2012 – 2013 Hurricane Flats Farm Riverbank Restoration Project

Project goal: Our goal is to restore 300-feet of eroding riverbank on the main stem of the White River at Hurricane Flats Farm in South Royalton while improving water quality, habitat, and flood resiliency.

Project background: Following Tropical Storm Irene, Hurricane Flats Farm owners Geo Honigford and Sharon O'Connor contacted the White River Partnership (WRP) about options for restoring 300-feet of eroding riverbank without using large stone (also called rip rap). The WRP coordinated a site visit with US Forest Service Watershed Restoration Geologist Bob Gubernick who offered to design a restoration project utilizing natural materials founds on site. The WRP gathered survey data to inform the project design; secured grant funds and other donations to cover project costs; engaged a number of local, state, and federal partners to help implement the project (see list below); and coordinated project implementation. Stage 1 (the upstream 150 feet) was completed in October 2012 and Stage 2 (the downstream 150 feet) was completed in August 2013.

Project partners: Hurricane Flats Farm, White River Partnership, US Forest Service, US Fish & Wildlife Service, US Army Corps of Engineers, Vermont Agency of Natural Resources, Vermont Watershed Grants Program, Vermont Youth Conservation Corps (VYCC), Greater Upper Valley Chapter of Trout Unlimited, Clean Water Future donors, Ben Canonica (contractor)

Project design:

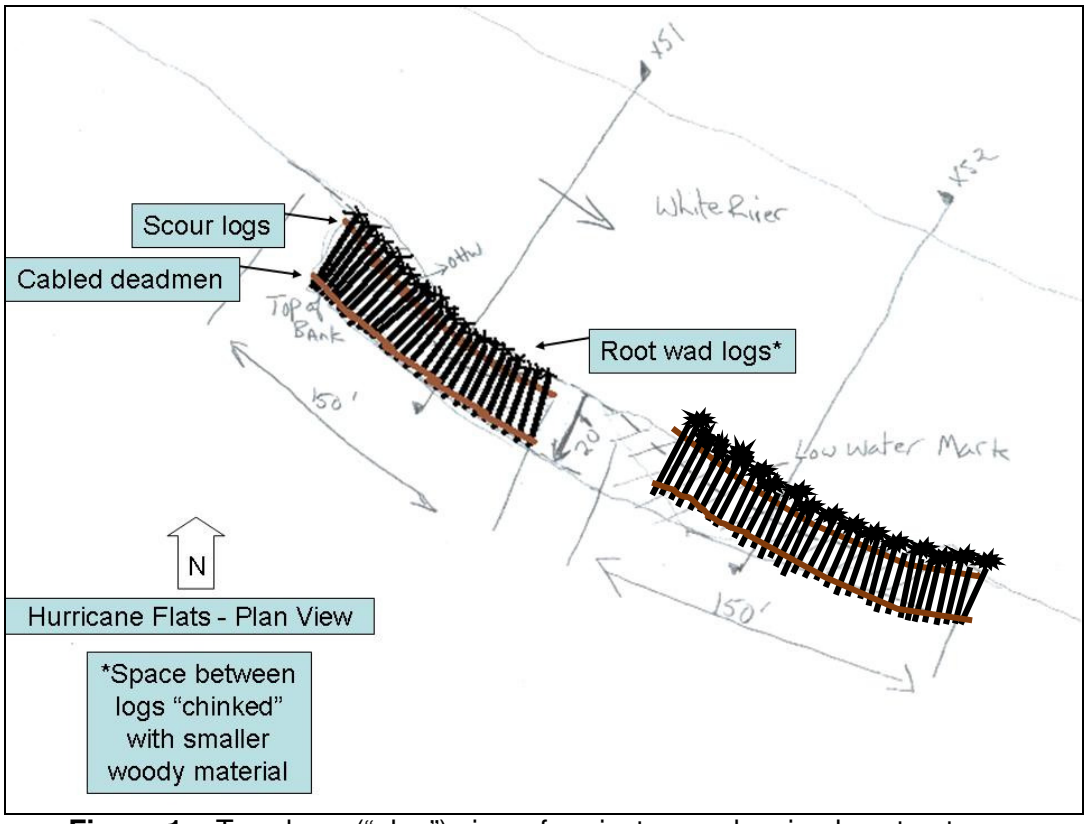

Figure 1 – Top-down ("plan") view of project area showing log structures.

