

SUMMARY REPORT
GLEC Project Number: 2410-00

2017 Torch Lake Assessment

Prepared for:

The Watershed Center – Grand Traverse Bay
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Funding Partners:

Dole Family Foundation
Three Lakes Association
Torch Conservation Center
Torch Lake Protection Alliance

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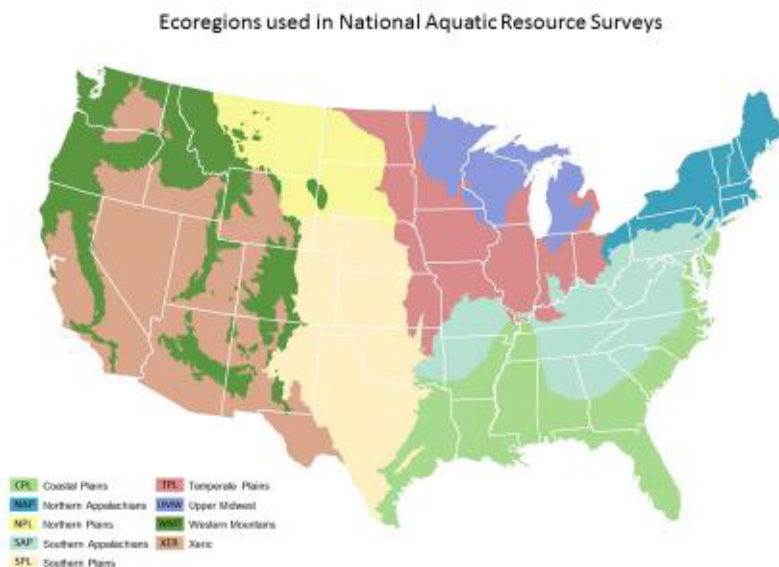
Date: November 13, 2017 (Revised)

SUMMARY REPORT

2017 Torch Lake Assessment

Great Lakes Environmental Center, Inc. (GLEC) sampled Torch Lake (Antrim County, Michigan) in July 2017 following the protocols outlined for the National Lakes Assessment (NLA) 2017 field season. The purpose of the work was to sample Torch Lake using the same protocols used for the NLA 2017 so that a comparison could be made between Torch Lake and the lake conditions (i.e., Least Disturbed, Most Disturbed and Intermediate) estimated for lakes within the Upper Midwest Ecoregion (Figure 1)(USEPA 2017). The NLA 2012 data have been published, whereas the NLA 2017 data were only recently collected. Therefore, the results of this study were mostly compared to the NLA 2012 results. A detailed explanation of the protocols used in the assessment may be found at <http://water.epa.gov/type/lakes/lakessurvey>; and are also outlined in the NLA 2012 field Operations Manual (USEPA 2012a). The analysis of water and sediment samples was conducted following the procedures outlined in the NLA 2012 Laboratory Operations Manual (USEPA 2012b). The raw data forms, summary calculations, and laboratory analysis data are given in Appendices A through C. The NLA 2007 and 2012 Technical reports are given in Appendix D.

Figure 1. Ecoregions Used in the National Aquatic Resource Surveys (USEPA 2015)



Direct comparisons to other Michigan lakes is difficult in this instance because the NLA protocol is designed to estimate the percentage of lakes within a given ecosystem that are in “Good”, “Fair”, or “Poor” condition when compared to a calculated reference condition (Table 1). However, the chemical and physical data collected from Torch Lake may be compared to similar northern Michigan lakes of similar size and characteristics, if those data are made available. A qualitative comparison of the “Good”, “Fair”, and “Poor” scores for two other northern Michigan lakes was made with Torch Lake. Those lakes are Little Glenn Lake (Leelanau County) and

Clear Lake (Montmorency County). Both lakes were included in the NLA 2012 assessments and have similar characteristics with Torch Lake (e.g., oligotrophic, similar geology, similar latitude). Because the 2012 and 2017 NLA assessments were a probabilistic study design, lakes of various sizes (e.g., greater than 1 hectare) were sampled. Torch Lake is a relatively large lake and unique in its own characteristics. Therefore, finding a similar reference condition lake that was sampled using NLA protocols was not possible. Reference condition would typically include lakes that were absent of human influences, however, those types of lakes are becoming increasingly rare. Consequently, EPA has determined that a “least disturbed” condition is the next best alternative to a true reference condition (USEPA 2017).

