High-Fishtrap-Rush Lakes Stewardship Program:
Phases 1 and 2

Submitted to:

Wisconsin Department of Natural Resources
Attention: Kevin Gauthier, Lake Coordinator
107 Sutliff Avenue
Rhinelander, Wisconsin 54501
Phone 715-365-8937, Fax 715-365-8932

Prepared and Submitted by:

High-Fishtrap-Rush Lakes Association
Daniel C. Johnson
Winter (9/21-6/15): 59 Logan Loop, Highland Park, IL 60035   847-926-4282
Summer (6/16-9/20): 6238 Oswego-Fishtrap Lake Road, Boulder Junction, WI 54512   715-385-9171
Email: dcjretired@hotmail.com

And

White Water Associates, Inc.
Contact: Dean B. Premo, Ph.D., President
429 River Lane, P.O. Box 27
Amasa, Michigan 49903
Phone: (906) 822-7889; E-mail: dean.premo@white-water-associates.com

Date: July 2012

TABLE OF CONTENTS

1. INTRODUCTION

This proposal seeks a large-scale lake management planning grant from the Wisconsin Department of Natural Resources (WDNR) Lake Planning Grants program. Our long-term vision is to ensure the perpetuation of a healthy High-Fishtrap-Rush Lakes. The tool by which to realize this vision is an adaptive management plan. In this proposal we describe two phases of a stewardship program coinciding with three calendar years. Objectives and tasks are established for the entire three year program. Likewise, budgets are summarized for each of the two program phases (each budget roughly corresponding to 18 months effort) and presented in this proposal.

An important component of the adaptive plan is an aquatic plant management plan. The underpinning of the aquatic plant management plan is information from point-intercept aquatic plant surveys. Such aquatic plant surveys have already been conducted on High and Fishtrap Lakes. The work proposed under this application will work with that existing data and will conduct a repeat point-intercept survey on High Lake (one that extends to include those parts of Rush Lake that are accessible). We envision the High-Fishtrap-Rush Lakes Stewardship Program as an ongoing endeavor. The present and future phases will continue the progress toward the overall vision. In the first phase of the program, we plan to increase our understanding of High-Fishtrap-Rush Lakes ecosystem by undertaking several activities:

- Gather existing information about fish and aquatic life;
- Gather information about High-Fishtrap-Rush Lakes rare species;
- Gather existing water quality information and conduct water sampling;
- Conduct point-intercept aquatic plant survey;
- Gather information about and delineate the watershed;
- Initiate a frog/toad survey;
- Initiate a volunteer anglers journal program; and
- Monitor lake stage height and measure lake discharge.

These activities are outlined in this proposal along with those planned for Phase 2 and beyond. This proposal is presented by the *High-Fishtrap-Rush Lakes Association* (hereafter, the *HFRLA*) with technical assistance provided by White Water Associates, Inc. The HFRLA has committed to stewardship of High-Fishtrap-Rush Lakes by undertaking the proposed work and expressing its desire to adopt a formal management plan for the lake. With the High-Fishtrap-

Rush Lakes Stewardship Program, we adopt the concept of "adaptive management." In this approach, findings from planned monitoring activities are used to inform future management actions and periodic refinement of the plan. An adaptive management plan accommodates new findings by integrating this information into successive iterations of the comprehensive plan. Subsequent program phases will continue acquisition of baseline data on High-Fishtrap-Rush Lakes and its watershed. An adaptive management plan is a dynamic entity and will successively evolve and improve to fit the needs of High-Fishtrap-Rush Lakes.

We organize this proposal by topics outlined in the WDNR Lake Management Grant Application including (1) Introduction, (2) Project Area, (3) Problem Statement, (4) Project Goals and Objectives, (5) Methods and Activities, (6) Project Products, (7) Data to be Collected, (8) Existing and Proposed Partnerships, (9) Role of Project in Planning and/or Management of Lake, (10) Timetable for Implementation of Key Activities, (11) Plan for Sharing Project Results, (12) Budget for Phases 1 and 2, and (13) Supplemental Information in Support of Project.

2. PROJECT AREA

Three interconnected lakes in Vilas County, Wisconsin are the subject of the proposed program. High Lake is the northern-most (upstream-most) of the three (Exhibit 1). It is located at the intersection of Land O'Lakes, Presque Isle, and Boulder Junction Townships and is partly in each of those three townships. A small stream enters High Lake through a culvert under County Road B. High Lake is about 5 miles northeast of the town of Boulder Junction, Wisconsin. High Lake's WBIC (water body identification code) is 2344000. It is 741 acres in size and has a maximum depth of 31 feet. A bathymetric (depth) map of High Lake is shown in Exhibit 2a.

Rush Lake is next on the system and is located immediately southwest of High Lake. Rush Lake is a small (43 acre) shallow (7 foot maximum depth) lake that connects High Lake and Fishtrap Lake. Rush Lake is in Boulder Junction Township. The WBIC for Rush Lake is 2343600. A small stream from Grassy Lake enters Rush Lake from the west. Rush Lake in large part is an emergent wetland with some forested areas. The navigable channel between High and Fishtrap Lakes is in the eastern part of Rush Lake (see aerial photograph in Exhibit 3).

Fishtrap Lake is the third lake in the system (and downstream-most). It is 339 acres and has a maximum depth of 41 feet. Fishtrap Lake is in Boulder Junction Township. The WBIC for is 2343200. A bathymetric map of Fishtrap Lake is shown in Exhibit 2b.

Exhibit 1. Map of the High-Fishtrap-Rush Lakes Landscape.
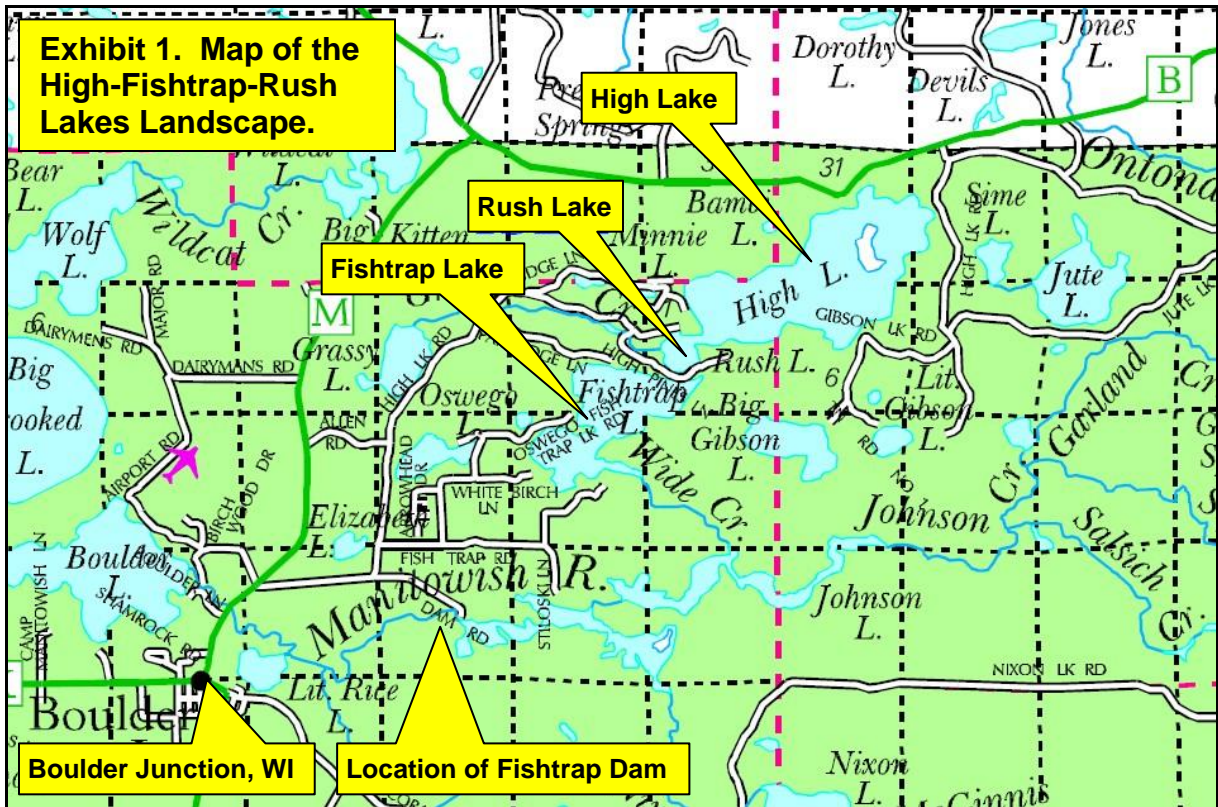
High Lake has one commercial resort that rents three or four cabins to the public. Fishtrap Lake has four resorts that are operational (the largest Wittig's Resort and Tavern). One former resort on Fishtrap has had all the cabins removed and is currently marketing vacant parcels.

The proposed project views High-Fishtrap-Rush Lakes as part of a larger landscape ecosystem. This is a "lake rich" area with other lakes, both large and small, in the landscape. Within four miles of the shores of High-Fishtrap-Rush Lakes are over thirty named lakes. Exhibit 1 shows High-Fishtrap-Rush Lakes and other features. As can be seen, the landscape is dotted with numerous bodies of water. This interconnected water landscape is a target for migrating and breeding waterfowl and other birds. High-Fishtrap-Rush Lakes have value and function in this larger landscape as well. Public access to the High-Fishtrap-Rush Lakes system is through a much-used public landing at County Road B that gives access into High Lake and by navigation to Rush and Fishtrap Lakes (Exhibit 3). An unimproved public access is used for Fishtrap on High Pines Road (Exhibit 3). A private boat landing on Fishtrap Lake (Wittig's Resort & Tavern) allows access for a $2 launch fee. Native Americans (Bad River Band) periodically spear fish on High Lake, a process that is monitored by the Great Lakes Indian Fish and Wildlife Commission

(GLIFWC) and WDNR. The program proposed herein will gather historical information on spearing quotas and harvest and integrate this with the resulting plan.

