

Lower Mokelumne River Project

FERC Project No. 2916

2015 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 2016

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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
SJCRC	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 (2015), and those that it plans to implement in the current calendar year (2016), pursuant to the JSA, to protect and enhance the fishery resources and ecosystem of the lower Mokelumne River.

II. INTRODUCTION

This submittal is EBMUD’s Project Operations Update Report¹ for 2015. EBMUD actions in 2015 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

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 2014).

Plan (LMRMP), and in March 1996, voluntarily began releasing flows to the lower Mokelumne River consistent with the flow requirements of the then proposed JSA. As part of EBMUD's implementation of the JSA and FERC Order, EBMUD continues to release flows consistent with the requirements of the JSA.

Additional efforts to improve the health of the river ecosystem have been implemented through the Water Quality and Resource Management Program (WQRMP). This program, developed by the Partnership Steering Committee (PSC) consisting of representatives from EBMUD, CDFW, and USFWS, in cooperation with NOAA Fisheries and the Mokelumne River Technical Advisory Committee (MRTAC) members, and in accordance with 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 2015 calendar year and efforts planned for 2016. Section V contains the appendices.

III. STATUS OF THE LOWER MOKELUMNE RIVER SALMON POPULATION

Through the 1990s and into 2015, 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 12,870 in 2015 was well above the long term average and was the third largest for the lower Mokelumne River during the period 1990 - 2015 (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.

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Table 1: Lower Mokelumne River Fall-Run Chinook Salmon Data, 1989-2015

Year	Outmigration		Total Escapement	Hatchery Returns	Natural Spaw ners	Percent Natural Spaw ners 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

Notes:

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

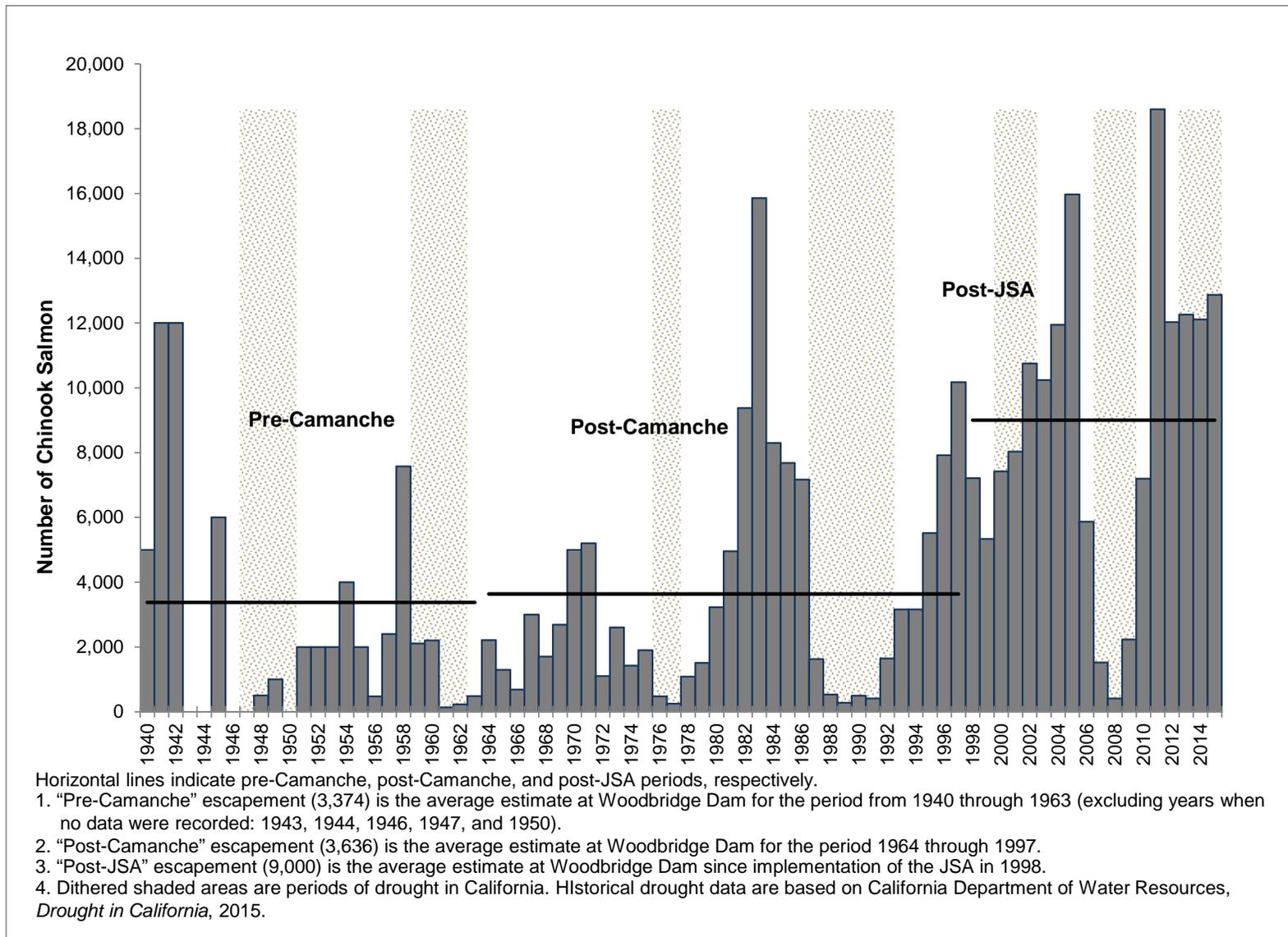


Figure 1: Estimated Annual Spawning Escapement of Fall-Run Chinook Salmon in the Lower Mokelumne River, 1940-2015

Five of the top six returns recorded have occurred during the period of 2011-2015, 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 – 2015 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 8,847 as of 2014, which represents a higher percentage of attainment than nearly all other Central Valley river populations.

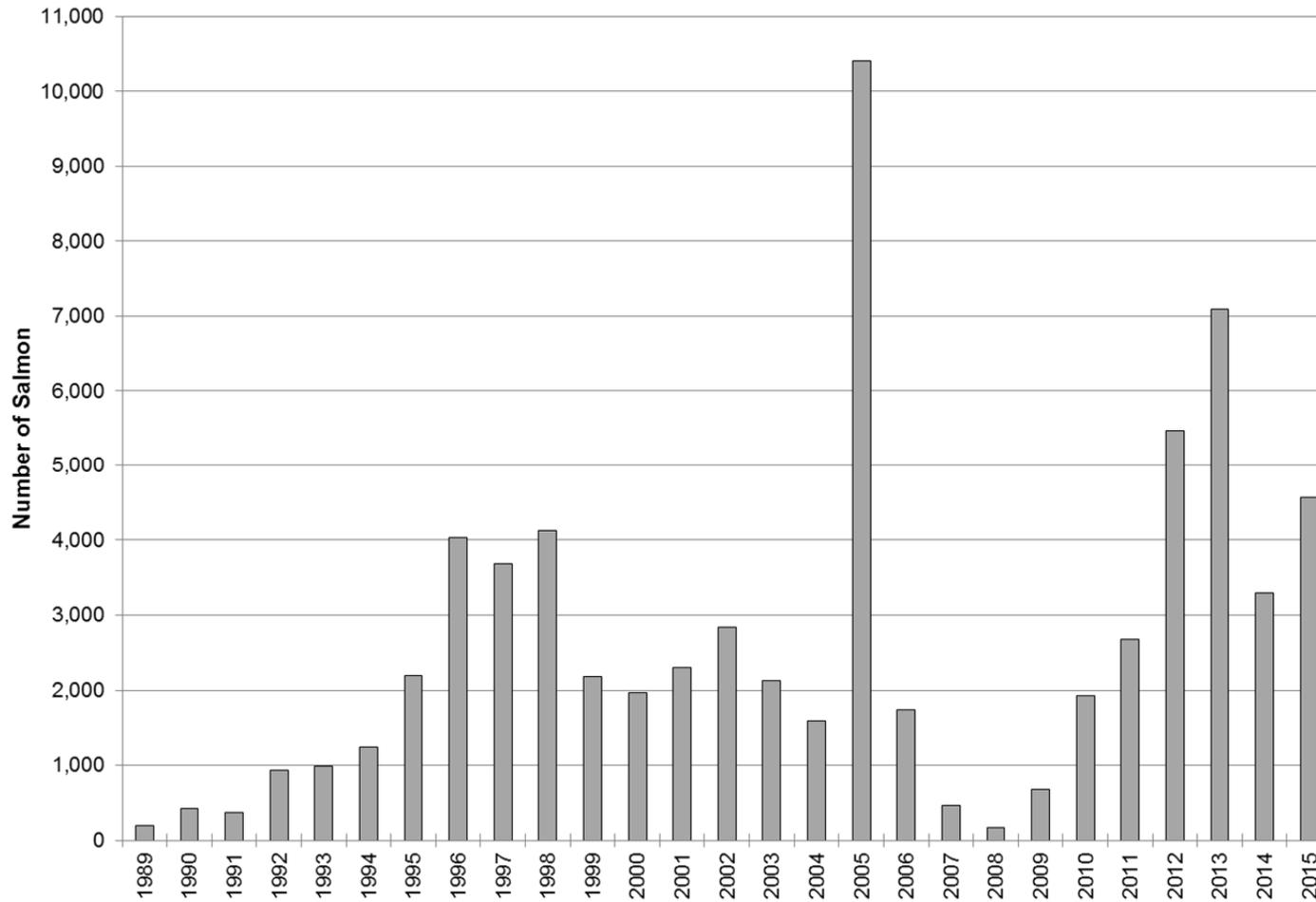


Figure 2: Fall-Run Chinook Salmon Naturally Spawning in the Lower Mokelumne River, 1989-2015

The Mokelumne River Fish Hatchery (MRFH), owned by EBMUD and operated by the California Department of Fish and Wildlife (CDFW), reported that the 2015 salmon return at the MRFH was 8,295 salmon. The 2015 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.

Approximately 4,500 salmon spawned within the river, constructing 1,357 redds (nests) in the 10-mile reach below Camanche Dam (Figure 2). In-river spawning habitat conditions were maintained through reservoir management for temperature and sustained habitat flows above JSA critical dry-year flows using gainshare supplies. Based on salmon emergence temperature models the peak of fry emergence will fall in late February and be completed by late March 2016. The estimated in-river production from brood year 2014 was 61,305, which was influenced by drought and associated conditions within the lower river.

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 2015, and those actions planned for 2016, 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 2015 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. For water year 2015, 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 2015 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.

2015

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, 2014, EBMUD provided “Dry” JSA water year type Camanche Dam flow releases from October 1, 2014 through March 31, 2015. Pardee and Camanche Reservoir actual total storage on November 5, 2014 was 292,990 acre-feet.

Based on the California Department of Water Resources (DWR) April 1, 2015 forecast of 233,000 acre-feet of unimpaired runoff into Pardee Reservoir, EBMUD operated under a “Critically Dry” JSA water year type Camanche Dam flow releases from April 1, 2015 through September 30, 2015.

EBMUD is making, at a minimum, “Critically Dry” JSA water year type Camanche Dam flow releases from October 1, 2015 through March 31, 2016. This is based on EBMUD’s forecast of total Pardee and Camanche Reservoir storage on November 5, 2015. Actual Pardee and Camanche reservoir storage on November 5, 2015 was 221,800 acre-feet.

Gainshare water, accumulated from EBMUD’s CVP contract water supply in 2015 and from the non-Mokelumne transfer water as stated in the JSA agreement, provided an increased baseflow and pulse flow for the fall salmon run. 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 very high return of salmon. As a result of these various operational adjustments in flows and releases, a limited number of temporary flow deviations below Woodbridge Dam occurred during transition periods.

On April 23, 2015, EBMUD received a curtailment letter from the State Water Resources Control Board. The letter required that all post-1914 water rights holders in the San Joaquin River watershed stop diverting water to storage. EBMUD tracked the unimpaired runoff into the

watershed, the inflow into Pardee, and diversions from Pardee to calculate the cumulative net curtailed inflow stored. This amount was released 30 days from the time the unimpaired runoff entering the system exceeded the releases from Camanche Reservoir. In total, EBMUD released an additional 24 TAF of water down the Mokelumne River above the JSA requirement in order to comply with the SWRCB's curtailment notice.

Calendar year 2015 actual Camanche Dam average daily flow releases and JSA agreed flow releases from Camanche Dam are shown in Table 2 and Figure 3. The daily average flow below Camanche Dam did not fall below the minimum during this period.

Calendar year 2015 actual average daily flows and JSA expected flows below Woodbridge Dam are shown in Table 3 and Figure 4. During this period, the daily average expected flow below Woodbridge Dam did not fall below the minimum expected flow.

Although daily average JSA expected flows below Woodbridge Dam were met, during calendar year 2015 there were eight provisional, temporary flow deviations based on the recorded fifteen minute readings measured at Golf gage. In order to optimize conditions for salmon, EBMUD and its partners chose to use gainsharing water to produce a series of pulse flow releases at the WID Dam for salmon attraction and up-migration. Through EBMUD coordination with the partnership, this management strategy made efficient use of limited water, which required storage then subsequent release during pulses, and resulted in a very high return of salmon. The pulse flows along with the critically dry conditions did create operational challenges. Of the eight provisional, temporary flow deviations, almost half of them resulted from WID refill operations, almost half of them resulted from the pulse flow operations, and the two remaining temporary deviations were related to instrumentation error and operational challenges due to the general difficulty of operating in such critically dry conditions.

