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**Section I: Application Type**

**Lake Management Planning Grant**

Check one:

- Large-scale planning grant  
 Small-scale planning grant

Check one:

- Lake education  
 Organizational development  
 Other study or assessment, or multiple-purpose project

**Lake Management Protection Grant**

Check one:

- Wetland restoration  
 Ordinance development  
 Lake improvement  
 Lake classification  
 Land or easement acquisition

Legislative District Numbers		To determine your legislative district, go to <a href="http://165.189.139.210/WAML/">http://165.189.139.210/WAML/</a> Type in complete address, next screen shows information.
Senate	Assembly	
12	34	

**Section II: Applicant Information**

Applicant Little St. Germain Lake Protection & Rehabilitation District			Type of Eligible Applicant		
Lake Name Little St. Germain Lake		Size in Acres 980.00	<input type="checkbox"/> County	<input type="checkbox"/> Tribe	<input type="checkbox"/> Other Governmental Unit
Project County/Township/Section/Range Vilas/T40N/R08E/S35			<input type="checkbox"/> City	<input type="checkbox"/> Sanitary District	<input type="checkbox"/> Non Profit Conservation Organization
Authorized Representative Named by Resolution Lou Mirek			<input type="checkbox"/> Village	<input checked="" type="checkbox"/> Lake District	<input type="checkbox"/> School Districts (Planning)
Authorized Representative Title Secretary			<input type="checkbox"/> Town	<input type="checkbox"/> Lake Association	
Address 1599 Shields Road			Project Contact Name Mike Meyer		
City St. Germain			Project Contact Title Research Scientist, WDNR		
State WI			Address 107 Sutliff Avenue		
ZIP Code 54558			City Rhinelander		
Daytime Phone (area code) (715) 477-2879		Evening Phone (area code) (715) 477-2879	Daytime Phone (area code) (715) 365-8858		State WI
E-mail Address ljmirek@verizon.net			Evening Phone (area code) (715) 365-8858		
E-Mail Address michael.meyer@wisconsin.gov			E-mail Address michael.meyer@wisconsin.gov		

**Mail Check to:** (if different from applicant)

Name and Title		Address			
Organization		City		State	ZIP Code

**For DNR Use Only**

Application Type	Date Received	Date Reviewed (LC)	Lake Coordinator Approval / Date		
Waterbody ID#	Adequate Public Access <input type="checkbox"/> Yes <input type="checkbox"/> No		Environmental Grants Specialist Approval / Date		
Eligible Project <input type="checkbox"/> Yes <input type="checkbox"/> No	Eligible Applicant <input type="checkbox"/> Yes <input type="checkbox"/> No		Project Priority Rank		
Prior Grant Award(s) <input type="checkbox"/> Yes <input type="checkbox"/> No	Fiscal Year(s)	Amount Received To Date \$	Project Awarded <input type="checkbox"/> Yes <input type="checkbox"/> No		

**Section III: Project Information**

Project Title Restoring Shoreline Habitat on Little Saint Germain Lake	Proposed Ending Date 12/31/11
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Other Management Units Around Lake	Letter of Support	Other Management Units Around Lake	Letter of Support
1. Town of St. Germain	<input checked="" type="checkbox"/>	4.	<input type="checkbox"/>
2. Vilas County Land & Water Conservation Dept.	<input checked="" type="checkbox"/>	5.	<input type="checkbox"/>
3.	<input type="checkbox"/>	6.	<input type="checkbox"/>

**Section IV: Lake Access**

Number of Public Vehicle Trailer Parking Spaces Available at Public Access Sites: 30

Number of Public Access Sites on Lake Including Boat Launches and Walk-ins: 2

**Section V: Cost Estimate and Grant Request**

<b>Section V must be completed or application will be returned. Details in support of Section V are welcome.</b>	<b>Project Costs</b>		
	Column 1 Cash Costs	Column 2 Donated Value	<i>DNR Use Only</i>
1. Salaries, wages and employee benefits			
2. Consulting services			
3. Purchased services--printing and mailing			
4. Other purchased services (specify):			
5. Plant material			
6. Supplies (specify) See attached	91,490.00	30,497.00	
7. Depreciation on equipment			
8. Hourly equipment use charges			
9. State Lab of Hygiene (SLOH) Costs			
10. Non-SLOH Lab Costs			
11. Land or easement acquisition value			
12. Associated acquisition costs			
13. Other (specify)			
<b>14. Subtotals (sum each column)</b>	91,490.00	30,497.00	
<b>15. Total Project Cost Estimate (sum of column 1 plus sum of column 2)</b>	121,987.00		
<b>16. State Share Requested (up to 75% of total costs may be requested)</b>	91,490.25		

Subject to the following maximum grant amounts:

- Large-scale lake planning projects--up to \$10,000
- Small-scale lake planning projects--up to \$3,000
- Lake classification and regulation or ordinance development projects--up to \$50,000
- Lake protection projects (other than lake classification and regulation or ordinance development projects)--up to \$200,000

**Section VI: Attachments (check all that are included)**

**A. For all applicants:**

- 1. Authorizing resolution
- 2. Letters of support
- 3. Map of project location and boundaries
- 4. Lake map with public access sites identified (per Section IV of this application)
- 5. Itemized breakdown of expenses
- 6. For projects that entail sending samples to the State Laboratory of Hygiene (SLOH) only: a completed SLOH Projected Cost Form
- 7. Project scope/description:
  - a. Description of project area
  - b. Description of problem to be addressed by project
  - c. Discussion of project goals and objectives
  - d. Description of methods and activities
  - e. Description of project products or deliverables
  - f. Description of data to be collected, if applicable
  - g. Description of existing and proposed partnerships
  - h. Discussion of role of project in planning and/or management of lake
  - i. Timetable for implementation of key activities
  - j. Plan for sharing project results
  - k. Other information in support of project not described above

**B. For applicants that are Lake Management Organizations (LMOs) or Non-profit Conservation Organizations (NCOs):**

- 1. For first time applicant LMOs only: A completed Form 8700-226 (Lake Association Organizational Application)
- 2. For first time applicant NCOs only: Copy of IRS 501(c)(3) determination letter and copies of your Articles of Incorporation and Bylaws
- 3. List of national and/or statewide organizations with which you are affiliated
- 4. List of board members' names, including municipality and county of residence. Designate officers
- 5. Documentation of current financial status
- 6. For land or easement acquisition projects: Detailed description of your organization's land management experience
- 7. Brochures, newsletters, annual reports or other information about your organization

**C. Wetland Restoration Projects:**

- 1. Deed, easement, or land control agreement
- 2. Preliminary engineering plans
- 3. Water regulatory permits
- 4. Map of project location and boundaries

