BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Application of California-American Water Company (U210W) to Obtain Approval of the Amended and Restated Water Purchase Agreement for the Pure Water Monterey Groundwater Replenishment Project, Update Supply and Demand Estimates for the Monterey Peninsula Water Supply Project, and Cost Recovery.	Application 21-11-024 (Filed November 29, 2021)

PHASE 2 DIRECT TESTIMONY OF PAUL FINDLEY

Sarah E. Leeper
Nicholas A. Subias
Cathy Hongola-Baptista
California-American Water Company
555 Montgomery Street, Suite 816
San Francisco, CA 94111
(415) 863-2960
sarah.leeper@amwater.com

Lori Anne Dolqueist
Willis Hon
Nossaman LLP
50 California Street
34th Floor
San Francisco, CA 94111
(415) 398-3600
ldolqueist@nossamna.com
whon@nossman.com

Attorneys for California-American Water Company

Dated: July 20, 2022

TABLE OF CONTENTS

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Application of California-American Water Company (U210W) to Obtain Approval of the Amended and Restated Water Purchase Agreement for the Pure Water Monterey Groundwater Replenishment Project, Update Supply and Demand Estimates for the Monterey Peninsula Water Supply Project, and Cost Recovery.	Application 21-11-024 (Filed November 29, 2021)

PHASE 2 DIRECT TESTIMONY OF PAUL FINDLEY

I. INTRODUCTION

Q1. Please state your name, position and business address.

A1. My name is Paul Findley. I am a self-employed independent contractor. My business address is 17954 Sencillo Court, San Diego, CA 92128. I provide professional engineering services in the water and wastewater utilities sector.

Q2. Please state your education and professional background.

A2. I have a Bachelor of Science Degree in Engineering (Environmental) from Purdue University and a Master of Science Degree in Sanitary Engineering from the University of California, Berkeley. I worked for 42 years as an environmental consulting engineer for three different companies on projects in twelve states involving environmental impact analysis, planning, program management, design, value engineering, and construction management for water and wastewater facilities, surface water facilities, industrial water and wastewater facilities, and seawater/brackish water desalination facilities. From 2004 to 2016, my responsibilities included Chief Engineer and Project Manager for the consulting team (RBF Consulting/ Michael Baker Company/ Michael Baker International) on various aspects of the Monterey Peninsula Water Supply Project and its predecessor known as the Coastal Water Project As a result, I obtained in-depth background and technical knowledge of California-American Water Company's (CAWC's) Monterey Main System and all of its components, including the Aquifer Storage and Recovery (ASR) system.

Q3. Are you a Professional Engineer in the State of California?

A3. Yes, since 1976. My Professional (Civil) Engineer's license number is C26189.

II. PURPOSE OF MY TESTIMONY

Q4. What is the purpose of your testimony?

A4. The purpose of my testimony is to provide a realistic assessment of the capabilities of existing and proposed facilities to capture excess Carmel River water for injection into the ASR wells. My analysis starts in Water Year 2026, when a sufficient number of ASR injection wells are expected to be available.

Q5. Please summarize your findings.

A5. A copy of the technical memorandum summarizing my findings, "ASR Availability and Reliability Analysis Technical Memorandum," dated July 15, 2022, is included as Attachment 1.

Q6. When can Carmel River water be diverted for injection at the ASR wells?

A6. The diversion of Carmel River water for injection in the ASR wells is regulated by the State Water Resources Control Board (SWRCB) such that it only can occur during a six-month ASR injection season from December 1 to May 31, and only if minimum stream flow requirements are met.

Q7. How do permits limit ASR diversions?

A7. The diversion of excess Carmel River water for injection the ASR system is limited by two SWRCB permits, and both permits have minimum stream flow conditions that must be met. When these minimum stream flow conditions are met, then the permits would theoretically allow diversion of up to 14.7 cubic feet per second (CFS), which is 29.2 Acre-feet per day (AFD). However, it is not physically possible to inject this amount of water in the ASR wells due to capacity limitations of the system.

Q8. What is the maximum ASR injection rate?

A8. The only way that Carmel River water can be delivered to the ASR wells is via the Crest Pipeline, and due to capacity limitations of that pipeline, the maximum ASR injection rate is 8.6 CFS (17 AFD). However, when diversion is only permitted under Permit 20808A, but stream flows are below the minimums of Permit 20808C; or, when the Upper Carmel Valley wells are not in operation, then the maximum injection rate is 6.7 CFS (13.3 AFD).

Q9. How did you simulate future ASR operation?

A9. I obtained daily Carmel River flow records for the last 59 years (1963 to 2021). I then prepared a hypothetical simulation in which I looked at the river flow for each day and determined if ASR diversion would have been permitted under present day permit rules. If that day qualified as an injection day, I then determined if ASR injection would have been 13.3 AFD or 17 AFD for that day. I then compiled and analyzed the results for each year.

