

updated

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Early Detection Rapid Response Plan for *Hydrilla verticillata* in Illinois



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prepared by:

Illinois Hydrilla Task Force

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The Illinois Hydrilla Task Force relied heavily on existing rapid response plans and reports in the development of this document. Information and text from several existing documents have been modified or used directly, and the source noted. In particular, extensive information was used with permission from the Mississippi Basin Rapid Response Plan, the California Aquatic Invasive Species Management Plan (CDFG 2008), the Mid-Atlantic Panel on Aquatic Invasive Species' Rapid Response Planning for Aquatic Invasive Species - A Template (Smits and Moser 2009), the Western Regional Panel on Aquatic Nuisance Species' Model Rapid Response Plan for Aquatic Nuisance Species (WRP undated), the Rapid Response Plan for Hydrilla in Massachusetts (Massachusetts Department of Conservation and Recreation 2005), and the Rapid Response Plan for Invasive Aquatic Plants, Fish, and Other Fauna Part 1: Plant Protocol (Maine Department of Environmental Protection). Information on the Incident Command System (ICS) was developed primarily using materials obtained from the U.S. Department of Homeland Security, the Federal Emergency Management Agency's National Incident Management System (USDHS 2008), and the online ICS Resource Center.

This report was prepared by Catherine McGlynn of the Chicago Botanic Garden and the Northeast Illinois Invasive Plant Partnership, with assistance from Robert Kirschner of the Chicago Botanic Garden and Michael Adam of the Lake County Health Department - Lakes Management Unit.

This January 2015 version provides several updates to a document that was originally prepared and released in July 2014.

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EXECUTIVE SUMMARY

Aquatic Invasive Species (AIS) pose significant environmental and economic threats to aquatic ecosystems throughout Illinois. Preventing AIS introductions is the best management strategy and is crucial to avoiding the establishment, spread, and irreversible consequences of AIS. Unfortunately, prevention efforts will not stop all AIS introductions. Education and outreach will increase detection capacity among existing monitoring organizations and raise public awareness about Hydrilla and how it can be transported. Managers must be prepared to take action when prevention measures fail and infestations are detected and reported—hence the formation of a rapid response team.

Rationale for Focusing on *Hydrilla verticillata*

Hydrilla verticillata (“Hydrilla”) is considered the perfect submerged aquatic weed (Langeland 1996). It is extremely well-adapted for competing in an aquatic environment. It can grow very rapidly; once it reaches the water surface, it can quickly produce a dense mat of stems that shades out native submerged aquatic plants. Because Hydrilla’s tissue is about 90% water, it can form new tissue very inexpensively and efficiently in habitats with low levels of available nutrients, and it can also take ready advantage of habitats rich in nutrients. Hydrilla can also grow in salinities higher than 7‰ and tolerates a wide range of pH, although it does best at pH = 7. It requires little light to grow (less than 1%) and can readily colonize deep water (up to 30 feet) where few other submerged aquatic plants can survive.

Hydrilla is adaptable in the form of carbon it can use in water and is able to reproduce by several means: fragmentation, tubers, turions, and seed. One Hydrilla stem fragment can grow into a plant that gives rise to a completely new population. Hydrilla tubers are small, potato-like storage structures that are deposited in the soil at the bottom of rivers, lakes, and ponds. One tuber can produce over 6,000 new tubers per m², which can remain viable for more than seven years in undisturbed sediment and survive herbicide applications and ingestion by waterfowl. Hydrilla turions are specialized overwintering buds that are produced in the leaf axils (where leaf meets stem) and when broken off they are deposited in the hydrosol or transported to a new location by water. A single Hydrilla plant can produce several thousand turions in one growing season. New plants sprout from both tubers and turions. The importance of seeds in the spread of Hydrilla is not well documented.

Hydrilla is found in the waters of six continents and has 47 biotypes (Netherland 2013). Two biotypes currently occur in the United States: 1) a dioecious female form found in the southern U.S. and some western U.S. states, and 2) a monoecious form that is becoming more prevalent in some northern U.S. states. It is the monoecious form that poses a threat to Illinois because its tubers are able to overwinter and successfully produce plants. Unfortunately, little is currently known about this form’s competitive ability to interact with Eurasian watermilfoil (*Myriophyllum spicatum*) and pondweeds (*Potamogeton spp.*). Its greatest environmental constraints are how quickly it can colonize an area and proliferate, and if it is a disturbance specialist (Netherland 2013). As research continues and data become available, Illinois’ Hydrilla Rapid Response Plan will be revised to reflect new findings.

Once Hydrilla has become established it can cause myriad adverse impacts including decreased effectiveness of drainage canals, impeded flow in irrigation canals, disrupted flow patterns in utility cooling reservoirs, limited navigation by commercial and recreational craft, displaced native plant

communities, decreased habitat quality for fish and other wildlife populations, decreased dissolved oxygen, and increased water temperature (see www.oregon.gov/ODA/PLANT/WEEDS/profile_hydrilla.shtml and www.statesmanjournal.com/article/20071125/INVASIVE03/711250308/Oregon-has-kept-hydrilla-out-of-its-waters).

Illinois' neighboring states of Wisconsin and Indiana recently have experienced one or more Hydrilla infestations. To date, Indiana has spent more than \$1 million on Hydrilla eradication in Lake Manitou. Given the fallibility of prevention measures and the multiple pathways for transport and spread of aquatic invasive plants, the arrival of Hydrilla in Illinois is considered imminent by many aquatic ecologists. The Illinois Hydrilla EDRR Plan seeks to minimize the economic and ecological impacts of such an introduction to state of Illinois.

Prevention

Illinois can reduce the risk of Hydrilla introduction and spread by providing information about the imminent arrival of Hydrilla, potential impacts, and steps that can be taken by boaters, anglers, and recreational water users to reduce the risk of its transport among lakes, ponds, and waterways. Additional ways to reduce risk of introduction include outreach to aquatic gardeners and aquarium owners. Aquatic plant purchases for water gardens may have “hitchhikers” in the form of Hydrilla fragments, turions, or tubers in their soil. Aquarium owners may unknowingly purchase Hydrilla for their aquaria online under the name of “anacharis.” Information about Hydrilla and how it can be introduced will be critical components of future aquatic invasive species outreach programs at the local, regional, and state levels in Illinois.

Early Detection

If coupled with management, early detection of populations reduces both economic and ecological costs because infestations are easier to eradicate when they cover a small area and can be contained. Establishing a reporting framework and verification system as well as increasing the number of people able to identify and report Hydrilla populations are essential for successful early detection.

Rapid Response

Rapid response actions are often complex, costly, and controversial (WRP undated); therefore, planning for rapid response prior to an introduction is critical. The Illinois Hydrilla Task Force intends this document to be an outline of the Illinois' protocols, and function and as a resource for natural resources management agencies to effectively plan and quickly implement rapid response actions. The model structure is based in part on the Incident Command System (ICS), which is a standardized, on-scene, all-hazards incident management approach that:

- allows for the integration of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure;
- enables a coordinated response among various jurisdictions and functional agencies, both public and private; and
- establishes common processes for planning and managing resources to utilize standardized procedures that allow for a coordinated response framework across agencies and jurisdictions (see www.fema.gov/incident-command-system).

Considerable preparation is necessary and can be initiated in advance of the need to implement a rapid response effort. To the extent possible, managers will complete partner agreements, secure

funding, determine and fulfill regulatory requirements, finalize protocols and procedures, and conduct needed training. It should be apparent that adequate preparation will take considerable time and effort, and therefore as much work as possible should be completed before a new AIS introduction occurs.

The combination of prevention, early detection, and rapid response measures will serve to reduce the economic and ecological impacts of *Hydrilla verticillata* in Illinois when it arrives. This Plan can also serve as a template for rapid response to introductions of other aquatic invasive plants.

INTRODUCTION

The National Invasive Species Information Center defines an invasive species as “non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health” (Executive Order 13112). The discovery of a new non-native species—or a new population of an established non-native species that is outside of its known distribution—is considered an introduction.

Preventing introductions is the most effective strategy in aquatic invasive species (AIS) management and is crucial to avoiding their establishment, spread, and resulting ecological and economic impacts. In the case of Hydrilla, experience has shown that once it has produced tubers, it is highly capable of rapid spread and establishment (Netherland 2013) and eradication will become highly unlikely (Menninger 2011). If not eradicated, control efforts to limit Hydrilla distribution and abundance can become perpetual and costly programs (*e.g.*, Hydrilla control in Lake Manitou, Indiana). Unfortunately, prevention measures usually are not foolproof, and even the best efforts may not stop all introductions.

Early detection and rapid response (EDRR) is a crucial second line of defense to prevent establishment (NISC 2008) and minimize the ecological and economic impacts of an AIS introduction (CDEFG 2008). The sooner a new introduction is detected, the greater probability there is that a systematic response effort can be implemented while the population is still localized and not beyond that which can be contained and eradicated (NISC 2003). In many cases, actions must be taken quickly to be effective, possibly within only a few days of the discovery (USEPA 2005). Successful rapid response depends on effective early detection monitoring and AIS reporting programs for alerting managers to new introductions. Government officials and natural resource managers must be prepared and committed to take rapid and effective action following the report of an AIS introduction (Smits and Moser 2009).

The Illinois Hydrilla Task Force (henceforth referred to as “Task Force”) has developed an EDRR plan for northeastern Illinois that will function as a template for a statewide plan. Outcomes the Task Force has focused on include:

1. a logo and public identity for the program;
2. public outreach and education for early detection purposes using radio interviews, digital publications, and the *Hydrilla Hunt!* card;
3. Hydrilla ID sheets with contact information for natural resource professionals and volunteers who monitor Illinois’ lakes, ponds, and waterways;
4. a website where the general public can learn how to identify Hydrilla and why it is a problematic species (www.niapp.net/hydrilla);
5. an email address where reports of potential Hydrilla sightings can be submitted (HydrillaHunt@niapp.net);
6. a rapid response program to eradicate identified infestations at the earliest possible opportunity;
7. local and state public policies that would facilitate rapid response activities on both public and private waters; and
8. a protocol for a more generic EDRR strategy that could be applied to other aquatic invasive plants.