**D. Ordinance Development Projects:**

- 1. Inventory of applicable existing ordinances
- 2. Description of resources each jurisdiction allocates to enforcement
- 3. Preliminary surveys

**E. Lake Improvement Projects:**

- 1. Engineering and design plans
- 2. Water regulatory permits
- 3. Map of project location and boundaries

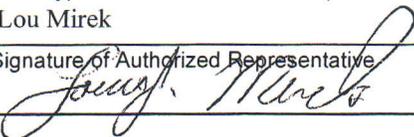
**Section VI: Attachments, continued**

**F. Land or easement acquisition projects:**

- 1. DNR Form 1800-1 (Environmental Hazards Assessment Form)
- 2. Legal description of the property
- 3. Project location boundary map
- 4. Property or easement appraisal (if not previously submitted to the Department)
- 5. If escrow closing, the title insurance commitment
- 6. Evidence of compliance with Uniform Relocation Act requirements, if applicable
- 7. Agricultural Impact Statement, if applicable
- 8. Status of acquisition negotiations, including expected time frame for closing
- 9. A land management plan
  - a. Full description of property and conditions
  - b. Description of current and proposed uses of property and adjoining properties
  - c. Management requirements for property
  - d. If roads, piers or grading are proposed, a topographic survey with feature locations, and design cross sections

**Section VII: Certification**

I certify that information in this application and all its attachments are true and correct and in conformity with applicable Wis. Statutes.

Print/Type Name of Authorized Representative Lou Mirek	Title of Authorized Representative Secretary
Signature of Authorized Representative 	Date Signed 04/29/09

**LITTLE ST. GERMAIN LAKE PROTECTION  
AND REHABILITATION DISTRICT  
SAINT GERMAIN, WI**

**Elected Commissioners**

Ted Ritter, Chairman  
Erv Stiemke, Treasurer  
Lou Mirek, Secretary

**Appointed Commissioners**

Todd Wiese, Town of Saint Germain  
Mary Platner, County of Vilas

<http://littlesaint.org>

**LAKE PROTECTION GRANT RESOLUTION**

WHEREAS Little St. Germain Lake is an important resource used by the public for recreation and enjoyment of natural beauty; and

WHEREAS a study and examination of the lake will lead to better understanding and will promote the public health, comfort, convenience, necessity and public welfare; and

WHEREAS we recognize the need for responsible and holistic long-range planning to better manage the lake, its watershed, and its use; and

WHEREAS we are qualified to carry out the responsibilities of lake protection projects,

IT IS, THEREFORE, RESOLVED THAT: The Little St. Germain Lake Protection & Rehabilitation District Board of Commissioners requests the funds and assistance available from the Wisconsin Department of Natural Resources under the "Lake Protection Grant Program": and

HEREBY AUTHORIZES Lou Mirek to act on behalf of the Little St. Germain Lake Protection & Rehabilitation District Board of Commissioners to: submit an application to the State of Wisconsin for financial aid for lake protection grant purposes; sign documents; and take necessary action to undertake, direct, and complete an approved grant.

BE IT FURTHER RESOLVED THAT the Little St. Germain Lake Protection & Rehabilitation District Board of Commissioners will meet the obligations of the protection project including timely publication of the results and meet the financial obligations under this grant including the prompt payment of our 25% commitment to protection project costs.

We understand the importance of a continuing management program for Little St. Germain Lake and intend to proceed on that course.

Adopted this 9<sup>th</sup> day of April, 2009

By a vote of: 4 in favor 0 against 0 abstain

By:   
Lou Mirek

Secretary, Board of Commissioners

**LITTLE ST. GERMAIN LAKE PROTECTION  
AND REHABILITATION DISTRICT  
SAINT GERMAIN, WI**

Elected Commissioners

Ted Ritter, Chairman  
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<http://www.littlesaint.org>

<b>Commissioner</b>	<b>Position</b>	<b>Town of residence</b>	<b>County of residence</b>
Ted Ritter	Chairman	St. Germain	Vilas
Erv Stiemke	Treasurer	St. Germain	Vilas
Lou Mirek	Secretary	St. Germain	Vilas
Todd Wiese	Town appointee	St. Germain	Vilas
Mary Platner	County appointee	St. Germain	Vilas

Please see the Little St. Germain Lake District website at <http://www.littlesaint.org/> for the following additional information:

- ✓ History of and authority for the Little Saint Germain Lake P&R District
- ✓ Valuation and tax levy history
- ✓ Grant history
- ✓ E-mail broadcast system
- ✓ Buoy marking program
- ✓ Water quality monitoring
- ✓ Invasive species management
- ✓ Winter aeration systems
- ✓ Lake studies
- ✓ Meeting minutes
- ✓ Financial reports
- ✓ Newsletters
- ✓ Miscellaneous documents

**Little St. Germain Lake Protection and Restoration District  
Lake Protection Grant Application  
Restoration of Shoreline Habitat  
May 1, 2009**

**Project Title: Restoring Shoreline Habitat on Little St. Germain Lake, Vilas County, to Develop Best Management Practices and to Evaluate the Ecological and Water Quality Benefits of Riparian Buffer Restorations.**

**Project Summary:** A large shoreline restoration project is proposed for Little St. Germain Lake, Vilas County. Little St. Germain is a multi-basin lake (upper East Bay, East Bay, No Fish Bay, West Bay, and South Bay) with a total of 977 surface water acres. Maximum depth ranges from 10-16 feet in East, No Fish, and South Bay to 53 feet in West Bay. Over seventy years of resort operation and housing development has resulted in moderate to severe erosion along its shoreline, which is also heavily impacted by run-off and pedestrian traffic. Impervious surface run-off has enhanced the impacts. Much of the impacted stretch of shoreline has little native vegetation and is at risk of losing mature white and red pine, and contributes large quantities of sediment to the lake during heavy rain events. In addition, much of the coarse woody material has been removed and few downed trees are found along the developed shoreline, resulting in degraded habitat for fish and their spawn. We propose to correct erosion problems through development of rain gardens to prevent run-off as well as use of biodegradable erosion control products to reduce bank erosion. We will also replace rip-rap, asphalt private boat ramps, and retaining walls with biodegradable materials such as bio-logs and delta-lock bags. Tree drops and establishment of aquatic macrophyte beds will be implemented to improve fish habitat. We will then plant the shoreline into native vegetation, including native trees, shrubs, and ground cover that are appropriate for the Little St. Germain Lake ecosystem. Aquatic invasive species such as curly pondweed and Eurasian Water Milfoil occur throughout the littoral zone of Little St. Germain Lake, and hand-pulling will occur whenever encountered in this research project. Terrestrial invasive species will be inventoried and eradicated as well. This project will be conducted in coordination with an ongoing Wisconsin DNR Science Services research project which is evaluating the ecological benefits of shoreline habitat restoration on 6 lakes in Vilas County. Little St. Germain Lake has historically provided habitat for Species of Greatest Conservation Need (Wisconsin Wildlife Action Plan <http://dnr.wi.gov/org/land/er/wwap/plan>) including the mink frog and black tern, as well as ospreys, a state threatened species – this project will provide habitat improvements that will benefit these species. Consultation and plant material will be provided by local landscapers with over 10 years experience conducting riparian restoration projects. All project partners have a documented history of successful completion of successful projects. We will also partner with WDNR Watershed Management and U.S. Geological Survey to evaluate the potential for a nutrient run-off experiment to test the effectiveness of riparian buffer restorations in reducing nutrient loadings to lakes. Finally, experiments will be conducted to develop Shoreland Restoration Best Management Practices for lakes in Vilas County.

