

Prevention Strategies to Reduce Risk

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Prevention Strategies to Reduce Risk of Aquatic Invasive Species Infestation

Lake managers understand that Aquatic Invasive Species (AIS) are harmful for lakes. Unfortunately, there still exists an educational and compliance gap and the spread of AIS continues. We have investigated the habits of boaters and found a significant percentage transport AIS, but more importantly, we have demonstrated a cost-effective prevention strategy for AIS.

The AIS rogues gallery in the northern lakes area of Minnesota and Wisconsin most often includes Eurasian watermilfoil, curlyleaf pondweed, zebra mussels, quagga mussels, spiny water flea, and other nasty plants, animals, and viruses.

In 1987, Eurasian watermilfoil was first discovered in Lake Minnetonka (MN), which is a mesotrophic to eutrophic lake with 132 miles of shoreline. In the past 20 years it has spread to every bay on this heavily trafficked lake. Growing in depths up to 35 feet at a rate of two inches per day, it overtakes native vegetation and forms heavy mats at the surface. Management includes private and organized control treatments, and a public harvesting program costing over \$300,000 each year. Besides removing diversity in native aquatics needed for healthy fisheries, milfoil has choked off bays, ruined engines by clogging water intakes, and was responsible for a drowning. Eurasian watermilfoil has “trampolined” to over 190 lakes in Minnesota to date and continues to spread.

Zebra mussels are a more recent occurrence in Minnesota. Their



Figure 1. Milfoil on Grays Bay, Lake Minnetonka, Minnesota.

propagation upstream in the Mississippi and St. Croix rivers have created over 50 boat launches from which watercraft can potentially transport to inland lakes. A study performed in Michigan showed the primary vector of zebra mussel introduction was by boats carrying aquatic vegetation with mature mussels attached. The long-term impacts for a lake with zebra mussels are devastating. They reproduce rapidly, they are razor sharp, cling to any surface, clog water intakes, and they have caused tens of millions of dollars in damage annually in the Great Lakes. There is no control for zebra mussels in inland lakes and rivers.

Because the cost of management is usually high and the prospect for eradication is low, preventing

introductions in the first place ought to receive the highest priority.

Many individuals are well-intentioned in inspecting and cleaning their boats; unfortunately, statistics show that on average 14-17 percent of boaters in Minnesota and Wisconsin are leaving boat launches with aquatic weeds attached to their trailer or boat. Relying on “highway clean-off” is not an acceptable method in Minnesota, where the law holds that it is illegal to transport aquatic macrophytes on public roads. It’s also an ineffective approach for boaters. The Minnesota DNR noted that the number of boats bringing aquatics to the launch increased from 0.7 percent to 1.2 percent in 2006. In Wisconsin, **Clean Boats Clean Waters** volunteers identified five

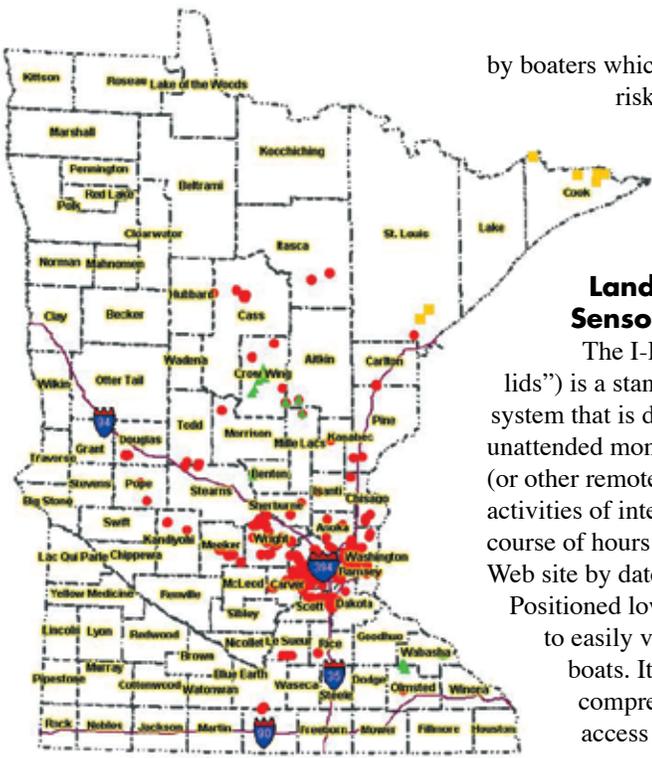


Figure 2. Spread of Eurasian watermilfoil (red) and zebra mussels (green) in Minnesota.

percent of the boats coming to the launch with attached aquatics.

