

# **Friends of Lake Wingra Watershed Management Plan—Invasive Species**

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## **Purpose of this plan**

This plan is submitted in partial fulfillment of a Wisconsin Department of Natural Resources (DNR) Lake Management Planning grant awarded to the Friends of Lake Wingra (FOLW). The plan is intended to address a critical need for widespread participation of citizen and partner groups in the development of a comprehensive, integrated plan for the control of invasive species in the Lake Wingra watershed.

The plan recommends planning values and management principles for consideration by watershed residents, businesses and municipalities. The plan outlines a comprehensive, strategic approach to invasive species management in Lake Wingra and its surrounding watershed. The plan recommends a range of management actions and it provides land managers, neighborhood groups and citizens with the tools for developing appropriate tactics to encourage native species and discourage pest species. The plan recommends short-term, mid-term and long-term management actions.

## **Watershed description**

Lake Wingra has a surface area of 140 hectares, a mean depth of 2.7 m and a maximum depth of 4.3 m. The watershed has a total area of 14 km<sup>2</sup>, with about 75% of that area urbanized. Although located in an urban setting with a well-established residential and commercial development, almost all of the shoreline is undeveloped and much of the total land area is green space occupied by urban parks, golf courses and the UW Arboretum.

## **FOLW Concerns about invasive species**

“The aquatic and wetland vegetation of the Lake Wingra watershed has changed considerably since European settlement, both as a result of major hydrological changes and the introduction of aggressive exotics species. There has been a decrease in diversity of submerged aquatic vegetation; a reduction of the extent of emergent aquatic/shallow marsh vegetation (and extirpation of wild rice); a significant decline in sedge meadow area; decrease in area, altered hydrology, loss of organic soil, and decrease in species diversity of fens; and a complete loss of tamarack stands and associated bog flora. At least 13 plant species are known to have been extirpated from the watershed, and at least one state-threatened species, white lady slipper (*Cypripedium candidum*) is apparently increasingly rare.” (Lake Wingra Watershed: A New Management Approach, Institute for Environmental Studies (IES) 1999.)

## **FOLW Values for Managing Invasive Species**

To address these problems, FOLW recommends that the following planning values and management principles be adopted by watershed residents, businesses and municipalities.

**Prevent—to the extent possible—the entry and establishment of invasive plants and animals into the watershed.** FOLW supports the continued enforcement of City of Madison regulations that prohibit the sale and cultivation of the known invasive plant, purple loosestrife. FOLW supports educational and outreach programs that inform watershed residents of native alternatives to known invasive plants. Support efforts by the DNR to prevent the spread of zebra mussel to inland lakes such as Lake Wingra.

**Control or eradicate invasive plant and animal species.** Coordinated efforts with a watershed perspective should be made to develop site-specific invasive species management plans for public and private lands for the watershed's most troublesome invasive species. The heavily urbanized watershed is a continual source of pest plant seeds and re-infestation, confounding the best efforts of citizens and land managers to halt their spread. There are countless invasive plant species reproducing in the Lake Wingra watershed but only about two dozen are the target of active management by individuals, neighborhood organizations, friends groups and public land agencies. (Glass, 1997). Land managers are unable to focus on controlling more than a few pest species at one time—thus they continually loose ground against the advance of invasive species.

**Native habitat restoration.** Improve natural habit through increased planting of native species, restoration of degraded habitat and reversal of ecosystem damage and system alteration caused by storm water and invasive species. Because removal of invasive species is a necessary—but not sufficient—step towards ecosystem recovery, active efforts must be taken to restore ecosystem structure, function and diversity on both a site-specific and watershed-wide basis.



**Breached storm water detention facility (Pond #4) in South East Marsh.**

**Improve storm water management practices in the watershed.** Immediate steps should be made to: **a)** eliminate erosion caused by overland storm water flow; **b)** decrease overland flows and increase infiltration of rainfall where it falls; and **c)** improve the management of impervious surfaces to capture nutrients and sediment before they flow into Lake Wingra, and **d)** repair existing storm water detention facilities. Seeds and other propagules of invasive plant species are transported by overland storm water flows.