As of January 2015 the Illinois Hydrilla Task Force was comprised as follows:

Co-coordinators:

- Mike Adam, Lake County Health Department – Lakes Management Unit
- Bob Kirschner, Chicago Botanic Garden
- Cathy McGlynn, Northeast Illinois Invasive Plant Partnership

Steering Committee:

- Scott Blackwood, US Department of Agriculture
- Chris Evans, Illinois Department of Natural Resources
- Karla Gage, River to River Cooperative Weed Management Area
- Holly Hudson, Chicago Metropolitan Agency for Planning
- Kevin Irons, Illinois Department of Natural Resources
- Frank Jakubicek, Illinois Department of Natural Resources
- Reuben Keller, Loyola University
- Debbie Maurer, Lake County Forest Preserve District
- Kathy Paap, Lake County Department of Health – Lakes Management Unit
- Jody Shimp, Illinois Department of Natural Resources
- Steve Shults, Illinois Department of Natural Resources
- Diane Tancl, Illinois Environmental Protection Agency
- Sarah Zack, Illinois-Indiana Sea Grant
- Gregg Zink, Integrated Lakes Management

PUBLIC OUTREACH AND EDUCATION

Consensus-building and public support for eradication of Hydrilla immediately after detection will facilitate rapid response actions. The recommended approach of immediate eradication is a method that has been successfully employed in California (Great Lakes Regional Panel on Aquatic Nuisance Species). The Illinois Hydrilla Task Force increased statewide public awareness and the capacity to detect, report, and respond to populations of Hydrilla via species-targeted outreach and education materials derived from existing regional and national program materials and using existing venues for dissemination of these materials (*e.g.*, Illinois-Indiana Sea Grant's (IISG's) Clean Boats Crew Program; Illinois Environmental Protection Agency's Volunteer Lake Monitoring Program; Illinois Lake Management Association membership mailings and events; Illinois Department of Natural Resource's Aquatic Nuisance Species Program; the River to River Cooperative Weed Management Area; Illinois Cooperative Agriculture Pest Survey; Chicago Botanic Garden; Lake County Health Department; and Northeast Illinois Invasive Plant Partnership).

In 2013-2014, the Task Force prepared 3,000 waterproof *Hydrilla Hunt!* cards (3" x 5"), 1,000 *Hydrilla Hunt!* posters (8.5" x 14"), and 1,000 waterproof ID sheets (8.5" x 11") (see Appendix A). A second printing of education/outreach materials provided an additional 20,000 *Hydrilla Hunt!* cards and an additional 1,000 ID sheets for extended outreach throughout the state of Illinois.

The Education and Outreach Subcommittee of the Task Force targets private sector water-related industries including recreational and water gardening trade shows and professional association newsletters. The Northeast Illinois Invasive Plant Partnership (NIIPP) has worked with the IISG to provide *Hydrilla Hunt!* cards at fishing tournaments and water gardening trade shows. NIIPP and other organizations have disseminated *Hydrilla Hunt!* cards at green industry trade shows and has contacted homeowner and lake management associations in conjunction with the Clean Boats Crew outreach and education program. The Chicago Botanic Garden (CBG) has added Hydrilla-related content to its webpages on aquatic invasive plants and plant conservation and distributed *Hydrilla Hunt!* cards via its Plant Information Desk.

The Task Force will continue to keep the public informed about Hydrilla via expanded website offerings. The *Hydrilla Hunt!* program has an active webpage at the NIIPP website (www.niipp.net/hydrilla) along with a link from the IISG and CBG websites to this webpage. This *Hydrilla Hunt!* webpage is cited in all published articles.

The Task Force coordinates public outreach through the media as well as governmental and non-governmental organizations. The focus of press releases is to reach recreational water users and waterfront property owners. The press release and public service announcements are available at <http://www.niipp.net/hydrilla/additional-resources>. The Task Force's goal is to have a single operational point of contact with the press to ensure delivery of accurate and consistent messages based on previously composed messaging (per Great Lakes Regional Panel on Aquatic Nuisance Species 2006).

Education and outreach will serve to increase the number of “eyes on the water” by training individuals already involved in existing monitoring programs (*e.g.*, Illinois EPA's Volunteer Lake Monitoring Program, RiverWatch, volunteer stewards, natural areas managers) and providing information to stakeholders who use aquatic resources (*e.g.*, recreational boaters, anglers, waterfront property owners).

EARLY DETECTION: DETECTION OF INVASION

Hydrilla is most likely to be introduced unintentionally by humans via plant parts attached to recreational water vehicles or fishing equipment; plant parts, turions, or tubers hitching a ride with aquatic ornamental plants; or plant parts dumped from aquaria. In some cases, waterfowl may also transport plant parts, or plant parts may be swept downstream of an infestation. Lake monitors, fisheries biologists, boaters, and anglers will probably be the first to see a Hydrilla infestation. If the infestation is visible at the water surface, considerable vegetative growth may have already taken place, particularly if the water is deep. If possible, the most effective rapid response is containment/control of the infestation before day length reaches 12 hours and tubers are produced. The timeframe for tuber production in the northern United States has been documented as beginning in early July to first frost (Netherland 2013). Once tubers have been released, containment and control are likely to become a long-term project (7 to 10 years).

EARLY DETECTION: SPECIES CONFIRMATION

If someone finds a potentially suspicious plant, the Task Force asks them report it to HydrillaHunt@niipp.net (in some cases, reports might be received outside of this email account). The person who submits the report is asked to submit digital photos along with location information. The *Hydrilla Hunt!* email account is monitored several times a week during the growing season by the Task Force co-coordinators. The co-coordinators review all submitted photos; if a photo does not resemble Hydrilla, the reporter will receive an email thanking them for taking the time to look for Hydrilla and provide them with links to websites with information about aquatic invasive plant identification. If the photo could potentially be Hydrilla, the co-coordinators request additional information including a live sample. Once that information is received, if the sample appears to be Hydrilla, the Illinois DNR's Aquatic Nuisance Species Program manager is alerted and a site visit is scheduled as soon as possible for a team of local experts to collect, identify, and catalog voucher specimens. Verification of a Hydrilla infestation automatically triggers several initial steps of the Rapid Response Plan. A Task Force member will immediately enter the data into the Early Detection and Distribution Mapping System (EDDMapS: University of Georgia, Institute for Ecosystem Health and Invasive Species), which is an existing system that has mechanisms for reports, verifications, distribution maps, and alerts. All Task Force members and relevant stakeholders will receive alerts, especially organizations associated with water bodies in close proximity to the invaded site.

RAPID RESPONSE: PLANNING

Rapid response actions are often complex, costly, and controversial (WRP undated), and therefore planning for rapid response prior to an introduction is crucial to allow for the significant coordination and analysis necessary for an appropriate response (Smits and Moser 2009). Rapid response usually requires cooperation among a variety of local, state, and federal agencies and organizations. Responsible management agencies need a clear understanding of their legal authorities, and the advanced preparation of formal agreements between likely participants that address roles, responsibilities, and procedures will facilitate rapid response. A collaborative advanced planning effort will assist in the identification and preparation of appropriate authorities, agreements, technical and communication protocols, training, personnel, equipment, permits, and other resources prior to the need for a response.

Establishing a transparent, well-documented, and effectively communicated decision-making process is essential to foster partner and public support (Heimowitz and Phillips 2008). A partnership of both public and private sector organizations comprise the Illinois Hydrilla Task Force's Rapid Response Team, which has the capacity to provide both direct and in-kind resources to quickly respond to newly discovered Hydrilla populations. A Memorandum of Understanding (MOU) among the Hydrilla Rapid Response Team members clearly defines commitments for each Team

partner (see Appendix B). The response structure incorporates a “tiered” alert/response system based on the perceived severity and location of a new invasion.

Management options selected for implementation will be determined by specific conditions of the AIS invasion and the technical, economic, and political feasibility of using existing management tools. The goal of eradication is to reduce AIS populations to levels not reproductively viable (including resting stages), resulting in complete elimination of the AIS population within the area of invasion (Great Lakes Regional Plan 2006).

The primary goal of rapid response deployment is to initiate eradication efforts (which may take years to complete) or critical interim measures to achieve effective containment while a longer-term eradication or suppression strategy is formulated. This means mobilizing and deploying as quickly as possible to address a newly detected aquatic invasive plant within the first season of detection, and, preferably, to begin active management within 30 days. Inherent in rapid response is the need to use physical techniques or chemical treatments that can eradicate an invasive species before it has a chance to proliferate. It is essential to ensure that providing such techniques or treatments is practical and that they pose little risk to rare or endangered species or human health. In the short term, commonly occurring native communities may be compromised and/or recreational water uses may be curtailed by eradication efforts. However, these are acceptable tradeoffs to avoid spreading such harmful species to other parts of a water body or other waters of the state (adapted from Maine Department of Inland Fisheries and Wildlife 2006).

RAPID RESPONSE: QUANTIFYING THE THREAT OF INVASION AND RISK OF SPREAD

Once verification is complete, the Rapid Response Team’s Assessment Crew will re-visit the site and assign the infestation to a level of response that considers: 1) the relative ease with which the population can be treated and eradicated, and 2) the risk of spread both internally (within the water body) and externally (to other water bodies).

Potential spread within the water body is governed by the physical features of the water body (especially water depth and substrate) and the level of potential vectors for Hydrilla’s spread (particularly boats, anglers, birds, and flow/currents). Hydrilla can grow on nearly any substrate, from rock to loose muck, but it prefers substrates with high organic content. Rocky to gravelly substrates typically support lesser densities of macrophytes while very loose muck provides an unstable substrate where growth may be variable over space and time. The depth range for Hydrilla typically is from shore up to 30 feet deep, in part depending on water clarity and light attenuation through the lake water. Boats and birds can actively transport Hydrilla within a water body, but Hydrilla may also become fragmented and pieces may drift or be carried to new locations. The production of tubers and turions further complicates control of this species.

Potential spread outside the water body is primarily a function of surface water outflow, bird movement, and human activities. Water can carry viable fragments downstream to additional water bodies. Birds may transport fragments, but they are more likely to carry seeds, either externally or in their digestive tract. Transport by humans is a known threat, with movement of plant fragments in or on boats and trailers well documented (Johnstone et al. 1985, Bratager et al. 1996).

All of these factors combine to create a site-specific level of threat. Of primary interest is how great an infestation may become, how readily it may be transmitted to new areas (both inside and outside the infested water body), what natural and cultural resources may be impacted and to what degree, and what the potential is for eradication or control through rapid response. In evaluating the potential threat from a new Hydrilla infestation on a case by case basis, the Rapid Response Team and its Assessment Crew will consider the following once the initial assessment of the infestation site is completed (the questions below are excerpted from the Massachusetts Hydrilla RR Plan):

1. What portion of the water body could be colonized (estimate as the area with water depth less than 30 feet, and/or less than twice the average summer Secchi disk transparency)?
2. What is the potential for dense bed formation (estimate as the area with stiff muck or sandy silt substrate)?
3. What is the potential for rapid (less than 3 years) spread of Hydrilla (estimate as the common area from #1 and #2 above and not densely covered by native plants)?
4. What is the strength of vectors for internal Hydrilla spread (boat traffic, flow, currents, open expanses vs. isolated coves)?
5. What is the potential strength of vectors for external Hydrilla spread (trailer day-use boats, daily or seasonally mobile bird populations)?
6. What resources and uses are potentially threatened (water supply, swimming, boating, fishing, aesthetics, populations of sensitive or protected species)?
7. What is the potential for eradication (based on extent and density of coverage, vectors of spread)?
8. What is the potential for confinement (based on extent and density of coverage, physical isolation of area affected, vectors of spread)?

For infestations involving landowners willing to cooperate in management and control activities, public access may be restricted along with signs posted explaining why the area has been “quarantined.” Based on guidance provided by the Illinois DNR to the Task Force, infestations involving landowners unwilling to cooperate in management and control activities will be dealt with on a case-by-case basis.

