Restoring Lakeshore Habitat on Little St. Germain Lake, Vilas County

Developing Best Management Practices and Evaluating the Ecological and Water Quality Benefits.

A Final Report Prepared by:

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Executive Summary

Little St. Germain Lake (LSG) located in Vilas County, Wisconsin, is one of 21 impoundments operated by Wisconsin Valley Improvement Company, originally to float cut timber downstream to mills, now mostly to provide seasonal water storage for downstream power, industry, and recreational use. The level of Little St. Germain, which was dammed in 1882, has been maintained about 5 feet above its natural level since 1929, and is annually drawn down about 1.5 feet from December – March.

A healthy lake ecosystem is a function of good water quality and intact lakeshore and aquatic habitat and food webs. Human alteration of lakeshore and aquatic habitat can result in changes to lake water quality (due to increased nutrient loading), decreases in native plant and animal species diversity, an increase in exotic invasive species, and changes in the populations of individual fish and wildlife species.

Water quality has recently declined across all basins of Little St. Germain – water clarity has decreased and algae blooms occur annually. Seasonal trends in water quality show that degradation occurs during the summer when phosphorus contributions from inflows are lower but internal phosphorus loading is elevated. The degraded water quality has negative impacts on aesthetics, fish populations, and aquatic plants, leading to lower enjoyment of the lake by residents and others who use the lake for these purposes. Long-term negative impacts on property values are also possible. While no solutions have been identified to rectify this problem, research conducted on northern Wisconsin lakes shows nutrient yield and overland runoff is lower along wooded shorelines as opposed to shorelines where natural vegetation has been replaced by managed lawns. Lakeshore habitat restoration has been proposed as a management practice to improve lake health by 1) increasing native plant abundance and diversity, 2) improving lakeshore habitat quality, 3) producing positive changes in wildlife abundance and diversity, 4) decreasing the presence of invasive species, and 5) reducing overland and nutrient runoff.

With grant support from the Little St. Germain Lake Protection and Rehabilitation District (WDNR Lake Protection grant LPT-344-1) WDNR Science Services, Michigan Technological University School of Forest Resources and Environmental Science, and regional environmental consultants implemented lakeshore habitat restorations at 6 private properties on LSG and is conducting long-term monitoring to quantify the ecological benefits of the restoration. Surveys were initiated to quantify the ecological benefits of lakeshore

habitat restoration for native plant communities and wildlife populations. Consultants developed methods with which to assess the impact of lakeshore habitat restoration on overland and nutrient runoff. Finally, experiments were conducted to develop Best Management Practices for lakeshore habitat restoration on LSG with applications regionally.

Measuring the Ecological Benefits of Lakeshore Habitat Restoration on Little St. Germain Lake 2010-2013

We developed site-specific management recommendations for LSG property owners who participated in the lakeshore habitat restoration program, completing restoration projects at six properties 2011-2012. Lakeshore habitat restoration occurred at over 1700' of developed lakeshore. Restoration activities included conservation and restoration of native vegetation, placement of physical structure such as downed trees and down woody material for fish and wildlife habitat, bank and toe erosion control with biodegradable materials, and other management techniques designed to reduce overland erosion and nutrient runoff. Habitat and wildlife surveys were conducted prior to commencement of restoration efforts, including baseline measures of relative abundance and diversity of native vegetation, pollinators (bees), birds, and small mammals. Physical characteristics of habitat such as vegetation structure and canopy closure were also measured. These measures will be repeated during the next 10 years to document changes as the projects mature. Results collected at the LSG restorations are compiled with data from completed projects at Moon, Found, Crystal, and Lost Lakes, Vilas County to assess whether lakeshore habitat restoration results in positive benefits to lake health in the Northern Highlands Ecological Landscape.

Landowner Participation - We recruited LSG property owners interested in participating in the Wisconsin Shoreland Restoration Project by conducting educational workshops and mailing educational materials/flyers in 2009 and 2010. We found interest in the project low among the 425 lake district property owners, despite the no-cost/no-labor investment on their behalf. Four property owners enrolled a total of 6 lakeshore parcels in the project, allowing us to meet our restoration objectives. The low level of enrollment may have been a consequence of required temporary (3-year) deer-proof fencing around restoration projects, follow-up visits by researchers for maintenance and periodic wildlife and vegetation surveys, and a restrictive covenant on the property deed protecting the restoration going forward. Also, landowners may have been deterred from participation due to the involvement of WDNR in the project

(see Comments from Participants, Page 13). Finding local, trusted on-lake champions of lakeshore rehabilitation work such as lake association officers, private sector business owners, or master gardeners can make for effective peer-to-peer learning and project buy-in. An effort initiated from the "grassroots" may yield greater participation than one initiated and sponsored by WDNR.

