
12. AQUATIC INVASIVE SPECIES

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Status

All aquatic invasive species monitoring efforts listed below are currently in place. The year that sampling was established for each species is indicated under “Monitoring Design”.

Monitoring Objectives

Clean Water Act Objectives

- Supporting the implementation of water management programs
- Supporting the evaluation of program effectiveness

Fisheries Objectives

- Compiling input for developing management recommendations

Specific objectives

- Documenting presence/absence of reproducing populations of aquatic invasive species in water samples
- Determining population densities after an infestation has occurred
- Tracking the spread of aquatic invasive species in state waters
- Assessing how effective information and education strategies and watercraft inspection efforts are at slowing the spread of these aquatic invasive species.

Monitoring Design

Because monitoring designs for aquatic invasive species depend on the species being sampled, each sampling effort is described separately.

- Zebra mussels**— Zebra mussels are sampled for both veligers (larvae) and adults. Precursors of the zebra mussel monitoring program began in the early 1990s, with sampling of adults established around 1993 and veliger sampling established around 1995. Veliger samples are collected at three different locations in a lake (different bays, basins or high use mid-depth sites) using a 50 cm diameter, 64 micron mesh plankton net. The three samples are collected from a particular lake on three dates between June and September (for a total of nine samples per lake). Adult sampling for zebra mussels is done primarily with substrate samples using four square plates that are 6”, 8”, 10” and 12” in size. The substrate sampler is usually hung from a pier or other structure found in the water or can be attached to a float or buoy to suspend the sampler in deeper water. Two samplers are placed at different locations in the lake with one sampler being removed and analyzed every four weeks and with the second one remaining in the water for the entire monitoring season. Over 100 lakes were sampled in 2007 for veligers and adults. Lakes are sampled based on boat traffic patterns and the likelihood of infestation based on such factors as the proximity to other infested waters, the size of the waterbody or hydrologic connection to an infested waterbody.
- Spiny water fleas**—Spiny water flea sampling was established in 2004. Samples are collected on a lake at a minimum of three dates during the summer from June through September. Within each lake, three different locations are sampled, ideally including the deepest point of the lake and areas near boat landings. Samples are collected using a large diameter (0.5 to 1 meter opening) zooplankton net with a mesh size of 250 microns. Over 100 lakes were sampled for spiny waterfleas in 2007. Many of the same lakes that are sampled for zebra mussels are also sampled for spiny waterfleas.

- c. **Rusty crayfish**—Rusty crayfish sampling was established in 2004. Samples for rusty crayfish are collected on both lakes and streams using minnow traps. Bait is placed into a standard wire-caged minnow trap. About 5-10 traps are placed at each sample site depending on the habitat and trap availability. As an alternative to using traps, a dip net or seine net is an effective field sampling method for rusty crayfish. Sampling continues until 20-30 crayfish have been collected or when 40 minutes have elapsed, whichever comes first, and the species collected are identified to determine whether rusty crayfish are present. Other water quality measurements (dissolved oxygen, conductivity, pH and temperature) are taken and recorded with the crayfish monitoring. Over 100 waterbodies representing a variety of ecosystem types and habitats were sampled in 2004 for rusty crayfish. Starting in 2007, Department staff has discontinued monitoring for rusty crayfish and this sampling effort is being conducted by volunteers only.
- d. **Eurasian water milfoil**—Monitoring for Eurasian water milfoil has been ongoing since the 1960s, with sampling protocols changing over time. Sampling is currently conducted primarily by volunteers but WDNR staff also conduct some monitoring. Sampling is done at least once or twice during the summer by viewing aquatic plant beds with polarized sunglasses or an Aqua-Scope under water view scope. Volunteers are asked to send in completed forms each time they sample for Eurasian water milfoil, regardless of whether the species is found. If volunteers think they have found Eurasian water milfoil in their lake, they note the plant's location and collect a specimen of the plant and send it into their local WDNR service station for verification. In some cases, hybrids of Eurasian and northern water milfoil have been found in the same lake. If there is any doubt whether the species is Eurasian water milfoil or a hybrid, the WDNR sends the specimen to a University expert, who uses a process known as genotyping for verification.
- e. **Invasive fish species**—Invasive fish species are sometimes captured as part of the statewide baseline fisheries monitoring activities of lakes, streams, and rivers, described in Tier 1 of this *Strategy*. Invasive fish species found as part of baseline collection efforts are recorded in the Fisheries Management Database, and Lake Michigan fisheries assessment data are stored in the Fish Tracking System. However, there are currently no active efforts through Baseline Tier 1 monitoring to analyze invasive fish data or track the spread of invasive fish species in Wisconsin. However, invasive fishes are also captured as part of other assessments or special studies, including Mississippi River studies and Great Lakes assessments. For instance, standard transects along the Mississippi River are used for Asian carp surveillance, and treatments for grass carp are conducted when problem areas are detected.

