

2017

Lake Vermilion

AIS Prevention Plan



Revision Date

4-25-2017

AIS Prevention Priorities at Lake Vermilion

Assessing Our Risks to Prioritize Our Activities

The resources to completely defend Lake Vermilion’s fishery and business community will never be available. We’re committed to deploying the resources we can muster on our highest priority risks as efficiently as we can.

Those high-priority risks have evolved rapidly over the last couple years. In 2016, starry stonewort – a relative newcomer to Minnesota’s AIS roster – was found in 4 new counties and 7 new lakes, including Upper Red, Cass and Winnibigoshish, after its discovery in Lake Koronis in 2015. This grass-like macro algae can produce dense mats, can interfere with recreation, and can alter habitat for young fish. Property values for affected areas of Lake Koronis appear to be significantly depressed according to anecdotal reports, with no buyers stepping forward.

Also in 2016, hybrid watermilfoil made headlines. Little is known about crosses between invasive Eurasian watermilfoil and our native Northern watermilfoil, but anecdotal reports suggest increased invasiveness and evidence of herbicide resistance. In Lake Vermilion, native watermilfoil co-exists with other native vegetation. We have no known Eurasian watermilfoil – an indication our habitat and water chemistry may not be suitable. However, at this point, no one knows whether certain Eurasian x native hybrids may overwhelm our native vegetation.

Starry stonewort and hybrid watermilfoils are major threats and join zebra mussels at the top of Lake Vermilion’s AIS concerns. Our current risk assessment – including what we don’t know – is summarized below:

Species	Introduction Risk	Habitat Suitability	Impact if Population Established	
			Fishery & Ecosystem	Recreational Boating
Zebra mussels	Very high	Unknown. Limited to calcium hotspots?	Serious stressor. Filters zooplankton, limiting growth of fry.	Negative but water clarity appeals to some
Starry stonewort	Moderate & increasing	Unknown. Limited to specific bays?	Serious stressor. Unknown impact on each fishery.	Severe in bays with suitable habitat
Hybrid and Eurasian watermilfoil	High	Unknown. Limited to specific bays?	Serious stressor. Unknown impact on each fishery.	Severe in bays with suitable habitat
Spiny waterfleas	Found in Big Bay in 2015	High. Likely to spread beyond east basin.	Serious stressor. Consume zooplankton, limiting growth of fry.	Low
Curly-leaf pondweed	Present in 3 small areas.	Moderate/high in specific bays	Limited to specific bays with suitable habitat.	May become severe in bays with suitable habitat.
Rusty crayfish	Present in east basin and west to Niles Bay	High for sandy, rocky, rubble bottoms	Weed bed destruction impacting several fish species	Low to moderate

In addition to the priority threats in the table above, Lake Vermilion is surrounded by a host of other AIS threats which we continually monitor. Examples include quagga mussel, Brazilian waterweed, brittle naiad, and water hyacinth.

Our Resulting Priorities in 2017

#1. Prevent new AIS infestations, especially zebra mussels, starry stonewort, and hybrid watermilfoil.

- **Public Access, Resort, Marina & Campground Inspection and Education.** *Expand significantly our inspection and education activities at all launch sites, both public and private.*
- **Boat Cleaning Capability.** *Partner with private businesses to offer boat cleaning at centralized locations. Develop the communications and publicity support to bring boaters to these centralized cleaning stations on their way to and from Lake Vermilion. In future years, develop low-cost solutions for cleaning and draining boats and equipment at remote resorts, marinas and campgrounds.*
- **Habitat Evaluation and Risk Assessment.** *To prioritize and focus resources, continue to refine our understanding of Lake Vermilion's risk level for all new and existing threats.*
- **Public Awareness and Education.** *Expand significantly our public awareness and education activities, especially among boaters intending to launch watercraft at Lake Vermilion.*
- **Regional and Statewide Partnership Development and Sharing.** *Expand significantly our partner recruitment, education and sharing among counties, lake associations and local Lake Vermilion stakeholders, including local government units, tribal governments, businesses and civic organizations.*

#2. Detect any new infestations early, when AIS control options are most effective.

