Section V: Cost Estimate

1. Salaries, wages and employee benefits

Harvesting Operators	$6000 yr x 3 yrs =	$18,000
Worker's Comp Ins.	$1200 yr x 3 yrs =	$ 3,600
APM Coordinator	$2500 yr x 3 yrs =	$ 7,500

Donated value: CBCW 400 hrs yr x $12 hr x 3 yrs = $14,400

2. Consulting services

LWRD Point Intercept	$1700 yr x 3 yrs =	$ 5,100
LWRD Water Quality	$3000 yr x 3 yrs =	$ 9,000
LWRD support	$1500 yr x 3 yrs =	$ 4,500
sociological survey, meetings, education support and training		
Report generation	$3000 x 1 time	$3000

3. Purchased services - printing and mailing

Blake Lake Bugle $500 yr x 3 yrs =	$ 1,500
Sociological survey 225 surveys x $.45 x 2	$ 202
Shipping for all samples =	$ 300

Donated value: Newsletter creation 40 hrs x $12 hr x 3 yrs= $ 1,440

4. Other purchased services

CLMN Water quality monitoring		
(DO, pH, etc)	$ 200 yr x 3 yrs =	$ 600

Donated value: Volunteer secchi readings
12.5 hrs yr x $12 hr x 3 yrs = $ 450

5. Plant material

6. Supplies

Harvester operating supplies (fuel, oil, repair parts)	
$3000 yr x 3 yrs =	$ 9,000
Head refurbished on harvester =	$15,000
Preservative =	$ 40
Bottles =	$50

7. Depreciation on equipment = N/A

8. Hourly equipment use charges

Donated value: Boat rental 27 trips (includes turnover) x $50= $1,350

9. SLOH costs

Chemistry in lake $207 x 21 samples x 1 site =	$ 4,347
Chemistry tributary $27 x 15 samples x 3 sites =	$ 1,215
Algae analysis $125 x 3 times/year x 3 years =	$ 1,125

10. Non-SLOH lab costs

Zooplankton analysis $160 x 3 times/year x 3 years =	$ 1,440

11. Other

WAL convention - education of members	
$ 1,500 yr x 3 yrs =	$ 4,500
Education materials, signage	
$ 500 yr x 3 yrs =	$ 1,500
Donated value: LWRD mileage 20 miles x 27 trips	$540

Big Blake Lake Aquatic Invasive Species Established Population Control Grant Project Scope and Description

August 1, 2012

Project area

BIG BLAKE LAKE DESCRIPTION AND LOCATION

Surface Area:	217 Acres
Maximum depth:	14 feet
Mean depth:	9 feet
Lake type:	Drainage
Section:	18
Township:	32N
Range:	16W
Accessibility:	Two Public Boat Launches, One Carry-In Access

Big Blake Lake is a 217 acre lake located in the Georgetown Township of Polk County, Wisconsin, approximately 80 miles northeast of the Twin Cities metropolitan area. The Big Blake Lake watershed is a relatively large watershed (61:1 watershed to lake ratio) and is part of the Upper Apple River Watershed in the St. Croix River Basin.

The main inlet for Big Blake Lake is a channel flowing directly from Little Blake Lake on the southeast end of the lake. Additionally, Big Blake Lake receives water from an inlet called Lost Creek located on the north side of the lake that flows from Lost Lake. The outlet is located on the northwest side of Big Blake Lake and flows to the Apple River via Fox Creek. Lakes may be classified according to their primary source of water, and how that water enters and leaves the system. Big Blake Lake is defined as a drainage lake, or a lake with both an inlet and outlet. Drainage lakes receive most of their water from the surrounding watershed in the form of stream drainage, have a prominent inlet and outlet that move water through the system, and commonly have high nutrient levels due to inputs from the adjacent watershed; as such, Big Blake Lake rarely stratifies.

Big Blake Lake has three distinct areas with Sensitive Area Designation which have known populations of wild rice. Big Blake Lake has platted access sites with road rights-of-way and one public resort. Big Blake Lake is a significant AIS source water with high public use.

