DOCS #3001719

Lower Mokelumne River Project

FERC Project No. 2916

2022 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 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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
SJCRCD	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 (2022), and those that it plans to implement in the current calendar year (2023), 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 Report[1] for 2022. EBMUD actions in 2022 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 2021).

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 2022 calendar year and efforts planned for 2023.
- Section V contains the appendices.

III. STATUS OF THE LOWER MOKELUMNE RIVER SALMON POPULATION

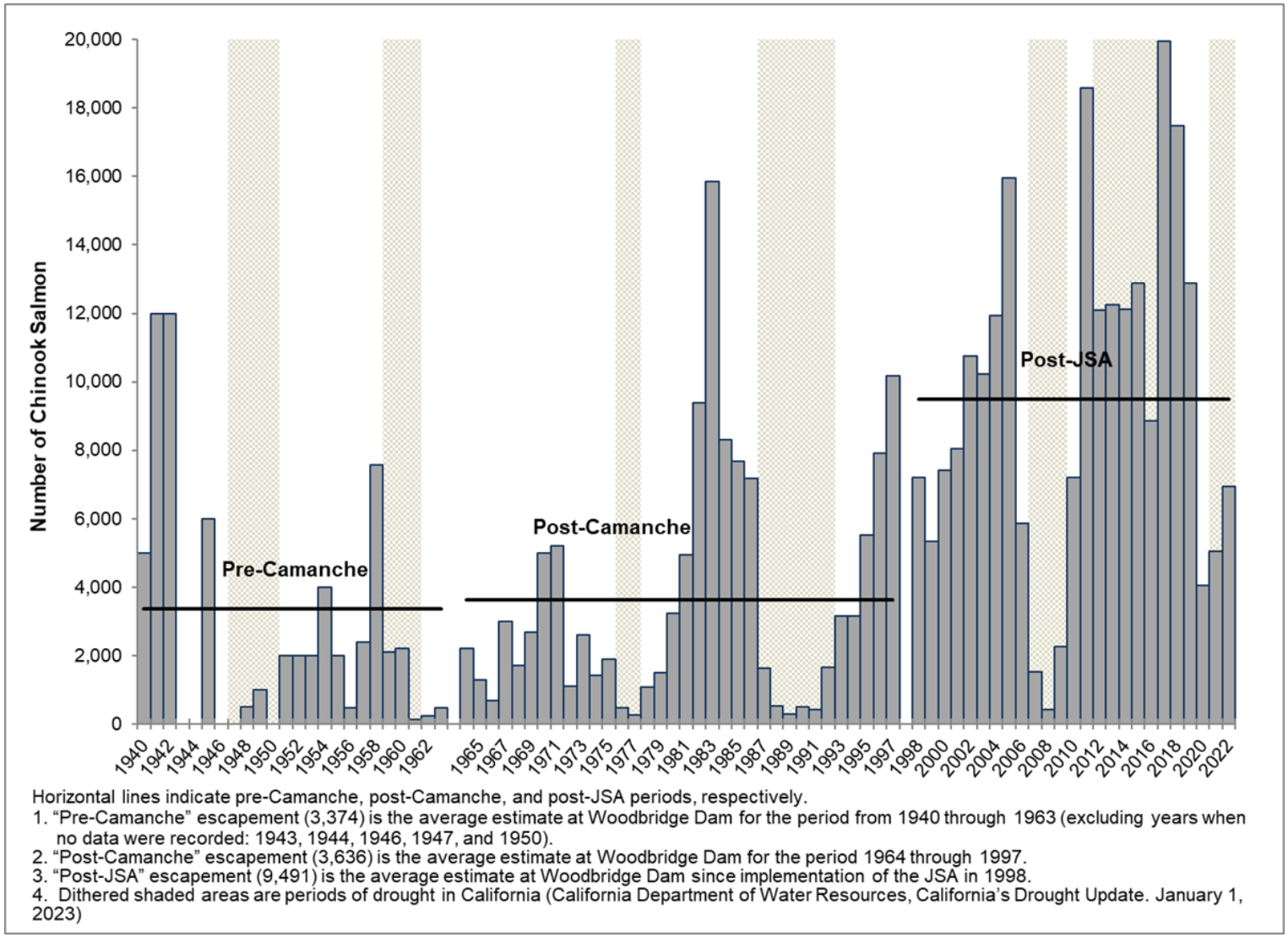
Through the 1990s and into 2022, the lower Mokelumne River Chinook salmon population continues to demonstrate characteristics consistent with long-term sustainability. As of December 31, 2022, the Mokelumne River fall-run Chinook salmon escapement for Brood Year 2022 was 6,928 (Table 1 and Figure 1). EBMUD and Woodbridge Irrigation District (WID) continue to work cooperatively in managing operations to maximize the accuracy of monitoring systems.

Table 1: Lower Mokelumne River Fall-Run Chinook Salmon Data, 1989–2022

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[4]	3,882	57,533	6,928	5,014	1,914	28	849

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.



Horizontal lines indicate pre-Camanche, post-Camanche, and post-JSA periods, respectively.
1. "Pre-Camanche" escapement (3,374) is the average estimate at Woodbridge Dam for the period from 1940 through 1963 (excluding years when no data were recorded: 1943, 1944, 1946, 1947, and 1950).
2. "Post-Camanche" escapement (3,636) is the average estimate at Woodbridge Dam for the period 1964 through 1997.
3. "Post-JSA" escapement (9,491) is the average estimate at Woodbridge Dam since implementation of the JSA in 1998.
4. Dithered shaded areas are periods of drought in California (California Department of Water Resources, California's Drought Update. January 1, 2023)

Figure 1: Estimated Annual Spawning Escapement of Fall-Run Chinook Salmon in the Lower Mokelumne River, 1940–2022

Eight of the past twelve 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 2018. The trend of above average returns is indicative of positive response to the adaptive management actions (discussed in later sections) implemented during 2009–2022.

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.

However, the 2022 Mokelumne River salmon escapement was lower than expected. Lower than expected returns were not confined to the Mokelumne River, but a large issue throughout the Central Valley with most rivers reporting lower overall escapement estimates. While the causes are currently unknown, overfishing from the commercial fishery and ongoing thiamine issues have been proposed.

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 long-term nature of the egg importation ban, EBMUD and CDFW are focused on achieving hatchery production goals through spawning only Mokelumne-origin fish returning to MRFH. From October 2022 through December 28, 2022, approximately 1,914 salmon spawned within the river, constructing approximately 849 redds (nests) in the 10-mile reach below Camanche Dam (Figure 2). Based on salmon emergence temperature models the peak of Brood Year 2022 fry emergence will occur during the first two weeks of March 2023 and be completed by early April 2023.

Outmigrating juvenile salmon from Brood Year 2021 were sampled at the beginning of 2022 through spring. The estimated outmigration of juvenile salmon in 2022 was 61,415 (Table 1).

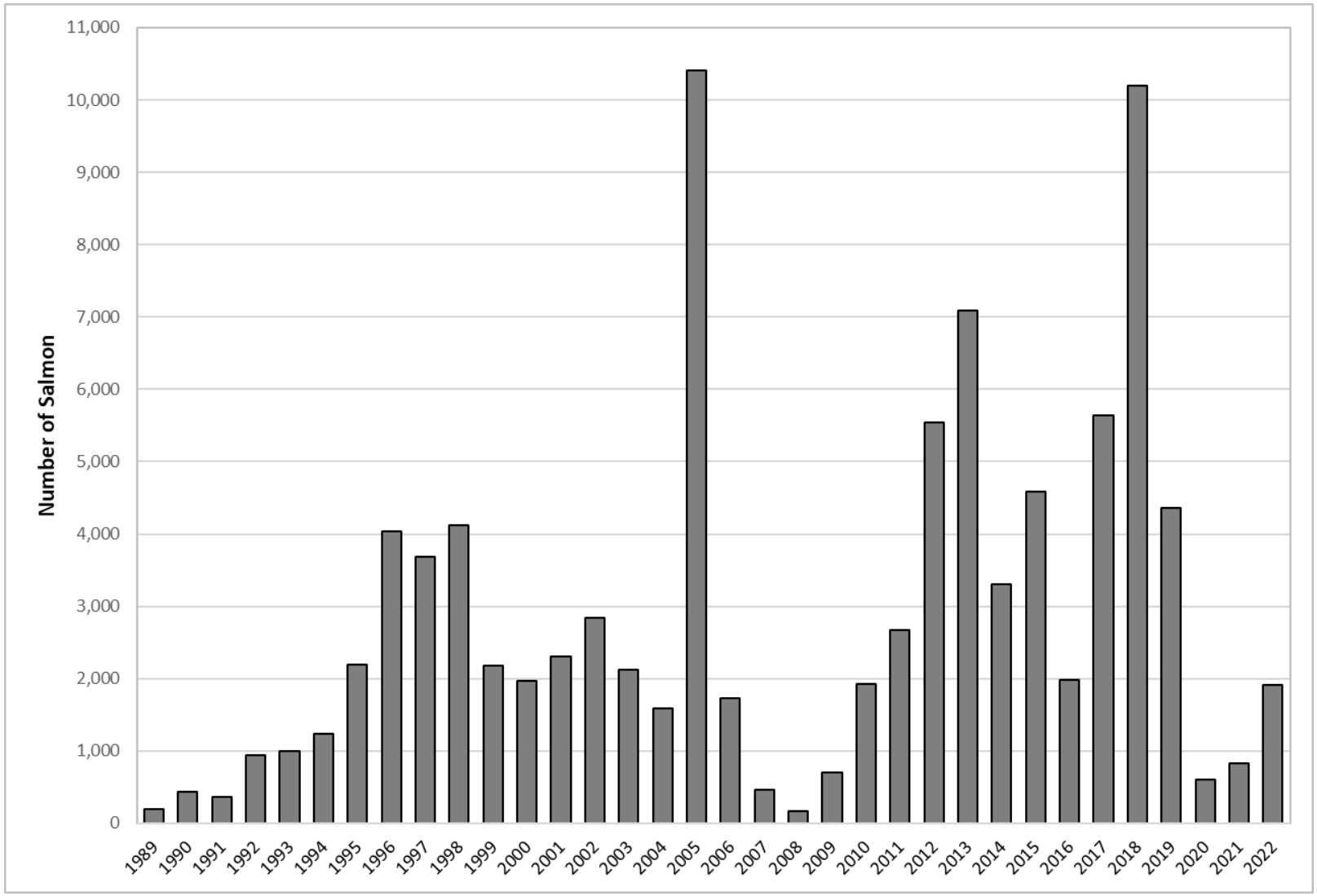


Figure 2: Fall-Run Chinook Salmon Naturally Spawning in the Lower Mokelumne River, 1989–2022

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 2022, and those actions planned for 2023, 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 2022 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 2022 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, 2021[2], EBMUD provided "Dry" JSA water year type Camanche dam flow releases from October 1, 2021 through March 31, 2022.

Based on the California Department of Water Resources (DWR) April 1, 2022 forecast of 440,000 acre-feet of unimpaired runoff into Pardee Reservoir, EBMUD operated under a "Dry" JSA water year type for Camanche Dam flow releases from April 1, 2022 through September 30, 2022. Actual runoff for Water Year 2022 was 456,000 acre-feet. EBMUD is making, at a minimum, "Dry" JSA water year type Camanche Dam flow releases from October 1, 2022 through March 31, 2023. This is based on EBMUD's total Pardee and Camanche Reservoir storage on November 5, 2022[3].

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 2022, because water year conditions were dry; EBMUD maintained Camanche releases at the JSA minimum flows in the spring, summer, and fall (with the exception of pulse flows during operations in the fall, as described in the section below). Pursuant to Condition 5 of D-1641, flows were adaptively managed in March of 2022. Camanche releases were reduced by 30 cubic feet per second, which conserved 1,794 acre-feet of water for the pulse flows released in October 2022.

The fall pulse attraction flows were a result of successful collaboration between several different agencies and stakeholders, primarily through the Partnership Coordinating Committee (PCC). Due to the dry conditions in 2022, flood control releases were not available for fall pulse flows. However, the Camanche Permit Extension (CPE) Mitigation Measure FISH-1 requires the release of up to 2,000 acre-feet of additional water above

[2] Pardee and Camanche Reservoir actual total storage on November 5, 2021 was 333,160 acre-feet.
[3] Actual Pardee and Camanche reservoir storage on November 5, 2022 was 389,940 acre-feet.

required releases during the September through February period in Below Normal and Dry water years to facilitate adult salmonid fish passage below Woodbridge Dam. 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).

Water for 2022 pulse flows came from releases from the CPE FISH-1 requirement, 1,794 acre-feet from adaptive management, as well as an additional 8,442 acre-feet of gainsharing releases to support the Lower Mokelumne fishery. Three pulses were planned for October. The first pulse had a peak flow of 1,000 cubic feet per second (cfs), the second peaked at 1,260, and third pulses had peak flows of 825 cfs, while the base flow between pulse events was increased to 300 cfs.

4. Coordination with PCC

As further described in the Adaptive Management and Pulse Flow Operations sections of this report, EBMUD's 2022 flow operations included close coordination with the PCC and EBMUD's Fisheries and Wildlife Division to utilize necessary CPE Mitigation releases to provide three pulses for salmon attraction during adult up-migration. Through EBMUD coordination with the PCC, this management strategy made efficient use of CPE Mitigation releases. 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 2022 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 a temporary excursion from agreed release below Camanche. The average daily flows below Camanche Dam did not fall below the required minimum daily flow. The excursion is included in Appendix B (Table B-1) of this report.

Calendar year 2022 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 temporary excursions and one deviation from expected minimum flows below Woodbridge Dam. The average daily flows below Woodbridge Dam did fall below the required minimum daily flow on May 4. EBMUD notified WID of negative shift for target elevation at GOLF measuring point, and, although WID did not immediately make the operational

changes, WID did later increase flow releases and the adjustments made brought operation back in compliance.

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. The excursions and deviation at EBMUD's gaging station, USGS No. 11325500 ("Mokelumne River below Woodbridge Dam") are included in Appendix B (Tables B-2 through B-4) of this report.

