Assessing Potential Recreation and Open Space Benefits in the Central Valley of California for the Central Valley Flood Protection Plan

Building Community Resilience through Action

Floodplain Management Association
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Introduction and Background

- 2012 Central Valley Flood Protection Plan (CVFPP); the 2017 CVFPP Update
- Basin-wide Feasibility Studies (BWFS)
- BWFS Technical Studies for the Yolo Bypass
Today’s Discussion

• **Introduction and Background**
  - What are the CVFPP and BWFS?
  - BWFS Technical Studies for the Yolo Bypass

• **Methodology**
  - Recreation Benefits
  - Open Space (Aesthetic) Benefits

• **Results**
  - Sacramento River Basin: Yolo Bypass
    - Recreation Benefits
    - Open Space (Aesthetic) Benefits
A Stressed System, the Need for Action

- Central Valley people, property and assets at risk
- Current flood risk management path unsustainable
- Lack of funding for capital works and for ongoing operations and maintenance of existing infrastructure
- In 2008, the Legislature enacted the Central Valley Flood Protection Act, which authorized and required development of the Central Valley Flood Protection Plan (CVFPP) to address these issues
2017 Update to the CVFPP

- CVFPP is a dynamic, programmatic plan, updated in five year cycles – CVFPP first adopted in 2012, first “Update” in 2017
- 2017 Update has same goals as 2012 CVFPP
- The planning horizon is 30 years
- Refines and updates the State Systemwide Investment Approach (SSIA)
- Adds specificity about recommended near and longer-term investment and financing approach
- Provides broad guidance about more resilient risk management
- Coordinated and aligned with other major flood management efforts
Technical Work to Support CVFPP Goals

- Technical analyses informing a reasonable, balanced and cost-effective approach
- Emphasis on sustainable, integrated flood management
- Diverse array of actions to improve flood protection

CVFPP GOALS

Primary Goal: Improve flood risk management
- Reduce the chance of flooding
- Reduce damages once flooding occurs
- Improve public safety, preparedness, and emergency response

Supporting Goals
- Improve Operations and Maintenance
- Promote Ecosystem Functions
- **Promote Multi-benefit Projects**
- Improve Institutional Support
How CVFPP Goals Align With Desired Societal Outcomes

<table>
<thead>
<tr>
<th>CVFPP GOALS</th>
<th>PRIMARY</th>
<th>SUPPORTING</th>
<th>O&amp;M, Ecosystem Institutional, Multi-benefit</th>
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<tr>
<td>SOCIETAL OUTCOMES</td>
<td>Public Safety</td>
<td>Ecosystem Vitality</td>
<td>Economic Stability</td>
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</table>

2017 ROADMAP
Enriching Experiences 
Outcomes

- Provide recreational benefits
- Support societal / aesthetic values
- Provide education and public awareness
- Protect significant farmland
Refine large scale system elements identified in the 2012 CVFPP

Provides planning level information, including an assessment of ecosystem benefits

Inform long-term financing and implementation strategies for the SSIA and the 2017 CVFPP Update
BWFS Technical Studies for the Yolo Bypass

- Included Development of Ecosystem Restoration Concepts for the Yolo Bypass in the Sacramento River Basin

- Assessed multiple configurations to expand the Yolo and Sacramento bypasses and modify the Fremont and Sacramento weirs.

- Supported the selection of the State Recommended Option for the 2017 Update to the CVFPP
Yolo Bypass Illustrative Option

- Bio-diversity in the region is significant. Notice the varying land cover types:
  - Oak Savannah
  - Annual Grassland
  - Freshwater Marsh
  - Seasonal Wetland
  - Riparian Forest
  - Riparian Scrub
  - ...Etc...

- Size: 172,000 total acres of Conservation Easements in the Sacramento Basin – (~20% the size of the State of Rhode Island!)
Methodology

- Literature Review – Recreation Planning
- Pathways
- Recreation Benefits
- Open Space (Aesthetic) Benefits
Recreation Planning in the Central Valley

Extensive History of Recreation Planning for the Central Valley by California Department of Parks and Recreation [also known as California State Parks]:

• California State Parks & The Great Central Valley, 2004

• Central Valley Vision Implementation Plan, 2009

• Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh, 2011

• 2015 California Statewide Comprehensive Outdoor Recreation Plan (SCORP)
Recreation Planning in the Central Valley

• In summary, these documents note that the Central Valley Region is projected to be the fastest-growing region in California, both in nominal and percentage terms.

