potentially by as much as 40%. (Milly, P.C.D. and Dunne, K.A. (2020). Colorado River flow dwindles as warming-driven loss of reflective snow energizes evaporation. *Science* 367(6483): 1252-1255, https://doi.org/10.1126/science.aay918.) Another recent study found that, estimated very conservatively, Colorado River streamflow will shrink at least 20% more by mid-century than it has already, and 35% more by the end of the century; and potentially the river's flow could suffer additional declines of more than 30% by mid-century and 55% by later in the century. (Udall, B. and Overpeck, J. (2017). The twenty-first century Colorado River hot drought and implications for the future. *Water Resources Research* 53: 2404–2418, https://doi.org/10.1002/2016WR019638.)

[11] Pub. L. 91–190, 42 U.S.C. 4321 et seq.

[12] The Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA, as amended, 40 CFR Parts 1500-1508 (May 20, 2022).

[13] It may also be appropriate or necessary for the International Boundary and Water Commission to be involved.

[14] A relatively small portion of the inflow into the central Salton Basin comes from local tributaries, groundwater, and stormwater. The rest is Colorado River wastewater, most of which derives from Imperial County's agricultural use of IID's allotment of the river's water, as noted above. Additional inflow is wastewater from agricultural, municipal, and industrial use of Colorado River water in the Coachella Valley and northwest Mexico.

the Salton Sea and restore its ecosystem either by using desalinated seawater (imported from either the Gulf of California or the Pacific Ocean), or by using imported seawater that is not desalinated, in combination with some sort of outflow mechanism to prevent salts from continuing to accumulate in the lake.[15]

A. In-basin restoration proposals

1. Proposed in-basin restoration plans all rely on huge amounts of Colorado River wastewater flowing into the central Salton Basin to fill large earthen impoundments constructed on the Salton Sea's lakebed to create habitat areas and recreational opportunities. The sizes and configurations of the impoundments vary from one proposed in-basin plan to another; however, all plans use excavated lakebed sediments to construct the impoundments and other features such as levees and causeways, and all plans use Colorado River wastewater to fill the impoundments. In-basin plans also employ dust mitigation measures on other portions of the exposed lakebed (e.g. deep furrowing to inhibit airborne movement of particles), and they include at least one large brine sink in the central basin that is incapable of supporting wildlife.

2. The dependence of in-basin plans on the continued availability of enormous volumes of Colorado River wastewater flowing annually into the central Salton Basin in perpetuity is exceedingly problematic if not completely untenable.[16] Worsening climate change, significantly decreasing Colorado River streamflow,[17] and tightening restrictions on use of the river's water will jeopardize the existence of the inflow amounts required by in-basin plans, and will threaten the efficacy and sustainability of all such plans. Consequently, all in-basin plans will face a substantial risk of failure if implemented. In the event that a very costly in-basin plan is ineffective or becomes inoperable because of water constraints, enormous amounts of money will have been wasted, and the devastating consequences for wildlife, people, the environment, and the climate will be tantamount to the dire impacts of a no-action scenario. Although permanent restoration conceivably could be accomplished using an in-basin plan if a very large annual amount of Colorado River water is specifically and irrevocably allocated to the Salton Sea, that approach is infeasible because of the many legitimate and competing demands for the river's over-allocated and declining water supply.

3. In addition to their problematic and likely unsustainable dependence on the use of Colorado River water, all in-basin plans suffer from many other significant inherent flaws that render them seriously inadvisable and undermine their viability. For example:

    a. Wastewater containing dangerous pollutants will be relied upon as the sole water source for impoundments to be used as habitat and for recreational activities, exposing both wildlife and people to known and serious risks of harm. The hazardous, toxic, and carcinogenic pollutants in the water include, but are not limited to, pesticide residues (from both banned legacy pesticides such as DDT and ones in current use), heavy metals (e.g. arsenic), polychlorinated biphenyls (PCBs), components of untreated wastewater crossing the international border from Mexico (potentially including pathogens), various

[15] For purposes of these comments, "ocean water importation," "seawater importation," "the use of ocean water" to restore the Salton Sea, and other similar phrases mean any restoration plan using either of those two general approaches. Many ocean water importation plans of those two types have been proposed during the past few decades.

[16] The amount of inflow required by in-basin plans varies among the proposed restoration concepts. The minimum quantity necessary for the in-basin concept with the smallest water requirement, taking into account the effects of climate change in the coming decades, is approximately several hundred thousand acre-feet per year. Other proposed in-basin plans require, roughly, as much as double that amount. Importantly, the suggested concepts with lower water requirements necessarily entail leaving much greater expanses of lakebed exposed, and they will therefore result in significantly larger emissions of hazardous fugitive dust and biogenic greenhouse gases from the exposed lakebed on an ongoing basis.

[17] For example, see the studies cited in footnote 10.

industrial chemicals released from Mexican factories, microcystins from harmful algae blooms, and elevated levels of selenium.

b. Lakebed and deltaic sediments contaminated with hazardous, toxic, and carcinogenic substances, including but not limited to the ones noted above, will be excavated and used to create and maintain impoundments, dikes, levees, islands for wildlife to nest and loaf, and other earthen structures such as causeways and embankments to be used by people (e.g. for driving, hiking, birdwatching, fishing, and launching boats). Through a variety of exposure pathways, the contaminants in sediments will pose known risks of significant harm to both wildlife and people.

c. The essential components of in-basin plans, including but not limited to impoundments, dikes, levees, causeways, and other infrastructure, will be constructed on the Salton Sea lakebed on top of or adjacent to significant active faults and seismic zones. In the event of a large earthquake (which is highly likely to happen during the life of a long-term restoration plan), major ground motion and extensive liquefaction of sediments in the Salton Sea footprint will occur, and will likely cause critical infrastructure built on top of the lakebed to be incapacitated and destroyed. Levees, dikes, and causeways will be cut by shearing forces causing co-seismic displacements of as much as 6 meters,[18] impoundments will collapse, and access roads on the lakebed will be disabled. Such a dangerous scenario will pose major threats to public safety, and will necessitate rebuilding the project—which might not even be feasible.

d. Huge amounts of fugitive dust consisting of PM10 and PM2.5, and containing hazardous, toxic, and carcinogenic components, will be emitted from vast areas of lakebed that will be left exposed by in-basin plans. The dangerous and chronic dust emissions will negatively affect regional air quality and endanger the health of approximately 600,000 people throughout the surrounding region (and potentially a significantly greater number, including the populations of western Riverside County and Los Angeles County in California, Yuma County in Arizona, and the city of Mexicali in Mexico).

e. Major quantities of greenhouse gases—including carbon dioxide, methane, and nitrous oxide—are likely to be emitted on an ongoing basis for the foreseeable future from exposed Salton Sea lakebed and other features of in-basin restoration plans.[19] The quantities of biogenic GHG emissions involved could be so large that California's plan to attain net-zero carbon emissions will be derailed, and climate change will be worsened.[20]

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[18] See, e.g., Kyriakopoulos, C., et al. (2019). Dynamic Rupture Scenarios in the Brawley Seismic Zone, Salton Trough, Southern California. *JGR Solid Earth* 124(4), 3680-3707. https://doi.org/10.1029/2018JB016795.

