

# San Joaquin River Restoration Program



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

Landowner Technical Meeting  
February 23, 2012



## Agenda

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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



## SJRRP Update

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- 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

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3



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4



## 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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5



## Agenda

- General Program Update
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- **Value Planning Overview and Results**
- Reach 4B Initial Alternatives Evaluation
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6



## 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

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7



## 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

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8



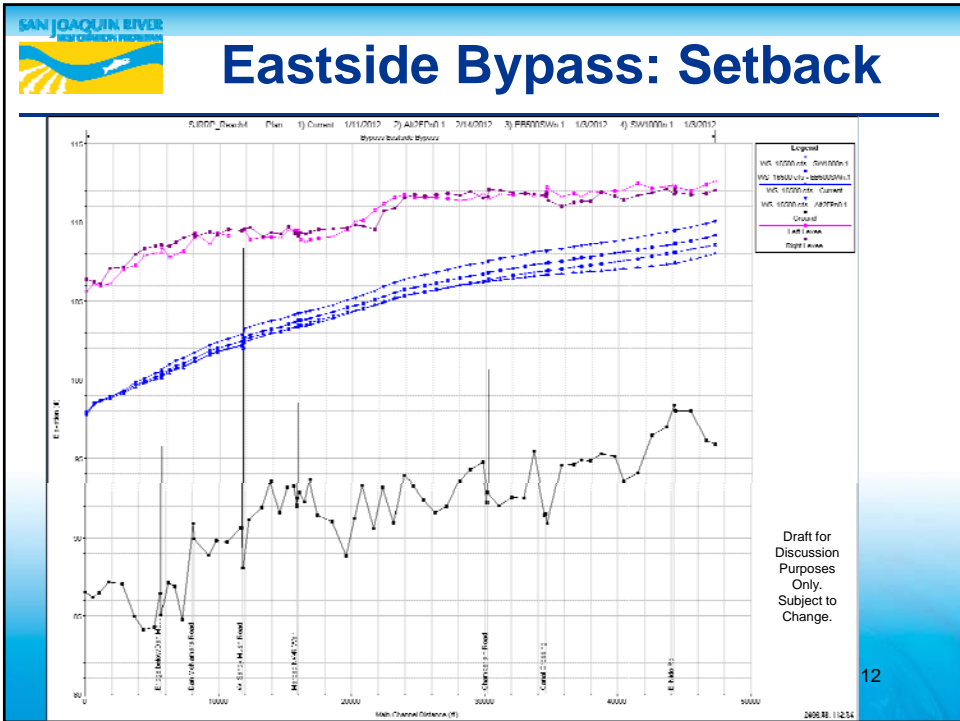
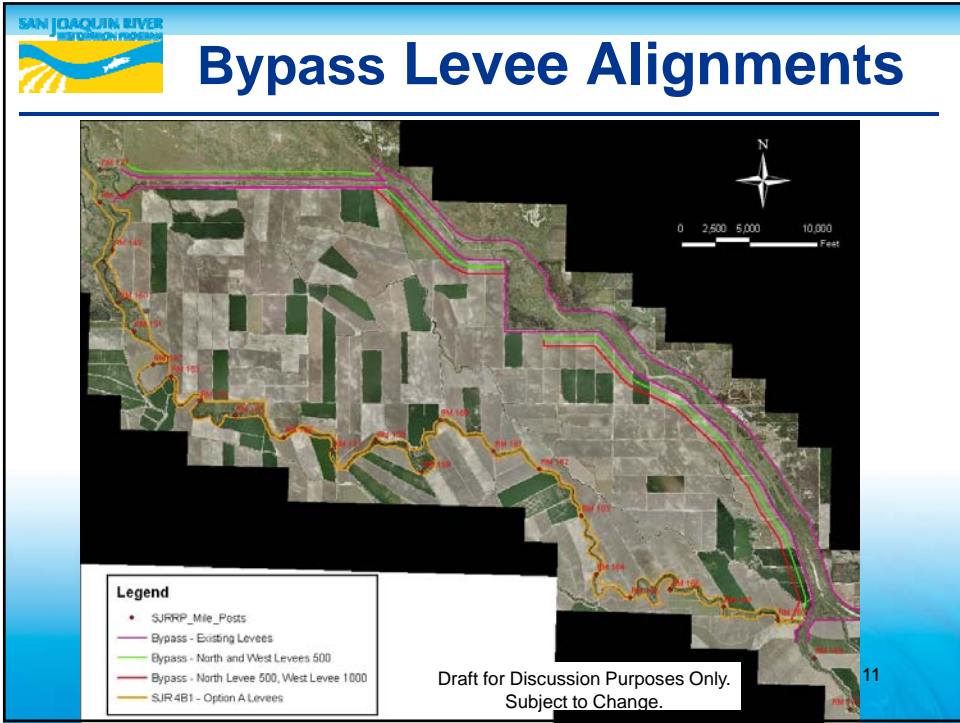
## Addressing Recommendations

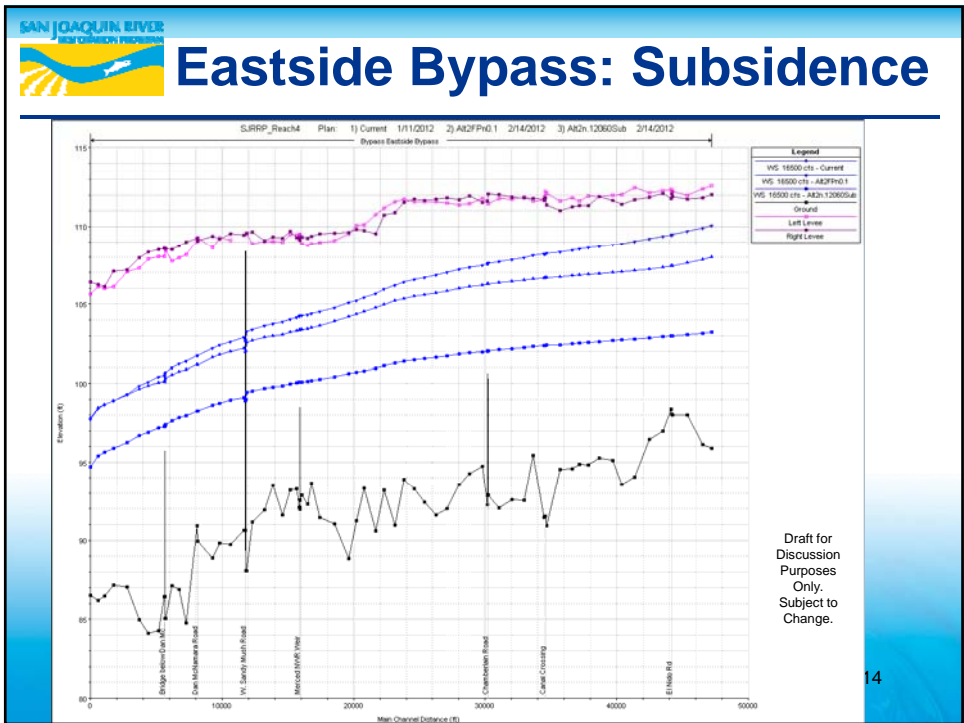
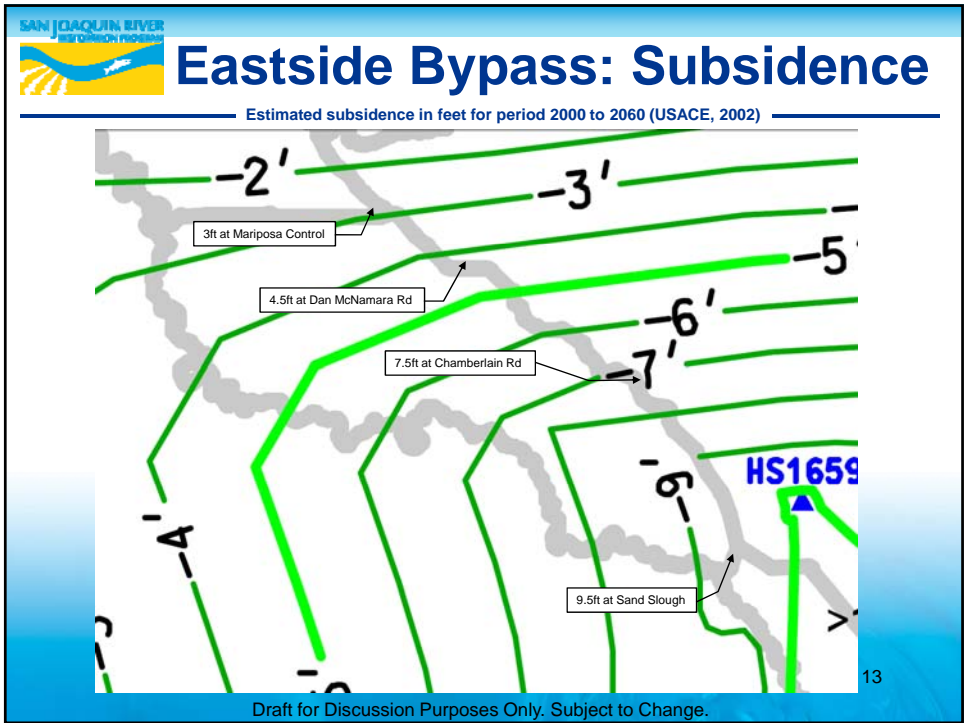
- Combine Alternative A with Initial Alternative 2
  - Include improvements in Reach 4B
  - Consider widening levees



