Appendices

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APPENDIX A

Don Pedro Project Fish Flow Procedure

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DON PEDRO PROJECT FISH FLOW PROCEDURE

1 INTRODUCTION

Minimum instream flow requirements under the original Article 37 varied between 40,123 AF (Water Year 1988-1989) and 123,210 AF per water year. The FERC authorized suspension of the instream flow requirement for Water Year 1976-1977, the driest water year of record. Under the 1995 Agreement and 1996 Order, instream flow requirements now vary from a minimum floor of 94,000 AF to a maximum of 300,923 AF.

Under the original Article 37, each year's minimum instream flow started on October 1 and was determined by the inflow into Don Pedro Reservoir during the immediately preceding water year, ending on September 30. There were only two set flow schedules – normal year and dry year – along with a methodology to determine required instream flows during critical water years. While rather simple to determine the required instream flow schedule, one AF of inflow could shift whether a normal versus dry year schedule applied, inflow is influenced by CCSF's Hetch Hetchy Project operations, and the methodology did not taken into consideration the amount of runoff produced during the then current water year when the actually releases would be made.

Section 11 of the 1995 Agreement as adopted by the 1996 Order made the following significant changes in setting minimum instream flows:

- Ten water year classifications with prescribed flow schedules were established – two difference schedules for each of the five water year types – Critical, Dry, Below Normal, Above Normal, and Wet.
- An absolute fish flow floor of 94,000 AF was established.
- One flow schedule of 300,923 AF was established for Above Normal and Wet water years – the 49.3% wetter water years.
- Water year classifications would be determined using the San Joaquin Basin 60-20-20 Index and the CDWR San Joaquin Valley unimpaired runoff forecasts, which are readily available over the Internet as well as published in the various reports of CDWR Bulletin 120-3-[year], Water Conditions in California.
- Additional water would be added to applicable flow schedule should the San Joaquin Basin Index fall between the designated water year classifications – that additional water became known as "Interpolation Water."
- The new fish flow year starts on April 15 of each year, approximately the time that spring outmigration pulse flows commence.
- Additional blocks of water would be provided for fall attraction flows in Below Normal, Above Normal, and Wet water years and spring outmigration pulse flows would be provided in all water years.
- Negative and positive True-ups to the fish flow schedule would be made during the fish flow year to reflect changes in the CDWR forecasted runoff.

- Fish flow schedule changes, the allocation of Interpolation Water, and True-ups are subject to agreement among the Districts, CDFG, and USFWS.

The flow schedule determination process thus became much more dynamic but within the fixed parameters established by the 1996 Order. The 1996 Order also provided the needed flexibility to adjust and integrate the Tuolumne FERC fish flows with fish flows from the New Melones Project operated by the USBR on the Stanislaus River and from the New Exchequer Project (FERC Project No. 2179) operated by the Merced Irrigation District on the Merced River to meet fish flow objectives for the San Joaquin River Basin.

The minimum instream flows for fishery purposes for the Don Pedro Project are determined using the following Water Year Classification table and Flow Schedule table in Article 37 of the FERC Order Amending License (issued July 31, 1996). In general, the current water year's calculated San Joaquin Basin 60-20-20 Index is used to determine the applicable FERC water year classification, which is then applied to the Flow Schedule table to determine the amount of water to be released for fish purposes during the fish flow year (April 15 through April 14). The Flow Schedule consists of two components: a base flow that will change in rate (cfs) depending on the time of year and pulse flows for the spring and fall periods.

Table A1-1. Water Year Classification Table

Water Year Classification	**Cumulative Occurrence**	**Freq.**	**60-20-20 Index (1906-1995)**	**60-20-20 Index (1906-2004)**
Critical Water Year and Below	<6.4	6.4	<1,500 TAF	<1,476 TAF
Median Critical Water Year	6.4-14.4	8.0	1,500	1,476
Inter. C-D Water Year	14.4-<20.5	6.1	2,000	2,002
Median Dry	20.5-<31.3	10.8	2,200	2,187
Intermediate D-BN	31.1-<40.4	9.1	2,400	2,403
Median Below Normal	40.4-<50.7	10.3	2,700	2,698
Intermediate BN-AN	50.7-<66.2	15.5	3,100	3,139
Median Above Normal	66.2-71.3	5.1	3,100	3,669
Intermediate AN-W	71.3-<86.7	15.4	3,100	3,898
Median Wet/Maximum	86.7-100	13.3	3,100	4,593

Table A1-2. 1995 FERC Flow Schedule by Water Year Classification.

Water Year Type	% Occurrence	Oct. 1–15 (cfs)	Attraction Pulse Flow (acre-feet)	Outmigration Pulse Flow (acre-feet)	Oct. 16–May 31 (cfs)	June 1–Sept. 30 (cfs)	Total Flow (acre-feet)
Critical and Below Normal	6.4	100	None	11,091	150	50	94,000
Median Critical	8.0	100	None	20,091	150	50	103,000
Intermediate Critical/Dry	6.1	150	None	32,619	150	50	117,016
Median Dry	10.8	150	None	37,060	150	75	127,507
Intermediate Dry/Below Normal	9.1	180	1,676	35,920	180	75	142,502
Median Below Normal	10.3	200	1,736	60,027	175	75	165,002
Intermediate Below Normal/Above Normal	15.5	300	5,950	89,882	300	250	300,923
Median Above Normal	5.1	300	5,950	89,882	300	250	300,923
Intermediate Above Normal/Wet	15.4	300	5,950	89,882	300	250	300,923
Median Wet/Maximum	13.3	300	5,950	9,882	300	250	300,923

The 1996 FERC Order in essence establishes two different fish flow schedule tracks – the Wetter Water Year Track and the Drier Water Year Track. The Wetter Water Year Track consists of the 49.3% wettest water year types (Intermediate Below Normal-Above Normal and above) and is generally characterized by the following:

- Four Water Year Classifications – two each for Above Normal and Wet water years – with the same fish flow schedule of 300,923 AF.
- Minimum base flows are set.
- Fall Attraction Pulse Flow amount is fixed but needs to be shaped.
- Spring Outmigration Pulse Flow amount is fixed but needs to be shaped and integrated with any required VAMP flows.

The Drier Water Year Track consists of the 50.7% drier water year types and is generally characterized by the following:

- Six Water Year Classifications – two each for Critical, Dry, and Below Normal water years – with fish flow schedules varying from a floor of 94,000 AF in a Critical Water Year or drier to 165,002 AF in a Median Below Normal Water Year.
- Potential Interpolation Water amounts to be added when 60-20-20 Index falls between Water Year Classifications, which can be used to increased base flows or pulse flows.
- Negative and positive True-ups to the fish flow schedule during the fish flow year resulting from changes in the forecasted runoff.
- Fall Attraction Pulse Flow amounts in Below Normal water years (i.e., Intermediate Dry-Below Normal and Median Below Normal) are fixed but need to be shaped.
- Spring Outmigration Pulse Flow amounts are fixed but need to be shaped and integrated with any required VAMP flows.

Each year the California Department of Water Resources (CDWR) makes a runoff forecast of the unimpaired flow of the San Joaquin River Basin System, which includes the unimpaired flows of the Stanislaus, Tuolumne, Merced and San Joaquin watersheds expressed in thousands of AF (TAF) of water. This data is converted into CDWR's San Joaquin Valley Water Year Hydrologic Index, also known as the San Joaquin Basin 60-20-20 Index, which classifies water years (October 1 through September 30) into five basic types – Critical, Dry, Below Normal, Above Normal, and Wet. The 60-20-20 Index consists of 60% of the current water year's April through July San Joaquin Valley unimpaired runoff, 20% of the current water year's October through March unimpaired runoff, and 20% of the previous water year's Index, all expressed in the tens of thousands of AF. Article 37 further refined those five water year types into ten water year types reflected in the above tables. Licensees use the numbers from the CDWR forecast to calculate the Index to the nearest thousand AF. The CDWR Index is only calculated to the nearest tens of thousands of AF and the more precise calculation is needed in order to comply with Article 37, i.e., the calculation of the breakpoint between each of the drier seven water year types requires the current water year's index to be calculated to the nearest thousand AF.

The process to determine the new fish flow schedule begins each year with the CDWR February 1 San Joaquin Valley unimpaired runoff forecast and proceeds through a step-wise progression to the following January. Input from the Federal and State fish agencies and from the other TRTAC participants are solicited at each step. However, the decisions regarding the final flow schedule are made by the Districts, CDFG, and FWS as provided in the license. The Districts are participants in the VAMP approved by the SWRCB and require the spring outmigration flows under the 1996 Order to be integrated and coordinated on a San Joaquin River Basin-wide basis.

Table A1-1 and Figure A1-1 summarize the process. A more detailed explanation of the Don Pedro Project fish flow procedure follows.

Table A1-3. Don Pedro Project Fish Flow Procedural Steps

Step	Date	Task
1	February	CDWR February 1 runoff forecast
2	March	CDWR March 1 runoff forecast. TID calculates preliminary San Joaquin Basin Index. If SJB Index is Intermediate BN-AN or wetter, then 300,923 AF allocated. If SJB is drier than Intermediate BN-AN, then Interpolation Water is calculated.
3	March	TID-MID develop Preliminary Flow Schedule based upon Step #2 and distributes to CDFG, USFWS, and other TRTAC participants and the VAMP technical team for review and comment.
4	March 15	CDFG is to submit proposed fish flow schedule to TID, MID, and USFWS for review and comment.
5	March	At March TRTAC meeting, fish flow schedules are discussed in detail.
6	April	CDWR April 1 runoff forecast. TID recalculates SJB Index number.
	April 10	Final fish flow schedule must be agreed upon by the Licensees, CDFG, and USFWS. If no agreement, then Default Flow Schedule is implemented.
	April 13	Possible start for Tuolumne River VAMP flows.
	April 15	**Start of new FERC Flow Schedule, Start of new Fish Flow Year (April 15 through April 14), VAMP pulse flow period is April 15 to May 15.**
7	May	CDWR May 1 runoff forecast.
	May	CDWR updates May 1 runoff forecast. TID updates SJB Index to see if runoff is on tract with April 1 forecast.
	May-June	TID, MID, CDFG, and USFWS, with input from other TRTAC participants, may agree upon interim true-ups and determine allocation of any "excess" fish flow water over the balance of the Fish Flow Year ending April 14. Can be discussed at June TRTAC meeting.
	June 1	**Start of Summer flows under Fish Flow Schedule.**
	June	June TRTAC meeting.
8	June	TID reports on the Spring Pulse Flow.
9	August	TID receives CDWR's final unimpaired runoff numbers.

10	August	TID calculates the Fish Flow Schedule true-up, if any. TID, MID, CDFG, and USFWS, with input from other TRTAC participants, determine how any positive or negative true-up will be allocated over the balance of the Fish Flow Year ending April 14.
	September	At September TRTAC meeting, if fall attraction pulse flow water is available, then the timing and duration of the fall pulse flow is discussed. If not finalized during August, how any positive or negative true-up would be allocated over the balance of the Fish Flow Year would also be discussed.
	October 1	**New Water Year starts and Fall flows start under Fish Flow Schedule.**
11	October	TID updates San Joaquin Basin Index and water year type frequency distribution.
12	October	TID consults with CDFG and USFWS on fall attraction pulse flow if applicable under the Fish Flow Schedule. TRTAC input was given at the September TRTAC meeting.
13	January	TID reports on the fall attraction pulse flow and Article 38's 45-day period.

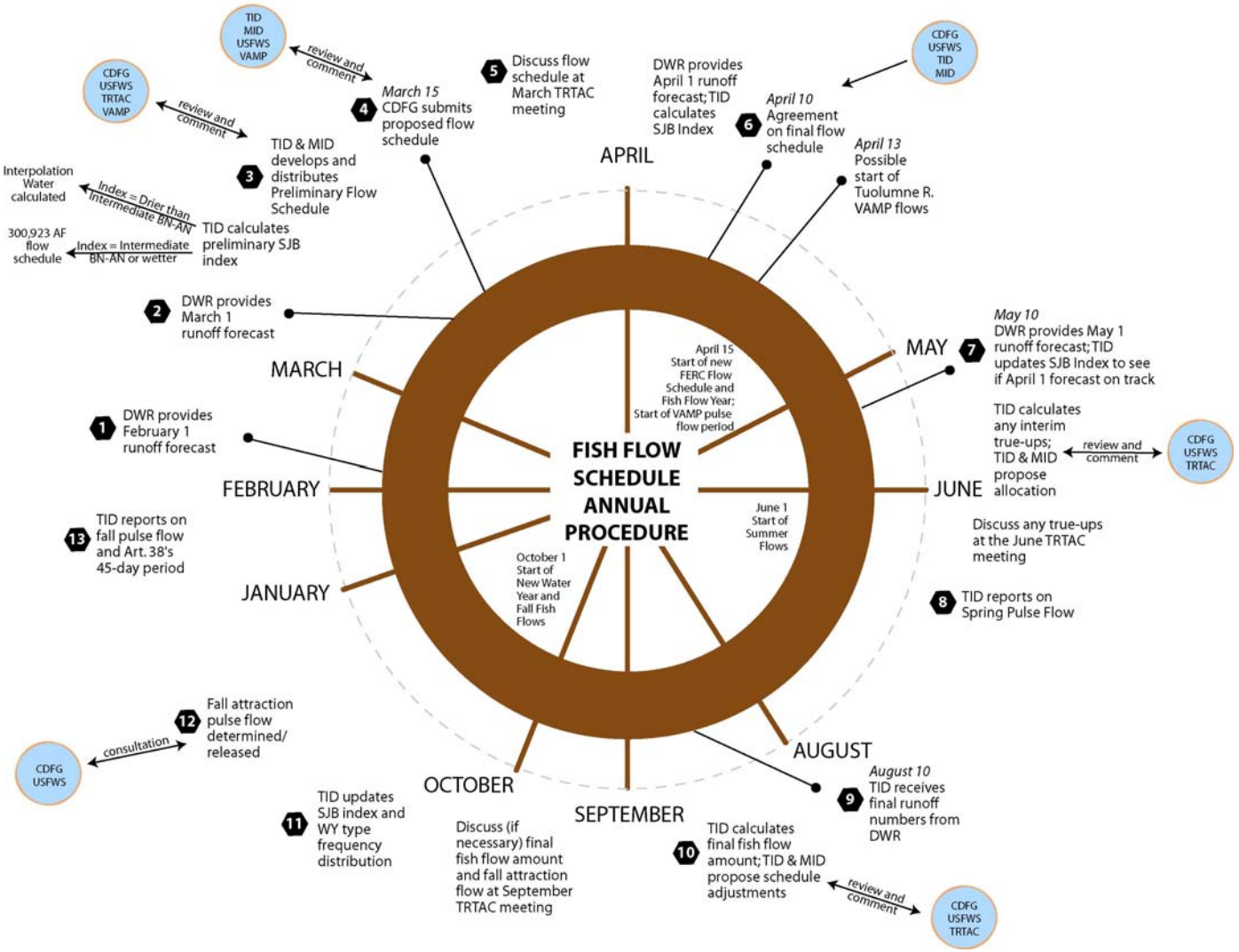

Figure A1-1 Don Pedro Project Fish Flow Procedure

2 PROCEDURAL STEPS

1. The first CDWR San Joaquin Basin runoff forecast and projected San Joaquin Basin 60-20-20 Index of the water year is for February 1. Licensees use the numbers from the CDWR forecast to calculate the Index to the nearest thousand AF. The CDWR Index is only calculated to the nearest tens of thousands of AF and the more precise calculation is needed in order to comply with Article 37. The forecast and the Index are considered very preliminary, but the Index is used to identify possible fish flow schedule volumes for the coming fish flow year beginning April 15. After February 1, CDWR issues weekly forecast updates and the numbers are available at: http://cdec.water.ca.gov/queryMonthly.html.

2. The March 1 CDWR forecast and the resulting projected San Joaquin Basin 60-20-20 Index are key planning tools. The calculated Index number is then applied to the right hand column of Table A1.1-1 above to determine the water year classification under the FERC Order. If the water year classification is "Intermediate BN-AN" or wetter, then 300,923 AF would be planned for fish flows. If the Index number calls for a drier water year classification, then Article 37 Flow Schedule specifies the amount of water allocated for fish flows for that water year classification plus any additional interpolation water.

   Interpolation water comes from the new Article 37, which states "[b]etween a Median Critical Water Year and an Intermediate Below Normal-Above Normal Water Year, the precise volume of flow to be released by the Licensees each fish flow year is to be determined using accepted methods of interpolation between index values given above." Once the applicable water year classification and corresponding flow schedule are determined, then the total annual flow requirement would be determined by interpolating between the two water year points and the corresponding two flow schedule amounts.

3. The Licensees through the Don Pedro Project Manager develops a preliminary fish flow schedule based upon the total number of AF of water to be allocated for fish flows based upon the March 1 CDWR forecast. This preliminary schedule is distributed to the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS). Information copies will be sent to members of the Tuolumne River Technical Advisory Committee (TRTAC) and the Technical Committee of the Vernalis Adaptive Management Program (VAMP) for comment.

4. Under the 1995 FERC Settlement Agreement, by March 15 of each year, CDFG is required to submit a preliminary fish flow schedule to the Licensees and the USFWS for review and comment.

5. The preliminary fish flow schedules are discussed in detail at the March TRTAC meeting.

6. The FERC Order provides that the water year classification shall be determined using the April 1 CDWR forecast, which is usually available by April 7. By April 10, CDFG is supposed to submit a proposed final fish flow schedule to the Licensees for review and comment. While this is a tight schedule, CDWR has been issuing weekly forecast updates. The final fish flow schedule requires the approval of the Licensees, CDFG, and USFWS. The final schedule must also be coordinate with VAMP. Any additional supplemental water that the Licensees are required to provide under the SJRA for VAMP is integrated with the Article 37 water.

   Under VAMP, the Article 37 fish flow water, including the spring outmigration pulse flow water, is considered part of the San Joaquin River base flows. However, as occurred in 2002 and 2004, the 12 days following the April 1 CDWR runoff forecast can turn dry thereby significantly reducing the applicable 60-20-20 index number and correspondingly reducing the amount of Article 37 water and the SJR base flow. The Licensees need to maintain flexibility to quickly address any significant reductions in the projected runoff so as to avoid significant negative True-ups to the Article 37 fish flow schedule later in the fish flow year. Because this actually occurred in 2002, both CDFG and USFWS have recognized the potential problem and have been responsive to the Licensees' need to quickly adjust the Article 37 water amount in this very short time period.

   Because the new fish flow year starts on April 15 and with possible ramping up to spring pulse flows beginning as early as April 13, obtaining timely approvals for the new fish flow schedule is crucial. For Don Pedro Project water and power operations, a minimum of three working days prior notice is needed before the new flow requirement takes effect. [Note: This has alternatively been stated as a minimum of two full working days.] For example, if April 15 were a Wednesday, then the third working day prior to April 15 would be the prior Friday. The final fish flow schedule for the new FERC fish flow year is adopted.

   Note: The Step 6 schedule is referred to as the "final" schedule. This is a practice carried over from the original Article 37. However, as described below, this "final" schedule may be adjusted during the fish flow year.

April 15 is the start of the new FERC fish flow year and new schedule.

7. The May 1 CDWR forecast and weekly updates thereafter are monitored to see how the actual runoff tracks the April 1 CDWR forecast. The new Article 37 requires that the volume of water for the then current fish flow year's flows shall be periodically readjusted upon agreement among the Licensees, CDFG, and USFWS after April 1 of each year as more current unimpaired flow information becomes available ("True-up"). Upon agreement of the Licensees, CDFG, and USFWS, adjustments may be

made to the flow schedule during May through July based upon the May 1 and subsequent forecasts and the resulting change in the current water year's San Joaquin Basin Index with the final True-up determined in August when the actual runoff numbers are known.

June 1 is the start of summer flows.

8. During the month of June, TID will issue a report on the spring pulse flow.

9. By mid-August, the actual San Joaquin Basin unimpaired runoff numbers are available for the final San Joaquin Basin Index determination. Two separate calculations are made based upon the actual runoff numbers: (a) a current fish flow year True-up calculation and (b) an updating of the San Joaquin Basin 60-20-20 index numbers ("Index Update") for the next fish flow year.

10. TID calculates the Fish Flow Schedule True-up, if any. TID, MID, CDFG, and USFWS, with input from other TRTAC participants, determine how any positive or negative true-up will be allocated over the balance of the Fish Flow Year ending April 14.

11. Index Update. The FERC Order amending Article 37 provides that the San Joaquin Basin 60-20-20 Index number are to be updated each year to incorporate subsequent water years pursuant to standard CDWR procedures so as to maintain approximately the same frequency distribution of water year types. The calculated historic San Joaquin Basin 60-20-20 Index from 1906 to the most recent water year is sorted to match the frequency of occurrence listed in the table set forth in Step 1 above. TID then adjusts the TAF numbers accordingly.

12. The Licensees consult with CDFG and USFWS on fall attraction pulse flow if applicable under the fish flow schedule. The fall pulse flow is discussed at the September TRTAC meeting.

October 1 is the start of fall flows and the new water year.

13. By January, TID will issue a report on the fall pulse flow and the 45-day period under Article 38 of the FERC license.

The procedure then starts back again at Step 1.

3 TRUE-UP FLOW ADJUSTMENT PROTOCOL

3.1 Authority and Purpose of Protocol

(1) The 1996 FERC Order amending Article 37 provides that the volume of water for the then current fish flow year's flows shall be periodically readjusted (increased or decreased) upon agreement among the Licensees, CDFG, and USFWS after April 1 of each year as more current unimpaired flow information becomes available ("True-up").

(2) The purpose of the Protocol is to implement the above portion of the FERC Order.

3.2 Overview of True-up Process

(1) The fish flow year and the new fish flow schedule start on April 15 of each year. The volume of water allocated to the new fish flow schedule is based upon the calculated April 1 CDWR 60-20-20 Index forecast for the San Joaquin River Basin. The new fish flow schedule is determined in accordance with the procedure described above.

(2) The weekly CDWR updates in April and the May 1 CDWR forecast and weekly updates thereafter are monitored to see how the actual runoff tracks the April 1 CDWR forecast. By mid-August, the actual San Joaquin Basin unimpaired runoff numbers are known so the actual San Joaquin Basin 60-20-20 Index number for the then current water year can be determined.

(3) Upon agreement of the Licensees, CDFG, and USFWS, adjustments to the fish flow schedule will be made from April through July based upon the forecast updates or the True-up could be determined in August when the actual runoff numbers are known.

(4) A default method of implementing a True-up is followed in the event that Licensees, CDFG, and USFWS cannot agree on how a True-up should be implemented.

3.3 True-up Procedure

(1) The Licensees through the Don Pedro Project Manager shall notify CDFG and USFWS if the May 1 or any subsequent CDWR forecast causes the San Joaquin Basin Index and thereby the fish flow volume to deviate from the April 1 based fish flow volume by more than five percent (5%). If any recalculated fish flow schedule volume deviates by more than the specified percentage, then the Licensees, CDFG, or USFWS may suggest for consideration an adjustment for the remaining fish flow schedule to April 14.

(2) The Licensees, CDFG, and USFWS are not required to agree on any True-up adjustment prior to the final adjustment under Section 1.4.3(6).

(3) By August 20 of each year, the Don Pedro Project Manager shall notify the Licensees, CDFG, and USFWS of the following:

a. The actual San Joaquin Basin 60-20-20 Index number for the then current water year;
b. the corresponding Tuolumne River fish flow volume based upon that index number;
c. any required increase or decrease in the initial fish flow volume based upon the CDWR April 1 forecast as adjusted by any interim True-ups;
d. suggested adjustments to the remaining fish flow schedule through April 14 of the then current fish flow year.

The Don Pedro Project Manager shall provide information copies of the notice via e-mail to all persons and entities on the TRTAC e-mail list.

(4) CDFG and USFWS shall have fifteen (15) calendar days to review and comment on the notice.

(5) If the TRTAC holds a September meeting, then the notice and any comments received shall be discussed at that meeting.

(6) The Licensees, CDFG, and USFWS shall have until September 23 to reach agreement on the appropriate manner of implementing any True-up flow adjustment.

APPENDIX B

Summary Reports, Annual Report contents, TRTAC materials and Actions documented in Lower Tuolumne River Annual Reports to FERC (1996–2004)

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1 SUMMARY REPORTS CONTAINED IN LOWER TUOLUMNE RIVER ANNUAL REPORTS TO FERC (1996–2004)

The Districts have submitted numerous technical reports for the Don Pedro Project. The 20-year report (8 volumes) was filed in 1992. This was followed by the first annual report (7 volumes) filed in 1997 that contained new material from 1991-1996 and inclusion of some earlier material not in the 1992 report. Annual reports, of 1-3 volumes each, have been submitted by April 1 each year thereafter. The annual reports have contained information on (1) Tuolumne River TAC activities and materials, (2) program goals and comparative population goals, including updates on salmon populations, ocean harvest, delta salvage and losses at CVP/SWP water export pumps, VAMP delta survival study, and ESA actions, (3) flow schedules, related correspondence, and operations, (4) monitoring activities, (5) non-flow measure activities and anticipated following year efforts, (6) updates on other FSA sections and program expenses, and (8) technical reports.

Below is a summary of the materials contained in the annual reports filed since 1996 pursuant to the FSA and Article 58. The remaining sections provide a complete submittal contents for each year, followed by a list, by topic, of all technical reports submitted for the Don Pedro Project under Articles 39 and 58, starting with the 1992 report. Lastly, an index of TRTAC materials from each annual report is provided.

1.1 FERC Summary Report for 1996

1.1.1 Introduction

This is the first annual report to the Federal Energy Regulatory Commission (FERC) as required in Sections (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and in Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA). This report primarily covers the 1996 calendar year with additional information as identified below.

For background, the Turlock and Modesto Irrigation Districts submitted to FERC in MAR92 the required Don Pedro Project FERC License Article 39 Report which consisted of eight volumes. Volumes III-VIII contained 28 appendices to the Fisheries Study Report in Volume II. This material included reports required under the Don Pedro Project 1986 Amended Fish Study Plan. Following that submittal, FERC initiated in DEC92 a license proceeding pursuant to Article 37 to reevaluate project minimum streamflow requirements. This led to a Draft Environmental Assessment issued by FERC in DEC93. The FSA was the product of negotiations which began in AUG94 and were facilitated by the Federal Mediation and Conciliation Service. The FSA was reached in APR95 and submitted to FERC by the Districts in FEB96. FERC issued an APR96 Draft Environmental Impact Statement (EIS) and a JUL96 Final EIS. The proceeding was concluded when FERC issued on 31JUL96 an Order amending Articles 37 and 58 of the license.

This report contains:

1) A summary and compilation of 1996 FSA activities, including meeting notes and materials for the Tuolumne River Technical Advisory Committee (Volume I).

2) Supplements to several of the 1992 FERC Report Appendices which include additional analyses or new information obtained since those appendices were prepared (Volumes II-VI).

3) Additional 1986 Fish Study Program reports that have been completed since the MAR92 FERC submittal are included here under Section (F) of the 31JUL96 Order (within Volumes II, III, and VII). These are being submitted prior to year 2005 to maximize their utility and further the information exchange identified in FSA Section 14.

4) Reports on other studies that are now available (Volume VII).

Specific elements in items 2, 3, and 4 above include:

Volume II: Spawning survey summary report, including 1986 through 1996 annual reports.

Volume III: Juvenile salmon summary report, including 1990 through 1996 annual reports.

Volume IV: 1991 through 1994 summer flow fish study annual reports.

Volume V: 1990 through 1993 summer flow aquatic invertebrate annual reports.

Volume VI: Supplements to 1992 FERC Report Appendices 2, 6, 7, 8, and 16 which are reports on stock recruitment, redd superimposition, redd excavation, 1987 89 gravel studies, and aquatic invertebrates.

Volume VII: 1991-93 gravel cleaning report, 1991 intragravel temperature report, 1995-96 screw trap monitoring report prepared by the California Department of Fish and Game (DFG), coded-wire tag summary report, and lower Tuolumne River GIS database status and map.

1.1.2 Tuolumne River Technical Advisory Committee (TAC)

The TAC is required in the FSA and replaced the "Technical Committee" established under the 1986 Amended FERC Fish Study Program. It is a key element in implementing the FSA and the strategy for recovery of Tuolumne River chinook salmon. A decision was made to proceed with functions of the TAC in DEC95 while still awaiting final FERC action on the ongoing license proceeding. Quarterly meetings have been held and additional meetings are scheduled as necessary as was done with the previous Technical Committee. TAC meetings were held on 18DEC95, 14FEB96, 20MAR96, 19JUN96, 08JUL96, 11SEP96, and 18DEC96. Included in Attachment D of this volume are materials related to those meetings as well as other TAC products and correspondence.

1.1.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

The FSA in Section 8 requires an adaptive management strategy and a detailed annual review to assess progress towards meeting the goals contained in FSA Section 9. This initial annual report provides the background from which to assess future progress by including updated and additional information since the 1992 FERC report. Further treatment of progress assessment will be provided in the 1997 annual report which will cover the first entire calendar year following the JUL96 FERC order.

1.1.4 Flows and Flow Schedules

1996 was a transition year wherein the minimum flow requirements of Article 37 were modified by the 31JUL96 FERC Order. Not only were flow requirements adjusted, but the "fish flow year" for allocation and scheduling purposes changed from the 01OCT-30SEP period that had been in effect since 1971 to the new 15APR-14APR period.

Attachment A of this volume contains tables of Article 37 minimum flow requirements for the 01OCT95-31JUL96 period and the 01AUG96-14APR97 period (the latter is in Table 1 of the 16OCT96 correspondence).

Attachment B of this volume contains:

1) available U.S. Geological Survey (USGS) and California Department of Water Resources stream flow records from water years 1995, 1996, and 1997 for four gaging stations on the Tuolumne River (below La Grange Dam, at La Grange Bridge, at Hickman Bridge, and at Modesto) and one station on Dry Creek at Claus Road.

2) Preliminary flow graphs for calendar years 1995 and 1996.

3) Available USGS water temperature records for water years 1995, 1996, and 1997 for the Tuolumne River below La Grange Dam.

The higher summer minimum flow requirements in the FERC order supersede the voluntary JUN-SEP augmented flows formerly provided by the Districts since 1988 under an agreement with the State Water Resources Control Board.

A flood event that is unprecedented since the 1971 completion of New Don Pedro Dam occurred in early JAN97. Flow in the lower Tuolumne River at La Grange and Modesto is estimated to have peaked at about 59,000 cfs. Information on the JAN97 flood will be in the 1997 annual report.

1.1.5 Monitoring Information

FERC License Article 58 and FSA Section 13 list various monitoring requirements. The FSA also lists four specific items under the 1986 Study Program that were to be completed. All four items were completed as described below:

FSA Section 13: 1986 Study Program - Fluctuation Study (a).
GIS mapping from River Mile (RM) 52 to RM 22 has been completed for flows of 1,100 cfs, 3,100 cfs, and 5,300 cfs based on aerial photography taken in APR92, OCT93, and FEB95, respectively. Additional aerial photography was taken at 8,400 cfs in APR95. Preliminary GIS mapping at 8,400 cfs is now complete and this is shown on the GIS map in Report 96-14 (Vol. VII).

FSA Section 13: 1986 Study Program - 1995 Juvenile Salmon Study (b).
Seine sampling for the juvenile salmon study was completed in 1995. The information is contained in Report 96-2 and Attachment 96-2.8 (Vol. III).

FSA Section 13: 1986 Study Program - 1995 Temperature Monitoring (c).
The temperature monitoring program continued in 1995 in the Tuolumne and San Joaquin Rivers. The data are depicted as graphs in handouts from the DEC95 and FEB96 TAC meetings and are included in those sections of Attachment D in this volume. Additional water temperature data from USGS is in Attachment B of this volume.

FSA Section 13: 1986 Study Program - 1995 Smolt Survival Index Study (d).

The smolt survival index study was performed in 1995. It was the first time that rotary screw traps were used for monitoring smolt outmigration in the Tuolumne River. Most of the monitoring was done by the Districts and the information is contained in Report 96-12 prepared by DFG (Vol. VII). Coded-wire tag recovery data from other locations in 1995 are in Report 96-13 (Vol. VII).

The monitoring items below are listed in FERC License Article 58:

(1) Spawning Escapement Estimates. The 1996 fall spawning survey was conducted by DFG. The survey information is contained in Attachment 96-1. 11 to Report 96-1 (Vol. II) which has a preliminary estimate of 3,300 salmon . This is: 1) an increase from the 1,000 salmon estimated for the 1995 run, 2) the fourth consecutive year of increase, and 3) the largest Tuolumne salmon run since 1988. Population levels are still recovering from effects of the 1987-92 drought period.

(2) Quality and Condition of Spawning Habitat. It was decided at the FEB96 TAC meeting to have a draft protocol for this monitoring element jointly prepared by consultants McBain & Trush and Stillwater Sciences. The protocol was initially available and discussed at the JUN96 TAC meeting. The proposal combined an egg-to-fry emergence aspect related to item #3 below. Several comments were provided and a revised protocol was completed early in 1997 with monitoring that could begin in fall 1997.

(3) Relative Fry Density/Female Spawners. The TAC approved in DEC95 of proceeding with a 1996 seining effort similar to prior years using a JAN-JUN sampling period to maintain this long-term monitoring program. The salmon fry (<50 mm) seine sampling (JAN-15MAR) period was consecutive with the later seining period (15MAR-JUN) conducted primarily to determine juvenile salmon (>50 mm) distribution (#5 below). The 1996 data are contained in Report 96-2, Attachment 96-2.9 (Vol. III). The TAC approved at the DEC96 meeting a similar 1997 seining program except that the sampling interval would be reduced from the three weeks used in 1996 to every two weeks in 1997 because of the larger spawning run.

A comparison between the number of estimated female spawners with peak and average fry abundance indices obtained annually from seining since 1986 is contained in Report 96-2 (Vol. III). Positive correlations were found, however the seining program was never intended to directly evaluate gravel quality or incubation success. The protocol referred to in #2 above is considered to be more appropriate to address those issues.

(4) Fry Distribution and Survival. The 1996 seining described in #3 above documented fry distribution throughout the Tuolumne River. DFG provided a draft proposal for an extended screw trap monitoring period at the FEB96 TAC meeting. The revised DFG proposal, which also included hydroacoustic evaluation, was sent to

the U.S. Fish and Wildlife Service for possible funding on 21OCT96. A draft monitoring protocol was not completed in 1996 but will be developed by the Districts in 1997.

(5) Juvenile Distribution and Temperature Relationships. The seining described in #3 above monitored the distribution of juvenile salmon in the Tuolumne River. Graphs of thermograph data available for 1996 were provided as handouts at the FEB96 and SEP96 TAC meetings and are included in Attachment D of this volume. Changes in 1996 were: a new thermograph location on the San Joaquin River upstream of the Tuolumne River was established, the Riverdale location was discontinued, and the Riffle 19 location was added.

(6) Smolt Survival. The 1996 smolt survival index, developed using releases of coded-wire tagged (CWT) salmon and rotary screw trap monitoring, was completed by DFG in 1996. The data are contained in Report 96-12 prepared by DFG (Vol. VII). A summary of the tag recovery data from the six CWT release years to date for the Tuolumne River (1986, 1987, 1990, 1994, 1995, 1996) is in Report 96-13 (Vol. VII).

1.1.6 Non-Flow Measure Activities in 1996

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. The TAC initiated much progress on non-flow measures in 1996. The following primary activities are noted:

FEB96 TAC Meeting:

- F. Ligon presented a draft list of potential restoration projects.
- A watershed analysis/restoration plan concept was discussed.

MAR96 TAC Meeting:

- A restoration scoping analysis not to exceed $25,000, was proposed by McBain and Trush and approved for completion.

JUN96 TAC Meeting:

- The restoration scoping analysis report by McBain and Trush was provided.
- A draft restoration workplan was presented by McBain and Trush. The TAC requested that it be revised. The TAC approved expending $105,000 for the restoration plan work, with matching funds to be obtained from other sources for a total plan cost of $210,000. The restoration plan is to be completed by the end of 1997.

JUL96:

- McBain and Trush provided an updated restoration plan work scope and schedule.
- T. Ford provided a list of potential restoration projects categories with preliminary cost projections.

- M. McElhiney of the local Natural Resources Conservation Service office began attending the TAC meetings.
- Comments were received on the draft restoration workplan from J. Schnagl on 09JUL.
- A revised restoration workplan was completed by McBain and Trush on 10JUL.

AUG96:

- A package containing two proposals from the TAC was sent on 19AUG to the U. S. Fish and Wildlife Service for funding from the Central Valley Project Improvement Act program. One proposal was for the matching $105,000 to complete the restoration plan. The other proposal was to fund a restoration project for the excavated reach of the Tuolumne River near River Mile 25 termed Special Run-Pools (SRP) 9 & 10.
- Stanislaus County Planning Department was notified in a letter dated 27AUG of the long-term efforts underway to restore salmon and habitat of the Tuolumne River.

SEP96:

- Additional comments were made on the restoration plan.
- The TAC decided to have T. Ford draft an applicable definition of restoration.
- A progress report on the restoration plan was provided on 25SEP.
- The FWS approved funding the $105,000 matching amount for the restoration plan.

NOV96:

- McBain and Trush provided several documents as part of the riparian inventory phase of the restoration plan development.

DEC96 TAC Meeting:

- An updated restoration plan schedule was provided by McBain and Trush.
- A proposed design for restoring SRP 5 upstream of Waterford was presented by McBain and Trush.
- The TAC decided to have a restoration definition incorporated into a mission, vision, goals, and objectives statement to be prepared by T. Ford in 1997.

1.1.7 Anticipated Non-Flow Measure Activities in 1997

Section (G) of the 31JUL96 FERC Order requires that a description of non-flow measures planned for implementation in the next year be included in the annual report. Those activities are:

- The primary activity will be related to completion of the restoration plan which will be accomplished using $105,000 of CVPIA matching funds. The work will include completing: a preservation and restoration site inventory, a project design for SRP 6,

an evaluation of fluvial geomorphic processes, a restoration strategy, and a restoration site list and other project designs.

- Work will continue in the effort to secure additional funding from various sources, including project and funding coordination activities of the San Joaquin River Management Program.

- Work will begin on pre-construction activities such as permitting and environmental documentation for implementing the SRP 9 &10 restoration project if outside funding is confirmed.

1.1.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Control. A letter requesting a meeting was sent by TID to the Army Corps of Engineers (ACOE), dated 05SEP96 (Attachment C). A meeting between the Districts, City and County of San Francisco, and ACOE was held on 02OCT. The ACOE reported that they were reviewing the Don Pedro Project flood control manual and would respond within six months on that review. The flood of JAN97 may change the ACOE process.

Section 20 - CDFG Staff Position. The CDFG biologist for the Tuolumne River under the provisions of this section is Mr. Tim Heyne.

1.1.9 Program Expenses in 1996

Ten-year funding obligations for non-flow options (Section 12) and for monitoring (Section 13) are identified in the FSA. The first year total 1996 expenses for non-flow measures and monitoring were $193,833. These are detailed below:

Non-flow Measures		
Restoration scoping analysis		$25,000
Restoration plan development		$75,483
	Subtotal:	$100,483
Monitoring		
Fry and juvenile salmon (Sec. 13c,e)		$21,720
Temperature (Sec. 13e)		$4,563
Smolt survival index (Sec. 13f)		$67,067
	Subtotal:	$93,350
	Total:	$193,833

1.2 FERC Summary Report for 1997

1.2.1 Introduction

This is the second annual report to the Federal Energy Regulatory Commission (FERC) as required by Section (F), amending Article 58, and Section (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 1997 calendar year, the first full year since the 1996 Order, and contains:

(1) A summary of 1997 FSA activities, including meeting notes and materials for the Tuolumne River Technical Advisory Committee (Volume I).

(2) Three salmon monitoring reports (Volume II).

(3) Data reports on water temperature monitoring, streamflows, and State and Federal Delta water export (Volume II).

For background, the following selected Project 2299 events are listed below:

- 1964 -- Turlock and Modesto Irrigation Districts (Districts) were issued FERC License 2299 for the Don Pedro Project on the Tuolumne River in 1964. Article 37 of License 2299 established initial minimum flow requirements to the Lower Tuolumne River below La Grange Dam for the first 20 years of project operation.
- 1968 – FERC issued an order approving a 20-year fish study program pursuant to Article 39 and filed by the Districts in 1967.
- 1971 – The new Don Pedro Dam was completed and project operation began. This initiated the required Article 39 cooperative fishery studies. The fishery study plan was supplemented by a cost-sharing agreement.
- 1987 -- License 2299 was amended by a FERC Order that required both the completion of the ongoing Article 39 study program in 1991 and approved a 1986 Amended Fish Study Plan as part of a new Article 58. The amended study plan was to conclude in 1998, or no later than 2000 depending on the timing on certain studies.
- 1992 -- The Districts submitted to FERC an eight-volume Article 39 Report covering the first 20 years of project operation, including a Fisheries Study Report with 28 technical appendices. This submittal included reports completed pursuant to the Article 58 Study Plan.
- 1992 -- FERC initiated a license proceeding pursuant to Article 37 to reevaluate project minimum streamflow requirements.
- 1993 -- FERC issued a Draft Environmental Assessment which concluded that an EIS would be prepared.
- 1995 -- A mediated FERC Settlement Agreement (FSA) was reached by interested parties. The FSA specified a Technical Advisory Committee and a Management Committee to implement provisions of the FSA.

- 1996 -- The Districts submitted the FSA to FERC and requested FERC license amendments to modify Articles 37 and 58 consistent with the provisions of the FSA.
- 1996 -- FERC issued Draft and Final Environmental Impact Statements on Article 37 streamflow requirements.
- 1996 -- The Project 2299 proceeding concluded on 31JUL96 when FERC issued an Order amending Articles 37 and 58 of License 2299. The amendments required increased minimum streamflows and monitoring requirements, and required annual reports to be filed with FERC by April 1. The Article 58 annual reports are to include information on non-flow measures.
- 1997 -- The first annual report pursuant to the amended Article 58 and the FSA was submitted to FERC. That 7-volume report included supplements to some of the 1992 Article 39 Report Appendices, remaining Article 58 reports completed since 1991 under the 1986 study plan, and other reports that were available since 1991.
- 2005 – All reports on fisheries studies, monitoring, non-flow measures, and flow fluctuation effects are to be filed with FERC by April 1, 2005 for determination by FERC of any further required monitoring studies or changes in project structures and operations.

1.2.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing Article 58, the FSA, and the strategy for recovery of Tuolumne River chinook salmon. This includes coordinating and implementing flow and non-flow measures, monitoring activities, and developing adaptive management strategies. Quarterly meetings were held and additional meetings were scheduled as necessary in 1997. A total of six TRTAC meetings were held in 1997: 26JAN, 13MAR, 21MAY, 25JUN, 17SEP, and 08DEC. Included in Attachment B of this volume are materials related to those meetings as well as other TRTAC products and correspondence.

Work continued in 1997 to further establish protocols for the TRTAC and to develop a restoration definition and mission statement. A monitoring subgroup of the TRTAC was established in the fall to further assist the TRTAC.

1.2.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

The FSA in Section 8 requires an adaptive management strategy and an annual review to assess progress towards meeting the goals contained in FSA Section 9.

> The Section 8 recovery strategy "attempts to: 1) increase naturally occurring salmon populations, 2) protect any remaining genetic distinction, and 3) increase salmon habitat in the Tuolumne River" using flow and non-flow measures. The strategy is to "Implement measures generally agreed upon as necessary to improve chinook salmon habitat and increase salmon populations. These measures include increased flows, habitat rehabilitation and improvement, and measures to improve smolt survival. When the chinook salmon population increases to acceptable levels, implement additional measures of some risk that the Technical Advisory Committee agrees may help improve the population."

The Section 9 comparative goals are:

- Improvements in smolt survival and successful escapement in the Tuolumne River.
- Increase in naturally reproducing chinook salmon in this subbasin.
- Barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This second annual report provides contains additional detailed background in the summary updates in Reports 97-1 and 97-2 from which to gauge future progress.

The Tuolumne fall-run chinook population estimate increased to 7,200 in 1997, more than double the 3,300 estimated in 1996. This was the fifth consecutive year of increase as the recovery of the population from the effects of the 1987-92 drought continued (see Report 97-1). A detailed cohort analysis to specifically evaluate age-specific contribution and survival to escapement is not available, but most of the spawning population appeared to be 3-year olds from the 1994 brood year. At least 17% of the run was estimated to be of hatchery origin and therefore not naturally produced from the Tuolumne River.

Preliminary ocean harvest and escapement (spawning run) data is available from the Pacific Fishery Management Council. These numbers report a higher 1997 catch of 691,000 salmon landed south of Pt. Arena as compared to 478,00 in 1996. The 1997 Central Valley estimated total escapement of 356,000 salmon as also larger than the 263,000 in 1996. This resulted in a similar estimated 'Ocean Harvest Index' for both years: 66% in 1997 and 64% in 1996. These indices are much lower than in the nine preceding years from 1987-95 which averaged 75% and ranged from 71-79%. Tuolumne-specific ocean harvest data are not available.

The Department of Fish and Game (DFG) has proposed a salmon and steelhead hatchery on the Tuolumne River near La Grange and planning efforts were accelerated in 1995. The need for that facility and how it would interface with the strategy and goals of the FSA have not yet been generally agreed upon. The hatchery proposal was recently modified by DFG in FEB98 and termed the Tuolumne River Interim Supplementation Program. The Districts submitted an unsuccessful proposal to CALFED in 1997 to improve and utilize on a interim basis the existing Tuolumne River Rearing Facility near La Grange Dam for the primary purpose of providing Tuolumne origin smolt salmon for south Delta/VAMP evaluations (see Flows and Flow Schedules section). CALFED did chose to fund a three-year proposal by DFG for a San Joaquin salmon genetic baseline assessment.

Merced River salmon are again the source for any hatchery salmon utilized for 1998 Tuolumne River evaluations. It is anticipated that an attempt will be made to utilize eggs taken from Tuolumne River salmon in the fall of 1998 as the source for any hatchery salmon released for evaluations in 1999 in the Tuolumne River. A review of salmon smolt survival information based on coded-wire tag (CWT) smolt releases of hatchery salmon in the

Tuolumne River since 1986 is ongoing by TRTAC participants -- initial data on smolt survival in 1997 is still being reviewed. There was a very low abundance of naturally produced smolts exiting the Tuolumne River during the screw trap monitoring period at Shiloh Road of 18APR-24MAY (see Report 97-3). State and Federal Delta water export salmon salvage data suggest that many smolts from the San Joaquin Basin were impacted by those pumping operations in the month preceding 18APR (see graph in 25JUN meeting section). Restoration projects and flow management intended to improve smolt survival within the Tuolumne River and the Delta are being designed and implemented.

The National Marine Fisheries Service (NMFS) on 09MAR98 published in the Federal Register a proposed rule to list as "threatened" the California Central Valley Fall/Late Fall-Run chinook salmon Evolutionary Significant Unit (ESU). NMFS published on 19MAR98 a final rule to list as "threatened" the California Central Valley steelhead ESU. It is not yet known what effect these NMFS proposed and final rules will have for the Tuolumne River, but more information on these issues will likely be available in the 1998 FERC Report.

1.2.4 Flows and Flow Schedules

Calendar year 1997 included minimum flow and pulse flow requirements of Article 37 spanning the 1996-97 and 1997-98 "fish flow year" schedules which are typically from 15APR-14APR. Attachment A of this volume contains tables of Article 37 minimum flow and pulse flow requirements which include the 01JAN-14APR97 and 15APR-31DEC97 periods of calendar year 1997 and associated correspondence. Both of these "fish flow years" (partial for 1996-97) had a total Article 37 requirement of 300,923 acre-feet. The 1997 calendar year also includes part of the 1997 and 1998 "water years" which are from OCT-SEP. Water Year streamflow records for the Tuolumne River and other San Joaquin Basin stations are contained in Report 97-4.

