Appendix T

Preliminary Description and Analysis of Anticipated Operating Guidelines for 2027 and 2028

This page intentionally left blank.

Contents

Tables

Figures

Attachment

Acronyms and Abbreviations

Acronym or Abbreviation	Full Phrase
2007 Final EIS	2007 Interim Guidelines Final Environmental Impact Statement
2007 Interim Guidelines	Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead
AAC	All-American Canal
CCS	Continued Current Strategies
CRSP	Colorado River Storage Project
CRSS	Colorado River Simulation System
CY	calendar year
DMDU	Decision Making under Deep Uncertainty
EIS	environmental impact statement
EOCY	end of calendar year
EOWY	end of water year
ICS	intentionally created surplus
kaf	thousand acre-feet
LTEMP	Long-Term Experimental and Management Plan
Maf	million acre-feet
NIB	Northerly International Boundary
SIB	Southerly International Boundary
U.S.	United States
WY	water year

This page intentionally left blank.

Appendix T. Preliminary Description and Analysis of Anticipated Operating Guidelines for 2027 and 2028

T.1 Introduction

As described in **Chapter 2**, Description of Alternatives, the Preferred Alternative is a 10-year decision framework through 2036. The decision framework establishes operational principles, sideboards (key thresholds and ranges for operational elements), and a process that would govern development and issuance of operating guidelines covering anticipated 2-year intervals, unless consensus-based agreements provide for a longer duration.

As of the date of this Final EIS, the anticipated guidelines for the first operating interval (2027 and 2028) are still being refined. These anticipated guidelines are based on extensive engagement with the Basin States and incorporate tribal input. For the purpose of this appendix, these anticipated guidelines are referred to as "2027-2028 Operating Guidelines." For the purpose of describing the potential upcoming operating guidelines and their associated impacts, a preliminary description and analysis of the 2027-2028 Operating Guidelines is included in this appendix. This appendix also analyzes how the impacts of the 2027-2028 Operating Guidelines compare to those of the Representative Preferred Alternative.

T.2 Preliminary Description of 2027-2028 Operating Guidelines

The four operational elements for the 2027-2028 Operating Guidelines are described in the subsequent sections. The specific Colorado River Simulation System (CRSS) modeling assumptions are provided in **Appendix T, Attachment T1**.

T.2.1 Guidelines to Reduce or Increase Deliveries from Lake Mead

Shortage Conditions

The 2027–2028 Operating Guidelines include a total Lower Basin shortage volume of 1.5 million acre-feet (maf) (inclusive of Mexico) in both 2027 and 2028.[1] Shortages above 1.5 maf are not modeled as shown in **Figure T-1**; however; if Lake Mead is projected to decline below elevation 1,000 feet during any 12-month period, consultation would occur to evaluate whether additional

[1] Based on the initial conditions, all 400 simulated futures apply a total Lower Basin shortage of 1.5 maf in 2027. The maximum December 2027 Lake Mead elevation across all 400 futures is 1,106 feet. As such all 400 simulated futures also apply a total Lower Basin shortage of 1.5 maf in 2028.

actions are necessary to reduce the risk of Lake Mead declining below elevation 950 feet. The modeled shortage volume is distributed among the Lower Division States (see **Table T-1**) consistent with the Lower Division States May 1 proposal.

Figure T-1
Shortage Guidelines to Reduce Deliveries from Lake Mead, 2027-2028 Operating Guidelines

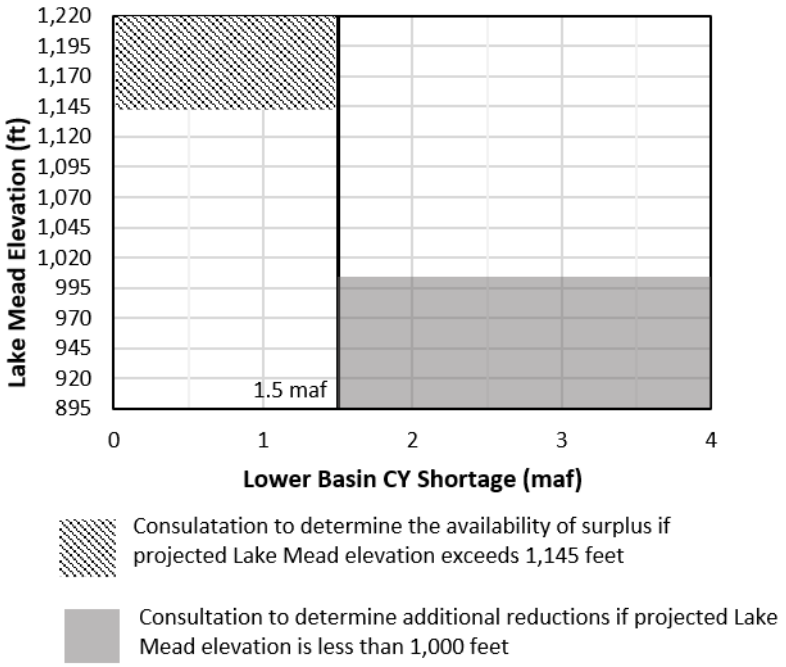


Table T-1
Shortage Distribution, 2027-2028 Operating Guidelines

Entity	Shortage (kaf)	Shortage (%)
Arizona	760	43.33
California	440	36.67
Nevada	50	3.33
Mexico	250	16.67

Note: Shortage distributions include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States (U.S.) policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

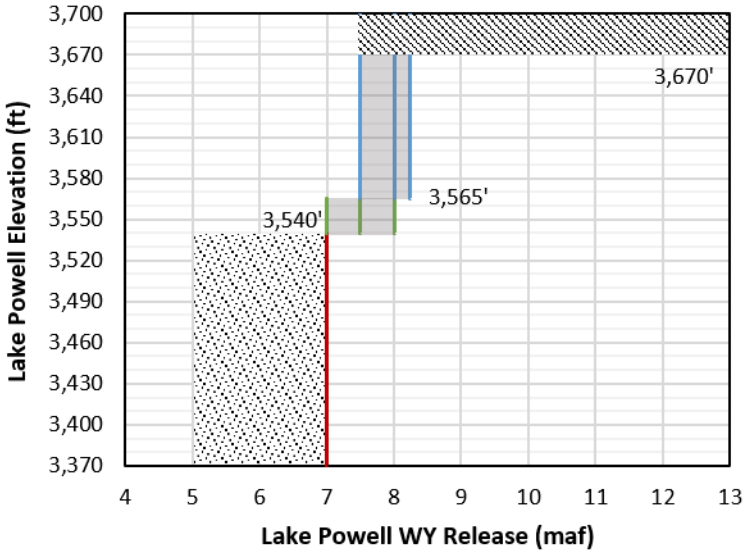
Normal and Surplus Conditions

If Lake Mead is projected to exceed elevation 1,145 feet, consultation regarding reduced shortage volumes or the availability of Surplus would occur. As described in footnote 1, the maximum December 2027 elevation is 1,106 feet; thus, neither Normal nor Surplus conditions are modeled in the analysis of the 2027-2028 Operating Guidelines.

T.2.2 Coordinated Reservoir Operations (Lake Powell and Lake Mead)

In 2027 and 2028, the annual water year releases from Lake Powell are determined based on projected reservoir conditions at the beginning of the water year, with the potential for adjustments during the water year in response to changing hydrologic conditions. These operations are designed to preserve the operational flexibility to protect critical infrastructure at Glen Canyon Dam and meet other operational objectives consistent with applicable federal law. The operations are summarized below and depicted in **Figure T-2.**

Figure T-2
Coordinated Operations of Lake Powell and Lake Mead, 2027-2028 Operating Guidelines



Equalization releases occur when the computed 602(a) Storage volume is exceeded. Hatching indicates the approximate corresponding Lake Powell elevation range.

WY release is selected from canditage releases by selecting the maximum release that maintains a projected elevation of at least 3,510' during the WY.

At any elevation, the release may be adjusted down to a minimum of 6.0 maf or 5.0 maf if Lake Powell is projected to decline below 3,510' or 3,500', respectively.

Primary Operations

Initial Water Year Release

The initial water year release is selected from a set of potential release volumes corresponding to the October 1 Lake Powell elevation as shown in **Table T-2** and **Figure T-2**. Potential release volumes are first evaluated to identify those projected to maintain a Lake Powell elevation of at least 3,510 feet during the following spring. The initial release is then selected from among those potential release volumes to preserve operational flexibility, allowing releases to be adjusted upward or downward over the course of the water year as hydrologic conditions evolve. The next section describes the potential adjustments to this initial water year release volume during the water year in response to changing hydrologic conditions.

When the October 1 Lake Powell elevation is below 3,540 feet, the modeled implementation evaluates an initial water year release of 7.0 maf. If that release is projected to result in Lake Powell declining below elevation 3,510 feet, the determination of the water year release is deferred until April, and monthly releases are adjusted to maintain elevation 3,510 feet. In April, the water year release is set, likely between 6.0 and 7.0 maf, contemporaneously with the additional releases from Colorado River Storage Project (CRSP) Upper Initial Units to protect critical infrastructure at Glen Canyon Dam, as described in the *Mid-Year Release Adjustments* section and in **Section T.2.4**.

Table T-2
Potential Initial Water Year Releases by Lake Powell Pool Elevation, 2027-2028 Operating Guidelines

Lake Powell October 1 Pool Elevation (feet)	Potential Initial Lake Powell Water Year Releases (maf)
> 3,565	8.23, 8.0, and 7.5
3,565 to 3,540	8.0, 7.5, and 7.0
< 3,540	7.0

Mid-Year Release Adjustments

There is potential for either an upward or a downward mid-year adjustment to the initial water year release. For modeling purposes, these adjustments occur in April.

An upward adjustment occurs if the end of water year (EOWY) projected Lake Powell elevation exceeds elevation 3,565 feet. In this case, the initial water year release is increased by half of the projected storage above elevation 3,565 feet, up to a maximum water year release of 12.0 maf.

A downward adjustment is evaluated to reduce the risk that Lake Powell will decline below elevation 3,510 feet during the next spring. If the projected Lake Powell elevation in the next spring is below 3,510 feet, the volume needed to maintain 3,510 feet is determined and used to adjust releases. First, the Lake Powell water year release is reduced to 7.0 maf if the initial release was greater than 7.0 maf. If additional reductions are necessary to meet the volume needed to maintain 3,510 feet, then the Lake Powell release is further reduced while CRSP Upper Initial Unit releases are increased. There is

an attempt to maintain a 1:1 ratio between the additional Lake Powell release reductions and the increased CRSP Upper Initial Unit releases, subject to a maximum CRSP Upper Initial Units release of 1.0 maf and a minimum Lake Powell water year release of 6.0 maf. The ***Infrastructure Protection and Other Considerations*** section describes the potential to reduce releases below 6.0 maf.

Coordination at High Elevations

For modeling purposes, a determination to potentially increase releases for the purpose of equalizing storage between Lake Powell and Lake Mead is made for the upcoming year if, on October 1, the net storage of all CRSP reservoirs exceeds the 602(a) storage volume and Lake Powell storage is greater than Lake Mead storage. The 602(a) storage volume is computed using the parameters from the 2007 Final EIS. **Appendix J**, Sensitivity Analysis – Effects of Assumed Parameter Values on 602(a) Storage, describes the 602(a) storage calculation and documents the parameters used in the 2007 calculation, which are also used in this analysis.

Infrastructure Protection and Other Considerations

If Lake Powell is projected to decline below elevation 3,510 feet during the current water year, annual releases may be reduced to as low as 6.0 maf. If Lake Powell is projected to decline below elevation 3,500 feet after these reductions are considered, water year releases may be further reduced to as low as 5.0 maf to protect critical Glen Canyon Dam infrastructure, subject to consultation. Monthly releases are adjusted to protect 3,510 and 3,500 feet subject to a minimum daily release established under the Long-Term Experimental and Management Plan.

T.2.3 Storage and Delivery of Conserved System and Non-System Water

The following sections reflect concepts included in the Lower Division States May 1 proposal. There are additional details on the specific modeling assumptions for the storage and delivery of conserved system and non-system water included in **Attachment T1**.

Lake Mead Mechanism

Water conserved by Lower Basin users would be stored in a pool in Lake Mead that can reach a maximum volume of 5.3 maf, which includes the storage of pre-2027 Intentionally Created Surplus (ICS) except for System Efficiency ICS. Annual total and state-based limits for conservation volumes and delivery of conserved water are presented in **Table T-3**. All conserved water stored in Lake Mead would be included in determinations of equalization releases from Lake Powell and in projections of Lake Mead's elevation for consultations regarding additional/reduced Lower Basin shortage or availability of Lower Basin surplus. Lower Colorado River entitlement holders, including Lower Basin Tribes, consistent with applicable implementation agreements, would be able to contribute to the conservation pool and to use their conserved water for delivery and/or in intra- and interstate transactions with other Lower Basin users.

Table T-3
Volume Limitations of Storage and Delivery of Conserved Water, 2027-2028 Operating Guidelines

Entity	Maximum Annual Contribution (kaf)	Maximum Cumulative Storage (kaf)	Maximum Annual Delivery (kaf)	Maximum Cumulative 2027-2028 Delivery (kaf)
Arizona	125	1,000	300	800
California	400	2,000	400	
Nevada	125	800	300	
Mexico[1]	250	1,500	N/A[2]	160
Total	**900**	**5,300**	**1,160**	**960**

1) Volumes include modeling assumptions for Mexico's storage and delivery limits. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.
2) There is an assumed maximum cumulative delivery to Mexico of 160 kaf for 2027–2028. No annual maximum is specified; the annual delivery is constrained only by the two-year cumulative limit of 160 kaf.

Water users could contribute or deliver water previously stored under this new mechanism at their discretion within the annual volume constraints related to the pool (**Table T-3**) and the elevation constraints described below. At the time the water is conserved, a one-time 10 percent system assessment would be applied, followed by an annual 3 percent evaporation deduction calculated based on the volume remaining in the Lake Mead mechanism at the end of the preceding calendar year.

Delivery of conserved water would be prohibited if Lake Mead begins the year with a pool elevation below 1,000 feet. For modeling purposes, if the beginning-of-year pool elevation is between 1,000 feet and 1,025 feet, delivery volumes are proportionally reduced so that the forecasted end of calendar year pool elevation does not fall below 1,000 feet. The cumulative delivery to the Lower Division States is limited to 800 thousand acre-feet (kaf) through the end of 2028. Additionally, deliveries from the Lake Mead mechanism would be limited to ensure that a state's annual apportionment or Mexico's annual allotment is not exceeded.

Lake Mead Mechanism (Federally Managed Water Resources Pool)

Although not included in this analysis, the 2027-2028 Operating Guidelines are anticipated to include a Federally Managed Water Resources Pool. For more information on the Federally Managed Water Resources Pool, see **Chapter 2**, Description of Alternatives, **Section 2.4.3.3.3**. The modeling of the Representative Preferred Alternative includes representative modeling of this pool.

Treatment of Pre-2027 Intentionally Created Surplus

For modeling purposes, ICS created under the 2007 Interim Guidelines, except for System Efficiency ICS, that remains in Lake Mead in 2027 is transferred to the Post-2026 Lake Mead water

user-controlled mechanism immediately and would be subject to all provisions described in the previous section.

System Conservation

As described in the Lower Division States May 1 proposal the Lower Division States intend to contribute a cumulative minimum of 700 kaf of system conservation through 2028. For modeling purposes, the 700 kaf is allocated as 300 kaf from Arizona, 300 kaf from California, and 100 kaf from Nevada. Each state's contribution is assumed to be split equally between 2027 and 2028. These volumes are separate from ICS, not stored in individual state pools, and in addition to the previously described shortage volumes (**Section T.2.1**).

T.2.4 Additional Activities Above Lake Powel

Upper Basin Conservation

No Upper Basin conservation is assumed to occur in the analysis of the 2027-2028 Operating Guidelines.

Releases to Protect Glen Canyon Dam

Releases from the CRSP Upper Initial Units to protect critical Glen Canyon Dam infrastructure would be considered, after appropriate consultations, within their RODs and contingent on hydrologic conditions, if Lake Powell is projected to go below elevation 3,510 feet. For modeling purposes, increased CRSP Upper Initial Unit releases occur contemporaneously with a reduction in the Lake Powell water year release below 7.0 maf. There is an assumed maximum additional CRSP Upper Initial Unit release of 1.0 maf. Releases would consider historical practices and volumetric reductions in Lake Powell releases. For modeling purposes, there is an attempt to maintain a 1:1 ratio between the Lake Powell release reductions below 7.0 maf and the increased CRSP Upper Initial Unit releases. Should Lake Powell begin to recover sufficient elevation, Reclamation would consult regarding opportunities for recovery of volumes of previous releases from the CRSP Upper Initial Units.

T.3 Analysis of 2027-2028 Operating Guidelines

This section analyzes the potential impacts associated with implementation of the 2027–2028 Operating Guidelines on hydrologic resources, water deliveries from the mainstream Lower Colorado River, and other applicable resources. The analyses in these sections mirror those include in **Chapter 3**, Affected Environment and Environmental Consequences, **Section 3.2**, Hydrologic Resources, and **Section 3.3**, Water Deliveries, and their corresponding Technical Appendices, **TA 3**, Hydrologic Resources, and **TA 4**, Water Deliveries, respectively.

To provide context, the analysis compares the 2027–2028 Operating Guidelines (described in **Section T.2**) with the Continued Current Strategies (CCS) Comparative Baseline scenario (summarized in **Chapter 3, Table 3.2**), the No Action Alternative (described in **Appendix S,** Additional Description of Alternatives), and the Representative Preferred Alternative (described in **Chapter 2**). These comparisons illustrate where the impacts associated with the 2027–2028

Operating Guidelines fall within the range of impacts analyzed for the Representative Preferred and No Action Alternatives in the Final EIS. As with the rest of the analysis in the Final EIS, the CCS Comparative Baseline scenario is provided to assess the impacts if operations were to continue under the current direction and strategies.[2] While the CCS Comparative Baseline is not an action alternative, it is a contemporary set of operations that stakeholders are familiar with that can be used to comparatively evaluate the performance of the alternatives.

T.3.1 Methodology

The analysis presented in this appendix is based on output from the CRSS, Reclamation's long-term planning model for the Colorado River Basin. CRSS simulates Basin conditions throughout the 2027–2060 Final EIS analysis period, accounting for hydrologic uncertainty while generating monthly projections of reservoir elevations, releases, river flows, and other operational metrics. Additional information about the No Action Alternative, CCS Comparative Baseline and Representative Preferred Alternative modeling assumptions can be found in **Appendix A**, CRSS Model Documentation and **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water. **Attachment T1** details the 2027-2028 Operating Guidelines modeling assumptions.

The comparisons presented in this appendix are based on the Decision Making under Deep Uncertainty (DMDU) framework used in this Final EIS. DMDU is a non-probabilistic evaluation framework that compares alternatives across a broad range of plausible future conditions and evaluates their performance under varying hydrologic conditions. Additional background and technical information on the DMDU framework are provided in **Appendix E**, DMDU Overview and Approach.

Analyses of the 2027–2028 Operating Guidelines are based on results for 2027–2028, whereas analyses of the CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative are based on the full 34-year Final EIS analysis period (2027–2060).

Results are summarized using conditional boxplots and summary statistics. Conditional boxplots group results by the preceding 3-year average Lees Ferry natural flow to facilitate comparisons among alternatives under similar hydrologic conditions (for example, average or dry conditions). Each figure includes results from all analysis years across 400 simulated futures, representing 800 data points for the 2027–2028 Operating Guidelines (two years) and 13,600 data points (34 years) for each of the CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative. Additional guidance for interpreting these figures is provided in **Chapter 3**, Affected Environment and Environmental Consequences, **Section 3.2.6**. Statistical summary tables that correspond to every boxplot in the following sections are included at the end of this appendix.

The difference in the underlying volume of data included for the 2027-2028 Operating Guidelines analysis versus the Representative Preferred Alternative may lead to the conclusion that the two-year operations would result in substantively different performance than the Representative Preferred

[2] This framework relies on strategies and agreements that expire in 2026, including the 2007 Interim Guidelines (as amended), the 2019 DCP, Minute 323 of the 1944 Water Treaty, and other agreements.

Alternative, but this is not an appropriate conclusion. The results over the shorter period are heavily influenced by the initial reservoir conditions in 2027, which are similar to what the 2027-2028 Operating Guidelines will be reacting to. In contrast, the results for Representative Preferred Alternative effectively incorporate hundreds of different initial reservoir conditions, including elevations significantly higher and significantly lower than current conditions. The expanded range of potential reservoir conditions is useful for evaluating a wide range of impacts, but not necessary for evaluating the range of potential near-term impacts. The relevant information is that, given the expected conditions in 2027, the potential impacts of the 2027-2028 Operating Guidelines are within the range of potential impacts associated with the Representative Preferred Alternative.

T.3.2 Hydrologic Resources

Impact Analysis Area

The geographic scope of the hydrologic resources analysis is the Colorado River corridor from the upstream limits of full pool elevation of Lake Powell to the downstream limits of the Southerly International Boundary (SIB). Reservoirs upstream of Lake Powell are operated pursuant to their own Records of Decision, which are not altered by the proposed alternatives.

Impact Indicators

The following indicators were used to assess impacts on hydrologic resources:

- **Reservoir elevations**: impacts on reservoir elevations due to operational activities
- **System storage**: impacts on system storage due to operational activities
- **Reservoir releases:** impacts on reservoir releases due to operational activities
- **River flows:** impacts on river flows due to operational activities
- **Groundwater**: qualitative impacts on groundwater adjacent to reservoirs and river reaches due to operational activities

Reservoir Elevation

This section evaluates how operational activities would affect reservoir elevations by comparing the 2027–2028 Operating Guidelines, CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative using the following metrics:

- Lake Powell pool elevations
- Lake Mead pool elevations

Lake Powell

This section presents a comparison of the 2027–2028 Operating Guidelines with the CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative with respect to minimum water year (WY) and EOWY elevations at Lake Powell. A description of critical Lake Powell elevations is listed in **TA 3**, Hydrologic Resources, **Table TA 3-2**. The total live storage capacity of Lake Powell at the full pool elevation of 3,700 feet is 23.31 maf (excluding approximately 1.9 maf of flood control space).

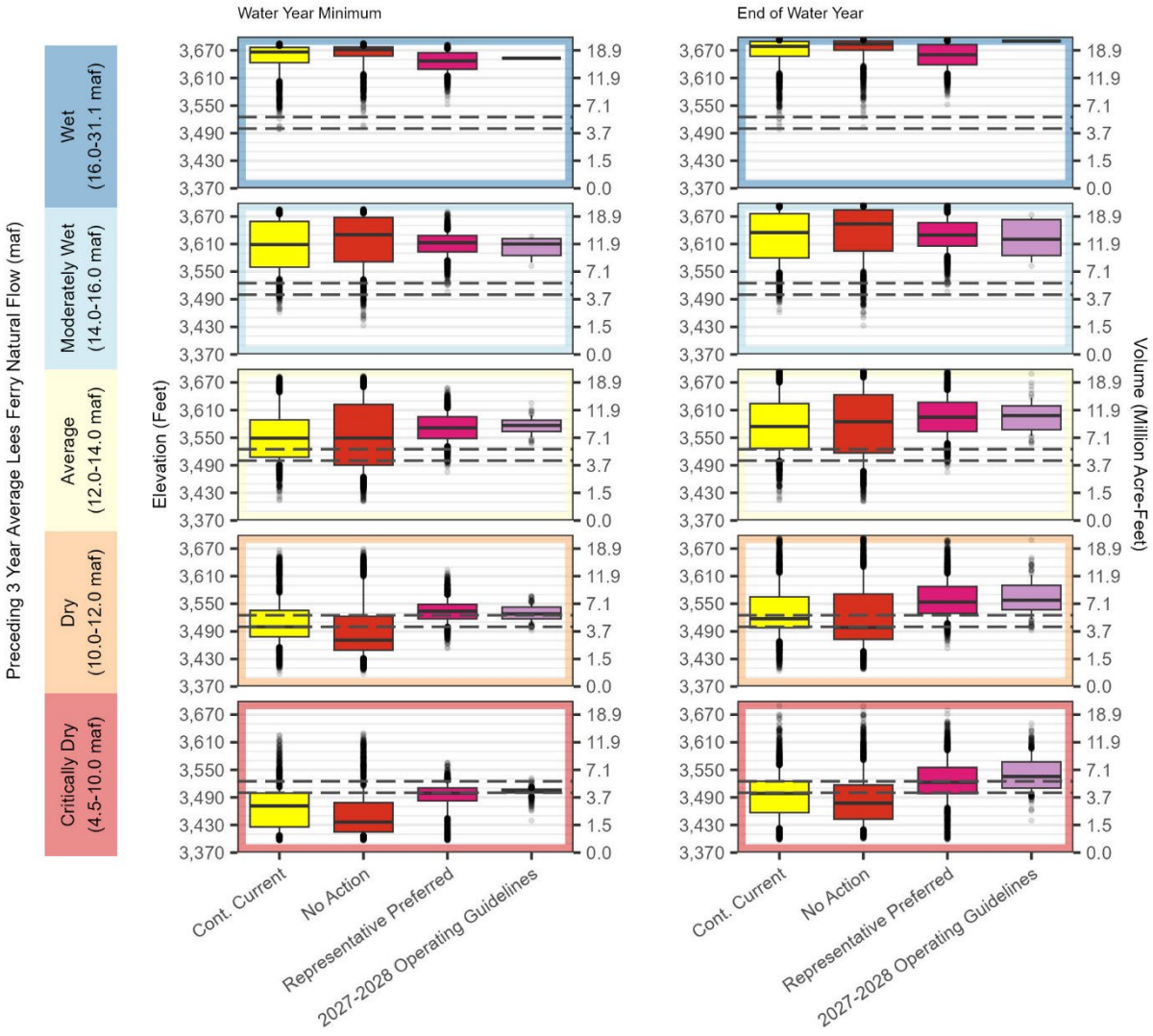
Figure T-3 shows minimum WY elevations and EOWY elevations at Lake Powell (feet) for each alternative using conditional boxplots. The boxplots show how the alternatives perform under varying hydrologic conditions, defined by the preceding three-year average of Lees Ferry natural flow. The bottom and top of each box captures the 25th to 75th percentile of the modeled results, respectively. The lines extend to the 10th and 90th percentiles, and outliers are shown as dots. To enable easier comparison of all flow categories, the vertical axes may have been truncated at the high end, and some outliers may have been omitted. Statistical summaries of the left and right columns are provided in **Table T-5** and **Table T-6** at the end of this appendix**.**

In each flow category shown in the boxplots, the critical elevation thresholds of 3,525 feet and 3,500 feet are identified with dashed lines. These elevations are important because they provide a 10-foot and a 35-foot buffer above 3,490 feet—the elevation below which water can only be released through the river outlet works. Operating below 3,490 feet limits the volume of water that can be released, since water can only pass through the river outlet works. As described in **Chapter 1**, Purpose and Need, **Section 1.8.4.1**, there are infrastructure concerns associated with the uncertainty of extended operations through the river outlet works as the sole means of sustained water releases from Glen Canyon Dam that could compromise the reliability and operational flexibility of Glen Canyon Dam and affect the ability to meet critical downstream water supply needs. There are additional impacts to hydropower associated with operating below 3,490 feet as this is minimum power pool.