## Background

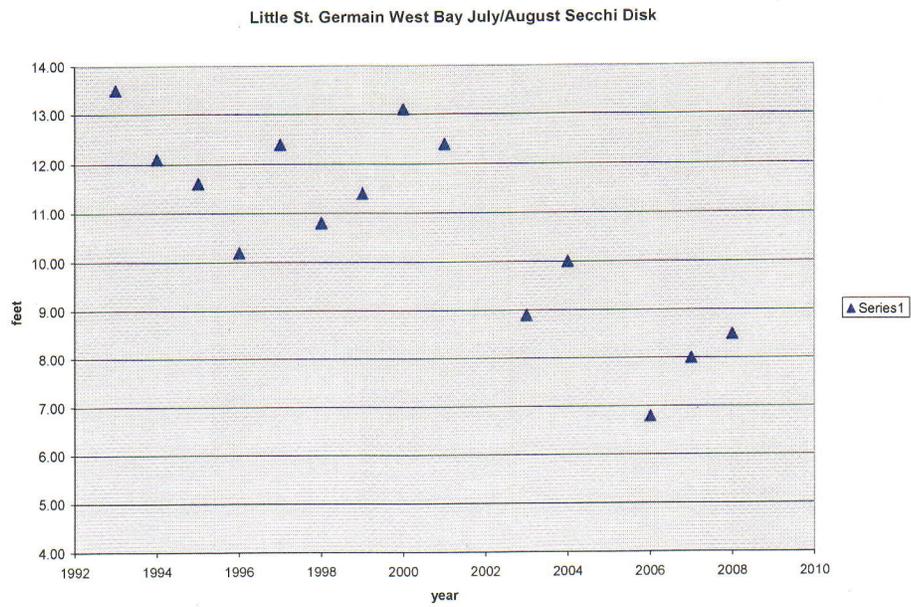
Little St. Germain Lake, Vilas County, is one of 21 impoundments operated by Wisconsin Valley Improvement Company (WVIC) to provide storage for power and recreational use. The level of the lake, which was dammed in 1882, has been maintained about 5 feet above its natural level since 1929, and is annually drawn down about 1.5 feet from December – March. Little St. Germain is a multi-basin lake (upper East Bay, East Bay, No Fish Bay, West Bay, and South Bay) with a total of 977 surface water acres. Maximum depth ranges from 10-16 feet in East, No Fish, and South Bay to 53 feet in West Bay. Water quality has recently declined across all basins (Robertson and Rose 2000). The West Bay consistently had the best water quality, the South Bay intermediate, and East Bay the worst water quality. While water quality was relatively stable 1991-2000, it has since worsened. The West Bay has changed from oligotrophic to mesotrophic, the South Bay from mesotrophic to eutrophic, and the East Bay from eutrophic to hypereutrophic (Robertson et al. 2005). 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 macrophytes leading to lower enjoyment of the lake by residents and others who use the lake for these purposes. As defined by NR 1.91(4d), Little St. Germain Lake exceeds minimum public boating access by having more than one access site with a total of more than 28 car-trailer parking spaces (1 per 35 open water acres). The system contains 18 resorts, of which 6 contain their own private boat landing.

Much of the Little St. Germain Lake shoreline has been developed for housing and the lake has been used for seasonal recreation for over 70 years. The soils in the watershed consist of mainly well-drained sand and sandy loams. These soils are thought to be naturally high in phosphorus content.

The water quality of Little St. Germain Lake, as indexed by secchi disk depth, has notably worsened over the past 5 years (Figure 1 & 2). Lake District residents are interested in implementing management strategies to improve water quality and reduce shoreland nutrient run-off. Recent studies conducted by WDNR Science Services and UW Trout Lake Research Station have documented dramatic alteration of riparian habitat (terrestrial and littoral zone) on many lakes in northern Wisconsin. The alteration is primarily due to shoreland housing development and has resulted in negative changes in native plant communities, simplification of habitat structure, and changes in fish, amphibian, and bird populations. Many of the WDNR findings have been published in peer-reviewed scientific journals (Elias & Meyer 2003, Lindsay et al. 2002, Woodford & Meyer 2002) and UW findings are in review (Sass 2004). The Little St. Germain Protection and Restoration Lake District will implement shoreland habitat restorations at private properties with a minimum of 500 meters of contiguous shoreland and will quantify the ecological benefits of the restoration via biotic surveys.

In this project, we proposed to 1) evaluate the ecological benefits of lake buffer restoration for wildlife and fish populations 2) assess the feasibility of using the Little St. Germain restoration project to conduct experiments to quantify the benefits of re-establishment of riparian buffers to reduce nutrient run-off, and 3) conduct experiments to develop Best Management Practices for shoreland restoration in the Upper Wisconsin River Watershed and Northern Highlands Ecological Landscape.

**Figure 2. Little St. Germain, Vilas County, West Bay, Secchi Disk Depth has declined (average July and August).**



**Figure 3. Shoreline Development, Little St. Germain Lake, Vilas County**



**JUSTIFICATION/CONCEPT:** Aquatic ecosystem health is a function of water quality and intact riparian and aquatic food webs. Human alteration of riparian and aquatic habitat has led to changes in lake water quality, decreases in plant and animal species diversity, increase in exotic invasive species, and changes in the population performance of individual fish and wildlife species. Management actions that limit riparian and littoral zone alteration or promote shoreland restoration should result in measurable improvements in aquatic ecosystem health. Documentation of this improvement will enhance public support of these management activities.

