End of Project Summary

Poskin Lake

Phase 2 - Watershed Evaluation, Paleocore, Plant Survey, and Shoreland Inventory

Barron County, Wisconsin

Grant No. LPL–1271–09
SEH No. POSKI 106161

June 2010

June 11, 2010

RE: End of Project Summary
Poskin Lake
Phase 2 - Watershed Evaluation,
Paleocore, Plant Survey, and Shoreland
Inventory
Barron County, Wisconsin
Grant No. LPL–1271–09
SEH No. POSKI 106161

Ms. Pamela Toshner
Wisconsin Department of Natural Resources
810 W. Maple Street
Spooner, WI 54801

Dear Ms. Toshner:

The Poskin Lake Association has put in a request for final reimbursement of grant number LPL-1271-09. All activities associated with this phase of the three-phased Lake Management Planning Project for Poskin Lake have been completed and accounted for. The aquatic plant point-intercept survey and report has been completed by Endangered Resources Services, LLC. A two part shoreline survey has been completed which included an aerial and a shoreline evaluation. The Barron County Soil and Water Conservation Department completed a watershed evaluation, primarily identifying the type and amount of land use. Basic non point source modeling was completed using the WiLMS NPS Module to estimate the potential loading from the watershed due to runoff. The WDNR completed a top/bottom paleoecological core and reported on its findings. Initial work has been completed to determine current ownership and operation of the existing dam structure on the outlet of the lake. Recommendations will be made related to the current set-up of the dam. Existing zoning ordinances have been reviewed and while it is believed that the existing ordinances are adequate, enforcement of the ordinances may not be. Please consider this report the final piece requirement for final reimbursement.

If you have questions or concerns please don't hesitate to contact me.

Sincerely,

Dave Blumer

Dave Blumer
Lakes Scientist

ls
p:\pt\p\poski\106161\reports&specs\rep\end of project summary-phase 2.docx

End of Project Summary

Phase 2 - Watershed Evaluation, Paleocore, Plant Survey, and Shoreland Inventory

Poskin Lake
Barron County, Wisconsin

Prepared for:
Poskin Lake Association
Barron County, Wisconsin

Prepared by:
Short Elliott Hendrickson Inc.
1701 West Knapp Street, Suite B
Rice Lake, WI 54868-1350
715.236.4000

Dave Blumer
Lakes Scientist

6/11/10
Date

Distribution List

No. of Copies	Sent to
1	Pamela Toshner Wisconsin Department of Natural Resources 810 W. Maple Street Spooner, WI 54801
1	Larry Kahl Poskin Lake Association 856 15th Avenue Almena, WI 54805

Table of Contents

List of Tables

List of Figures

List of Appendices

End of Project Summary

Poskin Lake
Phase 2 - Watershed Evaluation, Paleocore, Plant Survey, and Shoreland Inventory

Prepared for Poskin Lake Association

1.0 Introduction

The Poskin Lake Association applied for and was awarded a three phase Lake Management Planning grant in the fall of 2008. Work on Phases 1 and 2 was completed in the 2009 open water season. This document serves as an end of project summary of the work completed in Phase 2 - Watershed Evaluation, Paleocore, Plant Survey, and Shoreland Inventory and should be adequate to offer full reimbursements of expenditures incurred by the Poskin Lake Association in regards to this Phase.

The specific Phase 2 scope provided by the WDNR in the Lake Planning Grant Agreement LPL-1271-09 reads as follows:

The specific Phase 2 (LPL-1271-09) project tasks include: 1) Spring and summer whole lake aquatic plant point intercept survey; 2) Shoreline inventory; 3) Watershed evaluation with nutrient loading calculations; 4) Top/bottom paleolimnological core; and 5) Water level management and zoning ordinance review.

This document covers these expectations and further defines the activities that were included as a part of this phase of the overall project and summarizes the results.

1.1 Task 1 – Spring and Summer Whole Lake Aquatic Plant Point-intercept Survey

Poskin Lake (WBIC 2098000) is a 150-acre stratified, drainage lake located in west-central Barron County. It is eutrophic in nature with summer Secchi readings averaging 3.3 ft and a littoral zone that extends to 10.5 ft. The Poskin Lake Association (PLA), Short Elliott Hendrickson Inc. (SEH®), and the Wisconsin Department of Natural Resources (WDNR) authorized a series of full lake plant surveys as part of developing an Aquatic Plant Management Plan (APMP). The surveys used the WDNR's statewide guidelines for conducting systematic point intercept macrophyte sampling. The guidelines ensure that all sampling in the state will be conducted in the same manner, thus allowing data to be compared across time and space.