High-Fishtrap-Rush Lakes lie in the Northern Highland American Legion State Forest and as such are in a matrix of undeveloped land. Overall, 40% of the lakes' shorelines are state of Wisconsin lands (35% for High Lake, 66% for Rush Lake, and 39% for Fishtrap Lake). The approximate locations of these state-owned shorelands are displayed on Exhibit 3. The WDNR provides over a dozen water-access-only campsites on High and Fishtrap Lakes and several more on the Manitowish River between Fishtrap Lake and the Fishtrap Dam (see next paragraph).

High, Rush, and Fishtrap Lakes are drainage lakes with rather minor streams coming into the system. The outflowing stream, however, forms the headwaters of the Manitowish River. The outlet (and lake water level) is controlled by the WDNR-owned Fishtrap Dam located about 3.25 miles downstream of Fishtrap Lake near the town of Boulder Junction (see Exhibit 1).

The High-Fishtrap-Rush Lakes system appears to have a high diversity of aquatic habitats and as far as is known does not contain aquatic invasive plant species. It does, however, contain a population of the AIS rusty crayfish. High Lake has Chinese mystery snail and banded mystery snail. Fishtrap Lake has banded mystery snail. Generally, aquatic plants are not considered a recreational nuisance in High-Fishtrap-Rush Lakes but in recent years a dramatic increase in the abundance, density, and distribution of the aquatic plant *Najas guadalupensis* has given rise to concern and will be the subject of attention in the proposed work.

The lakes support a great fishery that includes "trophy" musky, walleye (High Lake is listed as having produced the state record walleye), largemouth bass, smallmouth bass, black crappie, and yellow perch. Every year, Fishtrap and High Lakes have been selected as part of the *Annual Musky Classic Fishing Tournament* held in Boulder Junction, Presque Isle and Manitowish Waters and High Lake is traditionally the largest producer of muskies in the tournament. The lakes' fishery is routinely surveyed by GLIFWC and WDNR, with the latest WDNR fish survey completed in 2010. Both agencies will be sources of information for the proposed program.

According to Fishtrap and High Lake residents, bald eagles and common loons are frequently seen. One nesting pair of eagles has occupied a nest on Fishtrap Lake for at least 45 years and at least one nesting pair exists on High Lake (on Frog Island). Fishtrap Lake usually has two nesting common loon pairs and Rush Lake has at least one nest. Ospreys are occasionally seen on the system but are not known to nest there. Great blue heron are abundant and sandhill cranes occasionally use nearby wetlands. Many species of waterfowl use the lake during migration. Migratory and resident songbird diversity makes the lakes system a birder's paradise.

Exhibit 2a. WDNR Lake Survey Map of High Lake
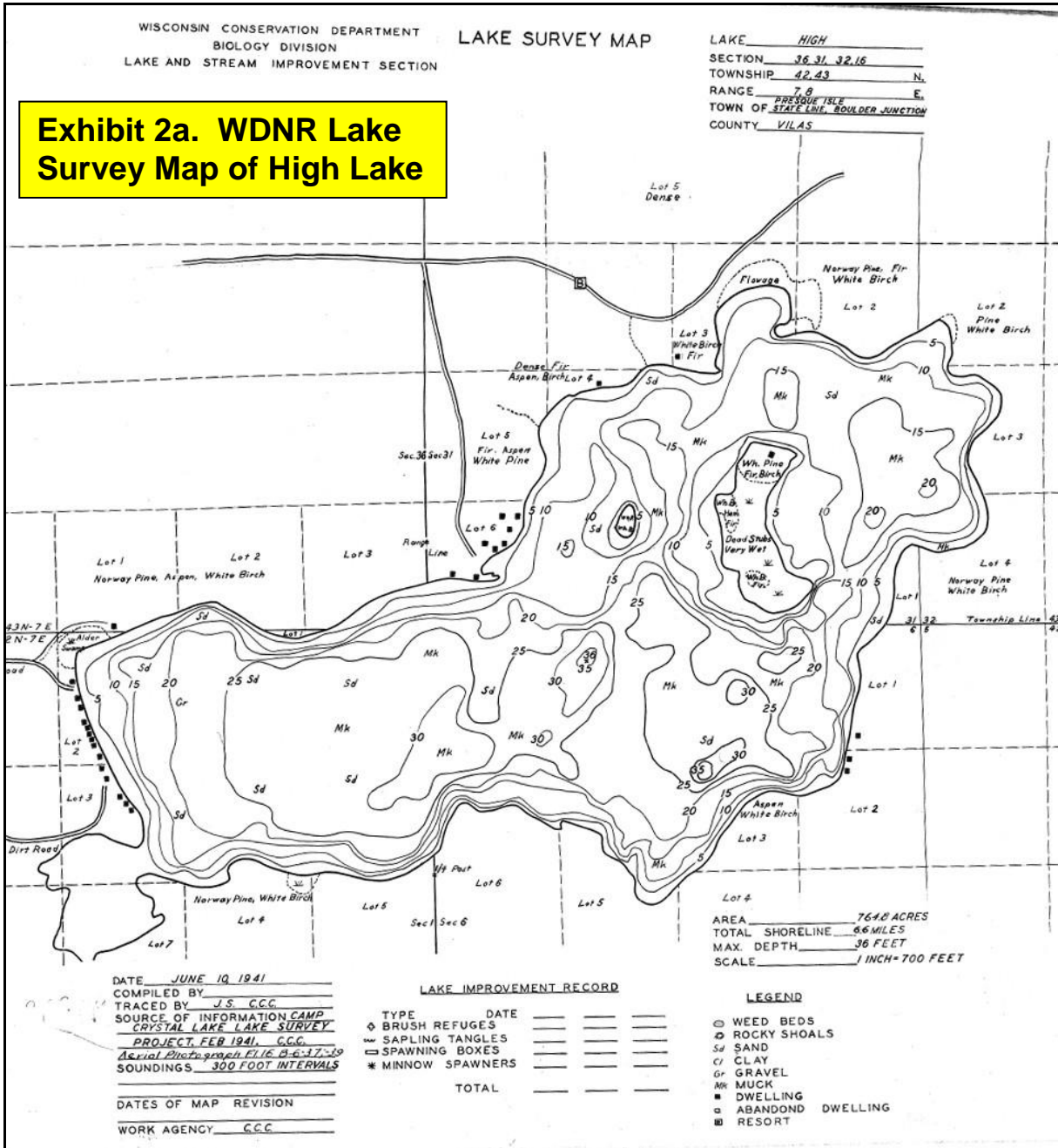
The High-Fishtrap-Rush Lakes system has some history of water quality data with nineteen years of water transparency data and three years of water chemistry. High Lake has Clean Lakes Monitoring (CLM) data from 1996 to 2011 for Secchi Depths. CLM data from 2008-2011 includes Chlorophyll "a," total phosphorus, temperature profile, and Secchi readings. Trophic status index (TSI) was given as mesotrophic from 1990 to 2011. WDNR did a full chemistry lake

baseline monitoring in July 2001 and satellite clarity from 1999 to 2008. Fishtrap Lake has CLM data from 2008 to 2011 (Secchi) and in 2011 CLM data included temperature profile, chlorophyll "a" and total phosphorus. STORET data for Fishtrap Lake shows a 1984 chlorophyll "a" and Secchi reading and several water quality parameters for 1985. Satellite clarity for Fishtrap Lake was give for 1999-2009.

Exhibit 2b. WDNR Lake Survey Map of Fishtrap Lake
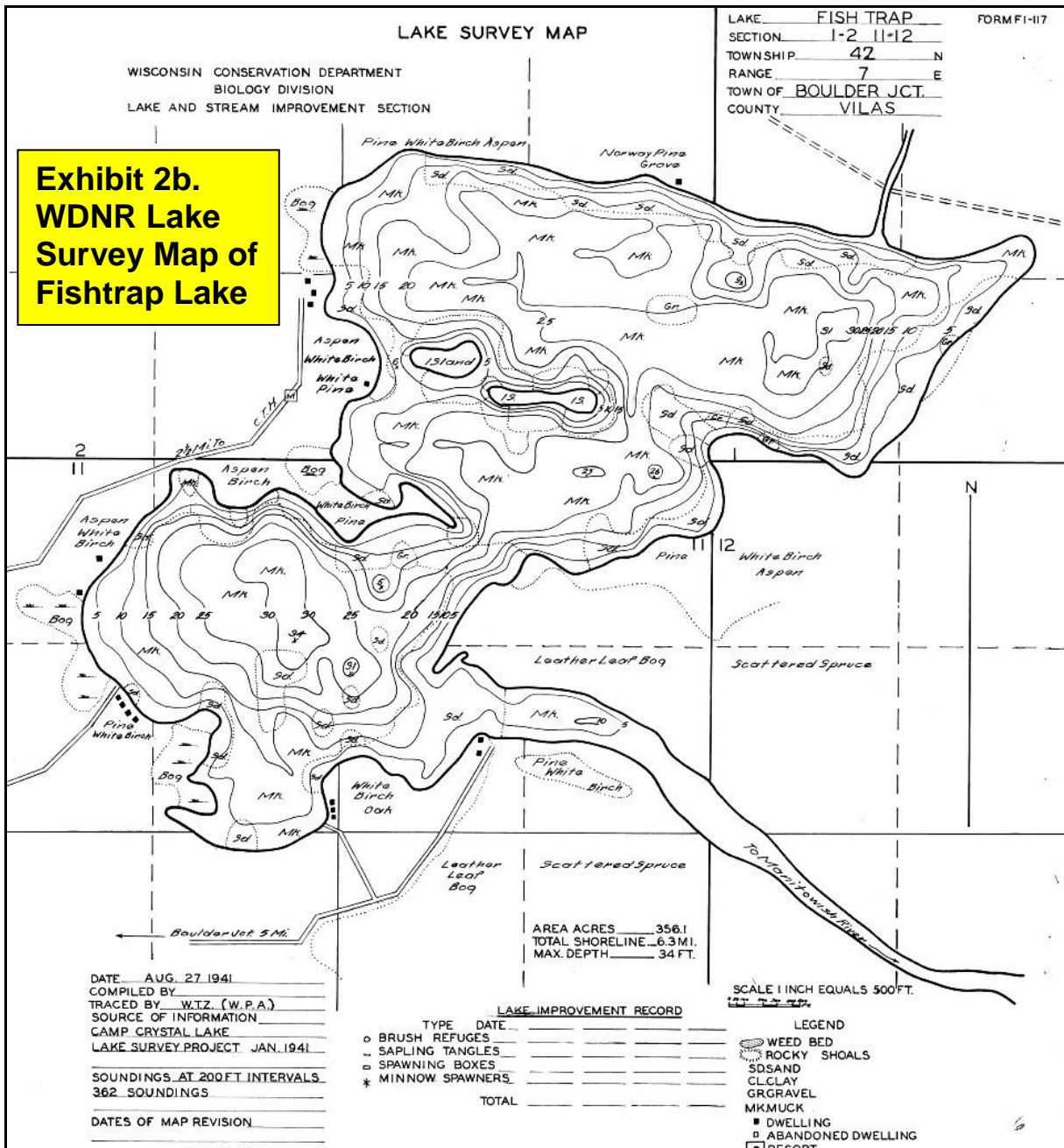
As can be seen from the aerial photo (Exhibit 3), High-Fishtrap-Rush Lakes have a fairly intact forest riparian area. This is an extremely valuable asset in protecting and maintaining high water quality.

