# Restoration Goal Technical Feedback

San Joaquin River Restoration Program

July 21, 2009

CSU Stanislaus, Turlock, CA

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## Agenda

- Introductions
- Program Background
- Scope of Technical Feedback Meetings
- Channel Capacity Evaluations
  - Analytical Tools
  - Interim Flow Water Year 2010
  - Program Document
  - Long-Term Implementation
- Next Meeting

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## Introductions

- Name
- Agency or Affiliation

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## Settlement Background

| | |
|---|---|
| 1988 | Lawsuit filed challenging Reclamation's renewal of the long-term contracts with Friant Division contractors |
| 2004 | Federal Judge rules Reclamation violated Section 5937 of the Fish and Game Code |
| 2005 | Settlement negotiations reinitiated to avoid remedy phase |
| 2006 | Settlement Agreement reached, implementation begins |
| 2009 | Federal legislation enacted |

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## Settlement Goals

- Restoration Goal
  - To restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.
- Water Management Goal
  - To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

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## Settlement Milestones

| | |
|---|---|
| Immediately | Planning, design work, and environmental reviews |
| Oct 2009 | Interim Flows begin |
| 2012 | Salmon re-introduction begins |
| 2013 | First Phase of channel and habitat improvements completed |
| 2014 | Full Restoration Flows initiated |
| 2016 | Second Phase of channel and habitat improvements completed |

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## Implementing Agencies

- Federal Agencies:
  - Bureau of Reclamation
  - Fish and Wildlife Service
  - National Marine Fisheries Service
- State Agencies:
  - Department of Water Resources
  - Department of Fish and Game

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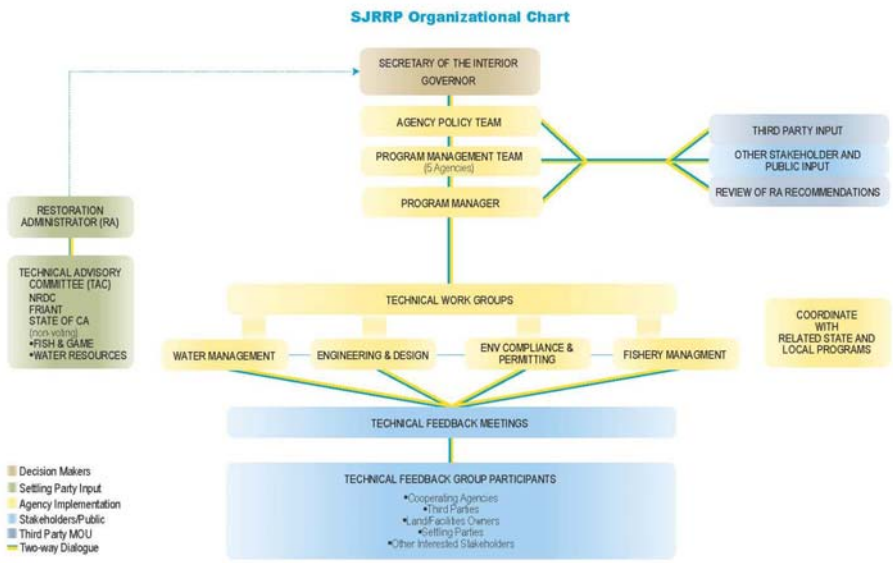
## Technical Feedback Meetings



## Restoration Goal Technical Feedback Meeting Scope

- Flow Management
  - Operations
  - Analyses and Assumptions
  - Monitoring
- Channel Improvement Projects
  - Alternatives Development
  - Analyses and Assumptions
  - Impact Assessments
- General Program Information and Updates