[19] See the following peer-reviewed report and the references cited therein: Ross, J.E. (2022). Potential Major Greenhouse Gas Emissions from Proposed Salton Sea Long-Range Plans. Report submitted to the California Natural Resources Agency. January 27, 2022. 14 pages. https://doi.org/10.13140/RG.2.2.36775.62884. Also see that report's Supplementary Information, explaining the possible magnitude of the greenhouse gas emissions that may result from implementation of proposed in-basin long-term plans for the Salton Sea that leave vast areas of lakebed exposed and include other components that are potentially large sources of GHG emissions. https://doi.org/10.13140/RG.2.2.10089.36964 .

[20] In the Supplementary Information for my January 2022 GHG report, cited in footnote 19 above ("the Supplementary Information"), I explained the possible magnitude of the GHG emissions involved. To derive a rough estimate I relied on source data for a lake that is the most similar to the Salton Sea of all the lakes for which data are available. I considered only CO_2 emissions and did not include any emissions of methane or nitrous oxide. My analysis indicated that a ballpark approximation of future biogenic CO_2 emissions from in-basin project components within the Salton Sea footprint is 26 million metric tons per year. Although that rough estimate is a very large amount, it would be reasonable to consider it to be a conservative approximation of the actual GHG emissions involved, because my calculation did not include any emissions of CH_4 or N_2O, yet those GHGs are likely to be emitted in significant quantities from the central Salton Basin in either a no-action scenario or in the event an in-basin plan is implemented.

f. The social cost of greenhouse gas emissions must be carefully evaluated when considering potential in-basin restoration plans, because huge quantities of biogenic GHG emissions and enormous related social costs are likely to be at stake. The social cost of greenhouse gas emissions (SC-GHG)—analyzed more specifically in federal contexts as the social cost of carbon dioxide (SC-CO_2), the social cost of methane (SC-CH_4), and the social cost of nitrous oxide (SC-N_2O)—is a metric used to estimate the economic costs incurred by society as a result of the emission of greenhouse gases. The SC-GHG is utilized across the entirety of the federal government when agencies evaluate the potential consequences of proposed policies or projects, including when conducting analyses pursuant to NEPA.[21] The SC-GHG associated with in-basin plans that leave large areas of lakebed exposed and include other components also likely to emit major quantities of GHGs on an ongoing basis is likely to reach at least scores of billions of dollars during the life of a long-term restoration plan, and could soar far higher than that.[22]

g. The inhabited region adjacent to the Salton Sea—the area that will be most negatively impacted if an ineffective and/or unsustainable in-basin restoration plan is implemented—encompasses disadvantaged populations bearing major burdens of environmental injustice.[23] The people living and working there are already adversely affected by hazardous dust emissions, hydrogen sulfide irruption events, harmful blooms of toxic algae, and other serious problems caused by shrinkage and deterioration of the Salton Sea related to the QSA water transfers. The serious concerns of those environmental justice communities include, but are not limited to, significant and disproportionate pulmonary illness associated with chronic inhalation of dangerous particulates being emitted from

[21] The federal Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) has recognized that the social cost of greenhouse gases should apply to all "relevant agency actions," and not just regulatory ones. (Interagency Working Group on the Social Cost of Greenhouse Gases (Feb. 2021), Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide – Interim Estimates under Executive Order 13,990, at p.14.) The IWG has also explained that the social cost of greenhouse gases has been used previously in NEPA analysis. (Id. at p.12.)

[22] The relevant calculation is performed using estimated emissions amounts and the data in Appendix A, section A.4, Table 4.2.1 of the following report: U.S. EPA (2022). Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances. https://www.epa.gov/environmental-economics/scghg. Based on the ballpark estimate of CO_2 emissions discussed in footnote 20 above, the total net present value of the SC-CO_2 for the life of a long-term in-basin restoration project could exceed $150 billion dollars. This is likely an underestimate of the total SC-GHG because it does not consider the SC-CH_4 or the SC-N_2O. The SC-CH_4 and the SC-N_2O are far more costly per ton of emissions than the SC-CO_2, because the Global Warming Potential of each of those GHGs is extremely high, and therefore the social costs of emitting those GHGs are far higher than for emitting the same amount of carbon dioxide. For example, using a 2% discount rate, the net present value for the social cost of one ton of CO_2 emitted in 2043 is $188, whereas the net present value of the SC-CH_4 for one ton of methane emitted in 2043 is $2400, and the net present value of the SC-N_2O for one ton of nitrous oxide emitted in 2043 is $55,940.

