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Lower Mokelumne River Project

FERC Project No. 2916

2016 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 2017

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ABBREVIATIONS

AFRP	Anadromous Fish Restoration Program
AOP	Annual Operations Plan
CAMP	Comprehensive Assessment and Monitoring Program
CBDA	California Bay Delta Authority
CDFW	California Department of Fish and Wildlife
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), and "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 (2016), and those that it plans to implement in the current calendar year (2017), 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 2016. EBMUD actions in 2016 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

[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 2015).

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 Sections E.3, F.5, and H.5 of the JSA, was approved by FERC 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 and 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 describes efforts made during the 2016 calendar year and efforts planned for 2017. Section V contains the appendices.

III. STATUS OF THE LOWER MOKELUMNE RIVER SALMON POPULATION

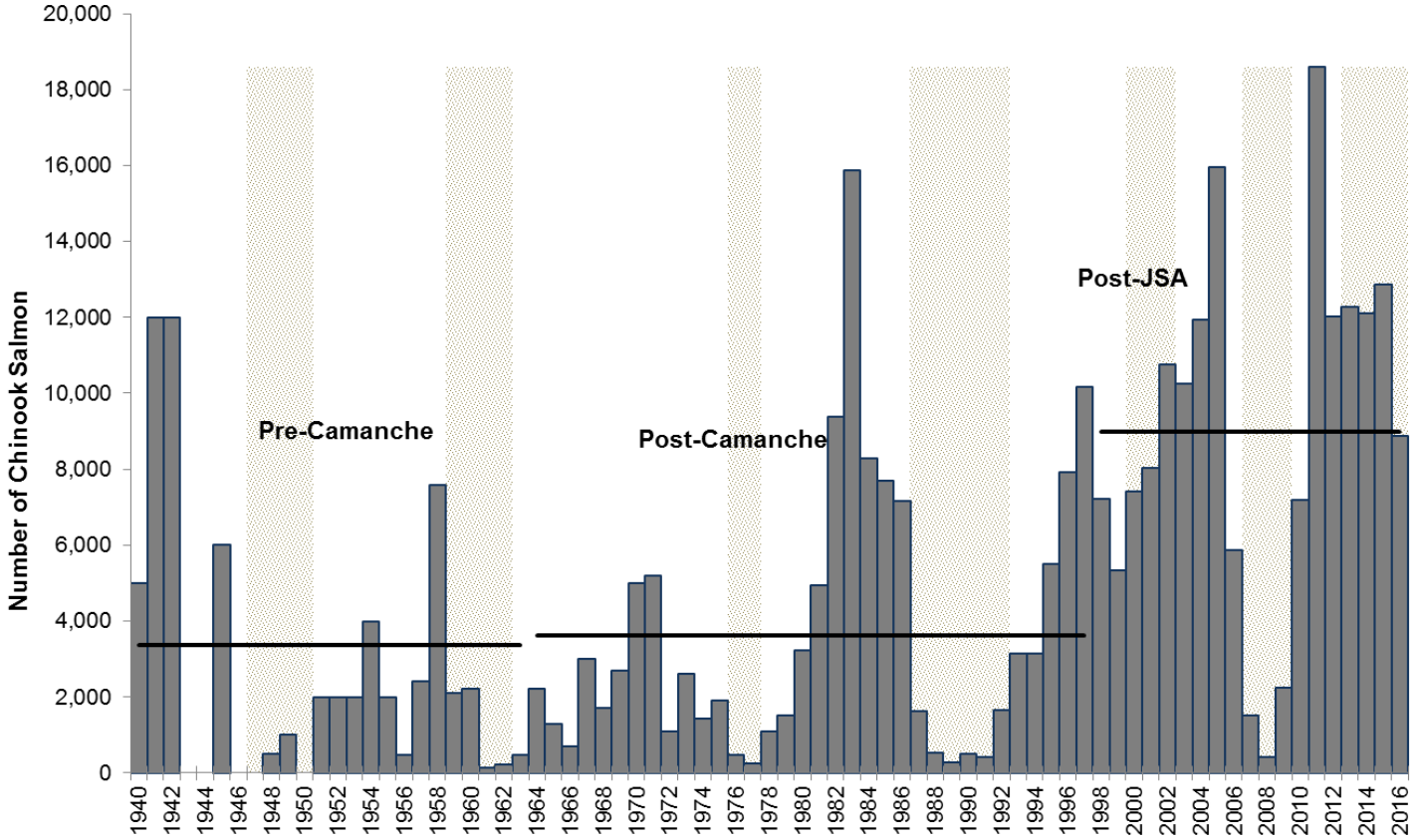
Through the 1990s and into 2016, the lower Mokelumne River Chinook salmon population continues to demonstrate characteristics consistent with long-term sustainability. The Mokelumne River fall-run Chinook salmon escapement of 8,871 in 2016 was above the long term average and consistent with the post-JSA average (see 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, 1989-2016

Year	Outmigration		Total Escapement	Hatchery Returns	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	2,233	1,553	680	30	248
2010	4,243	63,106	7,195	5,275	1,920	27	314*
2011	228,829	52,288	18,596	15,922	2,674	14	564
2012	13,888	38,049	12,027	6,556	5,471	45	1,287
2013	49,102	98,488	12,265	5,170	7,095	58	1,823
2014	15,764	154,100	12,113	8,817	3,296	27	909
2015	12,599	48,707	12,870	8,295	4,575	36	1,357
2016	7,182	127,411	8,871	6,887	1,984	22	405*

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 (9,000) is the average estimate at Woodbridge Dam since implementation of the JSA in 1998.
4. Dithered shaded areas are periods of drought in California. Historical drought data are based on California Department of Water Resources, *California's most Significant Droughts: Comparing Historical and Recent Conditions*, February 2015.

Figure 1: Estimated Annual Spawning Escapement of Fall-Run Chinook Salmon in the Lower Mokelumne River, 1940-2016

Five of the top six returns recorded have occurred during the period of 2011-2016, including a record return in 2011. The continued string of above average returns is indicative of positive response to the adaptive management actions (discussed in later sections) implemented during the 2009 – 2016 period. While 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 is one of the few salmon populations nearing the established Central Valley Project Improvement Act (CVPIA) doubling goal established by the USFWS Anadromous Fish Restoration Program (AFRP). The AFRP established doubling goal for the Mokelumne is 9,300 and the calculated number for the Mokelumne is 8,976 as of 2015, which represents a higher percentage of attainment than nearly all other Central Valley river populations.

The Mokelumne River Fish Hatchery (MRFH), owned by EBMUD and operated by the California Department of Fish and Wildlife (CDFW), reported that the 2016 salmon return at the MRFH was 6,887 salmon. The 2016 MRFH Annual Operations Plan (AOP) stated that the import ban of eggs originating from other hatcheries would continue for the long-term. In fact, 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. For recent news articles on the Mokelumne River fisheries, refer to Appendix A.

From October 2016 through January 5, 2017, approximately 1,983 salmon spawned within the river, constructing approximately 405 redds (nests) in the 10-mile reach below Camanche Dam. High flow releases beginning on January 5, 2017 prematurely discontinued monitoring efforts (Figure 2). Based on salmon emergence temperature models the peak of fry emergence will occur in late February and be completed by late March 2017. The estimated outmigration of juveniles in 2016 was 134,593, which was influenced by drought and associated conditions within the lower river.

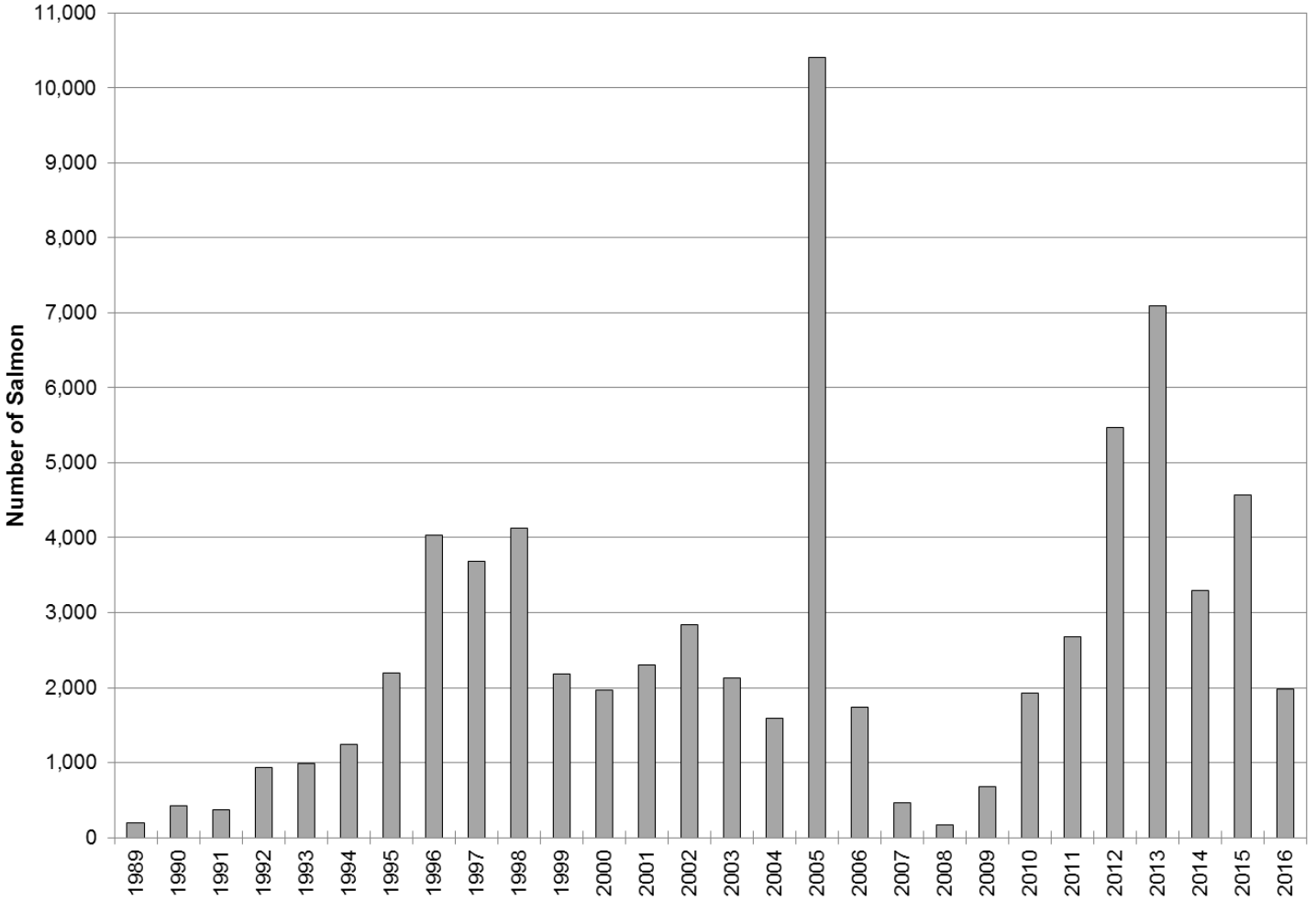


Figure 2: Fall-Run Chinook Salmon Naturally Spawning in the Lower Mokelumne River, 1989-2016

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 also contains additional actions to protect the lower Mokelumne River resource beyond those already undertaken by EBMUD under the LMRMP. Actions taken by EBMUD in 2016, and those actions planned for 2017, 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, and 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 2016 releases to the lower Mokelumne River are summarized in this section.

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 the time flow data are collected and the timing of publication in the USGS Water Data Reports, the 2016 flow data included in this report have not yet been verified or published by the USGS.

On December 29, 1999, the State Water Resources Control Board (SWRCB) issued Water Right Decision D-1641, a decision involving numerous parties throughout the Central Valley. A portion of D-1641 modified state water rights on the Mokelumne River, significantly increasing assurances that operations under the JSA will provide the expected flows below Woodbridge Dam. Water Right Decision D-1641, which was re-confirmed by the SWRCB's Water Right Order 2000-2 on March 15, 2000, modifies the water rights of both EBMUD and the Woodbridge Irrigation District (WID). Water Right Decision D-1641 conforms EBMUD's water rights to the FERC-approved JSA flow requirements and also requires WID to control its diversions to ensure that the minimum expected JSA bypass flows are met below Woodbridge Dam.

2016

In accordance with the November 27, 1998 FERC approval of the JSA, and based upon EBMUD's forecast of total Pardee and Camanche Reservoir storage on November 5, 2015, EBMUD provided "Critically Dry" JSA water year type Camanche Dam flow releases from October 1, 2015 through March 31, 2016. Pardee and Camanche Reservoir actual total storage on November 5, 2015 was 221,800 acre-feet.

Based on the California Department of Water Resources (DWR) April 1, 2016 forecast of 790,000 acre-feet of unimpaired runoff into Pardee Reservoir, EBMUD operated under a "Below Normal" JSA water year type Camanche Dam flow releases from April 1, 2016 through September 30, 2016.

From October 1, 2016 through October 17, 2016, EBMUD made releases from Camanche Dam under a "Below Normal" JSA water year type, based on then-current EBMUD forecasts of total Pardee and Camanche Reservoir Storage on November 5, 2016. The precipitation event that occurred from October 14, 2016 through October 16, 2016 in the upper Mokelumne River watershed resulted in runoff much greater than normal and increased the projected November 5 total Pardee and Camanche storage to the maximum allowable storage in accordance with the Army Corps of Engineer's Water Control Manual for Camanche Dam and

Reservoir. Accordingly, EBMUD adjusted the November 5 storage forecast and began making "Normal and Above" releases on October 18, 2016.[2] Based on that forecast, at a minimum, EBMUD will continue to make "Normal and Above" JSA water year type Camanche Dam flow releases through March 31, 2017.

On August 3, 2016 the California State Water Resources Control Board (SWRCB) issued to EBMUD an amended water right permit for Camanche and Pardee Reservoirs (Permit No. 10478) and extended the District's time to fully use the water available under the Permit to December 31, 2040. Under the amended Permit, if expected flows below Woodbridge Dam impair adult salmonid fish migration from September through February, the District is required to release from Camanche Dam up to 2,000 acre-feet of additional water above that required by the JSA during the September through February period in "Below Normal" and "Dry" water years. These increased flows are designed to facilitate adult salmonid fish passage below Woodbridge Dam. The schedule of release would be coordinated with and called upon by the Partnership Steering Committee.

The additional water that was potentially available in 2016 to enhance the minimum JSA flows and to provide additional pulse flows for the lower Mokelumne fishery includes (1) the 2,000 acre-feet of water required under the amended water right Permit 10478, (2) the remainder of gainsharing water that was made available in 2015 from supplemental water supplies EBMUD obtained through its CVP contract and from transfers of non-Mokelumne water, and (3) water bypassed to meet water right permit term requirements. Flows at the WID Dam were modulated to create additional pulse flow releases for the salmon attraction and the up-migration. Through EBMUD coordination with the Partnership, this management strategy made efficient use of limited water, which required storage and then subsequent release during pulses, and resulted in a high return of salmon.

[2] Actual Pardee and Camanche reservoir storage on November 5, 2016 was 473,000 acre-feet.

Calendar year 2016 actual Camanche Dam average daily flow releases and agreed JSA flow releases from Camanche Dam are shown in Table 2 and Figure 3. The average daily flows below Camanche Dam did not fall below the required minimum daily flow.

