Technical Appendix 4
Water Deliveries

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Acronyms and Abbreviations

Acronym or Abbreviation	Full Phrase
2007 Final EIS	2007 Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead Final Environmental Impact Statement
2007 ROD	2007 Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead Record of Decision
2024 Final SEIS	2024 Near-term Colorado River Operations Final Supplemental Environmental Impact Statement
2024 LTEMP	Final SEIS 2024 Glen Canyon Long-Term Experimental and Management Plan Final Supplemental EIS
2024 LTEMP ROD	2024 Glen Canyon Long-Term Experimental and Management Plan Record of Decision
2024 ROD	2024 Near-term Colorado River Operations Record of Decision
ADM	Alternative Distribution Model
af	acre-feet
afy	acre-feet per year
Basin	Colorado River Basin
BCPA	Boulder Canyon Project Act
CCS	Continued Current Strategies
CRSS	Colorado River Simulation System
DCP	Drought Contingency Plan
EIS	Environmental Impact Statement
ICS	Intentionally Created Surplus
kaf	thousand acre-feet
kafy	thousand acre-feet per year
LB	Lower Basin
LB Priority	Lower Basin Priority
LB Pro Rata	Lower Basin Pro Rata
Lower Basin	Lower Colorado River Basin
maf	million acre-feet
Mexico	United Mexican States
PPR	Present Perfected Right

Reclamation	United States Bureau of Reclamation
SAM	Shortage Allocation Model
Secretary	Secretary of the Interior
SNWA	Southern Nevada Water Authority
Upper Basin	Upper Colorado River Basin

TA 4. Water Deliveries

TA 4.1 Affected Environment

Water from the Colorado River is delivered to entities in the Lower Division states and the United Mexican States (Mexico) for domestic and agricultural use, in accordance with the Law of the River. Colorado River water is also used to serve many purposes in the Upper Basin. The geographic scope of this EIS does not extend above Lake Powell and accordingly does not include an analysis of the impact to Upper Basin water users. With respect to Upper Basin conservation, the nexus to the proposed federal action is the storage and delivery of that conserved water in Lake Powell. The effects of this storage in and delivery from Lake Powell are within the scope of the EIS (see EIS **Section 3.3**, Hydrologic Resources, and **TA 3**, Hydrologic Resources), while specific activities that may be undertaken in the Upper Basin to generate the conserved water are not within the scope of this EIS. Any such activities are unknown at this time and will not necessarily require federal decision making. Any federal decisions associated with these conservation activities will be assessed outside of this EIS.

The Law of the River is an umbrella term for the collection of laws, compacts, decrees, court decisions, contracts, and regulatory guidelines that govern management and operation of the Colorado River. Most notable among these documents are the Colorado River Compact of 1922, the Boulder Canyon Project Act (BCPA), the 1944 United States-Mexico Treaty on Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (1944 Water Treaty), the 1968 Colorado River Basin Project Act, and the 2006 Consolidated Decree (Reclamation 2016a). Several additions to this collection of documents include the: Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead Final Environmental Impact Statement (2007 Final EIS; Reclamation 2007b) and Record of Decision (2007 ROD; Reclamation 2007a), which established the 2007 Interim Guidelines; Minute 323, Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin in 2017 (International Boundary and Water Commission 2017); the 2019 Lower Basin Drought Contingency Plan (DCP; Reclamation 2019a), the 2024 Glen Canyon Long-Term Experimental and Management Plan Final Supplemental EIS (2024 LTEMP Final SEIS; Reclamation 2016a) and Record of Decision (2024 LTEMP ROD; Reclamation 2016b); and the 2024 Near-term Colorado River Operations Final Supplemental EIS (2024 Final SEIS, Reclamation 2024a) and Record of Decision (2024 ROD, Reclamation 2024b). Specific to the Upper Colorado River Basin (Upper Basin), changes include implementation of the 2019 Upper Basin DCP's Drought Response Operating Agreement, which seeks to prevent reaching critically low elevations in Lake Powell while maintaining compliance with the Colorado River Compact. The 2007 Interim Guidelines and 2019 DCPs are set to expire in mid-2026 necessitating the development of new guidelines that are proposed and analyzed in this environmental impact statement (EIS).

The Colorado River Compact apportions 7.5 million acre-feet (maf) of water per year to the Upper Colorado River Basin (Upper Basin), and 7.5 maf to the Lower Basin with division of the two basins occurring at Lee Ferry, Arizona. Within each Basin, further apportionments are made to individual states and entities. The 2007 Interim Guidelines as modified by the 2024 ROD provide, among other things, guidelines for Normal, Surplus, and Shortage Conditions in the Lower Basin during the interim period through 2026.

This section describes historic water deliveries to entities within the Colorado River Basin (Basin), including apportionments to the Upper and Lower Division States, entitlements, depletion schedules, allotments to Mexico, and distribution of shortages to the Lower Division States. See EIS **Section 1.8** for a description of historical water use across the Upper and Lower Basins.

TA 4.1.1   Apportionments to the Upper Division States

Water is distributed among the Upper Division States by the 1948 Upper Colorado River Basin Compact as a percentage of the total amount available for consumptive use each year after the deduction of Arizona's 50 thousand acre-feet (kaf) apportionment of Upper Basin water. These apportionment percentages are provided in **Table TA 4-1**. The Upper Division State apportionments have not yet been fully developed.

Table TA 4-1
Upper Division States Apportionment

State	Annual Apportionment (Percent)
Colorado	51.75
New Mexico	11.25
Utah	23.00
Wyoming	14.00

Source: Upper Colorado River Basin Compact 1948

TA 4.1.2   Apportionments to the Lower Division States

Water apportionments to the Lower Division States were established by the BCPA and are summarized in **Table TA 4-2**.

Table TA 4-2
Lower Division States Apportionment

State	Annual Apportionment (maf)
Arizona	2.8
California	4.4
Nevada	0.3
Total	**7.5**

Source: U.S. Congress 1928

TA 4.1.3   Water Delivery Entitlements to Entities in the Lower Division States

Rights to use Colorado River water within the Lower Division States, known as entitlements, are established in accordance with the BCPA and the Consolidated Decree. All of the water apportioned to the Lower Division States is allocated in accordance with these documents. For users in the Lower Division States, entitlements arise through (i) a decreed right, (ii) a Section 5 water delivery contract, or (iii) a Secretarial reservation.

According to Section 5 of the BCPA, the Secretary of the Interior (Secretary) is authorized as the contracting authority for the lower Colorado River, and any user of Colorado River water in the Lower Basin is required to have a contract with the Secretary acting through the Bureau of Reclamation (Reclamation).

The Consolidated Decree lists and quantifies all Present Perfected Rights (PPRs) in the Lower Division States. PPRs are the highest priority Lower Basin mainstream Colorado River water entitlements that were perfected before June 25, 1929. The Consolidated Decree also lists federal reserved water rights for five Indian reservations. PPRs are satisfied first in order of priority in years when less than 7.5 maf of water is available from the Colorado River for consumptive use in the Lower Division States, before other entitlements are fulfilled. A summary of the total amounts of water apportioned through PPRs for each of the Lower Division States is provided in **Table TA 4-3**. These entitlements are summarized in terms of both diversion and consumptive use. The return flows used to compute the consumptive use equivalent of diversion entitlements have been estimated from historical data.

Table TA 4-3
PPRs in the Lower Division States

State	Estimated Diversion Entitlement (acre-feet per year (afy))	Estimated Consumptive Use Entitlement (afy)
Arizona	1,077,971	597,811
California	3,019,573	2,801,326
Nevada	13,034	8,698
Total Lower Division States	**4,110,578**	**3,407,835**

Source: Reclamation 2023a

The BCPA stipulates that all mainstream Colorado River water delivery contracts in the Lower Basin are for permanent use. Water delivery contracts may describe entitlements as an annual diversion, an annual consumptive use, or both.

A Secretarial Reservation is an entitlement established by the Secretary for use at federal facilities or on federal lands. Secretarial Reservations have been established for water use on Bureau of Land Management lands, on the Cibola, Imperial, and Havasu National Wildlife Refuges, at Hoover and Davis Dams, and at the Lake Mead National Recreation Area.

Storage & Delivery of Conserved and Non-System Water and Treatment of Pre-2027 Intentionally Created Surplus

As outlined in the 2007 Interim Guidelines, Lower Basin entitlement holders can store conserved water in Lake Mead, provided they have an Intentionally Created Surplus (ICS) exhibit and an approved ICS creation plan. ICS may only be created in a given year via approved conservation actions and a reduction in consumptive use. The ICS created is also subject to constraints as defined in the 2007 ROD (Reclamation 2007a), 2019 DCPs agreements (Reclamation 2019a), and 2024 ROD (Reclamation 2024b).

Under the 2007 Interim Guidelines, ICS can be delivered to the Lower Division States when an ICS Surplus Condition is determined. The ICS Surplus Condition is enacted when (i) Lake Mead's elevation is projected to be above 1,075 feet, (ii) a Flood Control Surplus has not been determined, and (iii) delivery of ICS has been requested by one or multiple of the Lower Division States. The ICS Surplus Condition is enacted concurrent with the Normal operating condition in a given year and differs from other surplus conditions under the 2007 Interim Guidelines, discussed below. The Lower Basin DCP modified ICS delivery provisions, allowing for delivery of ICS below elevation 1,075 feet to elevation 1,025 feet. Beginning in 2027, guidelines regarding the delivery and creation of ICS will change in accordance with the Lower Basin DCP to incorporate additional thresholds and repayment timelines.

TA 4.1.4   Lower Division States' Water Supply Determination

As outlined in the Consolidated Decree, the Secretary determines the water supply condition for the lower Colorado River mainstream on an annual basis. The water supply conditions are:

- Normal Condition: sufficient water is available to satisfy 7.5 maf of consumptive use in the Lower Division States;
- Surplus Condition: sufficient water is available to satisfy an excess of 7.5 maf of consumptive use in the Lower Division States; and
- Shortage Condition: insufficient water is available to satisfy 7.5 maf of consumptive use in the Lower Division States.

The supply condition is annually determined based on the projected elevation of Lake Mead on January 1, as modeled by the most recent August 24-Month Study (Reclamation 2024c). The guidance provides supply thresholds under which the consumptive use from Lake Mead would be Normal, Surplus, or Shortage Conditions, as well as outlining coordinated reservoir management strategies between Lake Powell and Lake Mead.

Under a Surplus Condition, 46 percent of the surplus water is to be apportioned to Arizona, 50 percent to California, and four percent for use in Nevada, as outlined in the Consolidated Decree. In addition to the Consolidated Decree, the 2007 Interim Guidelines provide guidance regarding when a Surplus Condition should be declared, how surplus water should be distributed by use (e.g., agriculture, domestic, etc.), and recognition of modifications to surplus distributions amongst the states via forbearance agreements. Lake Mead has not operated in a Surplus Condition since the publication of the 2007 ROD. From 2008 to 2019, Lake Mead operated in a "Normal/ICS Surplus" Condition, and from 2020-2021 in a "Normal/ICS Surplus and DCP Contributions" Condition,

which is defined above. **Table TA 4-4** summarizes historical ICS deliveries for the Lower Division States. Note that states may elect not to request ICS deliveries during an ICS Surplus year, and may also create ICS during that year, hence some of the years under this condition display zero volume delivered.

Table TA 4-4
Lower Basin Annual Historical ICS Deliveries by State

Calendar Year	Operating Condition	ICS Delivered (acre-feet (af))			
		AZ	CA	NV	Total
2008	Normal/ICS Surplus	0	46,976	9,638	56,614
2009	Normal/ICS Surplus	0	0	0	0
2010	Normal/ICS Surplus	0	5,191	0	5,191
2011	Normal/ICS Surplus	0	0	0	0
2012	Normal/ICS Surplus	0	0	1,000	1,000
2013	Normal/ICS Surplus	0	93,857	0	93,857
2014	Normal/ICS Surplus	0	320,992	0	320,992
2015	Normal/ICS Surplus	0	70,756	75,000	145,756
2016	Normal/ICS Surplus	0	0	0	0
2017	Normal/ICS Surplus	0	0	0	0
2018	Normal/ICS Surplus	0	0	0	0
2019	Normal/ICS Surplus	0	0	0	0
2020	Normal/ICS Surplus and DCP Contributions	4,606	0	0	4,606
2021	Normal/ICS Surplus and DCP Contributions	0	18,786	0	18,786
2022	Level 1 Shortage and DCP Contributions	52,841	111,392	0	164,233
2023	Level 2 Shortage and DCP Contributions	1,318	0	0	1,318
2024	Level 1 Shortage and DCP Contributions	8,180	0	0	8,180
2025	Level 1 Shortage and DCP Contributions	TBD[1]	TBD[1]	TBD[1]	TBD[1]

Source: Reclamation 2024d
[1] As of the time of writing, ICS Delivered volumes were not yet available.

Under a Shortage Condition, the Consolidated Decree stipulates that all PPRs must be satisfied first in order of their priority dates before the remaining available water can be allocated consistent with the BCPA and other applicable federal statutes. In total, the annual water supply condition is currently governed by Section 2 of the 2007 Interim Guidelines, Articles III(3)(c) of the Operating Criteria and Article II(B)(3) of the Consolidated Decree, the 2019 Lower Basin DCP, and the 2024 ROD.

Each year, Reclamation develops an Annual Operating Plan for management of reservoirs on the Colorado River. The Annual Operating Plan reports on rules, guidelines, and decisions made for operations in the previous year as well as projected operations for the upcoming year. From 2008 to

2021, Lake Mead operated in an ICS/Surplus Condition, before switching to a Shortage Condition for the years 2022 through 2025. Additionally, DCP contributions were implemented from 2020 through 2025 (Reclamation 2024d).

TA 4.1.5   Depletion Schedules for Upper Division States

Projected depletions for the Upper Division States were updated in 2017 and adopted in 2022 by the Upper Colorado River Commission. This also includes detailed depletion volumes on a decadal basis through 2070 for each of the Upper Division States. Tabular data for these projections through 2060[1] can be found in **Appendix L**, Upper Basin States Depletion Schedules.

TA 4.1.6   Depletion Schedules for the Lower Division States

Projected mainstream depletions for the Lower Division States can be found in **Appendix N**, Lower Division States Depletion Schedules.

Historical lower Colorado River mainstream consumptive use by state is shown from 2008 to 2024 in **Table TA 4-5**. At the time of this report, the newest available data was for year 2024. Total annual lower Colorado River mainstream consumptive use has declined on average from 2008 to 2024.

Table TA 4-5
Consumptive Use of Lower Colorado River Mainstream Water by Lower Division States (Annual)

Calendar Year	Arizona (af)	California (af)	Nevada (af)	Lower Division States Total (af)
2008	2,752,497	4,498,810	269,654	7,520,961
2009	2,831,711	4,358,074	248,613	7,438,398
2010	2,780,367	4,356,839	241,437	7,378,643
2011	2,781,108	4,312,661	222,847	7,316,616
2012	2,789,667	4,416,718	237,161	7,443,546
2013	2,778,867	4,475,789	223,563	7,478,219
2014	2,774,661	4,649,734	224,616	7,649,011
2015	2,604,732	4,620,756	222,729	7,448,217
2016	2,612,833	4,381,101	238,326	7,232,260
2017	2,509,503	4,026,515	243,425	6,779,443
2018	2,632,260	4,265,525	244,103	7,141,888
2019	2,491,707	3,840,686	233,996	6,566,389
2020	2,470,776	4,059,911	255,568	6,786,255
2021	2,425,736	4,404,727	242,168	7,072,631
2022	2,014,176	4,424,247	223,670	6,662,093
2023	1,889,517	3,699,155	186,844	5,775,516
2024	1,934,518	3,943,741	212,428	6,090,687

Source: Reclamation 2025

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[1] While the UCRC depletion demand schedule is through 2070, the CRSS modeling was only performed through 2060.

TA 4.1.7   Mexico's Allotment

Mexico's allotment of Colorado River water is described under Article 10 of the 1944 Water Treaty. The Treaty guarantees that 1.5 maf will be delivered to Mexico annually. Additionally, it outlines Surplus Conditions such that no greater than 1.7 maf shall be delivered to Mexico in a given year, and Extraordinary Drought such that deliveries are reduced in proportion to reductions of United States consumptive uses. Additional Minute 242 documentation provides guidance for the geographic locations where deliveries from the United States will be made, specifically that approximately 1.36 maf will be delivered upstream of Morelos Diversion Dam, with the remainder being delivered downstream of the dam. Subsequent agreements included Minute 319 to the 1944 Water Treaty, which established four coordination mechanisms that affected flows in the International Border Region of the Colorado River. Upon Minute 319's expiration, Minute 323 built upon and extended these provisions by providing operational flexibility, storage options, and binational mechanisms for adjusting deliveries to Mexico under low and high elevation reservoir conditions.

Minute 323 does not change Mexico's allotment, but it does adjust how and under what conditions deliveries occur. Since 2019, the deliveries to Mexico were further adjusted for water savings contributions, as required under Minute 323, and since 2021 for reductions under low elevation reservoir conditions. Minute 323 additionally secures Mexico's ability to create water for or take delivery of Mexico's Water Reserve. Mexico's Water Reserve refers to the volume of Mexico's Colorado River allotment that is intentionally deferred (not taken for immediate use) and stored in Lake Mead for later delivery or recovery. This is in addition to the volumes of Mexico's Recoverable Water Savings, which are deferred during certain low reservoir elevations for recovery at a future time. Deliveries to Mexico were further adjusted in 2024, 2025, and 2026 through additional conserved water by Mexico under Minute 330.

Modeling assumptions have been made to project deliveries to Mexico. These projected deliveries are for analysis purposes only and are not intended to reflect an interpretation or application of the 1944 Water Treaty or to be misconstrued as United States policy regarding water deliveries to Mexico. For further information regarding Mexico's allotment and pertinent policy, please refer to the **Appendix M**, International Border Region of the Colorado River.

TA 4.1.8   Distribution of Shortages and Reductions to and within the Lower Division States

The 2007 Interim Guidelines, the 2019 DCP and Minute 323 to the 1944 Water Treaty provide for a maximum of 1.375 maf of shortages and reductions (including DCP Contributions and BWSCP savings). In addition to these required activities, in 2024, SEIS conservation implemented through the 2024 ROD resulted in additional Lower Basin conservation. 2024 ROD conservation may vary on a yearly basis, such that a collective total volume of 3.0 maf is conserved in calendar years 2023 through 2026. A summary of the 2007 Interim Guidelines Shortages, 2019 DCP contributions, and 2024 ROD conservation is shown in **Table TA 4-6**.

Distribution of Shortages within Arizona

Arizona's 2.8 maf apportionment is allocated via the priority system outlined in **Table TA 4-7**, as presented and analyzed in the 2007 Final EIS. Arizona's priority system is divided into six priorities.

As displayed in **Table TA 4-7**, contributions and shortages from Arizona are determined by the 2007 Interim Guidelines, the 2019 DCPs, and 2024 ROD conservation. The approximate combined shortage and DCP contribution volumes for Arizona range from 472 kaf to 1 maf.

Table TA 4-6
Lower Division States' Total Shortages and Contributions

Lake Mead Elevation (ft)	2007 ROD Shortages + 2019 DCP Contributions (kaf)				2024 ROD Conservation (kaf)*				Total 2007 ROD Shortages + DCP Contributions + 2024 ROD Conservation (kaf)**			
	AZ	NV	CA	Total	AZ	NV	CA	Total	AZ	NV	CA	Total
1,090 – 1,075	192	8	0	200	280	70	400	750	472	78	400	950
1,075 – 1,050	512	21	0	533					792	91	400	1,283
1,050 – 1,045	592	25	0	617					872	95	400	1,367
1,045 – 1,040	640	27	200	867					920	97	600	1,617
1,040 – 1,035	640	27	250	917					920	97	650	1,667
1,035 – 1,030	640	27	300	967					920	97	700	1,717
1,030 – 1,025	640	27	350	1,017					920	97	750	1,767
<1,025	720	30	350	1,100					1,000	100	750	1,850

Source: Reclamation 2024a
* Actual 2024 ROD conservation by state may vary each year depending on the conservation agreements in place in that year. 2024 ROD conservation shown are approximations and only apply for years 2023 to 2026, such that collectively a total of 3.0 maf of 2024 ROD conservation would occur through 2026.
** The total of 2007 ROD shortages, DCP contributions, 2024 ROD conservation, and any other additional conservation would not exceed 2.083 maf in a given year.

Table TA 4-7
Arizona's Priority System for Mainstream Colorado River Water

Priority	Rights to Be Satisfied
First	Present perfected rights (PPRs) established prior to June 25, 1929
Second[1]	Federal reservations and perfected rights established or effective prior to September 30, 1968
Third[1]	Entitlements pursuant to contracts executed on or before September 30, 1968
Fourth	(1) Entitlements pursuant to contracts, Secretarial reservations, and other arrangements between the U.S. and water users established subsequent to September 30, 1968 (2) Contract for Central Arizona Project
Fifth	Any unused Arizona entitlement
Sixth	Entitlements to surplus water

Source: Reclamation 2024a
[1] The Arizona second and third priorities are coequal in their priority.

Distribution of Shortages within California

California's 4.4 maf apportionment is allocated using a priority system based upon Secretarial regulations which incorporate provisions of the California Seven-Party Agreement of 1931. California's priority system is outlined below in **Table TA 4-8** from the 2007 Final EIS.

Table TA 4-8
California Seven-Party Agreement Priorities for Mainstream Colorado River Water

Priority	Rights to Be Satisfied
First	Present perfected rights (PPRs) established prior to June 25, 1929: Palo Verde Irrigation District for beneficial use upon 104,500 acres
Second	Reclamation's Yuma Project for beneficial use on up to 25,000 acres
Third[1,2]	(a) Imperial Irrigation District and Coachella Valley Water District (b) Palo Verde Irrigation District for use on 16,000 acres on the Lower Palo Verde Mesa
Fourth[3]	Metropolitan Water District and/or the City of Los Angeles and/or others on the coastal plain of Southern California for 550 thousand acre-feet per year (kafy)
Fifth	(a) Metropolitan Water District and/or the City of Los Angeles and/or others on the coastal plain of Southern California for 550 kafy (b) City and/or County of San Diego for 112 kafy
Sixth[4]	(a) Imperial Irrigation District and Coachella Valley Water District (b) Palo Verde Irrigation District for use on Lower Palo Verde Mesa
Seventh	All remaining water available within California for agricultural use

Source: Reclamation 2024a
[1] The total beneficial use of priorities 1, 2, and 3 shall not exceed 3.85 mafy.
[2] Article 4.7 of the Quantification Settlement Agreement by and among Imperial Irrigation District, The Metropolitan Water District of Southern California, and Coachella Valley Water District, dated October 10, 2003, refers to provisions of the Acquisition Agreements and the Allocation Agreement regarding shortage sharing between these two agencies.
[3] The sum of priorities 1 through 4 is 4.4 kafy.
[4] The sum of priority 6 is 300,000 afy.

As outlined above, contributions and shortages from California are described under the 2007 Interim Guidelines, 2019 DCPs, and 2024 ROD conservation. The approximate combined shortage and contribution volumes for California range from 400 kaf to 750 kaf.

Distribution of Shortages within Nevada

Nevada's 0.3 maf apportionment is allocated as outlined in **Table TA 4-9** below. The priority system was designed and implemented in 1992 through the contracting of Southern Nevada Water Authority (SNWA) by Reclamation for the balance of Nevada's apportionment.

Shortages and contributions from Nevada are outlined under the 2007 Interim Guidelines, 2019 DCPs, and 2024 ROD conservation. The approximate combined volume of Nevada's shortages and DCP contributions ranges from 78 kaf to 100 kaf.

Table TA 4-9
Nevada's Priority System for Mainstream Colorado River Water

Priority	Rights to Be Satisfied
First	Present perfected rights (PPRs) established prior to June 25, 1929: Fort Mojave Indian Reservation (12,534 afy) Lake Mead National Recreation Area (Diversion = 500 afy or Consumptive Use = 300 afy)
Second	Lake Mead National Recreation Area (1,500 afy, estimated)
Third	Boulder City (5,876 afy)
Fourth	City of Henderson (15,878 afy) Precision Castparts Corporation or Henderson Water Company, LLC (8,208 afy) SNWA (from Basic Water Company) (14,950 afy)
Fifth	Lakeview Company (0 afy) Pacific Coast Building Products (PABCO) (928 afy)
Sixth	Las Vegas Valley Water District (15,407 afy)
Seventh	U.S. Air Force (delivery from SNWA; 4,000 afy), Boy Scouts (annexed by SNWA; 10 afy), Reclamation (300 afy), and Nevada Department of Wildlife (formerly Nevada Department of Fish and Game; consumptive use 25 afy)
Eighth	Robert B. Griffith Project (308,000 afy) and Big Bend (10,000 afy) SNWA (balance of state apportionment, unused and surplus)

Source: Reclamation 2024a

TA 4.2   Environmental Consequences

This section compares water deliveries from the mainstream Colorado River under the No Action Alternative, four action alternatives (as described in **Chapter 2**), and the Continued Current Strategies (CCS) Comparative Baseline (as described in **Chapter 3, Section 3.2.3**).

TA 4.2.1   Methodology

This section examines potential effects on water deliveries under the action alternatives as compared to the No Action Alternative and the CCS Comparative Baseline. Potential impacts are considered for the following water delivery resources: shortage volumes, dead pool–related reductions, depletion volumes, and surplus volumes. Also provided is a comparison of Upper Basin conservation across the alternatives.

Reclamation uses the Colorado River Simulation System (CRSS) model for long-term planning studies. The CRSS model simulates Basin conditions decades into the future (the full analysis period is through 2060) and can be used to account for hydrologic and operational uncertainty. The CRSS model is a monthly time-step model that produces reservoir elevations, releases, and river flows as outputs. Refer to **Appendix A**, CRSS Model Documentation, for more details related to model documentation.

Additionally, the Shortage Allocation Model(s) (SAM) and Alternative Distribution Model(s) (ADM) were used to analyze potential impacts of the alternatives on individual water users within each

Lower Division State under varying levels of shortage. Modeling assumptions for the SAMs and ADMs are summarized in **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation.

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 assumptions about Upper Basin conservation are included in various alternatives, no assumptions are made with respect to where conserved water is generated or what specific activities generated the water (see **Appendix B** for more information).

Assumptions

The CRSS model was used to analyze shortage volumes and Lower Basin water deliveries, and the SAMs and ADMs were used to analyze shortage impacts on specific groups of water users. The model also includes assumptions regarding Upper Basin conservation activities but does not make assumptions with respect to conservation by different entities or via specific activities. Refer to their respective appendices for more details related to model assumptions and documentation. All action alternatives except for the Basic Coordination Alternative incorporate mechanisms related to the storage and delivery of conserved water in Lake Powell and/or Lake Mead (see **Chapter 2, Sections 2.6-2.8**). Unless otherwise specified, impacts reflect modeling assumptions about voluntary conservation behavior.

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 and within the Lower Division States

TA 4.2.2   Issue 1: Apportionments to the Upper Division States

The alternatives would not affect apportionments to the Upper Division States. Therefore, no impact analysis is warranted.

TA 4.2.3   Issue 2: Lower Division States Apportionments and Water Entitlements

The approaches to distributing shortages incorporated in all alternatives are designed to explore a wide range of potential concepts and impacts; they do not reflect an intention by Reclamation to alter apportionments or water entitlements. However, because the concepts would affect a range of users, impacts on deliveries to different entities are analyzed in Issues 3 and 5 and addressed in **Appendix C,** Shortage Allocation Model and Alternative Distribution Model Documentation. Once an alternative is selected, the Department will supplement the analysis if necessary.

TA 4.2.4   Issue 3: Lower Division States Water Supply Determinations

Issue 3 addresses how operational activities affect water deliveries for the Lower Division States and Mexico. It also presents total Basin conservation activity across different alternatives. Impacts will be analyzed through the comparison of the various action alternatives to the No Action Alternative and the CCS Comparative Baseline for the following metrics:

- Annual Lower Basin Reductions (Shortage and Lake Mead Dead Pool–Related Reductions)
- Effects of Modeling Assumptions for Upper Basin and Lower Basin Conservation Activity on Lower Basin Shortages and Deliveries
- Shortage
- Maximum Shortage
- 2027 Shortage Volumes Under Each Set of Initial Conditions
- Annual Lower Basin Shortage
- Annual Shortage by State (Arizona, California, Nevada) and Mexico
- Annual Depletions by State (Arizona, California, Nevada) and Mexico
- Surplus

Shortage vs Dead Pool–Related Reductions: Comparison for full Lower Basin

Shortage refers to delivery reductions that are defined as part of an alternative's operations, including reductions to the Basin, state apportionment, or individual entitlement. Volumes and distributions of shortage are described in **Chapter 2**. 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 it occurs higher (up to elevation 950 feet).