- **Invasive Vegetation Early Detection.** *Accelerate the multi-year "early-detection" survey of all littoral waters at Lake Vermilion, looking primarily for curly-leaf pondweed "escapes" and for undetected Eurasian watermilfoil, watermilfoil hybrids, starry stonewort, and curly-leaf infestations. Train volunteers to monitor highest risk launch sites frequently for new invasive vegetation.*
- **Zebra Mussel Early Detection.** *Continue to deploy adult zebra mussel samplers at high-calcium, high-traffic dock sites in the east basin. Continue periodic water sample collection and analysis to detect zebra mussel veligers.*

2017 AIS Prevention Plan Project and Activity List

☑ = 2017 Priority Activity

↑ = New or Significantly Expanded in 2017

1. Watercraft Inspection and Cleaning Project

- 1.1 Public Access Inspection and Education ☑
- 1.2 Resort, Marina & Campground Inspection and Education ☑↑
- 1.3 Resort & Campground Educational Materials ☑↑
- 1.4 Fishing Tournament Inspection and Education ☑↑
- 1.5 Advanced Inspector Training ☑↑
- 1.6 Boat Cleaning Stations ☑↑
- 1.7 Highway Signage Enhancements for Boat Cleaning Stations ☑↑
- 1.8 Watercraft Traffic Analysis and Staffing Optimization ☑

2. Public Awareness and Education Project

- 2.1 Newspapers and Newsletters ☑
- 2.2 Events and Shows ☑
- 2.3 Youth Summer Camp and K-12 Education ↑
- 2.4 Restaurants and Local Business ☑
- 2.5 Social Media and Website ☑

3. Early Detection, Rapid Response and Population Management Project

- 3.1 Habitat Evaluation and Risk Assessment ☑↑
- 3.2 Comprehensive Full-Lake Invasive Vegetation Detection ☑↑
- 3.3 Early Detection Monitoring for High-Risk Invasive Vegetation ☑↑
- 3.4 Zebra Mussel Veliger Sampling ☑
- 3.5 Zebra Mussel Adult Sampler ☑
- 3.6 Boater Early Detection Sample Kits ☑↑
- 3.7 Curly-Leaf Pondweed Control
- 3.8 Rapid Response Readiness ↑

4. Regional and Statewide Partnership Development Project

- 4.1 Lake Vermilion Stakeholder Information Sharing and Involvement ☑
- 4.2 Statewide Information Sharing and Involvement ☑↑

2017 AIS Prevention Plan Project Descriptions

1. Watercraft Inspection and Cleaning Project

Today, prevention of AIS infestations via boat inspection, boat cleaning, and public education remains our best bet. Population control is very expensive. Eradication is generally not possible.

In 2016, the Vermilion Lake Association partnered with North St Louis SWCD to significantly expand inspections at Lake Vermilion's 16 public accesses from about 700 hours in the prior year to 5688 hours. The partnership inspected 12,539 boats, including 6,755 (40%) of the estimated 16,700 which launch annually at Vermilion.

While 40% is a significant achievement in our inaugural year, even more is needed. In 2016, the VLA and SWCD partnership conducted a pilot project at three resorts and one marina to understand the best way for resorts to inspect incoming boats while continuing to provide the highest level of customer service. The partnership also worked with 1854 Treaty Authority to inspect and clean boats at Fortune Bay during the Walleye Classic fishing tournament.

These two 2016 pilots paved the way for extending boat inspections beyond public accesses to private resorts, campgrounds, marinas, and fishing tournaments in 2017. While less than one-quarter of incoming boats – about 3600 – enter Lake Vermilion through these pathways, they represent a disproportionate risk, as many come from out-of-state or are avid fishermen who have visited infested lakes in recent weeks.

