

# ARIZONA WATER BANKING AUTHORITY

## ANNUAL REPORT 2020



**Submitted  
July 2021**





# Arizona Water Banking Authority

## Annual Report

2020

**Honorable Douglas A. Ducey**  
**Governor of Arizona**

### **Members**

**Thomas Buschatzke**  
*Chair*

**Mark Clark**  
*Vice-chair*

**Alexandra Arboleda**  
*Secretary*

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**Senate President Karen Fann**  
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## ACRONYMS AND ABBREVIATIONS

ADWR	Arizona Department of Water Resources
Agreement to Firm	2005 Agreement to Firm Future Supplies between the Arizona Water
Ag	Agriculture
Amended Agreement to Firm	Amended Agreement to Firm Future Supplies executed March 17, 2010.
AMA	Active Management Area
APO	Annual Plan of Operation
AMWUA	Arizona Municipal Water Users Association
AWBA	Arizona Water Banking Authority
AWB Fund	Arizona Water Banking Fund
AWSA	Arizona Water Settlements Act of 2004
CAGR	Central Arizona Groundwater Replenishment District
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CRSS	Colorado River Simulation System
CRMMS	Colorado River Mid-term Modeling System
Community	Gila River Indian Community
GRIIDD	Gila River Indian Irrigation and Drainage District
GSF	Groundwater Savings Facility
ICS	Intentionally Created Surplus
ICUA	Intentionally Created Unused Apportionment
IGA	Intergovernmental Agreement
JRM	Joint Recovery Model
LBDCP	Lower Basin Drought Contingency Plan
LTSCs	Long-term storage credits
M&I	Municipal and Industrial
MCWA	Mohave County Water Authority
Nation	Tohono O'odham Nation
NIA	Non-Indian Agricultural
PSCP	Pilot System Conservation Program
Quantification Act	White Mountain Apache Tribe Water Rights Quantification Act
Reclamation	U.S. Bureau of Reclamation
RPAG	Recovery Planning Advisory Group
SNWA	Southern Nevada Water Authority
USF	Underground Storage Facility
WMAT	White Mountain Apache Tribe



## 1 SUMMARY

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The operation of the Arizona Water Banking Authority (AWBA) continues to evolve. In its initial phase, the AWBA primarily stored excess Central Arizona Project (CAP) water to create long-term storage credits (LTSCs) to mitigate the effects of future Colorado River shortages on municipal and industrial (M&I) water users, provide groundwater management benefits, assist the State in the settlement of Indian water rights claims, and assist both California and Nevada through interstate banking arrangements. In time, what began as opportunities to beneficially utilize the State's full entitlement of Colorado River water grew in certain cases into obligations the AWBA must fulfill. With reductions in excess CAP water supplies and increased probability of Colorado River shortages, the AWBA is transitioning to its next phase, focusing on making its LTSCs available to mitigate potential shortages.

The AWBA started calendar year 2020 with no available excess CAP water supplies but amended its Annual Plan of Operation (APO) to include unexpected supplies that became available mid-year. As a result, the AWBA recharged nearly 60,000 acre-feet of water within the Phoenix, Pinal, and Tucson Active Management Areas (AMA). The AWBA also purchased 27,080 acre-feet of LTSCs including 12,580 acre-feet in the Phoenix AMA and 14,500 acre-feet in the Tucson AMA. Additionally, the AWBA purchased 6,390 acre-feet of intentionally created surplus (ICS) firming credits pursuant to its 2019 agreement with the Gila River Indian Community. Cumulatively, the AWBA has accrued or acquired 4.36 million acre-feet (MAF) of LTSCs. Of this amount, 3.75 MAF are for Arizona uses and 0.61 MAF are interstate credits stored on behalf of the State of Nevada.

Throughout 2020, AWBA staff, as well as staff from the Arizona Department of Water Resources (ADWR) and Central Arizona Water Conservation District (CAWCD), consulted with the Recovery Planning Advisory Group (RPAG) on updates to the 2014 Joint Recovery Plan to provide additional clarity on recovery implementation. Activities included a review of updated hydrologic modeling analyses and estimated recovery capacity needs for both CAWCD recovery and CAP M&I subcontractors who elect to recover AWBA firming LTSCs using their own infrastructure or with a partner. This concept, referred to as Independent Recovery, resulted in legislation to simplify the operational steps required for Independent Recovery of AWBA LTSCs. Arizona Senate Bill 1147 passed unanimously and was signed by the Governor in April 2021. This legislation amends AWBA statutes by allowing the distribution of LTSCs directly to CAP M&I subcontractors for firming purposes. The updated recovery plan was released in May 2021.

Although conservation under the Lower Basin Drought Contingency Plan (LBDGP) and the 2007 Guidelines have improved water elevations in Lake Mead, exceptionally dry conditions have persisted throughout the Upper and Lower Colorado River Basins. The Bureau of Reclamation's (Reclamation) Colorado River water supply projections for April 2021 (Full Hydrology) indicate a Tier 1 shortage is most likely to be declared in the Lower Basin in 2022 (97% probability) and that a Tier 2 shortage could be in effect from 2024 (44% probability) through the remainder of the ten-year planning period (>27% probability). As a result, the AWBA could have a firming requirement ranging from an estimated 9,400 to 67,000 acre-feet per year over the next ten years. Furthermore, while the ten-year planning projections are based on April results, Reclamation's projections for June indicate an increased likelihood that a Tier 2 shortage could potentially occur as early as 2023. Shortage reductions during the planning period will likely impact the AWBA's obligation to firm supplies allocated to Tribes under the Arizona Water Settlements Act, as well as entities with CAP M&I subcontracts.

## 2 AWBA COMMISSION MEMBERS – CALENDAR YEAR 2020

**Thomas Buschatzke – Chair**  
As Director of Arizona Department of Water Resources



**Ray L. Jones – Vice-Chair**  
A person knowledgeable in water resource management

**Kathryn Sorensen – Secretary**  
Representing CAP M&I subcontracts



**Alexandra Arboleda**  
Representing CAWCD, designated by CAWCD Board President Lisa Atkins

**Mark Clark**  
Representing mainstream Colorado River contractors



### *Ex-officio Members*



**Senate President Karen Fann**



**Representative Gail Griffin**

## 3 2020 ACTIVITIES

The AWBA continued its quarterly meeting schedule in 2020 with meetings held on March 11, June 17, September 16, and December 2. A special meeting was held on January 21 for discussion and action on proposed legislation concerning the distribution of AWBA LTSCs. Commission member Kathryn Sorensen resigned from the Commission in October 2020.

### 3.1 AWBA 2020 WATER AVAILABILITY

The AWBA's initial APO for 2020 did not include storage of excess CAP water as these supplies were conserved in Lake Mead to assist in meeting Arizona's requirement to contribute 192,000 AF to Lake Mead under a Tier Zero condition. However, the AWBA amended its 2020 APO during the year to include storage of unexpected supplies in Lake Pleasant and water turned back from higher priority CAP water users. As a result, the AWBA recharged a total of 59,543 AF: 35,843 AF in the Phoenix AMA, 12,000 AF in the Pinal AMA and 11,700 AF in the Tucson AMA. The volume of water delivered to each storage facility is identified in [Appendix A](#). The AWBA utilized all available storage capacity in the Phoenix and Tucson AMAs and all available funding in the Pinal AMA.

### 3.2 LONG-TERM STORAGE CREDIT PURCHASES

In addition to storing excess CAP water supplies, the AWBA continued to seek other opportunities to secure firming supplies, including purchasing LTSCs.

#### 3.2.1 Purchases Pursuant to A.R.S. § 45-841.01

The Tohono O'odham Nation (Nation) must offer the AWBA 10 percent of any LTSCs deemed accruable from water stored at the Mission Mine Complex before ADWR can issue a final volume of LTSCs to the Nation. The price for each LTSC is equal to the AWBA's per acre-foot cost to deliver and store water at a state demonstration project located within 10 miles of the Nation's storage (i.e. Pima Mine Road Recharge Project) at the time of sale. These LTSCs may be used by the AWBA for M&I firming or for water management purposes. However, there is a restriction that they cannot be recovered within five miles of the exterior boundary of the reservation. The Nation did not offer credits for sale in 2020.

#### 3.2.2 Other LTSC Purchases

In 2020, the AWBA purchased a total of 27,080 acre-feet of LTSCs for a total cost of \$6.5 million. This amount includes 25,058 acre-feet of LTSCs purchased for CAP M&I firming: 12,580 acre-feet in the Phoenix AMA and 12,478 acre-feet in the Tucson AMA. Expenditures included just under \$3 million in Maricopa County water storage tax funds and \$3 million in Pima County Water storage tax funds. Additionally, the AWBA purchased 2,022 acre-feet of LTSCs in the Tucson AMA using withdrawal fees collected in that AMA. These LTSCs may also be used to firm CAP M&I supplies.

Cumulative LTSC purchases and expenditures are identified in [Appendix B](#).

### 3.3 TRIBAL FIRING PROGRAM

The AWBA is the State’s agent for meeting the State’s requirements under the Arizona Water Settlements Act of 2004 (AWSA). The AWSA required that the Secretary of the Interior and the State develop a Tribal Firing Program to ensure that CAP Non-Indian Agricultural (NIA) Priority water supplies made available to Tribes under the AWSA are firmed for a 100-year period (through 2107) to the equivalent of CAP M&I supplies. The AWBA has an obligation under the Tribal Firing Program to firm up to 15,000 acre-feet per year for the Gila River Indian Community (the Community) and up to 8,724 acre-feet per year for future settlements. Colorado River modeling projections have shown that CAP NIA Priority water supplies are the first supplies the AWBA will need to firm. To prepare, the AWBA has focused on accomplishing the steps necessary to ensure the state’s Tribal firing obligations will be met when the need arises. Staff also stayed abreast of the status of other ongoing settlement discussions, particularly any need to firm water supplies that may result from those settlements.

#### 3.3.1 Gila River Indian Community

Under the AWSA, the AWBA must firm CAP NIA Priority water for the Community whenever supplies are insufficient to meet demand. The *Agreement between the Secretary and the State of Arizona for the Firing of CAP Indian Water*, executed on November 15, 2007, defines the AWBA’s firing responsibilities, but also includes a provision that allows the AWBA to enter into separate agreements with the Community to carry out its firing obligation. Accordingly, an Intergovernmental Agreement (IGA) for firing was executed on June 16, 2015. The 2015 IGA uses the AWBA Ten-Year Plan as the basis for evaluating potential future shortages and outlines the steps that must be taken by each party as the potential for shortage approaches. By offering alternative firing options, the 2015 IGA provides flexibility in how a firing obligation can be satisfied during a shortage year. The AWBA entered into subsequent agreements to implement or add agreed-upon firing methods including an IGA in 2016 for the development of Firing Credits<sup>1</sup> and an IGA in 2019 for the development of ICS Firing Credits (2019 IGA), part of the offset component of Arizona’s LBDCP Implementation Plan.<sup>2</sup>

In 2020, pursuant to the 2019 IGA, the AWBA purchased 7,100 acre-feet of Firing ICS for \$1,755,120, which resulted in 6,390 acre-feet of ICS Firing Credits after losses. Withdrawal fees were used to purchase the Firing ICS, which included \$1,104,984 collected in the Phoenix AMA and \$650,136 collected in the Pinal AMA.

Cumulative firing credits and expenditures under these agreements are identified in [Appendix B](#).

#### **Southside Replenishment Bank**

In addition to firing requirements, the AWSA required that the AWBA deliver 15,000 acre-feet of water to the Community to establish the Southside Replenishment Bank. The Replenishment Bank can be used to

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<sup>1</sup> Agreement between the AWBA and the Community for the Development of Firing Credits effective June 30, 2016 through December 31, 2018. Firing credits developed under the agreement remain available until utilized to meet a firing obligation.