Note that the approach to distributing unplanned reductions associated with dead pool is not a component of any alternative. It is important for the impact analysis to show that these volumes occur, but it is not appropriate to analyze how they may impact specific states or users. Therefore, shortage results beyond this section will focus on shortage only. Where impacts due to dead pool–related reductions are presented, they will be specifically noted.

Annual Lower Basin Reductions

Table TA 4-10 and **Table TA 4-11** below show the statistical breakdown of how different alternatives perform in terms of annual Lower Basin reductions, reflected as shortage and dead pool–related reductions, over a range of hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum volumes of shortage and dead pool–related reductions.

Table TA 4-10
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	1.4	0.6	0.2	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	1.4	1.2	0.6	0.2	0.0	0.0	0.0
CCS Comparative Baseline	12-14	1.4	1.4	1.2	0.6	0.2	0.0	0.0
CCS Comparative Baseline	10-12	1.4	1.4	1.4	1.4	0.6	0.2	0.0
CCS Comparative Baseline	< 10	1.4	1.4	1.4	1.4	1.1	0.6	0.0
No Action	> 16	0.6	0.6	0.5	0.0	0.0	0.0	0.0
No Action	14-16	0.6	0.6	0.6	0.5	0.0	0.0	0.0
No Action	12-14	0.6	0.6	0.6	0.6	0.4	0.0	0.0
No Action	10-12	0.6	0.6	0.6	0.6	0.6	0.4	0.0
No Action	< 10	0.6	0.6	0.6	0.6	0.6	0.5	0.0
Basic Coordination	> 16	1.5	1.5	1.2	0.0	0.0	0.0	0.0
Basic Coordination	14-16	1.5	1.5	1.5	1.3	0.0	0.0	0.0
Basic Coordination	12-14	1.5	1.5	1.5	1.5	0.9	0.0	0.0
Basic Coordination	10-12	1.5	1.5	1.5	1.5	1.5	0.5	0.0
Basic Coordination	< 10	1.5	1.5	1.5	1.5	1.5	1.0	0.0
Enhanced Coordination	> 16	2.2	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	3.0	1.9	1.5	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	3.0	2.6	2.0	1.6	0.0	0.0	0.0
Enhanced Coordination	10-12	3.0	3.0	2.8	2.1	1.7	0.0	0.0
Enhanced Coordination	< 10	3.0	3.0	3.0	2.9	2.1	1.8	0.0
Max. Operational Flexibility	> 16	2.0	0.9	0.4	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	2.7	1.6	1.3	0.8	0.3	0.0	0.0
Max. Operational Flexibility	12-14	3.3	2.1	2.0	1.6	0.9	0.4	0.0
Max. Operational Flexibility	10-12	4.0	3.0	2.6	2.0	1.9	1.1	0.0
Max. Operational Flexibility	< 10	4.0	4.0	3.6	3.0	2.0	2.0	0.3
Supply Driven (LB Priority)	> 16	2.1	1.5	0.4	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	2.1	1.6	1.5	0.9	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	2.1	2.1	1.5	1.5	0.1	0.0	0.0
Supply Driven (LB Priority)	10-12	2.1	2.1	2.1	1.5	1.5	0.0	0.0
Supply Driven (LB Priority)	< 10	2.1	2.1	2.1	2.0	1.5	1.5	0.0
Supply Driven (LB Pro Rata)	> 16	2.1	1.5	0.4	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	2.1	1.6	1.5	0.9	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	2.1	2.1	1.5	1.5	0.2	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	2.1	2.1	2.1	1.5	1.5	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	2.1	2.1	2.1	1.9	1.5	1.5	0.0

Note: Shortage 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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Table TA 4-11
Lower Basin Dead Pool–Related Reductions (maf)[2]

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	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	4.1	1.4	0.3	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	6.3	3.1	2.1	0.4	0.0	0.0	0.0
No Action	> 16	1.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	14-16	1.5	0.2	0.0	0.0	0.0	0.0	0.0
No Action	12-14	3.8	0.7	0.1	0.0	0.0	0.0	0.0
No Action	10-12	5.5	2.4	1.4	0.1	0.0	0.0	0.0
No Action	< 10	6.6	4.1	3.2	1.7	0.0	0.0	0.0
Basic Coordination	> 16	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	4.5	1.0	0.1	0.0	0.0	0.0	0.0
Basic Coordination	< 10	6.1	2.9	1.6	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	10-12	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	< 10	3.9	1.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	1.8	0.1	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	4.3	1.5	0.2	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	4.3	1.2	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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

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[2] Dead pool–related reductions are in addition to shortages specified in each alternative. Shortages are shown in Table TA 4-10.

The two columns of boxplots in **Figure TA 4-1** look at how different alternatives perform in terms of Annual Lower Basin Reductions, both as shortage and dead pool–related reductions, over a range of hydrological conditions based on the preceding three-year average of Lees Ferry natural flow. The figure visualizes the same data that is included in **Table TA 4-10** and **Table TA 4-11** in two side by side conditional box plot panels. Reductions are expressed as a total volume of reductions to the Lower Basin, including Mexico. To enable easier comparison in all flow categories, the vertical axes have been truncated at the high end and some outliers in the Critically Dry Flow Category have been omitted.

Figure TA 4-1
Annual Lower Basin Reductions
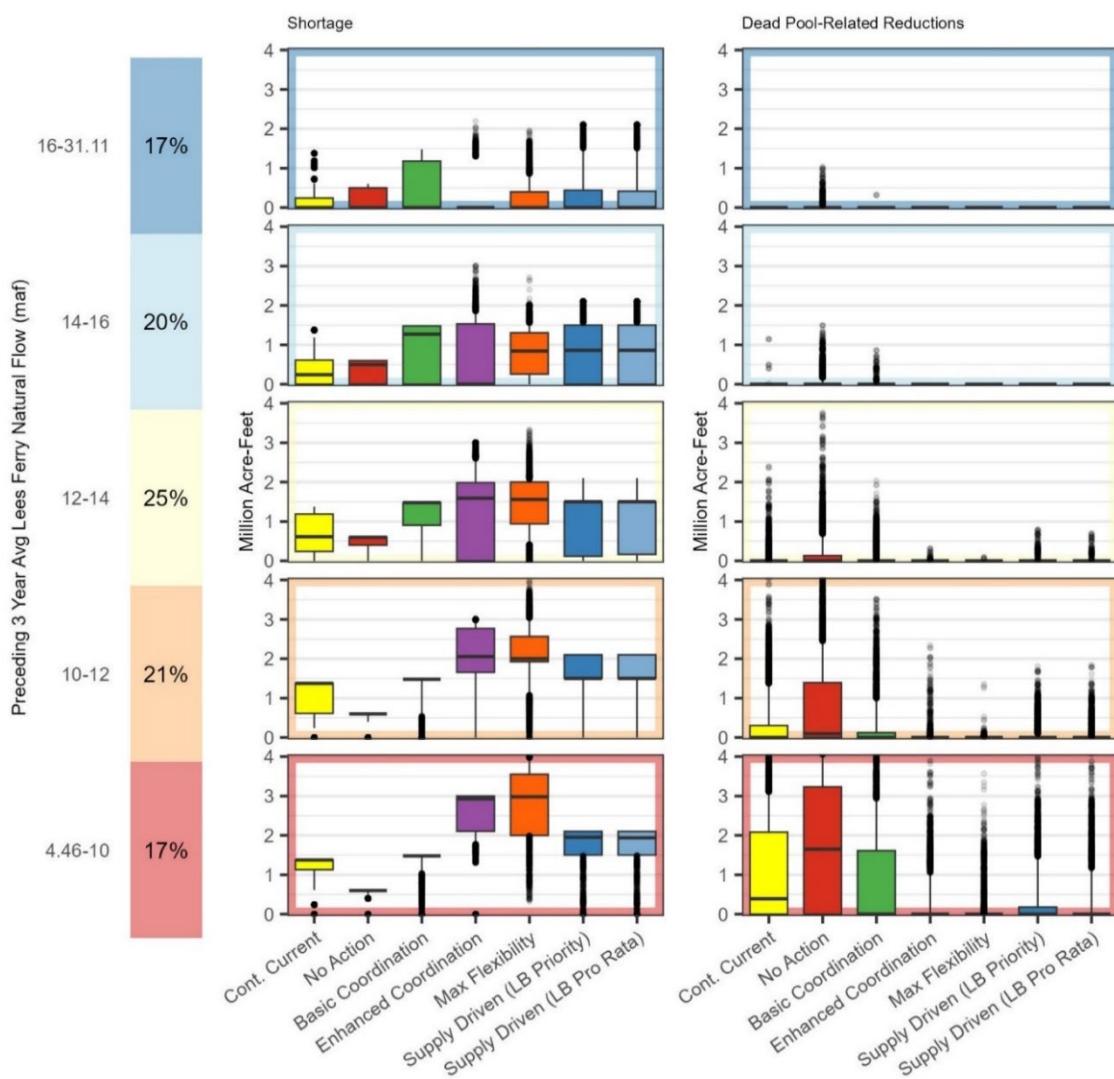
Note: Shortage and dead pool-related reduction volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Generally, lower maximum volumes of shortages correspond to higher frequency and larger volumes of 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. In some cases, this occurs because Lake Mead is approaching dead pool (elevation 895 feet) and in some cases it occurs higher (up to elevation 950 feet). In the Average Flow Category (12-14 maf), the medians and interquartile ranges for shortage involve reductions of 2.0 maf or less. The Enhanced Coordination Alternative has the largest interquartile range of shortage reductions, with a median reduction of 1.6 maf. The remaining action alternatives have smaller shortage interquartile ranges but similar medians; all action alternative medians are above the 0.6 maf median for the CCS Comparative Baseline and the No Action Alternative. In this Average Flow Category, all action alternatives except for the Basic Coordination Alternative have small and infrequent dead pool–related reductions (between 0 and 0.8 maf) that occur above the 90th percentile. The Basic Coordination Alternative has notably greater max dead pool–related reductions of 2.0 maf, similar to the 2.4 maf for CCS Comparative Baseline. The No Action Alternative has the most frequent and highest magnitude dead pool–related reductions, with a max observed value of 3.8 maf.

The greatest contrast between alternatives occurs in the Critically Dry Flow Category (4.46-10 maf). The No Action Alternative has the lowest median shortage reduction among all alternatives and shares the smallest interquartile range of zero with the Basic Coordination Alternative. All action alternatives except for the Basic Coordination Alternative show increases in median shortage reductions, with the Enhanced Coordination Alternative and Maximum Operational Flexibility Alternative reaching as high as 2.9 maf and 3.0 maf, respectively. While dead pool–related reductions increase across all alternatives as the flow categories become drier, these reductions only occur above the 50th percentile (i.e., in less than 50 percent of futures) for all action alternatives in the Critically Dry Flow Category. While shortages under the Basic Coordination Alternative remain low (not exceeding 1.5 maf), this alternative results in a larger percentage of futures with dead pool–related reductions from Lake Mead as it is compared to other action alternatives. In the Critically Dry Flow Category, all action alternatives perform better for dead pool–related reductions than for the CCS Comparative Baseline and the No Action Alternative.

Lake Mead Dead Pool

Lake Mead Dead Pool Robustness

Figure TA 4-2 below depicts the ability of each alternative (columns) to avoid dead pool–related reductions at Lake Mead in the specified percent of years (rows). The highlighted row represents the percentage of futures that an alternative successfully avoids dead pool–related reductions in 100 percent of the years. Keeping Lake Mead above dead pool ensures that water releases can still be made to users, although it does not guarantee the ability to generate power.

The Maximum Operational Flexibility Alternative is the most robust, avoiding dead pool–related reductions in 91 percent of the futures, followed by the Supply Driven Alternative (Lower Basin [LB] Pro Rata approach) and the Enhanced Coordination Alternative, succeeding in 85 percent and 84 percent of the futures, respectively. All three of these action alternatives outperform the Basic Coordination Alternative that succeeds in 62 percent of futures, which is still more than the CCS

Comparative Baseline at 50 percent. The No Action Alternative is the least robust, succeeding in only 30 percent of futures.

Figure TA 4-2
Lake Mead Dead Pool-Related Reductions: Robustness
Percent of futures in which dead pool-related reductions are avoided in the percent of years specified by each row
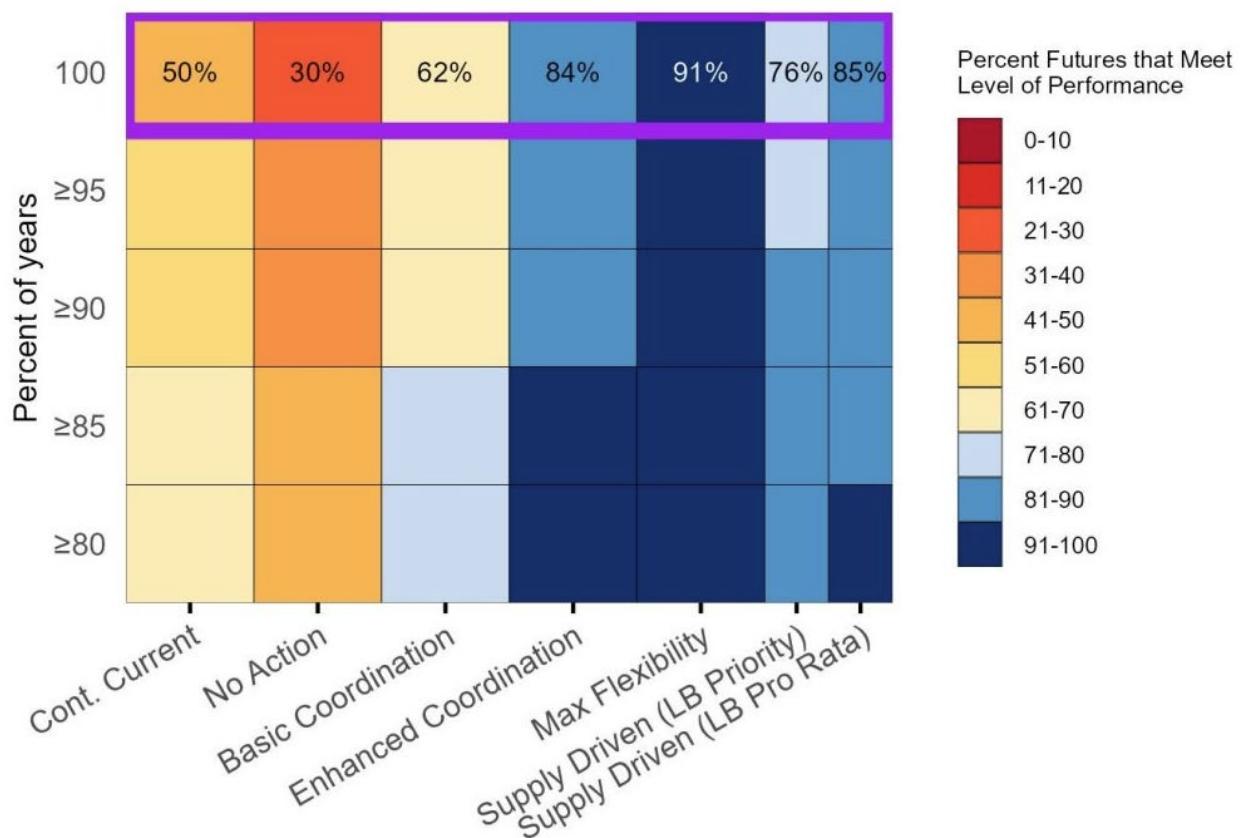
Note: Dead pool-related reduction volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Lake Mead Dead Pool Vulnerability
Figure TA 4-3 below shows what flow conditions are likely to cause dead pool–related reductions from Lake Mead in any year. This definition of undesirable performance is based on the highlighted row in **Figure TA 4-2** above, which determined a future as successful when an alternative avoided dead pool–related reductions 100 percent of the time.

For this vulnerability analysis, the driest 20-year average Lees Ferry annual flow was determined to be skillful at predicting undesirable performance. The vulnerability threshold for each alternative is described and compared to the reference hydrology ensemble using this streamflow summary statistic. The driest observed 20-year average flow from 2002-2021 (12.5 maf) and the average flow from 2005-2024 (13.1 maf) are also provided as dashed and dotted lines, respectively, for comparison.

Figure TA 4-3
Lake Mead Dead Pool–Related Reductions: Vulnerability.
Conditions that could cause Lake Mead Dead Pool–Related Reductions in Any Year
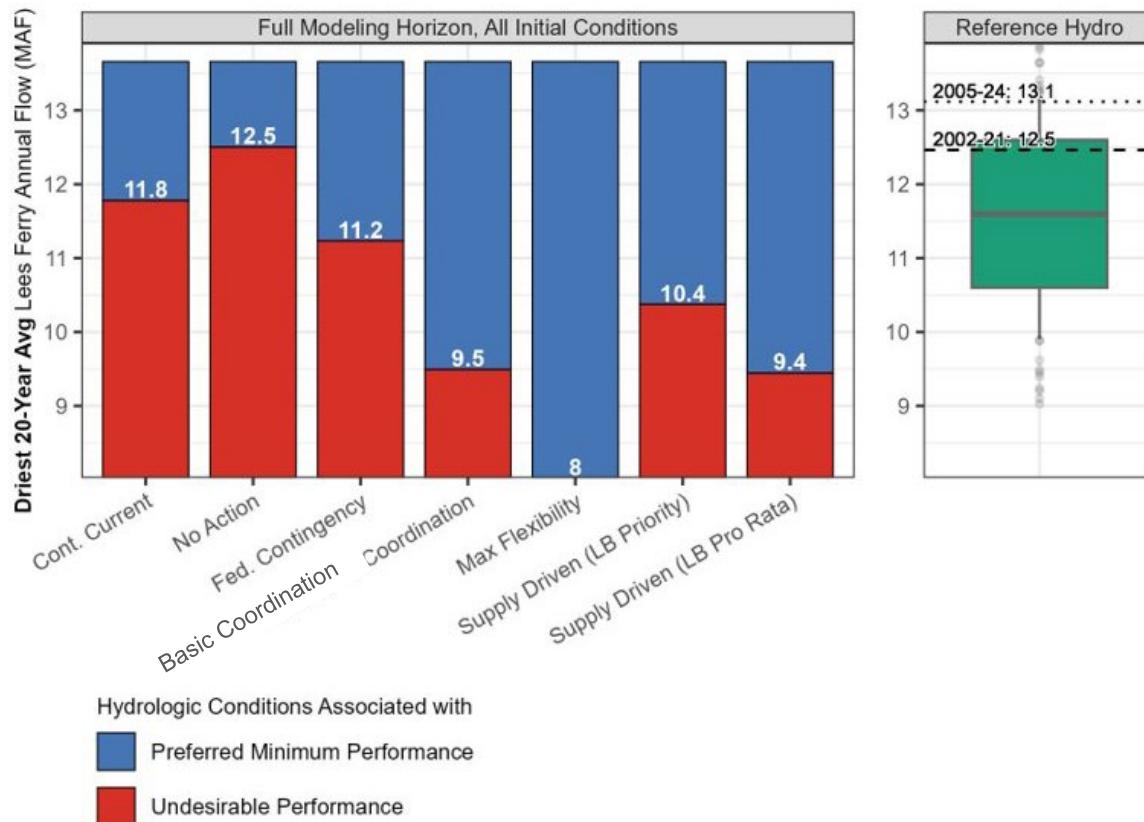
Note: Dead pool-related reduction volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

The Basic Coordination Alternative becomes vulnerable to falling below dead pool in a 20-year average drought of 11.2 maf, which is slightly less vulnerable than the CCS Comparative Baseline, which becomes vulnerable at a 20-year average of 11.8 maf. The No Action Alternative is vulnerable to the 20-year recently observed 2012-2021 average flows (12.5 maf) and is likely to be vulnerable in 75 percent of the driest 20-year averages in the refence hydrology ensemble. Undesirable

performance for Enhanced Coordination, Maximum Operational Flexibility and Supply Driven (LB Pro Rata approach) Alternatives are not likely to occur until well below the lowest 25th percentile, and even below the lowest 10 percent of the traces in the reference hydrology ensemble.

Conservation Activity

All action alternatives except for the Basic Coordination Alternative incorporate mechanisms related to the storage and delivery of conserved water in Lake Powell and Lake Mead. **Table TA 4-12** below summarizes the various conservation mechanisms for each action alternative. Refer to **Chapter 2, Sections 2.6-2.8** for specifics related to each alternative's policy on conservation.

<div align="center">

Table TA 4-12
Summary of Conservation Mechanisms by Alternative

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Alternative	Conservation Pool Volume	Conservation Pool Mechanism
Enhanced Coordination	2 maf	Upper Basin users in Lake Powell
	5 maf	Lower Basin users in Lake Mead
	2 maf	Protection Pool in Lake Mead
Maximum Operational Flexibility	5 maf	Upper Basin users (distributed strategically across Lake Powell and Lake Mead)
	3 maf	Lower Basin users (distributed strategically across Lake Powell and Lake Mead)
Supply Driven (both approaches)	3 maf	Upper Basin users in Lake Powell
	8 maf	Lower Basin users in Lake Mead

For modeling purposes, assumptions about conservation and delivery of previously conserved water were developed in order to show the maximum impacts of the conservation pools on reservoir elevations and downstream flows; they are not intended to represent specific activities or constraints on individual users. See **Chapter 2** of the EIS for more information about the assumptions for each alternative. Upper Basin conservation activity is discussed in Issue 6, below.

Lower Basin Conservation Activity

Table TA 4-15 through **Table TA 4-16** below show the statistical breakdown of how different alternatives perform in terms of annual Lower Basin conservation activity, reflected as total accumulated stored water, total annual creation, and total annual delivery and conversion, over a range of hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum volumes of shortage and dead pool–related reductions.

Figure TA 4-4 shows three components of Lower Basin conservation activity[3]. The first column shows the annual total volume of conserved water accumulated by Lower Basin conservation. The second column reports the annual volume of conserved water created in the Lower Basin. The third column reports the annual Lower Basin delivery and conversion of conserved water.

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[3] For all alternatives except Maximum Operational Flexibility, Lower Basin conserved water is stored in Lake Mead. For Maximum Operational Flexibility, this water can be stored in Lake Mead, Lake Powell, or both.

Table TA 4-13
Annual Lower Basin Conservation Activity: Lower Basin Total Accumulated Stored Water (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	4.2	4.2	3.7	3.1	1.1	0.5	0.4
CCS Comparative Baseline	14-16	4.2	4.2	4.1	3.3	3.1	1.8	0.4
CCS Comparative Baseline	12-14	4.2	4.2	4.2	3.7	3.1	2.9	0.4
CCS Comparative Baseline	10-12	4.2	4.2	4.2	4.1	3.3	3.0	0.5
CCS Comparative Baseline	< 10	4.2	4.2	4.2	4.2	3.4	3.1	0.6
No Action	> 16	2.7	1.7	0.3	0.2	0.0	0.0	0.0
No Action	14-16	2.7	2.2	1.3	0.3	0.2	0.0	0.0
No Action	12-14	2.8	2.3	1.4	0.3	0.2	0.1	0.0
No Action	10-12	2.7	2.1	0.8	0.3	0.3	0.1	0.0
No Action	< 10	2.7	2.5	1.4	0.3	0.3	0.1	0.0
Basic Coordination	> 16	2.7	1.4	0.3	0.1	0.0	0.0	0.0
Basic Coordination	14-16	2.7	2.1	0.8	0.2	0.0	0.0	0.0
Basic Coordination	12-14	2.8	2.2	0.7	0.2	0.1	0.0	0.0
Basic Coordination	10-12	2.7	2.0	0.3	0.3	0.1	0.0	0.0
Basic Coordination	< 10	2.7	2.5	0.7	0.3	0.1	0.0	0.0
Enhanced Coordination	> 16	7.0	6.2	5.1	3.2	0.2	0.0	0.0
Enhanced Coordination	14-16	7.0	6.6	5.8	4.2	2.8	1.6	0.0
Enhanced Coordination	12-14	7.0	6.5	5.5	3.8	2.5	1.8	0.0
Enhanced Coordination	10-12	7.0	6.2	5.0	3.0	2.2	1.5	0.0
Enhanced Coordination	< 10	7.0	5.6	4.0	2.7	2.1	1.5	0.1
Max. Operational Flexibility	> 16	5.0	5.0	4.5	2.4	0.3	0.2	0.0
Max. Operational Flexibility	14-16	5.0	5.0	5.0	3.6	2.0	0.9	0.0
Max. Operational Flexibility	12-14	5.0	5.0	4.9	2.9	1.6	0.8	0.0
Max. Operational Flexibility	10-12	5.0	5.0	3.9	2.2	1.1	0.6	0.0
Max. Operational Flexibility	< 10	5.4	4.3	3.3	2.0	1.0	0.6	0.0
Supply Driven (LB Priority)	> 16	8.0	5.9	4.6	2.5	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	8.0	6.4	5.3	4.0	2.6	0.9	0.0
Supply Driven (LB Priority)	12-14	8.0	6.4	5.1	4.0	2.8	1.6	0.0
Supply Driven (LB Priority)	10-12	8.0	6.3	4.9	3.7	2.3	1.5	0.0
Supply Driven (LB Priority)	< 10	7.9	5.5	4.3	3.1	2.1	1.4	0.0
Supply Driven (LB Pro Rata)	> 16	8.0	6.5	5.7	3.7	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	8.0	6.9	6.3	5.3	3.8	1.0	0.0
Supply Driven (LB Pro Rata)	12-14	8.0	6.9	6.4	5.6	4.4	3.2	0.0
Supply Driven (LB Pro Rata)	10-12	8.0	6.9	6.4	5.6	4.5	3.5	0.0
Supply Driven (LB Pro Rata)	< 10	7.9	6.7	6.1	5.2	4.0	3.2	0.0

Note: Lower Basin conservation activity includes assumptions related to the 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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Table TA 4-14
Annual Lower Basin Conservation Activity: Lower Basin Total Annual Creation (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	0.6	0.2	0.1	0.1	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.6	0.4	0.2	0.1	0.1	0.0	0.0
CCS Comparative Baseline	12-14	0.6	0.4	0.4	0.2	0.1	0.1	0.0
CCS Comparative Baseline	10-12	0.7	0.4	0.4	0.4	0.2	0.1	0.0
CCS Comparative Baseline	< 10	0.7	0.4	0.4	0.4	0.2	0.1	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	1.7	0.9	0.9	0.5	0.2	0.2	0.1
Enhanced Coordination	14-16	1.7	1.0	0.7	0.5	0.3	0.2	0.1
Enhanced Coordination	12-14	1.7	0.8	0.6	0.4	0.2	0.1	0.0
Enhanced Coordination	10-12	1.7	0.6	0.4	0.3	0.1	0.1	0.0
Enhanced Coordination	< 10	1.5	0.4	0.3	0.1	0.1	0.0	0.0
Max. Operational Flexibility	> 16	2.1	1.2	0.9	0.5	0.1	0.0	0.0
Max. Operational Flexibility	14-16	2.1	1.2	0.9	0.5	0.2	0.1	0.0
Max. Operational Flexibility	12-14	2.1	1.0	0.8	0.4	0.1	0.1	0.0
Max. Operational Flexibility	10-12	2.0	0.9	0.7	0.3	0.1	0.0	0.0
Max. Operational Flexibility	< 10	1.8	0.7	0.4	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	2.2	1.0	0.9	0.5	0.1	0.1	0.0
Supply Driven (LB Priority)	14-16	2.0	1.0	0.8	0.5	0.1	0.1	0.0
Supply Driven (LB Priority)	12-14	2.0	0.9	0.6	0.4	0.1	0.1	0.0
Supply Driven (LB Priority)	10-12	2.0	0.8	0.5	0.3	0.1	0.0	0.0
Supply Driven (LB Priority)	< 10	2.0	0.6	0.4	0.2	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	2.2	1.0	0.9	0.5	0.1	0.1	0.0
Supply Driven (LB Pro Rata)	14-16	2.0	0.9	0.7	0.4	0.2	0.1	0.0
Supply Driven (LB Pro Rata)	12-14	2.0	0.9	0.7	0.4	0.2	0.1	0.0
Supply Driven (LB Pro Rata)	10-12	2.1	0.8	0.6	0.3	0.2	0.1	0.0
Supply Driven (LB Pro Rata)	< 10	1.9	0.7	0.5	0.3	0.1	0.0	0.0