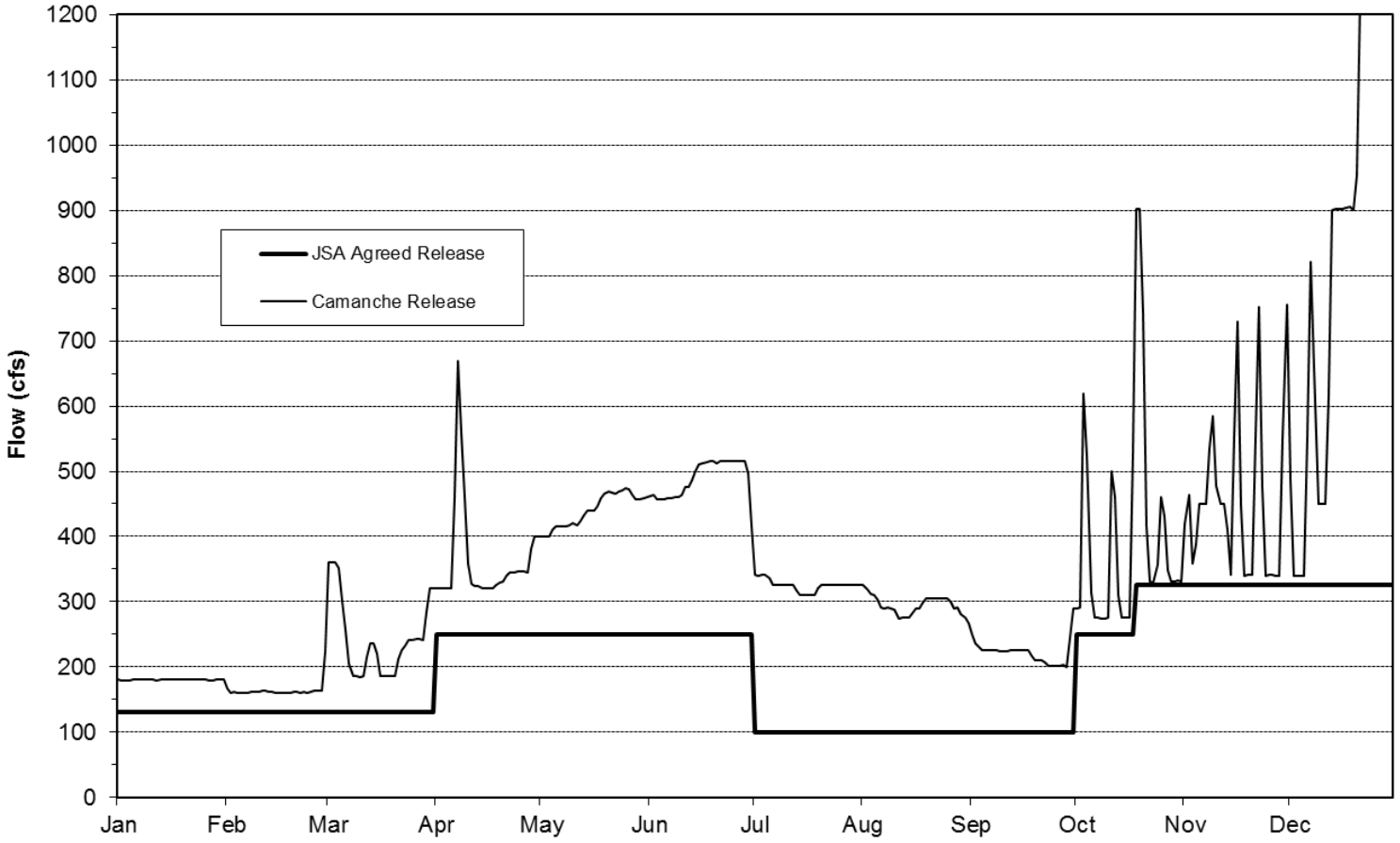
Calendar year 2016 actual average daily flows and expected JSA flows below Woodbridge Dam are shown in Table 3 and Figure 4. Average daily flows below Woodbridge Dam fell slightly below minimum daily expected flows on April 25, 2016 and during the period from May 25, 2016 to June 9, 2016. The April 25, 2016 drop in the average daily flow likely resulted from fish ladder maintenance work performed by WID. The drop in average daily flows between May 25, 2016 and June 9, 2016, appears to have resulted from a downed tree or other debris in the gauge pool, which changed the water surface elevation at the gauge. On June 8, EBMUD hydrographers performed a routine flow measurement at the gauge, identified the change in the gauge rating, and notified WID of the updated rating. On June 10 and for the remainder of the calendar year, the provisional average daily flows below Woodbridge Dam did not fall below the JSA expected minimum flows. Given the small magnitude of these deviations from daily expected minimum flows and the absence of any notable decrease in salmonid migration during the period of deviation, EBMUD's biologists determined that there was no impact to fisheries resources. 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.

In addition to these deviations from minimum daily expected flows, provisional fifteen-minute flow readings revealed three temporary excursions from expected minimum flows below Woodbridge Dam. The excursions in the fifteen minute data appear to have occurred during WID's routine maintenance operations, such as fish screen cleaning and canal maintenance work. These excursions, at EBMUD's gaging station, USGS No. 11325500 ("Mokelumne River below Woodbridge Dam") are included in Appendix B (Tables B-1 through B-3) of this report.

Table 2: Calendar Year 2016 Average Daily Release in Cubic Feet per Second from Camanche Dam

Date	Camanche Release	JSA Agreed Release	Date	Camanche Release	JSA Agreed Release	Date	Camanche Release	JSA Agreed Release	Date	Camanche Release	JSA Agreed Release	Date	Camanche Release	JSA Agreed Release
01/01/16	180	130	03/16/16	186	130	05/30/16	458	250	08/13/16	276	100	10/27/16	347	325
01/02/16	180	130	03/17/16	185	130	05/31/16	460	250	08/14/16	276	100	10/28/16	330	325
01/03/16	180	130	03/18/16	186	130	06/01/16	462	250	08/15/16	282	100	10/29/16	330	325
01/04/16	180	130	03/19/16	186	130	06/02/16	464	250	08/16/16	290	100	10/30/16	332	325
01/05/16	180	130	03/20/16	186	130	06/03/16	457	250	08/17/16	289	100	10/31/16	332	325
01/06/16	180	130	03/21/16	211	130	06/04/16	456	250	08/18/16	299	100	11/01/16	419	325
01/07/16	180	130	03/22/16	226	130	06/05/16	457	250	08/19/16	305	100	11/02/16	464	325
01/08/16	180	130	03/23/16	233	130	06/06/16	459	250	08/20/16	305	100	11/03/16	358	325
01/09/16	180	130	03/24/16	241	130	06/07/16	459	250	08/21/16	305	100	11/04/16	389	325
01/10/16	180	130	03/25/16	242	130	06/08/16	461	250	08/22/16	305	100	11/05/16	450	325
01/11/16	180	130	03/26/16	243	130	06/09/16	460	250	08/23/16	305	100	11/06/16	450	325
01/12/16	180	130	03/27/16	243	130	06/10/16	464	250	08/24/16	305	100	11/07/16	451	325
01/13/16	180	130	03/28/16	242	130	06/11/16	475	250	08/25/16	305	100	11/08/16	534	325
01/14/16	181	130	03/29/16	284	130	06/12/16	476	250	08/26/16	300	100	11/09/16	584	325
01/15/16	180	130	03/30/16	321	130	06/13/16	486	250	08/27/16	290	100	11/10/16	478	325
01/16/16	180	130	03/31/16	321	130	06/14/16	500	250	08/28/16	290	100	11/11/16	450	325
01/17/16	180	130	04/01/16	320	250	06/15/16	511	250	08/29/16	281	100	11/12/16	450	325
01/18/16	180	130	04/02/16	320	250	06/16/16	512	250	08/30/16	275	100	11/13/16	410	325
01/19/16	180	130	04/03/16	320	250	06/17/16	514	250	08/31/16	268	100	11/14/16	341	325
01/20/16	180	130	04/04/16	320	250	06/18/16	515	250	09/01/16	249	100	11/15/16	553	325
01/21/16	180	130	04/05/16	320	250	06/19/16	515	250	09/02/16	236	100	11/16/16	730	325
01/22/16	180	130	04/06/16	459	250	06/20/16	512	250	09/03/16	231	100	11/17/16	449	325
01/23/16	180	130	04/07/16	669	250	06/21/16	515	250	09/04/16	225	100	11/18/16	340	325
01/24/16	180	130	04/08/16	559	250	06/22/16	516	250	09/05/16	225	100	11/19/16	341	325
01/25/16	180	130	04/09/16	461	250	06/23/16	515	250	09/06/16	226	100	11/20/16	340	325
01/26/16	180	130	04/10/16	359	250	06/24/16	515	250	09/07/16	226	100	11/21/16	551	325
01/27/16	180	130	04/11/16	328	250	06/25/16	515	250	09/08/16	226	100	11/22/16	752	325
01/28/16	180	130	04/12/16	323	250	06/26/16	515	250	09/09/16	225	100	11/23/16	475	325
01/29/16	180	130	04/13/16	324	250	06/27/16	515	250	09/10/16	224	100	11/24/16	340	325
01/30/16	180	130	04/14/16	320	250	06/28/16	515	250	09/11/16	224	100	11/25/16	341	325
01/31/16	180	130	04/15/16	320	250	06/29/16	497	250	09/12/16	226	100	11/26/16	341	325
02/01/16	167	130	04/16/16	320	250	06/30/16	416	250	09/13/16	226	100	11/27/16	340	325
02/02/16	161	130	04/17/16	320	250	07/01/16	340	100	09/14/16	226	100	11/28/16	340	325
02/03/16	161	130	04/18/16	326	250	07/02/16	340	100	09/15/16	225	100	11/29/16	551	325
02/04/16	161	130	04/19/16	330	250	07/03/16	341	100	09/16/16	225	100	11/30/16	756	325
02/05/16	161	130	04/20/16	330	250	07/04/16	341	100	09/17/16	226	100	12/01/16	488	325
02/06/16	161	130	04/21/16	339	250	07/05/16	336	100	09/18/16	216	100	12/02/16	340	325
02/07/16	161	130	04/22/16	345	250	07/06/16	325	100	09/19/16	211	100	12/03/16	340	325
02/08/16	161	130	04/23/16	345	250	07/07/16	325	100	09/20/16	210	100	12/04/16	340	325
02/09/16	162	130	04/24/16	347	250	07/08/16	326	100	09/21/16	211	100	12/05/16	340	325
02/10/16	162	130	04/25/16	346	250	07/09/16	326	100	09/22/16	208	100	12/06/16	551	325
02/11/16	163	130	04/26/16	346	250	07/10/16	326	100	09/23/16	201	100	12/07/16	822	325
02/12/16	163	130	04/27/16	345	250	07/11/16	325	100	09/24/16	201	100	12/08/16	658	325
02/13/16	162	130	04/28/16	381	250	07/12/16	325	100	09/25/16	201	100	12/09/16	450	325
02/14/16	161	130	04/29/16	400	250	07/13/16	317	100	09/26/16	201	100	12/10/16	450	325
02/15/16	160	130	04/30/16	400	250	07/14/16	310	100	09/27/16	203	100	12/11/16	450	325
02/16/16	161	130	05/01/16	400	250	07/15/16	310	100	09/28/16	201	100	12/12/16	616	325
02/17/16	161	130	05/02/16	400	250	07/16/16	310	100	09/29/16	244	100	12/13/16	901	325
02/18/16	161	130	05/03/16	400	250	07/17/16	310	100	09/30/16	290	100	12/14/16	902	325
02/19/16	161	130	05/04/16	410	250	07/18/16	311	100	10/01/16	290	250	12/15/16	901	325
02/20/16	161	130	05/05/16	415	250	07/19/16	320	100	10/02/16	291	250	12/16/16	901	325
02/21/16	162	130	05/06/16	415	250	07/20/16	326	100	10/03/16	619	250	12/17/16	903	325
02/22/16	161	130	05/07/16	415	250	07/21/16	326	100	10/04/16	524	250	12/18/16	905	325
02/23/16	161	130	05/08/16	415	250	07/22/16	325	100	10/05/16	313	250	12/19/16	900	325
02/24/16	161	130	05/09/16	417	250	07/23/16	325	100	10/06/16	276	250	12/20/16	954	325
02/25/16	162	130	05/10/16	420	250	07/24/16	325	100	10/07/16	275	250	12/21/16	1228	325
02/26/16	163	130	05/11/16	418	250	07/25/16	325	100	10/08/16	274	250	12/22/16	1461	325
02/27/16	164	130	05/12/16	425	250	07/26/16	325	100	10/09/16	275	250	12/23/16	1461	325
02/28/16	164	130	05/13/16	433	250	07/27/16	325	100	10/10/16	275	250	12/24/16	1462	325
02/29/16	225	130	05/14/16	440	250	07/28/16	325	100	10/11/16	500	250	12/25/16	1463	325
03/01/16	361	130	05/15/16	440	250	07/29/16	326	100	10/12/16	461	250	12/26/16	1464	325
03/02/16	360	130	05/16/16	440	250	07/30/16	325	100	10/13/16	310	250	12/27/16	1463	325
03/03/16	360	130	05/17/16	447	250	07/31/16	325	100	10/14/16	276	250	12/28/16	1465	325
03/04/16	351	130	05/18/16	458	250	08/01/16	325	100	10/15/16	276	250	12/29/16	1465	325
03/05/16	301	130	05/19/16	466	250	08/02/16	318	100	10/16/16	275	250	12/30/16	1463	325
03/06/16	256	130	05/20/16	468	250	08/03/16	311	100	10/17/16	528	250	12/31/16	1462	325
03/07/16	206	130	05/21/16	467	250	08/04/16	311	100	10/18/16	901	325			
03/08/16	186	130	05/22/16	466	250	08/05/16	303	100	10/19/16	901	325			
03/09/16	185	130	05/23/16	468	250	08/06/16	291	100	10/20/16	743	325			
03/10/16	185	130	05/24/16	471	250	08/07/16	290	100	10/21/16	418	325			
03/11/16	185	130	05/25/16	475	250	08/08/16	291	100	10/22/16	330	325			
03/12/16	215	130	05/26/16	472	250	08/09/16	290	100	10/23/16	330	325			
03/13/16	236	130	05/27/16	464	250	08/10/16	288	100	10/24/16	356	325			
03/14/16	235	130	05/28/16	458	250	08/11/16	275	100	10/25/16	460	325			
03/15/16	220	130	05/29/16	457	250	08/12/16	275	100	10/26/16	432	325			

1. Releases in calendar year 2016 were made according to the "Critically Dry" year JSA Mokelumne River minimum flow schedule from Jan.1 to Mar. 31; "Below Normal" year flow schedule from Apr. 1 through Oct. 17; and "Normal & Above" year flow schedule from Oct. 18 through Dec. 31.
2. Flow measured using Accusonic flow meter (USGS Gage #11323500 - Mokelumne River below Camanche Dam.
3. Actual flow data has not yet been verified and published by the U.S. Geological Survey.



1. Releases in calendar year 2016 were made according to the "Critically Dry" year JSA Mokelumne River minimum flow schedule from Jan.1 to Mar. 31; "Below Normal" year flow schedule from Apr. 1 through Oct. 17; and "Normal & Above" year flow schedule from Oct. 18 through Dec. 31.
2. Actual flow data has not been verified and published by the U.S. Geological Survey.

Figure 3: Calendar Year 2016 Average Daily Release in Cubic Feet per Second from Camanche Dam

Table 3: Calendar Year 2016 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