The immediate goals of the project were to quantify the level of the known CLP infestation, determine if Eurasian water milfoil (*Myriophyllum spicatum*) had invaded the lake, and to establish baseline data on the diversity, abundance and distribution of other native aquatic plant populations. These data provide a baseline for long-term monitoring of the lake's macrophyte community. On May 27, 2009 an early season full lake Curly-leaf pondweed

(*Potamogeton crispus*) density and bed mapping survey was completed. On July 13 a warm water point-intercept survey of all aquatic macrophytes was completed. The early season survey found CLP at 11 points throughout the lake (Figure 1). Of these locations, nine points rated a 2 or a 3 indicating that just over 2% of the lake's surface had a sizable infestation.

In the spring of 2010, local landowners complained about a significant bed of CLP in the southwest corner of the lake. This bed has been mapped and will be considered in the aquatic plant management plan.

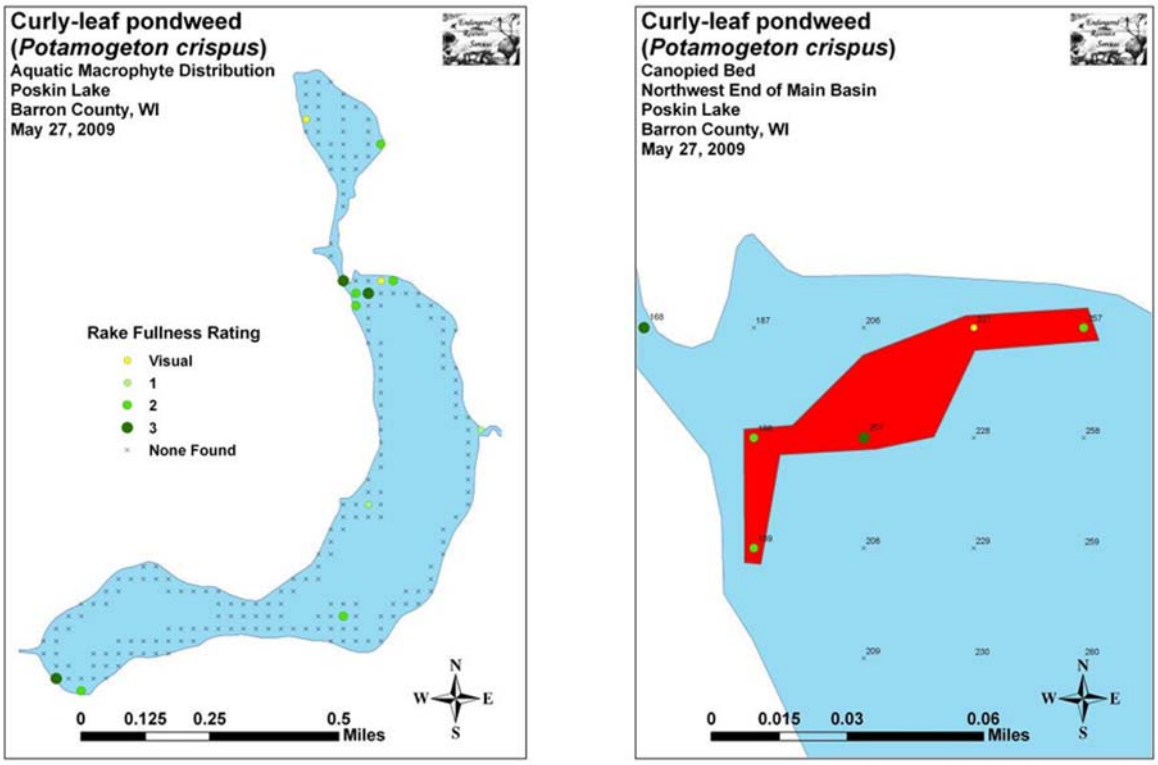

Figure 1 – May CLP Density and Bed Map

The full point intercept survey found macrophytes at 92 of the 403 survey points (22.8%) and identified a total of 25 native plants to species (Table 1). They produced an average mean Coefficient of Conservatism of 5.7 and a slightly above average Floristic Quality Index value of 28.4 (Table 2). Eleven additional plants were recorded as visuals or located during the boat survey. Coontail (*Ceratophyllum demersum*), Common watermeal (*Wolffia columbiana*), Small duckweed (*Lemna minor*) and Large duckweed (*Spirodela polyrhiza*) were the most common macrophyte species being found at 82.61%, 44.57%, 42.39%, and 41.30% of survey points with vegetation respectively. Together, they combined for nearly 55% of the total relative frequency. Filamentous algae also had a relative frequency over 10. Flat-stem pondweed and White water lily were the only other macrophytes over five.

Table 1
Frequencies and Mean Rake Sample of Aquatic Macrophytes. Poskin Lake, Barron County
July 13, 2009

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake
Ceratophyllum demersum	Coontail	76	21.23	82.61	67.86	2.00
Wolffia columbiana	Common watermeal	41	11.45	44.57	36.61	2.05
Lemna minor	Small duckweed	39	10.89	42.39	34.82	1.62
Spirodela polyrhiza	Large duckweed	38	10.61	41.30	33.93	2.13
	Filamentous algae	38	10.61	41.30	33.93	1.66
Nymphaea odorata	White water lily	22	6.15	23.91	19.64	2.00
Potamogeton zosteriformis	Flat-stem pondweed	20	5.59	21.74	17.86	1.25
Elodea canadensis	Common waterweed	15	4.19	16.30	13.39	1.33
Nuphar variegata	Spatterdock	15	4.19	16.30	13.39	2.47
Potamogeton crispus	Curly-leaf pondweed	10	2.79	10.87	8.93	1.20
Vallisneria americana	Wild celery	9	2.51	9.78	8.04	1.56
Myriophyllum sibiricum	Northern water milfoil	8	2.23	8.70	7.14	1.25
Ranunculus aquatilis	Stiff water crowfoot	4	1.12	4.35	3.57	1.00
Sparganium eurycarpum	Common bur-reed	4	1.12	4.35	3.57	2.50
Najas flexilis	Bushy pondweed	3	0.84	3.26	2.68	2.00
Potamogeton pusillus	Small pondweed	3	0.84	3.26	2.68	1.67
Heteranthera dubia	Water star-grass	2	0.56	2.17	1.79	2.00
Potamogeton strictifolius	Stiff pondweed	2	0.56	2.17	1.79	2.50
Calla palustris	Water calla	1	0.28	1.09	0.89	1.00
Callitriche palustris	Common water starwort	1	0.28	1.09	0.89	1.00
Carex comosa	Bottle brush sedge	1	0.28	1.09	0.89	3.00
Isoetes echinospora	Spiny-spored quillwort	1	0.28	1.09	0.89	1.00
Potamogeton nodosus	Long-leaf pondweed	1	0.28	1.09	0.89	2.00
Schoenoplectus tabernaemontani	Softstem bulrush	1	0.28	1.09	0.89	1.00
Typha angustifolia	Narrow-leaved cattail	1	0.28	1.09	0.89	3.00
Typha latifolia	Broad-leaved cattail	1	0.28	1.09	0.89	2.00
Zizania palustris	Northern wild rice	1	0.28	1.09	0.89	1.00
Lemna trisulca	Forked duckweed	**	**	**	**	**
Phalaris arundinacea	Reed canary grass	**	**	**	**	**
Potamogeton praelongus	White-stem pondweed	**	**	**	**	**
Potamogeton richardsonii	Clasping-leaf pondweed	**	**	**	**	**
Sagittaria latifolia	Common arrowhead	**	**	**	**	**
Sagittaria rigida	Sessile-fruited arrowhead	**	**	**	**	**
Potamogeton amplifolius	Large-leaf pondweed	***	***	***	***	***
Potamogeton obtusifolius (hybrid?)	Blunt-leaf pondweed	***	***	***	***	***
Schoenoplectus acutus	Hardstem bulrush	***	***	***	***	***

