

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

2018 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 2019

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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 (2018), and those that it plans to implement in the current calendar year (2019), 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 2018. EBMUD actions in 2018 were designed to improve water quality, flow regimes, and physical habitat in the lower Mokelumne River area for the benefit of the river’s anadromous and resident fish populations, the riparian zone, associated uplands, and recreational angling. In 1993, EBMUD began voluntarily releasing flows consistent with the Lower Mokelumne River Management Plan (LMRMP), and in March 1996, voluntarily began releasing flows to the lower Mokelumne River consistent with the flow requirements of the then proposed JSA. As part of EBMUD’s implementation of the JSA and FERC Order, EBMUD continues to release flows consistent with the requirements of the JSA.

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

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 2017).

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 2018 calendar year and efforts planned for 2019. Section V contains the appendices.

III. STATUS OF THE LOWER MOKELUMNE RIVER SALMON POPULATION

Through the 1990s and into 2018, 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 17,474 in 2018 was well above the long term average and post-JSA average, and represents the third highest escapement on record for the Mokelumne River (see Table 1 and Figure 1). EBMUD and Woodbridge Irrigation District (WID) continue to work cooperatively in managing operations to maximize the accuracy of monitoring systems.

Table 1: Lower Mokelumne River Fall-Run Chinook Salmon Data, 1989-2018

| Year | Outmigration | | Total Escapement | Hatchery Returns | Natural Spawners | Percent Natural Spawners of Total | Number of Redds |
|------|--------------|---------|------------------|------------------|------------------|-----------------------------------|-----------------|
| | Fry | Smolts | | | | | |
| 1989 | no data | no data | 280 | 81 | 199 | 71 | no data |
| 1990 | See note 3 | 78,179 | 497 | 68 | 429 | 86 | 71 |
| 1991 | See note 3 | 31,025 | 410 | 42 | 368 | 90 | 127 |
| 1992 | See note 3 | 69,993 | 1,645 | 710 | 935 | 57 | 345 |
| 1993 | 11,006 | 172,442 | 3,157 | 2,164 | 993 | 31 | 530 |
| 1994 | 554 | 142,670 | 3,157 | 1,919 | 1,238 | 39 | 777 |
| 1995 | 260,103 | 174,103 | 5,517 | 3,323 | 2,194 | 40 | 888 |
| 1996 | 103,270 | 80,744 | 7,921 | 3,883 | 4,038 | 51 | 929 |
| 1997 | 405,350 | 135,116 | 10,175 | 6,494 | 3,681 | 36 | 1,325 |
| 1998 | 1,336,768 | 511,771 | 7,213 | 3,091 | 4,122 | 57 | 1,116 |
| 1999 | 1,232,958 | 302,481 | 5,333 | 3,150 | 2,183 | 41 | 627 |
| 2000 | 107,134 | 61,391 | 7,423 | 5,450 | 1,973 | 27 | 987 |
| 2001 | 37,754 | 81,580 | 8,035 | 5,728 | 2,307 | 29 | 843 |
| 2002 | 11,791 | 66,132 | 10,753 | 7,913 | 2,840 | 26 | 848 |
| 2003 | 8,297 | 132,174 | 10,239 | 8,117 | 2,122 | 21 | 807 |
| 2004 | 45,467 | 42,187 | 11,944 | 10,356 | 1,588 | 13 | 835 |
| 2005 | 197,390 | 235,484 | 15,969 | 5,563 | 10,406 | 65 | 2,170 |
| 2006 | 1,008,289 | 179,264 | 5,871 | 4,139 | 1,732 | 30 | 755 |
| 2007 | 10,349 | 29,278 | 1,521 | 1,051 | 470 | 31 | 306 |
| 2008 | 1,835 | 16,512 | 412 | 239 | 173 | 42 | 63 |
| 2009 | 960 | 29,654 | 2,233 | 1,553 | 680 | 30 | 248 |
| 2010 | 4,243 | 63,106 | 7,195 | 5,275 | 1,920 | 27 | 314* |
| 2011 | 228,829 | 52,288 | 18,596 | 15,922 | 2,674 | 14 | 564 |
| 2012 | 13,888 | 38,049 | 12,027 | 6,556 | 5,471 | 45 | 1,287 |
| 2013 | 49,102 | 98,488 | 12,265 | 5,170 | 7,095 | 58 | 1,823 |
| 2014 | 15,764 | 154,100 | 12,113 | 8,817 | 3,296 | 27 | 909 |
| 2015 | 12,599 | 48,707 | 12,870 | 8,295 | 4,575 | 36 | 1,357 |
| 2016 | 7,182 | 127,411 | 8,871 | 6,887 | 1,984 | 22 | 405* |
| 2017 | 261,209 | 209,696 | 19,954 | 14,319 | 5,635 | 28 | 1,255 |
| 2018 | 10,569 | 29,548 | 17,474 | 7,280 | 10,194 | 58 | 2,432 |

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

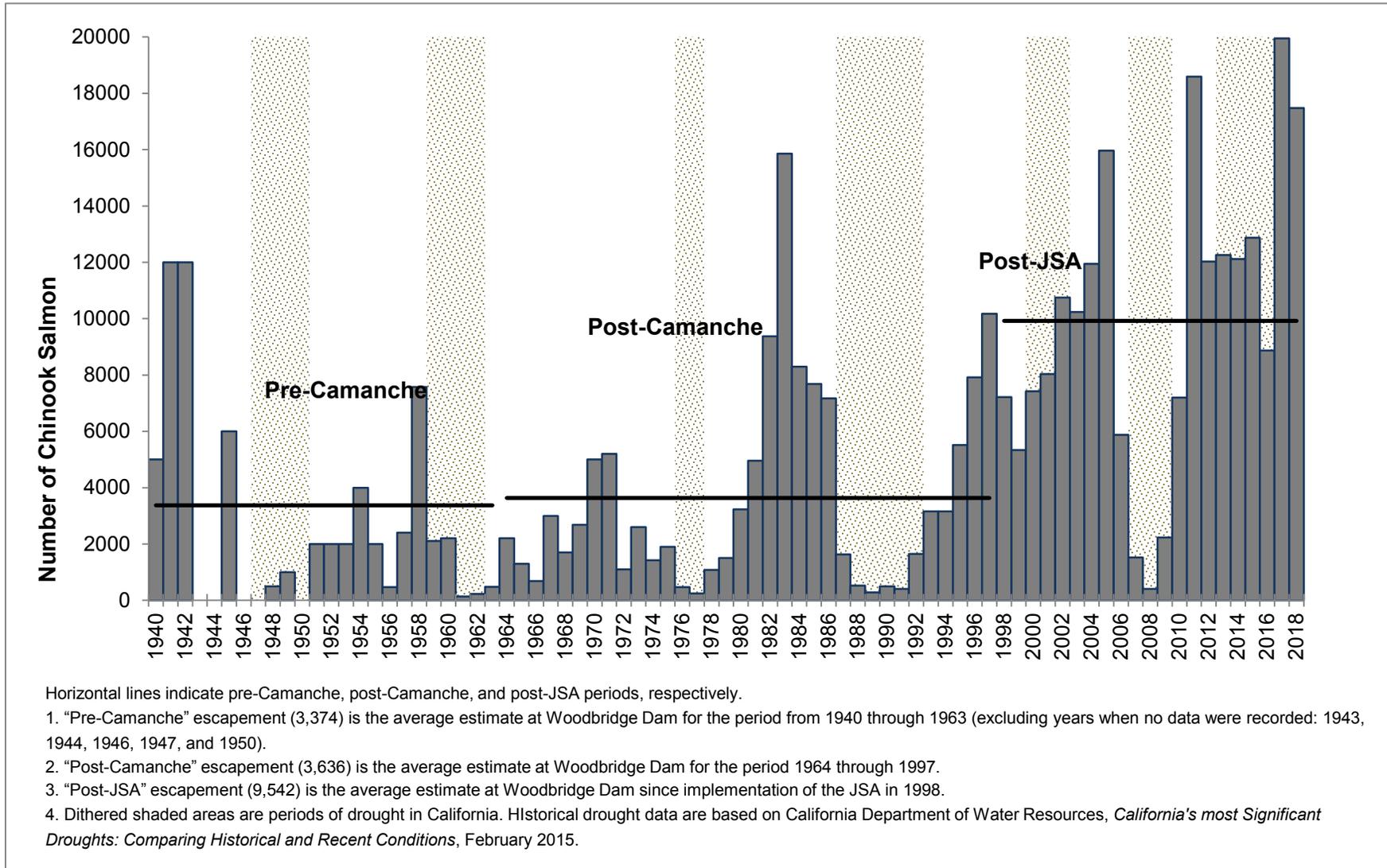


Figure 1: Estimated Annual Spawning Escapement of Fall-Run Chinook Salmon in the Lower Mokelumne River, 1940-2018

Seven of the past eight years have seen run sizes of over 10,000 adult salmon returning to the Mokelumne River, including the highest three returns in order of magnitude in 2011, 2018 and 2017. The continued string of above average returns is indicative of positive response to the adaptive management actions (discussed in later sections) implemented during the 2009-2018 period. Despite having been mired in a multi-year drought and associated flow regimes, along with deteriorating ocean conditions, the lower Mokelumne River Chinook salmon population continues to demonstrate characteristics consistent with long-term sustainability. In fact, the Mokelumne 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 8,939 as of 2016, which represents a higher percentage of attainment than nearly all other Central Valley river populations.

The Mokelumne River Fish Hatchery (MRFH), owned by EBMUD and operated by the California Department of Fish and Wildlife (CDFW), reported that the 2017 salmon return at the MRFH was 14,319 salmon. The 2017 MRFH Annual Operations Plan (AOP) stated that the import ban of eggs originating from other hatcheries would continue for the long-term. In fact, due to the long-term nature of the egg importation ban, EBMUD and CDFW are focused on achieving hatchery production goals through spawning only Mokelumne origin fish returning to MRFH. For recent news articles on the Mokelumne River fisheries, refer to Appendix A.

From October 2018 through January 7, 2019, approximately 10,192 salmon spawned within the river, constructing approximately 2,354 redds (nests) in the 10-mile reach below Camanche Dam (Figure 2). Based on salmon emergence temperature models the peak of fry emergence will occur in late February and be completed by late March 2019. The estimated outmigration of juvenile salmon in 2018 was 40,117.

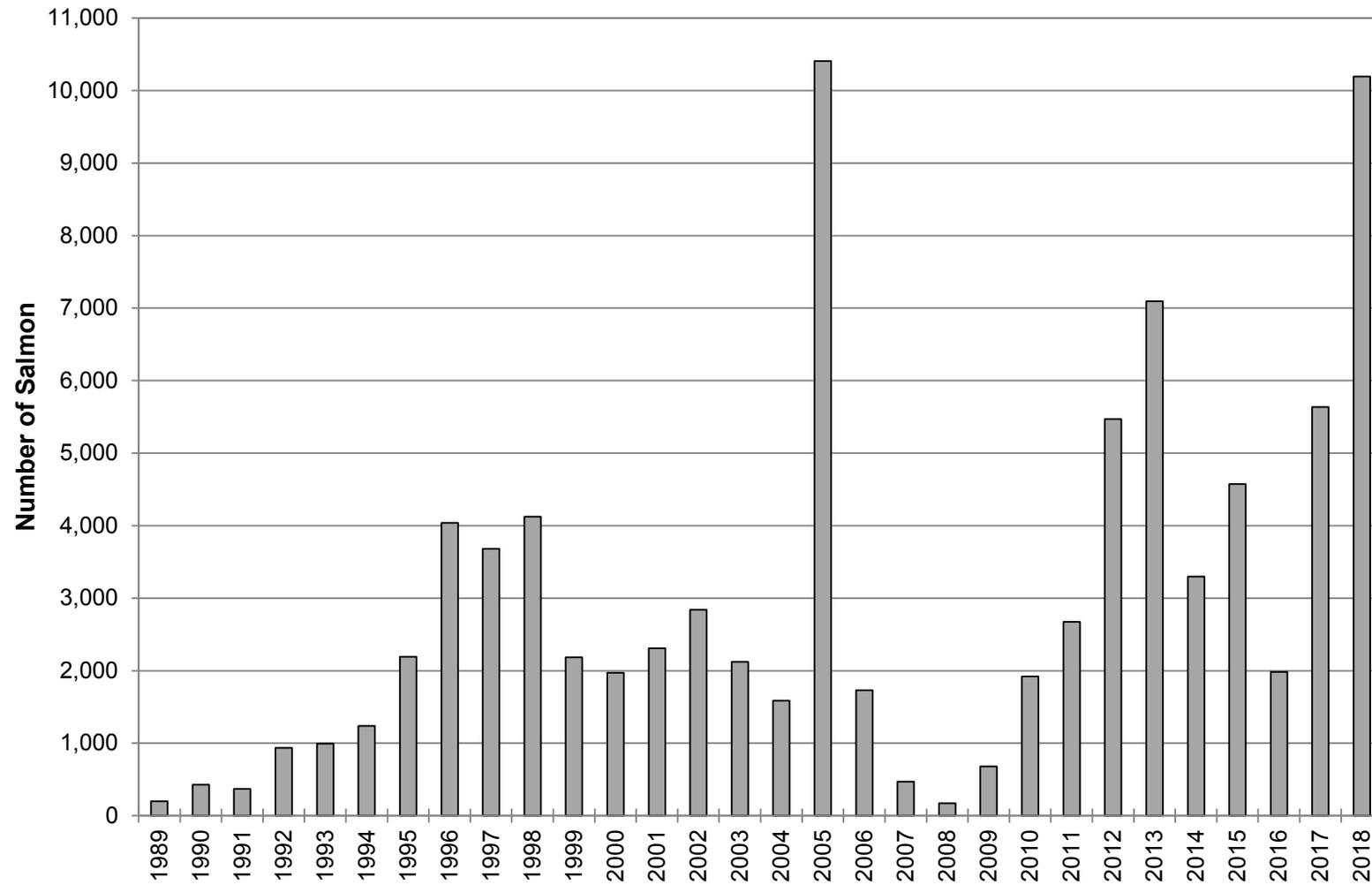


Figure 2: Fall-Run Chinook Salmon Naturally Spawning in the Lower Mokelumne River, 1989-2018

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 2018, and those actions planned for 2019, 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 2018 releases to the lower Mokelumne River are summarized in this section.

EBMUD owns and operates the gaging stations below Woodbridge Dam and below Camanche Dam and measures the flow in accordance with United States Geological Survey (USGS) stream gaging procedures. Releases were measured at Camanche Dam using its Accusonic flow meters. The flow data is verified by USGS staff annually and subsequently published in the USGS Water Data Reports, approximately one to two years later. Because of the delay between the time flow data are collected and the timing of publication in the USGS Water Data Reports, the 2018 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 1641 (D-1641), a decision involving numerous parties throughout the Central Valley. Among other regulatory changes, D-1641 modified water rights on the Mokelumne River, significantly increasing assurances that operations under the JSA will provide the expected flows below Woodbridge Dam. D-1641, which was re-confirmed by the SWRCB's Water Right Order 2000-2 on March 15, 2000, modified the water rights of both EBMUD and the Woodbridge Irrigation District (WID). It conforms EBMUD's water rights to the FERC-approved JSA flow requirements and also requires

WID to curtail its diversions at Woodbridge Dam that exceed its Permanent Regulated Base Supply entitlement released from Camanche Dam under its 1965 Agreement with EBMUD adequately to ensure that the JSA flows are met below Woodbridge Diversion Dam.

2018

In accordance with the November 27, 1998 FERC approval of the JSA, and based upon EBMUD’s end of September forecast of total Pardee and Camanche Reservoir storage on November 5, 2017, EBMUD provided “Normal and Above” JSA water year type Camanche dam flow releases from October 1, 2017 through March 31, 2018. Pardee and Camanche Reservoir actual total storage on November 5, 2017 was 480,020 acre-feet.

Based on the California Department of Water Resources (DWR) April 1, 2018 forecast of 605,000 acre-feet of unimpaired runoff into Pardee Reservoir, EBMUD operated under a “Below Normal” JSA water year type for Camanche Dam flow releases from April 1, 2018 through September 30, 2018. Footnote 5² was in effect April 1, 2018 through June 30, 2018.

EBMUD is making, at a minimum, “Normal and Above” JSA water year type Camanche Dam flow releases from October 1, 2018 through March 31, 2019. This is based on EBMUD’s forecast of total Pardee and Camanche Reservoir storage on November 5, 2018. Actual Pardee and Camanche reservoir storage on November 5, 2018 was 489,440 acre-feet.

As further described in the Adaptive Management and Pulse Flow Operations sections of this report, EBMUD’s 2018 flow operations included close coordination with the Partnership Coordinating Committee (PCC) and EBMUD’s Fisheries and Wildlife Division to utilize necessary flood control releases to provide seven pulses for salmon attraction and the up-migration. Flows at the Woodbridge Dam were also modulated to create two pulse flow releases in mid-November for the salmon attraction and the up-migration. Through EBMUD coordination with the PCC, this management strategy made efficient use of flood control releases. These pulse flows are credited with helping improve the salmon returns to the Mokelumne through reduced straying to other systems.

² Footnote 5 refers to the fifth footnote in Attachment 1 (Below Normal Year Flow Schedule) of JSA, which requires additional releases from Camanche of up to 200 cfs dependent upon combined Pardee and Camanche storage levels in Below Normal year types. This release is in addition to all other required releases to meet downstream obligations.

Calendar year 2018 actual Camanche Dam average daily flow releases and agreed JSA flow releases from Camanche Dam are shown in Table 2 and Figure 3. The average daily flows below Camanche Dam did not fall below the required minimum daily flow.

Calendar year 2018 actual average daily flows and expected JSA flows below Woodbridge Dam are shown in Table 3 and Figure 4. Average daily flows below Woodbridge Dam fell one cfs below minimum daily expected flows on June 26th, 2018. The drop in average daily flow likely resulted from fish ladder maintenance work performed by WID. Given the small magnitude of deviation from the daily expected minimum flows and the deviation occurring at the end of the outmigration, EBMUD's biologists determined that there was no impact to fisheries resources. EBMUD will continue to coordinate with WID to share information and data as it becomes available to make best faith efforts to continue to operate to meet JSA expected daily flows.

In addition to the deviation from minimum daily expected flows, provisional fifteen minute flow readings revealed three temporary excursions from expected minimum flows below Woodbridge dam. The excursions in the fifteen minute data appear to have occurred during WID's routine maintenance operations, such as fish screen cleaning and canal maintenance. These excursions and the deviation, at EBMUD's gaging station, USGS No. 11325500 ("Mokelumne River below Woodbridge Dam") are included in Appendix B (Tables B-1 through B-5) of this report.

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Table 2: Calendar Year 2018 Average Daily Release in Cubic Feet per Second from Camanche Dam

