

2017 Hydraulic Conveyor System
Final Harvesting Report
December 30, 2017

The summer harvesting season of 2017 was a continuation in the Hydraulic Conveyor System's (HCS) program development, building upon the strong operational base established in the initial summer of HCS operation in 2008. Continued refinement of operational protocols has taken place over its years of operation, but the overall goal of the HCS continues to be for the purposes that it was designed for; removing new, previously undiscovered points of infestation of EWM. It is by removing these newly discovered infestation sites that the goal of stopping or greatly reducing the spread of EWM before it becomes established may be realized.

Concept & Design:

The concept and design of the HCS is to remove EWM from specific areas where treatment by other means is not feasible or advisable. The HCS is designed to remove EWM in areas of new infestation where the size of the new outbreak is small enough to preclude chemical treatment, and where the diver can remove the entire outbreak before it spreads or becomes established to the point where it adversely affects the native plant and animal community. In addition, the HCS works well in areas where other treatment regimes cannot be used effectively. These areas include areas around and behind docks, areas under boathouses and other structures, and areas where the use of other treatments may adversely affect sensitive areas. A third use for the HCS, although not a use that was anticipated when the concept and design were under development is in locations where chemical treatments have proved ineffective, and where the risk of EWM propagation from fragmentation is high. This includes areas of high EWM density that are susceptible to high boat traffic.

Finally, while the HCS was designed to combat infestations of EWM, the concept is easily adaptable for use in removing other species of AIS where appropriate. An example could be where a dive team could remove Curley Leaf Pondweed plants from the lake bed. Dependent upon the time of the growing season, many individual targeted species could be removed with the HCS system. Regeneration of the targeted AIS species in subsequent growing seasons would be dependent upon the means of reproduction for the species being targeted.

Historical Perspective:

Historically, the HCS system has been remarkably consistent in its seasonal harvesting results, with the environmental factors of early season water temperatures and the resulting degree of plant development during the month of June being the determining factors.

	2010	2011	2012	2013	2014	2015	2016
Number of sites	101	89	81	106	149	114	102
Seasonal drained weight	18,301	22,507	17,699	20,311	20,679	24,765	26,653
Approximate area (in sq. ft.)	21,555	64,243	30,401	34,250	62,090	65,225	84,040
EWM selectivity (bi-catch)	91.98%	92.73%	91.75%	93.58%	93.19%	93.19%	94.04%

Limiting Factors of Success:

Of the four elements noted above that we have reported on a yearly basis, only “*Seasonal Drained Weight*” gives an accurate measure of the program’s progress, as it is an actual representation of what the HCS system accomplished during its time of seasonal operation. The other two measures of harvesting; “Number of Sites” & Approximate Area (in Square Feet”) do not represent any accurate measure of success because they are simply indicators of EWM plant density, and the homogenous nature of the beds harvested. In beds that are more homogenous (higher density of EWM vs. other plant species), relatively more daily drained weight is harvested in less square footage. (More plant weight from a smaller footprint)

As this trend happens, the daily drained weight of harvested EWM would increase even as the harvesting is slowed and the number of EWM plants harvested increases. In the Tomahawk Lake watershed however, the size of the watershed is so great that the emergence of new & dense beds of EWM at new locations seems to overshadow the elimination of high density older beds. It seems that there are always new & dense beds to harvest.

In 2017 the critical factors which limited the success of the harvesting program were growth in the spatial size of EWM beds and the increased plant density within those beds!