Restoration Activities - In the spring and summer months of 2011,187 trees, 1014 shrubs, two vines, 65 ferns, 4000 forbs and grasses and sedges were planted within the 35′ buffer zone along approximately 500′ of linear lakeshore on two privately owned LSG properties. In the spring and summer months of 2012, 542 trees, 1510 shrubs, eight vines, 93 ferns, 6000 forbs, grasses and sedges were planted within the 35′ buffer zone along approximately 1200′ of linear lakeshore on four privately owned properties. Geotextile bag walls and erosion control blankets were installed to reduce bank erosion and coconut coir biologs were used to reduce toe erosion. Rain gardens were installed to reduce runoff from impervious surfaces and tree drops were created to enhance fish habitat and reduce bank undercutting from wave action.

Measuring Ecological Benefits - Experimental Design - A habitat and wildlife sampling design was implemented to compare habitat and wildlife endpoints measured along 250 m of the "Treated" (developed/to be restored) lakeshore with those measured at 250 m of the "Control" (developed/unrestored) lakeshore on LSG Lake, as well as an additional 250 meters of lakeshore on Star Lake which is in state ownership (undeveloped "Reference" lakeshore). Star Lake was paired with LSG Lake on the basis of similar lake characteristics (surface area, substrate, and lake type) as well as aspect, fetch, and slope, but having low levels of housing development.

Vegetation and Habitat Surveys Prior to Restorations - We found a greater number of trees within vegetation plots on the reference transect (Star Lake, Vilas County) as compared to the LSG treated (developed/to be restored) and LSG control (developed/no restoration) vegetation plots prior to restoration activities. Sapling numbers were also higher on the Star Lake reference transect, the majority being conifers. There were no shrubs detected on either the control or treated transects on LSG prior to restoration, while there were two species of shrub detected on the reference site on Star Lake; 9 sweet fern (Comptonia

peregrina) and 23 tag alders (Alnus rugosa) for a total of 32 shrubs. Habitat measures show the canopy was more open at the LSG control and treated transects prior to restoration compared to the Star Lake reference transect, and the understory (shrubs and saplings) is less dense at LSG control and treated transects than at the Star Lake reference shore transect. We will measure vegetation and habitat parameters again in the same vegetation plots in 2014, 2 years after LSG restoration planting has been completed.

Preliminary data from Wildlife Surveys 2010-2013 - Breeding bird and small mammal surveys were initiated on the LSG treated and control transects and the Star Lake reference transect in 2011, and will continue as the restoration projects mature on the LSG treated transect. We recorded 19 ground and shrub nesting bird species on the Star reference transect compared to 14 species and 12 species on the LSG control and treated transects respectively during 2011 and 2012 surveys. In addition, we recorded 41 insectivorous bird species on the Reference transect compared to the Treated and Control transects where 35 bird species were recorded on each transect. Overall, the diversity of bird species present was greater on the reference transect in 2011 and 2012; long-term monitoring is required to assess whether this trend continues, and whether diversity increases on the LSG treated transect. The small mammal surveys conducted 2011-2013 show a high amount of variability between years, with the total number of small mammals captured at all sites much higher in 2011 (86 captured) than in 2012 (24 captured) and 2013 (56 captured). Factors such as weather, predators, and population cycles can contribute to variability in small mammal abundance thus long-term measures will be required to discern whether restoration activities impact small mammal populations. A total of 8 species of small mammals were recorded. The early results do show a greater number of eastern chipmunks were captured on developed LSG lakeshore and a greater number of southern red-backed voles were captured on Star Lake reference transects. Finally, a pilot study was conducted on LSG treated and control transects in 2013 to develop methods with which to compare native bee (pollinator) populations post-restoration on LSG. “Bee-bowl” traps were deployed along these transects during 3 sampling intervals – one in May and two in June. During each sampling period a greater number of native bees (of 5 taxa) were collected at the treated transect, and diversity was higher. This difference may be attributed to habitat differences, however repeat measures at these sites, as well as replication of these methods at other restoration projects, is necessary to draw quantitative inferences.