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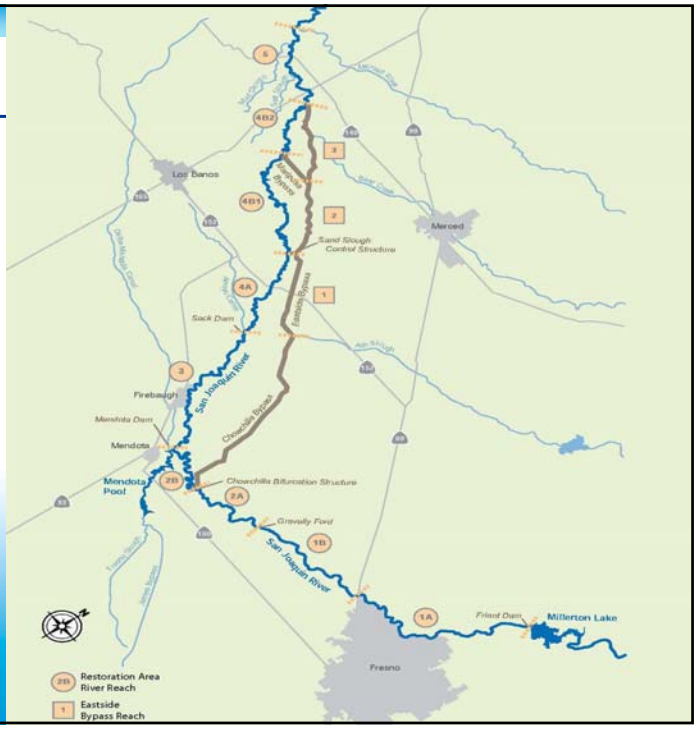
## Restoration Area



## Flow Management

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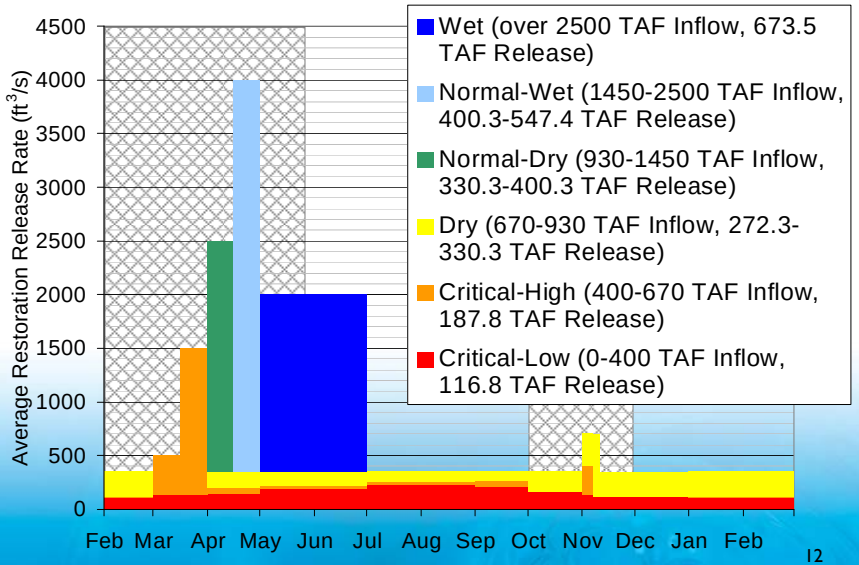
## Restoration Releases at Friant Dam

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## Channel Capacity Improvements

- Assumed Capacity Limitations
  - Reach 2B: 1,300 $ft^3/s$
  - Reach 4B: unknown capacity
- Specified Improvement Projects
  - Reach 2B Phase 1: 4,500 $ft^3/s$
  - Reach 4B1 Phase 1: 475 $ft^3/s$
  - Reach 4B1 Phase 2: Potentially 4,500 $ft^3/s$
- The PEIS/R will identify other constraints.

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## Major Flow Management Objectives

- Non-Damaging Flows (Today)
- Other Objectives
  - Temperature
  - Vegetation
  - Spawning Gravel Quality
  - Geomorphic Processes

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## Flow Management: Non-Damaging Flows

- Objective: avoid adverse impacts
  - Direct Inundation
  - Indirect Inundation
  - Shallow Groundwater Tables
- Indicators
  - Water Surface Elevation
  - Groundwater Elevation
- Thresholds
  - Discharge and Duration

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## WY2010 Analytical Tools

- Historical Experience: landowner accounts and measurements of past conditions
- HEC-RAS: additional one-dimensional (1D) water surface elevation and inundation
- SRH-2D: testing of 1D parameterization
- MOD-FLOW: ground and surface water interactions from the Background Report

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## Conceptual Model

- Non-Damaging Flow
- Routing Path
- Roughness
- Infiltration
- Attenuation
- Seepage and Levee Stability