<sup>2</sup> Intergovernmental Agreement between the AWBA and the Gila River Indian Community for the Development of ICS Firing Credits executed May 20, 2019.

satisfy a replenishment obligation that may be incurred from excess groundwater pumping in the Southside Protection Zones, an area adjacent to the southern portion of the Community reservation. This obligation was fully satisfied in 2015. Cumulative expenditures for meeting this obligation totaled \$2,339,000.

### **Southside Replenishment Obligations**

In February 2020, the AWBA extinguished 9.78 acre-feet of LTSCs accrued at the Hohokam Irrigation and Drainage District GSF in the Pinal AMA to meet the replenishment obligation incurred in the Municipal and Industrial Eastern Protection Zone South for the 2018 reporting year. In October 2020, ADWR informed the AWBA that there were no replenishment obligations for the 2019 reporting year. Information regarding any replenishment obligations for the 2020 reporting year will not be available until October 2021 and will be reported in the 2021 Annual Report.

### **3.3.2 White Mountain Apache Tribe (WMAT)**

The White Mountain Apache Tribe Water Rights Quantification Act of 2010 (Quantification Act) was enacted on Dec. 8, 2010. The Quantification Act requires the AWBA firm up to 3,750 acre-feet per year of CAP NIA Priority water made available under the agreement. This obligation is part of the 8,724 acre-feet per year firming requirement identified for future settlements under the AWSA. This water is intended to be leased. Therefore, the AWBA's firming obligations will accrue to the lessees.<sup>3</sup> In 2017, AWBA staff initiated individual meetings with the lessees to discuss potential firming opportunities relative to their operational needs. Based on these discussions, flexibility will be a key consideration in developing firming agreements

An Environmental Impact Statement on the construction and operation of the WMAT Rural Water System (RWS Project) including the proposed Minor Flat Dam, reservoir, pipeline, and water treatment plant, must be completed before enforceability conditions can be met. In January 2018, the WMAT was given the authority under federal legislation (S.140) to utilize funds from another part of the Quantification Agreement for the planning, design, and construction of the RWS Project. In December 2019, due to unforeseen conditions at the site of the proposed dam, the Senate passed legislation extending the enforceability date of the Quantification Agreement by two more years to April 30, 2023.

### **3.3.3 Hualapai Tribe**

Legislation to approve and authorize the settlement of the Hualapai Indian Tribe's claims to the Colorado River (H.R.2459) was introduced to Congress by Rep. Tom O'Halleran (D-AZ-1) on May 1, 2019. A companion bill (S.1277) was introduced by Sen. Martha McSally (R-AZ) and co-sponsored by Sen. Kyrsten Sinema (D-AZ) in the Senate Committee on Indian Affairs. The House Natural Resources Subcommittee on Water, Oceans, and Wildlife held a hearing on June 26, 2019. However, no further progress was made on the bill. If the legislation is resubmitted and approved, the AWBA would have an obligation to firm 557.5 acre-feet per year of CAP NIA Priority water through 2107. The federal government would have an equivalent firming obligation.

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<sup>3</sup> Lessees receiving firmed NIA Priority CAP water under the Quantification Agreement include the cities of Avondale, Chandler, Gilbert, Glendale, Mesa, Peoria, Phoenix and Tempe.

### 3.4 RECOVERY PLANNING

Recovery Planning activities in 2020 continued to focus on a collaborative effort among the AWBA, CAWCD, ADWR, and the Recovery Planning Advisory Group (RPAG) to update the 2014 Joint Recovery Plan.<sup>4</sup> The update is intended to improve planning level certainty as the potential for Colorado River shortages approaches. Considerable progress was made in 2020 with quarterly RPAG meetings, stakeholder engagement and section-by-section reviews of the document. The updated recovery plan<sup>5</sup> was subsequently released in May 2021 (2021 Recovery Update). It serves as a companion document to the 2014 Joint Recovery Plan and includes updated hydrologic modeling as well as an analysis of the AWBA's firming responsibilities. It also incorporates key recovery concepts developed through the RPAG and summarizes the procedural steps for recovery implementation.

As the designated recovery agent for the AWBA, CAWCD is responsible for the recovery of water stored by the AWBA, both for intrastate firming and interstate banking with Nevada. During RPAG discussions, many CAP M&I subcontractors indicated a preference for utilizing their own infrastructure, or that of a partner, to recover AWBA LTSCs for firming, particularly in the near-term. This concept, referred to as Independent Recovery, resulted in proposed legislation by the Arizona Municipal Water Users Association (AMWUA) to allow for the distribution of AWBA LTSCs directly to subcontractors for this purpose. The proposed legislation was originally introduced as Senate Bill 1301 in January 2020. However, while the legislation passed unanimously through the Senate, the bill died when the Legislature adjourned Sine Die in March in response to the Covid-19 pandemic. The legislation was re-introduced in 2021 as Senate Bill 1147. It passed unanimously through the Legislature and was signed by Governor Ducey on April 14, 2021. While this statutory amendment adds the ability to distribute LTSCs to CAP M&I subcontractors, it also further stipulates that any LTSCs assigned to a subcontractor by the AWBA cannot be sold; and that the subcontractor is responsible for all recovery costs as well as fees assessed by ADWR for the assignment of the LTSCs.<sup>6</sup>

To further evaluate the role of Independent Recovery, staff conducted an analysis of M&I direct use demands to estimate the timing and volume of M&I recovery well capacity needed. The analysis evaluated potential recovery capacity needs for both CAWCD and subcontractors that indicated a preference for Independent Recovery. Staff conducted several meetings with CAP M&I stakeholders to review the analysis and solicit feedback on the demand assumptions used. The contributions of RPAG members and stakeholders in this process played an important role in determining how the recovery of AWBA LTSCs for M&I firming could be accomplished during times of shortage.

The 2021 Recovery Update also includes a new timeline to provide clarity on recovery implementation for CAP M&I firming. It provides a three-year planning horizon for recovery implementation activities, with triggers tied to Reclamation's April Five-Year Probability Table and April 24-Month Study. The timeline is intended to ensure shortage readiness by highlighting critical decision points, deadlines for finalizing firming agreements, and the timing of rate notifications for CAP recovery. The triggers are described in detail under the Ten-Year Plan section of this report.

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<sup>4</sup> Recovery of Water Stored by the Arizona Water Banking Authority: A Joint Plan by AWBA, ADWR and CAP, dated 4/14/2014 (2014 Joint Recovery Plan).

<sup>5</sup> 2021 Update: Recovery of Water Stored by the Arizona Water Banking Authority: A Joint Plan by AWBA, ADWR and CAP, dated 5/6/2021.

<sup>6</sup> A.R.S § 45-2457(B)(7) as amended by SB 1147.

### **3.5 ADOPTION OF 2021 PLAN OF OPERATION**

The AWBA 2021 Annual Plan of Operation (APO) was adopted on Dec. 2, 2020. In calendar year 2021, consistent with the provisions of the LBDCP, the Colorado River is operating under a Tier Zero condition. Accordingly, Arizona must contribute 192,000 acre-feet in water savings to Lake Mead. Since these contributions come largely from excess CAP water supplies, there was no water available to CAWCD's Statutory Firming Pool that is utilized by the AWBA. As a result, the 2021 APO focuses on LTSC purchases and developing ICS firming credits to make progress on its CAP M&I and Tribal firming goals. The 2021 APO provides for the development of an estimated 45,060 acre-feet of credits at a total estimated cost of \$10.84 million.

Credit acquisitions are anticipated to occur in the Phoenix and Tucson AMAs. Potential LTSC purchases total 42,610 acre-feet and are estimated to cost just over \$10.14 million. The CAWCD has reserved \$10 million in water storage tax funds for this purpose: \$4 million in Maricopa County funds and \$6 million in Pima County funds. Total available funds also include an estimated \$143,900 in withdrawal fees collected in the Tucson AMA. Additionally, the AWBA anticipates developing 2,450 acre-feet of ICS Firming credits for approximately \$693,900 using withdrawal fee revenues collected in the Phoenix AMA.

The APO does not include the distribution of AWBA credits for firming purposes since there were no reductions to supplies that are firming by the AWBA. Additionally, the Southern Nevada Water Authority did not request the development of intentionally created unused apportionment. Therefore, there will be no LTSCs recovered for interstate purposes.

## 4 REVENUES AND EXPENDITURES

A.R.S § 45-2425 mandates the various sources of monies for the Arizona Water Banking (AWB) Fund. The AWB Fund is administered by the AWBA. In 2019, the AWBA obtained its funding from the following sources:

1. Fees for groundwater pumping, known as withdrawal fees, are collected within the Phoenix, Pinal and Tucson AMAs and charged for water banking purposes at \$2.50 per acre-foot in the Phoenix and Tucson AMAs and up to \$2.50 per acre-foot in the Pinal AMA. Withdrawal fees can be used by the AWBA for water-management purposes, which includes Tribal firming and CAP M&I firming. LTSCs accrued with these funds must be used to benefit the AMA in which the monies were collected.

The Arizona Legislature authorized the use of approximately \$1.4 million in the AWB Fund to support both ADWR (\$1.2 million) and the Arizona Navigable Stream Adjudication Commission (\$200,000) for the 2019/2020 fiscal year. Any unused monies are subsequently redistributed to the AWBA. Additionally, as a component of DCP, fees levied in the Pinal AMA during calendar years 2020 through 2026 will not be made available to the AWBA but will be used instead to support groundwater infrastructure and irrigation efficiency projects in the Pinal AMA.<sup>7</sup>

2. As in previous years, the CAWCD Board resolved to retain the water storage taxes levied and collected for the 2019-2020 tax year and to use the funds for meeting operating, maintenance (O&M) and replacement and/or repayment costs of the Central Arizona Project, which includes water storage by the AWBA. The CAWCD Board had also reserved \$6 million in water storage tax revenues to support AWBA purchases of LTSCs for CAP M&I Priority firming. Nearly all of these funds were deposited to the AWB Fund for this purpose. LTSCs accrued using water storage tax funds must be used to benefit the county in which the funds were collected.
3. The AWBA did not receive a general fund appropriation in 2020.

**Table 1** shows the monies the AWBA collected, monies made available by CAWCD and the monies expended in 2020 by source of funds. **Table 2** shows the total monies received, expended and remaining through December 2020 by source of funds. Remaining funds are committed to activities identified in the APO adopted for the current year.

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<sup>7</sup> A.R.S. § 45-611(C)(3), § 45-613(D) and § 45-615.01



**Table 1. Monies Collected, Made Available, and Expended in 2020 by Source of Funds**

Source of Funds	Carryover	Collected/Made Available	Expended
<b>General Fund</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>State Tribal FIRMing Appropriation</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Interstate Water Banking<sup>1</sup></b>	<b>\$23,415</b>	<b>\$432</b>	<b>\$0</b>
<b>Water Storage Tax</b>			
Maricopa County	\$12	\$ 10,961,398	\$10,961,410
Pinal County	\$0	\$2,124,000	\$2,124,000
Pima County	\$0	\$5,533,200	\$5,533,200
Subtotal	<b>\$12</b>	<b>\$18,618,598</b>	<b>\$18,618,610</b>
<b>Groundwater Withdrawal Fees<sup>2</sup></b>			
Phoenix AMA	\$6,069	\$1,330,639	\$1,104,984
Pinal AMA	\$412	\$812,292	\$650,136
Tucson AMA	\$423,698	\$263,938	\$624,746
Subtotal	<b>\$430,179</b>	<b>\$2,406,870</b>	<b>\$2,379,866</b>
<b>TOTAL<sup>3</sup></b>	<b>\$453,607</b>	<b>\$21,025,899</b>	<b>\$20,998,476</b>

<sup>1</sup> Includes \$253 in interest for 2020 and Lehman Brothers bankruptcy distribution of \$179.