Local Economic Impact - Materials and services purchased for the project ($103,000) supported jobs in local hardware stores, nurseries, gas stations, and landscaping companies. In addition, 15 seasonal student internships have been completed since 2011 to assist with wildlife surveys, habitat measurements and restoration activities. Also, environmental consultants were contracted to conduct botanical, wildlife, and water runoff surveys for this project. Furthermore, management activities which project water quality and lake habitat can positively affect lake front property values. Much is a stake on LSG – a recent evaluation of the assessed value of LSG lakeshore properties exceeds $175 million.

Feasibility Assessment – Testing Methods to Evaluate the Effectiveness of Lakeshore Habitat Restoration to Reduce Overland Runoff and Nutrient Loads from Developed Lakes in Northern Wisconsin

As part of the LSG Shoreland Restoration Project 2011-2013, consultants conducted a pilot study to develop and test a overland and nutrient runoff sampling methodology, modified from a USGS study (Graczyk et al., 2003). This method is necessary to determine how effective newly constructed lakeshore habitat buffers are at reducing overland runoff and nutrient loads to nearby water resources. The goal was to develop affordable methods which could be installed at several Vilas County restoration projects to document the effectiveness of lakeshore habitat restoration. A final report titled “Supplemental Report to WDNR: Little St. Germain Lake Protection Grant Restoration of Shoreland Habitat Project Final Report, November 1st, 2013 Re: Surface Water Runoff Volume and Nutrient Loading Surveys” describes the results of a pilot study and is available from the report authors. Excerpts from the report are in italics below:

> *Runoff collector design considerations included the practical needs for site customization and most importantly, to standardize performance so that the design and sample collection methods would produce comparable results across different sites (or treatment plots) within the study area. Additional considerations included a desire to stay within the current project budget and the interest to develop a low-cost prototype collector to measure overland runoff at multiple sites as part of an expanded future study. In practical terms, this omitted the purchase and installation of costly specialized instrumentation typical in large-scale runoff studies designed by the USGS.*

Three collectors were constructed and designed to represent a closed rainfall basin 50m2 in area approximating a true circle 4 meters in radius. The outer ring consisted of 83 feet of 6-inch plastic landscape edging buried and anchored to a 4-5" depth to enclose all rainfall (and irrigation) for available capture by the collector unit installed at the lowest elevation point of the circular plot. At the lowest end of each collector, a 2-inch PVC tee w/ cleanout couplers and sediment screens was installed inline to allow overland flow captured by the slotted pipe to drain to a centralized collecting tube that drained into a clean sampling vessel fabricated from a 3" x 33" Cellular-Core PVC pipe with end caps. The sampling vessel capacity is 3,500 milliliters (3.5 L) – later modified to increase capacity to 17 L.

In spring of 2012 and following the installation of the runoff collectors and edging, two of the experimental plots were "restored" to one of two plant stocking densities (Low- and High-density planting). A third plot received no additional plantings, however naturally occurring trees were present.

Visual observations of all three collectors over a period of 3 years showed no evidence of overland runoff flow over or under the plot edge barrier. From 2011 to fall of 2013, a total of six sampling events were conducted across all three plots (treatments) resulting in: 1) the water quality test results from Wisconsin State Lab of Hygiene analysis of runoff volume samples and 2) measurements of runoff volume per plot per collection period. Results are presented in Chapter 3.

This method offers a lower cost method for collecting overland runoff measures at lake shore sites. However the precision and accuracy of this approach requires evaluation before it can be considered as a method with which to compare overland runoff volume and nutrient loading at developed shorelines with restored lakeshore habitat buffers vs. developed shores without restored buffers. Simply stated, the precision of the collectors needs to be evaluated under controlled conditions. We recommend that overland runoff volume be evaluated under varying precipitation scenarios using controlled irrigation as the source – thereby varying the precipitation amount, duration, and intensity. The precision should also be evaluated using various ground cover substrates. The accuracy of the data also needs to be evaluated. Specifically, do these collectors model "real-world" lakeshore run-off scenarios? The physical forces associated with surface runoff at the landscape scale may or may not be generated within the bounds of the collectors – this should be evaluated. It could be that opening the upper boundary of the collectors will be necessary to intercept the surface water sheet flow generated by precipitation on the slope to be measured. These aspects should be considered in a controlled experimental laboratory environment.