Q10. What were the results of this simulation?

A10. Over the last 59 years, the number of days that would have qualified for injection averaged 79 days per year but ranged from zero (seven of the 59 years) to 181 days (once, in 1983). Simulated ASR injection averaged 1,210 AFY but ranged from zero (seven of the 59 years) to 2,840 AF (in 1983).

Q11. Did you discover any trends?

A11. Yes. I noticed a definite downward trend in average river flow in the last 30 years. Average Carmel River flow during the time period 1992-2001 was 256 CFS, and fell to 198 CFS during 2002-2011, and then fell again to 143 CFS during 2012-2021. As a result, simulated ASR diversion averages fell from 1,445 AFY for 1992-2001 to 868 AFY for 2012-2021.

Q12. What did you conclude regarding ASR injection as a reliable source of supply?

A12. Based on the past 59 years of record, I concluded that the chances that ASR injection will be zero in any given year in the future is approximately 12 percent. I also looked at five-year averages, and concluded that for any five-year period in the future, CAW can expect that the five-year ASR injection average will exceed 240 AFY with 95 percent reliability, and 470 AFY with 90 percent reliability.

Q13. Can ASR injection fill the anticipated gap between demand and firm supply?

A13. In my opinion, not with any reasonable degree of reliability. During the time period 2026-2030, the projected average demand is 11,300 AFY, which is 1,300 AFY more than the firm supply of 10,000 AFY. Based on the five-year averages from the simulation, the probability of attaining a five-year average of 1,300 AFY from ASR injection is 39 percent.

Q14. Does this conclude your testimony?

A14. Yes.

ATTACHMENT 1

REGISTERED PROFESSIONAL ENGINEER No. 26189 PAUL L. FINDLEY 7-15-22 STATE OF CALIFORNIA

To: Ian Crooks
From: Paul Findley, Sarp Sekeroglu
Subject: ASR Reliability Analysis
Date: July 15, 2022

Background

The Aquifer Storage and Recovery (ASR) Program, operated jointly by California American Water (CAW) and the Monterey Peninsula Water Management District (MPWMD), allows for the storage of excess Carmel River water in the Seaside Groundwater Basin during wet winter and spring months for later extraction and beneficial use during dry summer and fall months. The diversion of Carmel River water for this purpose is regulated by the State Water Resources Control Board (SWRCB) such that it only can occur during a six-month (183-day) ASR injection season from December 1 to May 31, and only if minimum stream flow requirements are met.

The injection of excess Carmel River water in the ASR system is limited by two SWRCB permits. Permit 20808A provides for injection of up to 6.7 cubic feet per second (CFS) of excess Carmel River flows, which is 13.3 acre-feet per day (AFD). For higher Carmel River flows, Permit 20808C provides for the injection of an additional 8 CFS (15.9 AFD). The maximum injection allowed under these two permits is 14.7 CFS (29.2 AFD). However, it is not physically possible to inject this amount of water in the ASR wells due to capacity limitations of the system.

ASR System Limitations

The ASR system's relevant facilities, shown in **Figure 1**, are the Carmel Valley Wells, the Begonia Iron Removal Plant (BIRP), the Segunda and Crest Tanks, the Crest/ASR pipelines, and the ASR wells.

Figure 1- ASR System Facilities

A total of four ASR wells have been developed. Currently, only Santa Margarita Well Nos. 1 and 2 (also known as ASR Well Nos. 1 and 2) can be used for injection, with each one having an injection capacity of 3.3 CFS (6.6 AFD). Neither one of these wells can be used for extraction due to nearby injection of Pure Water Monterey Project water, and the resulting inadequate travel time in the aquifer. The other two ASR wells are at the Seaside Middle School site. However, Middle School Well No. 4 is currently out of service, and Middle School Well No. 3 is currently dedicated to year-round extraction. In 2025, when additional extraction wells are available, the Middle School Wells will be available for ASR injection and a total of four ASR wells could be available for injection. However, other ASR system limitations preclude the simultaneous use of all four wells for injection.

The only way that Carmel River water can be conveyed to the ASR wells is from pumps that lift water from the Segunda Tanks to the Crest Tank. From the Crest Tank, water flows by gravity to the ASR wells via the Crest Pipeline and the ASR Pipeline. The Crest Pipeline is a 16-inch diameter pipeline that is 45 years old. Considering the difference in elevation between the Crest Tank and the ASR wells, and the condition of this pipeline, the estimated maximum flow rate that can be achieved in the Crest Pipeline is approximately 9.6 CFS (19 AFD). However, approximately 1 CFS (2 AFD), is delivered to customers that are connected to the Crest Pipeline, so the maximum amount of water that can be delivered to the ASR wells is estimated at 8.6 CFS (17 AFD).