| Date | Actual Camanche Release | JSA Agreed Release | Date | Actual Camanche Release | JSA Agreed Release | Date | Actual Camanche Release | JSA Agreed Release | Date | Actual Camanche Release | JSA Agreed Release | Date | Actual Camanche Release | JSA Agreed Release |
|-----------|-------------------------|--------------------|-----------|-------------------------|--------------------|-----------|-------------------------|--------------------|------------|-------------------------|--------------------|------------|-------------------------|--------------------|
| 1/1/2018 | 325 | 325 | 3/16/2018 | 332 | 325 | 5/29/2018 | 625 | 450 | 8/11/2018 | 366 | 100 | 10/24/2018 | 697 | 325 |
| 1/2/2018 | 336 | 325 | 3/17/2018 | 331 | 325 | 5/30/2018 | 625 | 450 | 8/12/2018 | 366 | 100 | 10/25/2018 | 1197 | 325 |
| 1/3/2018 | 336 | 325 | 3/18/2018 | 329 | 325 | 5/31/2018 | 627 | 450 | 8/13/2018 | 367 | 100 | 10/26/2018 | 1276 | 325 |
| 1/4/2018 | 336 | 325 | 3/19/2018 | 330 | 325 | 6/1/2018 | 564 | 350 | 8/14/2018 | 367 | 100 | 10/27/2018 | 954 | 325 |
| 1/5/2018 | 336 | 325 | 3/20/2018 | 332 | 325 | 6/2/2018 | 532 | 350 | 8/15/2018 | 367 | 100 | 10/28/2018 | 607 | 325 |
| 1/6/2018 | 334 | 325 | 3/21/2018 | 330 | 325 | 6/3/2018 | 539 | 350 | 8/16/2018 | 365 | 100 | 10/29/2018 | 450 | 325 |
| 1/7/2018 | 325 | 325 | 3/22/2018 | 330 | 325 | 6/4/2018 | 746 | 350 | 8/17/2018 | 352 | 100 | 10/30/2018 | 450 | 325 |
| 1/8/2018 | 334 | 325 | 3/23/2018 | 331 | 325 | 6/5/2018 | 1101 | 350 | 8/18/2018 | 342 | 100 | 10/31/2018 | 666 | 325 |
| 1/9/2018 | 325 | 325 | 3/24/2018 | 330 | 325 | 6/6/2018 | 1118 | 350 | 8/19/2018 | 341 | 100 | 11/1/2018 | 975 | 325 |
| 1/10/2018 | 325 | 325 | 3/25/2018 | 330 | 325 | 6/7/2018 | 915 | 350 | 8/20/2018 | 342 | 100 | 11/2/2018 | 876 | 325 |
| 1/11/2018 | 332 | 325 | 3/26/2018 | 330 | 325 | 6/8/2018 | 717 | 350 | 8/21/2018 | 342 | 100 | 11/3/2018 | 596 | 325 |
| 1/12/2018 | 325 | 325 | 3/27/2018 | 330 | 325 | 6/9/2018 | 517 | 350 | 8/22/2018 | 342 | 100 | 11/4/2018 | 349 | 325 |
| 1/13/2018 | 334 | 325 | 3/28/2018 | 330 | 325 | 6/10/2018 | 425 | 350 | 8/23/2018 | 342 | 100 | 11/5/2018 | 350 | 325 |
| 1/14/2018 | 336 | 325 | 3/29/2018 | 329 | 325 | 6/11/2018 | 642 | 350 | 8/24/2018 | 342 | 100 | 11/6/2018 | 350 | 325 |
| 1/15/2018 | 335 | 325 | 3/30/2018 | 329 | 325 | 6/12/2018 | 1032 | 350 | 8/25/2018 | 340 | 100 | 11/7/2018 | 350 | 325 |
| 1/16/2018 | 335 | 325 | 3/31/2018 | 381 | 325 | 6/13/2018 | 1131 | 350 | 8/26/2018 | 341 | 100 | 11/8/2018 | 350 | 325 |
| 1/17/2018 | 380 | 325 | 4/1/2018 | 454 | 450 | 6/14/2018 | 894 | 350 | 8/27/2018 | 341 | 100 | 11/9/2018 | 350 | 325 |
| 1/18/2018 | 401 | 325 | 4/2/2018 | 624 | 450 | 6/15/2018 | 693 | 350 | 8/28/2018 | 341 | 100 | 11/10/2018 | 350 | 325 |
| 1/19/2018 | 401 | 325 | 4/3/2018 | 1107 | 450 | 6/16/2018 | 502 | 350 | 8/29/2018 | 341 | 100 | 11/11/2018 | 350 | 325 |
| 1/20/2018 | 401 | 325 | 4/4/2018 | 1773 | 450 | 6/17/2018 | 425 | 350 | 8/30/2018 | 342 | 100 | 11/12/2018 | 350 | 325 |
| 1/21/2018 | 400 | 325 | 4/5/2018 | 2500 | 450 | 6/18/2018 | 425 | 350 | 8/31/2018 | 341 | 100 | 11/13/2018 | 350 | 325 |
| 1/22/2018 | 401 | 325 | 4/6/2018 | 2501 | 450 | 6/19/2018 | 425 | 350 | 9/1/2018 | 398 | 100 | 11/14/2018 | 350 | 325 |
| 1/23/2018 | 401 | 325 | 4/7/2018 | 2500 | 450 | 6/20/2018 | 425 | 350 | 9/2/2018 | 427 | 100 | 11/15/2018 | 342 | 325 |
| 1/24/2018 | 402 | 325 | 4/8/2018 | 2499 | 450 | 6/21/2018 | 426 | 350 | 9/3/2018 | 427 | 100 | 11/16/2018 | 325 | 325 |
| 1/25/2018 | 402 | 325 | 4/9/2018 | 2365 | 450 | 6/22/2018 | 424 | 350 | 9/4/2018 | 425 | 100 | 11/17/2018 | 335 | 325 |
| 1/26/2018 | 399 | 325 | 4/10/2018 | 2019 | 450 | 6/23/2018 | 438 | 350 | 9/5/2018 | 401 | 100 | 11/18/2018 | 335 | 325 |
| 1/27/2018 | 401 | 325 | 4/11/2018 | 1585 | 450 | 6/24/2018 | 445 | 350 | 9/6/2018 | 351 | 100 | 11/19/2018 | 335 | 325 |
| 1/28/2018 | 400 | 325 | 4/12/2018 | 1219 | 450 | 6/25/2018 | 454 | 350 | 9/7/2018 | 351 | 100 | 11/20/2018 | 335 | 325 |
| 1/29/2018 | 400 | 325 | 4/13/2018 | 819 | 450 | 6/26/2018 | 470 | 350 | 9/8/2018 | 353 | 100 | 11/21/2018 | 335 | 325 |
| 1/30/2018 | 400 | 325 | 4/14/2018 | 541 | 450 | 6/27/2018 | 493 | 350 | 9/9/2018 | 353 | 100 | 11/22/2018 | 335 | 325 |
| 1/31/2018 | 399 | 325 | 4/15/2018 | 499 | 450 | 6/28/2018 | 500 | 350 | 9/10/2018 | 350 | 100 | 11/23/2018 | 335 | 325 |
| 2/1/2018 | 400 | 325 | 4/16/2018 | 500 | 450 | 6/29/2018 | 500 | 350 | 9/11/2018 | 352 | 100 | 11/24/2018 | 335 | 325 |
| 2/2/2018 | 402 | 325 | 4/17/2018 | 500 | 450 | 6/30/2018 | 501 | 350 | 9/12/2018 | 351 | 100 | 11/25/2018 | 335 | 325 |
| 2/3/2018 | 402 | 325 | 4/18/2018 | 499 | 450 | 7/1/2018 | 451 | 100 | 9/13/2018 | 401 | 100 | 11/26/2018 | 335 | 325 |
| 2/4/2018 | 402 | 325 | 4/19/2018 | 500 | 450 | 7/2/2018 | 361 | 100 | 9/14/2018 | 451 | 100 | 11/27/2018 | 335 | 325 |
| 2/5/2018 | 402 | 325 | 4/20/2018 | 500 | 450 | 7/3/2018 | 321 | 100 | 9/15/2018 | 451 | 100 | 11/28/2018 | 335 | 325 |
| 2/6/2018 | 378 | 325 | 4/21/2018 | 499 | 450 | 7/4/2018 | 321 | 100 | 9/16/2018 | 450 | 100 | 11/29/2018 | 335 | 325 |
| 2/7/2018 | 342 | 325 | 4/22/2018 | 500 | 450 | 7/5/2018 | 321 | 100 | 9/17/2018 | 402 | 100 | 11/30/2018 | 336 | 325 |
| 2/8/2018 | 330 | 325 | 4/23/2018 | 500 | 450 | 7/6/2018 | 320 | 100 | 9/18/2018 | 351 | 100 | 12/1/2018 | 339 | 325 |
| 2/9/2018 | 331 | 325 | 4/24/2018 | 500 | 450 | 7/7/2018 | 321 | 100 | 9/19/2018 | 352 | 100 | 12/2/2018 | 340 | 325 |
| 2/10/2018 | 331 | 325 | 4/25/2018 | 500 | 450 | 7/8/2018 | 320 | 100 | 9/20/2018 | 352 | 100 | 12/3/2018 | 339 | 325 |
| 2/11/2018 | 331 | 325 | 4/26/2018 | 498 | 450 | 7/9/2018 | 321 | 100 | 9/21/2018 | 351 | 100 | 12/4/2018 | 339 | 325 |
| 2/12/2018 | 331 | 325 | 4/27/2018 | 500 | 450 | 7/10/2018 | 322 | 100 | 9/22/2018 | 410 | 100 | 12/5/2018 | 339 | 325 |
| 2/13/2018 | 332 | 325 | 4/28/2018 | 502 | 450 | 7/11/2018 | 323 | 100 | 9/23/2018 | 550 | 100 | 12/6/2018 | 339 | 325 |
| 2/14/2018 | 331 | 325 | 4/29/2018 | 500 | 450 | 7/12/2018 | 328 | 100 | 9/24/2018 | 552 | 100 | 12/7/2018 | 339 | 325 |
| 2/15/2018 | 330 | 325 | 4/30/2018 | 588 | 450 | 7/13/2018 | 343 | 100 | 9/25/2018 | 551 | 100 | 12/8/2018 | 339 | 325 |
| 2/16/2018 | 330 | 325 | 5/1/2018 | 699 | 450 | 7/14/2018 | 353 | 100 | 9/26/2018 | 799 | 100 | 12/9/2018 | 339 | 325 |
| 2/17/2018 | 330 | 325 | 5/2/2018 | 699 | 450 | 7/15/2018 | 361 | 100 | 9/27/2018 | 1298 | 100 | 12/10/2018 | 339 | 325 |
| 2/18/2018 | 330 | 325 | 5/3/2018 | 771 | 450 | 7/16/2018 | 365 | 100 | 9/28/2018 | 1549 | 100 | 12/11/2018 | 339 | 325 |
| 2/19/2018 | 330 | 325 | 5/4/2018 | 1150 | 450 | 7/17/2018 | 365 | 100 | 9/29/2018 | 1271 | 100 | 12/12/2018 | 339 | 325 |
| 2/20/2018 | 331 | 325 | 5/5/2018 | 1302 | 450 | 7/18/2018 | 366 | 100 | 9/30/2018 | 1036 | 100 | 12/13/2018 | 339 | 325 |
| 2/21/2018 | 331 | 325 | 5/6/2018 | 1303 | 450 | 7/19/2018 | 368 | 100 | 10/1/2018 | 633 | 325 | 12/14/2018 | 339 | 325 |
| 2/22/2018 | 332 | 325 | 5/7/2018 | 1300 | 450 | 7/20/2018 | 365 | 100 | 10/2/2018 | 450 | 325 | 12/15/2018 | 337 | 325 |
| 2/23/2018 | 333 | 325 | 5/8/2018 | 1300 | 450 | 7/21/2018 | 366 | 100 | 10/3/2018 | 716 | 325 | 12/16/2018 | 335 | 325 |
| 2/24/2018 | 333 | 325 | 5/9/2018 | 1299 | 450 | 7/22/2018 | 365 | 100 | 10/4/2018 | 1264 | 325 | 12/17/2018 | 336 | 325 |
| 2/25/2018 | 333 | 325 | 5/10/2018 | 1298 | 450 | 7/23/2018 | 366 | 100 | 10/5/2018 | 1551 | 325 | 12/18/2018 | 335 | 325 |
| 2/26/2018 | 332 | 325 | 5/11/2018 | 1297 | 450 | 7/24/2018 | 368 | 100 | 10/6/2018 | 1376 | 325 | 12/19/2018 | 335 | 325 |
| 2/27/2018 | 331 | 325 | 5/12/2018 | 1298 | 450 | 7/25/2018 | 365 | 100 | 10/7/2018 | 1043 | 325 | 12/20/2018 | 336 | 325 |
| 2/28/2018 | 332 | 325 | 5/13/2018 | 1297 | 450 | 7/26/2018 | 365 | 100 | 10/8/2018 | 636 | 325 | 12/21/2018 | 336 | 325 |
| 3/1/2018 | 331 | 325 | 5/14/2018 | 1190 | 450 | 7/27/2018 | 366 | 100 | 10/9/2018 | 449 | 325 | 12/22/2018 | 337 | 325 |
| 3/2/2018 | 332 | 325 | 5/15/2018 | 993 | 450 | 7/28/2018 | 366 | 100 | 10/10/2018 | 716 | 325 | 12/23/2018 | 336 | 325 |
| 3/3/2018 | 331 | 325 | 5/16/2018 | 793 | 450 | 7/29/2018 | 367 | 100 | 10/11/2018 | 1265 | 325 | 12/24/2018 | 337 | 325 |
| 3/4/2018 | 330 | 325 | 5/17/2018 | 842 | 450 | 7/30/2018 | 367 | 100 | 10/12/2018 | 1334 | 325 | 12/25/2018 | 337 | 325 |
| 3/5/2018 | 331 | 325 | 5/18/2018 | 1051 | 450 | 7/31/2018 | 365 | 100 | 10/13/2018 | 954 | 325 | 12/26/2018 | 336 | 325 |
| 3/6/2018 | 332 | 325 | 5/19/2018 | 1051 | 450 | 8/1/2018 | 366 | 100 | 10/14/2018 | 605 | 325 | 12/27/2018 | 336 | 325 |
| 3/7/2018 | 341 | 325 | 5/20/2018 | 1058 | 450 | 8/2/2018 | 365 | 100 | 10/15/2018 | 450 | 325 | 12/28/2018 | 337 | 325 |
| 3/8/2018 | 349 | 325 | 5/21/2018 | 862 | 450 | 8/3/2018 | 367 | 100 | 10/16/2018 | 450 | 325 | 12/29/2018 | 336 | 325 |
| 3/9/2018 | 344 | 325 | 5/22/2018 | 693 | 450 | 8/4/2018 | 367 | 100 | 10/17/2018 | 697 | 325 | 12/30/2018 | 335 | 325 |
| 3/10/2018 | 342 | 325 | 5/23/2018 | 627 | 450 | 8/5/2018 | 366 | 100 | 10/18/2018 | 1196 | 325 | 12/31/2018 | 336 | 325 |
| 3/11/2018 | 342 | 325 | 5/24/2018 | 625 | 450 | 8/6/2018 | 366 | 100 | 10/19/2018 | 1275 | 325 | | | |
| 3/12/2018 | 341 | 325 | 5/25/2018 | 625 | 450 | 8/7/2018 | 364 | 100 | 10/20/2018 | 955 | 325 | | | |
| 3/13/2018 | 340 | 325 | 5/26/2018 | 625 | 450 | 8/8/2018 | 365 | 100 | 10/21/2018 | 605 | 325 | | | |
| 3/14/2018 | 333 | 325 | 5/27/2018 | 626 | 450 | 8/9/2018 | 365 | 100 | 10/22/2018 | 449 | 325 | | | |
| 3/15/2018 | 331 | 325 | 5/28/2018 | 625 | 450 | 8/10/2018 | 367 | 100 | 10/23/2018 | 450 | 325 | | | |

1. Flow measured using Accuzonic Flow meter (USGS gage #11323300 - Mokelumne River below Camanche Dam)
2. Actual flow data has not yet been verified and published by the U.S. Geological Survey

1. Releases from Camanche Dam in calendar year 2018 were made according to JSA Below Normal Year Mokelumne River minimum flow schedule, found in Attachment 1 to the JSA. Consistent with Footnote 5 to this Flow Schedule and based on combined Pardee and Camanche storage levels, releases above that otherwise called for by the Schedule were made as follows:
 - a. April and May releases included an additional 200 cfs.
 - b. June releases included an additional 100 cfs.
2. Actual flow data has not yet been verified and published by the U.S. Geological Survey.

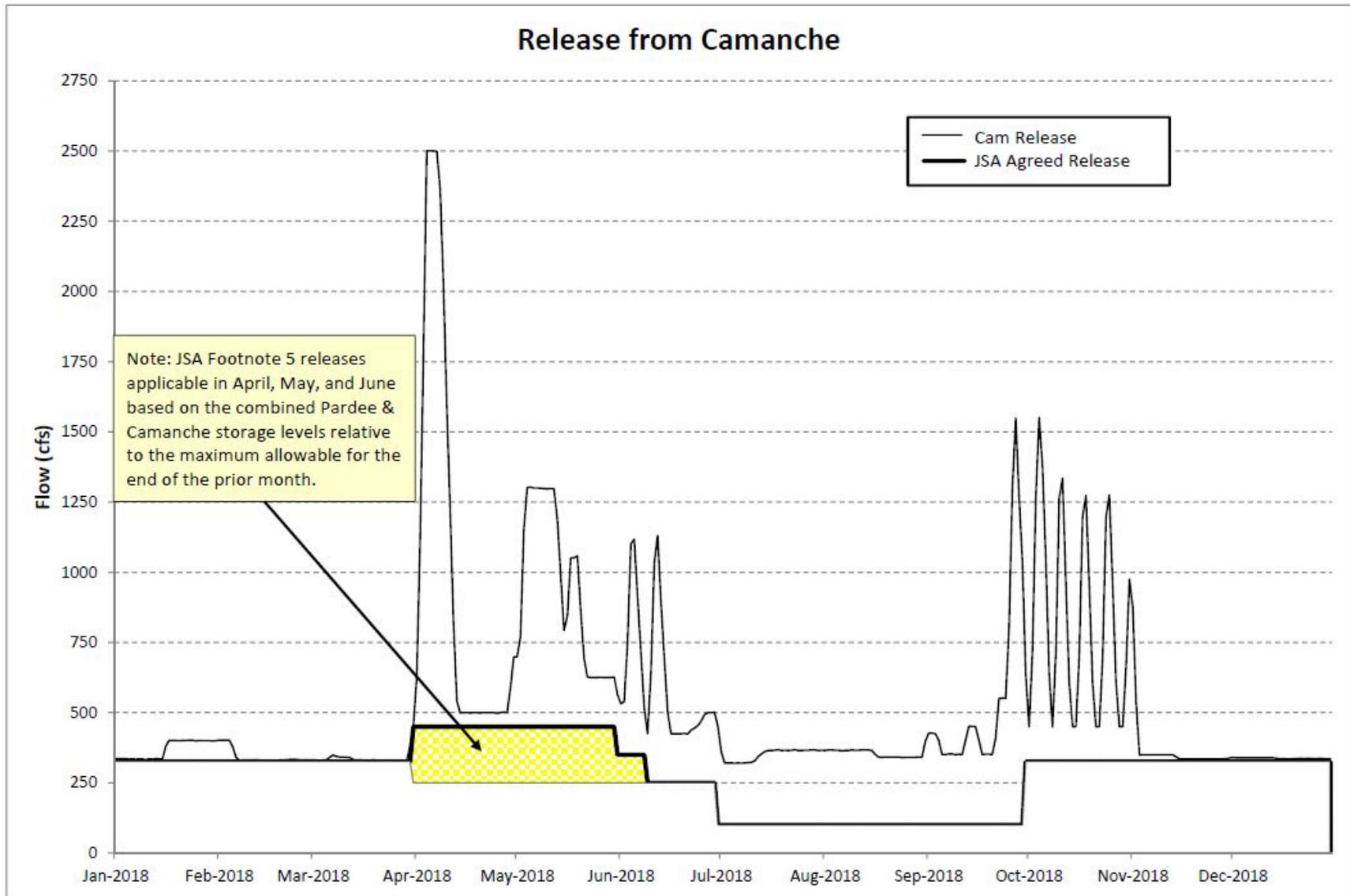


Figure 3: Calendar Year 2018 Average Daily Release in Cubic Feet per Second from Camanche Dam

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Table 3: Calendar Year 2018 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

