**FFY2018 Water Chestnut Management Work Plan**

Plan for July 1, 2018 – June 30, 2019

The Vermont Department of Environmental Conservation

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# Contact

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# Abstract

Water chestnut was first confirmed in Vermont in Lake Champlain in the 1940s. This annual aquatic plant can form dense monocultures, choking out beneficial native plant species, reducing oxygen levels, negatively altering the recreation potential of the invaded water body, and reducing shoreline property values. Since 1982, the Vermont Department of Environmental Conservation (VTDEC) has managed water chestnut in Lake Champlain and other Vermont waters annually. Many partners contribute to VTDEC’s program. To date, all water chestnut management activities have been non-chemical: harvesting by hand is used to control sparse populations and areas inaccessible to mechanical harvesters; and mechanical harvester is used to control dense mats.

While 17 new infestations were found in Vermont in the last decade (most outside of Lake Champlain), management successes continue with noted reductions of water chestnut populations documented for Lake Champlain and in other water bodies managed long term. Overall declines of water chestnut populations have occurred at 69 of 85 Lake Champlain sites and at least 19 of 26 sites in other Vermont wetlands, lakes or ponds. Continued management efforts reduced the northern-most water chestnut mechanical harvesting site in Lake Champlain from Ferrisburg to approximately 3 miles below Benson, Vermont – a distance of approximately 36 miles. Due to water chestnut’s rapid growth habits and long-term seed viability, constant “maintenance” management is required in any water body where a population has historically occurred.

In 2018, VTDEC will monitor, remove and dispose of hand harvested water chestnut at up to 85 Lake Champlain sites and 26 other water bodies via contract and multiple partnerships. EPA funds awarded via the Lake Champlain Basin Program (LCBP) in FFY2018 will contribute to a VTDEC-overseen contracted hand harvesting program at the majority of these sites, all of which are within the Lake Champlain Basin. A new initiative in 2018, VTDEC plans to employ drone technology to increase the efficiency of hand-harvesting efforts, and to monitor sites that have been the focus of long-term efforts. It is expected that this monitoring data will inform management plans for 2018 and beyond, and further increase the efficacy of the program. A portion of the funds sought from LCBP will contribute to this element.

VTDEC staff and partners will supplement contracted control efforts, including a partnership with the Friends of Missisquoi Bay and Missisquoi National Wildlife Refuge. Contracted mechanical harvesting at 12 Lake Champlain sites with dense water chestnut mats will also supplement hand harvesting efforts.

# Introduction

Water chestnut (*Trapa natans* L.) is an invasive aquatic plant native to Europe, Asia and Africa. First confirmed in Vermont in Lake Champlain in the 1940s, its current range in the lake is from Missisquoi Bay south to Whitehall, New York with the densest populations now limited to the South Lake segment, south of Benson Landing, Vermont only. Water chestnut can also be found in a number of southern Lake Champlain tributaries, 26 other Vermont water bodies and at sites north of the lake in Quebec. It is one of the few aquatic invasive plant species that are annual, reproducing by seed. With the ability to form dense monocultures in a short time period, water chestnut can choke out beneficial native plant species, and reduce oxygen levels, negatively alter the recreation potential of the invaded water body, and reduce shoreline property values.

The LCBP has supported annual VTDEC water chestnut management since 1991 and a VTDEC/The Nature Conservancy (TNC) partnership from 1998 to 2017. Annual management efforts working in a north to south progression have greatly reduced the overall Lake Champlain water chestnut population and dense mats on both sides of the lake. Declines of water chestnut populations have occurred at 69 of 85 Lake Champlain sites and at least 19 of 26 other sites in Vermont wetlands, lakes or ponds. Continued management efforts reduced the northern-most water chestnut mechanical harvesting sites in Lake Champlain from Ferrisburg to approximately 3 miles below Benson, Vermont – a distance of approximately 36 miles. Many native aquatic species have returned to these managed areas and fishing opportunities have increased.

Despite ongoing water chestnut harvest activity successes, there are exceptions. Water chestnut increases in abundances are noted at some sites, in some management years. Environmental conditions, fluctuations in water levels influencing both spread and accessibility, and a lack of understanding of water chestnut pathways are likely contributing factors.

# Objectives and Tasks

VTDEC will continue a north-to-south Lake Champlain and adjoining tributaries water chestnut management program to reduce water chestnut population density, and prevent the plant’s northward expansion in Lake Champlain and further spread in the Basin. The overall program involves surveys and searches, mapping, hand and mechanical harvesting, and multiple partners. Mechanical harvesting targets dense mats. Hand harvesting targets sparse populations and sites inaccessible to mechanical harvesters (shallow sites).

Three contractors will conduct the majority of the hand harvest work in 2018; one will work on sites associated with Lake Champlain only, and the other two will also work on inland waters within the Vermont portion of the Lake Champlain Basin. RFPs for this work were available in January 2018 and bids were due in March 2018. The contractor selection awards have been provided and the work plans are in progress. In addition, VTDEC will utilize aerial photography (drones) to assist with on-the-water monitoring efforts, and to gauge long-term success of the harvesting regime. This information will inform future harvesting plans. The contractor selection process is in progress but not completed.

