STRATECON INC.

March 2, 2026

VIA EMAIL (crbpost2026@usbr.gov)

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

RE: Stratecon's Comment on the U.S. Bureau of Reclamation's Draft Environmental Impact Statement (Draft EIS) for Post-2026 Colorado River Operations

Dear DEIS Program Manager:

On behalf of *Stratecon Inc*, I appreciate the opportunity to comment on the above captioned matter.[1]

The comments presented below are solely Stratecon's perspective on the urgent challenges facing the Colorado River Basin. Stratecon offers proposed principles of a five-year federal plan to implement needed changes in the management of the Colorado River, which could become a fifth alternative for Bureau consideration as it prepares its Record of Decision. The material presented below does not necessarily reflect the opinions or positions of any of Stratecon's past or current clients. On the use of language, I use "I" and "Stratecon" interchangeably when discussing the information, analysis, and suggestions presented below. Statements involving "we" state perspectives about the collective interests in the Colorado River Basin, including the Republic of Mexico.

[1] *Stratecon* is a strategic planning and economic consulting firm specializing in water resources with more than four decades experience in negotiating water transfers, developing privately-fund water projects, professional due diligence, and expert testimony on the economics of public policy and legal matters throughout the western United States and Mexico. Stratecon has been involved in Colorado River matters since the mid-1990s, most prominently as an economic advisor to the Imperial Irrigation District ("IID") from 1996-2010 on quantification of IID's Priority 3 right, as well as negotiation of IID's historic agreement with the San Diego County Water Authority, the Quantification Settlement Agreement, and more than three dozen inter-related agreements executed on October 10, 2003. Stratecon continues to provide advisory services to clients in the Colorado River Basin and elsewhere. For additional information, visit Stratecon's website www.stratwater.com.

Prelude

The current circumstances on the Colorado River are clearly dire and unsustainable. "Staying the course" is not viable. Stratecon's comments and proposed five-year federal plan reflect addressing six foundational questions:[2]

1) What is the hydrologic challenge?
2) What is the extent of the catastrophic failure of Colorado River management?
3) How does the impasse among the Seven Colorado River Basin States relate to the Law of the River?
4) What are the anticipated future challenges facing Colorado River Management?
5) What are the strengths and weakness of the draft EIS's technical approach?
6) What are the principles of Stratecon's proposed five-year federal plan?

Despite the bleakness of our current situation, I remain optimistic about the future of the Colorado River Basin. On the technical side, I have interacted with Bureau technical staff over the years and always encountered dedicated, competent, and open-minded professionals. There has been an impressive evolution over the decades in the thoroughness of the Bureau's tools. As discussed below, today's challenges are an opportunity for further development.

On the policy side, the Colorado River Basin has a history of innovating to address daunting problems. The California 4.4 Plan and Quantification Settlement Agreement come to mind. We tried to "run the table" with the 2007 Interim Guidelines, Minute 323, and the 2019 Drought Contingency Plan ("DCP"). We stumbled, in part, because the hydrologic realities of the Colorado River have been ignored.

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[2] The discussion below is based upon and supplements Stratecon blog posts: "The Colorado River in Disarray" August 19, 2022, https://hydrowonk.com/blog/2022/08/19/the-colorado-river-in-disarray/ and "On Evaporation and System Losses on the Colorado River" November 22, 2022, https://hydrowonk.com/blog/2022/11/22/on-evaporation-and-system-losses-in-the-colorado-river-basin/. "The Bureau's Vision of the Colorado River's Future" February 10, 2026 https://www.hydrowonk.com/p/the-bureaus-vision-of-the-colorado and *Water Strategist* article "Is the Colorado River Basin Bankrupt?" January 5, 2026, https://www.waterstrategist.com/p/is-the-colorado-river-basin-bankrupt. The discussion also expands upon Stratecon's earlier public comment in 2022 "Stratecon Comments on Bureau of Reclamation's Preparation of a Supplemental Environmental Impact Statement to December 2007 Record of Decision on Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead ("2007 Interim Guidelines")", December 20, 2022.

1) What is The Hydrologic Challenge?

The challenge is arithmetic. The 1922 Colorado River Compact and the 1944 Treaty between the United States and Mexico defined annual apportionments totaling 16.5-million-acre-feet ("maf")—see Table 1. Tree ring studies put the long-term annual natural flow of the Colorado River at 14.3 maf.[3] Evaporative losses are 2.0 maf (the Bureau of Reclamation's 2012 *Colorado River Basin Water Demand and Supply Study*). Annual apportionments exceed long-term annual natural flow by 4.2 maf (16.5 maf – 12.3 maf).

Table 1
How Over Appropriated is the Colorado River?

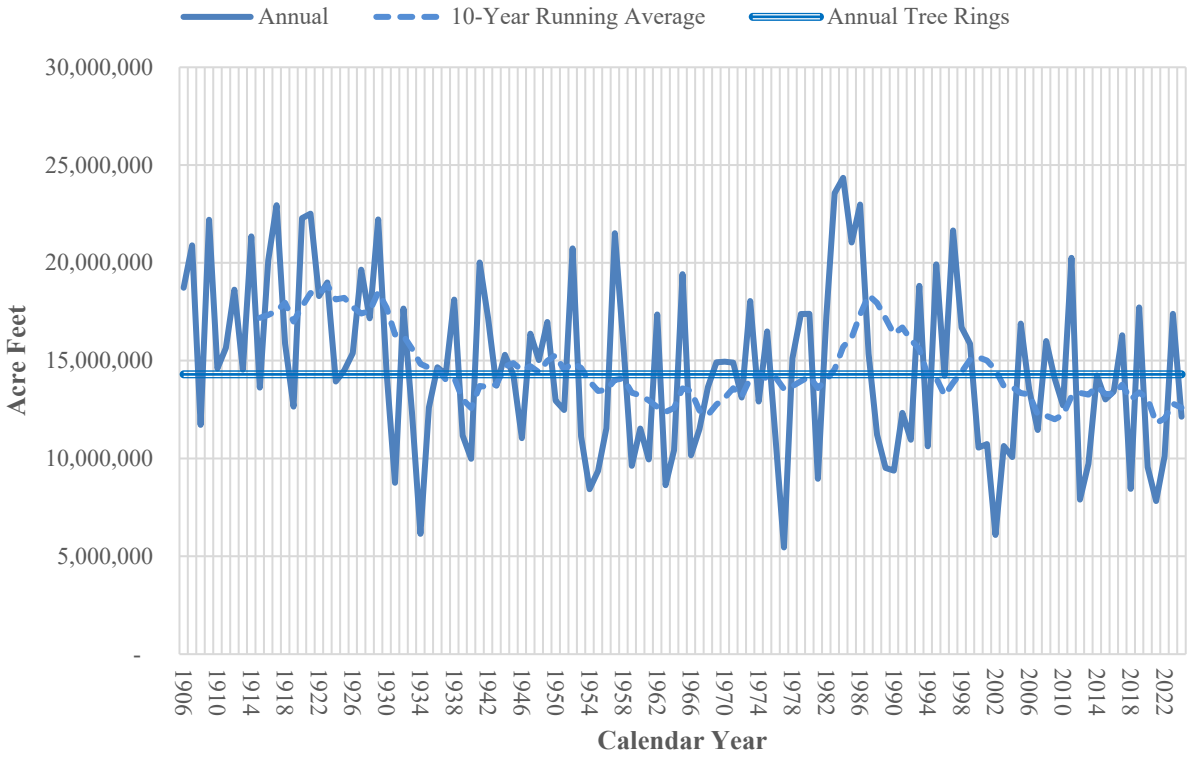
Item	*Million Acre Feet*	*Source*
Upper Basin Apportionment	7.5	1922 Colorado River Compact
Lower Basin Apportionment	7.5	1922 Colorado River Compact
Sub-Total	15.0	
Mexico Apportionment	1.5	1944 Treaty
Total Apportionment	**16.5**	
Long-Term Natural Flow	14.3	Tree-ring studies
Evaporative/System Losses	2.0	2012 Bureau Study
Net Supply	**12.3**	

The Colorado River's natural flows since 1922 have stubbornly moved toward long-term tree-ring estimates (see Figure 1).[4] Since the Great Depression, the 10-year running average of the annual natural flow of the Colorado River at Lees Ferry has hovered at or *below* 14.3 million acre-feet, except during the 1980s and a short-lived bubble in the 1990s. During the 1980s, the United States delivered "excess flows" to Mexico when historic floods overran water storage on the Colorado River. Pending the arrival of the next historic flood (once every fifty or hundred years?), the average annual natural flow of the Colorado River will fluctuate around 14.3 million acre-feet and decline slightly in the future (see below). The shorter-lived bubble in the 1990s coincided with the time some imagined surplus water on the Colorado River for "as long as the eye can see." Fooled by randomness.