The Big Blake Lake Protection and Rehabilitation District (District) was formed in 1976 in response to concerns about algae blooms and aquatic plant problems. A Feasibility Study was performed in 1981 by the WDNR Office of Inland Lake Renewal, which looked at both watershed management and in-lake macrophyte control options. During the 1980s and 1990s, Big Blake Lake engaged a variety of efforts including harvesting performed by outside contractors such as Lake Restoration, Inc., and chemical treatments paid for by individual

riparian landowners through companies such as Aquatic Engineers. In 1997, efforts began in earnest to address the immense growth of aquatic invasive species curly leaf pondweed. Barr Engineering completed a macrophyte survey and subsequent Macrophyte Management Plan in 1998. In 2004 The Limnological Institute (TLI) completed another macrophyte survey that helped the District develop a Lake Management Plan. TLI's plan led to the obtainment of an ACEI Aquatic Invasives Control grant through the WDNR providing a fifty-percent match for aquatic plant management through harvesting. This project was successfully completed and implemented control actions to reduce AIS in Big Blake Lake.

The Big Blake Lake District has already initiated numerous prevention and control strategies. Over the past six years Big Blake Lake has been developing a CBCW program and will continue these efforts into the future. Big Blake Lake also participated in the 2012 Landing Blitz and publicized their efforts through media sources. Additionally, the new State AIS signs have already been installed at the boat landings on Big Blake Lake. The District has also managed curlyleaf pondweed via harvesting with a fifty-fifty match coming from the District and the WDNR

For more detailed information on the studies that describe Big Blake Lake, please see the following references:

Williamson, J. 2011. Blake Lake Aquatic Macrophyte Monitoring 2011. Polk County Land and Water Resources Department, Balsam Lake, WI.

Williamson, J. 2010. Blake Lake Aquatic Macrophyte Monitoring 2010. Polk County Land and Water Resources Department, Balsam Lake, WI.

Williamson, J. 2006. Blake Lake Aquatic Macrophyte Monitoring 2006. Polk County Land and Water Resources Department, Balsam Lake, WI.

Strasser, N.D. and J.E. Britton. 2005. 2004 Big Blake Lake Aquatic Plant Survey Technical Report and Management Plan. Aquatic Engineering and The Limnological Institute, Lacrosse, WI.

Strasser, N.D. and J.E. Britton. 2005. 2004 Big Blake Lake Water Quality Monitoring Technical Report. Aquatic Engineering and The Limnological Institute, Lacrosse, WI.

Rattei, M. 1998. Blake Lake Macrophyte Surveys and Management Plan. Barr Engineering Company, Minneapolis, MN.

Cornelius, R. 1999. Fish Survey, Blake Lake (2627000), Polk Co. – 1998. Wisconsin Department of Natural Resources, Spooner, WI.

Description of problem to be addressed by project

There are three primary problems occurring in Big Blake Lake: aquatic invasive species and nuisance plant growth, algae blooms, and impaired water clarity.

Aquatic Invasive Species and Nuisance Plant Growth Discussion

Curly leaf pondweed (CLP) is an exotic plant present in most Wisconsin lakes. CLP has an annual life cycle unlike native Wisconsin aquatic plants. It begins growing in the fall as native plants die off for the year. CLP continues to grow throughout the winter months under ice cover because it tolerates cold-water temperatures and low light conditions. It completes its reproductive cycle with the formation of turions, or seeds, in the early summer, which float across the lake. Finally, CLP dies off in late June through mid-July. Nearly 130 acres were mapped by Aquatic Engineering in June, 2003, showing a 100 percent increase in total acreage determined by Barr Engineering in 1996. Until the summer CLP die off occurs, it is topped out in most shallow areas of the lake and impairs recreational uses such as boating, fishing, and swimming.

