National Conference on Ecosystem Restoration

Restoring Physical and Ecological Processes in an Agricultural Setting

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Presentation Overview

- Background & Purpose
- Historic Changes
- Existing Conditions
- Restoration Planning & Design
- Parting Thoughts
Background & Purpose

- Landowner Initiated Project – Rutherford Dust Society
- Funded by:
  - California Coastal Conservancy
  - Napa County
  - California Department of Fish and Game
- 4.5 Mile Project Reach
- 30+ Private Landowners
- Address Steambank Erosion & Loss of Productive Land
Historic Changes

- Changes in Land Cover Types within the Watershed - Modified Hydrologic Regime
- Distributary Channels Filled or Disconnected
- Concentrated Flow in the Main Channel – 12,500 cfs
- Significant Channel Incision
Channel Incision

The diagram shows the elevation (NAVD 88) over station for different scenarios:
- WSE (Pre-Project, no levees)
- WSE (Effective Model, 1972)
- Channel Invert (Pre-Project)
- Channel Invert (Effective Model, 1972)
Existing Conditions – Streambank Erosion

- Velocities Associated with High Flows Range from 6 to 12 fps
- Active Bank Erosion – Approximately 17,000 linear feet
- Undermines Large Mature Trees
- Destabilizes Earthen “Flood Protection” Berms
- Fine Sediments Degrade In-channel Habitat Quality
**Existing Conditions – Riparian Habitat**

- Most Reaches Support Intact Stands of Xeric Species (Oaks, Walnut) at Top-of-Bank

- Reaches with More Complex Morphology Support Riparian Species (Alder, Cottonwood and Willow)

- Limited Natural Recruitment Because of Channel Incision and Steep Banks

- Understory Vegetation Dominated by Non-Natives in Many Areas
Existing Conditions – Aquatic Habitat

- Migration Corridor for Fall-run Chinook Salmon & Steelhead
- Provides Spawning Habitat for Salmon (400-600 annually)

- Key Limitations:
  - Spawning gravel quality
  - High flows following spawning
  - Lack of refugia/cover
  - Barriers to upstream migration
Approximately 40% of the Rutherford Reach “Protected” by Earthen Berms

Existing Berms Provide Varying Levels of Flood Protection and are not Constructed to Engineering Standards

Risk of Catastrophic Failure in Large Storm Events
Restoration Planning & Design

- Identified Historic Conditions
- Performed Hydraulic Analyses
- Assessed Geomorphic, and Aquatic & Riparian Habitat Characteristics
- Conducted Extensive Landowner Outreach
- Developed & Evaluated Alternative Restoration Approaches
What are we Trying to Accomplish?

- Open up the Channel to Reduce Velocities
- Create more Stabile Channel Banks/Slopes
- Allow for Future Channel Widening
- Stabilize Eroding Streambanks in Key Areas
- Reduce Risks of Catastrophic Berm Failure
- Enhance Aquatic & Riparian Habitats
Alternative Design Concepts: Option 1

- Set-Back Existing Berms/Land Use at Least 100-feet from Top-of-Bank Along Both Banks
- Excavate Inset Floodplain Benches Throughout the Reach to Reduce Channel Velocities to Acceptable Levels

Issues:
- 165-foot effective loss/encroachment
- Extensive loss of habitat
- Extensive loss of vineyards (60 acres - $21,000,000)
Alternative Design Concepts: Option 2

- Reactivate Historic Distributary Channels to Reduce Flow in Main Channel
- Excavate Side Channels/Sloughs to Increase Capacity

Issues:
- Loss/encroachment associated with distributary channels
- Still need to setback landuse/berms along main channel
- Brings in additional landowners
Alternative Design Concepts: Option 3

- Setback Existing Berms/Land Use 50-Feet Along Both Banks (115-foot loss/encroachment)
- Excavate Inset Floodplain Benches in Areas with Actively Eroding Banks to Stabilize Banks and Reduce Localized Velocities to Acceptable Levels
- Allow Channel to Widen “Naturally” in Other Areas
- Less Vineyard Loss (35 acres - $12,500,000)
“Rolling” Berm

TURNAROUND ROAD (AG BASE)

3:1

8:1

15' 20' 40'

PLAN

A'

A'

EXISTING GROUND

5'

1

3

1

2

8

TURNAROUND ROAD (AG BASE)

SALVAGED TOPSOIL

COMPACTED FILL MATERIAL

PLANTABLE AREA

SECTION A-A'
Parting Thoughts on Working in Agricultural Environments

- Need to Build Relationships/Trust with Landowners
- Design is an Iterative Process and is Never Really “Done”
- Requires Compromise Between Science, Practicality, & Economics
- A Little Napa Valley Wine can at Least Make it feel like the Process is Going Smoothly