The 2027-2028 Operating Guidelines result in median WY minimum elevations of 3,577, 3,528, and 3,505 feet in the Average, Dry, and Critically Dry Flow Categories, respectively. In the Critically Dry Flow Category, the 10th percentile minimum elevation falls below 3,500 feet, with outliers dropping below 3,500 feet in the Dry Flow Category. The median WY minimum elevations of the 2027-2028 Operating Guidelines are similar to those of the Representative Preferred Alternative, with all of the 2027-2028 Operating Guidelines WY minimum elevations falling within the range of elevations from the Representative Preferred Alternative. The modeled Lake Powell operations in the 2027-2028 Operating Guidelines, which adjust to maintain elevation 3,510 feet, are effective at avoiding elevation 3,500 feet. Only the outliers below the 10th percentile in the Dry Flow Category and the 25th percentile and below in the Critically Dry Flow Category fall below elevation 3,500 feet.

For the EOWY elevations at Lake Powell, the 2027-2028 Operating Guidelines result in median elevations of 3,598, 3,558, and 3,535 feet in the Average, Dry, and Critically Dry Flow Categories, respectively. Similar to the WY minimum elevations, the 10th percentile EOWY elevation falls below 3,500 feet in the Critically Dry Flow Category, whereas elevations below 3,500 feet occur only as outliers in the Dry Flow Category. Median EOWY elevations are slightly higher than those of the Representative Preferred Alternative in the Average, Dry, and Critically Dry Flow Categories. Overall, the WY minimum and EOWY elevations in the 2027-2028 Operating Guidelines fall within the range of the elevations in the Representative Preferred Alternative.

Figure T-3
WY Minimum and EOWY Elevations and Storage Volumes of Lake Powell



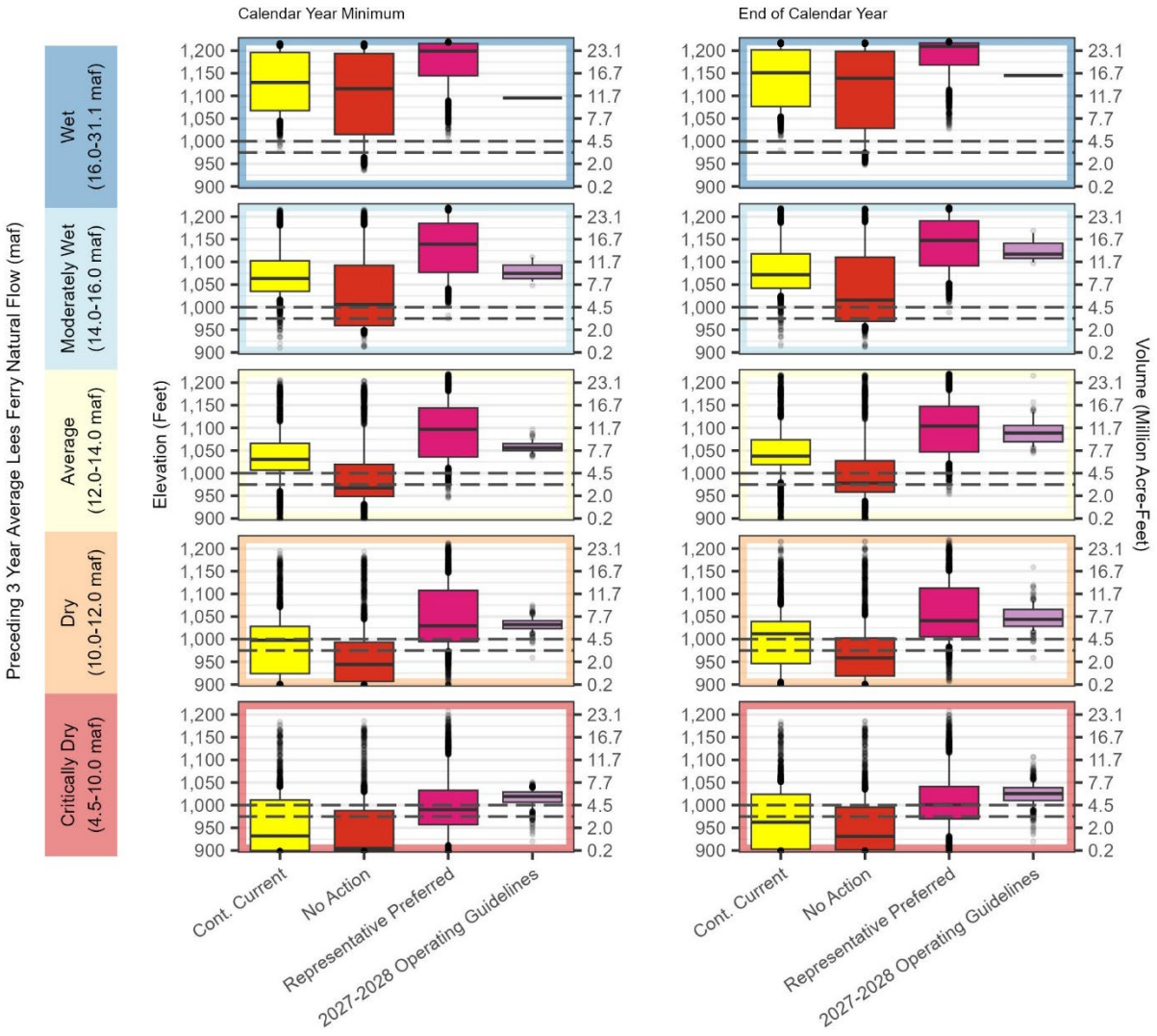
Lake Mead

This section presents a comparison of the 2027–2028 Operating Guidelines with the CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative with respect to minimum calendar year (CY) and end of calendar year (EOCY) elevations at Lake Mead. Critical elevations at Lake Mead listed in **TA 3**, Hydrologic Resources, **Table TA 3-5** preserve infrastructure and ensure Hoover Dam continues to operate under its intended design for purposes of downstream water releases. The total live storage capacity of Lake Mead at the full pool elevation of 1,219.6 feet is 26.12 maf (excluding approximately 1.5 maf of Flood Control storage available above the maximum operating elevation).

Figure T-4 shows minimum CY and EOCY elevations at Lake Mead (feet) for each alternative using conditional boxplots. Statistical summaries of data are provided in **Table T-7** and **Table T-8**

at the end of this appendix. In each flow category, the critical thresholds of 1,000 feet and 975 feet are identified with dashed lines. These elevations are important because they provide a 50-foot and a 25-foot buffer from 950 feet—the elevation below which water can only be released through the intake towers, constraining both the volume of water able to be released as well as the ability to generate power. Lake Mead requires larger buffers above the hydropower and critical infrastructure elevations than Lake Powell because Reclamation is required to deliver water orders that have already been approved. As a result, there is generally less flexibility to adjust releases from Hoover Dam than from Glen Canyon Dam.

Figure T-4
CY Minimum and EOCY Elevations and Storage Volumes of Lake Mead



The 2027-2028 Operating Guidelines have median CY minimum elevations of 1,056, 1,032, and 1,019 feet in the Average, Dry, and Critically Dry Flow Categories, respectively. In the Critically Dry Flow Category, the 10th percentile elevation falls below 1,000 feet, with outliers dropping below 975 feet. In the Dry Flow Category, minimum elevations below 975 feet occur only as outliers. The

range of CY minimum elevations is much narrower than that of the Representative Preferred Alternative because the 2027-2028 Operating Guidelines boxplot includes data only for the two-year period, which is heavily influenced by the initial conditions as previously discussed. Additionally, the 2027-2028 Operating Guidelines model a total Lower Basin shortage of 1.5 maf, while the Representative Preferred Alternative models shortages up to 3.6 maf, which affects Lake Mead's elevation.

For the EOCY elevations at Lake Mead, the median EOCY elevations of the 2027-2028 Operating Guidelines are 1,089, 1,044, and 1,025 feet in the Average, Dry, and Critically Dry Flow Categories, respectively. Like the CY minimum elevations, in the Critically Dry Flow Category, the 10th percentile EOCY elevation falls below 1,000 feet, with outliers dropping below 975 feet. In the Dry Flow Category, EOCY elevations below 975 feet only occur as outliers. Overall, CY minimum and EOCY elevations at Lake Mead under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

System Storage

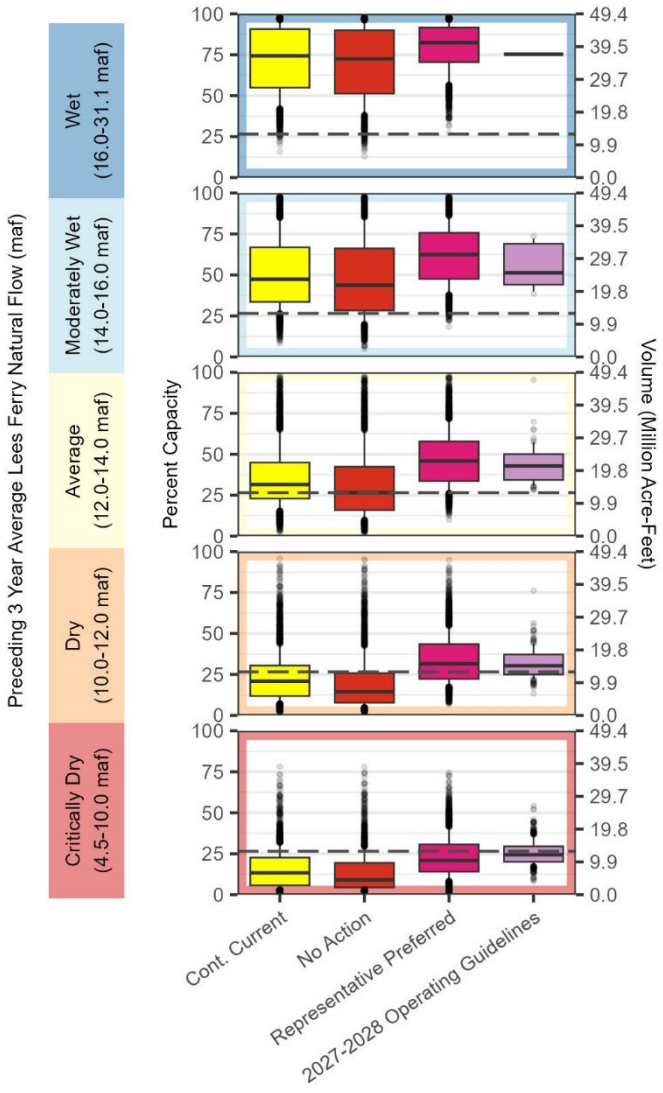
This section evaluates how operational activities would affect system storage by comparing the 2027–2028 Operating Guidelines, CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative using the EOWY combined system storage at Lake Powell and Lake Mead.

This metric provides insight into overall system conditions because Lake Powell and Lake Mead account for approximately 85 percent of the total storage volume in the major Colorado River system reservoirs. Excluding space allocated for surcharge and flood control, the live storage capacity is 23.31 maf at Lake Powell and 26.12 maf at Lake Mead, for a maximum combined live storage capacity of 49.43 maf.

Figure T-5 presents conditional boxplots of EOWY combined storage in Lake Powell and Lake Mead. The vertical axis shows combined percent full on the left and volume of storage on the right. A threshold line indicates the lowest observed EOWY combined storage, which occurred in September 2022, at 26.55 percent full (equivalent to 13.1 maf). A statistical summary of the data is provided in **Table T-9** at the end of this appendix.

The 2027-2028 Operating Guidelines result in a median EOWY combined storage at Lake Powell and Lake Mead of 42.9, 30.3, and 24.4 percent capacity in the Average, Dry, and Critically Dry Flow Categories, respectively. Compared to the Representative Preferred Alternative, the median combined storage is lower in the 2027-2028 Operating Guidelines in all flow categories except the Critically Dry Flow Category. The 25th percentile combined storage falls below the minimum observed combined storage in the Dry Flow Category, while the median combined storage falls below the minimum observed combined storage in the Critically Dry Flow Category. Overall, EOWY combined Powell and Mead storage under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

Figure T-5
EOWY Combined Storage at Lake Powell and Lake Mead



Reservoir Releases

This section evaluates how operational activities would affect reservoir releases by comparing the 2027–2028 Operating Guidelines, CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative using the following metrics:

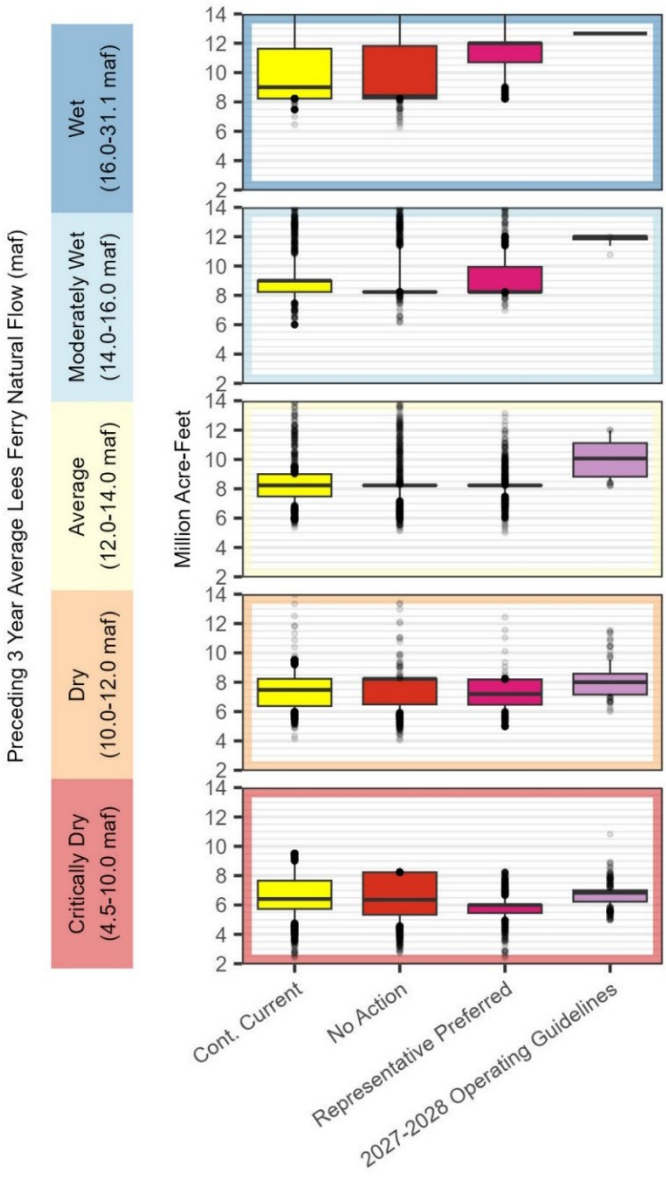
- WY Releases from Glen Canyon Dam
- 10-Year Releases from Glen Canyon Dam
- 10-Year Flows at Lee Ferry Compact Point
- CY Releases from Hoover Dam
- CY Releases from Davis Dam
- CY Releases from Parker Dam

Glen Canyon Dam

Releases from Glen Canyon Dam, at Lake Powell, are based on the operations as summarized in **Section T.2.2**.

Figure T-6 presents conditional boxplots of WY releases (maf) from Glen Canyon Dam. The y-axis has been truncated to facilitate easier comparison of the alternatives, see **Table T-10** at the end of this appendix for the full statistical summary.

Figure T-6
WY Releases from Glen Canyon Dam[3]



[3] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-10** for the full range of the data.

The 2027-2028 Operating Guidelines result in median WY Glen Canyon Dam release of 10.07, 8.00, and 6.83 maf in the Average, Dry, and Critically Dry Flow Categories, respectively. The median WY Glen Canyon Dam release in the 2027-2028 Operating Guidelines is higher than in the Representative Preferred Alternative in all flow categories. As previously discussed, the releases for the 2027-2028 Operating Guidelines are heavily influenced by initial conditions, and the number of data points analyzed compared to the other alternatives. The minimum WY Glen Canyon Dam release in the 2027-2028 Operating Guidelines is as low as 5.0 maf in the Critically Dry Flow Category. Overall, the WY Glen Canyon Dam release under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

Glen Canyon Dam 10-Year Releases

Figure T-7 presents conditional boxplots of cumulative 10-year releases from Glen Canyon Dam. The y-axis is truncated to enable easier comparison of alternatives. See **Table T-11** at the end of this appendix for the full statistical summary.

The 2027-2028 Operating Guidelines result in median 10-year releases from Glen Canyon Dam of 79.3, 77.0, and 77.6 maf in the Average, Dry, and Critically Dry Flow Categories, respectively. The median release volumes in the 2027-2028 Operating Guidelines are higher than the Representative Preferred Alternative in the Average, Dry and Critically Dry Flow Categories, largely due to the influence of initial conditions, which is even more influential in this metric, and the number of data points. The 10-year release volumes are all very similar since they are driven by the prior 9 or 8 years of historical flows. Overall, the 10-year releases from Glen Canyon Dam under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

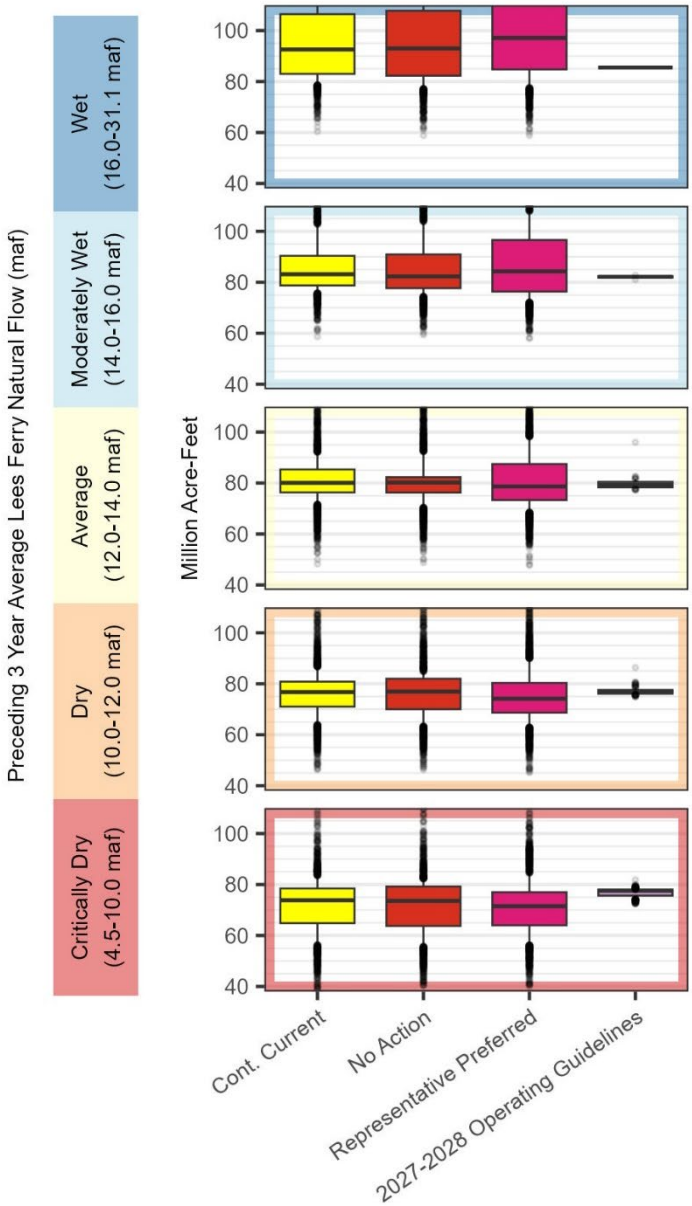
Cumulative 10-Year Lee Ferry Flows

The Lee Ferry Compact Point is the division point between the Upper Basin and the Lower Basin, as established by the 1922 Colorado River Compact. The Lee Ferry Compact point is in Arizona, approximately 17 miles downstream of Glen Canyon Dam and approximately 1 mile downstream of the confluence with the Paria River. Refer to **TA 3**, Hydrologic Resources, **Figure TA 3-2** in the Affected Environment Section for a map of the Lee Ferry Compact Point.

Figure T-8 presents conditional boxplots of cumulative 10-year Lee Ferry flow volumes (maf). In each flow category, 75.0 maf and 82.5 maf are shown with dashed lines**.** To facilitate easier comparison of alternatives, the y-axis is truncated. See **Table T-12** at the end of this appendix for the full statistical summary.

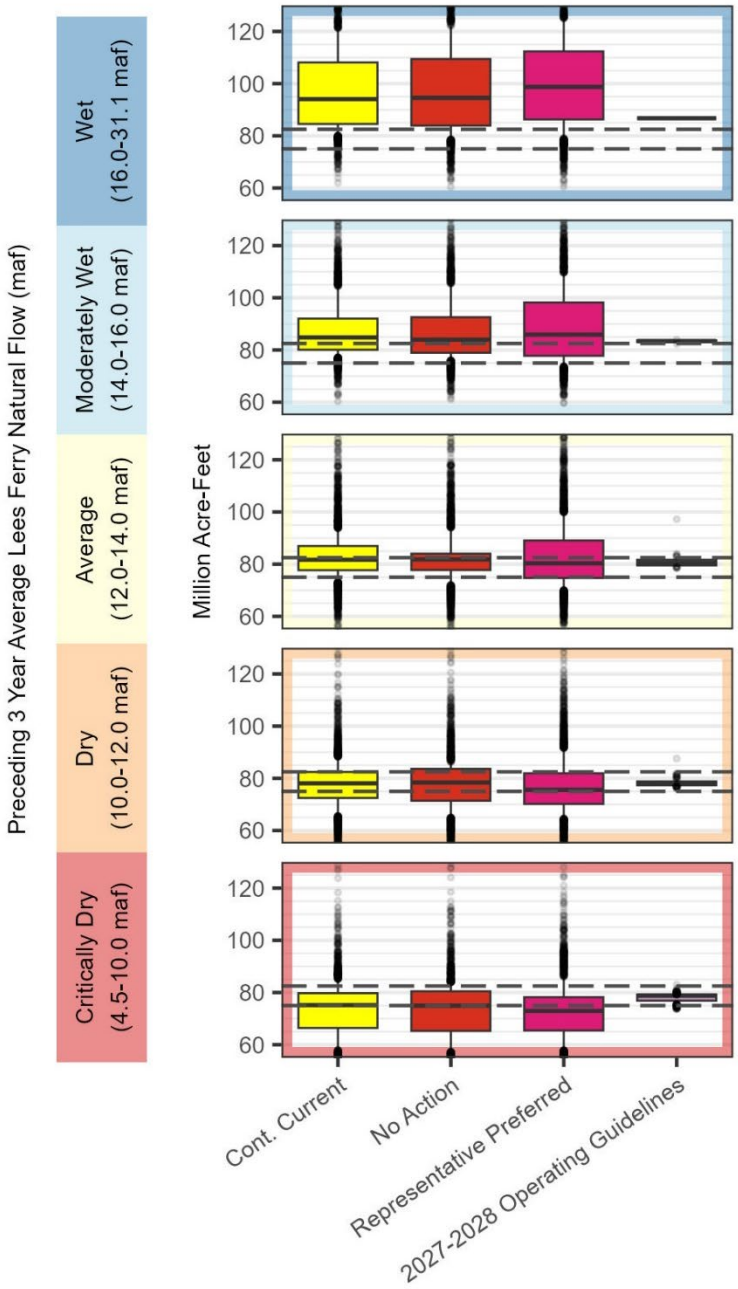
The 2027-2028 Operating Guidelines result in median 10-year cumulative Lee Ferry flow volumes of 80.5, 78.2, and 78.8 maf in the Average, Dry, and Critically Dry Flow Categories, respectively. These median volumes are below the 82.5 maf threshold, while only the outliers in the Critically Dry Flow Category fall below the 75 maf threshold. The 10-year cumulative Lee Ferry flow volumes are all very similar since they are driven by the prior 9 or 8 years of historical flows. Overall, the 10-year cumulative Lee Ferry flow volumes under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

Figure T-7
10-Year Cumulative Releases from Glen Canyon Dam[4]



[4] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-11** for the full range of the data.