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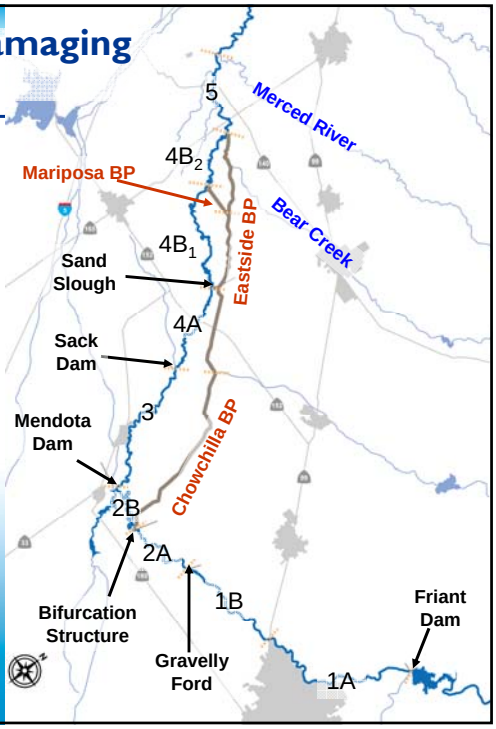
## Assumed Non-damaging Flow Capacities

- Reach 1: >8,000 $ft^3/s$
- Reach 2A: >8,000 $ft^3/s$
- Chowchilla: >5,500 $ft^3/s$
- Reach 2B: 1,300 $ft^3/s$
- Reach 3: 1,300 $ft^3/s$
- Reach 4A: 3,300 $ft^3/s$
- Eastside: >8,000 $ft^3/s$
- Reach 4B1: ? $ft^3/s$
- Reach 4B2: 7,000 $ft^3/s$
- Reach 5: >8,000 $ft^3/s$



## System Response

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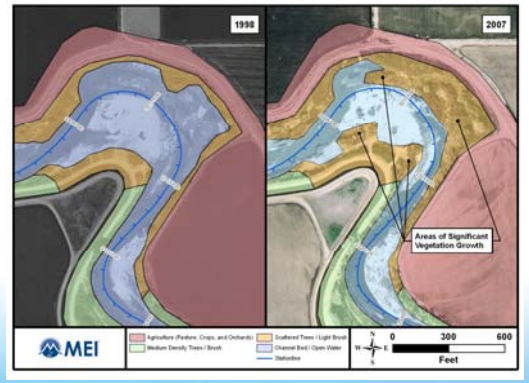
## Hydraulic Roughness

- Existing Conditions
  - Roughness polygons updated with 2007 mapping

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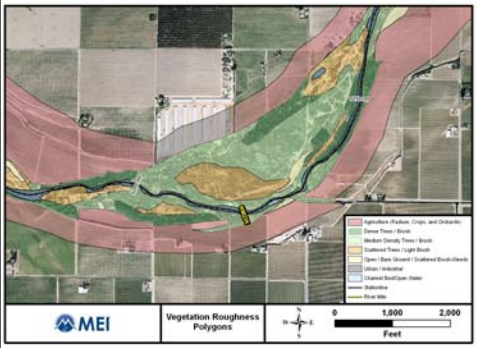
# Hydraulic Roughness




| Base n-values | |
|---|---|
| Roughness Description | Manning's n |
| Agriculture (pasture, crops, and orchards) | 0.045 |
| Dense trees / brush | 0.100 |
| Medium density trees / brush | 0.080 |
| Scattered trees / light brush | 0.060 |
| Open / bare ground / scattered brush-weeds | 0.045 |
| Urban / industrial | 0.080 |
| Channel bed / open water | 0.035 |

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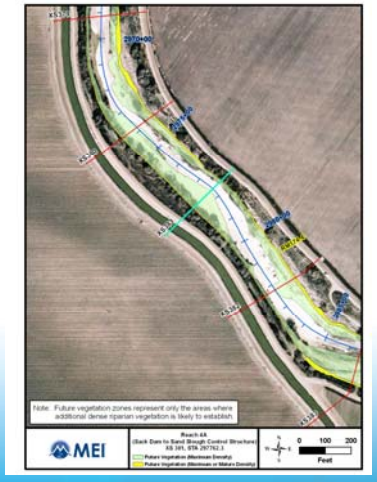
# Hydraulic Roughness




| Future Vegetation Roughness | |
|---|---|
| Roughness Description | Manning's n |
| Existing channel areas inundated by the 350-cfs Friant release | 0.035 |
| Overbank areas inundated by groundwater at the 350-cfs Friant release | 0.050 |
| Worst-case condition (maximum density) riparian vegetation | 0.200 |
| Mature condition (slightly lesser density) riparian vegetation | 0.100 |

