Invasive plant species have become the bane of wilderness landscapes throughout the world, but wetlands are among invasive plants’ most vulnerable victims. Just six percent of the world’s land mass is covered in wetlands, yet 33 percent of the world’s most invasive plant species are wetland invaders. The impact of invasive plants on a wetland can be devastating. Rather than adding to the diversity of a wetland they tend to take over, creating plant monocultures and a decline in overall plant and animal diversity.

Many factors can increase wetland vulnerability to invasive plant infestations. High road densities, ditches, culverts and increased nutrient loading due to human activities, for example, have been correlated with high prevalence of invasive plants in wetlands. There is also some natural variability in wetland vulnerability to invasive plant species. For example, wetlands fed by runoff tend to be more vulnerable to invasive plants than wetlands fed primarily by rainfall or groundwater. And wetlands in large watersheds are more vulnerable than wetlands in small watersheds.

A great deal can be determined about the biological integrity of a wetland by inspecting its plant community. As primary producers, plants provide the platform that supports other biotic communities in a wetland. Wetland managers and biologists throughout the state have identified invasive plant control as key to maintaining wetland integrity. But invasive plants cannot be controlled without knowing the extent and location of infestations. Early detection of new infestations is particularly valuable. Invasive plant eradication efforts tend to be most successful and cost effective when an infestation has only recently established itself in a location and colonies remain small. And if you are monitoring a wetland in which invasive removal efforts are taking place, monitoring can also help gauge the effectiveness of the removal efforts being used.

Coordinating volunteers to monitor invasive plants in wetlands has the added benefit of contributing to a network of passive detectors throughout the state. Volunteers trained to identify and report invasive plant infestations for surveys are empowered to also identify and report infestations they fortuitously detect while conducting other activities.

“Early detection of new infestations is particularly valuable.”

Purple loosestrife
Jeffrey J. Strobel
About Invasive Plant Surveys

Invasive plant monitoring is one of the most valuable site-level activities wetland volunteers can support, but requires volunteer coordinators to select survey methods that will best suit their wetland type from methods being used in other landscapes. As with many other monitoring activities, methods for monitoring invasive plants are less developed for wetlands than they are for other landscapes. No standard protocols have been developed for monitoring Wisconsin’s wetlands for invasive plants. Fortunately, there are many resources and experienced invasive plant monitors throughout the state to help coordinators determine the best survey methods for the unique hydrological conditions and invasive plants present in their wetland.

Generally, invasive plant monitoring is separated into programs that address aquatic plants or terrestrial plants. Wetlands straddle this divide, but each can lean a bit more toward one side of the divide or the other depending on the wetland type it represents. To determine the best methods for monitoring invasive plant species in your wetland, examine a variety of invasive plant monitoring efforts as examples. In Wisconsin, one of the best models for wetland volunteer coordinators trying to develop invasive plant monitoring may be Project RED (Riverine Early Detectors), a collaborative project developed by the River Alliance of Wisconsin, Wisconsin Department of Natural Resources and National Institute for Invasive Species (see Informational Resources on back page). Project RED recruits volunteer support to monitor invasive species along Wisconsin rivers. Information about Project RED can be found on the River Alliance of Wisconsin Web site, which is also a great place to find references to many other useful informational resources including contacts for Wisconsin invasive plant experts and educational events.

Networking is also an important part of establishing a robust invasive plant-monitoring project. Many volunteers and professionals are collaborating throughout the state to prevent the spread of invasive plants and are eager to help more people become involved. A network of support might include Project RED coordinators, Department of Natural Resources invasive species staff, University of Wisconsin-Cooperative Extension basin educators and Wisconsin regional and county plant group members. In Wisconsin there are ten regional or county invasive plant groups, the contacts for which can be found on the Invasive Plants Association of Wisconsin Web site (see Informational Resources on back page).
When monitoring invasive plants, your list of supplies can be as basic as you need it to be. A volunteer monitoring group could get by with as little as a few maps, rubber boots, identification materials, clipboards, data sheets and writing utensils.

But volunteers who also have access to a global positioning system (GPS) unit and a camera can enhance their surveys. A GPS unit will enable volunteers to map infestations precisely, including the boundaries of large infestations and patches of invasive plants that are small and inconspicuous. If you don’t have your own GPS unit to equip volunteers, you can borrow one from one of 20 technology libraries around the state (see IPAW under Informational Resources on back page).

Cameras can enhance monitoring by providing volunteers with an easy means of documenting and confirming identification of infestations. Volunteers can also confirm identification by pressing and drying specimen samples, which requires pieces of corrugated cardboard, newspaper and string. If you have additional resources, you might want to purchase commercially manufactured plant presses, which will enable volunteers to press plants faster. And if your wetland includes standing water you might also want to provide rubber boots, hip waders or canoes so volunteers may more thoroughly cover the wetland. Rubber boots and waders should have solid bottoms rather than felt soles. Felt soles can harbor invasive plant seeds and spread them throughout the wetland.