## 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”







# Agenda

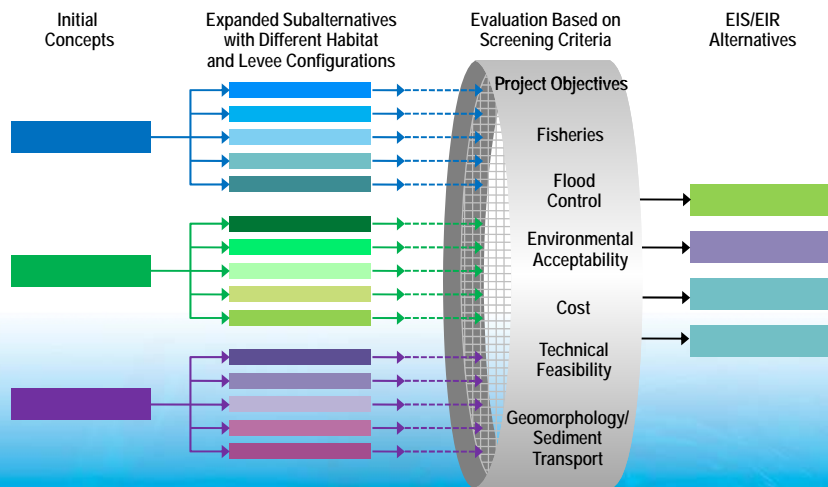
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15



# Alternative Evaluation



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## Reach 4B Initial Alternatives

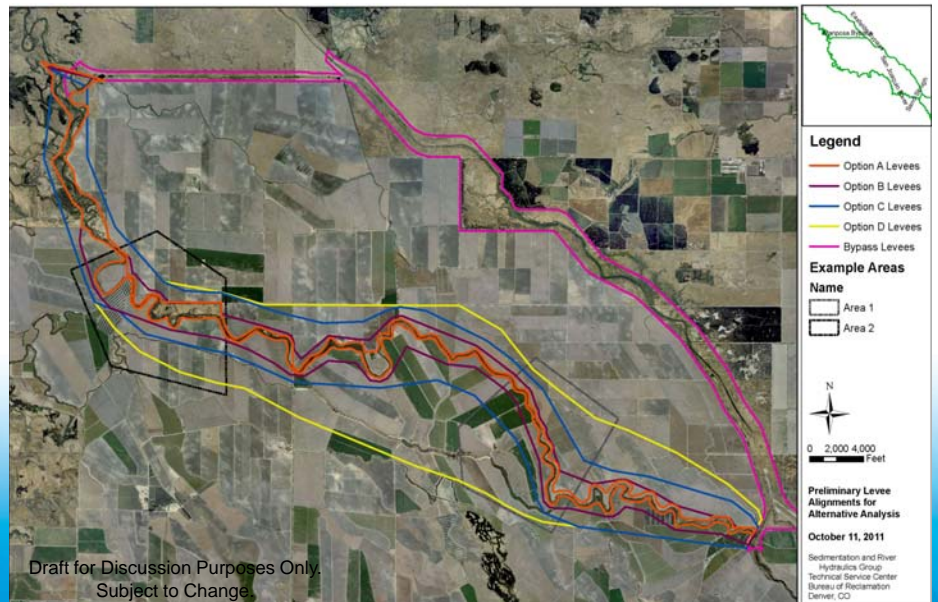
Channel/ Structure	Initial Alternative 1 Main Channel Restoration	Initial Alternative 2 Bypass Restoration	Initial Alternative 3 Bypass All Pulse Flows	Initial Alternative 4 Split Pulse Flows and Restore Both
San Joaquin River Flows	Up to 4,500 cfs (all Restoration Flows)	At least 475 cfs of Flood Flows	Restoration Flows of at least 475 cfs	Base and fall pulse flows; some spring pulse flows
Bypass System Flows	Flood flows greater than 4,500 cfs	All flows up to capacity	Flow greater than 475 cfs	Flow greater than Reach 4B capacity
Fish Routing	SJR	Eastside Bypass Reach 2, Mariposa Bypass	SJR, Eastside Bypass Reaches 2 and 3	SJR, Eastside Bypass Reach 2, Mariposa Bypass
Habitat	SJR	Bypass	SJR and Bypass	SJR and Bypass
Reach 4B Headgates	Remove Headgate	Simple Gate	Construct gates and roughened channel fishway	Construct gates and roughened channel fishway
Eastside Bypass Control Structure	No Change	No Change	Fish Passage	No Change
Mariposa Bypass Control Structure	No Change	Notch Center Bays	No Change	Notch Center Bays
Mariposa Drop Structure	No Change	Remove Drop Structure	No Change	Fish Passage
Reach 4B1 Levee Alignment Options	B, C, D	A	A	A, B, C

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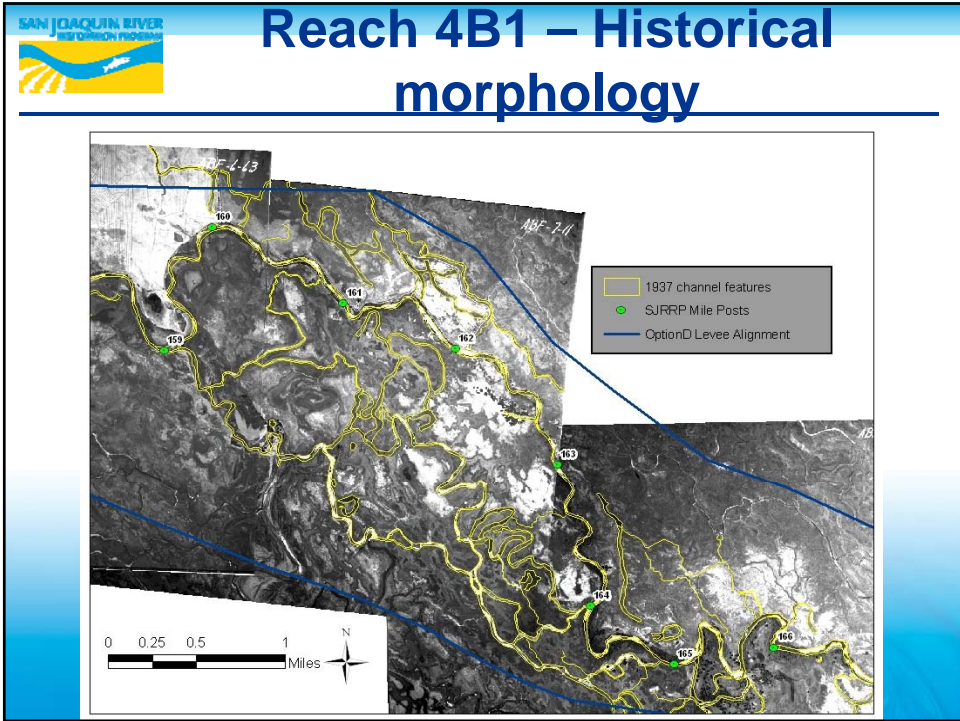
17



## Reach 4B1 Levee Alignments



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**SAN JOAQUIN RIVER**  
Flood Control Program

## Reach 4B1 Alignments

Levee Alignment Options	Initial Alternatives				Levee Length		Capacity	Approx. Width Between Levees
	1	2	3	4	Left Side	Right Side		
Option A		✓	✓	✓	102,000 ft	90,200 ft	1,500 cfs	250-400 ft
Option B	✓			✓	77,800 ft	76,400 ft	4,500 cfs	1,300 to 2,000 ft
Option C	✓			✓	72,800 ft	66,300 ft	4,500 cfs	3,500 to 5,500 ft
Option D	✓				70,200 ft	65,100 ft	4,500 cfs	1-2 miles wide at widest part

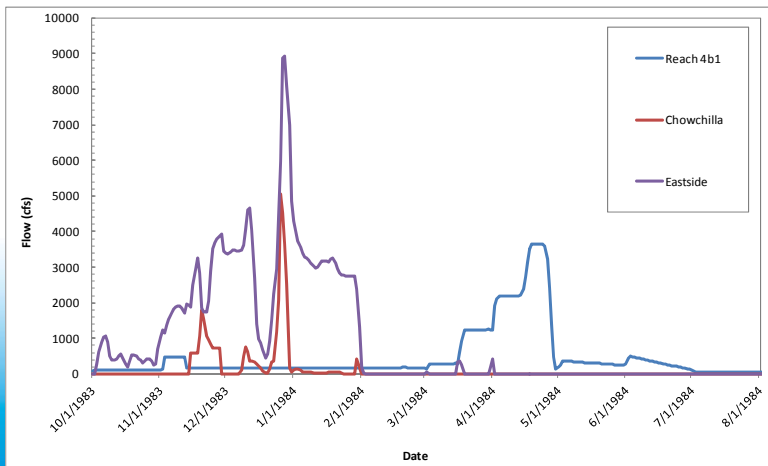
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20