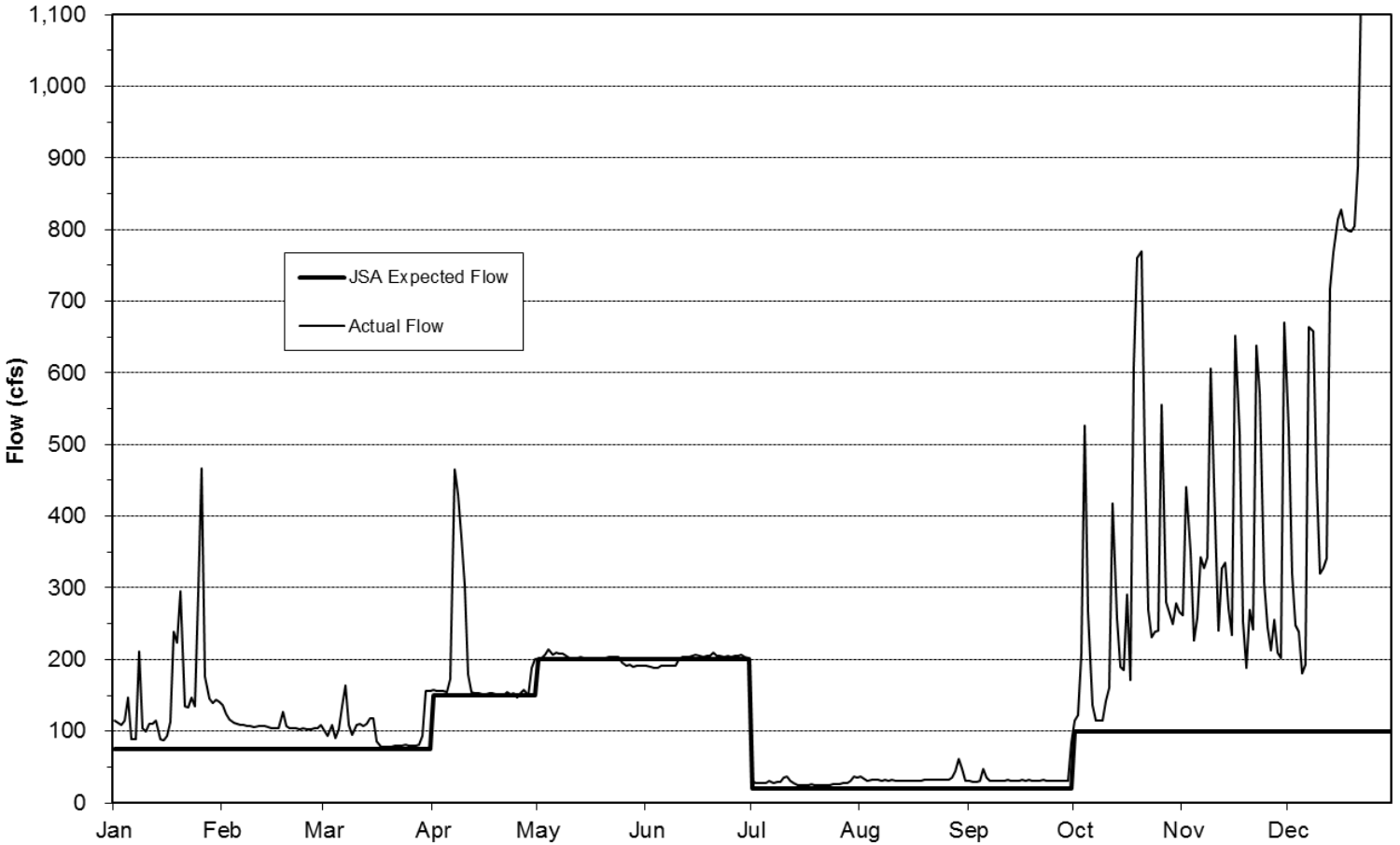
Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow
01/01/16	114	75	03/16/16	86	75	05/30/16	191	200	08/13/16	30	20	10/27/16	279	100
01/02/16	112	75	03/17/16	78	75	05/31/16	191	200	08/14/16	31	20	10/28/16	264	100
01/03/16	109	75	03/18/16	79	75	06/01/16	191	200	08/15/16	31	20	10/29/16	249	100
01/04/16	114	75	03/19/16	78	75	06/02/16	189	200	08/16/16	31	20	10/30/16	278	100
01/05/16	147	75	03/20/16	79	75	06/03/16	189	200	08/17/16	30	20	10/31/16	266	100
01/06/16	90	75	03/21/16	80	75	06/04/16	189	200	08/18/16	31	20	11/01/16	261	100
01/07/16	89	75	03/22/16	80	75	06/05/16	191	200	08/19/16	32	20	11/02/16	440	100
01/08/16	211	75	03/23/16	80	75	06/06/16	191	200	08/20/16	32	20	11/03/16	349	100
01/09/16	105	75	03/24/16	81	75	06/07/16	191	200	08/21/16	32	20	11/04/16	226	100
01/10/16	100	75	03/25/16	80	75	06/08/16	191	200	08/22/16	33	20	11/05/16	258	100
01/11/16	111	75	03/26/16	80	75	06/09/16	191	200	08/23/16	33	20	11/06/16	343	100
01/12/16	110	75	03/27/16	80	75	06/10/16	201	200	08/24/16	32	20	11/07/16	327	100
01/13/16	115	75	03/28/16	81	75	06/11/16	203	200	08/25/16	33	20	11/08/16	342	100
01/14/16	88	75	03/29/16	93	75	06/12/16	204	200	08/26/16	33	20	11/09/16	606	100
01/15/16	87	75	03/30/16	156	75	06/13/16	204	200	08/27/16	35	20	11/10/16	393	100
01/16/16	94	75	03/31/16	156	75	06/14/16	205	200	08/28/16	44	20	11/11/16	240	100
01/17/16	113	75	04/01/16	157	150	06/15/16	207	200	08/29/16	61	20	11/12/16	328	100
01/18/16	239	75	04/02/16	156	150	06/16/16	206	200	08/30/16	47	20	11/13/16	336	100
01/19/16	223	75	04/03/16	156	150	06/17/16	203	200	08/31/16	30	20	11/14/16	270	100
01/20/16	296	75	04/04/16	156	150	06/18/16	206	200	09/01/16	30	20	11/15/16	234	100
01/21/16	135	75	04/05/16	155	150	06/19/16	206	200	09/02/16	29	20	11/16/16	652	100
01/22/16	133	75	04/06/16	173	150	06/20/16	209	200	09/03/16	30	20	11/17/16	514	100
01/23/16	147	75	04/07/16	465	150	06/21/16	206	200	09/04/16	31	20	11/18/16	252	100
01/24/16	134	75	04/08/16	430	150	06/22/16	205	200	09/05/16	47	20	11/19/16	189	100
01/25/16	294	75	04/09/16	370	150	06/23/16	204	200	09/06/16	35	20	11/20/16	269	100
01/26/16	467	75	04/10/16	303	150	06/24/16	204	200	09/07/16	31	20	11/21/16	241	100
01/27/16	176	75	04/11/16	178	150	06/25/16	204	200	09/08/16	31	20	11/22/16	638	100
01/28/16	145	75	04/12/16	154	150	06/26/16	205	200	09/09/16	30	20	11/23/16	571	100
01/29/16	139	75	04/13/16	153	150	06/27/16	205	200	09/10/16	30	20	11/24/16	307	100
01/30/16	145	75	04/14/16	152	150	06/28/16	207	200	09/11/16	30	20	11/25/16	246	100
01/31/16	141	75	04/15/16	151	150	06/29/16	204	200	09/12/16	32	20	11/26/16	213	100
02/01/16	137	75	04/16/16	152	150	06/30/16	202	200	09/13/16	31	20	11/27/16	255	100
02/02/16	125	75	04/17/16	153	150	07/01/16	31	20	09/14/16	31	20	11/28/16	210	100
02/03/16	116	75	04/18/16	153	150	07/02/16	27	20	09/15/16	31	20	11/29/16	203	100
02/04/16	112	75	04/19/16	151	150	07/03/16	28	20	09/16/16	32	20	11/30/16	670	100
02/05/16	110	75	04/20/16	151	150	07/04/16	28	20	09/17/16	31	20	12/01/16	521	100
02/06/16	108	75	04/21/16	150	150	07/05/16	28	20	09/18/16	32	20	12/02/16	321	100
02/07/16	108	75	04/22/16	154	150	07/06/16	31	20	09/19/16	31	20	12/03/16	248	100
02/08/16	107	75	04/23/16	152	150	07/07/16	28	20	09/20/16	31	20	12/04/16	239	100
02/09/16	107	75	04/24/16	153	150	07/08/16	30	20	09/21/16	31	20	12/05/16	180	100
02/10/16	106	75	04/25/16	147	150	07/09/16	30	20	09/22/16	32	20	12/06/16	194	100
02/11/16	107	75	04/26/16	152	150	07/10/16	35	20	09/23/16	31	20	12/07/16	663	100
02/12/16	107	75	04/27/16	157	150	07/11/16	37	20	09/24/16	30	20	12/08/16	658	100
02/13/16	107	75	04/28/16	150	150	07/12/16	31	20	09/25/16	31	20	12/09/16	451	100
02/14/16	105	75	04/29/16	189	150	07/13/16	28	20	09/26/16	31	20	12/10/16	319	100
02/15/16	104	75	04/30/16	200	150	07/14/16	25	20	09/27/16	30	20	12/11/16	327	100
02/16/16	104	75	05/01/16	201	200	07/15/16	25	20	09/28/16	31	20	12/12/16	341	100
02/17/16	104	75	05/02/16	202	200	07/16/16	25	20	09/29/16	31	20	12/13/16	718	100
02/18/16	127	75	05/03/16	207	200	07/17/16	25	20	09/30/16	84	20	12/14/16	768	100
02/19/16	107	75	05/04/16	215	200	07/18/16	26	20	10/01/16	115	100	12/15/16	814	100
02/20/16	104	75	05/05/16	207	200	07/19/16	25	20	10/02/16	122	100	12/16/16	827	100
02/21/16	104	75	05/06/16	209	200	07/20/16	25	20	10/03/16	208	100	12/17/16	803	100
02/22/16	104	75	05/07/16	209	200	07/21/16	25	20	10/04/16	526	100	12/18/16	799	100
02/23/16	103	75	05/08/16	208	200	07/22/16	25	20	10/05/16	266	100	12/19/16	798	100
02/24/16	104	75	05/09/16	205	200	07/23/16	25	20	10/06/16	136	100	12/20/16	804	100
02/25/16	103	75	05/10/16	202	200	07/24/16	25	20	10/07/16	115	100	12/21/16	887	100
02/26/16	103	75	05/11/16	203	200	07/25/16	26	20	10/08/16	114	100	12/22/16	1226	100
02/27/16	104	75	05/12/16	202	200	07/26/16	27	20	10/09/16	115	100	12/23/16	1368	100
02/28/16	104	75	05/13/16	203	200	07/27/16	27	20	10/10/16	143	100	12/24/16	1359	100
02/29/16	108	75	05/14/16	203	200	07/28/16	27	20	10/11/16	161	100	12/25/16	1351	100
03/01/16	101	75	05/15/16	203	200	07/29/16	31	20	10/12/16	417	100	12/26/16	1359	100
03/02/16	93	75	05/16/16	202	200	07/30/16	36	20	10/13/16	257	100	12/27/16	1360	100
03/03/16	108	75	05/17/16	201	200	07/31/16	36	20	10/14/16	191	100	12/28/16	1370	100
03/04/16	91	75	05/18/16	202	200	08/01/16	37	20	10/15/16	186	100	12/29/16	1394	100
03/05/16	103	75	05/19/16	201	200	08/02/16	34	20	10/16/16	291	100	12/30/16	1406	100
03/06/16	134	75	05/20/16	202	200	08/03/16	31	20	10/17/16	171	100	12/31/16	1409	100
03/07/16	164	75	05/21/16	203	200	08/04/16	32	20	10/18/16	609	100			
03/08/16	109	75	05/22/16	204	200	08/05/16	32	20	10/19/16	760	100			
03/09/16	95	75	05/23/16	204	200	08/06/16	32	20	10/20/16	769	100			
03/10/16	109	75	05/24/16	204	200	08/07/16	31	20	10/21/16	476	100			
03/11/16	110	75	05/25/16	196	200	08/08/16	32	20	10/22/16	269	100			
03/12/16	108	75	05/26/16	191	200	08/09/16	31	20	10/23/16	231	100			
03/13/16	111	75	05/27/16	192	200	08/10/16	32	20	10/24/16	239	100			
03/14/16	117	75	05/28/16	190	200	08/11/16	31	20	10/25/16	240	100			
03/15/16	118	75	05/29/16	191	200	08/12/16	30	20	10/26/16	556	100			

1. Expected flows below Woodbridge Dam in calendar year 2016 were according to the "Critically Dry" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Below Normal" year flow schedule from Apr. 1 through Oct. 17; and "Normal & Above" year flow schedule from Oct. 18 through Dec. 31.

2. Flow measured at USGS Gage #11325500 - Mokelumne River at Woodbridge.

3. Actual flow data has not yet been verified and published by the U.S. Geological Survey.

4. On 4/25/2016 and during the period between 5/25/2016 through 6/9/2016, the provisional average daily flows below Woodbridge Dam fell below the expected JSA minimum flows. Given the small magnitude of these deviations from daily expected minimum flows and the absence of any notable decrease in salmonid migration during the period of deviation, EBMUD's biologists determined that there was no impact to fisheries resources.



1. Expected flows below Woodbridge Dam in calendar year 2016 were according to the "Critically Dry" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Below Normal" year flow schedule from Apr. 1 through Oct. 17; and "Normal & Above" year flow schedule from Oct. 18 through Dec. 31.
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Figure 4: Calendar Year 2016 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam.

Adaptive Management

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 so 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 order to maximize the effectiveness of fall attraction flows, by enabling higher peak flows while not impacting the number of pulses that could be implemented, at its September 29, 2016 meeting, the Partnership Coordinating Committee approved eliminating the ramping rate criteria for October through December 2016. The purpose of this decision was to prevent the waste of water during the ramp-down steps that could otherwise be used for additional and/or larger pulse flows. The Partnership Coordinating Committee agreed that using the water for pulses rather than for maintaining ramping rate flows would benefit the fisheries to a much greater extent, and that no impact related to fish stranding on ramp-down would be experienced at this time of the year. In making this decision, the committee also reviewed all available data associated with water elevations and concluded that there would be no significant impact to spawning salmon or nests due to eliminating the ramping criteria.

Gainsharing Increase in Flows

On December 31, 2015, 8,384 AF of gainsharing water was carried over to 2016. The Partnership Coordinating Committee (PCC) requested to use some of the gainsharing water to increase the minimum flow release from Camanche Reservoir for the months of January and February. By February 28, 2016, 4,185 AF of gainsharing water remained. Pulse flow releases from April 6 to 10 furthered reduced the available gainsharing quantity to 2,382 AF. At the September 2016 meeting, the PCC developed a fall pulse flow plan, which was implemented by EBMUD. Actual fall pulse flows used all remaining gainsharing water by November 5, 2016.

In order to maximize the effectiveness of the fall pulse flows, the Lower Mokelumne River Partnership has worked cooperatively with the USBR to develop a 5-year Delta Cross Channel (DCC) closure study plan to determine the effects of closures on stray rates. DCC operations during the up migration period may contribute to excessive straying of Mokelumne

origin salmon to the American River. In 2016, there were three DCC closures in November, due to the need to meet Rio Vista minimum flows and fish protection closures for winter run Chinook salmon. Closures were not related to the 5-year study plan. Analysis of return data beginning in 2010 indicate reductions in straying to the American River can be achieved with Mokelumne River pulse flows and DCC closures.

Pulse Flow Operations

Despite changing conditions due to the unanticipated precipitation received in late 2016, a series of ten pulse flows were released by EBMUD from Camanche Dam from October through December of 2016. As discussed above, the first six pulses in the series were made using gainsharing water and water bypassed to meet water right permit term requirements. The plan initially developed by the Partnership in September 2016 included the 2000 AF of water made available pursuant to the terms of amended water right Permit 10478; however, due to changing hydrologic conditions, the pulse flow plan was modified and the pulse flows were increased to take into account the large amount of flows coming into and out of the system. Pulse flow release timing was coordinated with the San Joaquin tributary planned releases, with Mokelumne releases slated to occur one week ahead of Stanislaus River releases, to minimize straying to the south. Reoperation of Woodbridge dam by WID downstream augmented the magnitude of pulse flow peaks below Woodbridge Dam with average daily peaks ranging up to 769 cfs. The final four pulses in the series were developed through collaboration with Woodbridge Irrigation District (WID) on reoperation of Woodbridge Dam elevations to support Chinook salmon and steelhead passage. These pulses were comprised of water bypassed to meet water right permit term requirements and contributed significantly to the positive fish response. Each pulse resulted in an increase in salmon numbers entering the Mokelumne River (see Figure 5). As of December 31, 2016, the 2000 AF allocated in the amended water right Permit 10478 has not been requested by the Partnership.

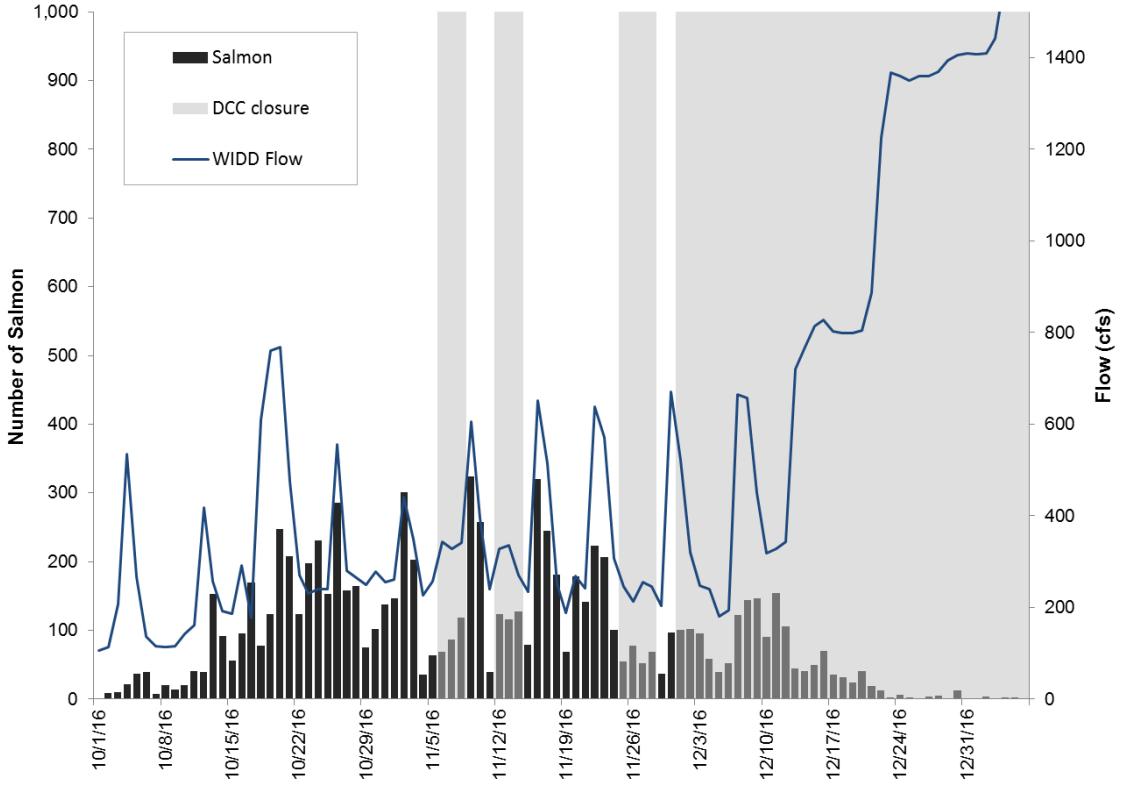

Figure 5: Daily Upstream Passage of Chinook Salmon at Woodbridge Dam Relative to Flow and Delta Cross Channel Closure, October –December 2016

Coded Wire Tag (CWT) return data clearly indicates that release locations for hatchery reared juveniles plays a significant role in straying.[3] 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. With the elimination of egg transfers the overall impact to Mokelumne returns is significant. In 2016, CDFW continued the practice of releasing production in net pens at Jersey Point, which previous return data indicates leads to less straying

[3] 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.

and better returns to the Mokelumne. Overall, these adaptive management efforts will maximize returns to the Mokelumne River while minimizing straying to other systems.