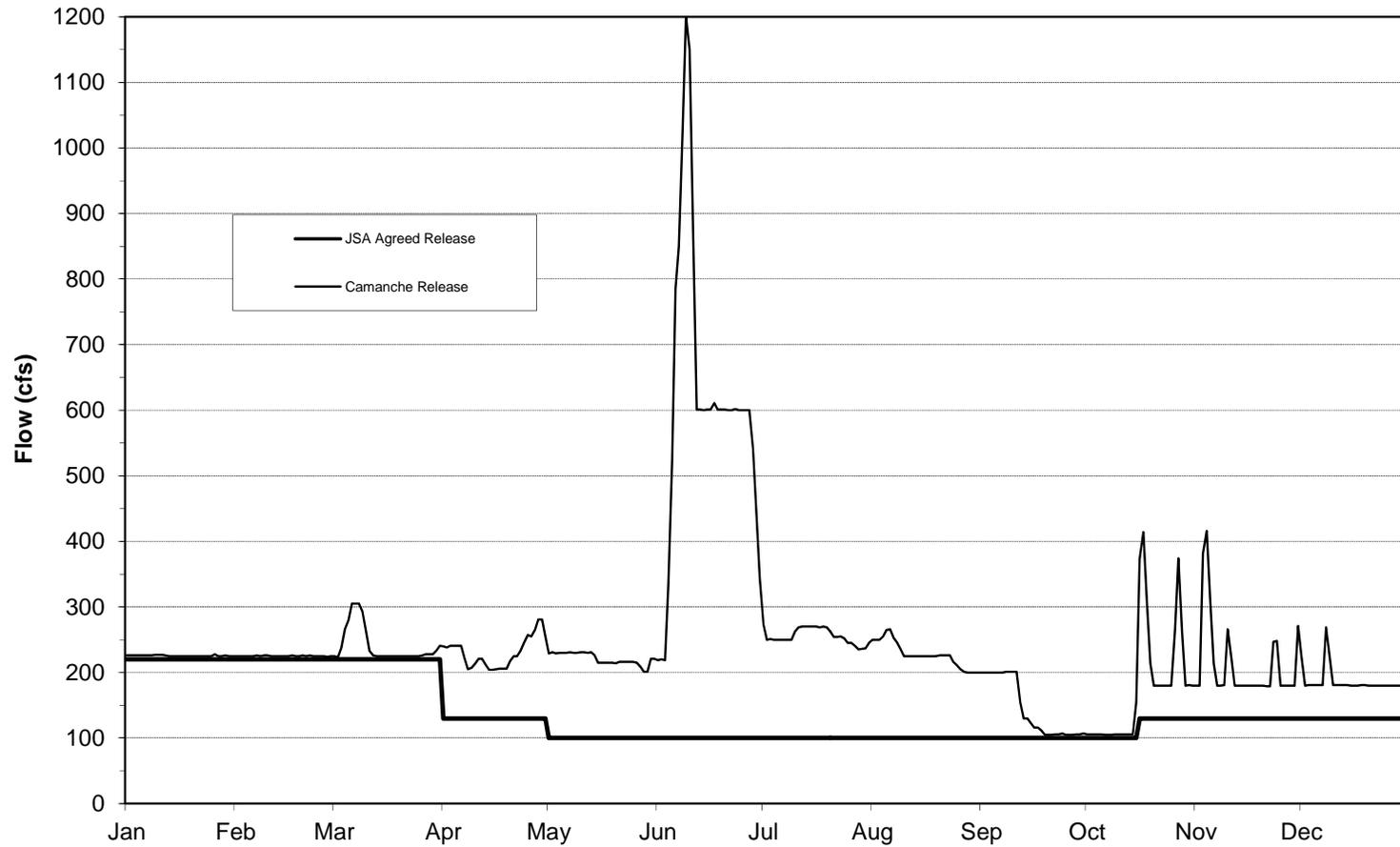
The fifteen-minute readings of river flows at EBMUD's gaging station, (USGS No. 11325500, "Mokelumne River below Woodbridge Dam,") during the eight provisional, temporary flow deviations are included in Appendix B of this report in Tables B-1 through B-8.

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Table 2: Calendar Year 2015 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
01/01/15	226	220	03/17/15	225	220	05/31/15	221	100	08/14/15	225	100	10/28/15	263	130
01/02/15	226	220	03/18/15	225	220	06/01/15	219	100	08/15/15	225	100	10/29/15	180	130
01/03/15	226	220	03/19/15	225	220	06/02/15	220	100	08/16/15	225	100	10/30/15	181	130
01/04/15	226	220	03/20/15	225	220	06/03/15	219	100	08/17/15	225	100	10/31/15	180	130
01/05/15	226	220	03/21/15	225	220	06/04/15	335	100	08/18/15	225	100	11/01/15	180	130
01/06/15	226	220	03/22/15	225	220	06/05/15	524	100	08/19/15	225	100	11/02/15	180	130
01/07/15	226	220	03/23/15	225	220	06/06/15	785	100	08/20/15	226	100	11/03/15	382	130
01/08/15	226	220	03/24/15	225	220	06/07/15	850	100	08/21/15	226	100	11/04/15	416	130
01/09/15	227	220	03/25/15	225	220	06/08/15	1027	100	08/22/15	226	100	11/05/15	314	130
01/10/15	227	220	03/26/15	226	220	06/09/15	1201	100	08/23/15	226	100	11/06/15	214	130
01/11/15	227	220	03/27/15	228	220	06/10/15	1150	100	08/24/15	216	100	11/07/15	180	130
01/12/15	226	220	03/28/15	228	220	06/11/15	873	100	08/25/15	211	100	11/08/15	180	130
01/13/15	225	220	03/29/15	228	220	06/12/15	601	100	08/26/15	205	100	11/09/15	181	130
01/14/15	225	220	03/30/15	233	220	06/13/15	601	100	08/27/15	201	100	11/10/15	266	130
01/15/15	225	220	03/31/15	241	220	06/14/15	600	100	08/28/15	200	100	11/11/15	223	130
01/16/15	225	220	04/01/15	240	130	06/15/15	601	100	08/29/15	200	100	11/12/15	180	130
01/17/15	225	220	04/02/15	238	130	06/16/15	601	100	08/30/15	200	100	11/13/15	180	130
01/18/15	225	220	04/03/15	241	130	06/17/15	611	100	08/31/15	200	100	11/14/15	180	130
01/19/15	225	220	04/04/15	241	130	06/18/15	601	100	09/01/15	200	100	11/15/15	180	130
01/20/15	225	220	04/05/15	241	130	06/19/15	601	100	09/02/15	200	100	11/16/15	180	130
01/21/15	225	220	04/06/15	241	130	06/20/15	601	100	09/03/15	200	100	11/17/15	180	130
01/22/15	225	220	04/07/15	222	130	06/21/15	600	100	09/04/15	200	100	11/18/15	180	130
01/23/15	225	220	04/08/15	205	130	06/22/15	600	100	09/05/15	200	100	11/19/15	180	130
01/24/15	225	220	04/09/15	207	130	06/23/15	602	100	09/06/15	200	100	11/20/15	180	130
01/25/15	225	220	04/10/15	213	130	06/24/15	600	100	09/07/15	200	100	11/21/15	179	130
01/26/15	228	220	04/11/15	221	130	06/25/15	600	100	09/08/15	201	100	11/22/15	179	130
01/27/15	225	220	04/12/15	221	130	06/26/15	600	100	09/09/15	201	100	11/23/15	247	130
01/28/15	225	220	04/13/15	212	130	06/27/15	600	100	09/10/15	201	100	11/24/15	248	130
01/29/15	226	220	04/14/15	204	130	06/28/15	541	100	09/11/15	201	100	11/25/15	180	130
01/30/15	225	220	04/15/15	204	130	06/29/15	442	100	09/12/15	154	100	11/26/15	180	130
01/31/15	225	220	04/16/15	205	130	06/30/15	344	100	09/13/15	130	100	11/27/15	180	130
02/01/15	225	220	04/17/15	206	130	07/01/15	273	100	09/14/15	130	100	11/28/15	180	130
02/02/15	225	220	04/18/15	206	130	07/02/15	250	100	09/15/15	123	100	11/29/15	180	130
02/03/15	225	220	04/19/15	206	130	07/03/15	251	100	09/16/15	116	100	11/30/15	271	130
02/04/15	225	220	04/20/15	218	130	07/04/15	250	100	09/17/15	116	100	12/01/15	225	130
02/05/15	225	220	04/21/15	225	130	07/05/15	250	100	09/18/15	112	100	12/02/15	180	130
02/06/15	225	220	04/22/15	225	130	07/06/15	250	100	09/19/15	105	100	12/03/15	181	130
02/07/15	226	220	04/23/15	234	130	07/07/15	250	100	09/20/15	105	100	12/04/15	181	130
02/08/15	225	220	04/24/15	246	130	07/08/15	250	100	09/21/15	105	100	12/05/15	181	130
02/09/15	226	220	04/25/15	257	130	07/09/15	250	100	09/22/15	106	100	12/06/15	181	130
02/10/15	226	220	04/26/15	255	130	07/10/15	263	100	09/23/15	106	100	12/07/15	181	130
02/11/15	225	220	04/27/15	265	130	07/11/15	269	100	09/24/15	107	100	12/08/15	269	130
02/12/15	225	220	04/28/15	281	130	07/12/15	270	100	09/25/15	105	100	12/09/15	223	130
02/13/15	225	220	04/29/15	281	130	07/13/15	270	100	09/26/15	105	100	12/10/15	181	130
02/14/15	225	220	04/30/15	255	130	07/14/15	270	100	09/27/15	105	100	12/11/15	181	130
02/15/15	225	220	05/01/15	229	100	07/15/15	270	100	09/28/15	106	100	12/12/15	181	130
02/16/15	225	220	05/02/15	231	100	07/16/15	270	100	09/29/15	106	100	12/13/15	181	130
02/17/15	226	220	05/03/15	229	100	07/17/15	269	100	09/30/15	107	100	12/14/15	181	130
02/18/15	225	220	05/04/15	230	100	07/18/15	270	100	10/01/15	106	100	12/15/15	180	130
02/19/15	225	220	05/05/15	230	100	07/19/15	269	100	10/02/15	106	100	12/16/15	180	130
02/20/15	226	220	05/06/15	230	100	07/20/15	263	100	10/03/15	106	100	12/17/15	180	130
02/21/15	225	220	05/07/15	231	100	07/21/15	254	100	10/04/15	106	100	12/18/15	181	130
02/22/15	226	220	05/08/15	230	100	07/22/15	254	100	10/05/15	106	100	12/19/15	181	130
02/23/15	225	220	05/09/15	230	100	07/23/15	255	100	10/06/15	105	100	12/20/15	180	130
02/24/15	225	220	05/10/15	231	100	07/24/15	252	100	10/07/15	105	100	12/21/15	180	130
02/25/15	225	220	05/11/15	231	100	07/25/15	245	100	10/08/15	105	100	12/22/15	180	130
02/26/15	225	220	05/12/15	230	100	07/26/15	245	100	10/09/15	106	100	12/23/15	180	130
02/27/15	224	220	05/13/15	231	100	07/27/15	241	100	10/10/15	106	100	12/24/15	180	130
02/28/15	225	220	05/14/15	226	100	07/28/15	235	100	10/11/15	106	100	12/25/15	180	130
03/01/15	225	220	05/15/15	215	100	07/29/15	236	100	10/12/15	106	100	12/26/15	180	130
03/02/15	223	220	05/16/15	215	100	07/30/15	237	100	10/13/15	106	100	12/27/15	180	130
03/03/15	238	220	05/17/15	215	100	07/31/15	245	100	10/14/15	106	100	12/28/15	180	130
03/04/15	266	220	05/18/15	215	100	08/01/15	250	100	10/15/15	155	100	12/29/15	180	130
03/05/15	280	220	05/19/15	215	100	08/02/15	250	100	10/16/15	373	130	12/30/15	180	130
03/06/15	305	220	05/20/15	214	100	08/03/15	250	100	10/17/15	414	130	12/31/15	180	130
03/07/15	305	220	05/21/15	216	100	08/04/15	255	100	10/18/15	313	130			
03/08/15	305	220	05/22/15	216	100	08/05/15	265	100	10/19/15	214	130			
03/09/15	293	220	05/23/15	216	100	08/06/15	266	100	10/20/15	180	130			
03/10/15	262	220	05/24/15	216	100	08/07/15	253	100	10/21/15	180	130			
03/11/15	233	220	05/25/15	216	100	08/08/15	246	100	10/22/15	180	130			
03/12/15	226	220	05/26/15	215	100	08/09/15	235	100	10/23/15	180	130			
03/13/15	225	220	05/27/15	209	100	08/10/15	225	100	10/24/15	180	130			
03/14/15	225	220	05/28/15	201	100	08/11/15	225	100	10/25/15	180	130			
03/15/15	225	220	05/29/15	201	100	08/12/15	225	100	10/26/15	266	130			
03/16/15	225	220	05/30/15	221	100	08/13/15	225	100	10/27/15	374	130			

1. Releases in Calendar Year 2015 were made according to the "Dry" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Critically Dry" year flow schedule from Apr. 1 through Sept. 30; and "Critically Dry" year flow schedule from Oct. 1 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 2015 were made according to the "Dry" year JSA Mokelumne River minimum flow schedule from Jan.1 to Mar. 31; "Critically Dry" year flow schedule from Apr. 1 through Sept. 30; and "Critically Dry" year flow schedule from Oct. 1 through Dec. 31.
2. Actual flow data has not been verified and published by the U.S. Geological Survey.

Figure 3: Calendar Year 2015 Average Daily Release in Cubic Feet per Second from Camanche Dam

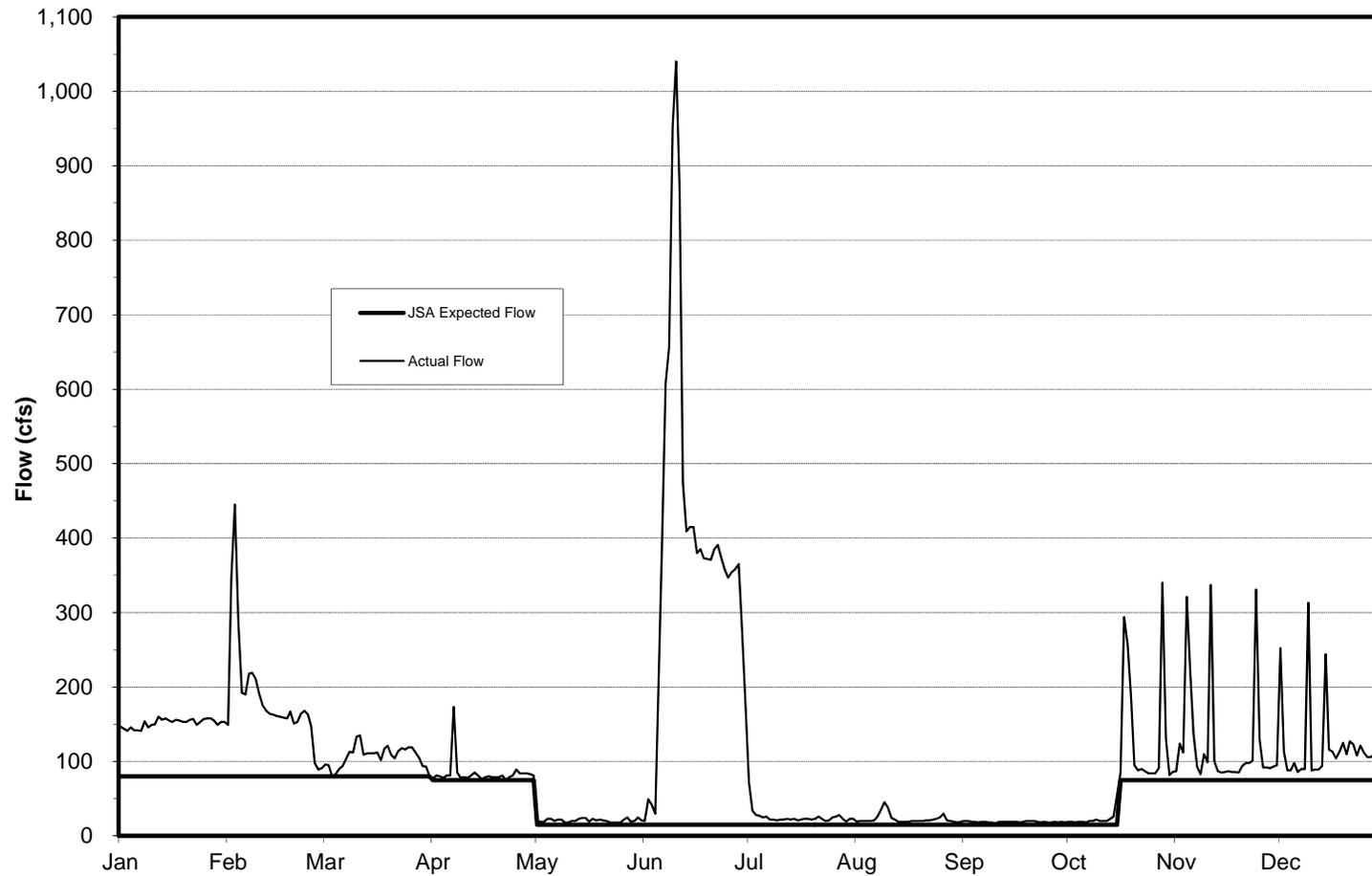
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Table 3: Calendar Year 2015 Average Daily Flow in Cubic Feet per Second Below Woodbridge Dam

