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River Management Unit Demonstrations

Central Coast Water Quality Control Board

March 6, 2014

Overview

- Approach:
  - Science-based: analysis leads to design
  - Collaborative: engaging growers, agencies, advisors
  - Addresses multiple benefits; communicates tradeoffs
  - Cooperative management: ‘River Management Unit’
- Role of Demonstration:
  - Build trust and show success: broad buy-in and permits attained
  - Lay out common framework for work in other areas
  - Feeds into MCWRA short-term approach and builds towards long-term

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Process & Timeline

1. Establish 'River Management Unit' (Nov 2013)
    a. Identify participants and geo boundaries
    b. Agree project goals

2. Understand existing conditions (Nov – Dec 2013)
    a. Model flood scenarios
    b. Agree on ecological conditions to maintain, avoid, improve

3. Create River Management Unit design (Jan – March 2014)
    a. Brainstorm management options
    b. Assess costs and benefits
    c. Agree on design for whole RMU

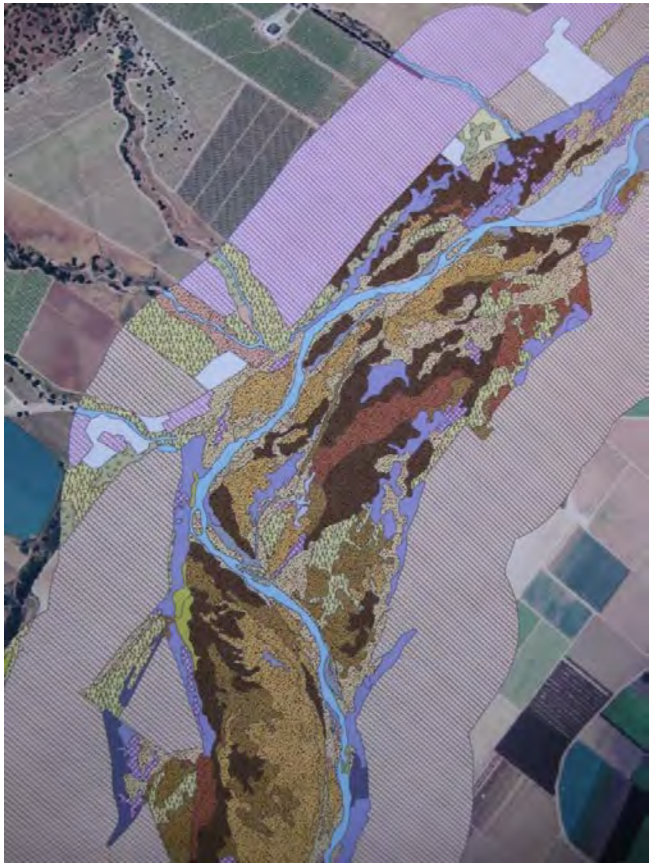
4. Engage permitting agencies and public (Jan – Sept 2014)
    a. Get collective feedback from permitting agencies
    b. CEQA/NEPA process
    c. Apply for permits; agency reviews

Demonstration Goals

- Build successful model for river management that:
  - Seeks 5 year permits
  - Relies on adaptive management
  - Defines and evaluates costs and benefits for landowners and implementing agencies
  - Establishes baseline information used for management decisions
  - Addresses multiple watershed objectives including flood risk reduction, recharge, water quality improvement, and maintaining ecological conditions for fish and wildlife

Existing Conditions

- 57 distinct natural communities:
  - Forests, woodlands
  - Scrub
  - Grassland
  - Wetland
  - Open water
- Biodiversity:
  - Hundreds species of songbirds, waterbirds
  - Priority Central Coast steelhead runs
  - Movement corridor for deer, bobcats, foxes
- Weed infestations (e.g., Arundo)
- Food safety pressures => habitat changes
- Changes in hydrology (dams, perennial flows, fewer large floods) => denser stands in some places compared to historical conditions



Flood Modeling

- Background of hydraulic analyses
- Summary of hydraulic results for RMUs

Analysis Background

- NewFields reviewed/modified EIR hydraulic model
- Created new 2-D hydraulic models at Chualar and Gonzales
- Evaluated flood extents, depths, and hydraulics for
    - Existing conditions
    - Maximum benefit achievable by vegetation clearing
    - Targeted clearing in high flow channels only
    - Levee setbacks
- Evaluated flood peak attenuation through detention/levee breaching

