

Big Bear Watermaster

Forty-Seventh Annual Report

For Calendar Year 2023



BIG BEAR MUNICIPAL WATER DISTRICT v. NORTH FORK WATER COMPANY, et al.,
Case No. SCV 165493 – County of San Bernardino



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**BIG BEAR WATERMASTER
FOR
BIG BEAR MUNICIPAL WATER DISTRICT v.
NORTH FORK WATER COMPANY, et al.,
CASE NO. 165493---COUNTY OF SAN BERNARDINO**

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March 29, 2024

To: Clerk of the Superior Court of San Bernardino County and All

Subject: Parties Watermaster Report for Calendar Year 2023

Gentlemen:

We have the honor of submitting the Forty-Seventh Annual Report of the Big Bear Watermaster for Calendar Year 2023.

Paragraph Twenty (20) of the Judgment requires that the Watermaster Report be submitted to the Court and the Parties before April 1 of each year on all significant Watermaster activities and provide an accounting of water deliveries for the preceding calendar year as set forth in Section VI, Physical Solutions, of the Judgment.

We and each of us here by certify that this is a true and correct report of the Watermaster work performed by us and under our supervision during 2023 pursuant to the requirements of the Judgment.

Respectfully Submitted,

By: Donald E. Evenson
Donald E. Evenson

By: Katelyn A. Scholte
Katelyn A. Scholte

By: Samuel H. Fuller
Samuel H. Fuller

FORTY-SEVENTH ANNUAL REPORT BIG BEAR WATERMASTER CALENDAR YEAR 2023

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FORTY-SEVENTH ANNUAL REPORT

BIG BEAR WATERMASTER

CALENDAR YEAR 2023

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I. INTRODUCTION

The Big Bear Watermaster presents the Forty-Seventh Annual Report of its activities for calendar year 2023. The Watermaster's activities ensure that the rights of all parties subject to the Judgment rendered in Case No. 165493 are protected. The Watermaster generally oversees watershed conditions that may affect the Judgment and attempts to improve the conditions to the benefit of all parties.

This report describes the 2023 activities of the Watermaster including the status of accounts and various tabulations as required by the Judgment.

In 2023, the Big Bear Watermaster Committee was composed of Donald E. Evenson, President, representing Big Bear Municipal Water District; Samuel H. Fuller, representing Bear Valley Mutual Water Company; and Katelyn A. Scholte, Secretary, representing San Bernardino Valley Water Conservation District.

The Watermaster Committee met four times during 2023. These meetings were held on the following dates:

January 31, 2023

March 21, 2023

July 18, 2023

October 24, 2023

Appendix A contains the minutes of these meetings. Minutes of the meetings are also on file at the office of each of the agencies.

II. SUMMARY

2023 WATERMASTER ACCOUNTS

2023 was an above average precipitation year. Annual precipitation at the two gauges in the Big Bear Lake watershed averaged 38.73 inches, which is 156.0 percent of the 24.83 inches of average annual rainfall since 1977. Precipitation at Bear Valley Dam was 52.94 inches, which is 151.2 percent of the 114-year (1910-2023) average of 35.02 inches.

Inflow to Big Bear Lake in 2023 was also above average. The 2023 calculated lake inflow was 32,195 acre-feet, which is 214 percent of the average inflow since 1977. The average inflow for the 47 years since the Judgment was rendered is 15,037 acre-feet per year.

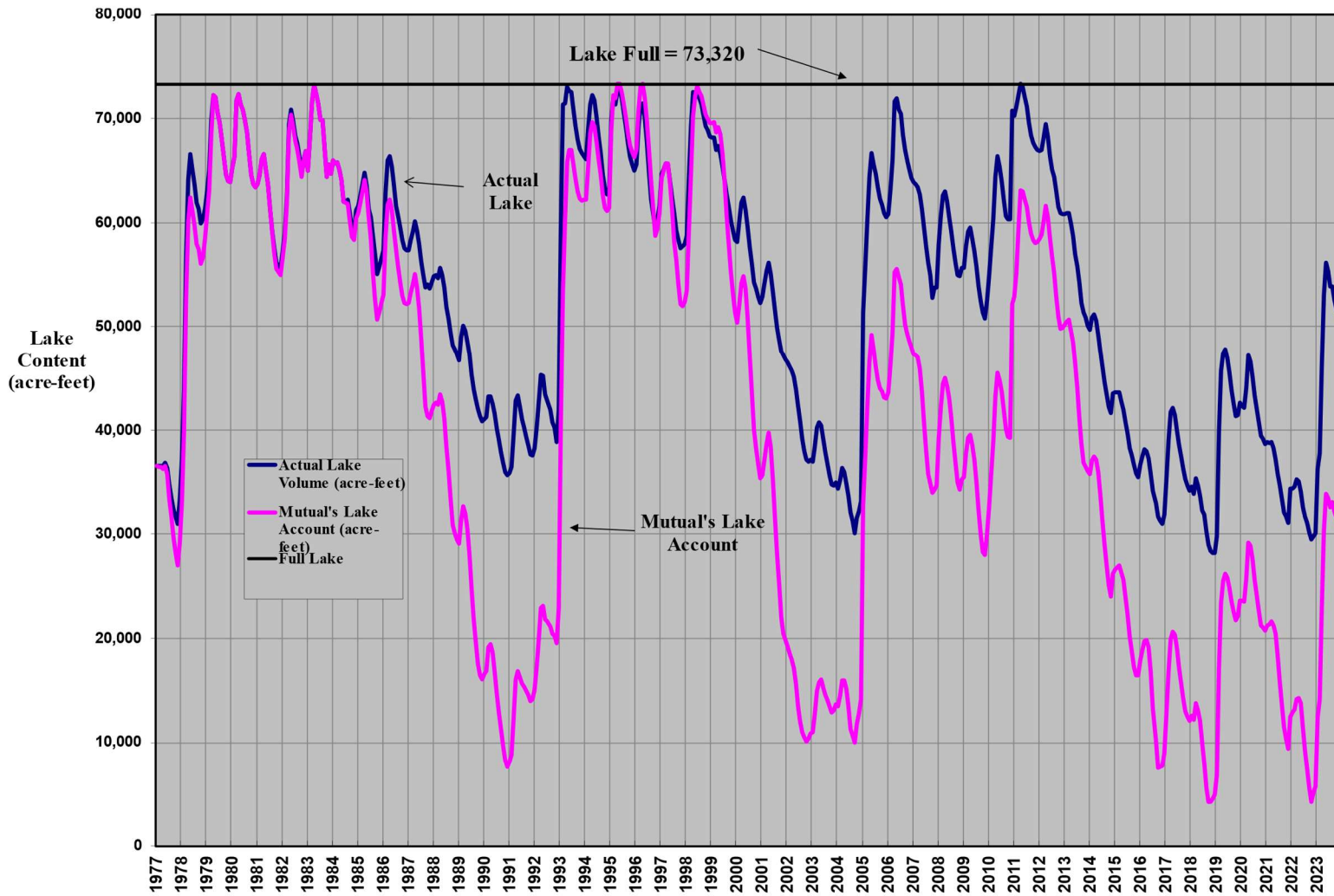
Actual lake levels rose 9.02 feet in 2023 and ended the year at 64.13 feet, which is 8.20 feet below the top of the dam. Accordingly, lake contents increased by 20,541 acre-feet during the year. On December 31, 2023, the lake contained 50,612 acre-feet of water. When full, the lake level is 72.33 feet and it holds 73,320 acre-feet. **Figure 1** shows the history of the actual lake contents since the Judgment was rendered in 1977.

Mutual's lake account held 31,172 acre-feet at the end of 2023. Their lake account increased by 25,394 acre-feet during the year. **Figure 1** also shows the history of Mutual's lake account since 1977. Under a "Mutual Operation" lake releases would be made to meet Mutual's water demands and their lake account is credited with the net wastewater exported from the Big Bear Lake watershed. Under these conditions, the lake level would have ended the year at 55.65 feet or 16.68 feet below the top of the dam and 8.48 feet lower than the actual year-end lake level of 64.13 feet. If Mutual had not been credited with the net wastewater exports, their lake account balance would have been 26,490 acre-feet and the lake level would have been 53.20 feet or 19.13 feet below the top of dam and 10.93 feet lower than it actually was.

In 2023, Mutual received only 294.6 acre-feet of water from Big Bear MWD. Big Bear MWD has the option to provide In Lieu Water supplies or to release water from the lake. 2023 was a very wet year and Mutual did not need any In Lieu water. They were able to meet their low elevation water needs from the Santa Ana River and use of the 294.6 acre-feet of water from Big Bear Lake that was required for fish protection purposes as required under SWRCB Order No. 95-4.

FIGURE 1
ACTUAL LAKE CONTENTS AND MUTUAL'S LAKE ACCOUNT 1977-2023

Calendar Year 2023 – Big Bear Watermaster



At the beginning of the year, Big Bear MWD had 24,293 acre-feet in their lake account. By the end of the year, their lake account had decreased by 4,853 acre-feet to 19,440 acre-feet. Big Bear MWD's lake account is the difference between the actual lake contents and Mutual's lake account as shown on **Figure 1**.

The Basin Make-up Account provides an estimate of the water supply impacts of the operation of Big Bear Lake under the Judgment on the San Bernardino Groundwater Basin. A positive account balance means there has been an increase in groundwater recharge as a result of the Big Bear MWD operation of the lake. If the account becomes negative, Big Bear MWD is required to correct the deficiency by providing additional water for groundwater recharge.

In 2023 the Basin Make-up Account balance increased by 98 acre-feet. The Basin Make-up Account began the year with a balance of 20,971 acre-feet and ended the year with a balance of 21,069 acre-feet. The increase resulted primarily as a result of the unused Fishery releases from Big Bear Lake that was recharged to the San Bernardino Groundwater Basin. In 2024, the Watermaster Committee will continue its efforts to determine how to adjust the Basin Make-up Account when Mutual uses In Lieu Water deliveries for groundwater recharge.

OTHER WATERMASTER ACTIVITIES

The Watermaster has the responsibility to undertake studies and investigations, collect and maintain data and records, and monitor related activities necessary to implement the physical solution contained in the Judgment. In 2023, the Watermaster was involved in monitoring and discussing two issues. These issues are:

- Impacts of Seven Oaks Dam,
- Protecting Big Bear Lake from Quagga Mussels,

These issues are discussed in Chapter V.

III. BASIC DATA

BIG BEAR LAKE

Summary

The Watermaster conducts a water balance of Big Bear Lake for each month. This water balance is based on measurements of lake levels, releases, leakages, and air temperature, as well as calculated values of spills, evaporation, and inflows. For 2023, the overall water balance for the lake was:

Initial Storage (1-1-23)	30,071 acre-feet
Inflows	32,195 acre-feet
Evaporation	10,660 acre-feet
Releases for Mutual	-0- acre-feet
Releases for Valley District	-0- acre-feet
Releases & Leakage for SWRCB Order 95-4	487 acre-feet
Spills & Flood Control Releases	-0- acre-feet
Net Snowmaking Withdrawal	507 acre-feet
Ending Storage (12-31-23)	50,612 acre-feet
Change-in-Storage	20,541 acre-feet

In 2023, the volume of water in Big Bear Lake increased by 20,541 acre-feet. The following subsections of this chapter describe each of the components in this water balance.

Lake Levels and Storage

Water levels in Big Bear Lake are measured continuously based on a reference mark located on the upstream side of the dam. In July 1998, Big Bear MWD completed installation of a continuous lake level recorder. The lake level recorder is a Global Water Model WL300 and is enclosed in a stilling well, which is attached to the upstream face of the dam. Lake level data is continuously

transmitted by a remote telemetry unit (RTU) in the control building at the dam. From there, data is transmitted via radio to a central computer in the administrative offices of Big Bear MWD. The automatically recorded values have been used since July 1998. The recorder can only record lake levels when the lake is within 15 feet of the top of the dam (i.e. above a gauge height of 57.33 feet).

The lake began the year at a gauge height of 55.11 feet and ended the year at a gauge height of 64.13 feet. Over the year the lake level rose 9.02 feet. The lowest lake level was 55.11 feet or 17.22 feet below the top of the dam, and it occurred on January 1, 2023. The highest recorded lake level was 66.25 feet, which occurred on May 29, 2023. The lake is full at a gauge height reading of 72.33 feet (6,743.20 feet above msl) and is empty at a gauge height of zero.

The Watermaster uses an established gauge height-lake capacity table to estimate the volume of water in the lake from the measured gauge heights. At the beginning of the year, the lake contained 30,071 acre-feet of water. At the end of the year, there were 50,612 acre-feet of water in the lake. The lake content increased by 20,541 acre-feet during 2023.

Lake Evaporation

The Watermaster calculates evaporation from the lake surface using the Blaney Criddle formula to estimate monthly evaporation rates. The 1977 Annual Watermaster report describes the formula as follows:

“The Blaney Criddle empirical formula, utilizing average temperatures and daylight hours, has been used. The constant K for each month was calculated based on float pan empirical data at Long Valley Reservoir in Mono County, California, which is at elevation 6,796 feet, compared to the elevation of Big Bear Lake which is 6,743 feet.”

Monthly lake evaporation is calculated using the estimated evaporation rate and the average surface area of the lake during the month. If a negative value for lake inflow is calculated, the monthly evaporation rate is increased to achieve a zero-lake inflow. Calculated negative lake inflows did not occur in 2023. The monthly evaporation rates totaled 4.099 feet (49.2 inches) for

2023. However, with an extended period of inflow seen, the full evaporation decrease was not realized. Total evaporation from the lake for 2023 was calculated to be 10,660 acre-feet.

Precipitation

Precipitation in the Big Bear Lake watershed varies significantly from Bear Valley Dam to Big Bear City at the east end of the watershed. **Table III-1** shows the monthly precipitation at Bear Valley Dam and the Big Bear City Community Services District for 2023. The 2023 precipitation at the two stations was 52.94 and 24.52 inches, respectively. During the month of April there was no precipitation. January and March were the wettest months with approximately 70 percent of the annual precipitation.

Table III-1 also compares the 2023 precipitation at the two stations with their corresponding averages for the forty-seven years since the Judgment was rendered. At the Bear Valley Dam station, precipitation was 153 percent of its forty-seven-year average, and at the Big Bear City Community Services District station, precipitation was 162 percent of its forty-seven-year average. For both stations, 2023 precipitation averaged 156 percent of their forty-seven-year combined average.

Table III-2 shows the annual precipitation for both stations for the forty-seven years since the Judgment was rendered. As shown in **Table III-2**, 2023 was an above average year for precipitation. For the Bear Valley Dam station, precipitation was 151 percent of the 114-year (1910–2023) average of 35.02 inches.

TABLE III - 1
MONTHLY PRECIPITATION FOR TWO STATIONS
IN BIG BEAR AREA (Inches)

Calendar Year 2023 - Big Bear Watermaster

Month	Bear Valley Dam*	Big Bear City Community Services District**	Average	Percent of Annual Total
January	24.20	7.43	15.82	40.83%
February	5.55	3.81	4.68	12.08%
March	15.74	7.27	11.51	29.71%
April	0.00	0.01	0.01	0.01%
May	0.00	0.36	0.18	0.46%
June	0.00	0.10	0.05	0.13%
July	0.00	0.40	0.20	0.52%
August	5.15	4.12	4.64	11.97%
September	0.38	0.26	0.32	0.83%
October	0.19	0.00	0.10	0.25%
November	0.89	0.30	0.60	1.54%
December	0.84	0.46	0.65	1.68%
2023 Totals	52.94	24.52	38.73	100.00%
1977-2023 47-year Average	34.57	15.09	24.83	
2023 % of 47-year Average	153.1%	162.5%	156.0%	

Average of the 45-year Average for both stations	24.83
Average of the 2022 precipitation for both stations	38.73
2022 Average as a percent of the 45-year average	156.0%

Source:

* Big Bear MWD

** Big Bear City Community Services District

Table III-2

**FORTY-SEVEN YEARS OF PRECIPITATION DATA FOR
TWO STATIONS IN BIG BEAR AREA (Inches)**

Calendar Year 2023 - Big Bear Watermaster

Year	Bear Valley Dam*	Big Bear City Community Services District**
1977	31.95	13.35
1978	68.43	26.09
1979	34.87	15.84
1980	63.00	29.86
1981	16.67	8.42
1982	49.14	26.53
1983	56.97	24.29
1984	20.19	16.66
1985	22.40	14.11
1986	35.16	15.26
1987	27.49	12.52
1988	24.18	8.15
1989	17.32	6.85
1990	22.20	11.02
1991	38.47	19.81
1992	44.03	16.64
1993	73.81	19.45
1994	31.78	12.24
1995	49.00	15.89
1996	41.04	15.47
1997	27.00	12.92
1998	50.40	12.07
1999	13.22	6.06
2000	24.82	5.21
2001	30.62	9.10
2002	15.02	3.82
2003	32.44	12.70
2004	39.50	13.51
2005	54.74	19.56
2006	37.96	9.98
2007	16.11	4.89
2008	37.87	8.58
2009	30.70	24.52
2010	64.14	33.23
2011	27.25	14.81
2012	23.70	16.41
2013	14.38	14.53
2014	29.61	12.23
2015	19.72	8.17
2016	31.93	15.42
2017	24.55	14.81
2018	27.84	12.74
2019	54.46	24.87
2020	21.50	11.43
2021	29.63	21.13
2022	24.70	13.68
2023	52.94	24.52
47-Year Average	34.57	15.09
Percent of 47-year Average	153.1%	162.5%
114-Year Average	35.02	N/A
Percent of 114-Year Average	151.2%	

Source:

* Big Bear MWD

** Big Bear City Community Services District

Lake Inflow

Inflows to Big Bear Lake are not measured. Consequently, inflows naturally tributary to Big Bear Lake above Bear Valley Dam are calculated for each month using a water balance on the actual operation of the lake. This calculation, which utilizes observed basic data along with the calculated evaporation losses described previously, creates a water balance for each month to determine the amount of natural flow into the lake. The formula used is:

$$\text{Inflow} = \text{Evaporation} + \text{Releases} + \text{Spills} + \text{Leakage} + \\ \text{Net Withdrawals} - \text{Change in Storage}$$

If the calculated monthly inflow is a negative value, it is reset to zero, and the monthly evaporation rate is recalculated to achieve a lake water balance. Calculated negative lake inflows did not occur in 2023.

Total annual inflow for 2023 into the lake was calculated to be 32,195 acre-feet. The largest monthly inflow was 8,859 acre-feet, and it occurred in March. The average annual lake inflow for the 47 years (1977-2023) since the Judgment was rendered is 15,037 acre-feet. The median annual inflow for this same period is 9,212 acre-feet.

Table III-3 lists the annual lake inflows for the period 1977–2023. This table also ranks the inflows from the lowest (1,717 acre-feet in 2002) to the highest (48,613 acre-feet in 1993). Inflow to the lake for 2023 was well above both the average inflow and the median inflow for the forty-seven years since the Judgment was rendered in 1977. Thirty-Eight years had lower lake inflows, and eight years had higher lake inflows.

Table III - 3
Big Bear Lake Inflows 1977-2023
 (acre-feet / year)
 Calendar Year 2023 - Big Bear Watermaster

Year	Lake Inflows (AF/year)	Rank	Plotting Position	Year	Lake Inflow (AF/year)
1977	7,103	Min. 1	2.1%	2002	1,717
1978	40,743	2	4.2%	2007	2,841
1979	25,318	3	6.3%	2013	3,129
1980	41,302	4	8.3%	2015	3,677
1981	6,529	5	10.4%	1999	3,774
1982	25,310	6	12.5%	1988	4,551
1983	34,492	7	14.6%	2018	4,818
1984	10,569	8	16.7%	1990	4,856
1985	9,497	9	18.8%	1989	4,967
1986	13,812	10	20.8%	2014	5,776
1987	8,005	11	22.9%	2022	5,958
1988	4,551	12	25.0%	2021	6,401
1989	4,967	13	27.1%	1981	6,529
1990	4,856	14	29.2%	2001	6,915
1991	11,658	15	31.3%	2000	6,930
1992	15,543	16	33.3%	2016	7,027
1993	48,613 Max.	17	35.4%	1977	7,103
1994	11,015	18	37.5%	2020	7,945
1995	33,340	19	39.6%	1987	8,005
1996	13,119	20	41.7%	2012	8,175
1997	8,757	21	43.8%	2003	8,295
1998	34,629	22	45.8%	2004	8,404
1999	3,774	23	47.9%	1997	8,757
2000	6,930	Median 24	50.0%	2009	9,212
2001	6,915	25	52.1%	1985	9,497
2002	1,717 Min.	26	54.2%	1984	10,569
2003	8,295	27	56.3%	1994	11,015
2004	8,404	28	58.3%	1991	11,658
2005	39,600	29	60.4%	1996	13,119
2006	17,564	30	62.5%	2017	13,213
2007	2,841	31	64.6%	1986	13,812
2008	14,182	32	66.7%	2008	14,182
2009	9,212	33	68.8%	1992	15,543
2010	32,959	34	70.8%	2011	16,908
2011	16,908	35	72.9%	2006	17,564
2012	8,175	36	75.0%	1982	25,310
2013	3,129	37	77.1%	1979	25,318
2014	5,776	38	79.2%	2019	25,381
2015	3,677	39	81.3%	2023	32,195
2016	7,027	40	83.3%	2010	32,959
2017	13,213	41	85.4%	1995	33,340
2018	4,818	42	87.5%	1983	34,492
2019	25,381	43	89.6%	1998	34,629
2020	7,945	44	91.7%	2005	39,600
2021	6,401	45	93.8%	1978	40,743
2022	5,958	46	95.8%	1980	41,302
2023	32,195	Max 47	97.9%	1993	48,613
1977 - 2023					
Maximum	48,613				
Average	15,037				
Median	9,212				
Minimum	1,717				

Notes: 1980 and 1983 values were corrected to delete non-tributary inflows to the Lake
 1998 inflows were corrected to reflect actual value in the 1998 Annual Report

SWRCB Order No. 95-4

On February 16, 1995, the State Water Resources Control Board (SWRCB) issued Order No. 95-4. This order directed the Big Bear MWD and Bear Valley Mutual Water Company to release enough water from the lake to maintain a minimum seven-day average flow of 1.2 cfs and a minimum average daily flow of 1.0 cfs in Bear Creek no more than 500 feet downstream of its confluence with West Cub Creek. This location is referred to as Station A. In 1998, Big Bear MWD completed construction of a continuous flow recording device at Station A to measure compliance with SWRCB Order No 95-4.

SWRCB Order No. 95-4 also required sufficient releases to maintain a minimum flow of 0.3 cfs at a location approximately 300 feet downstream from the toe of the dam. This location is referred to as Station B. In 1998, Big Bear MWD also completed construction of a continuous recording device at this location to measure compliance with SWRCB Order No. 95-4.

Station B History

Flow at Station B was initially measured by a compound weir with a v-notch section and a rectangular section. It was attached to a reinforced concrete structure in the riverbed. The v-notch section had a flow range of 0 to 0.44 cfs and the rectangular section had a flow range of 0.44 to 5.03 cfs. A water level transmitter is located in a stilling well just upstream of the weir structure. The water level data are transmitted to a remote telemetry unit (RTU) located in the control building at the dam. From there, data are transmitted to a central computer at the administrative offices of Big Bear MWD where average daily flow rates at Station B were calculated based on the rating curve of the weir plate.

In late 2015, vandalism at Station B impaired the reliability and accuracy of the flow measurements at Station B. To confirm compliance with the SWRCB Order No. 95-4, Big Bear MWD used the measured flows from the 6-inch Bypass Pipeline plus the estimated leakage from the sluice gates until Station B was repaired.

In October 2016, the Station B weir plate was replaced to improve the accuracy of the water level measurements and the calculated flow values. The weir plate was changed from the compound

weir to a 90-degree, 12-inch v-notch weir. Big Bear MWD reprogrammed the SCADA/PLC for the new weir and the flow values at Station B showed improved accuracy.

However, in 2017 measurement problems at Station B continued so Big Bear MWD continued to rely on using releases from the 6-inch Bypass Pipe Line to maintain flows at Station B. Big Bear MWD contracted with XiO, Inc. to install a new transducer probe and cloud SCADA system to record flows through the new weir plate at Station B. The new system was expected to be operational in early 2018 but problems with the data transmission cable delayed implementation. On December 12, 2018, the cable was repaired and the Station B data collection became operational and worked throughout 2023.

Station A History

On December 29, 2004, data transmission from Station A ceased. In January of 2005, major storms hit the Bear Creek watershed with significant snowfall. Consequently, Big Bear MWD staff could not access Station A until May. On their first visit to the site, they found the data transmission facilities destroyed, the stilling basin filled with sediment and the weir plate damaged. The staff estimated the flow in Bear Creek at this time to be in the range of 10 to 15 cfs, well above the 1.20 cfs requirement.

Beginning in June 2005, the staff visited the site every two weeks and made velocity and water depth measurements. From these measurements they used two methods to estimate the flow at Station A. Flow estimates ranged between 2.3 cfs and 11.8 cfs. Consequently, in 2005 Station A was well in compliance with the 1.20 cfs, seven-day flow requirement.

During the summer and fall of 2005, Big Bear MWD repaired the weir plate, cleaned out the stilling basin, and installed a battery operated, pressure transducer to record weir water depth information. Since 2005, when weather conditions permit, Big Bear MWD retrieves the recorded information and calculates the flows at Station A.

In December 2010, major storms again hit the Bear Creek watershed, destroyed the data recording equipment and filled the stilling basin with sediment and rock at Station A. In November 2011, Big Bear MWD cleaned out the stilling basin and downstream creek bed and installed a new battery

operated, pressure transducer to record weir water depth information. However, there was some damage to the weir plate that could not be repaired.

When weather conditions permit, Big Bear MWD staff retrieves the recorded information, which again allows the flow at Station A to be calculated.

To determine if Station A was determining flows accurately, Big Bear MWD retained a consultant, Jericho Systems, Inc., to manually measure the Bear Creek flows above and below Station A on two occasions. The consultant found that the measured flows were 0.5 to 1.0 cfs higher than the flows calculated from water level data applied to the damaged weir plate. In 2017, Big Bear MWD began discussing options for Station A with the State Water Resources Control Board. These discussions will continue in 2024.

Flow Compliance Plans

During 2005, Big Bear MWD, working with State Water Resources Control Board (SWRCB) and the State Department of Fish and Game, developed a proposed plan to keep Station A in compliance with both the 1.0 cfs average daily flow requirement and the 1.2 cfs seven-day average flow requirement. This proposed plan involved increasing the Station B flow requirements to ensure the Station A requirements would be met. The new Station B requirements vary by month and hydrologic year type. The monthly hydrologic year type is based on water year-to-date precipitation at Bear Valley Dam. Water years (October 1 to September 30) are used to determine the hydrologic year type. The adopted plan is referred to as the “Exhibit A Flow Compliance Plan” and is presented in the following table.

Exhibit A Flow Compliance Plan
Table to Determine Minimum Daily Flows at Station B
Based Upon Water Year-to-Date Precipitation at Bear Valley Dam

Date	Enter Water Year-to-date Precipitation at Bear Valley Dam (inches)	Dry Year		Below Normal Year		Above Normal Year		Wet Year	
		If year-to-date precipitation is less than (inches)	Station B Minimum Flow is (cfs)	If year-to-date precipitation is between (inches)	Station B Minimum Flow is (cfs)	If year-to-date precipitation is between (inches)	Station B Minimum Flow is (cfs)	If year-to-date precipitation is more than (inches)	Station B Minimum Flow is (cfs)
October 1		n.a.	0.95	n.a.	0.95	n.a.	0.95	n.a.	0.95
November 1		0.03	0.90	0.03 and 0.56	0.90	0.57 and 1.93	0.70	1.93	0.70
December 1		1.59	0.85	1.59 and 3.04	0.85	3.05 and 5.60	0.80	5.60	0.60
January 1		3.73	0.90	3.73 and 8.14	0.75	8.15 and 12.84	0.75	12.84	0.30
February 1		8.94	1.00	8.94 and 13.84	0.85	13.85 and 20.79	0.50	20.79	0.30
March 1		14.42	0.80	14.42 and 20.05	0.40	20.06 and 31.47	0.40	31.47	0.30
April 1		19.29	0.75	19.29 and 25.84	0.50	25.85 and 40.30	0.40	40.30	0.30
May 1		21.61	0.95	21.61 and 28.65	0.70	28.66 and 41.16	0.55	41.16	0.30
June 1		22.18	1.15	22.18 and 30.01	0.80	30.02 and 41.86	0.75	41.86	0.30
July 1		22.42	1.20	22.42 and 30.01	0.95	30.02 and 41.86	0.95	41.86	0.30
August 1		22.93	1.25	22.93 and 30.69	1.05	30.70 and 42.48	0.95	42.48	0.30
September 1		23.30	1.00	23.30 and 30.86	0.95	30.87 and 43.69	0.95	43.69	0.30

The Exhibit A Flow Compliance Plan was approved by the SWRCB on January 08, 2009. The amended order also required Big Bear MWD to monitor the flows at Station A for ten years to confirm that the Exhibit A Flow Compliance Plan would satisfy the minimum flow requirements at Station A. Starting in December of 2005, Big Bear MWD followed the Exhibit A Flow Compliance Plan for Station B.

Effective July 1, 2014, Big Bear MWD adopted a “Revised Flow Compliance Plan” that increased the minimum flow requirements at Station B in some months based on their experience over the six years since the SWRCB approved the Exhibit A Flow Compliance Plan. The Revised Flow Compliance Plan is shown on the following table. The Revised Station B flow requirements for 2023 are highlighted in yellow.