In 2017, the Vermilion Lake Association, in partnership with North St Louis SWCD, plans 7,250 “Level-1” inspection hours at Vermilion’s public and private accesses to achieve 50% incoming coverage in the table below:

Location Staffed	2017				2016 Reference		
	Inspector Hours	Inspection Target	Efficiency Target	Coverage Target	Inspector Hours	Inspection Actual	Efficiency Actual
Public Access	6,250	13,000 total, 6,750 entering	>2.0 per hour	>50% of boats entering	5,688 (includes resort pilot)	12,539 total, 6,755 entering (includes resort pilot)	2.2 per hour total
Resort Campground	1,000	1,800 total, 1,600 entering	>1.8 per hour	>50% of boats entering			

In 2016, the Vermilion Lake Association partnered with North St Louis SWCD to staff two centrally located boat cleaning stations, one on each end of Lake Vermilion. The Y Store (Tower) and Country Store (Cook) cleaning stations together decontaminated 240 boats and trailers, more than double the number anticipated. This “instant success” was the direct result of the cleaning stations being perfectly located on traffic arteries at popular convenience store parking lots and the strong commitment of the private business owners to AIS prevention.

While 240 is a great number, we are never satisfied and will target 400 in 2017, a 66% increase. We will achieve this increase with additional hours (35%) and significantly improved on-site signage, highway signage, and marketing.

In 2017, the Vermilion Lake Association, in partnership with North St Louis SWCD, plans 1,750 “Level-2” inspection hours at Vermilion’s two boat cleaning stations, as described in the table below:

Location Staffed	2017			2016 Reference		
	Inspector Hours	Inspection Target	Efficiency Target	Inspector Hours	Inspection Actual	Efficiency Actual
Boat Cleaning Stations	1,750 (open 875 hours)	400 decons	>0.45 per hour open	1,291 (open 645 hours)	240 decons	0.37 per hour open

Several additional projects complement the boat inspection and boat cleaning station activities. Expanded educational materials for resort guests, fishing tournament inspection coverage, 2-day advanced inspector training to follow the half-day basic DNR class, and advanced boat traffic analysis to guide inspector deployment are important elements of success.

Watercraft Inspection and Cleaning Project activities are summarized below:

1.1 Public Access Inspection and Education.

Summary: Partner with North St Louis SWCD to provide 6,250 hours of Level 1 inspectors at selected public accesses. Educate boat operators to self-inspect and to clean, drain and dry their equipment. Goal 13,000 total inspections and 50% coverage of boats entering Vermilion at public accesses. Measurements, analysis, and oversight.

1.2 Resort, Marina & Campground Inspection and Education.

Summary: Partner with North St Louis SWCD to provide 1,000 hours of Level 1 inspectors at 11 selected resort, marina and campground accesses. Educate boat operators to self-inspect and to clean, drain and dry their equipment. Where possible, train on-site personnel as Level 1 inspectors to strive for 24/7 coverage. Goal 1,800 total inspections and 50% coverage of boats entering Vermilion at private accesses (80% coverage for boats entering at participating resorts).

1.3 Resort & Campground Educational Materials.

Summary: Support resort and campground partners with AIS information and educational materials for their clients. Develop AIS identification materials tailored to the resort environment. May include a 3-ring binder with high-res pictures of native and invasive vegetation and invertebrates. Pre-visit informational materials and mailings, including recommended stop at boat cleaning station prior to arrival. Special training for dock attendants and resort owners. Possible AIS class and field trip for guest's children.

1.4 Fishing Tournament Inspection and Education.

Summary: Partner with North St Louis SWCD, 1854 Treaty Authority, and Fortune Bay Marina to inspect boats during pre-fishing and tournament days. Use Level 1 inspectors from North St Louis SWCD, trained 1854 inspectors, and Landa decontamination units, when available. Educate boat operators to self-inspect and to clean, drain and dry their equipment. Target: 90% coverage for all tournament participants entering Vermilion.

1.5 Advanced Inspector Training.

Summary: Partner with Burntside Lake Association and North St Louis SWCD to provide enhanced training for Level 1 and Level 2 inspectors. Based on the outstanding program pioneered in Cass County, develop a 2-day advanced education and training package for inspectors at Vermilion's public accesses who have already completed the required DNR half-day Level 1 training. Focus on AIS biology and habitat, AIS identification, advanced boat operator training concepts, customer relations and communication, when to call a CO, etc. Conduct classroom and field sessions in the spring and, as needed, during the summer. Develop a "refresher" class for new mid-season info and for subsequent years.

