The Nature of Restoration Design: A Case Study.

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River Partners
Outline

- Introduction
- Restoration Design Process
- Myths, Assumptions, and Restoration Design
- Conclusions
Design Process

- Site Assessment
- Conceptual Site Model
- Project implementation
- Framework for adaptive management and future monitoring
Conceptual Site Model

- Presents our understanding of the physical and biological factors that influence site ecology
- Outlines our restoration strategy and alternatives, and
- Identifies ecological benefits and targeted wildlife species.
Major Findings

- The site once supported a complex, mosaic of riparian forests.
- Currently, non-native plants dominate the project area.
- No-action (with targeted weed control) is appropriate on approximately 450 acres with an active restoration approach appropriate on the remaining 500 acres.
- Process has yielded scientifically sound options that protects the pumping plant, provide ecological benefits, and have local support.
Myths, Assumptions, and Restoration Design

- Interrupting your typical PowerPoint Presentation...
- Do not touch your projector....
Restoration Myths!!!
Design Myths

• Use the past as your only guide.
• Plant only communities that “belong” there.
• Your lucky numbers are:
Which history?

- How about a pragmatic design, based on current conditions that meet multiple needs?
Restoration Alternative – Site Specific Design

- Considers multiple management objectives
- Features: compatible with pumping plant measures and flood control objectives (access roads, conveyance corridors, etc)
- Benefits: provides good quality wildlife habitat, displaces weeds, consistent with other objectives, modest management input.
- Disadvantages: does not maximize wildlife objectives.
Site Specific Design

Plant Design Map for Riparian Sanctuary Restoration Planting.

Plant density the same, composition different, tree density different.
Wildlife Myth

True or False:

a) “Restoration doesn’t work” or

b) “Build it and they (wildlife) will come”
Habitat for what?
## Table 8. Matrix of Targeted Species Habitat Needs, Riparian Sanctuary Restoration Project

<table>
<thead>
<tr>
<th>Species</th>
<th>Habitats</th>
<th>Notable Habitat Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald eagle (Haliaeetus leucocephalus)</td>
<td>Valley Foothill Riparian Forest</td>
<td>Requires large old growth trees or snags in mixed stands near water. Feeds primarily on adult fish, but occasionally feeds on juvenile and dead fish, water birds and mammals.</td>
</tr>
<tr>
<td>Bank swallow (Riparia riparia)</td>
<td>Valley Foothill Riparian Forest</td>
<td>Requires vertical banks or cliffs with fine textured or sandy soils near streams, rivers for nesting. Forages by hawking insects during flight. Feeds over open riparian areas.</td>
</tr>
<tr>
<td>Bell Vireo (Vireo bellii)</td>
<td>Valley Foothill Riparian Forest</td>
<td>Thickets of willows and other low shrubs. Low dense riparian growth often in areas often near water. Associated plants include cottonwood, willow, coyote brush, or blackberry.</td>
</tr>
<tr>
<td>Swainson’s hawk (Buteo swainsoni)</td>
<td>Valley Foothill Riparian Forest</td>
<td>Nests in open riparian habitat, open grasslands with scattered large trees or groves.</td>
</tr>
<tr>
<td>Willow flycatcher (Empidonax trailli)</td>
<td>Valley Foothill Riparian Forest</td>
<td>Dense willow thickets are required for nesting and roosting. Makes short sallies for flying insects from exposed perches in willow thicket. Occasionally eats berries and seeds.</td>
</tr>
<tr>
<td>Yellow-billed cuckoo (Coccyzus americanus)</td>
<td>Valley Foothill Riparian Forest</td>
<td>Inhabits extensive deciduous riparian forests or thickets with dense low level understory foliage, and which about slow moving backwaters. Willows almost always a dominant component of the vegetation. Gleans large insects from foliage. Occasionally preys on frogs, lizards or eats fruit.</td>
</tr>
<tr>
<td>Chinook salmon (Oncorhynchus tshawytscha)</td>
<td>Aquatic habitats</td>
<td>Requires complex floodplain and channel features. Important terrestrial elements include.</td>
</tr>
<tr>
<td>Green Sturgeon (Acipenser medirostris)</td>
<td>Aquatic habitats</td>
<td>Requires various substrate particle sizes, most importantly large gravel, for spawning. Spawning occurs in the main stem of large river systems. This species is currently only found in California’s Sacramento and Klamath River basins.</td>
</tr>
</tbody>
</table>
Restoration designed for features for Targeted Wildlife

- See study for complete list
- Example: Least Bell’s Vireo (*Vireo bellii*)

Project features:
- Thickets of willows (sandbar) and other low shrubs (such as mugwort). Low dense riparian growth often in areas often near water. Associated plants include cottonwood, willow, coyote brush, or blackberry.
In 2003, River Partners sampled 7,600 elderberry shrubs for:
- Elderberry survivorship (high)
- Presence of VELB exit holes (yes), over 5%

Riparian Brush Rabbits thriving on release sites.
Riparian Sanctuary: Wildlife Potential