Table 1. Least-disturbed Reference Screening Filter Thresholds for NLA 2012 (Upper Midwest Ecoregion is labeled as UMW in the following table)

	TP (ug/L)	TN (ug/L)	Cl (ueq/L)	SO4 (ueq/L)	Turbidity (NTU)	Hii-NonAg ¹⁰	Hii-Ag ¹¹	Assessment (Ag/Res/Ind) ¹²
WMT ¹	>30@	>400	>100#	>200	>3	>0.6	>0	> 5/5/5
XER ²	>100	>1000	>500	>1000	>5	>1.5	>0.2	> 5/5/5
NPL ³	>150	>2000	>1000	---	>5	>1.5	>0.5	> 10/6/6
SPL ⁴	>150*	>2000*	>1000	---	>5	>1.5	>0.5	> 10/6/6
TPL ⁵	>120	>2000	>1000	>5000	>5.5	>1.7	>0.15	> 9/9/9
UMW⁶	>40	>1200	>200	>200	>5	>0.6	>0	> 5/5/5
CPL ⁷	>50	>1200	>1000	>400	>5	>1.0	>0	> 6/10/6
SAP ⁸	>35	>800	>125	>300	>5	>0.9	>0	> 6/6/6
NAP ⁹	>30	>600	>100#	>300	>5	>0.6	>0	> 6/6/6

¹ WMT = Western Mountains; ² XER = western Xeric; ³ NPL = Northern Plains; ⁴ SPL = Southern Plains; ⁵ TPL = Temperate Plains; ⁶ UMW = Upper Midwest; ⁷ CPL = Central Plains; ⁸ SAP = Southern Appalachians; ⁹ NAP = Northern Appalachians; ¹⁰ Lakeshore Physical Habitat disturbances; non-agricultural; ¹¹ Lakeshore Physical Habitat disturbances; agricultural; ¹² Sum of agricultural/residential/industrial human disturbances

The size of Torch Lake is published as 18,770 acres (7,596 hectares), with a maximum depth of 87 meters (288 feet), and an average depth of 111 feet, which makes it Michigan’s deepest inland lake. There are approximately 41 miles of shoreline and Torch Lake is approximately 2 miles wide (3.2 Km) at its widest point. Torch Lake is Michigan’s second largest lake; second to Houghton Lake (20,044 acres).

Torch Lake was sampled on July 5, 2017 at coordinates 44.960000N and -85.29362W (NAD 83). The depth at the index site was 46.0 meters (approx. 151 ft.) which was located near the center of the lake, due west of physical habitat Station A (Figure 2). Equipment limitations prevented sampling at greater depths (NLA protocols also limit sampling depths to 50 meters). At the time of sampling, GLEC performed a limnological profile of dissolved oxygen, temperature, pH and conductivity (Table 3 and Figure 3). At the time of sampling, water samples were also collected from the index site for the analysis of E. coli, algal toxins (microcystin), atrazine pesticides, nutrients, pH, phytoplankton abundance, zooplankton abundance, chlorophyll *a*, sediment TOC, sediment contaminants and sediment grain size. Macroinvertebrates and physical habitat measurements were also taken at 10 randomly selected, equidistant, shoreline stations (Figure 2). Physical habitat measurements were made within a 15 meter riparian plot and within a 10 meter littoral plot at each of the stations (Figure 3).