The recommended Rapid Response Team members for an infestation include staff from the affected city, village, and/or township; forest preserve/conservation district(s); local private contractors involved with lake management; lake management or homeowner association(s); local marinas and boat launches; the Illinois DNR; the Task Force co-coordinators; Task Force members; and federal/state/local governmental agencies with an interest and/or relevant authority.

RAPID RESPONSE: POPULATION DELINEATION AND MONITORING PROTOCOL

Control: Initial treatment should take place within 30 days after population verification, or late spring/early summer after verification in fall of the previous year (depending on water temperature and day length). Monitoring of growth at the treated site after initial treatment may dictate additional treatments during that growing season. Monitoring surrounding areas may yield additional detections that also require treatments during the same season.

Education and Outreach: Prior to initial control efforts, the Task Force will provide educational materials to the owner(s) of the infested site and to owners of property adjacent to the infestation, as well as to the general community in which the infestation is found. The Task Force will emphasize the need for long-term control and monitoring. Prior to initiation of management/control activities, the Task Force will work with the appropriate authorities to place signs describing what is happening at and near the infestation site. The Task Force will work with local radio, television, and print media to disseminate updates and public service announcements.

Monitoring: Members of the Task Force and the Rapid Response Team, staff from local agencies and organizations, and/or trained volunteers will monitor the infested site for several years after the initial treatment, using protocols determined at the time to be both scientifically valid as well as within financial and/or staff resource constraints.

The following monitoring methods will be used/adapted as appropriate for the particular infestation (excerpted from the MA Hydrilla RR Plan and recommendations from NY Hydrilla Task Force):

A. Sampling areas for tubers and new detections (a combination of monitoring treated areas and surveying for additional populations)

- Do not randomly sample water body; focus sampling on areas in and around where infestations were found.
- Using a bathymetric map of the site, set up transects at regular intervals (this sampling method may need to be modified depending on the size of infestation).
- Begin monitoring for tubers in early spring (March/April). Core samples are taken using a PVC sampler constructed by the Rapid Response Team that allows for sampling in waters up to 12 feet deep. The core samples are then rinsed and processed to determine if tubers are present and how many. Data collected are compiled and an average number of tubers per square meter is determined for each location as well as the overall infestation. Tuber monitoring is intended to provide an estimate of the remaining Hydrilla population and allows for tracking when tuber germination begins. After germination, plant growth is monitored during the course of tuber monitoring. This helps to determine the proper herbicide application time for the start of treatment. Tuber monitoring will take place after the treatment as well, which helps to determine overall tuber germination rates, remaining tuber dormancy, and whether new tubers have been formed.
- Ideally, space transects around the water body, extending from shore to the end of plant growth, with one transect per defined shoreline segment, determining transect location with GPS or readily identified shoreline features. Segments should be of

roughly equal length, but this can be based on actual shoreline, straight distance across the water, land use or other features of concern or interest, or encompassed water body area. Be sure to cover all boat launch, swimming, inlet, bird congregation, key habitat and intake areas, and any other key access points in the entire water body.

- Priority can be given to transects of key concern, either based on likely invasion points (access points) or potentially threatened resources (intakes, swimming areas, key habitat) if the number of transects is too great for the manpower and time resources available, but recognize the limitations this will impose on invasion detection.
- Rake toss surveys are also used before and after treatment to determine extent of infestation (picking up vegetation that is not long enough to be seen from the water surface) and efficacy of treatment. NYSDEC conducts one survey per hectare and uses up to three tosses per hectare ([http://nysfolia.mylaketown.com/uploads/tinymce/nysfolia/Rake%20Toss%20NYSFOLA2010%20\(2\).pdf](http://nysfolia.mylaketown.com/uploads/tinymce/nysfolia/Rake%20Toss%20NYSFOLA2010%20(2).pdf)).
- During the survey: 1) pilot boat to sample site (use transects); 2) anchor boat; 3) log GPS data, water depth, shoreline plants, and notes; 4) assign density to floating plants; 5) toss rake (full distance of the rope = 10 meters); 6) let the rake settle on bottom and then slowly retrieve to the boat; 7) assign an overall density to the plant mass; 8) separate the plant mass into different species, and assign each a plant density; 9) archive any plant samples for positive identification; and 10) remove all plant debris from work area (to avoid confusion at next site), pull anchor, and pilot to next sample site within that hectare.
- Tabulate all data in a manner that facilitates future comparisons, typically in a spreadsheet or GIS format. Evaluate presence of any Hydrilla, extent of coverage and density, and pattern of occurrence. Map the distribution of Hydrilla in the water body for visual reference. Report the locations and infestation information to EDDMapS (www.eddmaps.org) or New Invaders Watch Program (www.newinvaders.org) depending on the location within Illinois.
- Repeat monitoring every one to three years depending on local agency or organization staff availability.
- File report with Illinois DNR's Aquatic Nuisance Species Program manager and post on the *Hydrilla Hunt!* website (www.niipp.net/hydrilla)

B. Plant community monitoring

- Plant community monitoring is conducted both pre- and post-treatment. Assessing the rate of expansion may not be necessary if the invasion is detected early and prompt control actions are implemented. However, where Hydrilla has been present for more than a single growing season, information on the rate of expansion will be helpful in planning a control strategy and in garnering support for rapid action. Isolated plants are likely to signal the first year of growth. Scattered plants are likely to represent the second year of growth. Well-established beds will normally be more than two growing seasons old.
- Fifty-meter grids are used to determine sampling locations using the point intercept method and two-rake toss sampling technique while recording GPS coordinates. The metrics collected will include plant species presence, abundance, and GPS locations

following methodology commonly used to evaluate herbicide efficacy. Native and rare plant presence and abundance will be part of this monitoring. Measures of Hydrilla status (dead, alive, re-growth, roots, tubers, turions) will be quantified after each survey to determine herbicide efficacy. Data gathered is reviewed and assessed to determine exact Hydrilla eradication treatment implementation dates, as well as any treatment adjustments that need to be made. An annual Plant Community Report is created and presented to the public and stakeholders (adapted from New York State Hydrilla Task Force protocol).

- Tabulate all data in a manner that facilitates future comparisons, typically in a spreadsheet or GIS format. Evaluate presence of any endangered, threatened, or rare plant species (or additional invasive plant species); extent of coverage and density; and pattern of occurrence. Map the distribution of these species in the water body for visual reference. Report the locations and infestation information to EDDMapS (www.eddmaps.org) or New Invaders Watch Program (www.newinvaders.org) depending on the location within Illinois.
- Repeat monitoring every one to three years depending on local agency or organization staff availability.
- File annual report with Illinois Department of Natural Resources Aquatic Nuisance Species Program manager and post on the *Hydrilla Hunt!* website (www.niipp.net/hydrilla)

C. Water quality monitoring

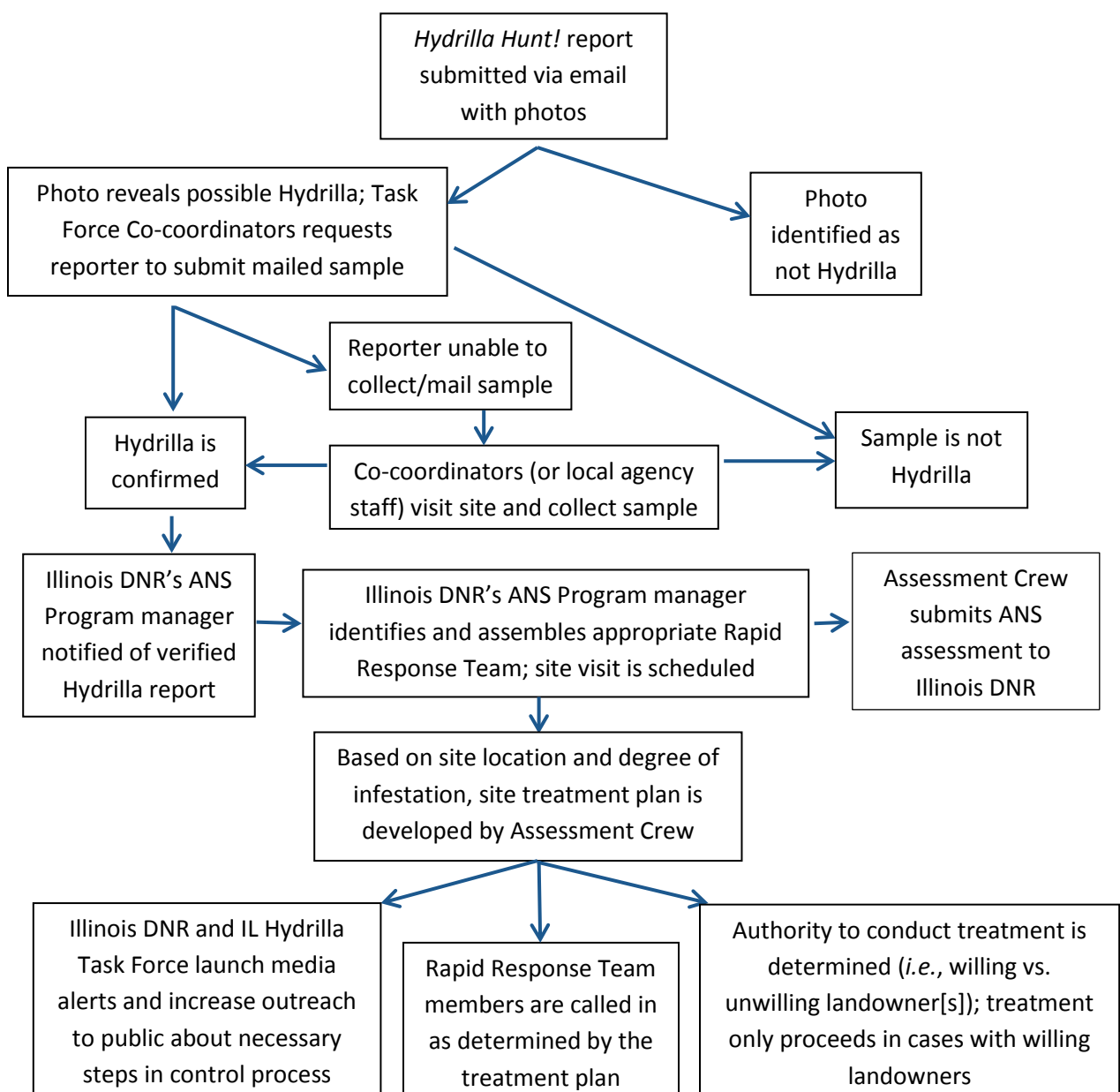
- The Task Force will conduct water quality monitoring in conjunction with any herbicide treatments. Results will be made available to the Illinois DNR, relevant herbicide manufacturers and applicators, and the public. Water sampling helps the Task Force determine herbicide levels for efficacy; in the case of fluridone treatments, the monitoring is needed to determine if “bump up” treatments are required.
- Documented records of water sample analysis will be archived and maintained by the Illinois DNR for treatment protocol and liability purposes.