[23] The Council on Environmental Quality's Climate and Environmental Justice Screening Tool (CEJST), available online at https://screeningtool.geoplatform.gov/en/#8/33.045/-115.98, identifies the locations and extent of disadvantaged communities, including but not limited to Federally Recognized Tribes, and shows that the entire Salton Sea region consists of such populations. CEQ developed the CEJST as required by Executive Order 14008. It is a geospatial mapping tool that federal agencies are directed to use "to identify disadvantaged communities. These communities have been marginalized by society, overburdened by pollution, and underserved by infrastructure and other basic services. The CEJST uses publicly-available, nationally-consistent datasets [that] are indicators of burdens that disadvantaged communities face. These burdens are related to climate change, the environment, health, and economic opportunity." (Instructions to Federal Agencies on Using the Climate and Environmental Justice Screening Tool," CEQ, Executive Office of the President of the United States, January 2023, page 2.) A memorandum from the Executive Office of the President to the heads of federal executive departments and agencies dated January 27, 2023 stated that federal agencies should immediately start using the CEJST to identify geographically defined disadvantaged communities for purposes of analyzing environmental justice issues.

increasingly exposed Salton Sea lakebed.[24] The proximity of disadvantaged populations to the Salton Sea ensures they will be subjected to worsening harm as the lake continues to shrivel and the ecosystem deteriorates further toward complete collapse.[25] Because of the fundamental limitations and problems intrinsic to all in-basin restoration plans, increased morbidity and mortality in environmental justice communities will occur if such a plan is implemented.[26]

B. Ocean water importation proposals

1. Proposed ocean water importation plans entail refilling the Salton Sea and restoring a robust aquatic ecosystem capable of supporting the number and diversity of species originally reliant on the huge lake. Pursuant to such a plan, millions of birds and hundreds of millions of fish could again be sustained by the Salton Sea. In broad terms, the proposed concepts would accomplish restoration by utilizing either: (a) desalinated seawater from the Gulf of California or Pacific Ocean imported into the Salton Basin; or (b) imported seawater that is not desalinated, in combination with some sort of outflow mechanism to prevent salts from continuing to accumulate in the lake. Various ocean water importation plans of these two general types have been proposed, some of which involve recent technological advancements.

2. A seawater importation plan would avoid all of the many serious problems afflicting in-basin plans, including all of the important difficulties noted in part II.A above. Utilizing ocean water to refill the Salton Sea and reestablish its ecosystem is the only approach that can break the tight linkage between Colorado River water use and sustenance of the Salton Sea, achieve permanent restoration of the lake, and protect both wildlife and people from significant harm. Specifically:

    a. An ocean water importation plan would fully restore essential Salton Sea habitat to conserve hundreds of species that will otherwise face grave threats to their survival. Moreover, restoring the Salton Sea with ocean water would avoid the substantial ongoing risks to both wildlife and people posed by in-basin plans that necessarily rely on impoundments constructed of contaminated sediments and filled with polluted wastewater.

    b. Use of seawater for full Salton Sea restoration would permanently prevent the emission of dangerous fugitive dust from exposed lakebed. Instead of blowing throughout the

[24] For example, a recent study found the childhood asthma rate for the portion of Imperial County closest to the Salton Sea's exposed lakebed was 22.4% in comparison to a nationwide prevalence of 8.4%. (Farzan, S.F. et al. (2019). Assessment of Respiratory Health Symptoms and Asthma in Children Near a Drying Saline Lake. *Int. J. Env. Res. Public Health*, 16(20):3828. https://doi.org/10.3390/ijerph16203828.) The same study determined that chronic pulmonary symptoms in children not diagnosed with asthma are also high in the Salton Sea region. In addition, other recent research concluded that dust from exposed Salton Sea lakebed causes lung inflammation that is distinct from the pulmonary effects of exposure to typical desert dust. (Biddle, T.A. et al. (2022). Aerosolized aqueous dust extracts collected near a drying lake trigger acute neutrophilic pulmonary inflammation reminiscent of microbial innate immune ligands. *Science of the Total Environment* 858(3):159882. https://doi.org/10.1016/j.scitotenv.2022.159882.) Notably, emergency room visits for children ages 5-17 years with asthma in Imperial County are more than double the California statewide average. (Data: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/Pages/CaliforniaBreathingCountyAsthmaProfiles.aspx.)

[25] One significant concern is the fact that inhabited tribal reservation lands of the Torres Martinez Desert Cahuilla Indians adjoin portions of the Salton Sea's exposed lakebed. There are also other Tribes in the Salton Sea region.

[26] For example, in addition to the research highlighted in footnote 24 above, another study concluded: "Between 1998 and 2014, the shrinking Salton Sea was associated with PM2.5 changes that increased lower respiratory mortality outcomes by…1.4/yr.–15.6/yr. in aggregate… [C]hanges in the amount of exposed lake bed around the Salton Sea are responsible for $13.2–$147.3 million per year in lower respiratory mortality costs associated with PM2.5 exposure… [E]ach one-foot drop in lake elevation creates, on average, $151.5 million in respiratory mortality costs in the Salton Sea counties…" (Jones, B.A. and Fleck, J. (2020). Shrinking lakes, air pollution, and human health: Evidence from California's Salton Sea. *Science of the Total Environment* 712(22):136490. http://dx.doi.org/10.1016/j.scitotenv.2019.136490.)

surrounding area and chronically jeopardizing human health, the hazardous constituents in lakebed sediments would remain buried.

c. Implementation of a seawater importation plan would facilitate achieving sustainability of the Colorado River system. Such a plan would provide the restored Salton Sea with an enduring source of water independent of the Colorado River that will be immune to the future vagaries of climate change and the impacts of worsening aridification, and will be unaffected by cuts in Colorado River water allocations. If required pursuant to the Post-2026 Program, water rightsholders in the Salton Trough could substantially reduce their use of the Colorado River's water while not causing harm to the Salton Sea, to the lake's wildlife, or to public health.[27]

d. Because inexhaustible ocean water would be used as the restored Salton Sea's water supply, the lake would also be unaffected by other foreseeable circumstances that will substantially reduce future inflows of Colorado River wastewater into the central Salton Basin. For example, the Salton Sea would suffer no adverse impacts as a result of water-use efficiency improvements implemented by Colorado River stakeholders in the Salton Trough, or because of significantly increased recycling and reuse of Colorado River wastewater in the region, or due to entirely consumptive use of large quantities of Colorado River water by anticipated commercial-scale lithium extraction operations in the Salton Basin that will release no wastewater. In contrast, all of those scenarios could fatally undermine an in-basin restoration plan.

e. Using seawater to accomplish full and permanent Salton Sea restoration would enhance the well-being of environmental justice communities across the adjacent region, rather than subjecting them to a variety of serious and ongoing health hazards and significant socioeconomic harm.

f. Restoring the Salton Sea with ocean water and reestablishing the lake's ecological, biological, and biogeochemical functions would likely serve to sequester significant amounts of carbon in submerged lakebed sediments, and yield net-zero or net-negative GHG emissions. In contrast, in-basin restoration approaches would likely result in large quantities of biogenic greenhouse gases being emitted on an ongoing basis, and would impose enormous social costs related to the damaging climate impacts of those emissions.

