Design Water Surface Profiles for the Feather River West Levee Project | Peterson Brustad, Inc | March 29, 2012

Design Water Surface Profiles for the Feather River West Levee Project

March 2012

Prepared for:

Sutter Butte Flood Control Agency

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This report titled:

Design Water Surface Profiles for the Feather River West Levee Project

has been prepared by or under the direct supervision of the following registered Civil Engineers:

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

This report documents the development of the design water surface profiles for the Sutter-Butte Flood Control Agency's (SBFCA) Feather River West Levee Project (FRWLP). The goal of the FRWLP is to provide 200-year flood protection for the urban and urbanizing northern portion of the Sutter-Yuba City Basin, and 100-year protection south of Yuba City. The FRWLP includes rehabilitation of the entire 44-mile west Feather River levee from the Thermalito Afterbay downstream to the Sutter Bypass (see Figure 1-1).

The original design water surface profiles for the FRWLP were developed in October, 2010. Following the original October profiles, there were three additional updates in order to improve the HEC-RAS model and to address independent technical review comments. Four Technical Memorandums (TM) were developed at each different stage to document the specific updates incorporated into the design profiles:

1. October 2010 TM – Original Design Water Surface Profiles
2. June 2011 TM – Update #1
3. September 2011 – Update #2
4. December 2011 – Update #3

In addition to the four TM's listed above, the United States Army Corps of Engineers (USACE) recently provided updates to the inflow hydrology for the n-year storm events. This report documents the recent improvements to the inflow hydrology and compiles all four of the above model development TM's into a single comprehensive document.

1.1 BACKGROUND

For the FRWLP, Peterson Brustad Inc. (PBI) utilized the HEC-RAS model that is currently being prepared for the USACE as part of the Sutter Basin Feasibility Study (SBFS). The USACE, in conjunction with SBFCA and California Department of Water Resources (DWR), is currently preparing the SBFS in order to evaluate flood damage reduction, ecosystem restoration, and recreation projects within the Sutter-Yuba City basin. To aid in this evaluation, extensive hydraulic modeling and floodplain mapping is being conducted in order to evaluate and determine the extent of flood inundation damages that would occur within the basin in the event of levee overtopping and/or levee failure. PBI has been assisting the USACE with the SBFS since 2009.

The Feather River system HEC-RAS model is an ever-changing model that is frequently updated in order to support various flood control projects throughout the region. The model was utilized in 2005 by the USACE for the *Lower Feather River Floodplain Mapping Study*[12] and versions of this model have since been updated independently by both the USACE and MBK Engineers (MBK). The USACE model was updated to support the *American River Watershed Common Features General Reevaluation Report*[11] and the MBK model was updated to support the levee improvement projects that were constructed by the *Three Rivers Levee Improvement Authority* (TRLIA)[4].

SUTTER BUTTE FLOOD CONTROL AGENCY

N

Biggs

Gridley

Butte County

Feather River
West Levee
Project

Live Oak

Yuba
County

Sutter

Yuba City

Marysville

Sutter County

SBFCA BOUNDARY

MARCH 2012

FIGURE 1-1

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A summary timeline of events regarding the development of the FRWLP HEC-RAS model is as follows:

OCTOBER 2010: PBI published the original design water surface profiles based upon an interim version of the SBFS HEC-RAS model. For the SBFS, PBI obtained the USACE Common Features model[13] and updated it to include the work that MBK performed for the TRLIA program. In addition, PBI further refined the model for the Upper Feather River and Sutter Bypass reaches. The SBFS model was then calibrated to a major flood event that occurred in January 2006 and verified to an event that occurred in 1997. This calibration had completed the Independent Technical Review stage and just prior to the FRWLP analysis, the model's vertical datum was updated from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88).

APRIL 2011: The USACE released an updated version of the SBFS model (Release 3)[14].

MAY 2011: PBI updated the FRWLP design water surface profiles (Update #1) using an improved version of the USACE Release 3 model.

JUNE 2011: PBI sent the FRWLP model to the USACE for technical review.

SEPTEMBER 2011: PBI updated the FRWLP design water surface profiles (Update #2) to incorporate the technical review comments provided by USACE.

OCTOBER 2011: PBI sent the FRWLP model to MBK for independent technical review.

DECEMBER 2011: PBI updated the FRWLP design water surface profiles (Update #3) to incorporate the technical review comments provided by MBK.

MARCH 2012: USACE released improvements to the inflow hydrology for the n-year storm events.

MARCH 2012: PBI updated the FRWLP design water surface profiles to incorporate the recent inflow hydrology updates provided by the USACE.

Details regarding the specific improvements that were incorporated into the HEC-RAS model at each update can be found in Section 3. The final water surface profiles are shown in Section 4.

1.2 DATUM

The FRWLP HEC-RAS model and all results and calculations presented in this report reference the California State Plane Coordinate System (CCS), Zone 2 – NAD83 horizontal datum and the North American Vertical Datum of 1988 (NAVD88). All units are in U.S. Survey feet.

1.3 TOPOGRAPHY

The ground surface topography included with the base USACE Release 3 model is based upon USACE Sacramento and San Joaquin River Basins Comprehensive Study mapping[(1)(10)], which was provided by the USACE at a contour interval of 2 feet. No new topography was obtained for the development of the FRWLP model. In early 2010, the base USACE model was converted from the National Geodetic Vertical Datum of 1929 (NGVD 29) to the North American Vertical Datum of 1988 (NAVD 88). The conversion was completed by PBI for the USACE as part of the SBFS. PBI converted the HEC-RAS geometry to NAVD88 based upon a conversion surface provided by the USACE. Levee crowns, weirs and stream gages were input directly from NAVD88 surveys. Details regarding PBI's role in the vertical datum conversion are included in the *Vertical Datum Conversion TM* (see Attachment A).

Levee elevations within the FRWLP HEC-RAS model are based upon top of levee (TOL) data from the USACE National Levee Database (NLDB)[(9)]. The NLDB contains an elevation every 100-ft for the top of levee. The elevations for the NLDB were obtained via ground surveys based in NAVD 88.

1.4 COMPARISON TO CVFED LIDAR

PBI compared the converted HEC-RAS model components to CVFED LiDAR[(2)] data in order to verify that the HEC-RAS model datum conversion matches the recent NAVD88 LiDAR surveys which are being used for the design of the FRWLP. PBI compared both cross section data (converted Comprehensive Study Topography) and Top of Levee data (NLDB) to the LiDAR. The results show that the while the cross sections are not exact overlays, the datum adjustment used to convert the Release 3 HEC-RAS model from NGVD29 to NAVD88 was within the precision of the modeling effort. It is important to note that the LiDAR data does not include bathymetric data for the river channel or any overbank areas containing water.

The 12 cross section comparisons are shown in Figure 1-2 thru Figure 1-13. The TOL comparison profile is shown in Figure 1-14.

Figure 1-2. Cross Section Topography Comparison at HEC-RAS River STA 57.7

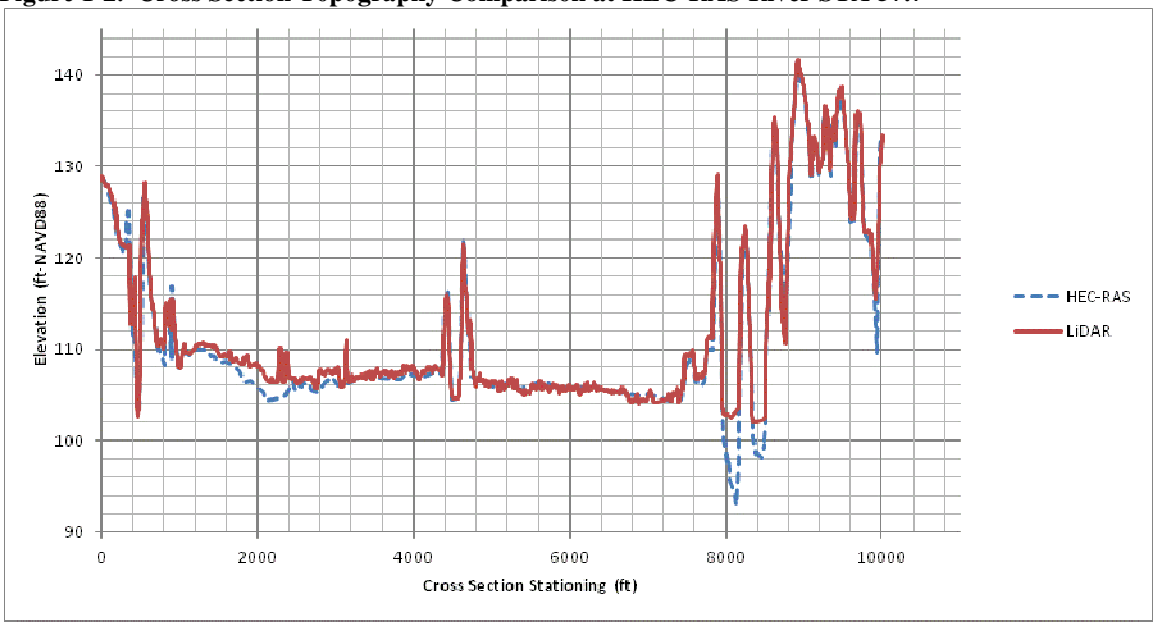


Figure 1-3. Cross Section Topography Comparison at HEC-RAS River STA 49.58

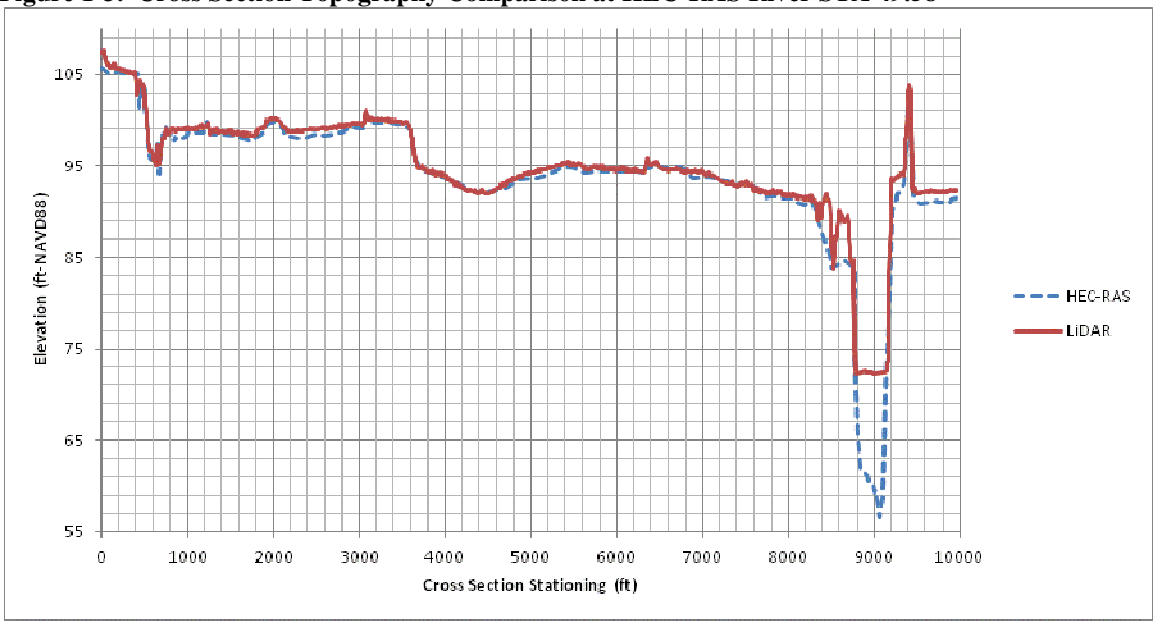


Figure 1-4. Cross Section Topography Comparison at HEC-RAS River STA 47.55

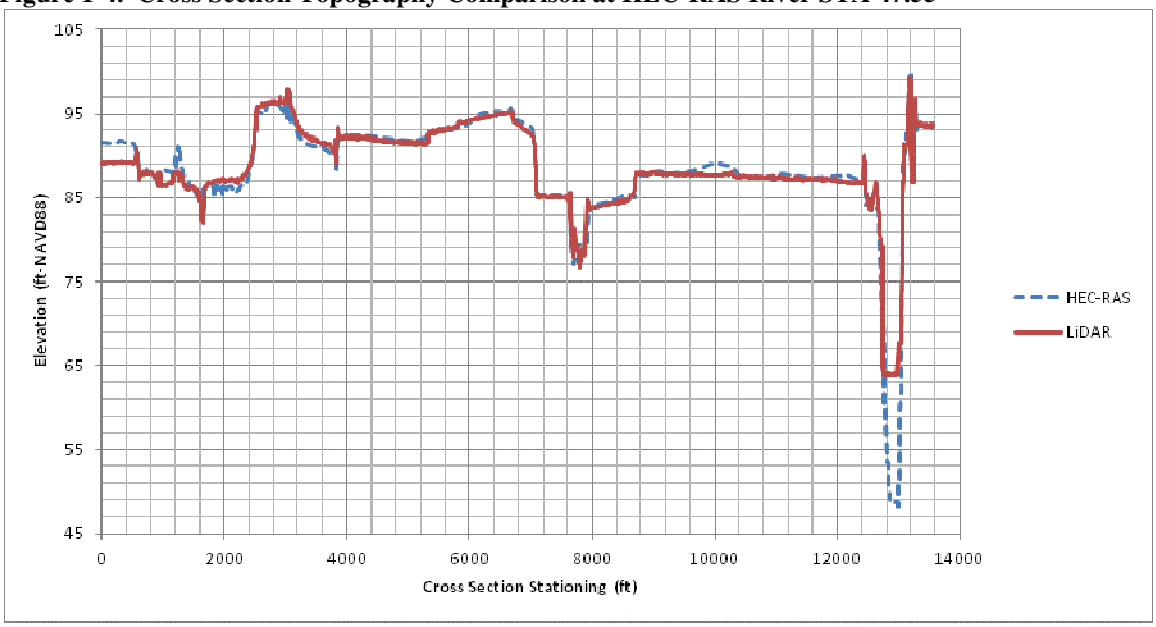


Figure 1-5. Cross Section Topography Comparison at HEC-RAS River STA 45.26

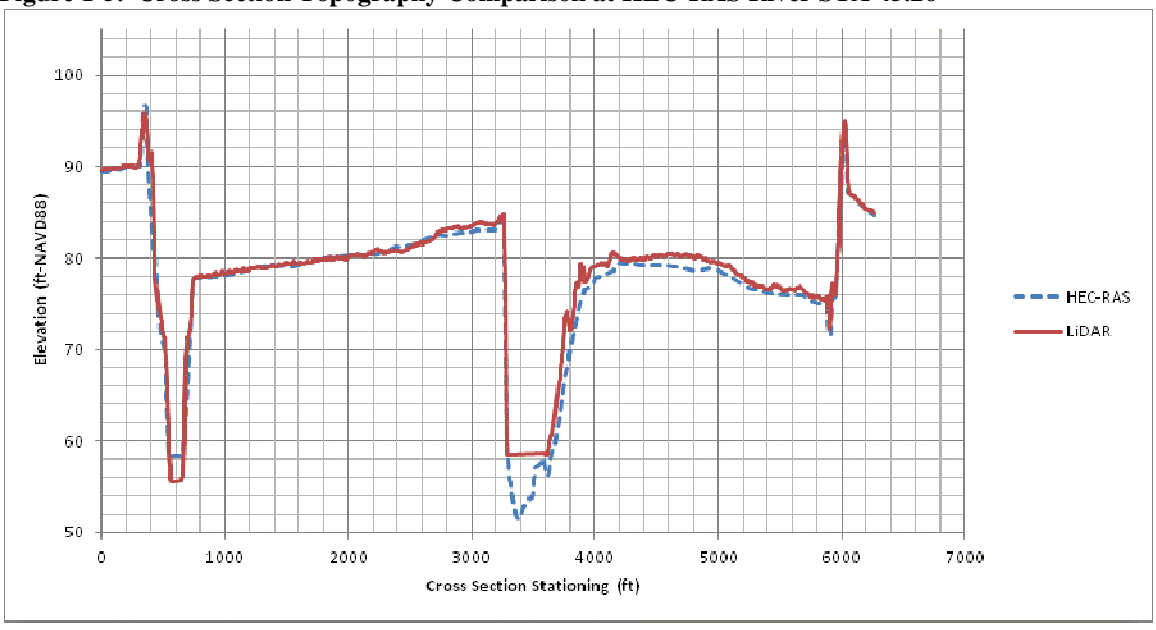


Figure 1-6. Cross Section Topography Comparison at HEC-RAS River STA 43.28

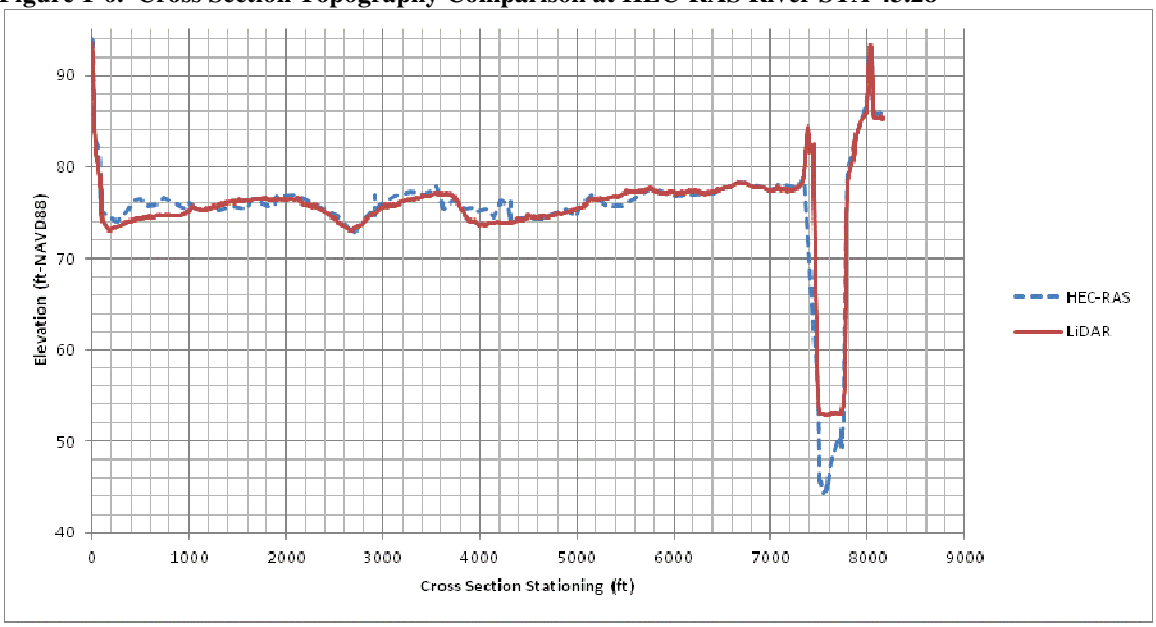


Figure 1-7. Cross Section Topography Comparison at HEC-RAS River STA 37.29

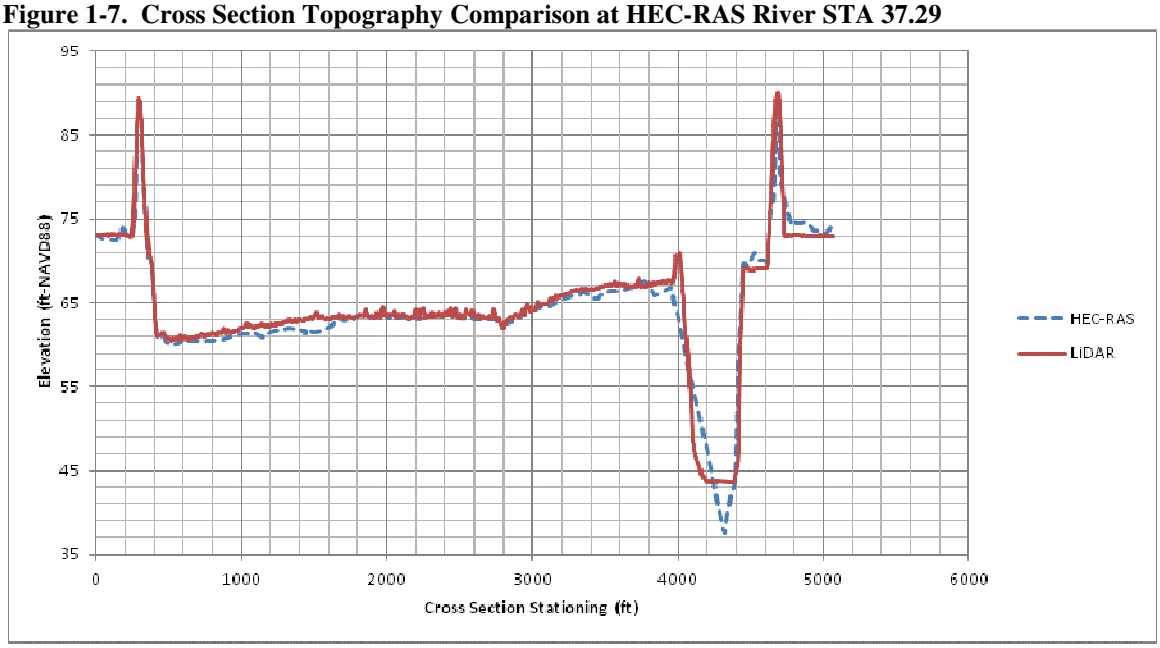


Figure 1-8. Cross Section Topography Comparison at HEC-RAS River STA 33.0

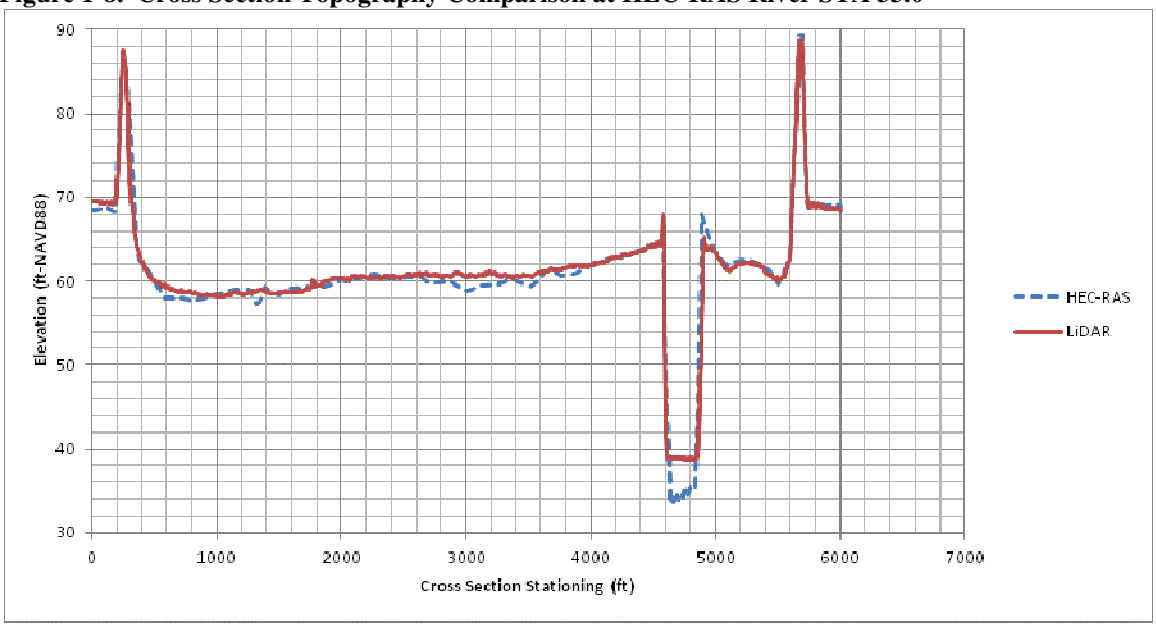


Figure 1-9. Cross Section Topography Comparison at HEC-RAS River STA 31.25

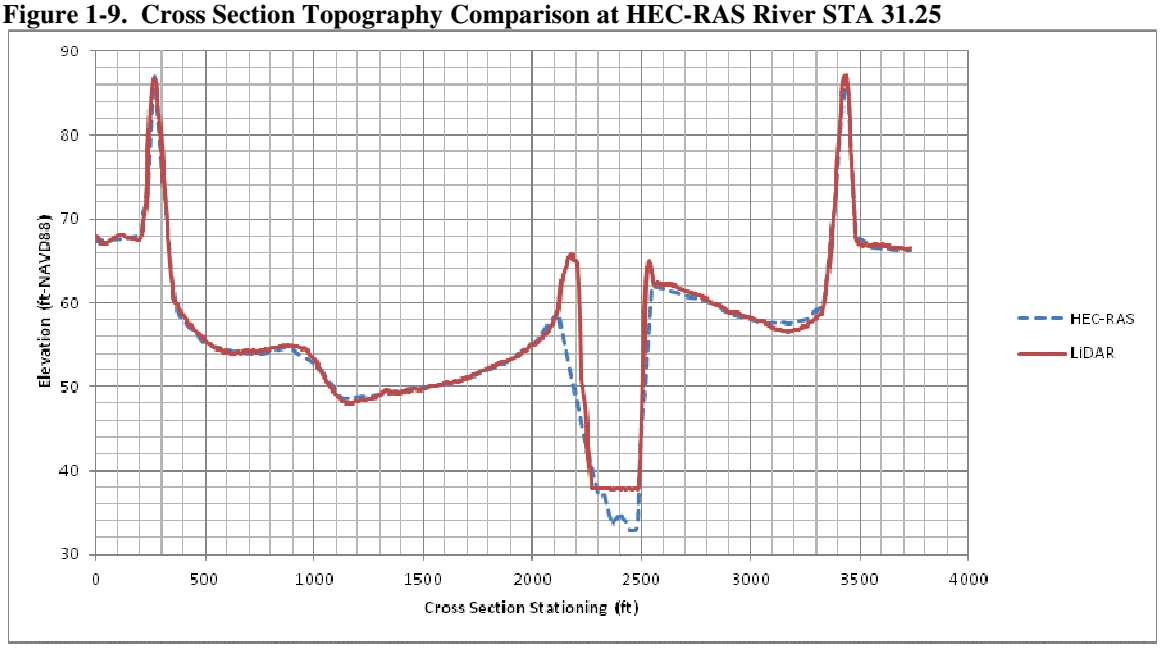


Figure 1-10. Cross Section Topography Comparison at HEC-RAS River STA 29.75

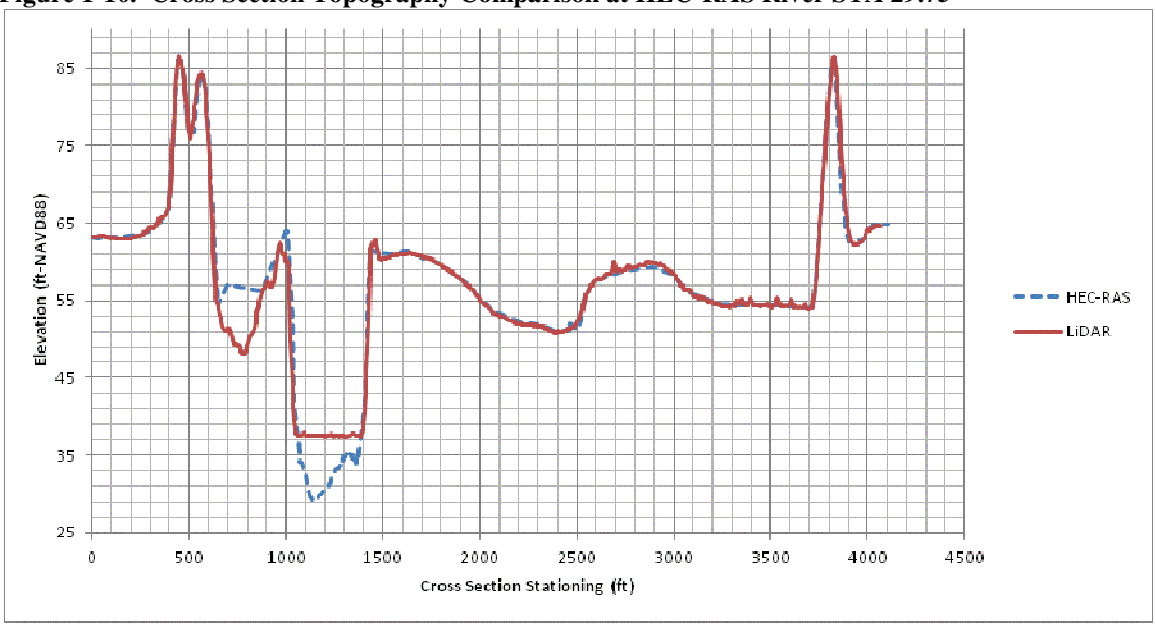


Figure 1-11. Cross Section Topography Comparison at HEC-RAS River STA 25.25

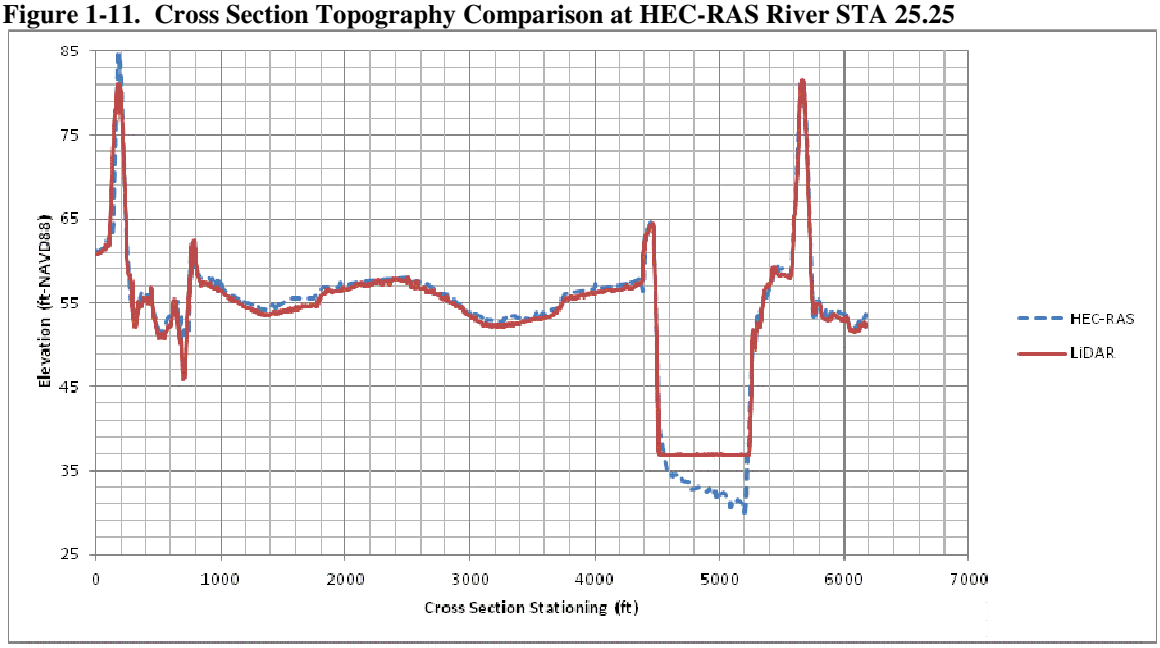


Figure 1-12. Cross Section Topography Comparison at HEC-RAS River STA 20.5

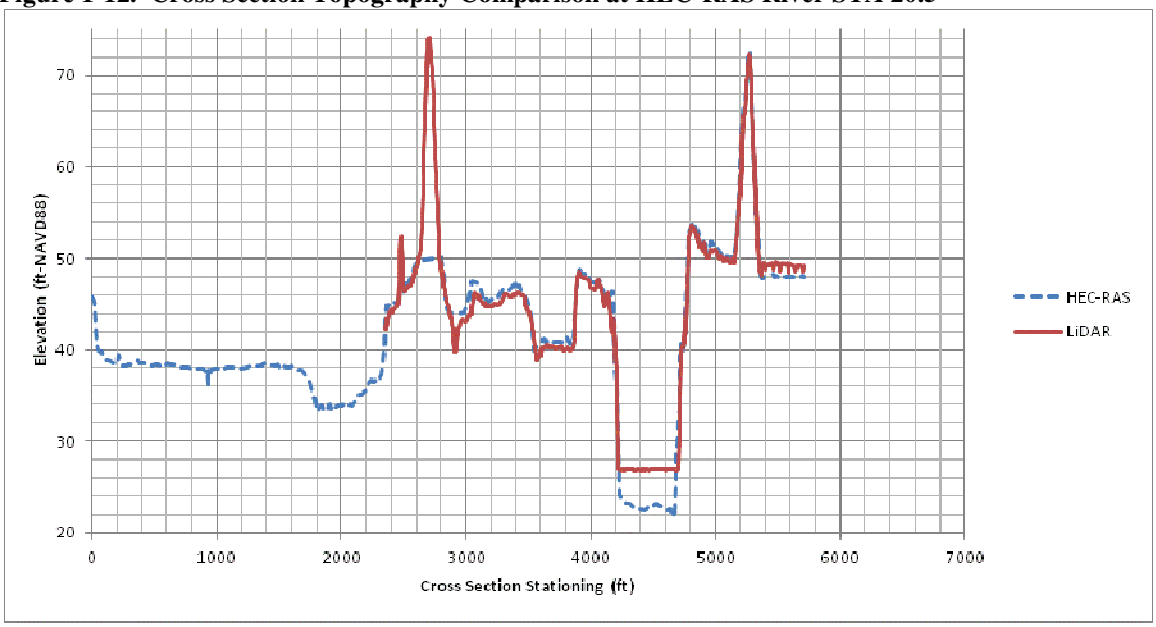
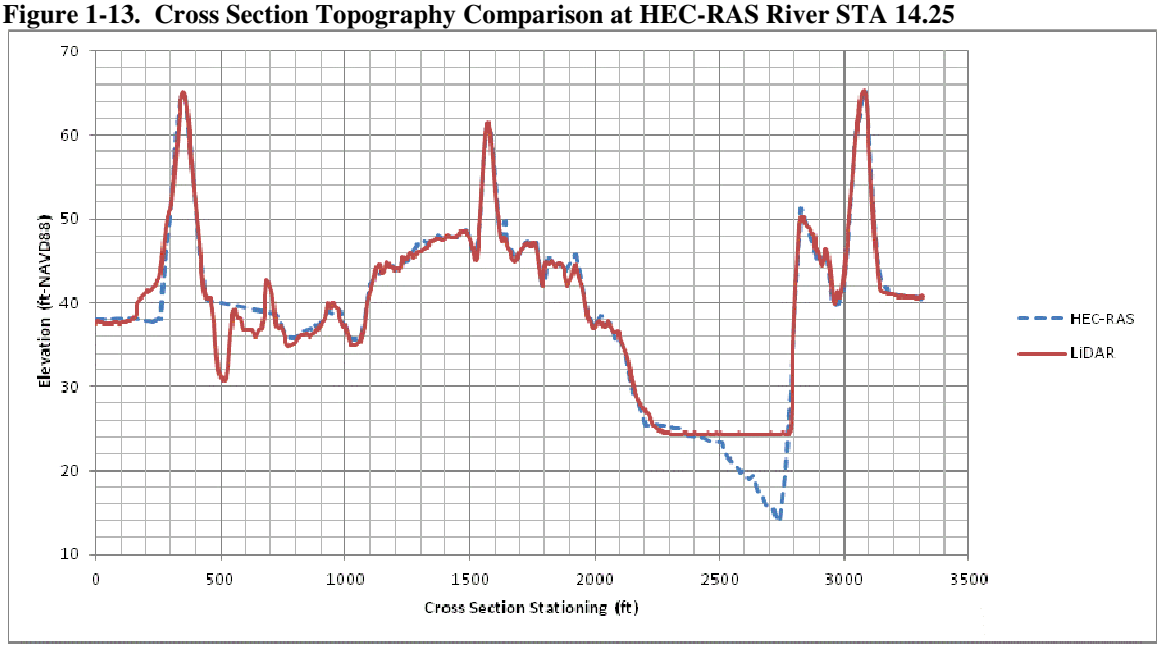


Figure 1-13. Cross Section Topography Comparison at HEC-RAS River STA 14.25



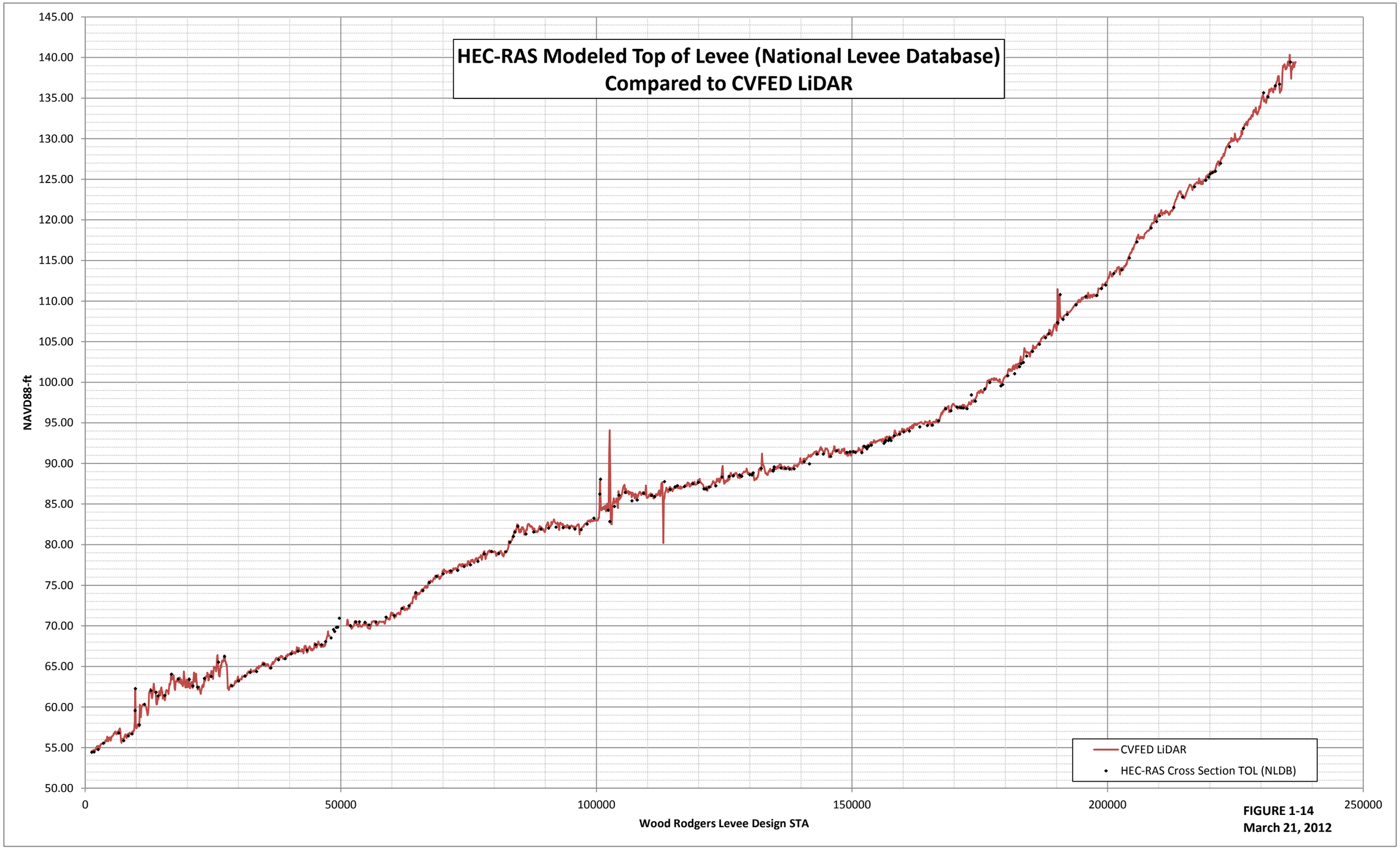


FIGURE 1-14
March 21, 2012

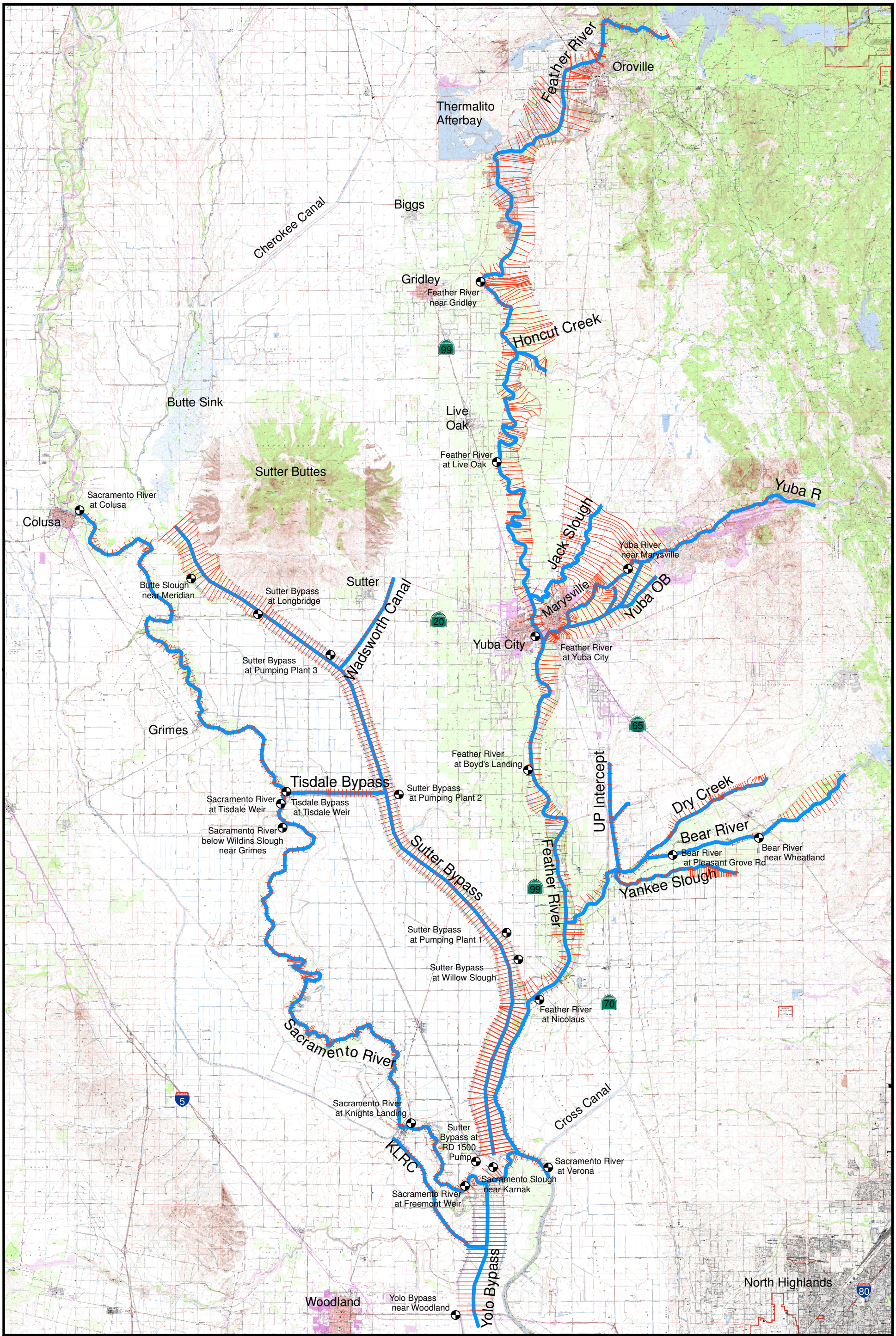
2 HYDROLOGY

For the HEC-RAS model inflow parameters, PBI utilized 1/100, 1/200 and 1/500 annual exceedance probability (AEP) 30-day storm event hydrographs provided by the USACE. The inflows were applied to the most upstream cross sections of the HEC-RAS model, which is shown in Figure 2-1. In developing the n-year hydrographs the USACE used two different storm centerings: 1) the Sacramento River storm centering and 2) the Shanghai Bend storm centering. The Shanghai Bend storm centering produces higher stages in the Feather River for the 200-year event. For the 100-year event, the Sacramento storm centering produces higher stages in the Feather River downstream of HEC-RAS River Station (RS) 47.04 and the Shanghai storm centering produces higher stages in the Feather River upstream of RS 47.04. For the 500-year storm event, the Sacramento storm centering produces higher stages for the lower Feather River (downstream of RS 15.25) and the Shanghai storm centering produces higher stages for the Feather River at and above RS 15.25.

In March 2012, the USACE made several improvements to the inflow hydrology for the n-year events. As part of the improvements, the USACE refined the inflows for the minor tributaries and verified that the inflow hydrographs input into the HEC-RAS model match their referenced study source. The March improvements included:

- Wadsworth Canal: Replaced the constant inflow of 1,500 cubic feet per second (cfs) with n-year hydrographs
- Best Slough: Updated the n-year hydrographs to include all of the AEP events
- UP Interceptor Canal: Updated the n-year hydrographs to include all of the AEP events
- Yankee Slough: Updated the n-year hydrographs to include all of the AEP events
- Honcut Creek: Revised the inflow hydrographs to account for flows that should be routed to Jack Slough
- Jack Slough: Updated the n-year hydrographs to include all of the AEP events
- Feather River: Revised the n-year hydrographs for the Shanghai storm centering to match the *Lower Feather River Floodplain Mapping Study*
- Bear River: Revised the n-year hydrographs to match the *Sacramento and San Joaquin Basins Comprehensive Study*
- Yuba River: Revised the n-year hydrographs for the Shanghai storm centering to match the *Lower Feather River Floodplain Mapping Study* and combined the n-year hydrographs from Englebright and Deer Creek at HEC-RAS River STA 13.84

Table 2-1 and Table 2-4 summarize the peak inflow values that were used for the FRWLP prior to March 2012. Table and Table 2-5 summarize the final peak inflow values after the March USACE improvements. All inflow hydrographs were provided by the USACE in HEC-DSS format. The sources of the inflow hydrographs are summarized in Table 2-3 and Table 2-6. The hydrology sources were provided by the USACE as part of the March update.



N

0 1.25 2.5 5 Miles

MARCH 2012

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SUTTER BUTTE FLOOD CONTROL AGENCY

PBI SUTTER BASIN HEC-RAS MODEL

FIGURE

2-1

Table 2-1. Shanghai Storm Centering Peak Inflow Values Prior to March 2012

Description	1/100 AEP Storm Event (cfs)	1/200 AEP Storm Event (cfs)	1/500 AEP Storm Event (cfs)
Bear River	41,500	47,700	55,300
Best Slough	820	820	820
Dry Creek	7,000	8,100	9,400
Feather River	150,000	174,000	327,000
Jack Slough	6,800	6,800	6,800
Sacramento River	52,900	58,200	62,600
Sutter Bypass	156,000	218,000	273,000
Yuba (Englebright)	141,000	211,000	295,000
Yuba (Deer Creek)	9,500	10,700	12,400
Yuba (Dry Creek)	9,000	10,100	11,600
Honcut Creek	32,300	38,800	48,100
Wadsworth Canal	1,500	1,500	1,500
UP Interceptor Canal	7,300	7,300	7,300
Yankee Slough	2,800	2,800	2,800

Table 2-2. Final Shanghai Storm Centering Peak Inflow Values

Description	1/100 AEP Storm Event (cfs)	1/200 AEP Storm Event (cfs)	1/500 AEP Storm Event (cfs)
Bear River	40,600	46,800	54,200
Best Slough	3,900	4,600	5,500
Dry Creek	7,000	8,100	9,400
Feather River	150,000	174,000	320,000
Jack Slough	4,500	5,400	6,600
Sacramento River	52,900	58,200	62,600
Sutter Bypass	156,000	218,000	273,000
Yuba (Englebright)	141,000	208,000	294,000
Yuba (Deer Creek)	9,500	10,700	12,400
Yuba (Dry Creek)	8,900	10,100	11,600
Honcut Creek	27,900	33,400	41,500
Wadsworth Canal	1,500	1,550	1,600
UP Interceptor Canal	5,700	7,300	9,500
Yankee Slough	2,100	2,800	3,800

Table 2-3. Sources of Shanghai Storm Centering Hydrology for the FRWLP HEC-RAS Model

Inflow Hydrograph	Source of Data
Bear River - Dry Creek at Jasper Lane	Lower Feather River Floodplain Mapping Study
Bear River below Camp Far West	Sacramento and San Joaquin Basins Comprehensive Study
Best Slough at Forty Mile Road	Lower Feather River Floodplain Mapping Study
Sutter Bypass at West Butte Road	Sacramento and San Joaquin Basins Comprehensive Study
Feather River at Oroville	Lower Feather River Floodplain Mapping Study
Honcut Creek at Hwy 70	Lower Feather River Floodplain Mapping Study
Sacramento River at Colusa Bridge	Sacramento and San Joaquin Basins Comprehensive Study
UP Interceptor Canal	Lower Feather River Floodplain Mapping Study
Wadsworth Canal at Hwy 20	Sutter County 2004 Feasibility Study
Yankee Slough at Swetzer Road	Lower Feather River Floodplain Mapping Study
Yuba River - Dry Creek at Hwy 20	Lower Feather River Floodplain Mapping Study
Yuba River below Englebright Dam	Lower Feather River Floodplain Mapping Study
Yuba River - Deer Creek	Lower Feather River Floodplain Mapping Study

Table 2-4. Sacramento Storm Centering Peak Inflow Values Prior to March 2012

Description	1/100 AEP Storm Event (cfs)	1/200 AEP Storm Event (cfs)	1/500 AEP Storm Event (cfs)
Bear River	49,200	54,700	62,000
Best Slough	820	820	820
Dry Creek	8,300	9,300	10,500
Feather River	150,000	150,000	292,000
Jack Slough	6,800	6,800	6,800
Sacramento River	55,500	59,300	67,900
Sutter Bypass	184,000	229,000	327,000
Yuba (Englebright)	124,000	170,000	244,000
Yuba (Deer Creek)	11,100	12,200	13,700
Yuba (Dry Creek)	10,400	11,400	12,900
Honcut Creek	31,200	37,300	46,500
Wadsworth Canal	1,500	1,500	1,500
UP Interceptor Canal	7,300	7,300	7,300
Yankee Slough	2,800	2,800	2,800

Table 2-5. Final Sacramento Storm Centering Peak Inflow Values

Description	1/100 AEP Storm Event (cfs)	1/200 AEP Storm Event (cfs)	1/500 AEP Storm Event (cfs)
Bear River	48,200	53,600	60,700
Best Slough	4,700	5,300	6,200
Dry Creek	8,300	9,300	10,500
Feather River	150,000	150,000	292,000
Jack Slough	4,300	5,100	6,400
Sacramento River	55,500	59,300	67,900
Sutter Bypass	184,000	229,000	327,000
Yuba (Englebright)	124,000	170,000	244,000
Yuba (Deer Creek)	11,100	12,200	13,700
Yuba (Dry Creek)	10,400	11,400	12,900
Honcut Creek	26,900	32,100	40,100
Wadsworth Canal	1,500	1,550	1,600
UP Interceptor Canal	6,800	8,400	10,600
Yankee Slough	2,500	3,200	4,300

Table 2-6. Sources of Sacramento Storm Centering Hydrology for the FRWLP HEC-RAS Model

Inflow Hydrograph	Source of Data
Bear River - Dry Creek at Jasper Lane	Sacramento and San Joaquin Basins Comprehensive Study
Bear River below Camp Far West	Sacramento and San Joaquin Basins Comprehensive Study
Best Slough at Forty Mile Road	Lower Feather River Floodplain Mapping Study
Sutter Bypass at West Butte Road	Sacramento and San Joaquin Basins Comprehensive Study
Feather River at Oroville	Sacramento and San Joaquin Basins Comprehensive Study
Honcut Creek at Hwy 70	Sacramento and San Joaquin Basins Comprehensive Study
Sacramento River at Colusa Bridge	Sacramento and San Joaquin Basins Comprehensive Study
UP Interceptor Canal	Lower Feather River Floodplain Mapping Study
Wadsworth Canal at Hwy 20	Sutter County 2004 Feasibility Study
Yankee Slough at Swetzer Road	Lower Feather River Floodplain Mapping Study
Yuba River - Dry Creek at Hwy 20	Sacramento and San Joaquin Basins Comprehensive Study
Yuba River below Englebright Dam	Sacramento and San Joaquin Basins Comprehensive Study
Yuba River - Deer Creek	Sacramento and San Joaquin Basins Comprehensive Study

3 HYDRAULICS

The final FRWLP HEC-RAS model was developed from Release 3 of the USACE Sacramento River Basin HEC-RAS Model (NAVD88 version), which was released by the USACE in February 2011. As part of Release 3, the USACE made several improvements to the input hydrology for both the 1997 and 2006 storm events. The USACE also made significant updates to the stream gage data based upon additional research and new field surveys. The following sections summarize the additional updates that were incorporated into the USACE Release 3 HEC-RAS model and provide the final calibration results for the FRWLP.

3.1 UPDATE #1 (JUNE 2011)

Subsequent to development of the preliminary design water surface profiles in PBI's October 2010 TM, both PBI and the USACE made significant improvements to the HEC-RAS hydraulic model. The major improvements included:

- Modifications to the hydrologic input used for the calibration storm events
- Updated stream gage data and stream gage rating curves
- Updates to the Tisdale Weir flow split
- Updates to the Fremont Weir coding
- Modifications to the coding of the Sutter Bypass/Feather River confluence
- Various minor topographic updates

These improvements necessitated a re-calibration of the HEC-RAS model and PBI therefore revised the design water surface profiles in June 2011 using this updated model version. The June update generally raised the water surface profile along the entire reach of the Feather River by an average of 0.5 feet. The most significant change occurred at the upper end near reach 34, where the water surface experienced a raise of plus 3 feet. HDR's 65% design is based upon the June 2011 water surface profiles.

A summary of the June updates that PBI incorporated into the modeling is provided below, along with a summary of the results of the June re-calibration. Information regarding the calibration inflow hydrographs, along with information regarding the updated stream gage data, will be published by the USACE at a later date. No modifications were made to the n-year design flow hydrology as part of the June 2011 update.

Based upon the new information, the HEC-RAS model was updated at each of its two downstream boundary locations: Sacramento River at Verona Gage and Yolo Bypass at Woodland Gage. The USACE discovered that the USGS Yolo Bypass Woodland gage rating curve incorporates an adjustment for Sacramento Weir inflow into the Yolo Bypass. The gage, however, is located upstream of the confluence with the Sacramento Bypass. As a result, the USGS rating curve does not accurately represent the stage-flow relationship at the gage. Therefore, the Woodland gage rating curve was revised by the USACE. The Sacramento River at Verona gage was also updated based upon new field survey data. Figure 3-1 and Figure 3-2 show the updated rating curves at each of these locations.

Figure 3-1. Updated Rating Curve for Sacramento River at Verona Gage

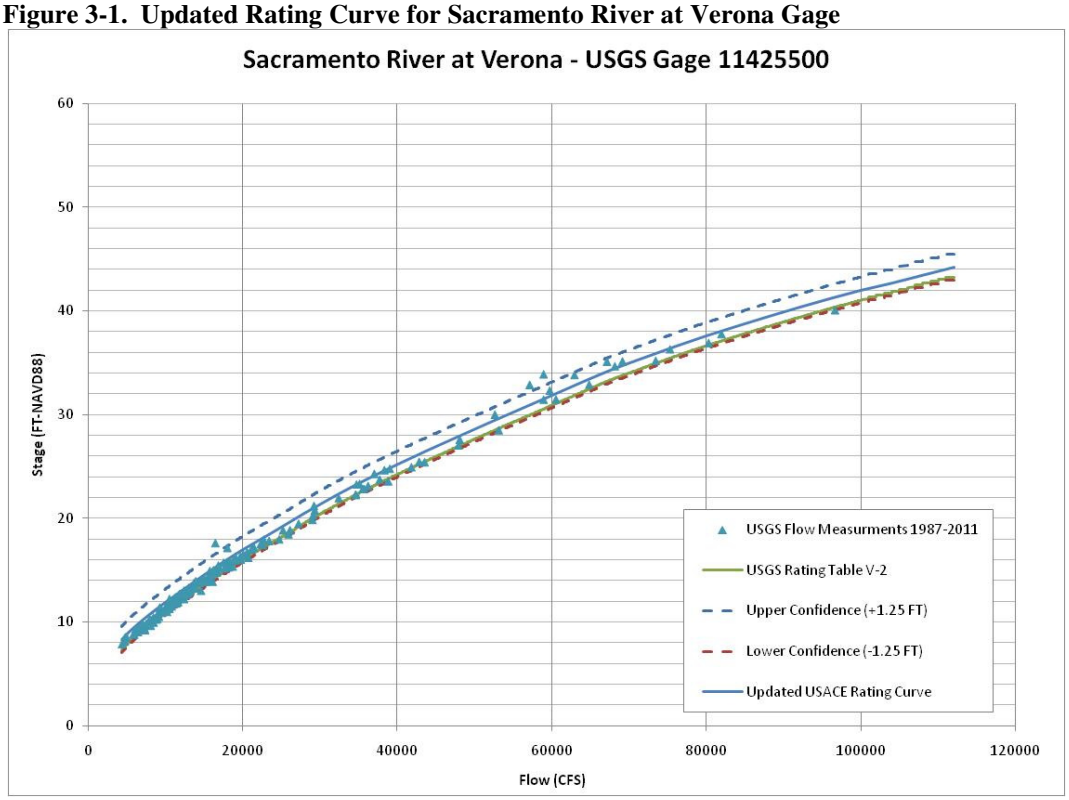
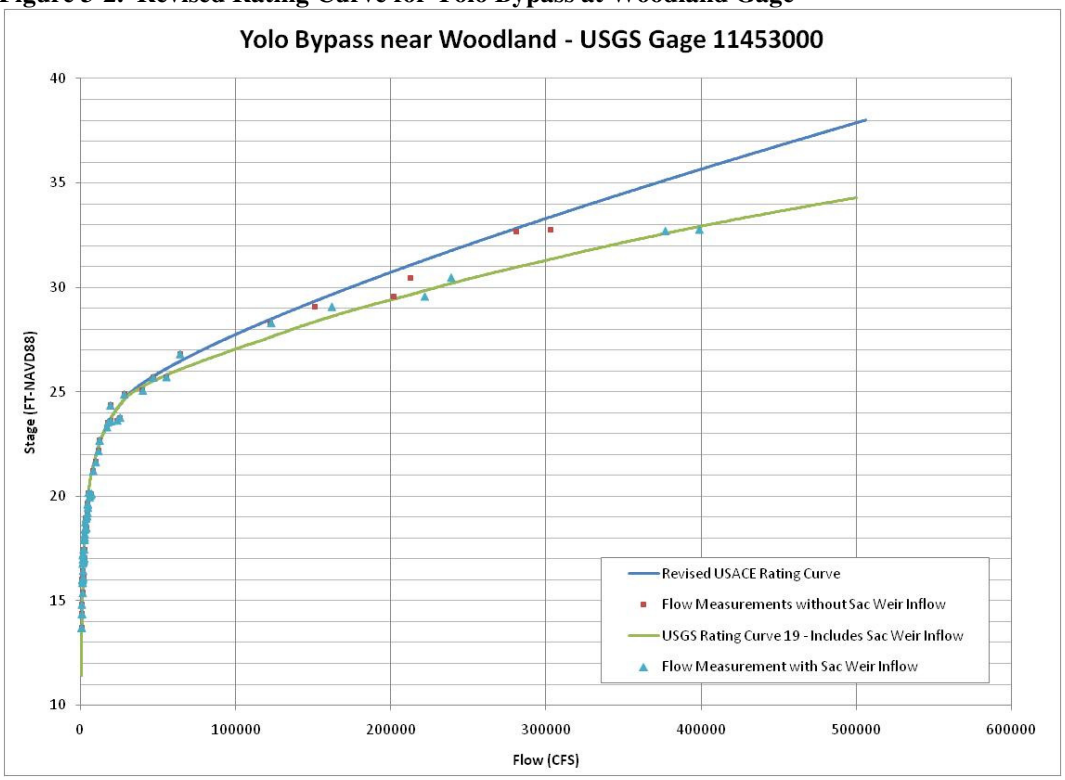


Figure 3-2. Revised Rating Curve for Yolo Bypass at Woodland Gage



The Tisdale Weir coding was also modified during the June 2011 update in order to better represent historic conditions and to stabilize HEC-RAS computations. The updated weir utilizes a user-input stage-discharge flow split provided by the USACE in lieu of a flow split calculated by HEC-RAS based on weir flow calculations. It is important to note that the updated rating curve is based upon historical data and that it does not incorporate the new bridge at Tisdale weir (completed in the Spring of 2010) or the DWR Tisdale Bypass sediment removal project (completed in 2008). These improvements are likely to modify the flow split table, but the modifications would have no appreciable effect on the Feather River water surface profiles, and very little effect on the outflow breach hydrographs utilized for the SBFS; therefore, it was deemed that the historic flow split table is appropriate for use in this study. However, it is recommended that this area of the HEC-RAS model be reviewed and updated in conjunction with future modeling focused on the Tisdale Bypass, Sutter Bypass and Sacramento River. The Tisdale Weir lateral diversion rating curve is shown in Table 3-1.

Table 3-1. Lateral Diversion Rating Curve for Tisdale Weir

Sacramento River Flow Upstream of Weir (cfs)	Diverted Flow to Tisdale Bypass (cfs)
0	0
2,400	0
22,300	0
22,500	10
22,800	100
23,700	500
24,500	1,000
26,000	2,000
28,650	4,050
33,250	7,950
37,950	12,050
42,500	15,000
52,400	20,000
60,000	23,300
66,800	26,000
69,600	27,000

As part of the June update, PBI re-calibrated the model to both the 1997 and 2006 storm events by adjusting the channel Manning's n-values in order to match observed stream gage data and surveyed high water marks. While performing the calibration, PBI made several structural modifications to the model to improve the topography and assist in the calibration, including:

- Removed the right bank blocked obstruction at Feather River Mile (RM) 7.55 (downstream of the Feather River Highway 99 crossing)
- Deleted the flow-based roughness factors for the upper Yuba River reach and incorporated the factors directly into the cross section Manning's n-values
- Further refined the ineffective flow areas for the upper Feather River (RM 63.73 thru 53.84)

- Added a blocked obstruction in the left overbank at Feather River (FR) RM 56.02 (Design STA 2200+58) to represent the top elevation of a road
- Raised the blocked obstructions along the Sutter Bypass, the Tisdale Bypass and Wadsworth Canal in order to correctly model levee overtopping
- Verified and refined the locations of the observed high water marks by incorporating the downstream distance relative to each cross section (completed for all of the Feather River and Sutter Bypass reaches)
- Added blocked obstructions and updated the lateral weir topography for Highway 70 (FR RM 56.43 thru 46.53)
- Added observed stage data for the DWR Feather River at Live Oak (FLO) gage, Feather River at Boyd's Landing (FBL) gage, and the Sutter Bypass at Longbridge (LNB) gage (see Attachment A for details regarding PBI's gage datum conversion to NAVD88)
- Various minor edits to the cross section hydraulic tables in order to eliminate model instabilities

Manning's n-values were adjusted (within reason) to duplicate stages for the 2006 storm event. The 1997 storm event was then simulated using the revised friction factors. In some locations, adjustments were made to achieve a compromise in stage errors between the two calibration events. It should be noted that the differences in the physical configuration of the Feather River between 1997 and 2006 (such as the Shanghai Bend Setback Levee completed in 1999) were taken into account in the calibration process. Table 3-2 shows a summary of the results of the June 2011 PBI re-calibration.

Table 3-2. Summary of the June 2011 Re-Calibration Results; Comparison of Peak Stages at Gages

GAGE	1997 Peak Stage (ft-NAVD88)			2006 Peak Stage (ft-NAVD88)		
	Observed	Computed	Difference (ft)	Observed	Computed	Difference (ft)
FEATHER RIVER NEAR GRIDLEY (#11407150)	99.66	99.21	-0.45	92.29	93.11	0.82
FEATHER RIVER AT LIVE OAK* (FLO) (FEATHER)	-	-	-	75.08	75.16	0.08
FEATHER RIVER AT YUBA CITY (#A05135)	77.51	77.13	-0.38	67.71	68.68	0.97
FEATHER RIVER AT BOYDS LANDING* (FBL) (FEATHER)	-	-	-	58.54	59.05	0.51
FEATHER RIVER AT NICOLAUS (#A05103)	49.33	49.22	-0.11	44.70	44.55	-0.15
BUTTE SLOUGH NR MERIDIAN (#A02972)	60.91	61.33	0.42	58.19	58.18	-0.01
SUTTER BYPASS AT LONGBRIDGE* (LNB) (BYPASS)	-	-	-	53.61	53.33	-0.28
SUTTER BYPASS AT PUMPING PLANT 3 (SB3) (BYPASS)	54.32	55.44	1.12	51.84	51.25	-0.59
SUTTER BYPASS AT PUMPING PLANT 2 (SB2) (BYPASS)	50.64	50.86	0.22	46.85	46.48	-0.37

GAGE	1997 Peak Stage (ft-NAVD88)			2006 Peak Stage (ft-NAVD88)		
	Observed	Computed	Difference (ft)	Observed	Computed	Difference (ft)
SUTTER BYPASS AT PUMPING PLANT 1 (SB1) (BYPASS)	47.01	48.57	1.56	44.71	44.02	-0.69
WILLOW SLOUGH NR NICOLAUS (#A02943)	46.91	48.42	1.51	43.49	43.73	0.24
SUTTER BYPASS AT RD 1500 NEAR KARNAK (#A02927)	42.50	42.83	0.33	39.00	38.75	-0.25

* This gage data should be considered provisional; the gage datum has not been verified and was converted from NGVD29 to NAVD88 using Corpscon.

3.2 UPDATE #2 (SEPTEMBER 2011)

PBI updated the June 2011 TM to incorporate technical review comments provided by the USACE (Attachment H). A summary of the USACE's comments is as follows:

- Yolo Bypass/Woodland gage corrections
- Junction reach length corrections
- Blocked obstruction modifications along the Bear River
- Various description field (text) modifications
- Modifications to the Honcut Creek inflow for the 1997 event

The September update raised the design water surface profiles by about 0.1 feet at the downstream end of the lower Feather River. The September update had no impacts to the design water surface profiles north of the Bear River confluence.

3.3 UPDATE #3 (DECEMBER 2011)

PBI updated the September 2011 TM to incorporate technical review comments provided by MBK (Attachment I). A summary of MBK's comments is as follows:

- Sutter Bypass and lower Feather River n-value adjustments
- Sutter Bypass/Feather River blocked obstruction modifications
- Lateral structure improvements
- Various report revisions
- 1997 surveyed high water mark review
- Tisdale Weir: rating curve vs. sharp crested weir

The December review comments were addressed by both PBI and the USACE as part of the December update. The comments necessitated a revision of the June 2011 re-calibration. The December calibration results are shown in Section 3.5. The December 2011 update lowered the design water surface profiles by about 0.5 feet at the downstream end of the lower Feather River and had no impacts to the water surface profiles north of Star Bend.

3.4 UPDATE #4 (MARCH 2012)

PBI updated the December 2011 TM to incorporate the updated n-year inflow hydrology provided by the USACE (see Section 2). The March update raised the 200-year design water surface profiles by about 0.3 feet at the Bear River and Feather River confluence, by about 0.2 feet at the Feather River and Sutter Bypass confluence, and by about 0.2 feet upstream of Highway 20. The March update had no impacts to the 200-year design water surface profiles north of Honcut Creek.

3.5 FINAL CALIBRATION RESULTS

Table 3-3 shows a summary of the results of the December 2011 re-calibration. The calibration water surface profiles are shown in Figure 3-3 thru Figure 3-10 (note that the shaded areas represent the right bank levee). Table 3-4 includes a complete list of the re-calibrated Manning's n-values. Table 3-4 also shows the additional n-values that were incorporated into the design to account for the 2009 Feather River Setback Levee.

Table 3-3. Summary of the Final Re-Calibration Results; Comparison of Peak Stages at Gages

GAGE	1997 Peak Stage (ft-NAVD88)			2006 Peak Stage (ft-NAVD88)		
	Observed	Computed	Difference (ft)	Observed	Computed	Difference (ft)
FEATHER RIVER NEAR GRIDLEY (#11407150)	99.66	99.22	-0.44	92.29	93.11	0.82
FEATHER RIVER AT LIVE OAK* (FLO) (FEATHER)	-	-	-	75.08	75.16	0.08
FEATHER RIVER AT YUBA CITY (#A05135)	77.51	77.36	-0.15	67.71	68.68	0.97
FEATHER RIVER AT BOYDS LANDING* (FBL) (FEATHER)	-	-	-	58.54	59.04	0.50
FEATHER RIVER AT NICOLAUS (#A05103)	49.33	49.48	0.15	44.70	44.96	0.26
BUTTE SLOUGH NR MERIDIAN (#A02972)	60.91	61.39	0.48	58.19	58.19	0.00
SUTTER BYPASS AT LONGBRIDGE* (LNB) (BYPASS)	-	-	-	53.61	53.41	-0.20
SUTTER BYPASS AT PUMPING PLANT 3 (SB3) (BYPASS)	54.32	55.65	1.33	51.84	51.38	-0.46
SUTTER BYPASS AT PUMPING PLANT 2 (SB2) (BYPASS)	50.64	51.36	0.72	46.85	46.89	0.04
SUTTER BYPASS AT PUMPING PLANT 1 (SB1) (BYPASS)	47.01	48.84	1.83	44.71	44.27	-0.44
WILLOW SLOUGH NR NICOLAUS (#A02943)	46.91	48.69	1.78	43.49	43.95	0.46
SUTTER BYPASS AT RD 1500 NEAR KARNAK (#A02927)	42.50	42.92	0.42	39.00	38.74	-0.26

* This gage data should be considered provisional; the gage datum has not been verified and was converted from NGVD29 to NAVD88 using Corpscon.