RAPID RESPONSE: PROCESS OVERVIEW

1. *Hydrilla Hunt!* program receives photo of suspected Hydrilla from the public
2. Co-coordinators conduct photographic identification and request mailed live sample if unsure
3. Confirm mailed sample identification and schedule site visit
4. Co-coordinators (or their representatives) confirm infestation on-site; notify Illinois DNR’s Aquatic Nuisance Species Program manager of findings
5. If infestation is confirmed via on-site visit, assemble Rapid Response Team and Assessment Crew to: a) conduct on-site infestation assessment, b) quarantine area (when possible), and c) formulate treatment plan
6. Treatment plan is presented to Illinois DNR’s Aquatic Nuisance Species Program manager for review within 10 days of confirmed report

7. Public outreach begins within the general proximity of the infestation site
8. Pre-treatment monitoring occurs
9. Treatment begins within 30 days of initial report; provide frequent updates to Illinois DNR's Aquatic Nuisance Species Program manager
10. Treatment concludes for first year
11. Post-treatment monitoring occurs
12. Monitoring program for next season is developed and plans for possible follow-up treatments and continued public outreach are formulated
13. First-season report filed with Illinois DNR's Aquatic Nuisance Species Program manager and made available on the *Hydrilla Hunt!* website

The following flowchart summarizes the Rapid Response notification and coordination protocols.



RAPID RESPONSE: QUARANTINE OPTIONS

The use of sequestering curtains or screens can both restrict access to an infested area and limit the spread of Hydrilla by vegetative fragmentation. This approach, while often expensive, has been very effective in a number of cases, especially for small areas or coves with a narrow connection to the main body of the waterbody.

Possible routes for spread should be considered and addressed to the extent possible. Sequestration can be highly effective if the infested area is localized and amenable to curtains or screens. Outlets from the waterbody should also be screened to minimize the export of Hydrilla fragments with outflow. This may be problematic where leaves or other debris is abundant enough to clog such screens, necessitating frequent cleaning. Rotating screens or other automated outflow restrictors are effective but expensive. Drawdown may also limit Hydrilla escape, particularly if an appropriate subsurface outlet exists and Hydrilla can be prevented from passing through it. It may be advisable to implement bird controls to limit bird contact with infested areas; scare tactics (*e.g.*, flags or pinwheels on buoys, noisemakers) can be effective for short time periods, which may be all that is necessary for lakes with migratory populations. Greater effort may be needed for lakes with substantial resident bird populations. If boating is allowed, it is advantageous to set up a temporary wash station at each ramp, and it may be necessary to staff it to maximize boater compliance. It is critical that all boats and trailers leaving the waterbody be inspected and cleaned.

Whenever feasible and where necessary permissions exist, the following quarantine steps will be considered and implemented as warranted:

1. Screen the surface outlet of the waterbody to minimize downstream movement of Hydrilla, maintaining the screen as necessary to facilitate outflow.
2. Lower the water level to prevent surface outflow; a subsurface drain may be used to continue outflow, but Hydrilla may escape through this exit if not screened, and such screening will require cleaning.
3. Post access points with public advisories to avoid Hydrilla and/or certain areas of the waterbody; use marker buoys to identify infested areas.
4. Surround smaller infested areas with sequestration curtain or other enclosing materials that prevent spread and limit public access.
5. Curtain-off coves or other isolated areas to prevent Hydrilla spread and limit access.
6. Use deterrence tactics or other strategies to limit bird use of the waterbody.
7. Set up a washing station and inspection point for boats taken off the waterbody; require inspection and cleaning when possible.
8. Close any access point (*e.g.*, boat ramp, beach, other points of active contact) in close proximity to Hydrilla beds where the potential for internal or external spread is considered high or close the entire affected waterbody to human use.

OPTIONS FOR EARLY ERADICATION

Mechanical – Hand Harvesting

The timeline for arresting Hydrilla invasions focuses on quickly stopping the plants' spread. Expansion from tubers occurs throughout the growing season, and so the sooner controls are implemented, the smaller the area that must be addressed. Once the growing season is over (around October), plants are largely dormant and many collapse or are otherwise reduced in volume until the following spring. Detecting and effectively removing Hydrilla plants by physical means will therefore be more difficult outside the growing season.

Mode of action: Plants are manually removed by divers; it is critical that removal includes root crowns. Where density is less than 500 plants per acre over a small number of acres, control can be complete although regrowth from tubers or turions is likely except in the most recent of infestations. At higher densities or area of coverage, risk of incomplete harvest or spread by fragment escape increases dramatically. Screening around the infestation is needed to prevent plant fragments from escaping the area.

Potential non-target impacts: Non-target impacts for hand harvesting is considered limited; with training, divers typically recognize Hydrilla and avoid other plants. The risk to non-target plants increases as the density of the area's plant community increases. Temporary increases in turbidity should be expected.

Permitting: An incidental take permit from the Illinois DNR may be required when working in natural glacial lakes or in an area where threatened or endangered species are located.

Monitoring: It is critical to delineate the target area and provide a means for divers to stay on course with complete coverage. Monitoring during harvesting to detect and collect fragments is also very important for successful elimination of Hydrilla.

Costs: This work can be done by trained volunteers; estimates from professional operations range from \$100 to \$500 per acre.

Other considerations: Use of a fragment barrier around all harvesting areas is highly recommended. Effective hand harvesting requires careful planning and is considered more difficult than it may appear.

Mechanical – Suction Harvesting

Mode of action: Plants can be pulled directly into the suction apparatus, but for best effect this is a suction aided-hand harvesting operation, whereby hand-harvested plants are fed into the suction tube and filtered out in an above-water chamber. This speeds up the operation and limits fragment dispersal.

Probability of successful control: High potential for eradication at low to moderate densities of Hydrilla; complete removal probability declines at higher densities.

Potential non-target impacts: May pull in non-target plants and plankton by suction, but effects localized and limited. Turbidity plume at surface from filtering chamber may be substantial.

Permitting: An incidental take permit from the Illinois DNR may be required when working in natural glacial lakes or in an area where threatened and/or endangered species are located.

Monitoring needs: Delineating the target area is critical to provide a means for divers to stay on course with complete coverage.

Costs: \$5,000 to \$15,000 per acre, depending on equipment features, contractor mobilization, Hydrilla density, and total area to be harvested.

Other considerations: Turbidity may be unacceptable where a large area is suction harvested. Filtering system must be able to capture tubers and turions, or Hydrilla may be spread.

Mechanical – Benthic Barriers

Mode of action: Covers target area with a porous or non-porous blanket; barrier limits light and physically stresses plants.

Probability of successful control: Usually completely eliminates live vegetation from covered area in 30 to 60 days. May need to cover infested areas for several growing seasons before tubers are spent.

Potential non-target impacts: All plants under the barrier will be killed. Some invertebrates are also killed, but many relocate. Fish find the barriers attractive for cover and foraging area, primarily caused by “edge effect” (creation of edges between plants and open water).

Permitting: An incidental take permit from the Illinois DNR may be required when working in natural glacial lakes or in an area where threatened and/or endangered species are located.

Monitoring: Careful delineation of areas to be covered is needed. Condition of plant community and the potential for recolonization through roots and tubers of Hydrilla should be assessed prior to removal.

Costs: Materials typically cost \$0.50 to \$1.00 per square foot. When including application and maintenance costs, expect \$30,000 to \$50,000 per acre. However, material can be re-used indefinitely, so costs are greatly reduced for subsequent applications.

Other considerations: To enhance performance, benthic barriers should be carefully anchored and periodically cleaned. To minimize hooks and lures being caught in benthic barriers, mark location with labeled buoys. Barriers may present a safety hazard in swimming areas.

Mechanical – Water Level Drawdown

Mode of action: Lowered water levels exposes plants and substrate to drying and freezing action. Ice damage may also be a factor. Where plants can be dried, frozen, or ripped up by ice action, Hydrilla may be greatly reduced in abundance. With years of repeated drawdown, exposed substrate tends to be dominated by coarse sediment less hospitable to Hydrilla invasion.

Probability of successful control: Very high where drying, freezing, and/or ice damage occurs. As this is a function of weather patterns, uncertainty is high; in Illinois, about one out of three years will provide effective drawdown conditions. Where thick organic sediments, groundwater seepage, or other factors limit freezing and drying, success will be lower. However, Hydrilla can grow at significant depths, so the drawdown must be substantial to be effective.

Potential non-target impacts: Other plants that overwinter in vegetative forms are also likely to be harmed. Seed-producing plants may be stimulated. Some invertebrates (especially mollusks), amphibians (most likely frogs), reptiles (particularly wood turtles), and mammals (most probably beaver and muskrat) could be negatively affected. Effects on fish vary, depending upon timing and duration of drawdown and the interaction with feeding and reproduction. Public water supply and water levels in wells may be affected.

Permitting: An incidental take permit from the Illinois DNR may be required when working in natural glacial lakes or in an area where threatened and/or endangered species are located.

Monitoring: Can be extensive. Pre- and post-implementation surveys are needed. Aside from effects on the plant community, effects on susceptible fauna may be required. Water supply must be monitored and a contingency plan is needed if a public water supply is impaired. It should be assumed that at least three years of implementation will be needed to conduct a valid assessment of success and non-target impacts.

Costs: Where drawdown is facilitated by existing structures, costs are limited to permitting and monitoring, with a potential for mitigation costs if impacts are unacceptable.

Other considerations: A very detailed evaluation of potential drawdown impacts is needed before attempting this technique. Issues of downstream flooding, refill time, and impacts on water supply and non-target organisms must be addressed.

Chemical

The most recently used control methods for Hydrilla involve coordinated applications of both endothall and fluridone (New York State Hydrilla Task Force notes: James Balyszak):

- *“Our Project is currently utilizing a combination treatment of a contact herbicide (Aquathol-K, active ingredient endothall) and a systemic herbicide (Sonar One & Sonar Genesis, active ingredient fluridone). After the initial discovery of Hydrilla in the Cayuga Inlet in 2011, a fall treatment using Aquathol-K*

was implemented. The contact herbicide serves to knock back and kill the vegetative growth above the sediment. By eliminating Hydrilla growth in the water column, you can greatly reduce the potential for fragmentation and spread via human vectors (boats, equipment, recreation, etc.) and animals. Less biomass in the water column also means there is less potential for Hydrilla to be fragmented and spread during high water flow events (which has been an issue locally for the Cayuga Inlet Project).