Table 2: Calendar Year 2022 Average Daily Release in Cubic Feet per Second from Camanche Dam

Date	Actual Camanche Release	JSA Agreed Release	Date	Actual Camanche Release	JSA Agreed Release	Date	Actual Camanche Release	JSA Agreed Release	Date	Actual Camanche Release	JSA Agreed Release	Date	Actual Camanche Release	JSA Agreed Release
1/1/2022	225	220	3/16/2022	234	190	5/29/2022	361	220	8/11/2022	345	100	10/24/2022	301	220
1/2/2022	224	220	3/17/2022	216	190	5/30/2022	360	220	8/12/2022	345	100	10/25/2022	299	220
1/3/2022	225	220	3/18/2022	215	190	5/31/2022	336	220	8/13/2022	345	100	10/26/2022	301	220
1/4/2022	225	220	3/19/2022	215	190	6/1/2022	244	100	8/14/2022	345	100	10/27/2022	303	220
1/5/2022	225	220	3/20/2022	215	190	6/2/2022	225	100	8/15/2022	345	100	10/28/2022	300	220
1/6/2022	225	220	3/21/2022	215	190	6/3/2022	227	100	8/16/2022	355	100	10/29/2022	300	220
1/7/2022	225	220	3/22/2022	214	190	6/4/2022	225	100	8/17/2022	361	100	10/30/2022	302	220
1/8/2022	225	220	3/23/2022	215	190	6/5/2022	225	100	8/18/2022	367	100	10/31/2022	592	220
1/9/2022	226	220	3/24/2022	221	190	6/6/2022	235	100	8/19/2022	370	100	11/1/2022	651	220
1/10/2022	226	220	3/25/2022	230	190	6/7/2022	245	100	8/20/2022	370	100	11/2/2022	367	220
1/11/2022	226	220	3/26/2022	229	190	6/8/2022	255	100	8/21/2022	369	100	11/3/2022	225	220
1/12/2022	228	220	3/27/2022	230	190	6/9/2022	255	100	8/22/2022	370	100	11/4/2022	225	220
1/13/2022	225	220	3/28/2022	220	190	6/10/2022	254	100	8/23/2022	370	100	11/5/2022	225	220
1/14/2022	225	220	3/29/2022	201	190	6/11/2022	254	100	8/24/2022	367	100	11/6/2022	225	220
1/15/2022	225	220	3/30/2022	200	190	6/12/2022	255	100	8/25/2022	356	100	11/7/2022	224	220
1/16/2022	225	220	3/31/2022	257	190	6/13/2022	265	100	8/26/2022	349	100	11/8/2022	225	220
1/17/2022	225	220	4/1/2022	301	220	6/14/2022	269	100	8/27/2022	341	100	11/9/2022	225	220
1/18/2022	225	220	4/2/2022	300	220	6/15/2022	271	100	8/28/2022	341	100	11/10/2022	225	220
1/19/2022	224	220	4/3/2022	299	220	6/16/2022	273	100	8/29/2022	341	100	11/11/2022	225	220
1/20/2022	225	220	4/4/2022	300	220	6/17/2022	278	100	8/30/2022	339	100	11/12/2022	224	220
1/21/2022	225	220	4/5/2022	299	220	6/18/2022	280	100	8/31/2022	340	100	11/13/2022	225	220
1/22/2022	225	220	4/6/2022	299	220	6/19/2022	280	100	9/1/2022	340	100	11/14/2022	226	220
1/23/2022	224	220	4/7/2022	298	220	6/20/2022	281	100	9/2/2022	336	100	11/15/2022	225	220
1/24/2022	225	220	4/8/2022	299	220	6/21/2022	279	100	9/3/2022	325	100	11/16/2022	224	220
1/25/2022	225	220	4/9/2022	299	220	6/22/2022	280	100	9/4/2022	325	100	11/17/2022	225	220
1/26/2022	225	220	4/10/2022	299	220	6/23/2022	280	100	9/5/2022	325	100	11/18/2022	225	220
1/27/2022	225	220	4/11/2022	300	220	6/24/2022	280	100	9/6/2022	325	100	11/19/2022	224	220
1/28/2022	226	220	4/12/2022	302	220	6/25/2022	280	100	9/7/2022	325	100	11/20/2022	224	220
1/29/2022	226	220	4/13/2022	299	220	6/26/2022	281	100	9/8/2022	317	100	11/21/2022	225	220
1/30/2022	226	220	4/14/2022	299	220	6/27/2022	282	100	9/9/2022	310	100	11/22/2022	225	220
1/31/2022	225	220	4/15/2022	299	220	6/28/2022	280	100	9/10/2022	310	100	11/23/2022	225	220
2/1/2022	224	220	4/16/2022	299	220	6/29/2022	280	100	9/11/2022	310	100	11/24/2022	225	220
2/2/2022	225	220	4/17/2022	300	220	6/30/2022	280	100	9/12/2022	301	100	11/25/2022	226	220
2/3/2022	225	220	4/18/2022	301	220	7/1/2022	280	100	9/13/2022	286	100	11/26/2022	225	220
2/4/2022	225	220	4/19/2022	292	220	7/2/2022	280	100	9/14/2022	277	100	11/27/2022	225	220
2/5/2022	225	220	4/20/2022	284	220	7/3/2022	281	100	9/15/2022	278	100	11/28/2022	224	220
2/6/2022	225	220	4/21/2022	285	220	7/4/2022	281	100	9/16/2022	272	100	11/29/2022	225	220
2/7/2022	226	220	4/22/2022	285	220	7/5/2022	280	100	9/17/2022	264	100	11/30/2022	225	220
2/8/2022	227	220	4/23/2022	285	220	7/6/2022	280	100	9/18/2022	265	100	12/1/2022	224	220
2/9/2022	226	220	4/24/2022	285	220	7/7/2022	281	100	9/19/2022	262	100	12/2/2022	224	220
2/10/2022	225	220	4/25/2022	285	220	7/8/2022	285	100	9/20/2022	251	100	12/3/2022	225	220
2/11/2022	225	220	4/26/2022	285	220	7/9/2022	294	100	9/21/2022	252	100	12/4/2022	226	220
2/12/2022	226	220	4/27/2022	285	220	7/10/2022	296	100	9/22/2022	252	100	12/5/2022	225	220
2/13/2022	226	220	4/28/2022	291	220	7/11/2022	295	100	9/23/2022	256	100	12/6/2022	225	220
2/14/2022	227	220	4/29/2022	295	220	7/12/2022	304	100	9/24/2022	265	100	12/7/2022	226	220
2/15/2022	227	220	4/30/2022	295	220	7/13/2022	310	100	9/25/2022	265	100	12/8/2022	226	220
2/16/2022	225	220	5/1/2022	295	220	7/14/2022	311	100	9/26/2022	265	100	12/9/2022	226	220
2/17/2022	225	220	5/2/2022	303	220	7/15/2022	310	100	9/27/2022	265	100	12/10/2022	226	220
2/18/2022	225	220	5/3/2022	310	220	7/16/2022	310	100	9/28/2022	258	100	12/11/2022	226	220
2/19/2022	225	220	5/4/2022	321	220	7/17/2022	310	100	9/29/2022	245	100	12/12/2022	226	220
2/20/2022	224	220	5/5/2022	341	220	7/18/2022	311	100	9/30/2022	246	100	12/13/2022	225	220
2/21/2022	225	220	5/6/2022	362	220	7/19/2022	310	100	10/1/2022	231	220	12/14/2022	225	220
2/22/2022	225	220	5/7/2022	370	220	7/20/2022	310	100	10/2/2022	224	220	12/15/2022	224	220
2/23/2022	226	220	5/8/2022	371	220	7/21/2022	311	100	10/3/2022	613	220	12/16/2022	225	220
2/24/2022	225	220	5/9/2022	370	220	7/22/2022	310	100	10/4/2022	824	220	12/17/2022	225	220
2/25/2022	226	220	5/10/2022	370	220	7/23/2022	310	100	10/5/2022	528	220	12/18/2022	225	220
2/26/2022	226	220	5/11/2022	370	220	7/24/2022	310	100	10/6/2022	334	220	12/19/2022	224	220
2/27/2022	225	220	5/12/2022	370	220	7/25/2022	310	100	10/7/2022	300	220	12/20/2022	225	220
2/28/2022	225	220	5/13/2022	362	220	7/26/2022	315	100	10/8/2022	300	220	12/21/2022	226	220
3/1/2022	203	190	5/14/2022	366	220	7/27/2022	320	100	10/9/2022	301	220	12/22/2022	225	220
3/2/2022	195	190	5/15/2022	360	220	7/28/2022	322	100	10/10/2022	301	220	12/23/2022	225	220
3/3/2022	195	190	5/16/2022	357	220	7/29/2022	330	100	10/11/2022	301	220	12/24/2022	225	220
3/4/2022	224	190	5/17/2022	351	220	7/30/2022	335	100	10/12/2022	299	220	12/25/2022	225	220
3/5/2022	245	190	5/18/2022	350	220	7/31/2022	335	100	10/13/2022	302	220	12/26/2022	225	220
3/6/2022	245	190	5/19/2022	356	220	8/1/2022	336	100	10/14/2022	302	220	12/27/2022	225	220
3/7/2022	245	190	5/20/2022	368	220	8/2/2022	336	100	10/15/2022	301	220	12/28/2022	226	220
3/8/2022	246	190	5/21/2022	374	220	8/3/2022	336	100	10/16/2022	300	220	12/29/2022	225	220
3/9/2022	245	190	5/22/2022	374	220	8/4/2022	334	100	10/17/2022	744	220	12/30/2022	225	220
3/10/2022	244	190	5/23/2022	374	220	8/5/2022	335	100	10/18/2022	1125	220	12/31/2022	225	220
3/11/2022	244	190	5/24/2022	374	220	8/6/2022	335	100	10/19/2022	823	220			
3/12/2022	245	190	5/25/2022	375	220	8/7/2022	335	100	10/20/2022	524	220			
3/13/2022	245	190	5/26/2022	375	220	8/8/2022	335	100	10/21/2022	320	220			
3/14/2022	244	190	5/27/2022	366	220	8/9/2022	338	100	10/22/2022	300	220			
3/15/2022	245	190	5/28/2022	360	220	8/10/2022	345	100	10/23/2022	301	220			

1. Flow measured using Accusonic Flow meter (USGS Gage #11323500 - Mokelumne River below Camanche Dam
2. Actual flow data has not yet been verified and published by the U.S. Geological Survey

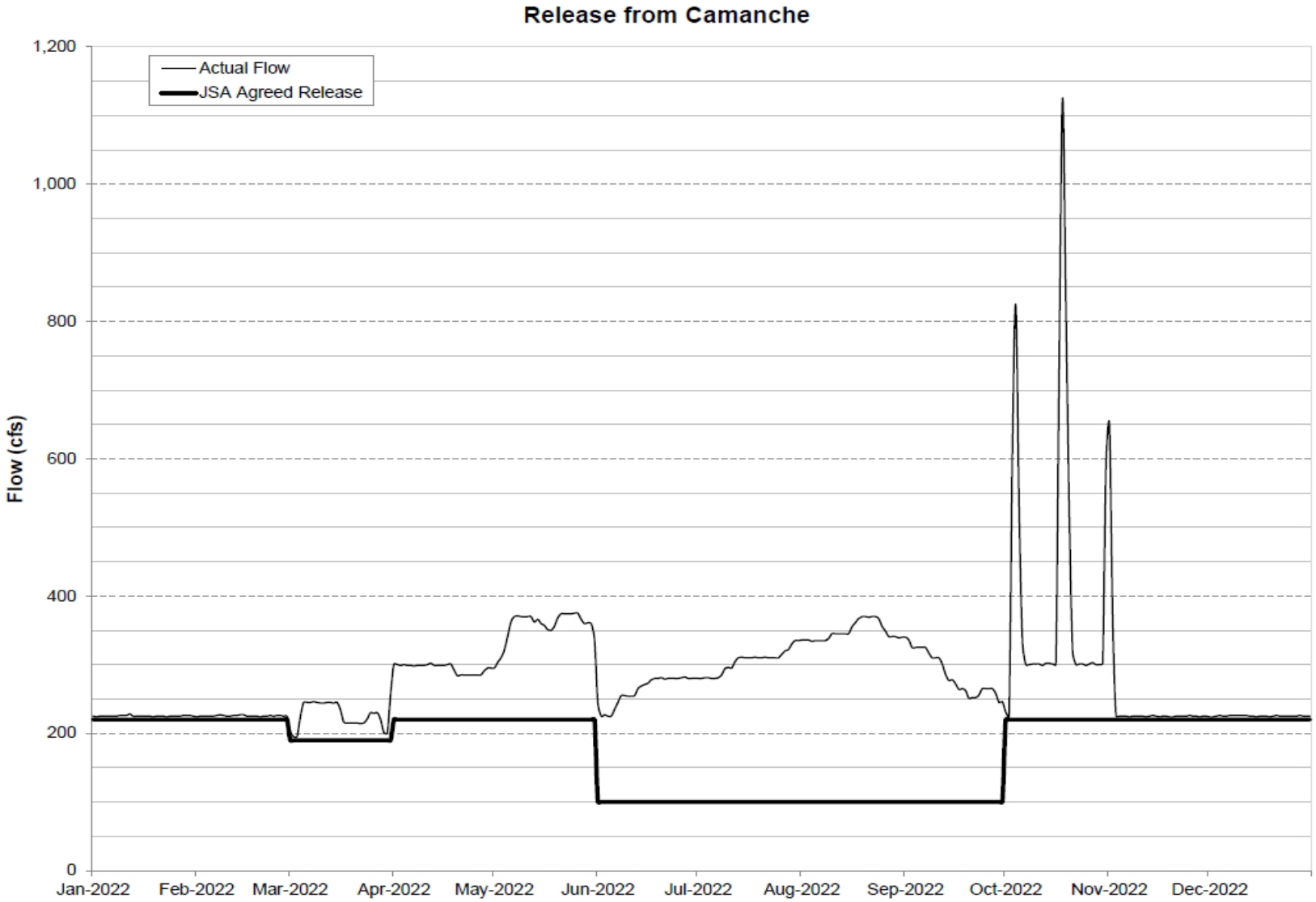


Figure 3: Calendar Year 2022 Average Daily Release in Cubic Feet per Second from Camanche Dam