2017

EBMUD is committed, pursuant to the FERC Order, to "Normal and Above" JSA year type Camanche Dam flow releases through March 31, 2017. In accordance with the stipulation in Attachment 1 of the JSA, EBMUD will determine, based on the DWR forecasted unimpaired runoff into Pardee Reservoir as identified in the April 1, 2017 DWR Bulletin 120, the JSA water year type which will govern EBMUD's flow schedule for the period April 1, 2017 through September 30, 2017. EBMUD will report to the FERC in the February 2017 report on the flow releases made in accordance with the JSA during the entire calendar year 2016. 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 2014 and 2015 calendar years.

B. WATER QUALITY

Water quality in the Mokelumne River Fish Hatchery (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. Ultra violet (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 Permit (NPDES). 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 destratified.
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.

2016

The operational plan used by EBMUD since 1990 has proven effective in maintaining thermal stratification in Camanche Reservoir during normal and above, below normal, and dry JSA water year conditions. Resulting temperatures are shown in Figure 6, Calendar Year 2016 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam.

From April 1, 2016 through September 30, 2016 EBMUD operated under a "Below Normal" JSA water year type, with releases in accordance with the JSA minimum flows. Furthermore, consistent with the JSA, EBMUD continued to manage its reservoir operations and was successful in maintaining a hypolimnion volume above 28,000 acre-feet in Camanche Reservoir at the end of October.

Pardee and Camanche reservoirs were operated to successfully maintain stratification in Camanche Reservoir, and 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 2016.

2017

EBMUD will also 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.

2016

The HOS was activated on July 11, 2016 and was shut down on December 2, 2016. The HOS has effectively prevented hydrogen sulfide formation.

2017

In 2017 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.

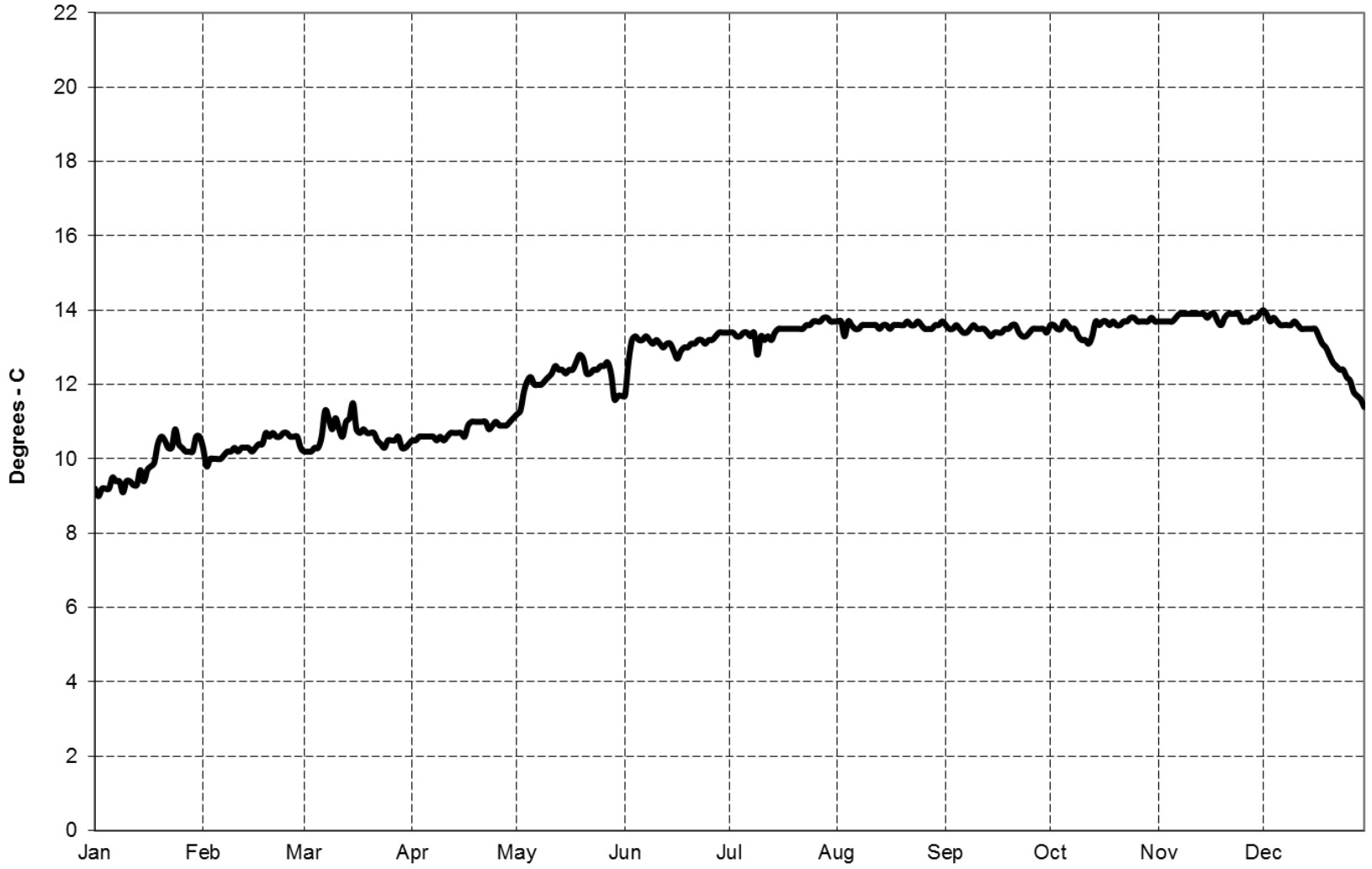

Figure 6: Calendar Year 2016 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam.

C. THE LOWER MOKELUMNE RIVER PARTNERSHIP

1. The Partnership Steering Committee

The Partnership Steering Committee (PSC), (consisting of representatives from EBMUD, CDFW, NOAA Fisheries and USFWS) met on January 25, 2017. Minutes of the PSC meeting are included in Appendix D. The PSC continued to oversee the operation of the Partnership Coordinating Committee (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 5, 2016 and September 29, 2016. September 29, 2016. A total of 42 projects since 1999 have been approved for Partnership funding. See Section IV.C.2 of this report for projects approved for Partnership funding in 2016 and projects with activity in 2016.

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 $837,448. The available earnings, net of funds obligated to approved projects, were $127,116 as of December 31, 2016.

Ongoing projects funded by the PSC with activity in 2016 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 2016 Activity Summary

Project Title	Project Sponsor	Project Description	Partnership Fund			Additional Funding	
			Date Approved by PSC	Anticipated Project Completion	Amount Obligated	Amount	Program
2012-2014 Watershed Coordinator	San Joaquin County Resource Conservation District	Cost-share to continue support of SJCRCD watershed coordinator position	4/23/2012	Fall 2017 (deadline extended)	$30,000	-	-
2014-15 and 2015-16 Lower Mokelumne River Watershed Education Project – City of Lodi	City of Lodi	Educational field trips for students	11/3/14	COMPLETED	$15,000	-	-
2015 Mokelumne River Salmonid Spawning and Rearing Habitat Potential: Analysis of Coarse Sediment and Floodplain Extent Project	EBMUD	Estimate the available coarse substrate and acreage of floodplain rearing habitat restoration opportunities.	11/3/14	COMPLETED	$34,097	$25,000	EBMUD Fisheries
Heritage Oak Winery Riparian Restoration and Streambank Stabilization Project	Tom and Matt Hoffman; Mokelumne Environmental Benefits Program	Phase 1: Invasive species removal, planting of riparian native plants; Phase 2: Streambank stabilization (bio-engineering)	11/15/2012	PROJECT CANCELLED (Partnership Funding not expended and returned to Partnership Fund	$42,001.41 (Increased from $21,196 in 2015)	**$150,000	**Partnership Funding conditional on project sponsor securing balance of project funding ($ and in-kind labor)
2016-17 Lower Mokelumne River Watershed Education Project – City of Lodi	City of Lodi	Educational field trips for students	10/28/16	Spring 2017	$7,975		

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 2016, 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 have focused on support and cooperation with the Stewardship Program.

The Lower Mokelumne River Stewardship Program (LMRSP) 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. In 2016, EBMUD and the Partnership continued as regular participants in the work of the Stewardship Program Steering Committee to implement elements of the LMRSP.

The Stewardship Program 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. In 2015, the Stewardship Steering Committee continued work towards increasing watershed stewardship awareness among urban landowners along the Mokelumne River and elsewhere in the watershed by initiating the process to update the LMRSP *Mokelumne River Watershed Owner's Manual*. Additional information on the Stewardship Program, including the watershed owner's manual is available at www.sjcrcd.org.

5. Additional EBMUD Stakeholder Activities

2016

In 2016, EBMUD pursued numerous opportunities to solicit Mokelumne River stakeholder participation independently of, but coordinated with, Partnership activities. Collaborative stakeholder activities that EBMUD representatives were involved with in 2016 included:

- Participation in the Mokelumne River Association (MRA). The mission of the MRA is to stimulate a greater understanding and a cooperative atmosphere and to provide information to the private owners, political entities, and public agencies responsible for the operation, maintenance, control, and management of Mokelumne River water systems. The MRA membership consists of representatives of any duly constituted public or private entity within the Mokelumne River Watershed. There are 19 public and private entities that are members of the MRA (1993-present). The MRA meets quarterly.
- Ongoing cooperation with the U.S. Fish and Wildlife Service to implement the Central Valley Project Improvement Act’s 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 the 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 2016, actions on the AFRP funded habitat restoration project included placement of 733 tons of gravel placed this season to create complete the 2015 riffle pool segment design in the river channel within the Mokelumne River Day Use Area. In addition, a 0.70 acre floodplain was built that will inundate at 350 cfs to provide habitat for juvenile fish rearing and growth.

- Participation in the CVPIA Science Integration Team to develop a structured decision making (SDM) model to develop CVPIA funding priorities for FY2018 and ultimately a 5 year plan. Staff are providing accurate empirical physical and biological data into the model to ensure the Mokelumne River is fairly represented in the process, and contributing technical input into the model scenarios to determine priorities.
- Participation in the 19th annual Sandhill Crane Festival in Lodi, CA on November 5-6, 2016. The festival provides information and education as well as field trips to various locations along the lower Mokelumne River. The Sandhill Crane Festival seeks to promote broad public awareness of lower Mokelumne River natural resource values. EBMUD staff has led field trips to view bald eagles at Pardee Reservoir. (1997-present)
- Participation in the 17th annual Central Valley Birding Symposium in Stockton on November 18, 2016. EBMUD staff led field trips on Pardee Reservoir.
- Participation in the Upper Mokelumne River Anadromous Fish Restoration 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 in developing a plan that is 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. Ongoing activities include preparing an RFP for habitat assessment of the upper watershed and looking for funding.
- 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)
- 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)

- 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 in Murphy Creek (a tributary to the lower Mokelumne River).
- Participating on the San Joaquin County Resource Conservation District's Lower Mokelumne River Recreational Waterway Steering Committee to develop and improve recreational access to the lower Mokelumne River.
- Participating on the California Bay Delta Authority (CBDA's) Watershed Public Advisory Sub-Committee and Ecosystem Restoration Sub-Committee.
- 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). (2007-present) The SHA covers the valley elderberry longhorn beetle on EBMUD land in San Joaquin County.
- Continue to participate with 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.
- Participation with the Sierra Nevada Conservancy, U.S. Forest Service, Sustainable Conservation, Mokelumne Consensus Group, Sure Harvest, Environmental Defense Fund, and others in the development of a pilot program to measure environmental benefits in the Mokelumne River watershed. (Ongoing)
- Participate in an annual "Kids Fishing Day" at Camanche South Shore (2014-present) Partnering with Camanche Concessionaire staff, local residents and local fishing groups to provide free angling opportunities and instruction to children <12 years of age.

2017

In 2017, EBMUD plans to continue the above activities, as well as search for new opportunities to participate in collaborative stakeholder activities. Specific efforts will be made to evaluate the implementation efforts and priorities of the Lower Mokelumne River Watershed Stewardship Plan and, for implementation efforts consistent with Partnership objectives, to determine how Partnership funding could possibly support them.

6. Surplus Water

2016

As water supply conditions improved in the spring of 2016, the District's Board of Directors began rescinding some drought-related actions that had been effect since 2015. On April 26, 2016, the Board of Directors accepted the 2016 Water Supply Availability and Deficiency Report declaring the sufficiency of water to meet customer demands in 2016, but did not determine that surplus Mokelumne River water would be available. EBMUD informed the Partnership of resource agencies about the availability of gainsharing water in April 2016 and in September 2016, a plan on the release schedule of the gainsharing water was developed and implemented.

D. MOKELUMNE RIVER TECHNICAL COOPERATION

1. 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, the State Water Resources Control Board (SWRCB), and the Federal Energy Regulatory Commission (FERC) are also members of the MRTAC, but do not attend consistently. 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.

2016

In 2016, the MRTAC met semiannually (alternating quarterly meetings between the MRTAC and the PCC). Representatives from WID, CDFW, EBMUD, USFWS, and NOAA Fisheries, participated in the MRTAC meetings held on January 27, 2016 and July 28, 2016.

2017

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 2017 will be held on February 22, 2017.

2. Mokelumne River Science Database

Section H.2 of the JSA specifies that EBMUD will develop a science database for the lower Mokelumne River. In 2016, 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. Recently, CAMP has developed a standardized database for juvenile outmigration monitoring in the California Central Valley. During this process EBMUD has worked with CAMP to transfer all juvenile trapping data collected on the lower Mokelumne River to the CAMP platform. Other contributors to the CAMP database include several resource agencies and associated contractors conducting juvenile outmigration monitoring in the California Central Valley.

E. 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.

2016

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.
- Assessment of entrainment and predation of juvenile chinook at a riparian diversion slated to be screened in the fall of 2016 by the Anadromous Fish Screen Program
- Cooperation with the state-wide Constant Fractional Marking (coded-wire tagging) of Chinook salmon released from the Mokelumne River Fish Hatchery.
- Continuing predation management program which relocates non-native salmonid predators from the Mokelumne River.
- Participating in a juvenile salmon barging study led by CDFW to assess differences in homing and straying rates from adult returns from paired barged and trucked release groups to the Golden Gate Bridge.
- Continuing to assist CDFW with acoustic tagging and tracking of adult salmon migration through the Delta system.
- Genetic analysis of steelhead broodstock, and spawning matrix development to reduce pair relatedness and increase the number of family groups represented in the progeny.
- Adaptive management actions to promote healthy fish populations include fall pulse flows to attract salmon and steelhead into the Mokelumne River;; managing Camanche cold water pool adaptively to maximize benefit for fall run chinook salmon

2017

EBMUD will continue similar research and monitoring activities in 2017.

F. HABITAT IMPROVEMENTS

1. Ongoing Efforts

EBMUD has continued to enhance the instream and riparian habitat of the lower Mokelumne River. These ongoing projects include:

2016

- Gravel Enhancement: Gravel enhancement projects began in 1990. Clean, washed gravel of a size suitable for salmon spawning is placed in the river in appropriate locations and mixed with seasoned gravel. In 2016, 846 yd^3 of gravel were placed in the Lower Mokelumne River to create three riffle pool sequences for spawning habitat. Since 1998, EBMUD has placed approximately 70,000 tons of spawning gravel in the Lower Mokelumne River.
- Floodplain Restoration: A 0.50 acre floodplain 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 ~400 cfs (Tier 1) and ~1,000-1,200 cfs (Tier 2)Floodplain creation activities were implemented by excavating and sorting existing streambed materials to produce the >800 yd^3 of spawning size rock for gravel enhancement described above while creating juvenile habitat.
- Riparian Habitat Enhancement: Developing 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. EBMUD continues working with winegrape and walnut growers to enhance and restore riparian vegetation.
- Providing technical support in seeking grant funding to continue implementation of *Lower Mokelumne River Stewardship Plan*, primarily restoration and invasive plant removal. Anticipated funding sources include: 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.

EBMUD has continued to support and collaborate with the Lower Mokelumne River Watershed Stewardship Program, including, but not limited to, the following projects:

- Continuing implementation of $1.3 million SWQCB grant. This includes EBMUD involvement with prioritization for riparian restoration, permitting, and providing technical advice.
- Participated in Lower Mokelumne River Restoration Tour coordinated by EBMUD and the San Joaquin County RCD. The tour involved local land owners, Department of Conservation staff from their office of government and environmental relations, the State Watershed Coordinator, Woodbridge Wine Grape Commission, and San Joaquin Council of Governments (SJCOG).
- Continuing to participate in the Student and Landowner Education and Watershed Stewardship (SLEWS) program.
- 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 RCD's 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.
- Restoration and Monitoring of Riparian Habitat Corridors along the Lower Mokelumne River. This project, funded by the CBDA ($859,405) and managed by the San Joaquin County Resource Conservation District, enhanced approximately 45 acres of riparian habitat along two miles of the lower Mokelumne River to increase the diversity and richness of riparian birds. Monitoring will provide information about which plants benefit avian communities, reduce stream bank erosion, and enhance river functions for anadromous fish.

2017

Many of the above habitat improvement activities will continue in 2017.

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 3, 2016 and was removed due to high flows on January 4, 2017. It is anticipated that it will be installed on the first Monday in October 2017 and operated through the steelhead migration season unless high flows require early removal.

