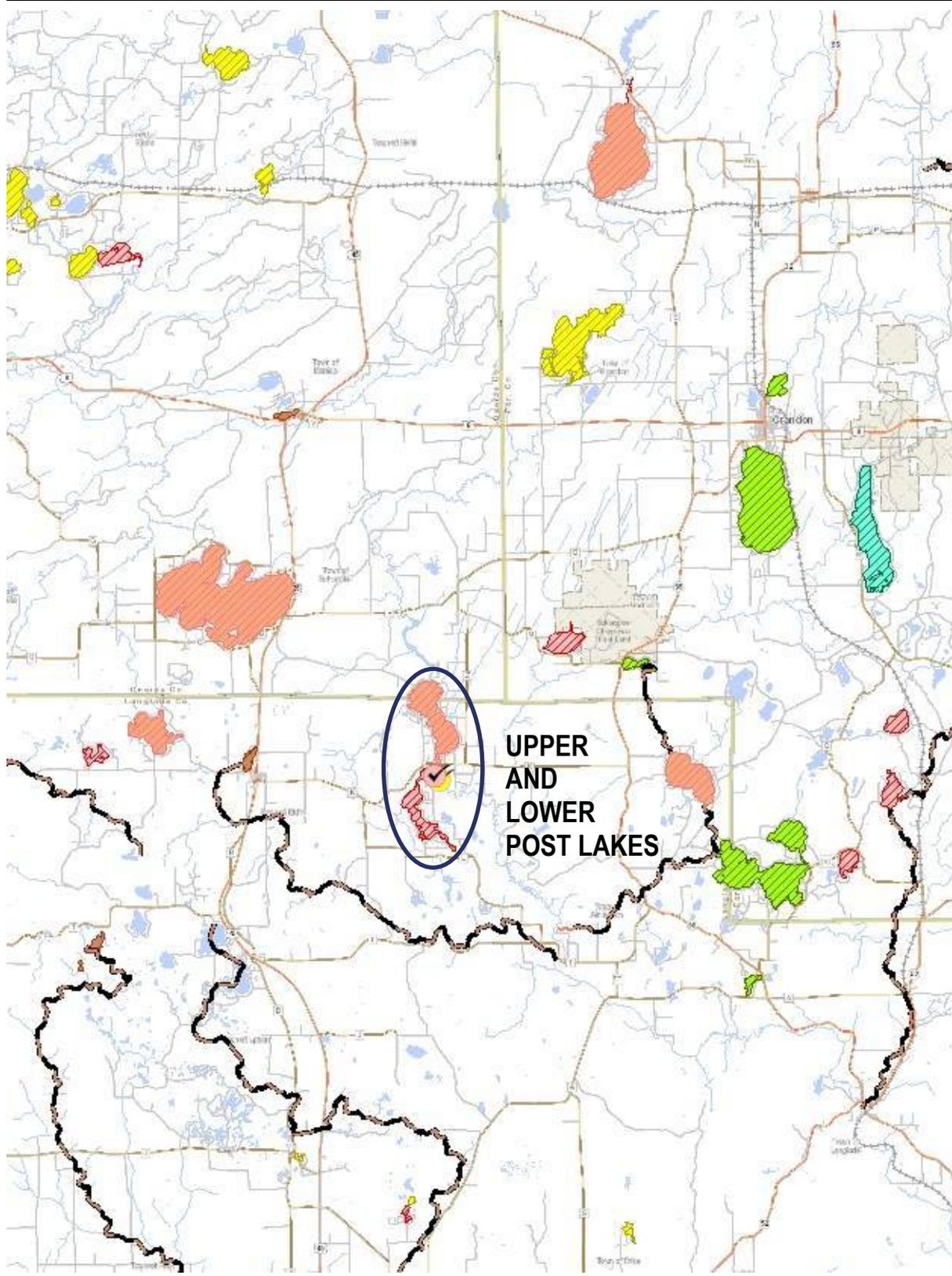


APPENDIX C

Importance of Aquatic Plants
Aquatic Invasive Species



AIS Near Upper and Lower Post Lakes



Legend

- Verified CLP Points
- Verified CLP Lines
- Verified CLP Areas
- Verified EWM Points
- Verified EWM Lines
- Verified EWM Areas
- Verified Hybrid Water-Milfoil Po
- Verified Hybrid Water-Milfoil Li
- Verified Hybrid Water-Milfoil Ar
- Rainbow Smelt Point
- Rainbow Smelt Lines
- Rainbow Smelt Areas
- Verified Goby Points
- Verified Goby Areas
- Verified Banded Mystery Snail
- Verified Banded Mystery Snail
- Verified Banded Mystery Snail
- Verified Chinese Mystery Snail
- Verified Chinese Mystery Snail
- Verified Chinese Mystery Snail
- Verified Rusty Crayfish Points
- Verified Rusty Crayfish Lines
- Verified Rusty Crayfish Areas
- Verified Zebra Mussel Points
- Verified Zebra Mussel Lines
- Verified Zebra Mussel Areas
- County Boundary
- Municipality
- State Boundaries
- County Boundaries

Major Roads

- Interstate Highway
- State Highway
- US Highway

County and Local Roads

- County HWY
- Local Road
- Railroads



NAD_1983_HARN_Wisconsin_TM

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: <http://dnr.wi.gov/legal/>

Notes

AQUATIC PLANT TYPES AND HABITAT

Aquatic plants can be divided into two major groups: microphytes (phytoplankton and epiphytes) composed mostly of single-celled algae, and macrophytes that include macro algae, flowering vascular plants, and aquatic mosses and ferns. Wide varieties of microphytes co-inhabit all habitable areas of a lake. Their abundance depends on light, nutrient availability, and other ecological factors.

In contrast, macrophytes are predominantly found in distinct habitats located in the littoral (i.e., shallow near shore) zone where light sufficient for photosynthesis can penetrate to the lake bottom. The littoral zone is subdivided into four distinct transitional zones: the eulittoral, upper littoral, middle littoral, and lower littoral (Wetzel, 1983).

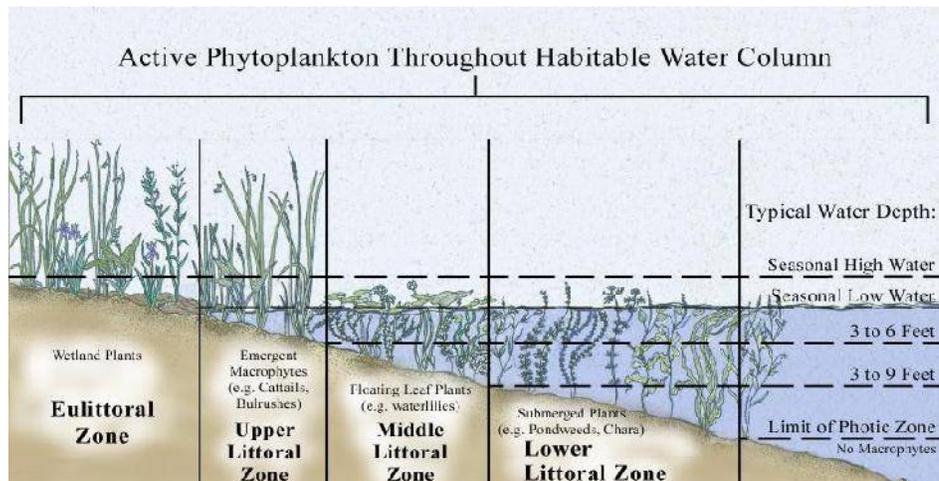
Eulittoral Zone: Includes the area between the highest and lowest seasonal water levels, and often contains many wetland plants.