** Visual Only
*** Boat Survey Only

Table 2
Summary Statistics for Point-intercept Aquatic Plant Survey

Total number of points sampled	403
Total number of sites with vegetation	92
Total number of sites shallower than the maximum depth of plants	112
Frequency of occurrence at sites shallower than maximum depth of plants	82.14
Simpson Diversity Index	0.89
Maximum depth of plants (ft)	10.50
Number of sites sampled using rope rake (R)	2
Number of sites sampled using pole rake (P)	160
Average number of all species per site (shallower than max depth)	3.20
Average number of all species per site (veg. sites only)	3.89
Average number of native species per site (shallower than max depth)	3.11
Average number of native species per site (veg. sites only)	3.78
Species Richness	27
Species Richness (including visuals)	33
Species Richness (including visuals and boat survey)	36
Mean depth of plants (ft)	4.06
Median depth of plants (ft)	3.00

1.2 Task 2 – Shoreline Inventory

A shoreline inventory using high resolution aerial photography and ArcMap operations was completed in 2009. Shore land cover was assessed within a band 200-ft wide all the way around Poskin and Little Poskin Lakes. A total of 102 acres were mapped for the following types of disturbed land cover: cropland, lawn, and impervious surfaces; and the following types of undisturbed land cover: forests, shrub/grass, wetlands, and open water. Table 3 shows the results of this aerial mapping. Figure 2 shows the results of the aerial shoreland cover assessment.

Table 3
Land Cover Within a 200-ft Band Around Poskin Lake

Land Cover	Total Acreage
Natural	
Forest	16.2 (16%)
Shrub/grass	7.5 (7%)
Wetland	23.7 (23%)
Open water	0.7 (1%)
Disturbed	
Cropland	10.2 (10%)
Lawn	36.2 (35%)
Impervious surface	7.5 (7%)