Table 3: Calendar Year 2022 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow
1/1/2022	174	80	3/16/2022	66	50	5/29/2022	170	150	8/11/2022	32	20	10/24/2022	156	80
1/2/2022	163	80	3/17/2022	65	50	5/30/2022	168	150	8/12/2022	32	20	10/25/2022	155	80
1/3/2022	173	80	3/18/2022	65	50	5/31/2022	167	150	8/13/2022	32	20	10/26/2022	157	80
1/4/2022	167	80	3/19/2022	65	50	6/1/2022	43	20	8/14/2022	32	20	10/27/2022	157	80
1/5/2022	165	80	3/20/2022	67	50	6/2/2022	35	20	8/15/2022	32	20	10/28/2022	158	80
1/6/2022	171	80	3/21/2022	62	50	6/3/2022	34	20	8/16/2022	32	20	10/29/2022	157	80
1/7/2022	162	80	3/22/2022	60	50	6/4/2022	35	20	8/17/2022	31	20	10/30/2022	157	80
1/8/2022	164	80	3/23/2022	60	50	6/5/2022	35	20	8/18/2022	29	20	10/31/2022	171	80
1/9/2022	161	80	3/24/2022	59	50	6/6/2022	35	20	8/19/2022	30	20	11/1/2022	524	80
1/10/2022	162	80	3/25/2022	60	50	6/7/2022	34	20	8/20/2022	32	20	11/2/2022	423	80
1/11/2022	163	80	3/26/2022	60	50	6/8/2022	34	20	8/21/2022	32	20	11/3/2022	196	80
1/12/2022	163	80	3/27/2022	61	50	6/9/2022	33	20	8/22/2022	33	20	11/4/2022	165	80
1/13/2022	165	80	3/28/2022	64	50	6/10/2022	32	20	8/23/2022	33	20	11/5/2022	161	80
1/14/2022	164	80	3/29/2022	61	50	6/11/2022	32	20	8/24/2022	33	20	11/6/2022	166	80
1/15/2022	163	80	3/30/2022	61	50	6/12/2022	33	20	8/25/2022	33	20	11/7/2022	172	80
1/16/2022	161	80	3/31/2022	62	50	6/13/2022	33	20	8/26/2022	33	20	11/8/2022	195	80
1/17/2022	161	80	4/1/2022	157	150	6/14/2022	32	20	8/27/2022	33	20	11/9/2022	165	80
1/18/2022	164	80	4/2/2022	164	150	6/15/2022	32	20	8/28/2022	33	20	11/10/2022	154	80
1/19/2022	163	80	4/3/2022	163	150	6/16/2022	33	20	8/29/2022	32	20	11/11/2022	157	80
1/20/2022	158	80	4/4/2022	164	150	6/17/2022	33	20	8/30/2022	32	20	11/12/2022	156	80
1/21/2022	164	80	4/5/2022	161	150	6/18/2022	34	20	8/31/2022	32	20	11/13/2022	165	80
1/22/2022	159	80	4/6/2022	160	150	6/19/2022	37	20	9/1/2022	32	20	11/14/2022	160	80
1/23/2022	155	80	4/7/2022	158	150	6/20/2022	42	20	9/2/2022	33	20	11/15/2022	164	80
1/24/2022	162	80	4/8/2022	160	150	6/21/2022	32	20	9/3/2022	34	20	11/16/2022	164	80
1/25/2022	160	80	4/9/2022	160	150	6/22/2022	32	20	9/4/2022	35	20	11/17/2022	159	80
1/26/2022	162	80	4/10/2022	161	150	6/23/2022	32	20	9/5/2022	36	20	11/18/2022	163	80
1/27/2022	164	80	4/11/2022	162	150	6/24/2022	33	20	9/6/2022	35	20	11/19/2022	169	80
1/28/2022	158	80	4/12/2022	160	150	6/25/2022	33	20	9/7/2022	35	20	11/20/2022	160	80
1/29/2022	163	80	4/13/2022	159	150	6/26/2022	33	20	9/8/2022	34	20	11/21/2022	164	80
1/30/2022	162	80	4/14/2022	158	150	6/27/2022	33	20	9/9/2022	34	20	11/22/2022	163	80
1/31/2022	334	80	4/15/2022	159	150	6/28/2022	33	20	9/10/2022	35	20	11/23/2022	164	80
2/1/2022	429	80	4/16/2022	160	150	6/29/2022	33	20	9/11/2022	35	20	11/24/2022	164	80
2/2/2022	348	80	4/17/2022	160	150	6/30/2022	32	20	9/12/2022	35	20	11/25/2022	160	80
2/3/2022	261	80	4/18/2022	159	150	7/1/2022	32	20	9/13/2022	34	20	11/26/2022	165	80
2/4/2022	220	80	4/19/2022	160	150	7/2/2022	32	20	9/14/2022	34	20	11/27/2022	166	80
2/5/2022	204	80	4/20/2022	158	150	7/3/2022	33	20	9/15/2022	35	20	11/28/2022	162	80
2/6/2022	199	80	4/21/2022	161	150	7/4/2022	33	20	9/16/2022	35	20	11/29/2022	168	80
2/7/2022	196	80	4/22/2022	159	150	7/5/2022	33	20	9/17/2022	35	20	11/30/2022	165	80
2/8/2022	190	80	4/23/2022	158	150	7/6/2022	32	20	9/18/2022	35	20	12/1/2022	212	80
2/9/2022	190	80	4/24/2022	157	150	7/7/2022	32	20	9/19/2022	36	20	12/2/2022	161	80
2/10/2022	186	80	4/25/2022	156	150	7/8/2022	32	20	9/20/2022	37	20	12/3/2022	236	80
2/11/2022	186	80	4/26/2022	155	150	7/9/2022	33	20	9/21/2022	34	20	12/4/2022	209	80
2/12/2022	186	80	4/27/2022	155	150	7/10/2022	32	20	9/22/2022	34	20	12/5/2022	174	80
2/13/2022	186	80	4/28/2022	155	150	7/11/2022	32	20	9/23/2022	33	20	12/6/2022	161	80
2/14/2022	186	80	4/29/2022	155	150	7/12/2022	32	20	9/24/2022	34	20	12/7/2022	171	80
2/15/2022	175	80	4/30/2022	155	150	7/13/2022	32	20	9/25/2022	34	20	12/8/2022	163	80
2/16/2022	184	80	5/1/2022	155	150	7/14/2022	33	20	9/26/2022	34	20	12/9/2022	164	80
2/17/2022	184	80	5/2/2022	152	150	7/15/2022	32	20	9/27/2022	34	20	12/10/2022	255	80
2/18/2022	183	80	5/3/2022	150	150	7/16/2022	33	20	9/28/2022	35	20	12/11/2022	202	80
2/19/2022	182	80	5/4/2022	149	150	7/17/2022	33	20	9/29/2022	34	20	12/12/2022	172	80
2/20/2022	179	80	5/5/2022	163	150	7/18/2022	33	20	9/30/2022	35	20	12/13/2022	170	80
2/21/2022	178	80	5/6/2022	166	150	7/19/2022	32	20	10/1/2022	89	80	12/14/2022	234	80
2/22/2022	174	80	5/7/2022	169	150	7/20/2022	32	20	10/2/2022	89	80	12/15/2022	152	80
2/23/2022	170	80	5/8/2022	171	150	7/21/2022	32	20	10/3/2022	107	80	12/16/2022	152	80
2/24/2022	171	80	5/9/2022	171	150	7/22/2022	32	20	10/4/2022	671	80	12/17/2022	152	80
2/25/2022	169	80	5/10/2022	168	150	7/23/2022	32	20	10/5/2022	507	80	12/18/2022	152	80
2/26/2022	175	80	5/11/2022	170	150	7/24/2022	32	20	10/6/2022	274	80	12/19/2022	153	80
2/27/2022	177	80	5/12/2022	168	150	7/25/2022	32	20	10/7/2022	162	80	12/20/2022	152	80
2/28/2022	179	80	5/13/2022	168	150	7/26/2022	31	20	10/8/2022	157	80	12/21/2022	165	80
3/1/2022	178	50	5/14/2022	166	150	7/27/2022	31	20	10/9/2022	156	80	12/22/2022	161	80
3/2/2022	157	50	5/15/2022	167	150	7/28/2022	30	20	10/10/2022	157	80	12/23/2022	164	80
3/3/2022	126	50	5/16/2022	168	150	7/29/2022	27	20	10/11/2022	158	80	12/24/2022	163	80
3/4/2022	87	50	5/17/2022	167	150	7/30/2022	27	20	10/12/2022	158	80	12/25/2022	158	80
3/5/2022	95	50	5/18/2022	166	150	7/31/2022	29	20	10/13/2022	158	80	12/26/2022	165	80
3/6/2022	79	50	5/19/2022	166	150	8/1/2022	32	20	10/14/2022	159	80	12/27/2022	282	80
3/7/2022	81	50	5/20/2022	166	150	8/2/2022	32	20	10/15/2022	159	80	12/28/2022	207	80
3/8/2022	79	50	5/21/2022	167	150	8/3/2022	32	20	10/16/2022	158	80	12/29/2022	202	80
3/9/2022	81	50	5/22/2022	169	150	8/4/2022	32	20	10/17/2022	171	80	12/30/2022	269	80
3/10/2022	75	50	5/23/2022	168	150	8/5/2022	32	20	10/18/2022	808	80	12/31/2022	628	80
3/11/2022	75	50	5/24/2022	166	150	8/6/2022	32	20	10/19/2022	755	80			
3/12/2022	75	50	5/25/2022	166	150	8/7/2022	32	20	10/20/2022	500	80			
3/13/2022	82	50	5/26/2022	167	150	8/8/2022	32	20	10/21/2022	258	80			
3/14/2022	89	50	5/27/2022	168	150	8/9/2022	31	20	10/22/2022	159	80			
3/15/2022	83	50	5/28/2022	168	150	8/10/2022	31	20	10/23/2022	156	80			

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

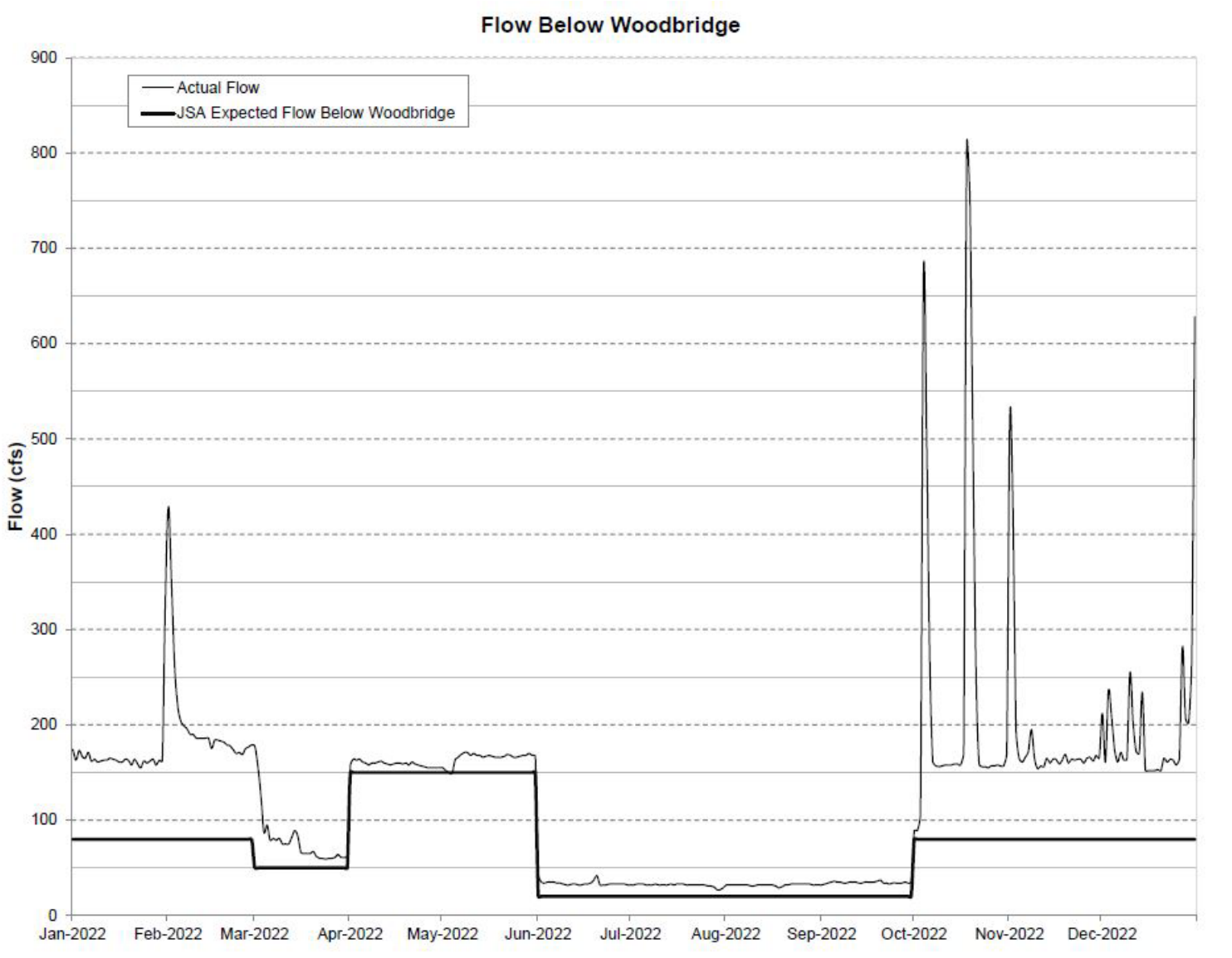


Figure 4: Calendar Year 2022 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

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 2022, 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 2022, DCC gates were closed nine times between October and November and remained closed following the November 28th 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 2022, approximately 42% of up-migrating Mokelumne River hatchery reared salmon strayed to the Sacramento River watershed, based on preliminary coded wire tag recovery data. EBMUD coordinated with USBR for DCC gate closures to reduce straying, but weekly DCC gate openings still occurred to support weekend recreational boating. Weekly gate openings could be contributing to the elevated rate of Mokelumne origin salmon straying north into the Sacramento River watershed. In order to limit the amount of straying to San Joaquin tributaries, EBMUD coordinated pulse flow release timing with the Stanislaus, Tuolumne, and Merced Rivers. However, 11% of Mokelumne River hatchery origin salmon strayed to San Joaquin River tributaries. Many factors play a role in annual escapement numbers to the Mokelumne River. It is currently unknown what specific factors caused the high stray rate in 2022.

[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.

However, differences between Mokelumne River mitigation and enhancement program salmon straying rates also contributed to elevated rates of straying. The Mokelumne origin ocean enhancement program fish strayed into the American River at higher rates than mitigation program fish, and the reverse was true for the San Joaquin River tributaries with more salmon from the mitigation releases straying to the south than salmon from the enhancement releases.

2023 Release Requirements

EBMUD is committed, pursuant to the FERC Order, to "Dry" JSA year type Camanche Dam flow releases through March 31, 2023, with adjustments made in timing due to approved adaptive management actions. 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, 2023 through September 30, 2023 based on the DWR forecasted unimpaired runoff into Pardee Reservoir as identified in the April 1, 2023 DWR Bulletin 120. EBMUD will report to the FERC in the February 2023 report on the flow releases made in accordance with the JSA during the entire calendar year 2022. EBMUD will include finalized flow data in an Appendix of the report as it is verified and published by USGS. Refer to Appendix C (Tables C-1 through C-4) for finalized flow data for the 2020 and 2021 calendar years.

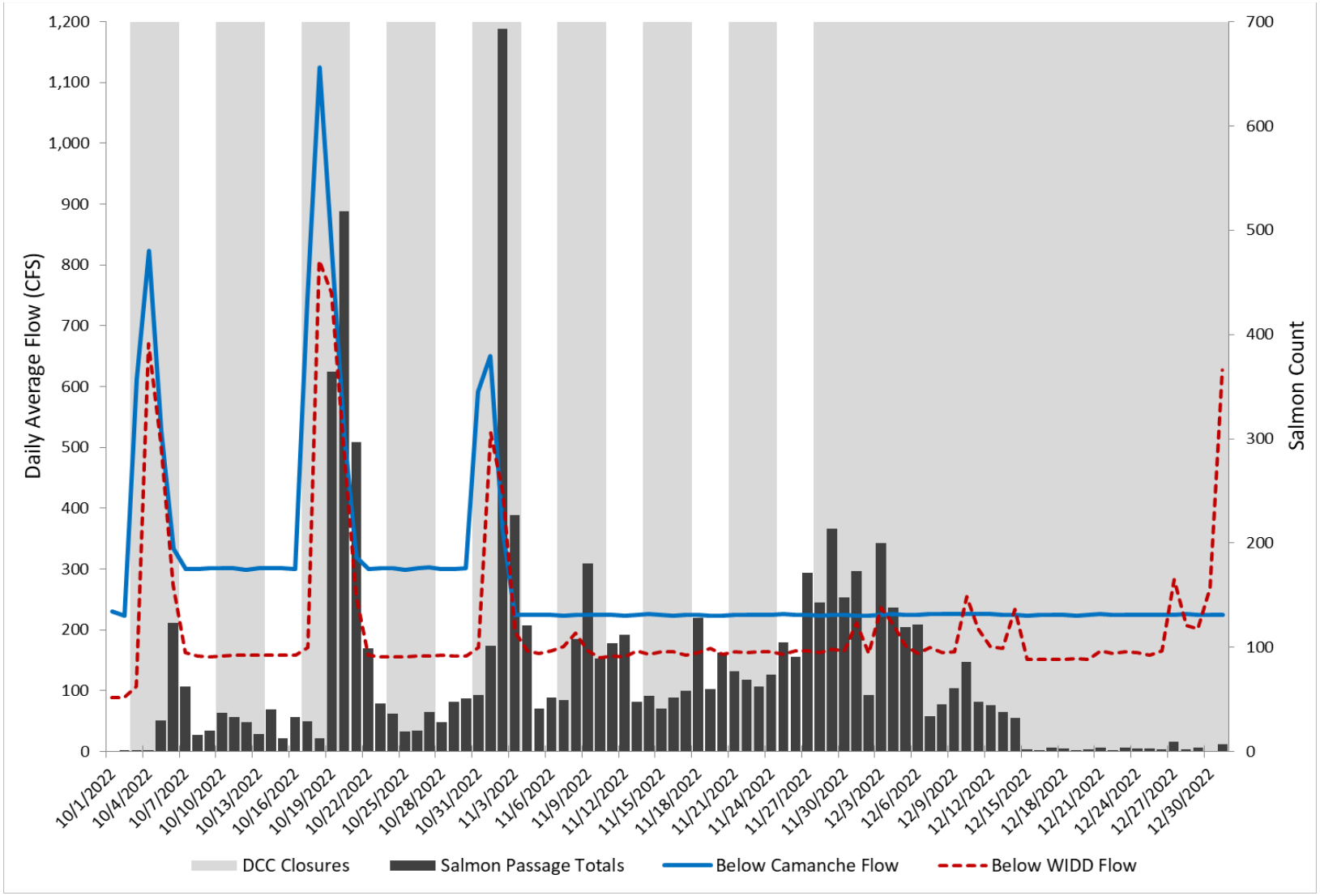


Figure 5: Daily Upstream Passage of Chinook Salmon at Woodbridge Dam Relative to Flow and Delta Cross Channel Closure, October 1, 2022–December 31, 2022

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.