III. Foreseeable and Significant Negative Consequences of Failure to Accomplish Permanent Salton Sea Restoration

Many devastating impacts on wildlife, people, the environment, and the climate will result from failure to implement an effective, safe, and sustainable long-term restoration plan for the Salton Sea. Such a failure may occur because: (a) federal and state agencies adopt a no-action or piecemeal minimal-action approach regarding restoration, and no long-term plan for permanent restoration is carried out; or (b) an in-basin long-term plan is selected for implementation but it cannot operate as intended, is otherwise ineffective and/or unsafe, and/or it cannot be sustained over the long term. The latter problematic scenario involving an in-basin plan may materialize as a consequence of various foreseeable factors—including, but not limited to, the fundamental problem that the Colorado River water supply necessary for operation of an in-basin plan may not exist in the future because of federal actions undertaken to address chronic overuse of the river's water and worsening aridification from climate change.

Current state and federal actions intended to ameliorate the Salton Sea's problems are important but are not sufficient for addressing the ongoing and worsening crisis affecting the lake and its ecosystem. Those actions

[27] Also, notably, the various proposed restoration plans involving desalination of seawater from the Gulf of California typically include substantial benefits for Mexico that could help offset the difficulties that country may experience due to future reductions in Colorado River water allocations.

include the development of the Salton Sea Management Program (SSMP) Phase 1: 10-Year Plan ("10-Year Plan"),[28] and the November 2022 multi-agency Memorandum of Understanding in which Interior conditionally pledged federal monies and federal assistance in carrying out the 10-Year Plan.[29] Even if the 10-Year Plan is fully implemented,[30] it will not be adequate to restore the habitats necessary for permanently supporting the number and variety of wildlife species, including threatened and endangered ones, originally reliant on the Salton Sea ecosystem—as required by California's Salton Sea Restoration Act.[31] The 10-Year Plan will also not be sufficient to prevent serious harm to human health across a large region as the Salton Sea continues to shrivel, and it will not be enough to avert other related injuries to disadvantaged communities in the Salton Sea area that are already bearing significant burdens of environmental injustice. Wildlife, people, the environment, and the climate will suffer severe and irreparable consequences if the 10-Year Plan is the only Salton Sea plan implemented as the residual deteriorating lake becomes ecologically useless and hazardous, huge quantities of greenhouse gases are emitted from biogenic sources all across the central Salton Basin within the Salton Sea's original footprint, and the dangerous dust that is already spewing from the exposed lakebed transforms the region into a toxic dustbowl.

When developing the Post-2026 Program and establishing a new Colorado River management regime that will require substantial reductions in water allocations, Interior and Reclamation must consider all of the following foreseeable and significant negative impacts (and others) of failure to implement an effective and sustainable long-term plan for permanent restoration of the Salton Sea.[32] These direct, indirect, and cumulative harmful effects are highly likely to result from either a no-action approach regarding restoration or a minimal-action approach (i.e., some version of 10-Year Plan alone). In addition, it is foreseeable that many—and potentially all—of the following significant adverse impacts (and others) could result from implementation of any in-basin plan for long-term restoration, because of the substantial risks that such a plan will be: (a) ineffective and/or unsafe because of inherent limitations and flaws; and/or (b) unsustainable due to various crucial factors including, but not limited to, future unavailability of the huge volumes of Colorado River water required for operation of an in-basin plan.

- Major decreases in the volume, depth, and surface area of the Salton Sea will occur, resulting in loss of habitat and harmful ecological impacts, and causing additional large areas of Salton Sea lakebed to become exposed. Depending on the particular restoration alternative at issue (no action, minimal action involving only the 10-Year Plan, or an in-basin long-term plan), and contingent on the magnitude of future reductions in Colorado River water allocations, the *additional* exposed lakebed

[28] A final Environmental Assessment for the 10-Year Plan has not yet been issued. The 2022 Draft Environmental Assessment for the 10-Year Plan is available, along with its appendices, on the following webpage at the links under the heading "Salton Sea Management Program (SSMP)": https://www.spl.usace.army.mil/Missions/Regulatory/Projects-Programs/.

[29] On November 28, 2022, Interior, the California Natural Resources Agency, and IID announced a joint Memorandum of Understanding including a conditional provision for payment of $250 million from federal Inflation Reduction Act (IRA) monies to cover costs largely associated with short-term mitigation and habitat creation measures in the SSMP's 10-Year Plan. That payment amount is contingent on voluntary reductions in Colorado River water use previously proposed by California water agencies on October 5, 2022 totaling 400,000 acre-feet per year for 4 years, including a reduction of 250,000 acre-feet per year by IID. https://www.iid.com/home/showpublisheddocument/20772/638052502977870000.

[30] Several substantially different versions of the SSMP 10-Year Plan were included as options in the 2022 Draft Environmental Assessment for the 10-Year Plan, and it is currently unclear which, if any, of those alternatives will actually be carried out. The funding necessary to implement the components of whichever 10-Year Plan is selected has not been secured, and various other essential preconditions for executing the plan have not been met. Therefore, full implementation of the 10-Year Plan is not guaranteed.

[31] California Fish and Game Code Chapter 13, Sections 2930 et seq. Restoration of the Salton Sea has become even more crucial recently because the Great Salt Lake is also shrinking, and its ecosystem is also collapsing, from freshwater deprivation. The demise of both lakes would jeopardize the survival of millions of migratory birds, including threatened and endangered species.

[32] This discussion is not intended to be an exhaustive enumeration of all foreseeable adverse impacts that may result from no restoration action, minimal action, or use of an ineffective, unsafe, and/or unsustainable in-basin plan.

(beyond the areas already being exposed because of the ongoing water transfers required by the QSA) could range in extent from many thousands of acres to more than 200 square miles.

- Huge additional quantities of hazardous particulates originating from the exposed Salton Sea lakebed will be chronically emitted into the region's atmosphere, fouling air quality and endangering public health. The fugitive dust consists of PM10 and PM2.5, and is known to contain other dangerous, toxic, and carcinogenic constituents, including but not limited to heavy metals such as arsenic, PCBs, and residues of current and banned pesticides such as dichlorodiphenyltrichloroethane (DDT) and its metabolite dichlorodiphenyldichloroethylene (DDE) that would otherwise be sequestered in undisturbed sediments beneath the waters of the Salton Sea. Microcystins and other toxins derived from harmful algae blooms that pose inhalation, ingestion, and dermal-contact hazards are also likely to be components of the dust emitted from the exposed lakebed. *Coccidioides* spores, which cause coccidioidomycosis (Valley Fever), are foreseeably present in the dust as well. Dangerous emissions of particulates from exposed lakebed will occur on an ongoing basis regardless of dust mitigation activities, because such measures can somewhat reduce the problem but cannot eliminate it.