2017 Harvesting Results:

The following results were obtained during the 2017 harvesting season:

Number of sites:	85 sites (see Table #1)
Seasonal drained weight:	44,375# (see Table 2)
Approximate Area Searched / Removed (see Table #1)	148,492 Sq. Ft / 65,522 Sq. Ft.
EWM selectivity (bi-catch):	95.65 %

Discussion:

Number of sites

The number of sites that are harvested over the course of the typical HCS harvesting season varies greatly due in part to a number of factors which are beyond the control of the harvesting team. These factors include but are not limited to:

- Weather conditions including high wind, electrical storm activity, and extremely cold temperatures.
- Mechanical failures of equipment
- Changes in diver seasonal start and stop dates

In 2017, the number of sites harvested were affected adversely by a high number of windy days which led to adjustments to the daily harvesting plans. Additionally, equipment failures resulted in the reduction of harvest days while equipment repairs were made. Additionally, EWM plant density within harvested beds was higher than in previous years which slowed the harvesting rate, and reduced the total number of beds which were harvested. In all 85 sites were harvested in 2017, down from 102 in 2016.

Seasonal drained weight

Seasonal drained weight was higher than in any previous year, due in part to a high number of new EWM beds that were well along in their development when discovered. 2017 was a year where growing conditions were optimal, and the EWM plant response was what one would expect. *2015, 2016 and again in 2017 were harvesting seasons which greatly favored EWM growth – early spring, record rain in April, May and June, rapid early water warm-up, lots of sunny warm days in July, August and September.* Fluctuations in total seasonal drained weight tend to be a product of the number of harvested sites, as well as EWM site density. In 2017, the number of harvested sites was down, but EWM bed plant density relative to prior years was up.

Approximate Area:

“Approximate Area” Searched has no relevancy in understanding the nature of the annual harvest, because the plant density within the harvested sites has no “baseline” value. There can be no comparatively valid conclusions drawn between a 100 square foot area with 10 EWM plant clusters of 10 stems per cluster, and a 100 square foot highly dense bed with 50 stems per square foot. However, we do keep records of estimated surface area of locations where harvesting took place. In 2017, the estimated, surface area in locations where harvesting took place was 148,492 Sq. Ft. The estimated surface area (foot print) where EWM was removed was 65,522 Sq. Ft.

Bi-Catch: Bi-Catch sampling provides a snapshot in time of diver efficiency in 1. plant identification and 2. ability to selectively harvest only the target species (EWM.) Over time, Bi-catch % of the target species should increase as diver skills in these areas develop. In 2017, the HCS team recorded a bi-catch average of 95.65 % of harvested plant material as Eurasian Water Milfoil (Target species).

Conclusion:

In the fall of 2016, the Wisconsin Department of Natural Resources – Rhinelander informed TLA that no future permits for the use of Chemical herbicides would be issued for control of EWM in “spot treatments” (polygons of less than 5 acres). That decision in effect ended our two tiered treatment program to control EWM in our watershed. Beginning in 2017, the only means of treating EWM is by the use of the Hydraulic Conveyor System, (and any shoreline owner initiatives of hand pulling EWM plants). As a result, future monitoring efforts by TLA will determine how TLA utilizes the HCS in future years. It should be remembered that the Hydraulic Conveyor System was developed to control smaller areas of new infestation. As EWM infestations continue to grow in both spatial size and plant density, the HCS will become less effective in its ability to “keep up” with the demands of larger and larger areas of EWM infestation.

The Tomahawk Lake Association believes that the 2017 HCS harvesting season was only partially successful in the control and reduction of new EWM outbreaks within the watershed. Over time the goal of the HCS is to reduce both the number and size of new EWM sites within the lake system. If we operated in a small watershed with limited access, our ability to meet these goals would be greatly enhanced. However, Tomahawk Lake’s large sizes, diversity of the character of the lakebed, and the high degree of public usage of the resource all have had a negative effect on attainment of these goals.

The Hydraulic Conveyor System has been one element in a two tiered treatment regime in our effort to control and reduce the effects of Aquatic Invasive Species in our watershed. It is important to evaluate the program’s successes by comparing year to year harvesting data. However, the comparison which would prove to be the most valid in evaluating the success or lack of success of the two tiered program cannot be made. That evaluation would have to include the comparison of the results of the two tiered treatment regime in our watershed, against the results of no treatment regime in our watershed. In that comparison I believe that our two tiered approach would be seen as a highly effective means of control.

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