Upper Littoral Zone: Dominated by emergent macrophytes and extends from the shoreline edge to water depths between 3 and 6 feet.

Middle Littoral Zone: Occupies water depths of 3 to 9 feet, extending deeper from the upper littoral zone. The middle littoral zone is often dominated by floating-leaf plants.

Lower Littoral Zone: Extends to a depth equivalent to the limit of the photic zone, which is the maximum depth that sufficient light can support photosynthesis. This area is dominated by submergent aquatic plant types.

The following illustration depicts these particular zones and aquatic plant communities.



Aquatic Plant Communities Schematic

The abundance and distribution of aquatic macrophytes are controlled by light availability, lake trophic status as it relates to nutrients and water chemistry, sediment characteristics, and wind energy. Lake morphology and watershed characteristics relate to these factors independently and in combination (NALMS, 1997).

AQUATIC PLANTS AND WATER QUALITY

In many instances aquatic plants serve as indicators of water quality due to the sensitive nature of plants to water quality parameters such as water clarity and nutrient levels. To grow, aquatic plants must have adequate supplies of nutrients. Microphytes and free-floating macrophytes (e.g., duckweed) derive all their nutrients directly from the water. Rooted macrophytes can absorb nutrients from water and/or sediment. Therefore, the growth of phytoplankton and free-floating aquatic plants is regulated by the supply of critical available nutrients in the water column. In contrast, rooted aquatic plants can normally continue to grow in nutrient-poor water if lake sediment contains adequate nutrient concentrations. Nutrients removed by rooted macrophytes from the lake bottom may be returned to the water column when the plants die. Consequently, killing too many aquatic macrophytes may increase nutrients available for algal growth.

In general, an inverse relationship exists between water clarity and macrophyte growth. That is, water clarity is usually improved with increasing abundance of aquatic macrophytes. Two possible explanations are postulated. The first is that the macrophytes and epiphytes out-compete phytoplankton for available nutrients. Epiphytes derive essentially all of their nutrient needs from the water column. The other explanation is that aquatic macrophytes stabilize bottom sediment and limit water circulation, preventing re-suspension of solids and nutrients (NALMS, 1997).

If aquatic macrophyte abundance is reduced, then water clarity may suffer. Water clarity reductions can further reduce the vigor of macrophytes by restricting light penetration. Studies have shown that if 30 percent or less of a lake areas occupied by aquatic plants is controlled, water clarity will generally not be affected. However, lake water clarity will likely be reduced if 50 percent or more of the macrophytes are controlled (NALMS, 1997).

Aquatic plants also play a key role in the ecology of a lake system. Aquatic plants provide food and shelter for fish, wildlife and invertebrates. Plants also improve water quality by protecting shorelines and the lake bottom, improving water quality, adding to the aesthetic quality of the lake and impacting recreational activities.

INVASIVE AQUATIC PLANTS

Invasive species have invaded our backyards, forests, prairies, wetlands, and waters. Invasive species are often transplanted from other regions, even from across the globe. "A species is regarded as invasive if it has been introduced by human action to a location, area, or region where it did not previously occur naturally (i.e., is not native), becomes capable of establishing a breeding population in the new location without further intervention by humans, and spreads widely throughout the new location " (Source: WDNR website, Invasive Species, 2007). AIS include plants and animals that affect our lakes, rivers, and wetlands in negative ways. Once in their new environment, AIS often lack natural control mechanisms they may have had in their native ecosystem and may interfere with the native plant and animal interactions in their new "home". Some AIS have aggressive reproductive potential and contribute to ecological declines and problems for water based recreation and local economies. AIS often quickly become a problem in already disturbed lake ecosystems (i.e. one with relatively few native plant species). While native plants provide numerous benefits, AIS can contribute to ecological decline and financial constraints to manage problem infestations.

Eurasian Watermilfoil (*Myriophyllum spicatum*)

EWM is the most common AIS found in Wisconsin lakes. EWM was first discovered in southeast Wisconsin in the 1960's. During the 1980's, EWM began to spread to other lakes in southern Wisconsin and by 1993 it was common in 39 Wisconsin counties. EWM continues to spread across Wisconsin and is now found in the far northern portion of the state including Vilas County.

Unlike many other plants, EWM does not rely on seed for reproduction. Its seeds germinate poorly under natural conditions. It reproduces vegetatively by fragmentation, allowing it to disperse over long distances. The plant produces fragments after fruiting once or twice during the summer. These shoots may then be carried downstream by water currents or inadvertently picked up by boaters. EWM is readily dispersed by boats, motors, trailers, bilges, live wells, or bait buckets, and can stay alive for weeks if kept moist (WDNR website, 2007).



Once established in an aquatic community, EWM reproduces from shoot fragments and stolons (runners that creep along the lake bed). As an opportunistic species, EWM is adapted for rapid growth early in spring. Stolons, lower stems, and roots persist over winter and store the carbohydrates that help milfoil claim the water column early in spring, photosynthesize, divide, and form a dense leaf canopy that shades out native aquatic plants. Its ability to spread rapidly by fragmentation and effectively block out sunlight needed for native plant growth often results in monotypic stands. Monotypic stands of EWM provide only a single habitat, and threaten the integrity of aquatic communities in a number of ways; for example, dense stands disrupt predator-prey relationships by fencing out larger fish, and reducing the number of nutrient-rich native plants available for waterfowl (WDNR website, 2007).

Dense stands of EWM also inhibit recreational uses like swimming, boating, and fishing. The visual impact that greets the lake user on milfoil-dominated lakes is the flat yellow-green of matted vegetation, often prompting the perception that the lake is "infested" or "dead". Cycling of nutrients from sediments to the water column by EWM may lead to deteriorating water quality and algae blooms of infested lakes (WDNR website, 2007).

Curly-leaf pondweed (*Potamogeton crispus*)

Curly-leaf pondweed (CLP) spreads through burr-like winter buds (turions), which are moved among waterways. These plants can also reproduce by seed, but this plays a relatively small role compared to the vegetative reproduction through turions. New plants form under the ice in winter, making CLP one of the first nuisance aquatic plants to emerge in the spring.



