Lower Mokelumne River Project
FERC Project No. 2916

2006 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 2007

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

AFRP	Anadromous Fish Restoration Program
CBDA	California Bay Delta Authority
CDFG	California Department of Fish and Game
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
LWCC	Lodi-Woodbridge Winegrape Commission
MRA	Mokelumne River Association
MRDUA	Mokelumne River Day Use Area
MRTAC	Mokelumne River Technical Advisory Committee
NOAA	National Oceanic and Atmospheric Administration
PCC	Partnership Coordinating Committee
PSC	Partnership Steering Committee
SAFCA	Sacramento Area Flood Control Agency
SCWA	Sacramento County Water Agency
SJCRCD	San Joaquin County Resource Conservation District
SWRCB	State Water Resources Control Board
TNC	The Nature Conservancy
USFWS	United States Fish and Wildlife Service
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 Game (CDFG), and "License" refers to the license for EBMUD's Lower Mokelumne River Project, FERC Project No. 2916.

This report summarizes the measures EBMUD implemented the previous calendar year (2006), and those it plans to implement in the current calendar year (2007), pursuant to the JSA, to protect and enhance the fishery resources and ecosystem of the lower Mokelumne River.

II. INTRODUCTION

This submittal is EBMUD's Project Operations Update Report[1] for 2006. EBMUD actions in 2006 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 watershed have been implemented through the Water Quality and Resource Management Program (WQRMP). This program, developed by the Partnership Steering Committee in cooperation with NOAA Fisheries and the Mokelumne River Technical Advisory Committee (MRTAC) members, and in accordance with Sections E.3, F.5, and H.5 of the JSA, was approved by FERC May 9, 2001. The WQRMP includes a comprehensive monitoring and applied research program integrated with a well-coordinated program to adaptively manage water and power supply operations, flood control, hatchery operations, and ecosystem rehabilitation actions. The Partnership Steering Committee (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 has made efforts to restore, enhance, and protect the fisheries resource and ecosystem of the lower Mokelumne River. These areas are Flow, Water Quality,

[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 thru 2005).

The Lower Mokelumne River Partnership, Mokelumne River Technical Cooperation, Research and Monitoring, and Habitat Improvements. Section V contains the appendices. Sections III and IV describe efforts made during the 2006 calendar year and efforts planned for 2007.

III. STATUS OF THE LOWER MOKELUMNE RIVER SALMON POPULATION

The lower Mokelumne River Chinook salmon population continues to demonstrate characteristics consistent with long-term sustainability. The fall-run Chinook salmon escapement was 16,144 in 2005-2006 and 5,861 in 2006-2007. Both of these values are greater than the values prior to the time EBMUD began implementing the flows consistent with the Lower Mokelumne River Management Plan (1993).

Table 1: Lower Mokelumne River Fall-Run Chinook Salmon Data, 1989-2006.

Year	Outmigration		Total	Hatchery	Natural	Percent Natural	Number of
	Fry	Smolts	Escapement	Returns	Spawners	Spawners of Total	Redds
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	343
1993	11,006	172,442	3,157	2,164	993	31	530
1994	554	142,670	3,157	1,919	1,238	39	774
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	1,322
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	623
2000	107,134	61,391	7,423	5,450	1,973	27	987
2001	37,754	81,580	8,116	5,809	2,307	28	843
2002	11,791	66,132	10,759	7,919	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	16,144	5,738	10,406	64	2,170
2006	1,008,289	179,264	5,861	4,138	1,723	29	754

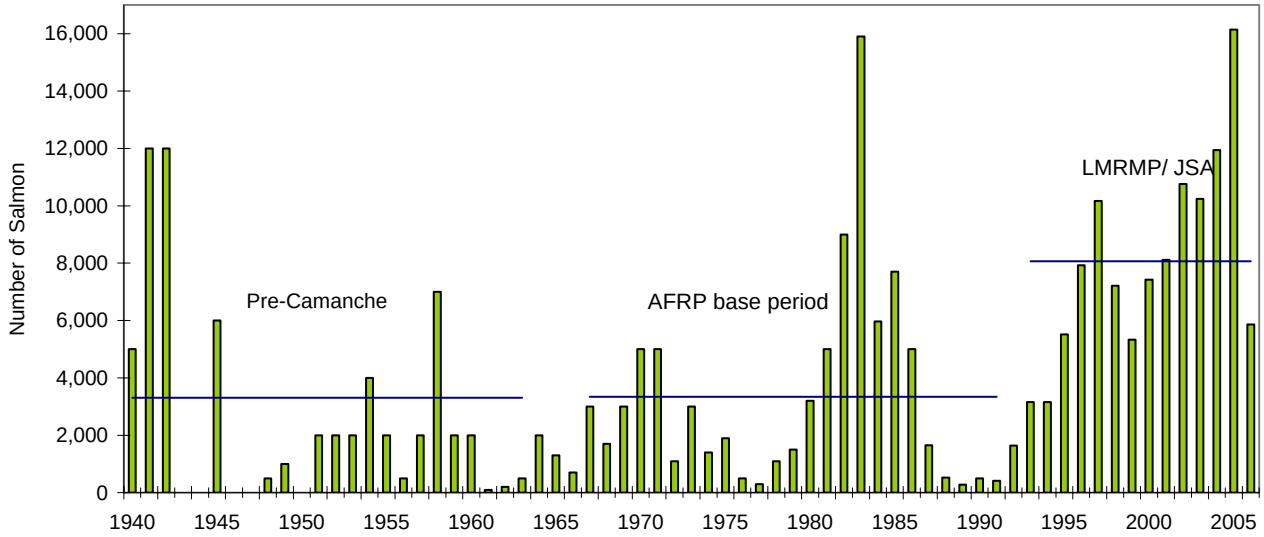
Notes:

1. Escapement monitoring generally occurs from August through January, but dates vary each year.
2. Hatchery Returns: count by CDFG 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.

The number of redds observed in the lower Mokelumne River has also increased in recent years. In 2006-2007, 754 redds were observed, a significant increase over the 71 redds observed in 1990, when monitoring of the redds began.

Fall-run Chinook salmon returns to the lower Mokelumne River, both before and after construction of Camanche Dam, show low returns during droughts (i.e., the 1976-1977 and 1987-1992 droughts) followed by higher returns after the end of a drought (Figure 1, below). Similar patterns of salmon returns are apparent in the other river systems in the Central Valley.

Although lower Mokelumne River salmon populations have experienced fluctuations in annual run sizes from 1940 to the present, there is evidence of a trend of increasing fall-run Chinook salmon abundance on the lower Mokelumne River. During the 1990s and into 2006, the lower Mokelumne River has experienced generally increasing annual escapements of fall-run Chinook salmon.



1. "Pre-Camanche" escapement (3305) is the average estimate at Woodbridge for the period of record beginning in 1940 through 1963 (excluding years when no data was recorded).
2. "AFRP base period" is defined as the 1967-1991 period. Mokelumne River average escapement estimate, at Woodbridge, for the AFRP base period is 3345.
3. "LMRMP/ JSA" escapement (8069) is the average estimate at Woodbridge since voluntary flow improvements were initiated in 1993.

Figure 1: Lower Mokelumne River Fall-Run Chinook Salmon Escapement, 1940-2006.

The Mokelumne River Fish Hatchery, owned by the District and operated by the California Department of Fish and Game (CDFG), reported that the 2006-2007 salmon return at the Mokelumne River Fish Hatchery was 4,138 salmon. The return of salmon to the hatchery in 2006 resulted in an egg take of 7.2 million.

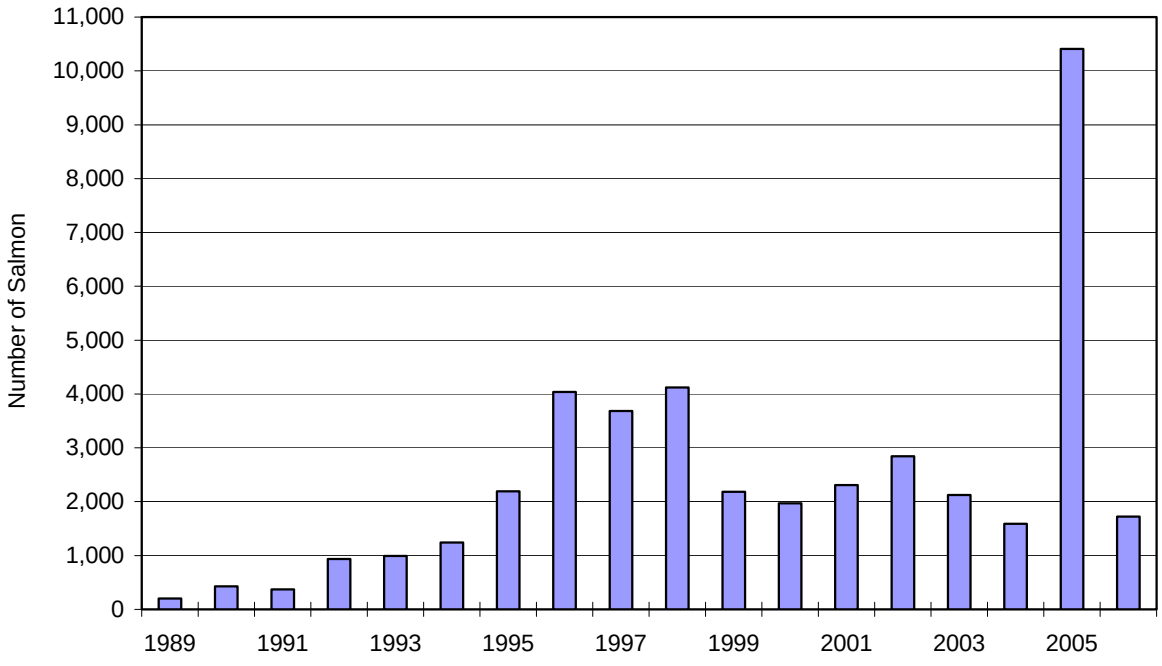


Figure 2: Fall-Run Chinook Salmon Spawning in the Lower Mokelumne River, 1989-2006.

In summary, the total escapement, hatchery returns, and number of redds continue to clearly indicate that the fall-run Chinook salmon population in the lower Mokelumne River is doing well, has recovered from the effects of prolonged drought and ocean conditions, and is rebuilding. For recent news articles on the Mokelumne River fisheries resource, refer to Appendix A.

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, EBMUD began in 1987 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 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 2006, and those actions planned for 2007, are described in this section.

A. FLOW

Consultation with CDFG 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 2006 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. 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 this flow data is collected and the time it is published in the USGS Water Data Reports, the 2006 flow data included in this report has not yet been verified or published by the USGS.

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

2006

In accordance with the November 27, 1998 FERC approval of the JSA, and based upon EBMUD's forecast of total Pardee and Camanche storage on November 5, 2005, EBMUD provided "Normal and Above" JSA water year type Camanche Dam flow releases from October 1, 2005 through March 31, 2006. Pardee and Camanche actual total storage on November 5, 2005 was 477,340 acre-feet.

Based on the California Department of Water Resources (DWR) April 1, 2006 forecast of 1,125,000 acre feet of unimpaired runoff into Pardee Reservoir, EBMUD operated under a "Normal and Above" JSA water year type Camanche Dam flow releases from April 1, 2006 through September 30, 2006.

EBMUD is making, at a minimum, "Normal and Above" JSA water year type Camanche Dam flow releases from October 1, 2006 through March 31, 2007. This is based on EBMUD's October 1, 2006 forecast of total Pardee and Camanche storage on November 5, 2006. Pardee and Camanche actual total storage on November 5, 2006 was 476,900 acre-feet.

Calendar year 2006 actual Camanche Dam average daily flow releases and JSA agreed flow releases from Camanche Dam can be seen in Table 2 and Figure 3, on the following pages. Calendar year 2006 actual average daily flow below Woodbridge Dam and JSA expected flow below Woodbridge Dam can be seen in Table 3 and Figure 4.

Woodbridge Dam, an inflatable bladder control structure consisting of two bays, is owned and operated by the Woodbridge Irrigation District (WID). In January 2004, construction of the new Woodbridge Dam, which replaced the existing 93-year old structure and improved fish passage facilities, began. Phase I of the project included construction of the north half of the dam and all fish ladders located on the north side of the dam, Phase II included the construction of the south side of the dam. In January 2006, WID's contractor removed the coffer-dam sheet-piling upstream of the Phase II portion of their new bladder dam but construction was not complete by the March project deadline because of flood control releases from Camanche Dam. Additional work such as grouting, painting, re-torquing bolts, fencing, and installation of a log boom and smolt bypass trap continued through May 2006, when construction was completed.

During the 2006 calendar year, three temporary flow deviations from the JSA expected flow below Woodridge Dam, based on the recorded 15-minute readings, occurred as a result of control system problems with the new Woodbridge Dam. No temporary flow deviations occurred from the JSA minimum flow release from Camanche Dam during the 2006 calendar year.

When both bays are in automatic control, fluctuations in downstream flow occur because the system continually over-compensates for changes to the lake elevation. In the future, to minimize the flow fluctuations during minimum flow events, WID has stated it intends to maintain expected downstream flows by setting the west bay to a fixed-position and managing the downstream flow by the automatically-controlled east bay (see Appendix D).

River flows at the USGS Gaging Station No. 11325500 below Woodbridge Dam, during the three temporary flow deviations, for each 15-minute reading, are shown in the tables below.

Date /Time	Flow Below Woodbridge Dam (cfs)	JSA Expected Flow (cfs)
10/7/2006 9:45	117	100
10/7/2006 10:00	103	100
10/7/2006 10:15	92	100
10/7/2006 10:30	85	100
10/7/2006 10:45	81	100
10/7/2006 11:00	79	100
10/7/2006 11:15	79	100
10/7/2006 11:30	79	100
10/7/2006 11:45	81	100
10/7/2006 12:00	82	100
10/7/2006 12:15	85	100
10/7/2006 12:30	87	100
10/7/2006 12:45	90	100
10/7/2006 13:00	93	100
10/7/2006 13:15	96	100
10/7/2006 13:30	99	100
10/7/2006 13:45	103	100
10/7/2006 14:00	106	100

Date /Time	Flow Below Woodbridge Dam (cfs)	JSA Expected Flow (cfs)
10/11/2006 8:45	115	100
10/11/2006 9:00	103	100
10/11/2006 9:15	94	100
10/11/2006 9:30	87	100
10/11/2006 9:45	82	100
10/11/2006 10:00	78	100
10/11/2006 10:15	75	100
10/11/2006 10:30	79	100
10/11/2006 10:45	83	100
10/11/2006 11:00	97	100
10/11/2006 11:15	119	100
10/11/2006 11:30	133	100

Date /Time	Flow Below Woodbridge Dam (cfs)	JSA Expected Flow (cfs)
10/20/2006 7:45	107	100
10/20/2006 8:00	104	100
10/20/2006 8:15	92	100
10/20/2006 8:30	86	100
10/20/2006 8:45	109	100
10/20/2006 9:00	119	100

2007

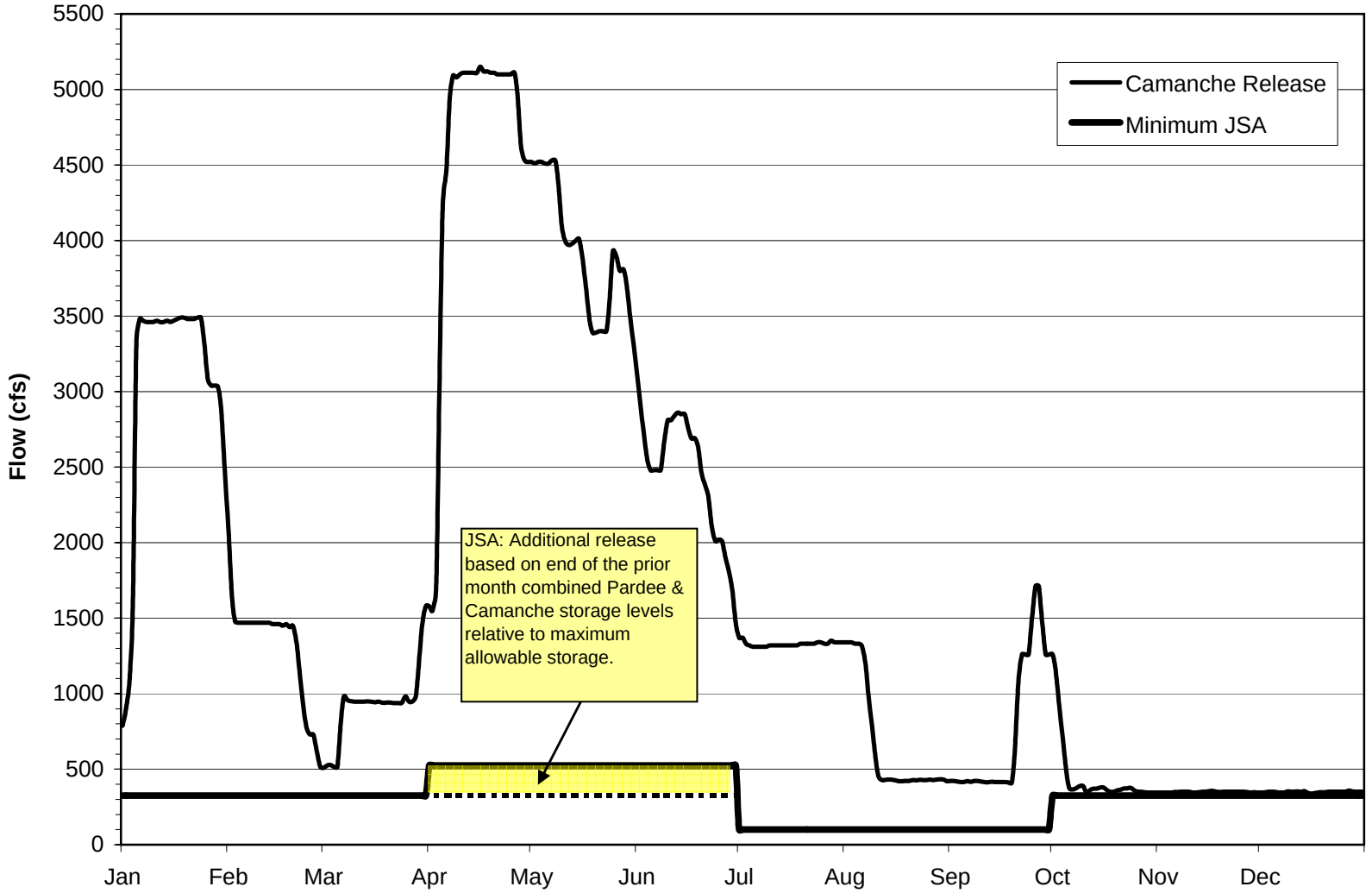
EBMUD is committed, pursuant to the FERC Order, to "Normal and Above" JSA year type Camanche Dam flow releases through March 31, 2007. In accordance with the stipulation in Attachment 1 of the JSA, EBMUD will determine, based on the DWR forecasted unimpaired runoff into Pardee Reservoir as identified in the April 1, 2007 DWR Bulletin 120, the JSA water year type which will govern EBMUD's flow schedule for the period April 1, 2007 through September 30, 2007. EBMUD will report to the FERC in the February 2008 report on the flow releases made in accordance with the JSA during the entire calendar year 2007. EBMUD will include finalized flow data in an Appendix of the report as it is verified and published by USGS. Refer to Appendix B for finalized flow data for the 2004 calendar year, and January through September, 2005.