Finally, you may also want to provide volunteers with towels or brushes for wiping down shoes when moving away from an infestation. This will help prevent the spread of invasive plants to not yet infested areas of the wetland.

Survey Participants

A volunteer invasive plant monitoring team should have a leader with relatively strong identification skills, while other members can get by with basic identification skills. If you begin your invasive plant-monitoring project with an expert survey to determine what invasive species are present and what new infestations your wetland might be vulnerable to, subsequent surveys can focus on the invasive plants of greatest concern for your wetland. Consequently, volunteers may only need to learn 12 to 16 invasive plants, a manageable number for most volunteers. Volunteers may need to learn several additional plant species to be able to distinguish target species from similar looking species. It is helpful to have some volunteers who know more invasive species than required for identifying the survey’s target species. Volunteers with strong identification skills are more likely to detect invasive plant species of concern, but not previously encountered in the wetland or on the survey target list.

If you begin your invasive plant-monitoring project with an expert survey, volunteers may only need to learn 12 to 16 invasive plants.

Finally, volunteers must be properly trained to use any maps or forms being used to document observations. And if your surveys employ a GPS unit, you will need a team leader who can provide volunteers with basic GPS training.
The best periods for surveying invasive plant species vary according to species. Reed canary grass, common reed grass and non-native cattails, for example, are best monitored in the early spring or in the fall when other plants are browning. Purple loosestrife is best monitored in late summer when it is flowering. Garlic mustard and Canada thistle are best monitored in the spring when actively growing. Finally, buckthorn and honeysuckle can be monitored in the spring, summer or fall.

With at least one survey taken in the spring and a second in mid-summer, volunteers should be able to detect a range of invasive plant species that satisfies the needs of your monitoring effort. If you have sufficient volunteer support, conducting additional surveys throughout the growing season can improve detection and better track the spread or retreat of infestations.

The best way to begin your invasive plant monitoring project is with an expert invasive plant survey determining which invasive plants are most likely to be problematic in your wetland. An expert survey can also help you identify hotspot areas where the wetland is most vulnerable to invasive species. You can recruit invasive species expertise by networking with the invasive species organizations, groups and DNR staff mentioned in About Invasive Plant Surveys (page 2). For subsequent surveys conducted by volunteers, it is a good idea to designate survey routes. Routes are usually established as a series of transects through the wetland. To minimize the impact of surveys on the landscape, some invasive plant monitoring projects recommend establishing transects along already existing trails, roads, rivers, streams and railroad corridors. Additionally, if your wetland includes hotspots of vulnerability to invasive plants you may want to design routes to concentrate volunteers’ monitoring activities in these areas.

If surveys are not conducted carefully they can also adversely impact the wetland by helping invasive plants spread to new areas. To avoid facilitating the spread of invasive plants in the wetland, surveying volunteers should periodically stop to inspect clothing and shoes and remove any seeds and other plant matter. This is particularly important when volunteers have just encountered an infestation.
Identification

Once you determine which invasive plants your monitoring project will target, provide volunteers with target species identification materials and identification field training. For invasive plant identification materials see the DNR’s invasive plant species Web site. The DNR provides a long list of fact sheets and multi-species identification sheets for invasive plants found in Wisconsin. Identification sheets include a picture reference sheet identifying 32 invasive plant species that are either commonly found in or have the potential to become widespread in Wisconsin wetlands.

The identification sheets provide useful quick guides and the factsheets more detailed invasive plant profiles. Factsheets for each of the survey target species will help volunteers better identify the plants they are looking for. They also cover plants that are not on the identification sheets.

You may also want to provide volunteers with a copy of *A Field Guide to Invasive Plants of Aquatic and Wetland Habitats for Michigan*. This field guide can be downloaded and printed for free, and provides identification keys for obligate wetland and aquatic species, and upland species with a tendency to spread into wetland areas. Although the guide was developed for monitoring in Michigan wetlands, Wisconsin wetlands face many of the same invasive plant species threats it addresses.

Volunteers should also be instructed to confirm and document their identifications, particularly when they have found a species of plant on the DNR watch list (see Informational Resources on back page). To confirm and document identifications, volunteers should take photographs and plant samples that can be examined by an expert. To adequately identify invasive plants using photographs, experts will require multiple photographs capturing key identification features. Identifying features might include, but are not limited to, branching patterns, buds, roots, flowers and seed heads. When photographing, volunteers should also place a coin or pencil alongside the plant for scale.

Experts confirming identifications using volunteer-collected voucher specimens require specimens that include distinguishing plant features. If the plant is small enough, volunteers should sample the entire plant. Otherwise multiple samples may be needed to adequately represent distinguishing features. Volunteers should preserve specimens in a plant press as quickly as possible.