2022 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 2022 operations are shown in Figure 6.

From April 1, 2022 through September 30, 2022 EBMUD operated under a "Dry" JSA water year type, with releases at 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 2022.

2023 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.

2022 HOS Operations

The HOS was activated from July 12, 2022 through November 10, 2022. The HOS effectively prevented hydrogen sulfide formation in 2022.

2023 Planned HOS Operations

In 2023, 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.

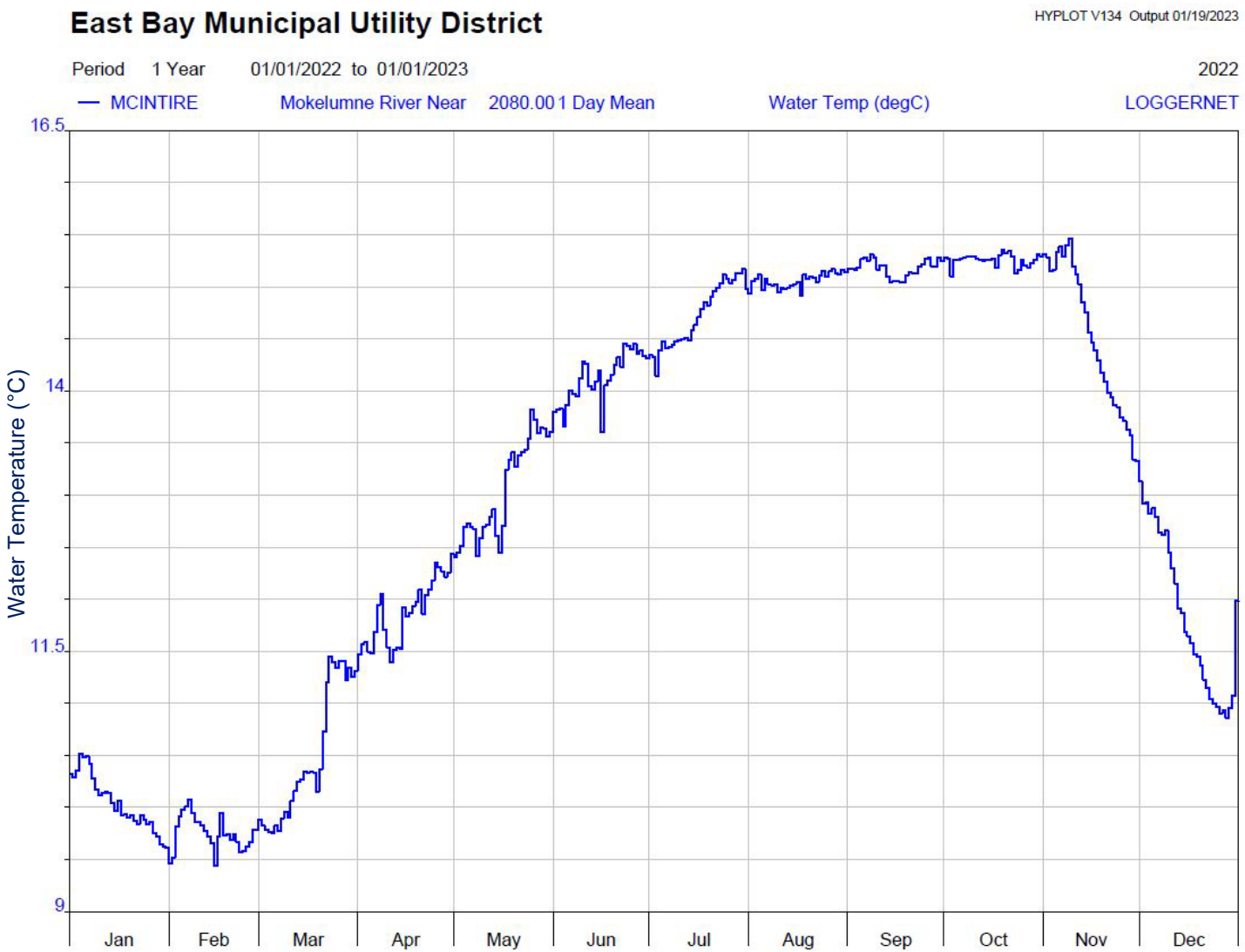


Figure 6: Calendar Year 2022 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam

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 2, 2022. 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 19, 2022 and October 27, 2022. A total of 52 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 2022 and projects with activity in 2022. 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 $1,048,079. The available balance, subtracting the funds that have been obligated to approved projects, was over $100,000 as of December 31, 2022.

Projects funded by the PSC with activity in 2022 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 2022 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
2021-22 Lower Mokelumne River Watershed Education Legacy Project	City of Lodi	Educational field trips for students, educational videos	1/31/22	Awarded and Completed	$6,930.00		
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	Awarded	$99,658.00	$2,536.95	EBMUD Natural Resources Department

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 2022, are described in detail in Section IV.E, 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://sjcrcd.com/articles/MokP.htm.

During 2022, 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 2022 of the Watershed Steering Committee included:

- Initiating process for finding a new web host for the Stewardship Plan as well as other documents and resources to stakeholders, including growers and landowners.
- Holding 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.

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 2022 and plans for 2023.

2022 Stakeholder Activities

Collaborative stakeholder activities that EBMUD representatives were involved with in 2022 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 2022, EBMUD completed actions on two AFRP-funded habitat restoration projects:

(1) Creation of a 0.5-acre site designed to function as ephemeral floodplain for juvenile salmonids and native fish. Construction included the removal of 5,500 yd^3 of material to create off channel rearing habitat.

(2) Maintenance of a 1-mile restoration reach in the lower Mokelumne River included adding 800 yd^3 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.

- CSAMP - Participation in the "Reorienting to Recovery" salmon project, that seeks to engage the Collaborative Science and Adaptive Management Program (CSAMP) member agencies, 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.
    - 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.

- Presentations on fish and wildlife issues to local sportsmen's groups, community groups, local schools, and local fishing and environmental organizations. (Ongoing)
- Periodic participation 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 (SJCRCD) 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)
- Continued 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.
- Participate 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)
- Participation 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)

2023 Planned Stakeholder Activities

In 2023, 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.

2022 MRTAC Meetings

In 2022, 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 8, 2022 and August 3, 2022.

2023 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 2023 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 2022, 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 2023.

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.

2022 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.
- 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 (limited in 2021 under COVID-19 pandemic field protocol restrictions).
- Cooperation with the state-wide Constant Fractional Marking (coded-wire tagging) of Chinook salmon released from the Mokelumne River Fish Hatchery.
- Continuing predation management and research program by acoustic tracking of non-native salmonid predators from the Mokelumne River and developed Predator Event Records to assess predation rates.
- 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.
- Bathymetry surveys to develop a 2D model of the riverbed to Woodbridge Dam to aid in habitat restoration projects.
- Assessment of the effects of feed rate on hatchery Chinook maturation rates, to manage the return of 2-year-old fish to the spawning population.
- 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.

2023 Planned Research and Monitoring

EBMUD will continue similar research and monitoring activities in 2023.

E. HABITAT IMPROVEMENTS

1. Ongoing Efforts

EBMUD continued to enhance the instream and riparian habitat of the lower Mokelumne River in 2022.

2022 Instream and Riparian Habitat Enhancements

Instream and riparian habitat projects for 2022 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 2022, long-term maintenance of a 1-mile restoration reach continued with placement of 800 yd^3 of gravel into the reach. Since 1998, EBMUD has placed approximately 54,600 yd^3 of spawning gravel in the Lower Mokelumne River.

- Floodplain Restoration: Floodplain habitat (0.5 acre) was created in the Mokelumne River Day Use Area to provide juvenile fish rearing and growth opportunities. The new floodplain habitat was designed to inundate at about 1,000 cfs and function as ephemeral habitat.

- 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.

2023 Planned Habitat Improvements

Many of the above habitat improvement activities will continue in 2023.

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 October 5, 2022. It is anticipated that it will be installed on the first Monday in October 2023 and 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: Temporary Flow Excursions and Deviation Below Camanche and Woodbridge Dam

Appendix C: USGS Verified Flow Data for 2020 and 2021

Appendix D: Meeting Minutes of the Partnership Steering Committee

Appendix E: Correspondence Related to Fall 2022 Attraction Flow

APPENDIX A

SAMPLE OF LOWER MOKELUMNE RIVER RELATED STORIES FROM LOCAL PRESS

Salmon delivery hatches curiosity in the classroom

SPECIAL TO THE NEWS-SENTINEL

A special delivery of chinook salmon eggs, wrapped in cheese cloth bundles from the Mokelumne River Fish Hatchery, were recently delivered to 53 schools in San Joaquin County, including 14 Lodi schools this month.

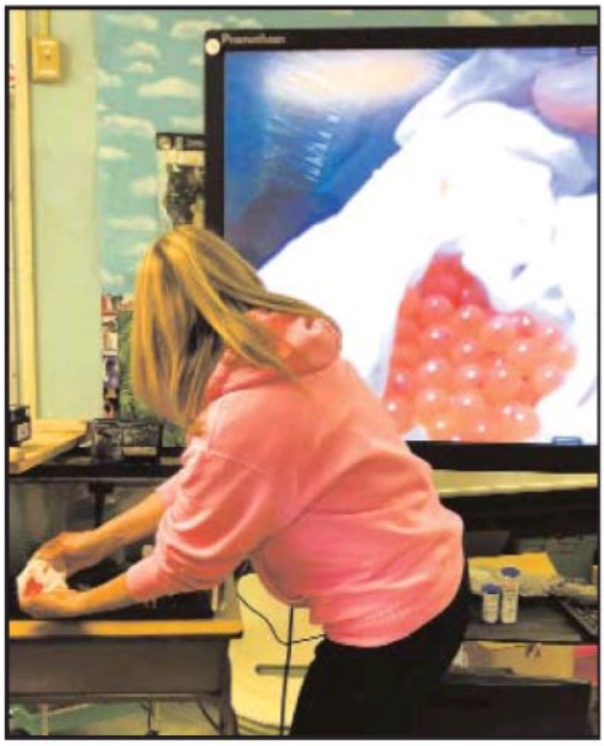
These eggs are part of the "Salmon in the Classroom" program that the City of Lodi has supported for seven years through the Watershed Education Program. Participating teachers attended a training class in October 2021 in order to meet the requirements of the California Department of Fish and Wildlife to rear eggs and transport fish. Students met the delivery team with excitement and curiosity as the eggs were brought into the classroom and gently dropped down to the rocky bottom of their classroom tanks.

The "Salmon in the Classroom" program will run through early March, and students will make predictions and daily observations (temperature, dissolved oxygen, pH, and ammonia levels) as the eggs continue to grow until they hatch.

Students will then return them to the Mokelumne River Fish Hatchery day-use area, and the fish will begin their journey to the ocean.

It has taken six months of planning between multiple agency partners including California Department of Fish and Wildlife, Mokelumne River Fish Hatchery, Lodi Unified School District, City of Lodi, San Joaquin County, City of Stockton and San Joaquin Office of Education staff, as well as the Delta Fly Fishers club, who helped fund the project and build tanks.

The Salmon in the Classroom program (part of the Watershed Education Program) helps meet the State's stormwater permit requirement for public outreach, since runoff from the streets of Lodi drain to the Mokelumne River. Students will study the Mokelumne River watershed and learn that it is important to help keep local waterways safe for salmon and other wildlife, as well as for themselves, since Lodi draws 40% of its drinking water from the Mokelumne River.



COURTESY PHOTOGRAPH

Joe Serna teacher Janine Jacinto displays salmon eggs on a television screen in her classroom.

Lowering Lodi Lake and buttressing the riverbanks

Wes Bowers
NEWS-SENTINEL STAFF WRITER

Visitors to Lodi Lake will see the water level at the park decline this week, but there is no need to worry.

Water in the lake will be lowered today in preparation for annual maintenance, and as the Riverbank Restoration Project gets underway.

The Woodbridge Irrigation District drains the lake by about two feet every February as part of its operating plan. The lake's depth is typically 12 feet.

During this time, the district's fish screens are cleaned, and City of Lodi Public Works staff typically inspect storm drains, as well as perform cleaning and maintenance on the Lodi Surface Water Treatment Plant.

In addition to annual maintenance, this city will be using the water drainage to undertake the Lodi Lake Shoreline Restoration Project, which includes removing falling trees and concrete debris along the riverbank, installing concrete rip-rap and planting new trees, among other repair work.

Lyman Chang, the city's deputy public works director, said staff applied for a state grant several years ago to fund an erosion prevention project.

NEWS-SENTINEL FILE PHOTOGRAPH

Estrella Sevilla does paddleboard yoga at Lodi Lake in Lodi on Aug. 2, 2017. The lake will be lowered this week by about 2 feet.

With Assemblyman Jim Cooper's help, the city was awarded a $1 million state grant in 2018, and immediately hired an engineering firm to perform the California Environmental Quality Act process, which includes permitting and design work.

"The permit process was estimated to take 18 to 24 months," Chang said. "The city and our consultant promptly submitted the applications to get the permit process moving, however, the process has taken longer than expected."

Chang said the last permit required before work can officially begin should be approved in the coming weeks.

The goal is to begin the work sometime around Feb. 26. If the permit is not approved by that time, work may be postponed until next year, when WID drains the lake again, he said.

"Woodbridge Irrigation District) has granted us a one-week extension to March 6 before raising their dam," he said. "We are working really hard with the permitting agencies and the contractor to make the repairs happen this February. In addition, the work needs to be performed in dry or light rain condition as required by one of the permit."

The lake's water level will return to its regular depth in mid-March, the city said, after both the restoration project and the WID maintenance are complete.

Federal budget gives NSJWCD $1 million

WASHINGTON, D.C. — The 2022 federal budget, which passed last week, contains $1 million for the North San Joaquin Water Conservation District's South System Groundwater Recharge Project. U.S. Rep. Jerry McNerney, D-Stockton, and Sen. Alex Padilla, D-California, worked to include the funding for this project in the final budget with support from Sen. Dianne Feinstein, D-California.

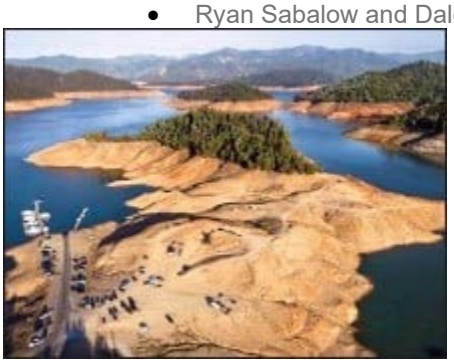
The NSJWCD said it has been working to modernize its south distribution system to increase the delivery of surface water to farmers for irrigation and to provide direct groundwater recharge opportunities for the non-irrigation season. These efforts are part of a larger plan to achieve groundwater sustainability in the area, protect local groundwater rights and protect all beneficial uses of groundwater in the district.