TABLE 2. Calendar Year 2006 Release in Cubic Feet Per Second from Camanche Dam.

Date	Camanche Release	JSA Release	Date	Camanche Release	JSA Release	Date	Camanche Release	JSA Release	Date	Camanche Release	JSA Release	Date	Camanche Release	JSA Release
01/01/06	787	325	03/17/06	946	325	05/31/06	3310	525	08/14/06	432	100	10/28/06	348	325
01/02/06	906	325	03/18/06	942	325	06/01/06	3120	525	08/15/06	429	100	10/29/06	345	325
01/03/06	1090	325	03/19/06	939	325	06/02/06	2920	525	08/16/06	425	100	10/30/06	345	325
01/04/06	1580	325	03/20/06	942	325	06/03/06	2720	525	08/17/06	421	100	10/31/06	345	325
01/05/06	3340	325	03/21/06	939	325	06/04/06	2550	525	08/18/06	421	100	11/01/06	345	325
01/06/06	3480	325	03/22/06	938	325	06/05/06	2480	525	08/19/06	422	100	11/02/06	345	325
01/07/06	3470	325	03/23/06	938	325	06/06/06	2480	525	08/20/06	422	100	11/03/06	345	325
01/08/06	3460	325	03/24/06	939	325	06/07/06	2480	525	08/21/06	428	100	11/04/06	345	325
01/09/06	3460	325	03/25/06	981	325	06/08/06	2480	525	08/22/06	426	100	11/05/06	345	325
01/10/06	3460	325	03/26/06	948	325	06/09/06	2670	525	08/23/06	430	100	11/06/06	349	325
01/11/06	3470	325	03/27/06	947	325	06/10/06	2810	525	08/24/06	428	100	11/07/06	350	325
01/12/06	3460	325	03/28/06	977	325	06/11/06	2810	525	08/25/06	428	100	11/08/06	351	325
01/13/06	3460	325	03/29/06	1210	325	06/12/06	2840	525	08/26/06	432	100	11/09/06	351	325
01/14/06	3470	325	03/30/06	1460	325	06/13/06	2860	525	08/27/06	428	100	11/10/06	351	325
01/15/06	3460	325	03/31/06	1580	325	06/14/06	2850	525	08/28/06	431	100	11/11/06	345	325
01/16/06	3470	325	04/01/06	1580	525	06/15/06	2850	525	08/29/06	433	100	11/12/06	345	325
01/17/06	3480	325	04/02/06	1550	525	06/16/06	2760	525	08/30/06	432	100	11/13/06	347	325
01/18/06	3490	325	04/03/06	1690	525	06/17/06	2690	525	08/31/06	420	100	11/14/06	351	325
01/19/06	3490	325	04/04/06	3010	525	06/18/06	2690	525	09/01/06	422	100	11/15/06	351	325
01/20/06	3480	325	04/05/06	4230	525	06/19/06	2630	525	09/02/06	422	100	11/16/06	355	325
01/21/06	3480	325	04/06/06	4460	525	06/20/06	2460	525	09/03/06	418	100	11/17/06	357	325
01/22/06	3480	325	04/07/06	4930	525	06/21/06	2380	525	09/04/06	415	100	11/18/06	351	325
01/23/06	3490	325	04/08/06	5090	525	06/22/06	2300	525	09/05/06	415	100	11/19/06	350	325
01/24/06	3490	325	04/09/06	5080	525	06/23/06	2110	525	09/06/06	421	100	11/20/06	351	325
01/25/06	3320	325	04/10/06	5100	525	06/24/06	2010	525	09/07/06	417	100	11/21/06	351	325
01/26/06	3080	325	04/11/06	5110	525	06/25/06	2020	525	09/08/06	422	100	11/22/06	351	325
01/27/06	3040	325	04/12/06	5110	525	06/26/06	2010	525	09/09/06	422	100	11/23/06	351	325
01/28/06	3040	325	04/13/06	5110	525	06/27/06	1900	525	09/10/06	419	100	11/24/06	351	325
01/29/06	3030	325	04/14/06	5110	525	06/28/06	1810	525	09/11/06	415	100	11/25/06	351	325
01/30/06	2860	325	04/15/06	5110	525	06/29/06	1690	525	09/12/06	414	100	11/26/06	351	325
01/31/06	2490	325	04/16/06	5150	525	06/30/06	1470	525	09/13/06	416	100	11/27/06	350	325
02/01/06	2100	325	04/17/06	5120	525	07/01/06	1370	100	09/14/06	415	100	11/28/06	345	325
02/02/06	1680	325	04/18/06	5120	525	07/02/06	1370	100	09/15/06	415	100	11/29/06	347	325
02/03/06	1480	325	04/19/06	5110	525	07/03/06	1330	100	09/16/06	415	100	11/30/06	346	325
02/04/06	1470	325	04/20/06	5110	525	07/04/06	1320	100	09/17/06	415	100	12/01/06	345	325
02/05/06	1470	325	04/21/06	5100	525	07/05/06	1310	100	09/18/06	414	100	12/02/06	345	325
02/06/06	1470	325	04/22/06	5100	525	07/06/06	1310	100	09/19/06	409	100	12/03/06	349	325
02/07/06	1470	325	04/23/06	5100	525	07/07/06	1310	100	09/20/06	647	100	12/04/06	351	325
02/08/06	1470	325	04/24/06	5100	525	07/08/06	1310	100	09/21/06	1070	100	12/05/06	351	325
02/09/06	1470	325	04/25/06	5100	525	07/09/06	1310	100	09/22/06	1260	100	12/06/06	347	325
02/10/06	1470	325	04/26/06	5110	525	07/10/06	1320	100	09/23/06	1260	100	12/07/06	345	325
02/11/06	1470	325	04/27/06	4940	525	07/11/06	1320	100	09/24/06	1260	100	12/08/06	346	325
02/12/06	1470	325	04/28/06	4620	525	07/12/06	1320	100	09/25/06	1510	100	12/09/06	352	325
02/13/06	1470	325	04/29/06	4530	525	07/13/06	1320	100	09/26/06	1710	100	12/10/06	351	325
02/14/06	1460	325	04/30/06	4520	525	07/14/06	1320	100	09/27/06	1710	100	12/11/06	351	325
02/15/06	1460	325	05/01/06	4520	525	07/15/06	1320	100	09/28/06	1460	100	12/12/06	352	325
02/16/06	1460	325	05/02/06	4510	525	07/16/06	1320	100	09/29/06	1260	100	12/13/06	351	325
02/17/06	1450	325	05/03/06	4520	525	07/17/06	1320	100	09/30/06	1260	100	12/14/06	354	325
02/18/06	1460	325	05/04/06	4520	525	07/18/06	1320	100	10/01/06	1260	325	12/15/06	343	325
02/19/06	1440	325	05/05/06	4510	525	07/19/06	1330	100	10/02/06	1140	325	12/16/06	339	325
02/20/06	1450	325	05/06/06	4510	525	07/20/06	1330	100	10/03/06	924	325	12/17/06	342	325
02/21/06	1340	325	05/07/06	4530	525	07/21/06	1330	100	10/04/06	707	325	12/18/06	345	325
02/22/06	1130	325	05/08/06	4530	525	07/22/06	1330	100	10/05/06	495	325	12/19/06	347	325
02/23/06	930	325	05/09/06	4360	525	07/23/06	1330	100	10/06/06	373	325	12/20/06	348	325
02/24/06	771	325	05/10/06	4090	525	07/24/06	1340	100	10/07/06	366	325	12/21/06	351	325
02/25/06	730	325	05/11/06	3990	525	07/25/06	1340	100	10/08/06	375	325	12/22/06	351	325
02/26/06	730	325	05/12/06	3970	525	07/26/06	1330	100	10/09/06	387	325	12/23/06	351	325
02/27/06	618	325	05/13/06	3980	525	07/27/06	1330	100	10/10/06	387	325	12/24/06	351	325
02/28/06	515	325	05/14/06	4000	525	07/28/06	1350	100	10/11/06	344	325	12/25/06	351	325
03/01/06	508	325	05/15/06	4010	525	07/29/06	1340	100	10/12/06	360	325	12/26/06	351	325
03/02/06	524	325	05/16/06	3890	525	07/30/06	1340	100	10/13/06	371	325	12/27/06	358	325
03/03/06	528	325	05/17/06	3690	525	07/31/06	1340	100	10/14/06	371	325	12/28/06	352	325
03/04/06	517	325	05/18/06	3490	525	08/01/06	1340	100	10/15/06	378	325	12/29/06	351	325
03/05/06	514	325	05/19/06	3390	525	08/02/06	1340	100	10/16/06	379	325	12/30/06	351	325
03/06/06	796	325	05/20/06	3390	525	08/03/06	1340	100	10/17/06	362	325	12/31/06	351	325
03/07/06	982	325	05/21/06	3400	525	08/04/06	1330	100	10/18/06	351	325			
03/08/06	957	325	05/22/06	3400	525	08/05/06	1330	100	10/19/06	351	325			
03/09/06	951	325	05/23/06	3400	525	08/06/06	1320	100	10/20/06	360	325			
03/10/06	946	325	05/24/06	3610	525	08/07/06	1210	100	10/21/06	364	325			
03/11/06	946	325	05/25/06	3930	525	08/08/06	988	100	10/22/06	372	325			
03/12/06	946	325	05/26/06	3890	525	08/09/06	785	100	10/23/06	373	325			
03/13/06	946	325	05/27/06	3800	525	08/10/06	579	100	10/24/06	377	325			
03/14/06	948	325	05/28/06	3810	525	08/11/06	447	100	10/25/06	361	325			
03/15/06	947	325	05/29/06	3700	525	08/12/06	428	100	10/26/06	351	325			
03/16/06	943	325	05/30/06	3500	525	08/13/06	429	100	10/27/06	351	325			

1. Releases in calendar year 2006 were made according to the "Normal/Above" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Normal/Above" year flow schedule from Apr. 1 through Sept. 30, which includes an additional 200 cfs in April, May and June; and "Normal/Above" year flow schedule from Oct. 1. through Dec. 31.
2. Flow data are accurate to within +- 2%.
3. Actual flow data has not yet been verified and published by the U.S. Geological Survey.
4. Flows in August were reduced for gravel placement and in September were increased for cleansing and redistribution flows.

FIGURE 3. Calendar Year 2006 Release in Cubic Feet Per Second from Camanche Dam.



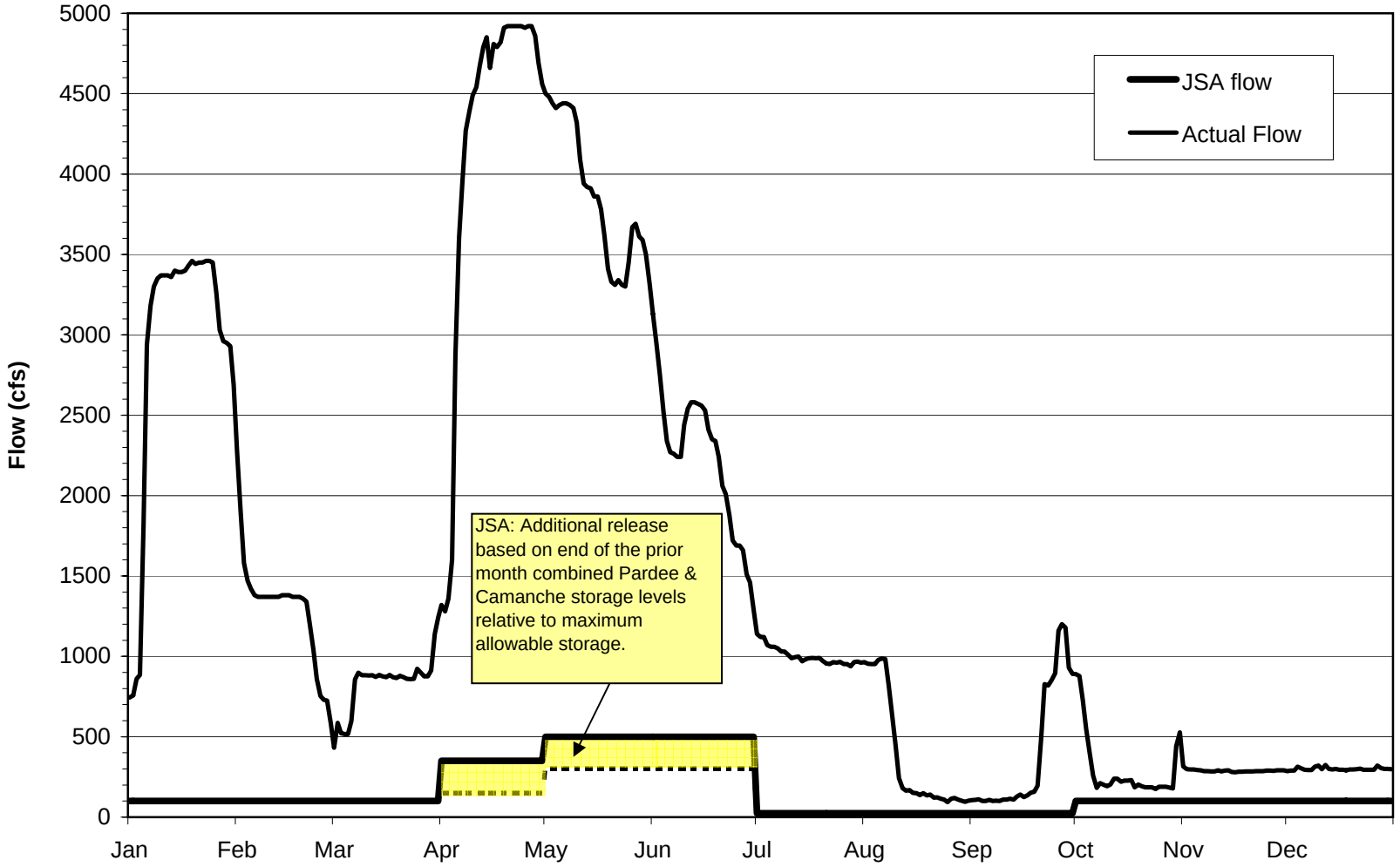
1. Releases in calendar year 2006 were made according to the "Normal/Above" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Normal/Above" year flow schedule from Apr. 1 through Sept. 30; and "Normal/Above" year flow schedule from Oct 1. through Dec. 31.
2. Actual flow data has not been verified and published by the U.S. Geological Survey.

TABLE 3. Calendar Year 2006 Flow in Cubic Feet Per Second Below Woodbridge Dam.

Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow	Date	Actual Flow	JSA Expected Flow
01/01/06	744	100	03/17/06	885	100	05/31/06	3320	500	08/14/06	168	25	10/28/06	183	100
01/02/06	758	100	03/18/06	871	100	06/01/06	3130	500	08/15/06	151	25	10/29/06	179	100
01/03/06	860	100	03/19/06	865	100	06/02/06	2940	500	08/16/06	149	25	10/30/06	442	100
01/04/06	885	100	03/20/06	879	100	06/03/06	2750	500	08/17/06	137	25	10/31/06	528	100
01/05/06	1820	100	03/21/06	871	100	06/04/06	2520	500	08/18/06	149	25	11/01/06	315	100
01/06/06	2940	100	03/22/06	861	100	06/05/06	2340	500	08/19/06	136	25	11/02/06	299	100
01/07/06	3180	100	03/23/06	859	100	06/06/06	2270	500	08/20/06	141	25	11/03/06	297	100
01/08/06	3300	100	03/24/06	860	100	06/07/06	2260	500	08/21/06	121	25	11/04/06	296	100
01/09/06	3350	100	03/25/06	923	100	06/08/06	2240	500	08/22/06	123	25	11/05/06	293	100
01/10/06	3370	100	03/26/06	899	100	06/09/06	2240	500	08/23/06	115	25	11/06/06	291	100
01/11/06	3370	100	03/27/06	875	100	06/10/06	2440	500	08/24/06	109	25	11/07/06	286	100
01/12/06	3370	100	03/28/06	875	100	06/11/06	2540	500	08/25/06	94	25	11/08/06	286	100
01/13/06	3360	100	03/29/06	912	100	06/12/06	2580	500	08/26/06	114	25	11/09/06	285	100
01/14/06	3400	100	03/30/06	1140	100	06/13/06	2580	500	08/27/06	120	25	11/10/06	285	100
01/15/06	3390	100	03/31/06	1240	100	06/14/06	2570	500	08/28/06	109	25	11/11/06	291	100
01/16/06	3390	100	04/01/06	1320	350	06/15/06	2560	500	08/29/06	102	25	11/12/06	285	100
01/17/06	3400	100	04/02/06	1280	350	06/16/06	2530	500	08/30/06	96	25	11/13/06	290	100
01/18/06	3430	100	04/03/06	1360	350	06/17/06	2410	500	08/31/06	102	25	11/14/06	291	100
01/19/06	3460	100	04/04/06	1600	350	06/18/06	2350	500	09/01/06	105	25	11/15/06	281	100
01/20/06	3440	100	04/05/06	2870	350	06/19/06	2340	500	09/02/06	107	25	11/16/06	280	100
01/21/06	3450	100	04/06/06	3600	350	06/20/06	2240	500	09/03/06	111	25	11/17/06	282	100
01/22/06	3450	100	04/07/06	3950	350	06/21/06	2060	500	09/04/06	101	25	11/18/06	283	100
01/23/06	3460	100	04/08/06	4270	350	06/22/06	2010	500	09/05/06	100	25	11/19/06	284	100
01/24/06	3460	100	04/09/06	4390	350	06/23/06	1880	500	09/06/06	108	25	11/20/06	284	100
01/25/06	3450	100	04/10/06	4490	350	06/24/06	1720	500	09/07/06	100	25	11/21/06	285	100
01/26/06	3260	100	04/11/06	4540	350	06/25/06	1690	500	09/08/06	103	25	11/22/06	286	100
01/27/06	3030	100	04/12/06	4670	350	06/26/06	1690	500	09/09/06	101	25	11/23/06	286	100
01/28/06	2960	100	04/13/06	4790	350	06/27/06	1660	500	09/10/06	110	25	11/24/06	287	100
01/29/06	2950	100	04/14/06	4850	350	06/28/06	1510	500	09/11/06	110	25	11/25/06	290	100
01/30/06	2930	100	04/15/06	4660	350	06/29/06	1460	500	09/12/06	115	25	11/26/06	290	100
01/31/06	2690	100	04/16/06	4810	350	06/30/06	1290	500	09/13/06	109	25	11/27/06	288	100
02/01/06	2280	100	04/17/06	4790	350	07/01/06	1140	25	09/14/06	129	25	11/28/06	292	100
02/02/06	1900	100	04/18/06	4820	350	07/02/06	1120	25	09/15/06	140	25	11/29/06	292	100
02/03/06	1580	100	04/19/06	4910	350	07/03/06	1120	25	09/16/06	125	25	11/30/06	291	100
02/04/06	1470	100	04/20/06	4920	350	07/04/06	1070	25	09/17/06	135	25	12/01/06	287	100
02/05/06	1420	100	04/21/06	4920	350	07/05/06	1060	25	09/18/06	152	25	12/02/06	289	100
02/06/06	1380	100	04/22/06	4920	350	07/06/06	1060	25	09/19/06	157	25	12/03/06	289	100
02/07/06	1370	100	04/23/06	4920	350	07/07/06	1050	25	09/20/06	196	25	12/04/06	314	100
02/08/06	1370	100	04/24/06	4920	350	07/08/06	1030	25	09/21/06	496	25	12/05/06	303	100
02/09/06	1370	100	04/25/06	4910	350	07/09/06	1030	25	09/22/06	828	25	12/06/06	295	100
02/10/06	1370	100	04/26/06	4920	350	07/10/06	1010	25	09/23/06	818	25	12/07/06	293	100
02/11/06	1370	100	04/27/06	4920	350	07/11/06	989	25	09/24/06	852	25	12/08/06	293	100
02/12/06	1370	100	04/28/06	4860	350	07/12/06	996	25	09/25/06	895	25	12/09/06	314	100
02/13/06	1370	100	04/29/06	4690	350	07/13/06	999	25	09/26/06	1160	25	12/10/06	321	100
02/14/06	1380	100	04/30/06	4560	350	07/14/06	970	25	09/27/06	1200	25	12/11/06	299	100
02/15/06	1380	100	05/01/06	4500	500	07/15/06	981	25	09/28/06	1180	25	12/12/06	324	100
02/16/06	1380	100	05/02/06	4480	500	07/16/06	988	25	09/29/06	929	25	12/13/06	300	100
02/17/06	1370	100	05/03/06	4440	500	07/17/06	990	25	09/30/06	891	25	12/14/06	296	100
02/18/06	1370	100	05/04/06	4410	500	07/18/06	989	25	10/01/06	890	100	12/15/06	300	100
02/19/06	1370	100	05/05/06	4430	500	07/19/06	990	25	10/02/06	878	100	12/16/06	294	100
02/20/06	1360	100	05/06/06	4440	500	07/20/06	971	25	10/03/06	729	100	12/17/06	295	100
02/21/06	1340	100	05/07/06	4440	500	07/21/06	956	25	10/04/06	550	100	12/18/06	292	100
02/22/06	1200	100	05/08/06	4430	500	07/22/06	952	25	10/05/06	396	100	12/19/06	296	100
02/23/06	1040	100	05/09/06	4410	500	07/23/06	965	25	10/06/06	258	100	12/20/06	297	100
02/24/06	861	100	05/10/06	4320	500	07/24/06	960	25	10/07/06	182	100	12/21/06	298	100
02/25/06	754	100	05/11/06	4090	500	07/25/06	966	25	10/08/06	212	100	12/22/06	301	100
02/26/06	731	100	05/12/06	3940	500	07/26/06	952	25	10/09/06	202	100	12/23/06	295	100
02/27/06	725	100	05/13/06	3920	500	07/27/06	953	25	10/10/06	192	100	12/24/06	294	100
02/28/06	586	100	05/14/06	3910	500	07/28/06	938	25	10/11/06	203	100	12/25/06	294	100
03/01/06	432	100	05/15/06	3860	500	07/29/06	964	25	10/12/06	239	100	12/26/06	295	100
03/02/06	586	100	05/16/06	3860	500	07/30/06	968	25	10/13/06	240	100	12/27/06	320	100
03/03/06	522	100	05/17/06	3780	500	07/31/06	961	25	10/14/06	221	100	12/28/06	305	100
03/04/06	516	100	05/18/06	3620	500	08/01/06	965	25	10/15/06	227	100	12/29/06	300	100
03/05/06	517	100	05/19/06	3410	500	08/02/06	954	25	10/16/06	228	100	12/30/06	300	100
03/06/06	598	100	05/20/06	3330	500	08/03/06	952	25	10/17/06	230	100	12/31/06	299	100
03/07/06	857	100	05/21/06	3310	500	08/04/06	953	25	10/18/06	186	100			
03/08/06	898	100	05/22/06	3340	500	08/05/06	978	25	10/19/06	203	100			
03/09/06	883	100	05/23/06	3310	500	08/06/06	986	25	10/20/06	192	100			
03/10/06	882	100	05/24/06	3300	500	08/07/06	984	25	10/21/06	186	100			
03/11/06	881	100	05/25/06	3450	500	08/08/06	824	25	10/22/06	185	100			
03/12/06	883	100	05/26/06	3670	500	08/09/06	628	25	10/23/06	185	100			
03/13/06	873	100	05/27/06	3690	500	08/10/06	446	25	10/24/06	176	100			
03/14/06	884	100	05/28/06	3610	500	08/11/06	243	25	10/25/06	189	100			
03/15/06	875	100	05/29/06	3590	500	08/12/06	181	25	10/26/06	189	100			
03/16/06	870	100	05/30/06	3500	500	08/13/06	164	25	10/27/06	189	100			

1. Expected flows past Woodbridge Dam in calendar year 2006 were according to the "Normal/Above" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Normal/Above" year flow schedule from Apr. 1 through Sept. 30, which includes additional 200 cfs in April, May and June; and "Normal/Above" year flow schedule from Oct 1. through Dec. 31.
2. Flow data are accurate to within +- 2%.
3. Actual flow data has not yet been verified and published by the U.S. Geological Survey.

FIGURE 4. Calendar Year 2006 Flow in Cubic Feet Per Second Below Woodbridge Dam.



1. Releases in calendar year 2006 were made according to the "Normal/Above" year JSA Mokelumne River minimum flow schedule from Jan. 1 to Mar. 31; "Normal/Above" year flow schedule from Apr. 1 through Sept. 30; and "Normal/Above" year flow schedule from Oct 1. through Dec. 31.
2. Actual flow data has not been verified and published by the U.S. Geological Survey.

B. WATER QUALITY

Water quality in the Mokelumne River Fish Hatchery and lower Mokelumne River continues to be actively managed by EBMUD through its extensive data collection and analysis, reservoir operations, the use of EBMUD's Hypolimnetic Oxygenation System (HOS), and the use of supplemental chillers and filtering equipment at the hatchery facility. The operation of Pardee and Camanche Reservoirs is coordinated to maintain thermal stratification in Camanche Reservoir through October and manage water temperature for native fish in the lower Mokelumne River. The HOS is operated to prevent hydrogen sulfide formation in Camanche Reservoir. (The functioning of the HOS system is described in Section IV.B.2 of this report.)

1. Reservoir Operations

EBMUD developed and implemented an adaptive reservoir operations plan (which includes management of cold water in the reservoir, reservoir water quality monitoring, weekly review of conditions, modeling and forecasting conditions, and scheduling of operations) that effectively meets the water temperature needs in the Mokelumne River Fish Hatchery and the lower Mokelumne River under all but extreme drought conditions. EBMUD manages temperatures in water released from Camanche Reservoir by keeping Camanche Reservoir thermally stratified until its surface waters naturally cool in November. EBMUD manages the release of cold water available in Pardee Reservoir so as to maintain the volume of Camanche Reservoir's hypolimnion, which is needed to keep the reservoir thermally stratified. The cold hypolimnetic water is also conserved in the spring, when Camanche Reservoir stratifies, by releasing warmer surface water.

EBMUD's approach to managing the system is based on direct control of the cold water hypolimnions 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 Mokelumne River Fish Hatchery during the fall by preserving approximately 28,000 acre-feet of hypolimnion in Camanche Reservoir until the end of October.

2. Maintain the stratification in Camanche by scheduling inflows of cold water from Pardee Reservoir as needed to replenish the hypolimnion of Camanche Reservoir. Releases from Pardee are normally not necessary for temperature management from approximately mid-November to April when Camanche Reservoir is cold and destratified.

Maintain stratification in Pardee Reservoir to the extent feasible from May through October to provide a supply of cold water releases from the Pardee hypolimnion to maintain stratification in Camanche Reservoir. It is estimated that a minimum of about 100,000 acre-feet is needed to maintain stratification in Pardee

2006

The operational plan used by EBMUD since 1990, has proven effective in maintaining thermal stratification in Camanche Reservoir during both normal and drought conditions. Resulting temperatures are shown in Figure 5, Calendar Year 2006 Mokelumne River Water Average Daily Temperatures of the Release from Camanche Dam.

In 2006, EBMUD continued to adaptively manage its reservoir operations. EBMUD provided bypass (sluice) flows from Camanche Reservoir to increase dissolved oxygen levels in the lower Mokelumne River when needed.

2007

In 2007 EBMUD will continue to adaptively manage Pardee and Camanche Reservoir operations based on real-time reservoir and riverine conditions. Pursuant to Section H.4 of the JSA, EBMUD has and 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 the hydrogen sulfide that can naturally occurs 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 state-of-the-art 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 upon normal reservoir overturn in the fall. The HOS has proven to be very effective in preventing the formation of hydrogen sulfide in the Camanche Reservoir hypolimnion.

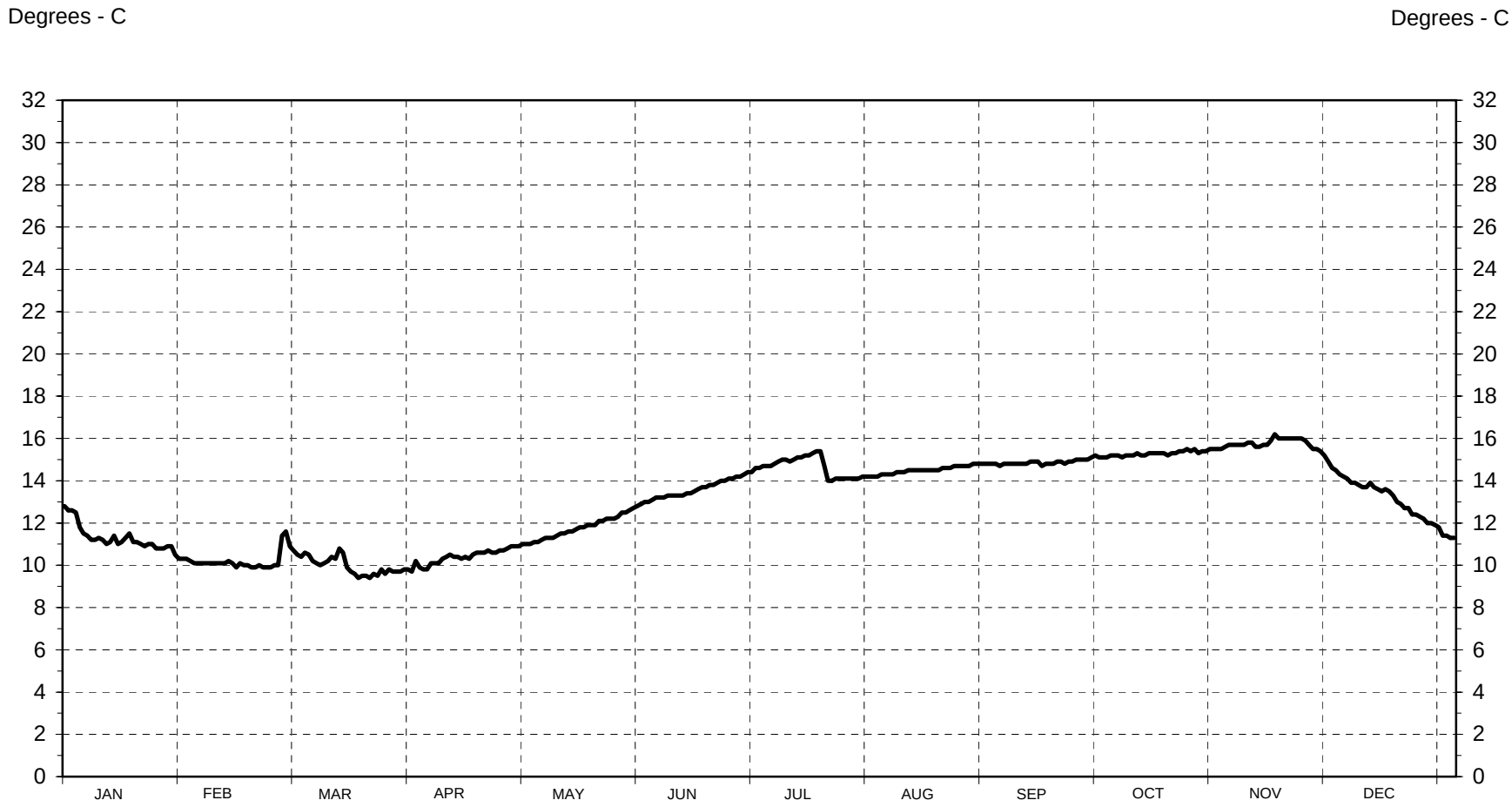
2006

The HOS was activated on August 18, 2006 and was shut down on November 19, 2006 after the reservoir naturally destratified. The HOS was effective in preventing hydrogen sulfide formation.

2007

In 2007 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 Mokelumne River Fish Hatchery.

FIGURE 5. Calendar Year 2006 Mokelumne River Temperatures Below Camanche Dam



Notes:
High Level Outlet Operations: opened on 1/23/2006 and closed on 07/19/2006.

C. THE LOWER MOKELUMNE RIVER PARTNERSHIP

1. The Partnership Steering Committee

The Partnership Steering Committee (PSC), (consisting of representatives from EBMUD, CDFG, and USFWS) met on December 13, 2006. Minutes of the Partnership Steering Committee meeting are included in Appendix C.

The Association of California Water Agencies presented the Partnership with the Theodore Roosevelt Environmental Award for Excellence in Conservation and Natural Resources Management in December 2006 for their efforts on the lower Mokelumne River.

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 11 and September 12, 2006. The PSC approved five projects for Partnership Funding in 2006. The PSC has approved 21 projects for Partnership funding since 1999. (See Section IV.C.2 of this report.)

2. The Partnership Fund

On January 11, 1999, EBMUD established the $2 million Partnership Fund, pursuant to Section E.2 of the JSA, to provide support to the Partnership programs. Interest from this fund provides operating funds for projects and programs to protect and enhance the lower Mokelumne River ecosystem. Since its inception, the fund has earned $601,608. The available earnings, after funds obligated to approved projects, were $243,147 as of December 31, 2006.

In November 2000 the Partnership Steering Committee funded two stakeholder proposals for ecosystem protection and restoration in the lower Mokelumne River one of which continues in 2006. This one is:

- Cost share funding for the **Cosumnes and Mokelumne Rivers Floodplain Integrated Resource Management Plan** focused on ecosystem restoration and flood damage reduction in the lower Mokelumne and Cosumnes rivers ($50,000). Work is currently ongoing. Completion of this planning project is anticipated in 2007. (See Section IV.F.1 for further information on this study.)

In 2003, the Partnership Steering Committee approved funding for one stakeholder proposal with implementation continuing in 2006:

- **San Joaquin County Resource Conservation District (SJCRCD) Cash-Match for Watershed Coordinator Grant Proposal** ($28,500 over three years). Support the SJCRCD's grant proposal for a State of California, Department of Conservation "Watershed Coordinator Grant" for 2004-2007. This funding approval was contingent upon the SJCRCD receiving a Watershed Coordinator grant award from the Department of Conservation. In spring 2004, the SJCRCD was awarded the Watershed Coordinator Grant from the Department of Conservation and the Partnership Fund committed the $28,500 matching funds to this effort. The SJCRCD's watershed coordinator continues to provide leadership and facilitation for the Lower Mokelumne River Watershed Stewardship Steering Committee, one of the primary stakeholder outreach mechanisms for the Partnership.

In 2005, the Partnership Steering Committee approved funding for four stakeholder proposals, with implementation continuing in 2006:

- **EBMUD Spawning Gravel Enhancement Program** ($35,000 over three years). This project funding was approved to supplement the funds committed annually by EBMUD for spawning gravel enhancement in the lower Mokelumne River. This enhancement work has been continuing annually since 1990. This supplemental funding supported implementation in 2005 and 2006 and will also support implementation in 2007. (See Section IV.F.1 of this report.)

- **Gill Creek Landowners Riparian Enhancement** ($11,191 over three years). This project consists of the riparian enhancement of approximately 4 acres of valley/foothill riparian habitat on Gil Creek, a tributary of the Mokelumne River. Enhancement will consist of the removal of a portion of a vineyard and the planting of native plants throughout the riparian zone. Native species to be planted within the forested floodplain will consist of 2,400 plugs and 18 pounds of seed of native grasses (creeping wild rye and blue wild rye), 800 small container native shrubs (coyote bush, coffee berry, and lupine), and 1,800 small to medium native understory trees (several species of willow along streambank, alder, box elder, and buckeye).

Enhancement will be phased over a 2 year period. Restoring the native riparian habitat will improve habitat for anadromous fishery.

- **Calvary Bible Church Riparian Enhancement** ($21,408 over three years). This project consists of the understory enhancement of approximately 11 acres of riparian valley oak woodland. Enhancement will consist of the removal of approximately 4 acres of invasive Himalayan blackberry and other non-native plant species; and the planting of native plants throughout the 11 acres of riparian woodland. The existing understory is sparse and not as dense as understory shrubs in reference riparian areas in City and County parks along the Mokelumne River. Restoring the native riparian habitat will improve habitat for anadromous fishery. This project will be implemented over a 3 year period. In 2005-2006, the project focus has been removal of invasive non-native vegetation. Goats were used for a second time in October 2006 for blackberry removal. Herbicide application will follow in 2007 and the first plantings will be put in the ground by church and Boy Scout volunteers.

- **EBMUD Mokelumne River Day-Use Area - River Parkway Grant project** ($42,531). EBMUD owns, operates and maintains the 65-acre Mokelumne River Day Use Area (MRDUA), adjacent to the lower Mokelumne River, downstream of Camanche Dam. The MRDUA is also adjacent to the greatest concentration of spawning Chinook salmon and steelhead in the lower Mokelumne River. EBMUD sought a $373,883 grant from the California River Parkways Grant Program to make recreation and ecosystem improvements. The Partnership Steering Committee approved $42,531 to support the implementation of specific project ecosystem enhancement elements (streambank protection, gravel dredge site rehabilitation, and planting of native vegetation) to improve habitat for anadromous fishery. The grant from the California River Parkways Program was not awarded to EBMUD. Partnership Steering Committee approval for this project was rescinded without Partnership Fund expenditure.