VTDEC will also work with volunteers and multiple partners to supplement contracted hand harvesting on Lake Champlain and inland waters. Continued communication and coordination, where appropriate, with U.S Fish and Wildlife Service, The Friends of Missisquoi National Wildlife Refuge, and Quebec and New York counterparts on management activities in the Missisquoi National Wildlife Refuge, and southern Lake Champlain areas in New York will also occur.

Motorized and non-motorized boats are used to access Lake Champlain sites. Pontoon boats transport contracted crews and kayaks to water chestnut sites not adjacent to access points. Kayaks and canoes are used to access other water body sites. At each managed site, systematic searches are conducted to look for and remove all water chestnut plants found, removing stem and roots when possible. Pulled water chestnut plants are collected in: plastic baskets or sleds strapped to the front of kayaks, Gardeners Supply leaf tip bags or other containers. The number and weight of rosettes pulled are estimated by counting and weighing a subset. All pulled rosettes are disposed of at upland, non-wetland sites. When possible, sites are targeted two or more times annually.

Management objectives will be accomplished with contractors; VTDEC and Missisquoi National Wildlife Refuge staff; Friends of the Missisquoi National Wildlife Refuge; recruited volunteers; and other partners.

# Environmental Outputs

With the anticipated management funds available, up to 85 Lake Champlain sites between Missisquoi Bay, Vermont and Dresden, New York on both the Vermont and New York sides of the lake with water chestnut will be managed by hand harvesting. In addition, searches for water chestnut will be conducted in 26 other Basin waters of Vermont; any water chestnut plants found will be removed by hand harvest. Hand harvesting of water chestnut will also occur at five sites in the Missisquoi Bay segment. Surveys/searches for water chestnut will occur in the vicinity of these known sites and in other areas of Lake Champlain and other waters within the Basin of Vermont.

# Deliverables

Quarterly progress reports will be submitted to LCBP in October 2018, and January, April and July 2019. A semi-annual report covering July – December 2018 will be submitted to EPA in January 2019. A final annual report of activities, tasks, outputs and outcomes will be prepared and a draft provided to the Technical Advisory Committee for review by approximately April, 2019. Once accepted, the final report will be submitted to EPA and the LCBP, and available for public distribution.

Through the LCBP Water Chestnut Workgroup, VTDEC will work with partners to provide 2018 water chestnut indicators for all water chestnut management efforts in the Lake Champlain Basin: area infested with water chestnut, management resources, and mechanical and hand harvesting management specifics.

**Environmental Outcomes**

2018 harvesting efforts – hand and mechanical - will continue to maintain existing water chestnut management goals: reduce densities, prevent further spread, shift Lake Champlain populations from dense mats in need of mechanical harvesting to populations harvested by hand, and continue surveillance.

# Schedule

The program represented in this workplan will be for one year, with the majority of the management work occurring between July and September 2018. The objectives, tasks and deliverables with a timeline are presented in Table 1.

**Table 1. FFY2018 water chestnut management objectives, tasks, deliverables and timeline**

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| --- | --- | --- | --- | --- | --- |
| **Objectives** | **Tasks** | **Deliverables** | | **Timeline** | |
| 1. 2018 coverage of known water chestnut sites established | Contact partners and establish control coverage for known Champlain and inland waters sites | 85 Lake Champlain and 26 inland waters in the Basin of Vermont visits. | May 2018 | |
| 1. Water chestnut surveillance | Conduct surveys and searches using on-water and aerial techniques | Water chestnut population locations and maps. QAPP for aerial photography monitoring element. | June thru September 2018 | |
| 1. Water chestnut control | Harvest and record water chestnut plants removed, known and new sites | Number and weight of plants harvested. | June thru September 2018 | |
| 1. With partners, develop 2018 water chestnut indicators | Compile data - area infested, management resources, mechanical and hand harvesting management specifics; populate indicators table | 2018 water chestnut indicators table. | March 2019 | |
| 1. Complete quarterly, semi-annual and final reports | Report on progress quarterly and semi-annually, compile data, create maps, write final report | Three quarterly reports, one semi-annual report and a final report. Final report on aerial photography work with site maps and future recommendations/plans for further work using this technology. | Quarterly basis for quarterly reports. January 2019 for semi-annual report  March 2019 for final report | |

# Budget Information

Requested funds will be used to support VTDEC contracted hand harvest work only, likely the Lake Champlain hand harvest contract only. Funds from LCBP would represent approximately 50% of the estimated total 2018 Lake Champlain Basin hand harvest contract amounts. Funds to support the balance of the hand harvest contract cost; mechanical harvesting and composting contracts; agreements for Lake Champlain access and access road repairs; salaries of VTDEC managing water chestnut; and for equipment maintenance and supplies are secured from other federal and state sources. Estimated budget details for the FFY2018 funds requested are provided in Table 2.

**Table 2. FFY2018 Water Chestnut Estimated Budget Details**

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| **FFY2018 Estimated Budget Details** | **Federal**  **(LCBP) Cost** |
| Contractual:  Hand harvest of water chestnut:  Lake Champlain element | $75,000 |
| Contractual:  Population monitoring using unmanned aerial systems | $15,000 |
| **Total** | **$90,000** |