2023 Revised Flow Compliance Plan
Table to Determine Minimum Flows at Station B
Based Upon Year-to-Date Precipitation at Bear Valley Dam
January 9, 2024

Date	Water Year-to-date Precipitation at Bear Valley Dam (inches)	Dry Year		Below Normal Year		Above Normal Year		Wet Year	
		If year-to-date precipitation is less than (inches)	Station B Minimum Flow is (cfs)	If year-to-date precipitation is between (inches)	Station B Minimum Flow is (cfs)	If year-to-date precipitation is between (inches)	Station B Minimum Flow is (cfs)	If year-to-date precipitation is more than (inches)	Station B Minimum Flow is (cfs)
October 1	0.00	n.a.	1.20	n.a.	1.20	n.a.	1.20	n.a.	1.20
November 1	0.71	0.03	1.10	0.03 and 0.56	1.00	0.57 and 1.93	0.95	1.93	0.90
December 1	8.21	1.59	0.90	1.59 and 3.04	0.85	3.05 and 5.60	0.85	5.60	0.85
2023									
January 1	12.23	3.73	0.90	3.73 and 8.14	0.85	8.15 and 12.84	0.85	12.84	0.85
February 1	36.43	8.94	1.00	8.94 and 13.84	0.85	13.85 and 20.79	0.50	20.79	0.30
March 1	41.98	14.42	0.95	14.42 and 20.05	0.85	20.06 and 31.47	0.40	31.47	0.30
April 1	57.72	19.29	0.75	19.29 and 25.84	0.50	25.85 and 40.30	0.40	40.30	0.30
May 1	57.72	21.61	0.95	21.61 and 28.65	0.70	28.66 and 41.16	0.55	41.16	0.30
June 1	57.72	22.18	1.15	22.18 and 30.01	1.00	30.02 and 41.86	0.75	41.86	0.30
July 1	57.72	22.42	1.50	22.42 and 30.01	1.30	30.02 and 41.86	0.95	41.86	0.55
August 1	57.72	22.93	1.50	22.93 and 30.69	1.50	30.70 and 42.48	1.25	42.48	0.55
September 1	57.72	23.30	1.35	23.30 and 30.86	1.20	30.87 and 43.69	1.20	43.69	1.15
October 1	0.00	n.a.	1.20	n.a.	1.20	n.a.	1.20	n.a.	1.20
November 1	0.19	0.03	1.10	0.03 and 0.56	1.00	0.57 and 1.93	0.95	1.93	0.90
December 1	1.08	1.59	0.90	1.59 and 3.04	0.85	3.05 and 5.60	0.85	5.60	0.85

Note 1

Note 2

Yellow highlighted values are the Flow Compliance values for CY 2023

Minimum flow values in blue are revised values used effective July 1, 2014

Based on the Revised Flow Compliance Plan and the actual water year-to-date precipitation at Bear Valley Dam, the plan for minimum daily average flows at Station B in 2023 were as follows:

Month 2023	Hydrologic Condition WY To-Date	Minimum Daily Averages Flow (cfs)	Exhibit A Req.
January	Above Normal	0.85	0.75
February	Wet	0.30	0.30
March	Wet	0.30	0.30
April	Wet	0.30	0.30
May	Wet	0.30	0.30
June	Wet	0.30	0.30
July	Wet	0.55	0.30
August	Wet	0.55	0.30
September	Wet	1.15	0.30
October	Start Water Year	1.20	0.95
November	Below Normal	1.00	0.90
December	Dry	0.90	0.85

Flows at Station B normally consist of leakage from the dam and spillway gates, releases, and leakage from the outlet works, spills from the lake, and inflows and consumptive losses between the Dam and Station B.

In December 2018, the XiO cloud SCADA system was installed and began collecting data. There was a testing period between December 2018 and January 2019 to ensure data collection reliability and probe accuracy. In 2019, the XiO data was checked against the original transducer at Station B to ensure accuracy of measurement and system redundancy. With reliable data from Station B, the XiO system will automatically actuate the 6-inch bypass valve based on flow conditions at Station B. If side flows are excessive, the XiO system will slow the flow of the 6-inch bypass valve. On the contrary, if side flows are non-existent, the XiO system will adjust flows through the 6-inch bypass valve to meet the desired downstream flow rate as stated in the Revised Flow Compliance Plan based on cumulative water year rainfall.

2019 was a year of learning how to implement the XiO Cloud SCADA system. The system began operation in December 2018 and on February 17, 2019, a deep freeze damaged the control valve on the 6-inch Bypass Line, which put the XiO system out of service. The control valve was

replaced but there were other operational and equipment issues that required the Big Bear MWD staff to manually oversee the control system to keep Station B in compliance. On December 2, 2019 all problems with XiO SCADA system appeared to be resolved. In October of 2020 XiO was having trouble keeping flows steady at Station B. Big Bear MWD determined that manual setting of the flows in the 6-inch Bypass Line would create a more accurate flow at Station B.

During 2023, the Exhibit A Flow Compliance Plan requirements at Station B were met on all, except 2 days. The Revised Flow Compliance Plan flow requirements at Station B were higher in some months and the number of days of non-compliance in 2023 was 17 days. On these days there were operational issues that resulted in flows that were just a little below the requirements. Meeting the Flow Compliance requirements at Station B appeared to keep the flows at Station A in compliance with the SWRCB requirements. However the probe malfunctioned until June 22 and the date of the last available data download from Station A was October 7 because of access limitation. The flows at Station A were well above the requirements during the period of available data (June 22 to October 7).

The next step for Big Bear MWD is to review the flow and release data collected over the past 16 years and recommend a final Flow Compliance Plan for Station B to the SWRCB that will require flows at Station B that will meet the flow needs at Station A and to eliminate the flow measurement facility at Station A. In 2024, Big Bear MWD will be in discussions with the SWRCB to close out the physical component of SWRCB Order No. 95-4.

Watermaster Accounting Procedures

To handle the SWRCB Order No 95-4 lake release and In Lieu delivery conditions, the Watermaster Committee, in 2002, clarified the accounting procedures. In 2003, the Watermaster made further improvements to these procedures. In 2005, they made a further change to better reflect actual lake management. This change was to include leakage with the flows from the outlet works in the accounting for flows to meet SWRCB Order 95-4. For the lake accounts, the accounting procedures are:

1. The outlet works flows and dam leakage will be deducted from both Mutual's and BBMWD's lake accounts in proportion to the amount of water in their respective lake

accounts on days when Mutual is not fully utilizing all the flow in the Santa Ana River at the point of diversion to the forebay of SCE Power Plant No. 1.

2. The outlet works flows and dam leakage releases will be deducted entirely from Mutual's lake account on days when:
 - a) Mutual is fully utilizing all the flow in the Santa Ana River at the point of diversion to the forebay of SCE Power Plant No. 1,
 - b) Mutual is requesting releases from the lake and BBMWD is releasing water from the lake or providing In Lieu supplies, or
 - c) Mutual is purchasing SWP Water.

Prior to 2012, the term "fully utilized" was defined as days when the "net amount" of water the SBVWCD diverted from the forebay of SCE Power Plant No. 3 was less than the amount of the fish release. The "net amount" of water diverted from the forebay was defined as the actual amount diverted by SBVWCD for groundwater recharge less the amount of water delivered to the forebay by the Bear Valley River Pick-up on the Santa Ana River below Seven Oaks Dam (SOD). In prior years, the Committee noticed there were some operational conditions when this definition did not accurately depict if Mutual was "fully utilizing" all the flow in the Santa Ana River at the point of diversion to the forebay of SCE Power Plant No. 1. When this occurred, adjustments were made in the accounting to better reflect actual operating conditions.

In 2012, the Committee reviewed the conditions and adopted a revised definition of the term "fully utilized." The revised definition of when Mutual is "fully utilizing" all the flow in the Santa Ana River is when:

- Mutual's Deliveries of Santa Ana River water are greater than or equal to the SCE Santa Ana River Diversions, and
- The SCE Santa Ana River Diversions are greater than the Outlet Works Flows and Dam Leakage used to meet SWRCB Order No. 95-4.

The daily values of Mutual's Deliveries and the SCE Santa Ana River Diversions will be made using the Daily Flow Reports prepared by the San Bernardino Valley Water Conservation District.

The daily SCE Santa Ana River Diversions will be determined as the sum of the following flows:

- PH#3 Penstock (CALC) (A1) flow,
- BVMWC Highline (B1) flow,
- Greenspot Spill (F1) to PH#3, and
- Deliveries to the Greenspot Pipeline (C1).

Beginning in 2018, the Watermaster Committee decided that Mutual's Deliveries of Santa Ana River Water should be determined as the sum of the following three deliveries:

- BVMWC Highline (B1)* delivery,
- Northfork delivery: Northfork Canal Weir delivery (G2) plus Edwards Canal delivery (H2) plus Northfork Parshall Flume delivery to SBVWCD (K2), and
- Redlands delivery: Redlands Aqueduct Weir (W1) delivery less the Redlands Tunnel (I1) inflow plus the Redlands Sandbox Spills (YI).

The daily Outlet Works Flows and Dam Leakage from Big Bear Lake used to meet SWRCB Order No. 95-4 are determined by the Watermaster Committee using measured releases and leakage estimates provided by Big Bear MWD.

The following paragraph describes the 2020 accounting changes related to the Big Bear Lake outflows for fishery protection required by SWRCB Order 95-4 to reflect the operational change of SCE operations and the impact of related SOD operational procedures in 2020.

2020 was an abnormal operational year that required changes to the accounting procedures used to allocate the daily Outlet Works Flows and Dam Leakage for fishery protection required by SWRCB Order 95-4. Beginning March 3 and throughout the remainder of 2020, SCE was not generating power. The only diversions SCE made at their Bear Creek diversion facility were for delivery to Mutual at the Greenspot Forebay. The diversions during this period were between zero and 11 cfs. This SCE operation limited the amount of SAR water that could be delivered to Mutual. Because of the low diversion rates, the assumption was made that SCE did not divert the full flow of Bear Creek and the Outlet Works Flows and Dam Leakage would continue to flow downstream into Seven Oaks Reservoir. This operating condition continued in 2023.

The updated allocation for the condition when SCE was not operational is to determine if Mutual is “fully utilizing” the releases from Seven Oaks Dam. If they are “fully utilizing” the SOD releases the amount of the Outlet Works Flows and Dam Leakage (i.e. Fishery Releases) would be deducted from Mutual's Lake Account. “Fully utilizing” is defined as the condition when Mutual is diverting and using essentially all of the SOD releases and the amount of the SOD releases diverted by SBVWCD and/or flowing past Cuttle Weir is less than the amount of the Outlet Works Flows and Dam Leakage.

* The term in parenthesis refers to the site location used in the Daily Flow Reports (DFR's) of the San Bernardino Valley Water Conservation District

When the SOD releases are high and the SBVWCD is diverting some of the SOD releases for recharge or there are un-diverted releases flowing past Cuttle Weir, the amount of the Outlet Works Flows and Dam Leakage is deducted from Mutual's and BBMWD's lake accounts in proportion to the amount of water in their accounts.

A second condition when Mutual is not "fully utilizing" the SOD releases and the SCE deliveries of SAR water is when Mutual delivers water to SBVWCD from the Tailrace Pipeline that is more than the Outlet Works Flows and Dam leakage used for fishery protection. The Tailrace Pipeline delivers SAR water from the afterbay of SCE Powerhouse #3. With SCE out of service, the water entering the afterbay comes from Mutual's River Pick-up, which consists of SOD releases and Greenspot spills from Mutual's Highline. When these flows exceed Mutual's needs, Mutual delivers the surplus water to SBVWCD for groundwater recharge. The committee assumes these flows include the Outlet Works Flows and Dam Leakage for fishery protection. The amounts would be deducted from Mutual's and BBMWD's lake accounts in proportion to the amount of water in their accounts.

In 2023, the Lake was more than 6 feet below full the entire year, so the In Lieu Lake Water Program was in effect all year. Under this condition, releases from the Lake were needed to meet the Fishery Requirements all year. The total releases from the Lake in 2023 to meet the Fishery Requirements was 487.34 acre-feet.

In 2023, SCE Powerhouse #1 was out of service all year and SCE did not make any diversions from Bear Creek. Consequently, the Fishery Releases in Bear Creek were not diverted by SCE and they flowed into the Santa Ana River. The Santa Ana River diversions by SCE were relatively small, except for 16 days when diversions were made to Powerhouse #3. These diversions ended on August 20 when storm flows from Tropical Storm Hillary damaged the SCE conduit where the conduit crossed the Santa Ana River. After August 20, there were no more SCE diversions of Santa Ana River water delivered to Mutual. As a consequence of these conditions, Mutual was forced to operate the Santa Ana Canyon Well #1 to extract 624 acre-feet of water to help meet its Highline water demands until the August 20 storm destroyed the pipeline that crosses the Santa Ana River. Mutual also purchased 2,108 acre-feet of State Water Project (SWP) water to supplement the Santa Ana Canyon well to meet the Highline water supply needs. After August 20, all the Highline needs were met by purchased SWP water.

Under these conditions, the 2023 Fishery Releases from Bear Valley Dam into Bear Creek flowed down into the Santa Ana River and then into storage behind Seven Oaks Dam (SOD). The SOD releases were continuous all year. There was only one day (November 29) when there were no releases. Based on the SBVWCD Daily Flow Reports, the total SOD releases in 2023 were 102,216 acre-feet.

The SOD releases were greater than the Fishery Releases on all days except one; this was November 29, when there was no SOD releases. The flow at the Main USGS gauge downstream from SOD was greater than the Fishery Releases on 338 days. This means the Fishery Releases that reached SOD would either be diverted by SBVWCD for groundwater recharge or flow past cuttle weir on 338 days.

On the other 26 days, Mutual's River Pick-up of the SOD releases would contain the Fishery Releases that reached SOD and they would be delivered to the afterbay of Powerhouse #3 and delivered to either the Redlands Aqueduct or the Tailrace Pipeline. These 26 days were January 1-11, November 15-28, and December 28.

On these 26 days, the Fishery Releases were deducted from Mutual's Lake Account. The amount deducted for these 26 days was 53.8 acre-feet. On the other 339 days, the Fishery Releases were deducted from Mutual's and Big Bear MWD's lake accounts in proportion to how much was in their lake account. Of the remaining 433.5 acre-feet of Fishery Releases, the result was that 240.8 acre-feet were deducted from Mutual's Lake Account and 192.7 acre-feet was deducted from Big Bear MWD's Lake Account. Mutual's total deduction was 294.6 acre-feet.

The Watermaster Committee will continue to review these accounting methods in 2024 to make sure 1) the determinations of the allocation of the "Outlet Works Flows and Dam Leakage" for fishery protection in Bear Creek accurately reflect actual operations, and 2) Mutual's use of In Lieu Water and purchase of SWP water are not a sole criterion to determine if the Fishery Releases are deducted from Mutual's Lake Account.

The input data and allocation of releases under SWRCB Order No. 95-4 in **Table 2.C of Appendix B** reflect the above revised procedures.

For the Basin Make-up Account the accounting procedures are:

1. Under a Big Bear MWD operation, the actual fish releases used by Mutual when Mutual is “fully utilizing” the SAR diversions will be considered a “release actually made under District Operation (R_d)” and the fish releases when Mutual is not “fully utilizing” the SAR diversion will be treated as “spills which actually occurred under District Operation (S_d)”.
2. Under a Mutual operation, the fish releases used by Mutual when Mutual is “fully utilizing” the SAR diversion will be considered a “release which would have been made under a Mutual Operation (R_m)”, and the releases allocated to Mutual when Mutual is not “full utilizing” the SAR diversions will be considered a “spill which would have occurred under a Mutual Operation (S_m).”

Tables 4.A and 4.B of Appendix B reflect these accounting procedures.

The Watermaster Committee will continue to work on these accounting procedures in 2024 to make sure they will be accurate for all possible river flow and diversion conditions that could occur in future years, including the condition when Mutual is using In Lieu water deliveries for groundwater recharge.

Dam and Spillway Gate Leakage

Leakage through the spillway gates in Bays 1 and 10 can occur when the lake level is above the spillway crest elevation. In addition, minor leakage from pressure relief valves in Bays 1 and 10 can occur when the lake level is below the spillway crest and above the elevation of the relief valves. The structural reinforcement project completed in 2006 eliminated the dam leakage from cracks in the upper arches of Bays 5, 6 and 8.

In 2023, the lake level was above the spillway crest (Elevation 6,735.25 feet which is 8.00 feet below a full lake) starting April 3 but and no spillway gate leakage was observed. The lake level was also above the relief valve elevation (6,731.05 feet above MSL) starting March 14 and the Big Bear MWD did observe relief valve leakage during this period. The 2023 estimated monthly leakages are shown in **Table III-4**. The estimated relief valve leakage in 2023 was 2.63 AF.

In late November 2009 during excavation of foundations for the new highway bridge below the Dam, workers noticed water entering the excavation and seeping to the surface below. During meetings with Caltrans engineers and the District's engineer in January 2010, Caltrans indicated they were convinced the new seepage was not related to their blasting efforts but the result of the removal of overburden and bedrock resulting in the opening of new pathways for seepage water to move through the abutment rock. Caltrans promised to prepare a remedial grouting plan and submit it to the District for engineering review and approval.

TABLE III-4
ESTIMATES OF
MONTHLY DAM LEAKAGE
 (acre-feet)
 Calendar Year 2023
 Big Bear Watermaster

Month	Spillway Gate Leakage (AF)	Bay 1 and Bay 10 Relief Valve Leakage (AF)	Additional Foundation Leakage (AF)	Total Estimated Leakage (AF)
January	-0-	-0-	-0-	-0-
February	-0-	-0-	-0-	-0-
March	-0-	-0-	-0-	-0-
April	-0-	0.25	-0-	0.25
May	-0-	0.48	-0-	0.48
June	-0-	0.28	-0-	0.28
July	-0-	0.27	-0-	0.27
August	-0-	0.27	-0-	0.27
September	-0-	0.26	-0-	0.26
October	-0-	0.27	-0-	0.27
November	-0-	0.26	-0-	0.26
December	<u>-0-</u>	<u>0.27</u>	<u>-0-</u>	<u>0.27</u>
Annual Total	-0-	2.63	-0-	2.63

In late 2011, Caltrans prepared a remedial grouting program to control seepage at the left abutment of the dam. After review and approval by the Big Bear MWD, the program was submitted for technical review to the Division of Safety of Dams and Caltrans received their approval in concept. The Caltrans proposal included four rows of grout holes. Two parallel rows parallel to the edge of the lake beginning at the left abutment and two rows perpendicular to the first rows beginning

at the left abutment. While the intent of Caltrans is to protect their new highway bridge foundation, the project should dramatically reduce seepage at the left abutment of the dam. In mid-2012, Caltrans conducted the left abutment grouting on the roadbed approach (now the parking area) of the old highway bridge. Two rows of holes were drilled and grouted during the process along with three verification holes. After completion of this effort in August 2012 observed downstream seepage at the left dam abutment was significantly reduced. As a result of this observation Caltrans determined that the second set of grout holes would be unnecessary, and Caltrans closed the project.

The additional foundation leakage cannot be directly measured and has been estimated from flow measurements at Station B that are in excess of the measured releases and estimated spillway gate leakage from the lake. Beginning in September 2013, no additional foundation leakage has been identified which indicates the grouting program may have reduced or perhaps eliminated the foundation leakage. The Committee will continue to monitor this source of leakage before drawing any conclusions concerning the effectiveness of the grouting program.

The total estimated dam leakage in 2023 was 2.63 AF, so it did contribute to the outflows from the Lake to meet the requirements of SWRCB Order 95-4.

Outlet Works Releases

Water is released from the lake through the outlet works. These releases can be for flood control purposes, for Mutual, or for fishery protection in accordance with SWRCB Order No. 95-4.

Releases are made either through a 36-inch outlet works or a 6-inch bypass pipeline that is connected to the 36-inch outlet works. A 36-inch butterfly valve is the primary control mechanism on the outlet works. Flows in the outlet works are measured by an in-line 36-inch flow meter that was installed on the outlet piping downstream of the butterfly valve in December 1993 to replace an older meter. The meter is an Electromatic Flow Meter Model 655 manufactured by Sparling Instruments, Inc. Downstream of the flow meter, the outlet works splits into a 24-inch pipeline and a 14-inch pipeline. Flows through these two pipelines are controlled by two motorized sluice gates. The two sluice gates are 24-inch by 24-inch and 14-inch by 14-inch. The 36-inch meter was calibrated with an accuracy of ± 0.5 percent between 7.07 and 212 cfs. When the sluice gates were

fully opened and the lake was full, the meter measured a flow of 256 cfs, which is the maximum that can be discharged through the outlet works. When the lake is full and only the 14-inch sluice gate is open, the flow from the outlet works is estimated to be 68 cfs. When only the 24-inch sluice gate is open, the maximum discharge from the Outlet Works is estimated to be 195 cfs. The rate of flow and totalized flow are recorded at the flow meter and also at the control building. There has been a small amount of leakage through the two sluice gates. In September 2022, the sluice gates were replaced and the leakage was eliminated. There was no sluice gate leakage in 2023.

There is also a 3-inch Relief Line meter and valve on the 36-inch outlet pipeline. During the winter months this valve is usually opened to allow a small amount of flow (minimum of 30 gpm) to pass through the 36-inch pipeline and prevent water in the pipeline from freezing. The 3-inch Relief Line had been used to provide water for the construction of the new highway bridge downstream of the Dam that replaced the bridge that was on the top of Bear Valley Dam. The bridge construction was completed in November 2011, and Big Bear MWD is no longer releasing any water for the bridge construction project. The releases through the 3-inch Relief Line were 49.5 acre-feet in 2023, and they flowed down Bear Creek and were measured as part of the flow at Station B. These releases are considered to be part of the releases to comply with SWRCB Order No. 95-4.

Flow through the 6-inch Bypass Pipeline was metered beginning in August 2006 when Big Bear MWD replaced a 4-inch Bypass Pipeline with a 6-inch Bypass Pipeline, valve and a Krohne IFS 400 flow meter. Releases to comply with SWCRB Order No. 95-4 are normally made through the 6-inch Bypass Pipeline. The total amount released through the 6-inch Bypass Pipeline in 2023 was 435.2 acre-feet.

In 2023, Big Bear MWD released water from the lake through the Outlet Works to comply with SWRCB Order No. 95-4. **Table III-5** summarizes the monthly amounts of water discharged from the Outlet Works in 2023. The total from the Outlet Works in 2023 was estimated to be 487.3 acre-feet.

TABLE III-5
MONTHLY DISCHARGES FROM LEAKAGE AND
THE OUTLET WORKS OF BEAR VALLEY DAM
(acre-feet)
Calendar Year 2023
Big Bear Watermaster

Month	Flood Control Releases (AF)	Mutual Releases (AF)	SBVMWD Releases (AF)	SWRCB Discharges (AF)	Total Outlet Works Discharges (AF)
January	-0-	-0-	-0-	52.1*	52.1*
February	-0-	-0-	-0-	16.3	16.3
March	-0-	-0-	-0-	18.1	18.1
April	-0-	-0-	-0-	12.4	12.4
May	-0-	-0-	-0-	13.0	13.0
June	-0-	-0-	-0-	16.2	16.2
July	-0-	-0-	-0-	37.7	37.7
August	-0-	-0-	-0-	43.6	43.6
September	-0-	-0-	-0-	74.0	74.0
October	-0-	-0-	-0-	79.2	79.2
November	-0-	-0-	-0-	65.7*	65.7*
December	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>59.0</u>	<u>59.0</u>
Total	-0-	-0-	-0-	487.3	487.3

* These releases were also used to partially or wholly meet Mutual's needs for lake water.

Mutual Releases

There were no lake releases for Mutual in 2023.

San Bernardino Valley MWD Releases

In 2023 San Bernardino Valley MWD did not request any lake releases from their storage account in Big Bear Lake for delivery of Lake water as an alternative to In Lieu Water to Mutual.

Flood Control Releases

There were no flood control releases in 2023.

Spills

Spills are flows that leave the lake over the spillway of the dam. They are calculated from lake gauge height readings and spillway gate settings at the dam during the time of the spill. In 2023, there were no spills from the lake.

Station B Flows

Leakage estimates and outlet works flows are confirmed by comparing the sum of dam leakage plus the amount released from the lake through the outlet works with the flow measured at Station B, which is 300 feet downstream of the dam. The differences can be either gains or losses. Although small, these differences can illustrate the impacts of rainfall/snowfall and plant evapotranspiration between the dam and Station B. **Table III-6** shows this comparison.

TABLE III-6
COMPARISON OF FLOWS AT STATION B WITH
ESTIMATED LEAKAGE AND FLOWS FROM OUTLET WORKS
Calendar Year 2023 - Big Bear Watermaster

Month	Flows from Outlet Works (AF)	Dam Leakage (AF)	Spillway Gate Release (AF)	Total Flows From Lake (AF)	Flow at Station B (AF)	Gains/ (Losses) (AF)
January	52.05	-	-	52.05	76.44	24.40
February	16.32	-	-	16.32	22.23	5.90
March	18.14	-	-	18.14	44.48	26.33
April	12.20	0.25	-	12.45	61.08	48.62
May	12.51	0.48	-	12.99	32.58	19.59
June	15.88	0.28	-	16.17	18.82	2.65
July	37.46	0.27	-	37.73	34.46	(3.27)
August	43.35	0.27	-	43.62	41.60	(2.02)
September	73.73	0.27	-	73.99	70.24	(3.76)
October	78.92	0.26	-	79.18	76.21	(2.97)
November	65.43	0.27	-	65.69	63.22	(2.47)
December	58.75	0.27	-	59.02	58.38	(0.64)
Total	484.74	2.62	-	487.36	599.74	112.38

In 2023, the measured flow at Station B was 112.4 acre-feet more than the estimated amount leaving Big Bear Lake from releases, leakage and spills. In 2023 these differences reflect the side flows that enter Bear Creek between the Dam and Station B during the winter months. In the summer and fall months, the differences were small and reflect the improved measurements at Station B. In October 2016, Big Bear MWD replaced the weir plate at Station B with a 12-inch v-notch weir to improve the accuracy of the measurements and replaced the communication line between the transducer and the SCADA system. These changes improved the accuracy of the Station B measurements. Big Bear MWD is continuing their efforts to improve the reliability and accuracy of the Station B measurements by installing an additional transducer probe and XiO cloud SCADA system. Big Bear MWD is taking physical measurements as well to ensure that Station B measurements are accurate. The Watermaster Committee will continue to monitor this condition in 2024.

Lake Withdrawals for Snowmaking

Big Bear MWD sells water from Big Bear Lake for use in snowmaking and active fire fighting for ski areas within the watershed. In 2023, 849.26 acre-feet of water was withdrawn from the lake for these purposes. The withdrawals for snowmaking occurred in seven winter months (January, February, March, April, October, November, and December). The withdrawals for other purposes occurred in five summer and fall months (May, June, July, August, and September).

Big Bear MWD began selling water from the lake for snowmaking purposes in 1980 and the Watermaster accounting assumed 50 percent would return to the lake as snowmelt. In 1989, Big Bear MWD retained James M. Montgomery, Consulting Engineers to evaluate this assumption. Their report was completed in May 1989 and concluded the return flow factors would range between 0.48 and 0.52 depending on the air temperature during snowmaking. The report recommended the Watermaster continue using a return flow factor of 0.50. The Watermaster Committee adopted the recommendation in 1989.

Based on this report, Watermaster estimates that half of the monthly amount pumped from the lake for snowmaking in the winter months returns to the lake in the form of snowmelt during the same month. In 2023, the withdrawal from the lake for snowmaking was 685.11 acre-feet and 342.56

acre-feet returned to the lake. In the summer and fall months, 164.15 acre-feet of water was used and none was returned to the lake. The “net withdrawal” for all purposes was 506.71 acre-feet (342.56 acre-feet for snowmaking and 164.15 acre-feet for use during the summer and fall months).

Net Wastewater Exports

The Watermaster Committee calculates “net” wastewater exports as the difference between the wastewater that leaves the Big Bear Lake Watershed and the water supply that is imported into the Big Bear Lake Watershed from the Baldwin Lake Watershed. The methodology used to make these calculations is documented in a report entitled “Development of a Methodology for Estimating Gross Sewage Export from Upper Bear Creek Watershed”, prepared by James M. Montgomery, Consulting Engineers, Inc., in September 1989 for Big Bear Municipal Water District.

Wastewater is exported from the Big Bear Lake watershed to the Baldwin Lake watershed from the following three areas:

- City of Big Bear Lake
- San Bernardino County Service Area 53B
- Airport area served by Big Bear City CSD

Wastewater flows from the first two areas are measured by the Big Bear Area Regional Wastewater Authority (BBARWA). Wastewater flows from the airport area within the Big Bear Lake watershed are estimated based upon the number of sewer connections in the area.

Water is imported into the Big Bear Lake watershed from the Baldwin Lake watershed by the following three activities:

- City of Big Bear Lake imports groundwater from the Baldwin Lake watershed.
- Big Bear City CSD provides water to the airport area from the Baldwin Lake watershed
- Big Bear City CSD occasionally provides emergency water to the City of Big Bear Lake

The City of Big Bear Lake imported supplies and emergency supplies are both metered, while the airport area supplies are estimated based on the number of water service connections.

In 2023, the "net" wastewater exported from the Big Bear Lake Watershed was 1,552.8 acre-feet. **Table III-7** contains the 2023 monthly net exports. The “net” wastewater exported in 2023 was higher than normal due to the wet winter conditions, which contributed to higher inflow/infiltration into the sewerage collection systems from rainfall and snowmelt.