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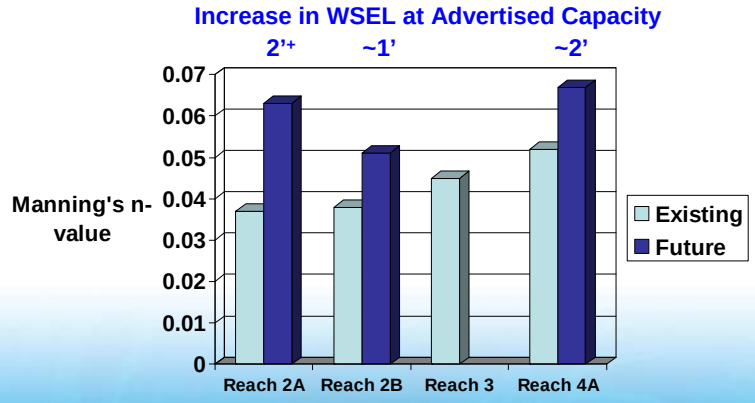
# Hydraulic Roughness
# Future Vegetation – Initial Test

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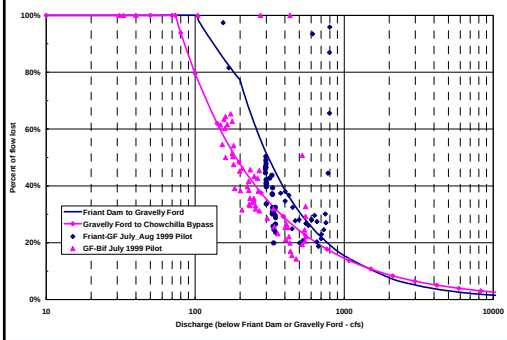
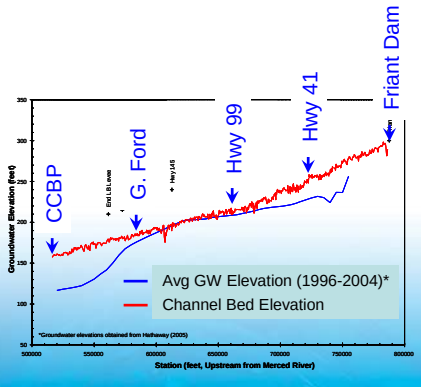
# Infiltration

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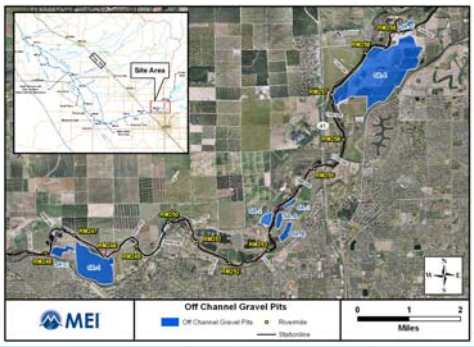
# Storage




**Modeled Storage Areas.**

| Storage Area | River Mile | Surface Area (acres) | Inlet Weir Elevation NGVD29 | Inlet Weir Length (ft) |
|---|---|---|---|---|
| SA-1 | 248.2 | 254 | 234 | 400 |
| SA-2 | 253.8 | 30 | 248 | 100 |
| SA-3 | 254.1 | 10 | 246 | 300 |
| SA-4 | 258.3 | 250 | 273 | 805 |
| SA-A | 253.7 | 20 | 248 | 170 |
| SA-B | 253.7 | 32 | 254 | 100 |
| SA-C | 246.1 | 36 | 228 | 200 |
| SA-D | 259.0 | 18 | 269 | 80 |

