

**Lower Mokelumne River Project
FERC Project No. 2916**

2023 Project Operations Report



EAST BAY MUNICIPAL UTILITY DISTRICT

**Submitted to the Federal Energy Regulatory Commission in
Compliance with Ordering Paragraph (C) of the November 27, 1998
Order Approving Settlement Agreement and Amending License**

February 2024

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ABBREVIATIONS

AFRP	Anadromous Fish Restoration Program
AOP	Annual Operations Plan
CAMP	Comprehensive Assessment and Monitoring Program
CBDA	California Bay Delta Authority
CDFW	California Department of Fish and Wildlife
CFS	Cubic Feet Per Second
CVPIA	Central Valley Project Improvement Act
CWT	Coded Wire Tag
DCC	Delta Cross Channel
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utility District
FERC	Federal Energy Regulatory Commission
HOS	Hypolimnetic Oxygenation System
JSA	Joint Settlement Agreement
LMRMP	Lower Mokelumne River Management Plan
LMRSP	Lower Mokelumne River Stewardship Program
LWWC	Lodi-Woodbridge Winegrape Commission
MRA	Mokelumne River Association
MRDUA	Mokelumne River Day Use Area
MRFH	Mokelumne River Fish Hatchery
MRTAC	Mokelumne River Technical Advisory Committee
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System Permit
PCC	Partnership Coordinating Committee
PSC	Partnership Steering Committee
SAFCA	Sacramento Area Flood Control Agency
SCWA	Sacramento County Water Agency
SJCOG	San Joaquin Council of Governments
SJCRCDD	San Joaquin County Resource Conservation District
SWRCB	State Water Resources Control Board
TNC	The Nature Conservancy
USFWS	United States Fish and Wildlife Service
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
WID	Woodbridge Irrigation District
WQRMP	Water Quality and Resource Management Program

I. PURPOSE AND SCOPE

This report is submitted to the Federal Energy Regulatory Commission (FERC) in compliance with Ordering Paragraph (C) of the FERC’s November 27, 1998 Order Approving Settlement Agreement and Amending License (FERC Order), which provides:

“On February 15 of each year, the licensee shall file a report describing all measures completed pursuant to the Settlement during the previous calendar year, and actions proposed to be completed during the then-current calendar year.”

In this report, “Settlement Agreement” refers to the March 23, 1998 Joint Settlement Agreement (JSA) among the East Bay Municipal Utility District (EBMUD), the United States Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW), while “License” refers to the license for EBMUD’s Lower Mokelumne River Project, FERC Project No. 2916.

This report summarizes the measures EBMUD implemented in the previous calendar year (2023), and those that it plans to implement in the current calendar year (2024), pursuant to the JSA, to protect and enhance the fishery resources and ecosystem of the lower Mokelumne River.

II. INTRODUCTION

This submittal is EBMUD’s Project Operations Update Report¹ for 2023. EBMUD actions in 2023 were designed to improve water quality, flow regimes, and physical habitat in the lower Mokelumne River area for the benefit of the river’s anadromous and resident fish populations, the riparian zone, associated uplands, and recreational angling. In 1993, EBMUD began voluntarily releasing flows consistent with the Lower Mokelumne River Management Plan (LMRMP), and in March 1996, voluntarily began releasing flows to the lower Mokelumne River consistent with the flow requirements of the then proposed JSA. As part of EBMUD’s implementation of the JSA and FERC Order, EBMUD continues to release flows consistent with the requirements of the JSA.

Additional efforts to improve the health of the river ecosystem have been implemented through the Water Quality and Resource Management Program (WQRMP). This program, developed by the Partnership Steering Committee (PSC) consisting of representatives from EBMUD, CDFW, and USFWS, in cooperation with NOAA Fisheries and the Mokelumne River Technical Advisory Committee (MRTAC) members, and in accordance with

¹ EBMUD submitted earlier Project Operations Reports to FERC prior to the JSA (for the years 1990-94, 1995-96) and after the JSA (for the years 1997-1998 through 2022).

Sections E.3, F.5, and H.5 of the JSA, was approved by FERC on May 9, 2001. The WQRMP includes a comprehensive monitoring and applied research program integrated with a well-coordinated program to adaptively manage water and power supply operations, flood control, hatchery operations, and ecosystem rehabilitation actions. The PSC oversees the implementation of the measures identified in the JSA and the WQRMP.

This report is composed of five sections:

- Section I describes the purpose and scope of EBMUD’s Project Operations Update Report.
- Section II is an introduction to the report.
- Section III contains current and past data on the status of the lower Mokelumne River salmon populations, including escapement data, redd counts, and outmigration.
- Section IV covers six key areas in which EBMUD and the JSA partners have made efforts to restore, enhance, and protect the fisheries resource and ecosystem of the lower Mokelumne River. These areas are Flow, Water Quality, Lower Mokelumne River Partnership, Mokelumne River Technical Cooperation, Research and Monitoring, and Habitat Improvements. This section also describes efforts made during the 2023 calendar year and efforts planned for 2024.
- Section V contains the appendices.

III. STATUS OF THE LOWER MOKELUMNE RIVER SALMON POPULATION

Through the 1990s and into Brood Year 2023, the lower Mokelumne River Chinook salmon population continues to demonstrate characteristics consistent with long-term sustainability. As of January 2, 2024, the Mokelumne River fall-run Chinook salmon escapement for Brood Year 2023 was 28,665 (Table 1 and Figure 1). EBMUD and Woodbridge Irrigation District (WID) continue to work cooperatively in managing operations to maximize the accuracy of monitoring systems.

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Table 1: Lower Mokelumne River Fall-Run Chinook Salmon Data, 1989–2023

Year	Outmigration		Total Escapement ¹	Hatchery Returns ²	Natural Spawners	Percent Natural Spawners of Total	Number of Redds
	Fry	Smolts					
1989	no data	no data	280	81	199	71	no data
1990	See note 3	78,179	497	68	429	86	71
1991	See note 3	31,025	410	42	368	90	127
1992	See note 3	69,993	1,645	710	935	57	345
1993	11,006	172,442	3,157	2,164	993	31	530
1994	554	142,670	3,157	1,919	1,238	39	777
1995	260,103	174,103	5,517	3,323	2,194	40	888
1996	103,270	80,744	7,921	3,883	4,038	51	929
1997	405,350	135,116	10,175	6,494	3,681	36	1,325
1998	1,336,768	511,771	7,213	3,091	4,122	57	1,116
1999	1,232,958	302,481	5,333	3,150	2,183	41	627
2000	107,134	61,391	7,423	5,450	1,973	27	987
2001	37,754	81,580	8,035	5,728	2,307	29	843
2002	11,791	66,132	10,753	7,913	2,840	26	848
2003	8,297	132,174	10,239	8,117	2,122	21	807
2004	45,467	42,187	11,944	10,356	1,588	13	835
2005	197,390	235,484	15,969	5,563	10,406	65	2,170
2006	1,008,289	179,264	5,871	4,139	1,732	30	755
2007	10,349	29,278	1,521	1,051	470	31	306
2008	1,835	16,512	412	239	173	42	63
2009	960	29,654	2,250	1,553	697	31	248
2010	4,243	63,106	7,196	5,275	1,921	27	314*
2011	228,829	52,288	18,596	15,922	2,674	14	564
2012	13,888	38,049	12,091	6,556	5,535	46	1,287
2013	49,102	98,488	12,252	5,170	7,082	58	1,823
2014	15,764	154,100	12,117	8,817	3,300	27	909
2015	12,599	48,707	12,879	8,295	4,584	36	1,357
2016	7,182	127,411	8,871	6,887	1,984	22	405*
2017	261,209	209,696	19,963	14,319	5,644	28	1,255
2018	10,569	29,548	17,475	7,280	10,195	58	2,432
2019	2,669,037	130,172	12,870	8,509	4,361	34	1,051
2020	3,672	20,427	4,044	3,443	601	15	290
2021	21,349	60,791	5,043	4,217	826	16	371
2022	3,882	57,533	6,935	5,014	1,921	28	849
2023 ⁴	60,557	123,685	28,665	9,866	18,799	66	4,953

Notes:

1. Escapement monitoring generally occurs from August through January, but dates vary each year.
2. Hatchery Returns: count by CDFW at the Mokelumne River Fish Hatchery.
3. Estimates were not segregated into fry and smolts.
4. The data for the most recent year may change as estimates are finalized and new information is analyzed.

* Redd survey incomplete due to high flows

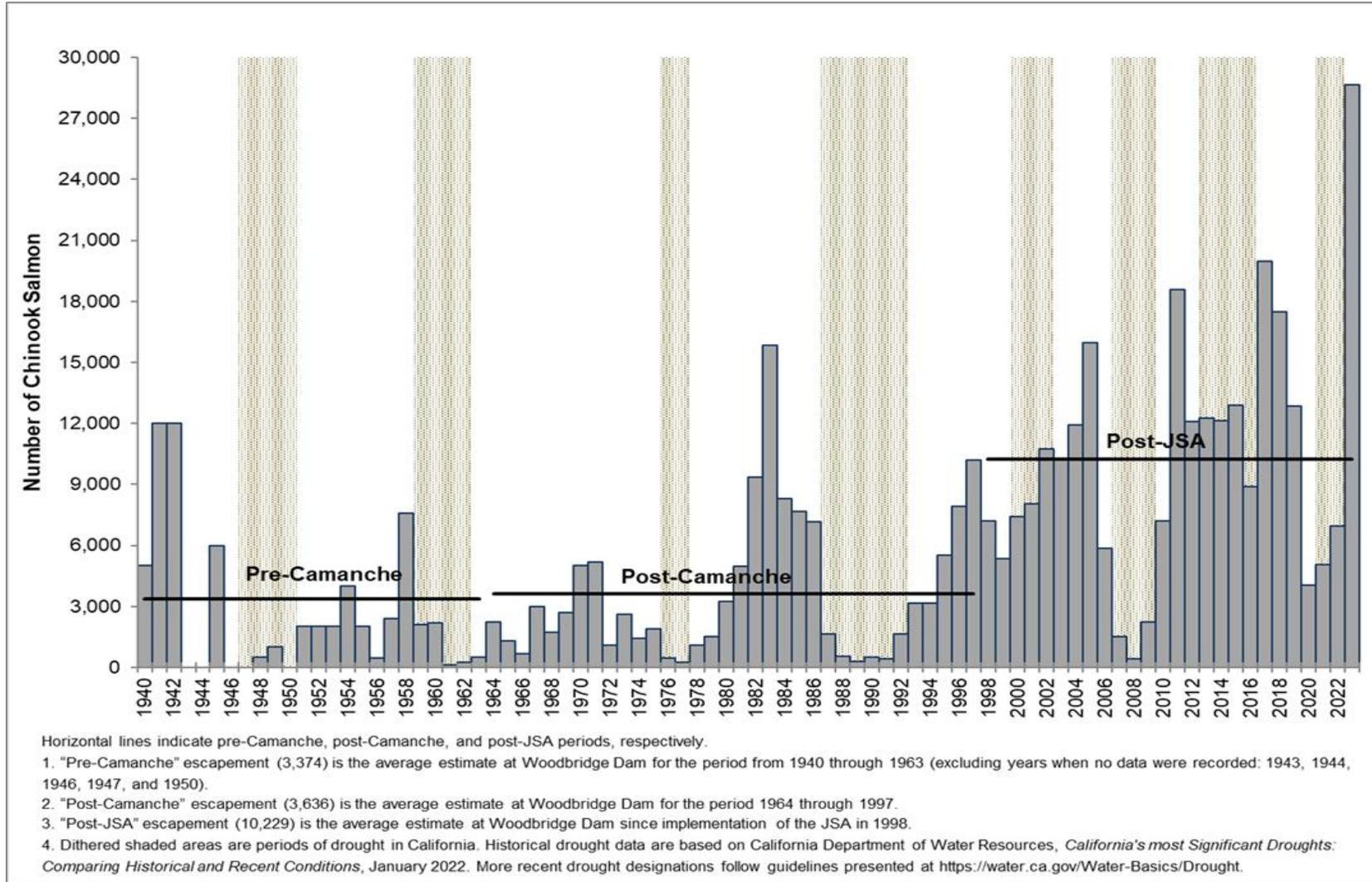


Figure 1: Estimated Annual Spawning Escapement of Fall-Run Chinook Salmon in the Lower Mokelumne River, 1940–2023

Nine of the past thirteen years have seen run sizes of over 10,000 adult salmon returning to the Mokelumne River, including the highest three returns in 2011, 2017, and 2023. The trend of above average returns is indicative of positive response to the management actions implemented during 2009–2023.

Despite having been mired in a multi-year drought and associated flow regimes, along with deteriorating ocean conditions, the lower Mokelumne River Chinook salmon population continues to demonstrate characteristics consistent with long-term sustainability. In fact, the Mokelumne produces one of the few salmon populations nearing the natural production doubling goal relative to baseline 1967–1991 levels established by the USFWS Anadromous Fish Restoration Program (AFRP) through the 1992 Central Valley Project Improvement Act (CVPIA). The AFRP-established doubling goal for the Mokelumne is 9,300, while the river’s 1992–2015 average natural production was 8,976 as of the last official AFRP update published in 2016. This represents a higher percentage of attainment (97%) for the Mokelumne River than any other Central Valley river salmon population.

Demonstrating EBMUD’s organizational commitment to improving conditions for salmon and steelhead in the lower Mokelumne, the 2023 Mokelumne River salmon escapement was the most successful return in more than 80 years, the highest count since record keeping began in 1940. When the season is complete and the full dataset is available, EBMUD staff will determine which strategies contributed most to the success on the Mokelumne, given some Central Valley rivers are experiencing low returns. Factors that may have contributed to the success of 2023 Mokelumne River salmon run include on-going habitat enhancement in the lower Mokelumne River to improve salmonid spawning and rearing, flow management (including pulse attraction flows), hatchery management practices and hatchery facility investments, and the statewide fisheries closure.

Due to the consistently strong runs on the Mokelumne River in recent years, the Mokelumne River Fish Hatchery (MRFH), owned by EBMUD and operated by the California Department of Fish and Wildlife (CDFW), reported in the 2017 MRFH Annual Operations Plan (AOP) that it would continue into the long-term the import ban of eggs originating from other hatcheries whenever possible. Due to the strong salmon run on the Mokelumne and relatively poor returns to the upper Sacramento, three million eggs were transferred from the MRFH to the Coleman National Fish Hatchery, marking a shift in fisheries management where the MRFH was now able to supply eggs to other systems. From October 2023 through January 10, 2024, approximately 18,799 salmon spawned within the river, constructing approximately 4,953 redds (nests) in the 10-mile reach below Camanche Dam (Figure 2). Based on salmon emergence temperature models the peak of Brood Year 2023 fry emergence will occur during the first three weeks of February 2024 and be completed by early April 2024.

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Outmigrating juvenile salmon from Brood Year 2022 were sampled at the beginning of 2023 through spring. The estimated outmigration of juvenile salmon in 2023 was 184,242 (Table 1).

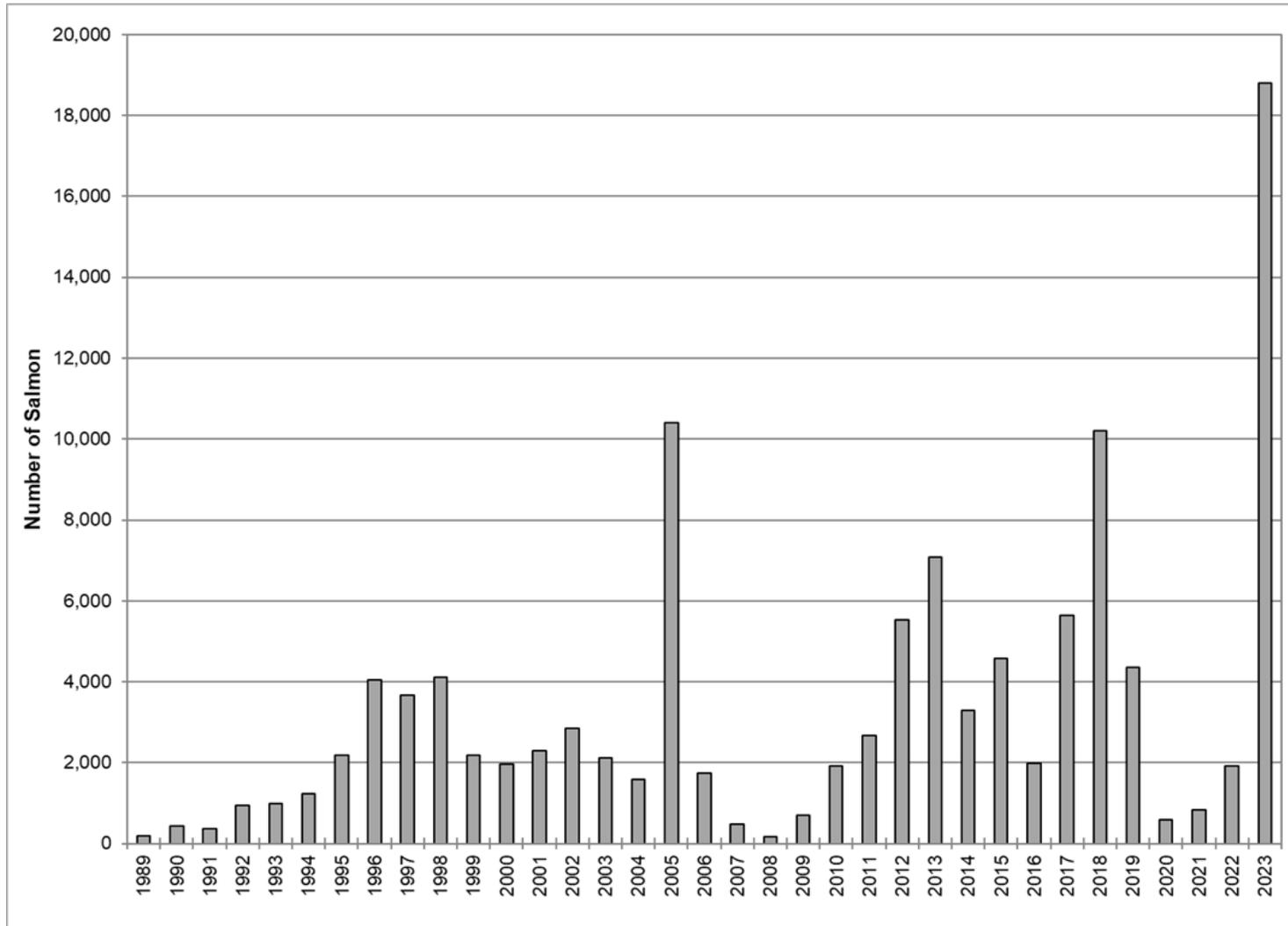


Figure 2: Fall-Run Chinook Salmon Naturally Spawning in the Lower Mokelumne River, 1989–2023

IV. EBMUD EFFORTS TO RESTORE, ENHANCE, AND PROTECT THE FISHERIES RESOURCES AND ECOSYSTEM OF THE LOWER MOKELUMNE RIVER

Responding to drought conditions, increased environmental concerns, and an improved understanding of fishery resource needs on the lower Mokelumne River, in 1987 EBMUD began to develop a multifaceted plan to protect and enhance the fishery and riparian resources of the lower Mokelumne River. This plan, known as the Lower Mokelumne River Management Plan (LMRMP), was developed over five years and was voluntarily implemented by EBMUD beginning in 1993. The 1998 Joint Settlement Agreement (JSA) incorporates the knowledge gained through the development of the LMRMP and contains additional actions to protect the lower Mokelumne River resource beyond those already undertaken by EBMUD under the LMRMP. Actions taken by EBMUD in 2023, and those actions planned for 2024, are described in this section.

A. FLOW

Consultation with CDFW and USFWS, on a real-time basis, began during the 1992–1993 salmon run with voluntary flow releases consistent with the LMRMP; real-time consultation has continued since that time. In March 1996, EBMUD voluntarily began releasing flows to the lower Mokelumne River consistent with the flow requirements of the JSA. The 2023 releases to the lower Mokelumne River are summarized in this section.