TABLE III-7
NET WASTEWATER EXPORTS
(acre-feet)
Calendar Year 2023
Big Bear Watermaster

Month	Net Wastewater Exports (acre-feet)
January	233.2
February	126.1
March	283.8
April	269.4
May	119.8
June	93.8
July	81.3
August	74.9
September	59.1
October	57.9
November	66.5
December	<u>87.0</u>
Total	1,552.8

SANTA ANA RIVER

Bear Valley Mutual Water Company Water Needs

Mutual meets the water needs of its shareholders primarily by diverting water from the Santa Ana River. When river flow is inadequate to meet their needs Mutual can call upon water stored in Big Bear Lake, pump groundwater from the San Bernardino groundwater basin, buy State Water Project (SWP) water from San Bernardino Valley MWD, or reduce the delivery rate to its shareholders.

In 2023, Mutual reported they may not need much water from Big Bear MWD other than the portion of the SWRCB 95-4 Lake outflows they could beneficially use. 2023 was a very wet year but was a difficult year for Mutual because SCE was out of service for most of the year and was only able to deliver Santa Ana River water to Mutual to the Greenspot forebay until their pipeline was damaged on August 20. After that date, SCE was not able to deliver any Santa Ana River water to Mutual. Fortunately, Mutual was able to use the releases from Seven Oaks Dam to help meet their water needs. Mutual met their overall 2023 water needs by releases from SOD, diversions from the Santa Ana River, purchased State Water Project water, and local groundwater. Mutual also got some water from the lake releases and dam leakage for fish protection in Bear Creek.

Summary of Flows and Diversions at Mouth of the Santa Ana River Canyon

Exhibit D, Section 1(f) of the Judgment calls for data to be included in each Watermaster annual report summarizing the river flows at the mouth of the Santa Ana River Canyon and diversions at the mouth of the Santa Ana River Canyon. Specifically, it requests quantities of water diverted into the following facilities:

1. Bear Valley High Line
2. Redlands Canal
3. North Fork Canal

4. Edwards Canal

5. San Bernardino Valley Water Conservation District Spreading Grounds

Exhibit D also requires the annual report to estimate the amount of Santa Ana River flow not diverted for beneficial use. **Table III-8** contains this information for 2023

TABLE III-8
SUMMARY OF DIVERTED FLOW AT MOUTH OF
SANTA ANA RIVER CANYON
(ACRE-FEET)

Calendar Year 2023
Big Bear Watermaster

Flow Component	Amount (AF)
FLOW OF SANTA ANA RIVER AT MOUTH OF CANYON	
Flow Reported for U.S.G.S. Gauge 11051501-provisional	105,917
less BVMWC Canyon Well No. 1 Production	<u>-624</u>
Estimated Santa Ana River Flow Below Seven Oaks Dam	105,293
Annual Storage Change in Seven Oaks Reservoir	<u>+1,362</u>
Estimated Santa Ana River Flow at Mouth of Canyon	106,655
DIVERSIONS BY BEAR VALLEY MUTUAL WATER COMPANY	
Diversions:	
Greenspot Pipeline Metering Station	95
Edwards Line	172
North Fork Canal	1,294
North Fork Flume	6,138
Bear Valley Highline (includes Canyon Well No. 1)	820
Redlands Aqueduct (includes Redlands Tunnel)	10,126
SBVMWD Morton Canyon Connector Deliveries	-0-
Redlands Sandbox Spreading (observed)	<u>1,273</u>
	19,918
Adjustments:	
Water pumped from BVMWC Canyon Well No. 1	-624
Redlands Tunnel Diversion	<u>-712</u>
Total MUTUAL Diversions	18,582
DIVERSIONS BY SBVWCD	
Diversion by San Bernardino Valley Water Conservation District	54,508
SBVMWD Morton Canyon Connector Deliveries to SBVWCD	<u>0</u>
	54,508
Adjustments:	
North Fork Parshall Flume	<u>6,138</u>
Total SBVWCD Diversions	48,370
TOTAL DIVERSIONS FROM THE SANTA ANA RIVER	
Total Diversions by Mutual and SBVWCD	66,952
AMOUNT NOT DIVERTED	
Santa Ana River Flow at Mouth of Canyon	106,655
Mutual and SBVWCD Diversions	- 66,952
Amount Released from Storage Behind Seven Oaks Dam	<u>-1,362</u>
Estimated Not Diverted	38,342
Estimated Flow Downstream of Diversions*	36,815
Estimated Losses and Measurement Errors **	+1,527 1.45%

* This value equals the amount observed at the Cuttle Weir (36,697 AF) plus spills from PH #3 (118 AF)

** See written text for explanation

Flow of Santa Ana River at Mouth of Canyon

The United States Geological Survey (USGS) reports flow in the Santa Ana River at the mouth of the Santa Ana Canyon under Station No. 11051501. This station is the combination of flow records from three gauges (USGS Station No. 11049500, 11051499, and 11051502). Flow in the flume between the afterbay of SCE Power House No. 1 (SCE Power House No. 2 was removed due to the construction of Seven Oaks Dam) and the forebay of SCE Power House No. 3 is estimated by the USGS using a meter installed by SCE and reported as Station No. 11049500. Note that this metered flow includes the overflow from the old SCE Powerhouse No. 3 forebay as reported on the Daily Flow Report as the Greenspot Spill. In addition, the USGS maintains two gauging stations near the mouth of the Santa Ana River Canyon below Seven Oaks Dam. Station No. 11051499 measures the flow in the main river channel while Station No. 11051502 measures river flow diverted into the afterbay of SCE Power House No. 3 through the Bear Valley River Pick-up. The measured flows at this gauge also includes the over-flow from the old SCE Powerhouse No. 3 forebay. The records from these three sources are summarized, adjusted for the overflow from the old SCE Powerhouse No. 3 forebay, and reported as the total flow in the Santa Ana River, USGS Station No. 11051501.

During 2023, the total river flow reported by the USGS, currently provisional, was 105,917 acre-feet. However, measurements at Station No. 11049500 include the amount of groundwater pumped by Mutual and discharged into the flume above the gauge. Thus, to get the actual Santa Ana River Flow the Canyon Well production must be deducted from the reported flows. In 2023, the Canyon Well production was 624 acre-feet. Thus, the resulting estimated Santa Ana River flow was 105,293 acre-feet in 2023. However, this value does not reflect the storage change in the reservoir behind Seven Oaks Dam. In 2023, an estimated 1,362 acre-feet of water was added to storage behind the Dam. Thus, the estimated flow of the Santa Ana River at the mouth of the canyon above Seven Oaks Dam was 106,655 acre-feet in 2023.

Diversions by Bear Valley Mutual Water Company

Amounts diverted by Mutual and associated prior right companies are reported to the State Water Resources Control Board under Recordation Numbers 36-00021, 36-00022, and 36-00028. In 2023, Mutual's SAR diversions were estimated to be 18,582 acre-feet based on the Daily Flow

Reports prepared by the San Bernardino Valley Water Conservation District (SBVWCD). The majority, 17,150 acre-feet, was SAR water released from Seven Oaks Dam and diverted by Mutual at their River Pick Up. Beginning in 2020, Mutual's diversions include the water they deliver to North Fork Water Company and that North Fork delivers to SBVWCD via the North Fork Parshall Flume. Also, Mutual pumped 624 acre-feet of groundwater from their Canyon Well No.1 located in the Santa Ana Canyon above the major points of diversion and they produced 712 acre-feet of water from the Redlands Tunnel.

Diversions by San Bernardino Valley Water Conservation District

Water diverted by the San Bernardino Valley Water Conservation District for groundwater recharge is by virtue of licenses, pre-1914 rights and diversion rights of San Bernardino Valley MWD and Western MWD; all diversions are reported to the State Water Resources Control Board. In 2023, the diversions were estimated to be 48,370 acre-feet of Santa Ana River water for ground water recharge based on the Daily Flow Reports prepared by the SBVWCD. As mentioned above, the SAR water SBVWCD received from the North Fork Parshall Flume was not included in Table III-8 as a SBVWCD diversion.

Amount Not Diverted

The sum of the diversions mentioned above are subtracted from the total river flow as reported by USGS Gauge 11051501 plus the annual storage change in Seven Oaks Reservoir to determine the "Amount Not Diverted". The "Amount Not Diverted" represents the amount of water that flows past the mouth of the Santa Ana River Canyon without being diverted for beneficial use.

Losses and Measurement Errors

During preparation of the 1996 report the Watermaster Committee discovered significant discrepancies between the value for "Amount Not Diverted", as calculated by the method contained in previous Watermaster Reports and observed flows in the Santa Ana River just downstream from the last diversion point. Since 1994, San Bernardino Valley Water Conservation District staff have been estimating the amount of water flowing past the Greenspot Road Bridge at the Cuttle Weir, which is just downstream from the mouth of the Santa Ana River Canyon, on a daily basis. In past years the difference between the estimated flows at the Greenspot Road

Bridge and the “Amount Not Diverted” were significantly different. The Watermaster has conducted extensive research with regards to the discrepancy and provided the following eight explanations:

1. Leakage Losses between Inflows and Outflows. The first explanation was unmeasured losses between the points where inflows and outflows are measured. These include:

1. Leakage in the tailrace from SCE Power House No. 3 afterbay,
2. Leakage in the Redlands Aqueduct between SCE Power House No. 3 afterbay and the Redlands Sandbox which may have been partially remedied by the replacement of a portion of a steel pipe segment of the Aqueduct in 2021, and
3. Leakage around the Redlands Sandbox weir.

2. Unmeasured Diversions. The second explanation was that Mutual could divert water for spreading at the Redlands Sandbox without it being measured. San Bernardino Valley Water Conservation District staff now observes and reports this diversion on a daily basis. These estimates are based on known flows delivered to the Redlands Sandbox and are fairly accurate. This possible source of error has been corrected and the amount diverted for spreading is included in Table III-8.

3. USGS Gauge Accuracy. The third possible explanation for the disparity is the accuracy of the USGS flow records. The USGS reports that this combined flow measurement of the three gaging stations is considered to have an accuracy rating of "fair". A "fair" rating means that 95 percent of the daily discharge measurements are within 15 percent of the true value. According to Jeffrey Agajanian of the USGS, this means the error band for the entire year should be within approximately 15 percent of the total measured flow. This value is a conservative estimate of the possible measurement errors and the flow is likely to be well within this error band, especially during the summer months when flows are generally constant and lower.

4. Water Delivery Flow Measuring Device Accuracy. A fourth reason for the difference could be inaccuracies in the diversion measuring devices, which should be less than +/- 10 percent at any given time. Most of these measurements are obtained through the use of stable, long-term weirs and Parshall flumes, but small, though not insignificant, errors are possible. Some of the measurement devices provide daily readings and are equipped with totalizer equipment providing monthly data. The San Bernardino Valley Water Conservation District (SBVWCD) will continue to update totalizer equipment on any of the measurement devices that are not equipped with totalizer equipment.

5. Observed Flow at the Cuttle Weir. A fifth possible explanation was the accuracy of the flow estimates at the Cuttle Weir. These estimates are based on daily flow observations. Total flow quantities are difficult to determine because of the high degree of short-term variability in the river flows during storm events. For 2023, the flow over the Cuttle Weir was estimated to be 36,697 acre-feet.

The construction of the Seven Oaks Dam required the reconstruction of the SCE flume between the old Power House No. 2 and No. 3. This eliminated any losses in the flume from the old Power House No. 2 and No. 3 and required the USGS to move Station No. 11049500 to the old forebay of Power House No. 3. Flow at this station was initially estimated by using the Daily Flow Report provided by the San Bernardino Valley Water Conservation District and is reported as Station No. 11049500. As of August 2001, SCE has installed a new meter in their aqueduct above the forebay of Power House No. 3 and data from this flow meter is provided to the USGS. In addition, improved efforts were taken to monitor diverted water at the Redlands Sandbox for ground water recharge and observed flows at the Cuttle Weir. The Watermaster has concluded that these efforts have reduced the losses and measurement inaccuracies such that the large errors that occurred in the past should no longer occur.

6. Storage behind Seven Oaks Dam. There is, however, an additional factor that must be considered when the Watermaster Committee estimates the “amount not diverted”. This factor is the amount of water that has been stored behind Seven Oaks Dam (SOD) and not released by year-end. This stored water is Santa Ana River flow that has not yet been measured by the two USGS stream gauges below the dam. In addition, water stored behind the dam from inflow in the previous year and released in the current year must also be taken into account. The amount stored behind SOD at the end of 2022 was 2,088.2 acre-feet (water surface elevation of 2,186 feet). The amount stored behind SOD at the end of 2023 was 3,450.0 acre-feet (water surface elevation of 2,204 feet). In other words, water that was added to storage behind the dam was from inflow in 2023. This amount was 1,361.8 acre-feet and was not included in the USGS provisional value of 150,917 acre-feet. Adding the amount of SAR water stored behind SOD in 2023 and deducting the amount of groundwater pumped from BVMWC Canyon Well (623.5 acre-feet) from the USGS provisional value increases the estimate of Santa Ana River flow to 106,655.3 acre-feet for 2023.

7. Spills from SCE PH No. 3. In 2012, the Committee identified an additional location where Santa Ana River water that is not diverted is measured by the San Bernardino Valley Water Conservation District. This location is the afterbay of SCE Power House No. 3. On occasion, all of the water delivered to the afterbay is not diverted and some of it is spilled to a small channel that discharges to the Santa Ana River below Cuttle Weir. The Committee agreed that these spills should be added to the observed flows at Cuttle Weir to estimate the “Estimated Flow Downstream of Diversions” as reported in **Table III-8**. In 2023, there were 117.8 acre-feet of spills from SCE PH No. 3.

8. Differences in Measurements. The USGS estimates of the Santa Ana River flow are based on stream gauges that record data at 15-minute intervals throughout the day. The estimates of diversions are based on the Daily Flow Reports prepared by the SBVWCD and these reports contain only a single value (usually in the morning) for each working day for each diversion point. Thus, the diversion estimates are not as accurate as the USGS flow estimates and this could lead to significant errors in the “Estimated Not Diverted” value (1,527 acre-feet) as shown in Table III-8. The Watermaster Committee will review this item in 2024 to determine if Table III-8 should be revised to provide a better estimate of the amount of Santa Ana River water that is not diverted.

2023 Estimate of Amount Not Diverted

In 2023, San Bernardino Valley Water Conservation District observed significant river flow past the Cuttle Weir at the Greenspot Road Bridge (36,697 acre-feet), and they reported 118 acre-feet of spills into the Santa Ana River from the afterbay of SCE Power House No. 3. Their estimate of these flows, which represents the amount not diverted, was 36,815 acre-feet.

In 2023, the estimated Santa Ana River flow at the mouth of the canyon was 106,655 acre-feet. The total estimated diversions of Santa Ana River flow by Mutual and San Bernardino Valley Water Conservation District was 66,952 acre-feet. Deducting the 1,362 acre-feet of water stored behind Seven Oaks Dam in 2023, this left an estimated 38,342 acre-feet of Santa Ana River water not diverted in 2023. Comparing this difference with the observed flows past the Cuttle Weir at Greenspot Road Bridge (36,697 acre-feet) and the spills from the afterbay of SCE PH No. 3 (118 acre-feet), results in unmeasured leakage losses and measurement errors of 1,527 acre-feet. These

losses and errors represent 1.45 percent of the estimated Santa Ana River flow (acre-feet), which is lower than normal.

Lake Releases/In Lieu Water Deliveries

Santa Ana River flows are often insufficient to meet Mutual's water needs; as a result, they frequently request lake releases from Big Bear MWD to meet their needs. Big Bear MWD has the choice of releasing water from the lake or providing an In Lieu supply. At their meeting on May 1, 1987, the Board of Directors of the Big Bear MWD voted unanimously to approve the following policy for providing In Lieu Water supplies.

1. *Adopt the following 1987 In Lieu policy:*
 - A. *When the lake is in the top 4 feet, the irrigation demands from the lake will be met by releasing water from Big Bear Lake.*
 - B. *When the lake is between 4 feet and 6 feet down, the District intends to purchase In Lieu Water between the months of May 1st and October 31st from either wells or the State Water Project; between November 1st and April 30, water required would be released from Big Bear Lake.*
 - C. *When the lake is between 6 and 7 feet down, the Board shall determine whether to release from the lake.*
 - D. *In the unlikely event that the lake is more than 7 feet down, the District intends to buy In Lieu water throughout the year.*
 - E. *The General Manager shall inform the Board each time water is released.*

On November 16, 2006, the Board of Directors of Big Bear MWD modified their Lake Release Policy to eliminate items C, D and E and to use In Lieu Water whenever the lake is more than 6 feet below full. The revised Lake Release Policy is:

1. *When the Lake is within the top 4 feet, the water demands from Bear Valley Mutual will be met with Lake releases;*

2. *When the Lake is between 4 and 6 feet below full, the District intends to obtain In Lieu water between the months of May 1 and October 31. Between November 1 and April 30, water required would be released from Big Bear Lake;*
3. *When the Lake is more than 6 feet below full, the District intends to obtain In Lieu water throughout the year.*

In 2023, the lake level was more than 6 feet below full for the entire year. The lake ended the year 8.20 feet below full.

2012 In Lieu Lake Release Agreement

In July 2012, Big Bear MWD and San Bernardino Valley MWD (Valley District) entered into a Memorandum of Understanding that allowed Valley District to deliver In Lieu Water to Mutual when the Lake Release Policy would normally call for lake releases, and, in return, Valley District would get credit for an equal amount of water stored in Big Bear Lake. The amount of water in their storage account would be reduced monthly by the amount of additional evaporation resulting from the increased surface area of the lake. This In Lieu Lake Release program began on July 1, 2012 and was scheduled to run through December 31, 2015. In 2015, the two agencies modified the existing In Lieu Agreement to extend the time Valley District could make In Lieu Lake Water deliveries to Mutual and provide Valley District with the opportunity to reduce their In Lieu SWP Water deliveries to Mutual during emergency years when their State Water Project (SWP) deliveries are significantly reduced.

At the end of 2022, Valley District had stored 491 acre-feet of water in Big Bear Lake. In 2023, Valley District did not request any In Lieu Lake Releases. The additional evaporation losses in 2023 were 53 acre-feet. Valley District ended the year with 438 acre-feet in their sub-account and the Lake was 0.22 feet higher than it would have been without the Memorandum of Understanding. **Table III-9** shows the account details of Valley District's portion of Big Bear MWD's lake account.

TABLE III-9
ALLOCATION OF BIG BEAR MWD LAKE ACCOUNT
 Calendar Year 2023
 Big Bear Watermaster

LAKE ACCOUNTS (acre-feet)	Big Bear WM Account	Valley District Subaccount	Big Bear Subaccount
Initial Storage	24,293.2	490.8	23,802.4
Lake Inflows	-	-	-
In Lieu Water Supplies to Mutual	-	-	-
Lake Releases (Mutual & BBMWD)	-	-	-
Releases & Leakage (SWRCB 95-4)	(192.7)	-	(192.7)
Net Snowmaking Withdrawals	(506.7)	-	(506.7)
Lake Spills & Flood Control Releases	-	-	-
Evaporation from Lake	(2,601.1)	(53.2)	(2,547.9)
Net Wastewater Exports	(1,552.8)	-	(1,552.8)
Advances and Repayment of Advances	-	-	-
Ending Storage	19,439.9	437.6	19,002.3

Water Deliveries to Mutual by Big Bear MWD

Mutual received 294.6 acre-feet of water from Big Bear MWD in 2023. This year Mutual's needs for water from BBMWD were met only by water discharged from the lake for fishery protection under SWRCB Order No. 95-4. **Table III-10** shows Big Bear MWD monthly water deliveries to Mutual during 2023.

TABLE III-10
WATER DELIVERIES TO MUTUAL BY
BIG BEAR MUNICIPAL WATER DISTRICT
(Acre-feet)
Calendar Year 2023
Big Bear Watermaster

Month	Releases from Big Bear Lake for Mutual	Mutual's Use of Fish Releases*	"In Lieu" State Water Project	"In Lieu" Lake Releases	"In Lieu" Groundwater	Total Deliveries to Mutual
January	-0-	26.2	-0-	-0-	-0-	26.2
February	-0-	5.6	-0-	-0-	-0-	5.6
March	-0-	6.8	-0-	-0-	-0-	6.8
April	-0-	6.2	-0-	-0-	-0-	6.2
May	-0-	7.4	-0-	-0-	-0-	7.4
June	-0-	9.8	-0-	-0-	-0-	9.8
July	-0-	22.9	-0-	-0-	-0-	22.9
August	-0-	26.4	-0-	-0-	-0-	26.4
September	-0-	45.4	-0-	-0-	-0-	45.4
October	-0-	48.5	-0-	-0-	-0-	48.5
November	-0-	52.5	-0-	-0-	-0-	52.5
December	<u>-0-</u>	<u>36.9</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>36.9</u>
Total	-0-	294.6	-0-	-0-	-0-	294.6

* Also required to comply with SWRCB Order No. 95-4

In 2019, Mutual used In Lieu Water for groundwater recharge for the second time. These deliveries could have an impact on the Basin Make-up Account. In 2022, Mutual delivered SAR water to SBVWCD at the Tailrace Pipeline Valve (J2) for groundwater recharge for 28 days when they were also taking In Lieu groundwater. The current formula for Basin Make-up Account does not include this operational condition. In 2024, the watermaster committee will address this issue.

The amount of water Big Bear MWD is obligated to deliver to Mutual is limited by the Judgment. According to the Physical Solution Agreement, Article III.A.1.(b), Mutual has the right to:

“divert water, or cause water to be diverted, at such rate as may be reasonably necessary to meet the requirements of Mutual’s stockholders, not exceeding 65,000 acre-feet in any ten (10) year period, as determined by the Board of Directors of Mutual in its sole discretion.”

Table III-11 summarizes the deliveries to Mutual since the agreement went into effect. For the ten-year period ending with calendar year 2023, the amount of water delivered to Mutual by Big Bear MWD was 58,140 acre-feet. For the 47-year period the Judgment has been in effect, the average annual deliveries by Big Bear MWD to Mutual has been 4,612 acre-feet.

In 2024 Mutual can request up to 14,161 acre-feet of water from Big Bear MWD. This value is the amount that they are below the 65,000 acre-feet limitation at the end of 2023 (which is 6,860 acre-feet), plus the deliveries made in 2014 (which was 7,301 acre-feet), that will be dropped from the ten-year period ending in 2024. The 14,161 acre-feet total includes In Lieu deliveries, lake releases, and fishery outflows that Mutual is able to divert.

TABLE III-11
SUMMARY OF WATER DELIVERIES TO MUTUAL 1977 - 2023
(acre-feet)

Calendar Year 2023 Big Bear Watermaster

Calendar Year	Mutual Lake Releases	SWRCB Outflows to Mutual	In Lieu Well Water	In Lieu SWP Water	In Lieu EVWD or VD Lake Re	In- Lieu BV Stock Water	Total In Lieu & Releases	10-year Total
1977	868.0	-	4,412.0	-	-	-	5,280.0	n.a.
1978	-	-	-	-	-	-	-	n.a.
1979	-	-	-	-	-	-	-	n.a.
1980	-	-	-	-	-	-	-	n.a.
1981	2,250.0	-	-	672.0	-	-	2,922.0	n.a.
1982	657.0	-	-	56.0	-	-	713.0	n.a.
1983	-	-	-	-	-	-	-	n.a.
1984	1,700.0	-	-	993.0	-	-	2,693.0	n.a.
1985	2,463.0	-	842.0	2,994.0	-	-	6,299.0	n.a.
1986	1,358.0	-	1,139.0	190.0	-	-	2,687.0	20,594.0
1987	-	-	3,301.0	4,762.0	-	84.0	8,147.0	23,461.0
1988	-	-	1,864.0	5,432.0	-	63.0	7,359.0	30,820.0
1989	-	-	1,593.0	8,555.0	-	-	10,148.0	40,968.0
1990	-	-	562.0	7,722.0	-	-	8,284.0	49,252.0
1991	78.6	-	-	-	151.0	-	229.6	46,559.6
1992	-	-	-	-	-	-	-	45,846.6
1993	-	-	-	-	-	-	-	45,846.6
1994	1,140.8	-	-	-	-	-	1,140.8	44,294.4
1995	88.3	-	-	-	-	-	88.3	38,083.7
1996	3,460.7	-	-	4,027.5	-	-	7,488.2	42,884.9
1997	364.0	-	-	6,780.1	-	-	7,144.1	41,882.0
1998	-	-	-	-	-	-	-	34,523.0
1999	124.2	146.5	-	10,435.8	-	-	10,706.5	35,081.5
2000	-	510.4	-	12,877.5	-	-	13,387.9	40,185.4
2001	46.3	492.7	48.1	14,212.4	-	-	14,799.5	54,755.3
2002	-	614.1	-	5,000.0	-	-	5,614.1	60,369.4
2003	-	484.3	-	-	-	-	484.3	60,853.7
2004	-	512.3	-	2,500.0	-	-	3,012.3	62,725.2
2005	-	146.3	-	2,218.0	-	-	2,364.3	65,001.2
2006	-	467.2	-	2,070.3	-	-	2,537.5	60,050.5
2007	-	486.0	-	6,500.0	-	-	6,986.0	59,892.4
2008	-	474.6	-	4,633.6	-	-	5,108.2	65,000.7
2009	-	509.8	-	5,990.2	-	-	6,500.0	60,794.2
2010	123.1	276.2	-	2,478.8	-	-	2,878.1	50,284.3
2011	-	384.5	-	789.2	-	-	1,173.7	36,658.5
2012	-	640.8	-	4,695.9	-	-	5,336.7	36,381.1
2013	-	653.1	-	6,454.4	-	-	7,107.5	43,004.3
2014	-	892.9	4,691.9	1,716.0	-	-	7,300.8	47,292.8
2015	-	661.9	648.0	5,170.9	484.8	-	6,965.6	51,894.1
2016	-	766.5	-	8,500.0	-	-	9,266.5	58,623.1
2017	-	506.3	-	4,146.8	-	-	4,653.1	56,290.2
2018	-	824.6	447.9	6,618.4	-	-	7,890.9	59,072.9
2019	-	251.2	-	299.7	-	-	550.9	53,123.8
2020	-	587.8	-	3,079.7	-	-	3,667.5	53,913.2
2021	-	706.9	6,084.0	2,190.4	-	-	8,981.3	61,720.8
2022	-	596.3	6,226.0	1,746.0	-	-	8,568.3	64,952.4
2023	-	294.8	-	-	-	-	294.8	58,139.7
1977-2023 Average	313.2	274.2	677.8	3,329.9	13.5	3.3	4,611.9	

2019 value for SWRCB Outflows to Mutual was corrected to 251.2 AF

Table III-11 was updated December 27, 2018 to correct minor rounding problems

Mutual's Equivalent Water Diversions

Table III-12 shows the amount of water that Mutual would have diverted from the Santa Ana River if the Judgment had not been rendered. This figure is determined by adding the In Lieu State Water Project water and In Lieu groundwater deliveries as reported in **Table III-10** to the River diversions by Mutual and Mutual's groundwater production from their Canyon Well No. 1, as shown in **Table III-8**. Mutual's Canyon Well No. 2 was destroyed as part of the construction of the Seven Oaks Dam between 1994 and 1998. The value for Santa Ana River diversions includes the supply from the Redlands Tunnel. This Equivalent Water Diversion is the amount of Santa Ana River water Mutual would have to divert if their demands for water from Big Bear MWD had been met by lake releases rather than In Lieu Water deliveries. The 2023 Equivalent Water Diversions were 19,918 acre-feet.

TABLE III-12
EQUIVALENT WATER DIVERSIONS BY MUTUAL 1977-2023 (acre-feet)

Calendar Year 2023, Big Bear Watermaster

Calendar Year	Net Santa Ana River Diversion by BVMWC*	Groundwater Production From Wells No. 1 & 2	Big Bear MWD In Lieu Water Deliveries	Equivalent Total Water Diversions
1977	14,420	1,546	4,412	20,378
1978	16,809	282	-	17,373
1979	19,470	114	-	19,584
1980	20,479	188	-	20,667
1981	20,449	1,130	672	22,251
1982	18,565	246	56	18,867
1983	19,209	53	-	19,262
1984	23,392	739	993	25,124
1985	19,837	872	3,836	24,545
1986	23,160	894	1,329	25,383
1987	16,373	947	8,147	25,467
1988	14,170	612	7,359	21,141
1989	11,449	672	10,148	22,269
1990	11,242	1,576	8,283	21,101
1991	13,715	368	151	14,234
1992	16,840	97	-	16,937
1993	26,591	-	-	26,591
1994	23,819	594	-	24,413
1995	30,794	60	-	30,853
1996	19,529	1,131	4,027	24,687
1997	19,490	1,559	6,780	27,829
1998	26,625	105	-	26,730
1999	21,336	484	10,436	32,256
2000	17,171	2	12,878	30,371
2001	12,355	140	14,260	26,755
2002	8,007	58	5,000	13,065
2003	13,301	114	-	13,415
2004	11,815	67	2,500	14,382
2005	13,615	-	2,218	15,833
2006	18,733	-	2,070	20,803
2007	12,445	182	6,500	19,127
2008	14,144	182	4,634	18,960
2009	11,022	-	5,990	17,012
2010	18,153	-	2,479	20,632
2011	17,601	-	789	18,390
2012	15,560	-	4,696	20,250
2013	11,310	-	6,454	17,764
2014	9,572	-	6,408	15,980
2015	11,345	-	5,819	17,164
2016	9,453	-	5,800	17,953
2017	16,521	-	4,147	20,668
2018	11,608	-	7,066	18,674
2019	18,205	15	30	18,520
2020	20,789	131	3,080	24,090
2021	11,073	-	8,274	19,347
2022	12,371	-	7,972	20,343
2023	19,294	624	-	19,918

*Includes Redlands Tunnel Diversions

IV. DETERMINATIONS AND ACCOUNTS

ACCOUNTING REQUIREMENTS

In accordance with Article 29 of the Judgment, "Watermaster shall maintain three basic accounts, in accordance with Watermaster Operating Criteria, as follows:

(a) District's Lake Water Operation. A detailed account to reflect actual operation of the Lake by District shall be maintained.