- *The first treatment of the season involves the contact herbicide, which functions to eliminate the Hydrilla biomass above the sediment. By timing this first treatment based on in-field monitoring/ sampling, we treat the Hydrilla AFTER it has had a chance to germinate and grow, but BEFORE it has a chance to develop new tubers/ turions. Since the Hydrilla tubers can remain viable in the sediment for years at a time, it is our goal to allow new growth to sprout from tubers that have overwintered (seed bank), and to then treat and kill the plant before it has a chance to establish new tubers. Treatment timing is crucial! Aquathol is usually applied at 3-5ppm, depending on area to be treated and flow. If a permit is required, it is helpful to have coverage for a broad time range. Since the Aquathol treatment is a one-time treatment, a broad time range of coverage will allow you to choose the most optimal treatment time (based on growth observations, weather, flow rates, etc.).*
- *Following the initial contact herbicide treatment of the season, we implement the systemic herbicide treatment for the remainder of the season. Sonar Genesis (liquid formulation) is injected into the water system at a very low rate (5-8ppb) over a long period of time (60-90 days). Special injection units have been installed at three strategic locations along the Cayuga Inlet. These units are filled with Sonar Genesis, which inject the herbicide at a metered rate into the water system. The injection units are controlled remotely, and adjustments to the injection rates can be made by herbicide applicators as needed (based on flow rates and herbicide concentrations from water sampling analysis). A pelletized formulation of Sonar (Sonar One) is used in conjunction with the liquid formulation as well. These pellets are applied to specific areas within the Cayuga Inlet treatment area (in locations that are somewhat isolated or receive less flow). Sonar One and Sonar Genesis treatments begin on the same day. Depending on herbicide concentrations, subsequent Sonar One pellet applications may be required at regular (monthly) intervals as the season progresses.*
- *As there is not a great deal of vegetative growth (above the sediment) following the contact herbicide treatment, the systemic Sonar treatments functions to kill off any new growth that might sprout during the remainder of the season. Treatment timing for Sonar is usually determined by the observation of new growth following the initial Aquathol treatment. Essentially any new growth that emerges above the sediment following the Aquathol treatment will be killed by the Sonar. Once again, the goal is to have the Hydrilla tubers germinate, expend their energy stores, and kill the plant before it has a chance to establish new tubers.*
- *Both the Aquathol and Sonar herbicide applications have worked extremely well. We have observed approximately 90-95% kill effectiveness following the Aquathol applications in 2011, 2012, and 2013. Very little (if any) Hydrilla growth is observed above the sediment following the Aquathol application. Approximately 3-5 weeks after the initial Aquathol application, we will observe new Hydrilla growth (from tubers that did not germinate initially). When this growth is observed, Sonar applications begin. Once Sonar applications begin the Hydrilla dies back, and very little vegetative growth is observed for the rest of the season. Overall, we are very pleased with the results and success that we have had in the Cayuga Inlet using this combination treatment.”*

A. Application of endothall herbicide

Mode of action: Endothall is a selective contact herbicide that has been used to manage submerged aquatic vegetation for over 50 years. The herbicide damages the cells of

susceptible plants at the point of contact but does not affect areas untouched by the herbicide such as roots or tubers. It is selective in the sense that some plants show greater susceptibility to endothall treatment than others; for example, Hydrilla is very susceptible, while elodea (a common native plant) is not; see more at <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.6r4DXA7g.dpuf>.

Endothall acid works by interfering with plant respiration, affecting protein and lipid biosynthesis and disrupting plant cell membranes (Senseman 2007, Madsen et al. 2010, US EPA 2005). It causes cellular breakdown of plants within two to five days. Symptoms of plant damage including defoliation; brown and shriveled tissues will become apparent within a week of herbicide application. Plants will fall out of the water column within three to four weeks after application; see more at <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.6r4DXA7g.dpuf> (taken from Cornell Cooperative Extension Tompkins County's "Endothall: Herbicide Treatment FAQ" <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq>).

Probability of successful control: In Lake Cayuga, New York, post-treatment monitoring of treated areas indicated that at least 90 percent of the vegetative portions of the Hydrilla were killed with minimal impact to other species. The reproductive and propagation potential of Hydrilla plants in these areas was significantly reduced, as was the potential for boat traffic to chop up and spread plant fragments.

The New York Hydrilla Task Force anticipated that the Aquathol K treatment (a brand name of liquid endothall acid) would result in significant but not complete control of Hydrilla in the treatment area. The results observed—including significant biomass decline accompanied by some delayed die-off and the initiation of new shoots—are consistent with observations from other water bodies in the Northeast where Aquathol K has been previously used to control other invasive aquatic plants (*e.g.*, Eurasian watermilfoil); see more at <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.6r4DXA7g.dpuf> (taken from Cornell Cooperative Extension Tompkins County's "Endothall: Herbicide Treatment FAQ" <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq>). The label for endothall (trade name Aquathol K) can be found at <http://ccetompkins.org/environment/invasive-species/labels>.

Potential non-target impacts: Hydrilla, the target of the endothall application in the Cayuga Inlet, reproduces primarily by fragmentation and turions. Native aquatic plants are mostly seed producers. Seeds will not be affected by the endothall treatment and will germinate the following year.

Endothall is strictly a contact herbicide. It kills the growing green vegetation that it contacts in the water, but will not translocate to the roots and will not kill the roots. Thus, submerged plants that lose green vegetation after treatment will be able to sprout next season from living rootstock in the sediment.

Hydrilla is considered highly susceptible to the effects of endothall, yet not all aquatic plants are considered equally susceptible to the effects of the herbicide (NYSFOLA 2009). For example, common waterweed (*Elodea canadensis*) is a beneficial native plant found in Cayuga Lake and has low susceptibility to the herbicide. Other common native plants, including eelgrass (*Vallisneria spiralis*) and water stargrass (*Zosterella dubia*), are considered to have medium susceptibility to endothall. Other plants, including some pondweeds

(*Potamogeton spp.*), coontail (*Ceratophyllum demersum*), and Eurasian watermilfoil (*Myriophyllum spicatum*), are expected to be highly susceptible to endothall treatment at the concentrations anticipated in the Cayuga Inlet; see more at <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.6r4DXA7g.dpuf> (taken from Cornell Cooperative Extension Tompkins County's "Endothall: Herbicide Treatment FAQ" <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq>).

Permitting: The Rapid Response Team will apply for a National Pollutant Discharge Elimination System (NPDES) permit for use of aquatic-rated herbicides on or near water in Illinois www.epa.state.il.us/water/permits/pesticide/general-permit.pdf. An incidental take permit from the Illinois DNR may be required when working in natural glacial lakes with threatened and/or endangered species.

Monitoring: Herbicide concentrations will be monitored by the Rapid Response Team and herbicide providers during the application to determine if target concentrations have been achieved—and if not, to guide adjustments in dosing and possible bump-up treatments. Concentrations will then be continuously monitored post-application at multiple locations to track the decay and possible transport of the herbicide until it can no longer be detected.

Much of this monitoring is not required by permit; however, the Task Force contends that it is critical to determine the effectiveness of the effort, allow for informed decision making about future years' treatments, and to address public questions/concerns. All water quality results will be posted on the *Hydrilla Hunt!* Website as soon as they have been verified. In addition, the Rapid Response Team will monitor the plant community at treatment sites to determine the presence/absence of Hydrilla and its tubers, record all species' presence and abundance, and identify any unintended impacts on the aquatic plant community.

Costs: Costs typically range from \$500 to \$2,000 per acre, depending upon the form of endothall applied, any necessary re-treatment(s) necessary to maintain the target concentration, and any sequestration actions in the target area. For example, approximately \$1,080 of product is needed for a dose of 5 ppm per acre with an average depth of 5 feet, while \$648 of product is needed for the same rate at an average depth of 3 feet.

Other considerations: The combination of dose and exposure time is critical to success; the combination of achievable detention time and degree to which non-target plants must be protected will determine the potential for eradication or extended control. Communication with the public before, during, and after treatments is essential to generate public support for treatment efforts, and to promote understanding of how aquatic invasive plants are transported and to enhance general awareness of aquatic invasive species.

B. Application of fluridone herbicide

Mode of action: This systemic herbicide is absorbed by vegetative tissues and translocated throughout the plant, inhibiting the synthesis of carotenoid pigments. Lack of these auxiliary (protective) photosynthetic pigments causes susceptible plants to die slowly through reduced food production and damage by sunlight. Uptake must be nearly continuous over an extended period (>60 days preferred), necessitating extended exposure time.

Probability of successful control: Where adequate concentration (>6 ppb, preferably up to 20 ppb) and exposure time (60-120 days) are maintained, Hydrilla can be eradicated. This has proven difficult to achieve, however, particularly in partial lake treatments. Use of slow release pellet formulations or sequestration of the target area with impervious curtains maximizes exposure time and limits dilution of the dose. Follow-up actions, such as hand harvesting, are often necessary. This treatment will not affect the seeds, tubers or turions of the Hydrilla, so repeated applications may be needed to achieve eradication or control; it is currently assumed that treatment must be repeated for two or even three consecutive years. The label for fluridone (trade name Sonar) can be found at <http://ccetompkins.org/environment/invasive-species/labels>.

Potential non-target impacts: Susceptibility of other plants to fluridone varies widely, and lowering of the dose can maintain much of the native community. However, doses <10 ppb have a lowered probability of controlling Hydrilla. Impacts to non-target plants should be expected in an aggressive Hydrilla control program employing fluridone. Slow die-off of affected plants limits oxygen reduction in the water column. No impacts to fauna or humans are expected at doses consistent with label rates.

Permitting: The Rapid Response Team will apply for a National Pollutant Discharge Elimination System (NPDES) permit for use of aquatic-rated herbicides on or near water <http://www.epa.state.il.us/water/permits/pesticide/general-permit.pdf>. An incidental take permit from the Illinois DNR may be required when working in natural glacial lakes or in areas where threatened and/or endangered species are located.