Figure T-8
Compact Point 10-Year Volume[5]

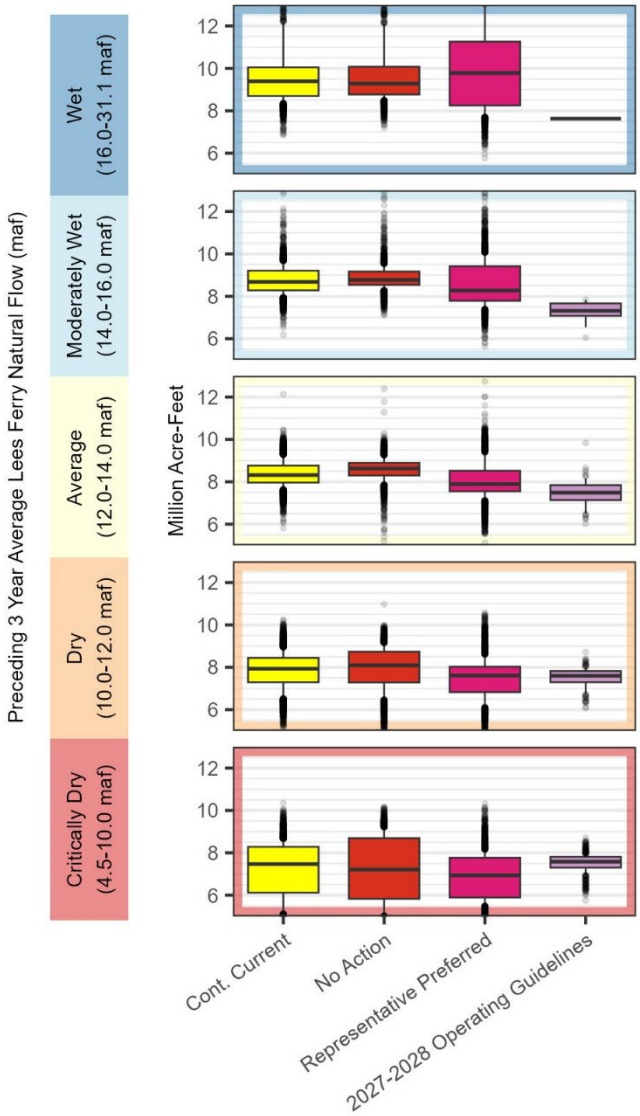


[5] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-12** for the full range of the data.

Hoover Dam

Releases from Hoover Dam, at Lake Mead, are based on downstream diversions and Lower Basin intervening flows. Diversions are impacted by the Lower Basin condition and the Lower Basin conservation, storage, and delivery of conserved system and non-system water. **Figure T-9** presents conditional boxplots of CY releases (maf) from Hoover Dam. The range of releases has been truncated to facilitate comparison of the alternatives, see **Table T-13** at the end of this appendix for the full range of data.

Figure T-9
CY Releases from Hoover Dam[6]



[6] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-13** for the full range of the data.

The 2027-2028 Operating Guidelines have median CY Hoover releases of 7.5, 7.6, and 7.6 maf in the Average, Dry, and Critically Dry Flow Categories, respectively. The median CY Hoover release under the 2027-2028 Operating Guidelines is lower than under the Representative Preferred Alternative in all flow categories except the Critically Dry Flow Category. The range of CY Hoover releases is much narrower than that of the Representative Preferred Alternative because the 2027-2028 Operating Guidelines only include data from the two-year period, which model a total Lower Basin annual shortage of 1.5 maf for all years and futures analyzed. In contrast, the Representative Preferred Alternative models shortages up to 3.6 maf, which explains the lower releases that are shown for it. Variability in Hoover releases is mainly driven by intervening inflows and diversions below Hoover. Overall, the CY Hoover release under the 2027–2028 Operating Guidelines falls within the range of impacts evaluated for the Representative Preferred Alternative.

Davis Dam

Releases from Davis Dam, at Lake Mohave, are based on target elevations defined by the existing rule curve (refer to **TA 6**, Water Quality). Inflows into Lake Mohave vary across alternatives, and because elevations are kept to the range determined by the rule curve, releases from Davis Dam subsequently vary across alternatives.

Figure T-10 presents conditional boxplots of CY releases from Davis Dam. The range of releases has been truncated to facilitate comparisons of alternatives, see **Table T-14** at the end of this appendix for the full statistical summary and full range of values.

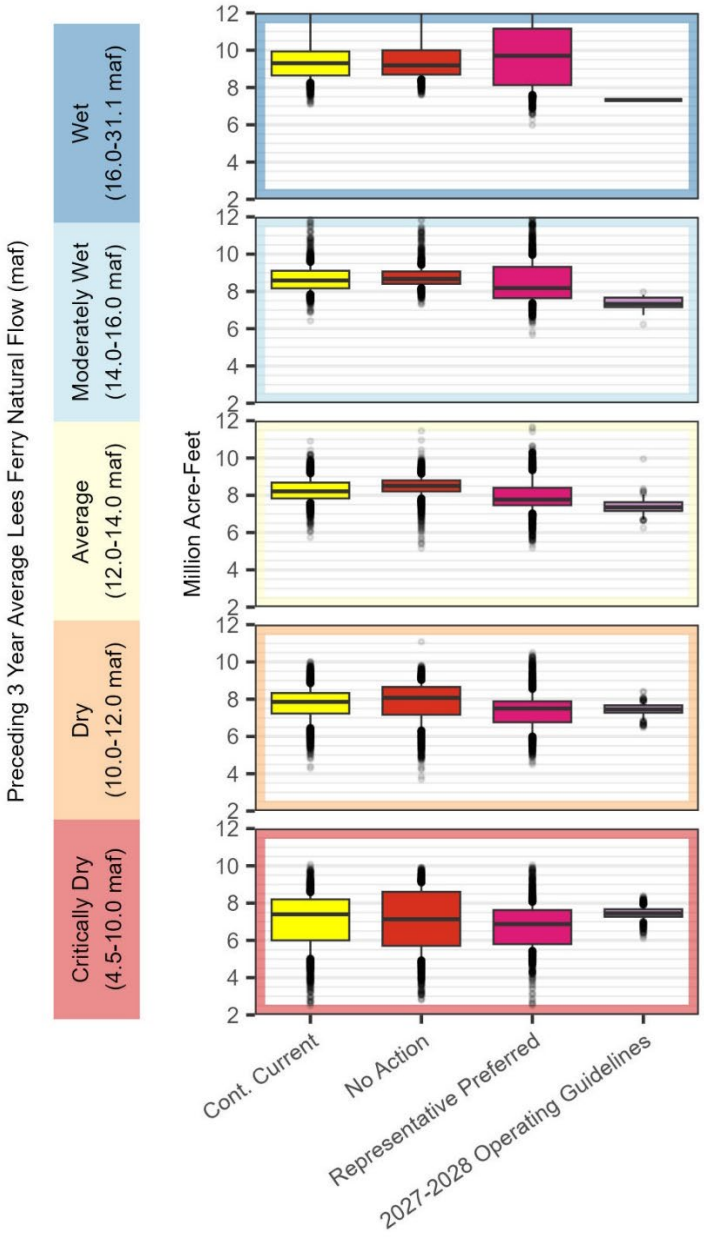
The 2027-2028 Operating Guidelines result in median CY Davis Dam releases of 7.4, 7.5, and 7.5 maf in the Average, Dry, and Critically Dry Flow Categories, respectively. Similar to Hoover releases, the median CY Davis release under the 2027-2028 Operating Guidelines is less than or equal to that under the Representative Preferred Alternative in all flow categories except the Critically Dry Flow Category. The boxplots for the 2027-2028 Operating Guidelines Davis release are similar to the Hoover release though there is slightly less variability. Variability in releases is driven by the same factors as the Hoover release (i.e., downstream diversions and intervening inflows). Overall, the CY Davis release under the 2027–2028 Operating Guidelines falls within the range of impacts evaluated for the Representative Preferred Alternative.

Parker Dam

Releases from Parker Dam, at Lake Havasu, are based on target elevations defined by the existing rule curve (refer to **TA 6**, Water Quality). Inflows into Lake Havasu vary across alternatives, and because elevations are kept to the range determined by the rule curve, releases from Parker Dam subsequently vary across alternatives.

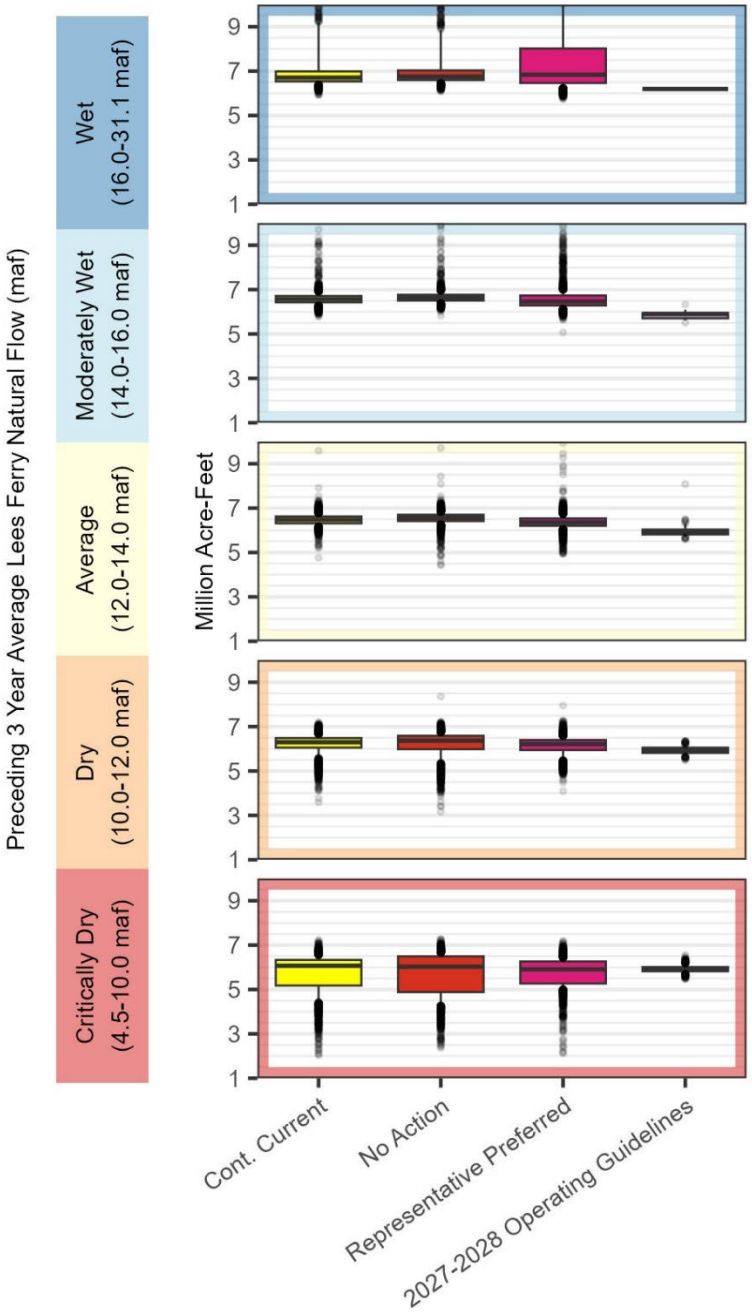
Figure T-11 presents conditional boxplots of CY releases from Parker Dam. The range of releases is truncated to facilitate comparisons between the alternatives, see **Table T-15** at the end of this appendix for the full statistical summary.

Figure T-10
CY Releases from Davis Dam[7]



[7] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-14** for the full range of the data.

Figure T-11
CY Releases from Parker Dam[8]



The 2027-2028 Operating Guidelines result in median CY Parker Dam releases of 5.9 maf in the Average, Dry, and Critically Dry Flow Categories. Similar to Hoover and Davis releases, the median CY Parker release under the 2027-2028 Operating Guidelines is lower than under the Representative Preferred Alternative in all flow categories except the Critically Dry Flow Category. The releases

[8] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-15** for the full range of the data.

from Parker Dam are affected by the assumed location (i.e., which CRSS water user) of the shortages and system conservation. **Attachment T1** provides details on these assumptions. Overall, the CY Parker release under the 2027–2028 Operating Guidelines falls within the range of impacts evaluated for the Representative Preferred Alternative.

River Flows

This section evaluates how operational activities affect river flows by comparing the 2027–2028 Operating Guidelines, CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative using the following metrics

- Annual Colorado River flows below Glen Canyon Dam
- Annual Colorado River flows below Hoover Dam
- Annual Colorado River flows below Davis Dam
- Annual Colorado River flows below Parker Dam
- Annual Colorado River flows at Imperial Dam
- Annual Colorado River flows below Imperial Dam
- Annual Colorado River flows below Morelos Diversion Dam

Reach 1: Glen Canyon Dam to Lake Mead

This reach of the river extends 292-miles from Glen Canyon Dam to Lake Mead through a series of narrow canyons, including Grand Canyon National Park. River flows in this reach primarily consist of controlled releases from Glen Canyon Dam at Lake Powell. Refer to **Section T.3.2** Reservoir Releases—Glen Canyon Dam, for the analysis of WY releases (**Figure T-6**) and 10-year cumulative releases (**Figure T-7**). While the results of the CRSS analysis are on an annual basis, monthly releases from Lake Powell at Glen Canyon Dam meet the 2016 LTEMP ROD (Reclamation 2016) minimum flows. Reclamation has the option to conduct high flow experiment releases from Glen Canyon Dam under certain conditions to reduce sediment deposition, which usually occurs in durations ranging from 60 hours to 10 days. Refer to **TA 5**, Geomorphology and Sediment, and **TA 8**, Biological Resources – Fish and Other Aquatic Species, for the analysis of high flow experiment flows from Glen Canyon Dam.

This reach also includes contributions from the Paria River and Little Colorado River, two perennial tributaries that discharge to the Colorado River between Glen Canyon Dam and Lake Mead. Based on historical USGS gage data, inflows from the Paria River and Little Colorado River make up approximately three percent of the total flow in this reach of the Colorado River (USGS 2025a). From 1906 to 2005, the annual inflow of the Paria River averaged 21.0 kafy and the Little Colorado River inflow averaged 180.0 kafy. Since 2007, the annual inflow from the Paria River averaged 17.0 kafy, and the Little Colorado River inflow averaged 274.0 kafy. Inflows from the Paria River and Little Colorado River were modeled in CRSS the same across alternatives.

Reach 2: Hoover Dam to Lake Mohave

This reach of the Colorado river) extends 67-miles from Hoover Dam at Lake Mead through Black Canyon, El Dorado Canyon, and Pyramid Canyon. Lake Mohave is on the downstream end of the reach, and acts hydraulically like a tailwater to Hoover Dam. River flows in this reach primarily

consist of releases from Hoover Dam, with small contribution from tributary inflows. According to the 2007 Final EIS, tributary inflows, mostly from side washes, comprise less than 1 percent of the total annual flow (Reclamation 2007a). Refer to **Section T.3.2** Reservoir Releases—Hoover Dam for the analysis of CY releases from Hoover Dam (**Figure T-9**).

Reach 3: Davis Dam to Lake Havasu

This reach of the Colorado River extends 84-miles from Davis Dam at Lake Mohave to Lake Havasu. River flows are primarily composed of releases from Davis Dam and tributary inflow from the Bill Williams River. Inflows from the Bill Williams River discharge directly into Lake Havasu and are regulated by the USACE operations of Alamo Dam. Annual inflow from the Bill Williams River averaged 102,000 af from 1906 through 2007, and 105,000 af from 2008 to 2022 (USGS 2025b).

Because releases from Davis Dam are the primary component that differs among alternatives, they are used as the basis for comparison. Refer to **Section T.3.2** Reservoir Releases—Davis Dam for the analysis of CY releases from Davis Dam (**Figure T-10**).

Reach 4: Parker Dam to Cibola Gage

This reach of the Colorado river extends 105-miles from Parker Dam at Lake Havasu to Reclamation's Cibola Gage. Flows in this reach primarily consist of releases from Parker Dam. Two major diversion dams are located in this reach of the river: Headgate Rock Dam and Palo Verde Diversion Dam. The impoundments of these dams are used to facilitate the diversion of water for the Colorado River Indian Tribes and Palo Verde Irrigation District.

The analysis of flows for this reach is based on CY release volumes from Parker Dam. Refer to **Section T.3.2** Reservoir Releases—Parker Dam for the analysis of CY releases from Parker Dam (**Figure T-11**).

Reach 5: Cibola Gage to Imperial Dam

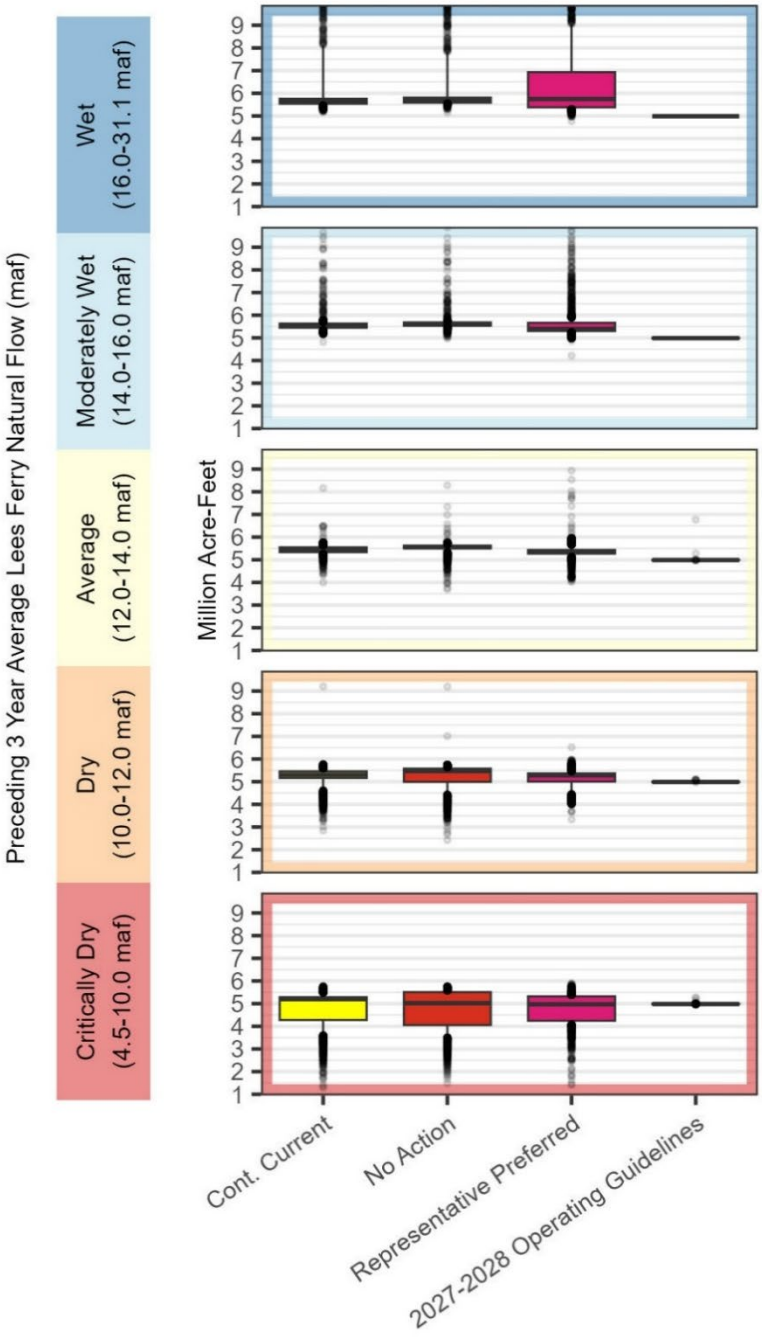
This reach of the river extends 38-miles from Reclamation's Cibola Gage to Imperial Dam at Imperial Reservoir. Flows in this reach consist primarily of releases from Parker Dam but are impacted by diversions and return flows. The Imperial Dam impoundment in this reach operates at a nearly constant elevation to meet water delivery requirements.

Figure T-12 presents conditional boxplots of annual flow volume at Imperial Dam. The range of volumes is truncated at the high end to facilitate comparisons between alternatives, see **Table T-16** at the end of this appendix for the full statistical summary.

The 2027-2028 Operating Guidelines result in median annual flow volume at Imperial Dam of 5.0 maf in the Average, Dry, and Critically Dry Flow Categories. The median annual flow volume at Imperial Dam under the 2027-2028 Operating Guidelines is less than or equal to that under the Representative Preferred Alternative in all flow categories. The annual flow volume boxplots at Imperial Dam for the 2027-2028 Operating Guidelines show variability only in the outliers, which are driven by intervening flows because releases from Hoover Dam are set to meet the downstream demands in consideration of the intervening flows. The annual flow volume at Imperial Dam is affected by the assumed location (i.e., which CRSS water user) of the shortages and system

conservation. **Attachment T1** provides details on these assumptions. Overall, the annual flow volume at Imperial Dam under the 2027–2028 Operating Guidelines falls within the range of impacts evaluated for the Representative Preferred Alternative.

Figure T-12
Annual Flow Volume at Imperial Dam[9]



[9] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-16** for the full range of the data.

Reach 6: Imperial Dam to Northerly International Boundary
This reach of the Colorado river extends 26-miles from Imperial Dam to the Northerly International Boundary (NIB) between the U.S. and Mexico. Flows in this reach primarily consist of releases from Imperial Dam to meet downstream delivery requirements. They also include leakage from the All-American Canal (AAC) sluiceway gates and return flows from Imperial Dam diversions.

Figure T-13 presents conditional boxplots of annual flow volume below Imperial Dam. The range of volumes is truncated at the high end to facilitate comparisons between alternatives, see **Table T-17** at the end of this appendix for the full statistical summary

The 2027-2028 Operating Guidelines result in median annual flow volume below Imperial Dam of 1.0 maf in the Average, Dry, and Critically Dry Flow Categories. The median annual flow volume below Imperial Dam under the 2027-2028 Operating Guidelines is lower than under the Representative Preferred Alternative in the Wet flow category but slightly higher in all other flow categories. Differences in the median performance are due to the lower shortage volume (1.5 maf) under the 2027-2028 Operating Guidelines compared to the shortages up to 3.6 maf included in the Representative Preferred Alternative. Overall, the annual flow volume below Imperial Dam under the 2027–2028 Operating Guidelines falls within the range of impacts evaluated for the Representative Preferred Alternative.