Figure 3-3. 1997 Calibration Water Surface Profile for Upper Reach of Feather River

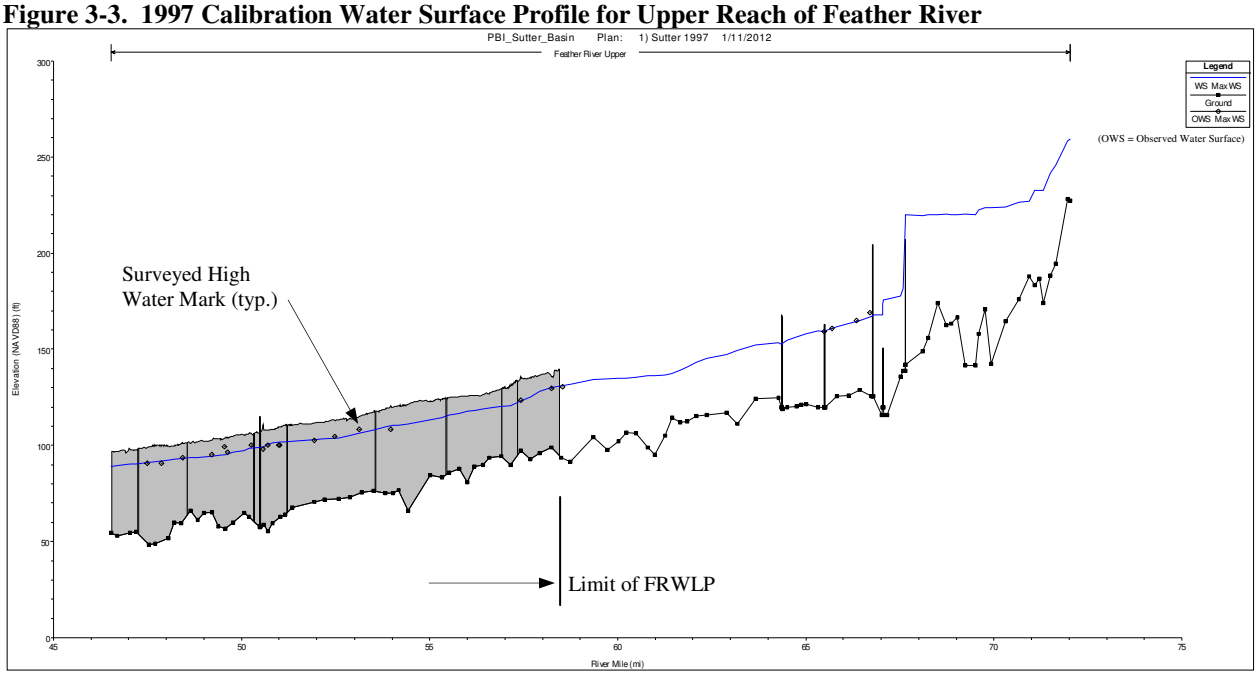


Figure 3-4. 1997 Calibration Water Surface Profile for Honcut-Jack Reach of Feather River

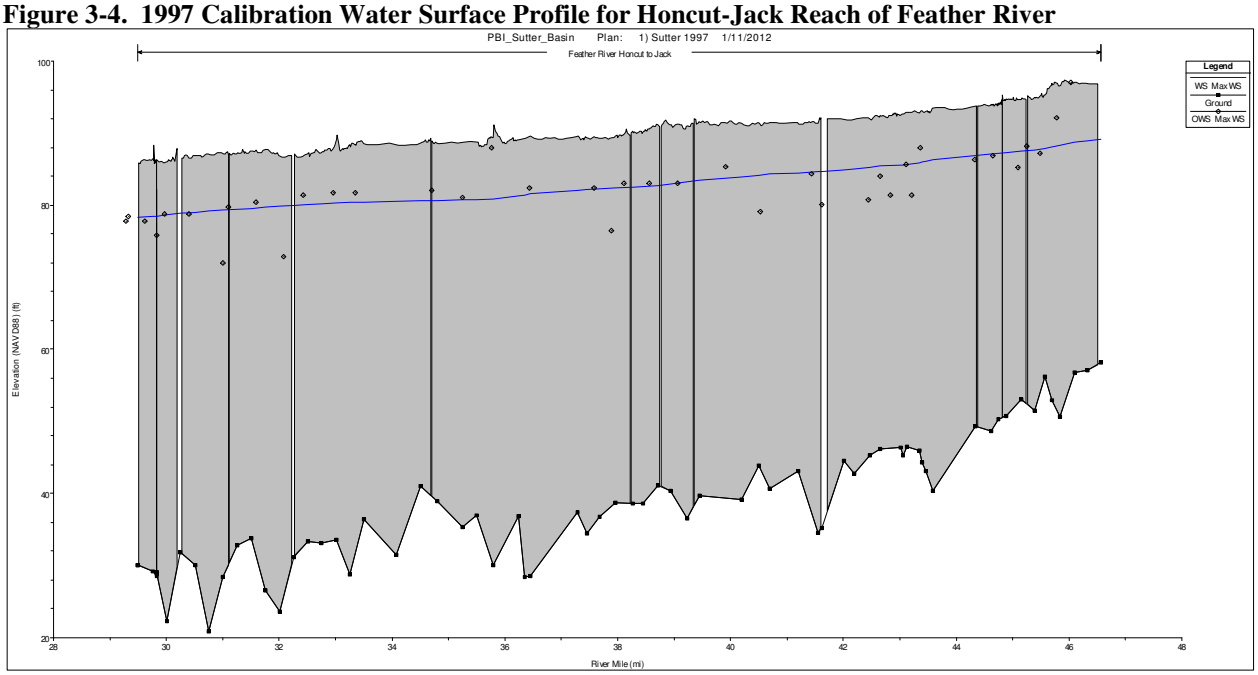


Figure 3-5. 1997 Calibration Water Surface Profile for Jack-Bear Reach of Feather River

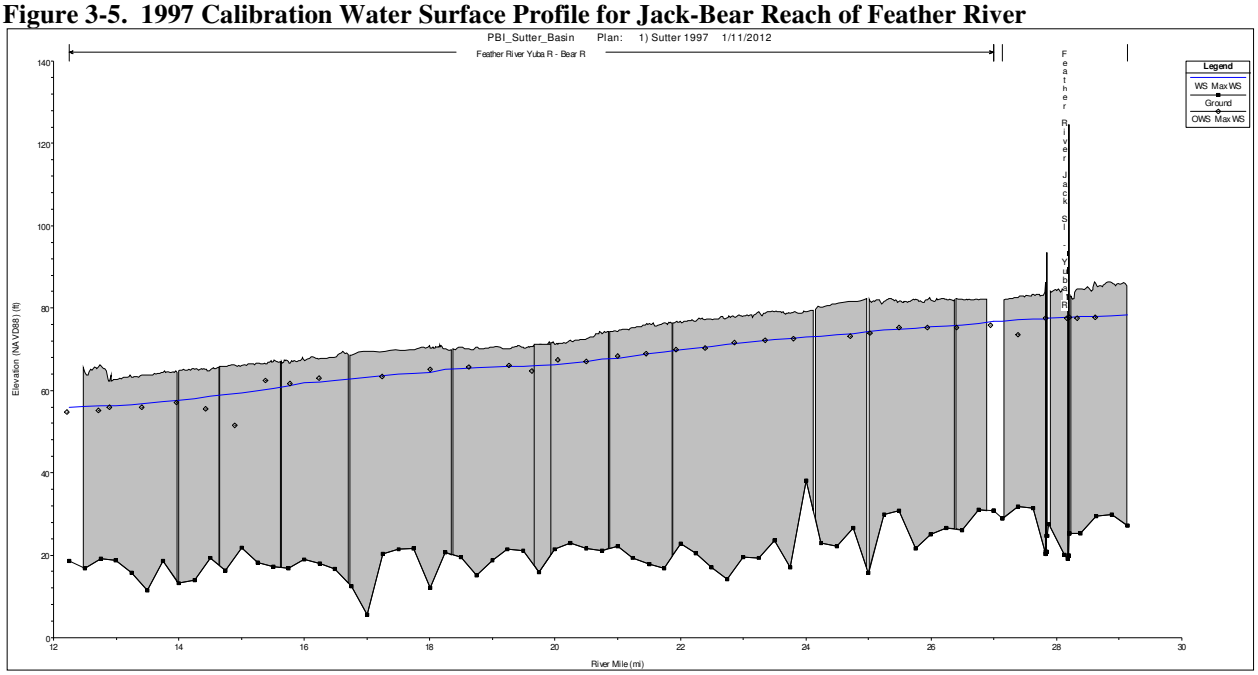


Figure 3-6. 1997 Calibration Water Surface Profile for Bear-Sac Reach of Feather River

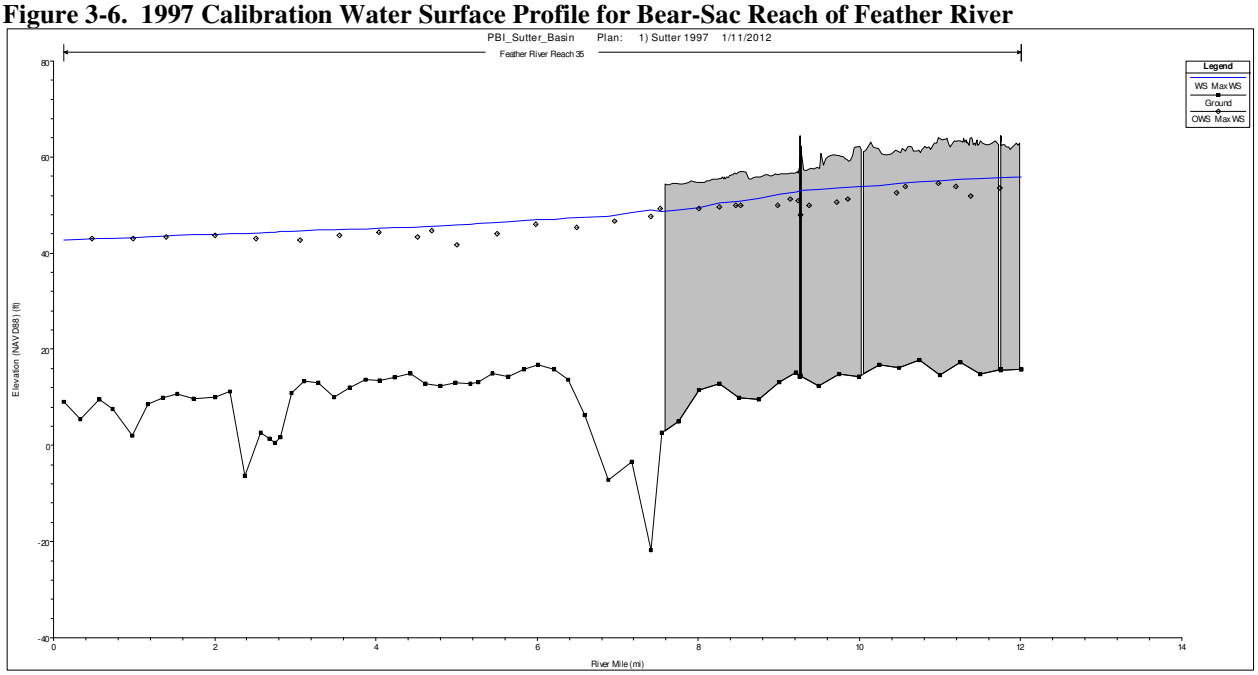


Figure 3-7. 1997 Calibration Water Surface Profile for Butte-Tisdale Reach of Sutter Bypass

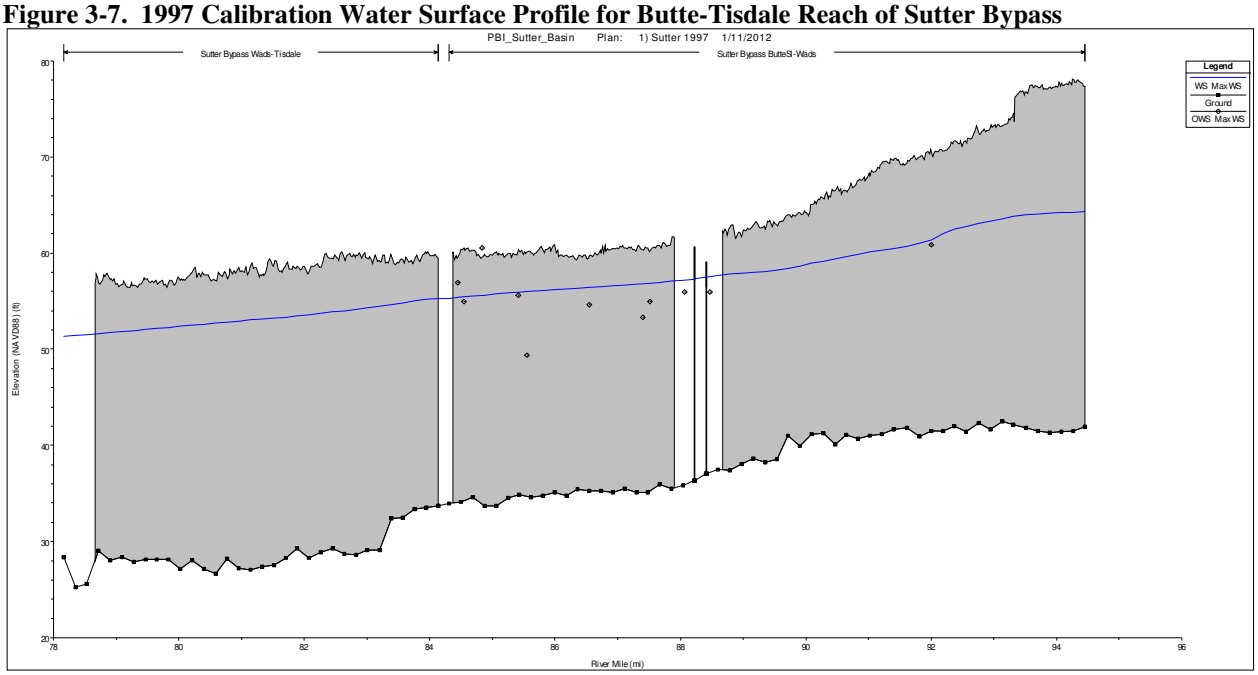


Figure 3-8. 1997 Calibration Water Surface Profile for Tisdale-Yolo Reach of Sutter Bypass

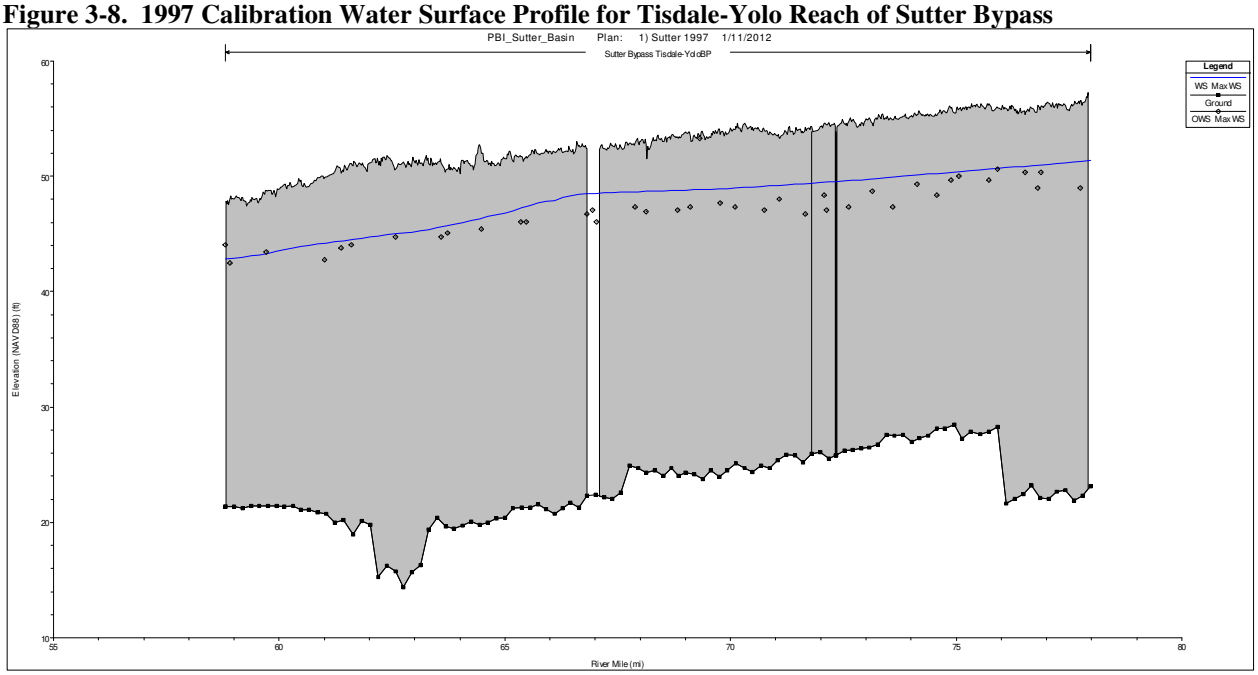


Figure 3-9. 2006 Calibration Water Surface Profile for Butte-Tisdale Reach of Sutter Bypass

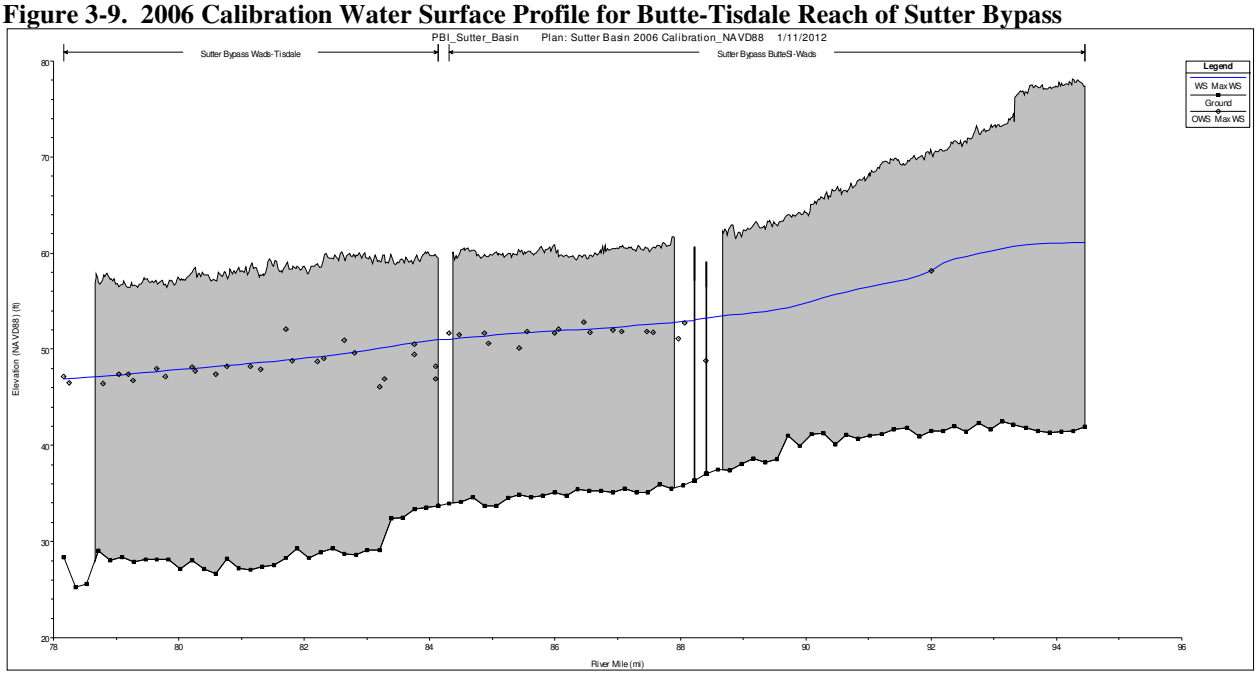


Figure 3-10. 2006 Calibration Water Surface Profile for Tisdale-Yolo Reach of Sutter Bypass

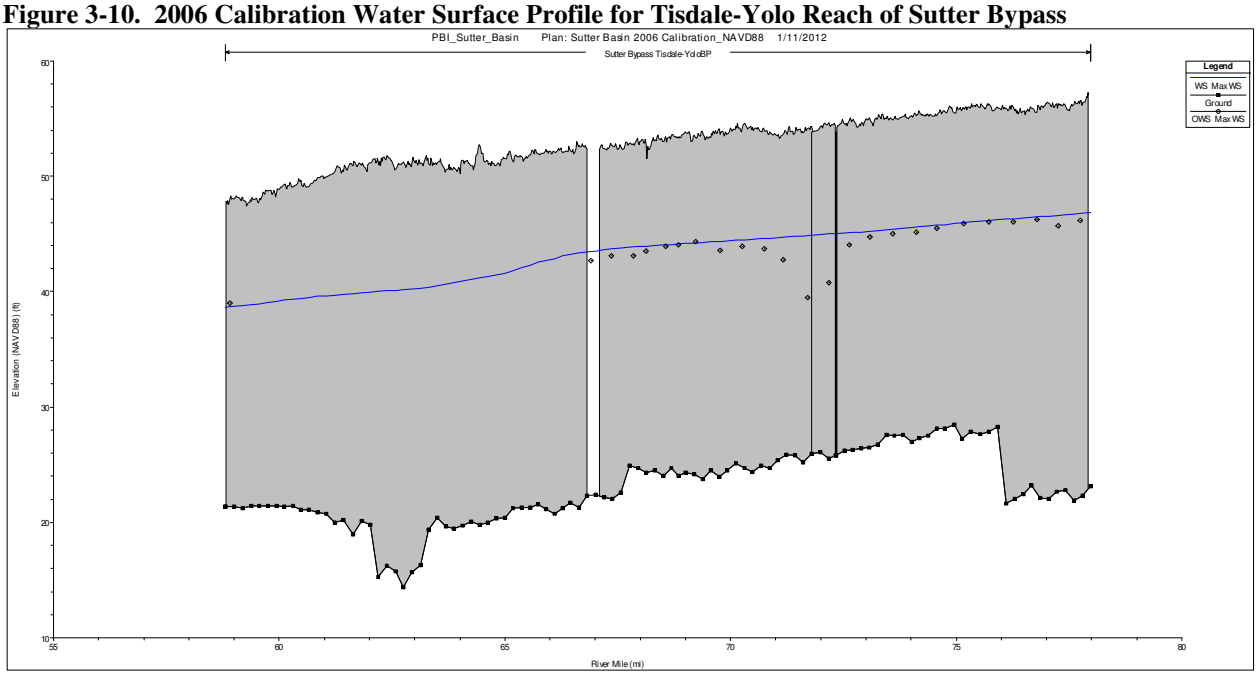


Table 3-4. Feather River Manning's n-Values Utilized for the PBI Sutter Basin Model

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Upper	71.45	n	0.07	0.07	0.07		
Upper	71.4	n	0.07	0.07	0.07		
Upper	71.09	n	0.07	0.07	0.07		
Upper	70.95	n	0.07	0.07	0.07		
Upper	70.74	n	0.07	0.07	0.07		
Upper	70.65	n	0.065	0.04	0.065		
Upper	70.53	n	0.065	0.04	0.065		
Upper	70.38	n	0.065	0.04	0.065		
Upper	70.1	n	0.065	0.04	0.065		
Upper	69.73	n	0.065	0.04	0.065		
Upper	69.37	n	0.065	0.04	0.065		
Upper	69.2	n	0.065	0.04	0.065		
Upper	69.04	n	0.065	0.04	0.065		
Upper	68.95	n	0.065	0.04	0.065		
Upper	68.67	n	0.065	0.04	0.065		
Upper	68.46	n	0.065	0.04	0.065		
Upper	68.29	n	0.065	0.04	0.065		
Upper	68.17	n	0.065	0.04	0.065		
Upper	67.94	n	0.065	0.04	0.065		
Upper	67.7	n	0.065	0.04	0.065		
Upper	67.54	n	0.065	0.04	0.065		
Upper	67.08	n	0.065	0.04	0.065		
Upper	67.07	Inl Struct					
Upper	67.03	n	0.065	0.04	0.065		
Upper	66.95	n	0.065	0.04	0.065		
Upper	66.61	n	0.065	0.04	0.065		
Upper	66.4889	n	0.055	0.04	0.055		
Upper	66.472	n	0.055	0.04	0.055		
Upper	66.469	Inl Struct					
Upper	66.4637	n	0.055	0.04	0.055		
Upper	66.4448	n	0.055	0.04	0.055		
Upper	66.2317	n	0.055	0.04	0.055		
Upper	66.2162	n	0.055	0.04	0.055		
Upper	66.2149	Bridge					
Upper	66.212	n	0.055	0.04	0.055		
Upper	66.19	n	0.055	0.04	0.055		
Upper	65.88	n	0.055	0.04	0.055		
Upper	65.58	n	0.055	0.04	0.055		
Upper	65.28	n	0.055	0.04	0.055		
Upper	64.954	n	0.055	0.04	0.055		
Upper	64.952	n	0.055	0.04	0.055		
Upper	64.95	Bridge					
Upper	64.916	n	0.055	0.04	0.055		
Upper	64.914	n	0.055	0.04	0.055		
Upper	64.76	n	0.055	0.04	0.055		
Upper	64.46	n	0.055	0.04	0.055		
Upper	64.34	n	0.055	0.04	0.055		
Upper	64.2	n	0.055	0.04	0.055		
Upper	63.95	n	0.055	0.04	0.055		
Upper	63.826	n	0.055	0.04	0.055		
Upper	63.824	n	0.055	0.04	0.055		
Upper	63.82	Bridge					

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Upper	63.816	n	0.055	0.04	0.055		
Upper	63.814	n	0.055	0.04	0.055		
Upper	63.73	n	0.055	0.04	0.055		
Upper	63.43	n	0.055	0.04	0.055		
Upper	62.93	n	0.055	0.04	0.055		
Upper	62.65	n	0.055	0.04	0.055		
Upper	62.38	n	0.055	0.04	0.055		
Upper	62.12	n	0.055	0.04	0.07		
Upper	61.86	n	0.055	0.04	0.07		
Upper	61.67	n	0.055	0.04	0.07		
Upper	61.46	n	0.055	0.04	0.07		
Upper	61.28	n	0.055	0.04	0.07		
Upper	61	n	0.055	0.04	0.07		
Upper	60.81	n	0.055	0.04	0.07		
Upper	60.49	n	0.055	0.04	0.07		
Upper	60.25	n	0.055	0.04	0.07		
Upper	60.04	n	0.055	0.04	0.07		
Upper	59.74	n	0.055	0.04	0.07		
Upper	59.35	n	0.055	0.04	0.07		
Upper	58.75	n	0.055	0.04	0.07		
Upper	58.51	n	0.07	0.04	0.055		
Upper	58.45	Lat Struct					
Upper	58.26	n	0.07	0.04	0.055		
Upper	57.95	n	0.07	0.04	0.055		
Upper	57.7	n	0.07	0.04	0.055		
Upper	57.45	n	0.07	0.04	0.055		
Upper	57.3	Lat Struct					
Upper	57.17	n	0.07	0.04	0.055		
Upper	56.99	Lat Struct					
Upper	56.94	n	0.07	0.04	0.055		
Upper	56.61	n	0.07	0.04	0.055		
Upper	56.43	n	0.07	0.04	0.055		
Upper	56.42	Lat Struct					
Upper	56.2	n	0.07	0.04	0.055		
Upper	56.02	n	0.07	0.04	0.055		
Upper	55.8	n	0.055	0.04	0.055		
Upper	55.55	n	0.055	0.04	0.055		
Upper	55.4	Lat Struct					
Upper	55.35	n	0.055	0.04	0.055		
Upper	55.03	n	0.055	0.04	0.055		
Upper	54.45	n	0.05	0.04	0.05		
Upper	54.2	n	0.05	0.04	0.05		
Upper	54.04	n	0.05	0.04	0.05		
Upper	54.039	Lat Struct					
Upper	53.84	n	0.05	0.04	0.05		
Upper	53.56	Lat Struct					
Upper	53.52	n	0.05	0.04	0.05		
Upper	53.22	n	0.05	0.04	0.05		
Upper	52.89	n	0.065	0.04	0.065		
Upper	52.6	n	0.065	0.045	0.065		
Upper	52.21	n	0.065	0.045	0.065		
Upper	51.95	n	0.065	0.045	0.065		
Upper	51.35	n	0.055	0.04	0.055		

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Upper	51.2	Lat Struct					
Upper	51.1777	n	0.06	0.038	0.06		
Upper	51.04	n	0.06	0.038	0.06		
Upper	50.84	n	0.06	0.038	0.06		
Upper	50.7	n	0.065	0.038	0.065		
Upper	50.59	n	0.065	0.038	0.065		
Upper	50.498	n	0.065	0.038	0.065		
Upper	50.496	n	0.07	0.038	0.07		
Upper	50.493	Bridge					
Upper	50.489	n	0.07	0.038	0.07		
Upper	50.487	n	0.07	0.038	0.07		
Upper	50.486	Lat Struct					
Upper	50.48	Lat Struct					
Upper	50.31	Lat Struct					
Upper	50.2	n	0.065	0.038	0.065		
Upper	50.06	n	0.065	0.038	0.065		
Upper	49.78	n	0.065	0.038	0.065		
Upper	49.58	n	0.065	0.038	0.065		
Upper	49.38	n	0.065	0.038	0.065		
Upper	49.21	n	0.065	0.038	0.065		
Upper	48.99	n	0.055	0.04	0.055		
Upper	48.85	n	0.055	0.04	0.055		
Upper	48.66	n	0.055	0.04	0.055		
Upper	48.55	Lat Struct					
Upper	48.47	Lat Struct					
Upper	48.39	n	0.055	0.04	0.055		
Upper	48.21	n	0.055	0.04	0.055		
Upper	48.07	n	0.055	0.04	0.055		
Upper	47.7	n	0.055	0.04	0.055		
Upper	47.55	n	0.055	0.04	0.055		
Upper	47.25	Lat Struct					
Upper	47.2	n	0.055	0.04	0.055		
Upper	47.04	n	0.055	0.04	0.055		
Upper	46.69	n	0.055	0.04	0.055		
Upper	46.53	n	0.055	0.04	0.055		
Honcut to Jack	46.45	n	0.06	0.04	0.06		
Honcut to Jack	46.449	n	0.06	0.04	0.06		
Honcut to Jack	46.44	Lat Struct					
Honcut to Jack	46.43	Lat Struct					
Honcut to Jack	46.2	n	0.06	0.04	0.06		
Honcut to Jack	45.98	n	0.06	0.04	0.06		
Honcut to Jack	45.71	n	0.06	0.04	0.06		
Honcut to Jack	45.58	n	0.06	0.04	0.06		
Honcut to Jack	45.55	Lat Struct					
Honcut to Jack	45.44	n	0.06	0.04	0.06		
Honcut to Jack	45.26	n	0.06	0.04	0.06		
Honcut to Jack	45.14	Lat Struct					
Honcut to Jack	45.1	Lat Struct					
Honcut to Jack	45.03	n	0.06	0.04	0.06		
Honcut to Jack	44.76	n	0.06	0.04	0.06		
Honcut to Jack	44.71	Lat Struct					
Honcut to Jack	44.6326	n	0.06	0.04	0.06		
Honcut to Jack	44.6	Lat Struct					

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Honcut to Jack	44.5	n	0.06	0.04	0.06		
Honcut to Jack	44.24	Lat Struct					
Honcut to Jack	44.23	n	0.06	0.05	0.06		
Honcut to Jack	44.2	Lat Struct					
Honcut to Jack	43.46	n	0.06	0.05	0.06		
Honcut to Jack	43.34	n	0.06	0.05	0.06		
Honcut to Jack	43.28	n	0.06	0.05	0.06		
Honcut to Jack	43.27	Lat Struct					
Honcut to Jack	43.23	n	0.06	0.05	0.06		
Honcut to Jack	43.12	n	0.06	0.05	0.06		
Honcut to Jack	43.06	n	0.06	0.05	0.06		
Honcut to Jack	43.01	n	0.06	0.05	0.06		
Honcut to Jack	42.65	n	0.06	0.05	0.06		
Honcut to Jack	42.62	Lat Struct					
Honcut to Jack	42.47	n	0.065	0.05	0.065		
Honcut to Jack	42.19	n	0.065	0.05	0.065		
Honcut to Jack	42.01	n	0.065	0.05	0.065		
Honcut to Jack	41.61	n	0.065	0.05	0.065		
Honcut to Jack	41.6	Lat Struct					
Honcut to Jack	41.59	Lat Struct					
Honcut to Jack	41.55	n	0.065	0.05	0.065		
Honcut to Jack	41.2	n	0.065	0.05	0.065		
Honcut to Jack	40.7	n	0.065	0.05	0.065		
Honcut to Jack	40.49	n	0.065	0.05	0.065		
Honcut to Jack	40.19	n	0.065	0.05	0.065		
Honcut to Jack	39.45	n	0.07	0.05	0.07		
Honcut to Jack	39.35	Lat Struct					
Honcut to Jack	39.3	Lat Struct					
Honcut to Jack	39.23	n	0.07	0.05	0.07		
Honcut to Jack	38.94	n	0.07	0.05	0.07		
Honcut to Jack	38.75	Lat Struct					
Honcut to Jack	38.73	Lat Struct					
Honcut to Jack	38.71	n	0.07	0.05	0.07		
Honcut to Jack	38.45	n	0.07	0.05	0.07		
Honcut to Jack	38.27	n	0.07	0.05	0.07		
Honcut to Jack	38.2	Lat Struct					
Honcut to Jack	38.1	Lat Struct					
Honcut to Jack	37.95	n	0.07	0.05	0.07		
Honcut to Jack	37.68	n	0.07	0.05	0.07		
Honcut to Jack	37.45	n	0.08	0.05	0.08		
Honcut to Jack	37.29	n	0.08	0.05	0.08		
Honcut to Jack	36.45	n	0.08	0.05	0.08		
Honcut to Jack	36.35	n	0.08	0.05	0.08		
Honcut to Jack	36.24	n	0.08	0.05	0.08		
Honcut to Jack	35.78	n	0.08	0.05	0.08		
Honcut to Jack	35.5	n	0.08	0.05	0.08		
Honcut to Jack	35.25	n	0.088	0.056	0.088		
Honcut to Jack	34.8	n	0.088	0.056	0.088		
Honcut to Jack	34.7	Lat Struct					
Honcut to Jack	34.6	Lat Struct					
Honcut to Jack	34.5	n	0.088	0.056	0.088		
Honcut to Jack	34.07	n	0.088	0.056	0.088		
Honcut to Jack	33.5	n	0.088	0.056	0.088		

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Honcut to Jack	33.25	n	0.088	0.056	0.088		
Honcut to Jack	33	n	0.088	0.056	0.088		
Honcut to Jack	32.75	n	0.088	0.056	0.088		
Honcut to Jack	32.5	n	0.088	0.056	0.088		
Honcut to Jack	32.25	n	0.088	0.056	0.088		
Honcut to Jack	32.23	Lat Struct					
Honcut to Jack	32.2	Lat Struct					
Honcut to Jack	32	n	0.088	0.056	0.088		
Honcut to Jack	31.75	n	0.088	0.056	0.088		
Honcut to Jack	31.5	n	0.088	0.056	0.088		
Honcut to Jack	31.25	n	0.088	0.056	0.088		
Honcut to Jack	31.1	Lat Struct					
Honcut to Jack	31.05	Lat Struct					
Honcut to Jack	31	n	0.088	0.056	0.088		
Honcut to Jack	30.75	n	0.088	0.056	0.088		
Honcut to Jack	30.5	n	0.088	0.056	0.088		
Honcut to Jack	30.25	n	0.085	0.056	0.085		
Honcut to Jack	30.21	Lat Struct					
Honcut to Jack	30.2	Lat Struct					
Honcut to Jack	30	n	0.085	0.056	0.085		
Honcut to Jack	29.828	n	0.085	0.056	0.085		
Honcut to Jack	29.826	n	0.085	0.056	0.085		
Honcut to Jack	29.824	Bridge					
Honcut to Jack	29.822	n	0.072	0.056	0.072		
Honcut to Jack	29.821	n	0.072	0.056	0.072		
Honcut to Jack	29.82	Lat Struct					
Honcut to Jack	29.75	n	0.07	0.05	0.07		
Honcut to Jack	29.741	Lat Struct					
Honcut to Jack	29.501	n	0.065	0.045	0.065		
Honcut to Jack	29.5	n	0.065	0.045	0.065		
Jack Sl - Yuba R	29.25	n	0.065	0.045	0.065		
Jack Sl - Yuba R	29.249	n	0.065	0.045	0.065		
Jack Sl - Yuba R	29.241	Lat Struct					
Jack Sl - Yuba R	29.2	Lat Struct					
Jack Sl - Yuba R	29.00	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.75	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.74	Lat Struct					
Jack Sl - Yuba R	28.50	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.324	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.322	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.321	Bridge					
Jack Sl - Yuba R	28.309	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.307	n	0.065	0.045	0.065		
Jack Sl - Yuba R	28.3	Lat Struct					
Jack Sl - Yuba R	28.255	Lat Struct					
Jack Sl - Yuba R	28.25	n	0.06	0.04	0.06		
Jack Sl - Yuba R	28.00	n	0.06	0.04	0.06		
Jack Sl - Yuba R	27.971	n	0.06	0.04	0.06		
Jack Sl - Yuba R	27.97	Bridge					
Jack Sl - Yuba R	27.963	n	0.06	0.04	0.06		
Jack Sl - Yuba R	27.956	n	0.06	0.04	0.06		
Jack Sl - Yuba R	27.955	Bridge					
Jack Sl - Yuba R	27.952	n	0.06	0.04	0.06		

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Jack Sl - Yuba R	27.95	Lat Struct					
Jack Sl - Yuba R	27.94	Lat Struct					
Jack Sl - Yuba R	27.75	n	0.06	0.04	0.06		
Jack Sl - Yuba R	27.50	n	0.06	0.04	0.06		
Jack Sl - Yuba R	27.251	n	0.06	0.045	0.06		
Jack Sl - Yuba R	27.25	n	0.06	0.045	0.06		
Yuba R - Bear R	27	n	0.06	0.055	0.06		
Yuba R - Bear R	26.999	n	0.06	0.055	0.06		
Yuba R - Bear R	26.95	Lat Struct					
Yuba R - Bear R	26.9	Lat Struct					
Yuba R - Bear R	26.75	n	0.06	0.055	0.06		
Yuba R - Bear R	26.5	n	0.06	0.055	0.06		
Yuba R - Bear R	26.4	Lat Struct					
Yuba R - Bear R	26.3	Lat Struct					
Yuba R - Bear R	26.25	n	0.06	0.055	0.06		
Yuba R - Bear R	26	n	0.06	0.055	0.06		
Yuba R - Bear R	25.75	n	0.06	0.055	0.06		
Yuba R - Bear R	25.5	n	0.06	0.055	0.06		
Yuba R - Bear R	25.25	n	0.06	0.055	0.06		
Yuba R - Bear R	25	n	0.06	0.055	0.06		
Yuba R - Bear R	24.99	Lat Struct					
Yuba R - Bear R	24.95	Lat Struct					
Yuba R - Bear R	24.75	n	0.06	0.055	0.06		
Yuba R - Bear R	24.5	n	0.06	0.055	0.06		
Yuba R - Bear R	24.25	n	0.06	0.055	0.06		
Yuba R - Bear R	24.12	Lat Struct					
Yuba R - Bear R	24	n	0.1	0.06	0.039	0.06	The n-values for the calibration scenario do not include the 0.1 left overbank values. The 0.1 left overbank values were incorporated into the design scenario in order to account for the 2009 Feather River Setback Levee Project.
Yuba R - Bear R	23.75	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	23.5	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	23.25	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	23	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	22.75	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	22.5	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	22.25	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	22	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	21.89	Lat Struct					
Yuba R - Bear R	21.75	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	21.5	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	21.25	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	21	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	20.85	Lat Struct					
Yuba R - Bear R	20.75	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	20.5	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	20.25	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	20	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	19.91	Lat Struct					
Yuba R - Bear R	19.9	Lat Struct					
Yuba R - Bear R	19.75	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	19.5	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	19.25	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	19	n	0.1	0.06	0.039	0.06	
Yuba R - Bear R	18.75	n	0.1	0.088	0.039	0.088	
Yuba R - Bear R	18.5	n	0.1	0.088	0.039	0.088	

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Yuba R - Bear R	18.3	Lat Struct					
Yuba R - Bear R	18.25	n	0.1	0.088	0.039	0.088	
Yuba R - Bear R	18	n	0.1	0.088	0.039	0.088	
Yuba R - Bear R	17.75	n	0.1	0.088	0.039	0.088	
Yuba R - Bear R	17.5	n	0.1	0.088	0.039	0.088	
Yuba R - Bear R	17.25	n	0.088	0.042	0.088		
Yuba R - Bear R	17.2	Lat Struct					
Yuba R - Bear R	17	n	0.088	0.042	0.088		
Yuba R - Bear R	16.75	n	0.08	0.042	0.08		
Yuba R - Bear R	16.7	Lat Struct					
Yuba R - Bear R	16.69	Lat Struct					
Yuba R - Bear R	16.5	n	0.08	0.042	0.08		
Yuba R - Bear R	16.25	n	0.08	0.042	0.08		
Yuba R - Bear R	16	n	0.08	0.042	0.08		
Yuba R - Bear R	15.75	n	0.08	0.042	0.08		
Yuba R - Bear R	15.61	Lat Struct					
Yuba R - Bear R	15.6	Lat Struct					
Yuba R - Bear R	15.5	n	0.08	0.042	0.08		
Yuba R - Bear R	15.25	n	0.08	0.035	0.08		
Yuba R - Bear R	15	n	0.08	0.035	0.08		
Yuba R - Bear R	14.75	n	0.055	0.035	0.055		
Yuba R - Bear R	14.68	Lat Struct					
Yuba R - Bear R	14.67	Lat Struct					
Yuba R - Bear R	14.5	n	0.055	0.035	0.055		
Yuba R - Bear R	14.25	n	0.055	0.035	0.055		
Yuba R - Bear R	14	n	0.055	0.031	0.055		
Yuba R - Bear R	13.95	Lat Struct					
Yuba R - Bear R	13.9	Lat Struct					
Yuba R - Bear R	13.75	n	0.055	0.031	0.055		
Yuba R - Bear R	13.5	n	0.055	0.031	0.055		
Yuba R - Bear R	13.25	n	0.05	0.031	0.05		
Yuba R - Bear R	13.24	Lat Struct					
Yuba R - Bear R	13	n	0.055	0.035	0.055		
Yuba R - Bear R	12.75	n	0.055	0.035	0.055		
Yuba R - Bear R	12.74	Lat Struct					
Yuba R - Bear R	12.5	n	0.055	0.035	0.055		
Yuba R - Bear R	12.25	n	0.055	0.035	0.055		
Reach 35	12	n	0.045	0.031	0.045		
Reach 35	11.999	n	0.045	0.031	0.045		
Reach 35	11.95	Lat Struct					
Reach 35	11.93	Lat Struct					
Reach 35	11.75	n	0.045	0.031	0.045		
Reach 35	11.599	n	0.045	0.031	0.045		
Reach 35	11.59	Lat Struct					
Reach 35	11.57	Lat Struct					
Reach 35	11.5	n	0.045	0.031	0.045		
Reach 35	11.25	n	0.045	0.031	0.045		
Reach 35	11	n	0.045	0.031	0.045		
Reach 35	10.75	n	0.045	0.031	0.045		
Reach 35	10.5	n	0.045	0.031	0.045		
Reach 35	10.25	n	0.045	0.031	0.045		
Reach 35	10.07	Lat Struct					
Reach 35	10.05	Lat Struct					

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Reach 35	10	n	0.045	0.031	0.045		
Reach 35	9.75	n	0.045	0.031	0.045		
Reach 35	9.5	n	0.045	0.031	0.045		
Reach 35	9.278	n	0.045	0.031	0.045		
Reach 35	9.27	Bridge					
Reach 35	9.265	n	0.045	0.031	0.045		
Reach 35	9.261	Lat Struct					
Reach 35	9.22	Lat Struct					
Reach 35	9.2	n	0.05	0.031	0.05		
Reach 35	9	n	0.05	0.035	0.05		
Reach 35	8.75	n	0.05	0.035	0.05		
Reach 35	8.5	n	0.05	0.035	0.05		
Reach 35	8.25	n	0.05	0.035	0.05		
Reach 35	8	n	0.05	0.035	0.05		
Reach 35	7.75	n	0.05	0.035	0.05		
Reach 35	7.55	n	0.05	0.035	0.05		
Reach 35	7.52	Lat Struct					
Reach 35	7.41	n	0.05	0.035	0.05		
Reach 35	7.17	n	0.05	0.035	0.05		
Reach 35	6.88	n	0.05	0.035	0.05		
Reach 35	6.59	n	0.05	0.035	0.05		
Reach 35	6.39	n	0.05	0.035	0.05		
Reach 35	6.21	n	0.05	0.035	0.05		
Reach 35	6.02	n	0.05	0.035	0.05		
Reach 35	5.83	n	0.05	0.035	0.05		
Reach 35	5.64	n	0.05	0.035	0.05		
Reach 35	5.45	n	0.05	0.035	0.05		
Reach 35	5.27	n	0.05	0.035	0.05		
Reach 35	5.17	n	0.05	0.035	0.05		
Reach 35	4.98	n	0.05	0.035	0.05		
Reach 35	4.95	Lat Struct					
Reach 35	4.8	n	0.055	0.04	0.055		
Reach 35	4.62	n	0.055	0.04	0.055		
Reach 35	4.42	n	0.055	0.04	0.055		
Reach 35	4.23	n	0.055	0.04	0.055		
Reach 35	4.05	n	0.055	0.04	0.055		
Reach 35	3.87	n	0.055	0.04	0.055		
Reach 35	3.67	n	0.055	0.04	0.055		
Reach 35	3.47	n	0.055	0.04	0.055		
Reach 35	3.29	n	0.055	0.04	0.055		
Reach 35	3.1	n	0.055	0.04	0.055		
Reach 35	2.95	n	0.055	0.04	0.055		
Reach 35	2.82	n	0.055	0.04	0.055		
Reach 35	2.74	n	0.055	0.04	0.055		
Reach 35	2.68	n	0.055	0.04	0.055		
Reach 35	2.57	n	0.055	0.04	0.055		
Reach 35	2.55	Lat Struct					
Reach 35	2.37	n	0.055	0.04	0.055		
Reach 35	2.19	n	0.055	0.04	0.055		
Reach 35	2	n	0.055	0.04	0.055		
Reach 35	1.74	n	0.055	0.04	0.055		
Reach 35	1.54	n	0.055	0.04	0.055		
Reach 35	1.36	n	0.055	0.04	0.055		

(Note: N-values are numbered from left overbank to right overbank; Channel n-values are highlighted)

Reach	River Station	Friction (n/K)	n #1	n #2	n #3	n #4	COMMENTS
Reach 35	1.17	n	0.055	0.04	0.055		
Reach 35	0.98	n	0.055	0.04	0.055		
Reach 35	0.73	n	0.055	0.04	0.055		
Reach 35	0.56	n	0.055	0.04	0.055		
Reach 35	0.33	n	0.055	0.04	0.055		
Reach 35	0.13	n	0.055	0.04	0.055		

4 FINAL DESIGN WATER SURFACE PROFILES

The Feather River West Levee Project design water surface profiles include the 1/100, 1/200, and 1/500 annual exceedance probability (AEP) storm events. The design water surface profiles are a composite of the Shanghai and Sacramento storm centerings as described in Section 2. The simulations utilized to compute the n-year design profiles assume no levee breaches and the levees act as weirs if they are overtopped.

The HEC-RAS model results for each of the AEP events are shown in Table 4-1 and Figure 4-1. Table 4-2 and Figure 4-2 compares the final design water surface profiles to the profiles used for HDR's 65% design (June 2011 profiles). Velocity and shear stress information is included in Table 4-3 and Table 4-4. Similar to the design water surface profiles, the shear stress and velocity information is a composite of both the Sacramento and Shanghai storm centerings, with the larger of the two selected at each location. All results are referenced to both the Wood Rodgers FRWLP design stationing (provided to PBI from Wood Rodgers on September 27, 2010) and the USACE 1957 profile (provided to PBI by DWR on August 26, 2010). The 1957 profile was provided to PBI by DWR via excel spreadsheet (see Attachment C). No details were provided regarding its development. The river stationing of the 1957 profile was compared to the river stationing of the PBI HEC-RAS model by comparing the values at bridge crossings and river confluences; these values were found to be within +/- 0.25 miles.

The HEC-RAS model files that were used in this analysis are titled "PBI Sutter Basin Model 03.27.2012".

Table 4-1. FRWLP Maximum Water Surface Profiles

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 Profile (NAVD88-ft)	Wood Rodgers Design STA
Upper	58.75	131.09	132.96	137.96	-	-
Upper	-	130.74	132.53	137.58	-	236800.00
Upper	58.51	130.32	132.03	137.14	132.14	235748.95
Upper	58.26	129.25	131.01	136.03	130.88	233625.38
Upper	57.95	127.30	128.94	134.46	129.32	232796.18
Upper	57.7	124.59	126.04	132.60	128.05	231347.46
Upper	57.45	122.54	123.89	130.41	126.84	230491.75
Upper	57.17	120.27	121.48	127.39	125.70	226547.44
Upper	56.94	119.72	121.02	126.81	124.95	223836.90
Upper	56.61	119.04	120.36	126.18	123.87	222092.63
Upper	56.43	118.70	120.04	125.79	123.28	221068.16
Upper	56.2	117.82	119.19	124.92	122.52	220516.06
Upper	56.02	117.18	118.55	124.13	121.93	220057.97
Upper	55.8	115.95	117.20	122.24	121.18	219786.54
Upper	55.55	115.34	116.58	121.42	120.17	219191.24
Upper	55.35	114.23	115.38	119.72	119.31	216984.11
Upper	55.03	112.90	113.96	117.87	117.92	214664.25
Upper	54.45	110.87	111.90	115.86	115.41	212925.66
Upper	54.2	110.15	111.17	115.02	114.33	210158.47
Upper	54.04	109.82	110.86	114.74	113.64	209562.52
Upper	53.84	109.01	110.08	113.99	112.77	208499.74

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 Profile (NAVD88-ft)	Wood Rodgers Design STA
Upper	53.52	107.58	108.54	112.31	111.39	205714.05
Upper	53.22	106.33	107.26	110.78	110.18	204265.70
Upper	52.89	104.81	105.71	109.17	109.40	202757.11
Upper	52.6	103.63	104.49	107.82	108.90	201183.88
Upper	52.21	102.99	103.81	107.01	108.23	199618.97
Upper	51.95	102.73	103.54	106.68	107.78	198775.45
Upper	51.35	101.83	102.74	106.02	106.73	197882.65
Upper	51.1777	101.65	102.54	105.80	106.00	195736.74
Upper	51.04	101.54	102.42	105.65	105.38	193817.41
Upper	50.84	100.98	101.90	105.18	104.23	192085.50
Upper	50.7	100.23	101.32	104.79	103.61	191278.99
Upper	50.59	98.83	100.21	104.18	102.93	190705.90
Upper	50.498	98.73	99.99	103.98	102.55	190230.79
Upper	50.496	98.67	99.94	103.90	102.54	190218.72
Upper	50.489	98.64	99.86	103.75	102.52	190176.83
Upper	50.487	98.69	99.91	103.77	102.51	190166.78
Upper	50.2	97.95	98.92	102.75	101.47	188470.72
Upper	50.06	97.10	98.12	102.03	100.96	187822.66
Upper	49.78	95.96	96.97	100.93	99.97	186662.60
Upper	49.58	95.11	96.12	100.18	99.36	185293.60
Upper	49.38	94.51	95.49	99.53	98.77	184138.90
Upper	49.21	94.12	95.11	99.22	98.27	183514.21
Upper	48.99	93.86	94.86	99.01	97.62	183056.49
Upper	48.85	93.54	94.54	98.74	97.21	182753.69
Upper	48.66	93.34	94.33	98.53	96.65	181801.88
Upper	48.39	93.02	94.02	98.24	95.85	180454.16
Upper	48.21	92.70	93.69	97.92	95.32	179460.20
Upper	48.07	92.25	93.26	97.61	95.00	179109.34
Upper	47.7	91.39	92.43	97.02	94.57	176933.60
Upper	47.55	90.83	91.92	96.72	94.39	175967.91
Upper	47.2	90.24	91.36	96.31	93.85	174102.82
Upper	47.04	90.01	91.14	96.16	93.54	173345.89
Upper	46.69	89.45	90.55	95.84	92.86	172499.41
Upper	46.53	89.16	90.22	95.66	92.55	171792.00
Honcut to Jack	46.45	89.16	90.22	95.66	92.40	171454.59
Honcut to Jack	46.2	88.94	90.02	95.46	92.00	171127.62
Honcut to Jack	45.98	88.71	89.80	95.24	91.82	170521.00
Honcut to Jack	45.71	88.22	89.34	94.85	91.60	169330.99
Honcut to Jack	45.58	87.96	89.10	94.64	91.49	168312.33
Honcut to Jack	45.44	87.79	88.94	94.49	91.37	166923.76
Honcut to Jack	45.26	87.57	88.73	94.29	91.22	165726.12
Honcut to Jack	45.03	87.39	88.57	94.12	91.03	164732.57
Honcut to Jack	44.76	87.19	88.38	93.95	90.81	163250.84
Honcut to Jack	44.6326	87.11	88.29	93.86	90.70	161213.76
Honcut to Jack	44.5	86.96	88.15	93.71	90.59	160088.12
Honcut to Jack	44.23	86.74	87.94	93.51	90.35	159311.39
Honcut to Jack	43.46	86.15	87.43	93.10	89.56	158271.13
Honcut to Jack	43.34	85.88	87.19	92.91	89.38	157627.58
Honcut to Jack	43.28	85.77	87.09	92.88	89.38	157373.66
Honcut to Jack	43.23	85.62	86.96	92.82	89.32	157104.73
Honcut to Jack	43.12	85.32	86.70	92.70	89.21	156612.83
Honcut to Jack	43.06	85.25	86.64	92.67	89.15	156460.24
Honcut to Jack	43.01	85.19	86.59	92.62	89.10	156249.06

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 Profile (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	42.65	85.05	86.47	92.52	88.73	153765.90
Honcut to Jack	42.47	84.85	86.29	92.36	88.55	153202.55
Honcut to Jack	42.19	84.56	86.03	92.16	88.27	152912.23
Honcut to Jack	42.01	84.50	85.98	92.12	88.13	152695.48
Honcut to Jack	41.61	84.26	85.78	91.97	87.81	152341.44
Honcut to Jack	41.55	84.16	85.69	91.90	87.76	151907.71
Honcut to Jack	41.2	83.90	85.47	91.74	87.49	150600.52
Honcut to Jack	40.7	83.73	85.33	91.64	87.09	150271.92
Honcut to Jack	40.49	83.49	85.11	91.46	86.93	149590.33
Honcut to Jack	40.19	83.28	84.93	91.33	86.71	148995.18
Honcut to Jack	39.45	82.75	84.47	90.97	86.23	147001.01
Honcut to Jack	39.23	82.42	84.20	90.73	86.09	145807.70
Honcut to Jack	38.94	82.02	83.89	90.45	85.90	144368.14
Honcut to Jack	38.71	81.77	83.69	90.26	85.75	143106.13
Honcut to Jack	38.45	81.60	83.55	90.13	85.58	141664.04
Honcut to Jack	38.27	81.47	83.45	90.03	85.46	140631.21
Honcut to Jack	37.95	81.29	83.31	89.88	85.28	138661.68
Honcut to Jack	37.68	81.13	83.18	89.74	85.13	137779.55
Honcut to Jack	37.45	80.95	83.04	89.59	85.00	136973.90
Honcut to Jack	37.29	80.80	82.91	89.44	84.91	136058.20
Honcut to Jack	36.45	80.20	82.48	89.00	84.43	134783.46
Honcut to Jack	36.35	80.01	82.34	88.86	84.37	134645.65
Honcut to Jack	36.24	79.77	82.18	88.72	84.30	134561.14
Honcut to Jack	35.78	79.22	81.79	88.34	83.99	132247.58
Honcut to Jack	35.5	79.07	81.67	88.20	83.88	130647.35
Honcut to Jack	35.25	78.97	81.60	88.12	83.77	130422.24
Honcut to Jack	34.8	78.89	81.54	88.05	83.58	129991.41
Honcut to Jack	34.5	78.80	81.47	87.97	83.46	128407.23
Honcut to Jack	34.07	78.72	81.41	87.90	83.28	127995.61
Honcut to Jack	33.5	78.63	81.34	87.82	83.03	126794.65
Honcut to Jack	33.25	78.50	81.25	87.72	82.90	125934.45
Honcut to Jack	33	78.37	81.15	87.61	82.77	124547.32
Honcut to Jack	32.75	78.21	81.03	87.46	82.65	123335.94
Honcut to Jack	32.5	78.09	80.93	87.34	82.52	122068.05
Honcut to Jack	32.25	77.98	80.85	87.24	82.39	121462.67
Honcut to Jack	32	77.82	80.73	87.09	82.26	121023.94
Honcut to Jack	31.75	77.62	80.57	86.88	82.13	119945.84
Honcut to Jack	31.5	77.43	80.42	86.68	81.98	118882.16
Honcut to Jack	31.25	77.25	80.28	86.49	81.80	117232.05
Honcut to Jack	31	77.06	80.13	86.30	81.63	115835.54
Honcut to Jack	30.75	76.88	80.00	86.12	82.65	115369.28
Honcut to Jack	30.5	76.67	79.84	85.92	82.03	114410.61
Honcut to Jack	30.25	76.45	79.67	85.70	81.08	113317.84
Honcut to Jack	30	76.13	79.42	85.35	80.84	111356.97
Honcut to Jack	29.828	75.84	79.20	85.27	80.67	110812.54
Honcut to Jack	29.826	75.86	79.21	85.27	80.67	110802.45
Honcut to Jack	29.822	75.87	79.23	85.26	80.67	110784.75
Honcut to Jack	29.821	75.88	79.24	85.25	80.66	110774.66
Honcut to Jack	29.75	75.83	79.21	85.16	80.60	109217.11
Honcut to Jack	29.5	75.72	79.13	85.06	80.36	107965.48
Jack Sl - Yuba R	29.25	75.72	79.13	85.06	80.12	106938.36
Jack Sl - Yuba R	29	75.59	78.98	84.86	79.88	105627.60
Jack Sl - Yuba R	28.75	75.35	78.71	84.50	79.65	104417.55

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 Profile (NAVD88-ft)	Wood Rodgers Design STA
Jack Sl - Yuba R	28.5	75.21	78.54	84.27	79.33	103521.79
Jack Sl - Yuba R	28.324	75.07	78.39	84.07	78.95	102627.46
Jack Sl - Yuba R	28.322	75.07	78.39	84.06	78.94	102615.67
Jack Sl - Yuba R	28.309	75.05	78.37	84.05	78.91	102537.51
Jack Sl - Yuba R	28.307	75.05	78.37	84.04	78.91	102527.14
Jack Sl - Yuba R	28.25	75.01	78.32	83.97	78.79	102281.40
Jack Sl - Yuba R	28	74.85	78.13	83.70	78.51	100798.76
Jack Sl - Yuba R	27.971	74.75	77.99	83.48	78.49	100749.02
Jack Sl - Yuba R	27.963	74.73	77.96	83.42	78.48	100696.07
Jack Sl - Yuba R	27.956	74.70	77.92	83.36	78.48	100684.10
Jack Sl - Yuba R	27.952	74.63	77.82	83.17	78.47	100652.33
Jack Sl - Yuba R	27.75	74.64	77.83	83.19	78.31	99512.10
Jack Sl - Yuba R	27.5	74.36	77.48	82.66	78.10	98174.47
Jack Sl - Yuba R	27.251	73.93	76.91	81.77	77.90	97016.29
Jack Sl - Yuba R	27.25	73.92	76.91	81.76	77.90	97011.08
Yuba R - Bear R	27	73.92	76.91	81.76	77.71	95787.83
Yuba R - Bear R	26.999	73.92	76.91	81.76	77.71	95782.80
Yuba R - Bear R	26.75	73.42	76.39	81.23	77.55	94705.78
Yuba R - Bear R	26.5	72.85	75.85	80.72	77.39	93495.05
Yuba R - Bear R	26.25	72.42	75.45	80.36	77.23	92095.83
Yuba R - Bear R	26	72.06	75.13	80.06	77.07	90634.01
Yuba R - Bear R	25.75	71.74	74.83	79.78	76.91	89136.87
Yuba R - Bear R	25.5	71.49	74.59	79.54	76.74	87728.16
Yuba R - Bear R	25.25	71.23	74.32	79.26	76.49	86208.17
Yuba R - Bear R	25	70.68	73.80	78.76	76.17	84613.00
Yuba R - Bear R	24.75	70.08	73.24	78.20	75.86	84085.03
Yuba R - Bear R	24.5	69.64	72.81	77.77	75.55	83744.43
Yuba R - Bear R	24.25	69.21	72.39	77.35	75.23	83076.25
Yuba R - Bear R	24	68.89	72.09	77.05	74.92	82269.01
Yuba R - Bear R	23.75	68.49	71.71	76.67	74.61	80891.65
Yuba R - Bear R	23.5	68.23	71.45	76.41	74.25	79494.60
Yuba R - Bear R	23.25	67.85	71.09	76.04	73.87	78032.72
Yuba R - Bear R	23	67.46	70.70	75.62	73.49	76810.25
Yuba R - Bear R	22.75	67.15	70.39	75.28	73.11	75345.95
Yuba R - Bear R	22.5	66.70	69.94	74.79	72.73	74107.24
Yuba R - Bear R	22.25	66.32	69.55	74.36	72.35	72852.32
Yuba R - Bear R	22	66.05	69.27	74.06	71.97	71497.68
Yuba R - Bear R	21.75	65.67	68.90	73.67	71.41	70018.45
Yuba R - Bear R	21.5	65.35	68.59	73.33	70.82	68712.35
Yuba R - Bear R	21.25	64.98	68.22	72.94	70.23	67330.45
Yuba R - Bear R	21	64.69	67.93	72.61	69.77	66047.23
Yuba R - Bear R	20.75	64.47	67.71	72.36	69.30	64675.51
Yuba R - Bear R	20.5	64.29	67.51	72.12	68.83	63332.45
Yuba R - Bear R	20.25	64.11	67.31	71.89	68.37	61977.06
Yuba R - Bear R	20	63.93	67.13	71.67	67.90	60460.00
Yuba R - Bear R	19.75	63.76	66.95	71.48	67.74	58852.41
Yuba R - Bear R	19.5	63.63	66.82	71.33	67.58	56862.66
Yuba R - Bear R	19.25	63.52	66.71	71.20	67.37	55516.59
Yuba R - Bear R	19	63.43	66.61	71.10	67.15	54713.04
Yuba R - Bear R	18.75	63.27	66.45	70.91	66.93	53622.77
Yuba R - Bear R	18.5	63.18	66.35	70.81	66.71	52897.52
Yuba R - Bear R	18.25	63.07	66.24	70.68	66.45	51890.28
Yuba R - Bear R	18	62.88	66.03	70.44	66.19	49704.43

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 Profile (NAVD88-ft)	Wood Rodgers Design STA
Yuba R - Bear R	17.75	62.73	65.87	70.26	65.93	49399.72
Yuba R - Bear R	17.5	62.57	65.70	70.06	65.67	49114.25
Yuba R - Bear R	17.25	62.37	65.51	69.85	65.41	48794.83
Yuba R - Bear R	17	61.95	65.08	69.39	65.16	48556.49
Yuba R - Bear R	16.75	61.67	64.79	69.07	64.90	48094.20
Yuba R - Bear R	16.5	61.37	64.47	68.71	64.39	47013.16
Yuba R - Bear R	16.25	61.15	64.23	68.45	63.87	46228.38
Yuba R - Bear R	16	60.83	63.89	68.06	63.36	45101.47
Yuba R - Bear R	15.75	60.22	63.19	67.26	62.85	43356.36
Yuba R - Bear R	15.5	59.65	62.55	66.50	62.33	41613.14
Yuba R - Bear R	15.25	59.13	61.97	65.83	61.82	40305.41
Yuba R - Bear R	15	58.73	61.50	65.26	61.31	39102.69
Yuba R - Bear R	14.75	58.35	61.10	64.84	60.60	37817.10
Yuba R - Bear R	14.5	57.98	60.67	64.34	59.88	36319.37
Yuba R - Bear R	14.25	57.44	60.03	63.58	59.24	34904.17
Yuba R - Bear R	14	57.11	59.65	63.15	58.89	33507.55
Yuba R - Bear R	13.75	56.82	59.30	62.72	58.53	32270.43
Yuba R - Bear R	13.5	56.44	58.85	62.18	58.17	31239.13
Yuba R - Bear R	13.25	56.21	58.60	61.90	57.82	29977.40
Yuba R - Bear R	13	56.15	58.53	61.85	57.46	28644.35
Yuba R - Bear R	12.75	55.99	58.35	61.65	57.11	27255.90
Yuba R - Bear R	12.5	55.91	58.28	61.58	56.82	26065.40
Yuba R - Bear R	12.25	55.66	58.04	61.32	56.59	24642.20
Reach 35	12	55.66	58.04	61.32	56.37	23313.05
Reach 35	11.75	55.53	57.90	61.19	56.15	21993.69
Reach 35	11.599	55.49	57.86	61.15	56.02	21069.77
Reach 35	11.5	55.37	57.74	61.03	55.93	20354.66
Reach 35	11.25	55.16	57.52	60.77	55.71	18182.41
Reach 35	11	54.86	57.20	60.40	55.44	16871.48
Reach 35	10.75	54.72	57.05	60.23	55.01	15547.88
Reach 35	10.5	54.48	56.79	59.92	54.57	14278.44
Reach 35	10.25	54.03	56.29	59.31	54.13	13850.18
Reach 35	10	53.83	56.07	59.06	53.69	12847.13
Reach 35	9.75	53.52	55.73	58.65	53.27	11597.74
Reach 35	9.5	53.18	55.35	58.20	52.91	10595.55
Reach 35	9.278	53.12	55.30	58.15	52.59	9814.09
Reach 35	9.265	52.82	54.94	57.69	52.56	9758.91
Reach 35	9.2	52.70	54.81	57.52	52.39	9164.29
Reach 35	9	52.35	54.42	57.06	51.55	8445.84
Reach 35	8.75	51.56	53.54	55.99	50.44	7531.76
Reach 35	8.5	51.07	53.03	55.39	49.34	6548.71
Reach 35	8.25	50.71	52.66	54.97	48.23	3573.02
Reach 35	8	49.98	51.88	53.99	47.12	2528.45
Reach 35	7.75	49.55	51.41	53.36	46.02	1733.43
Reach 35	7.55	49.33	51.16	53.03	44.98	1275.43

Table 4-2. Comparison of June 2011 vs. March 2012 Design Water Surface Profiles (NAVD88-ft)

Feather River Reach	HEC-RAS River STA	100yr Max WSE (JUN 2011)	100yr Max WSE (MAR 2012)	Diff. (ft)	200yr Max WSE (JUN 2011)	200yr Max WSE (MAR 2012)	Diff. (ft)	500yr Max WSE (JUN 2011)	500yr Max WSE (MAR 2012)	Diff. (ft)
Upper	58.51	130.32	130.32	0	131.97	132.03	0.06	137.27	137.14	-0.13
Upper	58.26	129.25	129.25	0	130.96	131.01	0.05	136.17	136.03	-0.14
Upper	57.95	127.3	127.3	0	128.89	128.94	0.05	134.60	134.46	-0.14
Upper	57.7	124.59	124.59	0	125.99	126.04	0.05	132.74	132.60	-0.14
Upper	57.45	122.54	122.54	0	123.85	123.89	0.04	130.54	130.41	-0.13
Upper	57.17	120.27	120.27	0	121.44	121.48	0.04	127.48	127.39	-0.09
Upper	56.94	119.72	119.72	0	120.97	121.02	0.05	126.88	126.81	-0.07
Upper	56.61	119.04	119.04	0	120.31	120.36	0.05	126.24	126.18	-0.06
Upper	56.43	118.7	118.7	0	120	120.04	0.04	125.86	125.79	-0.07
Upper	56.2	117.82	117.82	0	119.14	119.19	0.05	124.99	124.92	-0.07
Upper	56.02	117.18	117.18	0	118.5	118.55	0.05	124.19	124.13	-0.06
Upper	55.8	115.95	115.95	0	117.16	117.2	0.04	122.29	122.24	-0.05
Upper	55.55	115.34	115.34	0	116.54	116.58	0.04	121.47	121.42	-0.05
Upper	55.35	114.23	114.23	0	115.34	115.38	0.04	119.76	119.72	-0.04
Upper	55.03	112.9	112.9	0	113.93	113.96	0.03	117.90	117.87	-0.03
Upper	54.45	110.87	110.87	0	111.86	111.9	0.04	115.89	115.86	-0.03
Upper	54.2	110.15	110.15	0	111.13	111.17	0.04	115.05	115.02	-0.03
Upper	54.04	109.82	109.82	0	110.82	110.86	0.04	114.77	114.74	-0.03
Upper	53.84	109.01	109.01	0	110.03	110.08	0.05	114.02	113.99	-0.03
Upper	53.52	107.58	107.58	0	108.5	108.54	0.04	112.34	112.31	-0.03
Upper	53.22	106.33	106.33	0	107.23	107.26	0.03	110.81	110.78	-0.03
Upper	52.89	104.81	104.81	0	105.68	105.71	0.03	109.20	109.17	-0.03
Upper	52.6	103.63	103.63	0	104.46	104.49	0.03	107.84	107.82	-0.02
Upper	52.21	102.99	102.99	0	103.78	103.81	0.03	107.04	107.01	-0.03
Upper	51.95	102.73	102.73	0	103.51	103.54	0.03	106.70	106.68	-0.02
Upper	51.35	101.83	101.83	0	102.7	102.74	0.04	106.04	106.02	-0.02
Upper	51.1777	101.65	101.65	0	102.51	102.54	0.03	105.82	105.80	-0.02
Upper	51.04	101.54	101.54	0	102.39	102.42	0.03	105.67	105.65	-0.02
Upper	50.84	100.98	100.98	0	101.86	101.9	0.04	105.21	105.18	-0.03
Upper	50.7	100.23	100.23	0	101.28	101.32	0.04	104.82	104.79	-0.03
Upper	50.59	98.83	98.83	0	100.16	100.21	0.05	104.20	104.18	-0.02
Upper	50.498	98.73	98.73	0	99.94	99.99	0.05	104.00	103.98	-0.02
Upper	50.496	98.68	98.67	-0.01	99.89	99.94	0.05	103.93	103.90	-0.03
Upper	50.489	98.65	98.64	-0.01	99.82	99.86	0.04	103.78	103.75	-0.03
Upper	50.487	98.69	98.69	0	99.87	99.91	0.04	103.80	103.77	-0.03
Upper	50.2	97.95	97.95	0	98.89	98.92	0.03	102.77	102.75	-0.02
Upper	50.06	97.11	97.1	-0.01	98.09	98.12	0.03	102.06	102.03	-0.03
Upper	49.78	95.96	95.96	0	96.94	96.97	0.03	100.96	100.93	-0.03
Upper	49.58	95.12	95.11	-0.01	96.1	96.12	0.02	100.21	100.18	-0.03
Upper	49.38	94.52	94.51	-0.01	95.46	95.49	0.03	99.56	99.53	-0.03
Upper	49.21	94.13	94.12	-0.01	95.09	95.11	0.02	99.25	99.22	-0.03
Upper	48.99	93.87	93.86	-0.01	94.84	94.86	0.02	99.05	99.01	-0.04
Upper	48.85	93.55	93.54	-0.01	94.52	94.54	0.02	98.78	98.74	-0.04
Upper	48.66	93.35	93.34	-0.01	94.32	94.33	0.01	98.57	98.53	-0.04
Upper	48.39	93.03	93.02	-0.01	94	94.02	0.02	98.28	98.24	-0.04
Upper	48.21	92.71	92.7	-0.01	93.67	93.69	0.02	97.96	97.92	-0.04
Upper	48.07	92.27	92.25	-0.02	93.25	93.26	0.01	97.65	97.61	-0.04
Upper	47.7	91.41	91.39	-0.02	92.42	92.43	0.01	97.07	97.02	-0.05
Upper	47.55	90.85	90.83	-0.02	91.92	91.92	0	96.78	96.72	-0.06
Upper	47.2	90.27	90.24	-0.03	91.37	91.36	-0.01	96.37	96.31	-0.06
Upper	47.04	90.04	90.01	-0.03	91.15	91.14	-0.01	96.23	96.16	-0.07
Upper	46.69	89.38	89.45	0.07	90.56	90.55	-0.01	95.91	95.84	-0.07
Upper	46.53	89.03	89.16	0.13	90.24	90.22	-0.02	95.74	95.66	-0.08
Honcut to Jack	46.45	89.03	89.16	0.13	90.24	90.22	-0.02	95.74	95.66	-0.08
Honcut to Jack	46.2	88.82	88.94	0.12	90.04	90.02	-0.02	95.53	95.46	-0.07
Honcut to Jack	45.98	88.6	88.71	0.11	89.81	89.8	-0.01	95.31	95.24	-0.07
Honcut to Jack	45.71	88.11	88.22	0.11	89.35	89.34	-0.01	94.92	94.85	-0.07
Honcut to Jack	45.58	87.85	87.96	0.11	89.11	89.1	-0.01	94.71	94.64	-0.07
Honcut to Jack	45.44	87.69	87.79	0.1	88.95	88.94	-0.01	94.55	94.49	-0.06
Honcut to Jack	45.26	87.47	87.57	0.1	88.74	88.73	-0.01	94.36	94.29	-0.07
Honcut to Jack	45.03	87.3	87.39	0.09	88.57	88.57	0	94.19	94.12	-0.07
Honcut to Jack	44.76	87.1	87.19	0.09	88.38	88.38	0	94.01	93.95	-0.06
Honcut to Jack	44.6326	87.02	87.11	0.09	88.3	88.29	-0.01	93.92	93.86	-0.06
Honcut to Jack	44.5	86.87	86.96	0.09	88.15	88.15	0	93.77	93.71	-0.06
Honcut to Jack	44.23	86.65	86.74	0.09	87.94	87.94	0	93.57	93.51	-0.06
Honcut to Jack	43.46	86.07	86.15	0.08	87.42	87.43	0.01	93.15	93.10	-0.05
Honcut to Jack	43.34	85.81	85.88	0.07	87.18	87.19	0.01	92.96	92.91	-0.05
Honcut to Jack	43.28	85.7	85.77	0.07	87.08	87.09	0.01	92.93	92.88	-0.05
Honcut to Jack	43.23	85.55	85.62	0.07	86.95	86.96	0.01	92.87	92.82	-0.05
Honcut to Jack	43.12	85.25	85.32	0.07	86.68	86.7	0.02	92.74	92.70	-0.04
Honcut to Jack	43.06	85.18	85.25	0.07	86.62	86.64	0.02	92.72	92.67	-0.05
Honcut to Jack	43.01	85.12	85.19	0.07	86.57	86.59	0.02	92.66	92.62	-0.04
Honcut to Jack	42.65	84.99	85.05	0.06	86.45	86.47	0.02	92.57	92.52	-0.05
Honcut to Jack	42.47	84.79	84.85	0.06	86.26	86.29	0.03	92.40	92.36	-0.04
Honcut to Jack	42.19	84.5	84.56	0.06	86	86.03	0.03	92.20	92.16	-0.04
Honcut to Jack	42.01	84.44	84.5	0.06	85.95	85.98	0.03	92.16	92.12	-0.04