Note: Lower Basin conservation activity includes assumptions related to the 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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Table TA 4-15
Annual Lower Basin Conservation Activity: Lower Basin Total Annual Delivery and Conversion (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	0.5	0.1	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.4	0.2	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.3	0.1	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.3	0.1	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.3	0.1	0.0	0.0	0.0	0.0	0.0
No Action	> 16	0.7	0.2	0.0	0.0	0.0	0.0	0.0
No Action	14-16	0.6	0.3	0.0	0.0	0.0	0.0	0.0
No Action	12-14	0.6	0.2	0.0	0.0	0.0	0.0	0.0
No Action	10-12	0.6	0.0	0.0	0.0	0.0	0.0	0.0
No Action	< 10	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.6	0.2	0.1	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.6	0.3	0.1	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.7	0.3	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.6	0.1	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.6	0.2	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	0.6	0.1	0.1	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	0.8	0.3	0.2	0.1	0.0	0.0	0.0
Enhanced Coordination	12-14	1.0	0.4	0.3	0.1	0.0	0.0	0.0
Enhanced Coordination	10-12	1.0	0.5	0.3	0.1	0.0	0.0	0.0
Enhanced Coordination	< 10	1.0	0.5	0.3	0.1	0.0	0.0	0.0
Max. Operational Flexibility	> 16	0.7	0.3	0.1	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.7	0.4	0.2	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	1.0	0.5	0.4	0.1	0.0	0.0	0.0
Max. Operational Flexibility	10-12	1.2	0.6	0.4	0.2	0.0	0.0	0.0
Max. Operational Flexibility	< 10	1.9	0.7	0.4	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	1.1	0.3	0.1	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	1.3	0.4	0.3	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	1.3	0.5	0.3	0.1	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	1.3	0.5	0.3	0.1	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	1.3	0.6	0.3	0.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.6	0.2	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.7	0.3	0.1	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.7	0.3	0.2	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	0.7	0.3	0.2	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	0.7	0.3	0.2	0.1	0.0	0.0	0.0

Figure TA 4-4
Annual Lower Basin Conservation Activity
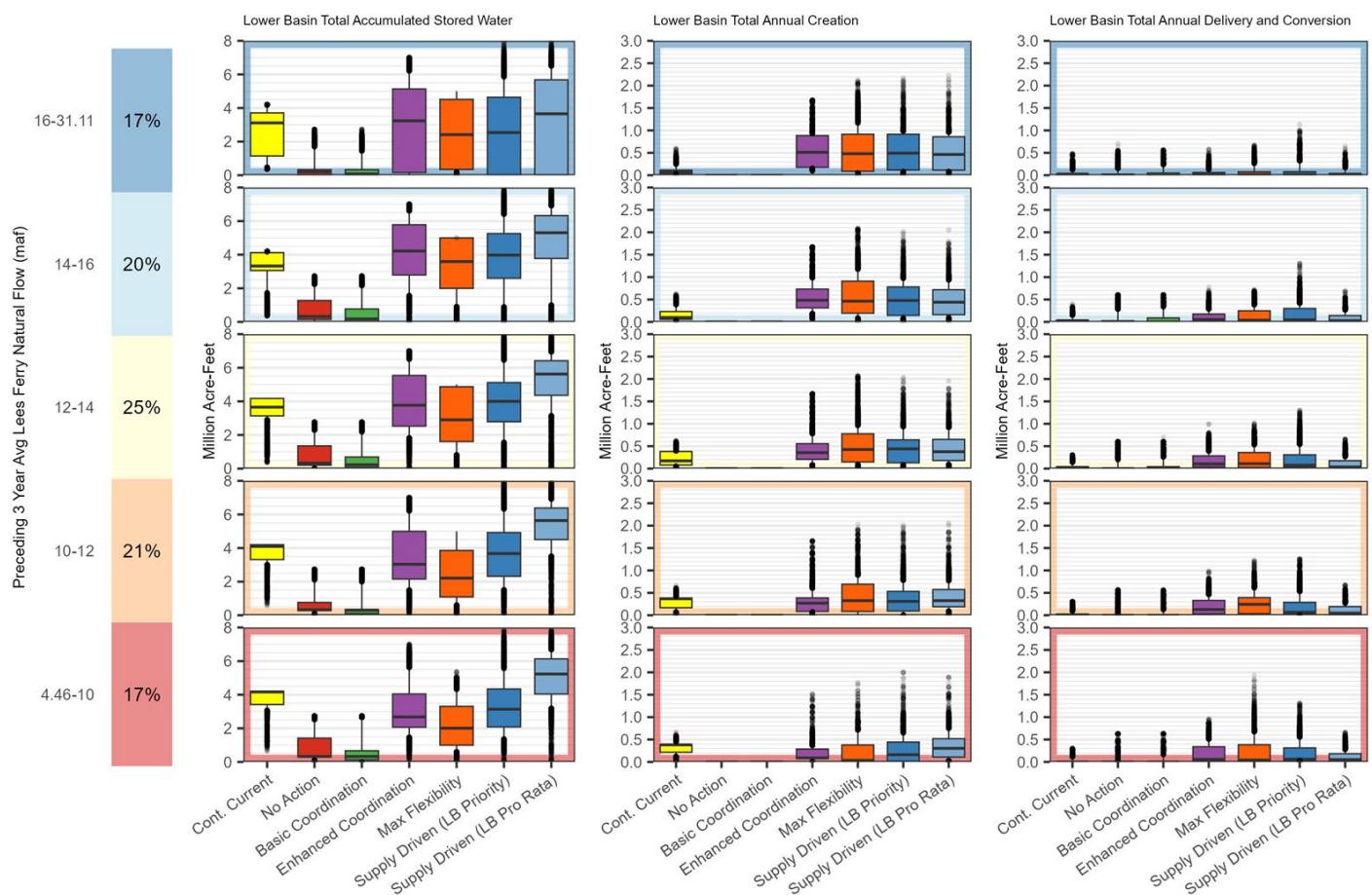
Note: Lower Basin conservation activity includes assumptions related to the storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Considering total accumulated stored water (first column), under Average Flow Category (12-14 maf), the Supply Driven (LB Pro Rata approach) Alternative has the largest median (5.6 maf) followed by the Supply Driven (LB Priority approach) Alternative (4.0 maf), Enhanced Coordination Alternative (3.8 maf), CCS Comparative Baseline (3.7 maf), and Maximum Operational Flexibility Alternative (2.9 maf)[4]. The No Action and Basic Coordination Alternatives

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[4] Supply Driven (LB Pro Rata) differs from Supply Driven (LB Priority) due to the shortage distribution method. Under the LB Priority distribution, junior priority water users take a larger share of the shortage than they do under the Pro Rata distribution. As a result, their deliveries from the conservation pool are larger and more frequent, while their contributions are smaller and less frequent, resulting in an overall smaller conservation pool. See **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water, for more information.

accumulate smaller volumes, with medians of 0.3 maf for the No Action Alternative and 0.2 maf for Basic Coordination Alternative.

The relative ranking of alternatives changes when considering the Critically Dry Flow Category (4.46-10 maf). Considering the median, the Supply Driven (LB Pro Rata approach) Alternative has the most accumulation (5.2 maf), followed by the CCS Comparative Baseline (4.2 maf), Supply Driven (LB Priority approach) Alternative (3.1 maf), Enhanced Coordination Alternative (2.7 maf), and Maximum Operational Flexibility Alternative (2.0 maf).

Considering annual creation under the Average Flow Category (second column), median values are similar for the Supply Driven (LB Priority approach) Alternative (440 kaf), Maximum Operational Flexibility Alternative (420 kaf), Supply Driven (LB Pro Rata approach) Alternative (380 kaf), and Enhanced Coordination Alternative (360 kaf). The CCS Comparative Baseline has a smaller median (170 kaf), and the No Action and Basic Coordination Alternatives have zero new conservation. The Maximum Operational Flexibility Alternative has the largest 75th percentile (780 kaf), followed by the Supply Driven (LB Pro Rata approach) Alternative (650 kaf).

The relative ranking of alternatives changes under the Critically Dry Flow Category. Considering the median, the CCS Comparative Baseline has the largest creation (380 kaf), followed by the Supply Driven (LB Pro Rata approach) Alternative (300 kaf), and the Supply Driven (LB Priority approach) Alternative (160 kaf).

Considering annual delivery and conversion (third column), under the Average Flow Category, the alternatives with the largest median volumes of delivery and conversion are Maximum Operational Flexibility (110 kaf), Enhanced Coordination (100 kaf), and Supply Driven (LB Priority approach) (75 kaf). Under dry hydrology, Maximum Operational Flexibility Alternative has the largest median (240 kaf), which is noticeably larger than the alternative with second largest value (Enhanced Coordination, 130 kaf). Under the Critically Dry Flow Category, median values are similar for Supply Driven Alternative (LB Priority approach) (62 kaf), Enhanced Coordination Alternative (57 kaf), Supply Driven Alternative (LB Pro Rata approach) (52 kaf), and Maximum Operation Flexibility Alternative (42 kaf). However, the Maximum Operational Flexibility Alternative (380 kaf), Enhanced Coordination Alternative (340 kaf), and Supply Driven Alternative (LB Priority approach) (310 kaf) have the largest 75th percentiles.

Effects of Modeling Assumptions for Total Basin Conservation Activity on Lower Basin Shortages and Deliveries

The following section describes the effects of modeling assumptions for conservation activities for the various alternatives by showing how removing all conservation activity results in differences to Lower Basin shortages and depletions.

While the No Action and Basic Coordination Alternatives do not include mechanisms to conserve and store water in Lake Powell or Lake Mead, the model does include assumptions for the delivery of existing ICS that was conserved prior to 2027. In the conservation-off results, activity related to pre-2027 conservation is turned off for all the alternatives and the CCS Comparative Baseline.

Shortage

Table TA 4-16 below shows the statistical breakdown and comparison of the effects of modeling assumptions for conservation activity on shortage (as volumes in maf) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum volumes of shortage and dead pool–related reductions.

Figure TA 4-5 below compares the effects of conservation activity on annual Lower Basin shortages. The reductions are broken out by different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow. In each boxplot, conservation activity is turned on for the left of each pair (darker color) and conservation activity is turned off for the right of each pair (lighter color). The figure visualizes the same data that is included in **Table TA 4-16** in a conditional box plot.

For all alternatives and the CCS Comparative Baseline, and across all flow categories, the median shortage is similar when comparing conservation activity on and conservation activity off. In other words, conservation activity on or conservation activity off does not greatly impact the median shortage. However, conservation activity on versus conservation activity off does affect the variability of shortage across the different alternatives and the CCS Comparative Baseline and across flow categories.

In the Average Flow Category (12-14 maf), all action alternatives except for the Basic Coordination Alternative show greater variability in interquartile ranges for shortage compared to the CCS Comparative Baseline and the No Action Alternative. The Enhanced Coordination Alternative has the greatest variability in interquartile ranges between conservation activity assumptions: conservation activity on (0-2.0 maf) compared to conservation activity off (1.3-2.3 maf).

In the Critically Dry Flow Category (4.46-10 maf) for shortage, the median reductions shift higher compared to the Average Flow Category for the CCS Comparative Baseline and all alternatives except for the No Action and Basic Coordination Alternatives, which maintain the same medians as for the Average Flow Category. The Critically Dry Flow category also shows less interquartile variability for shortage between conservation activity on and conservation activity off compared to the Average Flow Category. The Maximum Operational Flexibility Alternative has the greatest interquartile variability between conservation activity assumptions: conservation activity on (2-3.6 maf) compared to conservation activity off (2.6-3.6 maf).

Table TA 4-16
Effects of Modeling Assumptions for Conservation Activity on Shortage (maf)

Alternative	Conservation Activity	Flow Category	Max	90%	75%	50%	25%	10%	Min
CCS Comparative Baseline	On	> 16	1.4	0.6	0.2	0.0	0.0	0.0	0.0
CCS Comparative Baseline	Off	> 16	1.4	0.6	0.2	0.0	0.0	0.0	0.0
CCS Comparative Baseline	On	14-16	1.4	1.2	0.6	0.2	0.0	0.0	0.0
CCS Comparative Baseline	Off	14-16	1.4	1.1	0.6	0.2	0.0	0.0	0.0
CCS Comparative Baseline	On	12-14	1.4	1.4	1.2	0.6	0.2	0.0	0.0
CCS Comparative Baseline	Off	12-14	1.4	1.4	1.2	0.6	0.2	0.0	0.0
CCS Comparative Baseline	On	10-12	1.4	1.4	1.4	1.4	0.6	0.2	0.0
CCS Comparative Baseline	Off	10-12	1.4	1.4	1.4	1.2	0.6	0.2	0.0
CCS Comparative Baseline	On	< 10	1.4	1.4	1.4	1.4	1.1	0.6	0.0
CCS Comparative Baseline	Off	< 10	1.4	1.4	1.4	1.4	1.1	0.6	0.0
No Action	On	> 16	0.6	0.6	0.5	0.0	0.0	0.0	0.0
No Action	Off	> 16	0.6	0.6	0.4	0.0	0.0	0.0	0.0
No Action	On	14-16	0.6	0.6	0.6	0.5	0.0	0.0	0.0
No Action	Off	14-16	0.6	0.6	0.6	0.4	0.0	0.0	0.0
No Action	On	12-14	0.6	0.6	0.6	0.6	0.4	0.0	0.0
No Action	Off	12-14	0.6	0.6	0.6	0.6	0.4	0.0	0.0
No Action	On	10-12	0.6	0.6	0.6	0.6	0.6	0.4	0.0
No Action	Off	10-12	0.6	0.6	0.6	0.6	0.5	0.0	0.0
No Action	On	< 10	0.6	0.6	0.6	0.6	0.6	0.5	0.0
No Action	Off	< 10	0.6	0.6	0.6	0.6	0.6	0.5	0.0
Basic Coordination	On	> 16	1.5	1.5	1.2	0.0	0.0	0.0	0.0
Basic Coordination	Off	> 16	1.5	1.5	1.0	0.0	0.0	0.0	0.0
Basic Coordination	On	14-16	1.5	1.5	1.5	1.3	0.0	0.0	0.0
Basic Coordination	Off	14-16	1.5	1.5	1.5	1.2	0.0	0.0	0.0
Basic Coordination	On	12-14	1.5	1.5	1.5	1.5	0.9	0.0	0.0
Basic Coordination	Off	12-14	1.5	1.5	1.5	1.5	0.8	0.0	0.0
Basic Coordination	On	10-12	1.5	1.5	1.5	1.5	1.5	0.5	0.0
Basic Coordination	Off	10-12	1.5	1.5	1.5	1.5	1.4	0.4	0.0
Basic Coordination	On	< 10	1.5	1.5	1.5	1.5	1.5	1.0	0.0
Basic Coordination	Off	< 10	1.5	1.5	1.5	1.5	1.5	0.9	0.0
Enhanced Coordination	On	> 16	2.2	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	Off	> 16	2.5	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	On	14-16	3.0	1.9	1.5	0.0	0.0	0.0	0.0
Enhanced Coordination	Off	14-16	3.0	2.0	1.6	0.0	0.0	0.0	0.0
Enhanced Coordination	On	12-14	3.0	2.6	2.0	1.6	0.0	0.0	0.0
Enhanced Coordination	Off	12-14	3.0	2.6	2.3	1.7	1.3	0.0	0.0
Enhanced Coordination	On	10-12	3.0	3.0	2.8	2.1	1.7	0.0	0.0
Enhanced Coordination	Off	10-12	3.0	3.0	3.0	2.4	1.9	1.5	0.0

Alternative	Conservation Activity	Flow Category	Max	90%	75%	50%	25%	10%	Min
Enhanced Coordination	On	< 10	3.0	3.0	3.0	2.9	2.1	1.8	0.0
Enhanced Coordination	Off	< 10	3.0	3.0	3.0	3.0	2.6	2.1	0.0
Max. Operational Flexibility	On	> 16	2.0	0.9	0.4	0.0	0.0	0.0	0.0
Max. Operational Flexibility	Off	> 16	1.8	0.8	0.3	0.0	0.0	0.0	0.0
Max. Operational Flexibility	On	14-16	2.7	1.6	1.3	0.8	0.3	0.0	0.0
Max. Operational Flexibility	Off	14-16	2.5	1.5	1.2	0.7	0.1	0.0	0.0
Max. Operational Flexibility	On	12-14	3.3	2.1	2.0	1.6	0.9	0.4	0.0
Max. Operational Flexibility	Off	12-14	3.2	2.2	1.9	1.4	0.8	0.2	0.0
Max. Operational Flexibility	On	10-12	4.0	3.0	2.6	2.0	1.9	1.1	0.0
Max. Operational Flexibility	Off	10-12	3.8	3.0	2.7	2.3	1.8	0.9	0.0
Max. Operational Flexibility	On	< 10	4.0	4.0	3.6	3.0	2.0	2.0	0.3
Max. Operational Flexibility	Off	< 10	4.0	4.0	3.6	3.1	2.6	2.2	0.3
Supply Driven (LB Priority)	On	> 16	2.1	1.5	0.4	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	Off	> 16	2.1	1.5	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	On	14-16	2.1	1.6	1.5	0.9	0.0	0.0	0.0
Supply Driven (LB Priority)	Off	14-16	2.1	1.5	1.5	0.5	0.0	0.0	0.0
Supply Driven (LB Priority)	On	12-14	2.1	2.1	1.5	1.5	0.1	0.0	0.0
Supply Driven (LB Priority)	Off	12-14	2.1	2.0	1.5	1.5	0.0	0.0	0.0
Supply Driven (LB Priority)	On	10-12	2.1	2.1	2.1	1.5	1.5	0.0	0.0
Supply Driven (LB Priority)	Off	10-12	2.1	2.1	2.1	1.5	1.5	0.0	0.0
Supply Driven (LB Priority)	On	< 10	2.1	2.1	2.1	2.0	1.5	1.5	0.0
Supply Driven (LB Priority)	Off	< 10	2.1	2.1	2.1	1.8	1.5	1.3	0.0
Supply Driven (LB Pro Rata)	On	> 16	2.1	1.5	0.4	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	Off	> 16	2.1	1.5	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	On	14-16	2.1	1.6	1.5	0.9	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	Off	14-16	2.1	1.5	1.5	0.5	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	On	12-14	2.1	2.1	1.5	1.5	0.2	0.0	0.0
Supply Driven (LB Pro Rata)	Off	12-14	2.1	2.0	1.5	1.5	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	On	10-12	2.1	2.1	2.1	1.5	1.5	0.0	0.0
Supply Driven (LB Pro Rata)	Off	10-12	2.1	2.1	2.1	1.5	1.5	0.0	0.0
Supply Driven (LB Pro Rata)	On	< 10	2.1	2.1	2.1	1.9	1.5	1.5	0.0
Supply Driven (LB Pro Rata)	Off	< 10	2.1	2.1	2.1	1.8	1.5	1.3	0.0

Note: Lower Basin conservation activity includes assumptions related to the 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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Figure TA 4-5
Effects of Modeling Assumptions for Conservation Activity on Lower Basin Shortage
(Conservation On in Left Column, Conservation Off in Right Column)
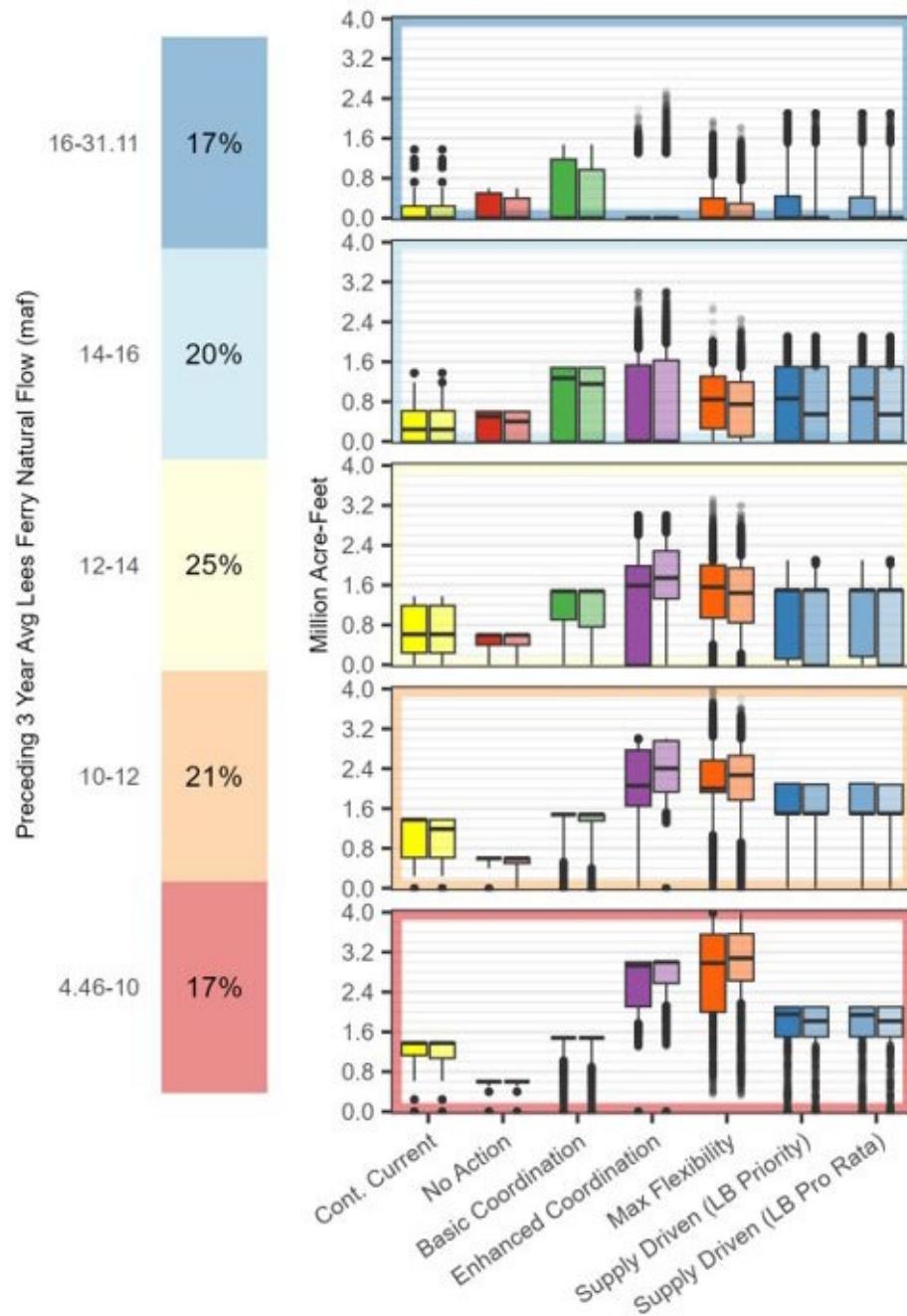
Note: Shortage volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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

Table TA 4-17 below shows the statistical breakdown and comparison of the effects of modeling assumptions for conservation activity on annual Lower Basin depletions (as percents of apportionment) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum percent of apportionment.

Figure TA 4-6 below compares the effects of conservation activity on annual Lower Basin depletions. The depletions are broken out by different hydrologic conditions based on the preceding 3-year average of Lees Ferry natural flow. On the left vertical axis, depletions are reported as a percentage of the total volume apportioned to the Lower Basin (i.e., percent of 9.0 maf). The vertical axis on the right reports the depletion volumes. In each boxplot, conservation activity is turned on for the left of each pair (darker color) and conservation activity is turned off for the right of each pair (lighter color). The figure visualizes the same data that is included in **Table TA 4-17** in a conditional box plot.

In the Average Flow Category (12-14 maf), with conservation activity turned on, the CCS Comparative Baseline, and the No Action and Basic Coordination Alternatives tend to result in the largest depletions (median depletions of 86.5-93.7 percent) and the smallest interquartile ranges (7.0-9.6 percent). The Supply Driven (both LB Priority and LB Pro Rata approaches), Maximum Operational Flexibility, and Enhanced Coordination Alternatives tend to result in lower depletions (medians ranging from 81.8 – 83.6 percent) and larger interquartile ranges (10.6-16.2 percent). Results with conservation activity turned off show the largest changes compared to conservation activity turned on for the Enhanced Coordination and Supply Driven (LB Priority approach) Alternatives. With conservation activity turned off, the interquartile range for the Enhanced Coordination Alternative decreases from 16.2 percent to 10.6 percent while it increases for the Supply Driven Alternative (LB Priority approach) from 13.8 to 16.7 percent.

In the Critically Dry Category (4.46-10 maf), with conservation activity turned on, the CCS Comparative Baseline, and the Basic Coordination, and Supply Driven (both LB Priority and LB Pro Rata approaches) Alternatives have the largest median depletions, followed by the No Action, Enhanced Coordination, and Maximum Operational Flexibility Alternatives. The No Action Alternative and the CCS Comparative Baseline have the largest interquartile ranges in this category, likely due to higher frequency and volumes of dead pool–related delivery reductions as shown in **Figure TA 4-1**.

In the Wet Flow Category (16-31.11 maf), CCS Comparative Baseline and the Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have median depletions ranging from 103.8-105.5 percent - meaning over 9.0 maf is depleted - whereas the other alternatives have median depletions very close to 100 (range of 100.3-100.6 percent). This is likely due to the larger frequency of surplus deliveries.