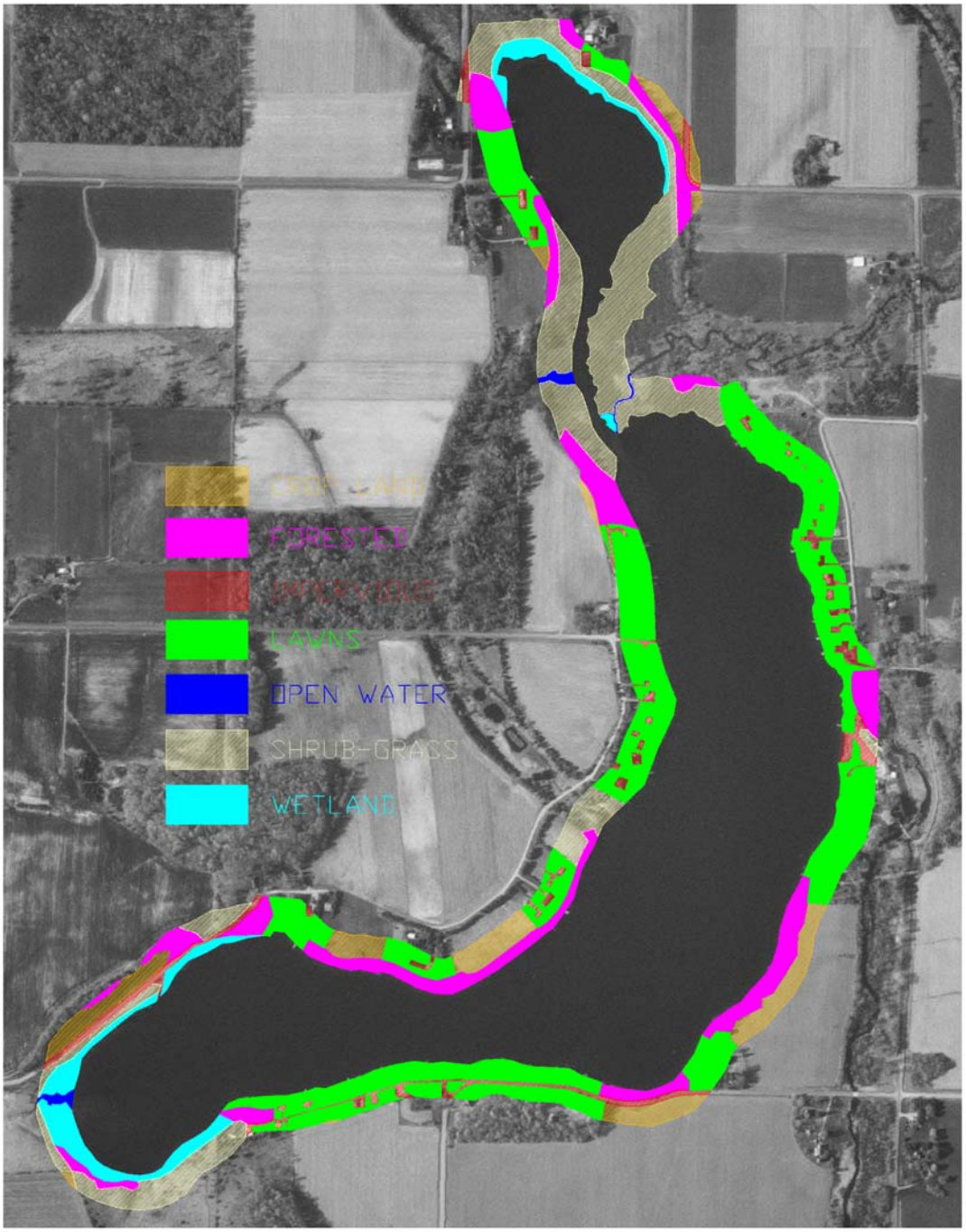

Figure 2 – Aerial Photo Land Cover Assessment

After the aerial assessment was completed, an on-the-water shoreline inventory was conducted. Using a canoe and GPS, points were marked designating where different types of shoreline began and ended. A total of 4.16 miles of shoreline were inventoried. Areas inventoried included lawn, forest, wetland, shrub, and rip rap. Locations with slight to severe erosion were also documented. All GPS points were transferred to ArcMap, and a shape file created for each shoreline type, and the overall existence of a buffer strip. Table 4 shows the results of the on-lake shoreline survey. Three sites with erosion were documented.

Table 4
On-lake Shoreline Inventory Results

Shoreland Type	Linear feet	Miles	% of Shoreline
Wetland (buffer)	6741	1.28	31
Shrub (buffer)	5944	1.13	27
Forest (buffer)	2988	0.57	14
Lawn	6256	1.18	28
Rip rap	3751	0.71	17
Total Buffer	15673	2.97	71

1.3 Task 3 – Watershed Evaluation with Nutrient Loading Calculations

The Barron County Soil and Water Conservation Department was partnered with to provide an assessment of the entire Poskin Lake and Vermillion River Watershed. Land use within the watershed, including significant farming operations was evaluated. The entire watershed is approximately 12,817 acres or approximately 20 square miles in size. The immediate watershed around Poskin Lake accounts for 9,735 acres or about 76% of the overall watershed. The Vermillion River watershed, beginning at the outlet of Lower Vermillion Lake accounts for the remaining 24% (Figure 3). Table 5 summarizes land use in the watershed.

Table 5
Land Use in the Poskin Lake and Vermillion River Watersheds

Land Use	Poskin Lake Watershed (acres)	Vermillion River Watershed (acres)
Cropland	6192	1745
Residential	68	15
Wetland	585	380
Lake/River surface area	166	34
Forest	1867	590
Pasture, roads, brush, farmsteads	893	282
TOTAL	**9771**	**3046**
Source: Barron County SWCD, 2010		

There are nine dairy farms and eleven other cattle/livestock facilities. Five of the nine dairy farms have manure storage facilities. According to the SWCD, there are approximately 7.3 miles of field waterways that are currently cropped, that could be converted to “grassed” waterways.