1. Source of Flow Data

EBMUD owns and operates the gaging stations below Woodbridge Dam and below Camanche Dam and measures the flow in accordance with United States Geological Survey (USGS) stream gaging procedures. Releases were measured at Camanche Dam using its Accusonic flow meters. The flow data is verified by USGS staff annually and subsequently published in the USGS Water Data Reports, approximately one to two years later. Because of the delay between when flow data are collected and subsequently published in the USGS Water Data Reports, the 2023 flow data included in this report have not yet been verified or published by the USGS and are considered provisional.

2. Flow Releases follow JSA Year Types per SWRCB D-1641

On December 29, 1999, the State Water Resources Control Board (SWRCB) issued Water Right Decision 1641 (D-1641), a decision involving numerous parties throughout the Central Valley. Among other regulatory changes, D-1641 modified water rights on the Mokelumne River, significantly increasing assurances that operations under the JSA will provide the expected flows below Woodbridge Dam. D-1641, which was re-confirmed by the SWRCB's Water Right Order 2000-2 on March 15, 2000, modified the water rights of

both EBMUD and the Woodbridge Irrigation District (WID). It conforms EBMUD’s water rights to the FERC-approved JSA flow requirements and requires WID to curtail its diversions at Woodbridge Dam that exceed its Permanent Regulated Base Supply entitlement released from Camanche Dam under its 1965 Agreement with EBMUD to ensure that the expected JSA flows are met below Woodbridge Diversion Dam.

JSA Year Type

In accordance with the November 27, 1998 FERC approval of the JSA and based upon EBMUD’s end of September forecast of total Pardee and Camanche Reservoir storage on November 5, 2022², EBMUD provided “Dry” JSA water year type Camanche dam flow releases from October 1, 2022 through March 31, 2023.

Based on the California Department of Water Resources (DWR) April 1, 2023 forecast of 1,590,000 acre-feet of unimpaired runoff into Pardee Reservoir, EBMUD operated under a “Normal and Above” JSA water year type for Camanche Dam flow releases from April 1, 2023 through September 30, 2023. Actual runoff for Water Year 2023 was 1,485,000 acre-feet. EBMUD is making, at a minimum, “Normal and Above” JSA water year type Camanche Dam flow releases from October 1, 2023 through March 31, 2024. This is based on EBMUD’s total Pardee and Camanche Reservoir storage on November 5, 2023³.

3. Adaptive Management & Pulse Flow Operations

The JSA contains an adaptive management provision related to minimum flows. The flow schedule may be changed to optimize fishery habitat and other ecosystem values as long as the total quantity of water released in any given year will not be less than the quantity of water provided by the flow requirements for that type of year. In 2023, because water year conditions were wet; EBMUD maintained Camanche releases in excess of the JSA minimum flows in the winter, spring, summer, and fall (including the pulse flows during operations in the fall, as described in the section below). Due to the wet conditions, no adaptive management, pursuant to Condition 5 of D-1641, was performed in 2023.

The fall pulse attraction flows were a result of successful collaboration between several different agencies and stakeholders, primarily through the Partnership Coordinating Committee (PCC). The EBMUD Fisheries and Wildlife Division closely coordinated with the PCC to manage these necessary releases so that they could be used to provide fish attraction pulse flows, with a goal of maximizing returns to the Mokelumne River by reducing straying of Mokelumne-origin salmon to other systems. Each pulse resulted in an increase in salmon numbers entering the Mokelumne River (see Figure 5).

² Pardee and Camanche Reservoir actual total storage on November 5, 2022 was 390,900 acre-feet.

³ Actual Pardee and Camanche reservoir storage on November 5, 2023 was 500,320 acre-feet.

Water for 2023 pulse flows came from shaping flood control releases to support the Lower Mokelumne fishery. Six pulses were planned for September and October. The first pulse had a peak flow of 1,540 cubic feet per second (cfs), the second through fifth pulses each peaked at 1,700, and the sixth pulse had a peak flow of 1,500 cfs, while the base flow between pulse events was increased to 440 cfs between the first and second pulse and increased to 500 cfs between the remaining pulses.

4. Coordination with PCC

As further described in the Adaptive Management and Pulse Flow Operations sections of this report, EBMUD’s 2023 flow operations included close coordination with the PCC and EBMUD’s Fisheries and Wildlife Division to shape necessary flood control releases in the form of pulses for salmon attraction and the up-migration. In general, pulse flows are credited with helping improve the salmon returns to the Mokelumne through reduced straying to other systems.

5. Summary of Flow Releases

Calendar year 2023 actual Camanche Dam average daily flow releases and JSA agreed flow releases from Camanche Dam are shown in Table 2 and Figure 3. JSA agreed releases represent JSA minimum releases with any approved JSA Adaptive Management flow reductions. Provisional fifteen-minute flow readings indicated no temporary excursions from agreed release below Camanche. The average daily flows below Camanche Dam did not fall below the required minimum daily flow. Calendar year 2023 actual average daily flows and expected JSA flows below Woodbridge Dam are shown in Table 3 and Figure 4. Provisional fifteen-minute flow readings indicated no temporary excursions and no deviations from expected minimum flows below Woodbridge Dam. The average daily flows below Woodbridge Dam did not fall below the required minimum daily flow.

EBMUD will continue to coordinate with WID to share information and data as it becomes available to make best faith efforts to continue to operate to meet JSA expected daily flows.

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Table 2: Calendar Year 2023 Average Daily Release in Cubic Feet per Second from Camanche Dam

Year 2023	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	Actual Camanche Release	JSA Agreed Release																						
1	225	220	1400	220	603	220	4000	525	4000	325	2500	525	1300	100	984	100	902	100	440	325	798	325	330	325
2	606	220	1400	220	600	220	4000	525	3770	325	2500	525	1300	100	802	100	900	100	440	325	1300	325	329	325
3	1450	220	1400	220	774	220	4000	525	3500	325	2500	525	1300	100	700	100	900	100	440	325	1300	325	330	325
4	2000	220	1400	220	899	220	4000	525	3500	325	2510	525	1300	100	700	100	901	100	789	325	926	325	331	325
5	2220	220	1400	220	900	220	4000	525	3500	325	2510	525	1540	100	701	100	920	100	1420	325	521	325	331	325
6	2760	220	1400	220	1070	220	4000	525	3500	325	2500	525	1880	100	700	100	1120	100	1530	325	331	325	330	325
7	3260	220	1400	220	1540	220	4000	525	3500	325	2500	525	2000	100	746	100	1350	100	1230	325	331	325	330	325
8	3500	220	1400	220	1940	220	4000	525	3490	325	2500	525	1990	100	800	100	1200	100	924	325	332	325	330	325
9	3500	220	1400	220	2340	220	4000	525	3500	325	2500	525	2000	100	801	100	901	100	626	325	333	325	331	325
10	3500	220	1280	220	2790	220	4000	525	3500	325	2500	525	2000	100	800	100	624	100	501	325	333	325	331	325
11	3500	220	1080	220	3290	220	4000	525	3500	325	2500	525	2000	100	800	100	429	100	850	325	330	325	331	325
12	3500	220	1000	220	3500	220	4000	525	3500	325	2500	525	2000	100	800	100	400	100	1450	325	330	325	331	325
13	3500	220	1000	220	3490	220	4000	525	3500	325	2210	525	2000	100	800	100	399	100	1530	325	330	325	330	325
14	3500	220	1000	220	3500	220	4000	525	3500	325	2000	525	2220	100	800	100	433	100	1230	325	330	325	332	325
15	3500	220	1000	220	3510	220	4000	525	3500	325	2000	525	2500	100	801	100	708	100	932	325	330	325	330	325
16	3500	220	1000	220	3710	220	4000	525	3200	325	1880	525	2500	100	800	100	900	100	628	325	331	325	330	325
17	3500	220	881	220	4000	220	4000	525	3000	325	1800	525	2500	100	800	100	900	100	500	325	330	325	330	325
18	3500	220	799	220	4000	220	4000	525	3000	325	1800	525	2500	100	801	100	900	100	854	325	330	325	330	325
19	3510	220	801	220	4000	220	4000	525	3000	325	1800	525	2210	100	805	100	900	100	1450	325	330	325	332	325
20	3510	220	800	220	4000	220	4000	525	3000	325	1800	525	1880	100	801	100	900	100	1530	325	330	325	333	325
21	3510	220	800	220	4010	220	4000	525	3000	325	1800	525	1680	100	818	100	901	100	1230	325	330	325	333	325
22	3500	220	800	220	4010	220	3990	525	3010	325	1680	525	1600	100	804	100	1070	100	925	325	329	325	330	325
23	3500	220	801	220	4000	220	4000	525	3000	325	1480	525	1600	100	801	100	1420	100	626	325	329	325	330	325
24	3250	220	679	220	4000	220	4000	525	3000	325	1280	525	1600	100	800	100	1540	100	501	325	330	325	330	325
25	2750	220	601	220	4020	220	4000	525	3000	325	1080	525	1600	100	801	100	1540	100	855	325	330	325	331	325
26	2250	220	599	220	4270	220	4000	525	3000	325	884	525	1600	100	800	100	1420	100	1460	325	330	325	331	325
27	1900	220	599	220	4020	220	4010	525	2980	325	715	525	1480	100	800	100	1220	100	1530	325	333	325	330	325
28	1800	220	601	220	4010	220	4010	525	3000	325	653	525	1350	100	800	100	1010	100	1230	325	328	325	331	325
29	1800	220			4000	220	4000	525	3000	325	777	525	1300	100	803	100	816	100	929	325	330	325	331	325
30	1730	220			4010	220	4000	525	2710	325	1160	525	1300	100	801	100	566	100	627	325	329	325	332	325
31	1480	220			4010	220			2500	325			1200	100	848	100			500	325			332	325

1. Releases from Camanche Dam in calendar year 2023 were made according to JSA Normal and Above year type Mokelumne River minimum flow schedule, found in Attachment 1 to the JSA. Consistent with Footnote 5 to this flow schedule and based on combined Pardee and Camanche storage levels, releases above that otherwise called for by the schedule were made in April and June, which included an additional 200 cfs.
2. Actual flow data has not yet been verified and published by the U.S. Geological Survey.
3. Flow measured using Accusonic Flowmeter (USGS Gage #11323500 – Mokelumne River below Camanche Dam).

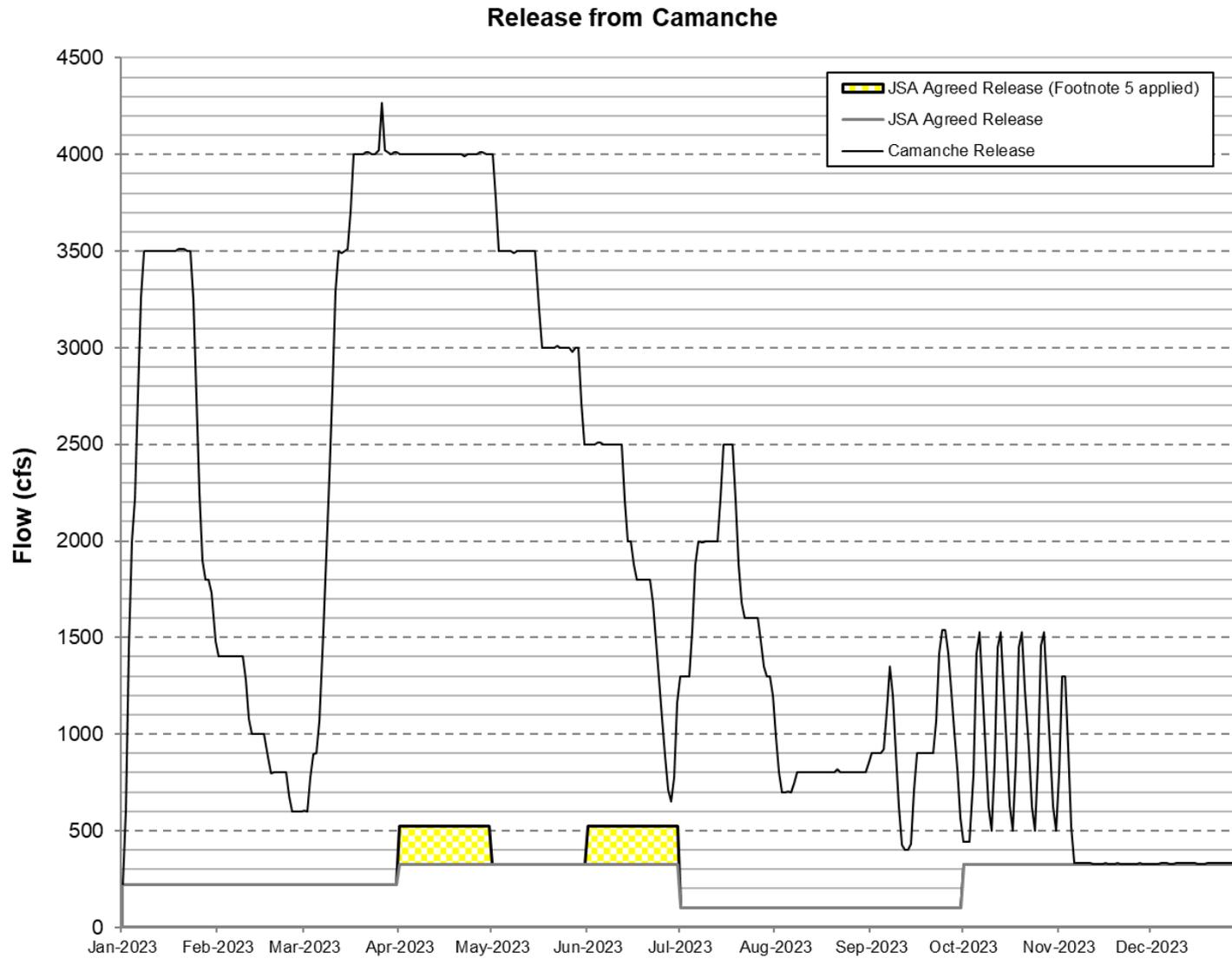


Figure 3: Calendar Year 2023 Average Daily Release in Cubic Feet per Second from Camanche Dam

Lower Mokelumne River Project – FERC Project No. 2916
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Table 3: Calendar Year 2023 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

Year 2023	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Day	Actual Golf Release	JSA Agreed Release																						
1	906	80	1540	80	733	80	3740	150	3670	300	2270	300	1050	25	836	25	579	25	310	100	413	100	237	100
2	401	80	1500	80	687	80	3740	150	3660	300	2270	300	1070	25	653	25	601	25	279	100	810	100	240	100
3	880	80	1490	80	675	80	3730	150	3450	300	2270	300	1070	25	460	25	602	25	257	100	1150	100	238	100
4	1710	80	1490	80	881	80	3730	150	3280	300	2270	300	1080	25	439	25	607	25	309	100	902	100	246	100
5	1940	80	1490	80	932	80	3720	150	3220	300	2270	300	1110	25	435	25	607	25	801	100	568	100	243	100
6	2260	80	1470	80	708	80	3720	150	3240	300	2260	300	1410	25	436	25	673	25	1250	100	284	100	248	100
7	2660	80	1470	80	956	80	3730	150	3230	300	2240	300	1630	25	428	25	923	25	1080	100	225	100	251	100
8	3000	80	1460	80	1530	80	3720	150	3220	300	2230	300	1650	25	475	25	954	25	839	100	212	100	255	100
9	3300	80	1460	80	1920	80	3710	150	3200	300	2220	300	1670	25	484	25	728	25	575	100	215	100	278	100
10	3420	80	1440	80	2410	80	3700	150	3200	300	2220	300	1680	25	491	25	487	25	336	100	215	100	282	100
11	3380	80	1280	80	2720	80	3700	150	3180	300	2220	300	1670	25	479	25	262	25	370	100	215	100	279	100
12	3340	80	1220	80	3040	80	3700	150	3180	300	2220	300	1660	25	471	25	187	25	862	100	215	100	278	100
13	3340	80	1290	80	3170	80	3700	150	3180	300	2170	300	1650	25	469	25	175	25	1290	100	211	100	281	100
14	3490	80	1170	80	3250	80	3700	150	3180	300	1860	300	1670	25	470	25	171	25	1110	100	208	100	275	100
15	3530	80	1110	80	3280	80	3700	150	3160	300	1800	300	1980	25	459	25	285	25	867	100	219	100	271	100
16	3600	80	1090	80	3280	80	3690	150	3140	300	1770	300	2070	25	465	25	567	25	603	100	212	100	269	100
17	3550	80	1060	80	3440	80	3680	150	2850	300	1640	300	2080	25	478	25	606	25	361	100	217	100	273	100
18	3480	80	928	80	3590	80	3690	150	2750	300	1620	300	2080	25	476	25	606	25	400	100	237	100	292	100
19	3460	80	896	80	3680	80	3690	150	2730	300	1610	300	2050	25	492	25	600	25	881	100	215	100	286	100
20	3430	80	888	80	3710	80	3680	150	2720	300	1600	300	1710	25	504	25	597	25	1290	100	220	100	288	100
21	3420	80	883	80	3710	80	3680	150	2730	300	1580	300	1510	25	531	25	604	25	1110	100	223	100	282	100
22	3410	80	870	80	3730	80	3680	150	2720	300	1560	300	1360	25	497	25	623	25	874	100	219	100	274	100
23	3390	80	879	80	3740	80	3670	150	2700	300	1400	300	1350	25	482	25	912	25	605	100	221	100	278	100
24	3410	80	873	80	3730	80	3680	150	2690	300	1230	300	1340	25	469	25	1130	25	368	100	224	100	273	100
25	3130	80	743	80	3720	80	3680	150	2690	300	1060	300	1330	25	475	25	1170	25	401	100	213	100	274	100
26	2650	80	699	80	3820	80	3680	150	2680	300	893	300	1330	25	480	25	1160	25	890	100	219	100	277	100
27	2180	80	715	80	3880	80	3680	150	2680	300	696	300	1290	25	484	25	1020	25	1320	100	227	100	283	100
28	1950	80	737	80	3800	80	3680	150	2700	300	560	300	1140	25	484	25	878	25	1130	100	233	100	279	100
29	1890	80			3800	80	3670	150	2710	300	544	300	1050	25	477	25	715	25	876	100	222	100	286	100
30	1870	80			3770	80	3670	150	2680	300	779	300	1040	25	486	25	542	25	615	100	239	100	317	100
31	1730	80			3750	80			2340	300			1010	25	493	25			380	100			279	100

1. Flow measured at USGS Gage #11325500 - Mokelumne River at Woodbridge.
2. Actual flow data has not yet been verified and published by the U.S. Geological Survey.