The district covers 150,000 acres and is one of 16 local agencies that overlies the Eastern San Joaquin Groundwater Subbasin.

"The district is very grateful for the support of federal representatives to bring much needed capital to our area for groundwater recharge projects," district board president Joe Valente said.

Newsom outlines peace agreement on water

- Lodi News-Sentinel
- 31 Mar 2022
- Ryan Sabalow and Dale Kasler



Water levels at Lake Shasta last June in Lake Shasta. On Tuesday, federal and state officials outlined a plan for releasing minimal amounts of water this year from Shasta Lake due to the drought California is experiencing.

Gov. Gavin Newsom's administration unveiled a $2.6 billion environmental peace treaty on the Central Valley's overtaxed rivers Tuesday. The deal calls for farms and cities to surrender billions of gallons of water while contributing funds to help restore troubled fish habitats.

Newsom's top aides called the 34page memorandum of understanding a compromise measure that will leave more water in the rivers — but not as much as many environmentalists believe is needed to prop up ailing populations of salmon, steelhead and other fish. And some key water users, such as the city of San Francisco, haven't yet signed onto the plan.

"We don't have to choose between healthy ecosystems or a healthy economy," Newsom said in a written statement. "We can choose a path that provides for both. This is a meaningful, hard-earned step in the right direction."
This latest attempt to create a grand bargain among competing factions in California's water world comes as the state faces a third straight year of drought. Many farmers have already been told to expect minimal water supplies this year, and on Monday Newsom ordered urban water agencies to step up their conservation efforts.

In a separate move Tuesday that underscores the severity of the drought, federal and state officials outlined a plan for releasing minimal amounts of water this year from Shasta Lake — the state's largest reservoir that's supposed to feed the Sacramento River with enough cold water to keep

endangered winter-run Chinook salmon alive. Less than 3% of the population survived last year, when water releases from Shasta were more generous.

“The system is in incredibly bad shape,” said Jared Blumenfeld, secretary of the state Environmental Protection Agency. “No pretense here that this is a decision that will produce great outcomes.”
Against that dismal backdrop, state officials say a peace plan on the rivers is essential.
“We have to end these water wars,” Blumenfeld said.

The so-called voluntary agreement released Tuesday is signed by some of California’s biggest water users that pull water from the Central Valley’s rivers. They include the
agencies supplying water for Sacramento Valley’s rice farmers, the city of Sacramento and its suburbs, most of urban Southern California and Westlands Water District, the largest farm-water agency in the San Joaquin Valley.

“We actually have a critical mass of players — water users, federal agencies, state agencies — that are going to move forward,” said Wade Crowfoot, Newsom’s Natural Resources Secretary. “We’re not waiting any longer.”

Key water users haven’t signed on
That said, several key players that pull water from the San Joaquin River and its tributaries are notably absent from the list of signatories released Tuesday. They include the city of San Francisco and water districts serving Turlock and Modesto and their surrounding farms. These water users have long objected to giving up water under Newsom’s compromise plan, which originated in the final months of the governorship of his predecessor, Jerry Brown.

Last fall, Newsom’s administration sent these holdouts a warning: Without their cooperation, the State Water Resources Control Board would go ahead with a plan that would seize considerably more of their water than what’s called for in the voluntary agreement.

On Tuesday, top administration officials repeated that warning, saying the state water board would crack down on groups that refuse to leave more water in the rivers for fish.

“We anticipate that,” Blumenfeld said. “It’s really important that we have a regime to make them provide (river) flows, because otherwise, if we didn’t, it would put an undue burden, an unfair burden on the folks signing the (voluntary agreements).”

He added that the terms outlined in the proposal "are not seen as negotiable." Two of the holdout agencies, the Modesto and Turlock irrigation districts, said they were disappointed that state officials left them out of the negotiations that produced Tuesday's agreement. Despite Blumenfeld's statement, they declared themselves open to negotiating.

"We will keep pursuing every avenue to reach an agreement that benefits all — the Tuolumne River, our communities and our customers," they said in a joint statement.

The San Francisco Public Utilities Commission remains in talks with the state, said spokesman John Coté.
Environmentalists have been objecting to the voluntary program for years, saying Newsom's compromise doesn't go nearly far enough to protect the fish. Instead, they've been calling on the state water board to simply order farms and cities to leave more water in the state's rivers.

The added water for the environment "is far less than half of what's needed," said Doug Obegi, a lawyer with the Natural Resources Defense Council. He scoffed at the idea that the voluntary plan would solve California's litigious water climate, saying, "How do you bring peace to a process when you exclude from the room" environmentalists and other key players?
The document that state officials unveiled Tuesday isn't a legally binding settlement, but officials said it spells out the parameters of an enforceable plan.

Tuesday's document details how the $2.6 billion would be spent and how much water would be left in the rivers that flow into the Sacramento-San Joaquin Delta, California's massive and environmentally troubled estuary south of Sacramento that serves as the hub of the state's water delivery network.

Under the plan, farmers and cities would leave up to 824,000 acre-feet of additional water in the rivers that flow into the Delta during certain months of the year.

Local water district receives $3.9M grant for groundwater project

- Wes Bowers/News-Sentinel Staff Writer
- May 5, 2022

Top of Form
Bottom of Form

The North San Joaquin Water Conservation District announced this week that it has received a $3.9 million grant from the California Department of Water Resources.

The grant will be used for the district's North System Groundwater Recharge Project, which will help support groundwater sustainability efforts in the Eastern San Joaquin Groundwater Subbasin.

"The district is excited to begin work on the North System and associated groundwater recharge projects, especially since the North System has not operated for more than a decade," district board of directors president Joe Valente said. "We are thankful to DWR and our cooperating landowners for making this project possible."

Grant funds will be used to rehabilitate the North System and deliver surface water to growers for irrigation, as well as for non-irrigation season projects on flood dormant vineyards and orchards during the winter to recharge groundwater.

These efforts are part of a larger plan to achieve groundwater sustainability in the area, protect local groundwater rights, and sustain all beneficial uses of groundwater in the district.

The grant is part of a larger state program to help fund local projects necessary to implement the Sustainable Groundwater Management Act, a state law passed in 2014 to further the long-term protection of groundwater resources.

The SGMA required local government agencies and water districts to create plans to conserve groundwater or the DWR would take control.

In 2014, the DWR identified the Eastern San Joaquin Groundwater Subbasin as one of 24 in the state that was in a state of critical overdraft.

The San Joaquin County Board of Supervisors adopted a sustainability plan for the subbasin in 2019, which consists of nine projects to be developed over the course of two decades and produce 90,000 acre-feet of water annually, or 29.3 billion gallons. The NSJWCD covers 150,000 acres and is one of 16 local agencies that comprise the Eastern San Joaquin Groundwater Subbasin, along with the City of Lodi, Lockeford Community Services District and the Woodbridge Irrigation District.

The district first developed a strategic plan to identify high priority projects in coordination with local stakeholders to meet state requirements and is now actively working to secure state, federal, and other funding to implement the projects, including the $3.9 million grant from the DWR.

LODI NEWS-SENTINEL FRIDAY, MAY 20, 2022

Mokelumne Current: Another year of watershed moments

By Kathy Grant
SPECIAL TO THE NEWS-SENTINEL

"Stop! Don't rush past this column!" Dig out the 2022 Mokelumne Current student written newspaper, found in the center of this newspaper. Our Lodi students want to share what they've learned about the Mokelumne River watershed this year, and its precious.

This year's edition has covered the usual topics, highlighting the various programs made available to Lodi teachers interested in incorporating the Mokelumne River watershed in their studies. Programs like the Salmon in the Classroom, where students raised hatchery Chinook salmon eggs for six weeks, then later released them to the river. Or the returning Sandhill cranes in the fall, promoted by the Lodi Sandhill Crane Association Classroom Art program, or the various cleanups students attended, including the current Litterati 2022 Challenge. You probably have read about these topics before, but to our students, they are fresh, and new, and they want to share what they have learned. (Teachers: If you are interested in learning more about, or joining our program, email me: kgrant@lodi.gov.)

But, have you read much about the fossils found in the summer of 2020 by EBMUD Ranger Francek? Students were able to meet with him online, and interview him about his, "Look left, look right. Look up, look down," strategy when he walks his rounds in the upper watershed,

PLEASE SEE CURRENT, PAGE 5

CURRENT

CONTINUED FROM PAGE 1

hunting for fossils.

Students also met with UC Davis emeritus professor Dr. Cathy Busby, a volcanologist who has been studying extinct volcanoes and the Sierras for her whole research career.

Her work is helping date the EBMUD fossils finds. Learn more: https://www.csuchico.edu/gateway/education/for-lifelong-learners/mwowf21-fossils.shtml. We also made new friends up at CSU Chico State, where the fossils are being studied. We hope to create a second "Meet your Watershed — Fossils 2.0" video later this summer, to follow the first video "Fossil Finders."

Learn more: https://www.youtube.com/channel/UCAy-pappX1conjUNrPoE7SA.

Many thanks to the City of Lodi Watershed Education Program funders and partners, especially the LUSD GOT Kids Foundation, who sponsored the grant which paid for this year's 2021-2022 edition of the Mokelumne Current. Thank you also to the C.A. Webster Foundation, Waste Management, and the Lower Mokelumne River Partnership for funding study trips, the Litterati app, and more "Meet Your Watershed" videos. Thank you also to the Lodi Sandhill Crane Association, CSU Chico State Gateway Science Center, East Bay Municipal Utility District Mokelumne staff, WGR-Southwest for their film work making the "Meet Your Watershed" video series. Special thanks to LUSD teachers, especially Serna School (Janine Jacinto); Heritage School (Melissa Yatteau, Cynthia Espinoza-Martinez, Nora Araujo); Reese School (Mel Martinez); Vinewood School (Kim Hudson); Beckman School (Andrea Ames); Turner School (Jennica Frisk); and Jennifer Robison-Buck- at Tokay. You are all worth pure gold!

Thank you also to the Lodi News Sentinel staff, especially Kyla Cathey who is the herculean wizard who creates the layout for the Mokelumne Current and gets it to press. Thank you to editor Scott Howell, and his team behind the scenes, from Adam and his pressmen, and to the warehouse crew. Thank you also to the Lodi News Sentinel subscribers! Your support keeps our community connected in vital ways.

Finally, thank you to my amazing co-workers in the City of Lodi Public Works Department. Tosha Wiman and her team especially helped scan student work, pay invoices, and solve problems. And to my boss, Andrew Richle, thank you for your graciousness and willingness to support our efforts, wherever the adventure leads us.

Cause we know, you can't protect what you don't understand.

Happy summer, all, and go "Meet Your Watershed!"

Kathy Grant is the City of Lodi's watershed program coordinator.

Lodi News Sentinel – June 9, 2022

California tells San Francisco, Valley farmers to halt water diversions as drought worsens

+1 more Dale Kasler

State regulators have ordered the city of San Francisco and scores of San Joaquin Valley farmers to stop pulling water from Valley rivers, the latest sign of worsening conditions in California's drought.

The water-rights "curtailment orders" issued by the State Water Resources Control Board affect San Francisco's ability to pull water from the Tuolumne River, one of its most important water sources. Others affected include the Modesto and Turlock irrigation districts, which deliver water to farmers and residents in the northern San Joaquin Valley from the Tuolumne.

All told, 212 public water systems are affected by the move.

Erik Ekdahl, the state board's deputy director, said Tuesday the move amounts to "significant, very deep cuts and curtailments."

The order doesn't mean taps will go dry in San Francisco. Water already held in storage isn't affected, and the San Francisco Chronicle reported that reservoirs controlled by the city have relatively strong supplies. The curtailments are mostly centered on the San Joaquin Valley, and the board doesn't expect to curtail many water rights on the Sacramento River.

But farmers and other rights holders on the Sacramento have already lost vast amounts of their water this year due to separate cutbacks mandated by the U.S. Bureau of Reclamation, resulting in widespread idling of rice fields in the Sacramento Valley.

The board made similar moves last August. What makes Tuesday's move so striking is that happened in early June, another troubling indicator of the severity of the drought, now in its third year. Ekdahl, in a presentation to the state board, noted that the rainy season is over and the Sierra Nevada snowpack is effectively gone, meaning the state can't expect any relief for its parched reservoirs until fall. "We're not going to get a significant pulse of new snowmelt at this point," he said. "There is no more snow to melt."

San Joaquin Valley is sinking as groundwater levels drop – but it may be fixable

Lodi News Sentinel – June 14, 2022

Ian James
LOS ANGELES TIMES

LOS ANGELES — As pumps hum on wells and send vast quantities of water flowing to farms in the San Joaquin Valley, the dropping water levels are leaving underground spaces in layers of gravel, sand and clay, causing the ground to collapse and sink.

Satellite measures have tracked the worsening problem, known as land subsidence. In parts of the valley, the land has been sinking about 1 foot each year. The shifting ground has damaged canals and wells, and threatens to do more costly damage in the years to come.

In a new study, researchers at Stanford University examined the sinking in one area of the San Joaquin Valley over 65 years and projected that subsidence will likely continue for decades or centuries, even if aquifer levels were to stop declining. They also found, however, that if aquifers recover with a significant rise in water levels, that could slow or stop the sinking within a few years.

"To get this subsidence problem under wraps, we really have to get the water levels to recover," said Matthew Lees, a doctoral student in geophysics and the study's lead author.

The research brings new insights about how the ground can continue to sink over a long period even if groundwater levels stop declining. Previously, there had been a widespread assumption that if water levels in an aquifer stabilized with reduced pumping, that would resolve the subsidence problem, Less said.

IRFAN KHAN/LOS ANGELES TIMES

Matt Davis' company drills a 1,300 feet deep well in an orchard at Setton Farms on Oct. 14, 2021, in Terra Bella.

"What we're showing here is that unfortunately, even if you flatten out the water levels, you have this so-called deferred subsidence that continues," Lees aid.

And where the sinking continues, the aquifer permanently loses space for holding water. Aboveground, the sinking land buckles concrete canals, cracks roads and other infrastructure, and can rip apart the casings of wells.

Parts of the valley floor have collapsed about 20 feet over the last 65 years, including about 10 feet over the last 20 years as repeated droughts have added to the strains on groundwater, Lees said.

The study also found if groundwater levels rise in an area, the water table doesn't have to recover completely to curb the sinking.

The research, which was published this month in the journal Water Resources Research, involved data from satellite measurements, well records and water-level measurements dating to the 1950s in an area near Hanford, where farmlands depend on water from wells.

The data allowed Lees and his colleagues to develop a model to examine subsidence in the area, including details such as the layers of sediments and clays that collapse with dropping water levels. Describing the underground compaction, they compared it to a sponge that has been squeezed.

The researchers found that water levels in the area had dropped about 30 meters by the end of California's last major drought, which lasted from 2012 to 2016. Then came a very wet year in 2017, and water levels rose about 10 meters. And the annual rate of subsidence slowed by more than half, from 35 centimeters to about 15 centimeters per year.

"So a kind of rough rule of thumb is that the water levels should recover about a third of the amount that they fall," Lees said, to significantly curb the rate at which the ground surface is dropping.

Land subsidence was one of the chronic problems that California legislators sought to address when they wrote the state's 2014 groundwater law. The Sustainable Groundwater Management Act, or SGMA, is aimed at addressing overpumping and halting declines in water levels over the next two decades.

SGMA also requires local agencies that are charged with combating the declines to adopt sustainability plans and avoid a list of "undesirable results," one of which is "significant and unreasonable land subsidence that substantially interferes with surface land uses."

What counts as "significant" land subsidence may be open to interpretation but will depend to a large degree on the effects, including the damage that

sinking ground is already causing or will cause to aqueducts or other infrastructure.

