Appendix H

Sensitivity Analysis – Effects of Demand Schedule Assumptions on Modeled Unused Tribal Water Available for Storage in the Enhanced Coordination Alternative

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Contents

Tables

Figures

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Appendix H. Sensitivity Analysis – Effects of Demand Schedule Assumptions on Modeled Unused Tribal Water Available for Storage in the Enhanced Coordination Alternative

H.1 Introduction

The Enhanced Coordination Alternative contemplates mechanisms to store Upper Basin unused tribal water in a Lake Powell conservation pool and Lower Basin unused tribal water in the Protection Pool in Lake Mead. The volume of unused tribal water that could be potentially available for storage in each basin is highly dependent on the modeled baseline demands and modeling assumptions developed for each storage mechanism.

This appendix summarizes the baseline demands that Reclamation used to estimate the volumes of unused tribal water available for conservation and storage in each basin, describes the methodology for calculating these volumes, and compares potential accumulation volumes under two demand scenarios. The first scenario is based on baseline demands, which is used in the resource analysis for the Enhanced Coordination Alternative. The second scenario assumes the demands remain near historical (i.e., 2027) levels throughout the simulation period, providing an upper bound on the volume of unused tribal that could be available for storage if future demands do not increase as projected in the baseline scenario.

This appendix is exploratory and for modeling purposes only, is not intended to express any legal positions or conclusions about unused tribal water, and it does not modify any legal authorities applicable to any particular tribe's water resources. Further, nothing in this appendix represents a legal position or interpretation of any of the water rights of any basin tribes, other water users, or the Law of the River including as applicable unused water. Nothing in this appendix shall be construed so as to interpret, diminish or modify the water rights of any tribe or other water users. Reclamation continues to recognize the right of each tribe and of each of the Basin States under existing law to use and develop the water of the Colorado River System.

For purposes of this appendix, unused tribal water is defined as the difference between a quantified[1] entitlement or its depletion equivalent and the associated modeled baseline demand, subject to the following key assumptions:

- The analyzed volumes of unused tribal water are physically and legally available and deliverable for storage in Lake Powell or Lake Mead, as applicable, and can be stored in Lake Powell or Lake Mead consistent with the mechanisms explored in the Enhanced Coordination Alternative.
- In the Lower Basin, the unused tribal water analyzed in this appendix includes mainstream Lower Colorado River water entitlements.
- This appendix does not attempt to define the contours of any trust asset. Please see **Technical Appendix 18**, Indian Trust Assets, for more information on trust assets.
- The analyzed volumes of unused tribal water are derived from the entitlement-holder and do not include any analysis of possible end-user arrangements, if applicable.
- Unused tribal water is water that a tribe does not divert from the mainstream Colorado River or other applicable authorized diversion location in any given year. Unused tribal water does not include return flows or effluent.
- The term unused tribal water is used to describe when a tribe does not fully divert its quantified water entitlement, for any reason; the term does not indicate or imply that any water in the Colorado River System is left unused in any given year, as such water may be used by the other Basin, state(s), or more junior priorities consistent with existing law.
- Rounding may be used for any given entitlement.
- CRSS requires depletion schedules to function. Tribal water entitlements may be quantified by depletion, diversion, or both, as described in the applicable legal authority. Accordingly, depletion, and/or diversion, entitlement or equivalent volumes are calculated or estimated for CRSS modeling purposes as necessary for model functionality, as described in the sections below.
- The tribal water entitlement is legally quantified, including by settlement, adjudication, or contract, with some caveats for modeling purposes as noted herein. This appendix does not attempt to quantify any currently unquantified tribal water rights.
- This appendix does not address a number of issues that may be related to implementation of any alternative, including but not limited to baseline depletion or consumptive use calculations, forbearance agreements, legal authorities, calculations related to diversion or depletion equivalents, and other operational and accounting details such as verification, water orders, and interaction with shortage distribution scheme(s).

[1] In some instances for modeling purposes, this appendix references an estimate or other data about a tribal water right. Where this occurs, it is not intended to represent a modification, alteration, or interpretation of any legal quantification and law applicable to a tribal water right. Reclamation reserves the right to update any quantifications, estimates, or data applicable to any tribal water rights as needed.

H.2 Overview of Baseline Demand Schedules

H.2.1 Upper Basin Demand Schedules

The Upper Basin CRSS baseline demand schedules were developed using data from the Upper Colorado River Commission's (UCRC) updated 2016 Depletion Demand Schedule[2]. Specifically, the UCRC—in coordination with the Upper Division States—developed decadal projections of water depletion demands by sector at the state level to support long-term planning efforts. These projections represent anticipated water demands under assumed economic and hydrologic conditions. The representation of the Upper Colorado Basin Tribes in the UCRC depletion demand schedule was presented in documentation provided by Reclamation to the Upper Colorado Basin Tribes dated July 13, 2022, that outlines the differences between the 2018 Tribal Water Study[3] demand schedules and the updated 2016 Depletion Demand Schedule. Information on how these projections are integrated into CRSS is provided in **Appendix L**, Upper Division States Depletion Schedules, with the resulting depletion schedules for the Upper Basin Tribes summarized in **Table H-1**. **Table H-1** cites the U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study (2018) as a source for certain aspects of the tribal water rights discussed herein. This citation is intended to provide an accessible source of information for the reader, and it does not supersede or modify any tribal water rights settlement or other authority. Reclamation reserves the right to update references to tribal water rights authorities in this appendix as needed and appropriate.