In 2006, the Partnership Steering Committee approved funding for the following five stakeholder proposals, with project initiation in 2006:

- **2006 Spawning Gravel Enhancement Project** ($87,000). This project continued EBMUD's spawning gravel enhancement program on the lower Mokelumne River. The Partnership Fund expenses for the gravel placement work were 100% reimbursed by an AFRP grant (Anadromous Fish Restoration Program – USFWS).

- **San Joaquin County Resource Conservation District Watershed Open House** ($500). The Partnership was one of the sponsors of the SJCRCD's watershed open house event at Lodi Lake in May 2006. This public event was conducted to increase awareness about the lower Mokelumne River ecosystem within the community.

- **Lower Mokelumne River Stewardship Award** ($200). This annual award is sponsored by the Partnership to acknowledge individuals within the lower Mokelumne River watershed that show outstanding leadership, responsibility, or activism in the promotion of sound and innovative natural resource stewardship practices on the lower Mokelumne River. The 2005 award was presented to Brad Lange (Lange Twins Farms).

- **Integrating Large Woody Materials into SHIRA For Application on the Lower Mokelumne River** – University of California at Davis ($25,663) The overall goal of this research is to investigate the role of large woody material in the lower Mokelumne River and to provide a scientific foundation for the potential use of large woody material management in river rehabilitation and enhancement in the lower Mokelumne River.

- **Student and Landowner Education and Watershed Stewardship (SLEWS) and Hoffman Vineyards Riparian Enhancement project** ($9,138 over two years). This project consists of the riparian enhancement of approximately 10 acres of valley/foothill riparian habitat on the lower Mokelumne River. Native species planted within the floodplain will consist of 13 lbs of native grasses (creeping wild rye and blue wild rye), 600 small container native shrubs (elderberry, coyote bush, coffee berry, and lupine), and 1,800 small to medium native understory trees (several species of willow along stream bank, alder, box elder, and buckeye). Enhancement was started in fall 2006 with the planting of 200 native trees and shrubs in one acre of the riparian zone, by students from Lodi High School.

3. Water Quality and Resource Management Program

The Water Quality and Resource Management Program (WQRMP), developed by the Partnership Steering Committee 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 CDFG began implementing the specific WQRMP measures in 1999. These measures, including the ones implemented in 2006, 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 Partnership 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. (The structure and purpose of each of these two groups is described below).

The Mokelumne-Cosumnes Watershed Alliance facilities communication, identifies and supports conflict resolution, optimizes resources, identifies and pursues funding opportunities, encourages partnerships and improves the integration of various environmental, flood control and beneficial use opportunities in the Mokelumne and Cosumnes watersheds.

The North Delta Flood Control and Ecosystem Restoration Project (North Delta Project) is an integrated flood control and ecosystem restoration project, proposed by the California Department of Water Resources under the CALFED Bay-Delta Program administered by the California Bay-Delta Authority (CBDA). Because of the numerous stakeholder meetings conducted during 2006 to move the North Delta Project forward, no meetings of the Watershed Alliance were held in 2006. Additional information on the Mokelumne-Cosumnes Watershed Alliance is available on the Internet at www.mcwatershed.org.

The Lower Mokelumne River Stewardship Program (LMRSP) was initiated as a proposal to 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 2006, EBMUD and the Partnership were regular participants in the work of the Stewardship Steering Committee to implement elements of the LMRSP.

The Stewardship Program Steering Committee meets quarterly and includes participation from private landowners, farmers, community groups, local government staff, and agency representatives, including representatives for EBMUD and the Partnership. This community-based watershed stewardship effort if coordinated and facilitated by the Lower Mokleumne River Watershed Coordinator of the SJCRCD.

Additional information on the Stewardship Program, including the watershed owner's manual is available on the Internet at www.sjcrcd.org.

5. Additional EBMUD Stakeholder Activities

2006

In 2006, 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 2006 included:

- Participation in the Mokelumne River Association (MRA). The mission of the MRA is to stimulate a greater understanding and a cooperative atmosphere and to provide information to the private owners, political entities, and public agencies responsible for the operation, maintenance control, and management of the entire Mokelumne River System. The MRA membership consists of representatives of any duly constituted public or private entity within the Mokelumne River Watershed. There are nineteen (19) public and private entities that are members of the MRA (1993-present). The group meets on a quarterly basis.

- Ongoing collaboration with the Woodbridge Irrigation District to construct new fish screens at the Woodbridge Dam canal on the lower Mokelumne River (1998-present).

- 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 2006, with funding from AFRP, EBMUD placed 4,372 cubic yards of anadromous fish spawning gravel in the lower Mokelumne River.

- Participation and sponsorship of the tenth-annual Sandhill Crane Festival in Lodi, CA on November 3-5, 2006. The festival provides information and entertainment as well as field trips to various locations along the lower Mokelumne River. The Sandhill Crane Festivals seek to promote broad public awareness of lower Mokelumne River natural resource values. Besides funding, EBMUD staff leads two field trips to view bald eagles at Pardee Reservoir. (1997-present)

- Participation and sponsorship of the Migration Celebration at Micke Grove Park in San Joaquin County on May 13, 2006. The event, presented by Micke Grove Zoo

and the San Joaquin Audubon Society is a family event that promotes awareness and conservation of local wildlife.

- Continued 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)

- Continued 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. In 2006 the LWWC received the California Department of Pesticide Regulation IPM Innovator Award and the Governor's Award for Environmental and Economic Excellence for the Lodi Rules Sustainable Certification program. An EBMUD biologist participated as an advisor and key author for this program. (1999-present)

- Presentations on fish and wildlife issues to local sportsmen's groups, community groups, 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)

- Continued work with California Bay Delta Authority (CBDA) staff and public participants on the North Delta Regional Plan. The objective of this plan is to provide a coordinated regional solution to water quality, flood control, water supply reliability, and fisheries concerns. Specific components of the North Delta Regional Plan include North Delta flood control improvements and coordination of watershed projects, acquisition and conversion of land for shallow water wetland and riparian habitat, and studying the feasibility of Delta Cross Channel operation. (Ongoing)

- Continued as a study partner for the Cosumnes and Mokelumne Rivers Floodplain Integrated Resource Management Plan on the lower Mokelumne and Cosumnes rivers. (See Section IV.F of this report)

- Providing continuing technical support to the SJCRCD and private landowners to enhance anadromous fish habitat in Murphy Creek (a tributary to the lower Mokelumne River).

- Participated in the 2006 CBDA's Watershed Partnership Seminar in Riverside, CA.
- Participated in the SJCRCD's "Lower Mokleumne River Watershed Open House" event at Lake Lodi.
- Partnered in the establishment of the Mokelumne River Programmatic Safe Harbor Agreement (California's first regional safe harbor agreement).
- Participated on the CBDA's Watershed Public Advisory Sub-Committee.

2007

In 2007, 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

2006

At the April 25, 2006 meeting of the Board of Directors, the District accepted its annual Water Supply Availability and Deficiency Report declaring the availability of surplus water for 2006. Pursuant to Section F.3 of the JSA, on May 2, 2006, EBMUD notified USFWS and CDFG of the availability for sale of surplus Mokelumne River water. A copy of the letter of notification 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, CDFG, USFWS, NOAA Fisheries, and Woodbridge Irrigation District (WID). San Joaquin County, the State Water Resources Control Board (SWRCB), and the Federal Energy Regulatory Commission (FERC) are also members of the MRTAC, but do not attend consistently. The MRTAC provides an interactive and proactive forum in which factors affecting lower Mokelumne River aquatic resources are identified, specific scientific investigations are formulated, technical data and analyses are presented and discussed, and agency activities are coordinated to improve the aquatic resources of the lower Mokelumne River.

2006

In 2006, the MRTAC met biannually (alternating quarterly meetings between the MRTAC and the PCC). Representatives from CDFG, EBMUD, USFWS, and NOAA Fisheries, participated in the MRTAC meetings held on January 19 and July 20, 2006.

2007

Pursuant to Section H.1 of the JSA, EBMUD, USFWS, and CDFG agree that they will continue to actively support the MRTAC as a technical information-sharing forum and that the Partnership Steering Committee will review the need for the MRTAC periodically, with input from the Stakeholders Group. The most recent MRTAC meeting was held on January 31, 2007.

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 2006, 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. The electronic database is shared with the Bay Delta and Tributaries (BDAT) Project site (http://baydelta.water.ca.gov). BDAT contains environmental data concerning the San Francisco Bay-Delta and provides public access to that data. Over fifty organizations contribute data voluntarily to this project. The database includes biological, water quality, and meteorological data. These can be used to gauge the health of the estuary and to manage water and environmental resources. BDAT is a part of the California Environmental Data Exchange Network (CEDEN), which includes projects and organizations from all parts of the state.

3. Mokelumne River Symposium

Section H.3 of the JSA requires the Parties to sponsor periodic symposia to provide opportunities for scientists, biologists, and other professionals who have conducted studies or research on the Mokelumne River ecosystem to present their papers and participate in peer group discussions about the river corridor and its ecosystem.

The first such symposium, known as the “State of the Rivers” conference was held on November 5, 1999. The second State of the Rivers Symposium was held at the University of

California, Davis campus on October 25, 2001. EBMUD co-sponsored the 22nd Annual Salmonid Restoration Conference and 14th Annual Salmonid Habitat Enhancement Workshop held in Davis, CA on March 17-20, 2004. The conference included presentations describing ecological and hydrological research on the Mokelumne River.

Results from research conducted by EBMUD staff published or presented in 2006 include:

Jeffres, C. A. A. P. Klimley, J. E. Merz and J. J. Cech Jr. 2006. Movement of Sacramento sucker, *Catostomus occidentalis*, and hitch, *Lavinia exilicauda*, during a spring release of water from Camanche Dam in the Mokelumne River, California. Environmental Biology of Fishes (2006) 75:365–373.

Merz, J.E., and P. B. Moyle. 2006. Salmon, wildlife, and wine: Marine-derived nutrients in human-dominated ecosystems of Central California. Ecological Applications 16(3):999-1009.

Merz, J.E., G.B. Pasternack and J.M. Wheaton. 2006. Sediment budget for salmonid spawning habitat rehabilitation in a regulated river. Geomorphology 76:207-228.

Reeves, K.A., and J.S. Jones. 2006. Impact of Flooding on a Burrowing Owl Colony in the San Joaquin Delta, Central California. Poster. The Wildlife Society – Western Section 52nd Annual Conference, Sacramento, CA February 8-10, 2006.

Reeves, K.A., J.S. Jones, and J.R. Smith. 2006. Lower Mokelumne River Small Mammal Inventory. Oral presentation. The Wildlife Society – Western Section 52nd Annual Conference, Sacramento, CA February 8-10, 2006.

Reeves, K.A., J. Brodie, B.R. Edwards, and M.L. Workman. 2006. Building Partnerships for Restoration: The Lower Mokelumne River Watershed Stewardship Program. Oral presentation. Salmonid Restoration Federation 24th Annual Conference, Santa Barbara, CA February 22-25, 2006.

Jones, J.S., and K.A. Reeves. 2006. Use of a land imprinter for native grass planting in the central valley foothills. Poster and Oral Presentation. California Native Grasslands Association Annual Conference, Chico, CA May 4-6, 2006.

Jones, J.S., and K.A. Reeves. 2006. Use of a land imprinter for native grass planting in the central Sierra Nevada foothills. Ecological Restoration 24(2):119-120.

Reeves, K.A., J. Brodie, B.R. Edwards, and C. Storm. 2006. Building partnerships for restoration in a working landscape: The Lower Mokelumne River Watershed Stewardship Program, Central California. Oral presentation. International Conference on The Future of Agriculture: Science, Stewardship, and Sustainability, Sacramento, CA August 6-9, 2006.

Reeves, K.A., J. Brodie, B.R. Edwards, and C. Storm. 2006. Building partnerships for restoration in a working landscape: The Lower Mokelumne River Watershed Stewardship Program, Central California. Oral presentation. Pesticide Applicators Professional Association Seminar, Stockton, CA September 12, 2006.

Reeves, K.A., J. Brodie, B.R. Edwards, and C. Storm. 2006. Building partnerships for restoration in a working landscape: The Lower Mokelumne River Watershed Stewardship Program, Central California. Oral presentation. Pesticide Applicators Professional Association Seminar, Sacramento, CA September 21, 2006.

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.

2006

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

- Continued monitoring of fish populations in the lower Mokelumne River from Camanche Dam downstream to the San Joaquin River.
- Daily enumeration of migrating adult Chinook salmon and steelhead by carcass surveys in the lower Mokelumne River and by video monitoring at Woodbridge Dam.
- Continued salmon and steelhead redd surveys in the lower Mokelumne River between Camanche Dam and the Elliott Road Bridge.
- Estimation of the emigration of juvenile Chinook salmon and steelhead by trapping at Woodbridge Dam and operation of a rotary screw trap below Woodbridge Dam.
- 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.

- Implementation of a passive integrated transponder tag study of steelhead in the lower Mokelumne River to assess population size and distribution.

- Continued seasonal electrofishing and seining surveys of the lower Mokelumne River fish community.

- Development of a cooperative program to evaluate the benefits of changing release locations in the Mokelumne River of salmon and steelhead produced at the Mokelumne River Fish Hatchery.

- Implementation of a cooperative program to return unripe fall-run Chinook salmon trapped at the Mokelumne River Fish Hatchery to spawn in the lower Mokelumne River.

- Continued coded-wire tagging of representative lots of Chinook salmon and steelhead released from the Mokelumne River Fish Hatchery.

2007

EBMUD will continue similar research and monitoring activities in 2007. These efforts will be described in full in the calendar year 2007 update report.

F. HABITAT IMPROVEMENTS

1. Ongoing Efforts

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

2006

- 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 2006, EBMUD placed 4,372 cubic yards of spawning gravel in the lower Mokelumne River at a site adjacent to the Mokelumne River Day Use Area. The Partnership Fund provided $11,700, the Anadromous Fish Restoration Program (AFRP) administered by the U.S. Fish and Wildlife Service provided $86,145 and EBMUD provided $25,000 to fund the project. The weekly redd survey results indicate that anadromous fish are using the enhancement gravel.

- Riparian Habitat Enhancement: Developing a cooperative program with local interests to improve land management with agricultural practices and livestock grazing along riparian zones to reduce streambank erosion and fine sediment input. EBMUD continues working with winegrape and walnut growers to enhance and restore riparian vegetation. In 2006, 345 trees (130 California box elder, *Acer negundo californica*; 50 Fremont cottonwood, *Populus fremontii*; 60 valley oak, *Quercus lobata*; 30 interior live oak, *Quercus wislizenii;* and 75 Oregon ash, *Fraxinus latifolia*) and 410 shrubs (30 California wild rose, *Rosa californica*; 50 coyote bush, *Baccharis pilularis*; 55 coffee berry, *Rhamnus californica*; 55 California blackberry, *Rubus ursinus;* and 220 blue elderberry, *Sambucus mexicana*) were planted in the Mokelumne River corridor.

- Provide 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. Current proposed projects include, but are not limited to:

    1. Arundo removal and native species planting – Seivers Property
    2. Streambank stabilization, buffer development and riparian restoration – El Rio Farms

3. Tree of heaven and himalayan blackberry removal, and riparian restoration/enhancement with native species planting – Vino Farms
4. Riparian enhancement/restoration – Nakagawa Farms
5. Riparian enhancement/restoration and streambank stabilization – Mohr-Fry Ranches
6. Orchard removal and riparian enhancement/restoration with levee/streambank stabilization – Locke Ranch
7. Streambank stabilization and restoration/enhancement – Woodbridge Regional Park (San Joaquin County Parks)

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

- Continued implementation of $1.3 million SWQCB Grant. This includes EBMUD involvement with prioritization for riparian restoration, permitting, and providing technical advice.

- Continued to expand the Student and Landowner Education and Watershed Stewardship (SLEWS) program to include five additional landowners (Dentone, El Rio, Hoffman, Liebolt, and Locke).

- Establish a schedule of training field days for local agricultural stakeholders and interests in conjunction with the RCD, Plant Materials Center, and San Joaquin County and Delta Water Quality Coalition.

- Continued work with the Mokelumne River Partnership to present the second stewardship award for stakeholders in the watershed. The second award was presented to Brad Lange for his riparian habitat restoration activities and sustainable farming practices along the LMR.

- Work with the City of Lodi to educate the residents of the Mokelumne River Watershed about non-point source pollution.

- Work with the City of Lodi and Lodi-Woodbridge Winegrape Commission to conduct water quality testing and release results to the public for educational purposes.

- Continue 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).

- Completed work with LWWC on sustainable certification for winegrape growers. Program began in 2005 and will provide benefits for fisheries and wildlife along LMR. An additional 6,000 acres were certified under this program in 2006.

- Conducted watershed tours for: USFWS Ecological Services, Office of Endangered Species, March 2006; and USDA, Agriculture Research Services, April 2006; that highlighted current restoration, and outreach and education projects.

- Worked with NGO Environmental Defense, USFWS, and California Association of RCD's to complete and implement a programatic Safe Harbor Agreement for landowners in the Mokelumne River Watershed. The first of its kind, in California and for the Valley Elderberry Longhorn Beetle, was signed in June 2006. The 2006 POWER Award "Honoring Those Who Have Overcome Opposition Through a Collaborative Method" was presented to EBMUD at the California Water Policy 16 Conference. This award was shared with Lange Twins Estates, Environmental Defense, and U.S. Fish & Wildlife Service for implementing this first statewide programmatic Safe Harbor Agreement for the valley elderberry longhorn beetle.

- Continue to work with the USDA NRCS to promote EQIP, WHIP, and other federal programs that benefit watershed resources.

- Flood Plain Restoration Feasibility Study: Participating in the feasibility study to identify activities to minimize flood-related damage to structures, levees, and agriculture through controlled releases of flood flows into the shared floodplain of the Cosumnes River and Deer Creek between Highway 99 to Highway 16. Project Study Partners for the Project are the Southeast Sacramento County Agricultural Water Authority, Sacramento Area Flood Control Agency (SAFCA), Sacramento County Water Agency (SCWA), The Nature Conservancy (TNC) and the University of California, Davis and EBMUD. The project is funded primarily by the California Bay Delta Authority ($1,007,800) with contributions from SAFCA ($50,000) and the Partnership Fund ($50,000). The project will continue through early 2007.

- 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. This project was completed in July 2006. Restoration and enhancement work is continuing on both sites and additional funding is being sought to fully fund an additional three years of restoration implementation and monitoring on these. The Lange Twins, who are key to this project, received the Leopold Award for Environmental Excellence. This is the first Leopold to be presented in California. There are five other states where this award is given and sponsored by the Sand County Foundation. The Lange Twins farm along

the Mokelumne River and their ecological restoration efforts have been a cooperative effort with EBMUD Fisheries and Wildlife staff.