• The most popular recreation facilities are picnic tables and pavilions, unpaved trails, open space to play, beach or water recreation areas, and scenic observation/wildlife viewing areas.

• The CV Vision Implementation Plan notes that, compared to other California regions, the Central Valley lacks parks for residents and visitors.
DWR’s Handbook for Assessing Value

The Handbook for Assessing Value of State Flood Management Investments (HAV) is a tool for water management:

- HAV is a tool in the broader IWM toolbox to analyze [economic] benefits and costs of proposed water management actions
- Guides DWR Planners in understanding conceptual basis of describing and computing benefits, including Recreation and Open Space
Pathways to Recreation and OS Benefits

- Pathways = Qualitative or quantitative methods used to identify these types of effects
- Goal: Reflect the interdependencies between managing water and land resources for flood mitigation, and the multiple benefits that the public derives from open space aesthetics and recreational uses of those resources
- There were 3 pathways to recreation benefits identified for the CVFPP – but only one had adequate data to be quantified in terms of changes in the monetary values or quantities of recreational visitor-days (e.g., waterfowl hunting, wildlife observation, and fishing)
- There was 1 pathway to open space (aesthetic) benefits identified: A potential increase in nearby private property values due to new or enhanced open space lands being protected in perpetuity.
Methodology – Recreation Benefits

1. Screened concepts for recreation potential
2. Determined the appropriate USFWS National Wildlife Refuge (NWR) Recreational Use Reference Factor (Annual Visitor-Days) based on potential future uses that would not conflict with the primary flood management and ecosystem restoration goals
3. Determined the amount of new recreational acreage for each concept
4. Applied the NWR Reference factor to this new acreage to arrive at the additional annual Recreation Visitor-Days by Yolo Bypass Concept and Configuration
5. Quantified the value of these benefits (relative v absolute)
6. These additional annual Recreation Visitor-Days by Yolo Bypass Concept were used in assessing and comparing the potential recreational benefits across the range of BWFS configurations (alternatives).
Method similar to that in *Amenity Values of Proximity to National Wildlife Refuges* -- found that NWRs are more likely to have an impact if they are located near housing markets where open space is relatively scarce (Taylor et al., 2012).

1. Screened current local government data for those detached, single-family residential parcels:
   - Located within 8 mile buffer of geographic center of an Urbanized Area, as defined by the U.S. Census Bureau as consisting of densely developed territory that contains 50,000 or more people, and
   - Located within 0.5 mile of one of the Yolo Bypass Concepts

2. Applied the median sale price of single-family homes in the City of Woodland, the applicable Urbanized Area, from Zillow (~$309,000 as of June 2015)

3. Applied the resulting aesthetic premium of 4.5 percent (Taylor et al., 2012)
Results

• Recreation Benefits
• Open Space (Aesthetic) Benefits
Potential Additional Annual Recreation Visitor-Days by Yolo Bypass Option

<table>
<thead>
<tr>
<th>BWFS Configuration</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
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</thead>
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<tr>
<td>New Recreation Visitor Days</td>
<td>7,600</td>
<td>7,600</td>
<td>7,600</td>
<td>7,500</td>
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<tr>
<td>Fremont Weir Expansion</td>
<td>3,500</td>
<td>3,500</td>
<td>3,600</td>
<td>3,700</td>
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<tr>
<td>Sacramento Bypass</td>
<td>700</td>
<td>2,900</td>
<td>700</td>
<td>100</td>
</tr>
<tr>
<td>Elkhorn Basin</td>
<td>2,900</td>
<td>2,100</td>
<td>2,900</td>
<td>2,900</td>
</tr>
<tr>
<td>Willow Slough</td>
<td>700</td>
<td>2,100</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Putah Creek</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Lower Yolo Bypass</td>
<td>2,700</td>
<td>2,700</td>
<td>2,700</td>
<td>7,800</td>
</tr>
</tbody>
</table>
## Open Space Benefit Results