V. APPENDICES

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

Appendix B: Temporary Flow Excursions below Woodbridge Dam

Appendix C: USGS Verified Flow Data for 2014 and 2015

Appendix D: Meeting Minutes of the Partnership Steering Committee

APPENDIX A

SAMPLE OF LOWER MOKELUMNE RIVER RELATED STORIES FROM LOCAL PRESS

DREAM project draws both hope and concern

Posted: Friday, April 8, 2016 11:07 pm

By Joe Benapfl / News-Sentinel Staff Writer

In an effort to address countywide water concerns, the North San Joaquin Water Conservation District (NSJWCD) is looking to recharge the county's declining groundwater supply with a joint project that includes the participation of East Bay Municipal Utility District (EBMUD).

The Demonstration Recharge Extraction and Aquifer Management (DREAM) project would potentially replenish north San Joaquin County's diminishing groundwater supply. And while other agencies are leery of this project becoming a harbinger of larger projects, the project organizers, including NSJWCD secretary Dave Simpson, are confident that this venture will benefit the water situation for everyone.

"We're all in this together. Nobody has it out for each other," Simpson said.

The plan is to extract 1,000 to 1,100 acre-feet of EBMUD-owned surface water from the Mokelumne River about three miles east of Lodi city limits. That water would then travel south through a pre-existing NSJWCD pipeline and fill into Pixley Slough. From there, that water would irrigate 350 acres of vineyards south of Armstrong Road, according to Simpson.

With that water now available for farmers, they would no longer need to pump groundwater for their crops for one to two seasons. Hence, the groundwater would theoretically replenish itself through natural means.

Another aspect of the project will include extracting as much as half of the groundwater saved, to be transported to EBMUD's Mokelumne Aqueduct. In total, NSJWCD officials hope to net up to 500 acre-feet of groundwater during the program.

Ultimately, the project would provide the water district information about groundwater sustainability and offer the officials an opportunity to accurately measure and improve upon current groundwater levels. Looked upon as a test for the future, this operation might also inform water agencies about the viability of this specific water recharge method.

"It's really good to know right now whether this size project will increase groundwater levels," said Jennifer Spaletta, an attorney representing NSJWCD.

The NSJWCD will use about $1 million to upgrade the well pump and build the pump-to-Mokelumne Aqueduct pipeline, and an additional $1.25 million to cover permit costs, electrical costs and general pipe repairs for the Mokelumne River-Pixley Slough pipeline.

The Mokelumne Aqueduct pipe will also be available for irrigation after the project's conclusion, Simpson said.

This money was obtained as part of a previous settlement agreement with EBMUD.

Because groundwater would be leaving San Joaquin County via the Mokelumne Aqueduct, the DREAM project would require the county to approve a groundwater export permit, according to San Joaquin County public works deputy director Fritz Buchman. Then the county board of supervisors will vote to approve the plans, and DREAM project operations would start sometime in 2017.

However, this is new territory for the water district, as an export permit has never been approved before, Buchman said. Nevertheless, project participants are undeterred, noting that the small scale of the DREAM project should help gain approval.

"Those things take time, and we think that can be approved. There's not much at stake because it's just a demo project," said Richard Sykes, director of water and natural resources at EBMUD.

This hasn't stopped other agencies from having concerns. The City of Lodi is in the process of drafting a letter of concern to county supervisors. Lodi officials are worried about any larger projects that might stem from this effort haven't been environmentally reviewed, and claim that Woodbridge Irrigation District (WID) has water rights to Mokelumne River surface water that was not acknowledged by the project. And because Lodi purchases water from WID, the city might also be involved.

Representatives from WID were unavailable for comment.

However, NSJWCD officers say they have no future blueprints for larger-scale undertakings, and that the DREAM project is simply a test to see if this recharge method is beneficial. Indeed, the water district is trying to find a solution that will assist the entire county's water supply, according to Simpson.

"We're building in safeguards to make sure nobody is adversely impacted," Simpson said. "It has the potential to benefit everybody."

Contact reporter Joe Benapfl at josephb@lodinews.com

Article rank | 19 Aug 2016 | Lodi News-Sentinel | STOCKTON RECORD

East Bay MUD water storage experiment gets broad support

San Joaquin County water commissioners took the first formal step Wednesday toward approving an innovative experiment to store water below ground and share a portion of it with Bay Area residents.

The plan sailed through the commission by a 13-0 vote, meaning it now will go before the county Board of Supervisors.

Representatives of the Woodbridge Irrigation District and the city of Lodi, which rely on water downstream of the proposed project, voted in support despite having raised concerns earlier. The experiment will provide "valuable scientific information" and will assist farmers in northeastern San Joaquin County, Woodbridge General Manager Andy Christensen said.

Under the one-time deal, the East Bay Municipal Utility District would allow local farmers to take a modest 1,000 acre-feet of water off the Mokelumne River to irrigate their crops. That effectively puts 1,000 acre-feet of water into the ground because the farmers won't be pumping as heavily from their wells.

East Bay MUD then would be allowed to extract half of that underground water — about 500 acre-feet — and ship it to the Bay Area. It's not much water; the idea is to prove that it's possible to share groundwater as droughts intensify and new regulations go into effect.

Contemplating the export of even a small amount of groundwater is a big deal in San Joaquin County, where such transfers are illegal unless a special permit is obtained.

County Public Works officials said Wednesday that supervisors may consider approving such a permit by the end of the year.

Former Lodian recognized for contributions to local watershed

Posted: Friday, February 19, 2016 10:49 pm

By Jennifer Bonnett / News-Sentinel staff writer

A man credited with bringing together landowners and government regulators was recognized this week for his contributions to the local watershed.

John Brodie, former San Joaquin County Resource Conservation District Watershed coordinator for the Lower Mokelumne River, received the 2015 Frank R. Beeler Watershed Stewardship Award at a ceremony Thursday.

The award is presented annually to recognize an individual or organization within the Lower Mokelumne River watershed that 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.

Although he admits he was somewhat surprised at the honor because he is neither a landowner nor program adviser, Brodie was recognized for helping bring in millions of dollars to the City of Lodi and local landowners for the improvement of the watershed. Those efforts have benefited the watershed's farmers, habitat, water and air quality and community at large, according to Kathy Grant, chairwoman of the Lower Mokelumne River Watershed Stewardship Steering Committee.

“I just coordinated things,” Brodie said of bringing stakeholders to the table. “I just helped put the puzzle pieces together.”

He served as the liaison between all the stakeholders in the watershed, including private landowners, agriculture growers, the State Water Resources Control Board, Regional Water Quality Control Board, City of Lodi, San Joaquin Farm Bureau, Nature Conservancy, Woodbridge Irrigation District, Sustainable Conservation and the East Bay Municipal Utility District. Through his effort these groups were able to work together and make significant difference in the health and restoration of the river, stream banks and water quality, according to a press release.

Among those efforts was making the goals of the Watershed Storage Plan a reality. The plan was adopted in early 2002, less than a year into his job.

Although he now lives in Las Vegas, Brodie is still involved in grant writing for the University of Nevada at Las Vegas. He also contributed to a recent City of Lodi grant for Lodi Lake, according to Grant.

“He knows our watershed well,” she said. “It just flows out of him like a second language. It’s thanks to John’s writing that Lodi got so much money for our watershed.”

Near the beginning of his 13-year tenure with Resource Conservation District, Brodie partnered with the City of Lodi to launch its “Storm Drain Detectives” program. It is made up of a group of teachers, students and community members, in partnership with the city’s public works department, that monitors the Mokelumne River monthly at several different sites where stormwater enters the river.

Today, there are an estimated 200 participants, according to Grant.

He also helped clear the government red tape for a Habitat Restoration Project alongside winegrape grower Brad Lange. Those efforts ultimately resulted in the first-ever Mokelumne River Safe Harbor agreement which protects landowners who help restore the riparian habitat along the waterway.

Among Brodie’s other contributions was narrating a training video highlighting the Mokelumne River, helping to restore Murphy Creek, a tributary of the Mokelumne River, by removing the dam and restoring the salmon run, and appointment to the California Department of Conservation’s Statewide Watershed Advisory Committee to develop guiding principles for a statewide watershed program.

“John was really good at passing on his knowledge, too,” Grant said.

The award was named for Beeler, the late water and wastewater superintendent for the City of Lodi who was an active participant and advocate for the Lower Mokelumne River Watershed Stewardship Plan and the Lower Mokelumne River Watershed Stewardship Steering Committee. He was a leader in the city’s stormwater program and tirelessly supported volunteer watershed stewardship activities such as the “Storm Drain Detectives.”

Past recipients of the Beeler Award include Grant, Lange, Chris Locke of Locke Ranch, Tom Hoffman of Heritage Oak Winery, Vino Farms LLC, the Center For Land-Based Learning and Anders Christensen of the Woodbridge Irrigation District.

Groundwater levels still falling

More rain helps, but not enough to stop the slide

By Alex Breitler
Record Staff Writer

Posted Jun. 15, 2016 at 5:54 PM

What a difference a year doesn't make.

For anyone who doubts that we're still in a drought, San Joaquin County's groundwater "savings account" was even more depleted this spring than last, despite improved rainfall over the course of the winter.

Routine surveys of hundreds of wells across the county revealed water levels had dropped about 2 feet on average — not as severe as the 3-foot drop seen the previous spring, but still a decline.

Officials had hoped the results might be a little better.

"But we weren't expecting an instant turnaround," said Fritz Buchman, deputy director of county Public Works.

Here's why: While last winter was better than the three so-called "rainy seasons" that preceded it, it was not an extraordinarily wet year. Rainfall at the Stockton Metropolitan Airport is about 3 inches ahead of normal, but other local monitoring locations — like Stockton's Fire Station No. 4 on Pacific Avenue — are actually below normal.

The less rain, the less water is available to seep into the soil and recharge the groundwater, a source relied upon to varying degrees by both farmers and San Joaquin County residents.

The county's less-than-ideal groundwater report, released Wednesday to the Advisory Water Commission, is one reason county officials are leaving twice-a-week watering rules in place for residents in unincorporated areas.

"It's just too early" to lift those rules, Buchman said.

Lower groundwater is also troublesome for farmers, who must pay more for the power needed to pump the water from deeper underground.

The groundwater decline is not universal across the county. Some areas — including wells in the city of Stockton and Tracy — have seen improvement. Those communities have been relying more on river water in recent years.

Heading east of Stockton, however, the farther you go the more depleted the wells have become. The same is true heading into the northeastern portion of the county generally in the area of Highway 99. In both areas, groundwater levels this spring were as low or even slightly lower than the fall of 1992, which has long been considered the benchmark “low-water” year.

In the most extreme case, a well within the Central San Joaquin Water Conservation District dropped 28 feet this spring compared to last spring. (Though another well within the same district climbed 12 feet, highlighting how variable groundwater levels can be, depending on local conditions.)

San Joaquin County’s groundwater problems, of course, predate the drought. The county has long been considered by state officials to be in overdraft, meaning that on average, more water is taken out of the ground than is replaced by the rain.

In some areas, irrigated orchards have sprouted in areas where before there was only dry-land grazing.

The county is still working on long-term solutions, including an experimental groundwater banking partnership with the East Bay Municipal Utility District east of Lodi.

— Contact reporter Alex Breitler at (209) 546-8295 or abreitler@recordnet.com. Follow him at recordnet.com/breitlerblog and on Twitter @alexbreitler.

Groundwater running on a deficit in S.J. County

By Alex Breitler
Record Staff Writer

Lodi News Sentinel
Posted Feb. 17, 2016 at 6:52 PM

Our water “savings account” hasn’t exactly gone broke, but it’s sure getting harder to make a withdrawal.

To the surprise of no one, groundwater levels in the fall of 2015 plummeted to new historic lows in portions of San Joaquin County, worse even than the previous “low-water” year of 1992.

There are still untold volumes of water beneath our feet. But the lower the water level drops, the more expensive it is pump it to the surface and use it.

The county's problem is nowhere near as severe as the south Valley, where so much groundwater has been pumped that the ground itself is sinking. Still, with a $3 billion agricultural industry in San Joaquin County and hundreds of thousands of residents who rely to some extent on groundwater, experts don’t like seeing local wells dropping by 5, 10 or even 20 feet in a single year, as happened last fall in one extreme case.

The groundwater situation is “worse than it was in the ’90s and way worse than it was in the ’70s,” said Tom McGurk, an east county farmer who is chair of the county’s Advisory Water Commission.

Droughts during those decades were bad, but farmers feel the pinch even more today, McGurk said. The prices they fetch for their crops go up and down, but the cost of the power required to pump water from farther and farther below ground has only gone up over time.

“(Farming) is more risky now than it was then,” McGurk said.

For decades, the county has kept close tabs on its invisible underground water supply by sampling private wells twice a year.

What they find is predictable: During droughts, less rain percolates into the soil and the rivers shrivel up. Cities and farmers pump more groundwater, and the underground supply shrinks.

During wet times, the opposite occurs. Indeed, as bad as recent groundwater reports have been, a turn for the wetter would likely help the groundwater bounce back, officials say.

Glimmers of hope can be found even in the latest depressing report. Not all wells have sunk below 1992 levels, the report shows. Some remain well above that threshold, thanks to efforts to secure more water from rivers and streams.

The city of Stockton's new Delta drinking water plant is one example. Some wells within the city are actually 20 feet higher than they were in 1992, thanks to the additional river water, officials say.

It's a similar story in Tracy, which because of a new supply from the Stanislaus River now pumps very little groundwater, even during droughts.

The fact that some areas are doing better suggests that the county's groundwater as a whole may be more stable than it seems, said Brandon Nakagawa, the county's water resources coordinator.

"That sounds like pretty good sustainability to me," he said.

But Stockton's and Tracy's successes won't help a farmer who happens to live in an area where the groundwater has been depleted. One area east of Stockton saw groundwater sink to 70 feet below sea level last year across an area of 20 square miles, an increase from 12 square miles the year before.

Paul Sanguinetti, a farmer and board member at the Stockton East Water District, said he is safe because his wells plunge 200 feet below ground. "My father was always thinking ahead," Sanguinetti said Wednesday.

Those whose wells aren't as deep may be struggling, he said. In some cases they must lower their pumps to draw water from lower down the well; in other cases they might have to drill an entirely new well.

In a county with tens of thousands of wells, a total of 255 permits to drill new ones were issued last year by the county Environmental Health Department. For comparison, hard-hit Tulare County approved more than 4,700 permits over the past two years.

Almost half of San Joaquin County's new well permits were for homeowners, and in many cases those had nothing to do with the drought.

And many of the agricultural wells were not necessarily the result of poor water conditions, but rather fear of stricter regulation, said Rodney Estrada, a program coordinator with county Environmental Health.

The state is starting to regulate groundwater for the first time, which years from now could lead to pumping limits in over-drafted areas. Separately, the state last summer attempted to stop even senior water rights holders from diverting from local rivers, a move that frightened some growers and might have motivated them to drill new wells as a kind of insurance policy.

“It got hot and heavy this past year because of the water rights issue,” Estrada said.

The key to reversing the scary trend in the county’s groundwater reports is to build the infrastructure to harness more river water when it is available, McGurk said.

As one example, county officials are working with the East Bay Municipal Utility District on a project to store water underground during wet years and then share it — a cooperative effort that historically has been the exception, not the norm.

For its part, Stockton East would like to be able to build canals to spread river water to growers who right now must rely only on wells, McGurk said. But the money to do so, he said, is hard to come by despite the state’s edict to ease up on groundwater.

“We’re getting by,” McGurk said, “but we should be in a much better position.”

— Contact reporter Alex Breitler at (209) 546-8295 or abreitler@recordnet.com. Follow him at recordnet.com/breitlerblog and on Twitter @alexbreitler.

Lodi Community Hall of Fame

Kathy Grant shares her passion for the Mokelumne River with Lodi students

By Kyla Cathey
SPECIAL TO THE NEWS-SENTINEL

Elementary, middle and high school students throughout Lodi have the unique opportunity to learn about the local watershed. Some raise young salmon in their classrooms. Others create murals or write newspaper stories celebrating local water, plants and animals.

Students go on field trips to Lodi's water treatment plants, area fisheries, and research vessels that sail the Delta and San Francisco Bay.

High schoolers head out to Lodi Lake and the Mokelumne River once a month to test the water's clarity and quality.

At the center of it all is Kathy Grant, the City of Lodi's watershed education coordinator. For her dedication to teaching Lodi residents of all ages about caring for the local watershed, she has been selected for induction to the Lodi Community Hall of Fame.

"The first impression I remember was of a mother, active with her children yet also willing to volunteer in the community, knowing that setting an example as a parent is important," wrote Mary Fuhs, a longtime community volunteer who has worked closely with Grant, in her nomination. "Kathy understands connections, and the ripple effect our actions have in this world."

Grant's involvement in watershed education began with the Lodi Lake docent program, started by Jay Bell and his wife in 1987.

PLEASE SEE GRANT, PAGE 6

BEA AHBECK/NEWS-SENTINEL

Left: Kathy Grant, center, City of Lodi Public Works watershed program coordinator, along with John Teravskis, far left, senior compliance specialist at WGR Southwest, lead the "Lessons from a Riparian Trail" walk through the riparian habitat at the Lodi Lake nature trail on Sept. 30.