In conclusion, the pilot study has resulted in a low cost method for measuring overland and nutrient runoff following natural or artificial precipitation events. However additional testing under controlled precipitation amounts and intensity, and on differing soil substrates, is required before the method should be considered a viable research tool.

Developing Best Management Practices for Lakeshore Habitat Restoration on Little St. Germain Lake and the Northern Highlands Ecological Landscape

Research continues as we develop Best Management Practices (BMP) for lakeshore habitat restoration on LSG and the NHEL. Here we present our preliminary BMP for LSG, including recommended steps for implementing a restoration. As additional research data is gathered, we will expand and finalize these recommendations, and extend them to the Northern Highlands Ecological Landscape, as many practices which work on LSG will have applicability throughout the region.

Pre-restoration Planning: A detailed restoration plan and map are crucial to a successful restoration project. A restoration map should be generated from careful notes taken in the field and through discussion with property owners. In addition, several photos should be taken on-site at various places in the restoration area, usually at the corners facing the restoration area, with multiple angles. These photos will be valuable when planning a restoration and for comparing before and after restoration activities. Once all information is collected this can be transferred to a detailed map of the area. Gridded map paper can be used to produce a product approximately to scale. Then restoration plants and erosion control techniques can be added to the final map. Several map copies should be made, with one being sent to landowner, and one to interested government agencies (state or county if permitting is required), as well as to the restoration practitioners installing the project. It is critical the landowner, restoration designer (if not the landowner), and practitioners installing the project are in complete understanding as to the map layout. Consultation on bank or shoreline toe erosion problems should be begin by contacting the local county conservation department and/or state agency as permits may be required. The permitting can take several days to months for approval so this should be done as soon as possible. Contact information

for Vilas County and Wisconsin DNR shoreland information, regulations and permit requirements can be found here:

- The Vilas County Land and Water Conservation contact number is 715-479-3682, the website is found at http://www.vilasconservation.org/
- The Vilas County Zoning Department contact number is 715-479-3620, the website and Vilas County Shoreland Ordinances are found at http://www.vilascountyzoning.com/ordinances.html
- The Wisconsin Department of Natural Resources Water Regulations and Zoning Specialist for Vilas County can be reached at 715-365-8991, the WDNR Shoreland Zoning website can be found at http://dnr.wi.gov/topic/ShorelandZoning/.

Planting Decisions: Plant densities used at the five Northern Highland Ecological Landscape (NHEL) lakeshore habitat restoration projects, including LSG, are based on the Wisconsin Biology Technical Note 1: Shoreland Habitat (NRCS 2002). The planting density includes 25 ground cover plants (forbs and grasses), three shrubs, and one tree per 100 ft^2 –the low end of densities prescribed by the technical note. The species of trees and shrubs to be planted at LSG restorations can be guided by examining the NHEL lakeshores which have not been developed for housing. On this basis, we suggest 40-50% of sapling trees planted on future LSG restoration projects be conifers - white pine and balsam fir to be used most frequently as these species are common and somewhat resistant to deer browsing. Deciduous trees that commonly occur on NHEL lakeshores and are available at local and state tree nurseries include red maple, red oak, paper birch, and chokecherry – a mix of which could total 60-70% of all deciduous saplings planted, and are listed in order of their frequency of occurrence. As for shrubs, nearshore we recommend using tag alder, Spirea, sweet gale, and red-osier dogwood (60-80% of those planted), with lesser quantities (<10%) for winterberry, mountain holly, and leatherleaf. For upland shrub species we recommend that 60-70% include a mix of hazel, serviceberry, honeysuckle, and upland dogwood species - other species to consider in small numbers include Salix and Vaccinium species. We have had good success using sweet fern and bearberry on steep, sandy slopes that are highly erodible. These species should be planted at higher densities (six/100 ft^2) as we have found they are adaptable to drier soils and can thrive on degraded and low nutrient soils. Ground cover species (forbs

and grasses) chosen will depend on site conditions and nursery availability; we recommend consulting with a local botanist, forestry personnel, and wildlife managers to develop a list.