Many of the local groundwater sustainability plans that have been written so far assume that if water levels stop going down, subsidence will stop, said Rosemary Knight, the senior study author and a geophysics professor at Stanford's School of Earth, Energy and Environmental Sciences.

"But that's not true," Knight said. "There is, in fact, deferred subsidence that will continue for decades, beyond the point at which you stop the water levels going down."

In examining trends over decades in this part of the San Joaquin Valley, she said, "at no point in those 65 years did subsidence stop, even during the water level recovery period. It slowed, but it didn't stop. So that's an insight into the targeted effort needed to raise water levels."

In areas where the potential harm points to a need to slow or stop subsidence, Knight said, the findings show that replenishing groundwater through what are called managed aquifer recharge projects could accomplish a great deal.

"How can we possibly bring these water levels up? With a very aggressive program of recharge," Knight said. "The future of California is likely to be more intense floods and more intense droughts. So let's be ready, during the wet years, to capture any excess surface water and get it underground."

She said the study also adds to research that can help in prioritizing areas where surface water should be routed so that it can percolate into the soil to replenish aquifers.

"Let's be ready to say, this is where we want to get it underground. This is an area where if we can recharge the groundwater system in this area, we can slow or halt subsidence," Knight said.

LODI NEWS-SENTINEL FRIDAY, JULY 8, 2022

Banking on it

WES BOWERS/NEWS-SENTINEL

Jennifer Spaletta, attorney for the North San Joaquin Water Conservation District, explains where water from the Mokelumne River traverses through the DREAM Project the agency created with East Bay Municipal Utilities District.

WES BOWERS

San Joaquin County Board of Supervisors chair Chuck Winn said the DREAM Project was an example of how two agencies can come together and create a project that benefits both customers and the region's water basin.

Water agencies once at odds collaborating on 'Dream' project

Wes Bowers
NEWS-SENTINEL STAFF WRITER

North San Joaquin Water Conservation District and East Bay Municipal Utilities District built a new pump station near Tretheway Road in Lockeford as part of the DREAM Project.

Historically, the relationship between the North San Joaquin Water Conservation District and the East Bay Municipal Utilities District has been tense at times, hindering the opportunity to collaborate on regional projects.

The tension, NSJWCD attorney Jennifer Spaletta said, was over EBMUD building the Camanche and Pardee reservoirs and ending up with senior water rights along the Mokelumne River.

But over the last two decades, the two agencies have worked to resolve their issues, and ultimately came to the mutual understanding that they needed to work together in order to solve future water supply challenges.

The result was the Demonstration Recharge, Extraction and Aquifer Management — or DREAM Project — a groundwater banking project launched in 2014 in which EBMUD would deliver any excess water it had in a year to the NSJWCD, which in turn would deliver that water to local farmers.

"When they do, that means their groundwater wells are turned off and the groundwater table is able to recover," Spaletta said. "And then we basically cut a business deal where EBMUD delivers a certain amount of water to our area, we take half the benefits of those delivers and make the commitment to deliver the remaining half back to EBMUD when they need it."

On Wednesday, the two agencies hosted a tour of the facilities built for the DREAM Project, which

PLEASE SEE DREAM, PAGE 6

DREAM

CONTINUED FROM PAGE 1

include a brand new pump station located near 18999 North Tretheway Road in Lockeford, a well near Pixley Slough at 12000 Angier Road in Lodi, and an aqueduct at 101043 Hildreth Lane in Stockton.

The project entails EBMUD providing NSJWCD its traditional allowance of 20,000 acre feet of water from the river, along with an additional 8,000 acre feet. That's more than 9.1 billion gallons of water.

That water is pumped at the Tretheway Road station, then delivered to the well site near Angier Road. Farmers in the area then use the water for irrigation, instead of pumping groundwater.

As a result, NSJWCD benefits because farmers are pumping less water, and additional surface water recharges the groundwater basin.

In addition, EBMUD benefits because half the water it delivers is ultimately returned and can be delivered to its customers in the East Bay.

Spaletta said that the NSJWCD consists of 150,000 agricultural acres of land, of which 75,000 acres are irrigated. She added that about 95% of the water currently used to irrigate farmland is coming out of the ground.

The two agencies decided on launching a pilot program of the DREAM Project in order to figure out how to work with local landowners, determine how to build the facilities, and navigate through potential political hurdles, she said.

"So we intentionally put ourselves kind of in the hornet's nest to see what would happen," Spaletta said. "Since 2014, that is exactly what has been happening. These local agencies intentionally put themselves in the hornet's nest and tried to see what all the challenges could be with a groundwater banking program. And so far so good. We've definitely had a lot of challenges, but the project is moving forward."

She said EBMUD provided $4 million to build the facilities, which not only includes the pump station, well and aqueduct, but also improvements along 7 miles of distribution pipeline that dumps into Pixley Slough, and a a brand new 2-mile long pipeline from the slough to the aqueduct.

San Joaquin County Board of Supervisors chair Chuck Winn, who represents Lodi, Ripon and the northern and eastern unincorporated areas of the county, said the project was an example of how agencies can come together to produce something that benefits both their customers and the groundwater basin.

"In this county alone, we have to potential for up to 2 million acre feet of water underground to recharge," he said. "This is an example of how we can maximize the availability of storage capacities to make sure we have that water when we need it. This drought we're experiencing, who knows how long it will go. The last one went five, six years, so we need to have this excess water available to contribute to whatever we can get."

Doug Linney, EBMUD board of directors chair, said the DREAM Project was not just a symbol of two agencies working together, but the result of an agreement coming to fruition after years of work and progress.

"I've been on the board 20 years now, and it always seemed like a great idea to make use of this water that was surplus water in wet years, and be able to store it underground without building more dams or impediments," he said. "The difference between getting to a concept to getting to a reality is a huge gap. It really has taken a lot of cooperation, a lot of patience, a lot of hours, a lot of time."

LOCAL/STATE

UC Davis researcher shares why he believes saving 'stupid little fish' is vital

Ariane Lange
SACRAMENTO BEE

Delta smelt swim in a tank at the UC Davis Fish Conservation and Culture Laboratory on July 19. The Delta smelt is a small, slender fish that only lives in the Sacramento-San Joaquin Delta.

HECTOR AMEZCUA/SACRAMENTO BEE

Tien-Chieh Hung, the director of the UC Davis Fish Conservation and Culture Laboratory, stands in July near fish tanks where he and his team work to preserve the endangered Delta smelt at the mouth of the California Aqueduct.

The fragile little fish that swim around in dark tanks in a lab are the last hope for their kind. The lab director who oversees their care, Tien-Chieh Hung, explained that when the Delta smelt captives are young, scientists at the UC Davis Fish Conservation and Culture Laboratory put snails in the black interiors of the tanks as a slow-moving mollusk cleaning crew.

The snails must do the work because the fish are so delicate, they could get tangled in a human cleaner's arm hair and perish.

The whole project of painstakingly raising these temperamental endangered creatures, Hung said, may be futile — the smelt could just keep surviving in the lab because of human intervention, and vanishing in the wild because of human intervention.

With a California Delta habitat especially damaged by the rising temperatures and drought wrought by human-caused climate change and the unslakable thirst of people and farms in California, the smelt are perilously close to extinction.

"We do research, we try to do something for the earth," Hung said. "There are just so many things to be done."

It might not be enough to save the silvery fish, but it's created a bizarre parallel world for these small creatures and the scientists who look after them, as well as for the visiting scientists who have much less experience with the smelt, and accidentally kill a bunch of them every time they handle the fish for research.

Significant Delta smelt populations only exist three places in the world: The Fish Conservation and Culture Laboratory at the mouth of the California Aqueduct, which Hung oversees; the Livingston Stone National Fish Hatchery at the base of the Shasta Dam, where Hung sends emergency fish in case something catastrophic happens to his own lab; and in their native California Delta, in precipitously dwindling numbers — as of this past winter, Hung sends reinforcements there, too.

Probably less than a thousand smelt are flitting through murky waters in the wild. In the rows of tanks in Byron, scientists care for more than 100,000 fish. And Hung, a wry former pesticides engineer, led the charge to release 56,000 captive fish in the winter for the first time, after years of debate.

He wasn't sure they would make it in the "home" that had never been their home. "They might be too naive," he said. "They might just become (a) buffet for bigger fish."

But the scientists thought they had no choice, because with so few smelt in the wild, researchers couldn't even find them anymore.

Months later, Hung smiled telling a reporter that at least some of the freed smelt were thriving. In an irony befitting the Delta smelt, Hung knew this because they'd been caught and killed in surveyors' nets.

A smelt is drafted into a culture war

In a sense, Delta smelt can trace their controversial status to Republican President Richard Nixon.

A federal law championed by Nixon, the Endangered Species Act, prohibits people from driving another species out of existence.

"Nothing is more priceless and more worthy of preservation than the rich array of animal life with which our country has been blessed," he said in 1973. "It is a many-faceted treasure, of value to scholars, scientists, and nature lovers alike, and it forms a vital part of the heritage we all share as Americans."

Years later, the Delta smelt rose to fame as a casualty of California's water wars: Because they are endangered — their numbers have been dropping since the 1980s — the government is obligated by law to protect them and their habitat.

In 1996, the lab was formed; it was not until 2008 that scientists there successfully spawned the fish in captivity. Their spawning behaviors in their wild habitat aren't well understood.

And their wild habitat happens to supply millions of acre-feet of water to other parts of the state.

The smelt's story resonates so much that then-presidential candidate Donald Trump brought up this "certain kind of 3-inch fish" on the 2016 campaign trail in Fresno. Former U.S. Rep. Devin Nunes called them a "stupid little fish."

As Tufts University sociology professor Caleb Scoville has written, the fish was only recognized as a unique species because of the water infrastructure that was threatening to destroy their home: "Building extractive infrastructure," he said, "resulted in the proliferation of scientific knowledge about the natural systems it disrupted."

And now, Hung and his team raise hundreds of thousands of tiny fish in dozens of tanks, less than 200 yards away from some of the water infrastructure that's killing them.

In captivity, the smelt have a peculiar life. They only spawn when a lab worker plucks them out of the water and squeezes them until they release eggs or sperm into a plastic dish. Their mates are carefully chosen by DNA testing through UC Davis' Genomic Variation Lab.

"Basically," Hung said, "it's like a Match.com.

PLEASE SEE SMELT, PAGE 10

The fish lab once had some wild-caught smelt that it brought in every year to maintain genetic diversity and make sure the captive fish weren't getting too dissimilar from their wild brethren.

The lab's workers retrieved the full 100 fish they are permitted to capture each year for the last time in the 2017-18 season, pulling in nets gently 15 times. The next season, the fish's population had a steep decline — 111 gentle pulls, Hung said, and only 28 fish.

In the 2020-21 season, workers set out a net and gently pulled it in by hand 451 times. They caught two fish.

Hung wasn't sure what to expect releasing the 56,000 captives in December 2021 and January and February 2022. The permission to release the fish — a multi-agency deal — came fairly last-minute, and his team didn't have much time to prepare. There was a chance the tiny, sensitive fish would all just die.

How well they're doing is still unknown — less than 1,000 fully wild smelt, Hung said, were suddenly joined by 56,000 newcomers. The habitat these lab fish were introduced to was still the same Delta that was increasingly inhospitable to their species.

Farmers have cried out that they need the Delta waters that are being held back in part to protect this fish. Nunes and some of his former constituents believed the "stupid little fish" didn't deserve all these protections.

In a way, Hung agrees with them: It kind of is a stupid little fish.

"People always ask this question: They're asking, what happens if this fish disappears?" he said. "Will that affect the food chain? Will that affect the ecosystem?"

The answer, he said, is no: The fish are pretty much gone already.

"If they all disappear, nothing will change," he said. At least, not right away. But once the Delta is too hostile for the smelt, then it will just get too hostile for the next-most-fragile animal.

"It's important to keep diversity for ecosystems," he said. "... After the Delta smelt, there are just several other local species — they will disappear. They (are) already in danger."

Recent Lodi High grad wins the Beeler Award

- Lodi News-Sentinel
- 12 Oct 2022
- NEWS-SENTINEL STAFF

Dylan O'Ryan, a 2018 Lodi High graduate, was recently awarded the Frank R. Beeler Watershed Stewardship Award for his volunteer efforts.

Dylan O'Ryan, a 2018 Lodi High School graduate and a long-time volunteer for the City of Lodi's Storm Drain Detectives' Mokelumne River monitoring program, received the 2022 Frank R. Beeler Watershed Stewardship Award from the Lower Mokelumne River Watershed Stewardship Steering Committee last week.

The award recognizes O'Ryan's volunteer contributions to water-quality monitoring program, as well as his work for the good of the Mokelumne River watershed.

While still in high school, O'Ryan and fellow students designed a stormwater BMP as part of a "Caring for Your Watershed" statewide competition. The teens worked with Lodi Unified School District's maintenance and operations division to install the device at Lodi High to help reduce stormwater pollution from entering the Mokelumne River from the campus.

O'Ryan has continued to demonstrate his passion for watershed protection by pursuing a bachelor's degree in environmental studies at California State University, Sacramento, as well as by working for the Lawrence Berkeley National Laboratory as a student research assistant in the earth and environmental sciences area.

He has also been a role model and mentor for younger students as he continues to work several times a month with the Storm Drain Detectives monitoring program.

The Frank R. Beeler Watershed Stewardship Award is presented annually to acknowledge and recognize an individual or organization within the Lower Mokelumne River watershed who has shown outstanding leadership, responsibility, or activism in the promotion of sound and innovative natural resource stewardship practices that help sustain the environment and enhance productivity and profitability in the Mokelumne River watershed.

APPENDIX B

TEMPORARY FLOW EXCURSIONS AND DEVIATION BELOW CAMANCHE AND WOODBRIDGE DAM

Table B-1: Flow Below Camanche Dam, December 5, 2022

Reading Date and Time	Interval	Unit	JSA Water Year Type	Camanche Measured Flow	JSA Expected Flow
12/5/2022 6:15	15 Minute	cfs	Dry	145	220
12/5/2022 6:30	15 Minute	cfs	Dry	146	220

1. The flow decreased during a transition of releases from the Camanche Dam north outlet flow to south outlet flow.
2. The provisional average daily flow for 12/5/2022 is 225 cfs.

Table B-2: Flow Below Woodbridge Dam, April 1, 2022

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
4/1/2022 0:00	15 Minute	cfs	Dry	63	150
4/1/2022 0:15	15 Minute	cfs	Dry	63	150
4/1/2022 0:30	15 Minute	cfs	Dry	65	150
4/1/2022 0:45	15 Minute	cfs	Dry	66	150
4/1/2022 1:00	15 Minute	cfs	Dry	66	150
4/1/2022 1:15	15 Minute	cfs	Dry	67	150
4/1/2022 1:30	15 Minute	cfs	Dry	67	150
4/1/2022 1:45	15 Minute	cfs	Dry	67	150
4/1/2022 2:00	15 Minute	cfs	Dry	67	150
4/1/2022 2:15	15 Minute	cfs	Dry	69	150
4/1/2022 2:30	15 Minute	cfs	Dry	72	150
4/1/2022 2:45	15 Minute	cfs	Dry	76	150
4/1/2022 3:00	15 Minute	cfs	Dry	81	150
4/1/2022 3:15	15 Minute	cfs	Dry	87	150
4/1/2022 3:30	15 Minute	cfs	Dry	93	150
4/1/2022 3:45	15 Minute	cfs	Dry	100	150
4/1/2022 4:00	15 Minute	cfs	Dry	107	150
4/1/2022 4:15	15 Minute	cfs	Dry	117	150
4/1/2022 4:30	15 Minute	cfs	Dry	124	150
4/1/2022 4:45	15 Minute	cfs	Dry	133	150

1. The expected flow increase below WID dam appears to have been delayed. EBMUD communicated the expecting flow and timing to WID prior to April 1st.
2. The provisional average daily flow for 4/1/2022 is 157 cfs.

