Yolo Bypass Salmonid Habitat Restoration & Fish Passage

Yolo Bypass Fishery Enhancement Planning Team
January 27, 2015

State of California
Department of Water Resources

U.S. Department of the Interior
Bureau of Reclamation
Presentation Overview

• Reclamation’s Value Planning Study Process & Recommendations

• Yolo Bypass Planning & Environmental Compliance Process Updates
  – Technical Team and Modeling Updates
Reclamation’s Value Program

Purpose:

• Make good projects better and save taxpayer dollars
• Inject stakeholder input and creativity into the design process
• Satisfy Public Law, OMB, and DOI Requirements
  – “Ultimate goal is the acquisition of the most functionally effective assets, products, and programs at initial and life-cycle costs that provide best value to the government.” DOI DM 369-1
  – “Improving performance, reliability, quality, safety, and life cycle costs.” Public Law 104-106
Value Analysis Strives To:

- Maximize project value
- Minimize life-cycle costs
- Improve alternatives
- Focus on the big picture
- Challenge paradigms
- **Enhance understanding of project**
- Inspire change
- Drive innovation
- **Build consensus with partners**

Value Analysis Is **Not**:

- An audit
- Cost cutting
- Quality reduction
- Quality control
- Peer review or check of the design
- **Final decision on project direction**

1/27/2015
Value Planning Study

• Limited-duration exercise
  – Presentation: September 4, 2014
• Facilitated by Reclamation
• 20+ Participants:
  – Biologists
  – Reclamation Districts
  – Yolo County
  – Flood Planning
  – Property Owners
  – Duck Club Owners
  – USACE
  – DWR Flood Management
  – Water Contractors
  – Wildlife Area Managers
  – Hydrology Modelers

• Since completing the Value Planning process, participants have continued to meet independently to refine concepts
Value Planning Participants Recommendations
Technical Team Updates:

- Hydrology
- Fish Benefits/Behavior Modeling
- Terrestrial Surveys
- Agricultural Impacts
Hydrodynamic Modeling

- TuFlow Classic Modeling Results Used for:
  - Agricultural Economic Impact Analysis
  - Fisheries Benefits Model
  - Waterfowl Impact Analysis
  - Mercury Model
Model Simulations

- **Simulation period**
  - Water years 1997 through 2012 (Oct. – May/June)

- **Gate operations**
  - Gates used to limit inflow to 6,000 cfs during project period and to shut flow during non-project periods
  - Gates open during natural Fremont Weir overtopping events
  - Five gate closure dates evaluated:
    - February 15
    - March 1
    - March 15
    - March 31
    - April 30

- **Currently under peer review by Yolo County**
Main Channel Dimensions

Small Channel with one to three 30ft. wide gates:
- Length: 133ft.
- Width: 20ft.
- Depth: 18ft.

Medium Channel with six 30ft. wide gates:
- Length: 320ft.
- Width: 225ft.
- Depth: 14.5ft.

Large Channel with six 30ft. wide gates:
- Length: 338ft.
- Width: 225ft.
- Depth: 18ft.
STAGE VS. VELOCITY RATING CURVES OF FREMONT WEIR INUNDATION CHANNELS

Max Sturgeon Passable Velocity

SACRAMENTO RIVER STAGE (FT)

VELOCITY THROUGH CHANNEL/GATES (FT/S)
Inundation is Unique Each Year

**Water Year 2004**

- More Flow From Tributaries Than Fremont Weir
- Increased Draw-down Time

**Water Year 2002**

- Not Much Change In Wetted Days

*Preliminary Results*
**Average Difference in Annual Wetted Days:**
Existing Conditions vs. **Large Fremont Weir Alternative**

- Lowest elevation areas experience the biggest changes
- Yolo Bypass changes:
  - 3 to 4 week increase in the north
  - 2 to 3 week increase in the south
- Sutter Bypass changes:
  - 3 to 7 day decrease
Average Difference in Annual Wetted Days: Existing Conditions vs. Small Fremont Weir Alternative

- Fewer wetted days compared to Large Fremont Weir Alternative
- Yolo Bypass changes:
  - 2 to 3 week increase in the north
  - 1 to 2 week increase in the south
- Sutter Bypass changes:
  - Less than 3-day decrease
Acres Wetted in 67% of Years
From Nov 1 - May 30

*Preliminary Results

Duration (days)

Acres Wetted

1/27/2015

Preliminary Draft for Deliberative Purposes
Only
Evaluation of Fisheries Benefits