Water from the Carmel River is diverted using the Lower Carmel Valley Wells (always) and the Upper Carmel Valley Wells (sometimes). These wells serve approximately 2,000 AFY to customers in Carmel Valley and the Monterey Peninsula, and the excess is pumped to the Crest Tank from the Segunda Tank.

The capacities of the Lower Carmel Valley Wells, which supply the Begonia Iron Removal Plant (BIRP), are shown in **Table 1**. As shown, the combined maximum capacity of these wells is approximately 9.6 CFS (19 AFD) and the firm capacity (*the capacity of a system with the largest unit out of service)* is approximately 7.5 CFS (15 AFD). The BIRP receives all of its source water from the Lower Carmel Valley Wells.

Table 1 - Lower Carmel Valley Well Capacities[1]

Lower Carmel Valley Wells (To BIRP)	Capacity		
	GPM	CFS	AFD
Eastwood-Canada (Malpaso)	27	0.06	0.1
Rancho Canada #2	560	1.22	2.5
Cypress #2	907	2.03	4.0
Pearce	790	1.77	3.5
Schulte #2	258	0.57	1.1
Begonia #2	578	1.29	2.6
Berwick #8	721	1.61	3.2
Berwick #9	443	0.99	2.0
Total	**4,284**	**9.54**	**19**
Firm (largest out)	**3,377**	**7.51**	**15**

Note 1: From e-mail from Mike Magretto to Ian Crooks, May 7, 2021

Four wells in the Upper Carmel Valley also pump into the system, but only when certain minimum stream flow conditions are met from December 1 through May 31. The maximum and firm capacities of the Upper Carmel Valley wells are 2.7 CFS and 1.6 CFS, respectively. Also, during certain stream flow conditions, the Upper Valley wells may be diverting Table 13 water, which cannot be used for ASR injection and directly serves customers in Carmel Valley.

During an ASR diversion event, it is possible that the Upper Carmel Valley Wells are not operating and all of the ASR diversion is coming from the Lower Carmel Valley Wells. In this instance, the maximum amount of water that can be delivered to the ASR wells is as follows:

Maximum Capacity of Lower Carmel Valley Wells:	19.0	AFD
Less Carmel Valley/Monterey Peninsula Demand (est.):	3.0	AFD
Less Backwash and Pipeline Losses:	0.7	AFD
Equals Available at Segunda Tanks for Pumping to Crest Tank:	16.0	AFD
Less Deliveries to Customers from Crest Pipeline:	2.0	AFD
Equals Deliveries to ASR Injection Wells	13.3	AFD

When ASR diversions occur and both the Lower and Upper Carmel Valley wells are operating, the maximum amount of water that can be delivered to the ASR wells is as follows:

Maximum Capacity of Lower Carmel Valley Wells:	19.0	AFD
Plus Maximum Capacity of Upper Carmel Valley Wells:	5.3	AFD
Less Carmel Valley/Monterey Peninsula Demand (est.):	3.0	AFD
Less Backwash and Pipeline Losses:	0.7	AFD
Equals Available at Segunda Tanks for Pumping to Crest Tank:	20.6	AFD
Less Capacity Exceedance in Crest Pipeline:	1.6	AFD
Less Deliveries to Customers from Crest Pipeline:	2.0	AFD
Equals Deliveries to ASR Injection Wells	17.0	AFD