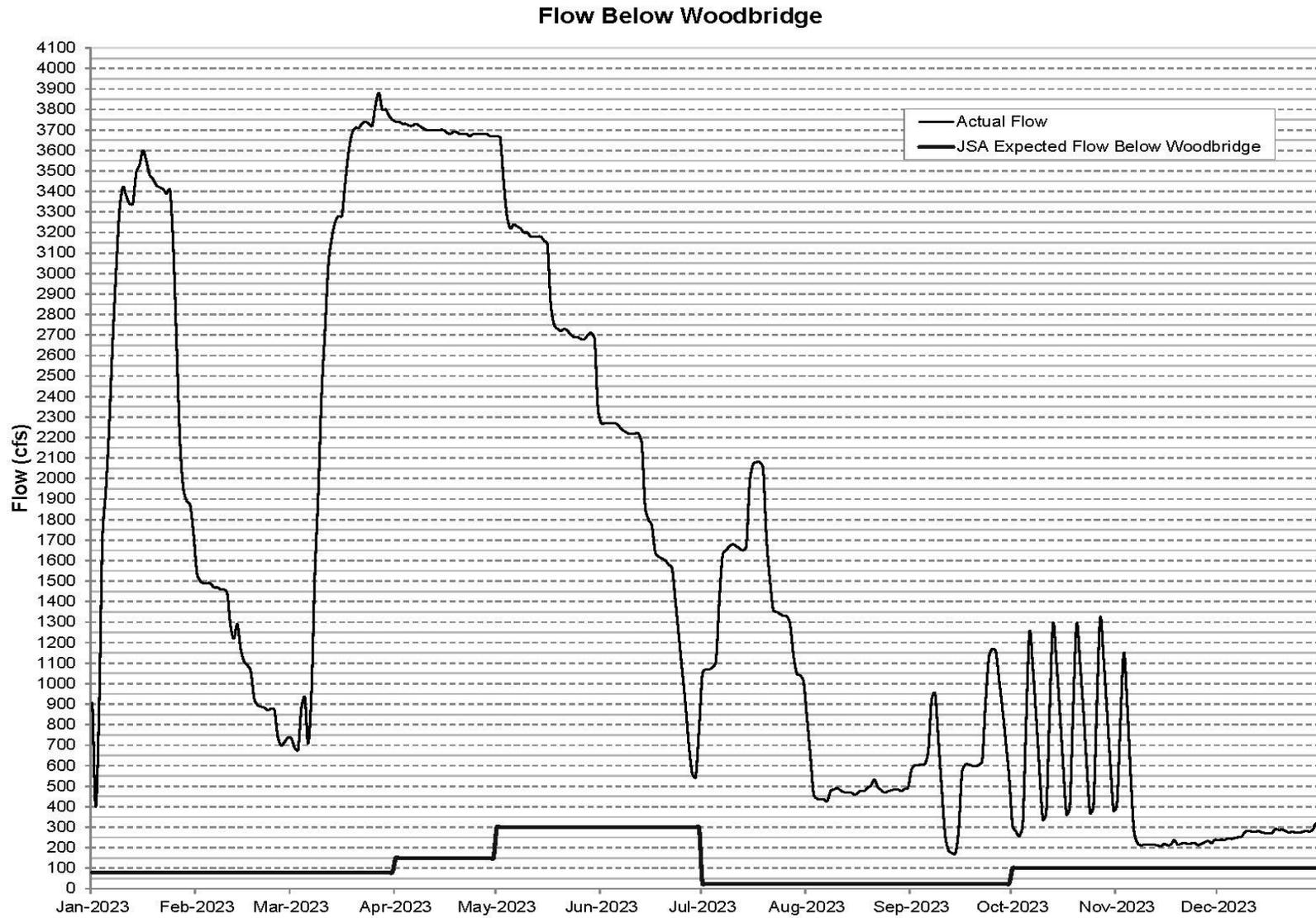


Figure 4: Calendar Year 2023 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

Fish Straying During Up-Migration

Coded Wire Tag (CWT) return data clearly indicate that release locations for hatchery-reared juvenile salmon play a significant role in straying.⁴ In 2007, CDFW released nearly the entire MRFH production in the San Pablo Bay region. While this practice may increase overall survival, it significantly increases straying rates when fish return to spawn. With the MRFH AOP long-term import ban of eggs originating from other hatcheries, the overall impact straying has on Mokelumne returns is significant. In 2023, CDFW continued the practice of releasing the mitigation production in net pens at Sherman Island. Previous return data has indicated that releasing fish at Sherman Island balances the need to increase survival through the Delta while reducing straying (when compared to further downstream release locations) which has led to better returns to the Mokelumne River. Releases occurred during outgoing tides and for not more than two consecutive days in order to improve overall survival by reducing predation on later release groups.

Analysis of return data collected through a 2010 5-year study with the USBR indicated that adaptive management of Mokelumne River pulse flows and Delta Cross Channel (DCC) gate closures during the up-migration period could reduce straying of Mokelumne-origin salmon to the Sacramento River watershed. In October 2019, the 2019 Biological Opinions for the Central Valley Project and California’s State Water Project issued by NOAA under Endangered Species Act Section 7 Consultation proposed to “within 48 hours of start of Lower Mokelumne River attraction flow release, close the Delta Cross Channel gates for up to 5 days (dependent upon continuity of favorable water quality conditions)”. In 2023, the preliminary DCC gate operations log indicated that there were twelve closures between September and November and remained closed following the November 27th closure (Figure 5). Each pulse flow was coordinated with the USBR for parallel DCC gate closures to provide protection from potential straying to the Sacramento River watershed.

In 2023, approximately 21% of up-migrating Mokelumne River hatchery reared salmon strayed to the Sacramento River watershed and 10% strayed to San Joaquin River tributaries, based on preliminary coded wire tag recovery data. The estimated number of strays to the Sacramento River in 2023 was significantly smaller than the estimated stray rate in 2022 (42%). Planned pulse flow events from the Mokelumne River were successful at attracting Mokelumne origin salmon back to their natal stream and contributed to the substantial reduction in the stray rate for the 2023 salmon run. In addition, DCC gate closures beginning in September and extending throughout the duration of the Mokelumne River salmon run helped reduce the rate of Mokelumne origin salmon straying into the Sacramento River watershed. However, many factors continue to play a role in Mokelumne origin salmon stray

⁴ M. Palmer-Zwahlen, and B. Kormos. December 2013. Recovery of Coded-Wire Tags from Chinook Salmon in California’s Central Valley Escapement and Ocean Harvest in 2011. California Department of Fish and Wildlife Fisheries Branch Administrative Report 2013-02.

rates to other Central Valley rivers, albeit at reduced rates in 2023. DCC gate openings still occurred and provided both a flow attraction and pathway for Mokelumne River salmon to stray north. Weekly gate openings could be contributing to continued Mokelumne origin salmon straying north into the Sacramento River watershed. In an effort to reduce straying to San Joaquin tributaries, EBMUD coordinated the timing of pulse flow releases with the Stanislaus, Tuolumne and, Merced Rivers. Differences between Mokelumne River hatchery-origin enhancement and mitigation program salmon may also be contributing to the rates of straying. The enhancement program salmon had higher rates of straying overall and within the Sacramento River watershed. Conversely, the mitigation program salmon had higher straying rates to San Joaquin River tributaries, but at lower rates.

2024 Release Requirements

EBMUD is committed, pursuant to the FERC Order, to “Normal and Above” JSA year type Camanche Dam flow releases through March 31, 2024. In accordance with the stipulation in Attachment 1 of the JSA, EBMUD will determine the JSA water year type which will govern EBMUD’s flow schedule for the period April 1, 2024 through September 30, 2024 based on the DWR forecasted unimpaired runoff into Pardee Reservoir as identified in the April 1, 2024 DWR Bulletin 120. EBMUD will report to the FERC in the February 2024 report on the flow releases made in accordance with the JSA during the entire calendar year 2023. EBMUD will include finalized flow data in an Appendix of the report as it is verified and published by USGS. Refer to Appendix B (Tables B-1 through B-4) for finalized flow data for the 2021 and 2022 calendar years.

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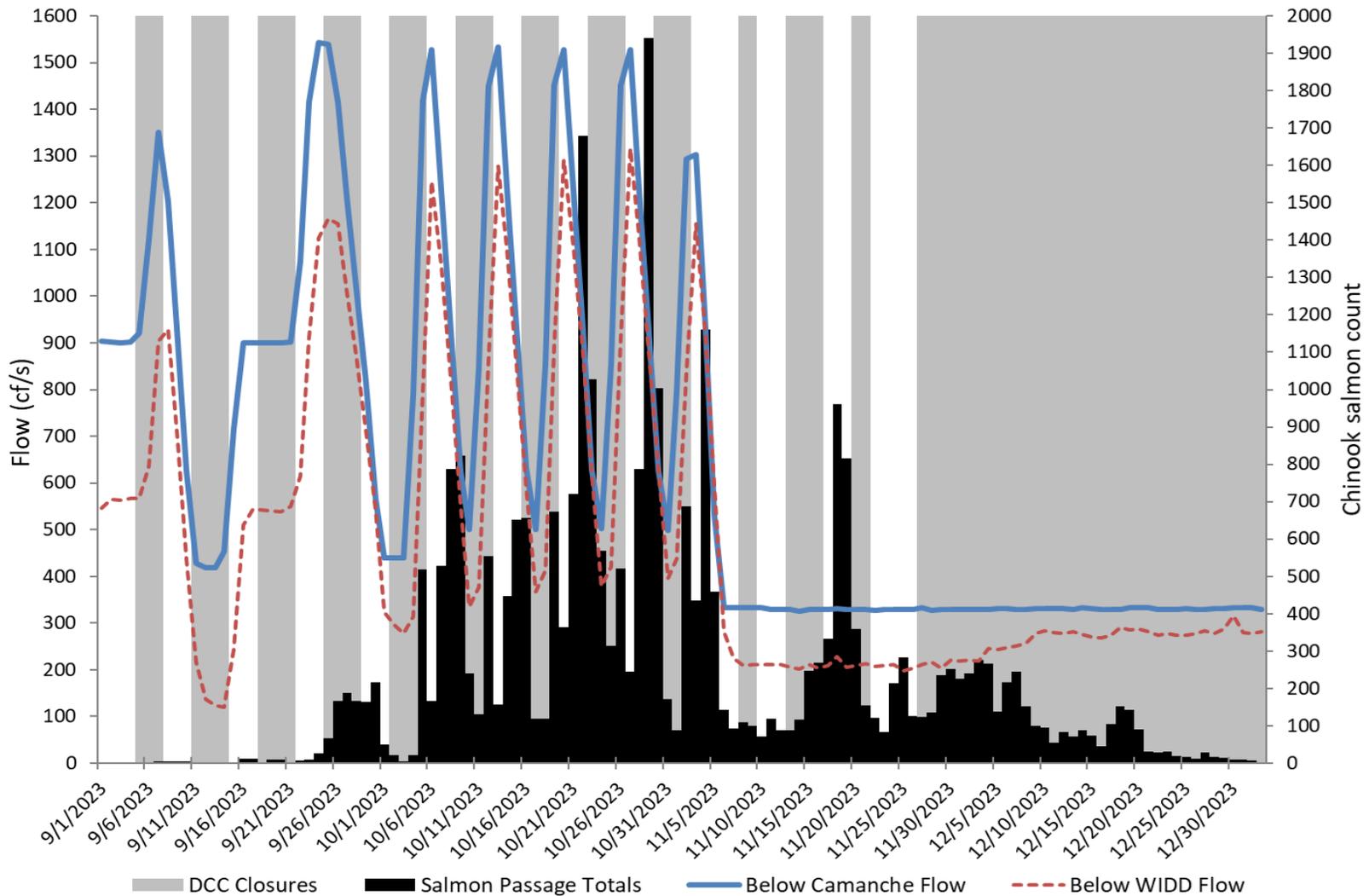


Figure 5: Daily Upstream Passage of Chinook Salmon at Woodbridge Dam Relative to Flow and Delta Cross Channel Closure, October 1, 2022–December 31, 2023

B. WATER QUALITY

Water quality in the MRFH and lower Mokelumne River continues to be actively managed by EBMUD through its extensive data collection and analysis, reservoir operations, and the use of EBMUD's Hypolimnetic Oxygenation System (HOS). Supplemental chillers are used to sustain MRFH water temperatures in the optimal range for egg incubation. Sand filters remove suspended solids from the hatchery water supply. Ultraviolet (UV) disinfection equipment continuously protects against pathogenic organisms. These measures increase fish survival and decrease the need for use of medicated feed or chemical treatment of the water supply and have reduced the effort needed to comply with provisions of the hatchery's National Pollution Discharge Elimination System (NPDES) Permit. The operation of Pardee and Camanche Reservoirs is coordinated to maintain thermal stratification in Camanche Reservoir through October and manage water temperature for native fish in the lower Mokelumne River. The HOS is operated to prevent hydrogen sulfide formation in Camanche Reservoir (the functions of the HOS system are described in Section IV.B.2 of this report).

1. Reservoir Operations

EBMUD has developed and implemented adaptive reservoir operations plans (which include management of cold water in the reservoir; reservoir water quality monitoring; and weekly review of conditions, modeling and forecasting of conditions, and scheduling of operations) that effectively meet the water temperature needs in the MRFH and the lower Mokelumne River. EBMUD manages temperatures in water released from Camanche Reservoir by keeping Camanche Reservoir thermally stratified until its surface waters naturally cool, usually in the fall. To maintain the volume of Camanche Reservoir's hypolimnion, which is needed to keep the reservoir thermally stratified, EBMUD manages the release of cold water available in Pardee Reservoir.

EBMUD's approach to managing the system is based on direct control of the cold water hypolimnion in both Camanche and Pardee Reservoirs. This approach has been developed operationally; incorporating a flexible response to several unique features of the Pardee Reservoir/Camanche Reservoir system and is possible because of extensive monitoring during operation. The operational criteria for reservoir stratification in EBMUD's reservoir operations plan are:

1. Maintain stratification in Camanche Reservoir to the extent feasible from May through October to provide cold water releases to the lower Mokelumne River and the MRFH during the fall.
2. Maintain the stratification in Camanche by scheduling inflows of cold water from Pardee Reservoir, as needed, to replenish the hypolimnion of Camanche Reservoir. Releases from Pardee are normally not necessary for temperature management

from approximately mid-November to April when Camanche Reservoir is cold and de-stratified.

3. Make best efforts to maintain a minimum of 28,000 acre-feet of hypolimnetic volume in Camanche Reservoir through October whenever Pardee Reservoir volume exceeds 100,000 acre-feet.

2023 Temperatures & Hypolimnion Volume

The operational plan used by EBMUD since 1990 has proven effective in maintaining thermal stratification in Camanche Reservoir during Normal and Above, Below Normal, Dry, and Critically Dry JSA water year conditions. Average daily water temperatures in the Mokelumne River resulting from 2023 operations are shown in Figure 6.

From April 1, 2023 through September 30, 2023 EBMUD operated under a “Normal and Above” JSA water year type, with flood control releases in excess of the JSA minimum flows. Consistent with the JSA, EBMUD continued to adaptively manage its reservoir and was successful in maintaining a hypolimnion volume of 28,000 acre-feet in Camanche Reservoir at the end of October by coordinating releases from Pardee Reservoir. EBMUD successfully maintained stratification in Camanche Reservoir. Pardee and Camanche reservoirs were operated to provide cold water releases in the lower Mokelumne River through the critical spawning period from October through December. EBMUD also provided bypass (sluice) flows from Camanche Reservoir to increase dissolved oxygen levels in the lower Mokelumne River when needed during 2023.

2024 Plans for Temperature Management

EBMUD will continue to manage Pardee and Camanche Reservoir operations based on real-time reservoir and riverine conditions. Pursuant to Section H.4 of the JSA, EBMUD will continue to consult with the resource agencies about changes in real-time Lower Mokelumne River Project operations.

2. Hypolimnetic Oxygenation System

EBMUD takes proactive steps to prevent naturally occurring hydrogen sulfide in Camanche Reservoir from entering the river. EBMUD studies found that when pure oxygen is added to Camanche Reservoir's anoxic hypolimnion, hydrogen sulfide production in the oxygenated area is eliminated. In response to these studies, EBMUD designed and installed, and began operating in 1993, a Hypolimnetic Oxygenation System (HOS) to add pure oxygen into the Camanche Reservoir hypolimnion. EBMUD monitors oxidation-reduction potential and dissolved oxygen concentrations in the hypolimnion (at elevation 115 ft.). The annual decision to activate the HOS is based on the dissolved oxygen concentration in the hypolimnion. The HOS is deactivated in anticipation of reservoir

turnover in the fall. The HOS has proven to be very effective in preventing hydrogen sulfide formation in the Camanche Reservoir hypolimnion.

2023 HOS Operations

The HOS was activated from October 12, 2023 through November 21, 2023. The HOS effectively prevented hydrogen sulfide formation in 2023.

2024 Planned HOS Operations

In 2024, EBMUD will continue to operate the HOS to manage the hydrogen sulfide concentrations for the benefit of the Camanche Reservoir, the lower Mokelumne River, and the MRFH.

East Bay Municipal Utility District

HYPLOT V134 Output 01/04/2024

Period 1 Year 01/01/2023 to 01/01/2024

2023

— MCINTIRE Mokelumne River Near 2080.001 Day Mean Water Temp (degC)

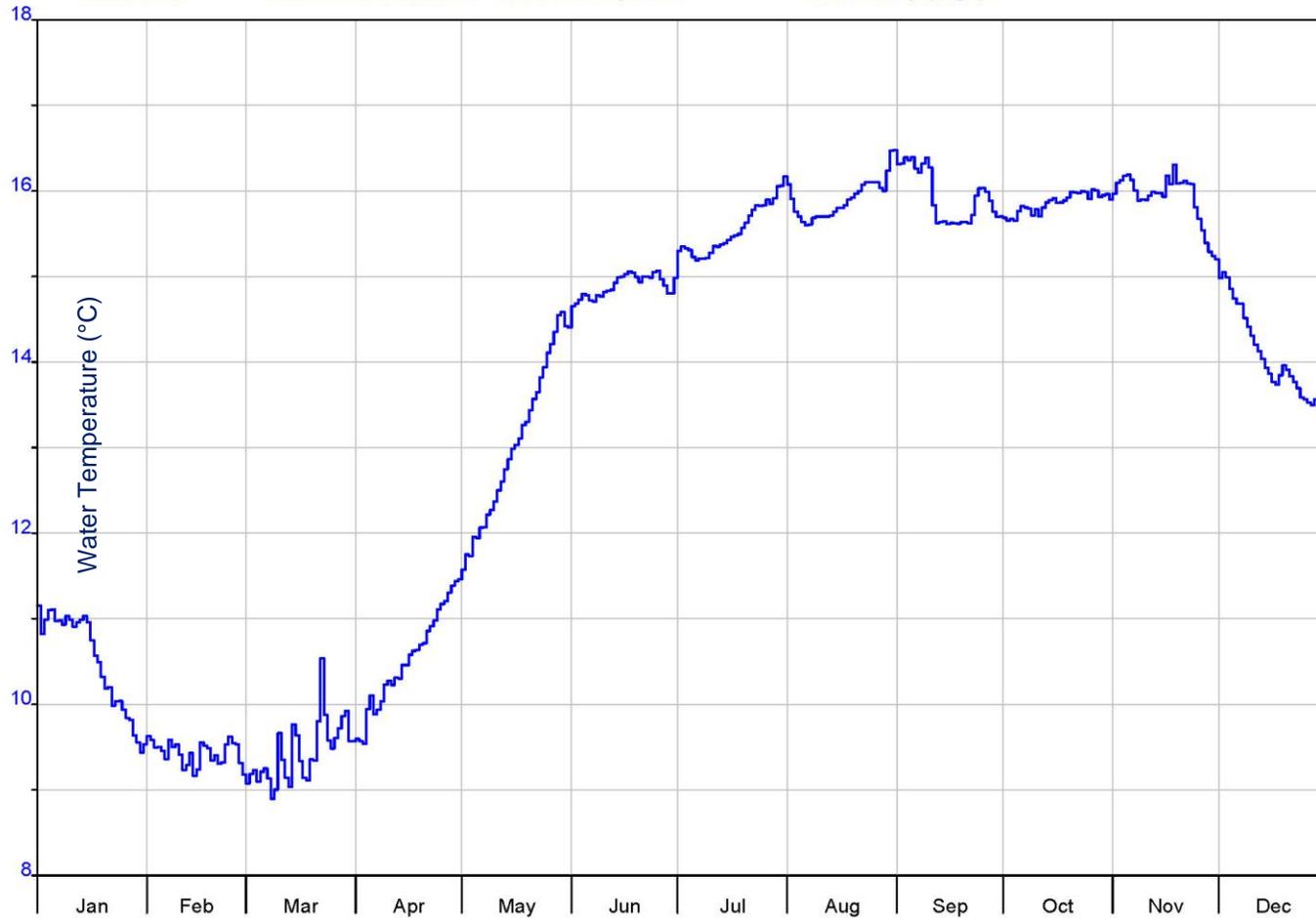


Figure 6: Calendar Year 2023 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam

C. THE LOWER MOKELUMNE RIVER PARTNERSHIP

1. The Partnership Steering Committee

The Partnership Steering Committee (PSC), consisting of representatives from EBMUD, CDFW, and USFWS in cooperation with NOAA Fisheries, met on December 14, 2023. Minutes of the PSC meeting are included in Appendix D. The PSC continued to oversee the operation of the PCC, the technical group of Partnership representatives that meets biannually to ensure timely implementation of the measures identified in the JSA and the Water Quality and Resource Management Program (WQRMP). The PCC met on April 18, 2023 and September 18, 2022. A total of 55 projects have been approved since 1999 for Partnership funding (three were subsequently cancelled by the applicant). See Section IV.C.2 of this report for projects approved for Partnership funding in 2023 and projects with activity in 2023. For recent news articles on Partnership projects and Mokelumne River fisheries, refer to Appendix A.

2. The Partnership Fund

EBMUD established the \$2 million Partnership Fund in 1999, pursuant to Section E.2 of the JSA, to provide support to the Partnership programs. The interest income earned provides operating funds to pay for projects and programs that protect and enhance the lower Mokelumne River ecosystem. Since its inception, the fund has earned \$1,106,815. The available balance, subtracting the funds that have been obligated to approved projects, was approximately \$100,000 as of December 31, 2023.

