

WATER CHESTNUT MANAGEMENT GUIDANCE & FIVE-YEAR MANAGEMENT PLAN FOR THE SUDBURY, ASSABET, AND CONCORD RIVER WATERSHED

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FOR THE ASSABET SUDBURY & CONCORD RIVERS

23 Bradford Street · Concord, MA 01742

978 · 369 · 3956

office@oars3rivers.org

www.oars3rivers.org

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This work was prepared by OARS staff Suzanne Flint, Alison Field-Juma, and Jessica Furbeck and any errors or omissions are OARS’ responsibility. The Guidance is intended as a living document and we will endeavor to keep it up-to-date with the help of its readers and users.

EXECUTIVE SUMMARY

Lakes, ponds and rivers across the Commonwealth of Massachusetts are being choked by invasive water chestnut (*Trapa natans*). The result is degraded ecology and habitat value, loss of recreational value, and the high cost of control efforts. It can be challenging to figure out how to effectively manage water chestnut due to a lack of life-cycle information, diverse approaches to permitting, cost, and evolving control methods. This Guidance provides the latest research and management experience compiled for Conservation Commissions, communities, researchers and other stakeholders to use in developing effective management approaches and plans. The document reviews the control options and permitting needs for each option and provides model language for permitting under the Wetlands Protection Act for use by both applicants and Commissions. It includes a 5-year Water Chestnut Management Plan for the Sudbury, Assabet and Concord watershed, and extensive references. It is intended to be a living a document.

WATER CHESTNUT IN THE SUDBURY, ASSABET, AND CONCORD WATERSHED

The Sudbury, Assabet, and Concord watershed lies within Middlesex and Worcester Counties in eastern Massachusetts, some 20 miles west of Boston. The watershed drains an area of 399 square miles, flowing generally north into the Merrimack River at Lowell. Ten of the river miles along the Sudbury and Concord Rivers lie within the boundaries of Great Meadows National Wildlife Refuge, established to protect the outstanding waterfowl habitat associated with the extensive riparian wetlands. Twenty-nine miles of free-flowing sections of the Sudbury, Assabet, and Concord Rivers are federally designated “Wild and Scenic Rivers” recognizing their outstanding ecology, history, scenery, recreation values, and place in American literature.

DISTRIBUTION OF WATER CHESTNUT

As described earlier, water chestnut was introduced to the watershed in the late 1870s and had expanded to nuisance proportions in the Sudbury River by 1945. Today water chestnut has been documented in all three mainstem rivers, and observed in various ponds, lakes and tributary streams of the watershed.

In 2013, 2014, and 2016 OARS mapped the extent of water chestnut infestation throughout the length of the Assabet, Sudbury and Concord Rivers and several ponds of the watershed. This was funded through the SuAsCo Cooperative Invasive Species Management Area (CISMA) from a natural resources damages payment from the Nyanza Superfund site on the Sudbury River in Ashland. See Appendix III for 2016 maps of the watershed (on-line version). These surveys showed a spread of the plant from the initial long-term concentrations on the Sudbury and Concord Rivers.

MANAGEMENT HISTORY

SUDBURY RIVER

The Sudbury River from Route 27 in Wayland downstream to Fairhaven Bay in Lincoln/Concord have been impacted by a heavy infestation of water chestnut for more than 20 years. By 1998, Fairhaven Bay was reported to be almost completely closed by a thick mat of water chestnut plants inhibiting recreation and changing the ecological conditions in the Bay.

US Fish & Wildlife Service in collaboration with other stakeholders manages water chestnut on the Great Meadow National Wildlife sections of the Sudbury River with mechanical harvesting and hand-pulling. USF&W purchased their first mechanical harvester in 1988, an Erectoweld Aquamarine H7-400 with dedicated trailer for transport, and conveyor for transfer of the harvested weeds from the harvester to a truck. Deployment of the harvester (which weighs over 5 tons) requires either a boat ramp or a lifting crane, and approximately 2 hours for installation and removal of the side paddle wheels (Hop Brook Protection Association, 2004). New harvester equipment was purchased from Alpha Boats in 2014 at an cost of about \$309,500 including: FX-6 Aquatic Weed Harvester, TLT-300 Tilt Deck Trailer

for harvester, TS-10 Transport Barge, TLT-300 Tilt Deck Trailer for barge, and SL-6036 Shore Loading Conveyor. This was funded by the Nyanza Natural Resources Damages Settlement.