**GOAL:** Demonstrate the ecological benefits of shoreland habitat conservation and restoration via plant, wildlife, and fish surveys before, during, and after conservation and restoration activities on Little St. Germain Lake in Vilas County. Evaluate the feasibility of conducting experiments to test the effectiveness of shoreland buffer restorations to reduce nutrient run-off to lakes. Establish Best Management Practices for Wisconsin Shoreland Restoration projects. Methods will follow those established during 2007-2008 Wisconsin Shoreland Restoration projects at Found Lake, Vilas County. These goals are met by following the methods describing in each of the following 3 projects.

### Wisconsin Shoreland Restoration Projects 2007-2008





### **Project 1. Measuring the Value for Riparian Buffer Restorations for Fish and Wildlife Populations on Little St. Germain Lake**

**Background:** We will develop site-specific management recommendations for Little Saint Germain lakeshore property owners who participate in the restoration program and will initiate restoration projects at the properties. Restoration activities will include conservation (no-cut, no disturbance) and restoration of native vegetation (terrestrial buffer zone and near-shore littoral zone), removal of exotic and invasive species, placement of physical structure such as downed trees and coarse woody debris for fish habitat, removal and replacement of retaining walls and impervious surface within the 35' buffer, and other proven management techniques designed to enhance fish and wildlife diversity and abundance and reduce surface water runoff. Methods will follow that as described in Haskell (2009).

Biotic surveys will include baseline surveys before restoration commences, including measures of relative abundance and diversity of native vegetation, frogs and toads, prey and game fish, pollinating invertebrates, breeding birds, small mammals, and furbearers. Surveys will be repeated annually as restoration projects proceed – methods will follow those in Haskell (2009). Little St. Germain lake is known to provide habitat for ospreys, a state threatened species, and mink frogs, bald eagles, black terns, listed as Species of Greatest Conservation Need under with Wisconsin Wildlife Action Plan <http://dnr.wi.gov/org/land/er/wwap/plan>.

The project will focus restoration efforts on 500 meters of Little St. Germain lakeshore where habitat impacts are significant and private landowners on a significant portion of the shoreline agree to participate in the restoration efforts. Incentives will be offered to recruit participation. The study design will also include a control shoreline on Little St. Germain Lake, 500 meters of shoreline with significant habitat alteration that do not receive restoration efforts. Biotic survey results will be compared between the control and restoration shore sites.

Results of this restoration will be compiled with that of ongoing projects at Moon, Found, and Lost Lakes, Vilas County. Additional restoration projects are anticipated at 2 additional developed lakes in the county.

#### **OBJECTIVES:**

1. Solicit private landowner project participation via personal contacts and contractual agreements; >75% landowner participation is required at restoration and control sites to provide access for surveys and to allow for measurable benefits from restoration projects.

2. Develop site specific shoreland restoration management plans for each property owner enrolled in the project. Landowners will provide the initial restoration plans for their property and project scientists will then work with landowners to produce a plan that provides the maximum ecological value while integrating property owner land-use preferences.
3. Restore and conserve native vegetation within the shoreland riparian buffer and littoral zone of all properties participating in the project. Remove all invasive plant species encountered. Directly involve members of lake associations, landowners, and citizen groups in the restoration projects.
4. Repair shoreland bank erosion and shoreline toe erosion using biologically degradable materials such as bio-logs, brush bundles, delta-lock bags, straw blankets, sediment logs, as well as development of impervious surface run-off management plans via rain gardens and retention ponds when appropriate.
5. Remove/replace impervious surface (asphalt, concrete), retaining walls and rip-rap within the 35' buffer when feasible, replacing with bio-degradable materials and improved run-off engineering.
6. Quantify the benefits of restoration activities by measuring water quality parameters, and by conducting annual habitat and plant and animal species surveys at reference, control, and treatment lake shorelands before restoration occurs and in subsequent years.

#### **METHODS:**

1. Recruit Little St. Germain property owners interested in participating in the Wisconsin Shoreland Restoration Project by conducting educational workshops and mailing educational materials/flyers. GIS products (24k lake hydrolayer, soil maps, county building layers) and shoreland surveys will be used to identify shorelands most impacted by development. Desktop publishing and Adobe Photoshop software will be used to create newsletters and educational pamphlets on this project's objectives and detailed information on lake ecology, fish and wildlife species and habitat, and terrestrial and aquatic plant communities. This information will be distributed to all lake property owners via the Little St. Germain Lake District along with a description of the project's goals and objectives.
2. Project biologists will arrange to meet with all property owners by phone, letter, or direct visits. During these visits the biologists will explain the project objectives as well as describe the type of landowner participation sought. Questions will be answered and a signed participation and care agreement shall be established with each participating landowner defining restoration benefits/goals, approved areas, site requirements. These agreements will follow the protocol developed by the Shoreland Habitat Restoration Interim BMP.
3. Restoration protocol shall follow WDNR and County Shoreland Habitat Restoration Best Management Practices and will include:
  - Site Evaluation: Establish baseline condition by determine current land-use patterns, boundaries, layout of plants and structures, inventory existing terrestrial and aquatic plants, determine slope, land contour, exposure, collect soil samples,

take landward and lakeward photographs, determine current pesticide, fertilizer, and mowing and practices currently employed.

- Site Planning: We will adopt lakeshore restoration planning methods developed by Wisconsin county land conservation departments, the Lower Chippewa Priority Watershed, and UW Extension. We will work with property owners to develop restoration plans that maximize ecological benefits while preserving property owners' expectations for use of their properties. During the planning process we will assemble a team of WDNR program and research experts (lake, watershed, fish, wildlife, vegetation/horticulture, etc.) for consultation and restoration plan reviews.
- Site Preparation/Installation: Wisconsin Shoreland Habitat Restoration BMP methods will be used during the site restorations. Erosion control measures will be used when needed during restorations. Native plant species appropriate for conditions must be used and species shall be selected to minimize the need for fertilizer, pesticides, watering and maintenance. We will provide a service contract with private sector lake restoration specialists to guide our efforts as well in-kind cooperation with county LCD biologists who have been active in restoration projects across Wisconsin. When appropriate, aquatic plant communities will be restored and a service contract will be established to provide expert consultation with Dr. Susan Knight, UW Trout Lake, to guide restoration plans. Fish habitat will be improved on all lakes with coarse woody habitat augmentation (downed trees from properties as well as placement of trees when necessary). Habitat improvements will follow protocols established by Drs. Steve Carpenter and Greg Sass at the University of Wisconsin and we will seek to establish service contracts with this team to provide expert consultation. WDNR fish manager Steve Gilbert will be consulted prior to restoration activities.