As mentioned earlier, plants can be pressed either using an improvised plant press made of corrugated cardboard and newspaper or with a commercially manufactured plant press. When using an improvised plant press, sandwich specimen clippings between newspaper and cardboard layers and tie them together.

### SHORT LIST OF INVASIVE PLANT SPECIES COMMONLY FOUND IN WISCONSIN WETLAND AREAS:

- Canada thistle
- Common buckthorn
- Common forget-me-not
- Common teasel
- Cut-leaved teasel
- Dame’s rocket
- Flowering rush
- Garden valerian
- Garlic mustard
- Glossy buckthorn
- Honeysuckle
- Hybrid cattail
- Japanese knotweed
- Moneywort
- Narrowleaf cattail
- Purple loosestrife
- Reed canary grass
- Watercress
When volunteers have completed their fieldwork, newspaper and cardboard-layered specimens should be placed under a heavy object such as a large rock. To facilitate drying, newspaper layers should be changed as the specimens dry. To ensure sampled plant data stays with the appropriate specimen, include data sheets in the plant press with the specimen.

Dried specimens can be sent to the DNR for identification confirmation, secured between two sheets of cardboard tied together and placed in an envelope. For a specimen mailing address refer to the DNR’s Invasive Plant Report Form and for more on preserving voucher specimens see the DNR’s invasive plants Web site (see Informational Resources on back page).
To document the invasive plants surveyed, we recommend volunteers complete and submit DNR Invasive Plant Report Forms. The forms can be downloaded and printed from the DNR’s Web site (see Informational Resources on back page).

One form should be filled out for each invasive species observed. For each species, the form asks for the date of the observation, a description of the size and density of the infestation, location landmarks and geographic coordinates for the locations in which it was found. The form suggests three ways in which the geographic coordinates of invasive observations can be documented.

Once completed, the forms can be sent to the address listed on the form. The DNR will then enter the information into the National Institute of Invasive Species Science database, where the data can be stored and made publicly accessible. Data submitted to the DNR is also sometimes used in state volunteer efforts to eradicate and monitor selected invasive plant species.

The leafy plant clusters are purple loosestrife in the spring, before flowering.
INFORMATIONAL RESOURCES

Wisconsin Department of Natural Resources (WDNR) invasive plant species Web site

The WDNR Web site provides quick-guide identification sheets and fact sheets for identifying invasive species present in Wisconsin, including invasive species that threaten Wisconsin wetlands. [http://dnr.wi.gov/invasives/plants.asp](http://dnr.wi.gov/invasives/plants.asp)

The WDNR has created an Invasive Plant Report Form for reporting invasive plant species. We recommend volunteer wetland groups use these forms to report their survey observations. Data submitted using the forms is entered into a database of invasive plants species.


The WDNR has also produced a watch list of invasive plant species of special concern, [http://dnr.wi.gov/invasives/futureplants/target.htm](http://dnr.wi.gov/invasives/futureplants/target.htm)

Invasive Plant Association of Wisconsin (IPAW) Web site

This non-profit organization helps facilitate the exchange of information regarding invasive plant management and control and its Web site is a good place to find invasive plant workshops, symposiums, distribution maps, useful contacts and other resources for invasive plant monitoring groups. [http://www.ipaw.org](http://www.ipaw.org)

The IPAW Web site also includes a list of Wisconsin Regional and County Weed Groups and their contact information, [http://www.ipaw.org/other_groups.aspx](http://www.ipaw.org/other_groups.aspx), and lists Wisconsin technology libraries, where monitoring groups can borrow global positioning system (GPS) units. [http://www.ipaw.org/science/techlibraries.aspx](http://www.ipaw.org/science/techlibraries.aspx)

Project RED

This River Alliance of Wisconsin project was developed to support invasive species monitoring of rivers throughout the state, including the monitoring of 15 species of invasive plants.


This field guide was developed to support invasive plant monitoring activities in wetland and aquatic habitat areas of Michigan. The guide provides identification keys for obligate wetland and aquatic species, and upland species with a tendency to spread into wetland areas. It can be downloaded and printed free of charge from MSU Extension at:


March 2011

Project coordination by the Rock River Coalition and Suzanne Wade, UW-Extension Basin Education Initiative. Researched and written by Patrice Kohl

With editorial contributions from Courtney LeClair, Wisconsin Department of Natural Resources invasive plant educator; and Pat Trochlell, Wisconsin Department of Natural Resources wetland ecologist. Editorial assistance by Marie Martinelle and graphic design by Jeffrey J. Strobel, UW-Extension Environmental Resources Center. Photography by Jeffrey J. Strobel except where otherwise noted.

Project funded through a DNR Citizen-Based Monitoring Partnership Program Grant with support from University of Wisconsin-Extension.

University of Wisconsin, U.S. Department of Agriculture and Wisconsin counties cooperating. An EEO/AA employer, University of Wisconsin Extension provides equal opportunities in employment and programming, including Title IX and American with Disabilities (ADA) requirements.