RPA Action 1.6.1 Juvenile Rearing
- Yolo Bypass Fish Production Model
- Fremont Weir Telemetry Study
- ELAM Behavioral Model

RPA Action 1.7 Adult Fish Passage
- Adult Fish Passage Evaluation Spreadsheet Tool
- Historical Adult Stranding Documentation
Yolo Bypass Fish Production Model

Modeled Demographics
- Emigration Timing
- Fish Size
- Initial Abundance

Result Metrics
- % Entrainment
- Rearing Survival
- Rearing Sac River
- Size at Ocean Entry
- Abundance at Ocean Entry
- Ocean Survival

% Entrainment
- Survival
- Migration Rate
- Growth
- Capacity

Emigration
- Survival
- Migration Rate
- Growth

Ocean Residence
- Survival

Upstream Migration
- % Successful Passage

Model Entry
- Yolo Entrainment
- Rearing Yolo Bypass
- Rearing Sac River

Escapement
Yolo Bypass Fish Production Model
Initial Results for Water Year 2000

Increase in Winter-Run *Entrainment*

Increase in Winter-Run *Escapement*
Fremont Weir Telemetry Study

- Track movement of winter-run Chinook juveniles along Fremont Weir
- Describe cross-channel distribution
- Compare movement to larger late fall-run Chinook
- Incorporate data into behavioral model
ELAM Behavioral Model
(Eularian-Lagrangian-Agent Method)

- Predicts individual fish response to various stimuli
- Used in Columbia River to evaluate dams and intake configurations
- Utility to our process:
  - Optimize notch configuration for juvenile entrainment
  - Reduce uncertainty in “proportion of flow” assumption
Adult Fish Passage Evaluation Tool
Example Output: (Sturgeon; Oct-May)

<table>
<thead>
<tr>
<th>Sturgeon Passage Criteria</th>
<th>User Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Depth (ft)</td>
<td>3.0</td>
</tr>
<tr>
<td>Velocity Min (fps)</td>
<td>0.0</td>
</tr>
<tr>
<td>Velocity Max (fps)</td>
<td>8.0</td>
</tr>
<tr>
<td>Slot Height (ft)</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Sturgeon Passage by Notch Size**

- Existing Condition: 0%
- Small Notch: 75%
- Medium Notch: 37%
- Large Notch: 69%
Adult Fish Passage Evaluation Tool

Example Output: (Sturgeon Oct-May)

Reasons for Sturgeon Passage Failure

- Small Notch: 6% Tule Canal Velocity, 19% Tule Canal Depth, 0% Gate Velocity, 0% Gate Depth
- Medium Notch: 45% Tule Canal Velocity, 0% Tule Canal Depth, 16% Gate Velocity, 3% Gate Depth
- Large Notch: 0% Tule Canal Velocity, 0% Tule Canal Depth, 24% Gate Velocity, 7% Gate Depth
Compile Historic Stranding Information

- Working with DFW to characterize past stranding events
- Link past stranding events to available hydrologic data
- Identify if proposed alternatives would have reduced stranding
Working With Landowners for Access

• Temporary Entry Permit (TEP)
  – Required for access environmental surveys (biological, cultural, engineering geology, and land surveying)

• Landowner Communication
  – DWR staff contacts landowners prior to submitting TEP request
  – Prior to surveys, DWR contacts owners to avoid conflicts with existing land practices

• After Field Surveys
  – If property damaged DWR resolves issues with owner
  – Special-status species observed during surveys are reported in CA Natural Diversity Database (CNDDB) but not by parcel number
2014 Terrestrial Surveys

Fremont Weir Wildlife Area

• Habitat Assessments:
  • Giant garter snake, Western pond turtle, bats, Valley elderberry longhorn beetle

• Botanical Surveys:
  • Late season sensitive species
  • Vegetation class mapping

• Cultural Resources

Agricultural Crossings 1-3

• Land Surveying:
  • Work started in November 2014. Will be completed in 2015.
2015 Terrestrial Surveys

Fremont Weir Wildlife Area
Lisbon and Wallace weirs
Tule Canal ag crossings sites (4)

- **Habitat Assessments:**
  - Giant garter snake, Western pond turtle, bats, Valley elderberry longhorn beetle

- **Botanical Surveys:**
  - Sensitive species
  - Vegetation class mapping

- **Avian Surveys:**
  - Sensitive species

- **Cultural Resources**
- **Land Surveying**
Agricultural Impacts Analysis