5. Pre- and Post Restoration habitat and species monitoring methods shall include surveys that quantify and describe the following

- Composition of aquatic and terrestrial plant communities
- Avian and amphibian abundance and species composition
- Invertebrate pollinators surveys
- Small mammal and furbearer presence
- Fish species composition and relative abundance
- Coarse woody habitat structure and abundance

We will develop service contracts with experts to develop protocols for the plant, aquatic invertebrate, fish, and CWH surveys. WDNR researchers and managers will also be consulted during protocol development. Endpoints developed by the University of Wisconsin Lake Biocomplexity research project will also be evaluated for incorporation into monitoring plans. Videographic documentation of shoreline habitat will also be made before, during, and after restoration activities.

6. Implement Pollinator Response Surveys – pollinating insect abundance and species diversity surveys/before and after restoration. Pollinating insects, such as bees, are declining across the region. Anecdotal observation has demonstrated that these insects are responding positively to our restoration projects. We will conduct pollinator surveys at Little St. Germain

Lake to quantify the number of pollinating insects present before and after the restoration project is installed. This data will be used to quantify the ecological benefits of shoreland restoration projects.

Results of biological surveys at this restoration will be compiled with that of ongoing projects at Moon, Found, and Lost Lakes, Vilas County. Additional restoration projects are anticipated at 2 additional developed lakes in the county. Wildlife and fisheries surveys will be conducted for 10 years at each restoration project. Before-After-Control-Impact-Paired (BACIP) design (Morrison 2003) will be used to test the fish, vegetation, and wildlife response to the restorations as part of the larger Wisconsin Shoreland Restoration Project as outlined in Haskell (2009).

### **INTERGRATION OF THE LITTLE ST. GERMAIN SHORELINE HABITAT RESTORATION PROJECT WITH WDNR SCIENCE SERVICES WISCONSIN LAKESHORE RESTORATION RESEARCH PROJECT**

Wisconsin DNR Research Scientist Dr. Mike Meyer, Science Services, Rhinelander, will provide consultation during development and implementation of this restoration project so that the Little St. Germain Lake Shoreland Restoration project can become a survey site for the Wisconsin Shoreland Restoration Project that Dr. Meyer is supervising. The study plan for Dr. Meyer's project is described below. Dr. Meyer and his research team will continue to monitor the wildlife and fish response to the Moon Lake Shoreland Restoration Project as part of their evaluation of the ecological benefits of shoreland restoration projects in Vilas County. This project will continue through 2018.

#### **RESEARCH PROJECT PROPOSAL PROJECT SUMMARY**

- Study Title: Measuring the Value of Fish and Wildlife Habitat Restoration on Northern Wisconsin Lakes: The Wisconsin Lakeshore Restoration Project.
- Study Number:  
Grant: Federal Aid in Restoration, WI W-160-R
- Objectives: Identify, map, and survey eight reference lakes, four control lakes, and four treatment lakes within Vilas County, Wisconsin. Educate & invest property owners in the project by conducting lake ecology workshops and creating and distributing educational information (pamphlets, hand-outs, video DVDs) of the native plant and animal communities found on northern Wisconsin lakes as well as the important ecological features. Solicit private landowner project participation via personal contacts and contractual agreements; substantial landowner participation is required at restoration and control sites to provide access for surveys and to allow for measurable benefits from restoration projects. Develop site specific management plans for each property owner. Landowner will provide the initial restoration plan for their property and project scientists will then work with landowners to produce a plan that provides the maximum ecological value while integrating property owner land-use preferences. Restore and conserve native vegetation within the shoreland riparian buffer and littoral zone of all properties participating in the project. Directly involve members of lake associations, landowners, and citizen groups in the restoration projects. Quantify the benefits of restoration activities by measuring water quality parameters, and by conducting annual habitat and plant and animal species surveys at reference, control, and treatment lakes before restoration occurs and in subsequent years.

Benefits: Aquatic ecosystem health is a function of water quality and intact riparian and aquatic food webs. Human alteration of riparian and aquatic habitat has led to changes in lake water quality, decreases in plant and animal species diversity, increase in exotic invasive species, and changes in the population performance of individual fish and wildlife species. Management actions that limit riparian and littoral zone alteration or promote shoreland restoration should result in measurable improvements in aquatic ecosystem health. Documentation of this improvement will enhance public support of these management activities.

## **Project 2. Feasibility Assessment – Testing the Effectiveness of Vegetated Buffers to Reduce Overland Runoff and Nutrient Loads from Developed Nearshore Lawns to Lakes in Northern Wisconsin**

**Background:** Shoreland standards set by the Wisconsin Department of Natural Resources (WDNR) in Wisconsin Administrative Code NR115 (Wisconsin Department of Natural Resources, 2000) were designed in 1968 to protect water resource values including water quality, recreational uses, navigation, fish and wildlife habitat, and natural scenic beauty. Among numerous shoreland provisions in NR 115 is language to create a 35-foot-wide buffer zone landward of the ordinary high water mark in which trees and shrubs may not be clear-cut. At the time of codification, shoreland development was already quite high at many lakes and rivers, and the 35-foot riparian zone had already been cut and planted to grass. Shoreline standards are aimed to mitigate this issue on new and existing lots by requiring conditional permits for specific lot improvements with provisions such that a 35-foot riparian buffer be maintained or constructed as part of the permit agreement.

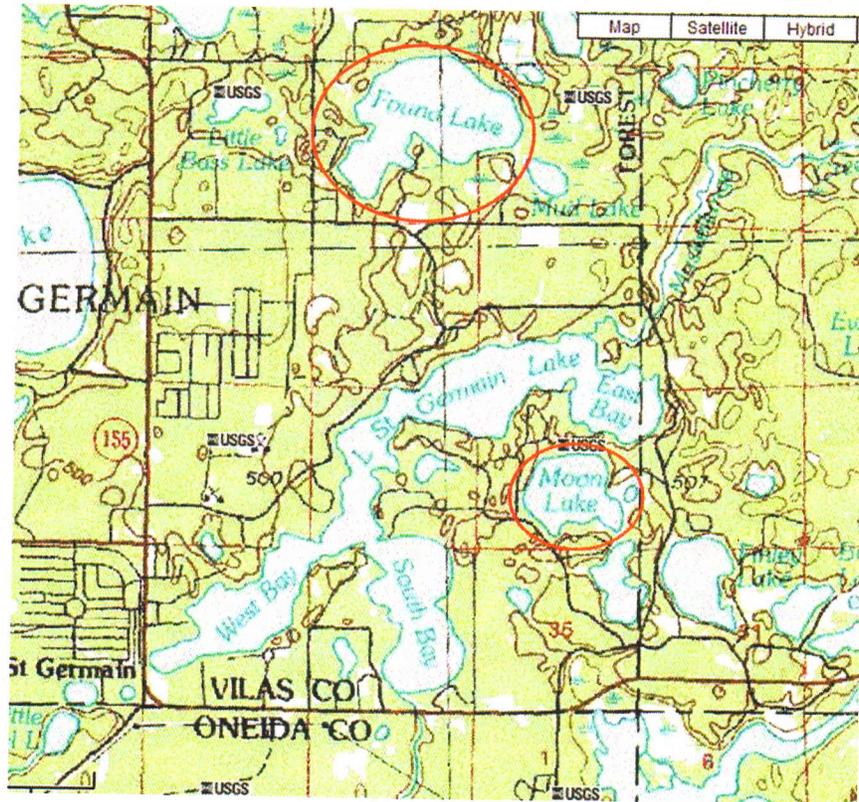
The USGS, in cooperation with the WDNR, previously conducted a study which evaluated differences in overland runoff and nutrient yields between grassed lawns and naturally-occurring woodland buffers at nearshore locations in northern Wisconsin (Graczyk and others, 2003). Data showed that while concentrations of nutrients were generally higher in woodland areas, loads and yields of nutrients delivered to lakes were actually higher from lawns because overland runoff from the lawns was higher than the woods. Lake groups at Moon and Found Lakes in northern Wisconsin are currently receiving funding to implement lakeshore improvements, which includes installation of vegetative buffers.