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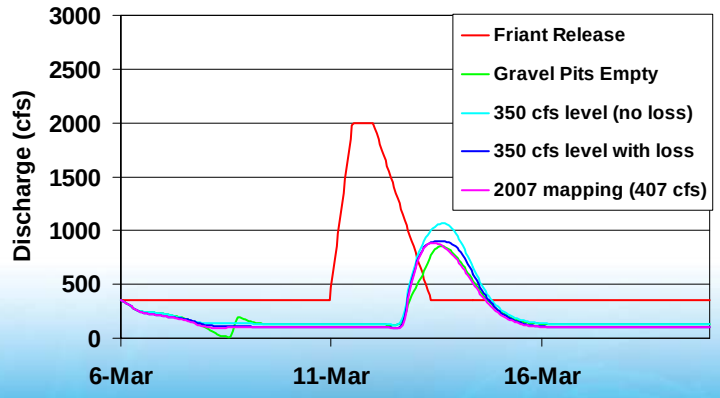
# Storage and Attenuation

**Friant Release: 12 hrs @ 2,000 cfs**

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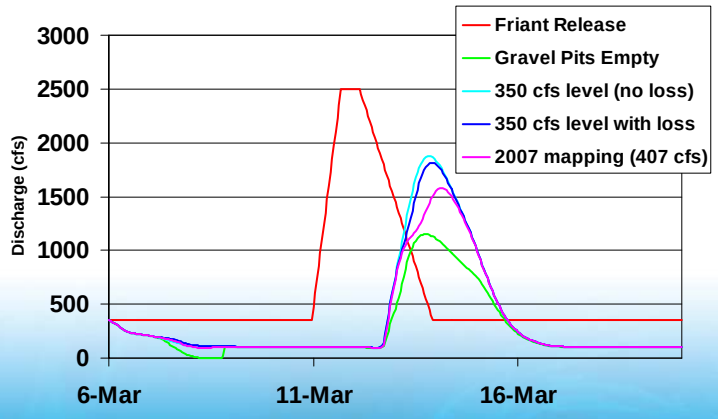
## Storage and Attenuation

**Friant Release: 12 hrs @ 2,500 cfs**

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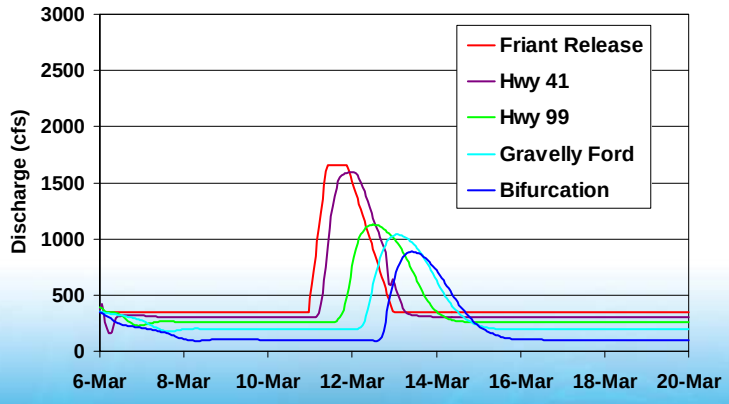
## Storage and Attenuation

**Friant Release: 12 hrs @ 1,660 cfs**
**Gravel pit levels in 2007 mapping**

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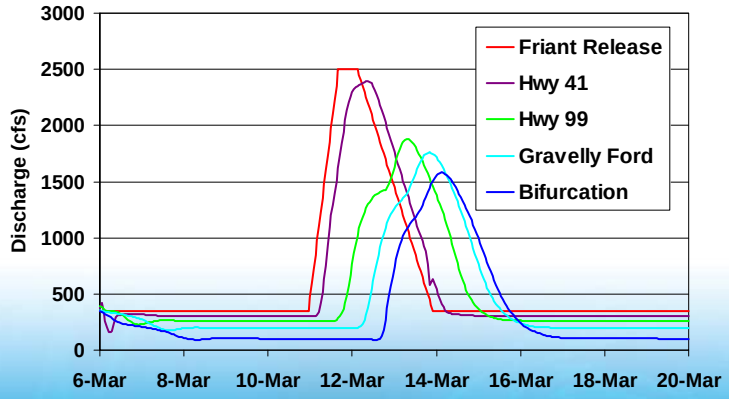
## Storage and Attenuation