The leaves of curly-leaf pondweed are reddish-green, oblong, and about 3 inches long, with distinct wavy edges that are finely toothed. The stem of the plant is flat, reddish-brown and grows from 1 to 3 feet long. The plant usually drops to the lake bottom by early July.

CLP becomes invasive in some areas because of its tolerance for low light and low water temperatures. These tolerances allow it to get a head start on and out-compete native plants in the spring. CLP forms surface mats that interfere with aquatic recreation in mid-summer, when most aquatic plants are growing, CLP plants are dying off. Plant die-offs may result in a critical loss of dissolved oxygen. Furthermore, the decaying plants can increase nutrients which contribute to algal blooms, as well as create unpleasant stinking messes on beaches (WDNR website, 2007).



Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife is a perennial herb 3-7 feet tall with a dense bushy growth form. Showy flowers vary from purple to magenta, possess 5-6 petals aggregated into numerous long spikes, and bloom from July to September. Leaves are opposite, nearly linear, and attached to four-sided stems without stalks. It has a large, woody taproot with fibrous rhizomes that form a dense mat.

Purple loosestrife was first detected in Wisconsin in the early 1930's, but remained uncommon until the 1970's. It is now widely dispersed in the state, and has been recorded in 70 of Wisconsin's 72 counties. Low densities in most areas of the state suggest that the plant is still in the pioneering stage of establishment. Areas of heaviest infestation are sections of the Wisconsin River, the extreme southeastern part of the state, and the Wolf and Fox River drainage systems.

This plant's optimal habitat includes marshes, stream margins, alluvial flood plains, sedge meadows, and wet prairies. It is tolerant of moist soil and shallow water sites such as pastures and meadows, although established plants can tolerate drier conditions. Purple loosestrife has also been planted in lawns and gardens, which is often how it has been introduced to many of our wetlands, lakes, and rivers. Purple

loosestrife spreads mainly by seed, but it can also spread vegetatively from root or stem segments. A single stalk can produce from 100,000 to 300,000 seeds per year. Seed survival is up to 60-70%, resulting in an extensive seed bank. Mature plants with up to 50 shoots grow over 2 meters high and produce more than two million seeds a year. Germination is restricted to open, wet soils and requires high temperatures, but seeds remain viable in the soil for many years. Even seeds submerged in water can live for approximately 20 months (WDNR website, 2007).

OTHER AQUATIC INVASIVE SPECIES

The following AIS are not plants, but are mentioned here because they also can significantly disrupt healthy aquatic ecosystems.

Rusty Crayfish (*Orconectes rusticus*) are large crustaceans that feed aggressively on aquatic plants, small invertebrates, small fish, and fish eggs. They can remove nearly all the aquatic vegetation from a lake, offsetting the balance of a lake ecosystem. More information about this invader can be found at <http://dnr.wi.gov/invasives/fact/rusty.htm>.

Zebra Mussels (*Dreissena polymorpha*) are small freshwater clams that can attach to hard substrates in water bodies, often forming large of thousands of individual mussels. They are prolific filter feeders, removing valuable phytoplankton from the water, which is the base of the food chain in an aquatic ecosystem. More information about this invader can be found at

<http://dnr.wi.gov/invasives/fact/zebra.htm>.

Spiny Water Fleas (*Bythotrephes cederstoemi*) are predatory zooplankton (tiny aquatic animals) that have a barbed tail making up most of their body length (one centimeter average). They compete with small fish for food supplies (zooplankton) and small fish cannot swallow the spiny water flea due to the long spiny appendage. More research is being completed to determine the potential impacts of the spiny water flea. More information about this invader can be found at

<http://dnr.wi.gov/invasives/fact/spiny.htm>.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES' RESPONSE FRAMEWORK FOR INVASIVE SPECIES

May 12, 2017

SCOPE AND PURPOSE

This document was developed by the Wisconsin Department of Natural Resources' Department Invasive Species Team (DIST) as an internal protocol for responding to newly detected populations of suspected invasive species. This framework cannot and does not attempt to provide answers or solutions to all of the issues associated with response activities. Rather, this document provides a framework to assist any manager in responding thoroughly, professionally, and effectively to the many challenges that result from new invasions.

This framework will be used when:

- A terrestrial invasive species is found in a county where it is listed as Prohibited, OR
- An aquatic invasive species is found in a county where it is listed as Prohibited or Restricted, OR
- An invasive species is discovered in an area of the state where it has not been previously documented

AND:

- Legal access is granted for entry onto the property the species is found on

Stepped enforcement procedures should be considered in lieu of or in concert with this response framework when legal access to populations in question is not granted, or the report is a result of a complaint or allegation submitted via the [DNR's Violation Hotline](#). This framework, if not used initially, can be re-entered at any time. Stepped enforcement procedures can be found in the Bureau of Law Enforcement's [Invasive Species Compliance Guidance](#).

This framework will not be used when the species is one of the following: [white nose syndrome](#), [emerald ash borer](#) or [gypsy moth](#). Wisconsin has species-specific plans already in place that should be followed when these species, or any future species with specific statewide plans, are found.

Additionally, the department purposefully did not prepare detailed "response plans" for individual species that have not yet invaded since responses must be guided by case-specific facts. How a species invades – their number, density and distribution, proximity to other known invasions, the time of year, land or water use, and numerous other factors – determines what actions are possible, prudent, and useful. Some pre-planning efforts for future invasions can be very valuable, but there is a limit to the level of response planning that is useful until an invasion actually occurs. For example, an understanding

of the species' biology, habitats invaded, possible actions, and real and potential constraints is very helpful in advance of an invasion. Similarly, establishing communication networks with potential partners and stakeholders ahead of an invasion can be useful.

The department works closely with federal, interstate, state, and local partners on the development of rapid response plans and research options for controlling invasive species. As planning and research efforts proceed, we will incorporate findings and recommendations into the Wisconsin Department of Natural Resources' Response Framework for Invasive Species.

HOW TO USE THIS DOCUMENT

This document is operational in nature; therefore, the activities outlined below focus on the steps to verify a new population of invasive species and the actions that would follow a confirmed introduction. The actions are not necessarily arranged in the order they should be performed; some activities may or should be implemented simultaneously, and other tasks will occur in differing orders depending on types of discovery, timing, and available resources. Some of the tasks identified may be ongoing, while others will need to be implemented quickly following review and approval. Not all items in this document will be relevant to all invasions. Nevertheless, managers should consider each item as they proceed to plan and implement responses to new invasions. Additional resources to assist with response efforts will be provided as hyperlinks throughout this document, as well as outlined in Appendix A (p. 21).