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
01/01/15	147	80	03/17/15	102	80	05/31/15	21	15	08/14/15	19	15	10/28/15	340	75
01/02/15	144	80	03/18/15	117	80	06/01/15	20	15	08/15/15	19	15	10/29/15	131	75
01/03/15	141	80	03/19/15	121	80	06/02/15	49	15	08/16/15	19	15	10/30/15	82	75
01/04/15	146	80	03/20/15	109	80	06/03/15	42	15	08/17/15	20	15	10/31/15	86	75
01/05/15	142	80	03/21/15	104	80	06/04/15	30	15	08/18/15	20	15	11/01/15	87	75
01/06/15	142	80	03/22/15	114	80	06/05/15	218	15	08/19/15	20	15	11/02/15	124	75
01/07/15	141	80	03/23/15	118	80	06/06/15	394	15	08/20/15	20	15	11/03/15	112	75
01/08/15	154	80	03/24/15	116	80	06/07/15	608	15	08/21/15	21	15	11/04/15	321	75
01/09/15	146	80	03/25/15	119	80	06/08/15	657	15	08/22/15	21	15	11/05/15	220	75
01/10/15	149	80	03/26/15	119	80	06/09/15	952	15	08/23/15	22	15	11/06/15	137	75
01/11/15	150	80	03/27/15	112	80	06/10/15	1040	15	08/24/15	23	15	11/07/15	93	75
01/12/15	160	80	03/28/15	105	80	06/11/15	867	15	08/25/15	25	15	11/08/15	83	75
01/13/15	156	80	03/29/15	94	80	06/12/15	475	15	08/26/15	30	15	11/09/15	110	75
01/14/15	158	80	03/30/15	93	80	06/13/15	409	15	08/27/15	21	15	11/10/15	99	75
01/15/15	155	80	03/31/15	81	80	06/14/15	415	15	08/28/15	20	15	11/11/15	337	75
01/16/15	153	80	04/01/15	77	75	06/15/15	415	15	08/29/15	19	15	11/12/15	100	75
01/17/15	156	80	04/02/15	81	75	06/16/15	380	15	08/30/15	18	15	11/13/15	87	75
01/18/15	155	80	04/03/15	80	75	06/17/15	385	15	08/31/15	19	15	11/14/15	85	75
01/19/15	153	80	04/04/15	78	75	06/18/15	373	15	09/01/15	20	15	11/15/15	86	75
01/20/15	153	80	04/05/15	81	75	06/19/15	372	15	09/02/15	20	15	11/16/15	87	75
01/21/15	156	80	04/06/15	81	75	06/20/15	371	15	09/03/15	19	15	11/17/15	86	75
01/22/15	157	80	04/07/15	173	75	06/21/15	385	15	09/04/15	19	15	11/18/15	86	75
01/23/15	149	80	04/08/15	85	75	06/22/15	391	15	09/05/15	18	15	11/19/15	85	75
01/24/15	153	80	04/09/15	78	75	06/23/15	374	15	09/06/15	19	15	11/20/15	94	75
01/25/15	157	80	04/10/15	79	75	06/24/15	358	15	09/07/15	19	15	11/21/15	98	75
01/26/15	158	80	04/11/15	78	75	06/25/15	347	15	09/08/15	18	15	11/22/15	98	75
01/27/15	158	80	04/12/15	81	75	06/26/15	354	15	09/09/15	18	15	11/23/15	101	75
01/28/15	155	80	04/13/15	85	75	06/27/15	358	15	09/10/15	17	15	11/24/15	331	75
01/29/15	149	80	04/14/15	81	75	06/28/15	365	15	09/11/15	19	15	11/25/15	130	75
01/30/15	153	80	04/15/15	76	75	06/29/15	279	15	09/12/15	19	15	11/26/15	92	75
01/31/15	153	80	04/16/15	79	75	06/30/15	178	15	09/13/15	19	15	11/27/15	92	75
02/01/15	149	80	04/17/15	80	75	07/01/15	72	15	09/14/15	19	15	11/28/15	91	75
02/02/15	347	80	04/18/15	79	75	07/02/15	34	15	09/15/15	19	15	11/29/15	93	75
02/03/15	445	80	04/19/15	79	75	07/03/15	28	15	09/16/15	19	15	11/30/15	95	75
02/04/15	287	80	04/20/15	79	75	07/04/15	27	15	09/17/15	18	15	12/01/15	252	75
02/05/15	192	80	04/21/15	81	75	07/05/15	25	15	09/18/15	19	15	12/02/15	113	75
02/06/15	190	80	04/22/15	75	75	07/06/15	26	15	09/19/15	20	15	12/03/15	88	75
02/07/15	218	80	04/23/15	79	75	07/07/15	22	15	09/20/15	20	15	12/04/15	88	75
02/08/15	219	80	04/24/15	81	75	07/08/15	22	15	09/21/15	20	15	12/05/15	98	75
02/09/15	211	80	04/25/15	89	75	07/09/15	21	15	09/22/15	19	15	12/06/15	86	75
02/10/15	191	80	04/26/15	84	75	07/10/15	22	15	09/23/15	18	15	12/07/15	90	75
02/11/15	175	80	04/27/15	84	75	07/11/15	22	15	09/24/15	19	15	12/08/15	90	75
02/12/15	168	80	04/28/15	84	75	07/12/15	23	15	09/25/15	18	15	12/09/15	313	75
02/13/15	164	80	04/29/15	83	75	07/13/15	22	15	09/26/15	18	15	12/10/15	88	75
02/14/15	163	80	04/30/15	81	75	07/14/15	23	15	09/27/15	19	15	12/11/15	89	75
02/15/15	161	80	05/01/15	20	15	07/15/15	21	15	09/28/15	18	15	12/12/15	89	75
02/16/15	160	80	05/02/15	19	15	07/16/15	22	15	09/29/15	19	15	12/13/15	94	75
02/17/15	159	80	05/03/15	19	15	07/17/15	23	15	09/30/15	18	15	12/14/15	244	75
02/18/15	158	80	05/04/15	23	15	07/18/15	23	15	10/01/15	19	15	12/15/15	116	75
02/19/15	167	80	05/05/15	23	15	07/19/15	22	15	10/02/15	19	15	12/16/15	113	75
02/20/15	151	80	05/06/15	20	15	07/20/15	23	15	10/03/15	18	15	12/17/15	104	75
02/21/15	153	80	05/07/15	22	15	07/21/15	26	15	10/04/15	19	15	12/18/15	113	75
02/22/15	164	80	05/08/15	22	15	07/22/15	23	15	10/05/15	19	15	12/19/15	125	75
02/23/15	168	80	05/09/15	18	15	07/23/15	20	15	10/06/15	18	15	12/20/15	110	75
02/24/15	163	80	05/10/15	18	15	07/24/15	21	15	10/07/15	20	15	12/21/15	127	75
02/25/15	147	80	05/11/15	20	15	07/25/15	25	15	10/08/15	20	15	12/22/15	123	75
02/26/15	98	80	05/12/15	20	15	07/26/15	26	15	10/09/15	22	15	12/23/15	108	75
02/27/15	89	80	05/13/15	23	15	07/27/15	28	15	10/10/15	20	15	12/24/15	121	75
02/28/15	91	80	05/14/15	24	15	07/28/15	23	15	10/11/15	20	15	12/25/15	112	75
03/01/15	96	80	05/15/15	24	15	07/29/15	19	15	10/12/15	20	15	12/26/15	106	75
03/02/15	95	80	05/16/15	19	15	07/30/15	23	15	10/13/15	23	15	12/27/15	106	75
03/03/15	80	80	05/17/15	23	15	07/31/15	23	15	10/14/15	26	15	12/28/15	110	75
03/04/15	83	80	05/18/15	21	15	08/01/15	19	15	10/15/15	55	15	12/29/15	119	75
03/05/15	90	80	05/19/15	22	15	08/02/15	20	15	10/16/15	85	75	12/30/15	118	75
03/06/15	94	80	05/20/15	21	15	08/03/15	20	15	10/17/15	294	75	12/31/15	115	75
03/07/15	104	80	05/21/15	20	15	08/04/15	20	15	10/18/15	256	75			
03/08/15	113	80	05/22/15	18	15	08/05/15	20	15	10/19/15	183	75			
03/09/15	112	80	05/23/15	18	15	08/06/15	21	15	10/20/15	95	75			
03/10/15	133	80	05/24/15	18	15	08/07/15	26	15	10/21/15	88	75			
03/11/15	135	80	05/25/15	18	15	08/08/15	35	15	10/22/15	90	75			
03/12/15	109	80	05/26/15	22	15	08/09/15	45	15	10/23/15	87	75			
03/13/15	111	80	05/27/15	25	15	08/10/15	38	15	10/24/15	84	75			
03/14/15	111	80	05/28/15	19	15	08/11/15	24	15	10/25/15	84	75			
03/15/15	111	80	05/29/15	20	15	08/12/15	22	15	10/26/15	84	75			
03/16/15	112	80	05/30/15	25	15	08/13/15	19	15	10/27/15	91	75			

1. Expected flows below Woodbridge Dam in Calendar Year 2015 were according to the "Dry" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Critically Dry" year flow schedule from Apr. 1 through Sept. 30; and "Critically Dry" year flow schedule from Oct 1. 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.

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1. Releases in Calendar Year 2015 were made according to the "Dry" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Critically Dry" year flow schedule from Apr. 1 through Sept. 30; and "Critically Dry" year flow schedule from Oct. 1 through Dec. 31.
2. Actual flow data has not been verified and published by the U.S. Geological Survey.

Figure 4: Calendar Year 2015 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 the limited water supply available for adaptive management, at its October 8, 2015 meeting, the Partnership Coordinating Committee approved eliminating the ramping rate criteria for October through December 2015. 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. In making this decision, the committee 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

Due to continued drought conditions and reduced projected Mokelumne run-off (41% of average), EBMUD obtained additional water supplies through its Freeport Project. The JSA states that EBMUD will “increase instream flows beyond the flows specified in Attachment 1 [of the JSA] by an amount equal to 20% of the actual yield of additional water supplies developed by EBMUD ... until reaching a maximum quantity of 20 TAF....” In 2015, a total of 57,930 AF of supplemental supplies was delivered to EBMUD. EBMUD received 33,250 AF from its Central Valley Project (CVP) contract with the U.S. Bureau of Reclamation (USBR) and also took delivery of 24,680 AF of transfer water. Based on these deliveries a total of 11,586 AF was made available through the JSA gainsharing provision.

USFWS and CDFW were notified of the availability of gainsharing water in May 2015. The amount of gainsharing water available for use was 14,477 AF, based on the 2,891 AF of gainsharing water carried over from 2014 plus the 11,586 AF of gainsharing water accumulated

in 2015. Initial planning for use of the water was conducted at the July 2015 MRTAC meeting. In September 2015, a draft fall flow plan was forwarded to the Partnership Coordinating Committee (PCC) for review and approval. Subsequent discussions were held at the October 2015 PCC meeting and during periodic meetings throughout the salmon migration season. A total of 6,093 AF of the gainsharing supply was used from October 16, 2015 through December 31, 2015 to augment base flows and for additional pulse flows.

The remaining 8,384 AF of gainsharing water was carried over to 2016 per JSA provision F.2. Initial planning for use of the remaining gainsharing water occurred at the January 2016 MRTAC meeting.

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 2015, there were limited DCC closures, 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

A series of seven pulse flows were released by EBMUD from Camanche Dam October through December of 2015 using a portion of the gainsharing water discussed above. Reoperation of Woodbridge dam by WID downstream augmented the magnitude of pulse flow peaks below Woodbridge Dam with average daily peaks ranging up to 340 cfs. In addition to pulse flows supported with gainsharing supplies, an additional three pulses through January 2016 were developed through collaboration with Woodbridge Irrigation District (WID) on reoperation of Woodbridge Dam elevations to support chinook salmon and steelhead passage. These pulses did not require additional volume of release from Camanche Dam, but contributed significantly

to the positive fish response. Each pulse resulted in an increase in salmon numbers entering the Mokelumne River (see Figure 5).