## Flood Frequency

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



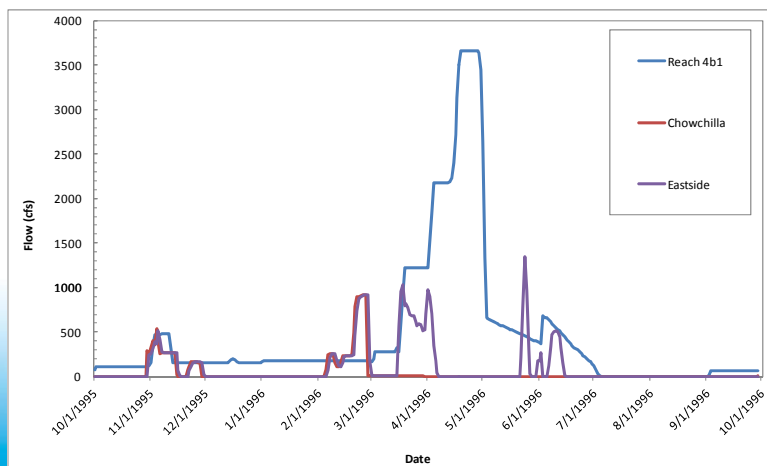
21

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## Flood Frequency

- Alternative 1: Normal-Wet Year



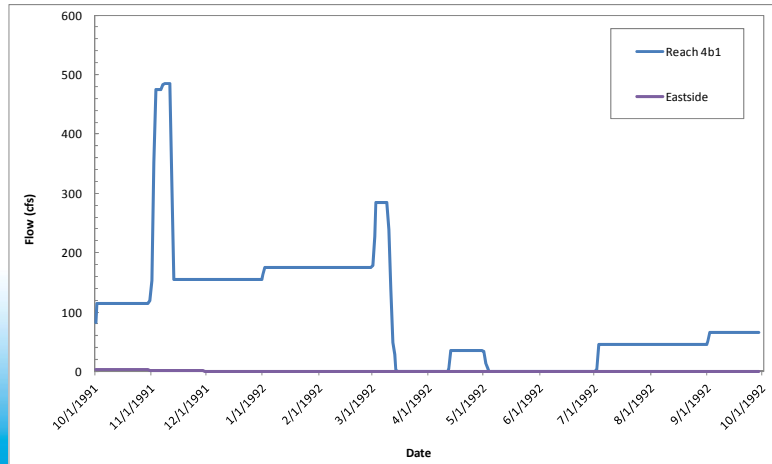
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# Flood Frequency

- Alternative 1: Dry Year



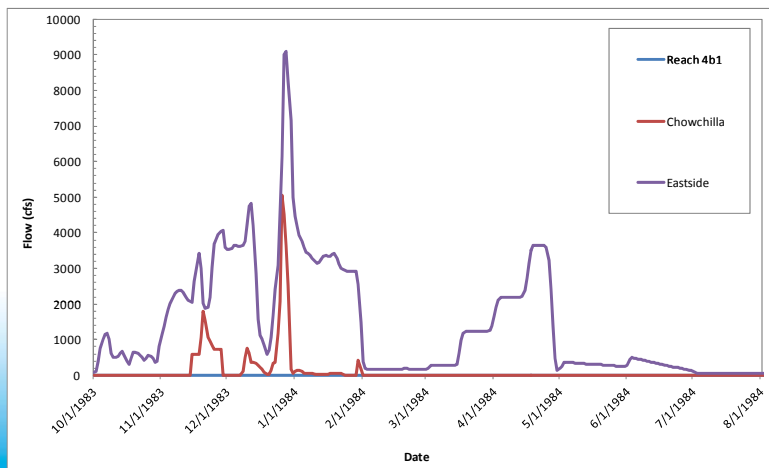
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23



# Flood Frequency

- Alternative 2: Wet Year



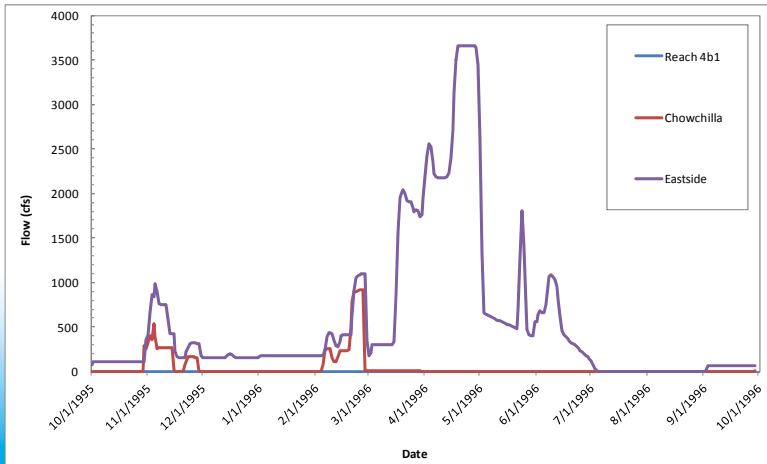
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24



# Flood Frequency

- Alternative 2: Normal-Wet Year



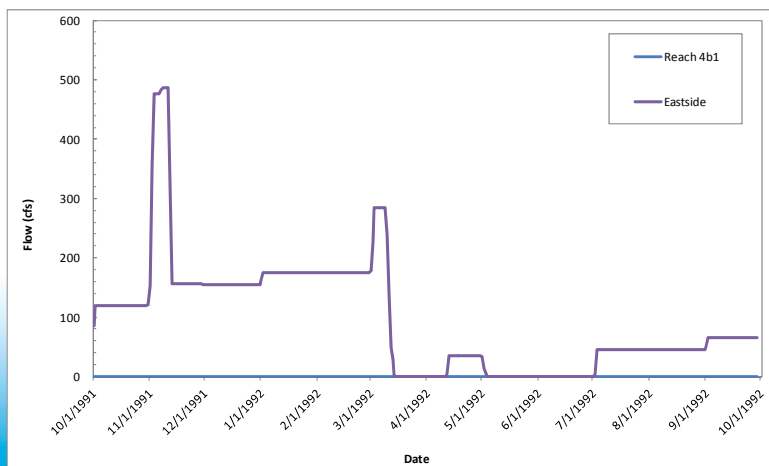
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25



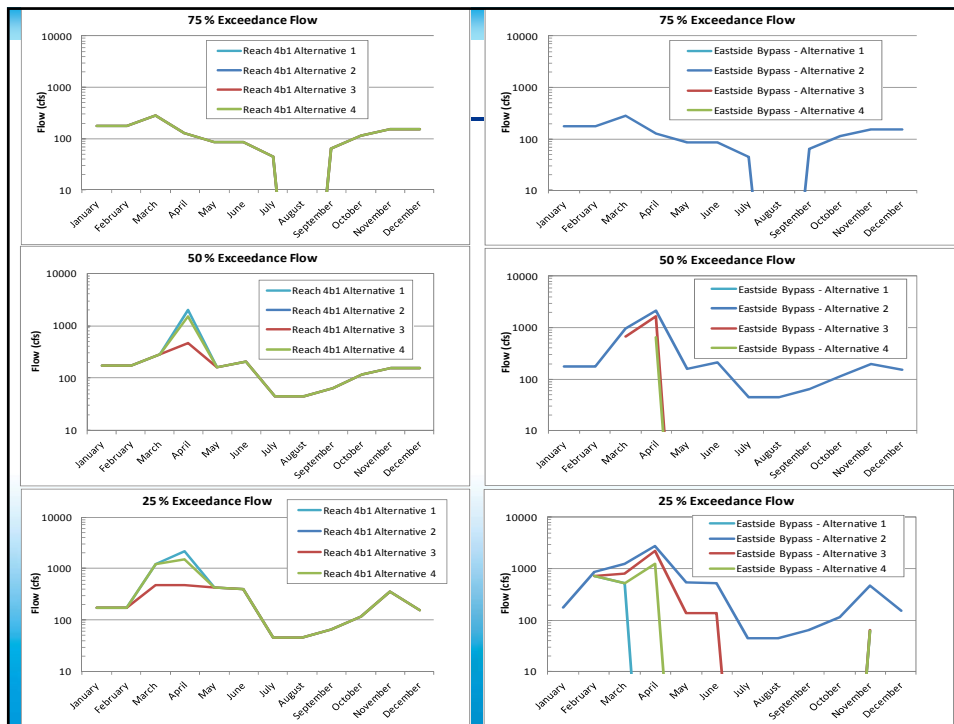
# Flood Frequency


- Alternative 2: Dry Year



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26





## Alternative Evaluation

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**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

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28



## Evaluation Criteria

### Seven Evaluation Criteria Categories:

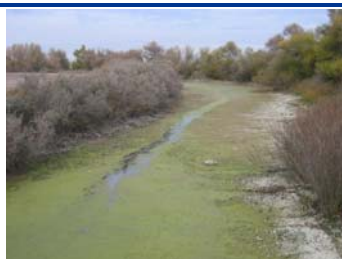
- Project Objectives
- Technical Feasibility
- Environmental Acceptability
  - Biological Effects, Social Effects, Physical Effects, Regulatory Constraints
- Cost
- Flood Control
- Geomorphology/Sediment Transport
- Fisheries