A major regional flood event, unprecedented since the 1971 completion of new Don Pedro Dam , occurred in early JAN97. Computed natural flow for the Tuolumne River averaged about 120,000 cfs for 02JAN. This flood caused Don Pedro Dam to spill for the first time from the radial gate and ogee crest spillway facilities. The daily average flow in the lower Tuolumne River at La Grange on 03JAN was about 56,000 cfs. Flow at La Grange Dam and at Modesto 36 miles downstream is estimated to have peaked at about 59,000 cfs. The San Joaquin River at Friant Dam had similar releases which contributed to extensive flooding downstream into the Delta.

The weather pattern for central California changed dramatically after January and resulted in the driest FEB-MAY period on record for the Tuolumne watershed. By late March, Don Pedro Project "excess" river releases had ended and the La Grange flow was back down to near the minimum fish flow schedule. A spring pulse flow pattern with three peak flow periods of about 2,150 cfs was utilized. The Tuolumne flows were coordinated with other basin flows to meet a target flow in the San Joaquin River at Vernalis, downstream of the Stanislaus River confluence. A long-term program, termed the Vernalis Adaptive Management Program (VAMP), that would require a similar operation for Vernalis flow in the mid-APR to mid-MAY period each year was being developed in 1997. The VAMP plan may be adopted in 1998 by the State Water Resources Control Board.

The daily average computed natural flow and actual La Grange flows are shown in the graphs at the end of this summary. The lower graph shows the same data on a 12,000 cfs Y-axis range, one-tenth of the upper graph.

1.2.5 Monitoring Information

Flood Impacts. The JAN97 flood occurred at a time when a majority of the salmon eggs and alevins from the 1996 run were still in the gravel. Extensive streambed movement took place which relocated or eliminated entire spawning riffles, but mapping of spawning riffle changes was not done in 1997. It is likely that scour losses were very high from this flood event, although some salmon fry emergence before and after the flood is evident from the seining data. The Don Pedro spillway releases resulted in extensive erosion of the channel leading to La Grange Reservoir. A tremendous quantity of sand resulted from the spill and much of this was transported over La Grange Dam. Large sand deposits were left in the floodplain, but the short-term effects and input of sand to spawning riffles is undetermined. The spill also deposited a large quantity of rocks in La Grange Reservoir.

Favorable survival conditions for salmon during portions of the 1997 rearing or outmigration periods may have been offset by potential losses due to stranding in flooded areas behind repaired levees, especially along the San Joaquin River and into the Delta, but there is no confirming information. Adult returns from the 1996 brood year to the Tuolumne, combined with ocean harvest information, will be the primary indication of overall survival, but without identifying specific juvenile mortality sources.

Monitoring Elements. FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program, but not the total Section 13 funding limit of $1,355,000. The monitoring elements listed below are those in Article 58:

> (1) Spawning Escapement Estimates. The 1997 fall spawning survey was conducted by DFG. The analysis and report on the DFG field data by the Districts is contained in Report 97-1. The estimate of 7,200 salmon is the largest for the Tuolumne run since 1987. The 1997 run included the highest estimated number (over 1,200) of hatchery salmon to date. Most of these originated from the Merced River Hatchery, but the number resulting from Tuolumne smolt survival evaluations it is not yet available.
>
> (2) Quality and Condition of Spawning Habitat. The revised protocol for this monitoring element, jointly prepared by consultants McBain & Trush and Stillwater Sciences, is contained in the 08DEC97 meeting section. The TRTAC approved at the DEC meeting for the Districts to proceed with the first year monitoring work at an estimated cost of $56,400 which is expected to begin in 1998.
>
> (3) Relative Fry Density/Female Spawners. Tuolumne River fry density in 1997 was low due to the JAN97 flood as a result of scour losses and the downstream distribution of fry out of Tuolumne River. It was recognized in Report 96-2 that work in #2 above

will more directly address gravel quality and potential incubation success, rather than using fry density from seining data. It is likely that redd superimposition also has a major role in overall fry density, especially as run sizes increase. There was overall an estimated 4.3 female spawners for each redd counted in 1997 (Report 97-1). Spawning density is typically highest in the first six river miles below La Grange Dam.

(4) Fry Distribution and Survival. The TRTAC approved in DEC96 for the Districts to proceed with 1997 seine sampling for the JAN-MAY period similar to the 1996 effort. The 1997 seining documented fry distribution in the Tuolumne River. Limited stranding information was also obtained. The 1997 data are contained in Report 97-2. A draft fry/juvenile/smolt monitoring proposal was provided to the TRTAC on 01DEC and is in the 08DEC97 meeting section. That proposal includes monitoring protocols for fry distribution and fluctuation effects and is being reviewed by the TRTAC. The TRTAC did approve in DEC97 for the Districts to proceed in JAN98 with screw trap sampling at TLSRA (River Mile 42). This sampling would be applicable to FSA Sections 13c,d,e,f.

(5) Juvenile Distribution and Temperature Relationships. The seining referred to in #4 above monitored the distribution of juvenile salmon in the Tuolumne River. Report 97-2 also includes JUN97 snorkel observations. Thermograph data are included in Report 97-4 which also is a summary compilation of all data gathered since 1987.

(6) Smolt Survival. The 1997 smolt survival index study releases of coded-wire tagged (CWT) salmon and Shiloh Road rotary screw trap and Mossdale trawl monitoring were performed by DFG. The TRTAC approved in JAN97 that CWT releases of about 135,000 would again be done. DFG actually released about 194,000 CWT salmon in April. The screw trap data are contained in Report 97-3 prepared by DFG. An extensive review of 1997 and prior CWT recovery information is ongoing. An alternative protocol for reach-specific survival information that could reduce the number of hatchery salmon used is contained in the proposal mentioned in #4 above. DFG also recommended some changes to the large CWT release protocol for 1998 and these are being reviewed by the TRTAC.

The CVPIA Comprehensive Assessment and Monitoring Program (CAMP) is anticipated to provide JAN-JUN screw trap monitoring near the San Joaquin River starting in 1998. This has the potential to provide a more complete understanding of the movement timing, sizes, and production of fry/juvenile/smolts from the Tuolumne River. This sampling would be applicable with FSA Sections 13d, e, f, g.

1.2.6 Non-Flow Measure Activities in 1997

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. The TRTAC made much progress on non-flow measures in 1997, especially in project design development and in obtaining outside funds. By year end, there were combined approved AFRP and CALFED funds of $2,602,500 for the SRP 9/10 Projects

and $6,183,000 for the Mining Reach Projects. These funds provide for final design, CEQA documentation, permitting, and partial construction and monitoring. Detailed information is contained in the TRTAC materials section of this volume. The following primary activities are noted:

JAN97:

- Most attention was focused on the recent flood and impacts. The berms separating most gravel extraction pits from the river were breached and would need repairs.

MAR97:

- Ford provided a list of river reaches and potential restoration projects. Priorities were established and recommendations as the 'Tuolumne Stakeholders' were provided to CALFED.
- A draft proposal for SRP 6 was presented to the TRTAC by McBain.
- McBain worked on developing a proposal for the 6-mile mining reach upstream of Waterford affected by the flood. This proposal would include setback berms and floodplain restoration to improve channel capacity up to at least 15,000 cfs, as well as restore salmon habitat.

APR-MAY97:

- Meetings for the mining reach were held with regulatory agencies, mining operators, and landowners. The proposal was refined into four segments.
- The TRTAC approved $50,00 each (total $100,000) of Section 12 funds as a cost-share contribution to the SRP9/10 and the mining reach.

JUN-JUL97:

- Fryer (TID) submitted the SRP 9 construction and Mining Reach 7-11 segment construction proposals to CALFED on behalf of the TRTAC. He presented a proposed shift of some of the allocated AFRP funds from SPR9/10 to the mining reach. AFRP (FWS) would prepare the NEPA documentation for the projects and TID would prepare the CEQA documentation. Plans were to complete environmental documentation and permitting for all of SRP 9&10 and the entire 6-mile Mining Reach using a combination of AFRP and FSA funds.
- DFG submitted a land acquisition proposal (near RM 49) and a Tuolumne gravel introduction proposal (with assistance from McBain) to CALFED.

SEP97:

- Fryer presented AFRP funding allocations of $3,382,000 for SRP 9/10 and the Mining Reach and TID restoration project management plans.
- DFG requested an agreement for sharing the Tuolumne River GIS database developed by the Districts.

DEC97:

- The TRTAC was informed that CALFED had approved funding $2,353,100 SRP 9 and $2,801,000 for Mining Reach 7-11 segment.
- Project permitting and environmental documentation was underway by TID and FWS.

1.2.7 Anticipated Non-Flow Measure Activities in 1998

Section (G) of the 31JUL96 FERC Order requires that a description of non-flow measures planned for implementation in the next year be included in the annual report. Those anticipated activities include:

- Completion of the Restoration Plan by McBain and Trush. This work was delayed due to other commitments but should be concluded in early 1998. It is being completed with CVPIA (AFRP) matching funds. The work will include: additional restoration project designs, restoration strategy, restoration site list, GIS data compilation, and production of the draft restoration plan.

- Work will continue on the CEQA/NEPA documentation, design, permits, and other pre-construction activities for the funded SRP 9 project and the 7-11 segment of the Mining Reach. Pre-project monitoring will be done in 1998 and construction may begin in late summer. Restoration project management will continue by TID.

- Efforts to secure funding for additional projects from various sources will continue. It is anticipated there will be opportunities to submit proposals to CALFED, AFRP, and other programs in 1998.

- Detailed project monitoring plans will be developed through the TRTAC and the monitoring subgroup. These will be integrated with other project-specific monitoring programs such as those to be implemented by DFG and with river-wide monitoring such as FSA Section 13 monitoring, CAMP, and other efforts.

1.2.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Control. No further activity occurred on this item due to the January 1997 flood. Congress approved a multi-year review of flood operations and solutions throughout the San Joaquin Basin by the Army Corps of Engineers (ACOE). Non-structural solutions will be considered in that process. The Districts have recommended for improved flood operations on the Tuolumne River that they be allowed to release up to 15,000 cfs at La Grange with a maximum allowable flow of 20,000 cfs below Dry Creek at Modesto, instead of the present 9,000 cfs limit at Modesto. Purchase of flood-prone lands and floodproofing key facilities to accommodate these higher flows were also part of the Districts' recommendations. The increase in allowable flood releases would require a change by the ACOE to the Don Pedro Project Flood Control Manual.

1.2.9 Program Expenses in 1997

The annual program expenses for 1996 and 1997 for FSA Sections 12 and 13 are in the accompanying table and graph. The 1997 expense for Section 12 was $61,629 and for Section 13 was $77,587.

Total funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and is $1,355,000 for monitoring (Section 13). The total expense through 1997 for Section 12 was $162,112 and for Section 13 was $170,937 for a combined program total of $333,049. The projected costs on an equal annual basis in the graph are for comparison to actual expenses. These are projected to occur through year 2004 because of the License 2299 reporting requirement of no later than 01APR2005.

1.3 FERC Summary Report for 1998

1.3.1 Introduction

This is the third annual report to the Federal Energy Regulatory Commission (FERC) as required by Section (F), amending Article 58, and Section (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 1998 calendar year and contains:

(1) A summary of 1998 FSA activities, including meeting notes and materials from the Tuolumne River Technical Advisory Committee (Volume I).

(2) Four monitoring reports and a smolt survival peer review report (Volume II).

1.3.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing Article 58, the FSA, and the strategy for recovery of Tuolumne River chinook salmon. This includes coordinating and implementing flow and non-flow measures, monitoring activities, and developing adaptive management strategies. Quarterly meetings were scheduled and additional meetings were added as necessary in 1998. A total of seven TRTAC meetings were held in 1998: 09FEB, 18MAR, 24MAR, 01APR, 17JUN, 17SEP, and 17DEC. Included in Attachment B of this volume are materials related to those meetings as well as other TRTAC materials and correspondence. The TRTAC subgroup held six meetings in 1998; those agendas and meeting summaries are in Attachment C of this volume.

Protocols for the TRTAC were established in 1998 (see Vol. II, 17JUN meeting) and work continued on developing a mission statement.

1.3.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

The FSA in Section 8 requires an adaptive management strategy and an annual review to assess progress towards meeting the goals contained in FSA Section 9.

> The Section 8 recovery strategy "attempts to: 1) increase naturally occurring salmon populations, 2) protect any remaining genetic distinction, and 3) increase salmon habitat in the Tuolumne River" using flow and non-flow measures. The strategy is to "Implement measures generally agreed upon as necessary to improve chinook salmon habitat and increase salmon populations. These measures include increased flows, habitat rehabilitation and improvement, and measures to improve smolt survival. When the Chinook salmon population increases to acceptable levels, implement additional

measures of some risk that the Technical Advisory Committee agrees may help improve the population."

The Section 9 comparative goals are:

- Improvements in smolt survival and successful escapement in the Tuolumne River.
- Increase in naturally reproducing chinook salmon in this subbasin.
- Barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This third annual report provides additional detailed background in the summary updates in Vol. II - Reports 98-1, 98-2, and 98-5 from which to gauge future progress.

The Tuolumne fall-run chinook population estimate increased to 8,900 in 1998, up from the 7,200 estimated in 1997. This was the sixth consecutive year of increase as the population continued to recover from the effects of the 1987-92 drought (see Report 98-1). A verified cohort analysis to evaluate age-specific contribution and survival to escapement is not yet available, but cohort composition is estimated from the length frequency distribution of salmon carcasses measured in the spawning survey. Estimated at about 40% of the spawning population were 2-year olds from the 1996 brood year which survived the JAN97 flood, about 35% 3-year olds from the 1995 brood year, and about 20% 4-year olds from the 1994 brood year. At least 14% of the run, based on carcasses with an adipose fin clip indicating a coded-wire tag (CWT), were likely of hatchery origin and not naturally produced from the Tuolumne River.

Preliminary 1998 ocean harvest and Central Valley escapement (spawning run) data is available from the Pacific Fishery Management Council (PFMC). The PFMC reported a much lower 1998 catch of 324,000 salmon landed south of Pt. Arena as compared to 687,00 in 1997. The 1998 Central Valley estimated total escapement of 254,000 salmon was also less than the 368,000 estimated for 1997. These values resulted in a lower estimated Central Valley 'Ocean Harvest Index' (HRI) of 56% in 1998 as compared to 65% in 1997. The 1998 HRI was much lower than the nine-year average from 1987-95 of 75% (range of 71-79%). Tuolumne-specific ocean harvest data are not available.

The Department of Fish and Game (DFG) has for several years proposed a salmon hatchery on the Tuolumne River near La Grange. In late 1998 the CDFG began a San Joaquin basin-wide (within DFG Region 4) review of the need for hatchery salmon and alternatives for their production. A potential Tuolumne River facility, and how it would interface with the strategy and goals of the FSA, will be considered in that process. Presently the only artificial production facility in use in the basin is the Merced River Hatchery, as the Tuolumne River Rearing Facility near La Grange Dam has not been used by DFG since 1994.

Merced River salmon were again the source for hatchery salmon utilized in 1998 Tuolumne River smolt survival evaluations. There was no attempt made to obtain eggs from Tuolumne

River salmon in the fall of 1998 to be used as a source of artificially reared salmon for evaluations in 1999 in the Tuolumne River. The smolt survival evaluations in 1998 included a new method of utilizing relatively small numbers of marked salmon to evaluate survival within several reaches of the river (see Report 98-3).

A peer review of two salmon smolt survival methods, and information obtained from coded-wire tag (CWT) smolt releases of hatchery salmon in the Tuolumne River since 1986, was conducted in DEC98 with the assistance of the University of California, Davis, Centers for Water and Wildland Resources. The report from this effort, which was co-funded by the FSA and the Anadromous Fish Restoration Program (AFRP) of the US Fish and Wildlife Service, is in Vol. II, Report 98-4. Consideration of the peer review comments and further analyses of smolt survival data is ongoing by TRTAC participants. Report 98-5 provides an updated summary of the data from the Tuolumne River CWT smolt survival evaluations.

There was a very low capture of naturally produced smolts exiting the Tuolumne River during the screw trap monitoring at Shiloh Road in APR-MAY98 (see 17DEC meeting handout), due in part to sampling problems at that site. State and Federal Delta water export salmon salvage data suggest that many salmon from the San Joaquin Basin were impacted by those pumping operations during the JAN-JUN98 period (see graph at end of this report section) although delta water exports were at relatively low levels due to the wet year.

The National Marine Fisheries Service (NMFS) on 09MAR98 published in the Federal Register a proposed rule to list as "threatened" the California Central Valley Fall/Late Fall-Run chinook salmon Evolutionary Significant Unit (ESU). A notice of a 6-month extension on a final listing determination was published by NMFS on 24MAR99 on this ESU. NMFS published a final rule to list as "threatened" the California Central Valley steelhead ESU on 19MAR98. A proposed critical habitat designation was published by NMFS on 05FEB99. The USFWS issued a final determination of "threatened" status for Sacramento splittail on 08FEB99. It is not yet known what effect these proposed and final rules and determinations will have on the Tuolumne River.

1.3.4 Flows and Flow Schedules

Calendar year 1998 included minimum flow and pulse flow requirements of Article 37 spanning the 1997-98 and 1998-99 "fish flow year" schedules, which are typically from 15APR-14APR. Attachment A of this volume contains the flow schedule correspondence. Both of these "fish flow years" had a total Article 37 requirement of 300,923 acre-feet.

The 1998 calendar year included part of the 1998 and 1999 "water years" which run from OCT-SEP. The 1998 water year (OCT97-SEP98) was very wet with a Tuolumne River computed natural runoff volume of 3,348,000 acre-feet. This was 178% of average (1,900,000 af) and the 9th wettest in the 102-year record. Operational flows in excess of FERC requirements occurred throughout the spring and summer months. The daily average computed natural flow and actual La Grange flows are shown in the upper graph in Attachment A. The lower graph shows the actual flow and the FERC flow schedule on a reduced Y-axis range.

1.3.5 Monitoring Information

Monitoring Elements. FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program, but not the total Section 13 funding limit of $1,355,000. The monitoring elements listed below are those in Article 58:

(1) Spawning Escapement Estimates. The 1998 fall spawning survey was conducted by DFG and the report is in preparation by CDFG. An update using some of the 1998 DFG data is in Report 98-1.

(2) Quality and Condition of Spawning Habitat. Fieldwork on the approved gravel permeability evaluation began in the fall and will continue in 1999. Habitat mapping as part of the Gravel Mining Reach and SRP 9/10 restoration project monitoring was done in the summer and the report by McBain & Trush and Stillwater Sciences is in preparation. DFG conducted a comparison of redd counts and the report is in preparation.

(3) Relative Fry Density/Female Spawners. Tuolumne River average salmon fry density in 1998 was moderate due to size of the parent run and the higher flows starting in mid-JAN which resulted in the downstream distribution of many fry into the San Joaquin River (see Report 98-2). It was recognized in Report 96-2 that work in #2 above would more directly address gravel quality and potential incubation success, rather than using fry density from seining data.

(4) Fry Distribution and Survival. The TRTAC approved in DEC97 for the Districts to proceed with 1998 seine sampling and for screw trap sampling at Turlock Lake State Recreation Area (TLSRA). The 1998 seining documented fry distribution in the Tuolumne River and the results are contained in Report 98-2. The 1998 screw trap sampling at TLSRA, later moved to 7/11 Gravel, and near Charles Road is covered in Report 98-3. DFG monitored a screw trap at Shiloh Road and that report is in preparation. The TRTAC approved for work to proceed on a Stranding and Entrapment Study (see plan in 09FEB meeting handouts).

(5) Juvenile Distribution and Temperature Relationships. The seining and screw trap sampling referred to in #4 above monitored the distribution of juvenile salmon in the Tuolumne River. Updated thermograph data graphs are in the Vol. I , 17SEP TRTAC meeting handouts. Electrofishing for the SRP9/10 restoration project was done in the fall and the report by McBain & Trush and Stillwater Sciences is in preparation.

(6) Smolt Survival. The TRTAC approved at the 01APR98 meeting the number and location of release groups. For the first time, smaller releases of ink-marked salmon were used for within-river evaluations, including a part of the pre-project monitoring for the SPR9/10 restoration project. The lower large CWT group was released in the San Joaquin River for the first time and increased Mossdale trawl monitoring effort (at 400 minutes/day, up from 200) was performed by DFG. The ink-marked data are

contained in Report 98-3. Results of a TRTAC smolt survival peer review of two alternative methods, conducted with support from the AFRP (FWS), are in Report 98-4 and the TRTAC is still reviewing the input. An updated summary of the CWT data is in Report 98-5.

1.3.6 Non-Flow Measure Activities in 1998

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. Work progressed on the funded portions of the Gravel Mining Reach and the SPR9/10 projects, especially in project design, engineering and environmental documentation. Several meetings were held with affected landowners. More detailed information is contained in the TRTAC materials section of this volume. Primary activities noted were:

MAR98:

McBain presented a draft proposal for a Gasburg Creek sediment detention basin to the TRTAC.

MAY-JUN98:

The TRTAC approved submittal to CALFED for more funds to the SRP9/10 and the gravel mining reach.
Draft NEPA/CEQA documents were issued jointly by TID/FWS.
McBain & Trush presented the draft restoration plan.
TRTAC supported the NRCS Grayson River Ranch restoration proposal.

SEP98:

TRTAC decides to produce a summary brochure of the restoration plan for the public and to conduct outreach workshops
DFG reported that the gravel addition project near La Grange would be implemented in the summer of 1999.
FWS recommends that a programmatic environmental document be produced for Tuolumne River restoration projects.

1.3.7 Anticipated Non-Flow Measure Activities in 1999

Section (G) of the 31JUL96 FERC Order requires that a description of non-flow measures planned for implementation in the next year be included in the annual report. Those anticipated activities include:

- Completion of the Restoration Plan by McBain and Trush. This work should be concluded in mid-1999. The work includes additional restoration project designs, public meetings, and production of a brochure and the final restoration plan.

- Work will continue to complete the CEQA/NEPA documentation, design, permits, easements, and other pre-construction activities for the SRP 9/10 projects and the Gravel Mining Reach. More pre-project monitoring will be done in 1999 and

construction will likely begin in late summer. Restoration project management will continue by TID.

- Efforts to secure funding for additional projects from various sources will continue. There will be opportunities to submit proposals to CALFED/AFRP and possibly other programs in 1999.

- Detailed project monitoring plans will be developed through the TRTAC and the monitoring subgroup. These will be integrated with other project-specific monitoring programs such as those to be implemented by DFG and with river-wide monitoring such as FSA Section 13 monitoring, CAMP, and other efforts.

- Coordination with DFG projects and monitoring such as the planned La Grange gravel addition will continue to be developed.

1.3.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Control. The 1996 FERC Report included a 05SEP96 letter from TID to the Army Corps of Engineers (ACOE) on this subject. Contained at the end of this section is the 05SEP96 letter again and two letters, dated 18OCT96 and 11APR97 from the ACOE in response.

The JAN97 flood initiated short-term and long-term review of flood management in the Central Valley of California. The ACOE completed: (1) the Modesto Community Assessment Study in SEP97 and (2) the Tuolumne River Reconnaissance Study (Section 905(b) Analysis) in OCT98. The ACOE plans to begin the next step, a Tuolumne River Feasibility Study in 1999. The ACOE and the State Reclamation Board began in 1998 a four-year Sacramento and San Joaquin River Basins Comprehensive Study. All of these review processes will consider structural and non-structural solutions.

The Districts continue to recommend for improved flood operations on the Tuolumne River that the allowable release be increased up to 15,000 cfs at La Grange and a maximum flow of at least 20,000 cfs below Dry Creek at Modesto, instead of the present 9,000 cfs limit at Modesto. The increase in allowable flood releases would require concurrence by the ACOE and a change to the Don Pedro Project Flood Control Manual.

1.3.9 Program Expenses in 1998

The annual program expenses for 1996-98 for FSA Sections 12 and 13 are in the accompanying table and graph. The 1998 expense for Section 12 was $77,459 and for Section 13 was $194,157.

Total funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and is $1,355,000 for monitoring (Section 13). The total expense through 1998 for Section 12 was $239,571 and for Section 13 was $365,094 for a combined program total of $606,665. The projected costs on an equal annual basis in the graph are for comparison to actual expenses. These expenses

are projected to occur into year 2005, even though the License 2299 Article 58 reporting requirement is for a summary report by 01APR2005.

1.4 FERC Summary Report for 1999

1.4.1 Introduction

This is the fourth annual report to the Federal Energy Regulatory Commission (FERC) as required by Order Items (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 1999 calendar year and contains:

(1) A summary of 1999 FSA activities, including meeting notes and materials from the Tuolumne River Technical Advisory Committee (Volume I).

(2) Monitoring and other fishery-related reports (Volume II).

(3) Restoration plan documents and project monitoring reports (Volume III).

1.4.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing the 1996 FERC Order and the FSA. The TRTAC is responsible for coordinating monitoring activities and non-flow measures and developing adaptive management strategies. The TRTAC also provides input into flow decisions by the Districts, CDFG, and USFWS. An expanded tracking process was initiated in 1999 to better monitor the progress in meeting the requirements of the FSA and FERC Order. During 1999, the CDFG representative, George Neillands, accepted another position with the Department and was replaced by Tim Heyne. Susan Boring accepted another position with the USFWS, resulting in Scott Spaulding acting as proxy for Gary Taylor.

Quarterly TRTAC meetings were scheduled and additional meetings were added as necessary in 1999. A total of nine TRTAC meetings were held in 1999: 26JAN, 02FEB, 09MAR, 10MAR, 07APR, 23JUN, 02AUG, 13SEP, and 16DEC. Included in Attachment B of this volume are materials related to those meetings as well as other TRTAC materials and correspondence.

A subgroup of the TRTAC held six meetings in 1999: 21JAN, 12FEB, 25MAY, 25AUG, 22OCT, and 18NOV. The subgroup agendas and meeting summaries are in Attachment C of this volume. The subgroup format was chosen in 1997 to facilitate more detailed activities and implementing TRTAC actions while leaving official TRTAC decisions to the TRTAC meetings.

Attachment D of this volume contains a listing of all the TRTAC materials and actions since DEC95 that have been filed in the three previous annual reports to FERC and in this volume. That is followed by a separate listing of all the literature handouts at the TRTAC meetings since DEC95.

1.4.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

FSA Section 8 sets forth the Tuolumne River Chinook Salmon Program goals as (1) increase naturally occurring salmon populations; (2) protect any remaining genetic distinction; and (3) increase salmon habitat in the Tuolumne River. The program is to employ flow and non-flow measures and an adaptive management strategy.

Relating to FSA Section 8 Program Goal 1, FSA Section 9 recognized that many factors affecting the Tuolumne salmon population are beyond the control of the FSA participants. So instead of establishing numerical population goals, the FSA established the following narrative comparative population goals: (1) Improvements in smolt survival and successful escapement in the Tuolumne River; (2) increase in naturally reproducing chinook salmon in this subbasin; (3) barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This fourth annual report provides detailed background in the summary updates in Vol. II - Reports 99-4 and 99-7 to gauge progress in implementing the FSA strategy and meeting the FSA goals. [CDFG was not able to provide the 1999 Spawning Survey Report (Report 99-2) in time for this submittal, so the data needed to prepare the Spawning Survey Summary Update was not available and Report 99-3 is also not included in this 1999 report].

CDFG has determined the Tuolumne River salmon population is at a sufficient level to provide some angling harvest. The California Fish and Game Commission changed the year 2000 sportfishing regulations from the previous year-round river-wide prohibition (zero limit) to allowing a salmon bag limit. Specifically, the limit is now 1 salmon daily from 01JAN-15OCT in the Tuolumne River from the Hickman Bridge at Waterford down to the mouth and in the San Joaquin River down to the Highway 132 Bridge (6.5 miles below the Tuolumne confluence).

Salmon Population. The preliminary 1999 Tuolumne fall-run chinook population estimate (by T. Ford) is 6,800, but further information from the CDFG survey is pending. This would represent a decrease from the 8,900 salmon estimated by CDFG for the 1998 run, but a level similar to the 7,100 estimated in 1997. The Tuolumne salmon population continued to show a significant recovery from the 1987-92 drought period, which contributed to CDFG run estimates for the 1990-1995 period of less than 800 salmon each year. About 11% of the 1999 run was reported by CDFG to have an adipose fin clip, indicating salmon with a coded-wire tag (CWT), most likely of hatchery origin and not naturally produced from the Tuolumne River.

The FSA Section 8 Program Goals give clear direction on increasing naturally occurring salmon while protecting any remaining genetic distinction of Tuolumne River salmon from other salmon in the San Joaquin Basin. Most of the known hatchery-origin salmon in the Tuolumne salmon runs are Merced River hatchery fish used in the Tuolumne smolt survival studies. Issues regarding the number of hatchery fish to be used in Tuolumne studies, the use of non-Tuolumne origin study fish, and their population effects, have been much debated by

the TRTAC since 1996. In DEC99, the TRTAC was finally able to reach an agreement on a new smolt survival study design for the years 2000 through 2005, which addresses these issues. The agreement in part provides for two more years of large CWT smolt study releases, transition to a new study design using less study fish, reduction in the number of hatchery study fish used by 2003, and use of only Tuolumne-origin study fish by 2002. The agreement is in the Exhibits section.

High flows in JAN-MAR resulted in a large movement of fry out of the river as evidenced by seine and screw trap monitoring. A record 100,000 fry were estimated in a single night's catch at the upper (7/11) trap on 21JAN. There were 18,852 naturally produced salmon, mostly fry, captured in screw trap monitoring by CDFG above Shiloh Road (River Mile 5) in JAN-MAR. During 20APR-15MAY, a total of 194 CWT hatchery smolts from upstream study releases were caught at that site. In comparison, 343 unmarked naturally produced smolts were caught in the same period.

Outside Factors. The FSA (Section 10) recognized there are factors outside the Tuolumne River that affect the chinook salmon population, including ocean salmon catch and mortality associated with south Delta water export operations.

Preliminary 1999 ocean harvest and Central Valley escapement (spawning run) data are available from the Pacific Fishery Management Council (PFMC). The PFMC reported a similar 1999 ocean catch of 334,900 salmon landed south of Pt. Arena as compared to 336,000 in 1998. Nearly all the California ocean catch has been landed south of Pt. Arena since 1992 as fisheries have been much reduced or closed to the north. The estimated 1999 Central Valley total escapement of 309,400 salmon was slightly higher than the 293,100 estimated for 1998. These catch/escapement values resulted in a low estimated Central Valley "Ocean Harvest Index" (HRI) of 52% in 1999, close to the 53% reported in 1998. The HRI has been much lower in the last four years than the nine-year average from 1987-95 of 75% (range of 71-79%). Graphs of the PFMC data are in the Exhibits section. River-specific ocean harvest data are not available in this mixed-stock fishery.

State and Federal Delta water export salmon salvage data show a large number of salmon were impacted by those pumping operations throughout the JAN-JUN99 period (see Report 99-6) as record recent numbers of salmon were estimated killed or salvaged. Combined facility estimates for JAN-JUN99 were 164,897 salmon salvaged and 266,569 in losses. The salvage and mortality estimates for salmon less than 50 mm are probably low due to reduced screening efficiency and the reported numbers do not include associated indirect losses within the Delta. There was no barrier installed in 1999 during the mid-April to mid-May period at the head of Old River for improving survival of migrating San Joaquin River salmon smolts.

ESA Actions. The National Marine Fisheries Service (NMFS) published in the Federal Register on 16SEP99 a notice of determination to not list the California Central Valley Fall/Late Fall-Run chinook salmon (*Oncorhynchus tshawytcha*) Evolutionary Significant Unit (ESU) as "threatened" and left the ESU, which includes the Tuolumne River, as a "candidate" species.

NMFS published a final rule to list as "threatened" the California Central Valley steelhead (*Oncorhynchus mykiss*) ESU on 19MAR98 and published a proposed critical habitat designation on 05FEB99. NMFS published a final rule on 16FEB2000 that designated the Tuolumne River as part of the ESU's critical habitat. A proposed rule was published by NMFS on 30DEC99 governing "take" under ESA Section 4(d).

The USFWS issued a final determination of "threatened" status for Sacramento splittail (*Pogonichthys macrolepidotus*) on 08FEB99. This species of the minnow family, Cyprinidae, occurs in the Central Valley, including the San Joaquin River system, although no critical habitat was designated as part of the listing.

1.4.4 Flows and Flow Schedules

Calendar year 1999 included minimum flow and pulse flow requirements of Article 37 spanning the 1998-99 and 1999-2000 "fish flow year" schedules, which are typically from 15APR-14APR. Attachment A of this volume contains the 1999-2000 FERC flow schedule correspondence. Both of these "fish flow years" had a total Article 37 flow requirement of 300,923 acre-feet. This continued the pattern since the 1996 FERC Order with all years requiring the maximum flow volume.

The 1999 calendar year included part of the 1999 and 2000 "water years" which run from OCT-SEP. The 1999 water year (OCT98-SEP99) was 107% of the 50-year average (ending in 1990) with a Tuolumne River computed natural runoff volume of 2,010,000 acre-feet. The San Joaquin Basin 60-20-20 Water Supply Index April 1 Forecast (3.4 in 1999) is used to determine the water year classification and corresponding Article 37 annual minimum streamflow volume. The actual 1999 San Joaquin Basin 60-20-20 Water Supply Index was 3.59. The daily average computed natural flow and actual La Grange flows are shown in the upper graph in Attachment A. The lower graph shows the actual flow and the FERC minimum flow schedule on a reduced Y-axis range.

Operational flows in excess of FERC requirements, up to about 7,500 cfs, occurred during 1999 in the mid-January to mid-April period due to winter/spring flood space requirements in Don Pedro Reservoir. The mid-April to mid-May spring pulse flow in the FERC fish flow schedule was augmented by additional water provided as part of implementation of the San Joaquin River Agreement (SJRA), a component of a basin-wide program referred to as the Vernalis Adaptive Management Plan (VAMP). Actual river flows during the remainder of the year, from mid-May through December, closely followed the minimum flow schedule requirements. The fall pulse flow volume was spread out over a 25-day period from 29SEP-23OCT99 due to a temporary flow limitation caused by construction of a new Roberts Ferry Bridge to replace the bridge damaged by the JAN97 flood.

1.4.5 Monitoring Information

FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program within the total Section 13 funding limit of $1,355,000. An updated list of fish species recorded in Tuolumne River monitoring is in the Exhibits section. A recent

addition to the list is river lamprey (*Lampetra ayresi)* documented in the catch of the screw trap near Hughson.

The monitoring elements listed below are in Article 58:

(1) Spawning Escapement. The California Department of Fish and Game (CDFG) conducts the spawning surveys under FSA Section 13a. Much of the information from the 1999 survey has not yet been provided to the Districts, so there is no detailed report (Report 99-2) or long-term update (Report 99-3) available for 1999. The CDFG report for the 1998 spawning run is Report 99-1 (Vol. II).

(2) Quality and Condition of Spawning Habitat. Work continued on the gravel permeability evaluation begun in 1998 with an update provided in SEP99 (see 13SEP TRTAC meeting). Habitat mapping of the Gravel Mining Reach and SRP 9/10 restoration projects is in Reports 99-10 (1998 work) and 99-11 (Vol. III). DFG conducted a comparison of redd count methods during the fall spawning period.

(3) Relative Fry Density/Female Spawners. Tuolumne River average salmon fry density from seining in 1999 was high despite the higher flows starting in mid-JAN that resulted in the downstream distribution of many fry into the San Joaquin River (see Report 99-4). Fry density showed a relationship to the number of female spawners consistent with other years.

(4) Fry Distribution and Survival. Seine and screw trap sampling provide much of the distribution data. The 1999 seining results are contained in Report 99-4. The 1999 screw trap sampling at 7/11 Gravel and near Hughson is covered in Report 99-5. CDFG monitored screw traps upstream of Shiloh Road in 1999 and reports on that sampling and the CDFG screw trap sampling at Shiloh Road in 1998 are not yet available. Limited work continued on the Stranding and Entrapment Study as part of the fry survival evaluation.

(5) Juvenile Distribution and Temperature Relationships. The seine and screw trap sampling monitored the primary winter/spring distribution of juvenile salmon in the Tuolumne River (Reports 99-4 and 99-5). The 1999 daily average thermograph data are graphed in Attachment A.

(6) Smolt Survival. Merced River salmon were again the source for hatchery salmon utilized in 1999 Tuolumne River smolt survival and screw trap evaluations. The TRTAC approved at the 02FEB99 meeting a total of 160,000 CWT hatchery salmon to be used for all 1999 Tuolumne River smolt survival and screw trap evaluations. The smolt survival evaluations in 1999 included large and small releases of coded-wire tagged (CWT) salmon to evaluate survival within several reaches and throughout the river (see Report 99-4). Report 99-7 provides an updated summary of data from the Tuolumne River large CWT smolt survival evaluations, although some 1999 information is not yet available. There was no attempt to obtain eggs from Tuolumne

River salmon in the fall of 1999 to be used as a source of artificially reared salmon for evaluations in 2000 in the Tuolumne River.

Project–related Monitoring. Pre-project monitoring, except for smolt survival/screw trapping, was done in the summer. Electrofishing and habitat mapping for the SRP 9/10 restoration projects was done in much lower flow conditions than in the summer of 1998. The results for both the 1998 and 1999 sampling are in Reports 99-10 and 99-11 (Vol. III).

1.4.6 Non-Flow Measure Activities in 1999

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. Work progressed on the funded portions of the Gravel Mining Reach and the SRP 9/10 projects, especially in project design, engineering, environmental documentation, and coordination with agencies, gravel operators, and landowners. More detailed information is contained in the TRTAC materials section of this volume. The primary activities noted were:

JAN99:

- TRTAC selected 6 of the 10 projects required in Section 12.

MAR99:

- TRTAC approved preparation of a sediment management proposal for submittal to CALFED.
- Preparation of TRTAC proposals to CALFED for completion of SRP 9/10 and the Warner-Deardorff projects was approved.
- A 16-page color restoration plan summary brochure was produced (Report 99-8).

APR99:

- TRTAC decided to support 3 other CALFED proposals by providing letters of recommendation (CDFG gravel introduction, CDFG Gasburg Creek restoration, and FOTT Bobcat Flat project).

JUN99:

- TRTAC held a public workshop on the restoration plan.
- Approved funds for project environmental documentation and permitting.

DEC99:

- Near completion of the final restoration plan with production to occur in early 2000 (Report 99-9).

Several other Tuolumne restoration projects had activity in 1999: (1) CDFG gravel addition at old La Grange Bridge – completed; (2) NRCS easement at Grayson River Ranch - completed, restoration planning ongoing; and (3) Tuolumne River Regional Park planning by Modesto, Ceres, and Stanislaus County - ongoing.

1.4.7 Anticipated Non-Flow Measure Activities in 2000

Section (G) of the 31JUL96 FERC Order requires a description of non-flow measures planned for implementation in the next year be included in the annual report. Those activities include:

- Production of the Tuolumne River Restoration Plan by McBain and Trush. This work includes producing hardcopy and CD-format of the final restoration plan (see Report 99-9). Additional plan summary brochures may be produced due to high demand for the product (see Report 99-8).

- Major construction activities will begin on the SRP 9 project and the 7-11 Gravel Mining Reach Project. FSA-sponsored restoration project management will continue by TID.

- Work will continue to complete the CEQA/NEPA documentation, design, permits, easements, and other pre-construction activities for the SRP 9/10 projects and the Gravel Mining Reach projects.

- Efforts to secure additional funding for projects from various sources will continue. There will be opportunities to submit proposals to CALFED/AFRP and possibly other programs in 2000.

- Detailed project monitoring plans will continue to be developed and implemented through the TRTAC and subgroup. These will be integrated with other project-specific monitoring programs, such as those to be implemented by DFG, and with river-wide monitoring such as FSA Section 13 monitoring, CAMP, and other efforts.

- Coordination with other projects, such as CDFG gravel addition projects, the Grayson River Ranch Project, the Bobcat Flat Project, and Tuolumne River Regional Park will continue.

1.4.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Control. FERC issued an Order amending Article 38 on 23DEC99 in response to requests filed in 1998 by the ACOE and the Districts to ensure consistency among wording in Article 38 and ACOE water control requirements. The Order also added, in (B), "In the report required by article 58, the licensees shall describe any implemented flood control measures or other efforts to change the floodway or flood control operational guidelines for this project during the reporting period."

La Grange flows up to 7500 cfs were released in the JAN-APR99 period to maintain the flood control space in Don Pedro Reservoir (see flow graphs and Don Pedro Reservoir storage graph in Attachment A).

The JAN97 flood initiated short-term and long-term review of flood management in the Central Valley of California. The Army Corps of Engineers (ACOE) and the State Reclamation Board continued their Sacramento and San Joaquin River Basins Comprehensive

Study in 1999. At the local level, the ACOE, TID, MID, Stanislaus County, and City of Modesto, initiated a Tuolumne River Feasibility Study process in 1999, following the completion of the ACOE Tuolumne River Reconnaissance Study in 1998. All of these review processes will consider structural and non-structural solutions.

The Districts continue to recommend the maximum allowable release be increased up to 15,000 cfs at La Grange with a maximum flow of at least 20,000 cfs below Dry Creek at Modesto (up from the present 9,000 cfs limit at Modesto) for improved flood operations on the Tuolumne River. An increase in allowable flood releases will require approval by the ACOE and a change to the Don Pedro Project Flood Control Manual.

Section 19 – Riparian Habitat and Recreation. The East Stanislaus Resource Conservation District (ESRCD) was selected as the public agency mutually acceptable to the CCSF, FOTT, and TRPT to be funded the $500,000 provided by CCSF pursuant to FSA Section 19. The RCD receives assistance from the Natural Resources Conservation Service (NRCS). There has been no expenditure of Section 19 funds through 1999.

Section 20 – CDFG Staff Position. The CDFG biologist, Tim Heyne, who was funded through the City by this section, accepted a new position replacing George Neillands in 1999. CDFG anticipates filling the vacant Tuolumne River biologist position in 2000.

1.4.9 Program Expenses in 1999

The annual program expenses for 1996-99 for FSA Sections 12 and 13 are in the Exhibits section. The 1999 expense for Section 12 was $84,587 and for Section 13 was $244,695, for a combined total of $329,282. The exhibit also shows detailed 1999 monthly costs per task category and agency/consultant.

Funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and total $1,355,000 for monitoring (Section 13). The total expense through 1999 for Section 12 was $324,158 and for Section 13 was $609,789 for a combined program total of $933,947. The projected costs for each Section (see Exhibit) are graphed on an equal annual basis simply for comparison to actual expenses. These FSA expenses are presently projected to occur into year 2005, even though the License 2299 Article 58 reporting requirement calls for a summary report by 01APR2005.

1.4.10 Exhibits

1. TRTAC smolt survival agreement
2. PFMC ocean catch and escapement data
3. Tuolumne River fish species list
4. FSA program expenses through 1999

1.5 FERC Summary Report for 2000

1.5.1 Introduction

This is the fifth annual report to the Federal Energy Regulatory Commission (FERC) as required by Order Items (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 2000 calendar year and contains:

(1) A summary of 2000 FSA activities, including meeting notes and materials from the Tuolumne River Technical Advisory Committee, and related items (Volume I).

(2) Monitoring and other fishery-related reports (Volume II).

1.5.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing the 1996 FERC Order and the FSA. The TRTAC is responsible for coordinating monitoring activities and non-flow measures and developing adaptive management strategies. The TRTAC also provides input into flow schedule decisions by the Districts, CDFG, and USFWS. An updated tracking table for monitoring the progress in meeting the requirements of the FSA and FERC Order is in the 20DEC meeting section.

Quarterly TRTAC meetings were held in 2000: 16MAR, 21JUN, 28SEP, and 20DEC. Included in Attachment B of this volume are materials related to those meetings as well as other TRTAC materials and correspondence. An associated meeting of the FSA Management Committee was held on 16MAR. A listing of 1996-2000 Technical Reports submitted to FERC is in Attachment C. TRTAC subgroup meetings were held on 18JAN, 07APR, 27APR, 12JUN, 13OCT, 18OCT, and 29NOV; several conference calls also took place. A float trip starting at La Grange was held on 11JUL and a site visit to the Bobcat Flat project area was on 16NOV.

1.5.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

FSA Section 8, the Strategy for Salmon Recovery, sets forth the Tuolumne River Chinook Salmon Program goals as (1) increase naturally occurring salmon populations; (2) protect any remaining genetic distinction; and (3) increase salmon habitat in the Tuolumne River. The program is to employ flow and non-flow measures and an adaptive management strategy.

Relating to FSA Section 8 Program Goal 1, FSA Section 9 recognized that many factors affecting the Tuolumne salmon population are beyond the control of the FSA participants. Thus the FSA established narrative comparative population goals: (1) Improvements in smolt survival and successful escapement in the Tuolumne River; (2) increase in naturally reproducing chinook salmon in this subbasin; (3) barring events outside the control of the participants to the settlement, by 2005 the salmon population

should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This annual report provides information on the progress in implementing the FSA strategy and meeting the FSA goals. More detailed background is provided in the summary updates in Vol. II - Reports 2000-2, 3, and 8, and in other sections, to further gauge progress.

CDFG has determined the Tuolumne River salmon population has recovered enough to provide some angling harvest. The California Fish and Game Commission changed the year 2000 sportfishing regulations from the previous year-round river-wide prohibition (zero limit) to allowing a salmon bag limit. Specifically, the limit is now 1 salmon daily from 01JAN-15OCT in the Tuolumne River from the Hickman Bridge at Waterford down to the mouth and in the San Joaquin River down to the Highway 132 Bridge (6.5 miles below the Tuolumne confluence). Catch and release angling, restricted to artificial lures with barbless hooks, is allowed upstream of Waterford from 01JAN-15OCT. A zero-limit (catch and release only) is in effect for trout in the entire lower Tuolumne River and in the San Joaquin River downstream of Highway 140, above the Merced River confluence.

Salmon Population. The preliminary 2000 Tuolumne fall-run chinook population estimate is 17,900, the 2nd highest figure since 1971 and a major increase from the 7,700 salmon estimated for the 1999 run (**Exhibit 1,** see also Reports 2000-1 and 2000-2). The Tuolumne salmon population continued to show significant recovery from low numbers of the 1990-1995 period and was the largest run of the three rivers for the 4th straight year. The run seemed to have a high proportion of 3- and 4-year olds, progeny of the 1996 and 1997 runs. About 7% of the 2000 run was reported by CDFG to have an adipose fin clip, indicating hatchery salmon with a coded-wire tag (CWT).

An unusual small run of salmon in JUN-AUG was observed this year by CDFG and they accounted for about 40 near La Grange through a combination of carcass surveys, snorkeling, and net sampling. A total of 23 carcasses were recovered (see Appendix II, Report 2000-1).

Most of the known hatchery-origin salmon in the Tuolumne salmon runs are Merced River hatchery fish used in the Tuolumne smolt survival studies (Report 2000-2). Issues regarding the number and origin of hatchery fish used in Tuolumne studies have been subject to much consideration and deliberation by the FSA participants, including a smolt survival peer review process (see 1996-99 FERC Reports).

The DEC99 TRTAC Smolt Survival Study Agreement (SSA) addresses those issues in several ways. It provided for two more years of large CWT smolt study releases (2000 and probably 2001), then a transition to using fewer hatchery smolts and only if they are of Tuolumne-origin. The SSA also provided for a proposal to obtain Tuolumne-origin eggs, further analysis of the Tuolumne River large CWT tag studies (2000 was the 10th year of releases), consideration of removing CWT salmon from Tuolumne runs, and input on a target hatchery component of future runs. The Districts presented a draft trap and rear proposal to CDFG in MAR2000. The TRTAC subgroup effort initiated to further analyze past large release smolt survival information is still ongoing.

Outside Factors. The FSA (Section 10) recognized there are factors outside the Tuolumne River that affect the chinook salmon population, including ocean salmon catch and mortality associated with south Delta water export operations.

