

## **Aquatic Invasive Species - A Case for Prevention**

### **Background on the impact to lakes so far**

The attack against our lake legacy is well underway. We may not realize it but Aquatic Invasive Species are spreading exponentially to our lakes, and they are causing irrevocable impact. Already most of the lakes in the Twin Cities area are infested with Eurasian watermilfoil which can grow in up to 35 feet of water and form dense mats at the surface. Zebra mussels are now hitchhiking on vegetation hanging on boat trailers and moving from lake to lake. Spiny waterflea and Zebra mussels voraciously filtering the bottom of the food chain are causing dramatic changes to our game fish population.

Imagine...

- Swimming through thick mats of Eurasian watermilfoil on the lake surface
- Algae blooms from Curlyleaf pondweed die-off in the summer
- Cutting feet on razor sharp Zebra mussels that blanket the beach
- A closed walleye season because the fishery has been devastated
- Property value loss and trying to sell a home on an infested lake
- Lake residents and LUG's having significant, ongoing management expenses
- Potential well contamination from exposure from 2,4-D herbicide treatments

For a growing number of lake residents and counties in Minnesota, they don't have to imagine, this is the reality.



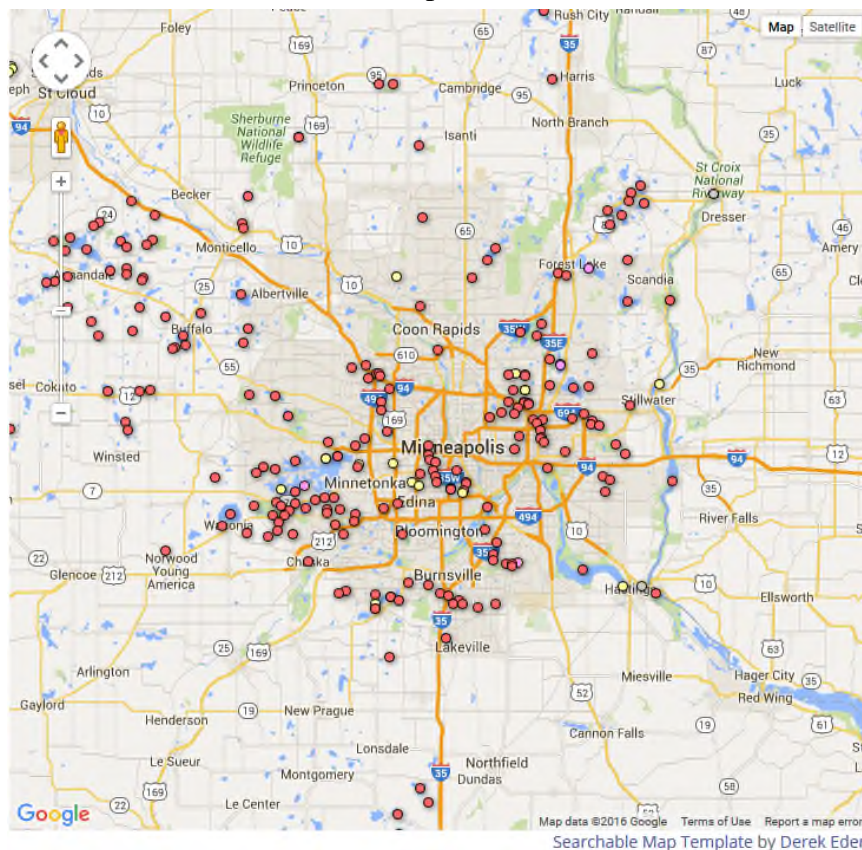
Lake Minnetonka - Grays Bay - Eurasian Watermilfoil 2005

## Exponential growth

In 1987 Eurasian watermilfoil was first discovered in Lake Minnetonka. It has since "trampoline" to 522 lakes. If this AIS had been contained to Lake Minnetonka when it was discovered, millions of dollars in management costs by other lakes could have been saved.



