San Joaquin River Restoration Program

Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project

Landowner Technical Meeting
February 23, 2012

Agenda

- General Program Update
- Action Items from Previous Meetings
- Value Planning Overview and Results
- Reach 4B Initial Alternatives Evaluation
- Next Steps
- Landowner Information Sharing
SJRRP Update

- Draft Program EIS/R released to public April 2011
- Comment period closed on September 21, 2011
- Final Program EIS/R and Comment Responses
- Interim flows

Agenda

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- Value Planning Overview and Results
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- Next Steps
- Landowner Information Sharing
Action Items

• Provide copies of CSLC compilation plats in electronic format.
• Provide copies of preliminary draft levee alignments in electronic format.
• Develop a graphic that shows how the Reach 4B Project is related to the Program EIS/R document.
• Provide total number of acreages affected under each initial alternative/levee alignment option.
• Update field activities list with CSLC activities in Reach 4B.

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• General Program Update
• Action Items from Previous Meetings
• Value Planning Overview and Results
• Reach 4B Initial Alternatives Evaluation
• Next Steps
• Landowner Information Sharing
Value Planning Overview

• Reclamation organized Reach 4B Value Planning Study in Nov & Dec of 2011
• It is a decision making process to creatively develop alternatives that satisfy essential functions at the highest value
• Team members chosen to bring experience and understanding of the discipline they represent and open and independent inquiry of issues under study

Value Planning Results

• Recommended new alternative and two new seepage control mechanisms
• New Alternative “Alternative A”
  – All flows in enhanced bypass system
  – No actions in Reach 4B
  – Bypass widened to accommodate vegetation and floodplain restoration actions
  – Sediment detention structure in bypass
Addressing Recommendations

- Combine Alternative A with Initial Alternative 2
  - Include improvements in Reach 4B
  - Consider widening levees

Limitations

- Value Planning would not meet all the Settlement Requirements because it would not include conveyance of at least 475 cfs in Reach 4B (Paragraph 11(a)(3))
- Initial Alternative 2 would still require 475 cfs in Reach 4B1 to meet Settlement Requirements
- The “Preferred Alternative” will not be selected until the Final EIS/R; Initial Alternative 2 is not the “Preferred Alternative”
Eastside Bypass: Subsidence

Estimated subsidence in feet for period 2000 to 2060 (USACE, 2002)

- 3 ft at Mariposa Control
- 4.5 ft at Dan McNamara Rd
- 7.5 ft at Chamberlain Rd
- 9.5 ft at Sand Slough

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Alternative Evaluation

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### Reach 4B Initial Alternatives

<table>
<thead>
<tr>
<th>Channel/Structure</th>
<th>Initial Alternative 1 Main Channel Restoration</th>
<th>Initial Alternative 2 Bypass Restoration</th>
<th>Initial Alternative 3 Bypass All Pulse Flows</th>
<th>Initial Alternative 4 Split Pulse Flows and Restore Both</th>
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<td>Habitat</td>
<td>SJR</td>
<td>Bypass</td>
<td>SJR and Bypass</td>
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<tr>
<td>Eastside Bypass Control Structure</td>
<td>No Change</td>
<td>No Change</td>
<td>Fish Passage</td>
<td>No Change</td>
</tr>
<tr>
<td>Mariposa Bypass Drop Structure</td>
<td>No Change</td>
<td>Remove Drop Structure</td>
<td>No Change</td>
<td>Fish Passage</td>
</tr>
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<td>Mariposa Drop Structure</td>
<td>No Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reach 4B1 Levee Alignment Options</td>
<td>B, C, D</td>
<td>A</td>
<td>A</td>
<td>A, B, C</td>
</tr>
</tbody>
</table>

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### Reach 4B1 Levee Alignments

Legend
- Option A Levees
- Option B Levees
- Option C Levees
- Option D Levees
- Bypass Levees

Example Areas
- Area 1
- Area 2

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Reach 4B1 – Historical morphology

Reach 4B1 Alignments

<table>
<thead>
<tr>
<th>Levee Alignment Options</th>
<th>Initial Alternatives</th>
<th>Levee Length</th>
<th>Capacity</th>
<th>Approx. Width Between Levees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>Left Side</td>
<td>Right Side</td>
<td></td>
</tr>
<tr>
<td>Option A</td>
<td>✓ ✓ ✓</td>
<td>102,000 ft</td>
<td>90,200 ft</td>
<td>1,500 cfs</td>
</tr>
<tr>
<td>Option B</td>
<td>✓</td>
<td>77,800 ft</td>
<td>76,400 ft</td>
<td>4,500 cfs</td>
</tr>
<tr>
<td>Option C</td>
<td>✓ ✓</td>
<td>72,800 ft</td>
<td>66,300 ft</td>
<td>4,500 cfs</td>
</tr>
<tr>
<td>Option D</td>
<td>✓</td>
<td>70,200 ft</td>
<td>65,100 ft</td>
<td>4,500 cfs</td>
</tr>
</tbody>
</table>

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Flood Frequency

• Alternative 1: Wet Year and no floods flows in Reach 4b1

Flood Frequency

• Alternative 1: Normal-Wet Year
Flood Frequency

• Alternative 1: Dry Year

[Graph showing flow (cfs) over time for different reaches.]