Ocean Harvest. Preliminary 2000 ocean harvest and Central Valley escapement (spawning run) data are available from the Pacific Fishery Management Council (PFMC). The PFMC reported a much higher 2000 ocean catch of 559,500 salmon landed south of Pt. Arena as compared to 362,000 in 1999. Over 90% of the California ocean catch has been landed south of Pt. Arena since 1992 as fisheries to the north have been much reduced or closed. The estimated 1999 Central Valley total "adult" escapement of 485,000 salmon was also much greater than the 310,300 estimated for 1999 and was the highest estimate since at least 1970.

These catch/escapement values resulted in an estimated Central Valley "Ocean Harvest Index" (HRI) of 54% in 1999, the same as reported for 1998-99. The HRI has been much lower in the last three years than in the nine-year period from 1987-95 (range of 71-79%). Graphs of the PFMC data are in the **Exhibit 2**. River-specific ocean harvest data are not available in this mixed-stock fishery.

Salmon Salvage and Losses at Delta Water Export Pumps. FERC Report 99-6 reviewed natural/unmarked salmon salvage and losses at the State and Federal Delta water export facilities for the 1993-99 period. Salmon salvage data for 2000 show a large number of salmon were again impacted by those pumping operations during JAN-JUN2000 (see annual, monthly, and weekly data in **Exhibit 3**). Combined facility estimates for JAN-JUN2000 were 114,569 salmon salvaged and 216,236 in losses. It is not certain to what extent these salmon were of San Joaquin basin origin.

Losses of natural/unmarked salmon were greatest in FEB and APR at CVP facilities and in APR at SWP facilities. The daily graph of length for salvaged salmon showed a pattern similar to 1998 and 1999 with a large number of fry (< 50 mm) salvaged in FEB-MAR associated with high delta inflows and an extended salvage period of larger juveniles/smolts (70-110 mm) from about mid-MAR to mid-JUN. The highest salmon densities at both facilities were in APR. The reported numbers do not include associated indirect losses within the Delta and the salvage and loss estimates for fry (mostly in JAN-MAR) are probably low due to reduced screening efficiency.

For the first time we reviewed salvage and loss data on weekly intervals to better identify patterns before, during, and after implementation of salmon protective measures, e.g. the Head of Old River Barrier (HORB – a temporary rock barrier installed for improving survival of migrating San Joaquin River salmon) and reduced exports in mid-APR to mid-MAY. The MAR-MAY2000 period showed high CVP/SWP numbers in the first half of APR, prior to the onset of protective measures. The SWP also had high numbers in the last week of APR during the spring pulse flow period.

San Joaquin River Agreement/Vernalis Adaptive Management Program. CWT hatchery salmon releases at various locations to evaluate San Joaquin Delta smolt survival began in

1986. Feather River Hatchery (Sacramento basin) salmon were used during 1989-98 and Merced River Hatchery salmon have been used in 1986, 87, 89, and 1996-2000. A spring HORB has been installed for varying periods in 1992, 94, 96, 97 and 2000. Culverts were built into the barrier in 1997 and 2000 to pass limited flows into Old River. An additional trawl location for CWT salmon recovery has been at Jersey Point in 1997-99 and at Antioch in 2000.

The San Joaquin River Agreement (SJRA) and the Vernalis Adaptive Management Plan (VAMP) are recent elements for meeting the objectives of the 1995 State Water Resources Control Board (SWRCB) Bay-Delta Water Quality Control Plan over a 12-year period. 2000 was the first year of formal compliance with SWRCB Decision 1641 revised in MAR2000. The program includes a 31-day period in APR-MAY with an experimental combination of salmon protective measures: HORB, specified San Joaquin River flows at Vernalis, and reduced delta exports. An additional Tuolumne River spring pulse flow volume of up to 22,000 acre-feet from TID/MID, supplemental to the FERC pulse allocation, can be required under the SJRA. More spring pulse flow may also be added be to the Tuolumne River, due to potential flow limitations on the Stanislaus River, through a water sharing arrangement with other parties to the SJRA.

A HORB with 6 operable culverts was installed in 2000 during the mid-April to mid-May period, the target flow at Vernalis was 5,700 cfs, and combined export target was 2,250 cfs during that 1-month period. A CWT release site was added on the San Joaquin River near Durham Ferry, about 18 miles upstream of Old River. About 23,000 acre-feet of SJRA supplemental water was included in the pulse flow period. Initial relative survival indices for Mossdale and Durham Ferry releases recovered at Antioch and Chipps Island were low, about .1-.2. Absolute survival estimates for the same groups to Jersey Point were higher at about .15-.35, although that is still quite low.

ESA Actions. The National Marine Fisheries Service (NMFS) continued the "candidate" species status of the California Central Valley Fall/Late Fall-Run chinook salmon (*Oncorhynchus tshawytscha*) Evolutionary Significant Unit (ESU), which includes the Tuolumne River.

NMFS listed the California Central Valley steelhead (*Oncorhynchus mykiss*) ESU as "threatened" in MAR98. NMFS published a final rule on 16FEB2000 that designated the Tuolumne River as part of the ESU's critical habitat. A final rule was announced on 20JUN2000, and published in the Federal Register by NMFS on 10JUL2000, governing "take" under ESA Section 4(d). That ruling has the potential to affect, and possibly terminate, many monitoring programs, including those under the FERC Order and FSA. The Districts submitted an application on 10OCT2000 to NMFS to obtain a take permit for scientific purposes. Submitting the application by that date provided a 6-month period, ending in MAR2001, to continue ongoing monitoring while the application was to be processed. To date, no determination on the application has been made.

The USFWS listed the Sacramento splittail (*Pogonichthys macrolepidotus*) as "threatened" in FEB99. This species of the minnow family Cyprinidae occurs in the Central Valley,

including the San Joaquin River system, although no critical habitat was designated as part of the listing. That listing was challenged in court and the FWS was ordered to reevaluate the listing determination by 22MAR2001. The comment period was reopened from 12JAN-12FEB2001.

1.5.4 Flows and Flow Schedules

Calendar year 2000 included minimum flow and pulse flow requirements of Article 37 spanning the 1999-2000 and 2000-2001 "fish flow year" schedules, which are typically from about 15APR-14APR. Attachment A of this volume contains the 2000-2001 FERC flow schedule correspondence. Both of these "fish flow years" had a total Article 37 flow requirement of 300,923 acre-feet. This continued the pattern since the 1996 FERC Order of each year requiring the maximum scheduled flow volume.

The 2000 calendar year included part of the 2000 and 2001 "water years (WY)" which run from OCT-SEP. WY2000 (OCT99-SEP2000) was 102% of the WY1897-2000 average with a Tuolumne River computed natural runoff volume of 1,950,000 acre-feet. The April 1 San Joaquin Basin 60-20-20 Water Supply Index 50% Exceedence Forecast (3.3 in 2000) was used to determine the water year classification and corresponding Article 37 annual minimum required streamflow volume. The actual WY2000 San Joaquin Basin 60-20-20 Water Supply Index ended up at 3.38. The daily average computed natural flow, actual La Grange flows, and FERC minimum flow schedules for WY2000/2001are graphed in Attachment A. Actual flows at other basin sites and Don Pedro Reservoir storage are included as well.

Operational flows in excess of FERC requirements, up to about 6,500 cfs, occurred during WY2000 in the mid-February to early-April period due to winter/spring flood space requirements in Don Pedro Reservoir. The mid-April to mid-May spring pulse flow in the FERC fish flow schedule was augmented by the additional water provided as part of implementation of the SJRA/VAMP. River flows during the mid-May through September period also often exceeded the minimum flow schedule requirement. The declining fall pulse flow was spread out over a 24-day period from 02-25OCT, similar to the 1999 pulse.

1.5.5 Monitoring Information

FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program within the total Section 13 funding limit of $1,355,000.

The monitoring elements listed below are in Article 58:

> (1) Spawning Escapement. The California Department of Fish and Game (CDFG) conducts the spawning surveys under FSA Section 13a. The CDFG reports for the 1999-2000 spawning runs are in Report 2000-1 and the long-term update is Report 2000-2.

(2) Quality and Condition of Spawning Habitat. Results of gravel permeability monitoring are in Report 2000-7. DFG conducted more redd count comparisons during the fall spawning period and a report is pending on prior work.

(3) Relative Fry Density/Female Spawners. Tuolumne River average salmon fry density from seining in 2000 was high even with the higher flows starting in late JAN that resulted in the downstream distribution of many fry into the San Joaquin River (see Reports 2000-3 and 2000-5). Fry density from seining had a similar relationship to the number of female spawners as in other comparable years.

(4) Fry Distribution and Survival. Seine and screw trap sampling provide much of the distribution data. High flows in FEB-MAR2000 resulted in a large movement of fry down and out of the river, similar to 1999, as evidenced by seine and screw trap monitoring (Reports 2000-3, 4, 5). CDFG monitored screw traps upstream of Shiloh Road in 1999/2000 and that information is in Report 2000-5. A report on the screw trap sampling at Shiloh Road in 1998 is not yet available. The results of the fry and juvenile stranding assessment are in Report 2000-6.

(5) Juvenile Distribution and Temperature Relationships. The seine and screw trap sampling monitored the primary winter/spring distribution of juvenile salmon in the Tuolumne River (Reports 2000-3, 2000-4, and 2000-5). The daily average thermograph data are graphed in Attachment A. Snorkel surveys in JUN reported about 340 juvenile salmon, mostly upstream of Basso Bridge. About 180 rainbow trout, with a more downstream distribution, were also seen in those surveys.

(6) Smolt Survival. Merced River salmon were again the source for hatchery salmon utilized in 2000 Tuolumne River smolt survival and screw trap evaluations. The DEC99 TRTAC Smolt Survival Study Agreement established a total of up to about 185,000 CWT hatchery salmon to be used in 2000; a total of about 176,000 were effectively released. The smolt survival evaluations in 2000 included large and small releases of coded-wire tagged (CWT) salmon to evaluate survival within several reaches and throughout the river (see Report 2000-4). Report 2000-8 provides an updated summary of results for ten years of Tuolumne River large CWT smolt survival evaluations. There was no attempt to obtain eggs from Tuolumne River salmon in the fall of 2000 to be used as a source of artificially reared salmon for 2001 evaluations.

Project–related Monitoring. Smolt survival/screw trapping associated with SRP 9/10 projects near Geer Road (RM 26) was done in 2000 and the results are in Report 2000-4.

1.5.6 Non-Flow Measure Activities in 2000

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. Work progressed on the funded portions of the Gravel Mining Reach and the SRP 9/10 projects, especially in project design, engineering, environmental documentation, and coordination with agencies, gravel operators, and landowners. More

detailed information is contained in the TRTAC materials section of this volume. A list of TRTAC restoration-related actions is **Exhibit 4.** Notable 2000 activities were:

MAR2000:

- Approved final restoration plan prepared by McBain and Trush (see Report 99-9).
- Proposals to CALFED for completion of SRP 10 and the Warner-Deardorff projects will be resubmitted.

MAY2000:

- Submittal of fine sediment management plan proposal, including Gasburg Creek project, to CALFED. AFRP decided to fund the coarse sediment management plan.
- TRTAC support letters for other CALFED proposals (FOTT Waterford area parcels, TRPT outreach map).

JUL2000:

- TRTAC support letter to FOTT on Venn project.

SEP2000:

- TRTAC selected 4 more priority projects: gravel cleaning, Gasburg Creek, gravel augmentation, and channel restoration within Phase III (Hall) of the Dredger Tailing Reach. This completed the identification of ten priority projects per FSA Sec. 12 (c).
- A proposal for channel restoration in the Dredger Tailing Reach will be submitted to the Delta Pumps ("4-pumps") mitigation advisory committee.

OCT2000:

- TRTAC support letter for Todd project by East Stanislaus RCD

DEC2000:

- A contingency amount of $225,000 reserved for the 7/11 project was approved.
- UC Davis presented a plan for a CALFED/AFRP Adaptive Management Forum on Tuolumne restoration projects in 2001.

Other Tuolumne restoration projects had activity in 2000: (1) Grayson River Ranch - restoration ongoing; and (2) Tuolumne River Regional Park planning by Modesto, Ceres, and Stanislaus County - ongoing.

A broad coalition of local interests and agencies, supported by elected representatives, came together to promote proposals for river-oriented restoration and recreation and for obtaining funds. Called the "Tuolumne River Initiative" (TRI), the effort works toward implementing more of the TRTAC restoration plan and complementary projects. Several FSA participants are involved in the TRI process. **Exhibit 5** contains updated TRI documents and project descriptions.

1.5.7 Anticipated Non-Flow Measure Activities in 2001

Section (G) of the 31JUL96 FERC Order requires a description of non-flow measures planned for implementation in the next year be included in the annual report. Those activities include:

- Major construction activities may begin on SRP 9 and 7-11 Gravel Mining Reach Projects. Restoration project management will continue by TID.

- Work will continue to complete the CEQA/NEPA documentation, design, permits, easements, and other pre-construction activities for the balance of SRP 9/10 projects and the Gravel Mining Reach projects.

- Initiation of work on coarse and fine sediment management plans and projects.

- Efforts to secure additional funding for projects from various sources will continue.

- Coordination with other projects, such as CDFG gravel addition projects, the Grayson River Ranch Project, the Bobcat Flat Project, and Tuolumne River Regional Park will continue.

1.5.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Control. La Grange flows up to 6500 cfs were released in the FEB-APR2000 period to maintain flood control space in Don Pedro Reservoir (see flow graphs and Don Pedro Reservoir storage graph in Attachment A).

The Army Corps of Engineers (ACOE) and the State Reclamation Board continued their Sacramento and San Joaquin River Basins Comprehensive Study in 2000. At the local level, the ACOE, TID, MID, Stanislaus County, and City of Modesto, have an ongoing Tuolumne River Feasibility Study process. These review processes will consider structural and non-structural solutions.

The Districts continue to recommend the maximum allowable release be increased up to 15,000 cfs at La Grange with a maximum flow of at least 20,000 cfs below Dry Creek at Modesto (up from the present 9,000 cfs limit at Modesto) for improved flood operations on the Tuolumne River.

Section 19 – Riparian Habitat and Recreation. The East Stanislaus Resource Conservation District (ESRCD) continued as the public agency selected to be funded the $500,000 provided by CCSF pursuant to FSA Section 19. The RCD receives assistance from the Natural Resources Conservation Service (NRCS).

Section 20 – CDFG Staff Position. During 2000, Jason Vasques become the CDFG Tuolumne River fishery biologist funded under FSA Section 20.

1.5.9 Program Expenses in 2000

The annual program expenses for 1996-2000 for FSA Sections 12 and 13 are in **Exhibit 6**. The 2000 expense for Section 12 was $64,656 and for Section 13 was $263,093, for a combined total of $327,748. A comparative table of initial Section 13 categories and TRTAC implementation tracking is shown. Detailed monthly costs per task category and agency/consultant are included.

Funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and total $1,355,000 for monitoring (Section 13). The total expense through 2000 for Section 12 was $388,814 and for Section 13 was $872,882 for a combined program total of $1,261,695. FSA expenses are presently projected to occur into year 2005, even though the License 2299 Article 58 reporting requirement calls for a summary report by 01APR2005.

1.5.10 Exhibits

1. Spawning run estimates
2. Ocean catch and harvest rate data
3. Delta salmon salvage data
4. TRTAC restoration projects and plans
5. Tuolumne River Initiative information
6. FSA program expenses through 2000
7. Related publications on San Joaquin fishes, Central Valley salmon, and alluvial streams:

Brown, L. 2000. Fish communities and their associations with environmental variables, lower San Joaquin River drainage, California. Environmental Biology of Fishes 57: 251-269.

Yoshiyama, R. et al. 2000. Chinook salmon in the California Central Valley: an assessment. Fisheries 25(2): 6-20.

Trush, W. et al. 2000. Attributes of an alluvial river and their relation to water policy and management. PNAS (Proceedings National Academy of Sciences) 24OCT2000, 97(22):11858-11863.

1.6 FERC Summary Report for 2001

1.6.1 Introduction

This is the sixth annual report to the Federal Energy Regulatory Commission (FERC) as required by Order Items (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 2001 calendar year and contains:

(1) A summary of 2001 FSA activities, including meeting notes and materials from the Tuolumne River Technical Advisory Committee, and related items (Volume I).

(2) Monitoring and other reports (Volume II).

1.6.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing the 1996 FERC Order and the FSA. The TRTAC is responsible for coordinating monitoring activities and non-flow measures and developing adaptive management strategies. The TRTAC also provides input into flow schedule decisions by the Districts, CDFG, and USFWS.

Quarterly TRTAC meetings were held in 2001: 07MAR, 07JUN, 12SEP, and 13DEC. Included in **Attachment B** of this volume are materials related to those meetings as well as other TRTAC materials and correspondence. Several TRTAC subgroup meetings were also held.

1.6.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

FSA Section 8, the Strategy for Salmon Recovery, sets forth the Tuolumne River Chinook Salmon Program goals as (1) increase naturally occurring salmon populations; (2) protect any remaining genetic distinction; and (3) increase salmon habitat in the Tuolumne River. The program is to employ flow and non-flow measures and an adaptive management strategy.

Relating to FSA Section 8 Program Goal 1, FSA Section 9 recognized that many factors affecting the Tuolumne salmon population are beyond the control of the FSA participants. Thus the FSA established narrative comparative population goals: (1) Improvements in smolt survival and successful escapement in the Tuolumne River; (2) increase in naturally reproducing chinook salmon in this subbasin; (3) barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This annual report provides information on the progress in implementing the FSA strategy and meeting the FSA goals. More detailed background is provided in the summary updates in Vol. II - Reports 2000-2, 3, and 6, and in other sections, to further gauge progress.

Salmon Population. The preliminary 2001 Tuolumne fall-run chinook population estimate by CDFG is about 9,200, a decrease from the 17,900 salmon estimated for the 2000 run (**Exhibit 1,** see also Reports 2001-1 and 2001-2). The Tuolumne salmon population continued to show significant recovery from low numbers of the 1990-1995 period. About 16% of the 2001 run had an adipose fin clip, indicating hatchery salmon with a coded-wire tag (CWT).

Most of the known hatchery-origin salmon in the Tuolumne salmon runs are Merced River hatchery fish used in the Tuolumne smolt survival studies (Report 2001-2). Issues regarding the number and origin of hatchery fish used in Tuolumne studies have been subject to much consideration and deliberation by the FSA participants, including a smolt survival peer review process and a DEC99 TRTAC Smolt Survival Study Agreement (SSA) (see 1996-2000 FERC Reports).

The TRTAC subgroup continued a review of the large CWT smolt survival studies in 2001 (Report 2001-5). The initial focus was on 1994-98 releases and recovery data at Mossdale. The preliminary results suggested that the 1997 evaluation was unsuccessful, in addition to the previously recognized problems with the 1990 and 1994 tests. Although the SSA provided for two more years of large CWT smolt study releases (2000 and 2001), the TRTAC approved another large CWT study using Merced River Hatchery salmon in 2002. No program to collect eggs from Tuolumne River salmon for studies was implemented in 2001.

Outside Factors. The FSA (Section 10) recognized there are factors outside the Tuolumne River that affect the chinook salmon population, including ocean salmon catch and mortality associated with south Delta water export operations.

Ocean Harvest. Preliminary 2001 ocean harvest and Central Valley escapement (spawning run) data are available from the Pacific Fishery Management Council (PFMC). The PFMC reported a much lower 2001 ocean catch of 218,700 salmon landed south of Pt. Arena as compared to 559,500 in 2000. The estimated 2001 Central Valley total "adult" escapement (including hatchery) of 587,300 salmon (561,500 fall run) was greater than the 470,300 (454,500 fall run) estimated for 2000.

These catch/escapement values resulted in an estimated Central Valley "Harvest Rate Index" (HRI) of 27% in 2001, about one-half the rate reported for 1998-2000. The HRI has been much lower in the last four years (range of 27-54%) than in the nine-year period from 1987-95 (range of 71-79%). Graphs of the PFMC data are in the **Exhibit 2**. River-specific ocean harvest data are not available in this mixed-stock fishery.

Salmon Salvage and Losses at Delta Water Export Pumps. FERC Report 99-6 reviewed natural/unmarked salmon salvage and losses at the State (SWP) and Federal (CVP) Delta water export facilities for the 1993-99 period. Salmon salvage data for annual, monthly, and

weekly periods are in **Exhibit 3**. Combined facility estimates for JAN-JUN2001 were 54,275 salmon salvaged and 133,484 in losses. It is not certain to what extent these salmon were from the San Joaquin basin as there is presently no method to ascertain specific origins. However, comparison of salmon size and timing with tributary and mainstem seine, screw trap, and trawl catch data can indicate the potential interception of San Joaquin basin salmon at the facilities.

Losses of natural/unmarked salmon were greatest in APR at both CVP and SWP facilities. The daily graph of length for salvaged salmon showed a pattern similar to recent years with mostly fry (< 50 mm) salvaged in FEB to mid-MAR and an extended salvage period of larger juveniles/smolts (70-110 mm) from about mid-MAR to mid-JUN. The highest salmon densities at both facilities were in APR-MAY. The reported numbers do not include associated indirect losses within the Delta and the salvage and loss estimates for fry (mostly in JAN-MAR) are probably low due to reduced screening efficiency.

For the second year, we reviewed salvage and loss data on weekly intervals to better identify patterns before, during, and after implementation of salmon protective measures, e.g. the Head of Old River Barrier (HORB – a temporary rock barrier installed for improving survival of migrating San Joaquin River salmon) and reduced exports in mid-APR to mid-MAY. The MAR-MAY2001 period showed high CVP numbers in the first three weeks of APR, prior to the onset of protective measures, and during the last week of April. The SWP had higher numbers about a week later than the CVP, with the peak in the first week of MAY during the spring pulse flow period. **Exhibit 4** has two corrected pages for data that was in the 2000 report.

SJRA/VAMP. CWT hatchery salmon releases at various locations to evaluate San Joaquin Delta smolt survival began in 1986. Feather River Hatchery (Sacramento basin) salmon were used during 1989-98 and Merced River Hatchery salmon have been used in 1986, 87, 89, and 1996-2001. A spring HORB has been installed for varying periods in 1992, 94, 96, 97, 2000, and 2001. Culverts have been placed in the barrier since 1997 to pass limited flows into Old River. An additional trawl location for CWT salmon recovery has been at Jersey Point in 1997-99 and at Antioch in 2000-2001.

The San Joaquin River Agreement (SJRA) and the Vernalis Adaptive Management Plan (VAMP) are recent elements for meeting the objectives of the 1995 State Water Resources Control Board (SWRCB) Bay-Delta Water Quality Control Plan over a 12-year period. 2001 was the second year of formal compliance with SWRCB Decision 1641, revised in MAR2000. The program includes a 31-day period in APR-MAY with an experimental combination of salmon protective measures: HORB, specified San Joaquin River flows at Vernalis, and reduced delta exports. An additional Tuolumne River spring pulse flow volume of up to 22,000 acre-feet from TID/MID, supplemental to the FERC pulse allocation, can be required under the SJRA. More spring pulse flow may also be added to the Tuolumne River through a water sharing arrangement with other parties to the SJRA.

A HORB with 6 operable culverts was again installed in 2001 during the 20APR-20MAY period, the target flow at Vernalis was 4,450 cfs, and combined export target was 1,500 cfs

during that 1-month period. About 78,650 acre-feet of SJRA supplemental water was released for the VAMP pulse flow period, including 14,100 acre-feet in the Tuolumne River. "Absolute survival" indices for Mossdale and Durham Ferry releases to Jersey Point (recovered at Antioch and Chipps Island) were low this year, similar to 2000, and ranged from 11-34%.

ESA Actions. The National Marine Fisheries Service (NMFS) maintained the "candidate" species status of the California Central Valley Fall/Late Fall-Run chinook salmon (*Oncorhynchus tshawytscha*) Evolutionary Significant Unit (ESU) and the "threatened" status for the California Central Valley steelhead (*Oncorhynchus mykiss*) ESU. NMFS did not respond to the Districts OCT2000 application to obtain a steelhead take permit for scientific purposes. NMFS announced in NOV2001 they would reinitiate status reviews of listed salmonids and review hatchery policies as a result of the "Alsea Decision".

The USFWS maintained the listing of the Sacramento splittail (*Pogonichthys macrolepidotus*) as "threatened". A legal challenge resulted in three reopened comment periods to reevaluate the listing determination in 2001: 12JAN-12FEB, 07MAY-07JUN, and 17AUG-01OCT.

1.6.4 Flows and Flow Schedules

Calendar year 2001 included minimum flow and pulse flow requirements of Article 37 spanning the 2000-2001 and 2001-2002 "fish flow year" schedules, which are typically from about 15APR-14APR. **Attachment A** of this volume contains the FERC flow schedule correspondence. The 2001-2002 "fish flow year" was the first since the 1996 FERC Order with an annual Article 37 flow requirement of less than 300,923 acre-feet; the scheduled flow volume based on license provisions was 128,781 acre-feet. Base flow requirements were 150 cfs from 15APR-31MAY, 75 cfs from 01JUN-30SEP, and 150 cfs after 30SEP.

The 2001 calendar year included part of the 2001 and 2002 "water years (WY)" which run from OCT-SEP. WY2001 (OCT2000-SEP2001) Tuolumne River computed natural runoff volume was 54.1% of the WY1897-2000 average. The April 1 San Joaquin Basin 60-20-20 Water Supply Index 50% Exceedence Forecast (2.2 in 2001) was used to initially determine the water year classification and corresponding Article 37 annual minimum required streamflow volume. The WY2001 San Joaquin Basin 60-20-20 Water Supply Index ended up at 2.205, based on the provisional data through JUL2001. The daily average computed natural flow, actual La Grange flows, and FERC minimum flow schedules for WY2001/2002 are graphed in **Attachment A**. Actual flows at other basin locations, Don Pedro Reservoir storage, and snow and precipitation data used in forecasting are included as well.

Operational flows in excess of FERC requirements, up to about 3,400 cfs, occurred briefly in February and early-March due to winter flood space requirements in Don Pedro Reservoir. The mid-April to mid-May spring pulse flow in the FERC fish flow schedule was augmented by the additional water provided as part of implementation of the SJRA/VAMP. The small fall pulse flow was spread out over a 10-day period from 19-28OCT.

1.6.5 Monitoring Information

FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program within the total Section 13 funding limit of $1,355,000.

The monitoring elements listed below are in Article 58:

(1) Spawning Escapement. The California Department of Fish and Game (CDFG) conducts the spawning surveys under FSA Section 13a. The CDFG report for the 2001 spawning run is in Report 2001-1 and the long-term update is Report 2001-2.

(2) Quality and Condition of Spawning Habitat. No major work was done on this element in 2001. DFG did not submit their report on 1999 redd count comparisons.

(3) Relative Fry Density/Female Spawners. Tuolumne River average salmon fry density from seining in 2001 was the highest recorded and peak fry density was the second highest (Report 2001-3). Fry density from seining had a similar relationship to the number of female spawners as in other comparable years.

(4) Fry Distribution and Survival. Moderate flows in FEB-MAR resulted in some movement of fry below the spawning reach and out of the river as evidenced by seine and screw trap monitoring (Reports 2001-3 and 2001-4). The CDFG report for screw trap sampling at Shiloh Road in 1998 was not provided.

(5) Juvenile Distribution and Temperature Relationships. The seine and screw trap sampling monitored the winter/spring distribution of juvenile salmon in the Tuolumne River (Reports 2001-3 and 2001-4). The daily average thermograph data are shown in **Attachment A**. Snorkel surveys in JUN found about 400 chinook salmon and about 40 rainbow trout. A SEP snorkel survey recorded 21 chinook salmon and 12 rainbow trout. The introduced redeye bass (*Micropterus coosae*) was recorded for the first time in the river during the SEP snorkel survey.

(6) Smolt Survival. Merced River salmon were again the source for hatchery salmon utilized in 2001 Tuolumne River smolt survival and screw trap evaluations. The 2001 evaluation included only large releases of coded-wire tagged (CWT) salmon to estimate survival throughout the river (see Report 2001-2). The study flow was about 620 cfs and the "relative survival" index estimates, based on recovery data from Mossdale, Antioch, and Chipps Island trawls, were low, ranging from 17-21%. Combining the average of those estimates with the average of comparable estimates from the 2001 VAMP releases at Durham Ferry results in an overall estimate of 4% survival from La Grange to Jersey Point for the CWT hatchery salmon, (not including about a 9-mile reach of the San Joaquin River). Report 2001-5 provides an interim summary of analysis results of 1994-98 large CWT smolt survival evaluations. Report 2001-6
updates the CWT release and recovery information for all study years.

Other Monitoring Information. A paper (Report 2001-8) by Tim Ford and Larry Brown, based on various Tuolumne River fish monitoring data, was included in the California Department of Fish and Game Fish Bulletin 179. This 2-volume publication was based, in part, on presentations at the OCT1997 Central Valley Salmonid Symposium held at Bodega Bay.

1.6.6 Non-Flow Measure Activities in 2001

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. Work progressed on the funded portions of the Gravel Mining Reach and the SRP 9/10 projects, especially in project design, engineering, environmental documentation, and coordination with agencies, gravel operators, and landowners. Construction and vegetation planting of the SRP 9 project was completed. More detailed information is contained in the TRTAC materials section of this volume. Other notable 2001 activities were:

MAR: - CALFED/AFRP Conceptual Models Workshop (see Report 2001-7)

JUN: - CALFED/AFRP Adaptive Management Forum (see Report 2001-7)

SEP: - TRTAC provided three support letters for proposed projects (see 12SEP TRTAC meeting section)

- TRTAC submitted funding proposals to CALFED for the Warner-Deardorff segment of the Mining Reach and for Gravel Acquisition and Addition.
- The Four-Pumps Committee recommended funding several Tuolumne River projects, including a TRTAC River Mile 43 project. This source is mitigation funding for losses associated with the export operations in the Delta by the State Water Project.

Several Tuolumne restoration projects implemented by others had activity in 2001: (1) Grayson River Ranch – initial restoration completed; (2) Tuolumne River Regional Park planning by Modesto, Ceres, and Stanislaus County – completed; La Grange area river parcels purchased by the Wildlife Conservation Board (CDFG) – completed; and (4) initial Bobcat Flat acquisition - completed.

The "Tuolumne River Initiative" name was changed to the Tuolumne River Coalition (TRC). This broad group of local interests and agencies promotes proposals for river-oriented restoration and recreation and for obtaining funds. The effort works toward projects implementing elements of the TRTAC restoration plan and complementary projects. Several FSA participants are involved in the TRC process.

Some outreach efforts on Tuolumne River habitat restoration took place in 2001. These included:

(1) presentation by Fryer (TID) on project design and planning elements at the ACOE Hydrologic Engineering training session in Davis (12SEP)

(2) presentations by Fryer (TID) and Koepele (TRPT) on the Restoration Plan and the TRC at the California Society for Ecological Restoration (SERCAL) Riparian Guild conference in Fresno (29NOV).

Adaptive Management Forum. Large-scale channel restoration projects on targeted Central Valley streams (Tuolumne River, Merced River, and Clear Creek) were chosen for the subject of separate "Adaptive Management Forums" by CALFED/AFRP. Conceptual models were documented and review material compiled by the TRTAC for the Scientific and Technical Panel of experts. The forum on the Tuolumne River was the first one conducted and materials associated with this effort comprise Report 2001-7. The panel's report contains many suggestions in the areas of Ecosystem Perspective, Monitoring, Project Design and Implementation, and Opportunities for Experiments. Although the report is dated 01OCT2001, it was not released in final form until early 2002. The TRTAC will be considering this report and its recommendations in 2002.

1.6.7 Anticipated Non-Flow Measure Activities in 2002

Section (G) of the 31JUL96 FERC Order requires a description of non-flow measures planned for implementation in the next year be included in the annual report. Those 2002 activities include:

- Major construction activities at 7-11 and Ruddy Gravel Mining Reach Projects. Restoration project management by Wilton Fryer of TID will continue.

- Work will continue on several other TRTAC projects: CEQA/NEPA documentation, design, permits, easements, and other pre-construction activities for the SRP 10, remaining Gravel Mining Reach sections, River Mile 43, Coarse Sediment, Fine Sediment, and Gasburg Creek projects.

- Continued efforts to secure additional funding for projects from various sources, such as CALFED.

- Coordination with other projects, such as CDFG gravel addition, Bobcat Flat, and Tuolumne River Regional Park, and participation in the Tuolumne River Coalition process will continue.

1.6.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Management. La Grange flows up to 3400 cfs were released in the FEB-MAR2001 period to maintain flood reservation space in Don Pedro Reservoir (see flow graphs and Don Pedro Reservoir storage graph in **Attachment A**).

The Army Corps of Engineers (ACOE) and the State Reclamation Board continued their Sacramento and San Joaquin River Basins Comprehensive Study. ACOE staff made a presentation to the TRTAC at the JUN2001 meeting. The ACOE, TID, MID, Stanislaus County, and City of Modesto, have an ongoing Tuolumne River Feasibility Study process.

Section 19 – Riparian Habitat and Recreation. The East Stanislaus Resource Conservation District (ESRCD) continued as the public agency funded with the $500,000 from CCSF pursuant to FSA Section 19. The RCD receives assistance from the Natural Resources Conservation Service (NRCS).

Section 20 – CDFG Staff Position. During 2001, Ken Kundargi became the CDFG Tuolumne River fishery biologist funded under FSA Section 20.

1.6.9 Program Expenses in 2001

The annual program expenses for 1996-2001 for FSA Sections 12 and 13 are in **Exhibit 5**. The 2001 expenses for Section 12 were $116,474 and for Section 13 were $170,683, for a combined total of $287,156. A comparative table of initial Section 13 categories and TRTAC implementation tracking is included. The major Section 13 cost item in 2001 was the large CWT smolt survival study at $102,132, in addition to $33,590 spent on analysis of large CWT survival data. More detailed monthly costs per task category and agency/consultant are included.

Overall funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and $1,355,000 for monitoring (Section 13). The total expenses through 2001 for Section 12 were $505,287 and for Section 13 were $1,043,565 for a combined program total of $1,548,852. FSA expenses are presently projected to occur into year 2005, although the License 2299 Article 58 reporting requirement calls for a summary report by 01APR2005.

1.6.10 Exhibits

1. Spawning run estimates
2. Ocean catch and harvest rate data
3. Delta salmon salvage data
4. Errata for 2000 report
5. FSA program expenses through 2001

1.7 FERC Summary Report for 2002

1.7.1 Introduction

This is the seventh annual report to the Federal Energy Regulatory Commission (FERC) as required by Order Items (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 2002 calendar year and contains:

(1) A summary of 2002 FSA activities, including meeting notes and materials from the Tuolumne River Technical Advisory Committee, and related items (Volume I).

(2) Monitoring and other reports (Volume II).

1.7.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing the 1996 FERC Order and the FSA. The TRTAC is responsible for coordinating monitoring activities and non-flow measures and developing adaptive management strategies. The TRTAC also provides input into flow schedule decisions by the Districts, CDFG, and USFWS.

Quarterly TRTAC meetings were held in 2002: 20MAR, 19JUN, 26SEP, and 18DEC. Included in **Attachment B** of this volume are materials related to those meetings as well as other TRTAC materials and correspondence. Several TRTAC subgroup meetings and conference calls were also held. A workshop on flow schedules was held in Stockton on 28AUG.

1.7.3 Strategy and Goals for Recovery of Tuolumne River Chinook Salmon

FSA Section 8, the Strategy for Salmon Recovery, sets forth the Tuolumne River Chinook Salmon Program goals as (1) increase naturally occurring salmon populations; (2) protect any remaining genetic distinction; and (3) increase salmon habitat in the Tuolumne River. The program is to employ flow and non-flow measures and an adaptive management strategy.

Relating to FSA Section 8 Program Goal 1, FSA Section 9 recognized that many factors affecting the Tuolumne salmon population are beyond the control of the FSA participants. Thus the FSA established narrative comparative population goals: (1) Improvements in smolt survival and successful escapement in the Tuolumne River; (2) increase in naturally reproducing chinook salmon in this subbasin; (3) barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This annual report provides information on the progress in implementing the FSA strategy and meeting the FSA goals. More detailed background is provided in the summary updates in Vol. II - Reports 2002-2, 3, and 5, and in other sections, to further gauge progress.

Salmon Population. The preliminary 2002 Tuolumne fall-run chinook population estimate is about 7,100, a decrease from the 9,200 salmon estimated for the 2001 run (**Exhibit 1,** see also Reports 2002-1 and 2).

Most of the known hatchery-origin salmon in Tuolumne salmon runs are typically Merced River hatchery fish used in Tuolumne smolt survival studies (Report 2002-2). About 30% of the 2002 run had an adipose fin clip, indicating hatchery salmon with a coded-wire tag (CWT). The estimated 2,200 known hatchery salmon in the 2002 run is the most on record for the Tuolumne River. Issues regarding the number and origin of hatchery fish used in Tuolumne studies have been subject to much consideration and deliberation by the FSA participants, including a 1998 smolt survival peer review process and a DEC99 TRTAC Smolt Survival Study Agreement (SSA) (see 1996-2001 FERC Reports). Although the SSA provided for two more years of large CWT smolt study releases (in 2000 and 2001), the TRTAC approved another large CWT study using Merced River Hatchery salmon in 2002, in part because the 1997 study was later determined to be invalid. Again, there was no program to collect eggs from Tuolumne River salmon for the CWT study implemented in 2002.

The TRTAC subgroup continued a review (part of the SSA) of the large CWT smolt survival studies and recovery data at Mossdale by analyzing releases in 1987, 1990, and 1999-2001 (Report 2002-4). The previous findings suggest that the 1997 evaluation was unsuccessful, in addition to the 1990 and 1994 tests. Only the 1986 release (no sampling at Mossdale) and the 2002 release have not been similarly reviewed. Report 2002-5 updates the recovery data and survival estimates for all recovery locations.

Outside Factors. The FSA (Section 10) recognized there are factors outside the Tuolumne River that affect the Chinook salmon population, including juvenile mortality associated with southern Delta water export operations, ocean salmon catch, and San Joaquin River water quality, including periods of low dissolved oxygen levels near Stockton. The water quality issues are addressed in this report.

Ocean Harvest. Preliminary 2002 ocean harvest and Central Valley escapement (spawning run) data are available from the Pacific Fishery Management Council (PFMC). The PFMC reported a higher 2002 ocean catch of 440,900 salmon landed south of Pt. Arena as compared to 232,400 in 2001. The estimated 2002 Central Valley total "adult" escapement (including hatchery) of 844,000 salmon (809,800 fall run) was greater than the 617,000 (564,200 fall run) estimated for 2001 and higher that all other years since 1970. Much of the increase was due to a Battle Creek/Coleman Hatchery run in the upper Sacramento basin estimated to be in excess of 450,000 salmon (preliminary CDFG data from Robert Kano). However, female pre-spawn inriver mortality there was estimated at 88% (PFMC 2003).

These catch/escapement values resulted in an estimated Central Valley "Harvest Rate Index" (HRI) of 34% in 2002. The HRI has been lower in the last five years (range of 27-54%) than

in the nine-year period from 1987-95 (range of 71-79%). Graphs of the PFMC data are in the **Exhibit 2**. River-specific ocean harvest data are not available for this mixed-stock fishery.

Salmon Salvage and Losses at Delta Water Export Pumps. Natural/unmarked salmon salvage and losses at the State (SWP) and Federal (CVP) Delta water export facilities were very low in 2002. Salmon salvage data for JAN-JUN, monthly, and weekly periods are in **Exhibit 3**. Combined facility estimates for JAN-JUN2002 were 14,168 salmon salvaged and 21,157 in losses. The reported numbers do not include associated indirect losses within the Delta and the salvage and loss estimates for fry (mostly in JAN-MAR) are probably low due to reduced screening efficiency. It is not certain to what extent these salmon were from the San Joaquin basin as there is presently no method to ascertain specific origins. However, comparison of salmon size and timing with tributary and mainstem seine, screw trap, and trawl catch data can indicate the potential interception of San Joaquin basin salmon at the facilities.

Very few salmon <70mm were evident at the facilities prior to late March, indicating that early fry/juvenile migration was minimal in the San Joaquin system in 2002. The daily graph of length for salvaged salmon showed an extended salvage period of larger juveniles/smolts (70-110 mm) from late MAR to early JUN.

For the third year, we reviewed salvage and loss data on weekly intervals to better identify patterns before, during, and after implementation of salmon protective measures, e.g. the Head of Old River Barrier (HORB – a temporary rock barrier, with six culverts, installed for improving survival of migrating juvenile San Joaquin River salmon) and reduced exports in mid-APR to mid-MAY. The MAR-MAY2002 period showed the highest CVP numbers in the first two weeks of APR, prior to the onset of protective measures. The SWP had its highest numbers in the first two weeks of MAY during the spring pulse flow period.

SJRA/VAMP. CWT hatchery salmon releases at various locations to evaluate San Joaquin Delta smolt survival began in 1986. Feather River Hatchery (Sacramento basin) salmon were used during 1989-98 and Merced River Hatchery salmon have been used in 1986, 87, 89, and 1996-2002. A spring HORB has been installed for varying periods in 1992, 94, 96, 97, and 2000-2002. Culverts have been placed in the barrier since 1997 to pass limited flows into Old River for irrigation needs. Chipps Island has been a CWT salmon recovery trawl location in all years and an additional trawl site has been either at Jersey Point (1997-99) or Antioch (2000-2002).

The San Joaquin River Agreement (SJRA) and the Vernalis Adaptive Management Plan (VAMP) are elements for meeting the objectives of the 1995 State Water Resources Control Board (SWRCB) Bay-Delta Water Quality Control Plan over a 10-12 year period. 2002 was the third year of formal compliance with SWRCB Decision 1641, revised in MAR2000. The program includes a 31-day period in APR-MAY with an experimental combination of salmon protective measures: HORB, specified San Joaquin River flows at Vernalis, and reduced State and Federal delta exports. An additional Tuolumne River spring pulse flow volume of up to 22,000 acre-feet from TID/MID, supplemental to the FERC pulse allocation, can be required

under the SJRA. More spring pulse flow may also be added to the Tuolumne River through a water sharing arrangement with other parties to the SJRA.

As reported by the San Joaquin River Group Authority (2003), a HORB with 6 operable culverts was again installed in 2002. During the 15APR-15MAY period, the target flow at Vernalis was 3,200 cfs, and the combined export target was 1,500 cfs during that 1-month period. About 33,430 acre-feet of total SJRA supplemental water were released for the VAMP pulse flow period, but none was required in the Tuolumne River in addition to the FERC pulse flow. "Absolute survival" indices for Mossdale and Durham Ferry releases to Jersey Point (recovered at Antioch and Chipps Island) were low again this year and ranged from 9-19% (average = 14.3%).

ESA Actions. The National Marine Fisheries Service (NOAA Fisheries) maintained the "candidate species" status of the California Central Valley Fall/Late Fall-Run chinook salmon (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU) as determined in 1999 (64 FR 50394).

NOAA Fisheries determined "threatened" status for anadromous forms of rainbow trout (steelhead), *Oncorhynchus mykiss,* in the California Central Valley ESU in 1998 (63 FR 13347). In 2002, they solicited information from 11FEB-12APR for updating the status review (67 FR 6215), to be completed following revision of a policy regarding hatchery fish. The comment period was reopened from 13JUN-12AUG (67 FR 4067). A consent decree issued on April 30, 2002 withdrew the critical habitat designation made in 2000.

The USFWS reopened the comment period in 2002 to reevaluate the 1999 listing determination of the Sacramento splittail (*Pogonichthys macrolepidotus*) as "threatened" (64 FR 5963). The final rule comment period was reopened on 21MAR-20MAY (67 FR 13095; closing date corrected on 01APR – 67 FR 15337) and again on 31OCT-02DEC (67 FR 66344).

1.7.4 Flows and Flow Schedules

Calendar year 2002 included minimum flow and pulse flow requirements of Article 37 spanning the 2001-2002 and 2002-2003 "fish flow year" schedules, which are typically from about 15APR-14APR. **Attachment A** of this volume contains the FERC flow schedule correspondence. The 2002-2003 "fish flow year" was the second since the 1996 FERC Order with an annual Article 37 flow requirement of less than 300,923 acre-feet; the final scheduled flow volume based on license provisions was 136,467 acre-feet. Base flow requirements were 175 cfs from 15APR-30MAY, 75 cfs from 02JUN-08OCT, and 150 cfs from 09OCT on.

The 2002 calendar year included part of the 2002 and 2003 "water years (WY)" which run from OCT-SEP. WY2002 (OCT2001-SEP2002) Tuolumne River computed natural runoff volume was 73.4% of the WY1897-2002 average. The April 1 San Joaquin Basin 60-20-20 Water Supply Index 50% Exceedence Forecast (2.507 in 2002) was used to initially determine the water year classification and corresponding Article 37 annual minimum required streamflow volume. The WY2002 San Joaquin Basin 60-20-20 Water Supply Index ended up

at 2.338, based on the provisional data through JUL2002. This drop from the April 1 forecast and the amount allocated to the spring pulse flow necessitated a "true-up" adjustment to the flow schedule to meet the required annual fish flow year volume. The daily average computed natural flow, actual La Grange flows, and FERC minimum flow schedules for WY2002/2003 are graphed in **Attachment A**. Actual flows at other basin locations, Don Pedro Reservoir storage, and snow and precipitation data used in forecasting are included as well.

Operational flows due to winter flood space requirements in Don Pedro Reservoir did not occur and the 12APR-16MAY spring pulse flow was not augmented by additional water for implementation of the SJRA/VAMP. The small fall pulse flow was spread out over an 11-day period from 16-26OCT.

1.7.5 Monitoring Information

FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program within the total Section 13 funding limit of $1,355,000.

(1) Spawning Escapement. The California Department of Fish and Game (CDFG) conducts the spawning surveys under FSA Section 13a. The CDFG report for the 2002 spawning run is in Report 2002-1 and the long-term update is Report 2002-2.

(2) Quality and Condition of Spawning Habitat. Work in this category was associated with a study of survival to emergence in artificial redds in 2002 as part of the consultant's fine sediment assessment to be reported on later. CDFG did not submit the previously missing report on their FSA-funded 1999 redd count comparison study.

(3) Relative Fry Density/Female Spawners. Tuolumne River peak salmon fry density from seining in 2002 was the second highest recorded in the 1997-2002 period (Report 2002-3). Fry density had a similar relationship to the number of female spawners as in other comparable years.

(4) Fry Distribution and Survival. Sustained low flows in JAN-MAR resulted in little movement of fry below the spawning reach nor out of the river as evidenced by seine monitoring (Report 2002-3). The CDFG report for 2002 screw trap sampling at Grayson Ranch and the previously missing report on Shiloh Road screw trap sampling in 1998 were not provided.

(5) Juvenile Distribution and Temperature Relationships. The seine sampling monitored the winter/spring distribution of juvenile salmon in the Tuolumne River (Report 2002-3), as did the CDFG Grayson Ranch screw trap monitoring. As noted in 5.4 above, no data or report by CDFG has been provided. The daily average thermograph data are shown in **Attachment A** and Report 2002-7 provides additional temperature data. Snorkel surveys in JUN found about 570 Chinook salmon and 28

rainbow trout. A SEP snorkel survey recorded only 3 Chinook salmon and 12 rainbow trout. The redeye bass (*Micropterus coosae*) observation noted in last year's report should be considered unconfirmed and their presence remains to be verified.

(6) Smolt Survival. Merced River salmon were again the source for hatchery salmon utilized in 2002 Tuolumne River smolt survival and screw trap evaluations. The 2002 evaluation included only large releases of coded-wire tagged (CWT) salmon to estimate survival throughout the river (see Report 2002-5). The Tuolumne river study flow was about 1300 cfs and the "relative survival" index estimates, based on recovery data from Mossdale and Chipps Island trawls, were medium, ranging from 48-53%. Combining the 50.3% average of those estimates with the 14.2% average of comparable estimates from the 2002 VAMP releases at Durham Ferry results in an overall estimate of 7.1% survival from La Grange to Jersey Point for the CWT hatchery salmon, (not including about a 9-mile reach of the San Joaquin River). Report 2002-4 provides a summary of analysis results of 1987-2001 large CWT smolt survival evaluations. Report 2002-5 updates the CWT release and recovery information for all study years.