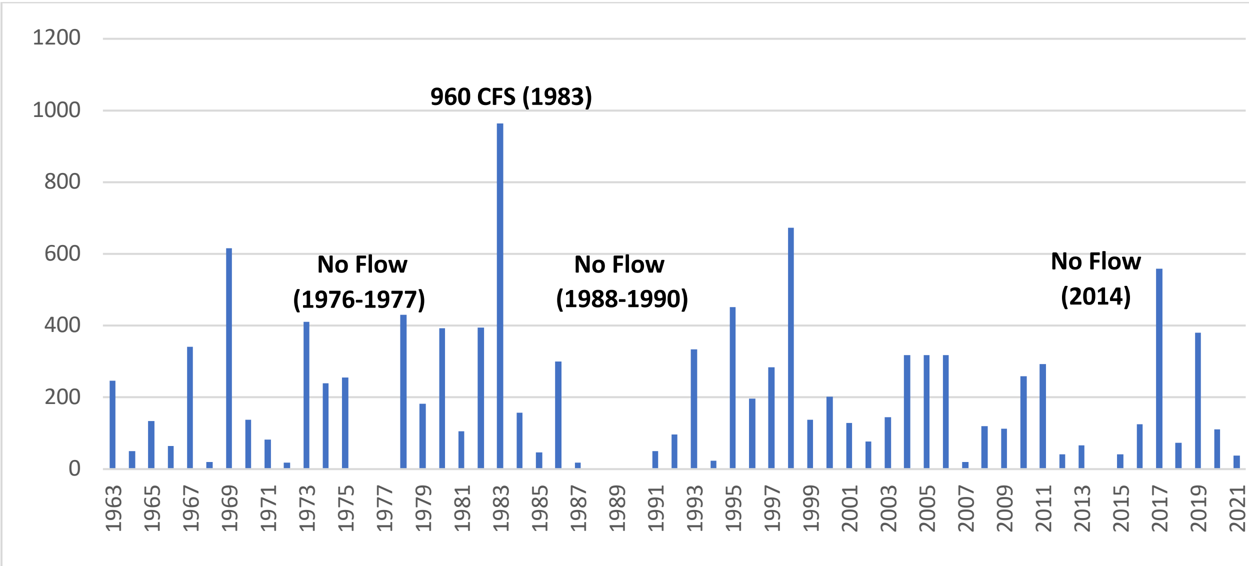
Permit Limitations on ASR Operations

Diversions are never allowed when Carmel River flows are less than 40 CFS, and when diversions are allowed, the diversion cannot cause the flow to drop below 40 CFS. For stream flows above 40 CFS, the minimum stream flow conditions for ASR diversions are determined according to a complicated set of rules in WRCB Permits 20808A and WRCB 20808C. Permit 20808A provides for diversion of up to 6.7 CFS. Under different and higher minimum stream flow conditions, SWRCB Permit 20808C provides for diversion of an additional 8.0 CFS. However, as previously described, delivery of water to the ASR wells is limited to approximately 8.6 CFS, so the increment of ASR injection flow that can be obtained under Permit 20808C is limited to 1.9 CFS. This increment is not always available because the minimum stream flow conditions in Permit 20808C are more restrictive than the minimums specified in Permit 20808A.

Historic Carmel River Flows

Carmel River flows during December through May for 59 water years (WY), starting in WY1963 (the first year when data was available), are summarized in **Figure 2**.

Figure 2-Average River Flow (CFS) During ASR Injection Season (December-May)



Carmel River flows during the injection season averaged approximately 197 CFS over the 59-year period. However, for fourteen years, the average Carmel River flow was less than 42 CFS, and for seven of these years (1968, 1972, 1976, 1977, 1987-1990, 1994, 2007, and 2014), Carmel River flows were essentially zero. Conversely, for seven years (1969, 1973, 1978, 1983, 1995, 1998, and 2017), average Carmel River flows exceeded 400 CFS.

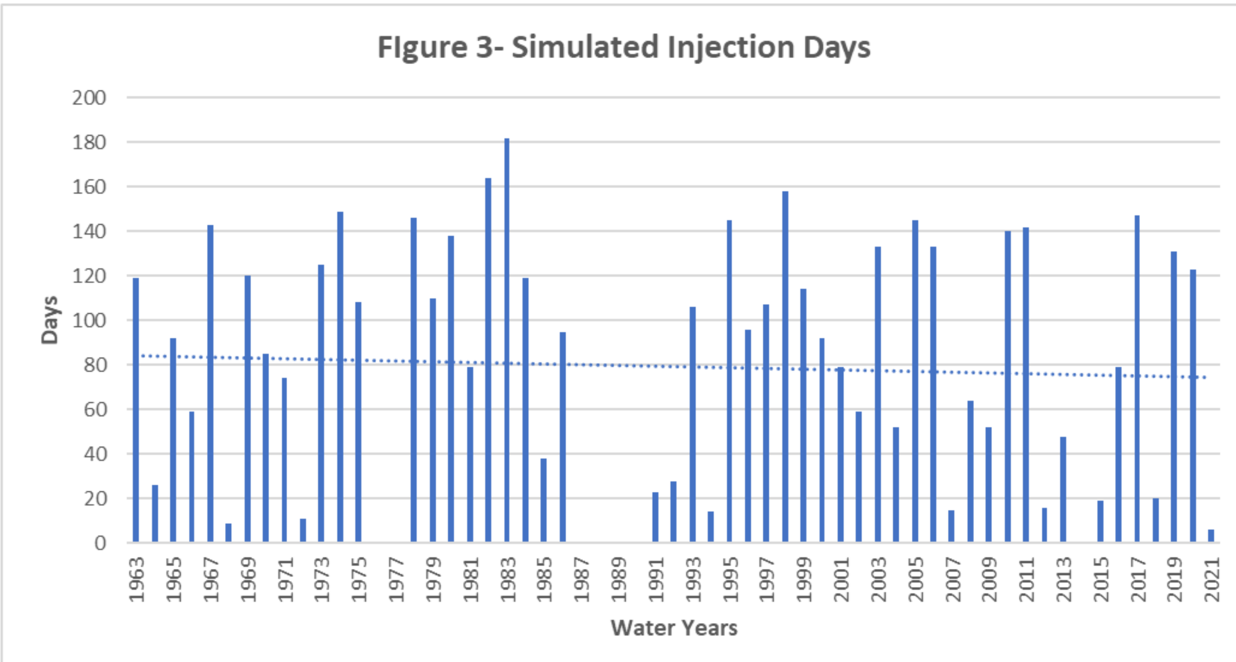
In the last thirty years, the average flows in the Carmel River have declined significantly, as shown in **Table 2.** It is possible that this is the beginning of a long-term downward trend in Carmel River flows as a result of climate change, but this is too short of a period to conclude that the trend will continue.