Addition of Wood to Restorations: Since it may take decades for downed woody material (DWM) to naturally accumulate on lakeshores altered for housing, augmentation of DWM should be considered when planning restoration projects. DWM is critical to ecosystem function, provides habitat to a variety of wildlife, promotes plant health and growth, and provides nutrients to soils. Furthermore, the addition of DWM can reduce fluctuations of soil moisture and temperatures, thus reducing stress to new plantings. DWM should be obtained within 10 miles of the restoration site as so to use site-specific material and to reduce the risk of introducing disease (e.g., emerald ash borers, birch-leaf minor, oak wilt, etc.).

Plant Source: Gravel culture (GC) and spring bare root (BR) trees and shrubs should be considered for restoration projects. They reduce the cost of plant material yet often match grow rates of container (CT) plants. However, logistics need to be considered when using GC and BR. First and foremost, plant roots cannot be allowed to dry out during transport to the site and must be kept moist on site if not immediately planted. This can be accomplished by having a water tank of appropriate size to hold the GC plants, with the entire root ball submerged in water. For spring BR plants, roots can be kept moist by covering with damp wheat or oat straw and storing out of the sun until planting. Both GC and BR should be planted as soon as possible once they have arrived on site. Then once planted irrigation and mulch should be applied for an extended period of time. Of the GC species selection, and based on this study's results, hazel, serviceberry, dogwood, and black chokeberry would be good candidates for restoration activities. Contact study authors for a list of local GC vendors. As for BR species, and based on LSG results, all tree and shrub species from the list are good candidates with an emphasis on hazel, serviceberry, dogwood, black chokeberry, red oak, red maple, and paper birch. Preliminary results indicate GC conifers may be more robust than BR conifers, however continued monitoring of planted conifers is required to reach a definite conclusion.

Lake Bank and Toe Erosion Control: We recommend a geotextile bag system for stabilizing and establishing vegetation on steep, sandy slopes that are highly erodible. The newly installed bags require frequent irrigation to prevent bags and the plants between from drying,

and newly planted restorations should be irrigated thoroughly (at least 1" precipitation per week). The logistics of delivering and placing bags can be challenging as each weighs 50 – 80 lbs. Other techniques such as erosion control mats, both coconut coir and straw mats, in combination with geotextile bags can be beneficial in reducing runoff and establishing vegetation on less severe slopes. Straw mats degrade more quickly than coir logs or bags, thus may be more useful for establishing vegetation from seed rather than plug. The netting can persist but becomes buried in the duff over time. Snakes and amphibians have been reported ensnared by the material in other studies, however it was not observed on this study. Erosion control mats with biodegradable netting are available. If property owners chose to install a geotextile bag system we recommend consulting with a local landscaper who has experience with this technique. If erosion blankets are the choice, these can be installed by a capable landowner, but advice as to method of installation should be sought. In regard to toe erosion, the coconut coir log (e.g. biolog) works well in reducing toe erosion and establishing shoreline vegetation. The biolog is designed to degrade within 5-8 years at which time the native vegetation should be sufficiently established to stabilize the lake shore. A combination of earth anchors attached to steel cables and hardwood wooden stakes works well to secure biologs to the shoreline and lake bed. To properly secure biologs to the lakebed requires special tools and experienced personnel. Once biologs are installed, we recommend planting native wetland forbs, grasses, sedges and rushes between the biolog and shoreline, no farther than 30cm (12") apart. In addition, wetland shrubs such as red-osier dogwood, tag alder, spirea, sweet gale, and leather leaf should be planted every third plant. However, biologs have limitations at sites with high water level fluctuations (often due to dam control) - if waves over-top the biolog, the shore can be scoured from behind and beneath and the anchoring system undermined. This impact can also occur at lakes with long fetch distance, thus high wave action – which can be exacerbated by steep shorelines or in areas with much wake action from boating. Implementation and enforcement of no-wake zones can reduce wave damage to vulnerable shorelines. Additionally, biologs are susceptible to ice heaves during spring breakup, which can have a drastic effect on planted vegetation and the biolog itself. If the shoreline is susceptible to ice heave (which can be determined by contacting a private landscapers, county, or state lake management staff), a combination of rip-rap and biologs could be used, but will require a permit application and approval. Because of this requirement, we recommend property owners consult with experienced landscapers for guidance on permit application, selection of proper biolog size and type, as well as for the

actual installation. We successfully used tree drops at 4 LSG properties to reduced toe erosion, create fish habitat, and potentially assist in establishment of aquatic macrophyte beds. These techniques have been highly successful and popular to date. Landowners should consider this practice if appropriate for their property, however it is recommended that practitioners contract practitioners experienced in the technique. Also, an approved WDNR waterway permit is required prior to placement of tree drops – application materials can be found at WDNR website *http://dnr.wi.gov/topic/waterways/documents/permitdocs/gps/gp-treedrop.pdf*.

