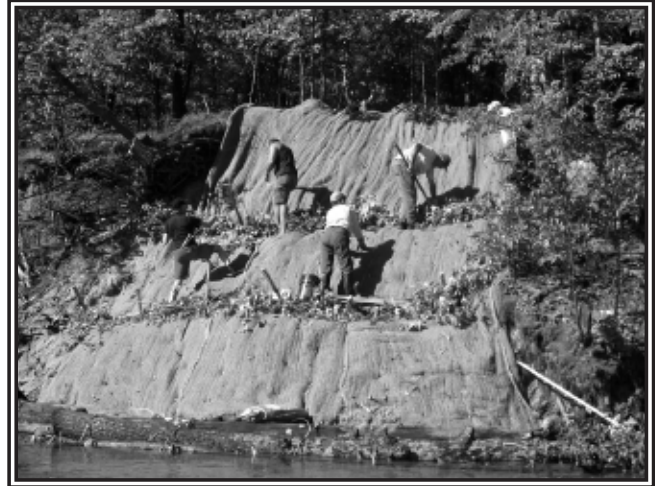


Rush Lake Erosion Research – *Part one of two*

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For decades, lakeshore owners and boaters on Rush Lake (part of the Whitefish Chain north of Brainerd) have viewed the steep, sandy, eroding banks of County and DNR Islands. Past efforts to stabilize these banks have been partially successful, but the erosion continued.

This summer, people on Rush Lake were greeted with a curious sight. The islands' steep slopes resembled a patchwork quilt of colors and logs nestled along the shorelines. The islands had become research sites, testing the effectiveness of several erosion control methods. Combining the successes of past erosion control efforts with new technology and techniques, several state and local agencies, organizations, and businesses coordinated and established this research project.



Slope Stabilization

The goal for stabilizing the upland slope area is to establish deep-rooted, drought-tolerant, native plants. To facilitate installation (every footstep generates a small landslide of sand) and create a favorable growing environment for the plants, bio-terraces were installed by anchoring several brush bundles along the slope. Native grass seed, flower seedlings, and bare root shrub and tree seedlings were planted. Four types of protective layers were also applied to the soil surface to minimize slope erosion and to hold moisture for the plants during establishment: one layer of coconut fiber blanket, two layers of coconut fiber blanket, Futera – a blanket of wood fiber material, and hydro-mulch – a fiber slurry mixed with the native seed and sprayed on the slope. The table below summarizes the cost and first-year plant establishment success for each of the four trials of protective layers.

During this initial year, Rush Lake Association members watered the site during periods of drought, aiding establishment of the plants. Sixty percent of the bare-root seedlings established well. While the success of the native

flower planting was evident, it is too early to comment on the success of the native grass seeding as very little growth is visible above ground the first year. Much of the plant cover on each plot at the end of this season consisted of annual weeds, native perennials that were not planted, and a few survivors of past planting efforts. A complete report of the project and subsequent updates can be found at www.extension.umn.edu/shoreland beginning January 2006. ■

Major Contributors

Rush Lake Association, Whitefish Area Property Owners Association, Crow Wing Soil and Water Conservation District, and University of Minnesota Extension Service, with significant financial support and contributions from the Minnesota Department of Natural Resources Shoreland Habitat Program, Pequot Sand and Gravel, Professional Lake Management, and Lakeside Lawn and Landscape Company.

Trial (each 600 sq. ft.)	Blanket & Bioterrace	Native Grass Seed (1#)	Native Flower Seedlings (45)	Percent Cover	Flower Survival
1 coco blanket	\$174	\$14	\$158	33%	90%
2 coco blankets	\$399	\$14	\$158	13%	64%
Futera blanket	\$ 96	\$14	\$158	45%	57%
Hydromulch	\$425	\$14	\$158	38%	64%

Rush Lake Erosion Research – *Part two of two*

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A long undisturbed shorelines, native plants or natural rock guard against erosion by waves and ice. The research sites on County and DNR islands in Rush Lake are eroding primarily due to historic water level changes as well as increased size and frequency of boat wakes. These factors have made it difficult for native plants to reestablish.

Multiple goals were considered in the design of this portion of the Rush Lake project: provide long-term, no-maintenance stabilization of the slope toe, discourage boater foot traffic on the steep slopes above, and create fish and wildlife habitat.

Toe Stabilization – Where Land Meets Water

Six toe protection methods were tested on Rush Lake:

Live fascine - a 1-foot diameter bundle of willow and red-osier dogwood branches backed with geotextile and held in place with wooden stakes pounded through the bundles.

Cocoa log - a woven jute sock 1 foot in diameter filled with compressed cocoa fibers. The sock is held in place with nylon rope attached to wood stakes or cable attached to duckbill anchors. Live

Rock gabion tubes - 1.25 diameter tube of 4-8 inch diameter rock surrounded by chain link fencing (secured with tiger ties) and backed with geotextile.

Anchored log rafts - bundles of 3 to 5 logs anchored along the shore with a cable attached to duckbill anchors.

Stump revetment - large stumps placed so that they overlap with roots facing the lake.

Rock rip rap - a layer of 8-12 inch diameter rock placed over geotextile.

The table below summarizes the cost, installation time, maintenance time, and effectiveness of each treatment after one year.

Toe Treatment (20 linear ft.)	Cost	Installation Time	Maintenance Time	Effectiveness
Live fascine	\$ 9	1.5 hrs	0 hrs	No erosion, plants root and sprout
Cocoa log (wood stake) (duckbill anchor)	\$157 \$267	0.5 hr 1 hr	1.5 hrs	No erosion, cabled log replaced live fascine
Rock gabion tube	\$ 97	2.5 hrs	0 hrs	No erosion
Anchored log rafts	\$206	5 hrs	3 hrs	Minor erosion in gaps between rafts
Stump revetment	\$136	0 hrs	0 hrs	Moderate erosion between stumps
Rock rip rap	\$1,800	0 hrs	0 hrs	No erosion

During this initial year, all toe treatments, except for the anchored log rafts and the stump revetments, were effective at stopping erosion. The anchored log rafts were very problematic in that several duckbill anchors did not hold, allowing logs to work loose from the rafts and pose a hazard to boaters. This was corrected by replacing the duckbill anchors with earth anchors, as well as loosely fastening the cables to the logs with fencing staples.

Continued erosion behind the stump revetment was due to waves washing between the widely spaced stumps.

A tighter stump placement may diminish this erosion. In addition, wave action working on the cabled cocoa log cut the log in several pieces. It was replaced with a live fascine.

Our Minnesota winter will continue to test these toe treatments over the next few months. Look for a more detailed report and project updates on www.extension.umn.edu/shoreland beginning in January 2006. ■