WDNR and USGS are proposing a new study which will build on some of the components of the previous study and determine how effective newly constructed shoreland vegetation buffers are at reducing overland runoff and nutrient loads to nearby water resources. We will test the feasibility of implementing this project at the Little St. Germain restoration project 2010-2015.

**OBJECTIVE:** Evaluate the feasibility of conducting a nutrient run-off experiment at the Little St. Germain shoreline restoration project. If deemed feasible, and if funding is secured, this experiment will:

1. Estimate the quantity of surface-water runoff from developed nearshore lawns before and after implementation of constructed shoreland buffers.
2. Determine concentrations, loads, and yields of nutrients and sediment in surface-water runoff from developed nearshore lawns before and after implementation of a constructed shoreland buffer.

3. Estimate rainfall/runoff coefficients for developed nearshore lawns with and without constructed shoreland buffers.
4. Evaluate differences in the quantity of surface-water runoff between developed nearshore lawns and those with a constructed shoreland buffer.
5. Evaluate differences in the quality of surface-water runoff between developed nearshore lawns and those with a constructed shoreland buffer.
6. Estimate spatial and temporal flow patterns of in nearshore soils beneath developed nearshore lawns before and after implementation of constructed shoreland buffers.



**Proposed Approach:**

WDNR and USGS lake scientists and hydrologists will travel to the Little St. Germain restoration site to conduct site assessments and establish pilot study collection sites. Ideally, the study will be conducted at 6 paired locations on lawns surrounding Little St. Germain Lake in Vilas County, Wisconsin (see map above). Five of the lawn pairs will be used for surface-water runoff and water-quality evaluations, while another lawn pair will be used to evaluate surface-water runoff and shallow subsurface-flow only. The study period is expected to last 5 years. Two years of pre-implementation data collection will be necessary to identify relations between lawn pairs so that proper statistical analyses can be conducted after the implementation phase. After 2 monitoring years, the implementation phase will begin, with half of the studied lawns having shoreland buffers constructed to specifications detailed in NR 115. Following buffer construction, 3 additional years of data collection will be necessary to properly evaluate differences in the hydrology and water quality that may be caused by the vegetated buffer. This project will provide the funds necessary for USGS and WDNR scientists to evaluate the feasibility of the St. Germain restoration sites for these measures.

**Relevance and Benefits:** As development activities near scenic areas have increased nationwide, determining the effects of this activity (sources of detrimental constituents, the processes affecting them, and pathways of movement) on environmentally sensitive areas has become of interest, both on the state and national scale. Lakes are one example of a system potentially sensitive to nearby development. Presently, lake modelers estimate the inputs to lakes, but the estimates are approximate and are generally not based on field studies. There is a need to quantify both surface water and groundwater inputs, and the loads they carry, to lakes from small parcels. In this proposed project, the USGS will provide a key role in collection of the field data because of its expertise in surface water and groundwater quantity and quality monitoring. These data will be used to elucidate movement of surface water and groundwater from small parcels to lakes and help us obtain a better understanding of the effects of changes in land use. Consequently, this information can be used to develop effective management practices to reduce any adverse effects of development.

### **Project 3. Developing Best Management Practices for Lakeshore Restoration in Vilas County, Wisconsin**

We will test and quantify the ecological and cost benefits of several shoreland restoration management techniques. These techniques have been recommended as methods which are likely to increase the success of restoration efforts. Experiments 1 & 2 are a continuation of those implemented on Found Lake, Vilas County 2007-2008, by Haskell (2009) and Experiments 3 & 4 will be a continuation of new studies to be implemented on Moon Lake, Vilas County in 2009. Results of these experiments will guide development of Best Management Practices for Shoreland Restoration in Vilas County.

#### **1. Down Woody Material Augmentation**

Down Woody Material (DWM) is vital to the function and structure of healthy terrestrial and aquatic systems. Soil temperature and moisture can affect plant growth and survival. Haskell (2009) investigated the benefits of the addition of DWM at Found Lake restoration sites by establishing 30 - 10m x 10m experimental plots using three treatments of DWM (0, 25, 50% coverage). Daily soil temperature and moisture were measured at a depth of 10 cm, and plots were planted with 2 native shrubs and native understory herbaceous species; change in plant canopy volume was compared between treatments. The mean maximum soil moisture, temperature variation, and change in soil moisture were significantly lower in the 25% and 50% DWM plots. Plant volume growth was for snowberry (*Symphoricarpus albus*) and barren strawberry (*Waldenstenia fragaroides*) was significantly greater in the 25% and 50% DWM plots. We will replicate these experiments on Little St. Germain, using other "work-horse" plant restoration species in 2010 and 2011.

#### **2. Gravel Culture vs. Ball Shrub Plantings**

Haskell (2009) tested six native shrub species of survival and growth rates that were transplanted in the summer from bare root stock and compared them to shrubs planted from nursery containers in 2007 at Found Lake restoration sites. Bare root shrubs were established in a culture of 2.5 cm diameter gravel at a local nursery (Hansen's Garden Village, Rhinelander). Bare root shrubs can be cost efficient for restoration projects as their use can reduce the restoration costs of shrubs planted in nursery containers by 50-75%. Haskell found no difference in growth rates and survival of four species of matched shrubs (*Sambucus*

*canadensis*, *Aronia canadensis*, *Cornus racmosa*, *Cornus stolonifera*), but an increase in growth rates of bare-root snowberry (*Symphoricarpus albus*) and a decrease in growth rates of bare root common ninebark (*Physocarpus opulifolius*). Six additional species were added to the experiment in 2008 and will be evaluated in 2009. We will continue the bare-root vs. nursery container shrub growth and survival experiments using “work-horse” species on Little St. Germain Lake 2010-2011.