[2] Upper Colorado River Commission (UCRC) & Upper Division States. (2022, June 14). *Combined Resolution and Updated 2016 Depletion Demand Schedule*. Upper Colorado River Commission. Retrieved from http://www.ucrcommission.com/wp-content/uploads/2022/06/UCRC-and-Upper-Division-States-Combined-Resolution-and-Updated-2016-Depletion-Demand-Schedule-June-14-2022-1.pdf.

[3] All disclaimers in the 2018 Tribal Water Study regarding its limitations and assumption are incorporated herein by reference, including that it does not, and shall not, represent a legal position or interpretation of any of the water rights of the Partnership Tribes, by any Basin State, the federal government, or the Upper Colorado River Commission as it relates to the Law of the River. Furthermore, nothing in the Tribal Water Study is intended to, nor shall the Study be construed so as to, interpret, diminish or modify the water rights of any of the Partnership Tribes, any other tribe, any Basin State, the federal government, or the Upper Colorado River Commission under federal or state law or administrative rule, regulation or guideline. Reclamation and the Partnership continue to recognize the right of each of the Partnership Tribes and of each of the Basin States under existing law to use and develop the water of the Colorado River System.

Table H-1
CRSS Baseline Depletion Demand Schedules for Upper Basin Tribes (acre-feet)

Year	Jicarilla (NM)	Navajo				Southern Ute (CO)	Ute Indian (UT)[4]	Ute Mtn. Ute (CO)	Upper Basin Total
		(NM)	(UT)	(AZ UB)[5]	(Total)				
2027	30,380	286,910	10,615	31,071	328,596	33,578	184,641	13,067	590,262
2028	31,020	290,040	11,896	30,626	332,562	33,912	190,157	13,131	600,782
2029	31,660	293,170	13,176	30,182	336,528	34,246	195,674	13,195	611,302
2030	32,300	296,300	14,456	29,737	340,493	34,580	201,190	13,259	621,822
2031	32,460	299,100	15,736	29,293	344,129	34,914	206,965	13,323	631,792
2032	32,620	301,900	17,017	28,848	347,765	35,248	212,741	13,387	641,761
2033	32,780	304,700	18,297	28,403	351,400	35,583	218,516	13,451	651,730
2034	32,940	307,500	19,578	27,959	355,037	35,917	224,291	13,515	661,700
2035	33,100	310,300	20,858	27,514	358,672	36,251	230,067	13,579	671,669
2036	33,260	313,100	22,138	27,070	362,308	36,585	235,842	13,643	681,638
2037	33,420	315,900	23,419	26,625	365,944	36,919	241,617	13,707	691,607
2038	33,580	318,700	24,699	26,181	369,580	37,254	247,392	13,771	701,577
2039	33,740	321,500	25,980	25,736	373,216	37,588	253,168	13,835	711,546
2040	33,900	324,300	27,260	25,291	376,851	37,922	258,943	13,899	721,515
2041	33,900	324,540	27,950	24,847	377,337	38,195	258,943	14,072	722,448
2042	33,900	324,780	28,641	24,402	377,823	38,468	258,943	14,245	723,379
2043	33,900	325,020	29,331	23,958	378,309	38,742	258,943	14,418	724,312
2044	33,900	325,260	30,021	23,513	378,794	39,015	258,943	14,591	725,243
2045	33,900	325,500	30,712	23,068	379,280	39,288	258,944	14,764	726,175
2046	33,900	325,740	31,402	22,625	379,767	39,561	258,944	14,936	727,108
2047	33,900	325,980	32,092	22,180	380,252	39,834	258,944	15,109	728,040
2048	33,900	326,220	32,782	21,736	380,738	40,108	258,944	15,282	728,972
2049	33,900	326,460	33,473	21,291	381,224	40,381	258,944	15,455	729,904
2050	33,900	326,700	34,163	20,846	381,709	40,654	258,944	15,628	730,835
2051	33,910	326,860	34,756	20,402	382,018	40,927	258,944	15,801	731,600

[4] The Post-2026 modeling is based on water rights of the Ute Indian Tribe of the Uintah & Ouray Reservation that have not been ratified by all parties. The Ute Indian Tribe of the Uintah & Ouray Reservation has federally reserved Indian water rights, a portion of which were federally decreed in 1923 and a portion of which have been separately recognized and put to use by the United States and the State of Utah, which are not fully resolved. The information presented on these water rights in the Draft EIS is for analysis purposes only and does not reflect a legal position or interpretation of the water rights by the United States.

