Adobe Ranch Wetland Reserve Project

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What is Bioengineering?

- Working with natural stream process and dynamics to protect and/or rebuild banks and prevent erosion
- Bioengineering uses native plants
- Can use rock too
- Utilizes sound engineering
When to Bioengineer

- On streambanks with widening erosion problems
- On streambanks with incision issues

But Remember:

Bioengineer (usually) treats the symptom, not the ultimate problem

Bioengineering is not habitat restoration
When Not to Bioengineer

- Landslides
- Emergency situations
- Where livestock cannot / will not be controlled
- When vehicle access or vandalism cannot be controlled
- When toe and upstream and downstream ends cannot be secured
Why Bioengineer?

- Bioengineering strengthens over time
- Bioengineering works with the natural stream dynamics
- Bioengineering provides wildlife habitat
- Bioengineering can provide water quality benefits
- Bioengineering is more aesthetically pleasing
- Bioengineering is cheaper
- Bioengineering is easier to permit
Limitations of Bioengineering

- Vegetation takes a few years to establish
- Vegetation could fail
- Some engineers & flood control districts are still not comfortable
- Improper projects in the past have given the wrong impression
Necessary Expertise

- Engineering
- Hydrology
- Hydraulics
- Ecology
- Native Plant Propagation
- Permitting
Two Main Tenets to Bioengineering:

Secure the Toe & Prevent Flanking!!!
Failure to Secure the Toe...
Wetlands Reserve Program (WRP)

- WRP offers landowners permanent or 30-year easements, or 10-year restoration agreements.
- For restoring wetlands and associated uplands and riparian habitat with agricultural history.
- WRP restores, protects, and enhances wetlands for the benefit of migratory birds and other wetland dependent species, including state and federally listed species, and species of concern.
Adobe Ranch Project (WRP)
Location Map: Mono Co, CA

Highway 120
Project Goals

- Restore and enhance migratory and nesting bird habitat
- Enhance habitat for brook trout
- Stabilize streambanks and downcutting
- Teach others bioengineering techniques
Habitat Types
Fauna
Nine Step Process

1) **Identify Problems**
2) **Determine Objectives**
3) **Inventory Resources**
4) **Analyze Resource Data**
5) **Formulate Alternatives**
6) **Evaluate Alternatives**
7) **Make Decisions**
8) Implement the Plan
9) Evaluate the Plan

1-7: “Planning”
Chris Hoag
Wetland Plant Ecologist
NRCS Plant Materials Center
Aberdeen, Idaho
Baseline Monitoring

- Bird Surveys (baseline and yearly survey)
- Channel Morphology & Flow
- Vegetation (baseline inventory)
- Bat and Amphibian Survey
- Cultural Resources
Baseline Bird Monitoring

- Done by Point Reyes Bird Observatory (PRBO)
- Adobe Pond - 62 bird species:
  - Most Common: Mallard, Cinnamon Teal, Green-winged Teal, and American Coot, Swallows
- PRBO documented 141 bird species
  - determined breeding status for each
  - 24 species of conservation concern
  - 27 California Partners In Flight Bird Conservation Plan focal species documented
**Adobe Creek Depth by Day at Reservoir - 2006-2008**

Depth is from surface of water to bottom of troll, add 4 inches to get depth of water.

**Calculated Peak Flow**

142 cfs

May 22, 2006

**Adobe Creek Temperature by Day at the Reservoir 2006-2008**

**3 Level Trolls**

**5 Cross Sections**

**Longitudinal Profiles**

**Rosgen Stream Typed**
Nine Step Process

1) Identify Problems
2) Determine Objectives
3) Inventory Resources
4) Analyze Resource Data
5) Formulate Alternatives
6) Evaluate Alternatives
7) Make Decisions
8) Implement the Plan
9) Evaluate the Plan/ Monitoring
Implementation Schedule

- Bioengineering – Completed November 07
  - Rock Drop Structures, Willow Poles, Willow Clumps, Fish Lunker, Willow Vertical Bundles, Willow Mattress, and Willow Fascine

- Pond Expansion – Completed April 08

- Spoils Pile Revegetation – Start Fall 08

- Wetland Creation – Start Spring 09
BioEngineering Plan

Note: Locations are approximate

(A) Modify existing Stone drops

(B) Live Clumps and live cuttings

(C) Brush Mattress with fascine toe

(D) Lunker Structure Live clumps at ends and 6 vertical bundles on bank

(E) Reconnected Channel Live poles and live clumps in riparian

(F) Live cuttings and live clumps

Stone Channel Blocks Pools remain between

Stone Drop flanked by live clumps

Live cuttings along bank in areas that are not densely vegetated

Live clumps in lower areas that are more vegetated with grasses and sedges

Leave access

See report for discussion of timing and details
Photographs are indexed by letters

Final location of all treatments to be determined during installation

Treatments are not to scale

1 foot Contour Interval
Rock Drop Structures
November 07
# WILLOW POLE PLANTINGS

## ADOBE POLE PLANTING SUCCESS

<table>
<thead>
<tr>
<th>Site</th>
<th>Planted 11/07</th>
<th>Growing 6/5/08 (# / %)</th>
<th>Growing 8/7/08 (# / %)</th>
<th>Growing 7/16/08 (# / %)</th>
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<tbody>
<tr>
<td>Poles</td>
<td>118</td>
<td>48 / 41</td>
<td>79 / 67</td>
<td>67 / 57</td>
</tr>
<tr>
<td>Lunker</td>
<td>35</td>
<td>35 / 100</td>
<td>33 / 94</td>
<td>18 / 51</td>
</tr>
</tbody>
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Willow Clumps  Nov. 16, 2007
20 Clumps were planted
Fascine & Brush Mattress
Pre-Restoration
June 5, 2007
Brush Mattress

a. Profile view

- Brush 4-8" thick when compressed
- Wattling Bundle
- Stakes 18" - 30" long
- Firmly stake to hold 3" O.C.

b. Plan view

- Stake & wire brush; add wattling last
- Tiedown details
- Wire securely tied to stakes; brush partially compressed
- #10 galv. tie wire
- Butt end
- Tapered construction stakes
Done - November 8, 2007
Fish Lunker
Cross section
Not to scale

Fish Lunker

Existing vegetation, plantings or soil bioengineering systems

Erosion control fabric
Compacted fill material
Live branch cuttings

Stream-forming flow

Baseflow
3 to 4 feet

Streambed
2 to 3 feet

4 to 5 feet

Rock fill
Vertical Bundles

Aug. 7, 2008
Pond Expansion
Pond Expansion - January 2007
22,400 cu yds - 2,400 truck loads
Spoil Pile ReVeg - June 2009
NRCS is Available for Technical Assistance

Streambank Soil Bioengineering Field Guide:
