2527 Lake Ottawa Road

Iron River, MI 49935

906.284.2198

Summary of Diver Assisted Suction Harvesting & Hand Removal Efforts

Long Lake, Vilas County, WI

2015 WDNR Mechanical Harvesting Permit Annual Report

Permit ID: NO-2015-64-91M

Date: 11.29.2015

Submitted To:

Long Lake of Phelps Lake District
and
Wisconsin Department of Natural Resources

Submitted By:

Many Waters, LLC
2527 Lake Ottawa Road
Iron River, MI 49935

Contact:
Bill Artwich: billartwich@gmail.com, 906.367.3206
Barb Gajewski: skih2o@hotmail.com, 715.617.4688

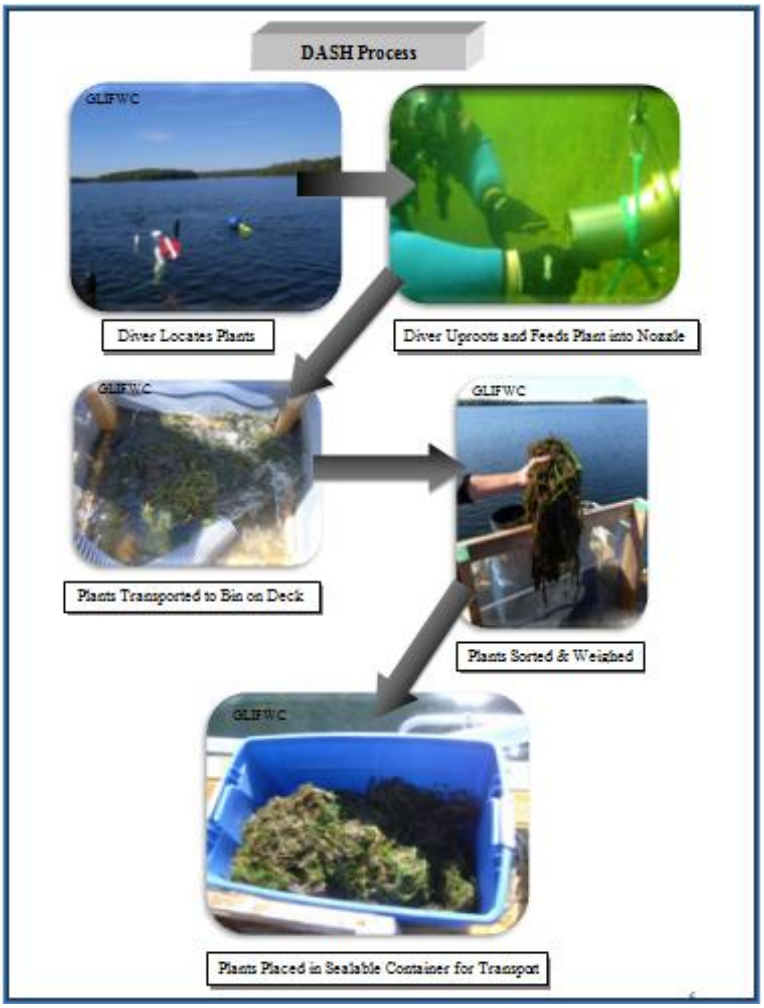
Introduction

The Long Lake of Phelps Lake District solicited the services of Many Waters, LLC to use Diver Assisted Suction Harvesting (DASH) to manage for Eurasian watermilfoil (EWM) on Long Lake, located near Phelps, Vilas County. DASH is a mechanical process and requires a mechanical harvesting permit (Form 3200-113 (R 3/04)) from the Wisconsin Department of Natural Resources (WDNR). The 2015 WDNR Mechanical Harvesting Permit ID is NO-2015-64-91M.