Exhibit 3. Aerial photo of High-Fishtrap-Rush

Public access off Co. Hwy B

Rush Lake (at the time of this aerial photo water levels must have been low and Rush Lake appears as an emergent wetland).

High Lake

These yellow lines indicate approximate areas of state-owned lake frontage

Fishtrap Lake

These yellow lines indicate approximate areas of state-owned lake frontage

The various attributes of the High-Fishtrap-Rush Lakes watershed described above combine to make this area of great importance to the waterscape of Vilas County. It is a popular water resource and worthy of scientific understanding of its baseline condition and a continuously improving adaptive management plan that serves to perpetuate this ecosystem in a healthy and productive state far into the future. The next section describes the opportunities we now have to progress toward this goal.

3. PROBLEM STATEMENT

The High-Fishtrap-Rush Lakes Stewardship Program will gather existing and new information about the ecosystem and nearby surroundings. There are information gaps that are recognized by the HFRLA and its consultant (White Water Associates). Concern exists regarding possible establishment of aquatic invasive species and the status of the native aquatic plants (especially *Najas guadalupensis*). An opportunity exists to monitor changes in the aquatic plant community. This concern and opportunity gives an aquatic plant survey and aquatic plant management plan high priority in High-Fishtrap-Rush Lakes stewardship and Phase 1 begins the process. This strategy positions the HFRLA with information that allows rapid and planned response to aquatic invasive plant discoveries in the system.

Other sentinels of aquatic ecosystem health are aquatic and water-related animals: fish, invertebrates, anurans (frogs and toads) and rare water-related birds (common loon, American bittern, bald eagle, and osprey). Having a baseline of information on these biotic communities allow us to track environmental conditions and strengthen management recommendations that seek to perpetuate healthy conditions and restore aspects of the High-Fishtrap-Rush Lakes ecosystem that have been degraded.

The HFRLA would also like to compile and interpret the existing water quality and fisheries information. This will serve the aquatic plant management plan and allow identification of information gaps. Future water quality monitoring will be designed to fill such gaps and complement historic water quality and fisheries data.

The opportunity for success with the High-Fishtrap-Rush Lakes Stewardship Program is strengthened by a dedicated set of program partners. These partners include members of the HFRLA, the ecologists of White Water Associates, the Aquatic Invasives Coordinator, Land & Water Conservation Department for Vilas County, and the WDNR.

The mantra of watershed restoration groups across North America is, "Protect the best and restore the rest." High-Fishtrap-Rush Lakes and its watershed have high quality areas that are worthy of a management plan that seeks to protect this high quality condition. Other aspects may need more active restoration. Funding this program that seeks to establish baseline conditions and create a plan of action is a good investment by the WDNR. Additional characterization of High-Fishtrap-Rush Lakes conditions will help define restoration and protection needs of the lake. The specific goals and objectives of the High-Fishtrap-Rush Lakes Stewardship Program are addressed in the next section.

4. PROJECT GOALS AND OBJECTIVES

The overarching goal of the High-Fishtrap-Rush Lakes Stewardship Program is to perpetuate the quality of High-Fishtrap-Rush Lakes and the surrounding watershed ecosystem into the future. The HFRLA recognizes that sometimes this will mean protecting what is good about the lakes and sometimes it may mean restoring features that have been degraded. This implies rehabilitating and protecting sufficient components of the ecosystem so that it functions in natural way, provides habitat for native biota, and supports reasonable human uses. The Stewardship Program objectives and actions outlined below are designed to support this goal.

The specific objectives and related tasks for the first three years of the High-Fishtrap-Rush Lakes Stewardship Program are detailed in this section. Some objectives and tasks are initiated in the first phase of the program and continue on through more than one phase. Others are taken up in subsequent project phases. The anticipated timing of each objective is indicated in this section and more fully illustrated (by an individual task calendar) later in this proposal.

Objective 1 (Year 1). Develop a strategy to perpetuate lakes and watershed quality.
       Task 1A: Articulate a general strategy in Lake Planning Grant proposal.
       Task 1B: Meet with project partners to identify and prioritize management needs.
       Task 1C: Meet with project partners to develop strategy and approach.
       Task 1D: Finalize assignment of tasks to project partners.

Objective 2 (Year 1). Gather/manage information about fish, aquatic life, & habitats.
       Task 2A: Collect/review historical information regarding fish.
       Task 2B: Interview fish biologists (WDNR and GLIFWC) for detailed information.
       Task 2C: Collect/review information about other aquatic life.
       Task 2D: Collect/review information about aquatic or wetland habitats.

Objective 3 (Years 1-3). Gather/manage information about rare species.
       Task 3A: Evaluate use of the lakes by Common Loons.
       Task 3B: Determine nesting success of Bald Eagles.
       Task 3C: Evaluate use of the lakes by other rare species.
       Task 3D: Assess habitat features appropriate to rare species.
       Task 3E: Develop recommendations for rare species habitat.

Objective 4 (Years 1-3). Gather/manage water quality information.

Task 4A: Collect/review existing limnological information.

Task 4B: Analyze and summarize water quality data.

Task 4C: Prepare a regimen of water quality sampling.

Task 4D: Conduct water quality sampling in High and Fishtrap Lakes (including calcium to determine zebra mussel susceptibility).

Task 4E: Conduct temp/DO profiles in High and Fishtrap Lakes.

Task 4F: Summarize water quality and trophic status.

Objective 5 (Year 1). Investigate aquatic plant community with PI method.

Task 5A: Obtain PI sampling coordinates (Fishtrap and Rush Lakes).

Task 5B: Deploy field team during July-August 2013.

Task 5C: Process and manage plant data.

Task 5D: Prepare plant voucher specimens.

Task 5E: Obtain data for previous P-I surveys.

Task 5F: Further analyze plant data and map.

Task 5G: Compare results of two Fishtrap L. surveys.

Task 5H. Summarize High-Fishtrap-Rush Lakes *Najas guadalupensis*.

Objective 6 (Year 1). Gather/manage information about the watershed.

Task 6A: Delineate the watershed.

Task 6B: Map watershed land cover/use & soils.

Task 6C: Map slopes to identify runoff patterns.

Task 6D: Review existing institutional programs.

Task 6E: Determine critical sites and/or activities.

Objective 7 (Years 1-3). Initiate frog/toad monitoring program.

Task 7A: Develop frog/toad monitoring protocol.

Task 7B: Train volunteers to conduct frog/toad monitoring.

Task 7C: Select appropriate monitoring sites.

Task 7D: Carry out the frog and toad monitoring (2013-2015).

Task 7E: Analyze 2013 monitoring data and revise protocol.

Task 7F: Summarize 2013-2015 monitoring results.

Objective 8 (Years 1-3). Apply a volunteer angler journal program.

 Task 8A: Customize volunteer angler's journal.

 Task 8B: Provide protocol and angler forms to volunteers.

 Task 8C: Train volunteer group in data collection/management.

 Task 8D: Conduct volunteer angler's journal program (2013-2015).

 Task 8E: Summarize the 2013-2015 angler's journal results.

Objective 9 (Years 1-3). Investigate and monitor stage, discharge, and retention times.

 Task 9A: Establish lake stage monitoring protocol.

 Task 9B: Determine discharge (cfs) at locations in the system.

 Task 9C: Estimate lake volume and retention time.

 Task 9D: Determine drainage basin/lake area ratio.

 Task 9E: Provide volunteers for weekly dam monitoring.

Objective 10 (Year 2). Develop and conduct a stakeholder survey.

 Task 10A: Develop draft survey questions.

 Task 10B: Provide draft survey questions for WDNR review.

 Task 10C: Distribute survey to lake stakeholders.

 Task 10D: Summarize stakeholder responses.

Objective 11 (Year 3). Apply WiLMS or alternative modeling system.

 Task 11A: Run appropriate modeling elements from WiLMS.

 Task 11B: Incorporate findings into educational program.

 Task 11C: Incorporate findings into management plan.