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29



## Geomorphology/Sediment Transport



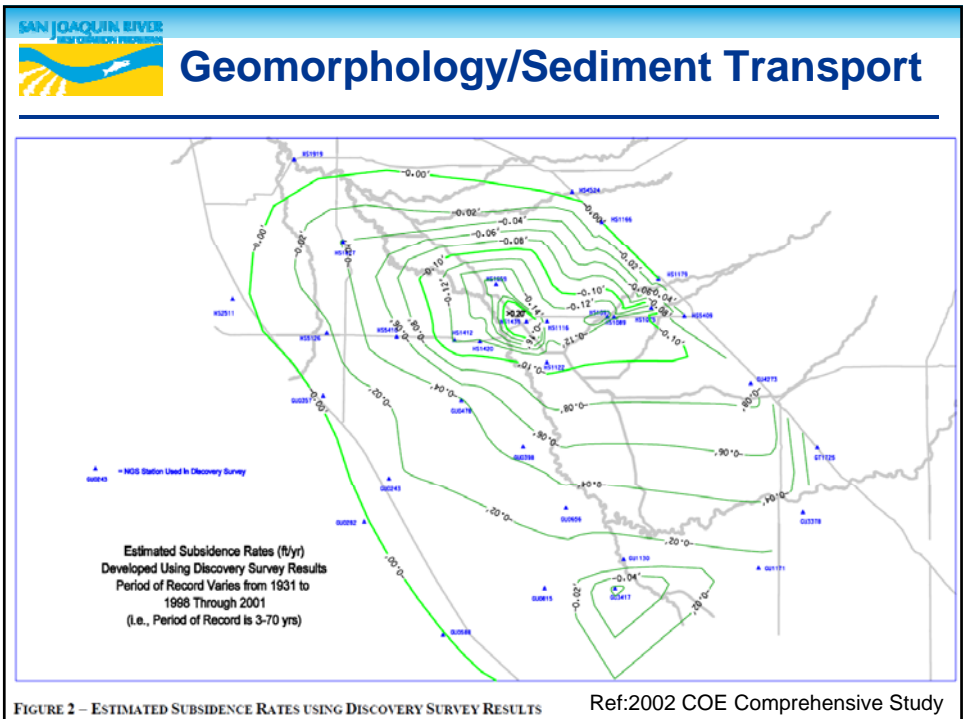
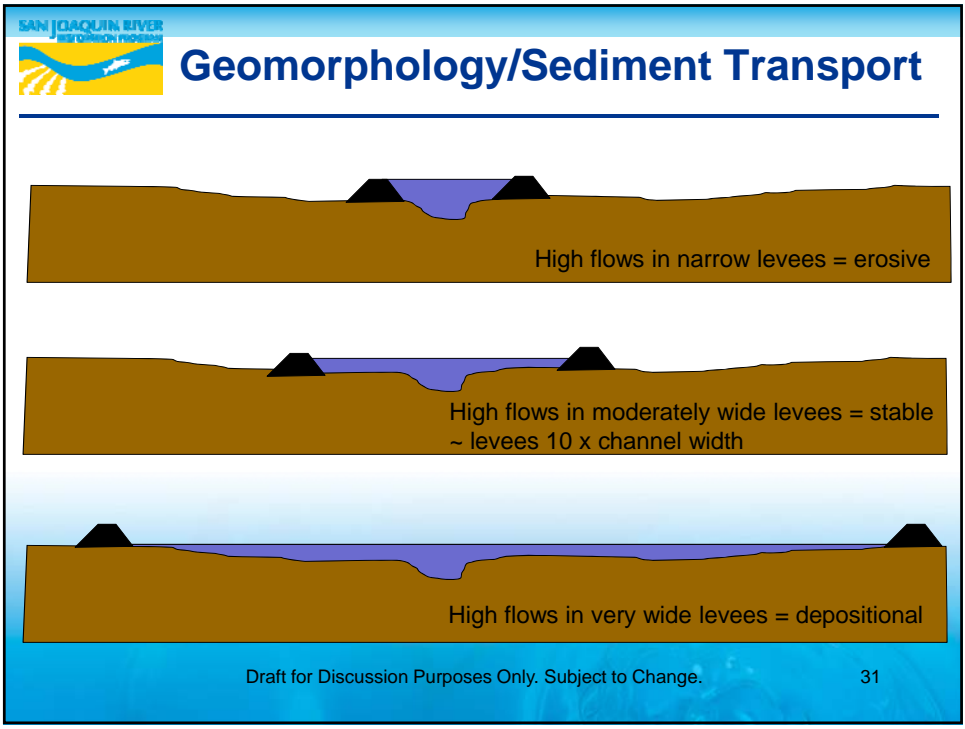
San Joaquin River channel (above)  
Eastside Bypass (below)



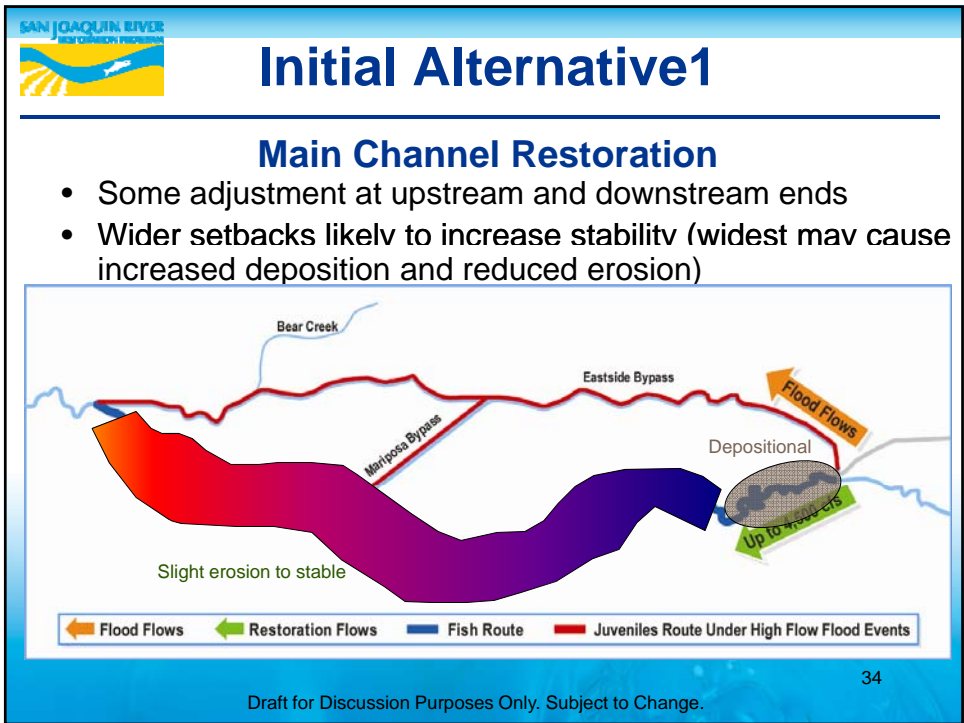
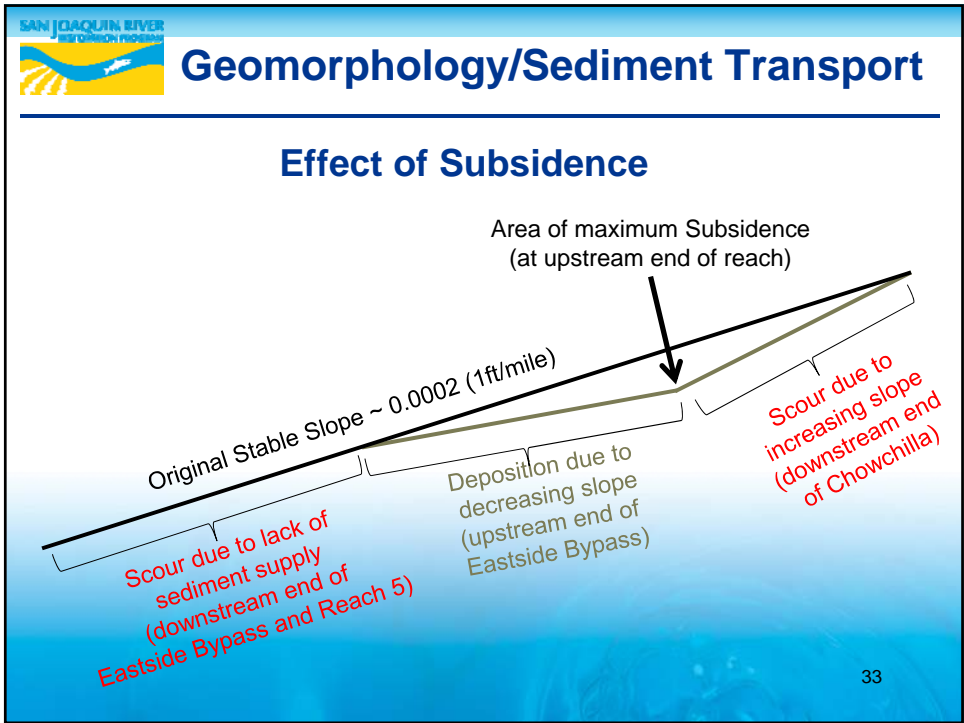
- Key points
  - System is very flat, likely to be depositional after initial adjustment to increased flows and gradient
  - Splitting flow tends to increase deposition
  - Capping flows tends to reduce channel complexity
  - Newly created channels much less stable than existing channels due to lack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

30

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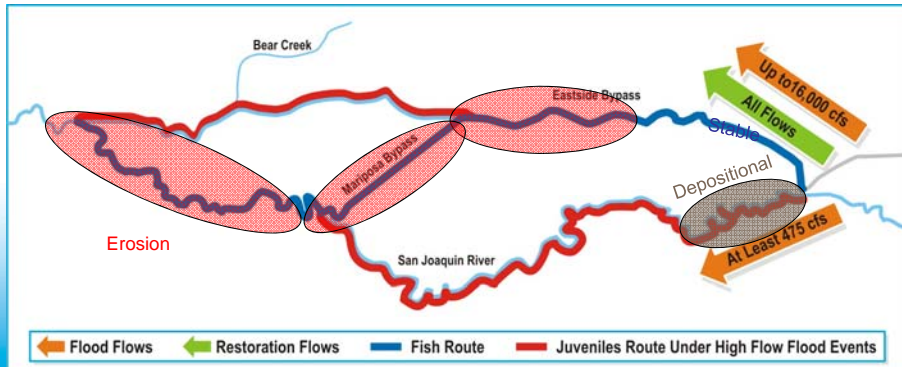