<table>
<thead>
<tr>
<th>Yolo Bypass Concepts within 8 Miles of an Urbanized Center</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fremont Weir</strong></td>
<td></td>
</tr>
<tr>
<td>Total detached, single-family homes within 0.5 mile</td>
<td>47</td>
</tr>
<tr>
<td><strong>Elkhorn Basin</strong></td>
<td></td>
</tr>
<tr>
<td>Total detached single-family homes within 0.5 mile</td>
<td>9</td>
</tr>
<tr>
<td><strong>All Communities – Existing Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Total detached single-family homes within 0.5 mile</td>
<td>56</td>
</tr>
</tbody>
</table>
Conclusions

- This recreation benefit assessment is based upon high-level conceptual design and is intended as a starting place for discussions about managing the concepts for recreational uses that are consistent with flood management and ecosystem improvement objectives. As such, the concepts do not include specifics related to access, facilities, management, or programs.

- What the analysis does show is the concepts could make a substantial contribution toward closing the gap between wildlife-related recreation demand and supply in the Central Valley.
The Path Forward

- Need to change how we think about flood risk management
- 2017 Update will refine the 2012 CVFPP and provides a holistic path forward to a different approach
- The refined SSIA enables the State to integrate and prioritize investments in multi-benefit flood risk reduction projects
- CVFPP will take 30 years to implement
Discussion

Questions & Answers

Thank you!

For more information please visit:

http://www.water.ca.gov/cvfmp/
Discussion / Q and A

Thank you!

For more information please visit http://www.water.ca.gov/cvfmp/

Photo Credit: David Feliz
Plan View Design Concepts

(for example/reference/discussion)
SACRAMENTO BYPASS AND WEIR - EXPAND BYPASS AND EXTEND WEIR 1,500 FEET TO THE NORTH

DESIGN CONCEPTS

1. Alter grade at the base of the existing weir to remove pools in the bypass and eliminate fish stranding

2. Eliminate known stranding pool within the bypass by altering grade and establishing better connection to south toe drain; extend existing south toe drain to connect with Tule Canal, and alter grade within discrete areas along the existing channel to eliminate fish stranding where necessary

3. Preserve existing riparian vegetation (corridor ranges from 0 to 250 feet wide; average 100 feet wide) on the southern channel and expand riparian corridor to be 330 feet wide

4. Grade a deeper low-flow channel with an adjacent wetland floodplain terrace (approximately 40 feet wide) along the southern channel, to expand wetland habitat; width of additional wetland vegetation will depend on hydrology

5. Preserve and enhance existing riparian habitat
LOWER ELKHORN BASIN - EXPAND BYPASS FROM 3,000 FEET EAST (NORTH END) TO 4,500 FEET EAST (SOUTH END) AT LOWER ELKHORN BASIN

DESIGN CONCEPTS

1. Maintain existing agriculture in the expansion footprint; encourage wildlife-friendly practices

2. Enhance and extend existing canals to provide improved connectivity for GGS.

3. Enhance and expand riparian corridor along Tule Canal to be 1,000 feet wide

4. Grade a deeper low-flow channel with an adjacent wetland floodplain terrace (approximately 40 feet wide) along Tule Canal to expand wetland habitat; width of additional wetland vegetation will depend on hydrology

5. Maintain existing riparian vegetation on the west side of Tule Canal (ranges between 50 and 350 feet wide; average of 100 feet wide)

6. Expand riparian vegetation on the east side of Tule Canal (ranges between 0 and 250 feet; average of 25 feet wide) by 300 feet to 850 feet depending on existing vegetation

7. Retain sections of existing levee as high ground refugia for GGS and other wildlife

8. Modify road crossings along Tule Canal (one north and one south of Sacramento Bypass) to eliminate fish passage barriers.
WILLOW SLOUGH - EXPAND BYPASS 4,000 FEET TO THE WEST AT WILLOW SLOUGH

DESIGN CONCEPTS

1. Enhance and expand the riparian corridor to between 800 and 1,000 feet wide within the footprint of the removed levee along the east side

2. Expand riparian vegetation by 300 to 650 feet on the east side of the existing canal and open water (existing riparian vegetation ranges between 0 and 200 feet wide on the west, average of 25 feet wide; ranges between 0 and 500 feet wide on the east, average of 75 feet wide)

