



Established in 1967

Spring 2015

Presidents Forum

Ed Jacobsen (715-546-3771)

We have a big change for our annual membership meeting this year. We are having it on July 9th at



6:30 PM, that's a Thursday night, at the Reiter Center. It had been on a Saturday morning and that time should be spent on the lakes and not in a meeting. Plan on attending our evening meeting and meet your fellow members.

We are preparing for another great summer on our beautiful chain. The original AIS infestation in the Long Lake channel seems to be under control and we are vigorously fighting that pesky invader in Virgin Lake. Remember there has never been an infestation in Wisconsin that has been completely eradicated unless the lake was totally denuded, and we are not planning anything like that. We have resources and we will keep fighting.

We have a new one year program that will allow you to renew your membership by paying for a non-member to join the association. If you have a neighbor, relative, friend who is not a member just give us their name and pay their \$20.00 and we will renew your membership for another year. See back page of this newsletter for details.

You will find a decal in your mailing that is intended to show others that you are a member of the Waterfront Association. It can be placed on the inside of your car window, front door, boat windshield or wherever you want. Please note that most of the businesses are now members of the

Waterfront Association so look for their decal to show you that they are members. We are proud of what we do and you should be proud for supporting us. If you need more decals you can pick them up at White Deer Liquors or from inside the windshield cabinet in front of the Petroleum Museum.

Our efforts to spearhead the buoy program took a large step this year. By the end of summer we will be more than half way through the process of lighting all the navigation buoys and replacing all the worn and damaged ones. We are partnering with the Town and other volunteer groups to get this project completed within the 4 year projection.

The two major programs we have for combating AIS on our chain have seen great enhancements over the winter. The clean boat patrol at the landings has been increased by 33%. Instead of two interns working all summer we will have three checking for foreign matter. Say "hi" and thank them when you see them, that job is not easy. The Adopt-A-Shoreline program has a new look and a new batch of volunteers, a welcome sign for this very important program. Bruce Renquist has spent nine years participating in this important effort to monitor our lakes and now he is running it so please help if you can.

We have included an up to date business listing for waterfront members who own local businesses. We need these businesses and all local businesses that make our town complete. For the most part the Association members are those who like the beauty of the lakes and forests in the summer so why waste time driving to Rhinelander or even Eagle River to save a few bucks? Shop locally and help keep our businesses viable. Keep this directory by your phone and use it all summer.

Have a great summer and read on.....

MARK YOUR CALENDAR

Annual Meeting July 9 at 6:30 pm at the Reiter Center. Refreshments will be served.

Clean Boats – Clean Waters

More Volunteers/Interns— More Boats Inspected

By Bob Agen

Soon the summer season will be here, and so too, another year of checking boats and educating the public about the dangers of unchecked AIS. And now with the discovery of invasive Spiny Water Fleas on nearby lakes, the importance of checking livewells, bait buckets and bilge water is critical to prevent their spread to the Chain.



This year we will build on our successful student intern program by adding a third full time intern. Our focus will remain on hiring local students first-- who meet our requirements. We will continue having one student work the Burnt Rollways Dam and lift and

another working the Town Line landing. The third intern will work several landings including one on Big Stone (Sunset Grill) and Big Lake. In addition to working the boat landings on our Chain of Lakes, the students stand a good chance of assisting Onterra with some stream research this summer. They will be assisting in the measurement of water flow patterns in the watershed.



A shrinking volunteer base made the increased student intern program a necessity. However, volunteers remain an important part of our CB-CW program. They are still needed to cover other landings, and become extremely important over the Labor Day Weekend when the students have left for

school. Contact me at 715 546 3893 or agenrobert@gmail.com

Have a great summer!

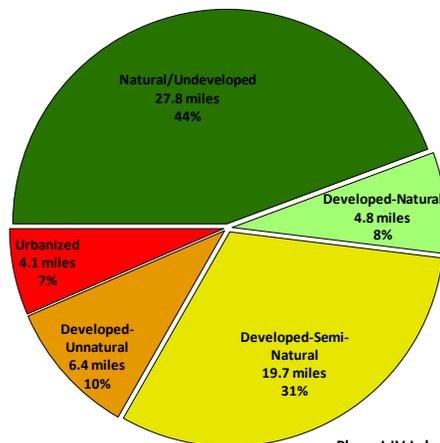
Rating Shorelines

Your Property Rating

By Norris Ross

As a part of each Lake Management Plan, our professional limnologists have rated the entire shoreline of each lake. The five categories are identified and have been depicted on the following page. The graphics depicting these ratings of the entire shoreline of each lake can be found in the individual lake reports.