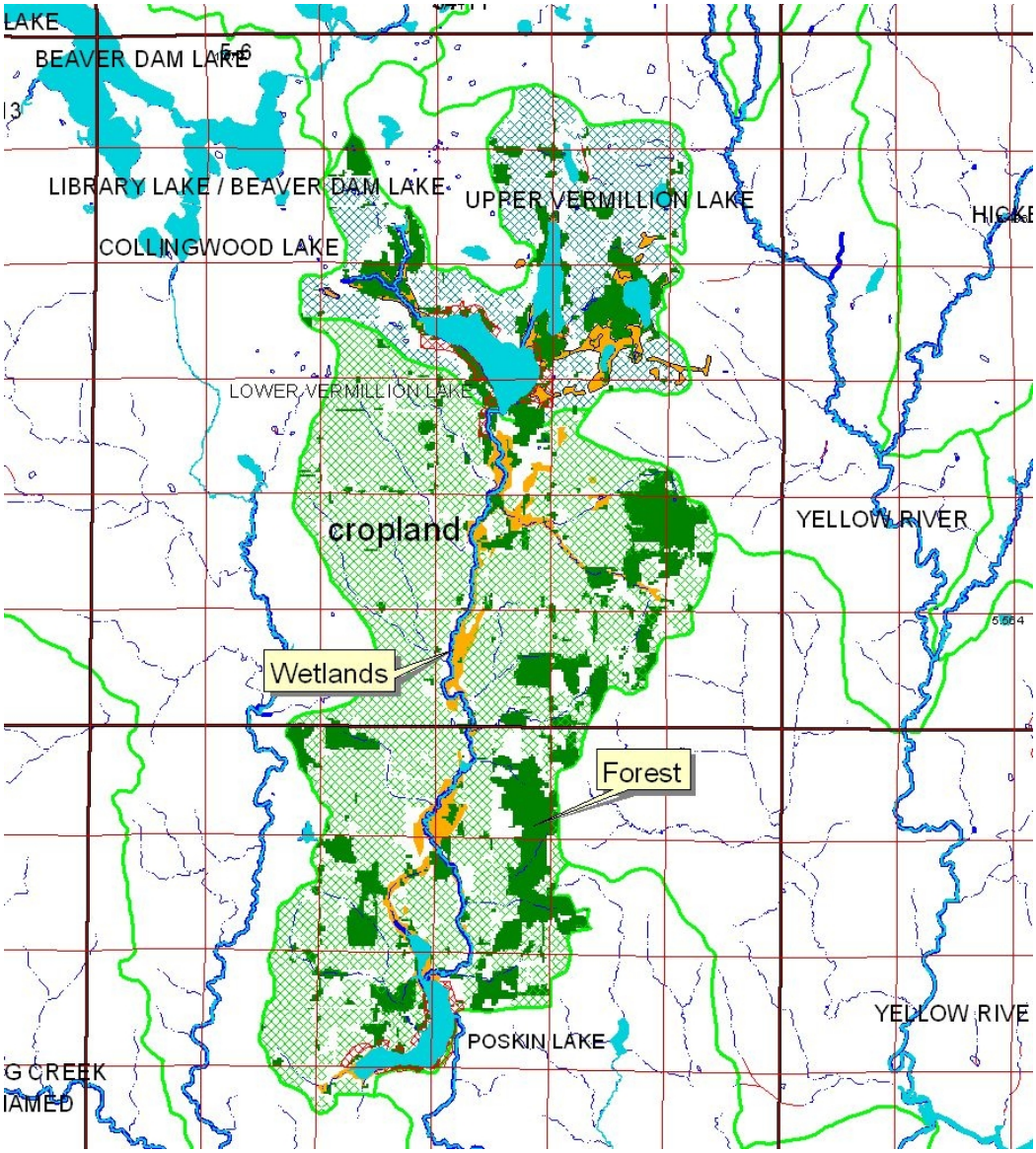

Figure 3 – Poskin Lake and Vermillion River Watersheds (Barron County SWCD, 2010)

The Non Point Source (NPS) Phosphorous Module from the Wisconsin Lake Modeling Suite (WiLMS), produced by the Wisconsin Department of Natural Resources, was used to calculate preliminary values for nutrient loading into Poskin Lake from its watershed (Appendix A). The NPS Module generates three different values for potential phosphorous loading per year from the watershed based on its land use; a low, most likely, and high value. For Poskin Lake, these values are 3,845 lbs, 7,687 lbs, and 22,268 lbs respectively. Phase 3 of the Poskin Lake project will provide greater hydrologic and morphometric data and provide some calculations in terms of the effect phosphorous reduction may have on the water quality in the lake.