**Friant Release: 12 hrs @ 2,500 cfs**
**Gravel pit levels in 2007 mapping**

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## Interim Flows Project Description

- Purpose is " . . . to collect relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture and reuse"
- Water Year 2010
  - October 1 to November 20, 2009
    - Approx max release of 700 cfs at Friant Dam
  - February 1 to September 30, 2010
    - Approx max release of 1,660 cfs at Friant Dam
- Flows based on water year type, downstream channel capacity, potential seepage impacts, and consistent with all necessary permits and agreements
- No flows in Reach 4B1

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## Criteria for WY2010 Interim Flows

- No Significant Impact
- Maximize Releases
- Maximize Data Collection
- Test Operations
- Facilitate Experimental Design

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## Assumed Non-damaging Flow Capacities and Flow Routing

<table>
<tr><th>River Route</th><th>Mariposa Route</th><th>Eastside Route</th><th>Chowchilla Route</th><th>Chow. – Marip.</th></tr>
<tr><td colspan="5">Reach 5 (>8,000 ft$^3$/s)</td></tr>
<tr><td colspan="2">4B$_2$ (7,000 ft$^3$/s)</td><td rowspan="2">Eastside<br>(>8,000 ft$^3$/s)</td><td colspan="2">4B$_2$ (7,000 ft$^3$/s)</td></tr>
<tr><td rowspan="2">4B$_1$<br>(? ft$^3$/s)</td><td>Mariposa<br>(>8,000 ft$^3$/s)</td><td colspan="2">Mariposa<br>(>8,000 ft$^3$/s)</td></tr>
<tr><td colspan="3">Eastside (>8,000 ft$^3$/s)</td></tr>
<tr><td colspan="2">Reach 4A (3,300 ft$^3$/s)</td><td colspan="3" rowspan="3">Chowchilla<br>(5,500 ft$^3$/s)</td></tr>
<tr><td colspan="2">Reach 3 (1,300 ft$^3$/s)</td></tr>
<tr><td colspan="2">2B (1,300 ft$^3$/s)</td></tr>
<tr><td colspan="5">Reach 2A (>8,000 ft$^3$/s)</td></tr>
<tr><td colspan="5">Reach 1 (>8,000 ft$^3$/s)</td></tr>
</table>

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## Routing WY2010 Interim Flows

- Reach 2B (No Chowchilla Bypass)
  - Levee District Operations
  - Flow Target Tests
  - Seepage Management Tests
  - Temperature Tests
  - Recapture Opportunity Tests
  - Collect Site-Specific Project Data
- Eastside Bypass (No Reach 4B)

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## Maximum Release WY2010 Interim Flows

- Roughness: Anecdotal accounts of damaging flow rates identified a 1,300 cfs limit in Reach 2B.
- Seepage Losses: the Background Report identified steady state losses that would permit a 1,660 cfs release at Friant for 1,300 cfs at Reach 2B.
- Attenuation: not included
  - Sensitivity to Antecedent Conditions
  - Limited Calibration Data
  - Uncertainty in Other Parameters

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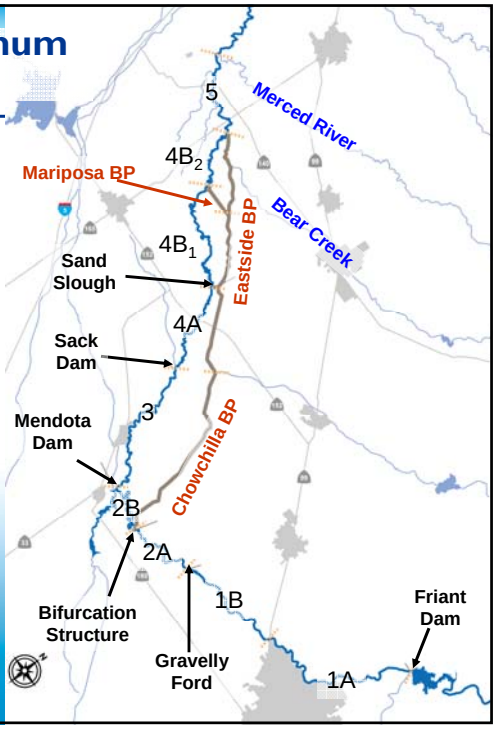
## Estimated Maximum Interim Flows