2007

Many of the above habitat improvement activities will continue in 2007. A full description of 2007 activities will be reported in calendar year 2007 update report.

2. Fish Guidance Fence

The fence was installed and operated from October 1, 2006 through January 1, 2007. It is anticipated that it will be installed and operated during the same period in 2007.

V. APPENDICES

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

Appendix B: USGS Verified Flow Data for 2004 and 2005

Appendix C: Meeting Minutes of the Partnership Steering Committee

Appendix D: Woodbridge Irrigation District Notification Letter

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

APPENDIX A

SAMPLE OF LOWER MOKELUMNE RIVER RELATED STORIES FROM LOCAL PRESS

Habitat helpers

Area students work to save elderberry beetle at El Rio Farms

By Rebecca Adler
News-Sentinel Staff Writer
Last updated: Wednesday, Jan 31, 2007 - 07:11:02 am PST
Comments (0)

One day.
Eight acres.
Thirty students.
And 300 plants.
That's what it takes to help the valley elderberry longhorn beetle from becoming endangered.

Kimberly Hong pats the top of a California Buckeye Tree to wish the plant good luck in growing Tuesday morning at the El Rio Farm next to the Mokelumne River as part of a Middle College High School biology project to restore the riparian habitat along the river. (Brian Feulner/News-Sentinel)

Tuesday morning, sophomores from Middle College High School gathered at El Rio Farms north of Lockeford to plant native vegetation along the farm's Mokelumne River border in an ongoing effort to restore habitat for the beetle. The beetle, which measures less than an inch long, lays its eggs in the bark of elderberry trees. It grows to an adult within the tree's limbs and burrows out when it has reached full size. In many parts of the Central Valley, the holes left by the beetles are the only sign they are living in the area.

To teach students about conservation and give them practical experience in field work, teacher Aleathea Langone gave all of her biology students an opportunity to volunteer for the project. The high school, located on the Delta College campus, has about 260 students, with about 60 students per grade level. Some, like Lacresha Mason, grew up surrounded by pavement and shopping centers instead of spending time outdoors working with the dirt.

"At first I didn't want to do it because I didn't want to get dirty. Oh, and the worms," Mason said as she began digging another hole. "But now that I'm out here I'm really glad I decided to do it."

Mason was one of many students who had created their own sort of ritual to go with the tree planting. Mason would sing a rendition of "Old McDonald" for every new species she planted, inserting the new plant's name in place of an animal. Other students would pat the trees and wish them luck to grow.

The elderberry longhorn beetle. (Courtesy photo)

The conservation effort at El Rio Farms is one of several projects in San Joaquin County to preserve the beetle's natural habitat. The Center for Land-Based Learning, the San Joaquin County of Governments, East Bay Municipal Utilities District and the Lodi-Woodbridge Winegrape Commission all have specialists working with landowners and high schools to conserve and restore as much natural habitat as possible.

The El Rio Farms land was purchased by SJCOG as part of a development easement. Once restored to riparian habitat the land can never be used for development or agriculture.

Habitat restoration drives the project but the organizers also hope it encourages some of the participating students to pursue careers in conservation or environmental science, said Susan Douglas, who coordinates the Student and Landowner Education and Watershed Stewardship program at the Center for Land-Based Learning.

Douglas said encouraging students to get out of the class and use their hands is an important step in creating future environmentalists. At the very least, she hopes they will be more aware of how humans affect the environment. In a previous SLEWS program, high school students helped remove a dam from Murphy Creek to help salmon get upriver for spawning. Douglas said salmon spawned in the creek this season for the first time in about 15 years.

"I like planting and getting dirty," said Shelby Cruz. "We're helping the elderberry longhorn beetle because it thrives in area where native plants live." Cruz said the experience at El Rio Farms has been rewarding and she looks forward to coming back in a few weeks to check on the plants planted Tuesday. For the next four weeks Middle College High School will alternate Tuesdays at El Rio Farms with Bear Creek High School.

Contact reporter Rebecca Adler at rebeccaa@lodinews.com.

What is riparian habitat?

Riparian habitat refers to any natural plants and animals living along a river or other similar body of water.
Source: East Bay Municipal Utilities District.

THE RECORD News

Bonds to fund screen for Mokelumne River fish

By *Jeff Hood*
January 09, 2007
Lodi Bureau Chief

WOODBRIDGE - A $3 million, state-of-the-art screen that will keep fish out of irrigation canals while gently sweeping off-course salmon fry and other swimming critters down the Mokelumne River where they belong will be financed through a bond sale Thursday by the Woodbridge Irrigation District.

The screen will replace one installed in 1967 that is as much a filter as it is a barrier to fish that accidentally swim into the district's chief diversion point on the Mokelumne, just south of the recently replaced Woodbridge Dam.

"You can't just use the resources, but you need to protect the resources," said Andy Christensen, Woodbridge Irrigation District manager. "When you get into a battle over water rights and you have competing interests, the last thing you want to do is apologize for your facilities."

The new screen, at the head of the district's main canal, will funnel errant fish into a 30-inch pipeline that will carry them 1,800 feet downstream to a point in the river below the dam. A new gate to regulate water flows into the canal will replace one installed in the 1920s, Christensen said. Debris will be skimmed off before it enters the fish screen.

Woodbridge Irrigation District has the money to pay off the bonds - as well as an additional $11.5million in bonds issued to fund the recently completed dam reconstruction - because of its 40-year agreement to sell 6,000 acre-feet of water to Lodi for $1.2million a year.

State and federal agencies paid 75 percent of the cost of the existing screen, Christensen said, but public funds no longer are available for a new screen.

The construction schedule means Lodi Lake will be drained at least one more time before it becomes a year-round lake. Construction is not scheduled to begin until October, near the end of the irrigation season, lasting until mid-March 2008. The lake will be emptied earlier than its typical November date to give construction crews dry ground on which to work, Christensen said, and possibly filled later than normal in 2008 depending on construction progress.

The new screen, which will be in a V shape nearly 100 feet long, will replace a mesh one that's nearly perpendicular to the water flow and has the potential to trap small aquatic animals that rely on the direction of water flows to migrate. Adult salmon do not enter the canal in Woodbridge, Christensen said.

"A state-of-the-art screen at Woodbridge is long overdue, and we're delighted," said Bill Jennings, a member of the California Sportfishing Protection Alliance and a longtime Delta environmental watchdog. "It should protect out-migrating salmon. The larger percentage we can get downriver than in a farmer's field can only help. All the diversions on the Mokelumne take a cumulative toll, and the failure to have a state-of-the-art screen has been a significant source of mortality over the years."

Screen designer Ed Donahue of HDR Fishpro in Port Orchard, Wash., said he worked closely with the National Marine Fisheries Service to ensure fish won't be harmed in the screen.

"The fish should not be trapped on the screen, because the water velocity is slow enough," Donahue said.

Woodbridge Irrigation District also is installing a 4-foot-diameter pipeline stub near the screen for a future connection to Lodi's water system.

Contact Lodi Bureau Chief Jeff Hood at (209) 367-7427 or jhood@recordnet.com.

Wild salmon of the Mokelumne: Saving a species

Salmon at risk — from dams to tiny mudsnails

By Rebecca Adler

News-Sentinel Staff Writer

Last updated: Wednesday, Dec 06, 2006 - 07:16:15 am PST

When Bill Ferrero takes friends or clients fishing on the Mokelumne River he provides the wading boots, which he cleans in near-boiling water and bleach after each trip. He also keeps a second set of fishing gear stored for trips to other rivers.

This may seem odd to someone who hasn't spent much time on the Mokelumne River, but Ferrero takes these extra precautions to help stop the spread of a non-native snail living within the river.

Michelle Workman, an EBMUD biologist, tags and measures a salmon carcass from the Mokelumne River. Workman does a weekly survey to measure the salmon cycle in the river. (Jennifer M. Howell/News-Sentinel)

About the size of a pencil eraser, the tiny New Zealand mudsnail could cause big problems for salmon and river ecology in general, according to biologists who study the river.

Invasive species, like the mudsnail, are only one of a number of threats facing salmon in California.

Destruction of spawning habitat, pollution from sediment and agriculture run-off, increased water demands from a growing population and development along riverbanks are all threatening the natural life cycle of salmon in the Mokelumne River and elsewhere.

Because the mudsnail feeds on the same types of aquatic insects needed by young salmon and other native creatures, their introduction to the river could create an imbalance in the food chain, especially because the population spreads quickly.

With no natural predators and the ability to reproduce asexually, just one snail in a water way could become 40 million within just one year, said Joe Merz, an East Bay Municipal Utilities District biologist studying the snails.

The species is spreading quickly from river to river by hitching rides with fisherman and recreational boaters who use the same clothing, boots and gear in more than one waterway, Merz said.

U.S. Fish and Wildlife have put up signs at many popular fishing sites in an effort to raise awareness and Merz tries to educate people he sees on the river often, which is why Ferrero has been boiling his boots after going in the river.

"With the amount of time I spend on the river, I feel it's my responsibility to be a steward of the river," Ferrero said. "If this is something that can ruin the nature balance of the river then we need to take steps to stop it from spreading."

Biologists studying other problems with the river are also looking to everyday citizens keep the salmon run and the river healthy, said J.D. Wikert, coordinator of the U.S. Fish and Wildlife's Anadromous Fish Restoration Program.

"We're working on a small scale to fix bits and pieces of the radical changes that have been made to the watersheds," Wikert said.

EBMUD biologist Jose Setka records the location of new salmon redds, or nests in the water of the Mokelumne River onto his GPS device. (Jennifer M. Howell/News-Sentinel)

A larger scale effort is being made to educate the public about how water usage and run-off can cause problems in the river.

He said household water usage diverts water from natural watersheds, changes water flow, increases the need for dams and closes off natural habitat areas for salmon.

Creating a buffer of native plants along the riverbank is one way Wikert said people can help restore the river. A natural buffer can reduce run-off from yard work and construction, create shade for wildlife, keep the river cool and provide nutrients for fish through leaf litter, Wikert said.

In 1999 the AFRP estimated it will cost $23 million to restore the ecosystem of the Mokelumne River, which includes maintaining the salmon population and doubling the average of yearly returns recorded from 1967 to 1991.

People should also be aware of what they are putting into the river. If it doesn't occur naturally, it shouldn't be there, he said. This includes invasive species, which only enter California waterways with the help of humans, either purposely or accidentally.

For people to continue enjoying the river some steps need to be taken to protect it, which means paying attention to posted signs, keeping the river clean and being respectful of the wildlife, according to Merz.

Ferrero boils his boots, but there are other ways to get rid of the mudsnails, Merz said. The U.S. Fish and Wildlife recommends using a bristled brush and Formula 409 to remove any visible snails, then freezing fishing gear, such as boots and nets, to get rid of any additional snails.

"It may not be convenient, but we need to be responsible," Merz said. "It's already here in the Mokelumne. Our job is to keep it from spreading."

Contact reporter Rebecca Adler at rebeccaa@lodinews.com.

What you can do

Fisherman and river guides who use more than one river are most likely to spread New Zealand mudsnails, but the Department of Fish and Game recommends all river users take precautions to keep the snails from moving into other waterways. Adult mudsnails can survive several days out of water on moist gear and reproduce asexually, so even one snail could mean big problems.
To remove snails Fish and Game recommends any of the following:
• Place gear in water at 130 degrees Fahrenheit for five minutes or freeze overnight for at last six hours.
• Have extra waders and boots that are used only in infested waters. Store them separately.
• After leaving water, inspect waders, boots, float tubes, boats or trailers — any gear used in the water.
• Remove visible snails with a stiff brush and follow with rinsing.
• Never transport live fish or other aquatic animals or plants from one water to another.
• Brush coats of dogs after wading.
• Spray gear with Clorox or Formula 409, and then scrub with stiff-bristled brush to remove all visible snails.
Source: California Department of Fish and Game.

First published: Wednesday, December 6, 2006

Biologists work to protect salmon

By Rebecca Adler
News-Sentinel Staff Writer
Last updated: Wednesday, Dec 06, 2006 - 07:16:20 am PST

An underwater migration of more than 16,000 salmon is underway in the Mokelumne River.

Each fish is struggling against the rushing river current to get back to its birthplace to spawn and then finish its life cycle.

Salmon are piled in a bin for charities after Mokelumne Fish Hatchery employees collected eggs. (Jennifer M. Howell/News-Sentinel)

It's a massive movement of fish that goes widely unnoticed on land, but there are some for whom this is the busiest time of the year.

The damming of rivers throughout the state has changed the natural salmon run, creating obstacles and destroying spawning habitat for millions of fish, said Joe Merz, a fisheries biologist with the East Bay Municipal Utilities District.

But the salmon have proven to be a resilient species, with the help of humans, Merz said.

"What we have now is far from natural, though," he said. "The Mokelumne is a highly managed river."

Fall-run Chinook salmon of the Mokelumne River historically spawned above what is now the Camanche Reservoir. The Camanche Dam, built in 1964, essentially destroyed the natural spawning habitat of the salmon, which was replaced with the Mokelumne River Fish Hatchery.

The hatchery is responsible for more than half of the Mokelumne River salmon produced each year — the first step in restoring the salmon population. Merz and a team of biologists are now working on the next step — getting as many salmon as possible to spawn naturally in the river.

Without removing the dams along the Mokelumne river, the task is somewhat complicated, requiring constant monitoring of water flow and temperatures to create prime spawning conditions, adding gravel to the river bed to recreate the natural flow of sediment impeded by the dam and restricting recreational fishing to give salmon the best chance possible to reach their spawning destination.

Not including staffing costs, the spawning and restoration projects cost EBMUD $520,000 annually.

Biologists also count the salmon carcasses and redds, or salmon nests, found in the spawning area between Camanche Dam and Mackville Road.

To an untrained eye the redds could go unnoticed, but biologist Jose Setka surveys the river while floating down it, looking for areas where the gravel seems cleaner than normal.

Did you know?

Salmon are an anadromous fish, meaning they spend part of their lives in fresh water and part of their lives in the ocean. Some other anadromous fish native to the Pacific Northwest are coastal cutthroat trout, steelhead, American shad, sturgeon and Pacific lamprey.
Source: Pacific States Marine Fisheries Commission, http://www.psmfc.org.

Gravel along the riverbed accumulates algae and mud throughout the year, but in order for their eggs to be properly fertilized, the female salmon has to have a clean area to work. She uses her tail to stir up any settled grime and dig a space large enough to lay about 5,000 pea-sized eggs.

When she's finished, she covers the pile of orange eggs with the now clean gravel to hide the nest from predators. All this work makes Setka's job a little bit easier.

Setka said his group performs the redd counts the same way every year so they can get comparative results.

If numbers are down or up by a large margin research is done to try to figure out what changed from one year to the next.

"It's important to remember that the salmon run is cyclical, so it peaks and then the numbers go down again," Setka said. "Our job is to ensure the low side of the cycle isn't as bad as it used to be."

Setka is referring to poor river conditions between 1987 and 1992 due to drought that caused the salmon run to drastically decline. In 1990 only 71 redds were found in the Mokelumne River. Last year Setka's group found more than 2,400.

Wildlife biologists, specializing in habitat restoration on land, like Kent Reeves, are also helping the salmon by working with landowners along the riverbanks to restore natural vegetation, which in turn brings native species, reduces water pollution, stabilizes riverbank erosion and improves the overall river ecology.

He said buy-in from farmers is especially important because it can significantly reduce the amounts of pesticides that enter the river.

Chris Locke, whose walnut grove runs along about one-and-a-half miles of the Mokelumne River, began serious habitat restoration along his property in 2001 with the help of Reeves.

"It's a very effective and inexpensive way to control pests," Locke said. "There are aesthetic benefits, too. It beautifies our ranch and it makes the riverbank look more natural for people floating down the river."

The restored habitat acts as a buffer between recreational river users and Locke's crops, while also increasing the population of natural pest predators, such as bats and owls.

Attracting natural predators for moths and mosquitoes means decreasing the need for pesticides, which will increase water quality.

Reeves said trees along the riverbanks also creates shade, which keeps the water cool during warm winter months. Cooler water is better habitat for salmon and steelhead, and it keeps diseases from breaking out in aquatic species.

"It's good for the crops and it's good for the wildlife," Reeves said. "Everybody benefits from the restoration effort."

Contact reporter Rebecca Adler at rebeccaa@lodinews.com.

First published: Wednesday, December 6, 2006

Biologist doing part in saving salmon

By News-Sentinel Staff

Last updated: Wednesday, Dec 06, 2006 - 07:16:24 am PST

Kent Reeves

He's ridden in rodeos, guided trips through Kenya and surfed a number of coastlines.

Early on in his life, Kent Reeves realized if he was going to settle on a job it would have to be something that would allow him to be outdoors.

Kent Reeves

"It's not often you can have a job where you get out of the office half the time," Reeves said. "A lot of people my age spend their days stuck behind a desk. I didn't want that."

Surfing and a love for the ocean got him interested in marine biology, which he studied at a community college in Santa Cruz.

But he chose to transfer to California State University, Humboldt after two years and changed his major to wildlife biology. He received a bachelor's of science and master's degree from Humboldt State and then worked for several years as a consultant for government conservation agencies.

In the mid-90s, he changed career paths and moved to East Bay Municipal Utilities District to become a full-time wildlife biologist.

With a background in restoration and enhancement, Reeves, 52, now spends his days working on restoring natural habitat along the Mokelumne River.

Known for his cowboy hats and easy smile, Reeves spends his time out of the office talking to landowners and farmers, trying to get them interested in habitat and wildlife restoration.

In addition to his job at EBMUD, Reeves continues to surf and ski regularly and takes photos, many of which have been exhibited at shows throughout the state.

First published: Wednesday, December 6, 2006

Wild salmon of the Mokelumne: Saving a species

Salmon vital to environment, economy

By Rebecca Adler
News-Sentinel Staff Writer
Last updated: Tuesday, Dec 05, 2006 - 08:19:38 am PST

Matt Saldate, a fishery technician, hooks a salmon carcass as fellow technician Ed Rible looks on. The men conduct a carcass survey recording how many spawned fish make it up to the Mokelumne River Hatchery and lay their eggs in the river. (Jennifer M. Howell/News-Sentinel)

Tons of gravel are hauled in each summer to restore the Mokelumne River salmon habitat. Biologists and volunteers spend hours scouring the riverbed in search of salmon nests.

Others look for carcasses of the salmon that have already completed their life cycle.

In the hatchery, workers spawn the fish by hand in case something goes wrong with the natural process.

But what's the point in putting all this effort and spending millions of dollars to keep the local salmon run healthy? After all, there are salmon runs everywhere.

Biologists working on the river say there's a big point: the health of the river.

Millions of dollars are spent each year to improve dams, fish ladders and spawning habitat for salmon, not because salmon are the only important species, but because their presence indicates good water quality and a thriving ecosystem, said Bill Jennings, executive director of the California Sportfishing Protection Alliance. Salmon also have economic value for commercial and sports fisherman, as well as restaurants and grocery stores.