* * *

ACKNOWLEDGEMENTS

Special thanks to Eric J. Kasza, Planning Coordinator in the Office of Invasive Species Coordination and New York State Department of Environmental Conservation Albany, New York 12233-1052 for allowing Wisconsin liberal use of New York state's Rapid Response Framework for Invasive Species in preparation of this document.

* * *

This document was prepared by Amanda Perdsock, WDNR, with the assistance and approval of the Department's Invasive Species Team.

THE INVASIVE SPECIES RESPONSE PROCESS OVERVIEW & CHECKLIST

Early Detection & Reporting (p. 6)

- Report new populations of suspected invasive species on the DNR website at <http://dnr.wi.gov/topic/Invasives/report.html> or by contacting the Invasive Species Program Specialist at invasive.species@wisconsin.gov.
- Document possible invasives with photographs when possible

Verification (p. 7)

- Interview the reporter to validate the detection
- Get verification of identification by a recognized expert, accredited lab, or herbarium
- Voucher a specimen, when appropriate
- Conduct a site visit to verify location and population size
- For Prohibited species, obtain a definitive confirmation of identification via a second expert and/or biological analysis

Communication (p. 9)

- Notify appropriate resource managers at the local, regional, state, and national levels
- Notify local stakeholders and consider a local or statewide press release
- Select members for management team and identify a lead coordinator
- Establish an internal communications plan
- Begin planning external communications

Assessment (p. 12)

- Delimit the population and determine demographics of population
- Determine appropriate timeline based on level of threat
- Compile a knowledge base – literature reviews and species expert interviews
- Prevent the spread – identify dispersal vectors/pathways and restrict where feasible
- Begin marshalling resources – estimate needs and identify potential sources

Planning (p. 14)

- Decide on a reasonable and feasible control action (containment, eradication, partial or temporary suppression, or no action)
- Determine which management actions to undertake for selected control
- Secure permits, if needed

Implementation (p. 17)

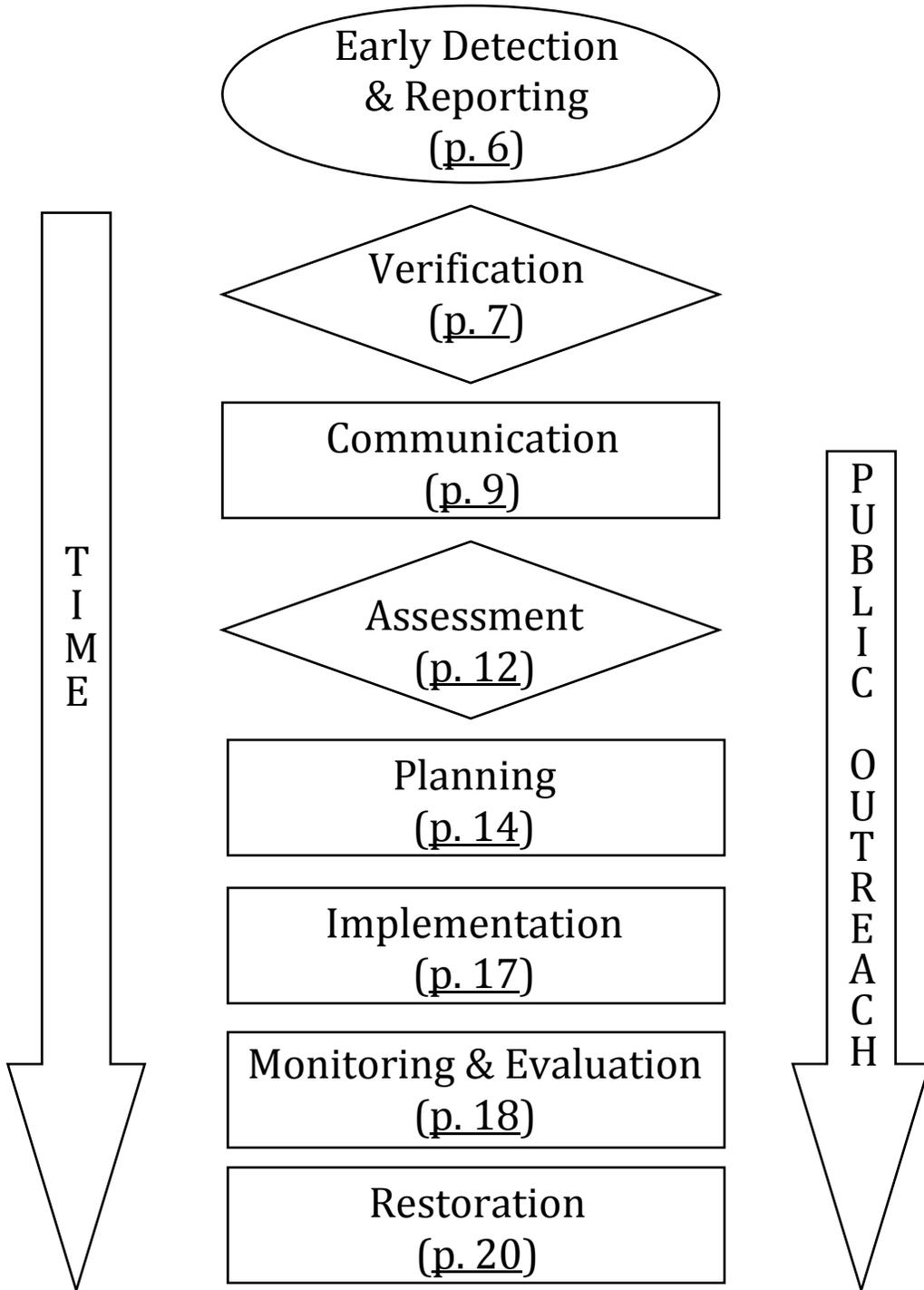
- Lead coordinator facilitates implementation of response plan
- Continue public outreach efforts

Monitoring & Evaluation (p. 18)

- Monitor progress and adapt the plan, as needed
- Conduct response action effectiveness monitoring – evaluate the effectiveness of the response
- Conduct surveillance monitoring – confirm that the population was contained
- Document and disseminate findings and “lessons learned”

Restoration (p. 20)

- Develop and implement a site restoration plan to restore impacted areas, if needed



EARLY DETECTION & REPORTING

Why Early detection of new invasions is critical to any effective and appropriate response effort. To be most effective, a response to a new introduction should occur quickly during the “pioneering” stage, when the identified populations are still small and manageable. Note that the term “quickly” is subject to the biology and context of each individual invasion. Importantly, this means that for some species, response could continue for years when a species spreads slowly and can be effectively contained.

How

1. New populations of invasive species in Wisconsin should be reported by:
 - Visiting the [Invasive Species webpage](#) and filling out the appropriate form
 - OR
 - Contacting the Invasive Species Program Specialist at invasive.species@wisconsin.gov.
2. Reporting of invasive species will vary depending on the type of species discovered and their status as defined by [Wisconsin Administrative Code Chapter NR 40](#):

Prohibited

- Report all occurrences of Prohibited species.