Objective 12 (Years 1-3). Meet with partners each year to assess progress.

 Task 12A: Develop annual progress report.

 Task 12B: Distribute the annual progress report.

 Task 12C: Meet with partners once/year to discuss status.

Objective 13 (Year 2). Deliver a workshop on littoral zone and riparian area.

 Task 13A: Prepare a half-day workshop on littoral zone and riparian area.

 Task 13B: Establish workshop date and promote attendance.

 Task 13C: Deliver the workshop.

Objective 14 (Year 2). Document littoral and riparian area condition using digital photography.

 Task 14A: Train volunteer work team to conduct photography/GPS fieldwork.

 Task 14B: Train volunteer work team to manage digital photography data.

 Task 14C: Volunteer team collects digital photos of the shoreline.

 Task 14D: Integrate photos into an interactive electronic archive.

 Task 14E: Submit interactive electronic archive to WDNR.

Objective 15 (Year 2). Qualitatively document littoral & riparian areas & prepare written history.

 Task 15A: Train volunteer team to conduct assessment and manage data.

 Task 15B: Volunteer team deploys to collect data.

 Task 15C: Integrate qualitative information into electronic photo archive.

 Task 15D: Submit interactive electronic archive to WDNR.

 Task 15E: Prepare a written history of the lake.

Objective 16 (Year 2). Quantitatively document littoral and riparian areas.

 Task 16A: Establish ten physical habitat ("P-Hab") stations.

 Task 16B: Conduct USEPA measurements.

 Task 16C: Conduct WDNR measurements.

 Task 16D: Manage assessment data and summarize.

Objective 17 (Year 3). Prepare aquatic plant management plan.

 Task 17A: Summarize plant community data.

 Task 17B: Create an APM Report and Plan.

 Task 17C: Incorporate APM Plan into Adapt. Mgt Plan.

Objective 18 (Year 3). Create Adaptive Management Plan.

 Task 18A: Write Adaptive Management Plan.

 Task 18B: Prepare initial management actions.

Objective 19 (Years 1-3). Contribute recommendations to L&W Resources Management Plan.

 Task 19A: Review the Vilas County L&W Resources Management Plan.

 Task 19B: Communicate with the L&W Conservation Department.

Objective 20 (Years 1-3). Deliver education program.
>   Task 20A: Provide written & verbal education material to lake volunteers.
>   Task 20B: Contribute materials to lake association newsletter/website.
>   Task 20C: Prepare one press release/year for local news outlet(s).

Objective 21 (Years 1-3). Aquatic Invasive Species (AIS) awareness and protection.
>   Task 21A: Staff boat landing(s) with volunteer CB/CW inspectors at regular times.
>   Task 21B: Solicit lake steward volunteers to augment boat inspections for future years.
>   Task 21C: Review documentation for known AIS in lake system.
>   Task 21D: Conduct analysis of lake susceptibility to zebra and quagga mussels.
>   Task 21E. Document AIS review and zebra mussel analysis in Adaptive Management Plan.
>   Task 21F: Incorporate AIS findings into education program.
>   Task 21G: Recommend AIS monitoring needs.

By adopting the "adaptive management" paradigm, we anticipate that the planning, implementation, and monitoring process will be ongoing and the Adaptive Management Plan will be designed to accommodate future findings and management directions. Future phases will build on the foundation established in the work outlined in this proposal. Other aspects of the lake ecosystem will be explored. For example, future phases might address AIS mapping, watershed wetlands, riparian vegetation assessment, and education of lake users. Future phases will include revisions to the lake management plan and monitoring tasks that support adaptive management. The timeline provided in Exhibit 4 illustrates the various anticipated project phases.

Exhibit 4. Timeline for representative actions in phases of the Lake Stewardship Program.				
Years 1, 2, and 3 (Phases 1 and 2) are covered in this proposal			*Future Phases*	
Year 1	Year 2	Year 3	Year 4	Year 5
Existing info on biota & water quality; water sampling; aq. plant survey; begin rare species research, watershed delineation & research, frog/toad monitoring, angler's journal; education program; watercraft inspection; stage and discharge monitoring; progress mtg.	Stakeholder survey; riparian area-littoral zone; photo documentation of shoreline; EPA/DNR habitat assessm't; continue water sampling, frog/toad monitoring; angler's journal; rare species research, educ. program, watercraft inspection; progress meeting.	WiLMS; water quality, aquatic plant management plan & adaptive mgt plan; continue water quality sampling, rare species research, frog/toad monitoring, angler's journal, education program, watercraft inspection; progress meeting.	Water quality sampling & analysis; monitoring indicators; implement adaptive mgt plan; AIS monitoring	Water quality sampling; implement adaptive mgt plan; AIS monitoring

5. METHODS AND ACTIVITIES

In this section, we discuss the methods and activities that will be undertaken to meet the goals and objectives. We also provide task assignments. White Water and HFRLA will conduct project tasks (Table 1). Information will be gathered, reviewed, and summarized. Scientific literature will document project recommendations.

TABLE 1. TASKS AND RESPONSIBILITIES FOR PHASES I AND 2		
1=Primary responsibility; 2=Secondary responsibility *Key to Organizations: High-Fishtrap-Rush Lakes Association (HFRLA); White Water Associates, Inc. (WWA)*		
TASK	**HFRLA**	**WWA**
Task 1A: Articulate a general strategy in Lake Planning Grant proposal.	1	1
Task 1B: Meet with project partners to identify and prioritize management needs.	1	1
Task 1C: Meet with project partners to develop strategy and approach.	1	1
Task 1D: Finalize assignment of tasks to project partners.	1	1
Task 2A: Collect/review historical information regarding fish.		1
Task 2B: Interview fish biologists (WDNR and GLIFWC) for detailed information.		1
Task 2C: Collect/review information about other aquatic life.		1
Task 2D: Collect/review information about aquatic or wetland habitats.		1
Task 3A: Evaluate use of the lakes by Common Loons.	1	1
Task 3B: Determine nesting success of Bald Eagles.	1	1
Task 3C: Evaluate use of the lakes by other rare species.	2	1
Task 3D: Assess habitat features appropriate to rare species.	2	1
Task 3E: Develop recommendations for rare species habitat.	2	1
Task 4A: Collect/review existing limnological information.		1
Task 4B: Analyze and summarize water quality data.		1
Task 4C: Prepare a regimen of water quality sampling.		1
Task 4D: Conduct water quality sampling.	2	1
Task 4E: Conduct temp/DO profiles in High and Fishtrap Lakes.	2	1
Task 4F: Summarize water quality and trophic status.		1
Task 5A: Obtain PI sampling coordinates (Fishtrap and Rush Lakes).		1
Task 5B: Deploy field team during July-August 2013		1
Task 5C: Process and manage plant data.		1
Task 5D: Prepare plant voucher specimens.		1
Task 5E: Obtain data for previous P-I surveys.		1
Task 5F: Further analyze plant data and map.		1
Task 5G: Compare results of two Fishtrap L. surveys.		1
Task 5H. Summarize High-Fishtrap-Rush Lakes Najas guadalupensis.	2	1
Task 6A: Delineate the watershed.		1
Task 6B: Map watershed land cover/use & soils.		1
Task 6C: Map slopes to identify runoff patterns.		1
Task 6D: Review existing institutional programs.	1	2

TABLE 1. TASKS AND RESPONSIBILITIES FOR PHASES I AND 2

1=Primary responsibility; 2=Secondary responsibility
Key to Organizations: High-Fishtrap-Rush Lakes Association (HFRLA); White Water Associates, Inc. (WWA)

TASK	HFRLA	WWA
Task 6E: Determine critical sites and/or activities.	2	1
Task 7A: Develop frog/toad monitoring protocol.		1
Task 7B: Train volunteers to conduct frog/toad monitoring.		1
Task 7C: Select appropriate monitoring sites.	1	1
Task 7D: Carry out the frog and toad monitoring (2013-2015).	1	2
Task 7E: Analyze 201 monitoring data and revise protocol.		1
Task 7F: Summarize 2013-2015 monitoring results.	2	1
Task 8A: Customize volunteer angler's journal.		1
Task 8B: Provide protocol and angler forms to volunteers.		1
Task 8C: Train volunteer group in data collection/management.		1
Task 8D: Conduct volunteer angler's journal program (2013-2015).	1	2
Task 8E: Summarize the 2013-2015 angler's journal results.	2	1
Task 9A: Establish lake stage monitoring protocol.	2	1
Task 9B: Determine discharge (cfs) at locations in the system.	2	1
Task 9C: Estimate lake volume and retention time.		1
Task 9D: Determine drainage basin/lake area ratio.		1
Task 9E: Provide volunteers for weekly dam monitoring.	1	
Task 10A: Develop draft survey questions.	1	2
Task 10B: Provide draft survey questions for WDNR review.	1	
Task 10C: Distribute survey to lake stakeholders.	1	
Task 10D: Summarize stakeholder responses.	1	
Task 11A: Run appropriate modeling elements from WiLMS.		1
Task 11B: Incorporate findings into educational program.		1
Task 11C: Incorporate findings into management plan.		1
Task 12A: Develop annual progress report.		1
Task 12B: Distribute the annual progress report.	1	
Task 12C: Meet with partners once/year to discuss status.	1	1
Task 13A: Prepare a half-day workshop on littoral zone and riparian area.		1
Task 13B: Establish workshop date and promote attendance.	1	2
Task 13C: Deliver the workshop.		1
Task 14A: Train volunteer work team to conduct photography/GPS fieldwork.		1
Task 14B: Train volunteer work team to manage digital photography data.		1
Task 14C: Volunteer team collects digital photos of the shoreline.	1	
Task 14D: Integrate photos into an interactive electronic archive.		1
Task 14E: Submit interactive electronic archive to WDNR.		1
Task 15A: Train volunteer team to conduct assessment and manage data.		1
Task 15B: Volunteer team deploys to collect data.	1	
Task 15C: Integrate qualitative information into electronic photo archive.		1
Task 15D: Submit interactive electronic archive to WDNR.		1
Task 15E: Prepare a written history of the lake.	1	