Table TA 4-17
Effects of Modeling Assumptions for Conservation Activity on Lower Basin Depletions
(Percent of Apportionment)

Alternative	Conservation Activity	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	On	> 16	119.6	112.8	108.6	103.8	98.0	93.3	84.5
CCS Comparative Baseline	Off	> 16	119.3	113.2	111.4	104.3	97.3	93.2	84.7
CCS Comparative Baseline	On	14-16	118.1	104.6	100.9	96.9	93.0	88.3	72.5
CCS Comparative Baseline	Off	14-16	118.3	104.5	100.0	97.3	93.2	87.5	71.6
CCS Comparative Baseline	On	12-14	117.3	100.9	97.5	93.0	87.9	85.2	58.5
CCS Comparative Baseline	Off	12-14	117.4	100.0	97.3	93.2	86.8	84.7	57.8
CCS Comparative Baseline	On	10-12	106.8	98.0	93.5	88.1	82.0	70.0	40.1
CCS Comparative Baseline	Off	10-12	107.6	97.3	93.2	86.8	82.1	70.3	40.1
CCS Comparative Baseline	On	< 10	105.6	94.0	90.5	82.0	62.2	50.7	15.6
CCS Comparative Baseline	Off	< 10	104.9	93.2	88.1	83.2	62.4	50.8	14.8
No Action	On	> 16	118.0	116.8	113.4	100.6	95.9	93.7	81.8
No Action	Off	> 16	118.0	116.9	113.6	100.0	95.6	93.3	81.8
No Action	On	14-16	118.0	104.5	100.3	95.9	93.7	91.6	76.8
No Action	Off	14-16	118.0	100.0	100.0	95.6	93.3	91.7	76.4
No Action	On	12-14	116.5	100.3	98.9	93.7	91.9	85.8	51.6
No Action	Off	12-14	116.5	100.0	95.6	93.3	92.5	85.7	51.2
No Action	On	10-12	107.3	100.3	93.7	92.4	77.9	66.2	32.5
No Action	Off	10-12	107.3	100.0	94.4	93.3	77.8	65.7	32.1
No Action	On	< 10	106.4	98.6	93.7	75.0	57.4	48.3	20.6
No Action	Off	< 10	100.0	94.4	93.3	75.6	57.2	47.9	20.1
Basic Coordination	On	> 16	118.0	117.1	115.3	100.3	89.3	83.9	80.1
Basic Coordination	Off	> 16	118.0	117.0	115.6	100.0	89.3	83.6	79.9
Basic Coordination	On	14-16	118.0	100.6	100.3	89.3	85.2	83.9	74.0
Basic Coordination	Off	14-16	118.0	100.0	100.0	87.2	83.6	83.6	73.7
Basic Coordination	On	12-14	116.5	100.3	91.3	86.5	83.9	83.6	61.0
Basic Coordination	Off	12-14	116.9	100.0	91.6	83.6	83.6	83.6	60.6
Basic Coordination	On	10-12	107.3	94.8	87.4	83.9	82.3	72.6	33.8
Basic Coordination	Off	10-12	107.3	95.4	85.0	83.6	83.6	72.7	33.5
Basic Coordination	On	< 10	106.4	90.3	85.8	83.9	65.7	50.9	15.7
Basic Coordination	Off	< 10	100.0	89.9	83.6	83.6	66.7	50.8	15.3
Enhanced Coordination	On	> 16	121.3	117.4	115.8	100.5	95.8	91.5	74.9
Enhanced Coordination	Off	> 16	119.6	117.2	115.5	100.4	100.4	100.4	72.1
Enhanced Coordination	On	14-16	119.4	103.5	98.7	94.4	82.4	78.5	64.5
Enhanced Coordination	Off	14-16	119.0	100.4	100.4	100.4	82.3	78.6	67.1
Enhanced Coordination	On	12-14	120.1	98.5	93.6	82.3	77.4	72.3	64.0
Enhanced Coordination	Off	12-14	116.4	100.4	85.6	81.0	75.0	71.0	62.8
Enhanced Coordination	On	10-12	106.1	88.4	82.2	77.0	69.3	66.8	43.3

Alternative	Conservation Activity	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
Enhanced Coordination	Off	10-12	107.5	83.4	78.9	73.7	67.5	67.1	40.2
Enhanced Coordination	On	< 10	100.5	82.1	77.3	68.9	65.1	55.5	23.7
Enhanced Coordination	Off	< 10	100.4	76.7	71.8	67.1	67.1	52.9	22.2
Max. Operational Flexibility	On	> 16	119.7	117.5	115.7	100.3	90.3	81.9	75.3
Max. Operational Flexibility	Off	> 16	119.7	117.0	114.1	100.0	96.8	91.7	79.9
Max. Operational Flexibility	On	14-16	119.6	104.5	96.0	88.6	82.1	77.6	69.5
Max. Operational Flexibility	Off	14-16	119.3	100.0	98.9	91.7	86.7	83.5	70.1
Max. Operational Flexibility	On	12-14	118.8	93.6	88.6	83.6	78.0	75.7	63.4
Max. Operational Flexibility	Off	12-14	117.0	97.5	90.6	84.0	78.4	75.7	64.5
Max. Operational Flexibility	On	10-12	105.6	86.9	83.5	78.3	72.8	66.3	44.8
Max. Operational Flexibility	Off	10-12	106.5	89.7	80.3	74.8	70.4	66.6	38.4
Max. Operational Flexibility	On	< 10	90.6	84.7	79.7	68.7	60.3	55.2	27.0
Max. Operational Flexibility	Off	< 10	96.4	75.7	70.8	65.8	60.2	55.4	26.4
Supply Driven (LB Priority)	On	> 16	119.1	116.8	113.2	105.2	89.2	79.2	71.4
Supply Driven (LB Priority)	Off	> 16	119.4	116.5	110.5	105.9	100.4	83.7	77.1
Supply Driven (LB Priority)	On	14-16	118.7	105.8	101.0	87.3	80.2	75.2	71.4
Supply Driven (LB Priority)	Off	14-16	119.0	105.9	104.8	94.4	83.7	83.7	77.1
Supply Driven (LB Priority)	On	12-14	116.5	101.0	91.6	83.0	77.8	74.1	68.2
Supply Driven (LB Priority)	Off	12-14	115.5	105.9	100.4	83.7	83.7	78.1	68.2
Supply Driven (LB Priority)	On	10-12	109.3	92.6	85.7	80.5	76.2	72.7	56.8
Supply Driven (LB Priority)	Off	10-12	106.9	100.4	83.7	83.7	77.2	74.7	57.9
Supply Driven (LB Priority)	On	< 10	107.4	87.2	83.1	78.0	73.0	60.7	28.9
Supply Driven (LB Priority)	Off	< 10	105.9	85.5	83.7	80.2	72.3	59.6	29.1
Supply Driven (LB Pro Rata)	On	> 16	119.1	116.8	113.5	105.5	90.2	78.5	70.6
Supply Driven (LB Pro Rata)	Off	> 16	119.4	116.5	110.5	105.9	100.3	83.7	77.1
Supply Driven (LB Pro Rata)	On	14-16	118.7	105.8	101.0	85.9	79.3	74.6	68.5
Supply Driven (LB Pro Rata)	Off	14-16	119.0	105.9	104.8	94.4	83.7	83.7	76.3
Supply Driven (LB Pro Rata)	On	12-14	116.5	100.8	92.2	81.8	77.0	73.1	68.5
Supply Driven (LB Pro Rata)	Off	12-14	115.5	105.9	100.4	83.7	83.7	78.0	69.0
Supply Driven (LB Pro Rata)	On	10-12	109.2	93.2	83.4	79.1	74.8	71.8	56.0
Supply Driven (LB Pro Rata)	Off	10-12	106.9	100.4	83.7	83.7	77.3	74.9	56.3
Supply Driven (LB Pro Rata)	On	< 10	107.4	85.0	80.7	76.7	72.2	63.7	28.7
Supply Driven (LB Pro Rata)	Off	< 10	105.9	85.5	83.7	80.2	73.1	59.8	29.0

Note: The modeled annual Lower Basin depletions 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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Figure TA 4-6

Effects of Modeling Assumptions for Conservation Activity on Lower Basin Depletions (Conservation On in Left Column, Conservation Off in Right Column)
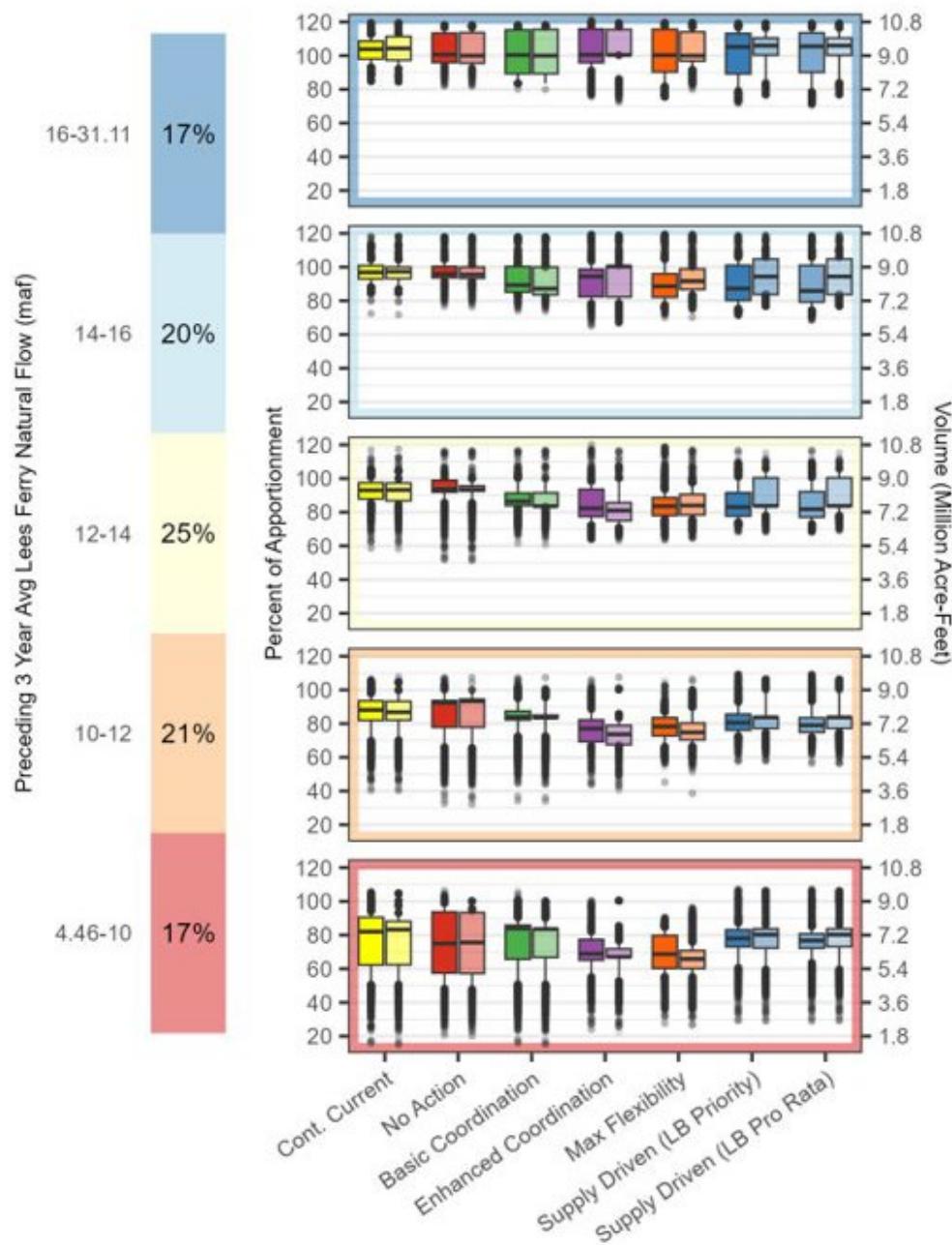
Note: The modeled annual Lower Basin depletions include modeling assumptions for reductions in water deliveries to Mexico and storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Shortage

This section compares all the alternatives and the CCS Comparative Baseline with respect to shortages to each of the Lower Division States and Mexico.

Maximum Shortage

Figure TA 4-7 below compares alternatives based on the maximum volume of shortage they apply to the entire Lower Basin and to each state and Mexico. The rows correspond to the entire Lower Basin (top row) and to different states or Mexico, and the columns correspond to different alternatives. Under each alternative the shortages per state and Mexico sum up to the total Lower Basin shortage shown in the top row[5]. Each row has an independent color scale, so the darkest color in each row corresponds to the highest shortage for that entity. Under the CCS Comparative Baseline, DCP contributions and Binational Water Scarcity Contingency Plan savings are counted as shortages though the required volumes are recoverable under certain conditions.

Figure TA 4-7
Maximum Shortage (maf)
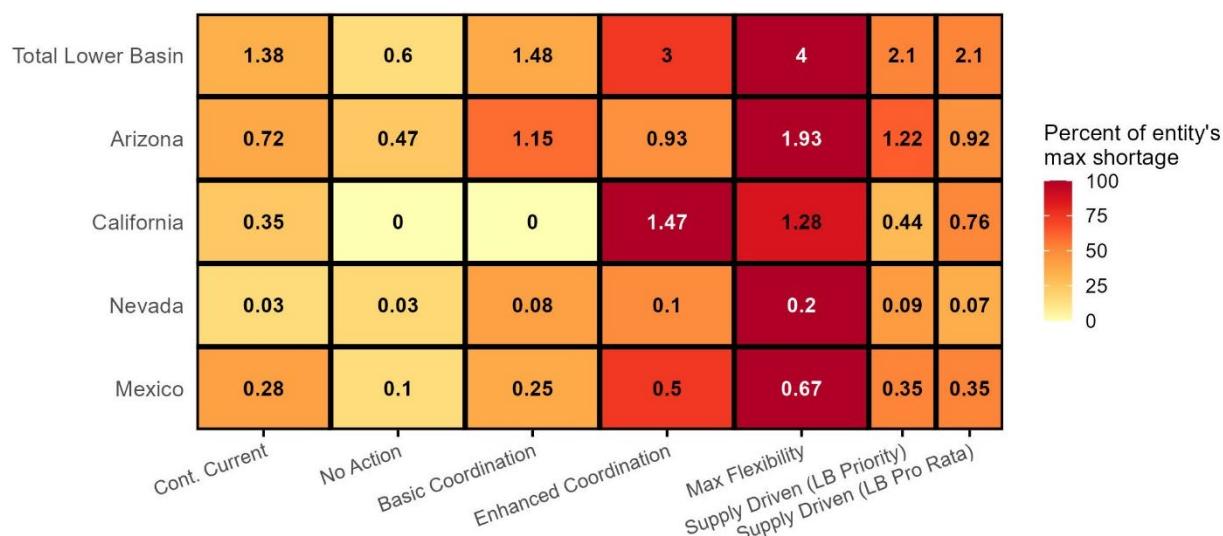
Note: Lower Basin shortage volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

For all entities except California, the Maximum Operational Flexibility Alternative imposes the largest maximum shortages, and the No Action Alternative imposes the lowest (or is tied for lowest in Nevada). California takes its largest shortage under the Enhanced Coordination Alternative, due to its pro rata approach to shortage distribution.

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[5] The sum of individual entities' volumes is different than the Total Lower Basin volumes for the Maximum Operational Flexibility Alternative due to rounding values to two decimal places. The Total Lower Basin volume is correct.

First Year Shortage Under Each Set of Initial Conditions

Figure TA 4-8 below compares alternatives based on the Lower Basin shortage in 2027. The rows correspond to initial reservoir conditions, and the columns correspond to different alternatives. The color scale represents volume of shortage, so the darkest colors correspond to the highest shortages independent of row or column.

**Figure TA 4-8
Lower Basin Shortage in 2027**
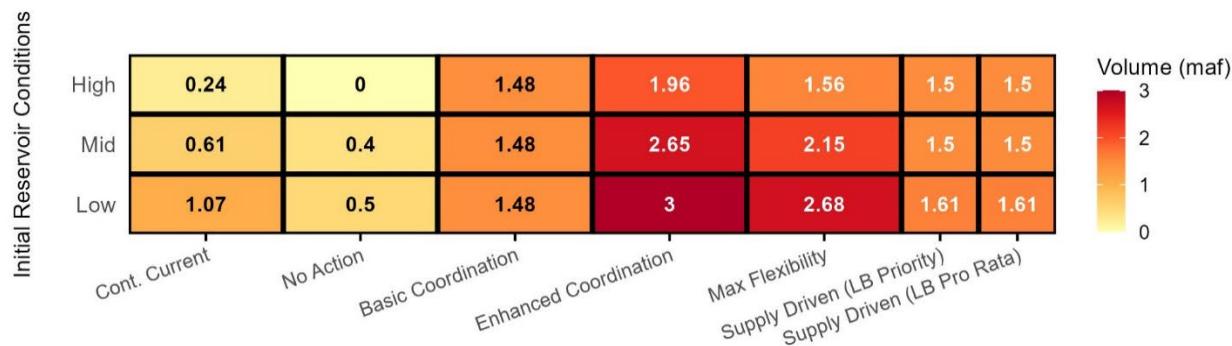
Note: Lower Basin shortage volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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

For all reservoir conditions in the Lower Basin in 2027, the Enhanced Coordination Alternative imposes the largest shortages, and the No Action Alternative imposes the lowest shortages.

Annual Lower Basin Shortage

Figure TA 4-9 below compares the alternatives with respect to shortages under different hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. There is a column for each Lower Basin state and Mexico. The vertical axis for each state's column is scaled based on its respective volume of apportionment; the percent apportionment is shown on the left side of each column, and the absolute volume of shortage is shown on the right.

Arizona, Nevada, and Mexico show similar relationships between alternatives across flow categories and are described together. In the Average Flow Category (12-14 maf), the CCS Comparative Baseline and the No Action Alternative generally have the lowest medians, applying shortages between 5 percent of apportionment (Mexico, CCS Comparative Baseline) to 18 percent of apportionment (Arizona, CCS Comparative Baseline). These alternatives also show relatively low variability around the medians, except for CCS Comparative Baseline for Arizona which has an interquartile range from 7 percent to 23 percent of apportionment. Recall that low shortages in **Figure TA 4-9** are associated with large and frequent dead pool–related reductions (see **Figure TA 4-1**, **Figure TA 4-2**, and **Figure TA 4-3**). Under the Basic Coordination Alternative, Arizona, and Nevada take median (which is also the maximum possible) shortages of 41 percent and 27 percent

Figure TA 4-9
Calendar Year Shortage by State and Water Delivery Reductions to Mexico
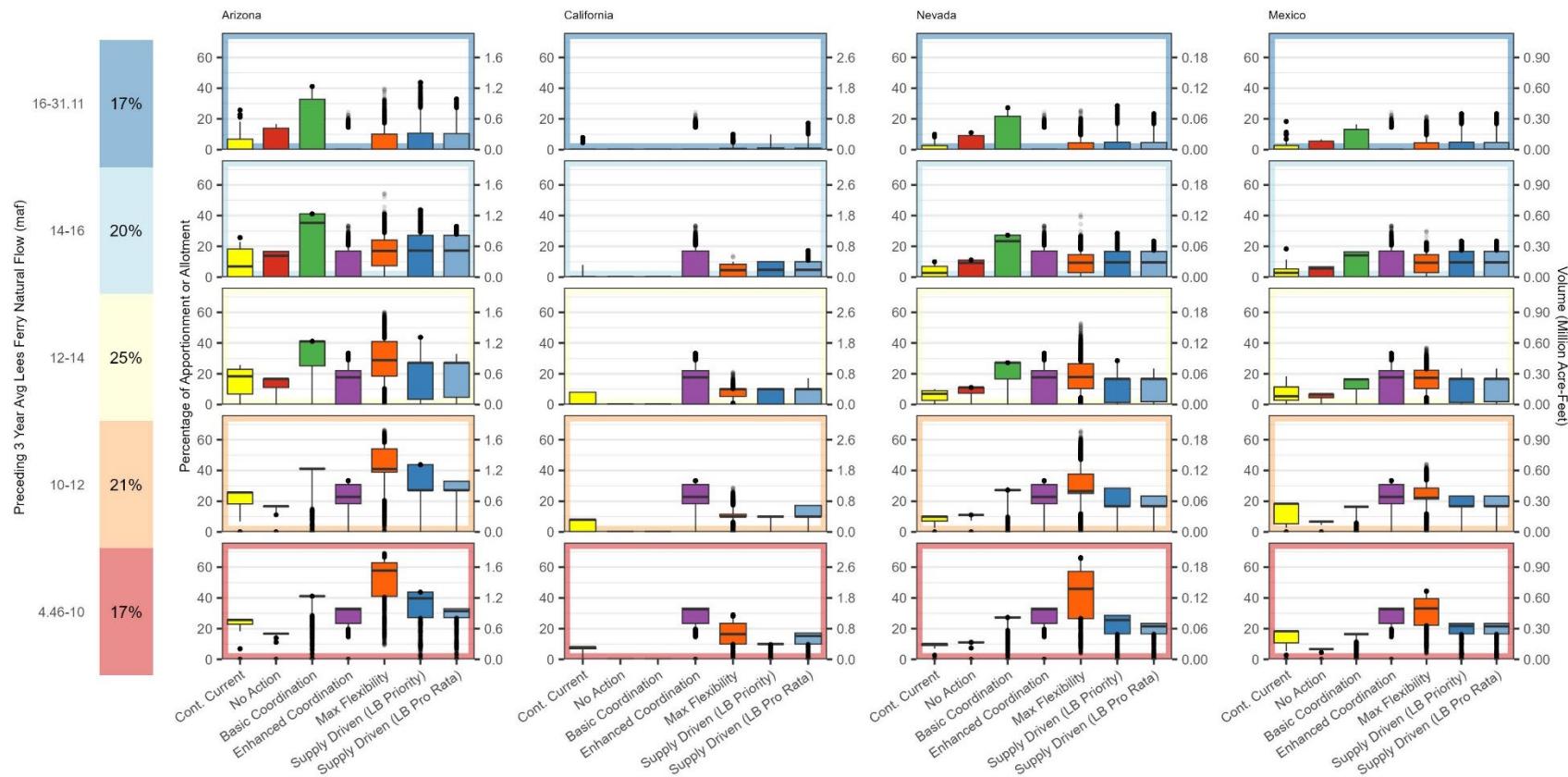
Note: The modeled annual delivery reductions in Mexico include modeling assumptions for reductions in water deliveries to Mexico and storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

of apportionment, respectively; Mexico's median and maximum shortage under the Basic Coordination Alternative is lower, at 16 percent of apportionment; Arizona shows the most interquartile variability and Mexico shows the least. The Maximum Operational Flexibility and Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) show a similar relationship between medians across the three entities, but the Maximum Operational Flexibility Alternative has more high-end variability and the Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have more low-end variability. The Enhanced Coordination Alternative has exactly the same median shortage (18 percent of apportionment) and interquartile range (0-22 percent of apportionment) across all entities, because it distributes shortages using a pro rata scheme.

In the Dry Flow Category (10-12 maf), median shortages generally increase, and variability generally decreases. The Critically Dry Flow Category (4.46-10 maf) continues this shift, with most alternatives showing median shortages at the maximum shortage possible and some lower end variability. The exception in this category is the Maximum Operational Flexibility Alternative, which only reaches its largest shortages in high outliers and has large variability.

The second column shows shortages to California, where alternatives demonstrate different patterns because of the Lower Basin state-level priority system. The No Action and Basic Coordination Alternatives do not impose any shortages because they only employ the priority distribution scheme. In the Average Flow Category (12-14 maf), the Enhanced Coordination Alternative has the highest median shortage (18 percent of apportionment) and the largest variability among alternatives. The Maximum Operational Flexibility and Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) all have median shortages of 10 percent of apportionment. In the Critically Dry Flow Category (4.46-10 maf), the CCS Comparative Baseline and the Supply Driven Alternative (LB Priority approach) show median shortages up to 8 percent and 10 percent of apportionment, respectively. The Enhanced Coordination Alternative shows the largest shortages, up to 33 percent of apportionment, which is the same as the maximum shortages under the Enhanced Coordination Alternative for other states and Mexico because the shortages are distributed pro rata. The Maximum Operational Flexibility Alternative shortages to California top out at 29 percent of apportionment.

Annual Shortage by State and Priority

Arizona

Table TA 4-18 through **Table TA 4-22** show the statistical breakdown of shortage for Arizona by total (as percent of apportionment) and priority (as volume in kaf) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum shortages. The first table, for total shortage, references the data visualized in **Figure TA 4-9** above. **Figure TA 4-10** below compares the shortages in Arizona for each alternative under a range of hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. There is a column for each priority within the state. The vertical axis for each column is scaled based on the volume of apportionment within the priority group. The total shortages broken out by priority users in the following figure sum to the annual shortage by state (for Arizona) in the previous **Figure TA 4-9**.

Table TA 4-18
Total State Shortage for Arizona (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	25.7	18.3	6.9	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	25.7	22.9	18.3	6.9	0.0	0.0	0.0
CCS Comparative Baseline	12-14	25.7	25.7	22.9	18.3	6.9	0.0	0.0
CCS Comparative Baseline	10-12	25.7	25.7	25.7	25.7	18.3	6.9	0.0
CCS Comparative Baseline	< 10	25.7	25.7	25.7	25.7	22.9	18.3	0.0
No Action	> 16	16.7	16.7	13.9	0.0	0.0	0.0	0.0
No Action	14-16	16.7	16.7	16.7	13.9	0.0	0.0	0.0
No Action	12-14	16.7	16.7	16.7	16.7	11.1	0.0	0.0
No Action	10-12	16.7	16.7	16.7	16.7	16.7	11.1	0.0
No Action	< 10	16.7	16.7	16.7	16.7	16.7	13.9	0.0
Basic Coordination	> 16	41.1	41.1	32.8	0.0	0.0	0.0	0.0
Basic Coordination	14-16	41.1	41.1	41.1	35.3	0.0	0.0	0.0
Basic Coordination	12-14	41.1	41.1	41.1	41.1	25.2	0.0	0.0
Basic Coordination	10-12	41.1	41.1	41.1	41.1	41.1	15.2	0.0
Basic Coordination	< 10	41.1	41.1	41.1	41.1	41.1	28.9	0.0
Enhanced Coordination	> 16	24.4	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	33.3	20.6	17.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	33.3	28.8	22.1	17.7	0.0	0.0	0.0
Enhanced Coordination	10-12	33.3	33.2	30.8	22.8	18.4	0.0	0.0
Enhanced Coordination	< 10	33.3	33.3	33.3	32.6	23.4	19.7	0.0
Max. Operational Flexibility	> 16	39.8	17.2	10.1	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	54.6	28.8	24.1	17.0	7.3	0.0	0.0
Max. Operational Flexibility	12-14	60.3	43.1	41.0	28.8	18.5	10.3	0.0
Max. Operational Flexibility	10-12	66.7	58.3	54.1	41.0	38.9	20.6	0.0
Max. Operational Flexibility	< 10	69.0	66.4	62.9	57.8	41.0	41.0	8.8
Supply Driven (LB Priority)	> 16	43.7	27.1	10.7	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	43.7	28.9	27.1	17.2	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	43.7	43.7	27.1	27.1	3.4	0.0	0.0
Supply Driven (LB Priority)	10-12	43.7	43.7	43.7	27.1	27.1	0.0	0.0
Supply Driven (LB Priority)	< 10	43.7	43.7	43.7	39.7	27.1	27.1	0.0
Supply Driven (LB Pro Rata)	> 16	33.0	27.1	10.4	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	33.0	27.8	27.1	17.2	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	33.0	33.0	27.1	27.1	4.7	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	33.0	33.0	33.0	27.1	27.1	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	33.0	33.0	33.0	31.4	27.1	27.1	0.0

Table TA 4-19
State Shortage for Arizona Priority 4 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	480.0	320.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	480.0	400.0	320.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	480.0	480.0	400.0	320.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	480.0	480.0	480.0	480.0	320.0	0.0	0.0
CCS Comparative Baseline	< 10	480.0	480.0	480.0	480.0	400.0	320.0	0.0
No Action	> 16	466.9	466.9	389.0	0.0	0.0	0.0	0.0
No Action	14-16	466.9	466.9	466.9	389.0	0.0	0.0	0.0
No Action	12-14	466.9	466.9	466.9	466.8	311.2	0.0	0.0
No Action	10-12	466.9	466.9	466.9	466.9	466.8	311.2	0.0
No Action	< 10	466.9	466.9	466.9	466.9	466.8	389.0	0.0
Basic Coordination	> 16	1,151.6	1,151.6	917.6	0.0	0.0	0.0	0.0
Basic Coordination	14-16	1,151.6	1,151.6	1,151.6	988.2	0.0	0.0	0.0
Basic Coordination	12-14	1,151.6	1,151.6	1,151.6	1,151.6	704.9	0.0	0.0
Basic Coordination	10-12	1,151.6	1,151.6	1,151.6	1,151.6	1,151.5	424.3	0.0
Basic Coordination	< 10	1,151.6	1,151.6	1,151.6	1,151.6	1,151.5	808.5	0.0
Enhanced Coordination	> 16	351.5	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	486.4	311.2	250.5	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	509.0	428.2	327.1	258.1	0.0	0.0	0.0
Enhanced Coordination	10-12	520.3	480.9	456.6	337.0	266.5	0.0	0.0
Enhanced Coordination	< 10	523.8	513.2	480.9	480.1	339.8	286.1	0.0
Max. Operational Flexibility	> 16	1,113.3	482.8	282.8	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	1,456.7	806.9	676.0	475.5	205.7	0.0	0.0
Max. Operational Flexibility	12-14	1,539.7	1,206.3	1,147.0	807.6	517.1	289.4	0.0
Max. Operational Flexibility	10-12	1,560.8	1,481.4	1,442.6	1,147.0	1,088.1	577.2	0.0
Max. Operational Flexibility	< 10	1,571.4	1,550.3	1,481.4	1,442.6	1,147.0	1,147.0	247.6
Supply Driven (LB Priority)	> 16	1,224.6	760.0	300.4	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	1,224.7	810.5	760.0	482.7	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	1,224.7	1,224.4	760.0	760.0	94.6	0.0	0.0
Supply Driven (LB Priority)	10-12	1,224.7	1,224.4	1,224.4	760.0	760.0	0.0	0.0
Supply Driven (LB Priority)	< 10	1,224.7	1,224.5	1,224.4	1,111.1	760.0	760.0	0.0
Supply Driven (LB Pro Rata)	> 16	504.5	412.7	154.8	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	514.6	426.5	410.0	252.3	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	511.2	475.6	423.7	391.6	68.4	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	514.6	484.9	475.6	409.8	391.6	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	514.6	491.7	475.6	465.7	391.6	391.6	0.0

Table TA 4-20
State Shortage for Arizona Priority 3 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	175.5	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	240.1	139.5	118.8	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	240.1	188.1	152.4	125.1	0.0	0.0	0.0
Enhanced Coordination	10-12	240.1	234.0	212.1	159.3	130.7	0.0	0.0
Enhanced Coordination	< 10	240.1	240.1	240.1	216.1	166.1	141.2	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	84.9	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	244.7	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	414.7	161.4	33.6	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	417.0	394.5	293.9	141.6	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	237.5	192.6	72.2	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	237.5	195.5	189.9	122.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	237.5	229.3	195.5	183.7	34.1	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	237.5	237.5	227.3	195.5	180.3	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	237.5	237.5	237.5	215.0	195.5	178.7	0.0

Table TA 4-21
State Shortage for Arizona Priority 2 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	9.6	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	13.2	6.6	4.4	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	13.2	9.0	7.2	5.8	0.0	0.0	0.0
Enhanced Coordination	10-12	13.2	12.8	10.5	7.7	6.5	0.0	0.0
Enhanced Coordination	< 10	13.2	13.2	13.2	9.6	7.7	6.2	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	13.0	9.4	3.5	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	13.0	10.7	8.8	5.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	13.0	12.0	10.7	7.7	1.8	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	13.0	13.0	11.7	10.7	6.8	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	13.0	13.0	13.0	10.7	8.2	5.2	0.0