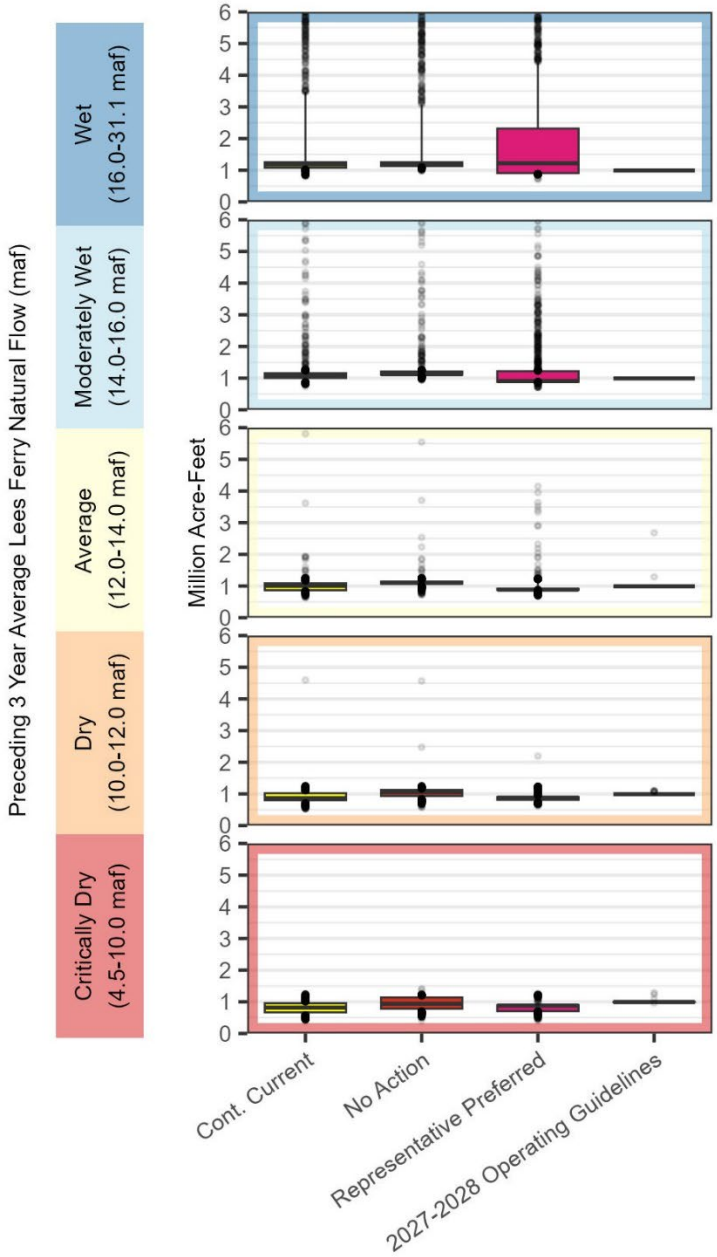
Reach 7: Northerly International Boundary in the Limitrophe to Southerly International Boundary
This reach of the river, beginning at the NIB, is divided into two sub reaches. Approximately 1.1-miles downstream from the NIB is Moreles Dam, where, under normal operations, the remaining Colorado River flow is diverted into Mexico's Reforma Canal for water supply.

Downstream of Morelos Diversion Dam, the reach continues to the SIB and the Colorado River Delta. Flows in this reach, referred to as the limitrophe, consist of water in excess of Mexico's scheduled delivery. Excess flows may result from flood control operations at Hoover Dam, seepage from Morelos Diversion Dam, irrigation return flows, groundwater inflows, or water released for environmental purposes in the Colorado River Delta.

Figure T-14 presents conditional boxplots of annual flow volume below Morelos Diversion Dam. The range of volumes is truncated to facilitate comparisons between alternatives, se**e Table T-18** at the end of this appendix for the full statistical summary.

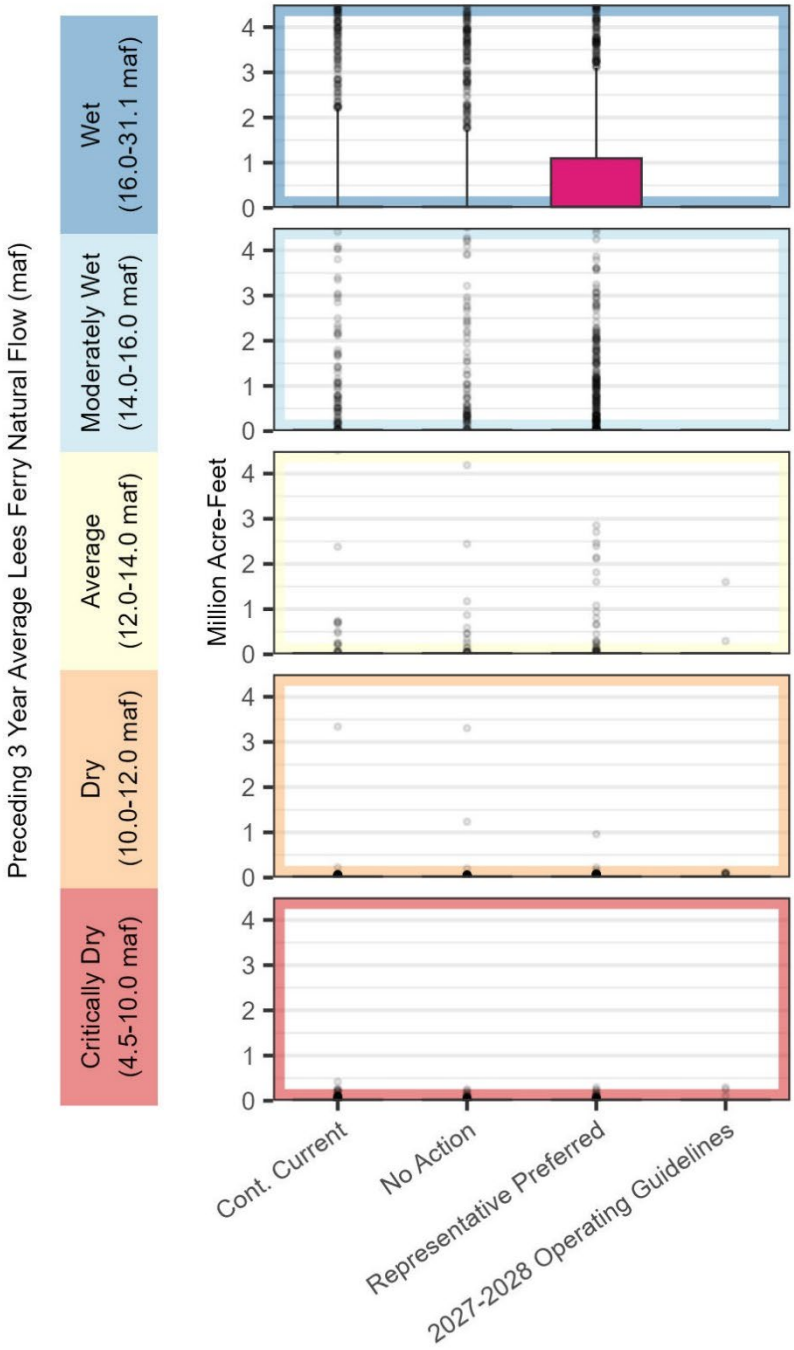
The 2027-2028 Operating Guidelines result in median annual flow volume below Morelos Diversion Dam of 0.0 maf in all flow categories. Although annual flows below Morelos Diversion Dam are infrequent in the two-year period coved by the 2027-2028 Operating Guidelines, flows in the limitrophe can exceed 10 maf (see **Table T-18**) when they do occur. These are the result of exceptionally high intervening flows included in some of the hydrologic futures included in the modeling analysis. Overall, the annual flow volume below Morelos Diversion Dam under the 2027–2028 Operating Guidelines falls within the range of impacts evaluated for the Representative Preferred Alternative.

Figure T-13
Annual Flow Volume Below Imperial Dam[10]



[10] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-17** for the full range of the data.

Figure T-14
Annual Flow Volume Below Morelos Diversion Dam[11]



[11] The plotting range has been truncated to facilitate comparison of the alternatives. Consult **Table T-18** for the full range of the data.

Groundwater

Regional scale changes to groundwater are complex and hard to quantify without extensive data records and groundwater models. Current data on groundwater at a regional scale is limited in scope and historical duration.

There are no legal requirements to not deplete groundwater for nearby wells, although decreasing reservoir elevations may contribute to decreased groundwater elevations depending on hydraulic connectivity. Secondary impacts on groundwater are not considered in this analysis (e.g., if actions under the various alternatives would result in more groundwater pumping occurring in order to supplement decreased supply). See **TA 3**, Hydrologic Resources, *Issue 5: Groundwater*, for a discussion of impacts.

T.3.3 Water Deliveries

Impact Analysis Area

The geographic scope of the water deliveries analysis is the Colorado River corridor from the upstream limit of full pool elevation of Lake Powell to the downstream limit of the Southerly International Boundary. The geographic scope of this EIS does not extend above Lake Powell and accordingly does not include an analysis of the impact on Upper Basin water users. Although some of the alternatives include assumptions about Upper Basin conservation, they do not specify where conserved water is generated or the specific activities used to create those conservation volumes (see **Appendix B**, Modeling Assumptions, for more information).

Impact Indicators

This section discusses impacts on the Lower Division States' water deliveries, deliveries to Mexico, and the distribution of shortages within the Lower Division States. To quantify impacts, the following indicators are used:

- Magnitude of shortage volumes
- Distribution of shortages and depletions among the Lower Division States

Lower Division States Water Supply Determinations

This section evaluates the effects of operational activities on water deliveries to the Lower Division States and Mexico by comparing the 2027–2028 Operating Guidelines, CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative using the following metrics:

- Annual Lower Basin Reductions (Shortage and Lake Mead Dead Pool–Related Reductions)
- Annual Lower Basin Shortage
- Annual Shortage by State (Arizona, California, Nevada) and water delivery reductions to Mexico
- Annual Depletions by State (Arizona, California, Nevada) and Mexico
- Surplus

Shortages & Dead Pool–Related Reductions

Shortage refers to delivery reductions at the Basin, state, or individual apportionment level that are defined and distributed as part of an alternative's shortage operations. Volumes and distributions of shortage are described in **Chapter 2,** Description of Alternatives. Dead pool–related reductions occur when there is not enough water in Lake Mead to fully meet downstream demands and/or when Hoover Dam infrastructure constraints result in releases below the demand volume. In some cases, these unplanned reductions occur because Lake Mead is approaching dead pool (elevation 895 feet) and in some cases they occur higher (up to elevation 950 feet).

The approach to distributing unplanned reductions associated with dead pool is not a component of any alternative. Although itis important for the impact analysis to show the volumes of these reductions, it is not appropriate to evaluate their effects on specific states or users. Accordingly, the results included beyond this section focus on shortages only. Any impacts associated with dead pool–related reductions are specifically noted.

Annual Lower Basin Reductions

Figure T-15 shows annual Lower Basin shortages and dead pool–related reductions for each alternative using conditional boxplots. The boxplots show how the alternatives perform under varying hydrologic conditions, defined by the preceding three-year average of Lees Ferry natural flow. The bottom and top of each box captures the 25th to 75th percentile of the modeled results, respectively. The lines extend to the 10th and 90th percentiles, and outliers are shown as dots. To enable easier comparison of all flow categories, the vertical axes may have been truncated at the high end and some outliers in the Critically Dry Flow Category may have been omitted. Statistical summaries of the left and right columns are provided in **Table T-19** and **Table T-20** at the end of this appendix.

Under the 2027–2028 Operating Guidelines, an annual shortage of 1.25 maf is distributed among the Lower Division States. For this analysis, an assumed reduction to Mexico increases the total annual Lower Basin shortage to 1.5 maf. Accordingly, as shown in **Figure T-15**, the 2027–2028 Operating Guidelines result in a fixed annual Lower Basin shortage of 1.5 maf across all flow categories. This shortage falls within the range of outcomes evaluated for the Representative Preferred Alternative, which has annual shortages ranging from 0 to 3.6 maf.

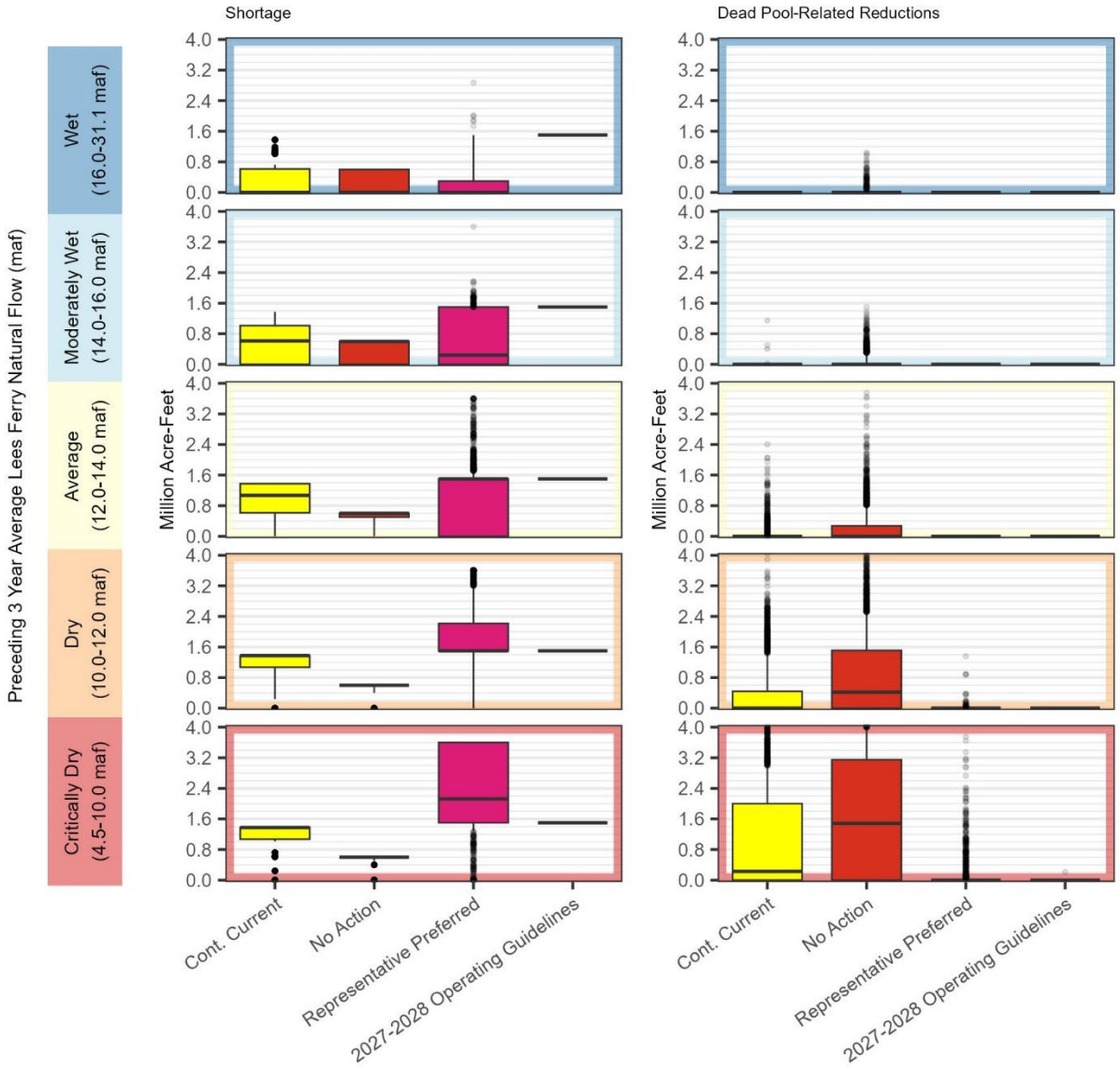
In general, smaller maximum shortage volumes correspond to more frequent and larger dead pool–related reductions, seen most prominently in the No Action Alternative. Dead pool–related reductions occur when there is not enough water in Lake Mead to fully meet downstream demands and/or when Hoover Dam infrastructure constraints result in releases below the demand volume. As shown in **Figure T-15**, the 2027–2028 Operating Guidelines result in relatively small dead pool–related reductions. This primarily reflects the short two-year analysis period and the initial reservoir conditions, rather than indicating that a 1.5 maf shortage is sufficient to avoid dead pool–related reductions under longer-term conditions.

In the Average Flow Category, neither the 2027–2028 Operating Guidelines nor the Representative Preferred Alternative results in dead pool–related reductions. In the Dry Flow Category, the 2027–2028 Operating Guidelines result in no dead pool–related reductions, whereas the Representative Preferred Alternative has a median dead pool–related reduction of zero and a maximum reduction

of 1.4 maf. This reflects the influence of the 2027 initial reservoir conditions rather than a significant distinction in performance (see **Section T.3.1**, Methodology) In the Critically Dry Flow Category, the Representative Preferred Alternative has a median dead pool–related reduction of zero and a maximum reduction of 3.8 maf, compared with a maximum reduction of 0.2 maf under the 2027–2028 Operating Guidelines.

Overall, impacts under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

Figure T-15
Annual Lower Basin Reductions



Note: Shortage and dead pool-related reduction volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions

Annual Lower Basin Shortage

Figure T-16 shows shortages to each Lower Basin State and Mexico using four columns of conditional boxplots. The vertical axis for each state's column is scaled based on its respective volume of apportionment or allotment; the percent apportionment is shown on the left side of each column, and the absolute volume of shortage is shown on the right. Statistical summaries of the data are provided in **Table T-21** through **Table T-24** at the end of this appendix.

As shown in **Figure T-16**, the 2027–2028 Operating Guidelines result in an Arizona shortage of 760 kaf, or 27.1 percent of Arizona's apportionment, in each flow category. This shortage is lower than the Representative Preferred Alternative median shortage in the Average, Dry, and Critically Dry Flow Categories. In the Average Flow Category, the Representative Preferred Alternative has a median shortage of 41.7 percent of Arizona's apportionment and a maximum of 68.3 percent. In the Dry Flow Category, the median remains at 41.7 percent, while the maximum increases to 70.2 percent. In the Critically Dry Flow Category, the median increases to 53.1 percent, the maximum remains at 70.2 percent, all of which exceed the shortage under the 2027–2028 Operating Guidelines.

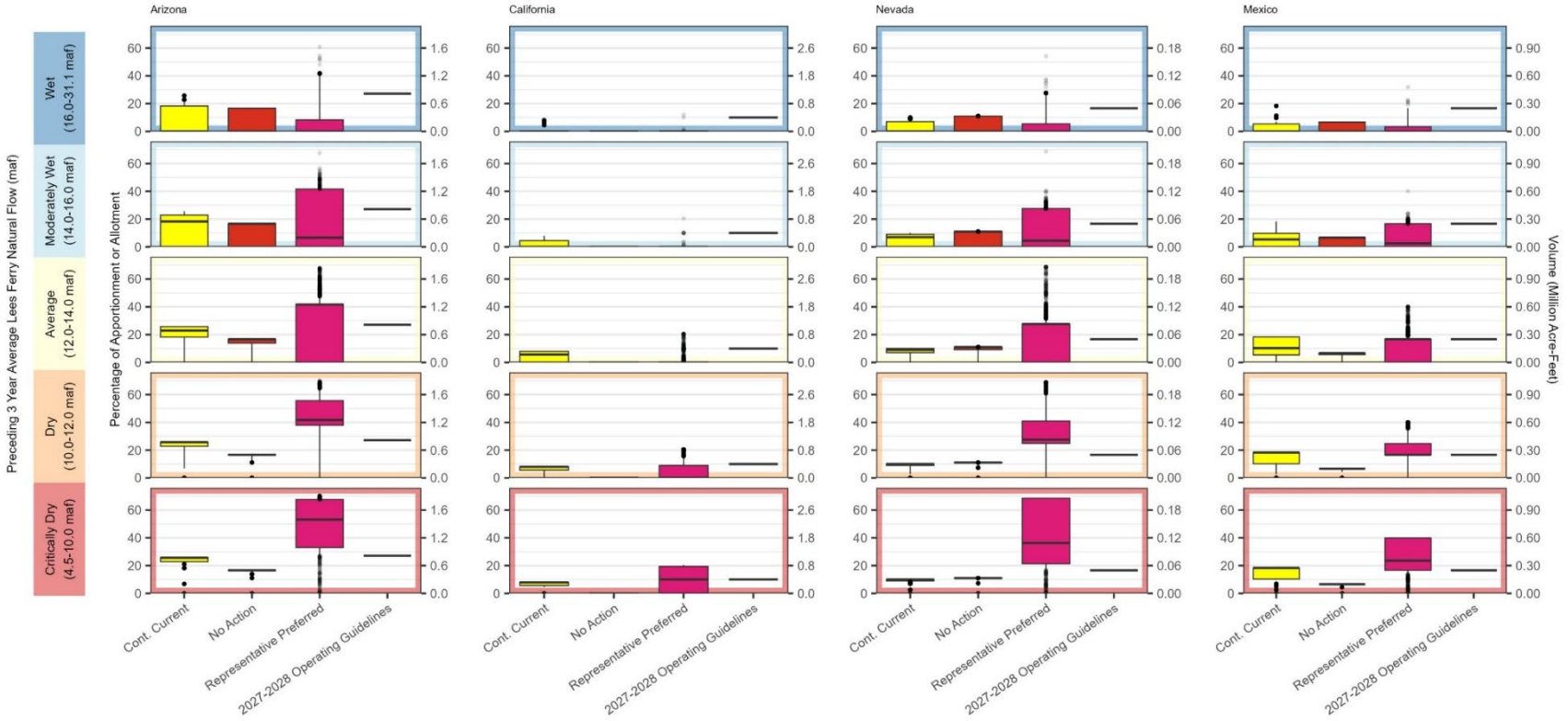
The 2027–2028 Operating Guidelines result in a California shortage of 440 kaf, or 10.0 percent of California's apportionment, in each flow category. This shortage exceeds the Representative Preferred Alternative median shortage in the Average and Dry Flow Categories and is equal to the median shortage in the Critically Dry Flow Category. In the Average Flow Category, the Representative Preferred Alternative has a median shortage of 0 percent of California's apportionment and a maximum of 20.5 percent. In the Dry Flow Category, the median remains at 0 percent and the maximum remains at 20.5 percent, with the shortage under the 2027–2028 Operating Guidelines exceeding the median but remaining below the maximum. In the Critically Dry Flow Category, the median increases to 10.0 percent of California's apportionment, equal to the shortage under the 2027–2028 Operating Guidelines, while the maximum remains at 20.5 percent.

For Nevada, the 2027–2028 Operating Guidelines result in a shortage of 50 kaf, or 16.7 percent of Nevada's apportionment, in each flow category. This shortage is lower than the Representative Preferred Alternative median shortage in the Average, Dry, and Critically Dry Flow Categories. In both the Average and Dry Flow Categories, the Representative Preferred Alternative has a median shortage of 27.6 percent of Nevada's apportionment and maximum of 68.7 percent. In the Critically Dry Flow Category, the median increases to 36.3 percent, the maximum remains at 68.7 percent, all of which exceed the shortage under the 2027–2028 Operating Guidelines.

For purposes of this analysis, the 2027–2028 Operating Guidelines are evaluated assuming a reduction to Mexico of 250 kaf, or approximately 16.67 percent of Mexico's allotment. This reduction is equal to the Representative Preferred Alternative median reduction in the Average and Dry Flow Categories and lower than the median reduction in the Critically Dry Flow Category. In both the Average and Dry Flow Categories, the Representative Preferred Alternative has a median reduction of 16.67 percent of Mexico's allotment and a maximum of 40.0 percent. In the Critically Dry Flow Category, the median increases to 23.6 percent, the maximum remains at 40.0 percent, all of which exceed the reduction under the 2027–2028 Operating Guidelines.

Overall, impacts under the 2027–2028 Operating Guidelines fall within the range of impacts evaluated for the Representative Preferred Alternative.