Table 4-2. Comparison of June 2011 vs. March 2012 Design Water Surface Profiles (NAVD88-ft)

Feather River Reach	HEC-RAS River STA	100yr Max WSE (JUN 2011)	100yr Max WSE (MAR 2012)	Diff. (ft)	200yr Max WSE (JUN 2011)	200yr Max WSE (MAR 2012)	Diff. (ft)	500yr Max WSE (JUN 2011)	500yr Max WSE (MAR 2012)	Diff. (ft)
Honcut to Jack	41.61	84.21	84.26	0.05	85.74	85.78	0.04	92.01	91.97	-0.04
Honcut to Jack	41.55	84.11	84.16	0.05	85.65	85.69	0.04	91.94	91.90	-0.04
Honcut to Jack	41.2	83.85	83.9	0.05	85.42	85.47	0.05	91.78	91.74	-0.04
Honcut to Jack	40.7	83.68	83.73	0.05	85.28	85.33	0.05	91.68	91.64	-0.04
Honcut to Jack	40.49	83.43	83.49	0.06	85.05	85.11	0.06	91.50	91.46	-0.04
Honcut to Jack	40.19	83.23	83.28	0.05	84.87	84.93	0.06	91.36	91.33	-0.03
Honcut to Jack	39.45	82.7	82.75	0.05	84.41	84.47	0.06	91.00	90.97	-0.03
Honcut to Jack	39.23	82.36	82.42	0.06	84.15	84.2	0.05	90.76	90.73	-0.03
Honcut to Jack	38.94	81.97	82.02	0.05	83.84	83.89	0.05	90.47	90.45	-0.02
Honcut to Jack	38.71	81.71	81.77	0.06	83.63	83.69	0.06	90.28	90.26	-0.02
Honcut to Jack	38.45	81.53	81.6	0.07	83.5	83.55	0.05	90.15	90.13	-0.02
Honcut to Jack	38.27	81.41	81.47	0.06	83.4	83.45	0.05	90.05	90.03	-0.02
Honcut to Jack	37.95	81.22	81.29	0.07	83.25	83.31	0.06	89.90	89.88	-0.02
Honcut to Jack	37.68	81.06	81.13	0.07	83.12	83.18	0.06	89.76	89.74	-0.02
Honcut to Jack	37.45	80.88	80.95	0.07	82.98	83.04	0.06	89.60	89.59	-0.01
Honcut to Jack	37.29	80.72	80.8	0.08	82.85	82.91	0.06	89.45	89.44	-0.01
Honcut to Jack	36.45	80.11	80.2	0.09	82.41	82.48	0.07	89.01	89.00	-0.01
Honcut to Jack	36.35	79.9	80.01	0.11	82.27	82.34	0.07	88.88	88.86	-0.02
Honcut to Jack	36.24	79.66	79.77	0.11	82.1	82.18	0.08	88.73	88.72	-0.01
Honcut to Jack	35.78	79.08	79.22	0.14	81.71	81.79	0.08	88.34	88.34	0.00
Honcut to Jack	35.5	78.92	79.07	0.15	81.59	81.67	0.08	88.21	88.20	-0.01
Honcut to Jack	35.25	78.82	78.97	0.15	81.51	81.6	0.09	88.13	88.12	-0.01
Honcut to Jack	34.8	78.73	78.89	0.16	81.45	81.54	0.09	88.06	88.05	-0.01
Honcut to Jack	34.5	78.64	78.8	0.16	81.38	81.47	0.09	87.98	87.97	-0.01
Honcut to Jack	34.07	78.55	78.72	0.17	81.32	81.41	0.09	87.90	87.90	0.00
Honcut to Jack	33.5	78.45	78.63	0.18	81.25	81.34	0.09	87.83	87.82	-0.01
Honcut to Jack	33.25	78.32	78.5	0.18	81.15	81.25	0.1	87.72	87.72	0.00
Honcut to Jack	33	78.18	78.37	0.19	81.05	81.15	0.1	87.61	87.61	0.00
Honcut to Jack	32.75	78	78.21	0.21	80.93	81.03	0.1	87.46	87.46	0.00
Honcut to Jack	32.5	77.87	78.09	0.22	80.83	80.93	0.1	87.34	87.34	0.00
Honcut to Jack	32.25	77.76	77.98	0.22	80.75	80.85	0.1	87.24	87.24	0.00
Honcut to Jack	32	77.58	77.82	0.24	80.62	80.73	0.11	87.08	87.09	0.01
Honcut to Jack	31.75	77.37	77.62	0.25	80.46	80.57	0.11	86.88	86.88	0.00
Honcut to Jack	31.5	77.16	77.43	0.27	80.31	80.42	0.11	86.67	86.68	0.01
Honcut to Jack	31.25	76.97	77.25	0.28	80.16	80.28	0.12	86.48	86.49	0.01
Honcut to Jack	31	76.76	77.06	0.3	80.01	80.13	0.12	86.29	86.30	0.01
Honcut to Jack	30.75	76.56	76.88	0.32	79.88	80	0.12	86.11	86.12	0.01
Honcut to Jack	30.5	76.33	76.67	0.34	79.71	79.84	0.13	85.90	85.92	0.02
Honcut to Jack	30.25	76.1	76.45	0.35	79.55	79.67	0.12	85.68	85.70	0.02
Honcut to Jack	30	75.84	76.13	0.29	79.29	79.42	0.13	85.33	85.35	0.02
Honcut to Jack	29.828	75.6	75.84	0.24	79.06	79.2	0.14	85.24	85.27	0.03
Honcut to Jack	29.826	75.62	75.86	0.24	79.08	79.21	0.13	85.24	85.27	0.03
Honcut to Jack	29.822	75.63	75.87	0.24	79.09	79.23	0.14	85.23	85.26	0.03
Honcut to Jack	29.821	75.64	75.88	0.24	79.11	79.24	0.13	85.23	85.25	0.02
Honcut to Jack	29.75	75.6	75.83	0.23	79.07	79.21	0.14	85.13	85.16	0.03
Honcut to Jack	29.5	75.51	75.72	0.21	78.99	79.13	0.14	85.03	85.06	0.03
Jack Sl - Yuba R	29.25	75.51	75.72	0.21	78.99	79.13	0.14	85.03	85.06	0.03
Jack Sl - Yuba R	29	75.39	75.59	0.2	78.85	78.98	0.13	84.83	84.86	0.03
Jack Sl - Yuba R	28.75	75.18	75.35	0.17	78.58	78.71	0.13	84.47	84.50	0.03
Jack Sl - Yuba R	28.5	75.05	75.21	0.16	78.41	78.54	0.13	84.24	84.27	0.03
Jack Sl - Yuba R	28.324	74.93	75.07	0.14	78.26	78.39	0.13	84.03	84.07	0.04
Jack Sl - Yuba R	28.322	74.92	75.07	0.15	78.26	78.39	0.13	84.03	84.06	0.03
Jack Sl - Yuba R	28.309	74.91	75.05	0.14	78.24	78.37	0.13	84.02	84.05	0.03
Jack Sl - Yuba R	28.307	74.91	75.05	0.14	78.24	78.37	0.13	84.01	84.04	0.03
Jack Sl - Yuba R	28.25	74.87	75.01	0.14	78.19	78.32	0.13	83.94	83.97	0.03
Jack Sl - Yuba R	28	74.72	74.85	0.13	78	78.13	0.13	83.67	83.70	0.03
Jack Sl - Yuba R	27.971	74.63	74.75	0.12	77.87	77.99	0.12	83.45	83.48	0.03
Jack Sl - Yuba R	27.963	74.61	74.73	0.12	77.84	77.96	0.12	83.39	83.42	0.03
Jack Sl - Yuba R	27.956	74.58	74.7	0.12	77.79	77.92	0.13	83.33	83.36	0.03
Jack Sl - Yuba R	27.952	74.52	74.63	0.11	77.7	77.82	0.12	83.14	83.17	0.03
Jack Sl - Yuba R	27.75	74.53	74.64	0.11	77.71	77.83	0.12	83.16	83.19	0.03
Jack Sl - Yuba R	27.5	74.27	74.36	0.09	77.36	77.48	0.12	82.62	82.66	0.04
Jack Sl - Yuba R	27.251	73.87	73.93	0.06	76.8	76.91	0.11	81.73	81.77	0.04
Jack Sl - Yuba R	27.25	73.87	73.92	0.05	76.8	76.91	0.11	81.73	81.76	0.03
Yuba R - Bear R	27	73.87	73.92	0.05	76.8	76.91	0.11	81.73	81.76	0.03
Yuba R - Bear R	26.999	73.87	73.92	0.05	76.8	76.91	0.11	81.72	81.76	0.04
Yuba R - Bear R	26.75	73.37	73.42	0.05	76.29	76.39	0.1	81.20	81.23	0.03
Yuba R - Bear R	26.5	72.79	72.85	0.06	75.74	75.85	0.11	80.68	80.72	0.04
Yuba R - Bear R	26.25	72.35	72.42	0.07	75.34	75.45	0.11	80.32	80.36	0.04
Yuba R - Bear R	26	71.99	72.06	0.07	75.01	75.13	0.12	80.03	80.06	0.03
Yuba R - Bear R	25.75	71.67	71.74	0.07	74.72	74.83	0.11	79.75	79.78	0.03
Yuba R - Bear R	25.5	71.41	71.49	0.08	74.47	74.59	0.12	79.50	79.54	0.04
Yuba R - Bear R	25.25	71.15	71.23	0.08	74.2	74.32	0.12	79.22	79.26	0.04
Yuba R - Bear R	25	70.59	70.68	0.09	73.69	73.8	0.11	78.72	78.76	0.04
Yuba R - Bear R	24.75	69.98	70.08	0.1	73.12	73.24	0.12	78.17	78.20	0.03
Yuba R - Bear R	24.5	69.54	69.64	0.1	72.69	72.81	0.12	77.74	77.77	0.03
Yuba R - Bear R	24.25	69.1	69.21	0.11	72.27	72.39	0.12	77.32	77.35	0.03
Yuba R - Bear R	24	68.77	68.89	0.12	71.97	72.09	0.12	77.02	77.05	0.03

Table 4-2. Comparison of June 2011 vs. March 2012 Design Water Surface Profiles (NAVD88-ft)

Feather River Reach	HEC-RAS River STA	100yr Max WSE (JUN 2011)	100yr Max WSE (MAR 2012)	Diff. (ft)	200yr Max WSE (JUN 2011)	200yr Max WSE (MAR 2012)	Diff. (ft)	500yr Max WSE (JUN 2011)	500yr Max WSE (MAR 2012)	Diff. (ft)
Yuba R - Bear R	23.75	68.36	68.49	0.13	71.58	71.71	0.13	76.63	76.67	0.04
Yuba R - Bear R	23.5	68.1	68.23	0.13	71.33	71.45	0.12	76.38	76.41	0.03
Yuba R - Bear R	23.25	67.72	67.85	0.13	70.97	71.09	0.12	76.01	76.04	0.03
Yuba R - Bear R	23	67.31	67.46	0.15	70.58	70.7	0.12	75.59	75.62	0.03
Yuba R - Bear R	22.75	67	67.15	0.15	70.26	70.39	0.13	75.25	75.28	0.03
Yuba R - Bear R	22.5	66.54	66.7	0.16	69.81	69.94	0.13	74.76	74.79	0.03
Yuba R - Bear R	22.25	66.15	66.32	0.17	69.42	69.55	0.13	74.34	74.36	0.02
Yuba R - Bear R	22	65.88	66.05	0.17	69.15	69.27	0.12	74.04	74.06	0.02
Yuba R - Bear R	21.75	65.49	65.67	0.18	68.78	68.9	0.12	73.65	73.67	0.02
Yuba R - Bear R	21.5	65.16	65.35	0.19	68.46	68.59	0.13	73.30	73.33	0.03
Yuba R - Bear R	21.25	64.78	64.98	0.2	68.09	68.22	0.13	72.92	72.94	0.02
Yuba R - Bear R	21	64.48	64.69	0.21	67.8	67.93	0.13	72.59	72.61	0.02
Yuba R - Bear R	20.75	64.26	64.47	0.21	67.58	67.71	0.13	72.34	72.36	0.02
Yuba R - Bear R	20.5	64.08	64.29	0.21	67.38	67.51	0.13	72.10	72.12	0.02
Yuba R - Bear R	20.25	63.88	64.11	0.23	67.19	67.31	0.12	71.87	71.89	0.02
Yuba R - Bear R	20	63.71	63.93	0.22	67	67.13	0.13	71.65	71.67	0.02
Yuba R - Bear R	19.75	63.53	63.76	0.23	66.83	66.95	0.12	71.46	71.48	0.02
Yuba R - Bear R	19.5	63.4	63.63	0.23	66.69	66.82	0.13	71.31	71.33	0.02
Yuba R - Bear R	19.25	63.28	63.52	0.24	66.58	66.71	0.13	71.19	71.20	0.01
Yuba R - Bear R	19	63.19	63.43	0.24	66.48	66.61	0.13	71.08	71.10	0.02
Yuba R - Bear R	18.75	63.03	63.27	0.24	66.32	66.45	0.13	70.90	70.91	0.01
Yuba R - Bear R	18.5	62.93	63.18	0.25	66.23	66.35	0.12	70.79	70.81	0.02
Yuba R - Bear R	18.25	62.82	63.07	0.25	66.12	66.24	0.12	70.66	70.68	0.02
Yuba R - Bear R	18	62.62	62.88	0.26	65.91	66.03	0.12	70.42	70.44	0.02
Yuba R - Bear R	17.75	62.47	62.73	0.26	65.75	65.87	0.12	70.25	70.26	0.01
Yuba R - Bear R	17.5	62.3	62.57	0.27	65.58	65.7	0.12	70.05	70.06	0.01
Yuba R - Bear R	17.25	62.1	62.37	0.27	65.39	65.51	0.12	69.84	69.85	0.01
Yuba R - Bear R	17	61.66	61.95	0.29	64.96	65.08	0.12	69.38	69.39	0.01
Yuba R - Bear R	16.75	61.37	61.67	0.3	64.67	64.79	0.12	69.06	69.07	0.01
Yuba R - Bear R	16.5	61.06	61.37	0.31	64.35	64.47	0.12	68.70	68.71	0.01
Yuba R - Bear R	16.25	60.84	61.15	0.31	64.12	64.23	0.11	68.44	68.45	0.01
Yuba R - Bear R	16	60.52	60.83	0.31	63.78	63.89	0.11	68.05	68.06	0.01
Yuba R - Bear R	15.75	59.9	60.22	0.32	63.08	63.19	0.11	67.26	67.26	0.00
Yuba R - Bear R	15.5	59.32	59.65	0.33	62.44	62.55	0.11	66.50	66.50	0.00
Yuba R - Bear R	15.25	58.8	59.13	0.33	61.87	61.97	0.1	65.83	65.83	0.00
Yuba R - Bear R	15	58.39	58.73	0.34	61.4	61.5	0.1	65.26	65.26	0.00
Yuba R - Bear R	14.75	58.01	58.35	0.34	61	61.1	0.1	64.83	64.84	0.01
Yuba R - Bear R	14.5	57.64	57.98	0.34	60.58	60.67	0.09	64.32	64.34	0.02
Yuba R - Bear R	14.25	57.09	57.44	0.35	59.95	60.03	0.08	63.55	63.58	0.03
Yuba R - Bear R	14	56.75	57.11	0.36	59.58	59.65	0.07	63.11	63.15	0.04
Yuba R - Bear R	13.75	56.47	56.82	0.35	59.24	59.3	0.06	62.67	62.72	0.05
Yuba R - Bear R	13.5	56.08	56.44	0.36	58.79	58.85	0.06	62.13	62.18	0.05
Yuba R - Bear R	13.25	55.86	56.21	0.35	58.54	58.6	0.06	61.84	61.90	0.06
Yuba R - Bear R	13	55.79	56.15	0.36	58.48	58.53	0.05	61.79	61.85	0.06
Yuba R - Bear R	12.75	55.62	55.99	0.37	58.31	58.35	0.04	61.59	61.65	0.06
Yuba R - Bear R	12.5	55.55	55.91	0.36	58.23	58.28	0.05	61.52	61.58	0.06
Yuba R - Bear R	12.25	55.32	55.66	0.34	58	58.04	0.04	61.29	61.32	0.03
Reach 35	12	55.32	55.66	0.34	58	58.04	0.04	61.29	61.32	0.03
Reach 35	11.75	55.19	55.53	0.34	57.88	57.9	0.02	61.16	61.19	0.03
Reach 35	11.599	55.16	55.49	0.33	57.84	57.86	0.02	61.12	61.15	0.03
Reach 35	11.5	55.04	55.37	0.33	57.73	57.74	0.01	61.01	61.03	0.02
Reach 35	11.25	54.84	55.16	0.32	57.52	57.52	0	60.76	60.77	0.01
Reach 35	11	54.55	54.86	0.31	57.21	57.2	-0.01	60.42	60.40	-0.02
Reach 35	10.75	54.42	54.72	0.3	57.07	57.05	-0.02	60.25	60.23	-0.02
Reach 35	10.5	54.19	54.48	0.29	56.82	56.79	-0.03	59.97	59.92	-0.05
Reach 35	10.25	53.77	54.03	0.26	56.34	56.29	-0.05	59.39	59.31	-0.08
Reach 35	10	53.57	53.83	0.26	56.14	56.07	-0.07	59.16	59.06	-0.10
Reach 35	9.75	53.29	53.52	0.23	55.82	55.73	-0.09	58.78	58.65	-0.13
Reach 35	9.5	52.97	53.18	0.21	55.47	55.35	-0.12	58.37	58.20	-0.17
Reach 35	9.278	52.91	53.12	0.21	55.41	55.3	-0.11	58.33	58.15	-0.18
Reach 35	9.265	52.63	52.82	0.19	55.08	54.94	-0.14	57.90	57.69	-0.21
Reach 35	9.2	52.51	52.7	0.19	54.95	54.81	-0.14	57.75	57.52	-0.23
Reach 35	9	52.19	52.35	0.16	54.6	54.42	-0.18	57.36	57.06	-0.30
Reach 35	8.75	51.26	51.56	0.3	53.6	53.54	-0.06	56.22	55.99	-0.23
Reach 35	8.5	50.58	51.07	0.49	52.91	53.03	0.12	55.47	55.39	-0.08
Reach 35	8.25	50.04	50.71	0.67	52.37	52.66	0.29	54.90	54.97	0.07
Reach 35	8	49.07	49.98	0.91	51.42	51.88	0.46	53.82	53.99	0.17
Reach 35	7.75	48.4	49.55	1.15	50.76	51.41	0.65	53.03	53.36	0.33
Reach 35	7.55	48.04	49.33	1.29	50.4	51.16	0.76	52.58	53.03	0.45
			MAX:	**1.29**		**MAX:**	**0.76**		**MAX:**	**0.45**
			MIN:	**-0.03**		**MIN:**	**-0.18**		**MIN:**	**-0.3**
			AVG:	**0.15**		**AVG:**	**0.07**		**AVG:**	**-0.01**

Feather River West Levee Project
Design Water Surface Profiles

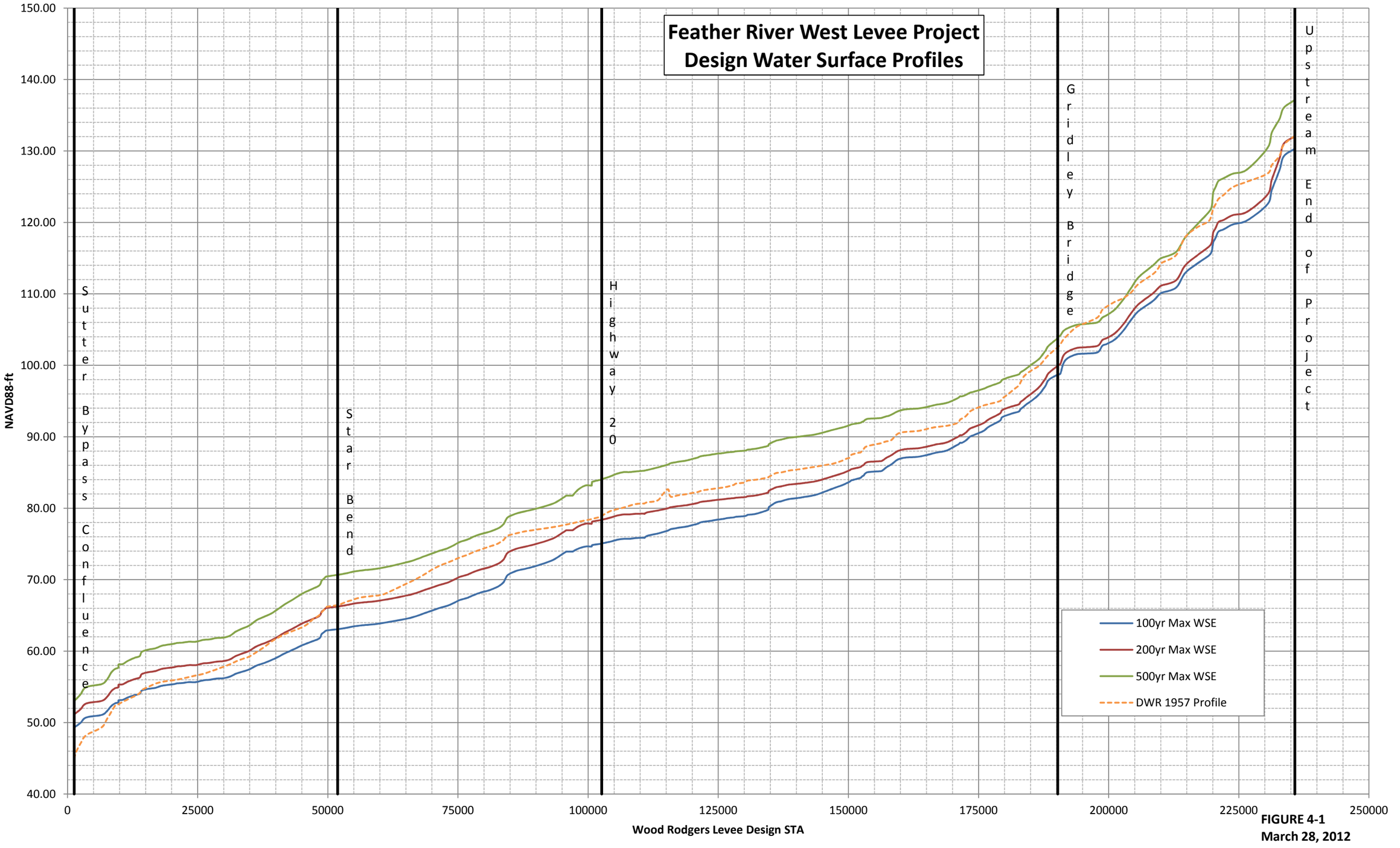


FIGURE 4-1
March 28, 2012

FRWLP - June 2011 vs. March 2012
Design Water Surface Profiles

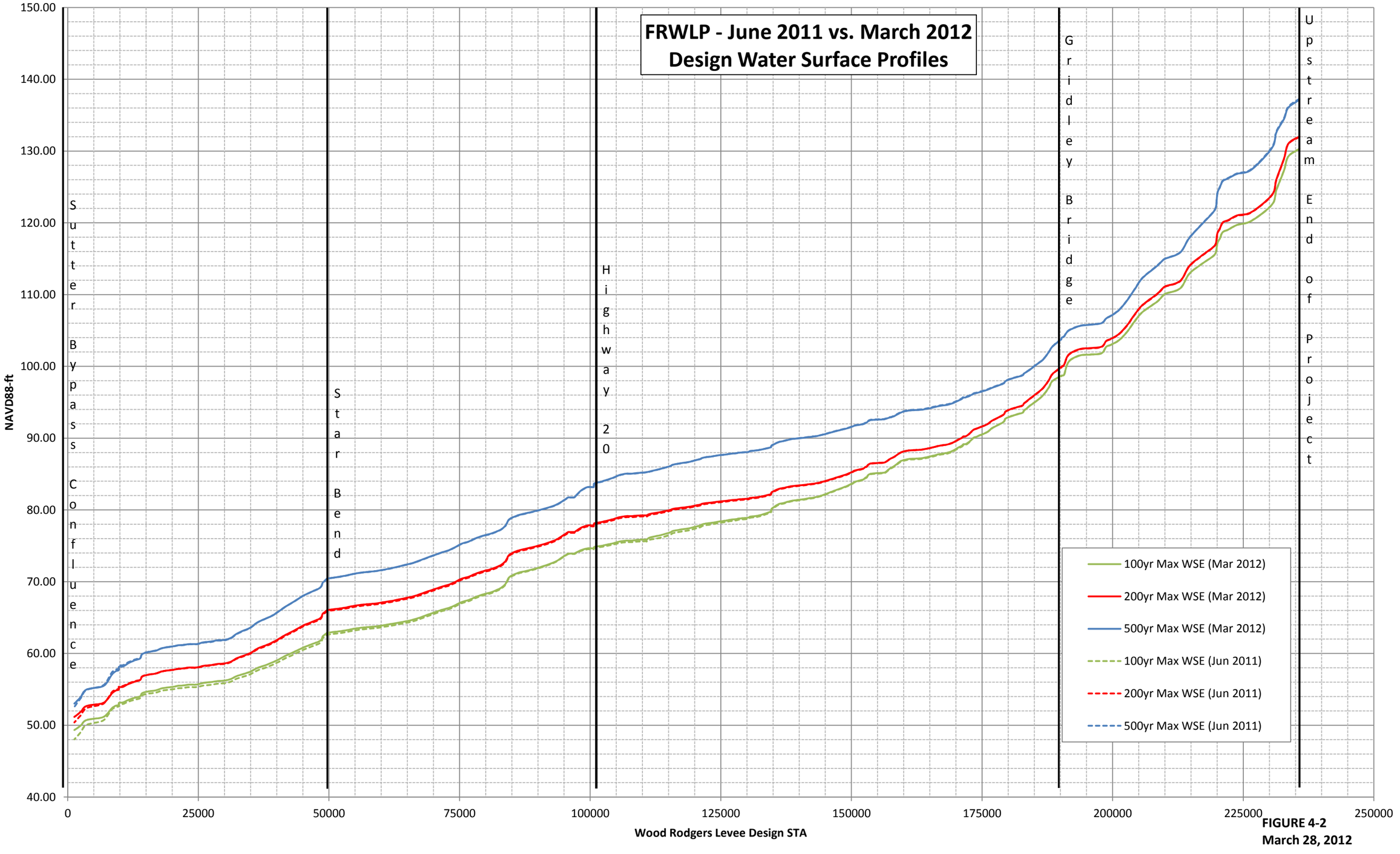


FIGURE 4-2
March 28, 2012

Table 4-3. Feather River Average Velocity Information

Feather River Reach	HEC-RAS River STA	500YR LOB Velocity (ft/s)	200YR LOB Velocity (ft/s)	100YR LOB Velocity (ft/s)	500YR Channel Velocity (ft/s)	200YR Channel Velocity (ft/s)	100YR Channel Velocity (ft/s)	500YR ROB Velocity (ft/s)	200YR ROB Velocity (ft/s)	100YR ROB Velocity (ft/s)	Wood Rodgers Design STA
Upper	58.51	1.78	0.29	0	7.97	7.55	7.32	1.84	2.25	2.03	235748.95
Upper	58.26	1.52	0	0	8.34	7	6.74	2.18	2.18	2.18	233625.38
Upper	57.95	1.97	0	0	11.21	9.86	9.18	4.99	5.04	5.04	232796.18
Upper	57.7	2.25	0	0	12.15	12.14	11.42	4.02	3.84	3.47	231347.46
Upper	57.45	1.99	0	0	11.98	10.92	10.24	2.39	0	0	230491.75
Upper	57.17	1.61	0	0	13.13	10.42	9.72	0	0	0	226547.44
Upper	56.94	1.22	0	0	7.74	6.39	6.18	3.44	3.26	3.02	223836.90
Upper	56.61	0.99	0	0	6.52	5.68	5.52	2.95	2.65	2.45	222092.63
Upper	56.43	0.74	0	0	5.77	5.04	4.95	2.69	2.37	2.21	221068.16
Upper	56.2	0	0	0	7.63	6.87	6.72	3.67	3.02	2.78	220516.06
Upper	56.02	0	0	0	8.19	6.83	6.57	3.55	2.65	2.36	220057.97
Upper	55.8	0	0	0	10.82	8.41	7.91	3.53	3.04	2.61	219786.54
Upper	55.55	0	0	0	9.18	6.83	6.39	2.91	2.18	1.85	219191.24
Upper	55.35	0	0	0	11.52	8.8	8.26	4.61	2.75	2.31	216984.11
Upper	55.03	0	0	0	10.71	8.19	7.64	2.98	1.49	1.07	214664.25
Upper	54.45	2.67	1.21	0.67	8.45	7.21	6.78	2.41	1.88	1.88	212925.66
Upper	54.2	2.89	1.74	1.4	7.86	6.6	6.32	2.1	1.43	1.11	210158.47
Upper	54.04	2.51	1.56	1.27	6.36	5.6	5.45	1.92	1.15	0.91	209562.52
Upper	53.84	2.75	1.78	1.47	8.42	7.58	7.44	2.44	1.76	1.56	208499.74
Upper	53.52	3.04	2.63	2.33	9.96	8.58	8.18	4.6	3.41	3.08	205714.05
Upper	53.22	2.7	2.21	1.87	9.46	7.77	7.42	4.04	2.75	2.43	204265.70
Upper	52.89	2.23	1.34	1.08	9.38	8.09	7.72	2.86	1.9	1.62	202757.11
Upper	52.6	2.15	1.35	1.04	8.53	7.22	6.88	3.24	2.3	2.05	201183.88
Upper	52.21	1.14	0.58	0.4	5.1	3.93	3.64	1.82	1.18	1.02	199618.97
Upper	51.95	1.27	0.81	0.72	4.75	3.81	3.56	1.61	1.05	0.91	198775.45
Upper	51.35	2	1.72	1.61	6.88	6.66	6.66	2.29	1.68	1.51	197882.65
Upper	51.1777	1.29	0.92	0.81	4.93	4.37	4.24	1.79	1.37	1.26	195736.74
Upper	51.04	1.24	0.82	0.7	4.54	3.83	3.64	0.84	0.4	0.23	193817.41
Upper	50.84	1.81	1.32	1.12	7.16	6.72	6.71	0	0	0	192085.50
Upper	50.7	2.16	1.73	1.54	7.28	8.2	8.2	0	0	0	191278.99
Upper	50.59	2.25	1.46	1.2	10.38	11.72	11.72	0	0	0	190705.90
Upper	50.498	2.13	1.39	1.35	8.86	9.71	9.71	1.2	0.7	0.36	190230.79
Upper	50.496	2.06	1.26	1.08	9.08	9.61	9.61	0.86	0	0	190218.72
Upper	50.489	1.93	1.19	1.01	8.93	9.39	9.35	0.79	0	0	190176.83
Upper	50.487	1.92	1.27	1.15	8.87	9.25	9.25	0.89	0.14	0	190166.78
Upper	50.2	2.04	2.61	2.61	9.31	8.9	7.18	1.43	1.11	0.78	188470.72
Upper	50.06	1.97	1.79	1.69	9.61	8.89	8.53	1.7	1.17	0.98	187822.66
Upper	49.78	1.81	1.44	1.23	9.4	8.48	8.16	2.98	2.28	2.05	186662.60
Upper	49.58	1.9	1.24	0.9	8.83	8.25	8	2.31	1.66	1.41	185293.60
Upper	49.38	1.64	1.04	0.72	8.06	7.28	6.99	1.71	1.05	0.79	184138.90
Upper	49.21	1.66	1	0.74	6.85	6.39	6.21	1.99	1.36	1.14	183514.21
Upper	48.99	1.81	1.18	0.96	5.26	4.98	4.9	1.93	1.33	1.13	183056.49
Upper	48.85	1.99	1.5	1.32	5.47	5.29	5.28	1.97	1.41	1.22	182753.69
Upper	48.66	1.71	1.4	1.28	4.05	3.63	3.54	2.26	1.93	1.85	181801.88
Upper	48.39	1.61	1.49	1.38	4.13	3.68	3.56	0	0	0	180454.16
Upper	48.21	1.73	1.65	1.54	5.43	4.85	4.71	2.24	1.69	1.54	179460.20
Upper	48.07	1.94	1.87	1.66	7.57	7.38	7.28	2.84	2.3	2.12	179109.34
Upper	47.7	2.02	2.03	1.78	6.72	7.1	7.22	1.09	0	0	176933.60
Upper	47.55	2.04	2.05	1.87	6.72	7.61	7.72	1.59	0.81	0.5	175967.91
Upper	47.2	1.58	1.61	1.46	4.74	4.67	4.62	1.76	1.24	1.15	174102.82
Upper	47.04	1.58	1.65	1.54	4.55	4.62	4.57	1.77	1.36	1.23	173345.89
Upper	46.69	1.68	1.91	1.78	5.86	6.67	6.75	1.86	1.46	1.26	172499.41
Upper	46.53	1.62	2.01	1.93	4.97	6.03	6.2	1.79	1.54	1.37	171792.00
Honcut to Jack	46.45	1.81	1.77	1.77	4.64	4.55	4.54	1.65	1.19	1.07	171454.59
Honcut to Jack	46.2	1.65	1.57	1.56	4.16	3.62	3.57	1.52	0.99	0.89	171127.62
Honcut to Jack	45.98	1.88	1.77	1.7	5.35	4.66	4.6	1.94	1.35	1.24	170521.00
Honcut to Jack	45.71	2.59	2.29	2.21	6.15	6.24	6.22	2.63	2.04	1.94	169330.99
Honcut to Jack	45.58	2.38	1.89	1.81	6.23	6.08	6.06	2.39	1.87	1.78	168312.33
Honcut to Jack	45.44	2.28	1.8	1.72	5.67	5.33	5.31	2.39	1.93	1.86	166923.76
Honcut to Jack	45.26	2.22	1.71	1.63	5.31	4.84	4.85	2.33	1.85	1.78	165726.12
Honcut to Jack	45.03	1.89	1.44	1.37	4.16	3.56	3.51	1.67	1.18	1.1	164732.57
Honcut to Jack	44.76	2.03	1.58	1.51	4.78	4.27	4.26	2	1.53	1.45	163250.84
Honcut to Jack	44.6326	2.1	1.67	1.61	4.6	4.1	4.08	2.08	1.65	1.6	161213.76
Honcut to Jack	44.5	2.38	2.02	1.97	4.96	4.36	4.32	2.27	1.75	1.66	160088.12
Honcut to Jack	44.23	1.96	1.58	1.49	4	3.45	3.43	2.39	1.87	1.8	159311.39
Honcut to Jack	43.46	2.44	2.05	2.01	4.7	4.67	4.85	1.24	0.32	0	158271.13
Honcut to Jack	43.34	2.18	1.82	1.78	4.46	4.44	4.61	1.41	0.98	0.87	157627.58
Honcut to Jack	43.28	1.92	1.96	1.91	3.7	4.48	4.61	1.13	0.83	0.72	157373.66
Honcut to Jack	43.23	1.83	1.9	1.86	3.67	4.56	4.74	1.24	1.06	1	157104.73
Honcut to Jack	43.12	1.77	1.91	1.87	3.51	4.56	4.75	1.47	1.43	1.35	156612.83
Honcut to Jack	43.06	1.82	2.01	1.99	3.35	4.38	4.6	1.52	1.52	1.44	156460.24
Honcut to Jack	43.01	2	1.85	1.82	3.81	4.17	4.33	1.64	1.36	1.3	156249.06
Honcut to Jack	42.65	2.02	1.69	1.66	3.79	3.66	3.76	1.91	1.58	1.53	153765.90
Honcut to Jack	42.47	2.22	1.89	1.86	4.1	3.9	3.98	2.03	1.65	1.59	153202.55
Honcut to Jack	42.19	2.24	1.91	1.88	4.44	4.33	4.45	2.05	1.67	1.6	152912.23
Honcut to Jack	42.01	1.69	1.39	1.35	3.13	2.93	2.96	1.91	1.68	1.66	152695.48
Honcut to Jack	41.61	2.11	1.8	1.75	4.53	4.59	4.76	1.56	1.24	1.14	152341.44
Honcut to Jack	41.55	2.22	1.93	1.89	4.68	4.78	4.97	1.66	1.32	1.26	151907.71

Table 4-3. Feather River Average Velocity Information

Feather River Reach	HEC-RAS River STA	500YR LOB Velocity (ft/s)	200YR LOB Velocity (ft/s)	100YR LOB Velocity (ft/s)	500YR Channel Velocity (ft/s)	200YR Channel Velocity (ft/s)	100YR Channel Velocity (ft/s)	500YR ROB Velocity (ft/s)	200YR ROB Velocity (ft/s)	100YR ROB Velocity (ft/s)	Wood Rodgers Design STA
Honcut to Jack	41.2	1.94	1.72	1.7	3.76	3.79	3.93	1.75	1.47	1.41	150600.52
Honcut to Jack	40.7	2.04	1.84	1.83	3.55	3.49	3.59	1.81	1.54	1.49	150271.92
Honcut to Jack	40.49	2.05	1.83	1.8	3.82	3.75	3.83	1.85	1.55	1.49	149590.33
Honcut to Jack	40.19	1.84	1.58	1.53	3.91	3.93	4.06	1.96	1.73	1.71	148995.18
Honcut to Jack	39.45	2.34	2.01	1.96	5.14	5.12	5.31	1.75	1.53	1.45	147001.01
Honcut to Jack	39.23	2.43	1.99	2.02	5.33	4.99	5.37	1.77	1.28	1.23	145807.70
Honcut to Jack	38.94	2.21	1.82	1.89	4.34	3.96	4.3	1.68	1.23	1.2	144368.14
Honcut to Jack	38.71	2.07	1.66	1.73	4.3	3.88	4.22	1.12	0.63	0.57	143106.13
Honcut to Jack	38.45	1.77	1.41	1.47	3.5	3.07	3.32	1.45	1.12	1.15	141664.04
Honcut to Jack	38.27	1.76	1.39	1.45	3.41	2.97	3.2	1.26	1	1.02	140631.21
Honcut to Jack	37.95	1.77	1.42	1.49	3.04	2.58	2.78	1.67	1.32	1.37	138661.68
Honcut to Jack	37.68	1.92	1.5	1.55	3.74	3.17	3.41	1.77	1.35	1.39	137779.55
Honcut to Jack	37.45	1.95	1.52	1.57	4.51	3.85	4.15	1.78	1.36	1.4	136973.90
Honcut to Jack	37.29	2.03	1.58	1.64	4.18	3.46	3.7	1.5	1.1	1.1	136058.20
Honcut to Jack	36.45	1.69	1.31	1.34	5.05	4.47	4.98	2	1.54	1.6	134783.46
Honcut to Jack	36.35	1.85	1.45	1.49	5.15	4.65	5.28	2.18	1.73	1.83	134645.65
Honcut to Jack	36.24	2.01	1.68	1.76	5.87	5.37	6.16	2.25	1.74	1.82	134561.14
Honcut to Jack	35.78	1.68	1.28	1.34	3.97	3.31	3.65	1.81	1.39	1.47	132247.58
Honcut to Jack	35.5	1.48	1.13	1.18	3.29	2.67	2.91	1.56	1.19	1.25	130647.35
Honcut to Jack	35.25	1.41	1.09	1.14	3.02	2.47	2.69	1.45	1.11	1.17	130422.24
Honcut to Jack	34.8	1.34	1.03	1.08	2.78	2.28	2.5	1.37	1.07	1.13	129991.41
Honcut to Jack	34.5	1.36	1.04	1.1	2.4	1.88	2.01	1.38	1.07	1.14	128407.23
Honcut to Jack	34.07	1.12	0.85	0.88	2.12	1.66	1.78	1.23	0.96	1.02	127995.61
Honcut to Jack	33.5	1.29	1.01	1.07	2.63	2.17	2.4	1.4	1.15	1.26	126794.65
Honcut to Jack	33.25	1.56	1.22	1.3	3.43	2.9	3.24	1.2	0.9	0.93	125934.45
Honcut to Jack	33	1.61	1.25	1.33	3.57	3.01	3.37	1.47	1.13	1.2	124547.32
Honcut to Jack	32.75	1.57	1.19	1.26	3.37	2.73	2.98	1.26	0.92	0.95	123335.94
Honcut to Jack	32.5	1.75	1.33	1.41	3.75	3.04	3.35	1.43	1.05	1.08	122068.05
Honcut to Jack	32.25	1.7	1.3	1.39	3.49	2.83	3.12	1.58	1.19	1.25	121462.67
Honcut to Jack	32	1.93	1.45	1.53	4.26	3.44	3.78	1.98	1.5	1.59	121023.94
Honcut to Jack	31.75	1.99	1.47	1.53	4.4	3.47	3.79	2.15	1.62	1.72	119945.84
Honcut to Jack	31.5	1.97	1.45	1.52	4	3.09	3.33	1.83	1.33	1.39	118882.16
Honcut to Jack	31.25	2.31	1.72	1.83	4.37	3.36	3.65	1.97	1.42	1.47	117232.05
Honcut to Jack	31	2.14	1.6	1.72	4.32	3.37	3.71	1.89	1.37	1.43	115835.54
Honcut to Jack	30.75	1.72	1.3	1.39	4.67	3.67	4.07	2.11	1.55	1.63	115369.28
Honcut to Jack	30.5	1.7	1.23	1.28	4.75	3.73	4.15	2.2	1.63	1.73	114410.61
Honcut to Jack	30.25	1.94	1.44	1.54	3.84	2.96	3.28	1.97	1.45	1.54	113317.84
Honcut to Jack	30	2.55	1.84	1.93	5.51	4.21	4.64	2.7	1.94	2.03	111356.97
Honcut to Jack	29.828	2.17	2.28	2.43	4.56	4.99	5.48	2.14	2.18	2.25	110812.54
Honcut to Jack	29.826	2.18	2.18	2.33	4.58	4.77	5.27	2.15	2.08	2.16	110802.45
Honcut to Jack	29.822	2.26	2.34	2.51	4.05	4.36	4.84	2.25	2.25	2.35	110784.75
Honcut to Jack	29.821	2.26	2.21	2.39	4.05	4.14	4.62	2.25	2.11	2.21	110774.66
Honcut to Jack	29.75	1.85	1.5	1.59	4.47	3.41	3.79	2.29	1.64	1.73	109217.11
Honcut to Jack	29.5	1.56	1.11	1.13	3.42	2.67	3.01	2.08	1.58	1.76	107965.48
Jack Sl - Yuba R	29.25	2.25	1.58	1.29	5.42	4.28	3.91	2.99	2.28	2.03	106938.36
Jack Sl - Yuba R	29	2.61	1.87	1.56	5.63	4.43	4.02	3.18	2.44	2.16	105627.60
Jack Sl - Yuba R	28.75	2.92	2.1	1.73	6.68	5.27	4.7	3.36	2.57	2.2	104417.55
Jack Sl - Yuba R	28.5	2.73	1.96	1.61	5.7	4.36	3.76	3.12	2.4	2.06	103521.79
Jack Sl - Yuba R	28.324	3.07	2.31	1.93	5.8	4.54	3.96	2.48	1.87	1.58	102627.46
Jack Sl - Yuba R	28.322	3.07	2.31	1.93	5.81	4.55	3.97	2.53	1.91	1.62	102615.67
Jack Sl - Yuba R	28.309	3.46	2.62	2.21	5.62	4.45	3.91	2.38	1.83	1.55	102537.51
Jack Sl - Yuba R	28.307	3.46	2.62	2.21	5.65	4.47	3.94	2.38	1.82	1.55	102527.14
Jack Sl - Yuba R	28.25	3.14	2.32	1.94	6.24	4.85	4.22	2.03	1.67	1.38	102281.40
Jack Sl - Yuba R	28	3.6	2.67	2.22	7.14	5.53	4.78	2.04	1.5	1.32	100798.76
Jack Sl - Yuba R	27.971	3.85	2.79	2.29	8.07	6.14	5.23	2.44	1.76	1.39	100749.02
Jack Sl - Yuba R	27.963	3.85	2.79	2.29	8.08	6.14	5.23	2.45	1.76	1.4	100696.07
Jack Sl - Yuba R	27.956	3.91	2.82	2.3	8.41	6.41	5.46	2.6	1.77	1.55	100684.10
Jack Sl - Yuba R	27.952	3.94	2.84	2.31	8.51	6.47	5.5	2.51	1.71	1.54	100652.33
Jack Sl - Yuba R	27.75	4.17	3.05	2.53	5.78	4.29	3.59	1.95	1.45	1.18	99512.10
Jack Sl - Yuba R	27.5	2.67	1.73	1.26	7.03	5.29	4.46	1.69	1.19	0.9	98174.47
Jack Sl - Yuba R	27.251	4.2	2.81	2.14	9.12	6.78	5.69	3.79	2.57	1.95	97016.29
Jack Sl - Yuba R	27.25	4.2	2.81	2.14	9.12	6.78	5.69	3.78	2.57	1.95	97011.08
Yuba R - Bear R	27	3.98	3.16	2.64	7.47	6.61	6.06	2.12	1.35	1.14	95787.83
Yuba R - Bear R	26.999	3.96	3.16	2.64	7.48	6.61	6.06	2.12	1.35	1.14	95782.80
Yuba R - Bear R	26.75	3.82	3.1	2.64	6.88	6.18	5.76	1.86	1.3	1.04	94705.78
Yuba R - Bear R	26.5	3.61	3.03	2.65	6.7	6.29	6.08	1.72	1.02	1.01	93495.05
Yuba R - Bear R	26.25	3.22	2.76	2.46	5.76	5.48	5.36	2.65	2.34	2.13	92095.83
Yuba R - Bear R	26	2.89	2.49	2.23	4.8	4.53	4.41	2.85	2.52	2.31	90634.01
Yuba R - Bear R	25.75	2.9	2.5	2.25	4.54	4.22	4.08	2.98	2.63	2.42	89136.87
Yuba R - Bear R	25.5	2.73	2.3	2.03	4.55	4.12	3.89	3.16	2.78	2.56	87728.16
Yuba R - Bear R	25.25	3.06	2.59	2.31	4.75	4.31	4.08	2.42	2.03	1.78	86208.17
Yuba R - Bear R	25	3.7	3.2	2.91	6.05	5.72	5.62	3.59	3.1	2.81	84613.00
Yuba R - Bear R	24.75	3.34	2.69	2.26	6.48	5.98	5.72	3.69	3.1	2.72	84085.03
Yuba R - Bear R	24.5	3.53	2.95	2.61	5.44	4.92	4.65	3.36	2.78	2.41	83744.43
Yuba R - Bear R	24.25	3.55	3.01	2.7	5.02	4.47	4.19	2.8	2.26	1.91	83076.25
Yuba R - Bear R	24	3.17	2.76	2.53	6.17	5.58	5.32	2.97	2.47	2.15	82269.01
Yuba R - Bear R	23.75	3.02	2.55	2.28	7.13	6.42	6.08	1.6	1.14	0.91	80891.65
Yuba R - Bear R	23.5	2.75	2.33	2.1	6.2	5.52	5.18	1.3	0.91	0.67	79494.60

Table 4-3. Feather River Average Velocity Information

Feather River Reach	HEC-RAS River STA	500YR LOB Velocity (ft/s)	200YR LOB Velocity (ft/s)	100YR LOB Velocity (ft/s)	500YR Channel Velocity (ft/s)	200YR Channel Velocity (ft/s)	100YR Channel Velocity (ft/s)	500YR ROB Velocity (ft/s)	200YR ROB Velocity (ft/s)	100YR ROB Velocity (ft/s)	Wood Rodgers Design STA
Yuba R - Bear R	23.25	3.19	2.73	2.47	7.77	7.07	6.78	3.58	3.19	2.96	78032.72
Yuba R - Bear R	23	2.98	2.49	2.22	8.28	7.41	7	2.38	1.9	1.59	76810.25
Yuba R - Bear R	22.75	2.98	2.49	2.21	8.39	7.46	7.01	2.6	2.09	1.79	75345.95
Yuba R - Bear R	22.5	3.13	2.63	2.35	9.22	8.28	7.86	2.99	2.45	2.13	74107.24
Yuba R - Bear R	22.25	3	2.5	2.22	8.73	7.76	7.3	2.85	2.36	2.06	72852.32
Yuba R - Bear R	22	2.44	2.01	1.78	6.86	6.03	5.63	2.47	2.04	1.78	71497.68
Yuba R - Bear R	21.75	2.55	2.09	1.82	8.29	7.43	7.07	2.91	2.43	2.16	70018.45
Yuba R - Bear R	21.5	2.45	2.03	1.79	7.06	6.28	5.95	1.65	1.09	0.68	68712.35
Yuba R - Bear R	21.25	2.52	2.07	1.82	7.57	6.72	6.36	1.96	1.41	1.02	67330.45
Yuba R - Bear R	21	2.43	1.98	1.73	7.42	6.48	6.05	1.47	0.97	0.61	66047.23
Yuba R - Bear R	20.75	2.44	2.01	1.77	6.91	5.98	5.57	2.61	2.09	1.81	64675.51
Yuba R - Bear R	20.5	2.36	1.92	1.69	6.26	5.3	4.82	2.33	1.81	1.54	63332.45
Yuba R - Bear R	20.25	2.21	1.8	1.59	6.17	5.24	4.79	2.51	2.06	1.77	61977.06
Yuba R - Bear R	20	2.13	1.74	1.54	5.81	4.93	4.49	2.57	2.06	1.8	60460.00
Yuba R - Bear R	19.75	1.81	1.5	1.33	5.65	4.88	4.51	2.36	1.89	1.63	58852.41
Yuba R - Bear R	19.5	1.63	1.37	1.22	5.37	4.72	4.43	2.39	1.99	1.76	56862.66
Yuba R - Bear R	19.25	1.27	1.05	0.92	4.42	3.86	3.57	2.24	1.89	1.69	55516.59
Yuba R - Bear R	19	1.3	1.08	0.96	4.08	3.53	3.26	2.2	1.86	1.66	54713.04
Yuba R - Bear R	18.75	1.68	1.41	1.25	5.55	4.84	4.47	1.88	1.58	1.41	53622.77
Yuba R - Bear R	18.5	1.68	1.42	1.26	5.35	4.66	4.3	1.78	1.49	1.32	52897.52
Yuba R - Bear R	18.25	1.78	1.49	1.31	5.93	5.16	4.74	1.97	1.66	1.47	51890.28
Yuba R - Bear R	18	2.05	1.73	1.53	6.51	5.7	5.26	1.94	1.6	1.39	49704.43
Yuba R - Bear R	17.75	1.92	1.61	1.43	6.17	5.39	4.96	1.89	1.56	1.36	49399.72
Yuba R - Bear R	17.5	2.03	1.73	1.54	6.44	5.61	5.18	1.89	1.55	1.34	49114.25
Yuba R - Bear R	17.25	2.29	1.99	1.79	6.83	6.1	5.76	2.06	1.7	1.49	48794.83
Yuba R - Bear R	17	1.81	1.47	1.22	8.44	7.65	7.3	2.62	2.21	1.95	48556.49
Yuba R - Bear R	16.75	0	0	0	7.21	6.42	6.04	2.81	2.38	2.11	48094.20
Yuba R - Bear R	16.5	2.02	1.65	1.37	7.19	6.3	5.79	2.76	2.31	2.04	47013.16
Yuba R - Bear R	16.25	2.28	1.88	1.61	7.08	6.23	5.7	2.7	2.28	2.02	46228.38
Yuba R - Bear R	16	2.54	2.12	1.83	7.64	6.76	6.22	2.87	2.44	2.15	45101.47
Yuba R - Bear R	15.75	3.37	2.82	2.39	9.82	8.7	7.86	3.07	2.64	2.53	43356.36
Yuba R - Bear R	15.5	3.68	3.06	2.65	10.35	9.06	8.19	3.52	2.96	2.56	41613.14
Yuba R - Bear R	15.25	3.17	2.62	2.24	10.68	9.28	8.35	3.21	2.69	2.34	40305.41
Yuba R - Bear R	15	2.81	2.28	1.92	9.83	8.44	7.53	3	2.49	2.12	39102.69
Yuba R - Bear R	14.75	4.08	3.39	2.91	9.72	8.55	7.8	4.22	3.57	3.13	37817.10
Yuba R - Bear R	14.5	4.11	3.39	2.9	9.72	8.44	7.61	4.12	3.48	3.05	36319.37
Yuba R - Bear R	14.25	4.38	3.6	3.07	10.77	9.31	8.36	3.7	3.06	2.55	34904.17
Yuba R - Bear R	14	4.11	3.37	2.86	11.29	9.72	8.72	4.55	3.81	3.32	33507.55
Yuba R - Bear R	13.75	4.03	3.32	2.84	10.03	8.51	7.51	3.56	2.87	2.43	32270.43
Yuba R - Bear R	13.5	4.3	3.61	3.1	10.45	9.04	8.04	3.78	3.1	2.59	31239.13
Yuba R - Bear R	13.25	4.46	3.74	3.23	9.75	8.46	7.55	4.05	3.36	2.85	29977.40
Yuba R - Bear R	13	3.58	3.03	2.63	6.97	6.03	5.37	2.91	2.39	2.01	28644.35
Yuba R - Bear R	12.75	3.34	2.83	2.47	6.63	5.76	5.16	2.81	2.33	1.97	27255.90
Yuba R - Bear R	12.5	2.87	2.42	2.1	5.81	5.04	4.51	2.34	1.91	1.6	26065.40
Yuba R - Bear R	12.25	2.9	2.5	2.26	6.32	5.67	5.29	2.42	2.03	1.77	24642.20
Reach 35	12	2.76	2.38	2.14	5.71	5.19	4.91	2.78	2.41	2.18	23313.05
Reach 35	11.75	2.71	2.35	2.13	5.37	4.88	4.62	2.69	2.35	2.14	21993.69
Reach 35	11.599	2.78	2.4	2.15	5.75	5.24	4.96	2.8	2.43	2.19	21069.77
Reach 35	11.5	2.66	2.31	2.09	5.51	5.02	4.75	2.54	2.19	1.97	20354.66
Reach 35	11.25	3.01	2.57	2.3	6.26	5.61	5.23	2.98	2.57	2.31	18182.41
Reach 35	11	3.75	3.22	2.9	7.68	6.9	6.46	3.39	2.89	2.57	16871.48
Reach 35	10.75	3.44	2.93	2.61	7.04	6.24	5.78	3.58	3.1	2.79	15547.88
Reach 35	10.5	3.86	3.31	2.97	7.46	6.58	6.07	3.52	3.01	2.68	14278.44
Reach 35	10.25	4.3	3.63	3.21	8.95	7.83	7.19	4.22	3.54	3.12	13850.18
Reach 35	10	4.36	3.7	3.29	8.63	7.54	6.91	4.35	3.68	3.27	12847.13
Reach 35	9.75	3.98	3.39	3.02	7.66	6.64	6.04	4.1	3.46	3.08	11597.74
Reach 35	9.5	4.95	4.19	3.73	9.73	8.41	7.64	4.33	3.6	3.14	10595.55
Reach 35	9.278	0	0	0	6.09	5.26	4.77	0	0	0	9814.09
Reach 35	9.265	2.08	1.62	1.32	8.08	6.94	6.27	3.83	3.16	2.74	9758.91
Reach 35	9.2	1.86	1.36	1.14	8.61	7.41	6.7	3.54	2.91	2.51	9164.29
Reach 35	9	2.28	1.75	1.28	9.43	8.16	7.43	4.25	3.52	3.05	8445.84
Reach 35	8.75	2.95	2.12	1.52	11.97	10.36	9.57	5.24	4.33	3.77	7531.76
Reach 35	8.5	3.57	2.81	2.31	11.16	9.68	9.05	4.99	4.13	3.64	6548.71
Reach 35	8.25	2.18	1.92	1.97	9.46	8.19	7.74	4.2	3.47	3.09	3573.02
Reach 35	8	3.38	2.79	2.56	11.71	10.03	9.68	4.59	3.71	3.29	2528.45
Reach 35	7.75	1.96	1.46	1.15	11.17	9.33	8.95	4.42	3.51	3.12	1733.43
Reach 35	7.55	2	1.56	1.32	10.15	8.35	7.99	4.09	3.22	2.87	1275.43

Table 4-4. Feather River Shear Stress Information

Feather River Reach	HEC-RAS River STA	500YR LOB Shear Stress (lb/sq ft)	200YR LOB Shear Stress (lb/sq ft)	100YR LOB Shear Stress (lb/sq ft)	500YR Channel Shear Stress (lb/sq ft)	200YR Channel Shear Stress (lb/sq ft)	100yr Channel Shear Stress (lb/sq ft)	500YR ROB Shear Stress (lb/sq ft)	200YR ROB Shear Stress (lb/sq ft)	100YR ROB Shear Stress (lb/sq ft)	Wood Rodgers Design STA
Upper	58.51	0.25	0.02	0	1.03	1	0.97	0.18	0.26	0.23	235748.95
Upper	58.26	0.2	0	0	1.11	0.85	0.81	0.22	0.19	0.19	233625.38
Upper	57.95	0.33	0	0	1.94	1.56	1.38	0.68	0.73	0.62	232796.18
Upper	57.7	0.42	0	0	2.27	2.46	2.22	0.5	0.62	0.49	231347.46
Upper	57.45	0.36	0	0	2.33	2.06	1.84	0.32	0	0	230491.75
Upper	57.17	0.27	0	0	2.76	1.89	1.67	0	0	0	226547.44
Upper	56.94	0.14	0	0	0.94	0.7	0.67	0.45	0.41	0.37	223836.90
Upper	56.61	0.09	0	0	0.66	0.54	0.52	0.32	0.28	0.25	222092.63
Upper	56.43	0.05	0	0	0.52	0.43	0.42	0.27	0.22	0.2	221068.16
Upper	56.2	0	0	0	0.94	0.8	0.78	0.46	0.37	0.33	220516.06
Upper	56.02	0	0	0	1.02	0.76	0.72	0.4	0.3	0.25	220057.97
Upper	55.8	0	0	0	1.87	1.19	1.07	0.39	0.42	0.33	219786.54
Upper	55.55	0	0	0	1.26	0.74	0.66	0.36	0.21	0.17	219191.24
Upper	55.35	0	0	0	2.08	1.29	1.15	0.85	0.36	0.27	216984.11
Upper	55.03	0	0	0	1.8	1.1	0.97	0.42	0.14	0.08	214664.25
Upper	54.45	0.29	0.09	0.04	1.16	0.89	0.8	0.24	0.16	0.16	212925.66
Upper	54.2	0.3	0.14	0.1	0.97	0.73	0.68	0.18	0.1	0.07	210158.47
Upper	54.04	0.23	0.11	0.08	0.66	0.54	0.53	0.14	0.06	0.04	209562.52
Upper	53.84	0.27	0.14	0.1	1.06	0.9	0.88	0.22	0.13	0.11	208499.74
Upper	53.52	0.36	0.24	0.22	1.55	1.21	1.12	0.68	0.43	0.36	205714.05
Upper	53.22	0.3	0.21	0.17	1.43	1.02	0.94	0.56	0.3	0.25	204265.70
Upper	52.89	0.34	0.14	0.11	1.4	1.1	1.02	0.49	0.26	0.2	202757.11
Upper	52.6	0.32	0.16	0.1	1.47	1.11	1.02	0.6	0.35	0.29	201183.88
Upper	52.21	0.09	0.03	0.02	0.51	0.31	0.27	0.19	0.09	0.07	199618.97
Upper	51.95	0.11	0.04	0.04	0.44	0.3	0.26	0.15	0.07	0.06	198775.45
Upper	51.35	0.18	0.13	0.11	0.73	0.72	0.72	0.23	0.15	0.12	197882.65
Upper	51.1777	0.08	0.05	0.04	0.34	0.27	0.26	0.15	0.1	0.08	195736.74
Upper	51.04	0.08	0.04	0.03	0.29	0.21	0.2	0.04	0.01	0.01	193817.41
Upper	50.84	0.18	0.11	0.09	0.72	0.67	0.67	0	0	0	192085.50
Upper	50.7	0.3	0.23	0.21	0.82	1.14	1.15	0	0	0	191278.99
Upper	50.59	0.33	0.19	0.15	1.48	2.01	2.01	0	0	0	190705.90
Upper	50.498	0.29	0.17	0.14	1.12	1.46	1.46	0.12	0.06	0.02	190230.79
Upper	50.496	0.32	0.17	0.13	1.2	1.47	1.47	0.09	0	0	190218.72
Upper	50.489	0.29	0.15	0.12	1.15	1.38	1.38	0.08	0	0	190176.83
Upper	50.487	0.28	0.15	0.12	1.12	1.31	1.31	0.09	0.01	0	190166.78
Upper	50.2	0.27	0.17	0.11	1.17	1.12	0.74	0.16	0.11	0.06	188470.72
Upper	50.06	0.27	0.18	0.16	1.3	1.17	1.1	0.22	0.13	0.1	187822.66
Upper	49.78	0.24	0.15	0.1	1.24	1.07	1	0.5	0.33	0.28	186662.60
Upper	49.58	0.21	0.13	0.08	1.1	1.02	0.98	0.33	0.21	0.16	185293.60
Upper	49.38	0.19	0.1	0.06	0.94	0.81	0.76	0.21	0.1	0.07	184138.90
Upper	49.21	0.18	0.09	0.05	0.67	0.62	0.6	0.24	0.14	0.11	183514.21
Upper	48.99	0.14	0.08	0.06	0.44	0.42	0.41	0.16	0.09	0.07	183056.49
Upper	48.85	0.16	0.11	0.09	0.47	0.47	0.47	0.16	0.1	0.08	182753.69
Upper	48.66	0.11	0.09	0.08	0.26	0.23	0.22	0.18	0.14	0.13	181801.88
Upper	48.39	0.11	0.09	0.09	0.28	0.24	0.23	0	0	0	180454.16
Upper	48.21	0.13	0.1	0.09	0.45	0.38	0.36	0.19	0.12	0.11	179460.20
Upper	48.07	0.17	0.17	0.14	0.82	0.81	0.8	0.3	0.23	0.2	179109.34
Upper	47.7	0.19	0.19	0.17	0.7	0.81	0.85	0.07	0	0	176933.60
Upper	47.55	0.18	0.18	0.18	0.68	0.93	0.97	0.13	0.05	0.03	175967.91
Upper	47.2	0.11	0.12	0.1	0.35	0.36	0.36	0.13	0.08	0.07	174102.82
Upper	47.04	0.11	0.11	0.11	0.32	0.35	0.36	0.13	0.09	0.08	173345.89
Upper	46.69	0.12	0.14	0.15	0.48	0.66	0.68	0.14	0.11	0.09	172499.41
Upper	46.53	0.11	0.16	0.17	0.36	0.57	0.61	0.13	0.12	0.1	171792.00
Honcut to Jack	46.45	0.14	0.14	0.14	0.32	0.34	0.34	0.13	0.08	0.07	171454.59
Honcut to Jack	46.2	0.12	0.09	0.09	0.26	0.21	0.21	0.11	0.06	0.05	171127.62
Honcut to Jack	45.98	0.16	0.14	0.14	0.41	0.33	0.33	0.16	0.09	0.08	170521.00
Honcut to Jack	45.71	0.29	0.24	0.24	0.57	0.62	0.62	0.29	0.21	0.2	169330.99
Honcut to Jack	45.58	0.24	0.17	0.16	0.54	0.55	0.55	0.24	0.17	0.16	168312.33
Honcut to Jack	45.44	0.21	0.15	0.14	0.45	0.43	0.43	0.23	0.17	0.16	166923.76
Honcut to Jack	45.26	0.2	0.14	0.13	0.41	0.36	0.37	0.22	0.16	0.15	165726.12
Honcut to Jack	45.03	0.14	0.09	0.09	0.25	0.2	0.19	0.12	0.07	0.06	164732.57
Honcut to Jack	44.76	0.16	0.11	0.11	0.32	0.28	0.28	0.16	0.11	0.1	163250.84
Honcut to Jack	44.6326	0.17	0.12	0.12	0.3	0.25	0.25	0.17	0.12	0.11	161213.76
Honcut to Jack	44.5	0.23	0.17	0.17	0.37	0.31	0.31	0.21	0.14	0.13	160088.12
Honcut to Jack	44.23	0.16	0.11	0.11	0.36	0.28	0.28	0.22	0.15	0.14	159311.39
Honcut to Jack	43.46	0.24	0.2	0.2	0.49	0.51	0.56	0.09	0.01	0	158271.13
Honcut to Jack	43.34	0.19	0.15	0.15	0.43	0.45	0.49	0.1	0.06	0.05	157627.58
Honcut to Jack	43.28	0.15	0.18	0.17	0.3	0.46	0.5	0.07	0.05	0.04	157373.66
Honcut to Jack	43.23	0.13	0.17	0.17	0.29	0.48	0.52	0.08	0.07	0.07	157104.73
Honcut to Jack	43.12	0.12	0.17	0.17	0.26	0.47	0.52	0.09	0.11	0.1	156612.83
Honcut to Jack	43.06	0.13	0.19	0.19	0.25	0.45	0.51	0.1	0.12	0.12	156460.24
Honcut to Jack	43.01	0.16	0.15	0.15	0.31	0.39	0.43	0.12	0.1	0.09	156249.06
Honcut to Jack	42.65	0.16	0.12	0.12	0.31	0.3	0.32	0.14	0.11	0.11	153765.90
Honcut to Jack	42.47	0.22	0.18	0.18	0.37	0.36	0.38	0.19	0.15	0.14	153202.55
Honcut to Jack	42.19	0.23	0.19	0.19	0.43	0.43	0.46	0.2	0.15	0.15	152912.23
Honcut to Jack	42.01	0.13	0.1	0.1	0.22	0.21	0.22	0.16	0.13	0.14	152695.48
Honcut to Jack	41.61	0.2	0.17	0.17	0.43	0.47	0.52	0.13	0.1	0.09	152341.44

Table 4-4. Feather River Shear Stress Information

Feather River Reach	HEC-RAS River STA	500YR LOB Shear Stress (lb/sq ft)	200YR LOB Shear Stress (lb/sq ft)	100YR LOB Shear Stress (lb/sq ft)	500YR Channel Shear Stress (lb/sq ft)	200YR Channel Shear Stress (lb/sq ft)	100yr Channel Shear Stress (lb/sq ft)	500YR ROB Shear Stress (lb/sq ft)	200YR ROB Shear Stress (lb/sq ft)	100YR ROB Shear Stress (lb/sq ft)	Wood Rodgers Design STA
Honcut to Jack	41.55	0.23	0.2	0.2	0.47	0.52	0.57	0.15	0.11	0.11	151907.71
Honcut to Jack	41.2	0.17	0.15	0.15	0.31	0.33	0.36	0.14	0.12	0.12	150600.52
Honcut to Jack	40.7	0.18	0.16	0.17	0.28	0.29	0.31	0.15	0.13	0.12	150271.92
Honcut to Jack	40.49	0.18	0.16	0.16	0.31	0.32	0.34	0.16	0.13	0.12	149590.33
Honcut to Jack	40.19	0.15	0.13	0.13	0.32	0.34	0.37	0.17	0.15	0.15	148995.18
Honcut to Jack	39.45	0.28	0.24	0.24	0.56	0.59	0.64	0.18	0.16	0.15	147001.01
Honcut to Jack	39.23	0.3	0.23	0.25	0.59	0.55	0.64	0.19	0.12	0.12	145807.70
Honcut to Jack	38.94	0.24	0.19	0.21	0.4	0.36	0.43	0.16	0.1	0.11	144368.14
Honcut to Jack	38.71	0.21	0.15	0.17	0.38	0.33	0.39	0.08	0.04	0.03	143106.13
Honcut to Jack	38.45	0.15	0.11	0.12	0.25	0.21	0.25	0.11	0.08	0.08	141664.04
Honcut to Jack	38.27	0.15	0.1	0.12	0.24	0.2	0.23	0.09	0.06	0.07	140631.21
Honcut to Jack	37.95	0.15	0.11	0.12	0.2	0.16	0.19	0.14	0.1	0.11	138661.68
Honcut to Jack	37.68	0.18	0.12	0.13	0.29	0.22	0.26	0.15	0.1	0.11	137779.55
Honcut to Jack	37.45	0.23	0.16	0.17	0.41	0.31	0.37	0.2	0.13	0.15	136973.90
Honcut to Jack	37.29	0.25	0.17	0.19	0.37	0.27	0.32	0.16	0.1	0.1	136058.20
Honcut to Jack	36.45	0.21	0.14	0.16	0.53	0.44	0.56	0.27	0.18	0.2	134783.46
Honcut to Jack	36.35	0.25	0.18	0.2	0.57	0.5	0.66	0.32	0.23	0.27	134645.65
Honcut to Jack	36.24	0.29	0.23	0.27	0.72	0.64	0.86	0.34	0.24	0.28	134561.14
Honcut to Jack	35.78	0.18	0.12	0.13	0.32	0.24	0.3	0.2	0.13	0.15	132247.58
Honcut to Jack	35.5	0.13	0.09	0.1	0.22	0.15	0.19	0.14	0.09	0.11	130647.35
Honcut to Jack	35.25	0.15	0.09	0.11	0.23	0.16	0.2	0.15	0.1	0.11	130422.24
Honcut to Jack	34.8	0.13	0.09	0.1	0.2	0.14	0.18	0.14	0.09	0.11	129991.41
Honcut to Jack	34.5	0.13	0.08	0.1	0.15	0.1	0.12	0.13	0.09	0.1	128407.23
Honcut to Jack	34.07	0.09	0.06	0.07	0.12	0.08	0.1	0.11	0.07	0.08	127995.61
Honcut to Jack	33.5	0.12	0.08	0.1	0.18	0.13	0.16	0.14	0.1	0.12	126794.65
Honcut to Jack	33.25	0.18	0.12	0.14	0.29	0.22	0.28	0.12	0.07	0.08	125934.45
Honcut to Jack	33	0.19	0.12	0.15	0.32	0.24	0.3	0.16	0.11	0.13	124547.32
Honcut to Jack	32.75	0.18	0.11	0.13	0.28	0.19	0.24	0.13	0.07	0.08	123335.94
Honcut to Jack	32.5	0.22	0.14	0.16	0.34	0.24	0.3	0.16	0.09	0.11	122068.05
Honcut to Jack	32.25	0.2	0.13	0.15	0.31	0.21	0.26	0.18	0.11	0.13	121462.67
Honcut to Jack	32	0.27	0.17	0.19	0.45	0.3	0.38	0.28	0.17	0.2	121023.94
Honcut to Jack	31.75	0.28	0.17	0.19	0.48	0.31	0.38	0.32	0.19	0.23	119945.84
Honcut to Jack	31.5	0.28	0.16	0.18	0.4	0.25	0.3	0.25	0.14	0.16	118882.16
Honcut to Jack	31.25	0.36	0.22	0.25	0.48	0.3	0.36	0.29	0.16	0.18	117232.05
Honcut to Jack	31	0.31	0.19	0.23	0.46	0.29	0.36	0.26	0.15	0.17	115835.54
Honcut to Jack	30.75	0.24	0.15	0.17	0.54	0.35	0.44	0.32	0.19	0.22	115369.28
Honcut to Jack	30.5	0.24	0.13	0.15	0.56	0.36	0.46	0.35	0.2	0.24	114410.61
Honcut to Jack	30.25	0.26	0.15	0.19	0.39	0.24	0.31	0.27	0.16	0.19	113317.84
Honcut to Jack	30	0.45	0.25	0.29	0.76	0.46	0.58	0.49	0.27	0.31	111356.97
Honcut to Jack	29.828	0.32	0.37	0.44	0.52	0.65	0.8	0.31	0.35	0.39	110812.54
Honcut to Jack	29.826	0.32	0.34	0.41	0.52	0.59	0.74	0.31	0.32	0.36	110802.45
Honcut to Jack	29.822	0.25	0.28	0.34	0.41	0.49	0.63	0.25	0.27	0.31	110784.75
Honcut to Jack	29.821	0.25	0.25	0.31	0.41	0.45	0.57	0.25	0.24	0.28	110774.66
Honcut to Jack	29.75	0.17	0.11	0.14	0.39	0.24	0.3	0.24	0.13	0.16	109217.11
Honcut to Jack	29.5	0.11	0.06	0.07	0.2	0.13	0.17	0.16	0.1	0.13	107965.48
Jack Sl - Yuba R	29.25	0.22	0.12	0.09	0.47	0.3	0.26	0.33	0.21	0.17	106938.36
Jack Sl - Yuba R	29	0.28	0.16	0.12	0.52	0.34	0.29	0.38	0.24	0.2	105627.60
Jack Sl - Yuba R	28.75	0.36	0.2	0.15	0.71	0.46	0.38	0.44	0.27	0.21	104417.55
Jack Sl - Yuba R	28.5	0.3	0.17	0.12	0.52	0.32	0.24	0.37	0.23	0.17	103521.79
Jack Sl - Yuba R	28.324	0.36	0.23	0.17	0.57	0.37	0.29	0.28	0.17	0.13	102627.46
Jack Sl - Yuba R	28.322	0.36	0.23	0.17	0.58	0.37	0.29	0.29	0.18	0.13	102615.67
Jack Sl - Yuba R	28.309	0.33	0.21	0.16	0.54	0.35	0.28	0.26	0.16	0.12	102537.51
Jack Sl - Yuba R	28.307	0.33	0.21	0.16	0.54	0.36	0.29	0.26	0.16	0.12	102527.14
Jack Sl - Yuba R	28.25	0.33	0.19	0.14	0.51	0.32	0.25	0.17	0.12	0.09	102281.40
Jack Sl - Yuba R	28	0.42	0.25	0.18	0.64	0.4	0.31	0.18	0.1	0.08	100798.76
Jack Sl - Yuba R	27.971	0.49	0.28	0.19	0.82	0.49	0.36	0.25	0.14	0.09	100749.02
Jack Sl - Yuba R	27.963	0.5	0.28	0.19	0.82	0.49	0.37	0.25	0.14	0.09	100696.07
Jack Sl - Yuba R	27.956	0.52	0.29	0.2	0.89	0.54	0.4	0.28	0.14	0.1	100684.10
Jack Sl - Yuba R	27.952	0.53	0.29	0.2	0.91	0.55	0.41	0.27	0.14	0.11	100652.33
Jack Sl - Yuba R	27.75	0.28	0.15	0.11	0.42	0.24	0.17	0.15	0.09	0.06	99512.10
Jack Sl - Yuba R	27.5	0.28	0.13	0.08	0.66	0.39	0.29	0.14	0.08	0.05	98174.47
Jack Sl - Yuba R	27.251	0.68	0.33	0.21	1.4	0.81	0.59	0.58	0.29	0.18	97016.29
Jack Sl - Yuba R	27.25	0.68	0.33	0.21	1.41	0.81	0.59	0.58	0.29	0.18	97011.08
Yuba R - Bear R	27	0.6	0.41	0.31	1.35	1.1	0.95	0.23	0.12	0.09	95787.83
Yuba R - Bear R	26.999	0.6	0.41	0.31	1.36	1.1	0.95	0.23	0.12	0.09	95782.80
Yuba R - Bear R	26.75	0.55	0.4	0.31	1.17	0.98	0.88	0.19	0.11	0.08	94705.78
Yuba R - Bear R	26.5	0.5	0.39	0.32	1.1	1.01	0.97	0.16	0.07	0.07	93495.05
Yuba R - Bear R	26.25	0.39	0.31	0.27	0.82	0.77	0.76	0.29	0.24	0.22	92095.83
Yuba R - Bear R	26	0.31	0.25	0.22	0.59	0.55	0.54	0.31	0.26	0.23	90634.01
Yuba R - Bear R	25.75	0.31	0.25	0.22	0.53	0.49	0.47	0.32	0.27	0.24	89136.87
Yuba R - Bear R	25.5	0.26	0.2	0.17	0.5	0.43	0.39	0.33	0.27	0.24	87728.16
Yuba R - Bear R	25.25	0.33	0.26	0.22	0.57	0.49	0.45	0.24	0.18	0.15	86208.17
Yuba R - Bear R	25	0.51	0.42	0.37	0.93	0.87	0.87	0.49	0.4	0.35	84613.00
Yuba R - Bear R	24.75	0.44	0.32	0.25	1.05	0.93	0.88	0.51	0.4	0.33	84085.03
Yuba R - Bear R	24.5	0.46	0.35	0.3	0.78	0.67	0.62	0.43	0.32	0.26	83744.43
Yuba R - Bear R	24.25	0.45	0.35	0.29	0.66	0.55	0.5	0.31	0.22	0.18	83076.25
Yuba R - Bear R	24	0.39	0.32	0.28	0.52	0.45	0.43	0.27	0.2	0.17	82269.01

