Agricultural Impacts Analysis of Proposals to Increase Flooding in the Yolo Bypass for Juvenile Salmon and Other Fish Species

Richard Howitt, UC Davis
Duncan MacEwan, UC Davis
Petrea Marchand, Yolo County
Doug Brown, Douglas Environmental

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Outline

• Why agricultural losses matter
• Scenarios
• Crop maps
• Crop yields/sub-regions
• Inundation maps
• Crop prices
• Models
• Results
Why Yolo Agricultural Losses Matter

• History
  – Long-standing policy to preserve agriculture
  – Financial sacrifices

• Local economy losses
  – Direct
  – Indirect

• Flood management
Scenarios

• **2** proposals to increase Yolo Bypass flooding:
  – BDCP Conservation Measure 2
  – Biological Opinion Reasonable and Prudent Alternative

• **5** flooding end dates for Biological Opinion scenarios: February 15th, March 24th, April 10th, April 30th, May 15th

• **1** BDCP Conservation Measure 2 scenario: No dry year flooding and 30-day natural flooding extension

• **2** flow rates: 3,000 cfs and 6,000 cfs
Yolo Bypass Crops: Overview

• Covers 2005-2009
• Best data available
• Representative of Bypass variation:
  – Covers high and low crop prices
  – Covers wet and dry years
  – Covers years the Fremont Weir did and did not overtop
Crop Data: Key Findings

• Rice and processing tomatoes highest acreage, as well as highest value crops
• Other crops are wild rice, corn, safflower, sunflower, pasture, and vine seed
• Fallow land decreases significantly in years there is no flooding and high prices
• Significant wetlands acreage
Yield

- No difference in east and west side regions with no flooding
- Different drainage times affect yields when flooding occurs
- Significant changes between north and south regions
- Significant changes by year
- Gradual decrease until planting not feasible
- Used average across 5 years for each region
## Average Rice Yield by Region & Flooding Date (tons per acre)

<table>
<thead>
<tr>
<th>Region</th>
<th>Feb 15</th>
<th>Mar 24</th>
<th>Apr 10</th>
<th>May 15</th>
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<tbody>
<tr>
<td>1</td>
<td>4.14</td>
<td>3.19</td>
<td>1.08</td>
<td>0.01</td>
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<tr>
<td>2</td>
<td>4.15</td>
<td>3.98</td>
<td>2.88</td>
<td>0.09</td>
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<td>3.20</td>
<td>1.09</td>
<td>0.01</td>
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<td>1.14</td>
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<td>6</td>
<td>3.74</td>
<td>3.42</td>
<td>2.41</td>
<td>0.21</td>
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</tbody>
</table>
Flooding Footprints

- Footprints based on HEC-RAS model
- Partially inundated fields will not be planted
  - 20% or more flooded for rice fields
  - 30% or more flooded for other row crops
- 3,000 cfs = 11,800 acres
- 6,000 cfs = 25,100 acres
- Reviewing MIKE-21 model
Field Inundation - 3,000 Cubic Feet per Second
Field Inundation – 6,000 Cubic Feet per Second
“Natural” Flooding

- Analysis accounts for natural flooding
- Weir overtopped in 15 of the 26 years
- End date range: January 10 to May 24
- Variation in flooding patterns
  - Example: Overtopping for only 3 days ending May 24 in 2005
  - Example: Almost continuous overtopping through May 5 in 2006
Crop Prices: Overview

- Price data from Yolo County Agricultural Commissioner reports
- No consensus on expected crop prices
- Analysis uses a 2009-2010 price average:
  - Representative of historical average
  - Excludes 2008 and 2011 price spikes
- Adjusted to 2008 $ for comparison
- Performed sensitivity analysis
Rice and Corn Prices: 1992-2012
Modeling Approach

- Data-driven analysis
- HEC-RAS Model (Hydrologic)
- DAYCENT Model (Agronomic)
- Bypass Production Model (BPM) (Economic)
- IMPLAN I/O Model (Regional Effects)
Job Losses with 3,000 cfs

Job Losses with 6,000 cfs
Conclusion

• The model framework is flexible and can be used to evaluate future Yolo Bypass proposals

• Many variables influence farmers’ decisions to plant crops if managed flooding is proposed

• Later flooding translates into increased losses

• Avoidance of flooding during dry years significantly reduces losses

• Unconstrained flooding has significantly higher losses than constrained flooding
Questions?