



An Assessment of the
Threats to Wisconsin's Flowing Waters by Aquatic
Invasive Species of Concern

and

Practical Recommendations for Education, Prevention,
Planning and Management Using Citizen Volunteers
and River Friends Groups

Final Report
Project Number AEPP-164-08

Submitted June 18, 2009



RIVER ALLIANCE
of Wisconsin

Table of Contents

Project Summary

Findings and Accomplishments

Potential Threats Posed by Invasive Species

Roles for Citizens and Volunteer Groups

Willingness and Ability of Groups to Assist

Assisting Groups Meet the Challenges of Invasive Species

Recommendations

The Future

Appendices

- A. Maps of Invasive Species found during the 2008 Project RED Pilot (Sheboygan River, Kickapoo River, Badfish Creek). *Data available upon request.*
- B. Map of groups who the River Alliance of Wisconsin has engaged in the issue of invasive species and are suited to assist in education, planning, prevention, or management activities for the priority species of concern. *Data available upon request.*
- C. Map of the geographic areas covered by River Alliance of Wisconsin's local groups (potential partners in Project RED and other invasive species education, prevention, or management). *Data available upon request.*
- D. Public Presentations, Posters, and Publications *Available upon request*
- E. Project RED Manual
- F. New Zealand Mudsnaill: A threat to Wisconsin's waters
- G. River and Wetland Invasive Plants
- H. Didymo: A threat to Wisconsin's waters

Project Summary

In March 2008, the River Alliance of Wisconsin (River Alliance) with the support from the Wisconsin Department of Natural Resources (Department) sought to assess the threats to Wisconsin's flowing waters by invasive species and to identify practical recommendations for education, prevention, planning and management using citizen volunteers and river friends groups. Through discussions with agency staff, researchers, and local organizations we have learned that citizen volunteers' and river friend groups' roles may vary dramatically by species of concern. Yet, there is much that they can do and should be doing.

Thanks to the support of the Department, the River Alliance has introduced multiple local organizations to the issues of invasive species throughout riparian and riverine ecosystem in Wisconsin, the means in which they can get involved in prevention and control of invasive species, the resources necessary and how they can through these efforts benefit as a small organization.

The most immediate need in addressing the issue of invasive species in our river corridors is monitoring. The River Alliance has established Project RED (riverine early detectors) as a tool to identify where invasive species are and to engage local organizations and citizens throughout the state. With continued support from the Department six Project RED trainings have been scheduled throughout the state. Participants will be provided the tools to monitor their local rivers and streams for 15 invasive species of concern, including early detection species not yet found in Wisconsin.

Findings and Accomplishments

Goal 1: Assess the potential threats posed by four priority species of concern (rusty crayfish, zebra mussel, Japanese knotweed, and Asian carp).

The following four species of concern were originally selected for the scope of this grant. Below we have summarized the threats they pose to the rivers of Wisconsin and their known current range. Through discussions held with Department staff and University researchers, additional invasive species of concern to rivers were identified. While addressing the following three goals, we did not limit ourselves to focusing on these four priority species. A more complete listing follows.

Zebra mussels (*Dreissena polymorpha*)

Zebra mussels are an invasive mussel found in many of our lakes and rivers here in Wisconsin (i.e. Oconto River, Lower Fox River, Wisconsin River, and Bark). The zebra mussel has never successfully been eradicated from a river system once established.

A Zebra mussel infestation can degrade the quality of our waters. They are exceptional filter feeders. As a result of their voracious appetites they leave behind an inordinate amount of waste. When this waste decomposed the dissolved oxygen in the water decreases, lowers the pH making the water more acidic and produces toxic byproducts. Zebra mussel infestations may also promote the growth of blue-green algae, since they avoid consuming this type of algae but not others. Their prolific feeding abilities disrupt the natural food chain leaving little nutrients for native mussels and fish. They effectively clean the water column leading to clearer water which allows light to penetrate further down allowing more growth of rooted aquatic plants which, although creating more habitat for small fish, may inhibit the larger, predatory fish from finding their food. Zebra mussels can be a pest to swimmers, fishermen, boaters, and beach visitors. They are capable of completely covering the substrate, docks and piers. Their shells can cut the feet of swimmers and clog intake pipes of boats. In addition beaches may become covered in shells of dead mussels. Infestation of raw water intake pipes and structures can seriously limit water flow into hatcheries, drinking water treatment plants, industrial facilities, and cooling systems of power plants.

Zebra mussels have been found in larger rivers and impoundments in Wisconsin. No additional reports of zebra mussels were found as a result of this grant. It has been included in the Project RED protocol.

Rusty crayfish (*Orconectes rusticus*)

Rusty crayfish are opportunistic feeders, they eat small fish, fish eggs, insects/invertebrates having a metabolism greater than native crayfish species. Being aggressive, they are capable of displacing native crayfish. They may force them out of hiding places, increasing fish predation on these natives. They also eat aquatic vegetation, damaging habitat important for spawning, cover and food of native species. This also results in the destruction of plant bed abundance and diversity. Removal of aquatic plants can increase erosion and turbidity. Some fear swimming in heavily infested waters - fear of getting pinched. Aesthetics of the river may be impacted when plant beds are destroyed.

Unfortunately, the rusty crayfish has become well established in Wisconsin. The role that volunteers can play in the collection and control of this species is limited. In speaking with Dr. Vander Zanden, his lab does not have the resources to solicit more vouchers, it is both time and resource demanding. Due to their wide spread distribution and the limited roles volunteers can play, the rusty crayfish has not been included in the Project RED protocol. This may change at a later date if roles or research partners become apparent.

Japanese knotweed (*Polygonum cuspidatum*)

Japanese knotweed has caused a reduction of biodiversity through out-shading native vegetation, increased risk of flooding through dead stems washed into river and stream channels, and decreased wildlife habitat. It also can have cascading effects on the food

web within a stream, as its leaf litter provides much less nutrients than native vegetation. It can cause damage to flood defense structures, a reduction in land values, damage to paving and other infrastructure. Its presence in riparian areas can restrict of access to riverbanks for anglers, bank inspection and amenity use. Japanese knotweed has been seen to increase the risk of soil erosion and bank instability following removal of established stands in riparian areas.

Japanese knotweed reproduces both vegetatively (rhizomes) and by seeds in Wisconsin, making it extremely hard to eradicate. Japanese knotweed is a strong threat to riparian corridors as it can withstand floods and quickly recolonize in scoured areas downstream. Finally, Japanese knotweed is very expensive and labor intensive to control. Early detection and rapid response is pertinent to saving management resources.

Japanese knotweed is present throughout Wisconsin. In riparian areas where it has become established it has spread downstream through high flows transporting vegetative matter (e.g. Sheboygan River). It has been included in the Project RED protocols. There are significant roles that citizens and local friends groups can have in detecting and eradicating it. For example, the Friends of Badfish Creek identified a pioneer stand on the banks of Badfish Creek during the River Alliance's pilot of Project RED. As a result, they partnered with the landowner and the Department to control this pioneer stand before it can spread downstream.

Asian Carp (*Hypophthalmichthys nobilis*/*Hypophthalmichthys molitrix*)

Bighead carp are planktivorous and attain a large size having the potential to deplete zooplankton populations. Reduced availability of plankton could lead to reductions in populations of native animals that eat the plankton, including all larval fish, some adult fish, and native mussels. They might decrease populations of filter feeding fish - those most at risk include paddlefish, bigmouth buffalo, and gizzard shad impact commercial and recreational fishing industries Silver carp swim close to the surface of the water and are known to jump in response to boat motors. Boater, anglers, and others recreating on the water risk severe injury if hit by one of these fish.

Asian carp have been found in the Mississippi River above the Wisconsin River confluence. It is anticipated that they will be found in the Lower Wisconsin River in the near future. It is unclear what role citizens and local groups may play at this time in the prevention of their spread. They have not been included in the Project RED protocols. Again, this may change. An educational campaign encouraging river users not to spread locally harvested bait fish may be necessary when they arrive.

Other Species of Concern:

The following species have the potential to become established in riverine ecosystems and cause economic or environmental damage. In partnership with Department staff, it has been determined that citizen groups may play some role in the detection or control of the following species in rivers.

Common Name	Scientific Name
purple loosestrife	<i>Lythrum salicaria</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Japanese hops	<i>Humulus japonicus</i>
common reed	<i>Phragmites australis</i>
flowering rush	<i>Butomus umbellatus</i>
hydrilla	<i>Hydrilla verticillata</i>
curly-leaf pondweed	<i>Potamogeton crispus</i>
Eurasian water milfoil	<i>Myriophyllum spicatum</i>
Brazilian waterweed	<i>Egeria densa</i>
didymo	<i>Didymosphenia geminata</i>
zebra mussel	<i>Dreissena polymorpha</i>
quagga mussel	<i>Dreissena rostriformis bugensis</i>
New Zealand mudsnail	<i>Potamopyrgus antipodarum</i>
Chinese mystery snail	<i>Cipangopaludina chinensis</i>
banded mystery snail	<i>Viviparus georgianus</i>

Goal 2: Examine potential roles for citizens and volunteer groups at the local level to take on education, prevention, planning, and management activities

Education & Prevention

Through the Clean Boats Clean Waters and the Clean Lakes Monitoring Network, the Lake Partnership has been instrumental in educating the general public about the threats of invasive species. Through partnering with the Department, the River Alliance and local river enthusiasts groups are reaching new audiences to protect headwater ecosystems, including streams, rivers and wetlands, through existing education programs (e.g. CBCW) and new campaigns.

New educational campaigns targeted toward flyfishermen are particularly in need as the Driftless Area gains national attention from the angling community and as our understanding improves on the role this user group has in the spread of such species as New Zealand mudsnails and Didymo. The River Alliance has been working with Trout Unlimited chapters throughout the state to raise awareness.

Groups such as the Bad River Watershed Association have expressed interest in beginning an educational campaign to prevent the spread of invasives species that are transported by fishermen. One simple role they may play is to place signs at popular fishing access points displaying disinfection protocols. Through these partnerships and with the support of the Department they may help implement ANS National Management and Control Plan for the New Zealand mudsnail prepared for the Aquatic Nuisance Species Task Force by the New Zealand mudsnail management and control plan working group (May 2007).

Riparian landowners are also another interest group who could be a target audience for an educational campaign. Local groups could reach out to these individuals to provide technical assistance and labor for control of riparian species (i.e. Japanese knotweed, purple loosestrife) to prevent spread downstream.

Monitoring

Minimal monitoring has been conducted statewide on riverine invasive species. There is a great opportunity to engage citizen scientists in assisting in mapping invasive species in riparian corridors to better help us understand the impacts they are having in Wisconsin and to prioritize our prevention and control efforts. Outlined below are five means of engaging citizens.