Table B-3: Flow Below Woodbridge Dam, April 29, 2022

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
4/29/2022 15:45	15 Minute	cfs	Dry	127	150
4/29/2022 16:00	15 Minute	cfs	Dry	121	150

1. The provisional average daily flow for 4/29/2022 is 155 cfs.

Table B-4: Flow Below Woodbridge Dam, May 2, 2022

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
5/2/2022 10:45	15 Minute	cfs	Dry	133	150
5/2/2022 11:00	15 Minute	cfs	Dry	132	150
5/2/2022 11:15	15 Minute	cfs	Dry	133	150

1. The provisional average daily flow for 5/2/2022 is 152 cfs.

Table B-5: Flow Below Woodbridge Dam, May 4, 2022

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
5/4/2022	Daily	cfs	Dry	149	150

1. Retroactive shift was applied on May 4th. WID did not make any adjustments until May 5th. This full day deviation did not negatively impact the river or out-migrating salmonids.

APPENDIX C

USGS VERIFIED FLOW DATA FOR 2020 AND 2021

Table C-1: Calendar Year 2020 - USGS Verified Average Daily Flow from Camanche Dam

11323500 Mokelumne River below Camanche Dam, CA

DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2020
DAILY MEAN VALUES

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	330	331	328	328	364	360	301	320	289	265	256	255
2	330	331	330	322	364	336	301	320	290	266	256	255
3	330	331	330	314	365	311	301	317	286	265	256	254
4	330	330	331	316	364	291	299	311	280	265	256	255
5	330	330	332	315	364	295	299	310	280	440	256	256
6	330	330	331	306	366	305	301	310	280	478	256	255
7	329	330	330	294	376	305	301	310	280	328	256	255
8	330	330	330	290	385	305	301	310	282	265	256	255
9	330	330	330	290	384	305	303	310	276	265	255	254
10	330	330	330	290	386	305	302	304	265	265	255	255
11	330	330	330	290	385	306	301	300	265	475	255	254
12	330	330	329	290	385	304	307	300	265	559	255	255
13	330	330	330	289	386	306	320	300	265	408	255	255
14	330	330	329	291	387	305	320	300	265	294	255	255
15	331	330	330	292	387	316	320	299	265	265	256	255
16	332	331	331	291	387	325	320	300	266	265	256	255
17	331	331	330	290	386	325	316	300	265	265	257	255
18	331	332	329	290	385	324	310	300	260	433	257	256
19	330	332	330	295	385	319	311	300	255	468	255	255
20	330	330	331	305	385	315	311	300	255	319	255	255
21	328	330	330	312	386	315	311	300	255	255	255	255
22	330	330	330	328	384	315	310	301	255	256	254	255
23	331	330	330	355	384	329	311	301	255	255	255	255
24	332	330	333	364	385	335	314	300	255	255	255	255
25	332	331	331	365	396	328	320	300	256	255	254	255
26	331	331	331	365	412	320	320	299	255	256	255	255
27	330	331	331	365	431	320	320	300	255	429	255	255
28	331	329	330	365	441	320	320	297	254	468	255	255
29	330	328	330	365	446	313	320	291	255	319	256	253
30	331	---	331	364	455	301	320	291	259	256	255	255
31	331	---	331	---	442	---	320	290	---	256	---	255
Total	10,240	9,579	10,240	9,536	12,140	9,459	9,631	9,391	7,988	10,110	7,663	7,902
Mean	330	330	330	318	392	315	311	303	266	326	255	255
Max	332	332	333	365	455	360	320	320	290	559	257	256
Min	328	328	328	289	364	291	299	290	254	255	254	253
Ac-ft	20,310	19,000	20,310	18,910	24,080	18,760	19,100	18,630	15,840	20,060	15,200	15,670

Note- Data published by USGS

Table C-2: 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	298	346	345	245	237	247	201	225	543	228
2	255	255	300	345	350	245	237	255	200	225	702	225
3	255	253	300	345	347	244	237	252	200	225	501	225
4	255	255	280	345	359	232	236	246	200	225	301	225
5	255	237	228	345	366	228	237	245	201	507	225	225
6	253	225	225	337	375	231	238	245	203	602	225	225
7	255	225	225	330	372	227	238	247	201	402	225	225
8	255	225	251	325	372	212	237	239	200	264	225	225
9	255	225	295	315	372	215	240	232	205	225	226	225
10	255	225	296	315	371	210	240	230	192	225	224	225
11	255	226	273	315	373	210	240	234	160	225	224	225
12	255	227	252	315	362	210	237	225	140	225	225	225
13	254	225	252	318	365	215	240	212	142	225	224	225
14	254	225	255	315	365	234	237	213	140	225	225	225
15	252	225	255	315	363	235	235	208	140	225	225	225
16	255	232	247	315	365	233	239	200	136	225	224	225
17	255	228	232	316	365	232	238	202	130	226	225	226
18	252	225	235	321	363	249	238	200	130	547	225	225
19	254	223	235	318	362	250	238	202	126	702	225	225
20	255	225	235	319	365	249	241	200	122	501	225	224
21	255	225	235	324	364	246	240	200	121	302	224	225
22	252	222	237	319	360	247	240	200	120	225	224	225
23	255	225	236	330	358	237	238	200	107	225	225	226
24	255	225	235	330	361	235	238	200	110	225	225	226
25	255	225	236	332	362	239	240	200	110	224	224	226
26	255	222	245	336	360	236	249	200	110	225	224	225
27	255	223	245	325	358	237	250	200	110	225	225	225
28	255	252	255	337	368	237	247	200	111	225	225	225
29	255	---	270	347	386	237	248	200	181	225	225	225
30	255	---	302	347	363	240	249	202	225	225	225	226
31	255	---	342	---	260	---	250	202	---	225	---	226
Total	7,891	6,460	8,007	9,842	11,180	6,997	7,449	6,738	4,674	9,002	7,890	6,983
Mean	255	231	258	328	361	233	240	217	156	290	263	225
Max	255	255	342	347	386	250	250	255	225	702	702	228
Min	252	222	225	315	260	210	235	200	107	224	224	224
Ac-ft	15,650	12,810	15,880	19,520	22,170	13,880	14,770	13,360	9,271	17,860	15,650	13,850

Note- October through December data provisional until approved by USGS

Table C-3: Calendar Year 2020 - USGS Verified Average Daily Flow below Woodbridge

11325500 Mokelumne River at Woodbridge, CA

DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2020
DAILY MEAN VALUES

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	279	311	132	202	169	80.6	35.4	36.1	35.5	102	175	188
2	281	311	166	189	169	91.3	35.6	37.1	36.7	109	127	188
3	281	309	177	173	170	56.9	35.4	37.3	36.3	105	244	192
4	280	309	209	161	171	37.7	35.5	35.7	35.6	105	104	191
5	280	321	219	215	171	38.5	36.5	35.5	35.4	105	102	189
6	280	309	209	225	171	39.8	36.0	34.5	35.5	126	244	185
7	281	305	214	184	171	40.1	36.4	35.1	35.7	368	102	193
8	282	302	217	163	172	55.8	36.4	35.4	36.3	275	106	185
9	294	299	205	163	173	42.8	36.3	35.3	36.6	109	261	220
10	283	295	196	164	175	42.5	35.8	37.4	35.5	106	108	260
11	284	292	190	165	174	42.8	35.3	35.0	35.5	106	148	201
12	284	290	194	165	174	42.5	36.1	34.5	35.2	116	176	214
13	284	289	190	164	177	42.4	36.9	34.1	35.3	422	181	244
14	286	290	209	164	179	42.7	36.7	35.3	35.9	337	183	199
15	284	291	242	165	180	43.1	36.7	34.5	35.6	211	181	200
16	310	290	255	165	182	43.6	36.7	35.2	35.5	120	184	200
17	286	290	225	164	184	42.7	36.4	35.2	35.2	106	191	207
18	288	288	218	164	187	43.3	36.2	34.6	35.3	108	201	196
19	285	289	218	165	188	42.7	36.2	34.6	35.1	147	185	201
20	287	288	219	167	188	42.7	36.5	34.8	35.2	355	188	197
21	286	284	220	166	189	43.3	36.6	35.3	35.3	268	184	199
22	293	284	219	161	191	41.4	35.9	35.4	35.2	118	183	202
23	290	285	224	164	193	36.2	35.9	35.4	35.4	105	186	203
24	410	279	218	168	193	36.6	36.8	35.7	35.4	104	187	197
25	463	236	222	169	195	36.2	36.8	35.8	35.9	104	190	200
26	439	256	209	170	197	35.6	37.5	35.8	34.9	101	181	208
27	381	161	213	169	199	36.1	37.2	35.0	36.0	97	187	197
28	327	108	212	168	199	36.5	36.5	35.3	36.2	130	189	201
29	317	127	204	169	197	41.7	36.4	34.7	36.2	352	189	196
30	314	---	202	170	201	35.7	36.3	35.0	37.8	269	193	196
31	313	---	210	---	201	---	36.2	35.3	---	191	---	203
Total	9,532	7,988	6,457	5,161	5,679	1,334	1,125	1,096	1,071	5,377	5,260	6,252
Mean	307	275	208	172	183	44	36	35	36	173	175	202
Max	463	321	255	225	201	91	38	37	38	422	261	260
Min	279	108	132	161	169	36	35	34	35	97	102	185
Ac-ft	18,910	15,840	12,810	10,240	11,270	2,646	2,232	2,174	2,125	10,660	10,430	12,400

Note- Data published by USGS

Table C-4: 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	44.0	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	28.0	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	28.0	29.3	23.4	259	163	158
9	196	193	115	166	159	30.2	28.3	32.0	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	93.0	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	29.0	27.8	24.7	23.4	243	162	201
16	193	189	124	160	159	29.0	27.5	24.9	24.5	93.0	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	25.0	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	27.0	25.0	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	902	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- October through December data provisional until approved by USGS

APPENDIX D

MEETING MINUTES OF THE PARTNERSHIP STEERING COMMITTEE

Lower Mokelumne River, Joint Settlement Agreement
Annual Partnership Steering Committee Meeting
December 2, 2022
1:00 pm to 3:00 pm

Location: 1701 Nimbus Rd., Rancho Cordova.

Present:

- JSA Steering Committee Representatives: Kevin Thomas, CDFW; Dan Welsh, USFWS; Mike Tognolini, EBMUD; Jonathan Ambrose, NMFS

- JSA Coordinating Committee Representatives: Colin Purdy, CDFW; Casey Del Real for Michelle Workman, EBMUD

- Others: Stephanie Milsap (USFWS); Nick Bauer & Jason Julienne (CDFW); Chris Potter & Shirley Lu & Katie Miller & Jon Bauer (EBMUD)

Water Supply Update – Shirley Lu, EBMUD

- Mokelumne Precipitation – Rainfall Year 2022 total was 39.21" (81% of average), with most falling in October and December and a very dry Jan-Mar.
- Water Year 2022 Total Runoff was 456 TAF (Average = 745); Total System Storage on Sept 30, 2022 was 520 TAF (Average = 630), which includes 50 TAF delivered via Freeport.
- Reviewed Camanche Reservoir and Mokelumne River temperatures.
- JSA Year Type Oct 22-Mar 23 = DRY
- Precipitation for Rainfall Year 2023 through Dec 1 was 9.23" or 96% of average.
- Current snow conditions are low-density.
- Total System Storage as of 12/1/22 was 97% of average and 68% of capacity.
- Reviewed Water Supply Projections for Rainfall Year 2023.
- Camanche Release – meeting JSA minimum required flows.
- Colin asked about Gainshare accounting; Shirley shared a spreadsheet showing 2021-22 numbers.

2021/22 Mokelumne Fisheries Review – Casey Del Real, EBMUD

- Brood Year 2021 Outmigration monitoring
    - 2022 Juvenile Trapping was summarized, including rotary screw traps (RST) and bypass trap. The upstream RST was operated from 12/6/21 - 6/24/22 while the downstream RST was operated from 12/21/21 - 5/30/22. The bypass trap was operated from 3/21/22 - 6/24/22. Trapping and trucking operations started 5/24/22, went for 32 days, counted and transported 14,873 smolt-sized wild salmon, with a mortality rate of 0.11%.
    - The salmon outmigrant estimate for the upstream RST was 110,358, 69% of which were fry. The salmon outmigrant estimate for the downstream RST was 61,415, 95% of which were smolts.
    - 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 56%, the 2nd highest on record.
    - Kevin suggested a graph that correlates each outmigration brood vs three years later.

- 2022 Habitat Restoration Actions
    - South floodplain was created; riffle maintenance.
    - Prop 68 grant (three years) completed; Created 0.5 acres of new floodplain that will inundate at 1,000 cfs. Have a few years of gravel on site now. Colin suggested coordinating on gravel contractors for cost savings.
    - Kevin asked about the design and slop of side channels and floodplains, and how many days the floodplains are being inundated.
- Brood Year 2022 Escapement Monitoring
    - Fall Management Actions – Three Fall pulse flows plus increases to baseflows; 12,236 Acre Feet; DCC gates were closed 8 times during the salmon run this year.
    - As of 11/22/22, Chinook salmon escapement for the Mokelumne River was 4,672.
    - The 1940-2022 Adult Salmon Returns graph got a lot of discussion; Colin mentioned that the fall run is getting 'pushed back' each year, i.e. later in the year; the current crop of bad years could be attributable to: ocean harvesting; thiamine deficiency, vitamin deficiency.
    - Brood Year 2022 Salmonid Redd Survey found 265 redds through 11/22/22; 81% of redds were in reach 6, the rest in reach 5. No *O.mykiss* redds detected yet.
    - Adaptive Management discussions are starting this month and should be requested in January for March 1, 2023.
- Landowner Outreach
    - Three landowners interested in floodplain restoration
    - Two landowners interested in diversion screens – they are about $85K each.
    - Colin asked if there was interest in more boater access?
    - Jason referenced the Shared Habitat Alliance for Recreational Enhancement (SHARE) program: Shared Habitat Alliance for Recreational Enhancement (SHARE) (ca.gov)
    - Colin referenced the Sport Fish Restoration Grant Program - Sport Fish Restoration | U.S. Fish & Wildlife Service (fws.gov)
- Presentations to Lodi Rotary, Lodi District Grape Growers Association, and EBMUD Water Wednesdays "Seeking the Source" Water Wednesday :: East Bay Municipal Utility District (ebmud.com)
- Diversion Screening Project:
    - 270 water diversions along the LMR; Relative Risk Model developed by EBMUD and USFWS to rank water diversions; in 2021 three unscreened diversions were fitted with screens; two more landowners interested in three more screens.
- Floodplain Restoration
    - One landowner interested in 23 acres of floodplain restoration – George Reed property
    - Two landowners interested in 4.35 acres of floodplain restoration – McIntire properties.
- 2022 Acoustic Telemetry Study
- Steelhead Release Timing Study

2022 MRFH Operations Summary – Jason Julienne, CDFW

- Egg take goals for enhancement and mitigation production were met. Transferred eggs from the Feather River Fish Hatchery (70k) will be culled.
- Will look at spawning steelhead on December 15th.
- Planting schedule – three different groups marked for the Steelhead Release Timing Study.
- Casey commented that carcass surveys happen weekly and not many heads are being found.
- Casey discussed Moke Hatchery contributions to recreational (42%) and commercial (19%) fisheries.