[5] The information reflected in the baseline depletion demands schedule relies on information about projected future tribal water demands. The projections were based on information compiled in a Colorado River Basin Ten Tribes Partnership Tribal Water Study (December 2018). As discussed in Chapter 8 of that Study, the technical approach was based on the best science and information available at the time, given limitations related to timeframes and resource constraints, among other things. The Study also noted that tribes were in the process of developing and implementing tribal water development plans. The Navajo Nation has informed Reclamation that it is developing updated projections as part of its water development planning. Reclamation will work with the Navajo Nation as needed to update demand schedules prior to the publication of a Final EIS. The use of the 2018 projections reflected in this DEIS is appropriate to allow readers to compare among alternatives; updated demand projections are not expected to change the comparison among alternatives.

Year	Jicarilla (NM)	Navajo				Southern Ute (CO)	Ute Indian (UT)[4]	Ute Mtn. Ute (CO)	Upper Basin Total
		(NM)	(UT)	(AZ UB)[5]	(Total)				
2052	33,920	327,020	35,350	19,957	382,327	41,200	258,944	15,974	732,364
2053	33,930	327,180	35,943	19,513	382,636	41,473	258,944	16,146	733,130
2054	33,940	327,340	36,536	19,068	382,944	41,746	258,944	16,319	733,894
2055	33,950	327,500	37,130	18,623	383,253	42,020	258,944	16,492	734,658
2056	33,960	327,660	37,723	18,179	383,562	42,293	258,944	16,665	735,423
2057	33,970	327,820	38,316	17,734	383,870	42,566	258,944	16,838	736,187
2058	33,980	327,980	38,909	17,290	384,179	42,839	258,944	17,010	736,953
2059	33,990	328,140	39,503	16,845	384,488	43,112	258,944	17,183	737,717
2060	34,000	328,300	40,096	16,400	384,796	43,385	258,944	17,356	738,481
Diversion Entitlement/ Equivalent	45,683[6]	633,531[7]				128,939	480,590[8]		
Depletion Entitlement/ Equivalent	34,194[9]	336,979[10]	81,500[11]	47,000[12]	465,479	70,049[13]	258,944[14]	78,123[15]	928,621

H.2.2 Lower Division States Depletion Schedules

As part of the Post-2026 EIS process, the Lower Division States CRSS baseline depletion schedules were developed to ensure all water users reach their full entitlement by 2040. In general, the initial 2027 depletion is estimated as the lesser of the historical average maximum use and the user's entitlement. This estimate serves as the starting point for linear interpolation, with annual depletions gradually increasing to the full entitlement by 2040. This methodology is applied to all water users except for Metropolitan Water District, Central Arizona Project, and Southern Nevada Water Authority. For these users, the depletion is estimated by subtracting the total revised depletion schedules of all other users from the State's apportionment. The corresponding diversion is then calculated using historical average efficiency.

[6] *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.4-A.
[7] *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.5-B.
[8] This table includes depletion and diversion volumes from the 2009 version of the proposed Ute Indian Water Compact, which was not ratified. These volumes are intended as a placeholder for NEPA analysis purposes, may be subject to change, and are not to be construed as federal legal or policy position. See also *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.1-G.
[9] *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.4-A.
[10] *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.5-B.
[11] *Navajo–Utah Water Rights Settlement Act* (Pub. L. 116-260, § 1102, 2020).
[12] This table includes the depletion volume as proposed in S.953. This volume is intended as a placeholder for NEPA analysis purposes, may be subject to change, and is not to be construed as federal legal or policy position.
[13] *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.2-I.
[14] This table includes depletion and diversion volumes from the 2009 version of the proposed Ute Indian Water Compact, which was not ratified. These volumes are intended as a placeholder for NEPA analysis purposes, may be subject to change, and are not to be construed as federal legal or policy position.
[15] *U.S. Bureau of Reclamation and Ten Tribes Partnership, Colorado River Basin Tribal Water Study* (2018), Table 5.3-I.

The depletion schedules represent the baseline demands, which are further adjusted using CRSS to account for new conservation mechanisms, Intentionally Created Surplus, shortage, surplus, and other alternative specific assumptions. A detailed description of the methodology used to develop the baseline depletion schedules is provided in **Appendix N**, Lower Division States Depletion Schedules, with the resulting revised depletion schedules for the Lower Division States Tribes' mainstream entitlements summarized in **Table H-2**.