Early Detection Campaigns - There are several species that are not currently known to exist in Wisconsin but are anticipated, such as the New Zealand mudsnail, hydrilla, and Didymo. River user groups can assist in the early detection of these species through education campaigns. Information about these species and reporting protocols should be posted at river access points.

Water Action Volunteers and Level II Citizen Water Quality Monitors – Water quality monitoring volunteers could be given the option to receive resources and a brief training to identify and report invasive species. Many have expressed interest and are currently participating in Project RED.

Project RED – The River Alliance of Wisconsin has received funding from the Department to implement Project RED in partnership with the National Institute for Invasive Species Science and local groups through June 2010. See page 11 and Appendix E for more information about Project RED. The full 4 hour training slideshow (.ppt and .pdf) is available with speaker notes.

Statewide AIS Snapshot Day – A statewide AIS snapshot day could be hosted by the River Alliance and partners. With assistance from AIS coordinators and local groups, rivers statewide could be monitored for a species of concern. If interest exists, a pilot might be held at the end of the Project RED training season in September 2009 for Project RED participants.

Additional Level III Citizen Monitoring - As local groups become aware of invasive species within their watershed, there may be a growing demand to perform more rigorous monitoring. This is the case for the Friends of the St. Croix Headwaters, who recently were awarded a River Planning Grant from the Department to conduct a survey of macrophytes, including invasives in the St. Croix River. There currently are not standardized protocols for monitoring for invasive species in rivers. Level III citizen monitoring efforts could partner with the Department to establish and refine such protocols.

Planning

Together lake, wetland and river enthusiasts may partner to take a more watershed wide approach to invasive species management plans. Determining if rivers within watersheds acting as corridors for spread of species of concern and a greater understanding of the distribution of invasive species and their impacts should be a priority in planning. In addition, river and wetland invasive species (i.e. Japanese knotweed) should be addressed in county wide AIS management plans and the concerns of local groups addressed.

Control

Local citizen groups can assist in the control of many invasive species highlighted in this report. Their strength is in their numbers and partnerships, providing coordination of volunteers. Control measures include handpulling small patches of invasive macrophytes and wetland plants, mechanical and chemical control of Japanese knotweed, and biocontrol of purple loosestrife. Their capability in controlling invasive animal species however is limited.

Control on private lands is a challenge along riparian corridors as there is little organization amongst these landowners as opposed to a lake association or district. Local groups could assist in organizing landowners for invasive specie management.

Goal 3: Assess the willingness and ability of these groups to take on roles identified as necessary

We met with local river groups throughout the state and identified what they currently *know* (or don't know) about the aquatic invasive species threatening their river or watershed and what they are currently doing to address the issue. Local groups in general are aware of the threat of invasive species in general, but not particularly aware that they threaten river corridors. Of those that are engaged in invasive species work, the majority are worried about buckthorn, purple loosestrife, and garlic mustard. The majority of the groups, such as the Friends of the St. Croix Headwaters, are concerned about the impacts of invasive species and are interested in learning more through monitoring.

During our workshops and meetings we discussed what they currently *do* about aquatic invasive species. We found examples of groups who are in engaged locally in monitoring and control of invasives; however, these were the exceptions. For example, members of the Friends of the White River in Neshkoro are engaged in purple loosestrife biocontrol projects and the Bad River Watershed Association's water quality monitors have taken it upon themselves to passively monitor for invasive species while visiting their monitoring sites.

We have identified many roles that groups can play from educational campaigns to control within existing programs, such as the Clean Boats Clean Waters and Purple Loosestrife Biocontrol Project. They have many resources to bring to the table including people power, familiarity with local resources and partnerships. In addition, focusing on this issue could serve to strengthen the group itself through the development of new

partnerships (e.g. Master Gardener, Prairie Enthusiasts, etc.), volunteer/member recruitment and new, hands-on focus.

The majority of groups we spoke to were in need of technical and/or financial support. Project RED has engaged many groups who are unsure where to begin. Through this monitoring effort, it is our hopes that groups are able to identify threats to their rivers and begin to prioritize management activities. The River Alliance of Wisconsin will provide this technical support through March 2010 or as long as funding allows us to. However, it would be valuable for these groups if other local AIS coordinators are more aware of riverine issues and are willing to assist.

The River Alliance of Wisconsin is making local groups whom we work with aware of the Department's AIS grants and that they may be applied to all waters of the state, including streams, springs and wetlands. We recognize that this grant program is growing increasingly competitive. To ensure that riverine and wetland projects are competitive it is necessary to ensure that proper consideration to these waters is given during the drafting of ranking criteria. It may be necessary to set aside a portion of the funds for non-lake waterbodies. See recommendations for more details.

Goal 4: Guide these groups on how to improve their knowledge and expand their capacity to meet the challenges of riverine invasive species, including education and control

We have met with representative of numerous groups throughout the state including the following: Friends of Badfish Creek, Upper Sugar River Watershed Association, Friends of the Platte River, Rock River Coalition, Milwaukee Riverkeeper, Bad River Watershed Association, Trout Unlimited, Friends of White River (Neshkoro), Sheboygan Master Gardner's, Valley Stewardship Network, Friends of the Branch, Friends of White River (Bayfield County), Florence County Lakes and River Association. Eight of these groups will be participating in Project RED trainings to begin monitoring for invasives in their riparian corridors in 2009.

In fall 2008 we piloted Project RED in partnership with the Department, Sheboygan Master Gardeners, Valley Stewardship Network, an individual paddler, and Friends of Badfish Creek. Monitoring over 50 miles of riverbank, it was determined that volunteers could successfully detect wetland invasive species by canoe.

With the Friends of Badfish Creek, who identified Japanese knotweed while participating in the Project RED pilot, we reviewed the invasive species knowledge and information gathered for this project, assisted to develop realistic educational and/or action plans for the invasive species threatening their watershed, and introduced them to agencies and other stakeholders in managing AIS. The River Alliance will continue to provide this support to other groups as they identify invasive species during Project RED as long as possible financially.

Through Project RED and continued discussions with local groups the River Alliance has begun to build a statewide network of watershed and river friends groups devoted to controlling priority riverine invasive species.

Recommendations

The River Alliance of Wisconsin looks forward to continuing to partner with the Department. The following are recommendations to the Department that would facilitate the monitoring and management of invasive species in Wisconsin's rivers and streams. It is our hope that together we can work towards these goals.

There is a need for the development of department accepted monitoring protocols for invasive species within rivers that go beyond the opportunistic early detection protocols used by Project RED participants similar to that of the point-intercept approach applied in lake ecosystems. Pilot projects in cooperation with local groups with financial support from the Department could assist in accomplishing this goal without too much demand on Department science services staff. The immediate opportunity for such a partnership is with Friends of St. Croix Headwaters.

There is a need for the integration of Riverine AIS into SWIMS Database or another Department database to enable field staff and volunteers to record riverine AIS locations. As of the beginning of this grant cycle it was clear that the Department did not have the resources to do this following discussion with Department staff. The River Alliance's partners are temporarily using the National Institute for Invasive Species Science's database to manage data. Although anyone can view this data, it is not as readily available to county and state AIS staff as SWIMS would be thus creating a barrier.

The River Alliance would like to partner further with state and county AIS staff to engage them in issues relative to invasive species. One important step is to persuade counties with higher percentages of flowing waters verses lakes to develop an AIS management plan; in particular those who are adjacent to our larger systems, the Mississippi and Wisconsin Rivers.

Finally, the Department should consider dedicating funding to River Management Organizations for AIS management allowing separate ranking criteria to be established for flowing waters and wetlands. The disparity between the current level of understanding of invasive species management on lakes and rivers/wetlands makes it very difficult to successfully establish ranking criteria that identify priorities within each ecosystem.

The Future

The River Alliance of Wisconsin with the continued support of the Wisconsin Department of Natural Resources will host six Project RED trainings in Ashland, Florence, Menominee, Waushara, Jefferson and Milwaukee counties by in 2009. The River Alliance of Wisconsin has received requests for additional Project RED trainings throughout the state and interest continues to grow.

Project RED volunteers will use GPS units that are stored at technology libraries throughout the state to record the latitude and longitude of any invasives. These are provided by the Citizen Based Monitoring Network of Wisconsin. The species name, coordinates, and estimated size of the infestation will be recorded on a field data sheet printed on waterproof paper provided by Project RED.

Project RED volunteers will enter their data into a citizen scientist's website (www.citsci.org), an online tool created by NIISS. The web site allows volunteer organizations to tailor online data reporting sheets and maps to meet their specific needs. Through the site, data may be shared with other project members, resource management agencies, funding sources, landowners, and the general public.

Throughout the field season and winter 2009/2010 the River Alliance of Wisconsin will be working to improve Project RED training materials, quality assurance of data and volunteer monitoring protocols with the hope that we may identify additional funding to support Project RED beyond the spring of 2010.

In addition, the River Alliance of Wisconsin will continue to provide planning and technical support to local groups as they become engaged in the issue of invasive species whether or not they are committed to participating in Project RED. We will continue to be abreast of emerging threats to rivers as they arise, educate the public and our membership base about preventative measures to be taken in the meantime, and serve as the voice of rivers in the state to ensure that the necessary resources are allocated to protect them from the impacts of invasive species.

Appendix A: Invasive species found during 2008 Project RED pilot

A. Sheboygan River

The screenshot displays the CitSci.org website interface. At the top, it says "Logout Welcome Laura" and "My Profile May 4th 2009". The main header features the CitSci.org logo and the tagline "Fighting invasive species... through citizen science".

On the left, there is a navigation menu with the following items: Home, About Us, Find a Species, Find a Project, Collect Data, Make a Map, Tutorials, Links, My Profile, Logout, and Contact Us.

The central map area shows a satellite view of the Sheboygan River region. The current project is identified as "Project R.E.D (Riverine Early Detectors)". The map includes labels for "Kohler", "Blackwolf Run Golf Course", "State Rd 28", and "Washington". Data points are marked with red and blue plus signs along the river. A scale bar at the bottom indicates distances up to 2,000 meters. The map is powered by Google and uses Google Mercator projection.

On the right side, there is a "Location" section with a world map, a "Legend" section, and a "Sources" section. The legend includes:

- Plants:
 - Common reed
 - Purple-loosestrife
 - Japanese knotweed
- Projects:
 - Project R.E.D (Riverine)
- Backgrounds:
 - Google: Terrain
 - Google: Map
 - Google: Satellite
 - Google: Hybrid

The "Sources" section is partially visible at the bottom right.

Data as seen on www.CitSci.org, the online data management website that will be used by Project RED volunteers.

Japanese knotweed, purple loosestrife, and common reed grass were found along the Sheboygan River between Rochester Park, Sheboygan Falls and Taylor Drive. Data available through niiss.org, citsci.org, or upon request from the River Alliance of Wisconsin.

B. Badfish Creek

The screenshot displays the CitSci.org website interface. At the top, there is a navigation bar with "Logout Welcome Laura" on the left and "My Profile May 4th 2009" on the right. The main header features the CitSci.org logo and the tagline "Fighting invasive species... through citizen science".

