



Water Chestnut (*Trapa natans*) Response Guidelines for Manual Removal Efforts

Water chestnut (*Trapa natans*) is an aquatic invasive plant that can have considerable ecological and economic impacts. The following Aquatic Invasive Species (AIS) Response Guideline outlines the steps for the manual control of small water chestnut infestations (≤ 0.50 acre) by waterfront homeowners, lake associations, and related organizations. Entities seeking to control large infestations (> 0.50 acre) of water chestnut may find better suited information in the “Mechanical Response Guidelines” offered by the Capital Region PRISM. Goals and justifications for conducting a manual response should be well defined with clear objectives. The following document will describe the process involved for a safe and successful response.

The Capital Region Partnership for Invasive Species Management (CR-PRISM) is a collaborative organization created to address the threat of invasive species. CR-PRISM is a not-for-profit hosted by Cornell Cooperative Extension of Saratoga County. The CR-PRISM strategically operates across eleven counties and is financially supported by the Environmental Protection Fund as administered by the New York State Department of Environmental Conservation (NYS DEC). The CR-PRISM is one of eight Partnerships for Regional Invasive Species Management in New York State. The CR-PRISM works in collaboration with partner groups to promote prevention, education, and outreach strategies, create early detection and response networks, and execute best management practices for invasive species control including post-treatment monitoring and restoration actions. The goal of these efforts is to protect conservation targets within our communities and slow the spread of aquatic and terrestrial invasive species.



Topics in this response guideline includes information such as

- Statement of problem, water chestnut biology, and background
- How to conduct a water chestnut pull and management considerations
- Capital Region PRISM Framework of Response and prioritization



Step 1. Identifying Management Goal and Objectives

Step 2. Determine the Size and Distribution of the Infestation

Step 3. Permissions and Permitting

Step 4. Equipment, Materials and Safety

Step 5. Scheduling Event

Step 6. Methodology

Step 7. Disposal and Permitting

Step 8. Volunteer Recruitment and Engagement



Water Chestnut Biology and Background

Water chestnut is a New York State [Prohibited](#) Invasive Species and cannot be knowingly possessed with the intent to sell, import, purchase, transport or introduce. The New York State Natural Heritage Program [Tier Rankings](#) lists water chestnut as a high threat tier four (widespread) aquatic invasive species with significant negative impacts.

Water chestnut (*Trapa natans*) colonizes areas of freshwater lakes and ponds and slow-moving streams and rivers, where it can form dense mats of floating vegetation. These floating dense mats cause problems for boaters and swimmers and negatively impact aquatic ecosystem functions. They can cause a decrease of dissolved oxygen content in the water column, alter submersed plant and animal communities, and decrease biodiversity by outcompeting native aquatic plants. Water chestnut may reduce real estate values and economically impact businesses and marinas. The aquatic invasive plant was introduced to the northeast more than a century ago and is widespread. Water chestnut grows in the littoral zone; this is the shallow area surrounding a waterbody that leads to land.



Water chestnut is an annual, rooted floating aquatic invasive plant species. Water chestnuts typically surface in late May to mid-June in the Capital Region. It has both submerged and floating leaves which are different in appearance. Submerged leaves are feather-like and somewhat delicate and can resemble a milfoil; triangular floating leaves are more easily identifiable with their toothed edges and inflated stems (petioles). The plants generally grow in water up to 0.3-2.0 meters deep and their stems can be up to 5 meters long. The floating leaves form a rosette around the central stem.

Each rosette has the capacity to produce 20 seeds (also known as fruits or nutlets). Mature seeds are light green and typically mature by late July to mid-August within the CR-PRISM. The seeds are easily identifiable with four sharp barbs and may be transported by waterfowl, floating dispersal, boats/trailers, fishing equipment, and improper disposal. Seeds fall from the rosette into the sediment and contribute to the “seed bank.” Because seeds remain viable for up to 12 years, management of water chestnut requires a long-term commitment.

How to Conduct a Manual Water Chestnut Pull & Management Considerations

Capital Region PRISM Framework of Response and Prioritization

Water chestnut responses are conducted on a limited basis each year at priority locations by the CR-PRISM. Response locations are internally guided using a [Water Chestnut Prioritization](#). All partner and public requests for water chestnut removals are considered. CR-PRISM water chestnut removals are typically justified using three factors: ecological significance, public benefit/economic value, and emergency access. The size, density, and longevity of preexisting sites are also considered. Populations less than 0.5 acres in size can typically be locally eradicated using manual pulling techniques. Larger populations with high densities require mechanical (harvesters/hydro rakes) or chemical controls. In all cases, control requires commitment and resources to perform the work. The CR-PRISM can assist entities seeking to control water chestnut by helping with grant applications and providing guidance for volunteer recruitment and retention.