- Greatly worsened public health threats will cause increased morbidity and mortality.[33] More than half a million people throughout the region adjacent to the Salton Sea—including Tribes and other disadvantaged communities already suffering from environmental injustice—will be obliged to breathe hazardous, toxic, and carcinogenic particulates emitted into the region's air from exposed Salton Sea lakebed, and to suffer ongoing exposure to harmful algae blooms and increasing releases of noxious fumes from the deteriorating lake, such as dangerous hydrogen sulfide.

- Rapid and significant increases in the salinity of the residual Salton Sea will occur, as will other negative effects on water quality, including but not limited to decreases in dissolved oxygen and increased concentrations of hazardous contaminants. Depending on the alternative involved and the magnitude of Colorado River water cutbacks required, the residual Salton Sea will eventually be pushed into a state of extreme hypersalinity in which the lake will be ecologically useless and incapable of supporting any organisms other than halophilic bacteria, archaea, and viruses.

- Depending on the alternative at issue, the remaining Salton Sea fish and invertebrates—which have provided an essential food supply for millions of migratory and resident birds—will be extirpated in the residual lake as a result of physiologically intolerable salinity levels, and potentially in part because of other adverse impacts on water quality.

- Rapid deterioration and loss of crucial habitat for hundreds of species of birds will foreseeably occur. In particular, there will likely be loss of essential habitat for millions of migratory birds that depend on the Salton Sea ecosystem during twice-yearly migrations, and that have no other appropriate resting and feeding locations in a vast arid region as they travel enormous distances. Depending on the alternative involved, most or all essential aquatic habitat for hundreds of species may be lost. For in-basin plans, even in a best-case scenario (which I suggest is extremely unlikely to occur, particularly over the long term) the amount and quality of available habitat will be greatly diminished in comparison to what was available previously, and will be insufficient to support and conserve the number and variety of species originally reliant on the Salton Sea ecosystem.

- Depending on the alternative at issue, crowding of birds in impoundments, particularly after the residual Salton Sea becomes ecologically useless, is likely to enhance avian disease transmission, cause outbreaks that are difficult to control, and result in major die-offs of birds.

- Depending on the alternative involved, use of impoundments to support fish and birds will foreseeably require constant oversight and ongoing intervention to maintain appropriate salinity levels and other necessary water quality parameters. It is foreseeable that difficulties managing

[33] For example, see the references in footnotes 24 and 26.

salinity, problematic water temperatures, harmful algae blooms, insufficient levels of dissolved oxygen, elevated levels of contaminants, and other water quality issues will cause significant fish mortality, as well as poor and potentially unsafe habitat areas for birds. Fish die-offs will also adversely affect piscivorous birds in particular.

- Threats to the health and survival of numerous species will result from increased contact with and ingestion of contaminated sediments in exposed Salton Sea lakebed, and hazardous substances in polluted tributary water that will flow undiluted across expanses of exposed lakebed and attract wildlife. Depending on the alternative at issue, wildlife and people will also be exposed to polluted water in impoundments and to contaminated sediments used for earthen structures such as dikes and causeways. In addition, the food web will be affected by potentially dangerous biomagnification of some pollutants. The contaminants in water and sediments will include substances posing known and serious dangers to wildlife and people, such as heavy metals, PCBs, elevated levels of selenium, various industrial chemicals flowing across the international border from Mexico, microcystins, and residues of pesticides including, but not limited to, banned substances such as DDT and its metabolite DDE.

- Depending on the alternative involved, exposure and drying of portions of the central region of the Salton Sea lakebed will pose significant additional threats to wildlife and people. Ongoing research has established that elevated levels of hazardous, toxic, and carcinogenic contaminants are highest in Salton Sea sediments within the central region of the lakebed.[34] It is therefore foreseeable that exposure of central lakebed areas and emission of fugitive dust from them will result in particularly consequential negative impacts on air quality and public health. In addition, because the most contaminated lakebed areas will be exposed adjoining the residual Salton Sea (again, depending on the alternative at issue), it is also likely there will be increased harmful effects on wildlife drawn to the remaining water.

- There will be significantly increased threats to the health and continued existence of migratory and resident avian species that are already designated as endangered, threatened, or of special concern under federal and/or state law and that depend on the Salton Sea ecosystem for resting, feeding, and/or breeding.

- Also in jeopardy will be the continued survival of the desert pupfish (*Cyprinodon macularius*), which is already designated as an endangered species under the U.S. Endangered Species Act and California law, and is reliant on the Salton Sea ecosystem.

- Major quantities of greenhouse gases—including carbon dioxide, methane, and nitrous oxide—will come from numerous biogenic sources within the Salton Sea footprint if a no-action alternative for restoration is selected. Moreover, such GHGs will also be emitted in large amounts from the features of a minimal-action alternative that is limited to the 10-Year Plan, and from the components of potential in-basin long-term plans.[35] In all those scenarios, biogenic GHG emissions will come from a variety of sources, including but not limited to: vast areas of exposed lakebed (including dry lakebed sediments, intermittently rewetted sediments, and sediments that are disturbed—e.g., by furrowing for dust control); tributary streams dispersing across large expanses of exposed lakebed; the residual Salton Sea as it becomes extremely hypersaline; other brine sinks; and various other components of in-basin plans constructed on the lakebed, such as impoundments, canals, dikes, levees, other embankments, causeways, and dirt roads. The quantities of the greenhouse gas emissions could be so large they will undermine federal and state statutory and policy objectives related to achieving net-zero emissions, and will worsen climate change.[36] In addition, the potentially enormous scale of the

[34] Statements by Dr. Timothy Lyons (University of California, Riverside) during the May 16-17, 2023 California State Water Resources Control Board workshop on the Salton Sea. (Video of the workshop is available online at: https://www.waterboards.ca.gov/board_info/video.html. Dr. Lyons speaks during Panel 4 on May 17.)