Figure 2. Torch Lake 2017 Physical Habitat Monitoring

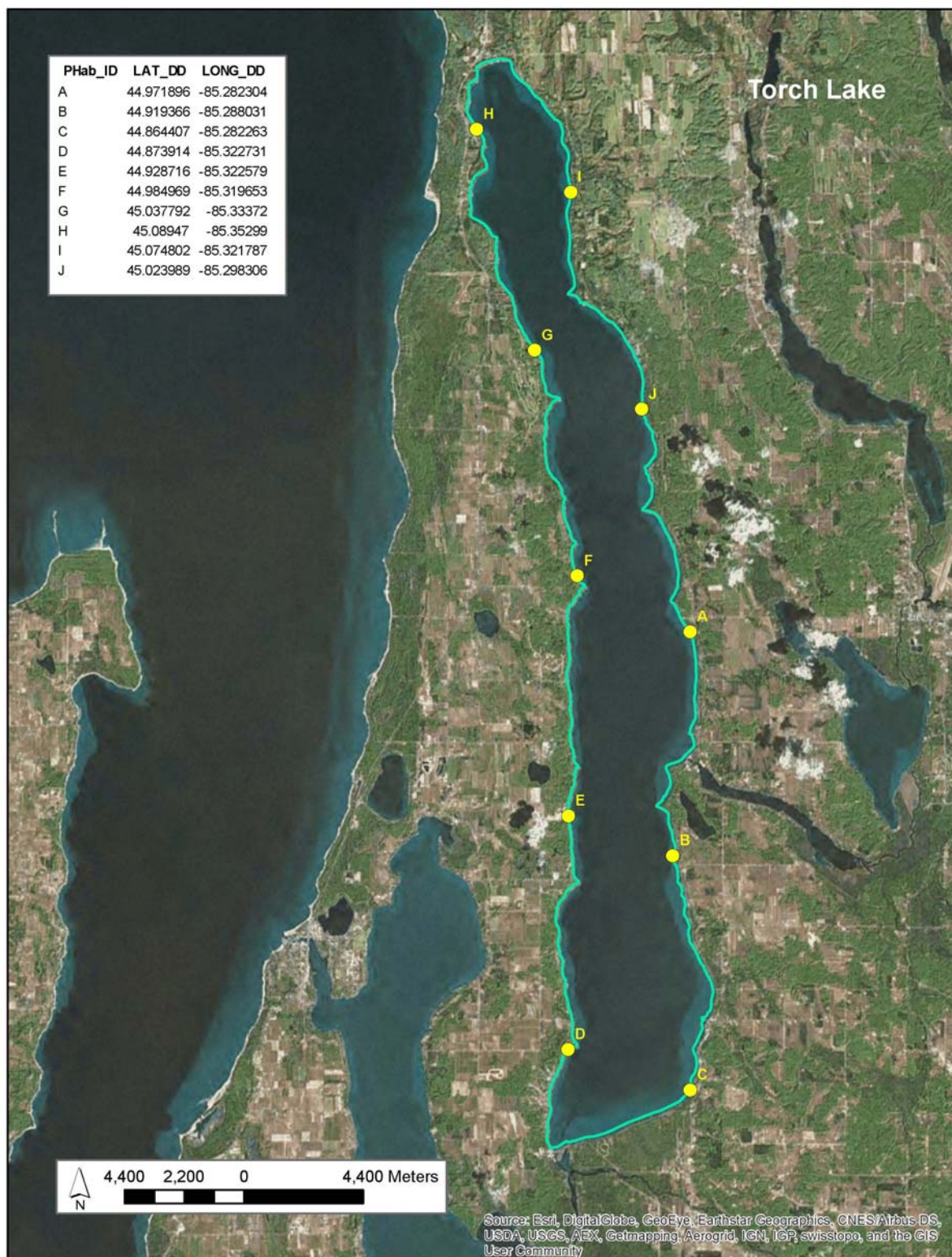
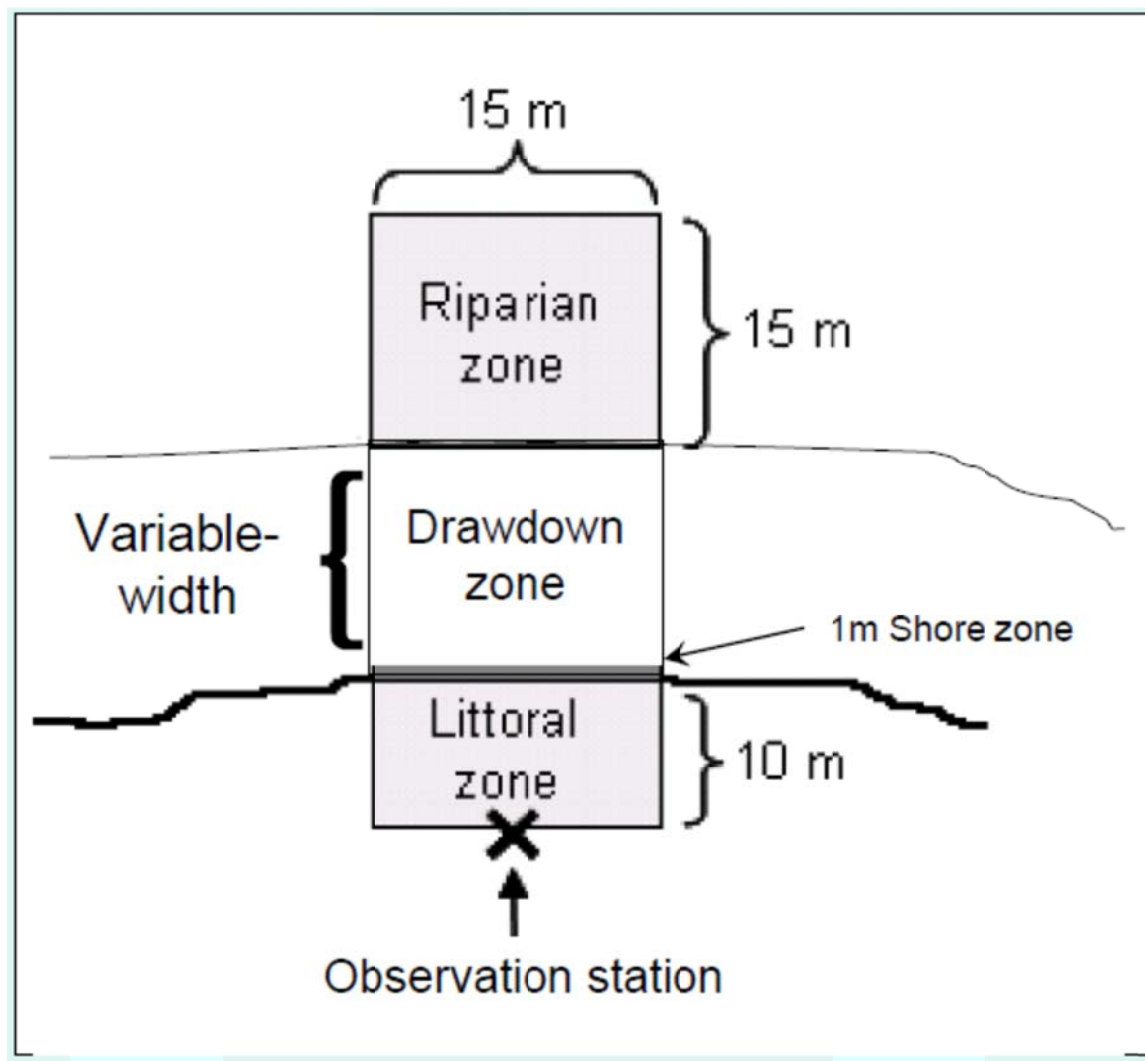