Flood Frequency

• Alternative 2: Wet Year

[Graph showing flow (cfs) over time for different reaches.]
Flood Frequency

• Alternative 2: Normal-Wet Year

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Flood Frequency

• Alternative 2: Dry Year

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Alternative Evaluation

Purpose of Evaluation:

- Evaluate and compare initial alternatives
- Select a range of feasible alternatives to move forward for analysis in EIS/EIR that:
  - Meet most of the Purpose and Need/Project Objectives (Settlement Requirements); and,
  - Can avoid or substantially lessen one or more of the significant effects
Evaluation Criteria

Seven Evaluation Criteria Categories:

- Project Objectives
- Technical Feasibility
- Environmental Acceptability
  - Biological Effects, Social Effects, Physical Effects, Regulatory Constraints
- Cost
- Flood Control
- Geomorphology/Sediment Transport
- Fisheries

Geomorphology/Sediment Transport

- Key points
  - System is very flat, likely to be depositional after initial adjustment to increased flows and gradient
  - Splitting flow tends to increase deposition
  - Capping flows tends to reduce channel complexity
  - Newly created channels much less stable than existing channels due to lack of vegetation establishment and bank stability
High flows in narrow levees = erosive

High flows in moderately wide levees = stable ~ levees 10 x channel width

High flows in very wide levees = depositional

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Geomorphology/Sediment Transport

Effect of Subsidence

Area of maximum Subsidence
(at upstream end of reach)

Original Stable Slope ~ 0.0002 (1ft/mile)

Scour due to lack of sediment supply
(downstream end of Eastside Bypass and Reach 5)

Deposition due to decreasing slope
(upstream end of Eastside Bypass)

Scour due to increasing slope
(downstream end of Chowchilla)

Initial Alternative 1

Main Channel Restoration

• Some adjustment at upstream and downstream ends
• Wider setbacks likely to increase stability (widest may cause increased deposition and reduced erosion)

Slight erosion to stable

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Initial Alternative 2

Bypass Restoration

• Erosion and lack of channel function likely on Eastside Bypass until riparian vegetation establishes (~10 years)

Initial Alternative 3

Bypass All Pulse Flows

• Low – medium function in San Joaquin (‘static’ condition)
• Difficult to establish channel in Eastside Bypass
### Initial Alternative 4

**Split Pulse Flows and Restore Both**

- Increased sustained velocities due to narrow levee alignment and sustained flows
- Function in San Joaquin depends on flow split and bypass options – low to high possible

### Geomorphology/Sediment Transport

<table>
<thead>
<tr>
<th>Geomorphology/Sediment Transport Evaluation Criteria</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>C</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Sediment in equals sediment out (Material)</td>
<td>Mix of erosion and deposition</td>
<td>Mix of erosion and deposition</td>
<td>Sediment</td>
<td>Assumed (deposition)</td>
</tr>
<tr>
<td>Sediment in equals sediment out (flowable)</td>
<td>Assumed (deposition)</td>
<td>Mix of erosion and deposition</td>
<td>Assumed (deposition)</td>
<td>Assumed (no sediment transport modeling)</td>
</tr>
<tr>
<td>Low flow and riparian channels (bypass one or more channels)</td>
<td>Mix of erosion and deposition</td>
<td>Mix of erosion and deposition</td>
<td>Assumed (deposition)</td>
<td>Assumed (deposition)</td>
</tr>
<tr>
<td>Diversion does not breakthrough or cross fills passage barriers</td>
<td>EB</td>
<td>EB</td>
<td>EB</td>
<td>EB</td>
</tr>
<tr>
<td>Forest and floodplains (river habitat complexity can be naturally sustained)</td>
<td>Initially</td>
<td>SB</td>
<td>SB</td>
<td>SB</td>
</tr>
<tr>
<td>After 10 yrs</td>
<td>EB</td>
<td>EB</td>
<td>EB</td>
<td>EB</td>
</tr>
</tbody>
</table>

**Legend**

- **Low**
- **Medium**
- **High**

**Key**

- EB = Eastern Bay Delta
- SJR = San Joaquin River

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Existing Conditions

Average Channel Bed Elevation (ft) Existing

<table>
<thead>
<tr>
<th>River Mile</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
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</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>75</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>95</td>
</tr>
</tbody>
</table>