Table H-2
CRSS Baseline Depletion Schedules for Lower Division Tribes with Mainstream Entitlements[16]
(acre-feet)

Year	Chemehuevi Indian Res.	Cocopah Indian Res. (Priority 1)	Cocopah Indian Res. (Priority 4)	Colorado River Indian Res. (AZ)	Colorado River Indian Res. (CA)	Fort Mojave Indian Res. (AZ)
2027	219	5,910	31	337,116	3,322	39,174
2028	673	5,910	133	337,680	5,602	40,461
2029	1,128	5,910	235	338,244	7,883	41,748
2030	1,582	5,910	337	338,808	10,164	43,036
2031	2,036	5,910	439	339,372	12,444	44,323
2032	2,490	5,910	541	339,936	14,725	45,610
2033	2,944	5,910	643	340,500	17,006	46,898
2034	3,399	5,910	745	341,065	19,287	48,185
2035	3,853	5,910	847	341,629	21,567	49,472
2036	4,307	5,910	949	342,193	23,848	50,760
2037	4,761	5,910	1,051	342,757	26,129	52,047
2038	5,215	5,910	1,153	343,321	28,409	53,334
2039	5,669	5,910	1,255	343,885	30,690	54,622
2040-2060	6,124	5,910	1,357	344,449	32,971	55,909
Diversion Entitlement[17]	11,340	8,821	2,026	662,402	56,846	103,535
Depletion Equivalent[18]	6,124	5,910	1,357	344,449	32,971	55,909

[16] This analysis does not include the Hualapai Tribe's Arizona Priority 4 entitlement as it was acquired after the Lower Division States depletion schedules were finalized for this DEIS.
[17] Unless otherwise noted, see the Consolidated Decree entered by the Supreme Court of the United States in *Arizona* v. *California*, 547 U.S. 150 (2006).
[18] CRSS requires depletion schedules; the depletion equivalent is calculated using the diversion entitlement and average historical efficiencies (2008-2022), unless otherwise noted in **Appendix N**, Lower Division States Depletion Schedules.

Table H-2 *(continued)*
CRSS Baseline Depletion Schedules for Lower Division Tribes with Mainstream Entitlements[19]
(acre-feet)

Year	Fort Mojave Indian Res. (CA)	Fort Mojave Indian Res. (NV)	Fort Yuma Indian Res. (AZ)	Fort Yuma Indian Res. (CA)	Hopi Tribe[20]	Indian Water Rights Settlements Priority 4[21]
2027	9,029	3,538	1,501	32,954	3,037	0
2028	9,029	3,911	2,334	32,954	3,133	269
2029	9,029	4,285	3,167	32,954	3,228	538
2030	9,029	4,659	4,001	32,954	3,324	808
2031	9,029	5,033	4,001	32,954	3,419	1,077
2032	9,029	5,407	4,001	32,954	3,515	1,346
2033	9,029	5,781	4,001	32,954	3,610	1,615
2034	9,029	6,155	4,001	32,954	3,705	1,885
2035	9,029	6,528	4,001	36,524	3,801	2,154
2036	9,029	6,902	4,001	36,524	3,896	2,423
2037	9,029	7,276	4,001	36,524	3,992	2,692
2038	9,029	7,650	4,001	36,524	4,087	2,962
2039	9,029	8,024	4,001	36,524	4,183	3,231
2040-2060	9,029	8,398	4,001	36,524	4,278	3,500
Diversion Entitlement[22]	16,720	12,534	6,350	71,616	4,278	3,500
Depletion Equivalent[23]	9,029	8,398	4,001	36,524	4,278	3,500

[19] This analysis does not include the Hualapai Tribe's Arizona Priority 4 entitlement as it was acquired after the Lower Division States depletion schedules were finalized for this DEIS.
[20] The Hopi Tribe holds a delivery contract for an Arizona Priority 4 entitlement. This table does not include the Hopi Tribe's Arizona Priority 5 and 6 entitlements. This table is not intended to limit or preclude any future settlement terms associated with the Hopi Tribe's water resources and is not to be construed as a federal legal or policy position.
[21] This column shows the 3,500 acre-feet of Arizona Priority 4 water reserved for a Navajo-Hopi Indian water rights settlement pursuant to paragraph 11.3 of the 2007 Arizona Water Settlement Agreement as a placeholder. This table is not intended to limit or preclude any future settlement terms associated with this water and is not to be construed as a federal legal or policy position.
[22] Unless otherwise noted, see the Consolidated Decree entered by the Supreme Court of the United States in *Arizona* v. *California*, 547 U.S. 150 (2006).
[23] CRSS requires depletion schedules; the depletion equivalent is calculated using the diversion entitlement and average historical efficiencies (2008-2022), unless otherwise noted in **Appendix N**, Lower Division States Depletion Schedules.

H.3 Estimated Volume of Unused Tribal Water in the Baseline Demand Schedules

H.3.1 Upper Basin

Table H-3 shows the estimated unused water for the Upper Basin Tribes from 2027-2060.[24] For modeling purposes, unused water is calculated as the difference between each tribe's depletion entitlement (or depletion equivalent) (**Table H-1**) and its corresponding annual baseline depletion demand (**Table H-1**).

In the Enhanced Coordination Alternative, a portion of the total Upper Basin unused volume is assumed to be stored in the Lake Powell conservation pool each year. Additional information on the associated modeling assumptions and portion determination is provided in the following section.