(7) Project-related Monitoring. This monitoring in 2003 was limited to post-project habitat mapping of the channel at the SRP 9 and 7/11 mining reach projects. The results will be included in a future report when other monitoring elements are completed.

Other Monitoring Information. Aquatic invertebrate monitoring results are in Report 2002-8. That report reviews analysis and community indices of single site Hess samples collected since 1994 and the expanded kick net sampling done in 2001-2002.

A paper by Larry Brown and Tim Ford on the effects of flow on resident fish communities, based on Tuolumne River seining data, was published in *River Research and Applications* (Report 2002-9).

The CDFG annual "Sport Fish Report" contains information on other rivers or programs in the basin (Report 2002-10).

1.7.6 Non-Flow Measure Activities in 2002

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. Construction at the 7/11 Mining Reach Project was nearly completed. More detailed information is contained in the TRTAC materials section of this volume. Other notable 2002 items were:

- CALFED pledged $4.35 million for Gravel Acquisition and Addition
- CALFED pledged $10.8 million for construction of the Warner-Deardorff segment of the Mining Reach

Work by others included:

- CDFG Gravel Addition near La Grange

- Todd and Venn property purchase and TRPT River Corridor map booklet completed

Several outreach efforts on Tuolumne River habitat restoration took place in 2002. These included:

(1) Fryer (TID): 24 Jan - Poster session in Oakdale for USBR/AFRP; 3 Mar - presentation at Salmonid Restoration Conference in Ukiah; 11 Jun - presentation to the Turlock Rotary Club; 21 Jun - Tour of SRP 9 with local Farm Bureau members

(2) Friends of the Tuolumne: 20 Feb – Landscaping with Nature seminar presentation; 20 Aug – presentation to Waterford City Council; 20 Sep – presentation to Sierra Club Yokuts group.

1.7.7 Anticipated Non-Flow Measure Activities in 2003

Section (G) of the 31JUL96 FERC Order requires a description of non-flow measures planned for implementation in the next year be included in the annual report. Those 2003 activities include:

- Completion of remaining major construction and riparian planting activities at the 7-11 Mining Reach Project will be done early in the year. Construction of the Ruddy Mining Reach Project is anticipated.

- Design work on SRP 10 and the Warner-Deardorff Mining Reach Project is anticipated. Preliminary work on several other TRTAC projects (River Mile 43, Coarse Sediment, Fine Sediment, and Gasburg Creek projects) is expected to continue.

- Continued efforts to secure additional funding for projects from various sources, such as CALFED and through the Tuolumne River Coalition process.

- Coordination with other projects, such as CDFG gravel addition, Bobcat Flat, and Tuolumne River Regional Park, and participation in the Tuolumne River Coalition will continue.

1.7.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Management. No flood management releases were made in 2002 to maintain flood reservation space in Don Pedro Reservoir (see flow graphs and Don Pedro Reservoir storage graph in Attachment A).

The Army Corps of Engineers (ACOE) TID, MID, Stanislaus County, and City of Modesto, reached agreement on funding the Tuolumne River Feasibility Study.

Section 19 – Riparian Habitat and Recreation. The East Stanislaus Resource Conservation District (ESRCD) continued as the public agency funded with the $500,000 from CCSF pursuant to FSA Section 19. The RCD receives assistance from the Natural Resources

Conservation Service (NRCS). Expenditures or pledges for (1) Waterford land purchase and boat access and (2) Big Bend purchase were made in 2002.

Section 20 – CDFG Staff Position. The CDFG Tuolumne River fishery biologist position funded under FSA Section 20 was vacant starting on 01FEB. CDFG announced in September that Dennis Blakeman was assigned to that position.

1.7.9 Program Expenses in 2002

The annual program expenses for 1996-2002 for FSA Sections 12 and 13 are in **Exhibit 5**. The 2002 expenses for Section 12 were $92,570 and for Section 13 were $163,624, for a combined total of $240,381. A comparative table of initial Section 13 categories and TRTAC implementation tracking is included. The major Section 13 cost item in 2002 was again the large CWT smolt survival study at $91,387, in addition to $11,136 spent on analysis of large CWT survival data. More detailed monthly costs per task category and agency/consultant are included.

Overall funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and $1,355,000 for monitoring (Section 13). The total expenses through 2002 for Section 12 were $597,857 and for Section 13 were $1,191,376 for a combined program total of $1,789,233. The FSA expenses may be completed by the end of 2004 or continue into 2005. The License 2299 Article 58 reporting requirement calls for a summary report by 01APR2005.

1.7.10 Exhibits and References

1. Spawning run estimates
2. Ocean catch and harvest rate data
3. Delta salmon salvage data
4. Errata for 2000 report
5. FSA program expenses through 2002
6. References

Pacific Fishery Management Council. 2003. *Review of 2002 Ocean Salmon Fisheries*. Portland, Oregon

San Joaquin River Group Authority. 2003. *2002 Annual Technical Report.* Prepared for California State Water Resources Control Board in Compliance with D-1641.

1.8 FERC Summary Report for 2003

1.8.1 Introduction

This is the eighth annual report to the Federal Energy Regulatory Commission (FERC) as required by Order Items (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 2003 calendar year and contains:

(1) A summary of 2003 FSA activities, including meeting notes and materials from the Tuolumne River Technical Advisory Committee, and related items.

(2) Monitoring and other reports.

The License 2299 Article 58 reporting requirement calls for a summary report by 01APR2005 (i.e. the next annual reporting period). There are several technical reports noted within this annual report that will be available later in 2004 and the Districts may submit them prior to the summary report in 2005.

1.8.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing the 1996 FERC Order and the FSA. The TRTAC is responsible for coordinating monitoring activities and non-flow measures and developing adaptive management strategies. The TRTAC also provides input into flow schedule decisions by the Districts, CDFG, and USFWS.

Quarterly TRTAC meetings were held in 2003: 19MAR, 24JUN, 25SEP, and 17DEC. Included in **Attachment B** of this volume are materials related to those meetings as well as other TRTAC materials and correspondence. Several TRTAC subgroup meetings and conference calls were also held.

1.8.3 Program Goals and Comparative Population Goals

FSA Section 8, the Strategy for Salmon Recovery, sets forth the Tuolumne River Chinook Salmon Program goals as (1) increase naturally occurring salmon populations; (2) protect any remaining genetic distinction; and (3) increase salmon habitat in the Tuolumne River. The program is to employ flow and non-flow measures and an adaptive management strategy.

Relating to FSA Section 8 Program Goal 1, FSA Section 9 recognized that many factors affecting the Tuolumne salmon population are beyond the control of the FSA participants. Thus the FSA established narrative comparative population goals: (1) Improvements in smolt survival and successful escapement in the Tuolumne River; (2) increase in naturally reproducing chinook salmon in this subbasin; (3) barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

This annual report provides information on the progress in implementing the FSA strategy and meeting the FSA goals. More detailed background is provided in the summary updates in Reports 2003-1, 2, and 3, and in other sections, to further gauge progress.

Salmon Population. The preliminary 2003 Tuolumne fall-run chinook population estimate is about 2,900 salmon, a decrease from the 7,100 salmon estimated for the 2002 run (**Exhibit 1,** see also Report 2003-1). The 2003 run consisted of salmon from several age classes, mostly 2-5 years old, which are progeny from the 1998-2001 runs that mostly outmigrated as juveniles in the winter/spring of 1999-2002. The estimated contribution by age-class based on length frequencies is not yet available for the 2003 run, but DFG will issue their 2003 spawning survey report later this year. About 20% of the 2003 run had an adipose fin clip, indicating they were likely hatchery salmon with a coded-wire tag (CWT) – this was down from the 2002 run. Run estimates for the Stanislaus and Merced Rivers were also down, resulting in a combined 3-river total of about 11,000, as compared to about 24,000 in 2002.

A counting weir was employed for the first time on the Stanislaus River, just to the north of the Tuolumne River. Estimates from the weir operation can be compared to the carcass survey estimates derived from different calculation formulas, which potentially may lead to revision of some previous estimates on other rivers, including the Tuolumne. For example, the Stanislaus weir count was closer to the lower estimate from the carcass survey obtained using the Jolly-Seber formula than the higher estimate using the Schaefer formula, the method typically used by DFG for basin estimates. There has been some prior information developed by DFG, however, suggesting that the Jolly-Seber method should not be applied to runs of less than 3,000 salmon.

Production is the total of harvest plus escapement for a given brood year (cohort). This is obtained by summing up for several years (e.g. from 2-5 years following a given fall run for the Tuolumne) the annual numbers from a single cohort. That is, the estimated harvest by cohort, plus the estimated run component by cohort. The harvest component of the Tuolumne can be approximated using the overall Central Valley Harvest Rate index. The run component also can be approximated, generally based on size distribution, which typically overlaps by age class and can vary from year to year due to factors such as ocean conditions or hatchery production. The length of known-age salmon, typically tagged salmon of hatchery origin, can be used to assist in the assignment of age classes from the carcass length data. The Districts hope to obtain such information from DFG for use in refining age class distribution of the runs and hence, adult production estimates. Although the production numbers are inherently imprecise, they can be useful for identifying general trends and overall survival.

Hatchery fish can complicate, if not prevent, the development of natural production estimates in several ways. Most of the known hatchery-origin salmon in Tuolumne salmon runs are typically CWT Merced River hatchery fish used in Tuolumne smolt survival studies (Report 2003-3). Returns of prior CWT releases made through 2002 in the Tuolumne can be expected through 2006, although the percent in the run may go down as CWT releases in the Tuolumne ended in 2002.

Outside Factors. The FSA (Section 10) recognized there are many factors outside the control of the Districts or outside the Tuolumne River that affect the Chinook salmon population, including juvenile mortality associated with south Delta water export operations and the ocean salmon catch. Many other outside factors, such as ocean conditions and San Joaquin River water quality, including periods of low dissolved oxygen levels near Stockton, can also affect salmon populations. Some of these outside factors are discussed in this section.

Ocean Harvest. Preliminary 2003 ocean harvest and Central Valley escapement (spawning run) data are available from the Pacific Fishery Management Council (PFMC 2003). The PFMC reported a lower 2003 ocean catch of 307,600 Chinook salmon landed south of Pt. Arena as compared to 447,600 in 2002. The estimated 2003 Central Valley total "adult" escapement (including hatchery) of 594,700 salmon (539,600 fall run) was lower than the 844,400 (806,900 fall run) estimated for 2002. 2003 was still the third-highest escapement total since1970, and the hatchery total (number spawned in hatcheries) for fall run in the Sacramento basin was the highest in that period (108,500 of 519,600 total).

These catch and escapement values resulted in an estimated Central Valley "Harvest Rate Index" (HRI) of 34% in 2003 (307,600 of 902,300), nearly the same as in 2002. The HRI has been much lower in the last six years (range of 26-55%) than in the nine-year period from 1987-95 (range of 71-79%). Graphs of the PFMC data are in the **Exhibit 2**. The portion of total California Chinook landings made south of Pt. Arena dropped sharply in 2003, mostly as a result of higher landings at Fort Bragg to the north. River-specific ocean harvest data are not available for this mixed-stock fishery.

Salmon Salvage and Losses at Delta Water Export Pumps. Natural/unmarked salmon salvage and losses for JAN-JUN at the State (SWP) and Federal (CVP) Delta water export facilities were higher in 2003 than in 2002, mostly due to increases at the SWP. Salmon salvage data for JAN-JUN, monthly, and weekly periods are in **Exhibit 4**. Combined facility estimates for JAN-JUN2003 were 23,923 salmon salvaged and 57,498 in losses. Density (shown as number/1000 AF) was highest in APR at both facilities. The reported numbers do not include associated indirect losses within the Delta and the salvage and loss estimates for fry (mostly in JAN-MAR) are probably low due to reduced screening efficiency. It is not certain to what extent these salmon were from the San Joaquin basin as there is presently no method to ascertain specific origins. However, comparison of salmon size and timing with tributary and mainstem seine, screw trap, and trawl catch data can indicate the potential interception of San Joaquin basin salmon at the facilities.

Few salmon <70mm were evident at the facilities prior to about 12MAR, indicating that early fry/juvenile migration was low out of the San Joaquin system in 2003, with the exception of an early FEB increase associated with a small pulse flow on the Stanislaus River. The daily graph of length for salvaged salmon showed an extended salvage period of larger juveniles/smolts (70-110 mm) from mid-MAR to early JUN.

Salvage and loss data on weekly intervals is again presented to better identify patterns before, during, and after implementation of salmon protective measures, e.g. the Head of Old River

Barrier (HORB – a temporary rock barrier, with six culverts, installed for improving survival of migrating juvenile San Joaquin River salmon) and reduced exports in mid-APR to mid-MAY. The highest salvage and losses mostly occurred during the three weeks prior to VAMP (period of March 23 to April 12) when combined exports averaged 7,500-10,900 cfs.

SJRA/VAMP. CWT hatchery salmon releases to evaluate San Joaquin Delta smolt survival began in 1986. Feather River Hatchery (Sacramento basin) salmon were used during 1989-98 and Merced River Hatchery salmon have been used in 1986, 87, 89, and 1996-2003. A spring HORB has been installed for varying periods in 1992, 94, 96, 97, and 2000-2003. Culverts have been placed in the barrier since 1997 to pass limited flows into Old River for irrigation needs. Chipps Island has been a CWT salmon recovery trawl location in all years and an additional trawl site has been either at Jersey Point (1997-99) or Antioch (2000-2003).

The San Joaquin River Agreement (SJRA) and the Vernalis Adaptive Management Plan (VAMP) are elements for meeting the objectives of the 1995 State Water Resources Control Board (SWRCB) Bay-Delta Water Quality Control Plan over a 10-12 year period. 2003 was the fourth year of formal compliance with SWRCB Decision 1641, revised in MAR2000. The program includes a 31-day period, usually mid-APR to mid-MAY with an experimental combination of salmon protective measures: HORB, specified San Joaquin River flows at Vernalis, and reduced State and Federal delta exports. An additional Tuolumne River spring pulse flow volume of up to 22,000 acre-feet (AF) from TID/MID, supplemental to the FERC pulse allocation, can be required under the SJRA to help meet target flows at Vernalis. More spring pulse flow may also be added to the Tuolumne River through a water sharing arrangement with other parties to the SJRA.

As reported by the San Joaquin River Group Authority (2004), a HORB with 6 operable culverts was again installed in 2003. During the 15APR-15MAY period, the target flow at Vernalis was 3,200 cfs and the combined export target was 1,500 cfs during that 1-month period – same as in 2002. Only 3 of the HORB culverts were open as those were sufficient to meet downstream water needs in 2003. About 58,065 AF of total SJRA supplemental water were released for the VAMP pulse flow period, including 9,729 AF in the Tuolumne River.

"Absolute survival" indices for Mossdale and Durham Ferry releases to Jersey Point (recovered at Antioch and Chipps Island) were all very low this year and ranged from 1.4 – 4.3% (average = 2.6%). The overall "combined differential recovery rate" (CDRR) of 1.9% was also very low. There is some speculation that high disease levels, in combination with other factors, may have contributed to low survival in 2003, although that has not been determined. The CDRR of 15.1-19.1% for the 3 preceding years are indicative of relatively low spring Delta survival for the brood year 1999-2002 salmon cohorts that will be returning to the basin over the next few years.
Furthermore, the spring conditions of flow and export anticipated for 2004 in the Delta, which will bear on the spring survival on brood year 2003, looks to be in range of those in 2001-2003. Low winter flows throughout the basin during 2001-2003 also means that few fry migrated out of the tributaries in those years, as evidenced by seine, screw trap, trawl, and salvage data.

ESA Actions. National Marine Fisheries Service (NOAA Fisheries) determined "threatened" status for anadromous forms of rainbow trout (steelhead), *Oncorhynchus mykiss*, in the California Central Valley ESU in 1998 (63 FR 13347). Several parties, including the Districts, in DEC2002, filed a lawsuit against the listing. Some general NOAA Fisheries actions in 2003 regarding listed steelhead ESUs throughout the West Coast included:

- Solicited comments through 14FEB on the relationship of resident rainbow trout and steelhead: http://www.nwr.noaa.gov/HatcheryListingPolicy/SRSoCalFRN.html
- 25FEB – requested agency comments on draft Part 1 of updated status review: http://www.nwr.noaa.gov/BRTdraftreport/BRTdraftreport.html
- 19AUG -- Updated schedule for completing the status reviews of 26 populations of West Coast salmon and steelhead by MAR2004
- 29SEP – published advance notice of proposed rulemaking and schedule for ESA Critical Habitat Designations for 20 ESUs of salmon and steelhead: http://www.nwr.noaa.gov/1salmon/salmesa/crithab/anprpg92903.htm
- 30SEP – updated its 4(d) Rule Implementation Binder http://www.nwr.noaa.gov/1salmon/salmesa/final4d.htm

Several other measures were specific to the Don Pedro Project and involved FERC staff and consultants, the Districts, and other parties, as NOAA Fisheries requested formal consultation on steelhead in regards to project operations. These were a continuation of prior activities on this subject in recent years and included additional trout data exchange amongst the parties and TRTAC involvement. The 2003 actions included:

- 06MAR – FERC letter to Districts in response to 19NOV2002 letter from NOAA Fisheries requesting Section 7 consultation.
- 18MAR – Distribution to the TRTAC of the summer habitat assessment requested by NOAA Fisheries and prepared by SWS (dated 14MAR).
- 31MAR – Districts letter to FERC in response to 06MAR letter, agreeing to act as non-federal representative in consultations.
- 12MAY – NOAA Fisheries petition filed with FERC to modify flows for steelhead, modify project operations, and initiate formal consultation. "Conservation Groups", represented by Natural Heritage Institute (NHI), and the Friends of the Tuolumne, filed supporting briefs in JUN.
- 26JUN – Districts submitted to FERC their response to the NOAA Fisheries petition.
- 06AUG – Initial meeting at NOAA Fisheries office in Sacramento of Districts, FERC staff and ORNL consultant, NHI, and FOT.
- 28AUG – Letter from FERC staff to Districts requesting specific rainbow trout/steelhead information.
- 09OCT –Districts' first response to FERC's 28AUG request for information; contained an initial tabulation of *O. mykiss* data and SWS IFIM/WT model output using FERC's suggested temperature criteria.
- 19NOV – 2nd meeting held at NOAA Fisheries office in Sacramento
- 01DEC –Districts second response to FERC's 28AUG request for information; contains presentation and analysis of all available *O. mykiss* data for the lower Tuolumne River

- 04 and 19DEC – Conference calls with FERC staff, NOAA Fisheries, Districts, and other parties.
- 22DEC – FERC issued an order deferring action on the NOAA Fisheries petition pending completion of the ongoing informal consultation process (involving the TRTAC and other parties)

For other fishes, NOAA Fisheries maintained the "candidate species" status of the California Central Valley Fall/Late Fall-Run chinook salmon (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU) as determined in 1999 (64 FR 50394). The USFWS removed the Sacramento splittail (*Pogonichthys macrolepidotus*) from the list of "threatened" species in September.

1.8.4 Flows and Flow Schedules

Calendar year 2003 included minimum flow and pulse flow requirements of Article 37 spanning the 2002-2003 and 2003-2004 "fish flow year" schedules, which are typically from about 15APR-14APR, although some spring pulse flow may begin as early as 12APR to coincide with timing of flow needs at Vernalis on the San Joaquin River. **Attachment A** of this volume contains the FERC flow schedule correspondence. The 2003-2004 "fish flow year" was the third consecutive year with an annual Article 37 flow requirement of less than 300,923 AF; the final scheduled flow volume based on license provisions was 192,859 AF.

The 2003 calendar year included part of the 2003 and 2004 "water years (WY)" which run from OCT-SEP. WY2003 (OCT2002-SEP2003) Tuolumne River computed natural runoff volume was 86% of the WY1897-2003 average. The April 1 San Joaquin Basin 60-20-20 Water Supply Index 50% Exceedence Forecast (2.153 in 2003) was used to initially determine the water year classification and corresponding Article 37 annual minimum required streamflow volume at 126,064 AF, with 32, 619 AF for spring pulse. The WY2003 San Joaquin Basin 60-20-20 Water Supply Index increased during season and ended up at 2.815, based on the provisional data through JUL2003. This basin index increase from the April 1 forecast was mainly the result of a wet April and necessitated "true-up" adjustments to the flow schedule, resulting in additional flow that was added by agreement for most of the fish flow year from 20MAY on. The daily average computed natural flow, actual La Grange flows, and FERC minimum flow schedules for WY2003/2004 are graphed in **Attachment A**. Actual flows at other basin locations, Don Pedro Reservoir storage, and snow and precipitation data used in forecasting are included as well.

Base flow requirements were generally 150 cfs from 15APR through MAY, 75 cfs from JUN through SEP, 200 cfs from 01-15OCT, and 150 cfs from 16OCT on. Operational flows due to winter flood space requirements in Don Pedro Reservoir did not occur and the 12APR-16MAY period within the spring pulse flow had 9,729 AF of additional water for implementation of the SJRA/VAMP. The fall pulse flow was augmented and spread out over a 15-day period from 16-30OCT. Much of the summer flow period was operated with a flow requirement of 195 or 235 cfs, varying with air temperature forecasts (Report 2003-4).

1.8.5 Monitoring Information

FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provides the TRTAC with authorization to modify the monitoring program within the total Section 13 funding limit of $1,355,000.

(1) Salmon Spawning Escapement. The California Department of Fish and Game (CDFG) conducts the spawning surveys under FSA Section 13a. This year assistance from the Districts was needed to conduct the surveys. The CDFG report for the 2003 spawning run will be available later this year - the long-term update based on currently available data is in Report 2003-1.

(2) Quality and Condition of Spawning Habitat. A consultant's report on previous work associated with emergence in artificial redds as part of a fine sediment assessment is pending. CDFG will complete their 1999 redd count comparison study report later in 2004.

(3) Relative Salmon Fry Density/Female Spawners. Tuolumne River peak salmon fry density from seining in 2003 was similar in timing (early FEB) to 1998-2002 and the highest in the 1998-2003 period (Report 2003-2). Fry density was also higher for the number of female spawners than in other comparable years.

(4) Salmon Fry Distribution and Survival. Sustained low flows in JAN-MAR resulted in little movement of salmon fry (<or=50 mm) below Dry Creek (lower river section) or to the San Joaquin River as evidenced by seine monitoring (Report 2003-2). Screw trap sampling at Grayson Ranch in 2003 was limited to the APR-JUN period in 2003, when fry are not as abundant. However, few fry were caught in 2002 during the FEB-MAR screw trap monitoring under similar conditions (**Exhibit 3**). CDFG reports for 1998, 2002, and 2003 screw trap sampling will be available later in 2004.

(5) Juvenile Salmon Distribution and Temperature Relationships. Seine sampling monitored the winter/spring distribution of juvenile salmon (>50 mm) and other fishes in the Tuolumne River (Report 2003-2). Peak juvenile density was in late MAR and at a level similar to 1999.

The TRTAC selected to fund DFG to conduct rotary screw trap monitoring at Grayson Ranch for APR-MAY in 2003. As noted in 5.4 above, CDFG screw trap reports will be available later in 2004; however, preliminary data graphs for 2002 and 2003 are in **Exhibit 3**. The two peak daily catches of natural smolts in 2002 were associated with rapid flow increases as was the first peak catch in 2003. The secondary peak in 2003 followed a flow decrease. Size of natural smolts was similar in both years.

Snorkel surveys in JUN found about 537 Chinook salmon and 101 rainbow trout. A comparable SEP snorkel survey recorded 13 Chinook salmon and 71 rainbow trout. This followed the variable summer flow operation reviewed in Report 2003-4.

The daily average thermograph data are shown in **Attachment A.**

(6) Salmon Smolt Survival. There were no CWT smolt survival releases made in the Tuolumne River in 2003, but ocean and adult returns from earlier releases made through 2002 will continue coming in through about 2006. The graphs in **Exhibit 3** show that screw trap catch of CWT smolts in 2002 dwarfed those of naturally produced (unmarked) salmon. Report 2003-3 updates the CWT recovery information and survival estimates. An analysis of the validity of the 2002 test, based on Mossdale recoveries as has been done for 1987-2001 releases, will be available later this year.

Appendix A of Report 2003-3 includes an initial review of all paired release CWT survival evaluations in the San Joaquin River tributaries.

(7) Project-related Monitoring. This monitoring in 2003 included electro-fishing at the SRP 9/10 project sites and associated locations. The results will be included in a future report, along with habitat mapping.

Other Monitoring Information. Aquatic invertebrate monitoring continued by the Districts in July 2003, using the sites and methods employed in 2002. There were 3 Hess samples each taken at Riffles 4A and 23C and composite kick net samples taken in Riffles A4, 4A, 23C, 33, 57, 72. No decision has been made on when to analyze these samples. This effort is supplemental to the FSA-funded monitoring program.

An extensive review and analysis of rainbow trout data was submitted to FERC and distributed to the TRTAC in DEC (see Sec. 3.3 above).

1.8.6 Non-Flow Measure Activities in 2003

Both the 1996 FERC Order Section (G) and the FSA (Section 12) have non-flow measure and reporting requirements. Construction at the 7/11 Mining Reach Project was completed in 2003. More detailed information is contained in the TRTAC materials section of this report. Other notable 2003 items were:

- CALFED contract awarded for $4.35 million for Gravel Acquisition and Addition
- Ruddy Project design completed and right of way acquisition started
- Design for SRP10 Project started

Work by others included:

- CDFG Gravel Addition near La Grange
- TRPT had a La Grange floodplain restoration proposal for the State Wildlife Conservation Board

Several outreach/information efforts on Tuolumne River habitat restoration took place in 2003. These included:

(1) Fryer (TID): MAY – AFRP Restoration Tour; MAY – CBDA Rivers Conference presentation
(2) Friends of the Tuolumne: JAN - Slide presentation to the Stanislaus County Planning Commissioners Workshop; FEB - volunteer tree planting at the Waterford Perc Ponds; MAR - Slide presentation to the SJRMP Advisory Council; MAY- Tour of Bobcat Flat as part of the AFRP tour; OCT - Slide presentation to the Mariners group at Trinity United Presbyterian Church; Slide presentation to the McHenry Museum Docents

1.8.7 Anticipated Non-Flow Measure Activities in 2004

Section (G) of the 31JUL96 FERC Order requires a description of non-flow measures planned for implementation in the next year be included in the annual report. Those 2004 activities include:

- Construction of the Ruddy Mining Reach Project may begin
- Completion of design work on SRP 10 and the Warner-Deardorff Mining Reach Project is anticipated. Right of way acquisition to begin on Warner-Deardorff Project.
- CBDA contract amendment request on the Gravel Acquisition and Addition
- Initial work on several other TRTAC projects (River Mile 43, Fine Sediment, and Gasburg Creek projects) is expected to continue.
- Continued efforts to secure additional funding for projects from various sources, such as CALFED and through the Tuolumne River Coalition process.
- Coordination with other projects, such as Bobcat Flat, and efforts of the Tuolumne River Coalition, will continue.

1.8.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Management. No flood management releases were made in 2003 to maintain flood reservation space in Don Pedro Reservoir (see flow graphs and Don Pedro Reservoir storage graph in **Attachment A**).

Section 19 – Riparian Habitat and Recreation. The East Stanislaus Resource Conservation District (ESRCD) continued as the public agency funded with the $500,000 from CCSF pursuant to FSA Section 19. The RCD receives assistance from the Natural Resources Conservation Service (NRCS). Expenditures or pledges in 2003 were (1) Increased pledge for Caro Property purchase by Waterford – MAR $7,500; (2) Boating access at County's Riverdale Park – FEB $32,500; (3) Increased pledge for 7 ½ acres in Waterford – MAR $20,000. A unallocated balance of about $150,000 remained at the end of 2003.

Section 20 – CDFG Staff Position. The CDFG Tuolumne River fishery biologist position funded under FSA Section 20 continued to be staffed by Dennis Blakeman working out of their La Grange office.

1.8.9 Program Expenses in 2003

The annual program expenses for 1996-2003 for FSA Sections 12 and 13 are in **Exhibit 5**. The Districts have not yet received billing from DFG for 2003 screw trapping, so the tables show the amount approved by the TRTAC in that category.

The 2003 expenses for Section 12 (non-flow measures) were $291,560 and for Section 13 (monitoring) were estimated at $80,407, for a combined total of $371,967. A comparative table of initial Section 13 categories and TRTAC implementation tracking is included. A new Section 13 expense item in 2003 was for assisting DFG in conducting the fall spawning pursuant to Section 13a at a cost of $12,653. More detailed 2003 monthly costs per task category and agency/consultant are included. There may be a few miscellaneous monitoring charges since 1996 not included in these totals yet and these will be checked on this year. The higher Section 12 costs were mostly associated with contingency costs of the 7/11 large channel restoration project in the gravel mining reach.

Overall funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and $1,355,000 for monitoring (Section 13). The total expenses through 2003 for Section 12 were $889,417 and for Section 13 were estimated at $1,268,440 for a combined program total of $2,157,857. The FSA monitoring allocation is anticipated to be fully expended by the end of 2004, while the restoration funds may not be exhausted until 2005.

1.8.10 References

(1) Pacific Fishery Management Council. 2004. Review of 2003 Ocean Salmon Fisheries and Preseason Report 1: stock abundance analysis for 2004 ocean salmon fisheries. Portland, Oregon.

(2) San Joaquin River Group Authority. 2004. 2003 Annual Technical Report. Prepared for California State Water Resources Control Board in Compliance with D-1641.

1.9 FERC Summary Report for 2004

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This is the ninth annual report to the Federal Energy Regulatory Commission (FERC) as required by Order Items (F) and (G) of the 31JUL96 FERC Order on Project License 2299 and by Section 15 of the 1995 Don Pedro Project FERC Settlement Agreement (FSA).

This report covers the 2004 calendar year and contains:

(1) A summary of 2004 FSA activities

(2) Monitoring and other reports.

The License 2299 Article 58 reporting requirement calls for a summary report to be filed by 01APR2005. A separate 2005 Summary Report has been prepared in addition to this 2004 annual report.

1.9.2 Tuolumne River Technical Advisory Committee (TAC)

The TRTAC is a key element in implementing the 1996 FERC Order and the FSA. The TRTAC is responsible for coordinating monitoring activities and non-flow measures and developing adaptive management strategies. The TRTAC also provides input into flow schedule decisions by the Districts, CDFG, and USFWS.

Quarterly TRTAC meetings were held in 2004: 11MAR, 10JUN, 16SEP, and 15DEC. Several TRTAC subgroup meetings and conference calls were also held.

1.9.3 Program Goals and Comparative Population Goals

FSA Section 8, the Strategy for Salmon Recovery, sets forth the Tuolumne River Chinook Salmon Program goals as (1) increase naturally occurring salmon populations; (2) protect any remaining genetic distinction; and (3) increase salmon habitat in the Tuolumne River. The program is to employ flow and non-flow measures and an adaptive management strategy.

Relating to FSA Section 8 Program Goal 1, FSA Section 9 recognized that many factors affecting the Tuolumne salmon population are beyond the control of the FSA participants. Thus the FSA established narrative comparative population goals: (1) Improvements in smolt survival and successful escapement in the Tuolumne River; (2) increase in naturally reproducing chinook salmon in this subbasin; (3) barring events outside the control of the participants to the settlement, by 2005 the salmon population should be at levels where there is some resiliency so that some of the management measures described herein may be tested, on an experimental basis.

The 2005 Summary Report provides more information on the status of implementing the FSA strategy and meeting the FSA goals. Detailed background in this annual report is provided in summary updates in Reports 2004-2 and 8, and in other sections of this report, to further gauge progress.

Salmon Population. The preliminary 2004 Tuolumne fall-run chinook population estimate (modified Peterson) is about 1,900 salmon (CDFG Schaefer estimate is about 1,700), a decrease from the 3,000 (CDFG Schaefer) estimated for the 2003 run (CDFG Jolly-Seber estimate was 2,200) (see Reports 2004-1 and 2). The 2004 run is estimated to have age classes of 2-5 years old, which are progeny from the 1999-2002 runs that mostly outmigrated as juveniles in the winter/spring of 2000-2003. The estimated contribution by age-class based on length frequencies is 41% 2-year old, 43% 3-year old, 15% 4-year old, and 2% 5-year old. An estimated 59% of the run were females. About 18% of the 2004 run had an adipose fin clip, indicating they were likely hatchery salmon with a coded-wire tag (CWT) – down from 21% in the 2003 run. Initial run estimates for the Stanislaus (4,400 at weir) and Merced Rivers (4,000 river and 1,000 hatchery), result in a combined 3-river total of about 11,300, as compared to about 10,800 in 2003.

Production is the total of harvest plus escapement for a given brood year (cohort). This is obtained by summing up for several years (e.g. from 2-5 years following a given fall run for the Tuolumne) the annual numbers from a single cohort. That is, the estimated harvest by cohort, plus the estimated run component by cohort. The harvest component of the Tuolumne can be approximated using the overall Central Valley Harvest Rate index. The run component also can be approximated, generally based on size distribution, which typically overlaps by age class and can vary from year to year due to factors such as ocean conditions or hatchery production. The length of known-age salmon, typically tagged salmon of hatchery origin, can be used to assist in the assignment of age classes from the carcass length data. The Districts still must obtain such information from DFG for use in refining age class distribution of the runs and hence, cohort production estimates. Although production estimates are inherently imprecise, they can be useful for identifying general trends and overall cohort-specific survival.

Hatchery fish can complicate or prevent the accurate development of natural production estimates in several ways. This is further compromised by the release of unmarked hatchery production to the Merced River by CDFG in some years. Most of the known hatchery-origin salmon in Tuolumne salmon runs are typically CWT Merced River hatchery fish used in basin smolt survival studies (Report 2004-2). Returns of prior CWT releases made through 2002 in the Tuolumne can be expected through 2006.

Outside Factors. The FSA (Section 10) recognized there are many factors outside the control of the Districts and even outside the Tuolumne River that affect the Chinook salmon population, including juvenile mortality associated with south Delta water export operations and ocean salmon harvest. Many other outside factors, such as ocean conditions and San Joaquin River water quality, including periods of low dissolved oxygen levels near Stockton, can also affect salmon populations. Some of these outside factors are discussed in this section with further details contained in the 2005 Summary Report.

Ocean Harvest. Preliminary 2004 ocean harvest and Central Valley escapement (spawning run) data are available from the Pacific Fishery Management Council (PFMC 2005). The PFMC reported a higher 2004 ocean catch of 536,700 Chinook salmon landed south of Pt. Arena as compared to 308,700 in 2003. The estimated 2004 Central Valley total "adult" escapement (including hatchery) of 334,300 salmon was much lower than the 587,100 salmon estimated for 2003.

The total Central Valley Index Abundance, comprising the sum of catch and adult (age 3+) escapement, were about the same in 2003 (895,800) and 2004 (871,000). The difference between the two years is that much more of the total was harvested in 2004 than in 2003. The 2004 catch and escapement values resulted in an estimated Central Valley "Harvest Rate Index" (HRI) of 62% in 2004, much higher than the 34% of 2002. The HRI had been lower in the six prior years (range of 26-52%). The portion of total California Chinook landings made south of Pt. Arena was up from 53% in 2003 to 74% in 2004. River-specific ocean harvest data are not available for this mixed-stock fishery

Salmon Salvage and Losses at Delta Water Export Pumps. Natural/unmarked salmon salvage

and losses for JAN-JUN at the State (SWP) and Federal (CVP) Delta water export facilities were similar overall in 2003 and 2004. Combined facility estimates for JAN-JUN2004 were about 29,000 salmon salvaged and about 45,000 in losses. Monthly average density (number/1000 AF) was highest for March at the CVP and for APR at the SWP. The reported numbers do not include associated indirect losses within the Delta and the salvage and loss estimates for fry (mostly in JAN-MAR) are probably low due to reduced screening efficiency. It is not certain how many of these salmon were from the San Joaquin basin as there is presently no method to ascertain specific origins. However, comparison of salmon size and timing with tributary and mainstem seine, screw trap, and trawl catch data clearly indicate the potential interception of many San Joaquin basin salmon at the facilities.

Salmon <70mm were evident at the facilities starting in late FEB, with fry <50mm reported through the third week of MAR. Tuolumne flows increased in early MAR, which likely initiated fry/juvenile migration to the San Joaquin River. There was an extended salvage period of larger juveniles/smolts (70-110 mm) from early MAR through MAY, corresponding to the size of salmon caught after early APR at Mossdale.

Salvage and loss data on weekly intervals from late FEB through MAY were again presented in the 2004 VAMP Report (SJRGA 2005) to better identify patterns before, during, and after implementation of salmon protective measures, e.g. the Head of Old River Barrier (HORB – a rock barrier, with six culverts, installed on a temporary basis in the spring for improving survival of migrating juvenile San Joaquin River salmon) and reduced exports in mid-APR to mid-MAY. The highest salvage and losses mostly occurred during early to mid-MAR at a time when combined SWP/CVP exports exceeded flow at flow at Vernalis by about 8,000 cfs

SJRA/VAMP. CWT hatchery salmon releases to evaluate San Joaquin Delta smolt survival began in 1986. Feather River Hatchery (Sacramento basin) salmon were used during 1989-98 and Merced River Hatchery salmon have been used in 1986, 87, 89, and 1996-2004. A spring HORB has been installed for varying periods in 1992, 94, 96, 97, and 2000-2004. Culverts have been placed in the barrier since 1997 to pass limited flows into Old River for irrigation needs. Chipps Island has been a CWT salmon recovery trawl location in all years and an additional trawl site has been either at Jersey Point (1997-99) or Antioch (2000-2004).

The San Joaquin River Agreement (SJRA) and the Vernalis Adaptive Management Plan (VAMP) are elements for meeting the objectives of the 1995 State Water Resources Control Board (SWRCB) Bay-Delta Water Quality Control Plan over a 10-12 year period. 2004 was the fifth year of formal compliance with SWRCB Decision 1641, revised in MAR2000. The program includes a 31-day period, usually mid-APR to mid-MAY with an experimental combination of salmon protective measures: HORB, specified San Joaquin River flows at Vernalis, and reduced State and Federal delta exports. An additional Tuolumne River spring pulse flow volume of up to 22,000 acre-feet (AF) from TID/MID, supplemental to the FERC pulse allocation, can be required under the SJRA to help meet target flows at Vernalis. More spring pulse flow may also be added to the Tuolumne River through a water sharing arrangement with other parties to the SJRA.

As reported by the San Joaquin River Group Authority (2005), a HORB with 6 operable culverts was again installed in 2004. During the 15APR-15MAY period, the target flow at Vernalis was 3,200 cfs and the combined export target was 1,500 cfs during that 1-month period – same as in 2002 and 2003. Variable operation of the HORB culverts occurred during the period to meet downstream water needs in 2004. About 65,590 AF of total SJRA supplemental water were released for the VAMP pulse flow period, including 11,151 AF in the Tuolumne River.

"Absolute survival" indices for Mossdale and Durham Ferry releases to Jersey Point (recovered at Antioch and Chipps Island) were all very low again in 2004 and ranged from 1–4%. The overall "combined differential recovery rate" (CDRR) of 2.6% was also very low. There is still some speculation that high disease levels in the hatchery study fish, in combination with other factors, may have contributed to low survival in 2003 and 2004, although that has not been determined. The CDRR of 15.1-19.1% for 2001-2002, although higher than for 2003-2004 all indicate low spring Delta survival for the brood year 2000-2003 salmon cohorts that will be returning to the basin over the next few years.

The spring flow conditions anticipated for 2005 are expected to be much higher and it is likely that the HORB will not be installed due to high flood management flows in excess of 5,000 cfs in the San Joaquin River. At this time, plans are being considered to conduct the VAMP studies starting May 2 without the HORB and to curtail exports to 1,500 cfs. These are factors that will bear on the spring survival on brood year 2004.

ESA Actions. National Marine Fisheries Service (NOAA Fisheries) first determined "threatened" status for anadromous forms of rainbow trout (steelhead), *Oncorhynchus mykiss*, in the California Central Valley ESU in 1998 (63 FR 13347). Some NOAA Fisheries actions in 2004 regarding listed steelhead ESUs throughout the West Coast included:

- 03JUN: NOAA Fisheries publishes proposed hatchery listing policy
  http://www.nwr.noaa.gov/reference/frn/2004/69FR31354.pdf
- 14JUN: NOAA Fisheries published proposed rule on listing determinations
  http://www.nwr.noaa.gov/reference/frn/2004/69FR33102.pdf
- 15NOV: NOAA Fisheries published proposed revisions to 4(d) rules regarding take
  http://www.nwr.noaa.gov/reference/frn/2004/69FR65582.pdf
- 10DEC: NOAA Fisheries published proposed rule on critical habitat designations
  http://swr.ucsd.edu/salmon/69_FR_71880.pdf

Several parties, including the Districts, in DEC2002, filed a lawsuit against the listing of California Central Valley *Oncorhynchus mykiss*. The court ruling issued on 12MAY2004 found the listing to be flawed and determined that NOAA Fisheries had to reinstate a proper listing by JUN2005 or the listing would be vacated. The Districts filed the court ruling with FERC on 20 MAY2004. That filing also included a 2004 canal trout survey report, a recent CDFG Central Valley trout genetic study report, and the 1995 USFWS Tuolumne River IFIM report.

On 22DEC2003, FERC issued an order deferring action on the NOAA Fisheries petition

requesting formal consultation regarding the Don Pedro Project, pending completion of the ongoing informal consultation process (involving the TRTAC and other parties). The TRTAC (or subgroup) continued work on *O. mykiss* monitoring aspects during the year. Report 2004-11 updates the *O. mykiss* data compilation first filed with FERC late in 2003. The update includes trout captured in MAR-MAY2004 in a CDFG angling survey. Related 2004 correspondence in addition to those identified above filed with FERC in 2004 included:

- 21JAN: The Turlock and Modesto Irrigation Districts submit the Temperature Tolerences of Tuolumne River Fishes: A Critique of Declaration of Carl Mesick in support of Conservations Groups' Brief Report under P-2299.
- 26FEB: The Fish & Wildlife Service informs FERC of several fish resource concerns associated with Don Pedro Project license under P-2299.
- 23MAR: The Friends of the Tuolumne file a response objecting to the JAN filing
- 23APR: NOAA Fisheries filed a letter requesting studies and flows.
- 20MAY: Districts file reply to 26FEB FWS and 23APR NOAA letters.
- 30SEP: FWS files reply to Districts 20MAY letter.
- 15OCT: Friends of the Tuolumne, Inc's comments regarding the Coarse Sediment Management Plan for the Lower Tuolumne River under P-2299.
- 29OCT: Turlock Irrigation District responds to Friends of the Tuolumne's letter dated 10/15/04 re the Course Sediment Management Plan prepared for the Tuolumne River Technical Advisory Committee etc under P-2299.

1.9.4 Flows and Flow Schedules

Calendar year 2004 included minimum flow and pulse flow requirements of Article 37 spanning the 2003-2004 and 2004-2005 “fish flow year” schedules, which are from about 15APR-14APR, although some spring pulse flow begins as early as 12APR to coincide with timing of flow needs at Vernalis on the San Joaquin River. **Attachment A** contains the FERC flow schedule correspondence. The 2004-2005 “fish flow year” was the fourth consecutive year with an annual Article 37 flow requirement of less than 300,923 AF; the final scheduled flow volume based on license provisions was 128,970 AF.

The 2004 calendar year included part of the 2004 and 2005 “water years (WY)” which run from OCT-SEP. WY2004 (OCT2003-SEP2004) Tuolumne River computed natural runoff volume of 1,315,572 AF was 70% of the WY1897-2004 average, down from 86% in WY 2003. The April 1 San Joaquin Basin 60-20-20 Water Supply Index 50% Exceedence Forecast was 2.5424. Due to a dry early spring, the index dropped to 2.404649 by the 20APR forecast update, corresponding to 140,373 AF of annual fish flow volume initially, with 35,514 AF being allocated to the spring pulse. The WY2004 San Joaquin Basin 60-20-20 Water Supply Index continued to decrease during the season and ended up at 2.211624, based on the provisional data through JUL2004. This change necessitated downward “true-up” adjustments to the flow schedule. The daily average computed natural flow, actual La Grange flows, and FERC minimum flow schedules for WY2004/2005 are graphed in **Attachment A**. Actual flows at other basin locations, Don Pedro Reservoir storage, and snow and precipitation data are included as well.

Base flow requirements were generally 150 cfs from 15APR through MAY, 80 cfs from JUN through SEP, and 150 cfs from 01OCT on. Operational flows due to flood space requirements in Don Pedro Reservoir were required due to the unusually warm late winter/early spring weather that led to early snowmelt runoff prior to the spring pulse flow period. Increased flows of 500-2800 cfs had to be released from 03MAR-11APR in the dry year to maintain flood conservation space in the reservoir. The 12APR-16MAY spring pulse flow period had an additional 11,150 AF of water added due to implementation of the SJRA/VAMP. The fall pulse flow of 1,807 AF was scheduled for 25-31OCT, later than usual, to accommodate CDFG request to coordinate with other basin flows.

1.9.5 Monitoring Information

FERC License 2299 Article 58 and FSA Section 13 list several monitoring elements. Article 58 specifies that the monitoring frequencies and methods shall be agreeable to the Districts and consulted agencies. Section 13 provided the TRTAC with authorization to modify the monitoring program within the total Section 13 funding limit of $1,355,000. This funding allocation total was reached in 2004

(1) Salmon Spawning Escapement. The California Department of Fish and Game (CDFG) conducts the spawning surveys under FSA Section 13a. This year assistance from the Districts was again provided to conduct the surveys. The CDFG reports for the 2003 and 2004 spawning runs are in Report 2004-1 - the long-term update based on currently available data is in Report 2004-2.

(2) Quality and Condition of Spawning Habitat. Consultant reports on the Coarse Sediment Management Plan and the Tuolumne River Floodway Restoration (Design Manual) are in Reports 2004-12 and 13. CDFG provided a 2-page data summary of their 1998-1999 redd count comparison study in OCT2004.

(3) Relative Salmon Fry Density/Female Spawners. Tuolumne River peak salmon fry density from seining in 2004 was similar in timing (early FEB) to 1998-2003, but was relatively low (Report 2004-3). Fry density was typical for the number of female spawners.

(4) Salmon Fry Distribution and Survival. Sustained low flows in JAN-FEB resulted in little early movement of salmon fry (<50 mm) but fry density in the middle section peaked in mid-MAR after flood management flows began to be released (Report 2004-3). Screw trap sampling at Grayson Ranch in 2004 was limited to the APR-JUN period, when fry are not as abundant. CDFG reports for 1998, 2002, and 2003 screw trap sampling were provided in 2004.

(5) Juvenile Salmon Distribution and Temperature Relationships. Seine sampling monitored the winter/spring distribution of juvenile salmon (>50 mm) and other fishes in the Tuolumne River (Report 2004-3). Peak juvenile density was in late MAR at a time and amount similar to 2003.

SP Cramer conducted most of the rotary screw trap monitoring at Grayson Ranch for APR-MAY in 2004 and the results are in Report 2004-5. A total of 509 wild salmon were caught – 83% were in the 70-89 mm fork length range and 93% were classified as obvious smolts. The two peak daily catches were in early and late April associated with flow decreases - only one salmon was caught after 16MAY. About 16,000 hatchery salmon were used in 8 efficiency tests at Modesto flows of about 300-1,700 cfs and capture rates from the 7 tests considered to be unbiased were from 2.4-8.9%. Estimated passage during the sampling period was about 13,000 wild salmon.