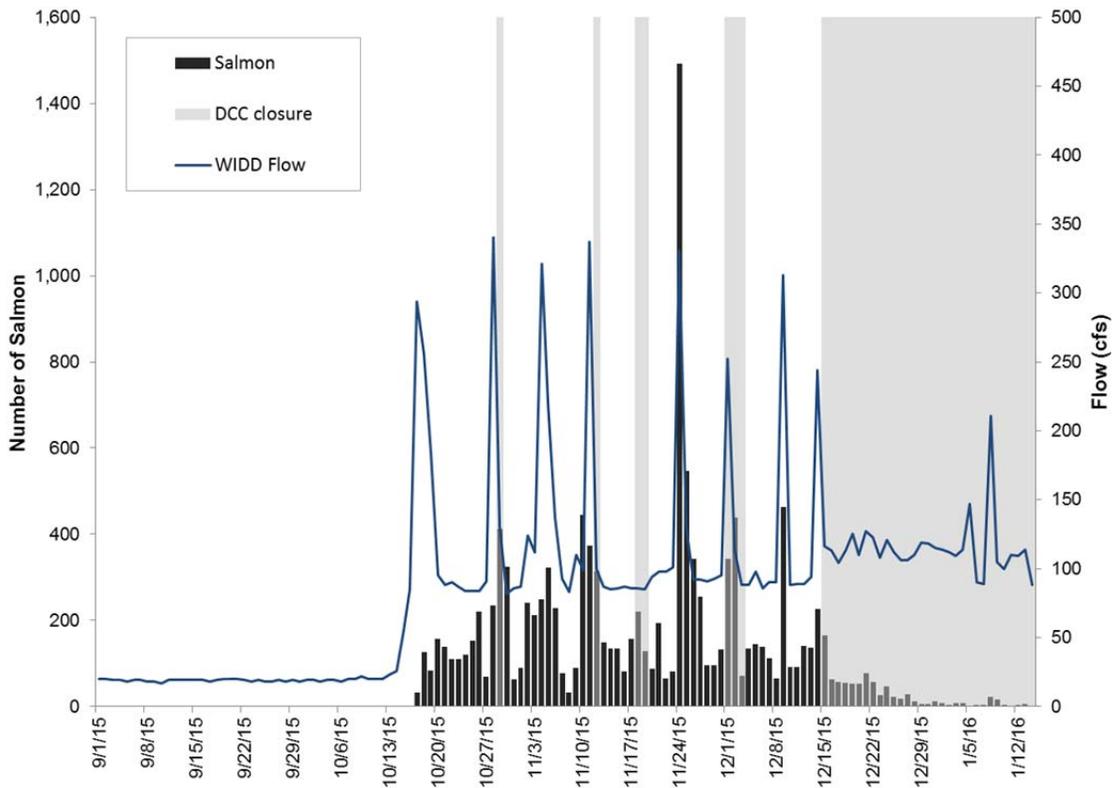


Figure 5: Daily Upstream Passage of Chinook Salmon at Woodbridge Dam Relative to Flow and Delta Cross Channel Closure, September 2015 – January 2016

Coded Wire Tag (CWT) return data clearly indicates that planting locations for hatchery reared juveniles plays a significant role in straying.² In 2007, CDFW planted 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 2015, CDFW continued the practice of releasing

² 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.

production in net pens at Jersey Point, which previous return data indicates leads to less straying and better returns to the Mokelumne. Overall, these adaptive management efforts will maximize returns to the Mokelumne River while minimizing straying to other systems.

Incidences of Fish Mortality in Camanche Reservoir

The severe drought in California led to reduced water levels in Camanche Reservoir in 2015, causing isolated ponds to surface in the reservoir. The development of isolated ponds led to the stranding of fish in Camanche Reservoir and resulted in fish mortality on three separate occasions in one location. Three instances of fish mortality were observed on the Rabbit Creek arm of Camanche Reservoir in the summer of 2015, and were likely caused by low nighttime dissolved oxygen levels due to low water levels and elevated air and water temperatures. An isolated pond at the East Cove was exposed in early July 2015, and EBMUD performed boat electrofishing to remove and relocate some of the larger fish. Lastly, the low reservoir levels exposed an isolated pond in the Camanche South Short Recreation Area south of the Monument RV Campground. EBMUD promoted recreational fishing in this site as there was good public access.

EBMUD described these incidents and its response to FERC in a letter dated September 11, 2015. FERC responded on October 20, 2015, concluding that EBMUD “undertook considerable effort to address and prevent fish mortality caused by receding reservoir elevation and the creation of isolated ponds with the project boundary... we do not find that the fish mortality events constitute a violation of your license requirements.”

2016

EBMUD is committed, pursuant to the FERC Order, to “Critically Dry” JSA year type Camanche Dam flow releases through March 31, 2016. 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, 2016 DWR Bulletin 120, the JSA water year type which will govern EBMUD’s flow schedule for the period April 1, 2016 through

September 30, 2016. 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 for finalized flow data for the 2013 and 2014 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.

2015

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 2015 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam.

From April 1, 2015 through September 30, 2015 EBMUD operated under a “Critically Dry” 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 by coordinating releases from Pardee Reservoir. Meeting the volume target was particularly challenging due to mandated releases due to SWRCB curtailment orders.

As described in section IV.A. above, in response to extreme drought conditions affecting California, the SWRCB issued a curtailment notice in May 2015 to all post-1914 water rights holders, including EBMUD, to cease diversions and to pass true natural flows through the system. From April 23, 2015 through November 1, 2015, EBMUD was releasing water from Camanche Reservoir to comply with the curtailment notice as well as JSA release requirements. The curtailment order resulted in the release of approximately 24,000 af of water from Camanche Reservoir. EBMUD complied with the curtailment notice and initiated meetings with Partnership agencies to develop a plan to meet hypolimnion targets for the fall. 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 2015.

2016

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.

2015

The HOS was activated on April 6, 2015 and was shut down on November 10, 2015. The HOS has effectively prevented hydrogen sulfide formation.

2016

In 2016 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.

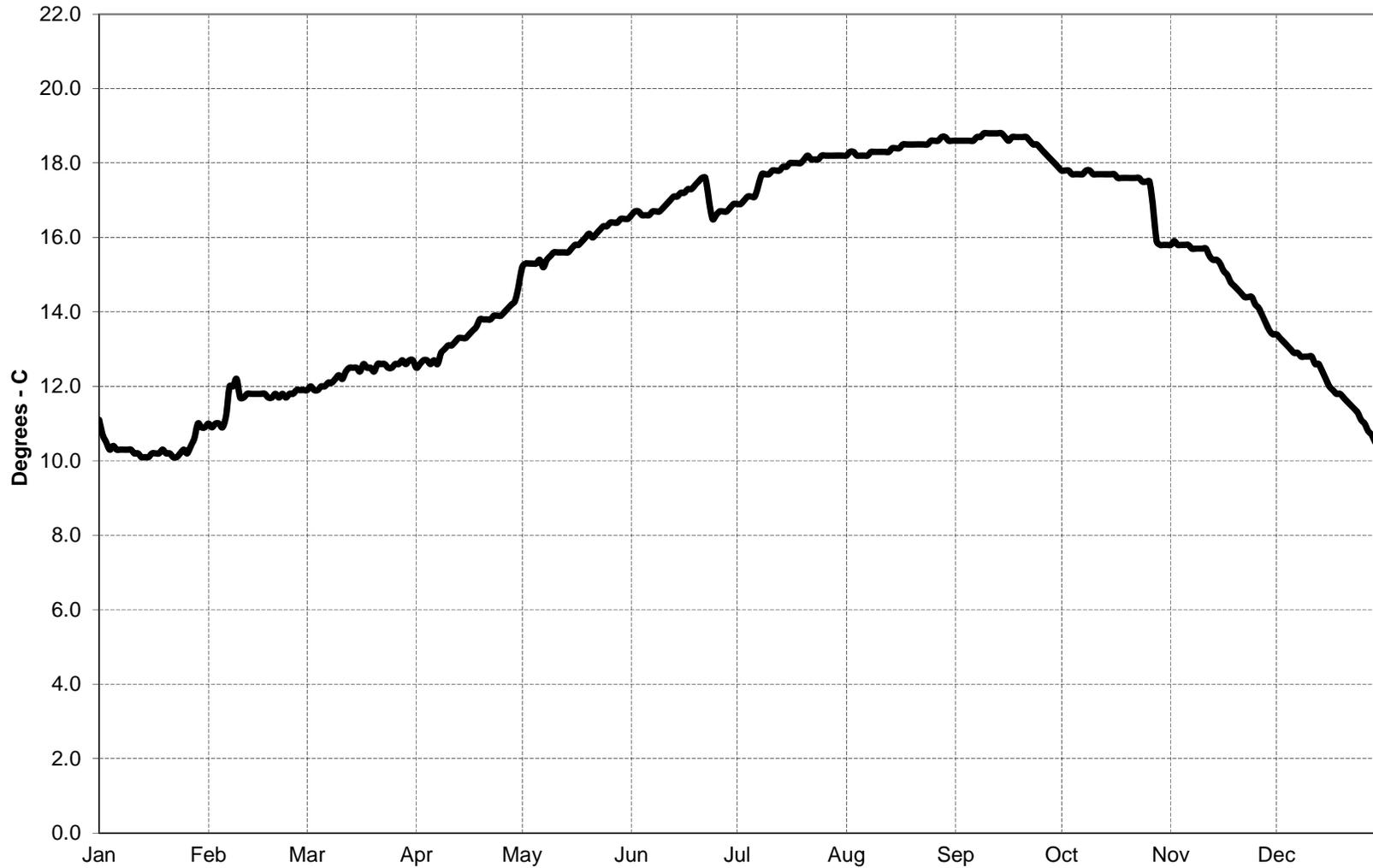


Figure 6: Calendar Year 2015 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam.

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 22, 2016. 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 21, 2015 and October 8, 2015. In 2015, the PSC approved an increase in funding for previously approved projects. A total of 40 projects since 1999 have been approved for Partnership funding. See Section IV.C.2 of this report for projects approved for Partnership funding in 2015 and projects with activity in 2015.

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 \$825,978. The available earnings, net of funds obligated to approved projects, were \$81,904 as of December 31, 2015.

In 2015, the Partnership Steering Committee approved an increase in Partnership funding from \$21,196 (approved in 2012) to a new total of \$42,001.41 for the Heritage Oak Winery Riparian Restoration and Streambank Stabilization.

Ongoing projects funded by the PSC with activity in 2015 for ecosystem protection and restoration in the lower Mokelumne River are summarized in Table 5 on the following page.

Lower Mokelumne River Project – FERC Project No. 2916
2015 Project Operations Report

Table 5: Partnership Fund-Supported Projects 2015 Activity Summary

Project Title	Project Sponsor	Project Description	Partnership Fund			Additional Funding	
			Date Approved by PSC	Anticipated Project Completion	Amount Obligated	Amount	Program
2014 Great Sierra River Clean Up	EBMUD	Purchase supplies for the annual community volunteer cleanup effort on the lower Mokelumne River	5/21/2014	COMPLETED	\$3,000		
2012-2014 Watershed Coordinator	San Joaquin County Resource Conservation District	Cost-share to continue support of SJCRCD watershed coordinator position	4/23/2012	Summer 2016 (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	Spring 2016	\$15,000	-	-
Jahant Slough Watershed Restoration Project	LangeTwins	Habitat restoration following PG&E tree removals	8/19/14	COMPLETED	\$5,000	\$18,000	PG&E “Pipeline Pathways” Program
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	Summer 2016	\$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	Fall 2016	\$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)

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 2015, 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 2015, 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.sjcrd.org.

5. Additional EBMUD Stakeholder Activities

2015

In 2015, 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 2015 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 2015, actions on the AFRP funded habitat restoration project included placement of 4,200 tons of gravel placed this season to create 3 riffle pool segments of habitat within the Mokelumne River Day Use Area. In addition, a 0.23 acre floodplain was built that will fill at 500 cfs and reach capacity at 1,000 cfs to provide habitat for juvenile fish rearing and growth 4.

- Participation in the CVPIA Science Integration Team to develop a structured decision making (SDM) model to develop CVPIA funding priorities from FY2017 and beyond. 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 18th annual Sandhill Crane Festival in Lodi, CA on November 6-8, 2015. 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 19-22, 2015. 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 and is currently working to overcome some pathology concerns from CDFW by implementing a fish pathology study with the USFWS.
- 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 (SJCRC) 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)

2016

In 2016, 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

2015

At the April 14, 2015 meeting of the Board of Directors, EBMUD accepted the 2015 Water Supply Availability and Deficiency Report declaring the lack of availability of water to be used by Resource Agencies for 2015. A copy of the letter of notification to the Resource Agencies is included in Appendix E of this report.

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). 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.

2015

In 2015, 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, 2015 and July 15, 2015.

2016

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 most recent MRTAC meeting was held on January 27, 2016.

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 2015, 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.

2015

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.
- 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.
- Adaptive management actions to promote healthy fish populations include fall pulse flows to attract salmon and steelhead into the Mokelumne River; trap, haul and net pen releases of coded wire tagged wild chinook salmon to overcome drought conditions; managing Camanche cold water pool adaptively to maximize benefit for fall run chinook salmon

2016

EBMUD will continue similar research and monitoring activities in 2016. These efforts will be described in full in the calendar year 2016 update report.

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:

2015

- 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 2015, 4,200 tons of gravel were placed

in the Lower Mokelumne River to create three riffle pool sequences for spawning habitat. Since 1998, EBMUD has placed approximately 69,000 tons of spawning gravel in the Lower Mokelumne River.

- Floodplain Restoration: A 0.23 acre floodplain was created in the Mokelumne River Day Use Area to provide juvenile fish rearing and growth opportunities. The floodplain will inundate at approximately 500 cfs, and reach capacity at 1,000 cfs. Floodplain creation activities were implemented by excavating and sorting existing streambed materials to produce an additional ~500 tons of spawning size rock for gravel enhancement 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.

2016

Many of the above habitat improvement activities will continue in 2016. A full description of 2016 activities will be reported in the calendar year 2016 update report.

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 1, 2015 and will be removed in early 2016. It is anticipated that it will be installed and operated during approximately the same period in 2016.

V. APPENDICES

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

Appendix B: Temporary Flow Deviations Below Woodbridge Dam

Appendix C: USGS Verified Flow Data for 2013 and 2014

Appendix D: Meeting Minutes of the Partnership Steering Committee

Appendix E: Notification of Availability for Sale of Surplus Mokelumne River Water

APPENDIX A

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

Lower Mokelumne River Watershed – NEWS

MEDIA Contacts: LMRWSC Chair- Kathy Grant 209-327-2063 or kgrant@lodi.gov.

SUBJECT: The **2015 Frank R. Beeler Watershed Stewardship Award** will Be Presented to **John Brodie** by the Lower Mokelumne River Watershed Stewardship Steering Committee of the San Joaquin County Resource Conservation District and the Lower Mokelumne River Partnership (California Department of Fish and Wildlife/U.S. Fish and Wildlife Service/East Bay Municipal Utility District on February 18, 2016, at 2 p.m. at the San Joaquin County Farm Bureau Federation office: 3290 North Ad Art Road, Stockton, CA 95215. The Beeler Award will be presented following the scheduled noontime RCD- BOD meeting. A reception with light refreshments will follow. Please RSVP: sjrcrd@outlook.com.

The Mokelumne River is a valuable resource that supports the economic, environmental, and aesthetic welfare of California. The Frank R. Beeler Watershed Stewardship Award is presented annually to acknowledge and 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.

John Brodie was selected to be the recipient of the 2015 Frank R. Beeler Watershed Stewardship Award by the Lower Mokelumne River Watershed Stewardship Committee of the SJC-Resource Conservation District, a committee composed of stakeholders within the Lower Mokelumne River region, and the Lower Mokelumne River Partnership, consisting of the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and East Bay Municipal Utility District for 14 years, John served as the watershed coordinator for the Mokelumne River watershed while working for the San Joaquin County Resource Conservation District (SJRC). Some of John's accomplishments include:

- Successful grant awards totaling over one million dollars that benefited the watershed's farmers, habitat, water and air quality and community.
- Production of a video highlighting the Mokelumne River
- Restoration of Murphy Creek, a tributary of the Mokelumne River, by removing the dam and restoring the salmon run
- Serving 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.