Projects funded by the PSC with activity in 2023 for ecosystem protection and restoration in the lower Mokelumne River are summarized in Table 4 on the following page.

Table 4: Partnership Fund-Supported Projects 2023 Activity Summary

Project Title	Project Sponsor	Project Description	Partnership Fund			Additional Funding	
			Date Approved by PSC	Anticipated Project Completion	Amount Obligated or Expended	Amount	Program
Integrated Genetic and Phenotypic Analysis of Mokelumne River Hatchery Steelhead	University of California; National Marine Fisheries Service, Southwest Fisheries Science Center	Understand the biological factors impacting steelhead life-history and inform steelhead hatchery brood stock management at the Mokelumne River Fish Hatchery.	3/3/22	Ongoing	\$99,658.00	\$2,536.95	EBMUD Natural Resources Department
Mokelumne Native Grassland Pilot Restoration Project	Lange Twins Winery	Restore native grasslands along Jahant Slough to provide multi-seasonal pollinator habitat; incorporate California native plants and specify local ecotypes; and accommodate for potential seasonal flooding.	2/7/23	Awarded and Completed	\$51,000.00		
2022-23 Lower Mokelumne River Watershed Education Legacy Project	City of Lodi	Watershed study trips for Lodi school students	2/10/23	Awarded and Completed	\$4,725.36		
2023-24 Lower Mokelumne River Watershed Education Legacy Project	City of Lodi	Create watershed walking tours using a mobile app, and watershed educational videos.	12/8/23	Awarded	\$8,800.00		

3. Water Quality and Resource Management Program

The Water Quality and Resource Management Program (WQRMP), developed by the PSC in cooperation with NOAA Fisheries and the Mokelumne River Technical Advisory Committee (MRTAC) members, and in accordance with Sections E.3, F.5, and H.5 of the JSA, was submitted to FERC in June 1999 and approved by FERC on May 9, 2001. The WQRMP vision includes a comprehensive monitoring and applied research program integrated with a well-coordinated program to adaptively manage water and power supply operations, flood control, hatchery operations, and ecosystem rehabilitation actions.

EBMUD, the USFWS, and CDFW began implementing the specific WQRMP measures in 1999. These measures, including the ones implemented in 2023, are described in detail in Section IV.D, Research and Monitoring.

4. Lower Mokelumne River Stakeholders Group

The members and the role of the Lower Mokelumne River Stakeholders Group are specified in Section E.5 of the JSA. These members include public resource agency representatives, private landowners, community and non-profit organizations, and local government staff. At the time the Lower Mokelumne River Stakeholders Group was convened, the Mokelumne/Cosumnes Watershed Alliance (Watershed Alliance) and the Lower Mokelumne Watershed Stewardship Program (Stewardship Program) were already functioning organizations. These two groups' areas of interest overlap geographically and share the same stakeholder base as the Lower Mokelumne River Partnership. To improve effectiveness and to eliminate redundant efforts, the PSC agreed that Partnership representatives would concentrate outreach activities by working directly with the existing Watershed Alliance and the Stewardship Program.

Since 2006, the stakeholder outreach efforts of the Partnership have focused on support and cooperation with the Lower Mokelumne River Watershed Stewardship Group, which is led by a Steering Committee. The Watershed Stewardship Steering Committee meets monthly and includes participation from private landowners, farmers, community groups, local government staff, and agency representatives, including representatives for EBMUD and the Partnership Coordinating Committee (PCC), and the Partnership Fund administrator.

A Lower Mokelumne River Watershed Stewardship Plan (LMRWSP), 2002, was initiated as a proposal to the former CALFED made by the San Joaquin County Resource Conservation District. EBMUD was a key contributor to this proposal, coordinating the implementation and participating in the biological monitoring necessary to complete the proposal. The Plan is available at <http://sjcred.com/articles/MokP.htm>.

During 2023, EBMUD and the Partnership continued as regular participants in the work of the Watershed Stewardship Steering Committee to implement elements of the LMRWSP. The Watershed Stewardship Steering Committee continued to work towards increasing watershed stewardship awareness among urban landowners along the Mokelumne River and elsewhere in the watershed through the distribution of the updated LMRSP *Mokelumne River Watershed Owner's Manual* and researching grant opportunities that would support the implementation of the Lower Mokelumne River Watershed Stewardship Plan. The Owner's Manual can be obtained by contacting the San Joaquin County Resource Conservation District.

Additional activities during 2023 of the Watershed Steering Committee included:

- Monthly LMRWSC meetings that allow communication between landowners, League of Women Voters, SJC representative, county and city agencies, and growers. The meetings have benefited most participants, especially the San Joaquin County Public Works Agency, whose task for Sustainable Groundwater Management Act is to connect with actual watershed stakeholders. In 2023, the Committee started holding informational presentations by a variety of stakeholders at the start of most meetings, for the benefit of the members.

5. Additional EBMUD Stakeholder Activities.

EBMUD pursued numerous opportunities to solicit Mokelumne River stakeholder participation independently of, but coordinated with, Partnership activities. Below is a summary of activities in 2023 and plans for 2024.

2023 Stakeholder Activities

Collaborative stakeholder activities that EBMUD representatives were involved with in 2023 included the following:

- CVPIA - Ongoing cooperation with the U.S. Fish and Wildlife Service to implement the Central Valley Project Improvement Act's (CVPIA) Anadromous Fish Restoration Program (AFRP) on the Mokelumne River. The goal of AFRP is to make all reasonable efforts to at least double natural production of anadromous fish in California's Central Valley streams on a long-term, sustainable basis. EBMUD continues to monitor anadromous fish populations in the lower Mokelumne River using AFRP protocols, participates cooperatively in restoration activities through cost sharing, provides scientific data for the analysis of AFRP projects, and supports biological research activities throughout the lower Mokelumne River basin and Sacramento-San Joaquin Delta. In 2023, EBMUD completed actions on one habitat restoration project:

- (1) Maintenance of a 1-mile restoration reach in the lower Mokelumne River included adding 800 yd³ of gravel to the river.

Participation in the CVPIA Science Integration Team has led to the development of a structured decision making (SDM) model for the Central Valley Chinook salmon populations, which is utilized to prioritize CVPIA funded habitat restoration projects. EBMUD staff provided accurate empirical, physical, and biological data that was incorporated into model updates, which continually ensures that the Mokelumne River is fairly represented in the process. EBMUD staff further contributed technical input into the creation of model scenarios, which are critical in ultimately identifying habitat restoration and subsequent funding priorities.

- ITAG - Participation in the Interagency Telemetry Advisory Group (ITAG) and the Enhanced Acoustic Telemetry (EAT) group, which are interagency coordination groups that were formed to support the planning, scheduling, and implementation of coordinated telemetry projects. These groups provide a platform in which members can discuss collaboration between agencies that ensures the successful development, implementation, and performance of telemetry projects. These groups further ensure that the strategic receiver arrays throughout the San Joaquin and Sacramento rivers and Bay-Delta are maintained, operated, and recovered. Lastly, these groups develop and review strategies to further improve coordination amongst agencies and between various telemetry projects.
- UMRAFR - Continuing participation in the Upper Mokelumne River Anadromous Fish Restoration (UMRAFR) Work Group. The workgroup’s mission statement is to “Reestablish a successfully reproducing population of fall-run Chinook salmon and/or Central Valley steelhead in the upper Mokelumne River.” EBMUD staff is participating in the group to provide technical assistance based on sound science and addresses concerns from multiple stakeholders, resource agencies and other local entities. The group has developed a draft pilot project study plan, has implemented a fish pathology study with the USFWS, and completed a habitat assessment in the upper watershed. Ongoing activities include continued evaluation of issues related to pathology and seeking additional funding.
- Reorienting to Recovery - Participation in the “Reorienting to Recovery” salmon project, that seeks to engage regional associations, interested parties, and California Tribes across the salmonid landscape in an inclusive, collaborative, and structured process to identify a suite of implementable and impactful actions that will advance the recovery of the four distinct runs of California Central Valley salmon (spring-run, fall-run, late fall-run, and winter-run) and steelhead throughout their life cycle; and establish broad support and buy-in for these preferred actions by making trade-offs transparent and balancing participants’ diverse values, perspectives, and priorities.

- BIOS - Continuing active involvement with the state’s Biologically Integrated Orchard Systems Program (BIOS) in San Joaquin County. BIOS is designed to support local agricultural growers through the use of biological pest control and ecologically friendly (Integrated Pest Management Program) agricultural methods. EBMUD biologists participate as advisors to individual farmers, UC Cooperative Extension specialists, and Natural Resource Conservation Service staff on wildlife issues in San Joaquin County. (1998–present)
- LWWC - Continuing active involvement with the Lodi-Woodbridge Winegrape Commission (LWWC). The LWWC is designed to support local grape growers through the use of biological pest control and ecologically friendly (Integrated Pest Management Program) agricultural methods. EBMUD biologists participate as advisors to the LWWC, individual farmers, UC Cooperative Extension specialists, and Natural Resource Conservation Service staff on wildlife issues in the lower Mokelumne River watershed. (1998–present)
- Lower Mokelumne River Watershed Stewardship Program: EBMUD has continued to support and collaborate with the Lower Mokelumne River Watershed Stewardship Program, including, but not limited to, the following projects:
 - Providing technical support in seeking grant funding to continue implementation of the *Lower Mokelumne River Stewardship Plan*, primarily in restoration and invasive plant removal. Anticipated funding sources include the Wildlife Conservation Board, USFWS Partners for Fish and Wildlife and Private Stewardship Grant Program, LMR Partnership, DWR, CBDA, Central Valley Joint Venture, and Ducks Unlimited.
 - Continuing to work with the San Joaquin County Farm Bureau to educate local teachers about farming and conservation practices along the Mokelumne River through the Ag in the Classroom program. (2002–present).
 - Continuing to work with NGO Environmental Defense, USFWS, and California Association of Resource Conservation Districts to conduct management activities noted in the Lower Mokelumne River Safe Harbor Agreement for the valley elderberry longhorn beetle on EBMUD property in the Mokelumne River Watershed in San Joaquin County.
 - Providing periodic technical support for local projects and participating as mentors during field days for the Center for Land-Based Learning Student Landowner Education & Watershed Stewardship (SLEWS) program.
 - Continuing to work with the U.S. Department of Agriculture’s Natural Resources Conservation Service to promote Environmental Quality Incentives Program

(EQIP), Wildlife Habitat Incentive Program (WHIP), and other federal programs that benefit watershed resources.

- Participating in the annual Sandhill Crane Festival in Lodi, CA. The festival provides information and education as well as field trips to various locations along the lower Mokelumne River. The Sandhill Crane Festival seeks to promote broad public awareness of lower Mokelumne River natural resource values. EBMUD staff has led field trips to view bald eagles at Pardee Reservoir. (1997–2019; 2023)
- Participating in Central Valley Birding Symposium in Stockton, CA.
- Presentations on fish and wildlife issues to local sportsmen’s groups, community groups, local schools, and local fishing and environmental organizations. (Ongoing)
- Leading Mokelumne River Fish Hatchery and EBMUD reservoir tours to legislative, environmental, agency, and interested public groups.
- Participating in the EBMUD Centennial Birthday Party and Community Fair at the Temescal Regional Recreation Area, which included staffing a Natural Resources booth to inform the public of EBMUD efforts to manage and restore the natural resources with which EBMUD is entrusted.
- Periodically participating as docents for the Lodi Parks and Recreation Department by giving presentations, nature tours, and demonstrations on fish and wildlife issues in the lower Mokelumne River. (1998–present)
- Providing continuing technical support to the San Joaquin County Resource Conservation District (SJCRC) and private landowners to enhance anadromous fish habitat.
- Participating in San Joaquin Council of Governments Habitat Technical Advisory Committee meetings.
- Participating in Mokelumne River Clean-up Day, which was associated with the Greater Sierra River Cleanup events. EBMUD provided dumpster, watercraft and personnel for the event.
- Continue to participate with the U.S. Fish and Wildlife Service in the “Lower Mokelumne Safe Harbor Cooperative Agreement” (SHA). The SHA covers the valley elderberry longhorn beetle on EBMUD land in San Joaquin County. (2007–present)
- Continuing participation in the U.S. Fish and Wildlife Service in the “Safe Harbor Agreement for East Bay Municipal Utility District Lands in San Joaquin, Amador, and Calaveras Counties”, which was implemented in 2009. The SHA covers valley elderberry beetles, California tiger salamanders, and California red-legged frogs on EBMUD land in the aforementioned counties.

- Participating in an annual “Kids Fishing Day” at Camanche South Shore. EBMUD partners with Camanche Concessionaire staff, local residents, and local fishing groups to provide free angling opportunities and instruction to children under 12 years of age. (2014–present)
- Participating in the City of Lodi’s “Watershed Education Legacy” Program which connects Lodi Unified School District students to the Mokelumne River and watershed. (2016–present)

2024 Planned Stakeholder Activities

In 2024, EBMUD plans to continue the above activities, as well as consider new opportunities to participate in collaborative stakeholder activities. Specific efforts will be made to support the goals of the Lower Mokelumne River Watershed Stewardship Plan through development of a website with resources for landowners and growers and, for implementation efforts consistent with Partnership objectives, to determine how Partnership funding could support the Watershed Stewardship Stakeholder Group.

6. Mokelumne River Technical Advisory Committee

EBMUD established the Mokelumne River Technical Advisory Committee (MRTAC) in 1988 to improve communication and coordination among a variety of state and federal agencies, EBMUD, irrigation districts, and interest groups. Agencies and organizations that currently participate in the MRTAC include EBMUD, CDFW, USFWS, NOAA Fisheries, and Woodbridge Irrigation District (WID). California Sportfishing Protection Alliance (CSPA), San Joaquin County, North San Joaquin Water Conservation District, the State Water Resources Control Board (SWRCB), US Bureau of Reclamation, and the Federal Energy Regulatory Commission (FERC) are also members of the MRTAC. The MRTAC provides an interactive and proactive forum in which factors affecting lower Mokelumne River aquatic resources are identified, specific scientific investigations are formulated, technical data and analyses are presented and discussed, and agency activities are coordinated to improve the aquatic resources of the lower Mokelumne River.

2023 MRTAC Meetings

In 2023, the MRTAC met semiannually (alternating quarterly meetings between the MRTAC and the PCC). Representatives from WID, CDFW, EBMUD, USFWS, NOAA Fisheries, SWRCB, the North San Joaquin Water Conservation District, and CSPA participated in the MRTAC meetings held on February 15, 2023 and July 25, 2023.

2024 Planned MRTAC Meetings

Pursuant to Section H.1 of the JSA, EBMUD, USFWS, and CDFW agree that they will continue to actively support the MRTAC as a technical information-sharing forum and that

the Partnership Steering Committee will review the need for the MRTAC periodically, with input from the Stakeholders Group. The first meeting of 2024 will be held in February.

7. Mokelumne River Science Database

Section H.2 of the JSA specifies that EBMUD will develop a science database for the lower Mokelumne River. In 2023, EBMUD continued updating this database. The Mokelumne Science Database consists of two parts, the written record (reports, correspondence, scientific literature and historic documents) and an electronic database (Oracle® format). The written record is compiled and cataloged by EBMUD. EBMUD also provides scientific data to the Central Valley Project Improvement Act (CVPIA) Comprehensive Assessment and Monitoring Program (CAMP) to evaluate the relative effectiveness of CVPIA actions in restoring anadromous fish production. This includes regular transfers of all EBMUD juvenile trapping data collected on the lower Mokelumne River to the CAMP standardized database for juvenile outmigration monitoring in the California Central Valley. No changes to the database are planned in 2024.

D. RESEARCH AND MONITORING

In 1987, EBMUD initiated and presently continues proactive, comprehensive programs to monitor, research, and improve anadromous salmonids in the lower Mokelumne River and to investigate potential ecological factors affecting the lower Mokelumne River anadromous fishery. The programs encompass every freshwater life phase of lower Mokelumne River salmon including upstream migration, spawning, egg incubation, fry and juvenile rearing, and outmigration. As a result, EBMUD has carried out some of the most extensive monitoring and research activities on anadromous fish and their habitats in the Central Valley. EBMUD has made a significant commitment and contribution to improving the technical understanding of the lower Mokelumne River salmon resource through intensive in-river scientific investigations. The results of those investigations were used to develop the agreed upon flows and non-flow measures identified in the Joint Settlement Agreement.

2023 Research and Monitoring Actions

The ongoing research and monitoring actions undertaken pursuant to the JSA and WQRMP include:

- Seasonal monitoring of fish populations in the lower Mokelumne River from Camanche Dam downstream to the San Joaquin River.
- Enumeration of migrating adult Chinook salmon and steelhead by video monitoring at Woodbridge Dam.

*Lower Mokelumne River Project – FERC Project No. 2916
2023 Project Operations Report*

- Salmon and steelhead redd surveys in the lower Mokelumne River between Camanche Dam and the Elliott Road Bridge.
- Estimation of redd production and emigration of juvenile Chinook salmon and steelhead by operation of rotary screw traps.
- Monitoring Camanche Reservoir water to measure temperature, pH, dissolved oxygen, conductivity, and oxidation-reduction potential.
- Collection of monthly water samples in the lower Mokelumne River at the Elliott Road Bridge and in Camanche Reservoir at PENN20 to measure hardness, cadmium, copper, and zinc.
- Monitoring of spawning reach substrate characteristics, including channel configuration and gradient.
- Monitoring temperature, pH, dissolved oxygen, conductivity, and oxidation-reduction potential of the Mokelumne River Fish Hatchery water supply and effluent.
- Continuing seasonal electrofishing and seining surveys of the lower Mokelumne River fish community.
- Cooperation with the state-wide Constant Fractional Marking (coded-wire tagging) of Chinook salmon released from the Mokelumne River Fish Hatchery.
- Genetic analysis of steelhead broodstock.
- Adaptive management actions to promote healthy fish populations including fall pulse flows to attract salmon and steelhead into the Mokelumne River and managing Camanche cold water pool to maximize benefit for fall-run Chinook salmon.
- Implemented an acoustic telemetry study to assess Mokelumne River salmon smolt migration pathways, route entrainment, and outmigration survival.
- Maintained the Mokelumne River segment of ITAG's Juvenile Salmon Acoustic Telemetry Study receiver array. In addition, deployed 180kHz Vemco receivers to support regional acoustic telemetry studies.
- Developed and implemented an optimized sampling protocol for the detection of California Tiger Salamander (CTS) environmental DNA (eDNA) from Mokelumne River Watershed ponds on EBMUD property. The pilot study was conducted with the goal to provide proof of concept that eDNA sampling could reliably be used to indicate presence or absence of CTS.

2024 Planned Research and Monitoring

EBMUD will continue similar research and monitoring activities in 2024.

E. HABITAT IMPROVEMENTS

1. Ongoing Efforts

EBMUD continued to enhance the instream and riparian habitat of the lower Mokelumne River in 2023.

2023 Instream and Riparian Habitat Enhancements

Instream and riparian habitat projects for 2023 included:

- Gravel Enhancement: Gravel enhancement projects began in 1990. They consist of placing clean, washed gravel of a size suitable for salmon and steelhead spawning in the river to increase spawning habitat. In 2023, long-term maintenance of a 1-mile restoration reach continued with placement of 800 yd³ of gravel into the reach. Since 1990, EBMUD has placed approximately 55,479 yd³ of spawning gravel in the Lower Mokelumne River.
- Floodplain Restoration: Floodplain habitat was enhanced with new native tree plantings in the Mokelumne River Day Use Area to provide juvenile fish rearing and growth opportunities.
- Riparian Habitat Enhancement: EBMUD continues working with winegrape and walnut growers to enhance and restore riparian vegetation. This is achieved primarily through development of a cooperative program with local interests to improve land management with agricultural best management practices and livestock grazing along riparian zones to reduce stream bank erosion and fine sediment input.

2024 Planned Habitat Improvements

Many of the above habitat improvement activities will continue in 2024, including the maintenance of the 1-mile restoration reach downstream of Camanche Dam with the annual placement of 800 yd³ of appropriately sized salmonid spawning gravel.