## Initial Alternative 2

### Bypass Restoration

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



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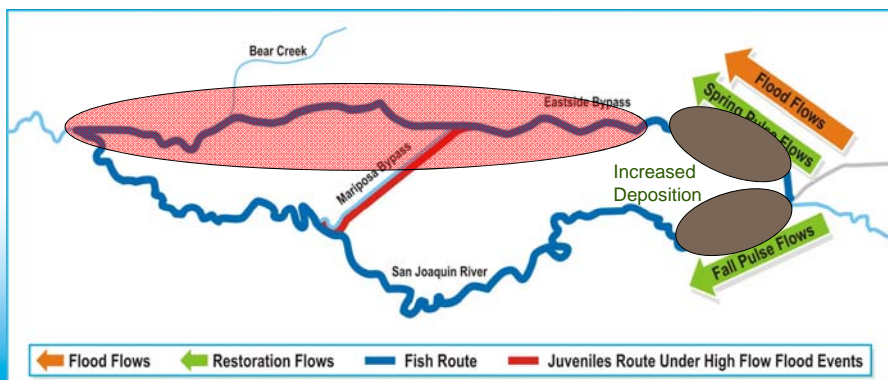
35



## Initial Alternative 3

### Bypass All Pulse Flows

- Low – medium function in San Joaquin ('static' condition)
- Difficult to establish channel in Eastside Bypass



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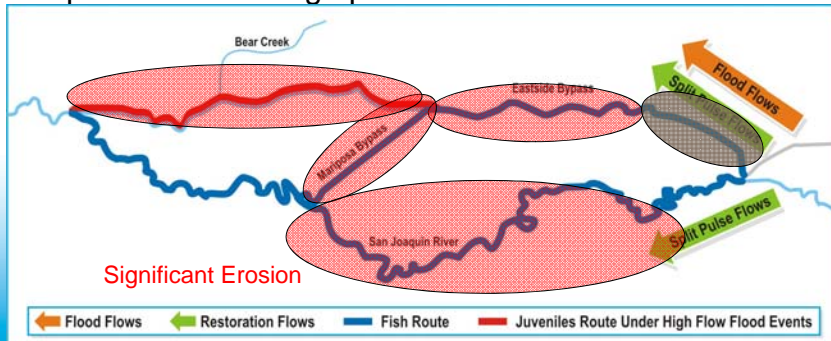
36



# 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



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37



# Geomorphology/Sediment Transport

Geomorphology/Sediment Transport Evaluation Criteria	Alternative 1			Alternative 2	Alternative 3	Alternative 4		
	B	C	D	A	A	A	B	C
Sediment in equals sediment out (Channel)	Mix of erosion and deposition	Mix of erosion and deposition	Assumed (mix of erosion and deposition)	SJR (deposition) EB (mixed)	Mix of erosion and deposition	Mix of erosion and deposition	Assumed (no sediment transport modeling)	Assumed (no sediment transport modeling)
Sediment in equals sediment out (floodplain)			Assumed	(depositional EB)		(depositional EB)	Assumed	Assumed
Low flow and migration channels (Bypass and main channel) persist without sediment deposition/plugs or excessive channel enlargement	Mix of erosion and deposition	Mix of erosion and deposition	Mix of erosion and deposition	Initially Maturing EB (mix of erosion and deposition)	Mix of erosion and deposition	Mix of erosion and deposition	Assumed (no sediment transport modeling)	Assumed (no sediment transport modeling)
Channel does not headcut or create fish passage barriers				EB	SJR and EB	SJR	Assumed in SJR (no sediment transport modeling)	Assumed in SJR (no sediment transport modeling)
Pools and bedforms (fishery habitat complexity) can be naturally sustained				Initially	SJR	SJR	SJR	SJR
				After 10 yrs	EB	EB	EB	EB
Riparian Vegetation Sustainability				Initially	SJR	SJR	SJR	SJR
				After 10 yrs	EB	EB	EB	EB

**Legend**

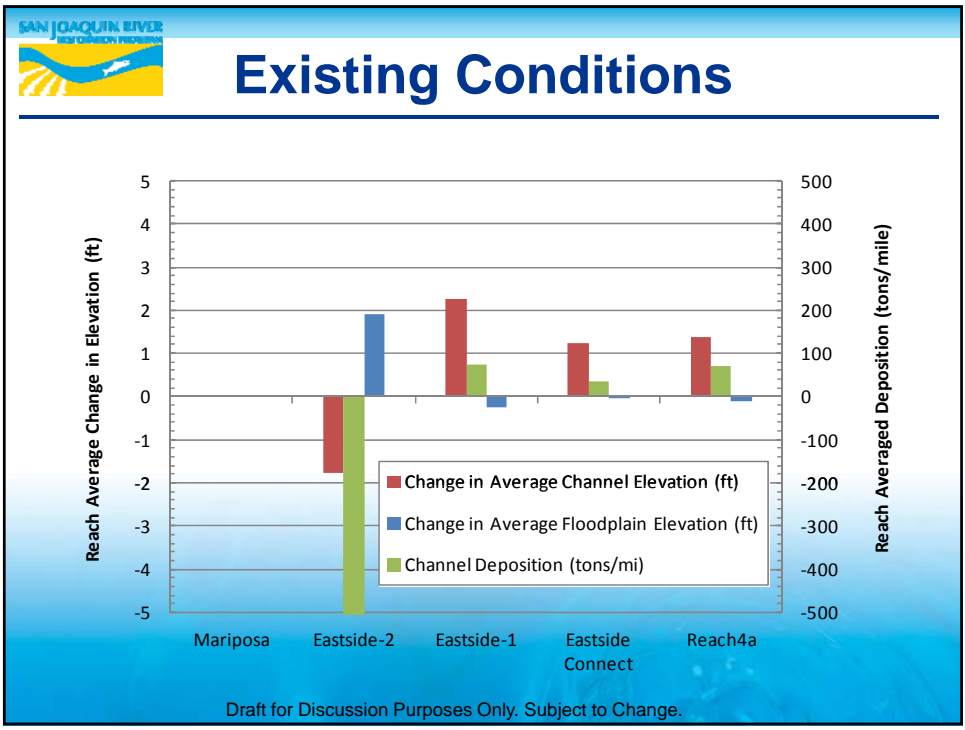
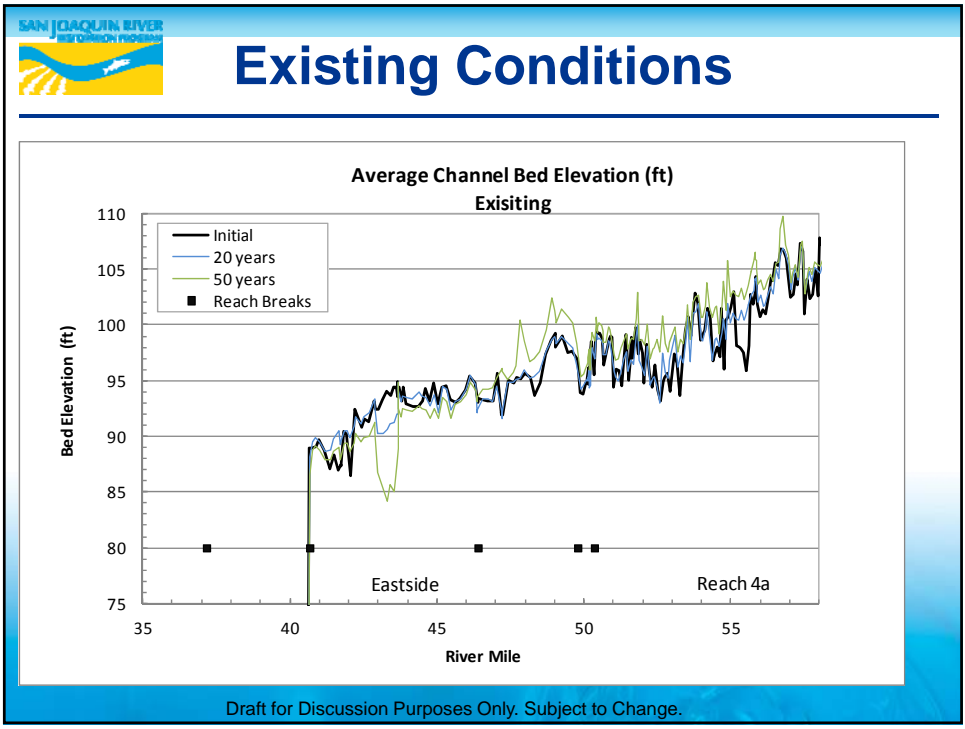
- Light Green = Low
- Medium Green = Medium
- Dark Green = High