Figure T-16
CY Shortage by State and Water Delivery Reductions to Mexico



Note: The modeled annual delivery reductions in Mexico include modeling assumptions for reductions in water deliveries to Mexico and storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

Depletions

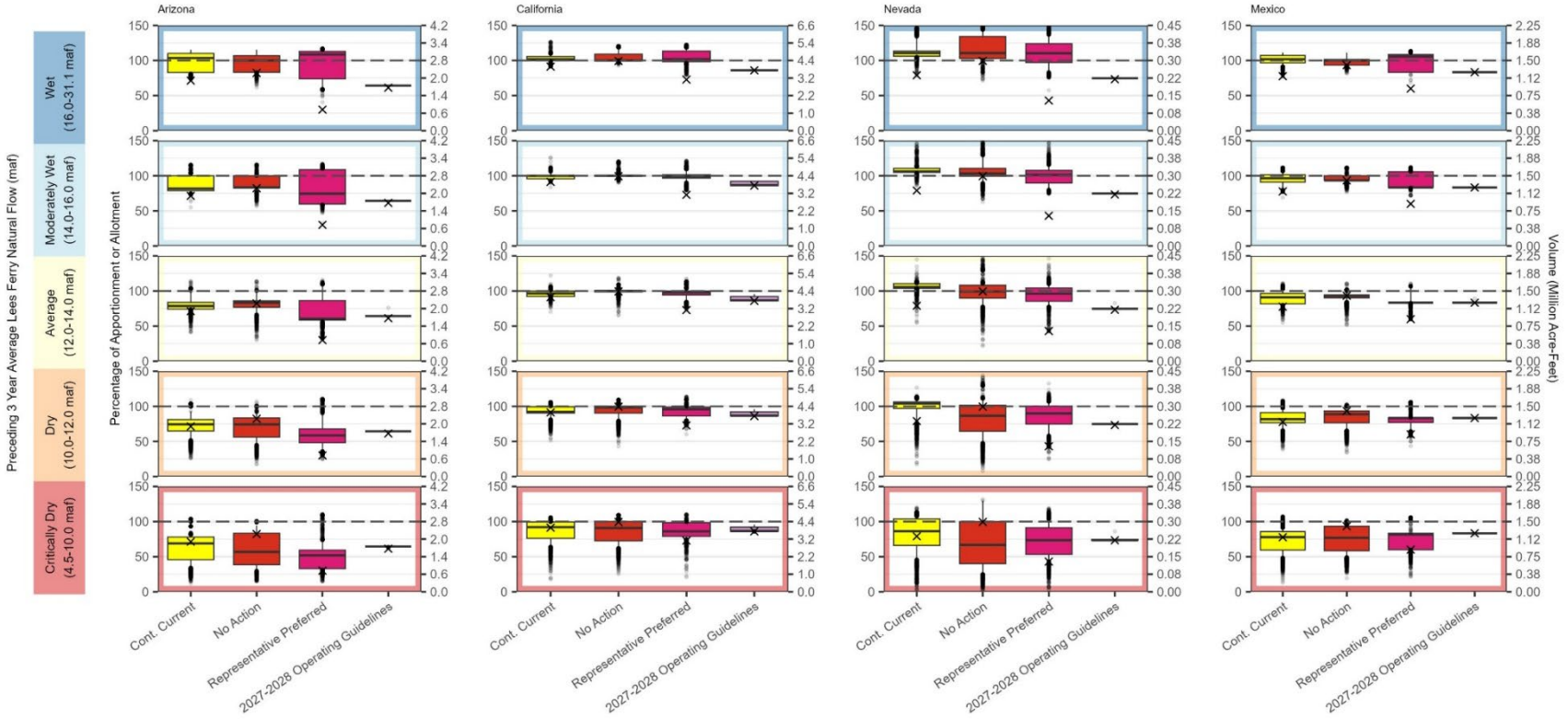
This section compares annual depletions for the Lower Division States and Mexico under the 2027–2028 Operating Guidelines, the Representative Preferred Alternative, the No Action Alternative, and the CCS Comparative Baseline. Depletion (also referred to as total consumptive use) is the net amount of water used and is calculated as the amount of water diverted from the river minus the return flow. Return flow is the portion of diverted water that is not consumed and returns to the river for subsequent downstream use. Depletions are influenced by the total shortage volume, the approach used to distribute shortages among the Lower Division States and Mexico, and modeling assumptions related to voluntary conservation mechanisms. Dead pool–related reductions are reflected in the depletion results presented in this section.

Figure T-17 shows annual depletions for each Lower Basin State and Mexico using four columns of conditional boxplots. Results are presented as both a percentage of apportionment or allotment (left axis) and a depletion volume (right axis). Unless otherwise noted, results are described in terms of percentage of apportionment or allotment. A dashed line at 100 percent of apportionment or allotment is included in each panel for reference. Each alternative also includes an "X" marker indicating the smallest depletion volume unaffected by dead pool–related reductions from Lake Mead; data points below the marker reflect depletions affected by infrastructure constraints at Lake Mead elevations near dead pool. The depletion volume associated with the marker differs among alternatives because shortage volumes vary, affecting the occurrence and magnitude of dead pool–related reductions. Statistical summaries of the data are provided in **Table T-25** through **Table T-28** at the end of this appendix.

Note, for the 2027–2028 Operating Guidelines, variability in depletions across flow categories reflects modeling assumptions related to Lake Mead storage and the delivery of conserved water rather than differences in shortage volumes (there is no variation in shortage volumes for 2027-2028 Operating Guidelines, as described in **Section T.2.1** and shown in **Figure T-16**). See **Attachment T1** for additional information on modeling assumptions specific to the 2027–2028 Operating Guidelines.

As shown in **Figure T-17**, the 2027–2028 Operating Guidelines result in Arizona depletions of approximately 1,802 kaf, or approximately 64.4 percent of Arizona's apportionment, in each flow category. This depletion exceeds the Representative Preferred Alternative median depletion in the Average and Dry Flow Categories and falls within the range of Representative Preferred Alternative outcomes in the Critically Dry Flow Category. In the Average Flow Category, the Representative Preferred Alternative has a median depletion of 60.4 percent of Arizona's apportionment and a maximum of 115.9 percent. In the Dry Flow Category, the median decreases to 58.5 percent, while the maximum decreases to 111.3 percent. In the Critically Dry Flow Category, the median decreases to 51.8 percent, the maximum decreases to 110.0 percent. The 2027–2028 Operating Guidelines depletions fall within the range of Representative Preferred Alternative outcomes.

Figure T-17
Annual Lower Basin Depletions



The 2027–2028 Operating Guidelines result in California depletions of approximately 3,810 kaf, or approximately 86.6 percent of California's apportionment, in each flow category. This depletion is lower than the Representative Preferred Alternative median depletion in the Average and Dry Flow Categories and falls between the median and maximum in the Critically Dry Flow Category. In the Average Flow Category, the Representative Preferred Alternative has a median depletion of 98.3 percent of California's apportionment and a maximum of 117.5 percent. In the Dry Flow Category, the median decreases to 95.8 percent, while the maximum decreases to 113.4 percent. In the Critically Dry Flow Category, the median decreases to 86.0 percent, the maximum decreases to 109.8 percent, with the 2027–2028 Operating Guidelines depletions falling within this range.

For Nevada, the 2027–2028 Operating Guidelines result in depletions of approximately 224 kaf, or approximately 74.7 percent of Nevada's apportionment. This depletion is lower than the Representative Preferred Alternative median depletion in the Average and Dry Flow Categories. In the Average Flow Category, the Representative Preferred Alternative has a median depletion of 96.1 percent of Nevada's apportionment and a maximum of 146.5 percent. In the Dry Flow Category, the median decreases to 89.7 percent, while the maximum decreases to 132.4 percent. In the Critically Dry Flow Category, the median depletion decreases to 73.3 percent—equal to the 2027–2028 Operating Guidelines median depletion—while the maximum decreases to 119.0 percent, placing the 2027–2028 Operating Guidelines depletions within the range Representative Preferred Alternative outcomes.

For purposes of this analysis, the 2027–2028 Operating Guidelines are evaluated assuming an annual reduction to Mexico of 250 kaf, resulting in annual depletions of approximately 1,250 kaf, or approximately 83.3 percent of Mexico's allotment. In the Average Flow Category, the Representative Preferred Alternative has a median depletion of 83.3 percent of Mexico's allotment and a maximum of 110.6 percent. In the Dry Flow Category, the median remains at 83.3 percent, while the maximum decreases to 106.5 percent. In the Critically Dry Flow Category, the median decreases to 81.5 percent, the maximum decreases to 105.6 percent. The 2027–2028 Operating Guidelines median depletion is equal to the Representative Preferred Alternative median depletion in the Average and Dry Flow Categories and exceeds the median but remains below the maximum in the Critically Dry Flow Category.

Overall, depletions under the 2027–2028 Operating Guidelines fall within the range of Representative Preferred Alternative outcomes.

Surplus

As noted in **Section T.2.1**, the 2027–2028 Operating Guidelines require consultation regarding reduced shortage volumes or the availability of Surplus when the EOCY Lake Mead elevation is projected to exceed 1,145 feet. For this analysis, the maximum EOCY Lake Mead elevation in 2027 is approximately 1,106 feet, which is below the 1,145-foot threshold. Although modeled EOCY elevations in 2028 exceed 1,145 feet **(Figure T-4)**, any resulting Surplus determination would apply to 2029 and is, therefore, beyond the scope of this analysis.

See **TA 4**, Water Deliveries, for additional information on the percentage of years with Surplus deliveries for the CCS Comparative Baseline, No Action Alternative, and Representative Preferred Alternative.

T.3.4 Other Environmental Resource Areas

Impacts to other resources are expected to fall within the range shown for the Representative Preferred Alternative in the technical appendices (**Volume III**). This is because impacts to these resources are driven primarily by reservoir elevations and releases, which are similar under the 2027-2028 Operating Guidelines and the Representative Preferred Alternative, as discussed in **Section T.3.1** above.

Specifically, results for the Dry and Critically Dry Flow Categories under the Representative Preferred Alternative best represent the range of potential impacts under the 2027-2028 Operating Guidelines. Impacts in 2027 fall within the Critically Dry Flow Category because of dry Lees Ferry natural flow conditions in 2024-2026 (see **Appendix G**, CRSS Initial Conditions, **Table G-2**). Although the flow category in 2028 depends on 2027 hydrology, impacts within the Dry and Critically Dry Flow Categories are the most plausible. Achieving the Average Flow Category in 2028 would require a Lees Ferry natural flow greater than 17.9 maf to occur in 2027, which occurred only once this century (2011). The Moderately Wet Flow Category would require a Lees Ferry natural flow greater than 23.9 maf, which has occurred only once in the historical record (1984), while the Wet Flow Category would require a Lees Ferry natural flow greater than 29.9 maf, which has never occurred in the historical record.

Modeling results for the 2027-2028 Operating Guidelines also show that annual releases from Glen Canyon Dam (**Figure T-6**) and Hoover Dam (**Figure T-9**) are generally greater than those under the Representative Preferred Alternative, particularly in the Dry and Critically Dry Flow Categories, while remaining within the range of Representative Preferred Alternative outcomes. These larger releases may mitigate adverse impacts to several resources, including hydropower, air quality, socioeconomics, population and land use, and indian trust assets.

Table T-4 below summarizes how the potential environmental impacts under the 2027-2028 Operating Guidelines compare with the modeled impacts for the Representative Preferred Alternative shown in **Volume III**. The *Explanation* column provides the basis for these comparisons by relating reservoir elevations and releases under 2027-2028 Operating Guidelines to those under the Representative Preferred Alternative, as shown in in **Figure T-3** (Lake Powell pool elevation), **Figure T-4** (Lake Mead pool elevation), **Figure T-6** (Glen Canyon Dam WY releases), and **Figure T-9** (Hoover Dam CY releases), with a focus on the Dry and Critically Dry Flow Categories.

Table T-4
Potential Environmental Impacts of the 2027-2028 Operating Guidelines Compared to the Representative Preferred Alternative

Resource	Potential Environmental Impact	Explanation
Geomorphology and Sediment (TA-5)	Similar to the Representative Preferred Alternative.	Lake Powell elevations are similar between the 2027-2028 Operating Guidelines and the Representative Preferred Alternative, indicating impacts on the ability to perform High Flow Experiments are expected to be similar.
Water Quality (TA-6)	Salinity concentration below Hoover Dam could be similar to or lower than the Representative Preferred Alternative. Impacts to dissolved oxygen and temperature below Glen Canyon Dam are expected to be similar to the Representative Preferred Alternative.	Calendar year releases from Hoover Dam under the 2027-2028 Operating Guidelines tend to be larger than under the Representative Preferred Alternative. Dissolved Oxygen and temperature are heavily impacted by Lake Powell elevations, which are similar.
Air Quality (TA-7)	Shoreline dust emissions from Lake Powell and Lake Mead are expected to be similar to the Representative Preferred Alternative.	2027-2028 Operating Guidelines have similar elevations but higher releases from Glen Canyon Dam and Hoover Dam, which could result in more hydropower production, mitigating the need for ancillary power sources. Similar reservoir elevations indicate similar shoreline dust emissions.
Fish and Aquatic Resources (TA-8)	Smallmouth bass (SMB) growth rate (lambda), SMB entrainment, and temperatures below Glen Canyon Dam are expected to be similar to the Representative Preferred Alternative. Important barriers to upstream fish movement (Lake Powell elevations 3,598, 3,600, 3,666.5 feet and Lake Mead elevation 1,090 feet) are expected to be maintained except under average or wetter hydrology. Minimum monthly releases from Hoover Dam and instream flows in reaches below Hoover Dam are expected to be higher than under the Representative Preferred Alternative.	Lambda, entrainment, and temperatures are heavily influenced by reservoir elevations, which are similar to the Representative Preferred Alternative. Important fish barriers are expected to be maintained in 2027-2028 due to low initial reservoir conditions. Flows in reaches below Hoover Dam are expected to be similar or greater than under the Representative Preferred because modeled Lower Basin shortages do not exceed 1.5 maf compared to 3.6 maf in the Representative Preferred Alternative.

Resource	Potential Environmental Impact	Explanation
Vegetation (TA-9)	Impacts to vegetation at Lake Powell are expected to be similar to the Representative Preferred Alternative. Impacts in the Grand Canyon are expected to be similar, as well, but with potentially less encroachment towards the river channel. Similar or less negative impacts to vegetation at Lake Mead and in reaches below Lake Mead are expected.	Lake Powell annual releases are similar enough that variability in inflows could have a greater impact on Lake Powell vegetation, and inflows are very similar between alternatives. Less encroachment in the Grand Canyon may occur because of larger releases under the Critically Dry Flow Category compared to the Representative Preferred Alternative. Releases from Lake Mead are less variable under the 2027-2028 Operating Guidelines, which may benefit marsh and woody vegetation.
Terrestrial Wildlife (TA-10)	Same as Vegetation	Same as Vegetation
Cultural Resources (TA-11)	Impacts similar as shown for the Representative Preferred Alternative.	Reservoir elevations are similar to Representative Preferred Alternative.
Paleontological Resources (TA-12)	Impacts similar as shown for the Representative Preferred Alternative.	Reservoir elevations are similar to the Representative Preferred Alternative.
Tribal Resources (TA-13)	Impacts similar as described for the Representative Preferred Alternative, but with potentially less exposure of sites near the riverbank.	Reservoir elevations are similar to the Representative Preferred Alternative, but releases under Critically Dry and Dry Flow Categories tend to be greater than the Representative Preferred Alternative.
Recreation (TA-14)	Proportion of recreation sites open is expected to be similar. Access to boat ramps at or above 1,040 feet at Lake Mead and above 3,590 feet at Lake Powell may be limited. Boating hazards due to elevations below 1,170 feet at Lake Mead and below 3,620 feet at Lake Powell are expected. Flows above 8,000 cfs and 5,000 cfs below Glen Canyon for whitewater boating are expected to be maintained at similar or higher frequencies. compared to the Representative Preferred Alternative.	Low initial reservoir conditions result in a low proportion of recreation sites open and suggest boat ramps at or above 1,040 feet at Lake Mead and 3,590 feet at Lake Powell may not be available unless hydrologic conditions improve. Likewise, elevations above 1,170 feet at Lake Mead and 3,620 at Lake Powell are unlikely in 2027-2028. Flows below Glen Canyon are expected to be similar or higher because the 2027-2028 Operating Guidelines tend to release larger annual volumes in Dry and Critically Dry Flow Categories than the Representative Preferred Alternative.

Resource	Potential Environmental Impact	Explanation
Dams and Electrical Power Resources (TA-15)	Both Glen Canyon Dam and Hoover Dam generation and capacity could be similar or greater than what is shown for the Representative Preferred Alternative. Minimum power pool elevations of 3,490 feet at Glen Canyon Dam and 950 feet at Hoover Dam are expected to be maintained. Loss of hydropower production due to Lake Mead elevations below 1,035 feet can occur under the Dry and Critically Dry Flow Categories. Risk to infrastructure due to high reservoir elevations is unlikely.	Similar elevations but larger releases compared to the Representative Preferred Alternative could result in greater capacity and generation. Elevations below 3,490 and 950 feet occur only as the outliers in the Critically Dry category. Elevations below 1,035 feet at Lake Mead occur frequently in the Dry and Critically Dry category due to low initial conditions and a maximum shortage of 1.5 maf. High reservoir elevations only occur in the Moderately Wet and Wet Flow Categories.
Socioeconomics (TA-16)	Impacts to cropland, market value, jobs, labor income, and total economic output are the same as reported for 'Representative Preferred (2027-2028)', but only up to 1.5 maf of shortage. The economic values of angling and rafting below Glen Canyon Dam are expected to be similar or higher than the Representative Preferred Alternative.	TA-16 reports impacts to cropland, market value, jobs, labor income, and total economic output under the LB Priority distribution and 1.5 maf of shortage, consistent with the 2027-2028 Operating Guidelines. Similar elevations but larger releases may increase the projected economic value of angling and rafting.
Population and Land Use (TA-17)	Impacts similar to or less than what is shown for the Representative Preferred Alternative are expected.	2027-2028 Operating Guidelines implement a maximum shortage of 1.5 maf whereas the Representative Preferred Alternative has a maximum of 3.6 maf.
Indian Trust Assets (TA-18)	Impacts similar to or less than what is shown for the Representative Preferred Alternative are expected.	2027-2028 Operating Guidelines implement a maximum shortage of 1.5 maf whereas the Representative Preferred Alternative has a maximum of 3.6 maf.
Visual Resources (TA-19)	Height of calcium carbonate rings at Lake Powell and Lake Mead are expected to be similar to what is shown for the Representative Preferred Alternative. Cathedral in the Desert is expected to be visible and accessible.	Elevations are similar to what is shown for the Representative Preferred Alternative. Due to low initial conditions, elevations are expected below 3,550 feet in 2027-2028 unless hydrologic conditions are Average or wetter.

T.4 Summary

This analysis shows that the anticipated 2027-2028 Operating Guidelines generally have similar or higher Lake Powell and Lake Mead elevations than the Representative Preferred Alternative, particularly in the Dry and Critically Dry Flow Categories at the median and lower percentiles. Where there are differences, these mainly reflect the shorter timeframe for the 2027-2028 Operating Guidelines and the influence of the 2027 initial reservoir conditions rather than a significant distinction in performance (see **Section T.3.1**, Methodology) The analysis of Lake Powell elevations shows that the modeled Lake Powell operations in the 2027-2028 Operating Guidelines, which adjust to maintain elevation 3,510 feet, are effective at avoiding elevation 3,500 feet. Only the outliers below the 10th percentile in the Dry Flow Category and the 25th percentile and below in the Critically Dry Flow Category fall below elevation 3,500 feet.

The 2027-2028 Operating Guidelines do not model shortages above 1.5 maf, but do include 700 kaf of additional system conservation, while the Representative Preferred Alternative includes shortages up to 3.6 maf. This affects the variability in releases from Hoover Dam as well as the flows in all reaches below Hoover Dam. This variability is also reflected in the analysis of Lower Basin shortages and deliveries, which only vary due to the assumed ICS behavior. The analysis of Lake Mead elevation and the dead pool-related reductions indicates that given the expected initial conditions in 2027, the 2027-2028 Operating Guidelines are effective at protecting elevation 950 feet at Lake Mead; however, there are still some cases where Lake Mead declines below elevation 1,000 feet in the two-year period, particularly in the Critically Dry Flow Category.

For all of the analyzed impact indicators in the Hydrologic Resources and Water Deliveries, and given the expected initial conditions in 2027, the potential impacts of the 2027-2028 Operating Guidelines are within the range of potential impacts associated with the Representative Preferred Alternative. Impacts to other resources are expected to fall within the range shown for the Representative Preferred Alternative in the technical appendices. This is because impacts to these resources are driven primarily by reservoir elevations and releases, which are similar under the 2027-2028 Operating Guidelines and the Representative Preferred Alternative.

T.5 References

Bureau of Reclamation (Reclamation). 2016. Glen Canyon Dam Long-Term Experimental and Management Plan Final Environmental Impact Statement. Upper Colorado Region, Salt Lake City, Utah, and National Park Service, Intermountain Region, Lakewood, Colorado. Internet website: https://ltempeis.anl.gov/documents/final-eis/.

United States Geological Survey (USGS). 2025a. USGS Water Data for the Nation: Gage Data for Paria River at Lees Ferry, AZ USGS Gage 09382000. Internet website: https://waterdata.usgs.gov/monitoring-location/USGS-09382000.

_____. 2025b. USGS Water Data for the Nation: Gage Data for Bill Williams River Near Parker, AZ. USGS Gage 09426620. Internet website: https://waterdata.usgs.gov/monitoring-location/USGS-09426620.

Statistical Summary Tables

Table T-5
Minimum Water Year Elevation (Feet) at Lake Powell

Alternative	Flow Category	Max (feet)	90% (feet)	75% (feet)	50% (feet)	25% (feet)	10% (feet)	Min (feet)
CCS Comparative Baseline	16-31.1	3,686	3,680	3,676	3,667	3,643	3,604	3,499
CCS Comparative Baseline	14-16	3,686	3,675	3,659	3,609	3,560	3,534	3,462
CCS Comparative Baseline	12-14	3,683	3,649	3,589	3,549	3,508	3,492	3,414
CCS Comparative Baseline	10-12	3,667	3,573	3,535	3,500	3,478	3,456	3,398
CCS Comparative Baseline	4.5-10	3,625	3,510	3,499	3,471	3,426	3,408	3,396
No Action	16-31.1	3,686	3,680	3,677	3,671	3,658	3,619	3,503
No Action	14-16	3,687	3,677	3,668	3,630	3,571	3,534	3,433
No Action	12-14	3,685	3,660	3,622	3,549	3,490	3,465	3,411
No Action	10-12	3,669	3,609	3,523	3,471	3,449	3,432	3,398
No Action	4.5-10	3,630	3,514	3,479	3,436	3,415	3,407	3,396
Representative Preferred	16-31.1	3,683	3,674	3,665	3,648	3,630	3,617	3,562
Representative Preferred	14-16	3,681	3,641	3,630	3,614	3,595	3,579	3,497
Representative Preferred	12-14	3,658	3,615	3,597	3,574	3,550	3,528	3,476
Representative Preferred	10-12	3,624	3,569	3,549	3,525	3,506	3,495	3,450
Representative Preferred	4.5-10	3,567	3,514	3,502	3,492	3,472	3,432	3,397
2027-2028 Operating Guidelines	16-31.1	3,653	3,653	3,653	3,653	3,653	3,653	3,653
2027-2028 Operating Guidelines	14-16	3,627	3,624	3,622	3,610	3,585	3,570	3,562
2027-2028 Operating Guidelines	12-14	3,625	3,600	3,588	3,577	3,563	3,551	3,537
2027-2028 Operating Guidelines	10-12	3,567	3,551	3,543	3,528	3,517	3,507	3,492
2027-2028 Operating Guidelines	4.5-10	3,532	3,510	3,508	3,505	3,500	3,494	3,440

NOTE: Elevations colored blue are above the spill avoidance elevation of 3,680 feet. Elevations colored red are below the minimum power pool elevation of 3,490 feet.

Table T-6
EOWY Elevation (Feet) at Lake Powell

Alternative	Flow Category	Max (feet)	90% (feet)	75% (feet)	50% (feet)	25% (feet)	10% (feet)	Min (feet)
CCS Comparative Baseline	16-31.1	3,696	3,692	3,690	3,679	3,657	3,621	3,499
CCS Comparative Baseline	14-16	3,697	3,690	3,676	3,635	3,580	3,549	3,462
CCS Comparative Baseline	12-14	3,695	3,670	3,624	3,574	3,527	3,500	3,414
CCS Comparative Baseline	10-12	3,694	3,616	3,565	3,517	3,498	3,468	3,404
CCS Comparative Baseline	4.5-10	3,689	3,560	3,525	3,499	3,457	3,424	3,398
No Action	16-31.1	3,696	3,693	3,690	3,684	3,670	3,637	3,503
No Action	14-16	3,696	3,691	3,684	3,654	3,595	3,551	3,433
No Action	12-14	3,697	3,681	3,643	3,585	3,517	3,478	3,411
No Action	10-12	3,695	3,629	3,571	3,498	3,473	3,447	3,407
No Action	4.5-10	3,688	3,571	3,517	3,478	3,443	3,421	3,400
Representative Preferred	16-31.1	3,696	3,690	3,683	3,661	3,639	3,620	3,553
Representative Preferred	14-16	3,696	3,678	3,656	3,629	3,606	3,585	3,507
Representative Preferred	12-14	3,699	3,653	3,627	3,595	3,563	3,539	3,476
Representative Preferred	10-12	3,689	3,616	3,588	3,554	3,529	3,508	3,454
Representative Preferred	4.5-10	3,680	3,592	3,555	3,523	3,498	3,468	3,398
2027-2028 Operating Guidelines	16-31.1	3,690	3,690	3,690	3,690	3,690	3,690	3,690
2027-2028 Operating Guidelines	14-16	3,674	3,667	3,663	3,620	3,585	3,570	3,562
2027-2028 Operating Guidelines	12-14	3,689	3,637	3,619	3,598	3,567	3,553	3,537
2027-2028 Operating Guidelines	10-12	3,689	3,613	3,590	3,558	3,537	3,516	3,492
2027-2028 Operating Guidelines	4.5-10	3,651	3,596	3,567	3,535	3,510	3,500	3,440

NOTE: Elevations colored blue are above the spill avoidance elevation of 3,680 feet**.** Elevations colored red are below the minimum power pool elevation of 3,490 feet.