<sup>2</sup> Funds collected includes \$373,100 in legislative allocations unused by ADWR in FY 2020 .

<sup>3</sup> Totals may not sum due to rounding.

**Table 2. Cumulative Monies Collected, Made Available, Expended and Remaining Available through 2020**

Source of Funds	Collected/Made Available	Expended	Remaining <sup>1</sup>
<b>General Fund</b>	<b>\$11,100,865</b>	<b>\$11,100,865</b>	<b>\$0</b>
<b>State Tribal FIRMing</b>	<b>\$2,578,389</b>	<b>\$2,578,389</b>	<b>\$0</b>
<b>In-Lieu Fund - MCWA Pre-payments</b>	<b>\$5,123,480</b>	<b>\$5,123,480</b>	<b>\$0</b>
<b>Interstate Water Banking-NV<sup>2</sup></b>	<b>\$112,408,777</b>	<b>\$112,384,930</b>	<b>\$23,847</b>
<b>Shortage Reparations – NV</b>	<b>\$8,001,948</b>	<b>\$8,001,948</b>	<b>\$0</b>
<b>Water Storage Tax<sup>3</sup></b>			
Maricopa County	\$142,416,526	\$142,416,526	\$0
Pinal County	\$16,585,741	\$16,585,741	\$0
Pima County	\$64,823,037	\$64,823,037	\$0
Subtotal	<b>\$223,825,304</b>	<b>\$223,825,304</b>	<b>\$0</b>
<b>Groundwater Withdrawal Fees</b>			
Phoenix AMA	\$34,457,542	\$34,225,818	\$231,724
Pinal AMA	\$26,013,601	\$25,851,033	\$162,568
Tucson AMA	\$10,837,782	\$10,774,892	\$62,890
Subtotal	<b>\$71,308,925</b>	<b>\$70,851,743</b>	<b>\$457,183</b>
<b>TOTAL<sup>4</sup></b>	<b>\$434,347,688</b>	<b>\$433,866,659</b>	<b>\$481,030</b>

<sup>1</sup> Remaining funds include monies committed for the 2021 AOP.

<sup>2</sup> Pursuant to the Third Amended Agreement, remaining funds are non-reconcilable for interstate purposes. They include accrued interest and recovered Lehman Brothers bankruptcy monies and are subject to legislative authorization prior to use by the AWBA.

<sup>3</sup> Monies collected by CAWCD made available to AWBA through direct deposit into the AWB Fund or as an expenditure by CAWCD to offset AWBA delivery and storage costs as part of CAP O&M costs.

<sup>4</sup> Totals may not sum due to rounding.

## 5 LONG-TERM STORAGE CREDIT DEVELOPMENT

The AWBA has established LTSC accounts with ADWR for each AMA. LTSCs are issued for 95 percent of the water that is stored. After LTSCs are issued, AWBA staff allocates the LTSCs to the appropriate sub-accounts based on the source of funding used to accrue the LTSCs. The AWBA also purchases LTSCs stored by other entities. The number and location of LTSCs for 2020, which were limited to purchase acquisitions, are listed in **Table 3**. Cumulative LTSCs accrued or acquired by the AWBA through December 2020 are listed in **Table 4**.

**Table 3. Number and Location of LTSCs Acquired in 2020 (AF)**

Funding Source	Phoenix AMA	Pinal AMA	Tucson AMA	Total
Water Storage Tax <sup>1</sup>	46,446	10,170	22,906	79,522
Withdrawal Fees	-	-	2,588	2,588
General Fund	-	-	-	-
<b>Intrastate TOTAL</b>	<b>46,446</b>	<b>10,170</b>	<b>25,494</b>	<b>82,109</b>
Interstate - Nevada	-	-	-	-
<b>TOTAL<sup>2</sup></b>	<b>46,446</b>	<b>10,170</b>	<b>25,494</b>	<b>82,109</b>

<sup>1</sup> An additional 1,000 AF of LTSCs could be issued by ADWR: 3 AF for the Phoenix AMA and 997 AF for the Pinal AMA.

<sup>2</sup>Totals may not sum due to rounding.

**Table 4. Cumulative LTSCs Accrued or Acquired through December 2020 (AF)**

Funding Source	Phoenix AMA	Pinal AMA <sup>1</sup>	Tucson AMA	Total
Water Storage Tax	1,565,592	233,797	507,934	2,307,323
Withdrawal Fees	339,724	434,757	112,769	887,249
General Fund <sup>2</sup>	42,316	306,968	54,546	403,830
<b>Other Intrastate:</b>				
Tribal Firming Appropriation	-	-	28,481	28,481
Shortage Reparation	20,642	60,507	28,340	109,489
GSF Operator Full Cost Share	-	14,125	-	14,125
<b>Intrastate TOTAL</b>	<b>1,968,273</b>	<b>1,050,153</b>	<b>732,071</b>	<b>3,750,498</b>
Interstate – Nevada	60,021	440,241 <sup>3</sup>	113,584	613,846
<b>TOTAL<sup>4</sup></b>	<b>2,028,294</b>	<b>1,490,394</b>	<b>845,655</b>	<b>4,364,344</b>

<sup>1</sup> Includes restoration of 282.70 AF of LTSCs previously withheld from storage occurring in 2018: 56.29 AF in water storage tax LTSCs and 226.41 AF in Withdrawal Fee LTSCs.

<sup>2</sup> Includes 256,174 AF of LTSCs reserved for MCWA in the Pinal AMA pursuant to firming agreements dated February 4, 2005 and December 8, 2010.

<sup>3</sup> Includes 50,000 AF of LTSCs transferred from CAWCD pursuant to Amended Agreement for Interstate Water Banking.

<sup>4</sup> Totals may not sum due to rounding.

Since its inception, the AWBA has focused its efforts on developing LTSCs for firming purposes. At the time, the AWBA identified 2.7 MAF of LTSCs as a reasonable amount of credits to firm the CAP M&I subcontracts for 100 years. This volume was divided based on a pro-rata distribution of CAP M&I subcontracts by county as follows: 58 percent Maricopa County (1.57 MAF), 32 percent Pima County (864 KAF), and 9 percent Pinal County (243 KAF). The AWBA also identified 420 KAF of LTSCs as a reasonable amount to firm the on-River communities for 100 years.

The AWBA has periodically re-evaluated these firming targets based on changing hydrologic conditions and Colorado River operating criteria. In 2020, the AWBA conducted a hydrologic modeling analysis to evaluate the impacts of the additional shortage contributions required under the LBDP, assuming the LBDP is extended for 100 years (now through 2120). The AWBA evaluated two different scenarios based on Upper Basin (UB) demands; 1) No changes to the 2007 Upper Colorado River Commission (UCRC) UB demand schedule inherent in Reclamation's 2019 Colorado River Simulation System (CRSS) model ("UB As-Is"), and 2) adjusting future UB projected demands in the CRSS model by applying a 15 percent reduction to the UCRC demand schedule to reflect actual and provisional unverified uses since 1999 ("UB 15% Reduction"). Additional modeling assumptions are identified in [Appendix C](#).

While the AWBA has essentially met or nearly met its original CAP M&I firming targets in the Phoenix and Pinal AMAs, the results of the analysis suggest that the AWBA would likely need significantly more water to firm supplies for CAP M&I subcontractors in the future: an increase of 20 percent under the UB 15% Reduction scenario and 90 percent under the UB As-Is scenario. In the Tucson AMA, this increase will put the AWBA even further behind in its ability to firm supplies with roughly only 56 percent of the original firming target achieved.

In contrast, the projected mean firming volumes have decreased for on-River communities under both scenarios. The modeling results show the AWBA may only need 221,000 acre-feet to firm supplies under the UB 15% reduction scenario (90% decrease) and 359,000 acre-feet (17% decrease) under the UB As-Is scenario. This reduction is due primarily to the inclusion of the 2006 Director's Shortage Sharing Recommendation in the modeling analysis, which bases shortage reductions to Fourth Priority on-River M&I users on contract volumes rather than individual annual demands. As a result, shortage reductions are absorbed by CAP water users until Fourth Priority on-River M&I users grow into their entitlements.

With enforceability of the AWSA in December 2007, the AWBA assumed the obligation to firm up to 23,724 acre-feet per year of CAP NIA Priority water supplies for 100 years (through 2107). Of this amount, up to 15,000 acre-feet per year will be made available to the Gila River Indian Community (Community) and 8,724 acre-feet per year allocated for future settlements. Based on the 2006 Indian Firming Study Commission Report, it was estimated that approximately 550,000 acre-feet would be needed to firm these supplies: 350,000 acre-feet for the Community and 200,000 acre-feet for future settlements. The 2020 modeling results indicate that the AWBA's potential firming obligation could increase to 717,000 acre-feet (30%) under the UB 15% Reduction scenario and 907,000 acre-feet (65%) under the UB As-Is scenario. The portion of these firming volumes needed to firm supplies for the Community is approximately 456,000 acre-feet under the UB 15% reduction scenario and 577,000 acre-feet under the UB As-is scenario, with the remainder being for future Tribal settlements.

In addition to firming, the AWSA also required that the state contribute \$3 million in cash or in-kind services to assist the Secretary in meeting the Federal obligation to the Tohono O'odham Nation. Pursuant to the AWBA's firming agreement with the Secretary, the parties agreed to accomplish this requirement through the accrual of an equivalent amount of LTSCs that would be distributed to the Secretary during shortages. This obligation

was satisfied in 2009. Lastly, as discussed earlier, the AWBA is required to directly deliver 15,000 acre-feet of water to the Community to establish the Southside Replenishment Bank. This obligation was satisfied in 2015.

**Table 5** shows the volume of credits the AWBA accrued through 2020 to meet its projected firming responsibilities and obligations. Progress on individual firming responsibilities or obligations varies due to the availability of funds, limitations on how each funding source may be used, and storage capacity that has been available in each AMA historically.

**Table 5. Uses of Credits Accrued through December 2020 and Estimated Firming Volumes**

Location and Objective	Funding Source	Credits Accrued or Dedicated <sup>1</sup> (AF)	Estimated Firming Volumes through 2120 (AF)	
			“UB 15% Reduction”	“UB As-Is”
<b>CAP M&amp;I Firming</b>				
Phoenix AMA	Water Storage Tax collected by County	1,565,592	1,885,000 – 2,985,000	
Pinal AMA		233,797	293,000 – 463,000	
Tucson AMA		507,934	1,040,000 – 1,647,000	
<b>On-River M&amp;I Firming<sup>2</sup></b>	General Fund	403,830	221,000 – 359,000	
<b>Tribal Settlement Obligations:</b>				
Gila River Indian Community <sup>3</sup> up to 15 KAF/year		<b>168,974</b>	456,000 – 577,000	
	General Fund	0		
	Withdrawal Fees	168,974		
Future Settlements <sup>4</sup> - up to 8.7 KAF/year		<b>0</b>	261,000 – 330,000	
	General Fund	0		
	Withdrawal Fees	0		
Federal Assistance (SAWRSA)- \$3 million provided in LTSCs		<b>34,102</b>	N/A	
	General Fund	28,481		
	Tucson W/Fees	5,621		
Southside Replenishment Bank 15 KAF direct delivery		<b>15,000</b>	N/A	
	General Fund	1,342		
	Pinal W/Fees	13,658		
<b>Groundwater Management<sup>5</sup></b>				
Phoenix AMA	Withdrawal Fees collected by AMA	251,411	N/A	
Pinal AMA		417,670		
Tucson AMA		107,148		
Shortage Reparations (\$8M)	Agreement w/NV	109,489	N/A	
Pinal Redirect Credits <sup>6</sup>	N/A	14,125	N/A	

<sup>1</sup> Includes purchased LTSCs and firming credits, including ICS firming credits, developed pursuant to the IGA.