### 3. Effectiveness of Deer repellents vs. Deer Fencing

We will test liquid deer repellents vs. fencing to prevent herbivory of restoration plants. Inspection of several restoration projects implemented by Vilas County LWCD prior to the WDNR Shoreland Restoration Project showed moderate to severe damage due to deer and snowshoe hare herbivory. Four repellent formulations vs. fencing vs. control will be tested in plots containing nine shrub species. Results of this experiment and a cost-benefit analysis will dictate how fencing and/or repellents are incorporated into recommended shoreland restoration best management practices (BMP). The consultant will also finalize the erosion engineering as well as design and implantation of the planting plans and Rain Garden/Vegetation Enhancement Test Plot (see below).

### 4. Vegetation survival enhancement test plot (25m x 25m rain-garden)

Run-off from a large asphalt parking lot or other impervious surfaces can funnel water from upland areas directly into the restoration project. To management run-off from this type of scenario, we will create a large rain-garden, containing 200 shrubs. These shrubs will provide the water-absorbing system for the rain garden. We will also use this site to test for the benefits of 2 nutrient formulations (Nutri-pak) and ectomycorrhizal supplements to enhance the survival and fitness of the planted shrubs. This experiment will be conducted in consultation with statisticians at Michigan State University, and designed so that practitioners of shoreland restoration can evaluate these tools as restoration plant supplements. The cost/benefits analysis of these supplements will dictate whether they are included in Shoreland Restoration BMP recommendations.

## **TIMELINE:**

### FY 2010

- Prepare survey protocols and datasheets
- Prepare education packets,
- Site planning & design forms, and landowner agreement forms
- Identify potential participating landowners – conduct workshops
- Conduct site analyses & develop restoration plans/designs
- Collect pretreatment data
- Order plants, cuttings, & seeds

### FY2011

- Finalize plans w/owners and establish no-mow & conservation areas
- Remove/replace impervious surface and retaining walls within the 35' buffer
- Augment aquatic and terrestrial coarse woody habitat, place biologists
- Conduct baseline water chemistry habitat, and species surveys
- Conduct habitat and species surveys
- Order plants, cuttings, & seeds
- Implement vegetation & habitat restorations

FY2012

Follow-up evaluation surveys at restoration sites  
Complete run-off engineering improvements  
Complete vegetation & habitat restorations  
Complete data analyses  
Write Final Report

**EXPECTED BENEFITS:**

1. High profile demonstration projects on well-known northern Wisconsin lakes.
2. Restoration of fish and wildlife habitat
3. Investment of local stakeholders in restoration (property owners, businesses, civic and lake groups)
4. Public education
5. Quantification of hydrological and ecological benefits
6. Provide a restoration template for DNR Watershed managers, county LCD specialists, and private sector environmental consulting firms.

**COOPERATORS:**

WDNR Science Service, Fisheries, and Watershed Management programs  
US Geological Survey  
UW Extension  
Vilas County Lake Association  
Vilas County Land and Water Conservation Department  
WDATCP  
Michigan Technical University Faculty and Graduate Program  
Private consulting firms  
Local businesses

**LITERATURE CITED:**

Elias, JE and Meyer, MW (2003) Vegetation at undeveloped and developed shorelands, Northern Wisconsin, and recommendations for restoration. *Wetlands* 23: 800-816.

Graczyk, D.G., Hunt, R.J., Greb, S.R., Buchwald, C.A. and Krohelski, J.T., 2003, Hydrology, nutrient concentrations, and nutrient yields in nearshore areas of four lakes in northern Wisconsin, 1999-2001: U.S. Geological Survey Water-Resources Investigations Report 03-4144, 64 p.

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Lindsay, AR, Gillum, SS, Meyer, MW (2002) Differences in avian assemblages between developed and undeveloped lakeshores in a mixed hardwood forest. *Biological Conservation* 107: 1-11.

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Island Press, Washington.

Robertson, D.M. and Rose, W.J. 2000. Hydrology, water quality, and phosphorus loading of Little St. Germain Lake, Vilas County, Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 00-4209, 8 pp.

Robertson, D.M., Rose, W.J., and Saad, D. 2005. Water Quality, hydrology, water quality, and phosphorus loading to Little St. Germain, Wisconsin, with special emphasis on the effects of winter aeration and ground water inputs: U.S. Geological Survey Water-Resources Investigations Report 2005-5071, 36 pp.

Sass, Gregory. 2004. Fish Community and Food Web Responses to Whole-Lake Removal of Coarse Woody Habitat. Ph.D dissertation. University of Wisconsin – Madison. 157pp.

Wisconsin Department of Natural Resources, 2000, Wisconsin Administrative Code, Environmental Protection, Chapter NR115, no. 532.

Woodford, JE and Meyer, MW. (2002) Impact of lakeshore development on green frog (*Rana clamitans*) abundance. *Biological Conservation* 110(2):277-284.

**BUDGET**  
**LITTLE ST. GERMAIN SHORELAND RESTORATION PROJECT**  
**July 1, 2009 – June 30, 2011**

**Project 1. Measuring the Value for Riparian Buffer Restorations for Fish and Wildlife Populations on Little St. Germain Lake**

**Erosion Control Supplies and Materials for 500 meter restoration project - \$ 4,740**

**FABRICS AND PINS**

3 rolls C125 incl pins @ 180.00 ea. = 540.00  
4 rolls DS150 dbl net straw blkt incl pins @ 88.00 ea. = 352.00

**NATURAL LOG BANK EROSION CONTROL**

To be supplied on site  
est. 6 duckbill anchors w/ short cables @ 15.00

**ENVIROLOCK WALLS**

400 Envirolock bags w/ ties and spikes @ 7.75 = 3,100.00  
Gravel/sand for base bags, 4 CY @ 25.00 delivered = 100.00  
Compost/sand for plantable bags 16 CY @ 25.00 deliv. = 400.00  
Should not need geogrid  
Sub-soil fill for behind walls, 12 CY @ 20.00 deliv. = 240.00

**Deer Fencing for 500m restoration project \$ 8,700**

3,150 LF 8' std. plastic UV-prot. deer fence - incl. post assembly's,  
cable, companion pins, clamps, zip-ties @ 2.60 per LF (delivered)

**Irrigation Supplies \$ 3,500**

3 pumps, hose, fittings, sprinkler heads

**Mulch, Shredded Bark, Cedar \$ 2,800**

100 CY, bulk delivery

**Compost \$ 1,000**

400 1 cu. ft. bags (Oneida County Compost) @ 2.50 per bag delivered

**Plant material for 500m restoration project \$47,400**

Incl 90 trees  
Incl. Rain Garden plants  
Incl. Delivery

**Contractual**

DESIGN/CONSULT, Hansen Garden Village \$7,200

180 hours, Brent Hansen @ 40.00 per hr.