[24] This estimate is included for analysis purposes only, and it is not a limit on or prediction of actual tribal water use. Actual tribal water use may vary.

Table H-3
Estimated Unused Water (Depletion) for Upper Basin Tribes (acre-feet)

Year	Jicarilla (NM)	Navajo (NM)	Navajo (UT)	Navajo (AZ UB)	Navajo (Total)	Southern Ute (CO)	Ute Indian (UT)	Ute Mountain Ute (CO)	Total
2027	3,814	50,069	70,885	15,929	136,883	36,471	74,303	65,056	316,527
2028	3,174	46,939	69,604	16,374	132,917	36,137	68,787	64,992	306,007
2029	2,534	43,809	68,324	16,818	128,951	35,803	63,270	64,928	295,487
2030	1,894	40,679	67,044	17,263	124,986	35,469	57,754	64,864	284,967
2031	1,734	37,879	65,764	17,707	121,350	35,135	51,979	64,800	274,997
2032	1,574	35,079	64,483	18,152	117,714	34,801	46,203	64,736	265,028
2033	1,414	32,279	63,203	18,597	114,079	34,466	40,428	64,672	255,059
2034	1,254	29,479	61,922	19,041	110,442	34,132	34,653	64,608	245,089
2035	1,094	26,679	60,642	19,486	106,807	33,798	28,878	64,544	235,120
2036	934	23,879	59,362	19,930	103,171	33,464	23,102	64,480	225,151
2037	774	21,079	58,081	20,375	99,535	33,130	17,327	64,416	215,182
2038	614	18,279	56,801	20,819	95,899	32,795	11,552	64,352	205,212
2039	454	15,479	55,520	21,264	92,263	32,461	5,776	64,288	195,243
2040	294	12,679	54,240	21,709	88,628	32,127	1	64,224	185,274
2041	294	12,439	53,550	22,153	88,142	31,854	1	64,051	184,341
2042	294	12,199	52,859	22,598	87,656	31,581	1	63,878	183,410
2043	294	11,959	52,169	23,042	87,170	31,307	1	63,705	182,477
2044	294	11,719	51,479	23,487	86,685	31,034	1	63,532	181,546
2045	294	11,479	50,788	23,932	86,199	30,761	0	63,359	180,614
2046	294	11,239	50,098	24,375	85,712	30,488	0	63,187	179,681
2047	294	10,999	49,408	24,820	85,227	30,215	0	63,014	178,749
2048	294	10,759	48,718	25,264	84,741	29,941	0	62,841	177,817
2049	294	10,519	48,027	25,709	84,255	29,668	0	62,668	176,885
2050	294	10,279	47,337	26,154	83,770	29,395	0	62,495	175,954
2051	284	10,119	46,744	26,598	83,461	29,122	0	62,322	175,189
2052	274	9,959	46,150	27,043	83,152	28,849	0	62,149	174,425
2053	264	9,799	45,557	27,487	82,843	28,576	0	61,977	173,659
2054	254	9,639	44,964	27,932	82,535	28,303	0	61,804	172,895
2055	244	9,479	44,370	28,377	82,226	28,030	0	61,631	172,131
2056	234	9,319	43,777	28,821	81,917	27,756	0	61,458	171,366
2057	224	9,159	43,184	29,266	81,609	27,483	0	61,285	170,602
2058	214	8,999	42,591	29,710	81,300	27,210	0	61,113	169,836
2059	204	8,839	41,997	30,155	80,991	26,937	0	60,940	169,072
2060	194	8,679	41,404	30,600	80,683	26,664	0	60,767	168,308

H.3.2 Lower Division States

Table H-4 shows the estimated unused water for the Lower Division Tribes with mainstream entitlements from 2027-2060. All of the Lower Division Tribes with mainstream entitlements hold diversion entitlements; therefore, for modeling purposes, unused water is calculated as the difference between the depletion equivalent of each tribe's entitlement (**Table H-2**) and its corresponding annual baseline depletion schedule (**Table H-2**).

In the Enhanced Coordination Alternative, a portion of the total unused water volume from the Lower Division Tribes with mainstream entitlements is assumed to be contributed to the Protection Pool each year. These modeling assumptions are detailed in the following section.