<sup>2</sup> A total of 256,174 acre-feet of LTSCs reserved for MCWA.

<sup>3</sup> LTSCs accrued from storage at the Gila River Indian IDD GSF: Phoenix AMA 88,313 AF, Pinal AMA 17,077. Includes 44,000 AF of firming credits developed on Community lands and 19,584 AF of ICS Firming credits.

<sup>4</sup> Settlement agreements are not yet enforceable, therefore LTSCs have not yet been dedicated for this purpose.

<sup>5</sup> Withdrawal fees could be utilized for M&I firming and/or Tribal settlement obligations if needed. Total reflects 9.78 AF of LTSCs used in the Pinal AMA for replenishment.

<sup>6</sup> LTSCs accrued from AWBA water provided to Pinal AMA GSFs at full cost to the GSF operators. These credits are currently identified for use in the Tucson AMA.

## 6 LONG-TERM STORAGE CREDIT DISTRIBUTION OR EXTINGUISHMENT

The LTSCs developed by the AWBA have been identified for five purposes:

- Firming CAP M&I priority subcontracts;
- Firming post-1968 Colorado River domestic use contracts;
- Firming the State’s obligation under the AWSA, including LTSCs accrued specifically for the State’s obligation to the United States;
- Assisting in fulfilling the water management objectives set forth in Chapter 2 of Title 45, Arizona Revised Statutes; and
- Interstate water banking purposes pursuant to agreements with Nevada.

LTSCs accrued by the AWBA for firming purposes may be distributed or extinguished under the following circumstances: if a shortage is declared on the Colorado River system and demand exceeds supply, if there is a water shortage as defined under the AWSA, or if there is an operational disruption of the CAP. As there were no shortages or unplanned CAP outages in 2020, the AWBA did not distribute or extinguish LTSCs for these purposes. Additionally, no LTSCs were distributed or extinguished in 2020 for water-management purposes or the development of intentionally created unused apportionment for interstate banking purposes.

Although the AWBA is authorized to develop or loan LTSCs pursuant to water banking services agreements, the AWBA has not yet entered into such agreements. Therefore no LTSCs were developed or distributed for this purpose in 2020.

## 7 Ten-Year Plan

Pursuant to A.R.S. §45-2426, the AWBA is required to prepare a ten-year plan (Ten-Year Plan) that describes any water banking services and interstate water banking it intends to undertake during the ten-year period in addition to storing Colorado River water for its three main purposes: (1) protecting Arizona’s M&I water users against future water shortages on the Colorado River and disruptions of operation of the CAP, (2) fulfilling Arizona’s water-management objectives as set forth in the Groundwater Code and (3) making water available to implement the settlement of water rights claims by Tribal communities within the state. The Ten-Year Plan must also provide an analysis of the AWBA’s ability to complete those activities. The Ten-Year Plan is prepared only for planning purposes and is updated annually based on current information.<sup>8</sup>

This Ten-Year Plan analyzes potential activity for the planning period 2022 through 2031 and will be utilized in the development of the 2022 APO. Additionally, the Ten-Year Plan is an essential tool for providing advance notice of potential near-term firming obligations or commitments and in developing future policies to guide AWBA activities. The AWBA’s firming responsibilities are triggered when reductions to Arizona’s Colorado River supplies intersect demand by on-River fourth priority users, CAP M&I Priority users, and Tribal contractors firming by the State under the AWSA.

The AWBA is not expected to have excess CAP water available under this Ten-Year Plan. However, the AWBA will continue to explore alternative resources for credit development. This Ten-Year Plan estimates the AWBA could develop approximately 168,000 acre-feet of credits for M&I and Tribal firming purposes based on the current agreements in place. Reclamation’s April 2021 CRMMS/CRSS probabilistic projections, under the Full Hydrology scenario, indicate the AWBA may have a cumulative firming requirement of approximately 438,000 acre-feet during this Ten-Year Plan. The estimated cumulative Tribal firming requirement is approximately 158,000 acre-feet and the estimated cumulative M&I firming requirement is approximately 279,000 acre-feet. Based on the Stress Test Hydrology scenario used to evaluate a drier future, current projections indicate the AWBA may have a cumulative firming requirement of approximately 579,000 acre-feet during this Ten-Year Plan. The estimated cumulative Tribal firming requirement is approximately 159,000 acre-feet and the estimated cumulative M&I firming requirement is approximately 420,000 acre-feet.

The Ten-Year Plan is comprised of two primary components, credit development and credit distribution. AWBA credits will be distributed for firming purposes or the creation of Intentionally Created Unused Apportionment (ICUA) associated with interstate water banking.

### 7.1 CREDIT DEVELOPMENT

The credit development plan is dependent on water availability, storage capacity and funding availability. When planning to store water, the AWBA must consider the availability of water, funding and storage capacity as they are interdependent. The availability of one, or lack thereof, will ultimately affect the significance of the other in developing the Ten-Year Plan. For example, if there is no excess CAP water available to the AWBA, the availability of storage capacity is not relevant. Similarly, if water is available for storage, funding limitations could affect the amount of water stored in each AMA. The availability of funding will be especially important when using credit development methods other than traditional water storage.

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<sup>8</sup> AWBA APOs and Annual Reports for past years can be accessed on the AWBA website.

### 7.1.1 Water Availability

Due to anticipated future hydrologic conditions, the AWBA is not expected to have excess CAP water available during the next ten years. Consequently, this Ten-Year Plan does not include water storage estimates. While the AWBA could store CAP water that is turned back during the year, the availability of this water cannot be known in advance and is therefore not a consideration in the Ten-Year Plan. Likewise, the AWBA could store water on behalf of others using supplies made available by those entities, such as Nevada’s unused Colorado River entitlement. However, since that storage would not impact the use of excess CAP supplies, it is also not a consideration in this Ten-Year Plan. If water does become available, the AWBA should have sufficient funding and storage capacity available to store the water.

### 7.1.2 Funding

Funding for water storage that benefits Arizona (intrastate storage) comes from three sources: water storage taxes (i.e. 4-cent water storage tax), groundwater withdrawal fees and general fund appropriations. The availability of revenues from each source varies annually. Additionally, there are restrictions on how each funding source can be used. Funding for interstate banking is received at the time of storage.

#### **Water Storage Taxes**

Pursuant to A.R.S. § 48-3715.03(B), ad valorem taxes for water storage levied and collected by CAWCD, not utilized for repayment or O&M costs of the Project, shall be deposited into three subaccounts held by the AWBA for each of the three counties in which the taxes are collected. This Ten-Year Plan assumes CAWCD will continue to retain the water storage tax revenues collected, but continue to offset AWBA water delivery and storage costs as part of O&M if water becomes available, and deposit funds into the AWB Fund for LTSC purchases. In accordance with the IGA between the AWBA, ADWR and CAWCD,<sup>9</sup> the AWBA must request funds from CAWCD annually for all planned LTSC purchases for the following year. For calendar year 2022, the AWBA requested \$7 million: \$4 million in Maricopa County Water Storage Tax funds and \$3 million in Pima County Water Storage Tax funds.

CAWCD has the authority to levy the water storage tax through 2030. The tax may be levied at a rate of up to 4-cent per \$100 of assessed property value through tax year 2024 and up to 3-cent for the remainder of the term. LTSCs accrued with these funds are used to firm CAP M&I supplies during shortages.

#### **Groundwater Withdrawal Fees**

Pursuant to A.R.S. § 45-611(3), the Director of ADWR collects a groundwater withdrawal fee for water banking purposes in the Phoenix and Tucson AMAs equal to \$2.50 per acre-foot per year and up to \$2.50 per acre-foot per year in the Pinal AMA. However, as previously noted, withdrawal fees will not be levied for AWBA purposes in the Pinal AMA through 2026. Additionally, in recent years, the Arizona Legislature has authorized the use of \$1.4 million in annual withdrawal fee revenues for other purposes. While future actions of the legislature

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<sup>9</sup> Intergovernmental Agreement among the Arizona Department of Water Resources, Arizona Water Banking Authority and Central Arizona Water Conservation District, executed January 3, 2019.

cannot be known, this Ten-Year Plan assumes withdrawal fees will continue to be reallocated for other state uses. Any unused monies are redistributed to the AWBA in subsequent fiscal years.

This Plan assumes an estimated \$2.4 million in withdrawal fees is collected annually prior to any legislative transfers with \$2 million collected in the Phoenix AMA and \$390,000 collected in the Tucson AMA.<sup>10</sup> The AWBA can utilize withdrawal fees to further the water management objectives of the AMAs, including firming for CAP M&I subcontracts and implementing Tribal water rights settlements when legislative appropriations are not available. When distributed or extinguished, these credits can only be used for the benefit of the AMA in which the monies were collected.

### **General Fund Appropriations**

Pursuant to A.R.S. § 45-2423.B.10, the AWBA can submit a request for a General Fund appropriation each year. While the AWBA may request General Fund appropriations during this planning period, receipt of an appropriation cannot be assured. Absent future General Fund appropriations, any credit development for Tribal firming would require the use of groundwater withdrawal fees.

### **Funding for Interstate Storage**

Pursuant to the Third Amended and Restated Agreement for Interstate Water Banking among the AWBA, Southern Nevada Water Authority (SNWA) and the Colorado River Commission of Nevada (Third Amended Agreement), the AWBA will collect all charges for administrative services and for delivery and storage of water. Costs for interstate banking will be incorporated into the APO.

## **7.1.3 Storage Capacity**

Based on recharge permit volumes and discussions with AWBA storage partners, the AWBA could have a cumulative volume of 154,500 acre-feet per year of storage capacity available at GSFs and 139,000 acre-feet per year of capacity available at USFs. However, actual storage capacity volumes available to the AWBA in any given year will depend on storage by other entities. If recent trends continue, increased storage by higher priority water users will reduce the storage capacity available to the AWBA. If excess CAP water becomes available to the AWBA, or CAP water is turned back during a year, the AWBA anticipates there will be enough capacity available. The AWBA's 2021 Water Storage Facility Inventory report will include a complete assessment of available storage capacity.

Details on AWBA storage partners, storage permits, and capacity available are described in [Appendix D](#).

## **7.1.4 Credit Development**

The AWBA will have accrued or acquired an estimated 4.47 MAF of credits through 2021. **Table 6** below identifies all available credits by firming responsibilities and objectives, including LTSCs and ICS Firming credits developed pursuant to the AWBA's agreements with the Gila River Indian Community (Community).

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<sup>10</sup> Withdrawal fee revenues vary from year to year. The assumptions used in this Ten-Year Plan are based on the average revenues over the last five years (2016 through 2020).



**Table 6. Existing AWBA Credits through 2021 (AF)**

	Phoenix AMA	Pinal AMA	Tucson AMA	Total
<b>M&amp;I Firming</b>	1,572,092	233,797	508,769	2,314,658
<b>On-River Firming</b>	42,316	306,968	54,546	403,830
<b>Tribal Firming</b>	148,024	25,146	34,102	207,272
<b>Water Management</b>	251,411	417,670	107,738	776,819
<b>Shortage Reparation</b>	20,642	60,507	28,340	109,489
<b>Other</b>	-	14,125	-	14,125
<b>Interstate</b>	60,021	440,241	113,584	613,846
<b>Total</b>	2,094,506	1,498,454	847,079	4,440,039

<sup>1</sup> Credit accrual for 2021 is estimated based on anticipated ICS firming credits and LTSC purchases.