| Date | Actual Flow | JSA Expected Flow | Date | Actual Flow | JSA Expected Flow | Date | Actual Flow | JSA Expected Flow | Date | Actual Flow | JSA Expected Flow | Date | Actual Flow | JSA Expected Flow |
|-----------|-------------|-------------------|-----------|-------------|-------------------|-----------|-------------|-------------------|------------|-------------|-------------------|------------|-------------|-------------------|
| 1/1/2018 | 297 | 100 | 3/16/2018 | 263 | 100 | 5/29/2018 | 415 | 200 | 8/11/2018 | 59 | 20 | 10/24/2018 | 325 | 100 |
| 1/2/2018 | 295 | 100 | 3/17/2018 | 237 | 100 | 5/30/2018 | 416 | 200 | 8/12/2018 | 59 | 20 | 10/25/2018 | 721 | 100 |
| 1/3/2018 | 294 | 100 | 3/18/2018 | 226 | 100 | 5/31/2018 | 416 | 200 | 8/13/2018 | 60 | 20 | 10/26/2018 | 1090 | 100 |
| 1/4/2018 | 294 | 100 | 3/19/2018 | 223 | 100 | 6/1/2018 | 384 | 200 | 8/14/2018 | 58 | 20 | 10/27/2018 | 922 | 100 |
| 1/5/2018 | 300 | 100 | 3/20/2018 | 243 | 100 | 6/2/2018 | 332 | 200 | 8/15/2018 | 52 | 20 | 10/28/2018 | 626 | 100 |
| 1/6/2018 | 307 | 100 | 3/21/2018 | 244 | 100 | 6/3/2018 | 334 | 200 | 8/16/2018 | 57 | 20 | 10/29/2018 | 342 | 100 |
| 1/7/2018 | 297 | 100 | 3/22/2018 | 332 | 100 | 6/4/2018 | 330 | 200 | 8/17/2018 | 56 | 20 | 10/30/2018 | 297 | 100 |
| 1/8/2018 | 352 | 100 | 3/23/2018 | 367 | 100 | 6/5/2018 | 382 | 200 | 8/18/2018 | 31 | 20 | 10/31/2018 | 326 | 100 |
| 1/9/2018 | 372 | 100 | 3/24/2018 | 258 | 100 | 6/6/2018 | 875 | 200 | 8/19/2018 | 30 | 20 | 11/1/2018 | 653 | 100 |
| 1/10/2018 | 306 | 100 | 3/25/2018 | 240 | 100 | 6/7/2018 | 745 | 200 | 8/20/2018 | 35 | 20 | 11/2/2018 | 801 | 100 |
| 1/11/2018 | 295 | 100 | 3/26/2018 | 233 | 100 | 6/8/2018 | 570 | 200 | 8/21/2018 | 38 | 20 | 11/3/2018 | 581 | 100 |
| 1/12/2018 | 295 | 100 | 3/27/2018 | 227 | 100 | 6/9/2018 | 389 | 200 | 8/22/2018 | 38 | 20 | 11/4/2018 | 283 | 100 |
| 1/13/2018 | 295 | 100 | 3/28/2018 | 230 | 100 | 6/10/2018 | 225 | 200 | 8/23/2018 | 38 | 20 | 11/5/2018 | 243 | 100 |
| 1/14/2018 | 293 | 100 | 3/29/2018 | 226 | 100 | 6/11/2018 | 240 | 200 | 8/24/2018 | 38 | 20 | 11/6/2018 | 378 | 100 |
| 1/15/2018 | 293 | 100 | 3/30/2018 | 222 | 100 | 6/12/2018 | 553 | 200 | 8/25/2018 | 38 | 20 | 11/7/2018 | 196 | 100 |
| 1/16/2018 | 294 | 100 | 3/31/2018 | 225 | 100 | 6/13/2018 | 831 | 200 | 8/26/2018 | 37 | 20 | 11/8/2018 | 176 | 100 |
| 1/17/2018 | 299 | 100 | 4/1/2018 | 321 | 150 | 6/14/2018 | 709 | 200 | 8/27/2018 | 38 | 20 | 11/9/2018 | 252 | 100 |
| 1/18/2018 | 357 | 100 | 4/2/2018 | 341 | 150 | 6/15/2018 | 525 | 200 | 8/28/2018 | 37 | 20 | 11/10/2018 | 257 | 100 |
| 1/19/2018 | 353 | 100 | 4/3/2018 | 691 | 150 | 6/16/2018 | 318 | 200 | 8/29/2018 | 38 | 20 | 11/11/2018 | 263 | 100 |
| 1/20/2018 | 349 | 100 | 4/4/2018 | 1070 | 150 | 6/17/2018 | 214 | 200 | 8/30/2018 | 37 | 20 | 11/12/2018 | 390 | 100 |
| 1/21/2018 | 347 | 100 | 4/5/2018 | 1900 | 150 | 6/18/2018 | 254 | 200 | 8/31/2018 | 37 | 20 | 11/13/2018 | 267 | 100 |
| 1/22/2018 | 355 | 100 | 4/6/2018 | 2260 | 150 | 6/19/2018 | 206 | 200 | 9/1/2018 | 39 | 20 | 11/14/2018 | 178 | 100 |
| 1/23/2018 | 348 | 100 | 4/7/2018 | 2360 | 150 | 6/20/2018 | 206 | 200 | 9/2/2018 | 106 | 20 | 11/15/2018 | 190 | 100 |
| 1/24/2018 | 360 | 100 | 4/8/2018 | 2330 | 150 | 6/21/2018 | 205 | 200 | 9/3/2018 | 121 | 20 | 11/16/2018 | 241 | 100 |
| 1/25/2018 | 361 | 100 | 4/9/2018 | 2310 | 150 | 6/22/2018 | 205 | 200 | 9/4/2018 | 124 | 20 | 11/17/2018 | 238 | 100 |
| 1/26/2018 | 350 | 100 | 4/10/2018 | 2090 | 150 | 6/23/2018 | 207 | 200 | 9/5/2018 | 138 | 20 | 11/18/2018 | 236 | 100 |
| 1/27/2018 | 350 | 100 | 4/11/2018 | 1730 | 150 | 6/24/2018 | 207 | 200 | 9/6/2018 | 68 | 20 | 11/19/2018 | 241 | 100 |
| 1/28/2018 | 346 | 100 | 4/12/2018 | 1350 | 150 | 6/25/2018 | 207 | 200 | 9/7/2018 | 48 | 20 | 11/20/2018 | 246 | 100 |
| 1/29/2018 | 348 | 100 | 4/13/2018 | 994 | 150 | 6/26/2018 | 199 | 200 | 9/8/2018 | 48 | 20 | 11/21/2018 | 356 | 100 |
| 1/30/2018 | 349 | 100 | 4/14/2018 | 650 | 150 | 6/27/2018 | 208 | 200 | 9/9/2018 | 46 | 20 | 11/22/2018 | 237 | 100 |
| 1/31/2018 | 349 | 100 | 4/15/2018 | 513 | 150 | 6/28/2018 | 208 | 200 | 9/10/2018 | 51 | 20 | 11/23/2018 | 282 | 100 |
| 2/1/2018 | 352 | 100 | 4/16/2018 | 503 | 150 | 6/29/2018 | 213 | 200 | 9/11/2018 | 47 | 20 | 11/24/2018 | 294 | 100 |
| 2/2/2018 | 394 | 100 | 4/17/2018 | 477 | 150 | 6/30/2018 | 208 | 200 | 9/12/2018 | 38 | 20 | 11/25/2018 | 251 | 100 |
| 2/3/2018 | 672 | 100 | 4/18/2018 | 463 | 150 | 7/1/2018 | 93 | 20 | 9/13/2018 | 82 | 20 | 11/26/2018 | 243 | 100 |
| 2/4/2018 | 500 | 100 | 4/19/2018 | 453 | 150 | 7/2/2018 | 132 | 20 | 9/14/2018 | 141 | 20 | 11/27/2018 | 251 | 100 |
| 2/5/2018 | 418 | 100 | 4/20/2018 | 447 | 150 | 7/3/2018 | 60 | 20 | 9/15/2018 | 146 | 20 | 11/28/2018 | 222 | 100 |
| 2/6/2018 | 381 | 100 | 4/21/2018 | 444 | 150 | 7/4/2018 | 56 | 20 | 9/16/2018 | 159 | 20 | 11/29/2018 | 435 | 100 |
| 2/7/2018 | 346 | 100 | 4/22/2018 | 437 | 150 | 7/5/2018 | 40 | 20 | 9/17/2018 | 169 | 20 | 11/30/2018 | 273 | 100 |
| 2/8/2018 | 320 | 100 | 4/23/2018 | 433 | 150 | 7/6/2018 | 36 | 20 | 9/18/2018 | 69 | 20 | 12/1/2018 | 283 | 100 |
| 2/9/2018 | 311 | 100 | 4/24/2018 | 427 | 150 | 7/7/2018 | 34 | 20 | 9/19/2018 | 54 | 20 | 12/2/2018 | 271 | 100 |
| 2/10/2018 | 308 | 100 | 4/25/2018 | 403 | 150 | 7/8/2018 | 34 | 20 | 9/20/2018 | 56 | 20 | 12/3/2018 | 273 | 100 |
| 2/11/2018 | 305 | 100 | 4/26/2018 | 403 | 150 | 7/9/2018 | 34 | 20 | 9/21/2018 | 53 | 20 | 12/4/2018 | 275 | 100 |
| 2/12/2018 | 303 | 100 | 4/27/2018 | 384 | 150 | 7/10/2018 | 33 | 20 | 9/22/2018 | 46 | 20 | 12/5/2018 | 282 | 100 |
| 2/13/2018 | 302 | 100 | 4/28/2018 | 381 | 150 | 7/11/2018 | 33 | 20 | 9/23/2018 | 211 | 20 | 12/6/2018 | 280 | 100 |
| 2/14/2018 | 299 | 100 | 4/29/2018 | 376 | 150 | 7/12/2018 | 33 | 20 | 9/24/2018 | 267 | 20 | 12/7/2018 | 281 | 100 |
| 2/15/2018 | 296 | 100 | 4/30/2018 | 395 | 150 | 7/13/2018 | 45 | 20 | 9/25/2018 | 275 | 20 | 12/8/2018 | 278 | 100 |
| 2/16/2018 | 296 | 100 | 5/1/2018 | 440 | 200 | 7/14/2018 | 49 | 20 | 9/26/2018 | 301 | 20 | 12/9/2018 | 283 | 100 |
| 2/17/2018 | 293 | 100 | 5/2/2018 | 530 | 200 | 7/15/2018 | 49 | 20 | 9/27/2018 | 696 | 20 | 12/10/2018 | 279 | 100 |
| 2/18/2018 | 292 | 100 | 5/3/2018 | 501 | 200 | 7/16/2018 | 51 | 20 | 9/28/2018 | 1110 | 20 | 12/11/2018 | 279 | 100 |
| 2/19/2018 | 280 | 100 | 5/4/2018 | 706 | 200 | 7/17/2018 | 50 | 20 | 9/29/2018 | 1170 | 20 | 12/12/2018 | 277 | 100 |
| 2/20/2018 | 287 | 100 | 5/5/2018 | 1000 | 200 | 7/18/2018 | 50 | 20 | 9/30/2018 | 932 | 20 | 12/13/2018 | 273 | 100 |
| 2/21/2018 | 282 | 100 | 5/6/2018 | 1030 | 200 | 7/19/2018 | 50 | 20 | 10/1/2018 | 996 | 100 | 12/14/2018 | 278 | 100 |
| 2/22/2018 | 285 | 100 | 5/7/2018 | 1050 | 200 | 7/20/2018 | 49 | 20 | 10/2/2018 | 270 | 100 | 12/15/2018 | 276 | 100 |
| 2/23/2018 | 290 | 100 | 5/8/2018 | 1050 | 200 | 7/21/2018 | 49 | 20 | 10/3/2018 | 284 | 100 | 12/16/2018 | 308 | 100 |
| 2/24/2018 | 286 | 100 | 5/9/2018 | 1050 | 200 | 7/22/2018 | 50 | 20 | 10/4/2018 | 720 | 100 | 12/17/2018 | 310 | 100 |
| 2/25/2018 | 290 | 100 | 5/10/2018 | 1040 | 200 | 7/23/2018 | 50 | 20 | 10/5/2018 | 1150 | 100 | 12/18/2018 | 279 | 100 |
| 2/26/2018 | 303 | 100 | 5/11/2018 | 1040 | 200 | 7/24/2018 | 50 | 20 | 10/6/2018 | 1210 | 100 | 12/19/2018 | 273 | 100 |
| 2/27/2018 | 302 | 100 | 5/12/2018 | 1030 | 200 | 7/25/2018 | 49 | 20 | 10/7/2018 | 968 | 100 | 12/20/2018 | 277 | 100 |
| 2/28/2018 | 294 | 100 | 5/13/2018 | 1040 | 200 | 7/26/2018 | 49 | 20 | 10/8/2018 | 638 | 100 | 12/21/2018 | 269 | 100 |
| 3/1/2018 | 315 | 100 | 5/14/2018 | 1040 | 200 | 7/27/2018 | 49 | 20 | 10/9/2018 | 317 | 100 | 12/22/2018 | 272 | 100 |
| 3/2/2018 | 300 | 100 | 5/15/2018 | 891 | 200 | 7/28/2018 | 49 | 20 | 10/10/2018 | 304 | 100 | 12/23/2018 | 270 | 100 |
| 3/3/2018 | 123 | 100 | 5/16/2018 | 713 | 200 | 7/29/2018 | 51 | 20 | 10/11/2018 | 723 | 100 | 12/24/2018 | 284 | 100 |
| 3/4/2018 | 146 | 100 | 5/17/2018 | 553 | 200 | 7/30/2018 | 50 | 20 | 10/12/2018 | 1140 | 100 | 12/25/2018 | 348 | 100 |
| 3/5/2018 | 162 | 100 | 5/18/2018 | 791 | 200 | 7/31/2018 | 52 | 20 | 10/13/2018 | 901 | 100 | 12/26/2018 | 273 | 100 |
| 3/6/2018 | 104 | 100 | 5/19/2018 | 820 | 200 | 8/1/2018 | 54 | 20 | 10/14/2018 | 991 | 100 | 12/27/2018 | 268 | 100 |
| 3/7/2018 | 121 | 100 | 5/20/2018 | 831 | 200 | 8/2/2018 | 54 | 20 | 10/15/2018 | 315 | 100 | 12/28/2018 | 274 | 100 |
| 3/8/2018 | 178 | 100 | 5/21/2018 | 784 | 200 | 8/3/2018 | 55 | 20 | 10/16/2018 | 281 | 100 | 12/29/2018 | 274 | 100 |
| 3/9/2018 | 216 | 100 | 5/22/2018 | 537 | 200 | 8/4/2018 | 55 | 20 | 10/17/2018 | 305 | 100 | 12/30/2018 | 268 | 100 |
| 3/10/2018 | 234 | 100 | 5/23/2018 | 440 | 200 | 8/5/2018 | 55 | 20 | 10/18/2018 | 689 | 100 | 12/31/2018 | 271 | 100 |
| 3/11/2018 | 234 | 100 | 5/24/2018 | 421 | 200 | 8/6/2018 | 56 | 20 | 10/19/2018 | 1060 | 100 | | | |
| 3/12/2018 | 234 | 100 | 5/25/2018 | 429 | 200 | 8/7/2018 | 55 | 20 | 10/20/2018 | 892 | 100 | | | |
| 3/13/2018 | 236 | 100 | 5/26/2018 | 425 | 200 | 8/8/2018 | 57 | 20 | 10/21/2018 | 995 | 100 | | | |
| 3/14/2018 | 236 | 100 | 5/27/2018 | 427 | 200 | 8/9/2018 | 59 | 20 | 10/22/2018 | 313 | 100 | | | |
| 3/15/2018 | 269 | 100 | 5/28/2018 | 427 | 200 | 8/10/2018 | 61 | 20 | 10/23/2018 | 282 | 100 | | | |

1. Flow measured at USGS Gage #11329500 - Mokelumne River at Woodbridge
2. Actual flow data has not yet been verified and published by the U.S. Geological Survey

1. The provisional average daily flow for 6/26/2018 is 199 cfs; this deviation is attributed to maintenance work that was being done on the fish ladder.

Given the small magnitude of deviation from the daily expected minimum flows and the deviation occurring at the end of the outmigration, EBMUD's biologists determined that there was no impact to biological resources.

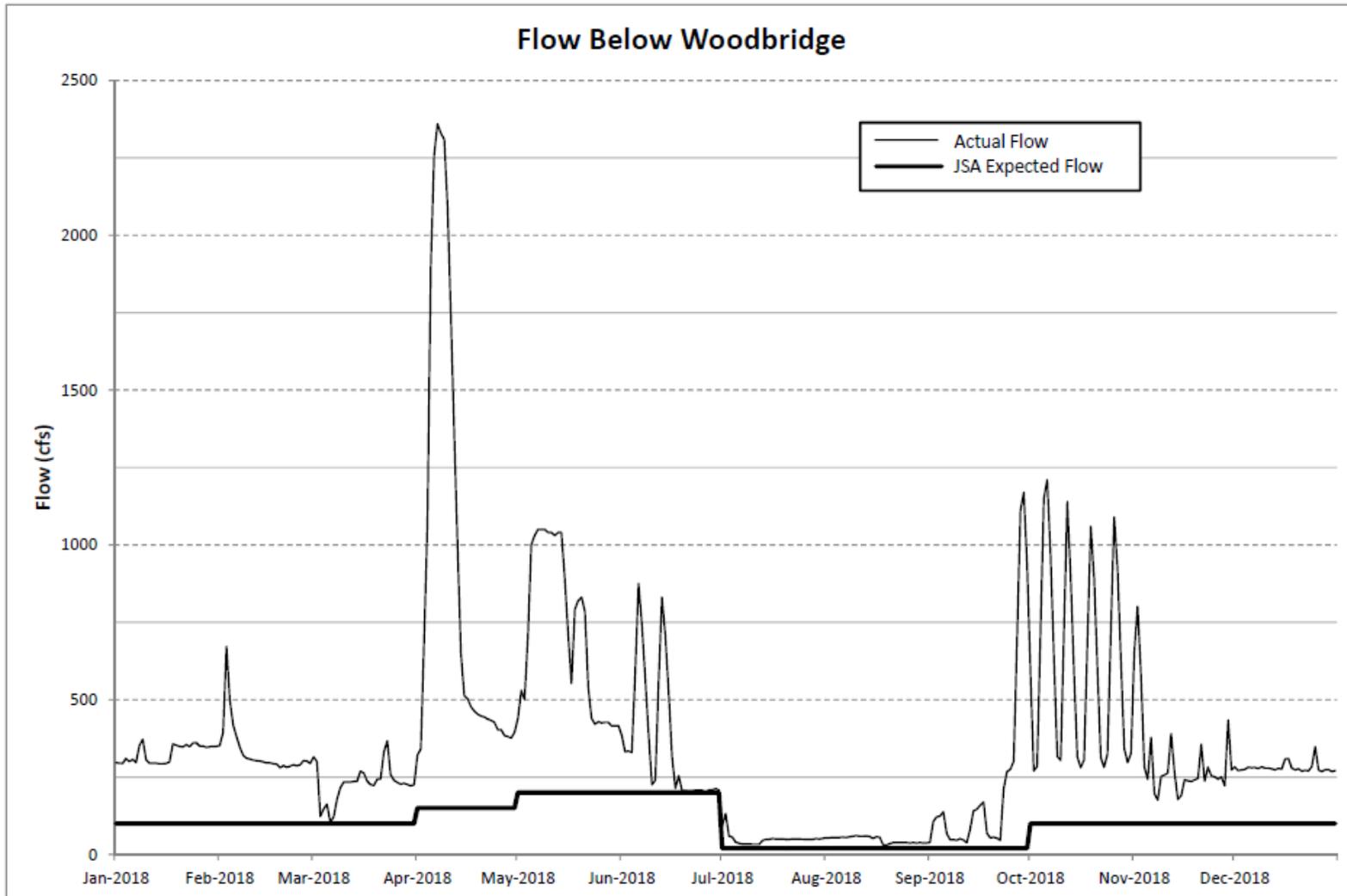


Figure 4: Calendar Year 2018 Average Daily Flow in Cubic Feet per Second below Woodbridge Dam

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 as long as the total quantity of water released in any given year will not be less than the quantity of water provided by the flow requirements for that type of year. In 2018, because conditions were close to normal; EBMUD maintained Camanche releases higher than JSA minimum flows in the spring, summer, and fall, and provided a spring pulse for juvenile migration as well as fall pulse attraction flows in the fall.

Water for 2018 pulse flows came from several sources: (1) 2000 AF of water pursuant to terms of the amended water right Permit 10478, (2) an agreed upon 3-day reduction in Footnote 5 releases at the end of May, and (3) additional releases from Camanche Reservoir to achieve flood control storage target, and (4) North San Joaquin Water Conservation District, a downstream Mokelumne River water user, meeting their required annual environmental flow releases by contributing toward pulse flows per CDFW request. EBMUD coordinated with the Partnership Coordinating Committee (PCC) on all the efforts mentioned above to gain PCC concurrence for the plan.

Pulse Flow Operations

In order to maximize the effectiveness of the fall pulse flows, the PCC 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 2018, DCC gates remained open for the majority of the adult fall chinook up-migration, and were only closed for 3-4 days three times in November, and then closed from November 30th to the end of the year. 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. In 2018, without those more rigorous closures, a high number of stray Mokelumne fish strayed to the American River, but the Mokelumne River fish numbers were also comprised of over 90% Mokelumne origin fish based on preliminary coded wire tag recovery data in the hatchery and the river.

In 2018, EBMUD made water releases from Camanche Dam from September through November to meet fall flood control targets. Projections were made in the summer to determine what amount of water would need to be released. There was close coordination with the PCC and Fisheries and Wildlife Division to manage necessary releases to provide pulse attraction flows. From September to November, six pulses were planned, with the first three pulses with the highest peak of 1,550 cfs, and the remaining pulses with peak flows of 1,450 cfs and 1,050 cfs. The base flow was maintained at 450 cfs

during this time. The original plan for six pulses ended in early November, and WID also provided two operational pulses in mid-November.

Pulse flow release timing was coordinated with the San Joaquin tributary planned releases, with Mokelumne releases slated to occur two weeks ahead of Stanislaus River releases, to minimize straying to the south. The final two pulses in mid-November were developed through collaboration with Woodbridge Irrigation District (WID) on reoperation of Woodbridge Dam elevations to support Chinook salmon and steelhead passage. Each pulse resulted in an increase in salmon numbers entering the Mokelumne River (see Figure 5).

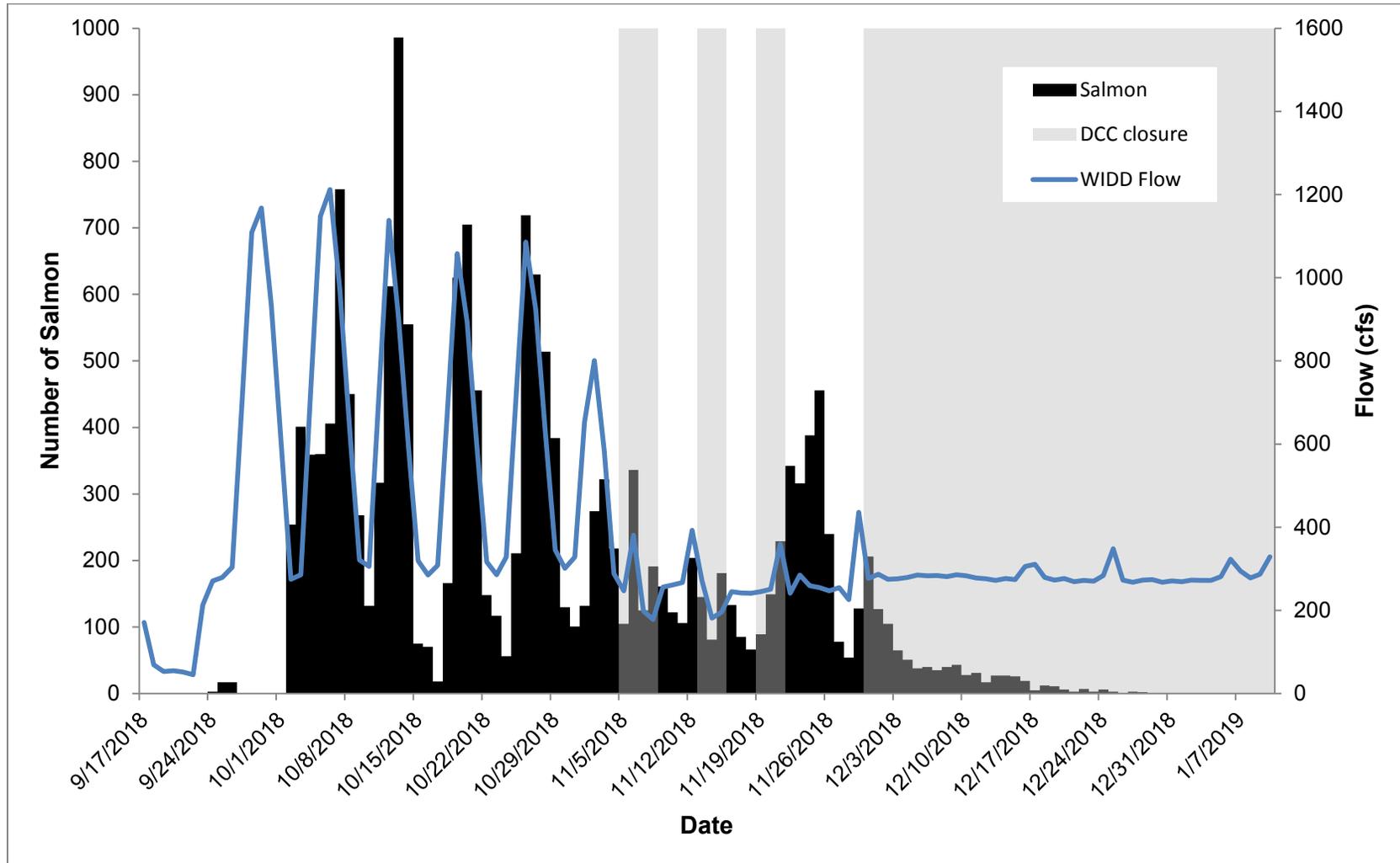


Figure 5: Daily Upstream Passage of Chinook Salmon at Woodbridge Dam Relative to Flow and Delta Cross Channel Closure, October–December 2018

Coded Wire Tag (CWT) return data clearly indicate that release locations for hatchery-reared juvenile salmon play a significant role in straying.³ In 2007, CDFW released nearly the entire MRFH production in the San Pablo Bay region. While this practice may increase overall survival, it significantly increases straying rates. With the elimination of egg transfers the overall impact to Mokelumne returns is significant. In 2018, CDFW continued the practice of releasing production in net pens at Jersey Point, which previous return data indicates leads to less straying and better returns to the Mokelumne. Additionally, the duration of releases was reduced from 5 days in a row to 2 days in a row, which has increased overall survival by reducing predation on later release groups. Overall, these adaptive management efforts will maximize returns to the Mokelumne River while minimizing straying to other systems.

