



Figure 9. Example 1: pre-installation and planting.



Figure 11. Example 2: pre-installation and planting.



Figure 10. Example 1: post-planting shoreland restoration.



Figure 12. Example 2: Post-installation with straw matting and native plantings.

Partner contacts:

1. Mike Meyer/Wisconsin Department of Natural Resources-Bureau of Integrated Science Services/107 Sutliff Avenue/Rhineland/ WI/54501-3349/ < Michael.Meyer@Wisconsin.gov >;
2. Dan Haskell/Michigan Technical University/School of Forest Resources & Environmental Science/1400 Townsend Drive/Houghton/ MI/49931-1295/< dehaskel@mtu.edu >;
3. Carolyn Scholl/Vilas County Land and Water Conservation Department/330 Court Street/Eagle River/WI/54521/ < cascho@co.vilas.wi.us >;
4. Stacy Dehne/Department of Agriculture, Trade and Consumer Protection/610 3rd Avenue South, Suite A/Park Falls/WI/54552/ < Stacy.Dehne@Wisconsin.gov >;
5. Brent Hanson/Hanson's Garden Village/2660 Cty. Hwy. G/Rhineland/WI/54501/< hansonbs@newnorth.net >;
6. Patrick Goggin & Bob Korth/ WI Lakes Partnership, UW-Extension Lakes/UW-Stevens Point, College of Natural Resources/800 Reserve Street/Stevens Point, WI/54481/< pgoggin@uwsp.edu >/< bkorth@uwsp.edu >.

Special thanks are extended to the partners, cooperators and advisors of this project: shoreland property owners on Found Lake and in the future; Chuck Thier and the Found Lake Association; Vilas County Lakes Association (VCLA) < <http://vcla.us/index.php> >; Vilas County Board of Supervisors and Land and Water Conservation Committee/Department < <http://vilaslandandwater.org/> >; Hanson's Garden Village < <http://www.hansonsgardenvillage.com/> >; Northern Lakes Landscaping, Inc. < www.northernlakeslandscaping.com >; UW-Extension Lakes, College of Natural Resources UW-Stevens Point < <http://www.uwsp.edu/uwexlakes/> >; Wisconsin Department of Natural Resources < <http://www.dnr.state.wi.us> >; and the Wisconsin Association of Lakes (WAL) < <http://www.wisconsinlakes.org/> >. For more information on this project, contact Patrick Goggin with UW-Extension Lakes via e-mail at < pgoggin@uwsp.edu >.

WISCONSIN
LAKES
PARTNERSHIP
< [HTTP://WWW.UWSP.EDU/
CNR/UWEXLAKES/ABOUT/
PARTNERSHIP_FACTSHEET.PDF](http://www.uwsp.edu/CNR/UWEXLAKES/ABOUT/PARTNERSHIP_FACTSHEET.PDF) >



Wisconsin Lakeshore Restoration Project - Advanced Lake Leaders Session

September
2009

SUMMARY

Recent studies conducted on several lakes in northern Wisconsin have documented alteration of riparian habitat. The alteration is primarily due to riparian housing development. It has resulted in negative changes to native plant communities, simplification of habitat structure, and adjustments to fish, amphibian, and bird populations. This study has riparian habitat conservation projects underway on several lakes in northcentral Wisconsin with the goal of quantifying the ecological benefits of the restoration via biotic surveys. The project focuses on a sample of six lakes with significant habitat impacts and private landowners willing to participate. Incentives are offered to recruit participants. The study includes a control of similar lakes that do not receive restoration efforts. Site-specific conservation plans are developed for property owners within the treatment shorelines. Restoration activities include: native vegetation plantings in the terrestrial buffer and near-shore littoral zones; removal of unwanted species; placement of physical structures and coarse woody habitat to reduce erosion and run-off; and other management techniques designed to enhance wildlife diversity and abundance. Each developed lake is paired with an undeveloped (reference) lake. Pre-restoration (baseline) and post-restoration quadrant and transect measures are made at paired reference (undeveloped), control (developed, no restoration), and impact (developed, with restoration) shorelines using the Before-After-Control-Impact-Paired (BACIP) design. Surveys quantify relative abundance and diversity of native vegetation, herptiles, breeding birds, small mammals, and furbearers, and will recur periodically for a minimum of ten years. Results are designed to assist development of best management practices for riparian habitat mitigation efforts throughout Wisconsin.

1. DAN HASKELL, MICHIGAN TECHNICAL UNIVERSITY (MTU)
2. MIKE MEYER, WISCONSIN DEPARTMENT OF NATURAL RESOURCES (WDNR)
3. CAROLYN SCHOLL, VILAS COUNTY LAND AND WATER CONSERVATION DEPARTMENT (VCLWCD)
4. STACY DEHNE, DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION (DATCP)
5. BRENT HANSON, HANSON'S GARDEN VILLAGE
6. PATRICK GOGGIN/BOB KORTH, WI LAKES PARTNERSHIP, UW-EXTENSION LAKES



Study background

For many of us, our lakeshore represents the sweep of one's heart, a place filled with memories of growing up, catching fish, watching frogs and whiling away the sweet summer days. For the past decade, the domestication of our shorelands has altered the character of our shores in a negative way, but change is afoot.