Core and Supplemental Water Quality Indicators

The core information is whether or not a waterbody is infested and with what species. Supplemental information would indicate the level of infestation (i.e., a pioneer versus a full-blown infestation).

Quality Assurance

Monitoring efforts for aquatic invasive species is not covered under the Department's QMP or QAPP. However, quality assurance measures are in place. Training is conducted over a two-day period each spring for both WDNR field staff and contract employees conducting aquatic invasive species monitoring. All procedures are documented in the *Watercraft Inspector Resource Handbook – Invasive Species Program, 2007*. In addition, all plant specimens are verified by UW-Stevens Point staff, and analytical work for spiny water fleas and zebra mussels is conducted by regional WDNR staff. Any suspected infestation sites are verified through additional WDNR staff field visits.

Data Management

The DNR has developed a new data system for tracking aquatic invasive species. It is called the Surface Water Integrated Monitoring System (SWIMS). This database was developed through 2005 and 2006 to hold a variety of water monitoring data, including AIS monitoring and watercraft inspection data. A second area of SWIMS holds information on water resources of interest, including AIS infestation lists, while a third area holds information on management actions such as AIS sign postings. The goal of SWIMS is to provide a

“one-stop”, centralized location for AIS data and management programs for the DNR, its partner organizations, and the general public. SWIMS utilizes a combination of an Oracle database for tabular data, and geographic information system (GIS) technology to store spatial data. Thus, it can be used to track what waters have been monitored for AIS and where the monitoring took place, which waters are infested with a particular species and where they are located, and any management actions that have taken place to address an infestation.

Currently, SWIMS is being used to actively manage Eurasian water-milfoil (EWM) and zebra mussel (ZM) monitoring and infestation data. The EWM and ZM infestation lists and maps included in this report are generated from SWIMS data. Live data from SWIMS is accessible to the public through the DNR Water Division’s interactive mapping application, called the Surface Water Data Viewer. The EWM/ZM data are located in the Resource Management Data folder in the list of layers on the site. Users can get details on individual infested waterbodies there, or can link to the DNR’s invasive species web pages (<http://dnr.wi.gov/invasives>) for more information. With this approach, users no longer have to wait for an annual infestation list to be compiled to see if a waterbody of interest is infested – it will display on the map as an infestation as soon as monitoring indicates an infestation and the data are entered into the database. The Surface Water Data Viewer in SWIMS is available online at <http://dnrmaps.wisconsin.gov/imf/imf.jsp?site=SurfaceWaterViewer>.

The SWIMS framework is able to hold data on many other invasive species, and data on other aquatic invasive species such as curly-leaf pondweed, purple loosestrife, and rusty crayfish will be migrated into the system. The management actions area is currently under development and will contain information on AIS sign postings and aquatic plant management. The Surface Water Data Viewer will continue to act as the primary public conduit to SWIMS data.