As CLP dies, a significant cascade of biological events occurs. Since the CLP die off occurs as water temperatures are relatively high, biological organisms are very active. As CLP decays, nutrients released into the water column are available for algal uptake. Large algal blooms usually occur as a result. Algal blooms result in increases in chlorophyll-a, elevated phosphorus concentrations, and reduced water clarity. Previous water quality data for Big Blake Lake identify the water clarity problems present in Big Blake Lake. Secchi depth measurements indicate a highly eutrophic condition in Big Blake Lake starting in mid-July and continuing at least through mid-September.

Algae Blooms and Impaired Water Quality Discussion

The cycle of annual die offs of a large biomass of plant material accelerates the aging process, or eutrophication, or a lake by adding nutrients and slowly filling in the lake. Eutrophication is a term used to define the aging process of a lake, and describes the response of a lake to nutrient enrichment. Water bodies that receive excessive amounts of nutrients from any source eventually become eutrophic. Once in the lake, these excess nutrients increase fertility levels and contribute to murky water conditions, algae blooms, and nuisance weed growth. Oxygen depletion and nutrient release from sediments acts as a positive feedback loop to push the lake system to a further eutrophic state, perhaps even a hypertrophic state.

Aquatic macrophytes play a major role in the dynamics of shallow lakes and often dominate the littoral zone of many large lakes. They provide food and habitat for a myriad of biota, anchor lake and river sediment, remove nutrients, and modify the current or seiche. Eutrophication and other anthropogenic impacts have caused dramatic changes to the structure and biomass of aquatic macrophyte communities. Sampling aquatic macrophyte communities and their

taxonomy is relatively straightforward and interpretation of water quality and habitat impacts from aquatic macrophyte community data can be made with a reasonable amount of training and effort. The resulting data suggest that macrophyte community response to natural, human, and recovery processes is essential knowledge for lake management decisions rather and may be more informative than simple chemical (e.g. phosphorus) endpoints.

Discussion of project goals and objectives

The overall goal of Big Blake Lake P&R District's Aquatic Plant Management Plan is to create a diverse aquatic plant community while maintaining a healthy fish population and preserving water quality in order to fully appreciate the entire spectrum of recreation, relaxation, and visual beauty this lake has to offer.

Big Blake Lake experiences two separate plant growth problems. In Spring, the lake has dense curly leaf pondweed beds. These beds have increased in lake coverage from 65 acres in June 1997 to 110 acres in 2004. The spring growth of curly leaf pondweed (CLP) severely restricts the use of the lake until the middle to end of June. Then in mid-July, Big Blake Lake experiences nuisance plant growth and algae blooms that again restrict the use of the lake. These mid- to late-summer plants include coontail, which floats most densely in the bays and in the north and south ends of the lake and restricts nearly all navigation and recreation. In addition, the die-off of Spring CLP loads the lake with phosphorus, which, by mid-July, impairs the water quality and threatens wildlife habitat such as loons and their chicks which rely on underwater vision to locate food.

By mechanically harvesting these plants, Big Blake Lake experiences season-long control to allow watercraft to more easily maneuver around the lake, improves our water clarity, and enhances fish community movement. Additionally, early season CLP harvesting will remove nutrient-rich biomass from the lake and limit additional spreading of turions. Mechanical harvesting is the best option to make more of the lake recreationally useful to the public while simultaneously improving the native plant community and water quality. Additionally, the District has determined harvesting to be a more cost-effective option. AIS grant dollars will be used only for the large-scale, early season curly leaf pondweed harvesting program and associated monitoring, research, and education.

The District recognizes that native species are an important component of the ecosystem and that a healthy native plant community may help protect the lake from future invasive aquatic plants like Eurasian water milfoil. Therefore, this Plan includes information and education elements to promote awareness of AIS and the importance of native plants.

Two aquatic macrophyte full point intercept surveys have been carried out on Big Blake Lake during our first five-year APM plan-based harvesting time period; one survey in 2007 and the second in 2011.

* The Frequency of Occurrence (FO) shows that Potamogeton crispus (CLP) was present at 96.54% of the sites shallow enough to support vegetation (in 2007), while in 2001 the FO was 66.91%, which represents a nearly 30% reduction!