On the left side, there is a vertical menu with the following items: Home, About Us, Find a Species, Find a Project, Collect Data, Make a Map, Tutorials, Links, My Profile, Logout, and Contact Us. Below the menu are sections for "Navigation" (with directional arrows and a zoom control) and "Tools" (with icons for pan, zoom, and other map functions).

The central part of the page is a map titled "Current Project: Project R.E.D (Riverine Early Detectors)". The map shows a topographic view of a region including Cooksville, with roads labeled "State Rd 138", "N State Rd 138", and "W State Rd 59". Two data points are marked on the map: a red dot and a purple dot. A scale bar at the bottom of the map indicates distances up to 2,000 meters. The map is powered by Google and includes a "Sources" link.

On the right side, there is a "Location" section with a world map showing the project's location in North America. Below that is a "Legend" section with an "Edit" link. The legend is organized into three categories:

- Plants:**
 - Common reed
 - Purple-loosestrife
 - Japanese knotweed
- Projects:**
 - Project R.E.D (Riverine)
- Backgrounds:**
 - Google: Terrain
 - Google: Map
 - Google: Satellite
 - Google: Hybrid

Purple loosestrife and Japanese knotweed were found along the banks of Badfish Creek. The Friends of Badfish Creek have acquired a grant from the Wisconsin Department of Natural Resources to eliminate the pioneer stand of Japanese knotweed within the floodplain. Data available through niiss.org, citsci.org, or upon request from the River Alliance of Wisconsin.

C. Kickapoo River .

The screenshot displays the CitSci.org Invasive Species Mapper interface. The browser window title is "CitSci.org - Invasive Species Mapper - Mozilla Firefox". The address bar shows the URL: http://www.citsci.org/cwis438/Browse/TiledMap/Scene_Basic.php?WebSiteID=7. The page header includes "Logout Welcome Laura" and "My Profile May 4th 2009". The main content area features a navigation menu on the left, a central map, and a legend on the right. The map shows the Kickapoo River area in Wisconsin, with a red dot indicating the location of Japanese knotweed. The legend lists the following species and projects:

- Plants:
 - Common reed
 - Purple-loosestrife
 - Japanese knotweed
- Projects:
 - Project R.E.D (Riverine Early Detectors)
- Backgrounds:
 - Google: Terrain
 - Google: Map
 - Google: Satellite
 - Google: Hybrid

The map data is attributed to Tele Atlas, 2009. The projection is Google Mercator. The map shows the Kickapoo River flowing through the area, with various valleys and mountains labeled, including Wildcat Mountain State Park and Mt Pisgah. The map also shows the Garden Bridge and W South St. The legend also includes a "Sources" link.

Japanese knotweed was found on the banks of the Kickapoo River in one location. Data available through niiss.org, citsci.org, or upon request from the River Alliance of Wisconsin.

D. Baraboo River

The screenshot shows the CitSci.org Invasive Species Mapper web application. The browser window title is "CitSci.org - Invasive Species Mapper - Mozilla Firefox". The address bar shows the URL: http://www.citsci.org/cwis438/Browse/TiledMap/Scene_Basic.php?WebSiteID=7. The page header includes "Logout Welcome Laura" and "My Profile May 4th 2009". The main content area features the CitSci.org logo and the tagline "Fighting invasive species... through citizen science".

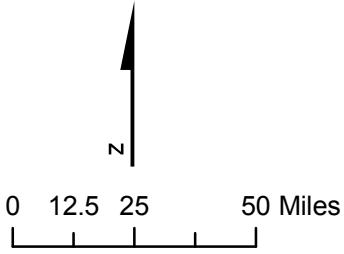
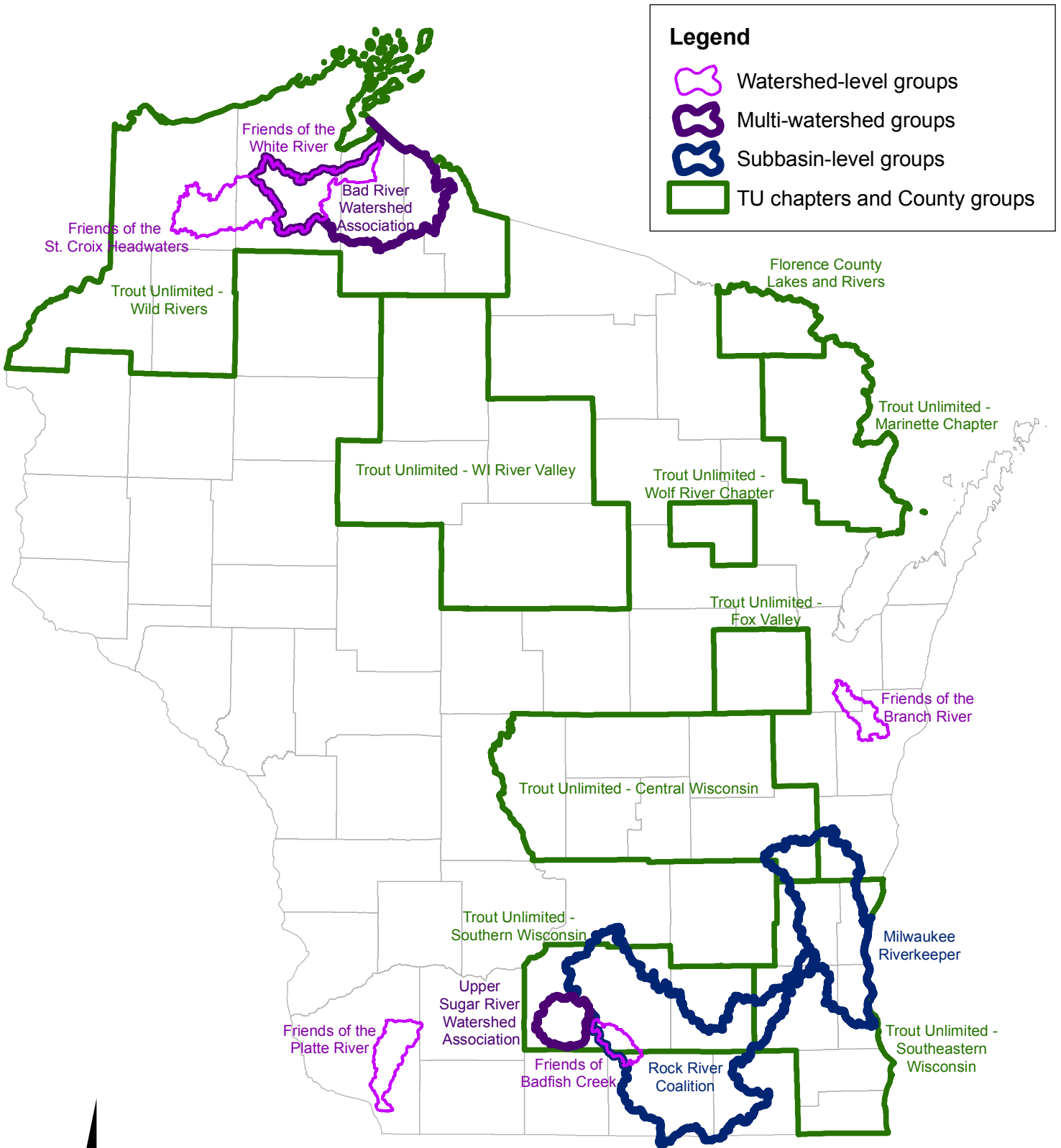
The interface is divided into several sections:

- Navigation:** Includes a home button, a search bar, and a "Current Project: Project R.E.D (Riverine Early Detectors)" label.
- Map:** A central map showing the Baraboo River area. A red dot is located on the river. The map includes a scale bar (0 to 2,000 meters) and a north arrow. The map data is attributed to "©2009 Tele Atlas - Terms of Use".
- Location:** A world map showing the location of the study area in the United States.
- Legend:** A legend titled "Legend" with an "Edit" link. It lists the following items:
 - Plants:**
 - Common reed
 - Purple loosestrife
 - Japanese knotweed
 - Projects:**
 - Project R.E.D (Riverine)
 - Backgrounds:**
 - Google: Terrain
 - Google: Map
 - Google: Satellite
 - Google: Hybrid
- Tools:** A vertical toolbar on the left side of the map with icons for navigation and map manipulation.

No purple loosestrife, Japanese knotweed, common reed grass, or Japanese hops were found between Haskins Park and the former Linen Mills dam site on the Baraboo River.

**Appendix B: Groups who the River Alliance has engaged in the issue
of invasive species and are suited to assist in
education, planning, prevention or management activities**

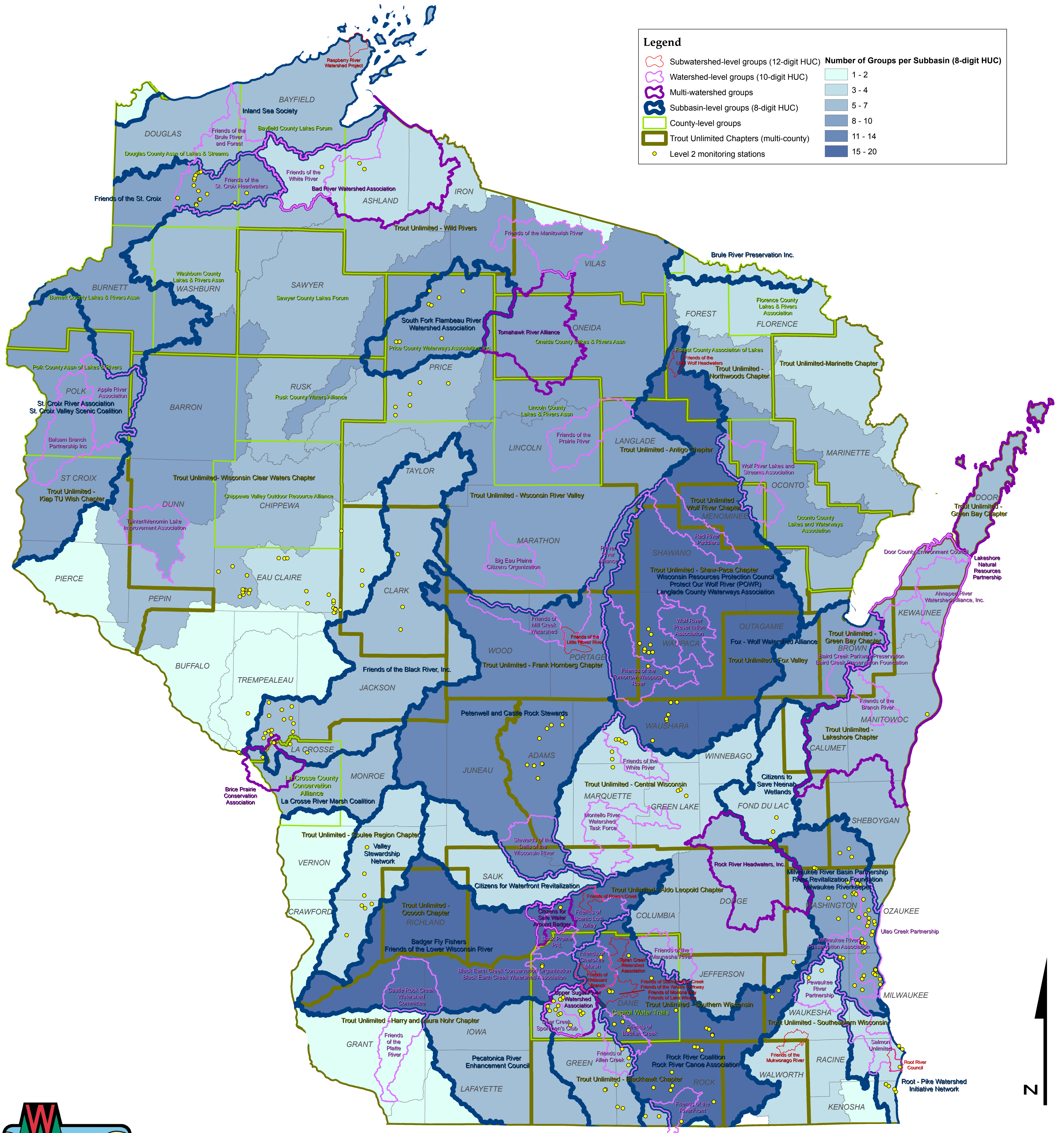
River Groups Interested in Aquatic Invasive Species Education, Planning, Prevention, or Management