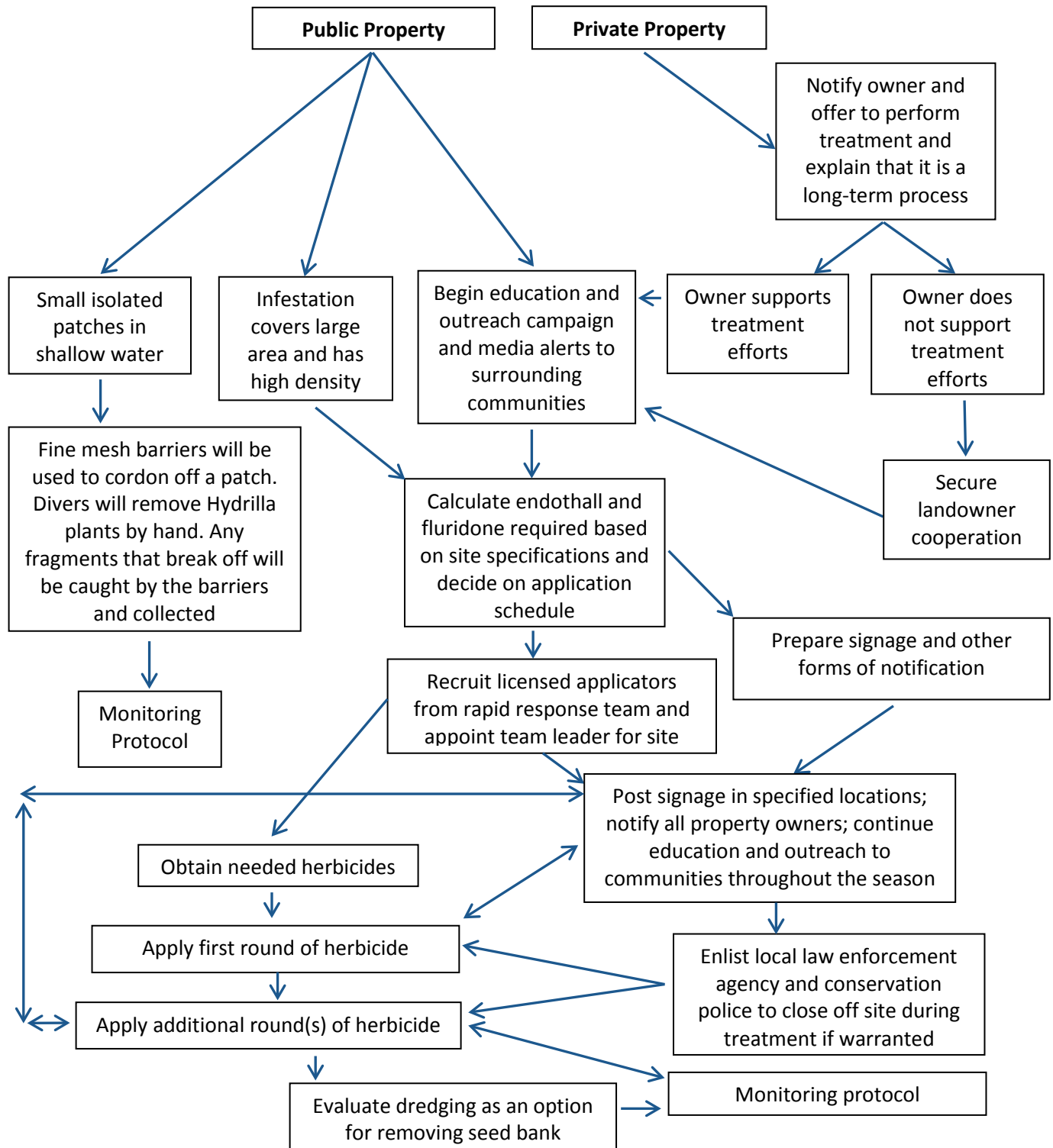
Monitoring: Typically, the plant community is monitored before and after treatment. The concentration of fluridone is also commonly tracked on a weekly to monthly basis and dosage adjusted accordingly. Protocol for monitoring may vary depending upon the manufacturer of the chosen herbicide. Additional information about monitoring can be found in the previous section that discusses endothall.

Costs: Costs range from \$50 to \$200 per acre, depending on the form of fluridone applied, any re-treatments necessary to maintain the target concentration, and any sequestration actions in the target area. For example, an 8 ppb dose of Sonar AS over one acre at an average depth of 5 feet would be \$52 per acre.

Other considerations: The combination of dose and exposure time is critical to success; the combination of achievable detention time and degree to which non-target plants must be protected will determine the potential for eradication or extended control.

RAPID RESPONSE TREATMENT PROTOCOL SUMMARY

The following flowchart represents a generalized Hydrilla rapid response treatment protocol. It is important to emphasize that the protocol will need to be flexible and subject to modification depending on characteristics of individual infestations.



POST-CONTROL FOLLOW-UP

Once reports have been logged and eradication efforts have been conducted, aggressive public and private sector monitoring of water resources in the vicinity of previously infested water bodies will be encouraged. Volunteer monitors will be recruited via the Northeast Illinois Invasive Plant Partnership, Illinois-Indiana Sea Grant, Illinois Lake Management Association, Illinois EPA's Volunteer Lake Monitoring Program, RiverWatch, and municipalities.

PREVENTION OF RE-INFESTATION

Once it is believed that a Hydrilla infestation has been eradicated, it is important for all stakeholders to remember that the waterbody remains highly susceptible to reinfestation. As the cost of prevention is much less than the cost of rehabilitation of an infested waterbody, steps should be taken to reduce the risk of re-introduction of Hydrilla. Since Hydrilla most often comes from a local source, control activity is encouraged at the watershed, municipal, and regional levels. Working across political boundaries with limited funding is difficult, but it represents the most sweeping opportunity to limit future invasions. Alternatively—and considered almost essential as a back-up—are steps taken at the individual waterbody to reduce the risk of re-introduction. Key steps may include:

- Education through a lake association or local municipality for all users about the threat of Hydrilla, how to avoid introducing it to the waterbody, how to identify it, and who to contact if it is found (see Outreach and Education section and Appendix A for relevant information that can be provided).
- Posting at all access points with signs that warn of Hydrilla's threat, identification tips, and urging that boats, fishing gear, and other recreational equipment be cleaned after each use in the waterbody.
- Provision of wash stations at boat ramps and/or staffing of ramps with inspectors.
- Monitoring the plant community to detect Hydrilla, with an emphasis on boat ramps and inlets.

RELEVANT LOCAL AND STATE REGULATORY POLICIES

City of Chicago's Invasive Species Ordinance: This ordinance stipulates that anyone importing, selling, transporting, owning, keeping, or otherwise possessing any live or viable regulated animal species or plant species (or plant material) within the city is subject to fine, as would a person or organization that releases or introduces these species into the environment anywhere within the city.

The Ordinance regulates 13 animal taxa and 11 plant taxa. More information can be found at http://www.cityofchicago.org/city/en/depts/bacp/supp_info/invasive_species.html.

Illinois Exotic Weed Act: Designated as 525 ILCS Sec. 10/1-5, this Act states that any person, corporation, political subdivision, agency, or department of the state that buys, sells, offers for sale, distributes or plants seeds, plants, or plant parts of exotic weeds without a permit issued by the Illinois DNR will be fined. Permits are only issued for experiments involving controlling and eradicating exotic weeds or for research to demonstrate that a variety of a species listed in this Act is not an exotic weed. Aquatic/wetland species on the list are purple loosestrife (*Lythrum salicaria*), common buckthorn (*Rhamnus cathartica*), and glossy buckthorn (*Rhamnus frangula*). See <http://codes.lp.findlaw.com/ilstatutes/525/10>.

Illinois Injurious Species List: Designated Administrative Rule 805.20, this Rule states that injurious species shall not be possessed, propagated, bought, sold, bartered, or offered to be bought, sold, bartered, transported, traded, transferred, or loaned to any other person or institution unless a permit is first obtained from the Illinois DNR in accordance with Section 805.40, except persons engaged in interstate transport for lawful commercial purposes who do not buy, sell, barter, trade, transfer, loan, or offer to do so in Illinois may transport injurious species across Illinois without an injurious species permit from the Illinois DNR. Twenty-seven aquatic invasive plants, including Hydrilla, are listed. See <http://www.ilga.gov/commission/jcar/admincode/017/01700805sections.html>.

Illinois Noxious Weed Law: This Law includes no aquatic or wetland plants on its Noxious Weed list. See <http://plants.usda.gov/java/noxious?rptType=State&statefips=17>.

RELEVANT STATEWIDE ORGANIZATIONS

Illinois Department of Natural Resources; <http://www.dnr.illinois.gov>

Illinois Environmental Protection Agency; <http://www.epa.state.il.us>

Illinois Lake Management Association; <http://www.ilma-lakes.org>

Illinois Volunteer Lake Monitoring Program; <http://www.epa.state.il.us/water/vlmp/index.html>

LITERATURE CITED

- Anderson, L.W.J. 2005. California's reaction to *Caulerpa taxifolia*: a model for invasive species rapid response. *Biological Invasions* 7:1003-1016.
- Bratager, M., W. Crowell, S. Enger, G. Montz, D. Perleberg, W.J. Rendall, L. Skinner, C.H. Welling and D. Wright. 1996. Harmful Exotic Species of Aquatic Plants and Wild Animals in Minnesota. Annual Report. Minnesota Department of Natural Resources, St. Paul, MN. 99 pp.
- CDFG (California Department of Fish and Game). California Aquatic Invasive Species Management Plan. 2008. Draft rapid response plan for aquatic invasive species in California in California aquatic invasive species management plan. 136 pp. + appendices.
- Federal Emergency Management Agency's National Incident Management System. USDHS 2008. <http://www.fema.gov/national-incident-management-system>
- GLRP (Great Lakes Regional Panel on Aquatic Nuisance Species). 2006. Model rapid response plan for Great Lakes aquatic invasions, Iteration III, Draft: December 2006. <http://www.glc.org/ans/pdf/06-12-12-RR-Plan-Iteration-III-Dec06-NT2.pdf>
- Heimowitz, P. and S. Phillips. 2008. Columbia River Basin interagency invasive species response plan: zebra mussels and other *Dreissenid* species. 100th Meridian Initiative Columbia Basin Team. <http://100thmeridian.org/ActionTeams/Columbia/CRB%20Dreissenid%20Rapid%20Response%20Plan%20OCTOBER%201%202008.pdf>
- Johnstone IM, Coffey BT, Howard-Williams C (1985) The role of recreational boat traffic in interlake dispersal of macrophytes: A New Zealand case study. *Journal of Environmental Management* 20: 263–279.
- Langeland, K.A. 1996. *Hydrilla verticillata* (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". *Castanea* 61:293-304. <http://plants.ifas.ufl.edu/node/184>
- Lodge, D.M., S. Williams, H. MacIsaac, K. Hayes, B. Leung, L. Loope, S. Reichard, R.N. Mack, P.B. Moyle, M. Smith, D.A. Andow, J.T. Carlton, and A. McMichael. 2006. Biological invasions: recommendations for policy and management [Position Paper for the Ecological Society of America]. *Ecological Applications* 16:2035-2054.
- Madsen, J. D., R. M. Wersal, K. D. Getsinger, and J. G. Skogerboe. 2010. Combinations of endothall with 2,4-D and triclopyr for Eurasian watermilfoil control. Miscellaneous paper APCRP-CC-14, US Army Engineer Research and Development Center, Vicksburg, MS. <http://el.erdc.usace.army.mil/elpubs/pdf/apccc-14.pdf> - See more at: <http://cctompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.0HvcuMA5.dpuf>
- Maine Department of Environmental Protection. 2006. Rapid Response Plan for Invasive Aquatic Plants, Fish, and Other Fauna Part1: Plant Protocol. http://www.maine.gov/dep/water/invasives/rrp_part1final.pdf

Massachusetts Department of Conservation and Recreation. 2005. Rapid Response Plan for Hydrilla in Massachusetts.

Menninger, H. 2011. *Hydrilla verticillata* in the Cayuga Inlet: A science-based review to guide management actions. NY Invasive Species Research Institute
http://www.nyis.info/user_uploads/files/NYISRI%20Hydrilla%20%20Briefing_Outreach.pdf

Miller, H. November 25, 2007. Oregon has kept Hydrilla out of its waters. Statesman Journal.
<http://www.statesmanjournal.com/article/20071125/INVASIVE03/711250308/Oregon-has-kept-hydrilla-out-of-its-waters>

Mississippi River Basin Panel on Aquatic Nuisance Species. 2010. A Model Rapid Response Plan for Aquatic Invasive Species.
<http://www.mrbp.org/images/stories/Documents/MRBP/RapidResponse/mrbp%20model%20rapid%20response%20plan%20with%20appendices.pdf>

Murray, C. and D. Marmorek. 2003. Chapter 24: Adaptive management and ecological restoration. Pages 417-428 in Freiderici, P., editor. Ecological restoration of Southwestern ponderosa pine forests. Island Press.