Table H-4
Estimated Unused Water (Depletion Equivalent) for Lower Division Tribes with Mainstream Entitlements (acre-feet)

Year	Chemehuevi Indian Res.	Cocopah Indian Res. (Priority 1)	Cocopah Indian Res. (Priority 4)	Colorado River Indian Res. (AZ)	Colorado River Indian Res. (CA)	Fort Mojave Indian Res. (AZ)
2027	5,904	0	1,326	7,333	29,649	16,735
2028	5,450	0	1,224	6,769	27,368	15,448
2029	4,996	0	1,122	6,205	25,088	14,161
2030	4,542	0	1,020	5,641	22,807	12,873
2031	4,088	0	918	5,077	20,526	11,586
2032	3,633	0	816	4,513	18,246	10,299
2033	3,179	0	714	3,949	15,965	9,011
2034	2,725	0	612	3,384	13,684	7,724
2035	2,271	0	510	2,820	11,403	6,437
2036	1,817	0	408	2,256	9,123	5,149
2037	1,363	0	306	1,692	6,842	3,862
2038	908	0	204	1,128	4,561	2,575
2039	454	0	102	564	2,281	1,287
2040-2060	0	0	0	0	0	0

Table H-4 *(continued)*
Estimated Unused Water (Depletion Equivalent) for Lower Division States Mainstream Tribes (acre-feet)

Year	Fort Mojave Indian Res. (CA)	Fort Mojave Indian Res. (NV)	Fort Yuma Indian Res. (AZ)	Fort Yuma Indian Res. (CA)	Hopi Tribe	Indian Water Rights Settlements Priority 4	Total
2027	0	4,860	2,500	3,570	0	3,500	75,377
2028	0	4,486	1,667	3,570	0	3,231	69,213
2029	0	4,112	833	3,570	0	2,962	63,048
2030	0	3,739	0	3,570	0	2,692	56,884
2031	0	3,365	0	3,570	0	2,423	51,552
2032	0	2,991	0	3,570	0	2,154	46,221
2033	0	2,617	0	3,570	0	1,885	40,890
2034	0	2,243	0	3,570	0	1,615	35,558
2035	0	1,869	0	0	0	1,346	26,657
2036	0	1,495	0	0	0	1,077	21,325
2037	0	1,122	0	0	0	808	15,994
2038	0	748	0	0	0	538	10,663
2039	0	374	0	0	0	269	5,331
2040-2060	0	0	0	0	0	0	0

H.4 Modeled Volume of Unused Tribal Water Available for Storage

This section compares the modeled volumes of unused tribal water available for storage in Lake Powell and Lake Mead under two assumed demand schedules. As noted, only a portion of the unused tribal water, calculated using the baseline demand schedule and documented in the previous section, is assumed to be available for storage in the Enhanced Coordination Alternative. The assumptions for determining this portion are outlined below, and the resulting volume is compared to the potential volume available for storage if tribal demands remain near historical (i.e., 2027) levels.

H.4.1 Modeled Volume of Unused Tribal Water Available for Storage in Lake Powell

The Enhanced Coordination Alternative includes a Lake Powell conservation pool with a maximum capacity of 2.0 maf. Both the Upper Division States and Upper Basin Tribes would have equal access to contribute to the conservation pool. In addition to storing Upper Basin conservation in the conservation pool, the Upper Basin Tribes could also store a portion of unused tribal water.

For modeling purposes, 5 to 15 percent of the unused Upper Basin tribal water is assumed to be available for storage in the Lake Powell conservation pool. The specific percentage, which varies with hydrologic conditions, is determined by comparing the modeled water year Lees Ferry natural flow to the 1991–2020 historical average (**Table H-5**). Linear interpolation is used to determine the specific percentage when the modeled (water year) Lees Ferry natural flow falls between 13.49 and 20.24 maf—with contributions increasing proportionally from 5 to 15 percent as natural flow increases across this range. It was assumed that this volume is contributed to the Lake Powell conservation pool without changing the inflow to Lake Powell. This operational modeling assumption implies that at least 5 to 15 percent of the unused Upper Basin tribal water physically reaches Lake Powell; however, the actual volume of unused Upper Basin tribal water that physically reaches Lake Powell is beyond the scope of this analysis.

Table H-5
Upper Basin Tribal Water Available for Storage in the Lake Powell Conservation Pool Relative to Historical Lees Ferry Natural Flow Thresholds

Current Water Year Lees Ferry Natural Flow (maf)	Annual Upper Basin Unused Tribal Contribution (%)
≥ 20.24[25]	15
Between 20.24 and 13.49[26]	5 to 15 (linear interpolation)
= 13.49	5
< 13.49	0

Table H-6 summarizes the potential volume of Upper Basin unused tribal water available for storage in the Lake Powell conservation pool.

Figure H-1 illustrates the potential cumulative contribution based on the baseline demands and the modeled natural flow used in this DEIS analysis (see **Appendix F**, Approach to Hydrologic Uncertainty), compared to the potential cumulative contribution if the demands remain near historical (i.e., 2027) levels throughout the simulation period. In this latter scenario, the 2027 demands are assumed to remain constant through 2060.