AIS in Minneapolis/St. Paul Area - 1987<sup>1</sup>



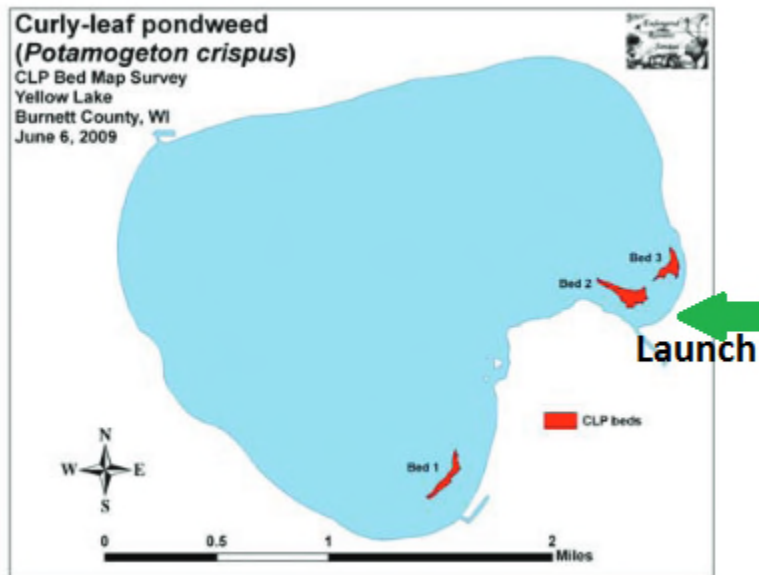
AIS in Minneapolis/St. Paul Area - 2015

<sup>1</sup> Courtesy of <http://minnesota.publicradio.org/projects/2014/04/invasive-aquatic-species-map/>

## How it is Spread

AIS spread is widely attributed to infested boats moving from infested waters to uninfested waters. Hitchhiking aquatic invasive plants such as Eurasian watermilfoil, Curlyleaf pondweed, Flowering rush, and Starry stonewort (algae) have already established themselves in Minnesota Lakes. Studies have shown the principal vector of invasive animals such as Zebra mussels and Quagga mussels is by attaching to plants and then transported by boaters<sup>2</sup>. Spiny waterflea and Viral hemorrhagic septicemia are spread when infested water is moved between lakes such as in bilges, live wells, or minnow buckets.

Initial infestations of aquatic invasive plants at lakes are often show to occur in proximity to boat launches.