Storm water itself disturbs natural communities and creates openings for invasive species. The nutrients and sediment loads carried by storm water further create conditions that are favorable for invasive plant species.

**Examples of existing invasive species management problems.**

In addition to the examples cited above, Lake Wingra and its watershed experience the following stresses:

- “Continued invasion of exotic plant species pose additional threats to habitat and water quality. Buckthorn (*Rhamnus sp*) and honeysuckle (*Lonicera x bella*) near the lake edge and in upland areas, reed canary grass (*Phalaris arundinacea*) in sedge meadows and marshes, and hybrid cattails (*Thypha x glauca*) in shallow marshes, all have large populations in or around Lake Wingra and are serious problems. Sedge meadows, formerly common, have been reduced to a few stands that are seriously threatened by invasion of these exotics.” (Lake Wingra Watershed: A New Management Approach, 1999.)



**A monotypic stand of reed canary grass that has overrun a former high-quality sedge meadow in South East Marsh. Viewed from the breached detention pond in previous photo and looking toward Carver St. and WHA radio tower.**

- A population of purple loosestrife (*Lythrum salicaria*), apparently an escape from a neighborhood garden, has become well-established in the Edgewood marsh. Since its discovery in the mid-1990’s, Edgewood College has worked in collaboration with the UW Arboretum and the WDNR to control this population. This population continues to serve as a source of infection for the rest of the watershed
- Garlic mustard and dame’s rocket continue to reproduce in the watershed and expand their ranges.
- Reed canary grass inhabits virtually every wetland in the watershed and is now invading dry upland woodlands throughout the watershed. Traditional management approaches such as prescribed fire only seem to encourage its spread.



**Reed canary grass monoculture (light-colored vegetation on right) in a drainage swale running through the center of Curtis Prairie, looking west towards Curtis Pond.**

- Several new invaders have entered the watershed recently, including: porcelain berry (*Ampelopsis brevipedunculata*) and castor-leaved aralia (*Calapanax* species).
- Research has identified common carp (*Cprinus carpio*) as contributing directly to the turbidity of Lake Wingra and indirectly to the loss of its macrophytes.

#### **Examples of Current Management Strategies and Actions**

- Aggressive control efforts in the watershed are holding garlic mustard and dame's rocket invasions at bay; they are confined to discrete, disjunctive populations but the species remain unpredictable.
- Public awareness of the extent and nature of the invasive species problem is increasing. FOLW has established good working relationships with "friends" groups, neighborhood associations and healthy lawn teams
- Citizen participation in public and private efforts to remove invasive plants and cultivate natives is increasing.
- Public land agencies are increasingly using strategic approaches to pest plant control that are guided by comprehensive weed management plans. These plans prioritize actions and spell out strategies and tactics for weed control.
- University of Wisconsin researchers are trying to understand the dynamics and ecology of pest plant invasions and their impacts on plant communities.
- Applied research is developing new and improved control efforts.
- Edgewood College and UW-Madison researchers and educators conduct outreach efforts to educate watershed residents about the impacts of invasive exotics; conduct classes on control efforts; and promote native alternatives to invasive exotics.
- University staff provide opportunities for faculty, staff and students and other watershed residents to get on-the-job training in methods of pest plant control and restoration techniques.

## Goals for improved invasive species management

1. Implement a comprehensive, watershed-wide invasive species management plan that results in control or eradication of targeted species (purple loosestrife, buckthorn and reed canary grass, for example) and reduction in distribution and density of selected other species (garlic mustard, dame's rocket, Japanese knotweed, etc.). Integrate and coordinate, to the extent feasible, planning for storm water management and control of invasive species. Recommended objectives include improved vegetation management and invasive species control on neglected public rights-of-way, storm water drainage ways and storm water detention facilities.