2. Fish Guidance Fence

The guidance fence is put in place in conjunction with opening the fish ladder and is used to guide fish towards the ladder opening. The fence was installed on September 22, 2023. It is anticipated that it will be operated through the steelhead migration season unless high flows require early removal.

APPENDICES

Appendix A: Sample of Lower Mokelumne River Related Stories from Local Press

Appendix B: USGS Verified Flow Data for 2021 and 2022

Appendix C: Meeting Minutes of the Partnership Steering Committee

Appendix D: Correspondence Related to Fall 2023 Attraction Flow

APPENDIX A

**SAMPLE OF LOWER MOKELUMNE RIVER RELATED
STORIES FROM LOCAL PRESS**

California's endangered salmon population plummets amid new threat



NEWS-SENTINEL FILE

A Chinook salmon attempts to enter the fish ladder at Mokelumne River Fish Hatchery on Nov. 21, 2019.

Susanne Rust and Ian James
LOS ANGELES TIMES

They've been pushed to the brink of extinction by dams, drought, extreme heat and even the flare of wildfires, but now California's endangered winter-run Chinook salmon appear to be facing an entirely new threat — their own ravenous hunger for anchovies.

After the worst spawning season ever in 2022, scientists now suspect the species' precipitous decline is being driven by its ocean diet.

Researchers hypothesize that the salmon are feasting too heavily on anchovies, a fish that is now swarming the California coast in record numbers. Unfortunately for the salmon, anchovies carry an enzyme called thiaminase, which breaks down thiamine — a vitamin that is essential to cell function in all living things.

"These are fish that returned to the river early this year and then spawned in the spring and early summer. They had really low thiamine," said Nate Mantua, a fisheries researcher with the National Marine Fisheries Service in Santa Cruz. Concentrations were "worse than last year."

In humans, a critical deficiency of thiamine, or vitamin B1, can lead to heart failure and nerve damage. In female salmon that are returning to rivers and streams to spawn, thiamine deficiency can be passed on to their many hatchlings, which suffer problems swimming and experience high rates of death, researchers say.

Nelsy Rodriguez, a spokesperson for East Bay Municipal Utilities District, said the agency and the California Department of Fish and Wildlife, which jointly operate the Mokelumne River Fish

Hatchery, have counted 6,917 Chinook salmon that have successfully completed the fall run back to the Mokelumne River watershed to complete their lifecycle. Out of those, 4,977 entered the hatchery to be spawned, and the rest spawned in the river. The district said this is an increase from the last few years, and above its long-term average.

She said that while this is a good year for the salmon run, EBMUD has noticed the effects of thiamine deficiency in the fall salmon population for the past three years or so.

"Now that we have a better understanding of what is occurring, we have initiated a protocol to add thiamine mononitrate to the saline solution that is used during the smolt fertilization process to mitigate the thiamine deficiency,"

Salmon continues on Page 6

SALMON

Continued from Page 1

she said. "However, the natural spawners won't get that assistance. We will continue to closely monitor the situation."

Now, with government agencies and Native American tribes fearing the collapse of the winter-run Chinook, scientists are embarking on a campaign to determine why the anchovy population has exploded off the California coast, and why winter-run Chinook are seemingly ignoring all other prey.

"The very unusual thing about their diet is that it's been so focused on anchovies and so lacking in other things that historically they have been found eating," Mantua said. "It is something we don't have great information on."

Researchers at the National Oceanic and Atmospheric Administration, California's Department of Fish and Wildlife and UC Davis are employing new technologies, such as environmental DNA sampling and isotopic analyses of fish eye lenses, along with older methods — such as plank-

ton sampling and fish ear bone studies — to better understand how and why the salmon ocean diet has changed.

Scientists first discovered salmon were suffering from a vitamin deficiency in 2020, after hatchery workers noticed salmon fry behaving strangely — swimming repeatedly in tight, corkscrewlike patterns before spiraling to their deaths at the bottom of the tanks. They learned a similar situation had occurred in the Great Lakes in the 1960s, when lake trout had exhibited similar behaviors after gorging on alewives,

another fish chock-full of thiaminase.

State, federal and University of California, Davis researchers quickly treated the swirling salmon fry with thiamine — infusing the water in their tanks with the vitamin; the salmon soon recovered.

But over the last three years, thiamine concentrations in salmon eggs have continued to drop.

"We thought initially it was just a one-year thing, maybe the way we thought of COVID," said Rachel Johnson, a fisheries biologist with the National

Oceanic and Atmospheric Administration and UC Davis. "I was cautiously optimistic that the ocean was going to rearrange itself back to normal. And we just haven't seen that."

Chinook salmon start their lives in the rivers of Central and Northern California, before migrating downstream to the Pacific Ocean. There, they typically spend the next two to three years feeding on a variety of fish and invertebrates — such as squid — off the coast.

News-Sentinel reporter Wes Bowers contributed to this report.

Highway to waterway

Flooding leads to long closure of 99 between Lodi and Acampo

- Lodi News-Sentinel
- 18 Jan 2023
- Wes Bowers NEWS-SENTINEL STAFF WRITER



Both the northbound and southbound lanes of Highway 99 were closed on Monday due to flooding, and Caltrans crews were still working to open the highway on Tuesday evening. Maintenance crews were using a pair of 10-inch diameter sump pumps to move pooled water from flooded areas on northbound Highway 99 at Woodbridge Road through about 5,000 feet of steel pipe along the roadway, south to the Mokelumne River, the agency said.

Highway 99 remained closed in both directions between Turner and Peltier roads on Tuesday as Caltrans crews worked to clear the flooded highway. It had not been reopened as of early Tuesday evening.

The highway was closed Monday evening due to flooding as a result of last weekend's storms.

Maintenance crews were using a pair of 10-inch diameter sump pumps to move pooled water from flooded areas on northbound Highway 99 at Woodbridge Road through about 5,000 feet of steel pipe along the roadway, south to the Mokelumne River, the agency said.

Waters began moving westward from the east side of the highway on Monday, eventually flooding several northbound lanes before reaching the median and southbound lanes.

Crews worked 12-hour shifts around the clock to address the flooding, Caltrans officials said.

Motorists were advised to seek alternate routes during this closure and were also reminded to not attempt to drive through flooded areas as the water may be deeper than it appears.

Visit www.quickmap.dot.ca.gov for the latest highway conditions and closure information.

Rep. Josh Harder, D-Manteca, announced he will host an in-person town hall focused on flooding, the Delta Tunnel project, and water issues in the Central Valley at 7751 S. Mantney Road in French Camp on Jan. 18 at 6 p.m. Harder will be joined by a variety of experts from across San Joaquin County. Members of the community will have the opportunity to make their voices heard as it relates to the flooding impacting the community and the Delta Tunnel project. Harder's office will then pass that feedback on directly to state and federal agencies.

Environmental rules stoke anger as California's stormwater flows to sea

- Lodi News-Sentinel
- 21 Jan 2023
- Hayley Smith



Dredging cranes rise over a section of the Sacramento-San Joaquin River Delta in Isleton.

Environmental rules designed to protect imperiled fish in the Sacramento-San Joaquin River Delta have ignited anger among a group of bipartisan lawmakers, who say too much of California's stormwater is being washed out to sea instead of being pumped to reservoirs and aqueducts.

In a series of strongly worded letters, nearly a dozen legislators — many from drought-starved agriculture regions of the Central Valley — have implored state and federal officials to relax environmental pumping restrictions that are limiting the amount of water captured from the Delta.

“When Mother Nature blesses us with rain, we need to save the water, instead of dumping it into the ocean,” Assemblymember Vince Fong, R-Bakersfield, wrote in a letter to Gov. Gavin Newsom.

Since the beginning of January, a series of atmospheric rivers has disgorged trillions of gallons of much-needed moisture across droughtstricken California, but only a small fraction of that water has so far made it into storage. In the Delta — the heart of the state's vast water system — nearly 95% of incoming water has flowed into the Pacific Ocean, according to data from the U.S. Bureau of Reclamation.

The calls by lawmakers have reignited a long-simmering debate over where — and to whom — the state’s precious water supplies should go.

“With so much excess water in the system, there is no reason that exports south of the Delta cannot be increased,” read another letter that State Sen. Melissa Hurtado, D-Sanger, and Assemblymember Jasmeet Bains, D-Bakersfield, addressed to Newsom.

But experts say it’s not that simple.

While the Delta provides drinking water for about 27 million Californians and supports the state’s massive agricultural industry, it is also a delicate ecosystem that is home to threatened and endangered species — many of which have been suffering amid warming waters, increasing salinity, dangerously low flows and other ecological stressors. The tiny Delta smelt are dangerously close to extinction.

State and federal water managers said they have been complying with environmental regulations designed to protect those species, including a so-called “first flush” protocol that mandates two weeks of reduced pumping at the onset of the first big winter storms.

The flush provides the fish with enough time and water to move away from the powerful pumps, which have been known to chew them up.

“There are reasons that there are restrictions on pumping, and each of them is founded in some way, shape or form on trying to conserve habitat for listed species,” said Jeffrey Mount, a senior fellow at the Public Policy Institute of California.

Mount said it would be a mistake to ignore the environmental benefits of the water. The smelt are akin to a “canary in the coal mine” for the entire health of the Delta, he said, and the first flush is biologically very important for the dynamics of the estuary.

“If we take actions which are helpful to smelt, we’ll help an array of other native fishes and the native ecosystem,” he said.

The first flush protocol stems from biological opinions issued by the Trump administration in 2019 and from incidental take permits issued by the Newsom administration in 2020. Some lawmakers on both sides of the aisle, however, are calling for the rules to be revised.

From Jan. 3-16, pumping rates in the Delta were reduced to nearly half of their capacity in accordance with the protocol, resulting in a loss of about 84,000 acre-feet of exports from the area, according to estimates from the Public Policy Institute. That’s enough water to irrigate 25,000 acres of farmland for a year or supply 150,000 homes.

“Government regulations should not and must not deny our constituents critical water from these storms,” U.S. Rep. David Valadao, R-Hanford, and five other Republican lawmakers wrote in a letter to Newsom and President Biden last week. “We have a moral obligation to provide Californians any relief that is within our control.”

But the environment also suffers when Delta water is diverted for agricultural and urban use, said Felicia Marcus, a fellow at Stanford University’s Water in the West Program.

“It’s always the fish that get shorted, and we destroyed the ecosystem as a result,” she said. “There are dry years where we’re diverting 80% to 90% of the flow during critical times of year. Well, no ecosystem survives with that kind of diversion, so we have to manage the system differently and share more of it with nature.”

She and Mount said that even with the twoweek protocol, the state still will still have time to capture more water. Patterns from previous wet years, including 2011, 2017 and 2019, indicate that the Delta will continue to flow at high rates for at least the next few weeks. That means more time to fill the San Luis Reservoir, the Delta’s key water reserve.

The reservoir, which is currently at 48% capacity, will also be filled by the state’s melting snowpack, which was at 245% of normal for the date on Thursday.

“Right now we’ve got a bonanza of snow, and it’s looking pretty good at this particular time of year, so the idea of shorting these poor fish and the ecosystem in a time of somewhat plenty isn’t very compelling,” Marcus said. Still, there’s no denying that stormwater capture remains a point of frustration in California — especially as millions of residents are being asked to cut back and conserve more water than ever.

“We must make the most of the heavy precipitation we are receiving and use it to our advantage,” Rep. Jim Costa, D-Fresno, wrote in a letter to state and federal officials. He called for increased flexibility on the first flush rule.

Uncaptured water isn't wasted, but more could be stored for non-rainy days

Lodi News-Sentinel · 26 Jan 2023

Political columnist George Skelton has covered government and politics for nearly 60 years and for The Los Angeles Times since 1974.

Agazillion gallons of stormwater have been rampaging down rivers into the sea. But that uncaptured bounty hasn't been "wasted."

"Wasted water" being dumped in the ocean is an old cliché that resurfaces whenever there's a big storm in this weather-eccentric state - or during the inevitable dry periods when crops are thirsty and homeowners are told to shut off their lawn sprinklers.

But "wasted water" is a myth.

Uncaptured runoff flowing to the sea flushes pollutants out of rivers and bays, helping to cleanse water for local domestic use. It also saves many kinds of fish, including salmon, not only for recreationists but for the coastal fishing industry. And it deposits sand on beaches. In the vital Sacramento-San Joaquin River Delta, runoff pushes back saltwater from San Francisco Bay, making the relatively small amount of water that is captured potentially drinkable.

That's the view of water scholars I've talked to recently.

And it makes sense, particularly concerning flows through real rivers. That doesn't necessarily include concrete-lined flood channels, such as the so-called Los Angeles River.

"Every drop of water flowing out of the Central Valley into San Francisco Bay creates benefits," asserts Jeffrey Mount, a water expert at the Public Policy Institute of California. He's a former UC Davis science professor and founding director of the university's Center for Watershed Sciences.

But he continues: "I want to be perfectly clear. That doesn't mean we couldn't harvest more." He also adds this caveat: "There are some places where water is just wasted to sea.

I'm thinking where I grew up - in Santa Monica. Street runoff there has no demonstrable value." That is, unless it's captured and recycled or stored underground, he notes.

But even uncaptured water headed to sea through the L.A. River is beneficial, he contends. "It cleans out the channel. The L.A. River is watered by urban slobber, an unpleasant mix of oils and other nasty stuff."

Unfortunately, it winds up "in places where surfers are," he says. "The ocean is full of viruses by the time they paddle out."

Mount's PPIC colleague, Greg Gartrell, says the L.A. and lower San Gabriel rivers were turned into flood control channels "to get the water off the land as fast as possible so they could build houses in floodplains."

The channels "almost immediately filled up with sediment," he continues.

"They put in sediment basins to catch the sediment so it wouldn't go into the channels. Then we started losing sand on the beaches."

The sand flows down from mountains as well as ocean cliffs.

"If we didn't build in flood plains," Gartrell adds, "we wouldn't have to do many of these projects."

The issue of whether to capture and store more runoff or allow it to flow freely into the ocean is more controversial in Northern California, where there are bona fide rivers.

The Sacramento-San Joaquin delta, fed by several rivers originating in the snow-covered mountains and flowing through the agriculture-rich Central Valley, is the source of drinking water for 27 million Californians and irrigation for 3 million acres of crops.

The uncaptured water flows into San Francisco Bay and out through the Golden Gate into the Pacific.

"Most of this water is not just uncaptured - it's uncapturable," says Gartrell, a delta expert, independent consulting engineer and former assistant general manager of the Contra Costa Water District.

"And it's not actually wasted. It's freshening San Francisco Bay."

It's uncapturable because of pumping capacity and aqueduct sizes, and often in wet years because reservoirs are practically full - particularly San Luis Reservoir in Merced County, the big holding pond for both the federal and state water projects. Last week, it was only half full, but is expected to fill by spring.

The future of storage is underground in aquifers, now dangerously depleted by over-pump-ing.

"We have a 150-million-acre-foot capacity underground - more storage than we'll ever be able to use," says Wade Crowfoot, secretary of the state Natural Resources Agency.

But Mount says, "We're currently not set up for pumping underground" in large quantities. "We haven't gotten our act together."

State and federal delta pumps now are operating at near capacity, sending nearly 14,000 cubic feet per second through aqueducts into the San Joaquin Valley and Southern California. But that's tiny compared to delta outflows, which last week were roughly 150,000 CFS. None of it wasted.

The wasted water issue is more relevant when runoff is normal or very low.

I called Mount after reading a UC Davis blog post he co-wrote six years ago, titled "Water wasted to the Sea?"

"The seaward flow of freshwater is essential to [delta] farmers, fishers, conservations, sea-shore lovers and government agencies that manage drinking water supplies, restore wet-lands, protect coastlines and clean up sewage and storm pollution," he concluded then.

"Wasted water to some is essential water to others."

"I feel even stronger about it today," Mount told me. "It's a mistake to refer to any water that goes to the ocean as wasted."

"I'm not saying all the water should go to the ocean. We could do a better job of storing some of it without impacting benefits."

So, uncaptured water isn't wasted.

But when large amounts are suddenly gifted by nature, more could be stored for a non-rainy day.

Newsom cares more about almond GROWERS THAN CALIFORNIA'S SALMON FISHERY

- Lodi News-Sentinel

- 2 Mar 2023

- GEORGE SKELTON

Gov. Gavin Newsom bills himself as a protector of wildlife, so you wouldn't think he'd take water from baby salmon and give it to almonds.

Or to pistachios or cotton or alfalfa. Especially when California was just drenched with the wettest three-week series of storms on record and was headed into another powerful soaking of snow and rain.

But Newsom and his water officials still contend we're suffering a drought — apparently it's a never-ending drought. So, they used that as a reason last week to drastically cut river flows needed by migrating little salmon in case the water is needed to irrigate San Joaquin Valley crops in summer.

Still calling our wet weather a drought is a shameful distortion of a word — a propaganda device aimed at convincing people they should keep conserving water. People should, but they don't need to be talked to like they're children. What Newsom and government officials are really talking about is a long-term water shortage. It's caused by California having more agriculture and people than can be sustained with what nature provides us. And it's made more problematic by the uncertain prospects of climate change.

But a water shortage doesn't necessarily mean drought. It means we're not recycling, conserving and recharging aquifers enough — and not judiciously allocating what we've got.

Agriculture uses 80% of California's developed water. The rest is allocated to domestic use — business and residential.

Calculated another way, 40% of all water — developed or not — winds up with agriculture and 10% goes to domestic use. The remaining 50% goes directly into the environment — running down streams, watering what's left of our wetlands and flowing into the ocean. And en route to the ocean, river flows carry baby salmon out to sea, where they grow up.

The Sacramento River is the second-biggest producer of salmon on the West Coast, behind only the Columbia.

But salmon numbers have been plummeting on the Sacramento in recent decades, largely because of dams that block historic spawning areas and the diversion of water to farms and cities.

Also, plumbing in the Sacramento-San Joaquin River Delta screws up salmon. Giant pumps that send water south through aqueducts mangle the critters or draw them into the grasp of lurking predators.

There are four salmon spawning runs up the Sacramento and San Joaquin rivers each year. By far the largest is in the Sacramento. The most significant is in fall. Last fall, fewer than 62,000 fish returned to spawn, the second lowest in 70 years. The fall before, there were nearly 132,000.

Those are steep drops from 448,000 in 2013 and 873,000 in 2002.

Meanwhile, almonds — one of our thirstiest crops — are proliferating. We're up to 1.6 million acres' worth, mostly in the San Joaquin Valley. California produces 80% of the world's almonds. Roughly two-thirds are exported.

"Salmon numbers have fallen significantly every Newsom year — onethird since he became governor," says Barry Nelson, a longtime water consultant and environmentalist.

But should Newsom be blamed for that? We've been in a real drought.

"Absolutely," Nelson says. "Without a doubt the governor is responsible. He's been waiving standards designed to protect salmon. The failure of the state to protect salmon has turned bad news into a disaster."

"In the same four years that salmon have crashed," Nelson adds, "almond acreage has expanded by 320,000 acres."

Newsom on Feb. 13 signed an executive order allowing the suspension of salmon protections. It was as if we were still suffering from drought and every drop of water was needed for humans and food production.

"To protect public health and safety, it is critical the state take certain immediate actions without undue delay to prepare for and mitigate the effects of the drought conditions," the governor proclaimed in his order.

The state Water Resources Control Board, which the governor appoints, dutifully obliged and suspended a requirement for flows through the delta estuary that salmon need this time of year to push them out into the ocean.

The suspension basically cut flows in half until at least late March. The water will be stored in reservoirs.

But the big reservoirs already were refilling from January storms. And the Sierra snowpack was deep — at 173% of normal for last week.

"It's not even a drought. If we can't provide good conditions for fish in a year like this, then we are totally bankrupt as resource managers," says Gary Bobker, program director at the Bay Institute, an environmental organization that focuses on San Francisco Bay.

Young salmon — roughly 4 inches long — need strong river flows to carry them through the delta, into San Francisco Bay and out the Golden Gate.

“They’re poor swimmers,” says John McManus, president of the Golden State Salmon Association. “They evolved to be washed down rivers in spring as nature would. But that’s been turned on its head. Now the water is released in summer for agriculture.”

That’s because agriculture has more political clout.

McManus says the governor “doesn’t return our calls or respond to our emails.”

“The single biggest problem for salmon in California is the lack of springtime flow in rivers,” McManus asserts.

Maybe 1% are making it to the ocean.