Step 1: Identifying Management Goal and Objectives

Stating clearly defined goal(s) and objectives is important in the planning stages of conducting a water chestnut pull. Success is dependent on having a clear scope of work, setting realistic targets for removal, and identifying available resources such as volunteers and related partner groups who can help. Goals can range from creating an access path, clearing a dock or boat launch, slowing the spread of an infestation in a specific area, suppressing efforts to reduce the size of a current population, or local eradication.

As seeds remain viable for up to 12 years removal efforts will require commitment over time to continue harvesting plants to deplete the seed bank. Reduced density of plants usually become apparent after 2-3 years depending on the size of the infestation. When stating a project goal consider incorporating several manual hand harvesting events over time in the first few years and tracking the success of your work.

Example goals:

- *Clear an area for recreational purposes*
- *Create a pathway for emergency access*
- *Clear a boat launch, slip, or floating dock*
- *To protect a conservation target or threatened species in critical habitat*
- *To prevent the spread of the aquatic invasive species into an uninvaded area*

Step 2. Determine the Size and Distribution of the Infestation

Setting a goal requires one to assess the size and extent of the infestation targeted for removal. The manual management of an existing population should be half an acre or less depending on the number of participants and time available for hand pulling events. If the infestation is larger than a half-acre, please consult the CR-PRISM Water Chestnut Guidelines for Mechanical Harvesting.



Delineating the infestation will aid in determining the best management approach, feasibility, time required, and project efficacy, i.e... if hand pulling efforts are an effective response based on the goal. An estimate of acreage can be determined by visiting the infestation site while cross referencing one's location to Google Maps. The CR-PRISM is available on a limited basis to assist with the initial delineation of an infestation.

A step-by-step guide is available on the iMapInvasives, [Documenting Water Chestnut Efforts](#) webpage. iMapInvasives is a free statewide database for reporting invasive species detections and management outcomes.



Step 3. Check for Permissions and Permitting to Perform the Work

Once manual removal has been chosen as the management option, all permits should be obtained three months prior to an activity. Dependent on the type of waterbody, private, local, state, and/or federal permits may or may not be needed. The lead entity is responsible for obtaining the proper permits. Consult with the New York State Department of Environmental Conservation Regional Permitting Office to determine what permits may be required.

Secure written permission from all property owners from access points, rights-of-way, and landowners including those who own property below the water's surface. Identify and follow all local municipality ordinances.

Check for Rare, Threatened, or Endangered Species. Contact the New York State Natural Heritage Program or discuss with your local PRISM to determine if species of concern or high conservation value are present to take necessary precautions as to not harm them.



Resources for Permitting

1. [DEC Statewide Offices Contact Information](#)
 - For questions contact your Regional NYS DEC Permit Administrator!
2. General Permit for Management of Invasive Species
Types: [\(GP-0-15-005/GP-0-21-004\)](#)
 - General Permit Application: [GP-0-21-004](#)
 - Protection of Waters Program: [Article 15](#)
3. Freshwater Wetlands Permitting
 - [ECL Article 24 Freshwater Wetlands](#)
 - Freshwater Wetlands [Joint Application Form](#)
4. The [Environmental Resource Mapper \(ERM\)](#) can be used to identify protected streams based on their classification and to create simple maps as part of the permit application process if needed.
5. Additional permitting may be required for disposal and/or transportation of plant material. Please refer to the end of this document for additional information.



Step 4. Equipment, Materials and Safety

- Procure watercraft to assist with the manual pull such as kayaks, canoes, and small rowboats. Motorized boats can be extremely helpful for collecting and transporting biomass to a central location for disposal. **Attendants on the boat can serve as safety guides.**
- Provide contractors with garbage bags or laundry baskets for plant collection and transport on watercraft.
- Make sure teams have gloves, hats, and sunscreen,
- Remind teams to bring food and water.
- Work with partners to have covered transport for the water chestnut and meet permit transportation requirements.
- Provide PPE like life jackets, have a first aid kit available, and appoint a manager to supervise workflow and assess safety issues on the water.
- Monitor forecasts and set a rain date as needed.



Step 5. Scheduling Event

Early in the season (May/June)

- It is best to collect the rosette and root system of the plant to prevent vegetative regrowth.
- Seeds at this point will be immature and still secured to the floating rosette
- This method can produce high levels of turbidity effecting water quality, especially with large pulls and many volunteers

Mid to Late Season (July/August)

- Seeds may be maturing and not fully secured to the floating rosette.
- Consider pulling and separating the top portion of the plant or cutting the rosette at the base which will reduce the likelihood of turbid waters.

Late Season (mid-August to early September)

- Mature seeds will start to fall from the rosette in late July to early September. Management during this time is ineffective to reduce the population size but can be effective to maintain access. The timing of seed fall can be site dependent.