Reach Breaks:
- Eastside
- Reach 4a

Change in Average Channel Elevation (ft)

<table>
<thead>
<tr>
<th>Reach</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mariposa</td>
<td>-5</td>
</tr>
<tr>
<td>Eastside-2</td>
<td>1</td>
</tr>
<tr>
<td>Eastside-3</td>
<td>2</td>
</tr>
<tr>
<td>Eastside-1</td>
<td>3</td>
</tr>
<tr>
<td>Eastside</td>
<td>-2</td>
</tr>
<tr>
<td>Reach 4a</td>
<td>-3</td>
</tr>
</tbody>
</table>

Change in Average Floodplain Elevation (ft)

<table>
<thead>
<tr>
<th>Reach</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mariposa</td>
<td>-5</td>
</tr>
<tr>
<td>Eastside-2</td>
<td>1</td>
</tr>
<tr>
<td>Eastside-3</td>
<td>2</td>
</tr>
<tr>
<td>Eastside-1</td>
<td>3</td>
</tr>
<tr>
<td>Eastside</td>
<td>-2</td>
</tr>
<tr>
<td>Reach 4a</td>
<td>-3</td>
</tr>
</tbody>
</table>

Channel Deposition (tons/mi)

<table>
<thead>
<tr>
<th>Reach</th>
<th>Deposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mariposa</td>
<td>-500</td>
</tr>
<tr>
<td>Eastside-2</td>
<td>100</td>
</tr>
<tr>
<td>Eastside-3</td>
<td>200</td>
</tr>
<tr>
<td>Eastside-1</td>
<td>300</td>
</tr>
<tr>
<td>Eastside</td>
<td>-400</td>
</tr>
<tr>
<td>Reach 4a</td>
<td>-500</td>
</tr>
</tbody>
</table>

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Alternative 1 Option B

Average Hydraulic Properties
1200 cfs

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Alternative 1 Option C

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Alternative 2

![Graph showing changes in average channel elevation, average floodplain elevation, and channel deposition for different reaches.]

Alternative 3 Option A

![Graph showing changes in average channel elevation, average floodplain elevation, and channel deposition for different reaches.]

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Fisheries

- All fisheries evaluation criteria which required quantitative comparisons (i.e. number of pools, habitat area etc.) were categorized into Low, Medium, and High scores.
- The value for each alternative was divided by the highest value to scale all values by the highest score.
- If the values of a given criteria were positively related to fish health (e.g. acres of floodplain habitat) then scaled scores were categorized accordingly: Low (0.0-0.33), Medium (0.33-0.66), or High (0.66-1).
Fisheries

- If values of a given criteria were negatively related to fish health (e.g. number of obstructions) then scaled scores were categorized accordingly: Low (0.66-1), Medium (0.33-0.66), or High (0.0-0.33)
- Criteria evaluated for each life stage (adults, juveniles) were only evaluated during the time period salmon of each life stage were expected to be present in reach 4B
Inundation Depths 1200 cfs

Habitat Suitability

- Individual Habitat Suitability:
  - Low
  - Medium
  - High

- Overall Habitat Suitability:
  - Low
  - Medium
  - High

Temperature

Velocity

Depth
### Depth HSI

#### Fry

<table>
<thead>
<tr>
<th>HSI Range</th>
<th>HSI Values</th>
<th>Depth (m) Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>2/3-1.00</td>
<td>0.15-0.56</td>
</tr>
<tr>
<td>Medium</td>
<td>1/3-2/3</td>
<td>0.06-0.15 and 0.56-0.85</td>
</tr>
<tr>
<td>Low</td>
<td>0.00-1/3</td>
<td>0.00-0.06 and 0.85-2.12</td>
</tr>
</tbody>
</table>

#### Juveniles

<table>
<thead>
<tr>
<th>HSI Range</th>
<th>HSI Values</th>
<th>Depth (m) Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>2/3-1.00</td>
<td>0.25-0.81</td>
</tr>
<tr>
<td>Medium</td>
<td>1/3-2/3</td>
<td>0.13-0.25 and 0.81-1.17</td>
</tr>
<tr>
<td>Low</td>
<td>0.00-1/3</td>
<td>0.00-0.13 and 1.17-3.04</td>
</tr>
</tbody>
</table>

*from data provided by the USFWS, Hoopa Valley Tribe, and Raleigh et al. (1996) for California salmon*