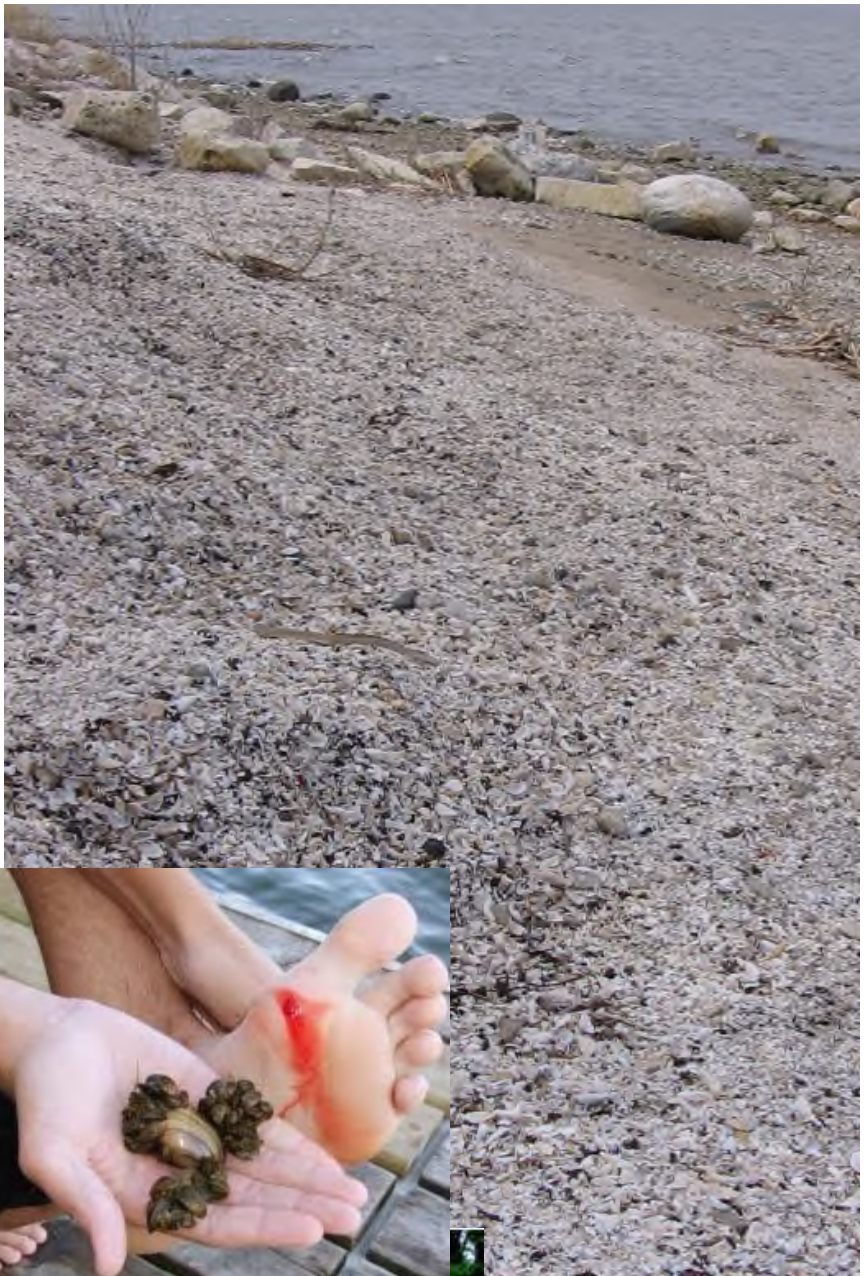


<sup>2</sup> "Overland Dispersal of Aquatic Invasive Species: A Risk Assessment of Transient Recreational Boating", Johnson, Ricciardi, Carlton - 2001 Ecological Society of America

## Recreation Impacts

The impact of AIS infestations extends beyond lake residents and affects everyone who uses or manages a lake.

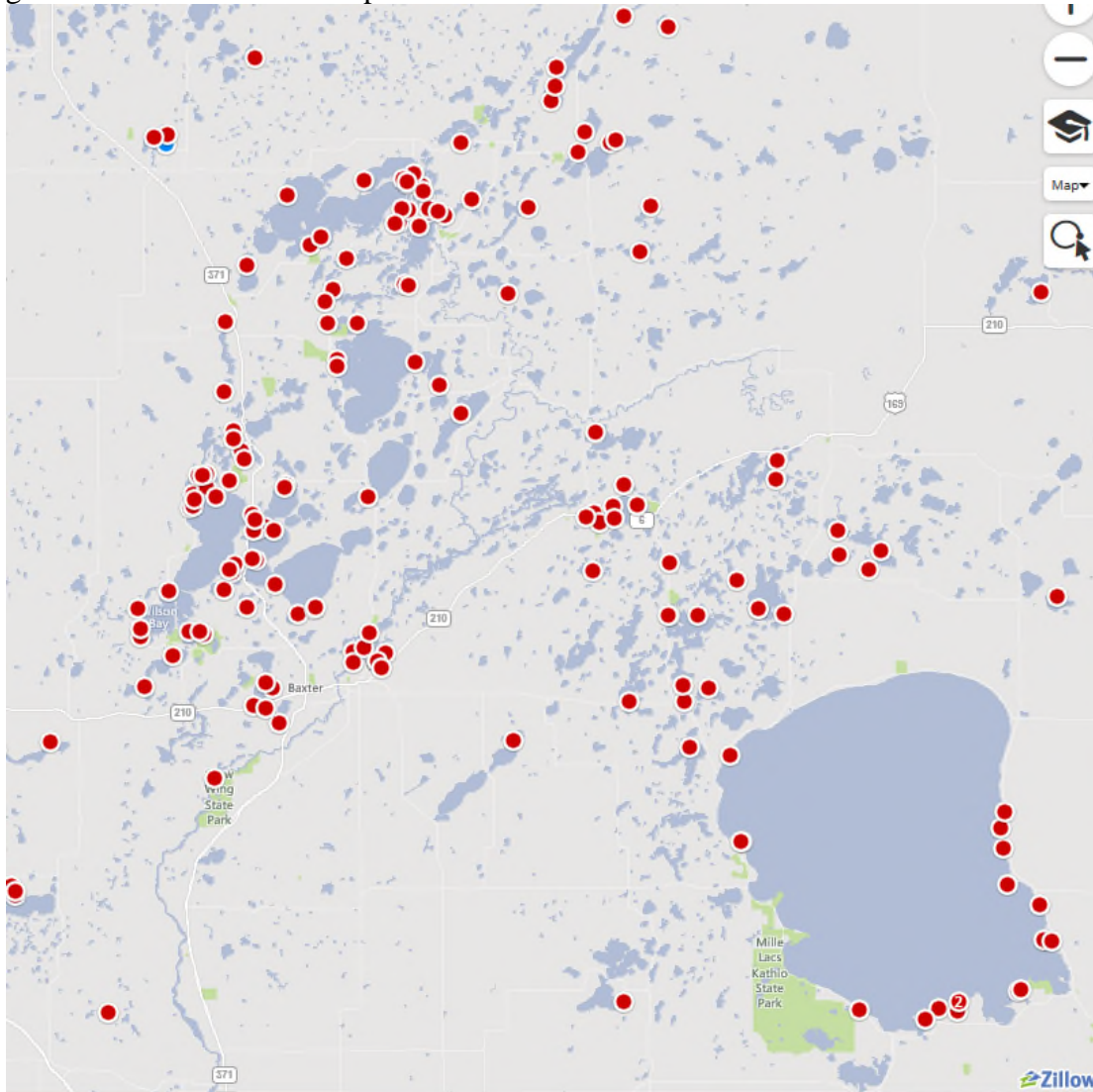
Recreational use of a lake can drop off quickly after it has experienced impacts of an AIS. Who really wants to try to swim through dense mats of weeds? When algae blooms and decaying plant matter cause a lake to smell and present a risk to pets, who wants to visit them? When people try to walk on a beach only to cut their feet on Zebra mussel shells, it is beyond inconvenient.