* In late summer 2007, the Simpson's Diversity Index (D), which measures the probability that two individuals randomly selected from a sample will belong to the same species, was calculated to be 0.63; in 2011 it was calculated to be 0.77.

* The Floristic Quality Index (FQI), which evaluates the closeness of flora in an area to that of an undisturbed condition, was determined to be 22.94 in 2007 and 24.49 in 2011.

The FO combined with the Simpson's Diversity Index and the FQI, show the native plant community is starting to recover as CLP density and coverage is reduced, indicating that Big Blake Lake has measurable success from harvesting CLP.

Therefore, we will continue to work toward our original goals while also adding an intense research component that will drive the development of our APM plan and will also provide data to compare harvesting methods on Big Blake Lake to chemically controlling CLP on similar lakes such as Long Lake, also in Polk County.

The specific goals of the 2007-2011 Big Blake Lake AIS Management Plan were (and will continue to be for 2013-2018):

* to decrease curly leaf pondweed (CLP) frequency and/or density
* to promote substantial recovery of the native aquatic plant community over a five-year period (2013-2018)
* and to restore reasonable uses of the lake.
*

Additional goals are:

* to produce meaningful data through water chemistry studies and full point intercept surveys, which will provide the WDNR and PCLWRD with information to compare and contrast with lakes who are managing their AIS with chemicals rather than harvesting.
* to protect sensitive areas from disturbances caused by harvesting or herbicide applications
* to improve water quality
* and to increase community involvement and education.

If attained, these goals will lead to an increased understanding of the historical impacts on our current situation, the restoration of the beneficial uses of the aquatic ecosystem, as well as improved community participation and education.

The original objectives (2007-2011 APM plan) for goal attainment have not yet been met, so the current APM committee, which includes District members (Sam Weber, Jim Filkins, Jim Maxwell, Joan Maxwell, and Ford Elliott), Polk County Land and Water Resources staff (Jeremy Williamson, Eric Wojchik, and Katelin Holm), and Wisconsin Department of Natural Resources staff (Pamela Toshner, Alex Smith, Jane Malischke, Frank Koshere, and Aaron Cole), St. Croix Tribal DNR (Anthony Havranek) have agreed that the following quantitative objectives shall remain as follows:

1. Reduce CLP average density rating to "1" OR
2. Reduce lake-wide CLP sample site frequency of occurrence by sixty percent in harvested areas by 2018 AND
3. Increase FQI by 4 units (from 2006 FQI of 16 to 20) to the regional mean by 2018.

In order to reach these goals, the following qualitative objectives must also be considered:

1. A better understanding of the drainage water and nutrient budgets and the sources of phosphorus from the watershed (beyond the natural decay of CLP)

Description of methods and activities

We intend to reach this goal by:

* Providing a progressive and flexible weed-harvesting program whereby we create maximum recreational use of the lake with minimum disturbance to the plant and animal life that depend on these waters.
* Producing valuable research to the WDNR and other interested parties on the effects of AIS management via harvesting by water chemistry studies and full point intercept surveys.
* Protecting a flourishing native aquatic plant community in order to safeguard Big Blake Lake's biodiversity since native plants are essential in slowing the spread of invasive species via competition.
* Promoting community involvement through heightened awareness and support of the preservation of our lake, and by creating a positive atmosphere of responsible action and an awareness of what individuals and communities can do to make a difference.

Harvesting methods and protection of sensitive areas

The harvesting season will begin each spring based on a visual observation. Harvesting will begin when the CLP can effectively be harvested. This is expected to occur when the plants can be efficiently harvested and the harvester blades can effectively cut and harvest. The plan is to clear-cut 80 of the existing 110 acres of curly leaf pondweed in the Spring prior to the maturation of the CLP, to within 50 feet of the shoreline. After 15 June harvesting may occur in water as shallow as 30 inches, but it should not occur within 50 feet of shore with the exception of Sensitive Area Site B. Navigational channels are allowed in Site B, but they are not

reimbursable through the grant. Harvesting will continue as needed during all CLP growth periods, and particularly to harvest CLP over specific broad areas (to be later monitored) to reduce turion deposition and work towards the five-year goals of CLP reduction.