People around Wisconsin have been rethinking what is best for the lakes, and for their families, and taking on the task of restoring their shorelands to a natural state. Lake residents and organizations, natural resource agencies from the Wisconsin Department of Natural Resources (DNR) to local land conservation committees, as well as tribal entities, energy companies, and businesses such as resorts and restaurants, have all embraced the idea of restoring shoreland buffers. A lot of great things can come from this effort. If restoration improves wildlife habitat, then there is more for our families to enjoy. If a shoreland buffer enhances water quality, then it helps our lakes become healthier and more satisfying for everyone.



Found Lake, Vilas County, Wisconsin, USA

This research and management project is measuring the value of fish and wildlife habitat restoration on northern Wisconsin lakes. It will implement shoreland habitat restoration on a sample of lakes. The project in 2007-2008 has developed site-specific conservation plans and management recommendations for 14 lakeshore property owners on Found Lake, Vilas County, U.S.A. The project compares and contrasts habitat and water quality measurements between developed and undeveloped lakes. Four developed lakes will get significant stretches of shoreland buffer restored. Pre- and post-restoration baseline data from these lakes will then be compared with untreated controlled sites on the same lake and to reference sites on undeveloped lakes with similar characteristics like chemistry, size, type, and landscape positioning.

So what is the study measuring?

- Biotic surveys including baseline inventories pre- and post-restoration;
- Relative abundance and the diversity of native vegetation;
- Surveys for herptiles, breeding birds, small mammals, and furbearers both initially and then repeated annually over the ten-year period of the study.

Native plants / work horse species

10' X 10' sites at multiple restorations were planted with a mix of several "work horse" shoreland species including the shrubs snowberry (*Symphoricarpos albus*) and sweet fern (*Comptonia peregrina*), a little bluestem grass (*Schizachyrium scoparium*), and the wildflowers big-leaf aster (*Aster macrophyllus*), columbine (*Aquilegia canadensis*), pearly everlasting (*Anaphalis margaritacea*), barren's strawberry (*Waldsteinia fragarioides*), and bergamot (*Monarda fistulosa*). Each plant was labeled with a permanent marker and their success will be tracked over the ten year period of the study.

The project also includes a shrub comparison study between bare root gravel culture plants versus 3-5 gallon containerized material. The pairings are planted in the same shoreland area, then marked and tagged for long-term monitoring.

Assorted shoreland erosion control techniques are being compared and contrasted on Found Lake sites including the following examples:



Fall color of native low-bush blueberry, *Vaccinium angustifolium*.

Erosion control effectiveness



Figure 2. Biologs.



Figure 4. ShoreSox®.



Figure 6. EnviroLok® bags.



Figure 1. Soil lifts.



Figure 3. Straw matting with plantings.



Figure 5. Straw matting replaces an asphalt boat landing.

Down woody material (DWM) habitat assessment

The project examines the use of down woody material (DWM) on restored plantings. Researchers monitor changes in soil temperature and moisture between sites with no wood on the ground, 25% DWM, and 50% DWM. To date, the mean maximum soil temperature, temperature variation, and change in soil moisture content were significantly lower in the 25% and 50% DWM plots. No difference in plant survival was identified, but snowberry (*Symphoricarpos albus*) and barren's strawberry (*Waldsteinia fragarioides*) growth was significantly greater in the DWM plots.



Figure 7. 25 % down woody material.



Figure 8. 50 % down woody material.

Lessons learned / emerging conclusions / transferability

- A holistic partnership involving a myriad of agencies, people and talents is crucial to our success;
- A formalized and significant watering regime during the first growing season initially took a lot of time and effort (I.E., portable pumps; drought conditions; sugar-sand soils; water sources; etc.); we underestimated total demand of this dimension to our partnership;
- Preliminary cost breakdowns are ~\$50 and \$100 per linear foot of restored buffer back 35 feet depending on the involvement level of the landowners, staff support, planting labor, watering, etc.
- Biocontrol and erosion control techniques can be costly and logistically challenging;
- Landowners are vital to making this partnership work over the ten-year period of the study;
- Creating a reliable funding mechanism for the ten-year duration of the study between multiple agencies is an ongoing hurdle to overcome;
- Finding willing landowners to participate in the lakeshore restoration process is a continuing issue;
- We know that 200 ft. [or greater] lot sizes typically provide landowners with enough room to live on the lake comfortably while still maintaining adequate wildlife habitat and suitable water quality;
- Fencing native plantings is crucial to allowing the plants to establish viable roots to resist heavy browsing pressure from deer, rabbits, and other critters;
- Building local expertise with contractors and nurseries for effective shoreland buffer designs and installations will be a priority into the future.
- A higher diversity of mammals is being detected on low-development lakes when compared to high-development lakes--coyotes were the most numerous species detected with the majority encountered on low-development lakes--white-tailed deer and red fox were more abundant on high-development lakes--high-development lakes are having a negative affect on the mammal community in this area;
- Baseline data for bird and small mammal community diversity and abundance and on vegetation structure is being collected over the long-term study.