- Appointment to the California Department of Conservation's Statewide Watershed Advisory Committee to develop guiding principles for a statewide watershed program.



Mr. Frank Robert Beeler (1953-2009), a water and wastewater superintendent for the City of Lodi, was an active participant and advocate for the Lower Mokelumne River Watershed Stewardship Plan and the Lower Mokelumne River Watershed Stewardship Steering Committee. Mr. Beeler was a leader in the City's stormwater program and tirelessly supported volunteer watershed stewardship activities such as the City's "Storm Drain Detectives" (a group of teachers, students, and community members, in partnership with the City of Lodi, Public Works

Department, that monitor the Mokelumne River monthly at several different sites where stormwater enters the river. Using water quality tests, visual assessments, and toxicity tests, the Storm Drain Detectives collect and record data to analyze the effects that storm drain run off has on the river.) Mr. Beeler was also a world-class powerlifter having won many national and international medals. Mr. Beeler's death from cancer, only nine weeks after diagnosis, in April 2009 was a great loss to the community.

Past recipients of the Beeler Award include Kathy Grant (City of Lodi), Brad Lange (LangeTwins), Chris Locke (Locke Ranch), Tom Hoffman (Heritage Oak Winery), Vino Farms LLC, the Center For Land-Based Learning (SLEWS program), and Anders Christensen, (Woodbridge Irrigation District).

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Fish hatchery works to keep Mokelumne River's steelhead, salmon populations growing

By Christina Cornejo/News-Sentinel Staff Writer | Posted: Thursday, January 29, 2015 11:25 pm

After a long journey racing inland from the ocean, following the scent of home along the currents, steelhead trout take a trip up the fish ladder into the Mokelumne River Fish Hatchery near Lake Camanche. They wait in a set of concrete raceways to spawn, a fish occasionally shooting out of the murky water. It appears and disappears like slippery soap from a person's hands sinking back into the bathwater.

The fish shy away from the shadowy movements of people walking by at the hatchery.

It's a good thing, says Darrick Baker, fish hatchery manager, since they will be prepared to defend themselves against birds and other predators when they are released back into the river wilds.

In the hatchery one foggy morning, an osprey flew overhead, eyeing potential prey from above the mesh netting meant to protect them.

"Often times we'll see them overhead with fish in their mouths from the river," Baker said.

In the rivers, however, steelhead are powerful creatures, known to be one of the fastest fish in world, and are a bit predatory toward salmon eggs in the wild.

"When you hook into a steelhead, it's pandemonium. It's one of the hardest freshwater fish in the world to catch," said Bill Ferrero, a fishing guide with Mokelumne River Outfitters.

Steelhead are often overshadowed by the impressive salmon runs, as they return from the ocean around the same times. Yet they are a unique and important part of the Mokelumne River that we all enjoy.

They travel in to the Delta along with many salmon, splitting off to various rivers such as the American River or the Mokelumne.



Fish hatchery works to keep Mokelumne River's steelhead, salmon populations growing

Steelhead trout fry at the California Department of Fish and Wildlife's Mokelumne River Hatchery on Thursday, Jan. 15, 2015.

Steelhead began arriving in November, in the middle of the chinook salmon run — which ended in late December — and are expected to continue to trickle in through February.

But these fish don't come in the same numbers as salmon. By the end of their run in December, the season total for chinook salmon was 12,130, with 8,809 being brought into the hatchery. As of mid-January, the total steelhead count at the hatchery was just 202, according to hatchery reports.

Unlike salmon, which die after spawning and are fileted and sent to food banks and nonprofits such as the International Chaplain Association, steelhead live to reproduce for a few more years.

Steelhead shimmer grey and have dark spots near the top. As they approach spawning time, swimming upstream, the steelhead blush with pink and red colors on the sides.

Many of the steelhead that come up the river are identified as hatchery fish because they are missing their adipose fin, located at the top back of the fish. If a steelhead still has one, it must be thrown back into the river, Baker said. Which is why fisherman must use barbless hooks so as not to kill the fish if it has to be thrown back in the water, he said. But often fisherman will throw back the fish they catch anyway.

"I do it so I can go back and get it again," Ferrero said with a laugh. "... The most important thing is that they are endangered. Catch and release is important in getting numbers up."

Weekly during the steelhead run, a team of wildlife technicians and pathologists gather around the concrete raceways to round up the newly arrived steelhead visitors and sedate them to inspect them and spawn the fish.

One man dips a large net into the water and scoops up a steelhead to drop into a sedating solution. Another picks up the fish and determines if its a male or female. He will squeeze the females to see if they are "green," meaning ready to produce eggs.

If they aren't ready, the young female fish are sent to another set of hands to be resuscitated, by moving them through the water to ensure water runs through their gills.

The males get their own bucket of sedating liquid. How do you tell the difference?

"Males have a more pronounced lower jaw," Baker said. "Females have more of a point to them."

The whole spawning process has to happen quickly, he said.

Once the female fish is out of the water, they quickly stick a needle into the bottom in between some fins and inject air. The air along with some squeezing will push out all of the eggs into a metal dish on a rolling plastic cart.

One person will split the reddish orange eggs into two dishes, while another grabs a male and squeezes the white milt (fish sperm) into each dish and sloshes it around with a finger.

The eggs are dipped into a solution of iodine to get rid of any fungus or other pathogens that could threaten the future fish, while a pathologist runs some tests on a few eggs. On the back of a truck, other technicians measure the fish and take samples of their scales.

“We get samples to age the fish and determine their life history, whether they went to the ocean or stayed in the river,” said Eric Bradbury, a scientific aide.

The whole process is very clinical and methodical, but is necessary because the steelhead and salmon can no longer access much their former habitats to procreate, due to dams. Some wild fish still do spawn in the stretch up the river leading up to hatchery, hiding their eggs in the gravel but not in as high of numbers as what comes from the hatchery, Baker said.

Fish and Wildlife technicians will raise the steelhead and salmon eggs in various tanks, feeding them a mix of proteins and other nutrients until they are big enough to swim into the ocean. Usually, they are about a quarter pound and a year old, Baker said.

“We mimic their lost habitat. With our steelhead we hold them for at least a year and then get them past with trucks and take them down the Mokelumne,” Baker said. “We usually wait for a big storm event that dirties the water to prevent predation (or predators easily finding the fish).”

This slippery creature is kept reproducing by the Department of Fish and Wildlife despite dwindling river levels, high water temperatures and other challenges of the drought.

“We sustain fish for the future, for commercial industry, for fisherman. We sustain the population for the loss of habitat from the dam,” Baker said.

Contact reporter Christina Cornejo at christinac@lodinews.com.

Lodi High School FFA students work to restore balance of nature at LangeTwins

By Christina Cornejo/News-Sentinel Staff Writer | Posted: Friday, February 13, 2015 12:14 am

Lodi High School students took to the fields Thursday to get their hands dirty planting drought-resistant native species such as sage, California poppy, California buckwheat, and deer grass along the edge of the LangeTwins Family Vineyards. Their work was quick and efficient, leaving room for friends to chat while working. Students were eager to talk about the day's work planting a 25-foot-wide and 1,500-foot-long hedgerow.

"We had different jobs. One person dug the holes, while someone else was taking the plants out of the pots. Once we put the plants in the soil, we had someone come around and sprinkle some fertilizer," said Connor Robinson, a junior. "After the fertilizer, we put dirt on top and then mulch to hold in the moisture and to keep away weeds."

Their task was to restore land along the 2000 block of Jahant Road, between the road and the vineyard. About a year ago, PG&E had to rip out a long row of oak trees lining the street when performing maintenance on their underground pipelines.

Students, most of them in the FFA program at Lodi High, were able to work on the replanting as a part of SLEWS, the Student and Landowner Education and Watershed Stewardship program. The program allowed students to learn more about science, agriculture and careers through funding and help from the Center for Land-Based Learning, PG&E and the LangeTwins Family Winery and Vineyards. Joining them were volunteers from organizations such as East Bay Municipal Utility District and the University of California, Davis.



Lodi High School FFA students work to restore balance of nature at LangeTwins

Lodi High School FFA student student Cal McWeeney, 16, plants drought-resistant plants during a restoration project along a LangeTwins vineyard in Acampo on Thursday, Feb. 12, 2015. The restoration project was a joint effort between Student and Landowner Education and Watershed Stewardship, the Center for Land-Based Learning, Pacific Gas and Electric and the LangeTwins Family Winery and Vineyards. The new plantings replace a line of oak

Aaron Lange, vineyard manager at LangeTwins Winery and Vineyards, said he was disappointed that the trees had to go, but glad he could give students the opportunity to get a hands on look at what a habitat restoration project involves.

“It’s a great benefit to the ecosystem. We can provide a new habitat for insects, pollinators and birds. It gives the benefit of biodiversity and helps us with erosion control on the side of the road here,” Lange said. “Instead of saying ‘let’s grow more vineyard’ — we lost some habitat, let’s try to bring it back.”

SLEWS often works on restoration projects such as these with the help of students and local landowners from the Sacramento area to Merced.

A group will return again to the site to install bluebird and owl boxes as well as high perches for other birds of prey.

As volunteers and speakers captivated students with subjects such as career opportunities, insects and scientific tools to measure rain out in the field, many students had something to take away from the experience.

“I learned a lot. I learned why many vineyards have rose bushes at the end of a row,” said Jessica Roley, a junior at Lodi High. “Now, they mainly use it for decorative purposes. But before the rose bushes would show signs of mildew earlier than the vines, so that you could take care of the problem before it spread to the whole vineyard.”

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Northern California salmon runs stronger than expected on many rivers despite drought

By Denis Cuff
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San Jose Mercury News

Posted: Sat Dec 19 14:12:15 MST 2015

EAST OF LODI -- Long droughts like the one California is experiencing can be cruel to wild chinook salmon -- smothering, starving, overheating, disorienting and drying out the fish.

But up and down Central Valley rivers, the story is surprisingly different this fall

On the Mokelumne River -- a central Sierra drinking water source to 1.4 million East Bay residents -- more than 12,000 adult chinook have returned for the fall run so far this year, exceeding a 17-year average of 8,000 fish.

They have come home to breed after a three-year struggle to survive migrations, predators, water-diversion pumps -- and drought.

The abundance is in sharp contrast to the meager returns for the coho salmon on many coastal creeks, and for the endangered winter-run chinook on the upper Sacramento River, where overheated water killed many young fish earlier this year.

Officials say the fall run on the Mokelumne and other Central Valley rivers -- the biggest such run in the state -- is doing better because of abundant food sources in the ocean the past three years and because of effective human intervention: operating hatcheries, trucking young hatchery fish out of shallow, drought-starved rivers, and delicately balancing the flow of water between people and fish.

The fall run is the main producer of salmon caught off the California coast and a foundation for the state's \$1.4 billion annual commercial salmon industry.

"We are relieved to have these returns in a very challenging year," said Michelle Workman, supervising fisheries and wildlife biologist for the East Bay Municipal Utility District, which relies on the Mokelumne River as its main water source.

As Workman walked by the river recently, 2- and 3-foot-long salmon shot through the green, tree-lined waters below EBMUD's Camanche Reservoir some 35 miles east of Lodi.

Some salmon slapped the water with their tails and dug out gravel burrows to lay eggs. Others leapt out of the water in a flurry of spray before swimming into a channel leading to the hatchery, where they will be killed -- adult salmon die shortly after spawning in any case -- and their eggs harvested to rear baby fish.

The scene of plentiful salmon returning is playing out on several other rivers, including the American near Sacramento, where nearly 8,000 salmon -- more than average -- have swum into the federal Nimbus Hatchery.

More than 16,000 salmon, also above average, have traveled up the Feather River to a hatchery below Oroville Reservoir north of Sacramento.

"Our hatchery managers are pleasantly surprised by the returns," said Andrew Hughan, a spokesman for the California Department of Fish and Wildlife, which operates nine salmon hatcheries. "We are going to get as many fish as we need this year."

Dam and hatchery operators in California have taken unusual measures in the drought to protect salmon competing with 38 million state residents for limited water supplies.

Officials have installed water-chilling equipment at hatcheries, released pulses of cold water behind dams, and reared baby fish longer in hatcheries than before.

They also have stepped up efforts to truck young hatchery-reared salmon for release in the Sacramento-San Joaquin Delta or San Francisco Bay. The giant taxi service moves salmon past meager drought-stricken rivers and streams, where fish can be overheated to death or picked off by predators.

East Bay water officials, in particular, took trucking to new heights this year, garnering praise from commercial salmon fishermen.

"We want to boost salmon's natural production in the river," said Workman. "There is no doubt the drought has provided a learning experience for those of us trying to protect fish."

John McManus, the Golden Gate Salmon Association's executive director, praised EBMUD for giving a lift to the naturally spawned fish, even though he says it's too early to say what the long-term effect will be.

"They are regarded as the most progressive and most willing to experiment," McManus said.

EBMUD, as well as other California water suppliers, have practical reasons for acting to protect fish: Their water supplies can be slashed if salmon or other fish do poorly.

State and federal environmental regulators have broad authority to limit pumping water from rivers and the Delta, and have faced criticism from environmentalists who say too much water has been diverted to people and farms at the expense of fish.

"When you have many fall-run salmon returning, it masks the extent of the problem because most of the fish coming back are hatchery fish," said Jon Rosenfield, a scientist with the Bay Institute.

He contends drought is not the real problem but rather too much water being taken for farms and cities. "Salmon are amazingly resilient fish that can bounce back from extremes like drought, but the problem is our response to the drought."

Inadequate flows of cold enough water hurt survival of young winter-run salmon this spring on the Upper Sacramento River, with many of the endangered juveniles dying out, the National Marine Fisheries Service reported in October.

For their part, East Bay water officials said they made two big sacrifices this year to protect salmon.

The district dedicated some of its emergency purchase of Sacramento River water to river flows for fish.

Then, to save cold water in the lower depths of its Pardee Reservoir for salmon, the district this summer pumped poorer-tasting water with algae from the upper reservoir to people in the East Bay. Many customers complained about the taste, but district officials said they needed to save the cool water to be released in fall to attract the salmon.

Some customers say the East Bay district is aggravating water shortages for people by giving away so much to the fish.

EBMUD officials said their water supplies for homes and businesses could be slashed by state and federal environmental regulators unless adequate measures are taken to help the fish.

This year as before, the water district used a motion-activated camera to count and inspect every salmon on the run to gauge whether measures to help them are working.

"We have to protect the fish," said district spokeswoman Nelsey Rodriguez. "If the salmon on the Mokelumne River are not healthy, it jeopardizes our entire water supply."