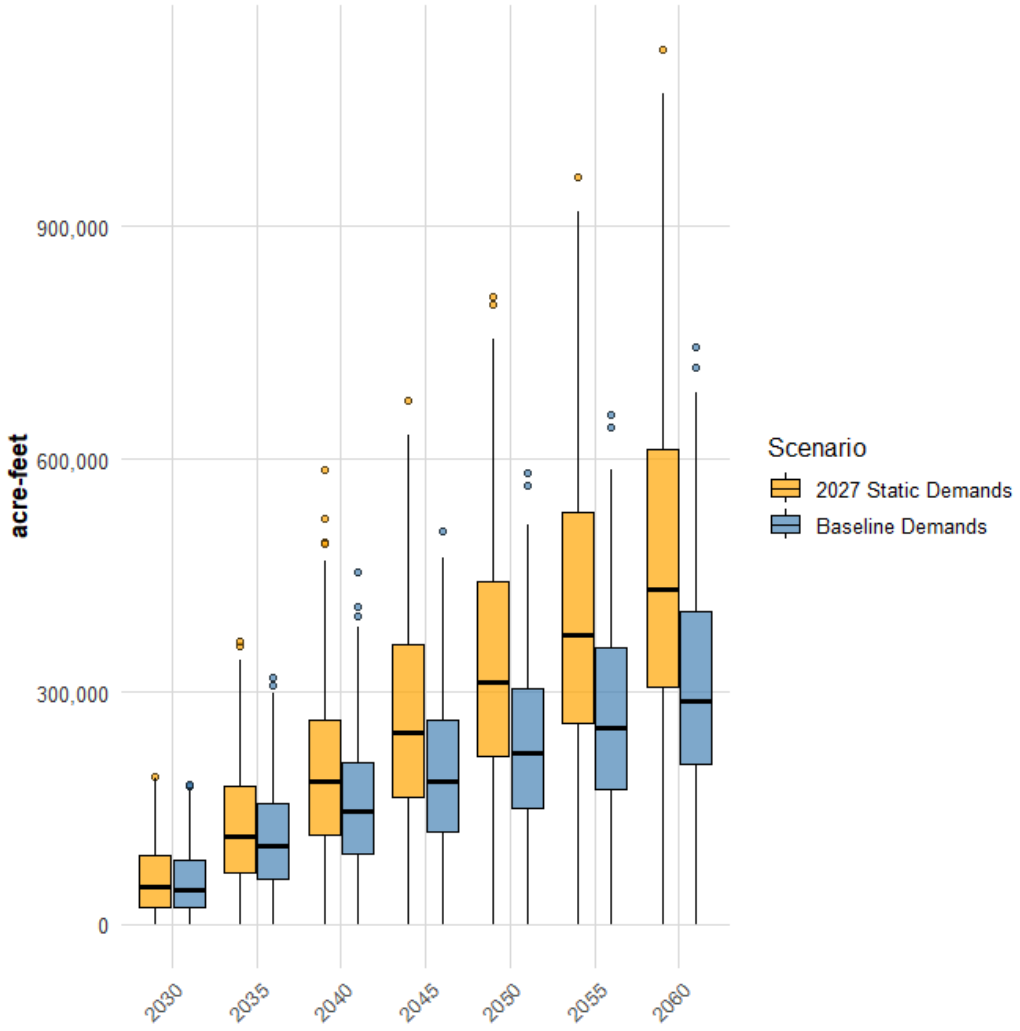
Note, the volumes shown in **Figure H-1** do not represent modeled storage of Upper Basin unused tribal water in the Lake Powell conservation pool. Stored volumes are subject to overall capacity constraints—which also account for other types of conserved water. Furthermore, water is periodically withdrawn according to the modeling assumptions detailed in the **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water.

[25] 150 percent of the historical average Lees Ferry natural flow from 1991-2020.
[26] Historical average Lees Ferry natural flow from 1991-2020.

Table H-6
Potential Volume of Upper Basin Unused Tribal Water Available for Storage in Lake Powell Conservation Pool (acre-feet)

Year	Potential Volume Available for Storage		
	5%	10%	15%
2027	15,826	31,653	47,479
2028	15,300	30,601	45,901
2029	14,774	29,549	44,323
2030	14,248	28,497	42,745
2031	13,750	27,500	41,250
2032	13,251	26,503	39,754
2033	12,753	25,506	38,259
2034	12,254	24,509	36,763
2035	11,756	23,512	35,268
2036	11,258	22,515	33,773
2037	10,759	21,518	32,277
2038	10,261	20,521	30,782
2039	9,762	19,524	29,286
2040	9,264	18,527	27,791
2041	9,217	18,434	27,651
2042	9,170	18,341	27,511
2043	9,124	18,248	27,372
2044	9,077	18,155	27,232
2045	9,031	18,061	27,092
2046	8,984	17,968	26,952
2047	8,937	17,875	26,812
2048	8,891	17,782	26,673
2049	8,844	17,689	26,533
2050	8,798	17,595	26,393
2051	8,759	17,519	26,278
2052	8,721	17,442	26,164
2053	8,683	17,366	26,049
2054	8,645	17,290	25,934
2055	8,607	17,213	25,820
2056	8,568	17,137	25,705
2057	8,530	17,060	25,590
2058	8,492	16,984	25,475
2059	8,454	16,907	25,361
2060	8,415	16,831	25,246

Figure H-1
Potential Cumulative Contribution from Upper Basin Unused Tribal Water



H.4.2 Estimated Modeled Volume of Unused Tribal Water Available for Storage in Lake Mead

The Enhanced Coordination Alternative includes a conservation mechanism referred to as the Protection Pool. In general, the Protection Pool is assumed to be a pool of water in Lake Mead, controlled by Reclamation for Lower Basin-wide benefits, with a maximum capacity of 2.0 maf. It is assumed that water could be acquired through multiple mechanisms, including—but not limited to—both conserved consumptive use and unused Lower Basin tribal water.