TABLE 1. TASKS AND RESPONSIBILITIES FOR PHASES I AND 2

1=Primary responsibility; 2=Secondary responsibility
Key to Organizations: High-Fishtrap-Rush Lakes Association (HFRLA); White Water Associates, Inc. (WWA)

TASK	HFRLA	WWA
Task 16A: Establish ten physical habitat ("P-Hab") stations.		1
Task 16B: Conduct USEPA measurements.		1
Task 16C: Conduct WDNR measurements.		1
Task 16D: Manage assessment data and summarize.		1
Task 17A: Summarize plant community data.		1
Task 17B: Create an APM Report and Plan.		1
Task 17C: Incorporate APM Plan into Adapt. Mgt Plan.		1
Task 18A: Write Adaptive Management Plan.		1
Task 18B: Prepare initial management actions.	2	1
Task 19A: Review the Vilas County L&W Resources Management Plan.	1	2
Task 19B: Communicate with the L&W Conservation Department.	1	2
Task 20A: Provide written & verbal education material to lake volunteers.	2	1
Task 20B: Contribute materials to lake association newsletter/website.	1	2
Task 20C: Prepare one press release/year for local news outlet(s).	2	1
Task 21A: Staff boat landing(s) with volunteer CB/CW inspectors at regular times.	1	
Task 21B: Solicit lake steward volunteers to augment boat inspections for future years.	1	
Task 21C: Review documentation for known AIS in lake system.		1
Task 21D: Conduct analysis of lake susceptibility to zebra and quagga mussels.		1
Task 21E: Document AIS review & zebra mussel analysis in Adaptive Management Plan.		1
Task 21F: Incorporate AIS findings into education program.		1
Task 21G: Recommend AIS monitoring needs.		1

Point-Intercept Aquatic Plant Survey - A primary question for the field investigation of the High-Fishtrap-Rush Lakes aquatic plant community is "What is the composition, density, and geographic distribution of the aquatic plant community in the lake and how has it changed?" In the last few years, the WDNR has developed a rigorous approach in how they deal with many aquatic plants. First, they realized that many citizens and lake groups requested permits every year to harvest or chemically treat nuisance plants, with no accounting of how successful they were. Second, the WDNR realized that they could get more information from their own routine plant sampling surveys by taking advantage of new technologies such as the Global Positioning System (GPS). In order to address both issues, the WDNR developed a plant sampling survey system designed to systematically examine all parts of the lake. The protocol calls for using a rake sampler to determine what species are present, where they occur, at what depths they are found, and in what kind of substrate. The spatially explicit information can be used to create a variety of ecologically based maps such as the location of an invasive plant, where the plants

grow most densely, or how a species of special concern is distributed. The survey will serve as a baseline for the future, and will be especially important should there be changes in the lake such as a water level or an invasion of an exotic species.

The WDNR launched the new plant survey protocol in 2005. After early experience, they revised the protocol to its current form. A lake group that creates an aquatic plant management plan, requests a permit to do large scale chemical treatment, or requests assistance from the WDNR with aquatic plant issues are asked to perform a plant survey following the new protocol.

This WDNR survey protocol is called a point-intercept sampling scheme because data is collected from all over the lake, instead of sampling along a few straight lines laid out perpendicular to the shore (as was done by WDNR prior to 2005). The first step is to lay an electronic grid over a map of the lake. This step is done by the WDNR's Integrated Science Services, who receives requests and determines the number of sampling points on this grid. This sampling density depends on the acreage of the lake, the depth contours of the lake, and the convolutions of the shoreline. There is a latitude and longitude associated with each intersection point on the grid. These coordinates are loaded into a computer file and then loaded into a global positioning (GPS) unit for use in the field.

A field team will use a GPS unit, sampling rakes, and data sheets, to conduct the surveys. The boat driver will use the GPS unit to navigate to each point. The navigator will also call out the depth from electronic depth finder so the sampler knows what sampling rake to use. At each point, the sampler will use the rake-on-a-pole (if the depth is less than 15 feet) or the rake-on-a-rope to scrape the lake bottom and haul up the catch of aquatic plants. The sampler will call out the depth and sediment type (muck, sand or rock), identify each plant caught on the rake, and give each species an abundance rating of 1 (few plants), 2 (moderate amount), or 3 (plants overflowing the rake). The data recorder will write down all the data and keep track of what points still need to be sampled. Non-native species will be carefully identified and characterized.

The data will allow calculation of distribution metrics such as number of sites where a plant species is found, relative percent frequency of species occurrence, frequency of occurrence within vegetated areas, frequency of occurrence at all sites, and maximum depth at which plants are found. The data will also allow calculation of metrics such as total number of points sampled, total number of sites with vegetation, total number of sites shallower than maximum depth of plants, frequency of occurrence at sites shallower than maximum depth of plants, Simpson Diversity Index, maximum depth of plants (feet), average number of all species per site, average number of native species per site, and species richness.

Volunteer Frog and Toad Surveys - An innovative component of the Phase 1 project is the implementation of two volunteer-based monitoring programs of vertebrate indicator animals: anurans (frogs and toads) and fish. Monitoring of each of these taxa can provide important information for lake and watershed management. In the case of frog and toad surveys, a standard protocol will be has been developed and tested at Lake Alice in Lincoln County (actually adopted from existing Wisconsin protocols) in consultation with Mike Meyer (WDNR researcher). We plan to apply that protocol in the proposed project using volunteer monitors.

Volunteer-based Anglers' Journal - In the case of a volunteer based angler's journal, we have also developed a protocol and implemented it at Lake Alice and other lakes. We believe this will also be an appropriate tool by which to gather information about fish community. The protocol was developed in concert with WDNR scientists and managers. Volunteer derived fish data can augment fish data collected by agencies. An advantage of such data is it they come from on-going angling activity rather than periodic surveys (usually separated by several year intervals). Noteworthy occurrences (such as the discovery of an aquatic invasive species) or trends in fish sizes or numbers will be reflected in this volunteer data. As an example of the efficacy of this approach, a study reported in the American Fisheries Society Online Journals (Vol. 29, Issue 5) examined use of volunteer angler survey data for assessing length distribution and seasonal catch trends of trophy largemouth bass. Volunteer data were compared with agency collected data as a means to validate volunteer data and length distributions by inch-group. The study found no significant difference between survey methods, validating the fish length reported by volunteers.

Survey of High-Fishtrap-Rush Lakes Stakeholders – In order to ascertain the perspectives and priorities of the people who live on and/or use the lake, we propose to undertake a formal survey. We will draw survey questions from other questionnaires that have been used in Wisconsin, but customize a survey specific to High-Fishtrap-Rush Lakes. A draft questionnaire will be provided to the WDNR for review. Information from this survey will be useful for preparation of the final aquatic plant management and adaptive management plans. It will identify gaps in understanding about aquatic plants and other aspects of the lake ecosystem and guide education efforts.

Watershed Modeling Using WiLMS – The Wisconsin Lake Modeling Suite (WiLMS) is a lake water quality-planning tool with direct applications for understanding the influence of watershed land-cover type on lake water quality. White Water Associates will take principal responsibility

for conducting this modeling exercise and integrating results of the effort into the education program and the adaptive management plan.

An Image-Based Waterfront Archive – The advancement of digital photography provides an efficient tool for application in documenting the existing conditions along the lake shoreline. Add this to the technology of "global positioning systems" or "GPS" and a straight-forward qualitative assessment of shoreline conditions and we have a useful archive of lakefront conditions that can be used to monitor long and short term changes. In fact, a prototype of this image-based waterfront archive has been developed by White Water Associates with funding and guidance from the WDNR and has been applied to other Wisconsin Lakes under planning grants. We will apply this approach in the proposed project.

In 2001, the WDNR contracted with White Water Associates to develop a prototype of using digital photography to document shoreland conditions. Headwaters Sub-Team Leader Scott Watson was the WDNR technical contact on the project. Scattering Rice Lake in northern Wisconsin was the subject lake. The WDNR felt that documenting the existing shoreline condition of inland lakes in Wisconsin was a valuable goal to pursue. The product of White Water's 2001 effort is contained in a web-based application that demonstrates an approach to photographic documentation of lakeshore. At the time of its development, White Water and the WDNR viewed the product as a pilot for purposes of evaluating the usefulness and practicality of pursuing a larger program. The High-Fishtrap-Rush Lakes system provides ideal circumstances under which to apply this model again. Further, we propose this is an excellent circumstance to use volunteer labor for a considerable proportion of the effort.