Table 2
Average Carmel River Flows for Selected Time Periods

Time Period	Average Carmel River Flow During Injection Season (CFS)
WY1963-WY1971	188
WY1972-WY1981	204
WY1982-WY1991	193
WY1992-WY2001	256
WY2002-WY2011	198
WY2012-WY2021	143

Simulation of ASR Injection

A day-by-day analysis of Carmel River flow records for 59 years from WY1963 to WY 2021 was conducted to determine the ASR diversions (injections) that hypothetically could have occurred while observing the previously described system limitations and permit limitations. The results of the simulation are shown in **Figures 3 and 4** and **Table 3.**



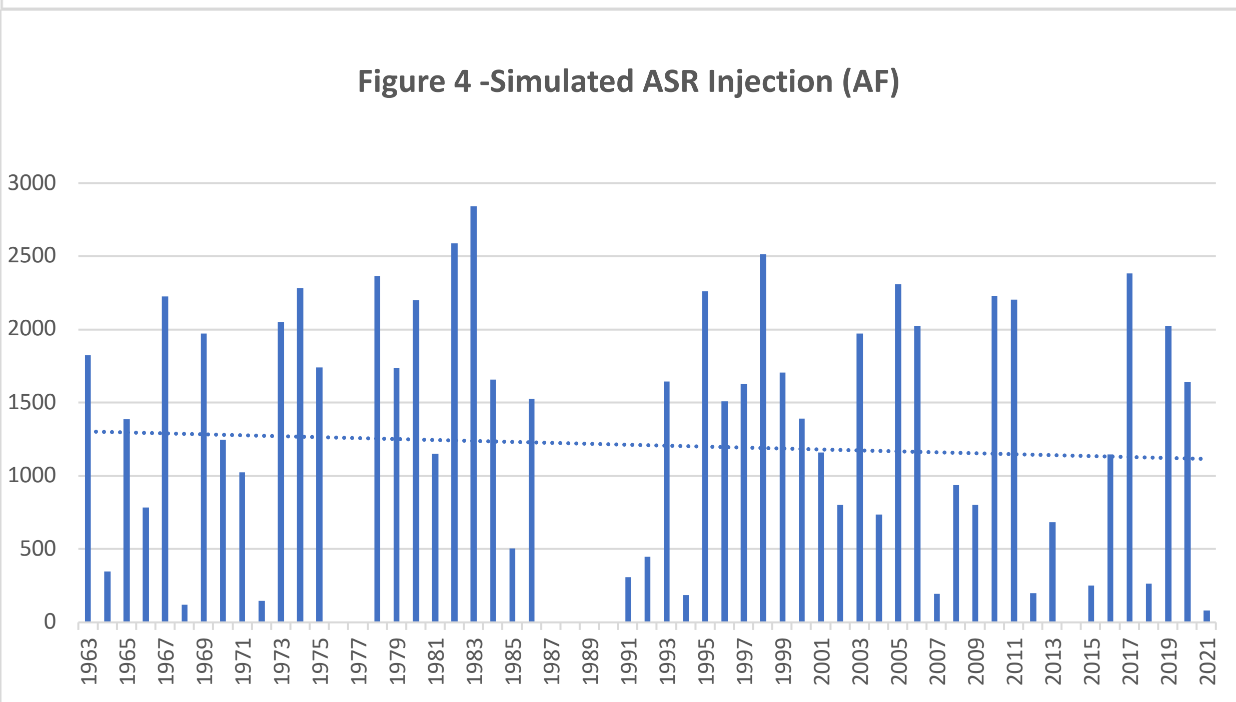


Table 3
Simulated ASR Injection for Water Years 1963 to 2021

Water Year	Dec-May Average River Flow (CFS)	ASR INJECTION IN ACRE-FEET				
		Permit 20808A		Permit 20808C		
		Injection Days	AF Injected at 13.3 AFD	Injection Days	Additional Injected at 3.7 AFD	Total ASR Injection (AF)
1963	247	119	1587	63	238	1825
1964	50	26	347	0	0	347
1965	133	92	1227	43	163	1389
1966	65	59	787	0	0	787
1967	341	143	1907	85	320	2227
1968	20	9	120	0	0	120
1969	617	120	1600	99	374	1974
1970	138	85	1127	43	120	1247
1971	83	74	987	66	38	1024
1972	19	11	147	0	0	147
1973	410	125	1667	102	386	2052
1974	239	149	1987	78	295	2282
1975	256	108	1440	80	302	1742
1976	0	0	0	0	0	0
1977	0	0	0	0	0	0
1978	430	146	1947	111	420	2366
1979	182	110	1467	71	268	1735
1980	394	138	1840	95	359	2199
1981	106	79	1041	29	110	1150
1982	394	164	2187	106	401	2587
1983	965	182	2419	112	423	2843
1984	157	119	1587	19	72	1658
1985	47	38	507	0	0	507
1986	300	95	1267	69	261	1528
1987	19	0	0	0	0	0
1988	0	0	0	0	0	0
1989	0	0	0	0	0	0
1990	1	0	0	0	0	0