A failing salmon run indicates larger problems for both wildlife and humans who rely on water from rivers and streams, Jennings said.

"An estuary that won't support salmon and frogs and butterflies won't long support little boys and girls," he said.

By the time humans start noticing a depleted salmon run there have already been major changes in the river, which could mean a loss in aquatic insects the fish feed on or a temperature change that could spread disease. Likewise, if natural spawning is restored it indicates much of the ecosystem is working again and the river is healthy.

"Salmon are a native species to California and are important for the survival of the ecosystem," said Michelle Workman, a fisheries biologist for East Bay Municipal Utilities District. "They keep the food chain and the river functioning the way they should be."

If salmon were to disappear from the Mokelumne River it would cause an imbalance. An insect species could

reproduce unchecked or a new fish species could take the river over and possibly kill off another native species or overcrowd the river.

Getting to know salmon

Want to sound savvy about the salmon run? Here are a few words you'll need to know:
Anadromous: Fish that hatch and rear in fresh water, migrate to the ocean (salt water) to grow and mature, and migrate back to fresh water to spawn and reproduce.
Spawn: Fish reproduction; the mixing of the sperm of a male fish and the eggs of a female fish.
Redd: A fish nest covered with gravel.
Alevin: The developmental life stage of young salmon between the egg and fry stage. The alevin has not absorbed its yolk sac and has not emerged from spawning gravels.
Fry: A stage of development in young salmon. A fry is usually less than one year old, has absorbed its yolk sac, is rearing in the stream, and is between the alevin and parr stage of development.
Fingerling: A young fish in its first or second year of life.
Parr: The developmental life stage of salmon and trout between alevin and smolt, when the young have developed vertical stripes and are actively feeding in fresh water.
Smolt: Refers to the salmon developmental life stage between parr and adult, when the juvenile is at least one year old and has adapted to the marine environment.
Milt: Fish sperm.
Fish Ladder: Allows adults to pass dams on their upstream spawning migration.
Source: http://www.streamnet.org.

Workman works with a group of biologists on the Mokelumne River to improve natural spawning in the river, but she said it's only part of the solution.

Salmon are anadromous fish, meaning they live part of their life in fresh water and part of their life in the ocean so they face threats from both, she said.

A drought about 10 years ago critically reduced salmon populations.

Much like the Klamath River today, the drought caused poor river flows, making it difficult for salmon to navigate the river and warming the river to levels unfit for spawning.

The Mokelumne now has between 5,000 and 16,000 returning salmon each year, with an out-migration of nearly 8 million. Since 1992, more local salmon have been returning since the drought reduced their numbers to about 150.

A thriving ecosystem also means a thriving income for a number of people throughout the United States.

Northern California fishermen learned just how much one salmon run can affect their income, when the U.S. Department of Commerce banned fishing along the coast during the height of the season this year. The reason: Klamath River's poor salmon run. The cost to fisherman? An estimated $16 million.

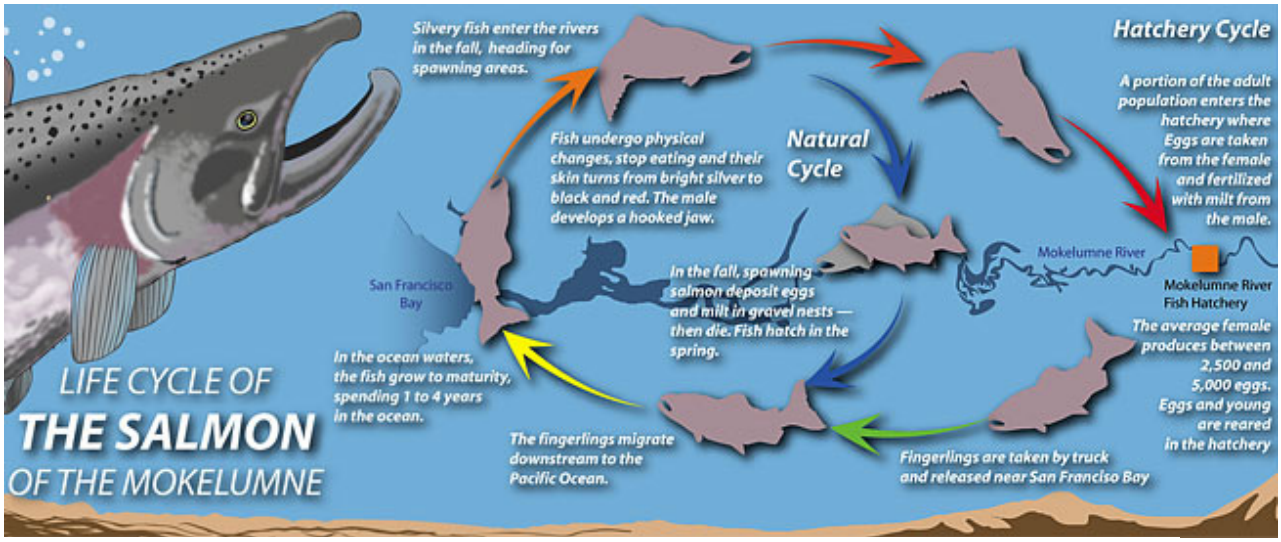
Salmon also create an income for restaurants, the ecotourism industry and, in Lodi, possibly wineries, said Andy Christensen, manager of the Woodbridge Irrigation District.

Christensen has been approached by wineries from both Lodi and Woodbridge who are interested in working with the district to turn Woodbridge Dam into a tourist attraction by adding a visitor center, expanding the salmon viewing station and opening it to the public.

Christensen said it would give tourists a unique opportunity to see the fish at eye level, giving people one more reason to visit Lodi.

However, the district, which spent $15 million to improve the dam and fish ladders in 2003, doesn't have any money available right now to expand into the tourist sector.

More than half of the money spent on improvements went toward fish ladders to help the salmon migrate upriver to spawning habitat and the hatchery near Camanche Dam, Christensen said.



(Marc Lutz/News-Sentinel)

"The river was out of balance and the declining salmon populations were an indication of that," he said. "Part of improving the fish ladders was to put things back in balance."

Christensen said there doesn't have to be a choice between serving salmon or people along the Mokelumne River, "we can do both."

Contact reporter Rebecca Adler at rebeccaa@lodinews.com.

Published: Wednesday, December 6, 2006

Hatchery keeps river healthy

By Rebecca Adler
News-Sentinel Staff Writer
Last updated: Tuesday, Dec 05, 2006 - 06:35:48 am PST

"This is cruel!" Katie Arata screams "They're hitting them in the head with a hammer and there's blood everywhere!"

She looks at her teacher earnestly, but the answer comes instead from another classmate, Mia Knipper.

"But they need to do it if they want to have new fish," Knipper explains.

Cynthia Pierce, a fish and wildlife technician, removes the eggs from a salmon as technician Darrick Baker gets ready to mix the milt from a male salmon during the fertilization process at the egg table at the Mokelumne Fish Hatchery. (Jennifer M. Howell/News-Sentinel)

The two seventh graders from Stockton's Waverly Elementary School have just witnessed the gruesome side to the spawning procedure at the Mokelumne River Fish Hatchery, where more than 8,000 salmon came to end their life cycle last year.

It's a necessary process to keep the salmon population and the river healthy.

Through two large windows the students see the sorting area, where they watch salmon move down two metal platforms — one side for the males and one for the females — two workers wait with orange rubber hammers, with which they hit the salmon on the head.

A third worker sprays water through the females' gills to get all the blood out before moving them down to where workers will remove their eggs.

At the end of the two platforms one worker sits with an empty white tub. She slits open a salmon's belly with a knife while another worker picks up a male salmon and squeezes its belly until a white liquid squirts out near its tail.

The white liquid, or milt, the scientific word for salmon sperm, is squirted into the white tub before, and while, the eggs are removed from the female's belly and scooped in.

A little swish of the tub and the workers have the beginnings of up to 5,000 salmon, which will be reared at the hatchery and released in the San Francisco Bay in late April.

John Precissi, the science teacher who took his sixth-, seventhand eighth-grade classes to see the salmon on Monday, said he gets mixed reactions from the children each year, but he finds it important to impress upon them how necessary it is to have the hatchery at the foot of Camanche Dam.

"Sure, it's an eye-opener cruelty-wise, but these fish die anyway so it's important for (the children) to know why its done," Precissi said.

By the end of the tour most onlookers understand the need to artificially spawn the salmon, said Shazana Gardner, the California Department of Fish and Game employee who leads group tours of the fishery hatchery.

"We really try to explain that this is done for the good of the salmon," Gardner said. "It may not be pleasant,

Bill Smith, the Mokelumne Fish Hatchery manager, holds one of the biggest salmon of the day as he sorts salmon from the fish loader. (Jennifer M. Howell/News-Sentinel)

but it's a reality of keeping the salmon population strong."

But not everybody agrees.

Some, like Bill Jennings, think hatcheries create fish that don't know how to survive in the wild.

Fish raised in hatcheries may also be more prone to diseases and could lead to a diluted gene pool, said Jennings, the executive director of the California Sportfishing Protection Alliance.

"A hatchery is a poor substitute for the natural cycle," Jennings said. "It breeds dumb fish and truncates the genetic diversity of the fish."

But without the hatchery, the Mokelumne River salmon run may not have survived long past 1964, when the natural spawning habitat was destroyed and Camanche Dam was built.

Results at the hatchery have been promising with numbers increasing from 2,000 total spawning salmon in 1964 to 16,128 returning last year, half of which spawned naturally in the river.

While salmon may not naturally be slit open and milked to reproduce, they do die after they've finished the process. And biologists found more than 2,400 salmon nests in the Mokelumne River last year, meaning at least 5,000 salmon spawned and died in their natural habitat.

Hatchery by the numbers

16,128: Total number of fish to return to the Mokelumne River in 2005.
8,187: number of salmon to return to the hatchery in 2005.
5,000: possible number of eggs from one salmon.
506: number of female chinook salmon to enter hatchery this year (as of Nov. 9).
425: number of male chinook salmon to enter hatchery this year (as of Nov. 9).
58: optimum water temperature in degrees fahrenheit for spawning salmon.
15: average weight in pounds of a spawning salmon.
Source: Department of Fish and Game.

Located on McIntyre Road, off Highway 88 in Clements, the fish hatchery is composed of a visitors center, the spawning area with rearing tanks, where the fry, or baby salmon, develop for about six weeks, and 20 or more concrete raceways outside, where the young salmon, also called fingerlings, are raised alongside steelhead, which have a longer spawning period that begins around January.

Gardner said people are sometimes shocked by the spawning process, but are appeased when they see the final result at the end of the tour. The tour finishes at the concrete raceways, where students are able to feed the fingerlings and watch them swim and jump.

Even without the hatchery operation, the salmon would have died said Steve Boyd, an East Bay Municipal Utility District fishery biologist working at the hatchery. He said the hatchery process just allows a larger portion of the population to finish the life cycle than would be possible in the limited habitat.

Boyd said spawning the fish is one of the main tasks at the hatchery, but there are several other important projects taking place within the hatchery.

Workers do research to determine the age of the salmon returning for spawning. They keep track of the salmon population. They track salmon migration patterns. And they manage river flows and temperatures to give salmon an opportunity to spawn in the wild.

In addition, nearly 50,000 pounds of salmon is donated each year to the San Joaquin County Commodities Program, which provides food for the needy.

"I thought it was mean until I knew what they were doing," said Ashlynn Poggio, one of Precissi's seventh graders, "I guess if it helps it's a good thing even though there's a good and a bad side to it."

Contact reporter Rebecca Adler at rebeccaa@lodinews.com.

Published: Tuesday, December 5, 2006

Boyd, Ferrero strive to keep Mokelumne healthy

By News-Sentinel Staff

Last updated: Tuesday, Dec 05, 2006 - 06:35:49 am PST

Steve Boyd

For the past 17 years, Steve Boyd has overseen operations at the Mokelumne River Hatchery as a fisheries biologist for East Bay Municipal Utilities District.

Steve Boyd

His interest in fish began when he was growing up in Ogden, Utah. He fished regularly at a local waterway and it sparked his interest in studying biology and conservation.

Years later, when he was trying to decide what he was going to do with his life, he chose a career in fisheries because it gave him an opportunity to work outdoors and specialize in something he already enjoyed.

"I liked to be outdoors and thought, 'Hey, they'll pay me to do this?'" Boyd said.

Today, Boyd, 47, splits his time between the office and the hatchery, giving him the opportunity to be outdoors and help preserve the fish for which he still fishes regularly.

Bill Ferrero

Bill Ferrero is a man with many talents. By day, he works as a salesman for California Waste Recovery Systems. On the side, he plays guitar in a band, of which he's been part for 13 years. And in his free time, he fishes the Mokelumne River.

Originally from Lodi, the Stockton fisherman picked up his first fishing rod at age five, nearly 48 years ago, and he's been fishing the Mokelumne River ever since.

Each year he logs between 35 and 45 days on the river. Even in winter, when the water is bone-chillingly cold, he wades in about 5:30 a.m. and stays for a few hours to enjoy the sound of the river and hopefully to catch a few fish.

Bill Ferrero

This spring he plans to add a third job to his repertoire: Guiding tours on the river.

He figures if he starts now he'll have a pretty steady stream of clients by the time he retires, in about 15 years.

With all the time Ferrero spends on the river, he said keeping the river and its fish healthy is important to him.

He plans to educate his clients about proper licensing and catch limits, along with river safety.

"It comes down to one thing: If you're going to spend time on the river you need to be a steward of the river," Ferrero said.

Published: Tuesday, December 5, 2006

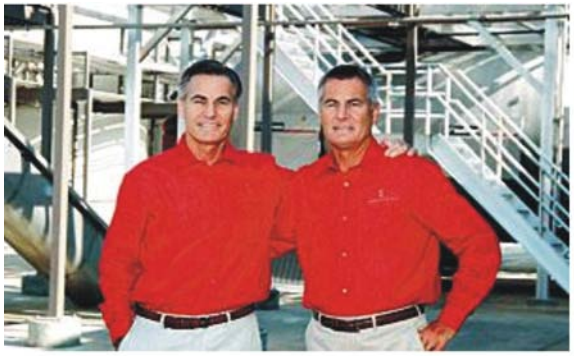
Lange twins win $10,000 Leopold Conservation Award

By News-Sentinel Staff

Last updated: Tuesday, Dec 05, 2006 - 06:35:56 am PST

Local farmers Brad and Randy Lange are again in the spotlight for their conservation efforts.

At the California Farm Bureau's annual meeting Monday, the two brothers received the first-ever Leopold Conservation Award, which comes with a check for $10,000.



Brad and Randy Lange. (Courtesy photo)

Brad Lange said the brothers would use the prize money for more habitat restoration on their land.

Farming nearly 6,500 acres of vineyards along the Mokelumne River, the Lange brothers take several approaches to conservation. Their practices include: using natural predators to combat pests; using sprayers that reduce chemical use by 50 percent and water use ten-fold; and installing solar power for their vineyard operations and farmhouse.

"The environmental stewardship frame of mind allows us to think outside the box to find creative solutions that can be mutually beneficial to our ecosystem and to our bottom line," said Brad Lange, co-owner of the LangeTwins Wine Estates, "Not to mention the priceless benefit of conserving the environment for future farming generations."

The Leopold Conservation Award was presented by Sand County Foundation, a group dedicated to working with private landowners to improve and restore natural habitat on their land.

The other two California finalists, Prather Ranch of Shasta County and V6 Ranch of Monterey County, received $1,000 prizes.

Expert evaluators toured the operations of all three finalists to understand the environmental and economic benefits of the various conservation practices, and a Blue Ribbon panel of experts chose the final award winner.

"The Langes and all of the Leopold Conservation Award nominees demonstrate that California farmers and ranchers play a crucial role in protecting the health of the environment and providing habitat for wildlife," said Ashley Boren, Executive Director of Sustainable Conservation. "With more than half of California land in private hands, their work is a win for wildlife, humans and the economy."

Conservation in farming

Brad and Randy Lange are third-generation winegrape growers on their 6,500 acre vineyard near Lodi. Building on the efforts of their father, which began in the 1940s, the Lange brothers' approach today includes:

- Restoring riparian habitat along the Mokelumne River.
- Minimizing the use of harmful and costly pesticides by pioneering new ways to combat pests with natural predators.
- Installing solar power for their vineyard operations and farmhouse.
- Building a winery that incorporates energy-efficient lighting, sanitation methods that employ ozone instead of chlorine and an advanced processing system to treat wastewater generated during the winemaking process.

Source: Sand County Foundation.

Who is Aldo Leopold?

The Leopold Conservation award was named after Aldo Leopold, who wrote "A Sand County Almanac." The book, published in 1949 a year after Leopold died in 1948, called for an ethical relationship between people and the land they own and manage. The development of a land ethic was, he wrote, "an evolutionary possibility and an ecological necessity."

The Sand County Foundation presents the award to a private landowner who exemplifies the spirit of this land ethic. The Leopold Conservation Award is currently presented in six states: California, Colorado, Texas Nebraska, Wisconsin and Wyoming.

Source: Sand County Foundation.

Published: Tuesday, December 5, 2006

MOKELUMNE'S RECOVERY COULD SPAWN REBOUND IN OTHER TROUBLED WATERWAYS

By ***Alex Breitler***
November 26, 2006
Record Staff Writer

CLEMENTS - Standing in the Mokelumne River Fish Hatchery at the height of the fall salmon run is a bit like being plunked into a fishbowl.

There are the salmon, of course - hundreds fresh out of the river, their slimy tails slapping the metal chutes as workers in blood-spattered slickers harvest their eggs and sperm.

And then there are scores of awed schoolchildren, pressing their faces to the windows to take in the gruesome but necessary demise of the fish as their life cycle comes to an end.

The spectacle has only grown over the years. Last year, more than 16,000 chinook salmon found their way up the Mokelumne River, the highest number since river restoration efforts began four decades ago.

That is good for fishermen. It is good for local economies. And it is good for those whose taps run with Mokelumne water.

In the end, the Mokelumne could serve as an example for returning fish to other San Joaquin Valley waterways, conservationists say.

"It's a wonderful thing to know that this river is healthy enough to support salmon. It has gone through a lot in its history," said Joe Merz, a biologist with the East Bay Municipal Utility District, which takes water from the Mokelumne and supplies it to 1.3 million people in Alameda and Contra Costa counties.

The history of which he speaks stretches back to the 1850s, when gold miners had diverted so much water from the Mokelumne that the streambed was occasionally left dry.

In 1929, officials built the Pardee Dam on the river, blocking upstream salmon habitat but allowing the diversion of water to homes in the East Bay.

Copper mining in the early 1940s caused heavy metals to leach into streams that feed the river, killing all downstream aquatic life for two years.

The fish never got much attention until the 1960s, when the hatchery was built at the base of Camanche Dam, near Clements. Even after that, the salmon populations dwindled perilously during the droughts of the late 1970s and early 1990s.