Data current as of May 2009

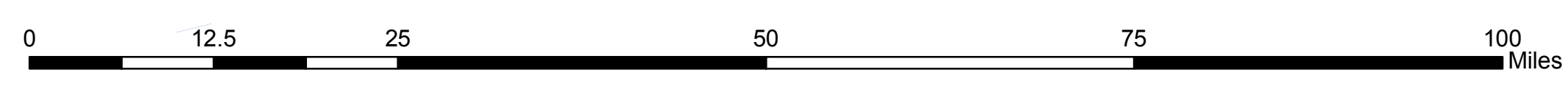
Appendix C: Geographic Areas Covered by River Alliance of Wisconsin's Local Groups

Wisconsin's River Groups



Legend

Subwatershed-level groups (12-digit HUC)	Number of Groups per Subbasin (8-digit HUC)
Watershed-level groups (10-digit HUC)	
Multi-watershed groups	1 - 2
Subbasin-level groups (8-digit HUC)	3 - 4
County-level groups	5 - 7
Trout Unlimited Chapters (multi-county)	8 - 10
Level 2 monitoring stations	11 - 14
	15 - 20



Map produced by Wisconsin DNR
 Data furnished by River Alliance of Wisconsin
 River groups data current as of January 2009

Appendix D: Presentations, Posters, and Publications

Presentations

- “Engaging Local Citizens in Detecting and Controlling Invasive Species in River Corridors” 2008 Citizen Based Monitoring Conference. October 2008. Onalaska, WI.
- “Early Detection of Riparian/Aquatic Invasive Species” Trout Unlimited Driftless Area Symposium. October 2008. Lanesboro, MN.
- “Aquatic Invasive Species Workshop” Friends of Badfish Creek Meeting. October 2008. Oregon, WI.
- “Aquatic Invasive Species Workshop” Oregon Public Access Channel. November 2008. Oregon, WI.
- “Project RED: Volunteer Monitoring for Riverine Invasive Species.” 2009 Citizen-Based Stream Monitoring Symposium. January 2009. Stevens Point, WI.
- “Your Role in Protecting Wisconsin’s Streams from Invasive Species” Trout Unlimited Statewide Meeting. February 2009. Stevens Point, WI.
- “Rock Snot, Knotweed, Mudsnails. Oh My!” Canoecopia. March 13, 2009. Madison, WI.
- “Engaging River Enthusiasts in the Fight Against Invasive Species” Wisconsin Lakes Convention. March 19, 2009. Green Bay, WI.
- “Project RED: Helping detect invasives species in our rivers and streams.” Friends of the Branch River Annual Meeting. March 26, 2009. Whitelaw, WI.
- “Project RED: Helping detect invasives species in our rivers and streams.” Trout Unlimited Driftless Area Restoration Workshop. March 28, 2009. Westby, WI.
- “Invasive Species and Wisconsin’s Rivers.” Madcity Paddlers Meeting. April 2, 2009. Madison, WI.
- “Invasive Species Threatening Wisconsin’s Rivers.” Fontana’s Annual Flyfishing Rendezvous. April 18, 2009. Madison, WI.
- “Invasive Species Threatening Wisconsin’s Rivers.” Discover the Koshkonong Creek. April 21, 2009. Cambridge, WI.

Posters

- “Volunteer Monitors Patrol River Corridors for Invasive Species” 2008 Citizen Based Monitoring Conference. October 2008. Onalaska, WI.
- “Volunteer Monitors Patrol River Corridors for Invasive Species” Minnesota Invasive Species Conference. October 2008. Duluth, MN.
- “Volunteer Monitors Patrol River Corridors for Invasive Species” Wisconsin Lakes Convention. March 2009. Green Bay, WI.

Table

Wisconsin Association of Land Conservation Employees (WALCE) Annual Professional Improvement Conference. February 19, 2009. Green Bay, WI.

Wisconsin Lakes Convention: Back to Balance. March 18-20, 2009. Green Bay, WI.

Canoecopia. March 13 -15, 2009. Madison, WI

Publications

River Alliance of Wisconsin and Wisconsin DNR. New Zealand Mudsnaails WT-903-2008

River Alliance of Wisconsin, Wisconsin DNR and University of Wisconsin Extension. River and Wetland Invasive Plants. ER-905-2009

River Alliance of Wisconsin. "Spread the Message, Not the Mudsnaail" Wild Rivers Trout Unlimited Chapter Newsletter December 2008.

River Alliance of Wisconsin. "Felt Soled Wading Shoe Taboo" Wisconsin River: River Alliance of Wisconsin Newsletter January 2009 vol 15 issue 1 (2009).

River Alliance of Wisconsin. "Invasive Species and Rivers" River Alliance of Wisconsin Online
<http://www.wisconsinrivers.org/index.php?page=content&mode=view&id=167>
(2008)

River Alliance of Wisconsin. "Invader Crusaders" Word on the Stream: River Alliance of Wisconsin E-News. June 5, 2008.

River Alliance of Wisconsin. "Invasives on the Move" Word on the Stream: River Alliance of Wisconsin E-News. December 17, 2008.

River Alliance of Wisconsin. "Riverine Early Detectors: A new frontier in the fight against invasive species." The Volunteer Monitor vol 20(1) (2009).

River Alliance of Wisconsin. "Riverine Early Detectors: A new frontier in the fight against invasive species." Plants Out of Place: IPAW Newsletter (2009)

River Alliance of Wisconsin. Project RED Manual. February 2009.

Appendix E: Project RED Manual
*(Not meant to be a stand alone document for distribution.
Project participants receive manual during training)*

Project **RED**

Riverine Early Detectors Manual:
Finding **Invasive Species** First.



New Zealand mudsnail

Find It! Report It! Fight It!

Version 1.2, March 2009



RIVER ALLIANCE
of Wisconsin

www.wisconsinrivers.org

Welcome to Project RED

The health of your river depends on you! Wisconsin's rivers are vulnerable to invasion by a number of invasive species from Eurasian water-milfoil to Japanese knotweed. The key to successfully protecting your river is detecting invasives early when it is still possible to isolate or eradicate them. The longer we wait to find them and fight them the more money and time it will take. Volunteers like you are invaluable for early detection and rapid response.

Find it, report it and fight it! Project RED provides you with the necessary tools to be a Riverine Early Detector. Our protocols are easy and fun. Use this activity to become more familiar with your river or stream and to engage your friends and neighbors!

Project RED has four steps: collect samples of suspect invasives on your river, verify the specimens, submit the data, and advocate for control.

The River Alliance of Wisconsin and the Wisconsin DNR can help you take the next step of eradication or containment if you find a pioneer population! There are funding and technical resources available to you!

Grab your paddle or waders and get out on the water! We need your help.



Find It, Report It and Fight It!

Why Should You Join Project RED?

- Easy, Fun Protocols to Identify 15 Species of Concern
- Great Opportunity to Engage New Members/Volunteers
- Educate Local Landowners About Invasive Species
- GPS Units Available for Your Use at Technology Libraries Statewide
- Online Data Management Tools
- Species Verification by Professionals
- Eradication and Containment Technical Support
- Its Free!

Step I: Collecting Data and Samples

Specific monitoring and sample collection protocols for each category of invasives (wetland plants, snails, mussels, and emergent and submersed plants) are on the following pages.

We recommend you start at the headwaters or at areas of potential introduction, such as bridge crossings or boat landings. If monitoring from a canoe, it is recommended that you wade or pay particularly close attention within the 100 meters upstream and downstream of boat landings, bridge abutments or other probable locations of introduction.

Invasive species do not respect private property lines, but we do. Inform riparian landowners about Project RED and always ask permission to venture onto their property. You must help us educate landowners in your watershed to help in the fight!

Monitoring Schedule

The time of the year can determine how easily a species can be identified and the likelihood of detection. For example, purple loosestrife is difficult to see from a canoe before it blooms. However, once it is in bloom its vibrant color is difficult to miss. It is recommended that you monitor the same segment of river at least twice a year, once in May or June and once in August or September. Three times is even better and will increase your chance of successfully detecting invasives. The schedule below is an estimation of when you should look for each species. This schedule might vary slightly dependant upon your latitude, micro-climates and the year's weather. Remember, be prepared for potentially cold and dangerous weather in May and September in the northern portion of the state. Safety is ALWAYS our first priority.

MAY	JUNE	JULY	AUGUST	SEPTEMBER
curly-leaf pondweed snails and mussels didymo	flowering rush curly-leaf pondweed Eurasian water-milfoil snails and mussels didymo	purple loosestrife common reed grass Japanese hops flowering rush Eurasian water-milfoil hydrilla Brazilian waterweed snails and mussels didymo	Japanese knotweed purple loosestrife common reed grass Japanese hops flowering rush Eurasian water-milfoil hydrilla Brazilian waterweed snails and mussels didymo	Japanese knotweed purple loosestrife common reed grass Japanese hops hydrilla Brazilian waterweed snails and mussels didymo

Supplies

REQUIRED:

Paddling or Wading Equipment
Lifevests (required for paddlers)
Clip board or other hard surface for writing
Project RED Field Data Collection Sheets
Ziploc bags
Plastic jars
Waterproof sharpie pen (to write on Ziploc bags and jars)
GPS unit
Heavy trash bag
Paper towels

OPTIONAL:

Camera (recommended)
Rubbing Alcohol
Ice chest for keeping samples cool
Rake to collect aquatic plants
.3—.5 mm mesh kicknet
Polarized sunglasses
Aqua-View Scope

Step II: Verification

Invasive species are often easily confused with native look-a-likes. To ensure quality data volunteers are encouraged to send or deliver samples or photographs to professionals to verify their findings. Verification is often required if you plan to apply for funding or technical assistance to contain or eradicate the invasive.