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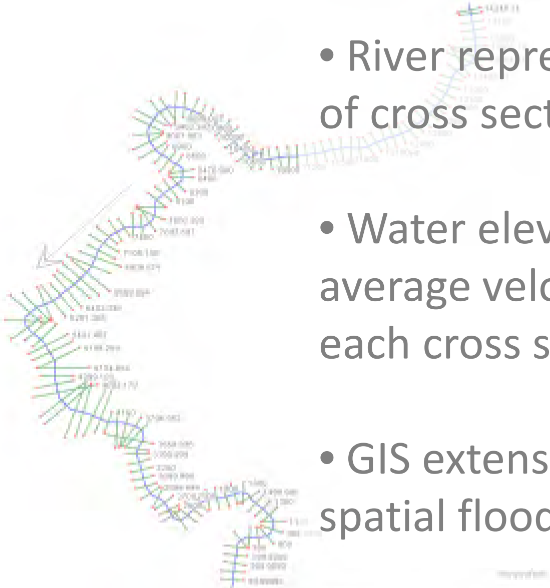
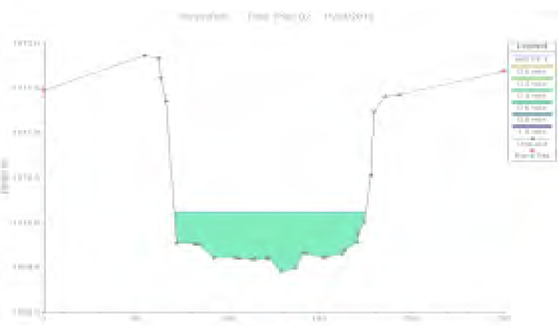
1-D vs 2D Models

1-D (HEC-RAS)

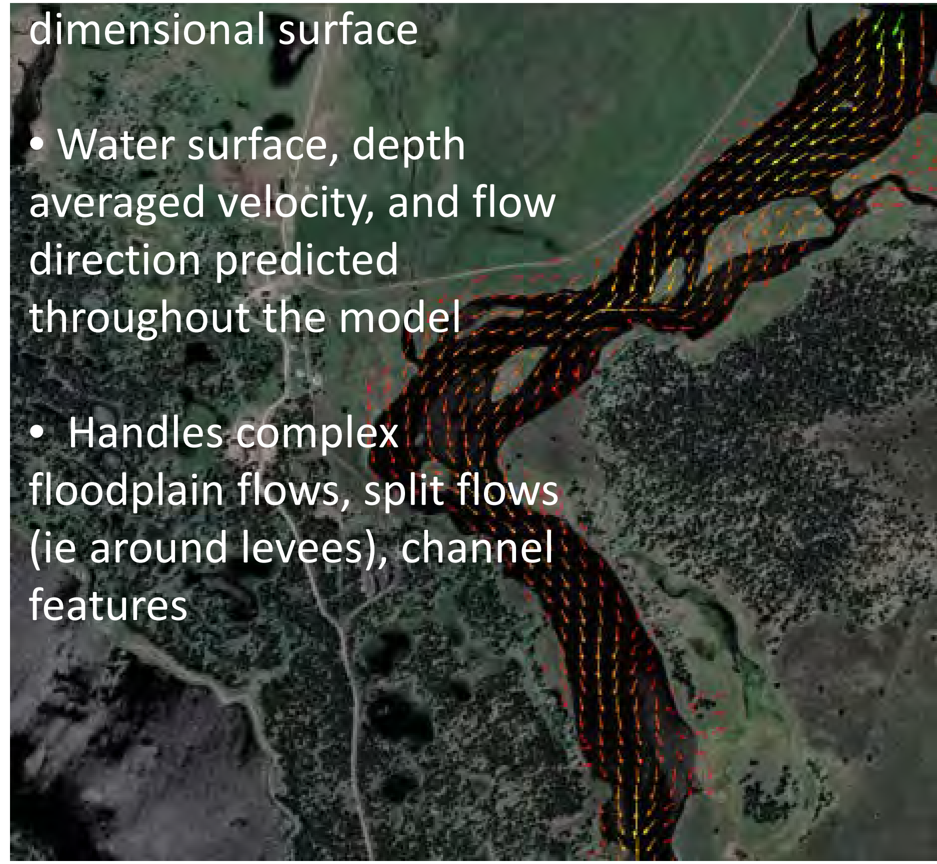


- River represented by series of cross sectional profiles
- Water elevation and average velocity predicted at each cross section
- GIS extensions allow for spatial flood mapping



Rapid, robust, established.
Not sufficient to describe complex flow patterns or features

2-D (many offerings)



dimensional surface

- Water surface, depth averaged velocity, and flow direction predicted throughout the model
- Handles complex floodplain flows, split flows (ie around levees), channel features

Detailed flow predictions tell more of the story. Requires (and generates) more data.

Need for 2-D modeling on Salinas

- Salinas often overflows its banks (lateral flows)
- Salinas is partially leveed (flow around/behind levees)
- Flooding can occur as backwater flowing upstream onto farmland (upstream flows)
- Channel is often braided with multiple flow paths (split flows)

Flows Modeled

- 5,000 CFS = 2 year return flow
- 12,300 CFS = Peak from 2011 flood event
- 22,000 CFS = 5 year return flow
- 45,000 CFS = 10 year return flow