For modeling purposes, it is assumed that 10 percent of the unused Lower Basin tribal water can be stored in the Protection Pool. As a result, this water would not be available for diversion and use by lower priority water users. **Figure H-2** shows the resulting maximum potential accumulation of unused tribal water in the Protection Pool given baseline demands, compared with the maximum potential accumulation if the 2027 demands are maintained as static through 2060. The corresponding data is presented in **Table H-7**. Lower priority water users would experience a corresponding reduction in water available for their diversion and use resulting from the volume of unused water storage. Any reductions in water available to lower priority users resulting from increases to baseline demand, however, would be due to tribal water development independent of the Colorado River operations considered herein, and is not an impact of any alternatives.

Figure H-2
Maximum Potential Accumulation of Unused Tribal Water in the Protection Pool

Table H-7
Maximum Accumulation of Unused Tribal Water in the Protection Pool: Assuming 10-Percent Availability for Storage (acre-feet)

Year	Accumulated Volume	
	Baseline Demands[27]	2027 Static Demands
2027	7,538	7,538
2028	14,459	15,075
2029	20,764	22,613
2030	26,452	30,151
2031	31,607	37,689
2032	36,230	45,226
2033	40,318	52,764
2034	43,874	60,302
2035	46,540	67,840
2036	48,673	75,377
2037	50,272	82,915
2038	51,338	90,453
2039	51,871	97,991
2040	51,871	105,528
2041	51,871	113,066
2042	51,871	120,604
2043	51,871	128,142
2044	51,871	135,679
2045	51,871	143,217
2046	51,871	150,755
2047	51,871	158,293
2048	51,871	165,830
2049	51,871	173,368
2050	51,871	180,906
2051	51,871	188,444
2052	51,871	195,981
2053	51,871	203,519
2054	51,871	211,057
2055	51,871	218,595
2056	51,871	226,132
2057	51,871	233,670
2058	51,871	241,208
2059	51,871	248,746
2060	51,871	256,283

[27] The CRSS modeling erroneously includes unused tribal water associated with the Hopi Tribe. As such, the volumes here do not match 10 percent of the total in Table H-4 as they should. The maximum magnitude of the discrepancy is 868 acre-feet in 2039-2060.

Note that with the baseline demands, the maximum accumulation volume plateaus in 2040 when all users reach full use of their entitlements; in contrast, the maximum accumulation continues to linearly increase throughout the simulation period if the 2027 demands are maintained.

Additional information on the other types of water that may be stored in the Protection Pool, along with detailed modeling assumptions underlying the creation and use of Protection Pool volumes is provided in **Appendix B**, Modeling Assumptions: Lake Powell and Lake Mead Storage and Delivery of Conserved Water.

H.5 Summary

The Enhanced Coordination Alternative contemplates mechanisms to store Upper Basin unused tribal water in a Lake Powell conservation pool and Lower Basin unused tribal water in the Protection Pool in Lake Mead. The volume of unused tribal water available for storage in each basin is highly dependent on the assumed demand schedules and modeling assumptions developed for each storage mechanism. Stored unused tribal water would not be available for diversion and use by lower priority water users, including for some of the existing water uses of Arizona Priority 4 users (including tribes). Because of the sensitivity to these assumptions and the uncertainty associated with future demands, the volume of stored unused tribal water was evaluated using the baseline demand schedules—which generally increase over time—and compared to a scenario assuming continuation of historical demand levels.

This comparison shows that by 2060, approximately 143,049 – 382,378[28] acre-feet of additional unused tribal water could be stored in Lake Powell if Upper Basin tribal demands remain near historical levels compared to the baseline demand scenario, based on an assumed 5 to 15 percent contribution rate. As tribal demands grow over time, the volume of unused tribal water available for storage decreases correspondingly. Similarly, in the Lower Basin, approximately 204,412 acre-feet more unused tribal water could be stored in the Lake Mead Protection Pool if Lower Basin mainstream tribal demands remain near historical levels compared to the projected increases under the baseline demand scenario, based on an assumed 10 percent contribution rate. Both estimates depend on the assumed contribution rates, i.e., the portion of total unused water that can be stored.

[28] This represents the difference between the median and the maximum from **Figure H-1**, reflecting that the modeled Upper Basin volume of unused tribal water available for storage is also dependent on assumed future hydrology.

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