(b) Mutual's Lake Water Operations. In addition, a corollary account shall be maintained to simulate the effect of Mutual's operations with regard to Lake water under the In Lieu Water operations.

(c) Basin Make-up Account. An account of District's annual and cumulative obligation for Basin Make-up Water shall also be maintained."

In 1986, the Watermaster Committee developed a computer program for keeping these accounts. This program was designed to operate on an IBM (or IBM compatible) personal computer using Lotus 1-2-3. To standardize all years of operations under the Judgment, all past accounts were recalculated using the program and were included in the 1986 Annual Report.

In 1990, the Watermaster Committee decided how to account for wastewater exports from the Big Bear Lake watershed and delivery of water on Mutual stock owned by Big Bear MWD. Only the Basin Make-up Account was affected by these decisions. Consequently, the 1990 Watermaster Report contained revised tables for the Basin Make-up Accounts for calendar years 1986, 1987, 1988, and 1989, as well as the status of all the 1990 accounts.

For the 1994 report, the Watermaster Committee updated the accounting procedures to reflect 1994 Watermaster decisions and to clarify the reports.

In 1995, the Watermaster made several additional revisions to the accounting procedures. However, in preparing the 1996 accounts, the Watermaster Committee discovered some errors in

the changes made in 1995. These errors were corrected and, as a result, the 1995 accounts were recomputed and were included in the 1996 Annual Watermaster Report.

2023 ACCOUNT BALANCES

Appendix B contains the 2023 accounts. The first four pages of the appendix present the input data used to calculate the various accounts. The fifth page summarizes the status of the various accounts. The remaining pages of **Appendix B** are the detailed monthly tables of the accounts.

Actual Lake Account

Figure 2 illustrates the water balance for the actual operation of Big Bear Lake in 2023. **Table 1** of **Appendix B** provides additional detail. This information shows that:

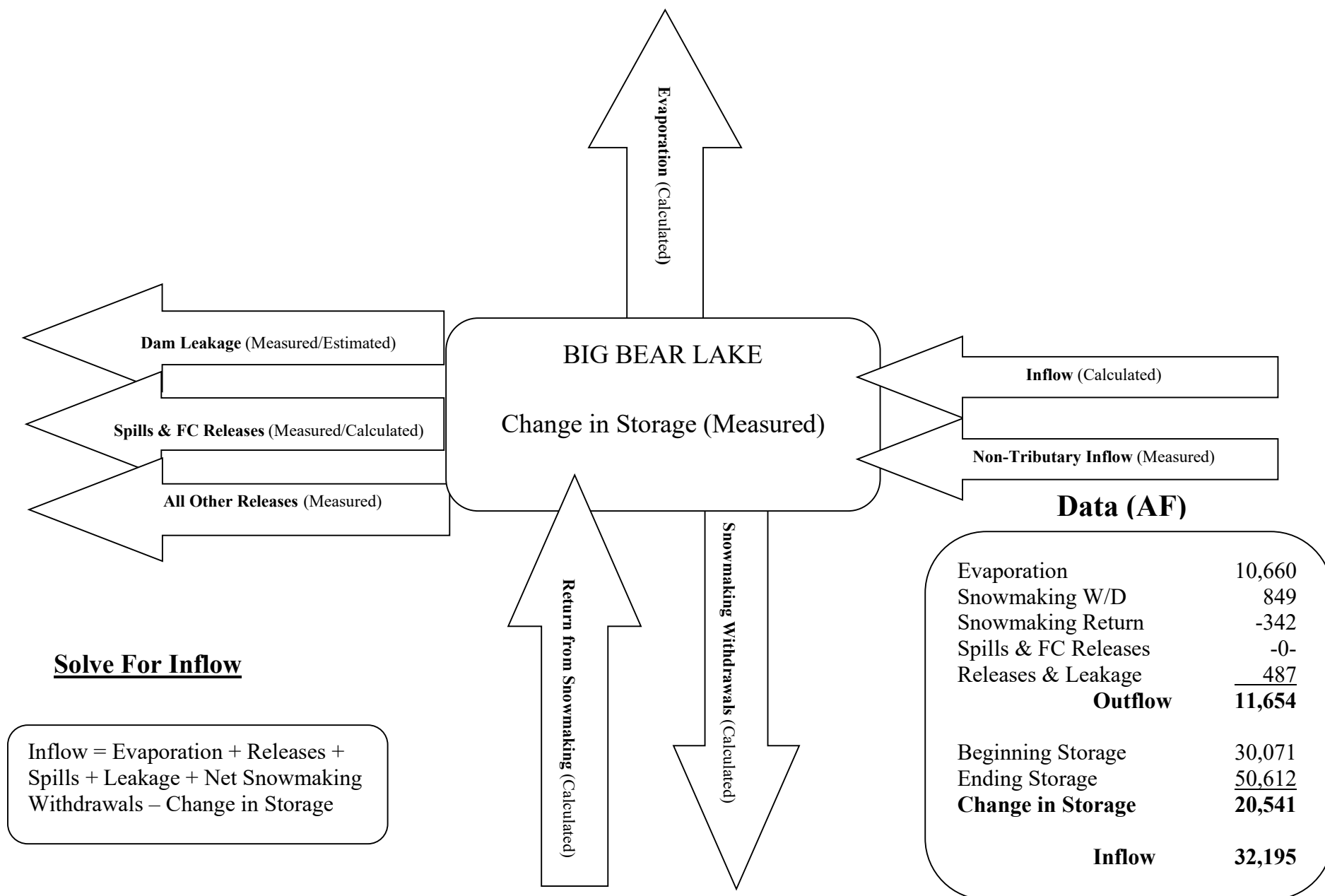
- 1) The lake level rose 9.02 feet, from a gauge height of 55.11 feet to 64.13 feet; 72.33 feet is full;
- 2) Lake storage increased by 20,541 acre-feet, it began the year with 30,071 acre-feet and ended the year with 50,612 acre-feet; when the lake is full, it contains 73,320 acre-feet of water;
- 3) Lake surface area varied between 1,952 and 2,686 acres;
- 4) Evaporation was 10,660 acre-feet;
- 5) Lake inflow was 32,195 acre-feet,
- 6) The total of spills, releases, leakage, and net lake withdrawals was 994 acre-feet.

Tables 1A through **1D** provide additional details to support **Table 1**.

Mutual's Lake Account

Figure 3 illustrates the water balance for Mutual's synthesized operation of Big Bear Lake in 2023. Mutual's operation shows what would have happened if:

Figure 2
Water Balance for 2023 Actual Lake Operations



- 1) Mutual had owned the lake,
- 2) The In Lieu program was not in place, and
- 3) The net wastewater exported from Big Bear Lake watershed entered the lake as supplemental inflow.

In this synthesized case, Mutual's demands for lake water would have been met entirely from lake releases.

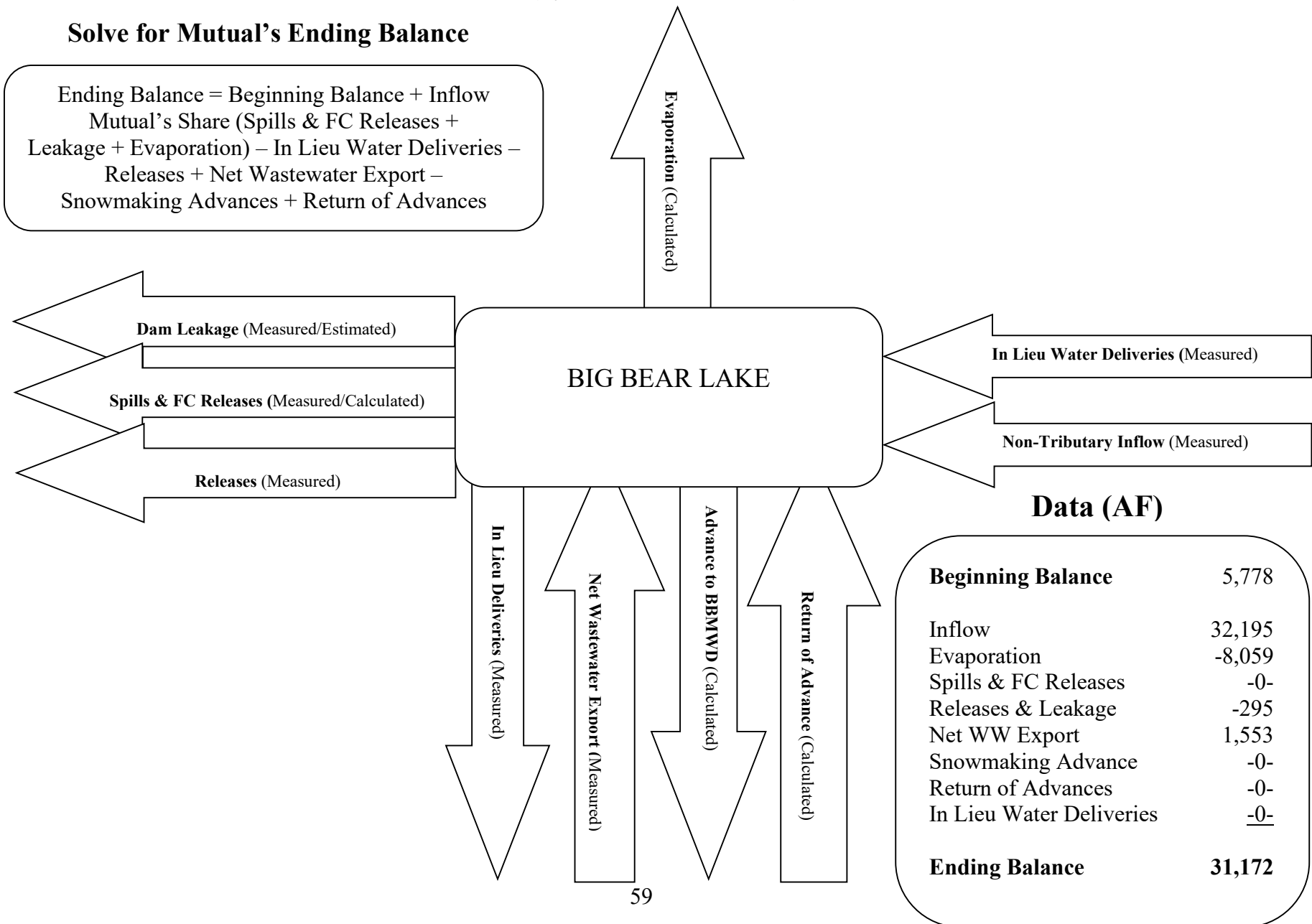
Figure 3 and **Table 2** of **Appendix B** show that Mutual had 31,172 acre-feet in its lake account at the end of 2023. This account balance is 25,394 acre-feet more than was in their lake account at the end of 2022. **Table 2** also shows that in 2023 Mutual's lake account was credited with all the lake inflow (32,195 acre-feet), the total of their releases, spills, and leakage was 295 acre-feet. There were no In Lieu Water deliveries in 2023. In 2023, supplemental inflow of 1,553 acre-feet was added to Mutual's Lake Account for net wastewater exported from the basin. In 2023, there were no advances to Big Bear MWD for snowmaking within the watershed. Evaporation that would have taken place under a Mutual operation was 8,059 acre-feet.

The cumulative effect of changes in lake releases and supplemental inflows that would have taken place since 1977 under a "Mutual Operation" would be a lake level that would have been 55.65 feet at the end of 2023 or 16.68 feet below the top of the dam. This synthesized lake level is 8.48 feet lower than it actually was. This lower lake level reflects the impact of what Mutual's lake withdrawals would have been without the In Lieu Water program and with the credits they receive from the net wastewater exports. **Tables 2A** through **2C** of **Appendix B** provide additional details to support **Table 2**.

Article 4.(b) of the Watermaster Operating Criteria (Exhibit "D" of the Judgment discusses how to handle the export of wastewater from and the import of water to the Upper Bear Creek Watershed. Specifically, it says:

In the event gross export from Upper Bear Creek Watershed to any area not tributary to the Santa Ana River Watershed within Upper Bear Creek Watershed, calculated inflow to the Lake shall be increased each year, beginning with the calendar year 1986 by the amount by which such gross export exceeds imports. If gross import exceeds gross export, said excess shall be credited against District's Basin Make-up Water obligation.

Figure 3
Water Balance for 2023 Mutual's Lake Operation
 (Synthesized Conditions)



In 1986, the Watermaster Committee decided to handle the net wastewater exports (gross exports-gross imports) entirely in the District's Basin Make-up water obligations. This decision was contingent upon implementation of a wastewater reclamation project in the Upper Bear Creek Watershed by December 31, 1994. A reclamation project was not implemented by that date so the Watermaster Committee, in 1994, decided to add the net wastewater credits to the calculated lake inflows effective January 1990. This decision adds the net wastewater credits to Mutual's lake account. Essentially, it transfers the amount of the credit from Big Bear MWD's lake account to Mutual's lake account.

Table IV-1 shows the impacts of crediting Mutual's lake account (and debiting Big Bear MWD's lake account) with the net wastewater exports. Since 1990, Mutual has been credited with 42,546 acre-feet of net wastewater exports. After 34 years of getting these credits, Mutual's lake account has 4,682 acre-feet more water than it would have had if it hadn't received the credits. This additional increase raised their simulated lake level by 2.45 feet. In other words, without the credits, Mutual's lake account would have been 26,490 acre-feet and their lake level would have ended the year at 53.20 or 19.13 feet down. In other words, it would have been 10.93 feet below the actual lake level of 64.13 feet and 2.45 feet lower than reported in Mutual's lake account tables (55.65 feet).

There are two primary reasons why the increase in their lake account (4,682 acre-feet) is less than the cumulative credits they have received (42,546 acre-feet). The first reason is spills. When the lake fills, Big Bear MWD's water spills first, and then Mutual's water spills. The Wastewater export credits they receive will spill during very wet years, like 1998. The second reason is evaporation. Mutual's lake level increases with the credits. With higher lake levels, their share of the evaporation losses increases. The end result is that at the end of 2023 Mutual's lake account had 4,682 acre-feet more and Big Bear MWD's lake account had 4,682 acre-feet less as a consequence of the net wastewater export credits.

TABLE IV-1
EFFECT OF WASTEWATER EXPORT CREDITS
ON MUTUAL'S LAKE ACCOUNT
 Calendar Year 2023
 Big Bear Watermaster

End of Calendar Year	Net Wastewater Export Credit (AF)	<u>w/Wastewater Credits</u>		<u>w/o Wastewater Credits</u>		<u>Differences</u>	
		Storage Account (AF)	Lake Level (Feet)	Storage Account (AF)	Lake Level (Feet)	Storage Account (AF)	Lake Level (Feet)
1989	-	16,905	47.00	16,905	47.00	-	-
1990	857	7,627	40.30	6,864	39.50	763	
1991	940	14,226	45.75	12,772	44.65	1,454	1.10
1992	723	22,787	51.15	20,886	50.05	1,901	1.10
1993	2,223	62,165	68.40	58,271	67.00	3,894	1.40
1994	1,397	61,407	68.15	56,451	66.35	4,956	1.80
1995	2,012	66,308	69.90	65,019	69.45	1,289	0.45
1996	1,540	60,875	67.95	58,229	67.00	2,646	0.95
1997	1,427	52,407	64.80	48,663	63.35	3,744	1.45
1998	2,427	69,566	71.00	68,282	70.60	1,284	0.40
1999	1,339	51,390	64.40	48,922	63.45	2,468	0.95
2000	1,337	35,335	57.65	31,900	56.00	3,435	1.65
2001	1,317	19,898	49.45	15,732	46.75	4,166	2.70
2002	889	10,856	43.15	6,897	39.55	3,959	3.60
2003	1,044	13,718	45.35	9,695	42.20	4,023	3.15
2004	1,024	14,200	45.70	10,233	42.65	3,967	3.05
2005	1,750	43,041	61.05	37,900	58.85	5,141	2.20
2006	1,462	48,034	63.10	42,067	60.65	5,967	2.46
2007	997	34,655	57.35	28,588	54.30	6,067	3.05
2008	1,207	35,251	57.60	28,855	54.45	6,396	3.15
2009	1,074	30,034	55.05	23,496	51.55	6,538	3.50
2010	1,715	52,208	64.75	44,898	61.85	7,310	2.90
2011	1,781	58,121	66.95	49,683	63.75	8,438	3.20
2012	1,175	49,881	63.85	41,167	60.25	8,714	3.60
2013	883	36,058	58.00	27,657	53.80	8,402	4.20
2014	732	26,252	53.05	18,292	48.45	7,960	4.60
2015	846	16,437	47.25	8,968	41.55	7,469	5.70
2016	848	8,977	41.55	3,021	33.65	5,956	7.90
2017	1,279	12,122	44.20	6,290	38.90	5,832	5.30
2018	727	4,935	37.25	799	26.00	4,136	11.25
2019	1,264	23,611	51.60	18,920	48.85	4,691	2.75
2020	1,038	20,788	49.95	15,775	46.80	5,013	3.15
2021	881	12,537	44.50	7,818	40.50	4,719	4.00
2022	838	5,778	38.30	2,006	30.80	3,772	7.50
2023	1,553	31,172	55.65	26,490	53.20	4,682	2.45
TOTAL	42,546						

*The lake is empty at a gauge height of 23.0

** The 2018 Storage Account and Lake Level Values were incorrectly reported in the 2018 Watermaster Report; the corrected values are shown above

Big Bear MWD's Lake Account

Section 3(b), District's Water in Storage, of the Watermaster Operating Criteria of the Judgment describes the procedure to determine Big Bear MWD's storage account as follows:

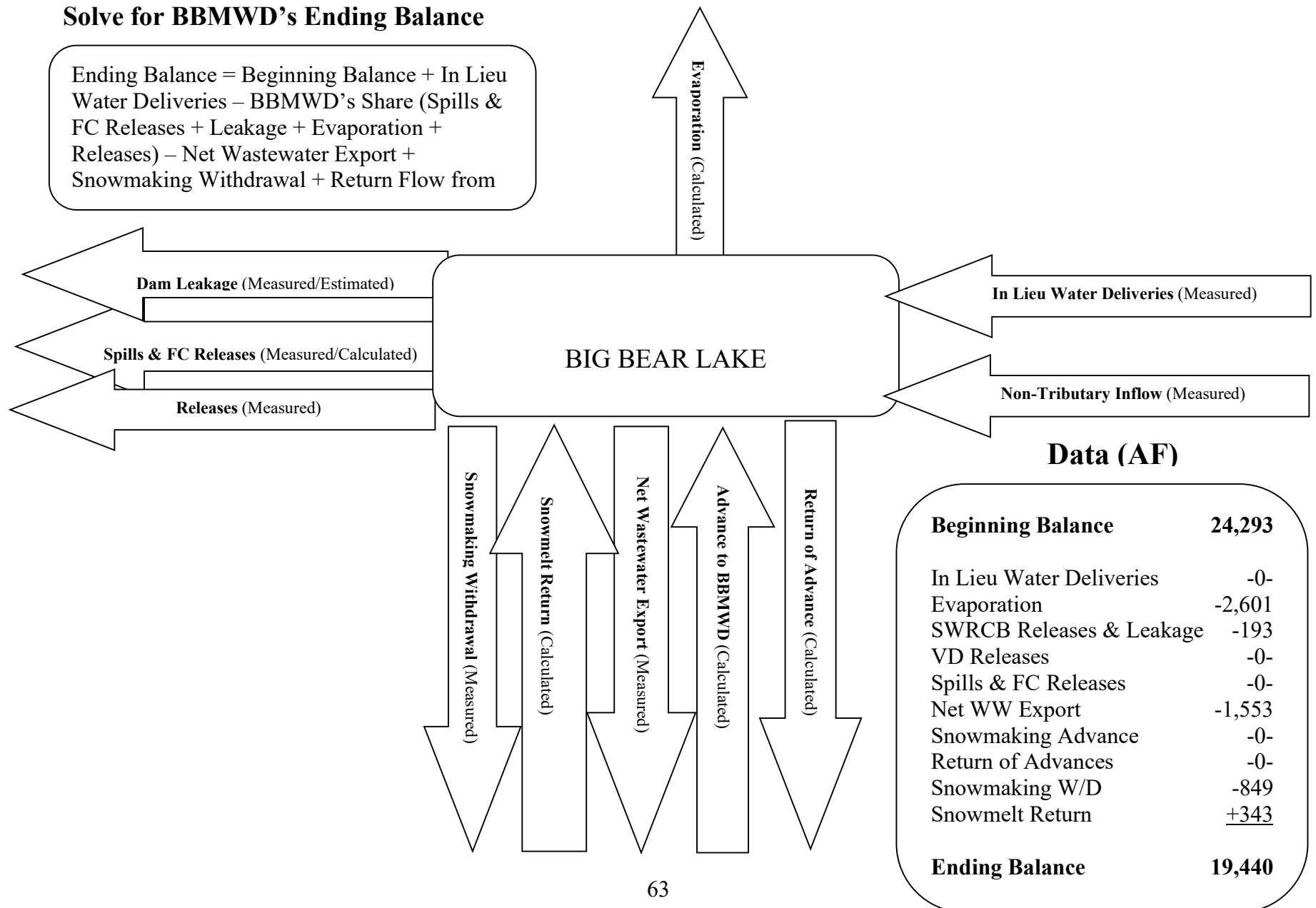
“Any water actually in storage in excess of Mutual's water in Storage, as calculated above, shall be for the account of District. So long as District has water in storage, all spills from the Lake shall be deemed District Water.”

Figure 4 illustrates the water balance for Big Bear MWD's lake account in 2023. Table 3 of **Appendix B** summarizes the results. This information shows the water actually in storage (from **Table 1** of **Appendix B**), Mutual's water in storage (from **Table 2** of **Appendix B**), and the difference between the two, which is the amount in Big Bear MWD's account. In 2023, Big Bear MWD's account balance began with 24,293 acre-feet and ended the year with 19,440 acre-feet. The decrease in their account was 4,853 acre-feet. This decrease was because there was no credits for In Lieu Water deliveries to Mutual during the year, and there were evaporation losses, SWRCB releases, net snowmaking withdrawals, and net wastewater exports.

Table 3 of **Appendix B** also shows the status of Big Bear MWD's "Advance Account". This account represents the net amount of water Big Bear MWD has "borrowed" from Mutual for snowmaking in the Big Bear Lake watershed. In 2023, Big Bear MWD's advance account was zero throughout the year.

Tables 3.A and **3.B** of **Appendix B** provide supporting information to Table 3.

Figure 4
Water Balance for 2023 BBMWD's Lake Operation
 (Synthesized Conditions)



Basin Make-up Account

Exhibit D of the Judgment contains a formula to be used for determination of the amount of Basin Make-up Water, if any, that is needed to offset deficiencies in the recharge supply to the San Bernardino Groundwater Basin. **Tables 4, 4A, 4B and 4C in Appendix B** follow the formula presented in the Judgment for calculating the credit or deficiency in the Basin Compensation Account. The formula contained in the Judgment is:

Deficiency or Credit =

$$[(.50) (R_d) + (.51) (S_d) + (.50) (P_d)] - [(.50) (R_m) + (.51) (S_m)]$$

wherein:

R_d = Releases actually made under District Operation.

S_d = Spills which actually occurred under District Operation.

P_d = In lieu water purchased by District from San Bernardino Valley MWD or the Management Committee of the Mill Creek Exchange and delivered under District Operation to Mutual for service area requirements.

R_m = Releases which would have been made under a Mutual Operation.

S_m = Spills which would have occurred under a Mutual Operation.

The first three terms in the equation represent the recharge that occurs under Big Bear MWD's lake operation. These are referred to as the "Big Bear's Basin Additions" in **Table 4. Table 4.A** shows the details of the calculations for these three terms.

The last two terms in the equation represent the recharge that would have occurred if Mutual had owned and operated the lake and met its supplemental water needs from lake releases. Collectively these terms are referred to as "Mutual's Basin Additions" in **Table 4. Table 4.B** shows the detailed calculations for these two terms.

The monthly net credit or deficiency in recharge to the San Bernardino Basin is shown in Column 5 of **Table 4**. These calculations are in accordance with the formula in the Judgment.

The Judgment also requires Big Bear MWD to make-up for deficiencies in recharge that would occur as a result of their lake operations. Column 7 of **Table 4** shows the amount of water recharged by Big Bear MWD in the San Bernardino Basin to correct (or prevent) deficiencies in recharge. **Table 4.C** presents details of the sources of water used to replenish the Basin Compensation Account.

Table 4 of Appendix B presents the status of the Basin Make-up Account for 2023. The account balance began the year with a balance of 20,971 acre-feet and ended the year with 21,069 acre-feet. There was a 98 acre-foot increase in the Basin Make-Up Account in 2023. The reason for the increase was the Fishery release that were not used, which increased the amount of groundwater recharge under the District operation.

In 2022, Mutual delivered In Lieu Water for groundwater recharge for the third time. Mutual did not deliver any In Lieu Water for groundwater recharge in 2023. The Watermaster Committee has agreed to review the impact of this new use of In Lieu Water on the Basin Make-up Account. The 1977 Judgment did not anticipate this use of In Lieu Water and the formulas used to determine the Basin Make-up Account balances may have to be revised to reflect this new use. The Watermaster Committee began to address this issue in 2023 and should complete their evaluation in 2024.

V. OTHER WATERMASTER ACTIVITIES

IMPACTS OF SEVEN OAKS DAM

History and Background

Construction of the 550-foot high Seven Oaks Dam (SOD) by the U.S. Army Corps of Engineers (Corps) began in 1990 and was completed in 1998. The plunge pool by-pass pipeline was completed in 2001, which routes low flows - for beneficial use by either Mutual (through its "River Pick-up") or by SBVWCD at its main river diversion - through the Dam, around the plunge pool, and back to the river channel.

Two features of SOD can affect Watermaster activities. First, the SOD prevents the natural subsurface flow of groundwater from leaving the Santa Ana River Canyon and causes all groundwater coming from upstream of the Dam to rise to the surface and pass through the dam outlet structure. The plunge pool by-pass line helps to overcome the loss of these subsurface flows. Second, when the SOD impounds storm flows behind the Dam for extended periods, it causes water quality degradation.

In 1993, San Bernardino Valley Municipal Water District (SBVMWD) and Western Municipal Water District (WMWD) of Riverside County provided funding to the Corps for a water conservation study to evaluate SOD as a dual-use structure for flood control and water conservation. The possible impoundment of waters of the Santa Ana River for uses other than flood control raised some water rights issues. Several diversion points for SBVWCD, North Fork Water Company, Mutual, and Redlands Water Company ("Below the Dam Diverters") are downstream of SOD, and the Dam altered the operation of these historical diversion points. It was the intent of the "below the dam diverters" to have releases from SOD approximately average annual natural flows, recognizing that flood control release flows were expected to have less silt at low release rates than previous flows and maybe more evenly distributed. Their request was to have the amount of water to be impounded behind SOD for uses other than flood control determined after the combined needs have been met for (1) the water supply agencies to provide

direct delivery water and (2) the integrity of the groundwater basin is stabilized by assuring groundwater levels are maintained within an appropriate operating range.

Water Rights

In 1995, SBVMWD and WMWD filed a petition to revise the Declaration that the Santa Ana River Stream System is Fully Appropriated and an application to Appropriate Water By Permit with the State Water Resources Control Board (SWRCB). The petition and application were to give the two local agencies the right to impound water behind SOD, subject to the operational directions of the Dam for flood control. In 2000, the SWRCB adopted Order WR2000-12 to process the application filed by SBVMWD and WMWD and for the processing of a water right application filed by Orange County Water District (OCWD). In 2001 the water rights application (AO31165) was filed by SBVMWD and WMWD, and the water rights application (AO31174) filed by OCWD were accepted.

In 2001, SBVMWD filed a second application, and SBVWCD applied for the right to use Santa Ana River water that would initially be impounded behind SOD, then released for downstream use. In 2002, the SWRCB noticed the water rights applications filed by SBVMWD, WMWD, and OCWD, and a Pre-Hearing Conference and Public Hearing were noticed for the water rights applications filed by the Chino Basin Watermaster, SBVMWD/WMWD, SBVWCD, and the City of Riverside. During the Pre-Hearing Conference, all parties agreed to accept the evidence, which resulted in Order WR 2000-12 revising the fully appropriated stream designation for the Santa Ana River. Consequently, the SWRCB adopted WR 2002-6 during its Public Hearing on July 2, 2002. Following the hearing on July 2, the protest period for Applications 31165 and 31174 was closed on July 17. Several protests were submitted and responses provided, but no further action occurred.

In 2008, the SBVWCD and SBVMWD conducted a study of the water spreading capacity of facilities downstream of SOD. Major conclusions of the study were that the area is ideal for recharge and not inhibited by clay or silt, faulting may interfere with the recharge in the eastern end, and very high flow years will saturate the spreading grounds. Additionally, structural capacities limit regular use to 300 cfs, and further to the west, the stable flows are limited to about 150 cfs. This study gave rise to the Enhanced Recharge Project, which would be permitted under SBVWCD Wash Plan HCP and SBVMWD River HCP. Construction of Phase 1A of the Enhanced

Recharge Project, which includes a sedimentation basin to improve the water quality of spreading flows, was completed in 2019. Phase 1B includes the construction of additional spreading basins and construction began in the summer of 2023. This will allow the water rights decisions to be perfected to a license.

