CLSI Habitat Restoration Projects in the Napa River Watershed

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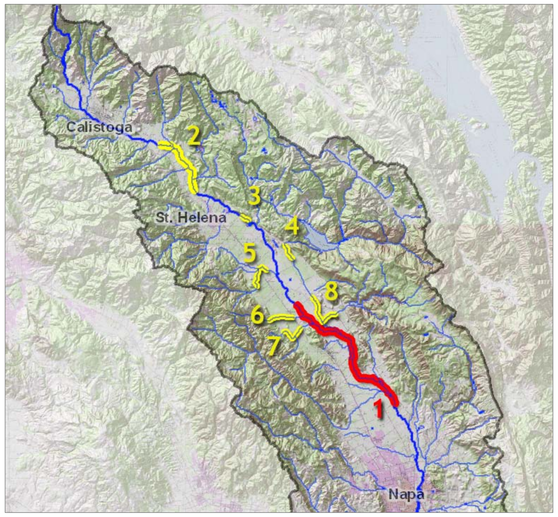
Habitat Restoration Project Sites

In 2011, the California Land Stewardship Institute (CLSI) completed the Napa River: Oakville to Oak Knoll Restoration Plan. CLSI has also implemented several invasive plant removal and revegetation projects in the Napa River watershed since 2007.



CLSI projects in the Napa River Watershed described by number below.

Napa River: Oakville to Oak Knoll Plan: Goals

1. The Napa River between Oakville Cross Rd and Oak Knoll Ave is a 9-mile reach where the channel has downcut into its alluvial floodplain by more that 12 feet due to dramatic changes in the river's watershed and floodplain. Four large municipal reservoirs affect this reach as do hillside developments and the reduction in secondary channels and slough channels. Downcutting or channel entrenchment gives the river channel a deep, narrow form with no functional floodplain to allow for flood flows to spread out and slow. Instead flood water stays in the channel, digging it deeper until the highly unstable banks collapse, widening the channel, and creating a new lower floodplain and slower flows.

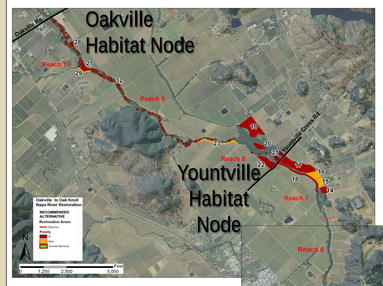
The focus of the restoration plan is to widen the river channel and re-establish a functional floodplain in four large nodes along the reach. Within the nodes a variety of riparian and aquatic habitats will be restored, and the areas are large enough for ecological and geomorphic processes to occur.

Napa River: Oakville to Oak Knoll Plan: Methods

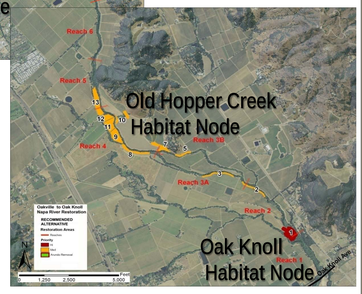
CLSI used a multidisciplinary approach to the plan. Detailed geomorphic mapping and topographic surveys were used in a hydraulic model. Riparian vegetation was mapped by geomorphic feature to determine both biodiversity and ecologic succession. Salmonid habitats were assessed and a carcass survey was completed. The assessments completed for the plan provide a detailed baseline for evaluating long-term ecological improvement. Landowners were involved in determining types and locations of restoration. The plan focuses restoration into a series of four nodes to create large, more diverse habitat areas and use fallow agricultural and public lands. A Technical Advisory Group provided input to the plan.

Napa River: Oakville to Oak Knoll Restoration Plan

Rather than an engineered fix, the science-based review of the geomorphic and ecologic processes resulted in a restoration design with an ecosystem orientation focusing on four habitat nodes.



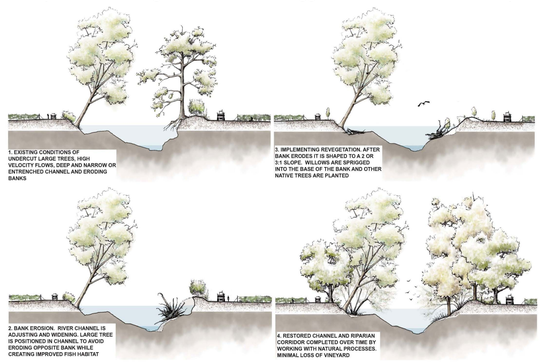
The final plan proposes:
- Channel Widening and Floodplain Restoration
- Secondary Channel Restoration
- Managed Bank Retreat
- Eradication of Non-Native Invasive Plants



The plan proposes restoration at areas identified by number on this map.