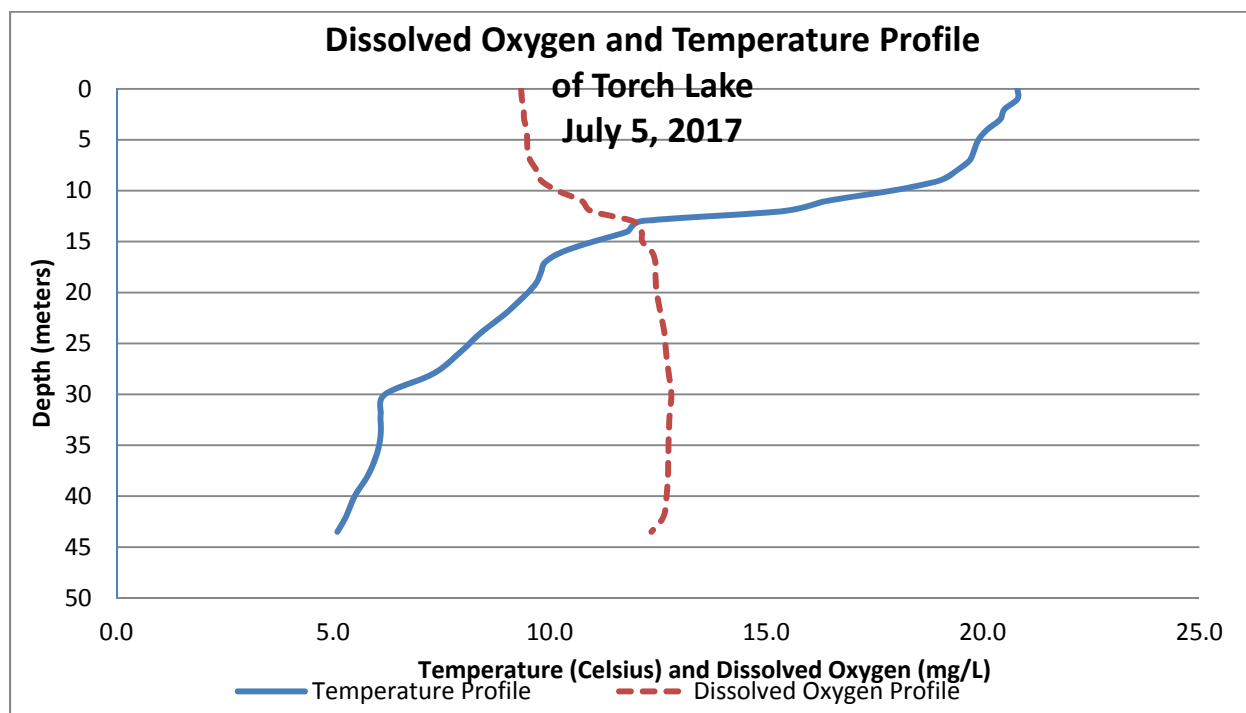
Figure 3. Physical Habitat Monitoring and Assessment Layout



RESULTS AND DISCUSSION

Torch Lake is known as a deep, cold, oligotrophic lake and the dissolved oxygen and temperature profile collected at the index station demonstrated that condition. The temperature profile demonstrated a defined thermocline at approximately 12 meters. Dissolved oxygen concentrations concomitantly increased at the thermocline to approximately 12 mg/L (> 100% saturation). Bottom temperatures were measured at 5.1° C (41 ° F). At that temperature, the 100 percent saturation of dissolved oxygen is 12.79 mg/L. We measured dissolved oxygen at 12.35 mg/L near the bottom. Consequently, the dissolved oxygen status is “high” in Torch Lake.

Figure 4. Torch Lake Dissolved Oxygen and Temperature Profile (July 5, 2017)



Water Quality

The water quality samples collected at the index station were analyzed and compared to the same parameters used for the Least Disturbed reference screening thresholds from the 2012 NLA from the Upper Midwest Ecoregion (Table 6). The examination of the Torch lake water chemistry indicators suggest that Torch Lake is a Least Disturbed water body. Measurements were also made for atrazine pesticides, toxic algae (microcystins), total coliforms, and E. coli. Those analyses suggest very little if any contamination of Torch Lake from pesticides, toxic algae or coliforms at the index station. The concentration of metals in the Torch Lake sediment is unremarkable. The metal concentrations are similar to that we would expect to see in any other non-contaminated lake in Northern Michigan. All of the PAH, PCB, pesticide and metals data were significantly less than the published sediment quality guidelines, indicating that none of the analytes were at toxic concentrations.