Snorkel surveys in JUN found about 491 Chinook salmon and 91 rainbow trout. A comparable SEP snorkel survey recorded no Chinook salmon and 40 rainbow trout. This followed a supplemental AUG snorkel survey that recorded 80 Chinook salmon and 76 rainbow trout (Report 2004-3).

The thermograph data for the Tuolumne and San Joaquin Rivers, along with other monitoring data are posted at http://www.sanjoaquinbasin.com/. Figures for 2004-2005 daily average thermograph data are also in Attachment A

(6) Salmon Smolt Survival. T There were no CWT smolt survival releases made in the Tuolumne River in 2004, but ocean and adult returns from earlier releases made through 2002 will continue coming in through about 2006. Report 2004-7 finalizes the detailed review of Mossdale and other data through 2002 and Report 2004-8 updates the CWT recovery information and survival estimates.

(7) Project-related Monitoring. This monitoring in 2004 included electro-fishing for the SRP 9/10 project sites that had to be aborted due to the presence of adult salmon. Habitat mapping is contained in the 2005 Summary Report and its GIS appendix.

Other Monitoring Information. Aquatic invertebrate monitoring continued by the Districts in July 2004, using the sites and methods employed in 2003. There were 3 Hess samples each taken at Riffles 4A and 23C and composite kick net samples taken in Riffles A4, 4A, 23C, 33, 57, 72. No decision has been made on when to analyze these samples. This effort is supplemental to the FSA monitoring program and a summary is in Report 2004-9

1.9.6 Non-Flow Measure Activities in 2004

Primary work on non-flow measures in 2004 was related to pre-construction activities such as permitting, environmental review, design, and appraisal.

1.9.7 Anticipated Non-Flow Measure Activities in 2005

There are 5 projects that have been developed such that field activities may proceed in 2005:

- Gravel Mining Reach Phase II (Ruddy segment)
- Gravel Addition
- River Mile 43
- Gravel Cleaning

- Gasburg Creek basin

Design and other pre-construction work may continue on the SRP 10 and Gravel Mining Reach Phase III projects in 2005.

1.9.8 Other FERC Settlement Agreement Activities

Section 11 - Flood Management. Flood management releases were made in 2004 to maintain flood reservation space in Don Pedro Reservoir from early MAR to the start of the spring pulse flow period (see flow graphs and Don Pedro Reservoir storage graph in **Attachment A**)

Section 19 – Riparian Habitat and Recreation. The East Stanislaus Resource Conservation District (ESRCD) continued as the public agency funded with the $500,000 from CCSF pursuant to FSA Section 19. The ESRCD receives assistance from the Natural Resources Conservation Service (NRCS). An unallocated balance of about $150,000 remained at the end of 2004.

Section 20 – CDFG Staff Position. The CDFG Tuolumne River fishery biologist position funded under FSA Section 20 continued to be staffed by Dennis Blakeman working out of their La Grange office

1.9.9 Program Expenses in 2004

Overall funding obligations of FSA costs shared by the Districts and City and County of San Francisco are up to $1,000,000 for non-flow options (Section 12) and $1,355,000 for monitoring (Section 13). The Section 13 allocation was reached in 2004 and the Section 12 allocation had about $24,000 remaining at the end of 2004. Assistance was again provided to DFG in 2004 in conducting the fall spawning survey.

1.9.10 References

Pacific Fishery Management Council. 2004. *Review of 2004 Ocean Salmon Fisheries* and *Preseason Report 1: stock abundance analysis for 2005 ocean salmon fisheries*. Portland, Oregon

San Joaquin River Group Authority. 2005. *2004 Annual Technical Report.* Prepared for California State Water Resources Control Board in Compliance with D-1641.

2 DON PEDRO PROJECT LICENSE ARTICLE 58 ANNUAL REPORT CONTENTS (1996–2004)

2.1 1996 Annual Report

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VOL. II: Report 96-1: Spawning Survey Summary Report Attachments:

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96-2.1 1986 Snorkel Survey Report
96-2.2 1988-89 Pulse Flow Reports
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VOL. I: 1997 FERC Report: Lower Tuolumne River

VOL. II:
97-1: 1997 Spawning Survey Report and Summary Update
97-2: 1997 Juvenile Salmon Report and Summary Update
97-3: 1997 Screw Trap and Smolt Monitoring Report
97-4: Streamflow and Delta Water Export Data Report
97-5: 1987-97 Water Temperature Monitoring Data Report

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98-1: Spawning Survey Summary Update
98-2: 1998 Juvenile Salmon Report and Summary Update
98-3: 1998 Tuolumne River Outmigrant Trapping Report
98-4: 1998 Smolt Survival Peer Review Report
98-5: CWT Summary Update

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99-8:	A Summary of the Habitat Restoration Plan for the Lower Tuolumne River Corridor
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2000-5:	1999-2000 Grayson Screw Trap Report
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2000-7:	Tuolumne River Substrate Permeability Assessment andMonitoring Program Report
2000-8:	Coded-wire Tag Summary Update

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2002-1: 2002 Spawning Survey Report
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2002-4: Large CWT Smolt Survival Analysis
2002-5: Coded-wire Tag Summary Update
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2002-8: Aquatic Invertebrate Report
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2003-2: 2003 Seine/Snorkel Report and Summary Update
2003-3: Coded-wire Tag Summary Update
2003-4: Review of 2003 Summer Flow Operation

2.9 2004 Annual Report

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Report 2004-2: Spawning Survey Summary Update
Report 2004-3: 2004 Seine/Snorkel Report and Summary Update
Report 2004-4: 1998, 2002, and 2003 Grayson Screw Trap Reports
Report 2004-5: 2004 Grayson Screw Trap Report
Report 2004-6: [reserved]
Report 2004-7: Large CWT Smolt Survival Analysis Update

Report 2004-8: Coded-wire Tag Summary Update
Report 2004-9: Aquatic Invertebrate Monitoring Report (2003-2004)
Report 2004-10: 2004 Water Quality Report
Report 2004-11: [reserved]
Report 2004-12: Coarse Sediment Management Plan
Report 2004-13: Tuolumne River Floodway Restoration (Design Manual)

3 INDEX OF MATERIALS AND ACTIONS FROM TECHNICAL ADVISORY COMMITTEE MEETINGS CONTAINED IN ANNUAL REPORTS TO FERC (1995–2003)

3.1 1995-1996 Meeting Materials

18DEC95 Meeting:

Meeting notes, attendance list, notice, and agenda

Meeting sign-up sheet

Handouts (from Ford)

Figure: 1971-95 Tuolumne River salmon runs
Figure: 1970-95 California ocean commercial and sport chinook catch
Table and figures (3 pgs.): 1995 Tuolumne salmon run data
Table and figures (3 pgs.): 1995 Tuolumne screw trap data
Figures (3 pgs.): 1995 seine monitoring
Figures (5 pgs.): Thermograph locations and FEB-AUG95 water temperature data
Figures (3 pgs.): Tuolumne and San Joaquin basin runoff data
Figures (2 pgs.): 1995 Tuolumne flow data
Figures (3 pgs.): 1995 Reservoir and precipitation data
Figures (2 pgs.): FSA flow requirement volume and frequency
Fishery data needed by TID/MID
Table: FSA Expense Requirements and 1996 expense projections
Draft 8-page outline of FSA requirements and action items

Actions:

Ligon will develop a draft gravel quality protocol by February for TAC review.
Seining will be done from JAN-MAY by Districts/EA similar to 1995. Ford will have a thermograph placed in the San Joaquin above the Tuolumne River and placement of the current thermographs will be considered for changes.
Ford will contact USFWS about funding early and late screw trap operations.
Any parties with requested data will provide to Ford as soon as possible for TAC use and distribution.
Ligon will prepare a draft list of potential restoration projects and distribute by February. Ford will check on status of GIS for next meeting.

14FEB96 Meeting:

Meeting notes, attendance list, notice, and agenda

Draft DFG proposal for indexing juvenile chinook salmon production
19JAN correspondence from SFBAWUA regarding 05JAN river tour

Meeting sign-up sheet

Handouts (from Ford)

Revised draft 8-page outline of FSA requirements and action items (Ford)
Table and figures (5 pgs.): Runoff forecasts, reservoir and flow data (Ford)
Table and figures (3 pgs.): 1995 Tuolumne salmon run data (Ford)
Figures (2 pgs.): 1981-95 Tuolumne coded-wire tagged salmon data (Ford)
Barnhard, K., and McBain, S. 1994. Standpipe to determine permeability, dissolved oxygen, and vertical particle size distribution in salmonid spawning gravels. U.S.D.A. Forest Service Fish Habitat Relationships Technical Bulletin No. 15, 12 pgs. (Ford)
Table and figures (3 pgs.): 1996 seine monitoring (Ford)
Figures (6 pgs.): AUG95-JAN96 water temperature data (Ford)
Proposed restoration projects - 15 pgs. (Ligon)

Actions:

Ligon will develop with McBain a gravel quality monitoring protocol for TAC review.
Heyne/Ligon will contact USFWS in Stockton regarding funding for early screw trap monitoring.
Ford will follow up on weekly Bay-Delta web posting of tributary data.
Ford/Ligon will prepare a schedule chart for 10-year FSA program.
Ligon/McBain/Trush will prepare cost estimates and proposals for two levels of effort of watershed assessment.

20MAR96 Meeting:

Meeting notes, attendance list, notice, and agenda

Correspondence

29FEB correspondence from McBain regarding field data collection
13MAR 2-pg. proposal by McBain & Trush for watershed analysis and restoration strategy

Meeting sign-up sheet

Handouts (from Ford):

Figures (3 pgs.): Reservoir and flow data, runoff forecast
Figures (6 pgs.): 1993-95 Vernalis flow and Delta water export data Figures (3 pgs.): 1952-95 Delta water export data
Figure: 1961-95 San Joaquin tributary salmon runs
Figure: 1996 seining data
Figure: AUG95-JAN96 daily average thermograph data
Figures (3 pgs.): 1979-92 Tuolumne salmon production, fecundity, survival data
Figures (4 pgs.): 1970-95 ocean salmon harvest data

Actions:

Ford will identify all expense approvals in the notes and submit quarterly expense summaries.

TAC and Management Committee members are to be designated. Dissenting views regarding TAC decisions will be noted.

Ford will prepare a draft program master plan which will include estimated costs per task.

Ford will provide further notification of flows and fish releases and distribute meeting notes in April.

McBain and Trush were approved to proceed on the initial assessment work as described in their proposal with a cost not to exceed $25,000. A summary report will be provided by the next meeting.

McBain and Trush will prepare a proposal for additional funding, e. g., from the CVPIA Anadromous Fish Restoration Program (AFRP), to be reviewed by Heyne, Taylor, Ramirez, and Ford.

Ford will investigate the District s ability to contract with McBain and Trush.

Heyne will review status of the proposed State land purchase near Basso Bridge and prepare list of funding sources and formats.

McBain will provide a gravel quality proposal at the next meeting.

Heyne will complete proposal for future CVPIA funding of two more screw traps and extended monitoring during JAN-JUN.

Neillands will provide the annual DFG report when available and a separate screw trap report at the next meeting.

19JUN96 Meeting:

Meeting notes, attendance list, notice, and agenda

Meeting sign-up sheet

Correspondence

16JUN correspondence from McBain and Trush (M&T) containing:

14JUN Restoration Plan Scoping Summary and Proposed Workplan by M&T (14 pgs.)

14JUN Draft protocol for monitoring gravel quality and emergence success by M&T and Stillwater Sciences (4 pgs.)

Handouts (from Ford):

Figures (3 pgs.): Runoff forecast, flow and reservoir data (Ford)

Figure: Tuolumne River water surface profile, River Mile 34.3-37.5 at 5,300 cfs (Ford)

Tables and figures (7 pgs.): 1996 seine monitoring, water temperature, and fish species list (Ford)

Table: Brood year 1995 marked salmon releases from Merced River Hatchery (from DFG) (Ford)

1996 Screwtrapping Summary (8 pgs. - 1 of text, 7 of figures) (DFG)

Tables (4 pgs.): Brood year 1995 Merced River Hatchery marked, unmarked, and panjet dyed salmon releases (DFG)
Figures (3 pgs.): 1996 Stanislaus River (Oakdale, Caswell) screw trap data (DFG)
Figures (3 pgs.): 1996 San Joaquin River at Mossdale trawl data (DFG)
Proposed protocols for TAC meeting - 2 pgs. (FWS)
Table: FSA 1996 expenses through May (Ford)

Actions:
McBain and Trush were approved to proceed on the restoration plan as well as make requested revisions. DFG and FWS are to get additional comments to them. Total cost was reduced to $210,000 with $105,000 (50%) being funded as a non-flow measure under the Settlement Agreement and the balance to be submitted for funding from CVPIA.
Ford will get costs of adding the 8,400 cfs flow (above and below Empire) and floodplain features to the GIS.
Ford is to add more notations to the GIS, e.g. tributaries.
No decisions were made, but the gravel quality proposal will be discussed next time.
DFG will detail next year their proposed adult trapping for fall 1997. DFG is not proposing any trapping this fall.

08JUL96 Meeting:

Meeting notes, attendance list, and agenda

Meeting sign-up sheet
03JUL correspondence from McBain and Trush (M&T) containing:
02JUL revised Restoration Plan Scoping Summary and Proposed Workplan by M&T (15 pgs.)

Handouts (from Ford):
Table: Time line chart for restoration plan (M&T)
Figures (3 pgs.): 1996 flow and Delta water export data, watershed and reservoir data (Ford)
Figures (3 pgs.): 1996 Delta water export data and Vernalis flow/export ratio (Ford)
Habitat restoration program funding proposal - 2 pgs. (Ford)
Table: 03JUL96 snorkel survey data summary (from Riffle 7 to Hickman) (Ford)
Tables (2 pgs): FSA potential 1996 expenses and 1996 expenses through MAY (Ford)

09JUL correspondence from Schnagl regarding the restoration plan scoping summary (1 pg.)
19AUG letter (4 pgs.) to McKevitt (Central Valley Fish and Wildlife Restoration Program - AFRP) enclosing two proposals for funding:
10JUL Restoration Plan Scoping Summary and Proposed Workplan by M&T (14 pgs.)
20AUG Channel Restoration Project: SRP 9&10 by M&T and EA Engineering

Actions:

Masuda will prepare cover letter for restoration plan proposal package.
Fryer will send out proposal package.
TAC approved adding the 8,400 cfs flow from La Grange Dam to Empire to the GIS at a cost estimate of $8,900 to be counted as a non-flow measure expense.
Ford will check on availability of aerial photos for use by McBain and Trush.
Heyne will provide a summary of the DFG snorkel survey at the next meeting.
Heyne will check on costs of adult salmon trapping.

11SEP96 Meeting:

Meeting notes, attendance list (should be 11SEP), notice, and agenda

Meeting sign-up sheet (should be 11SEP)

Correspondence

06SEP correspondence from Ford regarding the two AFRP funding proposals and enclosing:
27AUG correspondence from Ford to Stanislaus County regarding the FERC Order, the FSA, the AFRP funding proposals, and Tuolumne River habitat restoration.

Handouts (from Ford):

Figure: Reservoir data (Ford)
15AUG correspondence from Trihey and Associates with comments on the restoration plan scoping summary and proposed workplan - 3 pgs. (CCSF)
CVPIA AFRP Annual Work Plan (FY97) dated 11SEP96 (7 pgs.) - page 2, Sec. V, Item A-6 is SRP 9&10 with potential $1 million in FY97; sixth page (Appendix A, Item A-1) includes $105,000 for Tuolumne restoration plan in FY96 (Ford)
CVPIA Spawning Gravel/Riparian Habitat Work Plan (FY97) dated 11SEP96 - 2 pgs. (Ford)
California Riparian Habitat Conservation Program Description - JAN95 - 14 pgs. (Ford)
California Riparian Habitat Conservation: MAY96 Program Report for FY1991-92 through FY 1995-96 - 13 pgs. (Ford)
Figures (7 pgs.): OCT95-JUN96 water temperature data (Ford)
Table (2 pgs.): San Joaquin Basin stock estimates since 1939 (Ford)
PFMC 20-23AUG Meeting Summary with 1994-96 ocean harvest data - 2 pgs. (Ford)
Table: FSA 1996 partial expenses through AUG (Ford)
Table: Preliminary Tuolumne River Hatchery Water Supply Alternatives - 03SEP96 (DFG)
Draft letter regarding local NMFS hearing on Steelhead (proposed rule) (CCSF)
SEP96 TAC Distribution List - 2 pgs. (Ford)

Actions:

Ford to draft restoration definition by 01OCT.
Ford will provide McBain with written comments from Tom Taylor.
Comments on gravel quality/emergence proposal are due to Ford by 01NOV.
DFG to complete draft 1995-96 screw trap report by 01NOV.
DFG to complete draft 1996 Mossdale trawl report by 01NOV.
Ford to complete draft fluctuation protocol by 01NOV.
Heyne to complete RST proposal by 13SEP.
Heyne to provide summer snorkeling data to Ford by 13SEP.
Heyne will snorkel again later in September.
Heyne to contact County Fire Chief about debris at trestle in Modesto.
Neillands will distribute the 1994-95 DFG Job Performance Report.
Neillands will complete an adult trapping program proposal in JAN97.

24SEP correspondence from M&T regarding restoration plan commentary at 11SEP TAC meeting (2 pgs.)
25SEP correspondence from M&T providing a restoration plan progress report (3 pgs.)
21OCT correspondence (3 pgs.) from DFG to AFRP/CAMP enclosing:
Proposal for Assessment of Chinook Salmon Fry and Smolt Production and Distribution in the Merced and Tuolumne Rivers (17 pgs.)
22OCT correspondence from DFG to M&T regarding the restoration plan and the gravel quality/emergence success proposal (3 pgs.)
26NOV correspondence from M&T (J. Bair) enclosing:
27AUG memo from J. Bair regarding proposed riparian classification protocol (5 pgs.)
05NOV memo from J. Bair regarding riparian mapping and riparian site classification (3 pgs.)
21NOV draft plant series list (3 pgs.)
21NOV plant species list (4 pgs.)
26SEP draft riparian preservation/restoration criteria and 26NOV draft site lists (12 pgs.)

18DEC96:

Revised meeting notes, attendance list, notice, and agenda
Request of DFG data from TID/MID - DEC95 and DEC96 (1 pg.)
Draft definition of "Restoration" by Ford (2 pgs.)

Meeting sign-up sheet

Handouts (from Ford):
DEC96 TAC Distribution List - 2 pgs. (Ford)
Figures (3 pgs.): 1996 precipitation, snow water content, reservoir, and flow data (Ford)
Heede, B., and Rinne, J. 1990. Hydrologic and fluvial morphologic processes: implications for fisheries management and research. North American Journal of Fisheries Management 10:249-268. (Ford)

Plant voucher specimen list - 1 pg. (M&T)
Table: 16DEC Time line chart of tasks for restoration plan (M&T)
Figure: 01DEC restoration plan time line (M&T)
21NOV comments by Dr. Kondolf on the JUL96 restoration plan scoping summary and proposed workplan - 5 pgs. (FWS)
21NOV comments by Dr. Kondolf on the AUG96 SRP 9&10 restoration proposal - 3 pgs. (FWS)
16DEC draft channel restoration project: SRP 5 (M&T)
Draft CALFED Ecosystem Restoration program materials - 6 pgs. (Masuda)
11DEC draft Memorandum of Understanding on local watershed planning process - 10 pgs. (NRCS)
Information on the Wildlife Habitat Incentives Program - 2 pgs. (NRCS)
Table and figures (5 pgs.): Mokelumne River spawning run data (FWS)
Table and figures (4 pgs.): 1996 Tuolumne River spawning run data, 1971-96 % female, and 1981-96 egg potential (Ford)
Table and figures (2 pgs.): Preliminary hatchery contribution to Tuolumne runs and CWT releases (Ford)
Figure: 1996 Tuolumne and San Joaquin River daily average water temperature data (Ford)
Table: FSA 1996 partial expenses through NOV (Ford)
FY1994-95 Annual Report: San Joaquin Drainage Chinook Salmon/Steelhead Habitat Restoration Program - FEB96 (DFG)
FY1994-95 Annual Report: San Joaquin Drainage Chinook Salmon/Steelhead Enhancement Project -FEB96 (DFG)

Actions:

Comments to Bair on weighting restoration criteria by 15JAN97.
Comments to Ford on restoration definition by 15JAN97.
Heyne to find out about adding DFG pump survey data to Tuolumne River GIS.
A TRTAC meeting was scheduled for 29JAN97 to further discuss the SSIS.
Seining will be done as in 1996, except on a two-week interval, and thermograph monitoring will be the same as in 1996.
Heyne will coordinate screw trap repairs by TID with Ford.
Neillands will provide a description and cost estimate for the SSIS.
McBain will revise the gravel quality monitoring proposal based on written comments.

3.2 1997 TRTAC Meeting Materials

29JAN97 Meeting:

Meeting notes, attendance list, notice, and agenda.

Correspondence

07JAN letter from FWS restoration definition and smolt survival releases.
07JAN letter from FWS on proposed riparian classification protocol.
10JAN memo from McBain & Trush on riparian restoration site criteria.
15JAN letter from J. Farnkopf (BAWUA) on riparian restoration site criteria.
27JAN letter from DFG regarding 1997 smolt survival releases

Handouts (from Ford):

Hydrology conditions; 1997 seine monitoring summary table; FSA expense summary; Schlosser, I. 1991. Stream Fish Ecology: a landscape perspective. Bioscience 41(10): 704 -712 (Ford).
NRCS emergency programs.
Draft 1996 screw trap monitoring report; estimated 1997 screw trap and smolt release monitoring expense; smolt survival data; scale/otolith analysis proposal (DFG)

Actions:

Ford will work on placing the second plant collection.
McBain will complete the SRP 6 proposal.
Comments are due to Heyne on the 1995-96 SSIS report by 14FEB.
A smolt survival study will be performed similar to last year with an estimated cost of $75,000. A total of about 135,000 CWT salmon will be released as an upper and a lower group. Two screw traps will be operated by DFG at Shiloh Road.

13MAR97 Meeting:

Meeting notes, attendance list, notice, and agenda.

Correspondence

12MAR letter from DFG on TRTAC vision and purpose

Handouts (from Ford):

Hydrology information (Ford); proposed flow schedule (DFG).
CALFED planning timeline; potential restoration projects; FSA expense summary (Ford).
Restoration plan timeline; draft project prioritization criteria; draft SRP6 proposal; 14FEB and 16FEB letters on floodway restoration (M&T).
Draft mission statement; seining data; smolt survival data; 1996 FERC report topics (Ford).
Revised gravel quality monitoring proposal (M&T) and 11MAR comments (Yoshiyama).

Waples, R. 1994. Genetic considerations in recovery efforts for Pacific salmon. Conservation Biology 8(3): 884-886 (Ford).
Tuolumne River hatchery planning request (DFG)

Actions:
Ford to revise JAN97 meeting notes as suggested.
DFG to provide a revised pulse flow schedule by 10APR.
Comments due to McBain on the SRP 6 proposal by 01APR.
Comments due to Ford on mission statement by 01APR.
Discuss protocols at JUN97 meeting.
Heyne to provide 1995-96 screw trap report to Ford by 22MAR.
Gravel proposal comments due to Ford by 15APR.
21MAR letter from Masuda to CALFED on restoration project priorities.

21MAY97 Meeting:

Meeting notes, attendance list, notice, and agenda.

Handouts (from Ford):
Distribution list; Tuolumne habitat restoration review; revised projects list; FSA expense summary (Ford).
Restoration plan status (M&T); CALFED timeline; restoration project management; mining reach map (Fryer).
Hydrology data; San Joaquin Basin salmon spawning run estimate data since 1940 (Ford).
1997 Screw trap data (DFG).

Actions:
Comments should be sent to McBain on the SRP 5 & 6 proposals.
McBain to obtain estimates of "non-public cost" elements in the mining reach.
TAC will discuss at the SEP meeting about potential funding for the restoration plan final report estimated to cost $15,000.
TAC approved an estimated $8,000 as a non-flow option expense for additional McBain & Trush costs on the mining reach proposal with the understanding that reimbursement will be sought from other sources.
TAC approved $50,000 each ($100,000) of non-flow option expense as a cost-share contribution on the SRP 9 & 10 project and the mining reach project.
Project-specific monitoring is to discussed at the JUN meeting.
Genetic monitoring is to be discussed at the JUN meeting.
Ford will add AFRP expenses to the cost summary table.

25JUN97 Meeting:

Meeting notes, attendance list, notice, and agenda

Handouts (from Ford):

Hydrology conditions; 1997 Delta export salmon salvage data; San Joaquin Basin flow and water quality monitoring stations; 1996-97 water temperature graphs; FSA expense summary; watershed restoration articles from Fisheries 22(5) May 1997 (Ford).

AFRP - CALFED funding matrix (Fryer)

Genetic baseline study design; HORB vicinity water velocity figure; 1997 screw trap data; Heyne work activities; DFG information request to TMID; potential Tuolumne River angling regulations (DFG)

Actions:

Fryer will prepare SRP 9/10 and Mining Reach CALFED proposals.

DFG (Mayott) will work with McBain to prepare the La Grange gravel introduction proposal.

DFG requested that their proposed hatchery be discussed at the SEP TRTAC meeting.

Ford will propose specific GIS action later.

Comments to Heyne are due by 09JUL on the RST proposal.

The Districts will pursue updating the SJR salmon population (EACH) model

Heyne will coordinate a project monitoring discussion through e-mail

A revised gravel quality proposal from McBain & Trush will be provided by 01SEP.

Protocols and mission statement will be on the SEP agenda.

01JUL letter from Ford to Heyne responding to DFG data request

08AUG information packet from Ford distributed to TRTAC

Updated TRTAC distribution list

JUN97 TMID snorkel data summary

Channel profile at Old La Grange Bridge from M&T

1997 Tuolumne CWT and marked salmon release summary from DFG

SRP 9 restoration proposal to CALFED

Mining Reach (7-11 segment) restoration proposal to CALFED

Draft TMID 1997 Juvenile Salmon Report (not included -see Vol. II Report 97-2)

17SEP97 Meeting:

Meeting notes, attendance list, notice, and agenda

11SEP letter from Heyne regarding data request

Handouts (from Ford):

Draft mission and vision statement; hydrology information; FSA expense summary (Ford)

Protocol suggestions from FWS and DFG

Restoration Plan status update (M&T)

Spawning gravel quality monitoring proposal by M&T/Stillwater

HORB vicinity water velocity report dated 07AUG (DFG)

National Riparian Service Team information (FOTT)

Actions:

Consensus will be used by the TRTAC.
An adoption of process items be considered at the next meeting.
Comments on the draft mission statement are due to Ford by 15OCT and this will be a decision item on the next agenda.
Boucher asked that water supply options be reviewed at the next meeting.
Ford stated that a pulse flow decision should be made by 01OCT. DFG will FAX a proposed schedule to FWS and Ford, then TID will confirm the agreed schedule.
The Districts and DFG will work to reach a GIS agreement.
Heyne is working on the 1997 rotary screw trap (RST) report to be completed by 03OCT.
A 15OCT subgroup meeting at La Grange was scheduled to discuss 1998 monitoring.
Neillands will confirm with Loudermilk that DFG has no plans to take Tuolumne eggs.
Comments are due by 03OCT on the revised gravel quality monitoring proposal. If favorable, the work will proceed or otherwise be addressed at the DEC meeting.
Monitoring for riverwide and project-specific purposes will continue to be worked on by the monitoring subgroup with a document due 01DEC.

08OCT letter from DFG regarding adult salmon trapping

08DEC97 Meeting:

Meeting notes, attendance list, notice, and agenda

24NOV memo from Ford regarding review of smolt survival index studies
02DEC letter from Fryer regarding status of restoration projects
05DEC letter from Neillands regarding smolt survival index studies
05DEC letter from Ford on CALFED funding decisions
05DEC letter from Heyne regarding sand in La Grange Reservoir

01DEC distribution of draft salmon fry/juvenile/smolt monitoring proposal and FSA Section 13 monitoring schedule from Ford.

Handouts (from Ford):

Hydrology information; revised restoration project list; CALFED Fall 1997 funding recommendations; funding source list; Bay-Delta salmon monitoring information; revised TRTAC distribution list; FSA expense summary; proposed FSA Section 13 monitoring schedule (Ford)
Restoration Plan expense update and draft restoration site list (M&T)
Draft GIS Agreement for TMID and DFG (Masuda)
Wildlife Habitat Incentives Program (WHIP) information (NRCS)

Monitoring plan outline; mission/vision suggestions; P. Wilcock essay on river restoration (TRPT)
USFS stream habitat classification procedures (FWS)
J. Harrison article on Washington salmon hatchery policies (Ford)
Revised spawning gravel quality monitoring proposal and comments (M&T/Stillwater)
Tuolumne River papers from AUG97 ASCE Congress proceedings (Ford)

Actions:

Loudermilk will pursue a remedy of the sand in the Gasburg Creek channel through emergency action.
McBain will send out a packet of potential projects with more details for comment.
The TRTAC may consider more project proposal endorsements at the next meeting.
The TRTAC approved the Districts to continue the temperature monitoring, and proceed in mid-January with river-wide seining and screw trap sampling at TLSRA.
The TRTAC approved the Districts (Stillwater) to proceed with the first year of gravel quality work at an estimated cost of $56,400 as described in the proposal.
Comments are due back to Ford by 31JAN and the protocols and mission statement will be discussed at the next meeting.

30DEC Restoration Plan report outline and supporting materials from McBain and Trush

3.3 1998 TRTAC Meeting Materials

09FEB98 Meeting:

Notice and agenda, meeting notes, and attendance list

Handouts (from Ford):

Restoration plan status from McBain and Trush; consensus information from FOTT; protocol suggestions (Ford)
FERC Article 58 (Masuda)
Draft Salmonid Stranding and Entrapment plan (Stillwater)
Sport fishing regulations (Ford)
06FEB98 DFG letter re: screw trapping
30JAN South Delta Water Agency letter re: South Delta barriers (DFG)
Bugert, R. 1998. Mechanics of supplementation in the Columbia River. Fisheries 23(1): 11-20 (DFG)
25JAN98 document from DFG on smolt study needs, VAMP, and Merced Hatchery
News release re: North Coast steelhead angling restrictions (DFG)
News release re: winter-run chinook facility dedication (DFG)

Actions:

Tasks 1 & 2 ($4,025) of the stranding and entrapment study were approved to proceed, with Task 3 ($5,200) approval conditional upon CCSF review and their concerns satisfactorily addressed. Task 4 will be reviewed at later date.
Wilton was asked to see if AFRP monitoring funds can be used for a third screwtrap.
The Monitoring Subgroup was asked to review smolt survival study issues at their 24 February meeting and make recommendations to the TRTAC at the 18 March meeting.

18MAR98 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

06MAR letter from Madden on FSA smolt survival study
16MAR e-mail from Ford on 1998 TMID smolt release recommendation

Handouts (from Ford):

Revised Draft Mission Statement with comments received during SEP-DEC97
FWS Planning Survival Guide (24 pg.)
NRCS Wetlands Reserve Program information
16MAR restoration plan status update (M&T)
12MAR Gasburg Creek sediment basin proposal (M&T)
Interim stranding assessment report (Stillwater)

Actions:

Fryer will send out a marked version of the protocols for further review and consideration at the TRTAC meeting in June.

A cost estimate for any extended screw trapping at the Hughson site using FSA funds will be developed.

Adjourn the decision on smolt survival to a special TRTAC meeting on 24 March to develop a hybrid program for 1998 and resolve number of fish, number of monitoring points, and the number of releases and their locations.

Tim Ford is to draft a letter of support, indicating compatibility with the draft restoration plan, for a wetlands reserve perpetual easement for the van Konynenburg property and e-mail to the TRTAC for approval.

It was noted that CCSF did previously approve, by e-mail, the expenditure for Task 3 of the stranding and entrapment study per the 9 Feb 98 TRTAC minutes.

FWS will make the contact with NMFS regarding potential monitoring implications due to species listings.

24MAR98 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

Draft flow schedule graphs, seining data, screw trap data and operations (Ford)
Fyke net 1973-82 data summary (Stillwater)
CWT data review (Ford and DFG)
Proposed and modeled smolt release patterns (Stillwater)
23MAR DFG memo on 1998 smolt survival recommendations
DFG basin supplementation planning sheet

Actions:

The operators will review runoff projections to see if any of the "excess" water due to wet year conditions can be reoperated for release in the summer. DFG will provide a FERC flow schedule for consideration.

Screw trap monitoring data will be weekly reports of daily data. Loudermilk will coordinate with Heyne on this request.

Tim Ford and Jennifer Vick are to develop a budget, including funding sources, for the multiple mark recapture program and DFG will provide cost estimates for CWT-related efforts.

A copy of the 1992 FERC fyke-netting report with backup information will be provided to Craig Fleming, Jennifer Vick, Tim Heyne, and Scott Spaulding. DFG to provide a cost estimate for fyke netting.

Continue the TRTAC meeting on 2 April to review the logistics, details, and budget for the combined CWT and mark-recapture monitoring program for 1998.

01APR98 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

31MAR Ford/Stillwater proposal on 1998 smolt studies

AFRP - CALFED funding matrix (TID)

Campton, D. 1995. Genetic effects of hatchery fish on wild populations of Pacific salmon and steelhead: What do we really know? AFS Symposium 15: 337-353 (DFG)

Actions:

DFG requested that the proposed multiple mark-recapture methodology undergo a peer review.

The following smolt survival option with a cap of 175K CWT fish was agreed upon:

Period 1	100K CWT @ La Grange
	50K CWT @ San Joaquin River
	29K marked and clipped only, no CWT, for efficiency tests at unspecified times (20K at Shiloh) and SRP 9 / 10 tests.
Period 2	24K CWT and marked for Test #3 in Table 3
	Total: 203K released from Merced Hatchery
	Note: the Period 2 releases will be in May with La Grange (5K), TLSRA (5K), Geer Rd. (9K), and Hughson (6K) releases and three releases of 3K as part of AFRP tests timed with efficiency releases.

Jennifer Vick to draft efficiency release plan, showing a calendar and coordination/reporting structure, etc., to be reviewed by the subgroup.

DFG was requested to try and make the 100K La Grange release in two parts, one in the morning and the second in the evening or on consecutive days.

Demko to be instructed to count and release clipped fish, closely monitor RSTs during the 100K release including lifting of traps when necessary, and measure a subset for "size of fish" test.

Wilton Fryer to confirm FSA budget adjustment tracking.

28APR e-mail from M&T/Stillwater on permeability and emergence studies

17JUN98 Meeting:

Agenda, meeting notes, attendance list, and draft protocols

Correspondence

MAY98 correspondence on status of DFG CALFED projects

14MAY letter from TID to DFG on monitoring data and reports

23MAY letter from FOTT to NMFS on proposed Tuolumne hatchery

Handouts (from Ford):

Draft peer review process (Stillwater)

Meffe, G. et al. 1998. Independent scientific review in natural resource management. Conservation Biology 12 (2): 268-270 (FWS)

Restoration Program update (TID)
Draft Tuolumne River Corridor Restoration Plan by McBain &Trush (not included)
17JUN TRTAC letter to NRCS in support of the Grayson River Ranch Project
1998 preliminary screw trap data (Ford/Stillwater), Mossdale marked recoveries (DFG)
Hood River and Yakima River articles (DFG)
MAY/JUN correspondence by California and Bay Institute re: SJRA/VAMP Water Rights Hearings (TRPT)

Actions:

The draft protocols were reviewed, comments received, and adopted. They will remain as a draft dated 17 June 1998 and be distributed with the minutes. The intent is to treat them as a document in progress that can be used for guidance yet modified as the situation and the parties desire.
The subgroup is to prepare comments on the draft Peer Review Process, develop specific questions on the smolt survival studies for TRTAC review, and elaborate on the overall peer review process.
Scott Spaulding to see if AFRP funds for peer review, $5K to $15K, are available and if TID and USFWS can set up simple task order system to administer the funds separately from the AFRP contracts.
The Gasburg Creek sediment basin project will be revisited at the next TRTAC meeting. Tim Ford will provide a copy of the proposal to DWR (Steve Ford) for their information.
Add the GIS layer changes & project update to next TRTAC agenda.

27AUG letter from FWS to DFG re: San Joaquin basin Study Fish Planning

17SEP98 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

15SEP letter from DFG to TID on monitoring data and reports

Handouts (from Ford):

List of correspondence since 17JUN meeting (Ford)
27AUG update from FWS on AFRP selected actions
1998 CALFED funding – recommended projects (Masuda)
Peer review budget (FWS)
Modesto Airport Vegetation Management Plan summary (Ford)
GIS Database changes since 1996 FERC Report (Ford)
Updated water temperature graphs (Ford)
J. Williams IEP newsletter article on adaptive management (Ford)

Actions:

Tim Ford to provide TRTAC mailing list to Irene Davies, ACOE
Tim Ford will combine all comments into a new draft Mission and Vision Statement that will be distributed with the agenda for the next meeting
The TRTAC approved a 50% cost share, with a $5,000 cap, for the Peer Review process.
Tim Heyne will prepare a one page description of a life stage and survival alternative for Scott Spaulding.
The following changes are to be incorporated to finalize the Restoration Plan:
1. Re-write the title to indicate this is a Technical Habitat Restoration Plan.
2. Specific project recommendations will be separated from the rating section and taken out for use as a separate internal TRTAC document, by Scott McBain.
3. Prepare an Executive Summary, by Scott McBain, for general distribution. Prepare a preface, by Roger Masuda, outlining the TRTAC's intended use of the Plan by others.
4. Conduct one general outreach informational workshop on the Plan and possibly several smaller meetings with specific groups, like planning staffs and land owners.
5. Adopt a final Habitat Restoration Plan, incorporating appropriate comments from item 4.

Scott McBain to prepare a budget covering items 1 to 5 and identify types and quantities of materials to be produced. This is to be available for the 19 Oct 98 TRTAC Subgroup meeting.

17DEC98 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

08DEC letter from TID to DFG on monitoring data and reports

Handouts (from Ford):

List of correspondence since 17SEP meeting (Ford)
11DEC conference call notes on 1999 marked fish proposals (Ford)
Figures on La Grange gravel addition project (DFG)
18JUN97 memo from Ford on restoration program
Infiltration bag study proposal (Stillwater)
Hughson/Charles Road screw trap site evaluation data (Stillwater)
Draft 1998 electrofishing data (Stillwater)
FOTT river brochure
1998 preliminary Shiloh (CAMP) screw trap data (DFG)
Draft 1998 Escapement report (DFG)

Actions:

The TRTAC distribution list will be used as the meeting check-in list. Members will be asked to update information as part of the sign in.

Rhonda Reed, DFG, is to facilitate the Gasburg Creek trip.

Tim Heyne, DFG, will confirm proposed actions with the affected landowners of the Basso area land acquisitions.

The subgroup needs to address the electrofishing issues as part of the monitoring program review for 1999.

Place TRTAC project selection criteria identification as a priority item on the next agenda.

Place sediment management as topic for project identification at the next meeting.

Approve the deployment of the upper RST and confirm deployment of the other RST at the monitoring subgroup meeting in January 99.

3.4 1999 TRTAC Meeting Materials

26JAN99 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

Peer reviewer comment summary (Spaulding)
Smolt survival study – integrated conceptual approach (Spaulding)
NRCS conservation education application
FSA measure tracking worksheet, Tuolumne River restoration projects, and FSA monitoring schedule (Fryer)
05JAN99 letter from DFG to M&T re: dredger tailing reach

Actions:

Certain elements were generally agreed to: any hatchery fish released in the Tuolumne River were to be CWT, hatchery fish would be in CWT lots of 25,000 or less, a decision on the 1999 SSI monitoring plan will be made on 2 Feb 99, and trapping and removing CWT salmon from the Tuolumne run would be further considered since none of those fish are presently of Tuolumne origin.
Stillwater Sciences and DFG will compare capture probability for RST and large CWT release methods, respectively.
Stillwater Sciences will model CWT release numbers for recovery at Mossdale.
A decision to proceed with seining and the upper RST operation was made.
A decision will be made on one of three smolt survival options to be considered at the next meeting.
Agreement was reached on the first 6 of the 10 TRTAC projects to be selected. The 6 projects are: SRP's 9 & 10 and the four Mining Reach segments (7/11, MJ Ruddy, Warner-Deardorff, and Reed).

02FEB99 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

20JAN letter from FWS to Congressman Condit re: artificial salmon production
1998 smolt mark-recapture recovery data (Stillwater)
Survival modeling (Ecological Monographs - partial) and 1997 Mossdale CWT recovery graphs (DFG)
1999 smolt survival alternatives (Spaulding)
Tuolumne CWT 1987-98 Mossdale recovery data (Stillwater)
1999 7/11 screw trap and seining data (Ford)
1998 CWT screw trap recovery data (Stillwater)
An evaluation of the statistical power of paired release experiments to estimate smolt survival (Stillwater)

Actions:

The group agreed on a total of 160k Merced-origin hatchery releases with all hatchery fish to be marked with a CWT. The 160k will consist of one independent mark-recapture test (9.5k) and another (5.5k) integrated with the large CWT release (125k), and 20k for the Grayson trap.

TID, on behalf of MID and CCSF, is to enter into a contract to provide CWT's for the 160k test fish from Merced Hatchery, with these expenses to be counted as part of the TRTAC smolt survival monitoring costs.

The Monitoring Subgroup is to develop the monitoring schedule and budget for the next TRTAC meeting.

DFG is to permit capture and marking of natural salmon for use at the upper RSTs.

09/10MAR99 Meetings:

Agenda, meeting notes, and attendance lists

Correspondence

28FEB packet re: Bobcat Flat purchase proposal
03MAR – draft 1999 smolt survival study plan (Ford)

Handouts (from Ford):

(09MAR):
08MAR letter from Reed re: Bobcat Flat proposal
Gravel Quality progress report and proposal (Stillwater)
11x17 stranding survey maps (Stillwater) – (not included)
Potential APR CALFED proposals (M&T)
(10MAR):
Screw trap data graphs (Heyne and Ford)
Abstract from Impacts of Gravel Mining on Gravel Bed Streams
Progress report on stranding assessment and GIS proposal (Stillwater)
Pulse flow graph (Ford)
09MAR memo from Fryer on SRP 9 – Infiltration Gallery proposal

Actions:

McBain and Trush, Stillwater Sciences, and CDFG will develop an integrated proposal for long-term sediment management strategy for review by the TRTAC.

Each member of the TRTAC will review the draft restoration plan in detail, especially with regard to the 14 identified projects, and provide feedback to Scott McBain.

Wilton Fryer will prepare proposals for completing SRP 10 and the Warner/Deardorff phase of the Gravel Mining Reach for submittal to CALFED.

The appropriate TRTAC members will coordinate with the VAMP hydrology team to finalize the Tuolumne River spring flow schedule.

Tim Ford will revise the draft overall monitoring document for distribution at the June TRTAC meeting.

Jennifer Vick and Scott McBain will prepare a list of potential issues regarding the infiltration gallery. Wilton Fryer will find out from the project engineers whether the gallery would be built during the first or second year of project construction.

The TRTAC will not approve additional GIS work until the data sharing agreement between the Districts and CDFG is finalized.

The TRTAC decided to delay discussion of the 2000 Smolt Evaluation Plan until NMFS announces its decision in September 1999.

07APR99 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

Handouts (from Ford):

Memo from M&T re: costs of restoration brochure and sediment management proposal scope of work

Sediment management plan schematic (M&T)

CALFED proposals on SRP 10 and Mining Reach Segment 3 (Fryer) (not included)

Notification letter from USBR (Denver office) to Fryer about their intention of submitting a sediment management proposal to CALFED

NRCS Clean Water Action Plan Tuolumne River application

Proposed VAMP period river operations (Ford)

DFG funding request to CWT 25k smolts to be released near Mossdale (Neillands)

DFG CALFED spawning gravel addition proposal (Heyne)

Actions:

Comments on 09-10MAR notes were due by 21 April 99

Comments to Scott on sediment management proposal contents must be received by Friday 9 April. The TRTAC authorized McBain to proceed at a cost not to exceed $3,500.

Ford will draft 6 letters of support for CALFED proposals with a closure of "As authorized and signed on behalf of the TRTAC". A copy of the letters will be sent to Boring and Farnkopf to initial and fax back to Ford.

Vick will provide a copy of the 1998 project monitoring report to TRPT and CCSF. Comments are due by 3 May so the final can be presented to the monitoring subgroup on 25 May 1999.

The draft 1999 Project Monitoring Plan will be out for comments by 3 May with a final plan to be agreed upon by the 25 May 1999 meeting.

There was no consensus to include added CWTs at Mossdale as part of the FERC program.

07APR TRTAC letters of support for CALFED proposals

23JUN99 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

10FEB99 letter from City of Modesto to TID re: Restoration Plan
15JUN99 response to City of Modesto
21JUN e-mail from consultant Steve Kirihara (EA Eng.) with snorkel survey results

Handouts (from Ford):

Draft index of 1999 TRTAC materials to date (not included)
DFG redd enumeration funding proposal
Screw trap and multiple mark-recapture field implementation issues
Preliminary 1999 Mossdale trawl data and 1994-98 Merced River smolt survival data (DFG)
Draft DFG letter re: Mossdale CWT release
22JUN99 memo from Stillwater Sciences re: gravel monitoring
1998 project monitoring report from McBain & Trush (not included)
Recommended projects for CALFED funding (Spaulding)
FSA expense status table and draft FSA tracking table (Ford – not included)
Williams, R. et al. 1999. Scientific issues in the restoration of salmonid fishes in the Columbia River. Fisheries 24(3): 10-19. (Ford)
Beechie, T. and S. Bolton.. An approach to restoring salmonid habitat-forming processes in the Pacific Northwest watersheds. Fisheries 24(4): 6-15. (Ford)
NWPPC. 1998. Development of a regional framework for fish and wildlife restoration in the Columbia River Basin. Document 98-16, 11pgs. (Ford)

Actions:

Vick and Fryer, with input from Reed, are to develop answers to timing, facility availability, environmental documentation, and costs for the above matrix for the 2 August TRTAC meeting.
The TRTAC approved the expenditure of up to $66,260 under Section 12 to complete the environmental documentation and permitting. (USFWS confirmed approval on 24 Jun 99)
The TRTAC approved the expenditure of up to $6,000 by the DFG under Section 13 monitoring (redd enumeration) for a one-year period. (USFWS confirmed approval on 24 Jun 99)
Scott Spaulding will act as the proxy for Susan Boring until Gary Taylor finds a replacement member for the USFWS voting representative on the TRTAC.
Tim Heyne will replace George Neillands on the TRTAC, as George will be moving to the coast region.

25JUN – revised draft FSA/Order implementation measures tracking spreadsheet (Ford)

02AUG99 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

Smolt study fish options (Ford)
Updated CWT adult Tuolumne River return and origin data (Ford)
Artificial production reference list with annotations (Stillwater)
Restoration plan channel restoration project list (pg. 114)
AFRP potential FY 2000 Tuolumne River projects (Spaulding)
Updated figures of thermograph data (Ford)
Updated figures delta salmon salvage/loss data (Ford)
Updated FSA expense status table (Ford)
Draft FSA tracking table (Ford – not included; see 25JUN)

Actions:

DFG would be asked to provide information on CEQA – NEPA and safety issues that would might need to be addressed for the TRFF option, along with the names of State-certified aquaculturalists that could operate the facility for the TRTAC.
Jen Vick was asked to present at the monitoring subgroup meeting a summary of study issues and potential management options that came out of the completed analysis of study statistics.
Scott McBain will be asked to provide a copy of the plan text by the TRTAC meeting in September and a schedule for completion of the plan that includes production of a final document.
Develop a restoration project matrix for the September TRTAC meeting.
Comments are due to Wilton by 1 September on the FSA tracking table.