**Buckthorn (*Rhamnus cathartica*) forest typical of those in Lake Wingra Watershed. *Rhamnus* alters soil chemistry and microfauna and shades out native wildflowers.**

2. Increased public, private and citizen participation in promoting a healthy Lake Wingra. Increased capacity for long-term collaboration and integration of planning and management among public, private and citizen partners on high leverage, site-specific invasive species infestations. This would result in implementation of best management practices at specific sites that represent particular invasive species problems and/or opportunities. These opportunities include, but are not limited to:
  - Eradication of purple loosestrife in Edgewood Marsh and elsewhere in the watershed.
  - Prevention of zebra mussel infestation through public education and boat washes at infested Wisconsin lakes to prevent transport to Lake Wingra.
  - Control or eradication of reed canary grass in Lake Wingra wetlands.
  - Population suppression of carp (*Cyprinus carpio*) in Lake Wingra.
3. Develop a pilot neighborhood project for control of invasive plant species and restoration of native habitat in a community public space. Provide assistance in

developing community plans for control of invasive species, restoration and management. Neighborhood segments along the SW Bike Pedestrian Path corridor provides numerous opportunities for such projects. Projects at a particular site may have a more or less informational and educational purpose but they will also result in significant reductions of invasive species infestations.



**Honeysuckle (*Lonicera x bella*) thicket. Areas such as this harbor garlic mustard and dame’s rocket, few native wildflowers and provide inferior wildlife habitat.**

4. Educate and train watershed residents in the concepts and implementation techniques of environmental stewardship of the Lake Wingra watershed. New or heightened skills would include ecological literacy, and strategies and techniques for habitat conservation, preservation and restoration. A “backyard habitat audit” that would inventory, map and report on the status of invasive species is a good example. The idea aims to build the capacity of individuals and community groups to identify future, unanticipated environmental problems and craft solutions for them.

Obviously, a citizen stewardship pilot or demonstration project such as this could be combined with a physical demonstration project but with the desired outcome being to build the in the capacity of watershed residents to identify and address environmental problems, in general in addition to addressing a particular site-specific problem—likely partners include: neighborhood associations; healthy lawn teams, schools, friends groups, other.

5. Increase public, private and citizen’s group partnerships to coordinate and expand outreach and education about invasive species management and native habitat restoration. There is a wealth of talent and expertise in the watershed and beyond already at work on invasive species management. Active groups and potential partners include, but are not limited to, the Invasive Plant Association of Wisconsin (IPAW); Wild Ones; Madison Area Weed Warriors, City of Madison Parks, Dane County Parks, Wisconsin DNR, etc.

## **Rationale for recommendations**

These recommendations were informed, in part, by the strategic weed management planning done by the UW-Madison Arboretum, the Wisconsin Department of Natural Resources, Bureau of Endangered Resources and the U.S. National Park Service. The Arboretum work provides a template the site-specific invasive species management planning recommended in this document and includes a priority ranking of some of the most serious pest plant species in the watershed. For those interested in the specifics of such work, a detailed description is found at the end of this plan.

## **Site-specific recommendations for possible actions**

### **Demonstration projects**

#### **1. Odana Ponds SW Bike Path drainage way (immediate action)**

Purple loosestrife (and nearly a dozen other non-native invasive plants) grow in the drainage way that parallels the bike path from south west of Hammersley Road. Runoff associated with rainfall events and periodic discharges of industrial waste water from plants along the drainage way disperses seeds of these plants throughout the west watershed. There is potential for purple loosestrife seeds to be carried into Lake Wingra. It does not appear that the vegetation along this drainage way is managed.

**Recommendation:** All purple loosestrife plants should be eradicated. Public land management agencies should be encouraged to mow the swale at least once a year to prevent invasive plants from setting seed. A vegetation management plan for the drainage way should be written. The plan should include target population levels for the most troublesome invasive species and a strategic and tactical work plan for achieving the goals.