National Research Council. 2004. Adaptive Management for Water Resources Planning, The National Academies Press. Washington, DC.
http://www.nap.edu/openbook.php?record_id=10972&page=12

Netherland, M. 2013. Hydrilla. Presentation at Ohio River Basin Hydrilla Workshop.
<http://appalachianohioweeds.files.wordpress.com/2013/07/ohio-river-hydrilla.pdf>

New York State Federation of Lake Associations (NYSFOLA). 2009. Diet for a Small Lake: The Expanded Guide to New York State Lake and Watershed Management, 2nd edition. - See more at: <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.0HvcuMA5.dpuf>

NISC (National Invasive Species Council). 2003. General guidelines for the establishment and evaluation of invasive species early detection and rapid response systems. Version 1. 16 pp.
http://www.invasivespecies.gov/global/EDRR/EDRR_documents/Guidelines%20for%20Early%20Detection%20&%20Rapid%20Response.pdf

NISC (National Invasive Species Council). 2008. 2008 – 2012 National Invasive Species Management Plan. http://www.invasivespecies.gov/home_documents/2008-2012%20National%20Invasive%20Species%20Management%20Plan.pdf

Oregon Department of Agriculture Plant Programs.
http://www.oregon.gov/ODA/PLANT/WEEDS/profile_hydrilla.shtml

Salafsky, N., R. Margoluis, and K. H. Redford. 2001. Adaptive management: a tool for conservation practitioners. Biodiversity Support Program, Washington, D.C.
http://www.lauxen.net/conecte/referencias/Salafsky_2001a.pdf

Senseman, S. A., editor. 2007. Herbicide Handbook. Ninth Edition. Weed Science Society of America, Lawrence, KS. - See more at: <http://ccetompkins.org/environment/invasive-species/hydrilla-endothal-treatment-faq#sthash.0HvcuMA5.dpuf>

Smits, J. and F. Moser, editors. 2009. Rapid response planning for aquatic invasive species: a template. Mid-Atlantic Panel on Aquatic Invasive Species. 43 pp.
<http://ww2.mdsg.umd.edu/images/uploads/siteimages/MarylandPlanFinal.pdf>

USDHS (U.S. Department of Homeland Security). 2008. National Incident Management System. Federal Emergency Management Agency, Publication P-501. Washington, D.C. 156 pp.
Pimentel, David. 2005. Aquatic nuisance species in the New York State Canal and Hudson River systems and the Great Lakes Basin: An economic and environmental assessment *Environmental-Management*. 2005; 35(5): 692-70

USEPA (U.S. Environmental Protection Agency). 2005. Overview of EPA authorities for natural resources managers developing aquatic invasive species rapid response and management plans. EPA842-B-05-002. Department of Wetlands, Oceans, and Watersheds, Washington, D.C.

Western Regional Panel on Aquatic Nuisance Species. (undated). Model Rapid Response Plan for Aquatic Nuisance Species <http://www.fws.gov/answest/Docs/WRP%20RRP%20Final.pdf>

Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive management: the U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

WRP (Western Regional Panel on Aquatic Nuisance Species). Undated. Model rapid response plan for aquatic nuisance species. 60 pp.
<http://www.fws.gov/answest/Docs/WRP%20RRP%20Final.pdf>

Wittenberg, R. and Cock, M.J.W. (eds.). 2001. Invasive Alien Species: A Toolkit of Best Prevention and Management Practices. CAB International, Wallingford, Oxon, UK, xvii - 228.

APPENDIX A

Early Detection Public Outreach Materials

Hydrilla Hunt! Card

(actual size is 3" x 5")

UNWANTED: Hydrilla

An invasive aquatic plant recently found in neighboring states, hydrilla could be very detrimental to Illinois fishing, boating and swimming along with waterfront property values. Early detection of hydrilla in Illinois could save millions of dollars in control costs.

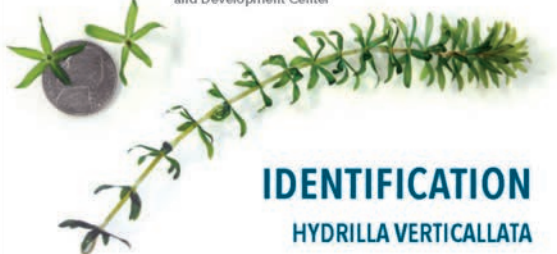
**HELP IDENTIFY THIS PLANT EARLY ON
WHEN POPULATIONS ARE STILL SMALL
ENOUGH TO ERADICATE AND MANAGE.**

Keep this card handy in your boat or tackle box and let us know right away if you think you've found hydrilla. To learn more about hydrilla and the Hydrilla Hunt! program, visit

www.niipp.net/hydrilla

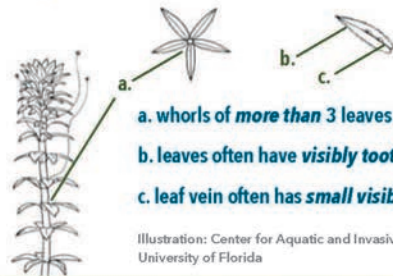


Photo: Michael J. Grodowitz, U.S. Army Engineer Research and Development Center



IDENTIFICATION

HYDRILLA VERTICALLATA



- a. whorls of **more than 3** leaves
- b. leaves often have **visibly toothed** edge
- c. leaf vein often has **small visible spines**

Illustration: Center for Aquatic and Invasive Plants, University of Florida

Notice the toothed edges of hydrilla leaves, as well as the whorls of more than three leaves.




Photo: Robert Vidéki, Doronicum Kft., Bugwood.org

Think you have found hydrilla? Email us a picture of the plant stem placed on a light-colored background. If you're unable to send a digital picture, email us and we will contact you.

HydrillaHunt@niipp.net

Hydrilla Hunt! Poster
(actual size is 8.5" x 14")

UNWANTED!





Richard K. Younts/USFWS, U.S. Geological Survey, Bugwood.org

HYDRILLA COULD IMPACT YOU



Wibeke Rudek, Mississippi State University, Bugwood.org

Hydrilla is an invasive aquatic "superweed" that's been found recently in Indiana and Wisconsin. Our enjoyment of fishing, swimming, and boating will be dramatically affected if it gets into Illinois' lakes and rivers.

Hydrilla can grow an inch a day and produce a dense mat of stems on the water surface. Early detection of hydrilla could save Illinois millions of dollars in control costs.



www.niipp.net/hydrilla

Take a Hydrilla Hunt! card and keep it handy as you enjoy Illinois' waterways. If you think you've found hydrilla, please let us know right away!

TAKE A HYDRILLA HUNT CARD!

Photos: Michael J. Goodrich, US Army Engineer Research and Development Center



IDENTIFICATION

HYDRILLA VERTICILLATA

- a. whorls of **more than 3** leaves
- b. leaves often have **visibly toothed** edge
- c. leaf vein often has **small visible spines**

Illustrations: Center for Aquatic and Invasive Plants, University of Florida

Notice the toothed edges of hydrilla leaves, as well as the whorls of more than three leaves.



Photos: Robert Vidale, Dorcasen KB, Bugwood.org

Think you have found hydrilla? Email us a picture of the plant stem placed on a light-colored background. If you're unable to send a digital picture, email us and we will contact you.

HydrillaHunt@niipp.net

HELP IDENTIFY THIS PLANT EARLY ON WHEN POPULATIONS ARE STILL SMALL ENOUGH TO ERADICATE AND MANAGE!

Hydrilla Hunt! Identification Sheet – front side

(actual size is 8.5" x 11")

ILLINOIS' LEAST WANTED!

Hydrilla is a highly invasive aquatic plant that threatens the health of Illinois' lakes and rivers—as well as fishing, boating, and swimming. It's **very** easily confused with American elodea (a desirable native aquatic plant), as well as Brazilian elodea (another invasive aquatic plant). If you think you've seen *hydrilla* or *Brazilian elodea*, please take a picture and let us know right away—see the reverse side for contact information.

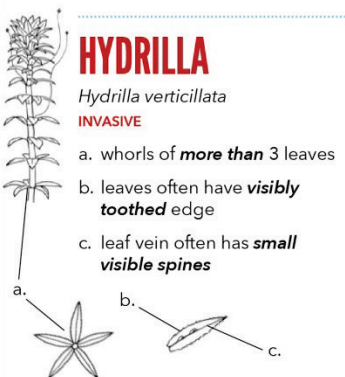


Join the Search!

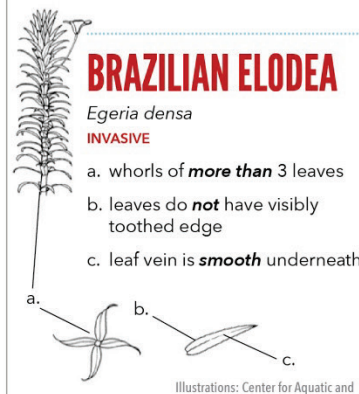
INVASIVE



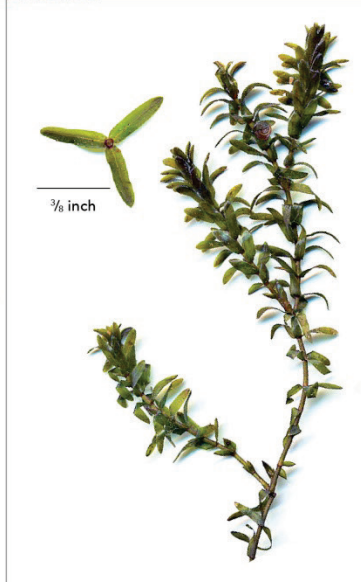
Michael J. Grodowitz, U.S. Army Engineer Research and Development Center



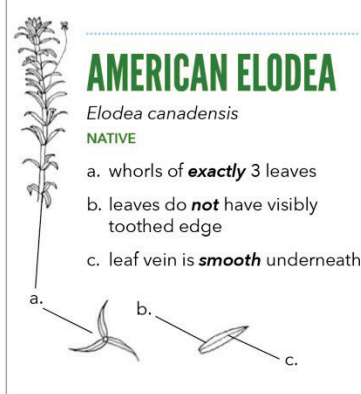
Christian Fischer, www.commonswikimedia.org



NATIVE



Paul Skawinski, Aquatic Plants of the Upper Midwest



Hydrilla Hunt! Identification Sheet – back side

(actual size is 8.5" x 11")

HOW CAN I HELP?