06AUG – Letter from Masuda to DFG re: smolt survival study fish

13SEP99 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

25AUG subgroup meeting notes and smolt survival options table (Ford – not included here; see Subgroup Section)
11SEP99 smolt survival comments (Spaulding)
Smolt survival and other monitoring comments (TRPT)
Updated CWT Tuolumne River adult return graphs (Ford)
24 Aug 99 (revised 12 Sep 99) summary of smolt survival evaluations (Stillwater)
Year 2000 survival study proposal (DFG)

Gravel monitoring update (Stillwater)
Draft 1999 FERC report table of contents (Ford)
Fall pulse flow schedule proposals (Ford and DFG)

Actions:

Stillwater will complete the MMR monitoring analysis and report by 15 Oct 99. DFG will complete their smolt survival analysis by 15 Nov 99.

Baker and Vick will initiate the peer review questions to be considered by the subgroup.

Vick will compile escapement, spawning distribution, and flow data to evaluate the effect of pulse flows on run timing and distribution. Ford will revise the schedule using 300 cfs minimum and submit it to the subgroup for review.

Ford will pass on the restoration plan copy to others for quick edits and return to McBain. The list of potential projects will be sent out two weeks prior to the December TRTAC meeting.

05OCT – E-mail from FOTT re: FERC minimum flow operations.
11OCT – E-mail distribution of 13SEP meeting notes with comments due by 25OCT (not included).

16DEC99 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

21OCT – Letter from Hanson re: recommendations on VAMP technical fishery issues.
08NOV – 04NOV letter from Loudermilk re: DFG staff changes.
08NOV – E-mail notice of new contact information for TRPT and Tim Ramirez.
08NOV – Letter from Heyne re: smolt survival monitoring.
10NOV – E-mail from Masuda requesting DFG response to his 06AUG letter.
19NOV – E-mail distribution from McBain & Trush of revised restoration plan.
29NOV – E-mail from Ford re: DEC TRTAC meeting date change (not included).
08DEC – E-mail from Masuda re: smolt survival evaluation proposal.
15DEC – E-mail from Ford re: smolt survival evaluation proposal.
15DEC – E-mail from Masuda re: NMFS (D. Smith) views on smolt survival proposal.

Handouts (from Ford):

Revised draft FSA/Order tracking table (Fryer – not included)
Updated FSA expense status tables (Ford – not included)
Revised draft 1999 FERC Report table of contents (Ford – not included)
Clarification of CDFG perspectives on smolt survival issues (Heyne)
List of TRTAC actions on restoration projects/proposals (Ford)
Draft table of annual screw trap catch of wild vs. CWT smolts (Ford)

Waldvogel, J. 1997. Salmon restoration depends on improved habitat. California Agriculture 51(4): 28-29 (Ford)

PFMC. 1999. Ocean salmon landings. Pacific Council News, November 1999: 8-9 (Ford)

Bakke, B. 1999. Killing hatchery coho okay with judges. Northwest Fishletter (Internet), December 8 (Ford)

Swauger, T. 1999. Her own river dance. Fish & Game Today, Vol. 47(4) (Ford)

McEwan, D. 1999. Feather River study: highlights of the salmon emigration surveys, 1996-1998 in Interagency Ecological Program for the Sacramento-San Joaquin Estuary Newsletter. Vol. 12(4): 21-28 (Ford)

Reisenbichler, R. and S. Rubin. 1999. Genetic changes from artificial propagation of Pacific salmon affect the productivity and viability of supplemented populations. ICES J. of Marine Science Vol. 56: 459-466 (Spaulding)

Rhodes, J. and T. Quinn. 1999. Comparative performance of genetically similar hatchery and naturally reared juvenile coho salmon in streams. N. American J. of Fisheries Management 19:670-677 (Spaulding)

Gharett, A. et al. 1999. Outbreeding depression in hybrids between odd- and even-broodyear pink salmon. Aquaculture 173:117-129 (Spaulding)

Actions:

E-mail designated for the FERC Report will use the following as part of the lead-in at the head of the e-mail: CC: FERC Report.

A modified long-term smolt survival monitoring plan was approved and will be sent to the TAC management for signature.

Tim Ford to provide more detail in the tracking of fry/juvenile/smolt expenses.

RST sampling at 7/11 was approved to begin about 10JAN. The seining will start the first week in January.

The subgroup will focus some discussion at their next meeting to CWT studies and fry studies.

Wilton Fryer to make changes to tracking table & send to subgroup by 23 Dec 99.

20DEC e-mail (17DEC) from Masuda of TRTAC smolt survival evaluation agreement.

29DEC e-mail from Heyne re: 1999 run data

3.5 2000 TRTAC Meeting Materials

16MAR2000 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

29DEC e-mail from Heyne re: 1999 run data
12JAN2000 e-mail from Heyne re: TRTAC smolt survival agreement.
17JAN e-mail reply from Masuda to Heyne and final smolt survival agreement
10MAR e-mail re: sediment sampling request from McBain and Trush

Handouts (from Ford):

TRTAC materials since the 16DEC99 meeting (Ford)
Status of 1999 FERC Report (Ford)
1999 FERC Report Table of Contents, and draft summary (Ford) (not included)
Selected Don Pedro Project License Events and table of reports submitted to FERC (Ford)
1999 MMR results (Stillwater) (not included)
03MAR00 FSA/FO tracking table (Fryer) (not included)
31DEC99 quarterly DFG reports to CALFED (Heyne)
Basin CWT release schedules and proposed APR-MAY flow schedules (Heyne)
2000 Grayson RST salmon catch data (Vasques)
1998 TR chinook salmon spawning escapement survey report (Heyne) (not included)
TRTAC restoration activity (Reed)
1999 thermograph and seine maps/graphs (Ford) (not included)
2000 delta salmon salvage graph/tables (Ford) (not included)
1999 basin flow graph, 2000 60-20-20 index forecast, and APR-MAY flow proposal (Ford)
Updated gravel monitoring status memo (Stillwater) (not included)
AFRP project selection (Spaulding)
TRPT map proposal (Olsen)
Water intake gallery memo (Fryer)
Request for restoration project funding (Fryer)
DEC99 smolt survival agreement (Fryer)
DFG management summary tenants (Loudermilk)
2000 basin salmonid sportfishing regulations (Ford)

Actions:

Approved bedload sampling as proposed by McBain & Trush with Section 12 funds with potential later AFRP funding
DFG approved for up to $2000 (Section 13) to implement smolt marking evaluation – Jen Vick and Tim Heyne to coordinate.
Subgroup conference call on 23 March to further discuss 2000 smolt survival study. Meeting on 07 April for the large CWT review process
Jen Vick will contact Alan Barraco of DFG re: trap/rear proposal

Subgroup conference call on 23 March to discuss new location for 7/11 RST
Final restoration plan by McBain & Trush was adopted; landowners in SRP 5 and 6 areas to be contacted by Fryer prior to public distribution of plan. Number of requested brochure copies should be sent to Fryer
Fryer to check with FWS on CEQA/NEPA needs for the water gallery project
Proposals for CALFED to be submitted with TRTAC support letters sent by e-mail. $75,000 was approved of Section 12 funds for permitting work on the Ruddy project

21JUN2000 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):
Draft meeting notes from 16MAR00 meeting (Ford)
TRTAC materials list since the 16MAR00 meeting (Ford)
20JUN00 NOAA press release on ESA 4(d) rules (Heyne)
Updated 2000 FSA expense tables (Ford)
Stillwater 21JUN memo on funding request for CWT analysis (Vick)
Updated FSA/FO tracking table (Ford)
JUN00 draft snorkel summary table (Ford)
Delta salmon salvage graph and 13JUN VAMP meeting handouts (Ford)
21JUN memo on restoration project status (Fryer)
13JUN transmittal letter from Spaulding to CALFED on 1998-99 project monitoring reports (Ford)
Draft reply letter to CALFED on project monitoring with N. Sandkulla edits (Ford)
Kondolf, M. 2000. Some suggested guidelines for geomorphic aspects of anadromous salmonid habitat restoration proposals. Restoration Ecology 8(1): 48-56. (Ford)
Roper, B. and D. Scarnecchia. 2000. Key strategies for estimating population sizes of emigrating salmon smolts with a single trap. Rivers 7(2): 77-88. (Ford)
Geist, D. and D. Dauble. 1998. Redd site selection and spawning habitat use by fall chinook salmon: the importance of geomorphic features in large rivers. Environmental Management 22(5): 655-669. (Yoshiyama)

Actions:
The $6,739 funding increase for gravel monitoring was approved pending confirmation approvals from Gary Taylor of USFWS and Donn Furman of CCSF. (Those confirmations were received after the meeting)
The subgroup will develop a recommended list of projects for the next TRTAC meeting. The list will include aspects on achieving restoration goals, work scoping issues, construction feasibility, and landowner issues.
Olsen will coordinate 11JUL float trip
Funding for $3,200 DFG CWT analysis work approved and the $17,500 work by Stillwater on hold pending review and approval at the subgroup meeting in July.

Heyne will provide summary of comparative redd study by the SEP meeting
Vick to finalize monitoring letter to CALFED with Mierau and Ford/Heyne are to review

12JUL e-mail from Vick of letter to Baracco (CDFG) re: salmon trap/rear proposal
24JUL e-mail from Ford of Venn project support letter

28SEP2000 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

31JUL e-mail from Stillwater re: draft matrix of potential restoration projects
08AUG e-mail from McBain & Trush re: results of sediment transport measurements
21SEP meeting notice e-mail from Ford with list of materials/correspondence since JUN meeting

Handouts (from Ford):

Draft Meeting notes from 21JUN00 meeting (Ford) (see above)
21SEP00 TRTAC Correspondence List since 21JUN00 Meeting (Ford) (see above)
27SEP00 Proposed 2000 FERC Report Schedule (Ford)
Draft matrix of potential restoration projects (Vick)
MAY-SEP2000 La Grange flow graph (Ford) (not included)
JAN-JUL2000 water temperature graphs (Ford) (not included)
Tuolumne and San Joaquin draft fall pulse flow graphs (Heyne)
Tuolumne draft fall pulse flow graph (Ford)
Fall 1999 flow, air temp. and water temp. graph (Ford)
27SEP memo on gravel monitoring (Vick)
Draft 2000 screw trap/MMR data (Vick) (not included)
Draft summary of 2000 summer adult salmon survey (Vasques)
Updated FSA expense tables (Ford) (not included)
Proposed 2000 FERC report schedule (Ford)
28SEP memo on status of restoration projects (Fryer)

Actions:

Stillwater Sciences will revise the project matrix by the next TRTAC meeting
The following actions were selected as four more of the Section 12 priority projects:
Gravel Cleaning (to be implemented under the Fine Sediment Management Plan);
Gasburg Creek sedimentation project (to be implemented under the Fine Sediment Management Plan);
Gravel augmentation (projects implemented under the Coarse Sediment Management Plan in addition to CDFG's augmentation projects); and
Bobcat Flat/Dredger Tailings Reach Phase III (Hall).
Jennifer Vick will fax the trap and rear proposal to Rhonda Reed

Jennifer Vick will coordinate a subgroup meeting to discuss restoration designs for the Bobcat Flat property. The subgroup will prepare a proposal to be submitted to the Four Pumps Committee.

20DEC2000 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

28SEP e-mail from Vick of 27JUL response letter to CALFED re: project monitoring
16OCT e-mail from Ford of Todd project support letter to ESRCD
21DEC00 e-mail from Spaulding of file for restoration map (handout at meeting)

Handouts (from Ford):

Adaptive Management Forum (AMF) Proposed Scope of Work – dated OCT2000 (Shaw)
Conceptual Model and AMF handout sheets (Reed)
Map of restoration activities (Spaulding)
Updated TRTAC project and proposal list (Ford) (not included)
Updated FSA/FO tracking table (Ford)
Updated FSA expense tables (Ford) (not included)
Draft options for 2001 FSA Section 13 monitoring (Ford)
Revised 2000 FERC report schedule (Ford)
Draft report of 2000 fall adult salmon survey (Vasques) (not included)
List of potential restoration outreach opportunities (Koepele)

Actions:

The subgroup is to generate a list of "tributary goals" for use at a conceptual model meeting set for 1000 on 13 February 2001 at the DFG office in La Grange. Rhonda Reed will compile goals from existing plans and programs. Wilton will compile goals for specific projects.
Temperature and seine monitoring was approved for the January – March 2001 period. There will be no upper screw trap operated during JAN-MAR. Heyne to work with Ford and Vick to collect information on fry habitat use.
An additional $5,000 for Stillwater to do more large CWT release analysis work was approved.
The prior approval for $225,000 project contingency funding was reaffirmed.
Tim Ford to send a follow up letter to Baracco (cc to NMFS, USFWS, DFG) on smolt study fish.

3.6 2001 TRTAC Meeting Materials

07MAR2001 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

10JAN01 e-mail from McBain of letter to Stanislaus County re: gravel sources
06FEB01 e-mail from Olsen re: final TRI documents for federal funding opportunities
05MAR01 e-mail from Ford of follow-up letter to Baracco (DFG) re: trap and rear proposal
05MAR01 e-mail from Loudermilk of reply re: letter to Baracco (DFG)

Handouts (from Ford):

TRTAC materials since the 22DEC00 meeting (Ford)
2000 FERC Report Table of Contents and schedule (Ford) (not included)
FSA expense summary information (Ford) (not included)
2000 spawning survey report (Vasques) (not included)
AFRP project list (Spaulding)

Actions:

Wilton will adjust the Big Eagle CWT tagging contract to 141,000 fish
The ACOE will be requested to make a presentation at the JUN meeting

07JUN2001 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

09APR01 revised letter of invitation to ACOE from Koepele
10APR01 e-mail from Marston of DFG proposal for 500-700 cfs smolt survival study flow

Handouts (from Ford):

Draft meeting notes from 07MAR meeting (Ford) (see above)
TRTAC materials list since the 07MAR meeting (Ford)
Updated 2000 FSA expense tables (Ford) (not included)
Updated water temperature graphs (Ford) (not included)
Basin Index and FERC flow volume graphs (Ford)
River tributary and spill discharge issues/photos (Heyne)
DFG steelhead genetic study field sampling data (Heyne)
Material from Dr. Klimley for electronic tracking of salmonids (not included)
Army COE Comprehensive Study and Ecosystems Functions Model materials (not included)

Actions:

Approval to pay for McBain & Trush and Vick to attend AMF workshop. CALFED will be asked for reimbursement.

Approved a contingency funding agreement for the SRP 9 project in the amount of $290,000, with unspent contingency funds returning to the TRTAC.

12SEP2001 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

28SEP: three project support letters

Handouts (from Ford):

Draft meeting notes from JUN meeting (Ford) (see above)
Farm News article on SRP 9 project (Boucher)
FOTT project update report (Boucher)
Updated FSA expense tables (Ford) (not included)
Coarse sediment supply tables (Mierau) (not included)
Bobcat Flat "Instream Restoration 2" project description sheet (Boucher)
Big Bend project area drawing (Koepele)
Basin runoff index and FERC flow volume information (Ford)
Restoration project timing charts and funding summary (Fryer and Ford)
Draft Riverine Stakeholder MOU (Crow) (not included)

Actions:

Approval to contribute $50,000-75,000 to the long-term coarse sediment project.

Approval to pay McBain & Trush up to $5,000 to prepare the CALFED coarse sediment submittal, subject to CCSF concurrence.

A TRTAC support letter to FOTT for Bobcat Flat channel restoration will be provided.

TRTAC support letters to TRPT for Big Bend and La Grange area restoration will be provided.

13DEC2001 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

TRTAC materials list since the SEP meeting (Ford)
Restoration project monitoring budget allocation (Fryer)
Proposed FERC Report schedule (Ford) (not included)
Updated FSA expense tables (Ford) (not included)
Daily water teperature graphs (Ford) (not included)
Air temperature and water temperature graph (Ford)

7/11 project modification proposal (Fryer) (not included)
Restoration project timing chart (Ford)
Project vegetation memo and plant list (Fryer)
Excerpts from FWS riprapping impacts report (Ford)
Tuolumne River projects listed on CALFED website (Ford)

Actions:

Water temperature and seine/snorkel monitoring was approved at same level of effort as in prior year.

Approved the expenditure of $23,000 to complete the large CWT analysis

Approved a large CWT test (125,000 smolts + 25,000 for efficiency) at flows in the 3,000 to 5,000 cfs range or 650-2000 this spring, the subgroup to reevaluate the Smolt Survival Agreement especially considering CALFED science panel genetic issues, and authorized DFG to proceed with purchase of the tags for the study this spring.

Agreed to (a) reduce the total number of redds in the emergence study from 20 to 12 and to (b) allow the use of eyed eggs if no more spawning female salmon entered the Merced Hatchery trap over the next few days. (Note: Eyed eggs were eventually used.)

3.7 2002 TRTAC Meeting Materials

20MAR2002 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

07FEB2002: letter reviewing the 2001 fall pulse flow and 45-day period (TID) (see Attachment A)
13MAR2002: agenda, meeting notes, expense summary, FERC report contents list, and draft CWT analysis report introduction (Ford) (notice only included)
14MAR2002: notification of Tuolumne AMF Report posted on AFRP website (Ford) (not included)
15MAR02: Coded-wire-tag Summary Update Report (Kirihara) (in 2001 FERC Report)
18MAR2002: Permeability Monitoring Proposal (Hume)
19MAR2002: DFG 2001 rotary screw trap report (Heyne) (in 2001 FERC Report)

Handouts (from Ford):

TRTAC materials since the 13DEC2001 meeting (Ford)
FSA expense summary information (Ford) (not included)
NOAA funding and restoration opportunities (Martinez)
Water year basin index forecasts (Ford) (not included)

Actions:

Roger Masuda will attend NMFS meeting on 29MAR in Sacramento.
Roger Masuda to draft a letter for TRTAC to the Governor re: filling DFG biologist position
Wilton Fryer to review 1600 Permit conditions for bridge replacements with C. Mayott of DFG
DFG is to provide copies of the 2001 spawning survey data sheets to TID and to provide copies to TID every two weeks during the survey season starting in 2002
The SNTEMP model code and report on the temperature model is to be provided to Marston
DFG is to provide their recent thermograph data to TID and then TID will distribute the combined thermograph data to the TRTAC

Follow-up Correspondence

21MAR: Notice of Tuolumne fisheries discussion, 3-29 at NMFS office in Sacramento (Blanco)
22MAR: TRTAC Permeability Scope and Budget Revision (Hume)
27MAR: Updated Water Year Classification Index letter (see Attachment A)
27MAR: 2001 FERC Report cover letter (Ford) (not included)
27MAR: TRTAC distribution list file (Ford) (not included)

01APR: FWS concurrence on TRTAC Permeability Scope and Budget Revision (not included)
12APR: Updated VAMP 2002 daily operations plan (notice only included)
18APR: Initial FERC flow schedule for 2002-2003 fish flow year (see Attachment A)
07MAY: Correspondence re: FSA biologist position (CCSF & DFG)
14MAY: Support letter for J. Stella application to CALFED Science Fellows Program (Fryer)
23MAY: Draft meeting notes (Ford) (not included)
11JUN: Update of spring flow schedule and releases (Ford)
12JUN: Stranding survey summary (Ford)

19JUN2002 Meeting:

Agenda, meeting notes, and attendance list

Correspondence
13JUN2002: meeting notice and agenda (Ford) (not included)

Handouts (from Ford):
Revised TRTAC materials list since the 13DEC01 meeting (Ford)
TRTAC materials list since the 20MAR meeting (Ford)
Draft agenda for 28AUG flow schedule workshop (Ford) (not included)
Updated FSA expense tables and graph (Ford) (not included)
11JUN letter from NMFS to FERC (Ford)
'Lower Tuolumne River Corridor and Its Lands' map booklet (Koepele)
Updated table of TRTAC restoration project list (Ford)
Restoration project status update (Fryer)

Presentation:
RWQCB water quality monitoring and TMDL programs

Actions:
Recognition of prior approval for $9,000 on gravel monitoring work by SWS
Subgroup workshop on flow schedules set for 28AUG in Stockton

26SEP2002 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):
Material List since June meeting (Ford) (see above)
List of FERC Fish Flow Schedule correspondence since Water Year 1996 (Ford)
Updated FSA expense tables (Ford) (not included)
Graphs of 2001-2 flow schedule volume changes using 50% and 90% forecasts (TID)
Coarse sediment supply tables (Mierau) (not included)

FOTT items of interest sheet (Boucher)
Restoration project status and funding summary (Fryer)

Presentation:
IMPACT software program by Dr. Chris Bowles (Philip Williams and Assoc.)

18DEC2002 Meeting:

Agenda, meeting notes, and attendance list

Correspondence
02OCT: Flow schedule update letter dated 30SEP (TID) (in flow correspondence section)

Handouts (from Ford):
TRTAC materials list since the SEP meeting (Ford)
TRTAC distribution list (Ford)
Proposed FERC Report schedule (Ford) (not included)
Updated FSA expense tables (Ford) (not included)
NOAA Fisheries Scientific Permit Application Information (Martinez)
List of 1996-2001 Technical Reports submiited to FERC (Ford)
Watershed status (Ford)
Flow schedule process information (Masuda)
50% vs. 90% forecast difference for initial flow scheduling (TID)
Restoration project status and planning (Fryer and Ford)
Hatchery fish concerns from Independent Scientific Advisory Board (Ford)

Actions:
The Monitoring subgroup is to address remaining funding in more detail at their January 2003 meeting.
DFG was authorized to purchase a block of 150,000 CW tags at the reduced advance price of $90 per 1000 tags ($13,500). These would be refunded by other projects if not used in future TRTAC studies.

3.8 2003 TRTAC Meeting Materials

19MAR2003 Meeting:

Agenda, meeting notes, and attendance list
04FEB2003: letter reviewing the 2002 fall pulse flow and 45-day period (TID) (see Attachment A)
14FEB2003: 29JAN subgroup meeting notes

Handouts (from Ford):
TRTAC materials since the 13DEC2001 meeting (Ford)
Watershed snowpack and precipitation data (Ford) (not included)
14MAR SWS memo packet on oversummering habitat for steelhead (Hume)
17MAR SWS memo on GIS task cost estimates (Hume)
Restoration project status update (Fryer)
News article on smaller eggs at salmon farms (Ford)

Actions:
Monitoring spending allocations were not changed from those made at the JAN subgroup meeting

Follow-up Correspondence
18APR: Initial Fish Flow Year schedule letter (see Attachment A)
20MAY: Revised flow schedule letter (see Attachment A)

24JUN2003 Meeting:

Agenda, meeting notes, and attendance list
Summary of 13JUN flow schedule decisions
20JUN2003: meeting notice and agenda (Ford) (not included)

Handouts (from Ford):
TRTAC materials list since the 18MAR meeting (Ford)
Updated FSA expense tables (Ford) (not included)
Fish flow volume and schedule (Ford)
Flow and air temperature data (Ford)
Flow and stage at La Grange data (Ford)
Snorkel summary to date (Ford)
Restoration project status update (Fryer)

Presentation:
RWQCB water quality monitoring and TMDL programs

Actions:
Decision on summer flow operation

Follow-up Correspondence

25JUN: Summary of 24JUN flow schedule decision (Ford)
03JUL: Flow schedule letter of 30JUN from Districts (see Attachment A)

25SEP2003 Meeting:

Agenda, meeting notes, and attendance list

Handouts (from Ford):

Materials list since September meeting (Ford)
August letter from FERC to the Districts requesting steelhead information
Updated FSA expense tables (Ford) (not included)
Graph/table of summer flow schedule and air temperatures (Ford)
Graph of observed first dates of La Grange salmon sightings (Ford - not included)
Proposed fall flow schedules (DFG and Ford)
Restoration project status and funding summary (Fryer)
La Grange floodplain restoration proposal to Wildlife Conservation Board (Koepele)

17DEC2003 Meeting:

Agenda, meeting notes, and attendance list

Correspondence

15OCT: Flow schedule update letter dated 09OCT (TID) (see Attachment A)
15DEC: Memo from McBain and Trush on coarse sediment project
16DEC: TRTAC materials list (Ford) and potential steelhead concerns from FERC (Gaedeke)

Handouts (from Ford):

Updated FSA expense table/graph (Ford) (not included)
CCRF Section 10 permit application (Mesick)
CCRF restoration designs and presentation (Mesick)
Restoration project status and gravel addition project scope change (Fryer)

Actions:

Several followup actions related to trout were identified (see list below)
Fryer was approved to submit Gravel Project amendment

Follow-up Correspondence

18DEC: Source of trout WT info used in 01DEC filing and limited DO data (Ford)
18DEC: Trout WT criteria information (Martinez) (report cover included)
19DEC: Comments on trout WT criteria (Bevelheimer)
19DEC: New DFG fishing stamp information (Ford)

19DEC: Habitat maps for La Grange Dam to Roberts Ferry Bridge from M&T (Ford)

22DEC: Central Valley trout genetics report and north coast survey protocol (Heyne) (cover/abstract included)

APPENDIX C

Don Pedro Project License Articles 39 and 58 Technical Report List by Topic (1992–2004)

Table of Contents

1 DON PEDRO PROJECT LICENSE ARTICLES 39 AND 58 TECHNICAL REPORT LIST BY TOPIC (1992–2004)

1.1 Salmon Population Models

1992 Appdx. 1: Population Model Documentation
1992 Appdx. 26: Export Mortality Fraction Submodel
1992 Appdx. 2: Stock Recruitment Analysis of the Population Dynamics of San Joaquin River System Chinook salmon
Report 1996-5: Stock-Recruitment Analysis Report

1.2 Salmon Spawning Surveys

1992 Appdx. 3: Tuolumne River Salmon Spawning Surveys 1971-88
Report 1996-1: Spawning Survey Summary Report Attachments:
96-1.1 1986 Spawning Survey Report
96-1.2 1987 Spawning Survey Report
96-1.3 1988 Spawning Survey Report
96-1.4 1989 Spawning Survey Report
96-1.5 1990 Spawning Survey Report
96-1.6 1991 Spawning Survey Report
96-1.7 1992 Spawning Survey Report
96-1.8 1993 Spawning Survey Report
96-1.10 1995 Spawning Survey Report

1996 Spawning Survey Report - Population Estimation Methods
1997-1: 1997 Spawning Survey Report and Summary Update
1998-1: Spawning Survey Summary Update
1999-1: 1998 Spawning Survey Report
1999-2: 1999 Spawning Survey Report (no report from DFG)
1999-3: Spawning Survey Summary Update (no report)
2000-1: 1999 and 2000 Spawning Survey Reports
2000-2: Spawning Survey Summary Update
2001-1: 2001 Spawning Survey Report
2001-2: Spawning Survey Summary Update
2002-1: 2002 Spawning Survey Report
2002-2: Spawning Survey Summary Update
2003-1: Spawning Survey Summary Update
2004-1: 2003 and 2004 Spawning Survey Reports
2004-2: Spawning Survey Summary Update

1.3 Juvenile Salmon Studies

1992 Appdx. 10: 1987 Juvenile Chinook salmon Mark-Recapture Study
1992 Appdx. 12: Data Reports: Seining of Juvenile Chinook salmon in the Tuolumne, San Joaquin, and Stanislaus Rivers, 1986-89

1992 Appdx. 20: Juvenile Salmon Pilot Temperature Observation Experiments
Report 1996-2: Juvenile Salmon Summary Report Attachments
96-2.1 1986 Snorkel Survey Report
96-2.2 1988-89 Pulse Flow Reports
96-2.3 1990 Juvenile Salmon Report
96-2.4 1991 Juvenile Salmon Report
96-2.5 1992 Juvenile Salmon Report
96-2.6 1993 Juvenile Salmon Report
1994 Juvenile Salmon Report
1995 Juvenile Salmon Report
1996 Juvenile Salmon Report
1997-2: 1997 Juvenile Salmon Report and Summary Update
1998-2: 1998 Juvenile Salmon Report and Summary Update
1999-4: 1999 Juvenile Salmon Report and Summary Update
2000-3: 2000 Seine/Snorkel Report and Summary Update
2001-3: 2001 Seine/Snorkel Report and Summary Update
2002-3: 2002 Seine/Snorkel Report and Summary Update
2003-2: 2003 Seine/Snorkel Report and Summary Update
2004-3: 2004 Seine/Snorkel Report and Summary Update

1.4 Fluctuation Assessments

1992 Appdx. 14: Fluctuation Flow Study Report
1992 Appdx. 15: Fluctuation Flow Study Plan: Draft
Report 2000-6: Tuolumne River Chinook Salmon Fry and Juvenile Stranding Report

1.5 Screw Trap and Smolt Monitoring Evaluations

1992 Appdx. 21: Possible Effects of High Water Temperature on Migrating Salmon Smolts in the San Joaquin River
1992 Appdx. 25: Preliminary Summary Smolt Survival Study (no report from DFG)
1992 Appdx. 22: Lower Tuolumne River Predation Study Report
1992 Appdx. 23: Effects of Turbidity on Bass Predation Efficiency
1996-12: Screw Trap Monitoring Report: 1995-96
1996-13: Coded-wire Tag Summary Report
1997-3: 1997 Screw Trap and Smolt Monitoring Report
1998-3: 1998 Tuolumne River Outmigrant Trapping Report
1998-4: 1998 Smolt Survival Peer Review Report
1998-5: CWT Summary Update
1999-5: 1999 Tuolumne River Upper Rotary Screw Trap Report
1999-7: Coded-wire Tag Summary Update
2000-4: 2000 Tuolumne River Smolt Survival and Upper Screw Traps Report
2000-5: 1999-2000 Grayson Screw Trap Report
2000-8: Coded-wire Tag Summary Update
2001-4: 2001 Grayson Screw Trap Report
2001-5: Large CWT Smolt Survival Analysis

2001-6: Coded-wire Tag Summary Update
2002-4: Large CWT Smolt Survival Analysis
2002-5: Coded-wire Tag Summary Update
2003-3: Coded-wire Tag Summary Update
2004-4: 1998, 2002, and 2003 Grayson Screw Trap Reports
2004-5: 2004 Grayson Screw Trap Report
2004-7: Large CWT Smolt Survival Analysis Update
2004-8: Coded-wire Tag Summary Update

1.6 Fish Community Assessments

1992 Appdx. 24: Effects of Introduced Species of Fish in the San Joaquin River System
1992 Appdx. 27: Summer Flow Study Report 1988-90
Report 1996-3: Summer Flow Fish Study Annual Reports: 1991-94 Attachments:
96-3.1 1991 Report
96-3.2 1992 Report
96-3.3 1993 Report
96-3.4 1994 Report
2001-8: Distribution and Abundance of Fishes Publication
2002-9: Publication on the Effects of Flow on Fish Communities

1.7 Invertebrate Reports

1992 Appdx. 16: Aquatic Invertebrate Studies Report
1992 Appdx. 13: Report on Sampling of Chinook Salmon Fry and Smolts by Fyke Net and Seine in the Lower Tuolumne River, 1973-86
1992 Appdx. 28: Summer Flow Invertebrate Study
Report 1996-4: Summer Flow Aquatic Invertebrate Annual Reports: 1989-93 Attachments:
96-4.1 1989 Report
96-4.2 1990 Report
96-4.3 1991 Report
1992 Report
1993 Report
1996-9: Aquatic Invertebrate Report
2002-8: Aquatic Invertebrate Report
2004-9: Aquatic Invertebrate Monitoring Report (2003-2004)

1.8 Delta Salmon Salvage

1999-6: 1993-99 Delta Salmon Salvage Report

1.9 Gravel Studies

1992 Appdx. 6: Spawning Gravel Availability and Superimposition Report (incl. map)
1992 Appdx. 7: Salmon Redd Excavation Report
1992 Appdx. 8: Spawning Gravel Studies Report
1992 Appdx. 9: Spawning Gravel Cleaning Methodologies
1992 Appdx. 11: An Evaluation of the Effect of Gravel Ripping on Redd Distribution

1996-6: Redd Superimposition Report
1996-7: Redd Excavation Report
1996-8: Gravel Studies Report: 1987-89
1996-10: Gravel Cleaning Report: 1991-93
2000-7: Tuolumne River Substrate Permeability Assessment and Monitoring Program Report

1.10 Water Temperature and Water Quality

1992 Appdx. 17: Preliminary Tuolumne River Water Temperature Report
1992 Appdx. 18: Instream Temperature Model Documentation: Description and Calibration
1992 Appdx. 19: Modeled Effects of La Grange Releases on Instream Temperatures in the Lower Tuolumne River
1996-11: Intragravel Temperature Report: 1991
1997-5: 1987-97 Water Temperature Monitoring Data Report
2002-7: 1998-2002 Temperature and Conductivity Data Report
2004-10: 2004 Water Quality Report

1.11 IFIM Assessment

1992 Appdx. 4: Instream Flow Data Processing, Tuolumne River
1992 Appdx. 5: Analysis of 1981 Lower Tuolumne River IFIM Data

1.12 Flow and Delta Exports

1997-4: Streamflow and Delta Water Export Data Report
2002-6: 1998-2002 Streamflow and Delta Water Export Data Report
2003-4: Review of 2003 Summer Flow Operation

1.13 Habitat Improvement and Mapping

1996-14: Tuolumne River GIS Database Report and Map
1999-8: A Summary of the Habitat Restoration Plan for the Lower Tuolumne River Corridor
1999-9: Habitat Restoration Plan for the Lower Tuolumne River Corridor
1999-10: 1998 Restoration Project Monitoring Report
1999-11: 1999 Restoration Project Monitoring Report
2001-7: Adaptive Management Forum Report
2004-12: Coarse Sediment Management Plan
2004-13: Tuolumne River Floodway Restoration (Design Manual)

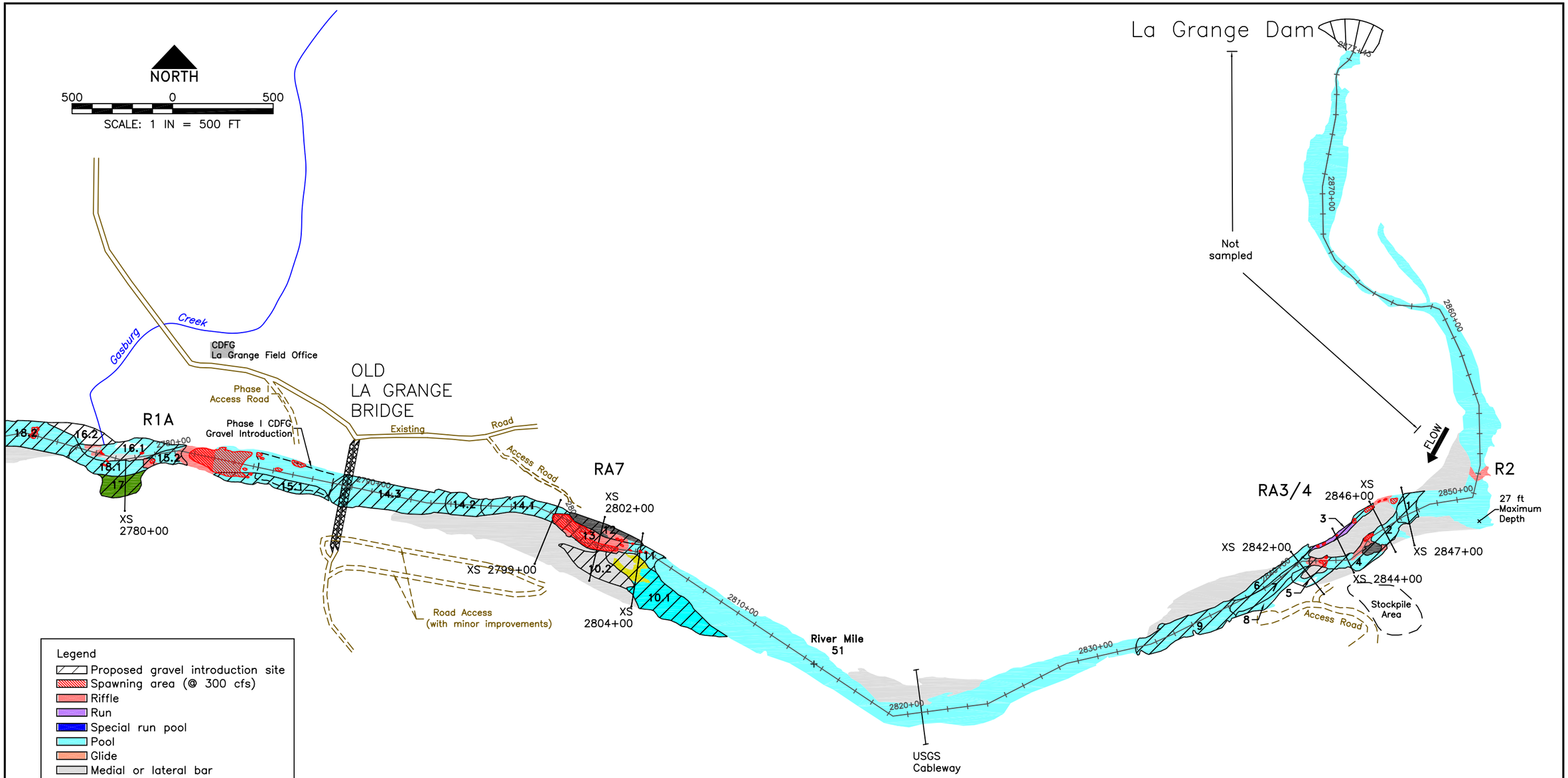
1.14 General Monitoring Information

2002-10: 2001-2002 Annual CDFG Sportfish Restoration Report

APPENDIX D

Salmonid Habitat Maps for the Lower Tuolumne River

Table of Contents



TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 1 OF 11

McBain & Trush 2002

2/22/02

NORTH

500 0 500

SCALE: 1 IN = 500 FT

NEW
LA GRANGE
BRIDGE (J59)

R3A

R2

R1B

R1A

River Mile
50

River Mile
49

Gasburg Creek

Abandoned
Haul Road

Access Road

Access Road

XS
2735+00

XS
2728+00

XS
2731+00

XS
2722+00

XS
2705+00

XS
2699+00

XS
2702+00

XS 2762+00

XS
2780+00

R3B

R4A

FLOW

McBain & Trush 2002

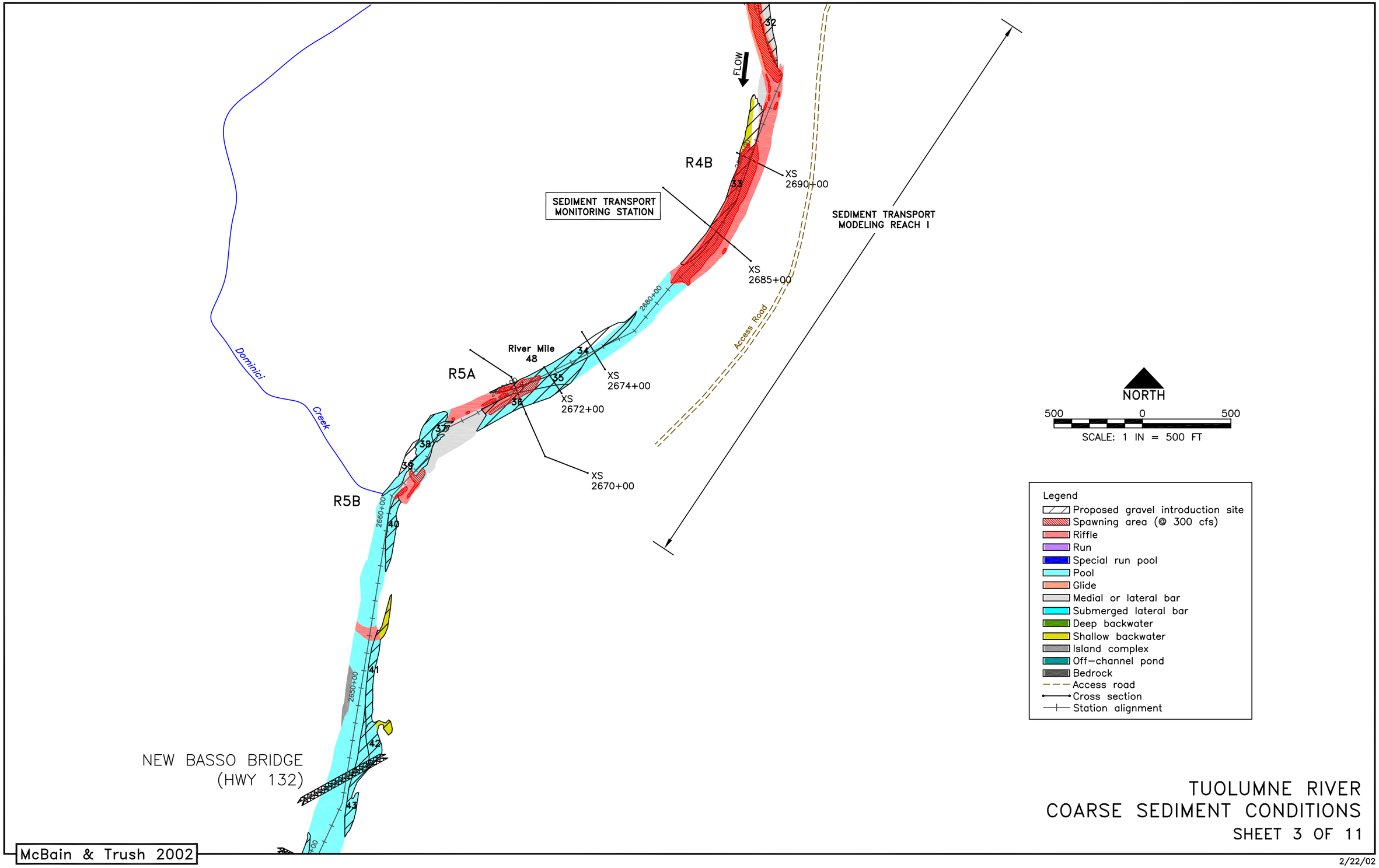
Legend

- Proposed gravel introduction site
- Spawning area (@ 300 cfs)
- Riffle
- Run
- Special run pool
- Pool
- Glide
- Medial or lateral bar
- Submerged lateral bar
- Deep backwater
- Shallow backwater
- Island complex
- Off-channel pond
- Bedrock
- Access road
- Cross section
- Station alignment

TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS

SHEET 2 OF 11

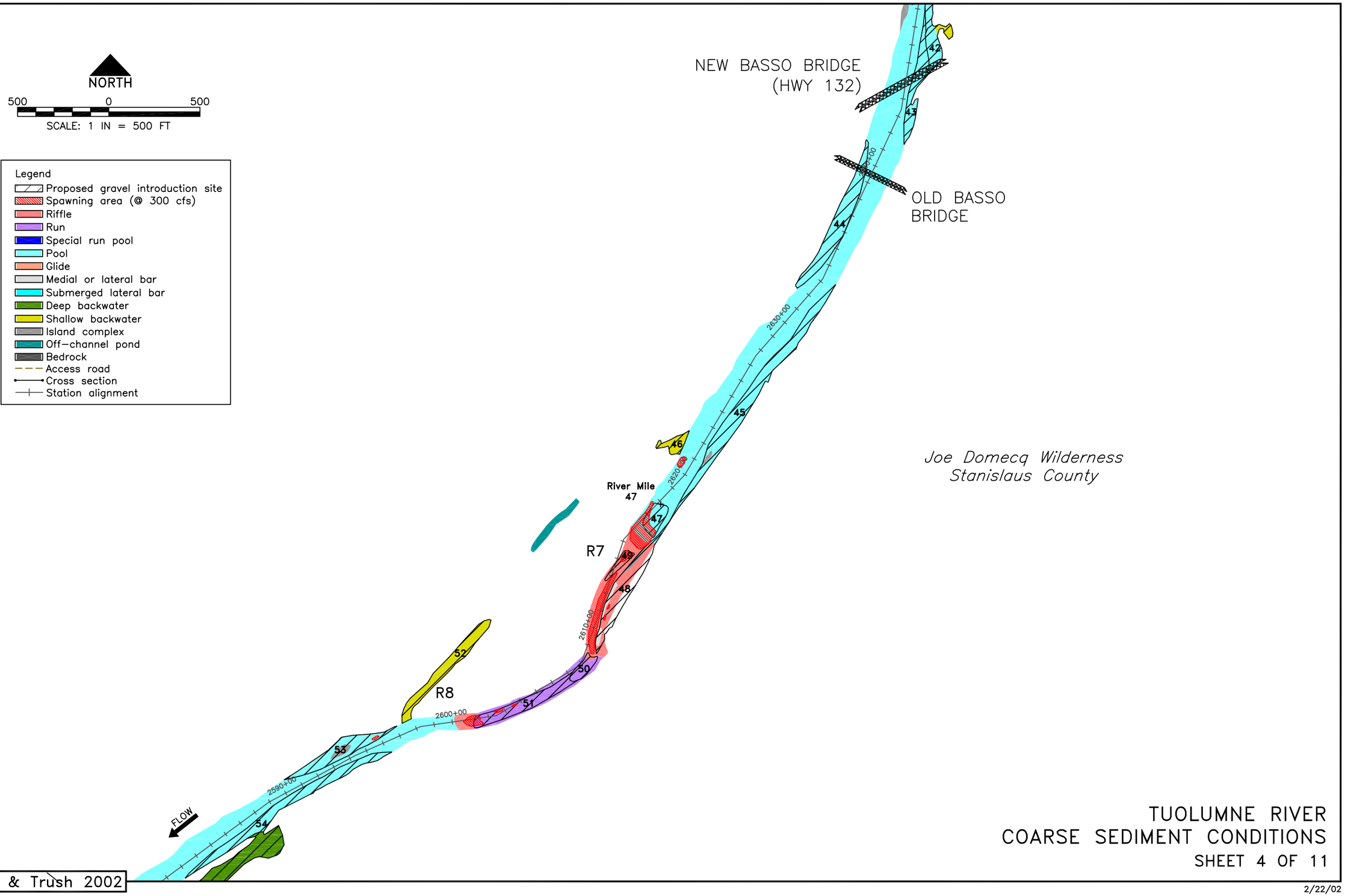
2/22/02

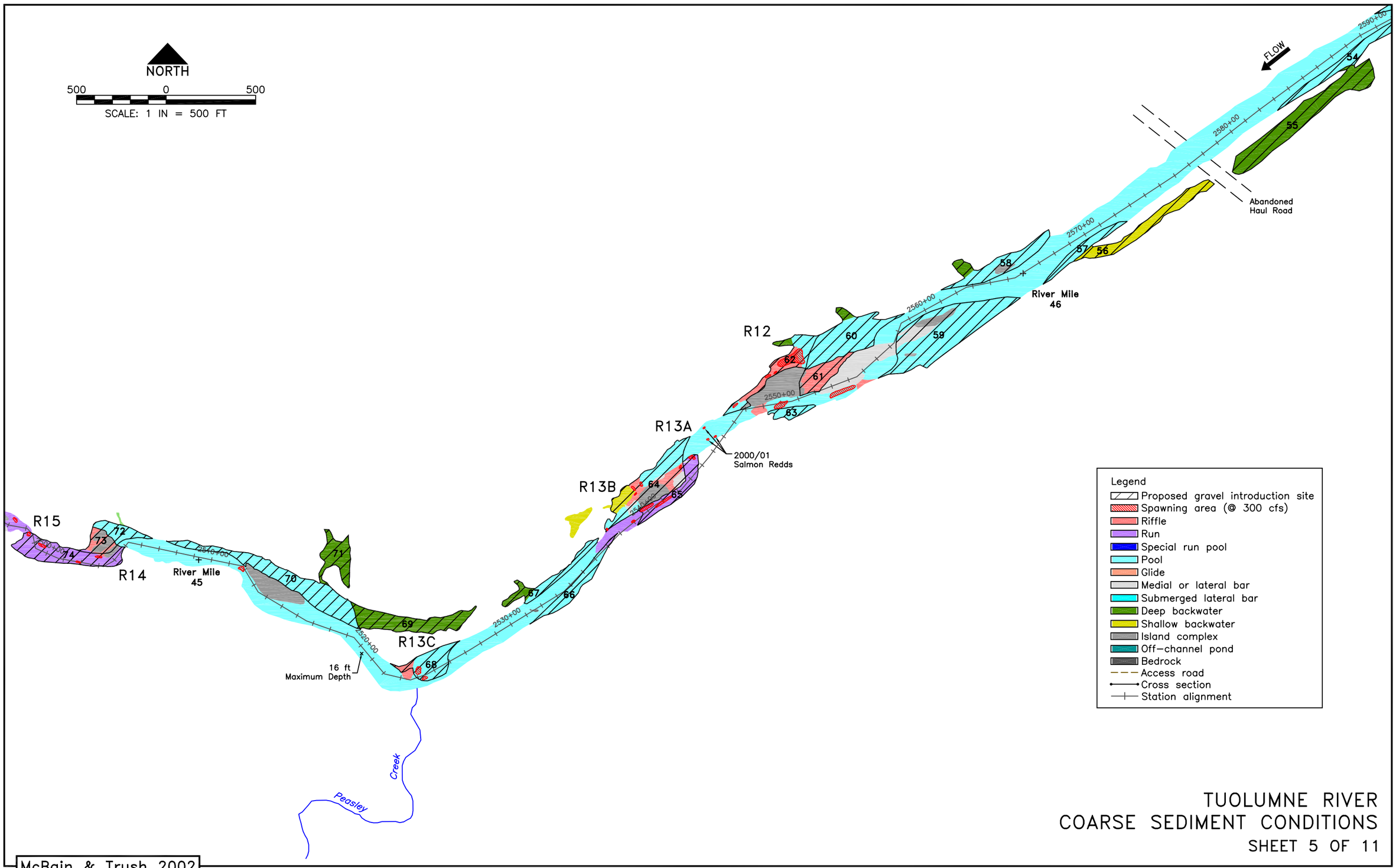


McBain & Trush 2002

TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 3 OF 11

2/22/02

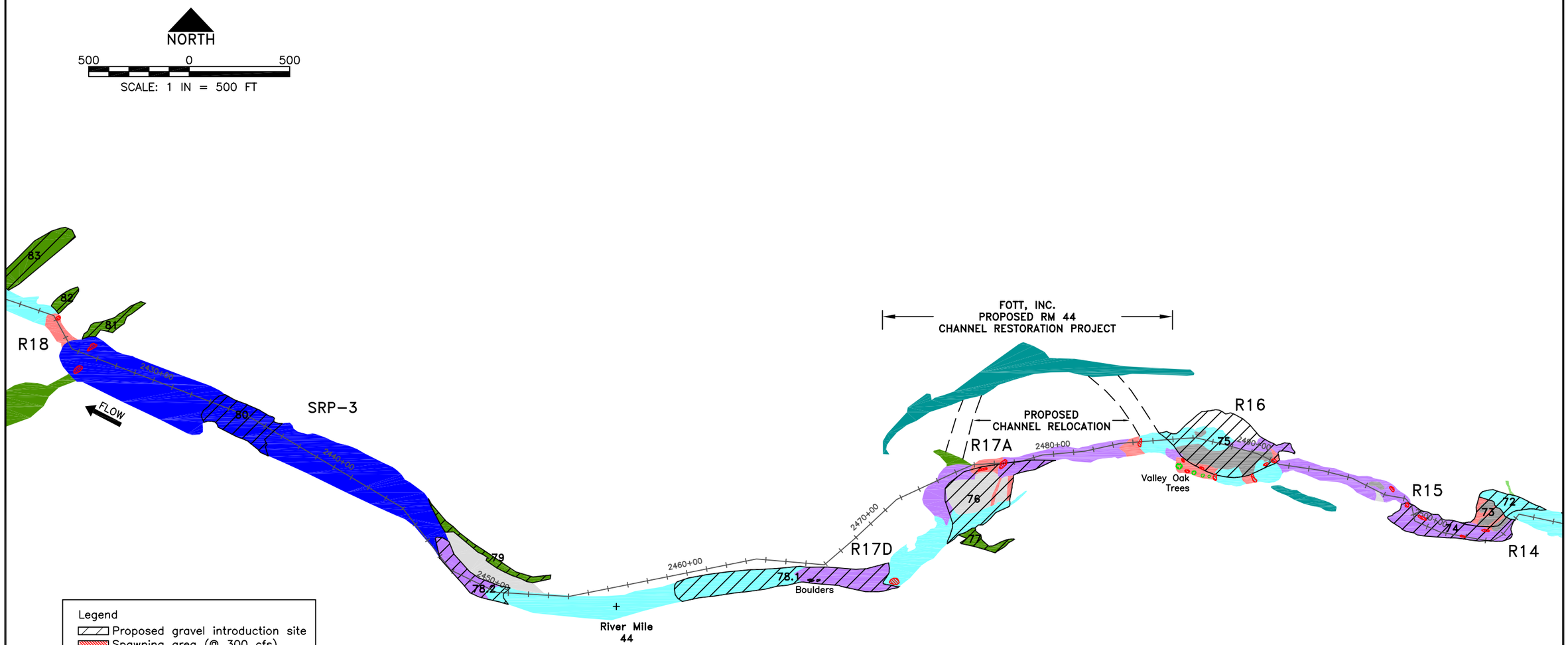

NORTH
500 0 500
SCALE: 1 IN = 500 FT
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
NEW BASSO BRIDGE
(HWY 132)
OLD BASSO
BRIDGE
River Mile
47
R7
R8
2630+00
2620+00
2610+00
2600+00
2590+00
42
43
44
45
46
47
48
49
50
51
52
53
54
FLOW
Joe Domecq Wilderness
Stanislaus County
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 4 OF 11
McBain & Trush 2002
2/22/02