Since 2001, water chestnut control in the Sudbury River's Fairhaven Bay (on the Lincoln/Concord line) has been jointly managed by a collaboration between USF&W, Town of Concord, Town of Lincoln, and Concord Land Conservation Trust. Together with the Hop Brook Protection Association, these entities shared the cost of operation and maintenance and cooperated to schedule the harvester use in their areas. In addition, volunteers or summer employees help with hand-pulling in tandem with the harvester for sections that the harvester cannot reach, picking up weeds that are dropped, and pulling early season before the weeds are dense enough for the harvester. By 2012, the population of water chestnut in Fairhaven Bay had been reduced enough to be managed by hand-pulling alone. In 2014–2015, the SuAsCo Cooperative Invasive Species Management Area (CISMA) hired summer staff and bought canoes and kayaks with funds from the Nyanza Natural Resources Damages Settlement to work hand-pulling in association with the mechanical harvesting. However, lacking funding, seasonal help was not hired in 2016. Water chestnut populations along the Sudbury River from Route 27, Wayland, and Fairhaven Bay remain a problem.

A large infestation of water chestnut in the Saxonville Impoundment of the Sudbury River in Framingham came to OARS' attention with the first full watershed mapping in 2013. Local residents reported that the population had grown explosively in the previous few years and they had brought their concerns to the Framingham Conservation Commission. An estimated 30 acres of the 56-acre impoundment were completely covered with water chestnut in 2016 (OARS, unpublished). In 2015, CISMA funded a study of management options for the town conducted by SOLitude Lake Management (formerly Aquatic Control Technologies). OARS assisted local residents in organizing hand-pulling focused on maintaining dock access in 2015 and 2016. A "Sudbury River Nuisance Aquatic Vegetation Management Working Group" was formed by the Conservation Commission, including DPW, OARS, and local residents, to determine an appropriate approach and fundraising mechanisms. The working group also met with local legislators. A Notice of Intent was prepared by SOLitude for the Conservation Commission to put forward a 5-year plan for approval and conditions under the Wetlands Protection Act. The Conservation Commission issued an Order of Conditions approving a first year Clearcast foliar spray treatment (with supplemental hand-pulling), with pre- and post-treatment surveys each year. Using a herbicide was selected due to concerns that mechanical harvesting could spread milfoil already present at a low density, and the lower cost relative to mechanical harvesting. The Commission's goal is to restore a balance of native aquatic species to create healthy river conditions and recreation access. Annual review is required to incorporate the survey results and assess whether current methods should be continued or modified.

The upstream-most population of water chestnut on the Sudbury River documented in OARS' 2016 survey was in the Mill Pond off Pinehill Road in Ashland. No known management has been started yet.

SUDBURY RESERVOIR

The Sudbury Reservoir is a backup water supply for Boston; it flows into the Sudbury River in Framingham via the Framingham Reservoirs #3 (Foss) and #1 (Stearns). In 2006, DCR in collaboration with Massachusetts Water Resources Authority (MWRA) conducted a plant survey of the Sudbury Reservoir. The survey identified a pioneer infestation of water chestnut in the extreme northern end of the reservoir, with the two largest patches each 30 to 40 feet in diameter (Mass. DCR, 2010). Since 2006, Aquatic Control Technology (now SOLitude Lake Management) has been hired to manage aquatic weeds in the Sudbury Reservoir by hand-pulling.