Restricted

- Report all Restricted aquatic and wetland species
- Report new county occurrences of terrestrial plants
- Report all occurrences of jumping worm

Non-regulated

- Report species previously unknown in the state

3. Invasives should be documented with photographs when possible, to assist with initial identification and verification.

When Prohibited and Restricted species should be reported as soon as possible after discovery.

VERIFICATION

Why Since many species have look-alikes, verification is needed to confirm the accuracy of a report. Verification also assists with determining the condition (age, reproductive status, vigor, etc.) of an infestation, and ensures that everyone is handling reports consistently and judiciously.

How

1. The verification process will vary based on the [classification of the invasive species](#) under NR 40. Species that are classified as Prohibited require a more thorough verification process than those which are Restricted. If a species was not previously known to be in the state, a DIST representative will have to be consulted/notified to assist with verification and status determination.
Note: If the species found is in an aquatic environment, refer to the department's [Suspected New AIS Discoveries - Communication Protocol](#) for proper verification procedures.
2. Interview the reporter(s) to validate the species and ensure the appropriate report form from the Invasive Species webpage has been filled out.
 - a. Record details of the location such as: County, Township, City/Village, street address, name of waterbody, land unit area, landmarks, boat landing name, highway mile, and landownership where the suspect invader was found. Get GPS coordinates if possible.
 - b. Collect contact information from the reporter(s).
 - c. Secure an estimate of the number of the individuals found and the extent of the infestation.
 - d. Obtain a photograph (with scale indicator), if possible. In the case of terrestrial plants, this maybe the first step of the procedure if the description of the plant is insufficient to rule out a species look-alike.
 - e. Secure a specimen for vouchering, when possible.
 - f. Document the date of sighting(s).
 - g. Note other relevant conditions at the site (access limitations, possible transport vectors, etc.)
 - h. Determine who owns land for terrestrial and wetland species, and get landowner's contact information when possible.
3. Validate identification as soon as possible via examination of a physical sample.
 - a. When feasible, arrange for a site visit by at least one recognized expert. Be sure to notify landowners prior to site visits.

- b. If recognized experts cannot feasibly reach the site within a reasonable time frame, arrange to have samples and/or other evidence (e.g., photographs) hand-delivered or sent via express mail service to the most accessible recognized expert. If a recognized expert does not reside in the state, out of state specialists may be consulted.
 - c. Prior to shipping samples, obtain guidelines from recognized experts (and use any existing protocols) regarding handling of the sample, desired quantity, where and how to deliver the sample, etc.
 - d. If private land must be accessed to obtain a specimen or verify an occurrence, contact the landowner prior to collecting the specimen. If the landowner is unreachable, or denies entry onto land, contact the local warden to explore options for legal access.
 - e. It may be necessary to initiate stepped enforcement if legal access is not obtained.
4. For Prohibited species, obtain a definitive confirmation of the invasive species via a second expert and/or a biological analysis (e.g., genetic, histological, etc.) when deemed necessary by department invasive species staff.

When Verification should occur as soon as possible after species discovery, but prior to any control actions. Samples for verification can be collected at the same time that the species is initially discovered, or in a subsequent site visit. Further response activities should not be taken until a definitive confirmation of identification is made.

COMMUNICATION

Step I- Initial Notification

Why The objectives are to ensure that all parties that may affect a response decision are quickly engaged and to rapidly inform all other interested parties. The when and how of contacting individuals will differ based on species type, size of invasion, and location of new discovery. This section will provide some general guidelines of contacts that need to be made after a discovery is made. For aquatic invasive species, follow the [Suspected New AIS Discoveries – Communication Protocol](#).

How

1. Notify all relevant natural resource managers, which may include property managers, local program members, and DIST program members.
 - a. Note that for many organizations, only primary contacts will be notified. Those primary contacts will then be responsible for further notification within their organization (i.e., a primary contact for a state agency would be responsible for contacting other key officials within their state agency).
 - b. Secure verification of notifications to confirm that all relevant contacts did, in fact, receive notification (e.g., Internet list server response confirmation requirement, phone list call-backs, etc.).
2. Contact landowner(s) if they were not the initial observer.
3. Contact the initial observer of the new population of invasive species to inform them on the verification of the species.
4. Notify any local Cooperative Invasive Species Management Areas. They may be able to assist with verification, landowner contacts, control efforts, and communication. They should also be contacted prior to the media when media contact is necessary.
5. Disseminate information on definitively confirmed invasions through appropriate mechanisms.
6. Consider if general public/media notification is appropriate. If so, work with the local DNR public affairs staff to identify a spokesperson for the response initiative and follow the [Media Communications Protocol](#). Be sure to contact the Office of Communication whenever a potentially controversial and/or high profile case occurs. It is also good to contact the Office of Communication whenever response efforts result in positive outcomes as well.
7. All media contacts should be documented following the fact sheet: [Working with the News Media](#).

8. Copy the Agency Tribal Liaison,, on communications between tribal entities and the DNR. Meetings with tribal members or representatives should be recorded via the department's [Meeting Reporting](#) site.

When Notify all relevant natural resource managers as soon as practical after a physical sample is visually confirmed to be an invasive species by a recognized expert. Notify the division administrator when the species is listed as Prohibited and landowner(s) will not cooperate or multiple reports suggest the invasive is widespread, or a landowner does not have resources to respond to an important discovery.

Step II – Defining Roles, Responsibilities, and Internal Communication

Why The objective is to activate a predetermined response management system that expedites decision-making, information sharing, avoids duplication, and minimizes authority conflicts, while preserving flexibility for adaptive management.

How

1. The lead agency or organization with authority where the initial sighting(s) occurred convenes a meeting of all relevant managers and selects a management team and lead coordinator. The management team will assess the risk and analyze all potential management options. The lead coordinator will coordinate all management activities. At a minimum, all organizations that have jurisdiction within the infestation area should be notified of this meeting. (See Appendix B on p. 23 for descriptions of roles and responsibilities)
2. Create agreement on reporting process between internal and partner response staff. Develop a response management system as needed. The [Incident Command System](#) (ICS), a management system designed to assist with the development and implementation of response plans, should be used and may be necessary for securing federal grants.
3. Establish a schedule for frequent management team meetings to resolve operational issues that cross jurisdictional interests.

Step III - Planning External Communications

Why The objective is to develop a joint information center to ensure consistent and effective communication to resource managers and interested external stakeholders, including the media and public when appropriate.

How

1. Determine priority messages and desired behavior changes to achieve rapid response goals.
2. Identify public groups who are (1) impacted by the invasion, (2) potential vectors of spread, and/or (3) potential management partners.