2019

EBMUD is committed, pursuant to the FERC Order, to “Normal and Above” JSA year type Camanche Dam flow releases through March 31, 2019. 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, 2019 DWR Bulletin 120, the JSA water year type which will govern EBMUD’s flow schedule for the period April 1, 2019 through September 30, 2019. EBMUD will report to the FERC in the February 2019 report on the flow releases made in accordance with the JSA during the entire calendar year 2018. EBMUD will include finalized flow data in an Appendix of the report as it is verified and published by USGS. Refer to Appendix C (Tables C-1 through C-4) for finalized flow data for the 2016 and 2017 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

³ M. Palmer-Zwahlen, and B. Kormos. December 2013. Recovery of Coded-Wire Tags from Chinook Salmon in California’s Central Valley Escapement and Ocean Harvest in 2011. California Department of Fish and Wildlife Fisheries Branch Administrative Report 2013-02.

Reservoirs is coordinated to maintain thermal stratification in Camanche Reservoir through October and manage water temperature for native fish in the lower Mokelumne River. The HOS is operated to prevent hydrogen sulfide formation in Camanche Reservoir. (The functions of the HOS system are described in Section IV.B.2 of this report).

1. Reservoir Operations

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

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

1. Maintain stratification in Camanche Reservoir to the extent feasible from May through October to provide cold water releases to the lower Mokelumne River and the MRFH during the fall.
2. Maintain the stratification in Camanche by scheduling inflows of cold water from Pardee Reservoir, as needed, to replenish the hypolimnion of Camanche Reservoir. Releases from Pardee are normally not necessary for temperature management from approximately mid-November to April when Camanche Reservoir is cold and de-stratified.
3. Make best efforts to maintain a minimum of 28,000 acre-feet of hypolimnetic volume in Camanche Reservoir through October whenever Pardee Reservoir volume exceeds 100,000 acre-feet.

2018

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 2018 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam.

From April 1, 2018 through September 30, 2018 EBMUD operated under a “Below Normal” JSA water year type, with surplus releases in excess of the JSA minimum flows. In close coordination with the PCC and consistent with the JSA to adaptively manage its reservoir and use its best efforts to maintain a hypolimnion volume of 28,000 acre-feet in Camanche Reservoir, 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.⁴

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 2018.

2019

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.

⁴ Midnight November 1, 2018 Camanche Reservoir Hypolimnion volume was greater than 28 TAF.

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2018

The HOS was activated from July 11-17, 2018, and again on August 15, 2018 through November 26, 2018. The HOS has effectively prevented hydrogen sulfide formation.

2019

In 2019 EBMUD will continue to operate the HOS to manage the hydrogen sulfide concentrations for the benefit of the Camanche Reservoir, the lower Mokelumne River, and the MRFH.

East Bay Municipal Utility District

HYPLOT V134 Output 01/16/2019

Period 1 Year 01/01/2018 to 01/01/2019

2018

— MCINTIRE Mokelumne River Near 2080.00 1 Day Mean Water Temp (degC) LOGGNET



Figure 6: Calendar Year 2018 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 December 4, 2018. Minutes of the PSC meeting are included in Appendix D. The PSC continued to oversee the operation of the Partnership Coordinating Committee (PCC), the technical group of Partnership representatives that meets biannually to ensure timely implementation of the measures identified in the JSA and the Water Quality and Resource Management Program (WQRMP). The PCC met on April 5, 2018 and October 16, 2018. A total of 42 projects since 1999 have been approved for Partnership funding. See Section IV.C.2 of this report for projects approved for Partnership funding in 2018 and projects with activity in 2018.

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 \$897,359. The available earnings, subtracting the funds that were already obligated to approved projects, were \$152,400 as of December 31, 2018.

Ongoing projects funded by the PSC with activity in 2018 for ecosystem protection and restoration in the lower Mokelumne River are summarized in Table 4 on the following page.

Table 4: Partnership Fund-Supported Projects 2018 Activity Summary

| Project Title | Project Sponsor | Project Description | Partnership Fund | | | Additional Funding | |
|--|---|---|----------------------|--------------------------------|------------------|--------------------|----------------------|
| | | | Date Approved by PSC | Anticipated Project Completion | Amount Obligated | Amount | Program |
| 2012-2014 Watershed Coordinator | San Joaquin County Resource Conservation District | Cost-share to continue support of SJCRCD watershed coordinator position | 4/23/2012 | COMPLETED | \$30,000 | - | - |
| 2017 Upper Mokelumne River Watershed Salmonid Habitat Assessment | Foothill Conservancy | Assessment of potential salmonid habitat upstream of Pardee Reservoir (for possible species reintroduction in future) | 9/6/2017 | COMPLETED | \$35,105 | \$10,000 | Foothill Conservancy |
| 2017-18 Lower Mokelumne River Watershed Education Project – City of Lodi | City of Lodi | Educational field trips for students | 10/10/2017 | COMPLETED | \$9,576 | - | - |
| 2018-19 Lower Mokelumne River Watershed Education Project – City of Lodi | City of Lodi | Educational field trips for students | 9/11/2018 | Spring 2019 | \$6,900 | - | - |

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 2017, 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 2018, 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 PCC. In 2018, the Stewardship Program Steering Committee continued work towards increasing watershed

stewardship awareness among urban landowners along the Mokelumne River and elsewhere in the watershed through the distribution of the updated LMRSP *Mokelumne River Watershed Owner's Manual* and researching grant opportunities that would support the implementation of the Lower Mokelumne River Watershed Stewardship Plan. Additional information on the Stewardship Program, including the watershed owner's manual is available at www.sjcrd.org.

5. Additional EBMUD Stakeholder Activities

2018

In 2018, 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 2018 included the following:

- 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 2018, actions on the AFRP funded habitat restoration project included expanding the floodplain habitat created in 2015 to 0.5 acres, building up floodplain habitat built in 2016 approximately 1 foot in elevation, placing 150 cubic yards of spawning gravel to fill a large pool, and placing 500 cubic feet of spawning gravel in downstream riffle area for long term reach maintenance.
- Participation in the CVPIA Science Integration Team to develop a structured decision making (SDM) model to develop CVPIA funding priorities for FY2018 and ultimately a 5-year plan. Staff are providing accurate empirical physical and biological data into the model to ensure the Mokelumne River is fairly represented in the process, and contributing technical input into the model scenarios to determine priorities.

- Participation in the 20th annual Sandhill Crane Festival in Lodi, CA on November 4-5, 2017. 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 18th annual Central Valley Birding Symposium in Stockton on November 17, 2017. EBMUD staff led field trips on Pardee Reservoir.
- Continuing participation in the Upper Mokelumne River Anadromous Fish Restoration Work Group. The workgroup’s mission statement is to “Reestablish a successfully reproducing population of fall-run Chinook salmon and or central valley steelhead in the upper Mokelumne River.” EBMUD staff is participating in the group to provide technical assistance in developing a plan that is based on sound science and addresses concerns from multiple stakeholders, resource agencies and other local entities. The group has developed a draft pilot project study plan has implemented a fish pathology study with the USFWS. A habitat assessment was completed in the upper watershed by Cramer Fish Sciences (for the Foothill Conservancy) in 2018. Ongoing activities include continued evaluation of issues related to pathology and seeking additional funding.
- Continuing active involvement with the state’s Biologically Integrated Orchard Systems Program (BIOS) in San Joaquin County. BIOS is designed to support local agricultural growers through the use of biological pest control and ecologically friendly (Integrated Pest Management Program) agricultural methods. EBMUD biologists participate as advisors to individual farmers, UC Cooperative Extension specialists, and Natural Resource Conservation Service staff on wildlife issues in San Joaquin County. (1998-present)
- Continuing active involvement with the Lodi-Woodbridge Winegrape Commission (LWWC). The LWWC is designed to support local grape growers through the use of biological pest control and ecologically friendly (Integrated Pest Management Program) agricultural methods. EBMUD biologists participate as advisors to the LWWC, individual farmers, UC Cooperative Extension specialists, and Natural Resource Conservation Service staff on wildlife issues in the lower Mokelumne River watershed. (1998-present)
- Presentations on fish and wildlife issues to local sportsmen’s groups, community groups, local schools, and local fishing and environmental organizations. (Ongoing)
- Periodic participation as docents for the Lodi Parks and Recreation Department by giving presentations, nature tours, and demonstrations on fish and wildlife issues in the lower Mokelumne River. (1998-present)
- Providing continuing technical support to the San Joaquin County Resource Conservation District (SJCRC) and private landowners to enhance anadromous fish habitat in Murphy Creek (a tributary to the lower Mokelumne River).

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- 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.
- Participate in an annual “Kids Fishing Day” at Camanche South Shore (2014-present) Partnering with Camanche Concessionaire staff, local residents and local fishing groups to provide free angling opportunities and instruction to children under 12 years of age.
- Participation in the City of Lodi’s “Watershed Education Legacy” Program which connects Lodi Unified School District students to the Mokelumne River and watershed. (2016-present)
- Participation in the California Department of Water Resources Flood-MAR Research Advisory Committee (RAC) on the Terrestrial and Aquatic Environment Theme Subcommittee. Collaboratively compile recommendations to develop a Research and Data Plan that will be used to develop tools to guide the implementation of Flood-MAR projects. This subcommittee will focus on providing information needed to make decisions about integrating groundwater recharge in the stewardship of California’s wildlife and ecosystems. FloodMAR is an integrated and voluntary resource management strategy that uses flood water resulting from, or in anticipation of, rainfall or snow melt for managed aquifer recharge on agricultural lands and working landscapes, including but not limited to refuges, floodplains, and flood bypasses (<https://water.ca.gov/Programs/All-Programs/Flood-MAR>).

2019

In 2019, 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

2018

On April 24, 2018, the Board of Directors accepted the 2018 Water Supply Availability and Deficiency Report declaring the sufficiency of water to meet customer demands in 2018, and EBMUD notified resources agencies of the availability of surplus water. 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). California Sportfishing Protection Alliance (CSPA), San Joaquin County, the State Water Resources Control Board (SWRCB), and the Federal Energy Regulatory Commission (FERC) are also members of the MRTAC, but do not attend consistently. The MRTAC provides an interactive and proactive forum in which factors affecting lower Mokelumne River aquatic resources are identified, specific scientific investigations are formulated, technical data and analyses are presented and discussed, and agency activities are coordinated to improve the aquatic resources of the lower Mokelumne River.

2018

In 2018, 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 February 15, 2018 and July 19, 2018.

2019

Pursuant to Section H.1 of the JSA, EBMUD, USFWS, and CDFW agree that they will continue to actively support the MRTAC as a technical information-sharing forum and that the Partnership Steering Committee will review the need for the MRTAC periodically, with input from the Stakeholders Group. The first meeting of 2019 will be held in late February.

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 2018, 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.

2018

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.

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- 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 and research program using stomach content analysis of non-native salmonid predators from the Mokelumne River.
- Genetic analysis of steelhead broodstock, and spawning matrix development to reduce pair relatedness and increase the number of family groups represented in the progeny.
- Adaptive management actions to promote healthy fish populations include fall pulse flows to attract salmon and steelhead into the Mokelumne River; managing Camanche cold water pool adaptively to maximize benefit for fall run chinook salmon
- Bathymetry surveys to develop a 2D model of the river bed to Woodbridge Dam to aid in habitat restoration projects.
- Mokelumne River Riparian Diversion assessment to prioritize diversions for screening through a grant with USFWS, Anadromous Fish Restoration Program.
- Assessment of the effects of feed rate on hatchery chinook maturation rates, to manage the return of 2 year old fish to the spawning population.

2019

EBMUD will continue similar research and monitoring activities in 2019.

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:

2018

- 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 2018, the long-term maintenance of a 1-mile restoration reach began when 720 yd³ of gravel were placed in degraded riffle and pool at the end of the reach. Since 1998, EBMUD has placed approximately 49,000 yd³ of spawning gravel in the Lower Mokelumne River.
- Floodplain Restoration: Two floodplain habitats (~1.0 acre) were created in the Mokelumne River Day Use Area to provide juvenile fish rearing and growth opportunities. The new floodplain habitats have been improved to inundate at ~600 cfs (Tier 1) and ~1,000 cfs (Tier 2) and function as ephemeral habitats. In 2018, one of the floodplain habitats was expanded by 0.25 acres and the other was built-up to an elevation where the area will function as an ephemeral 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.

2019

Many of the above habitat improvement activities will continue in 2019.

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, 2018. It is anticipated that it will be installed on the first Monday in October 2019 and operated through the steelhead migration season unless high flows require early removal.

V. APPENDICES

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

Appendix B: Flow Excursions below Woodbridge Dam

Appendix C: USGS Verified Flow Data for 2016 and 2017

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**

Local district moves forward with water project

By John Bays

NEWS-SENTINEL STAFF WRITER

The North San Joaquin County Water Conservation District Board of Directors approved the formation of a special water district as well as the engineer's report for the South System Groundwater Improvement Project during its meeting on Monday afternoon in the Lodi Public Library's Community Room.

The project would create a new system of pipes for in-lieu discharge, taking surface water from the Mokelumne River to irrigate agricul-

tural lands in the area instead of groundwater, allowing declining groundwater levels to replenish.

The district was formed to identify the outer boundaries for the Groundwater Improvement Project, according to Jennifer Spaletta, the board's general counsel. The new district consists of agricultural areas south of the Mokelumne River and west of North Tully Road, and does not include developed areas of Lodi, Spaletta explained.

The resolution passed with four "aye" votes and Board President Joe Valente as the only absence, and was

proposed following a special meeting last December.

"It's important to note that this resolution only allows us to move forward with drawing the outer boundary for the project. It's not an assessment. It's not a budget. It's simply to say that we're complying with the water codes. We published a public notice in the newspaper and, seeing no majority, are moving forward with setting the outer boundary," Spaletta said.

The board also voted to approve the engineer's report with four "aye" votes and one absence. A draft of the

report was presented at November's board meeting, and the board has since been collecting input from landowners, according to Spaletta. Provost & Pritchard Engineering Group, Inc., the firm hired to assess parcels of land to fund the project and assist with its development and implementation, reviewed the feedback before submitting the final report that was approved on Monday.

"I can say that the feedback was good, and changes have been made based on that feedback. Provost & Pritchard allocated benefits to different properties, and proposed assess-

ments based on those benefits. If approved, the board will send notices and ballots out and hold a public hearing on Feb. 26, where the ballots will be counted," Spaletta said.

Gerald Belluomini, a landowner in the project's area, raised the question of what specific benefits he would see from the project.

"How is this assessment going to benefit me? I'm at the eastern boundary, I'm going to pay money for it, but will I see benefits from it in my lifetime? Probably not," Belluomini said.

[PLEASE SEE PROJECT PAGE 8](#)

PROJECT

CONTINUED FROM PAGE 1

Tom Flinn, the board's vice president and treasurer, explained that the project would stop the groundwater levels from declining in the area as well as guarantee the district's water usage rights. Mike Day, principle engineer for Provost & Pritchard, then went into more detail about the specific benefits of the project.

"If there isn't the use of surface water in the area, (groundwater) levels will continue to decline. It can take areas that use groundwater and get them an average of 5,000 acre-feet per year and turn the wells off so that groundwater levels won't decline one foot per year. We've identified who they are, and we do know that when people turn the wells on, it does affect people as far as two miles away," Day said.

Bill Castro, another landowner, asked if parcels smaller than five acres would be assessed in the project. Day explained that those parcels would not be assessed, and Spaletta added that they would be assessed at \$0, along with unirrigated parcels larger than five acres. Spaletta explained those parcels would have the option to be assessed in the future, should they decide to hook up to the pipeline once it has been completed.

Spaletta also explained that, although the district is permitted to use up to 20,000 acre-feet of water per year, it rarely uses that much as it is considered lower priority than other areas. Instead, the district uses an average of 10,000 acre-feet per year approximately 50 percent of the time, she said, before addressing how much of the district's water overdraft the project would correct.

"It turns into a 'numbers soup,' sometimes because you have to look at North San Joaquin and smaller areas for ourselves. North San Joaquin uses about 20,000 acre-feet more water per year than is naturally replenished. Bringing in 5,000 acre-feet of surface water, this project alone would correct 25 percent of the overdraft problem. We have other projects that would correct another 25 percent, so we can solve 50 percent of the problem. We can also put in projects that help farmers be the most efficient they can be," Spaletta said.

Central Valley Salmon Population Remains Strong After Record Numbers Last Year

Rich Ibarra

Wednesday, November 28, 2018 | Sacramento, CA | [Permalink](#)



LISTEN

0:57



Calif. Dept. of Fish and Wildlife / Courtesy

Central Valley rivers are seeing a strong showing of Chinook salmon returning to spawn after record numbers last year.

The 20-year average for Chinook salmon coming up the Mokelumne River Fish Hatchery has been about 9,500. But last year, almost 20,000 salmon made it upriver, the highest recorded since 1940.

More than 14,000 have already been counted by mid-November, according to Peter Tira with the California Department of Fish and Wildlife.

He says the recent rains have helped considerably.

"It clears out debris in the rivers when you get increased flows," Tira says. "These rains are a trigger, an environmental trigger, for the salmon that it's time to move upstream."

Tira adds that hatcheries at the Nimbus Dam on the American River and Feather River are also seeing high numbers.

Mokelumne River salmon make up 20 percent of the commercial and 35 percent of the recreational catch off the California coast.

Salmon surge: Habitat improvements paying off on one California river



Peter Fimrite | Nov. 28, 2018 | Updated: Nov. 28, 2018 4 a.m.



1 of 6



A chinook, also called king salmon, attempts to jump up the fish ladder to the hatchery on the Mokelumne River in the Sierra foothills, where fisheries biologists say improved habitat in recent years has paid off.

Photo: Mason Trinca / Special to The Chronicle 2017

Near record numbers of chinook salmon are surging up the Mokelumne River, marking the second large spawning year in a row and signaling to fisheries biologists that habitat improvements in recent years are paying off for fish and the people who eat the pinkish delicacies.

The Mokelumne River Fish Hatchery, a Sierra foothills plant that is part of California's sprawling Central Valley river system, has processed 13,695 salmon so far this year, a number that by the end of the year could come close to last year's record of 19,954 returning fish.

It is expected to be the best two-year run on the river since records started being kept in 1940, a significant accomplishment given how dismal salmon returns have been over the past three years in virtually every other waterway in California, including the Sacramento River, which last year saw its lowest returns in eight years.

The incursion in the Mokelumne is the result of increases over the past few years in cold water releases from the reservoirs, better management of hatchery fish and habitat improvements in the river, according to fisheries biologists.

“It’s a very positive trend,” said Jose Setka, the manager of fisheries and wildlife for the East Bay Municipal Utility District, which supplies Mokelumne River water to 1.4 million East Bay customers. “We’re very excited. I think it’s just the culmination of a number of different management actions we’ve taken over the last decade that have pushed us to the next level.”

Steelhead numbers are also up for the third consecutive year. Setka said they are on pace to match the 500 to 600 that returned each of the past two years. He said 100 returning steelhead used to be considered a good year.

It is the fall run chinook, otherwise known as king salmon, that are most important to fisheries biologists because that is the species that commercial fishermen catch and fish markets sell. The count is a crucial gauge of how many salmon survive the ocean and swim upriver to the place where they were born.

The salmon, in this case, have imprinted on the Mokelumne so they instinctively swim to the hatchery, where they are taken inside on conveyor belts and unceremoniously clubbed to death. Workers then cut out their eggs, which are fertilized with sperm milked out of the males, and the resulting babies are raised until they are ready to be released.



Near record numbers of salmon are returning to spawn at the Mokelumne River Fish Hatchery

Video: SFChronicle

Fall run chinook, so named because the fish return to their native streams in the fall, pass through San Francisco Bay and roam the Pacific Ocean as far away as Alaska before returning to their natal streams, usually at age 3, to spawn. Salmon born into the wild die naturally after laying their eggs in gravel.

The other chinook populations — the winter and spring runs — have been so badly depleted that in most waterways there are too few of them to allow fishing.

The Mokelumne hatchery was built for \$13 million 20 years ago as part of a relicensing agreement with the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service. The improved hatchery — a rudimentary one existed before — was mitigation for the disruption of the fish migration caused by the construction of dams, including at the Camanche Reservoir in Amador, Calaveras and San Joaquin counties and the Pardee Reservoir in Amador and Calaveras counties.

The water released from the reservoirs flows through the Central Valley and meets the Sacramento-San Joaquin River Delta, which is a crossroads for one of the largest annual fish migrations on the West Coast. Fish released from the Mokelumne made up 20 percent of the commercial catch and 35 percent of the recreational catch off the coast of California in 2017.

About 2,000 fewer salmon have spawned in the Mokelumne so far this fall compared with last year at this time, but Setka said the number is well above the 20-year average of 9,541. It is, Setka said, a strong indication that recent improvements made by the water district in collaboration with the Department of Fish and Wildlife have been effective.

Delta Cross Channel gates to close weekdays

WALNUT GROVE — Until further notice, the Bureau of Reclamation plans a cycle of closing the Delta Cross Channel gates during weekdays beginning 10 a.m. Monday, in order to meet the Sacramento River at Rio Vista flow standard. The gates are expected to reopen Fridays around 10 a.m. for weekend recreation.

Opening or closing gates can be made on short notice and boaters are advised to check the status of the gates, especially around holidays. The process takes about one hour.

The Delta Cross Channel gates control the diversion channel near Walnut Grove, about 30 miles south of Sacramento. When the gates are open, fresh water is drawn from the Sacramento River into the interior of the Sacramento-San Joaquin River Delta through Snodgrass

Slough and the Mokelumne River. The open gates also allow boat traffic to pass. When closed, the gates prevent salmon from straying from their migratory route along the Sacramento River into the interior Delta.

Information on gate operations can be accessed by calling [916-979-2194](tel:916-979-2194) or [916-979-2196](tel:916-979-2196).

Grower floods vineyard



BEA AHBECK/NEWS-SENTINEL

Vineyard owner Al Costa talks Thursday about the flooding of his Acampo vineyard as the Lodi winegrape grower and North San Joaquin Water Conservation District floods 14 acres of vineyards with up to 500 acre-feet of Mokelumne River water to recharge groundwater aquifer.