Dive Methods

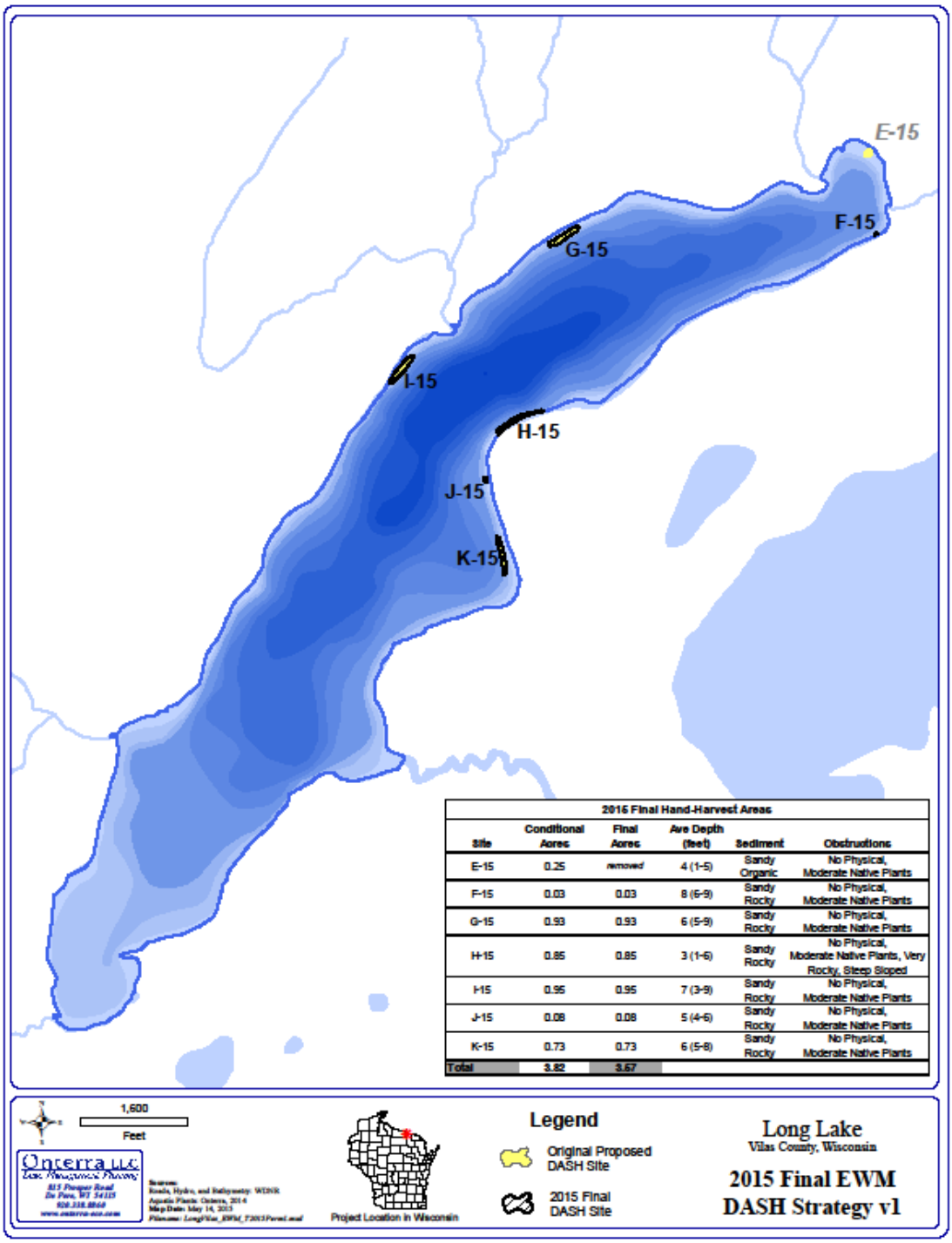
While using DASH, a diver typically will begin by locating a EWM plant from the surface, and then descend next to the plant while simultaneously lowering the nozzle. Divers works along the bottom by using fin pivots, kneeling on the bottom or hovering above the bottom at a distance where the root mass of the plant is within hands reach. The diver will either feed the top of the plant into the hose first and then uproot the plant or uproot the plant and feed it root wad first into the hose. It is very important that the diver shake as much sediment from the root wad before getting the root wad near the nozzle. Shaking the root wad away from the nozzle helps maintain visibility for the diver and minimizes debris and sediment in the holding bins. As plants are fed into the nozzle, the diver carefully observes for possible fragments. Fragments are caught by hand and fed into the nozzle.

Work sites that have dense monotypic beds of EWM, the initial DASH efforts are quite simple. The diver will descend adjacent to the bed and begin hand pulling or harvesting systematically across the bed to dismantle the bed. Once the majority of the bed is removed, a more systematic approach follows to target remaining clustered, scattered or outlier plants in the work site. As part of our method for covering a work area while using DASH (or divers alone), a grid pattern is used. A diver will start at either the port or starboard side of the boat and work to and from the boat perpendicular to the direction the boat is facing. For example, with the boat facing north and the diver starting on the port side, the diver begins by heading west. The diver will continue to work perpendicular to the boat until reaching the end of the suction hose. The diver then works back to the boat on a new transect line. Distance between each transect is dictated by visibility, density of EWM, and obstructions. This process is repeated on the opposite side and in front of the boat. Depending on the site, once the diver has adequately covered the area, which the suction hose can reach, they will signal the deckhand to let out more anchor line or determine that the boat needs re-positioning.