Eric Oppenheimer, the water board’s chief deputy director, told me: “We’re not saying [the flow reduction] won’t have any effect” on fish. “We’re just saying we don’t think the change will result in an unreasonable impact.”

The state Department of Fish and Wildlife basically agrees.

“At this point, we’re still in a drought,” Oppenheimer said. “We’re sometimes in a drought and flood simultaneously.”

That doesn’t make sense to me. Neither does cutting back water for struggling baby salmon when it’s pouring rain.

Political columnist George Skelton has covered government and politics for nearly 60 years and for The Los Angeles Times since 1974

Eastern San Joaquin groundwater plan gets a thumbs up

NEWS-SENTINEL STAFF

STOCKTON — The California Department of Water Resources has recommended the approval of the Eastern San Joaquin Water Authority Groundwater Sustainability Plan.

San Joaquin County officials said the recommendation is a significant step toward ensuring the region will have enough groundwater by 2040.

“DWR’s acceptance of our groundwater sustainability plan is a tribute to the hard work and historic collaboration among 16 diverse Groundwater Sustainability Agencies (GSAs) that joined together to build consensus around realistic and common-sense solutions with the unified goal of sustainability,” San Joaquin County Board of Supervisors Chairman Robert Rickman said in a Friday media statement.

Rickman, who represents the Tracy area on the board, also serves as the Chairman for the Eastern San Joaquin Groundwater Authority, the agency that drafted the groundwater sustainability plan.

“We want to thank DWR for their contribution of grant monies and expertise which have helped us produce a viable GSP that will lead to sustainably using local surface and groundwater supplies while also sustaining our local economy,” he added.

The DWR has been designated the basin as being in critical overdraft, meaning more water is taken out of the ground than is recharged on an annual basis.

Groundwater supplied roughly 60% of the water used in the Eastern San Joaquin Subbasin in 2022, a drought year

when a relatively small amount of surface water was available.

As a result, the subbasin experienced a decrease in groundwater storage of 122,000 acre-feet, contributing to the long-term decline in water levels.

In some parts of the San Joaquin Valley, groundwater levels are reaching record lows due to ongoing groundwater use and the drought — as much as 100 feet lower than previous records.

Chronic lowering of groundwater levels may cause land subsidence, seawater intrusion, groundwater quality issues, and other undesirable effects in many parts of the state. Continued groundwater over-pumping could also put nearby infrastructure such as structures, roads and pipelines at greater risk of costly damage, the county said. To address the problem, the Sustainable Groundwater Management Act was enacted in 2014, the first-ever comprehensive groundwater management legislation in California.

The SGMA requires agencies to develop plans that result in sustainable groundwater use within 20 years for groundwater basins designated by the state as medium- or high-priority.

Successful implementation would protect water quality and supplies for agricultural, municipal, environmental, among other uses.

“The Eastern San Joaquin GSP contains project management actions that will help the regional groundwater basin achieve sustainability for all our GSAs,” San Joaquin County Public Works director Fritz Buchman said in Friday’s media statement.

“When these actions are implemented, we can solve our overdraft and use the groundwater storage space in the basin as a reservoir,” he added. “This will help us avoid restrictions on pumping, respond to drought and climate change, and take full advantage of the resources available from our rivers and streams while protecting and enhancing the environment.”

The ESJGWA was formed in 2017 by local agencies that included cities, counties and water districts to develop a groundwater sustainability plans for the Eastern San Joaquin groundwater basin, which consists of about 1,200 square miles encompassing the portion of the county east of the San Joaquin River, and smaller sections of Calaveras and Stanislaus counties.

For more information www.sgma.water.ca.gov.

FEATURE: The Magic of the Mokelumne: How such a small river produces so many salmon

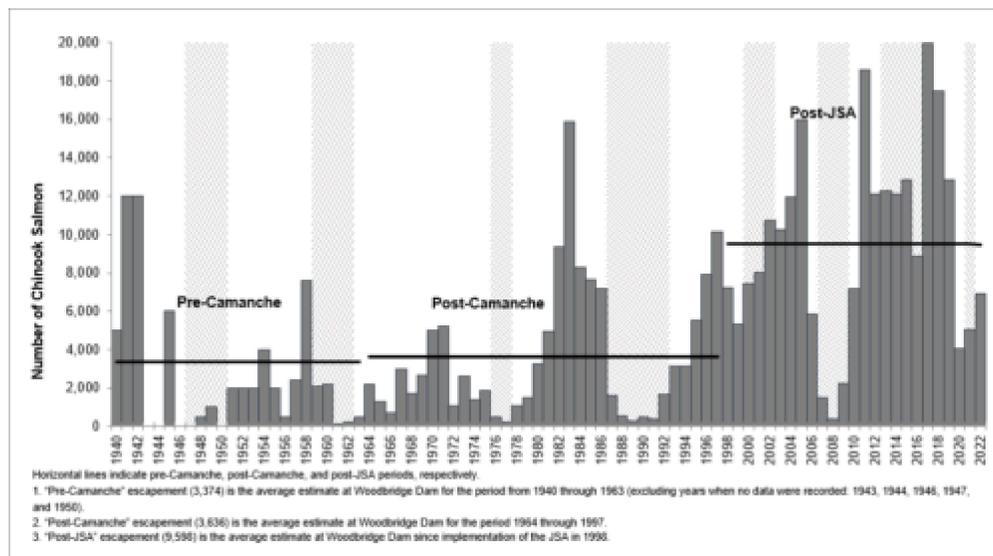
mavensnotebook.com/2023/03/28/feature-the-magic-of-the-mokelumne-how-such-a-small-river-produces-so-many-salmon/

Robin Meadows News and Features March 28, 2023 7 9703

March 28, 2023



Written by Robin Meadows for Maven's Notebook



Salmon returns have risen dramatically in the Mokelumne River.

The Mokelumne River is on the modest side, running 95 miles from the Sierra Nevada and accounting for less than 3% of flows into the Sacramento-San Joaquin River Delta. But the river's impact on salmon is outsized and the latest figures really made a splash. The California Department of Fish and Wildlife (CDFW) puts the Mokelumne's contribution to the 2022 commercial ocean salmon fishery at a whopping 51% of the total for hatcheries.

“The Mokelumne is the single biggest contributor to the catch,” says John McManus, president of the Golden State Salmon Association. “It’s huge.”

The Mokelumne River Hatchery’s record is even more impressive given that it raises just a fraction of the young salmon—about 6 million of the 32 million total—produced by Central Valley hatcheries each year.

“It’s punching above its weight,” McManus says. “Why? What’s the magic with the Mokelumne?”

McManus credits the partnership between the CDFW hatchery and a dedicated team of biologists at the East Bay Municipal Utility District (EBMUD), which gets water from and manages part of the Mokelumne River.

Caring for hatchery fish

The Mokelumne River Hatchery was constructed in 1963 to mitigate for the spawning habitat lost when EBMUD built Camanche Dam, creating a second reservoir downstream of Pardee Reservoir in the Sierra Nevada foothills. A 2002 hatchery rebuild optimized conditions for raising salmon from eggs to three-inch smolts, adding water chillers, sediment filters, and UV to kill disease-causing microorganisms.

“Up to 96% of the eggs survive to the smolt stage,” says Michelle Workman, who leads EBMUD’s fish biology team. “That’s way higher than any other hatchery.”



Salmon eggs beginning to hatch. Photo: CDFW

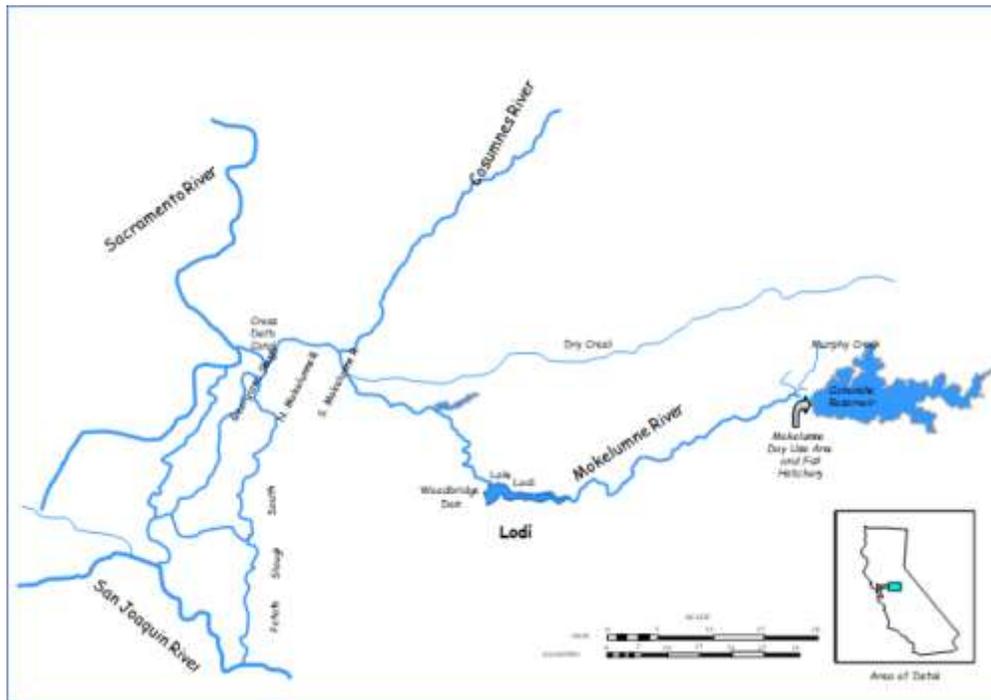
The hatchery upgrades also help young salmon withstand the transition from what McManus describes as a life of relative luxury to the wild, where they suddenly face surviving on their own. The journey is stressful from the start: smolts are trucked to the Delta and shot out of a tube into net pens.

“It’s kind of traumatic,” Workman says.

Net pens keep smolts from being immediately snapped up by striped bass and other predators. And smolt survival after leaving the safety of these enclosures is also high, thanks to data-driven refinements. Net pens are placed where the Mokelumne meets the San Joaquin River, which is far enough into the Delta both to keep smolts from being sucked south by the pumps and to bypass the worst of the predators. In addition, net pen releases are staggered, with two days on and two days off, to keep predators from learning where to come for an easy meal.

“Striped bass are smart but we’re smarter,” Workman says. “They have a very short memory.”

Lower Mokelumne spawners



EBMUD biologists are also helping wild spawning salmon in the Mokelumne. The team spent the last couple of decades working with private landowners to restore gravel spawning grounds downstream of Camanche Dam. Landowners are often happy to grant river access for adding gravel because they love seeing the salmon, making it a relatively easy sell.

Now the team is working with landowners to restore the floodplains that make perfect nurseries for little fish. This is a harder sell because it entails a conservation easement on private land. However, floodplains can also benefit landowners by speeding groundwater replenishment.

EBMUD also works with private landowners to install screens that keep young ocean-bound salmon out of water diversion intakes. John Vink, a farmer in the Central Valley, signed up for a fish screen after chatting with biologists who came to check for juvenile salmon in the rotary screw trap—or fish counter, as he aptly calls it—he had allowed them to install on the property.

Vink uses Mokelumne water to irrigate nearly 300 acres of walnuts in Lockeford, a town just east of Lodi. “We’re right on the river,” he says, adding that he enjoys watching salmon coming upstream to spawn. The screen on his diversion intake, which is self cleaning, has been in place since 2021.

“We used to find little fish in the pump filters and now we don’t,” Vink says. “I like helping them out.” He also likes that the screens catch debris so he doesn’t have to clean the filters in front of the pumps anymore. “They’re helping us out too.”

Another key to the success of wild-born salmon is cool water, especially in the fall when the Mokelumne population returns to spawn. “For Chinook salmon, eggs need the coldest water and it’s really hard to have enough in the summer in the Central Valley,” Workman says.



Salmon swimming up the Mokelumne River to spawn. Photo by EBMUD.

In the fall of 2015, deep into a severe drought, EBMUD came up with an out-of-the-box solution to supplying the cold water that salmon depend on. Regulations require Camanche Reservoir to maintain a store of cold water, but temperatures stay low much later into the year in Pardee Reservoir because it is much deeper.

So the team proposed drawing cold water from Camanche Reservoir through the summer and then replenishing it with large pulses from Pardee Reservoir in the fall. “Cold water is denser so it sinks and stays together as it flows through Camanche,” Workman says. “It’s

about 1°C colder compared to similar years, which doesn't sound like much but makes a difference in egg survival."

She's grateful for the trust of EBMUD's resource agency partners. "They went out on a limb and tried it during drought because we were desperate."

Upper Mokelumne spawning habitat

As good as the Mokelumne is for salmon, it could be even better. Workman hopes to restore these fish to their historical spawning grounds upstream of the reservoirs. This effort was initiated in 2011 by the Foothill Conservancy, an environmental nonprofit in Amador and Calaveras counties. The Conservancy then joined forces with EBMUD and other groups, including the California Sportfishing Protection Alliance, state and federal agencies, and local Miwok tribes, to form a salmon restoration working group.

"We wanted to get a key piece of the watershed ecology back," recalls Katherine Evatt. She and her husband Pete Bell helped found the Foothill Conservancy and live near the Amador County town of Volcano. "Wildlife eat salmon carcasses, and forest plants get nutrients from carcasses that are dragged up from the river—everything in the watershed had salmon in it."



Surveying the Upper Mokelumne for salmon spawning habitat. Photo by Foothill Conservancy.

In 2019 the restoration working group commissioned a survey that identified more than 13 miles of potential salmon spawning and rearing grounds in the Upper Mokelumne. "It was really exciting to find there was suitable salmon spawning habitat," Evatt says. Next the

group planned a small pilot reintroduction to test how well salmon would actually do once in the Upper Mokelumne.

The pilot required trucking adults from the lower to the upper part of the river, but this turned out to be a stumbling block. A pathology study showed that many salmon in the lower Mokelumne were infected with pathogens, and the state didn't want to risk reintroducing diseases along with the fish.

"CDFW was really worried that the pathogens would get into the hatchery and said no," Evatt says. "The project is in a limbo hold right now."

Workman hasn't given up on returning salmon to the Upper Mokelumne, however. She's exploring the feasibility of disinfecting the hatchery's water supply with ozone, which kills pathogens including viruses. While ozone treatment is quite costly, Workman sees it as a hedge against future warming. "We support moving fish above the reservoirs as a climate change strategy during drought," she says.

This would be a dream come true for Evatt and her husband, who spent countless hours commuting—by car, Amtrak and Bay Area Rapid Transit—between their home and EBMUD's offices in Oakland in hopes of seeing salmon in the Upper Mokelumne once again. "We love this project," Evatt says. "We're just waiting for the right time to bring it back."

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EBMUD says 'not a worry' on possible flooding along the Mokelumne River

Wes Bowers

NEWS-SENTINEL STAFF WRITER

While other water agencies throughout Northern and Central California are concerned the state's winter snowpack could result in devastating floods, East Bay Municipal Utilities District said there is no cause for alarm.

"There's not a worry," EBMUD spokeswoman Andrea Pook said. "But we have been releasing water quite significantly from Camanche (Reservoir) for months, and we'll probably be doing that for months to come."

EBMUD manages the Camanche and Pardee reservoirs, both of which control the flow of the Mokelumne River.

On April 1, the Department of Water Resources conducted its fourth snow survey of the season at Phillips Station in the Sierra Nevada.

The manual survey recorded 126.5 inches of snow depth and a snow water equivalent of 54 inches, which DWR said is 221% of average for that location.

The snow water equivalent measures the

amount of water contained in the snowpack and is a key component of the agency's water supply forecast.

Its electronic readings from 130 snow sensors placed throughout California indicate the statewide snowpack's snow water equivalent is 61.1 inches, or 237% of average as of April 3.

"This year's severe storms and flooding is the latest example that California's climate is becoming more extreme," DWR Director Karla Nemeth said in an April 3 media statement.

"After the driest three years on record and devastating drought impacts to communities across the state, DWR has rapidly shifted to flood response and forecasting for the upcoming snowmelt," she added. "We have provided flood assistance to many communities who just a few months ago were facing severe drought impacts."

Pook said EBMUD has been consistently releasing 4,000 cubic feet of water per second, or 29.922 gallons, from Camanche Reservoir

Worry continues on Page 6

WORRY

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since the severe storms and atmospheric rivers began.

As of Wednesday, Camanche Reservoir was 65% full and Pardee Reservoir was 101% full, she said, adding EBMUD's entire system is at 81% capacity.

"That's great," she said of Camanche's capacity. "There is pretty significant space in Camanche because the releases have been mainly regular."

The only concern EBMUD had with expected flooding, Pook said, was potential damage to the Mokelumne day-use area in Clements, which was closed on March 16.

Pook said the agency closes the day-use area when release flows exceed 1,000 cfs, and that it might remain closed for some time.

This year's April 1 result from DWR's statewide snow sensor network is higher than any other reading since the its was established in the mid-1980s, the agency said.

Before the network was established, the April 1, 1983 statewide summery reported the snowpack was 227% of average, and the April 1, 1962 summary reported the snowpack was 237% of average.

"This year's result will go down as one of the largest snowpack years on record in California," said Sean de Guzman, DWR's Snow Surveys and Water Supply Forecasting Unit manager. "While 1962's snow course measurements showed a similar result, there were fewer snow courses at that time, making it difficult to compare to today's results. Because additional snow courses were added over the years, it is difficult to compare results accurately across the decades with precision, but this year's snowpack is definitely one of the biggest the state has seen since the 1950s."

For California's snow course measurements, only 1962, 1969 and 1983 recorded statewide results above 200% of the April 1 average, the agency said.

While snowpack reports are above average across the state this year, they actually vary considerably, depending on the region.

The Southern Sierra snowpack is currently 300% of its April 1 average, DWR said, and the Central Sierra is at

237% of its April 1 average.

However, the Northern Sierra region, where the state's largest surface water reservoirs are located, is at 192% of its April 1 average.

While EBMUD releases 4,000 cfs into the Mokelumne River for an indefinite period of time, Lodians should not have to worry about this weekend's Paddlefest at Lodi Lake.

The annual event, hosted by Headwaters Kayak, is Saturday from 10 a.m. to 3 p.m.

Headwaters co-owner Abigail Christensen told the News-Sentinel last month that paddlers will be asked to remain on the lake and not enter the river.

Tiffany Heyer, San Joaquin County Deputy Director of General Services-Emergency Operations, said the county has continued to prepare for possible flooding in several waterways.

The county's Emergency Operations Center remains activated, with OES, local reclamation districts, fire and law enforcement agencies meeting on a regular basis to plan and address concerns as they arise, she said.

"This includes continued levee patrols, repairs to levees, planning for area evacuations, and outreach to residents to prepare for the potential of flooding," she said. "The agencies are also monitoring the local waterways, releases from area reservoirs, and are in constant communication with state and federal partners to ensure the county is prepared."

Heyer added that residents who live along waterways should have a go-bag that includes important documents, cash, medications, food, water, clothing, and pet supplies ready in the event of an evacuation.

Residents should also be prepared for a potential power outages by gathering flashlights and charging devices early, she said.

Visit www.siready.org to sign up to receive emergency alerts from local officials and to learn more about evacuation planning in San Joaquin County.

"We're doing what we need to do," Pook said. "It's been tough. We've not seen waterflow like this before, but we're making sure we release enough water so we don't put ourselves into a corner. We had a lot of rain and snow, and now that snow is coming down the mountain."

FEATURED

Access to Mokelumne to remain closed through July 4

News-Sentinel Staff
Jun 8, 2023



Recreational usage on the Mokelumne River, including river rafting from the Mokelumne River Day Use Area to the county's own Stillman Magee Regional Park, will remain closed through July 7.
COURTESY PHOTOGRAPH

With the Mokelumne River's flow expected to remain at 2,500 cubic feet per second for the foreseeable future, access will remain closed through the July 4 holiday, San Joaquin County Park officials announced this week.

All recreational usage, including river rafting from the Mokelumne River Day Use Area to the county's own Stillman Magee Regional Park, will remain closed through July 7.

Stillman Magee Regional Park remains closed, along with Woodbridge Wilderness Area. State and county officials have continued to monitor local rivers and waterways since winter storms caused record snowfall and sparked flood concerns.

Day-use and boat launching at Dos Reis Regional Park, which borders the San Joaquin River, remains closed at this time, along with Mossdale Crossing Regional Park.