Total Veg Clearing Model Setup

Targeted Removal Model Setup

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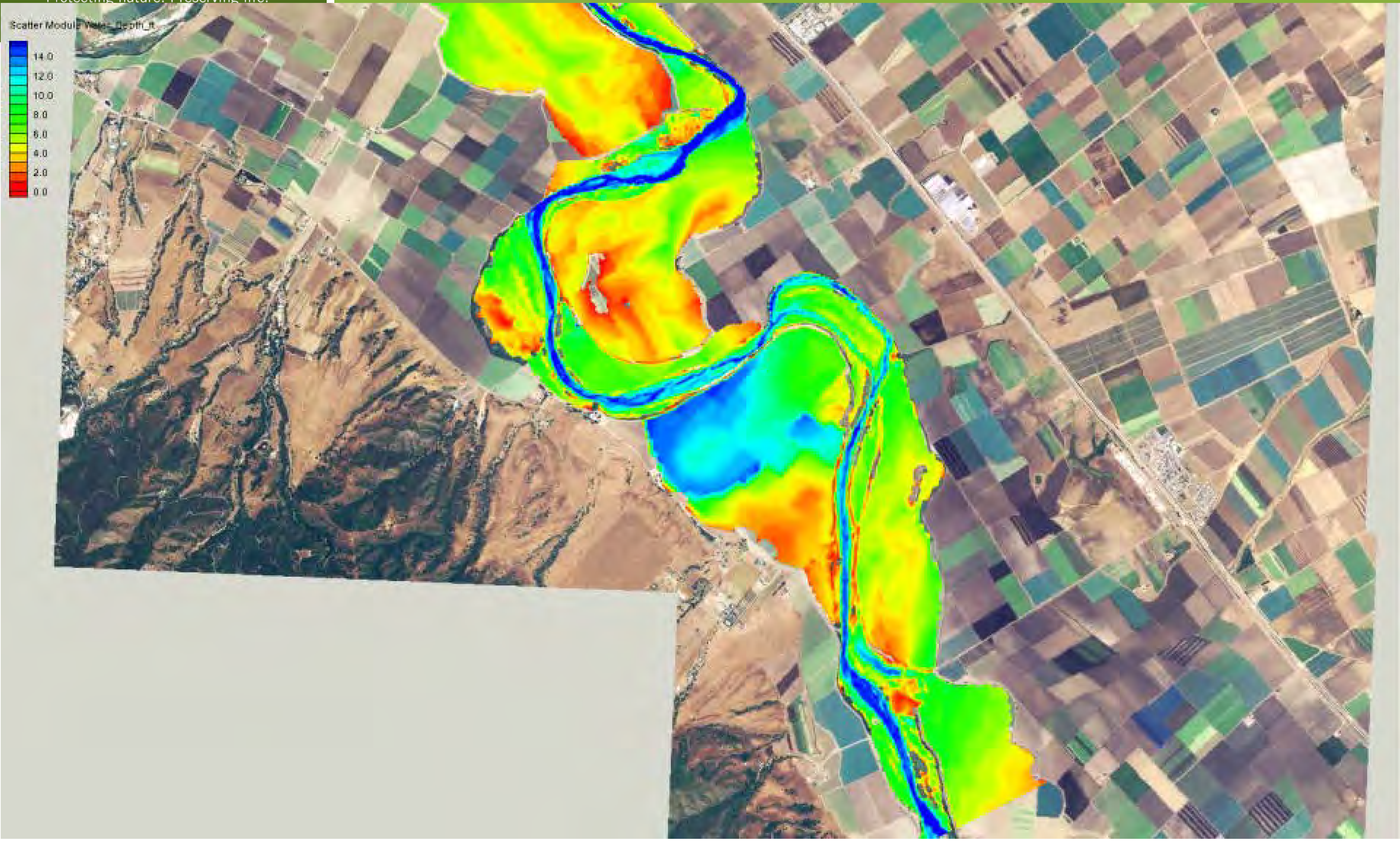
45,000 CFS Existing