[3] Streamflow reconstructions from tree rings, https://www.treeflow.info/ , "Longest" period, 1116-2014.

[4] Data from Bureau of Reclamation, Provisional natural flow data 1906-2024 based on August 2024 24 Month Study, https://www.usbr.gov/lc/region/g4000/NaturalFlow/provisional.html While the Bureau does not use the provisional data for the years 2021-2024 in its modeling, Stratecon plots the data as it provides the best available public information on the natural flow of the Colorado River since 2020. Stratecon is puzzled why the Bureau has not finalized its analysis over the past four years to provide a consistent data series for the natural flow of the Colorado River.

Figure 1
Annual Natural Flow of Colorado River at Lees Ferry



Reflecting drought conditions, the 10-Year Running average of the natural flow of the Colorado River at Lees Ferry has been below 14.3 maf since the early 2000s. Attempts at curtailments in the use of Colorado River water have been too little, too late.

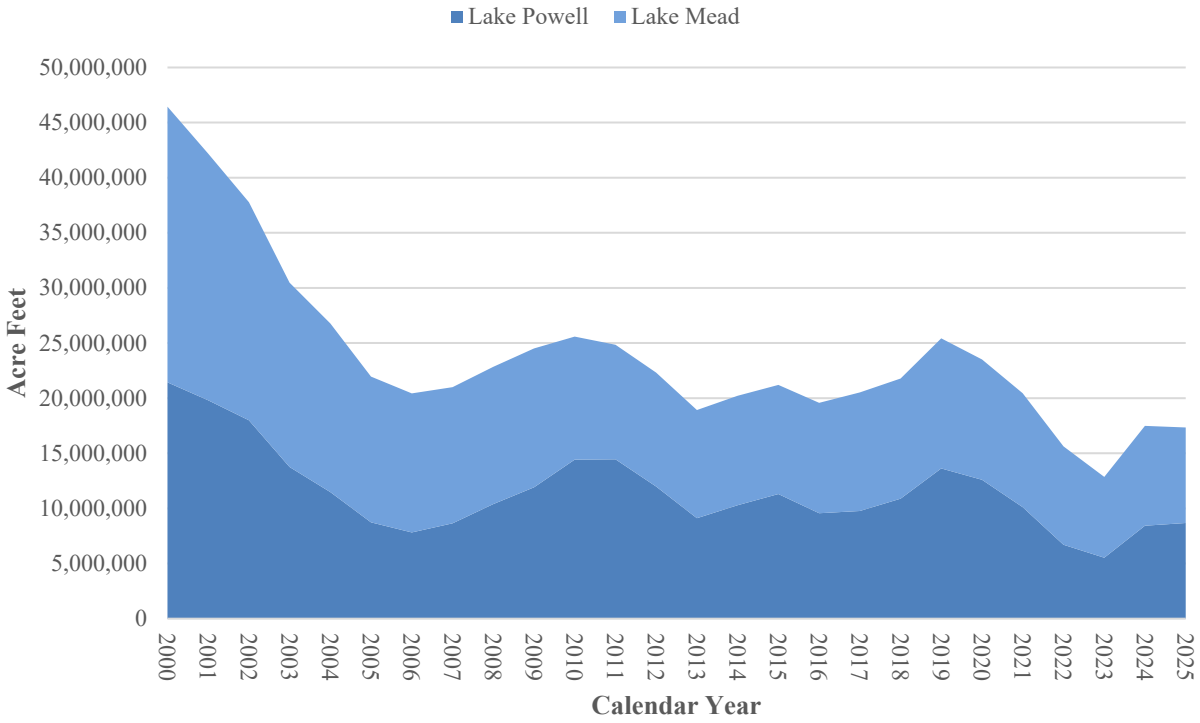
2) What is the Extent of The Catastrophic Failure of Colorado River Management?

In June 2022, the Bureau of Reclamation announced an emerging emergency. Depending on hydrology, the Colorado River Basin (including Mexico) must collectively reduce their use of Colorado River water by 2 million to 4 million acre-feet per year (*beyond* the Drought Contingency Plan contributions and Mexico's contribution under treaty minutes) to protect the elevation of Lake Powell at 3,500 feet and the elevation of Lake Mead at 1,000 feet. The target elevation for Lake Powell was 35 feet above the minimum power pool (below which there is no hydropower generation) and 170 feet above the dead pool (no longer capable of releasing water to the Lower Basin). The target elevation for Lake Mead was 50 feet above the minimum power pool and 105 feet above the dead pool (no longer capable of withdrawing water from Lake Mead).

The increased risk of breaching minimum power pools and reaching dead pool elevations in the case of extreme drought was undoubtedly driven by the free fall of water storage in Lake Powell and Lake Mead (see Figure 2). In 2000, total water in storage exceeded 45 maf. Since

then, water in storage fell, with brief rebounds in January storage in 2018, 2020 and 2024 due to natural flows in the preceding years temporarily jumping above the long-term annual average of tree ring studies. By 2025, total water storage stood at 17.3 maf, with reductions in water storage at Lake Powell accounting for 44% of the total decline and reductions in water storage at Lake Mead accounting for 56% of the total decline. Not content to run a "hydrology lottery," the Bureau continues to propose that the Colorado River Basin States and Mexico agree to further reductions in their use of Colorado River water.

Figure 2
Water Storage in Lake Powell and Lake Mead as of January 1st of Calendar Year



3) How does the impasse among the Seven Colorado River Basin States relate to the Law of the River?

The final session of the 2025 annual meeting of the *Colorado River Water Users Association* ("CRWUA") had presentations by Basin State representatives. All speakers committed to addressing the challenge. All conceded an impasse. Some speakers discussed the prospect of litigation.

Nevada's John Entsminger summarized his colleagues' views in three points:

- Each state has already done a lot to conserve water.
- Each state faces strong headwinds (cost?) of doing more.
- Therefore, someone else must do more.

With these observations, Mr. Entsminger suggested that efforts turn to developing a five-year plan. One needs a rule curve and an allocation of available Colorado River water. The long-term management of post-2026 Colorado River water policy may be a "bridge too far" for the parties at this time.

Stratecon agrees. See discussion below of principles for a five-year federal plan.

A key dispute involves disagreement between the Upper Basin and the Lower Basin. The 1922 Colorado River Compact includes a provision requiring the Upper Basin to deliver 75 maf of Colorado River water over a rolling 10-year period to the Lower Basin. When combined with the equal sharing by the Upper Basin and the Lower Basin of Mexico's 1.5 maf Colorado River entitlement, this requires the Upper Basin to deliver an average annual 8.25 maf of Colorado River water to the Lower Basin (7.5 maf + 0.75 maf). The adjusted Upper Basin apportionment is 6.75 maf (7.5 maf – 0.75 maf). With 8.25 maf from the Upper Basin, the Lower Basin would have 6.75 maf available of Colorado River water (after delivery of 1.5 maf of Colorado River to Mexico). With only 14.3 maf of annual Colorado River water available, this leaves the Upper Basin with an apportionment of 6.05 maf of Colorado River water (14.3 maf – 8.25 maf).

The historic record shows the 10-year running average of Total Releases from Lake Powell have met or exceeded the 8.25 maf threshold (see Figure 3).[5] The 10-year running average spiked above the 8.25 maf threshold during the historic floods on the Colorado River in the 1980s, as well as the "bubble" in the 1990.

Arizona's presentation at CRWUA stated a reluctance to wave 1922 Compact requirements.

[5] Source: United States Bureau of Reclamation Hydrodata, daily release data aggregated to calendar year totals.