Table T-7
Minimum Calendar Year Elevation (Feet) at Lake Mead

Alternative	Flow Category	Max (feet)	90% (feet)	75% (feet)	50% (feet)	25% (feet)	10% (feet)	Min (feet)
CCS Comparative Baseline	16-31.1	1,217	1,210	1,196	1,130	1,067	1,046	980
CCS Comparative Baseline	14-16	1,216	1,180	1,102	1,063	1,035	1,017	910
CCS Comparative Baseline	12-14	1,206	1,113	1,066	1,030	1,007	962	898
CCS Comparative Baseline	10-12	1,195	1,070	1,028	998	924	901	897
CCS Comparative Baseline	4.5-10	1,184	1,040	1,011	932	900	898	897
No Action	16-31.1	1,217	1,209	1,194	1,116	1,015	966	936
No Action	14-16	1,215	1,180	1,093	1,006	959	949	912
No Action	12-14	1,204	1,107	1,020	967	949	932	898
No Action	10-12	1,193	1,043	993	944	907	900	897
No Action	4.5-10	1,186	1,029	988	905	900	899	897
Representative Preferred	16-31.1	1,220	1,218	1,216	1,199	1,145	1,091	1,001
Representative Preferred	14-16	1,220	1,213	1,185	1,139	1,077	1,042	975
Representative Preferred	12-14	1,219	1,180	1,144	1,097	1,036	1,012	945
Representative Preferred	10-12	1,212	1,146	1,108	1,030	995	974	898
Representative Preferred	4.5-10	1,207	1,111	1,033	990	957	914	896
2027-2028 Operating Guidelines	16-31.1	1,095	1,095	1,095	1,095	1,095	1,095	1,095
2027-2028 Operating Guidelines	14-16	1,111	1,110	1,093	1,075	1,063	1,057	1,048
2027-2028 Operating Guidelines	12-14	1,096	1,076	1,065	1,056	1,050	1,043	1,035
2027-2028 Operating Guidelines	10-12	1,075	1,053	1,041	1,032	1,023	1,014	959
2027-2028 Operating Guidelines	4.5-10	1,052	1,038	1,029	1,019	1,006	987	920

NOTE: Elevations colored blue are above the spillway elevation of 1,221 feet, listed in the previous table. Elevations colored red are below the minimum power pool elevation of 950 feet.

Table T-8
End-Of-Calendar Year Elevations (Feet) at Lake Mead

Alternative	Flow Category	Max (feet)	90% (feet)	75% (feet)	50% (feet)	25% (feet)	10% (feet)	Min (feet)
CCS Comparative Baseline	16-31.1	1,219	1,215	1,201	1,151	1,077	1,054	980
CCS Comparative Baseline	14-16	1,219	1,185	1,118	1,072	1,042	1,025	914
CCS Comparative Baseline	12-14	1,217	1,122	1,074	1,038	1,019	980	898
CCS Comparative Baseline	10-12	1,215	1,075	1,039	1,012	946	906	898
CCS Comparative Baseline	4.5-10	1,184	1,051	1,024	962	903	900	897
No Action	16-31.1	1,218	1,215	1,198	1,139	1,029	975	947
No Action	14-16	1,218	1,187	1,110	1,016	969	958	912
No Action	12-14	1,217	1,119	1,027	978	958	939	898
No Action	10-12	1,215	1,052	1,003	959	919	901	897
No Action	4.5-10	1,186	1,034	995	931	901	900	897
Representative Preferred	16-31.1	1,220	1,218	1,217	1,209	1,168	1,115	1,027
Representative Preferred	14-16	1,220	1,215	1,191	1,147	1,091	1,054	989
Representative Preferred	12-14	1,220	1,183	1,148	1,104	1,047	1,022	953
Representative Preferred	10-12	1,219	1,150	1,113	1,041	1,005	984	907
Representative Preferred	4.5-10	1,207	1,115	1,041	1,001	970	932	897
2027-2028 Operating Guidelines	16-31.1	1,145	1,145	1,145	1,145	1,145	1,145	1,145
2027-2028 Operating Guidelines	14-16	1,169	1,164	1,141	1,117	1,108	1,099	1,097
2027-2028 Operating Guidelines	12-14	1,215	1,136	1,105	1,089	1,069	1,057	1,044
2027-2028 Operating Guidelines	10-12	1,159	1,084	1,066	1,044	1,029	1,018	959
2027-2028 Operating Guidelines	4.5-10	1,106	1,056	1,039	1,025	1,010	990	920

NOTE: Elevations colored blue are above the spillway elevation of 1,221 feet, listed in the previous table. Elevations colored red are below the minimum power pool elevation of 950 feet.

Table T-9
End-Of-Water Year Combine Storage at Lake Powell and Lake Mead (% Full)

Alternative	Flow Category	Max (% Full)	90% (% Full)	75% (% Full)	50% (% Full)	25% (% Full)	10% (% Full)	Min (% Full)
CCS Comparative Baseline	16-31.1	98.2	96.4	90.7	74.3	54.9	42.3	15.8
CCS Comparative Baseline	14-16	98.1	84.6	66.9	47.4	33.6	26.5	8.2
CCS Comparative Baseline	12-14	97.7	65.0	44.9	31.6	22.9	15.4	2.4
CCS Comparative Baseline	10-12	95.7	43.5	30.4	20.9	11.9	7.1	1.6
CCS Comparative Baseline	4.5-10	78.1	31.8	22.6	13.3	5.7	3.0	1.5
No Action	16-31.1	98.3	96.1	89.9	72.5	51.3	38.4	13.0
No Action	14-16	98.1	85.2	66.2	43.7	28.4	19.9	4.9
No Action	12-14	97.4	64.7	42.4	26.6	15.9	9.9	2.2
No Action	10-12	95.5	42.4	25.9	14.5	7.8	4.8	1.9
No Action	4.5-10	78.0	29.4	19.4	9.0	4.4	2.8	1.6
Representative Preferred	16-31.1	98.5	96.5	91.6	82.4	70.5	56.7	27.3
Representative Preferred	14-16	98.6	86	75.8	62.4	47.6	37.9	18.3
Representative Preferred	12-14	97.8	71.5	57.9	45.9	33.6	26.2	10.1
Representative Preferred	10-12	94.8	54.8	43.5	31.5	22.3	17.4	6.9
Representative Preferred	4.5-10	74.5	41.5	30.7	20.8	14.1	8.3	1.4
2027-2028 Operating Guidelines	16-31.1	75.3	75.3	75.3	75.3	75.3	75.3	75.3
2027-2028 Operating Guidelines	14-16	73.6	72.3	69.1	51.3	44.1	39.9	38.5
2027-2028 Operating Guidelines	12-14	95.4	57.4	50.1	42.9	34.3	30.8	28.2
2027-2028 Operating Guidelines	10-12	76.1	43.6	37.2	30.3	25.0	22.4	13.4
2027-2028 Operating Guidelines	4.5-10	54.3	36.7	29.5	24.4	20.1	17.4	8.1

Table T-10
Water Year Releases from Glen Canyon Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	38.09	14.79	11.63	9.00	8.23	8.23	6.45
CCS Comparative Baseline	14-16	24.28	10.81	9.00	9.00	8.23	7.48	6.00
CCS Comparative Baseline	12-14	28.14	9.00	9.00	8.23	7.48	6.89	5.36
CCS Comparative Baseline	10-12	17.22	9.16	8.23	7.48	6.37	6.00	4.15
CCS Comparative Baseline	4.5-10	9.50	9.00	7.66	6.41	5.73	4.79	2.42
No Action	16-31.1	38.13	15.25	11.82	8.40	8.23	8.23	6.27
No Action	14-16	24.50	11.35	8.23	8.23	8.23	8.23	6.15
No Action	12-14	28.49	8.23	8.23	8.23	8.23	7.20	5.11
No Action	10-12	18.89	8.23	8.23	8.23	6.49	5.93	4.06
No Action	4.5-10	8.32	8.23	8.23	6.36	5.33	4.58	2.76
Representative Preferred	16-31.1	38.29	14.47	12.00	12.00	10.70	9.05	8.23
Representative Preferred	14-16	22.85	11.36	9.94	8.23	8.23	8.23	6.97
Representative Preferred	12-14	28.46	8.23	8.23	8.23	8.23	7.50	5.00
Representative Preferred	10-12	18.97	8.23	8.19	7.20	6.47	6.00	5.00
Representative Preferred	4.5-10	8.23	6.65	6.00	6.00	5.45	5.00	2.42
2027-2028 Operating Guidelines	16-31.1	12.66	12.66	12.66	12.66	12.66	12.66	12.66
2027-2028 Operating Guidelines	14-16	12.00	12.00	12.00	12.00	11.82	11.39	10.77
2027-2028 Operating Guidelines	12-14	26.01	12.00	11.11	10.07	8.82	8.48	8.23
2027-2028 Operating Guidelines	10-12	17.36	9.54	8.58	8.00	7.15	7.00	6.00
2027-2028 Operating Guidelines	4.5-10	10.83	7.12	7.00	6.83	6.23	5.88	5.00

NOTE: Releases colored blue highlight Glen Canyon Dam's median release of 8.23 maf. Releases colored red are at or below the smallest releases allowable of 4.73 maf in accordance with LTEMP (Reclamation 2016).

Table T-11
10-Year Releases from Glen Canyon Dam

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	174.0	119.6	106.6	93.0	83.3	79.4	60.4
CCS Comparative Baseline	14-16	154.5	102.8	90.4	83.5	79.5	76.3	58.6
CCS Comparative Baseline	12-14	145.4	92.2	85.4	80.4	77.3	72.0	48.2
CCS Comparative Baseline	10-12	134.5	86.7	80.9	77.7	71.4	64.0	46.3
CCS Comparative Baseline	4.5-10	132.9	83.5	79.5	74.5	65.2	56.4	38.5
No Action	16-31.1	174.6	120.6	107.8	93.3	82.3	77.8	58.8
No Action	14-16	156.8	103.8	91.0	82.3	79.2	74.6	59.4
No Action	12-14	145.5	92.3	82.3	80.8	77.0	70.7	48.7
No Action	10-12	135.3	84.7	82.0	77.8	70.4	63.5	46.3
No Action	4.5-10	135.3	82.3	80.6	74.2	64.2	55.8	40.4
Representative Preferred	16-31.1	175.7	123.5	110.8	97.7	85.2	78.4	58.8
Representative Preferred	14-16	160.9	107.8	96.6	84.4	77.0	72.8	58.0
Representative Preferred	12-14	152.3	98.2	87.6	78.8	74.0	69.0	47.8
Representative Preferred	10-12	139.6	90.0	80.4	74.8	69.2	63.1	45.1
Representative Preferred	4.5-10	133.4	84.5	78.5	72.5	64.4	56.5	40.0
2027-2028 Operating Guidelines	16-31.1	85.5	85.5	85.5	85.5	85.5	85.5	85.5
2027-2028 Operating Guidelines	14-16	82.7	82.7	82.4	82.2	81.8	81.5	81.1
2027-2028 Operating Guidelines	12-14	96.0	81.5	80.5	79.3	78.3	77.8	77.2
2027-2028 Operating Guidelines	10-12	86.4	78.5	77.6	77.0	76.1	75.8	74.9
2027-2028 Operating Guidelines	4.5-10	81.8	78.0	78.0	77.6	75.6	74.3	72.5

Table T-12
Cumulative 10-Year Lee Ferry Flow Volume (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	175.7	121.3	108.2	94.6	84.9	80.9	62.0
CCS Comparative Baseline	14-16	156.2	104.4	92.1	85.1	81.1	77.9	60.3
CCS Comparative Baseline	12-14	147.0	93.8	87.0	81.9	78.8	73.6	49.8
CCS Comparative Baseline	10-12	136.2	88.3	82.5	79.1	73.0	65.6	47.9
CCS Comparative Baseline	4.5-10	134.6	85.1	81.0	76.0	66.8	58.0	40.1
No Action	16-31.1	176.3	122.2	109.5	95.0	83.9	79.4	60.4
No Action	14-16	158.5	105.4	92.7	83.9	80.5	76.3	61.1
No Action	12-14	147.2	94.0	84.0	82.3	78.6	72.3	50.3
No Action	10-12	137.0	86.4	83.6	79.3	72.0	65.2	47.9
No Action	4.5-10	137.0	84.0	82.0	75.7	65.8	57.4	42.0
Representative Preferred	16-31.1	177.4	125.2	112.5	99.3	86.7	79.9	60.4
Representative Preferred	14-16	162.6	109.4	98.2	86.0	78.6	74.3	59.7
Representative Preferred	12-14	154.0	99.9	89.3	80.4	75.5	70.6	49.4
Representative Preferred	10-12	141.2	91.6	82.1	76.4	70.7	64.7	46.7
Representative Preferred	4.5-10	135.1	86.1	79.9	73.9	66.0	58.1	41.6
2027-2028 Operating Guidelines	16-31.1	86.7	86.7	86.7	86.7	86.7	86.7	86.7
2027-2028 Operating Guidelines	14-16	83.9	83.9	83.7	83.4	83.1	82.7	82.3
2027-2028 Operating Guidelines	12-14	97.2	82.7	81.7	80.5	79.5	79.0	78.5
2027-2028 Operating Guidelines	10-12	87.6	79.7	78.8	78.2	77.3	77.0	76.1
2027-2028 Operating Guidelines	4.5-10	83.1	79.3	79.2	78.8	76.9	75.6	73.7

Table T-13
Calendar Year Releases from Hoover Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	37.9	12.1	10.0	9.4	8.7	8.4	6.9
CCS Comparative Baseline	14-16	22.3	9.7	9.2	8.7	8.3	8.0	6.2
CCS Comparative Baseline	12-14	21.3	9.3	8.8	8.3	8.0	7.6	5.8
CCS Comparative Baseline	10-12	13.2	8.9	8.4	7.9	7.3	6.5	4.3
CCS Comparative Baseline	4.5-10	10.4	8.7	8.3	7.5	6.1	5.1	2.6
No Action	16-31.1	37.8	12.1	10.1	9.3	8.8	8.5	7.2
No Action	14-16	22.4	9.5	9.2	8.8	8.5	8.3	7.1
No Action	12-14	22.7	9.3	8.9	8.6	8.3	7.9	5.2
No Action	10-12	13.3	9.2	8.7	8.1	7.3	6.5	3.7
No Action	4.5-10	10.2	9.2	8.7	7.2	5.8	5.0	2.9
Representative Preferred	16-31.1	38.2	13.0	11.3	9.8	8.3	7.7	5.8
Representative Preferred	14-16	22.1	10.1	9.4	8.3	7.8	7.4	5.6
Representative Preferred	12-14	20.1	9.4	8.5	7.9	7.6	7.1	4.9
Representative Preferred	10-12	10.6	8.6	8.0	7.6	6.8	6.1	4.1
Representative Preferred	4.5-10	10.3	8.2	7.8	6.9	5.9	5.5	2.6
2027-2028 Operating Guidelines	16-31.1	7.6	7.6	7.6	7.6	7.6	7.6	7.6
2027-2028 Operating Guidelines	14-16	7.8	7.8	7.7	7.3	7.1	6.5	6.1
2027-2028 Operating Guidelines	12-14	9.8	8.2	7.8	7.5	7.1	6.5	6.0
2027-2028 Operating Guidelines	10-12	8.7	8.0	7.8	7.6	7.3	6.8	6.1
2027-2028 Operating Guidelines	4.5-10	8.7	8.0	7.8	7.6	7.3	7.0	5.8

Table T-14
Calendar Year Releases from Davis Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	37.6	12.1	9.9	9.3	8.6	8.3	7.1
CCS Comparative Baseline	14-16	22.5	9.6	9.1	8.6	8.2	7.9	6.4
CCS Comparative Baseline	12-14	21.9	9.2	8.7	8.2	7.8	7.6	5.7
CCS Comparative Baseline	10-12	13.3	8.8	8.3	7.9	7.2	6.5	4.3
CCS Comparative Baseline	4.5-10	10.1	8.6	8.2	7.4	6.0	5.0	2.5
No Action	16-31.1	37.5	12.1	10.0	9.2	8.7	8.4	7.6
No Action	14-16	22.6	9.4	9.1	8.7	8.4	8.2	7.3
No Action	12-14	23.2	9.2	8.8	8.5	8.2	7.8	5.2
No Action	10-12	13.4	9.0	8.7	8.1	7.2	6.3	3.7
No Action	4.5-10	9.9	9.1	8.6	7.1	5.7	4.9	2.8
Representative Preferred	16-31.1	37.9	13.1	11.2	9.7	8.1	7.6	6.0
Representative Preferred	14-16	22.2	9.9	9.3	8.2	7.6	7.4	5.7
Representative Preferred	12-14	20.6	9.3	8.4	7.8	7.5	7.0	5.2
Representative Preferred	10-12	10.5	8.5	7.9	7.5	6.8	6.0	4.5
Representative Preferred	4.5-10	10.1	8.0	7.6	6.9	5.8	5.5	2.5
2027-2028 Operating Guidelines	16-31.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3
2027-2028 Operating Guidelines	14-16	8.0	7.8	7.7	7.3	7.2	6.7	6.2
2027-2028 Operating Guidelines	12-14	9.9	8.0	7.6	7.4	7.2	6.7	6.2
2027-2028 Operating Guidelines	10-12	8.4	7.9	7.7	7.5	7.3	6.9	6.5
2027-2028 Operating Guidelines	4.5-10	8.4	7.9	7.7	7.5	7.3	7.0	6.1

Table T-15
Calendar Year Releases from Parker Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	34.8	9.2	7.0	6.7	6.5	6.4	5.9
CCS Comparative Baseline	14-16	19.9	6.9	6.7	6.6	6.4	6.3	5.8
CCS Comparative Baseline	12-14	18.7	6.8	6.6	6.5	6.3	6.2	4.8
CCS Comparative Baseline	10-12	10.6	6.7	6.5	6.3	6.1	5.6	3.6
CCS Comparative Baseline	4.5-10	7.2	6.6	6.3	6.1	5.2	4.4	2.0
No Action	16-31.1	34.4	8.8	7.0	6.8	6.6	6.5	6.1
No Action	14-16	19.6	7.0	6.8	6.6	6.5	6.4	5.8
No Action	12-14	19.7	6.8	6.7	6.6	6.4	6.3	4.4
No Action	10-12	10.6	6.8	6.6	6.4	6.0	5.3	3.2
No Action	4.5-10	7.3	6.7	6.5	6.0	4.9	4.3	2.4
Representative Preferred	16-31.1	34.8	10.0	8.0	6.8	6.5	6.2	5.7
Representative Preferred	14-16	18.8	7.0	6.7	6.5	6.3	6.1	5.1
Representative Preferred	12-14	17.4	6.7	6.5	6.4	6.2	6.0	4.9
Representative Preferred	10-12	7.9	6.6	6.4	6.2	5.9	5.5	4.1
Representative Preferred	4.5-10	7.2	6.4	6.3	5.9	5.3	5.0	2.1
2027-2028 Operating Guidelines	16-31.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2
2027-2028 Operating Guidelines	14-16	6.3	6.1	5.9	5.9	5.7	5.6	5.5
2027-2028 Operating Guidelines	12-14	8.1	6.3	6.0	5.9	5.8	5.7	5.6
2027-2028 Operating Guidelines	10-12	6.3	6.2	6.1	5.9	5.8	5.7	5.5
2027-2028 Operating Guidelines	4.5-10	6.6	6.2	6.0	5.9	5.8	5.7	5.5

Table T-16
Annual Flow Volume at Imperial Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	33.5	8.1	5.8	5.6	5.5	5.5	5.2
CCS Comparative Baseline	14-16	19.1	5.7	5.6	5.5	5.4	5.3	4.8
CCS Comparative Baseline	12-14	17.3	5.6	5.6	5.5	5.3	5.3	4.0
CCS Comparative Baseline	10-12	9.2	5.6	5.5	5.3	5.2	4.6	2.8
CCS Comparative Baseline	4.5-10	5.8	5.5	5.3	5.2	4.3	3.6	1.3
No Action	16-31.1	33.1	7.8	5.8	5.7	5.6	5.5	5.1
No Action	14-16	18.7	5.7	5.7	5.6	5.5	5.5	5.0
No Action	12-14	18.2	5.7	5.6	5.6	5.5	5.3	3.7
No Action	10-12	9.2	5.6	5.6	5.5	5.0	4.4	2.4
No Action	4.5-10	5.8	5.6	5.5	5.0	4.1	3.5	1.5
Representative Preferred	16-31.1	33.5	9.0	6.9	5.7	5.4	5.3	4.8
Representative Preferred	14-16	17.4	5.9	5.7	5.4	5.3	5.2	4.2
Representative Preferred	12-14	15.9	5.7	5.4	5.3	5.3	5.1	4.0
Representative Preferred	10-12	6.5	5.5	5.4	5.3	5.0	4.5	3.3
Representative Preferred	4.5-10	5.9	5.4	5.3	5.0	4.2	4.1	1.4
2027-2028 Operating Guidelines	16-31.1	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2027-2028 Operating Guidelines	14-16	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2027-2028 Operating Guidelines	12-14	6.8	5.0	5.0	5.0	5.0	5.0	5.0
2027-2028 Operating Guidelines	10-12	5.1	5.0	5.0	5.0	5.0	5.0	5.0
2027-2028 Operating Guidelines	4.5-10	5.3	5.0	5.0	5.0	5.0	5.0	5.0

Table T-17
Annual Flow Volume Below Imperial Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	28.7	3.5	1.3	1.2	1.1	1.0	0.8
CCS Comparative Baseline	14-16	14.3	1.2	1.2	1.1	1.0	0.9	0.7
CCS Comparative Baseline	12-14	12.6	1.2	1.1	1.0	0.9	0.8	0.6
CCS Comparative Baseline	10-12	4.6	1.1	1.0	0.9	0.8	0.7	0.5
CCS Comparative Baseline	4.5-10	1.2	1.0	1.0	0.8	0.7	0.6	0.4
No Action	16-31.1	28.2	3.1	1.3	1.2	1.1	1.1	1.0
No Action	14-16	13.9	1.2	1.2	1.1	1.1	1.1	0.9
No Action	12-14	13.5	1.2	1.1	1.1	1.1	1.0	0.7
No Action	10-12	4.6	1.2	1.1	1.1	0.9	0.8	0.6
No Action	4.5-10	1.4	1.2	1.1	0.9	0.8	0.7	0.4
Representative Preferred	16-31.1	28.6	4.4	2.3	1.2	0.9	0.9	0.7
Representative Preferred	14-16	12.6	1.2	1.2	0.9	0.9	0.9	0.7
Representative Preferred	12-14	11.4	1.2	0.9	0.9	0.9	0.9	0.7
Representative Preferred	10-12	2.2	0.9	0.9	0.9	0.8	0.7	0.6
Representative Preferred	4.5-10	1.3	1.0	0.9	0.9	0.7	0.7	0.4
2027-2028 Operating Guidelines	16-31.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2027-2028 Operating Guidelines	14-16	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2027-2028 Operating Guidelines	12-14	2.7	1.0	1.0	1.0	1.0	1.0	1.0
2027-2028 Operating Guidelines	10-12	1.1	1.0	1.0	1.0	1.0	1.0	1.0
2027-2028 Operating Guidelines	4.5-10	1.3	1.0	1.0	1.0	1.0	1.0	1.0

Table T-18
Annual Flow Volume Below Morelos Diversion Dam (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	27.4	2.2	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	13.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	11.3	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	3.3	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	4.5-10	0.4	0.0	0.0	0.0	0.0	0.0	0.0
No Action	16-31.1	26.9	1.7	0.0	0.0	0.0	0.0	0.0
No Action	14-16	12.5	0.0	0.0	0.0	0.0	0.0	0.0
No Action	12-14	12.2	0.0	0.0	0.0	0.0	0.0	0.0
No Action	10-12	3.3	0.0	0.0	0.0	0.0	0.0	0.0
No Action	4.5-10	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	16-31.1	27.3	3.1	1.1	0.0	0.0	0.0	0.0
Representative Preferred	14-16	11.3	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	12-14	10.2	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	10-12	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	4.5-10	0.3	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	16-31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	12-14	1.6	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	10-12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	4.5-10	0.3	0.0	0.0	0.0	0.0	0.0	0.0

Table T-19
Lower Basin Shortage (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	1.4	0.7	0.6	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	1.4	1.4	1.0	0.6	0.0	0.0	0.0
CCS Comparative Baseline	12-14	1.4	1.4	1.4	1.1	0.6	0.0	0.0
CCS Comparative Baseline	10-12	1.4	1.4	1.4	1.4	1.1	0.2	0.0
CCS Comparative Baseline	4.5-10	1.4	1.4	1.4	1.4	1.1	1.0	0.0
No Action	16-31.1	0.6	0.6	0.6	0.0	0.0	0.0	0.0
No Action	14-16	0.6	0.6	0.6	0.6	0.0	0.0	0.0
No Action	12-14	0.6	0.6	0.6	0.6	0.5	0.0	0.0
No Action	10-12	0.6	0.6	0.6	0.6	0.6	0.4	0.0
No Action	4.5-10	0.6	0.6	0.6	0.6	0.6	0.5	0.0
Representative Preferred	16-31.1	2.9	1.5	0.3	0.0	0.0	0.0	0.0
Representative Preferred	14-16	3.6	1.5	1.5	0.2	0.0	0.0	0.0
Representative Preferred	12-14	3.6	1.7	1.5	1.5	0.0	0.0	0.0
Representative Preferred	10-12	3.6	3.2	2.2	1.5	1.5	0.0	0.0
Representative Preferred	4.5-10	3.6	3.6	3.6	2.1	1.5	1.3	0.0
2027-2028 Operating Guidelines	16-31.1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2027-2028 Operating Guidelines	14-16	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2027-2028 Operating Guidelines	12-14	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2027-2028 Operating Guidelines	10-12	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2027-2028 Operating Guidelines	4.5-10	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Table T-20
Lower Basin Dead Pool–Related Reductions (maf)[12]

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	16-31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	1.1	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	2.4	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	4.0	1.4	0.4	0.0	0.0	0.0	0.0
CCS Comparative Baseline	4.5-10	6.2	3.0	2.0	0.2	0.0	0.0	0.0
No Action	16-31.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	14-16	1.5	0.3	0.0	0.0	0.0	0.0	0.0
No Action	12-14	3.8	0.8	0.3	0.0	0.0	0.0	0.0
No Action	10-12	5.5	2.5	1.5	0.4	0.0	0.0	0.0
No Action	4.5-10	6.5	4.0	3.1	1.5	0.0	0.0	0.0
Representative Preferred	16-31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	10-12	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	4.5-10	3.8	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	16-31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	4.5-10	0.2	0.0	0.0	0.0	0.0	0.0	0.0

Note: Dead pool-related delivery reduction volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

[12] Dead pool–related reductions are in addition to shortages specified in each alternative. Shortages are shown in **Table T-19**.