## Property Value Impacts

Everything else being equal a home buyer is going to elect to purchase a home on a lake that has not been infested with an AIS. Studies have shown that a home on a lake with AIS can expect to be valued at 13% less than a home on an uninfested lake. The conclusion of a 2008 study revealed: "...results indicate that lakes invaded with milfoil experienced an average 13% decrease in land values after invasion."<sup>3</sup>

All one has to do is look at available real estate (Edina Realty or Zillow) to see that there are more homes for sale on AIS infested lakes. The map of the Brainerd area below shows 176 properties for sale on lakes where many have Zebra mussel infestations. Supply appears to be greater than demand for the prices listed.



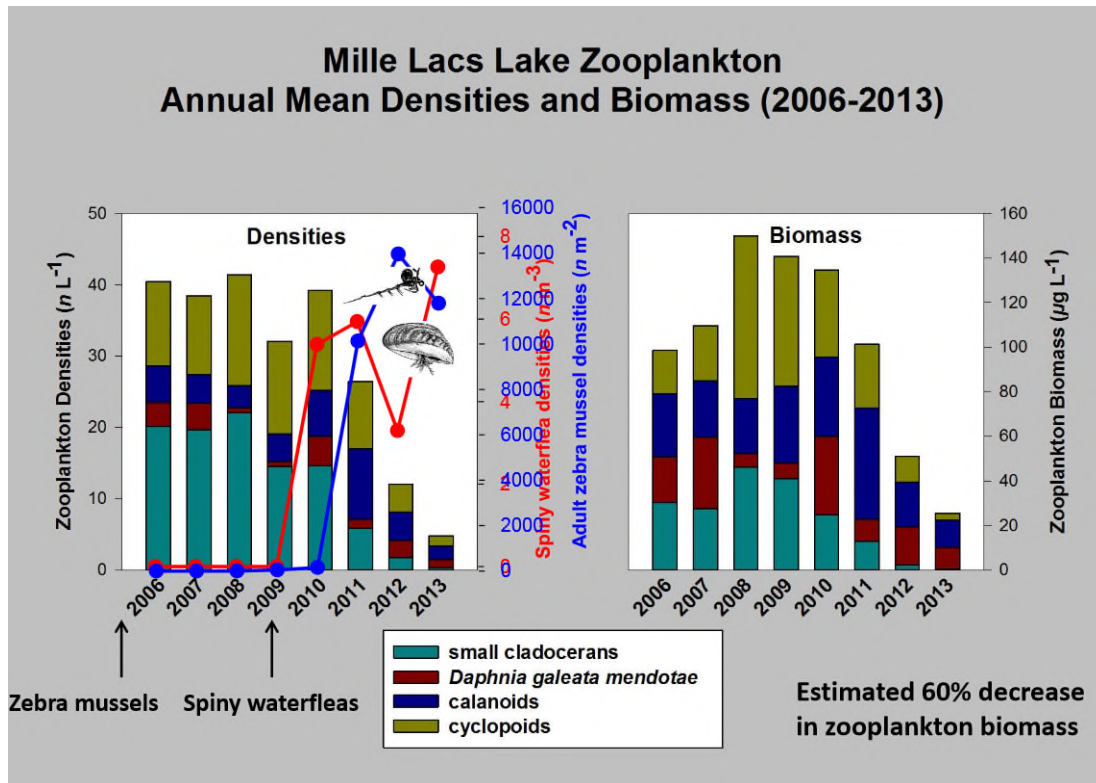
Due to the premier value that has been ascribed to lake homes, townships and counties today count on those properties for a significant amount (up to 90% in some cases) of the tax base. If these contributions to the tax base drop, other taxes would have to be raised, or budgets would need to be cut.