Irrigation: It is essential that newly planted restoration sites receive 1-2" of precipitation (either natural or by irrigation) weekly during the first growing season - even more if extremely hot and dry. The high amount of precipitation can reduce transplant shock which plants can experience. Irrigation should occur early in the early morning or after sunset to reduce evaporation. Restoration projects will benefit from an automatic irrigation system if practical. This will allow practitioners to program watering events. If it is not possible to obtain an automatic irrigation system then a small 110 volt electric or gas powered water pump can be used with the lake as the water source and garden hoses and sprinklers. However, this technique requires practitioners to visit restoration sites at least twice a week to operate pumps or recruit landowners or volunteers to monitor restoration sites and operate pumps. If a drilled well is available, and water use is not limiting, then a household sprinkling system can also be used.

Restoration damage from deer, cottontail rabbits, and snowshoe hare: We recommend using fencing to abate browsing by deer that often occurs on many developed lakes in Vilas County. The fence is a one-time purchase and the cost can be significant (approximately $2.60/foot), depending on the amount of fence needed – the entire area restored should be surrounded on all sides by the fencing for a minimum of 3 years. The fence may require maintenance periodically as trees and tree branches can fall and damage the fence. Developing a monitoring routine is critical – particularly if the property is only seasonally occupied. When used, deer repellent sprays need to be applied frequently as new plant growth emerges. We have observed that deer will become less deterred by repellents over time; therefore, switching repellents throughout the growing season and winter months is necessary. Additionally, we have noted where deer are fed by lake residents (corn,

salt/mineral blocks or livestock hay), deer densities are very high, often congregating the local herds within several properties. This concentration of deer can damage or kill a significant proportion of a restored lakeshore habitat, even when first protected by fencing (personal observations). We suggest that when lakeshore property owners initiate a restoration, they stop feeding the deer and suggest their neighbors curtail providing supplemental food for wildlife. Additional work is required to identify tree, shrub, and ground cover species that are less preferred by deer, but provide habitat value. No deer feeding should occur where lakeshore habitat restoration projects are underway – we recommend no deer feeding occur within a minimum of 500 feet of lakeshores to protect native trees, shrubs, saplings, and groundcover which are planted for wildlife habitat and landscaping.

Version – January 23, 2014

Recommendations to the Little St. Germain Lake Protection and Rehabilitation District

For all measured variables of water quality, the health of Little St. Germain Lake continues to worsen, with all lake basins showing declining trends in water clarity and increasing indices of eutrophication. This change in lake water quality threatens Little St. Germain lakeshore property values and poses a real threat to the health of the lake and its fishery, and to local tourism.

Several studies have evaluated the sources of nutrient enrichment to Little St. Germain Lake. A dam in the outlet of Little St. Germain Lake maintains water levels 5' above the natural shoreline and the lake experiences 1.5' seasonal water level fluctuations, "natural nutrient enrichment" occurs via the lake inlet (Muskellunge Creek), and seasonal remobilization of in-place sediment phosphorus results in extensive algae blooms. While no solutions have been identified to rectify this problem, research conducted on northern Wisconsin lakes (Graczyk et al. 2003) shows nutrient yield and overland run-off is lower along wooded shorelines as opposed to shorelines where natural vegetation has been replaced by managed lawns.

On the basis of these findings, we recommend to the Little St. Germain Lake Protection and Rehabilitation District that they promote lakeshore habitat restoration and conservation as a management practice to all Little St. Germain property owners. This practice alone will not resolve all water quality issues facing Little St. Germain Lake; however it will likely facilitate in reducing nutrient input while at the same time increasing the amount of wildlife and fish habitat.

The following action items are recommended to increase the practice of lakeshore habitat restoration and conservation on Little St. Germain Lake:

1. Onterra LLC produced a Town of St. Germain Lake Management Plan in which they mapped shoreland zone condition on 5 lakes in the town of St. Germain (Found, Lost, Lake Content, Big St. Germain, Fawn – Onterra LLC 2013, pages 31-32). This mapping should be conducted on Little St. Germain to identify portions of the lake most in need of lakeshore habitat restoration. Property owners should be provided with this shoreland condition map and those in the most impacted areas should be provided with restoration incentives and information.

