

The Upper Clark Fork River Streambank Stabilization Pilot Study

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In spring 1996, with funding from Atlantic Richfield Company (ARCO), the Riparian and Wetland Research Program (RWRP) in the School of Forestry at The University of Montana initiated a bank stabilization pilot study on the upper Clark Fork River

The objective of the study is to evaluate the effectiveness of "soft" streambank stabilization treatments to reduce the potential for bank erosion. The study treatment emphasize the use of native riparian vegetation instead of traditional, "hard" treatments which focus exclusively on riprap.



Treatments

Twenty-one different treatments were implemented on properties in fall 1996, spring 1997, summer 1997 and fall 1998 as part of the streambank stabilization pilot study. The 21 treatments, which incorporate many of the same materials, include the following:

- coir fabric and willow poles
- coir fabric, willow poles and log barbs
- coir fabric, rock barbs, rock toe and container plantings
- coir fabric, willow and red-osier dogwood fascine tow and container plantings
- coir fabric, coir fascine toe and container plantings
- container plantings
- Douglas fir revetments and willow stakes
- Rocky Mountain juniper revetments and willow stakes
- mature shrub transplants and willow stakes
- root wads, mature shrub transplants and container plantings
- rock barbs and mature shrub transplants

- layered coir fabric, container plantings and coir fascine toe
- layered coir fabric, container plantings, vertical willow stakes and rock toe
- layered coir fabric, container plantings and rock toe
- layered coir fabric, container plantings, root wads and coir fascine toe
- layered coir fabric, container plantings, root wads and coir fascine toe
- layered coir fabric, container plantings, vertical willow stakes and coir fascine toe
- gradient control installatio
- sod mats
- rip rap



Channel Morphology Measurements

A total of 140 permanently monumented cross sections have been measured since 1996. All cross sections were measured at 3, 4 or 5 ft intervals with two member teams using a laser level. Most cross sections (depending on time of treatment construction) were measured six times: before treatment construction, after treatment construction, after the 1996-97 and 1997-98 ice events and after the spring 1997 and 1998 runoffs.

Surface Profile Measurements

In March and August 1998, 100 bank surface profiles located on all study reaches were monitored to document changes in bank surface volume (cu yds) as a result of peak flow events. A two person crew consisting of a "rod person" and an "instrument person" conducted surface profile measurements with a Topcon GTS 211D surveying total station.

Vegetation Survival Monitoring

Monitoring of vegetation survival was performed for four types of plantings. These included: angled willow (*Salix* spp.) cuttings, vertical willow cuttings, mature shrub transplants and container plants (1G). These types of plantings were incorporated into 18 of the 21 treatments installed on 24 treatment areas in this study as of December 1998.



Results

- The change in bank volumes for all untreated (control) area was highly variable and occurred as both an erosional and depositional change. The rate of change appears to be dependent on the individual bank.
- Almost two-thirds of the control and treatment reaches did not experience a detectable change in surface volumes as a result of the 1998 peak flow event.
- Coir fabric seems to hold up well against ice and flow events when it has been secured at the toe. The coir fabric that was installed in all treatments where secured at the tow remained intact throughout the 1998 season.
- When vegetation is planted on the terrace back away from the bank and the bank is not adjusted (for example, sloped), the bank will initially continue to erode. Theoretically, this erosion will cease once the bank erodes to the point where it is stabilized by the roots of the vegetation.
- Surface volume calculations and cross-sectional data for the treatments with sloped bank with coir fabric, container plantings and rock, coir fascine or willow/red0osier dogwood fascines indicate that in 1998, these treatments experienced substantially less bank erosion than they had in 1997 prior to treatment implementation.
- Container plantings and mature transplants have superior survival to cuttings. In terms of their ability to survive planting, both container plantings and mature transplants seem to be a viable vegetative treatment for the upper Clark Fork River.
- Vertical poles have a higher survival rating than angled cuttings. The survival rates of vertical poles have dropped dramatically after the first year. After two years of monitoring, cuttings do not seem to be a promising vegetative treatment in terms of survival when placed on the terrace.