Table 2. Limnological Profile of Torch Lake; July 5, 2017

<u>DEPTH (m)</u>	<u>DO¹</u>	<u>TEMP²</u>	<u>PH³</u>	<u>COND⁴</u>
<u>Surface</u>	<u>9.3</u>	<u>20.8</u>	<u>8.45</u>	<u>296.6</u>
1	9.4	20.8	8.46	296.6
2	9.4	20.5	8.47	296.5
3	9.4	20.4	8.47	296.4
4	9.5	20.1	8.47	295.9
5	9.5	19.9	8.47	295.7
6	9.5	19.8	8.48	295.4
7	9.6	19.7	8.48	295.5
8	9.7	19.4	8.48	295.4
9	9.8	19.0	8.48	294.4
10	10.2	17.9	8.46	293.5
11	10.7	16.4	8.45	294.3
12	11.0	15.4	8.43	294.1
13	11.9	12.1	8.42	294.5
14	12.1	11.8	8.41	294.8
15	12.1	11.0	8.43	295
16	12.4	10.3	8.42	294.9
17	12.4	9.9	8.42	294.9
18	12.4	9.8	8.41	295
19	12.5	9.7	8.41	295
20	12.5	9.5	8.41	295.6
22	12.6	9.0	8.40	295.5
24	12.7	8.4	8.39	295.5
26	12.7	7.9	8.39	295.5
28	12.8	7.3	8.38	295.7
30	12.8	6.2	8.45	295.9
32	12.8	6.1	8.36	296.1
34	12.8	6.1	8.35	296.1
36	12.7	6.0	8.34	296.1
38	12.7	5.8	8.33	296.3
40	12.7	5.5	8.34	296.5
42	12.6	5.3	8.33	296.6
<u>43.5</u>	<u>12.4</u>	<u>5.1</u>	<u>8.26</u>	<u>296.8</u>
AVG.	11.4	12.5	8.42	295.5
MAX	12.8	20.8	8.48	296.8
MIN	9.3	5.1	8.26	293.5

⁰¹ Dissolved Oxygen (mg/L), ² Temperature (C), ³ pH (standard units), ⁴ Conductivity (µmhos/cm)

Table 3. Water and Sediment Quality Analysis: Torch Lake 2017¹

NLA Indicators		Torch Lake Results
Sample Type	Analyses	
Water chemistry	pH	8.24
nutrients	TOTAL PHOSPHORUS	<0.0007
nutrients	TKN	0.458 mg/L
	Chlorophyll a	0.00033 mg/L
Bacteria	E.coli	<1 (MPN)
Bacteria	Total Coliforms	5.2 (MPN)
Algal Toxin	Microcystin	0.001 µg/L
Sediment	Total Organic Carbon	3.8%
Sediment	grain size	Clay: 26.1%, Sand: 35.0%, Silt: 29.1%
Sediment	Chlorinated Pesticides	<1 ng/dry gram (<mdl)
Sediment	Total PCBs	<1 ng/dry gram (<mdl)
Sediment	Total PAHs	14.0 ng/dry gram
Sediment	Percent Solids	73.8%
Sediment	Metals (µg/L) : Aluminum	3249/3640
	Antimony	0/0
	Arsenic	4.16/4.12
	Cadmium	0/0
	Chromium	5.9/6.2
	Copper	5.9/7.6
	Iron	5665/5667
	Lead	1.7/1.7
	Manganese	179/178
	Mercury	0.0053/0.0046
	Nickel	3.4/3.4
	Selenium	0.091/0.112
	Silver	0/0
	Tin	0.45/0.52
	Vanadium	10.7/10.9
	Zinc	8.2
Triazine Pesticides (water)	Atrazine Screen	0 µg/L

¹ Water samples were collected from a vertical two meter surface composite sample, with the exception of the bacteria and algal toxin samples which were collected as grab samples 0.5 meter from the surface. Sediment samples were collected from a 3inch core sampler at the index station.

Physical Habitat

Following the protocols outlined in the 2017 Field Operations Manual for the 2017 NLA, physical habitat was assessed at ten randomly selected stations on Torch Lake (Figure 2). The physical habitat observations included the assessment of littoral substrates, aquatic macrophytes, littoral fish cover, riparian canopy and ground cover, and human disturbance (Table 4). Percent cover was categorized as absent (0), sparse (less than 10%; 0.1), moderate (10-40%; 0.4), heavy (40-75%; 0.75), or very heavy (>75%; 1.0). Depth was also measured at a fixed distance from shore at each station.

In addition, four summary physical habitat condition indices: Lakeshore Anthropogenic disturbance Index (Intensity and Extent)(RDis_IX), Riparian Vegetation Cover Complexity Index (RVegQ), Littoral Cover Complexity Index (LitCvrQ) and Littoral-riparian Habitat Complexity Index (LitRipCvrQ), were calculated from the field collected data. These indices were qualitatively compared to the 2012 NLA technical report values for least disturbed conditions (Table 6). Quantitative comparisons to other northern Michigan lakes were not completed for each indicator because the data analysis methods for the NLA are designed for comparison on an ecoregion scale. However, a qualitative comparison was made between Torch Lake and two other northern Michigan lakes (Table 5). For trend analysis purposes, these data can be compared to future NLA assessments on Torch Lake.