Table TA 4-22
State Shortage for Arizona Priority 1 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	145.6	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	199.2	120.5	100.6	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	199.2	167.7	129.9	105.0	0.0	0.0	0.0
Enhanced Coordination	10-12	199.2	195.4	180.8	134.6	109.4	0.0	0.0
Enhanced Coordination	< 10	199.2	199.2	199.2	190.1	139.2	117.7	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	197.1	161.7	61.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	197.1	163.8	160.7	102.4	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	197.1	193.9	162.2	158.6	28.3	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	197.1	197.1	193.7	162.2	157.2	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	197.1	197.1	197.1	183.4	162.2	156.3	0.0

Figure TA 4-10
Annual Shortage for Arizona
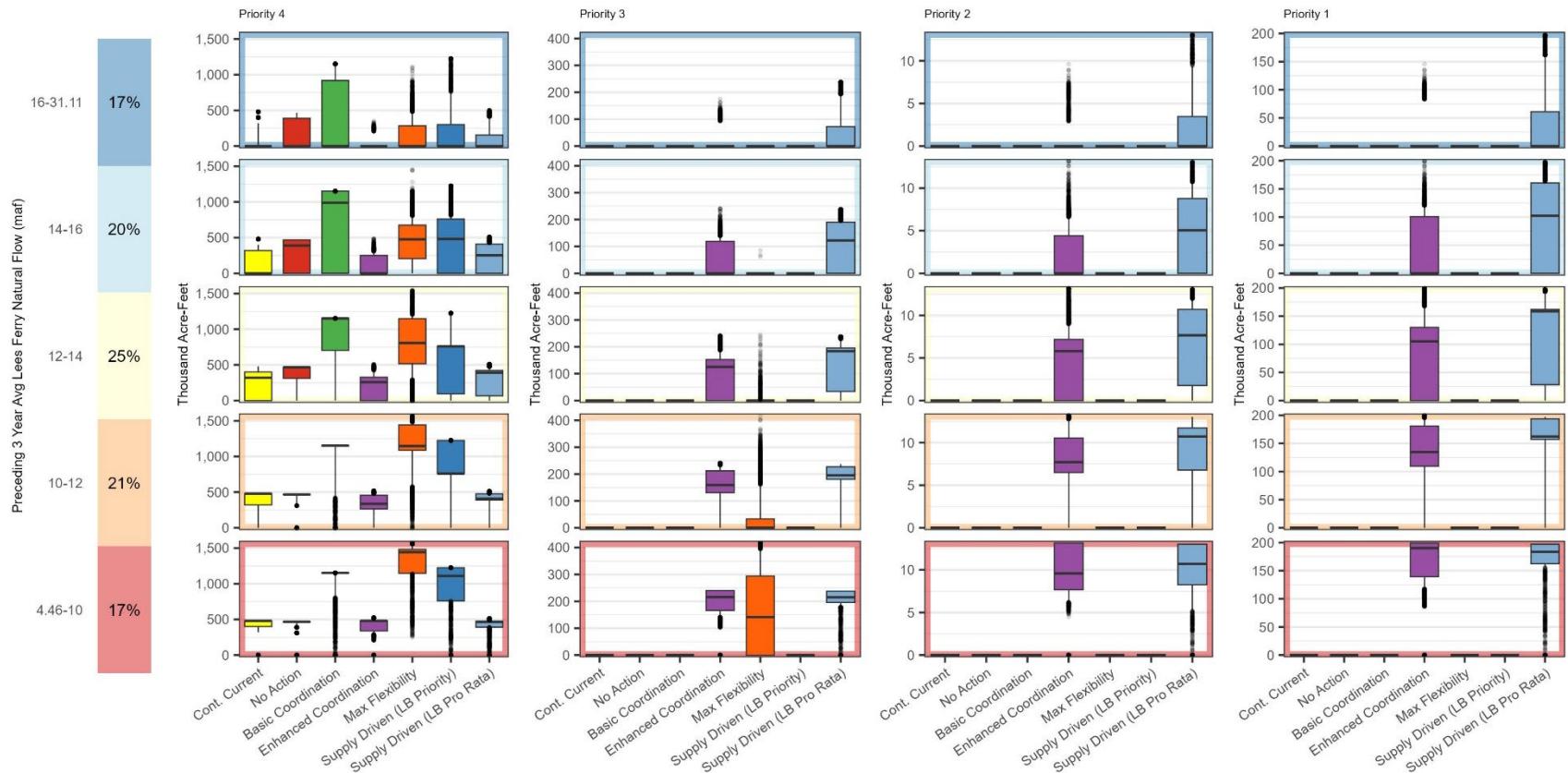
Overall, shortage reductions increase as flow categories become drier. The action alternatives generally have larger shortage reductions compared to the CCS Comparative Baseline and No Action Alternative. In the Critically Dry Flow Category, the highest median shortage occurs under the Maximum Operational Flexibility Alternative (57.8 percent of apportionment), and the lowest median shortage occurs under the No Action Alternative (16.7 percent of apportionment).

Priority 4 users make up the largest volume of Arizona's apportionment and have some amount of shortage for all of the alternatives and in every flow category. Among the Lower Division States, Arizona is more affected by priority-based alternatives, due to provisions of the Colorado River Basin Project Act, in comparison to California. Except for the Enhanced Coordination Alternative and the Supply Driven Alternative (LB Pro Rata approach), all alternatives and the CCS Comparative Baseline use the priority system to partially or fully distribute shortage. The Enhanced Coordination and Supply Driven Alternative (LB Pro Rata approach) distribute shortages pro rata and are therefore the only alternatives that apply shortages proportionally to all Lower Basin users including the highest priority users (Priority 1 and Priority 2 users). The Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven (LB Pro Rata approach) Alternatives are the only alternatives that impose shortages on Priority 3 users[6] (which make up second largest volume of Arizona's apportionment). Large shortages that occur in a high percentage of futures under the Maximum Operational Flexibility Alternative only occur in the Critically Dry Flow Category (4.46-10 maf) due to how the "dual indicator" allows for Lower Basin shortages of up to 4 maf when Seven-Reservoir [7]storage is as high as 15 percent with Critically Dry Flow Category hydrology (refer to **Section 2.7.1**). The remaining comparison of alternatives focuses only on the Priority 4 users.

In the Average Flow Category (12-14 maf), the Basic Coordination Alternative results in the highest median shortage of 1.15 maf (which also corresponds to the maximum shortage for this alternative) and demonstrates the widest range of low-end variability. The Maximum Operational Flexibility Alternative and Supply Driven Alternative (LB Priority approach) have similar median shortages of around 750 kaf and the greatest high-end variabilities, with maximum shortages reaching up to 1.57 maf for the Maximum Operational Flexibility Alternative and 1.22 maf for the Supply Driven Alternative (LB Priority approach). The CCS Comparative Baseline and the No Action, Enhanced Coordination, and Supply Driven (LB Pro Rata approach) Alternatives have lower medians ranging from 258 kaf to 467 kaf with limited high-end shortage variability. These alternatives all have maximum observed shortages of around 500 kaf.

The median shortages in the CCS Comparative Baseline and the Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven (both LB Priority and LB Pro Rata approaches) Alternatives increase in the Dry Flow Category (10-12 maf) or Critically Dry Flow Category (l4.46-10 maf) categories compared to the Average Flow Category (12-14 maf). Conversely, the medians for the No Action and Basic Coordination Alternatives remain the same across the three flow categories and have low variability. In the Critically Dry Flow Category (4.46-10 maf), the median shortage for the Maximum Operational Flexibility Alternative is 1.44 maf, the highest of all

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[6] Difference in Priority 3 and Priority 2 user shortages are due to CRSS assumptions. Please refer to **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation, for more information.
[7] Seven-Reservoir refers to the seven reservoirs that make up the total system storage: Flaming Gorge, Navajo, Blue Mesa, Powell, Mead, Mohave, and Havasu.

alternatives. All of the alternatives for Priority 4 users demonstrate greater variability towards lower shortages than higher shortages in the two driest flow categories.

California

Table TA 4-23 through **Table TA 4-29** show the statistical breakdown of shortage for California by total (as percent of apportionment) and priority (as volume in kaf) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum shortages. The first table, for total shortage, references the data visualized in **Figure TA 4-9** above. **Figure TA 4-11** below compares the shortages in California for each alternative under a range of hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. There is a column for each priority group within the state. The vertical axis for each column is scaled based on the volume of apportionment within the priority group. The total shortages broken out by priority users in the following figure sum to the annual shortage by state (for California) in the previous **Figure TA 4-9**.

Overall, shortage reductions increase as flow categories become drier. The action alternatives have larger shortage reductions compared to the CCS Comparative Baseline and No Action Alternative. California does not have shortages under the No Action Alternative or the Basic Coordination Alternative (both priority-based alternatives). In the Critically Dry Flow Category, the highest median shortage occurs under the Enhanced Coordination Alternative (32.6 percent of apportionment) and the lowest non-zero median shortage occurs under the Supply Driven Alternative (LB Priority approach; 10 percent of apportionment).

PPRs users and Priority 3a users make up the largest volumes of California's apportionment, followed by Priority 4 users. Among the Lower Division States, California is least affected by priority-based alternatives, due to the Colorado Basin Project Act and the volume of PPRs in the state, in comparison to Arizona and Nevada. This can be seen in the CCS Comparative Baseline and the No Action and Basic Coordination Alternatives—all priority-based alternatives—that do not impose shortages on any users (regardless of priority) in California. Except for the Enhanced Coordination Alternative and Supply Driven Alternative (LB Pro Rata approach), all alternatives and the CCS Comparative Baseline use the priority system to partially or fully distribute shortage. The Enhanced Coordination Alternative and Supply Driven Alternative (LB Pro Rata approach) distribute shortages pro rata and are therefore the only alternatives that apply shortages to California's high priority users (PPRs, Priority 1 and Priority 2), with the exception of some high outlier shortages for Priority 1 and Priority 2 users under the Maximum Operational Flexibility Alternative in the drier flow categories. For the high priority users, the Enhanced Coordination Alternative shows larger and more frequent shortages in the Average to Dry Flow Categories but smaller (except for outliers) and more infrequent shortages in the Wet Flow Category when compared to the Supply Driven Alternative (LB Pro Rata approach). The Supply Driven Alternative (LB Priority approach) only imposes shortages on lower priority users (Priority 3a, Priority 3b and Priority 4).

Table TA 4-23
Total State Shortage for California (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	8.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	8.0	8.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	8.0	8.0	8.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	8.0	8.0	8.0	8.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	8.0	8.0	8.0	8.0	6.8	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	24.4	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	33.3	20.6	17.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	33.3	28.8	22.1	17.7	0.0	0.0	0.0
Enhanced Coordination	10-12	33.3	33.2	30.8	22.8	18.4	0.0	0.0
Enhanced Coordination	< 10	33.3	33.3	33.3	32.6	23.4	19.7	0.0
Max. Operational Flexibility	> 16	10.0	4.7	0.8	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	13.9	10.0	8.4	4.5	0.0	0.0	0.0
Max. Operational Flexibility	12-14	21.1	10.0	10.0	10.0	5.3	0.9	0.0
Max. Operational Flexibility	10-12	28.9	17.3	11.5	10.0	10.0	6.5	0.0
Max. Operational Flexibility	< 10	29.0	28.0	23.4	16.4	10.0	10.0	0.1
Supply Driven (LB Priority)	> 16	10.0	10.0	1.2	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	10.0	10.0	10.0	4.7	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	10.0	10.0	10.0	10.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	10.0	10.0	10.0	10.0	10.0	0.0	0.0
Supply Driven (LB Priority)	< 10	10.0	10.0	10.0	10.0	10.0	10.0	0.0
Supply Driven (LB Pro Rata)	> 16	17.2	10.0	1.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	17.2	10.8	10.0	4.7	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	17.2	17.2	10.0	10.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	17.2	17.2	17.2	10.0	10.0	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	17.2	17.2	17.2	15.3	10.0	10.0	0.0

Table TA 4-24
State Shortage for California Priority 4 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	73.8	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	103.9	65.2	50.6	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	109.2	87.6	66.5	50.5	0.0	0.0	0.0
Enhanced Coordination	10-12	112.3	101.7	87.0	67.6	50.7	0.0	0.0
Enhanced Coordination	< 10	113.2	110.4	100.9	85.2	66.9	53.6	0.0
Max. Operational Flexibility	> 16	336.8	205.4	36.2	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	339.6	331.1	302.7	199.3	0.0	0.0	0.0
Max. Operational Flexibility	12-14	339.6	333.9	314.1	255.7	234.5	41.8	0.0
Max. Operational Flexibility	10-12	336.8	331.1	314.1	302.7	255.7	255.7	0.0
Max. Operational Flexibility	< 10	339.6	333.9	316.9	302.7	255.7	255.7	6.4
Supply Driven (LB Priority)	> 16	336.8	316.9	51.1	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	339.6	333.9	311.2	205.4	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	339.6	333.9	314.1	255.7	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	336.8	331.1	311.2	302.7	255.7	0.0	0.0
Supply Driven (LB Priority)	< 10	339.6	333.9	316.9	302.7	255.7	255.7	0.0
Supply Driven (LB Pro Rata)	> 16	56.5	32.5	3.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	57.9	34.0	32.3	13.6	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	57.4	45.5	33.7	30.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	57.9	52.7	44.0	32.0	25.6	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	57.9	54.5	52.1	44.0	30.3	25.6	0.0

Table TA 4-25
State Shortage for California Priority 3b (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	1.2	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	1.7	1.0	0.9	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	1.7	1.4	1.1	0.9	0.0	0.0	0.0
Enhanced Coordination	10-12	1.7	1.7	1.5	1.1	0.9	0.0	0.0
Enhanced Coordination	< 10	1.7	1.7	1.7	1.6	1.2	1.0	0.0
Max. Operational Flexibility	> 16	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	5.0	5.0	5.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	5.0	5.0	5.0	5.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	5.0	5.0	5.0	5.0	5.0	0.0	0.0
Max. Operational Flexibility	< 10	5.0	5.0	5.0	5.0	5.0	5.0	0.0
Supply Driven (LB Priority)	> 16	5.0	5.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	5.0	5.0	5.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	5.0	5.0	5.0	5.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	5.0	5.0	5.0	5.0	5.0	0.0	0.0
Supply Driven (LB Priority)	< 10	5.0	5.0	5.0	5.0	5.0	5.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.9	0.5	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.9	0.5	0.5	0.2	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.9	0.9	0.5	0.5	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	0.9	0.9	0.9	0.5	0.5	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	0.9	0.9	0.9	0.8	0.5	0.5	0.0

Table TA 4-26
State Shortage for California Priority 3a (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	226.7	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	325.8	193.5	160.9	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	325.8	272.6	208.2	168.0	0.0	0.0	0.0
Enhanced Coordination	10-12	325.8	310.2	291.2	216.0	175.1	0.0	0.0
Enhanced Coordination	< 10	325.8	325.8	310.2	306.1	224.3	187.0	0.0
Max. Operational Flexibility	> 16	179.3	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	349.3	109.6	59.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	669.4	179.3	132.3	101.1	0.0	0.0	0.0
Max. Operational Flexibility	10-12	977.5	469.3	198.4	148.1	112.4	0.0	0.0
Max. Operational Flexibility	< 10	977.5	926.1	731.7	413.7	179.3	129.5	0.0
Supply Driven (LB Priority)	> 16	179.3	120.9	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	179.3	172.2	115.3	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	179.3	179.3	132.3	106.8	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	179.3	179.3	179.3	129.5	101.1	0.0	0.0
Supply Driven (LB Priority)	< 10	179.3	179.3	179.3	132.3	109.6	95.4	0.0
Supply Driven (LB Pro Rata)	> 16	168.1	93.1	9.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	168.1	101.1	93.1	44.2	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	168.1	160.0	97.8	93.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	168.1	168.1	160.0	97.8	93.1	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	168.1	168.1	160.0	143.5	97.8	93.1	0.0

Table TA 4-27
State Shortage for California Priority 2 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	0.8	0.5	0.4	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	0.8	0.7	0.5	0.4	0.0	0.0	0.0
Enhanced Coordination	10-12	0.8	0.8	0.7	0.5	0.4	0.0	0.0
Enhanced Coordination	< 10	0.8	0.8	0.8	0.7	0.5	0.5	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.4	0.2	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.4	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.4	0.4	0.2	0.2	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	0.4	0.4	0.4	0.2	0.2	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	0.4	0.4	0.4	0.4	0.2	0.2	0.0

Table TA 4-28
State Shortage for California Priority 1 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	89.8	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	122.8	75.8	62.6	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	122.8	106.3	81.2	65.0	0.0	0.0	0.0
Enhanced Coordination	10-12	122.8	122.2	113.4	84.1	67.7	0.0	0.0
Enhanced Coordination	< 10	122.8	122.8	122.8	120.0	86.1	72.7	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	30.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	34.8	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	63.4	36.8	3.6	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	63.4	39.8	36.8	17.2	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	63.4	63.4	36.8	36.8	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	63.4	63.4	63.4	36.8	36.8	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	63.4	63.4	63.4	56.2	36.8	36.8	0.0

Table TA 4-29
State Shortage for California Present Perfected Rights (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	680.1	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	930.4	570.9	472.9	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	930.4	801.9	612.2	492.3	0.0	0.0	0.0
Enhanced Coordination	10-12	930.4	921.9	854.2	634.7	512.1	0.0	0.0
Enhanced Coordination	< 10	930.4	930.4	930.4	907.1	652.1	550.4	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	480.1	279.1	26.9	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	480.1	299.8	278.3	130.3	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	480.1	477.1	279.1	277.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	480.1	480.1	477.1	279.1	276.3	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	480.1	480.1	480.1	421.8	279.1	276.0	0.0

Figure TA 4-11
Annual Shortage for California
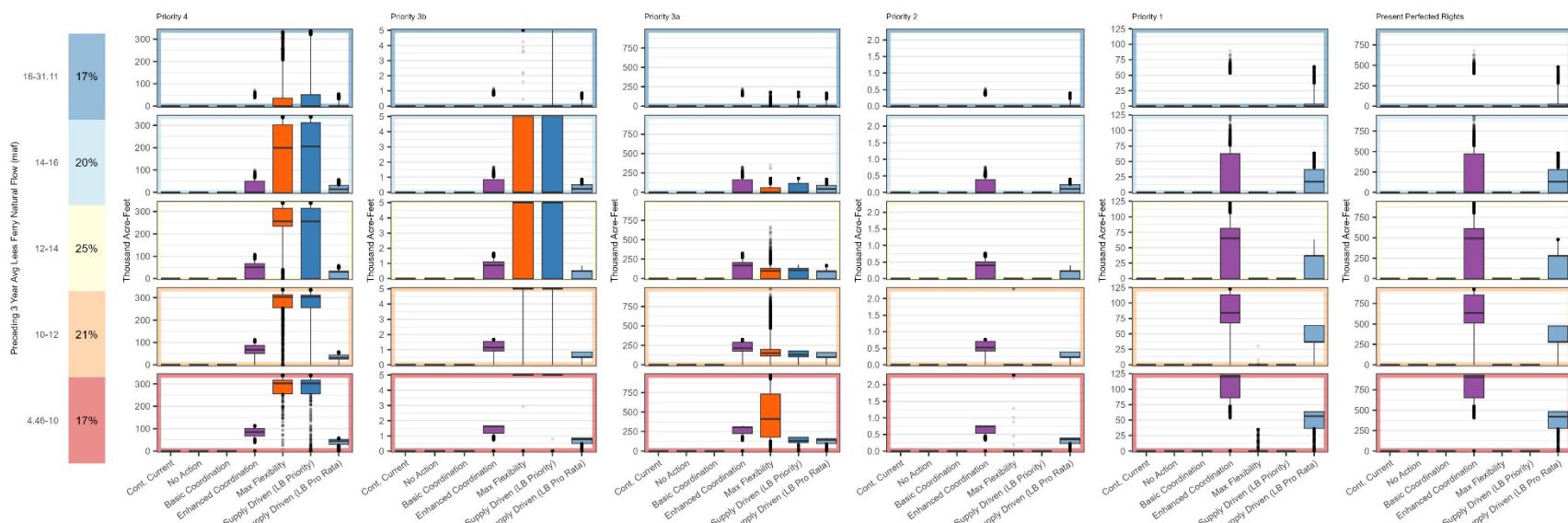
In the Average Flow Category (12-14 maf), the median shortages for high priority users (PPRs, Priority 1 and Priority 2) are almost twice as high under the Enhanced Coordination Alternative (492 kaf, 65 kaf, and 0.41 kaf, respectively) as compared to the Supply Driven Alternative (LB Pro Rata approach); (277 kaf, 37 kaf, and 0.23 kaf, respectively), demonstrating different outcomes under the pro rata system. This pattern continues across the drier flow categories. For Priority 3a users, the Enhanced Coordination Alternative has the highest median shortage of 168 kaf, while the Maximum Operational Flexibility Alternative has the largest upper-end shortage variability (up to 669 kaf). For the lower priority users (Priority 3b through Priority 4), the Maximum Operational Flexibility and Supply Driven Alternative (LB Priority approach) have the highest median shortages and greatest shortage variability among alternatives. Outside of the Basic Coordination Alternative, the Supply Driven Alternative (LB Pro Rata approach) results in the lowest median shortage volumes of the action alternatives for Priority 3b and 4 users across all flow categories.

In the Critically Dry Flow Category (4.46-10 maf), the median shortages for high priority users (PPRs, Priority 1 and Priority 2) are about twice as high under the Enhanced Coordination Alternative (907 kaf, 120 kaf, and 0.75 kaf, respectively) as compared to the Supply Driven Alternative (LB Pro Rata approach); (422 kaf, 56 kaf, and 0.35 kaf, respectively). Priority 3a users experience median shortages below 250 kaf for all alternatives and all flow categories except in the Critically Dry Flow Category (4.46-10 maf), where the Enhanced Coordination Alternative has a median of 306 kaf and the Maximum Operational Flexibility Alternative has the highest median of 414 kaf as well as the greatest variability (between 0-978 kaf). For Priority 3b and Priority 4 users, the medians and variability for the Maximum Operational Flexibility Alternative and Supply Driven Alternative (LB Priority approach) show similarities within their priority group across the two driest flow categories, with median shortages of 5 kaf for Priority 3b and 300 kaf for Priority 4.

Nevada

Table TA 4-30 through **Table TA 4-34** show the statistical breakdown of shortage for Nevada by total (as percent of apportionment) and priority (as volume in kaf) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum shortages. The first table, for total shortage, references the data visualized in **Figure TA 4-9** above. **Figure TA 4-12** below compares the alternatives with respect to shortages in Nevada under different hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. There is a column for each priority group within the state. The vertical axis for each column is scaled based on the volume of apportionment within the priority group. The total shortages broken out by priority users in the following figure sum to the annual shortage by state (for Nevada) in the previous **Figure TA 4-9**.

Overall, shortage reductions increase as flow categories become drier. The action alternatives generally have larger shortage reductions compared to the CCS Comparative Baseline and No Action Alternative. In the Critically Dry Flow Category, the highest median shortage occurs under the Maximum Operational Flexibility Alternative (45.9 percent of apportionment), and the lowest median shortage occurs under the No Action Alternative (11 percent of apportionment).

Table TA 4-30
Total State Shortage for Nevada (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	10.0	7.0	2.7	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	10.0	9.0	7.0	2.7	0.0	0.0	0.0
CCS Comparative Baseline	12-14	10.0	10.0	9.0	7.0	2.7	0.0	0.0
CCS Comparative Baseline	10-12	10.0	10.0	10.0	10.0	7.0	2.7	0.0
CCS Comparative Baseline	< 10	10.0	10.0	10.0	10.0	9.0	7.0	0.0
No Action	> 16	11.0	11.0	9.2	0.0	0.0	0.0	0.0
No Action	14-16	11.0	11.0	11.0	9.2	0.0	0.0	0.0
No Action	12-14	11.0	11.0	11.0	11.0	7.4	0.0	0.0
No Action	10-12	11.0	11.0	11.0	11.0	11.0	7.4	0.0
No Action	< 10	11.0	11.0	11.0	11.0	11.0	9.2	0.0
Basic Coordination	> 16	27.2	27.2	21.7	0.0	0.0	0.0	0.0
Basic Coordination	14-16	27.2	27.2	27.2	23.4	0.0	0.0	0.0
Basic Coordination	12-14	27.2	27.2	27.2	27.2	16.7	0.0	0.0
Basic Coordination	10-12	27.2	27.2	27.2	27.2	27.2	10.0	0.0
Basic Coordination	< 10	27.2	27.2	27.2	27.2	27.2	19.1	0.0
Enhanced Coordination	> 16	24.4	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	33.3	20.6	17.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	33.3	28.8	22.1	17.7	0.0	0.0	0.0
Enhanced Coordination	10-12	33.3	33.2	30.8	22.8	18.4	0.0	0.0
Enhanced Coordination	< 10	33.3	33.3	33.3	32.6	23.4	19.7	0.0
Max. Operational Flexibility	> 16	25.7	9.6	4.4	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	40.6	17.9	14.5	9.4	2.9	0.0	0.0
Max. Operational Flexibility	12-14	52.9	28.0	26.5	17.9	10.4	4.6	0.0
Max. Operational Flexibility	10-12	65.9	47.1	37.7	26.6	25.0	12.0	0.0
Max. Operational Flexibility	< 10	66.1	65.6	57.2	45.9	26.6	26.5	3.5
Supply Driven (LB Priority)	> 16	28.5	16.7	4.9	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	28.5	17.9	16.7	9.6	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	28.5	28.5	16.7	16.7	1.3	0.0	0.0
Supply Driven (LB Priority)	10-12	28.5	28.5	28.5	16.7	16.7	0.0	0.0
Supply Driven (LB Priority)	< 10	28.5	28.5	28.5	25.5	16.7	16.7	0.0
Supply Driven (LB Pro Rata)	> 16	23.3	16.7	4.6	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	23.3	17.4	16.7	9.6	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	23.3	23.3	16.7	16.7	1.8	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	23.3	23.3	23.3	16.7	16.7	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	23.3	23.3	23.3	21.5	16.7	16.7	0.0

Table TA 4-31
State Shortage for Nevada Priority 8 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	30.0	21.0	8.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	30.0	27.0	21.0	8.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	30.0	30.0	27.0	21.0	8.0	0.0	0.0
CCS Comparative Baseline	10-12	30.0	30.0	30.0	30.0	21.0	8.0	0.0
CCS Comparative Baseline	< 10	30.0	30.0	30.0	30.0	27.0	21.0	0.0
No Action	> 16	33.1	33.1	27.6	0.0	0.0	0.0	0.0
No Action	14-16	33.1	33.1	33.1	27.6	0.0	0.0	0.0
No Action	12-14	33.1	33.1	33.1	33.1	22.1	0.0	0.0
No Action	10-12	33.1	33.1	33.1	33.1	33.1	22.1	0.0
No Action	< 10	33.1	33.1	33.1	33.1	33.1	27.6	0.0
Basic Coordination	> 16	81.7	81.7	65.1	0.0	0.0	0.0	0.0
Basic Coordination	14-16	81.7	81.7	81.7	70.1	0.0	0.0	0.0
Basic Coordination	12-14	81.7	81.7	81.7	81.7	50.0	0.0	0.0
Basic Coordination	10-12	81.7	81.7	81.7	81.7	81.7	30.1	0.0
Basic Coordination	< 10	81.7	81.7	81.7	81.7	81.7	57.4	0.0
Enhanced Coordination	> 16	70.6	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	96.5	60.4	49.5	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	97.8	84.3	64.4	51.3	0.0	0.0	0.0
Enhanced Coordination	10-12	98.4	96.5	89.7	66.6	53.3	0.0	0.0
Enhanced Coordination	< 10	98.6	98.1	96.5	95.2	67.8	57.2	0.0
Max. Operational Flexibility	> 16	77.1	28.7	13.3	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	121.9	53.6	43.5	28.1	8.6	0.0	0.0
Max. Operational Flexibility	12-14	158.7	84.1	79.4	53.6	31.3	13.8	0.0
Max. Operational Flexibility	10-12	197.8	141.2	113.1	79.7	75.1	35.9	0.0
Max. Operational Flexibility	< 10	198.4	196.7	171.7	137.7	79.7	79.6	10.6
Supply Driven (LB Priority)	> 16	85.6	50.0	14.6	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	85.6	53.8	50.0	28.7	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	85.6	85.4	50.0	50.0	3.9	0.0	0.0
Supply Driven (LB Priority)	10-12	85.6	85.6	85.4	50.0	50.0	0.0	0.0
Supply Driven (LB Priority)	< 10	85.6	85.6	85.6	76.6	50.0	50.0	0.0
Supply Driven (LB Pro Rata)	> 16	68.6	48.9	13.6	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	68.9	50.7	48.9	27.7	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	68.8	67.6	49.3	48.3	5.3	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	68.9	67.7	67.6	48.9	48.3	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	68.9	68.0	67.6	63.3	48.3	48.3	0.0

