ADDENDUM TO 'A CONCEPTUAL PLAN FOR THE STABILIZATION AND RESTORATION OF THE NAPA RIVER, RUTHERFORD REACH'

In December 2003 the Rutherford Dust Society published 'The Conceptual Plan for the Stabilization and Restoration of the Napa River, Rutherford Reach' (the plan). The plan covers approximately four miles of the Napa River that lay within the Rutherford Appellation. However, the plan stops at a location approximately 0.6 miles north of Oakville Cross Road Bridge, which forms a natural boundary for the restoration effort. This addendum uses the same field and analytical techniques to extend the geomorphic assessment and conceptual design downstream from the southern boundary of the Rutherford Reach (the Cakebread property on the west bank and the Laird property on the east bank) to Oakville Cross Road Bridge.

1.1.1.1 Reach 9

From Oakville Cross Road to the southern boundary of the Cakebread property (west bank) and the Laird property (east bank).
This reach is 3,200 feet long. The reach is largely in Stage 4, with evidence of channel widening on both sides of the river, but with sub-reaches in Stage 5 where point bars and low floodplain have developed. There is bank toe and top of bank erosion in most parts of the reach, and much of the reach has been treated with loose riprap. The channel is dominated by a series of long, uniform glides with impaired aquatic habitat. There is a significant shortage of riffle habitat and a slight shortage of deep pools. The bed is gravel with infilling from fine sediment. In general the banks on the west side are steeper and more erosion-prone than those on the east side, which often have high flow terraces and more mature riparian vegetation. Although the channel is overdeepened and would benefit from regrading or terracing, there are numerous mature trees that present a partial constraint on channel and bank reshaping.

No action alternative
Under the no action alternative this reach will continue to erode its banks until it widens to the point where excess erosive energy is dispersed on the newly formed floodplain. This will result in loss of land and riparian canopy cover, and will generate excess fine sediment into this reach and downstream. We estimate that natural recovery will take 50 to 100 years.

Local hard bank stabilization
Hard bank stabilization will reduce the rate of bank erosion, and associated problems, but will not solve the underlying problem of confined flow conditions. In the Stage 4 sub reach reducing the ability of the river to expend excess energy on the banks may lead to increased vertical scour of the bed, creating deep continuous pools and potentially undermining the banks further. It will also potentially pass the problem downstream to unprotected reaches.

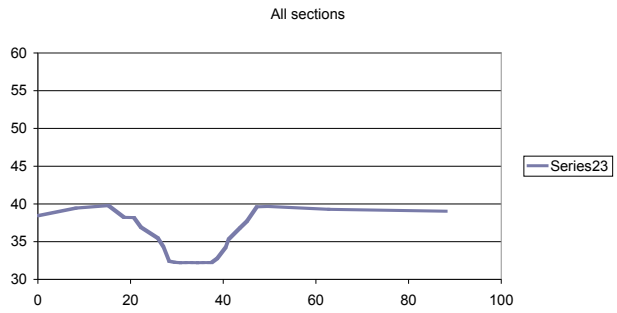
Banktop setbacks and regrading
Setbacks will provide the river with sufficient width to create a new floodplain, relieving erosive energy during high flows and so returning erosion (and subsequent downstream sedimentation) rates to natural levels. Setbacks will allow a sustainable river corridor to develop, and will lead to more diverse channel conditions with long continuous pools replaced by riffle-pool sequences. However, while banktop setbacks will directly solving the underlying problem in this reach, a program of full levee setbacks here will damage or destroy the existing riparian corridor where it exists. In some portions of Reach 9 the riparian corridor is wide and ecologically valuable, providing shade and habitat. Setbacks will also carry a high economic cost, due to construction and loss of land.