Park officials will continue to assess all facilities as flood concerns subside and reopen parks once conditions improve. There is no estimated reopening date at this time.

For the latest conditions and closures, residents can visit the county's Office of Emergency

Services page at sjready.org/disasters/flooding.html.

For more information about park closures and reopening status, visit our website at www.sjpark.com, Facebook or Instagram pages.

Flowing a new direction



COURTESY PHOTOGRAPH

Andy Christensen has served as general manager of the Woodbridge Irrigation District since 1991. Christensen is leaving the position and will be replaced by Keith Bussman.

Andy Christensen steps down, Keith Bussman is new GM of Woodbridge Irrigation District

David Witte
NEWS-SENTINEL SPORTS EDITOR

Keith Bussman remembers his father digging a well on the family vineyard near Lodi during a dry year in the 1970s.

With water in short supply, the Woodbridge Irrigation District wasn't able to deliver the full allotment.

Today, Bussman may find himself making decisions like the one that affected his family those decades ago after taking over as manager of the Woodbridge Irrigation District on Monday.

"It's a different thing from what I was before," said Bussman, who was born in Lodi and grew up in Stockton. "I was an on-call engineer for radio towers, and I worked for my own company."



BUSSMAN

After graduating from Lincoln High and Delta College, Bussman started working for Pac West Telecom in Stockton in 1984. When Pac West sold in 1996, Bussman started his business, as well as purchasing a radio station in Ukiah. His company has worked on towers in the Sacramento area, the Bay Area and Hawaii. He also flies planes and helicopters commercially.

Bussman steps into big shoes, replacing Andy Christensen, who is stepping down after serving as the district's manager since 1991. Christensen said he'll stay as an advisor to Bussman and the board of directors until February of next year.

"He's real excited about the position," Christensen said. "I think he'll do a great job. He's a really nice guy, and he has

WID continues on Page 6

WID

Continued from Page 1

of directors since 2013.

In Christensen's time as manager, the WID has seen many changes. He's seen the construction of the Woodbridge Dam and its fish ladders, and the creation of an electronic control system that operates the district's distribution system, known as the SCADA (Supervisory Control and Data Acquisition) system.

WID delivers raw water to agricultural customers covering about 13,000 acres of farmland, and also supplies about 6,000 acre-feet per year to the City of Lodi, and about 6,500 AFY to the City of Stockton. Christensen estimated WID covers about 35% of Lodi's water needs.

"The whole area's gone through a metamorphosis, and the district's changed completely. It's just been one exciting time," Christensen said. "It's just gone by so fast. I've been there a number of years, and it's just a wonderful job. If I was 30 years younger, I'd still be there."

Bussman said one of the biggest challenges facing the district as he takes over is preserving the water rights it has to provide water to the area. According to the district's announcement, it is one of the oldest diverters of water on the Mokelumne River and holds pre-1914 water

rights and two licenses on the Mokelumne River.

"During wet years, doesn't seem like it's too big of a fight, but during dry years, it's like the giant water grab," Bussman said. "Everybody wants what we have, which is the water rights. There needs to be more storage,

and they're finally discussing it."

Bussman will also hold the titles of secretary and treasurer for the district.

"I'm really looking forward to working at the district," Bussman said. "Over the years, Andy has built a wonderful staff and a great board to work with."

Schwabauer's career shift goes with the flow

Outgoing Lodi city manager's first day at water district is Oct. 16

Wes Bowers
NEWS-SENTINEL STAFF WRITER

When Lodi City Manager Steve Schwabauer announced his resignation on social media earlier this month, he said he would be moving on to a local water district, but would not reveal which one.

This week, the North San Joaquin Water Conservation District announced that it has hired Schwabauer as its general manager. His first day is Oct. 16.

"The district is thrilled that Steve has agreed to serve as our general manager," district board president Joe Valente

said. "Steve brings decades of management and problem-solving skills to the position, as well as a true passion for water and our community. The district has a wide variety of projects that will benefit from Steve's leadership."

Schwabauer said he was honored to become the district's new general manager.

"Water has been one of the greatest passions of my career, having negotiated a number of water supply agreements with Woodbridge Irrigation District, and performed the legal work for Lodi's surface water treatment plant and of course resolved a major piece of water contamination litigation," he said. "I look forward to working with the North San Joaquin Board to improve groundwater supplies for the growers in the district."

The NSJWCD encompasses 150,000 acres east of Lodi on both sides of the Mokelumne River, and includes approximately 75,000 acres of irrigated farmland that use 150,000 acre-feet of groundwater annually.

The district also manages a 20,000 acre-foot surface water right from the Mokelumne River for irrigation and groundwater recharge projects.

Over the course of his 24-year career with the city, Schwabauer developed a strong interest in water, how it is distributed to residents and businesses, and how it is cleaned for consumption and

irrigation.

"One thing I've learned about water, is how critical it is to survival in our community," Schwabauer said. "County-wide, we continue to have a lot of work to do to address sustainability, and to ensure our children and grandchildren have water to drink, and our future farmers have water to irrigate their land."

The district's original water delivery systems were constructed in the 1960s, and after a period of limited activity in the 1990s and early 2000s, it began undertaking several projects over the last 15 years to modernize its infrastructure and increase groundwater recharge capacity to halt the decline of groundwater levels.

In addition, the district is currently working on a \$4 mil-

lion grant-funded project on its north system along Acampo Road and on a \$2 million grant-funded project on its south system. The district purchased and developed a new 10-acre groundwater recharge facility in 2023 and has a variety of additional projects in the planning stages for the next 10 years.

"The district is extremely excited to have Steve come on board," NSJWCD attorney Jennifer Spaletta said. "He comes to us with a wealth of experience and love for his community, and a love for water."

Schwabauer's last day as Lodi's city manager is Oct. 6. The Lodi City Council is expected to name an interim city manager at a Sept. 6 meeting.



SCHWABAUER

'Piece by piece'



NEWS-SENTINEL FILE PHOTOGRAPHS

David Simpson stands by the North San Joaquin Water Conservation District's new water pump along the Mokelumne River outside of Lodi Friday, Nov. 22, 2019. It was recently announced that the water district received a \$1 million grant to continue to modernize its water delivery system.

Local water district continues to modernize delivery system

Wes Bowers

NEWS-SENTINEL STAFF WRITER

The North San Joaquin Water Conservation District recently received some help from the federal government to ensure its ratepayers continue to receive water.

The U.S. Department of Agriculture announced Tuesday that the district has been awarded a \$1 million grant to make repairs and upgrades to its irrigation system.

The investment will help make critical improvements to upstream level control, gates, and flow meters to meet delivery needs and support effective, safe groundwater management, the agency said.

Jennifer Spaletta, the district's attorney, said the grant money will be used to build a lateral off the south distribution system located near Handel Road.

Laterals deliver water from a system's mainline or sub-mainline to sprinklers for irrigation.

"That lateral will increase the capacity of our system to deliver surface water to our farmers for irrigation, and for groundwater recharge," Spaletta said.

Installing the lateral off the south distribution system is the latest upgrade to NSJWCD's system.

The district expects receive another \$3 million grant to improve a segment of pipeline just north of a well near Pixley Slough, and Spaletta is working on applying



The water pipe leading from the North San Joaquin Water Conservation District's new water pump by the Mokelumne River outside Lodi.

for a \$5 million federal grant to help complete the upgrades.

She said the district hopes to have everything finished by 2026.

"It's a bug system," she said. "We're biting it off piece by piece. The lateral is just another notch in an effort to modernize and improve our system."

The NSJWCD encompasses 150,000 acres east of Lodi on both sides of the Mokelumne River, and includes approximately 75,000 acres of irrigated farmland that use 150,000 acre-feet of groundwater annually.

The \$1 million grant is funded

through USDA's Community Facilities Program, which offers direct loans, loan guarantees and grants to develop or improve essential public services and facilities in communities across rural America.

Funds can be used to construct, expand or improve facilities that provide health care, education, public safety, and public services.

Projects include fire and rescue stations, village and town halls, health care clinics, hospitals, adult and child care centers, assisted living facilities, rehabilitation centers, public buildings, schools, libraries, and many other community-based initiatives, according to the USDA.

The district was one of two in California to receive federal grants.

Squaw Valley Mutual Water Company in Placer County will use a \$723,000 loan to replacing aging water lines and substandard water infrastructure to provide quality water to its rural customers in northwestern Olympic Valley.

"When we invest in modernizing California's rural water infrastructure we're investing in community resilience and stability," Maria Gallegos Herrera, the USDA's Rural Development California State Director, said.

To learn more about investment resources for rural areas, visit www.rd.usda.gov.

Lodi Sandhill Crane board honored for promoting Mokelumne River watershed

Wes Bowers

NEWS-SENTINEL STAFF WRITER

The Lower Mokelumne River Watershed Stewardship Steering Committee has selected the Lodi Sandhill Crane Association's board of directors as recipients of the 2023 Frank R. Beeler Watershed Stewardship Award.

The award is presented annually to acknowledge and recognize an individual or organization who has shown outstanding leadership, responsibility, or activism to promote sound and innovative natural practices that help sustain the Mokelumne River watershed.

The LSCA board is being recognized for a number of efforts, including its advocacy for the Sandhill cranes that

spend winters in the California Delta, as well as the environment in which the birds live.

The board is also being recognized for its collaboration with both the California and U.S. Departments of Fish and Wildlife; and for organizing the Lodi Sandhill Crane Festival for 25 years.

Many of this year's board members have been with the association since its founding in 1996, when the festival was first held in cooperation with the DFW and Lodi Unified School District.

Current board members include Jay Bell, Jill Cauthen, Kathy Hieb, Howard Larimer, Ken Nieland, and Mamie Starr.

Honored continues on Page 6

HONORED

Continued from Page 1

The award is named in honor of Frank Beeler, a former water and wastewater superintendent for the City of Lodi who passed away in 2009.

Beeler was an active participant and advocate for the Lower Mokelumne River Watershed Stewardship Plan and the steering committee.

He was also a leader of the city's

stormwater program and tirelessly supported volunteer watershed stewardship activities such as the City's Storm Drain Detectives. The board will receive the Beeler Award at the annual East Bay Municipal Utility District Pardee Barbeque on Oct. 6.

This year's Lodi Sandhill Crane Festival is November 4-5 at Hutchins Street Square.

For more information, visit lo-disandhillcrane.org.

In a tough year for salmon, a record number of fish have returned to California's Mokelumne River

by Dan Bacher

Community (This content is not subject to review by Daily Kos staff prior to publication.)

Thursday, November 16, 2023 at 9:42:53a PST



Fall-run Chinook salmon enter the fish ladder on the Mokelumne River. Photo courtesy of EBMUD.

Clements — A record number of over 20,000 fall-run fall-run Chinook salmon have returned to the Mokelumne River, a tributary of the San Joaquin River in the Central Valley.

The fish are now returning from the ocean in a year where all salmon fishing was closed in California's rivers and ocean waters, due to the projected low

abundance of Sacramento and Klamath River fall-run Chinook salmon, so fishery managers and salmon advocates are keeping a close eye on this fall's spawning escapement.

The East Bay Municipal Utility District (EBMUD) today reported the 2023-24 fall run of Chinook salmon on the Mokelumne River is now "the most successful return in more than 80 years." More than 20,000 fish – and counting – have returned from the Pacific Ocean to spawn in the river, the most since record keeping began in 1940.

"This year's historic return highlights EBMUD's longstanding collaboration in the region and our deep commitment to sustaining this vital fish hatchery and protecting the river's habitat," said EBMUD Board President Andy Katz. "We are proud to celebrate this achievement with our local, state and federal partners, as well as the broader community, which has entrusted us with safeguarding this precious natural resource."

Amazingly, the Mokelumne River contributes only about 3 percent of the freshwater flow into the Sacramento-San Joaquin Delta, yet its salmon population makes up as much as 50 percent of the commercial catch off the coast of California in years where the season is open, according to data from the Pacific Fishery Management Council (PFMC).

On October 29 of this year, EBMUD biologists tallied the largest one-day salmon count in 30 years: 1,941 fish.

"The science-driven hatchery management program by EBMUD and CDFW includes operations that support ocean fisheries and natural spawning on the

river,” according to EBMUD in a statement. “When the season is complete and full data is available, experts will determine which strategies contributed most to the success on the Mokelumne, given some rivers are experiencing low returns, as has the Mokelumne in previous years.”

Long-term strategies cited by the water agency include:

- “Habitat enhancement to improve natural river spawning and rearing, in partnership with both the U.S. Fish and Wildlife Service’s Anadromous Fish Restoration Program and the CDFW.
- Flow management, including pulse flows from EBMUD’s Camanche Reservoir into the river to attract returning fish; coordination with the U.S. Bureau of Reclamation to close the Delta Cross Channel to reduce straying; and management of the Camanche cold water pool to support spawning, incubation, and rearing.
- Hatchery management, including investments in chillers and ultraviolet filters to improve egg survival; collaboration on the release of juvenile fish; and management of the fish ladder leading into the hatchery.
- Statewide closure of California’s 2023 commercial and recreational salmon fishing season to protect the Central Valley fall-run Chinook population; the commercial and recreational salmon fishing fleet, which funds the production of ocean enhancement fish at the hatchery, forewent the season and contributed to this year’s success.”

“The Mokelumne faces many challenges,” said EBMUD Manager of Fisheries and Wildlife Michelle Workman. “It is a small river that can be overwhelmed by flows from larger Central Valley rivers when attracting salmon back from the ocean.

But through collaborations with our agency partners, we have found winning strategies. This year's large run allows us to meet our hatchery goals as well as improve natural production numbers in the river by maximizing the use of the available spawning habitat we worked so hard to build. Decades of work to improve the natural habitat are paying off."

Workman said the hatchery is working towards its 10 million egg-take goal to produce approximately 9 million smolts, including the required 3.4 million mitigation fish, 3 million enhancement fish, and 2.5 million drought recovery fish. The mitigation fish are funded by EBMUD, the enhancement fish are funded through the ocean commercial and CPFV (Commercial Passenger Fishing Vessel) salmon stamp and the drought recovery fish are funded by the CDFW.

The majority of the enhancement fish will be trucked to release sites spanning Fort Baker, Richmond, Marin Rod & Gun Club, Tiburon, Half Moon Bay, Santa Cruz, and Monterey in 2024. The mitigation fish will be released at Sherman island.

Last year a total of 6.4 million salmon smolts were produced at the Mokelumne River Fish Hatchery.

"We are proud of the collaboration between EBMUD and CDFW and we attribute much of our success to our partnership," concluded Workman. "This large run translates into meeting the hatchery goals and also being able to fill all of the restored habitat that we spent millions of dollars creating over the past 30 years."

The Mokelumne River serves as the primary drinking water source for 1.4 million customers served by EBMUD in Alameda and Contra Costa counties. The not-for-profit public agency said it is “dedicated to balancing customers’ water needs with environmental protection and river stewardship.”

To mitigate for habitat losses that resulted from construction of Camanche Dan, EBMUD manages river flows, enhances habitat, and funds the Mokelumne River Fish Hatchery, operated in partnership with the California Department of Fish and Wildlife (CDFW).

The total numbers of hatchery and naturally spawned fish returning to the Mokelumne, American, Feather and Sacramento River and their tributaries won’t be known until the numbers of fish returning to the hatcheries and carcass counts on the rivers are compiled by the CDFW and NOAA Fisheries in January 2024 in preparation for the Pacific Fishery Management Council meetings that craft the fishing seasons and restrictions.

Nimbus Fish Hatchery

Salmon are also returning now to the American River’s Nimbus Fish Hatchery. The fish ladder at the hatchery opened on Friday, November 3. Egg-taking began on Monday, November 6.

The hatchery will be taking eggs to reach a production goal of 4.5 million smolts and an additional 2 million fry, which will have parent-based tagging, according to Cat Kaiser, operations and events director for the Golden State Salmon Association.

Feather River Fish Hatchery

The Feather River Hatchery in Oroville is close to meeting its egg-take goal of 11 million with a 9.5 million smolt goal, Kaiser reported. Of those, 6 million are mitigation and 3.5 million are drought enhancement fish. Of that 3.5 million, 1.5 million fall run Chinook will be released as fingerlings.

“There are still a lot of fish in the Feather River (a little more than this time last year) and they will continue to spawn until the house is full and maximum capacity is reached. They have space for about 14-15 million eggs. One million of the fish will most likely be released into the river, depending on water conditions, with hopes of the rest being trucked,” Kaiser concluded.

Coleman National Fish Hatchery

On Battle Creek, the Coleman National Fish Hatchery is approaching four weeks into spawning and they have handled, to date, about 4,000 fish with a preliminary count downstream in Battle Creek at 5,000,

“This appears to be the 2nd lowest return in many years and hatchery staff are reporting a paltry 200 fish in holding,” reported Scott Artis, Executive Director of the Golden Gate Salmon Association (GSSA).

“They expect a little under 9 million eggs, translating into about 8 to 8.3 million smolts out of a goal of 12 million – falling well below targets,” noted Artis. “And to make things worse, 2024 will still represent returns from a drought year class. Thus, returns are expected to continue to be depressed until October 2025 when some better numbers are anticipated.”

Action Alert

The NorCal Guides and Sportsmen's Association (NCGASA) is now requesting that people participate in an action alert requesting 10-15 million salmon eggs to be sent from other facilities so the hatchery can come close to meeting their goals:

CALL TO ACTION: click the link below to send a prewritten letter to the Fishery Directors at CDFW and USFWS if you are concerned about the Sacramento fall salmon run and the future of the fishery. This letter is a request for the 10-15 million salmon eggs to be sent to Coleman National Fish Hatchery in order for them to come close to meeting their goals. We are hoping this can be done before Thanksgiving break. Find this letter on our website under

NEWS: ncgasa.org/...