1.6 Boat Cleaning Stations.

Summary: Partner with North St Louis SWCD to provide 1,750 hours of Level 2 inspectors at the Country Store (Cook) and the Y Store (Tower) boat cleaning stations. Operate two Landa decontamination units. Offer courtesy cleaning, pre-emptive cleaning for boats heading to Vermilion accesses, and corrective decontamination for boats denied entry. Educate boat operators to self-inspect and to clean, drain and dry their equipment. Select hours of operation based on traffic patterns, aiming for 400 total cleanings, 66% increase over 2016. Significant marketing campaign to boost cleanings per hour open.

1.7 Highway Signage Enhancements for Cleaning Stations.

Summary: Support the centralized Boat Cleaning Project with enhanced highway signage in the "last mile." Partner with Wildlife Forever. Work with MnDOT to allow temporary (seasonal) signage on the right-of-way (ROW) in the last couple miles before each boat cleaning station. Consider "Burma-Shave" style signage coordinated with marketing campaign. Supplement with semi-permanent signage or possibly leased billboard off the ROW. Goal is to inform boaters who otherwise were not planning to stop at the convenience store. Concept development plus signage expenses.

1.8 Watercraft Traffic Analysis and Staffing Optimization.

Summary: Analyze all available ramp traffic data collected at public and private accesses by both the inspector surveys and unstaffed monitors (e.g., TRAFx sensors). Develop a usage model to fill in the time and spatial gaps where data is weak. Combine with risk-of-establishment data to optimize equipment and inspector deployment. Test promising ideas to reduce cost-per-boat, increase percentage of boats inspected before launch, provide increased focus on high-risk boats (i.e., last lake, dry time, style of boat), and improve inspection/cleaning quality. Actively seek proven ideas from other lakes or counties and adapt to Lake Vermilion situation. Involves concept and tool development, analyst support.

2. Public Awareness and Education Project

Launch-site education activities (Project 1) are tailored to a specific audience and focused on Lake Vermilion's most significant AIS risks. We propose to complement that work with an awareness and education package – still focused on Lake Vermilion's risks – but aimed at the general public in their daily life.

The campaign will be local, emphasizing the region within 50 miles of Lake Vermilion.

- Display ads and feature articles in the *Cook News-Herald*, the *Tower News*, and the *Timberjay* (Tower edition) complementing the county-wide ads by Wildlife Forever.
- AIS content in the VLA quarterly newsletter, which is offered free to resort guests and in local businesses.
- AIS information booth at local fairs, carnivals, parades, and similar events.

The campaign will seek out tourists when they visit local businesses.

- Lake service providers, such as resorts, campgrounds, marinas, boat dealers.
- Grocery stores, cafes and restaurants catering to lake visitors.

The campaign will seek out the tech-savvy younger generation, a group hard to reach with traditional media.

- A dedicated Lake Vermilion AIS Facebook page. Practical ideas and news without the preaching.
- A significant increase in the AIS content of the VLA Facebook page and website, with AIS news and practical videos on boat cleaning and AIS identification.
- Youth summer camp (e.g., Camp Vermilion) or K-12 school AIS projects. Combination of AIS class room projects and field projects that train and inspire our next generation.
- Smartphone AIS messaging at selected locations near Lake Vermilion.

All Public Awareness and Education activities and expenses are summarized below:

2.1 Newspapers and Newsletters.

Summary: Informational articles in local newspapers and VLA newsletter to increase public awareness of AIS threats and prevention activities at Lake Vermilion. Complement AIS info and display ads from Wildlife Forever. News releases to *Cook News-Herald*, *Tower News*, the *Timberjay*, and, at times, the *Mesabi News* and *Hometown Focus*. Feature articles for same. Track column inches. Display ads, especially for AIS milestone announcements and “thank you” to partners and donors. Regular AIS presence in VLA newsletter, which is offered free to resort guests and in local business establishments catering to lake visitors.