GRANT

CONTINUED FROM PAGE 1

They recruited her as a volunteer docent in 1988, Grant said. At the time, docents mainly led students on tours of the Lodi Lake Nature Trail, pointing out examples of local flora and fauna.

By 1998, she was running the program, the fourth person to do so. Around the same time, she was invited to join the steering committee for the Lower Mokelumne River Watershed Stewardship Program. She met a number of city and county officials, including then-Lodi Public Works Director Richard Prima, who were developing a guide to care for the region's watershed.

"That's when I really saw the potential the docents program had," Grant said.

Instead of serving only as park guides with a focus on Lodi Lake, Grant envisioned a program where docents taught about how the lake and river fit into the watershed as a whole, which stretches into the Sierras and joins other rivers in delivering water to the Delta and Pacific Ocean.

With Prima's support, Grant developed the Storm Drain Detectives program, and they were able to secure grants and additional funding from the city to launch it. Grant received training from the State Water Resources Control Board to create a citizen science program, and recruited volunteer high school students and teachers to begin monitoring the lake and river.

Grant also applied for grants to fund public art projects to teach about the local watershed, including the mural near Guild Cleaners on Church Street, the mural at the Lodi Lake Discovery Center, and the informational murals located at the head of the Lodi Lake Nature Trail. The latter project was taken on by Lodi schoolchildren, who learned about the watershed while creating art to teach others about it.

During the mural project, Grant began working with Heritage Elementary teacher Janine Jacinto.

"I didn't really know her before then, but I realized I needed to get over to Heritage and start working with the community because that part of town drains directly to the river," Grant said.

Jacinto and her students launched the Earthkeepers program, which works hard to keep the area around the school trash-free. Other teachers began getting involved, and soon they were working with Grant to develop science-based field trips to the Woodbridge Ecological Reserve, Lodi Lake, the Delta and beyond.

One highlight each year is a trip on a research vessel with the Marine Science Institute, where students get hands-on experience testing water quality, surveying fish populations, and more.

"The goal is using the five senses as much as possible," Grant said.

Then she began to think about how the students could share what they were learning about the watershed with the rest of the Lodi community. That turned into the Mokelumne Current, a student-run annual newspaper published by the Lodi News-Sentinel. Students take photos, draw pictures, and write stories about caring for the Mokelumne River and surrounding area.

The plans involved pulling in educators, students, and dozens of other community members, and juggling multiple projects with strict deadlines, Fuhs said.

"I will concede I was a bit skeptical," she wrote in her nomination of Grant. "But Kathy made it happen. She connected all of you, encouraged all of us, and when needed, nudged all of us."

Another project, the Lodi Lake Coastal Cleanup, allows the greater Lodi community to take a hands-on role in caring for the river and lake. Though Grant is the organizer behind the twice-yearly volunteer effort, the idea came from Prima, Grant said.

He heard about the statewide event, and realized it could become the lynchpin of a public outreach and education effort — something the state would soon require from cities looking for stormwater permits.

"What he was doing was brilliant," Grant said.

He challenged Grant to work with the county and take on the project. It's been going strong for 14 years now, and has grown from about 60 volunteers the first year to 330 at last month's cleanup.

Grant's focus on working with children grew out of her role as a mother and community member, she said. She homeschooled her own four children, and her focus was on field trips, teachable moments, and emphasizing their connection with their community. Those are the same areas she focuses on when developing education programs for Lodi students.

Now, other cities are coming to Lodi — and Grant — for advice on launching watershed-based programs of their own.

Grant isn't resting on her laurels, either. She's working with the state's Project WET to incorporate environmental education into Lodi schools, hosting workshops for district teachers to learn about the curriculum created by the program. More information can be found at the city's new Lodi EEI Blog, *lodieei.wordpress.com*.

She's also working with Davis artist Donna Billick and the Sandhill Crane Festival — where she also volunteers as a steering committee member — to create a community mosaic mural project for the festival, which will be held on Nov. 4 to 6. The finished mural will be installed at the Lodi Public Library.

But Grant is quick to give credit to all of the people she's worked with over the past 28 years: The Lodi Lake docents, city Public Works staff members, and Lodi teachers. There's a lot of partnership involved in getting these programs off the ground, she said.

"I'm just very thankful. I'm really kind of humbled. I don't deserve this, I'm just doing what I love," Grant said.

IF YOU GO

A dinner honoring the newest inductees into the Lodi Community Hall of Fame will be held 5:30 p.m. (dinner at 6:30 p.m.) Saturday, Nov. 5, 2016 at the Boys and Girls Club, 275 Poplar St. The honorees include Cheryl Francis, Kathy Grant, Dan Ingrum, Suzanne Mangum, and the Van Buskirk family. Tickets may be purchased for $45 each by calling the club at 334-2697.

Letter to the Editor: Concerned about recharge project

Posted: Friday, April 8, 2016 11:39 pm

Letter: Concerned about recharge project

Interesting article by Joe Benapfl, “Lodi Council Responds to Recharge Project.”

The project referred to as the DREAM project is an acronym for the Demonstration Recharge Extraction and Aquifer Management project, and is a partnership of San Joaquin County and East Bay MUD.

This DREAM project is a water “banking” and storage scheme that calls for recharging our groundwater basin with surface water from the Mokelumne River, both by the natural process of matriculation and percolation, and by direct injection via injection and extraction wells, which circumvents the natural filtration of the earth. Essentially the groundwater basin becomes an underground storage facility without the expense of new off-stream storage, and also a water “banking operation with deposits and withdrawals. The real down side of this is that polluted surface water is introduced to the pristine Aquifer. But, dilution is not the solution for the pollution, and it will ruin the “public trust” groundwater basin resource.

If these “powers that be” are successful in turning our “public trust” groundwater basin into a storage facility and foul it, we will be forced to treat all drinking water pumped from the ground as well as surface water; and water treatment is a very lucrative business.

Your article mentioned Lodi City Manager Steve Schwabauer being concerned about future environmental studies and impact reports for this greater “banking and storage” project.

With powerful partners like EBMUD, often times environmental reviews can be mitigated, replaced by “Negative Declarations,” and even eliminated altogether as we’ve seen with Gov. Brown’s Twin Tunnel Peripheral Canal project.

It seems our Aquifer is threatened by saline intrusion from the bay; death by peripheral canal from Sacramento and Southern California, and now from our own county partnered with EBMUD, by way of a groundwater basin water storage and banking scheme.

Thank you for allowing me to comment.

William Van Amber Fields

Morada

Lodi City Council responds to water recharge project

Posted: Tuesday, March 29, 2016 11:51 pm

By Joe Benapfl / News-Sentinel Staff Writer

In the face of the ongoing drought, several water districts have developed a project to possibly recharge and sustain groundwater in San Joaquin County. However, Lodi officials have some misgivings about the proposal.

The Lodi City Council held a closed-session meeting Tuesday to discuss a potential suit by the city against San Joaquin County and the East Bay Municipal Utility District (EBMUD). The suit is in regard to the Demonstration Recharge, Extraction and Aquifer Management (DREAM) project, which plans to extract surface water from the Mokelumne River to create a permeable pond of water. The project would attempt to store wet-year water supplies in a groundwater aquifer to be used during drier seasons.

In response to the project, the city has authorized a comment letter to be sent to the San Joaquin County Board of Supervisors.

The DREAM project is headed by the North San Joaquin Water Conservation District (NSJWCD), with financial support from EBMUD. It involves the transportation of EBMUD surface water from the Mokelumne River to a private landowner within NSJWCD territory. Project coordinators would construct two-foot-high berms to create 1,000 acre-foot pond of water. The plan would cost EBMUD $4 million.

Participating NSJWCD landowners would then use this water for irrigation, and excess water would be pumped back into the mokelumne during the next winter season, according to the North San Joaquin groundwater fact sheet.

The benefits include reducing pumping costs by using surface water instead of groundwater, and replenishing the Eastern San Joaquin Groundwater Basin.

“By returning no more than half of the amount of water delivered by EBMUD, the DREAM project ensures that there will be a net addition to the usable groundwater underlying the project,” the fact sheet states.

However, this is simply the first phase of the DREAM project. If the demonstration phase is successful, a permanent project may be built on the same site, according to the website. The potential for the demonstration to be just the initial step in a much larger enterprise has City Manager Steve Schwabauer concerned.

“A larger project without full environmental review could be bad as well,” Schwabauer said.

Finally, it was also noted that Lodi's water district has water rights to some Mokelumne River surface water, purchased from the Woodbridge Irrigation District, and that the DREAM project doesn't make any recognition of that.

So while the project has some possible benefits for restoring groundwater, the city is sending the comment letter to make its concerns known.

"The project certainly has the potential to develop the San Joaquin County Groundwater Basin," Schwabauer said.

Contact reporter Joe Benapfl at josephb@lodinews.com

Lodi council moves to form water agency

Lodi News Sentinel…..January 7, 2016

At Wednesday's meeting, the Lodi City Council unanimously voted to adopt a resolution to form a groundwater sustainability agency (GSA) in Lodi city limits.

This resolution will ensure that the city of Lodi has declared to form an agency within the 90-day window required under the state Sustainable Groundwater Management Act (SGMA).

Technically, June 30, 2017 is the deadline in which to form a GSA. However, because San Joaquin County declared its intent to form a GSA in December, and that agency's boundaries would overlap with Lodi's, the city has 90 days to present its own agency, or else be included in the county agency.

Councilman Nakanishi described the benefits of having a localized agency.

"The (SGMA) makes it so that larger bodies can regulate usage and charge fees," he said.

The policies that would work for a city like Stockton, he said, would then be implemented on communities such as Lodi that do not have the same water requirements.

"It's like comparing apples and oranges," Nakanishi said.

A long road is ahead for Lodi to form its GSA. The next step is to send a notification to the California Department of Water Resources after considering individual water interests of numerous users, including well owners, public water systems, land use planning agencies and the federal government. The total cost of drafting the agreement would be $30,000.

And after that? Lodi and the San Joaquin county GSAs would have to hash out their boundaries, interim Public Works Director Charles Swimley said.

"The county's formation is going to force a coordinating agreement between us and the county. We are not sure of the terms of that at that point," Swimley said.

Along those lines, Woodbridge has committed to adjusting its boundaries to align with Lodi's north border, according to Swimley. There have also been preliminary talks with North San Joaquin Water Conservation District to coordinate GSA boundaries as well.

Councilman Kuehne asked the benefits of an independent GSA, to which Swimley said, "I think the biggest plus would be maintaining autonomy."

"We have demonstrated that the city of Lodi is sustainable in regard to our water sources. We would like more exclusivity and control in our groundwater sources."

For most council members, the ability for Lodi to control groundwater sustainability was of utmost importance.

City Manager Steve Schwabauer said that, because the city's ratepayers have made Lodi's water sustainable, they should be in control of Lodi's water usage in the future. Councilwoman Mounce echoed the sentiment.

"We fiercely need to protect our water rights. I don't want anybody else to be accountable to the citizens who have invests millions into water liability," Mounce said. In the past 10 years, Lodi has invested $40 million in groundwater sustainability measures, and nearly $50 million in wastewater treatment, according to Swimley.

Lodi students get lesson in salmon life cycle

Bea Ahbeck / News-Sentinel **February 26, 2016**

BEA AHBECK/NEWS-SENTINEL Brianna Nieves, 9, Johana Martinez, 10, and Kathia Rodriguez, 9, react as they are splashed with water as they feed young chinook salmon at the Mokelumne River Fish Hatchery , as fourth graders from Heritage School visit the hatchery and release chinook salmon frys they have cared for and observed since they were eggs, before returning them to the river by the Mokelumne River Fish Hatchery in Clements Friday morning, Feb. 26, 2016.

Johana Martinez, 10, and Kathia Rodriguez, 9, squealed in surprise as young salmon splashed about in the water, sending a few droplets their way.

The hungry fish jockeyed to get to the protein-based nibbles the young Heritage Oak Elementary School students were throwing their way.

The feeding frenzy was the final stop of a tour of the Mokelumne River Fish Hatchery, which started earlier in the morning as the fourth graders released their very own juvenile salmon fry back into the river more than a month after being entrusted with their care.

“It’s kind of sad, I am going to miss them,” Rodriguez said after fourth-grade teacher Marte Rott carefully released the young fish into the shallow water.

Rodriguez said it was exciting to take care of the “fishies” and follow their development from small eggs “with a black dot” to the young fry they were releasing to complete their life cycle in the river.

The fry's journey had started when the chinook salmon eggs were gathered at the hatchery in December. On Jan. 19, they were given to the students in their classroom, where they lived in a fish tank, complete with a pump and a thermometer.

The students were responsible for monitoring the temperature and making sure it stayed between 55 and 62 degrees.

The eggs were kept in complete darkness, with the tank covered with Styrofoam on all sides to mimic the dark "reds" or nests — the holes the female salmon dig for their eggs.

Once the eggs hatched, Rott took the front portion of the Styrofoam off so the students could follow the development of the fry. The students kept a daily log and took pictures and videos of their progress.

After they hatched, the salmon fry instinctively hid in the rocks at the bottom of the tank, mimicking how they hide in the rocks in the river.

Young fry are self-sufficient, carrying all the nutrition they need in the yolk sack on their belly. Once the fry had consumed the yolk sack, they started to swim around the tank. Toward the end of the stay the fry had consumed their yolk sack and 'buttoned up', which signaled it was time to return the young to their natural habitat in the river.

Rott said the experience taught her students the importance of clean water.

"They have learned not to pollute our water system," Marte said. "They even put fliers on neighbors' doors asking them not to dump things down the storm drains. They learned that the water that goes into the storm drains goes directly into river."

During their first visit to the hatchery, the students watched the staff take the eggs from the salmon and fertilize them. They also went down to the river to see actual nests and witnessed females guarding their eggs. The female salmon will guard their eggs until they wither away and die, completing their life cycle as they guard the new generation of salmon.

Trips to Lodi Lake and the Mokelumne River, a visit to the Woodbridge Water District, and a visit to the city's water treatment plant completed the students' educational experience.

"It was an amazing learning experience for the kids. They got to see things they would normally never do," Rott said. "It's an experience they will take with them for the rest of their lives."

SOUTH SAN JOAQUIN IRRIGATION DISTRICT

SSJID Helping Establish Groundwater Management Plan for Region

Also Working to Prevent Predation of Salmon and Influencing New Regulatory Proposals

One of the many new regulations that came out of the severe drought is a first-ever California state mandate to establish sustainable groundwater policies, and SSJID is an active partner in our region to draw up those plans.

In many parts of the state, the over-use of groundwater and the effects of the drought have led to subsidence – the level of the land actually dropping – as well as declining water levels in the underground aquifers, saltwater intrusion into those aquifers and degraded water quality. Sustainable groundwater plans are designed to avoid these undesirable results.

SSJID is working with the cities in our district to develop a governance plan for our specific area as mandated by law, and we're working with a number of other agencies in San Joaquin, Stanislaus and Calaveras counties to develop basin-wide policies for the region. The regional groundwater basin is critically overdrawn.

The good news for SSJID is that our local groundwater balance – the amount of water pumped from the ground compared to the amount that seeps back into the ground – is positive. Because we have relatively stable surface water sources from the Stanislaus River, our growers can irrigate their crops and that water also helps balance water in our area's underground aquifers.

SSJID is also focused on protecting our continued access to that surface water, which includes protecting endangered salmon and steelhead species from non-native predator fish. The scientific understanding of the role predator fish (which are mainly striped bass) have in low salmon fry survival numbers in California has advanced tremendously in large part due to investments SSJID and other irrigation districts have made in research on the issue, but fishery management practices have not kept pace and outdated regulations actively work against efforts to restore salmon and steelhead populations in the state. Fishery management largely focuses on flow-related actions, which have a significant and detrimental effect on water supply in the Stanislaus, and elsewhere around the state. If predation and other stressors are addressed, this could provide a more significant and sustainable method of supporting endangered fish populations.

We are working diligently to educate and influence lawmakers' understanding of the issue and asking them to support legislation that is being proposed due to growing recognition of the problem of predator fish. In 2015, the House of Representatives passed an amendment by Rep. Jeff Denham to focus on the predation problem, and Sen. Dianne Feinstein's water bill has specific language to require the removal of predator fish from the Stanislaus River to study the effects that would have on the salmon/steelhead population.

SSJID is also part of a broad statewide coalition of business, farming, and water users that petitioned the California Fish and Game Commission on June 9, asking the Commission to address predation of endangered salmon and smelt by non-native predator species by removing bag and size limits for predator fish. Similar efforts have been undertaken recently by Washington and Oregon to help boost salmon and steelhead populations on the Columbia River. For more information about this important issue, you can visit the website www.savethestan.org.

We are also closely monitoring the development of the Bay Delta Conservation Plan, a statewide water-management plan, which could impact SSJID's ability to provide water for all of the beneficial purposes we serve now.

As water-management issues move forward, we will keep District resident informed through newsletters, on www.ssjid.com and the local press.

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Lodi News-Sentinel October 28, 2016

- *By Christina Cornejo Contact reporter Christina Cornejo at christinac@lodi news.com.*

Storm Drain Detectives Program Teachers Receive Watershed Stewardship Award

Five Lodi Unified School District teachers and a retired city employee have been named recipients of the 2016 Frank Beeler Watershed Stewardship Award for their work with the City of Lodi Storm Drain Detectives program.