Initial Operations and Water Quality

The Corps and the Local Sponsors (San Bernardino and Orange County Flood Control Districts) initially operated the Dam under the Interim Water Control Plan, and in 2004 the Dam began operation under the Water Control Manual for the Seven Oaks Dam & Reservoir. The Manual required that during the storm season (October to May), a debris pool (water surface elevation of 2,200 feet) be formed to protect the intake tower from sediment intrusion. After the storm season, the Corp begins releasing water from the debris pool to start their maintenance activities.

The Watermaster Committee was concerned that the current operations of Seven Oaks Dam could restrict the operations of Big Bear Dam and the in-lieu program as described in the 1977 Judgment. These restrictions could include, at a minimum, reduced releases and increased in-lieu requirements when:

- SCE facilities are out of service, and the quality of water behind Seven Oaks Dam is unacceptable to Mutual.
- SCE facilities are operating at capacity, and the quality of water behind Seven Oaks Dam is unacceptable to Mutual.
- SCE facilities are out of service or operating at capacity in the fall and winter months when the Debris Pool is being filled, and there are no releases from Seven Oaks Dam.

In addition, any reduction in releases from the Lake would increase lake evaporation and decrease the long-term average deliveries to Mutual. These restrictions could also constrain Big Bear MWD's opportunities to beneficially use the flood control releases they would make from Big Bear Lake in the late fall and winter months.

It was quickly observed that the raw water discharged from SOD was of poor quality and adversely impacted the ability of the two downstream water treatment plants, one owned by East Valley

Water District (EVWD) and the other owned by the City of Redlands (COR), ability to treat the water. If the upstream flow is diverted around the debris pool, such as when the Edison Facility is operational, there were significantly lower adverse impacts at their respective plants. A 2004 study showed turbidity increasing from 2 NTU to between 5 to 80 NTU when released from the debris pool with similar effects noted with increased color units, iron, manganese, and TOC. These readings indicate poorer quality water than historical Santa Ana River water quality conditions when water is passed through the debris pool.

In 2005, representatives from the Basin met with Congressman Jerry Lewis to describe the situation and seek Federal assistance to solve the problem, and Congress appropriated \$1,000,000 to study the issue. This report identified that water quality impacts included longer durations and elevated levels of turbidity, total organic carbon, color, iron, manganese, algae, and taste and odor-causing compounds, as well as water supply impacts, including less supply in dry hydrologic years, reduced stores in Fall through Winter as the debris pool behind the Dam, is filled, and extended periods the SCE facilities are out of service after flood events. During these extended periods, the SCE facilities cannot divert high-quality Santa Ana River (and Bear Creek) water around SOD. The report recommended long-term comprehensive alternatives, including pretreatment of the water delivered from SOD to achieve the water quality levels that existed before the Dam was constructed and hardening of the SCE facilities to be more reliable and remain in-service for longer periods. The recommended interim solution was to purchase imported SWP water from SBVMWD to replace the water that could not be used because of water quality problems, or that was not available due to dam operations and SCE facilities' unavailability.

The COE undertook a two-year \$3.5 million study of these issues and completed its draft study of the steps taken to address the water quality degradation in 2008. The report verified the original methodology used in calculating the effects of placing a dam that interrupted the natural flow of the Santa Ana River for purposes of flood control and water retention to maintain a predictable daily controlled water flow for downstream users. The report noted through modeling techniques based on field record data that there appeared to be no negative effect on the Santa Ana River water quality. The downstream users contend otherwise that the very nature of the water being retained behind the Dam for lengthy periods caused algae and bacterial growth, caused water to become stale and stagnant, and tended to plug up the pervious rock and soil layers of the downstream spreading basins.

At Congressman Lewis's urging, the Corps resumed bi-monthly talks with interested downstream prior rights and permitted water users. The Corps was willing to change the method of its operation if the downstream users agreed to accept responsibility for downstream water quality. The Corps and local sponsors began design efforts for a drained debris basin to reduce water held by the Dam in low water conditions. This change would improve water quality but slightly reduce the water conserved. The Corps and local sponsors of the SOD project were unable to complete the documentation and environmental clearance for water quality improvements to the reservoir.

Testing Operations and Edison Facilities

The 2004-2005 water year began with higher rainfall. Late rains in 2004 had started to fill the debris pool behind the Dam. Heavy rains in 2004 and 2005 more than filled the debris pool, and there was approximately 40,000 acre-feet of water stored behind the Dam at an elevation of roughly 2,390. The Corps decided to test the operating valves for flood releases, and when high-velocity releases were taking place, a portion of the outlet tunnel failed, and the tests were terminated. The repairs to the tunnel were not completed until November 2005.

Operations in 2007 began with a release of approximately three (3) cfs from Seven Oaks Dam. The Corps slowly raised the reservoir elevation. During the last two weeks in April, the Corps and local sponsors had hoped to accumulate enough water to test the Seven Oaks Dam tunnel repairs, which were completed in early 2006 but never subjected to test flows. Unfortunately, there was insufficient water behind the Dam, and the "high flow" testing lasted only approximately six (6) hours.

In December 2010, heavy rains began, and the increased Santa Ana River flows were stored in the reservoir behind SOD. In mid-February 2011, the Corps operators utilized the stored flows to complete testing of the high flow capability of the Dam, ultimately releasing approximately 7,000 cfs in March 2011 from the dual main gates at the outlet works. The flow was reduced shortly thereafter, and flows of 1,000 cfs were maintained for several days, almost emptying the reservoir. At this time, the flows were reduced further to facilitate water conservation and Santa Ana Sucker spawning. At the conclusion of successful testing, the facility was considered complete, and the operation was transferred to the local sponsors.

Local Sponsor Operations

In contrast to 2011, precipitation in 2012-2016 was about 50% of normal, and this reduction in rainfall was seen in the watershed for Seven Oaks Dam. Little water was stored behind SOD, and most outflows were clean and useable by surface diverters. Most water entering the Dam flowed out at the same rate for use by surface diverters and conservation. State Project Water was available in limited quantities, and significant basin groundwater had to be used to make up water needed or guaranteed to local uses. Water levels behind SOD were at nearly historic lows due to drought.

2017 brought some decent rainfall with moderate and sustained outflows from the Seven Oaks dam between 50-250 cfs through April. Northern California had historic rainfall levels meaning State Project Water was widely available, and flows helped to relieve some pressure in the groundwater basin that has been caused by several years of drought. Operations in 2018 saw a return to less than average rainfall. There were only 16 days in April when flows greater than ten (10) cubic feet per second were released from the Dam for downstream users. Southern California Edison had to cease power generating operations in mid-August due to limited flow rates and was only able to begin generating again in December.

A new management entity, the San Bernardino Basin Groundwater Council, was formed in 2018. The goals of the Council were to prepare for and coordinate the management of groundwater supply resources throughout the Basin and to coordinate maintenance of conveyance and recharge facilities to expedite such management.

Operations in 2019 brought above-average rainfall, including one particularly warm storm on February 14, which caused debris that damaged the Edison intake. Edison was unable to generate for 186 days during 2019 due to damages at their intake and high-water levels behind SOD, which rose above 2,300 ft with releases of approximately 700 cubic feet per second occurring in May.

In 2019 the Exchange Plan members began to meet for the first time since 2003 to update the plan and address issues that were not included in the original plan. These issues were highlighted by the poor water quality supplies behind the SOD. A new possible exchange would be to swap Santa

Ana River water from behind SOD for imported water for direct use by Mutual, leaving the more turbid water for groundwater recharge. Work on updates to the Exchange Plan continued in 2023.

Average to less than average rainfall characterized 2020-2022. Water quality was not an issue as no water was stored behind SOD for significant periods. Edison was unable to generate at Powerhouse #1 due to the damages sustained at the Bear Creek intake in 2019. Limited intermittent generation occurred at Powerhouse #3 over the period due to staffing limitations related to the COVID-19 pandemic and diversions limited to Powerhouse #1. Flows were still diverted at Powerhouse #1 to the Mutual Highline and the Greenspot spill.

Current Period Operations

Greater than average rainfall, and an abundant supply of State Project Water, characterized 2023. SOD water elevation exceeded the debris pool level for most of the year, and water was released from January to July at flows around or above 100 cfs with another set of releases starting in August following Tropical Storm Hillary. Water quality was an issue in 2023 as water was stored behind SOD for significant periods of the year.

Edison was again unable to generate at Powerhouse #1 due to damages sustained at the Bear Creek intake in 2019. Heavy flows in the Santa Ana River throughout the year limited Edison access to the Powerhouse #1 diversion and generation at Powerhouse #3 occurred for only two weeks in the beginning of August. On August 20, 2023 Tropical Storm Hillary damaged the intake at Powerhouse #1, the conduit where it crosses the Santa Ana River between Powerhouse #1 and #3, and the access road between Seven Oaks Dam and Powerhouse #1. These damages stopped all diversions to both Powerhouse #3 and to the Mutual Highline through the end of the year, and required Mutual to purchase SWP water to meet their Highline water supply needs. Edison has not indicated any timeframe for repairs to either the Bear Creek diversion or the Powerhouse #1 intake and conduit.

The loss of the diversions from both Bear Creek and the Powerhouse #1 intake halts all flows of high-quality, high elevation water to Mutual through the Bear Valley Highline. Any water released from the Lake would reach the inlet pool of Seven Oaks Dam and would be subject to water quality issues and the release schedule controlled by the US Army Corps of Engineers. The consortium

formed to approach Edison about purchasing the powerhouses on both the Santa Ana River and its tributaries continued to evaluate and analyze purchase alternatives in 2023.

Construction of the Enhanced Recharge Phase 1B project began in 2023 and is anticipated to be completed in 2025. When Edison's facilities are damaged or down for maintenance, high-quality water flows into the inlet of pool of SOD or flows past water-rights holders on the tributaries. Edison's water rights are non-consumptive for the generation of electricity.

QUAGGA MUSSEL PROTECTION PROGRAM

The invasive Quagga Mussel became a significant threat to Big Bear Lake in 2008. Big Bear Municipal Water District launched a ground-breaking program at the beginning of the boating season to prevent the mussel from getting into the Lake. While once only a problem east of the 100th Meridian, the mussel reached western lakes, and most significantly, Lake Mead, in January 2007. By the fall of 2008, the mussel was pervasive in Lake Mojave and Lake Havasu. Boaters traveling to and from the lakes were transporting microscopic larvae in bilges and outdrives, creating a threat to Big Bear Lake. The California mussel population expanded via the Colorado River Aqueduct turnout at Parker Dam into receiving reservoirs in San Diego County. Other Southern California lakes became infested when infected boats transported the microscopic mussel larvae.

The Quagga Mussel is a prolific reproducer and colonizes every solid object it encounters. This leads to clogged pipes, damage to vessels, and out-competition of the native species. Also, because each mature mussel can filter feed about one liter of water daily, huge mussel masses significantly reduce concentrations of plankton, which are an essential food supply for lake and reservoir fisheries.

The potential impact of a mussel infestation in Big Bear Lake is significant because Big Bear Lake is at the top of the Santa Ana River watershed. Every water body and stream below the Bear Valley Dam could become infected, and the resulting impacts to Bear Creek fisheries could suffer. The areas below Bear Valley Dam that could be impacted include the impoundment behind Seven Oaks Dam, the Edison power generating station, and the Santa Ana River all the way to the ocean.

In response to the mussel threat, the District imposed new rules on launching, installed traffic control structures to prevent unauthorized launching, and strictly regulated the launch ramp hours to provide constant staffing at the start of the 2008 boating season. All boats entering in the Lake at public launch ramps were required to complete a questionnaire to determine if and when they might have been in an infected lake. They were also checked for standing water in bilges, lockers, bait wells, live wells, ballast tanks, etc. All vessels deemed suspicious by District inspectors were decontaminated at no charge to the boat owner with pressurized hot water (140°). Some limited training was also provided to commercial ramp operators who were responsible for sending suspicious vessels to a District facility for decontamination.

Both the City of Big Bear Lake and Snow Summit Resort contributed one-time funds at \$5,000 to help defray the costs associated with the unexpected burden on the financial resources of the District. Nearly \$100,000 was spent during the summer of 2008 for educational materials, signs, additional summer staffing, and capital improvements to the Quagga Prevention Program.

Sampling at the end of the 2008 boating season revealed that Big Bear Lake was free of visible mussels. Beginning in 2009, sampling for the microscopic mussel larvae began as soon as the Lake warmed to 53°F, the minimum temperature at which the mussels can reproduce.

In 2009, a Quagga Prevention Program surcharge was added to boat permits to offset the costs associated with the program. The surcharge will remain in place as long as a threat exists or as grant money becomes available from the State. With the number of Quagga Mussel infested lakes in southern California increasing and the proximity of recreational boating opportunities such as the Colorado River, the threat of infestation becomes greater. New, more stringent protective measures were implemented at the start of the 2009 boating season. These include training the entire public and private marina work force operating on the Lake, requirements for commercial marinas to staff launch ramps with certified Quagga Mussel inspectors, significant limitations on the use of private launch ramps, and an expanded program of boat decontamination with pressurized hot water at both public launch ramps and the District main office.

Starting in 2009, the BBMWD began offering Watercraft Inspection/Decontamination Training (WIT) certification to all of the private marina workers, allowing all participating marinas to inspect vessels before launching them. The BBMWD also adopted strict standards for the usage of private launch ramps (launch ramps on single family properties), requiring them to be able to be locked closed to prevent unauthorized access. Additionally, these private owners were required to meet personally with District personnel to receive Quagga Mussel education. In 2011, the BBMWD had a total of four WIT III certified staff, allowing them to teach the WIT I and II provided to the BBMWD seasonal staff and marina workers. By 2012, the BBMWD had three decontamination stations, one at the East Public Launch Ramp, one at the West Public Launch Ramp, and one at the BBMWD main office (used only for special events and full decontaminations). The station at the main office got usage in 2014, as inspectors found ten Quagga infested boats. Four of these vessels went to the main office for full decontamination and six were decontaminated at the East Public Launch Ramp.

In 2016, using Department of Boating and Waterways funding, an additional decontamination station and improved decontamination machines were installed at the East Public Launch Ramp. Following the decontamination upgrades, the BBMWD was able to purchase a Flow-Cam in 2017, using Department of Boating and Waterways funding, which allowed for in-house Quagga Mussel monitoring. In 2018, an enclosure for the decontamination units at the East Public Launch Ramp was constructed, protecting them from theft and the elements. The District continued to monitor for potential Quagga Mussel infestation through substrate monitoring at various points around the Lake and by sending plankton tow samples to the California Department of Fish and Wildlife Bodega Bay Shellfish Laboratory for cross-polarized light microscopy analysis and DNA testing. In 2019, the Watercraft Inspection and Decontamination data collection system (WID) was implemented at the Public Launch Ramps. Protocols for plankton tow sampling to be sent off to the California Department of Fish and Wildlife Bodega Bay Shellfish Laboratory were changed for more accurate results. Finally, after reports of New Zealand Mud Snails being found in Bear Creek (several miles below the Bear Valley Dam), the District performed an informal survey looking for New Zealand Mud Snails in Bear Creek, as well as formal surveys and setting traps in Big Bear Lake to search for a snail infestation. No New Zealand Mud Snails were found in either location.

The 2020 season was the busiest in BBMWD history. Despite a slow start caused by the onset of the COVID-19 pandemic, Big Bear Lake saw the highest number of visitors ever to Big Bear Lake. To help cope with the increased number of visitors and problems finding seasonal staff, the BBMWD implemented a fee for decontaminations. This helped to encourage boaters to take Clean, Drained, and Dry into their own hands. A quarantine banding program was implemented before the 2020 season, giving boaters another option to be ready for the boating season.

The 2021 season was a step back toward normal in spite of the ongoing COVID-19 pandemic. Visitors to the valley decreased relative to 2020 and boating saw a similar decline. The BBMWD adjusted with changing mandates and guidelines to keep staff and visitors safe.

The 2022 boating season turned out to be one of the slowest on record. The District almost hired a full staff of seasonal ramp attendants and launched just over 5,000 boats. Quagga mussel monitoring was performed and no indication of infestation was discovered.

2023 Activities

The 2023 boating season was approximately average given the lake level. The District hired eight seasonal ramp attendants to inspect and decontaminate vessels as they arrived at the Public Launch Ramps. In total, the District launched at least 6,964 vessels during the 2023 boating season. Of these, 2,819 were inspected at the Public Launch Ramps and of the inspected, 2,414 were clean, drained, and dry. A total of 482 vessels were decontaminated. 4,074 vessels arrived at the public launch ramps with BBMWD approved quagga mussel seals and were allowed to launch.

The District continued monitoring Big Bear Lake for the presence of quagga mussels. Quagga mussel veliger plankton tows, surface surveys, and artificial substrate monitoring are performed on a regular basis throughout the year to catch an infestation should it occur. All plankton tow samples analyzed came back negative for the presence of quagga mussel veligers (Tables V-1 to V-8) and no indication of infestation has been discovered through artificial substrate monitoring (Table V-9) or surface surveys (V-10).

Table V-1: Plankton Tow Sample Sheets May 18, 2023**Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring**

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	5/18/23 Dam	not detected	pass	1400 liters
2	5/18/23 Gilner Point	not detected	pass	1400 liters
3	5/18/23 Mid Lake Middle	not detected	pass	1400 liters
4	5/18/23 Stanfield Middle	not detected	pass	1400 liters

Table V-2: Plankton Tow Sample Sheet June 15, 2023**Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring**

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	6/15/23 Dam	not detected	pass	1300 liters
2	6/15/23 Gilner Point	not detected	pass	1300 liters
3	6/15/23 Mid Lake Middle	not detected	pass	1300 liters
4	6/15/23 Stanfield Middle	not detected	pass	1300 liters

Table V-3: Plankton Tow Sample Sheet June 29, 2023**Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring**

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	6/29/23 Dam	not detected	pass	1300 liters
2	6/29/23 Gilner Point	not detected	pass	1300 liters
3	6/29/23 Mid Lake Middle	not detected	pass	1300 liters
4	6/29/23 Stanfield Middle	not detected	pass	1300 liters

Table V-4: Plankton Tow Sample Sheet July 13, 2023**Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring**

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	7/13/23 Dam	not detected	pass	1300 liters
2	7/13/23 Gilner Point	not detected	pass	1300 liters
3	7/13/23 Mid Lake Middle	not detected	pass	1300 liters
4	7/13/23 Stanfield Middle	not detected	pass	1300 liters

Table V-5: Plankton Tow Sample Sheet July 27, 2023

Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	7/27/23 Dam	not detected	pass	1300 liters
2	7/27/23 Gilner Point	not detected	pass	1300 liters
3	7/27/23 Mid Lake Middle	not detected	pass	1300 liters
4	7/27/23 Stanfield Middle	not detected	pass	1300 liters

Table V-6: Plankton Tow Sample Sheet August 10, 2023

Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	8/10/23 Dam	not detected	pass	1300 liters
2	8/10/23 Gilner Point	not detected	pass	1300 liters
3	8/10/23 Mid Lake Middle	not detected	pass	1300 liters
4	8/10/23 Stanfield Middle	not detected	pass	1300 liters

Table V-7 Plankton Tow Sample Sheet August 24, 2023

Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	8/24/23 Dam	not detected	pass	1300 liters
2	8/24/23 Gilner Point	not detected	pass	1300 liters
3	8/24/23 Mid Lake Middle	not detected	pass	1300 liters
4	8/24/23 Stanfield Middle	not detected	pass	1300 liters

Table V-8 Plankton Tow Sample Sheet September 7, 2023

Results Summary – Big Bear Lake Quagga Mussel Veliger Monitoring

No	Sample descriptions Big Bear Lake locations	CPLM (veligers)	Preservation QC Check	Lake-equivalent volume examined
1	9/7/23 Dam	not detected	pass	1300 liters
2	9/7/23 Gilner Point	not detected	pass	1300 liters
3	9/7/23 Mid Lake Middle	not detected	pass	1300 liters
4	9/7/23 Stanfield Middle	not detected	pass	1300 liters

Table V-9: Quagga Mussel Substrate Data 2023

DATE	SUBSTRATE LOCATION	SUBSTRATE DEPTH	EMPLOYEE #	SUBSTRATE	CONDITION	COMMENTS	MUSSELS	SPECIES	PLATE SURFACE	PLATE EDGE	SPACERS	ROPE (DEPTH)	OTHER	OTHER ORGANISMS PRESENT	COMMENTS
5/1/2023	ER	6'	305	Present	Intact		None	None	None	None	None	None	None	None	None
	Patrol Dock	6'	305	Present	Intact		None	None	None	None	None	None	None	None	None
5/8/2023	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
5/15/2023	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
5/22/2023	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
5/30/2023	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
6/5/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
6/12/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae, Dragonfly larvae	None
6/19/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Lake Patrol	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
6/26/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
7/3/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None

DATE	SUBSTRATE LOCATION	SUBSTRATE DEPTH	EMPLOYEE #	SUBSTRATE	CONDITION	COMMENTS	MUSSELS	SPECIES	PLATE SURFACE	PLATE EDGE	SPACERS	ROPE (DEPTH)	OTHER	OTHER ORGANISMS PRESENT	COMMENTS
7/10/2023	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
7/17/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
7/24/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
7/31/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
8/8/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
8/14/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
8/21/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
8/28/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
9/5/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None

DATE	SUBSTRATE LOCATION	SUBSTRATE DEPTH	EMPLOYEE #	SUBSTRATE	CONDITION	COMMENTS	MUSSELS	SPECIES	PLATE SURFACE	PLATE EDGE	SPACERS	ROPE (DEPTH)	OTHER	OTHER ORGANISMS PRESENT	COMMENTS
9/11/2023	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
9/19/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
9/25/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
10/2/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
10/9/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
10/16/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
10/23/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
10/30/2023	WR	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	351	Present	Intact		None	None	None	None	None	None	None	Algae	None
11/6/2023	WR	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	ER	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
	Patrol Dock	5'	305	Present	Intact		None	None	None	None	None	None	None	Algae	None
11/13/2023	Artificial Substrate Removed from Lake for Winter														

Table V-10: Surface Survey Monitoring Data 2023

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
1/5/2023				Lake Surface Frozen					
1/12/2023				Lake Surface Frozen					
1/19/2023				Lake Surface Frozen					
1/26/2023				Lake Surface Frozen					
2/2/2023				Lake Surface Frozen					
2/9/2023				Lake Surface Frozen					
2/16/2023				Lake Surface Frozen					
2/23/2023				Lake Surface Frozen					
3/2/2023				Lake Surface Frozen					
3/9/2023				Lake Surface Frozen					
3/16/2023				Lake Surface Frozen					
3/23/2023				Lake Surface Frozen					
3/30/2023				Lake Surface Frozen					
4/6/2023				Lake Surface Frozen					
4/12/2023	WEST RAMP	351	60M	45°F, CLOUDY, MURKY	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	48.5°F, CLOUDY, MURKY	ABSENT	N/A	N/A	NONE	NONE
	MAIN OFFICE	351	60M	47.5°F, CLOUDY, MURKY	ABSENT	N/A	N/A	FINGERLINGS	NONE
4/19/2023	WEST RAMP	351	60M	44.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	41.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	42.5°F	ABSENT	N/A	N/A	NONE	NONE
4/26/2023	WEST RAMP	351	60M	52.0°F	ABSENT	N/A	N/A	NONE	NONE
	EAST RAMP	351	60M	51.0°F	ABSENT	N/A	N/A	NONE	NONE
	MAIN OFFICE	351	60M	51.5°F	ABSENT	N/A	N/A	CARP	NONE
5/2/2023	WEST RAMP	351	60M	52.5°F	ABSENT	N/A	N/A	NONE	NONE
	EAST RAMP	351	60M	55.0°F	ABSENT	N/A	N/A	NONE	NONE
	MAIN OFFICE	351	60M	48.5°F	ABSENT	N/A	N/A	NONE	NONE
5/12/2023	WEST RAMP	351	60M	54.5°F	ABSENT	N/A	N/A	NONE	NONE
	EAST RAMP	351	60M	54.5°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
	MAIN OFFICE	351	60M	56.0°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
	WEST RAMP	351	60M	59.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	61.5°F	ABSENT	N/A	N/A	ALGAE	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
5/17/2023	MAIN OFFICE	351	60M	59.5°F	ABSENT	N/A	N/A	ALGAE, LARGEMOUTH BASS, CARP	NONE
5/26/2023	WEST RAMP	351	60M	55.5°F, CLEAR	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	57.0°F, MURKY	ABSENT	N/A	N/A	TROUT, ALGAE	NONE
	MAIN OFFICE	351	60M	57.0°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
5/31/2023	WEST RAMP	351	60M	61°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	63°F	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	59°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
6/8/2023	WEST RAMP	351	60M	58.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	61.5°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
	MAIN OFFICE	351	60M	61.5°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
6/14/2023	WEST RAMP	351	60M	64.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	65.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	68.0°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
6/21/2023	WEST RAMP	351	60M	59.5°F	ABSENT	N/A	N/A	ALGAE, BUG LARVAE	NONE
	EAST RAMP	351	60M	63.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	62.0°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
6/28/2023	WEST RAMP	351	60M	60.0°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	64.0°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
	MAIN OFFICE	351	60M	63.5°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS, LARGEMOUTH BASS, WATER SMARTWEED	NONE
	WEST RAMP	351	60M	62.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	69.5°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
7/5/2023	MAIN OFFICE	351	60M	67.5°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
7/12/2023	WEST RAMP	351	60M	66.0°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	69.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	69.5°F	ABSENT	N/A	N/A	ALGAE, DRAGONFLY LARVAE, BLADDER SNAILS	NONE
7/21/2023	WEST RAMP	351	60M	71.5°F	ABSENT	N/A	N/A	BLADDER SNAILS, ALGAE, WORMS	NONE
	EAST RAMP	351	60M	75.5°F	ABSENT	N/A	N/A	BLADDER SNAILS, ALGAE	NONE
	MAIN OFFICE	351	60M	74.0°F	ABSENT	N/A	N/A	BLADDER SNAILS, ALGAE, CARP, WATER SMARTWEED	NONE
7/26/2023	WEST RAMP	351	60M	70.0°F	ABSENT	N/A	N/A	ALGAE, MILFOIL	NONE
	EAST RAMP	351	60M	73.0°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
	MAIN OFFICE	351	60M	71.0°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS, WATER SMARTWEED, MILFOIL	NONE
8/2/2023	WEST RAMP	351	60M	67.5°F	ABSENT	N/A	N/A	ALGAE, CARP	NONE
	EAST RAMP	351	60M	69.5°F	ABSENT	N/A	N/A	ALGAE, DUCKS, BLADDER SNAILS	NONE
	MAIN OFFICE	351	60M	67.5°F	ABSENT	N/A	N/A	ALGAE, CATFISH, BLADDER SNAILS, WATER SMARTWEED	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
8/9/2023	WEST RAMP	351	60M	65.5°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	68.5°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
	MAIN OFFICE	351	60M	68.0°F	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS, WATER SMARTWEED, GREBE, CARP	NONE
8/16/2023	WEST RAMP	351	60M	70.0°F	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	71.0°F	ABSENT	N/A	N/A	ALGAE, DUCKS	NONE
	MAIN OFFICE	351	60M	69.0°F	ABSENT	N/A	N/A	ALGAE, EURASIAN MILFOIL, WATER SMARTWEED, CARP	NONE
8/23/2023	WEST RAMP	351	60M	68.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	70.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, DUCKS	NONE
	MAIN OFFICE	351	60M	68.0°F, CONCRETE, RIP-RAP	ABSENT	N/A	N/A	ALGAE, WATERSMARTWEED, EURASIAN WATERMILFOIL	NONE
	WEST RAMP	351	60M	69.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	71.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
8/30/2023	MAIN OFFICE	351	60M	69.5°F, CONCRETE, RIP-RAP	ABSENT	N/A	N/A	ALGAE, WATERSMARTWEED, EURASIAN WATERMILFOIL, WIDGEON GRASS	NONE
9/6/2023	WEST RAMP	351	60M	64.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
	EAST RAMP	351	60M	63.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, DUCKS	NONE
	MAIN OFFICE	351	60M	63.5°F, RIP-RAP, CONCRETE	ABSENT	N/A	N/A	ALGAE, WATER SMARTWEED, EURASIAN WATERMILFOIL, WIDGEON GRASS	NONE
9/13/2023	WEST RAMP	351	60M	65.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	69.0°F, SAND, CONCRETE	ABSENT	N/A	N/A	ALGAE, FROGS, BLADDER SNAILS	NONE
	MAIN OFFICE	351	60M	64.5°F, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, WIDGEON GRASS, WATER SMARTWEED, EURASIAN WATERMILFOIL	NONE
9/21/2023	WEST RAMP	351	60M	58.0°F, COBBLE, SAND, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	58.0°F, COBBLE, SAND, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	60.0°F, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
9/29/2023	EAST RAMP	351	60M	62.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
	WEST RAMP	351	60M	58.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	58.5°F, CONCRETE BOULDERS	ABSENT	N/A	N/A	ALGAE	NONE
10/4/2023	WEST RAMP	351	60M	52.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	53.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	51.0°F, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
10/11/2023	WEST RAMP	351	60M	54.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	52.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	50.5°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
10/17/2023	WEST RAMP	351	60M	58.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	62.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE
	MAIN OFFICE	351	60M	58.0°F, CONCRETE, BOULDERS	ABSENT	N/A	N/A	ALGAE	NONE
10/26/2023	EAST RAMP	351	60M	53.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, FISH FINGERLINGS	NONE
	WEST RAMP	351	60M	51.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	54.0°F, CONCRETE, COBBLE	ABSENT	N/A	N/A	ALGAE, MILFOIL	NONE
	EAST RAMP	351	60M	50.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, BLADDER SNAILS	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
11/3/2023	WEST RAMP	351	60M	45.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	48.5°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE, BASS	NONE
11/9/2023	WEST RAMP	351	60M	41.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	41.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	34.0°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
11/14/2023	WEST RAMP	351	60M	46.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	44.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	44.0°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE, BASS	NONE
12/1/2023	WEST RAMP	351	60M	39°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	40°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE, SCULPIN	NONE
	MAIN OFFICE	351	60M	39.5°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
12/8/2023	WEST RAMP	351	60M	33°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	33°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MARSH	351	60M	33°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MAIN OFFICE	351	60M	33°F, BOULDERS, CONCRETE	ABSENT	N/A	N/A	ALGAE, SCULPIN	NONE
12/15/2023	WEST RAMP	351	60M	36.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	35.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALAGE	NONE

Date	Location	Employee #	Approx. Distance Surveyed	Comments	Mussels	Species	Area Found	Other Organisms Present	Notes
	MARSH	351	60M	FROZEN	ABSENT	N/A	N/A	NONE	NONE
	MAIN OFFICE	351	60M	37.0°F, CONCRETE, BOULDERS	ABSENT	N/A	N/A	ALGAE	NONE
12/20/2023	WEST RAMP	351	60M	38.0°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	EAST RAMP	351	60M	43.5°F, SAND, COBBLE, CONCRETE	ABSENT	N/A	N/A	ALGAE	NONE
	MARSH	351	60M	43.5°F, SAND, MUD	ABSENT	N/A	N/A	NONE	NONE
	MAIN OFFICE	351	60M	37.5°F, CONCRETE, BOULDERS	ABSENT	N/A	N/A	ALGAE, BASS	NONE
12/27/2023	ADVERSE CONDITIONS								

APPENDIX A

MINUTES OF WATERMASTER MEETINGS

Dates

January 31, 2023

March 21, 2023

July 18, 2023

October 24, 2023

BIG BEAR WATERMASTER
MINUTES OF THE MEETING OF JANUARY 31, 2023

PLACE: San Bernardino Valley Water Conservation District and
Zoom/Teleconference

PRESENT: <u>Watermaster Committee</u> Don Evenson Katelyn Scholte Sam Fuller	<u>Representing</u> Big Bear MWD, Chair SBV Water Conservation District Bear Valley Mutual Water Company
<u>Others</u> Mike Stephenson Steve Ludecke Mark Lee Brittany Lamson Betsy Miller Athena Laroche Robert Stewart George Hanson Charlotte Van Eck	 Big Bear MWD Big Bear MWD Big Bear MWD Big Bear MWD SBV Water Conservation District SBV Water Conservation District SBV Water Conservation District Bear Valley Mutual Water Company Bear Valley Mutual Water Company

1. WELCOME AND CALL TO ORDER

The Big Bear Watermaster meeting was called to order by Don Evenson at 10:00 a.m.