Data Analysis/Assessment

For zebra mussels, criteria have been developed to determine when to include a waterbody on the infested waters list. For a waterbody to be considered infested with zebra mussels, the data has to show that there is a reproducing population. Generally speaking, that means that veligers and adults are present in a lake at levels that can support reproduction. In most cases, the listing decision relies on the best professional judgment of the area biologist and the central office program coordinator. None of the other invasives that are currently being monitored have listing criteria established.

Once a waterbody is determined to be infested, the local lake association/lake district and any major water users are notified to take precautionary measures against spreading the species. Warning signs are posted, information and education efforts may be increased, and follow-up monitoring is often conducted.

Reporting

The data on aquatic invasive species is reported in the 305(b) report and a report to the Legislature and Governor. The 305(b) report contains a listing of the species of concern (currently only zebra mussels and Eurasian water milfoil) and distribution maps showing the location of infested waters where sampling has occurred for these species. A biennial report to the Legislature and Governor, published in March, 2007, provided an updated listing of waters that had zebra mussels, Eurasian water milfoil, rusty crayfish, and curly leaf pondweed as well as distribution maps. The report also includes a listing by county of waterbodies with posted signs and a log of all the watercraft inspection efforts. The report is available online at <http://dnr.wi.gov/invasives/aquatic/resrep.htm>. Distribution maps and infestation lists may be developed for other species as additional data becomes available.

Programmatic Evaluation

Over the longer term, the Center for Limnology will build databases on aquatic invasive species distributions. A GIS-based data management system will utilize existing invader distribution data compiled from various

sources. The emphasis will be on compiling data on multiple invaders, since it is more cost-effective than focusing on a single invasive species.

The data sets will be used to develop models on invader occurrences and identifying vulnerable aquatic ecosystems. The models will help guide future monitoring and detection efforts. For example, lakes predicted by the model as vulnerable to invaders would be targeted in a focused prevention program.

The DNR will continue to analyze a small number of the 474 waters confirmed to have Eurasian water-milfoil populations to determine whether they have the hybrid. The cost of conducting the DNA analysis will be covered by the lake associations. In addition, the DNR will work with local lake organizations to conduct research on possible chemical and biological control options.

General Support and Infrastructure Planning

There is about \$100,000 allocated for aquatic invasive species monitoring on an annual basis. This covers time for the field staff to conduct the monitoring, funding for traveling and equipment and analytical costs. About 20 seasonal staff-conducted monitoring efforts took place in 2007 for the species discussed above.. Laboratory analyses are conducted by one seasonal WDNR staff person, and the costs are minimal. Rusty crayfish analysis is currently being done as part of a contract with the UW Center for Limnology. Funding for baseline monitoring covers any invasive fish species data collected as part of those programs. Currently, very little monitoring is being done for most of the aquatic invasive plants like purple loosestrife and curly leaf pondweed. To adequately monitor for all aquatic invasive species in the state would require a substantial increase in funding to about \$500,000 annually. The Department would like to develop an early detection sampling effort statewide for all aquatic invasive species so that rapid response strategies can be implemented where there is a reasonable chance of such actions being effective. To implement such an effort would be costly given the number of waterbodies in the state and the likelihood of new introductions.

Program Gaps

The aquatic invasive species program was developed in 2002 and the key elements to manage AIS are already in place. However, there are future needs that, if implemented, will increase program efficiency and effectiveness including the following:

- *Improving rapid response efforts* – Aquatic invasive species are frequently misidentified and the information necessary for responsive management is spotty. This leads to poor documentation and delays in rapid response. There is a need to hire professional survey crews to respond to citizen sightings of AIS. In addition these crews would respond to community requests to confirm new infestations, quantify the extent of an invasion, evaluate the threats posed, determine the prospects for early control, and provide baseline information for smart prevention. Crews would be required to enter their findings in a statewide database, which would serve as a common platform for both local community action and state decision making. These survey crews could be funded by contracts from the AIS grants.
- *Providing technical assistance to local units of government* – There are no frontline regional AIS specialists that can coordinate watercraft inspection efforts, participate in community-based planning and prevention projects and oversee control projects. There is a need to hire from 3 to 6 regional aquatic invasive species specialists that can deliver effective and timely technical support and respond to community-based action proposals. The technical assistance positions could be funded in part by making 10% of the AIS grant funds available to DNR for support costs.
- *Assisting AIS grant efforts for Northern Wisconsin* – Nearly 90% of the AIS grant awards are made to local communities in northern Wisconsin; in the last round of the grants, there were 30 new projects. This relatively new and escalating grant program has overwhelmed the staff specialist who must process the claims, make payments and perform fiscal management on other lake planning grants. There is a need to