Alternative	Total Acres	New Acres of Riparian Habitat/Channel Area	Existing Riparian Acres Affected
Alternative 1 All sites ranked high	63.5-63.6	47.0-47.8 riparian 3.9-4.8 channel	5.7
Alternative 2 All sites ranked high and medium	128.4-130.8	70.4-76.2 riparian 7.5-8.9 channel	15.6-16.6

A depiction of Managed Bank Retreat suggested for Area 23 on the map



Napa River: Oakville to Oak Knoll Plan: Next Steps

The Concept Plan was completed in April 2011 and is available in digital form from CLSI by request. The next steps to be completed by CLSI and the Napa County Flood Control and Water Conservation District include:
- Environmental review and permitting
- Landowner involvement and continued review
- Design of the Oakville and Yountville Habitat Nodes
- Implementation of Arundo removal on 5 acres

Riparian Corridor Restoration Projects: Goals

The Napa River restoration work in the Oakville and Rutherford reaches is susceptible to infestation by non-native invasive plants from upstream, especially the giant reed, *Arundo donax*. CLSI is working with the Napa County Flood Control and Water Conservation District (NCFCWCD) on several of the following projects to address removal of invasive plants in the Napa River watershed.

Riparian Corridor Restoration Projects: Methods

Eradication methods vary by invasive species to be effective. Herbicide is carefully applied at times of the year when the plant is most affected. Most invasives require 1-5 years of annual treatments to completely kill them. Revegetation with native plants completes the process.

Riparian Corridor Restoration Projects: Results

2. Napa River, from Larkmead to Lodi Lane: Private landowners in this reach along the Napa River are participating in an Arundo Eradication Project, implemented by CLSI and NCFCWCD. In the spring and summer of 2010, aerial and ground surveys established the extent of Arundo along this reach of the Napa River. Initial site visits with landowners began in November, 2010. The first treatment is planned for the fall of 2011, after harvest.

Large infestations will be treated successively. Areas where large clumps were removed will be re-vegetated with riparian plants. Annual monitoring can keep re-growth to a minimum.

3. Napa River: Arundo was cut and treated from the banks of two landowners' property along the Napa River in 2009. Native plants were installed in the winter of 2009-2010.

4. Upper Conn Creek: In conjunction with Napa RCD, CLSI removed invasive eucalyptus in 2006-2007 along Conn Creek. Native plants were installed in 2008-2009. The landowner, Heitz Cellars, provided irrigation and labor to install the native plants.

5. Bear Canyon Creek: CLSI removed an acre of Arundo from one mile of riparian corridor along Bear Canyon Creek, both upstream and downstream of Hwy 29. Native plants were installed during the winter of 2009-2010 to increase the riparian habitat diversity along this fish-bearing stream. Landowners—including Beringer Vineyards, Beaulieu Vineyards, Alpha Omega Winery, LMR SB Partners, Gallegos, and Silverado Premium Properties—provided irrigation to the native plants and also funded the labor to install the plants.

Cut Arundo in a burn pile

Native plants installed

Riparian Corridor Restoration Projects: Results

6. & 7. Doak and Lincoln Creeks: After the invasive non-native plants—blue periwinkle, Himalayan blackberry, Spanish broom, French broom, acacia, tree-of-heaven, giant reed, eucalyptus seedlings, and ornamental cactus—were removed, native riparian trees and understory plants were installed in 2009. Landowners Robert Mondavi Winery and Martha's Vineyard provided irrigation and funded the labor to install the native plants.

8. Rector and Conn Creeks: The project began in 2007, removing non-native, invasive acacia, giant reed, eucalyptus, tree-of-heaven, black locust, Himalayan blackberry, blue periwinkle, and fennel from several miles of Rector and Conn Creeks, tributaries to the Napa River. The sites were then re-vegetated with native plants beginning in 2008. The first planting on the alluvial fan section of Rector Creek suffered during a dry spring and hot summer. A replant in 2010 has improved survival, despite the difficulties of planting on an alluvial fan. The landowners Beringer Vineyards and Charles Krug Winery provide irrigation to the native plants and funded the labor to install the native plants.

Riparian Corridor Restoration :Lessons Learned

- Invasive plants are persistent; eradicating them requires repeated herbicide treatments and consistent vigilance.
- Arundo treatment methods have evolved from cut and burn or chip, to cut and paint with herbicide, to spray in the fall to bring the herbicide into the root system and stop growth.
- Re-plants on alluvial fans: use of early and reliable irrigation; deep-rooted, drought-adapted species; and larger plants will increase survival at these challenging sites.

Program Funding

The Napa River Oakville to Oak Knoll Restoration Plan was funded by the California State Water Resources Control Board and Napa County.

The riparian corridor restoration projects were and are funded from the following sources:
- CALFED Bay-Delta Authority Ecosystem Restoration Program
- California Department of Fish and Game.
- American Recovery and Reinvestment Act of 2009
- Clean Water State Revolving Fund
- California State Water Resources Control Board

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