The idea of a waterfront archive has considerable application possibilities, but must be done well. An image-based waterfront archive as conceived herein should be scientifically defensible and therefore has important issues of data quality assurance and quality control (QA/QC). The goal of an image-based waterfront archive is to document current shoreline conditions for the purpose of verifying extent and origin of future human-caused changes or natural changes. The 2001 work conducted by White Water Associates provides a feasible methodology for collection, storage, and retrieval of data appropriate to the future goal. Importantly, with proper training, volunteer staff from the lake association can conduct the fieldwork portion of this effort. We have conducted two other projects using volunteers to carry out the field work components.
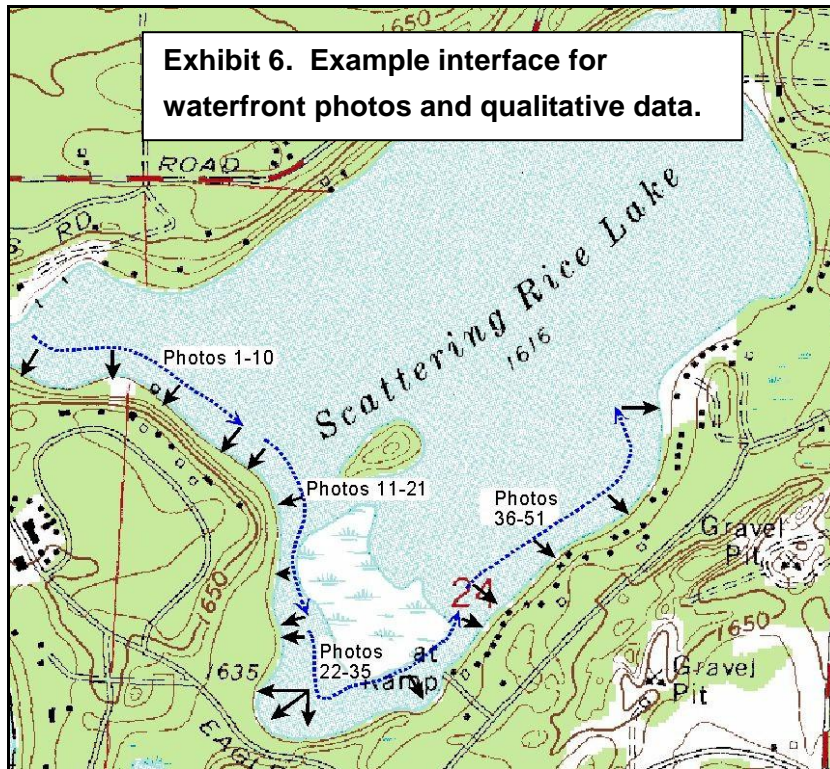
The field effort itself will involve a team aboard a pontoon boat or other suitable watercraft and armed with digital camera, GPS, map, and data forms for recording qualitative data collected

on specific stretches of waterfront. The watercraft will be positioned approximately 200 feet from shore. Every 250-300 feet a GPS reading will be obtained and a photograph will be taken perpendicular to the shore at a standardized focal length. A simple checklist of will then be completed that qualitatively assesses current conditions of the waterfront. An example of the 2001 checklist is show in Exhibit 5.

Data storage and retrieval are critical to the value of an archive program and deserve careful consideration in the image-based waterfront archive. We propose to use a similar web-based product as was used in 2001 (in the pilot program) and in subsequent applications at Black Oak Lake (Vilas County) and Lake Julia (Oneida County). The interface to access photos of the waterfront is a topographic map as shown in Exhibit 6. Arrows show where the photographs were taken and in the actual product, clicking on a group of photos brings up the photos and the qualitative assessment data for each waterfront segment. Aerial photography will also be used as part of the product. The final product can be accessed, navigated, and reviewed from CD-ROM or made available on a website.

Exhibit 5. Example qualitative assessment checklist for the waterfront archive.

Exhibit 6. Example interface for waterfront photos and qualitative data.

Quantitative Assessment of Littoral and Riparian area of High-Fishtrap-Rush Lakes – The USEPA has developed a methodology for surveying the Nation's lakes (*USEPA. 2007. Survey of the Nation's Lakes. Field Operations Manual. EPA 841-B-07-004. U.S. Environmental Protection Agency, Washington, DC.*)[1]. This method is applied in various states and in 2007 White Water assisted the Michigan Dept. of Env. Qual. in applying this method on a lake in Sylvania Tract. For the purposes of the High-Fishtrap-Rush Lakes Stewardship Program, we propose conducting "Littoral and Shoreline Activities" aspects of the USEPA protocol. To characterize the near-shore habitats and conditions (both littoral zone and riparian area), the survey team establishes and evaluates ten evenly spaced "physical habitat" ("P-hab") stations around the lake. Conditions and characteristics observed within a defined plot area are recorded. The protocol calls for making measures or observations of littoral and riparian physical habitat structure at the ten P-Hab stations, recording observations of invasive plants and macroinvertebrates, sampling benthic macroinvertebrates at each of the ten stations and combining as a single composite sample,[2] and collecting a water sample at the last P-Hab station for fecal indicator (*Enterococci*) analysis.

---

[1] M*anual can be downloaded at: http://www.epa.gov/owow/lakes/lakessurvey/pdf/lakes_field_op_manual.pdf*

[2] *The macroinvertebrate component of the technique may be omitted in this project.*

The WDNR has developed a Supplemental Lakeshore Assessment Methodology to augment the USEPA National Lake Assessment. The WDNR protocol enhances some of the USEPA protocol and makes it more relevant to Wisconsin lakes. The WDNR protocol uses the "P-hab" stations established by the USEPA method to take further measures of woody debris, invasive species, and human development. The WDNR protocol also calls for aquatic plant surveys, but since a point-intercept plant survey is a separate task for High-Fishtrap-Rush Lakes, the aquatic plant survey will be excluded from the WDNR protocol.

Lake Stage and Discharge – The WDNR is currently working on instituting a method for lake associations to more accurately monitor lake stage height. This project will interface with WDNR in order to develop a system for the High-Fishtrap-Rush Lakes system (coordination will occur with Tim Asplund and/or Carl Watras). In addition, standard procedures will be used to determine discharge at appropriate points in the system so that lake retention time can be estimated using the cubic feet per second (cfs) discharge data along with lake volumes estimated by existing bathymetric data.

6. PROJECT PRODUCTS

Each of the eighteen objectives outlined in this proposal results in a tangible product. These are each described in Table 2 (on next page).

Table 2. Products of the High-Fishtrap-Rush Lakes Stewardship Program.	
Objective	Description of Program Product
Objective 1 (Year 1). Develop a strategy to perpetuate lakes/watershed quality.	Lake Planning Grant Proposal (this document).
Objective 2 (Year 1). Gather/manage information about fish & aquatic life.	Review of information to be reported in Adaptive Management Plan.
Objective 3 (Years 1-3). Gather/manage information about rare species.	A report of findings contained in the Adaptive Management Plan.
Objective 4 (Years 1-3). Gather/manage water quality information.	A summary of water quality data (existing and newly collected) reported in the Adaptive Management Plan.
Objective 5 (Year 1). Investigate aquatic plant community with PI method.	Electronic plant and lake data delivered to the WDNR and aquatic plant voucher specimens.
Objective 6 (Year 1). Gather/manage information about the watershed.	Maps and narrative material in the Adaptive Management Plan.
Objective 7 (Years 1-3). Initiate frog/toad monitoring program.	Report section in Adaptive Management Plan including survey results, description of the field methods used, and a review of survey protocol.
Objective 8 (Years 1-3). Apply a volunteer angler journal program.	Report (including summary graphs) in Adaptive Management Plan.
Objective 9 (Years 1-3). Monitor stage, discharge, & retention times.	Discussion of results in Adaptive Management Plan.
Objective 10 (Year 2). Develop and conduct a stakeholder survey.	Discussion of results in Adaptive Management Plan.
Objective 11 (Year 3). Apply WiLMS or alternative modeling system.	Model output reported in Adaptive Management Plan.
Objective 12 (Years 1-3). Meet with partners each year to assess progress.	Annual progress summary
Objective 13 (Year 2). Deliver workshop on littoral zone and riparian area.	Workshop
Objective 14 (Year 2). Document littoral & riparian area using digital photography.	Reported and summarized in the Adaptive Management Plan.
Objective 15 (Year 2). Qualitatively document littoral & riparian areas and prepare written history.	Reported and summarized in the Adaptive Management Plan.
Objective 16 (Year 2). Quantitatively document littoral and riparian areas.	Reported and summarized in the Adaptive Management Plan.
Objective 17 (Year 3). Prepare aquatic plant management plan.	Includes aquatic plant report and APM plan that results from plant surveys. Includes analyses of plant community (diversity, distribution, composition, ecology, presence/absence of AIS or nuisance populations, fragile habitats, areas needing restoration, and discussion of management alternatives). APM will be part of Adapt. Mgt. Plan.
Objective 18 (Year 3). Create Adaptive Management Plan.	This document will incorporate newly collected and existing information relevant to the lake. It will contain most program products and recommendations and actions to implement that are designed to further progress toward program goals.
Objective 19 (Years 1-3). Contribute recommendations to L&W Resources Management Plan.	Written recommendations submitted to the County.
Objective 20 (Years 1-3). Deliver education program.	Includes formal & informal parts. The adaptive mgt plan and APM plan are formal educational pieces as are articles prepared for HFRLA newsletter or local newspapers. Training volunteers to sample water, stage height and other monitoring. Technical assistance provided via phone, e-mail, and at meetings.
Objective 21 (Years 1-3). AIS awareness and protection.	Findings discussed in Adaptive Mgt Plan and used in education pieces. Data gathered from watercraft inspectors will be recorded and reported.

7. DATA TO BE COLLECTED

The High-Fishtrap-Rush Lakes Stewardship Program will be a data-rich endeavor intended to increase understanding of the lake ecosystem. The plant survey generates an enormous data set. Water quality monitoring data will add to the baseline information about High-Fishtrap-Rush Lakes as well. Frog-toad surveys and volunteer angler's journal likewise produce large data sets.

8. EXISTING AND PROPOSED PARTNERSHIPS

The proposed project will benefit from a partnership between the HFRLA, White Water Associates, Vilas County AIS Coordinator, and the WDNR. These four entities play complimentary roles in the proposed project. The HFRLA has a committed membership and willing volunteers eager to contribute in a variety of ways to the project. White Water scientists bring landscape and aquatic ecology expertise and experience to this project. The Vilas County AIS Coordinator plays a role as information resource and responder to observations of potential AIS on High-Fishtrap-Rush Lakes. WDNR plays an advisory role, providing direction for High-Fishtrap-Rush Lakes stewardship and in providing coordinates for P-I aquatic plant survey.