#### **2. The Edgewood Marsh (immediate action)**

A well-established population of purple loosestrife was discovered in the Edgewood Marsh (1 ha) in 1996, having apparently originated from seed transported on storm water from a neighboring garden, possibly a decade earlier. The distribution pattern is dense, with about 70% of the population found in a relatively small area (about 200 m<sup>2</sup>) near the north end of the marsh. There is reduced density of purple loosestrife toward the fringes of the marsh. The population has spread toward the shoreline, and there is imminent potential of spread throughout wetlands surrounding the lake. Isolated individual loosestrife plants of uncertain origin have been discovered in wetlands on Edgewood and Arboretum property.

Early control efforts from 1996 through 1998 consisted of cutting and application of a 50% solution of roundup to stems. These efforts resulted in temporarily reduced loosestrife densities. However, consistent resources were not available to adequately control the spreading population. Since 1999 purple loosestrife beetles have been released into the marsh with cooperation of the DNR purple loosestrife bio-control program. Beetle populations have been established and have resulted in damage to loosestrife

plants in the area of densest growth. However, given the large seed bank and the absence of a supplemental and systematic mechanical control program, the loosestrife population has spread.

### **Suggested control strategy**

Research has shown that generally within 4 to 5 years after initial release, purple loosestrife beetles bring a dense loosestrife population down to the point where seed production is so low that it no longer poses a threat to nearby un-infested areas (Woods, personal communication, 2002.)

However, on the margins of infested areas, where the loosestrife population is too low and scattered to support a predatory beetle population, mechanical and cultural control methods are required. This situation is found on the lake and shore sides of the Edgewood Marsh. These scattered, and hard-to-find plants pose the greatest threat of escape and infestation of nearby areas. In this area, systematic, routine and careful scouting and monitoring by trained volunteers and land care managers is required. Mechanical, cultural and chemical controls will be dictated by the extent of the population and the time, energy and resources available to the land care managers.

It is recommended that Edgewood, in cooperation with the DNR purple loosestrife bio control program develop target purple loosestrife population levels, and a range of acceptable variation around these targets, for the marsh. Edgewood managers should continue to use predatory beetles in the main body of the densest loosestrife population. Within this containment zone, managers may choose to remove the flowers but leave the plants to support the beetle populations. A rigorous monitoring program should be established to evaluate the success of the bio control program and to inform management decisions.

A systematic, rigorous surveillance program, perhaps using watershed volunteers should be enough to keep tabs on the fringe areas. Here again, a set of target population levels should be established; fluctuations around this target level will trigger management action. The exact management action will depend upon the time, energy and resources available to managers and to the degree of threat posed by the population.

Precautions should be taken to ensure that as little harm as possible is done to the marsh during the efforts to control purple loosestrife. Steps should be taken to minimize walking in the marsh, soil disturbance, dispersal of seeds and trampling of native vegetation during monitoring and control. Managers might consider such things as temporary, “floating” walkways or small, portable lookout platforms as ways to avoid or lessen impact on the marsh.

### **3. SW Bike Path and Glenway (mid-term action)**

The SW Bike/Pedestrian path has been identified as a potentially important demonstration area.



The SW bike path itself is a major environmental corridor for the movement of storm water and pest plants through the watershed and into Lake Wingra. Most of the invasive plant species in the watershed are also found along the path. The storm water management plan has identified a number of storm water erosion gullies intersecting the bike path that carry sediment and seeds of pest species to Lake Wingra. Trees and shrubs under public utility lines along the bike path are currently managed on a regular basis.

In addition to the bike path's biological importance, it is a social and cultural corridor—a community even. The bike path connects most of the neighborhoods in the Lake Wingra watershed and is used for transportation, recreation and socializing by many of the watershed's residents. The bike path has a friends group that is active in invasive species control and planting of native species. FOLW has a good working relationship with members of the friends group.

**Recommendation:** Work with the Friends of the SW Bike/Pedestrian Path to help them build their organizational capacity; help the group develop habitat restoration and invasive species management plans; help organize community efforts to control pest plants and restore native habitat. Build on the already strong relationship with City agencies and develop partnerships with other land managers such as utility companies.

