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Summary of Diver Assisted Suction Harvesting Efforts

Lac Vieux Desert – Vilas County, WI & Gogebic County, MI

2017 WDNR Mechanical Harvesting Permit Annual Report

Permit ID: NO-2017-64-71M

Date: 11.27.2017

Submitted To:

Lac Vieux Desert Lake Association
and
Wisconsin Department of Natural Resources

Submitted By:

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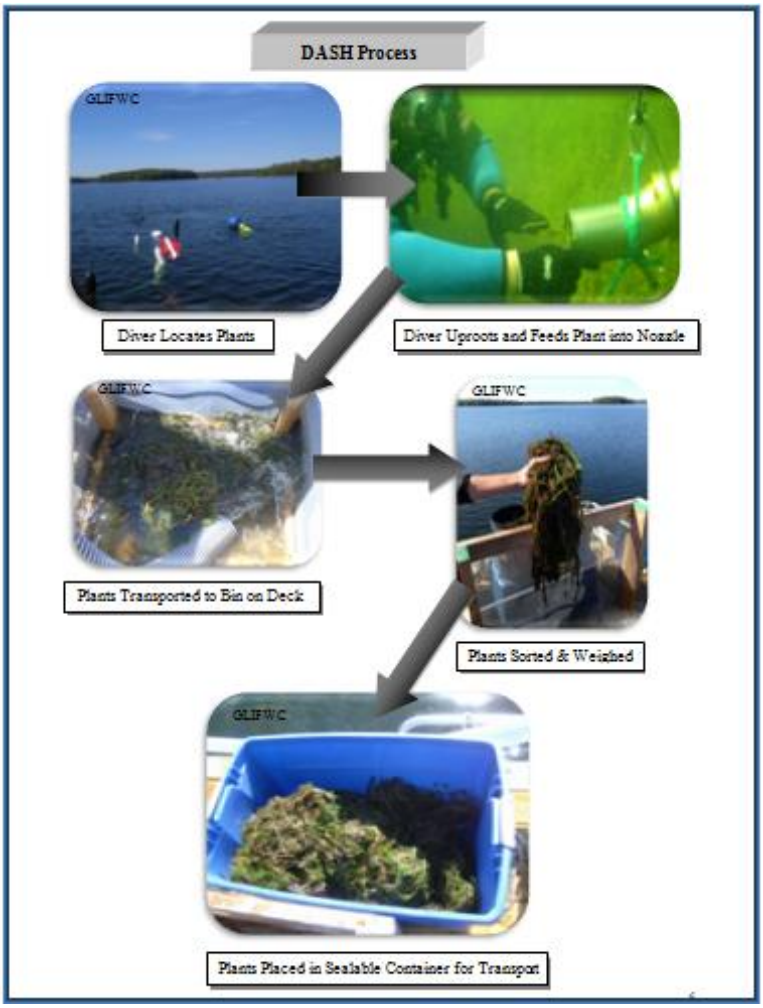
Introduction

The Lac Vieux Desert Lake Association solicited the services of Many Waters, LLC to use Diver Assisted Suction Harvesting (DASH) to manage for Eurasian watermilfoil (EWM) on Lac Vieux Desert, located in Vilas County Wisconsin and Gogebic County Michigan. 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 2017 Permit ID is NO-2017-64-71M.