NEWS-SENTINEL PHOTOGRAPHS BY BEA AHBECK

Water flows into Al Costa's vineyard as the Lodi winegrape grower and North San Joaquin Water Conservation District flood 14 acres of vineyards with up to 500 acre-feet of Mokelumne River water to recharge groundwater aquifer, in Acampo on Thursday.

Acampo vintner seeks to replenish groundwater

By John Bays
NEWS-SENTINEL STAFF WRITER

In an effort to recharge the overdrafted groundwater basin, grape grower Al Costa for the past week has been flooding his 14-acre vineyard in Acampo with approximately 4,000 gallons of water per minute.

"In about half of that area, the water really goes fast because there's a big sand strata right there and the water goes right through it into the water table," Costa said on Thursday afternoon.

Costa conducted similar flooding back

in 2006, he said as he leaned against his truck near his water pump on the Mokelumne River, but had to stop due to a lack of funding.

The controlled flooding started up again this year, however, when the North San Joaquin Water Conservation District started a pilot project with Sustainable Conservation, according to NSJWCD President and Lodi grape grower Joe Valente.

"We're overdrafting (our groundwater basin) and we need to do something about it, and what this project is trying to do is show that surface water can be used to

recharge the groundwater basin," Valente said. "We're providing the pumping facility and electricity, and our board budgeted \$15,000 (for the project)."

Joe Choperena, Sustainable Conservation's project lead, said that vineyards such as Costa's are ideal for this type of projects as vines are more tolerant to large amounts of water than other crops and do not use as much fertilizer, resulting in less nitrates making their way into the groundwater.

PLEASE SEE GROWER, PAGE 8

GROWER

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“We’ve been working on projects similar to this since 2011, looking at different types of crops and vines are very suitable to this,” Choperena said.

Tera Clark, Costa’s granddaughter, said grape vines can withstand the large amounts of water as long as they remain dormant.

The vine’s roots could become damaged if the water is too hot, Costa said, although the Mokelumne River’s temperatures are low enough that he is not worried.

Some of Choperena’s duties include monitoring moisture levels in the soil to see if the surface water is penetrating into the basin, he said, as well as looking at crop health.

Daniel DeGraff, lead district engineer for the Provost and Pritchard consulting group, said his job is to ensure that the flooding stays within NSJWCD’s water rights.

“(I’ve also been) contracted to monitor the water levels so



The pump pumps water from the river as the Lodi winegrape grower and North San Joaquin Water Conservation District flood 14 acres of vineyards with up to 500 acre-feet of Mokelumne River water to recharge groundwater aquifer, in Acampo on Thursday.

that we can show that the water is not just flowing back into the river, but actually recharging the groundwater basin and flowing northwest of the river,” DeGraff said.

The project is anticipated to run until the end of the month when NSJWCD will no longer be allowed to pump water from the Mokelumne River due in part to the beginning of the salmon run in November, DeGraff said, al-

though they are applying for an extension.

Should this pilot prove successful, DeGraff said their goal is to expand the project by encouraging more grape growers to participate.

“A lot of people have fears that it’ll negatively impact their vineyards, but if we can prove that it won’t affect their crop yield, hopefully more people will want to take part,” DeGraff said.

Flood releases cause concern about river debris

■ Property owners by Mokelumne River point fingers at EBMUD

Story

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Posted: Wednesday, July 4, 2018 10:00 am

By Danielle Vaughn/News-Sentinel Staff Writer



Bea Ahbeck/News-Sentinel

A fallen tree over Mokelumne River in Woodbridge Tuesday, July 3, 2018.



[Buy this photo](#)

Fallen trees and debris are clogging the Mokelumne River, and Woodbridge Irrigation District Manager Andy Christensen, along with property owners along the river, are pointing the finger at the East Bay Municipal Utility District.

According to Christensen, during the heavy 2016-17 flood year, EBMUD made releases out of the Camanche Dam that were right up to their allowable limit of 5,000 cubic feet per second, which knocked several trees and debris into the river and caused damage to surrounding properties .

“There has been a lot of damage to the river,” Christensen said. “On the west and south banks of the river, as it goes through the golf

course and all the way down to Peltier Road, we’ve lost a lot of the shading trees that were in there.”

According to EBMUD spokesperson Alison Kastama, there was quite a lot of precipitation that required that amount of water to be released, and It would’ve had to be released at some point in time. It’s very hard to predict how much rainfall and precipitation will happen, and so at anytime when they’re releasing that high level 5,000 cfs that’s challenging but it is something that the river can hold, Kastama said.

The stretch of river from Lower Sacramento Road to Peltier Road is clogged with trees and debris breaking down the capacity of the river, and a tree blocking the river has caused a sand bar to form below the Woodbridge Dam altering water flow, Christensen said. With the restricted river flows and reduction in shade, he worries about how fish will be affected.

“It’s looks like this year with the reservoirs that are full above us, that we may have high flood flow conditions similar to that of 2016,” Christensen said.

If the dam goes up to 5,000 cfs again in the fall and winter, Christensen is worried it could cause more damage to the river and potential flooding of the land downstream from the Woodbridge Dam.

Since the damage from last time, no one has done anything to remove the blockages from the river and Christensen feels as though EBMUD make the effort to help clean it up. He suggested they form a clean program where they go in and selectively remove the fallen trees and debris that are blocking river flows. While the Camanche Dam has a 5,000 cfs release capability, the river cannot handle that kind of flow under its current condition unless it is maintained, Christensen said.

However Kastama said its hard to necessarily assume that trees fell just because of the releases, and the responsibility of the clean up ultimately falls on the owners of the property from which the trees fell. There is a lot of permitting required to do clean up on the river, and EBMUD has met with property owners along the river to assist with the permitting process, she said.

“That wet winter leading into 2017, last January, February and March, we had one of largest amounts of precipitation on record, so we did in fact operate within the parameters of that flow control operation and allowed releases that were necessary to continue the flood protection downstream,” Kastama said.

According to Kastama, EBMUD did a great deal to notify property owners along the river and alert them to the releases.

“We really do want people to know that we’re operating there as a benefit to those downstream property owners,” Kastama said. “Having that reservoir is basically enabling us to smooth the impact of that heavy precipitation because we have possibly 200,000 aced feet of extra storage in that reservoir in order to hold back floodwaters that otherwise would flow down stream.”

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Even though EBMUD releases fell within the allowable limit, Lodi resident Jim Eilers, who owns a winery and vineyard 1 mile west of the Woodbridge Dam, felt that it was still too much water to release downstream.

“It’s just too much water to go down the river, and you’ve got way too much debris in the river that kind of dam things up and it doesn’t flow as well,” Eilers said. You just can’t have that 5,000 cfs coming down the Mokelumne River; its not built for that anymore. It can’t handle it, so then it destroys a crop like mine.”

As a result of the releases, Eilers’s vineyard was flooded. He lost his entire crop which was about \$200,000. He was also forced to spend about \$75,000 to fix the levees around his property and make repairs. Eilers feels that EBMUD owes all the property owners along the river who suffered damage some sort of reimbursement.

“They owe me something,” he said.

According to Eilers, several 200-year-old trees fell into the river due to the releases. Over the year, releases from the Camanche Dam have flooded him out several times, costing him hundreds of thousands of dollars.

News-Sentinel presented with award



BEA AHBECK/NEWS-SENTINEL

Richard Sykes, left, manager of EBMUD water and natural resources, and Lodi News-Sentinel editor of Sentinel media services Maggie Creamer listen as Lodi Living and Mokelumne Current editor Kyla Cathey talks as the News-Sentinel receives the Frank Beeler Award at the 25th annual Pardee barbecue on Friday.

Woodbridge Irrigation District focuses on EBMUD practices

By John Bays

NEWS-SENTINEL STAFF WRITER

After filing a lawsuit in January against the East Bay Municipal Utilities District for withholding water from the Mokelumne River, a Woodbridge Irrigation District official still has concerns about EBMUD's practices.

WID manager Andy Christensen said on Friday that EBMUD has been storing more water than it would need until November to keep its Camanche and Pardee reservoirs full through the winter for years, despite WID's water rights having seniority over EBMUD's, then dumping excess water in the winter.

"In 2017, they actually dumped water for four and a half months because they had so much excess," Christensen said. "Rather than dumping water at the begin-

ning of a rain year, we wanted them to release it in the summer so we could use it for irrigation."

Christensen said that releasing the water during the summer months could have alleviated EBMUD's need to dump their excess water during the winter which he said led to flooding in the district, while still respecting WID's water rights.

"Earlier this year, we filed a suit against them in civil court over that issue alone," Christensen said.

EBMUD released up to 5,000 cubic feet per second of water in 2017 which damaged trees along the Mokelumne River from the Woodbridge Dam down to the Sacramento-San Joaquin Delta, Christensen said, expressing concern that similar flooding might occur again this year.

PLEASE SEE EBMUD, PAGE 8

EBMUD

CONTINUED FROM PAGE 1

“The way EBMUD operates their reservoirs is detrimental,” Christensen said. “It doesn’t provide the flood protection that was originally promised.”

In a Tuesday press release, Christensen said WID requested 12,713 acre-feet of water under their senior licenses, which EBMUD reportedly denied on the grounds that “they have no obligation to make any releases to Woodbridge outside of the regulated base supply.”

Jim Ehlers, who owns an 80-acre vineyard approximately one mile down river from the Woodbridge Dam, said on Friday that his vines have suffered damage from EBMUD releasing too much water into the Mokelumne River going back as far as 1998.

“I was planting a new vineyard at the time, and when I called them they told me their maximum release would be 1,100 cubic feet per second,” Ehlers said. “I planted my vineyards and within a few months, they released 3,000 to 4,000 cubic feet per second which saturated my ground with moisture and killed about 10,000 vines. They could have just told me how much water they were going to release, I would have waited.”

Ehlers replanted his vines, he said, but suffered further losses between 2005 and 2006 when levees along the Mokelumne River eroded.

Ehlers’ vines were not the only plants to suffer due to flooding that he believes was caused by EBMUD releasing

too much water, he said, claiming that between 200 and 300 trees along the river died when water levels rose in 2017 and fell into the river, blocking the flow of water.

“It’s like a beaver dam around some of those corners,” Ehlers said.

EBMUD spokeswoman Andrea Pook said in an email on Friday that their agreement with the California Department of Fish and Wildlife limits their flows to a maximum of 5,000 cubic feet per second — although they try to stay below that limit — and that EBMUD has a protocol to inform customers of any changes to river flows before they occur.

Pook also denied that EBMUD has been withholding water from WID.

“EBMUD is meeting its obligations under the agreement with Woodbridge to release 60,000 acre-feet of water for their use, in compliance with the agreed-upon schedule,” Pook said.

EBMUD works to accommodate numerous requests from users such as WID, Pook said, adding that those requests can vary from year to year.

“Just last week we responded to North San Joaquin Water Conservation District to lower water levels so they could safely work to do necessary pump repairs. That allowed their contractor to get a new pump station connected in time,” Pook said. “Pulse flows are starting this weekend. As part of partnership coordination on the Mokelumne (River), we are pushing out short bursts of water to attract fish — which is good for the river, and good for the environment.”

S.J. water district wants to sell 10,000 acre-feet to Southern California

Story

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Posted: Saturday, July 14, 2018 5:30 pm

By John Bays/News-Sentinel Staff Writer

In a move that sparked controversy, the North San Joaquin Water Conservation District on June 5 filed a petition with the California State Water Resources Control Board proposing a one-time sale of 10,000 acre-feet of extra water from the Camanche Reservoir to Tulare Lake Basin Water Storage District in Corcoran.

One acre-foot of water is 326,000 gallons, the amount of water to cover one acre of land in one foot of water.

“NSJ can’t use the water this year because of the need to improve its facilities,” Jennifer Spaletta, NSJWCD general counsel said in an email. “The money from the sale would fund new delivery facilities in NSJ for future surface water deliveries.”

Andy Christensen, manager of the 40,000-acre Woodbridge Irrigation District that supplies water to 13,000 acres including Stockton and Lodi, said he opposes the sale on the grounds that WID’s water rights have seniority over NSJWCD’s, and that WID sits on top of an overdrafted groundwater basin.

“While I’m sure North San Joaquin needs the money, the precedent they’re setting of junior water rights taking water from senior water rights is something we can’t accept,” Christensen said.

“I’ve got customers in the area that are willing to use surface water instead of groundwater, and that sale would really hurt our customers. We think it’s wrong to take water out of the Mokelumne River and sell it south of the (Sacramento-San Joaquin River) Delta.”

WID filed a lawsuit in January claiming that the East Bay Municipal Utilities District has been withholding water for nearly 30 years with the first court hearing set for July 27. Christensen fears that the proposed transfer would deprive WID of even more water.

“Starting in 2014, we really tried to negotiate (with EBMUD),” Christensen said in the Jan. 30 article. “This has been going on since the late 1980s, when we had an interim agreement with them (EBMUD) that they didn’t renew.”

EBMUD could not be reached for comment.

Spaletta said that WID has not yet accepted NSJWCD’s offer to sell the water, but that no water would be transferred until WID’s rights have been satisfied.

“NSJ also tried to find a home for the water with others in our basin first, but so far has not found another interested buyer,” Spaletta said.

Sac Metro News

*News and Information
for the Greater Sacramento Region*

• A New Steelhead Run Record Set at Mokelumne River Fish Hatchery

By EGN - Wednesday, February 28, 2018 - No Comments



By Dan Bacher

It's official; a new record for the number of steelhead returning to the Mokelumne River Fish Hatchery in one season has been set.

The hatchery, located on the river near Clements, has received 530 adults and 638 juveniles this year to date, a total of 1,168 fish. That compares to 719 adults and 402 juveniles last season, a total of 1,121 fish.

"We've taken over 1 million eggs to date," said William Smith, the manager of the California Department of Fish and Wildlife-run hatchery. "Our goal is to raise 250,000 steelhead smolts for release into the river next year."

He plans to keep the hatchery open into the first week of March, since fresh steelhead are still arriving every week.

The hatchery has taken over 1 million steelhead eggs to make sure they meet their production goal of 250,000 steelhead smolts.

Over the past month, the CDFW has released 300,000 6 to 8-inch steelhead smolts in the Mokelumne below Camanche Dam.

Experienced anglers fishing below the hatchery continue to battle some quality steelhead and wild trout. "One guy who has been fishing three to four days per week has been catching and releasing around three fish per day in the 18- to 24-inch range while using flies," said Smith.

The big steelhead run follows a record salmon run. A total of 19,904 fall Chinook salmon went over Woodbridge Dam in the fall of 2017.

The factors behind the record steelhead and salmon runs include stronger river pulse flows, closures of the Delta Cross Channel gates, the use of tagging data to increase fish survival, barging salmon, habitat improvements and the 1998 Lower Mokelumne River Settlement Agreement.

You can thank the CDFW, East Bay Municipal Utility District, California Sportfishing Protection Alliance and Committee to Save the Mokelumne for their hard work in restoring the river's fisheries.

General information: (209) 759-3383. Fishing regulations information: <https://nrm.dfg.ca.gov/FileHandler.ashx?>

While a record number of Chinook salmon returned to the Mokelumne River Fish Hatchery in the fall of 2017 and good numbers of salmon returned to the Feather River Fish Hatchery, a below normal number of salmon came back to Nimbus Fish Hatchery on the American River and one of the lowest numbers of fall run Chinooks ever returned to Coleman Fish Hatchery on Battle Creek and the upper section of the Sacramento River.

For more information about last year's record salmon run, go to: <https://www.dailykos.com/stories/2017/11/16/1716371/-Record-chinook-salmon-steelhead-returns-projected-on-Mokelumne-River>

- *1 Mar 2018 Lodi News-Sentinel By John Bays*
Groundwater district explores irrigation options

After local landowners voted down a proposed irrigation project on Monday, the North San Joaquin Water Conservation District began exploring other options during a meeting on Wednesday.

The proposed South System Groundwater Improvement Project, an \$18.75 million plan that would have pumped pressurized surface water from the Mokelumne River along seven miles of new pipeline to Bear Creek and Pixley Slough, allowing farmers to irrigate their crops with surface water instead of depleting groundwater, according to NSJWCD President Joe Valente.

Approximately 49.5 percent of voters supported the project, Valente said, and roughly 50.5 percent opposed it. Out of 1,000 ballots sent out, approximately 500 were returned, according to Dave Simpson, NSJWCD secretary. Simpson felt that many people opposed the project because they thought it was too expensive. Parcels of land within the district's South System would have been assessed based on size to pay for the project, and Simpson said that landowners might have felt that they would not see any benefit from it.

"People farther away from the pipeline didn't really see this as providing any benefit to them. I guess some of that is when you're dealing with groundwater, it's kind of a

mystery. Even the best consultants you can find can't make a guarantee. We couldn't guarantee that groundwater levels would maintain or rise," Simpson said.

During Wednesday's meeting, the water district discussed building a new pump station in the Mokelumne River, as general counsel Jennifer Spaletta said the old pump is in need of replacement.

"The pump station is very old and very ineffective, so the district has, for years, been looking at building a new pump station," Spaletta said.

Building a new pump station would cost between \$2.7 million and \$3.5 million, according to Spaletta. The district currently has \$1.75 million from a settlement with the East Bay Municipal Utility District, she said, along with \$400,000 in their county general account.

To raise the additional \$1.1 million, she advised the board to consider taking out a loan and asking landowners to pay a voluntary standby charge to repay the loan, or sell water to the City of Lodi when a surplus is available.

Having already spoken with a construction company, Spaletta said that the board could split the pump station into two parts: First constructing the pump and installing piping and tie-ins, then building the platform and electrical controls.

The district already has a permit with a window from April 1 to Oct. 13 in which to begin the first phase, which would cost approximately \$1.75 million, Spaletta said, urging the board to reach a decision as soon as possible.

“To be frank, if we miss this window, I can predict that the cost of this project will increase by at least 10 percent,” Spaletta said.

Tom Flinn, NSJWCD vice president and treasurer, expressed concerns that the current concrete pipeline has too many leaks that would result in water loss. Landowners would be responsible for maintaining and operating their own connections, he said, as grant funds would not be available unless the pipeline is replaced. Additionally, the newly-constructed pump station would not be useable until the second phase of the project has been completed, he said.

“By making that move, we guarantee that we will not be able to operate the old system and can’t deliver water until Phase Two is complete. I am not in favor of utilizing a substantial amount of our annual revenue for this one project. We need to seek alternative sources of revenue or dedicated customers (of surface water) before we move forward with Phase Two,” Flinn said.

With a three-person quorum of Valente, Flinn and Simpson, the board voted to approve Spaletta’s suggestion, and planned to hold community outreach workshops in the near future to solicit public input.

Public asked to look out for Delta rodents

By Alex Breitler

STOCKTON RECORD

STOCKTON — As if the Delta didn't have enough problems, the South American swamp rats known as nutria may be about to stage an invasion.

Wildlife officials said this week that more than 20 nutria have been found over the past 10 months or so in the San Joaquin Valley upstream of the Delta. This includes the

San Joaquin River near Grayson, the San Luis National Wildlife Refuge, and Salt Slough.

Apparently there have been no official sightings in the Delta itself. "We are on the lookout, though," said Chris Neudeck, a levee engineer with Stockton-based Kjeldsen, Sinnock & Neudeck.

The state Department of Fish and Wildlife is asking the general public to keep an eye open as well. Nutria look a lot

like beavers, but are smaller and can be distinguished by their round, ratlike tails and their white whiskers. They can grow to 2½ feet long and up to 20 pounds in weight.

The Delta is already besieged by more than 200 invasive species that don't belong here, and is considered the most invaded estuary in North America. Nutria would be just one more addition, but a particularly destructive one.

County groundwater project rejected



By John Bays
NEWS-SENTINEL STAFF WRITER

After Lodi voters rejected a proposed irrigation plan on Monday the North San Joaquin Water Conservation District will explore other options during a meeting today.

The South System Groundwater Improvement Project was defeated by a narrow margin, according to Joe Valente, NSJWCD president. Valente added that a significant number of landowners in the project's proposed area did not vote, although ballots

were mailed out more than a month ago.

"When all was said and done, about 49.5 percent voted in favor of the project and about 50.5 percent opposed it, so it was extremely, extremely close. It looked like about 50 percent, maybe less, of property owners actually voted," Valente said.

Gloria Bodner, a Lodi resident whose family has farmed their 20-acre parcel for over 45 years, was one of the project's opponents.

Bodner felt the \$18.75 million project, which would have pumped pressurized surface

water from the Mokelumne River along seven miles of new pipeline to Bear Creek and Pixley Slough, would not deliver enough water to justify its cost.

"In the past, the system was poorly maintained and often, service was denied due to lack of water. For a farm to be profitable, we need a predictable

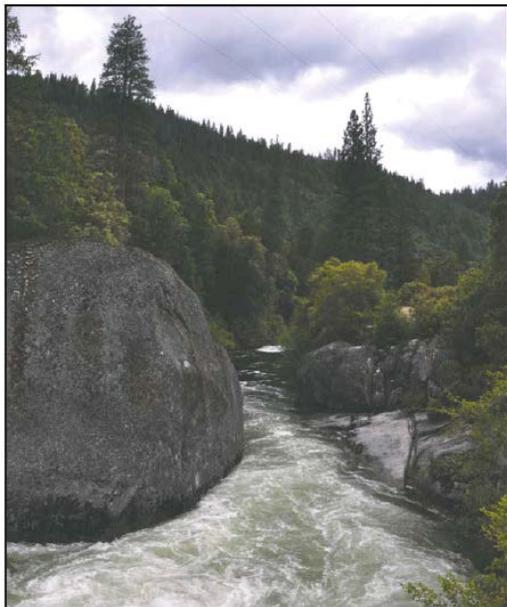
source of water and predictable costs," Bodner said.

The NSJWCD board will explore alternative projects during a meeting at 2 p.m. today, Valente said.

The meeting will be held at the Lodi Public Library, 201 W. Locust St., and is open to the public.

BEA AHBECK/NEWS-SENTINEL FILE PHOTOGRAPH

Left: North San Joaquin Water Conservation District President Joe Valente talks about the South System Groundwater Improvement Plan by the fish strainer at the water pump station in the Mokelumne River in Lodi on Jan. 12.