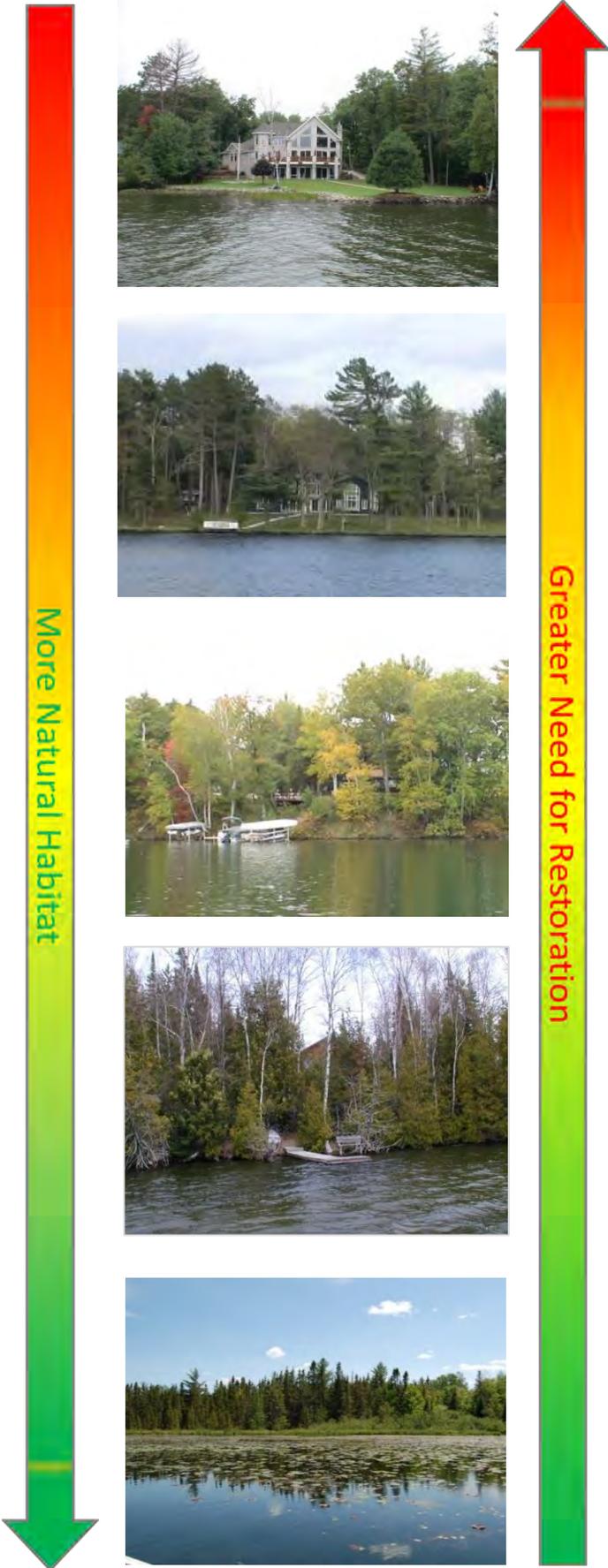
Somewhat surprisingly, 52% of the shoreline studied to date is considered natural or minimally developed. (This is the main reason the watershed is in such good condition.)



Phase I-IV Lakes Total Shoreline:

In planning for future actions in shoreland areas and to focus strategies for differing current shoreland ratings, the overall management plan has split the shoreland strategies into separate goals. They can be described in two words: **Preservation and restoration**. For those shoreland areas considered developed, restoration projects and strategies for reparian owners will be developed. For those areas identified as natural or minimally developed, preservation strategies should be developed and reparian owners with such shoreland should be encouraged to be in a preservation mode.

As development on the Chain moves forward, it will be important to keep the current percentages constant and hopefully improving. This will help to keep the watershed in its current good shape.



Urbanized: This type of shoreland has essentially no natural habitat. Areas that are mowed or unnaturally landscaped to the water's edge and areas that are rip-rapped or include a seawall would be placed in this category.



Developed-Unnatural: This category includes shorelands that have been developed, but only have small remnants of natural habitat yet intact. A property with many trees, but no remaining understory or herbaceous layer would be included within this category. Also, a property that has left a small (less than 30 feet), natural buffer in place, but has urbanized the areas behind the buffer would be included in this category.



Developed-Semi-Natural: This is a developed shoreland that is mostly in a natural state. Developed properties that have left much of the natural habitat in state, but have added gathering areas, small beaches, etc within those natural areas would likely fall into this category. An urbanized shoreland that was restored would likely be included here, also.



Developed-Natural: This category includes shorelands that are developed property, but essentially no modifications to the natural habitat have been made. Developed properties that have maintained the natural habitat and only added a path leading to a single pier would fall into this category.



Natural/Undeveloped: This category includes shorelands in a natural, undisturbed state. No signs of anthropogenic impact can be found on these shorelands. In forested areas, herbaceous, understory, and canopy layers would be intact.

Adopt-A-Shoreline

New Adopt-A-Shoreline Logo

The TLWA is introducing a new logo for Adopt-A-Shoreline. The logo has been designed to symbolize this unique program and support the spirit and pride of the volunteer shoreline monitors. The strength of this memorable graphic reinforces our commitment to creating awareness and furthering education in combating the potential spread of AIS on our Three Lakes Chain of Lakes. The logo is conceived to reflect the essence and quality of our north woods environment and be useful in a broad range of applications. In addition to use in the quarterly newsletters and on educational materials, the logo could be used in a decal form for monitoring watercraft, over the road vehicles or the windows and doors of supporting residences or businesses. Applications to wearable togs; caps, shirts and monitoring vests for volunteers or even promotional purposes can be considered.



We all look forward to a new focus in 2015. We will invite and welcome all waterfront property owners to the workshops. You do not have to be an Adopt-A-Shoreline volunteer or even a member of TLWA to attend and participate in an educational workshop. The more informed people on the water the better the odds for early detection of Aquatic Invasive Species on the Chain.

We plan to have a loaner kit available to TLWA members that will have the appropriate protocols on the identification and removal of the invasive Purple Loosestrife and Yellow Iris. The kit will also include the tools and chemicals to do the job.

Adopt-A-Shoreline 2015

By Bruce Renquist

The effort to recruit and train volunteer monitors will be our primary goal for 2015. A careful analysis of the current distribution of volunteers along our shorelines reveals several lakes needing additional coverage. If you have an interest in spending a few delightful hours on the water and making a big difference please contact me. Bruce Renquist, 262-639-0061 or bruce.renquist@gmail.com

We are planning two workshops this summer. The emphasis on education will be not only to train new volunteers but to sharpen the skills of volunteers who have been at it for a while. We hope to have these workshops on Virgin Lake so a firsthand look at Eurasian milfoil in the water is possible.

MARK YOUR CALENDAR

June 26 and July 10 Workshops
Check TLWA.org for time and place



AAS Volunteer “Ours”

By Larry Roth

Our time, our lakes, our shoreline. That is what tracking our Adopt-a-Shoreline volunteer hours is all about. First and foremost a very big thanks goes to the volunteers and lake captains that have been keeping an eye on our lakes and shoreline. We collectively logged over 420 hours in 2014 in making sure the lakes we enjoy remain healthy. That is a huge commitment from over 65 volunteers.