If you think you have found hydrilla or Brazilian elodea, please use your phone or digital camera to take one or two close-up photos of a plant stem placed on a light-colored background (then discard the plant fragment in the trash). Email your photos to us at

hydrillahunt@niipp.net

We will acknowledge receipt of your email and let you know what we see. If you're not able to send us a digital picture, email us and we will contact you. *Thanks!*

MORE INFORMATION

To learn more about hydrilla, and for more information about the Hydrilla Hunt! program, visit

www.niipp.net/hydrilla



Richard S. Hammerschlag, U.S. Geological Survey, Bugwood.org

HYDRILLA: THE PERFECT AQUATIC WEED

Hydrilla is extremely well-adapted for competing in an aquatic environment. It grows quite rapidly—up to one inch a day! Once hydrilla reaches the water surface, it can quickly produce a dense mat of stems that crowds out desirable native plants. Within the past few years, hydrilla has been discovered in Wisconsin and Indiana, and it could arrive in Illinois very soon. Early detection of hydrilla could save Illinois millions of dollars in control costs, and prevent many recreational and ecological impacts. Please help identify this plant early on when populations are still small enough to eradicate and manage!



Leslie J. Mehrhoff, Univ. of Connecticut, Bugwood.org



Robert Vidéki, Doronicum Kft., Bugwood.org

TUBERS: A SPECIAL CHARACTERISTIC OF HYDRILLA

Hydrilla produces tubers that grow in the sediment of lakes and streams. Each tuber can produce a new plant. The tubers are less than ½ inch long and can remain alive for many years.

NOTE: native American elodea (*Elodea canadensis*) and Brazilian elodea (*Egeria densa*) do **not** produce tubers.



Notice the toothed edges of hydrilla leaves, as well as the whorls of more than three leaves.

Photos: Robert Vidéki, Doronicum Kft., Bugwood.org

Model Press Release

News Contact:

Cathy McGlynn
(847)242-6423 office; (845)667-4981 mobile
cathy.mcglynn@niipp.net

For Immediate Release

Join the Search for Hydrilla

*Hydrilla Hunt! program solicits help of lake and river enthusiasts
to discover invasive aquatic plant*

GLENCOE, Ill. (May 31, 2013) – Boaters, anglers, swimmers, and others who enjoy Illinois’ lakes and rivers are keeping their eyes peeled this summer for an aquatic “superweed.” Through the Hydrilla Hunt! program, citizen volunteers are on the lookout for a highly invasive aquatic plant named *Hydrilla verticillata*, or simply “Hydrilla.”

Recognized as one of the world’s worst weeds, Hydrilla can grow an inch per day and form dense mats of vegetation at the water surface. Within the past few years, Hydrilla has been discovered in Wisconsin and Indiana and so it could arrive in Illinois very soon. Our desirable native aquatic plants, sport fishing, native wildlife, waterfront property values, and recreational uses might all be seriously impacted.

The strain of Hydrilla that’s been found in the northern United States is believed to have originated in Korea. It is found growing on mucky as well as sandy bottoms, and from shallow water up to depths of 20 feet or more. Hydrilla can spread quickly, since just a small stem fragment of Hydrilla can sprout roots and grow into a whole new plant.

“Early detection of Hydrilla could save Illinois millions of dollars in control costs,” noted Cathy McGlynn, coordinator for the Northeast Illinois Invasive Plant Partnership. “Experience from other states shows that once a waterway becomes infested with Hydrilla, it’s nearly impossible to control. Our hope in Illinois is to identify the plant at a very early stage when populations are still small enough to eradicate and manage,” added McGlynn.

Anyone can participate in the Hydrilla Hunt! program. Volunteers are encouraged to take a more detailed look at plants they encounter while out and about on Illinois’ waterways; for example, by inspecting plants that are snagged on fishing lines or on boat anchors, or by noting plants seen while boating or growing at the end of a pier. A Hydrilla identification sheet (available for download at the program’s website, see below) can be used to differentiate Hydrilla from look-alike plants such as Brazilian elodea and American elodea. Volunteers who suspect they may have found Hydrilla are asked to take several digital photographs and email them to the Hydrilla Hunt! program for verification.

For more information, including how to become a Hydrilla Hunt! volunteer, a Hydrilla Identification Sheet, fact sheets, and other resources, visit www.niipp.net/hydrilla. The Hydrilla Hunt! program is coordinated by the Northeast Illinois Invasive Plant Partnership, the Chicago Botanic Garden, and the Lake County Health Department-Lakes Management Unit. Funding support has been provided by the Illinois Department of Natural Resources through the Illinois-Indiana Sea Grant.

* * * * *

APPENDIX B

Illinois Hydrilla Task Force

Memorandum of Understanding Between Governmental and Non-Governmental Organizations in the State of Illinois

July 2014

ARTICLE 1. BACKGROUND AND OBJECTIVES

The purpose of this Memorandum of Understanding (MOU) is to formalize the cooperative relationship of governmental and non-governmental organizations for a coordinated Rapid Response Team to effect both short and long term management and control of the aquatic invasive plant Hydrilla (*Hydrilla verticillata*) once its presence is confirmed within the state of Illinois. Activities will include site assessment, treatment, and monitoring in addition to public outreach and reports.

ARTICLE 2. MISSION STATEMENT

The mission of the Illinois Hydrilla Task Force (“Task Force”) and its Rapid Response Team is to minimize the adverse impacts of Hydrilla on aquatic ecosystems throughout the state of Illinois.

ARTICLE 3. COOPERATION

Each partnering organization participating under this MOU agrees, to the extent they determine at their sole discretion to be feasible within the organization’s currently available personnel and programmatic resources, to share expertise, equipment, materials, herbicides, and staff and/or volunteer labor to control, manage, and/or eradicate one or more confirmed Hydrilla infestations in the state of Illinois. Each partnering organization may contribute towards the control and management of Hydrilla depending on their respective resource and budgetary constraints, as well as the geographic location and relative magnitude of the Hydrilla infestation. Partnering organization staff will be under the direction and control of their own respective organization but will endeavor to cooperate within the coordinated framework of the Task Force’s Rapid Response Team.

ARTICLE 4. ACTIVITIES

Partnering organizations agree, to the extent feasible, to:

1. Promote effective, integrated management of Hydrilla;
2. Promote land, water, and recreational management and practices that reduce the potential for Hydrilla to move from already infested areas to new locations;
3. Assist in the development and implementation of protocols that prevent spread of Hydrilla via potential vectors including outdoor recreation, construction and landscaping materials, hydrologic management, and vehicles; and
4. Support and/or participate in management and control efforts of identified Hydrilla infestation(s). An initial supply of treatment chemicals has been purchased by the Chicago Botanic Garden in cooperation with the Illinois Department of Natural Resources and the Northeast Illinois Invasive Plant Partnership. The Task Force will identify appropriate use of this initial supply and will assist with securing resources for additional control efforts. The Task Force will endeavor to develop a funding strategy for each infestation that is tailored to the specific situation. Funding resources may

be in the form of staff time, materials, equipment, or cash provided by Task Force members, MOU organizations, and/or other supporting organizations or individuals. The Task Force recognizes that effective control and management of Hydrilla may involve a combination of cultural, mechanical, and chemical techniques depending on the location and scale of the infestation. MOU participants will take all necessary precautions when implementing control measures to act in the best interests of the comprehensive protection and conservation of Illinois' natural ecosystems as well as in the best interests of public health and safety. In most cases, it is expected that control and management measures chosen will be based on documented prior outcomes.

ARTICLE 5. LIABILITY

Whenever possible the property owner(s) of the infestation site will sign a "Permission to Access" form before the Rapid Response Team initiates its work. The Illinois Department of Natural Resources has authority to treat Hydrilla on state-owned property and on the property of willing landowners.

AGREEMENT

Name of organization (if an individual, individual's name)

hereby agrees to the Illinois Hydrilla Task Force's "Memorandum of Understanding Between Governmental and Non-Governmental Organizations in the State of Illinois," dated July 2014.

Authorizing signature

Date

Printed name

Title

Principal contact who will participate in the Rapid Response Team for the organization

Principal contact's mailing address

Principal contact's city/ state/ zip

Principal contact's office, mobile, and FAX phone numbers

Principal contact's email address

Please return one signed copy to:

Illinois Hydrilla Task Force – Rapid Response Team
c/o Chicago Botanic Garden
1000 Lake Cook Road
Glencoe, IL 60022

APPENDIX C

Hydrilla Infestation Site Assessment Form

(check boxes as appropriate)

Body of Water: _____

Date of Site Assessment: _____

Name(s) and Affiliation(s) of Inspector(s): _____

County/Municipality: _____

Location Latitude and Longitude/UTMs: _____

Date Infestation First Reported/By Whom: _____

1. Ownership of property

- ☐ Privately owned
- ☐ Publicly owned; specify organization and primary contact: _____

2. Boat Launch present

- ☐ No
- ☐ Yes Describe accessibility: _____

3. Infestation Location

- ☐ Lake
- ☐ River/Stream
- ☐ Other _____

4. Water current

- ☐ None/low
- ☐ Medium
- ☐ High

5. Water depth (specify if varies by position)

- ☐ 1 - 5 feet
- ☐ 6 - 10 feet
- ☐ 11 - 20 feet
- ☐ > 20 feet
- ☐ Other _____

6. Connectivity of Site

- ☐ Isolated
- ☐ Linked to other water bodies and/or waterways (specify): _____

7. Potential vectors

- ☐ Frequently used by anglers, boaters, etc.
☐ Other _____

8. Area of water body infested

- ☐ <1 acre
☐ 1-5 acres
☐ 5- 10 acres
☐ 11-20 acres
☐ 21-30 acres
☐ Other _____

9. Percent cover Hydrilla within infested area

- ☐ 1 - 5%
☐ 6 - 10%
☐ 11 - 25%
☐ 26 - 50%
☐ 51 - 75%
☐ 76 - 100%

Approximately how many plants per m²? _____

10. Presence of threatened and/or endangered species in the aquatic and/or adjacent habitats?

- ☐ Yes
☐ No
☐ Unknown

List species present:

1. _____
2. _____
3. _____

11. Presence of additional aquatic plant species at site?

- ☐ Yes
☐ No

List species and estimates of their percent cover

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

12. IMPORTANT: Attach photographs, aerial photos and/or bathymetric map of site if available.

APPENDIX D

Hydrilla Infestation Site Access Agreement: Permit for Willing Partners on Solely Owned Property

STATE OF ILLINOIS
DEPARTMENT OF NATURAL RESOURCES

LAND USE PERMIT

I, _____, certify that I am the landowner of the property commonly known as _____ and have sole and exclusive authority to authorize work on that property. I hereby authorize the Illinois Department of Natural Resources ("IDNR") to remove Hydrilla on the above described property for the purpose of conservation, preservation, and restoration of native Illinois flora and fauna as set forth in 20 ILCS 805/805-150.

Receipt of this Permit and the conditions therein is hereby acknowledged.

LANDOWNER:

STATE OF ILLINOIS
Department of Natural Resources

Signature

Signature

Printed Name

Printed Name

Title

Address

Agreement Number