- Reach 1: >1,660 $ft^3/s$
- Reach 2A: >1,475 $ft^3/s$
- Reach 2B: 1,300 $ft^3/s$
- Chowchilla: 0
- Reach 3: 1,300 $ft^3/s$
- Reach 4A: 1,300 $ft^3/s$
- Reach $4B_1$: 0
- Eastside: 1,300 $ft^3/s$
- Reach $4B_2$: 1,300 $ft^3/s$
- Reach 5: 1,300 $ft^3/s$




## Monitoring WY2010 Interim Flows

- Water Surface
  - Flow Gages
  - Stage Recorders
  - Field Measurements
- Groundwater Wells
- Water Quality
- Sediment Transport
- Levee Patrols

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## Implementation of Restoration Flows

- Reclamation identifies operating limits and criteria.
- A Technical Advisory Committee assists a Restoration Administrator to recommend release schedules.
- Reclamation operates Friant Dam, monitors performance, performs analyses, and reports results.
- The RA provides recommendations on how to improve operating criteria.
- Public involvement and feedback on changes to criteria and operating limits.

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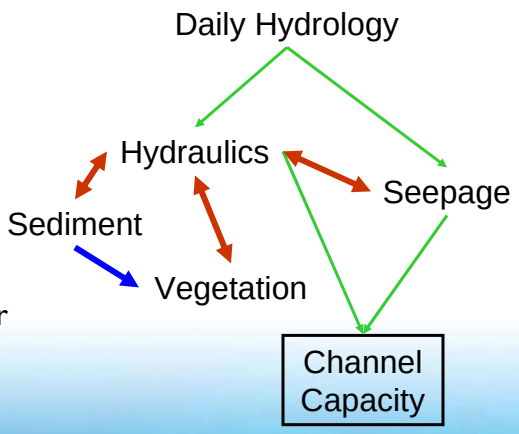
## Channel Capacity Tools and Analysis

- HEC-RAS: 1D water surface
- SRH-2D: 2D water surface
- SRH-1D: mobile boundary
- SRH-1DV: vegetation growth and mortality
- MOD-FLOW: groundwater
- HEC-5Q: water temperatures

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## Needs for Moving Forward

- Development of Conceptual Models
- Hypotheses to Improve Operations
- Prioritizing Tests
- Interpretation of Results
- Improving Analytic Tools

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## Program Update – PEIS/R

- Draft PEIS/R
  - Focuses on analysis of direct, indirect, and cumulative impacts of implementing the Program
  - Late summer / Fall 2009
- Final PEIS/R
  - Response to comments on Draft and any updates/revisions
  - Late 2009
- Record of Decision/Notice of Determination
  - Early 2010

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## Program Update – Interim Flows

- Draft EA/IS
  - Comment period closed Monday, July 20
- Final EA/IS
  - Mid-September 2009
- Flow Releases
  - October 1 to November 20, 2009
    - Approx max release of 700 cfs at Friant Dam
  - February 1 to September 30, 2010
    - Approx max release of 1,660 cfs at Friant Dam

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## Program Update – Phase 1 Projects

- Mendota Pool Bypass / Reach 2B Channel Improvements
  - NOI / NOP released on July 13
  - Scoping meetings on July 28 and 29
    - July 28, 6-8 PM, Piccadilly Inn Shaw, Fresno
    - July 29, 6-8 PM, Firebaugh City Council Chambers, Firebaugh
  - Comments due August 17, 2009
- Reach 4B, Eastside Bypass and Mariposa Bypass Low-flow Channel and Structural Improvements
  - NOI / NOP scheduled for release in mid-August

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## Next Meeting

- Early September
- Potential Future Meeting Topics
  - Operations ?
  - Sediment ?
  - Seepage ?
  - Temperature ?
  - Vegetation ?

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## Phase 1 Channel Improvements

- Mendota Pool Bypass / Reach 2B Channel Improvements
- Reach 4B, Eastside Bypass and Mariposa Bypass Low-flow Channel and Structural Improvements
- Arroyo Canal Fish Screen and Sack Dam Fish Passage
- Mud and Salt Slough Seasonal Barriers

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