Volunteers In Action

By Jack Warner

One of my roles as Long Lake Captain is to oversee the Adopt-A-Shoreline program. The importance of this program was reinforced when in 2006 I identified a colony of Eurasian water milfoil near the dog leg on the Eagle River approaching the Burnt Rollways dam. This was the first EWM identified on the Three Lakes side of the dam. Since then significant remedial actions have been taken to keep EWM from entering Long or other chain lakes and so far these efforts seem to have been successful.

Because of the EWM in the river Long Lake is a front line in the battle, It is important that we have a robust Adopt-A-Shoreline program to monitor for EWM in particular. I have been fortunate to have recruited six volunteers to monitor the lake. Most of these volunteers were members of the Long Lake Management Planning Committee which was tasked with developing a long range plan for preserving the quality of the Lake.

Honeyrock Camp owns a significant part of the east shore of the river and the northeast side of the lake. One of the goals of the lake management plan was to elicit involvement of Honeyrock in management of the lake. Each year in August freshmen students from Wheaton College attend Honeyrock for orientation. Their program involves service projects so we suggested that one of the projects be adopting their shoreline . They agreed and for the last several years I have been supervising 10-12 students /instructors in monitoring their shoreline.

One of the takeaways from my experience is that residents, resorts and business residing on the lake all have a stake in preserving lake quality. They all are candidates for the Adopt-A-Shoreline program.

Why do we do have an “Adopt-A-Shoreline Volunteer Hours” form? It is easy to understand why all the volunteers spend time on the water making sure that any potential lake issues are caught early and properly dealt with. Still, why do we ask folks to fill out forms and report those hours to the Three Lakes Waterfront Association? Three reasons come to mind:

1. Reporting a potential issue through a phone call or weed sample taken to Jokin Joe's will result in some quick follow up. However, reporting issues on the volunteer hours sheet will also trigger getting the right expertise involved.
2. Each year we report our volunteer hours to the DNR. These hours end up being reported to the state legislature as an indication that lake initiatives are important to the taxpaying public. In addition, the DNR uses these hours in grant applications to the federal government (more specifically the Great Lakes Restoration Initiative). One of the specific goals of this legislation is to prevent and control invasive species.
3. The totaled hours are also very important to the TLWA grant writing process. We have some excellent resources in the Three Lakes Waterfront Association that have been successful in explaining the issues our lakes face, the commitment our Association has to protecting our lakes, and the solid planning behind our efforts to control the issues our lakes face. By providing information about volunteer hours in these grant requests, we demonstrate a serious and effective commitment to our lakes.

So please, keep volunteering, keep reporting those hours, and let's keep our lakes a resource everyone can be proud of for generations.



It's All About Our Lakes ... Well, Maybe Not ...

By Michelle Sadauskas

To many of us, our lakes define who we are, where we live, and what we live for; fishing, hunting, tubing, swimming, beaches, family, and friends. We love our lakes, we cherish our lakes and we want to protect our lakes. Controlling and monitoring Eurasian water milfoil in Virgin Lake is important, but is it more important than monitoring and controlling Purple Loosestrife, Yellow Iris, and Phragmites that may invade the nearby wetlands of Julia Creek?

The idea of monitoring (i.e. actively searching) for invasive species *in* our lakes has been around for a number of years, but the idea of monitoring for invasive species *on our shorelines and in our wetlands* is a practice much less familiar to most people. Is it any less important to monitor for wetland invasive species? Absolutely not! If we allow invasive species to invade our wetlands and shorelines, we stand to lose water quality, wildlife habitat, and species diversity.

How do we stop invasive species in their tracks? **Inspect** our boating and fishing equipment. **Remove** all attached plants, animals, and mud. **Drain** all water from boats, vehicles, and equipment. **Never Move** plants or live fish, and **monitor** your shoreline and nearby wetlands for plants or animals that seem out of place, different, or overly abundant.

To help Three Lakes visitors and residents be able to better identify aquatic invasive species (both lake and wetland species), the Oneida County Land & Water Conservation Department's AIS team will be in Three Lakes for two training sessions during the Summer of 2015. Join us and continue to help Three Lakes be the "Single Best Town in America"!

*Weed-id-kayak courtesy Montana Weed Control Association.



Flowering rush Minocqua-
- These plants were at Dam Landing on Lake Kawaguesaga. Most Flowering Rush plants do not bloom, and their foliage looks like our native Bur-reed (all the spikey foliage you see in the picture is Flowering Rush foliage). For this reason, this wetland/shoreland AIS goes unreported. Plants flower in July, so a great time to monitor for this plant is mid-summer.



Weed-id-kayak*—This picture shows what may happen if Flowering Rush enters a lake or wetland. Additionally, Flowering Rush creates a dense, impenetrable root system that pushes out native vegetation and creates unsuitable spawning grounds for many fish species.



Michelle in Phragmites-
- This picture was taken just west of Rhinelander on Hy 8. This is one of two known Phragmite stands we have in Oneida County. This wetland AIS quickly spreads along shorelines and can get 10-15 feet tall! If anyone has seen the tall grasses along the Lake Michigan shoreline near Green Bay or Oshkosh, you have seen Phragmites!! This plant quickly displaces native vegetation and changes lake shore habitats for birds, mammals, and fish.

Business Profile

Baker's Foods, Rob Baker

By Jerry Schiedt

For the Baker family running a grocery store is not a new adventure. Starting with their grandfather, continuing through their father the Baker family has owned stores in Stevens Point and Shawano and now in Three Lakes. Rob bought the Three Lakes store with a partner in 2005 and became sole owner in February of 2014.



This store too is a family affair. Rob and his wife Heather are hands on manager/owners and they have involved most of their children in the process. They

have 7 children: Jessica, Joshua (deceased military, Marine), Corey, Rachel, Alex, and twins Nick & Luke.