Table T-21
Total State Shortage for Arizona (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	25.7	21.1	18.3	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	25.7	25.7	22.9	18.3	0.0	0.0	0.0
CCS Comparative Baseline	12-14	25.7	25.7	25.7	22.9	18.3	0.0	0.0
CCS Comparative Baseline	10-12	25.7	25.7	25.7	25.7	22.9	6.9	0.0
CCS Comparative Baseline	4.5-10	25.7	25.7	25.7	25.7	22.9	22.9	0.0
No Action	16-31.1	16.7	16.7	16.7	0.0	0.0	0.0	0.0
No Action	14-16	16.7	16.7	16.7	16.7	0.0	0.0	0.0
No Action	12-14	16.7	16.7	16.7	16.7	13.9	0.0	0.0
No Action	10-12	16.7	16.7	16.7	16.7	16.7	11.1	0.0
No Action	4.5-10	16.7	16.7	16.7	16.7	16.7	13.9	0.0
Representative Preferred	16-31.1	60.9	41.7	8.2	0.0	0.0	0.0	0.0
Representative Preferred	14-16	67.6	41.7	41.7	6.7	0.0	0.0	0.0
Representative Preferred	12-14	68.3	47.3	41.7	41.7	0.0	0.0	0.0
Representative Preferred	10-12	70.2	64.5	55.6	41.7	38.0	0.0	0.0
Representative Preferred	4.5-10	70.2	67.6	67.6	53.1	33.1	27.1	0.0
2027-2028 Operating Guidelines	16-31.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
2027-2028 Operating Guidelines	14-16	27.1	27.1	27.1	27.1	27.1	27.1	27.1
2027-2028 Operating Guidelines	12-14	27.1	27.1	27.1	27.1	27.1	27.1	27.1
2027-2028 Operating Guidelines	10-12	27.1	27.1	27.1	27.1	27.1	27.1	27.1
2027-2028 Operating Guidelines	4.5-10	27.1	27.1	27.1	27.1	27.1	27.1	27.1

Table T-22
Total State Shortage for California (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	8.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	8.0	8.0	4.5	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	8.0	8.0	8.0	5.7	0.0	0.0	0.0
CCS Comparative Baseline	10-12	8.0	8.0	8.0	8.0	5.7	0.0	0.0
CCS Comparative Baseline	4.5-10	8.0	8.0	8.0	8.0	5.7	4.5	0.0
No Action	16-31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	4.5-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	16-31.1	11.9	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	14-16	20.5	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	12-14	20.5	0.0	0.0	0.0	0.0	0.0	0.0
Representative Preferred	10-12	20.5	15.3	8.9	0.0	0.0	0.0	0.0
Representative Preferred	4.5-10	20.5	20.5	19.5	10.0	0.0	0.0	0.0
2027-2028 Operating Guidelines	16-31.1	10.0	10.0	10.0	10.0	10.0	10.0	10.0
2027-2028 Operating Guidelines	14-16	10.0	10.0	10.0	10.0	10.0	10.0	10.0
2027-2028 Operating Guidelines	12-14	10.0	10.0	10.0	10.0	10.0	10.0	10.0
2027-2028 Operating Guidelines	10-12	10.0	10.0	10.0	10.0	10.0	10.0	10.0
2027-2028 Operating Guidelines	4.5-10	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Table T-23
Total State Shortage for Nevada (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	10.0	8.3	7.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	10.0	10.0	9.0	7.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	10.0	10.0	10.0	9.0	7.0	0.0	0.0
CCS Comparative Baseline	10-12	10.0	10.0	10.0	10.0	9.0	2.7	0.0
CCS Comparative Baseline	4.5-10	10.0	10.0	10.0	10.0	9.0	9.0	0.0
No Action	16-31.1	11.0	11.0	11.0	0.0	0.0	0.0	0.0
No Action	14-16	11.0	11.0	11.0	11.0	0.0	0.0	0.0
No Action	12-14	11.0	11.0	11.0	11.0	9.2	0.0	0.0
No Action	10-12	11.0	11.0	11.0	11.0	11.0	7.4	0.0
No Action	4.5-10	11.0	11.0	11.0	11.0	11.0	9.2	0.0
Representative Preferred	16-31.1	54.2	27.6	5.4	0.0	0.0	0.0	0.0
Representative Preferred	14-16	68.7	27.6	27.6	4.4	0.0	0.0	0.0
Representative Preferred	12-14	68.7	31.3	27.6	27.6	0.0	0.0	0.0
Representative Preferred	10-12	68.7	60.6	41.0	27.6	24.9	0.0	0.0
Representative Preferred	4.5-10	68.7	68.7	68.5	36.3	21.4	16.7	0.0
2027-2028 Operating Guidelines	16-31.1	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	14-16	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	12-14	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	10-12	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	4.5-10	16.7	16.7	16.7	16.7	16.7	16.7	16.7

Table T-24
Water Delivery Reductions to Mexico (Percent of Allotment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	18.3	6.9	5.3	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	18.3	18.3	9.7	5.3	0.0	0.0	0.0
CCS Comparative Baseline	12-14	18.3	18.3	18.3	10.3	5.3	0.0	0.0
CCS Comparative Baseline	10-12	18.3	18.3	18.3	18.3	10.3	2.7	0.0
CCS Comparative Baseline	4.5-10	18.3	18.3	18.3	18.3	10.3	9.7	0.0
No Action	16-31.1	6.7	6.7	6.7	0.0	0.0	0.0	0.0
No Action	14-16	6.7	6.7	6.7	6.7	0.0	0.0	0.0
No Action	12-14	6.7	6.7	6.7	6.7	5.6	0.0	0.0
No Action	10-12	6.7	6.7	6.7	6.7	6.7	4.4	0.0
No Action	4.5-10	6.7	6.7	6.7	6.7	6.7	5.6	0.0
Representative Preferred	16-31.1	31.9	16.7	3.3	0.0	0.0	0.0	0.0
Representative Preferred	14-16	40.0	16.7	16.7	2.7	0.0	0.0	0.0
Representative Preferred	12-14	40.0	18.9	16.7	16.7	0.0	0.0	0.0
Representative Preferred	10-12	40.0	35.6	24.6	16.7	16.7	0.0	0.0
Representative Preferred	4.5-10	40.0	40.0	40.0	23.6	16.7	14.3	0.0
2027-2028 Operating Guidelines	16-31.1	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	14-16	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	12-14	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	10-12	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2027-2028 Operating Guidelines	4.5-10	16.7	16.7	16.7	16.7	16.7	16.7	16.7

Table T-25
Annual Arizona Depletions (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	115.3	115.3	110.0	103.5	83.0	81.1	73.3
CCS Comparative Baseline	14-16	115.3	103.5	100.0	81.7	78.8	74.3	55.0
CCS Comparative Baseline	12-14	113.9	100.0	83.9	78.7	74.3	73.7	41.3
CCS Comparative Baseline	10-12	108.6	93.1	81.1	74.3	64.8	51.9	26.2
CCS Comparative Baseline	4.5-10	103.5	81.6	78.0	68.8	45.7	34.4	11.4
No Action	16-31.1	115.3	115.3	106.8	100.0	83.3	82.9	61.7
No Action	14-16	115.3	100.0	100.0	83.3	82.8	76.7	56.9
No Action	12-14	113.7	100.0	86.0	83.3	76.9	66.3	29.9
No Action	10-12	106.6	91.9	83.3	74.2	56.2	45.0	17.9
No Action	4.5-10	101.6	94.2	83.3	56.7	38.7	29.6	15.3
Representative Preferred	16-31.1	116.8	115.3	112.9	108.6	73.8	59.5	40.6
Representative Preferred	14-16	116.7	110.0	108.6	74.4	59.8	58.5	32.4
Representative Preferred	12-14	115.9	108.6	86.4	60.4	58.5	56.7	31.7
Representative Preferred	10-12	111.3	89.9	67.7	58.5	48.2	35.9	24.5
Representative Preferred	4.5-10	110.0	73.0	59.3	51.8	32.9	31.0	14.9
2027-2028 Operating Guidelines	16-31.1	64.4	64.4	64.4	64.4	64.4	64.4	64.4
2027-2028 Operating Guidelines	14-16	64.4	64.4	64.4	64.4	64.4	64.4	64.4
2027-2028 Operating Guidelines	12-14	76.1	64.4	64.4	64.4	64.4	64.4	64.4
2027-2028 Operating Guidelines	10-12	64.4	64.4	64.4	64.4	64.4	64.4	64.4
2027-2028 Operating Guidelines	4.5-10	64.4	64.4	64.4	64.4	64.4	64.4	61.3

Table T-26
Annual California Depletions (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	126.3	110.0	105.6	101.9	100.0	99.2	91.9
CCS Comparative Baseline	14-16	125.8	105.6	100.3	100.0	95.8	92.0	83.8
CCS Comparative Baseline	12-14	122.0	101.1	100.0	96.6	92.0	92.0	70.6
CCS Comparative Baseline	10-12	105.6	100.0	99.4	92.0	90.3	81.3	51.4
CCS Comparative Baseline	4.5-10	105.6	100.0	99.4	92.0	76.1	64.2	17.8
No Action	16-31.1	120.2	118.8	109.1	100.0	100.0	100.0	92.8
No Action	14-16	120.2	100.6	100.0	100.0	100.0	98.8	89.8
No Action	12-14	118.7	100.0	100.0	100.0	99.0	96.0	65.7
No Action	10-12	109.1	100.0	100.0	98.4	90.3	79.5	42.9
No Action	4.5-10	109.1	100.6	100.0	90.9	72.5	62.3	25.5
Representative Preferred	16-31.1	122.7	118.6	113.4	101.9	98.3	96.6	80.0
Representative Preferred	14-16	121.5	109.7	101.4	98.9	96.6	90.3	78.8
Representative Preferred	12-14	117.5	103.0	100.0	98.3	94.5	84.8	73.5
Representative Preferred	10-12	113.4	100.0	98.9	95.8	86.1	79.9	60.3
Representative Preferred	4.5-10	109.8	99.8	98.3	86.0	78.9	74.7	20.8
2027-2028 Operating Guidelines	16-31.1	86.1	86.1	86.1	86.1	86.1	86.1	86.1
2027-2028 Operating Guidelines	14-16	92.0	92.0	92.0	86.6	86.1	86.1	86.1
2027-2028 Operating Guidelines	12-14	95.7	95.7	92.0	86.6	86.1	86.1	86.1
2027-2028 Operating Guidelines	10-12	95.7	95.7	92.0	86.6	86.1	86.1	86.1
2027-2028 Operating Guidelines	4.5-10	95.7	95.7	92.0	86.6	86.1	86.1	86.0

Table T-27
Annual Nevada Depletions (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	146.8	133.3	113.5	110.5	106.2	104.8	79.0
CCS Comparative Baseline	14-16	145.9	112.6	110.5	106.2	104.8	103.8	85.8
CCS Comparative Baseline	12-14	145.0	110.7	110.5	105.8	103.8	103.8	54.7
CCS Comparative Baseline	10-12	126.7	110.5	106.2	103.8	96.8	76.9	17.4
CCS Comparative Baseline	4.5-10	120.2	106.8	103.8	86.3	66.1	46.0	2.8
No Action	16-31.1	210.5	143.8	134.1	110.5	103.1	99.5	71.3
No Action	14-16	186.6	129.7	110.5	103.1	99.5	89.5	62.8
No Action	12-14	201.3	110.5	108.3	99.5	90.0	77.8	22.2
No Action	10-12	172.9	110.5	101.3	86.5	64.5	47.7	7.9
No Action	4.5-10	131.6	129.7	99.9	66.8	40.2	24.9	2.7
Representative Preferred	16-31.1	158.5	136.2	123.9	110.4	97.2	83.7	57.5
Representative Preferred	14-16	150.2	115.3	107.8	101.4	89.7	80.4	43.0
Representative Preferred	12-14	146.5	110.2	104.2	96.1	85.5	77.3	43.0
Representative Preferred	10-12	132.4	106.6	100.5	89.7	74.7	58.3	24.8
Representative Preferred	4.5-10	119.0	103.3	91.2	73.3	53.1	43.0	2.8
2027-2028 Operating Guidelines	16-31.1	74.7	74.7	74.7	74.7	74.7	74.7	74.7
2027-2028 Operating Guidelines	14-16	74.7	74.7	74.7	74.7	74.7	74.7	74.7
2027-2028 Operating Guidelines	12-14	82.7	74.7	74.7	74.7	74.7	74.7	74.7
2027-2028 Operating Guidelines	10-12	74.7	74.7	74.7	74.7	74.7	74.7	74.7
2027-2028 Operating Guidelines	4.5-10	86.0	74.7	74.7	73.3	73.3	73.3	73.3

Table T-28
Annual Mexico Depletions (Percent of Allotment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	16-31.1	111.2	111.2	107.1	101.8	96.5	91.5	77.7
CCS Comparative Baseline	14-16	111.2	106.1	101.3	96.5	91.0	81.7	68.9
CCS Comparative Baseline	12-14	111.2	101.8	96.5	91.0	81.7	80.2	55.0
CCS Comparative Baseline	10-12	108.8	96.5	91.0	81.7	76.6	65.8	38.4
CCS Comparative Baseline	4.5-10	107.1	91.0	85.7	77.7	59.5	48.6	12.7
No Action	16-31.1	111.2	111.2	101.7	100.0	93.3	93.3	81.8
No Action	14-16	111.2	101.7	100.0	93.3	93.3	90.0	76.7
No Action	12-14	111.2	100.0	94.4	93.3	90.3	84.3	51.6
No Action	10-12	103.6	95.6	93.3	88.7	76.5	65.5	34.2
No Action	4.5-10	101.7	94.4	93.3	76.8	58.4	49.1	19.4
Representative Preferred	16-31.1	113.3	111.2	108.3	105.6	83.3	83.3	68.1
Representative Preferred	14-16	112.3	105.6	105.6	83.3	83.3	83.3	60.0
Representative Preferred	12-14	110.6	105.6	83.3	83.3	83.3	82.7	60.0
Representative Preferred	10-12	106.5	83.3	83.3	83.3	76.9	64.4	43.5
Representative Preferred	4.5-10	105.6	83.3	83.3	81.5	60.0	59.5	21.3
2027-2028 Operating Guidelines	16-31.1	83.3	83.3	83.3	83.3	83.3	83.3	83.3
2027-2028 Operating Guidelines	14-16	83.3	83.3	83.3	83.3	83.3	83.3	83.3
2027-2028 Operating Guidelines	12-14	89.2	83.3	83.3	83.3	83.3	83.3	83.3
2027-2028 Operating Guidelines	10-12	83.3	83.3	83.3	83.3	83.3	83.3	83.3
2027-2028 Operating Guidelines	4.5-10	83.3	83.3	83.3	83.3	83.3	83.3	80.9

Note: The modeled annual depletions in Mexico include modeling assumptions for reductions in water deliveries to Mexico and storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State

Attachment T1

Modeling Assumptions for Anticipated Operating Guidelines for 2027-2028

This page intentionally left blank.

Attachment T1. Modeling Assumptions for Anticipated Operating Guidelines for 2027-2028

As of the date of this Final EIS, the anticipated guidelines for the first operating interval (2027 and 2028) are still being refined. These anticipated guidelines are based on extensive engagement with the Basin States and incorporate tribal input. For the purpose of this attachment, these anticipated guidelines are referred to as "2027-2028 Operating Guidelines."

The Colorado River Simulation System (CRSS) model is used to simulate operations of the major reservoirs on the Colorado River system for the 2027-2028 Operating Guidelines. This attachment includes detailed modeling assumptions used for the 2027–2028 Operating Guidelines, which are described in **Appendix T, Section T.2**. For additional information on the CRSS model background, overview, hydrology inputs, and initial reservoir conditions, see **Appendix A**, CRSS Modeling Assumptions.

T1.1 Operations Upstream of Lake Powell

The operations of the Upper Basin reservoirs upstream of Lake Powell for the 2027-2028 Operating Guidelines are the same as other alternatives as described in **Appendix A**, CRSS Modeling Assumptions, except as noted below for Powell Infrastructure Protection (PIP) releases when additional releases from CRSP Upper Initial Units are needed to protect critical infrastructure at Glen Canyon Dam.

T1.1.1 Powell Infrastructure Protection Releases

Section T.2.4, Releases to Protect Glen Canyon Dam, describes the additional releases from the CRSP Upper Initial Units to protect critical infrastructure at Glen Canyon Dam. The following sections detail the modeling representation of that description for the 2027-2028 Operating Guidelines. For the remainder of this attachment, these are referred to as PIP releases.

PIP releases are modeled as releases from Upper Initial Units under low elevation conditions at Lake Powell in the 2027-2028 Operating Guidelines. The PIP release modeling assumptions are simplifications of the actual PIP process, which, like the Drought Response Operations Agreement (DROA), involves collaborative decision-making among stakeholder workgroups and includes subjective judgments that cannot be captured in a model. The modeled PIP releases represent a potential range of releases; actual releases may be lower, higher, or may not occur, and do not reflect the views of all stakeholders. These modeling assumptions are intended solely for NEPA analysis and do not reflect a position by Reclamation on operations that might be implemented under a PIP collaborative process.

For modeling purposes, all PIP releases are assumed to be made from Flaming Gorge Reservoir.

2027 PIP Releases and Model Initialization

For modeling purposes, Flaming Gorge Reservoir's December 31st starting elevation and May 1 target were adjusted based on the June 2026 24-Month Study (24-MS) Most Probable projection. This adjustment was made to align the model with projected 2026-2027 DROA operations year, which projects a PIP release of 1.0 maf.

Powell Trigger

PIP releases from Flaming Gorge Reservoir are assumed to occur in coordination with Lake Powell operations. PIP releases are triggered when Lake Powell water year release is reduced below 7.0 maf through a mid-year adjustment, which occurs in April. This operational adjustment is modeled to occur in April to initiate PIP releases at the start of the Flaming Gorge operating year (May – April). See **Section T1.2.2**, *Mid-Year Annual Release Adjustment*, for details.

Available Volume

The total volume from Flaming Gorge Reservoir available for a PIP release is limited to the amount of water stored above the designated lower limit elevation. A forecasting algorithm estimates the elevation for the future annual operating target month. These forecasts assume daily spring flow release patterns followed by baseflow releases under the same hydrologic conditions throughout the forecast period.

The lower limit elevation and annual operating target month for Flaming Gorge Reservoir is 5,890 feet in April (May 1), which is 19 feet above minimum power pool. Typical May 1 targets range from 6,027 to 6,023 feet depending on the hydrologic conditions.

The lower limit elevation is used to determine the available volume and the annual operational target, but there is no modeled logic to protect and/or maintain lower limit storage on a month-to-month basis. Flaming Gorge Reservoir can fall below the lower limit, which may prevent it from meeting future environmental targets.

Releases

Maximum Annual Release

For modeling purposes, the maximum annual PIP release from Flaming Gorge Reservoir is assumed to be 1.0 maf. This corresponds with the potential to reduce Lake Powell releases from 7.0 maf to 6.0 maf and the attempt to maintain a 1:1 ratio between the Lake Powell release reductions and the increased CRSP Upper Initial Unit releases (PIP release).

Distribution of Releases

The total PIP release contribution is the smaller of two values: the volume by which Lake Powell's release is reduced below 7.0 maf, or the total volume available from Flaming Gorge Reservoir. Because Flaming Gorge Reservoir is the only CRSP Upper Initial Unit modeled to make PIP releases, the full PIP release volume is assigned to it.

Flaming Gorge Reservoir Operational Adjustments

Flaming Gorge Reservoir operations are adjusted within their Records of Decision to release an additional volume equal to the assigned contribution by modifying their operating targets. The annual contribution from Flaming Gorge Reservoir is estimated at the end of each operating year.

Flaming Gorge Reservoir's May 1 target is lowered by its assigned contribution. If the reservoir did not reach its normal May 1 target in the previous year due to PIP releases, the prior May 1 elevation is adjusted by the new assigned contribution. The May 1 target elevation cannot be lower than 5,890 feet (lower limit elevation). Operations are adjusted based on the sub annual flow regime as follows:

- Spring: No changes to the spring operations are modeled. Spring operations are modeled by a daily hydrograph that ramps up from baseflow to peak and back to baseflow. Operations vary by hydrologic classification and peak timing.
- Baseflow: The release in baseflow is the greater of the steady release to achieve the May 1 target or the minimum for Reach 2 (Jensen, UT) for the hydrologic classification. The release in all baseflow months is constrained further by the minimum and maximum for Reach 1 (below Flaming Gorge Reservoir). All maximum and minimum flows are from the 2022 Drought Response Operation Plan,[1] which uses the +/- 40 percent or 25 percent flexibility in the Record of Decision and vary by season.
- Transition: Releases during the transition period in March and April are constrained to a maximum of 2,000 cfs, which is based on an operator estimate of F&WS/Recovery Program preference.[2]

Recovery

Recovery is not explicitly modeled. Instead, Flaming Gorge Reservoir is modeled to naturally recover in years without PIP releases as it returns to the normal annual operating targets.

T1.2 Lake Powell Operation

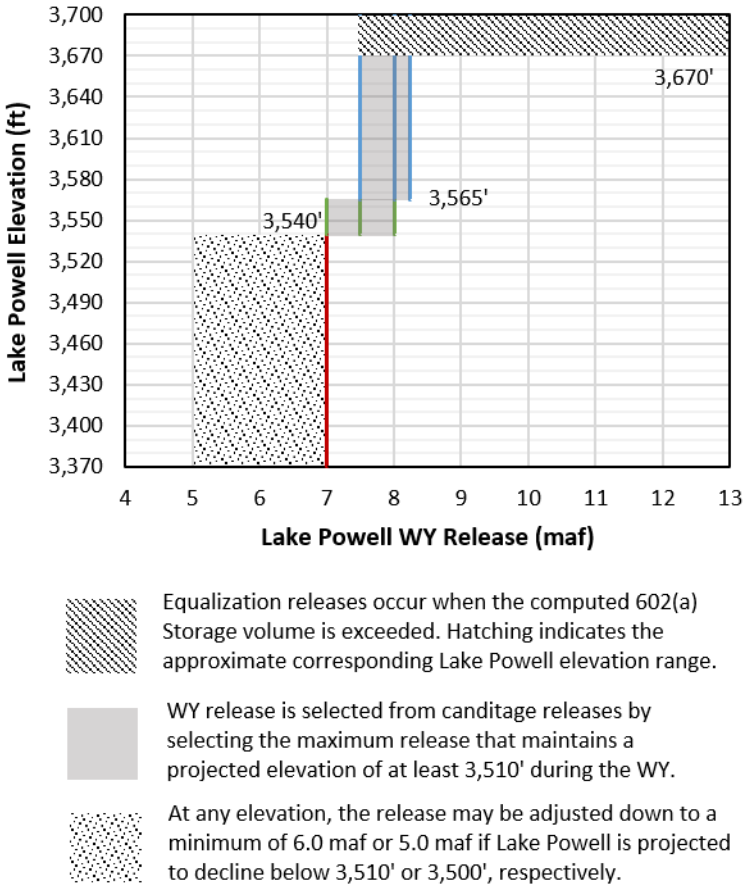
Lake Powell is the most downstream reservoir in the Upper Basin, impounded by Glen Canyon Dam near Page, Arizona. Lake Powell operates on a water year (October through September) basis with an annual release set at the beginning of the water year with possible adjustments throughout the year. Modeling assumptions common to all alternatives, including methods for disaggregating annual releases to monthly flows, safe operating capacity, and infrastructure constraints at low elevations, are summarized in **Appendix A**, CRSS Modeling Assumptions.