[35] See the references in footnote 19.

[36] Ibid. Also see the information in footnote 20.

GHG emissions involved could ultimately result in the cumulative social cost of GHG emissions[37] (including the SC-CO_2, SC-CH_4, and SC-N_2O) reaching at least scores of billions of dollars—and possibly much greater amounts—during the coming decades.[38]

- Areas of the Salton Sea lakebed containing unexploded ordnance (UXO), which was dropped into the lake during wartime military training activities in the 1940s and 1950s, are likely to be exposed as the Salton Sea shrinks and, depending on the alternative at issue, as lakebed sediments are excavated. Exposure of UXO could pose significant public safety risks. None of the UXO risk areas is expected to be cleaned up by the Department of Defense until after 2028, and most will not be remediated until 2038 or much later.[39]

- All aspects of the economy across the Salton Sea region will suffer negative impacts because of deteriorating environmental conditions and increasing threats to public health and wildlife from a no-action alternative, a minimal-action approach, or implementation of an in-basin plan that is ineffective, unsafe, and/or unsustainable. The adverse effects will include, but will not be limited to, decreasing property values, economic harm to all types of businesses and industries, and increased medical expenses.

- It is foreseeable that the region's important agricultural industry will be adversely affected by threats to the health of workers from hazardous fugitive dust, and by deposition onto crops of damaging salt particles and contaminants blown from increasing areas of exposed Salton Sea lakebed. These impacts on agriculture will compound the negative economic effects throughout the region that foreseeably may be caused by the loss of large quantities of Colorado River water needed for irrigation, and by the related fallowing of farm fields, decreased crop production, reduced employment, and diminished income for farmers and businesses associated with agriculture.

- Significant adverse impacts on the environment in the Salton Sea region will foreseeably affect major military installations and impair essential military operations, with potential negative consequences for military readiness and national security. Worsening dust storms containing dangerous particulates emanating from the central Salton Basin will impact the functions of the El Centro Naval Air Facility (NAS El Centro) in Imperial County, because flights to and from NAS El Centro will be grounded during major dust storms within the Salton Basin. Potential adverse health effects on military personnel are also foreseeable. In addition, critical military air operations at the Chocolate Mountain Aerial Gunnery Range (CMAGR) will be negatively affected by large quantities of fugitive dust from exposed Salton Sea lakebed. The CMAGR is located adjacent to the Salton Sea, to the east and southeast of the lake, and is in the direct path of hazardous particulates blown from exposed lakebed by prevailing winds.[40]

- Unsafe air quality in the central Salton Basin could jeopardize commercial-scale lithium extraction, a developing industry that is anticipated to be central for U.S. efforts to fight climate change in the coming years. Chronic impairment of air quality with hazardous fugitive dust containing toxic and carcinogenic constituents will likely be worst in the area where lithium extraction and processing facilities must be located, within the Salton Sea Geothermal Field near the southeast shore of the lake. Prevailing winds blowing across exposed lakebed will push airborne pollutants directly into that area. It is foreseeable that dangerous air quality will impair the ability of the lithium industry to

[37] U.S. EPA (2022). Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances. Available online at: https://www.epa.gov/environmental-economics/scghg.

[38] See the information in footnote 22.

[39] Salton Sea Management Program Phase 1: 10-Year Plan Draft Environmental Assessment (2022), Table 4-34.

[40] Similar problems previously afflicted Naval Air Weapons Station China Lake in the western Mojave Desert region of California because of dust storms emitted from desiccated Owens Lake. Frequent and extremely costly cessation of important military activities was necessary due to unsafe air quality and impaired visibility.

attract the large numbers of skilled workers it will require, and will adversely affect the health of those who choose to work at the necessary facilities near the shriveling Salton Sea.

- Depending on the alternative at issue, major shrinkage of the Salton Sea plus foreseeable curtailment of irrigated agriculture in the Imperial Valley (and in the Coachella and Mexicali Valleys) will negatively affect Salton Trough climate and hydrology, and possibly climate and hydrology in other areas of the Colorado River Basin as well.[41] Very large decreases in the previously immense quantities of water vapor injected into the regional atmosphere by evaporation from the full Salton Sea's surface, and reduced evapotranspiration from areas of irrigated crops due to constraints on Colorado River water allocations, will engender hotter ambient temperatures and dryer hydrologic conditions across the region. It is foreseeable that those effects will in turn cause negative impacts on public health and wildlife, as well as on agricultural production and other aspects of the regional economy. In addition, a detrimental feedback effect could result from the higher temperatures and drier hydrology related to the lake's shrinkage, causing further decreases in water availability, lower inflows to the central Salton Basin, additional decline of the residual Salton Sea, and even hotter and drier climate conditions.

- No action to accomplish long-term restoration, minimal action involving only the 10-Year Plan, or implementation of an ineffective, unsafe, and/or unsustainable in-basin plan will foreseeably result in violations of federal and state statutes, regulations, and policies related to air quality, water quality, threatened and endangered species, climate change, occupational safety and health, food safety, and other important matters administered and enforced by government entities. The federal statutes that are likely to be violated include, but are not limited to, the Clean Air Act, the Clean Water Act, and the Endangered Species Act.

IV. The Urgent Need for a Full Feasibility-Level Study of Ocean Water Importation for Accomplishing Salton Sea Restoration

As long as the Salton Sea remains dependent upon huge volumes of Colorado River wastewater continuously flowing into the central Salton Basin, there will always be an unavoidable conflict between the need to rectify untenably high levels of consumptive use of the Colorado River's water and efforts to restore the Salton Sea and sustain its essential ecosystem. Utilizing ocean water importation to accomplish permanent restoration of the Salton Sea is the only way to decouple the fate of the lake and its wildlife from an uncertain and shrinking supply of Colorado River water. In addition, seawater importation is the only restoration approach that has the potential to: establish a robust ecological, biological, and biogeochemical system capable of sustaining the large number and variety of species originally reliant on the Salton Sea ecosystem; protect people from significant ongoing threats to safety and health that cannot otherwise be eliminated; accomplish net carbon sequestration on a large scale instead of transforming the central Salton Basin into a continuing source of major biogenic greenhouse gas emissions; and support social well-being and a vigorous economy across a region composed of disadvantaged communities that will otherwise be subjected to worsening environmental injustice and potentially irreparable harm.