Figure 3
Historic Record of Total Releases from Lake Powell
(Glen Canyon Dam)

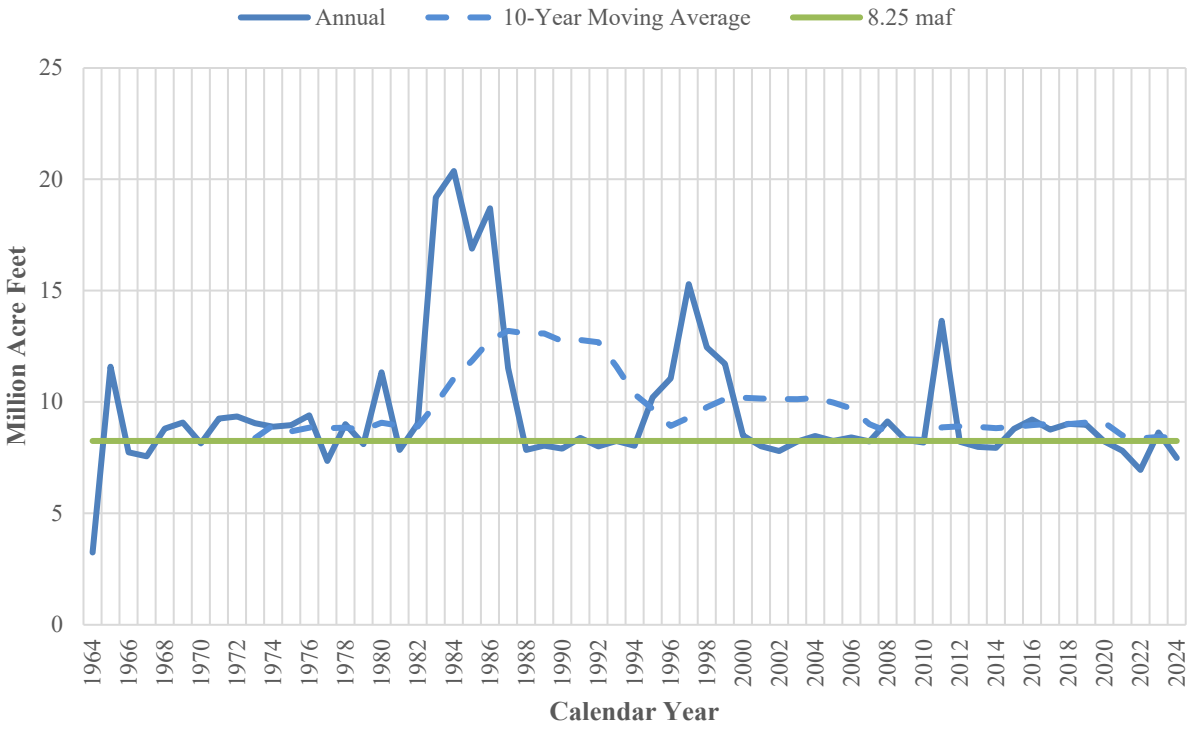
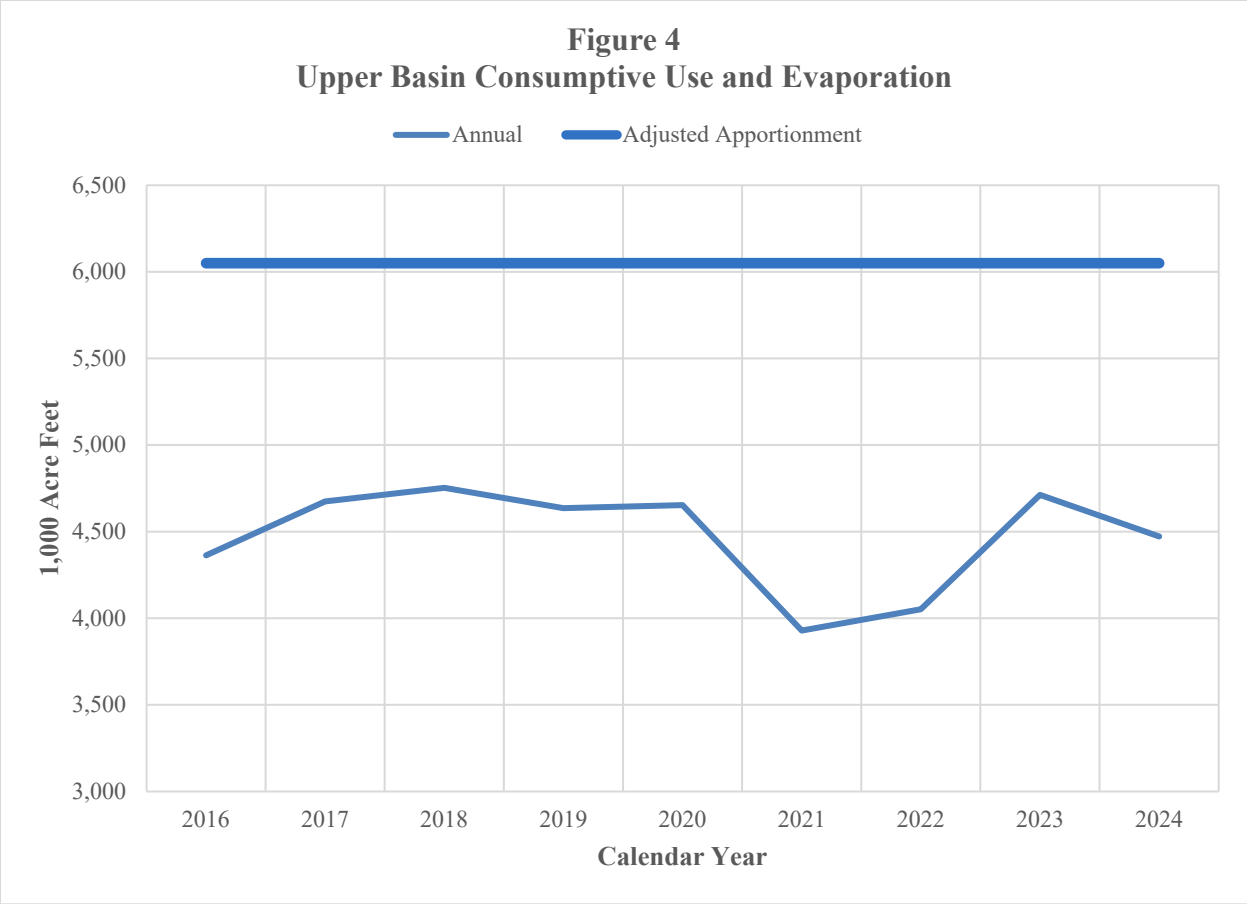


Figure 4 shows the recent historic record of Upper Basin Consumptive Use and Losses since 2016.[6] Over this period, Upper Basin consumptive use and losses have averaged 4,472 TAF ("thousand acre feet"), or 74% of the Upper Basin adjusted 6.05 maf apportionment described above. Even with the long-term natural flow of the Colorado River converging to 14.3 maf, there is 1.578 maf (6.050 maf – 4.472 maf) "headroom" for long term growth in the use of Colorado River water in the Upper Basin under implementation of 1922 Colorado River Compact. The economic viability of expanded use of Colorado River water in the Upper Basin will depend on the effectiveness of storage policies to firm up the reliability of available Colorado River water supplies.

[6] Data for 2016-2020 from *Upper Colorado River Basin Consumptive Use and Losses 2016-2020*, Bureau of Reclamation, February 2022. Data for 2021-2024 from *Upper Colorado River Basin Consumptive Use and Losses 2016-2020*, Bureau of Reclamation, November 2025.



4) What are the Anticipated Future Challenges facing Colorado River Management?

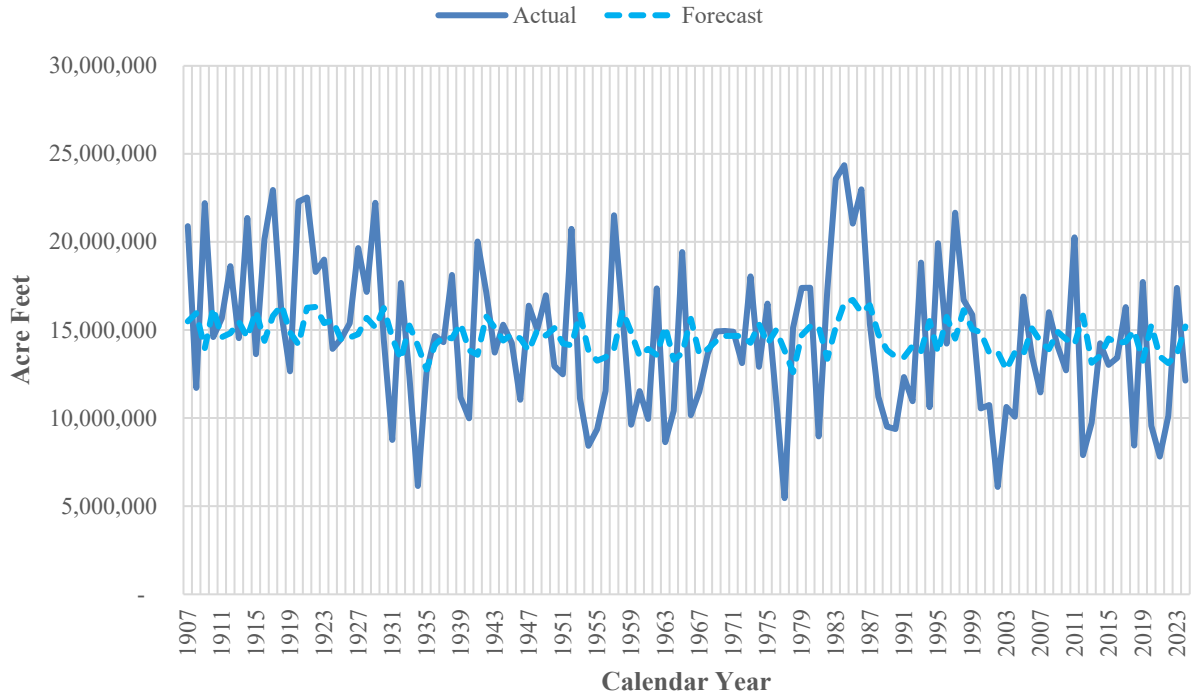
Developing a sustainable post-2026 operating policy for the Colorado River should be based on a fact-based understanding of the hydrology of the Colorado River. Otherwise, there is a material risk that past mismanagement could be prolog to our future.