In the NLA 2012 technical report, contrasts in key NLA physical habitat index values were made among reference (R), intermediate (S), and highly disturbed (T) lakes (Figure 5-5 in the NLA 2012 Report). The summary physical habitat indices calculated for Torch Lake were within ranges outlined for intermediate lakes. This is not surprising given the human influence indicators (e.g., buildings, commercial, park facilities, and shoreline structures and boats) observed within the study transects. Additionally, 7 of the 10 physical habitat sampling stations included at least one human disturbance feature, which largely contributed to a score of “poor” in the LitRipCvrQ index. Riparian ground cover was dominated by lawns (grasses, herbs and forbes). The littoral zone is also very monotypic (mean depth of 0.91 meters +/- 0.13 meters), and the substrate is dominated by sand, cobble and gravel throughout the lakeshore with the notable absence of other attributes that make up fish cover such as trees, macrophytes, and vegetation, other than human structures. Consequently, and not surprisingly, Torch Lake is considered to be neither least disturbed nor highly disturbed, based on these criteria. The other two northern Michigan lakes used for comparison were ranked overall nationally in the “Good” category regardless of their relatively poor rankings in physical habitat. Given these indicators and similar scoring, Torch Lake would also likely rank in the “Good” category nationally.

Again, the real value of these data is for trend monitoring purposes. The NLA protocols are easily repeatable, so short and long term trend monitoring of the indicators reported here should be relatively straight forward.

Table 4. Torch Lake 2017 National Lakes Assessment, Physical Habitat Assessment

Form P-1: NLA 2017 PHAB												
Station	A	B	C	D	E	F	G	H	I	J	Mean	Std. Dev.
DEPTH (meters)	0.8		0.7	1.0	0.8	0.9	1.1	0.8	1.2	0.9	0.91	0.162
LITTORAL SUBSTRATE												
Bedrock	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Boulders	0	0	0	0	0	0.1	0.4	0	0	0	0.05	0.127
Cobble	0.4	0.4	0	0.4	1	0.4	0.4	0	0.4	0.75	0.42	0.298
Gravel	0.4	0.4	0.1	0.4	0.1	0.1	0.1	0.4	0.4	0.4	0.28	0.155
Sand	0.4	0.4	1	0.4	0	0.75	0.1	0.75	0.75	0.1	0.47	0.338
Silt	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Woody Debris	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Organic	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Vegetation/Other	0	0	0	0	0	0	0	0	0	0	0.00	0.000
AQUATIC MACROPHYTES												
Submergent	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Emergent	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Floating	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Total Cover	0	0	0	0	0	0	0	0	0	0	0.00	0.000
LITTORAL FISH COVER												
Vegetation	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Woody Debris/Snags	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Woody Brush/Debris	0	0	0.1	0	0	0	0	0.1	0	0	0.02	0.042
Live Trees >0.3	0	0	0	0	0	0	0	0.1	0	0	0.01	0.032
Over Hanging Veg.	0	0.4	0.1	0	0	0	0	0.1	0	0	0.06	0.126
Ledges/Dropoffs	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Boulders	0	0	0	0	0	0	0.1	0	0	0	0.01	0.032
Human Structures	0.75	0.1	0	0.1	0	0	0.4	0	0.4	0	0.18	0.257
RIPARIAN CANOPY (>5m)												
Big Trees	0.1	0.75	0.1	0.4	0	0	0.4	0.4	0.4	0.1	0.27	0.243
Small Trees	0.4	0	0.75	0	0	0.1	0.1	0	0.4	0.4	0.22	0.258
RIPARIAN UNDERSTORY (0.5-5m)												
Woody Shrubs/Saplings	0.75	1	0.75	0.1	0	0.4	0.4	0.1	0.1	0.75	0.44	0.357
Herbs/Grasses/Forbes	0.4	0.4	0.1	0	0.1	0	0.1	0.1	0.1	0.1	0.14	0.143
RIPARIAN GROUND COVER (<0.5m)												
Woody Shrubs/Saplings	0.4	0.75	0.4	0	0	0.75	0.4	0.1	0.1	0.1	0.30	0.286
Herbs/Grasses/Forbes	0.75	0.4	1	1	0.75	0.1	0.4	1	1	0.75	0.72	0.317
Standing Water/Inundated	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Barren/Buildings	0.1	0	0.1	0	0.4	0.1	0.1	0	0	0.1	0.09	0.120
Mean											0.27	
HUMAN INFLUENCE												
Buildings	1	2	0	1	1	1	2	1	2	0	1.10	0.738
Commercial	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Park Facilities	0	0	2	0	0	0	0	0	0	0	0.20	0.632
Docks/boats	2	2	1	2	1	1	2	1	2	0	1.40	0.699
Walls/Dikes	0	0	2	2	0	1	2	2	0	0	0.90	0.994
Trash	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Roads/Railroad	1	0	1	0	0	1	0	0	1	0	0.40	0.516
Power Lines	1	0	1	1	1	0	0	0	0	0	0.40	0.516
Lawn	2	2	1	2	2	1	2	2	2	0	1.60	0.699
Mean											0.67	
Row Crops	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Pature/Range/Hay Fields	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Orchard	0	0	0	0	0	0	0	0	0	0	0.00	0.000
Mean											0.00	
Other	0	0	0	0	0	0	0	0	0	0	0.00	0.000