Project description: The project incorporates three "**bioengineering**" techniques to restore the eroding riverbank: 1) "**log structures**" to restore the bottom of the bank; 2) "**soil lifts**" to restore the face of the bank; and 3) "**riparian**" plantings to restore the top of the bank. Bioengineering refers to the installation of a living structure for erosion, sediment, and flood control. In this case, the project utilizes tree trunks, smaller logs and branches, coconut fiber or "**coir**" fabric, shrub willow, and bare-root trees to rebuild the riverbank; to capture sediment; and to create diverse habitat for fish and wildlife.

To restore the bottom of the bank, project partners installed log structures at the low-water elevation. First the contractor excavated the site to the correct elevation, then placed tree trunks called "**scour logs**" parallel to the river and 5-feet back from the river's edge. On top of the scour logs, the contractor placed 20-foot sections of tree trunks with roots attached called "**root wads**" perpendicular to the river's edge. Volunteers filled the gaps between the root wads with small logs. To complete the log structure, the contractor placed a single row of logs called "**deadmen**" perpendicular to the back edge of the root wads, which were anchored in place with steel cable (see Figure 2 below).

To restore the face of the bank, the contractor installed a series of three soil lifts. First the contractor covered the log structure with a layer of dirt. Next volunteers rolled out coir fabric 160 feet-long by 13-feet-wide on top of the dirt layer. The contractor compacted 2 feet of soil on top of the fabric, then volunteers wrapped the fabric over the compacted soil and used shrub willow stakes to hold the fabric in place. This process was repeated twice, resulting in three soil lifts. Between each soil lift, volunteers placed shrub willow cuttings (see Figure 3 below) and smaller logs called "**ice fenders**" that deflect ice and debris at high water flows.

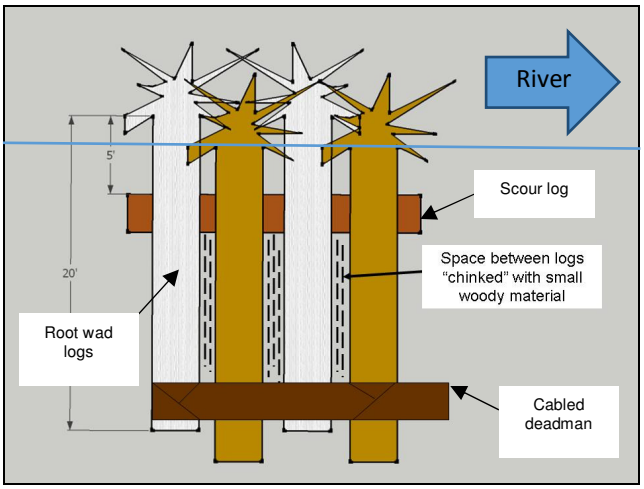

Figure 2 – Top-down view of log structure.

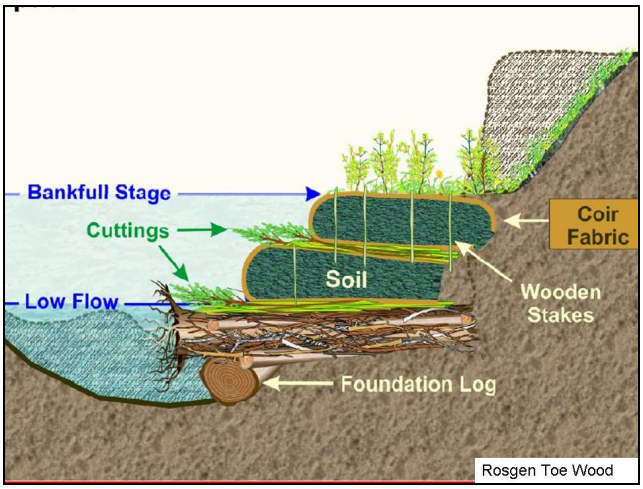

Figure 3 – Cross-section view of soil lifts.

To restore the top of the bank, the contractor prepared the site for a riparian (or riverside) planting. First the contractor compacted soil on top of the soil lifts, which volunteers seeded and mulched. Students and community volunteers planted native bare-root trees 35-feet back into the farm field above the Stage 1 site in spring 2013, and will repeat the process above the Stage 2 site in spring 2014 to complete the project.

Expenses: Project expenses included material costs (logs, steel cable/bolts, coir fabric, willows, seed/mulch, trees) and labor costs (contractor time, VYCC crew time, WRP Project Manager time). Direct costs, including coir fabric, seed, contractor time, and WRP Project Manager time, were funded by grants from the US Forest Service and Vermont Watershed Grants Program and by contributions from the Greater Upper Valley Chapter of Trout Unlimited and Clean Water Future donors. Logs, willows, and mulch hay were donated by the landowner; steel cable/bolts and bare-root trees were donated by the US Fish & Wildlife Service; and the VYCC donated their crew time.