Based on the volumes identified in its current agreements, the AWBA could purchase up to 32,415 acre-feet of LTSCs in 2022 and up to 11,415 acre-feet in 2023, which could result in an additional 19,700 acre-feet in the Phoenix AMA and 24,130 acre-feet in the Tucson AMA. However, the actual amount of LTSCs purchased cannot be known in advance because the decision to purchase and/or sell LTSCs is determined annually between the parties and subject to funding availability. As indicated earlier, CAWCD has reserved \$7 million in water storage tax funds for AWBA LTSC purchases in 2022: \$4 million in Maricopa County funds and \$3 million in Pima County funds. An estimated \$164,000 in withdrawal fees collected in the Tucson AMA in 2022 could also be used for this purpose.

**Table 7** identifies the volume of credits the AWBA may develop during the planning period. Progress on individual firming responsibilities or obligations varies due to the availability of funds, limitations on how each funding source may be used, and storage capacity available in each AMA.

Recent hydrologic modeling has shown the AWBA will likely need significantly more LTSCs to firm supplies during shortages. Since excess CAP supplies are not anticipated to be available during the next ten years, this Ten-Year Plan assumes the AWBA will continue to develop credits through alternative means. The decision to purchase LTSCs will be determined annually as part of the APO.

The AWBA will continue to fund the development of the remaining 21,220 acre-feet of the 45,000 total acre-feet of ICS firming credits identified under its agreement with the Community. Although this Ten-Year Plan focuses on the development of credits through LTSC purchases, the AWBA will continue to store water in all AMAs consistent with its established priorities if water supplies become available during the planning period.

**Table 7. Uses of Credits Accrued through December 2031 and Estimated Firming Volumes**

Location and Objective	Funding Source	Estimated Credits Accrued through 2031 (AF) <sup>1</sup>	Estimated Firming Volumes through 2120 (AF) <sup>7</sup>	
			“UB 15% Reduction”	“UB As-Is”
<b>CAP M&amp;I Firming</b>				
Phoenix AMA	Water Storage Tax collected by County	1,591,792	1,885,000 – 2,985,000	
Pinal AMA		233,797	293,000 – 463,000	
Tucson AMA		621,634	1,040,000 – 1,647,000	
<b>On-River M&amp;I Firming<sup>2</sup></b>	General Fund	403,830	221,000 – 359,000	
<b>Tribal Settlement Obligations:</b>				
Gila River Indian Community up to 15 KAF/year	General Fund Withdrawal Fees	194,390 <sup>3</sup>	456,000 – 577,000	
		0		
Future Settlements <sup>4</sup> - up to 8.7 KAF/year	General Fund Withdrawal Fees	0 0 0	261,000 – 330,000	
Federal Assistance (SAWRSA) - \$3 million provided in LTSCs	General Fund Tucson W/Fees	28,481 5,621		
Southside Replenishment Bank 15 KAF direct delivery	General Fund Pinal W/Fees	15,000 1,342 13,658		
<b>Groundwater Management<sup>5</sup></b>				
Phoenix AMA	Withdrawal Fees collected by AMA	251,411		
Pinal AMA		417,670		
Tucson AMA		121,845		
<b>Other:</b>	Agreement with Nevada			
Shortage Repairs (\$8M)		109,489		
Pinal Redirect Credits <sup>6</sup>	N/A	14,125		

<sup>1</sup> Includes purchased LTSCs and firming credits, including ICS firming credits, developed pursuant to the IGA.

<sup>2</sup> A total of 256,174 acre-feet of LTSCs reserved for MCWA.

<sup>3</sup> LTSCs accrued from storage at the Gila River Indian IDD GSF: Phoenix AMA 88,313 acre-feet, Pinal AMA 17,077. Also includes 44,000 acre-feet of firming credits developed on Community lands and 45,000 acre-feet of ICS Firming credits.

<sup>4</sup> Settlement agreements are not yet enforceable, therefore LTSCs have not yet been dedicated for this purpose.

<sup>5</sup> Withdrawal fees could be utilized for M&I firming and/or Tribal settlement obligations if needed. Total reflects 9.78 AF of LTSCs used in the Pinal AMA for replenishment.

<sup>6</sup> LTSCs accrued from AWBA water provided to Pinal AMA GSFs at full cost to the GSF operators. Credits for use in the Tucson AMA.

<sup>7</sup> Based on hydrologic modeling assumptions identified in [Appendix C](#).

## 7.2 CREDIT DISTRIBUTION OR EXTINGUISHMENT

The Ten-Year Plan is an important tool for providing advance notice of potential near-term firming obligations and developing future policies. Water Bank firming occurs when Colorado River water supplies are insufficient to meet demand for CAP users and on-River fourth priority users, for which the AWBA has firming responsibilities. Factors affecting AWBA firming obligations include Colorado River system hydrologic conditions, the supply available to Arizona and Colorado River demands within Arizona. To prepare for a range of future hydrologic possibilities, the AWBA estimates firming volumes based on the Full Observed Hydrology, with over one hundred years of historical inflows (1906-2019) and the Stress Test Hydrology, which samples a shorter, drier period of roughly thirty years of historical inflows (1988-2019). Firming projections for the Ten-Year Plan are developed based on an analysis of supply and demand, under each set of hydrologic conditions.

Reclamation’s April 2021 projections are developed using a combination of reservoir operations models. The Colorado River Mid-term Modeling System (CRMMS) and Colorado River Simulation System (CRSS) are both used to develop a probabilistic forecast of the supply available to Arizona based on the most likely system conditions and operating tier each year. System conditions for April through December of 2021 are simulated using the CRMMS, in MTOM mode<sup>11</sup>, to determine 2021 end-of-year system conditions. The results are imported into CRSS to simulate system conditions from January 2022 onward. The Joint Recovery Model (JRM), developed jointly by ADWR, AWBA, and CAWCD, is used to estimate Colorado River demands within Arizona’s priority system and evaluate the timing, frequency and magnitude of shortages that may result in AWBA firming.

**7.2.1 Timing, Magnitude and Likelihood of Firming**

Reclamation’s April 2021 projections, based on the Full Hydrology, are used as the baseline scenario for the AWBA Ten-Year Plan. As identified in **Table 8**, the April 2021 forecast developed based on the Full Observed Hydrology projected a Tier 1 shortage as the most likely operating condition in 2022 and 2023. However, due to decreased forecasted April-July inflows to Lake Powell, the June 24-month study now indicates a Tier 2a shortage is the most probable operating condition for 2023. Projections for 2021 Lake Powell total inflows decreased from 4.9 MAF in the April forecast to 3.37 MAF in the June 24-month study. The most current projections from the June 24-month study indicate that Water Year 2021 might finish the year in the top three lowest Lake Powell inflows on record. Extremely dry conditions in 2021 will likely result in 7.48 MAF releases from Lake Powell to Lake Mead in both 2022 and 2023, increasing the probability of a Tier 2a or Tier 2b operating condition in 2023 and 2024.<sup>12</sup>

**Table 8. Projected Lower Basin Supply Conditions – Full Observed Hydrology<sup>1</sup> (April 2021)**

Operational Tier		Shortage Probability <sup>2</sup>									
		Reclamation’s Five-Year Table				Projections Extended by AWBA					
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Surplus Condition ( $\geq 1,145$ )		0%	0%	1%	4%	7%	12%	16%	20%	22%	24%
Normal Year ( $< 1145$ and $> 1075$ )		3%	6%	17%	19%	22%	20%	18%	15%	13%	10%
Normal ( $< 1145$ and $> 1090$ )		0%	0%	5%	8%	14%	14%	16%	12%	11%	9%
Tier Zero ( $\leq 1090$ and $> 1075$ )	192	3%	5%	11%	10%	8%	6%	2%	3%	2%	1%
Any Shortage (Mead $\leq 1075$ )		97%	94%	82%	77%	72%	68%	66%	66%	65%	66%
Tier 1 Shortage ( $\geq 1050$ and $\leq 1075$ )	512	97%	81%	37%	34%	28%	25%	24%	22%	24%	27%
Tier 2 Shortage ( $\geq 1025$ and $< 1050$ )		0%	13%	44%	32%	32%	30%	28%	30%	29%	27%
Tier 2a ( $> 1045$ and $< 1050$ )	592	0%	11%	9%	6%	7%	6%	5%	8%	6%	6%
Tier 2b ( $\geq 1025$ and $\leq 1045$ )	640	0%	2%	35%	27%	25%	24%	23%	22%	24%	20%
Tier 3 Shortage ( $< 1025$ )	720	0%	0%	1%	11%	12%	13%	14%	14%	12%	12%

<sup>1</sup> Hydrologic assumptions from Reclamation’s April 2021 CRMMS/CRSS Full Hydrology (DNF 1906-2019).

<sup>2</sup> Shortage probabilities from Reclamation’s projections of future Colorado River system conditions, April 2021 CRMMS/CRSS Full Hydrology (DNF 1906-2019). Reclamation’s projections run through 2025. The 2007 Interim Guidelines expire in 2026. The AWBA extended Reclamation’s projections (based on current operating conditions) through 2031. These projections do not represent the full range of future possibilities that could occur with different modeling assumptions.

<sup>11</sup> CRMMS is a mid-term operations model. CRMMS in MTOM mode uses 35 potential inflow sequences that incorporates hydrologic uncertainty by considering current conditions and historical temperature and precipitation patterns.

<sup>12</sup> Reclamation’s June 24-month study shows calendar year 2022 ending with the most probable Lake Mead elevation at 1048.14 ft.

The AWBA also analyzed Reclamation’s April 2021 projections based on Stress Test Hydrology, reflecting a scenario based on a drier future. As identified in **Table 9**, the April 2021 forecast developed based on Stress Test Hydrology indicates a greater than 90 percent probability of a shortage condition in every year between 2022 to 2025 and a greater than 84 percent probability of shortage in every year between 2026 to 2031. In general, the probability of deeper shortage tiers is roughly 10 to 15 percent higher with the Stress Test Hydrology. The Stress Test Hydrology projects a higher probability of near-term shortages with a 44 percent probability of a Tier 1 shortage beginning in 2023 and a 26 percent probability of a Tier 3 shortage by 2027. Based on Stress Test Hydrology, there is a high probability of fluctuating between Tier 2 and Tier 3 shortage conditions during most of the planning period. During a Tier 3 shortage, the AWBA could have a maximum firming requirement of approximately 120,000 acre-feet per year.

**Table 9. Projected Lower Basin Supply Conditions - Stress Test Hydrology<sup>1</sup> (April 2021)**

Operational Tier		Shortage Probability <sup>2</sup>									
		Reclamation’s Five-Year Table				Projections Extended by AWBA					
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Surplus Condition ( $\geq 1,145$ )		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Normal Year ( $< 1,145$ and $> 1,075$ )		3%	8%	9%	6%	14%	16%	16%	15%	15%	10%
Normal ( $< 1,145$ and $> 1,090$ )		0%	0%	0%	3%	9%	9%	12%	13%	10%	10%
Tier Zero ( $\leq 1,090$ and $> 1,075$ )	192	3%	7%	9%	3%	5%	7%	4%	2%	5%	0%
Any Shortage (Mead $\leq 1,075$ )		97%	92%	91%	94%	86%	84%	84%	85%	85%	90%
Tier 1 Shortage ( $\geq 1,050$ and $\leq 1,075$ )	512	97%	71%	31%	33%	21%	15%	16%	17%	17%	23%
Tier 2 Shortage ( $\geq 1,025$ and $< 1,050$ )		0%	21%	60%	36%	37%	37%	30%	31%	38%	40%
Tier 2a ( $> 1,045$ and $< 1,050$ )	592	0%	17%	6%	7%	6%	7%	4%	4%	4%	6%
Tier 2b ( $\geq 1,025$ and $\leq 1,045$ )	640	0%	4%	54%	29%	31%	30%	26%	27%	34%	34%
Tier 3 Shortage ( $< 1,025$ )	720	0%	0%	0%	25%	28%	32%	38%	37%	30%	27%

<sup>1</sup> Hydrologic assumptions from Reclamation’s April 2021 CRMMS/CRSS Stress Test Hydrology (1988 - 2019).