Table 5. Comparison of Selected Water Quality and Physical Habitat Indices (Rating Over Index Value) From Two Northern Michigan Lakes and Torch Lake

Lake	Trophic Status	DO ¹	Chl. ² @	Draw-down	LitCvr ³	LitRipCvr ⁴	RDIS ⁵	RVeg. ⁶	Total Phosphorus (mg/L)	Secchi Depth (m)
Torch	Oligotrophic	High	Good (0.00033)	small	Poor (2.91)	Poor (1.5)	Poor (0.427)	Poor (0.11)	<0.0007	11.5
Clear	Oligotrophic	High	Good	Med.	Poor (0.071)	Poor (0.305)	Fair (0.487)	Poor (0.447)	21	8.8
Glenn	Oligotrophic	High	Good	Small	Poor (0.217)	Poor (0.424)	Poor (0.753)	Fair (0.560)	23	--

¹ Dissolved Oxygen, ² Chlorophyll @, ³ Littoral Cover, ⁴ Avg. Littoral and Riparian Cover, ⁵ Anthropogenic Disturbance, ⁶ Riparian Cover Complexity

Table 6. Comparison of the Least Disturbed Condition in the Upper Midwest EcoRegion to Torch Lake (2017)

	TP (ug/L)	TN (ug/L)	Cl (ueq/L)	SO4 (ueq/L)	Turbidity (NTU)
UMW	>40	>1200	>200	>200	>5
Torch	<7	458			>5

As stated, samples were also collected for the analysis of zooplankton, phytoplankton and macroinvertebrates. The zooplankton, phytoplankton and macroinvertebrate data are given in Appendix C. Those data are unremarkable in that they are very much indicative of deep cold water lakes with low densities and low diversity. No metrics were calculated with these data.

REFERENCES

USEPA (United States Environmental Protection Agency). 2009. National Lakes Assessment: a collaborative survey of the Nation's lakes. EPA 841/R-09/001, U.S. Environmental Protection Agency, Office of Water and Office of Research and Development, Washington, DC.

USEPA. 2012a. 2012 National Lakes Assessment Field Operations Manual. EPA/841/B-11/004, EPA/841/B-11/004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA. 2012b. 2012 National Lakes Assessment Laboratory Operations Manual. EPA/841/B-11/004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA. 2017. National Lakes Assessment 2012: Technical Report. EPA 841-R-16-114. U.S. Environmental Protection Agency, Washington, D.C. **Website:** <https://www.epa.gov/national-aquatic-resource-surveys/nla>.

APPENDIX A
FIELD DATA FORMS

FORM V-1: NLA 2017 VERIFICATION

Reviewed by (initial): mmSite ID: NLA17 TORCHVisit: ☒ 1 ☐ 2 Date: 07 / 05 / 2017Site Name: TORCH LAKEMode of Access: ☒ Vehicle ☐ Hike-In ☐ Aircraft Field Crew: _____

LAKE VERIFICATION INFORMATION

Lake shape compares with map? Is there public access?

☒ YES ☐ NO☒ Yes ☐ No

Access Description:

Lake verified by (Mark all that apply): ☒ GPS ☒ Local Contact ☒ Signs ☒ Roads ☐ Topo. Map☐ Other (Describe Here):☐ Not Verified (Explain in Comments)

DESIGN COORDINATES

Latitude

Longitude

MAP

Decimal Degrees
NAD 83LAUNCH
SITE*Decimal Degrees
NAD 8344.928528- 85.322704

Type of GPS Fix:

☐ 2D ☒ 3D

*If these are not actual launch site coordinates, explain below:

DID YOU SAMPLE THIS SITE? ☒ YES ☐ NOIf NO, mark one reason and explain below: ☐ Not Visited ☐ Non-target ☐ Inaccessible ☐ Other (Explain below):

GENERAL COMMENTS

Very large deep recreational lake.

DIRECTIONS TO LAKE & LAUNCH SITE (from nearest main road or town):

From Kewadin, north on Birch Lake Rd, to Indian Rd. Turn
R (east) and take it all the way to launch.

