Natural Development of a Multi-threaded Wetland Channel Complex and the Implications for Salmonids

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Willow Creek, Russian River, Sonoma Co., CA
Last Channel Dredging in 1983
Valley Fill Process

- Filling of the Stage 2 channel progresses upstream.
- Followed by channel network development.
Valley Fill Timeline

Extent of Gravel Deposition
- By 1987
- By 1997
- By 2004
- By 2018

Locations of Complete Channel Aggradation
- 1986 Flood
- 1995 and '96 Floods
- 1997
- 2004
- 2018
Vegetation Changes
Habitat and Ecosystem Benefits (%)

From Cluer and Thorne, 2013
Problem: Fish Passage Barrier

- No fish seen in upper watershed since mid 1990s

Solution!?? Design a "nature, self-sustaining, fish-friendly, bankfull channel" through the wetlands.
Installed a 40-foot wide bridge at valley thalweg in 2011. But still lingering questions...

- Will adult fish be able to find their way up through the wetlands?
- Will juveniles get lost on the way out?
- Will juveniles choose to rear in the wetlands?
Salmonid redds observed

Return winter | Coho salmon | Steelhead | Unknown salmonid
---|---|---|---
2013/2014 | 7 | 15 | 0
2014/2015 | 5 | 9 | 2
2015/2016 | 11 | 4 | 8
2016/2017 | 8 | 1 | 2
**Total:** | **31** | **29** | **12**
Number of days between detections on upper array and lower array

- 2013-14
- 2014-15
- 2015-16
- 2016-17
**Juvenile coho salmon survival rates**

<table>
<thead>
<tr>
<th>Winter</th>
<th>Detected passing upper antennas</th>
<th>Detected at both upper and lower antennas</th>
<th>Percent survival through Stage 0 reach</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-14</td>
<td>232</td>
<td>171</td>
<td>74%</td>
</tr>
<tr>
<td>2014-15</td>
<td>101</td>
<td>42</td>
<td>42%</td>
</tr>
<tr>
<td>2015-16</td>
<td>1,369</td>
<td>653</td>
<td>48%</td>
</tr>
<tr>
<td>2016-17</td>
<td>1,093</td>
<td>392</td>
<td>36%</td>
</tr>
</tbody>
</table>
Salmon can and will navigate a dynamic Stage 0 channel system.

Some juveniles choose to migrate down into wetlands early to rear. Have high survival rate.

Elevated sediment loads can transform alluvial valleys if deposition regime is allowed or fostered.
Restoration and Monitoring Partners:
- California Dept. of Fish and Wildlife
- California State Parks
- CA State Coastal Conservancy
- Gold Ridge RCD
- Land Paths
- Mendocino Redwoods Company
- NOAA Fisheries
- NOAA Restoration Center
- Prunuske Chatham, Inc.
- Sonoma County Public Works and Transportation
- Sonoma County Water Agency
- State Water Resources Control Board
- Stewards of the Coast and Redwoods
- Trout Unlimited
- UC Cooperative Extension/CA Sea Grant
- US Army Corps of Engineers