Species that are rare or have not been reported in Wisconsin yet have a red asterisk (*) after the species scientific name (ex. New Zealand mudsnail). These species if found must be sent in for verification immediately.

Plant specimens should be placed in a plastic bag with a damp paper towel and delivered or mailed to your DNR regional AIS verification contact (*see contacts on page 9*) as soon as possible. Digital or film photographs are another alternative. Be sure that you photograph all parts of the plant.

Live mussels and snails should be placed in rubbing alcohol to prevent them from decay. If the shells are empty this is not necessary. **Mailing alcohol is illegal.** If you preserve a specimen in alcohol it must be hand delivered to your DNR Regional AIS Verification Contacts (*see contacts on page 9*).

See protocols on the following pages for more on sample collection and preservation.

Prior to submitting your samples for verification double check your identification with print and online resources provided on page 9. If you have any questions about sample preparation or who to submit your sample to contact Courtney LeClair or Heidi Bunk.

Information About Plant Verification:

Courtney LeClair
(608) 267-7438
InvasivePlants@mailplus.wisc.edu

Information About Mussel or Snail Verification:

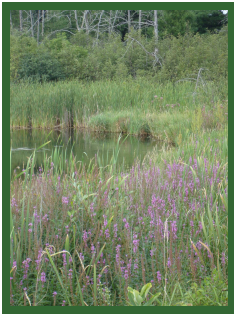
Heidi Bunk
(262) 574 2130
Heidi.Bunk@Wisconsin.gov

Step III: Submit Data

Don't forget to submit your data! Data sharing is important to help researchers and resource managers better understand the threats invasive species pose on our rivers in Wisconsin. Post your data on CitSci.org! CitSci.org has been developed by NIISS (the National Institute of Invasive Species Science) for projects like Project RED. It provides online data management, sharing, and viewing. Data posted here will be used by the River Alliance of Wisconsin and the Wisconsin Department of Natural Resources to allocate statewide resources to help eradicate and control invasives. If you and your fellow volunteers have not received training on how to use CitSci.org contact the River Alliance at (608) 257-2424 x110. The training is free!

Step IV: Taking Action

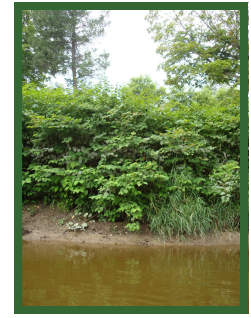
Finding and reporting an invasive unfortunately does not ensure that necessary resources will be allocated to address the problem. Your work does not stop here. Engage your neighbors and help educate landowners. With landowner consent and the necessary volunteer power, you can accomplish a lot in terms of containing or eradicating an invasive. There are technical and financial resources available to you. Contact the River Alliance of Wisconsin or your local WDNR Water Resource Management Specialist for best control practices, regulations on herbicide application, and available funding. We are here to help you.



purple loosestrife on the White River

Project RED

Wetland Invasive Plants



Japanese knotweed on the Sheboygan River

The four species pictured to the right have been found on streambanks and in wetlands throughout Wisconsin. They displace native plants that provide habitat for birds and other native animals, alter nutrient cycles that sustain native life, impede recreational activities and can alter the hydrology of our watersheds.

MONITORING AND SAMPLE COLLECTION PROTOCOL

While floating or wading search both banks and surrounding wetlands for these four plants. It is best to search for these in mid-July through September while they are blooming.

If possible collect a fresh sample in a plastic bag with a moist paper towel. Write the location where the specimen was found on the plastic bag and assign the sample an AIS ID# with a permanent marker. If it is not possible to safely obtain a sample, due to private property boundaries or otherwise, take detailed photographs (digital or film) for verification. Try to include flowers, seeds or fruit, buds, full leaves, stems roots and other distinctive features. In photos, try to place a coin, pencil or ruler for scale. If you can send a specimen and photos, all the better. Send samples or photos to the UW Herbarium (page 3) for verification. **Be careful not to spread seeds or fragments, see preventative note on back cover.**

SPECIES OVERVIEW

Japanese hops (*Humulus japonicus*)

Herbaceous vine climbing clockwise. No tendrils. Leaves opposite, 2 to 5 inches long with 5-7 deep lobes and coarse, downward pointing sticky hairs. Leaf stalk equals or exceeds length of leaf. Greenish flowers.

common reed grass (*Phragmites australis*)

3 to 20 ft tall grass with linear green leaves 10 –20 in. long. Large, dense, featherlike grayish purple plumes in July through September. Dull, tan, rough and ribbed cane-like stems.

Japanese knotweed (*Polygonum cuspidatum*, *Fallopia japonica*)*

Upright, semi-woody, shrub that can reach 10 feet tall. Stems resemble bamboo. Leaves about 6 inches long, heart shaped or triangular. Small green or white flowers bloom in August and/or September. Grows in dense stands.

Purple loosestrife (*Lythrum salicaria*, *Lythrum virgatum*)

Upright, semi-woody, perennial. Square stem 3 to 9 ft tall. Purple flowers with 5 or 6 petals on numerous long spikes. Leaves linear shaped, smooth edge, attached directly to stalk.

TIMELINE

Common Name	Scientific Name	May	June	July	Aug	Sept
purple loosestrife	<i>Lythrum salicaria</i>			x	x	x
Japanese knotweed	<i>Polygonum cuspidatum</i>				x	x
Japanese hops	<i>Humulus japonicus</i>		x	x	x	x
common reed grass	<i>Phragmites australis</i>			x	x	x



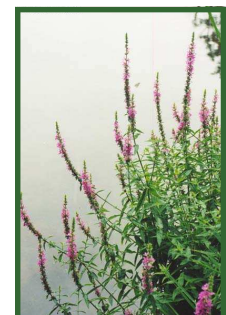
Japanese hops
(Photo by John Randall)



common reed grass
(photo by E. Czarapata)



Japanese knotweed
(photo by E. Czarapata)



purple loosestrife
(photo by E. Czarapata)

Project RED



flowering rush
(photo by E. Czarapata)

Emergent and Submersed Invasive Plants



curly-leaf pondweed

Emergent and submersed invasive plants alter the substrate of a waterbody and alter habitat and food source for birds, bugs and fish. Brazilian waterweed and didymo have not yet been found in Wisconsin but we anticipate their arrival soon.

MONITORING AND SAMPLE COLLECTION PROTOCOL

If you observe plants growing in the water, stop and closely observe them. Polarized sunglasses or a Aqua-View Scope can help. If the water is too deep to clearly identify the submerged plants or to reach a sample, drag a long-handled rake across the bottom of the river with a rope attached to the end to bring a sample to the surface. See the University of Wisconsin Extension Citizen Lake Monitoring Network Training Manual for more information about this technique. Until you grow familiar with both natives and invasives, collect suspect samples in plastic bags labeled with AIS ID #. Remember to record the AIS ID# and the sample location using your GPS on your field data sheet. At home use both print and online resources to identify them to the best of your ability and submit them for verification .

SPECIES OVERVIEW

flowering rush (*Butomus umbellatus*) *

Emergent herb 1 - 5 feet tall, stiff, narrow and triangular in cross-section leaves. Pink or white flowers with 3 petals and 3 sepals in a distinctive flat-topped spray atop a tall stalk.

hydrilla (*Hydrilla verticillata*) *

Submersed herb with slender, branching stem up to 25 feet long. Green leaves about .6 inches long with pointed tips in whorls of 3 to 10. Leaf edges are sawtoothed, rough to touch.

curly-leaf pondweed (*Potamogeton crispus*)

Submersed. Leaves are reddish-green, oblong, and about 3 inches long, distinct wavy edges that are finely toothed. The stem is flat, reddish-brown and grows from 1 to 3 feet long

Eurasian water-milfoil (*Myriophyllum spicatum*)

Submersed herb with slender stems whorled by feathery leaves and tiny flowers above water surface. Leaves threadlike, 9-21 pairs of leaflets per leaf typically uniform in length.

Brazilian waterweed (*Egeria densa*) *

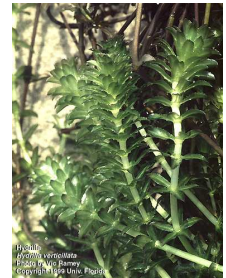
Submersed, bushy herb without tubers. Stem is single or branching. Leaves bright green, .8 – 1.2 inches long, up to .2 inches wide in whorls of 4 to 6 along stem. Leaf edges minutely serrated. Flowers white, .7 to 1 inch across with 3 petals.

didymo (*Didymosphenia geminata*) *

Large diatom forming massive blooms on bottom of stream on substrate or vegetation. Forms flowing ‘rats tails’ that can turn white at their ends and look similar to tissue paper. Although the algae appear slimy, it feels like wet cotton wool. Bloom is a pale yellow-brown to white color.

TIMELINE

Comon Name	Scientific Name	May	June	July	Aug	Sept
flowering rush	<i>Butomus umbellatus</i>		x	x	x	
hydrilla	<i>Hydrilla verticillata</i>			x	x	x
curly-leaf pondweed	<i>Potamogeton crispus</i>	x	x			
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>		x	x	x	
Brazilian waterweed	<i>Egeria densa</i>			x	x	x
didymo	<i>Didymosphenia geminata</i>	x	x	x	x	x



hydrilla
(photo from Vic Ramey)



Eurasian water-milfoil
(photo from TNC)



Brazilian waterweed
(photo from TNC)



didymo
(photo by Stu Sutherland)



New Zealand mudsnails
(Photo by Matt Elyash)

Project RED

Invasive Snails



New Zealand mudsnails
(Photo by Dan Gustafson)

Invasive snails displace native invertebrates, serve as vectors for the transmission of parasites and diseases, destroy instream habitat and alter food chains threatening native fish populations. The mystery snails shown here have been found in several rivers throughout Wisconsin. The New Zealand mudsnail has been discovered in the Great Lakes and the St. Louis River on the Wisconsin and Minnesota border.

MONITORING AND SAMPLE COLLECTION PROTOCOL

Search for snail shells along the shoreline where they may have washed up. Where possible look for snails under the water on the bottom of the river. Mystery snails typically are found in mud or sand. New Zealand mudsnails can be found on any substrate including vegetation. Kicknets with a mesh .5mm or smaller can be used to collect these tiny snails (optional). Collect the largest specimen possible. Larger specimens are typically easier to identify.