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<sup>3</sup> 2008 "The Effects of Aquatic Invasive Species on Property Values", Horsch, Lewis University of Wisconsin, Madison

## Fisheries Impact

The decline of game fish due to Zebra mussel and Spiny waterflea infestation should not come to a surprise when one understands the effect that filter and predatory feeding have on a lake ecosystem. In a balanced ecosystem the native Zooplankton are a critical part of the food web for game fish and forage fish. Lake Mille Lacs (a historical natural walleye producer) had Zebra mussels detected in 2005 and Spiny waterfleas in 2009. In a study by the Minnesota DNR covering 2006-2013, a 60% decline in zooplankton biomass was documented<sup>4</sup>. During the same period a dramatic rise in densities of these two AIS were detected. In 2015, the DNR closed the walleye season as the native walleye population had dropped dramatically.



The impact of Zebra mussel infestation on game fisheries has been predicted by other credible research. In a presentation at the Wisconsin Association of Lakes, noted Russian researchers Karatayev and Burlakova presented a summary of extensive research in the Baltic<sup>5</sup> (where the AIS originated) and in the US on the impact of Zebra mussels. They warned: *"Within decades your lakes with Zebra mussels will lose their game fish population and the fishery will consist of Snakehead; Round Goby; and Carp that eat Zebra mussels."*

In a synthesis of published studies "...there is little debate that the recovery of these pelagic planktivores and their predators, and the multimillion dollar fishery, is severely inhibited by the dreissenid-induced declines in zooplankton and the collapse of Diporeia".<sup>6</sup>

One has to When the game fish have declined, so will the fishing tourists.

<sup>4</sup> "Zooplankton Community Changes in Mille Lacs Lake, Minnesota after Zebra Mussel and Spiny Waterflea Infestations" J.Hirsch, D.Staples, Minnesota DNR

<sup>5</sup> "The Effects of Dreissena Polymorpha (Pallas) Invasion on Aquatic Communities in Eastern Europe" Karatayev, Burlakova, Journal of Shellfish Research Vol.16, No.1

<sup>6</sup> "What a difference a species makes: a meta-analysis of dreissenid mussel impacts on freshwater ecosystems", Higgins and Vander Zanden, Ecological Monographs, 80(2), 2010

## Cost of Management

*"The cost of AIS prevention is a fraction of the cost of management" Dick Osgood, CLM*