Dive Methods

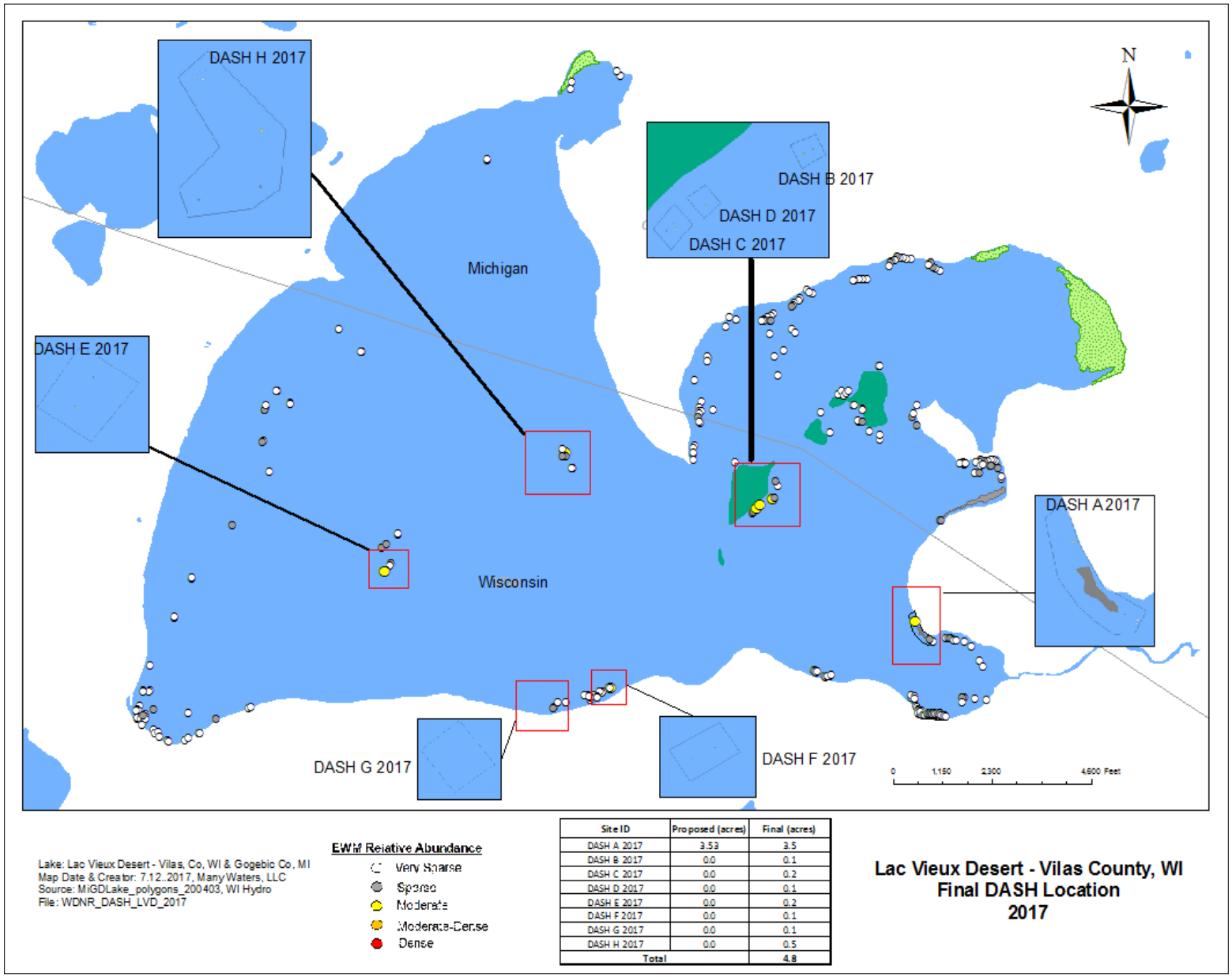
While using DASH, a diver typically will begin by locating the invasive plant such as Eurasian watermiloil plant from the surface, and then descend next to the plant while simultaneously lowering the nozzle. Divers works along the bottom by using fin pivots, kneeling on the bottom or hovering above the 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.