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Rocky basin to soon be transformed into nursery for Mokolumne salmon

By Rich Hanner/News-Sentinel Editor | Posted: Friday, August 28, 2015 11:33 pm

With heavy equipment and plenty of TLC, a nursery was completed Friday on the banks of the Mokolumne River.

Right now, the nursery is merely a basin covered with stone baking in the sun.

But when the rains come and the river rises, it will be a haven for young salmon.

Known as fry, the little ones will be able to dart into the nursery and escape predator fishes, which are too big to enter. In their nursery, the young fish will cavort in safety and feast on an assortment of insect larvae.

Creating the piscine nursery below Camanche Dam is part of ongoing fishery improvements coordinated by the East Bay Municipal Utility District. The work started Aug. 17 and was finished Friday afternoon. The basin is part of the day use recreation area off McIntire Road managed by the utility.

Officially known as the juvenile salmon habitat, the nursery covers two-tenths of an acre and was excavated by workers from Ford Construction Co. During the rainy season, a side channel from the river will spill into the basin.

According to Jose Sekta, manager of EBMUD's fisheries and wildlife division, the size, shape and location of the nursery was carefully designed so it will allow wee salmon in, but not bigger predatory fish, such as largemouth bass and pikeminnow, that would like to devour them.

Grasses and other vegetation will grow in the basin, attracting insects, including mayflies and dragonflies, whose larvae will nourish the young Chinook.

It's hoped the protection of the nursery will allow the fry to grow into smolt, the fish version of teens, before they head off downriver and, eventually, into the Pacific.

"The bigger they are when they start that journey, the better," said Robyn Bilski, fisheries biologist



Rocky basin to soon be transformed into nursery for Mokolumne salmon

Michelle Workman, supervising fisheries biologist for the East Bay Municipal Utility District, helped design and oversee construction of a basin that will provide a refuge for young salmon in the Mokolumne River. The project was finished Friday afternoon.

for EBMUD. “There are lots of things along the way that want to eat them.”

A benefit of digging out the basin: Tons of gravel that have been placed into a nearby shallows area.

The gravel was sorted to provide a mixture of rocks varying from 1/4 inch to 4 inches across, just the right mix for spawning salmon.

Like ice placed in a glass of water, the gravel will incrementally raise the level of the river. That’s going to allow water to flow into salmon-friendly nooks and crannies that would otherwise be dry or inaccessible, said Michelle Workman, the utility’s supervising fisheries biologist.

Some of the gravel was placed and contoured to speed velocity of water moving through the river. That’s because salmon like fast-moving water, which carries oxygen and cleanses the salmon nests, known as redds.

In total, the project cost \$125,000, paid for by EBMUD and a grant from the U.S. Fish and Wildlife Service.

Such projects have helped make the Mokelumne more attractive to salmon, which has seen record number of fish in recent years, with the peak of 18,000 in 2011. Reconstruction of the Woodbridge Dam has played a role in that resurgence, with modern ladders and spillways that allow the fish to swim around or over the edifice.

Why all the fuss over salmon? The salmon population reflects the general health of the river, said Workman, and the fish hatched on the Mokelumne are part of a sizable commercial and recreational fishing industry.

EBMUD’s biologists chart the Mokelumne’s salmon population carefully. In coming seasons, they’ll be checking to see how of a difference the gravel work and new nursery have made.

http://www.calaverasenterprise.com/news/article_d8e8b12a-adb9-11e5-acab-ef2622cd483e.html

HOT

Salmon run in bountiful numbers on the Moke River

Survival of the next generation still an open question

Dana Nichols Dec 28, 2015



Courtesy photo

A camera at Woodbridge Dam captures the returning salmon swimming upstream to spawn.

Here's a little good news amid the gloom cast by drought over the last four years: Salmon are again returning to spawn in record numbers on the Mokelumne River.

Biologists for the East Bay Municipal Utility District report that 12,451 adult salmon had returned to the Mokelumne River above Woodbridge as of Dec. 21. That's significantly more than the 8,000 average for the date over the past 70 years and the fifth highest count since dams closed off the upper reaches of the river decades ago, said Tracie Morales-Noisy, a spokeswoman for EBMUD.

"It is a relief to have such a return in such a challenging year," Morales-Noisy said. "We

are seeing these salmon defy the drought with a little bit of help.”



Biologists who monitor the Stanislaus River are also reporting a strong fall salmon run there.

But the large numbers returning to spawn don't necessarily mean all is well. After four years of drought, water supplies are depleted on the Stanislaus and many other California rivers. Because of that, water temperatures are higher than in past years and very few, if any, of the next generation of Stanislaus River salmon are expected to hatch, grow and return to the ocean.

Things are even worse for the state's winter run salmon. Their eggs hatch in the summer. The National Marine Fisheries Service reported in October that 95 percent of the winter run juvenile salmon hatched last summer in the Sacramento River had died. The Sacramento is home to the state's last wild winter run salmon.

Morales-Noisy said that managing water temperatures for fall run salmon on the Mokelumne River has also “been a challenge.” She said that this fall, agencies were able to cooperate to retain enough water behind dams so that the water could be released to keep water temperatures in a salmon-friendly temperature range on the Mokelumne.

She noted that her agency also cooperates with state and federal authorities on a number

of other programs to help the salmon survive.

The fall salmon run on the Mokelumne can't be considered entirely wild because about 60 percent of them are captured at a hatchery below Camanche Dam. There, their eggs are harvested and kept hatchery tanks until they hatch.

Once the juvenile salmon are large enough in the spring, they are trucked to a location on the west side of the San Joaquin River Delta to get them past hungry bass and other dangers that would otherwise kill many of them before they reach the ocean.

Of course heavy rain and snowfall this winter could improve the odds for the next generation of salmon by providing plenty of water before they need it in the spring. Right now, National Weather Service forecasters say the odds are in favor of above-average rainfall in late winter and spring.

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Dana Nichols

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HOT

This year, even wild salmon hitch a ride

Dana Nichols May 29, 2015



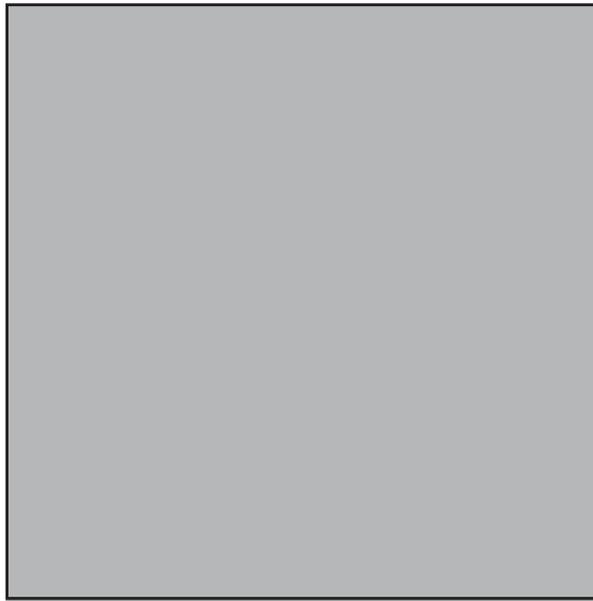
Photo courtesy of East Bay Municipal Utility District

Fisheries and Wildlife technician Edward Rible, left, and biologist Robyn Bilski, watch as 3,000 juvenile salmon are released into a net pen at Sherman Island.

Drought raises efforts to maintain Moke River salmon

It isn't new for adolescent salmon spawned on the Mokelumne River to hitch a truck ride toward the ocean. But this year's severe drought has prompted East Bay Municipal Utility District officials to give the ride to as many fish as possible, both wild and hatchery-raised.

And the wild fish, captured at Woodbridge before they get into the slow, hot, predator-infested sections of the lower river, this year for the first time are taking a detour to the hatchery to have small electronic tags implanted in them.



After that, they go for a brief stay in a net pen near Sherman Island in the San Joaquin River Delta. Then, after adjusting for a spell, they are released as an outgoing tide gives them the maximum chance to find their way through the Golden Gate to the Pacific without being gobbled by bass.

“We want to assess if this methodology is effective,” EBMUD fisheries manager Jose Setka said of the expanded use of the trucks and fish pens. “If we get decent survival, this is something we might want to consider doing not only in critically dry years, but in dry years as well.”

EBMUD has been taking various steps to boost salmon survival under a 1998 agreement with state and federal agencies. That agreement classifies years according to the amount of water in the river. This year is classified as “critically dry,” and is the first such critically dry year since the agreement went into effect.

“It is about as dry as we can get,” Setka said.

EBMUD crews have been doing weekly releases of the tagged wild salmon since early May. He estimated that about 30,000 of the fish will have been released by the time the final truckload swims out next week. This week, a batch was released from the pens near Sherman Island on Wednesday afternoon.

Setka said a 2 percent survival rate – meaning the juveniles return as adults in a few years to spawn in the Mokelumne – would be a great success. He said a 1 percent survival rate is more likely.

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Dana Nichols

APPENDIX B

TEMPORARY FLOW DEVIATIONS BELOW WOODBRIDGE DAM

Table B-1: Flow Below Woodbridge Dam February 20, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
2/20/15 16:45	15 Minute	cfs	Dry	121	80
2/20/15 17:00	15 Minute	cfs	Dry	74	80
2/20/15 17:15	15 Minute	cfs	Dry	47	80
2/20/15 17:30	15 Minute	cfs	Dry	59	80
2/20/15 17:45	15 Minute	cfs	Dry	87	80

1 The daily value for 2/20/2015 is 151 cfs.

2 The 2/20/2015 flow deviation occurred as a result of dry, low flow conditions when WID was refilling Lodi Lake after fish screen cleaning and annual canal maintenance.

Table B-2: Flow Below Woodbridge Dam March 2, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
3/2/15 9:00	15 Minute	cfs	Dry	91	80
3/2/15 9:15	15 Minute	cfs	Dry	63	80
3/2/15 9:30	15 Minute	cfs	Dry	52	80
3/2/15 9:45	15 Minute	cfs	Dry	51	80
3/2/15 10:00	15 Minute	cfs	Dry	55	80
3/2/15 10:15	15 Minute	cfs	Dry	61	80
3/2/15 10:30	15 Minute	cfs	Dry	72	80
3/2/15 10:45	15 Minute	cfs	Dry	83	80

1 The daily value for 3/2/2015 is 95 cfs.

2 The 3/2/2015 flow deviation occurred as a result of dry, low flow conditions when WID was refilling Lodi Lake after fish screen cleaning and annual canal maintenance.

Table B-3: Flow Below Woodbridge Dam March 5, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
3/5/15 13:30	15 Minute	cfs	Dry	83	80
3/5/15 13:45	15 Minute	cfs	Dry	74	80
3/5/15 14:00	15 Minute	cfs	Dry	71	80
3/5/15 14:15	15 Minute	cfs	Dry	71	80
3/5/15 14:30	15 Minute	cfs	Dry	71	80
3/5/15 14:45	15 Minute	cfs	Dry	72	80
3/5/15 15:00	15 Minute	cfs	Dry	74	80

3/5/15 15:15	15 Minute	cfs	Dry	76	80
3/5/15 15:30	15 Minute	cfs	Dry	77	80
3/5/15 15:45	15 Minute	cfs	Dry	82	80

1 The daily value for 3/5/2015 is 90 cfs.

2 The 3/5/2015 flow deviation occurred as a result of dry, low flow conditions when WID was refilling Lodi Lake after fish screen cleaning and annual canal maintenance.

Table B-4: Flow Below Woodbridge Dam April 22, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
4/22/15 12:00	15 Minute	cfs	Critically Dry	79	75
4/22/15 12:15	15 Minute	cfs	Critically Dry	79	75
4/22/15 12:30	15 Minute	cfs	Critically Dry	78	75
4/22/15 12:45	15 Minute	cfs	Critically Dry	77	75
4/22/15 13:00	15 Minute	cfs	Critically Dry	76	75
4/22/15 13:15	15 Minute	cfs	Critically Dry	69	75
4/22/15 13:30	15 Minute	cfs	Critically Dry	66	75
4/22/15 13:45	15 Minute	cfs	Critically Dry	62	75
4/22/15 14:00	15 Minute	cfs	Critically Dry	56	75
4/22/15 14:15	15 Minute	cfs	Critically Dry	52	75
4/22/15 14:30	15 Minute	cfs	Critically Dry	49	75
4/22/15 14:45	15 Minute	cfs	Critically Dry	44	75
4/22/15 15:00	15 Minute	cfs	Critically Dry	41	75
4/22/15 15:15	15 Minute	cfs	Critically Dry	40	75
4/22/15 15:30	15 Minute	cfs	Critically Dry	37	75
4/22/15 15:45	15 Minute	cfs	Critically Dry	36	75
4/22/15 16:00	15 Minute	cfs	Critically Dry	36	75
4/22/15 16:15	15 Minute	cfs	Critically Dry	60	75
4/22/15 16:30	15 Minute	cfs	Critically Dry	86	75

1 The daily value for 4/22/2015 is 75 cfs.

2 The 4/22/2015 flow deviation occurred when the measurement sensor was switched to a new bubbler line with a deeper tip for low flow conditions. WID's sensor, used to regulate flow over the dam, ties directly into EBMUD's gas line; when the bubbler line was switched, WID's system showed a gage height increase due to extra pressure from the deeper bubbler tip. The WID bladder dam responded to the artificially high gage height by reducing flow until WID was able to adjust the gage height offset in its system to match the actual gage height.