2. The Final Report contains Preliminary Best Management Practices for restoring lakeshore habitat on Little St. Germain Lake (see Chapter 4). These practices should be shared with property owners interested in restoration, as well as a list of vendors with the capabilities of assisting in implementation.
3. White-tailed deer can damage lakeshore plant communities by over browsing. Feeding of deer can result in very high numbers of deer around developed lakes. No deer feeding should occur where shoreland restoration projects are underway – we recommend no deer feeding occur within a minimum of 500 feet of lakeshores to protect lakeshore habitat.
4. Vilas County Land and Water Conservation Department offers a cost-share program which provides partial reimbursement to property owners who conduct approved shoreland restorations (http://www.vilasconservation.org/index.html). Information regarding this program should be made available to property owners.
5. LSGLPRD and project scientists should share the Little St. Germain Lakeshore Habitat Restoration Final Report results through public meetings, factsheets, and various outreach materials made accessible through the LSGPR District website: http://www.littlesaint.org/.
6. An information kiosk should be placed at the public boat landing describing project objectives. An example of kiosk signage can be found as an attached file, supplemental to the Final Report. The placement of small signs at the 6 lakeshore habitat restoration projects on LSG could identify the property/ project as a Demonstration Site – permission from landowners should be sought.
7. Continue lakeshore habitat and wildlife surveys in 2014 and beyond to document vegetation and wildlife response. These findings should be made available to property owners upon completion.
8. Burnett County and UW Extension have produced a 2013 report “Shoreland Habitat Protection Social Marketing Strategies” by John Haack and Brett Shaw. This report describes successful education and outreach methods used to promote shoreland restoration on Des Moines and Long Lakes in Burnett County *http://basineducation.uwex.edu/stcroix/Links/CBSM/campaignFAQ.pdf* . Recommendations from this report should be considered when promoting lakeshore habitat restoration practices on LSG. The report is available from this project’s authors.

Comments from Project Participants

My first comment would be how simple the process was. I think if any property owner knew that they could do something so beneficial for their lake, with such little effort, that a lot more would be inclined to sign up. However, people that did consider it were often spooked by the thought of "government involvement" in their personal property. That notion kept a lot of folks on the sidelines. Downplaying that fact in future projects would get a lot more land-owners on-board.

Getting that public education out there is still a challenge however. Everyone wonders what the fences are for, but there is very little in the way of accessible information about the project. We included an explanation about it, and the lake benefits thereof, in each of our rental units. But having similar information at the boat landings, other resorts, the chamber, or even posted at the sites themselves so people can read about it when they see it (often from their boats) would have gone a long way in spreading the word.

The tree drops in particular are a huge hit on our lake as they constantly get fished during the open water season. I can only see two of them from my house, but it is unusual not to have a boat anchored off one of them and fishing, every day when I come home from work. Not only are they fisherman attractors, but they actually hold fish. Schools of pan-fish use the branches all summer long, and many people catch the occasional bass off them yet besides.

The renters are a bit indifferent to the yard use thus far because our fences are still up. I think once those fences come down, and people can walk through and see how the plantings are controlling erosion, providing habitat, etc., there will be a lot more positive feedback.

I've had people tell me, that pontoon ride our lake once in a while, that it looks run-down and un-kept, primarily because of the tree-drops and shoreline cover. There is a mind-set out there that thinks a beautiful lake lot is one that is totally cleared and professionally landscaped right to the water's edge. For instance, Lake Minocqua is often cited as a prettier lake from that regard. Educating people how harmful those practices are to a lake, and teaching them that natural cover is the true beauty, is the essence of this project.

Since being involved with this project it has opened my own eyes to the shoreline abuse that it running rampant out there. Being a vacation home contractor I'm on lake-front properties every single day, and I can't begin to tell you how much filling, dredging, shoreline cover removal, and other harmful activities that I see. I went through a phase of reporting such activities for a while, but there's virtually no enforcement of these policies, so the vast majority of violations continue unchecked. As a point of reference, I bet I could cite 50 recent examples on our little lake alone. So, all we can do is set a good example, and hope that someday it will start to at least slow this current trend.