1991	50	23	307	0	0	307
1992	96	28	373	20	76	449
1993	335	106	1413	74	230	1643
1994	23	14	187	0	0	187
1995	476	145	1933	87	329	2262
1996	197	96	1280	61	231	1511

Table 3 (Continued)

Water Year	Dec-May Average River Flow (CFS)	ASR INJECTION IN ACRE-FEET				
		Permit 20808A		Permit 20808C		Total ASR Injection (AF)
		Injection Days	AF Injected at 13.3 AFD	Injection Days	Additional Injected at 3.7 AFD	
1997	285	107	1427	53	200	1627
1998	674	158	2107	108	408	2515
1999	138	114	1520	49	185	1705
2000	202	92	1223	44	166	1390
2001	130	79	1053	28	106	1159
2002	77	59	761	11	42	803
2003	147	133	1773	53	200	1974
2004	318	52	693	11	42	735
2005	319	145	1929	101	382	2310
2006	318	133	1773	67	253	2027
2007	20	15	193	0	0	193
2008	119	64	845	24	91	936
2009	112	52	677	33	125	802
2010	260	140	1865	97	366	2232
2011	292	142	1860	91	344	2205
2012	41	16	201	0	0	201
2013	67	48	635	13	49	684
2014	1	0	0	0	0	0
2015	41	19	253	0	0	253
2016	124	79	1053	25	95	1148
2017	558	147	1960	112	423	2383
2018	73	20	265	0	0	265
2019	380	131	1747	74	280	2026
2020	111	123	1640	0	0	1640
2021	37	6	80	0	0	80
Average	**197**	**79**	**1054**	**42**	**155**	**1210**

Simulated ASR injection averaged 79 days per year and averaged 1,210 AFY over the 59-year period. However, as previously discussed, Carmel River flows are trending downwards, and this has a significant effect on simulated ASR injection, as shown by the downward long-term trendlines in Figures 3 and 4. This trend for 10-year averages in recent years is shown in **Table 4.** The 10-year average for simulated ASR injection declined 45 percent from a high of 1,624 AFY for the period of 1997-2006 to 868 AFY for the period of 2012-2021