Table 4-4. Feather River Shear Stress Information

Feather River Reach	HEC-RAS River STA	500YR LOB Shear Stress (lb/sq ft)	200YR LOB Shear Stress (lb/sq ft)	100YR LOB Shear Stress (lb/sq ft)	500YR Channel Shear Stress (lb/sq ft)	200YR Channel Shear Stress (lb/sq ft)	100yr Channel Shear Stress (lb/sq ft)	500YR ROB Shear Stress (lb/sq ft)	200YR ROB Shear Stress (lb/sq ft)	100YR ROB Shear Stress (lb/sq ft)	Wood Rodgers Design STA
Yuba R - Bear R	23.75	0.37	0.28	0.24	0.64	0.55	0.51	0.13	0.08	0.06	80891.65
Yuba R - Bear R	23.5	0.33	0.25	0.21	0.5	0.42	0.38	0.09	0.05	0.03	79494.60
Yuba R - Bear R	23.25	0.46	0.35	0.3	0.77	0.66	0.63	0.46	0.38	0.35	78032.72
Yuba R - Bear R	23	0.44	0.32	0.27	0.82	0.69	0.63	0.24	0.17	0.13	76810.25
Yuba R - Bear R	22.75	0.45	0.33	0.27	0.83	0.68	0.62	0.28	0.19	0.15	75345.95
Yuba R - Bear R	22.5	0.53	0.39	0.33	1.02	0.86	0.79	0.36	0.26	0.21	74107.24
Yuba R - Bear R	22.25	0.47	0.35	0.28	0.91	0.74	0.68	0.32	0.24	0.19	72852.32
Yuba R - Bear R	22	0.35	0.26	0.21	0.59	0.48	0.43	0.24	0.18	0.14	71497.68
Yuba R - Bear R	21.75	0.41	0.3	0.25	0.83	0.69	0.64	0.33	0.25	0.21	70018.45
Yuba R - Bear R	21.5	0.4	0.3	0.26	0.65	0.54	0.5	0.14	0.07	0.04	68712.35
Yuba R - Bear R	21.25	0.41	0.31	0.26	0.72	0.59	0.55	0.18	0.11	0.07	67330.45
Yuba R - Bear R	21	0.38	0.28	0.23	0.67	0.53	0.48	0.11	0.06	0.03	66047.23
Yuba R - Bear R	20.75	0.38	0.27	0.22	0.59	0.46	0.41	0.26	0.18	0.14	64675.51
Yuba R - Bear R	20.5	0.35	0.25	0.2	0.48	0.36	0.31	0.21	0.14	0.11	63332.45
Yuba R - Bear R	20.25	0.34	0.24	0.2	0.47	0.36	0.31	0.23	0.17	0.13	61977.06
Yuba R - Bear R	20	0.31	0.22	0.18	0.42	0.32	0.27	0.24	0.16	0.13	60460.00
Yuba R - Bear R	19.75	0.26	0.19	0.16	0.39	0.3	0.27	0.2	0.14	0.11	58852.41
Yuba R - Bear R	19.5	0.21	0.16	0.13	0.35	0.28	0.25	0.2	0.15	0.12	56862.66
Yuba R - Bear R	19.25	0.15	0.11	0.09	0.25	0.19	0.17	0.17	0.13	0.11	55516.59
Yuba R - Bear R	19	0.15	0.11	0.09	0.22	0.17	0.15	0.16	0.12	0.1	54713.04
Yuba R - Bear R	18.75	0.26	0.19	0.16	0.39	0.3	0.27	0.26	0.19	0.16	53622.77
Yuba R - Bear R	18.5	0.24	0.17	0.14	0.35	0.28	0.25	0.23	0.17	0.14	52897.52
Yuba R - Bear R	18.25	0.26	0.19	0.15	0.43	0.34	0.29	0.28	0.21	0.17	51890.28
Yuba R - Bear R	18	0.34	0.25	0.21	0.52	0.41	0.36	0.28	0.21	0.17	49704.43
Yuba R - Bear R	17.75	0.3	0.22	0.18	0.46	0.37	0.32	0.27	0.19	0.16	49399.72
Yuba R - Bear R	17.5	0.34	0.26	0.21	0.51	0.4	0.35	0.27	0.2	0.16	49114.25
Yuba R - Bear R	17.25	0.39	0.31	0.26	0.66	0.54	0.5	0.33	0.24	0.2	48794.83
Yuba R - Bear R	17	0.31	0.22	0.17	1.03	0.87	0.82	0.54	0.41	0.34	48556.49
Yuba R - Bear R	16.75	0	0	0	0.76	0.62	0.56	0.49	0.37	0.31	48094.20
Yuba R - Bear R	16.5	0.29	0.2	0.15	0.73	0.58	0.5	0.46	0.34	0.28	47013.16
Yuba R - Bear R	16.25	0.34	0.24	0.19	0.7	0.56	0.48	0.43	0.32	0.26	46228.38
Yuba R - Bear R	16	0.42	0.31	0.24	0.83	0.67	0.58	0.5	0.38	0.31	45101.47
Yuba R - Bear R	15.75	0.73	0.54	0.41	1.37	1.11	0.93	0.63	0.49	0.45	43356.36
Yuba R - Bear R	15.5	0.86	0.63	0.49	1.54	1.22	1.03	0.8	0.6	0.47	41613.14
Yuba R - Bear R	15.25	0.64	0.46	0.35	1.14	0.89	0.74	0.65	0.48	0.38	40305.41
Yuba R - Bear R	15	0.52	0.36	0.27	0.97	0.74	0.61	0.57	0.41	0.31	39102.69
Yuba R - Bear R	14.75	0.51	0.38	0.29	0.96	0.77	0.66	0.54	0.41	0.33	37817.10
Yuba R - Bear R	14.5	0.51	0.37	0.28	0.95	0.73	0.61	0.51	0.38	0.31	36319.37
Yuba R - Bear R	14.25	0.6	0.43	0.33	1.18	0.91	0.75	0.47	0.34	0.25	34904.17
Yuba R - Bear R	14	0.52	0.37	0.28	1	0.76	0.63	0.6	0.44	0.35	33507.55
Yuba R - Bear R	13.75	0.48	0.34	0.26	0.8	0.59	0.47	0.4	0.27	0.21	32270.43
Yuba R - Bear R	13.5	0.55	0.41	0.31	0.89	0.68	0.56	0.46	0.32	0.24	31239.13
Yuba R - Bear R	13.25	0.49	0.36	0.28	0.77	0.59	0.48	0.42	0.3	0.23	29977.40
Yuba R - Bear R	13	0.37	0.28	0.22	0.51	0.4	0.32	0.27	0.2	0.15	28644.35
Yuba R - Bear R	12.75	0.32	0.24	0.19	0.46	0.36	0.29	0.25	0.18	0.14	27255.90
Yuba R - Bear R	12.5	0.24	0.18	0.14	0.35	0.27	0.22	0.18	0.12	0.09	26065.40
Yuba R - Bear R	12.25	0.25	0.19	0.16	0.41	0.34	0.3	0.19	0.14	0.11	24642.20
Reach 35	12	0.16	0.13	0.11	0.28	0.24	0.22	0.17	0.13	0.11	23313.05
Reach 35	11.75	0.15	0.12	0.11	0.25	0.21	0.2	0.15	0.12	0.11	21993.69
Reach 35	11.599	0.17	0.13	0.11	0.28	0.24	0.22	0.17	0.13	0.12	21069.77
Reach 35	11.5	0.15	0.12	0.1	0.25	0.22	0.2	0.14	0.11	0.09	20354.66
Reach 35	11.25	0.19	0.14	0.12	0.32	0.27	0.24	0.18	0.14	0.12	18182.41
Reach 35	11	0.29	0.23	0.19	0.49	0.4	0.36	0.25	0.19	0.16	16871.48
Reach 35	10.75	0.24	0.18	0.15	0.4	0.33	0.29	0.26	0.2	0.17	15547.88
Reach 35	10.5	0.3	0.23	0.19	0.45	0.36	0.32	0.26	0.2	0.16	14278.44
Reach 35	10.25	0.38	0.29	0.23	0.66	0.52	0.45	0.37	0.28	0.22	13850.18
Reach 35	10	0.38	0.29	0.24	0.61	0.48	0.41	0.38	0.29	0.24	12847.13
Reach 35	9.75	0.33	0.25	0.21	0.51	0.4	0.34	0.35	0.26	0.21	11597.74
Reach 35	9.5	0.48	0.35	0.29	0.75	0.57	0.48	0.39	0.28	0.22	10595.55
Reach 35	9.278	0	0	0	0.34	0.26	0.22	0	0	0	9814.09
Reach 35	9.265	0.12	0.08	0.06	0.54	0.41	0.34	0.31	0.22	0.17	9758.91
Reach 35	9.2	0.13	0.08	0.06	0.62	0.47	0.39	0.33	0.24	0.18	9164.29
Reach 35	9	0.19	0.12	0.07	0.94	0.72	0.61	0.49	0.35	0.27	8445.84
Reach 35	8.75	0.32	0.18	0.11	1.52	1.16	1.02	0.75	0.54	0.43	7531.76
Reach 35	8.5	0.41	0.27	0.2	1.32	1.02	0.91	0.67	0.48	0.4	6548.71
Reach 35	8.25	0.18	0.14	0.15	0.95	0.73	0.67	0.48	0.34	0.29	3573.02
Reach 35	8	0.38	0.27	0.24	1.44	1.07	1.02	0.6	0.41	0.35	2528.45
Reach 35	7.75	0.16	0.1	0.07	1.28	0.91	0.86	0.54	0.36	0.3	1733.43
Reach 35	7.55	0.16	0.1	0.08	1.05	0.72	0.68	0.46	0.3	0.25	1275.43

5 FREEBOARD ANALYSIS

For the freeboard analysis, PBI compared the final FRWLP design water surface profiles to both the CVFED LiDAR Top of Levee and the November 2011 Wood Rodgers field survey[16]. The results of the analysis are shown in Table 5-1 and Figure 5-1. The results show that there are no freeboard deficiencies for the 100-year event. However, for the 200-year event, the following sections do not have 3 feet of available freeboard:

- At STA 1,131+00 (railroad crossing)
- STA 555+00 to 557+00 (up to 0.1' deficient)
- STA 70+00 to 106+00 (includes Hwy 99)
- STA 34+00 to 38+00
- STA 27+00 to 29+00

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
236800.00		139.41	130.74	132.53	137.58				8.67	6.88	1.83
236700.00		139.43	130.70	132.48	137.54				8.73	6.94	1.89
236600.00		139.21	130.66	132.43	137.50				8.55	6.78	1.72
236500.00	138.91	138.82	130.62	132.39	137.45	8.29	6.52	1.46	8.20	6.44	1.37
236400.00		139.05	130.58	132.34	137.41				8.47	6.71	1.64
236300.00		139.42	130.54	132.29	137.37				8.88	7.13	2.05
236200.00		138.85	130.50	132.24	137.33				8.35	6.60	1.52
236100.00		138.53	130.46	132.20	137.29				8.07	6.33	1.24
236000.00	139.28	138.92	130.42	132.15	137.25	8.86	7.13	2.04	8.50	6.77	1.67
235900.00		137.38	130.38	132.10	137.20				7.00	5.28	0.18
235800.00		138.85	130.34	132.05	137.16				8.51	6.80	1.69
235700.00		139.01	130.30	132.01	137.11				8.72	7.01	1.90
235600.00		140.34	130.24	131.96	137.06				10.10	8.38	3.28
235500.00	138.84	138.98	130.19	131.91	137.01	8.64	6.93	1.83	8.79	7.07	1.97
235400.00		139.32	130.14	131.86	136.96				9.18	7.46	2.37
235300.00		139.52	130.09	131.81	136.91				9.42	7.70	2.61
235200.00		139.30	130.04	131.77	136.85				9.25	7.53	2.44
235100.00		138.91	129.99	131.72	136.80				8.91	7.19	2.10
235000.00	138.40	138.61	129.94	131.67	136.75	8.45	6.73	1.65	8.67	6.94	1.87
234900.00		138.64	129.89	131.62	136.70				8.75	7.02	1.94
234800.00		138.51	129.84	131.57	136.64				8.67	6.94	1.87
234700.00		138.91	129.79	131.53	136.59				9.11	7.38	2.31
234600.00		139.18	129.74	131.48	136.54				9.44	7.70	2.64
234500.00		138.85	129.69	131.43	136.49				9.16	7.42	2.36
234400.00		139.04	129.64	131.38	136.43				9.40	7.66	2.60
234300.00		138.93	129.59	131.33	136.38				9.34	7.59	2.55
234200.00		138.12	129.54	131.29	136.33				8.58	6.83	1.79
234100.00		136.70	129.49	131.24	136.28				7.21	5.46	0.42
234000.00	135.80	136.03	129.44	131.19	136.23	6.36	4.61	-0.42	6.60	4.84	-0.19
233900.00		135.89	129.39	131.14	136.17				6.50	4.75	-0.28
233800.00		136.06	129.34	131.09	136.12				6.72	4.96	-0.06
233700.00		135.63	129.29	131.05	136.07				6.35	4.59	-0.43
233600.00		136.18	129.19	130.95	135.98				6.99	5.23	0.20
233500.00	137.57	137.70	128.96	130.70	135.79	8.62	6.88	1.78	8.74	7.00	1.90
233400.00		137.74	128.72	130.45	135.60				9.02	7.30	2.14
233300.00		137.61	128.48	130.20	135.41				9.12	7.41	2.19
233200.00		137.16	128.25	129.95	135.22				8.91	7.21	1.93
233100.00		137.07	128.01	129.70	135.04				9.05	7.37	2.03
233000.00	136.79	136.88	127.78	129.45	134.85	9.01	7.35	1.95	9.10	7.43	2.04
232900.00		136.62	127.54	129.20	134.66				9.08	7.42	1.97
232800.00		136.05	127.31	128.95	134.47				8.74	7.10	1.58
232700.00		136.55	127.12	128.75	134.34				9.43	7.80	2.21
232600.00		136.22	126.93	128.55	134.21				9.29	7.68	2.02
232500.00	135.82	136.14	126.75	128.35	134.08	9.07	7.47	1.74	9.39	7.79	2.06
232400.00		135.68	126.56	128.15	133.95				9.12	7.54	1.73
232300.00		135.82	126.37	127.95	133.82				9.45	7.87	2.00
232200.00		136.08	126.18	127.75	133.69				9.90	8.33	2.39

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
232100.00		136.22	126.00	127.55	133.57				10.22	8.67	2.65
232000.00	136.11	136.17	125.81	127.35	133.44	10.30	8.76	2.67	10.36	8.83	2.74
231900.00		136.01	125.62	127.15	133.31				10.39	8.86	2.70
231800.00		135.82	125.44	126.95	133.18				10.38	8.87	2.64
231700.00		135.80	125.25	126.75	133.05				10.55	9.05	2.75
231600.00		136.06	125.06	126.55	132.92				11.00	9.52	3.14
231500.00		135.45	124.88	126.35	132.80				10.58	9.11	2.66
231400.00		135.26	124.69	126.15	132.67				10.57	9.11	2.59
231300.00		135.35	124.48	125.92	132.48				10.88	9.43	2.88
231200.00		135.20	124.24	125.67	132.22				10.96	9.53	2.98
231100.00		134.76	124.00	125.42	131.97				10.76	9.34	2.79
231000.00		134.39	123.76	125.17	131.71				10.64	9.23	2.68
230900.00		134.71	123.52	124.92	131.45				11.20	9.80	3.26
230800.00		134.76	123.28	124.66	131.20				11.49	10.10	3.57
230700.00		134.66	123.04	124.41	130.94				11.62	10.24	3.71
230600.00		134.57	122.80	124.16	130.69				11.77	10.40	3.88
230500.00		135.11	122.56	123.91	130.43				12.55	11.19	4.67
230400.00		135.43	122.49	123.83	130.34				12.94	11.59	5.09
230300.00		135.25	122.43	123.77	130.26				12.82	11.48	4.99
230200.00		135.12	122.37	123.71	130.19				12.75	11.41	4.93
230100.00		134.82	122.31	123.65	130.11				12.50	11.17	4.71
230000.00	134.36	134.50	122.26	123.59	130.03	12.10	10.77	4.32	12.25	10.92	4.47
229900.00		133.96	122.20	123.53	129.96				11.76	10.43	4.00
229800.00		133.75	122.14	123.47	129.88				11.61	10.29	3.87
229700.00		134.02	122.08	123.41	129.80				11.93	10.61	4.21
229600.00		133.54	122.03	123.35	129.73				11.51	10.20	3.81
229500.00	133.20	133.32	121.97	123.28	129.65	11.23	9.91	3.55	11.35	10.04	3.67
229400.00		133.19	121.91	123.22	129.57				11.28	9.97	3.62
229300.00		132.97	121.85	123.16	129.50				11.12	9.81	3.48
229200.00		133.05	121.80	123.10	129.42				11.26	9.95	3.63
229100.00		133.21	121.74	123.04	129.34				11.47	10.17	3.86
229000.00	133.52	133.85	121.68	122.98	129.27	11.83	10.54	4.25	12.16	10.87	4.58
228900.00		133.24	121.62	122.92	129.19				11.62	10.33	4.05
228800.00		133.58	121.57	122.86	129.11				12.01	10.72	4.46
228700.00		133.33	121.51	122.80	129.04				11.82	10.53	4.29
228600.00		133.54	121.45	122.73	128.96				12.08	10.80	4.57
228500.00	133.09	133.37	121.39	122.67	128.88	11.70	10.42	4.21	11.98	10.70	4.49
228400.00		132.76	121.34	122.61	128.81				11.42	10.14	3.95
228300.00		132.73	121.28	122.55	128.73				11.45	10.18	4.00
228200.00		132.91	121.22	122.49	128.66				11.69	10.43	4.26
228100.00		132.82	121.16	122.43	128.58				11.66	10.39	4.24
228000.00	132.44	132.41	121.11	122.37	128.50	11.33	10.07	3.93	11.30	10.04	3.91
227900.00		132.52	121.05	122.31	128.43				11.47	10.22	4.10
227800.00		132.51	120.99	122.25	128.35				11.52	10.26	4.16
227700.00		132.32	120.93	122.18	128.27				11.39	10.14	4.05
227600.00		132.37	120.88	122.12	128.20				11.50	10.25	4.18
227500.00	132.08	132.16	120.82	122.06	128.12	11.26	10.02	3.96	11.34	10.10	4.04
227400.00		131.97	120.76	122.00	128.04				11.21	9.97	3.93
227300.00		131.64	120.70	121.94	127.97				10.93	9.70	3.67
227200.00		132.10	120.65	121.88	127.89				11.45	10.22	4.21
227100.00		131.98	120.59	121.82	127.81				11.39	10.16	4.17
227000.00	131.75	131.71	120.53	121.76	127.74	11.22	9.99	4.01	11.17	9.95	3.97
226900.00		131.72	120.47	121.70	127.66				11.25	10.02	4.06
226800.00		131.80	120.42	121.63	127.58				11.38	10.16	4.21
226700.00		131.42	120.36	121.57	127.51				11.07	9.85	3.92
226600.00		131.46	120.30	121.51	127.43				11.16	9.95	4.03
226500.00	131.20	131.20	120.26	121.47	127.38	10.94	9.73	3.82	10.94	9.73	3.82
226400.00		130.93	120.24	121.45	127.36				10.69	9.48	3.57
226300.00		130.52	120.22	121.44	127.34				10.30	9.09	3.19
226200.00		131.00	120.20	121.42	127.32				10.80	9.58	3.68
226100.00		130.30	120.18	121.40	127.29				10.12	8.89	3.00
226000.00	130.28	130.25	120.16	121.39	127.27	10.12	8.89	3.00	10.09	8.87	2.98
225900.00		130.21	120.14	121.37	127.25				10.07	8.84	2.96
225800.00		129.89	120.12	121.35	127.23				9.77	8.54	2.66
225700.00		130.02	120.10	121.34	127.21				9.92	8.68	2.81
225600.00		129.99	120.08	121.32	127.19				9.91	8.67	2.80
225500.00	129.82	129.85	120.06	121.30	127.17	9.76	8.52	2.66	9.79	8.55	2.68
225400.00		129.61	120.04	121.29	127.14				9.58	8.33	2.47
225300.00		129.70	120.02	121.27	127.12				9.69	8.44	2.58
225200.00		129.90	120.00	121.25	127.10				9.91	8.65	2.80
225100.00		129.89	119.98	121.23	127.08				9.92	8.66	2.81
225000.00	130.06	130.13	119.96	121.22	127.06	10.10	8.84	3.00	10.18	8.91	3.07
224900.00		130.64	119.94	121.20	127.04				10.70	9.44	3.60
224800.00		129.92	119.92	121.18	127.02				10.01	8.74	2.91

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
224700.00		129.72	119.90	121.17	126.99				9.82	8.55	2.73
224600.00		129.89	119.87	121.15	126.97				10.02	8.74	2.92
224500.00	129.62	129.99	119.85	121.13	126.95	9.77	8.49	2.67	10.13	8.86	3.04
224400.00		129.67	119.83	121.12	126.93				9.84	8.55	2.74
224300.00		129.75	119.81	121.10	126.91				9.94	8.65	2.84
224200.00		130.09	119.79	121.08	126.89				10.30	9.01	3.21
224100.00		129.61	119.77	121.06	126.87				9.84	8.55	2.74
224000.00	129.46	129.55	119.75	121.05	126.84	9.71	8.41	2.62	9.80	8.51	2.71
223900.00		129.58	119.73	121.03	126.82				9.85	8.55	2.76
223800.00		129.54	119.71	121.01	126.80				9.84	8.54	2.74
223700.00		129.28	119.67	120.97	126.76				9.61	8.31	2.51
223600.00		129.37	119.63	120.93	126.72				9.74	8.43	2.64
223500.00	128.97	129.15	119.59	120.89	126.69	9.38	8.08	2.28	9.56	8.26	2.46
223400.00		129.09	119.55	120.85	126.65				9.54	8.24	2.44
223300.00		128.93	119.51	120.82	126.62				9.42	8.12	2.32
223200.00		128.93	119.47	120.78	126.58				9.46	8.15	2.35
223100.00		128.72	119.43	120.74	126.54				9.29	7.98	2.18
223000.00	128.34	128.41	119.39	120.70	126.51	8.95	7.64	1.84	9.02	7.71	1.91
222900.00		128.20	119.35	120.67	126.47				8.85	7.54	1.73
222800.00		127.90	119.32	120.63	126.44				8.58	7.27	1.46
222700.00		128.15	119.28	120.59	126.40				8.87	7.56	1.75
222600.00		127.92	119.24	120.55	126.36				8.68	7.36	1.55
222500.00	127.76	127.74	119.20	120.51	126.33	8.56	7.24	1.43	8.55	7.23	1.42
222400.00		127.59	119.16	120.48	126.29				8.43	7.12	1.30
222300.00		127.68	119.12	120.44	126.25				8.56	7.24	1.43
222200.00		127.43	119.08	120.40	126.22				8.35	7.03	1.22
222100.00		127.33	119.04	120.36	126.18				8.29	6.97	1.15
222000.00	126.93	126.92	119.01	120.33	126.14	7.92	6.60	0.78	7.91	6.59	0.78
221900.00		126.77	118.98	120.30	126.11				7.79	6.47	0.66
221800.00		126.66	118.94	120.27	126.07				7.72	6.39	0.59
221700.00		127.22	118.91	120.24	126.03				8.31	6.98	1.19
221600.00		127.20	118.88	120.21	125.99				8.33	7.00	1.21
221500.00	126.83	127.10	118.84	120.17	125.95	7.99	6.66	0.88	8.25	6.92	1.14
221400.00		126.85	118.81	120.14	125.92				8.04	6.71	0.93
221300.00		126.83	118.78	120.11	125.88				8.06	6.72	0.96
221200.00		126.51	118.74	120.08	125.84				7.76	6.42	0.66
221100.00		126.32	118.71	120.05	125.80				7.60	6.27	0.51
221000.00	126.02	126.10	118.59	119.94	125.68	7.43	6.08	0.34	7.51	6.17	0.42
220900.00		125.86	118.43	119.78	125.53				7.43	6.08	0.34
220800.00		125.87	118.27	119.63	125.37				7.60	6.25	0.51
220700.00		126.04	118.11	119.47	125.21				7.93	6.57	0.83
220600.00		125.84	117.95	119.32	125.05				7.88	6.52	0.79
220500.00	125.78	125.89	117.80	119.17	124.89	7.99	6.62	0.89	8.10	6.73	1.00
220400.00		125.88	117.66	119.03	124.72				8.22	6.85	1.16
220300.00		125.90	117.52	118.89	124.55				8.38	7.01	1.35
220200.00		125.98	117.38	118.75	124.37				8.60	7.23	1.61
220100.00		125.97	117.24	118.61	124.20				8.73	7.36	1.77
220000.00	125.55	125.80	116.92	118.26	123.73	8.64	7.29	1.83	8.89	7.54	2.08
219900.00		125.65	116.46	117.76	123.03				9.19	7.89	2.62
219800.00		125.49	116.01	117.27	122.33				9.48	8.22	3.15
219700.00		125.40	115.86	117.11	122.12				9.54	8.29	3.28
219600.00		125.57	115.76	117.01	121.98				9.82	8.57	3.59
219500.00	125.18	125.32	115.66	116.90	121.85	9.52	8.27	3.33	9.66	8.42	3.47
219400.00		125.21	115.55	116.80	121.71				9.66	8.41	3.50
219300.00		125.41	115.45	116.69	121.57				9.96	8.71	3.84
219200.00		125.19	115.35	116.59	121.43				9.84	8.60	3.75
219100.00		124.99	115.29	116.53	121.35				9.70	8.46	3.64
219000.00	124.67	124.90	115.24	116.48	121.27	9.42	8.19	3.40	9.65	8.42	3.62
218900.00		124.84	115.19	116.42	121.20				9.64	8.41	3.64
218800.00		124.94	115.14	116.37	121.12				9.79	8.57	3.82
218700.00		124.80	115.09	116.31	121.04				9.71	8.49	3.76
218600.00		124.40	115.04	116.26	120.96				9.35	8.14	3.43
218500.00	124.41	124.62	114.99	116.20	120.89	9.42	8.20	3.52	9.62	8.41	3.73
218400.00		124.73	114.94	116.15	120.81				9.79	8.58	3.92
218300.00		124.39	114.89	116.10	120.73				9.50	8.30	3.66
218200.00		124.55	114.84	116.04	120.66				9.71	8.51	3.90
218100.00		124.79	114.79	115.99	120.58				10.00	8.80	4.21
218000.00		124.49	114.74	115.93	120.50				9.75	8.56	3.99
217900.00		125.12	114.69	115.88	120.43				10.43	9.24	4.69
217800.00		124.58	114.64	115.82	120.35				9.94	8.76	4.24
217700.00		124.46	114.59	115.77	120.27				9.87	8.69	4.19
217600.00		124.62	114.54	115.71	120.19				10.08	8.90	4.42
217500.00		124.66	114.49	115.66	120.12				10.17	9.00	4.54
217400.00		124.63	114.44	115.61	120.04				10.19	9.02	4.59

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
217300.00		124.53	114.39	115.55	119.96				10.14	8.98	4.57
217200.00		124.39	114.34	115.50	119.89				10.06	8.90	4.51
217100.00		124.40	114.29	115.44	119.81				10.11	8.96	4.59
217000.00		124.40	114.24	115.39	119.73				10.17	9.01	4.67
216900.00		124.27	114.18	115.33	119.65				10.09	8.94	4.62
216800.00		124.11	114.12	115.27	119.57				9.98	8.84	4.54
216700.00		123.95	114.07	115.21	119.49				9.88	8.74	4.46
216600.00		123.66	114.01	115.14	119.41				9.65	8.52	4.25
216500.00		123.96	113.95	115.08	119.33				10.01	8.88	4.63
216400.00		124.17	113.90	115.02	119.25				10.28	9.15	4.92
216300.00		124.27	113.84	114.96	119.17				10.44	9.31	5.10
216200.00		124.33	113.78	114.90	119.09				10.55	9.43	5.23
216100.00		124.35	113.72	114.84	119.01				10.63	9.51	5.34
216000.00		124.28	113.67	114.78	118.94				10.62	9.50	5.35
215900.00		124.03	113.61	114.72	118.86				10.42	9.31	5.17
215800.00		123.94	113.55	114.66	118.78				10.38	9.28	5.16
215700.00		123.82	113.49	114.59	118.70				10.32	9.22	5.12
215600.00		123.63	113.44	114.53	118.62				10.19	9.10	5.02
215500.00		123.46	113.38	114.47	118.54				10.08	8.99	4.93
215400.00		123.30	113.32	114.41	118.46				9.98	8.89	4.84
215300.00		123.10	113.26	114.35	118.38				9.84	8.75	4.73
215200.00		122.89	113.21	114.29	118.30				9.69	8.60	4.60
215100.00		122.78	113.15	114.23	118.22				9.63	8.56	4.57
215000.00		122.63	113.09	114.17	118.14				9.54	8.46	4.49
214900.00		122.71	113.04	114.10	118.06				9.67	8.60	4.65
214800.00		122.97	112.98	114.04	117.98				9.99	8.93	4.99
214700.00		123.06	112.92	113.98	117.90				10.14	9.08	5.16
214600.00		122.84	112.82	113.88	117.80				10.02	8.96	5.04
214500.00		123.14	112.71	113.77	117.68				10.43	9.37	5.46
214400.00		123.15	112.59	113.65	117.56				10.56	9.51	5.59
214300.00		123.51	112.47	113.53	117.45				11.03	9.98	6.06
214200.00		123.35	112.36	113.41	117.33				11.00	9.94	6.02
214100.00		123.55	112.24	113.29	117.22				11.31	10.26	6.33
214000.00		123.34	112.12	113.17	117.10				11.21	10.17	6.24
213900.00		123.36	112.01	113.05	116.99				11.35	10.30	6.37
213800.00		123.29	111.89	112.94	116.87				11.40	10.36	6.42
213700.00		122.90	111.77	112.82	116.76				11.13	10.09	6.15
213600.00		122.94	111.66	112.70	116.64				11.28	10.24	6.30
213500.00	122.63	122.65	111.54	112.58	116.52	11.09	10.05	6.11	11.11	10.07	6.13
213400.00		122.52	111.42	112.46	116.41				11.09	10.05	6.11
213300.00		122.48	111.31	112.34	116.29				11.17	10.14	6.19
213200.00		122.21	111.19	112.23	116.18				11.02	9.98	6.03
213100.00		122.09	111.07	112.11	116.06				11.02	9.98	6.03
213000.00	121.65	121.65	110.96	111.99	115.95	10.70	9.66	5.71	10.69	9.66	5.71
212900.00		121.68	110.86	111.89	115.85				10.82	9.79	5.83
212800.00		121.26	110.84	111.87	115.82				10.42	9.40	5.44
212700.00		121.26	110.81	111.84	115.79				10.45	9.42	5.47
212600.00		121.07	110.79	111.81	115.76				10.28	9.25	5.31
212500.00	121.14	121.18	110.76	111.79	115.73	10.38	9.35	5.41	10.42	9.40	5.45
212400.00		121.09	110.73	111.76	115.70				10.35	9.33	5.39
212300.00		121.07	110.71	111.73	115.67				10.36	9.34	5.40
212200.00		120.74	110.68	111.71	115.64				10.06	9.03	5.10
212100.00		120.76	110.66	111.68	115.61				10.11	9.08	5.15
212000.00	120.56	120.59	110.63	111.66	115.58	9.93	8.90	4.98	9.96	8.94	5.01
211900.00		120.81	110.60	111.63	115.55				10.21	9.18	5.26
211800.00		120.92	110.58	111.60	115.52				10.35	9.32	5.40
211700.00		121.04	110.55	111.58	115.49				10.48	9.46	5.55
211600.00		120.89	110.53	111.55	115.46				10.36	9.34	5.43
211500.00	120.88	121.04	110.50	111.52	115.43	10.38	9.35	5.45	10.54	9.52	5.61
211400.00		121.14	110.47	111.50	115.40				10.66	9.64	5.74
211300.00		121.09	110.45	111.47	115.37				10.64	9.61	5.72
211200.00		120.77	110.42	111.44	115.34				10.35	9.33	5.43
211100.00		120.79	110.39	111.42	115.31				10.40	9.38	5.49
211000.00	120.69	120.95	110.37	111.39	115.28	10.32	9.30	5.41	10.58	9.56	5.68
210900.00		120.90	110.34	111.37	115.25				10.55	9.53	5.65
210800.00		120.75	110.32	111.34	115.21				10.43	9.41	5.54
210700.00		120.61	110.29	111.31	115.18				10.32	9.30	5.43
210600.00		120.79	110.26	111.29	115.15				10.52	9.50	5.63
210500.00	120.88	121.21	110.24	111.26	115.12	10.64	9.62	5.76	10.97	9.95	6.09
210400.00		121.00	110.21	111.23	115.09				10.78	9.76	5.90
210300.00		120.81	110.19	111.21	115.06				10.62	9.60	5.74
210200.00		120.77	110.16	111.18	115.03				10.61	9.59	5.74
210100.00		120.65	110.12	111.14	114.99				10.53	9.51	5.66
210000.00	120.42	120.72	110.06	111.09	114.95	10.36	9.33	5.47	10.66	9.63	5.77

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
209900.00		120.60	110.01	111.04	114.90				10.59	9.56	5.70
209800.00		120.38	109.95	110.98	114.85				10.43	9.40	5.53
209700.00		120.25	109.90	110.93	114.80				10.35	9.32	5.44
209600.00		120.08	109.84	110.88	114.76				10.24	9.20	5.32
209500.00	119.70	119.98	109.77	110.81	114.70	9.92	8.88	5.00	10.21	9.17	5.28
209400.00		120.12	109.70	110.74	114.63				10.42	9.37	5.49
209300.00		120.60	109.62	110.67	114.55				10.98	9.93	6.04
209200.00		120.37	109.54	110.59	114.48				10.82	9.77	5.88
209100.00		119.76	109.47	110.52	114.41				10.30	9.24	5.35
209000.00	119.24	119.60	109.39	110.45	114.34	9.85	8.79	4.90	10.21	9.15	5.26
208900.00		119.60	109.32	110.37	114.27				10.29	9.23	5.33
208800.00		119.62	109.24	110.30	114.20				10.38	9.32	5.42
208700.00		119.61	109.16	110.23	114.13				10.45	9.39	5.48
208600.00		119.42	109.09	110.15	114.06				10.33	9.26	5.35
208500.00	118.97	119.24	109.01	110.08	113.99	9.96	8.89	4.98	10.23	9.16	5.25
208400.00		119.25	108.96	110.02	113.93				10.29	9.23	5.32
208300.00		118.98	108.91	109.97	113.87				10.07	9.01	5.11
208200.00		118.81	108.86	109.91	113.81				9.96	8.90	5.01
208100.00		118.69	108.80	109.86	113.75				9.88	8.83	4.94
208000.00	118.50	118.65	108.75	109.80	113.69	9.75	8.70	4.81	9.90	8.85	4.96
207900.00		118.69	108.70	109.75	113.63				9.98	8.94	5.06
207800.00		118.60	108.65	109.69	113.57				9.95	8.91	5.04
207700.00		118.60	108.60	109.64	113.51				10.00	8.96	5.09
207600.00		118.51	108.55	109.58	113.45				9.96	8.93	5.07
207500.00	118.20	118.37	108.50	109.53	113.39	9.70	8.67	4.81	9.87	8.84	4.98
207400.00		118.42	108.45	109.47	113.33				9.98	8.95	5.09
207300.00		118.30	108.39	109.42	113.27				9.90	8.88	5.03
207200.00		118.20	108.34	109.36	113.21				9.85	8.84	4.99
207100.00		117.86	108.29	109.31	113.15				9.56	8.55	4.71
207000.00	117.40	117.71	108.24	109.25	113.09	9.16	8.15	4.32	9.47	8.46	4.63
206900.00		117.85	108.19	109.20	113.03				9.66	8.65	4.82
206800.00		117.92	108.14	109.14	112.96				9.78	8.78	4.95
206700.00		117.75	108.09	109.09	112.90				9.66	8.66	4.84
206600.00		117.82	108.03	109.03	112.84				9.79	8.79	4.98
206500.00	117.99	117.95	107.98	108.97	112.78	10.01	9.02	5.21	9.96	8.97	5.16
206400.00		117.77	107.93	108.92	112.72				9.84	8.85	5.04
206300.00		117.72	107.88	108.86	112.66				9.84	8.85	5.06
206200.00		117.63	107.83	108.81	112.60				9.80	8.82	5.03
206100.00		117.88	107.78	108.75	112.54				10.10	9.13	5.34
206000.00	117.71	118.20	107.73	108.70	112.48	9.98	9.01	5.22	10.47	9.50	5.71
205900.00		118.00	107.68	108.64	112.42				10.32	9.35	5.58
205800.00		117.76	107.62	108.59	112.36				10.14	9.18	5.40
205700.00		117.81	107.57	108.53	112.30				10.24	9.28	5.51
205600.00		117.30	107.48	108.44	112.19				9.82	8.86	5.11
205500.00	116.95	117.20	107.40	108.35	112.08	9.56	8.60	4.87	9.80	8.85	5.12
205400.00		117.03	107.31	108.26	111.98				9.73	8.77	5.06
205300.00		116.97	107.22	108.17	111.87				9.75	8.80	5.10
205200.00		116.83	107.14	108.09	111.77				9.70	8.75	5.07
205100.00		116.59	107.05	108.00	111.66				9.54	8.59	4.92
205000.00	116.29	116.34	106.96	107.91	111.56	9.32	8.38	4.73	9.38	8.44	4.79
204900.00		116.53	106.88	107.82	111.45				9.65	8.71	5.08
204800.00		116.33	106.79	107.73	111.34				9.54	8.60	4.99
204700.00		116.04	106.70	107.64	111.24				9.34	8.40	4.81
204600.00		115.92	106.62	107.56	111.13				9.30	8.36	4.79
204500.00	115.85	115.97	106.53	107.47	111.03	9.32	8.39	4.83	9.44	8.51	4.95
204400.00		115.83	106.45	107.38	110.92				9.38	8.45	4.90
204300.00		115.68	106.36	107.29	110.82				9.32	8.39	4.86
204200.00		115.46	106.26	107.19	110.71				9.19	8.26	4.75
204100.00		115.46	106.16	107.09	110.60				9.30	8.37	4.86
204000.00	114.96	115.14	106.06	106.99	110.50	8.90	7.98	4.47	9.08	8.15	4.65
203900.00		115.12	105.96	106.88	110.39				9.16	8.24	4.73
203800.00		114.76	105.86	106.78	110.28				8.90	7.98	4.48
203700.00		114.48	105.76	106.68	110.18				8.72	7.81	4.31
203600.00		114.58	105.66	106.58	110.07				8.92	8.01	4.51
203500.00	114.06	114.30	105.56	106.47	109.96	8.50	7.58	4.09	8.75	7.83	4.34
203400.00		114.24	105.46	106.37	109.86				8.78	7.86	4.38
203300.00		114.33	105.36	106.27	109.75				8.97	8.06	4.58
203200.00		114.23	105.26	106.17	109.64				8.97	8.06	4.58
203100.00		113.96	105.16	106.06	109.54				8.80	7.90	4.42
203000.00	113.62	113.80	105.05	105.96	109.43	8.57	7.66	4.19	8.75	7.84	4.37
202900.00		113.87	104.95	105.86	109.32				8.91	8.01	4.54
202800.00		114.10	104.85	105.75	109.22				9.25	8.35	4.89
202700.00		114.02	104.77	105.67	109.12				9.25	8.35	4.89
202600.00		114.05	104.69	105.59	109.04				9.36	8.47	5.02

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
202500.00	113.34	113.68	104.62	105.51	108.95	8.72	7.83	4.39	9.06	8.17	4.73
202400.00		113.26	104.54	105.43	108.86				8.72	7.83	4.40
202300.00		113.73	104.47	105.36	108.78				9.27	8.38	4.95
202200.00		114.23	104.39	105.28	108.69				9.83	8.95	5.53
202100.00		114.18	104.32	105.20	108.61				9.86	8.98	5.57
202000.00	113.80	114.03	104.24	105.12	108.52	9.55	8.67	5.27	9.79	8.90	5.51
201900.00		114.13	104.17	105.05	108.43				9.97	9.09	5.70
201800.00		113.93	104.09	104.97	108.35				9.83	8.96	5.58
201700.00		113.60	104.02	104.89	108.26				9.58	8.71	5.34
201600.00		113.68	103.94	104.81	108.18				9.74	8.87	5.50
201500.00	113.48	113.74	103.87	104.74	108.09	9.61	8.74	5.39	9.88	9.01	5.65
201400.00		113.64	103.79	104.66	108.01				9.85	8.99	5.64
201300.00		113.43	103.72	104.58	107.92				9.71	8.85	5.51
201200.00		113.49	103.64	104.50	107.83				9.85	8.99	5.65
201100.00		113.34	103.60	104.45	107.78				9.75	8.89	5.57
201000.00	112.90	113.09	103.55	104.41	107.72	9.35	8.49	5.18	9.53	8.68	5.36
200900.00		113.20	103.51	104.37	107.67				9.68	8.83	5.52
200800.00		112.99	103.47	104.32	107.62				9.52	8.67	5.37
200700.00		113.30	103.43	104.28	107.57				9.87	9.02	5.73
200600.00		113.42	103.39	104.24	107.52				10.03	9.18	5.90
200500.00	113.50	113.61	103.35	104.19	107.47	10.15	9.31	6.03	10.26	9.42	6.14
200400.00		113.36	103.31	104.15	107.41				10.06	9.22	5.95
200300.00		112.99	103.27	104.11	107.36				9.72	8.88	5.63
200200.00		112.81	103.23	104.06	107.31				9.58	8.75	5.50
200100.00		112.98	103.19	104.02	107.26				9.79	8.96	5.72
200000.00	112.55	112.60	103.15	103.98	107.21	9.41	8.58	5.35	9.45	8.62	5.39
199900.00		112.38	103.10	103.93	107.16				9.27	8.45	5.22
199800.00		112.31	103.06	103.89	107.10				9.24	8.42	5.20
199700.00		112.33	103.02	103.85	107.05				9.31	8.49	5.28
199600.00		112.26	102.98	103.80	107.00				9.28	8.46	5.26
199500.00	112.07	112.12	102.95	103.77	106.96	9.11	8.29	5.10	9.17	8.35	5.16
199400.00		112.01	102.92	103.74	106.92				9.09	8.27	5.09
199300.00		112.05	102.89	103.71	106.89				9.15	8.34	5.16
199200.00		112.04	102.86	103.68	106.85				9.18	8.36	5.19
199100.00		111.92	102.83	103.64	106.81				9.09	8.27	5.11
199000.00	111.97	112.08	102.80	103.61	106.77	9.17	8.36	5.20	9.29	8.47	5.32
198900.00		111.67	102.77	103.58	106.73				8.90	8.09	4.94
198800.00		111.64	102.74	103.55	106.69				8.90	8.09	4.95
198700.00		111.60	102.65	103.47	106.62				8.94	8.12	4.97
198600.00		111.54	102.55	103.38	106.55				8.99	8.16	4.99
198500.00	111.43	111.51	102.45	103.29	106.48	8.98	8.14	4.95	9.06	8.22	5.04
198400.00		111.52	102.35	103.20	106.40				9.17	8.32	5.12
198300.00		111.50	102.25	103.11	106.33				9.25	8.39	5.18
198200.00		111.58	102.15	103.02	106.25				9.43	8.55	5.32
198100.00		111.13	102.05	102.93	106.18				9.08	8.20	4.95
198000.00	110.82	110.87	101.95	102.85	106.11	8.87	7.97	4.71	8.92	8.03	4.77
197900.00		110.74	101.85	102.76	106.03				8.90	7.99	4.71
197800.00		110.76	101.82	102.73	106.01				8.94	8.03	4.75
197700.00		110.59	101.81	102.72	106.00				8.78	7.87	4.59
197600.00		110.64	101.81	102.71	105.99				8.83	7.92	4.64
197500.00	110.58	110.66	101.80	102.70	105.98	8.78	7.87	4.60	8.86	7.95	4.67
197400.00		110.83	101.79	102.70	105.97				9.04	8.14	4.86
197300.00		110.60	101.78	102.69	105.96				8.82	7.91	4.64
197200.00		110.76	101.77	102.68	105.95				8.99	8.09	4.81
197100.00		110.78	101.76	102.67	105.94				9.02	8.12	4.84
197000.00		110.46	101.76	102.66	105.93				8.70	7.80	4.53
196900.00		110.53	101.75	102.65	105.92				8.79	7.89	4.61
196800.00		110.69	101.74	102.64	105.91				8.95	8.05	4.79
196700.00		110.78	101.73	102.63	105.90				9.04	8.15	4.88
196600.00		110.71	101.72	102.62	105.89				8.99	8.09	4.82
196500.00	110.39	110.39	101.71	102.61	105.88	8.67	7.78	4.51	8.68	7.78	4.51
196400.00		110.55	101.71	102.60	105.87				8.84	7.94	4.68
196300.00		110.58	101.70	102.59	105.86				8.89	7.99	4.73
196200.00		111.03	101.69	102.58	105.85				9.34	8.45	5.18
196100.00		110.40	101.68	102.57	105.84				8.72	7.83	4.57
196000.00	110.31	110.32	101.67	102.56	105.83	8.64	7.75	4.49	8.65	7.76	4.50
195900.00		110.74	101.66	102.56	105.82				9.07	8.18	4.92
195800.00		110.56	101.66	102.55	105.81				8.90	8.01	4.75
195700.00		110.37	101.65	102.54	105.80				8.72	7.83	4.57
195600.00		110.59	101.64	102.53	105.79				8.95	8.06	4.80
195500.00	110.55	110.55	101.64	102.53	105.78	8.92	8.03	4.77	8.91	8.02	4.77
195400.00		110.47	101.63	102.52	105.77				8.84	7.96	4.70
195300.00		110.49	101.62	102.51	105.77				8.87	7.98	4.72
195200.00		110.27	101.62	102.51	105.76				8.65	7.77	4.51

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
195100.00		110.23	101.61	102.50	105.75				8.62	7.73	4.48
195000.00	110.47	110.44	101.61	102.49	105.74	8.86	7.98	4.73	8.83	7.94	4.70
194900.00		110.38	101.60	102.49	105.73				8.78	7.89	4.64
194800.00		110.14	101.60	102.48	105.73				8.54	7.66	4.41
194700.00		109.96	101.59	102.48	105.72				8.37	7.49	4.24
194600.00		109.87	101.58	102.47	105.71				8.29	7.40	4.16
194500.00	109.88	110.07	101.58	102.46	105.70	8.30	7.42	4.18	8.49	7.61	4.37
194400.00		110.17	101.57	102.46	105.70				8.60	7.71	4.47
194300.00		109.89	101.57	102.45	105.69				8.32	7.44	4.20
194200.00		110.02	101.56	102.44	105.68				8.46	7.58	4.34
194100.00		109.75	101.56	102.44	105.67				8.19	7.31	4.07
194000.00	109.72	109.65	101.55	102.43	105.66	8.17	7.29	4.05	8.10	7.22	3.99
193900.00		109.72	101.54	102.43	105.66				8.18	7.30	4.07
193800.00		109.69	101.53	102.41	105.65				8.15	7.27	4.04
193700.00		109.65	101.50	102.38	105.62				8.15	7.27	4.03
193600.00		109.54	101.47	102.35	105.59				8.07	7.18	3.95
193500.00	109.36	109.41	101.44	102.32	105.56	7.92	7.03	3.79	7.98	7.09	3.85
193400.00		109.40	101.41	102.29	105.54				8.00	7.11	3.87
193300.00		109.25	101.37	102.26	105.51				7.87	6.98	3.74
193200.00		109.16	101.34	102.23	105.48				7.82	6.93	3.68
193100.00		109.10	101.31	102.20	105.46				7.79	6.89	3.64
193000.00	108.93	108.98	101.28	102.17	105.43	7.66	6.76	3.50	7.71	6.81	3.55
192900.00		108.86	101.24	102.14	105.40				7.62	6.72	3.46
192800.00		108.80	101.21	102.11	105.37				7.59	6.68	3.42
192700.00	108.73	108.79	101.18	102.08	105.35	7.55	6.65	3.39	7.61	6.70	3.44
192600.00		108.68	101.15	102.05	105.32				7.53	6.62	3.36
192500.00	108.60	108.61	101.11	102.02	105.29	7.49	6.58	3.31	7.49	6.58	3.32
192400.00	108.63	108.57	101.08	101.99	105.27	7.54	6.63	3.36	7.49	6.58	3.31
192300.00		108.56	101.05	101.96	105.24				7.51	6.60	3.32
192200.00		108.62	101.02	101.93	105.21				7.60	6.68	3.41
192100.00		108.70	100.98	101.90	105.18				7.72	6.80	3.52
192000.00	108.45	108.41	100.90	101.84	105.14	7.55	6.62	3.32	7.51	6.57	3.27
191900.00	108.24	108.33	100.81	101.77	105.09	7.43	6.47	3.15	7.52	6.56	3.24
191800.00		108.30	100.71	101.69	105.04				7.58	6.60	3.25
191700.00		108.31	100.62	101.62	104.99				7.68	6.68	3.31
191600.00		108.25	100.53	101.55	104.95				7.72	6.70	3.31
191500.00	108.22	108.17	100.44	101.48	104.90	7.78	6.74	3.32	7.73	6.69	3.27
191400.00		108.11	100.34	101.41	104.85				7.77	6.71	3.26
191300.00		107.81	100.25	101.34	104.80				7.56	6.48	3.01
191200.00		107.91	100.04	101.17	104.71				7.87	6.74	3.20
191100.00		107.87	99.79	100.97	104.60				8.08	6.90	3.27
191000.00	107.87	107.81	99.55	100.78	104.49	8.32	7.09	3.38	8.27	7.04	3.32
190900.00		107.91	99.30	100.59	104.39				8.61	7.32	3.52
190800.00		108.12	99.06	100.39	104.28				9.06	7.73	3.84
190700.00		108.18	98.83	100.21	104.18				9.35	7.98	4.00
190600.00		110.66	98.81	100.16	104.14				11.85	10.50	6.52
190500.00	108.02	108.25	98.79	100.11	104.09	9.23	7.90	3.93	9.46	8.14	4.16
190400.00		107.73	98.77	100.07	104.05				8.96	7.66	3.68
190300.00	107.30	107.05	98.74	100.02	104.01	8.56	7.28	3.29	8.31	7.03	3.05
190200.00		111.48	98.66	99.90	103.83				12.82	11.58	7.65
190100.00		106.90	98.66	99.87	103.73				8.24	7.03	3.17
190000.00	106.15	106.35	98.62	99.81	103.67	7.53	6.34	2.48	7.74	6.54	2.68
189900.00		106.66	98.57	99.75	103.61				8.08	6.90	3.05
189800.00		106.94	98.53	99.70	103.55				8.41	7.24	3.39
189700.00		107.16	98.49	99.64	103.49				8.67	7.52	3.67
189600.00		107.09	98.44	99.58	103.43				8.65	7.51	3.66
189500.00		107.01	98.40	99.52	103.37				8.61	7.49	3.64
189400.00		106.54	98.36	99.46	103.31				8.18	7.08	3.23
189300.00		106.36	98.31	99.40	103.25				8.05	6.96	3.11
189200.00		106.17	98.27	99.35	103.19				7.90	6.83	2.98
189100.00		105.81	98.22	99.29	103.13				7.59	6.53	2.69
189000.00	105.56	105.74	98.18	99.23	103.07	7.38	6.34	2.50	7.55	6.51	2.67
188900.00		106.00	98.14	99.17	103.01				7.87	6.83	3.00
188800.00		106.40	98.09	99.11	102.95				8.31	7.29	3.45
188700.00		106.20	98.05	99.05	102.89				8.15	7.14	3.31
188600.00		106.49	98.01	99.00	102.83				8.48	7.49	3.66
188500.00	106.01	105.98	97.96	98.94	102.77	8.05	7.07	3.24	8.02	7.04	3.21
188400.00		106.02	97.86	98.83	102.67				8.16	7.18	3.35
188300.00		105.82	97.73	98.71	102.56				8.10	7.11	3.26
188200.00		105.83	97.59	98.59	102.45				8.24	7.25	3.38
188100.00		105.86	97.46	98.46	102.34				8.40	7.40	3.52
188000.00	105.65	105.60	97.33	98.34	102.23	8.31	7.31	3.42	8.27	7.27	3.38
187900.00		105.52	97.20	98.22	102.12				8.32	7.30	3.40
187800.00		105.52	97.08	98.10	102.01				8.45	7.43	3.52

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
187700.00		105.52	96.98	98.00	101.91				8.54	7.52	3.61
187600.00		105.75	96.88	97.90	101.82				8.87	7.85	3.93
187500.00	105.55	105.59	96.78	97.80	101.72	8.76	7.74	3.82	8.81	7.79	3.87
187400.00		105.61	96.68	97.70	101.63				8.93	7.91	3.98
187300.00		105.46	96.59	97.60	101.53				8.87	7.85	3.92
187200.00		105.45	96.49	97.50	101.44				8.96	7.94	4.01
187100.00		105.45	96.39	97.40	101.34				9.06	8.04	4.10
187000.00	105.37	105.36	96.29	97.30	101.25	9.08	8.07	4.12	9.07	8.06	4.11
186900.00		105.07	96.19	97.21	101.16				8.87	7.86	3.91
186800.00		105.04	96.10	97.11	101.06				8.95	7.94	3.98
186700.00		104.86	96.00	97.01	100.97				8.86	7.85	3.90
186600.00		104.73	95.92	96.93	100.90				8.81	7.80	3.84
186500.00	104.81	104.86	95.86	96.87	100.84	8.95	7.94	3.97	9.00	7.99	4.02
186400.00		104.62	95.80	96.81	100.79				8.83	7.82	3.84
186300.00		104.66	95.73	96.74	100.73				8.93	7.92	3.93
186200.00		104.57	95.67	96.68	100.68				8.90	7.89	3.89
186100.00		104.41	95.61	96.62	100.62				8.80	7.79	3.79
186000.00	104.20	104.22	95.55	96.56	100.57	8.65	7.64	3.63	8.67	7.66	3.65
185900.00		104.27	95.49	96.50	100.51				8.79	7.78	3.76
185800.00	104.07	104.15	95.42	96.43	100.46	8.65	7.64	3.61	8.73	7.72	3.69
185700.00		104.36	95.36	96.37	100.40				9.00	7.99	3.96
185600.00		104.32	95.30	96.31	100.35				9.02	8.01	3.98
185500.00	103.91	104.13	95.24	96.25	100.29	8.67	7.66	3.61	8.89	7.88	3.84
185400.00		104.53	95.18	96.19	100.24				9.36	8.35	4.29
185300.00	103.87	103.93	95.11	96.12	100.18	8.75	7.74	3.68	8.81	7.80	3.74
185200.00		103.99	95.06	96.07	100.13				8.93	7.92	3.86
185100.00		103.82	95.01	96.01	100.07				8.81	7.81	3.75
185000.00	103.46	103.79	94.96	95.96	100.01	8.51	7.50	3.45	8.83	7.83	3.77
184900.00		103.56	94.91	95.91	99.96				8.66	7.66	3.60
184800.00		103.15	94.85	95.85	99.90				8.30	7.30	3.25
184700.00		103.68	94.80	95.80	99.85				8.87	7.88	3.83
184600.00		103.52	94.75	95.74	99.79				8.77	7.78	3.73
184500.00	103.26	103.66	94.70	95.69	99.73	8.57	7.58	3.53	8.96	7.97	3.93
184400.00		103.65	94.65	95.63	99.68				9.01	8.02	3.97
184300.00		103.72	94.59	95.58	99.62				9.13	8.14	4.10
184200.00		103.64	94.54	95.52	99.56				9.10	8.11	4.07
184100.00		103.59	94.49	95.47	99.51				9.10	8.12	4.08
184000.00	103.25	103.80	94.42	95.41	99.46	8.83	7.85	3.79	9.37	8.39	4.34
183900.00		103.79	94.36	95.34	99.41				9.43	8.45	4.38
183800.00		104.02	94.30	95.28	99.36				9.72	8.73	4.65
183700.00		104.20	94.24	95.22	99.31				9.97	8.98	4.89
183600.00		103.34	94.17	95.16	99.26				9.16	8.18	4.08
183500.00	102.23	102.90	94.11	95.10	99.21	8.12	7.13	3.02	8.79	7.80	3.69
183400.00		102.78	94.06	95.05	99.17				8.72	7.73	3.61
183300.00		102.67	94.00	94.99	99.12				8.67	7.68	3.55
183200.00		102.61	93.94	94.94	99.08				8.67	7.67	3.53
183100.00		102.63	93.88	94.88	99.03				8.75	7.75	3.60
183000.00	102.66	103.16	93.80	94.80	98.96	8.85	7.85	3.70	9.36	8.36	4.20
182900.00		102.75	93.69	94.69	98.87				9.06	8.06	3.88
182800.00		102.29	93.59	94.59	98.78				8.70	7.70	3.51
182700.00		102.23	93.53	94.53	98.73				8.70	7.70	3.50
182600.00		102.04	93.51	94.51	98.71				8.53	7.53	3.33
182500.00	101.91	102.31	93.49	94.48	98.68	8.42	7.42	3.22	8.83	7.83	3.63
182400.00		101.80	93.47	94.46	98.66				8.33	7.33	3.13
182300.00		101.69	93.44	94.44	98.64				8.24	7.25	3.05
182200.00	101.51	101.78	93.42	94.42	98.62	8.09	7.09	2.89	8.36	7.36	3.16
182100.00		102.22	93.40	94.40	98.60				8.81	7.82	3.62
182000.00	101.91	102.16	93.38	94.37	98.57	8.53	7.53	3.33	8.78	7.79	3.59
181900.00		101.83	93.36	94.35	98.55				8.47	7.48	3.28
181800.00		101.61	93.34	94.33	98.53				8.27	7.28	3.08
181700.00		101.59	93.32	94.31	98.51				8.28	7.29	3.08
181600.00		102.09	93.29	94.28	98.49				8.79	7.80	3.60
181500.00	101.57	101.85	93.27	94.26	98.47	8.30	7.31	3.10	8.59	7.59	3.39
181400.00		101.88	93.24	94.24	98.44				8.64	7.64	3.44
181300.00		101.40	93.22	94.21	98.42				8.18	7.18	2.97
181200.00		101.41	93.20	94.19	98.40				8.22	7.22	3.01
181100.00		101.55	93.17	94.17	98.38				8.38	7.38	3.17
181000.00		101.61	93.15	94.15	98.36				8.46	7.47	3.25
180900.00		101.37	93.13	94.12	98.34				8.25	7.25	3.04
180800.00		101.47	93.10	94.10	98.31				8.37	7.37	3.16
180700.00		101.65	93.08	94.08	98.29				8.57	7.57	3.36
180600.00		101.57	93.05	94.05	98.27				8.52	7.52	3.30
180500.00		101.39	93.03	94.03	98.25				8.36	7.36	3.14
180400.00		100.91	93.00	94.00	98.22				7.91	6.91	2.69

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
180300.00		100.91	92.97	93.97	98.19				7.94	6.94	2.72
180200.00		100.70	92.94	93.94	98.16				7.76	6.76	2.54
180100.00		100.72	92.91	93.90	98.13				7.82	6.82	2.60
180000.00		100.75	92.87	93.87	98.09				7.88	6.88	2.66
179900.00		100.64	92.84	93.84	98.06				7.80	6.81	2.58
179800.00		100.59	92.81	93.80	98.03				7.78	6.79	2.56
179700.00		100.51	92.78	93.77	98.00				7.73	6.74	2.51
179600.00		100.32	92.75	93.74	97.97				7.58	6.59	2.36
179500.00		100.10	92.71	93.70	97.93				7.39	6.40	2.17
179400.00		100.06	92.62	93.62	97.87				7.44	6.45	2.20
179300.00		99.93	92.49	93.49	97.78				7.43	6.44	2.15
179200.00		99.90	92.37	93.37	97.69				7.53	6.53	2.21
179100.00		99.96	92.25	93.26	97.61				7.71	6.70	2.35
179000.00		99.93	92.21	93.22	97.58				7.73	6.71	2.35
178900.00		100.38	92.17	93.18	97.55				8.22	7.20	2.83
178800.00		100.35	92.13	93.14	97.53				8.22	7.21	2.83
178700.00		100.08	92.09	93.10	97.50				7.99	6.97	2.58
178600.00		100.12	92.05	93.07	97.47				8.07	7.05	2.65
178500.00		100.20	92.01	93.03	97.44				8.19	7.17	2.75
178400.00		100.25	91.97	92.99	97.42				8.28	7.26	2.83
178300.00		100.32	91.93	92.95	97.39				8.39	7.37	2.93
178200.00		100.48	91.89	92.91	97.36				8.59	7.57	3.12
178100.00		100.35	91.85	92.87	97.34				8.50	7.47	3.01
178000.00		100.28	91.81	92.84	97.31				8.47	7.44	2.97
177900.00		100.39	91.77	92.80	97.28				8.61	7.59	3.10
177800.00		100.53	91.73	92.76	97.25				8.79	7.76	3.27
177700.00		100.24	91.69	92.72	97.23				8.55	7.52	3.01
177600.00		100.36	91.65	92.68	97.20				8.71	7.68	3.16
177500.00		100.40	91.61	92.65	97.17				8.79	7.76	3.23
177400.00		100.44	91.57	92.61	97.15				8.87	7.83	3.30
177300.00		100.45	91.53	92.57	97.12				8.91	7.88	3.33
177200.00		100.25	91.50	92.53	97.09				8.76	7.72	3.16
177100.00		100.16	91.46	92.49	97.07				8.71	7.67	3.10
177000.00		100.15	91.42	92.46	97.04				8.74	7.70	3.12
176900.00		100.33	91.37	92.41	97.01				8.96	7.92	3.32
176800.00		100.24	91.31	92.36	96.98				8.93	7.88	3.26
176700.00		100.22	91.25	92.31	96.95				8.97	7.92	3.28
176600.00		100.10	91.20	92.25	96.92				8.91	7.85	3.19
176500.00	99.85	100.21	91.14	92.20	96.89	8.71	7.65	2.96	9.07	8.01	3.32
176400.00	99.46	99.85	91.08	92.15	96.85	8.38	7.32	2.61	8.77	7.70	3.00
176300.00		99.38	91.02	92.10	96.82				8.36	7.28	2.56
176200.00		99.30	90.96	92.04	96.79				8.34	7.26	2.51
176100.00		99.21	90.91	91.99	96.76				8.30	7.22	2.44
176000.00	99.09	99.28	90.85	91.94	96.73	8.24	7.15	2.36	8.43	7.34	2.55
175900.00		99.15	90.81	91.90	96.71				8.34	7.25	2.44
175800.00		98.95	90.78	91.87	96.68				8.17	7.08	2.26
175700.00		98.92	90.75	91.84	96.66				8.17	7.08	2.26
175600.00		98.68	90.71	91.81	96.64				7.97	6.87	2.04
175500.00	98.52	98.80	90.68	91.78	96.62	7.84	6.74	1.90	8.12	7.02	2.18
175400.00		98.74	90.65	91.75	96.60				8.09	7.00	2.15
175300.00		99.04	90.62	91.72	96.57				8.42	7.32	2.47
175200.00		99.05	90.59	91.69	96.55				8.46	7.36	2.50
175100.00		98.91	90.56	91.66	96.53				8.36	7.25	2.38
175000.00	98.36	98.70	90.52	91.63	96.51	7.83	6.73	1.85	8.18	7.07	2.19
174900.00		98.67	90.49	91.60	96.49				8.17	7.07	2.18
174800.00		98.89	90.46	91.57	96.46				8.43	7.32	2.43
174700.00	98.37	98.75	90.43	91.54	96.44	7.94	6.83	1.93	8.32	7.21	2.30
174600.00		98.73	90.40	91.51	96.42				8.34	7.22	2.31
174500.00	98.19	98.72	90.37	91.48	96.40	7.82	6.71	1.79	8.35	7.24	2.32
174400.00		98.25	90.33	91.45	96.38				7.92	6.80	1.88
174300.00		98.22	90.30	91.42	96.35				7.91	6.80	1.86
174200.00		98.02	90.27	91.39	96.33				7.75	6.63	1.69
174100.00		97.88	90.24	91.36	96.31				7.64	6.52	1.57
174000.00	97.57	97.87	90.21	91.33	96.29	7.36	6.24	1.28	7.66	6.54	1.58
173900.00		97.76	90.18	91.30	96.27				7.59	6.46	1.49
173800.00		97.86	90.15	91.27	96.25				7.72	6.59	1.61
173700.00		97.57	90.12	91.24	96.23				7.45	6.33	1.34
173600.00		97.71	90.09	91.21	96.21				7.63	6.50	1.50
173500.00	97.28	97.65	90.06	91.18	96.19	7.23	6.10	1.09	7.59	6.46	1.45
173400.00		97.77	90.03	91.16	96.17				7.74	6.61	1.60
173300.00		97.30	89.98	91.11	96.14				7.32	6.19	1.16
173200.00		97.24	89.91	91.04	96.10				7.33	6.20	1.14
173100.00		97.30	89.85	90.97	96.07				7.45	6.33	1.23
173000.00	97.26	97.48	89.78	90.90	96.03	7.47	6.36	1.23	7.70	6.58	1.45