1.4 Task 4 – Top/bottom Paleolimnological Core

On August 31, 2009 a sediment core was taken by Paul Garrison from the WDNR, Dave Blumer from SEH, and Denny Landro from the Poskin Lake Association, from near the deep area (N45° 25.688 W91°58.152) of Poskin Lake in about 28 feet of water using a gravity corer. Samples from the top of the core (0-1 cm) and a section (42-44 cm) deeper in the core were kept for analysis. It is assumed that the upper sample represents present conditions while the deeper sample is indicative of water quality conditions at least 100 years ago. The entire report furnished by Paul Garrison is included as Appendix B. The purpose of the core was to determine if Poskin Lake was historically a nutrient rich or fertile lake. By determining changes in the diatom community it is possible to determine water quality changes that have occurred in the lake. The diatom community provides information about changes in nutrient concentrations, water clarity, and pH conditions as well as alterations in the aquatic plant (macrophyte) community.

A summary of the sediment core indicates that Poskin Lake was historically a eutrophic lake. Although phosphorus levels at the present time are in the range of 50 µg /L, they were likely not much lower prior to the arrival of European settlers 150 years ago.

1.5 Task 5 – Water Level Management and Zoning Ordinance Review

As with many lakes, there is a great deal of discussion about the fluctuating water levels in Poskin Lake. Because the Vermillion River passes through the lake, it is subject to frequent and often significant water level fluctuations. There is a low dam (3-ft high with a 2-ft hydraulic height) at the outlet of the Vermillion River on the east shore of the lake (Figure 4). It is considered a small dam with a low hazard potential. It is currently listed as being owned by the Barron County Property Committee, and according to the WDNR, it was last inspected in 1969 (Appendix C).

Figure 4 – Vermillion River Dam on Poskin Lake

It is not known when this photo was taken, but the dam does not look like this anymore. A steel structure was placed on top of the 12-ft wide concrete structure to allow a gate to be opened and closed to either hold back or release water (Figure 5). The gate structure is currently left open so that the lake level is maintained at the level of the concrete structure. The issue most discussed is the fact that the steel structure reduces the linear feet that the lake water can flow over by half, thus reducing the amount of water that can flow through and out after a large rainfall event.

Figure 5 – Current Photo of the Vermillion River Dam on Poskin Lake

Barron County does not currently operate the gates on this dam and at this point it is not known who installed the iron gate. It is believed that the land owner immediately north of the dam structure does, though it in not known how often, or if they open the gate during high water events to allow more flow through. One result of the completed lake management plan will be to assign some entity the responsibility of monitoring and operating the gates on the dam structure.

Shoreland regulations in Barron County as described in Section 17.41 (SO Shoreland Overlay District) of the Barron County Ordinances governing land use and development were adopted for the purposes of promoting the public health, safety, convenience and general welfare, to further the maintenance of safe and healthful conditions, to prevent and control water pollution, to protect spawning grounds, fish and aquatic life, to control building sites, placement of structures and land uses, and to preserve shore cover and natural beauty. Shoreland jurisdiction applies to all lands in unincorporated parts of the County that are within 1000 ft from the normal high water elevation of navigable lakes, ponds, and flowages; or within 300 ft of the normal high water elevation or to the land-ward side of a floodplain of navigable reaches of rivers or streams. Poskin Lake is classified as a Class l lake, which is the

least restrictive classification in Barron County. The following is a summary of some of the ordinances in place that impact Poskin Lake.

- Filling, grading, lagooning, dredging, and related activities: a County grading permit is required before any of these activities can occur within the shoreland jurisdiction.
- Tree cutting, removal of shrubbery, and related activities: there shall be a shoreland vegetation protection area on each lot extending from the natural high water elevation to a line that is at least 50-ft land-ward of the natural high water elevation. Removal of trees, shrubs, and ground cover are limited to the following:
  - Establishment of one viewing corridor for each lot by pruning
  - Clear-cutting is not permitted in the corridor or elsewhere in the shoreland vegetation protection area
  - No more than 50% of the trees can be removed from the viewing corridor
  - The viewing corridor shall be more or less perpendicular to the shore, no more than 30% of the lot width not to exceed 30 ft
  - Pier, wharf, and lift placement shall be confined to waters immediately adjacent to the view corridor, unless this is not feasible
  - A pedestrian pathway to the shoreline is allowed provided it is located in the viewing corridor, is no more than 4-ft wide, and constructed of natural materials that blend with the ground cover in the vicinity of the pathway
  - Removal of dead and diseased trees is allowed
  - Control of noxious weeds and exotic species is allowed
  - Any paths or roadways with in the corridor shall be constructed or surfaces so as to be effective at erosion control
  - Natural shrubbery shall be preserved as far as practical, or replaced with other vegetation that is equally effective at retarding runoff, preventing erosion, and preserving native appearance and natural beauty