3. Maintain agriculture within the expansion footprint

4. Enhance and extend existing canals to provide improved connectivity for GGS

5. Maintain existing seasonal wetlands within the southern footprint

6. Retain sections of existing levee as high-ground refugia for GGS and other wildlife

7. Consider habitat connectivity with adjacent wetlands to the east and Yolo Bypass Wildlife Area to the south
PUTAH CREEK - EXPAND BYPASS 3,000 FEET WEST FROM WILLOW SLOUGH TO BELOW I-80 AND 5,000 FEET TO THE WEST AT PUTAH CREEK

DESIGN CONCEPTS

1. Enhance and expand existing riparian scrub along Putah Creek (existing ranges between 50 and 200 feet wide; average of 100 feet wide) to the edge of the remnant levee (proposed corridor is approximately 600 to 2,000 feet wide)

2. Maintain existing agriculture

3. Maintain existing open water/marsh habitat; provide improved connection to historical Putah Creek

4. Enhance existing riparian habitat along historical Putah Creek

5. Enhance existing canals to provide improved connectivity for GGS

6. Enhance and expand the riparian corridor along west bypass canal to 700 feet wide, above and below I-80, and to 1,000 feet further south (existing riparian habitat ranges from 0-25 feet; average 10 feet)

7. Retain sections of existing levee as high-ground refugia for GGS and other wildlife

8. Improve connection to west bypass canal for fish

9. Enhance habitat connectivity with areas to the north by extending the riparian corridor to the Willow Slough footprint. Corridor expansion limited to approximately 600 feet wide in areas to the north and just south of I-80 to maintain hydraulic capacity.
PUTAH CREEK - EXPAND BYPASS 3,000 FEET WEST FROM WILLOW SLOUGH TO BELOW I-80 AND 7,400 FEET TO THE WEST AT PUTAH CREEK

DESIGN CONCEPTS¹

1. Enhance and expand existing riparian scrub along Putah Creek (existing ranges between 50 and 200 feet wide; average of 100 feet wide) to the edge of the remnant levee (proposed corridor is approximately 600 to 2,000 feet wide)

2. Maintain existing agriculture

3. Maintain existing open water/marsh habitat; provide improved connection to historical Putah Creek

4. Enhance existing riparian habitat along historical Putah Creek

5. Enhance existing canals to provide improved connectivity for GGS

6. Enhance and expand the riparian corridor along west bypass canal to 700 feet wide, above and below I-80, and to 1,000 feet further south (existing riparian habitat ranges from 0-25 feet; average 10 feet)

7. Retain sections of existing levee as high-ground refugia for GGS and other wildlife

8. Improve connection to west bypass canal for fish

9. Enhance habitat connectivity with areas to the north by extending the riparian corridor to the Willow Slough footprint. Corridor expansion limited to approximately 600 feet wide in areas to the north and just south of I-80 to maintain hydraulic capacity.
FREMONT WEIR AND UPPER ELKHORN BASIN - EXTEND WEIR AND EXPAND BYPASS 2.5 MILES TO THE EAST

DESIGN CONCEPTS

1. Remove/degrade existing Sacramento River levee at the northern end of the basin to match surrounding grade
2. Set back weir extension away from the edge of the Sacramento River
3. Remove revetment along the Sacramento River and restore SRA habitat while maintaining existing, as well as, potential bank swallow nesting habitat
4. Restore native riparian forest on the footprint of the degraded levee and native valley oak woodland further from the river
5. Create a fish passage structure that connects the Sacramento River with the Yolo Basin
6. Construct new channel and riparian corridor (approximately 400 feet wide) through the Elkhorn Basin and connect to Tule Canal; extend riparian vegetation on the east side of the new canal to the edge of the footprint.
7. Remove east-side levee
8. Install an adjustable water control structure to manipulate release of water, inundate agricultural lands, and create fish rearing habitat
9. Eliminate fish passage barriers and expand the riparian corridor along Tule Canal to be approximately 1,000 feet wide
10. Maintain existing riparian vegetation on the west side of the Tule Canal (ranges between 0 and 400 feet wide with average of 50 feet wide)
11. Grade a deeper low-flow channel with an adjacent wetland floodplain terrace (approximately 40 feet wide) along the west canal to expand wetland habitat; width of additional wetland vegetation will depend on hydrology
12. Expand existing riparian vegetation (ranges between 0 and 150 feet; average of 50 feet wide) on the east side of canal to between 350 and 900 feet wide
13. Maintain existing agricultural practices within the Bypass; use seasonally as fish rearing habitat
14. Improve the existing fish passage structure in the Fremont Weir to allow passage of salmonids and green sturgeon
15. Eliminate fish stranding in the northeastern portion of the existing bypass, and potential stranding in the northwestern portion
LOWER YOLO BYPASS - EXPAND LOWER YOLO BYPASS 0.65 MILE TO THE WEST FROM COUNTY LINE (RD 2098) TO APPROXIMATELY 2.0 MILES BELOW LINDSEY SLOUGH