9. ROLE OF PROJECT IN PLANNING & MANAGEMENT OF LAKES

The proposed program will establish a foundation for ongoing lake stewardship. It will gather and use existing information and new data to guide development of the aquatic plant management plan and the adaptive management plan. It will also help assess where information gaps exist. The program will educate project participants and users of High-Fishtrap-Rush Lakes and its watershed and promote interest and involvement in ongoing stewardship.

10. TIMETABLE FOR IMPLEMENTATION OF KEY ACTIVITIES

Table 3 provides timing and duration of major project tasks over the entire program (2012-2016). Oversight of scheduling and progress will be accomplished by a team consisting of the HFRLA and White Water Associates with guidance provided by WDNR.

TABLE 3. PROJECT CALENDAR FOR PHASES 1 AND 2	
TASK	**ESTIMATED CALENDAR**
Task 1A: Articulate a general strategy in Lake Planning Grant proposal.	Aug 2012
Task 1B: Meet with project partners to identify & prioritize management needs.	Dec 2012
Task 1C: Meet with project partners to develop strategy and approach.	Dec 2012
Task 1D: Finalize assignment of tasks to project partners.	Dec 2012
Task 2A: Collect/review historical information regarding fish.	Jan 2013
Task 2B: Interview fish biologists (WDNR & GLIFWC) for detailed information.	Jan 2013
Task 2C: Collect/review information about other aquatic life.	Jan-Mar 2013
Task 2D: Collect/review information about aquatic or wetland habitats.	Jun-Jul 2012
Task 3A: Evaluate use of the lakes by Common Loons.	May-Oct 2013, 2014, 2015
Task 3B: Determine nesting success of Bald Eagles.	May-Oct 2013, 2014, 2015
Task 3C: Evaluate use of the lakes by other rare species.	May-Oct 2013, 2014, 2015
Task 3D: Assess habitat features appropriate to rare species.	May-Oct 2013, 2014, 2015
Task 3E: Develop recommendations for rare species habitat.	Jan 2015
Task 4A: Collect/review existing limnological information.	Jan 2013
Task 4B: Analyze and summarize water quality data.	Jan 2013
Task 4C: Prepare a regimen of water quality sampling.	Jan 2013
Task 4D: Conduct water quality sampling.	Ongoing 2013-2015
Task 4E: Conduct temp/DO profiles in High and Fishtrap Lakes.	Aug and Mar 2013 & 2014
Task 4F: Summarize water quality and trophic status.	Nov 2015
Task 5A: Obtain PI sampling coordinates (Fishtrap and Rush Lakes).	Apr 2013
Task 5B: Deploy field team during July-August 2013.	Jul-Aug 2013
Task 5C: Process and manage plant data.	Aug-Jan 2013
Task 5D: Prepare plant voucher specimens.	Aug 2013
Task 5E: Obtain data for previous P-I surveys.	Aug 2013
Task 5F: Further analyze plant data and map.	Jan-Feb 2014
Task 5G: Compare results of two Fishtrap L. surveys.	Feb 2014
Task 5H. Summarize High-Fishtrap-Rush Lakes Najas guadalupensis.	Feb-Mar 2014
Task 6A: Delineate the watershed.	Apr 2013
Task 6B: Map watershed land cover/use & soils.	Apr 2013
Task 6C: Map slopes to identify runoff patterns.	Apr 2013
Task 6D: Review existing institutional programs.	Apr 2014
Task 6E: Determine critical sites and/or activities.	Apr 2014
Task 7A: Develop frog/toad monitoring protocol.	Apr 2013
Task 7B: Train volunteers to conduct frog/toad monitoring.	Apr 2013
Task 7C: Select appropriate monitoring sites.	Apr 2012
Task 7D: Carry out the frog and toad monitoring (2012-2014).	Apr-Jul 2013, 2014, 2015
Task 7E: Analyze 2012 monitoring data and revise protocol.	Mar 2014
Task 7F: Summarize 2012-2014 monitoring results.	Oct 2015
Task 8A: Customize volunteer angler's journal.	Apr 2013
Task 8B: Provide protocol and angler forms to volunteers.	Apr 2013
Task 8C: Train volunteer group in data collection/management.	Apr 2013
Task 8D: Conduct volunteer angler's journal program (2012-2014).	Ongoing 2013-2015

TABLE 3. PROJECT CALENDAR FOR PHASES 1 AND 2	
TASK	**ESTIMATED CALENDAR**
Task 8E: Summarize the 2013-2015 angler's journal results.	Oct 2015
Task 9A: Establish lake stage monitoring protocol.	Ongoing 2013-2015
Task 9B: Determine discharge (cfs) at locations in the system.	Ongoing 2013-2015
Task 9C: Estimate lake volume and retention time.	Ongoing 2013-2015
Task 9D: Determine drainage basin/lake area ratio.	Oct 2013
Task 9E: Provide volunteers for weekly dam monitoring.	Ongoing 2013-2015
Task 10A: Develop draft survey questions.	Apr 2014
Task 10B: Provide draft survey questions for WDNR review.	May 2014
Task 10C: Distribute survey to lake stakeholders.	Jun-Aug 2014
Task 10D: Summarize stakeholder responses.	Oct-Nov 2014
Task 11A: Run appropriate modeling elements from WiLMS.	Oct-Nov 2015
Task 11B: Incorporate findings into educational program.	Dec 2015
Task 11C: Incorporate findings into management plan.	Jan 2016
Task 12A: Develop annual progress report.	Ongoing 2013-2015
Task 12B: Distribute the annual progress report.	Ongoing 2013-2015
Task 12C: Meet with partners once/year to discuss status.	Ongoing 2013-2015
Task 13A: Prepare a half-day workshop on littoral zone and riparian area.	Jun 2014
Task 13B: Establish workshop date and promote attendance.	Jun-Jul 2014
Task 13C: Deliver the workshop.	Jul 2014
Task 14A: Train volunteer work team to conduct photography/GPS fieldwork.	Jun 2014
Task 14B: Train volunteer work team to manage digital photography data.	Jun 2014
Task 14C: Volunteer team collects digital photos of the shoreline.	Jul-Aug 2014
Task 14D: Integrate photos into an interactive electronic archive.	Sep-Nov 2014
Task 14E: Submit interactive electronic archive to WDNR.	Jun 2015
Task 15A: Train volunteer team to conduct assessment and manage data.	Jun 2014
Task 15B: Volunteer team deploys to collect data.	Jul-Aug 2014
Task 15C: Integrate qualitative information into electronic photo archive.	Sep-Nov 2014
Task 15D: Submit interactive electronic archive to WDNR.	Jun 2015
Task 15E: Prepare a written history of the lake.	Ongoing 2013, 2014, 2015
Task 16A: Establish ten physical habitat ("P-Hab") stations.	Jul-Aug 2014
Task 16B: Conduct USEPA measurements.	Jul-Aug 2014
Task 16C: Conduct WDNR measurements.	Jul-Aug 2014
Task 16D: Manage assessment data and summarize.	Sep 2014
Task 17A: Summarize plant community data.	Sep-Nov 2014
Task 17B: Create an APM Report and Plan.	Jan 2015
Task 17C: Incorporate APM Plan into Adapt. Mgt Plan.	Mar 2016
Task 18A: Write Adaptive Management Plan.	Jan-Mar 2016
Task 18B: Prepare initial management actions.	Feb 2016
Task 19A: Review the Vilas County L&W Resources Management Plan.	Ongoing 2013-2015
Task 19B: Communicate with the L&W Conservation Department.	Ongoing 2013-2015
Task 20A: Provide written & verbal education material to lake volunteers.	Ongoing 2013-2015
Task 20B: Contribute materials to lake association newsletter/website.	Ongoing 2013-2015

TABLE 3. PROJECT CALENDAR FOR PHASES 1 AND 2	
TASK	**ESTIMATED CALENDAR**
Task 20C: Prepare one press release/year for local news outlet(s).	Ongoing 2013-2015
Task 21A: Staff boat landing(s) with volunteer CB/CW inspectors at reg. times.	2013, 2014, 2015
Task 21B: Solicit lake steward volunteers for future boat inspections.	Ongoing 2013-2016
Task 21C: Review documentation for known AIS in lake system.	Mar 2014
Task 21D: Conduct analysis of lake susceptibility to zebra & quagga mussels.	Mar 2014
Task 21E. Document AIS review in Adaptive Management Plan.	Apr 2014
Task 21F: Incorporate AIS findings into education program.	Apr 2014
Task 21G: Recommend AIS monitoring needs.	Apr 2014

11. PLAN FOR SHARING PROJECT RESULTS

As discussed in a previous section, our education deliverables for the project have significant elements that share project results with stakeholders. Refer to Table 2 for a summary of these products.

12. BUDGETS FOR PHASES 1 AND 2

The HFRLA and White Water will contribute large in-kind value to the project. Requested funds will be used for reimbursement of consultant and State Laboratory of Hygiene laboratory analyses fees. We anticipate that these funds will be allocated into the categories and approximate effort presented in Tables 4, and 5 (on the following three pages). These tables also outline donated time and value and other donations such as mileage and other direct costs (ODCs).