FOOTHILL CONSERVANCY/COURTESY PHOTOGRAPH

The northern fork of the Mokelumne River, downstream of Salt Springs Dam near Amador and Calaveras counties, is part of the section of the river that may be included in the California Wild and Scenic River System.

Report calls for added protections for parts of Mokelumne

‘Wild and scenic’ designation would prevent new dam, reservoir construction

By John Bays
NEWS-SENTINEL STAFF WRITER

A portion of the Mokelumne River upstream from Lodi could be designated wild and scenic.

The California Natural Resources Agency released a report last week that strengthens the case for protecting the river.

If approved by the CNRA, 37 miles of the Mokelumne River from below Salt Springs Dam in Amador and Calaveras counties to the Pardee Reservoir’s flood surcharge pool near Jackson would be added to the California Wild and Scenic River System.

Established in 1968, the National Wild and Scenic River System preserves rivers with “outstanding natural, cultural and recreational values in a free-flowing condition for the enjoyment of present and future generations,” according to the system’s website.

Onstream dams and reservoirs would be banned for that section of the river, although the designation would not impact existing water rights, land use or agriculture.

For this reason, Foothill Conservancy President Katherine Evatt does not anticipate any noticeable effects for Lodi or any other part of the Central Valley.

“A lot of folks from Lodi come to recreate at this area. What this does for them is make sure that the places they come to recreate are there in the future. This is good for the Valley because it keeps water flowing downstream in your direction. Not only does it protect parts of the river that are free-flowing today, but if anybody wanted to file a water rights application, this shouldn’t affect that process,” Evatt said.

Bill Ferrero, a Lodi-born fishing guide on the Mokelumne River, supported the proposal, echoing Evatt’s beliefs that Lodi would see virtually no impact if part of the Mokelumne were added to the system.

RIVER

CONTINUED FROM PAGE 1

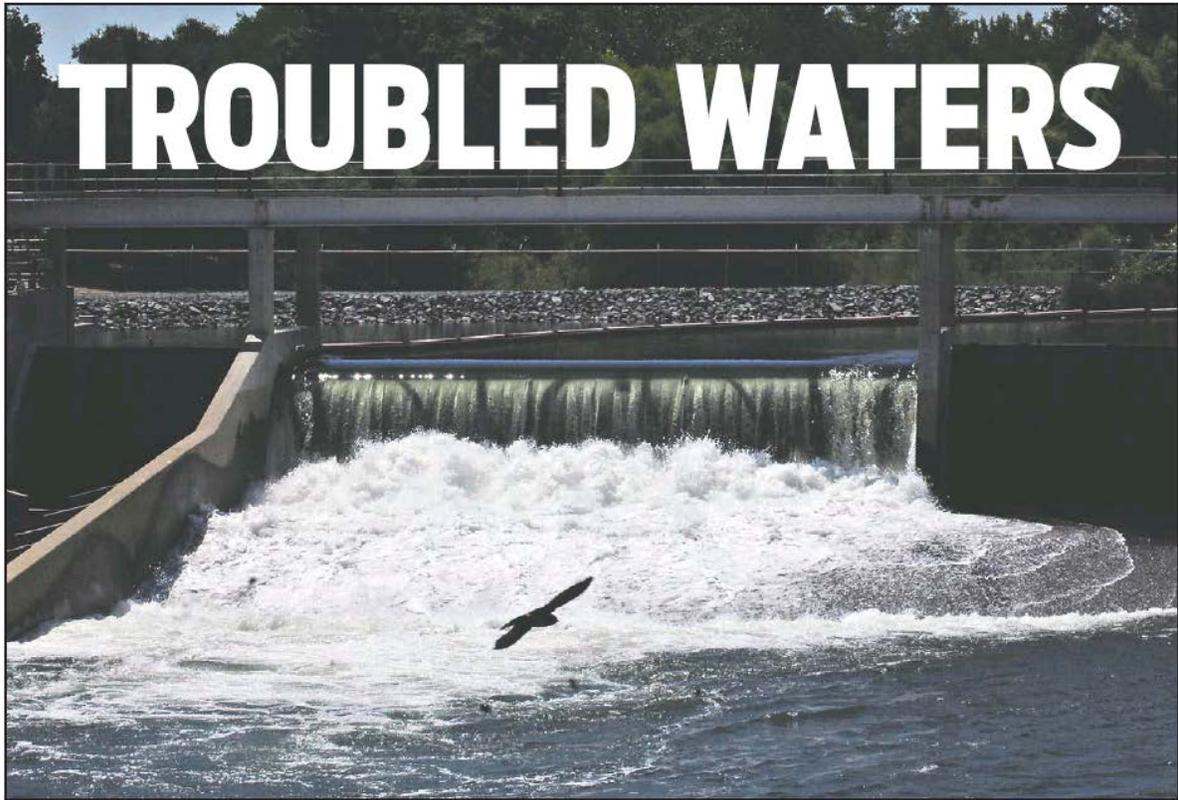
“I think it’s a great idea. I don’t think it would have any affect on Lodi. There are two reservoirs and miles of river before the Mokelumne reaches Lodi: Camanche (Reservoir) is used for flood control and irrigation, and Pardee (Reservoir) has an outlet to send drinking water to the East Bay. Conceptually, I don’t see how it could affect Lodi’s water, at all,” Ferrero said.

Kathy Grant, watershed program coordinator for the City of Lodi, voiced her own support for the proposal, adding that incorporating part of the Mokelumne into the system could bring potential benefits for Lodians who enjoy recre-

ational activities such as kayaking or fishing in the area.

“I think it’s a happy compromise. We need all the water we can get down here, because our groundwater is so depleted, but I see more (effects) in terms of recreation. We need all the recreational water we can get down here, too,” Grant said.

The draft Mokelumne study is now available for public review and comment. Comments are due to the California Natural Resources Agency by Feb. 28. The agency will hold a public meeting to discuss the study and hear public comments on Thursday, Feb. 15, at the Mokelumne Hill Town Hall, 8283 Main St., Mokelumne Hill, beginning at 6 p.m.



NEWS-SENTINEL FILE PHOTOGRAPHS

Water flows over the Woodbridge Dam near Lower Sacramento Road on July 11, 2015. The Woodbridge Irrigation District on Monday filed a lawsuit against the East Bay Municipal Utility District, claiming that water had been improperly withheld from the Mokelumne River.

Woodbridge Irrigation District files suit against EBMUD over water rights

By John Bays
NEWS-SENTINEL STAFF WRITER

The Woodbridge Irrigation District filed suit against the East Bay Municipal Utility District in the San Joaquin Superior Court on Monday, asking the court to review WID's water rights and contracts with EBMUD.

The suit was filed after four years of negotiations between the two districts, according to WID Manager Andy Christensen, who claimed that EBMUD has been withholding water from the Mokelumne River for almost 30 years.

"Starting in 2014, we really tried to negotiate (with EBMUD). This has been going on since the late 1980s, when we had an interim agreement with them (EBMUD) that they didn't renew," Christensen said.

Two licenses issued by the California State Water Resources Control Board authorize WID to divert additional tens of thousands of acre-feet of water from the Mokelumne River during years that it was available, with priority dates of 1928 and 1941, according to a WID press release. WID claims that the licenses have seniority over EBMUD's permit for the Camanche Dam and Reservoir, which was built in the early 1960s.

Shortly after the dam's completion in 1965, WID and EBMUD agreed that EBMUD would release up to 140,000 acre-feet of surface water per year, WID stated. That agree-



Woodbridge Irrigation District Manager Andy Christensen poses for a photograph at the Woodbridge Dam fish ladder on Feb. 24, 2015.

"The ideal outcome is for the court to make a thorough review of the contract between the two districts, and that EBMUD will operate their dams in accordance with our senior water rights and licenses."

ANDY CHRISTENSEN
MANAGER, WOODBRIDGE
IRRIGATION DISTRICT

"Woodbridge Irrigation District and EBMUD are partners on the Mokelumne River. We have been and will continue to be for years to come. ... We look forward to resolution and continuing our great work together on the Mokelumne."

ALISON KASTAMA
EBMUD SPOKESWOMAN

ment ended in 1988, and EBMUD now releases only 60,000 acre-feet per year, which Christensen feels does not satisfy WID's water needs.

"In certain years, we didn't

get all of the water that we're entitled to under our licenses. The effects have been that growers have not received all the water they need. We sit on an overdrafted groundwater

basin, and this has caused people to use more well water. This has created a bad situation for area farmers," Christensen said.

[PLEASE SEE WATER, PAGE 8](#)

WATER

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The first court hearing is scheduled for July 27, where Christensen hopes that the courts will clarify WID's water rights. He also hopes that EBMUD will operate their reservoirs and dams in a manner that respects those rights in the future, he said.

"The ideal outcome is for

the court to make a thorough review of the contract between the two districts, and that EBMUD will operate their dams in accordance with our senior water rights and licenses. This would mean that we would have more water not only for agriculture, but to help alleviate groundwater overdraft here in the northern part of San Joaquin County," Christensen said.

EBMUD spokeswoman Alison Kastama said that EBMUD could not comment on the court filing, and offered the following statement:

"Woodbridge Irrigation District and EBMUD are partners on the Mokelumne River. We have been and will continue to be for years to come. Recent discussions of future water supply planning, including groundwater banking, have brought forth

the need for clarifications of existing agreements between our agencies. We look forward to resolution and continuing our great work together on the Mokelumne," Kastama said.

Mokelumne River

Chinook return in record numbers



NEWS-SENTINEL FILE PHOTOGRAPH

Salmon try to climb the ladder at the Mokelumne River Fish Hatchery on Nov. 16, 2017.

As numbers fall across the state, Mokelumne River salmon population recovers

By John Bays

NEWS-SENTINEL STAFF WRITER

Although fall-run returns of Chinook salmon are low, the Mokelumne River Fish Hatchery in Clements has seen more returns than ever before, according to Peter Tira, a public information officer with the California Department of Fish and Wildlife.

"Compared to how other hatcheries are doing, Mokelumne is doing well. They're doing a lot of innovative things down there, and that's helping the returns. They're probably doing the best of any hatchery in California right now," Tira said.

Run by EBMUD and the CDFW, the hatchery has already more than doubled the number of returning salmon from 8,840 in 2016, according to EBMUD media representative Nelsy Rodriguez.

"We are doing fantastic. This is the highest return on record for East Bay

Municipal Utility District. As of Dec. 26, we've counted a total of 19,867 Chinook salmon returning," Rodriguez said.

By comparison, the Coleman National Fish Hatchery in Anderson, the largest in the state, fell 6 million salmon short of the 12 million they hoped to produce this season due to drought conditions in previous years as well as time spent shipping the young salmon to the ocean by truck, according to a report by the Sacramento Bee.

Rodriguez attributes Mokelumne's success to targeted water pulses in September and November 2017, that lowered the river's temperature, allowing returning salmon to more easily find their original spawning grounds.

The CDFW also negotiated gate closures from Monday to Friday at the Sacramento-San Joaquin Delta Cross Channel that normally supplies water to federal pumps, Rodriguez said. Had the channel remained open, she explained, the salmon would have been at greater risk of getting off course and not reaching their spawning grounds at the hatchery.

Salmon were released closer to the Golden Gate Bridge in San Francisco than in previous years, Rodriguez said, allowing them to spend as much time in familiar waters as possible before entering the ocean. Additionally, hatcheries have been introducing more salt into the diets of growing salmon to help ease the transition from freshwater to saltwater.

These efforts, along with continued collaboration between CDFW and EBMUD, are what Rodriguez believes led to the record salmon returns this season.

"This is a testament to a great partnership with the state and forging a relationship with the Bureau of reclamation. It really is a great way to start off the new year," Rodriguez said.

Chinook salmon from the Mokelumne River Hatchery make up approximately 18 percent of the ocean's commercial and recreational fish harvest, according to Rodriguez. While not the majority of the harvest, she is confident that the salmon industry will benefit from the increase in returning salmon.

Sacramento Bee reporter Ryan Sabalow contributed to this report.

Use it or lose it: Water pipeline project explored

North San Joaquin water official explains upcoming groundwater project

By John Bays
NEWS-SENTINEL STAFF WRITER

Joe Valente's gray Chevrolet pickup truck drove down Tretheway Road in Lodi on Friday afternoon as the president of the North San Joaquin Water Conservation District Board of Directors pointed out large concrete cylinders, known as stand pumps, that provide air to a seven-mile pipeline stretching from the Mokelumne River to Pixley Creek Slough.

Installed approximately 60 years ago, the pipeline was intended to provide surface water from the river to farms in the southern part of the water district, according to Valente. Although the pipeline functioned properly for flood irrigation, it was unable to meet the farmers' needs when they switched to drip irrigation, requiring them to tap into the groundwater supply, he explained.

"Think of it like a hose: If you don't have anything on one end, it just floods. The next step in irrigation is like adding a sprinkler. You need pressure for water to flow through it, and the current pipeline is not able to create that pressure," Valente said.

To address this issue, the water district board proposed the South System Groundwater Improvement Project, which would involve installing seven miles of PVC pipe as well as a new pump station. This would allow farmers in the area, primarily vineyards and cherry orchards, to utilize surface water from the Mokelumne River to irrigate their farms instead of groundwater, which Valente explained takes longer to replenish.

The board has held several public meetings since announcing the project in 2017 to solicit input from landowners whose property will be assessed based on size to help cover its cost of \$18.75 million. Although the district was awarded \$5.75 million in grants, they still need to raise \$13 million to begin the project by 2019, or risk losing the grant money, Va-



NEWS-SENTINEL PHOTOGRAPHS BY BEA AHBECK

North San Joaquin Water Conservation District President Joe Valente talks about the South System Groundwater Improvement Plan by the fish strainer at the water pump station in the Mokelumne River in Lodi on Friday.

"By 2025, we have to show the state that we're doing something with that water, or trying to do something, or else we could lose it."

JOE VALENTE
PRESIDENT,
NORTH SAN JOAQUIN WATER
CONSERVATION DISTRICT
BOARD OF DIRECTORS

lente said.

As he drove to the existing pump station on the Mokelumne River, Valente outlined the three methods for installing the new pipeline that the board is exploring with help from Provost & Pritchard Consulting Group.

PLEASE SEE WATER, PAGE 8



North San Joaquin Water Conservation District President Joe Valente stands near the existing pipeline as he talks about the South System Groundwater Improvement Plan in Lodi on Friday.

WATER

CONTINUED FROM PAGE 1

One option is to completely remove the existing cement pipeline and replace it with PVC, which he said would likely mean digging up many people's land. Another method would be to install the new pipeline next to the existing pipeline, which he felt would create the same problem.

After parking his truck, Valente walked down to the river and explained the third option, known as "slip-lining," which would involve feeding the new pipeline directly into the existing pipeline at its starting point near the river. This would mean that roadways and other land in the area would likely not need to be excavated, saving time and money and minimizing the inconvenience to landowners, he said.

"It could be a combination of all three options, it all depends on what's the most cost-effective way to do it," Valente said.

The project will also involve replacing the five existing pumps at the pumping station, some of which Valente said were installed in the 1960s, with a single variable-speed pump.

"If we need to max out the water flow, it can do that. If we need it to go slower, it can do that, too. It just makes the process a whole lot more efficient," Valente said.

Another factor that motivated the board to pursue the project is the district's water rights, Valente added. The district currently has the right to 20,000 acre-feet of water per year. Every few years, it must show the State of California that it is either



BEA AHBECK/NEWS-SENTINEL

The fish strainer at the water pump station in the Mokelumne River in Lodi on Friday.

utilizing that water, or has plans to use it, or it risks losing that right.

"By 2025, we have to show the state that we're doing something with that water, or trying to do something, or else we could lose it," Valente said.

The project has already gained the support of Steve Schwabauer, the city manager for Lodi. Schwabauer explained that the plan could benefit the entire county, whose groundwater basin is among the most overdrafted basins in California.

"I think the North San Joaquin project is good for all of San Joaquin County. San Joaquin County has one of the most overdrafted groundwater basins in the state. It's in critical overdraft, and we have to act sooner than other basins if we plan to become sustain-

able in the face of a 100,000 acre-feet-per-year overdraft," Schwabauer said.

Valente added that the City of Lodi already has a similar practice in place, pumping water through its treatment center at Lodi Lake before using it to supply the city. If approved by the water district's voters,

the project would result in even less groundwater being used during years with heavy rain, saving it for dry years.

"If we all pull water out of the same cup, it'll get empty a lot sooner whereas if we manage that cup or bucket responsibly, it won't run out," Valente said.

Salmon spawning again



PHOTOGRAPHS BY CYNDY GREEN/SPECIAL TO THE NEWS-SENTINEL

EBMUD and California Fish and Wildlife employees process spawning salmon at the Mokelumne River Hatchery. Damon Donich, left, and William Smith, right, work together to remove salmon eggs.



CYNDY GREEN/SPECIAL TO THE NEWS-SENTINEL

EBMUD and California Fish and Wildlife employees process spawning salmon at the Mokelumne River Hatchery. A California Fish and Wildlife employee tosses a processed female salmon carcass into a bin. These carcasses are sent north to Washington state for food if they pass inspections.

Mokelumne River Hatchery busy collecting eggs

By John Bays
NEWS-SENTINEL STAFF WRITER

Walking along a stretch of the Mokelumne River at the Mokelumne River Hatchery in Clements on Thursday morning, EBMUD's manager of fisheries and wildlife pointed to salmon spawning near the riverbank.

"An average adult salmon has about 5,000 eggs in them, and about 4,000 make it to the nest," Jose Setka said. "In the hatchery, of course, they take all of the eggs."

Run by EBMUD and the California Department of Fish and Wildlife, the hatchery has seen approximately 14,800 salmon return as of Wednesday, slightly less than the 16,500 salmon at this time last year.

Despite being one of the smallest rivers in the Sacramento-San Joaquin River Delta, the Mokelumne's



A salmon struggles through branches in a shallow area along the Mokelumne River below Camanche Dam.

salmon population made up approximately 20 percent of the commercial catch and approximately 30 percent of the recreation catch for California's coast last year.

The spawning season usually lasts from October through December, Setka said, and the juvenile salmon are released in late April through May of the

following year.

While some salmon spawn in shallow portions of the river, others swim toward a fence that steers the fish toward a gate which controls how many are let into the "ladder," a narrow man-made stream that leads the fish toward the hatchery.

The salmon then make their

way to a conveyor belt inside the hatchery building where employees separate the males and females before fertilizing the eggs and collecting them in large plastic tubs to incubate.

Before releasing the young salmon from the fresh waters of the Mokelumne River to the salt waters of the Pacific Ocean, however, Setka said hatchery employees feed the fish a diet with more salt than they would normally eat.

"That will start to trigger that transformation and make the transition easier," Setka said.

Although he does not expect this year's salmon run to meet or exceed last year's record-breaking run of 19,954 salmon, Setka was optimistic that the hatchery will continue its fruitful spawning season in the coming weeks.

PLEASE SEE SALMON, PAGE 2

SALMON

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“Since the new flow regime in the mid-1990s, our average has been about 9,000 fish per year,” Setka said. “No matter how you slice it, it’s been another successful year.”

CDFW supervisor Jay Rowan also felt that this year’s spawning season has been successful so far, he said, citing the partnership between CDFW and EBMUD as one of the primary reasons.

“They take the salmon run seriously, and make it a priority to have a good hatchery,”

Rowan said of EBMUD. “CDFW and EBMUD have a really good partnership and this shows what we can do when we work together.”

John McManus, president of the Golden Gate Salmon Association — which represents both sport and commercial salmon fisherman in California — praised the hatchery for the amount of salmon they release each year as he watched the employees process the fish.

“EBMUD encourages innovation with their hatchery practices,” McManus said. “Salmon fishermen see what’s going on, and we greatly appreciate this operation.”

APPENDIX B

FLOW EXCURSIONS/DEVIATION BELOW WOODBRIDGE DAM

Table B-1: Flow Below Woodbridge Dam March 5, 2018

| Reading Date and Time | Interval | Unit | JSA Water Year Type | Golf Gage Measured Flow | JSA Expected Flow (below WID Dam) |
|------------------------------|-----------------|-------------|----------------------------|--------------------------------|--|
| 3/5/2018 18:45 | 15 Minute | cfs | Normal and Above | 100 | 100 |
| 3/5/2018 19:00 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 3/5/2018 19:15 | 15 Minute | cfs | Normal and Above | 86 | 100 |
| 3/5/2018 19:30 | 15 Minute | cfs | Normal and Above | 96 | 100 |
| 3/5/2018 19:45 | 15 Minute | cfs | Normal and above | 120 | 100 |

1. The provisional average daily flow for 3/5/2018 is 162 cfs.
2. The 3/5/2018 temporary flow excursion occurred due to low flow conditions when WID was refilling Lodi Lake.

Table B-2: Flow Below Woodbridge Dam March 6, 2018

| Reading Date and Time | Interval | Unit | JSA Water Year Type | Golf Gage Measured Flow | JSA Expected Flow (below WID Dam) |
|------------------------------|-----------------|-------------|----------------------------|--------------------------------|--|
| 3/6/2018 11:30 | 15 Minute | cfs | Normal and Above | 110 | 100 |
| 3/6/2018 11:45 | 15 Minute | cfs | Normal and Above | 98 | 100 |
| 3/6/2018 12:00 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 3/6/2018 12:15 | 15 Minute | cfs | Normal and Above | 85 | 100 |
| 3/6/2018 12:30 | 15 Minute | cfs | Normal and Above | 86 | 100 |
| 3/6/2018 17:45 | 15 Minute | cfs | Normal and Above | 82 | 100 |
| 3/6/2018 18:00 | 15 Minute | cfs | Normal and Above | 79 | 100 |
| 3/6/2018 18:15 | 15 Minute | cfs | Normal and Above | 87 | 100 |
| 3/6/2018 19:45 | 15 Minute | cfs | Normal and Above | 85 | 100 |
| 3/6/2018 20:00 | 15 Minute | cfs | Normal and Above | 83 | 100 |
| 3/6/2018 20:15 | 15 Minute | cfs | Normal and Above | 91 | 100 |
| 3/6/2018 20:30 | 15 Minute | cfs | Normal and Above | 106 | 100 |

1. The provisional average daily flow for 3/6/2018 is 104 cfs.
2. The 3/6/2018 temporary flow excursion occurred due to low flow conditions when WID was refilling Lodi Lake.