Big Blake Lake has a valuable fishery that is particularly beneficial for bass and panfish populations. Therefore, spawning and nursery areas must be protected. This Plan excludes areas within 50 feet of the shore (with the exception of Sensitive Area Site B and perhaps Site C in future years) from harvesting operations. The calendar dates of Spring harvesting will vary year to year due to seasonal weather changes that affect the winter growth of plants. Once the ice is out and the plant growth can be determined to be efficiently harvested (within two feet of the lake's surface) the harvesting will begin, pending yearly GLIFWC approval.

The selection of harvesting areas will be based on the maturation level of the plants in the approved areas. This can also vary year to year along the length of the lake due to seasonal changes. Some years have dense growth early on in the south end of the lake and more sparse growth in the north end and vice versa on other years. Therefore, each harvesting season must begin with a visual observation of plant maturation in the approved harvesting areas.

Research on the effects of AIS management via harvesting by water chemistry studies

Physical and chemical data will be collected in-lake at the deep hole. Integrated samples will be collected from the water column once a month. Water samples will be analyzed at the State Lab of Hygiene for total phosphorus, soluble reactive phosphorus, nitrate/nitrite nitrogen, ammonium, total Kjeldahl nitrogen, sulfate, total suspended solids, and chlorophyll a. Spring and fall turnover samples will be collected in April and October. In addition to these sampling events, lake profile monitoring will be conducted every two weeks in the two locations previously mentioned. Profile monitoring will include dissolved oxygen, temperature, conductivity, and pH readings as well as Secchi depth readings.

A total of three tributaries will be sampled monthly throughout the growing season. Temperature, pH, dissolved oxygen, conductivity, and turbidity measurements will be collected in-stream biweekly. Stream flow will also be measured biweekly with a Marsh McBirney. Analysis of tributary samples will include nitrate + nitrite, ammonium, total Kjeldahl nitrogen, total phosphorus, soluble reactive phosphorus, and total suspended solids by the Water and Environmental Analysis lab in Stevens Point. Monitoring of the tributaries will help discern areas of increased phosphorus loading. Tributaries found to be high sources of phosphorus will be investigated for possible best management practices.

Phytoplankton will be sampled with a 2-meter composite sampler in-lake at the deep hole. Phytoplankton will be collected three times per year in accordance with the National Park Service Inland Lake Protocol from the Great Lakes Region. The samples will be sent to the State Lab of Hygiene for identification and enumeration of the algal community. The composition

and duration of species will be an indicator of how Big Blake Lake is processing nutrients and provide baseline information on food webs.

Zooplankton samples will be taken in-lake at the deep hole with a Wisconsin Net. Zooplankton samples will be collected three times a year in accordance with the National Park Service Inland Lake Protocol for the Great Lakes Region. Samples will be sent to the St. Croix Watershed Research Station for identification to genus. The secondary production in the lake can be related to the type of carbon sources entering from the watershed. High concentrations of cyanobacteria can impact zooplankton populations because of a lack of food sources. Samples will be used to determine if there is an impact on zooplankton during the summer season because of other in-situ conditions.

Lake and river water quality information will be used to improve lake modeling. Mapping and watershed delineation from the Limnological Institute report will be ground truthed and used as a basis for modeling as well as delineation of the Big Blake Watershed. An appropriate model such as WiLMS or BASINS will be updated to determine phosphorus loading from land use and upstream tributaries and the effects on Big Blake Lake. Scenarios of land use change can be used to show how to improve water quality.

A sociological landowner survey will be distributed to property owners within the Big Blake Lake District to obtain public perception on aquatic invasive species and nuisance plant growth, algae blooms, and water clarity.