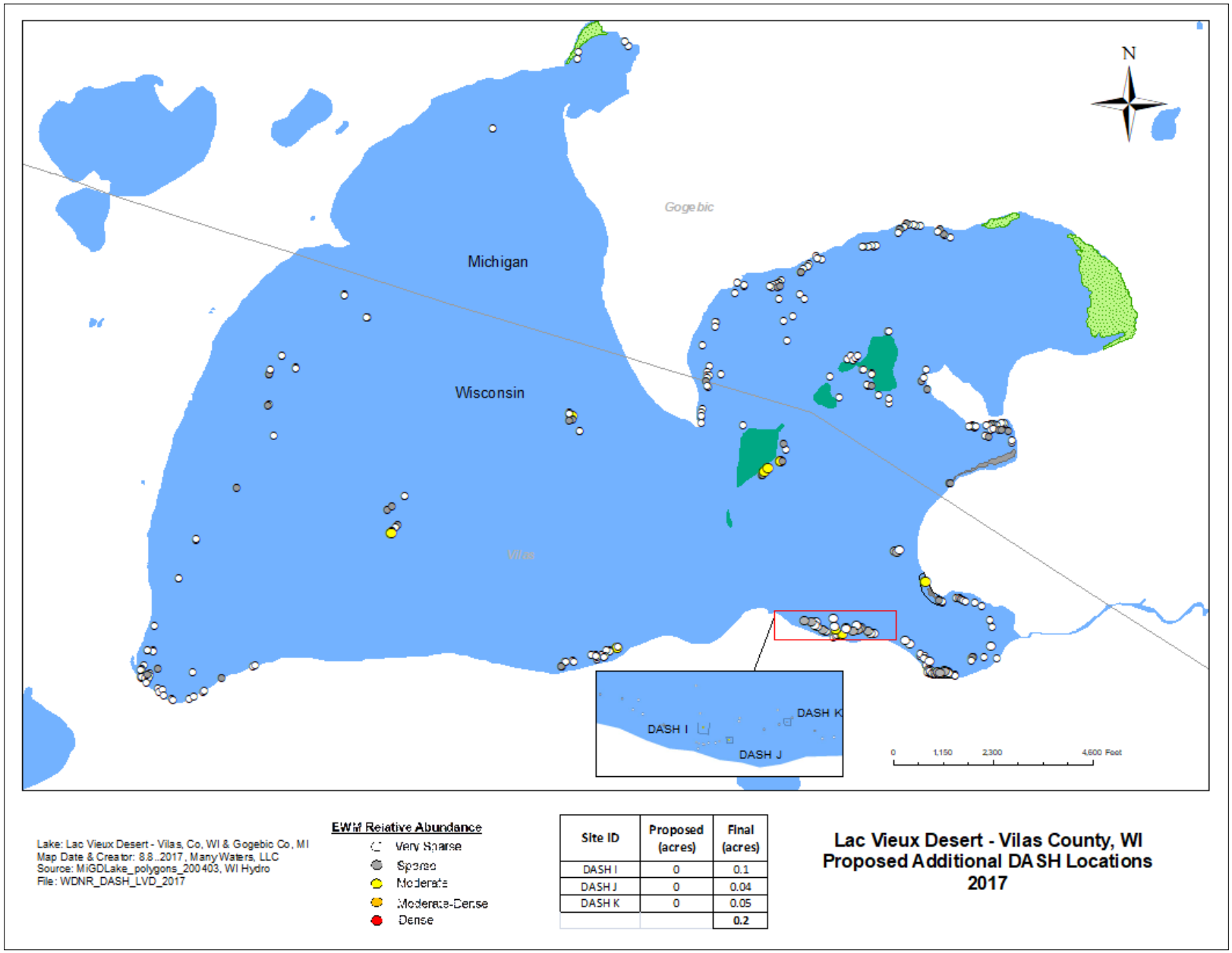
Once plants reach the surface, a hose dispenses the plant material into a series of screened bins located on the deck of the boat. These bins capture plants and allow water to drain out back into the lake. Plants on deck are sorted into two categories: the targeted invasive plant and native vegetation. 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: 2017 DASH Work Areas



Site ID	Proposed (acres)	Final (acres)
DASH A 2017	3.53	3.5
DASH B 2017	0.0	0.1
DASH C 2017	0.0	0.2
DASH D 2017	0.0	0.1
DASH E 2017	0.0	0.2
DASH F 2017	0.0	0.1
DASH G 2017	0.0	0.1
DASH H 2017	0.0	0.5
Total		4.8