ASSABET RIVER

In 2008, OARS, the watershed association for the Assabet, Sudbury and Concord Rivers, started water chestnut control efforts on the Assabet River mainstem from Stow through the Ben Smith dam in Maynard. The smaller water chestnut populations in the Assabet River have been managed with hand-pulling only. Since 2008 OARS has organized volunteer (public and corporate) hand-pulling events on the Assabet River in Stow, Maynard, and Acton every summer. Hcommunity and corporate hand-pulling events have also been organized in Acton, Concord, Lincoln, and Framingham. Water chestnut populations in the sections that have been consistently pulled have been reduced, but not eliminated since hand-pulling has not been thorough enough to remove all the water chestnuts in any year. In 2015, a combined effort of volunteer hand-pulling and a paid summer “Rapid Response” team of two hand-pullers, succeeded in nearly clearing the Assabet of water chestnuts for the first time. This effort was repeated in 2016, funded by an environmental penalty.

Maps of the Gleasondale area show some reduction in water chestnut in the area that have been consistently managed.



Figure 9: Assabet River Water Chestnut Survey, Gleasondale, 2013



Figure 10: Assabet River Water Chestnut Survey, Gleasondale, 2014



Figure 11: Assabet River Water Chestnut Survey, Gleasondale, 2016

CONCORD IMPOUNDMENTS

The Concord Impoundments along the Concord River were managed by US Fish and Wildlife Service as “moist soil management units” for the benefit of migrating birds between 2000 and 2013. Alternate impoundments were drawn down each year from late May until early fall. The drawdowns appeared to reduce the amount of water chestnut significantly in the impoundments, but only when sediment dried out and was left with no standing water; plants were observed to survive during a drawdown if the pool was not drawn down completely (E. McGouty, pers. comm., 2016). Since 2013, management of the impoundments has focused on habitat for Blanding’s turtles, and they are no longer drawn down in the summer. OARS’ 2016 survey documented water chestnut in one basin of the impoundments (Fig. 13); a considerable population of lotus is also now growing in the impoundments.

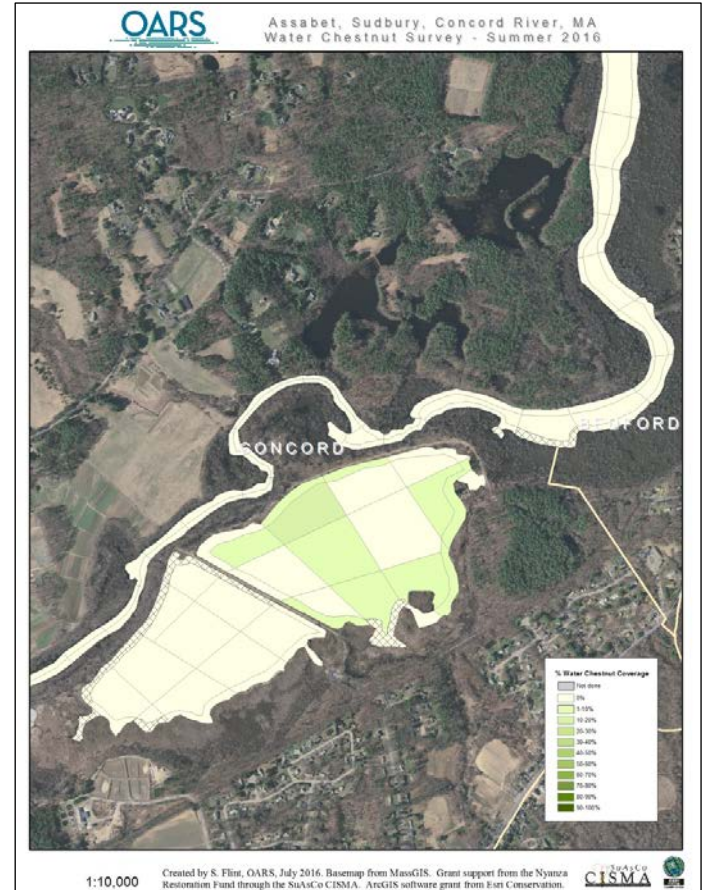


Figure 12: Water Chestnut Survey 2016 - Concord Impoundments

BILLERICA IMPOUNDMENT

The Concord River from Concord to Billerica is largely clear of water chestnut. However, the impoundment above North Billerica’s Talbot Mill dam has been heavily overgrown with water chestnut for more than 10 years, with an estimated 8 acres of 100% cover surveyed in 2016. Downstream of the Talbot Mill dam, surveys in 2013 and 2014 showed populations of water chestnut in the shallow edge-sections of the Concord River; however the 2016 survey, taken in much lower-flow drought conditions, showed no water chestnut along the edges.