McBain & Trush 2002

TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 5 OF 11

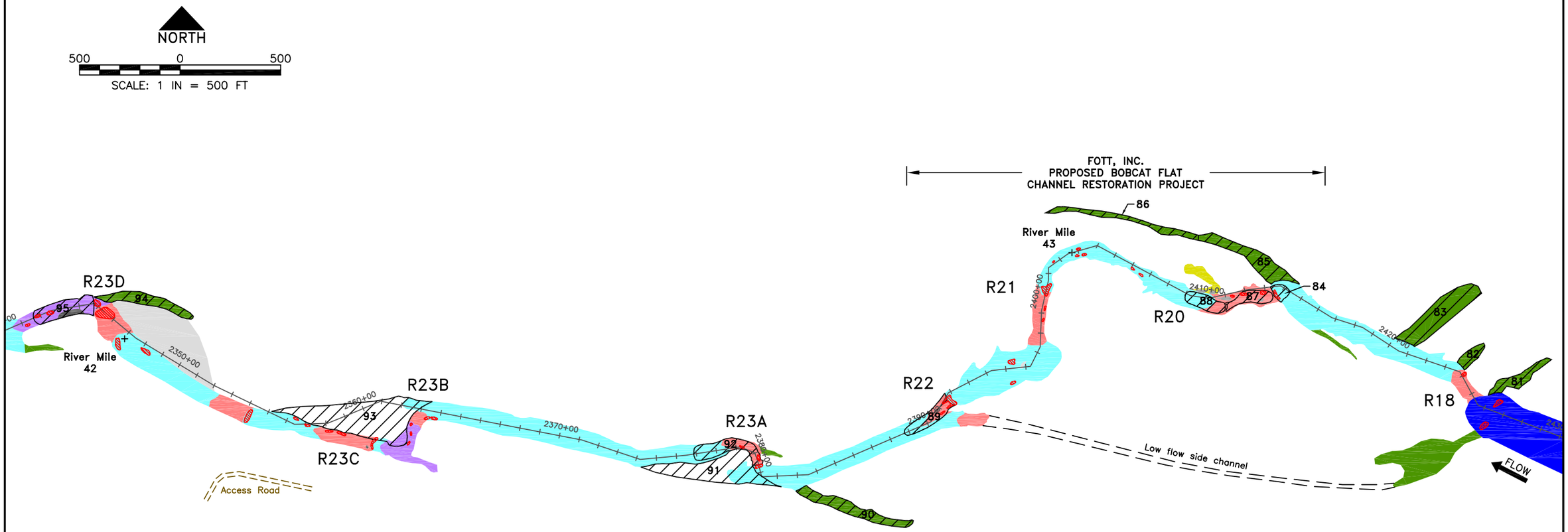
2/22/02



TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 6 OF 11

McBain & Trush 2002

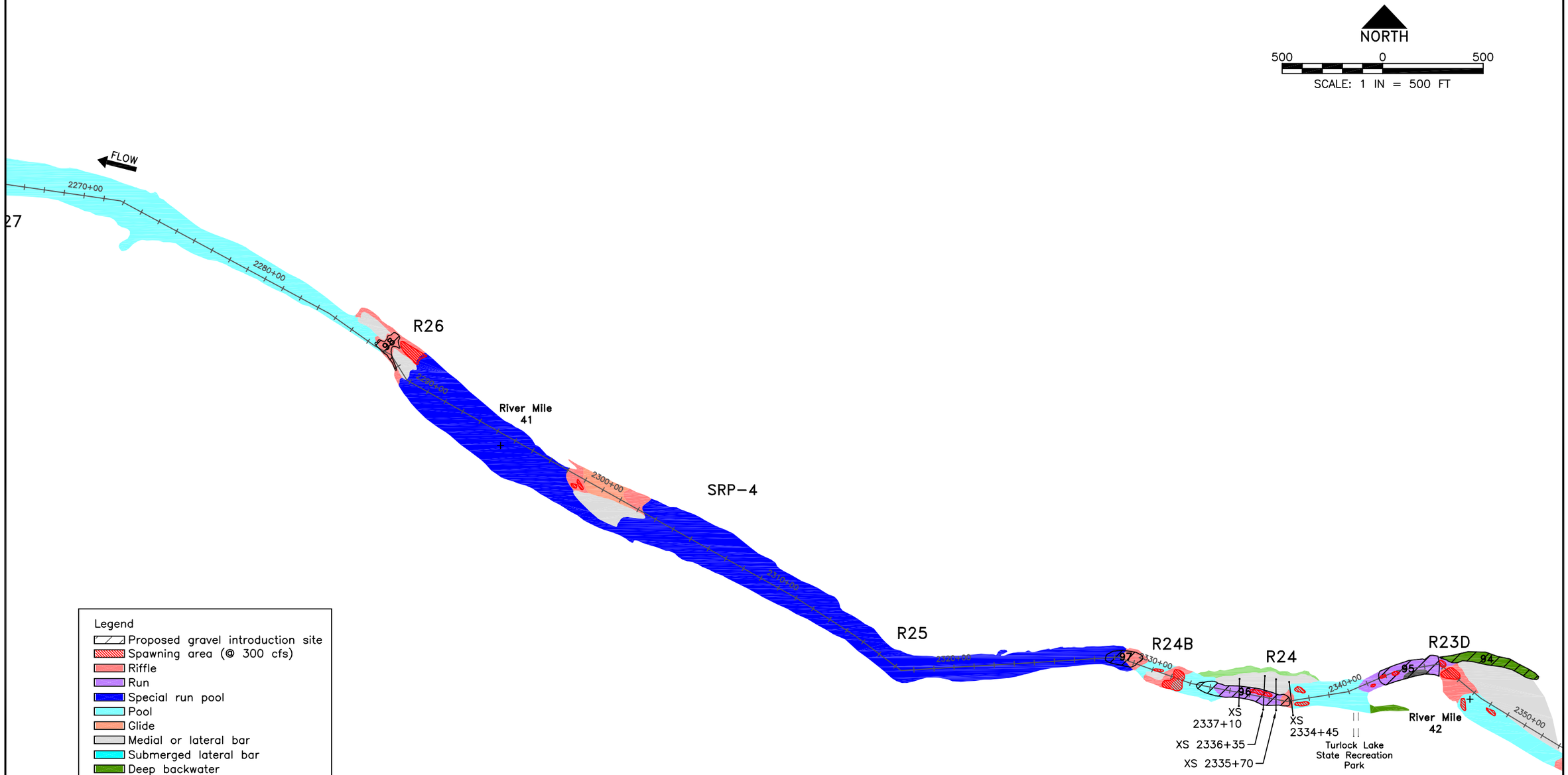
2/22/02



TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 7 OF 11

McBain & Trush 2002

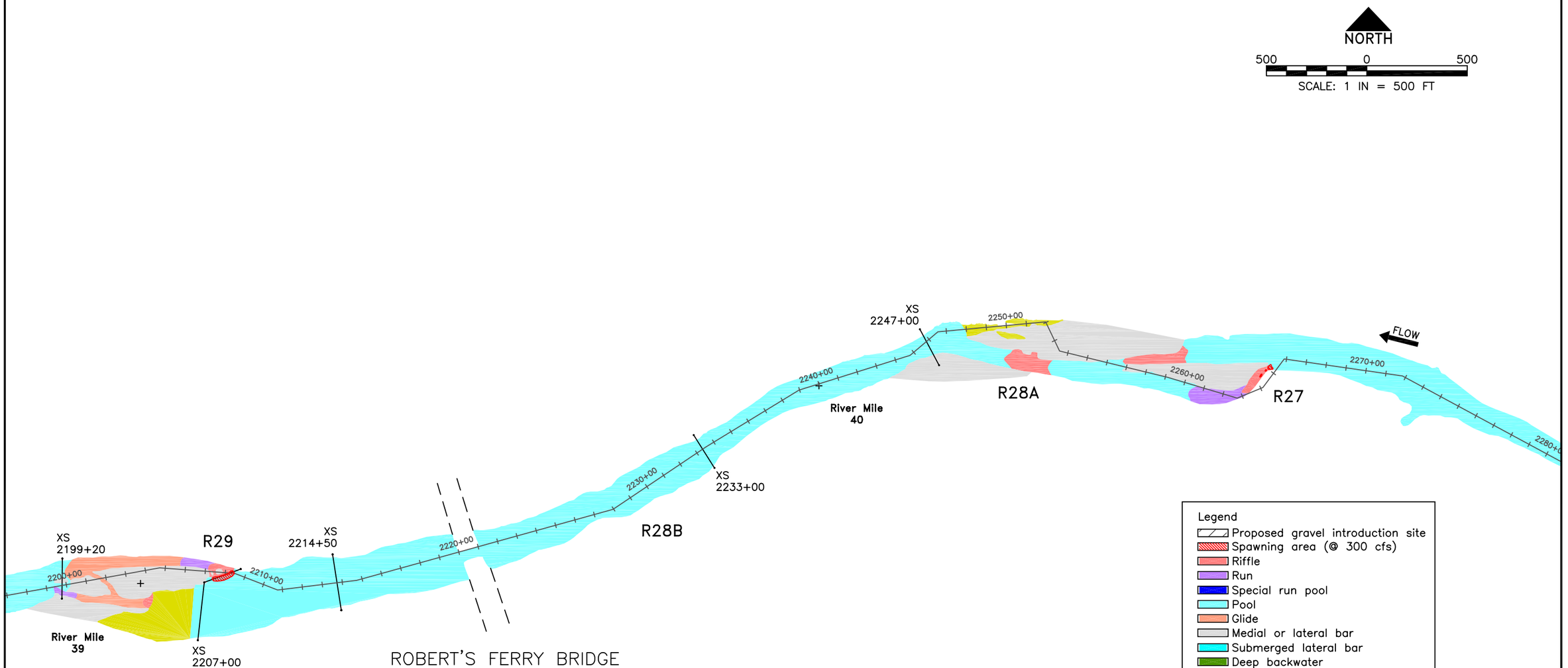
2/22/02



TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 8 OF 11

McBain & Trush 2002

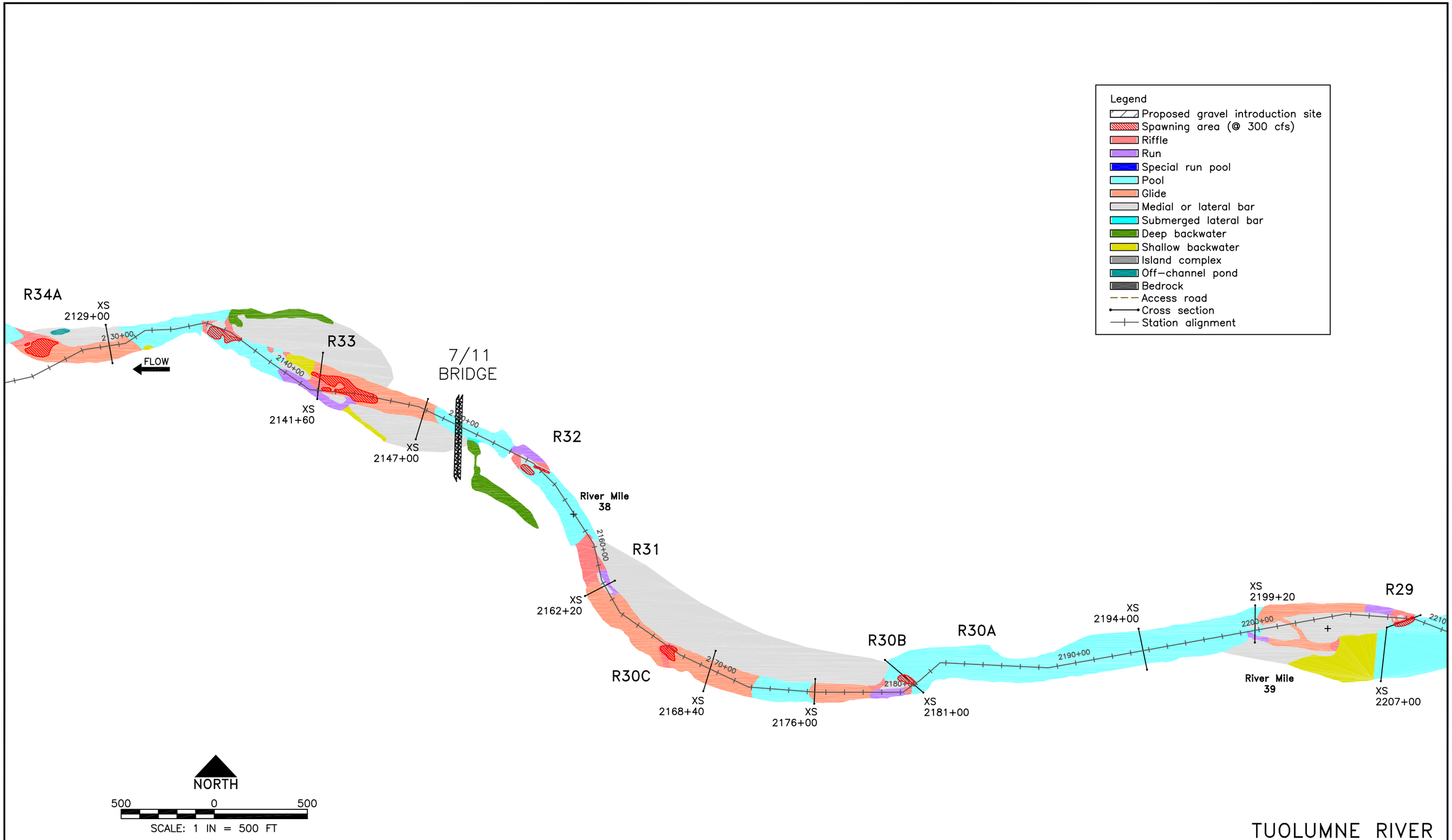
2/22/02



TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 9 OF 11

McBain & Trush 2002

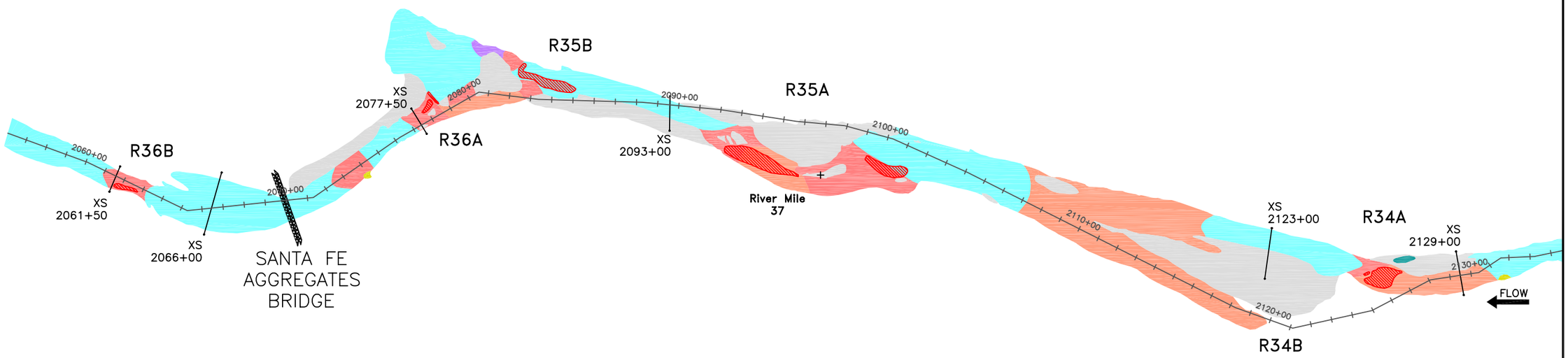
2/22/02


Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
R34A
XS 2129+00
2130+00
FLOW
R33
2140+00
XS 2141+60
7/11 BRIDGE
XS 2147+00
R32
River Mile 38
2160+00
R31
XS 2162+20
R30C
2170+00
XS 2168+40
XS 2176+00
R30B
2180+00
XS 2181+00
R30A
2190+00
XS 2194+00
XS 2199+20
2200+00
R29
River Mile 39
XS 2207+00
NORTH
500 0 500
SCALE: 1 IN = 500 FT
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 10 OF 11
McBain & Trush 2002
2/22/02

NORTH

500 0 500

SCALE: 1 IN = 500 FT



Legend

- Proposed gravel introduction site
- Spawning area (@ 300 cfs)
- Riffle
- Run
- Special run pool
- Pool
- Glide
- Medial or lateral bar
- Submerged lateral bar
- Deep backwater
- Shallow backwater
- Island complex
- Off-channel pond
- Bedrock
- Access road
- Cross section
- Station alignment

TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS

SHEET 11 OF 11

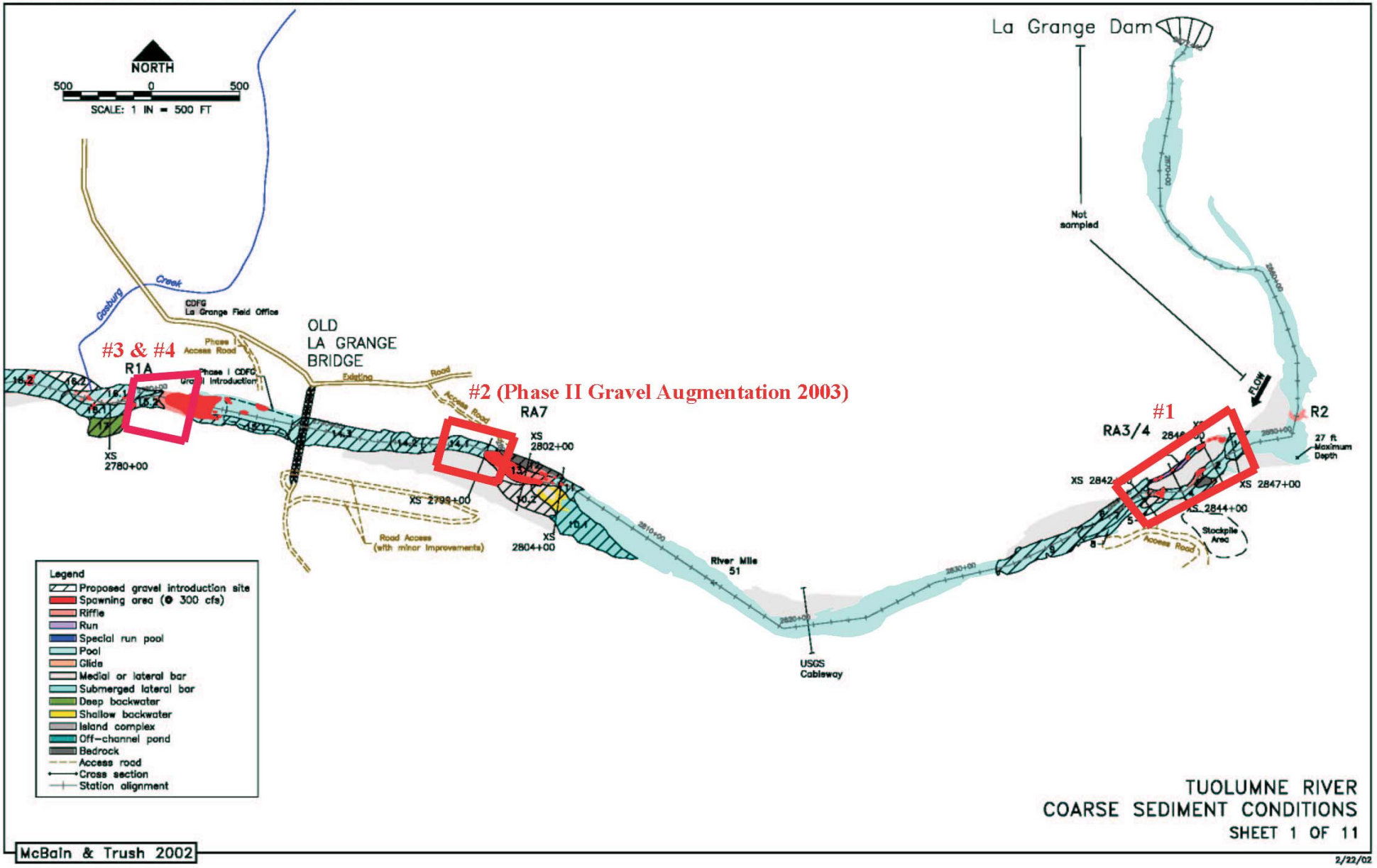
McBain & Trush 2002

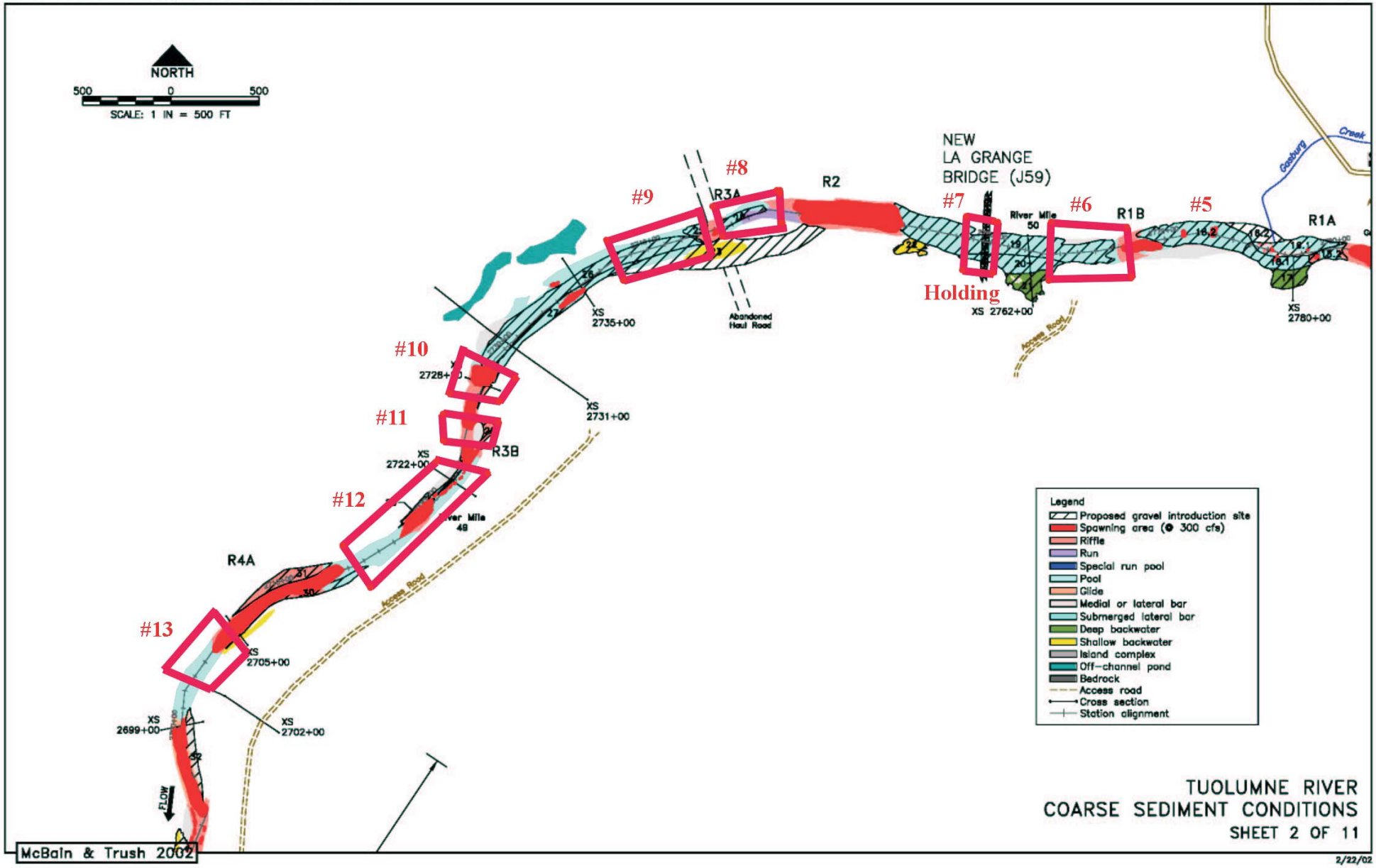
2/22/02

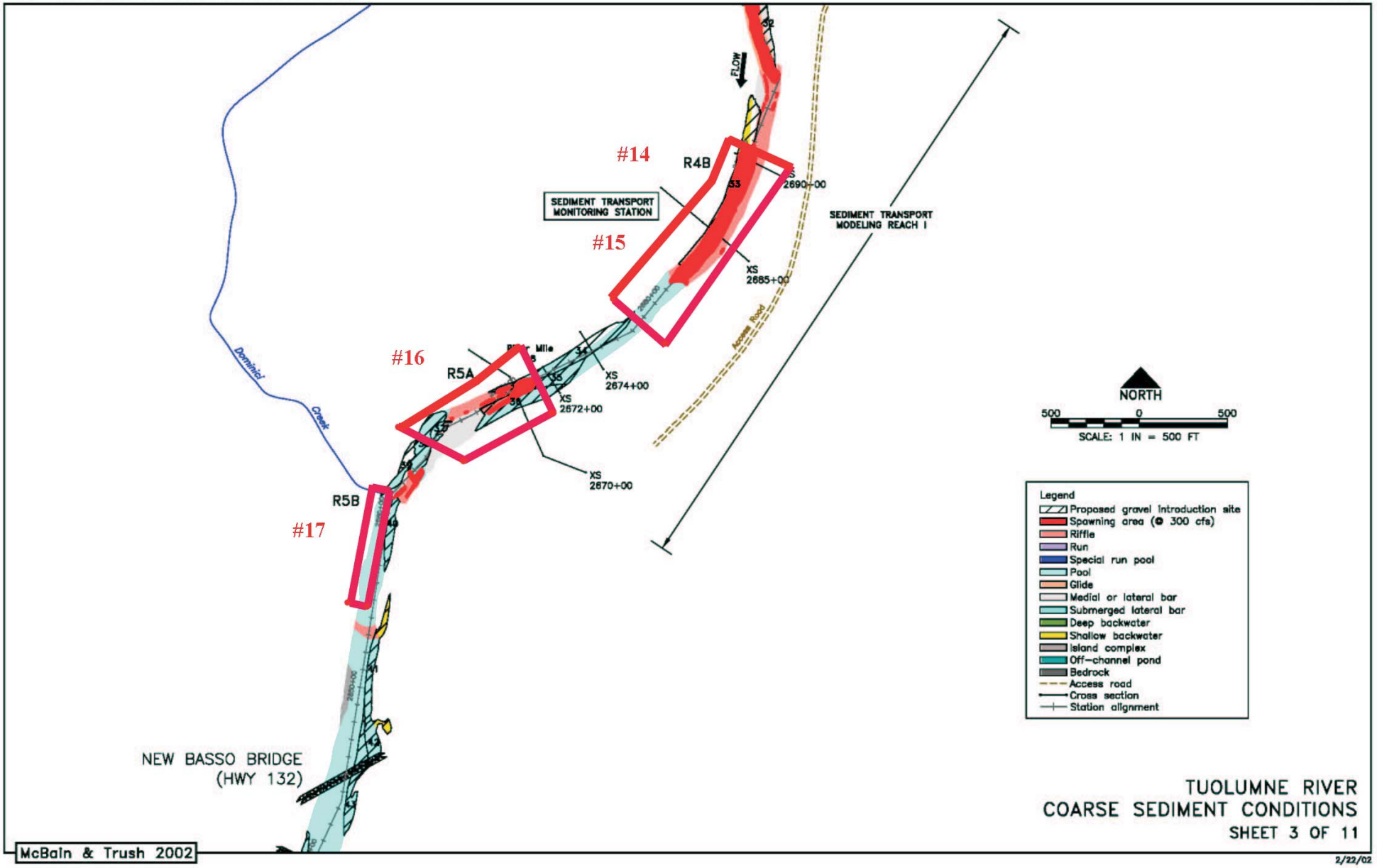
Oncorhynchus mykiss Habitat in the lower Tuolumne River between La Grange Dam and Robert's Ferry Bridge overlain on the McBain and Trush 2002 maps

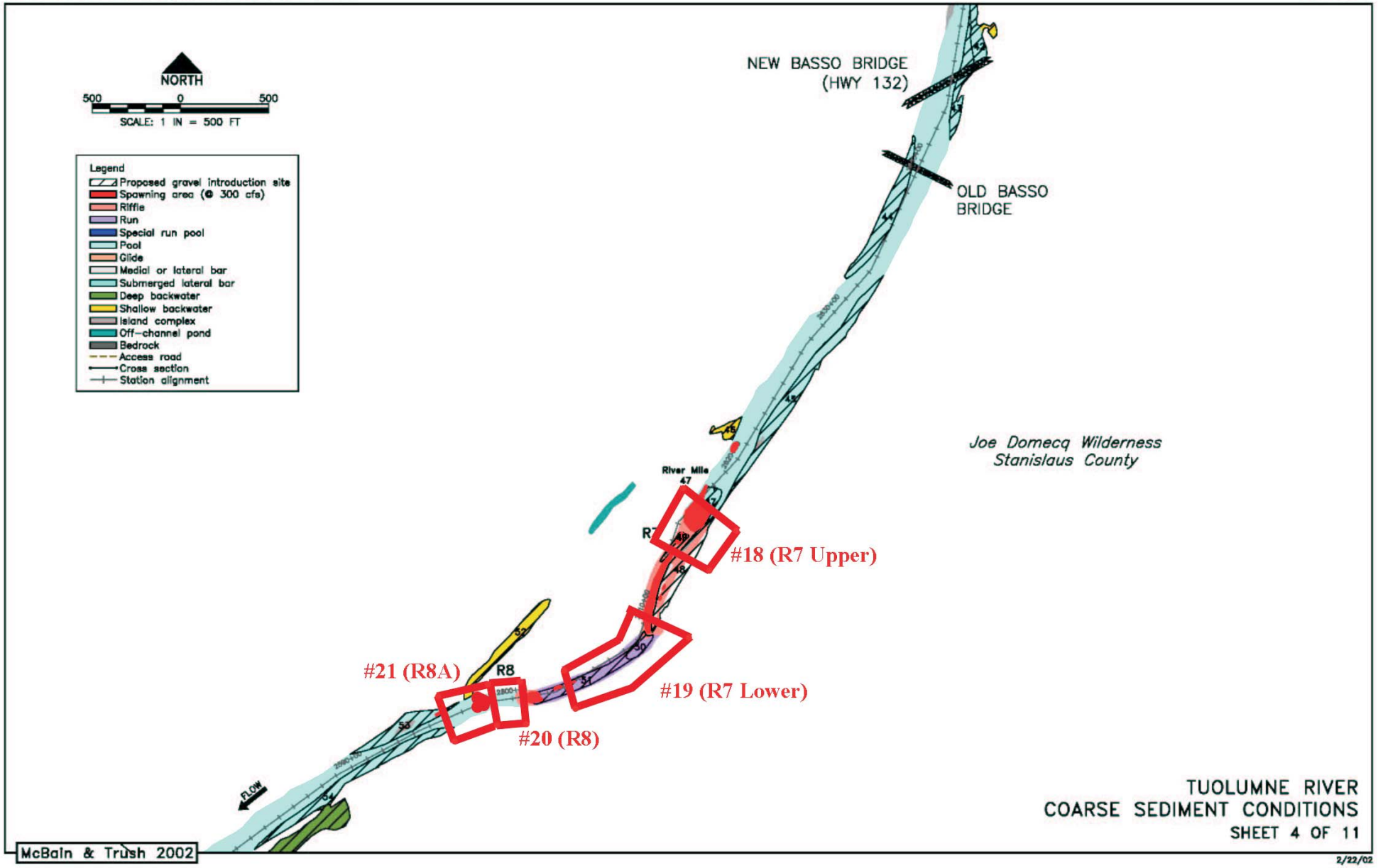
Prepared by

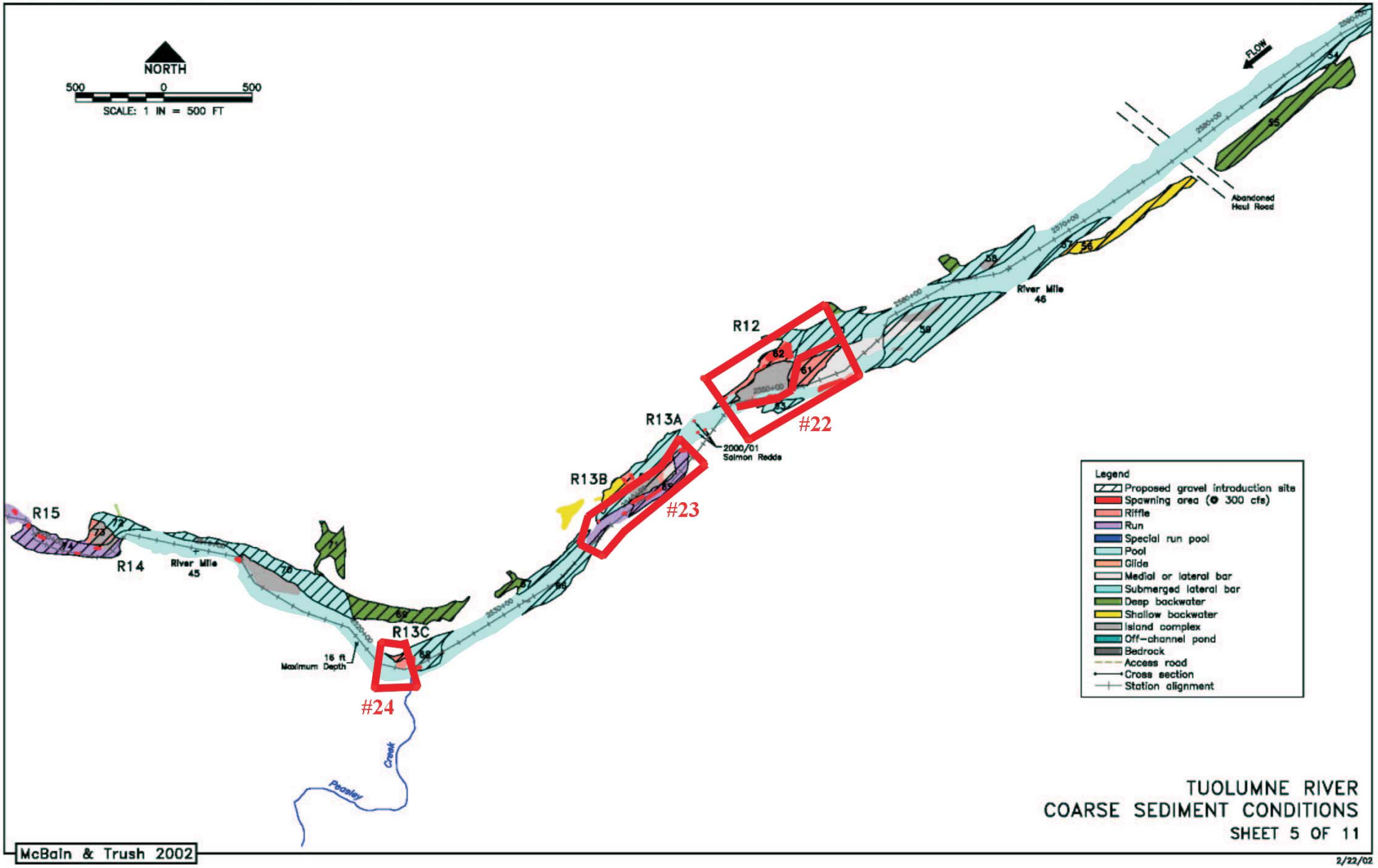
California Rivers Restoration Fund
P.O. Box 236
Soulsbyville, California 95372
Phone (209) 532-7146


NORTH
500 0 500
SCALE: 1 IN = 500 FT
La Grange Dam
Not sampled
FLOW
CDFG La Grange Field Office
OLD LA GRANGE BRIDGE
Existing Road
Access Road
Road Access (with minor improvements)
#3 & #4
R1A
#2 (Phase II Gravel Augmentation 2003)
RA7
#1
RA3/4
R2
XS 2780+00
XS 2799+00
XS 2802+00
XS 2804+00
XS 2842+00
XS 2844+00
XS 2847+00
27 ft Maximum Depth
Stockpile Area
River Mile 51
USGS Cableway
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 1 OF 11
McBain & Trush 2002
2/22/02


NORTH
500 0 500
SCALE: 1 IN = 500 FT
NEW
LA GRANGE
BRIDGE (J59)
#13
#12
#11
#10
#9
#8
#7
#6
#5
R4A
R3B
R3A
R2
R1B
R1A
Holding
XS 2762+00
XS 2735+00
XS 2731+00
XS 2722+00
XS 2705+00
XS 2702+00
XS 2699+00
XS 2780+00
Abandoned Haul Road
Access Road
River Mile 50
River Mile 49
FLOW
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 2 OF 11
McBain & Trush 2002
2/22/02


#14
R4B
SEDIMENT TRANSPORT MONITORING STATION
#15
XS 2690+00
XS 2685+00
SEDIMENT TRANSPORT MODELING REACH 1
FLOW
#16
R5A
XS 2674+00
XS 2672+00
XS 2670+00
Dominici Creek
Access Road
R5B
#17
NEW BASSO BRIDGE (HWY 132)
NORTH
500 0 500
SCALE: 1 IN = 500 FT
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 3 OF 11
McBain & Trush 2002
2/22/02


NORTH
500 0 500
SCALE: 1 IN = 500 FT
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
NEW BASSO BRIDGE
(HWY 132)
OLD BASSO
BRIDGE
Joe Domecq Wilderness
Stanislaus County
River Mile
47
R7
#18 (R7 Upper)
#19 (R7 Lower)
#21 (R8A)
R8
#20 (R8)
FLOW
McBain & Trush 2002
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 4 OF 11
2/22/02