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
172900.00		97.56	89.72	90.83	95.99				7.84	6.73	1.57
172800.00		97.27	89.65	90.76	95.95				7.62	6.51	1.32
172700.00		97.23	89.58	90.69	95.92				7.64	6.54	1.31
172600.00		97.13	89.52	90.62	95.88				7.61	6.51	1.25
172500.00	96.60	96.92	89.45	90.55	95.84	7.15	6.05	0.76	7.47	6.37	1.08
172400.00	96.55	97.01	89.41	90.50	95.81	7.14	6.05	0.74	7.61	6.51	1.20
172300.00		96.71	89.37	90.46	95.79				7.35	6.26	0.93
172200.00		97.00	89.33	90.41	95.76				7.67	6.59	1.23
172100.00		96.94	89.29	90.36	95.74				7.66	6.58	1.20
172000.00	96.72	97.19	89.25	90.32	95.71	7.48	6.41	1.01	7.95	6.87	1.48
171900.00		97.16	89.20	90.27	95.69				7.96	6.89	1.48
171800.00		97.14	89.16	90.22	95.66				7.97	6.91	1.47
171700.00		97.24	89.16	90.22	95.66				8.08	7.02	1.58
171600.00		97.20	89.16	90.22	95.66				8.04	6.98	1.54
171500.00	96.68	97.13	89.16	90.22	95.66	7.52	6.46	1.02	7.97	6.91	1.47
171400.00		96.95	89.12	90.19	95.63				7.82	6.76	1.32
171300.00		96.99	89.06	90.13	95.57				7.93	6.86	1.42
171200.00		96.90	88.99	90.06	95.50				7.91	6.84	1.40
171100.00		97.09	88.93	90.01	95.45				8.16	7.08	1.64
171000.00	96.70	97.00	88.89	89.97	95.41	7.81	6.73	1.29	8.11	7.03	1.59
170900.00		97.01	88.85	89.94	95.38				8.15	7.07	1.63
170800.00		96.98	88.82	89.90	95.34				8.16	7.08	1.64
170700.00		96.72	88.78	89.86	95.30				7.94	6.85	1.41
170600.00		96.95	88.74	89.83	95.27				8.21	7.12	1.68
170500.00	96.63	96.94	88.70	89.79	95.23	7.93	6.84	1.39	8.24	7.15	1.71
170400.00		97.05	88.66	89.75	95.20				8.39	7.29	1.84
170300.00		97.05	88.62	89.71	95.17				8.43	7.33	1.88
170200.00		97.09	88.58	89.68	95.13				8.51	7.42	1.96
170100.00		97.08	88.54	89.64	95.10				8.54	7.44	1.97
170000.00	96.86	97.26	88.50	89.60	95.07	8.37	7.26	1.79	8.76	7.66	2.19
169900.00		97.31	88.45	89.56	95.04				8.86	7.75	2.27
169800.00		97.36	88.41	89.52	95.00				8.94	7.84	2.35
169700.00		97.30	88.37	89.48	94.97				8.93	7.82	2.33
169600.00		97.16	88.33	89.44	94.94				8.83	7.72	2.22
169500.00	97.14	97.11	88.29	89.41	94.91	8.85	7.73	2.23	8.82	7.70	2.20
169400.00		96.63	88.25	89.37	94.87				8.38	7.27	1.76
169300.00		96.48	88.21	89.33	94.84				8.27	7.15	1.64
169200.00		96.42	88.19	89.31	94.82				8.23	7.11	1.60
169100.00		96.54	88.16	89.29	94.80				8.38	7.26	1.74
169000.00	96.98	96.32	88.14	89.26	94.78	8.85	7.72	2.20	8.18	7.06	1.54
168900.00		97.09	88.11	89.24	94.76				8.98	7.85	2.33
168800.00		96.92	88.08	89.21	94.74				8.84	7.71	2.18
168700.00		96.97	88.06	89.19	94.72				8.91	7.78	2.25
168600.00		96.96	88.03	89.17	94.70				8.92	7.79	2.26
168500.00	96.80	96.84	88.01	89.14	94.68	8.79	7.65	2.12	8.83	7.70	2.16
168400.00		96.65	87.98	89.12	94.66				8.67	7.53	1.99
168300.00		96.77	87.96	89.10	94.64				8.81	7.67	2.13
168200.00		96.94	87.95	89.09	94.63				8.99	7.85	2.31
168100.00		96.64	87.93	89.08	94.62				8.70	7.56	2.02
168000.00	96.55	96.59	87.92	89.06	94.61	8.63	7.49	1.94	8.66	7.52	1.98
167900.00		96.36	87.91	89.05	94.60				8.45	7.31	1.77
167800.00		96.54	87.90	89.04	94.58				8.64	7.49	1.95
167700.00		96.23	87.89	89.03	94.57				8.35	7.20	1.66
167600.00		96.04	87.87	89.02	94.56				8.17	7.03	1.48
167500.00	96.17	96.24	87.86	89.01	94.55	8.31	7.16	1.61	8.38	7.24	1.69
167400.00		96.00	87.85	88.99	94.54				8.15	7.01	1.46
167300.00		95.82	87.84	88.98	94.53				7.98	6.83	1.29
167200.00		95.55	87.82	88.97	94.52				7.73	6.58	1.03
167100.00		95.38	87.81	88.96	94.51				7.57	6.42	0.87
167000.00		95.21	87.80	88.95	94.50				7.41	6.26	0.71
166900.00		95.37	87.79	88.94	94.49				7.58	6.43	0.88
166800.00		95.00	87.77	88.92	94.47				7.24	6.08	0.53
166700.00		95.14	87.75	88.90	94.45				7.39	6.24	0.69
166600.00		95.25	87.73	88.88	94.44				7.52	6.37	0.82
166500.00		95.43	87.71	88.87	94.42				7.71	6.56	1.01
166400.00		95.14	87.69	88.85	94.40				7.44	6.29	0.73
166300.00		95.03	87.68	88.83	94.39				7.35	6.20	0.64
166200.00		95.08	87.66	88.81	94.37				7.42	6.27	0.71
166100.00		95.15	87.64	88.80	94.35				7.51	6.35	0.80
166000.00		95.01	87.62	88.78	94.34				7.39	6.23	0.67
165900.00		95.14	87.60	88.76	94.32				7.54	6.38	0.82
165800.00		95.04	87.58	88.74	94.30				7.46	6.30	0.74
165700.00		95.05	87.57	88.73	94.29				7.48	6.32	0.76
165600.00		94.74	87.55	88.71	94.27				7.19	6.03	0.47

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
165500.00		94.62	87.53	88.69	94.25				7.09	5.92	0.37
165400.00		94.98	87.51	88.68	94.23				7.47	6.30	0.75
165300.00		95.00	87.49	88.66	94.22				7.51	6.34	0.78
165200.00		95.29	87.47	88.65	94.20				7.82	6.64	1.09
165100.00		94.88	87.46	88.63	94.18				7.42	6.25	0.70
165000.00		94.85	87.44	88.61	94.17				7.41	6.23	0.68
164900.00		95.06	87.42	88.60	94.15				7.64	6.47	0.91
164800.00		95.09	87.40	88.58	94.13				7.69	6.51	0.96
164700.00		95.00	87.39	88.57	94.12				7.62	6.44	0.89
164600.00		95.05	87.37	88.55	94.10				7.68	6.50	0.95
164500.00		95.10	87.36	88.54	94.09				7.74	6.56	1.00
164400.00		95.07	87.35	88.53	94.08				7.72	6.54	0.99
164300.00		95.19	87.33	88.51	94.07				7.86	6.68	1.12
164200.00		94.97	87.32	88.50	94.06				7.65	6.47	0.91
164100.00		94.85	87.30	88.49	94.05				7.54	6.36	0.80
164000.00		94.96	87.29	88.48	94.04				7.67	6.48	0.92
163900.00		94.89	87.28	88.46	94.02				7.61	6.42	0.86
163800.00		94.91	87.26	88.45	94.01				7.65	6.46	0.90
163700.00		94.98	87.25	88.44	94.00				7.73	6.55	0.98
163600.00		95.08	87.24	88.42	93.99				7.84	6.66	1.09
163500.00		95.09	87.22	88.41	93.98				7.87	6.68	1.12
163400.00		95.05	87.21	88.40	93.97				7.84	6.65	1.08
163300.00		95.04	87.20	88.39	93.96				7.84	6.65	1.08
163200.00		94.96	87.19	88.38	93.95				7.77	6.58	1.01
163100.00		94.95	87.18	88.37	93.94				7.77	6.58	1.01
163000.00		95.00	87.18	88.37	93.94				7.82	6.64	1.07
162900.00		94.89	87.18	88.36	93.93				7.72	6.53	0.96
162800.00		94.76	87.17	88.36	93.93				7.59	6.40	0.83
162700.00		94.85	87.17	88.36	93.93				7.68	6.49	0.92
162600.00		94.73	87.16	88.35	93.92				7.56	6.38	0.81
162500.00		94.77	87.16	88.35	93.92				7.61	6.42	0.85
162400.00		94.94	87.16	88.34	93.91				7.78	6.59	1.02
162300.00		94.72	87.15	88.34	93.91				7.57	6.38	0.81
162200.00		94.93	87.15	88.33	93.90				7.78	6.60	1.03
162100.00		94.72	87.14	88.33	93.90				7.58	6.39	0.82
162000.00	94.12	94.43	87.14	88.32	93.89	6.98	5.80	0.23	7.28	6.10	0.53
161900.00		94.33	87.14	88.32	93.89				7.19	6.01	0.44
161800.00		94.73	87.13	88.32	93.89				7.60	6.42	0.85
161700.00		94.28	87.13	88.31	93.88				7.15	5.97	0.40
161600.00		94.40	87.13	88.31	93.88				7.28	6.10	0.53
161500.00	94.21	94.54	87.12	88.30	93.87	7.09	5.91	0.34	7.42	6.24	0.67
161400.00		94.38	87.12	88.30	93.87				7.26	6.08	0.51
161300.00		94.49	87.11	88.29	93.86				7.37	6.19	0.62
161200.00	94.05	94.21	87.11	88.29	93.86	6.94	5.76	0.19	7.10	5.92	0.35
161100.00		94.10	87.09	88.28	93.84				7.01	5.82	0.26
161000.00	94.00	94.32	87.08	88.26	93.83	6.92	5.74	0.17	7.23	6.05	0.48
160900.00		94.14	87.07	88.25	93.82				7.07	5.89	0.32
160800.00		94.34	87.05	88.24	93.80				7.28	6.10	0.53
160700.00	93.90	94.09	87.04	88.23	93.79	6.86	5.68	0.11	7.05	5.86	0.30
160600.00		93.99	87.03	88.21	93.78				6.96	5.77	0.21
160500.00	93.72	93.93	87.01	88.20	93.76	6.70	5.52	-0.05	6.91	5.72	0.16
160400.00		94.10	87.00	88.19	93.75				7.09	5.91	0.34
160300.00		94.10	86.99	88.18	93.74				7.11	5.92	0.36
160200.00		94.18	86.97	88.16	93.72				7.21	6.02	0.46
160100.00		94.22	86.96	88.15	93.71				7.26	6.07	0.51
160000.00	93.79	94.00	86.94	88.13	93.69	6.85	5.66	0.10	7.07	5.88	0.32
159900.00		93.99	86.91	88.10	93.66				7.09	5.89	0.33
159800.00		94.28	86.88	88.07	93.64				7.40	6.21	0.64
159700.00		93.93	86.85	88.05	93.61				7.08	5.88	0.32
159600.00		93.88	86.82	88.02	93.58				7.06	5.86	0.29
159500.00	93.74	93.81	86.79	87.99	93.56	6.95	5.75	0.18	7.02	5.82	0.25
159400.00		93.93	86.77	87.96	93.53				7.17	5.97	0.40
159300.00		93.96	86.73	87.93	93.51				7.22	6.02	0.45
159200.00		93.67	86.68	87.89	93.47				7.00	5.79	0.21
159100.00		93.63	86.62	87.84	93.43				7.01	5.79	0.20
159000.00	93.40	93.53	86.56	87.79	93.39	6.83	5.61	0.01	6.97	5.75	0.15
158900.00		93.44	86.51	87.74	93.35				6.94	5.71	0.10
158800.00		93.45	86.45	87.69	93.31				7.00	5.76	0.14
158700.00		93.47	86.39	87.64	93.27				7.08	5.83	0.20
158600.00		93.77	86.34	87.59	93.23				7.43	6.18	0.54
158500.00	93.54	93.76	86.28	87.54	93.19	7.26	6.00	0.35	7.48	6.22	0.57
158400.00	93.75	94.08	86.22	87.49	93.15	7.52	6.25	0.59	7.86	6.59	0.93
158300.00		93.89	86.17	87.44	93.11				7.73	6.45	0.78
158200.00		93.51	86.12	87.40	93.08				7.39	6.11	0.43

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
158100.00		93.32	86.08	87.37	93.05				7.24	5.95	0.27
158000.00	92.83	93.08	86.04	87.33	93.02	6.79	5.50	-0.19	7.05	5.75	0.06
157900.00		93.17	85.99	87.29	92.99				7.18	5.88	0.18
157800.00		93.19	85.95	87.25	92.96				7.24	5.93	0.23
157700.00		93.26	85.91	87.22	92.93				7.35	6.04	0.33
157600.00		93.19	85.87	87.18	92.91				7.32	6.01	0.29
157500.00	92.94	93.06	85.82	87.14	92.89	7.11	5.80	0.04	7.24	5.92	0.17
157400.00		93.23	85.78	87.10	92.88				7.45	6.13	0.35
157300.00		93.36	85.73	87.05	92.86				7.63	6.31	0.50
157200.00		93.19	85.67	87.01	92.84				7.52	6.19	0.35
157100.00		93.07	85.62	86.96	92.82				7.45	6.11	0.25
157000.00	92.91	93.17	85.56	86.90	92.79	7.36	6.01	0.12	7.62	6.27	0.38
156900.00		93.28	85.50	86.85	92.77				7.79	6.43	0.51
156800.00		93.31	85.43	86.80	92.75				7.88	6.51	0.57
156700.00		93.10	85.37	86.75	92.72				7.73	6.35	0.38
156600.00		93.23	85.31	86.69	92.70				7.92	6.54	0.54
156500.00	92.77	93.18	85.27	86.66	92.68	7.50	6.11	0.09	7.92	6.53	0.51
156400.00		92.94	85.23	86.63	92.66				7.70	6.31	0.28
156300.00		92.94	85.20	86.60	92.63				7.74	6.34	0.31
156200.00		92.72	85.19	86.59	92.62				7.54	6.14	0.11
156100.00		92.75	85.18	86.58	92.61				7.57	6.16	0.13
156000.00	92.78	93.03	85.18	86.58	92.61	7.60	6.20	0.17	7.86	6.46	0.42
155900.00		92.78	85.17	86.57	92.61				7.61	6.21	0.18
155800.00		92.68	85.16	86.57	92.60				7.52	6.11	0.08
155700.00		92.94	85.16	86.56	92.60				7.78	6.38	0.34
155600.00		92.95	85.15	86.56	92.59				7.80	6.39	0.36
155500.00	92.80	92.97	85.15	86.55	92.59	7.65	6.25	0.21	7.82	6.41	0.38
155400.00		92.84	85.14	86.55	92.59				7.70	6.29	0.25
155300.00		92.86	85.14	86.54	92.58				7.73	6.32	0.28
155200.00		92.77	85.13	86.54	92.58				7.64	6.23	0.20
155100.00		92.79	85.13	86.53	92.57				7.66	6.25	0.21
155000.00	92.51	92.81	85.12	86.53	92.57	7.39	5.98	-0.06	7.69	6.28	0.24
154900.00		92.69	85.11	86.52	92.57				7.58	6.17	0.12
154800.00		92.68	85.11	86.52	92.56				7.57	6.16	0.11
154700.00		92.74	85.10	86.52	92.56				7.64	6.23	0.19
154600.00		92.55	85.10	86.51	92.55				7.45	6.04	-0.01
154500.00	92.22	92.61	85.09	86.51	92.55	7.13	5.72	-0.33	7.52	6.11	0.06
154400.00		92.64	85.09	86.50	92.55				7.56	6.14	0.10
154300.00		92.86	85.08	86.50	92.54				7.78	6.37	0.32
154200.00		92.56	85.07	86.49	92.54				7.48	6.07	0.02
154100.00		92.62	85.07	86.49	92.53				7.55	6.14	0.09
154000.00	92.34	92.58	85.06	86.48	92.53	7.28	5.86	-0.19	7.51	6.09	0.05
153900.00		92.43	85.06	86.48	92.53				7.37	5.95	-0.09
153800.00		92.65	85.05	86.47	92.52				7.59	6.17	0.12
153700.00		92.44	85.03	86.45	92.50				7.42	6.00	-0.06
153600.00	92.40	92.55	84.99	86.42	92.47	7.41	5.99	-0.07	7.56	6.14	0.08
153500.00	92.28	92.38	84.96	86.39	92.44	7.32	5.89	-0.17	7.43	6.00	-0.06
153400.00		92.29	84.92	86.35	92.42				7.37	5.94	-0.13
153300.00	91.77	92.03	84.88	86.32	92.39	6.88	5.44	-0.62	7.14	5.71	-0.36
153200.00		92.20	84.85	86.29	92.36				7.35	5.91	-0.16
153100.00		92.33	84.75	86.20	92.29				7.58	6.13	0.04
153000.00	92.06	92.25	84.65	86.11	92.22	7.42	5.96	-0.16	7.60	6.14	0.03
152900.00		92.03	84.56	86.03	92.16				7.48	6.00	-0.13
152800.00		91.99	84.53	86.00	92.14				7.46	5.98	-0.15
152700.00		91.89	84.50	85.98	92.12				7.39	5.91	-0.23
152600.00		92.01	84.44	85.93	92.08				7.57	6.08	-0.07
152500.00	92.02	92.01	84.37	85.87	92.04	7.65	6.15	-0.02	7.65	6.14	-0.02
152400.00		91.97	84.30	85.81	91.99				7.67	6.16	-0.02
152300.00		92.12	84.25	85.77	91.96				7.87	6.35	0.15
152200.00		91.85	84.23	85.75	91.95				7.62	6.09	-0.10
152100.00		92.08	84.20	85.73	91.93				7.88	6.35	0.15
152000.00	91.48	91.51	84.18	85.71	91.91	7.29	5.77	-0.44	7.33	5.80	-0.41
151900.00		91.30	84.16	85.69	91.90				7.14	5.61	-0.60
151800.00		91.40	84.14	85.67	91.89				7.26	5.73	-0.49
151700.00		91.58	84.12	85.66	91.87				7.46	5.92	-0.30
151600.00		91.70	84.10	85.64	91.86				7.60	6.06	-0.16
151500.00	91.52	91.65	84.08	85.62	91.85	7.44	5.90	-0.33	7.58	6.03	-0.20
151400.00		91.81	84.06	85.60	91.84				7.75	6.21	-0.03
151300.00		91.94	84.04	85.59	91.83				7.90	6.35	0.12
151200.00		91.57	84.02	85.57	91.81				7.55	5.99	-0.25
151100.00		91.49	84.00	85.55	91.80				7.49	5.93	-0.31
151000.00	91.48	91.56	83.98	85.54	91.79	7.50	5.94	-0.31	7.58	6.02	-0.23
150900.00		91.42	83.96	85.52	91.78				7.46	5.90	-0.35
150800.00		91.29	83.94	85.50	91.76				7.35	5.79	-0.47

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
150700.00		91.24	83.92	85.49	91.75				7.32	5.76	-0.51
150600.00		91.48	83.90	85.47	91.74				7.58	6.01	-0.26
150500.00	91.45	91.45	83.85	85.43	91.71	7.60	6.02	-0.26	7.60	6.02	-0.26
150400.00		91.34	83.80	85.38	91.68				7.54	5.96	-0.34
150300.00		91.54	83.74	85.34	91.65				7.80	6.20	-0.11
150200.00		91.54	83.70	85.31	91.62				7.83	6.23	-0.08
150100.00		91.29	83.67	85.27	91.59				7.62	6.02	-0.30
150000.00	91.41	91.58	83.63	85.24	91.57	7.78	6.17	-0.15	7.95	6.34	0.02
149900.00		90.98	83.60	85.21	91.54				7.39	5.77	-0.56
149800.00		90.97	83.56	85.18	91.52				7.41	5.79	-0.55
149700.00		91.11	83.53	85.15	91.49				7.59	5.97	-0.37
149600.00		91.35	83.49	85.11	91.46				7.85	6.24	-0.11
149500.00	91.24	91.29	83.46	85.08	91.44	7.78	6.15	-0.21	7.84	6.21	-0.15
149400.00		91.30	83.42	85.05	91.42				7.88	6.25	-0.12
149300.00		91.02	83.39	85.02	91.40				7.63	5.99	-0.38
149200.00		90.95	83.35	84.99	91.37				7.59	5.95	-0.43
149100.00		90.95	83.32	84.96	91.35				7.63	5.98	-0.41
149000.00	91.30	91.24	83.28	84.93	91.33	8.02	6.37	-0.03	7.95	6.31	-0.09
148900.00		91.40	83.25	84.91	91.31				8.15	6.49	0.09
148800.00		91.33	83.23	84.88	91.29				8.10	6.44	0.03
148700.00		91.13	83.20	84.86	91.28				7.93	6.27	-0.15
148600.00		91.22	83.17	84.84	91.26				8.05	6.38	-0.04
148500.00	91.72	91.85	83.15	84.82	91.24	8.58	6.91	0.48	8.70	7.04	0.61
148400.00		91.82	83.12	84.79	91.22				8.70	7.03	0.60
148300.00		91.54	83.10	84.77	91.20				8.45	6.77	0.34
148200.00		91.63	83.07	84.75	91.19				8.57	6.89	0.45
148100.00		91.74	83.04	84.72	91.17				8.70	7.02	0.58
148000.00	91.30	91.77	83.02	84.70	91.15	8.29	6.60	0.15	8.75	7.07	0.62
147900.00		91.30	82.99	84.68	91.13				8.31	6.62	0.17
147800.00		91.28	82.96	84.65	91.11				8.32	6.62	0.16
147700.00		91.45	82.94	84.63	91.10				8.52	6.82	0.36
147600.00		91.26	82.91	84.61	91.08				8.36	6.66	0.19
147500.00	91.17	91.31	82.88	84.59	91.06	8.29	6.59	0.11	8.43	6.72	0.25
147400.00		91.75	82.86	84.56	91.04				8.90	7.19	0.71
147300.00		91.52	82.83	84.54	91.02				8.69	6.98	0.50
147200.00		91.71	82.80	84.52	91.01				8.91	7.20	0.71
147100.00		91.63	82.78	84.49	90.99				8.85	7.14	0.64
147000.00	91.50	91.63	82.75	84.47	90.97	8.75	7.03	0.53	8.88	7.16	0.66
146900.00		91.52	82.72	84.45	90.95				8.80	7.08	0.57
146800.00		91.43	82.69	84.42	90.93				8.74	7.01	0.50
146700.00		91.45	82.67	84.40	90.91				8.78	7.05	0.54
146600.00		92.10	82.64	84.38	90.89				9.46	7.72	1.21
146500.00	91.85	92.11	82.61	84.36	90.87	9.24	7.49	0.98	9.49	7.75	1.24
146400.00		91.57	82.58	84.33	90.85				8.99	7.24	0.72
146300.00		91.55	82.56	84.31	90.83				9.00	7.24	0.73
146200.00		91.38	82.53	84.29	90.81				8.85	7.09	0.57
146100.00		91.12	82.50	84.27	90.79				8.62	6.86	0.33
146000.00	90.90	91.10	82.47	84.24	90.77	8.43	6.66	0.14	8.63	6.85	0.33
145900.00		91.20	82.45	84.22	90.75				8.76	6.98	0.45
145800.00		91.23	82.42	84.20	90.73				8.81	7.03	0.50
145700.00		91.01	82.39	84.18	90.71				8.62	6.84	0.31
145600.00		91.06	82.36	84.16	90.69				8.70	6.91	0.37
145500.00	90.55	90.76	82.33	84.13	90.67	8.22	6.42	-0.12	8.43	6.63	0.09
145400.00		91.29	82.31	84.11	90.65				8.99	7.18	0.64
145300.00		91.60	82.28	84.09	90.63				9.32	7.51	0.96
145200.00		91.69	82.25	84.07	90.61				9.44	7.62	1.08
145100.00		91.83	82.22	84.05	90.59				9.61	7.78	1.24
145000.00	91.27	91.80	82.20	84.03	90.57	9.08	7.25	0.70	9.60	7.77	1.23
144900.00		91.82	82.17	84.00	90.55				9.66	7.82	1.27
144800.00		91.87	82.14	83.98	90.53				9.73	7.89	1.33
144700.00		91.54	82.11	83.96	90.51				9.43	7.58	1.02
144600.00		91.28	82.08	83.94	90.50				9.19	7.34	0.78
144500.00	90.99	91.39	82.06	83.92	90.48	8.93	7.07	0.51	9.34	7.47	0.92
144400.00		91.51	82.03	83.90	90.46				9.48	7.61	1.05
144300.00		91.54	82.01	83.88	90.44				9.53	7.66	1.10
144200.00		91.64	81.99	83.86	90.42				9.65	7.78	1.22
144100.00		91.83	81.97	83.85	90.41				9.87	7.99	1.42
144000.00	91.40	91.70	81.95	83.83	90.39	9.45	7.57	1.00	9.75	7.87	1.31
143900.00		92.04	81.93	83.82	90.38				10.11	8.22	1.66
143800.00		91.92	81.91	83.80	90.36				10.01	8.12	1.56
143700.00		91.70	81.89	83.78	90.35				9.81	7.91	1.35
143600.00		91.54	81.87	83.77	90.33				9.67	7.77	1.20
143500.00	91.04	91.42	81.85	83.75	90.32	9.19	7.29	0.72	9.57	7.67	1.10
143400.00		91.11	81.83	83.74	90.30				9.28	7.37	0.80

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
143300.00		91.28	81.81	83.72	90.29				9.47	7.56	0.99
143200.00		91.40	81.79	83.70	90.27				9.61	7.69	1.12
143100.00		91.50	81.77	83.69	90.26				9.73	7.81	1.24
143000.00	91.28	91.52	81.76	83.68	90.25	9.52	7.60	1.03	9.76	7.84	1.27
142900.00		91.36	81.75	83.67	90.24				9.62	7.69	1.12
142800.00		91.40	81.73	83.66	90.23				9.67	7.74	1.17
142700.00		91.45	81.72	83.65	90.22				9.72	7.79	1.22
142600.00		91.39	81.71	83.64	90.21				9.68	7.75	1.18
142500.00	90.66	91.21	81.70	83.63	90.21	8.96	7.03	0.45	9.51	7.58	1.00
142400.00		91.15	81.69	83.62	90.20				9.46	7.53	0.95
142300.00		91.19	81.67	83.61	90.19				9.51	7.58	1.00
142200.00		91.01	81.66	83.60	90.18				9.35	7.41	0.83
142100.00		90.99	81.65	83.59	90.17				9.34	7.40	0.82
142000.00	90.32	90.84	81.64	83.58	90.16	8.68	6.73	0.15	9.20	7.25	0.68
141900.00		91.08	81.63	83.57	90.15				9.45	7.51	0.93
141800.00		90.83	81.62	83.56	90.14				9.21	7.27	0.69
141700.00		90.86	81.60	83.55	90.13				9.25	7.30	0.72
141600.00		90.89	81.59	83.54	90.12				9.30	7.35	0.77
141500.00	90.38	91.06	81.58	83.53	90.11	8.80	6.85	0.27	9.48	7.53	0.95
141400.00		90.78	81.57	83.52	90.10				9.21	7.25	0.67
141300.00		90.72	81.55	83.51	90.09				9.17	7.21	0.63
141200.00		90.73	81.54	83.51	90.09				9.19	7.22	0.64
141100.00		90.47	81.53	83.50	90.08				8.94	6.98	0.40
141000.00	89.91	90.45	81.52	83.49	90.07	8.39	6.42	-0.16	8.93	6.97	0.39
140900.00		90.38	81.50	83.48	90.06				8.88	6.91	0.33
140800.00		90.61	81.49	83.47	90.05				9.12	7.15	0.57
140700.00		90.39	81.48	83.46	90.04				8.91	6.93	0.35
140600.00		90.55	81.47	83.45	90.03				9.08	7.10	0.52
140500.00	90.30	90.57	81.46	83.44	90.02	8.84	6.86	0.28	9.11	7.13	0.55
140400.00		90.07	81.45	83.43	90.01				8.62	6.63	0.06
140300.00		89.98	81.44	83.43	90.00				8.54	6.55	-0.03
140200.00		90.03	81.43	83.42	90.00				8.60	6.61	0.03
140100.00		90.02	81.42	83.41	89.99				8.59	6.60	0.03
140000.00	89.97	90.27	81.41	83.41	89.98	8.56	6.57	-0.01	8.86	6.86	0.29
139900.00		90.66	81.40	83.40	89.97				9.26	7.26	0.68
139800.00		90.22	81.39	83.39	89.97				8.82	6.83	0.25
139700.00		90.06	81.38	83.38	89.96				8.67	6.67	0.10
139600.00		89.87	81.38	83.38	89.95				8.49	6.49	-0.08
139500.00	89.77	89.96	81.37	83.37	89.94	8.41	6.40	-0.17	8.60	6.59	0.02
139400.00		89.73	81.36	83.36	89.94				8.37	6.37	-0.21
139300.00		89.59	81.35	83.36	89.93				8.24	6.23	-0.34
139200.00		89.78	81.34	83.35	89.92				8.44	6.44	-0.14
139100.00		89.73	81.33	83.34	89.91				8.40	6.38	-0.19
139000.00	89.62	89.78	81.32	83.33	89.91	8.30	6.28	-0.29	8.45	6.44	-0.13
138900.00		89.73	81.31	83.33	89.90				8.42	6.41	-0.17
138800.00		89.70	81.30	83.32	89.89				8.40	6.38	-0.19
138700.00		89.80	81.29	83.31	89.88				8.50	6.48	-0.09
138600.00		89.58	81.28	83.30	89.87				8.30	6.28	-0.29
138500.00	89.50	89.58	81.26	83.29	89.85	8.24	6.21	-0.36	8.32	6.29	-0.27
138400.00		89.38	81.24	83.27	89.84				8.14	6.11	-0.46
138300.00		89.39	81.22	83.26	89.82				8.17	6.14	-0.43
138200.00		89.20	81.21	83.24	89.81				8.00	5.96	-0.60
138100.00		89.46	81.19	83.23	89.79				8.27	6.23	-0.33
138000.00	89.39	89.38	81.17	83.21	89.77	8.22	6.18	-0.38	8.21	6.17	-0.39
137900.00		89.47	81.15	83.20	89.76				8.32	6.27	-0.29
137800.00		89.42	81.13	83.18	89.74				8.29	6.24	-0.32
137700.00		89.43	81.11	83.17	89.73				8.32	6.27	-0.29
137600.00		89.61	81.09	83.15	89.71				8.52	6.46	-0.09
137500.00	89.49	89.55	81.07	83.13	89.69	8.43	6.36	-0.19	8.48	6.42	-0.14
137400.00		89.56	81.05	83.11	89.67				8.52	6.45	-0.11
137300.00		89.35	81.02	83.10	89.65				8.33	6.25	-0.30
137200.00		89.27	81.00	83.08	89.63				8.27	6.19	-0.36
137100.00		89.41	80.98	83.06	89.61				8.44	6.35	-0.20
137000.00	89.34	89.38	80.96	83.04	89.59	8.39	6.30	-0.25	8.42	6.33	-0.22
136900.00		89.53	80.94	83.03	89.58				8.60	6.50	-0.04
136800.00		89.62	80.92	83.02	89.56				8.70	6.61	0.06
136700.00		89.27	80.91	83.00	89.55				8.36	6.26	-0.28
136600.00		89.37	80.89	82.99	89.53				8.48	6.39	-0.16
136500.00	89.34	89.57	80.87	82.97	89.51	8.46	6.36	-0.18	8.70	6.60	0.06
136400.00		89.36	80.86	82.96	89.50				8.50	6.40	-0.14
136300.00		89.30	80.84	82.94	89.48				8.46	6.36	-0.18
136200.00		89.63	80.82	82.93	89.46				8.81	6.70	0.17
136100.00		89.87	80.81	82.92	89.45				9.07	6.96	0.43
136000.00	89.55	89.96	80.77	82.89	89.42	8.78	6.66	0.13	9.18	7.07	0.54

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
135900.00		89.97	80.73	82.86	89.39				9.24	7.11	0.58
135800.00		89.80	80.68	82.82	89.35				9.12	6.98	0.45
135700.00		89.71	80.63	82.79	89.32				9.08	6.92	0.40
135600.00		89.44	80.58	82.76	89.28				8.85	6.68	0.16
135500.00	89.30	89.54	80.54	82.72	89.25	8.76	6.58	0.05	9.01	6.82	0.30
135400.00		89.67	80.49	82.69	89.21				9.18	6.98	0.46
135300.00		89.36	80.44	82.65	89.18				8.92	6.71	0.18
135200.00		89.49	80.40	82.62	89.14				9.09	6.87	0.34
135100.00		89.31	80.35	82.59	89.11				8.96	6.72	0.20
135000.00	89.27	89.34	80.30	82.55	89.07	8.96	6.71	0.19	9.04	6.79	0.27
134900.00		89.36	80.25	82.52	89.04				9.10	6.84	0.32
134800.00		89.61	80.21	82.49	89.01				9.40	7.13	0.61
134700.00		89.63	80.08	82.40	88.92				9.55	7.24	0.72
134600.00		89.10	79.88	82.25	88.78				9.22	6.84	0.31
134500.00	89.14	89.14	79.76	82.17	88.71	9.38	6.97	0.43	9.39	6.98	0.43
134400.00		89.17	79.73	82.15	88.69				9.44	7.01	0.47
134300.00		89.16	79.71	82.14	88.68				9.45	7.03	0.49
134200.00		89.19	79.68	82.12	88.66				9.50	7.07	0.53
134100.00		89.00	79.66	82.10	88.64				9.34	6.90	0.36
134000.00	89.45	89.34	79.64	82.09	88.63	9.81	7.36	0.82	9.71	7.26	0.72
133900.00		89.19	79.61	82.07	88.61				9.57	7.12	0.58
133800.00		89.01	79.59	82.05	88.59				9.43	6.96	0.42
133700.00		89.05	79.57	82.03	88.58				9.49	7.02	0.47
133600.00		88.85	79.54	82.02	88.56				9.31	6.83	0.29
133500.00	88.67	88.57	79.52	82.00	88.55	9.15	6.66	0.12	9.05	6.57	0.02
133400.00		88.58	79.49	81.98	88.53				9.09	6.60	0.06
133300.00		88.73	79.47	81.97	88.51				9.26	6.76	0.21
133200.00		88.81	79.45	81.95	88.50				9.36	6.86	0.31
133100.00		88.76	79.42	81.93	88.48				9.34	6.83	0.28
133000.00	88.95	88.95	79.40	81.92	88.46	9.55	7.03	0.49	9.55	7.03	0.48
132900.00		89.32	79.38	81.90	88.45				9.95	7.42	0.88
132800.00		89.59	79.35	81.88	88.43				10.24	7.71	1.16
132700.00		89.61	79.33	81.87	88.41				10.28	7.74	1.19
132600.00		90.02	79.30	81.85	88.40				10.72	8.17	1.62
132500.00	90.13	90.07	79.28	81.83	88.38	10.85	8.30	1.75	10.79	8.23	1.69
132400.00		91.23	79.26	81.82	88.37				11.97	9.41	2.87
132300.00		89.82	79.23	81.80	88.35				10.59	8.02	1.47
132200.00		89.09	79.22	81.79	88.34				9.87	7.30	0.75
132100.00		89.39	79.21	81.78	88.33				10.18	7.61	1.06
132000.00	89.40	89.45	79.20	81.77	88.32	10.20	7.63	1.08	10.25	7.68	1.13
131900.00		89.16	79.19	81.76	88.31				9.97	7.39	0.85
131800.00		89.29	79.18	81.76	88.30				10.11	7.53	0.99
131700.00		88.74	79.17	81.75	88.29				9.57	6.99	0.45
131600.00		88.46	79.16	81.74	88.28				9.30	6.72	0.18
131500.00	88.26	88.26	79.15	81.73	88.27	9.11	6.52	-0.02	9.11	6.53	-0.01
131400.00		88.26	79.14	81.73	88.27				9.12	6.54	0.00
131300.00		88.03	79.13	81.72	88.26				8.90	6.31	-0.23
131200.00		88.16	79.12	81.71	88.25				9.04	6.45	-0.08
131100.00		88.03	79.11	81.70	88.24				8.92	6.33	-0.21
131000.00	88.11	88.10	79.10	81.70	88.23	9.00	6.41	-0.12	9.00	6.41	-0.13
130900.00		87.93	79.09	81.69	88.22				8.83	6.24	-0.30
130800.00		88.31	79.08	81.68	88.21				9.22	6.63	0.09
130700.00		88.84	79.07	81.67	88.20				9.77	7.17	0.64
130600.00		88.79	79.05	81.66	88.18				9.75	7.14	0.61
130500.00	88.72	88.72	79.00	81.62	88.15	9.71	7.09	0.57	9.72	7.10	0.58
130400.00		88.71	78.97	81.60	88.12				9.74	7.11	0.59
130300.00		88.72	78.95	81.58	88.10				9.77	7.14	0.62
130200.00		88.78	78.93	81.57	88.08				9.85	7.21	0.69
130100.00		88.68	78.91	81.56	88.07				9.77	7.12	0.61
130000.00	88.56	88.73	78.89	81.54	88.05	9.66	7.01	0.50	9.84	7.19	0.68
129900.00		88.72	78.88	81.54	88.05				9.83	7.18	0.67
129800.00		88.87	78.88	81.53	88.04				9.99	7.34	0.83
129700.00		88.78	78.87	81.53	88.04				9.91	7.25	0.74
129600.00		88.72	78.87	81.52	88.03				9.85	7.19	0.69
129500.00	88.89	89.06	78.86	81.52	88.03	10.03	7.37	0.86	10.20	7.54	1.03
129400.00		89.39	78.86	81.51	88.02				10.53	7.87	1.37
129300.00		89.01	78.85	81.51	88.02				10.16	7.50	0.99
129200.00		89.04	78.85	81.51	88.01				10.20	7.54	1.03
129100.00		88.93	78.84	81.50	88.00				10.10	7.43	0.93
129000.00	88.83	88.92	78.83	81.50	88.00	9.99	7.33	0.83	10.08	7.42	0.92
128900.00		89.02	78.83	81.49	87.99				10.19	7.53	1.02
128800.00		88.97	78.82	81.49	87.99				10.15	7.49	0.98
128700.00		88.84	78.82	81.48	87.98				10.02	7.36	0.86
128600.00		88.73	78.81	81.48	87.98				9.92	7.25	0.75

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
128500.00	88.79	88.73	78.81	81.47	87.97	9.98	7.31	0.81	9.92	7.25	0.75
128400.00		88.55	78.80	81.47	87.97				9.75	7.08	0.58
128300.00		88.50	78.78	81.45	87.95				9.72	7.05	0.55
128200.00		88.34	78.76	81.44	87.93				9.58	6.90	0.40
128100.00		88.18	78.74	81.43	87.92				9.44	6.76	0.27
128000.00	88.24	88.27	78.72	81.41	87.90	9.52	6.83	0.34	9.55	6.86	0.37
127900.00		88.59	78.71	81.40	87.89				9.88	7.19	0.70
127800.00		88.31	78.71	81.40	87.89				9.60	6.91	0.42
127700.00		88.24	78.70	81.39	87.88				9.54	6.85	0.36
127600.00		88.44	78.69	81.39	87.87				9.75	7.05	0.57
127500.00	88.79	88.73	78.68	81.38	87.87	10.10	7.40	0.92	10.04	7.35	0.86
127400.00		88.77	78.68	81.38	87.86				10.10	7.40	0.91
127300.00		88.87	78.67	81.37	87.85				10.20	7.50	1.02
127200.00		88.78	78.66	81.36	87.85				10.12	7.42	0.93
127100.00		88.66	78.65	81.36	87.84				10.01	7.31	0.82
127000.00	88.83	88.76	78.65	81.35	87.83	10.18	7.47	0.99	10.12	7.41	0.93
126900.00		88.68	78.64	81.35	87.83				10.04	7.33	0.85
126800.00		88.61	78.63	81.34	87.82				9.98	7.27	0.79
126700.00		88.37	78.62	81.33	87.81				9.76	7.04	0.57
126600.00		88.38	78.60	81.32	87.80				9.78	7.06	0.58
126500.00	88.43	88.55	78.59	81.31	87.79	9.85	7.12	0.65	9.96	7.24	0.76
126400.00		88.64	78.57	81.30	87.77				10.07	7.34	0.86
126300.00		88.86	78.56	81.29	87.76				10.30	7.57	1.09
126200.00		88.64	78.54	81.28	87.75				10.10	7.37	0.89
126100.00		88.28	78.53	81.27	87.74				9.76	7.01	0.54
126000.00	87.99	87.99	78.51	81.26	87.73	9.48	6.74	0.26	9.48	6.73	0.26
125900.00		88.45	78.50	81.25	87.72				9.96	7.21	0.74
125800.00		88.25	78.49	81.24	87.71				9.76	7.01	0.54
125700.00		87.83	78.48	81.23	87.70				9.35	6.59	0.12
125600.00		88.03	78.47	81.23	87.69				9.56	6.80	0.33
125500.00	87.85	87.83	78.46	81.22	87.69	9.39	6.63	0.16	9.37	6.61	0.14
125400.00	87.88	87.82	78.45	81.21	87.68	9.43	6.66	0.20	9.37	6.60	0.14
125300.00		87.67	78.44	81.20	87.67				9.23	6.47	0.00
125200.00		87.89	78.43	81.20	87.66				9.45	6.69	0.22
125100.00		87.56	78.42	81.19	87.65				9.13	6.37	-0.10
125000.00	87.48	87.50	78.41	81.18	87.65	9.06	6.29	-0.17	9.09	6.32	-0.15
124900.00		87.80	78.40	81.18	87.64				9.39	6.62	0.16
124800.00		88.34	78.39	81.17	87.63				9.95	7.18	0.71
124700.00		89.69	78.38	81.16	87.62				11.31	8.53	2.07
124600.00		89.35	78.37	81.15	87.61				10.98	8.20	1.74
124500.00	88.54	88.62	78.36	81.15	87.60	10.17	7.39	0.93	10.26	7.48	1.02
124400.00		88.24	78.35	81.14	87.59				9.89	7.10	0.65
124300.00		87.98	78.34	81.13	87.58				9.64	6.86	0.40
124200.00		87.85	78.32	81.12	87.57				9.53	6.74	0.28
124100.00	87.50	87.65	78.31	81.11	87.55	9.19	6.39	-0.06	9.34	6.55	0.10
124000.00	88.04	88.16	78.30	81.10	87.54	9.74	6.94	0.49	9.86	7.06	0.61
123900.00		87.95	78.28	81.09	87.53				9.66	6.86	0.42
123800.00		87.82	78.27	81.08	87.52				9.54	6.74	0.30
123700.00		88.01	78.26	81.07	87.51				9.76	6.95	0.51
123600.00		88.13	78.24	81.06	87.49				9.88	7.07	0.64
123500.00	87.52	87.78	78.23	81.05	87.48	9.29	6.48	0.04	9.54	6.73	0.30
123400.00		87.74	78.22	81.04	87.47				9.52	6.70	0.27
123300.00		87.47	78.21	81.03	87.46				9.26	6.44	0.01
123200.00		87.45	78.20	81.02	87.45				9.25	6.43	0.00
123100.00		87.55	78.19	81.01	87.44				9.36	6.54	0.11
123000.00	87.55	87.70	78.18	81.00	87.43	9.37	6.54	0.12	9.52	6.69	0.27
122900.00		87.80	78.17	81.00	87.42				9.64	6.81	0.39
122800.00		87.81	78.16	80.99	87.41				9.65	6.82	0.40
122700.00		87.60	78.15	80.98	87.40				9.45	6.62	0.20
122600.00		87.44	78.14	80.97	87.39				9.30	6.47	0.05
122500.00	87.28	87.38	78.13	80.96	87.38	9.15	6.32	-0.10	9.25	6.42	0.00
122400.00		87.06	78.12	80.96	87.37				8.94	6.11	-0.31
122300.00		87.22	78.11	80.95	87.36				9.11	6.27	-0.14
122200.00		87.21	78.10	80.94	87.35				9.11	6.27	-0.14
122100.00		87.14	78.09	80.93	87.34				9.04	6.20	-0.21
122000.00	86.99	87.08	78.08	80.92	87.33	8.92	6.07	-0.33	9.01	6.16	-0.24
121900.00		87.18	78.06	80.91	87.31				9.12	6.27	-0.14
121800.00		86.91	78.04	80.89	87.30				8.87	6.02	-0.38
121700.00		86.63	78.02	80.88	87.28				8.61	5.75	-0.65
121600.00	86.96	86.88	78.00	80.87	87.26	8.95	6.09	-0.30	8.87	6.01	-0.39
121500.00	87.09	87.14	77.99	80.85	87.25	9.11	6.24	-0.15	9.15	6.28	-0.11
121400.00		86.92	77.96	80.83	87.22				8.97	6.09	-0.29
121300.00		86.99	77.92	80.81	87.18				9.07	6.19	-0.19
121200.00		86.78	77.88	80.78	87.15				8.89	6.00	-0.37

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
121100.00		86.81	77.85	80.75	87.12				8.96	6.06	-0.31
121000.00	86.92	86.99	77.82	80.73	87.09	9.10	6.19	-0.17	9.18	6.27	-0.09
120900.00		87.34	77.80	80.71	87.07				9.54	6.63	0.27
120800.00		87.40	77.78	80.70	87.05				9.62	6.70	0.35
120700.00		87.45	77.76	80.68	87.03				9.69	6.77	0.42
120600.00		87.56	77.74	80.67	87.01				9.81	6.89	0.55
120500.00	87.31	87.59	77.72	80.65	86.99	9.58	6.65	0.32	9.87	6.94	0.60
120400.00		87.69	77.70	80.64	86.97				9.99	7.05	0.72
120300.00		87.72	77.69	80.62	86.95				10.03	7.10	0.77
120200.00		88.11	77.67	80.61	86.93				10.44	7.50	1.18
120100.00		87.82	77.65	80.59	86.91				10.17	7.23	0.91
120000.00	87.81	87.95	77.63	80.58	86.89	10.18	7.23	0.92	10.32	7.37	1.06
119900.00		87.98	77.61	80.56	86.87				10.37	7.41	1.11
119800.00		87.74	77.59	80.55	86.85				10.14	7.19	0.88
119700.00		87.45	77.58	80.54	86.83				9.88	6.92	0.62
119600.00		87.48	77.56	80.52	86.81				9.92	6.96	0.67
119500.00	87.27	87.40	77.54	80.51	86.80	9.73	6.76	0.47	9.86	6.89	0.60
119400.00		87.38	77.52	80.49	86.78				9.86	6.89	0.60
119300.00		87.39	77.50	80.48	86.76				9.88	6.91	0.63
119200.00		87.76	77.49	80.46	86.74				10.27	7.30	1.02
119100.00		87.51	77.47	80.45	86.72				10.04	7.06	0.79
119000.00	87.55	87.58	77.45	80.44	86.70	10.10	7.12	0.85	10.13	7.15	0.88
118900.00		87.67	77.43	80.42	86.68				10.24	7.25	0.99
118800.00		87.69	77.42	80.41	86.67				10.27	7.28	1.02
118700.00		87.50	77.41	80.40	86.66				10.09	7.10	0.84
118600.00		87.53	77.40	80.40	86.65				10.13	7.13	0.88
118500.00	87.35	87.26	77.39	80.39	86.64	9.96	6.96	0.72	9.87	6.87	0.62
118400.00		87.39	77.38	80.38	86.62				10.01	7.01	0.76
118300.00		87.16	77.37	80.37	86.61				9.79	6.79	0.54
118200.00		87.18	77.36	80.36	86.60				9.83	6.82	0.58
118100.00		87.56	77.34	80.35	86.59				10.22	7.21	0.97
118000.00	87.59	87.55	77.33	80.35	86.58	10.25	7.24	1.01	10.22	7.21	0.97
117900.00		87.67	77.32	80.34	86.57				10.35	7.33	1.10
117800.00		87.65	77.31	80.33	86.56				10.34	7.32	1.09
117700.00		87.19	77.30	80.32	86.54				9.89	6.87	0.65
117600.00		87.35	77.29	80.31	86.53				10.06	7.03	0.81
117500.00	87.32	87.38	77.28	80.30	86.52	10.04	7.01	0.80	10.10	7.08	0.86
117400.00		87.22	77.27	80.29	86.51				9.95	6.93	0.71
117300.00		87.33	77.26	80.29	86.50				10.07	7.04	0.83
117200.00		87.20	77.25	80.28	86.49				9.95	6.92	0.71
117100.00		87.09	77.23	80.27	86.47				9.86	6.82	0.62
117000.00	87.05	87.07	77.22	80.26	86.46	9.84	6.80	0.60	9.85	6.81	0.61
116900.00		87.06	77.20	80.24	86.44				9.85	6.81	0.61
116800.00		87.07	77.19	80.23	86.43				9.88	6.84	0.64
116700.00		86.94	77.18	80.22	86.42				9.76	6.72	0.52
116600.00		86.90	77.16	80.21	86.40				9.73	6.68	0.49
116500.00	87.19	87.19	77.15	80.20	86.39	10.04	6.99	0.80	10.04	6.99	0.80
116400.00		86.88	77.14	80.19	86.38				9.74	6.69	0.50
116300.00		87.07	77.12	80.18	86.36				9.95	6.89	0.71
116200.00		87.10	77.11	80.17	86.35				9.99	6.93	0.75
116100.00		86.96	77.10	80.16	86.34				9.87	6.81	0.63
116000.00	87.08	86.94	77.08	80.15	86.32	9.99	6.93	0.75	9.85	6.79	0.61
115900.00		87.10	77.07	80.14	86.31				10.03	6.96	0.79
115800.00		87.25	77.05	80.12	86.29				10.21	7.13	0.97
115700.00		87.28	77.01	80.09	86.25				10.27	7.18	1.03
115600.00		86.99	76.97	80.06	86.21				10.02	6.93	0.78
115500.00	86.91	86.97	76.93	80.04	86.17	9.98	6.88	0.74	10.04	6.93	0.80
115400.00		87.01	76.89	80.01	86.13				10.12	7.00	0.88
115300.00		87.06	76.86	79.99	86.11				10.19	7.07	0.95
115200.00		86.88	76.84	79.97	86.08				10.04	6.91	0.80
115100.00		86.91	76.82	79.96	86.06				10.09	6.95	0.85
115000.00	86.77	86.77	76.80	79.94	86.04	9.97	6.83	0.73	9.97	6.83	0.73
114900.00		86.56	76.78	79.92	86.02				9.78	6.64	0.54
114800.00		86.83	76.76	79.90	86.00				10.07	6.92	0.83
114700.00		86.96	76.73	79.89	85.98				10.23	7.07	0.98
114600.00		86.85	76.71	79.87	85.96				10.14	6.98	0.89
114500.00	86.80	86.64	76.69	79.85	85.94	10.11	6.94	0.86	9.95	6.78	0.70
114400.00		87.13	76.67	79.84	85.92				10.46	7.29	1.21
114300.00		87.08	76.65	79.82	85.90				10.43	7.26	1.18
114200.00		86.80	76.63	79.81	85.88				10.17	6.99	0.92
114100.00		86.55	76.61	79.79	85.86				9.94	6.76	0.69
114000.00	86.53	86.45	76.59	79.78	85.84	9.94	6.75	0.69	9.86	6.67	0.61
113900.00		86.80	76.57	79.76	85.82				10.23	7.04	0.98
113800.00		86.84	76.55	79.75	85.80				10.29	7.09	1.04

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
113700.00		87.03	76.53	79.73	85.78				10.51	7.31	1.26
113600.00		86.73	76.51	79.71	85.76				10.22	7.01	0.97
113500.00	86.43	86.48	76.49	79.70	85.74	9.95	6.73	0.70	9.99	6.78	0.74
113400.00		86.40	76.47	79.68	85.72				9.93	6.72	0.68
113300.00		85.74	76.45	79.67	85.70				9.29	6.07	0.04
113200.00		85.52	76.43	79.65	85.68				9.09	5.86	-0.16
113100.00		80.21	76.41	79.64	85.66				3.79	0.57	-5.45
113000.00	85.72	85.49	76.40	79.63	85.64	9.32	6.09	0.07	9.09	5.86	-0.15
112900.00		87.68	76.38	79.62	85.63				11.30	8.06	2.06
112800.00		87.64	76.37	79.60	85.61				11.27	8.04	2.03
112700.00		87.46	76.35	79.59	85.59				11.11	7.87	1.87
112600.00		86.27	76.33	79.58	85.57				9.94	6.69	0.70
112500.00	86.08	85.97	76.32	79.57	85.55	9.77	6.52	0.53	9.65	6.40	0.41
112400.00		86.16	76.30	79.55	85.54				9.86	6.60	0.62
112300.00		86.70	76.28	79.54	85.52				10.41	7.15	1.18
112200.00		86.55	76.27	79.53	85.50				10.28	7.02	1.05
112100.00		86.40	76.25	79.51	85.48				10.14	6.88	0.91
112000.00	86.27	86.08	76.23	79.50	85.46	10.04	6.77	0.81	9.85	6.58	0.62
111900.00		86.04	76.22	79.49	85.45				9.82	6.55	0.60
111800.00		86.11	76.20	79.48	85.43				9.91	6.64	0.68
111700.00		86.25	76.19	79.46	85.41				10.07	6.79	0.84
111600.00		86.09	76.17	79.45	85.39				9.92	6.64	0.70
111500.00	86.08	85.86	76.15	79.44	85.38	9.92	6.64	0.70	9.71	6.42	0.49
111400.00		85.77	76.14	79.43	85.36				9.64	6.35	0.42
111300.00		85.73	76.10	79.40	85.34				9.63	6.33	0.39
111200.00		85.65	76.05	79.36	85.33				9.61	6.30	0.33
111100.00		85.93	75.99	79.32	85.31				9.94	6.61	0.62
111000.00	86.06	86.11	75.94	79.28	85.30	10.12	6.78	0.76	10.17	6.84	0.82
110900.00		86.26	75.89	79.24	85.28				10.37	7.02	0.98
110800.00		86.18	75.86	79.21	85.27				10.32	6.97	0.91
110700.00		86.25	75.88	79.24	85.25				10.37	7.01	1.00
110600.00		86.30	75.87	79.24	85.24				10.43	7.07	1.06
110500.00	86.04	85.95	75.87	79.23	85.23	10.16	6.80	0.80	10.07	6.71	0.71
110400.00		85.97	75.87	79.23	85.23				10.11	6.74	0.75
110300.00		86.15	75.86	79.23	85.22				10.29	6.92	0.93
110200.00		85.92	75.86	79.23	85.22				10.06	6.70	0.71
110100.00		85.81	75.86	79.23	85.21				9.95	6.58	0.60
110000.00	85.80	85.76	75.86	79.23	85.21	9.95	6.58	0.60	9.91	6.54	0.56
109900.00		85.73	75.85	79.22	85.20				9.88	6.51	0.53
109800.00		85.98	75.85	79.22	85.19				10.13	6.76	0.79
109700.00		87.29	75.85	79.22	85.19				11.44	8.07	2.10
109600.00		86.52	75.84	79.22	85.18				10.68	7.30	1.34
109500.00	86.38	86.15	75.84	79.22	85.18	10.54	7.17	1.21	10.31	6.93	0.97
109400.00		86.45	75.84	79.21	85.17				10.61	7.24	1.28
109300.00	86.44	86.30	75.83	79.21	85.16	10.60	7.22	1.27	10.46	7.08	1.13
109200.00		86.49	75.83	79.21	85.16				10.66	7.28	1.33
109100.00		86.47	75.82	79.20	85.15				10.65	7.26	1.32
109000.00	86.43	86.35	75.81	79.20	85.14	10.61	7.23	1.28	10.53	7.15	1.20
108900.00		86.23	75.80	79.19	85.13				10.42	7.04	1.09
108800.00		86.10	75.79	79.18	85.13				10.31	6.92	0.97
108700.00		86.34	75.78	79.18	85.12				10.55	7.16	1.22
108600.00		86.32	75.78	79.17	85.11				10.54	7.15	1.21
108500.00	86.36	86.54	75.77	79.16	85.10	10.60	7.20	1.26	10.77	7.37	1.43
108400.00		86.37	75.76	79.16	85.09				10.61	7.21	1.27
108300.00		86.34	75.75	79.15	85.09				10.59	7.18	1.25
108200.00		86.09	75.74	79.14	85.08				10.35	6.94	1.01
108100.00		85.84	75.73	79.14	85.07				10.11	6.70	0.77
108000.00	85.89	85.90	75.72	79.13	85.06	10.16	6.75	0.82	10.18	6.77	0.84
107900.00		85.71	75.72	79.13	85.06				9.99	6.58	0.65
107800.00		86.16	75.72	79.13	85.06				10.44	7.03	1.10
107700.00		86.10	75.72	79.13	85.06				10.38	6.97	1.04
107600.00		86.29	75.72	79.13	85.06				10.57	7.16	1.23
107500.00	85.46	85.67	75.72	79.13	85.06	9.74	6.33	0.40	9.95	6.54	0.61
107400.00		85.98	75.72	79.13	85.06				10.26	6.85	0.92
107300.00	85.79	86.09	75.72	79.13	85.06	10.07	6.66	0.73	10.37	6.96	1.03
107200.00		86.24	75.72	79.13	85.06				10.52	7.11	1.18
107100.00		86.40	75.72	79.13	85.06				10.68	7.27	1.34
107000.00	85.69	86.02	75.72	79.13	85.06	9.97	6.56	0.63	10.30	6.89	0.96
106900.00		85.85	75.72	79.13	85.05				10.13	6.72	0.79
106800.00		86.45	75.71	79.11	85.04				10.74	7.33	1.41
106700.00		86.40	75.70	79.10	85.02				10.70	7.30	1.38
106600.00		86.34	75.69	79.09	85.01				10.65	7.25	1.33
106500.00	86.07	86.54	75.68	79.08	84.99	10.39	6.99	1.08	10.86	7.46	1.54
106400.00		86.18	75.67	79.07	84.98				10.51	7.11	1.20

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
106300.00		86.32	75.66	79.06	84.96				10.66	7.26	1.36
106200.00		86.60	75.65	79.05	84.95				10.95	7.55	1.65
106100.00		86.59	75.64	79.03	84.93				10.95	7.55	1.66
106000.00	85.59	86.43	75.63	79.02	84.92	9.96	6.57	0.67	10.80	7.41	1.51
105900.00		86.34	75.62	79.01	84.90				10.72	7.32	1.43
105800.00		86.83	75.61	79.00	84.89				11.23	7.83	1.95
105700.00		86.90	75.60	78.99	84.87				11.30	7.91	2.03
105600.00		86.66	75.58	78.97	84.85				11.07	7.68	1.80
105500.00	86.49	87.37	75.56	78.95	84.82	10.92	7.53	1.66	11.81	8.42	2.55
105400.00		87.26	75.54	78.93	84.79				11.72	8.33	2.47
105300.00		87.19	75.53	78.91	84.76				11.67	8.28	2.43
105200.00		86.96	75.51	78.88	84.73				11.46	8.08	2.23
105100.00		86.60	75.49	78.86	84.70				11.11	7.73	1.89
105000.00	85.65	86.33	75.47	78.84	84.67	10.19	6.81	0.98	10.87	7.49	1.66
104900.00		85.94	75.45	78.82	84.64				10.49	7.12	1.29
104800.00		86.04	75.43	78.80	84.61				10.61	7.24	1.42
104700.00		85.73	75.41	78.77	84.58				10.33	6.96	1.15
104600.00		85.79	75.39	78.75	84.55				10.41	7.04	1.24
104500.00	85.27	85.55	75.37	78.73	84.52	9.90	6.54	0.75	10.19	6.83	1.03
104400.00		86.28	75.35	78.71	84.50				10.93	7.57	1.79
104300.00		86.58	75.33	78.69	84.47				11.25	7.89	2.11
104200.00		84.51	75.32	78.67	84.44				9.20	5.84	0.07
104100.00		85.02	75.30	78.65	84.42				9.72	6.37	0.60
104000.00	85.18	85.62	75.28	78.63	84.39	9.89	6.55	0.78	10.34	6.99	1.23
103900.00		85.70	75.27	78.61	84.37				10.43	7.09	1.33
103800.00		85.24	75.25	78.59	84.34				9.99	6.65	0.90
103700.00		85.25	75.24	78.57	84.32				10.02	6.68	0.94
103600.00		85.19	75.22	78.55	84.29				9.97	6.64	0.90
103500.00	84.68	85.14	75.21	78.54	84.27	9.47	6.14	0.41	9.93	6.60	0.87
103400.00		85.71	75.19	78.52	84.24				10.52	7.19	1.47
103300.00		85.31	75.18	78.50	84.22				10.13	6.81	1.09
103200.00		85.15	75.16	78.49	84.20				9.99	6.67	0.96
103100.00		84.53	75.14	78.47	84.18				9.39	6.06	0.36
103000.00	82.21	82.50	75.13	78.45	84.15	7.08	3.76	-1.94	7.38	4.05	-1.65
102900.00		82.52	75.11	78.44	84.13				7.41	4.08	-1.61
102800.00		83.24	75.10	78.42	84.11				8.14	4.82	-0.87
102700.00		88.83	75.08	78.40	84.09				13.75	10.43	4.74
102600.00		94.10	75.07	78.39	84.06				19.04	15.72	10.04
102500.00	90.55	91.42	75.05	78.36	84.03	15.51	12.19	6.52	16.38	13.06	7.39
102400.00		84.14	75.03	78.34	84.00				9.11	5.80	0.14
102300.00		85.02	75.01	78.32	83.98				10.01	6.70	1.05
102200.00		84.79	75.00	78.31	83.96				9.79	6.48	0.83
102100.00		85.07	74.99	78.30	83.94				10.08	6.77	1.13
102000.00	84.02	84.49	74.98	78.28	83.92	9.04	5.74	0.10	9.51	6.21	0.57
101900.00		84.08	74.97	78.27	83.90				9.11	5.81	0.18
101800.00		84.76	74.96	78.26	83.88				9.80	6.50	0.87
101700.00		84.80	74.95	78.25	83.86				9.85	6.55	0.94
101600.00		84.36	74.94	78.23	83.85				9.42	6.12	0.51
101500.00	84.16	84.41	74.93	78.22	83.83	9.24	5.94	0.34	9.49	6.19	0.58
101400.00		84.67	74.91	78.21	83.81				9.75	6.46	0.86
101300.00		84.36	74.90	78.19	83.79				9.45	6.16	0.56
101200.00		84.57	74.89	78.18	83.77				9.67	6.39	0.79
101100.00		84.32	74.88	78.17	83.75				9.44	6.15	0.57
101000.00		84.23	74.87	78.16	83.74				9.35	6.07	0.49
100900.00		84.29	74.86	78.14	83.72				9.42	6.14	0.57
100800.00		86.18	74.85	78.13	83.70				11.33	8.05	2.48
100700.00		87.83	74.73	77.96	83.42				13.09	9.86	4.40
100600.00		84.19	74.63	77.82	83.17				9.56	6.37	1.02
100500.00	83.28	83.26	74.63	77.82	83.17	8.65	5.46	0.10	8.63	5.44	0.09
100400.00		83.30	74.63	77.82	83.17				8.67	5.48	0.12
100300.00		83.02	74.63	77.82	83.18				8.39	5.20	-0.16
100200.00		82.97	74.63	77.82	83.18				8.33	5.14	-0.21
100100.00		82.97	74.63	77.82	83.18				8.33	5.14	-0.21
100000.00	83.14	83.05	74.64	77.83	83.18	8.50	5.31	-0.04	8.42	5.23	-0.13
99900.00		82.99	74.64	77.83	83.18				8.35	5.16	-0.20
99800.00		83.06	74.64	77.83	83.18				8.42	5.23	-0.13
99700.00		82.95	74.64	77.83	83.19				8.31	5.12	-0.24
99600.00		83.13	74.64	77.83	83.19				8.49	5.30	-0.06
99500.00	83.04	83.06	74.64	77.83	83.19	8.40	5.21	-0.15	8.42	5.23	-0.13
99400.00		82.91	74.62	77.80	83.15				8.29	5.11	-0.24
99300.00		82.89	74.60	77.77	83.11				8.30	5.12	-0.21
99200.00		82.95	74.57	77.75	83.07				8.38	5.20	-0.12
99100.00		82.90	74.55	77.72	83.03				8.34	5.18	-0.13
99000.00	82.85	83.10	74.53	77.70	82.99	8.31	5.15	-0.14	8.57	5.40	0.11

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
98900.00		82.98	74.51	77.67	82.95				8.47	5.31	0.03
98800.00		82.78	74.49	77.64	82.91				8.29	5.14	-0.13
98700.00		82.90	74.47	77.62	82.87				8.43	5.28	0.03
98600.00		83.00	74.45	77.59	82.83				8.55	5.41	0.17
98500.00	82.76	82.86	74.43	77.57	82.79	8.34	5.20	-0.02	8.43	5.30	0.07
98400.00		82.86	74.41	77.54	82.75				8.46	5.33	0.12
98300.00		82.93	74.39	77.51	82.71				8.54	5.41	0.22
98200.00		82.75	74.37	77.49	82.67				8.38	5.26	0.08
98100.00		82.61	74.33	77.44	82.60				8.28	5.17	0.01
98000.00	82.62	82.65	74.30	77.39	82.53	8.32	5.22	0.09	8.35	5.25	0.12
97900.00		82.63	74.26	77.34	82.45				8.37	5.28	0.18
97800.00		82.58	74.22	77.30	82.37				8.36	5.28	0.21
97700.00		82.45	74.18	77.25	82.30				8.27	5.21	0.16
97600.00		82.46	74.15	77.20	82.22				8.31	5.26	0.24
97500.00	82.28	82.24	74.11	77.15	82.14	8.17	5.13	0.13	8.13	5.09	0.09
97400.00		82.20	74.07	77.10	82.06				8.13	5.10	0.14
97300.00		82.19	74.04	77.05	81.99				8.15	5.14	0.20
97200.00		82.13	74.00	77.00	81.91				8.13	5.13	0.22
97100.00		81.96	73.96	76.95	81.83				8.00	5.01	0.12
97000.00	81.99	81.99	73.92	76.91	81.76	8.07	5.08	0.23	8.07	5.08	0.23
96900.00		81.86	73.92	76.91	81.76				7.94	4.95	0.10
96800.00		81.80	73.92	76.91	81.76				7.88	4.89	0.04
96700.00		81.27	73.92	76.91	81.76				7.35	4.36	-0.49
96600.00	82.17	82.42	73.92	76.91	81.76	8.25	5.26	0.41	8.50	5.51	0.66
96500.00	82.57	82.53	73.92	76.91	81.76	8.65	5.66	0.81	8.61	5.62	0.77
96400.00		82.37	73.92	76.91	81.76				8.45	5.46	0.61
96300.00		82.48	73.92	76.91	81.76				8.56	5.57	0.72
96200.00		82.37	73.92	76.91	81.76				8.45	5.46	0.61
96100.00		82.25	73.92	76.91	81.76				8.33	5.34	0.49
96000.00	82.08	82.21	73.92	76.91	81.76	8.16	5.17	0.32	8.29	5.30	0.45
95900.00		82.07	73.92	76.91	81.76				8.15	5.16	0.31
95800.00		82.11	73.92	76.91	81.76				8.19	5.20	0.35
95700.00		82.23	73.88	76.87	81.72				8.35	5.36	0.51
95600.00		82.22	73.84	76.82	81.67				8.38	5.40	0.55
95500.00	81.96	82.08	73.79	76.77	81.62	8.17	5.19	0.34	8.29	5.30	0.46
95400.00		82.29	73.74	76.73	81.57				8.54	5.56	0.72
95300.00		82.26	73.70	76.68	81.52				8.57	5.59	0.74
95200.00		82.26	73.65	76.63	81.47				8.61	5.63	0.79
95100.00		82.37	73.60	76.58	81.42				8.77	5.79	0.95
95000.00		82.24	73.56	76.53	81.37				8.68	5.71	0.86
94900.00		82.22	73.51	76.48	81.33				8.71	5.74	0.90
94800.00		82.28	73.46	76.44	81.28				8.82	5.85	1.01
94700.00		82.11	73.42	76.39	81.23				8.69	5.72	0.88
94600.00		82.12	73.37	76.34	81.19				8.75	5.78	0.93
94500.00		82.32	73.32	76.30	81.14				8.99	6.02	1.17
94400.00		82.16	73.28	76.25	81.10				8.89	5.91	1.06
94300.00		82.45	73.23	76.21	81.06				9.22	6.24	1.39
94200.00		82.20	73.18	76.16	81.02				9.01	6.03	1.18
94100.00		82.08	73.13	76.12	80.97				8.95	5.96	1.11
94000.00		82.11	73.09	76.08	80.93				9.02	6.04	1.18
93900.00		82.30	73.04	76.03	80.89				9.26	6.27	1.41
93800.00		82.28	72.99	75.99	80.85				9.28	6.29	1.43
93700.00		82.27	72.95	75.94	80.81				9.33	6.33	1.47
93600.00		82.34	72.90	75.90	80.76				9.44	6.44	1.57
93500.00		82.19	72.85	75.85	80.72				9.34	6.34	1.47
93400.00		82.57	72.82	75.82	80.70				9.75	6.75	1.87
93300.00		82.43	72.79	75.79	80.67				9.63	6.63	1.76
93200.00		82.52	72.76	75.77	80.64				9.76	6.76	1.88
93100.00		82.57	72.73	75.74	80.62				9.84	6.83	1.95
93000.00		82.71	72.70	75.71	80.59				10.01	7.00	2.12
92900.00		82.68	72.67	75.68	80.57				10.01	7.00	2.12
92800.00		82.33	72.64	75.65	80.54				9.69	6.68	1.79
92700.00		81.80	72.61	75.62	80.52				9.19	6.18	1.28
92600.00		82.59	72.57	75.59	80.49				10.02	7.00	2.11
92500.00	81.91	82.37	72.54	75.57	80.46	9.37	6.35	1.45	9.83	6.81	1.91
92400.00		82.74	72.51	75.54	80.44				10.23	7.20	2.30
92300.00		82.54	72.48	75.51	80.41				10.06	7.03	2.13
92200.00		82.57	72.45	75.48	80.39				10.11	7.09	2.18
92100.00		82.59	72.42	75.45	80.36				10.17	7.14	2.23
92000.00	82.20	82.65	72.40	75.43	80.34	9.80	6.77	1.86	10.25	7.22	2.30
91900.00		82.78	72.37	75.41	80.32				10.41	7.37	2.46
91800.00		82.93	72.35	75.39	80.30				10.59	7.55	2.63
91700.00		83.12	72.32	75.36	80.28				10.79	7.75	2.84
91600.00		82.92	72.30	75.34	80.26				10.62	7.58	2.66