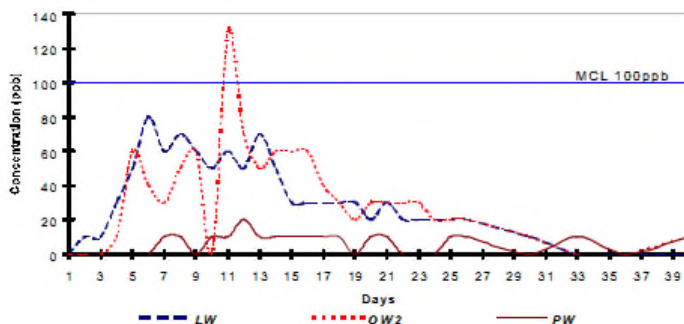
Once an AIS has infested a lake, it is too late for prevention. The focus then turns to management. Unfortunately, when it comes to Aquatic Invasive Animals (e.g. Zebra mussels, Spiny waterflea) management is usually not an option. Management of invasive aquatic plants is typically more common, and this has become extremely expensive. This is due to the fact that "invasive" plants out-compete native plants for territory, grow rapidly, and expand their coverage. Few if any lakes eradicate AIS and so there is an ongoing expense of AIS management treatments. In fact 6 lake associations spend over 1 million dollars annually just in an ongoing effort to try to control AIS (e.g. Eurasian watermilfoil).

- Lake Minnetonka has a \$400K+ budget annually
- Medicine Lake \$300,000 for CLP (2 years)
- Bay Lake Association \$120,000/year
- Mission Lake Association \$70,000/year
- Lake Washington, Meeker Cty \$60,000/year
- Beaver Dam Lake District \$150,000/year and 27 homes for sale
- Upper/Lower Clam Lake \$50,000/year + 2 harvesters

The other reason that treatments are expensive is the cost of planning and herbicides. This involves plant surveys, management plans, and finally application (@ \$600 per acre or more). Harvesters unfortunately fragment the plants and succeed in just "mowing the lawn". In one study that was done in Michigan, they found that Endothall (2,4-D) leached into test wells adjacent to the lake after treatment was performed<sup>7</sup>.



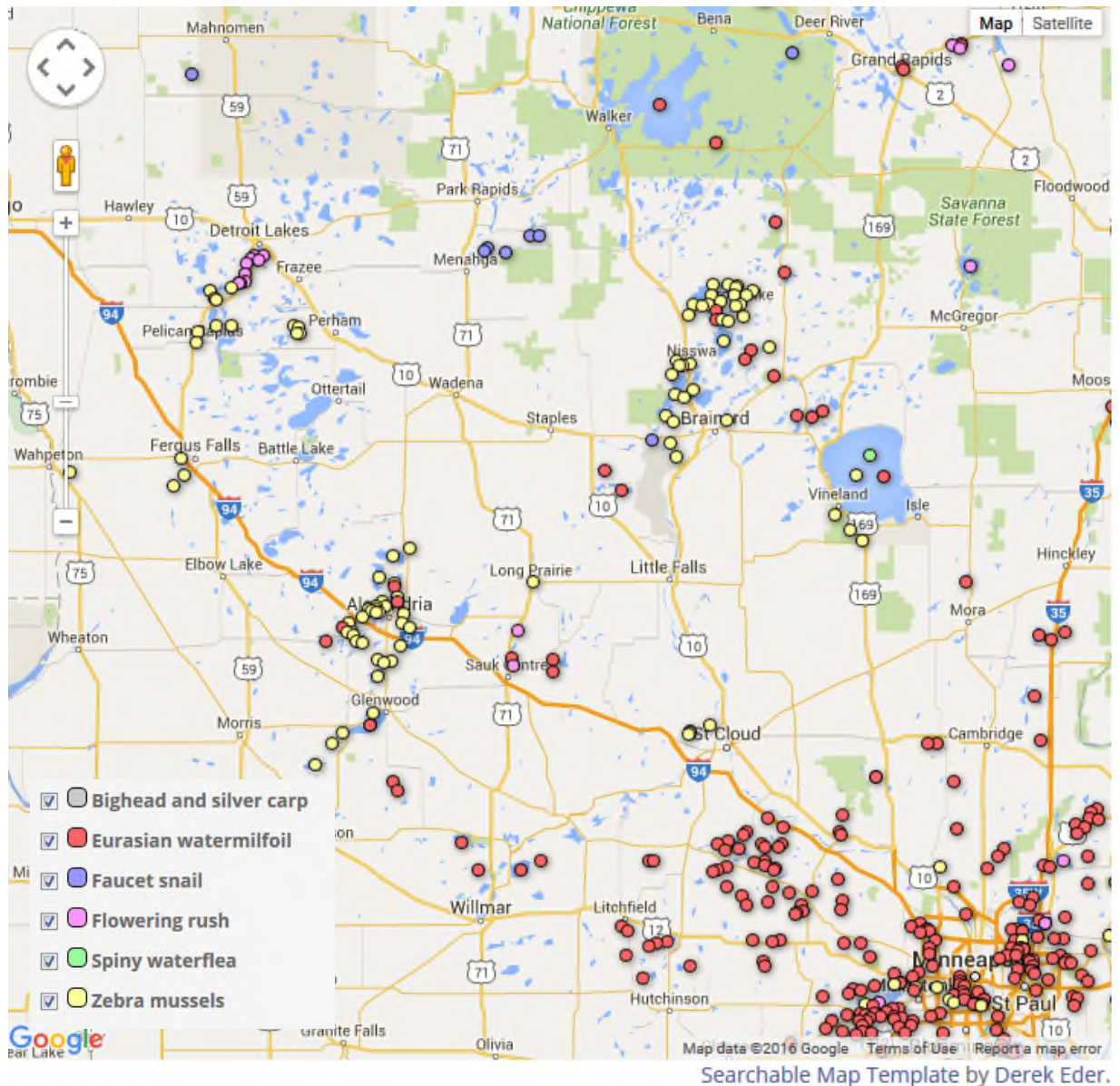
Figure 3: Endothall Concentration versus Sample Day