PRBO (2004) Point Count on Site:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Existing</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- species richness</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>- diversity (SW)</td>
<td>15.4</td>
<td>1.98</td>
</tr>
</tbody>
</table>

10/31/2005
Myths of Natural Processes

- Restoration unnecessary on the Sacramento River
Historically, over 500,000 acres of riparian forest bordered the Sacramento River (Katibah 1981).
By 1983, less than 23,000 acres (5%) of riparian forests remain.
Adding to the Mahoney and Rood Box Model
Recruitment

- Even after a decade only sparse native vegetation was observed.
Weed Myths

- Aliens invade!
- “You can’t beat weeds”
- “Build it and they (understory) will come.”
- “What weeds?”
Successional Outcomes - no action

Soil Characteristics
Deep, silty soils, relatively shallow groundwater levels (<25 ft).

Hydraulics/Hydrology
Post Shasta Dam hydrology. Most of site floods frequently (2-4 year intervals).

Geomorphologic processes
Minor deposition and erosion, some "gouged" areas.

Vegetation
Native seed sources further away, good conditions for non-native plant recruitment

Wildlife Response
Increase rodent populations

Management Actions
Land cleared.

Time: 10-30 years

Riparian forest or woodland
Riparian savanna
Riparian grassland
Riparian scrub
Limited riparian plant recruitment
Non-native herbaceous plants
Non-native woody plants

Annual non-native plants.
No Action - 2015?
**Successional Outcomes – Restoration**

**Soil Characteristics**
Deep, silty soils, relatively shallow groundwater levels (<25 ft).

**Hydraulics/Hydrology**
Post Shasta Dam hydrology. Site floods frequently (2-4 year intervals). **Restoration design must meet flood control design.**

**Geomorphologic processes**
Minor deposition and erosion, some “gouged” areas. **Changes depend on pumping plant alternatives.**

**Vegetation**
Native seed sources further away, good conditions for non-native plant recruitment

**Wildlife Response**
Changes in vegetation will alter wildlife usage on site and may increase native plant recruitment.

**Management Actions**
Initiate restoration activities for woody and herbaceous plants.

*Time: 3 - 40 years*

- Riparian forest or woodland
- Riparian savanna
- Riparian grassland
- Riparian scrub
- Limited riparian plant recruitment
- Non-native herbaceous plants
- Non-native woody plants

*Non-native annuals*
Planting Understory

- Displace weeds
- Wildlife benefits
Flooding Myths

- Restoration causes flooding or
- No action = “Current conditions” = Future conditions
Hydraulic Model (Ayres)

Velocity: Full vs. Site Specific Planting with cutoff
Cross-section

Cross Section Length = 3000 Feet

Mixed Riparian Forest
(1000 Feet)
(212 plants/acre)
(125+ trees/acre)

Elderberry Savanna
(400 Feet)
(212 plants/acre)
(50-100 trees/acre)

Riparian Scrub
(400 Feet)
(212 plants/acre)
(15-45 trees/acre)

Valley Oak Savanna
(400 Feet)
(212 plants/acre)
(50-100 trees/acre)

Valley Oak Woodland
(800 Feet)
(212 plants/acre)
(100+ trees/acre)

Drawing not to scale.
Water surface elevation: Current vs Site Specific Design

Project footprint
The Un-cooperation Myths

- Local Ag. and Env. Groups Broker Mid-East Peace Deal
Outreach Principals

- Open, science-based, inclusive process
- Collaborate with local interests and maintain two way flow of information
- Goal of a joint project, brought parties together.
- Flexible and responded to changes (i.e. monthly meetings, with CBDA rep.).
- Why has it worked?
Participation
Integration example: Current land use vs. site specific planting with cutoff
What’s the alternative to working together?

“There were sheets of flaming lava. Not a good intention in sight.”

“Not a good intention in sight”
How do I get more information?

- Dan Efseaff  
  - defseaff@riverpartners.org  
  - (530)894-5401 ext 21

- Web address  
  - www.riverpartners.org

River Partners

Riparian Sanctuary
Feasibility Studies

Riparian Sanctuary
Schedule of Events

Riparian Sanctuary
Related Links

River Partners

Riparian Sanctuary
Sign-up Form

Riparian Sanctuary
Documents

River Partners

- Restores an inclusive, cooperative, science-based planning process to investigate
  possibilities to:
  
  - Restore 500-acres on the Riparian Sanctuary (Llano Seco Unit of the Sacramento River
    National Wildlife Refuge) owned by the US Fish and Wildlife Service (USFWS), and
    the Pomona, Chiles, and Provident Irrigation Districts' (PCGID-PID) fish
    screen and pumping plant.

  This project will also develop a long-term monitoring plan to examine the relationship of restoration
to natural processes.

  We will work closely with the Sacramento River Conservation Area Forum, the PCGID-PID,
  USFWS, agencies, and other stakeholders to find locally supported, ecologically sound solutions for
this strategically located site.

  These planning efforts represent a major step toward allowing the Riparian Sanctuary to meet its
  ecological potential, protect the pumping plant and fish screen, and provide vital data for making
  sound floodplain management decisions on future sites.