Consider conducting pulls in a 3-5-hour window using the steps below as a guideline:

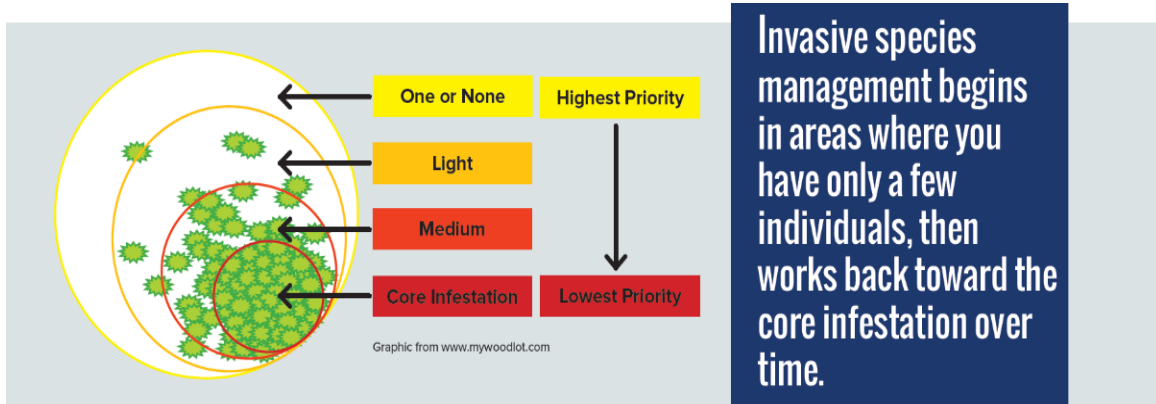
- Premeeting with all parties involved, outlining the objectives and safety measures of the activity.
- Identify site specific safety concerns.
- Review designated approach to the hand harvest (i.e. where to focus efforts as a group).
- Schedule multiple breaks during the event.
- Recommend participants bring extra clothes.
- Monitor weather forecasts and plan a rain date as needed.



Step 6. Methodology

Prioritize the work effort. Begin with low density satellite populations, then move into the core of an infestation.

- This strategy prevents smaller manageable infestations from becoming larger.



The New York State Department of Environmental Conservation "Managing Invasive Plants in Riparian Areas"

Identify the outer edge of the plant bed and work inward towards the center of the population over time, making sure to remove trace/sparse amounts that are away from the larger floating mat(s). Consider 2-4 harvests in a single year depending on time commitment and support. Repeat yearly at the same location to reduce the size of the infestation. Over time the seed bank will decrease, and response efforts will be able to become less frequent. Please note that upstream sources of water chestnut may serve as a seed source and continued efforts will be needed. In such cases annual maintenance may be the management goal.

Step 7. Disposal Permitting

Additional permits may be needed for the proper disposal of invasive species and should be considered in the beginning stages of planning.

- [Application and Permit](#) : Possess with Intent to Sell, Import, Purchase, Transport, or Introduce a Prohibited Invasive Species for Research, Education, or Other Approved Activity.
- Check with your regional NYS DEC Permitting Office to see if this is needed.
- Proposed disposal methods and protocols should render the invasive species non-viable and prevent the re-introduction and spread of the invasive species during transport to a disposal facility.



When disposing of AIS consider the following:

Securing a vehicle to transport water chestnut biomass.

- a. Water chestnut should be covered or contained during transport
- b. Decontamination of equipment using high pressure hot water (140 Degrees °F)
- c. Identify fees for needed disposal and build into a budget

A site for disposal must be identified prior to management

- a. Consider composting with a local municipality
- b. Burial as compost with a local farm
- c. Burial at a reclamation/recovery site for retired mines
- d. Processed as biofuel if a biodigester is present



Disposal of water chestnut should be organized roughly one month prior to the removal. It is recommended that points of contact for disposal be provided with an estimated biomass amount and drop off timeframe. Multiple trips to the disposal site may be necessary. Disposal locations vary. If the biomass does not pose a risk of reintroduction to a waterbody, it can be left to dry in hot weather over time. Compost facilities at municipality transfer stations accept this material on a limited basis. Farmers/landowners will also occasionally accept the material if there is need for compost.

Step 8. Volunteer Recruitment and Engagement

Volunteers who have a vested interest in the local environment are critical for success and need to be recruited and organized. Local community members should be recruited through different media channels.

- a. Begin with identifying a date and time that is favorable to recruit the most participants and designate a rain date.
- b. Advertise the event through multiple platforms.
- c. Instruct volunteers on what to bring: food, water, personal protective equipment, sunscreen, and personal watercraft.
- d. Sign volunteers in and have a safety meeting the day of the event. Review site specific safety concerns.
- e. Have volunteers sign a waiver of liability to participate.
- f. Demonstrate clean, drain, dry practices before and after an event.

The Capital Region PRISM is here to help serve our communities, please reach out to our staff for assistance.

capitalregionprism.org