That goes to show that the recent success cannot be guaranteed in the future, said Andy Christensen, manager of the Woodbridge Irrigation District, which has made its own improvements to the river, including spending millions on new fish ladders.

"We're glad the numbers are up," Christensen said. "Can you say that we aren't going to have low numbers again? I don't know that you can."

Salmon are reared in rivers and tributaries until they grow large enough to swim downstream and enter the ocean. There they spend several years before journeying back to their waters of origin, where they spawn and die.

Many factors determine the size of a run: flows in the river, food supplies in the ocean and survivability in the Delta, which is notorious for declining water quality and export pumps that kill some fish.

Success on the Mokelumne River could be duplicated, said Zeke Grader of the Pacific Coast Federation of Fishermen's Associations in San Francisco. He represents commercial fishermen who depend on salmon born in inland rivers.

"It gives me a lot of hope that we can bring back the San Joaquin River salmon runs," Grader said, referring to the heavily diverted waterway for which restoration plans were recently announced.

The Mokelumne got a hand from a 1998 legal settlement requiring the utility district to offset damage caused by its diversions. That meant a $12 million upgrade at the hatchery four years ago and about $500,000 a year to keep it in operation.

In the river itself, workers place beds of gravel to give salmon somewhere to spawn. Biologists like Merz routinely check water quality inside those mounds of gravel to determine if it's good for fish development.

"We want naturally produced chinook salmon," not just hatchery fish, said Joe Miyamota, manager of fisheries and wildlife for the utility district.

At the hatchery early last week, workers were processing up to 800 fish in one day, capturing close to 1 million eggs, hatchery manager Bill Smith said during a quick breather. The fish, diverted from the river into a canal leading up to the hatchery, were practically beating down the doors.

"We'll be at it well into the afternoon," Smith said, and there were plenty of children to ensure he had an audience.

Contact reporter Alex Breitler at (209) 546-8295 or abreitler@recordnet.com.

Go fish

The Mokelumne River Fish Hatchery is open to the public from 7 a.m. to 3:30 p.m. every day, including holidays. It is located on McIntire Road off Highway 12 east of Clements. For more information, call (209) 759-3383.

Hatchery Manager Bill Smith hoists a male Chinook Salmon out of a fresh batch as he and fellow workers sort the males from the females at the Mokelumne River Fish Hatchery. Students from Linden's Waverly Elementary School look on.

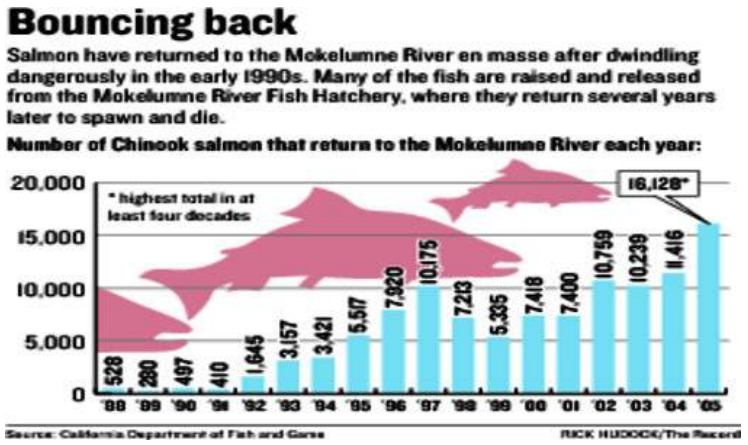
ARIEL ZAMBELICH/The Record

Dead Chinook Salmon lay discarded in large bins after Wildlife Technicians have emptied them of eggs. These salmon return to the river to spawn after years in the ocean, and some can reach up to 40 lbs. in weight by the time they reach the Mokelumne River Fish Hatchery.

ARIEL ZAMBELICH/The Record

Students from Linden's Waverly Elementary School take turns touching discarded chinook salmon during a field trip to the Mokelumne River Fish Hatchery, which is open every day.

ARIEL ZAMBELICH/The Record

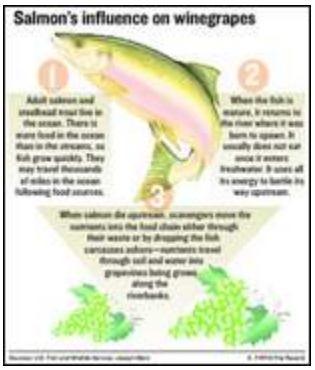


Rick Hudock/The Record

Fishing for a better wine

Dead salmon's effects on grapes the focus of biologist's study

BRUCE SPENCE
Record Staff Writer
Published Sunday, Aug 20, 2006



Is it your imagination or does that Lodi chardonnay display a hint of salmon on your palate?

According to a new study, a few thousand dead chinook salmon that die naturally in the Mokelumne and Calaveras rivers contribute significantly to the growth, and likely, even the quality of winegrapes growing nearby.

The study, led by Joseph Merz, a Lodi-based fisheries biologist with East Bay Municipal Utility District, concluded that 14 species of wild animals, such as turkey vultures, raccoons, river otters, rats, coyotes and deer, eat the salmon carcasses and convert the nutrient-laden fish into fertilizer for the grapevines.

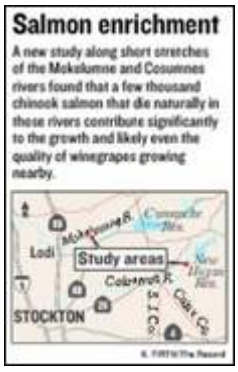
Merz, also an instructor at California State University, Sacramento, collaborated with Peter Moyle, a professor in the University of California, Davis department of wildlife, fish and conservation biology, and a leading authority on California native fishes.

They combined their own new studies with other researchers' earlier findings as they examined what happens after chinook salmon incorporate the rich chemistry of the northern Pacific Ocean - carbon, nitrogen, phosphorus and more - into their body tissues.

By tracing the movement of elemental "fingerprints" of nitrogen isotopes, the scientists found that when the salmon die upstream after spawning, scavengers move the marine-origin nutrients into the terrestrial food chain either through their wastes or by dropping the fish carcasses ashore.

The nutrients travel through soil and water into grapevines being grown commercially along the riverbanks, the study said.

"What we found is that the grapes close to the river get up to 25 percent of their nitrogen from salmon," Merz said. "In winemaking, nitrogen affects yeast growth and sugar fermentation. No doubt, some of the best California wine has salmon in it."



The study also indicates that managing regulated rivers for salmon has benefits far beyond helping to provide fish for fishermen.

The study, entitled "Salmon, Wildlife, and Wine: Marine-Delivered Nutrients in Human-Dominated Ecosystems of Central California," was published in the June issue of the journal Ecological Applications. It also was noted in the news pages of the July 21 issue of the journal Science.

The research was funded by East Bay MUD through its financial support of Merz's doctoral study of gravel enhancement to restore salmon spawning in the Lower Mokelumne River.

Stewart Spencer, program manager for the Lodi-Woodbridge Winegrape Commission, said no one seems to have particularly minded the study.

A motion-sensor camera captures turkey buzzards feeding on a salmon carcass. Nutrients from dead fish in the Mokelumne and Calaveras rivers contribute to the growth of nearby winegrapes, according to a new study.

Credit: Photo Courtesy/Joseph Merz

"If the benefits are as they say, it's good for everyone all around," he said. "If there's more fertilizer, there's less money that has to be spent on fertilizer."

It's been kind of an attention-getting story, he said. The commission has worked closely with East Bay MUD on its sustainable farming program, he said, so we're all working toward a healthier river ecosystem.

"It brings more attention to our wines, and that's a good thing."

Merz said he didn't think the study focus would be a problem for vintners.

"It's not like any of that fecal matter would be carried up through the roots to the grapes," he said. "And most folks use turkey droppings and cow manure for fertilizer, so I really didn't think of that as a negative thing."

Contact reporter Bruce Spence at (209) 943-8581 or bspence@recordnet.com

Many feel Mokelumne River should be open

By Ross Farrow
News-Sentinel Staff Writer
Last updated: Monday, Aug 14, 2006 - 06:23:42 am PDT

Now that rafting and boating on two sections of the Mokelumne River have been banned for the second time this year, Stillman Magee Park was much quieter over the weekend than it was when watercraft were permitted.

Only about 100 water enthusiasts visited the park on the south shore of the Mokelumne River on Mackville Road, according to Frank Densmore, the park's caretaker over the past seven years. The weekend of July 22, some 500 to 600 people packed Stillman Magee Park.

Ronnie Brown of Stockton is about to splash into the Mokelumne River after letting go of a rope Sunday afternoon at Stillman Magee Park in Clements. (Ross Farrow/News-Sentinel)

The San Joaquin County Board of Supervisors closed the river to boating and rafting on Aug. 1, two weeks after voting to open the river for public recreation. Supervisors had previously closed the river on May 24 because of rapid flows from a very wet winter.

One closure is from McIntyre Road, just downstream from Camanche Dam, to Bruella Road in Victor. The second closure is from Woodbridge Dam to Peltier Road.

The second closure this year stems from the approximately 70 locations in which downed trees partially or fully block river navigation, according to San Joaquin County Sheriff's spokesman Les Garcia. There could also be submerged hazards that people can't see, Garcia said.

"That's (garbage)," said Stockton resident K.G. Ghuman, who spent Sunday enjoying barbecued hot dogs and jumping into the river from a rope tied to a tree on the south shore at Stillman Magee.

"There's always been trees," Ghuman said. "People go at their own risk anyway."

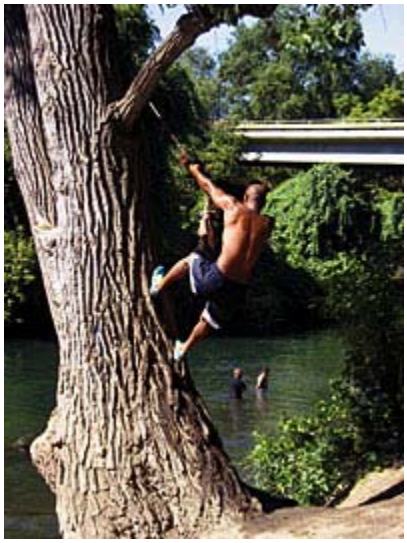
Trees caused problems for kayakers on July 23, just hours after county officials reopened the Mokelumne River for the first time since May 24.

The kayakers were not injured, but they were stranded on a snag in the river near Stillman Magee Park. A Mokelumne Fire boat couldn't reach them due to the swift current, so a California Highway Patrol helicopter had to pick them up by air.

On July 28, another group of rafters found themselves stuck in the water, and fire boating crews were

again called to help.

Officials closed the river in 2005 after a Southern California rafter drowned on Memorial Day near Camanche Dam. It reopened Aug. 7, 2005. Until then, the Board of Supervisors had not closed the river since 1997, and previously in 1995.



Stockton resident Ronnie Brown gets a firm grasp on some rope and climbs a tree before swinging out and into the Mokelumne River on Sunday afernoon in Clements. (Ross Farrow/News-Sentinel)

"It's kind of a safety hazard," Misty Garrett, of Stockton, said Sunday while stopping for refreshment at a Clements business. "I wouldn't want to kayak when it's dangerous."

Clements Fire Chief Dave Ingrum acknowledged that the Mokelumne River has debris every year, but when the water is high, the banks go out into some thorny berry bushes, which stand 8 feet tall and spread 12 feet wide.

The river closure hasn't deterred rafters, according to Frank Densmore, a caretaker at Stillman Magee Park.

"We've had dozens of people come down the river," Densmore said Sunday. "We had a kayak come down this morning."

But a majority of the park visitors Sunday were enjoying picnics, swimming in the river and diving into the river from a rope tied to a tree.

Some park visitors who enjoy the river are deterred from being involved in gang activity, Ghuman said. The river also prevents people from getting heat stroke, he added.

Ernie Brown, who lives along the river's north shore near the Mokelumne River Fish Hatchery, said the Board of Supervisors should never have opened it in the first place this year.

"The problem is, it looks good, but the people hit these trees, and they can't get out," said Brown, who has lived along the river more than 20 years.

But several people didn't see any problem rafting and boating in the Mokelumne River, despite the two rescues in July.

"That's the American way," said Jackson resident Joel Sweeney, enjoying a cold one at the Old Corner Saloon in Clements. "We started with a bunch of rights, but they keep taking our rights away. The American River is way more dangerous than this river."

Sweeney noted the white-water rafting conditions on the American River in the towns of Coloma and Lotus, north of Placerville.

Sweeney suggested that rafters could form a work party and remove trees and other debris from the river so that the river can be used again.

"It's dangerous to a point," Sweeney said of rafting on the Mokelumne River. "Everybody likes to regulate. If they want to regulate, mandate life vests."

Contact reporter Ross Farrow at rossf@lodinews.com.

First published: Monday, August 14, 2006

Thanks for help with critical water situation

Last updated: Tuesday, May 16, 2006 - 06:55:44 am PDT

Lockeford Protection District No. 1 is a levee system that protects mostly tree crops from flooding along the Mokelumne River from near Clements to Tretheway Road, west of Lockeford.

There are about 1,500 acres being protected; each landowner pays a reasonable amount per year in taxes for upkeep and repairs. Management is voluntary by a board of three trustees.

This year the rain and snow in abundant releases from Camanche Dam has put the levees to the test. Flows have been at about channel capacity, creating a seepage condition at various locations.

In communications with the East Bay MUD Engineers along with the U.S. Army Engineers who control releases from Camanche Dam, they have offered a choice: to send releases at the channel capacity for a shorter period, or drop a fifth of the flow for a longer period to handle expected runoff.

Because of seepage and the threat of weakening levees due to saturation, the board asked for the lower rate. The flow had dropped and seepage conditions are much improved.

The board of the district wishes to thank East Bay MUD and the U.S. Army Engineers for their spirit of cooperation in this critical situation.

Chester M. (Chet) Locke
Stockton

Officials promote health of Mokelumne

Warren Lutz
Record Staff Writer
Published Thursday, May 11, 2006
LODI - If Douglas and Barbara Booth knew little about the Mokelumne River before Wednesday, all that has changed.

The lower Mokelumne River watershed was the focus of an open house Wednesday at Lodi Lake geared to educating residents about protecting the river. A Himalayan black bear cub plays in a tub of water while his handler, Anita Jackson from the traveling education program Zoo to You, talks about bears.

Credit: CRAIG SANDERS/The Record

The couple were among the two dozen or so folks who gathered at Lodi Lake to learn about the waterway's vital role in the region - and what farmers, businesses and landowners are doing to protect it.

"I thought it was great," Douglas Booth said after watching Fish and Wildlife officials show off a fox and an alligator. "I just wish our grandkids were here."

The public "open house" for the Mokelumne River was intended to teach residents about the river and celebrate the achievements of a river stewardship program that began several years ago, said John Brodie, watershed coordinator for the San Joaquin County Resource Conservation District.

About 25 people turned out for the event, which was sponsored by the district. A similar event was held three years ago.

"A lot has happened," Brodie said. "We just wanted to give the community a chance to catch up with what's going on with the watershed."

For example, a coalition of farmers along the Mokelumne took a stand for the elderberry longhorn beetle, a federally threatened species. An inch-long insect with a ladybug-color back, the beetle has nearly vanished from the river as farming and housing development pushed closer to the river's edge.

Under a so-called safe harbor agreement, farmers will restore thousands of acres of beetle habitat. In exchange, officials won't hold the farmers liable if they accidently kill a beetle or two while farming.

Late Wednesday at the event, winegrape grower Brad Lange was honored with an award for encouraging other farmers to help save the beetle.

Restoring habitat is just one of 80 goals outlined by a river stewardship plan four years ago, Brodie said. But the biggest achievement, he said, is the level of cooperation among different groups when it comes to the river's problems.

"We're trying to promote that everything that everybody does has an effect on the river," he said.

Contact reporter Warren Lutz at (209) 546-8295 or wlutz@recordnet.com

By News-Sentinel Staff
Last updated: Friday, Apr 28, 2006 - 06:47:27 am PDT

State releases advisory on Mokelumne River fish

The state Environmental Protection Agency has released a draft advisory on eating fish caught in the lower Cosumnes and Mokelumne rivers because of high mercury levels in the waterways left over from mining operations.

The draft advisory asks that women of childbearing age and those 17 and younger eat no more than one meal a month of all fish caught in the lower Mokelumne River. Women older then childbearing years and men should eat no more than one meal a month of largemouth, smallmouth or spotted bass, or no more than two meals of stripped bass.

For a fact sheet and draft report containing the proposed advisories, visit http://www.oehha.ca.gov. Staff with the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment will make a presentation, answer questions and accept comments on the advisories during a public workshop at 6:45 p.m. Thursday, May 11 at the Lodi Public Library, 201 W. Locust St. Written comments on the advisories can be sent to the OEHHA office at 1001 I St., Sacramento 95812.