Without some creativity a grocery store is just a grocery store. That isn't enough for Rob & Heather and one strong way to differentiate their store is through the newly remodeled meat department. Baker's has long been known for quality meats but that standard has been raised in the past year. Only at Baker's can you find their famous Al Capone Roast as well as their potato sausage developed with the help of Rob's brother Dan, also a meat cutter. If you don't see it at Baker's they'll get it for you. If you want it special they'll create it for you. The home town spirit is alive right here in Three Lakes.



Management Planning Project Update

By Dan Cibulka – Onterra LLC

The Three Lakes Waterfront Association (TLWA) and Town of Three Lakes are involved in several on-going projects that aim to protect and preserve the Three Lakes Chain of Lakes. The TLWA and Town are working closely with Onterra, LLC, a lake management planning firm, on these projects, which include:

- Comprehensive lake management planning for the entire Three Lakes Chain of Lakes
- Eurasian water milfoil monitoring and control on the Burnt Rollways Channel of Long Lake and Virgin Lake
- A town-wide educational initiative on the matter of lake health and management

The TLWA and Town of Three Lakes have successfully obtained numerous grants through the Wisconsin Department of Natural Resources state-wide lake management grant program to partially fund these efforts. Hundreds of hours of in-kind, donated labor have been invested by TLWA and town volunteers in these projects. Their efforts include the following:

- Dissemination of aquatic invasive species information to the public
- Clean Boats / Clean Waters watercraft inspections
- An AIS rapid response program for potential new AIS infestations
- An Adopt-A-Shoreline program to search for AIS
- Numerous areas of involvement within chain-wide management planning efforts

This update intends to discuss activities involved with the comprehensive management planning projects (chain-wide and individual), the continued monitoring of EWM on the chain, and update the status of several current WDNR grants the TLWA and Town are working under.

Management Planning Project

In 2009, Long Lake began a management planning process that was spurred, in part, by the discovery of EWM near the Burnt Rollways Dam in 2006.

Since then a multi-phased project has been developed to create a full chain-wide management plan as well as individual plans for each lake in the chain. From 2010-2017, the water quality, watershed, aquatic plants, shoreland areas, fisheries management and stakeholder perspectives will be studied extensively in each lake in the chain during multiple phases. In February 2014, a draft of the chain-wide and Phase I-III lakes management plan was approved by TLWA and WDNR staff, concluding these phases of the project. During Phase III (field work conducted in 2013), Spirit, Maple and Moccasin Lakes were assessed. Onterra ecologists visited with representatives from the Phase IV lakes in July of 2014 to discuss the ecology and management of their lakes. The meeting was met with very good discussion regarding the exceptional health of these lakes, and what could be done to preserve them. It is anticipated that a Phase IV management plan document will be presented to the TLWA in November of 2014, and that an official first draft will be sent to the WDNR for review in December of 2014. As the planning process continues with the remaining lakes in the Three Lakes Chain, the chain-wide management plan will be continuously updated and further individual lake plans produced.

While Phase IV studies were being discussed with lake stakeholders from Maple, Spirit and Moccasin Lakes, Onterra ecologists began Phase V of the project in 2014 by visiting Little Fork and Medicine Lakes. Data analysis has only begun on the numerous variables being studied on these lakes; however, it can be said at this time that all observations indicate that the Phase V lakes are in good health and free of submergent AIS such as Eurasian water milfoil and curly-leaf pondweed.

While working on the Phase V lakes, Onterra crews found a native mussel of great interest, the Eastern pondmussel (Photograph 1). This mussel species is typically found in the lower Great Lakes region east to New England and south to the Carolina's, though its status ranges from "imperiled" to "endangered" in these areas. The Eastern pondmussel has a relatively thin shell, making it heavily impacted by the zebra mussel infestation and human disturbance that has occurred in the St. Lawrence River Basin and lower Great Lakes region. The mussel found in Medicine Lake (and later that summer in Laurel Lake) represents the westernmost occurrence of this species and also the first population recorded in the Mississippi drainage basin.



Photograph 1. Eastern pondmussel (*Ligumia nasuta*) specimen found in Medicine Lake of the Three Lakes Chain.

[Burnt Rollways Dam EWM Monitoring](#)

EWM monitoring has been conducted on the Burnt Rollways Dam channel since the discovery of the AIS in 2006. On several occasions since 2006, aquatic herbicide applications were conducted to bring down levels of EWM in the channel. In 2014, the TLWA was prepared to address the invasive plants with a Diver Assisted Suction Harvester (DASH) system, which is a plant removal tool built and operated by firm Many Waters, LLC. The areas they were arranged to harvest included a minimally dense population spotted in late summer of 2013 by Onterra ecologists. Upon inspection of the area in spring of 2014 however, the invasive plants were not observed – by visual monitoring from the surface or through submersible camera viewing. Thus, because of the low occurrence of EWM in the channel, no control action was completed. Further monitoring of the Burnt Rollways Channel in September 2014 turned up a single plant. For 2015 no control action is anticipated; however, monitoring within the channel will continue through both TLWA and Onterra surveys.

[Virgin Lake EWM Monitoring](#)

Since discovery of EWM in 2010, aggressive monitoring, hand-harvesting, and herbicide treatments have occurred on Virgin Lake in an attempt to minimize the spread of this invasive plant. With 2014, a new control strategy, Many Waters' previously mentioned DASH system, was utilized against EWM within the lake. A June 12, 2014 Onterra survey confirmed an area 0.7 acres in size that held several small plant colonies, as well as a sizeable (0.03 acres, or 1,300 sq. foot) colony of highly dominant density EWM. This area was prioritized for utilization of DASH.

Many Waters visited Virgin Lake on several occasions – first on July 12 and 19, then September 19. Use of the DASH system, though effective on most lake systems, was reportedly difficult due to the heavily stained water and abundant native plants in the area. The DASH system uses a hose that is controlled at one end by a diver and delivers plants that the diver pulls into a basket, which is situated on a boat at the water's surface. The abundant native plants within the water resulted in decreased mobility of the hose, as well as contributing to much native by-catch. They turned to hand-removal for much of the July 12 and July 19 Virgin Lake visit. Many Waters was able to remove 144 lbs of EWM using DASH, as well as another 143.5 lbs through hand-removal.