<sup>7</sup> "Migration of Aquatically Applied Herbicides From Surface Water to Ground Water", 4/19/99 Lovato, Fisher, Brown, Michigan Dept. Environmental Quality

## AIS Is Spreading

Prevention efforts for decades have focused on in-person inspections and boater education. Due to this most boaters will want to do the right thing and make sure their boats are free of attached plants or animals. Unfortunately, this alone has not been adequate as there has been a steady increase in the number of lakes that are infested with AIS in Minnesota and Wisconsin. With a 40% increase last in 2015 with the number of new lakes infested with AIS, there are now 522 lakes in Minnesota with some form of AIS.



The Alexandria area in particular was hard hit over the past few years with Zebra mussels spreading rapidly between their lakes. In the absence of an effective AIS prevention program this is what a regional area might expect could happen.



## AIS Prevention Solutions

There are over 2500 daylight hours at each of Minnesota's 3000 boat launches. The challenge is how to cover the launches with a reminder to boaters to clean off. Deploying inspectors there for that entire length of time is not economically feasible or desirable. An effective AIS program can be comprised of a number of techniques.

| Prevention Technique                 | Advantages   | Disadvantages   | Cost  |
|--------------------------------------|--|---|---|
| Billboards                           | Easy to deploy.  | Has not been effective. Boaters ignore. Not measurable results.   | ~\$3000 per month   |
| Inspectors                           | Engagement of boater by person. Can see if there are plants upon inspection. Can call a officer.   | Coverage at launch limited. Costly. Boaters don't want to be inconvenienced. Thorough inspection? Liability?            | \$16/hour + supervision / scheduling. \$50000+ for all daylight hours for one launch. |
| Inspection Cameras / Audio reminders | Near 24x7 coverage. Captures every launch to website to measure whether boaters have cleaned. Enables remote review of boats condition. Audio reminder to boaters. | Boaters may not always demonstrate awareness of camera. Review process takes some coordination amongst people involved. | \$7500 initial capital cost + \$0.75 / hour to operate thereafter.                    |
| Sheriff onsite                       | Consequence can be immediately issued if a boater violates.  | Not practical to do at every launch.  | Very expensive.   |
| Decontamination System               | Effective in cleaning a boat that has come from an infested water.   | Incenting boaters to take the time to have their boat cleaned.  | \$25,000 + operational costs  |
| Reminder signs                       | Memorable. Inexpensive. Easily deployed.   | Doesn't ensure boater takes action.   | Inexpensive   |
| School programs                      | Plant seeds with the youth for the future, create awareness with adults being influenced.  | Adult fishermen do not fish with their kids all the time and that is the issue currently.                               | Not expensive.  |
| Articles                             | Reaches broad audience   | Its not there at the point of use necessarily.  | ?   |
| Electronic tagging                   | Marks every boat that leaves an infested body of water. Can alert a boater if they haven't been decontaminated yet.  | Need to incent boaters to place stickers on boats. Need to have sensors at many of the lakes to implement.              | Initial capital cost with low ongoing cost.   |
| Reward boaters for cleanoffs         | Positive reinforcement   | Need to know which boaters cleaned off.   | \$10 gift cert per cleanoff   |
| Penalty for violation                | Consequence for an illegal launch into a lake.   | Knowing which boaters had a violation.  | Cost to review all videos. Followup with enforcement.                                 |