APPENDIX B

USGS VERIFIED FLOW DATA FOR 2004 AND 2005

11323500 Mokelumne River Below Camanche Dam

Discharge, cubic feet per second, January 2004 to December 2004

Daily Mean Values

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	413	358	368	353	783	583	467	377	328	287	271	276
2	386	361	375	355	914	530	384	365	326	283	271	280
3	360	364	365	356	1,040	525	384	372	325	283	271	283
4	355	367	364	352	1,120	524	389	376	326	286	271	279
5	351	367	363	352	1,510	527	389	357	315	287	274	277
6	352	364	364	353	1,390	527	378	358	317	285	277	277
7	352	364	364	354	1,260	528	365	358	306	283	277	282
8	352	364	361	355	1,110	518	364	358	290	285	279	290
9	351	364	361	355	1,010	513	364	358	291	285	282	283
10	351	364	363	351	920	513	364	358	291	285	283	281
11	351	368	361	351	817	505	364	357	289	289	287	283
12	354	364	358	368	742	503	364	356	289	289	290	283
13	356	365	358	516	704	507	364	358	289	288	285	283
14	352	366	358	514	683	507	362	358	285	277	283	283
15	352	368	356	530	665	516	362	358	283	276	283	283
16	351	364	356	546	660	542	363	356	283	273	283	279
17	351	359	357	547	656	553	362	354	267	275	283	277
18	351	410	358	547	651	549	358	351	265	277	283	277
19	351	375	354	547	641	547	360	345	266	281	283	277
20	356	362	352	548	633	547	359	351	258	281	278	277
21	358	358	351	548	633	539	368	345	251	265	277	277
22	358	360	355	550	628	533	376	345	229	265	279	277
23	358	358	357	553	633	534	374	345	229	265	278	277
24	358	358	354	550	632	535	371	344	227	265	277	277
25	358	402	354	547	632	533	370	345	224	266	277	271
26	358	482	351	572	635	533	371	343	217	274	277	271
27	358	422	351	601	635	536	374	345	221	269	277	274
28	358	372	351	601	662	536	377	339	225	268	276	288
29	358	368	353	599	659	539	390	339	223	268	277	278
30	358	---	354	787	663	539	389	343	288	268	277	295
31	355	---	352	---	664	---	388	337	---	271	---	334

11325500 Mokelumne River At Woodbridge

Discharge, cubic feet per second, January 2004 to December 2004

Daily Mean Values

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	357	284	306	289	428	363	181	43	29	114	511	197
2	360	306	299	292	456	281	92	37	34	112	410	198
3	305	301	293	290	591	256	79	34	36	107	261	199
4	286	290	289	287	718	244	69	34	34	109	253	200
5	280	286	286	290	901	233	74	33	28	109	215	200
6	278	286	286	291	981	232	69	33	28	108	202	200
7	282	287	284	288	944	239	49	32	28	106	194	223
8	279	286	282	287	854	242	37	30	28	106	194	237
9	275	287	281	285	772	228	33	30	28	110	181	218
10	274	286	283	282	676	230	31	30	28	113	191	206
11	272	289	283	285	595	233	30	38	28	113	204	202
12	300	291	284	288	528	223	34	46	27	112	205	198
13	275	290	284	305	430	226	33	46	27	110	196	197
14	276	290	284	298	430	222	33	46	28	110	191	197
15	276	290	285	271	423	212	32	43	26	108	192	197
16	274	315	283	262	418	213	32	33	26	109	190	195
17	273	293	285	264	409	215	31	34	28	111	193	196
18	273	351	284	260	409	222	30	37	28	114	192	196
19	276	328	284	259	405	223	29	33	30	148	194	196
20	277	300	285	257	383	228	28	29	30	197	194	195
21	276	292	284	251	376	234	28	29	29	184	197	192
22	278	295	286	251	379	224	30	29	30	156	199	194
23	278	295	287	257	383	220	57	30	30	139	197	194
24	282	288	289	253	386	218	49	30	30	137	195	196
25	280	321	293	249	386	216	37	30	31	134	196	196
26	279	376	297	248	390	211	38	29	32	210	198	196
27	284	388	288	263	365	208	33	30	30	180	222	197
28	285	326	289	271	384	214	32	29	30	142	207	240
29	283	301	288	270	390	213	32	30	36	154	204	231
30	285	---	289	313	396	215	42	30	54	162	198	268
31	283	---	291	---	399	---	52	29	---	159	---	313

11323500 Mokelumne River Below Camanche Dam

Discharge, cubic feet per second, January 2005 to December 2005

Daily Mean Values

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	326	454	999	1,420	1,850	2,500	1,340	1,330	416	351	337	354
2	290	451	1,010	1,420	1,850	2,500	1,330	1,340	415	351	340	354
3	291	452	1,000	1,420	1,850	2,500	1,330	1,340	415	349	343	350
4	289	452	1,030	1,420	1,850	2,500	1,330	1,340	412	326	344	343
5	279	449	1,100	1,410	1,850	2,500	1,330	1,340	413	326	342	339
6	274	448	1,100	1,410	1,850	2,500	1,330	1,340	460	321	342	339
7	291	445	1,160	1,410	1,850	2,490	1,330	1,340	919	324	345	341
8	310	441	1,250	1,400	1,860	2,490	1,330	1,340	1,310	325	349	342
9	299	442	1,310	1,400	1,760	2,490	1,330	1,340	1,590	324	342	342
10	289	442	1,310	1,400	1,850	2,490	1,330	1,380	1,590	336	339	345
11	345	441	1,310	1,400	1,850	2,490	1,330	1,400	1,590	332	342	345
12	299	441	1,310	1,400	1,850	2,490	1,330	1,400	1,590	337	339	351
13	285	441	1,300	1,700	1,850	2,490	1,340	1,390	1,580	339	339	352
14	281	600	1,300	1,850	1,850	2,440	1,340	1,390	1,430	337	341	356
15	277	919	1,300	1,850	1,850	2,230	1,330	1,400	1,390	334	337	358
16	272	921	1,300	1,850	1,850	2,030	1,330	1,400	1,380	333	335	360
17	271	910	1,330	1,850	1,930	1,990	1,330	1,400	1,360	335	333	364
18	271	973	1,420	1,850	2,050	1,980	1,330	1,240	1,190	334	335	373
19	271	1,020	1,450	1,850	2,190	1,990	1,330	1,030	981	337	333	369
20	268	1,020	1,460	1,850	2,520	1,990	1,330	812	765	336	333	461
21	274	1,010	1,460	1,850	2,530	1,980	1,330	581	531	333	335	526
22	266	1,010	1,700	1,850	2,520	1,880	1,330	409	371	332	333	546
23	265	1,010	1,520	1,850	2,520	1,680	1,330	410	351	336	337	672
24	266	1,000	1,430	1,850	2,510	1,590	1,330	410	351	339	341	767
25	265	1,000	1,420	1,850	2,520	1,580	1,330	411	345	339	339	776
26	270	1,000	1,410	1,850	2,520	1,580	1,330	417	347	339	339	824
27	271	1,000	1,410	1,850	2,510	1,580	1,330	415	345	340	341	779
28	475	1,010	1,410	1,850	2,510	1,470	1,330	415	346	336	338	780
29	473	---	1,420	1,850	2,380	1,370	1,330	417	348	333	343	775
30	459	---	1,420	1,850	2,260	1,350	1,330	417	345	335	348	772
31	457	---	1,420	---	2500	---	1330	415	---	339	---	925

Flow data from October through December has not yet been verified or published by the USGS.

11325500 Mokelumne River At Woodbridge

Discharge, cubic feet per second, January 2005 to December 2005

Daily Mean Values

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	299	354	836	1,310	1,450	2,130	906	928	149	158	277	309
2	263	353	868	1,310	1,470	2,130	892	915	138	157	278	322
3	244	351	843	1,320	1,460	2,130	894	914	125	171	279	291
4	235	356	842	1,320	1,470	2,130	900	921	143	161	281	287
5	219	355	889	1,310	1,480	2,140	898	921	155	173	279	285
6	211	355	917	1,310	1,480	2,140	893	923	149	155	279	284
7	232	358	925	1,320	1,470	2,150	870	929	359	157	278	284
8	241	355	993	1,330	1,490	2,170	873	923	706	152	279	283
9	247	354	1,070	1,320	1,490	2,180	877	941	1,030	163	279	282
10	232	354	1,110	1,320	1,400	2,170	876	945	1,180	151	276	280
11	284	357	1,110	1,310	1,460	2,150	860	978	1,220	157	271	281
12	282	358	1,120	1,310	1,460	2,130	874	987	1,250	159	273	281
13	229	357	1,120	1,320	1,460	2,130	879	991	1,250	161	274	280
14	216	375	1,120	1,460	1,450	2,100	888	990	1,200	167	276	280
15	210	572	1,120	1,590	1,460	1,980	884	1,000	1,110	594	275	277
16	207	722	1,130	1,690	1,440	1,690	883	986	1,100	548	272	278
17	204	714	1,130	1,700	1,460	1,570	901	988	1,100	344	272	293
18	201	729	1,200	1,610	1,590	1,540	906	926	1,040	308	270	374
19	204	787	1,280	1,550	1,630	1,530	913	777	868	300	271	315
20	204	807	1,290	1,530	1,910	1,530	924	606	676	293	274	291
21	204	816	1,300	1,500	2,070	1,500	920	438	493	286	275	402
22	208	811	1,340	1,510	2,090	1,470	922	267	314	281	273	451
23	203	815	1,640	1,520	2,110	1,320	923	184	198	276	266	432
24	203	815	1,390	1,510	2,090	1,170	934	162	189	274	264	544
25	201	816	1,330	1,480	2,090	1,130	952	145	186	273	275	591
26	218	817	1,320	1,480	2,090	1,130	969	150	181	276	278	667
27	208	829	1,310	1,490	2,100	1,150	976	145	167	275	279	624
28	260	854	1,320	1,490	2,120	1,110	947	161	176	277	283	612
29	368	---	1,320	1,450	2,130	977	921	163	162	278	284	603
30	360	---	1,330	1,460	1,930	927	924	159	160	277	287	603
31	357	---	1320	---	1980	---	929	155	---	277	---	775

Flow data from October through December has not yet been verified or published by the USGS.

APPENDIX C

MEETING MINUTES OF THE PARTNERSHIP STEERING COMMITTEE

Mokelumne River Partnership
Steering Committee Minutes

December 13, 2006
2:00 pm – 4:00 pm

Attendance: US FWS: David Harlow, David Hu, Bill Foster, Debbie Giglio
CDFG: Sandy Morey, Mike Healey
EBMUD: Rob Alcott, Jon Myers, Joe Miyamoto, Jim Smith, and Rick Leong

Meeting Location: USFWS Office, 2800 Cottage Way (Sacramento)

1. Approval of Agenda: The meeting agenda was approved by the Committee

2. Lower Mokelumne River Partnership: Overview: Jon Myers provided a brief overview of how the Partnership is organized and functions. The Committee was asked by Rob Alcott if the one annual meeting of the PSC was sufficient for providing information and updates on Partnership activities. The Committee representatives stated that the annual PSC meeting was sufficient.

3. Status Updates:

   - Status of Mokelumne River Salmon Run: Jim Smith provided a review of the 2006 salmon run to-date as compared to data from past years. The following information was reported (as of December 7th): Hatchery – 3,867, River – 1,660, Total Escapement – 5,527

   - Stakeholder outreach/Partnership expenditures and fund balance: Rick Leong provided a brief overview of the stakeholder outreach. Total interest earnings since the inception of the Fund in 1999 is close to $576K. The current available fund balance is approximately $174K. Rick also provided a brief overview on strategic use of Partnership Funds to leverage funds from other sources.

4. Project Updates: Jim Smith provided updates on the following projects

   - Spawning Gravel Restoration Project: 4,372 cubic yards of spawning gravel were placed in 2006. Funding sources were USFWS AFRP, EBMUD, and Partnership Fund.

   - Large Woody Debris Study: Inventory of large woody debris is 70% complete and will be completed in January 2007. Completion of the estimated local woody debris recruitment potential is anticipated spring 2007.

   - Cosumnes and Mokelumne River Floodplains Integrated Resources Management Plan: Two products from this project are close to completion (Floodplain Resources Characterization Report and Lower Mokelumne River Conservation Handbook). Modeling has shown that there is not enough potential flow capacity on the lower Mokelumne River to make any floodplain restoration feasible. The focus on the Lower Mokelumne will be on streambank stabilization and riparian restoration.

5. Funding Cycles and Process for Partnership Fund: Rick Leong explained the interest of the Coordinating Committee to revise the funding request process and develop formal funding cycles for receiving Partnership Fund requests. Formal funding cycles would simplify the process as well as make comparing potential projects requesting funding more feasible. The Steering Committee agreed on the benefits of this change and supported this move. Rick Leong will revise the current Partnership Fund guidelines to reflect this change.

6. Striped Bass Predation on Juvenile Salmon: Jim Smith shared an informational item about the ongoing predation on juvenile salmon by striped bass (below Woodbridge Dam). An estimated 200-500 adult striped bass are present in the WID Dam afterbay during May-July each year and the annual predation on juvenile salmon is estimated at 20,000-50,000 annually.

7. Reporting Camanche Releases: Jon Myers asked the Committee if the current process of reporting Camanche flow changes (via fax and email) is meeting the needs of the agencies. The Committee stated that the notices were fine and that email is sufficient (fax is not necessary).

   Jon Myers and Rob Alcott reviewed the process used in reporting minor and temporary excursions from JSA flow requirements (normally due to circumstances outside of EBMUD control, such as power outages) and the Committee supported the continuation of this reporting process.

8. JSA Ten-Year Review: Jim Smith led the discussion of the 10-year review requirement in the JSA (to be completed late 2008/early 2009). Jim Smith suggested an outline for the process to complete this ten-year report and all Partnership representatives supported the suggested process. The Partnership Coordinating Committee will work collaboratively to identify the successes, failures, and milestones associated with the Partnership goals and recommend continued or new measures designed to further the goals. The Partnership goals, developed from the Water Quality and Resource Management Program, include:

   - Managing the lower Mokelumne River to provide sustainable supplies of water, hydropower and other natural resources while rehabilitating and maintaining diverse migratory and resident fish and wildlife populations.
   - Maintaining 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.
   - Providing, to the extent feasible, habitat quality and availability in the lower Mokelumne River to maintain fishery, wildlife and riparian resources in good condition.
   - Contributing towards the state and federal fishery restoration goals as defined in the California Salmon, Steelhead Trout and Anadromous Fisheries Program Act, and the Central Valley Project Improvement Act.
   - Sustaining the long-term viability of the salmon and steelhead fishery while protecting the genetic diversity of naturally producing populations in the lower Mokelumne River.

   Working cooperatively with the Coordinating Committee, EBMUD staff will develop the draft report. The Coordinating Committee will submit the draft report to the Steering Committee, which will review the report, make final recommendations and approve the final report.

9. Other Business

   ACWA Theodore Roosevelt Award: EBMUD was awarded the 2006 Theodore Roosevelt Award for Environmental Excellence by the Association of California Water Agencies (ACWA) for the success of the Lower Mokelumne River Partnership.

   2007 American Fisheries Society Conference: The Steering Committee supported EBMUD's sponsorship of the 2007 AFS national conference (in the amount of $2,500) as part of the JSA commitment to support periodic symposia that share current information and research on the lower Mokelumne River. Rob Alcott suggested that in addition to a sponsorship, the Partnership might want to consider submitting a paper or poster for this conference that shared the success story of the Partnership. All agreed that this would be a good opportunity to share about the Partnership's success to a broad audience. Rick Leong will research the information and timeline for conference submissions.

   EBMUD Camanche Water Rights Permit Extension Update: Rob Alcott provided a brief summary of the District's pending Camanche permit extension and the expectation the State Water Resources Control Board may notice the proceeding in early 2007. He asked that the Partners let him know if at any time agency staff have concerns regarding the permit extension and encouraged the Partners to contact him to schedule agency briefings to address any concerns.

   Water Quality Monitoring Data: At the end of the meeting, Jim Smith provided David Harlow and Sandy Morey with the latest data on the water quality monitoring program associated with the Water Quality and Resource Management Program (CD format).

10. Meeting Adjournment: The meeting adjourned at 3:45 pm.

    Respectfully submitted by: Rick Leong

APPENDIX D

WOODBRIDGE IRRIGATION DISTRICT NOTIFICATION LETTER

EAST BAY
MUNICIPAL UTILITY DISTRICT

December 20, 2006

Anders Christensen, Manager
Woodbridge Irrigation District
18777 N. Lower Sacramento Road
Woodbridge, CA 95258

Subject: FERC Lower Mokelumne River Project
2006 Project Operations Report
U.S. Geological Survey Mokelumne River at Woodbridge Gage

Dear Mr. Christensen:

The East Bay Municipal Utility District (EBMUD) will be submitting its 2006 Project Operations Report (Operations Report) to the Federal Energy Regulatory Commission (FERC) by February 15, 2007, as required by FERC's November 27, 1998 Order Approving Settlement Agreement and Amending License (FERC Order). The referenced Settlement Agreement is the March 23, 1998 Joint Settlement Agreement (JSA) between East Bay Municipal Utility District, the United States Fish & Wildlife Service, and the California Department of Fish and Game. The FERC Order requires EBMUD to report flows below Camanche Dam and below Woodbridge Dam in the annual Operations Report.

Accordingly, the Operations Report will include flow data collected at the US Geological Survey Gaging Station No. 11325500 below Woodbridge Dam in addition to the flow release data from Camanche Reservoir. Average daily flow data and any flow deviations from the JSA expected minimum flow below Woodridge Dam for calendar year 2006, based on the recorded 15-minute readings, will be included in the report. Consistent with the information EBMUD has provided to you this past October and November, the report to FERC will show three events where the 15-minute readings were less than the expected minimum flow below Woodridge Dam identified in the JSA and codified in the FERC Order.

The Operations Report will include a statement explaining these temporary deviations. Please review for accuracy the following proposed language for the Operations Report. This text is based on our understanding from discussions between EBMUD staff and you:

> *During the 2006 calendar year, three temporary flow deviations from the JSA expected minimum flow below Woodridge Dam occurred as a result of control system problems with the new Woodbridge Diversion Dam. The dam, an inflatable bladder control structure consisting of two bays, is operated by the Woodbridge Irrigation District (WID). When both bays are in automatic control, fluctuations in downstream flow occur because the system continually over-*

compensates for changes to the lake elevation. In the future, to minimize the flow fluctuations during minimum flow events, WID has stated it intends to maintain minimum downstream flows by setting the west bay to a fixed-position and managing the downstream flow by the automatically-controlled east bay.

If you have any questions or have concerns, please contact Priyanka K. Jain at (510) 287-1153.

Sincerely,

for Lena L. Tam
Manager of Water Resources Planning Division

LLT:PKJ:es:smc

APPENDIX E

NOTIFICATION OF AVAILABILITY FOR SALE OF SURPLUS MOKELUMNE RIVER WATER

EAST BAY
MUNICIPAL UTILITY DISTRICT

ROB ALCOTT
DIRECTOR OF WATER AND NATURAL RESOURCES
(510) 287-1127
ralcott@ebmud.com

JON A. MYERS
MANAGER OF NATURAL RESOURCES
(510) 287-1121
myers@ebmud.com

May 2, 2006

Sandra Morey
Regional Manager
Department of Fish and Game
1701 Nimbus Road
Rancho Cordova, CA 95670

David Harlow
Assistant Field Supervisor
U. S. Fish & Wildlife Service
2800 Cottage Way, Room W2605
Sacramento, CA 95825

Subject: Availability for Sale of Surplus Mokelumne River Water

Dear Sandra Morey and David Harlow:

On November 27, 1998 the Federal Energy Regulatory Commission's (FERC) issued an order approving the March 1998 Joint Settlement Agreement (Agreement) between the District and your agencies. Section F.3 of the Agreement provides that the District notify your agencies of the availability for sale of surplus Mokelumne River Water.

Enclosed is a copy of the 2006 Water Supply Availability and Deficiency Report (Report) accepted by the District's Board of Directors at their April 28, 2006 meeting. The Report anticipates that surplus water will be available in accordance with District policy during the period of May through October 2006 when the District is making releases to attain flood control prior to November 5 as required by agreement with the Corps of Engineers. The wet weather pattern of early April and recent drier and warmer weather patterns may cause an adjustment to the projected runoff and affect the amount and schedule of surplus water availability. District Policy 9.02, which is an attachment to the Report, provides the direction by which the District considers requests for District surplus water sales.

If you have any questions regarding this matter, please contact Ms. Priyanka K. Jain, Senior Civil Engineer at (510) 287-1153.

Sincerely,

W. R. Alcott

WRA:PKJ:cf

Enclosures

375 ELEVENTH STREET . OAKLAND . CA 94607-4240 . FAX (510) 287-1275
P.O. BOX 24055 . OAKLAND . CA 94623-1055