Table 4
Recent 10-Year Averages

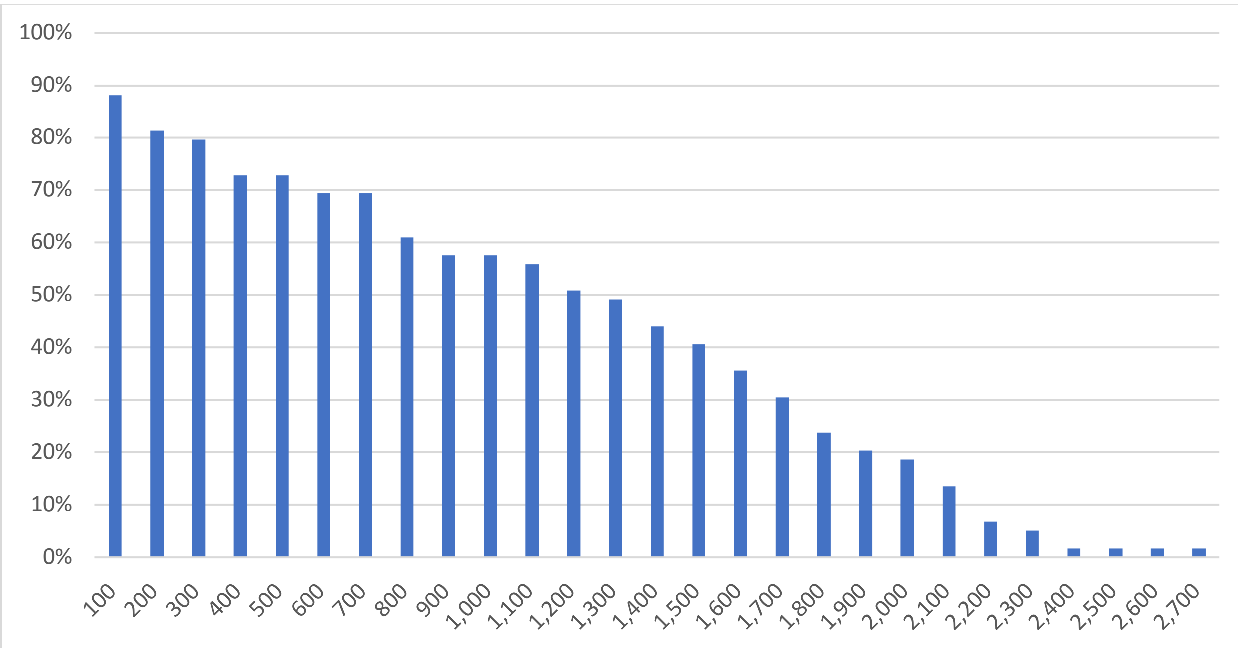
Period (Water Years)	Average Injection Days/Year	Average ASR Injected (AFY) (Simulated)
1992-2001	94	1445
1993-2002	97	1480
1994-2003	100	1513
1995-2004	104	1568
1996-2005	104	1573
1997-2006	107	1624
1998-2007	98	1481
1999-2008	89	1323
2000-2009	82	1233
2001-2010	87	1317
2002-2011	94	1422
2003-2012	89	1361
2004-2013	81	1232
2005-2014	76	1159
2006-2015	63	953
2007-2016	58	865
2008-2017	71	1084
2009-2018	66	1017
2010-2019	74	1140
2011-2020	73	1081
2012-2021	59	868

Figure 5 presents exceedance values for simulated ASR injection amounts over the 59-year period. For example, ASR injection exceeded 100 AFY less than 87 percent of the time in the simulation. Similarly, ASR injection exceeded 1,300 AFY less than 50 percent of the time in the simulation.

ASR Injection Probability Analysis

Figures 2, 3 and 4 demonstrate the highly variable nature of Carmel River flow and the resulting highly variable availability of excess Carmel River water for ASR injection from one year to the next. For example, the highest average flow for any injection season was 960 CFS in WY 1983, and simulated ASR injection would have been 2,840 AF (181 injection days). Four years later, in WY 1987, the Carmel River flows dropped to essentially zero for four consecutive years, and simulated ASR injection would have been zero for all four years.

Figure 5 - Historic Percent Exceedance of Simulated ASR Injection



Based on historical stream flows, the simulation results presented in Table 3 and Figures 3, 4, and 5, the probability that Carmel River flows and ASR injection will be zero is 12 percent (seven occurrences in 59 years) for any given year in the future. Similarly, the probability that ASR injection will be equal to or less than 200 AF is 20 percent (12 occurrences in 59 years) in any given year.

Similarly, probabilities can be developed for ASR injection over any given multiple-year period. For example, the 59-year record includes 55 consecutive five-year periods (1963-1967, 1964-1968, etc.). The simulated average injection days and simulated average injection amounts for each of the 55 five-year periods are presented in **Table 5.**

Table 5
Five-Year ASR Injection Averages (Simulated)

5- Year Period		Average Injection	Average Injection		5- Year Period		Average Injection	Average Injection
From	To	Days/Year	(AFY)		From	To	Days/Year	(AFY)
1963	1967	88	1315		1991	1995	63	969
1964	1968	66	974		1992	1996	78	1210
1965	1969	85	1299		1993	1997	94	1446
1966	1970	83	1271		1994	1998	104	1620
1967	1971	86	1318		1995	1999	124	1924
1968	1972	60	902		1996	2000	113	1749
1969	1973	83	1289		1997	2001	110	1679
1970	1974	89	1350		1998	2002	100	1514
1971	1975	93	1449		1999	2003	95	1406
1972	1976	79	1245		2000	2004	83	1212
1973	1977	76	1215		2001	2005	94	1396
1974	1978	81	1278		2002	2006	104	1570
1975	1979	73	1169		2003	2007	96	1448
1976	1980	79	1260		2004	2008	82	1240
1977	1981	95	1490		2005	2009	82	1254
1978	1982	127	2008		2006	2010	81	1238
1979	1983	135	2103		2007	2011	83	1273
1980	1984	136	2088		2008	2012	83	1275
1981	1985	116	1749		2009	2013	80	1225
1982	1986	120	1825		2010	2014	69	1064
1983	1987	87	1307		2011	2015	45	668
1984	1988	50	739		2012	2016	32	457
1985	1989	27	407		2013	2017	59	894
1986	1990	19	306		2014	2018	53	810
1987	1991	5	61		2015	2019	79	1215
1988	1992	10	151		2016	2020	100	1493
1989	1993	31	480		2017	2021	85	1279
1990	1994	34	517					