Onterra ecologists visited Virgin Lake several times during 2014 to observe the EWM population. On July 22nd, their visit was to complete a full-lake survey for EWM as well as to assess the control zone Many Waters had worked on the week previous. A few scattered plants were observed in several areas of the lake, and numerous plants were encountered within the 0.7 acre control zone – including the previously mentioned dense EWM colony. This colony was observed to still be present, but at a lower density. Following Many Waters' third visit to Virgin Lake (September 19), Onterra ecologists again assessed the colony and determined that although the EWM present was at a further reduced density, ample EWM still remained.



Photograph 2. Onterra staff collecting a plant sample from Virgin Lake.

While the efforts of Many Waters' DASH system were not used in vain, it is believed that this method was able to maintain the current level of EWM in Virgin Lake as opposed to significantly decreasing it to a more manageable level. The present level of

EWM, coupled with the stained water and abundant native plants, would make continued hand-removal or mechanical removal a difficult control option to implement in Virgin Lake. For 2015, Onterra is recommending that the TLWA and Virgin Lake stakeholders pursue an integrated approach to EWM management – one that includes a herbicide application to control the population at the south side of the lake, while hand-removal take place at the other, lightly scattered EWM locations in the lake.

Planning for this effort will take place during winter of 2014/2015.

[Three Lakes Chain Grant Status and Upcoming Activities](#)

The TLWA and Town of Three Lakes have been highly successful in securing state grants in a variety of categories, including Lake Management Planning, AIS Early Detection and Response and Lake Management Protection. The latest grant, awarded in May of 2013, includes 75% project cost assistance for Phase V and VI comprehensive lake management studies, Burnt Rollways and Virgin Lake AIS management as well as AIS education activities on the chain through 2015. As previously mentioned Phase V (2014) includes Little Fork and Medicine Lakes and is already underway, while Phase VI (2015) will include studies on Round, Island and Townline Lakes as well as Townline Creek. The TLWA can anticipate applying for a February 2016 Lake Management Protection grant from the WDNR. This grant would continue the project through Phase VII (2016) and VIII (2017), which would essentially complete the management planning studies on the Three Lakes Chain of Lakes. Continued monitoring of the Burnt Rollways Channel and Virgin Lake would be included in this grant, as well as funding to continue the TLWA and Town of Three Lakes' educational initiatives.

As these projects continue forward, Onterra staff will continue to meet with Three Lakes Chain



stakeholders to keep them updated on the results of comprehensive studies as well as the AIS monitoring that is taking place on the Three Lakes Chain of Lakes.

Fish Population

To Stock or Not to Stock ?

By Ed Cottingham

In light of the proposed plan by the DNR to decrease the bag limit on panfish, the Waterfront Association has inquired about the idea of a fish stocking program. To get a quick answer, I contacted the DNR fish biologist John Kubisiak.

The first part of the answer was a great one: The plan to decrease the bag limit has been scrubbed, i.e., no regulation change in the near future.

That still left the question of a well-planned fish stocking program for our lakes. Any fish stocking would need a permit, and the DNR cannot give a permit for fish that reproduce adequately on their own, which is the case on the Chain. Low panfish numbers in the Three Lakes Chain are due to lack of cover and abundant predators, rather than a reproduction problem. To alleviate the real problems, an increase in woody habitat would go a long way.



That brought us to a discussion about fish cribs. John stated that cribs are good for attracting and increasing fish harvest, but the jury is still out on whether they provide much benefit in

increasing the overall fish numbers. In most lakes, they are below the thermocline and unavailable due to oxygen depletion. He stated they do provide some positive benefits if placed in large numbers to spread out and distribute angler pressure, but they have to be properly constructed.

A new concept was next introduced—"fish sticks." This involves a cluster of trees placed near and secured to the shore. These clusters help increase the amount of near-shore cover, thereby providing more locations for young fish and panfish to hide and grow. A permit is required to place structures on waters designated "areas of special natural resource interest" (ASNRI). Here are the websites for those interested in this program:

<http://dnr.wi.gov/permits/water>. Also: <http://dnr.wi.gov/topic/waterways/permit/exemptions.html>. The location of habitat structures must be reported to the local fisheries biologist.

I am not certain about John's assessment of the Three Lakes Chain fishery content, but I have personally seen a decline in the number of fish on the Chain.

The DNR is in the final stages of a two-year study on the Chain which includes: Netting, electro-shocking and creel counts for both open water and ice fishing. They plan to publish the data by May of 2015. We'll keep you posted. When all the facts are in and we have a good picture of the health of the fish population, I may ask once again: "To stock or not to stock?" This is Ed Cottingham signing off and thanking John Kubisiak for taking the time to educate me for this article. John is available at 715-365-8919.

Please Patronize Our Local Business Members

The merchants, professionals and tradesmen listed in the TLWA Local Business Directory share our commitment to clean water and protecting our quality of life in the Northwoods. They deserve our support.



**STOP AQUATIC
HITCHHIKERS!**

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

Use of Herbicides for AIS Control in Wisconsin Lakes: A Balance of Ecological Risks

Dan Cibulka, Onterra LLC

Introduction

Aquatic invasive species (AIS) consist of non-native organisms that have been introduced to a region and hold the potential to alter native habitats and food webs. One well known species, Eurasian water milfoil (*Myriophyllum spicatum*; EWM) is a non-native aquatic plant now known to exist in over 700 lakes and rivers in Wisconsin. In some, but not all, of these ecosystems, EWM has grown aggressively to the point of displacing native vegetation, causing recreational impairment and altering the overall ecology of the system.



Photograph 1: Surface matted flowering Eurasian water milfoil on a Wisconsin Lake.