The 1906-2024 historic record of the natural flow of the Colorado River demonstrates that the challenges of the last twenty years are <u>not</u> simply driven by drought conditions. Two critical factors involve (i) the tendency of runs of high flow or low flow years and (2) the extreme volatility in the natural flow of the Colorado River at Lees Ferry.

The natural flow of the Colorado River in any year is dependent on the natural flow of the prior year (see Attachment A). A one maf increase (decrease) in the natural flow in the prior year increases (decreases) the expected natural flow by 0.217 maf. The increased natural flow in the prior year also feeds into expected natural flows in subsequent years. By the fifth year, the expected annual natural flow of the Colorado River increases (decreases) by 0.277 maf. In other words, this path dependency must be confronted when managing the Colorado River (see discussion below).

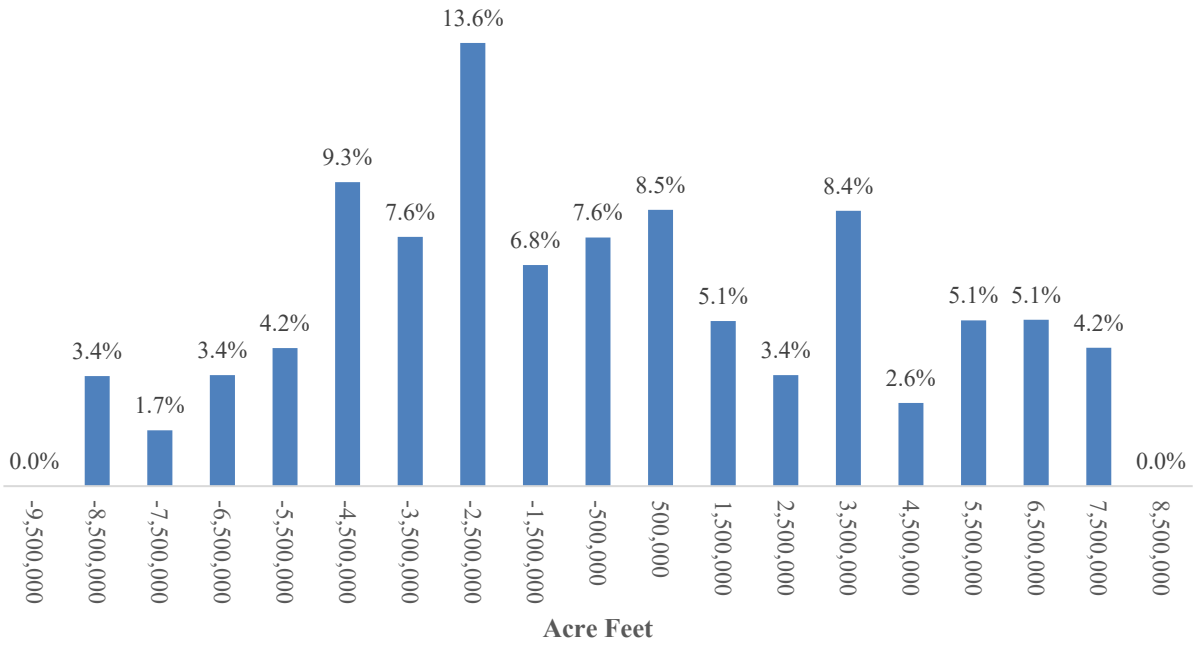
The actual natural flow of the Colorado River varies significantly around the forecasted natural flow based on the actual natural flow in the prior year (see Figure 5). The average annual difference is zero, but the variability of actual natural flow versus forecasted natural flow varies from a minimum of -8.4 maf to a maximum of 8.4 maf.

Figure 5
Actual versus Forecasted Natural Flow of Colorado River at Lees Ferry
(Based on 1906-2024 Historic Record)



The probability distribution of the difference between actual natural flow and forecasted natural flow is a "non-parametric" distribution (the data does not follow a defined form of a statistical distribution: see Figure 6). The forecast error "learns left", where negative forecast errors (that is, overstating the natural flow of the Colorado River at Lees Ferry) are more prevalent than positive forecast errors (that is, understating the natural flow of the Colorado River at Lees Ferry). In other words, the projected natural flow of the Colorado River over successive years will more likely have reduced flows than increased flows.

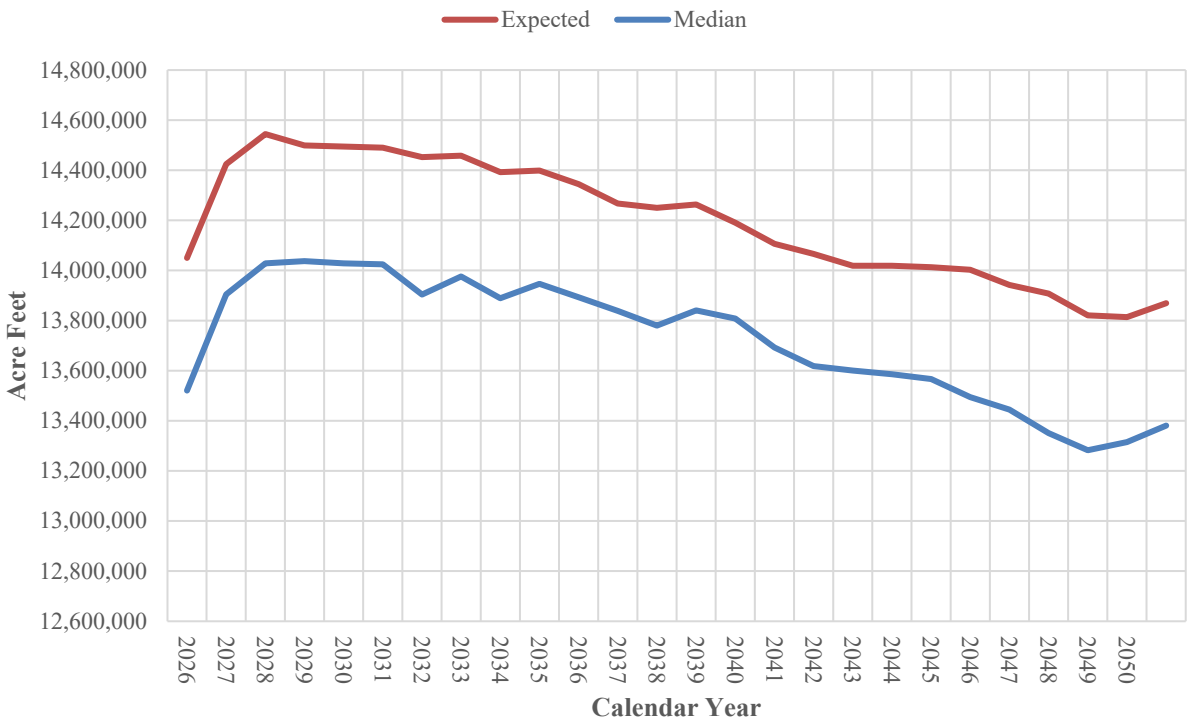
Figure 6
Probability Distribution of Actual Natural Flow versus Forecasted Natural Flow of Colorado River at Lees Ferry
(Based on 1906-2024 Historic Record)



The natural flow of the Colorado River in 2024 was 12.1 maf, below the long-term average. A Monte Carlo Simulation (https://www.investopedia.com/terms/m/montecarlosimulation.asp) was conducted to forecast the expected natural flow and the variability of natural flows in the future. Given the non-parametric distribution in the variability in the difference between actual natural flows and forecasted natural flows, 10,000 sequences of random draws from Figure 6 for the year 2025 through the year 2050 were conducted. This large number of sequences assures that the analysis was consistent with the probability distribution in Figure 6.

