



Lake Eden 2023 Pre-Treatment Eurasian Water Milfoil Inventory

June 19, 2023



ARROWWOOD ENVIRONMENTAL
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1. Introduction

In June of 2023, Arrowwood Environmental was retained by the Lake Eden Association to map Eurasian water milfoil (EWM) in Lake Eden, Vermont. The purpose of the inventory was to create a map of EWM in the lake for use in targeting control efforts. This brief report summarizes the methods and findings of that inventory.

2. Methods

The study area for the inventory consisted of the entire waterbody of Lake Eden as defined by the shoreline derived from the Vermont Hydrography Dataset (VHD). Two different methods were used to inventory for the presence of invasive species: 1) Visual Littoral Surveys; 2) Underwater SCUBA Surveys. The methodology used for each of these survey types is outlined below.

a. Visual Littoral Survey

The entire perimeter of the lake was circumnavigated in a motorboat and the littoral zone was visually surveyed for the presence EWM. Water visibility allowed for the survey of areas 8 feet deep and less with this method. In some cases, vigorous plants of EWM could be detected in 10' deep water. The map in Appendix 2 shows the areas that were surveyed using this method.

b. Underwater SCUBA Surveys

Underwater SCUBA Surveys were conducted in high priority areas where Visual Littoral Surveys were deemed insufficient for detecting EWM. These areas were chosen based on their proximity to known locations of EWM and areas that provided suitable habitat for EWM. These areas were surveyed by the diver either being towed behind a motorboat using a planer board or by swimming compass-based transects through the area (or a combination of the two methods). Underwater SCUBA Surveys were conducted in four areas as shown on the map in Appendix 2: 1) Public boat launch; 2) Along the north shore south of the boat launch; 3) Area near the public beach and; 4) Boy Scout camp.

c. Mapping EWM Occurrences

When EWM was detected, a GPS point was taken along with a count of the number of plants present, area occupied by the plants and the water depth. In three cases, the population of EWM was better mapped using boundaries. In these circumstances, GPS points were taken to define the edges of the EWM population, and these converted to polygons as shown in the maps in Appendix 2. For the Underwater surveys where the diver was towed behind the motorboat, the locations of EWM were marked using marker buoys and data collection occurred from the boat once the survey was completed. During underwater transects, data was collected by the field assistant in a kayak.

3. Results

The locations of EWM in the lake are shown on the maps in Appendix 2. The Tables in Appendix 1 lists each location along with number of plants, area occupied by the occurrence and water depth. In addition to these occurrences, 5 individual EWM plants were removed during the Underwater SCUBA Survey at the public beach area. Though widespread EWM control was beyond the scope of this inventory, these plants were removed because they were somewhat isolated and may have been difficult to locate by the DASH crew.

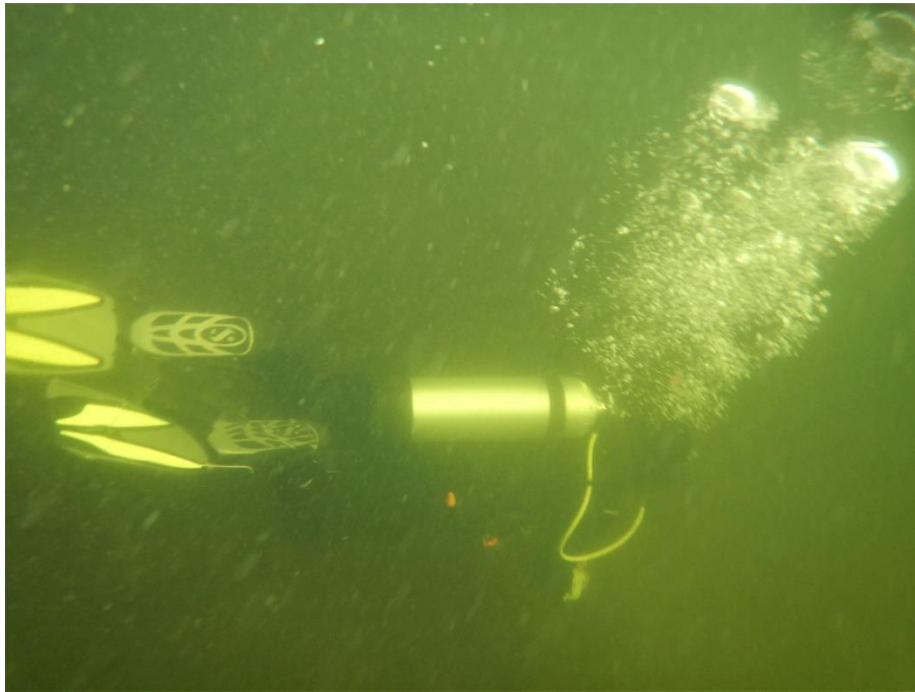
Every effort was made to detect all of the EWM in the lake. However, due to the size of the lake and the limited underwater visibility, some EWM may have been missed. The area in the vicinity of the public beach, in particular, is quite large and should be scanned by the DASH crew for EWM occurrences that may have been missed by the current inventory. As shown in the map in Appendix 2, no EWM plants were documented in the southwestern end of the lake. However, 12 fragments of EWM were found (and removed) floating in this area. Given wind and water currents, this area should be monitored later in the season for any EWM that may become established from fragments.