Table TA 4-32
State Shortage for Nevada Priority 7 (Acre-Feet)

| Alternative	Flow Category	Max (af)	90% (af)	75% (af)	50% (af)	25% (af)	10% (af)	Min (af)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	6.1	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	8.3	4.2	2.8	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	8.3	5.7	4.6	3.7	0.0	0.0	0.0
Enhanced Coordination	10-12	8.3	8.1	6.7	4.9	4.2	0.0	0.0
Enhanced Coordination	< 10	8.3	8.3	8.3	6.1	4.9	4.0	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	5.8	3.8	1.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	5.8	4.2	3.5	2.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	5.8	5.2	4.2	3.0	0.4	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	5.8	5.8	5.1	4.2	2.8	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	5.8	5.8	5.8	4.2	3.4	2.2	0.0

Table TA 4-33
State Shortage for Nevada Priority 2 (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	0.5	0.3	0.1	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	0.5	0.3	0.3	0.2	0.0	0.0	0.0
Enhanced Coordination	10-12	0.5	0.5	0.4	0.3	0.2	0.0	0.0
Enhanced Coordination	< 10	0.5	0.5	0.5	0.3	0.2	0.1	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.4	0.2	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.4	0.3	0.2	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.4	0.3	0.3	0.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	0.4	0.4	0.3	0.3	0.1	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	0.4	0.4	0.4	0.3	0.1	0.0	0.0

Table TA 4-34
State Shortage for Nevada Presented Perfected Rights (Thousand Acre-Feet)

Alternative	Flow Category	Max (kaf)	90% (kaf)	75% (kaf)	50% (kaf)	25% (kaf)	10% (kaf)	Min (kaf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	2.2	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	3.0	1.5	1.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	3.0	2.0	1.6	1.3	0.0	0.0	0.0
Enhanced Coordination	10-12	3.0	2.9	2.4	1.7	1.4	0.0	0.0
Enhanced Coordination	< 10	3.0	3.0	3.0	2.2	1.7	1.3	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	2.1	1.3	0.3	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	2.1	1.5	1.2	0.7	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	2.1	1.8	1.5	1.0	0.2	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	2.1	2.1	1.8	1.5	1.0	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	2.1	2.1	2.1	1.5	1.2	0.7	0.0

**Figure TA 4-12
Annual Shortage for Nevada**
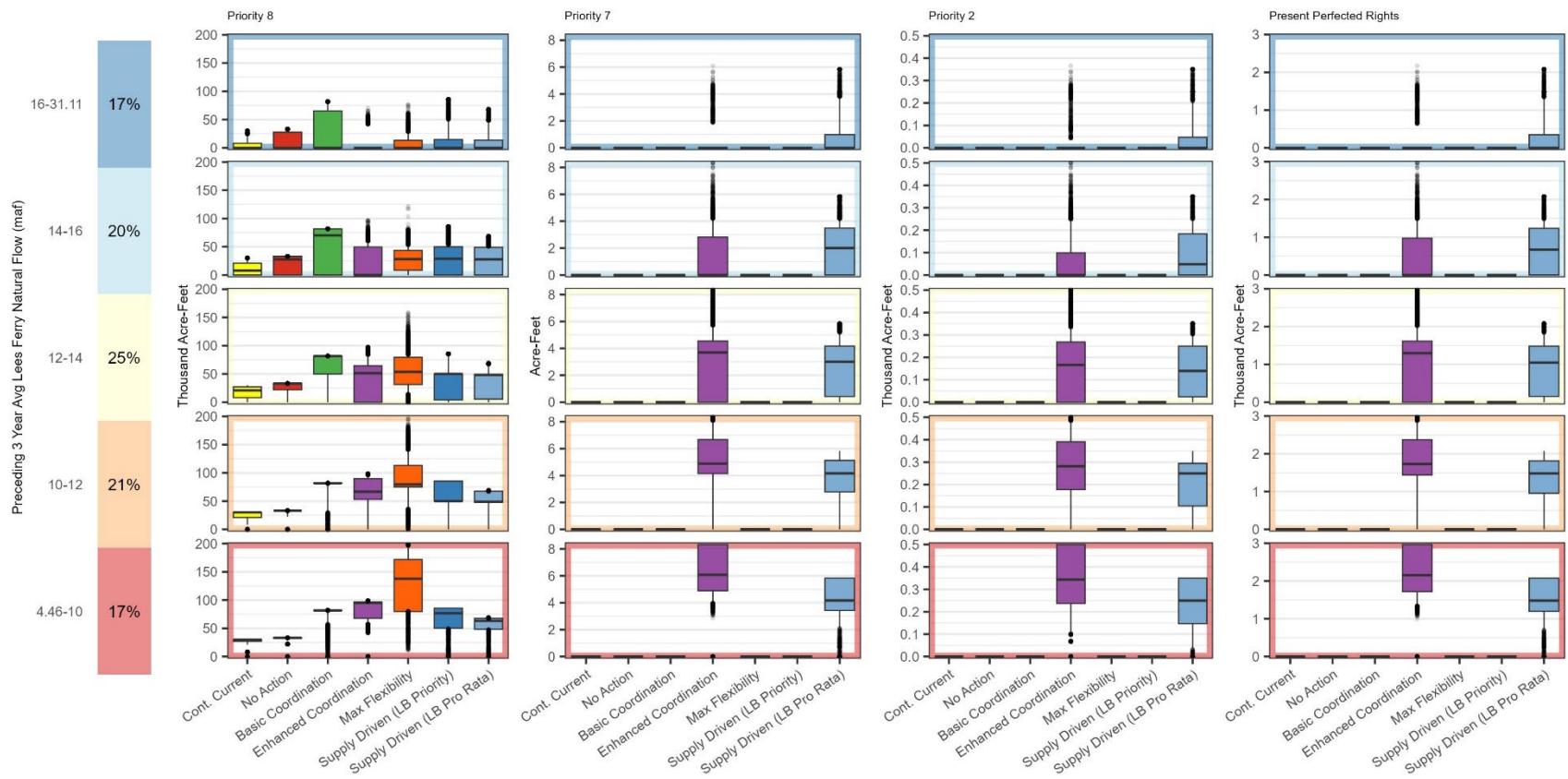
Priority 8 users make up the largest volume of Nevada's apportionment. Among the Lower Basin states, Nevada is more affected by priority-based alternatives in comparison to California. Except for the Enhanced Coordination Alternative and the Supply Driven Alternative (LB Pro Rata approach), all alternatives and CCS Comparative Baseline use the priority system to partially or fully distribute shortage. As a result, only the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives impose shortages on higher priority users (those that represent a small fraction of Nevada's apportionment), and therefore the comparison of alternatives below will focus on the Priority 8 users (leftmost column). In the Average Flow Category (12-14 maf), the Basic Coordination Alternative results in the highest median shortage, at 81.7 kaf, with interquartile variability ranging from 50.0 to 81.7 kaf. The Enhanced Coordination, Maximum Operational Flexibility, and both Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have similar medians of around 50 kaf, with the Maximum Operational Flexibility Alternative showing more high-end variability compared to other alternatives. The CCS Comparative Baseline and the No Action Alternative have the lowest median shortages of 21 kaf and 33.1 kaf, respectively, and low variability.

In the Dry Flow Category (10-12 maf), the median shortages do not change much compared to the Average Flow Category, but the variability decreases, with the exception of increasing outliers under the Maximum Operational Flexibility Alternative. In the Critically Dry Flow Category (4.46-10 maf), median shortages increase under the Enhanced Coordination, Maximum Operational Flexibility, and both Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches). The shortage variability increases the most under the Maximum Operational Flexibility Alternative, with an interquartile range from 79.7 to 171.7 kaf. The CCS Comparative Baseline and the No Action Alternative have the lowest median shortages of 30 kaf and 33.1 kaf, respectively, and low variability.

Annual Depletions

This section compares all the alternatives and the CCS Comparative Baseline with respect to annual depletions to the Lower Division States, including Mexico. Depletion (also referred to as total consumptive use or the net amount of water used) is defined as the amount of water diverted from the river minus the return flow. Return flow is the portion of water diverted for use that is not used and ultimately returned to the river for subsequent use downstream.

In this section, dead pool–related reduction impacts are included in the figures and discussion.

Arizona
Table TA 4-35 below shows the statistical breakdown of depletions for Arizona (as percent of apportionment) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum percent apportionments. **Figure TA 4-13** below compares the alternatives with respect to Arizona depletions under different hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. The figure visualizes the same data that is included in **Table TA 4-35** in a conditional box plot. The left side of the panel has units in percent of apportionment "depleted" (i.e., diverted minus the return flow) and the right side shows the corresponding depletion volume.

Table TA 4-35
State Depletions Arizona (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	115.3	115.3	110.7	103.5	93.1	81.7	73.3
CCS Comparative Baseline	14-16	115.3	103.5	100.0	93.1	81.7	77.5	55.0
CCS Comparative Baseline	12-14	115.3	100.0	93.1	81.7	77.5	73.9	41.1
CCS Comparative Baseline	10-12	108.6	93.1	81.7	74.3	67.3	52.7	26.2
CCS Comparative Baseline	< 10	103.5	83.3	77.7	65.9	44.4	33.7	11.3
No Action	> 16	115.3	115.3	111.5	100.0	88.2	83.2	61.7
No Action	14-16	115.3	103.5	100.0	88.2	83.3	79.4	56.9
No Action	12-14	115.3	100.0	90.5	83.3	80.2	69.1	29.9
No Action	10-12	106.6	93.7	83.3	80.6	57.7	45.8	17.7
No Action	< 10	102.2	94.2	83.3	54.6	37.6	29.0	15.3
Basic Coordination	> 16	115.3	115.3	113.6	100.0	68.9	58.9	54.7
Basic Coordination	14-16	115.3	100.0	100.0	65.3	59.4	58.9	47.7
Basic Coordination	12-14	115.3	100.0	74.9	60.7	58.9	58.9	35.6
Basic Coordination	10-12	106.6	85.0	62.1	58.9	56.6	46.1	19.5
Basic Coordination	< 10	103.5	71.1	60.3	58.9	40.9	30.6	11.0
Enhanced Coordination	> 16	116.8	115.3	115.0	101.4	99.0	90.3	75.1
Enhanced Coordination	14-16	116.7	105.8	99.6	97.7	79.6	77.6	66.3
Enhanced Coordination	12-14	116.7	99.3	97.6	80.9	77.3	72.7	60.6
Enhanced Coordination	10-12	107.1	88.7	80.6	77.1	70.7	66.5	30.6
Enhanced Coordination	< 10	100.6	79.5	77.0	71.3	66.4	48.4	13.9
Max. Operational Flexibility	> 16	116.7	115.3	113.5	100.2	80.2	68.4	67.4
Max. Operational Flexibility	14-16	116.7	106.5	90.2	70.0	68.4	68.4	45.3
Max. Operational Flexibility	12-14	116.6	85.8	73.3	68.4	67.7	60.3	39.7
Max. Operational Flexibility	10-12	105.1	70.3	68.4	68.2	49.9	42.0	27.6
Max. Operational Flexibility	< 10	82.1	68.5	68.4	42.5	36.7	33.1	16.9
Supply Driven (LB Priority)	> 16	115.3	115.3	113.4	110.5	80.0	57.1	55.5
Supply Driven (LB Priority)	14-16	115.3	110.3	108.3	74.6	57.7	57.1	55.4
Supply Driven (LB Priority)	12-14	115.3	108.6	85.7	69.5	57.1	57.1	46.1
Supply Driven (LB Priority)	10-12	111.1	88.9	69.5	65.7	56.9	54.1	35.5
Supply Driven (LB Priority)	< 10	108.6	72.9	69.5	57.4	53.1	39.7	16.3
Supply Driven (LB Pro Rata)	> 16	115.3	115.3	113.7	110.5	82.8	61.0	56.5
Supply Driven (LB Pro Rata)	14-16	115.3	110.1	108.2	76.0	63.0	57.1	54.5
Supply Driven (LB Pro Rata)	12-14	115.3	108.6	86.2	69.5	62.3	57.1	49.4
Supply Driven (LB Pro Rata)	10-12	111.1	89.4	69.5	65.0	60.4	57.1	34.8
Supply Driven (LB Pro Rata)	< 10	108.6	69.5	68.8	63.0	57.1	44.6	13.0

Figure TA 4-13
Annual Depletions in Arizona
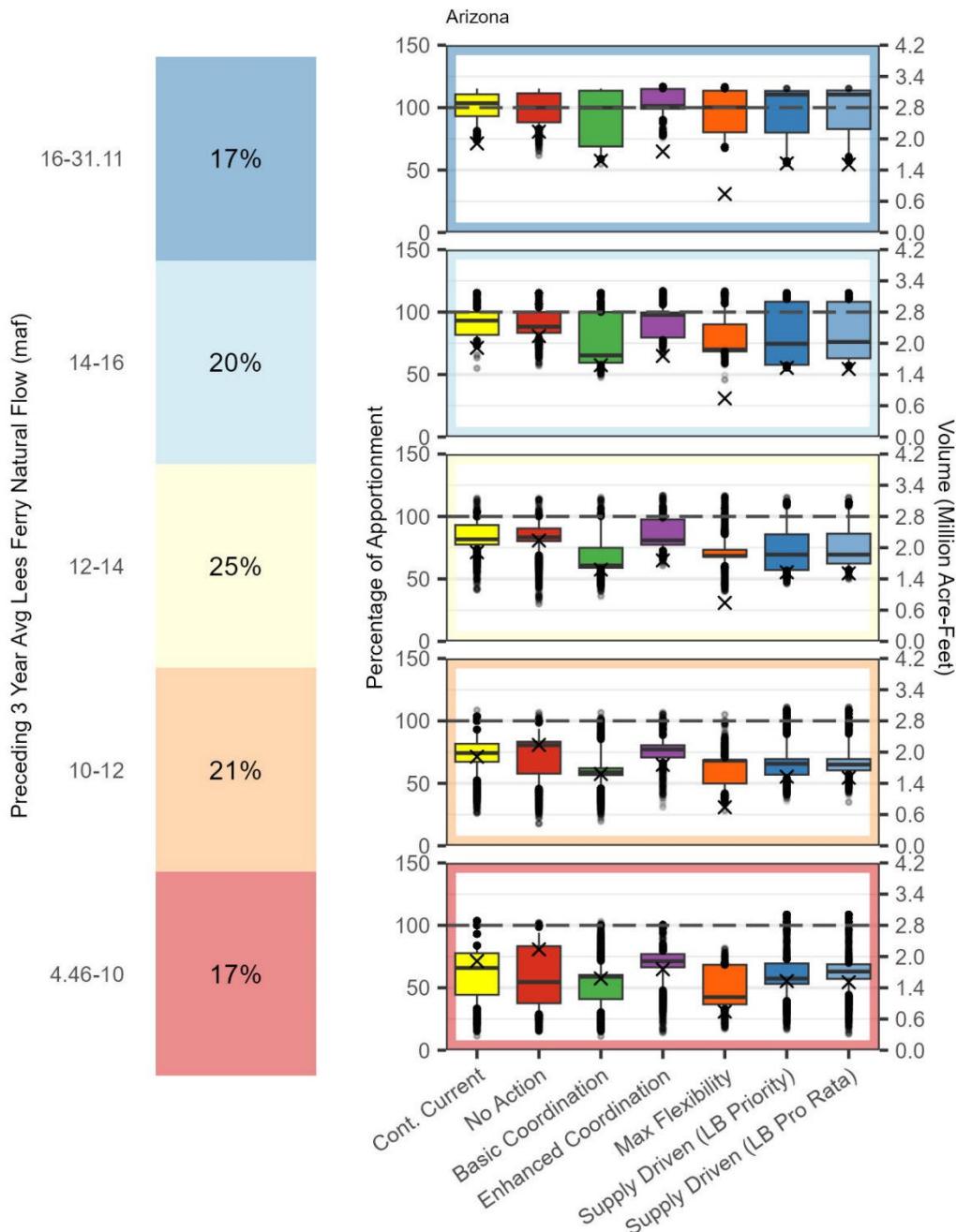
Each alternative has an "X" marker indicating the smallest depletion that was *not* affected by dead pool–related reductions from Lake Mead; any data points below the marker were affected by infrastructure at Lake Mead elevations near dead pool. The volume associated with the marker is different for each alternative because the shortage volumes are different.

Overall, depletions generally decrease as flow categories become drier. In the Critically Dry Flow Category (4.46-10 maf), median depletions are lowest under the Maximum Operational Flexibility Alternative (42 percent of apportionment, 1.2 maf). The Enhanced Coordination Alternative has the highest median depletions at 71.3 percent of apportionment (2.0 maf), due to the pro rata distribution.

In the Average Flow Category (12-14 maf), Arizona only gets 100 percent of its apportionment in the upper quartile across alternatives, with the CCS Comparative Baseline and every alternative except for the two Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) only receiving 100 percent of apportionment in high outlier years. The CCS Comparative Baseline, the No Action Alternative, and the Enhanced Coordination Alternative have median depletions around 80 percent of apportionment (2.2 maf), and the Basic Coordination, Maximum Operational Flexibility, and the two Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have lower median depletions around 60-70 percent of apportionment (1.7-2.0 maf). The No Action and the Maximum Operational Flexibility Alternatives have the least interquartile variability, and the Enhanced Coordination and the two Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have the most interquartile variability.

In the Dry Flow Category (10-12 maf), median depletions do not change much but interquartile ranges shift toward lower depletions and increasing numbers of years are affected by dead pool constraints. In the Critically Dry Flow Category (4.46-10 maf), median depletions are lowest under the Maximum Operational Flexibility Alternative (42 percent of apportionment, 1.2 maf) and No Action Alternative (55 percent of apportionment, 1.5 maf), but under the Maximum Operational Flexibility Alternative this is primarily due to shortage and under the No Action Alternative this is primarily due to proximity to dead pool. The Enhanced Coordination Alternative has the highest median depletions at 71.3 percent of apportionment (2.0 maf) due to the pro rata system.

California
Table TA 4-36 below shows the statistical breakdown of depletions for California (as percent of apportionment) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum percent apportionments. **Figure TA 4-14** below compares the alternatives with respect to California depletions under different hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. The figure visualizes the same data that is included in **Table TA 4-36** in a conditional box plot. The left side of the panel has units in percent of apportionment "depleted" (i.e., diverted minus the return flow) and the right side shows the corresponding depletion volume. Each alternative has an "X" marker indicating the smallest depletion that was *not* affected by dead pool–related reductions from Lake Mead; any data points below the marker were affected by infrastructure at Lake Mead elevations near dead pool. The volume associated with the marker is different for each alternative because the shortage volumes are different.

Table TA 4-36
State Depletions California (Percent of Apportionments)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	126.3	110.8	107.2	103.4	100.0	99.2	91.9
CCS Comparative Baseline	14-16	125.8	105.6	102.3	100.0	98.9	93.2	83.8
CCS Comparative Baseline	12-14	125.1	103.4	100.0	99.4	93.2	92.0	70.6
CCS Comparative Baseline	10-12	105.6	100.0	99.6	93.8	91.1	81.9	51.2
CCS Comparative Baseline	< 10	105.6	100.0	99.4	91.8	74.7	63.3	17.7
No Action	> 16	124.5	118.9	115.5	100.0	100.0	100.0	92.8
No Action	14-16	120.2	105.1	100.6	100.0	100.0	99.3	89.8
No Action	12-14	118.7	101.1	100.0	100.0	99.3	96.7	65.7
No Action	10-12	109.1	100.0	100.0	99.3	91.4	80.2	42.9
No Action	< 10	109.1	100.0	100.0	89.0	71.3	61.7	25.3
Basic Coordination	> 16	124.5	118.9	117.1	100.6	100.0	100.0	97.0
Basic Coordination	14-16	120.2	107.4	101.4	100.0	100.0	100.0	92.0
Basic Coordination	12-14	118.7	105.1	100.6	100.0	100.0	100.0	79.0
Basic Coordination	10-12	109.1	100.6	100.0	100.0	99.2	90.6	42.1
Basic Coordination	< 10	109.1	100.6	100.0	100.0	83.1	65.7	18.6
Enhanced Coordination	> 16	124.6	119.5	117.4	102.3	98.0	89.7	71.5
Enhanced Coordination	14-16	123.4	105.7	100.4	95.9	83.3	75.9	61.4
Enhanced Coordination	12-14	123.5	100.4	92.4	82.9	74.9	69.3	59.8
Enhanced Coordination	10-12	110.4	88.5	82.5	75.3	67.3	63.8	44.9
Enhanced Coordination	< 10	105.6	82.6	76.0	66.6	63.2	59.8	29.5
Max. Operational Flexibility	> 16	123.6	120.0	117.6	101.6	97.9	84.3	78.2
Max. Operational Flexibility	14-16	123.4	106.8	101.3	97.6	89.4	79.8	77.9
Max. Operational Flexibility	12-14	122.8	100.8	97.9	92.2	83.6	79.4	77.1
Max. Operational Flexibility	10-12	109.3	97.9	93.9	88.2	82.3	79.1	56.4
Max. Operational Flexibility	< 10	106.0	96.7	88.7	82.0	76.3	71.0	34.2
Supply Driven (LB Priority)	> 16	123.1	118.8	115.3	103.6	97.3	83.7	78.4
Supply Driven (LB Priority)	14-16	122.3	106.8	100.6	96.6	86.9	79.8	77.8
Supply Driven (LB Priority)	12-14	118.9	104.9	99.3	90.3	83.6	79.5	78.1
Supply Driven (LB Priority)	10-12	110.5	100.6	95.9	88.9	83.3	79.3	67.5
Supply Driven (LB Priority)	< 10	107.0	99.5	92.9	87.0	80.0	74.4	37.0
Supply Driven (LB Pro Rata)	> 16	122.9	118.8	115.6	104.0	95.0	85.4	72.0
Supply Driven (LB Pro Rata)	14-16	122.3	105.9	99.2	93.7	85.4	78.9	71.4
Supply Driven (LB Pro Rata)	12-14	118.9	100.6	95.1	89.9	82.6	77.8	71.4
Supply Driven (LB Pro Rata)	10-12	110.5	95.8	90.5	85.4	80.1	76.3	64.9
Supply Driven (LB Pro Rata)	< 10	107.0	94.9	88.9	84.0	77.6	72.3	39.4

Figure TA 4-14
Annual Depletions in California
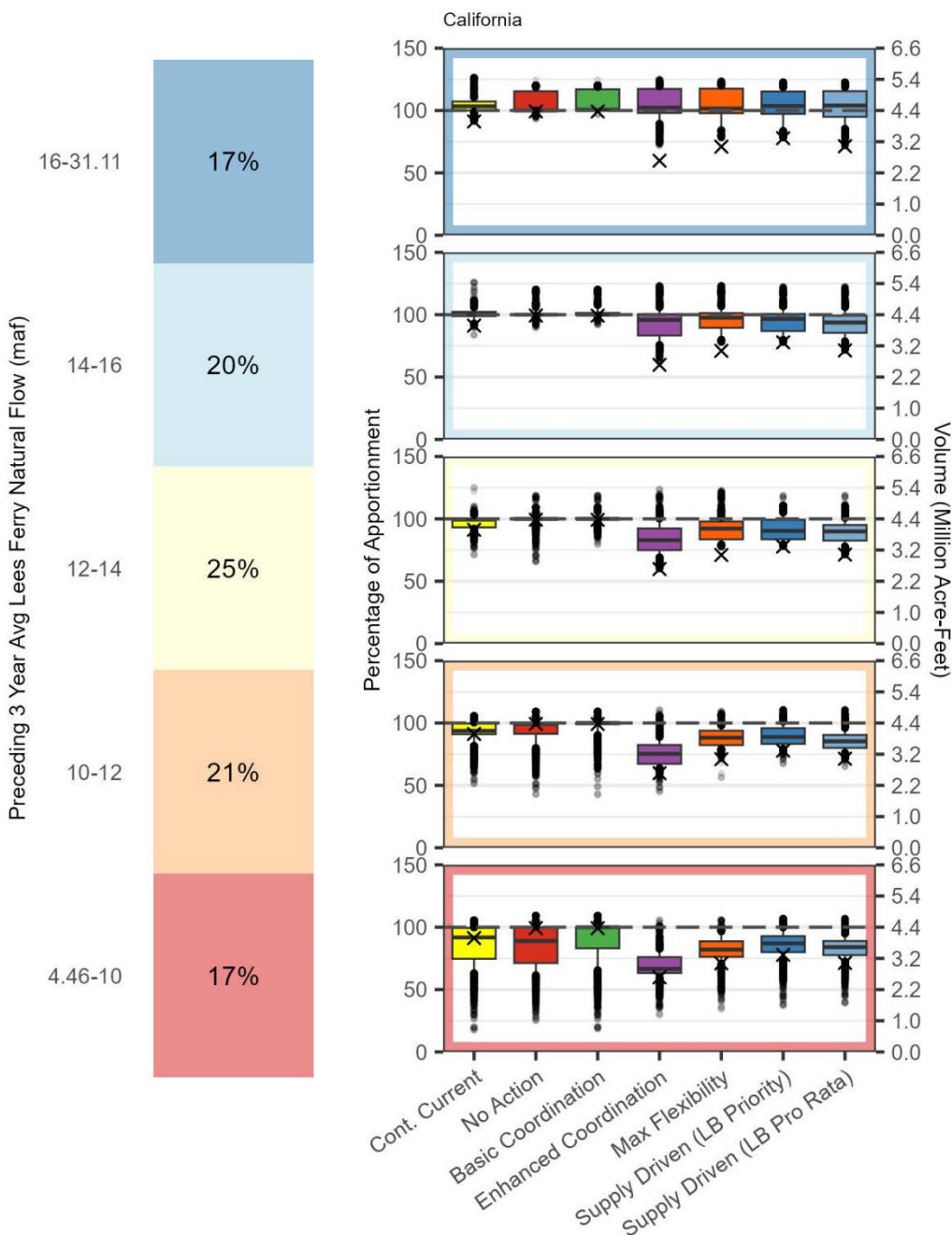
Overall, depletions generally decrease as flow categories become drier. In the Critically Dry Flow Category (4.46-10 maf), the Enhanced Coordination Alternative has the lowest median depletion (67 percent or apportionment, 2.9 maf). The Basic Coordination Alternative has the highest median depletion (100 percent of apportionment, 4.4 maf).

In the Average Flow Category (12-14 maf), California gets 100 percent of its apportionment in approximately 90 percent of years under the Basic Coordination Alternative, in approximately 75 percent of years under the No Action Alternative and in approximately 25 percent of years under the CCS Comparative Baseline. The remaining alternatives have interquartile ranges that are below 100 percent apportionment, with median depletions that range from a low of 83 percent of apportionment (3.6 maf) for the Enhanced Coordination Alternative, up to 98 percent of apportionment (4.3 maf) for the Maximum Operational Flexibility Alternative. The No Action and Basic Coordination Alternatives have the least interquartile variability, spanning less than 1 percent of apportionment, and the Enhanced Coordination, Maximum Operational Flexibility, and the two Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have the most variability, with interquartile ranges spanning 10-20 percent of apportionment.

As the flow categories get drier, interquartile ranges shift lower and an increasing number of years are affected by dead pool. The median depletions also get lower as the flow categories get drier except for the Basic Coordination Alternative, which remains constant at 100 percent of apportionment across all flow categories. In the Critically Dry Flow Category (4.46-10 maf), the 25th percentile shifts lower compared to the Dry Flow Category by approximately 15-20 percent of apportionment for the CCS Comparative Baseline and the No Action and Basic Coordination Alternatives, which increases the interquartile range for these alternatives and the CCS Comparative Baseline. Median depletions under the No Action, Enhanced Coordination, and Maximum Operational Flexibility Alternatives shift down the most, but under the Enhanced Coordination and Maximum Operational Flexibility Alternatives, this is primarily due to shortage, and under the No Action Alternative, this is primarily due to proximity to dead pool. The Enhanced Coordination Alternative has the lowest median depletions at 67 percent of apportionment (2.9 maf). All action alternatives except for the Basic Coordination Alternative have lower depletions than the CCS Comparative Baseline and No Action Alternative across all flow categories below the Wet Flow Category.