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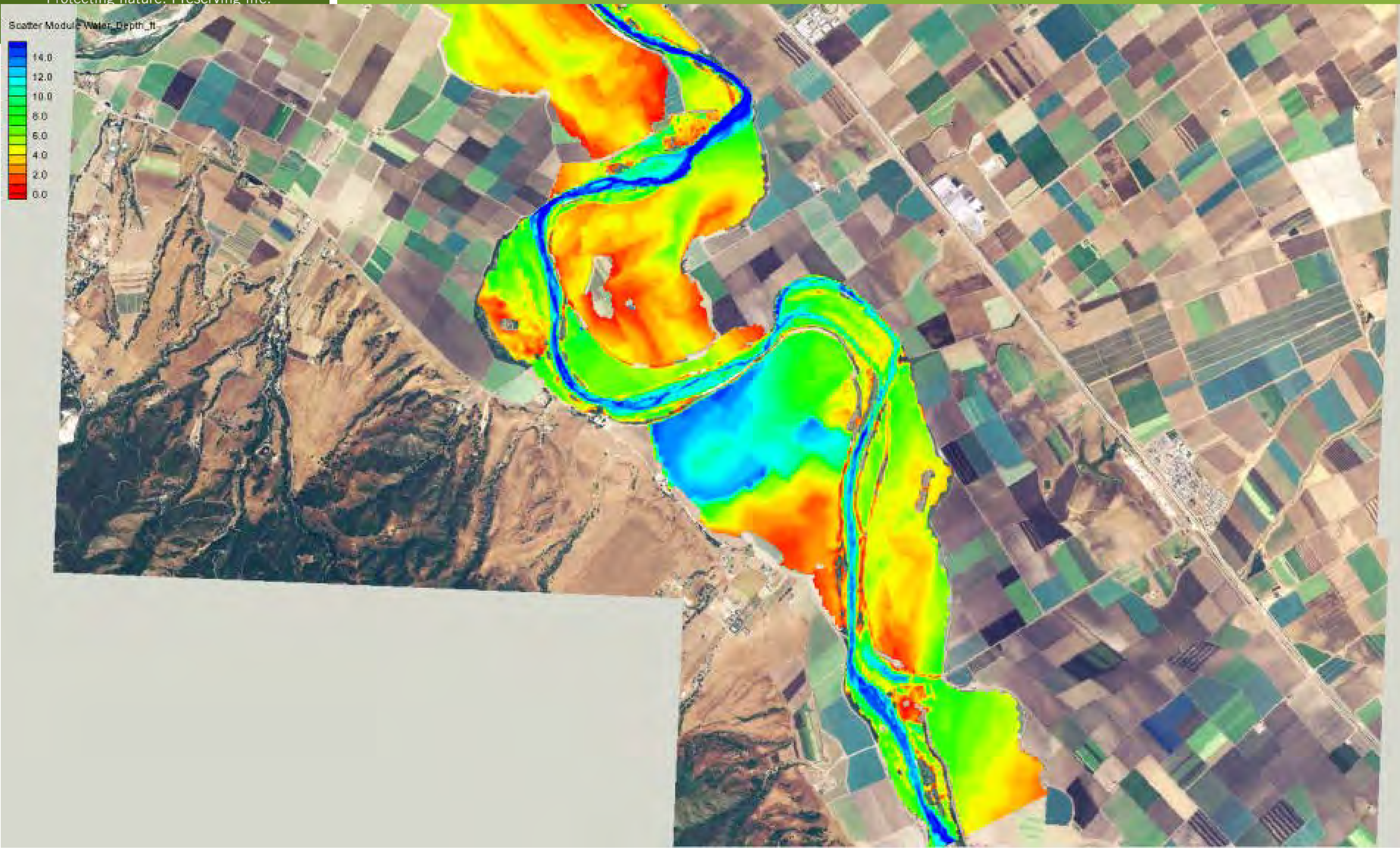
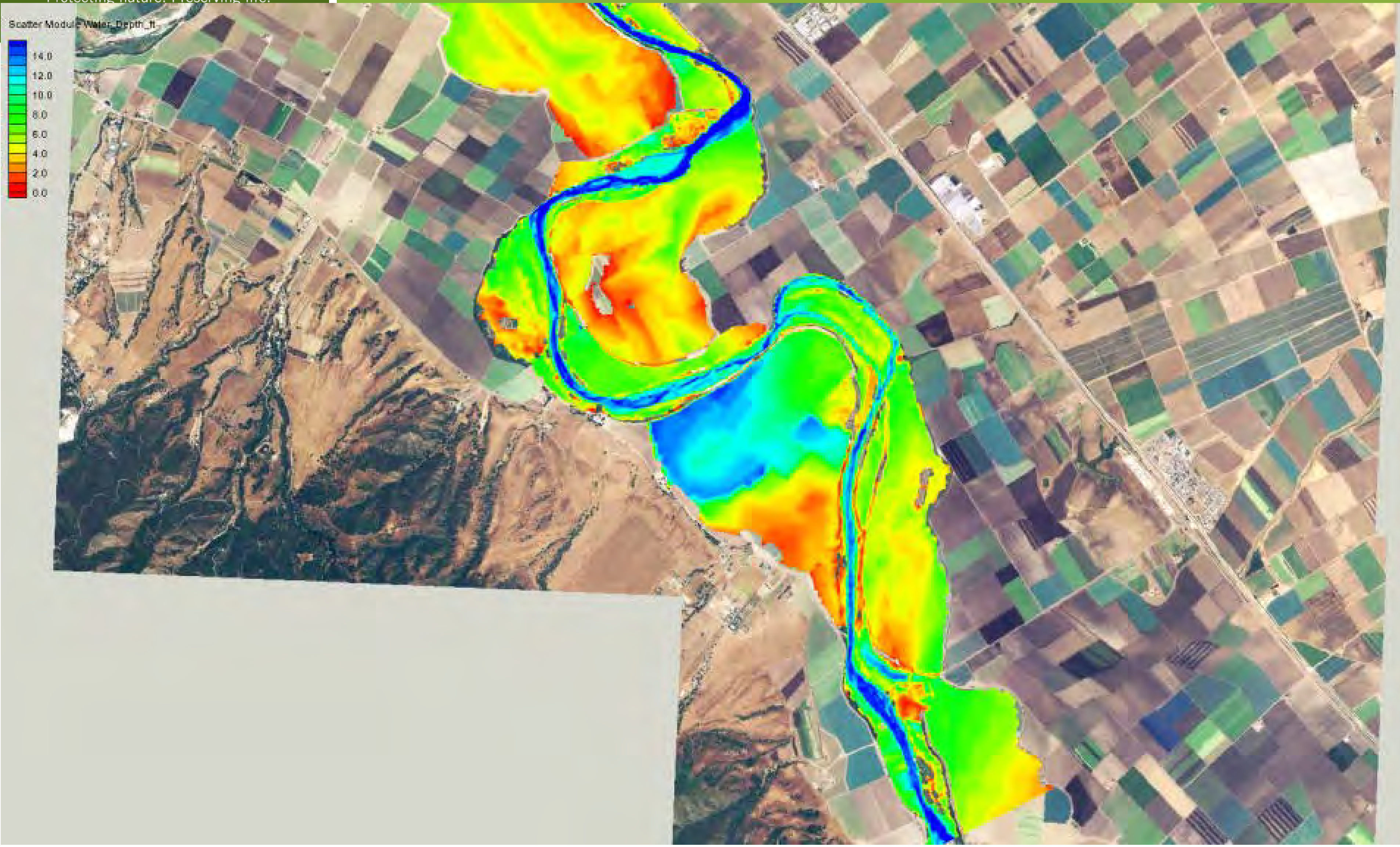
45,000 CFS Total Vegetation Clearing