EWM near Boy Scout
camp
6/15/2023



EWM near public boat
launch
6/12/2023



Underwater SCUBA Survey
6/15/2023



EWM flowering near
public beach
6/15/2023

Appendix 1

Table of EWM Occurrences

Depth (ft)	Plant Count	Diameter (ft)	Lat	Long
3	1	2	44.715906	-72.509998
3	1	2	44.717361	-72.504003
5	2	2	44.717551	-72.502907
3	2	10	44.717506	-72.502471
3	1	2	44.727449	-72.494886
2	2	5	44.727969	-72.495099
3	1	2	44.728029	-72.495162
4	1	2	44.72829	-72.495402
3	1	2	44.728472	-72.495711
6	2	2	44.727686	-72.497309
4	1	2	44.724102	-72.501612
6	1	2	44.728055	-72.496899
6	1	2	44.728325	-72.495967
5	1	2	44.728277	-72.495901
6	1	2	44.726773	-72.498428
10	1	2	44.72383	-72.501622
9	1	2	44.724412	-72.500698
6	1	2	44.725688	-72.49955
3	1	10	44.728307	-72.496105
10	3	2	44.727684	-72.495052
10	1	2	44.728046	-72.495377
12	1	2	44.728187	-72.49581
12	1	2	44.728266	-72.495839
12	1	2	44.728094	-72.496311
4	2	2	44.719279	-72.50806
4	2	2	44.719307	-72.508086
8	1	20	44.719287	-72.508463
7.5	1	2	44.719054	-72.510065
11	1	2	44.718829	-72.510001
10	1	2	44.719128	-72.508176
8	1	10	44.720981	-72.500144
8	1	2	44.721127	-72.500547
2	1	2	44.72126	-72.50057
10	1	10	44.721232	-72.500745
0	1	10	44.727614	-72.495029
6	2	2	44.721027	-72.500189
4	5	10	44.717599	-72.502312
9	3	30	44.718988	-72.509975
9	2	10	44.71886	-72.51022
40	2	6	44.720387	-72.499613
10	5	5	44.720472	-72.499828
5	2	30	44.720566	-72.499695
5	14	10	44.717557	-72.502627
9	13	5	44.724316	-72.500827
8.5	10	2	44.719283	-72.507471
10	7	2	44.719259	-72.508975
10	2	2	44.719289	-72.509224
20	6	2	44.719187	-72.508412
6	4	20	44.720652	-72.499762
10	5	2	44.720385	-72.499779
10	16	20	44.720998	-72.500324