JSA Partnership Fund and projects – Jon Bauer, EBMUD

- Fund balance will be about $100K by the end of 2022.
- EBMUD Treasury group reviewed having the $2 million Fund seed money invested in the Local Agency Investment Fund (LAIF) and concluded that that is still the best place to have it. Currently the Fund is earning about $25K per year.
- The Lodi 21-22 Educational Legacy project is submitting their final report and invoice. Watershed videos can be found at: City of Lodi Watershed Education Programs | Lodi, CA
- The UCSC/SWFSC *Integrated Genetic and Phenotypic Analysis of Mokelumne River Hatchery Steelhead* has been quietly making progress. Not due to be completed for another year.
- One proposal – for restoration work – is under review by the Partnership Coordinating Committee.

LMR Watershed Stewardship Committee – Jon Bauer

- Volunteer committee continues to meet monthly, discuss grower concerns and projects in the Lower Mokelumne River region.
- The 2022 Annual "Beeler" Stewardship Award went to Dylan O'Ryan, 2018 Lodi High graduate and a long-time volunteer for the City of Lodi's Storm Drain Detective, the Mokelumne River monitoring program, who has carried his passion for watershed protection into his collegiate studies. The award was presented at the Pardee BBQ on October 7, 2022.

WQCP Update – Mike Tognolini, EBMUD

- The Mokelumne is in Phase II with the Sacramento River tributaries.
- We didn't initially sign on to the Proposed Framework because it wasn't beneficial to our fish.
- We signed on in August with an Amendment. Includes the flows we've been proposing since 2018, is based on JSA year types, and has some offramp years.
- Expecting State Board environmental documentation in early 2023.
- It is just an MOU at this point, not an Agreement.

USFWS – Dan Welsh

- Stephanie Milsap is the alternate on the Partnership Steering Committee
- The USFWS is receiving $38 million per year for five years from the Bipartisan Infrastructure Law for fish passage projects. Next due date is December 16th – a letter of intent to the regional coordinator.

CDFW – Kevin Thomas

- Will have grant funding for new staff, especially to revive the HGMP reviews.
- Jason has the review for the Mokelumne Hatchery.

NMFS – Jon Ambrose

- Doing five-year status reviews – draft for spring run chinook should be out in January 2023.
- Has two upcoming positions to move the HGMP reviews forward.

Meeting Agenda

1. Introductions	All	10
2. Water Supply Update	Chris Potter or staff, EBMUD	10
3. 2021/22 Mokelumne Fisheries Review a) 2022 Outmigration and Escapement (and final 2021 escapement numbers) b) 2021/22 Redd Survey c) 2022 Habitat Restoration d) 2022 Management Actions e) Upcoming Year	Michelle Workman, EBMUD	30
4. 2022 MRFH Operations Summary a) 2022 Spawning b) Meeting Goals for enhancement and mitigation c) Planting Schedule d) Steelhead Program	EBMUD and CDFW	15
5. JSA Partnership Fund and projects a) Fund balance b) 2022 Awarded Projects - Lodi Education Legacy 2021-22 - UCSC/SWFSC *Integrated Genetic and Phenotypic Analysis of Mokelumne River Hatchery Steelhead*	Jon Bauer, EBMUD	5
6. Lower Mokelumne River Stewardship Group Update a. 2022 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.	All	10
Meeting Adjournment		Total: 120

APPENDIX E

CORRESPONDENCE RELATED TO FALL 2022 ATTRACTION FLOW

From:	Welsh, Daniel
To:	Steinhart, Geoffrey B
Cc:	Strange, Erin L; Del Real, Casey; Millsap, Stephanie D
Subject:	Re: Proposed Mokelumne Pulse Flows - response needed by Tue
Date:	Tuesday, August 23, 2022 4:01:27 PM
Attachments:	2022 Camanche Pulse Flow Plan 2.xlsx 2022 Mokelumne Pulse Flows.png

Geoff,

Thanks for the heads-up about the proposed fall pulse flows. I concur with the proposed fall flow plan that you and other Coordinating Committee members have developed with EBMUD. EBMUD usually sends proposals like this to me and the other Steering Committee members for approval after the Coordinating Committee develops a recommendation. I haven't received a request for approval from EBMUD yet, but am cc'ing Casey Del Real here to communicate my concurrence with the proposed fall pulse flow plan in advance of any pending request.

Thanks,

Dan Welsh, Deputy Field Supervisor
U.S. Fish and Wildlife Service
San Francisco Bay-Delta Fish and Wildlife Office
650 Capitol Mall, Suite 8-300
Sacramento, CA 95814
(916) 930-5639 (office)
(916) 468-8470 (cell)
Daniel_Welsh@fws.gov

From: Steinhart, Geoffrey B <geoffrey_steinhart@fws.gov>
Sent: Friday, August 19, 2022 11:50 AM
To: Welsh, Daniel <daniel_welsh@fws.gov>
Cc: Strange, Erin L <erin_strange@fws.gov>
Subject: Proposed Mokelumne Pulse Flows - response needed by Tue

Hello Dan,

JD informed me that “decisions of substance” related to the Mokelumne JSA should be sent to you for concurrence. Since I have taken over HRC duties for the Mokelumne, I am reaching out to you to inform you of the proposed fisheries pulse flows for this fall on the Mokelumne.

The proposed flows (attached image and Excel file) were agreed upon when the Mokelumne River TAC came to a consensus on these flows after feedback during and after our 3 August 2022 meeting and following comments on revised options that were distributed to the TAC on 12 August 2022. The proposed flows incorporated many recommended elements from the interested parties while also being a compromise of several factors. I support the proposed pulse flow plan (Pulse Flow Plan 2).

To move forward, please prepare a concurrence response and send it to Casey Del Real (casey.delreal@ebmud.com) no later than Tuesday of next week (8/23).

Please let me know if you have any questions.

Thanks,
Geoff

Geoff Steinhart, PhD
Fish Biologist / Habitat Restoration Coordinator
USFWS - Lodi Fish and Wildlife Office
850 S. Guild Ave., Suite 105
Lodi, CA 95240
Mobile: 209.313.3608
He/Him/His (What's This?)

From: Del Real, Casey
To: JD Wikert; Geoff Steinhart; Strange, Erin L
Subject: FW: Lower Mokelumne River - Pulse Flow Development
Date: Tuesday, August 23, 2022 3:21:00 PM
Attachments: 2022 Camanche Pulse Flow Plan 2.xlsx

Hello,

Friendly reminder – we are hoping to finalize the lower Mokelumne River pulse flow plan and need Partnership Coordinating Committee (PCC) representative concurrence. Please have the USFWS PCC rep notify us of your decision at their earliest convenience. So far, CDFW and NMFS have approved Pulse Flow Plan 2.

If you have any questions, please let me know.

Casey

From: Del Real, Casey
Sent: Friday, August 19, 2022 9:09 AM
To: Bill Smith <William.Smith@wildlife.ca.gov>; Jason Julienne <Jason.Julienne@wildlife.ca.gov>; JD Wikert <john_wikert@fws.gov>; Savannah Bell <savannah.bell@noaa.gov>; Chris McKibbin <chris.mckibbin@wildlife.ca.gov>; Colin Purdy <colin.purdy@wildlife.ca.gov>; Darrick Baker <Darrick.Baker@wildlife.ca.gov>; Duane Linander <Duane.Linander@wildlife.ca.gov>; Geoff Steinhart <geoffrey_steinhart@fws.gov>; Monica Gutierrez <Monica.Gutierrez@noaa.gov>; Nick Bauer <Nick.Bauer@Wildlife.ca.gov>; Skyler Burson <skyler.burson@wildlife.ca.gov>; Tanya Sheya <Tanya.Sheya@wildlife.ca.gov>; Workman, Michelle <michelle.workman@ebmud.com>; Jake Rennert <jake.rennert@noaa.gov>
Subject: RE: Lower Mokelumne River - Pulse Flow Development

Hi All,

We have decided to recommend Pulse Flow Plan 2 for approval (attached). It was our conclusion that Pulse Flow Plan 2 incorporated recommended elements from all interested parties and addressed multiple management considerations. Although it may not be the preferred plan for some, collaboration and, ultimately, compromise was the intended pathway for this process, and I believe we have achieved that end.

That said, there are still several steps in this process that still need to take place. In order to help facilitate this process, please have your agency's Partnership Coordinating Committee (PCC) representative prepare a concurrence response and send it to me no later than Tuesday of next week (8/23).

If you have any additional questions or concerns regarding the recommended Pulse Flow Plan or process for finalizing the plan, please give me a call (phone numbers are listed below).

Best,

Casey

S.C. Del Real
Supervising Fisheries & Wildlife Biologist
East Bay Municipal Utility District
Office: 209-263-6362
Cell: 916-996-2851
Email: casey.delreal@ebmud.com

From:	Monica Gutierrez - NOAA Federal
To:	Del Real, Casey
Cc:	Bill Smith; Jason Julienne; JD Wikert; Savannah Bell; Chris McKibbin; Colin Purdy; Darrick Baker; Duane Linander; Geoff Steinhart; Nick Bauer; Skyler Burson; Tanya Sheya; Workman, Michelle; Jake Rennert
Subject:	Re: Lower Mokelumne River - Pulse Flow Development
Date:	Monday, August 22, 2022 9:28:50 AM

Hi Casey,

After reviewing the attached spreadsheet. NMFS is agreeable to the proposed Pulse Flow Plan 2. Thank you for the continued coordination with NMFS.

On Fri, Aug 19, 2022 at 9:12 AM Del Real, Casey <casey.delreal@ebmud.com> wrote:

> Hi All,
>
> We have decided to recommend Pulse Flow Plan 2 for approval (attached). It was our conclusion that Pulse Flow Plan 2 incorporated recommended elements from all interested parties and addressed multiple management considerations. Although it may not be the preferred plan for some, collaboration and, ultimately, compromise was the intended pathway for this process, and I believe we have achieved that end.
>
> That said, there are still several steps in this process that still need to take place. In order to help facilitate this process, please have your agency's Partnership Coordinating Committee (PCC) representative prepare a concurrence response and send it to me no later than Tuesday of next week (8/23).
>
> If you have any additional questions or concerns regarding the recommended Pulse Flow Plan or process for finalizing the plan, please give me a call (phone numbers are listed below).
>
> Best,
>
> Casey
>
> S.C. Del Real
>
> Supervising Fisheries & Wildlife Biologist
>
> East Bay Municipal Utility District
>
> Office: 209-263-6362
>
> Cell: 916-996-2851
> Email: casey.delreal@ebmud.com

--
Monica Gutierrez | Fisheries Biologist
San Joaquin River Branch
California Central Valley
NOAA Fisheries | West Coast Region
U.S. Department of Commerce
650 Capitol Mall, Suite 5-100, Sacramento, CA 95814
916-930-3657 (Office) | 916-201-3259 (Cell)
Monica.Gutierrez@noaa.gov

During the COVID-19 pandemic, I am on mandatory telework. I may be working flexible hours to balance family and personal needs. I appreciate your patience if my response time is delayed. If you have a request, please specify important time frames or deadlines. I will do my best to respond accordingly. Because I have limited ability to retrieve mail, please send any formal correspondence that would normally be sent through the physical mail to ccvo.consultationrequests@noaa.gov. Thank you.

From: Bauer, Nick@Wildlife
To: Del Real, Casey; Smith, William@Wildlife; Julienne, Jason@Wildlife; JD Wikert; Savannah Bell; McKibbin, Chris@Wildlife; Purdy, Colin@Wildlife; Baker, Darrick@Wildlife; Linander, Duane@Wildlife; Steinhart, Geoffrey B; Monica Gutierrez; Burson, Skyler@Wildlife; Sheya, Tanya@Wildlife; Workman, Michelle; Jake Rennert
Subject: RE: Lower Mokelumne River - Pulse Flow Development
Date: Monday, August 22, 2022 7:45:29 AM

Casey,
Thank you for the coordination and support for these Pulse Flow Development meetings.
The Department is supportive of your decision.
Thanks,

Nick

Nick Bauer
Anadromous Fisheries Supervisor (SES Supervisory)
CA Dept. of Fish and Wildlife – North Central Region (R2)
1701 Nimbus Rd., Rancho Cordova, CA 95670
Work Cell: 916-282-8598

I am currently working remotely due to COVID-19
Email is the best way to reach me.

From: Del Real, Casey <casey.delreal@ebmud.com>
Sent: Friday, August 19, 2022 9:09 AM
To: Smith, William@Wildlife <William.Smith@wildlife.ca.gov>; Julienne, Jason@Wildlife <Jason.Julienne@wildlife.ca.gov>; JD Wikert <john_wikert@fws.gov>; Savannah Bell <savannah.bell@noaa.gov>; McKibbin, Chris@Wildlife <Chris.McKibbin@wildlife.ca.gov>; Purdy, Colin@Wildlife <Colin.Purdy@wildlife.ca.gov>; Baker, Darrick@Wildlife <Darrick.Baker@wildlife.ca.gov>; Linander, Duane@Wildlife <Duane.Linander@wildlife.ca.gov>; Steinhart, Geoffrey B <geoffrey_steinhart@fws.gov>; Monica Gutierrez <Monica.Gutierrez@noaa.gov>; Bauer, Nick@Wildlife <Nick.Bauer@Wildlife.ca.gov>; Burson, Skyler@Wildlife <Skyler.Burson@wildlife.ca.gov>; Sheya, Tanya@Wildlife <Tanya.Sheya@wildlife.ca.gov>; Michelle Workman <michelle.workman@ebmud.com>; Jake Rennert <jake.rennert@noaa.gov>
Subject: RE: Lower Mokelumne River - Pulse Flow Development

Hi All,

We have decided to recommend Pulse Flow Plan 2 for approval (attached). It was our conclusion that Pulse Flow Plan 2 incorporated recommended elements from all interested parties and addressed multiple management considerations. Although it may not be the preferred plan for some, collaboration and, ultimately, compromise was the intended pathway for this process, and I believe we have achieved that end.

That said, there are still several steps in this process that still need to take place. In order to help facilitate this process, please have your agency's Partnership Coordinating Committee (PCC) representative prepare a concurrence response and send it to me no later than Tuesday of next week (8/23).

If you have any additional questions or concerns regarding the recommended Pulse Flow Plan or process for finalizing the plan, please give me a call (phone numbers are listed below).

Best,

Casey

S.C. Del Real
Supervising Fisheries & Wildlife Biologist
East Bay Municipal Utility District
Office: 209-263-6362
Cell: 916-996-2851
Email: casey.delreal@ebmud.com

From:	Del Real, Casey
To:	Bill Smith; Jason Julienne; JD Wikert; Savannah Bell; Chris McKibbin; Colin Purdy; Darrick Baker; Duane Linander; Geoff Steinhart; Monica Gutierrez; Nick Bauer ; Skyler Burson; Tanya Sheya; Workman, Michelle; Jake Rennert
Subject:	RE: Lower Mokelumne River - Pulse Flow Development
Date:	Friday, August 19, 2022 9:09:00 AM
Attachments:	2022 Camanche Pulse Flow Plan 2.xlsx

Hi All,

We have decided to recommend Pulse Flow Plan 2 for approval (attached). It was our conclusion that Pulse Flow Plan 2 incorporated recommended elements from all interested parties and addressed multiple management considerations. Although it may not be the preferred plan for some, collaboration and, ultimately, compromise was the intended pathway for this process, and I believe we have achieved that end.

That said, there are still several steps in this process that still need to take place. In order to help facilitate this process, please have your agency's Partnership Coordinating Committee (PCC) representative prepare a concurrence response and send it to me no later than Tuesday of next week (8/23).

If you have any additional questions or concerns regarding the recommended Pulse Flow Plan or process for finalizing the plan, please give me a call (phone numbers are listed below).

Best,

Casey

S.C. Del Real
Supervising Fisheries & Wildlife Biologist
East Bay Municipal Utility District
Office: 209-263-6362
Cell: 916-996-2851
Email: casey.delreal@ebmud.com