Full point intercept surveys

The full point intercept surveys of aquatic plants is a method that uses a grid of sample points in the littoral area (rather than transects). The spacing between sample points is based upon the lake's surface area. Point intercept sample methodology is based upon Jessen and Lound (1962) and is outlined in Wisconsin's Department of Natural Resources Long-Term Trend Lake Monitoring Methods. (Bureau of Water Resources Management, July 1987) as modified by Deppe and Lathrop (1992).

The Jessen and Lound rake method is used to sample the macrophytes, which will assess the success of harvesting within the lake. 276 sampling points have been established in Big Blake Lake (see appendix C Blake Lake Aquatic Macrophyte Monitoring 2011). This method involves using a rake with a handle and making a figure eight in an area that is approximately 1 meter square. The rake is then inverted and brought to the surface to assess the sample.

Each species on the rake head is identified, and the approximate density of each species is determined on a scale of 1 to 3. This can be used to determine a species composition or dominance of a species at a site or certain water depth. The results are then evaluated using three different indices or metrics. The Floristic Quality Index (FQI) and Simpson's Diversity Index (D) will be calculated as well as the Frequency of Occurrence (FO) for each species.

Community involvement

Clean Boats Clean Waters (CBCW) is an integral component in involving District members and educating the public at large about Big Blake Lake's infestation of the aquatic invasive species, curly leaf pondweed, currently in our waters and to prevent additional infestations from occurring, namely Eurasian water milfoil, spiny waterflea, and zebra mussels. Big Blake Lake has been developing its CBCW program over the past six years. With the advancements in technology and social networking, we now have an interactive CBCW calendar where volunteers can sign-up for shifts online, a growing training program for volunteers, and a facebook site that is being developed to help reach a wider audience. CBCW hours will be entered into SWIMS. Big Blake Lake participated in the 2012 Landing Blitz and will continue to participate in this effort in the future.

The District's Information and Education (I&E) program includes our newsletter, The Blake Lake Bugle, which is a forum for I&E articles and provides updates on the progress of our AIS projects, landing signage, a blogging site, and a facebook page.

Annual participation in the WDNR's self-help monitoring program is another activity our community can become involved in as citizens will measure water clarity, using the Secchi Disk method. We will also collect water chemistry samples. Dissolved Oxygen, Total Phosphorus, and Chlorophyll will be measured in both basins and in the middle of the lake. Polk Co LWRD will perform training sessions for further activities our community can become involved in, such as macrophyte mapping, and all of our data can then be entered into the WDNR's CLMR website (SWIMS database).

<u>Description of project products or deliverables</u>

- Citizen lake monitoring results will be entered annually into the WDNR CLMR data base and into the WDNR SWIMS database.
- CBCW will be entered annually into the WDNR SWIMS database.
- A comprehensive, yet flexible Aquatic Plant Management Plan will be developed. The APM plan must be quick to change as the aquatic plant challenges evolve with time and with treatment. An integral element of our APM plan will be communication between the APM coordinator, PCLWRD, and WDNR to discuss changes in the aquatic plant community, which will drive changes to the plan in order to meet the overall objectives.
- A final report and executive summary for distribution by the Apple River Protection and Rehabilitation District will be prepared which includes:
    - In-lake and tributary water quality report with comparison to previous data where it exits and management options to improve water quality
    - In-lake biological report which will enhance the understanding of aquatic life in the flowage

- Evaluation of watershed conditions and land use including annual pollutant loading determined though modeling and actual load partitioning

Description of data to be collected

- Full point intercept data [Spring (pre-CLP) and each Fall (post-CLP)]
- Standardized water chemistry and monitoring data for in-lake and tributary sites
- Stream flow measurements and loading calculations
- Trophic State Index (TSI) data
- Biological data with indices and ecological interpretation
- Improved model of watershed influence on lake water quality
- Results of sociological survey
- CBCW data
- CLMN data