Once plants reach the surface, a hose dispenses the plant material into a series of screened bins located on the deck of the boat. These bins capture plants and allow water to drain out back into the lake. Plants on deck are sorted into two categories: the targeted invasive plant and native vegetation. A wet weight of both the invasive plant and all native species combined is taken. Plants are placed in sealable containers or bags for transport to the dumping site. The dumping site is a pre-determined site upland, away from any water body.

Figure 1: 2015 Hand Harvesting Work Areas (Onterra, 2015)



2015 Final Hand-Harvest Areas

Site	Conditional Acres	Final Acres	Ave Depth (feet)	Sediment	Obstructions
E-15	0.25	removed	4 (1-5)	Sandy Organic	No Physical, Moderate Native Plants
F-15	0.03	0.03	8 (6-9)	Sandy Rocky	No Physical, Moderate Native Plants
G-15	0.93	0.93	6 (5-9)	Sandy Rocky	No Physical, Moderate Native Plants
H-15	0.85	0.85	3 (1-6)	Sandy Rocky	No Physical, Moderate Native Plants, Very Rocky, Steep Sloped
I-15	0.95	0.95	7 (3-9)	Sandy Rocky	No Physical, Moderate Native Plants
J-15	0.08	0.08	5 (4-6)	Sandy Rocky	No Physical, Moderate Native Plants
K-15	0.73	0.73	6 (5-8)	Sandy Rocky	No Physical, Moderate Native Plants
Total	3.82	3.67			

Summary

Table 1: Summary of Daily DASH Efforts

Date	Location	Size (acres)	Ave. Depth (ft)	DASH Boat Locations		Dive Time (hrs)	EWM Removed (lbs*)	Native Plants Incidentally Harvested (lbs*)	Percent Incidental Harvest of Native Plants	Total Vegetation Removed (lbs*)
				Lat (NAD 83)	Long (NAD 83)					
6/19/2015	K-15	0.73	6	46.063530	89.016917	5.50	92.0	3.0	3%	95.0
				46.064190	89.016623					
				46.064424	89.016830					
				46.064616	89.016853					
				46.065028	89.016946					
	J-15	0.08	5	46.067408	89.017789	0.75	59.0	1.0	2%	60.0
6/21/2015	I-15	0.95	7	46.072096	89.022274	2.50	61.0	1.5	2%	62.5
6/23/2015	I-15	0.95	7	46.072257	89.021976	2.50	20.0	1.0	5%	21.0
				46.071850	89.022507					
				46.071697	89.022941					
				46.071414	89.023010					
6/25/2015	J-15	0.08	5	46.067379	89.017945	1.75	35.0	2.5	7%	37.5
	H-15	0.85	3	46.069493	89.016797	2.25	57.0	1.5	3%	58.5
				46.070011	89.015621					
				46.070027	89.015109					
				46.070134	89.014765					
				46.070238	89.014217					
6/26/2015	G-15	0.93	6	46.076949	89.013447	2.75	45.0	1.0	2%	46.0
				46.077047	89.013147					
				46.077402	89.012628					
8/21/2015	H-15	0.85	3	46.069647	89.016724	2.25	12.0	1.0	8%	13.0
				46.069756	89.016609					
				46.070102	89.014978					
				46.070159	89.014230					
* wet weights						**20.25**	**381.0**	**12.5**	**4% (average)**	**393.5**

Table 2: Summary of Hand Removal Efforts per Work Area (Note: this includes both DASH and diving efforts)

	Initial Efforts		Follow Up Efforts		
Site ID	**DASH Efforts (hrs)**	**EWM Removed (lbs*)**	**DASH/Diving Efforts (hrs*)**	**EWM Removed (lbs)**	**General Observations**
E-15	0.00	0.0	0.0	0.0	No EWM observed from surface – site removed from final hand removal strategy
F-15	0.00	0.0	0.50 - dive	0.0	Site swam, no EWM observed
G-15	2.75	45.0	2.50 - dive	8.0	
H-15	2.25	57.0	2.25 - DASH	12.0	Several obstacles including submersed wood pylons and exposed metal (rebar) made efforts challenging
I-15	5.00	81.0	3.75 - dive	17.0	
J-15	2.50	94.0	1.25 - dive	13.5	
K-15	5.50	92.0	2.50 dive	19.0	
TOTALS	**18.00**	**369.0**	**12.75**	**69.5**	