Working with Lowell Parks and Conservation Trust and the Billerica Conservation Commission, OARS held a volunteer water chestnut pulling day on the Billerica impoundment in June 2008. The population of water chestnut in the Billerica impoundment was already well-established, and it rapidly became obvious that a much more intensive effort would be required to have an impact. No further work has been done on the Billerica Impoundment or downstream Concord River.

ICE HOUSE AND ROBBINS MILL PONDS, ACTON

The Town of Acton began managing water chestnut in Ice House Pond, an impoundment of Nashoba Brook, in 1948 using herbicides, including mixtures of 2,4-D, and tricholopicolinic acid (Picloram).

The town dredged the pond in 1995 to remove the severe infestation of water chestnut, which was effective for several years. By 2011, the plant had returned and the first volunteer hand-pulling was organized. In 2012 the hand-pulling involved 30 local volunteers and ten boats and was designated a “community service project.” In 2014, Ice House Pond had very few plants and the effort moved to Robbins Mill Pond, also an impoundment of Nashoba Brook in Acton. But in 2015 it became evident that this had spread resources too thin and more intensive work was needed. That year Town Meeting approved a Community Preservation Act (CPA) grant of \$36,000 for three years of mechanical harvesting on both ponds. Mechanical harvesting was conducted in 2015. Drought conditions in 2016 made water levels too low for the harvester, therefore, SOLitude Lake Management was hired to conduct hand-pulling in both ponds (B. Abe, pers. comm., 2016).

HEARD POND, WAYLAND

Heard Pond in Wayland, which is connected to the Sudbury River during floods, is an example of intense harvesting efforts over fourteen consecutive years. Wayland Surface Water Quality Committee (WSWQC) reported that mechanical harvesting removed about 600 tons of water chestnut plants in the first year of harvesting. The quantities of water chestnut plants harvested declined sharply year to year from 2003 until in 2013, when only 691

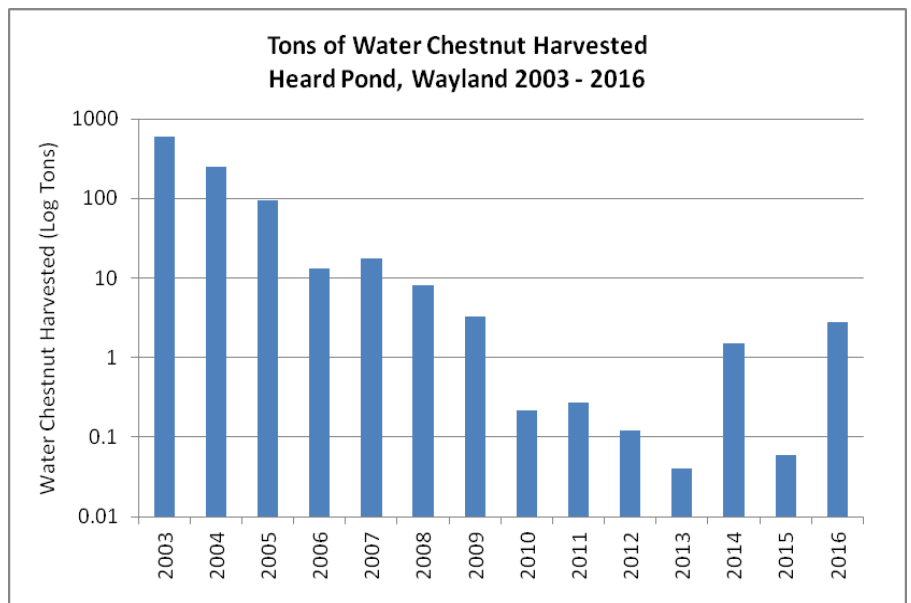


Figure 13: Water Chestnut Harvested, Heard Pond

plants were harvested (Aquatic Control Technology, 2015b). This led the WSWQC, which was managing the harvesting, to hope that the water chestnut seed bank in the pond sediment was close to being exhausted, given that published seed viability time frames range from about seven years to twelve years.