NORTH
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SCALE: 1 IN = 500 FT
FLOW
R15
R14
R13C
R13B
R13A
R12
River Mile 45
River Mile 46
Abandoned Haul Road
2000/01 Salmon Redds
16 ft Maximum Depth
#22
#23
#24
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 5 OF 11
McBain & Trush 2002
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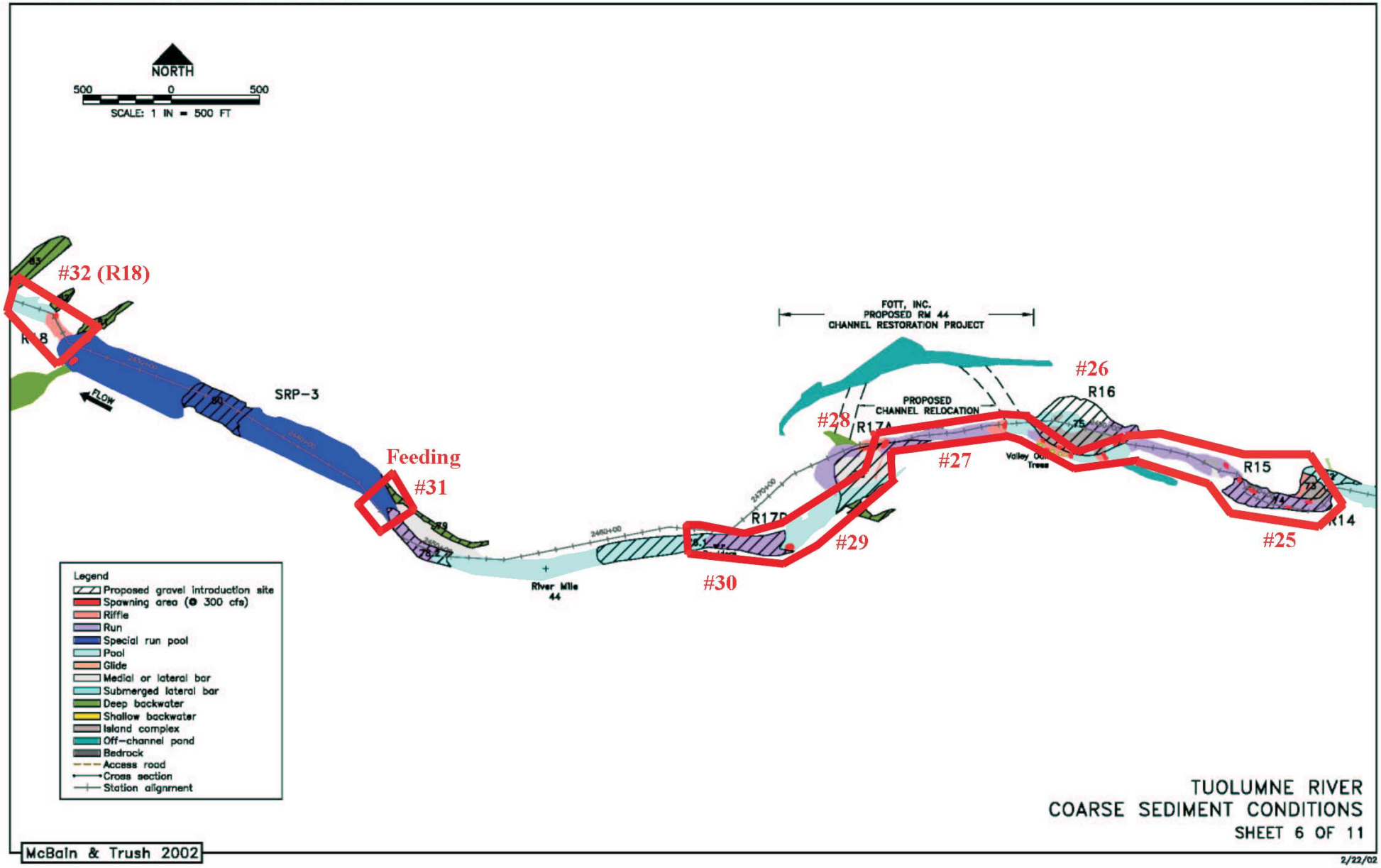
NORTH
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SCALE: 1 IN = 500 FT
#32 (R18)
SRP-3
FLOW
Feeding
#31
FOTT, INC.
PROPOSED RM 44
CHANNEL RESTORATION PROJECT
PROPOSED
CHANNEL RELOCATION
#26
R16
#28
R17A
#27
R15
R14
#25
#29
#30
River Mile
44
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 6 OF 11
McBain & Trush 2002
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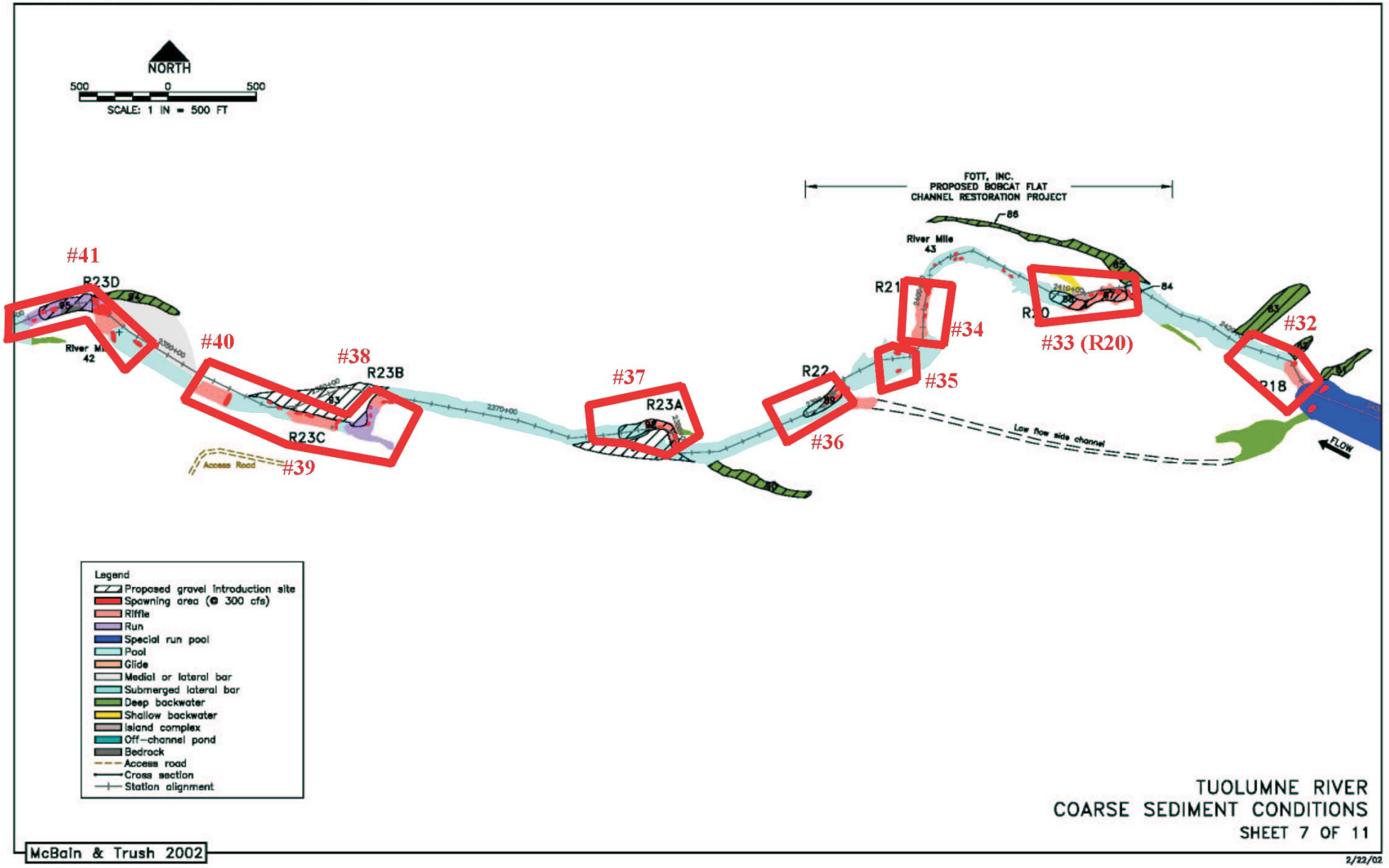
NORTH
500 0 500
SCALE: 1 IN = 500 FT
FOTT, INC.
PROPOSED BOBCAT FLAT
CHANNEL RESTORATION PROJECT
River Mile
43
River Mile
42
#41
R23D
#40
#38
R23B
R23C
#39
Access Road
#37
R23A
R22
#36
R21
#34
#35
R20
#33 (R20)
#32
R18
Low flow side channel
FLOW
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 7 OF 11
McBain & Trush 2002
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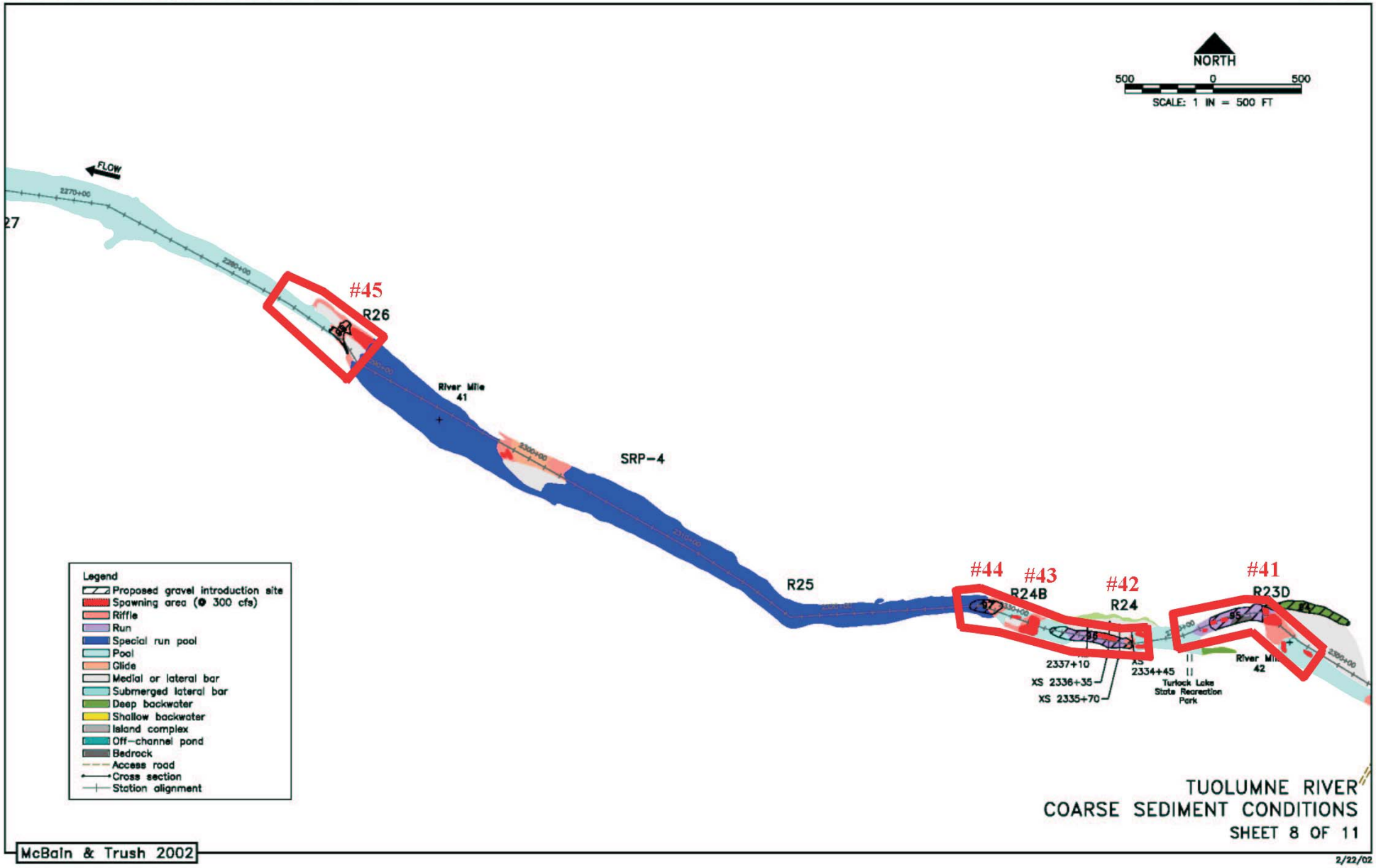
NORTH
500 0 500
SCALE: 1 IN = 500 FT
FLOW
#45
R26
River Mile 41
SRP-4
R25
#44
#43
R24B
#42
R24
#41
R23D
2337+10
XS 2336+35
XS 2335+70
XS 2334+45
Turlock Lake State Recreation Park
River Mile 42
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 8 OF 11
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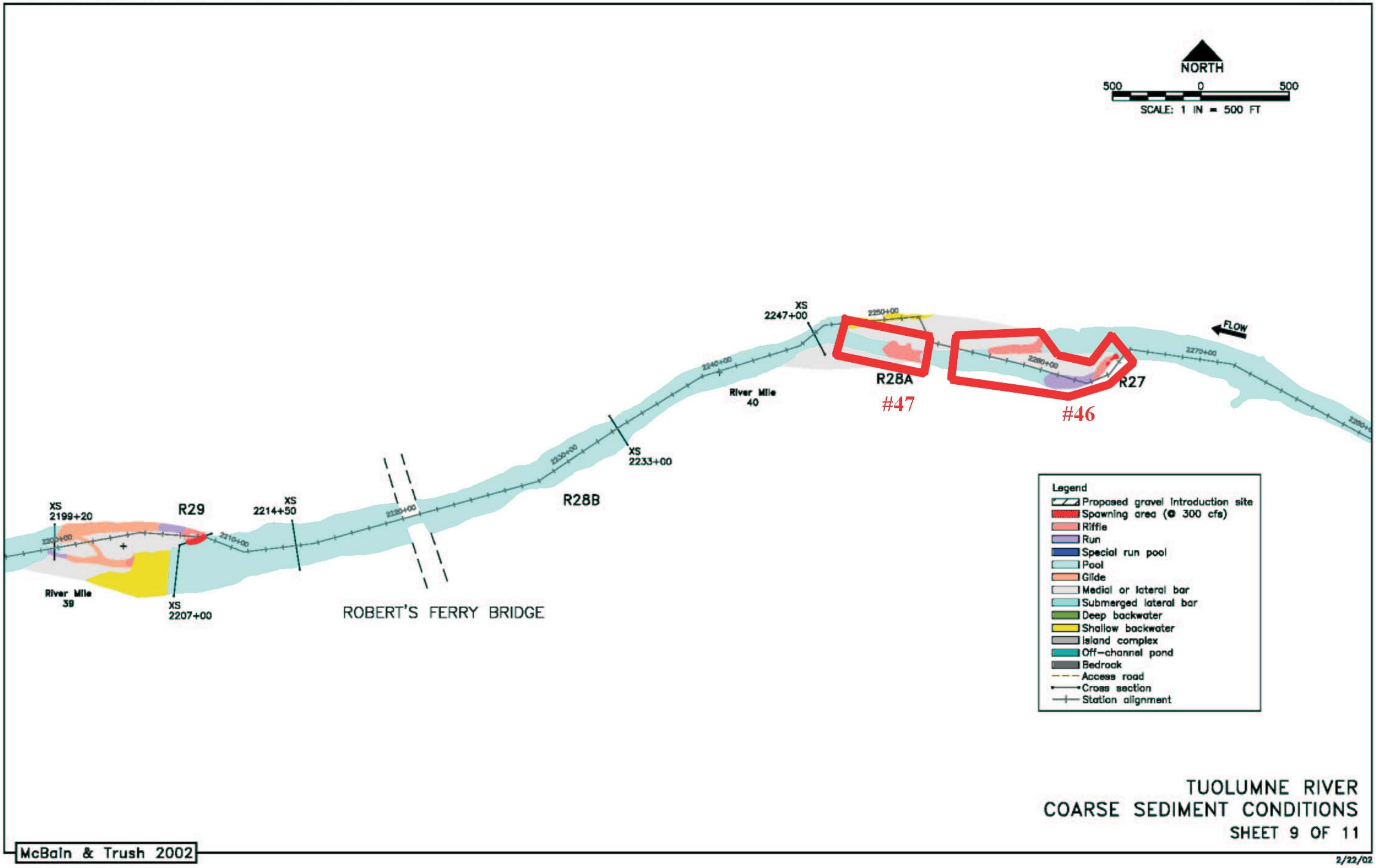
NORTH
500 0 500
SCALE: 1 IN = 500 FT
FLOW
XS 2247+00
R28A
#47
R27
#46
River Mile 40
XS 2233+00
R28B
XS 2199+20
R29
XS 2214+50
River Mile 39
XS 2207+00
ROBERT'S FERRY BRIDGE
Legend
Proposed gravel introduction site
Spawning area (@ 300 cfs)
Riffle
Run
Special run pool
Pool
Glide
Medial or lateral bar
Submerged lateral bar
Deep backwater
Shallow backwater
Island complex
Off-channel pond
Bedrock
Access road
Cross section
Station alignment
TUOLUMNE RIVER
COARSE SEDIMENT CONDITIONS
SHEET 9 OF 11
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APPENDIX E

Stranding Survey Data 1996-2002

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
14-16 Dec 86	4700	500	4200	Riffle 5	48.0	7	flows estimated from Figure 3, Appendix 14
14-16 Dec 86	4700	500	4200	Riffle 4B	48.4	8	flows estimated from Figure 3, Appendix 14
14-16 Dec 86	4700	500	4200	Riffle 1B	50.1	1	flows estimated from Figure 3, Appendix 14
22-Dec-86	4000	200	3800	Riffle 5	48.0	1	flows estimated from Figure 3, Appendix 14
22-Dec-86	4000	200	3800	Riffle 4B	48.4	3	flows estimated from Figure 3, Appendix 14
22-Dec-86	4000	200	3800	Riffle 4A	48.8	2	flows estimated from Figure 3, Appendix 14
28-Dec-86	4000	200	3800	Zanker Farm	45.9	4	flows estimated from Figure 3, Appendix 14
28-Dec-86	4000	200	3800	Riffle 4B	48.4	5	flows estimated from Figure 3, Appendix 14
28-Dec-86	4000	200	3800	Riffle 4A	48.8	1	flows estimated from Figure 3, Appendix 14
1-Jan-87	2600	200	2400	Riffle 5	48.0	1	flows estimated from Figure 3, Appendix 14
1-Jan-87	2600	200	2400	Riffle 4B	48.4	1	flows estimated from Figure 3, Appendix 14
7-Jan-87	2600	200	2400	Johanson	23.7	2	flows estimated from Figure 3, Appendix 14
9-Jan-87	2600	200	2400	Zanker Farm	45.9	7	flows estimated from Figure 3, Appendix 14
9-Jan-87	2600	200	2400	Riffle 5	48.0	7	flows estimated from Figure 3, Appendix 14
9-Jan-87	2600	200	2400	Riffle 4B	48.4	5	flows estimated from Figure 3, Appendix 14
9-Jan-87	2600	200	2400	Riffle 1B	50.1	2	flows estimated from Figure 3, Appendix 14
13-Jan-87	1200	500	700	Riffle 5	48.0	1	flows estimated from Figure 3, Appendix 14
13-Jan-87	1200	500	700	Riffle 4B	48.4	1	flows estimated from Figure 3, Appendix 14
13-Jan-87	1200	500	700	Old La Grange Bridge	50.5	3	flows estimated from Figure 3, Appendix 14
22-23 Jan 87	1200	500	700	Zanker Farm	45.9	14	flows estimated from Figure 3, Appendix 14
22-23 Jan 87	1200	500	700	Old La Grange Bridge	50.5	1	flows estimated from Figure 3, Appendix 14
5-Feb-87	200	200	0	Zanker Farm	45.9	1	no daily flow fluctuations (except for storm run-off); average flow for Feb approx 200 cfs
27-Mar-87	349	349	0	Lakewood	21.9	41	isolated pool; no daily flow fluctuations (except for storm run-off); average flow for Mar approx 349 cfs
1-May-87	550	200	350	Riffle A3	51.6	52	no daily flow fluctuations (except for storm run-off); average flow for May approx 230 cfs
4-May-87	230	230	0	Turlock Lake S.R.A.	42.0	14	no daily flow fluctuations (except for storm run-off); average flow for May approx 230 cfs

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
1-2 Jun 87	200	3	197	Tuolumne River Resort	42.4	2	no daily flow fluctuations (except for storm run-off); average flow for Jun approx 15 cfs
1-2 Jun 87	200	3	197	Riffle 5	48.0	169	1 possible CWT 71mm 02Jun87, 168 or 169 were measured; no daily flow fluctuations (except for storm run-off); average flow for Jun approx 15 cfs
1-2 Jun 87	200	3	197	Riffle 3A	49.5	1	no daily flow fluctuations (except for storm run-off); average flow for Jun approx 15 cfs
1-2 Jun 87	200	3	197	Riffle 2	49.9	31	no daily flow fluctuations (except for storm run-off); average flow for Jun approx 15 cfs
1-2 Jun 87	200	3	197	Riffle A6	51.1	14	no daily flow fluctuations (except for storm run-off); average flow for Jun approx 15 cfs
1-2 Jun 87	200	3	197	Riffle A3	51.6	186	no daily flow fluctuations (except for storm run-off); average flow for Jun approx 15 cfs
14-Jan-88	550	125	425	Zanker Farm	45.9	3	
14-Jan-88	550	125	425	Riffle 4B	48.4	1	
14-Jan-88	550	125	425	Old La Grange Bridge	50.5	5	
1-Feb-88	300	120	180	Zanker Farm	45.9	0	
1-Feb-88	300	120	180	Riffle 5	48.0	2	
1-Feb-88	300	120	180	Riffle 4B	48.4	5	
1-Feb-88	300	120	180	Riffle 4A	48.8	6	
1-Feb-88	300	120	180	Old La Grange Bridge	50.5	2	
1-Feb-88	300	120	180	Riffle A6	51.1	0	
1-Feb-88	300	120	180	Riffle A4	51.6	3	
16-Apr-88	550	115	435	Turlock Lake S.R.A.	42.0	2	
16-Apr-88	550	115	435	Zanker Farm	45.9	1	
16-Apr-88	550	115	435	Riffle 5	48.0	2	
16-Apr-88	550	115	435	Riffle 4B	48.2	1	
16-Apr-88	550	115	435	Riffle 4A	48.8	0	
16-Apr-88	550	115	435	Riffle 3B	49.1	0	

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
16-Apr-88	550	115	435	Riffle 2	49.9	0	
16-Apr-88	550	115	435	Old La Grange Bridge	50.5	4	
16-Apr-88	550	115	435	Riffle A6	51.1	0	
16-Apr-88	550	115	435	Riffle A5	51.4	0	
16-Apr-88	550	115	435	Riffle A4	51.6	7	
27-Apr-88	550	100	450	Reed Gravel	34.0	0	
27-Apr-88	550	100	450	Tuolumne River Resort	42.4	0	
27-Apr-88	550	100	450	Riffle 5	48.0	0	
27-Apr-88	550	100	450	Riffle 4B	48.2	1	
27-Apr-88	550	100	450	Riffle 4A	48.8	1	
27-Apr-88	550	100	450	Riffle 3B	49.1	0	
27-Apr-88	550	100	450	Old La Grange Bridge	50.5	0	
27-Apr-88	550	100	450	Riffle A6	51.1	2	
27-Apr-88	550	100	450	Riffle A4	51.6	1	
4-May-88	67	10	57	Riffle 5	48.0	0	
4-May-88	67	10	57	Riffle 4B	48.2	0	
4-May-88	67	10	57	Riffle 4A	48.8	0	
4-May-88	67	10	57	Riffle A4	51.6	53	
18-Apr-89	730	120	610	Zanker Farm	45.9	0	
18-Apr-89	730	120	610	Riffle 5	48.0	0	
18-Apr-89	730	120	610	Riffle 4B	48.4	0	
18-Apr-89	730	120	610	Riffle 4A	48.8	0	
18-Apr-89	730	120	610	Riffle 3A	49.5	0	
18-Apr-89	730	120	610	Old La Grange Bridge	50.5	0	
18-Apr-89	730	120	610	Riffle A3/A4	51.6	0	
29-Apr-89	1050	400	650	Tuolumne River Resort	42.4	0	
29-Apr-89	1050	400	650	Zanker Farm	45.9	2	
29-Apr-89	1050	400	650	Riffle 5	48.0	4	
29-Apr-89	1050	400	650	Riffle 4B	48.4	8	
29-Apr-89	1050	400	650	Riffle 4A	48.8	1	

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
29-Apr-89	1050	400	650	Old La Grange Bridge	50.5	17	
29-Apr-89	1050	400	650	Riffle A3/A4	51.6	20	
3-Mar-90				Riffle 5	48.0	1	
3-Mar-90				Riffle 4B	48.4	2	
3-Mar-90				Riffle 4A	48.8	0	
3-Mar-90				Old La Grange Bridge	50.5	1	
3-Mar-90				Riffle A3/A4	51.6	8	5 live
4-Mar-90				Zanker Farm	45.8	0	
4-Mar-90				Riffle 5	48.0	3	1not fresh, 1 live
4-Mar-90				Riffle 4B	48.4	15	3 not fresh
4-Mar-90				Riffle 4A	48.8	5	
4-Mar-90				Old La Grange Bridge	50.5	1	
4-Mar-90				Riffle A3/A4	51.6	10	1 not fresh
8-Mar-90				Riffle 4A	48.8	0	
8-Mar-90				Old La Grange Bridge	50.5	2	1 live
8-Mar-90				Riffle A3/A4	51.6	15	
12-Mar-90				Tuolumne River Resort	42.2	0	
12-Mar-90				Zanker Farm	45.8	0	
12-Mar-90				Riffle 5	48.0	2	1 not fresh (39 mm)
12-Mar-90				Riffle 4B	48.4	19	
12-Mar-90				Riffle 4A	48.8	3	
12-Mar-90				Old La Grange Bridge	50.5	5	
12-Mar-90				Riffle 6	51.1	0	
12-Mar-90				Riffle A3/A4	51.6	1	
15-Mar-90	220	120	100	Zanker Farm	45.8	0	
15-Mar-90	220	120	100	Riffle 5	48.0	1	1 not fresh (52 mm)
15-Mar-90	220	120	100	Riffle 4B	48.4	1	
15-Mar-90	220	120	100	Riffle 4A	48.8	0	
15-Mar-90	220	120	100	Old La Grange Bridge	50.5	1	
15-Mar-90	220	120	100	Riffle A3/A4	51.6	8	

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
4-May-90	560	280	280	Zanker Farm	45.8	0	
4-May-90	560	280	280	Riffle 5	48.0	0	
4-May-90	560	280	280	Riffle 4B	48.4	0	
4-May-90	560	280	280	Riffle 4A	48.8	0	
4-May-90	560	280	280	Old La Grange Bridge	50.5	2	1 not fresh (76 mm); dead cwt smolt from release group at bridge
4-May-90	560	280	280	Riffle 6	51.1	1	
4-May-90	560	280	280	Riffle A3/A4	51.6	2	
2-May-91	1120	667	453	Riffle 5	47.8	0	
2-May-91	1120	667	453	Riffle 5	47.8	0	
2-May-91	1120	667	453	Riffle 5	47.8	0	
2-May-91	1120	667	453	Riffle 4B	48.2	0	
2-May-91	1120	667	453	Old La Grange Bridge	50.5	0	
2-May-91	1120	667	453	Old La Grange Bridge	50.5	0	
2-May-91	1120	667	453	Riffle A3/A4	51.6	0	
3-May-91	667	284	383	Charles Road	25.0	0	
3-May-91	667	284	383	Hickman Bridge	31.7	0	
3-May-91	667	284	383	Ruddy Gravel	36.7	0	
4-May-92	1000	550	450	Riffle 5	47.8	0	gravel bar
4-May-92	1000	550	450	Riffle 3B	49.1	0	north bank, lower
4-May-92	1000	550	450	Riffle 3B	49.1	0	north bank, upper, GAM(35mm), SKR(YOY)
4-May-92	1000	550	450	Old La Grange Bridge	50.5	0	south bank, upper
4-May-92	1000	550	450	Old La Grange Bridge	50.5	0	south bank. Lower, LMB(28mm)
4-May-92	1000	550	450	Riffle A3/A4	51.6	0	south bank/tall veg.
12-May-92	160	50	110	Hickman Bridge	31.7	0	S gravel bar
12-May-92	160	50	110	Riffle 5	47.8	0	gravel bar, perimeter, SKR,GAM,SCP, 500 testing peak
12-May-92	160	50	110	Riffle 4B	48.2	0	south, SKR(YOY), 500 testing peak
12-May-92	160	50	110	Riffle 4B	48.2	0	N gravel bar, river side, 500 testing peak

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
12-May-92	160	50	110	Riffle 4B	48.2	0	N gravel bar, side channel, SKR,GAM, 500 testing peak
12-May-92	160	50	110	Old La Grange Bridge	50.5	0	north, SKR(YOY), 500 testing peak
12-May-92	160	50	110	Old La Grange Bridge	50.5	0	south, SKR(YOY), 500 testing peak
12-May-92	160	50	110	Riffle A3/A4	51.6	0	top of island, 500 testing peak
12-May-92	160	50	110	Riffle A4	51.6	0	north side, side chan., GAM(19,26), 500 testing peak
12-May-92	160	50	110	Riffle A4	51.6	0	south side, side chan., 500 testing peak
28-Apr-94	1100	550	550	Riffle 5	47.8	0	GRAVEL BAR
28-Apr-94	1100	550	550	Riffle 5	47.8	0	SOUTH BANK
28-Apr-94	1100	550	550	Old La Grange Bridge	50.5	0	SOUTH BANK, upper
28-Apr-94	1100	550	550	Old La Grange Bridge	50.5	0	SOUTH BANK, lower
28-Apr-94	1100	550	550	Riffle A3/A4	51.6	0	SOUTH BANK, tall veg.
2-Mar-95	2900	1200	1700	Riffle 5	47.8	18	SOUTH BANK, GAM,SKR
2-Mar-95	2900	1200	1700	Riffle 4B	48.2	7	SOUTH BANK, NONE
2-Mar-95	2900	1200	1700	Riffle 4B	48.2	73	SOUTH BANK, GAM
2-Mar-95	2900	1200	1700	Old La Grange Bridge	50.5	0	SOUTH BANK, SQ,SCP,LP,SKR
21-Mar-95	7700	4700	3000	Tuolumne River Resort	42.5	0	(quick walk-through of low areas was made ~12000 sq.ft.)
21-Mar-95	7700	4700	3000	Riffle 5	47.8	1	
21-Mar-95	7700	4700	3000	Riffle 4B	48.3	0	
21-Mar-95	7700	4700	3000	Riffle 1B	50.2	0	
21-Mar-95	7700	4700	3000	Old La Grange Bridge	50.5	1	
23-Mar-95	4700	1900	2800	Tuolumne River Resort	42.5	0	(quick walk-through of low areas was made ~12000 sq.ft.)
23-Mar-95	4700	1900	2800	Riffle 5	47.8	0	
23-Mar-95	4700	1900	2800	Riffle 4B	48.3	0	
23-Mar-95	4700	1900	2800	Riffle 1B	50.2	2	
23-Mar-95	4700	1900	2800	Old La Grange Bridge	50.5	(not searched)	
27-Jun-95	8600	1000	7600	Riffle 4B	48.3	0	

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
27-Jun-95	8600	1000	7600	Old La Grange Bridge	50.5	0	
22-Feb-96	5000	3000	2000	Turlock Lake S.R.A.	42.0	0	The south bank in the campground area adjacent to the river was searched from 12:45 to 13:00 pm. Many low areas still had standing water and the dense undergrowth was difficult to search.
22-Feb-96	5000	3000	2000	Riffle 5	47.8	0	The floodplain on the south bank was searched from 12:15 to 12:27 pm. No fish were found. However, if salmon were scattered in low densities, they would be difficult to detect. Most of this area does not appear to be ideal habitat for young salmon at the 5000 cfs flow level.
22-Feb-96	5000	3000	2000	Riffle 4B	48.2	0	At 12:04 pm the area along the south bank was looked at. The area has good drainage characteristics with adequate slope at this flow change.
22-Feb-96	5000	3000	2000	Riffle 4A	48.8	54	Searched the south bank gravel bar floodplain area along the riffle from 11:03 to 11:33 am. At the top of the overflow area is a depression ~40' X 40' which is a typical stranding area. There is little opportunity for salmon to escape this area as the flow recedes. All stranded salmon were found here (N=54 Ave.=41.6 mm FL), plus three Gambusia. The area immediately downstream of the stranding problem area was also searched. An area ~ 160' X 20' was searched. This area has adequate drainage at this flow change.

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
22-Feb-96	5000	3000	2000	Riffle 1B	50.1	0	Searched the north bank area downstream of Gasburg Creek between 10:15 and 10:45 am. There is a fairly flat floodplain which has limited stranding area potential. The search was focused on depressions within 100 ft. of the main channel edge.
22-Feb-96	5000	3000	2000	Old La Grange Bridge	50.5	0	Searched the south bank downstream of the old La Grange Bridge. There does not appear to be any stranding problem at this flow reduction. There is a good slope in the effected area and a quick 5 minute walk-through was made.
21-Jan-97	9700	5700	4000	South of R5	47.5	0	Search time was 20 minutes.
21-Jan-97	9700	5700	4000	South of R4A-B	48.4	1	Only one salmon (46mm) was found along the gravel bar near the top of riffle 4A. Search time was 45 minutes.
21-Jan-97	9700	5700	4000	North of R1B	50.2	0	Search time was 25 minutes.
15-May-97	1900	800	1100	South of R4A,R5	47.9	0	Search time was 45 minutes.
15-May-97	1900	800	1100	South of R2	49.6	0	Search time was 45 minutes.
15-May-97	1900	800	1100	South of OLGB	50.5	0	Isolated pools of water were observed and seined. Search time was 25 minutes.
15-May-97	1900	800	1100	South of RA7	50.5	0	Search time was 20 minutes.
16-May-99	3500	500	3000	Riffle 5B	47.9	0	Cobble, Gravel, and Sand substrates.
16-May-99	3500	500	3000	Riffle 4B	48.2	0	Field crew surveyed an area on the left bank of Riffle 4B where stranded fish have been documented in the past. Cobble, Gravel, and Sand substrates.
16-May-99	3500	500	3000	Riffle 4A	48.8	0	Sand and Cobble substrate.
16-May-99	3500	500	3000	Riffle 3B	49.1	0	Sand substrate.
17-May-99	3500	500	3000	Riffle 5B	47.9	3	All salmon found off transect. Sand substrate.

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
17-May-99	3500	500	3000	Riffle 4B	48.2	10	Juvenile chinook salmon were entrapped in potholes on the floodplain. Salmon found where sand substrate
17-May-99	3500	500	3000	Riffle 4A	48.8	0	Cobble, Gravel, and Sand substrates.
17-May-99	3500	500	3000	Riffle 3B	49.1	0	Sand substrate.
17-May-99	3500	500	3000	Riffle 1A	50.4	8	Cobble/Gravel/Sand substrate. Four salmon found off transect.
16-17 May 99	3500	500	3000	Riffle 4B	48.2	0	Sand substrate.
16-17 May 99	3500	500	3000	Riffle 4A	48.8	3	Juvenile chinook salmon were entrapped in potholes on the floodplain. Sand/Gravel substrate.
16-17 May 99	3500	500	3000	Riffle 1A	50.4	4	Juvenile chinook salmon were entrapped in potholes on the floodplain. Sand substrate.
18-Mar-00	7000	5400	1600	Riffle 17B	44.0	2	Salmon found in cobble side channel. Sand/Gravel or Cobble/Gravel substrate.
18-Mar-00	7000	5400	1600	Riffle 14	44.9	1	Salmon found in cobble substrate backwater. Sand and Cobble substrate.
18-Mar-00	7000	5400	1600	Riffle 13B	45.5	11	Salmon found in sandy side channel habitat. Sand substrate.
18-Mar-00	7000	5400	1600	Riffle 4A	48.8	0	Sand substrate.
18-Mar-00	7000	5400	1600	Riffle 3A	49.5	2	Cobble/Gravel substrate.
18-Mar-00	7000	5400	1600	Riffle 1B	50.1	0	Cobble/Gravel or Sand substrate.
20-Mar-00	7000	4000	3000	Riffle 17B	44.0	46	Sand, Sand/Gravel, or Cobble/Gravel substrate.
20-Mar-00	7000	4000	3000	Riffle 14	44.9	1	Sand/Cobble substrate.
20-Mar-00	7000	4000	3000	Riffle 13B	45.6	9	Sand substrate.
20-Mar-00	7000	4000	3000	Riffle 5B	47.9	4	Salmon found in Gravel side channel.
20-Mar-00	7000	4000	3000	Riffle 4A	48.8	4	Salmon found in Sand/Gravel side channel.
20-Mar-00	7000	4000	3000	Riffle 3B	49.1	7	Salmon found in Sand/Gravel potholes and side channels.
20-Mar-00	7000	4000	3000	Riffle 3A	49.5	0	Sand/Gravel substrate.

Survey Date	Beginning Flow (cfs)	Ending Flow (cfs)	Change in Flow (cfs)	Location Name	River Mile	Number of salmon found	Comments
20-Mar-00	7000	4000	3000	Riffle 1B	50.1	0	Sand or Sand/Gravel substrate.
2-May-02	1300	900	400	Riffle 5B	47.9	0	Sand and Vegetation.
2-May-02	1300	900	400	Riffle 1B	50.1	1	Salmon found in Gravel/Sand substrate with vegetation.
2-May-02	1300	900	400	Riffle 1A	50.4	0	Cobble/Sand/Gravel substrate.
2-May-02	1300	900	400	Riffle A7	50.6	0	Cobble/Sand/Gravel substrate.
3-May-02	900	600	300	Riffle 5A	48.0	0	Cobble/Gravel substrate with algae.
3-May-02	900	600	300	Riffle 1B	50.1	0	Cobble/Gravel substrate.
3-May-02	900	600	300	Riffle A7	50.6	0	Cobble/Gravel substrate with Algae.
17-May-02	243	193	50	Riffle 5A	48.0	0	Cobble/Gravel substrate.
17-May-02	243	193	50	Riffle A7	50.6	0	Cobble/Gravel substrate.
17-May-02	243	193	50	Riffle A3/A4	51.6	12	Salmon found in Cobble/Gravel with vegetation.
3-Jun-03	226	99	127	Riffle 4A	48.8	(not searched)	Stranding potential was extremely low and actual surveys were not done.
3-Jun-03	226	99	127	Riffle 5B		(not searched)	Stranding potential was extremely low and actual surveys were not done.
3-Jun-03	226	99	127	Riffle A3/A4	51.6	(not searched)	Stranding potential was extremely low and actual surveys were not done.
3-Jun-03	226	99	127	Riffle A7		(not searched)	Stranding potential was extremely low and actual surveys were not done.

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APPENDIX F

Lower Tuolumne GIS Mapping Products

Compiled on CD-ROM
by
McBain & Trush, Inc. Arcata, CA
for
Turlock Irrigation District and Modesto Irrigation District

Table of Contents

Lower Tuolumne Geographic Information System (GIS) Mapping Products

1 BACKGROUND

The original Tuolumne River GIS map was created in 1992 from stereo photographs (1:24,000 scale) at flows ranging from approximately 100 cfs, taken in January 1991 (TID/MID 1992), to 8,400 cfs, taken in April 1995 (TID/MID 1997). Using coordinates from common landmarks (*e.g.*, road intersections, buildings) on 7.5 minute USGS quad sheets, six control points were established per photograph to use in ortho-rectification. The coordinates and photographic data are accurate to approximately 2% of the photo and map scales (approx 40 ft) and were delineated using a stereo compiler and later translated into data attributed GIS coverage in ESRI ARC/INFO format. More recent mapping products have been developed by McBain & Trush using USGS digital orthophoto quadrangles (DOQ) and project-specific aerial photography for the development of the lower Tuolumne River Restoration Plan (McBain & Trush 2000), Tuolumne River Coarse Sediment Management Plan (McBain & Trush 2004) as well as in the development of individual restoration projects.

Although photographic coverage exists for the entire lower Tuolumne River, from La Grange Dam (RM 52.0) to the confluence with the San Joaquin River, only the upper portion, La Grange to Empire (RM 21.5) is included in the GIS for flows of 1,100 cfs, 3,100 cfs, 5,300 cfs, and 8,400 cfs. That is, other than the USGS DOQs, no electronic orthophotos are available and the portion below Empire is available as wetted perimeter lines at 100 cfs, 230 cfs, and 620 cfs with major habitat type classifications in the channel (e.g., vegetated, island, pool, bar, pond, backwater, etc.). As part of the USACE Comprehensive Study, the San Joaquin River and the lower Tuolumne River (RM 0–12) were surveyed in 1998. Topographic and hydrographic mapping data was compiled and mapped into a 2-ft resolution DEM that is currently available under the Freedom of Information Act (FOIA). Additional aerial photogrammetric surveys were conducted in 2000 by USACE up to RM 33.6, including the supporting ground control surveys but without bathymetric data. These data are available from USACE under the 1996 amendments of the 1966 Freedom of Information Act (FOIA).

2 INSTALLATION PROCEDURES

The files on the *Lower Tuolumne River GIS Data CD* are set up to be viewed by ESRI ArcExplorer, which is provided on this disk. Unless you have other GIS software, you must install ArcExplorer onto your computer using the instructions below.

To view the ArcExplorer projects:

1) Copy the Tuolumne GIS folder directly to your C:\ drive (e.g., C:\Tuolumne GIS)

2) Install ArcExplorer on your computer by double clicking the file "ae2setup.exe". Follow the installation instructions on your screen.

3) Double Click a project file "*.AEP" file and that project will open. (e.g., C:\Tuolumne GIS\EA Mapping.AEP)

You may add shapefiles and image files from other ArcExplorer projects to an open project by clicking the "add layer" button and browsing to desired file. You may also add other GIS layers not contained on this CD to an open project using the same procedure (as long as they are in the same coordinate system).

All shapefiles and images are georeferenced to California Stateplane NAD83 Zone 3 coordinate system

3 DESCRIPTION OF CD-ROM CONTENTS

The following mapping efforts are compiled as Adobe portable device format (.pdf), MrSID format orthophotos (with accompanying world files for geo-referencing), as well as standard ArcView shape files (.shp):

3.1 2001–2003 California Dept. of Fish and Game (CDFG) Riffle Atlas

a) PDF format maps
b) Riffles.shp

3.2 EA (now EA Engineering, Science and Technology) Mapping Products

a) The following coverages have been included in the December 16, 1997 data transfer from EA Engineering to TID/MID. Most files are from 1991 color aerial photos by Pacific Aerial Surveys (now HJW Geospatial, Inc.) except as noted:

- BRIDGES.e00
  bridges crossing the Tuolume, non-clean linework, not named (rivermile 4-51)
- CITYBUF.shp
  500/1000 ft buffer coverages, Waterford and Modesto
- CREEKS.shp
  Named arcs coverage of creeks and major spillways, maybe incomplete (rivermile 16-51) Gasburg to Dry Creek as per FERC plot
- FLOODPLN.shp
  Generalized floodplain
- GAGES.shp
  5 Stream Gaging Stations, (rivermile 4-50)
- HYACINTH.shp
  coded polygons
- POI.shp
  points of Interest, parks, industry, bridge labels
- RIFLABEL.shp
  point coverage, riffle and special run pool labels, (rivermile 23-52)
- RIVER.shp

coded polygons at 110, 230 and 620 cfs, off channel ponds, side channels, etc.

- RIVER_MI.shp
  coded polygons for 110, 230, 620 cfs
- ETS.shp
  point cov SHEerage, rivermile markers and labels
- TICKS.shp
  control points for aerial photos, (rivermile 27-52)
- 1000PRIM.shp
  1100 cfs wetted perimeter from 1992 overflight, reconciled to 620, 3K, and 5K cfs coverages, (rivermile 22-52)
- 3000PRIM.shp
  3100 cfs wetted perimeter from 1993 overflight, reconciled to 620, 3K, and 5K cfs coverages, (rivermile 22-52)
- 5000PRIM.shp
  5300 cfs wetted perimeter from 1995 overflight, reconciled to 620, 3K, and 5K cfs coverages, (rivermile 22-52)
- 620PRIM.shp
  620 cfs wetted perimeter from 1991 overflight, reconciled to 1K, 3K, and 5K cfs coverages, (rivermile 22-52)
- 8000PRIM.shp
  8,400 cfs wetted perimeter from 1995 overflight, reconciled to 110, 230, 620, 1K, 3K, and 5 K cfs, includes islands which are **not reconciled**
- 100PERIM.shp
  100 cfs perimeter from 1988 overflight, includes islands, used to calculate area
- 230PERIM.shp
  230 cfs wetted perimeter from 1986 overflight, includes islands, used to calculate area
- CAMP.shp
  campground near Turlock Lake Rec Area
- 8400ILND.shp
  8,400 cfs in-channel islands and islands within off-channel ponds from 1995 overflight. **Note: non-reconciled per HJW**
- PITS_TJF.shp
  gravel pits, as per TJF edits to Map Book
- 620RIFLB.shp
  riffle labels used for plotting coded polygons at 620 cfs, (Rivermile 24-52)
- FLOWSDEC.shp
  reconciled flows at 1100, 3100, 5300 cfs and 8400 cfs, 8400 not extensively QC'ed

3.3 KSN 2002 Ortho-rectified aerial photographs

- Orthophotos of SRP9-10 and 711 Reaches produced by KSN 08-30-2002

3.4 McBain & Trush Mapping Products

a) 1996 Riparian Inventory. The 1996 Riparian Inventory mapped riparian vegetation coverage as vegetation series stands along the entire 52 miles of the Lower Tuolumne River:

- 1996 Riparian Inventory.shp

b) 1998 Habitat Mapping. The 1998 Habitat Mapping documented baseline channel and floodplain habitat and geomorphic conditions at 260 cfs prior to project construction, including the 7/11 Mining Reach and SRPs 9 and 10 Reach:

- 98-711-CANOPY.shp
- 98-711-INCHANNEL_COVER.shp
- 98-711-LWD.shp
- 98-711-MESO HABITAT.shp
- 98-711-OVERHEAD_COVER.shp
- 98-711-SPAWN.shp
- 98-711-SUBSTRATE.shp
- 98-SRP9-10-Canopy.shp
- 98-SRP9-10-INCHANNEL_COVER.shp
- 98-SRP9-10-LMB-PRIMARY-HAB.shp
- 98-SRP9-10-LMB-SECONDARY-HAB.shp
- 98-SRP9-10-LWD.shp
- 98-SRP9-10-MESO HABITAT.shp
- 98-SRP9-10-OVERHEAD_COVER.shp
- 98-SRP9-10-SMB-PRIMARY-HAB.shp
- 98-SRP9-10-SMB-SECONDARY-HAB.shp
- 98-SRP9-10-SUBSTRATE.shp

c) 1999 Habitat Mapping. The 1999 Habitat Mapping documented baseline channel and floodplain habitat and geomorphic conditions at 260 cfs prior to project construction, including the 7/11 and MJ Ruddy Mining Reaches and SRPs 9 and 10 Reach:

- 99-711-CANOPY.shp
- 99-711-FRY.shp
- 99-711-INCHANNEL_COVER.shp
- 99-711-JUVENILE.shp
- 99-711-LWD.shp
- 99-711-MESO-HABITAT.shp
- 99-711-OHC.shp
- 99-711-SPAWN.shp

- 99-SRP9-10-LMB_SECONDARY_HABITAT.shp
- 99-SRP9-10-MESO_HABITAT.shp
- 99-SRP9-10-SMB_SECONDARY_HABITAT.shp
- 99-SRP9-10_INCHANNEL_COVER.shp
- 99-SRP9-10_LMB_PRIMARY_HABITAT.shp
- 99-SRP9-10_LWD.shp
- 99-SRP9-10_OHC.shp
- 99-SRP9-10_SMB_PRIMARY_HABITAT.shp

d) 2002 Habitat Mapping. The 2002 Habitat Mapping documented post-construction channel and floodplain habitat and geomorphic conditions at 185 cfs, including the 7/11 Mining Reach and SRP 9 Reach:

- 2002-711-MESO HABITAT.shp
- 2002-SRP9-MESO HABITAT.shp
- 711-2002-XSEC-TEXT.shp
- 711-2002-XSEC.shp
- SRP9-10-2002-XSEC-TEXT.shp
- SRP9-10-2002-XSEC.shp

e) 2004 Bass Habitat Mapping. The 2004 Bass Habitat Mapping documented juvenile and adult largemouth bass habitat at two control sites, including Charles Road and Riffle 64 Sites:

- Charles Road Adult Bass Hab.shp
- Charles Road Juvenile Bass Hab.shp
- Riffle 64 Adult Bass Habitat.shp
- Riffle 64 Juvenile Bass Habitat.shp

f) Coarse Sediment Management Plan. The 2001 Sediment Management Mapping established monitoring sites and cross sections, documented baseline salmonid habitat conditions, and identified potential sediment augmentation sites along the upper spawning reaches of the Lower Tuolumne River:

- Cross Section Location Text.shp
- Cross Section Locations.shp
- Gravel-Intro-Sites-RM36-52.shp
- MesoHabitat-RM36-52.shp
- Sensitive Omykiss Habitat RM36-52.shp (Steelhead habitat mapped by CCRF)
- SpawnHabitat-RM36-52.shp

3.5 2002 Tuolumne River Preservation Trust Riverwide Map

- 2002 TRPT river corridor map booklet.pdf

3.6 1998 USGS DOQQ

The standard DOQ's are based on 1998 aerial photography as either grayscale or color-infrared (CIR) images with a 1-meter ground resolution; they cover an area measuring 3.75-minutes longitude by 3.75-minutes latitude, or approximately 5 miles on each side. Each DOQ has between 50 and 300 meters of overedge image beyond the latitude and longitude corner crosses embedded in the image. This overedge facilitates tonal matching and creating mosaics from adjacent images.

a) SP_NAD83
- ceres_ne.sid
- ceres_nw.sid
- cooperstown_se.sid
- cooperstown_sw.sid
- denair_ne.sid
- denair_nw.sid
- lagrange_ne.sid
- lagrange_nw.sid
- lagrange_se.sid
- lagrange_sw.sid
- montpelier_ne.sid
- montpelier_nw.sid
- paulsell_se.sid
- paulsell_sw.sid
- riverbank_se.sid
- riverbank_sw.sid
- turlock_ne.sid
- turlock_nw.sid
- waterford_ne.sid
- waterford_nw.sid
- waterford_se.sid
- waterford_sw.sid

3.7 USGS Digital Raster Graphics (DRG)

Scanned digital raster graphics (DRG) images of standard USGS series topographic maps. Downloaded from the California Spatial Information Library at http://gis.ca.gov/data.epl

b) SP_NAD83
- ceres_sp83.sid
- cooperstown_sp83.sid

- denair_sp83.sid
- lagrange_sp83.sid
- montpelier_sp83.sid
- paulsell_sp83.sid
- riverbank_sp83.sid
- snelling_sp83.sid
- turlock_lake_sp83.sid
- waterford_sp83.sid

REFERENCES

McBain & Trush, 2000. Habitat Restoration Plan for the lower Tuolumne River Corridor, Prepared for Tuolumne River Technical Advisory Committee (Don Pedro Project, FERC License No. 2299) by McBain and Trush, Arcata, CA.

McBain and Trush, 2004. Coarse sediment management plan for the lower Tuolumne River, Prepared for the Tuolumne River Technical Advisory Committee, with assistance from Stillwater Sciences, Berkeley, CA, and Trinity Associates, Arcata, CA. November

TID/MID (Turlock Irrigation District and Modesto Irrigation District). 1992. GIS Methods for Lower Tuolumne River Map. Attachment B of the Lower Tuolumne River Spawning Gravel Availability and Superimposition Report. Appendix 6 to Don Pedro Project Fisheries Studies Report (FERC Article 39, Project No. 2299). *In* Report of Turlock Irrigation District and Modesto Irrigation District Pursuant to Article 39 of the License for the Don Pedro Project, No. 2299. Vol. IV. Prepared by EA Engineering, Science, and Technology, Lafayette, California.

TID/MID. 1997. Tuolumne River GIS Database Report and Map. Report 96-14 *In* Report of Turlock Irrigation District and Modesto Irrigation District Pursuant to Article 39 of the License for the Don Pedro Project, No. 2299. Vol. VII. Prepared by EA Engineering, Science, and Technology, Lafayette, California.