2.2 Events and Shows.

Summary: Staff AIS information tables at local fairs, carnivals, parades, and similar events. Examples: Cook Timber Days, Mountain Iron EarthFest, Tower Harbor Days. Coordinate with info tables by Sea Grant et al. Develop AIS pamphlets and other handouts. Utilize 10x10 EZ-Up canopy when outdoors. Organize event staffing.

2.3 Youth Summer Camp and K-12 Education.

Summary: Partner with a summer youth camp (e.g., Camp Vermilion) or K-12 schools on youth AIS projects. Combination of AIS class room projects and field projects that train and inspire our next generation. For summer camps, program could be repeated several times during the summer and tailored to various age groups. In some cases, field trips may involve actual AIS monitoring/control (e.g., removal of Chinese mystery snails from shallow shorelines). Curriculum development, materials and school support staff.

2.4 Restaurants and Local Businesses.

Summary: Provide informational AIS materials and assistance to local businesses. Emphasis on those catering to lake visitors. Reutilize materials created for local fairs. Create special-purpose materials (e.g., placemats, bar coasters) unique to a business segment. Provide display racks. Work with business owners to determine what's working.

2.5 Social Media and Website.

Summary: Maintain up-to-date AIS information on the VLA website and two Facebook pages to increase public awareness of AIS threats and prevention activities. Focus on reaching the tech-savvy younger generation. Provide dedicated landing pages where appropriate. Focus on outreach to potential AIS volunteers. Utilize Google Analytics and other tools to understand what's working. Content development and hosting by WA Fisher (Virginia).

3. Early Detection, Rapid Response, and Population Management Project

If a new invasive were to evade our inspection and boat-cleaning firewall, we rely on early detection to give us the best chance of eradication or control. With starry stonewort and hybrid watermilfoil in the headlines in 2016, we plan two new early detection initiatives at Lake Vermilion.

First, we plan to accelerate the vegetation survey of all remaining littoral waters to locate undetected existing and new vegetation infestations as quickly as possible. This effort began as a multi-year project in 2016 with an initial emphasis on locating any curly-leaf pondweed which might have escaped from our small Everett and Stuntz Bay infestations. We can no longer afford the time and must complete the remaining 70% of this critical early-detection survey in 2017.

Second, we plan to begin bi-weekly monitoring our 10 highest risk habitats – usually busy boat accesses with vegetation-friendly water depth and bottom structure. Trained volunteers will become familiar with “their” location to reliably recognize changes which could signal a new invader.

We will increase our activities in certain areas:

- Habitat assessment work to select the high-risk locations for our vegetation volunteers and to identify high-risk species for all our AIS work.
- Sample collection kits to involve recreational boater and fishermen in the early detection of new AIS infestations and mapping of existing infestations.
- Stand-by threat-by-threat rapid response plan for Lake Vermilion to guide our actions during the first 30 days.

We will continue other ongoing initiatives:

- Sample collection via 65-micron plankton nets to search for zebra mussel veligers in East Two River from the Tower Harbor downstream to Pike Bay.
- Water sample collection along Vermilion's eastern shore to obtain a second year of data on possible high-calcium inflows, a zebra mussel habitat concern.
- Deployment of adult zebra mussel samplers by Vermilion Country School students in East Two River from the Tower Harbor downstream to Pike Bay.
- Monitoring small curly-leaf pondweed infestations in Everett and Stuntz Bays and in Wakemup Narrows.

All Early Detection, Rapid Response, and Population Management activities and expenses are summarized below:

3.1 Habitat Evaluation and Risk Assessment.

Summary: For all AIS threats, understand our “risk of establishment” once introduced. Compare Vermilion's habitat (e.g., water chemistry, bottom structure, water temperature, nutrient content, etc) with that of infested lakes and with the preferred and minimum requirements for each species. Evaluate each bay's risk where micro-habitats exist. Include upstream habitats where appropriate. Provide recommendations on resource priorities.