However, the 2016 season saw about 50,000 plants harvested, with still some plants left unharvested in a very shallow “hot spot” area. The contracted hand harvesting crews were overwhelmed by sheer plant biomass, and harvesting continued into October, when a substantial number of plants were found to still have undropped seeds. The WSWQC noted that in years when the spring was colder and high water persisted into June, many fewer plants emerged, while 2016 was a remarkable year, with very low water levels from May onward, which may have resulted in the pond water warming up more quickly. Apparently the seed bank in the pond sediment was still large, despite fourteen years of largely complete shoreline-to-shoreline harvesting in the pond, calling into question the published ranges for seed viability. While mechanical harvesting was used in Heard Pond up until 2008, with very intensive hand

harvesting in the following years, the extraordinary 2016 season was very hard to manage. Mechanical harvesting wouldn't have been possible in that shallow "hot spot" area, with no funds available for that method in any case, and it wasn't until August that the full magnitude of the problem was understood. Both the WSWQC and SOLitude performed pond bottom surveys late in the season, with only a few square feet of the bottom being possible to survey, and no further viable seeds were found, although it was clear that some unknown number of new seeds had been dropped from unharvested 2016 plants. It is possible that the seed bank clock was somewhat reset in 2016, with the prospect of quite a few years of intensive harvesting efforts in Heard Pond still to come. (T. Largy, pers. comm., 2016).

HOP BROOK PONDS

The Hop Brook ponds (Stearns Mill, Carding Mill, Grist Mill and Hager Ponds) are impoundments of Hop Brook, which runs into the Sudbury River in Wayland. Hop Brook is heavily eutrophied, receiving the treated effluent from the Marlborough Easterly Wastewater Treatment Facility at its headwaters. Stearns Mill, Carding Mill and Grist Mill ponds all have large populations of water chestnut covering over 45 acres combined (estimated from OARS 2016 survey; Hager Pond was not surveyed). Hop Brook Protection Association, with collaboration with US Fish and Wildlife Service, has been harvesting aquatic weeds on Carding Mill Pond since 2000 and now harvest on Carding Mill and Stearns Mill Ponds. Because the ponds are also heavily overgrown with filamentous green algae, Elodea, and duckweed (among other plants), the weed harvester picks up a mixture of aquatic plants. In 2004, it took 3.5 weeks of mechanical harvesting to clear Carding Mill Pond (Hop Brook Protection Association, 2004). As of 2016, the Town of Sudbury is considering wet (hydraulic) dredging for the Hop Brook ponds and has completed a feasibility study for weed control; wet dredging would also remove the water chestnut seed bank.

WARNER'S POND, CONCORD

Warner's Pond was created in the 1800s by damming Nashoba Brook less than a mile downstream of its confluence with Fort Pond Brook to operate a saw mill, then a pail factory. Today the pond is shallow and eutrophic. In 1997 OARS (then the Organization for the Assabet River) conducted an aquatic plant survey of Warner's Pond, reporting the presence of water chestnut as well as Eurasian milfoil and fanwort. In 1999 Aquatic Control Technology surveyed the pond, again reporting water chestnut, milfoil and fanwort as the primary invasive aquatic weeds. Mechanical harvesting and hydroraking were conducted in 2005, but discontinued over concerns of spreading the milfoil and fanwort through fragmentation. The Town of Concord initiated hand pulling to control water chestnut in 2004 which continues on an annual basis. In 2011 and 2012, the pond was surveyed and treated with the herbicide Sonar (fluridone) to control milfoil and fanwort (ESS Group, 2012). In 2012, a comprehensive Watershed Management Plan was completed, and the Town has contracted with ESS Group to prepare a dredging feasibility study for limited portions of the pond (D. Kaye, pers. comm., 2016).

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