3. Prioritize public groups by impact (size, relative risk, and probability of participation) to strategically target priority audiences first.
4. Identify existing resources (materials, experts, research) and efforts with your selected messages and/or target audiences.
5. *If you are disseminating public information with no action request:*
 - a. Select the information you want to share.
 - b. Identify audiences who will want or benefit from the information.
 - c. Identify outlets and media formats that will reach your audiences.
 - d. Work with appropriate team, partners and department staff to create and disseminate information.
6. *If you are requesting an action:*
 - a. Select the action you want to request.
 - b. Identify the barriers and benefits to the action (e.g. knowledge, attitude, physical).
 - c. Develop strategies to assist your audiences with the desired action (decrease barriers, increase benefits).
 - d. Pilot your campaign with your target audience (small scale with two-way communication).
 - e. Implement your campaign and evaluate the results for future changes.
7. Identify a staff member to track and coordinate public and partner outreach.

When The timing of releasing information will vary depending on the situation. When asking for public assistance in identifying and reporting Prohibited species, it may be very soon after verification. For some species, media notification should not occur until all response efforts are planned or initiated. For aquatic invasives, refer to the [Suspected New AIS Discoveries – Communication Protocol](#) for timing of communication.

ASSESSMENT

Step I – Delimiting the Invasion and Compiling Knowledge Base

Why The objective is to rapidly provide information to guide subsequent management decisions, including survey design.

How

1. For regulated species, review information compiled by the Species Assessment Group (SAG) as needed. Compile existing information on the species through literature searches and interviews with experts on the species. If there have been past rapid responses to this species in Wisconsin, then first look for already compiled information. Program specialists within the department can direct individuals to the information that has been compiled for their program.
2. Determine the geographic extent of the infestation. Survey efforts should follow existing regional or national protocols.
3. Determine demography of infestation (e.g., age structure). These efforts should follow existing state, regional or national protocols. Where possible, surveys should assess maturity and reproduction condition of the populations at infested site(s).
4. Identify and survey nearby facilities, habitats or resources (e.g., campgrounds, boat launches, wetlands, beaches, areas with disturbed habitat, etc.) that are especially vulnerable to invasion.
5. Identify dispersal vectors (including movement by humans, fish and wildlife, water flow, and other physical processes) and pathways, and evaluate associated risks. Also identify any nearby facilities, habitats or resources (e.g., nearest known population, ports, railheads, boat launches, vendors, etc.) that could serve as a source or pathway of invasion.
6. Ensure that field surveys are completed and the results are reported using agreed upon methods.
7. Identify ways the new invasion may threaten the state's economic, ecological, and recreational resources.
8. Determine if financial resources are available for response activities. Keep in mind that some funding sources require actions that may go beyond the steps required within this framework. If no state funds are available to deal with a population, it may be possible to transfer the responsibility for response efforts to local stakeholders or the landowner. Funding sources should be taken into consideration as early in the response process as possible since sources may have an impact on the planning and implementation processes. A link containing possible funding sources can be found in Appendix A.

Note: As per NR 40, the landowner is ultimately responsible for containing and controlling Prohibited species on their property.

9. In certain situations, a letter of cooperation and/or a permit may be issued in response to the discovery of a new invasion. Such letters and permits would dictate response procedures. Permit requirements must be complied with.

Step II - Marshalling Resources

Why The objective is to provide sufficient resources (personnel, equipment, materials, contractors, funding) to initiate control actions and associated activities, including acquisition of required permits.

How

1. Develop estimates for personnel time, facilities and equipment needs, and funding.
2. Identify potential sources for personnel, facilities, equipment, and funds.
3. Secure commitments for needed personnel, facilities and equipment, and funds.
4. Ensure mechanism for dispersal of funds is in place, and when funds are needed, the flow of dollars occurs expeditiously. The sooner department finance staff are engaged, the sooner funding can be obtained.

When Steps within the assessment phase may begin as soon as a population is discovered and verified.

PLANNING

Why The objective is to evaluate all the available information and then decide which response action (eradication or containment/mitigation) and which management action (hand-pulling, dredging, herbicide, etc.) is reasonable and appropriate.

How Develop a response plan. The response plan ensures that everyone is working in concert toward agreed upon goals. The plan should provide a coherent means of communicating the overall response objectives in the context of both operational and support activities. At the simplest level, the plan must have the following three elements:

- a. What do we want to do?
 - b. Who is responsible for doing it?
 - c. How do we communicate with each other?
1. Decide the proper level of control based on analysis of the specific nature of the invasion, including population dynamics and pathways of spread. It is important to weigh several factors: the costs of eradication, the likelihood of success, and in the absence of eradication, the expected impact or costs of the invader and the monitoring ability. Consider the following:
- a. Risk to environment, human health, economy, etc.
 - b. Anticipated cost of eradication effort and follow-up monitoring (relative to available funding)
 - c. Available resources (personnel, equipment, etc.)
 - d. Regional and local distribution – single vs. multiple, continuous vs. patchy, isolated vs. widespread
 - e. Landscape context – upstream vs. downstream, edge vs. interior, etc.
 - f. Age of infestation
 - g. Neighbors' actions/inaction
 - h. Other available management or response plans, including plans that may already be in place
 - i. Pathways/source – identified, controlled, eliminated, etc.
 - j. Species track record of eradication/control
 - k. Survey and assessment confidence
 - l. Habitat type(s)
 - m. Life stage(s) present
 - n. Time of year in relation to reproduction, migration, etc.
 - o. Landownership – public vs. private, willing landowner vs. unwilling landowner
 - p. Amount of water in the system to be treated. Consider the following:
 - 1) Potential for drawn down or flows reduced before treatment
 - 2) Flow sources, including springs, and the potential to regulate that flow
 - q. Land use patterns locally and regionally
 - r. Presence of [state](#) or [federally](#) listed rare, threatened or endangered species. Note: An Endangered Resources (ER) Review completed through the Natural Heritage Inventory (NHI) Portal is required for any activity

conducted, funded or approved by the DNR ([internal](#) and [external](#) portals available). A project is exempt from needing an ER Review if the activity is included in the No/Low Broad Incidental Take Permit/Authorization (See table [1](#) and [2](#)) or if the ER Preliminary Assessment printout from the NHI Public Portal shows a result of ‘no endangered resources present’

- s. Presence of [critical habitat](#) if in a waterbody
- t. Special status, including:
 - 1) [Water use designation](#) (e.g., drink water)
 - 2) Wild, Scenic or Recreational River designation
 - 3) [Outstanding or Exceptional Resource Waters](#)
 - 4) [State natural area](#)
 - 5) Historic sites
 - 6) [Cultural resources](#)
 - 7) Department of Defense or other restricted access areas
 - 8) Tribal lands

2. Consider potential management actions:

- a. Physical/Mechanical activities
- b. Biological activities (Biocontrols)
- c. Chemical activities
- d. Regulatory activities
- e. No action taken

Note: All pesticide use on DNR lands or waters by DNR staff must follow Manual Code 4230 and guidance provided on the [Pesticide Use on DNR Lands intranet site](#).