2. APPROVAL OF MINUTES

The minutes of the October 18, 2022, meeting were approved.

3. LAKE AND BEAR CREEK STATUS

Mike Stephenson reported that BBMWD received .15 inches of precipitation last night; 36.36 inches has been received to date for the water year at the dam. The current lake level is at elevation 57.95, 14.38 feet down. The inflow for this month was approximately 7000 AF. The flow requirement at Station B is 0.85 CFS and the flow reading at Station B this morning was 0.90 CFS. If BBMWD gets another 7.33 inches of precipitation between now and April 1, they will stay in a wet year the entire year, and the releases will remain at 0.30 to 0.35 total CFS. Mr. Stephenson said that BBMWD finished the gate project to replace the leaking sluice gates install SCADA.

Mr. Stephenson also provided an update on the Replenish Big Bear recycled water project. Initial pilot testing will be underway soon. Project costs are estimated at \$75 million, with \$5.8 million in annual operations and maintenance costs; approximately \$8 million in grants have been secured. The debt service is in the range of \$3 million annually. Discussion ensued regarding the sanitary system. Grants are not available to fund operations and maintenance. The estimated cost is \$865 per AF for the beneficiaries. The system is designed for storage to occur in the lake with remaining water belonging to BBMWD. He discussed the brine management plan in brief. Mr. Hanson asked about the regulatory approval. Mr. Stephenson said that regulatory permits have not been obtained at this time. Mr. Hanson asked if it was dependent upon the pilot. Mr. Stephenson indicated that it is not. Mr. Stephenson said that the permit application was done in

February 2021, and the agency did not respond within the required 90-day period. The plant is taking in water and putting out water that is going to Lucerne. The current TDS is 450, compared to an average of 222 for last several years. Discussion of offsets ensued. Mr. Stephenson indicated that a water exchange has always proven to be a huge water quality benefit to the lake. Mr. Evenson said that Valley Municipal has determined that they are not able to capture 100% of spills from the lake because they occur at times when flows are high in the spreading basin area. He said that a fair amount of the additional spills from the lake move down the Santa Ana River to Orange County. He said future discussion may include payments from Orange County for captured water from lake spills. Mr. Stephenson said that Valley Municipal performed an analysis under the ten-year contract where it pays \$164 per AF of new water produced from Santa Ana River and expires in six years. It estimates \$64,000 of water coming uphill from this project. Mr. Stephenson equated that to be a possible benefit back to BMWWD for purchase of water based on additional spreading capacity of 500 CFS.

4. SANTA ANA RIVER STATUS AND FLOW REPORT/EDISON FACILITIES

Ms. Scholte said that this morning's Seven Oaks Dam (SOD) water elevation was 2227 feet with the debris pool elevation at 2200 feet. She said the SOD release was 250 CFS during last week, and close to 200 CFS prior to that. She said there is 230 CFS being recharged in Santa Ana, and the remainder is being utilized by North Fork and Mutual (Redlands) and there is 25 CFS in Mill Creek.

Ms. Scholte said that the SCE facilities are operational in Mill Creek, and are not being operated in Santa Ana. She indicated the road is washed out. She said that the consortium is awaiting feedback on the revised bid submitted to SCE for the facilities. The new owners would be the agencies participating in the consortium.

Ms. Scholte said that staff has been working with Mutual staff to address additional comments received on the Exchange Plan Amendment.

5. MUTUAL'S PROJECTION OF NEEDS FOR LAKE RELEASES/IN-LIEU WATER

Sam Fuller said that next year Mutual will need approximately 6500 AF of in-lieu water. He said that Valley Municipal will likely have some imported water available. Mr. Evenson asked if the needs will be met by SWP water. Mr. Fuller indicated that he is hopeful that is the case. He reviewed issues with SCE operations, and problems that occur from their facilities being down. Mr. Fuller said that there is a problem getting water to the Highline but believes SWP can meet their needs. Mutual will discuss the use of their Greenspot Pipeline with Valley Municipal but would like the Highline Pipeline to be functional in case it is needed. Discussion ensued regarding SCE operations. Mr. Fuller noted that the 1904 Power Agreement stays in effect regardless of who operates the SCE powerhouses.

6. ANNUAL WATERMASTER ACCOUNTING, REPORT, TASKS, AND DEADLINES

Mr. Evenson reviewed the 2022 lake levels. In 2022, the lake level dropped by 2.28 ft. The year ended at 17.34 ft down, and the water was below the spillway so there was no leakage to report. Year-end precipitation was 24.70 inches. Mr. Evenson reviewed the 2022 Revised Flow Compliance Plan, noting that the highlighted values are the flow compliance values and the numbers in blue are revised values used effective July 2014. The Station B flows were reviewed, and are in compliance. The Preliminary Lake Account Status was reviewed. The beginning lake storage was 34,418 AF and ended the calendar year at 29,873 AF. At the end of December, Mutual's Lake Account had 5,660 AF and BMWWD's Lake Account had 24,212 AF. The Basin

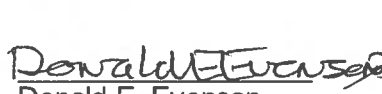
Make Up Account beginning balance was 24,032 AF, and ended at 20,991 AF. Table III-11 Summary of Water Deliveries to Mutual from 1977-2022 was reviewed, calendar year ended at 64,913 AF for the 10-year total. Table III-6 Comparison of Flows at Station B with estimated leakage and flows from outlet works was reviewed for calendar year 2022; end of year gain was 16.6 AF.

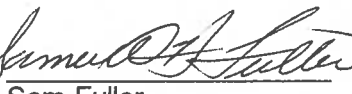
7. DATE FOR NEXT MEETING

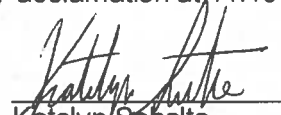
The next quarterly meeting is March 21 to be held at the Conservation District.

8. ADJOURN

There being no further business, the meeting was adjourned by acclamation at 11:10 a.m.


Donald E. Evenson


Sam Fuller


Katelyn Scholte

BIG BEAR WATERMASTER
MINUTES OF THE MEETING OF MARCH 21, 2023

PLACE: San Bernardino Valley Water Conservation District
and Zoom/Teleconference

PRESENT: Watermaster Committee

Don Evenson
Katelyn Scholte
Sam Fuller

Representing

Big Bear MWD, Chair
SBV Water Conservation District
Bear Valley Mutual Water Company

Others

Mike Stephenson
Steve Ludecke
Brittany Lamson
Athena Laroche
Robert Stewart
George Hanson
Charlotte Van Eck

Big Bear MWD
Big Bear MWD
Big Bear MWD
SBV Water Conservation District
SBV Water Conservation District
Bear Valley Mutual Water Company
Bear Valley Mutual Water Company

1. WELCOME AND CALL TO ORDER

The Big Bear Watermaster meeting was called to order by Don Evenson at 1:00 p.m.

2. APPROVAL OF MINUTES

The minutes of the January 31, 2023, meeting were approved.

3. LAKE AND BEAR CREEK STATUS

Mike Stephenson reported that the lake level began at 17.61 on November 7 which was the lowest point. The precipitation reading on November 8 was 6.76 inches. The lake gained approximately 1000 AF of storage. Mr. Stephenson reviewed the precipitation received for the water year. He said that the lake is currently 10.72 down for a lake level of 68.61. He indicated that .30 CFS is the current release requirement, and that it has been a wet year throughout the season. The current release at Station B is .83 CFS. There is .20 CFS coming through six inch and three-inch valves to prevent freezing. The flow has tripled at Station B because of side flows. The total for the water year is 14,365 AF of inflow. The beginning storage of this storm was 29,298 AF, and as of today storage is 43,663 AF. It snowed six to eight inches today.

Mr. Stephenson also provided an update on the Replenish Big Bear recycled water project. BBMWD has received comments on the CEQA public scoping meeting that was held. There were several comments received related to water quality. Big Bear Area

Regional Wastewater Agency (BBARWA) released a rate study and plans to fund the project with a WIFIA loan and other contributions. Discussion ensued regarding brine minimization and the pilot program.

4. SANTA ANA RIVER STATUS AND FLOW REPORT/EDISON FACILITIES

Ms. Scholte said that as of this morning there is 330 CFS in the Santa Ana River (SAR).

Ms. Scholte said that a large portion of flow has been recharge, approximately half has been going over the Cuttle Weir. A portion of the District's facilities are currently off-line due to preparation for the Enhance Recharge Project construction. This project will begin between April and June of this year. Ms. Scholte said that the District has been recharging the maximum amount possible with our available facilities, but has had to let flows pass through as the COE has been releasing. She noted in Mill Creek we are currently turned out but the soft plugs are still in. The District has been recharging 50 to 100 AF intermittently for the last couple of days. The District has begun recharging State Water Project (SWP) water on behalf of the Groundwater Council (GC). Ms. Scholte noted that SCE is currently out on both SAR and Mill Creek side. Mr. Hanson said that the SAR SCE access road is washed out.

Ms. Scholte stated that there is no update on the Exchange Plan Amendment.

5. MUTUAL'S PROJECTION OF NEEDS FOR LAKE RELEASES/IN-LIEU WATER

Mutual has scheduled 6,500 AF of in-lieu water to be delivered between June and December from Valley. He said that Mutual may not need it all. He said that it will be difficult to get water to the highline facilities with SCE being out. He discussed a potential need for an exchange of water. There will be times in the spring where Mutual is purchasing SWP water and not utilizing any of the river.

6. ANNUAL WATERMASTER ACCOUNTING, REPORT, TASKS, AND DEADLINES

Mr. Evenson reviewed the Summary Results table for calendar year 2022. The estimated lake level is 55.11 FT. The lake accounts increased slightly from the last report. The initial storage began at 21,881.21 AF for Big Bear, 12,536.8 AF for Mutual and 34,418 AF for Actual. The ending storage date is 24,293.2 AF for Big Bear, 5,777.8 AF for Mutual and 30,071 AF for Actual. The Basin Make-Up Account beginning balance was 24,032 AF and ending balance is 20,971 AF. Mr. Evenson reviewed Table III-11, which shows the ten-year summary. Mutual ended 2022 with a ten-year total of 64,952.4 AF. Mr. Evenson reviewed Figure 1: Actual Lake Contents and Mutual's Lake Account 1977-2022. He estimates that we will get an estimated 35,000 AF of runoff this year, which will put the lake close to full. Mr. Evenson would like to review the technical accounting issues, and potential solutions, for next year's Watermaster Report. There have been several significant changes since the 1977 Judgment was put into place. The Committee will meet and confer on these issues.

Mr. Evenson noted that the report is delayed due to data collection issues and requested the Committee approve an extension to submit the Watermaster Report on April 15.

It was moved by Ms. Scholte and seconded by Mr. Fuller to request an extension to submit the Watermaster Report for 2022 to April 15. The motion was carried 3-0, with all Committee members present voting in the affirmative.

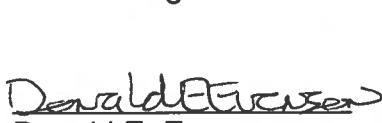
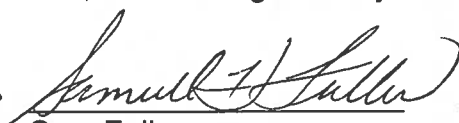
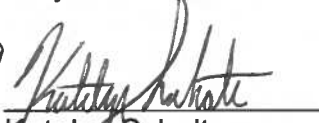
**Scholte: Yes
Evenson: Yes
Fuller: Yes**

7. DATE FOR NEXT MEETING

The next quarterly meeting is July 18 to be held at the Big Bear Municipal Water District, at 11:00 a.m.

8. ADJOURN

There being no further business, the meeting was adjourned by acclamation at 1:28 p.m.

		
Donald E. Evenson	Sam Fuller	Katelyn Scholte

BIG BEAR WATERMASTER
MINUTES OF THE MEETING OF JULY 18, 2023

PLACE: Big Bear Municipal Water District
and Zoom/Teleconference

PRESENT: <u>Watermaster Committee</u> Don Evenson Katelyn Scholte Sam Fuller	<u>Representing</u> Big Bear MWD, Chair SBV Water Conservation District Bear Valley Mutual Water Company
<u>Others</u> Mike Stephenson Steve Ludecke Brittany Lamson Mark Lee Mike Schermer Athena Laroche Robert Stewart Betsy Miller George Hanson Kristy Hoover	 Big Bear MWD Big Bear MWD Big Bear MWD Big Bear MWD Big Bear MWD SBV Water Conservation District SBV Water Conservation District SBV Water Conservation District Bear Valley Mutual Water Company

1. WELCOME AND CALL TO ORDER

The Big Bear Watermaster meeting was called to order by Don Evenson at 11:15 a.m.

2. APPROVAL OF MINUTES

The minutes of the March 21, 2023 meeting were approved with minor revisions.

3. LAKE AND BEAR CREEK STATUS

Mike Stephenson reported that the lake level is currently 65.67. He said that BBMWD is satisfied with the new meters and valves. He indicated that there will be a dam tour following the meeting. The September release requirement of 1.15 CFS will be the highest this year. Discussion ensued on average year.

Mr. Stephenson also provided an update on the Replenish Big Bear recycled water project. He said that tomorrow is the open house to view the water pilot. The pilot is ongoing, and they are ready to ship water to Israel. The brine minimization work will be done in Israel. The ultra filtration method was discussed, and Mr. Stephenson indicated that there is no better process in place. He noted that Stanfield Marsh also does a great

job with nutrient removal. It consists of 165 acres of land and has water in it currently. The 2011 study was discussed in brief. Basin objectives were discussed. Mr. Evenson asked the duration of the pilot. Mr. Stephenson stated that it will be concluded by the end of this year. Mr. Fuller discussed the projected charges that each of the local sewerage agencies would need to cover the costs of the completed project as reported in the Grizzly newspaper.

4. SANTA ANA RIVER STATUS AND FLOW REPORT/EDISON FACILITIES

Ms. Scholte said that as of this morning there is 80 CFS in the Santa Ana River (SAR), and 40 CFS in Mill Creek. This is one of the longest running flow period and we are currently able to recharge about half. The Enhanced Recharge Project construction kicked off and the District is limited on how much water we can take. On the Mill Creek side we will be kicking off construction on the replacement of the diversion structure. The District will be able to take imported water. She reviewed the Exchange Plan efforts, noting that there will be another meeting in three months. Ms. Miller said that there was interest in utilization of future potential projects discussed by the Exchange Plan Committee. She said that we hope to have the meeting in September or October for the next discussion.

Ms. Scholte reviewed the SCE facilities, noting that there is currently maintenance at the Mill Creek River pickup. The SAR facilities are still not generating at powerhouse three because the road was damaged. Mr. Evenson asked if they were diverting flows aside from that diverted to the highline. Mr. Fuller said that the Highline is operating on the SAR well. Mr. Hanson said that SCE is supposed to begin maintenance on SAR after Mill Creek is done. Mr. Evenson asked for progress update on the divestiture. Ms. Scholte said that the consortium is in the process of doing inspection on the facilities. San Bernardino Valley Municipal Water District (SBVMWD) is leading the effort to purchase it. The owners would likely be the consortium group. BBMWD expressed interest in joining the consortium. Mr. Stephenson it makes sense for all of us to have control and keep the SCE facilities online. Mr. Fuller said that he has approached Mr. Evenson with the idea, that the Watermaster needs to look at water deliveries more carefully and what is being spread and recharged and identify where SCE is impacting Mutual supply and BBMWD obligation. Mr. Fuller talked with Mr. Evenson on how to manage the supply and discussed costs. Mutual has an agreement with SCE that they will deliver water at the Highline, but SCE is unable to do so. Mr. Evenson stated that getting those powerhouses operational are the key to making everything work underneath the judgment. Discussion ensued regarding facilities. SBVMWD owns Sunrise Ranch and the Greenspot Pipeline which is an alternate pipeline. Mr. Fuller discussed exchange plan language and noted that the new exchange plan does not include language allowing Mutual to use the Greenspot Pipeline. There are two agencies that have requested to withdraw from the Exchange Plan. Mr. Evenson said exchange plan is a beneficial idea for the Watermaster Committee. Mr. Fuller discussed historical use of exchange plan. He said that the exchange plan is a good vehicle for what we need. The SCE issue is very important in how this will end up. Bringing these facilities functional will be beneficial.

5. MUTUAL'S PROJECTION OF NEEDS FOR LAKE RELEASES/IN-LIEU WATER

Mr. Fuller said there is 40 CFS being diverted, 10 CFS at Northfork and 30 CFS at Redlands Aqueduct. There is minimal in-lieu water needed this year. This year there was so much water, Bear Valley Mutual can't claim SWP in lieu deliveries. Mr. Evenson asked if Mutual can use flows released at SOD. Mr. Fuller said they are taking water in Northfork, Ms. Scholte discussed the hydroelectric facilities above EVWD's treatment plant.

6. ANNUAL WATERMASTER ACCOUNTING, REPORT, TASKS, AND DEADLINES

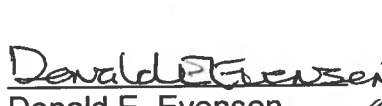
Mr. Evenson reviewed the 2023 Lake Levels. The estimated lake level is -17.22 below full. The initial storage began at 24,293 AF for Big Bear; 5,778 AF for Mutual; and 30,071 AF for Actual. The ending storage date is 22,504 AF for Big Bear; 32,834 AF for Mutual; and 55,338 AF for Actual. The 2023 Revised Flow Compliance Plan was reviewed, included data up to July 10. There has been 57.72 inches of precip received to date, and places us in the wet year category for the rest of the water year. There will be 0.55 CFS releases required at Station B for July and August. The fishery releases will be lower than previous years because it is a wet year.

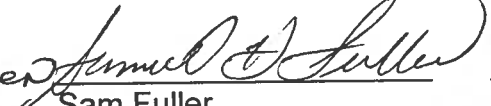
7. DATE FOR NEXT MEETING

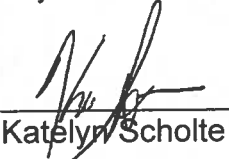
The next quarterly meeting is October 24 to be held at the Bear Valley Mutual Water Company, at 11:00 a.m.

8. ADJOURN

There being no further business, the meeting was adjourned by acclamation at 12:24 p.m.


Donald E. Evenson


Sam Fuller


Katelyn Scholte

BIG BEAR WATERMASTER
MINUTES OF THE MEETING OF OCTOBER 24, 2023

PLACE: Bear Valley Mutual Water Company
and Zoom/Teleconference

PRESENT:	<u>Watermaster Committee</u>	<u>Representing</u>
	Don Evenson	Big Bear MWD, Chair
	Katelyn Scholte	SBV Water Conservation District
	Sam Fuller	Bear Valley Mutual Water Company
	<u>Others</u>	
	Steve Ludecke	Big Bear MWD
	Brittany Lamson	Big Bear MWD
	Mike Schermer	Big Bear MWD
	Athena Laroche	SBV Water Conservation District
	Robert Stewart	SBV Water Conservation District
	George Hanson	Bear Valley Mutual Water Company
	Dave Knight	Bear Valley Mutual Water Company
	Charlotte Van Eck	Bear Valley Mutual Water Company
	Don Harriger	Guest

1. WELCOME AND CALL TO ORDER

The Big Bear Watermaster meeting was called to order by Don Evenson at 1:00 p.m.

2. APPROVAL OF MINUTES

The minutes of the July 18, 2023, meeting were approved.

3. LAKE AND BEAR CREEK STATUS

Brittany Lamson reported that the required release is 1.2 CFS; the actual release as of this morning is 1.26 CFS. The lake level is down 7.66 feet. There was a small amount of sediment removal in front of the weir at Station A. Mr. Evenson asked if Station A was still operational. Ms. Lamson confirmed in the affirmative.

Ms. Lamson also provided an update on the Replenish Big Bear recycled water project. She indicated that the project is still on schedule, and water from the pilot project is expected to be received in Israel for testing in December. Test results should be received shortly after that. Mr. Hanson asked if there have been any communications with the Regional Water Quality Control Board (RWQCB). Ms. Lamson stated that RWQCB provided BBMWD with initial and secondary comments upon application submittal. She said that BBMWD is anticipating that they will have the requirements for a discharge

permit by the end of the year, but no hard date has been received from RWQCB. The RFP for the plan has been sent out.

4. SANTA ANA RIVER STATUS AND FLOW REPORT/EDISON FACILITIES

Ms. Scholte said that as of this morning there is approximately 60 CFS in the Santa Ana River (SAR), and 35 CFS in Mill Creek. 45 CFS of the flow in SAR the Conservation District is recharging. In Mill Creek 14 CFS is being picked up by Redlands and Crafton; everything else is bypassing the recharge basins because we are replacing the diversion structure. Last water year the Conservation District recharged approximately 50,000 AF from SAR and 16,600 AF from Mill Creek.

Ms. Scholte noted that the SCE facilities are currently offline. Mr. Hanson said that on the Mill Creek side SCE has informed Mutual that they will have equipment at the river pickup Thursday this week to perform maintenance to hopefully bring these facilities back online. He noted that Hurricane Hilary damaged the distribution system between SAR-1 and SAR-3. SCE has been made aware, a timeline for repairs has not been received yet for the SAR side.

5. MUTUAL'S PROJECTION OF NEEDS FOR LAKE RELEASES/IN-LIEU WATER

Mr. Fuller stated that there has been no in-lieu water use so far this year. He indicated that this water year is expected to be an El Nino year; no in-lieu usage is anticipated. He said that BBMWD, Mutual and San Bernardino Valley Municipal Water District (SBVMWD) need to meet to discuss the situation since the SCE pipeline is down. Mr. Fuller said that if we get to the point where Mutual continues to receive water from the Seven Oak Dam reservoir, at times that precede in-lieu deliveries, it would be very difficult for Mutual to meet the Highline deliveries. Mr. Evenson said that the agreement with SBVMWD was based on a historical evaluation from 1945-1996; assuming that the lake release policy and SCE pipeline were in place. He said that without the pipeline BBMWD is at risk of needing to renegotiate that agreement. Mr. Evenson said that since the agreement was signed, there have been significant dry periods. BBMWD would like to modify the agreement to reduce in-lieu needs. The judgement said that in-lieu needs would have to be identified and set for each year. There has not been a need to do that. In-lieu limits may have to be set each year to identify how much water is available. Current discussions include limiting the maximum amount of in-lieu water available, and reduce amount of in-lieu groundwater used. This would be a temporary adjustment until SCE facilities were back online. Mutual is not a party to the agreement but will need to be involved in discussions because it is a recipient of the water. Mr. Evenson requested a meeting be held in November to discuss the potential amendment.

6. WATERMASTER REPORT SCHEDULE

Mr. Evenson reviewed the Preliminary Lake Account Status. The initial storage began at 24,293 AF for Big Bear, 5,778 AF for Mutual and 30,071 AF for Actual. The ending storage date is 21,133 AF for Big Bear, 31,428 AF for Mutual and 52,561 AF for Actual.

Mr. Evenson reviewed the 2023 Lake Levels noting that the year began at 17.23 AF below full, and was at 7.49 AF below full as of September 30. Mr. Evenson reviewed the 2023 Revised Flow Compliance Plan through October 11. He reviewed minimum flows at Station B. He said that the Basin Makeup Account needs to be reviewed from last year and may need to be revised if assumptions were inaccurate related to in-lieu usage. Mr. Hanson asked if the issue needs to be revised prior to completion of the report. Mr. Evenson indicated that he would like to see the issue resolved this year if possible.

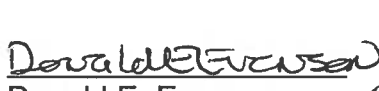
7. DATE FOR NEXT MEETING

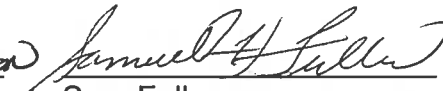
The next quarterly meetings are to be held as follows:

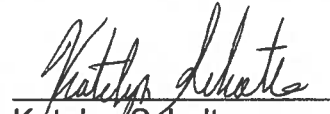
- January 16, 2024, at the Conservation District
- March 19, 2024, location to be determined
- July 16, 2024, at Big Bear Municipal Water District
- October 15, 2024, at Bear Valley Mutual Water Company

8. ADJOURN

There being no further business, the meeting was adjourned by acclamation at 11:48 a.m.