AIS have been managed since the 1950's using a variety of techniques. This article's purpose is to share information pertaining to herbicide application for the purposes of AIS control. While this article

cannot sufficiently cover all matters pertaining to this topic, it is hoped that the reader will obtain a general understanding on herbicide use, risks, and alternatives. A focus will be placed upon 2,4-D, an herbicide used for EWM control within the Burnt Rollways Channel and Virgin Lake of the Three Lakes Chain of Lakes.

Herbicide Mode of Action

The Environmental Protection Agency (EPA) has registered ~300 terrestrial (land-based) herbicides for use in the United States, while only 13 active ingredients are registered for use in aquatic environments. Common herbicides used for EWM control include 2,4-D (2,4-dichlorophenoxy acetic acid), fluridone, triclopyr and diquat. 2,4-D is by far the most common herbicide used in Wisconsin. In fact, 2,4-D is one of the most commonly used herbicides in the world, being applied on corn, soybean, spring wheat, sugarcane and barley fields each year. The EPA estimates annual domestic 2,4-D usage to be 46 million pounds.

2,4-D is systemic herbicide, meaning that upon application, the herbicide is taken up in the plant's structure and transported through it. 2,4-D mimics a naturally occurring plant hormone (auxin) that regulates plant growth, causing uncontrolled cell division in the plant's tissue, which ultimately leads to mortality. Several other herbicides work similarly, through translocation of the herbicide within the plant tissue. An alternative mode of action is through direct contact. Contact herbicides (diquat, endothall) cause tissue damage to all parts of a plant that contact the herbicide, rather than being transported through the plant to non-contact areas. With contact herbicide use, the potential exists for above-ground plant matter to be impacted, but root systems to remain alive. However, some plants species do not have sufficient storage reserves in their root crowns to rebound following exposure to contact herbicides.

Herbicides may be categorized based upon their selectivity as well. Selectivity refers to the ability of an herbicide to impact certain plant types while not impacting others. Herbicides may be selective or non-selective, based upon their chemical makeup, the application rate, method of application and stage of plant growth.

Herbicide Toxicity

Are aquatic herbicides considered "safe"? The herbicides applied to EWM and other invasive plant

beds are registered by the EPA, however this distinction does not necessarily mean the herbicide is “safe”. By registering an herbicide, the EPA acknowledges that the benefits of using this herbicide outweigh the potential risks the herbicide presents. Truly, no product is without risk of any kind, so if we were to be accurate we could not label any product as being “safe”. This includes household products that we use every day. In addition to studying the potential side effects of herbicides, researchers have studied these everyday items to determine where the risks actually lie in our use of products.

Table 1, adapted from Petty (2014) displays the oral LD₅₀ for a number of products. The LD₅₀ (lethal dose 50) represents the dose of a chemical required to kill 50% of a population of a given organism after ingestion. LD₅₀'s are expressed in units of milligrams per kilogram of body weight, so as a LD₅₀ value decreases, its toxicity increases. As an example, nicotine (oral LD₅₀ of 50) is 40 times more toxic than Vitamin C (2,000 oral LD₅₀). The LD₅₀ values presented in Table 1 are for populations of rats, a common test subject for these studies. Herbicide products are highlighted within the chart.

The data indicate that while all products carry the potential for bodily harm through ingestion, it is the dose of the product that must be considered. Most of us willingly choose to use products such as Aspirin, cinnamon, or caffeinated beverages, which if administered at high concentrations could be fatal. Overuse of these products can and will produce bodily harm to organisms; therefore, it is important to remember that all products (including herbicides) can be dangerous if used above recommended dosages.

[Toxicity & Aquatic Organisms](#)

As previously mentioned, 2,4-D is a common agricultural herbicide. This herbicide is able to be applied to these crop fields for “weed” control because 2,4-D is broadleaf specific; that is, it impacts broad-leaf (dicot) species and not narrow-leaf (monocot) species at recommended label rates. Broad-leaf and narrow-leaf species hold morphological and physiological differences, which is why one grouping may be impacted by an herbicide and the other group may not. Eurasian water milfoil is a broad-leaf plant, along with many native milfoil species and bladderwort (*Utricularia*)

species. Many of the native aquatic pondweeds, arrowheads, cattails, and grass species are monocots and thus not believed to be as susceptible to 2,4-D exposure. Unlike terrestrial 2,4-D applications, ongoing research indicates that some narrow-leaf (monocot) species are impacted by this herbicide. Conducting herbicide treatments early in the spring at cool water temperatures helps to minimize exposure of herbicide to native species, as many of Wisconsin’s native plants begin actively growing after the water has warmed from the ice-covered winter. Invasive plants such as EWM and curly-leaf pondweed often begin growing much sooner in the spring, thus giving them a competitive advantage over native species.

Product	Oral LD ₅₀ (mg/kg)	Usage
Nicotine	50	Personal Choice
Caffeine	140	Personal Choice
Hot Sauce (capsaicin)	161	Food Seasoning
Bleach (sodium hypochlorite)	192	Household Cleaner
Aspirin	200	Medication
Endothall	233	Herbicide
Naproxen Sodium	248	Medication
Cinnamon	275	Food Seasoning
Diphenhydramine HCl	500	Antihistamine
Diquat	866	Herbicide
Pink Bismuth (bismuth subsalicylate)	1,200	Medication
Vitamin A	1,510	Vitamin
Triclopyr	1,847	Herbicide
Acetaminophen	1,944	Medication
Vitamin C	2,000	Vitamin
Topramezone	2,000	Herbicide
Table Salt	3,000	Food Seasoning
2,4-D	3,129	Herbicide
Vinegar (Acetic Acid)	3,310	Food Seasoning
Bispyribac-sodium	4,077	Herbicide
Carfentrazone	5,000	Herbicide
Flumioxazin	5,000	Herbicide
Fluridone	5,000	Herbicide
Glyphosate	5,000	Herbicide
Imazamox	5,000	Herbicide
Imazapyr	5,000	Herbicide
Nail Polish Remover	5,000	Beauty Product
Penoxsulam	5,000	Herbicide

Adapted from: Petty, D.G. 2014. Comparative Oral Toxicity of Aquatic Herbicides and Common Household Products. *Aquatics*, Vol. 36, No. 2.