## 2014 Ottetail Lake I-LIDS - AIS Prevention Project

In 2014, the Ottetail Lake Association in coordination with the Ottetail County AIS taskforce, decided to test the usage of automated cameras (I-LIDS) on two launches on Ottetail Lake.

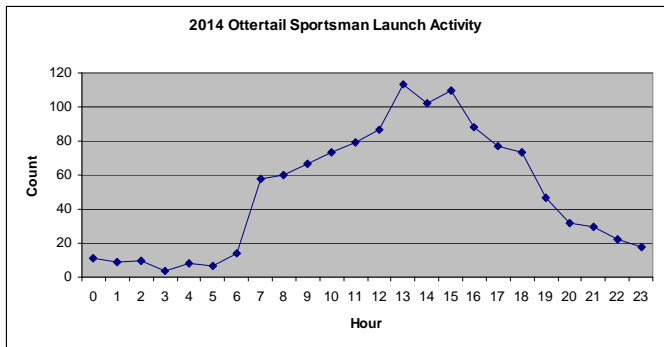
The goals of the project were to:

- Increase educational and inspection coverage
- Modify boater behaviors with audio / inspection presence
- Identify AIS violations

The success criteria were capturing clear boat launches with video that would be networked using 3G/4G cellular networks.

The 2 year project involved the redesign of the existing I-LIDS system to work over cellular networks. While there were some technical issues with the network provider these were worked out and the I-LIDS captured over 4000 high resolution videos that were made available on the website for review within an hour. Thousands of audio reminders were made to boaters on the two launches. Over 2 years there was only one boater seen launching a plant into the lake on 9/17/14. This suspect violation was provided to the MN DNR Conservation Officer who followed up with the individual and gave them a written warning with a suggestion that next time there would be a citation. In 2015 there were no suspect AIS violations seen.

Much insight into the trends of activity at the boat launch was gained from the automated system which could be used for scheduling inspectors at peak periods.



Positive observations about boater behavior as a result of the camera and audio presence were seen such as the boater pulling the plug on his boat and showing the camera.

More detail on this project can be found in the 2014-report-Ottetail from Environmental Sentry Protection, LLC.

## **Resources Available for Prevention Efforts**

The Minnesota Legislature has made \$10 million dollars in aid available to counties for AIS prevention. The funding comes from the Department of Revenue directly to the Counties.

Funding to counties is apportioned by the number of public launches and parking spaces in their county. Currently the Counties are developing comprehensive AIS prevention programs to stop the spread of AIS now with the support of committed individuals on AIS committees who have been involved on the front lines of this fight. There are other funding sources such as the Initiative Foundation who has been given funding from the Legacy Amendment to match contributions from other organizations in preventative steps.

The AIS prevention funding to the counties has support from a broad base of entities including the DNR, Association of Minnesota Counties, Governor Dayton, and those congressmen elected from the lake districts. When a bill was introduced in 2014 from a congressman to do away with this funding, the response from the support base was swift. There were 3000 emails in 2 days generated to representatives in the house in support of keeping the funding to the counties. The bill was moved to an informational hearing and based on the lack of support from anyone besides this congressman, it was dead.

The MN DNR has now removed any available funding for management of AIS. Therefore the regions have to choose if they will do prevention or wait for the more expensive option of management for which there are limited funds available.

### **Important Questions to consider:**

- **If we contain AIS in the few identified lakes within the county now, how much could be saved later on management?**
- **Which capital investments that could be made now in the fight against AIS would continue to provide benefit in the future?**
- **What is the best blend of prevention solutions that we can deploy now?**
- **What happens if there is a rapid increase in homes for sale on lakes due to AIS?**
- **How would a 13% decrease in our lake tax base affect the county budget?**
- **How important is tourism to the local economy and what happens to the revenue if our fisheries become impacted?**