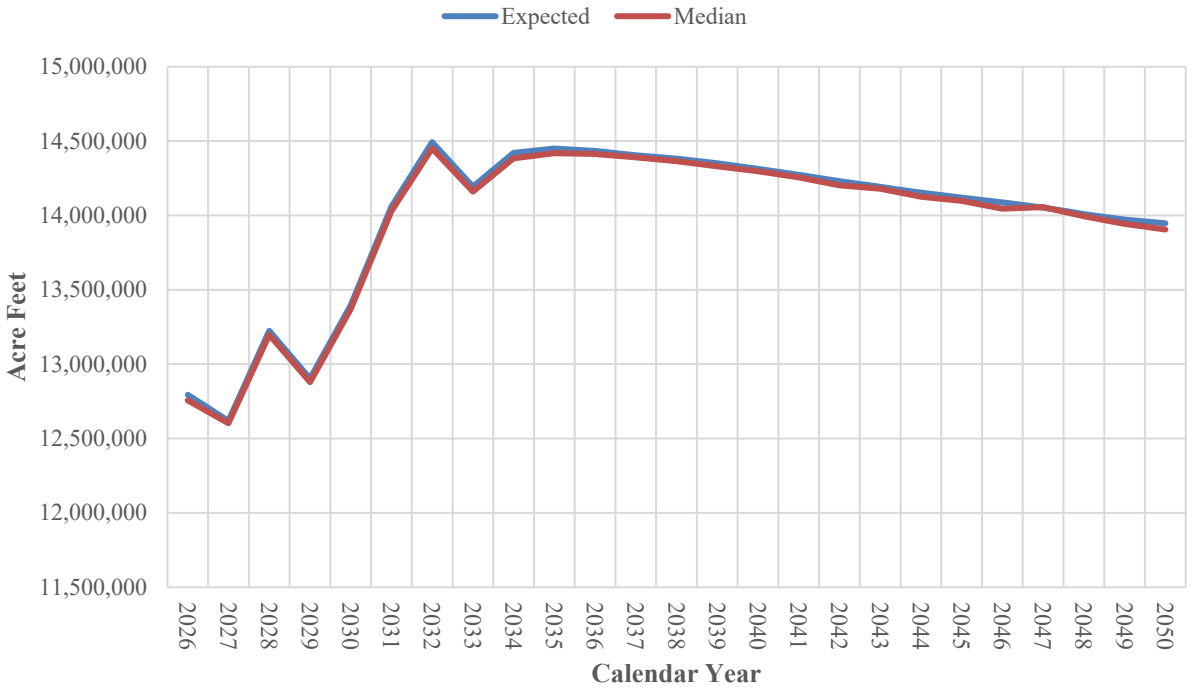
The annual natural flow of the Colorado River at Lees Ferry is expected to recover by the year 2028 at 14.5 maf and decline thereafter reaching slightly above 13.8 maf by the year 2050 (see Figure 7). The median annual natural flow (half of the scenarios are above the median and half are below the median) recovers slightly above 14.0 maf by the year 2030 and falls slightly below 13.4 maf by the year 2050. This secular decline into the future is consistent with the internal dynamics of the natural flow of the Colorado River at Lees Ferry for the historic period 1906-2024. To the extent climate change reduces long-term natural flows of the Colorado River below the long-term average of tree-ring studies, Stratecon's analysis understates the long-term challenges of managing the Colorado River.

Figure 7
Projected Natural Flow of Colorado River at Lees Ferry
(Based on 1906-2024 Historic Record)



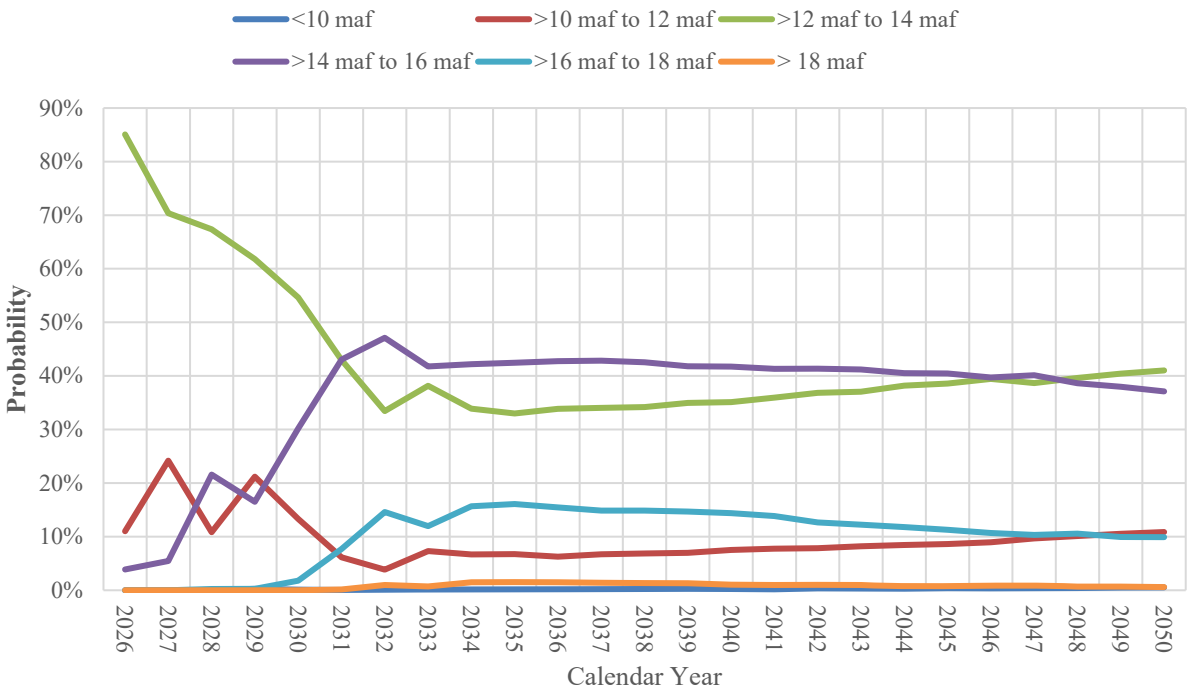
The projected 10-year running average of the natural flow of the Colorado River follows a comparable though different path (see Figure 8). The 10-year running average is not projected to reach 14.5 maf until the year 2032 (four years later). Thereafter, it is expected to decline to reach 14.0 maf by 2050. Relative to the annual natural flow, the 10-year running average of natural flows of the Colorado River is not as sensitive to the volatility in annual natural flows. The expected future annual natural flow of the Colorado River is above the median annual natural flows. In contrast, the expected 10-year running average of natural flows are identical to median 10-year running average of the natural flows of the Colorado River.

Figure 8
10-Year Running Average of Natural Flow of Colorado River at Lees Ferry
(Based on 1906-2024 Historic Record)



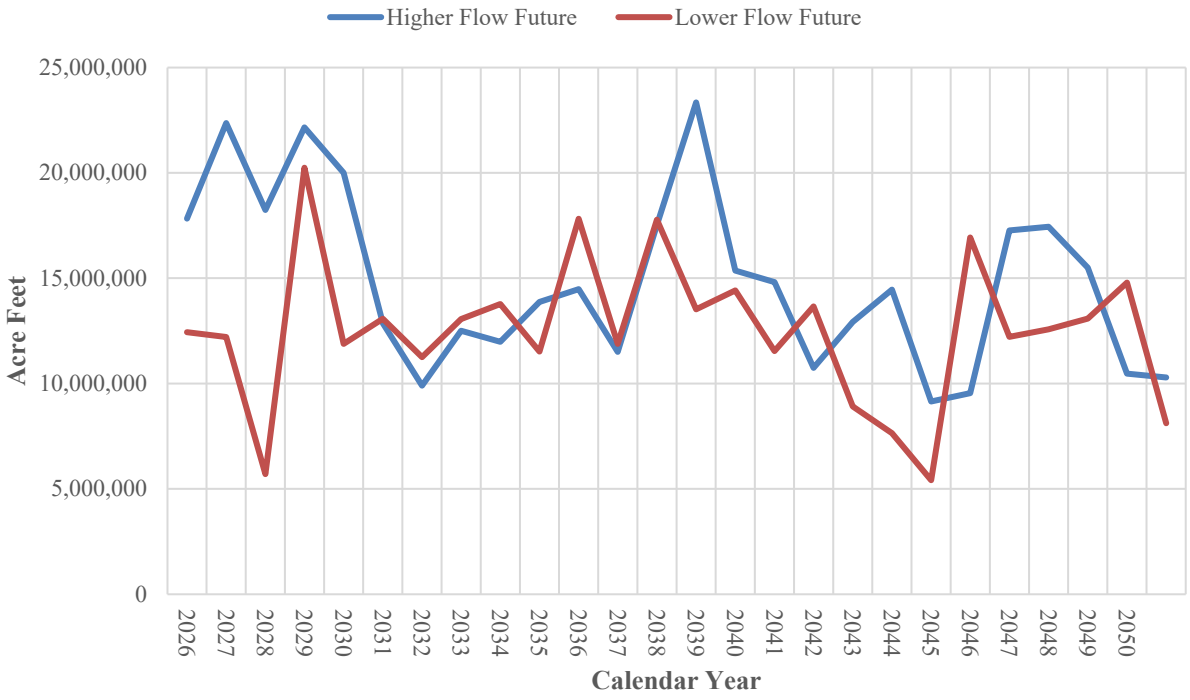
Given the volatility of annual natural flows, the expected 10-year running average of the natural flow of the Colorado River understates the risk management facing users of Colorado River water (see Figure 9). Until 2031, the 10-year running average will most likely fall between 12 maf to 14 maf. Thereafter, there is about 40% probability for the 10-year running average will be either between 12 maf to 14 maf or between 14 maf to 16 maf. There is about a 10% probability that the 10-year running average will be either between 10 maf to 12 maf or between 16 maf to 18 maf. The likelihood that the 10-year running average will fall below 10 maf or exceed 18 maf is remote.