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
91500.00	82.15	82.80	72.27	75.32	80.24	9.88	6.83	1.91	10.52	7.48	2.56
91400.00		82.69	72.25	75.30	80.22				10.44	7.39	2.47
91300.00		82.49	72.22	75.28	80.20				10.27	7.21	2.29
91200.00		82.79	72.20	75.25	80.18				10.60	7.54	2.62
91100.00		82.39	72.17	75.23	80.16				10.22	7.16	2.24
91000.00	81.64	82.20	72.15	75.21	80.14	9.49	6.43	1.50	10.05	6.99	2.07
90900.00		82.24	72.13	75.19	80.11				10.11	7.05	2.12
90800.00		82.30	72.10	75.17	80.09				10.20	7.14	2.21
90700.00		82.14	72.08	75.14	80.07				10.07	7.00	2.07
90600.00		82.53	72.05	75.12	80.05				10.48	7.41	2.47
90500.00	82.44	82.76	72.03	75.10	80.03	10.41	7.33	2.40	10.73	7.66	2.73
90400.00		82.60	72.01	75.08	80.02				10.59	7.51	2.58
90300.00		82.39	71.99	75.06	80.00				10.40	7.32	2.39
90200.00		82.36	71.97	75.04	79.98				10.39	7.32	2.38
90100.00		81.99	71.95	75.02	79.96				10.05	6.97	2.03
90000.00	81.48	81.69	71.92	75.00	79.94	9.56	6.48	1.54	9.76	6.68	1.75
89900.00		81.52	71.90	74.98	79.92				9.61	6.53	1.59
89800.00		81.64	71.88	74.96	79.90				9.76	6.67	1.73
89700.00		81.68	71.86	74.94	79.89				9.82	6.74	1.80
89600.00		81.93	71.84	74.92	79.87				10.09	7.01	2.07
89500.00	81.67	81.82	71.82	74.90	79.85	9.85	6.77	1.82	10.00	6.92	1.97
89400.00		82.01	71.80	74.88	79.83				10.22	7.13	2.18
89300.00		81.98	71.77	74.86	79.81				10.21	7.12	2.17
89200.00		82.17	71.75	74.84	79.79				10.42	7.33	2.38
89100.00		82.07	71.73	74.82	79.77				10.33	7.24	2.29
89000.00	82.20	82.13	71.72	74.81	79.76	10.48	7.39	2.44	10.42	7.33	2.38
88900.00		82.30	71.70	74.79	79.74				10.61	7.51	2.56
88800.00		82.09	71.68	74.77	79.72				10.41	7.32	2.37
88700.00		81.94	71.66	74.76	79.71				10.28	7.19	2.24
88600.00		81.68	71.64	74.74	79.69				10.04	6.94	1.99
88500.00	81.45	81.59	71.63	74.72	79.67	9.83	6.73	1.78	9.96	6.87	1.92
88400.00		81.54	71.61	74.70	79.65				9.93	6.83	1.88
88300.00		81.65	71.59	74.69	79.64				10.06	6.96	2.01
88200.00	81.60	81.67	71.57	74.67	79.62	10.02	6.93	1.98	10.10	7.00	2.05
88100.00		81.52	71.56	74.65	79.60				9.96	6.86	1.91
88000.00	81.50	81.55	71.54	74.64	79.59	9.96	6.86	1.91	10.01	6.91	1.96
87900.00		81.94	71.52	74.62	79.57				10.42	7.32	2.37
87800.00		82.00	71.50	74.60	79.55				10.50	7.40	2.45
87700.00		82.02	71.49	74.58	79.53				10.53	7.43	2.48
87600.00		81.86	71.47	74.57	79.52				10.39	7.29	2.34
87500.00	81.67	81.95	71.45	74.55	79.50	10.22	7.12	2.17	10.50	7.40	2.46
87400.00		82.23	71.43	74.53	79.48				10.79	7.69	2.75
87300.00		82.27	71.42	74.51	79.46				10.86	7.76	2.81
87200.00		82.31	71.40	74.50	79.44				10.91	7.81	2.87
87100.00		82.18	71.38	74.48	79.42				10.80	7.70	2.76
87000.00	82.15	82.27	71.37	74.46	79.41	10.78	7.68	2.74	10.90	7.81	2.86
86900.00		82.49	71.35	74.44	79.39				11.14	8.05	3.10
86800.00		82.51	71.33	74.43	79.37				11.18	8.09	3.14
86700.00		82.57	71.31	74.41	79.35				11.25	8.16	3.22
86600.00		82.52	71.30	74.39	79.33				11.22	8.13	3.19
86500.00	82.18	82.24	71.28	74.37	79.31	10.90	7.80	2.86	10.96	7.87	2.93
86400.00		81.80	71.26	74.35	79.30				10.53	7.44	2.50
86300.00		81.87	71.25	74.34	79.28				10.62	7.53	2.59
86200.00		81.70	71.23	74.32	79.26				10.47	7.38	2.44
86100.00		81.36	71.19	74.28	79.23				10.17	7.08	2.14
86000.00	81.08	81.23	71.16	74.25	79.19	9.92	6.83	1.89	10.07	6.97	2.03
85900.00		81.22	71.12	74.22	79.16				10.10	7.00	2.06
85800.00		81.89	71.09	74.19	79.13				10.80	7.70	2.76
85700.00		81.92	71.05	74.15	79.10				10.87	7.77	2.82
85600.00		82.14	71.02	74.12	79.07				11.12	8.02	3.07
85500.00	81.94	82.00	70.99	74.09	79.04	10.95	7.85	2.90	11.02	7.92	2.97
85400.00		82.14	70.95	74.06	79.01				11.18	8.08	3.13
85300.00		81.59	70.92	74.02	78.98				10.67	7.57	2.61
85200.00		81.92	70.88	73.99	78.94				11.03	7.93	2.97
85100.00		81.51	70.85	73.96	78.91				10.66	7.55	2.60
85000.00	81.47	81.51	70.81	73.93	78.88	10.66	7.54	2.59	10.70	7.59	2.63
84900.00		81.53	70.78	73.89	78.85				10.75	7.64	2.68
84800.00		81.86	70.74	73.86	78.82				11.12	8.00	3.04
84700.00		82.43	70.71	73.83	78.79				11.72	8.60	3.64
84600.00		82.42	70.67	73.79	78.75				11.76	8.64	3.68
84500.00	82.28	82.50	70.55	73.68	78.64	11.73	8.60	3.64	11.95	8.82	3.86
84400.00		81.97	70.44	73.57	78.53				11.54	8.40	3.44
84300.00		81.88	70.32	73.47	78.43				11.55	8.41	3.45
84200.00		81.57	70.21	73.36	78.32				11.36	8.21	3.25

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
84100.00		81.78	70.10	73.26	78.22				11.68	8.52	3.56
84000.00		81.75	69.97	73.13	78.09				11.78	8.62	3.66
83900.00		81.44	69.84	73.01	77.97				11.60	8.43	3.47
83800.00		81.27	69.71	72.88	77.84				11.55	8.39	3.43
83700.00		81.00	69.61	72.78	77.74				11.39	8.22	3.26
83600.00		80.96	69.55	72.72	77.68				11.42	8.24	3.28
83500.00		80.58	69.48	72.66	77.62				11.10	7.93	2.97
83400.00		80.54	69.42	72.59	77.55				11.12	7.95	2.99
83300.00		80.36	69.35	72.53	77.49				11.01	7.83	2.87
83200.00		80.34	69.29	72.47	77.43				11.05	7.87	2.91
83100.00		80.17	69.23	72.40	77.36				10.94	7.76	2.80
83000.00	80.35	80.19	69.18	72.36	77.32	11.17	7.99	3.03	11.01	7.83	2.87
82900.00		80.45	69.14	72.32	77.28				11.31	8.13	3.17
82800.00		79.77	69.10	72.29	77.25				10.67	7.48	2.52
82700.00		79.49	69.06	72.25	77.21				10.43	7.24	2.28
82600.00		79.31	69.02	72.21	77.17				10.29	7.10	2.14
82500.00	79.40	79.23	68.98	72.18	77.14	10.41	7.22	2.26	10.25	7.05	2.09
82400.00		79.16	68.94	72.14	77.10				10.22	7.02	2.06
82300.00		79.07	68.90	72.10	77.06				10.17	6.97	2.01
82200.00		79.11	68.87	72.07	77.03				10.24	7.04	2.08
82100.00		79.18	68.84	72.04	77.00				10.34	7.14	2.18
82000.00	78.97	78.92	68.81	72.02	76.98	10.15	6.95	1.99	10.11	6.90	1.94
81900.00		78.69	68.78	71.99	76.95				9.90	6.70	1.74
81800.00		78.53	68.75	71.96	76.92				9.78	6.57	1.61
81700.00		78.83	68.72	71.93	76.89				10.10	6.89	1.93
81600.00		78.70	68.70	71.91	76.87				10.01	6.80	1.84
81500.00	78.99	79.00	68.67	71.88	76.84	10.32	7.11	2.15	10.34	7.12	2.16
81400.00		79.03	68.64	71.85	76.81				10.39	7.18	2.22
81300.00		79.24	68.61	71.82	76.78				10.63	7.42	2.46
81200.00		79.21	68.58	71.80	76.76				10.63	7.41	2.45
81100.00		79.15	68.55	71.77	76.73				10.60	7.38	2.42
81000.00	79.02	79.00	68.52	71.74	76.70	10.50	7.28	2.32	10.47	7.26	2.30
80900.00		78.80	68.49	71.71	76.67				10.31	7.09	2.13
80800.00		79.06	68.47	71.69	76.65				10.59	7.37	2.41
80700.00		78.79	68.45	71.67	76.63				10.34	7.12	2.16
80600.00		78.90	68.44	71.66	76.62				10.46	7.24	2.28
80500.00	78.66	78.68	68.42	71.64	76.60	10.24	7.02	2.06	10.26	7.04	2.08
80400.00		78.62	68.40	71.62	76.58				10.22	7.00	2.04
80300.00		79.07	68.38	71.60	76.56				10.69	7.47	2.51
80200.00		79.05	68.36	71.58	76.54				10.69	7.47	2.51
80100.00		79.19	68.34	71.56	76.52				10.84	7.62	2.66
80000.00	79.16	79.16	68.32	71.54	76.50	10.84	7.62	2.66	10.83	7.61	2.65
79900.00		79.04	68.31	71.53	76.49				10.74	7.52	2.56
79800.00		79.11	68.29	71.51	76.47				10.82	7.60	2.64
79700.00		79.12	68.27	71.49	76.45				10.85	7.63	2.67
79600.00		79.12	68.25	71.47	76.43				10.87	7.65	2.69
79500.00	79.24	79.04	68.23	71.45	76.41	11.01	7.79	2.83	10.81	7.59	2.63
79400.00		79.21	68.21	71.43	76.39				11.00	7.78	2.82
79300.00		79.24	68.18	71.40	76.36				11.06	7.84	2.88
79200.00		79.04	68.15	71.38	76.34				10.89	7.66	2.70
79100.00		79.31	68.13	71.35	76.31				11.18	7.96	3.00
79000.00	79.16	79.26	68.10	71.33	76.28	11.06	7.84	2.88	11.16	7.93	2.98
78900.00		79.16	68.08	71.30	76.26				11.09	7.86	2.90
78800.00		79.16	68.05	71.28	76.23				11.11	7.88	2.93
78700.00		78.83	68.02	71.25	76.21				10.81	7.58	2.62
78600.00		78.73	68.00	71.23	76.18				10.74	7.50	2.55
78500.00	78.85	78.87	67.97	71.21	76.16	10.88	7.64	2.69	10.90	7.66	2.71
78400.00		78.38	67.95	71.18	76.13				10.43	7.20	2.25
78300.00		78.22	67.92	71.16	76.11				10.30	7.06	2.11
78200.00		78.69	67.89	71.13	76.08				10.79	7.56	2.60
78100.00		79.21	67.87	71.11	76.06				11.34	8.10	3.15
78000.00	79.14	79.17	67.84	71.08	76.03	11.30	8.06	3.11	11.34	8.10	3.15
77900.00		78.93	67.81	71.05	75.99				11.12	7.88	2.93
77800.00		78.74	67.78	71.02	75.96				10.96	7.72	2.78
77700.00		78.61	67.74	70.98	75.93				10.87	7.63	2.69
77600.00		78.13	67.71	70.95	75.89				10.42	7.18	2.24
77500.00	78.24	78.56	67.68	70.92	75.86	10.56	7.32	2.38	10.88	7.64	2.70
77400.00		78.72	67.65	70.89	75.82				11.07	7.83	2.90
77300.00		78.41	67.62	70.86	75.79				10.79	7.55	2.62
77200.00		78.45	67.58	70.82	75.75				10.87	7.63	2.70
77100.00		78.45	67.55	70.79	75.72				10.90	7.66	2.73
77000.00	78.27	78.40	67.52	70.76	75.69	10.75	7.51	2.59	10.88	7.64	2.71
76900.00		78.36	67.49	70.73	75.65				10.87	7.63	2.71
76800.00		77.99	67.46	70.70	75.62				10.53	7.29	2.37

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
76700.00		78.15	67.44	70.68	75.59				10.72	7.48	2.56
76600.00		78.16	67.42	70.66	75.57				10.74	7.50	2.59
76500.00	78.16	78.36	67.39	70.63	75.55	10.77	7.53	2.62	10.96	7.72	2.81
76400.00		78.30	67.37	70.61	75.52				10.93	7.69	2.78
76300.00		78.18	67.35	70.59	75.50				10.83	7.59	2.68
76200.00		77.93	67.33	70.57	75.48				10.60	7.36	2.45
76100.00		77.73	67.31	70.55	75.46				10.42	7.18	2.27
76000.00	77.74	77.78	67.29	70.53	75.43	10.45	7.21	2.31	10.49	7.25	2.35
75900.00		77.94	67.27	70.51	75.41				10.67	7.43	2.53
75800.00		78.17	67.25	70.49	75.39				10.93	7.69	2.79
75700.00		77.96	67.22	70.46	75.36				10.74	7.50	2.60
75600.00		77.99	67.20	70.44	75.34				10.79	7.55	2.65
75500.00	78.05	78.11	67.18	70.42	75.32	10.87	7.63	2.74	10.92	7.68	2.79
75400.00		77.90	67.16	70.40	75.29				10.73	7.49	2.60
75300.00		77.51	67.13	70.37	75.26				10.37	7.13	2.24
75200.00		77.55	67.10	70.34	75.22				10.45	7.21	2.33
75100.00		77.61	67.06	70.30	75.18				10.55	7.31	2.43
75000.00	77.85	77.95	67.02	70.26	75.14	10.83	7.59	2.71	10.93	7.69	2.81
74900.00		78.00	66.99	70.23	75.10				11.01	7.77	2.90
74800.00		77.77	66.95	70.19	75.06				10.81	7.57	2.70
74700.00		77.39	66.92	70.16	75.02				10.48	7.24	2.37
74600.00		77.48	66.88	70.12	74.98				10.60	7.36	2.50
74500.00	77.32	77.57	66.84	70.08	74.95	10.48	7.24	2.37	10.72	7.48	2.62
74400.00		77.54	66.81	70.05	74.91				10.73	7.49	2.63
74300.00		77.56	66.77	70.01	74.87				10.79	7.55	2.70
74200.00		77.31	66.73	69.97	74.83				10.58	7.34	2.49
74100.00		77.54	66.70	69.94	74.79				10.84	7.60	2.75
74000.00	77.29	77.46	66.67	69.91	74.75	10.62	7.38	2.53	10.79	7.56	2.71
73900.00		77.56	66.64	69.88	74.72				10.92	7.68	2.84
73800.00		77.62	66.61	69.84	74.68				11.01	7.77	2.93
73700.00		77.62	66.58	69.81	74.65				11.04	7.80	2.97
73600.00		77.30	66.55	69.78	74.62				10.76	7.52	2.69
73500.00	77.19	77.43	66.52	69.75	74.58	10.67	7.43	2.60	10.91	7.68	2.85
73400.00		77.50	66.49	69.72	74.55				11.01	7.77	2.95
73300.00		77.60	66.46	69.69	74.51				11.14	7.91	3.09
73200.00		77.46	66.43	69.66	74.48				11.04	7.80	2.98
73100.00		77.51	66.39	69.63	74.44				11.12	7.89	3.07
73000.00	77.39	77.43	66.36	69.60	74.41	11.03	7.80	2.98	11.07	7.83	3.02
72900.00		77.11	66.33	69.56	74.38				10.77	7.54	2.73
72800.00		76.75	66.31	69.54	74.35				10.44	7.22	2.41
72700.00		76.81	66.29	69.52	74.33				10.52	7.29	2.49
72600.00		77.04	66.27	69.50	74.30				10.77	7.54	2.73
72500.00	77.12	77.13	66.25	69.48	74.28	10.87	7.64	2.83	10.88	7.65	2.84
72400.00		77.09	66.23	69.46	74.26				10.86	7.63	2.83
72300.00		76.99	66.21	69.44	74.24				10.78	7.55	2.75
72200.00		77.05	66.19	69.42	74.22				10.86	7.63	2.83
72100.00		76.88	66.17	69.39	74.19				10.71	7.49	2.69
72000.00	76.96	77.10	66.15	69.37	74.17	10.81	7.58	2.78	10.95	7.72	2.93
71900.00		76.86	66.13	69.35	74.15				10.73	7.50	2.71
71800.00		76.76	66.11	69.33	74.13				10.65	7.43	2.64
71700.00		76.54	66.09	69.31	74.10				10.45	7.22	2.43
71600.00		76.49	66.07	69.29	74.08				10.42	7.20	2.41
71500.00	76.82	76.85	66.05	69.27	74.06	10.77	7.55	2.76	10.80	7.58	2.79
71400.00		76.69	66.02	69.25	74.03				10.67	7.45	2.66
71300.00		76.50	66.00	69.22	74.01				10.50	7.28	2.49
71200.00		76.81	65.97	69.20	73.98				10.83	7.61	2.83
71100.00		76.72	65.95	69.17	73.96				10.77	7.55	2.76
71000.00	76.58	76.64	65.92	69.15	73.93	10.66	7.43	2.65	10.72	7.50	2.71
70900.00		76.68	65.90	69.12	73.90				10.79	7.56	2.78
70800.00		76.66	65.87	69.10	73.88				10.79	7.57	2.79
70700.00		76.49	65.85	69.07	73.85				10.64	7.42	2.64
70600.00		76.76	65.82	69.05	73.82				10.94	7.71	2.94
70500.00	76.46	76.72	65.79	69.02	73.80	10.66	7.44	2.66	10.92	7.70	2.92
70400.00		76.80	65.77	69.00	73.77				11.03	7.80	3.03
70300.00		76.66	65.74	68.97	73.74				10.92	7.69	2.92
70200.00		76.95	65.72	68.95	73.72				11.23	8.01	3.23
70100.00		76.74	65.69	68.92	73.69				11.05	7.82	3.05
70000.00	76.54	76.82	65.67	68.90	73.67	10.87	7.64	2.87	11.16	7.93	3.16
69900.00		76.76	65.64	68.87	73.64				11.12	7.89	3.12
69800.00		76.26	65.62	68.85	73.61				10.64	7.41	2.64
69700.00		76.11	65.59	68.82	73.59				10.52	7.28	2.52
69600.00		76.10	65.57	68.80	73.56				10.54	7.30	2.54
69500.00	75.96	75.87	65.54	68.78	73.54	10.42	7.18	2.43	10.33	7.10	2.34
69400.00		75.85	65.52	68.75	73.51				10.33	7.10	2.34

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
69300.00		75.76	65.49	68.73	73.48				10.27	7.03	2.28
69200.00		76.05	65.47	68.71	73.46				10.58	7.34	2.59
69100.00		76.03	65.44	68.68	73.43				10.58	7.35	2.60
69000.00	76.39	76.27	65.42	68.66	73.40	10.97	7.73	2.99	10.85	7.61	2.87
68900.00		75.97	65.40	68.63	73.38				10.58	7.34	2.60
68800.00		75.97	65.37	68.61	73.35				10.60	7.36	2.62
68700.00		76.07	65.35	68.59	73.33				10.72	7.48	2.74
68600.00		76.06	65.32	68.56	73.30				10.74	7.50	2.76
68500.00	76.26	76.19	65.29	68.53	73.27	10.97	7.73	2.99	10.90	7.66	2.92
68400.00		75.78	65.27	68.51	73.24				10.51	7.27	2.53
68300.00		75.91	65.24	68.48	73.21				10.67	7.43	2.69
68200.00		75.89	65.21	68.45	73.19				10.68	7.44	2.71
68100.00		75.67	65.19	68.43	73.16				10.48	7.24	2.51
68000.00	75.64	75.53	65.16	68.40	73.13	10.48	7.24	2.51	10.37	7.13	2.40
67900.00		75.43	65.13	68.37	73.10				10.30	7.06	2.33
67800.00		75.50	65.11	68.35	73.07				10.39	7.15	2.42
67700.00		75.47	65.08	68.32	73.04				10.39	7.15	2.43
67600.00		75.58	65.05	68.29	73.02				10.53	7.29	2.57
67500.00	75.54	75.48	65.03	68.27	72.99	10.51	7.27	2.55	10.46	7.22	2.49
67400.00		75.29	65.00	68.24	72.96				10.29	7.05	2.33
67300.00		75.45	64.97	68.21	72.93				10.47	7.23	2.52
67200.00		75.48	64.95	68.19	72.91				10.53	7.29	2.58
67100.00		75.21	64.93	68.17	72.88				10.28	7.04	2.33
67000.00	75.07	74.78	64.91	68.15	72.86	10.16	6.92	2.21	9.87	6.63	1.92
66900.00		74.69	64.88	68.12	72.83				9.81	6.57	1.86
66800.00		74.92	64.86	68.10	72.80				10.06	6.82	2.12
66700.00		74.65	64.84	68.08	72.78				9.81	6.57	1.87
66600.00		74.92	64.81	68.05	72.75				10.10	6.86	2.17
66500.00	75.04	74.85	64.79	68.03	72.73	10.25	7.01	2.31	10.06	6.82	2.13
66400.00		74.78	64.77	68.01	72.70				10.01	6.77	2.08
66300.00		74.64	64.75	67.99	72.68				9.89	6.65	1.96
66200.00		74.59	64.72	67.96	72.65				9.87	6.63	1.95
66100.00		74.28	64.70	67.94	72.62				9.58	6.34	1.66
66000.00	74.34	74.21	64.68	67.92	72.60	9.66	6.42	1.74	9.52	6.28	1.61
65900.00		74.52	64.67	67.91	72.58				9.85	6.61	1.93
65800.00		74.42	64.65	67.89	72.56				9.77	6.53	1.86
65700.00		74.28	64.63	67.87	72.55				9.64	6.40	1.73
65600.00		74.19	64.62	67.86	72.53				9.58	6.34	1.67
65500.00	74.51	74.06	64.60	67.84	72.51	9.90	6.66	2.00	9.46	6.22	1.55
65400.00		73.94	64.59	67.83	72.49				9.35	6.11	1.44
65300.00		73.87	64.57	67.81	72.47				9.30	6.06	1.40
65200.00		74.05	64.55	67.79	72.46				9.50	6.26	1.59
65100.00		74.00	64.54	67.78	72.44				9.46	6.22	1.56
65000.00	74.29	73.83	64.52	67.76	72.42	9.77	6.53	1.87	9.31	6.07	1.41
64900.00		73.91	64.51	67.75	72.40				9.41	6.17	1.51
64800.00		73.68	64.49	67.73	72.38				9.19	5.95	1.29
64700.00		73.28	64.47	67.71	72.36				8.80	5.56	0.91
64600.00		74.08	64.46	67.70	72.35				9.62	6.38	1.74
64500.00	74.31	74.02	64.45	67.68	72.33	9.86	6.62	1.98	9.57	6.33	1.69
64400.00		73.49	64.43	67.67	72.31				9.06	5.82	1.18
64300.00		73.58	64.42	67.65	72.29				9.16	5.92	1.29
64200.00		73.57	64.41	67.64	72.28				9.17	5.93	1.30
64100.00		73.40	64.39	67.62	72.26				9.00	5.77	1.14
64000.00	73.11	72.77	64.38	67.61	72.24	8.73	5.50	0.87	8.39	5.16	0.53
63900.00		72.76	64.37	67.59	72.22				8.40	5.17	0.54
63800.00		72.82	64.35	67.58	72.20				8.47	5.24	0.61
63700.00		72.78	64.34	67.56	72.19				8.44	5.22	0.60
63600.00		72.74	64.33	67.55	72.17				8.41	5.19	0.57
63500.00	72.89	72.41	64.31	67.53	72.15	8.58	5.36	0.74	8.09	4.87	0.26
63400.00		72.15	64.30	67.52	72.13				7.85	4.63	0.02
63300.00		72.24	64.29	67.51	72.11				7.95	4.73	0.12
63200.00		72.15	64.27	67.49	72.10				7.87	4.66	0.05
63100.00		72.13	64.26	67.48	72.08				7.87	4.66	0.05
63000.00	72.42	71.98	64.25	67.46	72.06	8.18	4.96	0.36	7.73	4.52	-0.09
62900.00		72.14	64.23	67.45	72.05				7.91	4.69	0.09
62800.00		72.08	64.22	67.43	72.03				7.86	4.65	0.05
62700.00		72.02	64.21	67.42	72.01				7.82	4.61	0.01
62600.00		71.96	64.19	67.40	72.00				7.77	4.56	-0.03
62500.00	72.30	71.92	64.18	67.39	71.98	8.12	4.91	0.32	7.74	4.53	-0.06
62400.00		72.32	64.17	67.37	71.96				8.15	4.94	0.36
62300.00		72.39	64.15	67.36	71.94				8.23	5.03	0.44
62200.00		72.03	64.14	67.34	71.93				7.89	4.69	0.11
62100.00		72.08	64.13	67.33	71.91				7.96	4.76	0.17
62000.00	72.29	72.11	64.11	67.31	71.89	8.18	4.98	0.40	8.00	4.80	0.22

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
61900.00		72.15	64.10	67.30	71.88				8.05	4.85	0.27
61800.00		71.99	64.09	67.29	71.86				7.90	4.70	0.12
61700.00		71.65	64.08	67.28	71.85				7.57	4.37	-0.20
61600.00		71.41	64.07	67.27	71.84				7.35	4.15	-0.42
61500.00	71.66	71.40	64.05	67.25	71.82	7.60	4.40	-0.17	7.35	4.15	-0.42
61400.00		71.49	64.04	67.24	71.81				7.45	4.25	-0.31
61300.00		71.65	64.03	67.23	71.79				7.62	4.42	-0.15
61200.00		71.56	64.02	67.22	71.78				7.55	4.35	-0.21
61100.00		71.49	64.01	67.21	71.76				7.48	4.28	-0.27
61000.00	71.55	71.53	63.99	67.19	71.75	7.56	4.36	-0.20	7.54	4.34	-0.22
60900.00		71.47	63.98	67.18	71.73				7.49	4.29	-0.26
60800.00		71.18	63.97	67.17	71.72				7.21	4.01	-0.54
60700.00		71.14	63.96	67.16	71.70				7.18	3.98	-0.57
60600.00		71.13	63.95	67.15	71.69				7.18	3.98	-0.56
60500.00	71.19	70.95	63.93	67.13	71.68	7.26	4.06	-0.48	7.01	3.81	-0.73
60400.00		71.20	63.92	67.12	71.66				7.28	4.08	-0.46
60300.00		71.24	63.91	67.11	71.65				7.33	4.13	-0.41
60200.00		71.58	63.90	67.10	71.64				7.68	4.48	-0.06
60100.00		71.30	63.89	67.09	71.63				7.41	4.21	-0.32
60000.00	71.68	71.40	63.88	67.08	71.62	7.80	4.60	0.07	7.52	4.32	-0.21
59900.00		71.65	63.87	67.07	71.60				7.78	4.58	0.05
59800.00		71.54	63.86	67.06	71.59				7.68	4.49	-0.05
59700.00		71.13	63.85	67.04	71.58				7.28	4.09	-0.45
59600.00		70.78	63.84	67.03	71.57				6.94	3.74	-0.79
59500.00	71.06	70.75	63.83	67.02	71.56	7.23	4.04	-0.49	6.92	3.73	-0.81
59400.00		70.93	63.82	67.01	71.54				7.12	3.92	-0.61
59300.00		70.83	63.81	67.00	71.53				7.02	3.83	-0.71
59200.00		70.88	63.80	66.99	71.52				7.08	3.89	-0.65
59100.00		70.99	63.79	66.98	71.51				7.20	4.01	-0.52
59000.00	71.24	70.86	63.78	66.97	71.50	7.46	4.27	-0.26	7.09	3.90	-0.63
58900.00		70.84	63.77	66.96	71.49				7.08	3.89	-0.64
58800.00		70.78	63.76	66.95	71.48				7.02	3.83	-0.69
58700.00		70.47	63.75	66.94	71.47				6.72	3.53	-1.00
58600.00		70.24	63.74	66.93	71.46				6.50	3.31	-1.22
58500.00	70.83	70.41	63.74	66.93	71.45	7.09	3.90	-0.63	6.67	3.48	-1.05
58400.00		70.52	63.73	66.92	71.45				6.79	3.60	-0.93
58300.00		70.51	63.72	66.91	71.44				6.79	3.60	-0.92
58200.00		70.46	63.72	66.91	71.43				6.75	3.56	-0.97
58100.00		70.51	63.71	66.90	71.42				6.80	3.61	-0.92
58000.00	70.91	70.48	63.70	66.89	71.42	7.20	4.01	-0.51	6.78	3.59	-0.94
57900.00		70.53	63.70	66.89	71.41				6.83	3.64	-0.88
57800.00		70.50	63.69	66.88	71.40				6.81	3.62	-0.90
57700.00		70.50	63.68	66.87	71.39				6.82	3.63	-0.89
57600.00		70.54	63.68	66.87	71.39				6.86	3.67	-0.85
57500.00	70.75	70.55	63.67	66.86	71.38	7.07	3.88	-0.63	6.88	3.69	-0.83
57400.00		70.30	63.67	66.86	71.37				6.63	3.44	-1.07
57300.00		70.32	63.66	66.85	71.36				6.66	3.47	-1.04
57200.00		70.13	63.65	66.84	71.36				6.47	3.28	-1.23
57100.00		70.02	63.65	66.84	71.35				6.37	3.18	-1.33
57000.00	70.25	70.08	63.64	66.83	71.34	6.61	3.42	-1.09	6.44	3.25	-1.27
56900.00		70.27	63.63	66.82	71.33				6.64	3.45	-1.06
56800.00		70.34	63.62	66.81	71.32				6.72	3.53	-0.98
56700.00		70.48	63.62	66.81	71.31				6.86	3.67	-0.84
56600.00		70.60	63.61	66.80	71.30				6.99	3.80	-0.71
56500.00	70.94	70.57	63.60	66.79	71.29	7.34	4.15	-0.35	6.97	3.78	-0.72
56400.00		70.58	63.59	66.78	71.29				6.98	3.79	-0.71
56300.00		70.50	63.58	66.77	71.28				6.92	3.73	-0.77
56200.00		70.47	63.58	66.77	71.27				6.90	3.71	-0.79
56100.00		70.53	63.57	66.76	71.26				6.96	3.77	-0.73
56000.00	70.77	70.27	63.56	66.75	71.25	7.21	4.02	-0.48	6.71	3.52	-0.98
55900.00		69.95	63.55	66.74	71.24				6.40	3.21	-1.29
55800.00		69.83	63.54	66.73	71.23				6.28	3.09	-1.40
55700.00		69.61	63.53	66.72	71.22				6.07	2.88	-1.61
55600.00		69.67	63.53	66.72	71.21				6.15	2.96	-1.53
55500.00	70.19	69.68	63.52	66.71	71.20	6.67	3.48	-1.01	6.16	2.97	-1.52
55400.00		69.70	63.51	66.70	71.19				6.19	3.01	-1.48
55300.00		69.73	63.50	66.68	71.17				6.24	3.05	-1.44
55200.00		69.94	63.48	66.67	71.16				6.46	3.27	-1.22
55100.00		70.20	63.47	66.66	71.15				6.73	3.54	-0.95
55000.00	70.91	70.32	63.46	66.65	71.14	7.45	4.26	-0.23	6.86	3.68	-0.81
54900.00		70.42	63.45	66.63	71.12				6.97	3.78	-0.71
54800.00		70.16	63.44	66.62	71.11				6.72	3.54	-0.95
54700.00		70.10	63.43	66.61	71.10				6.67	3.49	-1.00
54600.00		70.25	63.41	66.59	71.08				6.84	3.66	-0.83

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
54500.00	70.60	70.26	63.40	66.58	71.06	7.20	4.02	-0.46	6.86	3.68	-0.80
54400.00		70.07	63.38	66.56	71.05				6.69	3.51	-0.97
54300.00		70.13	63.37	66.55	71.03				6.76	3.58	-0.90
54200.00		69.90	63.35	66.53	71.01				6.55	3.37	-1.11
54100.00		69.88	63.34	66.52	70.99				6.54	3.36	-1.12
54000.00	70.38	69.97	63.33	66.51	70.98	7.06	3.88	-0.59	6.64	3.46	-1.01
53900.00		69.94	63.31	66.49	70.96				6.62	3.44	-1.02
53800.00		69.92	63.30	66.48	70.94				6.62	3.44	-1.02
53700.00		70.22	63.28	66.46	70.92				6.94	3.76	-0.70
53600.00		70.31	63.27	66.45	70.91				7.05	3.87	-0.59
53500.00	70.22	69.99	63.25	66.43	70.89	6.96	3.78	-0.68	6.74	3.56	-0.90
53400.00		69.87	63.24	66.42	70.88				6.63	3.45	-1.01
53300.00		70.08	63.23	66.41	70.87				6.85	3.67	-0.79
53200.00		70.23	63.22	66.39	70.85				7.01	3.83	-0.63
53100.00		70.12	63.21	66.38	70.84				6.92	3.74	-0.72
53000.00	70.56	70.58	63.19	66.36	70.82	7.37	4.20	-0.26	7.39	4.22	-0.24
52900.00		70.54	63.18	66.35	70.81				7.36	4.19	-0.27
52800.00		70.57	63.17	66.34	70.80				7.41	4.24	-0.22
52700.00		70.39	63.16	66.33	70.78				7.23	4.06	-0.39
52600.00		70.07	63.15	66.32	70.77				6.92	3.75	-0.71
52500.00	70.23	69.99	63.14	66.31	70.76	7.10	3.93	-0.53	6.86	3.69	-0.77
52400.00		69.97	63.13	66.30	70.75				6.84	3.67	-0.78
52300.00		69.83	63.11	66.28	70.73				6.71	3.54	-0.91
52200.00		69.69	63.10	66.27	70.72				6.58	3.41	-1.03
52100.00		69.63	63.09	66.26	70.71				6.53	3.36	-1.08
52000.00	70.24	69.97	63.08	66.25	70.69	7.15	3.98	-0.46	6.89	3.72	-0.73
51900.00		70.14	63.07	66.24	70.68				7.07	3.90	-0.54
51800.00		69.99	63.06	66.23	70.67				6.93	3.76	-0.68
51700.00		69.98	63.05	66.22	70.66				6.93	3.76	-0.68
51600.00		70.05	63.04	66.21	70.65				7.00	3.83	-0.60
51500.00	71.20	70.07	63.04	66.20	70.64	8.16	5.00	0.56	7.04	3.87	-0.56
51400.00		70.59	63.03	66.19	70.63				7.56	4.40	-0.03
51300.00		70.76	63.02	66.18	70.62				7.74	4.57	0.14
51200.00		70.09	63.01	66.17	70.60				7.08	3.92	-0.51
51100.00			63.00	66.16	70.59						
51000.00			62.99	66.15	70.58						
50900.00			62.98	66.14	70.57						
50800.00			62.98	66.14	70.56						
50700.00			62.97	66.13	70.55						
50600.00			62.96	66.12	70.54						
50500.00			62.95	66.11	70.53						
50400.00			62.94	66.10	70.52						
50300.00			62.93	66.09	70.51						
50200.00			62.92	66.08	70.49						
50100.00			62.91	66.07	70.48						
50000.00			62.91	66.06	70.47						
49900.00			62.90	66.05	70.46						
49800.00			62.89	66.04	70.45						
49700.00			62.88	66.03	70.44						
49600.00			62.83	65.98	70.38						
49500.00			62.78	65.92	70.32						
49400.00			62.73	65.87	70.26						
49300.00			62.67	65.81	70.19						
49200.00			62.62	65.75	70.12						
49100.00			62.56	65.69	70.05						
49000.00			62.50	65.63	69.98						
48900.00			62.44	65.57	69.92						
48800.00			62.37	65.51	69.85						
48700.00			62.20	65.34	69.67						
48600.00			62.03	65.16	69.47						
48500.00			61.92	65.04	69.35						
48400.00			61.86	64.98	69.28						
48300.00			61.79	64.92	69.21						
48200.00			61.73	64.86	69.14						
48100.00			61.67	64.79	69.07						
48000.00			61.64	64.76	69.04						
47900.00			61.62	64.73	69.01						
47800.00		68.78	61.59	64.70	68.97				7.19	4.07	-0.19
47700.00		68.75	61.56	64.67	68.94				7.19	4.08	-0.19
47600.00		68.74	61.53	64.64	68.91				7.21	4.10	-0.16
47500.00	70.15	69.31	61.51	64.61	68.87	8.65	5.54	1.28	7.81	4.70	0.44
47400.00		68.72	61.48	64.58	68.84				7.24	4.13	-0.12
47300.00		68.64	61.45	64.55	68.81				7.19	4.09	-0.16
47200.00		68.39	61.42	64.53	68.77				6.97	3.87	-0.38

STAR BEND AREA

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
47100.00		68.09	61.39	64.50	68.74				6.70	3.60	-0.65
47000.00	68.41	67.75	61.37	64.47	68.71	7.04	3.94	-0.30	6.38	3.28	-0.96
46900.00		67.53	61.34	64.44	68.67				6.19	3.09	-1.14
46800.00		67.76	61.31	64.40	68.64				6.45	3.35	-0.88
46700.00		67.45	61.28	64.37	68.61				6.17	3.07	-1.16
46600.00		67.43	61.25	64.34	68.57				6.17	3.08	-1.15
46500.00	67.87	67.50	61.23	64.31	68.54	6.65	3.56	-0.67	6.28	3.19	-1.04
46400.00		67.46	61.20	64.28	68.51				6.26	3.17	-1.05
46300.00	67.97	67.41	61.17	64.25	68.47	6.80	3.72	-0.50	6.24	3.16	-1.07
46200.00		67.43	61.14	64.22	68.44				6.29	3.21	-1.01
46100.00		67.41	61.11	64.19	68.41				6.29	3.22	-1.00
46000.00	68.11	67.60	61.09	64.16	68.37	7.02	3.95	-0.26	6.51	3.44	-0.77
45900.00		67.63	61.06	64.13	68.34				6.58	3.50	-0.70
45800.00		67.75	61.03	64.10	68.30				6.72	3.65	-0.55
45700.00		67.89	61.00	64.07	68.27				6.89	3.82	-0.38
45600.00		68.07	60.97	64.04	68.23				7.10	4.03	-0.17
45500.00	68.05	67.71	60.94	64.01	68.20	7.11	4.04	-0.14	6.77	3.70	-0.48
45400.00		67.61	60.91	63.98	68.16				6.69	3.63	-0.56
45300.00		67.31	60.89	63.95	68.13				6.42	3.36	-0.82
45200.00		67.39	60.86	63.92	68.09				6.54	3.47	-0.70
45100.00		67.36	60.83	63.89	68.06				6.53	3.47	-0.70
45000.00	67.91	67.78	60.79	63.85	68.01	7.12	4.06	-0.10	6.98	3.93	-0.23
44900.00		67.87	60.76	63.81	67.97				7.11	4.06	-0.10
44800.00		67.37	60.72	63.77	67.92				6.65	3.60	-0.55
44700.00		67.13	60.69	63.73	67.88				6.44	3.40	-0.74
44600.00		67.11	60.65	63.69	67.83				6.45	3.42	-0.72
44500.00	67.26	66.98	60.62	63.65	67.78	6.64	3.61	-0.52	6.36	3.33	-0.81
44400.00		67.02	60.58	63.61	67.74				6.43	3.41	-0.72
44300.00		67.19	60.55	63.57	67.69				6.64	3.62	-0.51
44200.00		66.97	60.51	63.53	67.65				6.46	3.45	-0.67
44100.00		67.23	60.48	63.49	67.60				6.75	3.75	-0.37
44000.00	67.43	67.38	60.44	63.45	67.56	6.98	3.98	-0.13	6.93	3.93	-0.18
43900.00		67.47	60.41	63.41	67.51				7.06	4.07	-0.04
43800.00		67.25	60.38	63.37	67.46				6.88	3.88	-0.21
43700.00		67.29	60.34	63.33	67.42				6.95	3.96	-0.13
43600.00		66.96	60.31	63.29	67.37				6.65	3.67	-0.41
43500.00	66.95	66.79	60.27	63.25	67.33	6.68	3.71	-0.37	6.52	3.54	-0.53
43400.00		66.71	60.24	63.21	67.28				6.47	3.50	-0.57
43300.00		67.21	60.20	63.17	67.24				7.01	4.04	-0.02
43200.00		67.41	60.17	63.13	67.19				7.24	4.28	0.22
43100.00		67.55	60.14	63.10	67.15				7.41	4.45	0.40
43000.00	67.39	67.22	60.10	63.06	67.10	7.29	4.33	0.29	7.11	4.16	0.11
42900.00		67.49	60.07	63.02	67.06				7.42	4.47	0.43
42800.00		66.99	60.04	62.99	67.02				6.95	4.00	-0.03
42700.00		66.60	60.01	62.95	66.97				6.60	3.65	-0.37
42600.00		66.93	59.97	62.91	66.93				6.96	4.02	0.00
42500.00	67.17	66.98	59.94	62.88	66.89	7.23	4.30	0.29	7.04	4.11	0.10
42400.00		67.15	59.91	62.84	66.84				7.24	4.31	0.30
42300.00		66.84	59.87	62.80	66.80				6.96	4.03	0.04
42200.00		66.82	59.84	62.77	66.76				6.98	4.06	0.07
42100.00		66.95	59.81	62.73	66.71				7.14	4.23	0.24
42000.00	67.06	66.90	59.78	62.69	66.67	7.28	4.36	0.39	7.12	4.21	0.23
41900.00		67.00	59.74	62.66	66.63				7.26	4.35	0.38
41800.00		67.30	59.71	62.62	66.58				7.59	4.68	0.72
41700.00		67.09	59.68	62.58	66.54				7.41	4.50	0.55
41600.00		66.90	59.64	62.54	66.49				7.26	4.36	0.41
41500.00	67.05	66.92	59.61	62.50	66.44	7.44	4.55	0.60	7.32	4.42	0.48
41400.00		67.37	59.57	62.46	66.39				7.80	4.91	0.98
41300.00		66.75	59.53	62.41	66.34				7.23	4.34	0.41
41200.00		66.80	59.49	62.37	66.29				7.31	4.43	0.51
41100.00		66.57	59.45	62.32	66.24				7.12	4.24	0.33
41000.00	66.65	66.63	59.41	62.28	66.19	7.24	4.37	0.46	7.22	4.35	0.44
40900.00		66.77	59.37	62.23	66.13				7.41	4.54	0.64
40800.00		66.74	59.33	62.19	66.08				7.41	4.55	0.66
40700.00		66.59	59.29	62.15	66.03				7.30	4.44	0.56
40600.00		66.62	59.25	62.10	65.98				7.37	4.52	0.64
40500.00	66.82	66.90	59.21	62.06	65.93	7.61	4.76	0.89	7.69	4.85	0.97
40400.00		66.77	59.17	62.01	65.88				7.60	4.76	0.89
40300.00		66.73	59.13	61.97	65.83				7.60	4.76	0.90
40200.00		66.56	59.09	61.93	65.78				7.46	4.63	0.78
40100.00		66.46	59.06	61.89	65.73				7.40	4.57	0.73
40000.00	66.60	66.58	59.03	61.85	65.69	7.57	4.75	0.92	7.55	4.73	0.90
39900.00		66.52	59.00	61.81	65.64				7.52	4.71	0.88
39800.00		66.42	58.96	61.77	65.59				7.46	4.65	0.83

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
39700.00		66.36	58.93	61.73	65.54				7.43	4.63	0.82
39600.00		66.51	58.90	61.69	65.50				7.61	4.81	1.01
39500.00	66.22	66.19	58.86	61.66	65.45	7.36	4.56	0.77	7.32	4.53	0.74
39400.00		66.35	58.83	61.62	65.40				7.52	4.74	0.95
39300.00		66.31	58.80	61.58	65.35				7.52	4.74	0.96
39200.00		66.10	58.76	61.54	65.31				7.34	4.56	0.79
39100.00		66.03	58.73	61.50	65.26				7.30	4.53	0.77
39000.00	66.10	65.97	58.70	61.47	65.23	7.40	4.63	0.87	7.28	4.51	0.75
38900.00		65.99	58.67	61.44	65.19				7.32	4.55	0.79
38800.00		65.92	58.64	61.41	65.16				7.28	4.51	0.76
38700.00		65.92	58.61	61.37	65.13				7.31	4.55	0.79
38600.00		66.20	58.58	61.34	65.10				7.61	4.85	1.10
38500.00	66.23	66.27	58.55	61.31	65.06	7.68	4.92	1.17	7.72	4.96	1.21
38400.00		66.22	58.52	61.28	65.03				7.70	4.94	1.19
38300.00		66.32	58.49	61.25	65.00				7.82	5.07	1.32
38200.00		66.06	58.46	61.22	64.97				7.59	4.84	1.09
38100.00		66.12	58.43	61.19	64.93				7.69	4.94	1.19
38000.00	66.13	66.13	58.40	61.16	64.90	7.73	4.98	1.23	7.73	4.97	1.23
37900.00		66.12	58.37	61.13	64.87				7.75	5.00	1.25
37800.00		65.95	58.35	61.10	64.83				7.61	4.86	1.12
37700.00		65.81	58.32	61.07	64.80				7.49	4.74	1.01
37600.00		65.91	58.30	61.04	64.77				7.61	4.87	1.14
37500.00	66.07	66.03	58.27	61.01	64.73	7.80	5.06	1.33	7.76	5.02	1.30
37400.00		66.07	58.25	60.98	64.70				7.83	5.09	1.37
37300.00		65.82	58.22	60.95	64.67				7.60	4.87	1.15
37200.00		65.87	58.20	60.92	64.63				7.67	4.94	1.23
37100.00		65.64	58.17	60.89	64.60				7.47	4.75	1.04
37000.00	65.62	65.56	58.15	60.87	64.57	7.47	4.75	1.05	7.41	4.70	0.99
36900.00		65.49	58.12	60.84	64.53				7.37	4.65	0.95
36800.00		65.29	58.10	60.81	64.50				7.19	4.48	0.79
36700.00		65.56	58.07	60.78	64.47				7.48	4.78	1.09
36600.00		65.42	58.05	60.75	64.43				7.37	4.67	0.98
36500.00	65.22	65.22	58.02	60.72	64.40	7.20	4.50	0.82	7.20	4.50	0.82
36400.00		65.18	58.00	60.69	64.37				7.18	4.48	0.81
36300.00		64.85	57.97	60.66	64.33				6.88	4.19	0.52
36200.00		64.82	57.93	60.62	64.28				6.89	4.20	0.54
36100.00		64.72	57.90	60.57	64.22				6.82	4.15	0.49
36000.00	65.00	65.00	57.86	60.53	64.17	7.14	4.47	0.83	7.14	4.48	0.83
35900.00		65.03	57.82	60.48	64.11				7.21	4.55	0.91
35800.00		65.24	57.78	60.44	64.06				7.46	4.81	1.18
35700.00		65.29	57.74	60.39	64.01				7.55	4.90	1.29
35600.00		65.15	57.71	60.34	63.95				7.45	4.81	1.20
35500.00	65.28	65.30	57.67	60.30	63.90	7.61	4.98	1.38	7.63	5.00	1.40
35400.00		65.19	57.63	60.25	63.85				7.56	4.94	1.35
35300.00		65.01	57.59	60.21	63.79				7.42	4.80	1.21
35200.00		65.32	57.55	60.16	63.74				7.77	5.16	1.58
35100.00		65.42	57.51	60.12	63.69				7.91	5.30	1.73
35000.00	65.30	65.37	57.48	60.07	63.63	7.82	5.23	1.67	7.90	5.30	1.74
34900.00		65.36	57.44	60.03	63.58				7.92	5.33	1.78
34800.00		65.50	57.42	60.00	63.55				8.09	5.50	1.95
34700.00		65.44	57.39	59.97	63.52				8.05	5.46	1.92
34600.00		65.20	57.37	59.95	63.49				7.83	5.25	1.71
34500.00	65.16	65.16	57.34	59.92	63.46	7.82	5.24	1.71	7.82	5.24	1.71
34400.00		64.99	57.32	59.89	63.42				7.67	5.10	1.56
34300.00		65.02	57.30	59.87	63.39				7.73	5.16	1.63
34200.00		64.97	57.27	59.84	63.36				7.70	5.13	1.61
34100.00		64.89	57.25	59.81	63.33				7.64	5.07	1.55
34000.00	65.17	65.07	57.23	59.78	63.30	7.94	5.38	1.86	7.84	5.29	1.77
33900.00		64.72	57.20	59.76	63.27				7.51	4.96	1.45
33800.00		64.90	57.18	59.73	63.24				7.72	5.17	1.66
33700.00		64.81	57.16	59.70	63.21				7.66	5.11	1.60
33600.00		64.89	57.13	59.68	63.18				7.75	5.21	1.71
33500.00	64.79	64.66	57.11	59.65	63.15	7.68	5.14	1.64	7.56	5.02	1.52
33400.00		64.64	57.08	59.62	63.11				7.56	5.02	1.53
33300.00		64.55	57.06	59.59	63.08				7.48	4.95	1.47
33200.00		64.45	57.04	59.56	63.04				7.41	4.89	1.41
33100.00		64.35	57.01	59.53	63.01				7.33	4.81	1.34
33000.00	64.54	64.52	56.99	59.51	62.97	7.55	5.03	1.57	7.53	5.01	1.55
32900.00		64.38	56.97	59.48	62.94				7.42	4.91	1.44
32800.00		64.35	56.94	59.45	62.90				7.41	4.90	1.45
32700.00		64.39	56.92	59.42	62.87				7.47	4.97	1.52
32600.00		64.44	56.90	59.39	62.83				7.54	5.05	1.61
32500.00	64.39	64.35	56.87	59.36	62.80	7.52	5.03	1.59	7.47	4.98	1.55
32400.00		64.64	56.85	59.34	62.77				7.79	5.30	1.87

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
32300.00		64.41	56.83	59.31	62.73				7.59	5.10	1.68
32200.00	64.40	64.40	56.79	59.27	62.68	7.60	5.13	1.71	7.60	5.13	1.71
32100.00		64.26	56.76	59.23	62.63				7.51	5.04	1.63
32000.00		64.37	56.72	59.18	62.58				7.65	5.19	1.79
31900.00		64.39	56.68	59.14	62.53				7.71	5.25	1.87
31800.00		64.15	56.65	59.09	62.47				7.51	5.06	1.68
31700.00	64.06	64.18	56.61	59.05	62.42	7.45	5.01	1.64	7.57	5.13	1.76
31600.00		63.91	56.57	59.01	62.37				7.34	4.90	1.54
31500.00	63.84	63.85	56.54	58.96	62.32	7.30	4.87	1.52	7.32	4.89	1.54
31400.00		63.73	56.50	58.92	62.26				7.23	4.81	1.47
31300.00		63.69	56.46	58.88	62.21				7.23	4.82	1.48
31200.00		63.83	56.43	58.84	62.17				7.40	4.99	1.66
31100.00		63.77	56.41	58.82	62.15				7.35	4.94	1.62
31000.00	63.82	63.75	56.40	58.80	62.13	7.42	5.02	1.69	7.35	4.95	1.62
30900.00		63.72	56.38	58.78	62.10				7.34	4.94	1.61
30800.00		63.77	56.36	58.76	62.08				7.41	5.01	1.69
30700.00		63.79	56.34	58.74	62.06				7.45	5.05	1.73
30600.00		63.37	56.32	58.72	62.04				7.05	4.65	1.34
30500.00	63.33	63.45	56.31	58.70	62.02	7.03	4.63	1.32	7.14	4.74	1.43
30400.00		63.47	56.29	58.68	61.99				7.19	4.79	1.48
30300.00		63.44	56.27	58.66	61.97				7.17	4.78	1.47
30200.00		63.39	56.25	58.64	61.95				7.14	4.75	1.44
30100.00		63.14	56.23	58.62	61.93				6.91	4.52	1.21
30000.00	63.21	63.24	56.21	58.60	61.91	7.00	4.61	1.31	7.03	4.64	1.34
29900.00		63.75	56.21	58.60	61.90				7.55	5.16	1.86
29800.00		63.57	56.20	58.59	61.89				7.37	4.98	1.68
29700.00		63.14	56.20	58.59	61.89				6.94	4.55	1.25
29600.00		63.09	56.19	58.58	61.89				6.89	4.51	1.20
29500.00	63.22	63.03	56.19	58.57	61.88	7.03	4.64	1.33	6.84	4.46	1.15
29400.00		63.22	56.18	58.57	61.88				7.04	4.65	1.34
29300.00		63.08	56.18	58.56	61.87				6.90	4.52	1.21
29200.00		62.80	56.18	58.56	61.87				6.63	4.24	0.93
29100.00		62.67	56.17	58.55	61.87				6.50	4.12	0.81
29000.00	62.89	62.62	56.17	58.55	61.86	6.72	4.34	1.03	6.46	4.07	0.76
28900.00		62.66	56.16	58.54	61.86				6.49	4.11	0.80
28800.00		62.49	56.16	58.54	61.86				6.34	3.96	0.64
28700.00		62.66	56.15	58.53	61.85				6.50	4.12	0.80
28600.00		62.51	56.14	58.52	61.84				6.37	3.99	0.67
28500.00	62.75	62.80	56.13	58.51	61.83	6.61	4.24	0.92	6.66	4.29	0.97
28400.00		62.55	56.12	58.50	61.81				6.43	4.05	0.74
28300.00		62.51	56.11	58.49	61.80				6.40	4.03	0.71
28200.00		62.31	56.10	58.47	61.79				6.21	3.84	0.52
28100.00		62.09	56.09	58.46	61.77				6.00	3.63	0.31
28000.00	62.52	62.49	56.08	58.45	61.76	6.44	4.07	0.76	6.42	4.05	0.74
27900.00		62.28	56.06	58.43	61.74				6.22	3.85	0.54
27800.00		64.02	56.05	58.42	61.73				7.97	5.60	2.29
27700.00		65.23	56.04	58.41	61.71				9.19	6.82	3.52
27600.00		65.22	56.03	58.39	61.70				9.19	6.82	3.52
27500.00	65.37	65.59	56.02	58.38	61.69	9.35	6.99	3.69	9.57	7.21	3.90
27400.00		65.61	56.01	58.37	61.67				9.61	7.25	3.94
27300.00		66.25	56.00	58.36	61.66				10.26	7.90	4.59
27200.00		66.35	55.99	58.35	61.65				10.36	8.00	4.70
27100.00		65.69	55.98	58.34	61.64				9.71	7.35	4.05
27000.00	65.35	65.63	55.97	58.33	61.63	9.37	7.01	3.71	9.66	7.29	3.99
26900.00		65.53	55.97	58.33	61.63				9.57	7.20	3.90
26800.00		65.74	55.96	58.32	61.62				9.78	7.42	4.12
26700.00		65.37	55.95	58.32	61.62				9.42	7.06	3.76
26600.00		64.88	55.95	58.31	61.61				8.94	6.57	3.27
26500.00	65.16	65.13	55.94	58.31	61.61	9.22	6.85	3.55	9.19	6.83	3.53
26400.00		64.48	55.93	58.30	61.60				8.55	6.18	2.88
26300.00		63.75	55.93	58.29	61.59				7.82	5.46	2.16
26200.00		63.82	55.92	58.29	61.59				7.90	5.54	2.24
26100.00		64.34	55.91	58.28	61.58				8.43	6.06	2.76
26000.00	65.06	65.03	55.90	58.27	61.57	9.16	6.79	3.49	9.13	6.76	3.46
25900.00		66.41	55.88	58.25	61.55				10.53	8.16	4.86
25800.00		66.16	55.86	58.24	61.53				10.30	7.93	4.63
25700.00		64.85	55.85	58.22	61.51				9.00	6.63	3.33
25600.00		64.38	55.83	58.20	61.49				8.55	6.18	2.88
25500.00	65.01	64.93	55.81	58.18	61.48	9.20	6.83	3.53	9.12	6.74	3.45
25400.00		64.90	55.79	58.17	61.46				9.11	6.74	3.44
25300.00		64.83	55.78	58.15	61.44				9.06	6.68	3.39
25200.00		64.98	55.76	58.13	61.42				9.22	6.84	3.56
25100.00		64.19	55.74	58.12	61.40				8.45	6.08	2.79
25000.00	63.56	63.45	55.72	58.10	61.39	7.84	5.46	2.17	7.73	5.35	2.07

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
24900.00		64.37	55.71	58.08	61.37				8.67	6.29	3.01
24800.00		64.38	55.69	58.07	61.35				8.69	6.31	3.03
24700.00		64.47	55.67	58.05	61.33				8.80	6.42	3.14
24600.00		63.98	55.66	58.04	61.32				8.32	5.94	2.66
24500.00	63.79	63.73	55.66	58.04	61.32	8.13	5.75	2.47	8.07	5.69	2.41
24400.00		63.98	55.66	58.04	61.32				8.32	5.94	2.66
24300.00		64.02	55.66	58.04	61.32				8.36	5.98	2.70
24200.00		63.31	55.66	58.04	61.32				7.65	5.27	1.99
24100.00		63.27	55.66	58.04	61.32				7.61	5.23	1.95
24000.00	63.93	63.96	55.66	58.04	61.32	8.27	5.89	2.61	8.30	5.92	2.64
23900.00		64.23	55.66	58.04	61.32				8.57	6.19	2.91
23800.00		63.75	55.66	58.04	61.32				8.09	5.71	2.43
23700.00		63.78	55.66	58.04	61.32				8.12	5.74	2.46
23600.00		63.77	55.66	58.04	61.32				8.11	5.73	2.45
23500.00	63.46	63.27	55.66	58.04	61.32	7.80	5.42	2.14	7.61	5.23	1.95
23400.00		63.17	55.66	58.04	61.32				7.51	5.13	1.85
23300.00		63.35	55.66	58.04	61.32				7.69	5.31	2.03
23200.00		62.65	55.65	58.03	61.31				7.00	4.62	1.34
23100.00		62.45	55.64	58.02	61.30				6.81	4.43	1.15
23000.00	62.88	62.73	55.63	58.01	61.29	7.25	4.87	1.59	7.10	4.72	1.44
22900.00		62.63	55.62	58.00	61.28				7.01	4.63	1.35
22800.00		62.28	55.61	57.99	61.27				6.67	4.29	1.01
22700.00		61.98	55.60	57.97	61.26				6.38	4.01	0.72
22600.00		61.63	55.59	57.96	61.25				6.04	3.66	0.38
22500.00	62.07	61.92	55.58	57.95	61.24	6.49	4.12	0.83	6.34	3.96	0.68
22400.00		62.10	55.57	57.94	61.23				6.53	4.16	0.87
22300.00		62.52	55.56	57.93	61.22				6.96	4.59	1.30
22200.00		62.41	55.55	57.92	61.21				6.86	4.49	1.20
22100.00		62.40	55.54	57.91	61.20				6.86	4.49	1.20
22000.00	62.10	62.14	55.53	57.90	61.19	6.57	4.20	0.91	6.61	4.24	0.95
21900.00		62.59	55.53	57.90	61.19				7.07	4.70	1.41
21800.00		63.15	55.52	57.89	61.18				7.63	5.26	1.97
21700.00		64.11	55.52	57.89	61.18				8.59	6.22	2.93
21600.00		63.80	55.51	57.88	61.17				8.28	5.91	2.62
21500.00	62.98	63.12	55.51	57.88	61.17	7.47	5.10	1.81	7.61	5.24	1.95
21400.00		63.72	55.50	57.87	61.16				8.21	5.84	2.55
21300.00		64.26	55.50	57.87	61.16				8.76	6.39	3.10
21200.00		63.58	55.50	57.87	61.16				8.09	5.72	2.43
21100.00		62.82	55.49	57.86	61.15				7.33	4.96	1.67
21000.00	62.20	62.37	55.48	57.85	61.14	6.72	4.35	1.06	6.89	4.52	1.23
20900.00		63.10	55.46	57.83	61.12				7.63	5.26	1.97
20800.00		63.07	55.44	57.81	61.10				7.62	5.25	1.96
20700.00		62.70	55.43	57.80	61.09				7.27	4.90	1.61
20600.00		62.51	55.41	57.78	61.07				7.10	4.73	1.44
20500.00	62.20	62.31	55.39	57.76	61.05	6.80	4.43	1.14	6.91	4.54	1.25
20400.00		62.94	55.38	57.75	61.04				7.57	5.20	1.91
20300.00		63.54	55.36	57.73	61.02				8.18	5.81	2.52
20200.00		62.72	55.36	57.72	61.01				7.37	5.00	1.71
20100.00		62.43	55.35	57.71	61.00				7.08	4.72	1.43
20000.00		63.01	55.34	57.70	60.99				7.67	5.31	2.02
19900.00		63.40	55.33	57.69	60.98				8.07	5.71	2.42
19800.00		62.42	55.32	57.68	60.96				7.10	4.74	1.46
19700.00		62.68	55.31	57.67	60.95				7.38	5.01	1.73
19600.00		62.42	55.30	57.66	60.94				7.12	4.76	1.48
19500.00		63.21	55.29	57.65	60.93				7.92	5.56	2.28
19400.00		63.81	55.28	57.64	60.92				8.53	6.17	2.90
19300.00		64.38	55.27	57.63	60.90				9.11	6.75	3.48
19200.00		62.94	55.26	57.62	60.89				7.69	5.32	2.05
19100.00		62.56	55.25	57.61	60.88				7.31	4.95	1.68
19000.00		63.02	55.24	57.60	60.87				7.78	5.42	2.15
18900.00		62.82	55.23	57.59	60.86				7.59	5.23	1.96
18800.00		63.41	55.22	57.58	60.84				8.19	5.83	2.57
18700.00		62.92	55.21	57.57	60.83				7.71	5.35	2.09
18600.00		63.52	55.20	57.56	60.82				8.32	5.96	2.70
18500.00		63.65	55.19	57.55	60.81				8.46	6.10	2.84
18400.00		63.00	55.18	57.54	60.80				7.82	5.46	2.21
18300.00		63.34	55.17	57.53	60.78				8.17	5.81	2.56
18200.00		63.30	55.16	57.52	60.77				8.14	5.78	2.53
18100.00		63.20	55.14	57.50	60.75				8.06	5.70	2.46
18000.00		63.32	55.12	57.48	60.72				8.20	5.84	2.60
17900.00		63.10	55.10	57.45	60.69				8.01	5.65	2.41
17800.00		63.22	55.07	57.43	60.66				8.15	5.79	2.56
17700.00		63.07	55.05	57.40	60.63				8.03	5.67	2.44
17600.00		62.11	55.03	57.38	60.61				7.09	4.73	1.51

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
17500.00		62.27	55.00	57.35	60.58				7.26	4.91	1.69
17400.00		63.22	54.98	57.33	60.55				8.24	5.89	2.67
17300.00		63.90	54.96	57.30	60.52				8.95	6.60	3.38
17200.00		63.65	54.94	57.28	60.49				8.72	6.37	3.16
17100.00		63.66	54.91	57.26	60.46				8.75	6.41	3.20
17000.00		63.37	54.89	57.23	60.44				8.48	6.14	2.94
16900.00		63.66	54.87	57.21	60.41				8.79	6.45	3.25
16800.00		63.99	54.85	57.19	60.39				9.13	6.79	3.59
16700.00		63.07	54.84	57.18	60.38				8.23	5.89	2.69
16600.00		62.73	54.83	57.17	60.37				7.90	5.56	2.36
16500.00		62.86	54.82	57.16	60.35				8.04	5.70	2.51
16400.00		62.25	54.81	57.15	60.34				7.44	5.11	1.91
16300.00		61.60	54.80	57.14	60.33				6.80	4.47	1.28
16200.00		61.85	54.79	57.12	60.31				7.06	4.73	1.54
16100.00		62.03	54.78	57.11	60.30				7.25	4.92	1.73
16000.00		61.99	54.77	57.10	60.29				7.22	4.89	1.70
15900.00		62.10	54.76	57.09	60.28				7.35	5.01	1.83
15800.00		61.93	54.75	57.08	60.26				7.18	4.85	1.66
15700.00		61.41	54.74	57.07	60.25				6.67	4.34	1.16
15600.00		60.84	54.73	57.06	60.24				6.12	3.79	0.61
15500.00		61.40	54.71	57.04	60.22				6.69	4.36	1.18
15400.00		61.23	54.69	57.02	60.19				6.54	4.21	1.04
15300.00		61.35	54.67	57.00	60.17				6.68	4.36	1.19
15200.00		61.04	54.65	56.98	60.15				6.38	4.06	0.89
15100.00		61.87	54.64	56.96	60.12				7.24	4.92	1.75
15000.00		61.98	54.62	56.94	60.10				7.36	5.04	1.88
14900.00		62.42	54.60	56.92	60.07				7.82	5.51	2.35
14800.00		62.21	54.58	56.90	60.05				7.63	5.32	2.17
14700.00		61.42	54.56	56.88	60.02				6.86	4.55	1.40
14600.00		61.55	54.54	56.86	60.00				7.01	4.69	1.55
14500.00		61.95	54.52	56.84	59.97				7.43	5.12	1.98
14400.00		61.52	54.50	56.81	59.95				7.02	4.70	1.57
14300.00		60.95	54.48	56.79	59.93				6.47	4.16	1.02
14200.00		61.32	54.40	56.70	59.81				6.92	4.62	1.51
14100.00		60.39	54.29	56.58	59.67				6.10	3.81	0.73
14000.00		60.31	54.19	56.46	59.52				6.12	3.84	0.79
13900.00		60.48	54.08	56.35	59.38				6.39	4.13	1.10
13800.00		61.67	54.02	56.28	59.30				7.65	5.39	2.38
13700.00		61.80	54.00	56.26	59.27				7.80	5.54	2.52
13600.00		61.90	53.98	56.24	59.25				7.92	5.67	2.66
13500.00		62.40	53.96	56.21	59.22				8.44	6.18	3.17
13400.00		62.86	53.94	56.19	59.20				8.92	6.67	3.66
13300.00		62.03	53.92	56.17	59.17				8.11	5.86	2.86
13200.00		61.54	53.90	56.15	59.15				7.64	5.40	2.40
13100.00		61.09	53.88	56.13	59.12				7.20	4.96	1.96
13000.00		61.28	53.86	56.10	59.10				7.42	5.18	2.18
12900.00		62.08	53.84	56.08	59.07				8.24	6.00	3.01
12800.00		62.25	53.82	56.06	59.04				8.43	6.19	3.20
12700.00		61.75	53.79	56.03	59.01				7.96	5.72	2.74
12600.00		61.88	53.77	56.00	58.98				8.11	5.88	2.90
12500.00		61.72	53.74	55.98	58.95				7.98	5.75	2.78
12400.00		60.02	53.72	55.95	58.91				6.30	4.07	1.10
12300.00		59.19	53.69	55.92	58.88				5.50	3.27	0.31
12200.00		58.98	53.67	55.89	58.85				5.31	3.09	0.14
12100.00		59.47	53.64	55.87	58.81				5.83	3.60	0.66
12000.00		59.74	53.62	55.84	58.78				6.12	3.90	0.95
11900.00		60.07	53.59	55.81	58.75				6.48	4.26	1.32
11800.00		60.18	53.57	55.79	58.72				6.61	4.39	1.46
11700.00		60.25	53.55	55.76	58.68				6.70	4.49	1.57
11600.00		60.22	53.52	55.73	58.65				6.70	4.49	1.57
11500.00		60.23	53.49	55.69	58.61				6.74	4.53	1.62
11400.00		60.33	53.45	55.66	58.56				6.88	4.67	1.77
11300.00		60.32	53.42	55.62	58.52				6.90	4.70	1.80
11200.00		60.20	53.39	55.58	58.47				6.81	4.62	1.73
11100.00		60.11	53.35	55.54	58.43				6.75	4.56	1.68
11000.00		60.02	53.32	55.50	58.38				6.70	4.52	1.64
10900.00		58.74	53.28	55.47	58.34				5.46	3.28	0.41
10800.00		58.81	53.25	55.43	58.29				5.56	3.38	0.52
10700.00		60.29	53.22	55.39	58.25				7.08	4.90	2.05
10600.00		57.60	53.18	55.35	58.20				4.42	2.25	-0.60
10500.00		57.90	53.17	55.34	58.19				4.72	2.55	-0.30
10400.00		57.68	53.16	55.34	58.19				4.52	2.35	-0.50
10300.00		57.85	53.16	55.33	58.18				4.70	2.52	-0.33
10200.00		57.54	53.15	55.32	58.17				4.39	2.21	-0.64

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
10100.00		57.41	53.14	55.32	58.17				4.27	2.09	-0.76
10000.00		57.40	53.13	55.31	58.16				4.27	2.09	-0.76
9900.00		57.87	53.13	55.31	58.16				4.75	2.57	-0.28
9800.00		62.36	53.04	55.21	58.03				9.32	7.16	4.33
9700.00		58.26	52.81	54.93	57.67				5.45	3.33	0.59
9600.00		57.35	52.79	54.91	57.64				4.56	2.44	-0.30
9500.00		56.96	52.77	54.88	57.62				4.19	2.08	-0.66
9400.00		56.97	52.75	54.86	57.59				4.23	2.11	-0.61
9300.00		57.03	52.73	54.84	57.56				4.30	2.19	-0.53
9200.00		56.94	52.71	54.82	57.53				4.23	2.12	-0.59
9100.00		56.73	52.67	54.78	57.48				4.06	1.95	-0.75
9000.00		56.73	52.62	54.72	57.41				4.11	2.01	-0.69
8900.00		56.67	52.57	54.67	57.35				4.10	2.00	-0.68
8800.00		56.69	52.52	54.61	57.29				4.17	2.08	-0.59
8700.00		56.84	52.47	54.56	57.22				4.37	2.28	-0.38
8600.00		56.61	52.43	54.50	57.16				4.18	2.10	-0.55
8500.00		56.75	52.38	54.45	57.09				4.37	2.30	-0.35
8400.00		56.53	52.31	54.38	57.01				4.22	2.16	-0.47
8300.00		56.65	52.22	54.28	56.89				4.42	2.37	-0.24
8200.00		56.52	52.14	54.18	56.77				4.38	2.34	-0.25
8100.00		56.18	52.05	54.09	56.66				4.13	2.09	-0.47
8000.00		56.40	51.96	53.99	56.54				4.43	2.41	-0.14
7900.00		56.63	51.88	53.89	56.42				4.75	2.73	0.21
7800.00		56.54	51.79	53.80	56.30				4.75	2.75	0.24
7700.00		56.38	51.71	53.70	56.19				4.67	2.68	0.19
7600.00		56.12	51.62	53.61	56.07				4.50	2.52	0.05
7500.00		56.07	51.54	53.52	55.97				4.53	2.55	0.10
7400.00		56.10	51.49	53.47	55.91				4.60	2.62	0.19
7300.00		56.10	51.44	53.42	55.85				4.65	2.68	0.25
7200.00		56.07	51.39	53.37	55.79				4.68	2.71	0.29
7100.00		55.60	51.34	53.32	55.73				4.25	2.28	-0.13
7000.00		55.93	51.29	53.26	55.67				4.63	2.66	0.26
6900.00		56.92	51.25	53.21	55.60				5.68	3.71	1.32
6800.00		57.37	51.20	53.16	55.54				6.17	4.21	1.82
6700.00		57.22	51.15	53.11	55.48				6.08	4.11	1.74
6600.00		57.17	51.10	53.06	55.42				6.07	4.11	1.75
6500.00		56.90	51.06	53.02	55.38				5.83	3.87	1.52
6400.00		57.00	51.05	53.01	55.37				5.95	3.99	1.63
6300.00		56.75	51.04	53.00	55.35				5.71	3.76	1.40
6200.00		56.66	51.03	52.99	55.34				5.63	3.67	1.32
6100.00		56.67	51.02	52.97	55.33				5.66	3.70	1.35
6000.00		56.89	51.00	52.96	55.31				5.89	3.93	1.58
5900.00		57.00	50.99	52.95	55.30				6.01	4.05	1.70
5800.00		56.89	50.98	52.94	55.28				5.91	3.95	1.60
5700.00		56.70	50.97	52.92	55.27				5.74	3.78	1.43
5600.00		56.76	50.96	52.91	55.26				5.80	3.85	1.50
5500.00		56.53	50.94	52.90	55.24				5.59	3.63	1.29
5400.00		56.43	50.93	52.89	55.23				5.50	3.54	1.20
5300.00		56.43	50.92	52.87	55.21				5.51	3.56	1.22
5200.00		56.38	50.91	52.86	55.20				5.47	3.52	1.18
5100.00		56.18	50.89	52.85	55.19				5.29	3.33	1.00
5000.00		55.86	50.88	52.84	55.17				4.98	3.02	0.69
4900.00		56.04	50.87	52.82	55.16				5.17	3.22	0.88
4800.00		56.26	50.86	52.81	55.14				5.40	3.45	1.11
4700.00		56.23	50.85	52.80	55.13				5.39	3.43	1.11
4600.00		56.03	50.83	52.79	55.11				5.20	3.24	0.92
4500.00		55.78	50.82	52.78	55.10				4.96	3.01	0.68
4400.00		56.09	50.81	52.76	55.09				5.28	3.33	1.00
4300.00		56.35	50.80	52.75	55.07				5.56	3.60	1.28
4200.00		55.82	50.79	52.74	55.06				5.04	3.08	0.76
4100.00		55.79	50.77	52.73	55.04				5.01	3.06	0.74
4000.00		55.92	50.76	52.71	55.03				5.16	3.21	0.89
3900.00		55.73	50.75	52.70	55.02				4.98	3.02	0.71
3800.00		55.64	50.74	52.69	55.00				4.91	2.96	0.64
3700.00		55.60	50.73	52.68	54.99				4.87	2.92	0.61
3600.00		55.57	50.71	52.66	54.97				4.85	2.90	0.59
3500.00		55.61	50.66	52.61	54.90				4.95	3.00	0.70
3400.00		55.52	50.59	52.53	54.81				4.93	2.99	0.71
3300.00		55.48	50.52	52.46	54.71				4.96	3.02	0.76
3200.00		55.46	50.45	52.38	54.62				5.01	3.08	0.84
3100.00		55.38	50.38	52.31	54.53				5.00	3.07	0.86
3000.00		55.38	50.31	52.23	54.43				5.07	3.15	0.95
2900.00		55.13	50.24	52.16	54.34				4.89	2.97	0.79
2800.00		54.88	50.17	52.08	54.24				4.71	2.80	0.64

Table 5-1. Feather River West Levee Project Freeboard Analysis

						Field Survey Elevations			CVFED Elevations		
LEVEE DESIGN STATION	Survey Elevation @ Control Line	CVFED Elevation @ Control Line	100YR WSE	200YR WSE	500YR WSE	100YR Freeboard	200YR Freeboard	500YR Freeboard	100YR Freeboard	200YR Freeboard	500YR Freeboard
2700.00		54.87	50.10	52.01	54.15				4.77	2.86	0.72
2600.00		55.23	50.03	51.93	54.06				5.20	3.29	1.17
2500.00		55.01	49.96	51.86	53.97				5.05	3.15	1.04
2400.00		55.02	49.91	51.80	53.89				5.11	3.21	1.13
2300.00		55.19	49.86	51.74	53.81				5.33	3.44	1.38
2200.00		55.06	49.80	51.69	53.73				5.26	3.38	1.33
2100.00		54.84	49.75	51.63	53.65				5.10	3.22	1.19
2000.00		54.69	49.69	51.57	53.57				5.00	3.12	1.12
1900.00		54.74	49.64	51.51	53.49				5.10	3.23	1.25
1800.00		54.61	49.59	51.45	53.41				5.03	3.16	1.20
1700.00		54.58	49.53	51.39	53.34				5.04	3.19	1.24
1600.00		54.70	49.49	51.34	53.26				5.21	3.36	1.43
1500.00		54.53	49.44	51.28	53.19				5.09	3.25	1.34
1400.00		54.42	49.39	51.23	53.12				5.03	3.19	1.30
1300.00		54.58	49.34	51.17	53.05				5.24	3.41	1.53

Feather River West Levee Project
Freeboard Analysis

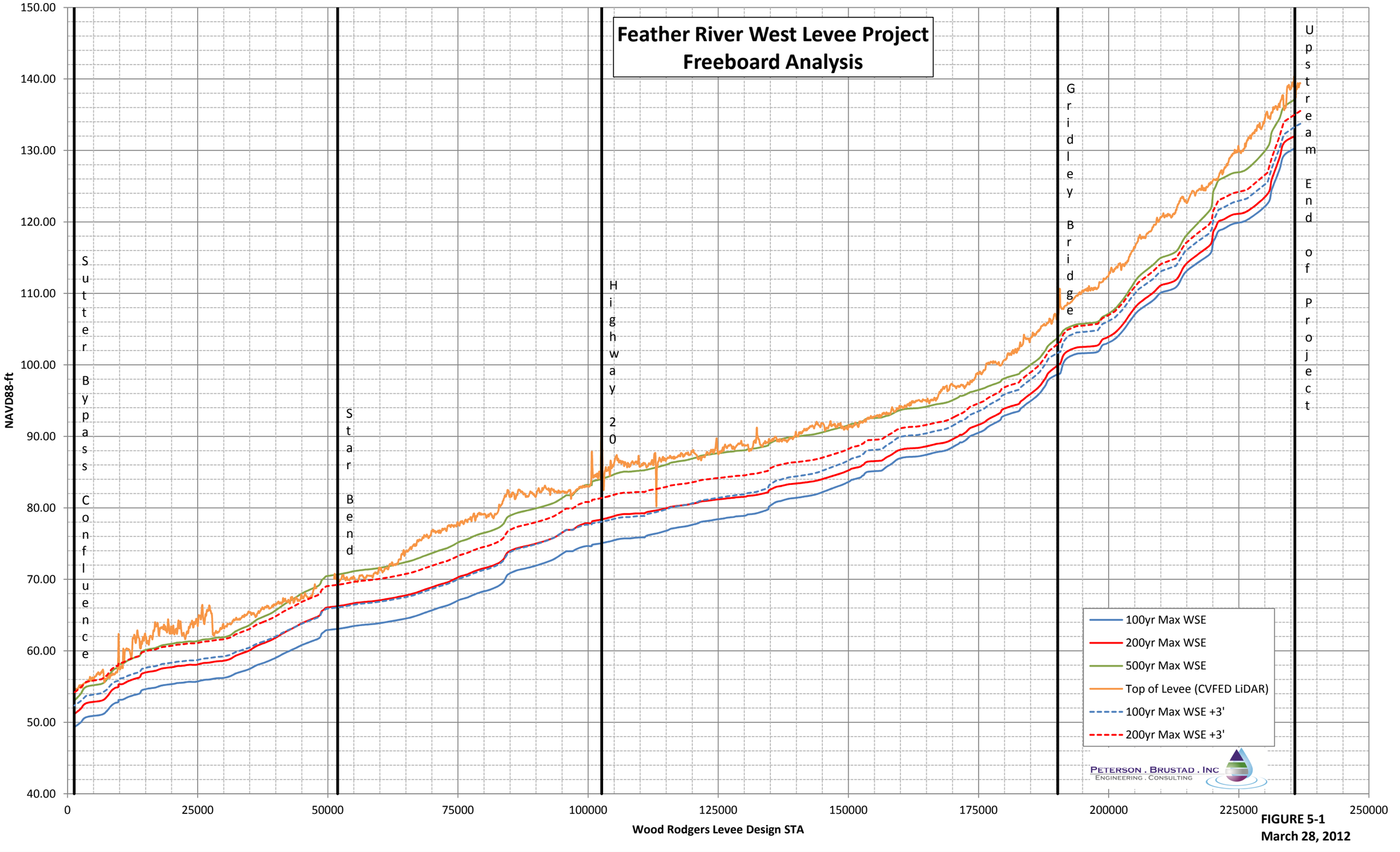


FIGURE 5-1
March 28, 2012

6 REFERENCES

1. Ayres Associates, *Final Report, Topographic and Hydrographic surveys of the Feather River System for the Sacramento and San Joaquin River Basins Comprehensive Study,* Prepared for the U.S. Army Corps of Engineers Sacramento District, May 2003.