Table 1: Herbicide and Household Product Toxicology Comparisons. (The lower the LD-50, the more toxic.)

Several studies have examined the toxicity of herbicides to aquatic organisms besides plants. The EPA has developed toxicology thresholds for a variety of aquatic organisms, yielding the following outcomes for 2,4-D acid toxicity:

- Practically nontoxic to fish & amphibians
- Slightly toxic to practically nontoxic to invertebrates
- Moderately to practically non-toxic to birds

These studies also indicate that herbicides are typically toxic to aquatic organisms at concentrations much higher than the EPA maximum label rates. For example, the maximum aquatic application rate for 2,4-D is 4 ppm ae. Bluegill, a common Wisconsin fish, has a LD₅₀ exposure value of 263 ppm 2,4-D ae (acid equivalent) over a 96 hour period. Leopard frog tadpoles have an LD₅₀ exposure value of 359 ppm ae. The water flea (*Daphnia* spp.), a common tiny aquatic crustacean, has a LD₅₀ exposure value of 25 ppm ae over 48 hours.

Human Herbicide Toxicity and Interaction

As previously mentioned, each herbicide is not used without some risk. However, environmental reviews by the EPA have determined the proper label application rates, public notice requirements, water use restrictions and exposure guidelines for each herbicide product. The EPA has determined that when these guidelines are followed, the benefits of these products outweigh the risks associated with their use.

Studies have shown that 2,4-D has very low acute toxicity to humans via oral, dermal or inhalation routes of exposure, though the acid form is considered to be a severe eye irritant. 2,4-D is not classifiable as pertaining to human carcinogenicity, meaning the EPA has determined there is not sufficient evidence to classify it as a carcinogen. There are no post 2,4-D treatment human or pet/livestock drinking water restrictions.

Because acute exposure limits for swimming were greater than the maximum label application rate, the EPA did not formulate swimming restrictions for 2,4-D when it is applied in the acid formulation. Additionally, there are no restrictions on eating fish from waters receiving registered aquatic herbicide applications in Wisconsin. Because it can potentially impact plants such as tomatoes, peppers or lawns, an irrigation water standard has been set at 0.1 ppm ae for 2,4-D. Under most application situations, a irrigation restriction of 30 days is set for residential areas near a 2,4-D treatment.

The National Institute of Health Science lists 2,4-D and other herbicides of its class as suspected endocrine disruptors. Because there have been no studies addressing the potential of endocrine disruption by 2,4-D, the EPA has included this herbicide for additional screening and this is an area of ongoing research.

Herbicide Aquatic Dissipation and Degradation

When introduced to an aquatic environment, aquatic herbicides begin to dissipate and degrade immediately. Many factors influence dissolution and degradation rates, including the herbicide used, the dose of the herbicide, treatment size, water column volume, water temperature, microbial activity, and more. Generally, studies have shown that 2,4-D holds a half-life (amount of time for half of a substance to disappear) in lakes of one to two weeks, though this may range from several hours to several weeks depending upon the above-mentioned circumstances. Realistically, smaller “spot treatment” situations result in measurable concentrations that tend to last for a period of hours, while in larger or “large-scale” treatments, the herbicide may be measurable for a period of days or weeks. When planning an herbicide treatment, lake managers must develop the treatment strategy with these factors in mind in order to produce an effective result which minimizes impacts to native plants or other organisms.

Environmental Trade-Off

All herbicide products may produce undesired effects if used above recommended dosages and in an improper manner. Their use in lakes must therefore be planned strategically and monitored appropriately. When managing aquatic invasive species populations, choosing to not use herbicides for control is certainly an option to consider. Perhaps the AIS population is in an early stage, and relatively small in density and extent. In this case, hand-removal might be a viable option for AIS control. The population may however expand to the point at which hand-removal is no longer a feasible option. True, there is a risk of using herbicides to control the AIS population, but there is also a risk involved in not treating this population. If an AIS such as EWM was to expand rapidly through the lake, there is the potential that it would displace native plant species and grow to the point at which it would mat the surface of the lake and fill

the water column. This growth may cause significant recreational issues, such as impacting swimming, boating, kayaking/canoeing and fishing. The changes in the aquatic plant community and water chemistry could greatly impact the ecology of the lake as well. Should the EWM reach this level of infestation, the ecological damage to the lake would be much greater than that which could be incurred from a well-planned and executed herbicide treatment strategy.

To complicate this problem, studies conducted by WDNR Science Services researchers have shown that EWM has displayed varying levels of population size and density within Wisconsin lakes. In some unmanaged lakes, the population reaches equilibrium where it dominates the plant community. In other unmanaged lakes, the population reaches a low-density equilibrium within the lake, which does not significantly alter the lake's native ecology or impact human use. Though it is traditionally thought that AIS introduction will result in negative impacts for all lakes, this simply is not the case. Should a lake group forgo herbicide treatment on an AIS population in hopes that the AIS in their lake will not do ecological harm? This is still a difficult decision to make. Researchers are beginning to learn which conditions allow AIS to thrive, such as low water clarity, high nutrients, or lakes with flow (reservoirs or drainage lakes). Nevertheless, it is simply too soon to be able to predict where these species will interfuse within native populations and where they will flourish, dominate the native population and do ecological harm.

Conclusion

The decision to manage AIS through aquatic herbicides is complex, and not without risk. Lake managers and researchers have learned much about herbicide toxicity, mode of action, selectivity and treatment efficacy over the years. However, there are still unknown factors involved. Treating an AIS population can pose a risk, however this risk is greatly reduced through strategic planning, proper strategy execution, and pre- and post treatment ecological monitoring. Further, the risk of treating an AIS population with herbicides must be weighed against the risk of allowing that AIS population to expand within a lake. There is no "acceptable risk" level that is standard for every lake and every lake stakeholder, so lake managers

and stakeholders must evaluate the variables presented for every AIS management situation and determine what the goals of management are, along with what risks are acceptable to reach those goals.