Figure 9
Probability Distribution of Projected 10-Year Running Average of Natural Flow of Colorado River
(Based on 1906-2024 Historic Record)



Managing the risk of the Colorado River requires humility. We do not know which hydrologic road we are traveling until after the fact. Consider, for example, two scenarios from Stratecon's Monte Carlo simulation: a higher flow future (annual average natural flow of 14.9 maf for 2026-2050) and a lower flow future (annual average natural flow of 12.5 maf for 2026-2050)—see Figure 10). Annual natural flows of the Colorado River are generally greater under the higher flow scenario than the lower flow scenario, although this is not the case in every year. The volatility of natural flows under these scenarios is comparable to the 1906-2024 historic record.

Figure 10
Projected Scenarios of Future Natural Flow of
Colorado River at Lees Ferry
(Based on 1906-2024 Historic Record)



Machine learning can help discern the road we are travelling on based on the actual sequence of hydrology we experience going forward. Adaptive risk management will prove critical to recalibrate decision-making as we learn more about our future (see discussion below). Seeking "long-term" decision rules today without consideration of adapting rules to future circumstances that are unknown today is a fool's errand.

5) What are the strengths and weakness of the draft EIS's technical approach?

Stratecon observed the Bureau's January 29, 2026, presentation of the draft EIS for post-2026 operations. Three highlights of an outstanding presentation:

- responsible risk management
- adaptative management in future Bureau operational policies
- the Bureau sets "rules of the road", water users decide how to respond to water supply risks

The Bureau is on the right pathway, although there are a few outstanding potential pitfalls.

Welcome to Responsible Risk Management

The Bureau examined the Colorado River's future under five scenarios (a no action scenario and four alternatives) utilizing *Decision-Making under Deep Uncertainty* ("DMDU"). DMDU is a framework for choosing policies when there is disagreement on how the world works, the time path and statistical variability in key drivers (such as hydrology and economic development), future likelihoods, disagreement on policy objectives and trade-offs, and path dependency (today's choices shape tomorrow's circumstances).

In other words, DMDU is an excellent framework for analyzing the Colorado River's future. In describing its approach, the Bureau mentioned that they have been working on this framework for more than a decade. Stratecon supports the Bureau bringing rigorous risk assessment to decision-making.

Welcome to Adaptative Management

The Bureau signaled the inevitable role of adaptative management. The post-2026 operations policy may have a short term (20 years or less). Discussion of operational alternatives states implementation "adjusted as necessary."

The prospect that post-2026 operations are subject to adaptative management is an improvement over pre-2026 operations. As discussed above, the volume of water in storage at Lake Powell and Lake Mead has been in freefall for 25 years. Shortage provisions initiated in 2007, followed by the 2019 Drought Contingency Plan, did not reverse the declining trend. By 2022, the Colorado River was in disarray. Long-term reliance on ineffective policy is a recipe for disaster.

Welcome to Water Users Being Responsible for Managing Water Risks

The Bureau received a question during its January 29th presentation about whether the EIS analyzes how new water supplies, such as desalination, would address water shortages. The Bureau's answered "no." Stratecon supports the Bureau.

The post-2026 operations will set the "rules of the road" for Bureau declarations of available Colorado River water, given the Law of the River. Water users are responsible for how they respond. Incur water shortages? Invest in new water supplies? Change water resource management? Enter into voluntary transfer agreements with senior water users?

The Bureau could regularly update anticipated availability of Colorado River water. Currently, the Bureau's five-year probabilistic projections serve this role. The post-2026 operations will become the new framework for determining water availability. The quantification of curtailment risks for basin states could be based on the updated "risk ensemble" included in the Bureau's assessments. Water users can incorporate the Bureau's risk assessment into their

decision-making about how best to manage their curtailment risk of their Colorado River water supplies.

To this end, Stratecon supports the Bureau discussion of the role of intrastate, interstate, and even interbasin transfers as a critical tool for providing address the challenges of managing the Colorado River. Clearly articulated policies can provide useful guidance as various interest contemplate their alternatives for meeting their water demands.

Potential Pitfalls

The "dialogue" among the basin states and interested parties includes potential pitfalls.

Maintain Priority. The alternatives identified in the draft EIS generally follow some adherence to the priority system, with hybrid alternatives including some role for pro rata reductions. Allocation decisions conflicting with federal law and contractual provisions are an invitation for litigation lotteries.

Avoid Misapplication of Evaporation/System Losses. Recognizing evaporation and system losses is part and parcel of the existing water rights regime, although not as contemplated by some interests. By impacting the volume of available water, evaporation losses reduce the volume of available water apportioned under the priority system. Regarding system delivery losses, water delivery contracts specify delivery points for a defined quantity of Colorado River water. Bureau uses available water to meet its delivery obligations **and** absorb system delivery losses.

Embrace Shortage Sharing Article of 1944 Treaty. Article 10(b) contemplates shortage sharing between the United States and Mexico triggered by infrastructure failure or drought. The Colorado River water allocated to Mexico "*will be reduced in the same proportion as consumptive uses in the United States are reduced*." Any post-2026 policy reducing Mexico's 1.5-million-acre-foot of Colorado River water delivered at the border not equal to the reduction of consumptive use in the United States would be inconsistent with the 1944 Treaty. This position, of course, does not prevent voluntary agreements to further reduce the consumptive use of Colorado River in Mexico with acceptable compensation.

6) What Are the Principles of Stratecon's Proposed Five-Year Federal Plan?

A five-year federal plan provides incentives for Basin States to reach a consensus as well as provide rules of the road for operations of the Colorado River during any litigation.

Before February 14, 2026, each Colorado River Basin States were comparing their preferred outcome to offers of other basin states. With a defined five-year federal plan, each party must now compare their preferred outcome versus the federal five-year plan implemented in the absence of a Colorado River Basin State consensus. Deferred action by further bargaining is no longer an alternative. The greater the "bite" of the federal five-year plan, the greater the incentives

for Basin States to settle among themselves, especially if they find the five-year federal plan objectionable.

Any basin state pursuing a "litigation lottery" must first obtain an injunction against implementation of a five-year federal plan, which by its nature is an emergency federal action. While the Imperial Irrigation District successfully secured a temporary injunction against the Bureau of Reclamation unilaterally reducing the district's 2003 order of Colorado River water, the factual circumstances then are materially different from the factual circumstances today.

Prelude to The Rule Curve

Prudence requires identification of precautionary storage levels to reduce the short-term risk of identified adverse circumstances to tolerable levels within five years.