Table B-5: Flow Below Woodbridge Dam October 16, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
10/16/15 0:45	15 Minute	cfs	Critically Dry	77	75
10/16/15 1:00	15 Minute	cfs	Critically Dry	59	75
10/16/15 1:15	15 Minute	cfs	Critically Dry	48	75
10/16/15 1:30	15 Minute	cfs	Critically Dry	44	75
10/16/15 1:45	15 Minute	cfs	Critically Dry	41	75
10/16/15 2:00	15 Minute	cfs	Critically Dry	41	75
10/16/15 2:15	15 Minute	cfs	Critically Dry	41	75
10/16/15 2:30	15 Minute	cfs	Critically Dry	41	75
10/16/15 2:45	15 Minute	cfs	Critically Dry	42	75
10/16/15 3:00	15 Minute	cfs	Critically Dry	43	75
10/16/15 3:15	15 Minute	cfs	Critically Dry	44	75
10/16/15 3:30	15 Minute	cfs	Critically Dry	45	75
10/16/15 3:45	15 Minute	cfs	Critically Dry	45	75
10/16/15 4:00	15 Minute	cfs	Critically Dry	46	75
10/16/15 4:15	15 Minute	cfs	Critically Dry	47	75
10/16/15 4:30	15 Minute	cfs	Critically Dry	48	75
10/16/15 4:45	15 Minute	cfs	Critically Dry	49	75
10/16/15 5:00	15 Minute	cfs	Critically Dry	50	75
10/16/15 5:15	15 Minute	cfs	Critically Dry	51	75
10/16/15 5:30	15 Minute	cfs	Critically Dry	52	75
10/16/15 5:45	15 Minute	cfs	Critically Dry	53	75
10/16/15 6:00	15 Minute	cfs	Critically Dry	54	75
10/16/15 6:15	15 Minute	cfs	Critically Dry	54	75
10/16/15 6:30	15 Minute	cfs	Critically Dry	55	75
10/16/15 6:45	15 Minute	cfs	Critically Dry	56	75
10/16/15 7:00	15 Minute	cfs	Critically Dry	59	75
10/16/15 7:15	15 Minute	cfs	Critically Dry	60	75
10/16/15 7:30	15 Minute	cfs	Critically Dry	71	75
10/16/15 7:45	15 Minute	cfs	Critically Dry	107	75

1 The daily value for 10/16/2015 is 85 cfs.

2 The 10/16/2015 flow deviation occurred as a result of operational transitions between a pulse flow event and JSA expected flows as part of adaptive management flow changes at the WID Dam. Flows at the WID Dam were modulated to create numerous pulse flow releases for salmon attraction and up-migration. Through EBMUD coordination with the partnership, this management strategy made efficient use of limited water, which required storage then subsequent release during pulses, and resulted in a very high return of salmon.

Table B-6: Flow Below Woodbridge Dam October 28, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
10/28/15 17:45	15 Minute	cfs	Critically Dry	82	75
10/28/15 18:00	15 Minute	cfs	Critically Dry	71	75
10/28/15 18:15	15 Minute	cfs	Critically Dry	65	75
10/28/15 18:30	15 Minute	cfs	Critically Dry	65	75
10/28/15 18:45	15 Minute	cfs	Critically Dry	68	75
10/28/15 19:00	15 Minute	cfs	Critically Dry	76	75

1 The daily value for 10/28/2015 is 340 cfs.

2 The 10/28/2015 flow deviation occurred as a result of operational transitions between a pulse flow event and JSA expected flows as part of adaptive management flow changes at the WID Dam. Flows at the WID Dam were modulated to create numerous pulse flow releases for salmon attraction and up-migration. Through EBMUD coordination with the partnership, this management strategy made efficient use of limited water, which required storage then subsequent release during pulses, and resulted in a very high return of salmon.

Table B-7: Flow Below Woodbridge Dam December 9, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
12/9/15 18:30	15 Minute	cfs	Critically Dry	89	75
12/9/15 18:45	15 Minute	cfs	Critically Dry	73	75
12/9/15 19:00	15 Minute	cfs	Critically Dry	62	75
12/9/15 19:15	15 Minute	cfs	Critically Dry	54	75
12/9/15 19:30	15 Minute	cfs	Critically Dry	51	75
12/9/15 19:45	15 Minute	cfs	Critically Dry	48	75
12/9/15 20:00	15 Minute	cfs	Critically Dry	48	75
12/9/15 20:15	15 Minute	cfs	Critically Dry	52	75
12/9/15 20:30	15 Minute	cfs	Critically Dry	62	75
12/9/15 20:45	15 Minute	cfs	Critically Dry	72	75
12/9/15 21:00	15 Minute	cfs	Critically Dry	82	75

1 The daily value for 12/9/2015 is 313 cfs.

2 The 12/9/2015 flow deviation occurred as a result of operational transitions between a pulse flow event and JSA expected flows as part of adaptive management flow changes at the WID Dam. Flows at the WID Dam were modulated to create numerous pulse flow releases for salmon attraction and up-migration. Through EBMUD coordination with the partnership, this management strategy made efficient use of limited water, which required storage then subsequent release during pulses, and resulted in a very high return of salmon.

Table B-8: Flow Below Woodbridge Dam December 30, 2015

Reading Date and Time	Interval	Unit	JSA Water Year Type	Golf Gage Measured Flow	JSA Expected Flow (below WID Dam)
12/30/15 15:15	15 Minute	cfs	Critically Dry	87	75
12/30/15 15:30	15 Minute	cfs	Critically Dry	66	75
12/30/15 15:45	15 Minute	cfs	Critically Dry	55	75
12/30/15 16:00	15 Minute	cfs	Critically Dry	50	75
12/30/15 16:15	15 Minute	cfs	Critically Dry	48	75
12/30/15 16:30	15 Minute	cfs	Critically Dry	67	75
12/30/15 16:45	15 Minute	cfs	Critically Dry	106	75

1 The daily value for 12/30/2015 is 118 cfs.

2 The 12/30/2015 flow deviation occurred as a result of operational issues.

APPENDIX C

USGS VERIFIED FLOW DATA FOR 2013 AND 2014

11323500 Mokelumne River below Camanche Dam, CA**DISCHARGE, CUBIC FEET PER SECOND****JANUARY TO DECEMBER 2013****DAILY MEAN VALUES**

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	500	255	300	326	375	267	331	287	290	265	273	256
2	501	255	294	320	385	245	320	284	291	266	256	257
3	501	255	294	311	390	247	320	275	283	267	256	256
4	500	255	272	305	390	246	325	276	276	266	333	255
5	498	256	257	297	392	245	326	275	275	266	374	256
6	498	255	254	297	390	251	325	277	275	265	324	256
7	499	255	255	297	389	265	326	277	276	410	274	255
8	492	254	258	284	390	271	314	277	277	472	256	255
9	489	254	256	275	400	270	306	276	283	381	257	255
10	486	254	256	276	405	272	314	276	290	287	255	255
11	449	254	255	274	406	271	327	276	291	266	255	255
12	334	255	257	275	406	271	331	276	291	267	256	255
13	273	255	259	276	406	270	336	276	292	267	256	255
14	255	255	276	276	399	271	335	276	291	388	257	255
15	255	255	281	276	387	271	326	283	291	434	256	255
16	255	254	279	286	386	263	311	292	290	382	255	255
17	255	256	280	301	380	248	298	290	284	333	255	255
18	255	256	279	314	379	240	292	290	279	281	255	255
19	254	254	272	329	380	237	297	292	281	265	255	255
20	255	370	261	339	381	242	300	291	281	266	256	255
21	255	397	255	341	382	260	301	293	282	355	256	255
22	255	320	256	340	382	263	300	292	281	434	257	255
23	255	268	256	340	382	278	303	293	274	383	255	255
24	255	264	266	341	381	285	301	290	266	334	256	255
25	254	255	263	339	380	286	301	292	249	283	257	255
26	255	255	270	354	380	297	310	292	240	266	257	255
27	256	288	271	360	379	305	315	293	240	265	257	255
28	255	305	270	360	370	317	316	291	241	350	256	255
29	255	---	271	367	365	335	312	293	242	423	255	255
30	255	---	271	376	365	337	299	292	259	372	256	255
31	255	---	308	---	350	---	292	292	---	322	---	255
Total	10,609	7,564	8,352	9,452	11,932	8,126	9,710	8,835	8,261	10,080	7,976	7,911
Mean	342	270	269	315	385	271	313	285	275	325	266	255
Max	501	397	308	376	406	337	336	293	292	472	374	257
Min	254	254	254	274	350	237	292	275	240	265	255	255
Ac-ft	21,040	15,000	16,570	18,750	23,670	16,120	19,260	17,520	16,390	19,990	15,820	15,690

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

Note- October through December data provisional until approved by USGS

11325500 Mokelumne River at Woodbridge, CA**DISCHARGE, CUBIC FEET PER SECOND****JANUARY TO DECEMBER 2013****DAILY MEAN VALUES**

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	453	435	157	203	170	59	42	40	34	112	156	178
2	444	514	159	186	169	41	42	39	40	110	135	172
3	452	276	166	172	169	41	36	37	46	105	151	179
4	443	258	164	234	169	38	36	35	38	107	160	184
5	454	216	174	181	170	38	38	36	32	109	397	183
6	511	209	180	172	169	37	41	38	34	114	273	182
7	471	204	154	177	167	39	45	35	32	116	227	202
8	455	204	159	186	168	37	46	35	32	459	171	185
9	443	202	154	169	168	38	37	33	33	287	171	184
10	443	199	153	168	170	37	34	35	33	181	173	179
11	428	199	157	167	170	36	37	34	33	114	175	181
12	355	198	146	169	171	36	36	34	34	109	168	182
13	259	199	142	167	172	37	37	33	33	110	171	184
14	211	201	128	167	167	37	42	34	34	115	151	183
15	195	184	122	170	167	40	44	34	34	270	135	181
16	196	194	125	167	171	41	48	37	35	197	148	179
17	188	199	128	168	169	73	45	40	33	149	148	179
18	195	194	128	167	182	40	43	38	33	133	164	170
19	191	179	123	167	172	37	32	40	33	107	163	174
20	190	174	183	169	166	36	36	37	34	108	262	176
21	188	137	133	171	164	35	37	37	53	110	235	174
22	189	133	119	171	164	34	40	37	70	419	209	181
23	189	124	118	170	166	34	38	42	56	205	163	178
24	191	135	118	167	165	36	37	36	38	168	147	175
25	187	147	119	168	166	37	37	37	34	149	156	179
26	189	120	121	168	168	35	39	43	34	113	163	174
27	180	150	119	168	170	34	40	37	34	110	270	175
28	193	149	120	169	169	33	47	33	36	116	167	174
29	182	---	121	170	162	37	52	34	42	371	181	179
30	182	---	122	171	165	39	39	34	77	243	177	178
31	212	---	142	---	163	---	42	34	---	204	---	178
Total	9,059	5,733	4,354	5,219	5,218	1,172	1,245	1,128	1,164	5,320	5,567	5,562
Mean	292	205	140	174	168	39	40	36	39	172	186	179
Max	511	514	183	234	182	73	52	43	77	459	397	202
Min	180	120	118	167	162	33	32	33	32	105	135	170
Ac-ft	17,970	11,370	8,640	10,350	10,350	2,320	2,470	2,240	2,310	10,550	11,040	11,030

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	9,010	9,850	11,050

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 22, 2016
9:00 am – 11:00 am**

Attendance: US FWS: Dan Welsh*, Donnie Ratcliff
CDFW: Tina Bartlett*, Mike Healy, Colin Purdy
NMFS: Rhonda Reed
EBMUD: Richard Sykes*, Jose Setka, Michelle Workman, Sean Todaro, Rick Leong
**JSA Steering Committee representatives*

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

1. Water Supply Update: (Sean Todaro) Sean stated that the JSA water year type is “Critically Dry” between October 2015 to March 2016 (based upon combined storage of Pardee and Camanche Reservoirs on Nov. 5, 2015). Sean then reviewed monthly precipitation for Rainfall Year (RY) 2015 (July 2014 – June 2015) that totaled 29.18” for the year. Next Sean reviewed RF 2016 to-date (totaling 23.06” July 1, 2015 through January 10, 2016). Sean presented the water projects for the remaining of RY 2016 and showed that so far this RY, precipitation has been much closer to the long term average. Next Sean presented graphs that represented both the flow from Camanche and Woodbridge Dams and the sequence of attraction pulse flows starting in mid-October that were implemented using 2015 gainshare water. Mokelumne River water temperature data for the time period October 1, 2014 to January 1, 2016 was presented, showing similar pattern as the previous year. Finally, Sean presented runoff projections as of January 10 for end-of-September 2016 storage. At 90% exceedance: annual runoff 500 TAF and September storage 415 TAF; At 50% exceedance: annual runoff 760 TAF and September storage 630 TAF; At 10% exceedance: annual runoff 1,100 TAF and September storage 630 TAF.
2. JSA Gainshare and Flows (Michelle Workman): Michelle provided some additional information on the attraction pulse flows implemented in Fall 2015. Sean stated that, as of January 12, 2016, approximately 7,600 AF of gainshare water was available based upon carryover of gainshare remaining from 2014 plus the gainshare associated with EBMUD’s operation of the Freeport project in 2015. Jose stated that gainshare water would need to be used by November 5, 2016. Partnership Coordinating Committee has discussed strategies using spring and/or fall pulse flows. Mike asked if there was any information on how far downstream the influence of the pulse flows traveled. Michelle did not have specific data, but shared that the first fall pulse in 2015 occurred before any fish were detected in the system and this first pulse did get a response from fish. The Steering Committee also identified the potential importance of gaining some flexibility in flood control releases to maximize benefits for the fishery.
3. 2015 Mokelumne Fisheries Review (Michelle Workman) Michelle explained that her presentation will cover the period from Fall 2014 spawners through the preliminary information on 2015 spawners. Michelle stated that adaptive flow management and utilization of gainshare water was used for the fall attraction flows for Brood Year (BY) 2014 and additional gainshare water in 2015 was used for attraction pulse flows for BY 2015. Pulse flows were also again coordinated with Woodbridge Irrigation District, who augmented flows from Camanche as well as providing independent pulse flows from Woodbridge Dam, Michelle said that the Delta Cross Channel (DCC) was closed 3 times in 2015 to meet Rio Vista water quality standards.

Michelle then stated that the Fall 2014 passage past the WID Dam was 12,117 Chinook salmon, with passage timing that was similar to past years. She reported that the breakdown was 53% adult/47% grilse and 24% were ad-clipped. The 2014 escapement operations included the pulse flows implemented in conjunction with WID. The 2014 O. mykiss (Aug. 2014 – July 2015) escapement number was 152, with 147 being ad-clipped. Michelle then reviewed the results of the 2014 redd

survey – 911 salmon redds (849 is the avg.) and 63 *O. mykiss* redds. Michelle said that 52% of the salmon redds were constructed in the spawning habitat restoration sites.

Michelle proceeded by reporting on the management of cold water in Camanche Reservoir which was made especially difficult due to the drought conditions. Michelle said rather than releasing cold water from Pardee throughout summer to maintain our cold water pool, which is how we have operated historically. This year, a modified release program to conserve Pardee's cold water for use in the fall for chinook spawning was implemented. The rate of cold water released from Pardee was increased closer to fall to re-build the cold water pool in Camanche prior to attraction pulse flows and to meet the needs at the MRFH. Michelle explained that this adjustment in how/when cold water was released from Pardee created taste and odor problems in the East Bay during the summer (because warmer surface water was being sent through the aqueducts to the East Bay service area). Also, this change in the Pardee releases was the result of managing flows for water temperature without power generation being a priority.

Michelle reported that in-river production estimate for BY14 out-migrants was 61,305.

Michelle provided a summary of trap, haul, and coded-wire tagging for 2015. 33,999 juvenile Chinook salmon were caught at the WID bypass trap and transported to the MRFH, CWT and kept at MRFH no more than 6-7 days. They were then released into net pens at Sherman Island for acclimation and released with the outgoing tide.