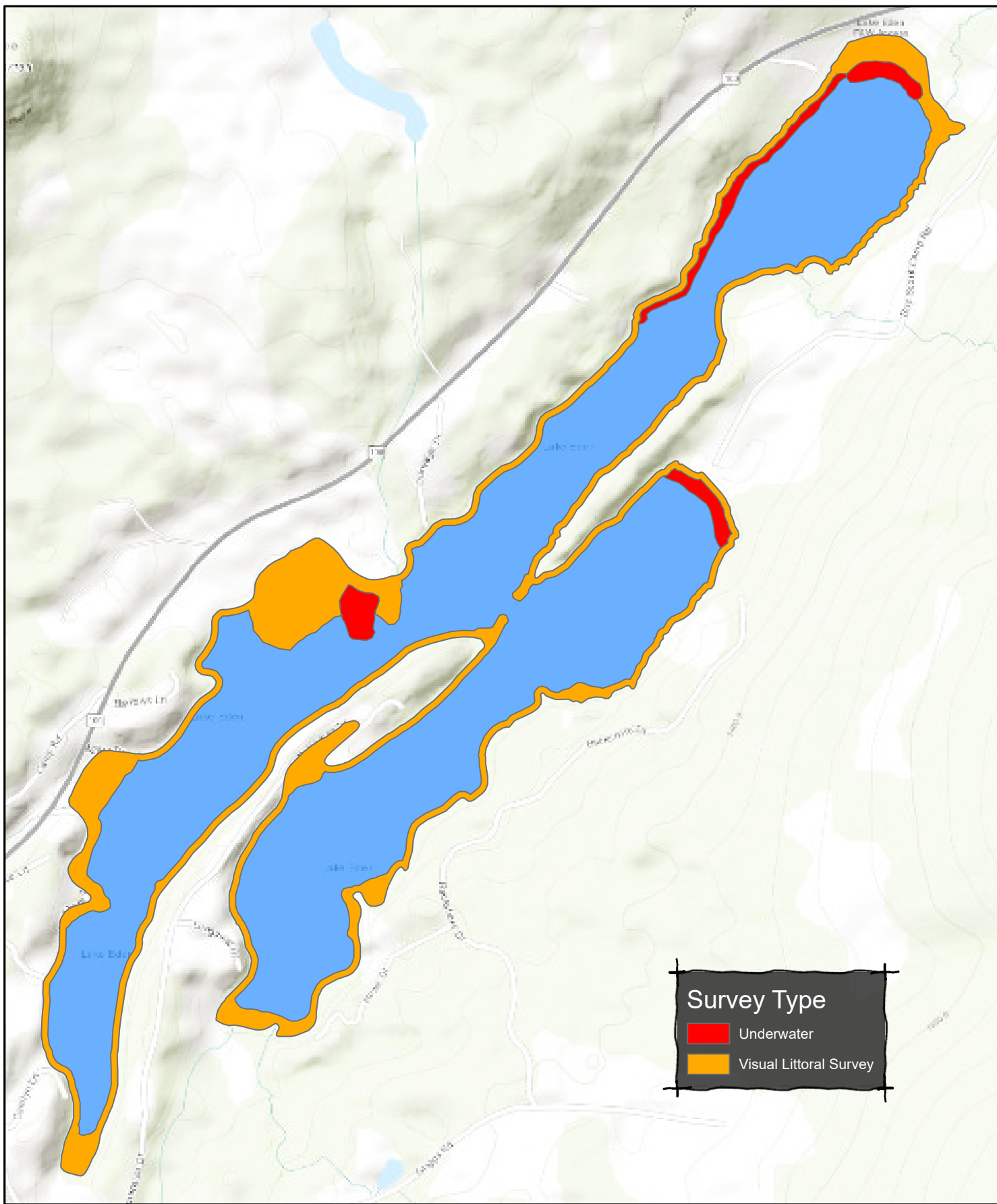
Depth (ft)	Plant Count	Diameter (ft)	Lat	Long
8	7	10	44.720921	-72.500155
12	3	10	44.728085	-72.496125
6	2	2	44.721221	-72.500775
11	6	NA	44.721129	-72.500585
10	22	NA	44.719084	-72.508306
10	60	NA	44.720246	-72.499739

EWM polygons

Site Name	Depth (ft)	Plant Count	Diameter (ft)	Lat	Long
A	2	59	5	44.72852	-72.495418
B	10	50% cover	2	44.718829	-72.507541
C	3	26	5	44.721143	-72.500275