DESIGN CONCEPTS

1. Breach levee in strategic locations to allow return of tidal influence; retain sections of existing levee as high-ground refugia for California black rail and other wildlife

2. Excavate primary channels in tidal marsh restoration zone; use spoils to create high-ground refugia for California black rail and other wildlife; plan for wide transition zones to allow migration of tidal marsh due to sea-level rise and to provide refugia during flood events

3. Where low elevations preclude tidal marsh establishment, remove levees and create open water; consider import of clean fill to create additional marsh

4. Establish narrow bands of riparian scrub along levee remnants (approximately 150 feet wide) where appropriate considering tidal regime influence and attenuation of wind/wave erosion

5. Maintain existing agriculture within agricultural levee; flooded only in extreme events
LOWER YOLO BYPASS: DEGRADE AGRICULTURAL LEVEE AT LITTLE EGBERT TRACT

DESIGN CONCEPTS

1. Breach agricultural levee in strategic locations to allow return of tidal influence; retain sections of existing levee as high-ground refugia for California black rail and other wildlife

2. Areas below the lower limits of vegetation establishment would support large areas of shallow to moderate subtidal habitat and smaller areas of deeper open water

3. Excavate primary channels in tidal marsh restoration zone; plan for wide transition zones to allow for migration of tidal marsh due to sea-level rise and to provide refugia during flood events

4. Establish native perennial grassland in areas above the high tide limits

5. Consider establishing narrow bands of riparian scrub along levee remnants (approximately 150 feet wide) where appropriate considering tidal regime influence and attenuation of wind/wave erosion
YOLO BYPASS TULE CANAL / TOE DRAIN ENHANCEMENTS

DESIGN CONCEPTS

1. Enhance and expand riparian corridor along Tule Canal to be a minimum of 300 feet wide.

2. Grade a deeper low-flow channel with an adjacent wetland floodplain terrace (approximately 40 feet wide) along Tule Canal to expand wetland habitat; width of additional wetland vegetation will depend on hydrology.

3. Establish new or expand existing riparian vegetation on the east side of Tule Canal to be a total of 150 feet wide.

4. Establish new or expand existing riparian vegetation on the west side of Tule Canal to be a total of 150 feet wide only where existing land cover is either agriculture, or other natural.

5. Preserve existing wetland habitat; no new establishment of riparian vegetation.
# Potential Additional Annual Recreation Visitor-Days by Yolo Bypass Option

<table>
<thead>
<tr>
<th>Concept</th>
<th>Option</th>
<th></th>
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<td>Fremont Weir Expansion</td>
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<td>7,500</td>
<td>-400</td>
<td>6,200</td>
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<td>Elkhorn Basin</td>
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<td>-300</td>
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<td>8.2 All activities</td>
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<td>100</td>
<td>2,100</td>
<td>2,100</td>
<td>8.2 All activities</td>
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<tr>
<td>Willow Slough</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td></td>
<td>700</td>
<td>6.2 Excludes hunting, fishing/boating, and auto touring)</td>
</tr>
<tr>
<td>Putah Creek</td>
<td>3,500</td>
<td>3,500</td>
<td>3,600</td>
<td>3,700</td>
<td></td>
<td>3,500</td>
<td>8.1 Excludes fishing/boating</td>
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<tr>
<td>Lower Yolo Bypass</td>
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<td>7,800</td>
<td>21,800</td>
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<td>500</td>
<td>6.9 Excludes auto touring</td>
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