Teachers Jud Atwater and Melissa Turner from Lodi High School, Sandi Starr from Tokay High School, Janine Jacinto from Heritage Elementary School and Melanie Martinez from Reese Elementary School were honored with the award. Retired City of Lodi Streets and Drainage Superintendent Curt Juran was also recognized for his time with the program beginning in 2011.

The Storm Drain Detectives leaders accepted the award at the annual October East Bay Municipal Utility District Pardee Barbecue.

The award is presented annually to recognized individuals or organizations within the Lower Mokelumne River watershed who have shown outstanding leadership, responsibility or activism in promoting environmental stewardship and enhancing the productivity and profitability of the watershed.

When not teaching in the classroom, the five teachers serve as Storm Drain Detectives team leaders, taking groups of students to Lodi Lake and the Mokelumne River to help monitor the impact of the city's stormwater runoff.

"Finally teachers are getting all this credit for putting in the work after school. It's a really big deal," said Kathy Grant, the City of Lodi's watershed education coordinator.

Students, teachers and volunteers in Storm Drain Detectives have been monitoring five sites along the lower Mokelumne River twice monthly since 2001.

They use water quality equipment to measure pH, dissolved oxygen, temperature, turbidity, nitrates and electrical conductivity. Collected data is posted online at

under Public Works, and the students' findings are presented to the public each May.

Students in Turner's class spend about two weeks analyzing the data and crunching numbers to see what might be causing fluctuations in the readings.

"I enjoy it because its a hands-on opportunity to get involved in the community," Turner said.

Since her students are typically freshman, many decide to continue volunteering and show the younger students how the testing all works.

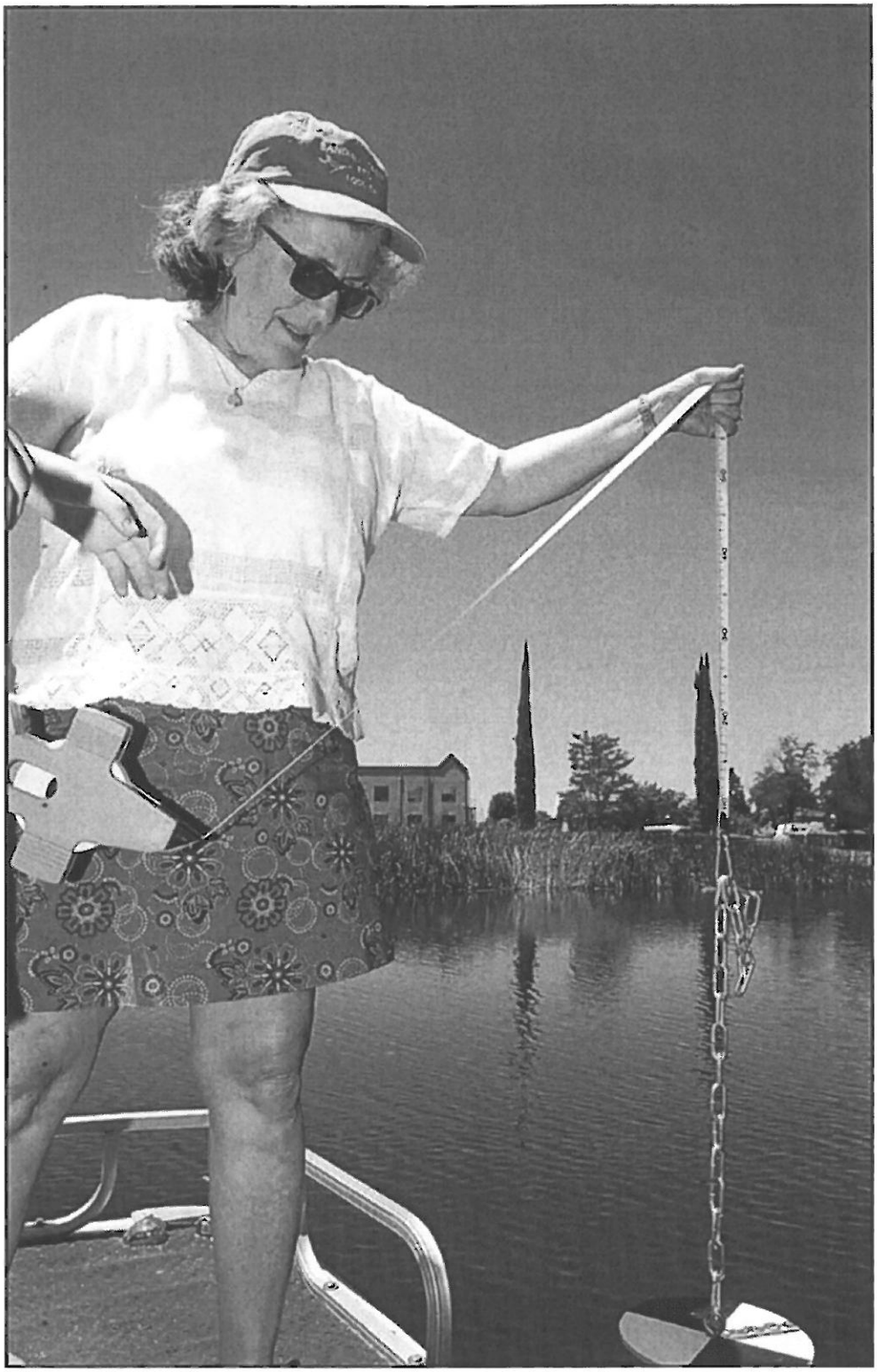
Not only do students get a taste of field work in science, they can also connect some of the concepts they use in monitoring the water to science concepts in the classroom.

At Tokay High School, Starr works with her AP Environmental Science students to look more at the overall system and what the stormwater runoff heading into the river means for that system.

Starr and Turner were honored to be recognized with their fellow teachers for this award, but share the credit with the great support they receive from Grant and the City of Lodi.

"It's great that the city supports teachers going out in the field," Starr said.

Storm Drain Detectives' watershed moment



BEA AHBECK/NEWS-SENTINEL

Kathy Grant, City of Lodi- Public Works Watershed Program Coordinator, lowers the disc as they use a secchi disc to check water clarity at Lodi Lake on July 14.

Lodi receives award for water quality awareness program

By Danielle Vaughn
NEWS-SENTINEL STAFF WRITER

Congratulations are in order for the City of Lodi after the League of California Cities selected the city as a 2016 Helen Putnam award winner.

Winners were honored during the opening session of the League's annual conference being held at the Long Beach Convention Center.

The award is given annually in 12 categories, and Lodi received the Ruth Vreeland Award for Engaging Youth in City Government for its Storm Drain Detective student volunteer river monitoring program.

Lodi Watershed Program Coordinator Kathy Grant nominated the program for the award after a friend made her aware of the opportunity.

Out of 137 submissions Lodi was able to come out on top as one of the 12 cities recognized for their programs.

"This is my baby. We gave birth to it in 2000 and now it's a model for other cities throughout out the state. It's replicable. People can copy what we've done and take it to their own communities, so it's a nice feeling. Homegrown Lodi at its best," Grant said when asked about her feelings on the honor.

She credited former Public Works Director Richard Prima for his vision for the program.

"The city was fined at their waste water treatment plant because their waste water had too much chlorine in it and we had a $20,000 fine from the state, and Richard had the vision, the tenacity to bargain with the state."

PLEASE SEE WATER, PAGE 4

WATER

CONTINUED FROM PAGE 1

His idea was to take half of that fine and turn it around and put back into the community in the form of a water quality education program. The state agreed.

Today there are almost 175 students from Tokay High, Lodi High, Reese Elementary and Heritage Elementary schools participating in the Storm Drain Detective program.

Teachers from the schools are responsible for bringing their students to the Mokelumne River once a month throughout the year. The students usually come out on the second or fourth Tuesday of the month after school are divided into five teams. They are given a box of equipment which is used to monitor five sites where the storm water enters the Mokelumne River. The students collect and record data to analyze the effects that storm drain run-off has on the river.

In May of each year, the data is presented to the public at a public forum.

"The Storm Drainage Detectives are a way the City of Lodi is reaching into the community to teach them it's not cool to do anything on the streets of Lodi that is going to hurt that river," Grant said. "It brings kids to the river so they can see the unintended consequences of what's going on in town."

She said it was very important to have a program like this in Lodi because it engages the public and involves kids in their local water story.

"It builds bridges from our schools into the community. It equips students who've considered going into water-related careers. The future is water and the sooner our kids realize that they need to understand water, the better because clean water is limited and our life revolves around water."

A League of California Cities representative will publicly present the city with the award during the first city council meeting in November.

Lodi News Sentinel May 16, 2016

Supervisors' work session dives into San Joaquin County water issues

By Wes Bowers
THE STOCKTON RECORD

STOCKTON — The first of five evening study sessions hosted by the San Joaquin County Board of Supervisors was well attended Thursday night, and Supervisor Kathy Miller considered the meeting a success.

Thursday's work session focused on a variety of water issues facing the county, including the status of the Bay Conservation Delta Plan and the Sustainable Groundwater Management Act, as well as the status of litigation against the Metropolitan Water District of Southern California over its acquisition of Delta wetlands properties, among other topics.

While the evening study sessions were created to get residents more involved in county government, the majority of those in attendance were representatives from various water districts and cities, as well as representatives from state and federal lawmakers.

"It's been really a great response to this," Miller said. "We really appreciate you being here, and we hope it's been a benefit for everyone. From my standpoint this has been very successful."

Roy Hawgood discussed the county's opposition to the Twin Tunnels project, which seeks to send water from the Delta to Southern California. He said the county needs to take the issue to the national level and let the rest of the country know about

"We need to reach out nationally," he said. "We need to get Anderson Cooper, Al Roker and Katie Couric here. They need to look at this. We need to shame these people who want to just steal our water and put in pipes that they'll never pay for."

Hawgood added that the county should get local children to write letters to lawmakers in opposition of the project, and ask the 2016 presidential candidates what they are going to do to help.

Lodi dairyman Hank Van Exel, who also serves on the Woodbridge Irrigation District's board of directors, said the county should also focus on restoring many of the sloughs in the area.

Van Exel's dairy is adjacent to two sloughs, as well as two game preserves. One of those, Sycamore Slough, has been determined to be a habitat for water hyacinth.

He said both sloughs are now so thick with vegetation that one can practically walk across them without getting wet.

"I'm worried about pumping my irrigation water, and getting clean water, getting healthy water," he said. "We need to be conservationists and get us back to where we need to go. We've got to get back to being normal, using our heads. And we're not doing it."

Supervisor Chuck Winn did address the tunnels issue, stating that he has spoken with supervisors in Southern California, and support of the project is fractured. He said there is also ongoing litigation between partners involved with the investment of the project as well.

"From some of the supervisors I've talked to in Southern California, they're actually doing their very best to become independent, and to not rely on Metropolitan (Water District) or the Delta water supplies," he said. "One of (the counties) just built a desalination plant in Carlsbad, and they want to build another in Huntington Beach."

The evening work sessions were suggested by Moses Zapien earlier this year, with each one focusing on a different topic related to the board's five strategic priorities it adopted in December.

Those priorities include water, education, economic development, public safety and homelessness.

The work session discussing education is scheduled for 5:30 p.m. Aug. 11 in board chambers, 44 N. San Joaquin St. on the sixth floor, in Stockton.

Supervisor Carlos Villapudua was absent from the work session.

APPENDIX B

TEMPORARY FLOW EXCURSIONS BELOW WOODBRIDGE DAM

Table B-1: Flow below Woodbridge Dam February 29, 2016

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
2/29/16 18:45	15 Minute	cfs	Critically Dry	77	75
2/29/16 19:00	15 Minute	cfs	Critically Dry	60	75
2/29/16 19:15	15 Minute	cfs	Critically Dry	56	75
2/29/16 19:30	15 Minute	cfs	Critically Dry	63	75
2/29/2016 19:45	15 Minute	cfs	Critically Dry	71	75
2/29/2016 20:00	15 Minute	cfs	Critically Dry	78	75

1. The provisional average daily flow for 2/29/2016 is 108 cfs.
2. The 2/29/2016 temporary flow excursion occurred due to low flow conditions when WID was refilling Lodi Lake after fish screen cleaning and annual canal maintenance.

Table B-2: Flow below Woodbridge Dam April 15, 2016

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
4/15/16 12:15	15 Minute	cfs	Below Normal	151	150
4/15/16 12:30	15 Minute	cfs	Below Normal	149	150
4/15/16 12:45	15 Minute	cfs	Below Normal	149	150
4/15/16 13:00	15 Minute	cfs	Below Normal	140	150
4/15/16 13:15	15 Minute	cfs	Below Normal	132	150
4/15/16 13:30	15 Minute	cfs	Below Normal	132	150
4/15/16 13:45	15 Minute	cfs	Below Normal	134	150
4/15/16 14:00	15 Minute	cfs	Below Normal	134	150
4/15/16 14:15	15 Minute	cfs	Below Normal	138	150
4/15/16 14:30	15 Minute	cfs	Below Normal	140	150
4/15/16 14:45	15 Minute	cfs	Below Normal	143	150
4/15/16 15:00	15 Minute	cfs	Below Normal	148	150
4/15/16 15:15	15 Minute	cfs	Below Normal	151	150

1. The provisional average daily flow for 4/15/2016 is 151 cfs.
2. The 4/15/2016 temporary flow excursions may have resulted from WID's operations during the start of their irrigation season.

Table B-3: Flow below Woodbridge Dam June 17, 2016

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
6/17/16 8:30	15 Minute	cfs	Below Normal	207	200
6/17/16 8:45	15 Minute	cfs	Below Normal	186	200
6/17/16 9:00	15 Minute	cfs	Below Normal	172	200
6/17/16 9:15	15 Minute	cfs	Below Normal	166	200
6/17/16 9:30	15 Minute	cfs	Below Normal	165	200
6/17/16 9:45	15 Minute	cfs	Below Normal	163	200
6/17/16 10:00	15 Minute	cfs	Below Normal	165	200
6/17/16 10:15	15 Minute	cfs	Below Normal	168	200
6/17/16 10:30	15 Minute	cfs	Below Normal	170	200
6/17/16 10:45	15 Minute	cfs	Below Normal	175	200
6/17/16 11:00	15 Minute	cfs	Below Normal	182	200
6/17/16 11:15	15 Minute	cfs	Below Normal	186	200
6/17/16 11:30	15 Minute	cfs	Below Normal	193	200
6/17/16 11:45	15 Minute	cfs	Below Normal	198	200
6/17/16 12:00	15 Minute	cfs	Below Normal	202	200

1. The provisional average daily flow for 6/17/2016 was 203 cfs.
2. The 6/17/2016 temporary flow excursions may have resulted from WID's adjustment in their operations during their irrigation season.