### Velocity HSI

#### Fry

<table>
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<tr>
<th>HSI Range</th>
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<th>Velocity (m/s) Range</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>2/3-1.00</td>
<td>0.00-0.08</td>
</tr>
<tr>
<td>Medium</td>
<td>1/3-2/3</td>
<td>0.08-0.15</td>
</tr>
<tr>
<td>Low</td>
<td>0.00-1/3</td>
<td>0.15-0.91</td>
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#### Juveniles

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<tbody>
<tr>
<td>High</td>
<td>2/3-1.00</td>
<td>0.02-0.23</td>
</tr>
<tr>
<td>Medium</td>
<td>1/3-2/3</td>
<td>0.00-0.02 and 0.23-0.40</td>
</tr>
<tr>
<td>Low</td>
<td>0.00-1/3</td>
<td>0.40-1.22</td>
</tr>
</tbody>
</table>

*from data provided by the USFWS and Hoopa Valley Tribe for California salmon*
Habitat Suitability at 1200 cfs

Alternative 1 Option D

Temperature Suitability

Weekly Average Temperature at Upstream End of Reach 4b1

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Evaluation Results

Alternative 1 – Primary Restored Channel in San Joaquin River

- Section 11(b)(1) of Settlement indicates that in the long-term, conveyance of at least 4,500 cfs through Reach 4B," unless the Secretary (with the RA, NMFS, and USFWS) determines that these modifications would not substantially enhance achievement of the Restoration Goal.

- Alternative 1 could include levee alignments B, C, and D with in-channel and floodplain rearing habitat. The trade-offs between the width of the floodplain are most apparent when examining alignments B and D.
Evaluation Results

Alternative 2 – Primary Restored Channel in Bypass

• Creating habitat complexity within bypass system would be a challenge due to sandy soils that would have difficulty maintaining structure. Any restoration actions would need to be designed to not interfere with flood control capacity/operational flexibility of the Flood Control Project.
• Based on Value Planning recommendations, this Alternative will move forward for further consideration.

Evaluation Results

Alternative 3 – Flows of at least 475 cfs in SJR with Eastside Bypass as Floodplain

• Alternative 3 could reduce potential biological, social, and physical effects associated with Alternative 1. However, while it would meet fisheries needs, it would provide fewer fish benefits than the other alternatives.
• Alternative 3 will move forward for further evaluation in the EIS/R because it has the potential to reduce environmental effects of other alternatives.

It is recommended that this alternative change the flow path through the bypass system from the Eastside Bypass to the Mariposa Bypass.
Evaluation Results

Alternative 4 – Split Flow, Fish-Friendly Bypass

- Depending on the levee alignment, Alternative 4 could reduce potential biological, social, and physical effects associated with Alternative 1.
- Alternative 4 could incorporate levee alignments A, B, or C. The potentially reduced impacts are generally associated with alignment A; therefore, this alignment is proposed to move forward for further analysis in the EIS/R.
- Levee alignments B and C would involve substantial amount of floodplain habitat that would function better with greater flows than those available under Alternative 4; therefore, it is recommended that these alignments not move forward into the EIS/R.

Recommendations

This document recommends seven Initial Alternatives be carried forward for further review:

- **Alternative 1 Main Channel Restoration** (levee option B)
- **Alternative 1 Main Channel Restoration** (levee option C)
- **Alternative 1 Main Channel Restoration** (levee option D)
- **Alternative 2 Primary Restored Channel in Bypass** (levee option A)
- **Alternative 3 Bypass All Pulse Flows** (levee option A)
- **Alternative 4 Split Pulse Flows, Restore Both** (levee option A)

- These alternatives will be further refined and additional analysis will be completed, as necessary.
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<td>No Change</td>
<td>No Change</td>
<td>Fish Passage</td>
<td>No Change</td>
</tr>
<tr>
<td>Mariposa Bypass Control Structure</td>
<td>No Change</td>
<td>Notch Center Bays</td>
<td>No Change</td>
<td>Notch Center Bays</td>
</tr>
<tr>
<td>Mariposa Drop Structure</td>
<td>No Change</td>
<td>Remove Drop Structure</td>
<td>No Change</td>
<td>Fish Passage</td>
</tr>
<tr>
<td>Reach 4B1 Levee Alignment Options</td>
<td>B, C, D</td>
<td>A</td>
<td>A</td>
<td>A (Removed B &amp; C)</td>
</tr>
<tr>
<td>Eastside Bypass Levee Alignment Options</td>
<td>None</td>
<td>New Levee Setbacks</td>
<td>None</td>
<td>None</td>
</tr>
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Next Steps

- Provide input on preliminary information presented
- Review and comment on draft Project Description TM
- Provide additional information sources
- Allow or participate in field activities

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Contact Information

Reach 4B Project:

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Cell: (916) 675-2936
E-mail: Mbanonis@usbr.gov