remove the AIS grant bottle neck in northern Wisconsin by hiring a full-time grant specialist. A potential source of funding could be from authorizing 10% of the AIS grant fund to be made available to DNR for support costs.

- *Enhancing watercraft inspection enforcement efforts* – Currently very little enforcement effort is directed at aquatic invasive species by Conservation Wardens. Since the illegal to launch law took effect in 2001, no new enforcement positions have been authorized, and only two citations have been issued by wardens. Limited term employees (LTEs) with law enforcement credentials should be hired in the summer months as part of a “Boat Ambassador” program. These LTEs would be stationed throughout the state in areas with high AIS infestations. The boat ambassadors would work with watercraft inspectors to raise public awareness of the problems of aquatic invasive species. In addition, they would be responsible for enforcing the regulations that prohibit the launching of a boat with aquatic plants attached. The Boat Ambassador proposal is recommended for funding as part of the Governor’s biennial budget.
- *Improving inspection efforts at the boat landings* – Clean Boats Clean Waters volunteers are burning out, and it is getting increasingly more difficult to recruit staff on infested waters like the Great Lakes. Based on DNR boater surveys, the data results show that one-on-one boater contact with the watercraft inspectors is the most effective way to get boaters to clean their boats and equipment. If we are to effectively slow the number of infested waterbodies, a doubling of the number of paid watercraft inspectors (from about 25 to 50) will be needed in the future. The increase in staffing would be used to hire additional DNR staff and University interns to inspect watercraft at all the infested and high boat traffic lakes on a regular basis. The total increase in costs for the additional watercraft inspectors would be \$150,000 annually. Part of the increase in funding would be used for printing additional informational and educational materials for distribution at boat access sites. Potential funding sources are the Water Resources Account or a boat trailer registration fee.
- *Researching smart prevention and control techniques* – Applied research to identify which lakes and streams are most vulnerable to invasion and developing innovative approaches for controlling invaders is essential to preventing new invasions and dealing with those that are already causing problems. Research includes determining the extent of current invasions, investigating the factors that lead to species introductions, identifying the most vulnerable waters in order to target prevention efforts, evaluating control strategies using whole lake community-based case studies to determine the effectiveness of different approaches, and conducting an economic study to determine the cost AIS are having on Wisconsin. These applied research efforts, to be conducted by UW and DNR, would cost approximately \$260,000 over the next biennium. Funding could be obtained through the water resources account or through a boat trailer registration fee.
- *Expanding purple loosestrife biocontrol efforts* – Very little recent data exists to determine the effectiveness of the Galerucella beetles. There is a need to survey the state for purple loosestrife to determine the impact of biocontrol on a landscape/watershed scale. In addition, beetle rearing efforts need to be expanded by targeting teachers and students in areas where more control effort is required. Approximately \$65,000 should be allocated annually to enhance this very important element of the AIS program. The source of this funding could come from the Water Resources Account or from a boat trailer registration fee.

References

Watercraft Inspector Resource Handbook – Invasive Species Program, Section 10: Invasive Species Monitoring, Wisconsin DNR, 2007. <http://www.uwsp.edu/cnr/uwexplakes/CBCW/handbook&forms.asp>

The 2005-2006 Biennial Report to the Governor and Legislature on controlling Aquatic Invasive Species in Wisconsin’s Waters, Wisconsin DNR, 2007. <http://dnr.wi.gov/invasives/aquatic/resrep.htm>