Figure 2: Additional DASH Work Areas



Summary

Table 1: Daily Summary of DASH Efforts

Date	Location	Size (acres)	DASH Boat Location		Dive Time (hrs)	EWM (lbs*)	Native (lbs*)	% Incidental Native Plant Harvest (lbs)*	Total (lbs*)
			Lat (NAD 83)	Long (NAD 83)					
8/7/2017	DASH B	0.1	46.135230	89.094020	1.50	86.0	7.00	8%	93.00
	DASH D	0.1	46.134790	89.095270	2.50	76.0	3.00	4%	79.00
8/8/2017	DASH C	0.2	46.134670	89.095600	2.00	93.0	17.00	18%	110.00
8/9/2017	DASH F	0.1	46.123220	89.108390	1.50	26.0	2.00	8%	28.00
	DASH I	0.1	46.124850	89.088530	1.75	188.0	1.00	1%	189.00
	DASH I	0.1	46.124800	89.088710	1.50	71.0	0.50	1%	71.50
8/14/2017	DASH J	0.04	46.124620	89.087850	1.00	15.0	0.25	2%	15.25
8/16/2017	DASH I	0.1	46.124729	89.088636	6.00	303.0	1.00	0%	304.00
					17.75	**858.0**	**31.75**	**5% (ave)**	**889.75**

Daily Log

August 7th 2017 Weather-mostly sunny, 65˚ F, NW 10-15 mph winds

A stout northwest wind dictated the locations that we were able to work. We tucked on the lee side of Big Duck Island and work DASH Areas B and D. Water clarity was poor due to suspended algae but bottom substrate was sand and gravel and made for little to no disturbance while divers removed EWM plants. Two divers dove for four hours and removed a total of 162 pounds of EWM. Incidental harvest of native species included: *N. guadalupensis, M. sibericum, V. americana, C. demersum, P. zosteriformis, P. richarsonii, P. gramineus* and E. *canadensis*.

August 8th 2017 Weather- sunny, 75˚ F, NW 10-15 mph winds

Again, a stout northwest wind dictated work areas and we returned the south side of Big Duck Island to work DASH Area C. Conditions remained the same, poor water clarity but a firm substrate where the plants were located with heavy native vegetation on the deepwater side of the EWM plants. In two hours, two divers harvested 93 pounds of EWM. DASH Area C was completed and divers relocated in a leeward area of the island to hand remove scattered EWM plants without DASH. Incidental harvest of native species remained similar to the previous day.

August 9th 2017 Weather-light overcast, 65˚ F, N 5 mph wind

Light winds allowed us to work anywhere we chose. We set up to work DASH Area F. The water is slightly deeper than some of the other DASH work areas and the depth combined with the poor water clarity made for tough visibility. The visibility was tough but the substrate was excellent for the divers. Two divers dove for an hour and a half and removed 26 pounds of EWM. The DASH boat was relocated to DASH Area I. Again, the water clarity was poor but substrate was good. At one point, we retreated to shore quickly as a thunderstorm rolled across the lake. Efforts resumed once the storm passed. Two divers in the water for three and a quarter hours removed 259 pounds of EWM. Incidental harvest of native species included: *P. zosteriformis, P. richarsonii, V. americana, M. sibericum, P. robbinsii* at both work sites and *P. praelongus* and *B. beckii* at DASH site I.

August 14th 2017 Weather-fog and rain, 65˚F, NNW winds 5 mph

A slight chance of thunderstorms, built into thunderstorms on and off all day. Set up at DASH J for only one hour, the diver removed 15 pounds of EWM. Incidental harvest of native plant species remained similar to previous efforts.

August 16th 2017 Weather- sunny, 72˚ F, E SE 5-10 mph winds

Wind conditions allowed us to work the south shore. Water clarity remained poor with lots of suspended algae making diver visibility difficult. Bottom substrate consisted of sand and gravel and was excellent for the divers. In a total of six hours, 303 pounds of EWM were removed. Incidental harvest of native plant species remained similar to previous efforts.