<sup>2</sup> Shortage probabilities from Reclamation’s projections of future Colorado River system conditions, April 2021 CRMMS/CRSS Stress Test Hydrology (DNF 1988-2019). Reclamation’s projections run through 2025. The 2007 Interim Guidelines expire in 2026. The AWBA extended Reclamation’s projections (based on current operating conditions) through 2031. These projections do not represent the full range of future possibilities that could occur with different modeling assumptions.

For planning purposes, Tier 1 operating conditions are anticipated in 2022 and 2023, with Tier 2 shortage reductions beginning in 2024. The likelihood of a Tier 1 or Tier 2 operating condition is roughly equal beginning in 2025 and continuing for the rest of the planning period. Reclamation’s April 2021 most probable projection is used to determine the most likely operating tier each year and the JRM model is used to estimate the corresponding AWBA firming volume that year (as highlighted in **Tables 11 & 12**). To determine the supply available to CAP each year, Arizona on-River demands are estimated based on a 0.1% growth rate for Priority 1-3 and a 1 % growth rate for Fourth Priority on-River M&I. The Fourth Priority on-River Agricultural use is held constant. As identified in **Table 11**, a Tier 1 shortage condition results in a firming requirement ranging between 9,402 acre-feet and 15,614 acre-feet per year, affecting only Tribal firming for CAP NIA Priority supplies. A Tier 2b shortage condition results in firming requirements for both Tribal contractors (CAP NIA priority supplies) and CAP M&I subcontractors (M&I Priority supplies), ranging between 45,984 acre-feet and 66,832 acre-feet per year.

Table 10. Estimated AWBA Firming Volumes – Full Observed Hydrology<sup>1</sup> (April 2021)

Operational Tier		Shortage Probability <sup>2</sup>									
		Reclamation’s Five-Year Table				Projections Extended by AWBA					
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	97%	81%	37%	34%	28%	25%	24%	22%	24%	27%
Tier 2 Shortage		0%	13%	44%	32%	32%	30%	28%	30%	29%	27%
Tier 2a	592	0%	11%	9%	6%	7%	6%	5%	8%	6%	6%
Tier 2b	640	0%	2%	35%	27%	25%	24%	23%	22%	24%	20%
Tier 3 Shortage	720	0%	0%	1%	11%	12%	13%	14%	14%	12%	12%

Operational Tier		Tribal Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	9,402	12,624	12,881	13,664	13,898	14,326	14,550	14,774	15,285	15,614
Tier 2 Shortage											
Tier 2a	592	14,252	18,154	18,412	18,677	18,750	18,703	18,608	18,515	18,422	18,331
Tier 2b	640	14,441	17,958	17,865	17,774	17,683	17,594	17,505	17,417	17,330	17,244
Tier 3 Shortage	720	13,053	16,232	16,148	16,066	15,984	15,903	15,822	15,743	15,664	15,587
<b>Total</b>		9,402	12,624	17,865	13,664	17,683	17,594	17,505	17,417	17,330	17,244

Operational Tier		M&I Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	-	-	-	-	-	-	-	-	-	-
Tier 2 Shortage											
Tier 2a	592	-	-	-	-	-	1,530	4,598	7,665	10,732	13,799
Tier 2b	640	21,983	25,050	28,118	31,185	34,252	37,319	40,387	43,454	46,521	49,588
Tier 3 Shortage	720	76,549	79,616	82,684	85,751	88,818	91,885	94,953	98,020	101,087	104,154
<b>Total</b>		-	-	28,118	-	34,252	37,319	40,387	43,454	46,521	49,588

Operational Tier		On-River Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	-	-	-	-	-	-	-	-	-	-
Tier 2 Shortage											
Tier 2a	592	-	-	-	-	-	-	-	-	-	-
Tier 2b	640	-	-	-	-	-	-	-	-	-	-
Tier 3 Shortage	720	-	-	-	-	-	-	-	-	-	-
<b>Total</b>		-	-	-	-	-	-	-	-	-	-

Operational Tier		Total AWBA Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	9,402	12,624	12,881	13,664	13,898	14,326	14,550	14,774	15,285	15,614
Tier 2 Shortage											
Tier 2a	592	14,252	18,154	18,412	18,677	18,750	20,232	23,206	26,179	29,154	32,129
Tier 2b	640	36,424	43,008	45,984	48,959	51,936	54,913	57,892	60,871	63,851	66,832
Tier 3 Shortage	720	89,602	95,848	98,832	101,817	104,802	107,788	110,776	113,763	116,752	119,741
<b>Total</b>		9,402	12,624	45,984	13,664	51,936	54,913	57,892	60,871	63,851	66,832
<b>Cumulative</b>											<b>437,969</b>

<sup>1</sup> Hydrologic assumptions from Reclamation’s April 2021 CRMMS/CRSS Full Hydrology (DNF 1906-2019).

<sup>2</sup> Shortage probabilities from Reclamation’s projections of future Colorado River system conditions, April 2021 CRMMS/CRSS Full Hydrology (DNF 1906-2019). Reclamation’s projections run through 2025. The 2007 Interim Guidelines expire in 2026. The AWBA extended Reclamation’s projections (based on current operating conditions) through 2031. These projections do not represent the full range of future possibilities that could occur with different modeling assumptions.

<sup>3</sup> Estimated AWBA firming volumes derived from the JRM in May 2021. Estimated firming volumes are for planning purposes and do not represent the full range of future possibilities that could occur with different modeling assumptions.

**Table 11. Estimated AWBA Firming Volumes - Stress Test Hydrology<sup>1</sup> (April 2021)**

Operational Tier		Shortage Probability <sup>2</sup>									
		Reclamation's Five-Year Table				Projections Extended by AWBA					
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	97%	71%	31%	33%	21%	15%	16%	17%	17%	23%
Tier 2 Shortage		0%	21%	60%	36%	37%	37%	30%	31%	38%	40%
Tier 2a	592	0%	17%	6%	7%	6%	7%	4%	4%	4%	6%
Tier 2b	640	0%	4%	54%	29%	31%	30%	26%	27%	34%	34%
Tier 3 Shortage	720	0%	0%	0%	25%	28%	32%	38%	37%	30%	27%

Operational Tier		Tribal Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	9,402	12,624	12,881	13,664	13,898	14,326	14,550	14,774	15,285	15,614
Tier 2 Shortage											
Tier 2a	592	14,252	18,154	18,412	18,677	18,750	18,703	18,608	18,515	18,422	18,331
Tier 2b	640	14,441	17,958	17,865	17,774	17,683	17,594	17,505	17,417	17,330	17,244
Tier 3 Shortage	720	13,053	16,232	16,148	16,066	15,984	15,903	15,822	15,743	15,664	15,587
<b>Total</b>		<b>9,402</b>	<b>12,624</b>	<b>17,865</b>	<b>17,774</b>	<b>17,683</b>	<b>17,594</b>	<b>15,822</b>	<b>15,743</b>	<b>17,330</b>	<b>17,244</b>

Operational Tier		M&I Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	-	-	-	-	-	-	-	-	-	-
Tier 2 Shortage											
Tier 2a	592	-	-	-	-	-	1,530	4,598	7,665	10,732	13,799
Tier 2b	640	21,983	25,050	28,118	31,185	34,252	37,319	40,387	43,454	46,521	49,588
Tier 3 Shortage	720	76,549	79,616	82,684	85,751	88,818	91,885	94,953	98,020	101,087	104,154
<b>Total</b>		<b>-</b>	<b>-</b>	<b>28,118</b>	<b>31,185</b>	<b>34,252</b>	<b>37,319</b>	<b>94,953</b>	<b>98,020</b>	<b>46,521</b>	<b>49,588</b>

Operational Tier		On-River Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	-	-	-	-	-	-	-	-	-	-
Tier 2 Shortage											
Tier 2a	592	-	-	-	-	-	-	-	-	-	-
Tier 2b	640	-	-	-	-	-	-	-	-	-	-
Tier 3 Shortage	720	-	-	-	-	-	-	-	-	-	-
<b>Total</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

Operational Tier		Total AWBA Firming <sup>3</sup>									
	KAF	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1 Shortage	512	9,402	12,624	12,881	13,664	13,898	14,326	14,550	14,774	15,285	15,614
Tier 2 Shortage											
Tier 2a	592	14,252	18,154	18,412	18,677	18,750	20,232	23,206	26,179	29,154	32,129
Tier 2b	640	36,424	43,008	45,984	48,959	51,936	54,913	57,892	60,871	63,851	66,832
Tier 3 Shortage	720	89,602	95,848	98,832	101,817	104,802	107,788	110,776	113,763	116,752	119,741
<b>Total</b>		<b>9,402</b>	<b>12,624</b>	<b>45,984</b>	<b>48,959</b>	<b>51,936</b>	<b>54,913</b>	<b>110,776</b>	<b>113,763</b>	<b>63,851</b>	<b>66,832</b>
<b>Cumulative</b>											<b>579,039</b>

<sup>1</sup> Hydrologic assumptions from Reclamation's April 2021 CRMMS/CRSS Stress Test Hydrology (1988-2019).

<sup>2</sup> Shortage probabilities from Reclamation's projections of future Colorado River system conditions, April 2021 CRMMS/CRSS Stress Test Hydrology (DNF 1988-2019). Reclamation's projections run through 2025. The 2007 Interim Guidelines expire in 2026. The AWBA extended Reclamation's projections (based on current operating conditions) through 2031. These projections do not represent the full range of future possibilities that could occur with different modeling assumptions.

<sup>3</sup> Estimated AWBA firming volumes derived from JRM (May 2021). Estimated firming volumes are for planning purposes and do not represent the full range of future possibilities that could occur with different modeling assumptions.

### 7.2.2 Tribal Firming for the Gila River Indian Community

Under the 2004 AWSA, the AWBA, as agent for the State, is obligated to firm up to 15,000 acre-feet per year (through 2107) of CAP NIA Priority water for the Gila River Indian Community (Community) when supplies are insufficient to meet demand. The AWBA and the Community entered into an IGA on June 16, 2015 to establish an annual process to ensure the State’s obligations to the Community are satisfied when shortages occur. The IGA outlines the steps that must be taken by each party to develop a firming plan prior to a shortage year. With the likelihood of a shortage in 2022, the parties agreed to utilize firming credits, as identified in Exhibit B to the IGA, to satisfy the AWBA’s firming obligation in 2022.

Additionally, the firming proposal must be developed using the firming calculations identified in Section 2 of the IGA. The volume that is firming is affected by the volume of contracted CAP NIA Priority water supplies and the total volume of water that is available to the pool in a shortage year. This includes the 46,330 acre-feet of previously unallocated CAP NIA Priority water that will likely be ordered in calendar year 2022, increasing the pool from 201,103 acre-feet to 247,433 acre-feet. **Table 12** below identifies the estimated firming volume for calendar year 2022 and will be amended to reflect actual 2022 water orders.