There is a native mystery snail, the brown mystery snail (*Campeloma decisum*), that can be confused with the non-natives. It typically lacks bands, does not grow as large as the non-native mystery snails, and is more elongated.

Suspect snails and mussels need to be sent to an expert for vouchering. Collect the largest specimen possible and place it in a plastic bag labeled with the AIS ID # and location. If there is a body in the shell, once you are home transfer it into a container of 70-95% ethanol or rubbing alcohol. If it is an empty shell you may leave it in the ziplock bag. If you transfer to alcohol be sure to label the new container with AIS ID# and location. It is illegal to mail alcohol, so please arrange to deliver sample(s) with alcohol to your local DNR (see page 9 for contact information). Remember to save a copy of your reporting forms for your own records.

SPECIES OVERVIEW

New Zealand mudsnail (*Potamopyrgus antipodarum*) *

Very small snail ranging from 3 to 6 mm. Brown or black cone-shaped shells with five to six whorls. Operculum (hard “lid”) covers the shell opening. Opening is on right side when shell is pointed up. Can reach incredible densities.

banded mystery snail (*Viviparus georgianus*) *

Large snail ranging from 14 to 45 mm. Yellow to green shell with 4 to 5 whorls with three or four darkly pigmented bands. Prefers slow flowing shallow water and lakes. Has been found in the Tomahawk River.

Chinese mystery snail (*Cipangopaludina chinensis malleata*) *

Large snail that can reach 65 mm in size with 6 to 7 whorls. The shell has a olive green, greenish brown, brown or reddish brown pigmentation. It prefers lakes; however, it has been found in large rivers such as the Wisconsin and the Manitowish.



Native brown mystery snail
(Photo Credit Pieter Johnson)



banded mystery snail
(Photo Credit USGS)



Chinese mystery snail
(Photo Credit USGS)

TIMELINE

Common Name	Scientific Name	May	June	July	Aug	Sept
New Zealand mudsnail	<i>Potamopyrgus antipodarum</i>	x	x	x	x	x
Chinese mystery snail	<i>Cipangopaludina chinensis</i>	x	x	x	x	x
banded mystery snail	<i>Viviparus georgianus</i>	x	x	x	x	x



zebra mussel

(Photo from Michigan Sea Grant Archives)

Project RED

Invasive Mussels



quagga mussel

(Photo by Mike Quigley, NOAA)

The zebra mussel and the quagga mussel are two invasive mussels that have been found in Wisconsin's rivers. They clog intake pipes, cover recreational equipment, destroy instream habitat, and outcompete native filter feeders.

MONITORING AND SAMPLE COLLECTION PROTOCOL

Search in shallow areas near shorelines for the presence of mussels (alive or empty shells) that may have washed up. Zebra mussels may be found on any hard surface (rocks, litter, piers, etc). Quagga mussels can colonize on either hard or soft surfaces. Rub your hands along rocks, piers, and vegetation. Mussels can make otherwise smooth surfaces feel like sandpaper. Be careful as to not cut yourself. Search under rocks. It is illegal to collect live native mussels (also known as clams). You may however collect empty shells of any species.

Suspect snails and mussels need to be sent to an expert for vouchering. Collect the largest specimen possible and place it in a plastic bag labeled with the AIS ID # and location. If there is a body in the shell, once you are home transfer it into a container of 70-95% ethanol or rubbing alcohol. If it is an empty shell you may leave it in the ziplock bag. If you transfer to alcohol be sure to label the new container with AIS ID# and location. It is illegal to mail alcohol, so please arrange to deliver sample(s) with alcohol to your local DNR (see page 9 for contact information). Remember to save a copy of your reporting forms for your own records.



zebra mussel

(Photo from USGS)

SPECIES OVERVIEW

zebra mussels (*Dreissena polymorpha*)

A tiny (1/8-inch to 2-inch) bottom-dwelling clam. Yellowish or brownish D-shaped shell, usually with alternating dark and light colored stripes. Attach to solid objects. Generally found in shallow, algae-rich water.

quagga mussel (*Dreissena bugensis*)

Light tan to almost white, with narrow stripes or mottled lines. It is fan-shaped, with pointed edges at either side. The ventral (bottom-side where the 2 shells attach) side of the mussel is convex which makes it topple over when placed ventral side down on a flat surface. The zebra mussel will remain upright when placed in this position.

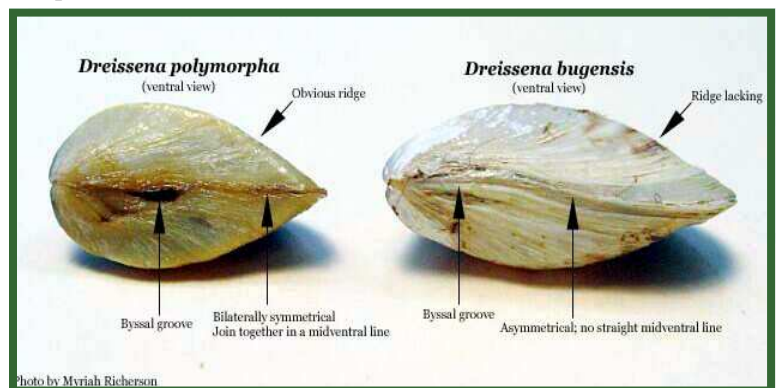


zebra mussels in a intake pipe

(Photo from Michigan Sea Grant Archives)



(Photos by Myriah Richerson, USGS)



TIMELINE

Common Name	Scientific Name	May	June	July	Aug	Sept
zebra mussel	<i>Dreissena polymorpha</i>	X	X	X	X	X
quagga mussel	<i>Dreissena rostriformis bugensis</i>	X	X	X	X	X

Project RED Field Data Collection Sheet



RIVER ALLIANCE
of Wisconsin



Project: (ex. Badfish Watershed Association) _____ Waterbody _____ County _____
 Date Collected / Observed _____ Observer's/Collector's Name _____
 Observer's/Collector's Street Address _____ City _____ State _____ Zip _____
 Phone _____ Email _____

STEP 1 DATA COLLECTION

Datum WGS84, NAD27, or NAD24 (*circle one*)

Record at least five decimal places for latitude and longitude. If a sample is collected, circle sample and be sure to label the sample with the corresponding sample number below.

AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)
AIS ID # _____	Species _____	Latitude _____	N Longitude _____	W Accuracy _____	M Area _____	M ² (Photo) (Sample)

STEP 2 VERIFY SAMPLE(S) (*refer to Project RED manual for instructions*)

Samples delivered/mailed to _____ name(s) of professional verifier(s) _____ on _____ date _____ Verified on _____ date _____

STEP 3 SUBMIT DATA ON WWW.CITSCI.ORG (*refer to CiSci.org folder for instructions*)

Verified samples were reported on CiSci.org on _____ date _____ by _____ signature of reporter _____

STEP 4 TAKING ACTION (*refer to page 3 of Project RED manual for instructions*)

Other Resources

PRINTED PUBLICATIONS

** Call Amanda Boyce (DNR) for these publications (608) 261-6450

- *Purple Loosestrife: A major threat to Wisconsin's Wetlands and Waterways.* WI-799-2007 **
- *Japanese Knotweed: A new threat to Wisconsin's Waterways, Lakeshores, and Wetlands.* ER-657-2007**
- *Invasive Plants of the Future.* ER-634-2005
- *Eurasian Water-milfoil/Northern Water-milfoil ID Cards* WT-394 **
- *Recognizing Eurasian Water-milfoil and Native Look-A-Likes* WT-783 **
- *Wisconsin DNR Wildcards ***
Eurasian water-milfoil WT-741-2003
Japanese knotweed ER-106V-2003
purple loosestrife WT-740-2002
common reed grass ER-106 W
zebra mussel WT-738 2002
curly-leaf pondweed WT-759 2003
VHS FH-930ww 2007
- *Wisconsin DNR Watch Cards ***
New Zealand mudsnail WT-844
zebra mussel WT-730
purple loosestrife WT-744
eurasian water-milfoil WT-745

ONLINE PUBLICATIONS

- *Aquatic Invasive Species Monitoring Procedures.* University of Wisconsin Extension Citizen Lake Monitoring Network Training Manual <http://www.uwsp.edu/uwexlakes/CLMN/AIS-Manual/AIS-CLMNmanual.pdf>

- UWEX and DNR Citizen Lake Monitoring Network Publications <http://www.uwsp.edu/cnr/uwexlakes/clmn/publications.asp>
- *New Zealand Mudsnail: A threat to Wisconsin's Waters.* WT-903-2008 <http://www.wisconsinrivers.org/>
- *Hydrilla Factsheet* WT-884 <http://dnr.wi.gov/invasives/fact/HydrillaFactsheet07.pdf>
- *Water-milfoil Turion Factsheet* WT-861 <http://www.uwsp.edu/cnr/uwexlakes/cbcw/Pubs/NWMTurions08.pdf>
- *Purple Loosestrife: A major threat to Wisconsin's Wetlands and Waterways.* WI-799-2007 <http://www.uwsp.edu/cnr/uwexlakes/CBCW/Pubs/new%20Purple%20Loosestrife.doc.pdf>
- *Keep A Lookout for New Aquatic Invasive Plants in the Midwest.* Midwest Invasive Plant Network. <http://mipn.org/Aquatics%20Early%20Detection%20Flyer.pdf>
- *Keep A Lookout for New Invasive Plants in the Midwest.* Midwest Invasive Plant Network. <http://mipn.org/New%20Invasives%20Flyer.pdf>

WEBSITES

- WDNR Invasive Species Webpage <http://dnr.wi.gov/invasives/>
- River Alliance of Wisconsin www.wisconsinrivers.org
- Midwest Invasive Plant Network www.mipn.org

Contacts

Laura MacFarland

AIS Project Coordinator
River Alliance of Wisconsin
(608) 257-2424 ext 110
lmacfarland@wisconsinrivers.org
www.wisconsinrivers.org

Alycia W. Crall

Citizen Science Program Coordinator
National Institute for Invasive Species Science
(970) 227-3310
crall@wisc.edu
www.citsci.org

DNR Regional AIS Verification Contacts:

Kris Larsen

810 W. Maple Street
Spooner, WI 54801
715-635-4072
kris.larsen@wisconsin

Sandy Wickman

107 Sutliff Avenue
Rhineland, WI 54501
715-365-8951
sandra.wickman@wisconsin.gov

Amy Lesik

1300 W. Clairemont Avenue
Eau Claire, WI 54701
715-839-2906
amyl.lesik@wisconsin.gov

Susan Graham

3911 Fish Hatchery Road
Fitchburg, WI 53711
608-275-3329
susan.graham@wisconsin.gov

Heidi Bunk

141 NW Barstow Street, Rm 180
Waukesha, WI 53188
262-574-2130
heidi.bunk@wisconsin.gov

Jay Schiefelbein

625 E. County Road Y, Suite 700
Oshkosh, WI 54901
920-303-5449 or 920-662-5175
jeremiah.schiefelbein@wisconsin.gov

Acknowledgments

Funding to produce this manual was provided by DNR Aquatic Invasive Species Grant AEPP 164-08.