2. California Department of Water Resources, LiDAR Datasets for the San Joaquin River Basin, Central Valley Floodplain Evaluation and Delineation Program (CVFED), March 2010 Deliverable.

3. California Data Exchange Center (CDEC); http://cdec.water.ca.gov

4. MBK Engineers, *Hydraulic and Hydrologic Documentation for FEMA, Certification of the Three River's Levee Improvement Authority Project,* March 2007.

5. Peterson Brustad Inc., *Design Water Surface Profiles for the Feather River West Levee Rehabilitation Project*, October 26, 2010.

6. Peterson Brustad Inc., *Revised Design Water Surface Profiles for the Feather River West Levee Rehabilitation Project (June 2011),* June 15, 2011.

7. Peterson Brustad Inc., *Revised Design Water Surface Profiles for the Feather River West Levee Rehabilitation Project (September 2011)*, September 30, 2011.

8. Peterson Brustad Inc., *Revised Design Water Surface Profiles for the Feather River West Levee Rehabilitation Project (December 2011),* January 7, 2012.

9. PBS&J, *Levee Inventory Project (NLDB),* Prepared for the U.S. Army Corps of Engineers Sacramento District, May 2008.

10. Towill Inc., *Project Report for Topographic Surveys of the Lower Feather and Bear Rivers for the Sacramento and San Joaquin River Basins Comprehensive Study*, Prepared for the U.S. Army Corps of Engineers Sacramento District, February 2006.

11. United States Army Corps of Engineers Sacramento District, *Draft Hydraulic Technical Documentation F3 Milestone, Appendix D, American River Watershed Common Features General Reevaluation Report (GRR),* December 2008.

12. United States Army Corps of Engineers Sacramento District, *Lower Feather River Floodplain Mapping Study, Appendix A Feather River Hydrology and Reservoir Modeling,* Prepared for the State of California Department of Water Resources, December 2004.

13. United States Army Corps of Engineers Sacramento District, *Memorandum for Record; Sacramento River Basin HEC-RAS Model Release,* March 2009.

14. United States Army Corps of Engineers Sacramento District, *Memorandum for Record; Sacramento River Basin HEC-RAS Model Release 3 (NAVD'88 Version),* February 2011.

15. United States Army Corps of Engineers, *HEC-RAS 4.1.0 Software*, January 2010.

16. Wood Rodgers, FRWL Field Survey, November 2011.

17. United States Army Corps of Engineers, *Yuba River Basin Project General Reevaluation Report: Appendix A Synthetic Hydrology and Reservoir Operations Technical Documentation,* 2008.

18. United States Army Corps of Engineers, *Sacramento and San Joaquin River Basins Comprehensive Study, Technical Studies Documentation: Appendix B Synthetic Hydrology,* 2002.

19. United States Army Corps of Engineers, *Sacramento and San Joaquin River Basins Comprehensive Study, Technical Studies Documentation: Appendix C Reservoir Operations Modeling, Existing Design Operations and Reoperation Analyses,* 2002.

20. United States Army Corps of Engineers, *Sacramento and San Joaquin River Basins Comprehensive Study, Technical Studies Documentation: Appendix D Hydraulics,* 2002.

7 ATTACHMENTS

A. PBI Datum Conversion for Select Gages

B. Vertical Datum Conversion TM

C. DWR 1957 Profile

D. October 2010 Water Surface Profiles

E. June 2011 Water Surface Profiles

F. September 2011 Water Surface Profiles

G. December 2011 Water Surface Profiles

H. USACE Technical Review Comments

I. MBK Technical Review Comments

ATTACHMENT A

PBI Datum Conversion for Select Gages

Additional Gages Inserted into PBI Calibration for reference:

Gage	NGVD29 to NAVD88 Corpscon Conversion Value	Comments Regarding Conversion from Reported Gage Datum to NAVD88
FR at Live Oak (FLO)	2.274	No Gage Datum information on CDEC; Per NHC report, subtract 3.0-ft to get Gage Datum to NGVD29. To convert: take reported CDEC stage and subtract 0.70-ft (subtract 3.0' then add 2.3') for NAVD88 values.
FR at Boyd's Landing (FBL)	2.293	Per CDEC, subtract 3.0-ft to get Gage Datum to NGVD29. To convert: take reported CDEC stage and subtract 0.70-ft (subtract 3.0' then add 2.3') for NAVD88 values.
SB at Longbridge (LNB)	2.375	Per CDEC, subtract 3.0 to get Gage Datum to NGVD29. To convert: take the reported CDEC stage and subtract 0.70-ft (subtract 3.0' then add 2.3') for NAVD88 values.
YR at Marysville (#11421000)	2.264	No Gage Datum information on CDEC; Per NHC report, subtract 2.95-ft to get Gage Datum to NGVD29. To convert: take reported CDEC stage and subtract 0.65-ft (subtract 2.95' then add 2.3') for NAVD88 values.
YR at Simpson Lane Bridge (SIM)	2.274	No Gage Datum information on CDEC; Per NHC report, subtract 3.0-ft to get Gage Datum to NGVD29. To convert: take reported CDEC stage and subtract 0.70-ft (subtract 3.0' then add 2.3') for NAVD 88 values.

NOTE: THIS DATA SHOULD ONLY BE USED AS REFERENCE; DO NOT USE WITHOUT SCRUTINY.
This data was converted based upon unverified information from past studies and CDEC. Elevations were converted to NAVD88 using Corpscon.
The Referenced NHC Report refers to the report titled "Common Features GRR: Data Gathering for Model Calibration" dated July 2008, prepared for the USACE by Northwest Hydraulic Consultants Inc. (NHC).

ATTACHMENT B

Vertical Datum Conversion TM

PETERSON . BRUSTAD . INC .
ENGINEERING . CONSULTING

VERTICAL DATUM CONVERSION of the SUTTER BYPASS-FEATHER RIVER HEC-RAS MODEL

Hydraulic Design Support for USACE Feasibility Study F3 Phase

Prepared for: Sutter-Butte Flood Control Agency ***July 14, 2010***

Prepared by: Chris Fritz, PE

Reviewed by: Barry O'Regan, PE

1. INTRODUCTION

The Peterson Brustad Inc. (PBI) Sutter Bypass-Feather River ver.1 HEC-RAS model (Sutter Basin model) was developed using the National Geodetic Vertical Datum of 1929 (NGVD 29). This Technical Memorandum (TM) documents the process and procedures utilized in converting the vertical datum of the Sutter Basin model from NGVD 29 to the North American Vertical Datum of 1988 (NAVD 88).

The datum conversion factors used in the conversion process described below were developed by the U.S. Army Corps of Engineers (USACE) and provided to PBI. The USACE is in the process of documenting how the conversion factors referred to below were developed. This documentation will be included in the final Feasibility Report.

2. CONVERSION PROCESS

The process used for converting each of the HEC-RAS model components was as follows:

2.1 Cross Sections

Cross sections were converted using electronic conversion surfaces that were provided to PBI by the USACE on June 3, 2010. The conversion surfaces specify the conversion factor value to apply to each cross section depending on the location of the cross section. Two conversion surfaces were provided by USACE; conversion surface 1 was used for the Lower Feather River Mapping conducted by Towill (see Figure 3) and conversion surface 2 was used for all other remaining areas. A list of the conversion factors that were applied to the PBI Sutter Basin model cross sections is contained in Table 1.

Table 1: Conversion Factors Utilized for the PBI Sutter Basin HEC-RAS Cross Sections

Description	Station Range			Conversion Factor	Conversion Surface
Sacramento River	139.75	-	143.24	1.8	2
	137.00	-	139.50	1.7	2
	134.25	-	136.75	1.8	2
	130.00	-	134.00	1.9	2
	124.25	-	129.75	2	2
	123.75	-	124.00	2.1	2
	122.75	-	123.50	2	2
	120.00	-	122.50	2.1	2
	116.25	-	119.75	2.2	2
	115.25	-	116.00	2.3	2
	111.75	-	115.00	2.2	2
	103.25	-	111.50	2.1	2
	97.75	-	103.00	2	2
	93.50	-	97.50	2.1	2
	86.50	-	93.25	2	2
	84.25	-	86.25	1.9	2
	81.26	-	84.00	2	2
	78.756	-	80.75	2.1	2
Wadsworth Canal	2.24	-	4.29	2.1	2
	0	-	2.06	2	2
Yuba OB	All			2.3	2
Feather River	68.46	-	71.45	2.2	2
	67.70	-	68.29	2.3	2
	65.88	-	67.54	2.2	2
	64.20	-	65.58	2.3	2
	59.35	-	63.95	2.2	2
	58.75			2.3	2
	55.35	-	58.51	2.2	2
	52.60	-	55.03	2.3	2
	35.78	-	52.21	2.2	2
	35.25	-	35.50	2.3	2
	32.50	-	34.80	2.2	2
	31.50	-	32.25	2.3	2
	30.25	-	31.25	2.2	2
	23.75	-	30.00	2.2	1
	7.55	-	23.50	2.1	1

Description	Station Range			Conversion Factor	Conversion Surface
	5.64	-	7.41	2.3	2
	3.10	-	5.45	2.2	2
	0.13	-	2.95	2.1	2
Dry Creek	All			2.1	1
Best Slough	All			2.1	1
Tisdale Bypass	0.21	-	4.36	2.2	2
	0.04			2.3	2
KLRC	5.13	-	6.25	2.0	2
	1.19	-	4.95	1.9	2
	0.26	-	1.0	1.8	2
Sutter Bypass	91.02	-	94.45	1.7	2
	89.53	-	90.84	1.8	2
	88.41	-	89.35	1.9	2
	86.18	-	88.23	2	2
	77.79	-	85.99	2.1	2
	75.91	-	77.61	2.2	2
	75.72			2.1	2
	73.63	-	75.53	2.2	2
	73.45			2.3	2
	73.07	-	73.26	2.4	2
	72.71	-	72.89	2.5	2
	67.20	-	72.52	2.4	2
	64.63	-	67.01	2.3	2
	62.01	-	64.44	2.2	2
	58.81	-	61.82	2.1	2
Yolo Bypass	56.57	-	57.15	2	2
	54.33	-	56.38	1.9	2
	51.284	-	53.626	1.8	2
	51.097			1.9	2
	50.911			2	2
	50.697			2	2
Honcut Creek	All			2.2	2
Yankee Slough	All			2.1	1
Bear River	13.37	-	16.35	2.2	Extrapolated*
	0.67	-	13.09	2.1	1
UPIC	4.939	-	4.94	2.2	1
	0.06	-	4.75	2.1	1
Jack Slough	2.250	-	7.50	2.3	2
	1.250	-	2.13	2.2	1
Yuba River	2.830	-	13.84	2.3	2
	1.479	-	2.60	2.2	2
	0.19	-	1.35	2.2	1

*Note – The conversion surfaces did not extend into the upper portion of Bear Creek. Therefore a conversion factor of 2.2 was applied by extrapolating the values of Conversion Surface 1.

2.2 Lateral Structures

Lateral structures in the PBI Sutter Basin model represent levees. The top of levee elevations used for the lateral structures are based upon data obtained from the USACE National Levee Database (NLDB) which was developed using NAVD 88. However, top of levee elevations

from the NLDB were converted to NGVD 29 (via Corpscon) when utilized for the USACE ver.3 model (which is the basis of the PBI Sutter Basin model). Three methods were specified by USACE to be used in converting the lateral structures from NGVD 29 to NAVD 88: (i) Lateral structures for the west bank of the Feather River and the east bank of the Sutter Bypass were re-coded into the model based upon the NLDB NAVD 88 values, (ii) certain lateral structures were re-converted back to NAVD 88 using the original conversion values that were provided by the USACE on June 9, 2010, and (iii) the remaining lateral structures were converted using the conversion surfaces referred to in Section 2.1. A list of the conversion values applied to the lateral structures in the PBI Sutter Basin model is contained in Table 2.

Table 2: Conversion Factors Utilized for the PBI Sutter Basin HEC-RAS Lateral Structures

Description	Lateral Structure Stations			Conversion Factor	Source
Feather River	56.99	-	58.45		Coded in from NLDB
	56.01			2.29	USACE Conversion Value
	55.4				Coded in from NLDB
	54.039			2.29	USACE Conversion Value
	50.31	-	53.56		Coded in from NLDB
	50.17			2.27	USACE Conversion Value
	48.55				Coded in from NLDB
	48.47			2.27	USACE Conversion Value
	47.25				Coded in from NLDB
	46.44			2.27	USACE Conversion Value
	29.82	-	46.43		Coded in from NLDB
	29.241	-	29.741	2.27	USACE Conversion Value
	20.85	-	29.2		Coded in from NLDB
	19.91			2.1	Conversion Surface
	13.9	-	19.9		Coded in from NLDB
	12.74	-	13.24	2.1	Conversion Surface
	2.55	-	11.95		Coded in from NLDB
Sacramento River	128.4	-	143.23	2.4	USACE Conversion Value
	122.4	-	125.49	2.38	USACE Conversion Value
	118.24	-	118.97	2.39	USACE Conversion Value
	90.35	-	111.49	2.42	USACE Conversion Value
	90.21	-	90.219	2.44	USACE Conversion Value
	84.74			1.9	Conversion Surface
	83.74			2	Conversion Surface
	79.2	-	79.99	2.1	Conversion Surface
Sutter Bypass	94.44			2.39	USACE Conversion Value
	88.03	-	88.191	2.37	USACE Conversion Value
	84.131			2.35	USACE Conversion Value
	81.23	-	84.13		Coded in from NLDB
	77.96	-	77.97	2.35	USACE Conversion Value
	73.84	-	77.2		Coded in from NLDB
	72.31			2.35	USACE Conversion Value

Description	Lateral Structure Stations			Conversion Factor	Source
	72.2	-	72.3		Coded in from NLDB
	71.97			2.35	USACE Conversion Value
	68.95	-	71.43		Coded in from NLDB
	66.81			2.39	USACE Conversion Value
	64.45	-	66.80	2.3	Conversion Surface
	62.02	-	64.26	2.2	Conversion Surface
	59.01	-	61.83	2.1	Conversion Surface
Best Slough	1.24			2.1	Conversion Surface
Dry Creek	1.948	-	7.58	2.27	USACE Conversion Value
Jack Slough	2.24	-	7.49	2.27	USACE Conversion Value
Wadsworth Canal	4.28	-	4.281	2.33	USACE Conversion Value
Tisdale Bypass	1.949	-	3.941	2.37	USACE Conversion Value
Yankee Slough	0.7	-	5.14	2.27	USACE Conversion Value
Yuba OB	1.781	-	1.921	2.3	Conversion Surface
Bear River	2.24	-	12.491	2.27	USACE Conversion Value
Honcut Creek	3.316			2.2	Conversion Surface
Yuba River	0.639	-	8.0	2.27	USACE Conversion Value
KLRC	1.18	-	6.24	Varies from 2.45-2.47	USACE Conversion Value
Yolo Bypass	56.7			1.9	Conversion Surface
	53.45	-	56.5	Varies from 2.44-2.53	USACE Conversion Value
	51.9			2.0	Conversion Surface
UPIC	2.24	-	4.93	2.27	USACE Conversion Value

2.3 Storage Areas

Storage areas within the PBI Sutter Basin model were converted using conversion factors provided by the USACE. A list of the conversion factors utilized is contained in Table 3.

Table 3: Conversion Factors Utilized for the PBI Sutter Basin HEC-RAS Storage Areas

Storage Area	Conversion Factor
SA - Grasshopper	2.24
SA - Yankee	2.24
SA - Reeds Cr	2.25
SA - N Best Sl	2.25
SA - Camp Beale	2.26
SARobinsons	2.26
SA - S Best Sl	2.27
SA - Olivehurst	2.27
SAHoncut	2.27
SA - N Tri	2.27
MarysvilleSA	2.27
SABOGA	2.28
SA - Yankee low	2.28
SAFernandez1	2.29

Storage Area	Conversion Factor
SAFernandez2	2.29
SA - Arboga	2.29
SA - Gilsizer	2.31
SA Gridley	2.33
SA - Coon Creek	2.33
SA Live Oak	2.34
SA-Sutter	2.37
SA94	2.39
SA-RD70&1660	2.39
SA96	2.40
SA92	2.40
SA-RD1500	2.41
SA86	2.41
SA100	2.42
SA89	2.42
SA98	2.43
SA93	2.43
SA87	2.43
SA90	2.43
SA88	2.44
sac-sutter	2.44
SA102	2.44
SA91	2.44
SA95	2.45
SA97	2.45
SA166	2.46
SA106	2.46
SA107	2.46
SA103	2.46
SA105	2.46
SA108	2.47
SA101	2.47
SA99	2.48
SA104	2.48
Cache Set Basin	2.49
SA 109	2.49
SA 110	2.51
SA 111	2.53
SA 112	2.53

2.4 Storage Area Connections

Storage area connections within the PBI Sutter Basin model were converted using conversion factors provided by the USACE. A list of the conversion factors utilized is contained in Table 4.

Table 4: Conversion Factors Utilized for the PBI Sutter Basin HEC-RAS Storage Area Connections

Storage Area Connection	Conversion Factor
SC - overland2	2.25
SC - overland1	2.26
SC - overland Ya	2.26
SC - overland3	2.26
SC - RTE 70 A	2.26
Robinsons-Honcut	2.27
SC - N Beale Rd	2.27
SC - RR Bridge	2.27
SC - levee notch	2.27
SC - FR Blvd	2.28
SC - RR A	2.28
SC - RR at Erle	2.28
SC - RR B	2.28
SAC122_125	2.29
SACGridl_LiveOak	2.29
SC - overland YS	2.29
Fern1toFern2	2.29
SACGridley_125	2.31
SACLiveOak_125	2.31
SACGridley_122	2.31
94-95	2.32
SACLiveOak_Gilsi	2.33
92-94	2.40
94-96	2.40
86-92	2.41
93-94	2.41
86-89	2.42
92-93	2.42
96-98	2.42
86-87	2.42
86-90	2.42
RD1500-Sutter	2.42
87-89	2.43
89-90	2.43
95-96	2.43
96-97	2.43
98-100	2.43
87-90	2.43
90-93	2.43
87-88	2.44
87-91	2.44
90-91	2.44
88-91	2.44
97-98	2.44
100-101	2.45
91-95	2.45
102-105	2.45
102-106	2.45
95-97	2.45
98-101	2.45

Storage Area Connection	Conversion Factor
98-99	2.46
105-106	2.46
105-107	2.46
106-107	2.46
101-103	2.47
105-108	2.47
107-108	2.47
97-99	2.47
103-104	2.47
101-104	2.48
99-101	2.48
SA104 to Cache	2.49
Cache to SA109	2.49
Cache to SA110	2.50
SA109 to SA111	2.51
SA110 to SA111	2.52
SA110 to SA112	2.52
SA111 to SA112	2.53

2.5 Bridges & Inline Structures

The bridges and inline structures within the PBI Sutter Basin model were converted using the conversion surface value for their associated river stationing. The bridges and inline structures utilize the same conversion factors that were applied to the cross sections (see Section 2.1 of this TM).

2.6 Flood Relief Structures

The PBI Sutter Basin HEC-RAS model contains two flood relief structures; the Fremont Weir and the Tisdale Bypass. These structures were converted to NAVD 88 based upon record drawing information provided by the USACE. A summary of the converted flood relief structure elevations is shown in Table 6.

Table 6: Conversion Factors Utilized for the HEC-RAS Flood Relief Structures

Flood Relief Structure	Weir Crest Elevation (ft-NAVD 88)
Tisdale Bypass	44.21
Freemont Weir (@ East End)	32.61

2.7 Downstream Boundary Conditions

Two rating curves are utilized as the downstream boundary condition for the PBI Sutter Basin model; 1) Yolo Bypass at Woodland and 2) Sacramento River at Verona. The rating curves were adjusted to NAVD 88 based upon data provided by the USACE (see Table 7).

Table 7: Gage Datum Relationships Utilized for the Downstream Rating Curves

Rating Curve Location	**NAVD 88 Gage Datum Relationship**
Yolo Bypass at Woodland	USGS Gage Datum minus 1.21'
Sacramento River at Verona	USGS Gage Datum minus 0.77'

2.8 Conversion Results

The water surface elevation profiles for the Feather River and Sutter Bypass resulting from the conversion of the PBI Sutter Basin HEC-RAS model from NGVD 29 to NAVD 88 are shown in Figures 1 and 2.

Figure 1: Model Conversion Results for the Feather River

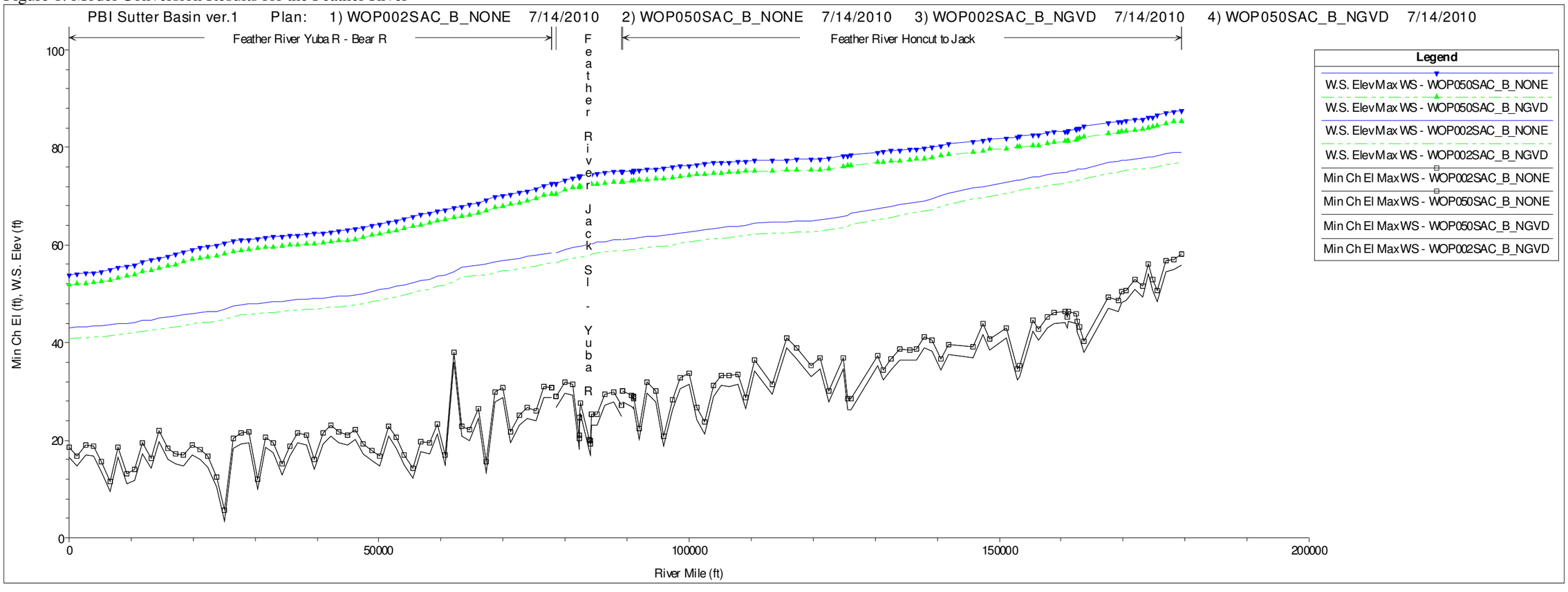
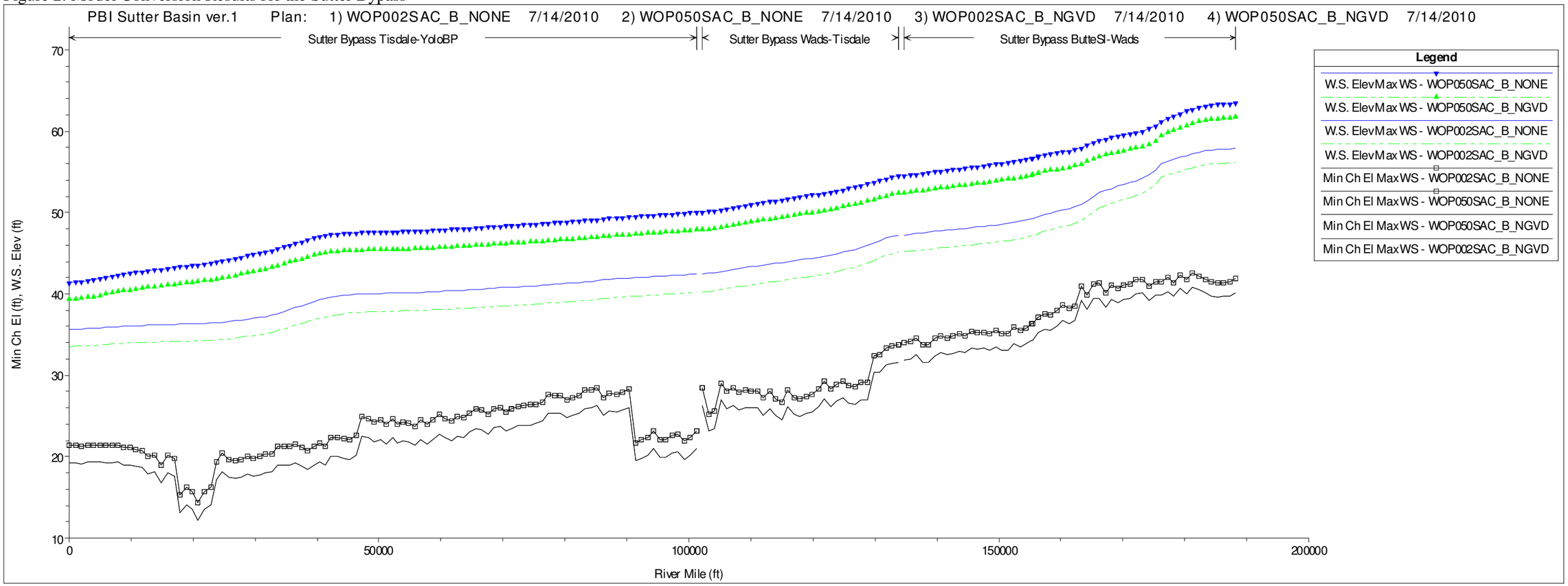


Figure 2: Model Conversion Results for the Sutter Bypass



LEGEND

- HEC-RAS Cross Section
- HEC-RAS River Alignment
- Csurface1 Contourlines
- Csurface2 Contourlines
- Conversion Surface 1 Boundary

Comp Study Map Index

- Ayres Upper Feather
- Towill Lower Feather

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JUNE 7, 2010

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SUTTER BUTTE FLOOD CONTROL AGENCY

TO2 CONVERSION SURFACE
PBI SUTTER BASIN HEC-RAS MODEL

FIGURE

3

ATTACHMENT C

DWR 1957 Profile

FEATHER RIVER
1957 PROFILE

	A	B	C	D	E
3		River Mile	1957 Design Profile	Design Elevation	
4			1929 Feet	1929 Feet	1988 Feet
5		58.560	130.09	130.09	**132.39**
6		58.310	128.83	128.83	**131.13**
7		58.000	127.27	127.27	**129.57**
8		57.750	126.01	126.01	**128.31**
9		57.500	124.75	124.75	**127.05**
10		57.220	123.57	123.57	**125.87**
11		56.990	122.82	122.82	**125.11**
12		56.660	121.74	121.74	**124.03**
13		56.480	121.15	121.15	**123.44**
14		56.250	120.40	120.40	**122.69**
15		56.070	119.81	119.81	**122.10**
16		55.850	119.09	119.09	**121.38**
17		55.600	118.11	118.11	**120.39**
18		55.400	117.24	117.24	**119.53**
19		55.080	115.86	115.86	**118.14**
20		54.500	113.35	113.35	**115.63**
21		54.250	112.27	112.27	**114.54**
22		54.090	111.58	111.58	**113.85**
23		53.890	110.71	110.71	**112.99**
24		53.570	109.33	109.33	**111.60**
25		53.270	108.03	108.03	**110.31**
26		52.940	107.20	107.20	**109.48**
27		52.650	106.71	106.71	**108.98**
28		52.260	106.04	106.04	**108.31**
29		52.000	105.59	105.59	**107.87**
30		51.400	104.56	104.56	**106.83**
31		51.090	103.38	103.38	**105.66**
32		50.890	102.24	102.24	**104.52**
33		50.750	101.44	101.44	**103.71**
34		50.548	100.45	100.45	**102.73**
35		50.546	100.45	100.45	**102.72**
36		50.539	100.42	100.42	**102.70**
37		50.537	100.41	100.41	**102.69**
38		50.250	99.37	99.37	**101.65**
39		50.110	98.86	98.86	**101.14**
40		49.830	97.85	97.85	**100.12**
41		49.630	97.23	97.23	**99.50**
42		49.430	96.64	96.64	**98.92**
43		49.260	96.14	96.14	**98.42**
44		49.040	95.49	95.49	**97.76**
45		48.900	95.08	95.08	**97.35**
46		48.710	94.52	94.52	**96.79**
47		48.440	93.73	93.73	**96.00**
48		48.260	93.20	93.20	**95.47**
49		48.120	92.79	92.79	**95.06**

FEATHER RIVER
1957 PROFILE

	A	B	C	D	E
3		River Mile	1957 Design Profile	Design Elevation	
4			1929 Feet	1929 Feet	1988 Feet
50		47.750	92.34	92.34	**94.62**
51		47.600	92.19	92.19	**94.46**
52		47.250	91.67	91.67	**93.94**
53		47.090	91.36	91.36	**93.63**
54		46.740	90.69	90.69	**92.96**
55		46.580	90.38	90.38	**92.65**
56		46.500	90.22	90.22	**92.49**
57		46.250	89.78	89.78	**92.05**
58		46.030	89.59	89.59	**91.86**
59		45.760	89.37	89.37	**91.64**
60		45.630	89.26	89.26	**91.53**
61		45.490	89.15	89.15	**91.42**
62		45.310	89.00	89.00	**91.27**
63		45.080	88.81	88.81	**91.08**
64		44.810	88.58	88.58	**90.85**
65		44.550	88.37	88.37	**90.64**
66		44.280	88.13	88.13	**90.40**
67		43.510	87.34	87.34	**89.61**
68		43.390	87.22	87.22	**89.49**
69		43.280	87.11	87.11	**89.38**
70		43.060	86.88	86.88	**89.15**
71		42.700	86.51	86.51	**88.78**
72		42.520	86.33	86.33	**88.60**
73		42.240	86.04	86.04	**88.31**
74		41.600	85.53	85.53	**87.80**
75		41.250	85.25	85.25	**87.53**
76		40.750	84.86	84.86	**87.13**
77		40.540	84.70	84.70	**86.97**
78		40.240	84.47	84.47	**86.74**
79		39.500	83.99	83.99	**86.26**
80		39.280	83.84	83.84	**86.12**
81		38.990	83.66	83.66	**85.93**
82		38.760	83.51	83.51	**85.78**
83		38.500	83.34	83.34	**85.61**
84		38.320	83.22	83.22	**85.49**
85		38.000	83.04	83.04	**85.31**
86		37.730	82.88	82.88	**85.16**
87		37.500	82.75	82.75	**85.02**
88		37.340	82.66	82.66	**84.94**
89		36.500	82.18	82.18	**84.46**
90		36.290	82.06	82.06	**84.34**
91		35.780	81.72	81.72	**83.99**
92		35.500	81.60	81.60	**83.88**
93		35.250	81.50	81.50	**83.77**
94		34.800	81.31	81.31	**83.58**

FEATHER RIVER
1957 PROFILE

	A	B	C	D	E
3		River Mile	1957 Design Profile	Design Elevation	
4			1929 Feet	1929 Feet	1988 Feet
95		34.500	81.18	81.18	**83.46**
96		34.070	81.00	81.00	**83.28**
97		33.500	80.75	80.75	**83.03**
98		33.250	80.62	80.62	**82.90**
99		33.000	80.49	80.49	**82.77**
100		32.750	80.37	80.37	**82.65**
101		32.500	80.24	80.24	**82.52**
102		32.250	80.11	80.11	**82.39**
103		32.000	79.98	79.98	**82.26**
104		31.750	79.86	79.86	**82.13**
105		31.500	79.70	79.70	**81.98**
106		31.250	79.53	79.53	**81.80**
107		31.000	79.35	79.35	**81.63**
108		30.750	80.38	80.38	**82.65**
109		30.500	79.75	79.75	**82.03**
110		30.250	78.80	78.80	**81.08**
111		30.000	78.56	78.56	**80.84**
112		29.828	78.39	78.39	**80.67**
113		29.826	78.39	78.39	**80.67**
114		29.822	78.39	78.39	**80.67**
115		29.821	78.39	78.39	**80.66**
116		29.750	78.32	78.32	**80.60**
117		29.500	78.08	78.08	**80.36**
118		29.250	77.84	77.84	**80.12**
119		29.000	77.61	77.61	**79.88**
120		28.750	77.37	77.37	**79.65**
121		28.500	77.05	77.05	**79.33**
122		28.324	76.67	76.67	**78.95**
123		28.322	76.66	76.66	**78.94**
124		28.309	76.64	76.64	**78.91**
125		28.307	76.63	76.63	**78.91**
126		28.250	76.51	76.51	**78.79**
127		28.000	76.24	76.24	**78.51**
128		27.973	76.21	76.21	**78.49**
129		27.971	76.21	76.21	**78.49**
130		27.954	76.20	76.20	**78.48**
131		27.952	76.20	76.20	**78.47**
132		27.750	76.03	76.03	**78.31**
133		27.500	75.83	75.83	**78.10**
134		27.250	75.62	75.62	**77.90**
135		27.000	75.44	75.44	**77.71**
136		26.750	75.27	75.27	**77.55**
137		26.500	75.11	75.11	**77.39**
138		26.250	74.95	74.95	**77.23**
139		26.000	74.79	74.79	**77.07**

FEATHER RIVER
1957 PROFILE

	A	B	C	D	E
3		River Mile	1957 Design Profile	Design Elevation	
4			1929 Feet	1929 Feet	1988 Feet
140		25.750	74.63	74.63	**76.91**
141		25.500	74.46	74.46	**76.74**
142	v	25.250	74.21	74.21	**76.49**
143		25.000	73.90	73.90	**76.17**
144		24.750	73.58	73.58	**75.86**
145		24.500	73.27	73.27	**75.55**
146		24.250	72.95	72.95	**75.23**
147		24.000	72.64	72.64	**74.92**
148		23.890	72.50	72.50	**74.78**
149		23.750	72.33	72.33	**74.61**
150		23.500	71.97	71.97	**74.25**
151		23.250	71.59	71.59	**73.87**
152		23.000	71.21	71.21	**73.49**
153		22.750	70.82	70.82	**73.11**
154		22.500	70.44	70.44	**72.73**
155		22.250	70.06	70.06	**72.35**
156		22.000	69.68	69.68	**71.97**
157		21.750	69.12	69.12	**71.41**
158		21.500	68.53	68.53	**70.82**
159		21.250	67.94	67.94	**70.23**
160		21.000	67.48	67.48	**69.77**
161		20.750	67.01	67.01	**69.30**
162		20.500	66.54	66.54	**68.83**
163		20.250	66.07	66.07	**68.37**
164		20.000	65.60	65.60	**67.90**
165		19.750	65.44	65.44	**67.74**
166		19.500	65.28	65.28	**67.58**
167		19.250	65.07	65.07	**67.37**
168		19.000	64.85	64.85	**67.15**
169		18.750	64.63	64.63	**66.93**
170		18.500	64.41	64.41	**66.71**
171		18.250	64.15	64.15	**66.45**
172		18.000	63.89	63.89	**66.19**
173		17.750	63.63	63.63	**65.93**
174		17.500	63.38	63.38	**65.67**
175		17.250	63.12	63.12	**65.41**
176		17.000	62.86	62.86	**65.16**
177		16.750	62.60	62.60	**64.90**
178		16.500	62.09	62.09	**64.39**
179		16.250	61.57	61.57	**63.87**
180		16.000	61.06	61.06	**63.36**
181		15.750	60.54	60.54	**62.85**
182		15.500	60.03	60.03	**62.33**
183		15.250	59.51	59.51	**61.82**
184		15.000	59.00	59.00	**61.31**

FEATHER RIVER
1957 PROFILE

	A	B	C	D	E
3		River Mile	1957 Design Profile	Design Elevation	
4			1929 Feet	1929 Feet	1988 Feet
185		14.750	58.29	58.29	**60.60**
186		14.500	57.57	57.57	**59.88**
187		14.250	56.93	56.93	**59.24**
188		14.000	56.57	56.57	**58.89**
189		13.750	56.21	56.21	**58.53**
190		13.500	55.86	55.86	**58.17**
191		13.250	55.50	55.50	**57.82**
192		13.000	55.14	55.14	**57.46**
193		12.750	54.79	54.79	**57.11**
194		12.500	54.49	54.49	**56.82**
195		12.250	54.27	54.27	**56.59**
196		12.000	54.05	54.05	**56.37**
197		11.750	53.82	53.82	**56.15**
198		11.500	53.60	53.60	**55.93**
199		11.250	53.38	53.38	**55.71**
200		11.000	53.11	53.11	**55.44**
201		10.750	52.67	52.67	**55.01**
202		10.500	52.23	52.23	**54.57**
203		10.250	51.79	51.79	**54.13**
204		10.000	51.35	51.35	**53.69**
205		9.750	50.93	50.93	**53.27**
206		9.500	50.57	50.57	**52.91**
207		9.278	50.25	50.25	**52.59**
208		9.276	50.24	50.24	**52.58**
209		9.267	50.22	50.22	**52.56**
210		9.265	50.21	50.21	**52.56**
211		9.200	50.05	50.05	**52.39**
212		9.000	49.20	49.20	**51.55**
213		8.750	48.09	48.09	**50.44**
214		8.500	46.99	46.99	**49.34**
215		8.250	45.88	45.88	**48.23**
216		8.000	44.77	44.77	**47.12**
217		7.750	43.66	43.66	**46.02**
218		7.550	42.62	42.62	**44.98**
219		7.410	42.55	42.55	**44.90**
220		7.170	42.41	42.41	**44.77**
221		6.880	42.26	42.26	**44.62**
222		6.590	42.10	42.10	**44.46**
223		6.390	41.99	41.99	**44.35**
224		6.210	41.89	41.89	**44.26**
225		6.020	41.79	41.79	**44.16**
226		5.830	41.68	41.68	**44.05**
227		5.640	41.58	41.58	**43.95**
228		5.450	41.48	41.48	**43.85**
229		5.270	41.38	41.38	**43.75**

FEATHER RIVER
1957 PROFILE

	A	B	C	D	E
3		River Mile	1957 Design Profile	Design Elevation	
4			1929 Feet	1929 Feet	1988 Feet
230		5.170	41.32	41.32	**43.70**
231		4.980	41.22	41.22	**43.60**
232		4.800	41.12	41.12	**43.50**
233		4.620	41.02	41.02	**43.40**
234		4.420	40.91	40.91	**43.30**
235		4.230	40.81	40.81	**43.19**
236		4.050	40.71	40.71	**43.10**
237		3.870	40.61	40.61	**43.00**
238		3.670	40.50	40.50	**42.90**
239		3.470	40.39	40.39	**42.79**
240		3.290	40.30	40.30	**42.69**
241		3.100	40.19	40.19	**42.59**
242		2.950	40.11	40.11	**42.51**
243		2.820	40.04	40.04	**42.44**
244		2.740	40.00	40.00	**42.40**
245		2.680	39.96	39.96	**42.37**
246		2.570	39.90	39.90	**42.31**
247		2.370	39.79	39.79	**42.20**
248		2.190	39.70	39.70	**42.10**
249		2.000	39.59	39.59	**42.00**
250		1.740	39.45	39.45	**41.86**
251		1.540	39.34	39.34	**41.75**
252		1.360	39.24	39.24	**41.66**
253		1.170	39.14	39.14	**41.55**
254		0.980	39.04	39.04	**41.45**
255		0.730	38.90	38.90	**41.32**
256		0.560	38.81	38.81	**41.23**
257		0.330	38.68	38.68	**41.10**
258		0.130	38.57	38.57	**40.99**

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

ATTACHMENT D

October 2010 Water Surface Profiles

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
October 26, 2010

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Upper	58.51	129.82	131.48	139.08	132.14	235748.95
Upper	58.26	129.39	131.08	139.07	130.88	233625.38
Upper	57.95	127.43	128.91	137.19	129.32	232796.18
Upper	57.7	124.99	126.24	132.7	128.05	231347.46
Upper	57.45	122.63	123.71	129.69	126.84	230491.75
Upper	57.17	120.24	121.32	127.59	125.70	226547.44
Upper	56.94	118.97	120.1	126.56	124.95	223836.90
Upper	56.61	117.66	118.82	125.38	123.87	222092.63
Upper	56.43	116.96	118.15	124.81	123.28	221068.16
Upper	56.2	115.55	116.82	123.65	122.52	220516.06
Upper	56.02	114.65	115.95	122.78	121.93	220057.97
Upper	55.8	113.07	114.25	120.24	121.18	219786.54
Upper	55.55	112.34	113.53	119.33	120.17	219191.24
Upper	55.35	110.94	112.04	117.07	119.31	216984.11
Upper	55.03	110.1	111.1	115.62	117.92	214664.25
Upper	54.45	109.02	109.95	114.44	115.41	212925.66
Upper	54.2	108.67	109.64	114.11	114.33	210158.47
Upper	54.04	108.63	109.61	114.11	113.64	209562.52
Upper	53.84	107.98	108.97	113.5	112.77	208499.74
Upper	53.52	107.21	108.13	112.38	111.39	205714.05
Upper	53.22	106.24	107.13	111.06	110.18	204265.70
Upper	52.89	104.42	105.32	109.34	109.40	202757.11
Upper	52.6	102.76	103.63	107.63	108.90	201183.88
Upper	52.21	101.94	102.79	106.71	108.23	199618.97
Upper	51.95	101.7	102.54	106.39	107.78	198775.45
Upper	51.35	100.89	101.83	105.93	106.73	197882.65
Upper	51.1777	100.97	101.87	105.89	106.00	195736.74
Upper	51.04	100.94	101.83	105.81	105.38	193817.41
Upper	50.84	100.54	101.47	105.57	104.23	192085.50
Upper	50.7	100.18	101.22	105.41	103.61	191278.99
Upper	50.59	99.34	100.57	105.08	102.93	190705.90
Upper	50.498	99.27	100.41	104.89	102.55	190230.79
Upper	50.496	99.26	100.39	104.85	102.54	190218.72
Upper	50.489	99.28	100.31	104.82	102.52	190176.83
Upper	50.487	99.33	100.35	104.84	102.51	190166.78
Upper	50.2	98.53	99.52	104.02	101.47	188470.72
Upper	50.06	97.9	98.86	103.41	100.96	187822.66
Upper	49.78	96.68	97.63	102.33	99.97	186662.60
Upper	49.58	95.64	96.6	101.37	99.36	185293.60
Upper	49.38	94.78	95.72	100.55	98.77	184138.90
Upper	49.21	94.19	95.15	100.06	98.27	183514.21
Upper	48.99	93.73	94.7	99.68	97.62	183056.49
Upper	48.85	93.24	94.22	99.24	97.21	182753.69
Upper	48.66	92.89	93.85	98.86	96.65	181801.88
Upper	48.39	92.46	93.42	98.44	95.85	180454.16
Upper	48.21	92.02	92.97	97.98	95.32	179460.20
Upper	48.07	91.42	92.38	97.49	95.00	179109.34
Upper	47.7	90.59	91.6	96.91	94.57	176933.60
Upper	47.55	89.97	91.06	96.62	94.39	175967.91
Upper	47.2	89.51	90.61	96.25	93.85	174102.82
Upper	47.04	89.29	90.4	96.14	93.54	173345.89
Upper	46.69	88.57	89.75	95.85	92.86	172499.41
Upper	46.53	88.22	89.45	95.69	92.55	171792.00
Honcut to Jack	46.45	88.22	89.45	95.69	92.40	171454.59
Honcut to Jack	46.2	88.02	89.25	95.48	92.00	171127.62
Honcut to Jack	45.98	87.77	89.01	95.26	91.82	170521.00
Honcut to Jack	45.71	87.22	88.5	94.86	91.60	169330.99
Honcut to Jack	45.58	86.95	88.25	94.64	91.49	168312.33

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
October 26, 2010

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	45.44	86.78	88.09	94.49	91.37	166923.76
Honcut to Jack	45.26	86.55	87.87	94.28	91.22	165726.12
Honcut to Jack	45.03	86.39	87.71	94.13	91.03	164732.57
Honcut to Jack	44.76	86.17	87.51	93.94	90.81	163250.84
Honcut to Jack	44.6326	86.09	87.43	93.86	90.70	161213.76
Honcut to Jack	44.5	85.92	87.27	93.7	90.59	160088.12
Honcut to Jack	44.23	85.7	87.05	93.49	90.35	159311.39
Honcut to Jack	43.46	85.1	86.54	93.12	89.56	158271.13
Honcut to Jack	43.34	84.85	86.32	92.95	89.38	157627.58
Honcut to Jack	43.28	84.75	86.22	92.93	89.38	157373.66
Honcut to Jack	43.23	84.61	86.1	92.87	89.32	157104.73
Honcut to Jack	43.12	84.32	85.86	92.76	89.21	156612.83
Honcut to Jack	43.06	84.26	85.81	92.74	89.15	156460.24
Honcut to Jack	43.01	84.21	85.76	92.68	89.10	156249.06
Honcut to Jack	42.65	84.09	85.66	92.58	88.73	153765.90
Honcut to Jack	42.47	83.88	85.46	92.4	88.55	153202.55
Honcut to Jack	42.19	83.58	85.2	92.18	88.27	152912.23
Honcut to Jack	42.01	83.56	85.18	92.17	88.13	152695.48
Honcut to Jack	41.61	83.28	84.94	91.98	87.81	152341.44
Honcut to Jack	41.55	83.17	84.85	91.91	87.76	151907.71
Honcut to Jack	41.2	82.92	84.67	91.76	87.49	150600.52
Honcut to Jack	40.7	82.75	84.54	91.65	87.09	150271.92
Honcut to Jack	40.49	82.5	84.34	91.46	86.93	149590.33
Honcut to Jack	40.19	82.3	84.19	91.32	86.71	148995.18
Honcut to Jack	39.45	81.77	83.81	90.95	86.23	147001.01
Honcut to Jack	39.23	81.47	83.59	90.71	86.09	145807.70
Honcut to Jack	38.94	81.15	83.35	90.47	85.90	144368.14
Honcut to Jack	38.71	80.92	83.18	90.29	85.75	143106.13
Honcut to Jack	38.45	80.77	83.08	90.17	85.58	141664.04
Honcut to Jack	38.27	80.66	82.99	90.07	85.46	140631.21
Honcut to Jack	37.95	80.5	82.88	89.93	85.28	138661.68
Honcut to Jack	37.68	80.34	82.76	89.79	85.13	137779.55
Honcut to Jack	37.45	80.18	82.64	89.64	85.00	136973.90
Honcut to Jack	37.29	80.05	82.54	89.49	84.91	136058.20
Honcut to Jack	36.45	79.52	82.17	89.07	84.43	134783.46
Honcut to Jack	36.35	79.36	82.07	88.96	84.37	134645.65
Honcut to Jack	36.24	79.17	81.95	88.84	84.30	134561.14
Honcut to Jack	35.78	78.72	81.66	88.5	83.99	132247.58
Honcut to Jack	35.5	78.59	81.56	88.38	83.88	130647.35
Honcut to Jack	35.25	78.51	81.51	88.3	83.77	130422.24
Honcut to Jack	34.8	78.44	81.46	88.25	83.58	129991.41
Honcut to Jack	34.5	78.39	81.42	88.2	83.46	128407.23
Honcut to Jack	34.07	78.32	81.38	88.14	83.28	127995.61
Honcut to Jack	33.5	78.25	81.33	88.08	83.03	126794.65
Honcut to Jack	33.25	78.15	81.26	87.99	82.90	125934.45
Honcut to Jack	33	78.04	81.18	87.89	82.77	124547.32
Honcut to Jack	32.75	77.91	81.09	87.77	82.65	123335.94
Honcut to Jack	32.5	77.82	81.03	87.67	82.52	122068.05
Honcut to Jack	32.25	77.74	80.97	87.6	82.39	121462.67
Honcut to Jack	32	77.57	80.85	87.43	82.26	121023.94
Honcut to Jack	31.75	77.33	80.68	87.19	82.13	119945.84
Honcut to Jack	31.5	77.12	80.52	86.95	81.98	118882.16
Honcut to Jack	31.25	76.91	80.37	86.74	81.80	117232.05
Honcut to Jack	31	76.68	80.21	86.51	81.63	115835.54
Honcut to Jack	30.75	76.49	80.09	86.32	82.65	115369.28
Honcut to Jack	30.5	76.36	80	86.19	82.03	114410.61
Honcut to Jack	30.25	76.25	79.92	86.08	81.08	113317.84
Honcut to Jack	30	76.03	79.76	85.83	80.84	111356.97

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
October 26, 2010

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	29.828	75.84	79.62	85.83	80.67	110812.54
Honcut to Jack	29.826	75.86	79.64	85.83	80.67	110802.45
Honcut to Jack	29.822	75.8	79.62	85.81	80.67	110784.75
Honcut to Jack	29.821	75.82	79.64	85.81	80.66	110774.66
Honcut to Jack	29.75	75.83	79.65	85.72	80.60	109217.11
Honcut to Jack	29.5	75.74	79.6	85.67	80.36	107965.48
Jack Sl - Yuba R	29.25	75.74	79.6	85.67	80.12	106938.36
Jack Sl - Yuba R	29	75.72	79.59	85.68	79.88	105627.60
Jack Sl - Yuba R	28.75	75.45	79.31	85.31	79.65	104417.55
Jack Sl - Yuba R	28.5	75.26	79.11	85.02	79.33	103521.79
Jack Sl - Yuba R	28.324	75.14	78.96	84.82	78.95	102627.46
Jack Sl - Yuba R	28.322	75.14	78.95	84.82	78.94	102615.67
Jack Sl - Yuba R	28.309	75.15	78.97	84.86	78.91	102537.51
Jack Sl - Yuba R	28.307	75.15	78.97	84.85	78.91	102527.14
Jack Sl - Yuba R	28.25	75.09	78.89	84.74	78.79	102281.40
Jack Sl - Yuba R	28	74.88	78.61	84.35	78.51	100798.76
Jack Sl - Yuba R	27.971	74.78	78.46	84.11	78.49	100749.02
Jack Sl - Yuba R	27.963	74.76	78.42	84.04	78.48	100696.07
Jack Sl - Yuba R	27.956	74.73	78.37	83.98	78.48	100684.10
Jack Sl - Yuba R	27.952	74.71	78.33	83.96	78.47	100652.33
Jack Sl - Yuba R	27.75	74.59	78.17	83.75	78.31	99512.10
Jack Sl - Yuba R	27.5	74.2	77.62	82.95	78.10	98174.47
Jack Sl - Yuba R	27.251	73.59	76.7	81.56	77.90	97016.29
Jack Sl - Yuba R	27.25	73.58	76.7	81.56	77.90	97011.08
Yuba R - Bear R	27	73.58	76.7	81.56	77.71	95787.83
Yuba R - Bear R	26.999	73.58	76.7	81.56	77.71	95782.80
Yuba R - Bear R	26.75	73.14	76.24	81.07	77.55	94705.78
Yuba R - Bear R	26.5	72.53	75.66	80.51	77.39	93495.05
Yuba R - Bear R	26.25	72.06	75.21	80.1	77.23	92095.83
Yuba R - Bear R	26	71.68	74.85	79.75	77.07	90634.01
Yuba R - Bear R	25.75	71.33	74.53	79.44	76.91	89136.87
Yuba R - Bear R	25.5	71.04	74.24	79.14	76.74	87728.16
Yuba R - Bear R	25.25	70.73	73.92	78.81	76.49	86208.17
Yuba R - Bear R	25	70.08	73.3	78.2	76.17	84613.00
Yuba R - Bear R	24.75	69.5	72.7	77.59	75.86	84085.03
Yuba R - Bear R	24.5	69.17	72.34	77.22	75.55	83744.43
Yuba R - Bear R	24.25	68.81	71.94	76.81	75.23	83076.25
Yuba R - Bear R	24	68.54	71.7	76.59	74.92	82269.01
Yuba R - Bear R	23.75	68.12	71.3	76.21	74.61	80891.65
Yuba R - Bear R	23.5	67.85	71.04	75.95	74.25	79494.60
Yuba R - Bear R	23.25	67.45	70.67	75.58	73.87	78032.72
Yuba R - Bear R	23	67.03	70.26	75.17	73.49	76810.25
Yuba R - Bear R	22.75	66.71	69.94	74.83	73.11	75345.95
Yuba R - Bear R	22.5	66.24	69.47	74.35	72.73	74107.24
Yuba R - Bear R	22.25	65.83	69.07	73.93	72.35	72852.32
Yuba R - Bear R	22	65.55	68.79	73.63	71.97	71497.68
Yuba R - Bear R	21.75	65.14	68.4	73.24	71.41	70018.45
Yuba R - Bear R	21.5	64.8	68.07	72.9	70.82	68712.35
Yuba R - Bear R	21.25	64.39	67.68	72.52	70.23	67330.45
Yuba R - Bear R	21	64.08	67.38	72.2	69.77	66047.23
Yuba R - Bear R	20.75	63.85	67.15	71.95	69.30	64675.51
Yuba R - Bear R	20.5	63.65	66.94	71.72	68.83	63332.45
Yuba R - Bear R	20.25	63.45	66.74	71.49	68.37	61977.06
Yuba R - Bear R	20	63.27	66.54	71.27	67.90	60460.00
Yuba R - Bear R	19.75	63.08	66.36	71.08	67.74	58852.41
Yuba R - Bear R	19.5	62.94	66.22	70.94	67.58	56862.66
Yuba R - Bear R	19.25	62.82	66.1	70.81	67.37	55516.59
Yuba R - Bear R	19	62.72	66	70.7	67.15	54713.04

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
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Yuba R - Bear R	18.75	62.55	65.83	70.52	66.93	53622.77
Yuba R - Bear R	18.5	62.45	65.73	70.41	66.71	52897.52
Yuba R - Bear R	18.25	62.33	65.61	70.28	66.45	51890.28
Yuba R - Bear R	18	62.12	65.39	70.03	66.19	49704.43
Yuba R - Bear R	17.75	61.95	65.23	69.85	65.93	49399.72
Yuba R - Bear R	17.5	61.78	65.05	69.66	65.67	49114.25
Yuba R - Bear R	17.25	61.56	64.83	69.43	65.41	48794.83
Yuba R - Bear R	17	61.1	64.39	68.97	65.16	48556.49
Yuba R - Bear R	16.75	60.82	64.11	68.67	64.90	48094.20
Yuba R - Bear R	16.5	60.54	63.81	68.33	64.39	47013.16
Yuba R - Bear R	16.25	60.34	63.6	68.1	63.87	46228.38
Yuba R - Bear R	16	60.04	63.28	67.73	63.36	45101.47
Yuba R - Bear R	15.75	59.47	62.64	66.99	62.85	43356.36
Yuba R - Bear R	15.5	58.98	62.1	66.34	62.33	41613.14
Yuba R - Bear R	15.25	58.59	61.67	65.85	61.82	40305.41
Yuba R - Bear R	15	58.17	61.2	65.28	61.31	39102.69
Yuba R - Bear R	14.75	57.78	60.8	64.84	60.60	37817.10
Yuba R - Bear R	14.5	57.4	60.37	64.33	59.88	36319.37
Yuba R - Bear R	14.25	56.83	59.73	63.55	59.24	34904.17
Yuba R - Bear R	14	56.51	59.38	63.17	58.89	33507.55
Yuba R - Bear R	13.75	56.15	58.96	62.64	58.53	32270.43
Yuba R - Bear R	13.5	55.68	58.44	62.01	58.17	31239.13
Yuba R - Bear R	13.25	55.32	58.05	61.55	57.82	29977.40
Yuba R - Bear R	13	55.19	57.92	61.43	57.46	28644.35
Yuba R - Bear R	12.75	55.01	57.73	61.21	57.11	27255.90
Yuba R - Bear R	12.5	54.93	57.65	61.14	56.82	26065.40
Yuba R - Bear R	12.25	54.68	57.4	60.89	56.59	24642.20
Reach 35	12	54.68	57.4	60.89	56.37	23313.05
Reach 35	11.75	54.54	57.27	60.76	56.15	21993.69
Reach 35	11.599	54.5	57.23	60.71	56.02	21069.77
Reach 35	11.5	54.37	57.1	60.59	55.93	20354.66
Reach 35	11.25	54.15	56.87	60.32	55.71	18182.41
Reach 35	11	53.82	56.51	59.93	55.44	16871.48
Reach 35	10.75	53.67	56.36	59.76	55.01	15547.88
Reach 35	10.5	53.41	56.08	59.44	54.57	14278.44
Reach 35	10.25	52.96	55.57	58.83	54.13	13850.18
Reach 35	10	52.74	55.34	58.59	53.69	12847.13
Reach 35	9.75	52.51	55.08	58.29	53.27	11597.74
Reach 35	9.5	52.1	54.62	57.74	52.91	10595.55
Reach 35	9.278	52.19	54.75	57.93	52.59	9814.09
Reach 35	9.265	51.71	54.16	57.16	52.56	9758.91
Reach 35	9.2	51.61	54.05	57.04	52.39	9164.29
Reach 35	9	51.26	53.66	56.58	51.55	8445.84
Reach 35	8.75	50.5	52.84	55.61	50.44	7531.76
Reach 35	8.5	50.14	52.48	55.23	49.34	6548.71
Reach 35	8.25	49.89	52.25	55	48.23	3573.02
Reach 35	8	49.11	51.46	54.1	47.12	2528.45
Reach 35	7.75	47.97	50.32	52.72	46.02	1733.43
Reach 35	7.55	46.82	49.11	51.05	44.98	1275.43

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

ATTACHMENT E

June 2011 Water Surface Profiles

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
June 10, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Upper	58.51	130.32	131.97	137.27	132.14	235748.95
Upper	58.26	129.25	130.96	136.17	130.88	233625.38
Upper	57.95	127.3	128.89	134.6	129.32	232796.18
Upper	57.7	124.59	125.99	132.74	128.05	231347.46
Upper	57.45	122.54	123.85	130.54	126.84	230491.75
Upper	57.17	120.27	121.44	127.48	125.70	226547.44
Upper	56.94	119.72	120.97	126.88	124.95	223836.90
Upper	56.61	119.04	120.31	126.24	123.87	222092.63
Upper	56.43	118.7	120	125.86	123.28	221068.16
Upper	56.2	117.82	119.14	124.99	122.52	220516.06
Upper	56.02	117.18	118.5	124.19	121.93	220057.97
Upper	55.8	115.95	117.16	122.29	121.18	219786.54
Upper	55.55	115.34	116.54	121.47	120.17	219191.24
Upper	55.35	114.23	115.34	119.76	119.31	216984.11
Upper	55.03	112.9	113.93	117.9	117.92	214664.25
Upper	54.45	110.87	111.86	115.89	115.41	212925.66
Upper	54.2	110.15	111.13	115.05	114.33	210158.47
Upper	54.04	109.82	110.82	114.77	113.64	209562.52
Upper	53.84	109.01	110.03	114.02	112.77	208499.74
Upper	53.52	107.58	108.5	112.34	111.39	205714.05
Upper	53.22	106.33	107.23	110.81	110.18	204265.70
Upper	52.89	104.81	105.68	109.2	109.40	202757.11
Upper	52.6	103.63	104.46	107.84	108.90	201183.88
Upper	52.21	102.99	103.78	107.04	108.23	199618.97
Upper	51.95	102.73	103.51	106.7	107.78	198775.45
Upper	51.35	101.83	102.7	106.04	106.73	197882.65
Upper	51.1777	101.65	102.51	105.82	106.00	195736.74
Upper	51.04	101.54	102.39	105.67	105.38	193817.41
Upper	50.84	100.98	101.86	105.21	104.23	192085.50
Upper	50.7	100.23	101.28	104.82	103.61	191278.99
Upper	50.59	98.83	100.16	104.2	102.93	190705.90
Upper	50.498	98.73	99.94	104	102.55	190230.79
Upper	50.496	98.68	99.89	103.93	102.54	190218.72
Upper	50.489	98.65	99.82	103.78	102.52	190176.83
Upper	50.487	98.69	99.87	103.8	102.51	190166.78
Upper	50.2	97.95	98.89	102.77	101.47	188470.72
Upper	50.06	97.11	98.09	102.06	100.96	187822.66
Upper	49.78	95.96	96.94	100.96	99.97	186662.60
Upper	49.58	95.12	96.1	100.21	99.36	185293.60
Upper	49.38	94.52	95.46	99.56	98.77	184138.90
Upper	49.21	94.13	95.09	99.25	98.27	183514.21
Upper	48.99	93.87	94.84	99.05	97.62	183056.49
Upper	48.85	93.55	94.52	98.78	97.21	182753.69
Upper	48.66	93.35	94.32	98.57	96.65	181801.88
Upper	48.39	93.03	94	98.28	95.85	180454.16
Upper	48.21	92.71	93.67	97.96	95.32	179460.20
Upper	48.07	92.27	93.25	97.65	95.00	179109.34
Upper	47.7	91.41	92.42	97.07	94.57	176933.60
Upper	47.55	90.85	91.92	96.78	94.39	175967.91
Upper	47.2	90.27	91.37	96.37	93.85	174102.82
Upper	47.04	90.04	91.15	96.23	93.54	173345.89
Upper	46.69	89.38	90.56	95.91	92.86	172499.41
Upper	46.53	89.03	90.24	95.74	92.55	171792.00
Honcut to Jack	46.45	89.03	90.24	95.74	92.40	171454.59
Honcut to Jack	46.2	88.82	90.04	95.53	92.00	171127.62
Honcut to Jack	45.98	88.6	89.81	95.31	91.82	170521.00
Honcut to Jack	45.71	88.11	89.35	94.92	91.60	169330.99
Honcut to Jack	45.58	87.85	89.11	94.71	91.49	168312.33

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
June 10, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	45.44	87.69	88.95	94.55	91.37	166923.76
Honcut to Jack	45.26	87.47	88.74	94.36	91.22	165726.12
Honcut to Jack	45.03	87.3	88.57	94.19	91.03	164732.57
Honcut to Jack	44.76	87.1	88.38	94.01	90.81	163250.84
Honcut to Jack	44.6326	87.02	88.3	93.92	90.70	161213.76
Honcut to Jack	44.5	86.87	88.15	93.77	90.59	160088.12
Honcut to Jack	44.23	86.65	87.94	93.57	90.35	159311.39
Honcut to Jack	43.46	86.07	87.42	93.15	89.56	158271.13
Honcut to Jack	43.34	85.81	87.18	92.96	89.38	157627.58
Honcut to Jack	43.28	85.7	87.08	92.93	89.38	157373.66
Honcut to Jack	43.23	85.55	86.95	92.87	89.32	157104.73
Honcut to Jack	43.12	85.25	86.68	92.74	89.21	156612.83
Honcut to Jack	43.06	85.18	86.62	92.72	89.15	156460.24
Honcut to Jack	43.01	85.12	86.57	92.66	89.10	156249.06
Honcut to Jack	42.65	84.99	86.45	92.57	88.73	153765.90
Honcut to Jack	42.47	84.79	86.26	92.4	88.55	153202.55
Honcut to Jack	42.19	84.5	86	92.2	88.27	152912.23
Honcut to Jack	42.01	84.44	85.95	92.16	88.13	152695.48
Honcut to Jack	41.61	84.21	85.74	92.01	87.81	152341.44
Honcut to Jack	41.55	84.11	85.65	91.94	87.76	151907.71
Honcut to Jack	41.2	83.85	85.42	91.78	87.49	150600.52
Honcut to Jack	40.7	83.68	85.28	91.68	87.09	150271.92
Honcut to Jack	40.49	83.43	85.05	91.5	86.93	149590.33
Honcut to Jack	40.19	83.23	84.87	91.36	86.71	148995.18
Honcut to Jack	39.45	82.7	84.41	91	86.23	147001.01
Honcut to Jack	39.23	82.36	84.15	90.76	86.09	145807.70
Honcut to Jack	38.94	81.97	83.84	90.47	85.90	144368.14
Honcut to Jack	38.71	81.71	83.63	90.28	85.75	143106.13
Honcut to Jack	38.45	81.53	83.5	90.15	85.58	141664.04
Honcut to Jack	38.27	81.41	83.4	90.05	85.46	140631.21
Honcut to Jack	37.95	81.22	83.25	89.9	85.28	138661.68
Honcut to Jack	37.68	81.06	83.12	89.76	85.13	137779.55
Honcut to Jack	37.45	80.88	82.98	89.6	85.00	136973.90
Honcut to Jack	37.29	80.72	82.85	89.45	84.91	136058.20
Honcut to Jack	36.45	80.11	82.41	89.01	84.43	134783.46
Honcut to Jack	36.35	79.9	82.27	88.88	84.37	134645.65
Honcut to Jack	36.24	79.66	82.1	88.73	84.30	134561.14
Honcut to Jack	35.78	79.08	81.71	88.34	83.99	132247.58
Honcut to Jack	35.5	78.92	81.59	88.21	83.88	130647.35
Honcut to Jack	35.25	78.82	81.51	88.13	83.77	130422.24
Honcut to Jack	34.8	78.73	81.45	88.06	83.58	129991.41
Honcut to Jack	34.5	78.64	81.38	87.98	83.46	128407.23
Honcut to Jack	34.07	78.55	81.32	87.9	83.28	127995.61
Honcut to Jack	33.5	78.45	81.25	87.83	83.03	126794.65
Honcut to Jack	33.25	78.32	81.15	87.72	82.90	125934.45
Honcut to Jack	33	78.18	81.05	87.61	82.77	124547.32
Honcut to Jack	32.75	78	80.93	87.46	82.65	123335.94
Honcut to Jack	32.5	77.87	80.83	87.34	82.52	122068.05
Honcut to Jack	32.25	77.76	80.75	87.24	82.39	121462.67
Honcut to Jack	32	77.58	80.62	87.08	82.26	121023.94
Honcut to Jack	31.75	77.37	80.46	86.88	82.13	119945.84
Honcut to Jack	31.5	77.16	80.31	86.67	81.98	118882.16
Honcut to Jack	31.25	76.97	80.16	86.48	81.80	117232.05
Honcut to Jack	31	76.76	80.01	86.29	81.63	115835.54
Honcut to Jack	30.75	76.56	79.88	86.11	82.65	115369.28
Honcut to Jack	30.5	76.33	79.71	85.9	82.03	114410.61
Honcut to Jack	30.25	76.1	79.55	85.68	81.08	113317.84
Honcut to Jack	30	75.84	79.29	85.33	80.84	111356.97