**Key**

- EB = Eastside Bypass
- SJR = San Joaquin River

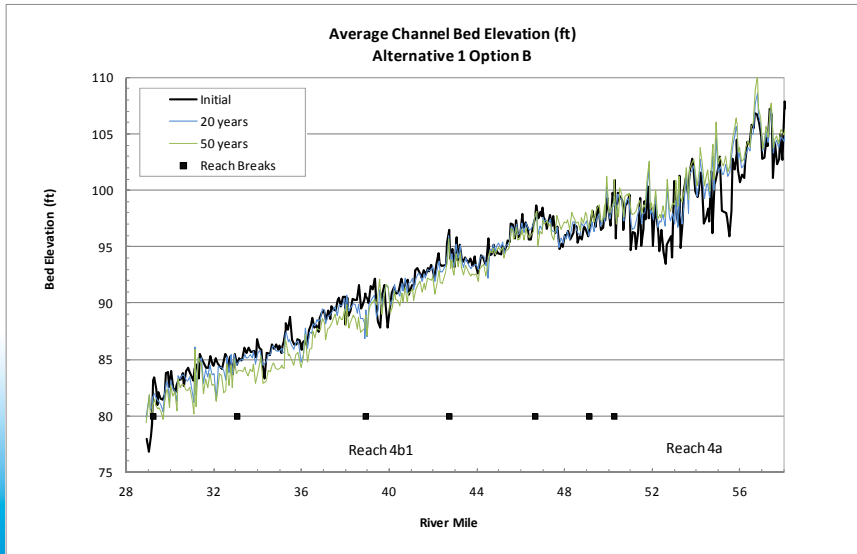
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38





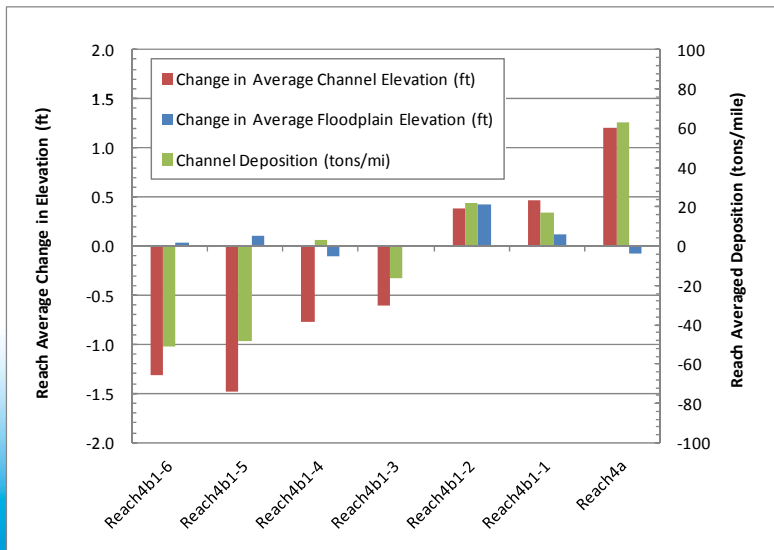
## Alternative 1 Option B



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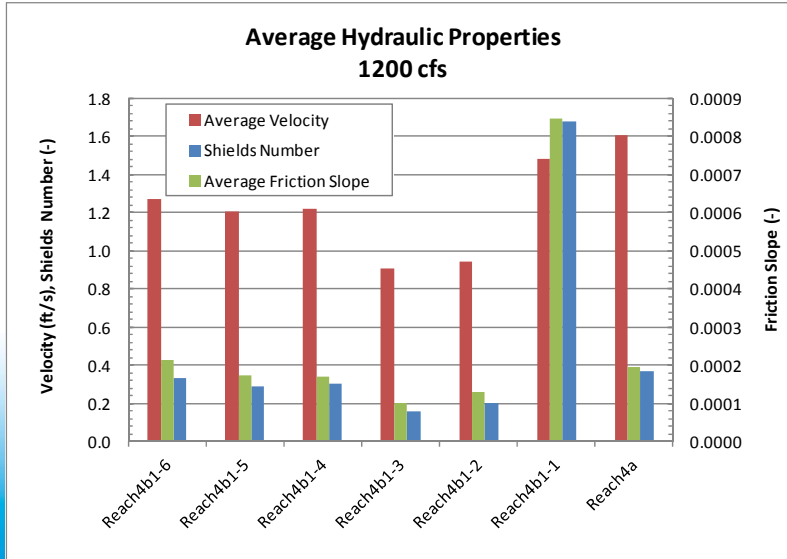
## Alternative 1 Option B



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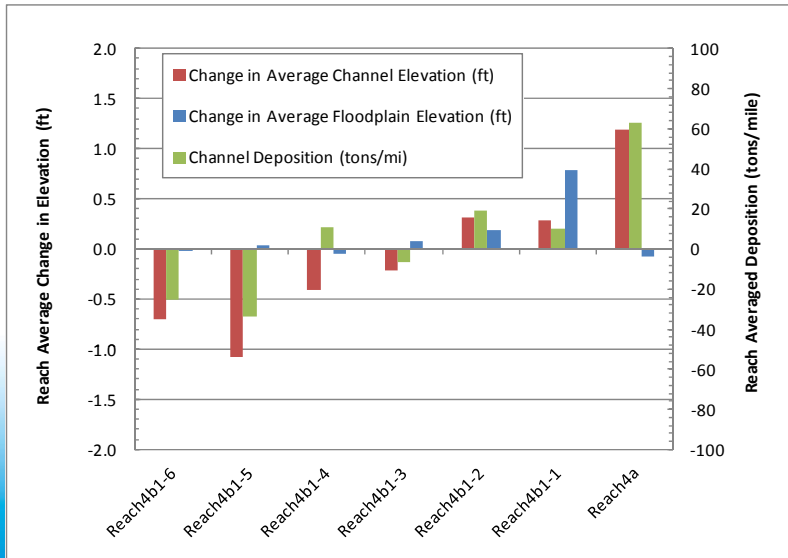
## Alternative 1 Option B



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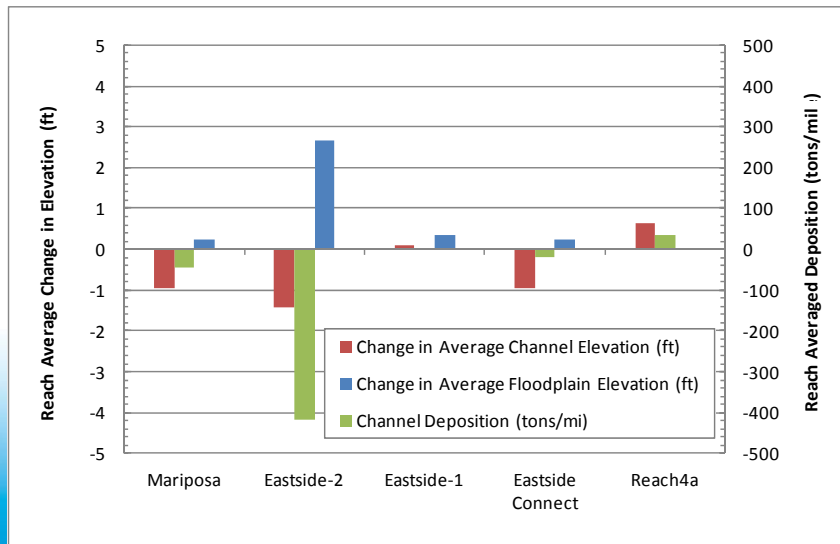
## Alternative 1 Option C



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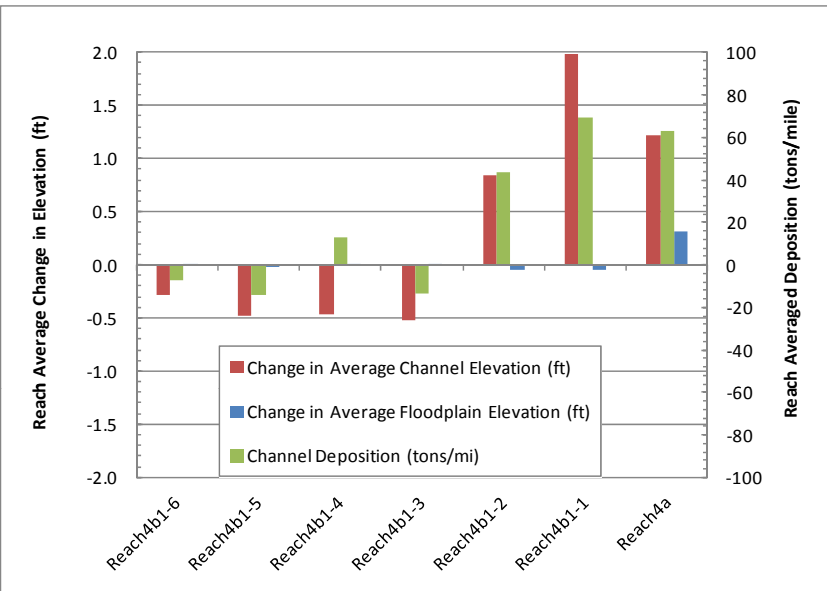
## Alternative 2