Appendix 2

Maps of Survey Areas and EWM Occurrences



Survey Type

Underwater
 Visual Littoral Survey

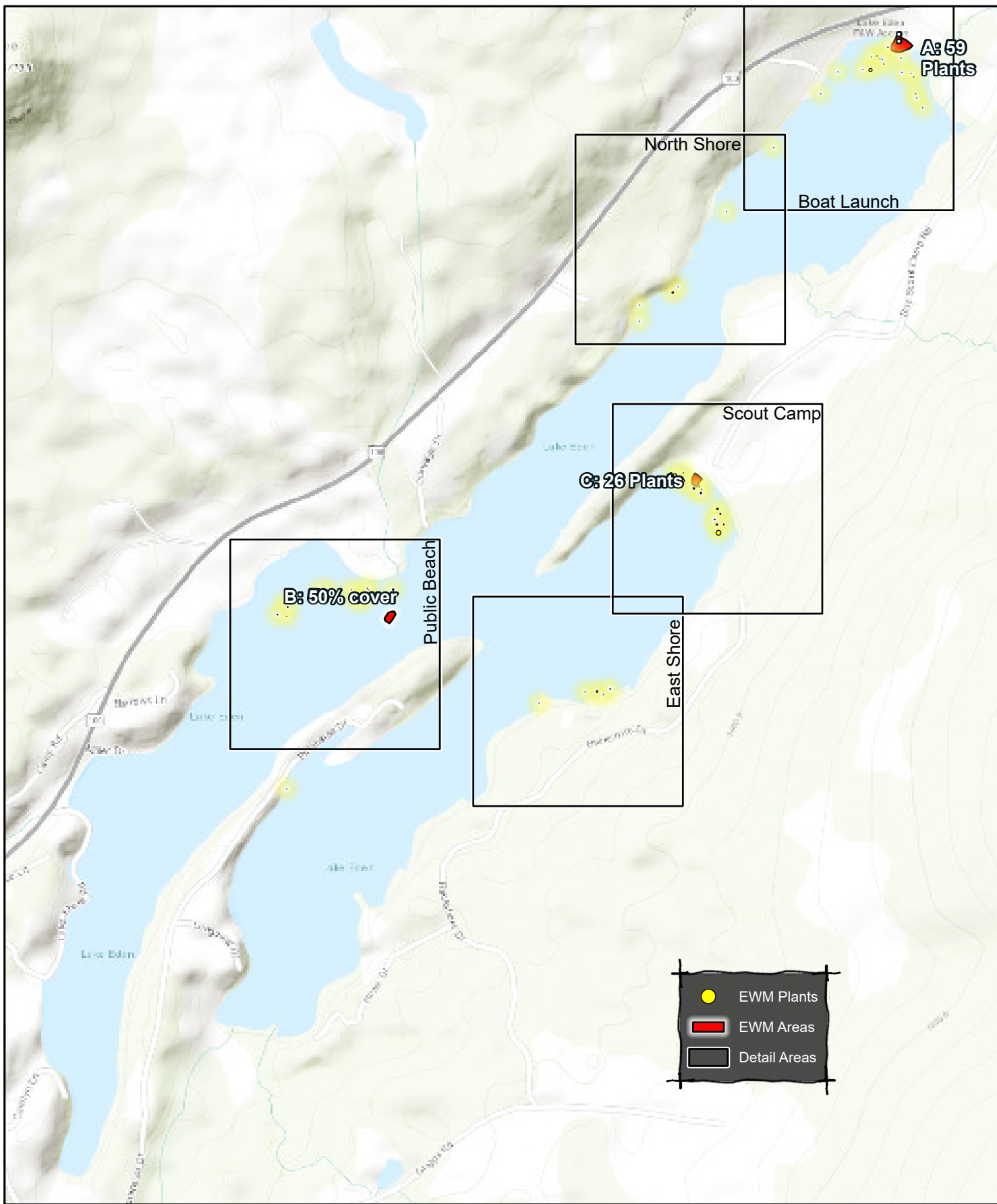


Lake Eden: EWM 2023 Survey Types

Monday, June 19, 2023 File: LakeEden:8.5x11 Report 2023-1
 Prepared By: A Worthley NAD 1983 StatePlane Vermont FIPS 4400