#### **4. Lake Wingra Marshes (mid-term)**

The FOLW storm water management plan recommends that “Maintenance and repair of storm water infrastructure in the UW Arboretum is needed to reduce habitat degradation and nutrient and sediment transport to the lake.” For example, unabated storm water (due to a by-pass channel around detention pond #3 and a breach in the berm of detention pond # 4) is a factor responsible for the spread of reed canary grass and hybrid cattail in South East Marsh. The advance of these two species threaten high quality marsh.



**Reed canary grass and urban storm water detritus such as pop cans and golf balls, are now common in South East Marsh.**

**Recommendation:** Support recommendations of FOLW storm water management plan. Encourage development of restoration plans for the marshes. Coordinate with UW-Madison Arboretum on development of a comprehensive storm water management plan and support efforts to develop innovative solutions such as infiltration to handling storm water flows.

## **6. In-lake invasive species management (long term)**

### Common carp

Evidence from research projects around the world suggests that the presence of common carp (*Cyprinus carpio*) is the primary cause of poor water clarity and loss of native macrophytes in shallow, eutrophic lakes such as Lake Wingra. “Introduction of the benthivorous common carp has been identified as one of the main causes of loss of biodiversity and water clarity in numerous shallow lakes worldwide” (Zambrano, et al 2001). The literature also shows that when carp are removed lake clarity improves (Meijer, et al, 1990.) However, other researchers (Zambrano and Hinojosa, 1999) have shown that there are many direct and indirect effects and complex interactions of carp removal on water turbidity, zoo plankton and macrophyte and benthic communities.

Since introduction of the fish to Lake Wingra in the mid-1880’s, there have been repeated attempts to control this invasive species. Carp denudes the lake bottom of aquatic plants and re-suspends sediments so that water clarity is constantly compromised. The last intensive removal effort took place in the 1950’s and carp quickly regained its place as one of the dominant fish species in the lake (University of Wisconsin, Institute for Environmental Studies, 1999.)

Baumann, et al (1974) in the classic Lake Wingra case history indicates that carp removal is not benign to other aquatic life forms. These authors suggest that “to be effective, management plans must consider the entire fish community and the total ecosystem.”

**Recommendations:**

Friends of Lake Wingra support an integrated approach to reducing the impact of carp.

Outreach--The fact that carp are over-abundant in Lake Wingra and the specific consequences of this for water and habitat quality need to be effectively communicated to the public as part of ongoing outreach that identifies community goals for the lake. In the long run, the watershed community will have to weigh the alternatives and decide what control measures might be acceptable or desirable.

Research—We support proposals to study the recovery of native macrophytes and fish species through the use of carp-proof exclosures that are compatible with other lake uses. This might provide the community with a pilot demonstration of what the lake could be like without carp.

Eradication—At this point in time, maintaining a carp-free environment over the long term does not, seem feasible because the occasional inundation of the Wingra dam provides access to the Lake by other carp populations. This view may change and in the future, with new information, eradication may seem more feasible and might be considered. Furthermore, the wholesale poisoning of all fish species, with subsequent reintroduction of those deemed beneficial, may not be compatible with the community’s vision of lake stewardship. In addition, carp removal may be a necessary step but will not be sufficient to allow native aquatic plants to re colonize if they are not already present in the lake.

Population suppression--FOLW supports efforts to suppress the carp population through methods that do not threaten other fish and plant species. These methods might include:

- Periodic commercial seining to remove large numbers of carp. This can be timed for minimum impact on macrophyte populations and provide a way to monitor trends in carp population.
- An on-going cash bounty on carp taken from the lake by hook and line, or bow and arrow. This approach engages the community, provides incentive for sport fishing and maintains continued pressure on declining carp population with no damage to other fish species.
- Further study and community discussion and agreement on goals and actions.