Brad Waldmann, Waldmann Construction, St. Germain, WI.

While we always noticed the habits of the wildlife on and around our property and shoreline, we have taken a greater interest since we were included in the restoration project. We also make it a point to watch the progress in most of the other areas of the lake included in the restoration project. Just hearing about the restoration project at a lake association meeting got Paula interested in planting a wildflower garden in an area where it was difficult to grow grass. So when our property was included in the restoration project, she was into her second or third year of working to get her plot established.

The first year of the restoration project we were most concerned about getting the planted area watered sufficiently so the plants had a chance to get a good footing in spite of the lack of rain. After the first winter we were pleasantly surprised to see how almost everything in the planting came back and how healthy everything looked.

This second year we looked forward to getting up to see whether everything was still doing well. One thing in which we were particularly interested was to see if the Canada yew plantings were successful. While most every yew appeared to survive the first winter, we had expected to notice more new growth. I'm sure this will be one part of the planting that we will follow very closely going forward.

To date we haven't noticed any new birds visiting the feeders and we will be watching to see if there is any additional wildlife that visits the planting once the fencing comes down in the future. There was no evidence yet of a nest in one of the wood duck houses I checked this fall so I continue to hope this project will help attract wood ducks.

The last 18 months have been an interesting and rewarding experience and it is nice to be a small part of a much larger effort to improve the lake. We appreciate being included in the restoration project and look forward to working with the team in the future.

Paula and Frank Skweres, St. Germain,WI.

Comments from Project Contractors

Our business, Hanson's Garden Village, LLC, Rhinelander, WI, is significantly impacted by our involvement with lakeshore restoration projects. We got into the business of lakeshore restorations early and with as much emphasis as we felt was appropriate for the amount of potential demand. Ten years ago most of the demand was for "lawns and retaining walls", which was an activity we avoided (and was sometimes not legal anyway). Slowly the demand for projects that were more lake and habitat friendly came along. Projects like those on Little Saint Germain have provided us important business revenue in the short term, but just as importantly will hopefully create more business in the future as people see and appreciate what can be done with native plants and appropriate erosion control practices. We will need that to happen to justify the very large investment in time and inputs to become a valid source of native northern Wisconsin plants.

Purchases made by the Little Saint Germain Lake Protection and Rehabilitation District provided approximately 3% of our firms' total gross income over the period covered by the grant monies. During that period, sales of native plants and materials for restoration purposes approximated 12% of our gross income and supported about two full time equivalent job positions here. Those positions, however, do not exist in a vacuum. The infrastructure, greenhouses, delivery capability and other inputs for growing or providing these products would not, at present, be financially supported on their own. This means that this kind of business is quite valuable to our company as a part of the mix of business that we do, but would not at present adequately support an independent business only involved with restoration products. But we are happy with the business that exists now as part of our operations, and we are hopeful about future gains through more widespread recognition of our offerings and/or because of more interest from the general public in these kinds of plants and products. I am also in agreement with those who state that the economy of Northern Wisconsin is heavily dependent upon the lakes, and that healthy lakes will be the most capable

of contributing to the local economy in the long run. So, to some extent, we are merely trying to do our part to provide for a good economic future by being able to supply some of what is needed to help keep our lakes healthy.

Brent Hanson, Owner, Horticulturist, and Landscape Designer, Hanson Garden Village, Rhinelander, WI.

We started doing shoreline restorations in 2005. It was a key player on helping us make it through the collapse in 2007. We are noticing that our clients are asking us to educate them on natural shoreline restorations. I would say approx. 35% of our calls are for Shoreline restoration and out of that about 23% continue through with the install. We have seen an increase in interest in shoreline restorations in the last five years and foresee it to continue to grow.

Jason Bach, Owner, Horticulturist, and Landscape Designer, Wild Wood Custom Landscape & Design, Eagle River, WI

If I add up all the restoration work we've did in the past couple seasons, it probably was 4 or 5 percent of our total volume, some with the DNR and the cost share program, and some with homeowners on their own. The program seemed popular and brought good awareness to the need of shoreline restoration. We had clients that didn't want to wait on the cost share program, and paid for the work themselves. Some had friends and neighbors in the program, and saw the process/results. That awareness and impact is above and beyond any tax money spent on the program.

Mike Krueger, Owner, Horticulturist, and Landscape Designer, MK Landscape Company LLC, Eagle River, WI