Additional Resources

- Aquatic Ecosystem Restoration Foundation. 2014. Biology and Control of Aquatic Plants – A best Management Practices Handbook: Third Edition. Available: <http://www.aquatics.org/bmp.html>
- Council for Agricultural Science and Technology. 2014. Benefits of Controlling Nuisance Aquatic Plants and Algae in the United States. QTA2014-1. Available: <http://www.cast-science.org/publications/>
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- United States Forest Service. 2006. 2,4-D Human Health and Ecological Risk Assessment, Final Report.
- Wisconsin Department of Natural Resources. 2010. EWM Research Facts. Miscellaneous Publication PUB-SS-1074.
- Wisconsin Dept. of Natural Resources, Dept. of Health Services & the Dept. of Agriculture, Trade and Consumer Protection (DATCP). 2011. Frequently Asked Questions about Aquatic Herbicide Use in Wisconsin. Available: <http://dnr.wi.gov/lakes/plants/factsheets/generalherbicidefaq.pdf>.
- Wisconsin Department of Natural Resources. 2012. 2,4-D Chemical Fact Sheet. DNR PUB-WT-964.
- Wisconsin Department of Natural Resources. 2014. Small-Scale Herbicide Treatments for Control of Invasive Aquatic Plants. Miscellaneous Publication PUB-SS-1143.



For timely information on important issues affecting our lakes and waterfront property, visit the TLWA website at:

www.TLWA.org

Looking Down the Road

By Stella Westfall, Town Board Chair

The Town of Three Lakes is looking at some rather large projects in the near future. The Thunder Lake dam will have to be replaced soon, probably in 2016. We are working with the DNR on permits at this point so a date has not been set, we will keep you informed as we get closer to a firm timetable. We do not expect and meaningful water level change as a result of this construction.



The Burnt Rollways Bridge will have to be reinforced and resurfaced. This is a major project and will involve the total closure of Hwy. X for a short while. It is unclear at this time if the

lift over the road for transport from the upper chain to the lower chain will be closed.

The "Blue Ribbon Bridge" needs to be structurally repaired soon. The bridge has been slowly deteriorating and will be unsafe for loaded school busses and emergency vehicles in the next few years. Unfortunately this is going to be a very expensive undertaking but it is necessary. At this point we are hoping to hold off construction until 2017 or later.

This Summer in Three Lakes

By Pat Volk, Town Board Supervisor

There will be three major projects which affect the waterfront homeowners this summer.



The first will be the Reed Rd. culvert replacement. The existing culvert is a 5 foot conventional culvert which has failed. The new culvert will be a 10' bottomless culvert which is a great improvement for

the long term. This project will begin in mid-June and it will require a short road closure for up to two

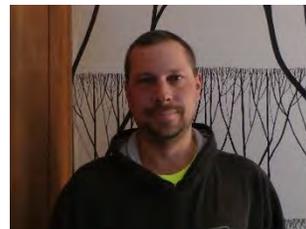
days. All affected residents will be notified as to the time of closure.

The next big project will be the total reconstruction of the Maple Lake dam. This construction, while extensive, will have very little effect on the lake level and any road disturbance will be minimal. This project will be complete by late September.

The third project will be the resurface of the nine mile bridge over the "box car dam". The resurfacing will include new railings and a wider roadway surface. There will be a complete road closure for a short while during this project but there are ways around in case of emergency.

Buoy Program

By Brian Slizewski, Town Shop



The buoy situation has greatly improved over the past two years in large part due to the funding by the Waterfront Association. We are rounding the corner on

our way to have all the red and green buoys on the chain lighted and protected with reinforced cages. This was a 4 year program with budgeted money from the Town as well as the funds from the Association. Three Lakes Fish & Wildlife as well as the Three Lakes Nicolet ATV club have also contributed to this effort. There are 143 buoys on our chain and at this point we will have all but 30 red and green buoys repaired, lighted and caged.

While we are replacing the worn out buoys with new ones we will still have damage each year. Some damage comes from vandalism and some comes from negligent driving but in either case we will have ongoing expenses in this area. For many years we were patching the damaged and worn buoys as best we could but that started to become apparent to our boaters. We now look more up to date. With the bad ones gone we will soon be in a position to maintain what we have and the expense will not be so overwhelming.

What is the Perfect Gift for a Person Who Has Everything and Is Not a Member of the TLWA?

A TLWA Gift Membership, of Course!

Help us toward our goal of every property owner becoming a TLWA member. Buy a one-year, \$20.00 TLWA membership for a non-member friend or neighbor and get a **free one-year extension** to your membership. We'll even send your gift recipient a letter naming you as their sponsor. It's the perfect gift!

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D-Y-K

Did you know the wood frog needs a predictable climate?

Wisconsin's wood frog is unique in its survival skills and that's why it can make it through Wisconsin's harshest months. Its ability to "freeze" in the winter and thaw in the spring, allows it to tolerate winter in Wisconsin. Wood frogs rely on soil burrows, leaf litter, and snow cover to help keep them insulated in the cold winter months, and need moist soils, leaf litter, and ponds close to woodlands for breeding in spring. This makes the Wisconsin wood frog very reliant on a predictable and steady climate.

Ecologists expect that because the climate is changing at a more rapid pace, the wood frog may face complications living in Wisconsin, and it may result in changes to the wood frog's population and range. A major cause of juvenile frog mortality is freezing when exposed to extremely cold temperatures, putting the wood frog at greater risk of dying before it is able to reproduce. Another threat to wood frogs is the possible projected future of drought increase and severity. Because Wood frogs rely on moist climates and temporary ponds for breeding grounds, the increase in drought-like conditions will have great ramifications on the amphibian's population in Wisconsin.

Credit: reprinted from *Lake Tides*, Vol. 39 No. 4



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