Donald E. Evenson


Sam Fuller


Katelyn Scholte

APPENDIX B

TABLE OF

ACCOUNTS OF OPERATION OF BIG BEAR LAKE

ACCOUNTS FOR

CALENDAR YEAR 2023

INPUT DATA	B-1 thru B-4
SUMMARY OF RESULTS	B-5
1. ACTUAL OPERATION OF BIG BEAR LAKE	B-6
1.A Summary Details	B-7
1.B Release Details	B-8
1.C Lake Withdrawal Details	B-9
1.D Evaporation Details	B-10
2. SYNTHESIZED MUTUAL OPERATION OF BIG BEAR LAKE	B-11
2.A Lake Outflow Details	B-12
2.B Synthesized Evaporation Calculation	B-13
2.C Mutual's Leakage and Adjusted Spills	B-14
3. DETERMINATION OF BIG BEAR'S LAKE ACCOUNT STATUS	B-15
3.A Lake Inflow Details	B-16
3.B Lake Outflow Details	B-17
4. BASIN MAKE-UP ACCOUNT	B-18
4.A Big Bear's Basin Additions	B-19
4.B Mutual's Basin Additions	B-20
4.C Basin Replenishments	B-21

INPUT DATA
BIG BEAR WATERMASTER REPORT
CALENDAR YEAR
2023

Sheet 1 Of 4

Calendar Year	=	2023		
Mutual's Lake Account Balance on Jan. 1	=	5,777.8	acre-feet	
Basin Make-Up Account Balance on Jan. 1	=	20,971	acre-feet	See Note 1
Account Balance for Mutual's Advances to BBMWD	=	-	acre-feet	
Repayment Premium for Mutual's Advances to BBMWD	=	0%		
Recharge Factor for Lake Deliveries to Mutual	=	0.500		
Recharge Factor for Imported Water Deliveries to Mutual	=	0.500		
Recharge Factor for Lake Spills	=	0.510		
Snowmelt Return Factor	=	0.500	Jan,Feb, Mar, Apr, Oct, Nov, Dec	
Snowmelt Return Factor	=	0.000	May, June, July, Aug, Sept	
<u>Monthly Evaporation Rate Calculation Factors</u>		<u>C1</u>	<u>C2</u>	<u>C3</u>
January		7.09	0.42	1,200
February		6.90	0.50	1,200
March		8.36	0.74	1,200
April		8.82	0.87	1,200
May		9.73	1.02	1,200
June		9.72	1.10	1,200
July		9.90	1.13	1,200
August		9.34	1.22	1,200
September		8.36	1.25	1,200
October		7.89	1.22	1,200
November		7.01	1.07	1,200
December		6.91	0.50	1,200
Evaporation rate (feet/month)	=	Average air temperature x C1 x C2 / C3		

**INPUT DATA
BIG BEAR WATERMASTER REPORT
CALENDAR YEAR
2023
(continued)**

Month	Gage* Height 1st of Month (feet)	Actual Mutual Shareholder Releases (acre-feet)	Mutual Other Releases (acre-feet)	Actual Spillway Flood Control Releases (acre-feet)	Actual Outlet Works & Flood Control Releases (acre-feet)	Big Bear's Spreading Releases (acre-feet)	Big Bear's Other Releases (acre-feet)	Leakage (Not used, included in Fish Releases) (acre-feet)
January	55.11	-	-	-	-	-	-	-
February	58.10	-	-	-	-	-	-	-
March	58.78	-	-	-	-	-	-	-
April	62.40	-	-	-	-	-	-	-
May	65.08	-	-	-	-	-	-	-
June	66.24	-	-	-	-	-	-	-
July	65.96	-	-	-	-	-	-	-
August	65.41	-	-	-	-	-	-	-
September	65.38	-	-	-	-	-	-	-
October	64.92	-	-	-	-	-	-	-
November	64.54	-	-	-	-	-	-	-
December	64.25	-	-	-	-	-	-	-
	64.13							
Change	9.02							
* Gage at Bear Valley Dam								

INPUT DATA
BIG BEAR WATERMASTER REPORT
CALENDAR YEAR
2023
(continued)

Month	Big Bear's Withdrawals for Snowmaking (acre-feet)	Big Bear's Releases for SBVMWD (acre-feet)	Mutual Spills of Wastewater Exports (acre-feet)	In-Lieu Imported Supplies (SBVMWD) (acre-feet)	In Lieu Supplies from SBVMWD's Contract Wells (acre-feet)	In Lieu Supplies from Mutual's Wells (acre-feet)	VD In Lieu Supplies from BB Lake acre-feet
January	261.18	-	-	-	-	-	-
February	43.55	-	-	-	-	-	-
March	7.80	-	-	-	-	-	-
April	15.86	-	-	-	-	-	-
May	8.57	-	-	-	-	-	-
June	54.15	-	-	-	-	-	-
July	41.87	-	-	-	-	-	-
August	24.82	-	-	-	-	-	-
September	34.74	-	-	-	-	-	-
October	17.80	-	-	-	-	-	-
November	171.26	-	-	-	-	-	-
December	167.66	-	-	-	-	-	-
Totals	849.26	-		-	-	-	-

INPUT DATA
BIG BEAR WATERMASTER REPORT
CALENDAR YEAR
2023
(continued)

Month	SWRCB Order 95-4 Releases & Leakage (acre-feet)	Mutual's Direct Use of Order 95-4 Lake Outflows (acre-feet)	Basin Replenishment from SBVMWD (acre-feet)	Basin Replenishment from Others (acre-feet)	2023 Net Wastewater Exports (acre-feet)	Average Air Temperature (degrees F)
January	52.05	20.12	-	-	233.15	32.1
February	16.32	-	-	-	126.14	31.8
March	18.14	-	-	-	283.78	33.1
April	12.45	-	-	-	269.35	45.6
May	12.99	-	-	-	119.85	50.9
June	16.17	-	-	-	93.78	55.4
July	37.73	-	-	-	81.26	68.1
August	43.62	-	-	-	74.88	64.1
September	73.99	-	-	-	59.11	57.9
October	79.18	-	-	-	57.93	52.4
November	65.69	31.78	-	-	66.52	42.3
December	59.01	1.90	-	-	87.00	41.2
Totals	487.34	53.80			1,552.75	

**SUMMARY RESULTS - Preliminary
CALENDAR YEAR
2023**

LAKE ACCOUNTS (acre-feet)	Big Bear	Mutual	Actual
Initial Storage	24,293.2	5,777.8	30,071.0
Lake Inflows	0.0	32,195.3	32,195.3
In-Lieu Supplies to Mutual	0.0	0.0	0.0
Lake Releases (Mutual & BBMWD)	0.0	0.0	0.0
Releases & Leakage (SWRCB 95-4)	(192.7)	(294.6)	(487.3)
Net Snowmaking Withdrawals from Lake	(506.7)	0.0	(506.7)
Lake Spills & Flood Control Releases	0.0	0.0	0.0
Leakage from Dam	0.0	0.0	0.0
Evaporation from Lake	(2,601.1)	(8,059.2)	(10,660.3)
Net Wastewater Exports	(1,552.8)	1,552.8	0.0
Advances & Repayment of Advances	0.0	0.0	0.0
Ending Storage	19,439.9	31,172.1	50,612.0
Storage Change	(4,853.3)	25,394.3	20,541.0
BASIN MAKE UP ACCOUNT (acre-feet)			
Beginning Balance	n.a.	n.a.	20,971
Recharge From Releases of Lake Water Used by Mutual	27	27	0
Recharge From In-lieu SWP Water Delivered to Mutual	0	n.a.	0
Recharge from Spills & Other Lake Releases	221	123	98
Account Credit (Debit)	248	150	98
Amount Replenished	0	n.a.	0
Ending Balance			21,069

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 1
ACTUAL OPERATION OF BIG BEAR LAKE**

Month	1 Gage Height 1st of Month (Input Data) (feet)	2 Volume in Storage (ac-ft)	3 Change in Storage (ac-ft)	4 Lake Surface Area (acres)	5 Spills Releases Leakage Withdrawals (see Table 1.A) (feet)	6 Estimated Lake Evaporation (see Table 1.D) (ac-ft)	7 Calc. Total Inflow (ac-ft)	8 Adjusted Lake Inflow * (ac-ft)	9 Adjusted Lake Evap * (ac-ft)	10 Adjusted Evap Rate * (feet/month)
January	55.11	30,071	6,158	1,952	183	164	6,505	6,504.8	164	0.080
February	58.10	36,229	1,539	2,169	38	201	1,778	1,777.8	201	0.091
March	58.78	37,768	8,438	2,222	22	399	8,859	8,859.2	399	0.171
April	62.40	46,206	6,880	2,456	20	742	7,642	7,641.9	742	0.292
May	65.08	53,086	3,059	2,630	22	1,119	4,199	4,199.5	1,119	0.421
June	66.24	56,145	(807)	2,686	70	1,322	586	585.7	1,322	0.494
July	65.96	55,338	(1,457)	2,672	80	1,687	310	310.1	1,687	0.635
August	65.41	53,881	0	2,644	68	1,609	1,678	1,677.8	1,609	0.609
September	65.38	53,881	(1,320)	2,644	109	1,327	116	115.6	1,327	0.504
October	64.92	52,561	(910)	2,619	88	1,097	275	275.3	1,097	0.420
November	64.54	51,651	(780)	2,602	151	686	57	57.3	686	0.264
December	64.25	50,871	(259)	2,587	143	307	190	190.4	307	0.119
	64.13	50,612	-----	2,582	-----	-----	-----	-----	-----	-----
TOTALS			20,541.0		994.0	10,660	32,195	32,195.3	10,660.3	4.099

* NOTE: Evaporation adjusted to eliminate negative inflow
6 month totals

31,672.3 8,570.5

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 1.A
ACTUAL OPERATION OF BIG BEAR LAKE
Summary Details**

1	2	3	4	5	6	7	8	9
Month	Actual Spillway Flood Control Releases (Input Data) (ac-ft)	Actual Outlet Works Flood Control Releases (Input Data) (ac-ft)	Actual Lake Releases (Non-FC) (see Table 1.B) (ac-ft)	Actual Estimated Leakage (not used) (Input Data) (ac-ft)	Estimated Net Lake Withdrawal (see Table 1.C) (ac-ft)			Total Spills Releases Leakage Withdrawals (ac-ft)
January	-	-	52.1	-	130.6			182.6
February	-	-	16.3	-	21.8			38.1
March	-	-	18.1	-	3.9			22.0
April	-	-	12.5	-	7.9			20.4
May	-	-	13.0	-	8.6			21.6
June	-	-	16.2	-	54.2			70.3
July	-	-	37.7	-	41.9			79.6
August	-	-	43.6	-	24.8			68.4
September	-	-	74.0	-	34.7			108.7
October	-	-	79.2	-	8.9			88.1
November	-	-	65.7	-	85.6			151.3
December	-	-	59.0	-	83.8			142.8
	-----	-----	-----	-----	-----			-----
TOTALS	-	-	487.3	-	506.7			994.0

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 1.B
ACTUAL OPERATION OF BIG BEAR LAKE
Release Details**

Month	1 Mutual's Shareholder Releases (Input Data) (ac-ft)	2 Mutual's Other Releases (Input Data) (ac-ft)	3 Mutual's Total Releases (Col.1 + Col.2) (ac-ft)	4 Big Bear's Releases for SBVMWD (Input Data) (ac-ft)	5 Big Bear's Spreading Releases (Input Data) (ac-ft)	6 Big Bear's Other Releases (Input Data) (ac-ft)	7 Big Bear's Total Releases (Col.4+Col.5+Col.6) (ac-ft)	8 SWRCB Order NO. 95-4 Lake Outflows (Input Data) (ac-ft)	9 Total Actual Releases (Cols.3+ 7+ 8) (ac-ft)
January	-	-	-	-	-	-	-	52.05	52.1
February	-	-	-	-	-	-	-	16.32	16.3
March	-	-	-	-	-	-	-	18.14	18.1
April	-	-	-	-	-	-	-	12.45	12.5
May	-	-	-	-	-	-	-	12.99	13.0
June	-	-	-	-	-	-	-	16.17	16.2
July	-	-	-	-	-	-	-	37.73	37.7
August	-	-	-	-	-	-	-	43.62	43.6
September	-	-	-	-	-	-	-	73.99	74.0
October	-	-	-	-	-	-	-	79.18	79.2
November	-	-	-	-	-	-	-	65.69	65.7
December	-	-	-	-	-	-	-	59.01	59.0
	-----	-----	-----	-----	-----	-----	-----	-----	-----
TOTALS	-	-	-	-	-	-	-	487.34	487.3

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 1.C
ACTUAL OPERATION OF BIG BEAR LAKE
Lake Withdrawal Details**

Month	1	2	3	4	5	6	7	8	9
		Snowmaking Withdrawals			Total Lake Withdrawals		Return from Snow melt @ 50.0%		Estimated Net Lake Withdrawals
		(Input Data) (ac-ft)			(ac-ft)		(ac-ft)		(ac-ft)
January		261.18			261.18		130.59		130.59
February		43.55			43.55		21.78		21.77
March		7.80			7.80		3.90		3.90
April		15.86			15.86		7.93		7.93
May		8.57			8.57		-		8.57
June		54.15			54.15		-		54.15
July		41.87			41.87		-		41.87
August		24.82			24.82		-		24.82
September		34.74			34.74		-		34.74
October		17.80			17.80		8.90		8.90
November		171.26			171.26		85.63		85.63
December		167.66			167.66		83.83		83.83
		-----			-----		-----		-----
TOTALS		849.26			849.26		342.56		506.70

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BIG BEAR WATERMASTER**

**TABLE 1.D
ACTUAL OPERATION OF BIG BEAR LAKE
Evaporation Details**

1	2	3	4	5	6	7	8	9
Month		Lake Surface Area (acres)	Average Lake Area (acres)	Average Air Temperature (Input Data) (deg F)	Calculated Evaporation Rate (feet/month)			Estimated Lake Evaporation (ac-ft)
January		1,952	2,061	32.10	0.080			164.1
February		2,169	2,196	31.80	0.091			200.7
March		2,222	2,339	33.10	0.171			399.1
April		2,456	2,543	45.60	0.292			741.5
May		2,630	2,658	50.90	0.421			1,118.9
June		2,686	2,679	55.40	0.494			1,322.4
July		2,672	2,658	68.10	0.635			1,687.5
August		2,644	2,644	64.10	0.609			1,609.3
September		2,644	2,632	57.90	0.504			1,326.8
October		2,619	2,611	52.40	0.420			1,097.3
November		2,602	2,595	42.30	0.264			686.0
December		2,587	2,585	41.20	0.119			306.6
		2,582			-----			-----
TOTALS					4.099			10,660.3

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BIG BEAR WATERMASTER**

**TABLE 2
SYNTHESIZED MUTUAL OPERATION OF BIG BEAR LAKE**

Month	1 Gauge Height 1st of Month (feet)	2 Mutual's Lake Account (ac-ft)	3 Change in Storage (*) (ac-ft)	4 Lake Surface Area (acres)	5 Mutual's Lake Inflow (see Table 1) (feet)	6 Mutual's Net Wastewater Export Credit (see Table 2.A) (ac-ft)	7 Mutual's Lake Evap. (see Table 2.B) (ac-ft)	8 Mutual's Snowmaking Advances to Big Bear (see Table 3) (ac-ft)	9 Mutual's Credit for Return of Advances (see Table 3) (ac-ft)	10 Mutual's Releases Leakage Spills & In-lieu Del. (see Table 2.A) (ac-ft)
January	38.30	5,778	6,625	853	6,504.8	233.2	86.2	-	-	26.3
February	44.40	12,403	1,774	1,312	1,777.8	126.1	124.2	-	-	5.6
March	45.70	14,177	8,867	1,404	8,859.2	283.8	269.3	-	-	6.8
April	51.30	23,044	7,364	1,752	7,641.9	269.4	541.2	-	-	6.2
May	55.25	30,408	3,461	1,960	4,199.5	119.9	850.6	-	-	7.4
June	56.95	33,869	(353)	2,077	585.7	93.8	1,022.3	-	-	9.8
July	56.80	33,517	(931)	2,065	310.1	81.3	1,299.2	-	-	22.9
August	56.35	32,586	486	2,028	1,677.8	74.9	1,240.5	-	-	26.4
September	56.60	33,072	(895)	2,048	115.6	59.1	1,023.8	-	-	45.4
October	56.15	32,177.3	(557)	2,013	275.3	57.9	841.7	-	-	48.5
November	55.85	31,620	(454)	1,992	57.3	66.5	525.2	-	-	52.5
December	55.65	31,167	6	1,981	190.4	87.0	235.0	-	-	36.9
	55.65	31,172.1		1,981						
TOTALS			25,394		32,195.3	1,552.8	8,059.2	-	-	294.6

(*) Col. 3 = Col. 5 + Col. 6 - Col. 7 - Col. 8 + Col. 9 - Col. 10

6,457.3

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 2.A
SYNTHESIZED MUTUAL OPERATION OF BIG BEAR LAKE
Lake Outflow Details**

Month	1 Mutual's Spills & FC Releases from Table 2.C (ac-ft)	2 Mutual's Lake Releases from Table 1.B (ac-ft)	3 Mutual's Leakage from Table 2.C (ac-ft)	4 Mutual's Order No. 95-4 Releases from Table 2.C (ac-ft)	5 Big Bear's In-lieu Supply Deliveries (see Table 3.B) (ac-ft)	6 Mutual's Releases Leakage Spills & In-lieu Del. (to Table 2) (ac-ft)	7	8 Net Credit for Wastewater Exports (Input Data) (ac-ft)	9 Spilled from Mutual's Lake Acct. (Input Data) (ac-ft)	10 Net Wastewater Export Credit (to Table 2) (ac-ft)
January	-	-	-	26.3	-	26.3		233.2	-	233.2
February	-	-	-	5.6	-	5.6		126.1	-	126.1
March	-	-	-	6.8	-	6.8		283.8	-	283.8
April	-	-	-	6.2	-	6.2		269.4	-	269.4
May	-	-	-	7.4	-	7.4		119.9	-	119.9
June	-	-	-	9.8	-	9.8		93.8	-	93.8
July	-	-	-	22.9	-	22.9		81.3	-	81.3
August	-	-	-	26.4	-	26.4		74.9	-	74.9
September	-	-	-	45.4	-	45.4		59.1	-	59.1
October	-	-	-	48.5	-	48.5		57.9	-	57.9
November	-	-	-	52.5	-	52.5		66.5	-	66.5
December	-	-	-	36.9	-	36.9		87.0	-	87.0
TOTALS	-	-	-	294.6	-	294.6		1,552.8	-	1,552.8

1341.3

**CALENDAR YEAR
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BIG BEAR WATERMASTER**

**TABLE 2.B
SYNTHESIZED MUTUAL OPERATION OF BIG BEAR LAKE
Synthesized Evaporation Calculation**

Month	1 Starting Volume (ac-ft)	2 Starting Area (acres)	3 Assumed Evap (ac-ft)	4 Estimated Ending Volume (ac-ft)	5 Estimated Ending Area (acres)	6 Average Area (acres)	7 Mutuals Lake Evap. (to Table 2) (ac-ft)	8 Big Bear's Lake Evap. (to Table 3.A) (ac-ft)	9 Revised Ending Volume Estimate (ac-ft)	10
January	5,777.8	853.0	67.9	12,421.5	1,312.0	1,082.5	86.2	77.9	12,403.3	
February	12,403.3	1,312.0	119.9	14,181.7	1,404.0	1,358.0	124.2	76.5	14,177.4	
March	14,177.4	1,404.0	239.6	23,074.0	1,752.0	1,578.0	269.3	129.8	23,044.3	
April	23,044.3	1,752.0	510.9	30,438.4	1,960.0	1,856.0	541.2	200.3	30,408.1	
May	30,408.1	1,960.0	825.1	33,894.9	2,081.0	2,020.5	850.6	268.3	33,869.4	
June	33,869.4	2,077.0	1,025.2	33,513.9	2,065.0	2,071.0	1,022.3	300.1	33,516.8	
July	33,516.8	2,065.0	1,311.0	32,574.3	2,028.0	2,046.5	1,299.2	388.3	32,586.1	
August	32,586.1	2,028.0	1,234.4	33,078.0	2,048.0	2,038.0	1,240.5	368.8	33,071.9	
September	33,071.9	2,048.0	1,032.6	32,168.5	2,013.0	2,030.5	1,023.8	303.0	32,177.3	
October	32,177.3	2,013.0	846.1	31,616.0	1,992.0	2,002.5	841.7	255.6	31,620.4	
November	31,620.4	1,992.0	526.7	31,165.0	1,981.0	1,986.5	525.2	160.8	31,166.5	
December	31,166.5	1,981.0	235.0	31,172.1	1,981.0	1,981.0	235.0	71.6	31,172.1	
TOTALS							8,059.2	2,601.1		

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 2.C
SYNTHESIZED MUTUAL OPERATION OF BIG BEAR LAKE
Mutual's Leakage, Spills & FC Releases, and SWRCB Releases**

Month	1 Total Leakage from Input Data (ac-ft)	2 Mutual's Leakage to Table 2.A (ac-ft)	3 Big Bear's Leakage to Table 3.B (ac-ft)	4 Actual Spills & FC Releases from Input Data (ac-ft)	5 Big Bear's Spills & FC Releases to Table 3.B (ac-ft)	6 Mutual's Spills & FC Releases to Table 2.A (ac-ft)	7 SWRCB Order 95-4 Releases from Input Data (ac-ft)	8 Mutual's Order 95-4 Direct Use from Input Data (ac-ft)	9 Mutual's Order 95-4 Releases to Table 2.A (ac-ft)	10 Big Bear's Order 95-4 Releases to Table 3.B (ac-ft)
January	-	-	-	-	-	-	52.05	20.12	26.25	25.80
February	-	-	-	-	-	-	16.32	0.00	5.59	10.73
March	-	-	-	-	-	-	18.14	0.00	6.81	11.33
April	-	-	-	-	-	-	12.45	0.00	6.21	6.24
May	-	-	-	-	-	-	12.99	0.00	7.44	5.55
June	-	-	-	-	-	-	16.17	0.00	9.75	6.42
July	-	-	-	-	-	-	37.73	0.00	22.85	14.88
August	-	-	-	-	-	-	43.62	0.00	26.38	17.24
September	-	-	-	-	-	-	73.99	0.00	45.41	28.58
October	-	-	-	-	-	-	79.18	0.00	48.47	30.71
November	-	-	-	-	-	-	65.69	31.78	52.54	13.15
December	-	-	-	-	-	-	59.01	1.90	36.89	22.12
TOTALS	-	-	-	-	-	-	487.34	53.80	294.61	192.73

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 3
DETERMINATION OF BIG BEAR'S LAKE ACCOUNT STATUS
Lake Account and Advance Account**

Month	1 Actual Lake Account (see Table 1) (ac-ft)	2 Mutual's Lake Account (see Table 2) (ac-ft)	3 Big Bear's Lake Account (calc.) (ac-ft)	4 Change in Big Bear's Lake Account (calc.) (ac-ft)	5	6 Big Bear's Advances From Mutual (calc.) (ac-ft)	7 Big Bear's Payments Against Advances (calc.) (ac-ft)	8 Big Bear's Advance Account Balance (calc.) (ac-ft)	9 Big Bear's 0% Repayment Premium (calc.) (ac-ft)	10 Mutual's Credit for Return of Advances (to Table 2) (ac-ft)
January	30,071	5,778	24,293.2	(467.5)		-	-	-	-	-
February	36,229	12,403	23,826	(235.2)		-	-	-	-	-
March	37,768	14,177	23,591	(428.8)		-	-	-	-	-
April	46,206	23,044	23,162	(483.8)		-	-	-	-	-
May	53,086	30,408	22,678	(402.3)		-	-	-	-	-
June	56,145	33,869	22,276	(454.4)		-	-	-	-	-
July	55,338	33,517	21,821	(526.3)		-	-	-	-	-
August	53,881	32,586	21,295	(485.8)		-	-	-	-	-
September	53,881	33,072	20,809	(425.5)		-	-	-	-	-
October	52,561	32,177	20,383.7	(353.1)		-	-	-	-	-
November	51,651	31,620	20,031	(326.1)		-	-	-	-	-
December	50,871	31,167	19,704	(264.5)		-	-	-	-	-
	50,612	31,172	19,439.9	-----		-----	-----	-	-----	-----
TOTALS				(4,853.3)		-	-	-	-	-

**CALENDAR YEAR
2023
BIG BEAR WATERMASTER**

**TABLE 3.A
DETERMINATION OF BIG BEAR'S LAKE ACCOUNT STATUS
Lake Inflow Details**

Month	1 In-lieu SWP Water from SBVMWD (Input Data) (ac-ft)	2 In-lieu Water from Other's Wells (Input Data) (ac-ft)	3 In-lieu Supplies from Mutual's Wells (Input Data) (ac-ft)	4	5 Valley District In Lieu Lake Supplies (Input Data) (ac-ft)	6 Big Bear's In-lieu Deliveries to Mutual (calc.) (ac-ft)	7	8 Big Bear's Advances From Mutual (from Table 3) (ac-ft)	9	10 Big Bear's Total Lake Inflows (calc.) (ac-ft)
January	-	-	-		-	-		-		-
February	-	-	-		-	-		-		-
March	-	-	-		-	-		-		-
April	-	-	-		-	-		-		-
May	-	-	-		-	-		-		-
June	-	-	-		-	-		-		-
July	-	-	-		-	-		-		-
August	-	-	-		-	-		-		-
September	-	-	-		-	-		-		-
October	-	-	-		-	-		-		-
November	-	-	-		-	-		-		-
December	-	-	-		-	-		-		-
TOTALS	----- -	----- -	----- -		----- -	----- -		----- -		----- -
6 month total						0				

**CALENDAR YEAR
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BIG BEAR WATERMASTER**

**TABLE 3.B
DETERMINATION OF BIG BEAR'S LAKE ACCOUNT STATUS
Lake Outflow Details**

Month	1 Big Bear's Snowmaking Withdrawals (Input Data) (ac-ft)	2 Big Bear's Total Releases Table 1.B (ac-ft)	3 Return Flow from Snowmelt 50.0% (Table 1.C) (ac-ft)	4 Big Bear's Net Lake Withdrawal (calc.) (ac-ft)	5 Big Bear's Payments Against Advances (see Table 3) (ac-ft)	6 Big Bear's Spills & FC Releases from Table 2.C (ac-ft)	7 Big Bear's Leakage + SWRCB Rel. from Table 2.C (ac-ft)	8 Big Bear's Lake Evaporation from Table 2.B (ac-ft)	9 Net Wastewater Export Credit (from Table 2.A) (ac-ft)	10 Big Bear's Total Lake Outflows (calc.) (ac-ft)
January	261.2	-	130.6	130.6	-	-	25.8	77.9	233.2	467.5
February	43.6	-	21.8	21.8	-	-	10.7	76.5	126.1	235.2
March	7.8	-	3.9	3.9	-	-	11.3	129.8	283.8	428.8
April	15.9	-	7.9	7.9	-	-	6.2	200.3	269.4	483.8
May	8.6	-	-	8.6	-	-	5.5	268.3	119.9	402.3
June	54.2	-	-	54.2	-	-	6.4	300.1	93.8	454.4
July	41.9	-	-	41.9	-	-	14.9	388.3	81.3	526.3
August	24.8	-	-	24.8	-	-	17.2	368.8	74.9	485.8
September	34.7	-	-	34.7	-	-	28.6	303.0	59.1	425.5
October	17.8	-	8.9	8.9	-	-	30.7	255.6	57.9	353.1
November	171.3	-	85.6	85.6	-	-	13.2	160.8	66.5	326.1
December	167.7	-	83.8	83.8	-	-	22.1	71.6	87.0	264.5
TOTALS	849.3	-	342.6	506.7	-	-	192.7	2,601.1	1,552.8	4,853.3

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BIG BEAR WATERMASTER

TABLE 4
BASIN MAKE-UP ACCOUNT

Month	1 Big Bear's Basin Additions (see Table 4.A) (ac-ft)	2	3 Mutual's Basin Additions (see Table 4.B) (ac-ft)	4	5 Net Credit (Debit) (ac-ft)	6	7 Total Basin Replenishment (see Table 4.C) (ac-ft)	8	9 Basin Comp. Account Balance (ac-ft)
January	26.3		13.2		13.2		-		20,971
February	8.3		2.8		5.5		-		20,984
March	9.3		3.5		5.8		-		20,989
April	6.3		3.2		3.2		-		20,995
May	6.6		3.8		2.8		-		20,998
June	8.2		5.0		3.3		-		21,001
July	19.2		11.7		7.6		-		21,004
August	22.2		13.5		8.8		-		21,012
September	37.7		23.2		14.6		-		21,021
October	40.4		24.7		15.7		-		21,035
November	33.2		26.5		6.7		-		21,051
December	30.1		18.8		11.3		-		21,058
TOTALS	248.0		149.7		98.3		0.0		21,069

**CALENDAR YEAR
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BIG BEAR WATERMASTER**

**TABLE 4.A
BIG BEAR'S BASIN ADDITIONS**

Month	SPILLS			LAKE RELEASES				IN LIEU SUPPLIES		10 Big Bear's Basin Additions (ac-ft)
	1 Actual Spills & FC Releases (ac-ft)	2 Actual SWRCB 95-4 Releases (ac-ft)	3 Basin Addition @ 51.0% (ac-ft)	4 Lake Release for Mutual (ac-ft)	5 SWRCB 95-4 Releases for Mutual (ac-ft)	6 Big Bear's Total Releases Table 1.B (ac-ft)	7 Basin Addition @ 50.0% (ac-ft)	8 Imported In Lieu Deliveries (ac-ft)	9 Basin Addition @ 50.0% (ac-ft)	
January	-	31.9	16.3	-	20.1	-	10.1	-	-	26.3
February	-	16.3	8.3	-	-	-	0.0	-	-	8.3
March	-	18.1	9.3	-	-	-	0.0	-	-	9.3
April	-	12.5	6.3	-	-	-	0.0	-	-	6.3
May	-	13.0	6.6	-	-	-	0.0	-	-	6.6
June	-	16.2	8.2	-	-	-	0.0	-	-	8.2
July	-	37.7	19.2	-	-	-	0.0	-	-	19.2
August	-	43.6	22.2	-	-	-	0.0	-	-	22.2
September	-	74.0	37.7	-	-	-	0.0	-	-	37.7
October	-	79.2	40.4	-	-	-	0.0	-	-	40.4
November	-	33.9	17.3	-	31.8	-	15.9	-	-	33.2
December	-	57.1	29.1	-	1.9	-	1.0	-	-	30.1
TOTALS	0.0	433.5	221.1	0.0	53.8	0.0	26.9	0.0	0.0	248.0

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**TABLE 4.B
MUTUAL'S BASIN ADDITIONS**

Month	SPILLS & FISH RELEASES			LAKE RELEASES			7 Total Basin Additions (ac-ft)
	1 Mutual's Spills (ac-ft)	2 Mutual's SWRCB 95-4 Shared Releases (ac-ft)	3 Basin Addition @ 51.0% (ac-ft)	4 Mutual's Lake Demands (ac-ft)	5 SWRCB 95-4 Lake Outflows Used by Mutual (ac-ft)	6 Basin Addition @ 50.0% (ac-ft)	
January	-	6.1	3.1	-	20.1	10.1	13.2
February	-	5.6	2.8	-	0.0	-	2.8
March	-	6.8	3.5	-	0.0	-	3.5
April	-	6.2	3.2	-	0.0	-	3.2
May	-	7.4	3.8	-	0.0	-	3.8
June	-	9.8	5.0	-	0.0	-	5.0
July	-	22.9	11.7	-	0.0	-	11.7
August	-	26.4	13.5	-	0.0	-	13.5
September	-	45.4	23.2	-	0.0	-	23.2
October	-	48.5	24.7	-	0.0	-	24.7
November	-	20.8	10.6	-	31.8	15.9	26.5
December	-	35.0	17.8	-	1.9	1.0	18.8
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TOTALS	0.0	240.8	122.8	0.0	53.8	26.9	149.7

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**TABLE 4.C
BASIN REPLENISHMENTS**

