

## 4.5 Engineered Streambank Restoration

Traditional structural controls, such as the use of rip-rap to armor banks, attempt to stop erosion only at that one specific site and are rarely part of a comprehensive streambank management plan. Structural controls can fail because of problems that are occurring upstream or downstream on the river. These types of controls can also cause problems for others landowners. What if you put in a rock weir to move the river away from your bank, only to cause massive erosion for your neighbor across the way? In addition, structural controls are not necessarily designed to improve the overall health and function of the river.



Engineered restoration by The Nature Conservancy

***Engineered streambank restoration is prohibitively expensive for the majority of private landowners. Prevention of streambank erosion through protection of the riparian buffer zone is the cheapest and most effective route to a stable waterway.***

A new technique which has been highly effective on the Kings River and around the United States is Natural Channel Design (NCD). NCD is a restoration strategy that is based on the individual river's water flow, sediment load, and channel structure. Restoration includes a broad range of measures, including the removal of the watershed disturbances that are causing stream instability; installation of structures and planting of vegetation to protect streambanks and provide habitat; and the reshaping or replacement of unstable stream reaches into appropriately designed functional streams and associated floodplains. Best of all, these designs treat the underlying causes for streambank erosion, and not just the symptoms.

The **Toe-Wood** structure incorporates large native hardwood tree material with root wads intact into a submerged undercut bank to replicate natural river banks. Soil lift benches constructed above the root-wad logs allow for flood relief at critical stages of the rising flood. These soil lifts can then be seeded, secured with high shear stress jute matting, and heavily planted with transplants of native species like willows, alders, sycamores, and river birch trees. This dense network of woody transplants provides a solid protected bank as well as immediate fish habitat.

The **J-Hook** structure is an upstream directed, gently sloping structure composed of native boulders. The structure is located on the outside of the river bend where high velocity flows generate stress on outer banks. This structure creates an area of calmer backwater near the bank and a scour pool to dissipate energy and provide cover for fish.