Table B-3: Flow Below Woodbridge Dam June 26, 2018

| Reading Date and Time | Interval | Unit | JSA Water Year Type | Golf Gage Measured Flow | JSA Expected Flow (below WID Dam) |
|------------------------------|-----------------|-------------|----------------------------|--------------------------------|--|
| 6/26/2018 8:30 | 15 Minute | cfs | Below Normal | 207 | 200 |
| 6/26/2018 8:45 | 15 Minute | cfs | Below Normal | 165 | 200 |
| 6/26/2018 9:00 | 15 Minute | cfs | Below Normal | 126 | 200 |
| 6/26/2018 9:15 | 15 Minute | cfs | Below Normal | 104 | 200 |
| 6/26/2018 9:30 | 15 Minute | cfs | Below Normal | 94 | 200 |
| 6/26/2018 9:45 | 15 Minute | cfs | Below Normal | 94 | 200 |
| 6/26/2018 10:00 | 15 Minute | cfs | Below Normal | 96 | 200 |
| 6/26/2018 10:15 | 15 Minute | cfs | Below Normal | 98 | 200 |
| 6/26/2018 10:30 | 15 Minute | cfs | Below Normal | 110 | 200 |
| 6/26/2018 10:45 | 15 Minute | cfs | Below Normal | 160 | 200 |
| 6/26/2018 11:00 | 15 Minute | cfs | Below Normal | 195 | 200 |
| 6/26/2018 11:15 | 15 Minute | cfs | Below Normal | 210 | 200 |

1. The provisional average daily flow for 6/26/2018 is 199 cfs.
2. The 6/26/2018 deviation occurred due to fish ladder maintenance work.

Table B-4: Flow below Woodbridge Dam November 14, 2018

| Reading Date and Time | Interval | Unit | JSA Water Year Type | Golf Gage Measured Flow | JSA Expected Flow (below WID Dam) |
|------------------------------|-----------------|-------------|----------------------------|--------------------------------|--|
| 11/14/2018 14:15 | 15 Minute | cfs | Normal and Above | 101 | 100 |
| 11/14/2018 14:30 | 15 Minute | cfs | Normal and Above | 98 | 100 |
| 11/14/2018 14:45 | 15 Minute | cfs | Normal and Above | 96 | 100 |
| 11/14/2018 15:00 | 15 Minute | cfs | Normal and Above | 94 | 100 |
| 11/14/2018 15:15 | 15 Minute | cfs | Normal and Above | 93 | 100 |
| 11/14/2018 15:30 | 15 Minute | cfs | Normal and Above | 91 | 100 |
| 11/14/2018 15:45 | 15 Minute | cfs | Normal and Above | 90 | 100 |
| 11/14/2018 16:00 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 16:15 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 16:30 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 16:45 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 17:00 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 17:15 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 17:30 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 17:45 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 18:00 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 18:15 | 15 Minute | cfs | Normal and Above | 89 | 100 |
| 11/14/2018 18:30 | 15 Minute | cfs | Normal and Above | 90 | 100 |
| 11/14/2018 18:45 | 15 Minute | cfs | Normal and Above | 90 | 100 |
| 11/14/2018 19:00 | 15 Minute | cfs | Normal and Above | 90 | 100 |
| 11/14/2018 19:15 | 15 Minute | cfs | Normal and Above | 90 | 100 |
| 11/14/2018 19:30 | 15 Minute | cfs | Normal and Above | 90 | 100 |
| 11/14/2018 19:45 | 15 Minute | cfs | Normal and Above | 91 | 100 |
| 11/14/2018 20:00 | 15 Minute | cfs | Normal and Above | 91 | 100 |

| | | | | | |
|------------------|-----------|-----|------------------|----|-----|
| 11/14/2018 20:15 | 15 Minute | cfs | Normal and Above | 91 | 100 |
| 11/14/2018 20:30 | 15 Minute | cfs | Normal and Above | 91 | 100 |
| 11/14/2018 20:45 | 15 Minute | cfs | Normal and Above | 93 | 100 |
| 11/14/2018 21:00 | 15 Minute | cfs | Normal and Above | 93 | 100 |
| 11/14/2018 21:15 | 15 Minute | cfs | Normal and Above | 93 | 100 |
| 11/14/2018 21:30 | 15 Minute | cfs | Normal and Above | 93 | 100 |
| 11/14/2018 21:45 | 15 Minute | cfs | Normal and Above | 94 | 100 |
| 11/14/2018 22:00 | 15 Minute | cfs | Normal and Above | 94 | 100 |
| 11/14/2018 22:15 | 15 Minute | cfs | Normal and Above | 94 | 100 |
| 11/14/2018 22:30 | 15 Minute | cfs | Normal and Above | 94 | 100 |
| 11/14/2018 22:45 | 15 Minute | cfs | Normal and Above | 96 | 100 |
| 11/14/2018 23:00 | 15 Minute | cfs | Normal and Above | 97 | 100 |
| 11/14/2018 23:15 | 15 Minute | cfs | Normal and Above | 97 | 100 |
| 11/14/2018 23:30 | 15 Minute | cfs | Normal and Above | 97 | 100 |
| 11/14/2018 23:45 | 15 Minute | cfs | Normal and Above | 98 | 100 |

1. The provisional average daily flow for 11/14/2018 is 178 cfs.
2. The cause of 11/14/2018 temporary flow excursion is likely due to operational maintenance work.

Table B-5: Flow below Woodbridge Dam November 15, 2018

| Reading Date and Time | Interval | Unit | JSA Water Year Type | Golf Gage Measured Flow | JSA Expected Flow (below WID Dam) |
|------------------------------|-----------------|-------------|----------------------------|--------------------------------|--|
| 11/15/2018 00:00 | 15 Minute | cfs | Normal and Above | 98 | 100 |
| 11/15/2018 00:15 | 15 Minute | cfs | Normal and Above | 98 | 100 |
| 11/15/2018 00:30 | 15 Minute | cfs | Normal and Above | 100 | 100 |
| 11/15/2018 00:45 | 15 Minute | cfs | Normal and Above | 100 | 100 |
| 11/15/2018 1:00 | 15 Minute | cfs | Normal and Above | 101 | 100 |

1. The provisional average daily flow for 11/15/2018 is 189 cfs.
2. The cause of 11/15/2018 temporary flow excursion is likely due to operational maintenance work.

APPENDIX C

USGS VERIFIED FLOW DATA FOR 2016 AND 2017

Table C-1: Calendar Year 2016 – USGS Verified Average Daily Flow from Camanche Dam

| 11323500 Mokelumne River below Camanche Dam, CA | | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2016 | | | | | | | | | | | | |
| DAILY MEAN VALUES | | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 180 | 167 | 361 | 320 | 400 | 462 | 340 | 325 | 249 | 291 | 420 | 487 |
| 2 | 180 | 161 | 360 | 320 | 400 | 464 | 340 | 318 | 236 | 291 | 463 | 340 |
| 3 | 180 | 161 | 360 | 320 | 400 | 457 | 341 | 311 | 231 | 621 | 358 | 340 |
| 4 | 180 | 161 | 351 | 320 | 410 | 456 | 341 | 311 | 225 | 524 | 389 | 339 |
| 5 | 180 | 161 | 301 | 320 | 415 | 457 | 336 | 303 | 225 | 313 | 450 | 340 |
| 6 | 180 | 161 | 256 | 461 | 415 | 459 | 325 | 291 | 226 | 276 | 451 | 554 |
| 7 | 180 | 161 | 206 | 668 | 415 | 459 | 325 | 290 | 226 | 275 | 452 | 821 |
| 8 | 180 | 161 | 186 | 558 | 415 | 461 | 326 | 291 | 226 | 273 | 535 | 657 |
| 9 | 180 | 162 | 185 | 460 | 417 | 460 | 326 | 290 | 225 | 275 | 584 | 450 |
| 10 | 180 | 162 | 185 | 359 | 420 | 464 | 326 | 287 | 224 | 275 | 477 | 450 |
| 11 | 180 | 163 | 185 | 328 | 418 | 475 | 325 | 275 | 224 | 501 | 450 | 450 |
| 12 | 180 | 163 | 216 | 323 | 425 | 476 | 325 | 275 | 226 | 460 | 450 | 619 |
| 13 | 180 | 162 | 236 | 324 | 433 | 486 | 317 | 276 | 226 | 309 | 410 | 901 |
| 14 | 181 | 161 | 235 | 320 | 440 | 500 | 310 | 276 | 226 | 277 | 341 | 902 |
| 15 | 180 | 160 | 220 | 320 | 440 | 511 | 310 | 282 | 225 | 276 | 556 | 902 |
| 16 | 180 | 161 | 186 | 320 | 440 | 512 | 310 | 290 | 225 | 275 | 727 | 901 |
| 17 | 180 | 161 | 185 | 320 | 447 | 514 | 310 | 289 | 226 | 529 | 449 | 903 |
| 18 | 180 | 161 | 186 | 326 | 458 | 515 | 311 | 299 | 216 | 902 | 340 | 905 |
| 19 | 180 | 161 | 186 | 330 | 466 | 515 | 321 | 305 | 211 | 901 | 340 | 900 |
| 20 | 180 | 161 | 186 | 330 | 468 | 512 | 326 | 305 | 210 | 740 | 340 | 954 |
| 21 | 180 | 162 | 211 | 339 | 467 | 515 | 326 | 305 | 211 | 418 | 553 | 1230 |
| 22 | 180 | 161 | 226 | 345 | 466 | 516 | 325 | 305 | 208 | 330 | 752 | 1460 |
| 23 | 180 | 161 | 233 | 345 | 468 | 515 | 325 | 305 | 201 | 330 | 475 | 1460 |
| 24 | 180 | 161 | 241 | 347 | 471 | 515 | 325 | 305 | 201 | 356 | 341 | 1460 |
| 25 | 180 | 162 | 242 | 346 | 475 | 515 | 325 | 305 | 201 | 460 | 341 | 1460 |
| 26 | 180 | 163 | 243 | 346 | 472 | 515 | 325 | 300 | 201 | 431 | 341 | 1460 |
| 27 | 180 | 164 | 243 | 345 | 464 | 515 | 325 | 290 | 203 | 347 | 341 | 1460 |
| 28 | 180 | 164 | 242 | 381 | 458 | 515 | 325 | 290 | 201 | 331 | 340 | 1470 |
| 29 | 180 | 226 | 285 | 400 | 457 | 497 | 326 | 281 | 245 | 332 | 554 | 1460 |
| 30 | 180 | --- | 321 | 400 | 458 | 415 | 325 | 275 | 290 | 333 | 754 | 1460 |
| 31 | 180 | --- | 321 | --- | 460 | --- | 325 | 268 | --- | 332 | --- | 1460 |
| Total | 5,581 | 4,756 | 7,580 | 10,940 | 13,660 | 14,650 | 10,070 | 9,118 | 6,670 | 12,580 | 13,769 | 28,949 |
| Mean | 180 | 164 | 245 | 365 | 441 | 488 | 325 | 294 | 222 | 406 | 459 | 935 |
| Max | 181 | 226 | 361 | 668 | 475 | 516 | 341 | 325 | 290 | 902 | 754 | 1465 |
| Min | 180 | 160 | 185 | 320 | 400 | 415 | 310 | 268 | 201 | 273 | 340 | 339 |
| Ac-ft | 11,070 | 9,433 | 15,040 | 21,700 | 27,089 | 29,049 | 19,970 | 18,090 | 13,230 | 24,960 | 27,320 | 57,430 |

Note- Data published by USGS

Table C-2: Calendar Year 2017 – USGS Verified Average Daily Flow from Camanche Dam

| 11323500 Mokelumne River below Camanche Dam, CA | | | | | | | | | | | | |
|---|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|
| DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2017 | | | | | | | | | | | | |
| DAILY MEAN VALUES | | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 1460 | 4570 | 4970 | 4970 | 3990 | 3090 | 2530 | 900 | 601 | 450 | 1247 | 1173 |
| 2 | 1460 | 4500 | 4970 | 4970 | 3990 | 2890 | 2530 | 903 | 600 | 451 | 956 | 770 |
| 3 | 1460 | 4250 | 4970 | 4880 | 4000 | 2690 | 2470 | 903 | 599 | 493 | 589 | 584 |
| 4 | 1830 | 4000 | 4970 | 4690 | 4000 | 2490 | 2380 | 904 | 599 | 981 | 450 | 586 |
| 5 | 3710 | 4010 | 4970 | 4490 | 4000 | 2290 | 2300 | 903 | 599 | 1348 | 451 | 586 |
| 6 | 4940 | 3760 | 4970 | 4290 | 4000 | 2090 | 2180 | 903 | 600 | 1349 | 452 | 585 |
| 7 | 4980 | 3500 | 4970 | 4090 | 4000 | 1900 | 2090 | 853 | 600 | 1001 | 452 | 585 |
| 8 | 4990 | 3500 | 4970 | 4000 | 4000 | 1690 | 1870 | 754 | 534 | 750 | 452 | 456 |
| 9 | 4990 | 3900 | 4970 | 4000 | 4000 | 1490 | 1690 | 705 | 444 | 750 | 452 | 345 |
| 10 | 4980 | 4750 | 4970 | 4000 | 4000 | 1350 | 1580 | 700 | 401 | 1022 | 451 | 344 |
| 11 | 4960 | 4940 | 4970 | 4000 | 4000 | 1300 | 1580 | 700 | 399 | 1347 | 454 | 344 |
| 12 | 4960 | 4960 | 4970 | 4000 | 4000 | 1300 | 1580 | 701 | 400 | 1347 | 452 | 345 |
| 13 | 4960 | 4950 | 4980 | 4000 | 4000 | 1300 | 1500 | 702 | 403 | 1027 | 419 | 346 |
| 14 | 4960 | 4950 | 4970 | 4000 | 4000 | 1190 | 1360 | 654 | 400 | 750 | 368 | 346 |
| 15 | 4960 | 4970 | 4980 | 3990 | 4000 | 993 | 1210 | 601 | 400 | 752 | 342 | 347 |
| 16 | 4960 | 4980 | 4970 | 4000 | 4000 | 793 | 1100 | 600 | 399 | 1097 | 336 | 345 |
| 17 | 4960 | 4980 | 4970 | 4000 | 4000 | 701 | 1100 | 602 | 434 | 1349 | 337 | 344 |
| 18 | 4950 | 4980 | 4970 | 3990 | 4000 | 701 | 1010 | 603 | 450 | 1348 | 336 | 341 |
| 19 | 4950 | 4980 | 4980 | 4000 | 4000 | 710 | 899 | 603 | 451 | 1089 | 337 | 339 |
| 20 | 4940 | 4980 | 4970 | 4000 | 4000 | 799 | 899 | 603 | 450 | 642 | 402 | 336 |
| 21 | 4940 | 4980 | 4970 | 4000 | 4000 | 1120 | 897 | 601 | 452 | 452 | 501 | 337 |
| 22 | 4940 | 4980 | 4980 | 4000 | 4000 | 1330 | 897 | 598 | 451 | 452 | 568 | 336 |
| 23 | 4940 | 4980 | 4970 | 4000 | 3950 | 1330 | 898 | 601 | 451 | 611 | 585 | 336 |
| 24 | 4930 | 4970 | 4970 | 4000 | 3850 | 1330 | 899 | 601 | 451 | 1032 | 585 | 336 |
| 25 | 4930 | 4970 | 4970 | 3990 | 3750 | 1330 | 899 | 601 | 876 | 1248 | 584 | 336 |
| 26 | 4930 | 4980 | 4970 | 4000 | 3650 | 1530 | 899 | 604 | 1650 | 956 | 585 | 337 |
| 27 | 4920 | 4970 | 4970 | 4000 | 3600 | 1940 | 900 | 603 | 2000 | 590 | 768 | 334 |
| 28 | 4860 | 4970 | 4970 | 4000 | 3600 | 2330 | 902 | 601 | 2000 | 450 | 1168 | 335 |
| 29 | 4830 | --- | 4970 | 4000 | 3600 | 2530 | 903 | 600 | 1610 | 449 | 1386 | 334 |
| 30 | 4810 | --- | 4970 | 3990 | 3510 | 2530 | 901 | 599 | 828 | 610 | 1382 | 337 |
| 31 | 4780 | --- | 4970 | --- | 3300 | --- | 899 | 600 | --- | 1024 | --- | 336 |
| Total | 138,200 | 130,200 | 154,100 | 124,300 | 120,800 | 49,060 | 43,750 | 21,410 | 20,530 | 27,217 | 17,847 | 13,138 |
| Mean | 4457 | 4651 | 4972 | 4143 | 3896 | 1636 | 1411 | 691 | 684 | 878 | 595 | 424 |
| Max | 4989 | 4983 | 4977 | 4967 | 4005 | 3095 | 2529 | 904 | 2002 | 1349 | 1386 | 1173 |
| Min | 1461 | 3498 | 4966 | 3993 | 3298 | 701 | 897 | 598 | 399 | 449 | 336 | 334 |
| Ac-ft | 274,100 | 258,299 | 305,700 | 246,600 | 239,600 | 97,300 | 86,780 | 42,460 | 40,730 | 53,980 | 35,400 | 26,060 |

Note- October through December data provisional until approved by USGS

Table C-3: Calendar Year 2016 – USGS Verified Average Daily Flow below Woodbridge Dam

| 11325500 Mokelumne River at Woodbridge, CA | | | | | | | | | | | | |
|---|-------|-------|-------|--------|--------|--------|-------|-------|-------|--------|--------|--------|
| DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2016 | | | | | | | | | | | | |
| DAILY MEAN VALUES | | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 114 | 137 | 102 | 157 | 201 | 191 | 31 | 37 | 30 | 107 | 259 | 518 |
| 2 | 112 | 125 | 93 | 156 | 202 | 189 | 27 | 34 | 29 | 115 | 440 | 318 |
| 3 | 109 | 116 | 108 | 156 | 207 | 189 | 28 | 31 | 30 | 202 | 347 | 246 |
| 4 | 114 | 112 | 90 | 156 | 215 | 189 | 28 | 32 | 31 | 521 | 224 | 238 |
| 5 | 147 | 110 | 104 | 155 | 207 | 191 | 28 | 32 | 47 | 259 | 257 | 178 |
| 6 | 90 | 108 | 134 | 174 | 209 | 191 | 31 | 32 | 35 | 128 | 342 | 193 |
| 7 | 89 | 108 | 164 | 465 | 209 | 191 | 28 | 31 | 31 | 107 | 326 | 664 |
| 8 | 211 | 107 | 108 | 430 | 208 | 191 | 30 | 32 | 31 | 107 | 341 | 656 |
| 9 | 105 | 107 | 95 | 370 | 205 | 191 | 30 | 31 | 30 | 107 | 605 | 447 |
| 10 | 101 | 106 | 109 | 302 | 202 | 201 | 35 | 32 | 30 | 135 | 391 | 318 |
| 11 | 110 | 107 | 110 | 178 | 203 | 203 | 37 | 31 | 30 | 154 | 238 | 327 |
| 12 | 110 | 107 | 108 | 154 | 202 | 204 | 31 | 30 | 32 | 411 | 327 | 341 |
| 13 | 114 | 107 | 111 | 153 | 203 | 204 | 28 | 30 | 31 | 250 | 334 | 720 |
| 14 | 88 | 105 | 117 | 152 | 203 | 205 | 25 | 31 | 31 | 183 | 269 | 771 |
| 15 | 87 | 104 | 118 | 151 | 203 | 207 | 25 | 31 | 31 | 178 | 233 | 822 |
| 16 | 94 | 104 | 86 | 152 | 202 | 206 | 25 | 31 | 32 | 284 | 653 | 842 |
| 17 | 113 | 105 | 78 | 153 | 201 | 203 | 25 | 30 | 31 | 169 | 510 | 829 |
| 18 | 240 | 127 | 79 | 153 | 202 | 206 | 26 | 31 | 32 | 610 | 249 | 831 |
| 19 | 223 | 107 | 78 | 151 | 201 | 206 | 25 | 32 | 31 | 758 | 188 | 835 |
| 20 | 295 | 104 | 79 | 151 | 202 | 209 | 25 | 32 | 31 | 767 | 268 | 847 |
| 21 | 134 | 104 | 80 | 150 | 203 | 206 | 25 | 32 | 31 | 472 | 240 | 936 |
| 22 | 133 | 104 | 80 | 154 | 204 | 205 | 25 | 33 | 32 | 267 | 639 | 1290 |
| 23 | 148 | 103 | 80 | 152 | 204 | 204 | 25 | 33 | 31 | 230 | 567 | 1440 |
| 24 | 134 | 104 | 81 | 153 | 204 | 204 | 25 | 32 | 30 | 238 | 305 | 1440 |
| 25 | 296 | 103 | 80 | 147 | 195 | 204 | 26 | 33 | 31 | 239 | 244 | 1430 |
| 26 | 465 | 103 | 80 | 152 | 191 | 205 | 27 | 33 | 31 | 555 | 212 | 1450 |
| 27 | 175 | 104 | 80 | 157 | 192 | 205 | 27 | 35 | 30 | 277 | 253 | 1460 |
| 28 | 145 | 104 | 81 | 150 | 190 | 207 | 27 | 44 | 31 | 263 | 208 | 1470 |
| 29 | 139 | 108 | 94 | 189 | 191 | 204 | 31 | 62 | 31 | 248 | 201 | 1500 |
| 30 | 145 | --- | 156 | 200 | 191 | 202 | 36 | 47 | 84 | 277 | 671 | 1520 |
| 31 | 141 | --- | 155 | --- | 191 | --- | 36 | 30 | --- | 264 | --- | 1530 |
| Total | 4,721 | 3,150 | 3,118 | 5,673 | 6,243 | 6,012 | 878 | 1,047 | 998 | 8,882 | 10,340 | 26,410 |
| Mean | 152 | 109 | 101 | 189 | 201 | 200 | 28 | 34 | 33 | 287 | 345 | 852 |
| Max | 465 | 137 | 164 | 465 | 215 | 209 | 37 | 62 | 84 | 767 | 671 | 1530 |
| Min | 87 | 103 | 78 | 147 | 190 | 189 | 25 | 30 | 29 | 107 | 188 | 178 |
| Ac-ft | 9,364 | 6,248 | 6,183 | 11,250 | 12,380 | 11,930 | 1,741 | 2,077 | 1,980 | 17,620 | 20,510 | 52,380 |