Photographs courtesy of the River Alliance of Wisconsin if not noted otherwise.



PREVENT THE SPREAD

WIPE YOUR FEET INSPECT ALL EQUIPMENT INCLUDING YOUR BOOTS AND BOATS BEFORE AND AFTER MONITORING. CLEAN ALL PLANTS, ANIMALS AND MUD OFF.

BAG IT WHEN COLLECTING SAMPLES BE SURE TO BAG THEM IMMEDIATELY. DO NOT PLACE SPECIMENS IN THE BOTTOM OF THE BOAT TO BE BAGGED LATER. IT ONLY TAKES A FRAGMENT OF A PLANT OR ONE SNAIL IN MOST CASES TO START A NEW INFESTATION.

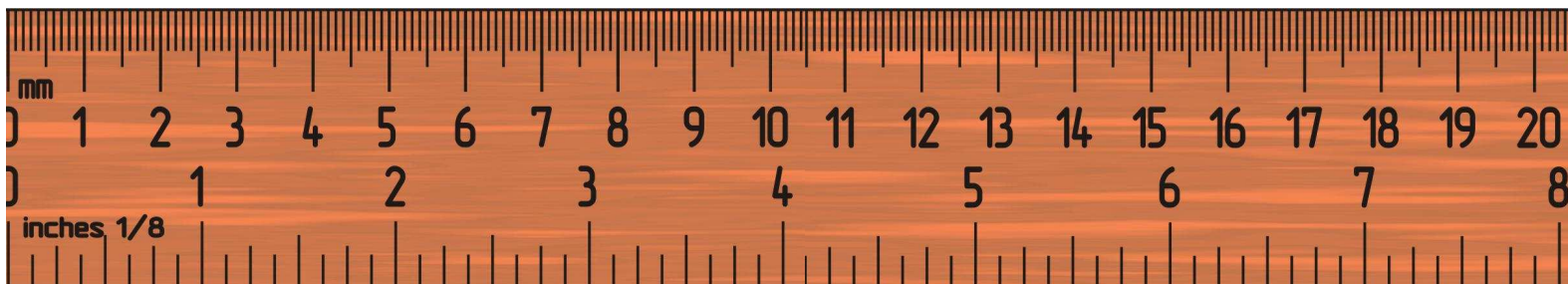
GO WITH THE FLOW MONITOR FROM UPSTREAM TO DOWNSTREAM TO HELP PREVENT THE INTRODUCTION OF INVASIVES IN THE HEADWATERS.

LOSE THE FELT FELT SOLED WADING BOOTS ARE MORE LIKELY TO HARBOR INVASIVE SPECIES. WE RECOMMEND USING HARD RUBBER BOOTS, NOT FELT.

LEAVE 'EM HIGH AND DRY LET ALL EQUIPMENT DRY BEFORE MOVING FROM ONE WATERBODY TO ANOTHER.

Remember only you can protect your waters and stop aquatic hitchhikers!

Visit www.ProtectYourWaters.net for more information.



Appendix F: New Zealand Mudsnail: A threat to Wisconsin's waters

New Zealand Mudsnail

(Potamopyrgus antipodarum)

A THREAT TO WISCONSIN'S WATERS

In 2005 the New Zealand mudsnail was found in Lake Superior in the Duluth-Superior Harbor. In 2007 ecologists at the Lake Michigan Biological Station discovered New Zealand mudsnails south of the Waukegan Harbor in Lake Michigan.

As of November 2008 they have not been documented in inland waters in Wisconsin. It is important that we be on the lookout and take the necessary precautions to prevent their spread to protect our fisheries and stream ecosystems.

These invasive snails from New Zealand have been spreading throughout the western United States since they were recorded for the first time in North America in 1987. In western streams mudsnails have been found to reach a density of a half million per square meter, frequently comprising over 95% of



*New Zealand mudsnails have been found in the Great Lakes Region. Scale is in millimeters.
(photo by Mike Gangloff)*

the invertebrate biomass in a river. This has devastating consequences to native mussels and other invertebrates populations, such as caddisflies and mayflies. Fish populations that depend on these natives as a food source are threatened as well.

Help prevent the spread....

- Inspect and remove visible aquatic plants, animals, and mud from waders, hip boots, and field gear before transporting
- Drain lake or river water from livewell and bilge
- Rinse waders, hip boots, and gear with hot water (113°F/45°C), or freeze gear
- Report new sightings by contacting Laura Herman, University of Wisconsin Extension, (715) 365-8998.

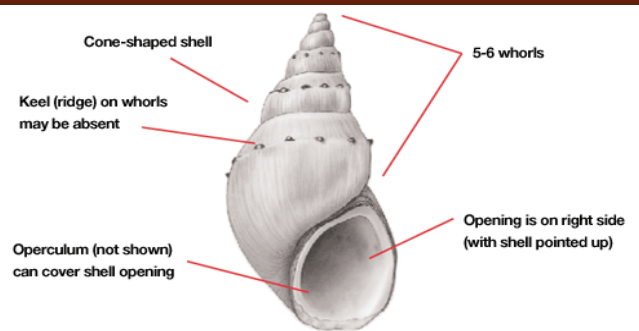


STOP AQUATIC HITCHHIKERS!

Prevent the transport of nuisance species.
Clean all recreational equipment.
Particularly waders/boots.
www.ProtectYourWaters.net

IDENTIFYING THE NEW ZEALAND MUDSNAIL

The mudsnail is very small typically ranging from 3 to 6 mm. They have brown or black cone-shaped shells with five to six whorls. Native snail are typically more elongated and have less whorls. The operculum is a hard "lid" that covers the opening.



Credit: U.S. Geological Survey

ECOLOGY



(photo by Dan Gustafson)

The New Zealand mudsnail inhabits both brackish and fresh waters. It can be found in estuaries, lakes, rivers and streams. It survives in waters with high and low calcium content, on hard and soft substrates, in turbid or clear water, and among vegetation. It is capable of tolerating a wide range of temperatures with upper thermal limits of 83°F and lower thermal limits near freezing allowing it to overwinter here in Wisconsin. It has a very high reproductive rate capable of producing 230 juveniles per year. It is asexual so one specimen has the potential of establishing a new population. It is classified as a scraper preferring diatoms, plant and animal detritus, and attached periphyton. It is a serious threat to native mollusks as it outcompetes them for resources and habitat.

STOP THE SPREAD

The mudsnail spreads through many mechanisms and it is not known if, how or when it may move from its known locations in the Great Lakes to nearby rivers and lakes. On its own it may move as much as 60 meters against current in 3 months. Salmon and other species of fish that migrate from the lakes up the tributaries may be the primary vector as the mudsnail is capable of passing through their digestive tract unharmed. Humans play a large role in its dispersal as it is transported to new basins on fishing waders and other recreational equipment. At cool temperatures, mudsnails can survive up to 25 days or longer (inside waders, in mud on wader boots, in the laces and tongue of wader boots, in live wells or in cooling systems). Simply drying gear is ineffective. To avoid spreading mudsnails **inspect and remove visible plants, animals, and mud from boats, waders, hip boots, and other gear** before transporting. **Drain lake or river water from boats. Rinse gear with hot water (113°F/45°C) or freeze gear before reuse.** Fishermen are encouraged not to use felt bottom wading boots as they are more likely to harbor mudsnails and other invasive species.



(photo by Dan Gustafson)

COLLECTING AND VERIFYING A SPECIMEN

Your help is needed to detect new infestations early to prevent spread throughout the state. Please become familiar with this species and be on the lookout while in the field, particularly in the Lake Superior and Lake Michigan watersheds. If you suspect that you have found a specimen, please...

- Confirm identification with this reference to be sure your snails are likely to be New Zealand mudsnails.
- Collect up to 10 of the suspect snails. Place them directly into a container of 70-95% ethanol (rubbing alcohol will also work) and place vials in the freezer. **DO NOT MAIL ALCOHOL, IT IS ILLEGAL.**
- Record exact location, collection date, approximate density and size of infestation. If possible, photograph the infestation.
- Contact Laura Herman, University of Wisconsin Extension, at (715) 365-8998 to arrange pick-up or delivery for verification.



Funding to produce this factsheet was provided by DNR Aquatic Invasive Species Grant AEPP 164-08.
DNR Publication WT-903

Appendix G: River and Wetland Invasive Plants

River and Wetland INVASIVE PLANTS*



COMMON REED GRASS 1,2



JAPANESE HOPS 3



JAPANESE KNOTWEED 2



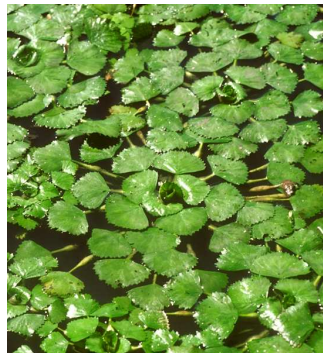
FLOWERING RUSH 1,2



CHINESE YAM 2



JAPANESE STILT GRASS 4



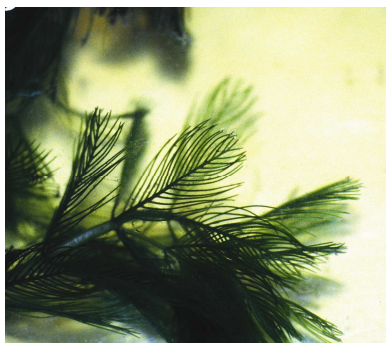
WATER CHESTNUT 5



HYDRILLA 6



PURPLE LOOSESTRIFE 2



EURASIAN WATERMILFOIL 7



CURLY-LEAF PONDWEED 7



BRAZILIAN WATERWEED 5

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Award No. 2005-45060-03346, acquired through the Urban Horticulture Team, UW Extension. Opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture. * Plants on this factsheet are early detection species. Report them immediately.

Photo Credits 1 Wisconsin Department of Natural Resources 2 Elizabeth Czarapata 3 David Eagan 4 North Carolina State 5 Anne Murray, University of Florida/IFAS Center for Aquatic and Invasive Plants 6 Vic Ramey, University of Florida/IFAS Center for Aquatic and Invasive Plants 7 Aquatic Eco-Systems, Inc.

River and Wetland INVASIVE PLANTS*

PHRAGMITES (*Phragmites australis*) **Perennial**, semi-aquatic grass, 6-13 feet tall in dense clones. Vegetative **spread** by rhizomes. **Leaves** are narrow to 30 inches long. **Flowers** are light brown to purple; silky hairs and spikelets form inflorescences that bloom July-September. Threatens shorelines, wetlands and disturbed areas. Both native and non-native Phragmites exist in Wisconsin.