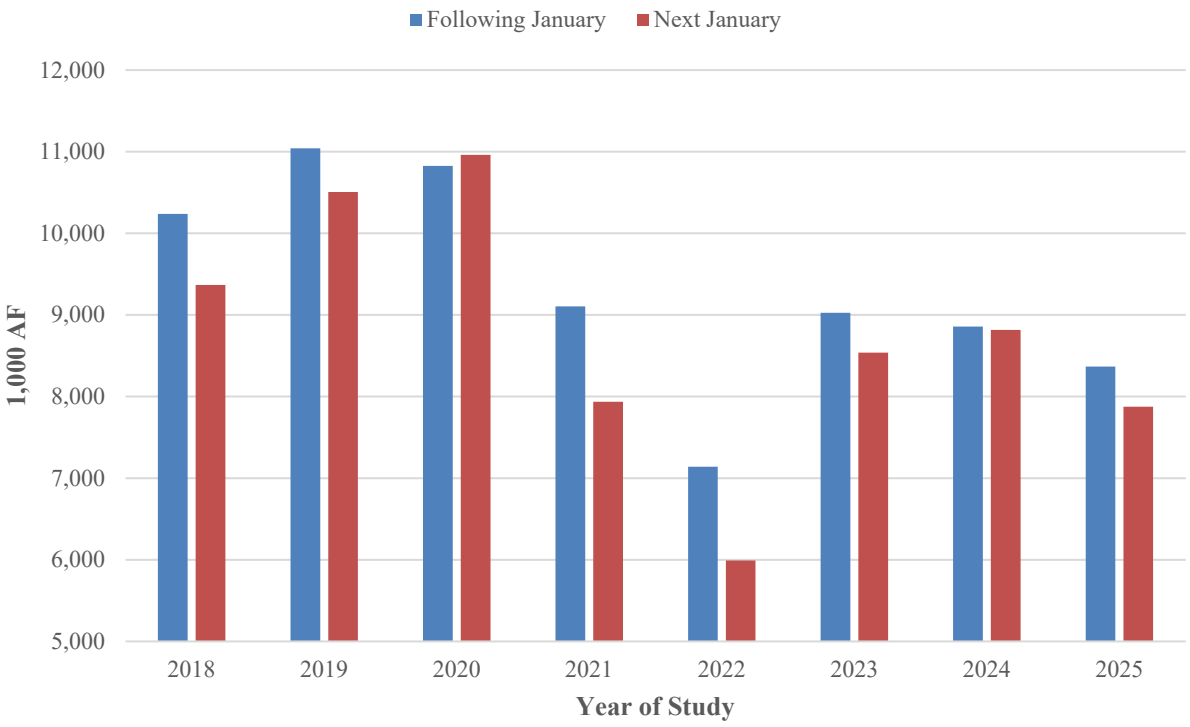
- What storage levels are required within five years to maintain a prudent margin to protect minimum power pools, eliminate Deadpool risk, and prudently manage other defined objectives for the Colorado River?
- How much water storage is required to manage the inevitable variability and trends in the natural flow of the Colorado River to avoid greater and more frequent shortages confronting Colorado River water right holders?
- What is the trade-off between declaring more frequent, smaller water curtailments versus deferring increased curtailments today and running the risk of larger curtailments in the future if (or when?) favorable hydrologic conditions fail to materialize?

This approach puts increasing water storage on the Colorado River as a front and center objective. This turns on its head the formulation used in the 2007 Guidelines and 2019 Drought Contingency Plan, which focused on how far reservoir elevations (water storage) must decline before defined cutbacks in water use occur.

Time to incorporate prudent risk management. Looking simply at next year in isolation of trends is a recipe for disaster.

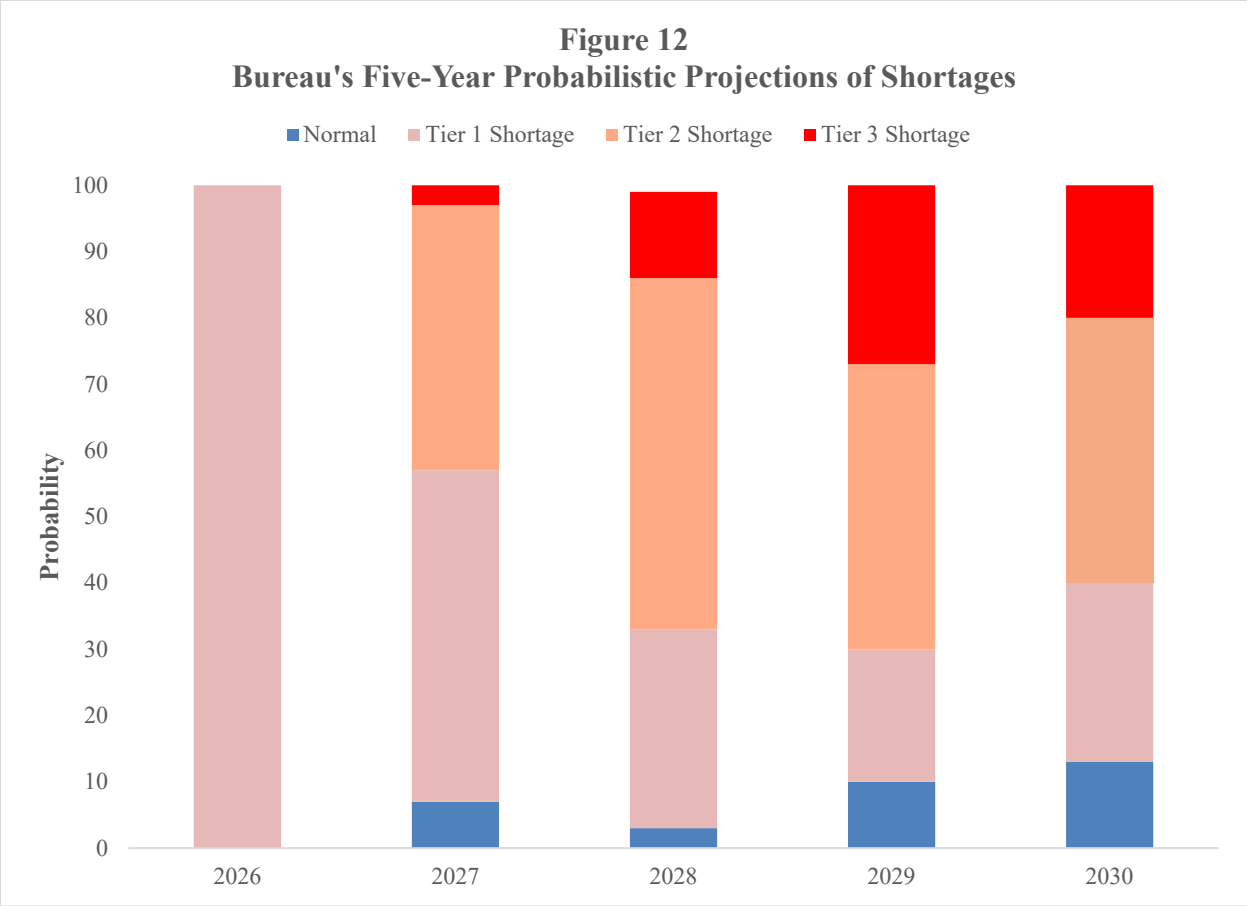
Consider the historic record of the Bureau's 24-Month studies used in declaring water shortages in the Lower Basin (see Figure 11). For each August 24-Month study, the figure shows projected Lake Mead water storage for the following January (where projected Lake Mead elevation determines curtailments in the Lower Basin) versus projected water storage in the next January. (Note: Lake Mead elevation and Lake Mead Water Storage are two sides of the same coin, see https://www.hydrowonk.com/p/reclamations-lake-mead-elevation.) In six of the eight years, the Bureau projected that Lake Mead storage would be lower seventeen months out (the next January after the following January) than four months out. That is, curtailments were not building water storage but mitigating anticipated further declines as curtailments were not designed to address the key problem: inadequate water storage.

Figure 11
Projected End-of-Month Lake Mead Storage
by August 24-Month Study



The August 2021 and 2022 24-Month Studies were "alarm bells" for those paying attention to the deteriorating conditions on the Colorado River. With the benefit of hindsight, the Bureau's June 2022 warning was a year late. The 2023 "bailout" (where the natural flow of the Colorado River exceeded 14.3 maf) temporarily increased storage at Lake Mead in 2023, followed by another declining trend.

The Bureau's Five-Year Probabilistic Projections of Shortages provide no solace (see Figure 12). Today's Tier 1 shortages have a significant risk of becoming Tier 2 and Tier 3 shortages in the near term. Unless effective water resource management is implemented immediately, today's curtailments look small from even a short-term perspective.



A Rule Curve

As discussed above, defining a rule curve starts with a defined target for increased water storage within five years. Table 2 presents the amount of water in active storage in Lake Powell and Lake Mead as of January 2026 and projected storage as of January 2027.[7] Total active storage in January stood at 14,976 TAF, or 31.9% of active storage capacity of Lake Powell and Lake Mead. Consistent with historical experience, the amount of water in storage in January 2027 is projected to decline to 11,873 TAF, or 25.3% of active storage capacity of Lake Powell and Lake Mead.

[7] Data from Bureau of Reclamation February 2026 24-month study. /

Table 2
Lake Powell and Lake Mead Storage under Most Probable Inflow
(thousand acre feet)

Item	*Jan-26*	*Jan-27*
Lake Powell	6,140	3,394
Lake Mead	8,836	8,479
Total	14,976	11,873
Active Storage Capacity	47,000	47,000
Capacity Utilization	31.9%	25.3%

Table 3 presents the relation between target for increased storage at Lake Powell and Lake Mead within five years and the annual curtailments in the use of Colorado River water during the proposed five-year federal plan. Storage deficiency is defined as the difference between the target in the first column multiplied by activity storage capacity less the projected amount of storage in January 2027 (11,873 TAF). Increased storage equals the storage deficiency in the second column divided by the projected amount of water storage for January 2027 (11,873 TAF). Annual curtailments over the proposed five-year federal plan equals the storage deficiency in the second column divided by five.