- Water setbacks and building elevation standards: all buildings and structures in the shoreland jurisdiction shall comply with the following:
  - No building or structure shall be located within the areas located between the normal high water elevation and water setback lines located 75-ft inland and parallel to the normal high water elevation
  - Driveways, walkways, platforms, terraces, patios, retaining walls may be established in the setback area with certain restrictions
  - A water setback line of 100-ft inland of the normal high water elevation shall apply to farm buildings housing animals, barnyards, and feedlots
  - Boat house structures shall be used solely for the storage of aquatic equipment, be of a color not to detract from the natural beauty of the shoreline, not be used for human habitation, be set back at least 10-ft from the ordinary high water elevation, not exceed 8-ft in height and 96 square feet in floor area, and may not be within 50 ft of the side lot line
  - Piers, docks, and boat hoist may be located within the setback area provided they are capable of seasonal removal
  - Seawalls may be located within the water setback provided a grading permit and any WDNR permits are first obtained

- The construction or placement of open structures within the shoreland setback shall be permitted if it meets the following conditions:
  - Is located at least 35-ft form the ordinary high water elevation and within the viewing corridor
  - Has a total floor areas that does not exceed 200 square feet
  - Has open or screened sides
  - Does not exceed 10-ft in height
  - Blends in with native or restored vegetation at the site

- The County must approve a vegetative buffer zone or shoreland restoration plan that will be implemented by the land owner to preserve or establish a vegetative buffer zone and comply with the following standards:
  - Shall cover at least 70% of the half of the shoreland setback area that is nearest the water
  - A plan submitted by a land owner shall contain a before and after description of the restoration site, provide a tree canopy, a shrub layer, and ground cover
  - A list of names and description of species to be utilized
  - A proposed schedule and sequence of work activities, and a list of the methods and equipment to be used
  - Be tended for a period of one growing season and maintained thereafter

- Minimum shoreland dimensional standards for lot development along the shores of Class 1 lakes are as follows:
  - Lot size – at least one acre
  - Lot width – at least 150-ft
  - Shoreline setback – at least 75-ft
  - Side yard setbacks – a minimum of 20-ft
  - Shoreland protection area – at least 50-ft from the ordinary high water elevation

- Ordinary maintenance and repair of non-conforming structures located within the designated shoreland areas is allowed
- Non-conforming structures within 50-ft of the ordinary high water elevation are permitted ordinary maintenance and repair provided no more than 25% of the structural members of the existing external walls and roof are modified or replaced. Such structures may be improved internally
- Non-conforming structures between 50 and 75 ft form the ordinary high water elevation are permitted ordinary maintenance and repair and may be expanded provided:
  - The existing structure includes at least 750 square feet of enclosed living space
  - Expansion is limited to a maximum of 1500 square feet enclosed living space
  - Addition are no closer to the normal high water elevation than the land-ward façade of the existing structure
  - Mitigation is required to compensate for loss of shoreland buffer area functions, and can be met by restoring vegetative buffer areas, removing non-conforming structures, restoring native vegetation in both side yards, or by other measures agreed upon by the owner and the Zoning Administrator

Barron County has two additional ordinances in place to help protect its lakes. An ordinance prohibiting power loading at all public access boat landings, and an "illegal to transport" ordinance making it illegal to travel on County roadways with plants or other things attached to a boat or trailer were both passed in recent months.

The Town of Clinton also has an ordinance requiring "no wake" watercraft operation in Poskin Lake between the hours of 6:00 p.m. and 10:00 a.m.

There are two new residential development areas on the shores of Poskin Lake. While it may be beneficial to have more restrictive ordinances in place to protect Poskin Lake, the existing ordinances, if fully enforced and complied with, are adequate at this time.

2.0 Summary

Activities intended for completion in Phase 2 of this project have been completed. Data collected in this phase of the overall project will be used in 2010 to help develop a comprehensive Lake Management Plan for Poskin Lake as a part of Phase 3 of the overall Project. Please consider this report support for the closure and complete reimbursement for grant number LPL-1271-09.

Appendix A

Non Point Source Modeling

Appendix B

Paleoecolgical Core Report

Appendix C

Dam Report