Yet despite the fact that potential methods for restoring the Salton Sea have been debated for many decades, there has never been a full, objective, and scientifically sound feasibility-level study of options for utilizing ocean water importation to accomplish permanent restoration of the lake and its crucial ecosystem. Assumptions have been made that importing seawater is not a feasible approach, and biases to that effect have been held by many people with influence concerning Salton Sea policy; however, those assumptions and biases have never been based on a proper feasibility analysis because such an analysis has never been done. Most recently, an assessment of water importation proposals led by UC Santa Cruz in 2021-2022—a project performed on behalf of California's Salton Sea Management Program—was supposed to be an independent

[41] See, e.g., Lo, M. and Famiglietti, J. S. (2013). Irrigation in California's Central Valley strengthens the southwestern U.S. water cycle. *Geophysical Research Letters* 40: 301–306. https://doi.org/10.1002/grl.50108.

and objective feasibility study grounded on appropriate scientific analysis; but, in reality, that was not the case. Instead, as I explained in detailed public comments submitted to the State of California,[42] the UCSC panel's work was seriously improper, biased, grossly inadequate, and fatally flawed.

It is essential that the federal government expeditiously perform a comprehensive, objective, and scientifically sound feasibility-level analysis of options to use importation of ocean water to permanently restore the Salton Sea and the lake's essential ecosystem. The need for such a study is now greater than ever and increasingly urgent, because the ongoing water shortage on the Colorado River is hastening the Salton Sea's demise and will likely ensure that any in-basin plan that may be utilized for restoration will ultimately fail, with devastating consequences for both wildlife and people. It must be determined objectively and scientifically whether seawater importation is a feasible long-term restoration approach—whether it can successfully restore the Salton Sea and sustain the number and diversity of species originally reliant on the lake's ecosystem, while avoiding the severe harm to public health, wildlife, the environment, the climate, and the regional economy that will occur if full and permanent restoration of the Salton Sea is not accomplished.

A new evaluation of options for long-term Salton Sea restoration, the *Imperial Streams Salton Sea and Tributaries Feasibility Study* ("ISSST study"), was initiated at the end of 2022, with the U.S. Army Corps of Engineers (the USACE or the Corps) as the lead federal agency and the California Department of Water Resources and Salton Sea Authority as non-federal co-sponsors.[43] In the recent public scoping phase of the ISSST study, I submitted comments urging the USACE—in consultation or collaboration with relevant agencies of the Interior Department, as appropriate—to independently scrutinize the viability of potential in-basin restoration plans and rigorously evaluate their numerous significant shortcomings, and to conduct a full and objective feasibility-level study of ocean water importation options to achieve permanent restoration of the Salton Sea.[44]

Although there are indications that the Corps may attempt to undertake the necessary analysis of both in-basin restoration concepts and seawater importation options, currently it remains unclear what the scope of the USACE's ISSST study will be. Importantly, the Corps is subject to jurisdictional constraints that may affect that agency's ability to conduct all facets of the comprehensive and scientifically sound study that is needed. **I therefore respectfully suggest that if, for any reason, the USACE does not plan to perform all aspects of the thorough feasibility study of potential long-term restoration options for the Salton Sea that is urgently required, Interior and Reclamation should expeditiously conduct that necessary study during the planning period for the Post-2026 Program, select a permanent restoration method pursuant to legal requirements, and implement the selected plan as part of the Post-2026 Program.**

V. Conclusion and Recommendations

For more than 100 years, federal management of the Colorado River and its water has chronically ignored the Salton Sea and the foreseeable injurious impacts on both wildlife and people resulting from depriving the lake of its necessary Colorado River water supply. The "equitable division and apportionment of the use of the waters of the Colorado River system" is specified in Article I of the Colorado River Compact of 1922 as a primary purpose of that foundational interstate agreement. Yet it is now widely understood that true equity

[42] Ross, J. E. (2023). Comments on the UC Santa Cruz Panel's Evaluation of Water Importation Proposals to Restore the Salton Sea. Submitted to the California Natural Resources Agency and Salton Sea Management Program, 20 February 2023. https://www.academia.edu/97889962/Comments_on_the_UC_Santa_Cruz_Panels_Evaluation_of_Water_Importation_Proposals_to_Restore_the_Salton_Sea_Jenny_E_Ross.

[43] See: https://www.spl.usace.army.mil/Media/News-Stories/Article/3254144/corps-partners-sign-agreement-to-move-forward-on-study-to-aid-salton-sea/, and https://www.spl.usace.army.mil/Missions/Civil-Works/Projects-Studies/Imperial-Streams-Salton-Sea/.

[44] The public scoping comments that I submitted to the USACE regarding the ISSST study are available online at: https://www.academia.edu/104633219/Comments_on_Scoping_for_the_Army_Corps_of_Engineers_Imperial_Streams_Salton_Sea_and_Tributaries_Feasibility_Study.

has never been achieved by federal water management in the Colorado River Basin in a variety of important ways. There has recently been renewed emphasis on the concept of equity in discussions of future management approaches for addressing the large, ongoing water-supply deficit on the Colorado River. But those deliberations have so far disregarded the severe inequity involved in chronically denying the Salton Sea the water supply critical to sustaining the lake and its essential ecosystem. That inequity is worsening as increasingly vast areas of dry lakebed spew hazardous dust that endangers human health across the surrounding region, and as the demise of the lake's ecosystem jeopardizes the survival of millions of birds, including species that are already at risk of extinction. **While other locations throughout the Colorado River Basin—and beyond it—have benefited greatly from prior federal management actions modifying the Colorado River and exhaustively distributing its water, the Salton Sea region has become a sacrifice zone. That extremely and disproportionately harmful approach, and the profound environmental injustice and ecological damage it entails, must not continue.**

The original root cause of the Salton Sea's plight was the intentional severing of the hydrologic connection between the Colorado River and the Salton Basin in the early 20th century. Compounding that fundamental underlying problem, Colorado River management actions in recent decades have spurred the Salton Sea's shrinkage and rapid ecological deterioration. Additional reductions in allocations of Colorado River water will intensify and accelerate the Salton Sea's existential crisis and the associated damage to public health and wildlife that is already unfolding. **Any Post-2026 Program that addresses the large water-supply deficit on the Colorado River by substantially decreasing apportionments of water for everyone reliant on the river will necessarily exacerbate the Salton Sea's predicament, and will ultimately destroy the lake's ecosystem, devastate migratory bird populations, push an endangered fish toward extinction, and cause potentially irreparable harm to more than half a million people. Interior and Reclamation are legally obligated to avert those foreseeable catastrophic consequences of federal agency actions.**

Federal support for mitigation activities at the Salton Sea on an ad hoc and piecemeal basis has been, and will continue to be, an inadequate approach for addressing the lake's crisis. Instead, **effective and permanent Salton Sea restoration is required. It should be accomplished as part of the Post-2026 Program**, in consultation or collaboration with the U.S. Army Corps of Engineers and the International Boundary and Water Commission, as appropriate.