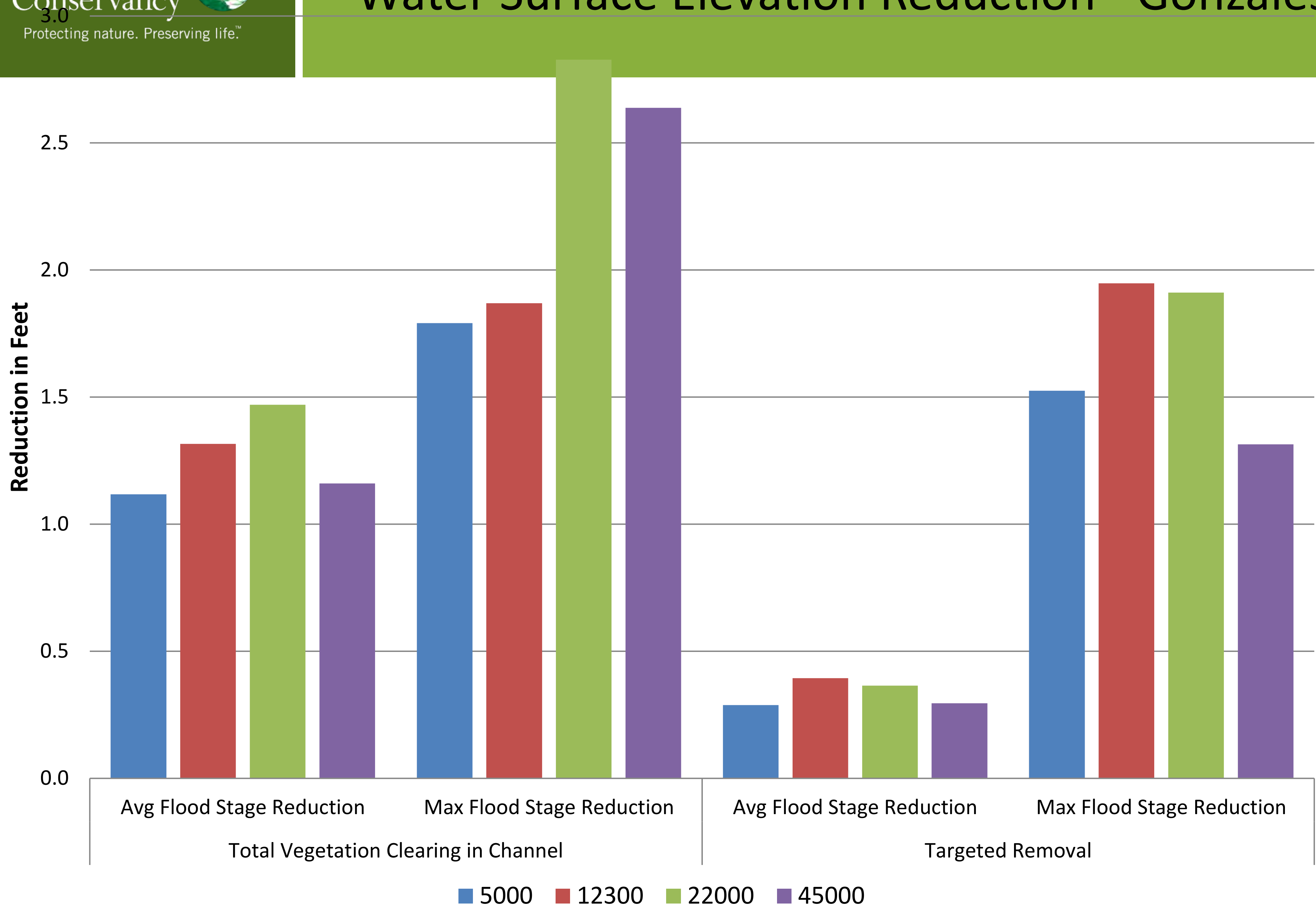


45000 CFS Targeted Removal




RM 16
RM 18
Flow
RM 17
RM 19
RM 20
RM 21
RM 22
RM 23
Flow
RM 24
RM 25
RM 26

Water Surface Elevation Reduction - Gonzales



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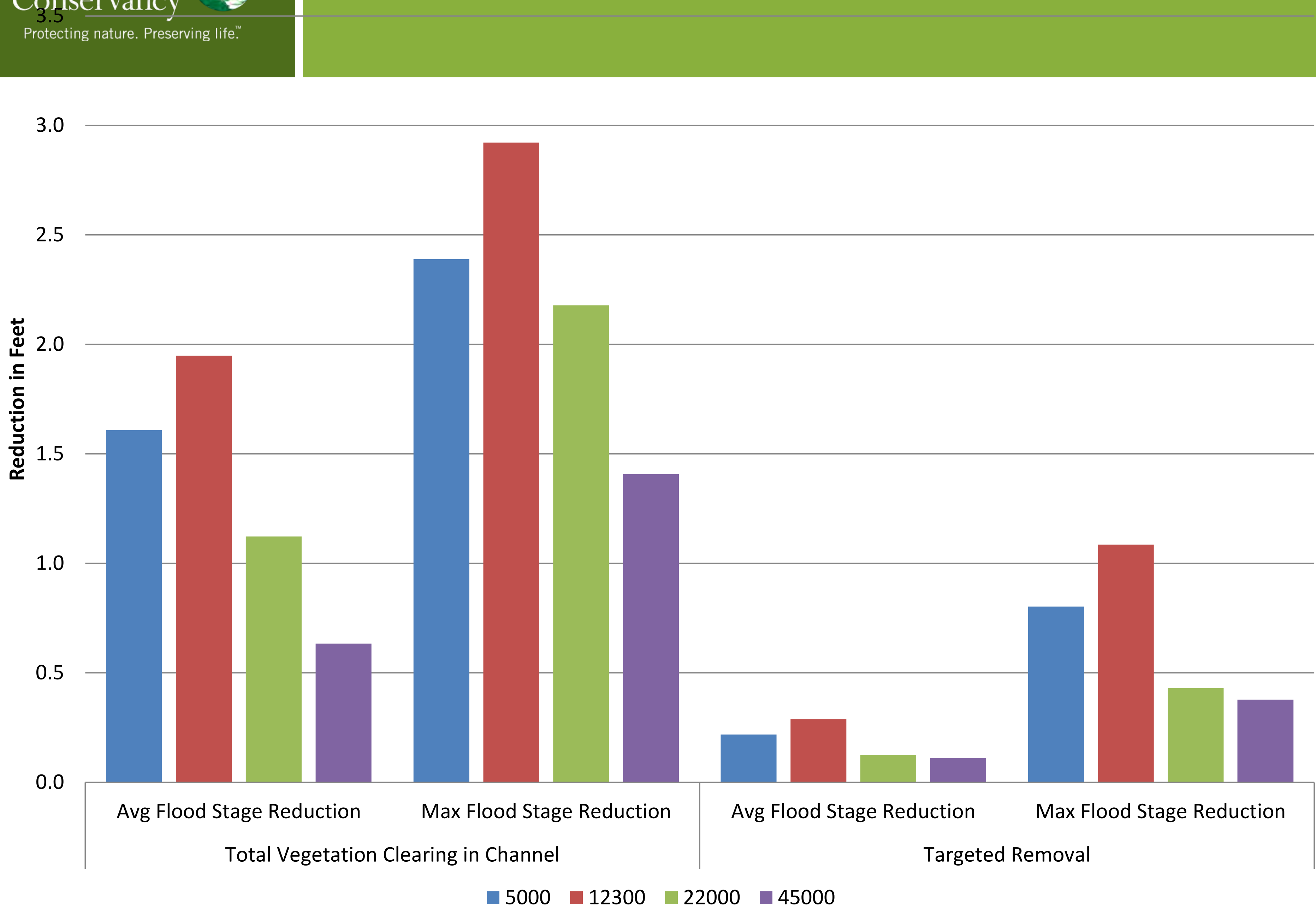
Water Surface Elevation Reduction - Chualar



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Analysis Outcomes

- Even complete removal of all vegetation from river channel does not protect farmlands from flooding
- Targeted vegetation removal may have some limited benefits, especially at low-moderate flood events (i.e. 2-5 year return)
- The “5-year” floodplain terrace cannot be protected from flooding by vegetation removal alone