The Lake Minnetonka Conservation District is concerned about boaters introducing new AIS to the lake. At a cost of over \$25,000 annually, DNR interns are hired to staff and inspect heavily used public launches. While this effort addresses peak use times, this leaves many usage hours at the 11 public boat landings unstaffed. Recognizing this need to continually educate and monitor boat launches, Environmental Sentry Protection, LLC developed a tool that could provide this ongoing diligence needed to protect lakes through education, monitoring, and information gathering.

A New Tool to Help Prevent AIS Introductions

In June of 2006, the Lake Minnetonka Conservation District (LMCD) approved a grant for a demonstration project to explore new methods and strategies to prevent zebra mussels and other AIS from being introduced to Lake Minnetonka by using an automated boat inspection system at a heavily used public boat launch, Grays Bay. The main goal of the study was to determine how video inspection of boats prior to launch may affect boat and trailer clean off activities

by boaters which would reduce the risk of additional aquatic invasive species being introduced to the lake.

The Internet Landing Installed Device Sensor (I-LIDS)

The I-LIDS (pronounced “eye-lids”) is a stand-alone video capture system that is designed to provide unattended monitoring of boat launches (or other remote locations) and capture activities of interest that occur over the course of hours or days onto a searchable Web site by date, time, and venue.

Positioned low to the ground, it is able to easily view below trailers and boats. It wirelessly transmits a compressed video to a nearby access point. Solar power removes the need to run power to the system. A circuit board monitoring the earth’s magnetic field can detect activity 20 feet away and shift from low power consumption to operation of devices such as video, LED lighting for night video, and playback of educational messages.

A digital video camera detects motion and captures video for a preset duration. The I-LIDS uploads these “transactions” to a server along with launch name, date, and time information. A backend server program looks for new transactions and parses meta-data into searchable fields for the Web site and database. By capturing only events when there is motion at the launch, and limiting time of capture (e.g., 15-20-second videos) users can efficiently review and find events of interest. Use of pier footings, stainless steel housing, bullet proof glass, and keyed access for authorized users deters vandalism.

Over 1,500 30-second pre-launch video sequences from August 14 through October 6, 2006 were collected at Grays Bay, Lake Minnetonka. Video monitoring from August 10 through September 5 was done without posted signage. On September 6, two signs were posted at the launch to alert users that boats were being video inspected and that they were required by law to inspect and clean their boats/trailers prior to launch. This provided an opportunity to compare boat clean-offs before and after signage

was posted at the boat launch. With the camera positioned 18 inches above the ground, we observed aquatic plants hanging on boats, trailers, and axles. Video captures showed license plate, registration numbers, and inspection/clean-off activities of boaters (or lack thereof). Storing images on an Internet-accessible Web site created an ongoing history of launch activity available immediately to authorized participants in the project.

Initial Results

The percentage of boats launching with weeds dropped dramatically after the posting of video monitoring signage. Launching boats with attached vegetation dropped from 7.4 percent to 1.8 percent when comparing pre-signage to post-signage periods at Grays Bay. On July 15, a third of the boat trailers in the Grays Bay parking lot had aquatics dangling from their trailer. On September 6, a similar walkthrough of the parking lot revealed not one trailer with weeds on it.



Figure 3. I-LIDS Automated Launch Inspection System.



Figure 4. Sign posted at Lake 26, Burnett County Wisconsin.



Figure 5. I-LIDS inspecting boat for AIS at Grays Bay, Lake Minnetonka.

The percentage of boaters inspecting their boats or slowing for camera inspection increased after posting of video monitoring signage. It was observed that boaters seemed to inspect more carefully or rely on slowing their boat/trailer while proceeding past the I-LIDS to confirm they had cleaned their craft. Before signage was posted it was observed that 3.17 percent of boaters performed inspection. After posting signage, 13.4 percent inspected or relied on camera for inspection.

Boaters tended to focus on cleaning off and inspecting boats after pullout vs. before launch. DNR procedures focus on interns advising boaters to clean after pullout. People are just in a hurry to get in the water once at the lake. The issue is that some boaters are not cleaning off at other lakes and are unknowingly or indifferently launching attached vegetation as seen on video captures. The presence of a spray-off facility presents an

attraction for boaters to clean their boats at Grays Bay.