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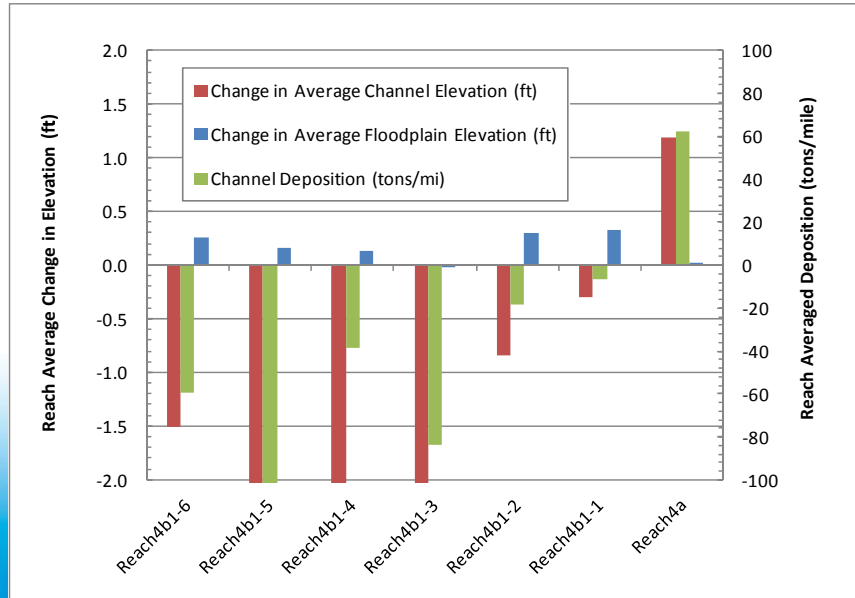
## Alternative 3 Option A



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## Alternative 4 Option A



## 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)



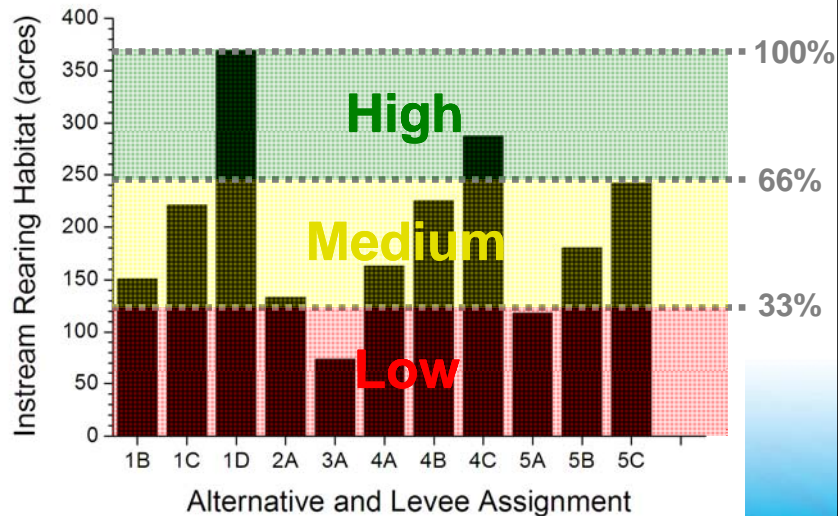


# Fisheries

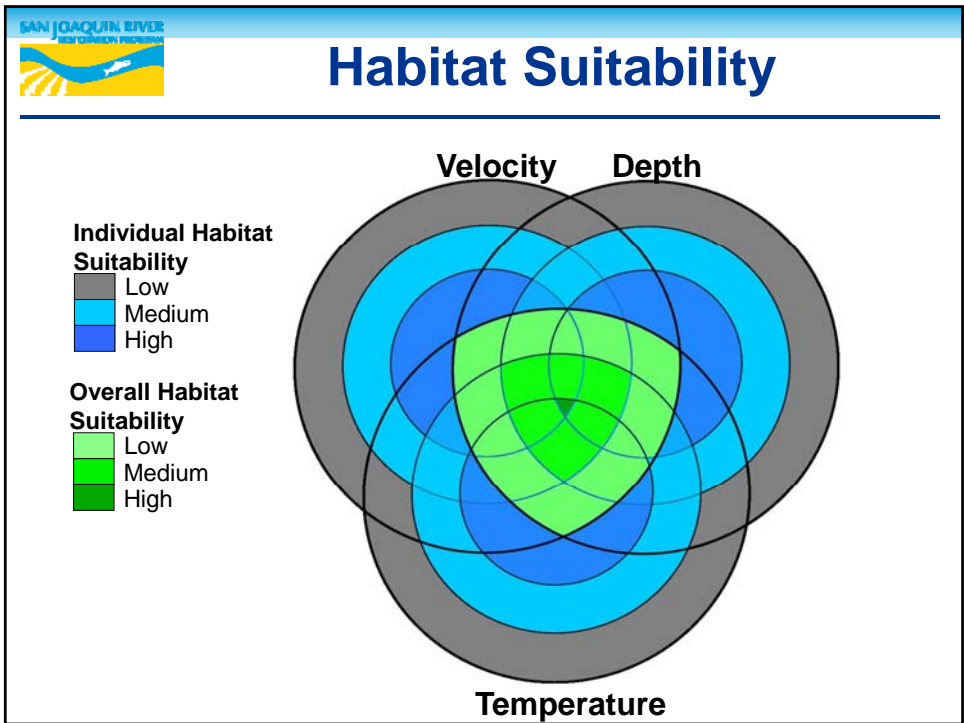
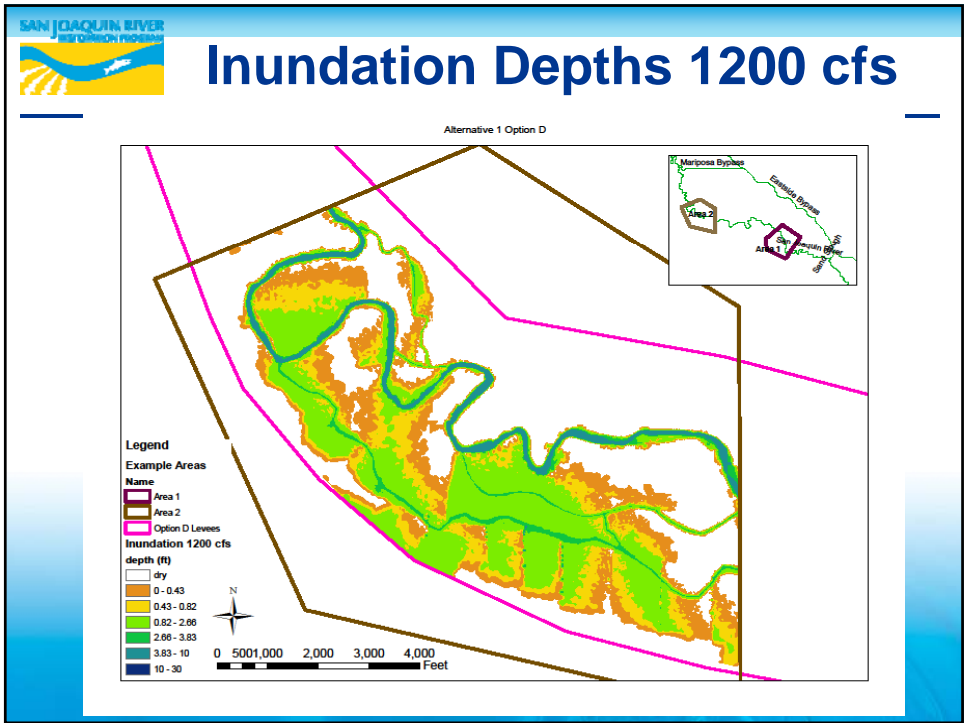
- If values of a given criteria were negatively related to fish health (e.g. number of obstructions) then scaled scores were categorized accordingly: Low (0.66-1), Medium (0.33-0.66), or High (0.0-0.33)
- Criteria evaluated for each life stage (adults, juveniles) were only evaluated during the time period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