Michelle continued by providing an update on PIT tag research and development grant-funded project by CDFW and NMFS. A floating fin array monitoring system will be tested on the Mokelumne in March 2016. 20K hatchery Chinook salmon will be PIT tagged for this study. The escapement figure for BY2015 is 12,868, as of January 19th. Michelle said that 9 attraction pulse flows were implemented between October 2015 and January 2016. Michelle explained that the pulses were shifted later in the year in order to not attract fish into the system until poor drought conditions in the spawning grounds improved. Michelle explained that the tradeoff for this adjustment would be a delay in the migration of juveniles out of the system.

Michelle reported that the BY2015 Chinook redd count was 1,354, as of January 12, 2016, with the first redd detected on October 21, 2015. Colin asked if there were plans for additional use of the Freeport facility and Richard said that it would depend on water supply conditions in the coming months.

2015 MRFH Operations (Michelle Workman) Next Michelle reported on hatchery production. BY2014 numbers were 5.2 M eggs taken with 92% survival. Numbers for BY2015 are in progress. Michelle explained that in 2015, 8,200 Chinook salmon entered the hatchery and 7.2 M eggs were taken. 50 *O. mykiss* entered the hatchery (primarily larger, resident fish) and 19K eggs were taken to date, but the season for *O. mykiss* is ongoing. Also, 1M Enhancement fish were reared at the MRFH, BY14 and this year 2M Enhancement fish will be raised. She also said that the barging study will continue in 2016 (2015 was skipped due to bridge repair work on the Mokelumne that limited barge movement). Michelle said that in 2014, 100K Chinook were barged, 100K trucked, and 100K were stream released. She said that Chinook release protocols per release group are expected to be reduced to a window of 2-3 days maximum due to data showing that increased predation occurs as release periods increase. Steelhead releases will be modified as well – instead of just February, it will be spread out over March and April to try to target true smoltification and anadromy in the hatchery steelhead stock.

4. 2015 spawning gravel restoration (Michelle Workman) Michelle reviewed spawning gravel enhancement activities in 2015. She said that one of the primary issues was sourcing suitable gravel because the local gravel source used in the past no longer has gravel suitable for spawning. Michelle said that EBMUD is using a consultant to help identify alternative sources of gravel, both on and off EBMUD property. Enhancement work in 2015 was focused on creating floodplain habitat and placement of 4,201 tons of gravel placed in the river adjacent to the MRDUA.

Donnie Ratcliff shared that AFRP funding for gravel restoration on the lower Mokelumne is secured (\$100,000), although future funding will be scrutinized based upon new CVPIA priorities that may be developed in the near future.

Rhonda Reed suggested that a programmatic Section 7 consultation would be more efficient than the current process of doing this annually for the gravel enhancement projects.

5. 2015 MRFH Coordination Team (CDFW/EBMUD) Jose Setka reviewed the 2015 activities of the HCT. He said that 5 meetings were held during the year, HCT developed goals and objectives, and submitted a recommended implementation strategy to the agencies to review by the Hatchery Policy Team (HPT). Jose also reported that a 2016 goal is to submit the HGMP. Central Valley HCT is focused on broad issues such as marking, tagging and monitoring.
6. Update on Partnership Fund and Lower Mokelumne Stewardship group activities (Rick Leong) Rick stated that the current available balance if the partnership Fund is approximately \$80,000. Rick provided an update on the Heritage Oak Winery streambank stabilization and restoration project that was approved for Partnership Fund monies. He explained that the project has been facing some budget problems and may need to be modified or abandoned. Rick said that if the project were to be modified, the current Partnership Fund monies that were previously committed to the project would become invalid and the project sponsors would be required to submit a new project proposal. Rick was asked if the current funding agreement had an expiration date and he said absolutely. Rick also shared that the 2015 Frank Beeler Watershed Stewardship Award is going to be presented to John Brodie, former watershed coordinator, at the February 18, 2016 meeting of the San Joaquin County Resource Conservation District Board of Directors. Rick said that he is seeking someone to represent the Partnership and make the presentation. He said that he would contact everyone by email with this request.
7. Update DCC Electric Barrier Project (Michelle Workman) Michelle reminded the PSC that this was a USBR proposed project to evaluate the potential use and effectiveness of an electric barrier at the DCC to reduce straying of Mokelumne fish. She said that pre-barrier monitoring has been approved and implementation initiated. Only one fish was captured and tagged as part of this study. Placement of the actual barrier has yet to be approved. NMFS permitting issues that need to be addressed are human safety, Green sturgeon, and marine mammals. EBMUD has also been working with CDFW to acoustically tag adult salmon in the Delta to track movement patterns. In 2015, Michelle said that 34 Chinook salmon were acoustically tagged as part of the CDFW study.
8. Updates from Steering Committee Members (All): The majority of comments from PSC representatives were staffing changes/vacancies. Dan Welsh reported that his new supervisor is Kaylee Allen and Allison Willy is filling in due to Debbie Giglio transitioning into a different position within the FWS. Rhonda reported that Monica Gutierrez will continue to be the NMFS contact for the Partnership. She also reported that a NMFS Restoration Center staff person has been located in the Central Valley and will be a valuable resource. Tina Bartlett shared that Kathy Hill has retired and that Gary Kelly is temporarily filling that position until recruitment can be completed. She said that there is a current Habitat Supervisor vacancy and that a new classification is being developed for use at the hatchery – Scientific Supervisor. Richard Sykes reported that EBMUD has filed a protest with DWR in regards to the California WaterFix project. He said this protest is based upon potential impacts to the Mokelumne fishery. Donnie Ratcliff provided a brief update on the Anadromous Fish Screening Program and that a small diversion pilot project will be implemented with landowner Chris Locke. This pilot will be used to monitor the effectiveness of diversion screens on smaller, single landowner diversions in San Joaquin River tributaries. He said that this program is supported by a Family Water Alliance grant.
9. Meeting Adjournment: The meeting adjourned at 11:35 p.m.

Respectfully submitted by: Rick Leong

APPENDIX E

**NOTIFICATION OF AVAILABILITY FOR SALE
OF SURPLUS MOKELUMNE RIVER WATER**

April 22, 2015

Tina Bartlett
Regional Manager
Department of Fish and Wildlife
1701 Nimbus Road
Rancho Cordova, CA 95670

Dan Welsh
Deputy Field Supervisor
U.S. Fish & Wildlife Service
2800 Cottage Way, Room 2605
Sacramento, CA 95825

Subject: Lack of Availability of Additional Mokelumne River Water

Dear Ms. Bartlett and Mr. Welsh:

The Federal Energy Regulatory Commission's November 27, 1998 Order approved the March 1998 Joint Settlement Agreement (JSA) between the East Bay Municipal Utility District (District) and your agencies. Section F.3 of the JSA provides that the District notify your agencies of the availability of additional Mokelumne River water. Based on the 2015 hydrologic conditions and the District's storage levels, there will be no water that is surplus to the District needs.

Enclosed is a copy of the 2015 Water Supply Availability and Deficiency Report (Report) accepted by the District's Board of Directors at their April 14, 2015 meeting. In low water years, this report provides the basis for the Board's consideration of demand management and/or supplemental supply measures. In other years, this report provides the basis for the Board's determination of sufficient water supply. The 2015 assessment, based on the Department of Water Resources' April 1 projected Mokelumne River runoff (about 20 percent of average), concludes that the District's end of year total system storage will be between 250 and 310 thousand acre-feet. As a result of this low storage level, a customer water use reduction program, coupled with supplemental supplies from the Freeport Project, will be needed this year. Predictably, no flood control releases are anticipated this year. Pursuant to the JSA, the District will provide flow releases to the lower Mokelumne River according to the "critically dry" year water type.

Given the extreme dry conditions, this year the District will seek supplemental supplies from several different entities. The District has a contract with the U.S. Bureau of Reclamation (Bureau) that allows it to take up to 133 TAF of water from the Central Valley Project (CVP) in any single dry year. However, the Bureau has notified the District and other municipal and industrial contractors that their allocations will be reduced to 25 percent of normal unless further reductions are necessary to meet the public health and safety needs of all contractors this year. If the allocations remain at 25 percent, then the allocation for the District would be 33,250 acre-feet. This allocation is insufficient to meet the District's supplemental supply needs, so the District is working to identify potential water transfers to increase its total supplemental supplies.

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Based on the initial supply of 33,250 AF, there will be approximately 6,650 AF of gainsharing water added to the overall supply. To date a total of 4,650 AF has been accumulated as gainshare supply, of which 1,788 AF was used (October – November 2014). With the anticipated addition of the 6,650 AF, total cumulative gainshare supply for the current drought cycle is approximately 11,300 AF. The remaining 9,512 AF gainshare amount available will be added to carry over storage, but shall not affect subsequent water year type determination.

EBMUD staff is working through the Lower Mokelumne Partnership Coordinating Committee to maximize the benefits of the gainsharing water supply for the Lower Mokelumne River. Due to dry conditions the District was not able to implement any adaptive management actions related to reallocation of flows, but did release the 2014 savings of 3,000 AF in October 2014. In August 2015, the Lower Mokelumne River Partnership Coordinating Committee will begin to develop a preliminary recommended release schedule for the gainshare water. The recommendation will be forwarded to your agencies for approval. The final release schedule for gainshare water will be circulated for approval in September or October depending on reservoir temperature and hypolimnion volume. Actual deliveries of additional water supplies will be monitored on a monthly basis, and if there are changes to the water obtained for supplemental supply, the District will adjust the amount of water available for gainsharing and notify your agencies accordingly.

If you have any questions regarding this matter, please contact Priyanka K. Jain, Senior Civil Engineer, at (510) 287-1153 or by email at pjain@ebmud.com.

Sincerely,



Lena L. Tam
Manager of Water Resources Planning

LLT:PKJ:AT:dlb

Enclosure

cc: Richard Sykes, Director of Water & Natural Resources Department
Lower Mokelumne River Partnership Coordinating Committee
Don Ratcliff – USFWS
Mike Healey – CDFW
Monica Guterrez – NMFS



AGENDA NO.
MEETING DATE

12.1. - 12.2.
April 14, 2015

TITLE WATER SUPPLY AVAILABILITY AND DEFICIENCY REPORT 2015

MOTION _____ RESOLUTION _____ ORDINANCE _____

RECOMMENDED ACTION

1. File the Water Supply Availability and Deficiency Report in conformance with Policy 9.03.
2. Declare that the District's water supply is deficient for meeting customer demands in 2015.

SUMMARY

This annual Water Supply Availability and Deficiency Report is prepared and submitted to the Board of Directors as required under District Policy 9.03. This report evaluates the adequacy of the current year's (2015) water supply and assesses the District's ability to reliably meet demands through the year 2040. In low water supply years, this annual report provides the basis for the Board's consideration of possible demand management and/or supplemental supply measures. In years of excess water supply, this report provides the basis for the Board's determination of additional availability of water for use by others. The 2015 assessment concludes that projected runoff and water storage require designating "critically dry" year flows in the lower Mokelumne River under the District's Joint Settlement Agreement (JSA).

DISCUSSION

2015 Water Supply and Demand Assessment

Current year water supply availability is determined by forecasting the amount of water that will be stored in District reservoirs on September 30, which marks the end of the "water year." This forecast is a two-step calculation. First, the amount of total system storage as of September 30 is determined by adding projected runoff amounts to existing storage levels. The second step is the subtraction of anticipated customer demands and the volume of water that must be released from the District's storage reservoirs to meet downstream obligations. These obligations include minimum flows for fishery requirements, use by senior water right holders, and water requirements of other downstream interests. If the projected September 30 total system storage exceeds 500 thousand acre-feet (TAF), the District has sufficient current year water supply. If the sum is less than 500 TAF, the District's water supply is deficient.

Funds Available: N/A		Budget Code:
DEPARTMENT SUBMITTING Water & Natural Resources	DEPARTMENT MANAGER or DIRECTOR Richard G. Sykes	APPROVED General Manager

Contact the Office of the District Secretary with questions about completing or submitting this form.

Water Year 2014 was one of the driest years on record, and the trend has continued in Water Year 2015. Although there was some precipitation in December of 2014 and February 2015, January 2015 was the driest January on record for the Mokelumne area. In addition, warm temperatures throughout early 2015 led to reduced snowpack throughout California. As of April 1, staff projects an end of September total system storage of between 250 and 320 TAF. Since the total system storage is projected to be less than 500 TAF at the end of the current water year (September 30, 2015), the District's water supply for 2015 is deemed to be deficient.

The 2015 water year falls within the "critically dry" category under the terms of the District's JSA, which establishes fishery flow releases by water year type. This determination is based on the Department of Water Resources' April 1 projected Mokelumne River runoff. This low runoff also has consequences for other water rights holders and downstream diverters on the Mokelumne River. Woodbridge Irrigation District will receive only 39 TAF as compared to its normal allocation of 60 TAF, a 35% reduction. There will be no water available for the North San Joaquin Water Conservation District or the Jackson Valley Irrigation District.

2040 Water Supply and Demand Assessment

To assess the adequacy of the District's water supply in 2040, this report evaluates the reliability of the future water supply based on the projected service area planning level of demand. The District's most recent Demand Assessment, completed in 2014, estimates a 2040 planning level of demand of 230 MGD.

District Policy 9.03 defines the Allowable Maximum Level of Demand (AML D) as the maximum demand that the District's existing water supply system can sustain under the three-year Drought Planning Sequence (DPS). The AML D is calculated using the District's water supply planning model and applying the following assumptions:

- The existing supplemental supplies consisting of the District's Central Valley Project contract supply and Bayside Groundwater Phase 1 Project will be available over the three-year period;
- The District-wide water use reduction goal is assumed not to exceed fifteen percent during the DPS;
- Fishery releases to the lower Mokelumne River will be made pursuant to the 1998 JSA between USFWS, CDFG, and EBMUD and approved by FERC and the SWRCB;
- Senior water right holders needs will be satisfied as required by their prior rights and established water rights settlement agreements; and
- All other operational requirements will be met, including the Army Corps of Engineers flood control requirements.

Based on these assumptions, the water supply planning model calculates an AML D of 189 MGD for the year 2040. The 2040 AML D estimate reflects the expectation that senior water rights holders will increase water diversions to the maximum quantities under their entitlements.

The 2040 planning level of demand of 230 MGD exceeds the 2040 AML D estimate of 189 MGD. As a result, without the development of further dry-year supplemental supplies beyond the District's Central Valley Project contract supply and the Bayside Groundwater Phase 1 Project, the District's water supply

Water Supply Availability and Deficiency Report
April 14, 2015
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will not be adequate to meet customer water demands during future severe droughts conditions while maintaining a fifteen percent District-wide water use reduction goal. As discussed in the March 10, 2015 Board Workshop on Long-Term Water Supply, staff are continuing to develop projects that provide future water supply consistent with the 2040 projected level of demand including long-term water transfers, groundwater banking, and desalination.

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