Canada geese (*Branta canadensis*)

Urban populations of the giant Canada goose (*Branta Canadensis maxima*) have increased dramatically in recent decades throughout North America, creating frequent

goose-human conflicts (Smith, et al, 1999). Geese have become increasingly adapted to urban and suburban environments, often breeding in cities. In 2002 in Vilas Park, there were 23 adult resident (locally nesting) giant Canada geese; they produced 33 young (Lorman, 2003); in addition there were 100 to 700 migrating geese during the same period. In Vilas Park in November of 2002, the 23 adult resident geese produced an average of 100 lbs dry-weight feces per acre.

Year-round resident populations of this species cause shoreline erosion which sends sediment and nutrient loads to the lake, and an accumulation of feces which contributes bacterial contamination to Lake Wingra. In addition, geese can transmit diseases to other animals and are known to attack people, especially during the nesting season.



**Spring Trail Pond. Shoreline erosion caused by resident (non –migratory) Canada geese and mallards.**

**Current management actions**—the Madison City Council has created an ad hoc committee on integrated waterfowl management. This committee has recommended various educational and outreach efforts; creation of scientific protocols to study the local situation and careful consideration of management strategies. Researchers at Edgewood College conduct population counts and document the effects of geese in Vilas Park.

### **Recommendation**

FOLW recommends that the giant Canada goose populations in the watershed be managed to reduce their impact on the lake and watershed. These steps should be taken.

- Friends of Lake Wingra support the work of the Madison City Parks Department and its partners in their efforts to find an integrated approach to geese management.
- Desired population levels should be set for Vilas Park and other locations in the watershed.
- Experiment with management/control strategies to reduce geese and mallard populations.

- Enforce existing regulations that prohibit the feeding of geese and mallards.
- Restore shoreline vegetation to stabilize banks, reduce erosion and discourage flocks of these two species.

### **Example template of an invasive species management plan**

The first rule of invasive species management is to keep them out. When that fails the goal becomes early detection and quick eradication (Simberloff, 2002). If invasive species become established or cannot be eradicated—such as may be the case with some species in the watershed—the goal is to manage the population at acceptably low levels. The purpose of an invasive species management plan is to provide overall strategy and tactical guidance to achieve these aims.

The keys to success in invasive species management are to commit adequate resources at the outset; lay down clear lines of authority for the management program; identify the vulnerable aspects of target species; and establish a positive, can-do attitude.

Thus, an invasive exotic or pest species management plan is a comprehensive, coordinated and strategic approach to planning for early detection, control and management. It is designed to guide efforts at a variety of scales—from a whole-site, or larger basis, down to the individual management unit, such as a city park, a block or two on a neighborhood street or a backyard. However, an invasive species management plan is only one tool, only one part of a comprehensive and effective restoration plan—removal of pest species is a necessary step but it is rarely a sufficient one.

An invasive species management plan helps managers by: focusing time and energy; establishing criteria by which to evaluate efforts; setting the agenda for public debate and; coordinating efforts.

An effective and efficient management plan is adaptive and contains these elements:

- Goals that are specific, measurable and achievable
- Is based upon an inventory of the current situation
- Rank orders priorities
- Assesses options for action
- Develops an implementation action plan with clearly articulated strategies, objectives, methods and techniques
- Monitors efforts and evaluates results
- Refines goals and objectives based upon monitoring and evaluation

An invasive species management plan can be either simple or complex based upon the number of sites or management units, the number of different goals and objectives, the number of invasive species it contains and the seriousness of the infestations. At a minimum, an invasive species management plan for a lake and watershed system with multiple, and possibly conflicting goals and objectives—such as may exist in the Lake Wingra basin should consider these factors:

1. The seriousness of the ecological impact of the species.
2. The degree of threat posed to the site and its goals.
3. The ease of control efforts, and
4. The likelihood of success at controlling the species.
5. The affect of one action on the rest of the ecosystem.

These five factors can be boiled down to a simple, two-variable scheme: low or high threat and easy or hard to control, adapted from Reiner and Gregory (2000). As explained later, degree of threat combines measures of potential impact and significance of impact. Ease of control is a measure of feasibility of control and likelihood of reinvasion (abundance within and near the resource.) Such a simple scheme (Table 2) allows managers to rank-order priorities for immediate and long-term weed control. Thus, those species that pose the highest threat to the resource and are the easiest to control are tackled first, while those species that are of little threat and are easy to control are left for last.