It is long past time to address comprehensively the significant and dangerous problems that are rapidly worsening as the Salton Sea's water supply diminishes, by developing and executing a plan for permanent restoration of the shriveling lake and its ailing ecosystem. While some proposed in-basin restoration options may be feasible in a narrow technical sense, and they may be able to accomplish limited ecological revitalization, all such plans suffer from serious shortcomings affecting their safety, efficacy, and long-term viability. The problems involved are *intrinsic to* in-basin plans; although potentially some of the problems may be partially mitigated, none can be eliminated. Consequently, implementation of an in-basin plan will pose substantial ongoing risks and will result in harmful impacts on wildlife, people, the environment, and the climate. Notably, the dependence of in-basin plans on voluminous annual inflow of Colorado River wastewater in perpetuity will be a chronic source of concern and difficulty affecting future Colorado River water management, as competing uses and aridification engender tightening restrictions on availability of the river's water. On the other hand, using ocean water importation to restore the Salton Sea would avoid all the significant problems afflicting in-basin plans. Such an approach would decouple the fate of the lake and its wildlife from a declining supply of Colorado River water, ensure long-term viability of a robust and fully restored Salton Sea ecosystem that will permanently support the number and diversity of wildlife species originally dependent on it, safeguard public health and enhance socioeconomic well-being, and assist in achieving sustainable management of the Colorado River's water.

I therefore urge Interior and Reclamation to incorporate permanent restoration of the Salton Sea as a key component of the Post-2026 Program. Specifically, for all of the above reasons, I respectfully suggest the following:

A. Beginning immediately and in compliance with all pertinent legal requirements, Interior and Reclamation should support the performance of the *Imperial Streams Salton Sea and Tributaries Feasibility Study* and the development of an effective plan for permanent Salton Sea restoration that is consistent with the Law of the River, by consulting and cooperating with the USACE.

B. It is essential that options for using ocean water importation to achieve full and permanent restoration of the Salton Sea and its ecosystem be considered thoroughly and objectively in a scientifically sound feasibility-level study, and carefully compared in detail to potential in-basin restoration concepts using a rigorous cost-benefit analysis, before a long-term restoration plan is selected for implementation. Therefore, if the USACE—for any reason (e.g., because of jurisdictional constraints)—does not plan to incorporate in the scope of the ISSST study a comprehensive feasibility-level analysis of ocean water importation options, including a full and objective evaluation of potentially viable proposals developed by persons and entities not affiliated with any government agency, then Interior and Reclamation should expeditiously perform that crucial study *during the planning period* for the Post-2026 Program.

C. Interior and Reclamation should include permanent restoration of the Salton Sea as a key element in the Post-2026 Program. Based upon the ISSST study and the results of any additional pertinent investigations conducted by agencies of the Interior Department (including, but not limited to, Reclamation), Interior and Reclamation should coordinate and cooperate with the USACE, the California Natural Resources Agency, the Salton Sea Authority, and the International Boundary and Water Commission (if appropriate) in selecting and fully implementing a permanent restoration plan for the Salton Sea in compliance with all applicable legal requirements. Among other goals, *the selected restoration plan should achieve the following objectives to the maximum feasible extent*: establish permanent habitat to support the number and diversity of wildlife species originally reliant on the Salton Sea ecosystem, including but not limited to essential habitat for conserving species designated as endangered, threatened, or of special concern under federal and/or California law; improve water quality in the Salton Sea and in all aquatic components of the restoration project, in order to minimize risks to wildlife and people, and to achieve compliance with relevant legal limits on contaminants; improve regional air quality by eliminating emissions of hazardous airborne particulates from exposed Salton Sea lakebed, and by complying with legally applicable ambient air quality standards; and minimize biogenic and anthropogenic greenhouse gas emissions from all components of the restoration project while maximizing carbon sequestration, with the aim of attaining net-zero or net-negative GHG emissions. In addition, the selected restoration plan should provide opportunities for recreation and enhancement of cultural and socioeconomic well-being, particularly for the environmental justice communities adjacent to the Salton Sea.

Thank you for considering these comments.

Sincerely,

Jenny E. Ross, J.D.

Research Affiliate, Stout Research Center[45]

[45] As a Research Affiliate of the Stout Research Center, I study a variety of scientific issues related to the Colorado River system, the Salton Trough, and the past, present, and future of the Salton Sea, including Pliocene-to-Holocene geology, hydrology, climatology, paleontology, and ecology. These comments are submitted in my personal capacity and not on behalf of the Stout Research Center.

Cc:

Gavin Newsom, Governor of California
Deb Haaland, Secretary of the U.S. Department of the Interior
Camille Calimlim Touton, Commissioner of the Bureau of Reclamation
Dianne Feinstein, U.S. Senator for California
Alex Padilla, U.S. Senator for California
Wade Crowfoot, California Secretary for Natural Resources
Yana Garcia, California Secretary for Environmental Protection
Karla Nemeth, Director of the California Department of Water Resources
Raul Ruiz, M.D., U.S. Congressman for the 36th District of California
Ken Calvert, U.S. Congressman for the 41st District of California
Steve Padilla, California State Senator, District 18
Eduardo Garcia, California Assemblymember, District 36
Michael Brain, Assistant Secretary for Water and Science, U.S. Department of the Interior
Samantha Arthur, Assistant Secretary for Salton Sea Policy, California Natural Resources Agency
Carly Jerla, Post-2026 Program Manager, Bureau of Reclamation
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Joaquin Esquivel, Chair of the California State Water Resources Control Board
Christopher Harris, Executive Director, Colorado River Board of California
J.B. Hamby, Chair, Colorado River Board of California
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