Note- Data published by USGS

Table C-4: Calendar Year 2017 – USGS Verified Average Daily Flow below Woodbridge Dam

| 11325500 Mokelumne River at Woodbridge, CA | | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| DISCHARGE, CUBIC FEET PER SECOND CALENDAR YEAR 2017 | | | | | | | | | | | | |
| DAILY MEAN VALUES | | | | | | | | | | | | |
| Day | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 1540 | 4740 | 4780 | 4740 | 3800 | 3130 | 2270 | 562 | 315 | 445 | 1020 | 1290 |
| 2 | 1540 | 4700 | 4790 | 4750 | 3790 | 2910 | 2280 | 586 | 315 | 269 | 1030 | 981 |
| 3 | 1580 | 4630 | 4780 | 4740 | 3790 | 2680 | 2290 | 580 | 326 | 311 | 641 | 647 |
| 4 | 1720 | 4530 | 4780 | 4670 | 3790 | 2470 | 2220 | 579 | 329 | 444 | 399 | 602 |
| 5 | 2400 | 4350 | 4790 | 4500 | 3810 | 2270 | 2180 | 565 | 328 | 1030 | 363 | 582 |
| 6 | 3540 | 4320 | 4780 | 4380 | 3810 | 2080 | 2040 | 566 | 325 | 1110 | 358 | 558 |
| 7 | 4320 | 4290 | 4780 | 4240 | 3810 | 1900 | 1980 | 568 | 321 | 1080 | 498 | 543 |
| 8 | 4500 | 4140 | 4780 | 4110 | 3800 | 1670 | 1800 | 498 | 302 | 649 | 320 | 533 |
| 9 | 4430 | 4040 | 4770 | 3990 | 3790 | 1490 | 1600 | 435 | 231 | 608 | 285 | 361 |
| 10 | 4610 | 4210 | 4770 | 3860 | 3780 | 1300 | 1420 | 420 | 165 | 627 | 361 | 331 |
| 11 | 4800 | 4620 | 4770 | 3860 | 3770 | 1190 | 1380 | 415 | 151 | 1060 | 387 | 324 |
| 12 | 4810 | 4780 | 4770 | 3870 | 3770 | 1150 | 1370 | 405 | 147 | 1130 | 389 | 323 |
| 13 | 4760 | 4800 | 4770 | 3880 | 3780 | 1130 | 1340 | 397 | 148 | 1100 | 374 | 320 |
| 14 | 4740 | 4790 | 4760 | 3850 | 3780 | 1060 | 1200 | 397 | 154 | 668 | 524 | 319 |
| 15 | 4690 | 4790 | 4760 | 3840 | 3780 | 917 | 1090 | 334 | 146 | 614 | 244 | 318 |
| 16 | 4620 | 4720 | 4760 | 3860 | 3770 | 739 | 919 | 330 | 150 | 675 | 336 | 309 |
| 17 | 4350 | 4750 | 4760 | 3870 | 3770 | 568 | 887 | 320 | 155 | 1100 | 322 | 317 |
| 18 | 4630 | 4800 | 4760 | 3870 | 3760 | 520 | 862 | 319 | 198 | 1130 | 314 | 312 |
| 19 | 4750 | 4810 | 4750 | 3850 | 3740 | 501 | 699 | 318 | 195 | 1100 | 316 | 309 |
| 20 | 4790 | 4840 | 4760 | 3850 | 3740 | 501 | 664 | 321 | 191 | 750 | 327 | 299 |
| 21 | 4800 | 4880 | 4780 | 3840 | 3730 | 677 | 636 | 328 | 197 | 397 | 522 | 291 |
| 22 | 4820 | 4900 | 4800 | 3830 | 3730 | 978 | 618 | 325 | 189 | 350 | 493 | 299 |
| 23 | 4830 | 4860 | 4780 | 3820 | 3730 | 1030 | 624 | 320 | 196 | 347 | 532 | 296 |
| 24 | 4730 | 4820 | 4770 | 3820 | 3710 | 1030 | 620 | 315 | 184 | 631 | 538 | 299 |
| 25 | 4740 | 4810 | 4760 | 3820 | 3650 | 1030 | 615 | 317 | 246 | 1010 | 540 | 304 |
| 26 | 4750 | 4810 | 4750 | 3820 | 3560 | 1070 | 618 | 319 | 834 | 1020 | 542 | 304 |
| 27 | 4760 | 4810 | 4750 | 3820 | 3470 | 1400 | 631 | 318 | 1460 | 650 | 508 | 305 |
| 28 | 4770 | 4790 | 4750 | 3800 | 3410 | 1800 | 607 | 322 | 1620 | 389 | 817 | 302 |
| 29 | 4760 | --- | 4740 | 3800 | 3390 | 2140 | 591 | 321 | 1630 | 361 | 1280 | 295 |
| 30 | 4760 | --- | 4740 | 3800 | 3360 | 2250 | 602 | 320 | 1060 | 388 | 1290 | 295 |
| 31 | 4750 | --- | 4730 | --- | 3300 | --- | 597 | 318 | --- | 667 | --- | 295 |
| Total | 129,600 | 130,300 | 147,800 | 120,700 | 114,700 | 43,580 | 37,250 | 12,440 | 12,210 | 22,110 | 15,870 | 12,863 |
| Mean | 4180 | 4658 | 4767 | 4025 | 3699 | 1453 | 1203 | 407 | 406 | 703 | 514 | 426 |
| Max | 4832 | 4903 | 4799 | 4747 | 3810 | 3131 | 2294 | 590 | 1631 | 1134 | 1291 | 1286 |
| Min | 1535 | 4046 | 4730 | 3798 | 3304 | 501 | 594 | 318 | 146 | 247 | 220 | 303 |
| Ac-ft | 257,000 | 258,500 | 293,100 | 239,500 | 227,400 | 86,440 | 73,880 | 24,670 | 24,210 | 43,850 | 31,480 | 25,510 |

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
December 4, 2018
9:00 am – Noon**

Attendance: USFWS: Dan Welsh*, Mark Gard
CDFW: Tina Bartlett*, Kevin Thomas, Colin Purdy, Jay Rowan
NMFS: Monica Gutierrez
EBMUD: Richard Sykes*, Mike Tognolini, Jose Setka, Rick Leong, Michelle Workman, Robyn Bilski, Dave Briggs (by phone), Heidi Chou (*by phone*),

**JSA Steering Committee representatives*

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

Meeting began with self-introductions. Richard Sykes shared that he will be retiring from EBMUD in a couple of weeks. He offered some thoughts and reflections on the work that this committee has accomplished together and extended his thanks to each around the table for collaborative successes over the years. Richard introduced Mike Tognolini, EBMUD's new Director of Water and Natural Resources and EBMUD's representative moving forward on the Partnership Steering Committee. Mike introduced himself to the committee and expressed that he is looking forward to working with the group to continue this great collaborative effort. Tina Bartlett then shared that she will be leaving her Regional Manager position in CDFW Region II (North Central Region) and will become CDFW Region I (Northern Region) Regional Manager in Redding beginning in January 2019. Tina also shared her appreciation of all the work the Lower Mokelumne River Partnership has accomplished and has enjoyed being part of it. Tina said that Kevin Thomas is the current temporary Regional Manager. Richard commented that in retirement he will be doing some work for the Mattole Salmon Group in the North Coast and that it would be likely that he and Tina's paths would cross in her new position.

1. 2018 Mokelumne River Fisheries Review (Robyn Bilski): Robyn provided the report on 2018 Mokelumne River fisheries research activities, management, and outmigration and escapement monitoring results. Robyn reported that water temperatures for egg incubation have been great in 2018.
 - a. Brood Year 2017 Outmigration: Robyn began her presentation with information on BY 2017 outmigration trapping data. Robyn stated that EBMUD utilizes an upstream rotary screw trap located at Vino Farms and a downstream rotary screw trap at Golf. Robyn shared that the upstream trap provided an in-river production estimate of 456K juvenile Chinook salmon and the downstream trap provided an estimate of about 40K juvenile Chinook salmon reaching that point in the river. Michelle Workman shared that EBMUD is planning to place a third rotary screw trap in the river (about halfway between the two existing traps) with the hope of narrowing down and helping to identify areas of concern that may be having a negative impact on outmigration survival of juvenile salmon.
 - b. Hatchery Summary: Next Robyn reviewed 2018 hatchery releases by number and location. Of the 5.6 million juvenile Chinook salmon released, approximately 4M were mitigation fish released to the Sherman Island net pens, 740K were enhancement fish released at Half Moon Bay, 400K were rearing study fish released at Sherman Island, and 400K were released in the lower Mokelumne River at Woodbridge and Mokelumne River Fish Hatchery. Robyn also reported that 100K yearling Steelhead were released at Feist Ranch and another 195K at New Hope. Robyn reported that approximately 5.3M salmon eggs have been taken through 11/21/18. Preliminary coded-wire tag recovery data indicate that 96% of the adult salmon entering the hatchery were of Mokelumne-origin.

- c. 2018 Habitat Restoration Activities: Next Robyn provided a summary of the 2018 habitat restoration activities. Habitat monitoring continued in the SHIRA gravel enhancement reach with a focus on examining movement of substrate following the very wet 2017 year. Robyn reported that approximately 900 cubic yards of gravel has moved downstream from the SHIRA site. Floodplain habitat restoration activities continued in the Mokelumne Day Use Area with expansion of the floodplain created in 2015 and the addition of fine sediment to the 2016 floodplain area. Robyn reported that about 500 cubic yards of spawning gravel was added as part of reach maintenance.
 - d. 2019 Habitat Restoration Plans: Robyn shared that the work planned for 2019 will include ongoing hydraulic modeling, restoration design, maintenance of existing floodplain areas and spawning gravel enhancement areas, and the addition of up to 3 acres of new floodplain habitat.
 - e. 2018 Escapement: Robyn reported on the 2018 escapement monitoring to-date. Robyn said that 6 planned attraction flows were implemented by EBMUD. Additional pulse flows were provided by Woodbridge Irrigation District beginning on 11/6/18. Also, the Delta Cross Channel gates were closed weekly between 11/5/18-11/30/18. Following 11/30/18, they were closed indefinitely. As of 11/28/18, 16,355 Chinook salmon passed WID dam. Robyn then showed a graph of the attraction flows, which appeared very successful based on daily salmon passage data. Robyn then provided a report on the demographics of the 2018 run (41% adult female, 24% adult male, 9% grilse female, and 26% grilse male).
 - f. 2018 Redd Survey: Robyn reported that 1,320 Chinook salmon redds were counted as of 11/27/18, with 92% of the redds occurring in Reach 6. Zero O. mykiss redds were counted as of 11/27/18.
 - g. 2017 Additional Activities: Robyn provided an update on the ongoing diversion surveys being conducted on the lower Mokelumne River to assess potential impacts from small diversion pumps. 7 diversion surveys have been completed between Camanche Reservoir and tidal influence and 54 active/potentially active diversions have been identified (with 47 that did not have fish screens). Landowner outreach will continue to identify those interested in a screening project and the diversion survey report will be completed in 2018. Robyn shared an update on the rearing study in progress at the Mokelumne hatchery. This study will evaluate if reduction of feed rates and/or rearing temperatures can effectively decrease growth rates to reduce precocious maturation of Mokelumne hatchery-origin salmon. Robyn shared some preliminary results from the first year of the rearing study and the second year of the study is underway. Robyn then reported on the preliminary results from the 3-year barging study (2015-17). These preliminary results indicate that barging of juvenile fish as part of their outmigration is beneficial for outmigration survival and escapement. Finally, Robyn shared the 2017 ocean recovery data, which has shown that the San Joaquin tributaries (primarily the Mokelumne) have contributed 35% (recreational) and 20% (commercial) to the ocean fishery.
2. Water Supply Update: (Heidi Chou – by phone) Heidi provided a review of the 2018 Water Year. Heidi first reported that the Mokelumne watershed received 42.66" of precipitation during WY 2018 that resulted in 600 TAF of runoff and, in September, 650 TAF of system storage. Heidi then reviewed river temperature and Camanche Reservoir hypolimnion volume data. River temperatures were significantly lower in 2018 and the Camanche Reservoir hypolimnion currently stands at 56 TAF. Heidi reported that the JSA water year type for the period of October 2018 to March 2019 is "Normal and Above" based upon combined storage of Pardee and Camanche Reservoirs on Nov. 5, 2018.
 3. Update on MRFH Hatchery Coordination Team: (Jose Setka) Jose shared that Cramer Fish Sciences has been hired to produce the HGMP and that a draft report is anticipated in 2019.

4. Update on Partnership Fund and Lower Mokelumne Stewardship group activities (Rick Leong) Rick stated that the current available balance Fund, as of September 30, 2018, was \$140,456. Rick shared that there were no new project proposals. Dan Welsh commented that more project proposals are needed. Jay asked if increasing angler access could be a program considered for the Partnership Fund. Rick explained that the Steering Committee developed funding criteria for the Partnership Fund and that if the angler access effort met the Partnership's criteria for meeting the objectives established for the Partnership, it could be considered. Rick shared that the Stewardship Steering Committee continues to be a place for sharing information, especially amongst private landowners, but there have not been any on-the-ground landowner projects in a while. Rick stated that EBMUD is trying to schedule a water supply operations forum/open house for landowners along the river and Rick said that the LMR Stewardship Steering Committee could be an ideal host since it is a forum made up of landowners. Michelle shared that the Stewardship Steering Committee is also trying to update their email database for information distribution.
5. Upper Mokelumne River Habitat Assessment (Michelle Workman) Michelle reported that the habitat assessment report completed by Cramer Fish Sciences was completed. Michelle reported that pathology continues to be one of the primary concerns of the CDFW, especially IHN (Infectious hematopoietic necrosis). Members of the Partnership Steering Committee discussed previous examples in other parts of the state when a re-introduction process ended up having a large negative impact of the fishery. Michelle explained that this project on the upper Mokelumne, if attempted, would only be a small, contained, trial.
6. SWRCB Delta Water Quality Control Plan Update (EBMUD and CDFW) The Steering Committee members discussed the State Board's Delta Water Quality Control Plan Update process. Jose shared the Voluntary Agreement process on the proposed VA for the Mokelumne has become stalled as DWR continues to evaluate next steps.
7. Updates from Steering Committee Members (All): Robyn Bilski asked Monica Gutierrez about the status of the 5-year Steelhead report. Monica said that she would check and report back. Dan Welsh shared that the USFWS has a large volume of Biological Opinion work ahead over the next 2 years related to OCAP and other projects around the state. Mark Gard shared that Jeff McLain is now the Field Supervisor at the USFWS Lodi Office.
8. Meeting Adjournment: The meeting adjourned at Noon.

Respectfully submitted by: Rick Leong

APPENDIX E

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



May 3, 2018

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

Jan Knight, Deputy Field Supervisor
US Fish & Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Subject: Lack of Availability of Additional Mokelumne River Water

Dear Ms. Bartlett and Ms. Knight:

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 2018 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 2018 Water Supply Availability and Deficiency Report accepted by the District's Board of Directors at their April 24, 2018 meeting. In low water years, this annual report provides the basis for the Board's consideration of demand management measures. In years of excess supply, this report provides the basis for the Board's determination of sufficient water supply.

The 2018 assessment, based on the Department of Water Resources' April 1st projected Mokelumne River runoff of 605 thousand acre-feet into Pardee Reservoir, concludes that water year 2018 is a "Below Normal" year. Flood control releases are being made and have occurred earlier this year as necessary to meet flood control obligations. Pursuant to the JSA, the District will provide flow releases to the lower Mokelumne River according to the "Below Normal" water year type. Pulse flow operations are planned for this May, and pulse flow timing would be coordinated with the resource agencies and downstream Mokelumne River water users. Fall pulse flows will be determined in the fall.

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

Sincerely,

A handwritten signature in blue ink that reads 'Lena L. Tam'.

Lena L. Tam
Manager of Water Resources Planning

LLT:PKJ:gjc

Enclosure



AGENDA NO. 21.
 MEETING DATE April 24, 2018

TITLE 2018 WATER SUPPLY AVAILABILITY AND DEFICIENCY REPORT

MOTION _____ RESOLUTION _____ ORDINANCE _____

RECOMMENDED ACTION

1. File the Water Supply Availability and Deficiency Report in conformance with District Policy 9.03 – Water Supply Availability and Deficiency.
2. Declare that the District’s water supply is sufficient for meeting customer demands in 2018.

SUMMARY

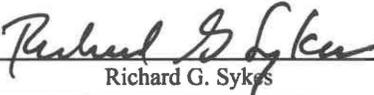
The annual Water Supply Availability and Deficiency Report is prepared and submitted to the Board of Directors pursuant to Policy 9.03 – Water Supply Availability and Deficiency. The report evaluates the adequacy of the current year’s (2018) water supply. In low water years, this annual report provides the basis for the Board’s consideration of possible demand management and/or supplemental supply measures as part of the District’s Drought Management Plan. In years of available water supply, this report provides the basis for the Board’s determination of additional availability of water for potential use by others.

For 2018, the end of September total system storage (TSS) is projected to be full, greater than 630 thousand acre-feet (TAF), resulting in the District’s water supply being sufficient to meet customer demands in 2018. The 2018 assessment also concludes that projected runoff and water storage require designating ‘Below Normal’ water year type flows in the lower Mokelumne River under the District’s Joint Settlement Agreement (JSA). This determination is based on the State of California Department of Water Resources’ (DWR) April 1 snow survey. The Mokelumne River runoff forecast as of April 9 is 76 percent of average.

DISCUSSION

2018 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 TSS 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 by other

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| Funds Available: FY | | Budget Code: | |
| DEPARTMENT SUBMITTING | DEPARTMENT MANAGER or DIRECTOR | APPROVED | |
| Water and Natural Resources |  Richard G. Sykes |  General Manager | |

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downstream interests. If the projected TSS on September 30, 2018 exceeds 500 TAF, the District's water supply is deemed sufficient to meet customer needs. If the sum is less than 500 TAF, the District's water supply is deemed deficient.

The dry winter in the early part of water year 2018 resurrected memories of the recent drought in California, but powerful storms in March helped improve storage levels. The water year total precipitation as of April 9 in the Mokelumne watershed is 48.28 inches (94 percent of average) and the total precipitation in the East Bay is 27.15 inches (79 percent of average). The median unimpaired runoff projection is 565 TAF, and this corresponds to a median projection for TSS at the end of September of 630 TAF. These projections are based on DWR's April 1 snow survey. With customer usage lower than the 2013 levels, the median runoff conditions combined with suppressed customer demands will enable the TSS to be greater than 500 TAF at the end of the current water year, the threshold for determining that the District's water supply for 2018 is sufficient.

The water year type is classified as "Below Normal," based on DWR's April 1 forecast for unimpaired runoff of 605 TAF into Pardee Reservoir. The "Below Normal" condition will determine the requirements for the releases from Camanche Reservoir and the flow expected below Woodbridge Dam during the April 1, 2018 through September 30, 2018, in accordance with the JSA year-type flow schedule.

The JSA requires additional releases from Camanche Reservoir of up to 200 cubic feet per second dependent upon combined Pardee and Camanche storage levels in Below Normal year types. Storage levels will hit those triggers this year, and these releases will be in addition to all other required releases to meet downstream obligations.

Based on current 2018 runoff projections for the remainder of the year, Woodbridge Irrigation District will receive its full base supply of 60,000 acre-feet (AF); Jackson Valley Irrigation District will receive its maximum entitlement of 3,850 AF; and North San Joaquin Water Conservation District (NSJWCD), a junior water right holder, may not receive the 20,000 AF they requested on January 22, 2018 as there may not be adequate water to store the requested full amount during the storage season. Runoff projections will continue to be updated through May and if runoff is found to be sufficient, the District will notify NSJWCD that storage is available. Flood control releases are being made currently and have occurred earlier this year as necessary to meet flood control obligations.

The JSA provides that the District notify resources agencies of the availability of surplus water. There will be no surplus water based on current projections.

State Regulations

EBMUD continues to comply with the State Water Resources Control Board (SWRCB) regulatory requirements for monthly reporting on water usage. There are no current drought water-use restrictions in effect.

DREAM Project

The Demonstration Recharge Extraction and Aquifer Management (DREAM) project is a pilot conjunctive use groundwater replenishment project to enable banking of up to 1,000 AF of water. This project is a joint effort of the San Joaquin County (County), the NSJWCD, and the District.

On March 23, the State Water Resources Control Board (SWRCB) granted the District a permit for the DREAM Project. The permit enables the project to start testing the viability of groundwater banking and extraction. Surplus water for the DREAM Project is not projected to be available at this time. However, runoff projections will continue to be updated and if found sufficient, the District will begin deliveries this year and continue for an additional one to two irrigation seasons.

Bayside Groundwater Project – Phase 1

This project is designed to store excess water in the East Bay Plain Groundwater Basin by injecting drinking water during wet years for later extraction during dry years. The District obtained a permit from the SWRCB in 2007 to inject water into the aquifer. This permit remains current. The District also applied to the State's Division of Drinking Water (DDW) for the permit to extract and use the groundwater in the event drought conditions return. The DDW has not approved the permit at this time.

In 2017, the District injected water for five days to test the groundwater aquifer's reaction. The test took place from February 10, 2017 to February 12, 2017 and just over 1.3 million gallons were injected. Since then, no water has been injected at Bayside. The District may inject water into the Bayside aquifer later this year, depending on availability of water in the upper San Leandro watershed.

Pulse Flow Operations

Pulse flows are intended to mimic the natural variability found in undammed rivers, and help cue fish migration. The District conducted multiple pulse flow releases in the fall of 2017. Each pulse resulted in an increase in salmon returning to the Mokelumne River.

This year, staff will develop a spring pulse flow plan to be operated in May to assist outmigrating juvenile salmon. Pulse flow timing would be coordinated with other fishery resource agencies and downstream Mokelumne River water users. Fall pulse flows will be determined in the fall.