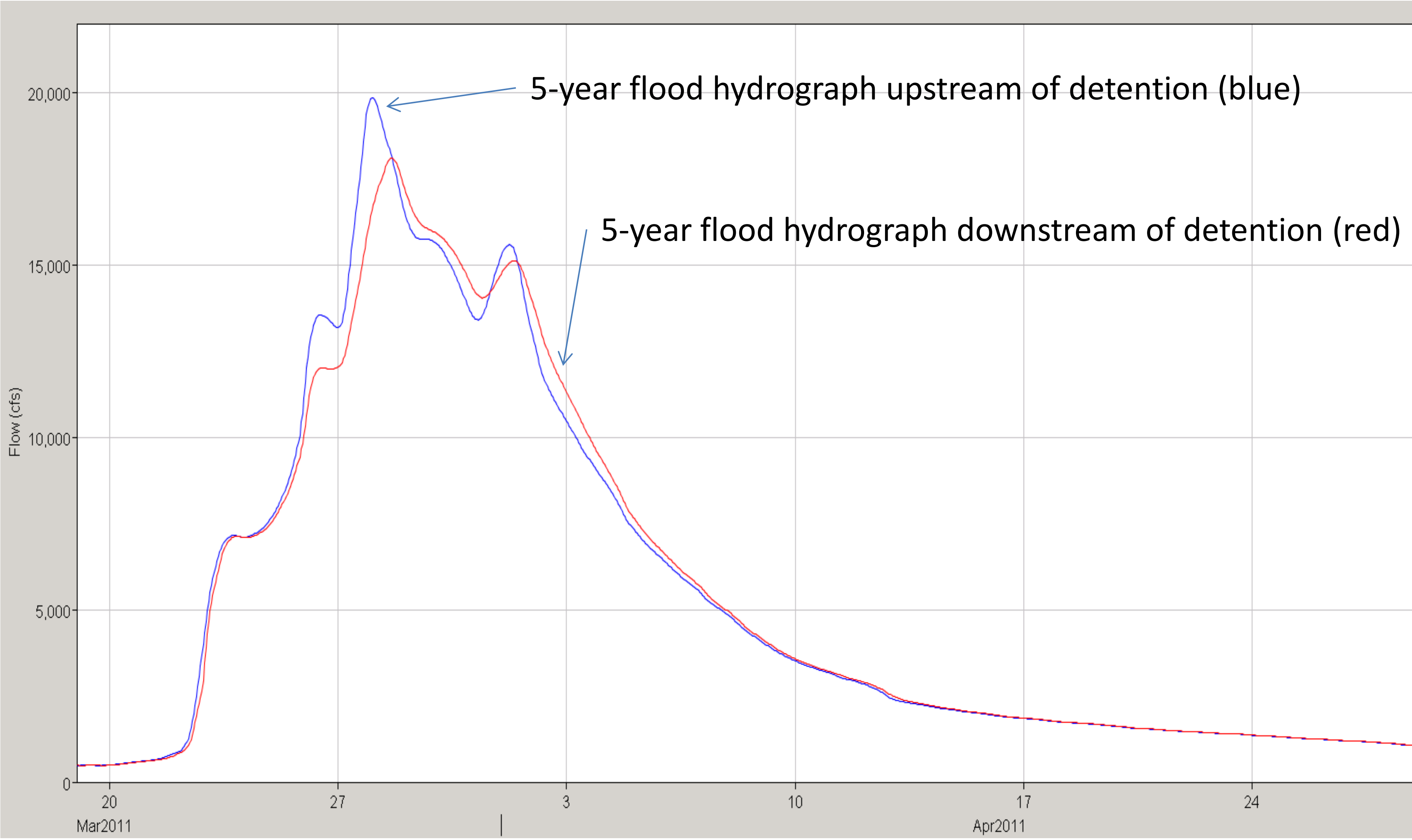
Managed Levee Breaches for Detention Storage

- Currently, floodwaters simply find the weakest link in the levee chain and impact that landowner
- Depending on circumstances, a levee failure may cause a parcel(s) to act as detention storage, helping reduce flood impacts downstream
- We evaluated potential benefit of managed detention

Managed Detention

- Analysis on 3 flows – 12,000 (2011 event); 22,000 (5-year); and 45,000 (10-year)
- 3 detention basin sizes – 300 ac (1800 ac-ft); 600 ac (3500 ac-ft); 1200 ac (7100 ac-ft)
- Modeled flood pulse through Salinas valley to quantify potential reduction in flood peak

Peak Attenuation



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Detention Overview

- Detention storage through managed levee breaching can have a noticeable reduction in peak flow
- “Sweet spot” is the 5-year return interval event
- Above 5-year event many levees flood behind, around, or over
- At 2-year event flooding is not widespread enough for full benefit, although there is some