Nevada

Table TA 4-37 below shows the statistical breakdown of depletions for Nevada (as percent of apportionment) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum percent apportionments. **Figure TA 4-15** below compares the alternatives with respect to Nevada depletions under different hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. The figure visualizes the same data that is included in **Table TA 4-37** in a conditional box plot. The left side of the panel has units in percent of apportionment "depleted" (i.e., diverted minus the return flow) and the right side shows the corresponding depletion volume. Each alternative has an "X" marker indicating the smallest depletion that was *not* affected by dead pool–related reductions from Lake Mead; any data points below the marker were affected by infrastructure at Lake Mead elevations near dead pool. The volume associated with the marker is different for each alternative because the shortage volumes are different.

Table TA 4-37
State Depletions Nevada (Percent of Apportionment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	146.8	133.3	115.7	110.5	107.8	104.8	77.6
CCS Comparative Baseline	14-16	145.9	112.6	110.5	108.8	104.8	102.9	79.0
CCS Comparative Baseline	12-14	145.0	110.7	110.5	106.2	104.8	100.8	53.8
CCS Comparative Baseline	10-12	126.7	110.5	106.2	104.8	99.4	78.9	17.3
CCS Comparative Baseline	< 10	120.2	109.7	104.8	91.2	64.4	43.9	2.8
No Action	> 16	210.5	142.5	137.1	111.7	109.3	99.5	71.3
No Action	14-16	201.3	137.2	122.4	110.5	99.5	96.8	62.8
No Action	12-14	201.3	131.1	110.5	101.3	99.5	81.7	21.8
No Action	10-12	172.9	112.6	105.3	99.5	66.7	49.3	7.9
No Action	< 10	137.6	111.2	99.5	64.2	38.9	24.4	2.7
Basic Coordination	> 16	183.3	143.1	133.1	111.7	101.6	83.3	68.6
Basic Coordination	14-16	183.3	121.0	111.7	110.5	83.3	83.3	56.4
Basic Coordination	12-14	183.3	111.7	111.2	91.7	83.3	72.8	32.5
Basic Coordination	10-12	183.3	111.7	100.4	83.3	72.5	54.0	10.2
Basic Coordination	< 10	143.7	111.7	88.9	83.3	45.5	26.9	2.8
Enhanced Coordination	> 16	160.3	140.1	128.7	110.7	96.8	94.9	76.9
Enhanced Coordination	14-16	150.9	116.0	108.6	99.9	94.7	77.0	73.0
Enhanced Coordination	12-14	145.9	109.7	104.8	97.0	85.0	76.6	72.7
Enhanced Coordination	10-12	130.5	107.5	101.9	93.2	83.3	76.6	39.8
Enhanced Coordination	< 10	113.5	105.2	95.6	89.2	76.6	66.8	9.2
Max. Operational Flexibility	> 16	154.3	139.2	126.4	109.7	97.4	81.5	72.2
Max. Operational Flexibility	14-16	146.8	121.1	109.5	100.6	85.6	75.1	68.8
Max. Operational Flexibility	12-14	145.9	109.8	103.5	97.1	84.6	75.1	57.7
Max. Operational Flexibility	10-12	133.9	102.5	97.2	92.7	76.5	66.1	29.7
Max. Operational Flexibility	< 10	128.0	97.2	93.8	72.1	53.8	43.3	7.8
Supply Driven (LB Priority)	> 16	146.8	134.1	124.9	112.3	98.7	81.9	74.6
Supply Driven (LB Priority)	14-16	145.9	115.7	109.2	98.7	85.5	76.1	73.3
Supply Driven (LB Priority)	12-14	134.1	111.2	105.5	97.2	85.5	76.1	73.3
Supply Driven (LB Priority)	10-12	123.6	109.4	103.4	95.1	84.5	77.3	47.6
Supply Driven (LB Priority)	< 10	118.1	108.5	99.7	89.7	76.0	62.6	3.7
Supply Driven (LB Pro Rata)	> 16	146.8	134.1	125.0	112.6	99.5	81.8	74.3
Supply Driven (LB Pro Rata)	14-16	145.9	115.8	108.9	98.7	85.1	75.8	73.1
Supply Driven (LB Pro Rata)	12-14	134.1	110.8	105.3	97.2	85.1	75.8	73.1
Supply Driven (LB Pro Rata)	10-12	123.6	109.4	104.5	96.4	85.7	77.1	55.2
Supply Driven (LB Pro Rata)	< 10	118.1	108.7	103.0	91.9	78.4	73.1	11.3

Figure TA 4-15
Annual Depletions in Nevada
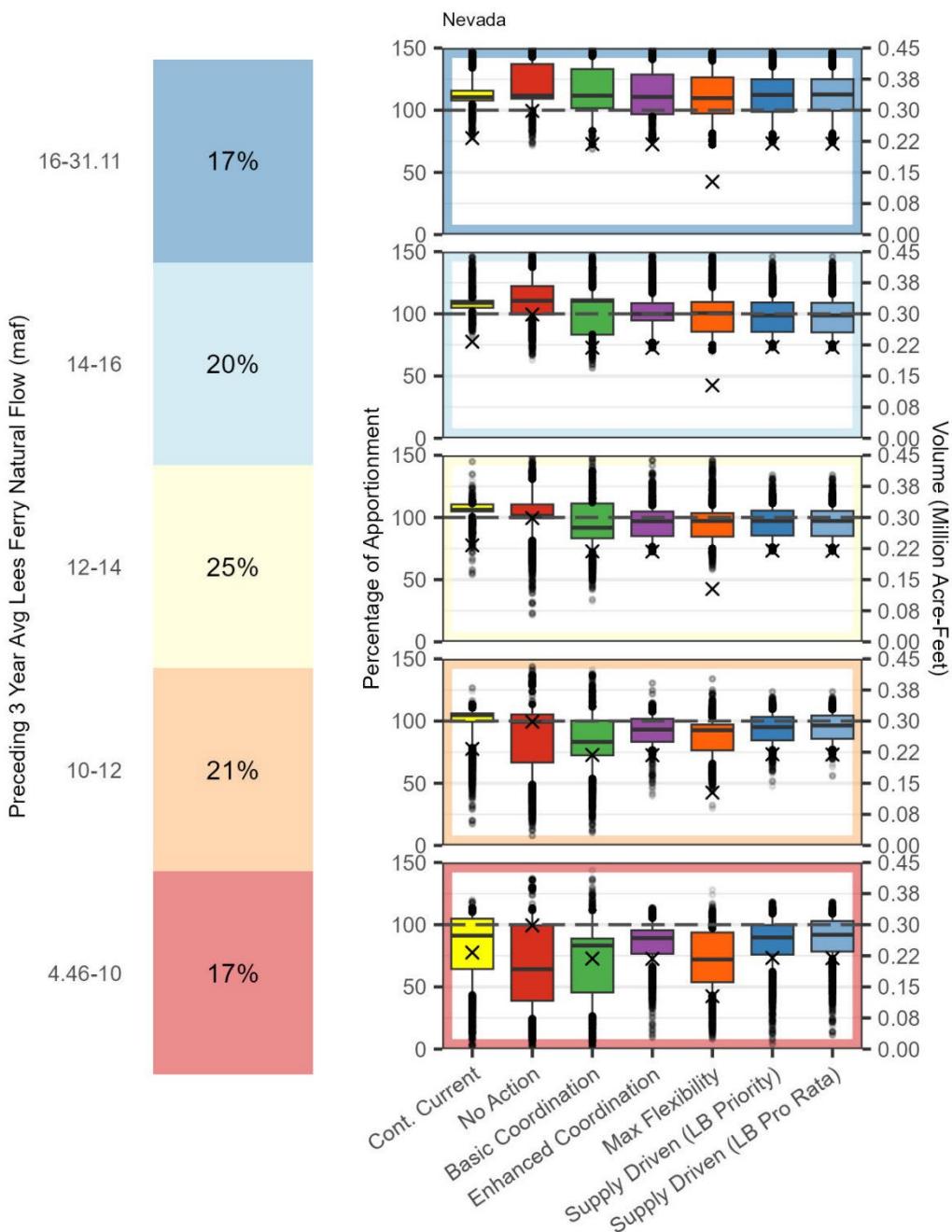
Overall, depletions generally decrease as flow categories become drier. In the Critically Dry Flow Category (4.46-10 maf), median depletions are lowest for the No Action Alternative (64 percent of apportionment maf). The Supply Driven Alternative (LB Pro Rata approach) has the highest median depletion (96.4 percent of apportionment).

In the Average Flow Category (12-14 maf), Nevada gets 100 percent of its apportionment in more than 25 percent of years under all alternatives and the CCS Comparative Baseline, in more than 75 percent of years under the CCS Comparative Baseline, and in more than 50 percent of years under the No Action Alternative. The Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven (both the LB Priority and LB Pro Rata approaches) Alternatives have median depletions around 97 percent of apportionment (0.29 maf), and the Basic Coordination Alternative has the lowest median depletion of 92 percent of apportionment. The CCS Comparative Baseline and the No Action Alternative have the least interquartile variability, spanning 6 percent and 12 percent of apportionment, respectively, and the Basic Coordination Alternative has the most variability, with an interquartile range spanning 28 percent of apportionment.

The median depletions get lower as the flow categories get drier, and an increasing number of years are affected by dead pool. The interquartile ranges also widen and shift lower as the flow categories get drier for the CCS Comparative Baseline and all alternatives except the Enhanced Coordination Alternative, which has the least overall variability. In the Critically Dry Flow Category (4.46-10 maf), the CCS Comparative Baseline, Enhanced Coordination and the two Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches) have median depletions of around 90 percent of apportionment (0.27 maf). Median depletions shift down the most under the No Action Alternative (64 percent of apportionment or 0.19 maf) and Maximum Operational Flexibility Alternatives (72 percent of apportionment or 0.22 maf), but under the Maximum Operational Flexibility Alternative this is primarily due to shortage, and under the No Action Alternative, this is primarily due to proximity to dead pool.

Surplus

Figure TA 4-16 below compares the alternatives with respect to delivery surplus. Percents of years with delivery surplus are broken out by different hydrologic conditions, categorized by preceding three-year average Lees Ferry natural flows. Because the frequency of surplus conditions occurring in each flow category is shown and not the volume of surplus water delivered, bars are used instead of boxplots. The height of the bar shows the percent of years when surplus deliveries occurred.

In the Average Flow Category (12-14 maf), the Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches), result in the highest frequencies of surplus in around 18 percent of years. The other alternatives and the CCS Comparative Baseline all result in fewer than 10 percent of years with surplus. Frequencies of surplus increase across all alternatives as conditions get wetter. In the Wet Flow Category (16-31.11 maf), both approaches to the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches) result in surplus in greater than 60 percent of years and all other action alternatives and the CCS Comparative Baseline have surplus in 36 percent to 52 percent of years. The No Action Alternative has the lowest frequency of surplus, in around 30 percent of years.

Figure TA 4-16
Percent of Years with Delivery Surplus
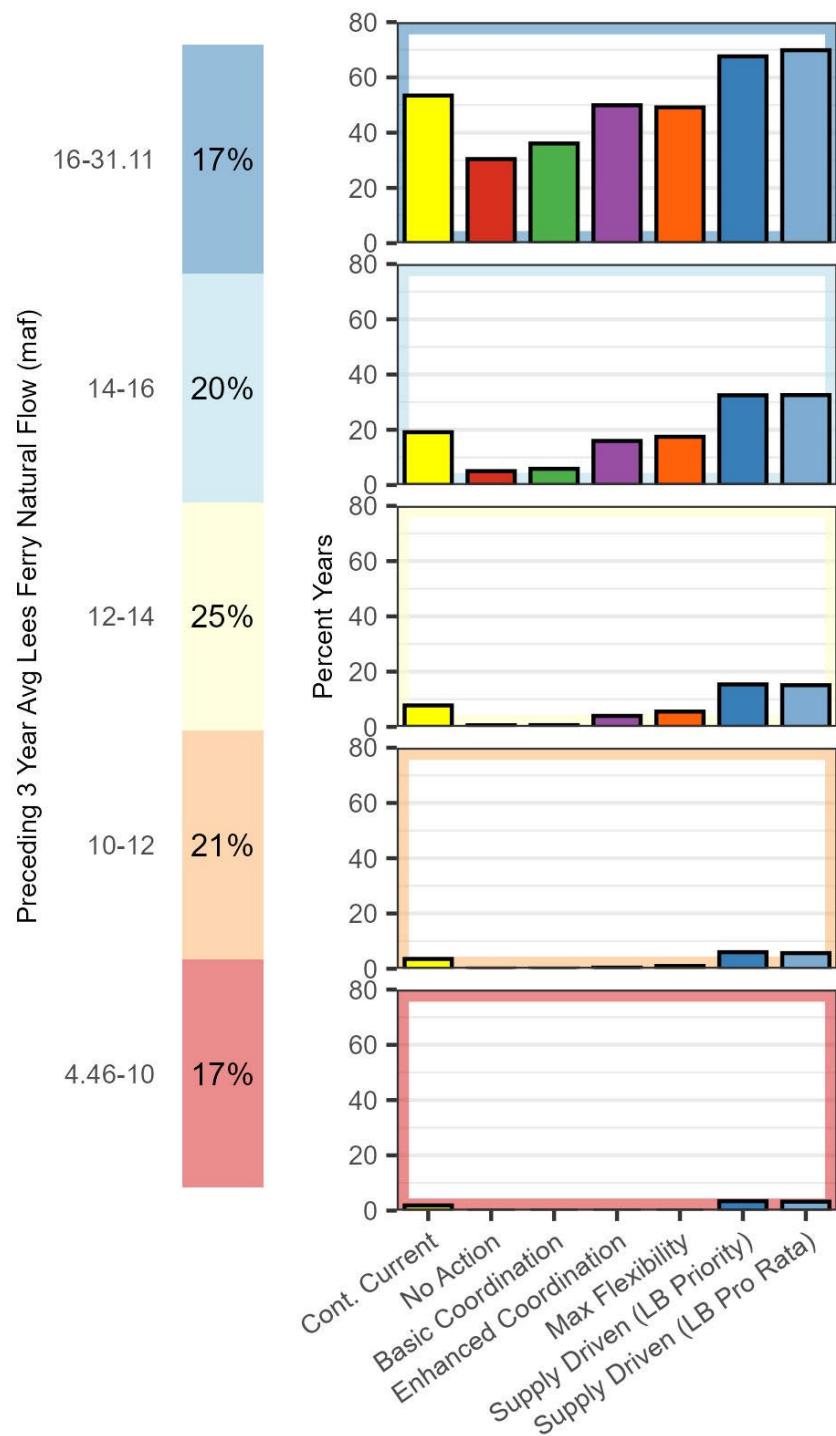
TA 4.2.5   Issue 4: Deliveries to Mexico

Issue 4 addresses how operational activities affect deliveries to Mexico. This will be achieved by comparison of the various action alternatives to the No Action Alternative and CCS Comparative Baseline for the following metrics:

- Annual Shortage to Mexico
- Annual depletions in Mexico

Refer to the **Appendix M**, International Border Region of the Colorado River, for additional information regarding water deliveries to the International Border Region.

Deliveries to Mexico under the CCS Comparative Baseline are established in Minute 319 and Minute 323, Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin in 2017 (International Boundary and Water Commission 2017) which identify maximum reductions to Mexico's delivery to 275 kaf including volumes of Mexico's recoverable water savings. All alternatives assume a 1.5 maf annual allotment to Mexico but differ in how shortage and surplus are determined. Under the No Action Alternative, determination of deliveries to Mexico is made in accordance with the 1944 Mexican Water Treaty.

Shortages to Mexico under all the alternatives, except for the CCS Comparative Baseline, are modeled in proportion to Lower Division States shortage. All alternatives assume that a consistent 16.67 percent of all Lower Basin shortages are applied to water deliveries to Mexico on an annual basis. Refer to **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation, and **Appendix M**, International Border Region of the Colorado River, for specifics.

Annual Water Delivery Reductions

Table TA 4-38 below shows the statistical breakdown of shortage for Mexico by total (as percent of allotment) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum shortages. **Figure TA 4-17** below compares against alternatives with respect to Mexico's water delivery reductions under different hydrologic conditions categorized by the preceding three-year average of Lees Ferry natural flow. The figure visualizes the same data that is included in **Table TA 4-38** in a conditional box plot.

In the Average Flow Category (12-14 maf), the No Action Alternative, and the CCS Comparative Baseline have the lowest medians and low variability around the medians. The action alternatives have similar median values but different interquartile variability, with the Basic Coordination and the Maximum Operational Flexibility Alternatives having the lowest variability of the action alternatives.

In the Moderately Dry Category (10-12 maf), median water delivery reductions generally increase and variability decreases. This pattern continues into the Dry Category (less than 10 maf), where all alternatives and the CCS Comparative Baseline show the maximum shortage possible.

Table TA 4-38
Water Delivery Reductions to Mexico (Percent of Allotment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	18.3	5.3	2.7	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	18.3	11.4	5.3	2.7	0.0	0.0	0.0
CCS Comparative Baseline	12-14	18.3	18.3	11.4	5.3	2.7	0.0	0.0
CCS Comparative Baseline	10-12	18.3	18.3	18.3	18.3	5.3	2.7	0.0
CCS Comparative Baseline	< 10	18.3	18.3	18.3	18.3	10.8	5.3	0.0
No Action	> 16	6.7	6.7	5.6	0.0	0.0	0.0	0.0
No Action	14-16	6.7	6.7	6.7	5.6	0.0	0.0	0.0
No Action	12-14	6.7	6.7	6.7	6.7	4.4	0.0	0.0
No Action	10-12	6.7	6.7	6.7	6.7	6.7	4.4	0.0
No Action	< 10	6.7	6.7	6.7	6.7	6.7	5.6	0.0
Basic Coordination	> 16	16.4	16.4	13.1	0.0	0.0	0.0	0.0
Basic Coordination	14-16	16.4	16.4	16.4	14.1	0.0	0.0	0.0
Basic Coordination	12-14	16.4	16.4	16.4	16.4	10.1	0.0	0.0
Basic Coordination	10-12	16.4	16.4	16.4	16.4	16.4	6.1	0.0
Basic Coordination	< 10	16.4	16.4	16.4	16.4	16.4	11.5	0.0
Enhanced Coordination	> 16	24.4	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	33.3	20.6	17.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	33.3	28.8	22.1	17.7	0.0	0.0	0.0
Enhanced Coordination	10-12	33.3	33.2	30.8	22.8	18.4	0.0	0.0
Enhanced Coordination	< 10	33.3	33.3	33.3	32.6	23.4	19.7	0.0
Max. Operational Flexibility	> 16	21.7	9.6	4.4	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	30.1	17.3	14.5	9.4	2.9	0.0	0.0
Max. Operational Flexibility	12-14	37.0	23.1	22.2	17.3	10.4	4.6	0.0
Max. Operational Flexibility	10-12	44.3	33.8	28.5	22.2	21.4	12.0	0.0
Max. Operational Flexibility	< 10	44.5	44.1	39.5	33.1	22.2	22.2	3.5
Supply Driven (LB Priority)	> 16	23.3	16.7	4.9	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	23.3	17.4	16.7	9.6	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	23.3	23.3	16.7	16.7	1.3	0.0	0.0
Supply Driven (LB Priority)	10-12	23.3	23.3	23.3	16.7	16.7	0.0	0.0
Supply Driven (LB Priority)	< 10	23.3	23.3	23.3	21.7	16.7	16.7	0.0
Supply Driven (LB Pro Rata)	> 16	23.3	16.7	4.6	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	23.3	17.4	16.7	9.6	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	23.3	23.3	16.7	16.7	1.8	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	23.3	23.3	23.3	16.7	16.7	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	23.3	23.3	23.3	21.5	16.7	16.7	0.0

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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Post-2026 Colorado River Reservoir Operations DEIS

Figure TA 4-17
Calendar Year Shortage by State and Water Delivery Reductions to Mexico
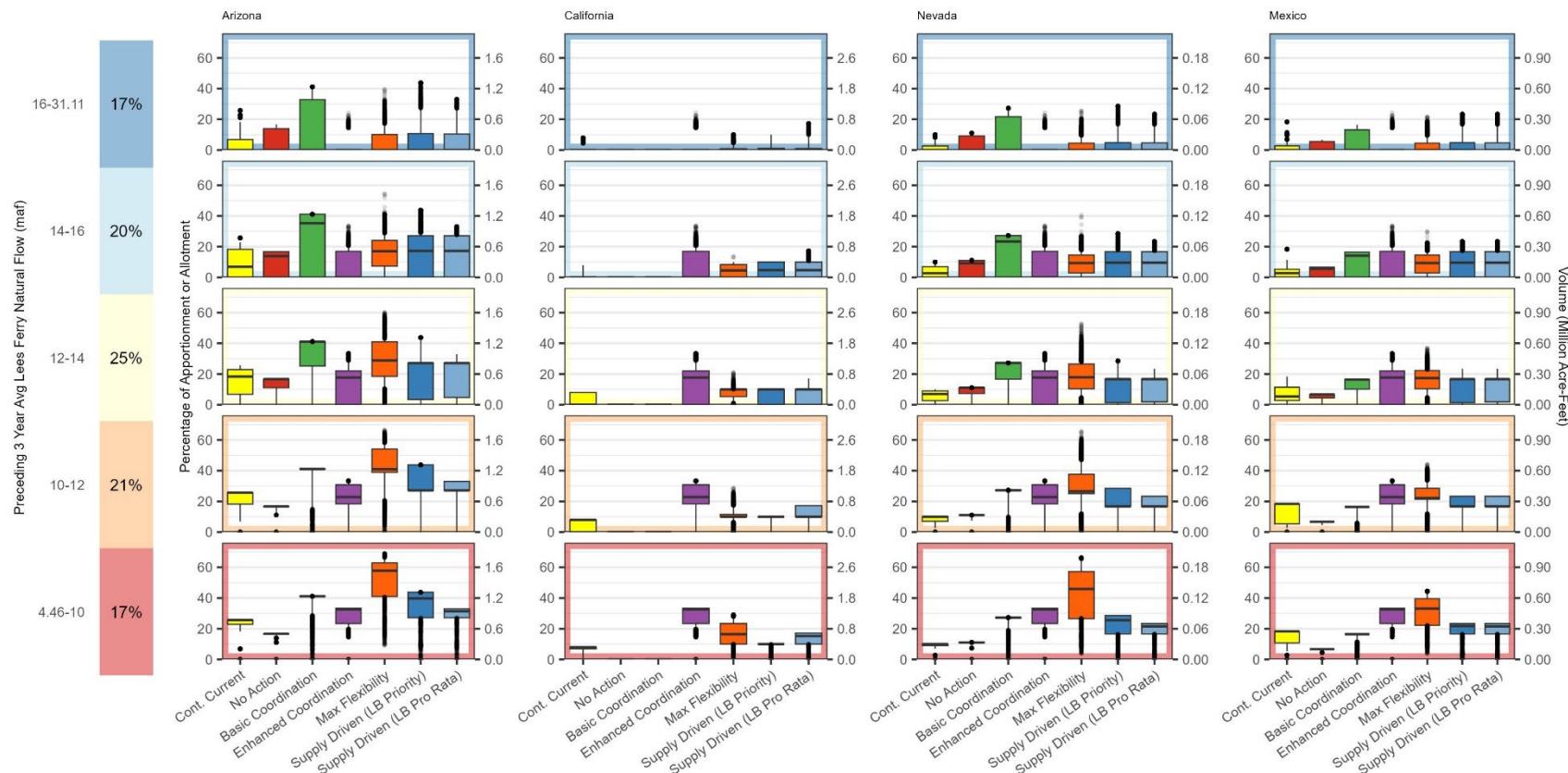
Note: The modeled annual delivery reductions in Mexico include modeling assumptions for reductions in water deliveries to Mexico and storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Annual Depletions

Table TA 4-39 below shows the statistical breakdown of depletions for Mexico (as percent of allotment) for each of the different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow under different alternatives. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum percent of allotment. **Figure TA 4-18** below shows each alternative's impacts on Annual Depletions in Mexico in different hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow. The figure visualizes the same data that is included in **Table TA 4-39** in a conditional box plot. In each flow category, the percentage of allotment "depleted" (i.e., diverted minus the return flow) is on the left y-axis, and the corresponding depletion volume is shown on the right y-axis. An X indicates the lowest depletion in years where dead pool–related reductions did not occur. For any year below an X, Lake Mead deliveries were constrained by dead pool.

In the Average Flow Category (12-14 maf), the interquartile ranges for all alternatives are below 100 percent of allotment. The median for all action alternatives is around 79 - 83 percent of allotment (1.18 - 1.25 maf) compared to 91.5 percent of allotment in the CCS Comparative Baseline and the No Action Alternative.

The range of depletion reductions expands as flow categories get drier and the medians decrease. Median allotments for the action alternatives range from a low of 66 percent (0.99 maf) under the Maximum Operational Flexibility Alternative up to 84 percent (1.25 maf) under the Basic Coordination Alternative.