3.2 Comprehensive Full-Lake Invasive Vegetation Early Detection.

Summary: Complete the planned multi-year early-detection survey of all littoral waters at Lake Vermilion which began in 2016 to locate undetected AIS infestations and new vegetation infestations as quickly as possible. Emphasis on starry stonewort, Eurasian & hybrid watermilfoil, and curly-leaf pondweed.

3.3 Early Detection Monitoring for High-Risk Invasive Vegetation.

Summary: Develop a plan to monitor about 10 highest risk habitats and/or launch sites for new invasive vegetation infestations. Initial concept 1 or 2 visits per month by trained volunteer "Sentries" who each will become familiar with their assigned site. Focus on vegetation matched to our water chemistry and habitat. Training for leader could be provided by U of M Extension's "AIS Detectors" surveillance program. Leader would recruit and train 10 volunteer Sentries.

3.4 Zebra Mussel Veliger Sampling.

Summary: Using 65-micron plankton nets, collect water samples at high-risk sites in July and August. Focus on sites where veligers may be introduced from other lakes and sites downstream from locations which could harbor an undiscovered Vermilion adult zebra population. Concentrate and send samples to RMB Labs for analysis.

3.5 Zebra Mussel Adult Sampler Partnership.

Summary: Volunteers work with Vermilion Country School (VCS) to build and deploy stacked-plate samplers off docks at 4-5 busy public and resort ramps. Focus on accesses in high-calcium bays. Recover samplers in October when docks are removed. Analyze samplers for presence of juvenile or adult zebra mussels and any other invasive invertebrates. For VCS, shop project to construct samplers, science project to deploy, analyze and report findings.

3.6 Boater Early Detection Sample Kits.

Summary: Develop and assemble 4000 sample collection kits to involve recreational boaters and fishermen in the early detection of new AIS infestations and mapping of existing infestations. Arrange for inspectors, resorts, and guides to distribute kits free to all boaters. Initial concept: ZipLoc bag with instructions, AIS ID cards, extra ZipLoc bags for sample collection, sample info recording form, etc. Frequently update the kits to match new threats. Arrange for data collection and analysis.

3.7 Curly-Leaf Pondweed Control.

Summary: Develop a management plan to control the expansion and, over time, reduce the infestation area of curly-leaf pondweed on Lake Vermilion. Work with Rich Rezanka et al to stay on top of new control and eradication options. Consider divers for small infestations. Work with contractor as needed to implement controls.

3.8 Rapid Response Readiness.

Summary: Develop a stand-by threat-by-threat rapid response plan for Lake Vermilion to guide our actions during the first 30 days. Update as new threats emerge or rise in priority. Continuously refresh with new tools, contacts, and best practices.

4. Regional and Statewide Partnership Development Project

The Vermilion Lake Association will work statewide to share information and exchange ideas among AIS prevention leaders. We will attend conferences and meetings as a participant and as a presenter, building contacts and partnerships at the county level and statewide.

We will also work closely with nearby lake associations, SWCDs, local government units, lake resorts and businesses, service clubs, the Lake Vermilion Resort Assn, and the Lake Vermilion Guides League to share ideas,

ment partnerships, and encourage community organizations to spread the AIS story through their internal communication channels.

All Regional and Statewide Partnership Development activities and expenses are summarized below:

4.1 Lake Vermilion Stakeholder Info Sharing & Involvement.

Summary: Share AIS information and exchange ideas among nearby lake associations, schools, townships, cities, SWCD, service clubs, LVRA, Guides League, chambers of commerce, etc. Build partnerships to share resources. PowerPoint prep and customization. Estimate 24 collaborative meetings and presentations annually.

4.2 Statewide Information Sharing and Involvement.

Summary: Share information and exchange ideas among AIS prevention leaders statewide Attend statewide conferences and meetings as a participant and as a presenter. Network at the state and county level. Build partnerships to share resources at the "Top 10" county level and statewide. PowerPoint prep and customization. Estimate 12 collaborative meetings and presentations annually. Estimate 3 major conferences annually. Overnight travel.