APPENDIX B

USGS VERIFIED FLOW DATA FOR 2021 AND 2022

Table B-1: Calendar Year 2021 – USGS Verified Average Daily Flow from Camanche Dam

11323500 Mokelumne River below Camanche Dam, CA												
DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2021												
DAILY MEAN VALUES												
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	255	255	252	342	347	260	240	250	202	225	543	228
2	255	255	298	346	345	245	237	247	201	225	702	225
3	255	255	300	345	350	245	237	255	200	225	501	225
4	255	253	300	345	347	244	237	252	200	225	301	225
5	255	255	280	345	359	232	236	246	200	507	225	225
6	255	237	228	345	366	228	237	245	201	602	225	225
7	253	225	225	337	375	231	238	245	203	402	225	225
8	255	225	225	330	372	227	238	247	201	264	225	225
9	255	225	251	325	372	212	237	239	200	225	226	225
10	255	225	295	315	372	215	240	232	205	225	224	225
11	255	225	296	315	371	210	240	230	192	225	224	225
12	255	226	273	315	373	210	240	234	160	225	225	225
13	255	227	252	315	362	210	237	225	140	225	224	225
14	254	225	252	318	365	215	240	212	142	225	225	225
15	254	225	255	315	365	234	237	213	140	225	225	225
16	252	225	255	315	363	235	235	208	140	225	224	225
17	255	232	247	315	365	233	239	200	136	226	225	226
18	255	228	232	316	365	232	238	202	130	547	225	225
19	252	225	235	321	363	249	238	200	130	702	225	225
20	254	223	235	318	362	250	238	202	126	501	225	224
21	255	225	235	319	365	249	241	200	122	302	224	225
22	255	225	235	324	364	246	240	200	121	225	224	225
23	252	222	237	319	360	247	240	200	120	225	225	226
24	255	225	236	330	358	237	238	200	107	225	225	226
25	255	225	235	330	361	235	238	200	110	224	224	226
26	255	225	236	332	362	239	240	200	110	225	224	225
27	255	222	245	336	360	236	249	200	110	225	225	225
28	255	223	245	325	358	237	250	200	110	225	225	225
29	255	---	255	337	368	237	247	200	111	225	225	225
30	255	---	270	347	386	237	248	200	181	225	225	226
31	255	---	302	---	363	---	249	202	---	225	---	226
Total	7,891	6,463	7,917	9,837	11,260	7,017	7,439	6,786	4,651	9,002	7,890	6,983
Mean	255	231	255	328	363	234	240	219	155	290	263	225
Max	255	255	302	347	386	260	250	255	205	702	702	228
Min	252	222	225	315	345	210	235	200	107	224	224	224
Ac-ft	15,650	12,820	15,700	19,510	22,340	13,920	14,760	13,460	9,225	17,860	15,650	13,850

Note- Data published by USGS

Table B-2: Calendar Year 2022 – USGS Verified Average Daily Flow from Camanche Dam

11323500 Mokelumne River below Camanche Dam, CA												
DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2022												
DAILY MEAN VALUES												
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	225	224	203	301	295	244	280	336	340	231	650	225
2	224	225	195	300	303	225	280	336	336	225	368	225
3	225	225	195	299	310	227	281	336	325	613	225	225
4	225	225	224	300	321	225	281	334	325	824	225	226
5	225	225	245	299	341	225	280	335	325	526	225	225
6	225	225	245	299	362	235	280	335	325	334	225	225
7	225	226	245	298	370	245	281	335	325	300	225	225
8	225	227	246	299	371	255	285	335	317	300	225	225
9	226	226	245	299	370	255	294	338	310	301	225	225
10	226	225	244	299	370	254	296	345	310	301	226	225
11	226	225	244	300	370	254	295	345	310	301	225	226
12	228	226	245	302	370	255	304	345	301	300	225	225
13	225	226	245	299	362	265	310	345	286	301	225	225
14	225	227	244	299	366	269	311	345	277	301	225	225
15	225	227	245	299	360	271	310	345	278	301	225	225
16	225	225	234	299	357	273	310	355	272	300	225	225
17	225	225	216	300	351	278	310	361	264	744	225	225
18	225	225	215	301	350	280	311	367	265	1130	225	225
19	224	225	215	292	356	280	310	370	262	822	225	225
20	225	224	215	284	368	281	310	370	251	524	225	225
21	225	225	215	285	374	279	311	369	252	320	225	225
22	225	225	214	285	374	280	310	370	252	300	225	226
23	224	226	215	285	374	280	310	370	256	301	225	226
24	225	225	221	285	374	280	310	367	265	301	225	225
25	225	226	230	285	375	280	310	356	265	300	225	225
26	225	226	229	285	375	281	315	349	265	301	225	225
27	225	225	230	285	366	282	320	341	265	303	225	225
28	226	225	220	291	360	280	322	341	258	300	224	225
29	226	---	201	295	361	280	330	341	245	300	225	224
30	226	---	200	295	360	280	335	339	246	301	225	225
31	225	---	257	---	336	---	335	340	---	592	---	225
Total	6,981	6,311	7,037	8,844	11,050	7,898	9,427	10,800	8,573	12,600	7,318	6,978
Mean	225	225	227	295	357	263	304	348	286	406	244	225
Max	228	227	257	302	375	282	335	370	340	1130	650	226
Min	224	224	195	284	295	225	280	334	245	225	224	224
Ac-ft	13,850	12,520	13,960	17,540	21,920	15,670	18,700	21,410	17,000	24,990	14,520	13,840

Note- October through December data provisional until approved by USGS

Table B-3: Calendar Year 2021 – USGS Verified Average Daily Flow below Woodbridge

11325500 Mokelumne River at Woodbridge, CA												
DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2021												
DAILY MEAN VALUES												
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	200	450	126	159	159	44	28.2	27.3	24.4	101	159	162
2	197	453	124	163	162	30.9	28.2	26.7	24.2	131	665	157
3	195	321	121	162	160	30.9	28.1	27.7	24.1	147	538	159
4	207	256	122	163	158	30.9	28.4	26.6	24.6	146	372	154
5	193	241	118	167	156	29.7	28.6	26.4	24.7	208	198	157
6	198	234	115	168	157	30.5	28	26.6	24.3	624	177	155
7	198	212	115	167	157	30.9	28.5	26.4	24.4	450	164	164
8	200	202	115	165	158	30.3	28	29.3	23.4	259	163	158
9	196	193	115	166	159	30.2	28.3	32	23.1	140	191	167
10	197	194	118	164	158	29.7	28.1	29.6	22.9	148	167	160
11	196	199	124	164	158	29.7	28.5	25.8	23.2	162	160	158
12	196	209	125	166	159	29.6	27.7	26.1	23.9	255	163	167
13	193	197	122	163	157	29.7	28.3	25.8	24.4	93.1	159	243
14	196	193	120	159	158	29.2	27.9	25.4	24.2	107	162	255
15	194	191	124	160	157	29	27.8	24.7	23.4	243	162	201
16	193	189	124	160	159	29	27.5	24.9	24.5	92.6	156	212
17	192	189	123	160	157	28.8	27.7	24.6	26.5	108	159	182
18	192	188	124	160	156	28.8	27.6	24.3	27.9	184	160	167
19	191	188	124	161	157	28.3	27.5	24.1	28.1	716	155	171
20	190	186	119	159	158	29.2	27.9	24.4	28.1	538	156	161
21	194	185	119	158	157	29.4	27.3	25	27.8	369	157	163
22	212	186	120	160	157	29.4	27.5	25.1	27.6	227	156	179
23	195	184	121	159	158	30.1	27	25	28.2	178	153	236
24	197	181	120	161	158	29.4	26.5	24.9	27.6	366	160	229
25	200	182	120	162	156	29.1	27.5	24.9	26.8	382	156	215
26	197	180	121	161	157	28.8	27.3	25.1	27.1	245	153	218
27	279	179	122	159	156	29.6	27.2	23.6	27.6	193	157	210
28	280	155	121	158	155	29.3	26.9	23.6	27.8	139	158	214
29	340	---	121	158	156	29.2	26.7	24.6	29.1	263	156	219
30	234	---	122	159	155	28.9	27.1	24.4	40.8	173	157	192
31	313	---	120	---	153	---	26.6	24.4	---	169	---	181
Total	6,555	6,117	3,745	4,851	4,878	903	858	799	785	7,557	5,949	5,766
Mean	211	218	121	162	157	30	28	26	26	244	198	186
Max	340	453	126	168	162	44	29	32	41	716	665	255
Min	190	155	115	158	153	28	27	24	23	93	153	154
Ac-ft	13,000	12,130	7,428	9,622	9,675	1,790	1,703	1,585	1,556	14,990	11,800	11,440

Note- Data published by USGS

Table B-4: Calendar Year 2022 – USGS Verified Average Daily Flow below Woodbridge

11325500 Mokelumne River at Woodbridge, CA												
DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2022												
DAILY MEAN VALUES												
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	174	429	178	157	145	43	32	32	32	89	598	225
2	163	348	157	164	142	35	33	32	33	87	439	176
3	173	261	126	162	139	35	33	33	34	108	213	247
4	167	220	87	162	137	35	33	32	35	673	180	224
5	165	204	95	160	151	35	33	32	36	519	176	189
6	171	199	79	159	154	35	32	33	35	249	181	176
7	162	196	81	157	157	34	32	32	35	124	187	187
8	164	190	79	158	159	34	32	32	34	119	208	179
9	161	190	81	157	159	33	33	31	34	119	180	179
10	162	186	75	158	157	32	32	32	36	119	169	266
11	163	186	75	159	159	32	32	32	35	121	172	216
12	163	186	75	155	156	33	32	32	35	121	171	187
13	165	186	82	155	156	33	32	32	34	120	182	186
14	164	186	89	155	155	32	33	32	34	122	176	246
15	163	175	83	154	156	32	33	32	35	121	180	166
16	161	184	66	156	157	33	33	32	35	121	180	166
17	161	184	65	155	156	33	33	31	35	134	174	166
18	164	183	65	153	155	34	33	29	35	867	178	166
19	163	182	65	153	155	37	32	30	36	851	185	167
20	158	179	67	152	155	42	32	32	37	583	176	166
21	164	178	62	153	156	32	32	33	34	298	179	178
22	159	174	60	153	157	32	32	33	34	186	179	177
23	155	170	60	152	156	32	32	33	33	183	180	180
24	162	171	59	149	155	33	32	33	34	184	180	179
25	160	169	60	148	155	33	32	33	34	182	176	174
26	162	175	60	147	155	33	31	33	35	184	180	179
27	164	177	61	145	156	33	31	33	34	184	181	293
28	158	179	64	145	156	33	30	33	35	185	178	222
29	163	---	61	145	158	33	27	32	34	185	183	214
30	162	---	61	145	156	32	27	33	35	185	181	278
31	334	---	62	---	156	---	29	32	---	197	---	629
Total	5,230	5,647	2,440	4,623	4,776	1,017	984	994	1,036	7,520	6,102	6,583
Mean	169	202	79	154	154	34	32	32	35	243	203	212
Max	334	429	178	164	159	43	33	33	37	867	598	629
Min	155	169	59	145	137	32	27	29	32	87	169	166
Ac-ft	10,370	11,200	4,840	9,170	9,473	2,017	1,951	1,972	2,055	14,920	12,100	13,060

Note- October through December data provisional until approved by USGS

APPENDIX C

MEETING MINUTES OF THE PARTNERSHIP STEERING COMMITTEE

EBMUD Lodi Fisheries and Wildlife Office, 1 Winemaster Way, Unit K, Lodi, and MS Teams.

JSA Steering Committee Representatives: Morgan Kilgour, CDFW; Stephanie Milsap, USFWS; Mike Tognolini, EBMUD; Jonathan Ambrose, NMFS

JSA Coordinating Committee Representatives: Colin Purdy, CDFW; Geoff Steinhart, USFWS; Michelle Workman, EBMUD; ~~Monica Gutierrez, NMFS~~

Other guests: Jason Julianne, CDFW; Kendra Altnow, Lange Twins farm.

Meeting Minutes

Water Supply Update – Shirley Lu, EBMUD

- Mokelumne Precipitation – Rainfall Year 2023 total was 76.57” (159% of average), with over half falling in December and January.
- Water Year 2023 Total Runoff was 1,485 TAF (Average = 745); Total System Storage on Sept 30, 2023 was 630 TAF (Average = 630).
- Reviewed Camanche Reservoir and Mokelumne River temperatures.
- JSA Year Type Oct 23-Mar 24 = Normal and Above
- Precipitation for Rainfall Year 2024 through Dec 10 was 7.50” or 63% of average.
- Total System Storage as of 12/10/22 was 113% of average and 84% of capacity.
- Reviewed Water Supply Projections for Rainfall Year 2024.
- Camanche Release 2023-24 – meeting JSA minimum required flows. 60 TAF was released in pulse flows.
- Colin asked about the reservoir temperature turn-over date. Some time in November is normal.

Mokelumne Fisheries Review – Casey Del Real, EBMUD

- Brood Year 2022 Outmigration monitoring
 - The salmon outmigrant estimate for the upstream RST was 842,449. The salmon outmigrant estimate for the downstream RST was 184,242.
 - Upstream and Downstream salmon catch and abundance estimates were shared going back to 2009 (for the upstream trap) and 1999 (for the downstream trap).
 - Chinook salmon survival between the two traps was 22% in 2023.
- 2023 Habitat Restoration Actions
 - 800 cubic yards of cobble were placed in the Mokelumne River Day Use Area.
- Brood Year 2023 Escapement Monitoring
 - Fall Management Actions – Six Fall pulse flows plus increases to baseflows; 60,000 Acre Feet; source was flood control. DCC gates were closed 13 times during the salmon run this year, beginning September 5th. Gate closures were designed to meet regulatory requirements, not necessarily coordinated with Mokelumne pulses, but provided significant benefit.
 - As of 12/12/23, Chinook salmon escapement for the Mokelumne River was 27,669.
 - Brood Year 2023 Salmonid Redd Survey found 4,555 redds through 12/13/23; 93% of redds were in reach 6, the rest in reach 5. No *O.mykiss* redds detected yet.
- 2022 Hatchery Contributions
 - Mokelumne contributed 44% of the recreational catch and 51% of the commercial catch of Central Valley fall-run Chinook. Salmon fishing was closed for 2023 to protect Sacramento River fall-run Chinook salmon, which had near-record low escapement in 2022. due to the low Sacramento River index.

- Landowner Outreach
 - Three landowners interested in floodplain restoration. SJCOG interested in collaborating. 50 acres potential.
 - Two landowners interested in diversion screens; 270 water diversions along the LMR, ranked by the Relative Risk Model developed with USFWS.
- Presentations to the Buena Vista Rancheria of Me-Wuk Indians, who will be joining the MRTAC meetings, and EBMUD hosted a public “water walk” at the MRDUA / Hatchery.
- 2023 Acoustic Telemetry Study – third year of the study; preliminary 14.8% survival rate in a wet year.
- Steelhead Release Timing Study
- Thiamine deficiency – Colin brought up that 50% of Moke salmon had the deficiency, DFW is treating for the deficiency in all the state anadromous fish hatcheries. Not treating at Coleman.

MRFH Operations Update – Jason Julienne, CDFW and Michelle Workman, EBMUD

- Production goal of 9M smolts. Typical is 3.4M for EBMUD, 3.0 Enhancement fish, and this year added 2.4M for drought impacts.
- Will collect over 10M eggs to meet the 9 million goal.
- Wrapping up spawning next year (Jon: what?)
- CDFW responded to a USFWS request for egg transfer for Nimbus and Mokelumne. Three million green eggs from Mokelumne, and 2 million eyed eggs from Nimbus were transferred to Coleman.
- “More winter run than fall fun” in the upper Sacramento River, which is not good.

Partnership Fund update – Jon Bauer, EBMUD

- Fund balance is about \$100,000 as of December 2023.
- Over 50 projects in 23 years of the Fund
- The Lodi Education Legacy Project 2022-23 final report was sent to the PSC this summer.
- The UCSC/SWFSC Integrated Genetic and Phenotypic Analysis of Mokelumne River Hatchery Steelhead project is proceeding, and we should have a final report in summer of 2024.
- Kendra Altnow of Lange Twins farm presented on their multi-year native grassland pilot restoration project at a former vineyard section of their property. Goals include provide diverse, multi-season pollinator habitat and plan for seasonal flooding. Monitoring will include soil sampling and bird and insect surveying. Contracted with Miridae to provide native plant materials, and planting occurred in November 2023.
- The PSC just approved the Lodi Education Legacy Project 2023-24, which includes two new Meet Your Watershed videos and new walking “waterhood” tours using the PocketSights app.

Lower Mokelumne River Watershed Stewardship Steering Committee

- Continues to meet monthly.
- Supported nomination and award of annual stewardship award (“Beeler Award”) to the Lodi Sandhill Crane Association.
- This year started to include presentations on topics of interest during the meetings, such as on the SLEWS program, Woodbridge Irrigation District operations, etc.
- EBMUD fishery staff want to connect the Buena Vista Rancheria to the group.

SWRCB Delta Water Quality Control Plan Update – Michelle Workman, EBMUD

- Goal: Continue with current tributary governance. Staff are currently reviewing the scientific basis report.

1. Introductions	All	10
2. Water Supply Update	Chris Potter or staff, EBMUD	10
3. 2022/23 Mokelumne Fisheries Review a) 2023 Outmigration and Escapement, and final 2022 escapement numbers b) 2022/23 Redd Survey c) 2023 Habitat Restoration d) 2023 Management Actions e) Upcoming Year	Casey Del Real, EBMUD	30
4. 2023 MRFH Operations Summary a) 2023 Spawning b) Meeting Goals for enhancement and mitigation, drought recovery, Coleman transfers c) Planting Schedule d) Steelhead Program	EBMUD and CDFW	15
5. JSA Partnership Fund and Projects a) Fund balance b) Awarded Projects - Lodi Education Legacy 2022-23; done. - UCSC/SWFSC Integrated Genetic and Phenotypic Analysis of Mokelumne River Hatchery Steelhead - Lange Twins habitat restoration – presentation (Kendra Altnow) - New Projects – Lodi 23-24	Jon Bauer, EBMUD	15
6. Lower Mokelumne River Stewardship Group Update a. 2023 Stewardship Award winner	Jon Bauer, EBMUD	5
7. SWRCB Delta Water Quality Control Plan Update	Mike Tognolini and Michelle Workman	10
8. USFWS Updates		5
9. CDFW Updates		5
10. NMFS Updates		5
11. Other Related Activities, updates, open forum. EBMUD a) Water Supply b) Any other topics?	All	10
Meeting Adjournment		Total: 120

APPENDIX D

CORRESPONDENCE RELATED TO FALL 2023 ATTRACTION FLOW

From: Purdy, Colin@Wildlife <Colin.Purdy@wildlife.ca.gov>
Sent: Thursday, August 31, 2023 10:57 AM
To: Workman, Michelle <michelle.workman@ebmud.com>; jonathan.ambrose@noaa.gov; Monica Gutierrez <monica.gutierrez@noaa.gov>; Bauer, Nicolas@Wildlife <Nick.Bauer@Wildlife.ca.gov>; Steinhart, Geoffrey B <geoffrey_steinhardt@fws.gov>
Cc: Casey <caseydelreal@hotmail.com>; Davis-Fadtke, Kristal@Wildlife <Kristal.Davis-Fadtke@wildlife.ca.gov>
Subject: RE: PCC Pulse plan approval

Sorry for the slow response on this. Just wanted to chime in that CDFW supports the proposed plan. Quick question, has USBR been able to confirm they will have Delta conditions suitable for DCC gate closures during the weeks?

Thanks,

Colin Purdy, M.S.
Environmental Program Manager - Fisheries
CA Department of Fish and Wildlife, North Central Region
1701 Nimbus Rd., Rancho Cordova, CA 95670 | Office (916) 358-2943 | Cell (916) 704-2154 | Fax (916) 358-2912
Colin.Purdy@wildlife.ca.gov



From: Deon Bryant - NOAA Affiliate <deon.bryant@noaa.gov>
Sent: Tuesday, August 29, 2023 8:28 AM
To: Workman, Michelle <michelle.workman@ebmud.com>
Cc: Del Real, Casey <casey.delreal@ebmud.com>; Jonathan Ambrose - NOAA Federal <jonathan.ambrose@noaa.gov>; Monica Gutierrez - NOAA Federal <monica.gutierrez@noaa.gov>; Saldate, Matt <matthew.saldate@ebmud.com>
Subject: Re: PCC Pulse Plan Approval

Hi Michelle,

Thank you for the valuable insight into the background and reasoning for the upcoming plan.

NMFS has reviewed the information provided, and we are agreeable to the plan.

Best regards,

Deon

From: Steinhart, Geoffrey B <geoffrey_steinhardt@fws.gov>
Sent: Wednesday, August 23, 2023 12:24 PM
To: Workman, Michelle <michelle.workman@ebmud.com>; Jon Ambrose <jonathan.ambrose@noaa.gov>; Monica Guitierrez <monica.gutierrez@noaa.gov>; colin <colin.purdy@wildlife.ca.gov>; Bauer, Nick@Wildlife <Nick.Bauer@Wildlife.ca.gov>
Cc: Casey <caseydelreal@hotmail.com>
Subject: RE: [EXTERNAL] PCC Pulse plan approval

Hello PCC,

I am good with this plan. It sure is nice to have more water this year!

Cheers,
Geoff

From: Workman, Michelle <michelle.workman@ebmud.com>
Sent: Wednesday, August 23, 2023 9:56 AM
To: Jon Ambrose <jonathan.ambrose@noaa.gov>; Monica Guitierrez <monica.gutierrez@noaa.gov>; colin <colin.purdy@wildlife.ca.gov>; Bauer, Nick@Wildlife <Nick.Bauer@Wildlife.ca.gov>; Steinhart, Geoffrey B <geoffrey_steinhardt@fws.gov>
Cc: Casey <caseydelreal@hotmail.com>
Subject: [EXTERNAL] PCC Pulse plan approval

PCC voting members,

I have attached the proposed pulse plan for this fall. There was long discussion at the MRTAC this July, and this revised pulse plan takes that discussion into consideration. We believe this plan meets multiple needs: early pulse to not truncate the run, stay within flow rates that are managed by the barrier fence and considering downstream landowners, timed with weekday closures of DCC, and maximizes available water that needs to be evacuated before we hit our November 5th storage target to comply with ACOE requirements.

Because the first pulse starts on the 21st (just 3 days after the scheduled PCC meeting), we are sending the plan early in case there are any issues that the voting group would like to address and resolve before the meeting. If you do not see any issues, we will plan to implement this plan on the 21st and inform the larger group of our discussion at the PCC meeting.

Thank you for any input you may have.

Michelle

Michelle Workman
Manager of Fisheries and Wildlife
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michelle.workman@ebmud.com / she/her/hers