TREE DROPS FOR FISH HABITAT \$1,000

**Implement Pollinator Response Surveys \$1,000**

materials & supplies = \$1000

**Sub Total Project 1.** **\$77,340**

**Project 2. Nutrient Run-off Feasibility Assessment Budget**

USGS and WDNR Travel and Per Diem \$3,000  
Supplies and Equipment for pilot studies \$5,800

**Sub Total Project 2.** **\$8,800**

**Project 3.**

**Vegetation Survival Enhancement Test Plot** **\$5,350**

plants (n=200 double density) = \$3000  
fencing = \$1000  
irrigation = \$600  
fill dirt = \$750

**Labor (25% Match)** **\$30,497**  
3 Field Technicians Michigan Technical University x 6 months x 2 years

**TOTAL PROJECT COST** **\$121,987**

**MINUS 25% MATCH** **\$ 30,497**

**TOTAL GRANT REQUEST** **\$ 91,490**



**VILAS COUNTY  
LAND AND WATER  
CONSERVATION DEPARTMENT**



330 COURT STREET  
EAGLE RIVER, WI 54521  
715/479-3682

Mr. Kevin Gauthier, Sr. – Lakes Management Coordinator  
c/o Wisconsin Department of Natural Resources  
107 Sutliff Avenue  
Rhineland, WI 54501

May 15, 2009

Dear Kevin:

Please regard this letter as my support for the WDNR Lake Protection Grant which was applied for by the Little Saint Germain Lake Protection & Rehabilitation District in the May, 2009 grant cycle. The project intends to restore shoreline habitat on Little Saint Germain Lake, to develop best management practices for the restored properties and to evaluate the ecological and water quality benefits of riparian buffer restorations.

The proposed project compliments the objectives of the Vilas County Land & Water Conservation Department's long range plans to reverse shoreline degradation and increase natural habitat through well designed and properly implemented restoration efforts. Because it parallels the County plan, this department will work with the project sponsor to provide cost sharing and technical support to help assure project success.

I am pleased to learn that this proposal is also being supported by Dr. Michael Meyer as a continuation of his research initiated in 2006. With Dr. Meyer's involvement, I am confident this project will not only satisfy its restoration objectives, but will also produce results of long term benefits in planning future shoreline restoration projects.

We look forward to working with the Little St. Germain Lake District and Dr. Meyer on this project and encourage you to approve funding for it. Please contact me at (715) 479-3747 if you have any questions about our assistance or the support role we intend to provide.

Sincerely,

Carolyn L. Scholl, Vilas County Conservationist



## State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor  
Matthew Frank, Secretary  
John Gozdzialski, Regional Director

Northern Region Headquarters  
107 Sutliff Ave.  
Rhineland, Wisconsin 54501-3349  
Telephone 715-365-8900  
FAX 715-365-8932  
TTY Access via relay - 711

May 1, 2009

Subject: Little St. Germain Lake Shoreland Restoration Lake Protection Application

Dear Kevin

I am writing to provide strong support for the Little St. Germain Lake Shoreland Restoration Lake Protection Application. The project at Little St. Germain Lake, described in the grant application submitted by the Little St. Germain Lake Protection and Rehabilitation District, is an excellent site to include in the Bureau of Science Services 2007-2017 research project investigating the ecological benefits of shoreland buffer restoration on northern Wisconsin lakes (Federal Pittman Robertson Project W-160-P; see attached). Because of the value of this project, I have agreed to provide staff and federal funds (PR) to assist the District meet their 25% match requirement. Specifically, my project will assist in the design and implementation of the restoration projects via staff, supplies, and materials. We will also conduct before and after wildlife, fish, and vegetation surveys at the site, to be repeated for 10 years post-restoration, to document changes in endpoint.

If you have any additional questions specific to Science Services commitment to this project please let me know. This project is a definite win/win for the WDNR Science Service research project as well as the Little St. Germain Lake Protection and Rehabilitation District.

Sincerely,

Mike Meyer

*Michael W. Meyer Ph.D.*

Research Scientist  
Wildlife and Forestry Research  
Bureau of Integrated Science Services  
Wisconsin Department of Natural Resources  
107 Sutliff Avenue  
Rhineland, WI 54501  
(☎) phone: (715) 365-8858  
(☎) fax: (715) 365-8932  
(✉) e-mail: Michael.Meyer@Wisconsin.gov

# TOWN OF ST. GERMAIN

P.O. Box 7

St. Germain, Wisconsin 54558

www.townofstgermain.org

CHAIR  
Peggy Nimz

SUPERVISORS  
Todd Wiese, Vice Chairman  
Fred Radtke  
John Vojta  
Lee Christensen

CLERK  
Thomas Martens

TREASURER  
Marion Janssen

May 10, 2009

Dr. Michael W. Meyer  
Bureau Of Integrated Services  
Wisconsin Department Of Natural Resources  
107 Sutliff Avenue  
Rhinelander, Wisconsin 54501

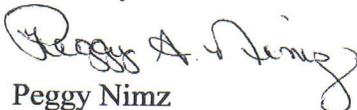
Dear Mike,

As you are aware, Todd Wiese, Vice Chairman for the Town Of Saint Germain, sits on the Board Of Commissioners for the Little Saint Germain Lake Protection and Rehabilitation District. Todd keeps the Town Board aware of the Districts activities that are of interest to the Town Of Saint Germain.

Recently, it has come to our Boards attention that the District will be applying for a grant to obtain funding necessary to restore approximately 1000 feet of shoreline on Little Saint Germain Lake. Given the deteriorating water quality and declining fish and wildlife habitat of the lake, it would be beneficial for the District to obtain the necessary funding to enable them to accomplish this project. This being one of our premier lake basins providing for the largest tourist based economy in our Town and the Districts desire to do what it takes to improve and maintain that water quality, we, **the Town Board of The Town Of Saint Germain unanimously support the Districts efforts.** Given the ongoing work and past history of the Little Saint Germain Lake Protection and Rehabilitation District, we are confident this would greatly enhance their past efforts. **We would encourage you to seriously consider their grant application to assist in funding this project.**

Thank you for your past attention to their efforts and be assured of our cooperation in all Matters of mutual concern.

Sincerely for the Town Board,



Peggy Nimz  
Town Chair

cc: Little Saint Germain Lake Protection And Rehabilitation District