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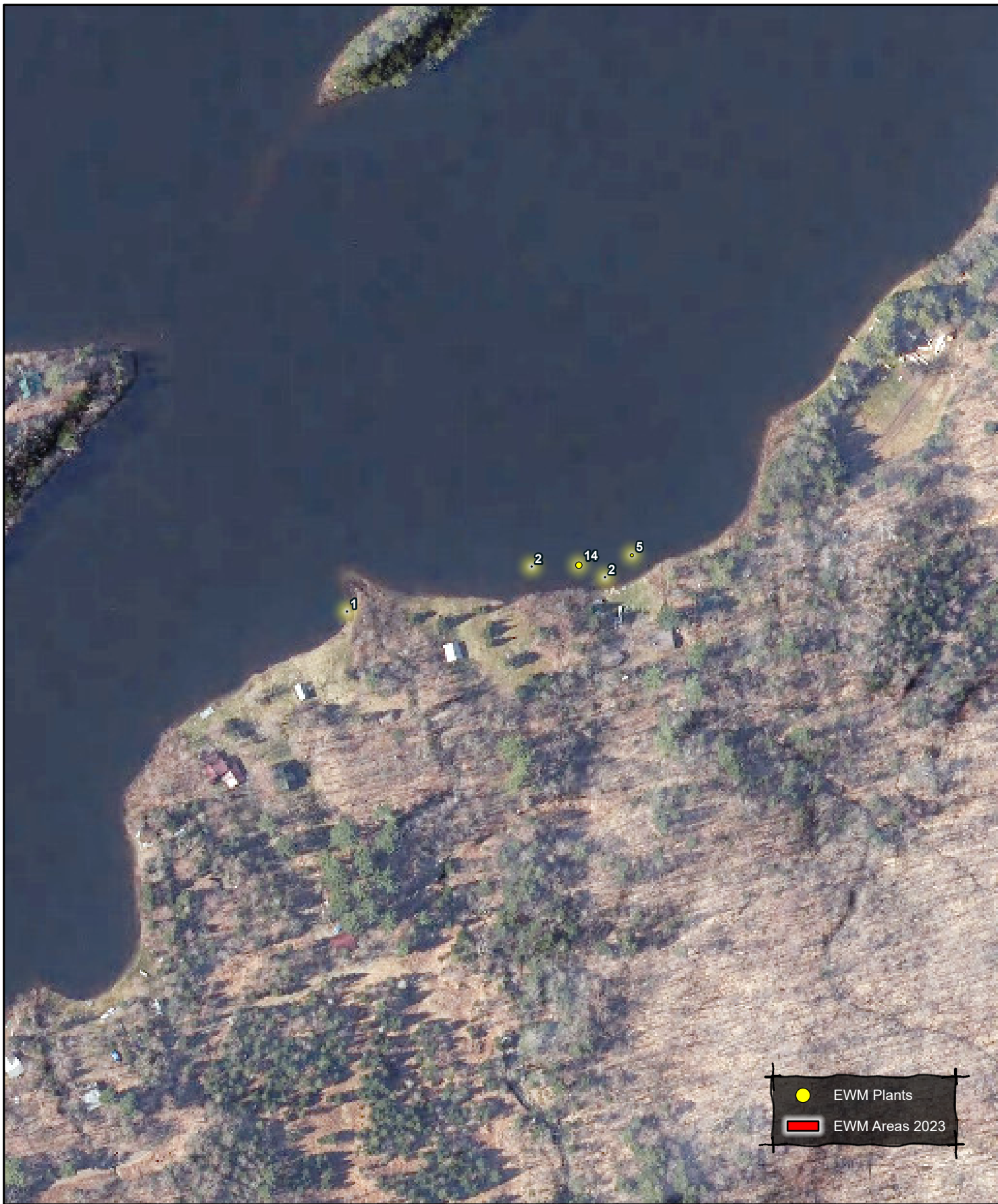


Lake Eden: Eurasian Watermilfoil 2023

Monday, June 19, 2023 File: LakeEden:8.5x11 Report 2023-1
Prepared By: A Worthley NAD 1983 StatePlane Vermont FIPS 4400

0 105210 420 630 840 Feet





Lake Eden: EWM 2023 DETAIL: East Shore

Monday, June 19, 2023
Prepared By: A Worthley

File: LakeEden:8.5x11 Report 2023-2
NAD 1983 StatePlane Vermont FIPS 4400

0 25 50 100 150 200 Feet



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Lake Eden: EWM 2023 DETAIL: North Shore

Monday, June 19, 2023 File: LakeEden:8.5x11 Report 2023-2
 Prepared By: A Worthley NAD 1983 StatePlane Vermont FIPS 4400

0 25 50 100 150 200 Feet



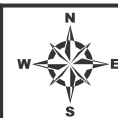
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Lake Eden: EWM 2023 DETAIL: Public Beach

Monday, June 19, 2023 File: LakeEden:8.5x11 Report 2023-2
 Prepared By: A Worthley NAD 1983 StatePlane Vermont FIPS 4400

0 25 50 100 150 200 Feet



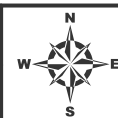


Lake Eden: EWM 2023 DETAIL: Scout Camp

Monday, June 19, 2023
Prepared By: A Worthley

File: LakeEden:8.5x11 Report 2023-2
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0 25 50 100 150 200 Feet



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