**Table 12. Firming Proposal for the Gila River Indian Community in Calendar Year 2022**

Firming Credits Developed (AF)				Firming Credits Used in 2022 (AF) <sup>1</sup>	Remaining Balance (AF)
Year	Firming Credits Developed	Cost/AF	Total Cost		
2015	16,000	\$ 157	\$2,512,000	9,402	6,598
2016	12,000	\$ 161	\$1,932,000		12,000
2017	7,000	\$ 164	\$1,148,000		7,000
2018	9,000	\$ 160	\$1,440,000		9,000
<b>TOTAL</b>	<b>44,000</b>		<b>\$7,032,000</b>	<b>9,402</b>	<b>34,598</b>

<sup>1</sup>Estimates for 2022 CAP water availability provided by CAWCD, assuming full water orders for NIA contracts issued in 2021.

### 7.2.3 M&I Firming and Recovery Capacity Required

As discussed in the 2021 Joint Update, the AWBA will initiate firming discussions with CAP M&I subcontractors based on a three-year planning horizon. Recovery implementation triggers for M&I firming are tied to Reclamation’s April Five-Year Probability Table and April 24-Month Study. The first trigger occurs when the April 5-year table shows a greater than 15% probability of a shortage impacting the M&I Priority pool in the third year. The second trigger occurs when the April 24-Month Study forecasts a shortage impacting the M&I Priority pool in the second year based on the “Min Probable” forecast. The third trigger occurs when the April 24-Month Study forecasts a shortage impacting the M&I Priority pool in the following year based on the “Most Probable” forecast. In addition to these annual triggers to initiate progressive levels of coordination, the M&I firming timeline in the 2021 Joint Update highlights critical decision points, deadlines to finalize firming agreements, and the timing of rate notifications for CAP recovery.

The AWBA is responsible for the distribution of credits for firming purposes, consistent with its statutory and contractual responsibilities. However, the AWBA is not authorized to recover stored water and must rely on CAP or other recovery partners. Many CAP M&I subcontractors have indicated a preference for Independent Recovery of AWBA LTSCs using their own infrastructure (with no direct reliance on CAP recovery). This allows for operational flexibility and maximizes the use of existing infrastructure. Arizona Senate Bill 1147, adopted in the spring of 2021, authorizes the AWBA to distribute LTSCs directly to CAP M&I subcontractors. This amendment to A.R.S. § 45-2457 allows M&I subcontractors to enter into a firming agreement with the AWBA and request a direct transfer of AWBA LTSCs for firming purposes.

In 2019, the AWBA adopted a policy for distributing LTSCs to CAP M&I subcontractors in order to facilitate the mitigation component of Arizona’s Implementation Plan for the LBDP. Under the policy, LTSCs will be distributed to meet all reductions to scheduled CAP M&I subcontracts due to a shortage condition or required DCP Contributions through 2026. The planning assumption after 2026 is that the maximum M&I firming is capped at 20%, which is consistent with previous AWBA planning assumptions.

To estimate the portion of AWBA firming volumes that might require recovery well capacity, it is necessary to evaluate how shortage reductions impact individual M&I subcontractors’ annual direct uses. In some cases, the reductions to M&I Priority supplies will only impact the ability of a subcontractor to accrue LTSCs for future use, but in other cases reductions will impact a subcontractor’s annual direct uses. Shortage impacts to CAP M&I Priority water scheduled for delivery to a treatment plant (or used for annual storage and recovery) is relevant for recovery planning, because these direct use impacts affect the annual volume of recovery capacity required for M&I firming. Understanding the timing of these impacts is particularly important, because it requires the use of recovery wells that must be available in the year that the shortage reductions occur. **Table 13** identifies the estimated volume of recovery capacity that may be needed for M&I firming each year and **Table 14** identifies the estimated volume of recovery capacity needed in each AMA during a Tier 3 reduction.

**Table 13. Estimated Recovery Capacity Needed by Shortage Tier (AF)**

Operational Tier	M&I Firming - Recovery Capacity Needed (AF)									
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Tier 1	-	-	-	-	-	-	-	-	-	-
Tier 2a	-	-	-	-	-	-	1,339	1,685	3,370	3,370
Tier 2b	3,698	4,345	4,869	6,388	8,050	9,713	11,190	11,986	12,804	13,614
Tier 3	19,980	21,741	23,504	25,267	27,032	28,321	29,220	30,893	33,881	37,095

**Table 14. Estimated Recovery Capacity Needed by AMA in Tier 3 (AF)**

	M&I Firming – Tier 3 Recovery Capacity Needed (AF)									
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Phoenix AMA										
Independent Recovery	12,032	12,972	13,913	14,852	15,792	16,494	16,999	18,258	20,834	23,414
CAP Recovery	6,088	6,838	7,591	8,346	9,102	9,622	9,947	10,270	10,591	11,134
Pinal AMA										
Independent Recovery	1,531	1,589	1,646	1,703	1,760	1,816	1,872	1,927	1,981	2,035
Tucson AMA										
Independent Recovery	328	341	353	366	378	390	402	438	475	511
<b>Total</b>	<b>19,980</b>	<b>21,740</b>	<b>23,503</b>	<b>25,267</b>	<b>27,032</b>	<b>28,322</b>	<b>29,220</b>	<b>30,893</b>	<b>33,881</b>	<b>37,094</b>

<sup>1</sup> Estimated recovery well capacity needs incorporate feedback from impacted M&I subcontractors



As the AWBA’s designated recovery agent, CAWCD has secured several recovery partnership agreements and continues to explore additional partnerships to increase the volume of recovery capacity available. Within the Phoenix AMA, CAP recovery capacity will likely be made available through the “CAP Board Policy Allowing the Use of the CAGR Long-Term Contract to Satisfy the Arizona Water Banking Authority’s Firming or Interstate Obligations.” During this ten-year period, CAP may be able to create sufficient recovery capacity through the CAGR policy and/or credit exchange partnerships. However, if additional recovery capacity is needed, direct recovery might be necessary. Direct recovery would require the development of wells and conveyance systems and would increase recovery costs.

In the Phoenix AMA, where most CAWCD recovery is anticipated, there are recovery partnership agreements in place with Roosevelt Water Conservation District (RWCD), New Magma Irrigation and Drainage District (NMIDD), and Queen Creek Irrigation District (QCID), for up to 10,000 acre-feet, 1,500 acre-feet and 1,750 acre-feet of annual recovery capacity respectively. In the Pinal AMA, CAWCD has recovery partnership agreements in place with Central Arizona Irrigation and Drainage District (CAIDD) and Maricopa-Stanfield Irrigation and Drainage District (MSIDD) for up to 5,250 acre-feet and 5,000 acre-feet of annual recovery capacity respectively. The recovery agreements with NMIDD, QCID, CAIDD, and MSIDD collectively satisfy the \$5 million commitment made by the CAWCD Board to support groundwater infrastructure development as part of Arizona’s DCP implementation. **Table 15** identifies the volume, terms and conditions of all existing CAP recovery partnership agreements.

CAWCD has also entered into two agreements specifically intended to secure capacity for the recovery of the AWBA’s interstate credits.<sup>13</sup> These agreements will be used to develop ICUA when SNWA makes a request. In the Pinal AMA, the agreement with Arizona Water Company, for up to 2,500 acre-feet of annual recovery capacity, will likely be utilized for interstate recovery beginning in 2025. However, this agreement can also be used for other AWBA recovery needs during a year when interstate recovery is not requested. In the Tucson AMA, CAWCD has entered into an agreement with Tucson Water for the recovery of the AWBA’s interstate LTSCs. The agreement with Tucson Water, for up to 10,000 acre-feet of annual recovery capacity (not to exceed 65,000 acre-feet total) can only be used for interstate recovery on behalf of SNWA. **Table 15** below identifies the volume, terms and conditions of CAP’s recovery agreements for both intrastate and interstate recovery.

**Table 15. CAP’s Available Recovery Capacity by AMA**

AMA	Partner	Volume (AF)	Term	Conditions
Phoenix	CAGR	6,426	Undefined	
	New Magma IDD	1,500	2027-2052	
	Queen Creek ID	1,750	2027-2052	
	RWCD	10,000	2008-2022	
	<b>Phoenix AMA TOTAL</b>	<b>19,676</b>		
Pinal	AZ Water Company	2,500	2025-2050	Interstate 1 <sup>st</sup>
	Central Arizona IDD	5,250	2027-2052	
	Maricopa-Stanfield IDD	5,000	2027-2052	
	<b>Pinal AMA TOTAL</b>	<b>12,750</b>		
Tucson	Tucson Water	10,000	2020-2050	Interstate only
	<b>Tucson AMA TOTAL</b>	<b>10,000</b>		
	<b>Grand TOTAL</b>	<b>42,426</b>		

<sup>13</sup> SNWA is responsible for paying the recovery costs to develop ICUA and has therefore, under separate agreements, provided CAWCD \$1 million for advancement to both AWC and the City of Tucson for this purpose.

#### 7.2.4 Agreement to Exchange LTSCs

In the event of a Tier 1 or Tier 2a shortage condition in 2022, the AWBA has agreed to exchange LTSCs in connection with Arizona's Implementation Plan for the LBDCP.<sup>14</sup> The AWBA will exchange up to 42,750 acre-feet of LTSCs (from 45,500 acre-feet of storage less 5 percent cut to the aquifer) with certain Arizona parties who agreed to partially mitigate the impacts of 2022 LBDCP reductions to lower priority CAP water users, by storing a portion of their CAP water at GSFs in the Pinal AMA. This agreement facilitates water storage by CAP M&I subcontractors in the Phoenix and Tucson AMAs at GSFs located in the Pinal AMA, to provide partial wet water mitigation to certain CAP agricultural districts. The AWBA agreed to exchange LTSCs previously accrued in the Phoenix and Tucson AMAs for an equal volume of LTSCs accrued in the Pinal AMA. This exchange allows these entities storing in the Pinal AMA the ability to recover and use the water in the AMA where they are located. All exchanges must be completed by Dec. 31, 2026.

#### 7.2.5 Interstate Storage and Requests for Intentionally Created Unused Apportionment

Pursuant to the interstate storage Third Amended Agreement, there is no obligation to accrue a specified volume of LTSCs on behalf of SNWA. Rather, storage is determined annually through mutual agreement and paid for by SNWA in a year storage occurs. LTSCs accrued under previous interstate water banking agreements with SNWA total 601,041 acre-feet and are held in a separate interstate subaccount for SNWA. In 2018, the AWBA stored 13,500 acre-feet of Nevada's unused Colorado River allocation, which resulted in 12,805 acre-feet of LTSCs, bringing the total volume of LTSCs in SNWA's subaccount to 613,846 acre-feet. Since decisions to store water for Nevada are made as part of the AWBA's APO, assumptions for interstate storage are not included in this Ten-Year Plan. Presently, interstate storage is not contemplated for the AWBA's 2021 APO.

The Third Amended Agreement also authorizes Nevada to request development of ICUA, as follows: in the initial year, an amount not exceeding 20,000 acre-feet; the second year, an amount not exceeding 30,000 acre-feet and in all subsequent years, an amount not exceeding 40,000 acre-feet. However, if sufficient recovery capacity exists, SNWA may request the development of additional ICUA to replace reductions in supply during Colorado River shortages up to its annual entitlement of 300,000 acre-feet. This Ten-Year Plan assumes that SNWA will request 2,500 acre-feet per year of ICUA development beginning in 2025.<sup>15</sup> There are currently recovery agreements on behalf of SNWA for the development of ICUA that provide up to 12,500 acre-feet per year of recovery capacity.<sup>16</sup> Credits accrued prior to the Third Amended Agreement must be recovered by December 31, 2063. Credits accrued after, such as those accrued in 2018, must be recovered within 50 years of the date of storage with the oldest credits recovered first. The agreement terminates when all credits (i.e. existing and future) have been recovered.