Month	1	2 Amount Replenished From SBVMWD Releases (ac-ft)	3	4	5 Amount Replenished From Releases (ac-ft)	6 Amount Replenished From Others (ac-ft)	7	8 Total Amount Replenished (ac-ft)	9
January		-			-	-		-	
February		-			-	-		-	
March		-			-	-		-	
April		-			-	-		-	
May		-			-	-		-	
June		-			-	-		-	
July		-			-	-		-	
August		-			-	-		-	
September		-			-	-		-	
October		-			-	-		-	
November		-			-	-		-	
December		-			-	-		-	
		----- 0.0			----- 0.0	----- 0.0		----- 0.0	

STAGE-VOLUME-AREA LOOK-UP TABLE

VOLUME IN STORAGE (AC-FT) -----	GUAGE HEIGHT (FT) -----	VOLUME IN STORAGE (AC-FT) -----	LAKE SURFACE AREA (ACRES) -----
10	23.00	10	1
100	24.00	100	135
170	25.00	170	159
485	26.00	485	183
800	27.00	800	207
1115	28.00	1115	231
1429	29.00	1429	279
1744	30.00	1744	303
1760	30.05	1760	304
1775	30.10	1775	305
1792	30.15	1792	307
1807	30.20	1807	308
1823	30.25	1823	309
1839	30.30	1839	310
1854	30.35	1854	311
1870	30.40	1870	313
1885	30.45	1885	314
1901	30.50	1901	315
1917	30.55	1917	316
1933	30.60	1933	317
1949	30.65	1949	319
1964	30.70	1964	320
1980	30.75	1980	321
1996	30.80	1996	322
2011	30.85	2011	323
2028	30.90	2028	325
2043	30.95	2043	326
2059	31.00	2059	327
2076	31.05	2076	328
2093	31.10	2093	329
2109	31.15	2109	330
2127	31.20	2127	331
2144	31.25	2144	332
2161	31.30	2161	333
2178	31.35	2178	334
2194	31.40	2194	336
2211	31.45	2211	337
2228	31.50	2228	338
2245	31.55	2245	339
2262	31.60	2262	340
2278	31.65	2278	342
2296	31.70	2296	343
2313	31.75	2313	344
2330	31.80	2330	345
2347	31.85	2347	346

2363	31.90	2363	348
2380	31.95	2380	349
2397	32.00	2397	350
2415	32.05	2415	351
2433	32.10	2433	352
2451	32.15	2451	353
2469	32.20	2469	354
2487	32.25	2487	355
2505	32.30	2505	356
2523	32.35	2523	357
2541	32.40	2541	359
2559	32.45	2559	360
2577	32.50	2577	361
2596	32.55	2596	362
2614	32.60	2614	362
2632	32.65	2632	364
2650	32.70	2650	365
2668	32.75	2668	366
2686	32.80	2686	367
2704	32.85	2704	368
2722	32.90	2722	370
2740	32.95	2740	370
2758	33.00	2758	371
2777	33.05	2777	372
2796	33.10	2796	373
2816	33.15	2816	375
2834	33.20	2834	376
2853	33.25	2853	377
2872	33.30	2872	378
2891	33.35	2891	379
2911	33.40	2911	380
2930	33.45	2930	381
2949	33.50	2949	382
2968	33.55	2968	383
2987	33.60	2987	384
3007	33.65	3007	386
3026	33.70	3026	387
3045	33.75	3045	388
3064	33.80	3064	389
3082	33.85	3082	390
3102	33.90	3102	391
3121	33.95	3121	392
3140	34.00	3140	393
3162	34.05	3162	397
3183	34.10	3183	401
3205	34.15	3205	406
3227	34.20	3227	410
3249	34.25	3249	414
3271	34.30	3271	418
3292	34.35	3292	421
3314	34.40	3314	426
3335	34.45	3335	430
3357	34.50	3357	434

3379	34.55	3379	438
3400	34.60	3400	442
3422	34.65	3422	447
3444	34.70	3444	450
3466	34.75	3466	454
3488	34.80	3488	458
3509	34.85	3509	462
3531	34.90	3531	467
3552	34.95	3552	471
3574	35.00	3574	475
3600	35.05	3600	479
3626	35.10	3626	483
3651	35.15	3651	488
3677	35.20	3677	491
3703	35.25	3703	495
3729	35.30	3729	499
3755	35.35	3755	503
3780	35.40	3780	508
3806	35.45	3806	512
3832	35.50	3832	516
3858	35.55	3858	520
3884	35.60	3884	524
3909	35.65	3909	528
3935	35.70	3935	532
3961	35.75	3961	536
3987	35.80	3987	540
4013	35.85	4013	544
4038	35.90	4038	549
4064	35.95	4064	553
4090	36.00	4090	557
4121	36.05	4121	564
4152	36.10	4152	570
4184	36.15	4184	577
4215	36.20	4215	583
4246	36.25	4246	590
4277	36.30	4277	597
4308	36.35	4308	604
4340	36.40	4340	611
4371	36.45	4371	617
4402	36.50	4402	624
4433	36.55	4433	631
4464	36.60	4464	638
4496	36.65	4496	645
4527	36.70	4527	651
4558	36.75	4558	658
4589	36.80	4589	665
4620	36.85	4620	671
4652	36.90	4652	679
4683	36.95	4683	685
4714	37.00	4714	692
4752	37.05	4752	699
4790	37.10	4790	705
4828	37.15	4828	713

4866	37.20	4866	719
4904	37.25	4904	726
4942	37.30	4942	733
4980	37.35	4980	739
5018	37.40	5018	746
5056	37.45	5056	753
5094	37.50	5094	760
5132	37.55	5132	767
5170	37.60	5170	773
5208	37.65	5208	780
5246	37.70	5246	787
5284	37.75	5284	794
5322	37.80	5322	801
5360	37.85	5360	807
5398	37.90	5398	814
5436	37.95	5436	820
5474	38.00	5474	827
5517	38.05	5517	832
5561	38.10	5561	836
5604	38.15	5604	841
5648	38.20	5648	845
5692	38.25	5692	849
5735	38.30	5735	853
5779	38.35	5779	857
5822	38.40	5822	862
5866	38.45	5866	866
5909	38.50	5909	871
5953	38.55	5953	875
5996	38.60	5996	879
6040	38.65	6040	884
6083	38.70	6083	888
6127	38.75	6127	892
6170	38.80	6170	896
6214	38.85	6214	900
6257	38.90	6257	905
6301	38.95	6301	909
6344	39.00	6344	914
6392	39.05	6392	918
6440	39.10	6440	922
6488	39.15	6488	927
6536	39.20	6536	931
6584	39.25	6584	935
6631	39.30	6631	939
6679	39.35	6679	943
6727	39.40	6727	948
6775	39.45	6775	952
6823	39.50	6823	957
6870	39.55	6870	961
6918	39.60	6918	965
6966	39.65	6966	970
7014	39.70	7014	974
7062	39.75	7062	978
7110	39.80	7110	982

7158	39.85	7158	986
7205	39.90	7205	991
7253	39.95	7253	995
7301	40.00	7301	1000
7353	40.05	7353	1003
7404	40.10	7404	1006
7456	40.15	7456	1010
7508	40.20	7508	1013
7560	40.25	7560	1017
7612	40.30	7612	1021
7663	40.35	7663	1024
7715	40.40	7715	1027
7766	40.45	7766	1030
7818	40.50	7818	1034
7870	40.55	7870	1038
7921	40.60	7921	1041
7973	40.65	7973	1045
8025	40.70	8025	1048
8077	40.75	8077	1051
8129	40.80	8129	1055
8180	40.85	8180	1058
8232	40.90	8232	1062
8283	40.95	8283	1065
8335	41.00	8335	1069
8390	41.05	8390	1072
8445	41.10	8445	1075
8501	41.15	8501	1079
8556	41.20	8556	1082
8611	41.25	8611	1086
8666	41.30	8666	1090
8721	41.35	8721	1093
8777	41.40	8777	1096
8832	41.45	8832	1099
8887	41.50	8887	1103
8942	41.55	8942	1107
8996	41.60	8996	1110
9052	41.65	9052	1113
9107	41.70	9107	1116
9162	41.75	9162	1120
9217	41.80	9217	1124
9272	41.85	9272	1127
9328	41.90	9328	1131
9383	41.95	9383	1134
9438	42.00	9438	1137
9497	42.05	9497	1141
9556	42.10	9556	1145
9614	42.15	9614	1149
9673	42.20	9673	1152
9732	42.25	9732	1156
9790	42.30	9790	1160
9849	42.35	9849	1163
9907	42.40	9907	1167
9966	42.45	9966	1170

10025	42.50	10025	1174
10084	42.55	10084	1178
10143	42.60	10143	1181
10201	42.65	10201	1185
10260	42.70	10260	1188
10318	42.75	10318	1192
10377	42.80	10377	1196
10436	42.85	10436	1199
10494	42.90	10494	1203
10553	42.95	10553	1206
10612	43.00	10612	1210
10674	43.05	10674	1214
10737	43.10	10737	1217
10799	43.15	10799	1221
10862	43.20	10862	1225
10924	43.25	10924	1229
10986	43.30	10986	1233
11049	43.35	11049	1236
11110	43.40	11110	1240
11173	43.45	11173	1243
11235	43.50	11235	1247
11297	43.55	11297	1251
11360	43.60	11360	1254
11422	43.65	11422	1258
11485	43.70	11485	1261
11547	43.75	11547	1265
11609	43.80	11609	1269
11672	43.85	11672	1272
11734	43.90	11734	1276
11797	43.95	11797	1279
11859	44.00	11859	1283
11925	44.05	11925	1287
11991	44.10	11991	1290
12056	44.15	12056	1294
12122	44.20	12122	1297
12188	44.25	12188	1301
12254	44.30	12254	1305
12320	44.35	12320	1308
12386	44.40	12386	1312
12452	44.45	12452	1315
12518	44.50	12518	1319
12584	44.55	12584	1323
12650	44.60	12650	1326
12716	44.65	12716	1330
12782	44.70	12782	1333
12848	44.75	12848	1336
12914	44.80	12914	1340
12980	44.85	12980	1343
13045	44.90	13045	1347
13111	44.95	13111	1350
13177	45.00	13177	1354
13247	45.05	13247	1358
13316	45.10	13316	1361

13386	45.15	13386	1365
13455	45.20	13455	1368
13525	45.25	13525	1372
13595	45.30	13595	1376
13664	45.35	13664	1379
13733	45.40	13733	1383
13802	45.45	13802	1386
13872	45.50	13872	1390
13942	45.55	13942	1394
14011	45.60	14011	1397
14081	45.65	14081	1401
14150	45.70	14150	1404
14220	45.75	14220	1408
14290	45.80	14290	1411
14359	45.85	14359	1414
14428	45.90	14428	1418
14497	45.95	14497	1421
14567	46.00	14567	1425
14640	46.05	14640	1429
14713	46.10	14713	1432
14786	46.15	14786	1436
14859	46.20	14859	1439
14932	46.25	14932	1442
15005	46.30	15005	1446
15078	46.35	15078	1449
15151	46.40	15151	1453
15224	46.45	15224	1456
15297	46.50	15297	1459
15370	46.55	15370	1463
15442	46.60	15442	1466
15516	46.65	15516	1470
15589	46.70	15589	1473
15662	46.75	15662	1476
15735	46.80	15735	1480
15807	46.85	15807	1483
15881	46.90	15881	1487
15954	46.95	15954	1490
16027	47.00	16027	1494
16103	47.05	16103	1497
16179	47.10	16179	1500
16256	47.15	16256	1504
16332	47.20	16332	1507
16408	47.25	16408	1511
16485	47.30	16485	1514
16561	47.35	16561	1517
16638	47.40	16638	1521
16714	47.45	16714	1524
16790	47.50	16790	1528
16867	47.55	16867	1531
16943	47.60	16943	1534
17020	47.65	17020	1538
17096	47.70	17096	1541
17172	47.75	17172	1545

17249	47.80	17249	1548
17325	47.85	17325	1551
17402	47.90	17402	1555
17478	47.95	17478	1558
17554	48.00	17554	1562
17634	48.05	17634	1565
17714	48.10	17714	1568
17793	48.15	17793	1571
17873	48.20	17873	1574
17952	48.25	17952	1577
18032	48.30	18032	1580
18112	48.35	18112	1583
18191	48.40	18191	1586
18271	48.45	18271	1589
18350	48.50	18350	1592
18430	48.55	18430	1595
18510	48.60	18510	1598
18589	48.65	18589	1601
18669	48.70	18669	1604
18748	48.75	18748	1608
18828	48.80	18828	1611
18908	48.85	18908	1614
18987	48.90	18987	1617
19067	48.95	19067	1620
19146	49.00	19146	1623
19229	49.05	19229	1626
19312	49.10	19312	1629
19394	49.15	19394	1632
19477	49.20	19477	1635
19560	49.25	19560	1638
19643	49.30	19643	1641
19725	49.35	19725	1644
19808	49.40	19808	1647
19890	49.45	19890	1650
19973	49.50	19973	1653
20056	49.55	20056	1657
20139	49.60	20139	1660
20221	49.65	20221	1663
20304	49.70	20304	1666
20386	49.75	20386	1669
20469	49.80	20469	1672
20552	49.85	20552	1675
20634	49.90	20634	1678
20717	49.95	20717	1681
20800	50.00	20800	1684
20885	50.05	20885	1686
20971	50.10	20971	1689
21056	50.15	21056	1692
21142	50.20	21142	1695
21227	50.25	21227	1697
21313	50.30	21313	1699
21398	50.35	21398	1702
21484	50.40	21484	1705

21569	50.45	21569	1708
21655	50.50	21655	1710
21740	50.55	21740	1713
21826	50.60	21826	1716
21911	50.65	21911	1718
21997	50.70	21997	1721
22082	50.75	22082	1723
22168	50.80	22168	1726
22253	50.85	22253	1729
22339	50.90	22339	1731
22424	50.95	22424	1734
22510	51.00	22510	1736
22598	51.05	22598	1739
22686	51.10	22686	1742
22775	51.15	22775	1744
22863	51.20	22863	1747
22951	51.25	22951	1750
23039	51.30	23039	1752
23127	51.35	23127	1755
23215	51.40	23215	1757
23303	51.45	23303	1760
23391	51.50	23391	1763
23479	51.55	23479	1765
23567	51.60	23567	1768
23656	51.65	23656	1770
23744	51.70	23744	1773
23832	51.75	23832	1776
23920	51.80	23920	1778
24008	51.85	24008	1781
24097	51.90	24097	1783
24185	51.95	24185	1786
24273	52.00	24273	1789
24364	52.05	24364	1791
24454	52.10	24454	1794
24545	52.15	24545	1797
24635	52.20	24635	1800
24726	52.25	24726	1802
24817	52.30	24817	1804
24908	52.35	24908	1807
24999	52.40	24999	1809
25089	52.45	25089	1812
25180	52.50	25180	1815
25271	52.55	25271	1817
25361	52.60	25361	1820
25453	52.65	25453	1822
25543	52.70	25543	1825
25634	52.75	25634	1828
25725	52.80	25725	1830
25815	52.85	25815	1833
25906	52.90	25906	1835
25996	52.95	25996	1838
26087	53.00	26087	1841
26181	53.05	26181	1843

26274	53.10	26274	1846
26368	53.15	26368	1848
26461	53.20	26461	1851
26554	53.25	26554	1854
26648	53.30	26648	1856
26741	53.35	26741	1859
26834	53.40	26834	1861
26927	53.45	26927	1864
27021	53.50	27021	1867
27114	53.55	27114	1869
27207	53.60	27207	1872
27301	53.65	27301	1874
27394	53.70	27394	1877
27487	53.75	27487	1880
27581	53.80	27581	1882
27674	53.85	27674	1885
27767	53.90	27767	1887
27860	53.95	27860	1890
27954	54.00	27954	1893
28050	54.05	28050	1895
28146	54.10	28146	1898
28242	54.15	28242	1900
28338	54.20	28338	1903
28434	54.25	28434	1906
28530	54.30	28530	1908
28626	54.35	28626	1911
28722	54.40	28722	1914
28818	54.45	28818	1917
28914	54.50	28914	1919
29010	54.55	29010	1922
29106	54.60	29106	1925
29202	54.65	29202	1927
29298	54.70	29298	1930
29394	54.75	29394	1933
29490	54.80	29490	1935
29586	54.85	29586	1938
29681	54.90	29681	1941
29777	54.95	29777	1944
29873	55.00	29873	1946
29972	55.05	29972	1949
30071	55.10	30071	1952
30169	55.15	30169	1954
30268	55.20	30268	1957
30367	55.25	30367	1960
30465	55.30	30465	1962
30564	55.35	30564	1965
30663	55.40	30663	1968
30762	55.45	30762	1971
30860	55.50	30860	1973
30958	55.55	30958	1976
31057	55.60	31057	1979
31156	55.65	31156	1981
31255	55.70	31255	1984

31353	55.75	31353	1987
31452	55.80	31452	1989
31551	55.85	31551	1992
31649	55.90	31649	1995
31748	55.95	31748	1998
31847	56.00	31847	2000
31949	56.05	31949	2004
32051	56.10	32051	2008
32153	56.15	32153	2013
32255	56.20	32255	2016
32357	56.25	32357	2020
32459	56.30	32459	2024
32561	56.35	32561	2028
32663	56.40	32663	2033
32765	56.45	32765	2037
32867	56.50	32867	2041
32969	56.55	32969	2045
33071	56.60	33071	2048
33173	56.65	33173	2053
33273	56.70	33273	2057
33377	56.75	33377	2061
33479	56.80	33479	2065
33581	56.85	33581	2069
33683	56.90	33683	2073
33785	56.95	33785	2077
33887	57.00	33887	2081
33993	57.05	33993	2085
34099	57.10	34099	2089
34206	57.15	34206	2094
34312	57.20	34312	2097
34418	57.25	34418	2101
34524	57.30	34524	2105
34629	57.35	34629	2109
34736	57.40	34736	2114
34842	57.45	34842	2118
34948	57.50	34948	2122
35054	57.55	35054	2126
35160	57.60	35160	2129
35267	57.65	35267	2134
35372	57.70	35372	2138
35478	57.75	35478	2142
35584	57.80	35584	2146
35690	57.85	35690	2150
35797	57.90	35797	2154
35903	57.95	35903	2158
36009	58.00	36009	2162
36119	58.05	36119	2166
36229	58.10	36229	2169
36338	58.15	36338	2174
36449	58.20	36449	2177
36559	58.25	36559	2181
36669	58.30	36669	2185
36779	58.35	36779	2188

36888	58.40	36888	2192
36999	58.45	36999	2196
37109	58.50	37109	2200
37219	58.55	37219	2204
37329	58.60	37329	2207
37438	58.65	37438	2211
37548	58.70	37548	2214
37658	58.75	37658	2218
37768	58.80	37768	2222
37879	58.85	37879	2226
37988	58.90	37988	2230
38098	58.95	38098	2233
38208	59.00	38208	2237
38322	59.05	38322	2241
38436	59.10	38436	2244
38549	59.15	38549	2249
38663	59.20	38663	2252
38777	59.25	38777	2256
38891	59.30	38891	2260
39005	59.35	39005	2263
39118	59.40	39118	2267
39232	59.45	39232	2271
39346	59.50	39346	2275
39459	59.55	39459	2279
39573	59.60	39573	2282
39687	59.65	39687	2286
39801	59.70	39801	2289
39914	59.75	39914	2293
40028	59.80	40028	2297
40142	59.85	40142	2301
40255	59.90	40255	2305
40369	59.95	40369	2308
40483	60.00	40483	2312
40600	60.05	40600	2315
40717	60.10	40717	2318
40834	60.15	40834	2321
40951	60.20	40951	2324
41068	60.25	41068	2326
41185	60.30	41185	2329
41302	60.35	41302	2332
41419	60.40	41419	2335
41536	60.45	41536	2338
41653	60.50	41653	2341
41770	60.55	41770	2343
41887	60.60	41887	2346
42004	60.65	42004	2349
42121	60.70	42121	2352
42238	60.75	42238	2355
42356	60.80	42356	2358
42473	60.85	42473	2361
42590	60.90	42590	2363
42707	60.95	42707	2366
42824	61.00	42824	2369

42943	61.05	42943	2372
43063	61.10	43063	2375
43183	61.15	43183	2377
43303	61.20	43303	2380
43423	61.25	43423	2383
43543	61.30	43543	2386
43663	61.35	43663	2389
43783	61.40	43783	2392
43903	61.45	43903	2395
44022	61.50	44022	2397
44142	61.55	44142	2400
44262	61.60	44262	2403
44382	61.65	44382	2406
44502	61.70	44502	2409
44622	61.75	44622	2412
44741	61.80	44741	2414
44861	61.85	44861	2417
44981	61.90	44981	2420
45101	61.95	45101	2423
45221	62.00	45221	2426
45344	62.05	45344	2430
45467	62.10	45467	2433
45590	62.15	45590	2437
45713	62.20	45713	2440
45837	62.25	45837	2444
45960	62.30	45960	2448
46083	62.35	46083	2452
46206	62.40	46206	2456
46329	62.45	46329	2459
46452	62.50	46452	2463
46576	62.55	46576	2467
46699	62.60	46699	2470
46822	62.65	46822	2474
46945	62.70	46945	2478
47068	62.75	47068	2482
47191	62.80	47191	2486
47314	62.85	47314	2489
47438	62.90	47438	2493
47561	62.95	47561	2496
47684	63.00	47684	2500
47811	63.05	47811	2504
47937	63.10	47937	2507
48065	63.15	48065	2512
48191	63.20	48191	2515
48318	63.25	48318	2519
48445	63.30	48445	2523
48572	63.35	48572	2526
48699	63.40	48699	2530
48826	63.45	48826	2534
48953	63.50	48953	2538
49080	63.55	49080	2542
49206	63.60	49206	2545
49334	63.65	49334	2549

49460	63.70	49460	2552
49587	63.75	49587	2556
49714	63.80	49714	2560
49841	63.85	49841	2563
49968	63.90	49968	2568
50094	63.95	50094	2571
50221	64.00	50221	2575
50351	64.05	50351	2577
50481	64.10	50481	2580
50612	64.15	50612	2582
50741	64.20	50741	2585
50871	64.25	50871	2587
51001	64.30	51001	2589
51131	64.35	51131	2592
51262	64.40	51262	2595
51391	64.45	51391	2598
51521	64.50	51521	2600
51651	64.55	51651	2602
51781	64.60	51781	2605
51912	64.65	51912	2607
52041	64.70	52041	2610
52171	64.75	52171	2612
52301	64.80	52301	2614
52431	64.85	52431	2617
52561	64.90	52561	2619
52691	64.95	52691	2622
52821	65.00	52821	2625
52954	65.05	52954	2627
53086	65.10	53086	2630
53219	65.15	53219	2632
53351	65.20	53351	2635
53483	65.25	53483	2637
53616	65.30	53616	2639
53748	65.35	53748	2642
53881	65.40	53881	2644
54013	65.45	54013	2647
54146	65.50	54146	2649
54279	65.55	54279	2652
54411	65.60	54411	2655
54543	65.65	54543	2657
54675	65.70	54675	2660
54808	65.75	54808	2662
54941	65.80	54941	2664
55073	65.85	55073	2667
55206	65.90	55206	2669
55338	65.95	55338	2672
55471	66.00	55471	2674
55605	66.05	55605	2676
55740	66.10	55740	2679
55875	66.15	55875	2681
56010	66.20	56010	2684
56145	66.25	56145	2686
56280	66.30	56280	2688

56415	66.35	56415	2691
56550	66.40	56550	2693
56685	66.45	56685	2696
56820	66.50	56820	2698
56954	66.55	56954	2700
57089	66.60	57089	2703
57224	66.65	57224	2705
57359	66.70	57359	2708
57494	66.75	57494	2710
57629	66.80	57629	2712
57764	66.85	57764	2715
57899	66.90	57899	2717
58034	66.95	58034	2720
58169	67.00	58169	2722
58306	67.05	58306	2724
58444	67.10	58444	2727
58580	67.15	58580	2729
58718	67.20	58718	2732
58855	67.25	58855	2734
58992	67.30	58992	2736
59130	67.35	59130	2739
59267	67.40	59267	2741
59405	67.45	59405	2744
59542	67.50	59542	2746
59679	67.55	59679	2748
59817	67.60	59817	2751
59954	67.65	59954	2753
60091	67.70	60091	2756
60228	67.75	60228	2758
60365	67.80	60365	2760
60503	67.85	60503	2763
60640	67.90	60640	2765
60778	67.95	60778	2768
60915	68.00	60915	2770
61055	68.05	61055	2772
61194	68.10	61194	2775
61334	68.15	61334	2777
61473	68.20	61473	2779
61613	68.25	61613	2781
61753	68.30	61753	2783
61892	68.35	61892	2786
62032	68.40	62032	2788
62171	68.45	62171	2790
62311	68.50	62311	2792
62451	68.55	62451	2794
62590	68.60	62590	2797
62730	68.65	62730	2799
62869	68.70	62869	2801
63009	68.75	63009	2803
63149	68.80	63149	2805
63289	68.85	63289	2808
63428	68.90	63428	2810
63568	68.95	63568	2813

63707	69.00	63707	2815
63849	69.05	63849	2817
63991	69.10	63991	2819
64133	69.15	64133	2821
64274	69.20	64274	2824
64416	69.25	64416	2826
64558	69.30	64558	2828
64700	69.35	64700	2830
64842	69.40	64842	2832
64984	69.45	64984	2835
65126	69.50	65126	2837
65268	69.55	65268	2839
65409	69.60	65409	2842
65551	69.65	65551	2843
65693	69.70	65693	2846
65835	69.75	65835	2848
65977	69.80	65977	2850
66118	69.85	66118	2853
66261	69.90	66261	2854
66402	69.95	66402	2857
66544	70.00	66544	2859
66688	70.05	66688	2861
66832	70.10	66832	2864
66977	70.15	66977	2866
67121	70.20	67121	2869
67265	70.25	67265	2871
67409	70.30	67409	2873
67553	70.35	67553	2876
67697	70.40	67697	2878
67841	70.45	67841	2881
67986	70.50	67986	2883
68130	70.55	68130	2885
68274	70.60	68274	2888
68418	70.65	68418	2890
68562	70.70	68562	2893
68706	70.75	68706	2895
68851	70.80	68851	2897
68995	70.85	68995	2900
69139	70.90	69139	2902
69283	70.95	69283	2905
69427	71.00	69427	2907
69573	71.05	69573	2909
69720	71.10	69720	2912
69866	71.15	69866	2914
70013	71.20	70013	2917
70160	71.25	70160	2919
70306	71.30	70306	2921
70453	71.35	70453	2924
70599	71.40	70599	2926
70746	71.45	70746	2929
70892	71.50	70892	2931
71039	71.55	71039	2933
71186	71.60	71186	2936

71332	71.65	71332	2938
71479	71.70	71479	2940
71625	71.75	71625	2942
71771	71.80	71771	2944
71918	71.85	71918	2947
72064	71.90	72064	2949
72211	71.95	72211	2952
72358	72.00	72358	2954
72502	72.05	72502	2956
72646	72.10	72646	2959
72790	72.15	72790	2962
72934	72.20	72934	2965
73079	72.25	73079	2968
73224	72.30	73224	2971
73369	72.35	73369	2974

Preliminary Lake Account Status, AF

6/30/23

Item	Actual Lake Account	Mutual's Lake Account	BBMWD's Lake Account
Beginning Storage (1-1-23)	30,071	5,778	24,293
Natural Lake Inflow	29,569	29,569	0
Wastewater Export Credits		479	-479
Lake Evaporation	-3,947	-2,864	-1,083
Mutual Releases	0	0	0
SWRCB Releases	-128	-128	0
BBMWD Net Snowmaking W/D	-227	0	-227
In Lieu Deliveries to Mutual		0	0
	-----	-----	-----
Calc. Ending Storage (6-30-23)	55,338	32,834	22,504
Storage Change	25,267	27,056	-1,789
Check Ending Storage	55,338	32,834	22,504

Notes:

Wastewater Export Credits are 2022 values

Assumes Mutual Uses all the Fishery Releases

Assumes No In Lieu Deliveries to Mutual

Preliminary Lake Account Status, AF

5/31/22

Item	Actual Lake Account	Mutual's Lake Account	BBMWD's Lake Account
Beginning Storage (1-1-23)	30,071	5,778	24,293
Natural Lake Inflow	28,983	28,983	0
Wastewater Export Credits		425	-425
Lake Evaporation	-2,624	-1,855	-769
Mutual Releases	0	0	0
SWRCB Releases	-112	-112	0
BBMWD Net Snowmaking W/D	-173	0	-173
In Lieu Deliveries to Mutual		0	0
	-----	-----	-----
Calc. Ending Storage (5-31-23)	56,145	33,219	22,926
Storage Change	26,074	27,441	-1,367
Check Ending Storage	56,145	33,219	22,926

Notes:

Wastewater Export Credits are 2022 values

Assumes Mutual Uses all the Fishery Releases

Assumes No In Lieu Deliveries to Mutual's values

Preliminary Lake Account Status, AF

September 30, 2023

Item	Actual Lake Account	Mutual's Lake Account	BBMWD's Lake Account
Beginning Storage (1-1-23)	30,071	5,778	24,293
Natural Lake Inflow	31,672	31,672	0
Wastewater Export Credits		640	-640
Lake Evaporation	-8,570	-6,378	-2,192
Mutual Releases	0	0	0
SWRCB Fishery Releases	-284	-284	0
BBMWD Net Snowmaking W/D	-328	0	-328
In Lieu Deliveries to Mutual		0	0
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Calc. Ending Storage (9-30-23)	52,561	31,428	21,133
Storage Change	22,490	25,650	-3,160
Check Ending Storage	52,561	31,428	21,133

Notes:

Wastewater Export Credits are 2022 values

Initial allocation of SWRCB Fishery Releases

Assumed no In Lieu Deliveries to Mutual in 2023