The boating public accepted or endorsed video boat inspection. During the course of working on the I-LIDS unit, there were over 100 people who would approach and ask “What is that thing?”, referring to the I-LIDS. The consistent response was that it was a demonstration project to perform video inspection of boats and trailers in an effort to understand if people are cleaning aquatics off of their boats prior to launch with a long term goal of keeping zebra mussels out of Lake Minnetonka. Most of the feedback was quite positive with “Great idea!”, “Good to see something is being done”, and “Wow, I hope you can keep them out.”

There is a significant gap in launch coverage when boaters are not being reviewed in person for clean-off compliance. The I-LIDS showed heavy usage of the Grays Bay boat launch occurring on weekends starting at 4:15 a.m. and continuing to after midnight. The existing monitoring program had about 1,996 hours of documented coverage between 9:00 a.m. and 7:00 p.m. on Fridays, Saturdays, and Sundays. The total demand for launch monitoring for 11 Lake Minnetonka launches for six months of usage is 39,600 hours. Only five percent of these potential usage hours were staffed at launches in 2006, which presents a significant opportunity for boaters to introduce AIS into the lake.

Enforcement

In 2005 the Minnesota DNR reports that there were a total of five citations issued to boaters violating AIS laws in the state. During the course of 20 days we saw 14 potential violations at one launch, on one lake! It is clear from the behavior in the videos that AIS clean-off needs to be elevated as a priority for all boaters. Boaters who were stopped carrying weeds claimed ignorance of the need to clean off their boats. There were also those that said it did not matter.

Minnesota's AIS Enforcement Conservation Officer captured it best when at a recent meeting he shared,

"There are three steps in soliciting compliance with the law:

"1. laws must be understood and supported;

"2. there must be an expectation of an enforcement;

"3. then there must be a consequence for a violation."

Project Recommendations

To address the goal of reducing risk of zebra mussel introduction, the following recommendations were made to the LMCD:

1. Develop policies and procedures at the boat launches to ensure that boaters receive consistent messages to inspect, clean, and drain boats not just leaving but entering as well.
2. Identify tools to facilitate clean off compliance by boaters. After all, if we want compliance we have to make it convenient.
3. Convey message to people that violations of AIS clean-off laws will be enforced through conversations, warnings, citations, and posting of citations in publications. Have peace officers/conservation officer presence to enforce violations.
4. Continue and expand usage of I-LIDS automated monitoring and posted signage to close gaps in monitoring coverage.

Based on the results of the study and after reviewing a proposal, the LMCD board voted to expand usage of the I-LIDS at four Lake Minnetonka launches

fulltime in 2007 to complement ongoing DNR intern presence.

Additionally, the Burnett County Lakes and Rivers Association (WI) was given a matching grant by the Wisconsin DNR for a program to implement I-LIDS monitoring at seven boat launches. On Lake Namakagon (WI), two I-LIDS were purchased to fill the void left by not receiving sufficient volunteer support to staff inspectors at the boat launches. In 2007, the I-LIDS will be educating and monitoring at 13 launches across Minnesota and Wisconsin lakes in an effort to stem the spread of Aquatic Invasive Species. Since becoming operational on May 12, 2007 on Lake Minnetonka, initial review of over 4,000 videos reveals only two boat launches with attached vegetation! In addition to launch presence, media attention, and onsite education efforts have clearly raised awareness of AIS among boaters.

Future development goals for the I-LIDS include automated license plate identification, and object recognition for dangling aquatics. Samples of video captures at Grays Bay can be seen at www.environmentalsentry.com.

Reference

- Johnson, Ricciardi, Carlton. 2001. Overland Dispersal of Aquatic Invasive Species: A Risk Assessment of Transient Recreational Boating. Ecological Society of North America.

Eric Lindberg, manages Environmental Sentry Protection, LLC, and has been involved with software development and computer systems networking since 1973. This is predated only by a growing love and mission of stewardship for our lakes and rivers. In his 27-year technology career he has developed software applications using a variety of programming architectures, managed teams of software engineers, and designed and delivered complex projects to meet customer requirements and specifications. For more information, contact Eric at: eric@environmentalsentry.com.



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