Table TA 4-39
Annual Depletions in Mexico (Percent of Allotment)

Alternative	Flow Category	Max (%)	90% (%)	75% (%)	50% (%)	25% (%)	10% (%)	Min (%)
CCS Comparative Baseline	> 16	112.4	111.2	107.1	103.0	96.5	92.7	77.7
CCS Comparative Baseline	14-16	111.2	106.1	101.8	96.5	92.1	87.2	68.9
CCS Comparative Baseline	12-14	111.2	101.8	96.5	91.5	84.6	81.7	55.0
CCS Comparative Baseline	10-12	108.8	99.1	93.3	81.7	77.7	66.5	38.3
CCS Comparative Baseline	< 10	107.1	96.5	85.7	77.1	58.6	47.5	12.7
No Action	> 16	111.2	111.2	101.7	100.0	94.4	93.3	81.8
No Action	14-16	111.2	101.7	100.0	94.4	93.3	91.5	76.7
No Action	12-14	111.2	100.0	95.6	93.3	91.8	85.8	51.6
No Action	10-12	103.6	95.6	93.3	92.3	77.8	66.2	34.2
No Action	< 10	101.7	94.4	93.3	75.0	57.5	48.3	19.3
Basic Coordination	> 16	113.3	111.2	111.2	100.0	87.9	83.6	80.0
Basic Coordination	14-16	113.3	100.9	100.0	86.4	83.6	83.6	74.0
Basic Coordination	12-14	113.3	100.0	90.6	83.6	83.6	83.6	61.0
Basic Coordination	10-12	103.6	94.4	85.2	83.6	82.2	72.5	35.5
Basic Coordination	< 10	101.7	89.0	83.6	83.6	65.6	51.2	15.0
Enhanced Coordination	> 16	113.3	111.8	111.2	100.0	83.3	83.3	75.6
Enhanced Coordination	14-16	113.3	101.1	92.8	83.3	83.3	82.1	66.7
Enhanced Coordination	12-14	111.2	92.3	83.3	83.3	80.6	74.5	65.3
Enhanced Coordination	10-12	96.7	83.3	83.3	79.0	69.7	66.7	42.0
Enhanced Coordination	< 10	96.3	83.3	83.3	68.1	66.7	55.2	24.4
Max. Operational Flexibility	> 16	111.2	111.2	111.2	100.4	89.0	78.5	75.3
Max. Operational Flexibility	14-16	111.2	104.1	95.8	87.5	78.5	78.5	66.7
Max. Operational Flexibility	12-14	111.2	92.7	87.5	78.6	78.5	74.6	60.5
Max. Operational Flexibility	10-12	101.5	87.5	83.6	78.5	71.8	63.8	43.7
Max. Operational Flexibility	< 10	92.5	83.2	78.5	66.1	58.2	53.1	28.2
Supply Driven (LB Priority)	> 16	111.2	111.2	108.8	105.6	83.3	83.3	67.8
Supply Driven (LB Priority)	14-16	111.2	105.8	103.3	83.3	83.3	83.3	67.8
Supply Driven (LB Priority)	12-14	111.2	104.4	83.3	83.3	83.3	77.0	67.7
Supply Driven (LB Priority)	10-12	107.2	100.0	83.3	83.3	76.7	75.6	56.6
Supply Driven (LB Priority)	< 10	105.6	83.3	83.3	83.3	74.7	60.5	30.3
Supply Driven (LB Pro Rata)	> 16	111.2	111.2	110.1	105.8	83.3	83.3	67.8
Supply Driven (LB Pro Rata)	14-16	111.2	105.8	103.3	83.3	83.3	83.3	66.9
Supply Driven (LB Pro Rata)	12-14	111.2	104.4	83.3	83.3	83.3	77.1	67.8
Supply Driven (LB Pro Rata)	10-12	107.2	100.0	83.3	83.3	76.7	76.7	56.2
Supply Driven (LB Pro Rata)	< 10	105.6	83.3	83.3	83.3	76.7	63.9	29.7

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 United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

Figure TA 4-18
Annual Depletions in Mexico
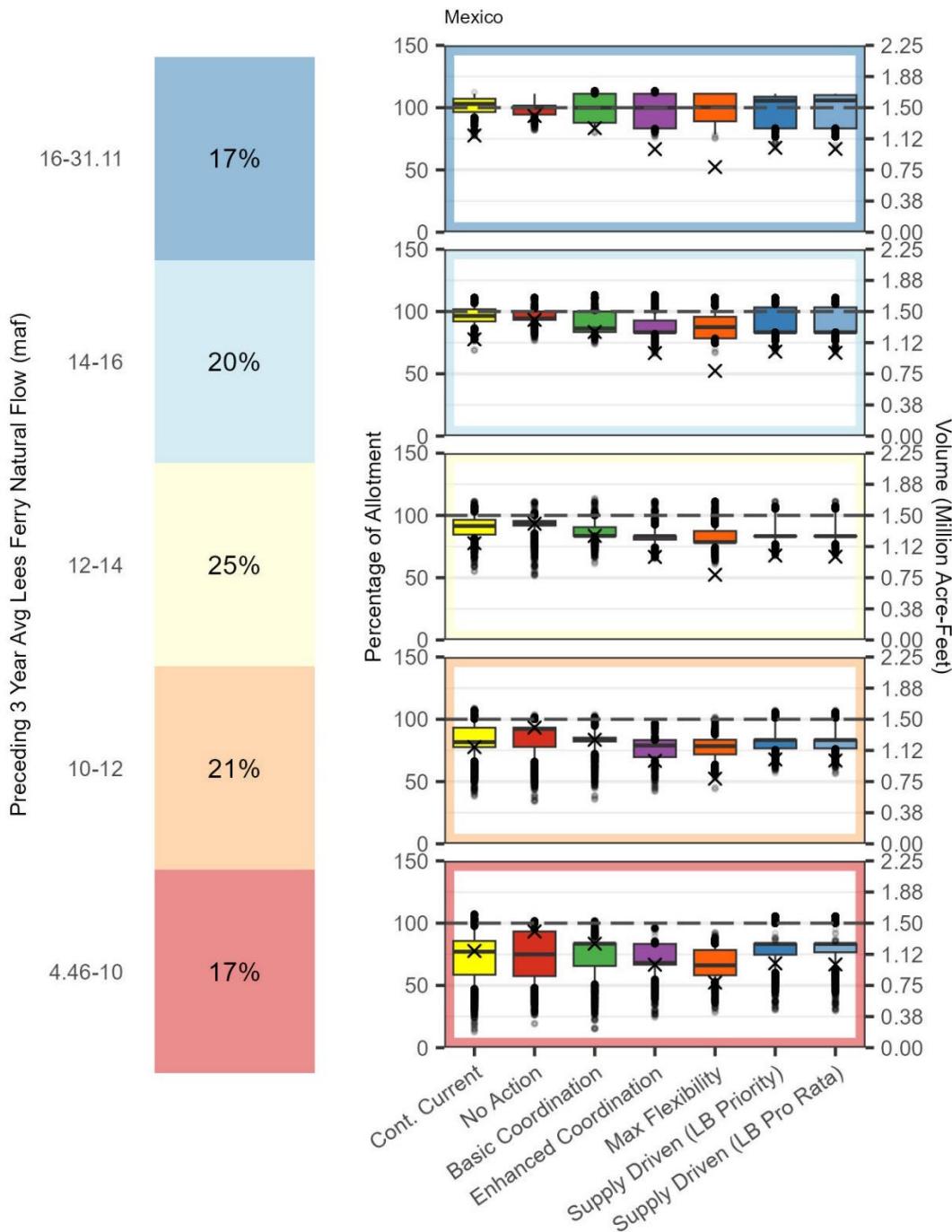
Note: The modeled annual depletions in Mexico include modeling assumptions for reductions in water deliveries to Mexico and storage available to Mexico. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current United States policy or a determination of future United States policy regarding deliveries to Mexico. The United States 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.

TA 4.2.6   Issue 5: Lower Division States Combined Shortages

Issue 5 addresses how operational activities affect modeled distribution of combined shortages for the Lower Division States. This will be achieved through the comparison of the various action alternatives to the No Action Alternative and CCS Comparative Baseline for the following metrics:

- Volumes of Shortage by Water User Type (tribal, domestic, irrigation)

As discussed in **Chapter 2**, the alternatives considered evaluate a distribution of shortages via priority and pro rata. Lower Division States' shortage distributions discussed under this issue were modeled with the SAM and ADM to estimate the volume of available water to entitlement holders or water users under Shortage Conditions over a specified range of shortage volumes. There are three unique SAMs and five ADMs to capture the nuances of the alternatives and sensitivity analyses which are further explained in **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation. The following analysis describes the distribution of shortages expected for a specified shortage volume.

Tribal Shortage Impacts

The following **Table TA 4-40** describes shortage impacts on tribal entitlements, broken out by SAM and ADM modeling approach and aligned by alternative. Each row corresponds to a modeling approach and EIS alternative or the CCS Comparative Baseline. Within the row, the color gradient is representative of conditional formatting for values ranging from zero to 1,103 kaf, the total of the entitlements modeled in the tribal category. The color gradient indicates the percentage reduction, with the darkest orange representing 100 percent reduction. The maximum values are a total of the Consumptive Use or equivalent entitlements modeled for tribal users. Each column of modeled total shortage was chosen based on points of interest in one or more models, or to provide granularity in the results over a range of volumes of interest. Total shortage volumes include an assumed component for Mexico, as described in the sections of this appendix pertaining to each model, and will not sum across panels.

As shown in the table, the shortage impacts of priority-based alternatives range from 209-582 kaf. The shortage impacts of pro rata-based alternatives range from 76-378 kaf. The pro rata-based alternatives display smaller shortage impacts compared to the priority-based alternatives at the same total shortage volume considered. For example, under a total shortage volume of 2,100 kaf, the Maximum Operational Flexibility and Supply Driven (LB Priority approach) Alternatives estimate a shortage impact of 510 kaf. The Enhanced Coordination and Supply Driven Pro Rata Alternatives estimate a shortage impact of 264 and 357 kaf, respectively. Overall, for tribal users, priority-based alternatives result in greater shortage impacts compared to pro rata-based alternatives. These tradeoffs are further discussed in **TA 18**, Indian Trust Assets.

Domestic Shortage Impacts

The following **Table TA 4-40** describes shortage impacts on Domestic users, broken out by SAM and ADM modeling approach and aligned by alternative. Each row corresponds to a modeling approach and EIS alternative or the CCS Comparative Baseline. Within the row, the color gradient is representative of conditional formatting for values ranging from zero to 1,606 kaf, the total of the entitlements modeled in the domestic category. The color gradient indicates the percentage

reduction, with the darkest orange representing 100 percent reduction. The maximum values are a total of the Consumptive Use or equivalent entitlements modeled for domestic users. Each column of modeled total shortage was chosen based on points of interest in one or more models, or to provide granularity in the results over a range of volumes of interest. Total shortage volumes include an assumed component for Mexico, as described in the sections of this appendix pertaining to each model, and will not sum across panels.

As shown in the table, the shortage impacts of priority-based alternatives range from 277-1,501 kaf. The shortage impacts of pro rata-based alternatives range from 109-546 kaf. The pro rata-based alternatives display smaller shortage impacts compared to the priority-based alternatives at the same total shortage volume considered. For example, under a total shortage volume of 2,100 kaf, the Maximum Operational Flexibility and Supply Driven (LB Priority approach) Alternatives estimate a shortage impact of 1,179 kaf. The Enhanced Coordination and Supply Driven Pro Rata Alternatives estimate a shortage impact of 382 and 449 kaf, respectively. Overall, for domestic users, priority-based alternatives result in greater shortage impacts compared to pro rata-based alternatives. These tradeoffs are further discussed in **TA 17**, Population and Land Use.

Irrigation Shortage Impacts

The following **Table TA 4-40** describes shortage impacts on non-tribal irrigation users, broken out by SAM and ADM modeling approach and aligned by alternative. Each row corresponds to a modeling approach and EIS alternative or the CCS Comparative Baseline. Within the row, the color gradient is representative of conditional formatting for values ranging from zero to 4,749 kaf, the total of the entitlements modeled in the irrigation category. The color gradient indicates the percentage reduction, with the darkest orange representing 100 percent reduction. The maximum values are a total of the Consumptive Use or equivalent entitlements assigned to irrigation users. Each column of total modeled shortage was chosen based on points of interest in one or more models, or to provide granularity in the results over a range of volumes of interest. Total shortage volumes include an assumed component for Mexico, as described in the sections of this appendix pertaining to each model, and will not sum across panels.

As shown in the table, the shortage impacts of priority-based alternatives range from 2-1,211 kaf. The shortage impacts of pro rata-based alternatives range from 206-1,578 kaf. The pro rata-based alternatives display larger shortage impacts compared to the priority-based alternatives at the same total shortage volume considered. For example, under a total shortage volume of 2,100 kaf, the Maximum Operational Flexibility and Supply Driven (LB Priority approach) Alternatives estimate a shortage impact of 88 kaf. The Enhanced Coordination and Supply Driven Pro Rata Alternatives estimate a shortage impact of 1,105 and 944 kaf, respectively. Overall, for non-tribal irrigation users, pro rata-based alternatives result in greater shortage impacts compared to priority-based alternatives. These tradeoffs are further discussed in **TA 17**, Population and Land Use.

Table TA 4-40
Total Shortage Impact Volumes (kaf)

Tribal Shortage Impacts

Modeling Approach	EIS Alternatives and Comparative Baseline	600	1,000	1,500	1,800	2,000	2,100	2,300	3,000	3,500	4,000
Priority	No Action	241									
Priority	Basic Coordination	241	351	489							
Continuing Current Strategies*	CCS Comparative Baseline	261	305								
LB Priority	Supply Driven (LB Priority approach)	209	269	346	431	483	510				
LB Priority	Maximum Operational Flexibility	209	269	346	431	483	510	550	561	571	582
Pro Rata	Enhanced Coordination	76	126	189	227	252	264	289	378		
LB Pro Rata	Supply Driven (LB Pro Rata Approach)	139	207	291	324	346	357				

Domestic Shortage Impacts

Modeling Approach	EIS Alternatives and Comparative Baseline	600	1,000	1,500	1,800	2,000	2,100	2,300	3,000	3,500	4,000
Priority	No Action	277									
Priority	Basic Coordination	277	488	752							
Continuing Current Strategies*	CCS Comparative Baseline	297	563								
LB Priority	Supply Driven (LB Priority approach)	313	579	858	1,024	1,125	1,179				
LB Priority	Maximum Operational Flexibility	313	579	858	1,024	1,125	1,179	1,263	1,390	1,446	1,501
Pro Rata	Enhanced Coordination	109	182	273	327	364	382	418	546		

Domestic Shortage Impacts

Modeling Approach	EIS Alternatives and Comparative Baseline	600	1,000	1,500	1,800	2,000	2,100	2,300	3,000	3,500	4,000
LB Pro Rata	Supply Driven (LB Pro Rata approach)	155	240	346	397	432	449				

Irrigation Shortage Impacts

Modeling Approach	EIS Alternatives and Comparative Baseline	600	1,000	1,500	1,800	2,000	2,100	2,300	3,000	3,500	4,000
Priority	No Action	6									
Priority	Basic Coordination	6	19	34							
Continuing Current Strategies*	CCS Comparative Baseline	8	27								
LB Priority	Supply Driven (LB Priority approach)	2	9	70	79	85	88				
LB Priority	Maximum Operational Flexibility	2	9	70	79	85	88	95	509	860	1,211
Pro Rata	Enhanced Coordination	316	526	789	947	1,052	1,105	1,210	1,578		
LB Pro Rata	Supply Driven (LB Pro Rata approach)	206	387	613	778	889	944				

Note:

Totals include Mexico and will not sum across panels.

*CCS Comparative Baseline strategies results are of limited comparability due to their fixed shortage volumes; shortages shown for 600 kafy and 1.0 maf per year in total shortage are associated with 613 kafy and 1,013 kafy of total shortage in the CCS Comparative Baseline SAM.

Volumes of Shortage by State (Arizona, California, Nevada)

State specific distribution of shortages can be viewed in **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation.

TA 4.2.7 *Issue 6: Upper Basin Conservation*

Table TA 4-41 through **Table TA 4-43**, below, show the statistical breakdown of how different alternatives perform in terms of annual Upper Basin conservation activity, reflected as total accumulated stored water, total annual creation, and total annual conversion, over a range of hydrologic conditions based on the preceding three-year average of Lees Ferry natural flow. These values include the maximum, 90th percentile, 75th percentile, median, 25th percentile, 10th percentile, and minimum volumes of shortage and dead pool–related reductions.

Figure TA 4-19 shows three components of Upper Basin Conservation activity.[8] The first column shows the annual, total volume of conserved water accumulated by Upper Basin conservation. The second column reports the annual volume of conserved water that is created. The third column reports the annual volume that is converted to system water.

There is zero accumulation, creation, or conversion under the CCS Comparative Baseline or the No Action and Basic Coordination Alternatives, so the remainder of the discussion on **Figure TA 4-19** focuses on Enhanced Coordination, Maximum Operational Flexibility, and Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches).[9]

Considering total annual accumulation (first column), under the Average Flow Category (12-14 maf), the Maximum Operational Flexibility Alternative has the largest median (1.7 maf), followed by the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches; 1.0 maf) and the Enhanced Coordination Alternative (0.59 maf). The relative ranking is the same under the Critically Dry Flow Category (4.46-10 maf), with medians of 0.57 maf (Maximum Operational Flexibility Alternative), 0.55 maf (Supply Driven Alternative [both LB Priority and LB Pro Rata approaches]), and 0.045 maf (Enhanced Coordination Alternative).

Considering total annual creation (second column), under the Average Flow Category, the Maximum Operational Flexibility Alternative has the largest median (200 kaf), followed by Supply Driven Alternative (both LB Priority and LB Pro Rata approaches; 63 kaf) and Enhanced Coordination Alternative (53 kaf). Under the Critically Dry Flow Category, the median for the Maximum Operational Flexibility Alternative remains at 200 kaf, but the median is 0 for both Enhanced Coordination and Supply Driven Alternatives (both LB Priority and LB Pro Rata approaches). However, the 75th percentiles are 300 kaf (Maximum Operational Flexibility Alternative), 140 kaf (Enhanced Coordination Alternative), and 94 kaf (Supply Driven Alternative [both LB Priority and LB Pro Rata approaches]).

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[8] For all alternatives except Maximum Operational Flexibility, Lower Basin conserved water is stored in Lake Powell. For Maximum Operational Flexibility, this water can be stored in Lake Mead, Lake Powell, or both.
[9] UB conservation activity is the same for both Supply Driven (LB Priority) and Supply Driven (LB Pro Rata).

Table TA 4-41
Annual Upper Basin Conservation Activity: Upper Basin Total Accumulated Stored Water (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	2.0	2.0	2.0	1.9	0.9	0.5	0.0
Enhanced Coordination	14-16	2.0	2.0	2.0	1.2	0.4	0.1	0.0
Enhanced Coordination	12-14	2.0	2.0	1.7	0.6	0.1	0.0	0.0
Enhanced Coordination	10-12	2.0	1.9	1.0	0.2	0.0	0.0	0.0
Enhanced Coordination	< 10	2.0	1.4	0.3	0.0	0.0	0.0	0.0
Max. Operational Flexibility	> 16	3.0	3.0	2.2	1.3	0.4	0.2	0.0
Max. Operational Flexibility	14-16	3.0	3.0	2.9	1.8	1.0	0.5	0.0
Max. Operational Flexibility	12-14	3.0	3.0	3.0	1.7	0.7	0.4	0.0
Max. Operational Flexibility	10-12	3.0	3.0	2.4	1.0	0.4	0.2	0.0
Max. Operational Flexibility	< 10	3.0	2.4	1.3	0.6	0.3	0.2	0.0
Supply Driven (LB Priority)	> 16	3.0	2.6	2.1	1.6	1.0	0.7	0.2
Supply Driven (LB Priority)	14-16	3.0	2.3	1.8	1.2	0.7	0.3	0.0
Supply Driven (LB Priority)	12-14	3.0	2.0	1.5	1.0	0.5	0.2	0.0
Supply Driven (LB Priority)	10-12	3.0	1.7	1.3	0.8	0.4	0.2	0.0
Supply Driven (LB Priority)	< 10	3.0	1.6	1.1	0.5	0.2	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	3.0	2.6	2.1	1.6	1.0	0.7	0.2
Supply Driven (LB Pro Rata)	14-16	3.0	2.3	1.8	1.2	0.7	0.3	0.0
Supply Driven (LB Pro Rata)	12-14	3.0	2.0	1.5	1.0	0.5	0.2	0.0
Supply Driven (LB Pro Rata)	10-12	3.0	1.7	1.3	0.8	0.4	0.2	0.0
Supply Driven (LB Pro Rata)	< 10	3.0	1.6	1.1	0.5	0.2	0.0	0.0

Post-2026 Colorado River Reservoir Operations DEIS

Table TA 4-42
**Annual Upper Basin Conservation Activity: Upper Basin Total Annual Creation (maf)**

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	0.4	0.3	0.2	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	0.4	0.3	0.2	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	0.4	0.4	0.2	0.1	0.0	0.0	0.0
Enhanced Coordination	10-12	0.4	0.4	0.2	0.0	0.0	0.0	0.0
Enhanced Coordination	< 10	0.4	0.4	0.1	0.0	0.0	0.0	0.0
Max. Operational Flexibility	> 16	0.5	0.5	0.5	0.3	0.2	0.0	0.0
Max. Operational Flexibility	14-16	0.5	0.5	0.3	0.2	0.0	0.0	0.0
Max. Operational Flexibility	12-14	0.5	0.5	0.3	0.2	0.0	0.0	0.0
Max. Operational Flexibility	10-12	0.5	0.5	0.3	0.2	0.0	0.0	0.0
Max. Operational Flexibility	< 10	0.5	0.5	0.3	0.2	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.2	0.2	0.1	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.2	0.2	0.1	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	0.2	0.2	0.1	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	0.2	0.2	0.1	0.0	0.0	0.0	0.0

Table TA 4-43
Annual Upper Basin Conservation Activity: Upper Basin Total Annual Conversion (maf)

Alternative	Flow Category	Max (maf)	90% (maf)	75% (maf)	50% (maf)	25% (maf)	10% (maf)	Min (maf)
CCS Comparative Baseline	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CCS Comparative Baseline	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Action	> 16	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	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basic Coordination	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	> 16	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	14-16	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Enhanced Coordination	12-14	0.3	0.2	0.1	0.0	0.0	0.0	0.0
Enhanced Coordination	10-12	0.5	0.2	0.1	0.0	0.0	0.0	0.0
Enhanced Coordination	< 10	0.5	0.2	0.1	0.0	0.0	0.0	0.0
Max. Operational Flexibility	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	14-16	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	12-14	1.0	0.2	0.0	0.0	0.0	0.0	0.0
Max. Operational Flexibility	10-12	1.7	0.4	0.3	0.1	0.0	0.0	0.0
Max. Operational Flexibility	< 10	2.9	0.8	0.5	0.1	0.0	0.0	0.0
Supply Driven (LB Priority)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Priority)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	> 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	14-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	12-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	10-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supply Driven (LB Pro Rata)	< 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure TA 4-19
Annual Upper Basin Conservation Activity
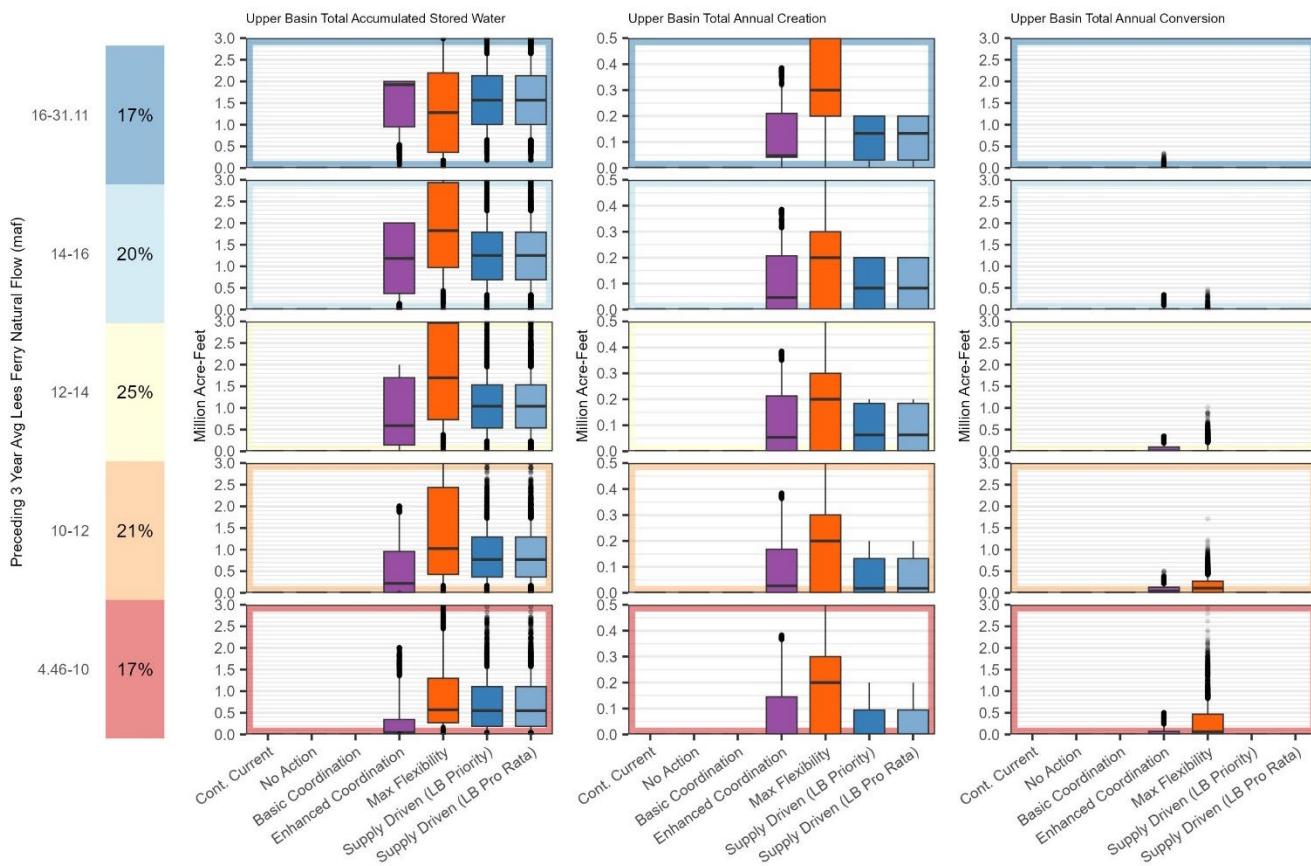
Note: In addition to the conservation volumes, the Supply Driven alternative also includes "gap water" (see EIS **Section 2.8.4.3** and **Appendix A,** CRSS Model Documentation). The modeled gap water volume has a median of 0 in all flow categories; the 75*th* percentile is approximately 256 kaf and 358 kaf in the dry and critically dry flow categories, respectively; the maximum gap water volume is approximately 1.1 maf. **Appendix D**, Sensitivity Analysis – Effects of Natural Flow Percentage Used for the Supply Driven Alternative, includes additional information on the modeled volumes of gap water.

Considering total annual conversion (third column), the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches) does not convert any conserved water (i.e., values of 0 for all flow categories and all percentiles). For Maximum Operational Flexibility and Enhanced Coordination Alternatives, the largest conversion volumes occur in Dry (10-12 maf) to Critically Dry Flow Categories (4.46-10 maf). Because conversion happens relatively infrequently and at small volumes, it is useful to compare the 75th percentile values. In the Dry Flow Category, 75th percentile conversion volumes are 270 kaf (Maximum Operational Flexibility Alternative) and 130 kaf (Enhanced Coordination Alternative). Under the Critically Dry Flow Category, the 75th percentile values are 470 kaf (Maximum Operational Flexibility Alternative) and 69 kaf (Enhanced Coordination Alternative).

TA 4.2.8   Summary Comparison of Alternatives

Lower Division states' water supply determinations and total water deliveries:

Shortage

Shortage reductions increase as flow categories become drier. The action alternatives generally have larger shortage reductions compared to the CCS Comparative Baseline and No Action Alternative. Conversely, the action alternatives have less dead pool–related reductions compared to the CCS Comparative Baseline and No Action Alternative, especially as the flow categories become drier.

California does not have shortages under the No Action Alternative or the Basic Coordination Alternative (both priority-based alternatives). For Arizona and Nevada, the Maximum Operational Flexibility Alternative imposes the largest maximum shortages, and the No Action Alternative imposes the lowest maximum shortages except for Nevada, where the CCS Comparative Baseline imposes the lowest maximum, closely followed by the No Action Alternative. California takes its largest shortage under the Enhanced Coordination Alternative, due to its pro rata approach to shortage distribution. In the Critically Dry Flow Category, most alternatives result in maximum shortages. The Maximum Operational Flexibility Alternative has the largest variability and highest outliers (except for California).

Dead Pool-Constrained Reductions

Considering robustness against dead pool–related reductions, the action alternatives perform better than the CCS Comparative Baseline and No Action Alternative. The Maximum Operational Flexibility Alternative is the most robust at avoiding dead pool–related reductions, doing so in 91 percent of the futures, followed by the Supply Driven Alternative (LB Pro Rata approach) and the Enhanced Coordination Alternative, with 85 percent and 84 percent, respectively. The CCS Comparative Baseline results in 50 percent, and the No Action Alternative has the worst performance at a 30 percent success rate. The No Action Alternative is vulnerable to the 20-year recently observed 2012-2021 average flows (12.5 maf), and is likely to be vulnerable in 75 percent of the driest 20-year averages in the reference hydrology ensemble. Undesirable performance for the Enhanced Coordination Alternative, the Maximum Operational Flexibility Alternative and Supply Driven Alternative (LB Pro Rata approach) are not likely to occur until well below the lowest 25th percentile, and even below the lowest 10 percent of the traces in the reference hydrology ensemble for the Maximum Operational Flexibility Alternative.

Conservation Activity Impacts

Median reductions remain similar whether conservation activity is on or off across all flow categories. Conservation activity mainly affects the variability of the interquartile ranges.

Depletions

For all entities and across all alternatives and the CCS Comparative Baseline, median depletions decrease as flow categories become drier and an increasing number of years are affected by dead pool.

Arizona: In the Critically Dry Flow Category (4.46-10 maf), median depletions are lowest under the Maximum Operational Flexibility Alternative (42 percent of apportionment, 1.2 maf). The

Enhanced Coordination Alternative has the highest median depletions at 71.3 percent of apportionment (2.0 maf), due to the pro rata system and lower max shortage.

California: In the Critically Dry Flow Category (4.46-10 maf), the Enhanced Coordination Alternative has the lowest median depletion (67 percent or apportionment, 2.9 maf).

Nevada: In the Critically Dry Flow Category (4.46-10 maf), median depletions are lowest for the No Action Alternative (64 percent of apportionment, 0.19 maf).

Deliveries to Mexico

Water Delivery Reductions

Water delivery reductions increase as the flow conditions become drier. Variability also decreases as the flow conditions become drier for the CCS Comparative Baseline and all alternatives except for the Maximum Operational Flexibility Alternative, which shows the opposite trend.

Depletions

As flow categories get drier, the range of depletion reductions expands and the medians decrease. In the Critically Dry Flow Category (4.46-10 maf), median apportionments for the action alternatives range from as low as 66 percent (0.99 maf) under the Maximum Operational Flexibility Alternative, up to 84 percent (1.25 maf) under the Basic Coordination Alternative.

Lower Division States Combined Shortages

For all combined tribal users combined, when comparing the same total shortage volume, the priority-based alternatives impose larger shortage impacts than pro rata. Total shortage impacts range from 76 kaf to 582 kaf across all alternatives and the CCS Comparative Baseline.

For Domestic users, the priority-based alternatives impose larger shortage impacts than pro rata when comparing the same total shortage volume. Total shortage impacts range from 109 kaf to 1,501 kaf across all alternatives and the CCS Comparative Baseline.

For Irrigation users, the pro rata-based alternatives impose larger shortage impacts than priority alternatives when comparing the same total shortage volume. Total shortage impacts range from 2 kaf to 1,578 kaf across all alternatives and the CCS Comparative Baseline.

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