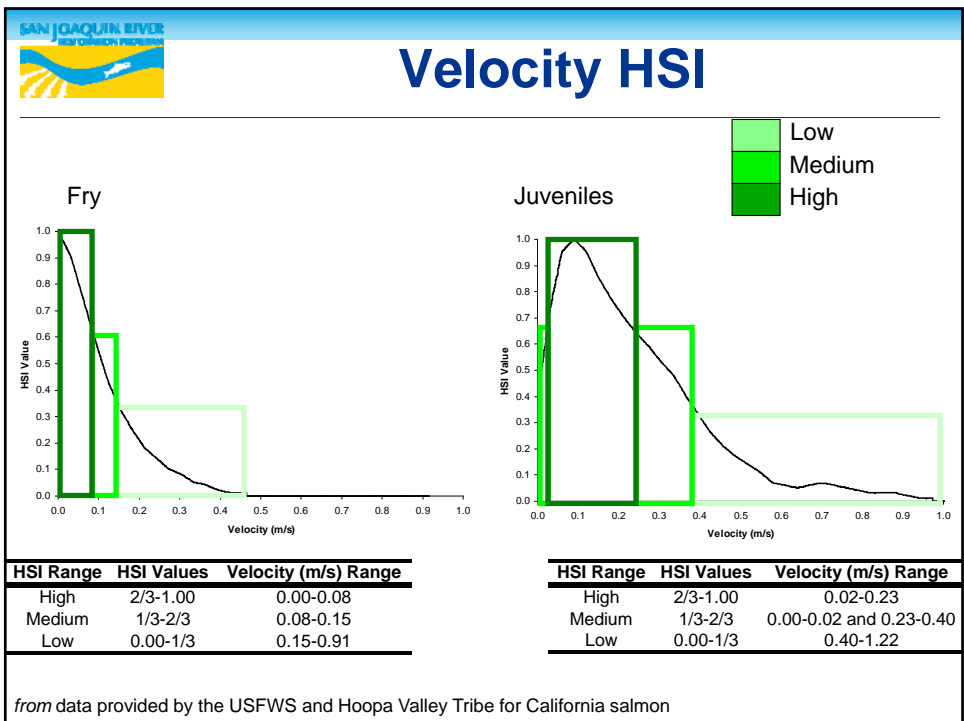
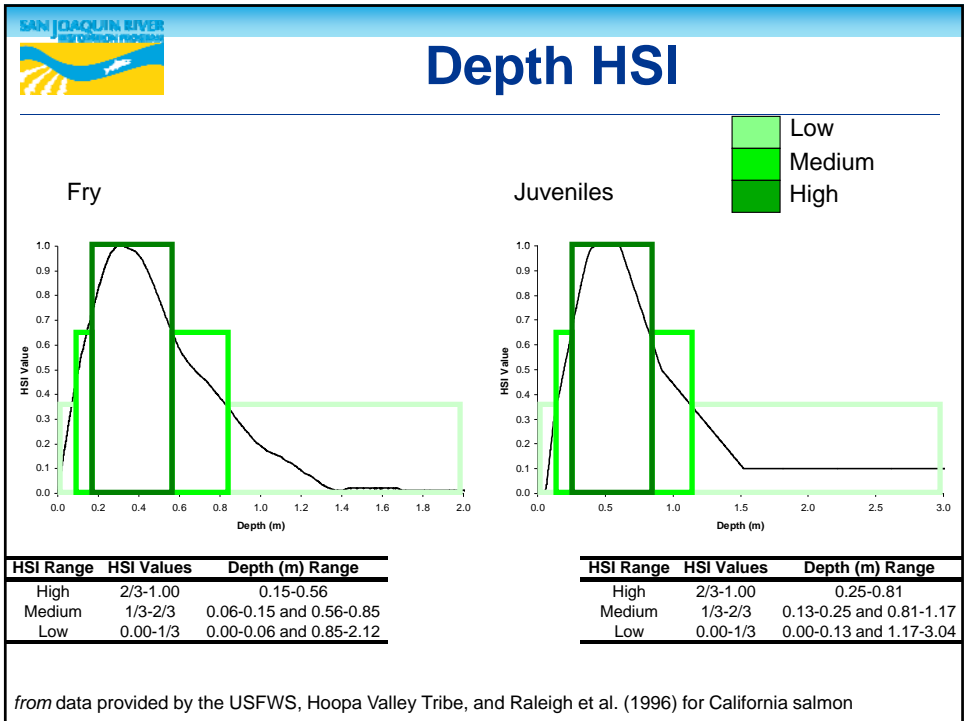
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49



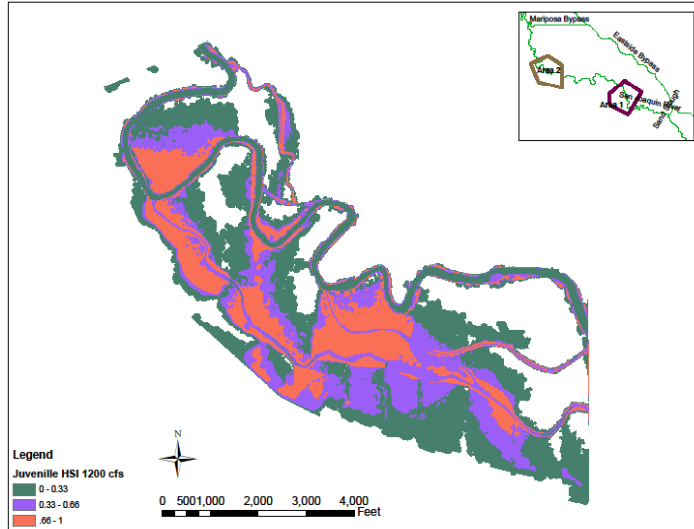
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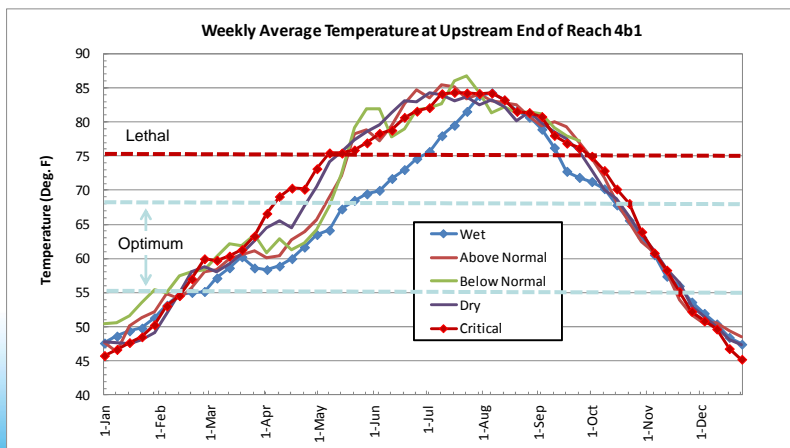


# Habitat Suitability at 1200 cfs

Alternative 1 Option D




# Temperature Suitability



Evaluation Criteria				Lifestage	Alternative 1		Alternative 2		Alternative 3		Alternative 4		
					B	C	D	A	A	A	B	C	
Fisheries	Predation Issues	Large pools in channel or near structures	Number of pools with average depth > 1.5 m	Juvenile									
			Adequate pool and channel depths	Adults: Habitat area with depths < 1.0 ft	Adults								
			Juveniles: Habitat area with depths < 0.5 ft	Juveniles									
	Passage Issues (Adults and Juveniles)	River channel and bypass channel flow	Adults: Habitat area with velocities > 6.0 ft/sec	Adults									
			Obstructions to migration	Adults: Number of obstructions (culverts, fish ladders, or chutes)	Adults								
			Juveniles: Number of obstructions (ag pump or diversion, culverts, structure that creates a scour pool)	Juveniles									
			Water quality barriers	If any part of reach has dissolved oxygen less than 4.5 mg/l or temps > 70°F then reach is total barrier (Low), DO 4.5-5.0 mg/l or temps between 66 and 70°F partial barrier (Medium), DO > 5 mg/L or temps < 66°F then suitable for passage (High).	Adults								
Fisheries	Habitat Complexity	Hydraulic jumps/Vertical Barriers	The number of potential vertical barriers, defined as a change in elevation > 1 ft and a jump pool depth of < 1.5 times jump height or < 2 ft.	Adults									
			Acreage of riparian vegetation	Acreage of riparian buffer (30 m from waterline) with at least 80% vegetated	Juveniles								
Fisheries	Habitat Complexity	Quantity of floodplain rearing habitat	Acreage of floodplain habitat with inundation more than 6" for at least two weeks	Juveniles									
			Quality of floodplain rearing habitat	Quality of floodplain cover (grass, trees, woody debris)	Juveniles								
			Percent of substrate designated as fines	Juveniles									
			Quantity and quality of instream rearing habitat	Fry: Total Annualized habitat area for Fry	Fry Juveniles								
	Water Quality	Temperature	Juveniles: Total Annualized habitat area for Juveniles	Juveniles	Juveniles								
Adults: High: If zero flows splits occur early (during September) during adult migration when high water temperatures can have deleterious effects, Medium: if one flow split, Low: if two flow splits.				Adults									
Juveniles: High: If zero flows splits occur late (during June/July) during juvenile emigration when high water temperatures can have deleterious effects, Medium: if one flow split, Low: if two flow splits.				Juveniles									
Fisheries	Water Quality	Relative Pesticide concentration	The number of agricultural returns	Both									

**Legend:**  
■ = High    ■ = Medium    ■ = Low



## Evaluation Results

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### 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.

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58



## 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.

59

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## 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 choose the flow path through the bypass system from the Eastside Bypass to the Mariposa Bypass.

60

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## 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.

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61



## 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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62



## Reach 4B Initial Alternatives

Channel/ Structure	Initial Alternative 1 Main Channel Restoration	Initial Alternative 2 Bypass Restoration	Initial Alternative 3 Bypass All Pulse Flows	Initial Alternative 4 Split Pulse Flows and Restore Both
San Joaquin River Flows	Up to 4,500 cfs (all Restoration Flows)	At least 475 cfs of Flood Flows	Restoration Flows of at least 475 cfs	Base and fall pulse flows; some spring pulse flows
Bypass System Flows	Flood flows greater than 4,500 cfs	All flows up to capacity	Flow greater than 475 cfs	Flow greater than Reach 4B capacity
Fish Routing	SJR	Eastside Bypass Reach 2, Mariposa Bypass	SJR, Eastside Bypass Reaches 2 and 3	SJR, Eastside Bypass Reach 2, Mariposa Bypass
Habitat	SJR	Bypass	SJR and Bypass	SJR and Bypass
Reach 4B Headgates	Remove Headgate	Simple Gate	Construct gates and roughened channel fishway	Construct gates and roughened channel fishway
Eastside Bypass Control Structure	No Change	No Change	Fish Passage	No Change
Mariposa Bypass Control Structure	No Change	Notch Center Bays	No Change	Notch Center Bays
Mariposa Drop Structure	No Change	Remove Drop Structure	No Change	Fish Passage
Reach 4B1 Levee Alignment Options	B, C, D	A	A	A (Removed B & C)
Eastside Bypass Levee Alignment Options	None	New Levee Setbacks	None	None

63

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## Agenda

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

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64





## Next Steps

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- 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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65



## Agenda

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- General Program Update
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66



## Contact Information

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67