APPENDIX C

USGS VERIFIED FLOW DATA FOR 2014 AND 2015

Table C-1: Calendar Year 2014 – USGS Verified Average Daily Flow from Camanche Dam

11323500 Mokelumne River below Camanche Dam, CA

DISCHARGE, CUBIC FEET PER SECOND

JANUARY TO DECEMBER 2014

DAILY MEAN VALUES

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	255	256	204	259	325	284	269	261	260	230	230	232
2	256	256	204	256	325	268	275	261	247	231	230	230
3	255	255	206	255	326	391	275	261	240	231	230	231
4	255	254	205	256	325	530	274	261	240	231	330	230
5	255	254	206	255	327	530	274	261	244	231	338	230
6	255	254	206	256	327	483	274	261	252	335	289	231
7	255	253	207	257	326	414	275	261	251	377	244	231
8	255	254	207	257	328	319	276	261	251	287	229	231
9	255	254	207	256	331	280	276	262	251	230	229	231
10	255	254	207	255	344	252	275	261	246	231	230	231
11	255	254	206	255	346	241	275	261	240	230	230	231
12	254	254	205	255	349	241	275	262	240	231	229	231
13	255	253	206	271	346	234	275	261	239	402	229	231
14	255	253	207	313	348	230	253	262	239	486	229	231
15	255	253	206	324	345	230	241	261	234	388	231	232
16	255	253	206	325	346	222	240	261	229	320	231	231
17	255	254	205	328	345	211	240	261	229	267	234	231
18	254	256	205	327	345	210	241	260	228	237	339	229
19	255	255	205	326	346	219	241	260	230	230	350	226
20	255	255	207	326	357	227	241	261	230	360	297	226
21	255	255	207	326	366	244	241	260	230	399	249	226
22	255	255	206	326	365	244	240	260	230	348	232	228
23	256	254	206	324	368	244	239	260	230	301	231	228
24	255	254	207	325	366	244	240	260	230	250	231	226
25	255	254	208	325	364	245	239	260	231	230	231	226
26	254	253	208	327	366	246	240	260	224	230	232	226
27	256	254	206	327	364	253	240	260	215	231	232	226
28	257	244	204	326	365	262	241	260	215	334	233	226
29	256	---	205	324	366	260	248	259	215	348	235	226
30	256	---	205	326	365	262	260	260	223	299	235	226
31	256	---	225	---	355	---	260	259	---	247	---	226
Total	7,910	7,107	6,404	8,868	10,770	8,520	7,953	8,078	7,063	8,982	7,519	7,097
Mean	255	254	207	296	347	284	257	261	235	290	251	229
Max	257	256	225	328	368	530	276	262	260	486	350	232
Min	254	244	204	255	325	210	239	259	215	230	229	226
Ac-ft	15,690	14,099	12,700	17,590	21,360	16,900	15,780	16,020	14,010	17,820	14,910	14,080

Table C-2: Calendar Year 2015 – USGS Verified Average Daily Flow from Camanche Dam

11323500 Mokelumne River below Camanche Dam, CA

DISCHARGE, CUBIC FEET PER SECOND

JANUARY TO DECEMBER 2015

DAILY MEAN VALUES

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	227	225	225	240	230	219	273	250	200	106	180	227
2	227	225	225	244	230	219	250	250	200	106	180	180
3	227	225	238	241	230	219	251	250	200	106	378	181
4	226	225	266	241	230	332	250	255	200	106	417	181
5	226	225	279	241	230	522	250	265	200	107	315	181
6	226	225	305	242	231	783	250	266	200	107	215	181
7	226	225	305	222	231	850	250	253	200	105	180	181
8	226	225	305	205	230	1020	250	246	201	105	180	267
9	227	225	293	207	231	1200	250	235	201	106	181	225
10	227	225	263	212	231	1150	262	225	201	106	265	181
11	226	225	233	221	231	878	271	225	201	106	225	181
12	227	225	226	221	234	600	270	225	154	106	180	181
13	225	225	225	212	232	601	270	225	130	106	180	181
14	225	225	225	205	226	600	270	225	130	106	180	181
15	225	225	225	204	215	601	270	225	123	154	180	180
16	225	225	225	205	215	601	270	225	116	369	180	180
17	225	225	225	206	215	600	269	225	116	415	180	180
18	225	226	225	206	215	601	270	225	112	315	180	181
19	225	225	225	206	215	600	269	225	105	215	180	181
20	225	225	225	217	216	600	263	226	105	180	180	180
21	225	225	225	225	216	600	254	226	105	180	179	180
22	225	225	227	226	216	600	254	226	107	180	179	180
23	225	225	225	234	216	601	255	226	106	180	245	180
24	225	225	225	246	216	600	252	216	107	180	249	180
25	225	225	225	256	216	600	245	211	107	180	180	180
26	228	225	226	255	215	600	245	205	105	264	180	180
27	225	225	228	265	209	600	241	201	105	375	180	180
28	225	225	228	281	201	543	235	202	106	264	180	180
29	225	---	228	281	201	443	236	200	107	180	180	180
30	225	---	233	256	221	345	237	200	107	180	270	180
31	225	---	241	---	221	---	245	200	---	180		180
Total	6,996	6,301	7,473	6,923	6,866	18,330	7,927	7,059	4,357	5,475	6,358	5,771
Mean	226	225	241	231	221	611	256	228	145	177	212	186
Max	228	226	305	281	234	1200	273	266	201	415	417	267
Min	225	225	225	204	201	219	235	200	105	105	179	180
Ac-ft	13,880	12,500	14,820	13,730	13,619	36,350	15,720	14,000	8,642	10,859	12,611	11,447

Note- October through December data provisional until approved by USGS

Table C-3: Calendar Year 2014 – USGS Verified Average Daily Flow below Woodbridge Dam

11325500 Mokelumne River at Woodbridge, CA

DISCHARGE, CUBIC FEET PER SECOND

JANUARY TO DECEMBER 2014

DAILY MEAN VALUES

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	179	185	174	168	162	69	30	30	45	89	110	305
2	178	189	112	173	161	52	30	29	37	90	139	184
3	173	192	121	188	160	110	30	29	30	90	136	193
4	176	187	149	186	163	239	30	29	30	91	158	183
5	179	341	144	184	163	300	30	30	30	91	414	157
6	177	535	130	185	164	293	31	34	31	93	175	159
7	165	264	134	170	164	215	33	42	31	239	122	152
8	171	259	139	160	162	153	30	35	32	199	133	128
9	168	269	136	159	162	71	30	33	40	97	116	102
10	164	225	122	160	161	62	30	37	38	94	135	102
11	166	210	111	161	161	45	30	44	37	93	291	363
12	174	205	111	161	162	33	30	30	35	94	98	253
13	181	203	125	163	163	36	30	31	35	87	113	182
14	180	203	130	167	162	33	33	32	35	243	110	158
15	177	202	131	160	160	31	30	35	35	331	142	200
16	177	202	129	162	159	44	29	35	33	184	148	228
17	171	200	128	162	159	35	30	33	31	149	140	223
18	170	198	126	163	162	27	30	34	30	98	161	182
19	167	154	100	170	163	29	29	34	32	96	420	203
20	170	121	103	163	163	30	30	32	31	101	191	196
21	167	120	128	168	163	33	30	32	31	370	134	186
22	162	121	130	162	163	34	29	32	31	203	128	157
23	168	121	129	159	163	34	29	32	31	137	165	157
24	170	121	106	160	163	33	29	31	31	118	148	160
25	165	121	94	161	161	31	29	36	34	99	294	151
26	160	120	117	186	160	29	28	35	33	99	104	157
27	167	121	144	200	159	29	28	33	36	103	103	147
28	172	248	141	173	160	30	29	31	42	110	105	153
29	172	---	145	179	162	30	29	32	44	411	159	151
30	180	---	152	168	164	30	29	36	52	143	175	154
31	184	---	156	---	164	---	30	40	---	102		147
Total	5,330	5,637	3,997	5,081	5,018	2,220	924	1,038	1,043	4,544	4,967	5,573
Mean	172	201	129	169	162	74	30	34	35	147	166	180
Max	184	535	174	200	164	300	33	44	52	411	420	363
Min	160	120	94	159	159	27	28	29	30	87	98	102
Ac-ft	10,570	11,180	7,927	10,080	9,953	4,403	1,833	2,059	2,069	9,013	9,852	11,050

Table C-4: Calendar Year 2015 – USGS Verified Average Daily Flow below Woodbridge Dam

11325500 Mokelumne River at Woodbridge, CA

DISCHARGE, CUBIC FEET PER SECOND

JANUARY TO DECEMBER 2015

DAILY MEAN VALUES

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	157	147	96	79	21	20	77	19	21	20	87	252
2	154	332	106	82	19	55	36	20	22	21	124	114
3	150	425	90	81	20	46	29	20	21	20	112	87
4	155	280	93	79	25	34	28	20	20	21	321	88
5	152	205	90	82	24	219	26	20	19	20	220	98
6	151	190	94	82	20	380	26	21	20	20	137	86
7	150	218	104	172	23	582	22	26	20	20	93	90
8	164	218	112	86	23	630	21	35	20	20	83	90
9	156	219	112	80	19	887	21	45	19	22	110	313
10	158	202	132	80	17	962	21	38	19	20	99	88
11	159	185	134	80	21	876	22	24	21	20	337	88
12	158	178	108	82	21	453	23	22	21	20	101	89
13	154	174	111	86	24	379	22	19	21	23	87	94
14	156	172	110	82	26	384	23	19	21	27	85	244
15	153	170	110	78	26	384	21	19	21	57	86	116
16	151	169	111	80	19	362	22	19	21	89	88	113
17	153	167	113	81	24	368	23	20	21	299	86	105
18	152	167	127	80	22	359	23	20	21	263	86	113
19	151	166	131	80	24	357	22	20	22	192	85	125
20	151	150	109	80	21	356	23	20	22	102	94	110
21	154	151	103	82	20	371	27	21	22	93	98	127
22	154	161	113	77	18	378	23	21	21	91	99	123
23	147	166	117	80	18	359	20	22	20	87	101	108
24	151	161	116	82	18	343	21	23	22	84	331	121
25	155	145	118	89	18	333	25	25	20	84	131	112
26	155	98	112	85	23	340	26	30	20	84	92	106
27	156	90	111	84	28	344	28	22	21	91	92	106
28	153	92	105	84	19	350	23	21	20	340	92	111
29	147	---	94	83	20	268	19	20	20	131	93	119
30	151	---	93	82	27	174	23	20	20	82	95	118
31	151	---	82	---	22	---	23	21	---	86		115
Total	4,759	5,198	3,357	2,540	670	11,350	789	712	619	2,549	3,745	3,769
Mean	154	186	108	85	22	378	26	23	21	82	125	122
Max	164	425	134	172	28	962	77	45	22	340	337	313
Min	147	90	82	77	17	20	19	19	19	20	83	86
Ac-ft	9,439	10,310	6,659	5,038	1,329	22,520	1,565	1,412	1,228	5,056	7,428	7,476

Note- October through December data provisional until approved by USGS

APPENDIX D

MEETING MINUTES OF THE PARTNERSHIP STEERING COMMITTEE

Mokelumne River Partnership
Steering Committee Minutes
January 25, 2017
9:00 am – 11:00 am

Attendance:
US FWS: Dan Welsh*, Donnie Ratcliff
CDFW: Tina Bartlett*, Colin Purdy, Kevin Thomas, Chris McKibbin
NMFS: Monica Gutierrez
EBMUD: Richard Sykes*, Jose Setka, Michelle Workman, Sean Todaro (*by phone*), Rick Leong
**JSA Steering Committee representatives*

Meeting Location: CDFW Region 2 Office, 1701 Nimbus Road (Rancho Cordova)

Meeting began with self-introductions.

1. Water Supply Update: (Sean Todaro – by phone) Sean reviewed the 2016 rainfall (RF) year to date. Sean said that to-date; the Mokelumne watershed has received 49.74" of precipitation and possibly on track for the wettest year on record (previously 1982-83). Sean reported that reservoirs are full and Pardee has spilled. The JSA water year type is "Normal and Above" between October 2016 to March 2017 (based upon combined storage of Pardee and Camanche Reservoirs on Nov. 5, 2016). Sean explained that EBMUD is currently most concerned with flood control and maintaining sufficient flood control storage in Camanche Reservoir. Sean stated that should a warmer storm(s) create a situation of "rain on snow", it is critical that storage space in Camanche is adequate to address the potential for large-volume runoff events and to avoid uncontrolled reservoir spills. Sean reported that current snow depth at Caples Lake is 111". Sean also provided runoff figures at the halfway point of RY16. He said that runoff is already at 390 TAF (the average yearly runoff total is 750 TAF). Richard Sykes explained that currently, due to high turbidity levels in Pardee Reservoir that EBMUD in-line treatment plants cannot process, the Mokelumne Aqueducts have been shut down and Briones Reservoir in the East Bay is currently being used to supply the system. Richard said that last time this occurred was in 1997.

2. JSA Gainshare and Flows (Michelle Workman): Michelle reported that all of the gainshare water that was accumulated during the recent drought (16 TAF) has been utilized the past 3 years before the current flood control mode began. Michelle reminded us that the gainshare water that was utilized during the drought was associated with taking supplemental supply from EBMUD operation of the Freeport Regional Water Facility. Additionally another 2,000af was available through terms of EBMUD's Camanche Permit Extension. Michelle stated that recently there has been a published report that has raised questions regarding the benefit from pulse flows to fisheries on the Stanislaus River. (*Environmental Factors Associated with the Upstream Migration of Fall-Run Chinook Salmon in a Regulated River*; Journal North American Journal of Fisheries Management, Volume 37, 2017 - Issue 1). The PSC agreed that it would be important for the Partnership to document the benefits seen from pulse flows on the Mokelumne to provide a different perspective on the subject. Michelle stated that each system has different characteristics and information from the Mokelumne would be a valuable addition to the discussion and for the ongoing work on the Bay-Delta Water Quality Control Plan. Michelle said that a coordinated effort has been initiated on documenting information for the Tuolumne and Merced Rivers.
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3. 2016 Mokelumne Fisheries Review (Michelle Workman) Michelle began her report by reviewing results of the Brood Year 2015 outmigration. Juvenile trapping in 2016 involved the operation of 2 rotary screw traps – "Upper Trap" at Vino Farms and "Lower Trap" at Golf. The count at the Upper trap was 856,000 juveniles and 134,000 at the Lower Trap. Michelle also reviewed juvenile outmigration data from previous years for comparison.

4. 2016 Mokelumne River Fish Hatchery Operations Summary (Michelle Workman) Michelle began by reporting that 2016 MRFH releases were conducted between April 6th and June 4th. She said that a combination of strategies was used again in 2016 (trucked or barged to net pens at Sherman Island and river release). Those released into the river were released in 2 locations: at MRFH and below Woodbridge Irrigation District facilities. Michelle reported that preliminary recovery data indicated primarily 3-year olds. She said that recovery of barged fish showed an improvement over those trucked to the Sherman Island net pens (.08% barged; .02% Sherman Island). Recoveries thru early December were 73% Mokelumne-origin with some fish also from Coleman Hatchery.

5. Locke Pump Screening and Juvenile Fish Monitoring Update (Michelle Workman) Michelle provided an update on the diversion screen project at the Locke Ranch that was supported by the Anadromous Fish Screen Program (AFSP). Michelle said that acoustic telemetry and GoPro cameras were utilized to monitor juvenile salmon and predators in the river adjacent to the Locke pump pre- and post-screen installation (although pre-installation monitoring data is limited). Data from this work is still preliminary and this work will continue.

6. 2016 Gravel and Floodplain Restoration Update (Michelle Workman) Next Michelle reported on gravel and floodplain restoration activities during 2016. Michelle reported that the floodplain development/enhancement work from 2015 was continued in 2016. The large amount of water this year has inundated many parts of the new floodplain areas. Work continues to establish riparian vegetation in these areas. Michelle said that data collection continues to evaluate the effectiveness of the floodplain improvement areas.

7. 2017 AFRP Funding and CVPIA SIT Update (Donnie Ratcliff) Donnie provided an update and that spawning and floodplain habitat are priorities for AFRP habitat funding. Priority setting plans developed by SIT will be 1-year plans for now with hopes of eventually getting to 5-year plans in the future.

8. 2016 Escapement Monitoring (Michelle Workman) Michelle reported that 2016 escapement totals at WIID was 8,871 (down from last year, but near the long-term post-JSA average). Michelle also reviewed the chinook escapement demographics. Next Michelle reported that the escapement number for steelhead was significantly higher in 2016-17 (1,110 fish/600K eggs) compared to 2015-16 (59 fish/19K eggs). Michelle explained that one possibility for this might be that many fish decided to stay as river residents than leaving the system. The issue of genetic diversity became an issue at the hatchery for the spawning of steelhead. A relatedness evaluation procedure was implemented to address the need for genetic diversity in spawning steelhead in the hatchery. The HCT developed a strategy to move forward and it required a large amount of coordination within a small time window. The goal was to do the best possible even improvement was only going to be incremental.

9. 2016 Redd Survey (Michelle Workman) Michelle provided a brief report on 2016 redd surveys. 405 chinook and 4 steelhead redds were documented thru December 20th, but surveys were then suspended due to high flows.

10. Update on Partnership Fund and Lower Mokelumne Stewardship group activities (Rick Leong) Rick stated that the current available balance Fund, as of December 31, 2016, is $127K.. Rick reviewed on-going projects that are fully or partially funded by the Partnership (2016 Beeler Award, SJCRCD Watershed Coordinator, Mokelumne River Salmonid Spawning and Rearing Habitat Assessment. , and the 2016-17 City of Lodi watershed education program. Rick explained that the Lower Mokelumne Stewardship group continues to be in a transition mode since the departure of John Brodie in 2014. Rick said that the role of the Stewardship group in meeting the JSA public outreach commitments will likely become an issue of discussion in 2017 and 2018.

11. SWRCB Delta Water Quality Control Plan Update (EBMUD) Jose stated that EBMUD has submitted their Phase 2 comment letter to the State Board (Tina Bartlett asked if a copy of that letter could be sent to her). Jose presented an idea of providing input into the DWQCP process, specifically for elements associated with the Mokelumne, “as the Partnership”. The Steering Committee thought that

this would be most effective, especially because of the long-term and collaborative working relationships that have been developed over the past 2 decades of implementing the Mokelumne JSA. Jose suggested a next step could be the planning of a workshop to discuss the DWQCP - possibly around April 2017 (in place of the regular Partnership Coordinating meeting in the spring). Dan Welsh stated that this could also be an opportunity to invite not only Mokelumne stakeholders, but to include stakeholders from other San Joaquin tributaries. Michelle suggested that maybe it would be possible to utilize the CVPIA Structured Decision Making model. Jose stated that he would initiate the planning for an April 2017 DWQCP workshop.

12. Updates from Steering Committee Members (All): The majority of comments from PSC representatives were staffing changes/vacancies. Dan Welsh and Donnie Ratcliff reported on several recent changes, including Donnie's move to the regional office in Sacramento and Erin Gleason has returned to the Bay-Delta office in Sacramento. Donnie said that recruiting for vacancies in the Lodi office will be delayed until the recently established Federal hiring freeze has ended. Monica Gutierrez reported that Erin Strange has become the new San Joaquin Basin Branch Chief (replacing Rhoda Reed). Monica explained that Erin is currently assigned to WaterFix duties until March 2017.

13. Meeting Adjournment: The meeting adjourned at 11:40 a.m.

Respectfully submitted by: Rick Leong

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