Table 3
Annual Curtailments in Use of Colorado River Water
to Reach Water Storage Targets within Five Years

Target for Lake Powell and Lake Mead Storage	*Storage Deficiency (TAF)*	*Increased Storage*	*Annual Curtailments (TAF)*
40%	6,927	58.3%	1,385
50%	11,627	97.9%	2,325
60%	16,327	137.5%	3,265
70%	21,027	177.1%	4,205

What is a reasonable target for the proposed five-year federal plan? The answer can be identified by future on Bureau analysis of the three questions posed above. For illustrative

purposes, Stratecon assumes that a 50% target represents the necessary balance between risks versus economic costs and benefits.[8]

Reflecting any prudent risk management plan, adaptive management should administer the proposed reductions. Suppose, for example, the Bureau's target was for combined storage in Lake Powell and Lake Mead to reach 50% of active capacity within five years (see Table 4). Above average natural flows would accelerate the planned increase in Colorado River Basin water storage ahead of schedule. Below average natural flows would mean the planned increase in water storage would be behind schedule. A prudent adaptative management strategy would define how the Bureau would adjust the schedule of annual reductions in the middle column when the actual increases in water storage are ahead or behind schedule.

Table 3
Illustrative Rule Curve for Building Colorado River Water Storage (TAF)

Year	*Planned Annual Reductions*	*Target Increase in Storage*
2027	2,325	2,325
2028	2,325	4,651
2029	2,325	6,976
2030	2,325	9,302
2031	2,325	11,627

In the end, the annual total amount of available Colorado River water for use would be the volume sustainable given present storage levels and the anticipated volatility of future natural flows of the Colorado River at Lees Ferry. The criterion for sustainability could be the level of available Colorado River water for use that faces acceptable risks and magnitudes of potential shortages over a defined time horizon (5 or 10 years?) This would require the balancing of the economic costs of larger curtailments today versus the economic benefits of reducing the risk and severity of curtailments in the future.

Allocation of Available Water

Allocate available water among the Upper Basin, Lower Basin, and Mexico based on their consumptive use of Colorado River water for a defined baseline. An allocation of available Colorado River water among the basin states:

[8] Achieving the 50% target within five years would mean that combined storage in Lake Powell and Lake Mead within five years would reach 23,500 TAF (11,873 TAF + 11,627 TAF), slightly below the amount of combined water storage in 2010.

- Upper Basin: per their respective Upper Basin Compact percentages
- Lower Basin: their respective shares of Lower Basin consumptive use of Colorado River for the defined baseline.

The discussion at the annual CRUWA meeting acknowledged that a Lower Basin proposal has yet to involve consultation with Mexico. A pro-rata sharing of water shortages with the entire Colorado River Basin is consistent with Article 10 (b) of the 1944 Treaty, which reads:

> "In the event of extraordinary drought or serious accident to the irrigation system in the United States, thereby making it difficult for the United States to deliver the guaranteed quantity of 1,500,000 acre-feet (1,850,234,000 cubic meters) a year, the water allotted to Mexico under subparagraph (a) of this Article (1,500,000 acre-feet) *will be reduced in the same proportion as consumptive uses in the United States are reduced*." (emphasis added)

A discussed above, any post-2026 policy reducing Mexico's 1.5-million-acre-foot of Colorado River water delivered at the border not equal to the pro-rata reduction of consumptive use in the United States would be inconsistent with the 1944 Treaty. This position, of course, does not preclude voluntary agreements to further reduce the consumptive use of Colorado River in Mexico with mutually acceptable compensation.

The impasse between the Upper Basin and Lower Basin reflects disagreement on the allocation of cutbacks in available Colorado River water within the United States. As discussed above, Lower Basin states cannot rely on enforcing the 1992 Colorado River Compact for solace or leverage. With a long-term annual natural flow of the Colorado at 14.3 maf, enforcement of the 1922 Compact still yields an adjusted Upper Basin apportionment of 6.02 maf, substantially above Upper Basin's current consumptive use of Colorado River water.

The Upper Basin, however, has its own challenges. Further economic development in the Upper Basin based on Colorado River water needs a reliable water supply. Falling water storage in the Colorado River is a drag on further economic development.

Ultimately, the Upper and Lower Basins have a common interest in building water storage to make their admittedly lower Colorado River apportionments reliable. To that end, a five-year federal plan must harness its decision-making tools to find a reasonable balance among the various interests. A proposed apportionment of responsibility between the basins should reflect a reasonable economic balance of the Upper Basin having the long-term opportunity for further economic development with a reliable water supply and the Lower Basin interest in assuring that the Colorado River apportionments in the Lower Basin is sufficiently reliable to sustain economic development.

Increasing the Bite of Five-Year Federal Plan

A Five-Year Federal Plan should minimize if not defer any federal funding until there is a viable long term consensus. As discussed above, the operational plan should be based on defined objectives for increasing water storage on the Colorado River implemented by adaptative management. The long-term reorganization plan should lead funding commitments for investment in taxpayer dollars.

Federal funding commitments could be justified by a transparent Department of the Interior ("DOI") cost-benefit analysis consistent with sound economic/finance principles, risk management and use of cutting-edge forecasts defining the dimensions of future challenges and estimated impacts of proposed actions *under guidance provided by the Office of Management and Budget ("OMB")*. Transparency requires that DOI analysis be subject to public review prior to entering into funding commitments or cancelling earlier federal funding. A rigorous review prior to cancelling existing or approving new funding commitments increases the prospect that the use of federal taxpayer dollars is efficient. This proposal enhances communication between the Executive and Congressional branches on budget requests and provides incentives for improved planning and decision-making by parties seeking federal funding. For more discussion, https://www.hydrowonk.com/p/federal-funding-of-the-colorado-river

Conclusion

Continuation of how we manage the Colorado River will not address the current emergency on the Colorado River. Changing management strategy and supporting rules of the road for voluntary trading of Colorado River Water consistent with the Law of the River including the priority system can address the challenge. Lawyerly arguing over dueling redlines of the 1922 Compact will solve nothing. The only paperwork that matters involves voluntary agreements, transactions, and Reclamation regulations that successfully navigate our challenges.

As I mentioned in the Prelude, I am optimistic about the future of the Colorado River Basin. Thank you for the opportunity to provide input into your SEIS planning.

Respectfully,

Rodney T. Smith, Ph.D.
President

Attachment A:
Stratecon's Statistical Model of the Historic Record of the Natural Flow of the Colorado River at Lees Ferry

The risk of curtailment in available Colorado River is exasperated to the extent that there are runs of dry and wet years, which is the case of the natural flow of the Colorado River at Lees Ferry. Table A-1 presents Stratecon's statistical study. The model's estimated long-term average of estimated natural flows is 14.6 million acre-feet.[9] The model estimates the impact of the estimated level of natural flow in the prior year on the estimated level of natural flow in the current year. A 1 million acre-foot change in the natural flow in the prior year generates a 0.217 million acre-foot change in the predicted natural flow for a current year. This impact on the current year natural flows, in turn, feeds into the level of natural flows in future years.[10]

Table B-1
Statistical Model of Estimated Annual Natural Flow of Colorado River: 1907-2024
(one thousand acre-feet)

Variable	*Coefficient*	*Standard Error*	*T-Statistic*	*P-Value*
Intercept	11,423	1,382	8.26	2.55E-13
Natural Flow Prior Year	0.217	0.090	2.40	0.018
R^2	0.05			
Standard Error Residual	4,236			
F-Statistic	5.76			
Significance	0.018			

- Coefficient measures the impact of the variable on natural flow in current year
- Standard Error is a statistical measure of the variability of the estimated coefficient
- T-statistic is the ratio of the coefficient to standard error

[9] Model average equals 11,423/(1-0.217) ~ 14,588 thousand acre-feet

[10] The impact on current year 0, and future years 1, 2, 3 . . . n equals 0.217x 0.321^t, where t = 0, 1, 2, 3, . . n, which is a power series. The long-term annual impact of 1 million acre-feet in the prior year is 0.277 million acre-feet, which is substantially achieved within five years.

- P-value is the probability that the true value of the coefficient is zero
- R^2 is the proportion of the variation in the natural flow in the current year is explained by the variation in natural flow in the prior year
- Standard Error Residual: the standard deviation of the difference between natural flow in a current year and the model's a prediction based on the natural flow of the prior year
- F-Statistic is a statistical measure of the ability to use natural flow in the prior year to explain variation in the natural flow of a current year
- Significance is the probability that the model's coefficients are jointly zero

As evidenced by the model coefficient's P-values and the significance of the model's F-statistic, the probability is remote that the estimated natural flow in a current year is independent of the natural flow in the prior year.