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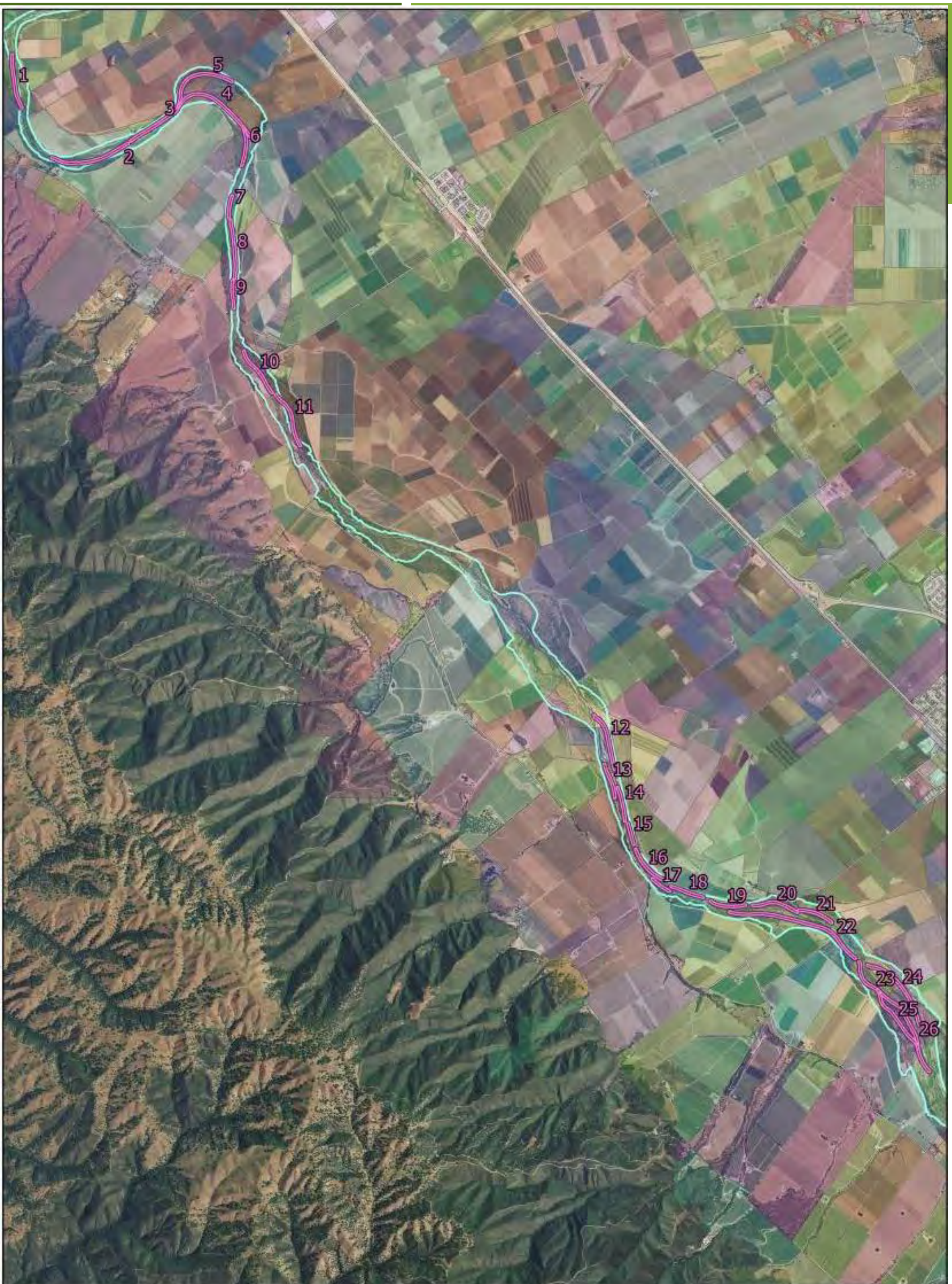
Modeling Outcomes

- Flooding on the Salinas is complex due to varied topography and ad-hoc levee system
- A significant amount of farming is done within the ~5-10 year floodplain
- Vegetation removal alone will not solve flooding problems
- Vegetation removal targeted to strips based on geomorphic/river process analysis can have a small but quantifiable benefit
- Managed levee breaches to detain flood waters on low-lying lands can attenuate downstream flood peaks



RMU's Overview

- ~12 miles river total
- 26 secondary channels
- 100 foot wide channels
- 500 ft – 1 mile length
- RMU's have recent history of ag field flooding, constrained channel, contiguous properties with landowner participation

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Design Overview

- Identify areas where vegetation clearing would:
  - **Improve flood conveyance** and
  - **Avoid sensitive habitats** such as primary steelhead migration path (low-flow channel), wetlands, large trees that support bird roosting and nesting
  - Facilitate **removal of high-priority weeds**, esp. Arundo and tamarisk
- "Secondary channels"
  - Convey water during flood stages
  - Avoid impacts to low-flow and sensitive areas
  - Co-designed to ensure accessibility, feasibility of implementation
  - Follow topo contours, mimic braiding
- Consider sediment removal in secondary channels
  - Additional potential activity to further enhance flood reduction
  - May require additional permitting, cost, logistics

Design Element Example

Next Steps

- Submit 404 and 401 permit applications for work Oct 2014
- Input to MCWRA stakeholder process:
  - Revised CEQA document
  - 2-D modeling for remaining 70 miles of river
  - Long-term river management plan