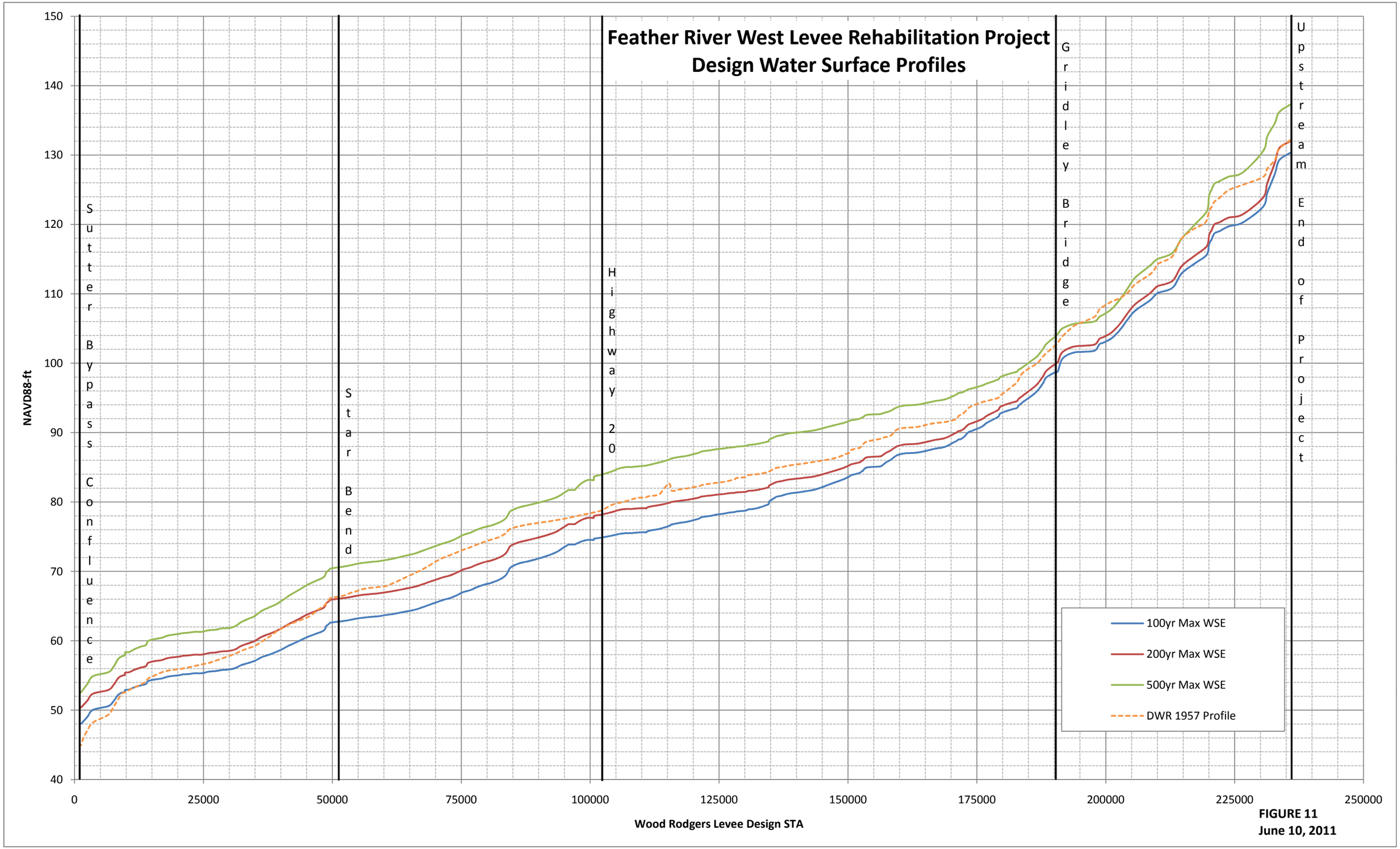
FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
June 10, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	29.828	75.6	79.06	85.24	80.67	110812.54
Honcut to Jack	29.826	75.62	79.08	85.24	80.67	110802.45
Honcut to Jack	29.822	75.63	79.09	85.23	80.67	110784.75
Honcut to Jack	29.821	75.64	79.11	85.23	80.66	110774.66
Honcut to Jack	29.75	75.6	79.07	85.13	80.60	109217.11
Honcut to Jack	29.5	75.51	78.99	85.03	80.36	107965.48
Jack Sl - Yuba R	29.25	75.51	78.99	85.03	80.12	106938.36
Jack Sl - Yuba R	29	75.39	78.85	84.83	79.88	105627.60
Jack Sl - Yuba R	28.75	75.18	78.58	84.47	79.65	104417.55
Jack Sl - Yuba R	28.5	75.05	78.41	84.24	79.33	103521.79
Jack Sl - Yuba R	28.324	74.93	78.26	84.03	78.95	102627.46
Jack Sl - Yuba R	28.322	74.92	78.26	84.03	78.94	102615.67
Jack Sl - Yuba R	28.309	74.91	78.24	84.02	78.91	102537.51
Jack Sl - Yuba R	28.307	74.91	78.24	84.01	78.91	102527.14
Jack Sl - Yuba R	28.25	74.87	78.19	83.94	78.79	102281.40
Jack Sl - Yuba R	28	74.72	78	83.67	78.51	100798.76
Jack Sl - Yuba R	27.971	74.63	77.87	83.45	78.49	100749.02
Jack Sl - Yuba R	27.963	74.61	77.84	83.39	78.48	100696.07
Jack Sl - Yuba R	27.956	74.58	77.79	83.33	78.48	100684.10
Jack Sl - Yuba R	27.952	74.52	77.7	83.14	78.47	100652.33
Jack Sl - Yuba R	27.75	74.53	77.71	83.16	78.31	99512.10
Jack Sl - Yuba R	27.5	74.27	77.36	82.62	78.10	98174.47
Jack Sl - Yuba R	27.251	73.87	76.8	81.73	77.90	97016.29
Jack Sl - Yuba R	27.25	73.87	76.8	81.73	77.90	97011.08
Yuba R - Bear R	27	73.87	76.8	81.73	77.71	95787.83
Yuba R - Bear R	26.999	73.87	76.8	81.72	77.71	95782.80
Yuba R - Bear R	26.75	73.37	76.29	81.2	77.55	94705.78
Yuba R - Bear R	26.5	72.79	75.74	80.68	77.39	93495.05
Yuba R - Bear R	26.25	72.35	75.34	80.32	77.23	92095.83
Yuba R - Bear R	26	71.99	75.01	80.03	77.07	90634.01
Yuba R - Bear R	25.75	71.67	74.72	79.75	76.91	89136.87
Yuba R - Bear R	25.5	71.41	74.47	79.5	76.74	87728.16
Yuba R - Bear R	25.25	71.15	74.2	79.22	76.49	86208.17
Yuba R - Bear R	25	70.59	73.69	78.72	76.17	84613.00
Yuba R - Bear R	24.75	69.98	73.12	78.17	75.86	84085.03
Yuba R - Bear R	24.5	69.54	72.69	77.74	75.55	83744.43
Yuba R - Bear R	24.25	69.1	72.27	77.32	75.23	83076.25
Yuba R - Bear R	24	68.77	71.97	77.02	74.92	82269.01
Yuba R - Bear R	23.75	68.36	71.58	76.63	74.61	80891.65
Yuba R - Bear R	23.5	68.1	71.33	76.38	74.25	79494.60
Yuba R - Bear R	23.25	67.72	70.97	76.01	73.87	78032.72
Yuba R - Bear R	23	67.31	70.58	75.59	73.49	76810.25
Yuba R - Bear R	22.75	67	70.26	75.25	73.11	75345.95
Yuba R - Bear R	22.5	66.54	69.81	74.76	72.73	74107.24
Yuba R - Bear R	22.25	66.15	69.42	74.34	72.35	72852.32
Yuba R - Bear R	22	65.88	69.15	74.04	71.97	71497.68
Yuba R - Bear R	21.75	65.49	68.78	73.65	71.41	70018.45
Yuba R - Bear R	21.5	65.16	68.46	73.3	70.82	68712.35
Yuba R - Bear R	21.25	64.78	68.09	72.92	70.23	67330.45
Yuba R - Bear R	21	64.48	67.8	72.59	69.77	66047.23
Yuba R - Bear R	20.75	64.26	67.58	72.34	69.30	64675.51
Yuba R - Bear R	20.5	64.08	67.38	72.1	68.83	63332.45
Yuba R - Bear R	20.25	63.88	67.19	71.87	68.37	61977.06
Yuba R - Bear R	20	63.71	67	71.65	67.90	60460.00
Yuba R - Bear R	19.75	63.53	66.83	71.46	67.74	58852.41
Yuba R - Bear R	19.5	63.4	66.69	71.31	67.58	56862.66
Yuba R - Bear R	19.25	63.28	66.58	71.19	67.37	55516.59
Yuba R - Bear R	19	63.19	66.48	71.08	67.15	54713.04

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
June 10, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Yuba R - Bear R	18.75	63.03	66.32	70.9	66.93	53622.77
Yuba R - Bear R	18.5	62.93	66.23	70.79	66.71	52897.52
Yuba R - Bear R	18.25	62.82	66.12	70.66	66.45	51890.28
Yuba R - Bear R	18	62.62	65.91	70.42	66.19	49704.43
Yuba R - Bear R	17.75	62.47	65.75	70.25	65.93	49399.72
Yuba R - Bear R	17.5	62.3	65.58	70.05	65.67	49114.25
Yuba R - Bear R	17.25	62.1	65.39	69.84	65.41	48794.83
Yuba R - Bear R	17	61.66	64.96	69.38	65.16	48556.49
Yuba R - Bear R	16.75	61.37	64.67	69.06	64.90	48094.20
Yuba R - Bear R	16.5	61.06	64.35	68.7	64.39	47013.16
Yuba R - Bear R	16.25	60.84	64.12	68.44	63.87	46228.38
Yuba R - Bear R	16	60.52	63.78	68.05	63.36	45101.47
Yuba R - Bear R	15.75	59.9	63.08	67.26	62.85	43356.36
Yuba R - Bear R	15.5	59.32	62.44	66.5	62.33	41613.14
Yuba R - Bear R	15.25	58.8	61.87	65.83	61.82	40305.41
Yuba R - Bear R	15	58.39	61.4	65.26	61.31	39102.69
Yuba R - Bear R	14.75	58.01	61	64.83	60.60	37817.10
Yuba R - Bear R	14.5	57.64	60.58	64.32	59.88	36319.37
Yuba R - Bear R	14.25	57.09	59.95	63.55	59.24	34904.17
Yuba R - Bear R	14	56.75	59.58	63.11	58.89	33507.55
Yuba R - Bear R	13.75	56.47	59.24	62.67	58.53	32270.43
Yuba R - Bear R	13.5	56.08	58.79	62.13	58.17	31239.13
Yuba R - Bear R	13.25	55.86	58.54	61.84	57.82	29977.40
Yuba R - Bear R	13	55.79	58.48	61.79	57.46	28644.35
Yuba R - Bear R	12.75	55.62	58.31	61.59	57.11	27255.90
Yuba R - Bear R	12.5	55.55	58.23	61.52	56.82	26065.40
Yuba R - Bear R	12.25	55.32	58	61.29	56.59	24642.20
Reach 35	12	55.32	58	61.29	56.37	23313.05
Reach 35	11.75	55.19	57.88	61.16	56.15	21993.69
Reach 35	11.599	55.16	57.84	61.12	56.02	21069.77
Reach 35	11.5	55.04	57.73	61.01	55.93	20354.66
Reach 35	11.25	54.84	57.52	60.76	55.71	18182.41
Reach 35	11	54.55	57.21	60.42	55.44	16871.48
Reach 35	10.75	54.42	57.07	60.25	55.01	15547.88
Reach 35	10.5	54.19	56.82	59.97	54.57	14278.44
Reach 35	10.25	53.77	56.34	59.39	54.13	13850.18
Reach 35	10	53.57	56.14	59.16	53.69	12847.13
Reach 35	9.75	53.29	55.82	58.78	53.27	11597.74
Reach 35	9.5	52.97	55.47	58.37	52.91	10595.55
Reach 35	9.278	52.91	55.41	58.33	52.59	9814.09
Reach 35	9.265	52.63	55.08	57.9	52.56	9758.91
Reach 35	9.2	52.51	54.95	57.75	52.39	9164.29
Reach 35	9	52.19	54.6	57.36	51.55	8445.84
Reach 35	8.75	51.26	53.6	56.22	50.44	7531.76
Reach 35	8.5	50.58	52.91	55.47	49.34	6548.71
Reach 35	8.25	50.04	52.37	54.9	48.23	3573.02
Reach 35	8	49.07	51.42	53.82	47.12	2528.45
Reach 35	7.75	48.4	50.76	53.03	46.02	1733.43
Reach 35	7.55	48.04	50.4	52.58	44.98	1275.43

Feather River West Levee Rehabilitation Project
Design Water Surface Profiles



Wood Rodgers Levee Design STA

FIGURE 11
June 10, 2011

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

ATTACHMENT F

September 2011 Water Surface Profiles

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
September 30, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Upper	58.51	130.32	131.97	137.27	132.14	235748.95
Upper	58.26	129.25	130.96	136.17	130.88	233625.38
Upper	57.95	127.30	128.89	134.60	129.32	232796.18
Upper	57.7	124.59	125.99	132.74	128.05	231347.46
Upper	57.45	122.54	123.85	130.54	126.84	230491.75
Upper	57.17	120.27	121.44	127.48	125.70	226547.44
Upper	56.94	119.72	120.97	126.88	124.95	223836.90
Upper	56.61	119.04	120.31	126.24	123.87	222092.63
Upper	56.43	118.70	120.00	125.86	123.28	221068.16
Upper	56.2	117.82	119.14	124.99	122.52	220516.06
Upper	56.02	117.18	118.50	124.19	121.93	220057.97
Upper	55.8	115.95	117.16	122.29	121.18	219786.54
Upper	55.55	115.34	116.54	121.47	120.17	219191.24
Upper	55.35	114.23	115.34	119.76	119.31	216984.11
Upper	55.03	112.90	113.93	117.90	117.92	214664.25
Upper	54.45	110.87	111.86	115.89	115.41	212925.66
Upper	54.2	110.15	111.13	115.05	114.33	210158.47
Upper	54.04	109.82	110.82	114.77	113.64	209562.52
Upper	53.84	109.01	110.03	114.02	112.77	208499.74
Upper	53.52	107.58	108.50	112.34	111.39	205714.05
Upper	53.22	106.33	107.23	110.81	110.18	204265.70
Upper	52.89	104.81	105.68	109.20	109.40	202757.11
Upper	52.6	103.63	104.46	107.84	108.90	201183.88
Upper	52.21	102.99	103.78	107.04	108.23	199618.97
Upper	51.95	102.73	103.51	106.70	107.78	198775.45
Upper	51.35	101.83	102.70	106.04	106.73	197882.65
Upper	51.1777	101.65	102.51	105.82	106.00	195736.74
Upper	51.04	101.54	102.39	105.67	105.38	193817.41
Upper	50.84	100.98	101.86	105.21	104.23	192085.50
Upper	50.7	100.23	101.28	104.82	103.61	191278.99
Upper	50.59	98.83	100.16	104.20	102.93	190705.90
Upper	50.498	98.73	99.94	104.00	102.55	190230.79
Upper	50.496	98.68	99.89	103.93	102.54	190218.72
Upper	50.489	98.65	99.82	103.78	102.52	190176.83
Upper	50.487	98.69	99.87	103.80	102.51	190166.78
Upper	50.2	97.95	98.89	102.77	101.47	188470.72
Upper	50.06	97.11	98.09	102.06	100.96	187822.66
Upper	49.78	95.96	96.94	100.96	99.97	186662.60
Upper	49.58	95.12	96.10	100.21	99.36	185293.60
Upper	49.38	94.52	95.46	99.56	98.77	184138.90
Upper	49.21	94.13	95.09	99.25	98.27	183514.21
Upper	48.99	93.87	94.84	99.05	97.62	183056.49
Upper	48.85	93.55	94.52	98.78	97.21	182753.69
Upper	48.66	93.35	94.32	98.57	96.65	181801.88
Upper	48.39	93.03	94.00	98.28	95.85	180454.16
Upper	48.21	92.71	93.67	97.96	95.32	179460.20
Upper	48.07	92.27	93.25	97.65	95.00	179109.34
Upper	47.7	91.41	92.42	97.07	94.57	176933.60
Upper	47.55	90.85	91.92	96.78	94.39	175967.91
Upper	47.2	90.27	91.37	96.37	93.85	174102.82
Upper	47.04	90.04	91.15	96.23	93.54	173345.89
Upper	46.69	89.38	90.56	95.91	92.86	172499.41
Upper	46.53	89.03	90.24	95.74	92.55	171792.00
Honcut to Jack	46.45	89.03	90.24	95.74	92.40	171454.59
Honcut to Jack	46.2	88.82	90.04	95.53	92.00	171127.62
Honcut to Jack	45.98	88.60	89.81	95.31	91.82	170521.00
Honcut to Jack	45.71	88.11	89.35	94.92	91.60	169330.99
Honcut to Jack	45.58	87.85	89.11	94.71	91.49	168312.33

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
September 30, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	45.44	87.69	88.95	94.55	91.37	166923.76
Honcut to Jack	45.26	87.47	88.74	94.36	91.22	165726.12
Honcut to Jack	45.03	87.30	88.57	94.19	91.03	164732.57
Honcut to Jack	44.76	87.10	88.38	94.01	90.81	163250.84
Honcut to Jack	44.6326	87.02	88.30	93.92	90.70	161213.76
Honcut to Jack	44.5	86.87	88.15	93.77	90.59	160088.12
Honcut to Jack	44.23	86.65	87.94	93.57	90.35	159311.39
Honcut to Jack	43.46	86.08	87.42	93.15	89.56	158271.13
Honcut to Jack	43.34	85.81	87.18	92.96	89.38	157627.58
Honcut to Jack	43.28	85.70	87.08	92.93	89.38	157373.66
Honcut to Jack	43.23	85.55	86.95	92.87	89.32	157104.73
Honcut to Jack	43.12	85.25	86.68	92.74	89.21	156612.83
Honcut to Jack	43.06	85.18	86.62	92.72	89.15	156460.24
Honcut to Jack	43.01	85.12	86.57	92.66	89.10	156249.06
Honcut to Jack	42.65	84.99	86.45	92.57	88.73	153765.90
Honcut to Jack	42.47	84.79	86.26	92.40	88.55	153202.55
Honcut to Jack	42.19	84.50	86.00	92.20	88.27	152912.23
Honcut to Jack	42.01	84.44	85.95	92.16	88.13	152695.48
Honcut to Jack	41.61	84.21	85.74	92.01	87.81	152341.44
Honcut to Jack	41.55	84.11	85.65	91.94	87.76	151907.71
Honcut to Jack	41.2	83.85	85.43	91.78	87.49	150600.52
Honcut to Jack	40.7	83.68	85.28	91.67	87.09	150271.92
Honcut to Jack	40.49	83.43	85.05	91.50	86.93	149590.33
Honcut to Jack	40.19	83.23	84.87	91.36	86.71	148995.18
Honcut to Jack	39.45	82.70	84.42	91.00	86.23	147001.01
Honcut to Jack	39.23	82.36	84.15	90.76	86.09	145807.70
Honcut to Jack	38.94	81.97	83.84	90.47	85.90	144368.14
Honcut to Jack	38.71	81.71	83.64	90.28	85.75	143106.13
Honcut to Jack	38.45	81.53	83.50	90.15	85.58	141664.04
Honcut to Jack	38.27	81.41	83.40	90.05	85.46	140631.21
Honcut to Jack	37.95	81.22	83.25	89.90	85.28	138661.68
Honcut to Jack	37.68	81.06	83.12	89.76	85.13	137779.55
Honcut to Jack	37.45	80.88	82.98	89.60	85.00	136973.90
Honcut to Jack	37.29	80.72	82.85	89.45	84.91	136058.20
Honcut to Jack	36.45	80.11	82.41	89.01	84.43	134783.46
Honcut to Jack	36.35	79.90	82.27	88.88	84.37	134645.65
Honcut to Jack	36.24	79.66	82.11	88.73	84.30	134561.14
Honcut to Jack	35.78	79.08	81.71	88.34	83.99	132247.58
Honcut to Jack	35.5	78.92	81.59	88.21	83.88	130647.35
Honcut to Jack	35.25	78.82	81.51	88.13	83.77	130422.24
Honcut to Jack	34.8	78.73	81.45	88.06	83.58	129991.41
Honcut to Jack	34.5	78.64	81.38	87.98	83.46	128407.23
Honcut to Jack	34.07	78.55	81.32	87.90	83.28	127995.61
Honcut to Jack	33.5	78.45	81.25	87.83	83.03	126794.65
Honcut to Jack	33.25	78.32	81.15	87.72	82.90	125934.45
Honcut to Jack	33	78.18	81.05	87.61	82.77	124547.32
Honcut to Jack	32.75	78.00	80.93	87.46	82.65	123335.94
Honcut to Jack	32.5	77.87	80.83	87.34	82.52	122068.05
Honcut to Jack	32.25	77.76	80.75	87.24	82.39	121462.67
Honcut to Jack	32	77.58	80.62	87.08	82.26	121023.94
Honcut to Jack	31.75	77.37	80.46	86.88	82.13	119945.84
Honcut to Jack	31.5	77.16	80.31	86.67	81.98	118882.16
Honcut to Jack	31.25	76.97	80.16	86.48	81.80	117232.05
Honcut to Jack	31	76.76	80.01	86.29	81.63	115835.54
Honcut to Jack	30.75	76.56	79.88	86.11	82.65	115369.28
Honcut to Jack	30.5	76.33	79.71	85.90	82.03	114410.61
Honcut to Jack	30.25	76.10	79.55	85.69	81.08	113317.84
Honcut to Jack	30	75.84	79.30	85.33	80.84	111356.97

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
September 30, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	29.828	75.60	79.06	85.24	80.67	110812.54
Honcut to Jack	29.826	75.62	79.08	85.24	80.67	110802.45
Honcut to Jack	29.822	75.63	79.09	85.23	80.67	110784.75
Honcut to Jack	29.821	75.64	79.11	85.23	80.66	110774.66
Honcut to Jack	29.75	75.60	79.07	85.13	80.60	109217.11
Honcut to Jack	29.5	75.51	78.99	85.03	80.36	107965.48
Jack Sl - Yuba R	29.25	75.51	78.99	85.03	80.12	106938.36
Jack Sl - Yuba R	29	75.39	78.85	84.83	79.88	105627.60
Jack Sl - Yuba R	28.75	75.18	78.58	84.47	79.65	104417.55
Jack Sl - Yuba R	28.5	75.05	78.42	84.24	79.33	103521.79
Jack Sl - Yuba R	28.324	74.93	78.26	84.04	78.95	102627.46
Jack Sl - Yuba R	28.322	74.92	78.26	84.03	78.94	102615.67
Jack Sl - Yuba R	28.309	74.91	78.24	84.02	78.91	102537.51
Jack Sl - Yuba R	28.307	74.91	78.24	84.01	78.91	102527.14
Jack Sl - Yuba R	28.25	74.87	78.19	83.94	78.79	102281.40
Jack Sl - Yuba R	28	74.72	78.00	83.67	78.51	100798.76
Jack Sl - Yuba R	27.971	74.63	77.87	83.45	78.49	100749.02
Jack Sl - Yuba R	27.963	74.61	77.84	83.39	78.48	100696.07
Jack Sl - Yuba R	27.956	74.58	77.79	83.33	78.48	100684.10
Jack Sl - Yuba R	27.952	74.52	77.70	83.14	78.47	100652.33
Jack Sl - Yuba R	27.75	74.53	77.71	83.16	78.31	99512.10
Jack Sl - Yuba R	27.5	74.27	77.36	82.62	78.10	98174.47
Jack Sl - Yuba R	27.251	73.87	76.80	81.73	77.90	97016.29
Jack Sl - Yuba R	27.25	73.87	76.80	81.73	77.90	97011.08
Yuba R - Bear R	27	73.87	76.80	81.73	77.71	95787.83
Yuba R - Bear R	26.999	73.87	76.80	81.72	77.71	95782.80
Yuba R - Bear R	26.75	73.37	76.29	81.20	77.55	94705.78
Yuba R - Bear R	26.5	72.79	75.74	80.68	77.39	93495.05
Yuba R - Bear R	26.25	72.35	75.34	80.32	77.23	92095.83
Yuba R - Bear R	26	71.99	75.02	80.03	77.07	90634.01
Yuba R - Bear R	25.75	71.67	74.72	79.75	76.91	89136.87
Yuba R - Bear R	25.5	71.42	74.47	79.50	76.74	87728.16
Yuba R - Bear R	25.25	71.15	74.21	79.22	76.49	86208.17
Yuba R - Bear R	25	70.59	73.69	78.72	76.17	84613.00
Yuba R - Bear R	24.75	69.99	73.12	78.17	75.86	84085.03
Yuba R - Bear R	24.5	69.54	72.70	77.74	75.55	83744.43
Yuba R - Bear R	24.25	69.11	72.28	77.32	75.23	83076.25
Yuba R - Bear R	24	68.78	71.97	77.02	74.92	82269.01
Yuba R - Bear R	23.75	68.36	71.59	76.64	74.61	80891.65
Yuba R - Bear R	23.5	68.10	71.34	76.38	74.25	79494.60
Yuba R - Bear R	23.25	67.72	70.97	76.01	73.87	78032.72
Yuba R - Bear R	23	67.32	70.58	75.59	73.49	76810.25
Yuba R - Bear R	22.75	67.01	70.27	75.25	73.11	75345.95
Yuba R - Bear R	22.5	66.55	69.82	74.77	72.73	74107.24
Yuba R - Bear R	22.25	66.16	69.43	74.34	72.35	72852.32
Yuba R - Bear R	22	65.88	69.16	74.04	71.97	71497.68
Yuba R - Bear R	21.75	65.49	68.79	73.65	71.41	70018.45
Yuba R - Bear R	21.5	65.17	68.47	73.31	70.82	68712.35
Yuba R - Bear R	21.25	64.78	68.10	72.92	70.23	67330.45
Yuba R - Bear R	21	64.49	67.81	72.59	69.77	66047.23
Yuba R - Bear R	20.75	64.27	67.59	72.34	69.30	64675.51
Yuba R - Bear R	20.5	64.08	67.39	72.11	68.83	63332.45
Yuba R - Bear R	20.25	63.89	67.19	71.87	68.37	61977.06
Yuba R - Bear R	20	63.71	67.01	71.66	67.90	60460.00
Yuba R - Bear R	19.75	63.54	66.84	71.46	67.74	58852.41
Yuba R - Bear R	19.5	63.40	66.71	71.32	67.58	56862.66
Yuba R - Bear R	19.25	63.29	66.59	71.19	67.37	55516.59
Yuba R - Bear R	19	63.19	66.49	71.08	67.15	54713.04

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
September 30, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Yuba R - Bear R	18.75	63.03	66.33	70.90	66.93	53622.77
Yuba R - Bear R	18.5	62.94	66.24	70.80	66.71	52897.52
Yuba R - Bear R	18.25	62.83	66.13	70.67	66.45	51890.28
Yuba R - Bear R	18	62.63	65.92	70.43	66.19	49704.43
Yuba R - Bear R	17.75	62.48	65.76	70.25	65.93	49399.72
Yuba R - Bear R	17.5	62.31	65.59	70.05	65.67	49114.25
Yuba R - Bear R	17.25	62.11	65.40	69.85	65.41	48794.83
Yuba R - Bear R	17	61.67	64.97	69.38	65.16	48556.49
Yuba R - Bear R	16.75	61.38	64.68	69.07	64.90	48094.20
Yuba R - Bear R	16.5	61.07	64.36	68.70	64.39	47013.16
Yuba R - Bear R	16.25	60.85	64.13	68.44	63.87	46228.38
Yuba R - Bear R	16	60.53	63.79	68.06	63.36	45101.47
Yuba R - Bear R	15.75	59.91	63.10	67.27	62.85	43356.36
Yuba R - Bear R	15.5	59.33	62.46	66.51	62.33	41613.14
Yuba R - Bear R	15.25	58.82	61.89	65.84	61.82	40305.41
Yuba R - Bear R	15	58.41	61.42	65.27	61.31	39102.69
Yuba R - Bear R	14.75	58.04	61.03	64.84	60.60	37817.10
Yuba R - Bear R	14.5	57.66	60.61	64.34	59.88	36319.37
Yuba R - Bear R	14.25	57.11	59.98	63.56	59.24	34904.17
Yuba R - Bear R	14	56.78	59.61	63.13	58.89	33507.55
Yuba R - Bear R	13.75	56.50	59.27	62.69	58.53	32270.43
Yuba R - Bear R	13.5	56.12	58.83	62.15	58.17	31239.13
Yuba R - Bear R	13.25	55.89	58.58	61.86	57.82	29977.40
Yuba R - Bear R	13	55.82	58.52	61.82	57.46	28644.35
Yuba R - Bear R	12.75	55.66	58.34	61.62	57.11	27255.90
Yuba R - Bear R	12.5	55.58	58.27	61.55	56.82	26065.40
Yuba R - Bear R	12.25	55.36	58.04	61.31	56.59	24642.20
Reach 35	12	55.36	58.04	61.31	56.37	23313.05
Reach 35	11.75	55.23	57.92	61.19	56.15	21993.69
Reach 35	11.599	55.19	57.88	61.15	56.02	21069.77
Reach 35	11.5	55.07	57.77	61.03	55.93	20354.66
Reach 35	11.25	54.88	57.56	60.79	55.71	18182.41
Reach 35	11	54.60	57.26	60.45	55.44	16871.48
Reach 35	10.75	54.46	57.11	60.28	55.01	15547.88
Reach 35	10.5	54.23	56.86	60.00	54.57	14278.44
Reach 35	10.25	53.82	56.39	59.43	54.13	13850.18
Reach 35	10	53.62	56.19	59.20	53.69	12847.13
Reach 35	9.75	53.34	55.87	58.82	53.27	11597.74
Reach 35	9.5	53.02	55.52	58.41	52.91	10595.55
Reach 35	9.278	52.97	55.47	58.37	52.59	9814.09
Reach 35	9.265	52.69	55.14	57.93	52.56	9758.91
Reach 35	9.2	52.57	55.01	57.79	52.39	9164.29
Reach 35	9	52.25	54.67	57.40	51.55	8445.84
Reach 35	8.75	51.34	53.68	56.27	50.44	7531.76
Reach 35	8.5	50.67	53.00	55.53	49.34	6548.71
Reach 35	8.25	50.14	52.47	54.96	48.23	3573.02
Reach 35	8	49.20	51.54	53.90	47.12	2528.45
Reach 35	7.75	48.56	50.90	53.12	46.02	1733.43
Reach 35	7.55	48.21	50.56	52.67	44.98	1275.43

Feather River West Levee Rehabilitation Project
Design Water Surface Profiles

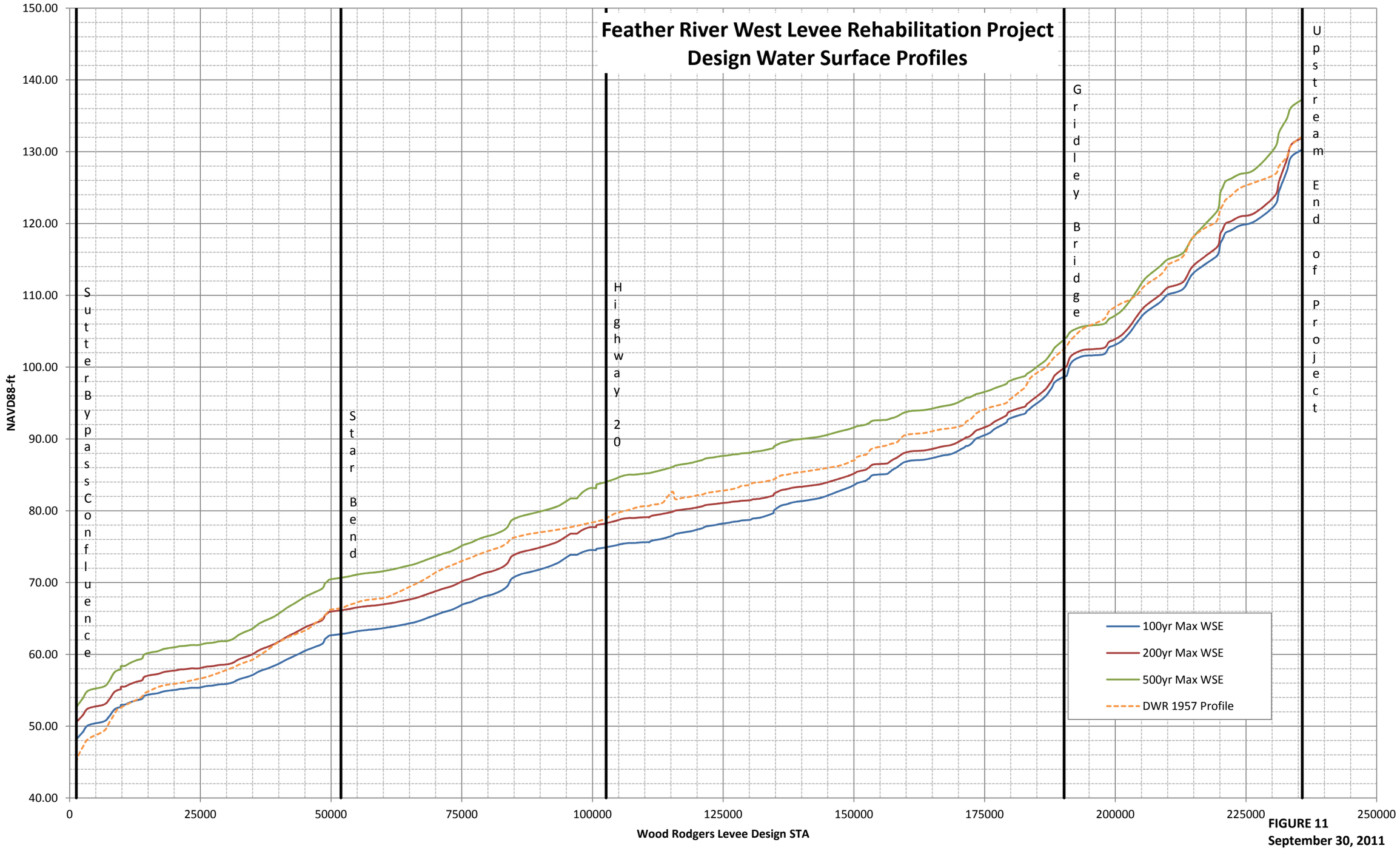


FIGURE 11
September 30, 2011

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

ATTACHMENT G

December 2011 Water Surface Profiles

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
December 29, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Upper	58.75	131.09	132.91	138.10	-	-
Upper	-	130.74	132.48	137.72	-	236800.00
Upper	58.51	130.32	131.97	137.27	132.14	235748.95
Upper	58.26	129.25	130.96	136.17	130.88	233625.38
Upper	57.95	127.30	128.89	134.60	129.32	232796.18
Upper	57.7	124.59	125.99	132.74	128.05	231347.46
Upper	57.45	122.54	123.85	130.54	126.84	230491.75
Upper	57.17	120.27	121.44	127.48	125.70	226547.44
Upper	56.94	119.72	120.97	126.88	124.95	223836.90
Upper	56.61	119.04	120.31	126.24	123.87	222092.63
Upper	56.43	118.70	120.00	125.86	123.28	221068.16
Upper	56.2	117.82	119.14	124.99	122.52	220516.06
Upper	56.02	117.18	118.50	124.19	121.93	220057.97
Upper	55.8	115.95	117.16	122.29	121.18	219786.54
Upper	55.55	115.34	116.54	121.47	120.17	219191.24
Upper	55.35	114.23	115.34	119.76	119.31	216984.11
Upper	55.03	112.90	113.93	117.90	117.92	214664.25
Upper	54.45	110.87	111.86	115.89	115.41	212925.66
Upper	54.2	110.15	111.13	115.05	114.33	210158.47
Upper	54.04	109.82	110.82	114.77	113.64	209562.52
Upper	53.84	109.01	110.03	114.02	112.77	208499.74
Upper	53.52	107.58	108.50	112.34	111.39	205714.05
Upper	53.22	106.33	107.23	110.81	110.18	204265.70
Upper	52.89	104.81	105.68	109.20	109.40	202757.11
Upper	52.6	103.63	104.46	107.84	108.90	201183.88
Upper	52.21	102.99	103.78	107.04	108.23	199618.97
Upper	51.95	102.73	103.51	106.70	107.78	198775.45
Upper	51.35	101.83	102.70	106.04	106.73	197882.65
Upper	51.1777	101.65	102.51	105.82	106.00	195736.74
Upper	51.04	101.54	102.39	105.67	105.38	193817.41
Upper	50.84	100.98	101.86	105.21	104.23	192085.50
Upper	50.7	100.23	101.28	104.82	103.61	191278.99
Upper	50.59	98.83	100.16	104.20	102.93	190705.90
Upper	50.498	98.73	99.94	104.00	102.55	190230.79
Upper	50.496	98.68	99.89	103.93	102.54	190218.72
Upper	50.489	98.65	99.82	103.78	102.52	190176.83
Upper	50.487	98.69	99.87	103.80	102.51	190166.78
Upper	50.2	97.95	98.89	102.77	101.47	188470.72
Upper	50.06	97.11	98.09	102.06	100.96	187822.66
Upper	49.78	95.96	96.94	100.96	99.97	186662.60
Upper	49.58	95.12	96.10	100.21	99.36	185293.60
Upper	49.38	94.52	95.46	99.56	98.77	184138.90
Upper	49.21	94.13	95.09	99.25	98.27	183514.21
Upper	48.99	93.87	94.84	99.05	97.62	183056.49
Upper	48.85	93.54	94.52	98.78	97.21	182753.69
Upper	48.66	93.35	94.32	98.57	96.65	181801.88
Upper	48.39	93.03	94.00	98.28	95.85	180454.16
Upper	48.21	92.71	93.67	97.96	95.32	179460.20
Upper	48.07	92.27	93.24	97.65	95.00	179109.34
Upper	47.7	91.41	92.42	97.07	94.57	176933.60
Upper	47.55	90.85	91.92	96.78	94.39	175967.91
Upper	47.2	90.27	91.37	96.37	93.85	174102.82
Upper	47.04	90.04	91.15	96.23	93.54	173345.89
Upper	46.69	89.38	90.56	95.91	92.86	172499.41
Upper	46.53	89.03	90.24	95.74	92.55	171792.00
Honcut to Jack	46.45	89.03	90.24	95.74	92.40	171454.59
Honcut to Jack	46.2	88.82	90.03	95.53	92.00	171127.62
Honcut to Jack	45.98	88.59	89.81	95.31	91.82	170521.00

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
December 29, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	45.71	88.11	89.35	94.92	91.60	169330.99
Honcut to Jack	45.58	87.85	89.11	94.71	91.49	168312.33
Honcut to Jack	45.44	87.68	88.95	94.55	91.37	166923.76
Honcut to Jack	45.26	87.47	88.74	94.36	91.22	165726.12
Honcut to Jack	45.03	87.30	88.57	94.19	91.03	164732.57
Honcut to Jack	44.76	87.10	88.38	94.01	90.81	163250.84
Honcut to Jack	44.6326	87.02	88.29	93.92	90.70	161213.76
Honcut to Jack	44.5	86.87	88.15	93.77	90.59	160088.12
Honcut to Jack	44.23	86.65	87.94	93.57	90.35	159311.39
Honcut to Jack	43.46	86.07	87.42	93.15	89.56	158271.13
Honcut to Jack	43.34	85.81	87.18	92.96	89.38	157627.58
Honcut to Jack	43.28	85.70	87.07	92.93	89.38	157373.66
Honcut to Jack	43.23	85.55	86.94	92.87	89.32	157104.73
Honcut to Jack	43.12	85.25	86.68	92.74	89.21	156612.83
Honcut to Jack	43.06	85.18	86.62	92.72	89.15	156460.24
Honcut to Jack	43.01	85.12	86.56	92.66	89.10	156249.06
Honcut to Jack	42.65	84.99	86.44	92.57	88.73	153765.90
Honcut to Jack	42.47	84.79	86.26	92.40	88.55	153202.55
Honcut to Jack	42.19	84.50	86.00	92.20	88.27	152912.23
Honcut to Jack	42.01	84.44	85.94	92.16	88.13	152695.48
Honcut to Jack	41.61	84.21	85.74	92.01	87.81	152341.44
Honcut to Jack	41.55	84.11	85.65	91.94	87.76	151907.71
Honcut to Jack	41.2	83.85	85.42	91.78	87.49	150600.52
Honcut to Jack	40.7	83.68	85.28	91.67	87.09	150271.92
Honcut to Jack	40.49	83.43	85.05	91.50	86.93	149590.33
Honcut to Jack	40.19	83.23	84.86	91.36	86.71	148995.18
Honcut to Jack	39.45	82.70	84.41	91.00	86.23	147001.01
Honcut to Jack	39.23	82.36	84.14	90.76	86.09	145807.70
Honcut to Jack	38.94	81.96	83.83	90.47	85.90	144368.14
Honcut to Jack	38.71	81.70	83.63	90.28	85.75	143106.13
Honcut to Jack	38.45	81.53	83.49	90.15	85.58	141664.04
Honcut to Jack	38.27	81.40	83.39	90.05	85.46	140631.21
Honcut to Jack	37.95	81.22	83.25	89.90	85.28	138661.68
Honcut to Jack	37.68	81.05	83.12	89.76	85.13	137779.55
Honcut to Jack	37.45	80.88	82.98	89.60	85.00	136973.90
Honcut to Jack	37.29	80.71	82.85	89.45	84.91	136058.20
Honcut to Jack	36.45	80.10	82.40	89.01	84.43	134783.46
Honcut to Jack	36.35	79.90	82.26	88.87	84.37	134645.65
Honcut to Jack	36.24	79.65	82.10	88.73	84.30	134561.14
Honcut to Jack	35.78	79.07	81.70	88.34	83.99	132247.58
Honcut to Jack	35.5	78.91	81.58	88.21	83.88	130647.35
Honcut to Jack	35.25	78.81	81.50	88.13	83.77	130422.24
Honcut to Jack	34.8	78.72	81.44	88.06	83.58	129991.41
Honcut to Jack	34.5	78.63	81.37	87.98	83.46	128407.23
Honcut to Jack	34.07	78.54	81.31	87.90	83.28	127995.61
Honcut to Jack	33.5	78.44	81.24	87.83	83.03	126794.65
Honcut to Jack	33.25	78.31	81.14	87.72	82.90	125934.45
Honcut to Jack	33	78.17	81.04	87.61	82.77	124547.32
Honcut to Jack	32.75	77.99	80.92	87.45	82.65	123335.94
Honcut to Jack	32.5	77.86	80.82	87.33	82.52	122068.05
Honcut to Jack	32.25	77.75	80.74	87.24	82.39	121462.67
Honcut to Jack	32	77.57	80.61	87.08	82.26	121023.94
Honcut to Jack	31.75	77.36	80.45	86.87	82.13	119945.84
Honcut to Jack	31.5	77.15	80.30	86.67	81.98	118882.16
Honcut to Jack	31.25	76.96	80.15	86.48	81.80	117232.05
Honcut to Jack	31	76.75	80.00	86.29	81.63	115835.54
Honcut to Jack	30.75	76.55	79.86	86.11	82.65	115369.28
Honcut to Jack	30.5	76.32	79.70	85.90	82.03	114410.61

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
December 29, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Honcut to Jack	30.25	76.10	79.53	85.68	81.08	113317.84
Honcut to Jack	30	75.83	79.28	85.33	80.84	111356.97
Honcut to Jack	29.828	75.60	79.05	85.24	80.67	110812.54
Honcut to Jack	29.826	75.61	79.07	85.24	80.67	110802.45
Honcut to Jack	29.822	75.62	79.08	85.23	80.67	110784.75
Honcut to Jack	29.821	75.63	79.09	85.23	80.66	110774.66
Honcut to Jack	29.75	75.59	79.06	85.13	80.60	109217.11
Honcut to Jack	29.5	75.50	78.98	85.03	80.36	107965.48
Jack Sl - Yuba R	29.25	75.50	78.98	85.03	80.12	106938.36
Jack Sl - Yuba R	29	75.38	78.83	84.83	79.88	105627.60
Jack Sl - Yuba R	28.75	75.17	78.57	84.47	79.65	104417.55
Jack Sl - Yuba R	28.5	75.04	78.40	84.23	79.33	103521.79
Jack Sl - Yuba R	28.324	74.92	78.25	84.03	78.95	102627.46
Jack Sl - Yuba R	28.322	74.92	78.25	84.03	78.94	102615.67
Jack Sl - Yuba R	28.309	74.90	78.23	84.01	78.91	102537.51
Jack Sl - Yuba R	28.307	74.90	78.23	84.01	78.91	102527.14
Jack Sl - Yuba R	28.25	74.86	78.18	83.94	78.79	102281.40
Jack Sl - Yuba R	28	74.71	77.99	83.66	78.51	100798.76
Jack Sl - Yuba R	27.971	74.62	77.85	83.44	78.49	100749.02
Jack Sl - Yuba R	27.963	74.60	77.82	83.38	78.48	100696.07
Jack Sl - Yuba R	27.956	74.57	77.78	83.32	78.48	100684.10
Jack Sl - Yuba R	27.952	74.51	77.69	83.13	78.47	100652.33
Jack Sl - Yuba R	27.75	74.52	77.69	83.15	78.31	99512.10
Jack Sl - Yuba R	27.5	74.26	77.34	82.62	78.10	98174.47
Jack Sl - Yuba R	27.251	73.86	76.79	81.72	77.90	97016.29
Jack Sl - Yuba R	27.25	73.86	76.78	81.72	77.90	97011.08
Yuba R - Bear R	27	73.86	76.78	81.72	77.71	95787.83
Yuba R - Bear R	26.999	73.86	76.78	81.71	77.71	95782.80
Yuba R - Bear R	26.75	73.36	76.27	81.19	77.55	94705.78
Yuba R - Bear R	26.5	72.77	75.72	80.67	77.39	93495.05
Yuba R - Bear R	26.25	72.33	75.32	80.31	77.23	92095.83
Yuba R - Bear R	26	71.98	74.99	80.02	77.07	90634.01
Yuba R - Bear R	25.75	71.65	74.69	79.73	76.91	89136.87
Yuba R - Bear R	25.5	71.40	74.45	79.49	76.74	87728.16
Yuba R - Bear R	25.25	71.13	74.18	79.21	76.49	86208.17
Yuba R - Bear R	25	70.57	73.66	78.71	76.17	84613.00
Yuba R - Bear R	24.75	69.96	73.09	78.15	75.86	84085.03
Yuba R - Bear R	24.5	69.51	72.66	77.72	75.55	83744.43
Yuba R - Bear R	24.25	69.08	72.24	77.30	75.23	83076.25
Yuba R - Bear R	24	68.74	71.93	77.01	74.92	82269.01
Yuba R - Bear R	23.75	68.33	71.54	76.62	74.61	80891.65
Yuba R - Bear R	23.5	68.07	71.29	76.36	74.25	79494.60
Yuba R - Bear R	23.25	67.68	70.92	75.99	73.87	78032.72
Yuba R - Bear R	23	67.27	70.53	75.57	73.49	76810.25
Yuba R - Bear R	22.75	66.96	70.21	75.23	73.11	75345.95
Yuba R - Bear R	22.5	66.50	69.76	74.74	72.73	74107.24
Yuba R - Bear R	22.25	66.11	69.36	74.32	72.35	72852.32
Yuba R - Bear R	22	65.83	69.09	74.01	71.97	71497.68
Yuba R - Bear R	21.75	65.44	68.71	73.62	71.41	70018.45
Yuba R - Bear R	21.5	65.11	68.39	73.28	70.82	68712.35
Yuba R - Bear R	21.25	64.71	68.02	72.89	70.23	67330.45
Yuba R - Bear R	21	64.42	67.73	72.57	69.77	66047.23
Yuba R - Bear R	20.75	64.19	67.50	72.31	69.30	64675.51
Yuba R - Bear R	20.5	64.01	67.30	72.07	68.83	63332.45
Yuba R - Bear R	20.25	63.81	67.10	71.84	68.37	61977.06
Yuba R - Bear R	20	63.63	66.92	71.62	67.90	60460.00
Yuba R - Bear R	19.75	63.46	66.74	71.43	67.74	58852.41
Yuba R - Bear R	19.5	63.32	66.61	71.28	67.58	56862.66

FEATHER RIVER WEST LEVEE REHABILITATION PROJECT
MAXIMUM WATER SURFACE PROFILES
December 29, 2011

Feather River Reach	HEC-RAS River STA	100yr Max WSE (NAVD88-ft)	200yr Max WSE (NAVD88-ft)	500yr Max WSE (NAVD88-ft)	DWR 1957 (NAVD88-ft)	Wood Rodgers Design STA
Yuba R - Bear R	19.25	63.20	66.49	71.16	67.37	55516.59
Yuba R - Bear R	19	63.11	66.39	71.05	67.15	54713.04
Yuba R - Bear R	18.75	62.95	66.23	70.87	66.93	53622.77
Yuba R - Bear R	18.5	62.85	66.13	70.76	66.71	52897.52
Yuba R - Bear R	18.25	62.74	66.02	70.63	66.45	51890.28
Yuba R - Bear R	18	62.53	65.81	70.39	66.19	49704.43
Yuba R - Bear R	17.75	62.38	65.65	70.21	65.93	49399.72
Yuba R - Bear R	17.5	62.21	65.48	70.01	65.67	49114.25
Yuba R - Bear R	17.25	62.01	65.28	69.80	65.41	48794.83
Yuba R - Bear R	17	61.55	64.84	69.33	65.16	48556.49
Yuba R - Bear R	16.75	61.26	64.55	69.01	64.90	48094.20
Yuba R - Bear R	16.5	60.94	64.23	68.65	64.39	47013.16
Yuba R - Bear R	16.25	60.72	63.99	68.38	63.87	46228.38
Yuba R - Bear R	16	60.39	63.64	67.99	63.36	45101.47
Yuba R - Bear R	15.75	59.76	62.94	67.18	62.85	43356.36
Yuba R - Bear R	15.5	59.17	62.28	66.41	62.33	41613.14
Yuba R - Bear R	15.25	58.64	61.70	65.73	61.82	40305.41
Yuba R - Bear R	15	58.22	61.22	65.14	61.31	39102.69
Yuba R - Bear R	14.75	57.83	60.81	64.70	60.60	37817.10
Yuba R - Bear R	14.5	57.45	60.38	64.18	59.88	36319.37
Yuba R - Bear R	14.25	56.88	59.73	63.38	59.24	34904.17
Yuba R - Bear R	14	56.54	59.35	62.93	58.89	33507.55
Yuba R - Bear R	13.75	56.25	59.00	62.48	58.53	32270.43
Yuba R - Bear R	13.5	55.85	58.54	61.91	58.17	31239.13
Yuba R - Bear R	13.25	55.62	58.28	61.62	57.82	29977.40
Yuba R - Bear R	13	55.54	58.22	61.57	57.46	28644.35
Yuba R - Bear R	12.75	55.37	58.03	61.36	57.11	27255.90
Yuba R - Bear R	12.5	55.30	57.96	61.29	56.82	26065.40
Yuba R - Bear R	12.25	55.06	57.72	61.04	56.59	24642.20
Reach 35	12	55.06	57.72	61.04	56.37	23313.05
Reach 35	11.75	54.92	57.59	60.90	56.15	21993.69
Reach 35	11.599	54.88	57.55	60.86	56.02	21069.77
Reach 35	11.5	54.76	57.43	60.74	55.93	20354.66
Reach 35	11.25	54.55	57.21	60.49	55.71	18182.41
Reach 35	11	54.26	56.89	60.12	55.44	16871.48
Reach 35	10.75	54.11	56.74	59.95	55.01	15547.88
Reach 35	10.5	53.87	56.48	59.65	54.57	14278.44
Reach 35	10.25	53.44	55.99	59.05	54.13	13850.18
Reach 35	10	53.23	55.77	58.80	53.69	12847.13
Reach 35	9.75	52.93	55.44	58.40	53.27	11597.74
Reach 35	9.5	52.60	55.07	57.95	52.91	10595.55
Reach 35	9.278	52.54	55.01	57.90	52.59	9814.09
Reach 35	9.265	52.24	54.66	57.45	52.56	9758.91
Reach 35	9.2	52.12	54.53	57.29	52.39	9164.29
Reach 35	9	51.78	54.15	56.83	51.55	8445.84
Reach 35	8.75	50.98	53.29	55.78	50.44	7531.76
Reach 35	8.5	50.47	52.78	55.20	49.34	6548.71
Reach 35	8.25	50.09	52.41	54.79	48.23	3573.02
Reach 35	8	49.31	51.64	53.85	47.12	2528.45
Reach 35	7.75	48.85	51.17	53.25	46.02	1733.43
Reach 35	7.55	48.62	50.94	52.93	44.98	1275.43

Feather River West Levee Rehabilitation Project
Design Water Surface Profiles

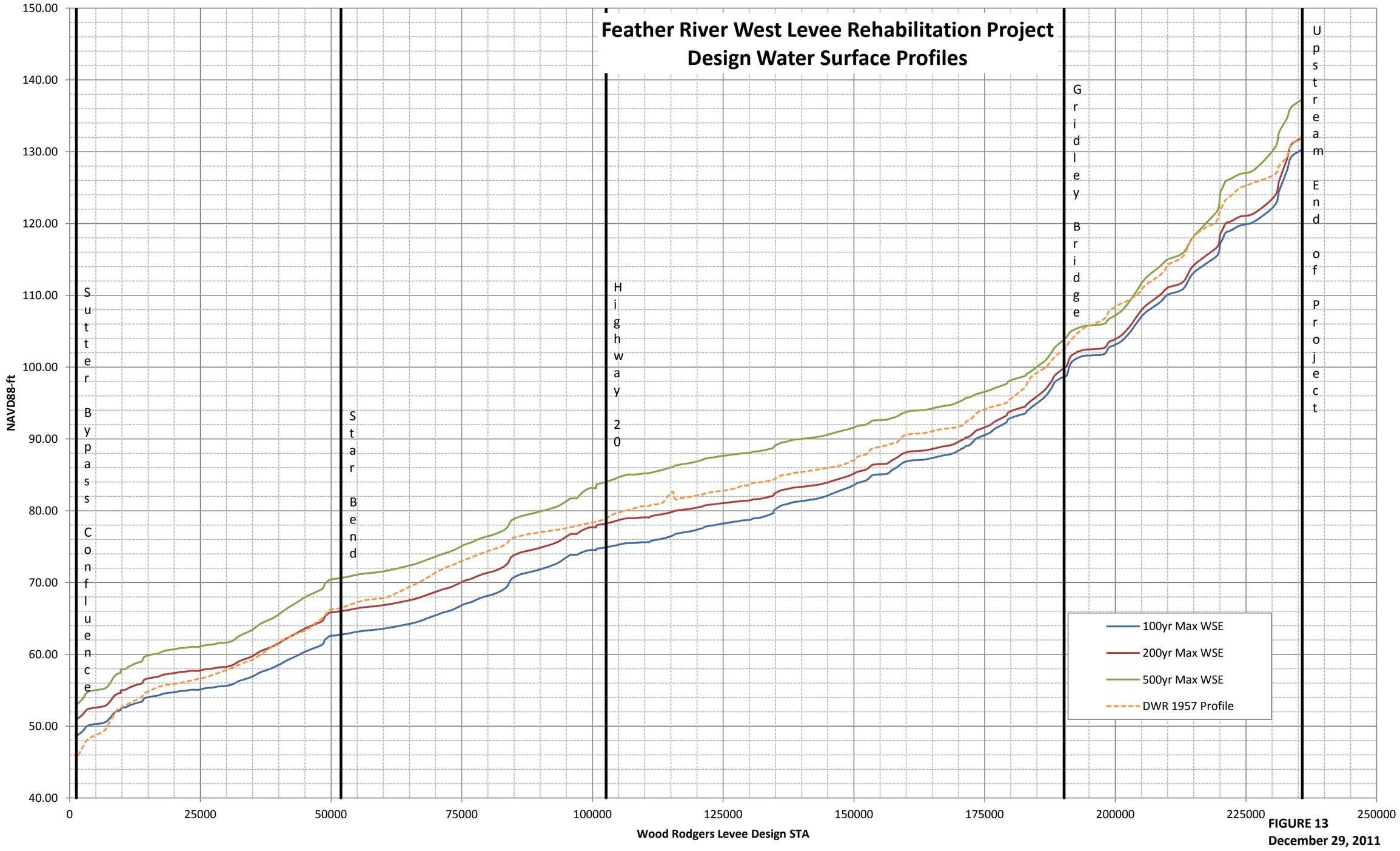


FIGURE 13
December 29, 2011

ATTACHMENT H

USACE Technical Review Comments

SUTTER BASIN FEASILITY STUDY

SPK HYDRAULIC DESIGN SECTION
DISTRICT QUALITY CONTROL REVIEW

SUTTER BASIN
PBI HEC-RAS HYDRAULIC MODEL 06.10.2011

Reviewer: Peter Blodgett, P.E. SPK Hydraulic Analysis Section
Review Date: 10 September 2011
Response Date: 16 September 2011
Backcheck Date: 14 December 2011

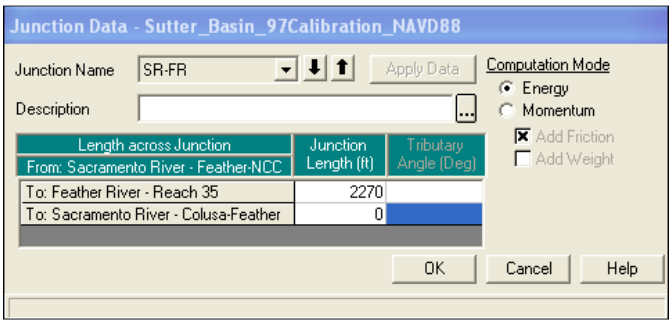
Review of 1997 and 2006 flood calibration/verification and 1/n-AEP event models.

Comment 1) Rating curve for Yolo Bypass at Woodland gage (downstream boundary) is not the same between calibration and 1/n aep runs. The calibration version seems to be correct.

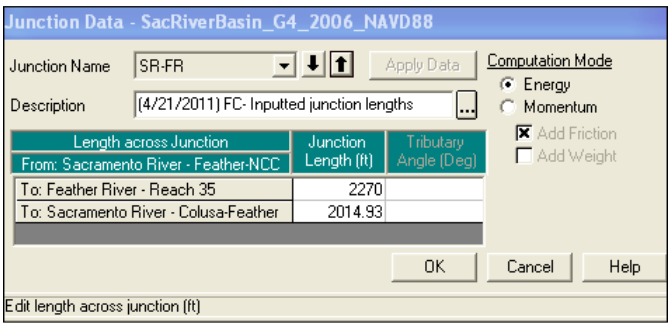
Response : Agree
Backcheck - Comment Resolved.

Comment 2) Junction SR-FR. Reach length is not correct.

In Model:



Should Be:

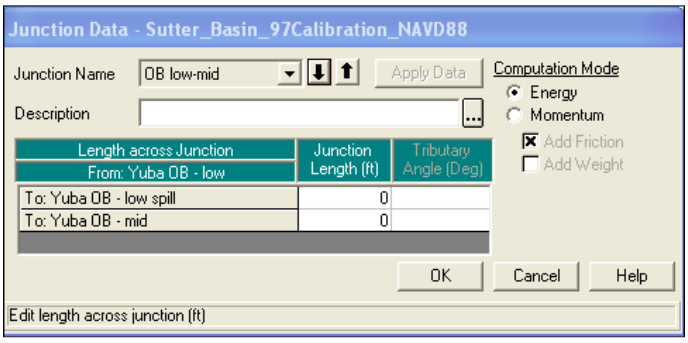


Response : Agree

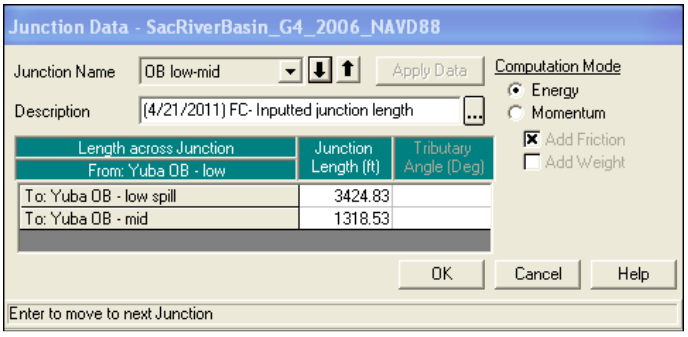
Backcheck - Comment Resolved.

Comment 3) Junction OB Low-Mid. Reach length is not correct

In Model:



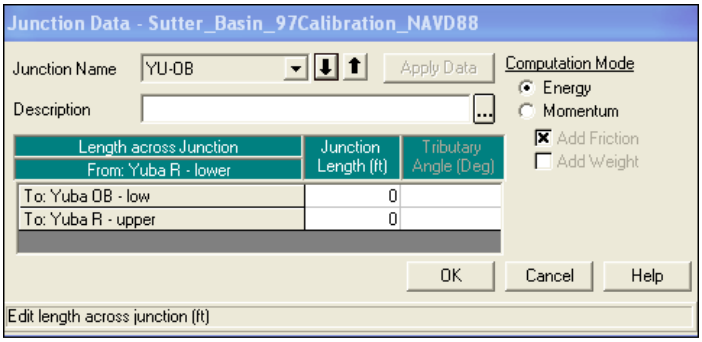
Should Be:

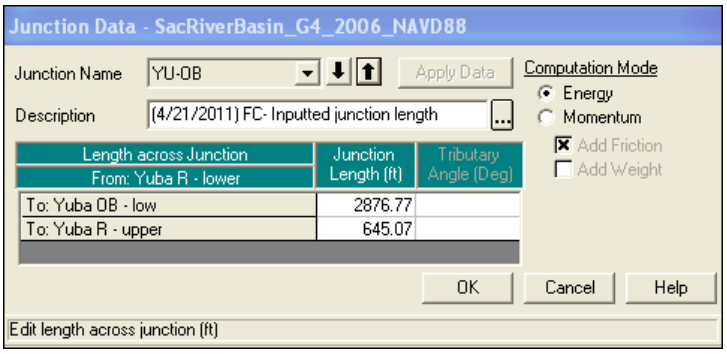


Response : Agree.

Backcheck - Comment Resolved.

Comment 4) Junction YU-OB. Reach length is not correct





Response : Agree.

Backcheck - Comment Resolved.

Comment 5) Recommend adding artificial obstructions to contain flow between levees at Bear River 6.50, 6.25, 6.0, 5.91.

Response: Agree.

Backcheck - Comment Resolved.

Comment 6) Please review description fields in the Bear River Lower cross sections. Do these comments apply?

Response: Most of the descriptions apply. However, there were a few comments with ambiguous meaning that appear to be left over from previous model versions. The ambiguous comments were deleted.

Backcheck - Comment Resolved.

Comment 7) Honcut Creek inflow for 1997 flood is multiplied by 0.50. Please check.

Response – This multiplier should not be there and has been deleted.
Backcheck - Comment Resolved.

ATTACHMENT I

MBK Technical Review Comments

REVIEW COMMENT/RESPONSE LOG

PROJECT: **Feather River West Levee Rehabilitation Project**

REVIEW DOCUMENT(S): **Revised Design Water Surface Profiles for the Feather River West Levee Rehabilitation Project (September 2011), September 30, 2011; HEC-RAS model and analysis dated 9/14/2011**

DATE: **1/19/2012**

SUBMITTAL:

REVIEWER: **MBK Engineers**

REFERENCE			**COMMENT** Comment Codes: **M**=Mandatory Response; **S**=Suggested Correction; **Q**=Question; **G**=General Comment;				**RESPONSE** Response Codes: **A**=Agree, will revise; **D**=Disagree, see explanation; **F**=Follow up required; **G**=General Response					
Comment No.	Dwg/Sec	Page/Sht	Code	Description	By	Date	Code	Explanation	By	Date	Backcheck By/Date	Backcheck Comment
1		Page 2 (2nd paragraph)	**S**	The report states "After PBI converted the HEC-RAS model's vertical datum from NGVD29 to NAVD88...". It appears from review that the model was developed from Release 3 of the USACE Sacramento River HEC-RAS model, which was converted from NGVD29 to NAVD88 by the USACE. If this is the case then the text needs to be revised to reflect this. Also, some discussion on how the model was converted from NGVD29 to NAVD88 should be included.	MBK	11/16/11	**A**	The report text was revised to include reference to Release 3. The text was also revised to include some discussion on how the model was converted from NGVD29 to NAVD88.	PBI	01/09/12	MBK 1/18/12	
2		Page 4 (1st paragraph)	**G**	It is our opinion that the use of a rating curve is not appropriate for the Tisdale Weir in that it does not reflect the reduction in flow that would occur due to submergence caused by high tailwater from the Sutter Bypass. It is our opinion that the Tidale Weir would be better represented as a weir with the "sharp crested" shape option. We provided this opinion to the USACE as part of a review of the Sacramento River HEC-RAS model. We agree with PBI that this is unlikely to have any appreciable effect on the Feather River, but recommend doing a sensitivity analysis to verify this.	MBK	11/16/11	**D**	Neither methods are appropriate for the high flows. The diversion method uses the DWR rating curve and USGS rating curves to estimate the diversion at the weir. At submergence, both of these approaches have higher and probably equal levels of uncertainty. However, at lower more common flows, diversions based on ratings developed from flow measurements would be more accurate. (PBI NOTE: We have verified that this issue has no appreciable effect on the Feather River and therefore request that MBK approve this backcheck for the FRWLRP.)	USACE	12/07/11	MBK 1/18/12 with comment	It is our opinion that the sharp-crested weir option is a better representation for Tisdale Weir than the rating curve option, especially for the large events which are the focus of the hydraulic model. However, since it has been demonstrated that the study area is not sensitive to the modeling method at Tisdale Weir, the model and analysis are acceptable for the study purposes.
3		Page 4 (2nd paragraph)	**G**	Recommend further review of 1997 surveyed high water marks. Review of the Feather River and Sutter Bypass high water mark elevations carried over from the USACE HEC-RAS model indicates that they were converted from NGVD29 to NAVD88 by adding 2.7 ft., which is not consistent with the conversion used for the model geometry, which is more in the 2.2 to 2.3 ft. range.	MBK	11/16/11	**G**	The conversion of 1997 HWM data to NAVD88 were based on a comparison of the vertical control used at the time of the survey. The conversions varied throughout the data set and were based on a comparison of the value used in the 1997 survey relative to a survey or GPS readjustment to establish the NAVD88 value. The reason the values are different is they used different vertical control values. It is important to note that all the NAVD88 GPS measurements have an estimated network uncertainty +/-0.3 feet (relative uncertainty is better) and the NGVD29 values probably have a higher degree of uncertainty.	USACE	12/07/11	MBK 1/18/12	

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Comment No.	Dwg/Sec	Page/Sht	Code	Description	By	Date	Code	Explanation	By	Date	Backcheck By/Date	Backcheck Comment
4		Page 5 (first bullet) & Model	**S**	A portion of the right bank in section 7.55 is represented by Sutter Bypass lateral structure 66.80. This portion should be a blocked obstruction. Without the blocked obstruction it is essentially represented twice: 1) in the cross-section as flow area that conveyed flow from section 7.55 to section 7.17, and 2) as connection that shares flow between section 7.55 and Sutter Bypass sections 66.80 to 66.10. Also, lateral structure 66.8, which is modeled with a single elevation of 37.8 ft NAVD88 should be refined to represent the actual topography.	MBK	11/16/11	**D**	We understand that the coding of the Sutter Bypass/Feather River confluence (by others) stretches the capabilities of the 1D HEC-RAS model. When we add a blocked obstruction at 7.55, it results in a accelerated flume effect in the Feather River at section 7.55 (lowered stages and high velocities) which we do not believe is what physically occurs during a major flood. While imperfect, removing the blocked obstruction smoothes out the transition and eliminates the flume effect. It also results in slightly higher stages in the lower Feather River, which is conservative for levee design purposes. We have revised lateral structure 66.8 to represent the actual topography.	PBI	01/09/12	MBK 1/18/12 with comment	It is understood that due to the complexity of the confluence and its 2-D nature, any representation in the 1-D HEC-RAS is going to be very approximate. Since the methodology used appears to be conservative (i.e. tends to overstimate water surface elevation), and the affected range represents only a small percentage of the study area, the model and analysis are acceptable for the study purposes. However, it is our recommendation that if the model is to be used for defining design water surfaces near the confluence, results from available 2-D hydraulic model simulations should be used to refine the 1-D model representation.
5		Page 5 (3rd paragraph) & Model	**G**	The Sutter Bypass n-values of 0.031 and 0.032 from section 76.86 downstream are too low in our opinion. This may be driven by attempting to calibrate to 1997 using the Butte Slough near Meridian observed flow. It is our opinion that the reported 1997 flow at the Meridian gage is too high. This is based on review of other gages: computed peak flow at Verona gage (102,000 cfs) calibrates well with observed (102,000 cfs) but computed peak flow in Yolo Bypass at Woodland gage (397,200 cfs) exceeds the reported peak flow (357,000 cfs) by 40,200 cfs. This is further supported that n-values based on 2006 calibration, where the reported Meridian flow is less uncertain, result in significantly over estimated water surface elevations in Sutter Bypass for the 1997 event when the reported Meridian flow is used. This is also demonstrated in Table 2, which shows understimated 2006 peak stages at Sutter Bypass gages and corresponding overestimated 1997 peak stages.	MBK	11/16/11	**G**	We have re-calibrated the Sutter Bypass to the 2006 event. This has resulted in higher Sutter Bypass n-values of 0.035 and 0.033. The report text has also been updated to reflect the changes.	PBI	01/09/12	MBK 1/18/12	
6		Page 11	**S**	It should be stated that the simulations used to compute the n-year profiles assumed no levee breaches and that levees would act as weirs if overtopped.	MBK	11/16/11	**A**	The report text was revised to include this statement.	PBI	01/09/12	MBK 1/18/12	
7			**S**	The report should include a location map and a project site map.	MBK	11/16/11	**A**	These maps have been added to the report as Figures 1 and 2.	PBI	01/09/12	MBK 1/18/12	
8			**S**	The DWR draft Urban Levee Design Criteria (ULDC) state that hydraulic analysis for design of urban and urbanizing levees should assume that system levees protecting urban areas are at a minimum height of 200-year water surface plus 3 feet and that non-urban levees satisfy there authorized design profile. Some discussion of the analysis in relation to the ULDC should be included in the report.	MBK	11/16/11	**G**	This information is included in the Pre-Design Formulation Report developed by HDR Inc. The objective of this TM is to document the hydraulic modeling utilized for the design WS profiles. Discussions regarding the application of the WS profiles is included in other project documentation.	PBI	01/09/12	MBK 1/18/12	

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Comment No.	Dwg/Sec	Page/Sht	Code	Description	By	Date	Code	Explanation	By	Date	Backcheck By/Date	Backcheck Comment
9		Model	**S**	Lateral Structure Yuba River upper 8.0 elevations have not been converted to NAVD88 from NGVD29.	MBK	11/16/11	**D**	The lateral structure was converted using a conversion factor of 2.27. For the YR Lateral Structure 8.0, station 0 has an elevation of 98.44' in the NAVD88 model version, and 96.17' in the NGVD29 model version. All other station elevations for LS 8.0 include the same relative difference between NGVD29 and NAVD88.	PBI	01/09/12	MBK 1/18/12 with comment	Our review has indicated that the 98.44' value at station 0 is actually NGVD29. The original USACE Feather River HEC-RAS model developed in 2003, with NGVD29 vertical datum, had the same lateral structure with the station 0 elevation of 98.44'. Review of the model shows that the weir elevations were derived from the model cross-sections, and the weir elevations in Rel. 3 (NAVD88 version) correspond to cross-section elevations in Rel. 2 (NGVD29 version). Review of CVFED LiDAR elevation data (NAVD88) also verifies this. Water that flows over this weir still ends up in the Feather River via Jack Slough, so the net effect on the Feather River is likely minimal. Therefore, the model and analysis are acceptable for the study purposes.