Biotechnical protection
Biotechnical protection that successfully prevents bank erosion poses the same risks as outlined for hard protection; though locally more environmentally friendly than hard protection, biotechnical protection in this reach will not solve the underlying problem of excess erosive energy. However, in some sub-reaches where there are erosion hotspots, such as the eroding outside bend in the middle portion of the reach, local biotechnical protection would have beneficial effects at absorbing energy and reducing erosion without deflecting erosive stress onto neighboring banks. In-stream biotechnical structures such as log weirs could also increase channel habitat diversity by creating local patterns of deposition and scour. The advantage of using biotechnical solutions rather than extensive setbacks in this reach is that they preserve the existing riparian corridor, which would be severely impacted or destroyed by extensive setbacks or bank regrading.

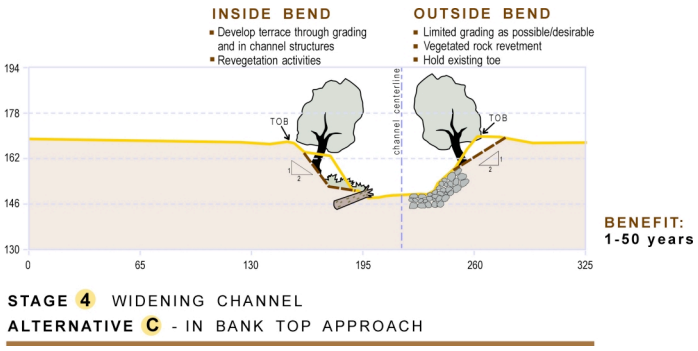
The preferred alternative restoration approach
We recommend a combination of biotechnical stabilization of local areas of high erosion, use of biotechnical structures such as weirs to increase channel diversity, and limited bank setbacks where constraints allow, with the objective of reducing overall erosive forces in the reach and increasing channel habitat potential. All work should be accompanied by revegetation using appropriate native species. The recommended restoration conceptual alternative is 4C and 5C (see pages 39-40 of conceptual plan), and limited 4D and 5D. The proposed alternative would restore more natural function to the river while working within the constraints of preserving the mature riparian canopy.

Oakville Cross Road Bridge
Oakville Cross Road Bridge lies at the downstream end of Reach 9, and forms an important boundary to the restoration project. There appears to have been a total of 2-4 ft of scour under the bridge piers since the bridge was constructed, and a larger depth of scour downstream. The initial scour under the bridge has probably already migrated upstream. Headward migration of the deeper scour below the bridge could threaten the project upstream. Based on an alder tree growing around the base of the pier (see photo) we believe that the piers have eroded by approximately 2 feet in the last 10-20 years. This is consistent with channel incision noted upstream. Currently the bed of the channel is loosely armored with riprap. The riprap is in poor condition and does not appear to have any kind of cut-off sill or impermeable liner to prevent piping of substrate through the riprap. We are therefore concerned that the downstream scour could migrate through the

bridge, causing channel incision upstream. We recommend that a grade control structure with step-pools to facilitate fish passage be included in this location to preserve the efforts of the Rutherford Reach restoration and the Oakville to Rutherford restoration.



Typical cross section



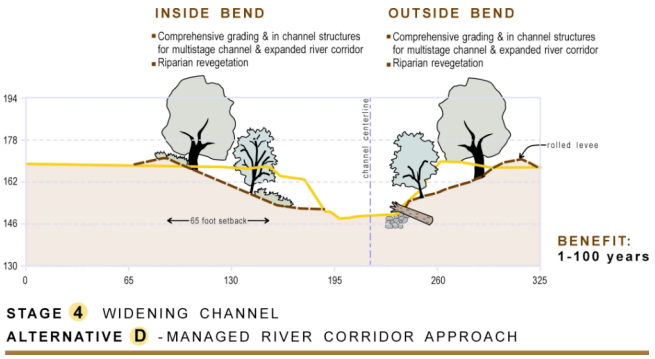


Figure 1. Typical existing conditions and conceptual design for Reach 9

Scour around the pier of Oakville Cross Road Bridge showing an estimated 2 feet or erosion in 10-20 years, and up to 4 feet of erosion since construction.