3. Assess potential impacts of management actions. Consider the following:

- a. Air Quality
- b. Soils
- c. Cultural Resources
- d. Water Resources
- e. Fish and Wildlife including threatened, endangered, and species sensitive to potential management actions
- f. Human Health
- g. Sociocultural Environment
- h. Vegetation diversity including threatened, endangered, and species sensitive to potential management actions
- i. Economic Conditions
- j. Visual Resources and Recreation
- k. Effectiveness of various treatment methods

4. Decide on control action, if any. Propose a single course of action or offer alternatives to decision-makers and brief as needed using methods decided upon during the communication planning phase.
5. Secure required permits, if needed. Make sure to satisfy all regulatory requirements, including permits, licenses, certifications, concurrence, etc. (See Appendix C on p. 24 for a list of possible permits)
6. Develop a monitoring plan for assessing success of response efforts post implementation of response plan. (See Monitoring and Evaluation section, p. 18)

When Most planning will occur prior to the initiation of control activities. As implementation proceeds, plans should be adjusted as needed following an adaptive management approach.

IMPLEMENTAION

Why The objective is to implement the eradication or control strategies.

How

1. Facilitate implementation of the response plan.
2. Continue public outreach efforts if appropriate. Make sure the public is well informed on response activities and progress by providing information updates as needed.
3. Comply with rules and regulations developed for emergencies, quarantines, or wash and inspection requirements. Identify loop-holes and additional regulatory needs.
4. Agencies collaborate to coordinate and deploy field resources; implement ICS if needed.
5. Restrict dispersal pathways where feasible, including:
 - a. Isolate infested areas as needed to prevent spread. Install physical barriers, if needed.
 - b. Assess the likely movement of infested vehicles, equipment, and materials to identify risk and inspection needs at other vulnerable areas.
 - c. Establish wash and inspection requirements on vehicles and equipment, if needed.
 - d. Use established procedures for equipment disinfection to ensure that personnel do not unintentionally spread the invasive species (See recommendations on the department's [Best Management Practices](#) page).
 - e. Ensure proper disposal or treatment of any species or materials that may be removed from an infested area (See recommendations on the department's [Best Management Practices](#) page).
6. Engage Law Enforcement to investigate and, if possible, control the source of the introduction if necessary. For more information see [Invasive Species Rule Compliance & Stepped Enforcement Process and Guidance](#).
7. Document efforts (e.g., take pictures) throughout the response process. These will be very useful when reporting on the response efforts.

When Implementation will continue for as long as it takes to meet management objectives. Follow up monitoring and control may be necessary after desired levels of containment or control are achieved.

MONITORING & EVALUATION

Why The objectives are to 1) Provide information and data on treatment effectiveness, effects on native species, and possibly ecosystem recovery AND 2) Provide surveillance for reinfestation or spread to additional locations.

How

1. Monitor the status of the invasive species population. Monitoring activities should be carried out in coordination with other program field operations, if possible.
2. Select appropriate ecological indicators and timeframes for monitoring to assess the status and trends in invasive and native species populations.
3. Two types of monitoring should be conducted: treatment effectiveness monitoring and surveillance monitoring for the return of invasives.

For Treatment effectiveness monitoring, consider:

- The frequency and density of the target organism within the control area.
- The frequency, density and richness of non-target organisms within the control area.
- The habitat characteristics of the control area that may affect the outcome of a given treatment.
- Water or sediment samples to estimate residuals from a chemical treatment, if a chemical control was done. This will help to determine the duration of effective treatment.

For surveillance monitoring, consider:

- The area around the control effort should be surveyed for additional invasive populations.
 - Habitat characteristics that could affect the suitability of the area to the establishment of an invasive species population should be taken into consideration. The habitats surveyed should be those that are suitable for establishment.
4. Disseminate findings through an easily accessible database and list server, or using any other alternative routes of communication decided upon during the development of the project's communication plan.
 5. Monitor eradication/control progress and the impacts of selected methods on the environment and other organisms.
 6. Consult management team and adjust eradication/control methods based on new information. Selected methods may be adjusted to improve effectiveness and/or to reduce or minimize impacts.

7. Conduct a follow-up evaluation of response organizations and other interest groups to identify opportunities for improving rapid response capacity. Disseminate “lessons learned” to other interested organizations as needed.

When Monitoring should be done several days, weeks, or months after the initial control effort depending on the species and area being controlled. In cases of apparent eradication, monitor at least one year after control activities to check for any subsequent infestation.

RESTORATION

Why The objective is to bolster the system to encourage the recovery of native plants and animals, which will ideally return natural ecological function while discouraging reinvasion by invasive species.

How

1. Collaborate with partners to share existing restoration protocols and contract specifications relating to invasive species.
2. Develop a site restoration plan to restore damaged areas (e.g., roads, lawns, boat launches, staging areas, etc.) and ecosystem functions, if applicable. Restoration plans will vary based on the targeted ecosystem and will take into consideration the types of species that should be present, when the species should be present, and whether restoration efforts are appropriate for the target site.
3. Implement restoration plan.
4. Monitor restoration projects to track the control of invasive species and the re-establishment of native species.

When In many cases it will be best to wait until the invasive species is mostly contained or removed to begin restoration. If native species are incorporated too early, it may prevent the use of pesticides or other necessary control methods.

Appendix A – Useful Links

Scope and Purpose

- Report a Violation: <http://dnr.wi.gov/Contact/Hotline.html>
- Bureau of Law Enforcement’s Environmental Enforcement Handbook: [https://sp.dnr.enterprise.wistate.us/org/AD/Bureau-LE/Stepped%20Enforcement%20Process/Environmental%20Enforcement%20Handbook%20\(Rav.%20202.2013\).pdf](https://sp.dnr.enterprise.wistate.us/org/AD/Bureau-LE/Stepped%20Enforcement%20Process/Environmental%20Enforcement%20Handbook%20(Rav.%20202.2013).pdf)

Species Specific Plans

- White nose syndrome: <http://wiatri.net/inventory/bats/>
- Emerald ash borer: http://datcpservices.wisconsin.gov/eab/report_eab.jsp or 1-800-462-2803
- Gypsy moth: <http://gypsymoth.wi.gov/> or 1-800-642-MOTH (6684)

Early Detection & Reporting

- Report new populations: <http://dnr.wi.gov/topic/Invasives/report.html>
- Wisconsin Administrative Code Chapter NR 40: http://docs.legis.wisconsin.gov/code/admin_code/nr/001/40.pdf

Verification

- List of regulated invasive species under NR 40: <http://dnr.wi.gov/topic/Invasives/classification.html>
- For verification steps for aquatic invasive species, also refer to the Suspected New AIS Discoveries – Communication Protocol (<https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=118813642>)