Under the modeled representation of the 2027–2028 Operating Guidelines, the Lake Powell water year release is established at the beginning of each water year based on the previous end of water year (EOWY) (September 30) Lake Powell pool elevation.

[1] Attachment C - Appendix 1, Estimated Normal / Maximum / Minimum Summer to Winter Baseflows in the Green River downstream from Flaming Gorge Dam, page 84-85.
[2] Typically, the transition period is the unconstrained release to achieve the May 1 target.

Figure T1-1 summarizes the Lake Powell release in the 2027-2028 Operating Guidelines. If the assumed 602(a) storage criteria are met (described in the subsequent section), Lake Powell operations are described in **Section T1.2.1**. Otherwise, Lake Powell operations are described in **Section T1.2.2**.

Figure T1-1
Coordinated Operations of Lake Powell and Lake Mead, 2027-2028 Operating Guidelines



T1.2.1 Coordination at High Elevations

If the combined Colorado River Storage Project (CRSP) storage is above the 602(a) storage volume at the previous EOWY and Lake Powell EOWY storage is greater than Lake Mead EOWY storage, equalization operations determine the water year release. A detailed description of the 602(a) storage volume calculation and parameters used in the calculation is found in **Appendix J**. For modeling purposes, the same parameters that were used to compute the 602(a) storage volume for the 2007 Interim Guidelines Equalization line are used for modeling the equalization operations in the 2027-2028 Operating Guidelines. **Appendix J** also presents a comparison illustrating how different parameter assumptions would influence the resulting 602(a) storage values.

The 602(a) storage volume is not converted to a Lake Powell elevation. The water year release is set to the minimum of the volume needed to bring the CRSP storage down to the calculated 602(a)

storage volume or to balance the Lake Powell and Lake Mead projected EOWY storage, but no lower than the computed maximum release using the primary operations. The modeled 602(a) storage volume grows over time; in 2027, the volume is 25,082,344 af and in 2060 it reaches 29,647,144 af. Equalization may only be triggered at the start of the water year, and once an equalization determination is made, Lake Powell operates in the Equalization Tier for the remainder of the water year.

T1.2.2 Primary Operations

Initial Water Year Release

The initial water release is determined in October based on the September 30 Lake Powell pool elevation and a series of potential initial Lake Powell Water Year Releases as shown in **Table T1-1** and **Figure T1-1**. Before selecting an initial release, the potential releases are evaluated to identify which annual release volumes maintain a projected Lake Powell elevation of at least 3,510 feet during the following spring. For modeling purposes, and in order to evaluate the maximum impacts on Lake Powell, the initial release is determined by selecting the maximum release from the potential release volumes meeting the criterion. The next section describes the potential adjustments to this initial water year release volume during the water year in response to changing hydrologic conditions.

The corresponding monthly releases are then calculated using the method described in **Appendix A, Section A.6.1,** *Disaggregation from Annual to Monthly Release*.

Table T1-1
Potential Initial Water Year Releases by Lake Powell Pool Elevation, 2027-2028 Operating Guidelines

Lake Powell End-of-September Pool Elevation (feet)	Potential Initial Lake Powell Water Year Releases (maf)
> 3,565	8.23, 8.0, and 7.5
3,565 to 3,540	8.0, 7.5, and 7.0
< 3,540	7.0

When Lake Powell's September 30 elevation is below 3,540 feet, the modeled implementation evaluates an initial water year release of 7.0 maf. If Lake Powell is projected to remain above 3,510 feet in March, the 7.0 maf release is selected and monthly releases are calculated as described above. If Lake Powell is projected to decline below 3,510 feet in March, releases from October through March are instead set using a dynamic monthly release pattern rather than a prescribed water year release pattern deferring the determination of the water year release until April. This pattern is designed to avoid elevation 3,500 feet while respecting the Long-Term Experimental Management Plan (LTEMP) minimum daily release of 6,521 cfs. In April, the water year release is set, likely between 6.0 and 7.0 maf, contemporaneously with the modeled PIP releases to protect critical infrastructure at Glen Canyon Dam, as described in the *Mid-Year Release Adjustments* section and in **Section T1.1.1**

The projections used to evaluate the potential initial water year releases are designed to approximate the inputs that would be used in an actual 24-Month Study. In practice, the 24-Month Study relies on the current Lake Powell unregulated inflow forecast from the Colorado Basin River Forecast Center, which in August is typically close to the historical average unregulated inflow, adjusted for antecedent conditions such as soil moisture carried over from the previous year. For modeling purposes, CRSS estimates the March elevation using the historical median Lake Powell inflow (1991-2020), along with any PIP releases assigned for the current PIP year. Because CRSS does not know in advance the volume of PIP releases that will occur, a proportional PIP volume is assumed to occur between October and March for this projection. This volume is calculated by multiplying the assigned annual PIP volume by the proportion of the 2026-2027 PIP volume that was projected to occur between October and March based on the June 2026 Most Probable 24-Month Study.

Mid-Year Release Adjustments

There is potential for either an upward or a downward mid-year adjustment to the initial water year release. For modeling purposes, these adjustments occur in April. After these adjustments are made to the annual release, monthly releases are calculated using the method described in **Appendix A, Section A.6.1,** *Disaggregation from Annual to Monthly Release*.

An upward adjustment occurs if the projected EOWY Lake Powell elevation is above 3,565 feet. In this case, the initial water year release is increased by half of the projected volume above the storage corresponding to elevation 3,565 feet, up to a maximum release of 12.0 maf. This adjustment can occur with any selected initial water year release.

A downward adjustment is evaluated to reduce the risk that Lake Powell will decline below elevation 3,510 feet during the next spring. The downward adjustment can occur with any selected initial water year release. To determine whether a downward adjustment is needed, Lake Powell's projected elevation in March of the following year is evaluated. This projection assumes forecasted Lake Powell inflow (see **Appendix A, Section A.6.2**, *Lake Powell Inflow Forecast*) for the remainder of the current water year and median Lake Powell inflow (1991-2020) for the following water year. For the water year release, the selected initial release for the current water year is used (7.0 maf if in the lowest tier) followed by an assumed 7.0 maf release in the following water year using the standard monthly release pattern. No PIP release is assumed in this projection since this projection determines if a PIP release is necessary in conjunction with a reduced Lake Powell release.

If Lake Powell is projected to be above 3,510 feet in March of the following water year, the initial annual release set at the beginning of the current water year is retained, and no PIP releases are initiated. If Lake Powell is projected to be below 3,510 feet, the volume needed to maintain 3,510 feet is determined and used to adjust releases. First, the Lake Powell water year release is reduced to 7.0 maf if the initial release was greater than 7.0 maf. If additional reductions are necessary to meet the volume needed to maintain 3,510 feet, then the Lake Powell release is further reduced while PIP releases are increased. There is an attempt to maintain a 1:1 ratio between the additional Lake Powell release reductions and the PIP releases, subject to a maximum assumed PIP release of 1.0 maf and a minimum Lake Powell water year release of 6.0 maf. The subsequent section describes the potential to reduce releases below 6.0 maf.

Reduced Releases for Infrastructure Protection

Lake Powell releases can be reduced to a minimum of 6.0 maf if Lake Powell is projected to drop below 3,510 feet during the water year, and releases can be reduced to a minimum of 5.0 maf if Lake Powell is projected to drop below 3,500 feet during the water year. In CRSS, first the current month's Lake Powell pool elevation is evaluated, and then the projected EOWY Lake Powell pool elevation with an assumed 5.0 maf and 6.0 maf release for the water year is used to determine the monthly release.

- If the projected EOWY Lake Powell pool elevation with a 5.0 maf release is less than 3,500 feet, the monthly release is calculated using the method described in **Appendix A, Section A.6.1,** *Disaggregation from Annual to Monthly Release*. with an assumed the annual release of 5.0 maf.
- If the projected EOWY Lake Powell pool elevation with a 6.0 maf release is less than 3,510 feet but greater than 3,500 feet, the monthly release is calculated using the method described in **Appendix A, Section A.6.1,** *Disaggregation from Annual to Monthly Release*. with an assumed annual release of 6.0 maf.
- If the projected EOWY Lake Powell pool elevation with a 6.0 maf release is less than 3,500 feet but projected EOWY Lake Powell pool elevation with a 5.0 maf release is greater than 3,500 feet, the monthly release is calculated using the method described in **Appendix A, Section A.6.1,** *Disaggregation from Annual to Monthly Release*. assuming the annual release of the volume needed to end the water year at 3,500 feet (computed to be between 5.0 and 6.0 maf).
- If the current Lake Powell pool elevation is below 3,500 feet but the projected EOWY Lake Powell pool elevation with a 5.0 maf release is greater than 3,500 feet and the projected EOWY Lake Powell pool elevation with a 6.0 maf release is greater than 3,510 feet, the current month's release is decreased such that the Lake Powell pool elevation is maintained at or above 3,500 feet; however, it is subject to the following constraints: the minimum water year release is 5.0 maf, and the monthly release will be no less than the volume necessary to meet the minimum daily LTEMP release (6,521 cfs).

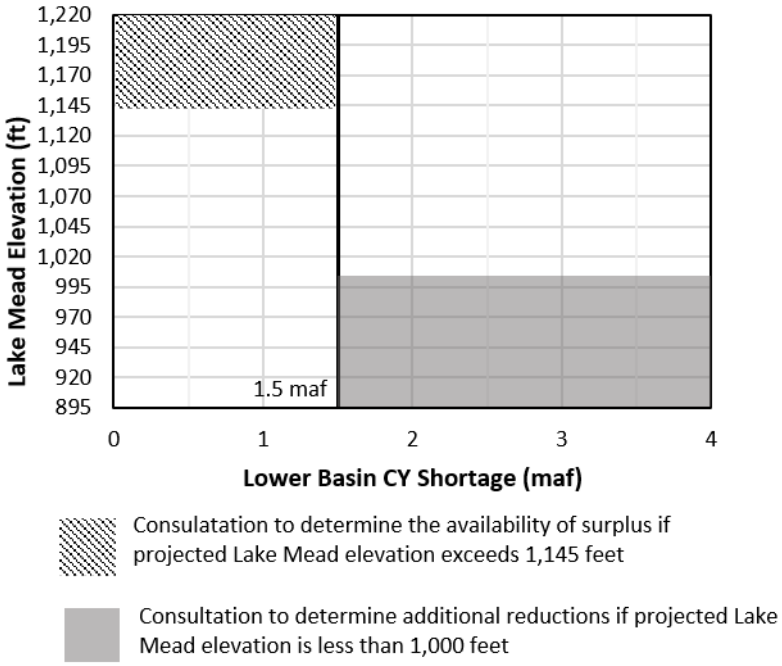
If releases are adjusted to protect 3,500 or 3,510 feet during a given month of the water year and Lake Powell pool elevation increases above 3,500 or 3,510 feet, monthly releases can be increased to release up to the original selected water year release.

T1.3 Lake Mead Operation

Lake Mead is the uppermost reservoir in the Lower Basin. In CRSS, Lake Mead operations are modeled by solving for the Lower Basin condition, Lower Basin and Mexico diversions, and the conservation, storage, and delivery of conserved system and non-system water, then setting Lake Mead's outflow to meet all downstream diversions. For detailed information on the modeling assumptions—including water user depletions, water passing to Mexico in excess of treaty requirements and water bypassed pursuant to International Boundary and Water Commission (IBWC) Minute 242, flood control operations, infrastructure constraints at low elevations, and dead pool-related reductions—see **Appendix A**, CRSS Modeling Assumptions.

Figure T1-2 summarizes the modeled Lake Mead operations in the 2027-2028 Operating Guidelines, and they are described more in the following sections.

Figure T1-2
Shortage Guidelines to Reduce Deliveries from Lake Mead, 2027-2028 Operating Guidelines



T1.3.1 Normal and Surplus Conditions

If Lake Mead is projected to exceed elevation 1,145 feet, consultation regarding reduced shortage volumes or the availability of surplus would occur. Neither normal nor surplus conditions are modeled in the analysis of the 2027-2028 Operating Guidelines.

T1.3.2 Shortage Condition

In 2027 and 2028, an annual shortage volume of 1.25 maf would be distributed among the Lower Division States, with an assumed reduction to Mexico bringing the total Lower Basin-wide shortage to 1.5 maf. This 1.5 maf shortage volume is applied in all 400 simulated futures in both 2027 and 2028. Shortages above 1.5 maf are not modeled as shown in **Figure T1-1**; however; if Lake Mead is projected to decline below elevation 1,000 feet during any 12-month period, consultation would occur to evaluate whether additional actions are necessary to reduce the risk of Lake Mead declining below elevation 950 feet. The modeled shortage volume is distributed among the Lower Division States and Mexico as shown in **Table T1-2** below. For modeling purposes only, the Arizona shortage is distributed proportionally to all Arizona Priority 4 water users; the California shortage is assumed to be applied to the Metropolitan Water District (MWD); and the Nevada shortage is assumed to be applied to the Southern Nevada Water Authority (SNWA).

Table T1-2
Shortage Distribution,
2027-2028 Operating Guidelines

Entity	Shortage (kaf)	Shortage (%)
Arizona	760	43.33
California	440	36.67
Nevada	50	3.33
Mexico	250	16.67

Note: Shortage distributions include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

T1.4 Storage and Delivery of Conserved System Water

T1.4.1 Lake Powell Mechanism

There is no modeled Lake Powell mechanism nor is there any modeled Upper Basin conservation in the analysis of the 2027-2028 Operating Guidelines.

T1.4.2 Lake Mead Mechanism

Water conserved by Lower Basin users would be stored in a pool in Lake Mead that can reach a maximum volume of 5.3 maf, which includes the storage of pre-2027 Intentionally Created Surplus (ICS) except for System Efficiency ICS. All conserved water stored in Lake Mead would be included in determinations of equalization releases from Lake Powell and in projections of Lake Mead's elevation for consultations regarding additional/reduced Lower Basin shortage or availability of Lower Basin surplus. Lower Colorado River entitlement holders, including Lower Basin Tribes, consistent with applicable implementation agreements, would be able to contribute to the conservation pool and to use their conserved water for delivery and/or in intra- and interstate transactions with other Lower Basin users.

The subsequent sections provide a detailed description of the modeling assumptions and associated constraints. Specific assumptions for the creation and delivery of ICS in 2027 and 2028 were based on the assumptions used for the Representative Preferred Alternative (see **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water).

Treatment of Pre-2027 Intentionally Created Surplus

For modeling purposes only, except for System Efficiency ICS, ICS created under the 2007 Interim Guidelines and 2019 Drought Contingency Plan (DCP) that remains in Lake Mead in 2027 is converted to the post-2026 Lake Mead mechanism on January 1, 2027.

General Assumptions

The maximum capacity of the Lake Mead mechanism, along with individual annual creation and delivery limits, is provided in **Table T1-3** below. The Lake Mead mechanism – State Pools operate on a calendar year to align with reservoir operations.

Table T1-3
Volume Limitations of Storage and Delivery of Conserved Water, 2027-2028 Operating Guidelines

Entity	Maximum Annual Contribution (kaf)	Maximum Cumulative Storage (kaf)	Maximum Annual Delivery (kaf)	Maximum Cumulative 2027 2028 Delivery (kaf)
Arizona	125	1,000	300	800
California	400	2,000	400	
Nevada	125	800	300	
Mexico[1]	250	1,500	N/A	160
Total	**900**	**5,300**	**1,160**	**960**

1) Volumes include modeling assumptions for Mexico's storage and delivery limits. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.
2) There is an assumed maximum cumulative delivery to Mexico of 160 kaf for 2027–2028. No annual maximum is specified; the annual delivery is constrained only by the two-year cumulative limit of 160 kaf.

Water users could contribute or deliver water previously stored under this new mechanism at their discretion within the annual volume constraints related to the pool (**Table T1-3**). At the time the water is conserved, a one-time 10 percent system assessment is applied, followed by an annual 3 percent evaporation deduction calculated based on the volume remaining in the Lake Mead mechanism at the end of the preceding calendar year.

For modeling purposes only, additional delivery constraints include the following:

- Delivery from the Lake Mead mechanism is prohibited when Lake Mead begins the year with a physical pool elevation below 1,000 feet. When the beginning-of-year pool elevation is between 1,000 feet and 1,025 feet, delivery/conversion volumes are proportionally reduced so that the forecasted EOCY pool elevation does not fall below 1,000 feet. Note, because the constraint is based on forecasted conditions, modeled elevations may still fall below 1,000 feet.
- The cumulative delivery by the Lower Division States is limited to 800 kaf through the end of 2028. As a modeling simplification, this constraint is applied to California's 2028 delivery when applicable. Based on the delivery assumptions (described in the following sections), the constraint applies only when California receives its maximum delivery of 400 kaf in 2027. Because the other States' delivery logic does not produce maximum deliveries, any necessary reduction to stay within the 800 kaf limit was applied to California.

- Delivery of stored water from the Lake Mead mechanism is limited such that a state's annual apportionment or Mexico's annual allotment is not exceeded.
- Delivery/conversion of existing DCP ICS (Arizona) and Binational Water Scarcity Contingency Plan credits (Mexico) is allowed when Lake Mead's pool elevation exceeds 1,110 feet.

Arizona Creation and Delivery Assumptions

In general, Arizona's creation and delivery of conserved water is inversely related to the physical elevation at Lake Mead and the state shortage volume. For modeling purposes only, Arizona's conservation activity is modeled using the Central Arizona Project (CAP) and Colorado River Indian Tribe-Arizona (CRIT-AZ) water users.

Creation

Arizona is modeled to create up to 125 kaf annually, depending on the state's total shortage volume. As in the Representative Preferred Alternative, the annual creation volume is calculated as the lesser of 1,200 kaf minus Arizona's policy shortage of 760 kaf and Arizona's maximum annual creation volume of 125 kaf (**Table T1-3**). For the modeled 2027 and 2028 Operating Guidelines, the annual shortage of 760 kaf to Arizona results in a modeled annual creation of 125 kaf.

The computed state creation volume is then split to the CAP and CRIT-AZ water users using the methodology described in the Enhanced Coordination Alternative (see **Appendix B, Section B.6.2.3**, *Creation*).

Delivery

For the modeled 2027 and 2028 Operating Guidelines, Arizona is assumed to take delivery of storage credits from the Lake Mead mechanism as a modeling representation of federal tribal firming obligations,[3] with delivery volumes based on specified CAP shortage thresholds shown in **Table T1-4**. This assumption was adapted from the No Action, Enhanced Coordination, and Representative Preferred Alternatives (see **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water).

Table T1-4
Storage Credit Delivery/Conversion Volumes by Shortage Threshold, 2027-2028 Operating Guidelines

Current Year Shortage for CAP (kaf)	Delivery Volume (kaf)
≥ 592	36.924
< 592 to ≥ 512	24.325

[3] Please see the Arizona Water Settlements Act, Pub. L. 108-451, 118 Stat. 3478 (Dec. 10, 2004), section 105, for a general description of the firming program. All firming deliveries in any given year would be made in accordance with applicable law. This appendix is not a legal interpretation of the firming program or of federal obligations. Actual firming deliveries may vary from the modeling approximations contained in this appendix, and Reclamation retains discretion to include legally required tribal deliveries in this priority mechanism.

As a result of the 760 kaf shortage to Arizona, Arizona is assumed to take delivery of 36.924 kaf of storage credits in both 2027 and 2028 modeled as a delivery to CAP.

California Creation and Delivery Assumptions

In general, California's creation and delivery of conserved water is based on the Sacramento River Water Year Type (SRWYT), described more in **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water. For modeling purposes, California's ICS creation and delivery is modeled using MWD.

Creation

The annual assumed creation volumes are shown below in **Table T1-5**.

Table T1-5
California's Assumed Creation Volumes,
2027-2028 Operating Guidelines

SRWYT	Total (kaf)
C	0
D	0
BN	100
AN	200
W	400

Conservation is assumed to first go towards meeting any shortages in the same year it occurs. Any remaining conserved water is stored in the Lake Mead mechanism. Because there is an assumed shortage of 460 kaf in 2027 and 2028 to California, there is no modeled creation of additional ICS in 2027 or 2028.

Delivery

The annual assumed delivery volumes are shown below in **Table T1-6**.

Table T1-6
California's Assumed Delivery Volumes,
2027-2028 Operating Guidelines

SRWYT	Total (kaf)
C	400
D	240
BN	0
AN	0
W	0

Nevada Creation and Delivery Assumptions

Creation

SNWA is modeled to store two types of water in the Lake Mead mechanism: conserved water and Tributary Conservation. With respect to Tributary Conservation, which represents conservation on the Virgin and Muddy Rivers, 35 kaf per year is created. This water is stored in the Lake Mead mechanism if space is available, after the applicable 10 percent system assessment is applied. In CRSS, this is modeled as a gain to Lake Mead.

For conserved water, SNWA's annual creation is calculated using following equation:

$$Annual\ Creation = Maximum(\ 300{,}000\ af - Annual\ Shortage_{NV} - AnnualSystemConservation_{NV} + TributaryConservation - Annual\ Demand_{NV}, 0\ af)$$

The system conservation assumptions are described in **Section T1.4.4**, and the Tributary Conservation is the volume after the system assessment is applied. Based on the assumed depletion schedules, SNWA creates ICS in 2027 and 2028 because the assumed depletions are below the state's annual apportionment in both years (see **Appendix M**, Lower Division States Depletion Schedules).

Delivery

In the Representative Preferred Alternative, Nevada's water stored in the Lake Mead mechanism is assumed to mitigate shortages; however, based on the assumed shortage volumes in the modeling of the 2027-2028 Operating Guidelines, no deliveries are necessary to mitigate shortages.

If Nevada's account in the Lake Mead mechanism is full or dead pool-related reductions occur, SNWA is assumed to take full delivery of its Tributary Conservation.

Mexico Creation and Delivery Assumptions

Reclamation developed modeling assumptions for the storage and delivery of deferred water by Mexico to evaluate possible impacts of this activity on flow and other resources for the Final EIS.[4] Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

In general, the volumes of creation and delivery depend on the assumed annual delivery reductions to Mexico, and the storage credits are used to mitigate these delivery reductions. The assumptions from the Supply Driven Alternative were used for this modeling, with the results of those assumptions described below.

Creation

The Supply Driven Alternative assumed Mexico would create up to 250 kaf per year, depending on its total reduction volume. Specifically, Mexico's assumed creation equals 250 kaf minus Mexico's

[4] Assuming activity in Mexico maximizes the effects on river flows as it occurs at the most downstream point in CRSS.

reduction. Because Mexico's reductions are assumed to be 250 kaf in both years of the 2027-2028 Operating Guidelines, no annual creation occurs.

Delivery

In the Supply Driven Alternative Mexico is assumed to convert storage credits to meet assumed delivery reductions that exceed 250 kaf. Because Mexico's reductions are assumed to be 250 kaf in both years of the 2027-2028 Operating Guidelines, no delivery occurs.

T1.4.3 Lake Mead Mechanism – Federally Managed Water Resources Pool

There are no model assumptions for the Federally Managed Water Resources Pool included in this analysis; however, the 2027-2028 Operating Guidelines are anticipated to include a Federally Managed Water Resources Pool. For more information on the Federally Managed Water Resources Pool, see **Chapter 2, Section 2.4.3.3.3**. The modeling of the Representative Preferred Alternative includes representative modeling of this pool.

T1.4.4 System Conservation: 700+ Plan

As described in the Lower Division States' May 1 proposal, the Lower Division States intend to contribute a cumulative minimum of 700 kaf of system conservation through 2028. Each state's contribution is assumed to be split equally between 2027 and 2028. These volumes are separate from ICS, not stored in individual state pools, and in addition to the previously described shortage volumes (**Section T1.3.2**).

Table T1-7 shows the annual system conservation volumes assumed for modeling purposes only for each state, totaling 700 kaf through 2028. The table also identifies the water user for which system conservation is modeled to occur, based on available demand and maximum downstream reach impacts.

Table T1-7
Assumed Annual System Conservation Volumes by State, 2027-2028 Operating Guidelines

State	Water User that System Conservation is Modeled On	Annual Conservation (kaf)	Cumulative 2027-2028 Conservation (kaf)
Arizona	Wellton Mohawk Irrigation and Drainage District (IDD)	150	300
California	Imperial Irrigation District (IID)	150	300
Nevada	Southern Nevada Water Authority (SNWA)	50	100
Total		**350**	**700**