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<sup>14</sup> *Lower Basin Drought Contingency Plan ("LBDCP") Implementation Plan: Agreement to Exchange Long-Term Storage Credits between AWBA and the City of Avondale; City of Chandler; City of Goodyear; City of Peoria; City of Phoenix; City of Scottsdale; City of Tucson; Freeport Minerals Corporation; and EPCOR Water Arizona Inc*

<sup>15</sup> This assumption is based on communication with SNWA May 2021.

<sup>16</sup> This includes an agreement with Arizona Water Co. providing recovery capacity for up to 2,500 acre-feet per year and an agreement with Tucson Water providing recovery capacity for up to 10,000 acre-feet per year. SNWA has also prepaid CAWCD for the recovery of 50,000 acre-feet of LTSCs that were accrued in the Pinal AMA and transferred to the AWBA under the original interstate water banking agreement.

## **Conclusion**

The Ten-Year Plan is intended to serve as a guide to assist the AWBA in the development of its APO, in which the AWBA is required to plan its activities for the following calendar year. The Ten-Year Plan is reviewed and updated annually and may change significantly depending on hydrologic conditions and the goals set by the AWBA. Based on a range of modeling scenarios, the AWBA anticipates that the Lower Basin will operate under Tier 1 or Tier 2 conditions for most of the planning period. The AWBA will continue to work collaboratively with CAWCD and stakeholders to ensure it is well prepared to meet its firming responsibilities under these conditions.

# APPENDICES

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APPENDIX A

Excess CAP Water Deliveries for Water Banking Purposes for CY 2020				
AMA	Facility	Type	AWBA Permit Capacity (AF)	Delivered* (AF)
PHOENIX AMA	Agua Fria	USF	24,000	0
	Hieroglyphic Mtn.	USF	35,000	0
	Superstition Mtns.	USF	25,000	0
	Tonopah Desert	USF	150,000	34,455
	New Magma IDD	GSF	54,000	953
	Queen Creek ID	GSF	28,000	35
	Tonopah ID	GSF	15,000	400
	<b>Phoenix AMA Subtotal</b>			
PINAL AMA	Central Arizona IDD	GSF	110,000	4,500
	Hohokam IDD	GSF	55,000	3,000
	Maricopa-Stanfield IDD	GSF	120,000	4,500
	<b>Pinal AMA Subtotal</b>			
TUCSON AMA	Avra Valley	USF	11,000	2,000
	Lower Santa Cruz	USF	50,000	0
	Pima Mine Road	USF	30,000	4,300
	SAVSARP	USF	60,000	5,400
	Cortaro-Marana ID	GSF	20,000	0
	BKW Farms	GSF	14,316	0
	Kai Farms-Red Rock	GSF	11,231	0
	<b>Tucson AMA Subtotal</b>			
<b>TOTAL RECHARGE DELIVERIES</b>				<b>59,543</b>

APPENDIX B

**Annual and Cumulative Long-Term Storage Credit Purchases<sup>1</sup>**

Funding Source	2020		Cumulative	
	Funds Expended	Credits Accrued <sup>2</sup> (AF)	Funds Expended	Credits Accrued (AF)
<b>Ad Valorem Tax</b>				
Phoenix AMA	\$ 2,997,814	12,580	\$22,655,402	94,262
Pinal AMA	\$ 0	-	\$0	-
Tucson AMA	\$ 3,000,000	12,478	\$9,989,937	44,433
<b>Withdrawal Fees</b>				
Phoenix AMA	\$ 0	-	\$834,876	3,600
Pinal AMA	-	-	\$0	-
Tucson AMA	\$ 486,090	2,022	\$1,100,403	5,123
<b>Shortage Reparations</b>				
Phoenix AMA	\$0	-	\$0	-
Pinal AMA	\$0	-	\$0	-
Tucson AMA	\$0	-	\$579,842	3,665
<b>Total</b>	<b>\$ 6,483,904</b>	<b>27,080</b>	<b>\$35,160,460</b>	<b>151,083</b>

<sup>1</sup> Information on AWBA annual and cumulative LTSCs accrued from water storage at individual facilities can be found on the AWBA’s website, [waterbank.az.gov](http://waterbank.az.gov)

<sup>2</sup> LTSC purchases in 2020 include 6,500 acre-feet from the City of Peoria and 3,780 acre-feet from the Ak-Chin Indian Community in the Phoenix AMA and 14,500 acre-feet from the Nation in the Tucson AMA.

**Annual and Cumulative Firming Credits Developed with the Gila River Indian Community**

Credits	2020		Cumulative	
	Funds Expended	Credits Accrued (AF)	Funds Expended	Credits Accrued (AF)
Firming Credits <sup>1</sup>	-	-	\$7,032,000	44,000
ICS Firming Credits	\$1,755,120	6,390	\$5,273,520	19,584

<sup>1</sup> Agreement expired December 31, 2018

## APPENDIX C

### AWBA 100-Year Modeling Assumptions

1. **CRSS Model** – The Bureau’s August 2019 CRSS Model (corrected version with the 12/19 update).
2. **Basin Hydrology** – Observed record, using 1906-2017 historical direct natural flows.
3. **Upper Basin Demands** –
  - Scenario 1: “As-is” in the August 2019 (with December 2019 update) CRSS model per the 2007 Upper Colorado River Commission (UCRC) schedule.
  - **Scenario 2: “15% Reduction” in projected future upper basin demands, per the 2007 UCRC schedule.**
4. **Operation of Yuma Desalting Plant** – No
5. **Mexico Shortage Sharing** – Minute 323 and the Binational Water Scarcity Contingency Plan (extended through 2120).
6. **Reservoir Operations** – The 2007 Interim Guidelines and DCP are extended through 2120. ICS activity also extended through 2120.
7. **Arizona Mainstem Priority 1-3 Demands** – Starting point is 10-year average (2009-2018) CU numbers with three growth scenarios:
  - Scenario 1 - P1-3 CU remains constant at the average of 2009-2018 levels.
  - **Scenario 2 - 0.01 % growth rate annually, and cap at 1.3 maf.**
  - Scenario 3 – 0.05% growth rate annually
8. **Arizona Mainstem Priority 4 Demands** – Starting point is 10-year average (2009-2018) CU numbers with a 1% increase to the Arizona Fourth Priority Mainstem M&I demands. Mainstem Ag remains constant.
9. **CAP M&I Priority Demands** – Assumes full utilization of M&I subcontracts by 2045, including former Hohokam assignment water which converts from NIA priority to M&I priority in 2045.
10. **CAP Indian Priority Demands** –
  - **Indian Priority used by M&I:** Assumes White Mountain Apache (WMAT) Tribe’s Water Settlement is enforceable by 2023, with the Indian priority allocation (1,218 AFY) leased to M&I users in 2023.
  - **Indian Priority used by Tribal users:** Assumes full utilization of all remaining Indian Priority water by Tribal users, after leases and exchanges have been subtracted.
11. **CAP Non-Indian Agricultural (NIA) Priority Demands** – Full utilization of NIA Priority water by 2035.
  - **NIA Priority, used by M&I:** Assumes the first round of currently unallocated NIA water (46,629 AF) is allocated to M&I users within the CAP Service Area in 2022, with 44,914 AF taken in 2022 and the remainder of 1,715 AF taken in 2023. Assumes the second round of currently unallocated NIA priority water (49,666 AF) is allocated in 2025, with 17,333 AF taken in 2025 along with 6,374 AF of the original 15,000 AF for water providers serving land in CAIDD and MSIDD. Assumes the remainder for outside the CAP Service Area would be taken in 2030 and the WMAT NIA priority allocation (23,782 AFY) is leased to M&I users in 2023.
  - **NIA Priority, used by tribes:** Assumes full utilization of all remaining NIA pool water by Tribal users (GRIC and Tohono O’odham), after long-term leases and exchanges have been subtracted. The remaining pool volume reserved for future Tribal Settlements (43,518 AF) is assumed to be fully utilized by Tribal users as follows – 4,000 AF in 2025 with the remaining amount (39,518 AF) allocated in three rounds in 2027, 2031 and 2035.
12. **CAP Ag Settlement Pool Demands** – This pool of excess CAP water is assumed to be fully utilized, stepping down to 225,000 AF in 2024 and reducing to zero in 2030.

## APPENDIX D

STORAGE FACILITIES AVAILABLE TO THE AWBA (as used in the Ten-Year Plan)					
Name of Facility	Facility Permit Expiration	Facility Permitted Capacity (AF)	Capacity Available to AWBA <sup>1</sup> (AF)	Year Water Last Stored	Volume of Water Last Stored <sup>2</sup> (AF)
<b>PHOENIX – GSF</b>					
New Magma Irrigation & Drainage District	Jan-23	80,000	3,000	2020	953
Queen Creek Irrigation District	Nov-21	22,000	2,500	2020	35
Tonopah Irrigation District	Sep-22	15,000	2,000	2020	400
<b>Subtotal for Phoenix AMA - GSF</b>		<b>117,000</b>	<b>7,500</b>		
<b>PHOENIX – USF</b>					
Agua Fria Recharge Project	Dec-40	24,000	8,000	2018	4,637
Granite Reef Underground Storage Project	Mar-32	93,000	15,000	2016	10,120
Hieroglyphic Mountains Recharge Project	Dec-21	35,000	8,000	2018	7,011
Superstition Mountains Recharge Project	Jan-28	25,000	8,000	2018	8,687
Tonopah Desert Recharge Project	Sep-25	150,000	80,000	2020	34,455
<b>Subtotal for Phoenix AMA - USF</b>		<b>333,000</b>	<b>119,000</b>		
<b>PINAL – GSF</b>					
Central Arizona Irrigation & Drainage District	Oct-23	110,000	60,000	2020	4,500
Hohokam Irrigation & Drainage District	Pending	82,000	20,000	2020	3,000
Maricopa-Stanfield Irrigation & Drainage District	Sep-25	168,114	60,000	2020	4,500
<b>Subtotal for Pinal AMA - GSF</b>		<b>360,114</b>	<b>140,000</b>		
<b>TUCSON – GSF</b>					
BKW Farms	Mar-26	14,324	1,000	2016	1,000
Cortaro-Marana Irrigation District	Oct-24	20,000	4,000	2018	2,500
Kai-Farms – Red Rock	Feb-26	11,401	2,000	2018	1,334
<b>Subtotal for Tucson AMA - GSF</b>		<b>45,725</b>	<b>7,000</b>		
<b>TUCSON – USF</b>					
Avra Valley Recharge Project	Jan-39	11,000	0	2020	2,000
Lower Santa Cruz Recharge Project	Jan-36	50,000	10,000	2018	6,666
Pima Mine Road Recharge Project	Feb-41	23,500	5,000	2018	1,300
SAVSARP	Jan-28	60,000	5,000	2020	5,400
<b>Subtotal for Tucson AMA - USF</b>		<b>144,500</b>	<b>20,000</b>		
<b>ALL AMAs - GSF</b>		<b>522,839</b>	<b>154,500</b>		
<b>ALL AMAs - USF</b>		<b>477,500</b>	<b>139,000</b>		

<sup>1</sup> This does not reflect the actual “permitted” volume for these facilities; instead for the purposes of this plan, staff relied on average historical storage volumes and potential for future storage and in some cases constraints provided by the facility operator.

<sup>2</sup> Storage volumes reflect the combined effect of water, funding, and storage capacity availability.