ASR Reliability Assessment

The reliability of any supply element in a supply portfolio is measured by the amount of water that can be reliably secured from that supply element. For 7 of the last 59 water years, Carmel River flows during the December-May injection season were negligible, and diversions of excess Carmel River water for injection in the Seaside Groundwater Basin would have been negligible. This suggests a 12 percent probability that ASR injection could be negligible, and that CAW cannot reasonably rely on having ASR injection **for any given year.**

Using the results shown in Table 5, the following are the probabilities for any given **five-year period** in the future:

- The probability that the five-year ASR injection average will be less than 240 AFY is approximately five percent. In other words, with **95 percent reliability**, CAW can expect that the five-year ASR injection average will exceed **240 AFY**.
- The probability that the five-year ASR injection average will be less than 470 AFY is approximately ten percent. In other words, with **90 percent reliability**, CAW can expect that the five-year ASR injection average will exceed **470 AFY**.

All other supply elements in CAW's portfolio are fixed, whereas the ASR supply element is highly variable. If ASR supply in any given year is low, CAW does not have the ability to increase its other supplies to make up for the shortfall. Therefore, it is very important to know how much consistent ASR supply can be relied upon and whether that ASR supply provides enough water to meet customer demand.

CAW's maximum potential firm supply, excluding ASR, is approximately 10,000 AFY. The demand projections presented in the 2020 Urban Water Management Plan (UWMP) for years 2025, 2030, 2035 and 2040 are presented in **Table 6** along with 5-year average values for periods 2026-2030, 2031-2035 and 2036-2040.

Table 6
Demand Projections (From 2020 UWMP)

Planning Period	UWMP Demand for Last Year of Period (AFY)	Average UWMP Demand During Period (AFY)
2025	10,440	10,440
2026-2030	11,880	11,300
2031-2035	12,470	12,230
2036-2040	13,060	12,820

As shown in Table 6, the projected demand exceeds the firm supply, and the deficit would have to be covered by ASR. The deficit for each planning period is presented in **Table 7** along with the confidence levels that ASR can meet the deficits. As shown, there is only a 39 percent probability that ASR will be able to supply the approximately 1,300 AFY necessary to meet demand between 2026 and 2030. Further, there is virtually no chance that ASR can make up demand shortfalls beyond 2030.

Table 7
Demand Deficits and ASR Supply Confidence Levels

Planning Period	Average UWMP Demand During Period (AFY)	Firm Supply Excluding ASR (AFY)	Average Deficit (AFY)	Confidence Level that ASR Supply Will Meet Deficit
2026-2030	11,300	10,000	1,300	39%
2031-2035	12,230	10,000	2,230	0%
2036-2040	12,820	10,000	2,820	0%

Conclusions

1. Due to limitations on the maximum capacity of the Crest Pipeline and deliveries to customers from the Crest Pipeline, injection into the ASR wells is limited to approximately 8.6 CFS or approximately 17 AFD.

2. Diversions from the Carmel River for ASR injection are limited to those times when stream flows meet the minimum bypass requirements of SWRCB Permits 20808A and 20808C. Over the last 59 years, the number of days that would have qualified for injection averaged 79 days but ranged from zero (seven of the 59 years) to 181 days (once, in 1983). Simulated ASR injection averaged 1,210 AFY but ranged from zero (seven of the 59 years) to 2,840 AF (in 1983).

3. For 7 of the last 59 water years, Carmel River flows during the December-May injection season were negligible, and diversions of excess Carmel River water for injection in the Seaside Groundwater Basin would have been negligible. This suggests a 12 percent probability that ASR injection could be negligible, and that CAW cannot rely upon ASR injection for any given future year.

4. For any five-year period in the future, CAW can expect that the five-year ASR injection average will exceed 240 AFY with 95 percent reliability, and 470 AFY with 90 percent reliability.

5. CAW's maximum potential supply sources, without ASR, will not be able to reliably meet the projected future demands of the 2020 UWMP**.** The average deficit for the five-year period 2026-2030 is approximately 1,300 AFY and the probability that ASR can meet this deficit is 39 percent. The average deficit for the five-year period 2031-2035 is approximately 2,230 AFY and the average deficit for the five-year period 2036-2040 is approximately 2,820 AFY. There is virtually no chance that the five-year average ASR injection can meet either one of these deficits.