Table 4. Phase 1 Budget High-Fishtrap-Rush Lakes Stewardship Program								
Objective	WWA Staff Hours	WWA Staff Budget	WWA Donated Hours	WWA Donated Budget	HFRLA Volunteer Hours	HFRLA Volunteer Budget	ODCs (including mileage)	SLOH (testing) Budget
1. Strategy	6	$510	4	$340	12	$144	$104	
2. Fish/aquatic life	15	$820	1	$85	0	$0	$0	
3. Rare species	16	$1,360	3	$255	24	$288	$104	
4. Water quality	42	$2,170	3	$255	12	$144	$416	$698
5. P-I Plants	127	$7,960	7	$595	0	$0	$312	
6. Watershed	24	$2,040	2	$170	0	$0	$0	
7. Frog/toad	12	$1,020	3	$255	44	$528	$0	
8. Angler journal	8	$680	2	$170	80	$960	$0	
9. Stage & discharge	32	$1,880	5	$425	126	$1,512	$0	
10. Stakeholder survey	11	$935	6	$510	50	$600	$0	
11. Watershed modeling	0	$0	0	$0	0	$0	$0	
12. Progress meeting	14	$1,190	9	$765	16	$192	$208	
13. Workshop	0	$0	0	$0	0	$0	$0	
14. Lit-Rip photos	16	$1,360	1	$85	12	$144	$0	
15. Qualitative lit-rip	0	$0	0	$0	18	$216	$0	
16. Quantitative lit-rip	0	$0	0	$0	0	$0	$0	
17. Aq. Plant Mgt Plan	0	$0	0	$0	0	$0	$0	
18. Adaptive Mgt Plan	0	$0	0	$0	0	$0	$0	
19. Input to County	2	$170	2	$170	0	$0	$0	
20. Education program	20	$1,700	6	$510	0	$0	$0	
21. AIS	24	$1,480	0	$0	408	$4,896	$0	
TOTALS	369	$25,275	54	$4,590	802	$9,624	$1,144	$698

BUDGET SUMMARY	
Total Phase 1 Request	$25,000
WWA Budget	$25,275
SLOH Cost	$698
Total Phase 1 Match	$16,858
WWA Donated Services	$4,590
WWA Donated ODCs	$1,144
HFRLA In-kind	$9,624
HFRLA Cash	$1,500
TOTAL PROJECT VALUE	$42,831
PERCENT WDNR	58.4
PERCENT MATCH	41.6

Objective	WWA Staff Hours	WWA Staff Budget	WWA Donated Hours	WWA Donated Budget	HFRLA Volunteer Hours	HFRLA Volunteer Budget	ODCs (including mileage)	SLOH (testing) Budget
Table 5. Phase 2 Budget High-Fishtrap-Rush Lakes Stewardship Program								
1. Strategy	0	$0	0	$0	0	$0	$0	
2. Fish/aquatic life	0	$0	0	$0	0	$0	$0	
3. Rare species	6	$510	6	$510	12	$144	$104	
4. Water quality	26	$1,510	0	$0	12	$144	$104	$213
5. P-I Plants	0	$0	0	$0	0	$0	$0	
6. Watershed	0	$0	0	$0	0	$0	$0	
7. Frog/toad	20	$1,700	5	$425	12	$144	$0	
8. Angler journal	33	$2,280	4	$340	100	$1,200	$0	
9. Stage & discharge	14	$770	0	$0	52	$624	$208	
10. Stakeholder survey	0	$0	0	$0	0	$0	$0	
11. Watershed modeling	28	$1,680	4	$340	0	$0	$0	
12. Progress meeting	13	$965	0	$0	12	$144	$104	
13. Workshop	0	$0	0	$0	0	$0	$0	
14. Lit-Rip photos	36	$2,850	2	$170	30	$360	$0	
15. Qualitative lit-rip	14	$1,190	2	$170	136	$1,632	$0	
16. Quantitative lit-rip	32	$2,370	8	$680	0	$0	$0	
17. Aq. Plant Mgt Plan	77	$5,705	8	$680	8	$96	$0	
18. Adaptive Mgt Plan	44	$3,740	10	$850	10	$120	$0	
19. Input to County	2	$170	0	$0	0	$0	$0	
20. Education program	0	$0	0	$0	0	$0	$0	
21. AIS	4	$340	2	$170	204	$2,448	$0	
TOTALS	349	$25,780	51	$4,335	588	$7,056	$520	$213

BUDGET SUMMARY	
Total Phase 1 Request	$25,000
WWA Budget	$25,780
SLOH Cost	$213
Total Phase 3 Match	$13,411
WWA Donated Services	$4,335
WWA Donated ODCs	$520
HFRLA In-kind	$7,056
HFRLA Cash	$1,500
TOTAL PROJECT VALUE	$39,404
PERCENT WDNR	63.4
PERCENT MATCH	36.6

13. SUPPLEMENTAL INFORMATION IN SUPPORT OF PROJECT

In this section we provide information on each of the two project partners: (1) HFRLA and (2) White Water Associates.

High-Fishtrap-Rush Lakes Association

The High-Fishtrap-Rush Lakes Association (HFRLA) is a 4 year old incorporated, 501c3 nonprofit and voluntary organization with a membership of approximately 70 property owners (about half of all landowners who live within one mile of the lakes). HFRLA is focused on activities that preserve and protect, for today and for future generations, the three lake system and its surrounding area. The association maintains membership in Wisconsin Lakes and Vilas County Lakes Association.

White Water Associates, Inc. - Biographical Summaries for Selected Staff

Established in 1985, White Water Associates, Inc. comprises a seasoned team of science professionals that approaches environmental problem-solving systematically and objectively. White Water is a certified small, disadvantaged business enterprise with big-business acumen. White Water teams well with other professionals and excels in clear, accurate communication. White Water carries necessary insurances to ensure protection for its clients, including Workers Compensation and Employers Liability; Commercial General Liability; Professional Liability, Errors and Omissions; and Automobile Liability insurance. White Water Associates' website is http://www.white-water-associates.com.

Dean Premo, Ph.D., is President and co-founder of White Water Associates, Inc., an ecological consulting firm and analytical laboratory in northern Michigan. His academic training is in zoology and ecology (with a specialty in herpetology, the study of reptiles and amphibians). His undergraduate degree included certification for secondary science education. His graduate studies research emphasized ecology of salamanders and frogs. Dr. Premo serves as a consultant to the U.S. Environmental Protection Agency Science Advisory Board (Ecological Processes and Effects Committee, and Research Strategies Advisory Committee). He is a member of the

National Research Council (research arm of the National Academy of Sciences) Committee on Inland Aquatic Ecosystems. He is on the Dean's Board of Advisors for the College of Natural Science at Michigan State University. During 1994-95, Dr. Premo was the principal project scientist for the Ecosystem Stewardship Program: Great Lakes Tribal Lands, a comparative risk analysis project with Native American communities in Michigan and Wisconsin. Dr. Premo's work regarding biodiversity and ecosystem health with forest managers has received regional and national recognition and has been featured in The New York Times. Dr. Premo served as a member of the Science Committee of Michigan's Relative Risk Assessment Project as an expert in biodiversity and landscape ecology. He served on the Project Advisory Committee for National Wildlife Federation's Lake Superior Biodiversity Project and later as a project scientist for the same endeavor. Dean Premo is a Certified Senior Ecologist (Ecological Society of America).

Kent Premo, M.S. is the systems support scientist, publications specialist, and technical editor for White Water Associates. His degrees bachelor's and master's degrees are in botany and plant pathology. Mr. Premo is a project scientist for a White Water study of car-deer accidents in a Michigan county that includes Grand Rapids, Michigan's second largest city. This study involves an innovative geographical information system (GIS) approach to evaluating many layers of information including land cover/use, deer accident records (precise location, time of day, age of driver, and more), stream locations, traffic density, and housing development trends. Mr. Premo assisted Oneida County, Wisconsin develop a GIS database for classification of its 1,200 lakes. In 1998, he attended a training workshop on lake classification and shoreland zoning sponsored by the North American Lake Management Society and Wisconsin Association of Lakes. In many water quality projects, Mr. Premo is responsible for deployment and maintenance of remote sensing devices for continuous monitoring of dissolved oxygen, temperature, and other water quality measures. This work includes data management and interpretation. Mr. Premo has considerable experience with scientific writing, education, and publication. From 1992 through 1997, he edited and published Strategies, a periodical that provided unique, practical information to resource managers. Mr. Premo has edited two scientific review texts; one dealt with biomarkers for toxicological exposure and effects, the other with a modeling initiative involving the effects of such exposures to birds. His publishing skills also include production of camera-ready graphics (illustrations, maps, and photographs).

Bette Premo, Ph.D., is White Water Associates Chief Executive Officer, with graduate training in limnology (freshwater ecosystem science) and 21 years of professional experience. Her doctoral research involved watershed management as related to nonpoint source phosphorus inputs in agricultural landscapes. For her M.S. degree, Dr. Premo studied aquatic invertebrate communities. She spent 16 months as a research scientist in Java, Indonesia studying water quality problems as related to agriculture and other land management practices. Dr. Premo is a member of Michigan Governor John Engler's Environmental Science Board and as such reviews environmental issues and tranHFRLAtes them for general public presentation, in formats that include white papers, handbooks and public hearings. For White Water Associates, Dr. Premo consults on hydrological studies of groundwater movement, lake and stream bathymetry, flow studies, water quality monitoring, baseline inventories and sediment contamination and transport. She has served as principal scientist for water quality studies and aquatic ecosystem habitat assessments related to FERC relicensing projects for major hydroelectric companies. She recently assisted Oneida County, Wisconsin in designation and classification of 1,200 lakes for purposes of establishing shoreland ecosystem management and zoning regulations. Dr. Premo has written and procured grants for environmental, cultural, education, and recreation projects for municipalities, intermediate school districts, universities, and corporations. Most recently, she procured nearly $200,000 for a municipality to establish a river walk and interpretive trail. Bette Premo is the president of the Iron River Watershed Council, a grassroots organization that coordinates and funds watershed restoration and education. She is on the board of directors of Operation Action U.P. (a northern Michigan Chamber of Commerce). Dr. Premo has been involved with many water quality and ecosystem health assessment projects at White Water Associates. In addition to her duties as White Water's CEO and project scientist, Bette manages White Water's laboratory staff and consults on data quality control issues. Bette Premo is now a recreational canoeist and kayaker, but was a professional river guide with her husband, Dean Premo in the late 1980's.