This comprehensive approach to, invasive species management planning will require managers to:

- Plan activities within the context of approved biological management plans or community goals.
- Identify the most threatening invasive species.
- Prioritize management needs.
- Develop strategies that assess the impacts of invasive species control.
- Explicitly state goals and objectives that describe the desired end-states or products of the restoration and the ways in which invasive species control will help achieve those goals.
- Resist activities that exacerbate invasions and domination.
- Co-ordinate invasive species management on a whole-site basis.
- Evaluate and modify management goals and objectives regularly.

Dozen of species of pest plants occur in the Arboretum (Glass, 1997). For the purposes of this plan 16 species have been identified that are reproducing on-site and are expanding their ranges. These species warrant active management. Examples include buckthorn, honeysuckle, garlic mustard and reed canary grass. Other species, such as castor-leaved aralia, Japanese knotweed and porcelainberry are suspected of being invasive and are on a “watch list”.

A risk analysis (Figure 1) was performed on the 16 species. The risk analysis form was developed by Acadia National Park (Reiner and Gregory (2000) and modified from Hiebert and Stubbendieck (1993). Because we are performing essentially a risk triage of already-established species to develop management priorities, instead of gauging the potential of these species to invade the Arboretum, we used only three of the four categories ranked in the Acadia National Park form. The results of the risk analysis are found in Table 1.

Scoring was a combination of objective assessment based upon the literature and subjective estimates based upon personal experience and observation. Results of the scoring were used to complete the pest plant risk ranking matrix ( Table 2) Different rankers may obtain different scores and different rankings but the exact scores and ranks are not as important as the relative scores and rankings which are used to establish management priorities.

### **Using the risk ranking system**

Because the pest plant risk ranking matrix yields relative results that are particular to the site and regional area in question, the results may guide management activities at any scale. The results obviously help set management priorities and guide weed control efforts on a whole-site scale but they may also guide work on the smaller management-unit basis or on the larger cross-boundary regional scale.

In this risk assessment scheme, purple loosestrife ranks high both in significance of impact and in feasibility of control. This combination of rankings places purple loosestrife in the first priority category—meaning that of all the weeds to worry about, this one will receive attention before all others; it will be hit early and often.

### **Steps to Implement FOLW Invasive Species Management Recommendations**

- 1) Continue to inventory the watershed
  - Document all new outbreaks of invasive species.
  - Identify specific, high-leverage opportunities for controlling invasive species or reducing their impact.
  - Support efforts to develop site-specific invasive species management plans.
- 2) Develop an implementation strategy
  - Prioritize management recommendations to guide funding and implementation over the next five years.
  - Set objectives for each site that are specific, measurable and achievable over a specific period of time.
  - Work to manage invasive species at specific sites that have particular problems and/or opportunities and where such changes will have significant positive impacts on the watershed.
  - Encourage state holders to restore native habitat in areas degraded by invasive plants and animals.
- 3) Educate stakeholders
  - Help public and private partners build capacity for developing management and implementation plans.
  - Sponsor training sessions on pest species identification and control techniques.
  - Create educational and outreach programs that help build ecological literacy.

- 4) Continue research on effective invasive species control techniques and impacts of invasive species on the watershed ecosystems.
- 5) Promote coordination of invasive species management planning among public agencies and private partners.
- 6) Evaluate impacts of efforts

**Expected Outcomes of Improved Invasive Species Management.**

- 1 Prevention the establishment of new, potentially invasive species such as porcelain berry and zebra mussel through early detection—and swift elimination—of new outbreaks of invasive species.
- 2 Halt to the spread, then control or eradication of the highest priority invasive species.
- 3 Reduction in the size, number and aerial extent of lower priority invasive species populations.
- 4 Improvement in quality of native habitat.
- 5 Restoration of marshes and fens, and prairie and savanna, for example that have been degraded by invasive species.



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