* wet weights

Daily Log

June 19th 2015 Weather- sunny, 58˚, light and variable winds

Diving efforts began in K-15, starting along the south end, and working north. Conditions were good with good visibility and firm sediment that made hand removal very efficient. Five and a half hours of diving removed 92 pounds of EWM from K-15. Repositioning in J-15, three quarters of a dive hour removed 59 pounds of EWM. Incidental harvest of native plants included: coontail (*C. demersum*), *Chara* sp., southern naiad (*N. guadalupensis*), common waterweed (*E. Canadensis*), fern pondweed (*P. robbinsii*), clasping leaf pondweed (*P. richarsonii*), northern watermilfoil (*M. sibericum*) and variable leaf pondweed (*P. gramineus*).

June 21st 2015 Weather- overcast, 57˚, calm winds

DASH efforts focused in I-15. This site has a rocky shoreline with an abrupt drop off. Most EWM and native plants occupy the area between the rocky shoreline and the beginning of the drop off. I-15 provided good visibility and firm sediment for hand removal. Two and a half dive hours yielded 61 pounds of EWM. Incidental harvest of native plant species remained similar to previous efforts but also included: *Nitella* sp., white stem pondweed (*P. praelongus*) and sago pondweed (*H. dubia*).

June 23rd 2015 Weather- mostly sunny, 70˚F, winds NW 10-15 mph gusts to 20 mph

DASH efforts continued on I-15 from about the middle of the work area to the south. Diving conditions remained good and two and a half hours of diving removed 20 pounds of EWM. Incidental harvest of native plant species remained similar to previous efforts but also included wild celery (*V. americana*).

June 25th 2015 Weather – overcast with rain, 65˚F, light winds

The day kicked off at the boat landing with Dan Anderson from the Long Lake of Phelps Lake District and Alex Bauch with the WDNR. After our meeting, Alex joined us on the water to observe our DASH operation. We began the day working on J-15 and one and three quarter dive hours removed 39 pounds. Barb took Alex back to the boat launch while the DASH boat repositioned on H-15. Starting from the southwest working northeast, two and a quarter dive hours removed 57 pounds of EWM. This site (H-15) had several underwater obstacles including old pier pylons and exposed rebar that did slow diving efforts. Incidental harvest of native plant species remained similar to previous efforts but also included coontail (*C. demersum*).

June 26th 2015 Weather- sunny, 50˚, calm winds

DASH efforts continued along the southwest side of G-15 and worked northeast. Dive conditions remained good except some areas had dense algal cover making plant ID very challenging and slowed diving efforts. Two and three quarter dive hours yielded 45 pounds of EWM.

August 21st 2015 Weather- sunny, 70˚, SSW winds 10 -15 mph

Strong winds dictated which DASH sites were feasible to work on. The point to the south of H-15 blocked most of the whitecaps and made holding on anchor possible. Two and a quarter dive hours yielded 12 pounds of EWM. Due to the low yield of EWM for the time spent diving, a decision was made that the most efficient way to cover the remaining work areas would be using two scuba divers hand harvesting low density EWM. A

visual inspection from the boat revealed no EWM at site F-15, but due to the daily conditions, the site was dove. A quick dive of the work area resulted in no EWM found.

August 23rd 2015 Weather- overcast, 46˚, WSW winds 10-15 mph

The day started rather brisk and cool for August and white caps greeted us as we rounded the pointed heading out of the bay from the boat launch. Due to the wind direction, we worked G-15. We made several passes up and down the work area placing buoys on waypoints where EWM had been present previously. We then anchored the boat on the northeast side of the work area. We made a zigzag pass visiting the marker buoys on the deeper side of the work area to the southwest then turned back and made another zigzag pass back the boat. Two and a half hours of diving removed eight pounds of EWM. We then moved to work area I-15. We again placed buoys on waypoints that previously had EWM and anchored the boat roughly in the middle of the work area working southwest. Two hours of diving removed eight pounds of EWM.

August 28th 2015 Weather- overcast, 72˚, SW winds 10-15 mph gust to 20 mph

Diving continued on I-15. Marker buoys identified previous EWM locations. Positioning the boat in the center of the work area, several passes to the northeast yielded nine pounds of EWM in one and three quarter dive hours. We moved across the lake to J-15 and placed marker buoys again. Swimming several passes covering the area one and quarter dive hours yielded 13.5 pounds of EWM. Diving efforts continued at K-15. Two and a half dive hours removed 19 pounds of EWM.