Description of existing and proposed partnerships

The Big Blake Lake Protection and Rehabilitation District

* Citizen Lake Monitoring
* Clean Boats Clean Waters
* Participation in Landing Blitz
* Participate in educational activities
* Develop goals and strategies for lake planning
* Provide financial assistance of $50,000
* Provide volunteer hours of $25,000
* Distribute final report and post on Blake Lake internet sites
* Demonstrated capability of managing past grant projects successfully
* Pre-application grant scoping consultation with the WDNR

The Polk County Land and Water Resources Department (LWRD)

* Perform field activities
* Advise on lake changes and challenges
* Organize, analyze, and present data and best management practices
* Provide educational materials and workshops
* Generate field report on water quality
* Demonstrated capability of managing past grant projects successfully
* Pre-application grant scoping consultation with the WDNR

The Polk County Land and Water Resource Management Plan (2009), adopted by the County Board and approved by the state identifies goals, objectives, and activities to be addressed. Goal 1 Objective 1A (below in italics) pertains to AIS:

Goal 1. Protect the water quality of our groundwater, lakes, streams, rivers, creeks, and associated ecosystems.

Objective 1A. Prevent, control or eliminate aquatic invasive species to protect the integrity of our surface water resources.

1. *Educate water users, lake groups, and special parties (fishing groups) of the impact, spread, and peril of AIS*
2. *Monitor water bodies for the presence/absence or extent of invasion*
3. *Create a plan for invasive species management*
4. *Use volunteers and interns whenever possible*
5. *Employ strategies to keep native ecosystems intact*
6. *Work with other agencies to coordinate programs and provide information*

The results of this grant project will be used to amend/update future drafts of the LWMP.

The St. Croix Band of Ojibwe Department of Natural Resources

* Assess for wild rice
* Advise on wild rice protection

Discussion of role of project in planning and/or management of lake

The development of the Aquatic Plant Management (APM) Plan for the next five years (2013-2018) will rely heavily on the data provided through the data collected as part of this study.

Big Blake Lake has seen a thirty-percent reduction in the density of CLP in just five years of APM plan-based harvesting. Prior to that, we had seen a 100% increase in CLP (from the 1998 BARR study to the 2004 TLI/LWRD study) during which time the District was hiring a harvesting company to come in and harvest "at will" and individual riparian owners were also hiring chemical treatments for their shoreline weeds. These studies helped us to understand the ecological impact that CLP was having on our water quality, and the impact that aquatic plant management, or lack thereof, was also having on our water quality. In 2005 we distributed a Resident Lake Survey, which helped us understand the impact that CLP and nuisance weeds such as coontail had on the recreational enjoyment of and navigational use of Big Blake Lake from the riparian owner's standpoint. A future survey will provide updated information regarding the above perceptions. Our next phase, after having seen such hopeful results from the last five years of APM-plan driven harvesting, is to create a more meaningful APM plan based on a wider variety of data: chemistry, citizen lake monitoring, resident surveys (including shoreland assessments and sociological survey), resident education, and biological monitoring.

Timetable for implementation of key activities (April 2013- June 2016)

The activities of this grant will be conducted over a three year timeframe. The below activities will take place in the years of 2013, 2014, and 2015.

April	Spring turnover samples
May	Full point intercept survey
July	State supported Landing Blitz
May-Sept	Physical/chemical water samples in lake/inflows/outflow/tributaries Biological monitoring (phytoplankton/zooplankton) Clean Boats, Clean Waters
August	Fully point intercept survey
October	Fall turnover sampling

A sociological survey will be conducted one time over the course of the three year grant.

The 2016 year will be devoted to grant accounting and final report generation.

Plan for sharing project results

*Updates will be shared with lake residents in the Blake Lake Bugle, emails, and through the District's blog and facebook sites.
*LWRD will present data and recommendations at Lake District meetings and/or to the Board.
*An executive summary will be given to every lakeshore property owner and interested residents.
*Project partners and WDNR officials will be provided with the final report.
*A hard copy of the final report and APM plan will be housed at the Balsam Lake Public Library
*APM plan available on PCALR website and on Big Blake Lake's social network sites.