Communication

- For notification steps for aquatic invasive species, also refer to the Suspected New AIS Discoveries – Communication Protocol (<https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=118813642>)
- Media Communication Protocol: http://intranet.dnr.state.wi.us/int/caer/ce/DNR_DraftMediaProtocols_020615workingversion.pdf
- Working with the News Media: http://intranet.dnr.state.wi.us/int/caer/ce/MediaProtocolFactSheet_20150205.pdf
- Tribal contact reporting: <https://sp.dnr.enterprise.wistate.us/org/dnr/Team-TAI/Lists/Meeting%20Reporting%20%20All%20Staff/AllItems.aspx>
- Incident Command System (ICS): <http://www.fema.gov/incident-command-system>

Assessment

- Potential Funding Sources: <http://invasivespecies.wi.gov/financial-assistance/>

Planning

- Wisconsin [State](http://dnr.wi.gov/topic/endangeredresources/etlist.html) listed rare, threatened or endangered species: <http://dnr.wi.gov/topic/endangeredresources/etlist.html>
- [Federally](http://www.fws.gov/midwest/endangered/lists/wisc-spp.html) listed rare, threatened or endangered species: <http://www.fws.gov/midwest/endangered/lists/wisc-spp.html>
- Natural Heritage Inventory Internal DNR Portal: http://intranet.dnr.state.wi.us/int/land/er/nhi_portal/
- Natural Heritage Inventory External Public Portal: <http://dnr.wi.gov/topic/ERReview/PublicPortal.html>
- No/Low Broad Incidental Take Permit/Authorization webpage: <http://dnr.wi.gov/topic/ERReview/ITNoLowImpact.html>
- Table 1 of the No/Low Broad Incidental Take Permit/Authorization: <http://dnr.wi.gov/topic/ERReview/documents/NoLowImpactActivities.pdf#page=5>
- Table 2 of the No/Low Broad Incidental Take Permit/Authorization (for use by DNR staff and ER Certified Reviewers only): http://intranet.dnr.state.wi.us/int/land/er/nhi_portal/pdf/NoLowImpactbyTaxa.pdf
- Critical Habitat Areas: <http://www.fws.gov/midwest/endangered/lists/wisc-spp.html>
- Water use designation: <http://dnr.wi.gov/topic/surfacewater/usedesignations.html>
- List of Outstanding and Exceptional Resource Waters (ORW and ERW): <http://dnr.wi.gov/topic/surfacewater/orwerw.html>
- State Natural Areas: <http://dnr.wi.gov/topic/lands/naturalareas/>
- Cultural Resources: <http://dnr.wi.gov/topic/Lands/CulturalRes/>
- Pesticide Use Intranet Site: <http://intranet.dnr.state.wi.us/pesticides/>

Implementation

- Best Management Practices (BMP) to minimize the spread of invasive species: <http://dnr.wi.gov/topic/invasives/bmp.html>
- Invasive Species Rule Compliance & Stepped Enforcement Process and Guidance: <http://intranet.dnr.state.wi.us/int/es/science/invasives/pe/SEoverview.pdf>

Monitoring & Evaluation

Restoration

Appendix B – Suggested Roles and Responsibilities

The management team will:

1. Determine the extent of the infestation and pathways for potential spread.
2. Determine the risk to the environment, human health, economy, etc.
3. Identify constraints and limitations, including jurisdictional issues, legislative authority, funding, permitting, personnel training, access to private lands, gaps in knowledge, and ecological uncertainties.
4. Determine if eradication/control is possible and select the appropriate method(s) to be employed.
5. Consult with legal services when necessary.

The lead coordinator will:

1. Coordinate management team notification operations.
2. Facilitate creation of a response management system involving lead representatives of each local, tribal, state, provincial, and/or federal government that has legal authority over the response.
3. Represent (i.e. be the spokesperson for) the management team.
4. Facilitate a collaborative decision-making process that considers cascading levels of authority within individual agencies.
5. Facilitate development of response priorities.

The above actions should take into account the roles, relationships, and inter-agency agreements among:

- All affected states (e.g., Governor, state agencies, etc.)
- Federal agencies (e.g., USFWS, USDA, NOAA, USACOE, etc.)
- Tribes
- Local governments
- Other interested parties, such as NGOs, universities, nurseries, marinas, etc.

Appendix C – Permit and Regulatory Considerations

1. Consider an Emergency Rule as an option. A formal determination of emergency can facilitate numerous aspects of regulatory processes.
2. Identify all State/Federal regulatory requirements, including any applicable emergency provisions. A partial list of State/Federal permits and regulatory reviews that may apply include:
 - a. US Army Corps of Engineers Section 10 permit for any work in, over, or under navigable waters of the United States.
 - b. US Clean Water Act Section 404 permit from the US Army Corps of engineers for the discharge of dredged or fill material into waters of the United States.
 - c. US Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 18 authorizes the Environmental Protection Agency (EPA) to allow states to use a pesticide for an unregistered use in the United States for a limited time if EPA determines that emergency conditions exist. The uses are requested for a limited period of time (no longer than 1 year), to address the emergency situation only. If the need is immediate, a state agency may issue a crisis exemption that allows the unregistered use for 15 days. Under FIFRA, registrations and product labeling may restrict uses of pesticides. Each registration specifies the plants/sites on which it may be applied. Restricted-use pesticides are limited to use by pesticide applicators who are certified, or to people under supervision of a certified applicator.
 - d. US Endangered Species Act Section 7 consultations with the National Marine Fisheries Service (NMFS) for marine and anadromous species, or the U.S. Fish and Wildlife Service (FWS) for fresh-water and wildlife, for any “action” that may affect listed species or their designated habitat in the United States.
 - e. WDNR Chapter NR 40 Invasive Species Identification, Classification and Control aimed at the prevention of new AIS introductions and to support the state in enforcement in controlling or eradicating pioneer populations.
 - f. WDNR Chapter NR 109 Aquatic Plants: Introduction, Manual Removal and Mechanical Control Regulations establishes procedures for issuing permits for mechanical aquatic plant control and prohibits the launching of watercraft or equipment that has attached aquatic plants or zebra mussels.
 - g. WDNR Chapter NR 107 Aquatic Plant Management establishes procedures and permitting for the control of aquatic plants using chemicals registered and labeled by the EPA.

- h. Wisconsin Pest Control Pollutant Discharge Permits are general permits for pest control treatment projects that have a pollutant discharge into a waterbody.
- 3. Identify all local regulatory requirements, including any applicable emergency provisions.
- 4. Identify any cooperative agreements with other agencies/organizations (e.g., MOUs, MOAs, etc.).
- 5. Assign lead person from each regulatory agency to facilitate permit approval in a timely manner within their respective agency.
- 6. Consult with DNR to determine if an environmental assessment or environmental impact statement is required.
- 7. Determine timeframe necessary for meeting all regulatory requirements.