JAPANESE HOPS (*Humulus japonicus*) **Annual, herbaceous vine** with downward pointing hairs along stem and petioles; climbs clockwise. **Leaves** are rough, have 5-9 lobes, and petioles are longer than leaves. **Flowers** are dull green with 5 petals in spikes that bloom July-October. Threatens floodplains, streambanks and lake shores.

JAPANESE KNOTWEED (*Polygonum cuspidatum*) **Shrub-like erect to arching perennial** 4-10 feet tall in dense rhizomatic clones. **Stems** are hollow, bamboo-like with swollen nodes. Alternate **leaves** are up to 6 inches long, broad, and oval with a pointed tip and flat base. Small white **flowers** clustered in erect racemes in leaf axils bloom in late summer. Threatens riparian corridors, wetlands, and disturbed areas. Spreads by stem/root fragments; possibly by seed.

FLOWERING RUSH (*Butomus umbellatus*) **Perennial emergent aquatic herb** 1-5 feet tall. Thin **stems** support pink to white **flowers** that have 3-6 petals 1 inch wide and bloom June-August. **Leaves** are narrow, up to 40 inches long, and have a triangular cross section. **Spreads** by rhizomes and stem fragments Threatens shallow water shoreline marshes, lakes and streams.

CHINESE YAM (*Dioscorea oppositifolia*) **Perennial herbaceous vine** climbs counter-clockwise to 15 feet. **Leaves** are opposite with alternate upper nodes, are tinted bronze to red in leaf joints, and are spear- or heart-shaped. **Flowers** are small, white-green, smell of cinnamon, and bloom June-July. **Spreads** by **bulbils**, which are small, potato-like organs in leaf axils that are apparent June-September. Threatens streambanks, floodplains, and moist forests.

BRAZILIAN WATERWEED (*Egeria densa*) Submersed, perennial, aquatic herb grows down to 20 feet. Stems may be branched. Resembles common Elodea canadensis, but these leaves are usually in whorls of 4 and very closely spaced. Bright green leaves are 0.8-1.2 inches long with finely serrated edges. Flowers rare. Spreads by fragments.

WATER CHESTNUT (*Trapa natans*) **Rooted, annual herb** that forms a leafy rosette that floats on the water surface. **Stems** are up to 16 feet long, and have 2 types of leaves. **Submersed leaves** are feathery, up to 6 inches long and are whorled the length of the stem. **Emergent leaves** are triangular, 1-2 inches long, and are waxy with serrated edges. **Leaf stems** have swollen bulbs that provide buoyancy. **Flowers** are small, white, and have 4 petals. Blooms late July to fall frost. **Fruit** is 1 inch wide nut with 4 stout barbs. **Spreads** by seed and plant fragments.

HYDRILLA (*Hydrilla verticillata*) Submersed, perennial, aquatic herb roots from inches to over 20 feet deep. Slender stems branch freely, often forming dense surface mats. Pointed leaves are 0.5-0.75 inches long. Resembles common Elodea canadensis, except hydrilla leaves have a serrated edge, barbs along the underside midrib and occur in whorls of 4. Spreads by fragments, turions and tubers.

PURPLE LOOSESTRIFE (*Lythrum salicaria*) **Perennial, semi-aquatic, emergent forb** is often in dense stands with woody roots. **Flowers** are purple, in spike-like inflorescences from 1 to 30 inches long, and bloom from July to September. **Leaves** are 1.5-4.5 inches long, finely hairy, lance-like, and usually opposite (sometimes whorled above). Threatens wet meadows, shorelines and shallow waterways.

EURASIAN WATER MILFOIL (*Myriophyllum spicatum*) Perennial, submersed aquatic herb rooted 2-15 feet deep. Stems branch freely and often form dense surface mats. Leaves in whorls of 4 with 12 or more pairs of leaflets and hang limply out of water. (Native milfoil leaves stout with 7-10 pairs, but hybrids occur.) Spreads by fragments.

CURLY-LEAF PONDWEED (*Potamogeton crispus*) Submersed, perennial, aquatic herb with flattened stems. Forms dense mats. Alternate leaves are 0.5-3.5 inches long, green-brown in summer with curly edges, and bright green and smooth in winter/early spring. Usually dies back in early summer. Spreads by root fragments and turions. Threatens water 3-10 feet deep.

JAPANESE STILT GRASS (*Microstegium vimineum*) **Annual grass** that looks similar to a small bamboo and forms dense mats. **Stems** are up to 40 inches long, root at stem nodes and are somewhat reclining. **Leaves** are light green, 4-5 inches long, lanceolate, and have a silver strip of reflective hairs on the slightly off center midrib. **Flower spikes** are 1-3 inches long, bloom in early fall, and produce large quantities of seed. Threatens floodplains, streambanks and forested wetlands.

Early detection is a must to prevent these species from becoming established in Wisconsin. Call the WDNR at (608) 267-7438 to report them or for more information.

Taxonomy references from Gleason & Cronquist's Manual of Vascular Plants of Northeastern United States and Robert W. Freckmann Herbarium, University of Stevens Point.

Prevent the Spread of River and Wetland Invasives!

- Remove any visible mud, plants, fish or animals before transporting equipment
- Eliminate water from equipment before transporting
- Clean and dry anything that came in contact with water (Boats, trailers, equipment, clothing, dogs, etc.)
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

* **Plants on this factsheet are early detection species.**

Appendix H: Didymo: A threat to Wisconsin's waters

Didymo / Rock Snot

(Didymosphenia geminata)

A Threat to Wisconsin's Waters

Didymo is an alga that historically was confined to cooler, low-nutrient waters. Although believed to be native to North America including the Great Lakes region, in recent years it has been found to occur at nuisance levels in nutrient rich streams and rivers expanding its ecological range and tolerance throughout the world.

Didymo forms dense mats that can be over 6 inches thick smothering streambeds, aquatic plants, insects and reducing fish habitat and food. In excess it has the ability to alter foodweb interactions with macroinvertebrates and alter the hydraulics of streams

and rivers.

In addition to the aforementioned ecological impacts, Didymo also can have regional economical impacts. It can clog and foul water intakes, hamper the use of river water in supply systems and decrease sport fishing opportunities.

Extensive blooms have been known to cover several miles of water ways, making it nearly impossible to eradicate once it is well established.

Despite the damage done by Didymo to other species, it does not threaten the safety of drinking water or produce an offensive odor. Overall, it is not considered a significant human risk.

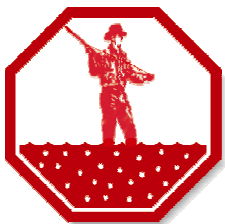


(photo by Nicholas Bach)

Currently nuisance blooms of Didymo are found in nineteen states including Idaho, Montana, Colorado, South Dakota, Arkansas, New York, and West Virginia. It has not been found in Wisconsin. There is a non-nuisance population in Lake Superior off of the coast of Ontario.

If Didymo finds its way into Wisconsin's waters it will likely be introduced on recreational equipment, such as waders or boats brought from infested areas.

Learn how to recognize Didymo and report any sightings immediately by calling (715) 365-8998.

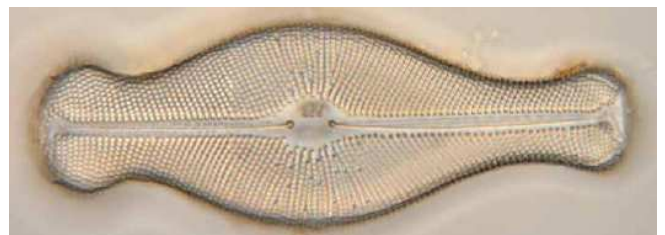


**STOP AQUATIC
HITCHHIKERS!™**

Prevent the transport of nuisance species.
Clean all recreational equipment.
Particularly waders/boots.
www.ProtectYourWaters.net

Identifying Didymo

A microscopic Didymo cell, seen to the right, creates an extracellular stalk that forms thick, nuisance masses which comprise the clumps pictured above. The clumps, often mistaken for raw sewage, are yellow-brown to white color and have a texture that is similar to wet wool, not slimy.



*Single cell of Didymo as seen through a microscope
(photo by Sarah Spaulding)*

Biology and Habitat



(photo by Tim Daley)

Didymo is a diatom, a single-celled alga that grows an extracellular stalk that is resistant to degradation in streams. In Colorado, stalks persist up to 2 months, long after the cells are gone. The accumulation of these stalks is what you see in the pictures to the left and below. Historically, the ideal habitat for Didymo was a clear, cold, nutrient-poor, shallow stream or river that received lots of sunshine. Didymo now thrives in a diverse range of physical and chemical conditions. It is found where both phosphorous and nitrogen are in low and high concentrations. It may be found in slow or fast moving, shallow or deep waters. Large nuisance blooms are frequent in rivers below impoundments where flow and temperature are more constant. Waters that are subject to reoccurring large floods are less susceptible to large blooms as scouring floods tend to keep nuisance levels down.

Stop the Spread: Check, Clean and Dry

Humans are believed to be the primary vector spreading Didymo. Anglers, boaters and other recreationists can unknowingly spread microscopic algae which cling to fishing gear, waders, boots and boats from one waterbody to another hundreds or thousands of miles away.

Only one microscopic cell is needed to begin a new infestation. Didymo can survive in cool, dark, damp environments for at least 40 days.

To avoid spreading Didymo, check, clean and dry equipment.

CHECK: Inspect and remove visible plants, animals, and mud from boats, waders, hip boots, and other gear before transporting.

CLEAN: Drain lake or river water from boats. If you have any reason to believe that you might have come in contact with infested waters scrub and soak gear for at least 1 minute in a 2 percent bleach solution (approximately 1 cup bleach and 3 gallons of water) or in very hot soapy water for 30 minutes.

DRY: Dry equipment thoroughly.

Fishermen and others are encouraged to avoid using felt bottom wading boots as they remain moist longer and are more likely to harbor Didymo cells, other invasive species and viruses than hard rubber soled boots. If you do use felt boots, soak them in hot soapy water for 30 minutes after use and allow to dry for 48 hours.



(photo by Environment Canada)

Don't Spread Didymo

- ◆ Remove plants, mud and water from all gear,
- ◆ Scrub and soak in very hot soapy water for 30 minutes, or 1 cup of bleach and 3 gallons of water for at least one minute,
- ◆ and dry all equipment thoroughly.

Report It

Your help is needed to detect new infestations early to prevent spread throughout the state. Please become familiar with this species and be on the lookout while in the field. Report any suspect findings!

If you suspect that you have found Didymo, please contact Laura Herman, University of Wisconsin Extension at (715) 365-8998 immediately.



RIVER ALLIANCE
of Wisconsin



Funding to produce this factsheet was provided by DNR Aquatic Invasive Species Grant AEPP 164-08.
DNR Publication WT-910