LAUNCH SITE DESCRIPTION

Paved

PERSONNEL

Name:

Leader:

Michelle A Moore

Name:

Julianne Heinlein

FORM IP-1: NLA 2017 INDEX PROFILE (Front)

Reviewed by (initial): mmSite ID: NLA17_ TARCHDate: 07/05/2017Time of Arrival at
Index Site (hh:mm) 13:04

Coordinates	Latitude	Longitude	Type of GPS Fix:
INDEX SITE Decimal Degrees NAD 83	<u>44.96</u>	<u>-85.29362</u>	<input type="radio"/> 2D <input checked="" type="radio"/> 3D

Precipitation: ☒ NONE ☐ LIGHT ☐ HEAVY Surface Conditions: ☐ FLAT ☐ RIPPLES ☒ CHOPPY ☐ WHITECAPSOdor: ☐ YES ☒ NO Description:Scum: ☐ YES ☒ NO Description:Index Site Depth (m): 4.6.0 Comments: _____
XX.X 4.6.0Method Used: ☐ LINE ☒ SONAR ☐ POLE ☐ ESTIMATE

CALIBRATION INFORMATION

Instrument manufacturer and model: YSI
Instrument ID number: 219 Operator: Julianne Heinlein

TEMPERATURE	Thermometer Reading (°C) XX.X	Sensor Reading (°C) XX.X	Comments
	<u> </u>	<u> </u>	

DO	Elevation	OR Barometric Pressure (mm Hg)	Calibration Value	Displayed Value	Flag
	<u> </u> (m)	<u>743</u>	<u>96.9</u> <input type="radio"/> mg/L <input checked="" type="radio"/> %	<u>97.8</u> <input type="radio"/> mg/L <input checked="" type="radio"/> %	<u> </u>

pH	Cal. STD 1 Description	Cal. STD 1 Value	Cal. STD 2 Description	Cal. STD 2 Value
	<u>pH 7 buffer</u>	<u>7.0</u>	<u>pH 10 buffer</u>	<u>9.99</u>
	Calibration Verified with Quality Control Sample (QCS)			
	QCS Description	QCS True	QCS Measured	Flag
	<u> </u>	<u> </u>	<u> </u>	<u> </u>

CONDUCTIVITY	Cal. STD 1 Description	Cal. STD 1 Value	Cal. STD 2 Description	Cal. STD 2 Value
	<u>1413 STD</u>	<u>1413</u>	<u> </u>	<u> </u>
	Calibration Verified with Quality Control Sample (QCS)			
	QCS Description	QCS True (µS/cm @25°C)	QCS Measured (µS/cm @25°C)	Flag
	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Flag	Comments

Flag codes: K = No measurement or observation made; U = Suspect measurement or observation; F1, F2, etc. = misc. flags assigned by field crew.
Explain all flags in comment sections.

FORM IP-1: NLA 2017 INDEX PROFILE (Back)

Reviewed by (initial): nmSite ID: NLA17 TORCHDate: 07 / 05 / 2017Submitted data via eFile ☐ DISSOLVED OXYGEN, TEMPERATURE, AND pH PROFILEIntervals (m): Surface to 20 m = every 1 m; 20-50 m = every 2 m; last reading 0.5 m above bottom^a^a If the site depth is <3 m, take readings at the surface, every 0.5 m, and 0.5 m above bottom.^b METALIMNION = The region of the profile where the temperature changes at the rate of 1 °C or greater per meter of depth. Indicate the depth of the top of the metalimnion with a 'T', and the bottom of the metalimnion (when the rate change becomes less than 1 °C per meter) with a 'B'. After the metalimnion is encountered, take readings every 1 m until bottom of the metalimnion is reached.

Depth XX.X	O ₂ (mg/L) XX.X	Temp. (°C) XX.X	pH X.XX	Cond. (μS/cm@ 25°C) XX	Meta- limnion ^b (T, B)	Flag	Depth XX.X	O ₂ (mg/L) XX.X	Temp. (°C) XX.X	pH X.XX	Cond. (μS/cm@ 25°C) XX	Meta- limnion ^b (T, B)	Flag
Surface	9.34	20.8	8.45	296.6			20	12.47	9.5	8.41	295		
1	9.36	20.8	8.46	296.6			22	12.56	9	8.4	295.6		
2	9.4	20.5	8.47	296.5			24	12.65	8.4	8.39	295.5		
3	9.41	20.4	8.47	296.4			26	12.69	7.9	8.39	295.5		
4	9.47	20.1	8.47	295.9			28	12.75	7.3	8.38	295.7		
5	9.48	19.9	8.47	295.7			30	12.81	6.2	8.45	295.9		
6	9.49	19.8	8.48	295.4			32	12.77	6.1	8.36	296.1		
7	9.55	19.7	8.48	295.5			34	12.75	6.1	8.35	296.1		
8	9.7	19.4	8.48	295.4			36	12.74	6	8.34	296.1		
9	9.8	19	8.48	295		T	38	12.73	5.8	8.33	296.3		
10	10.18	17.9	8.46	294.4			40	12.7	5.5	8.34	296.5		
11	10.74	16.4	8.45	293.5			42	12.63	5.3	8.33	296.6		
12	10.96	15.4	8.43	294.3			43.5	12.35	5.1	8.26	296.8		
13	11.93	12.1	8.42	294.1		B							
14	12.12	11.8	8.41	294.5									
15	12.14	11	8.43	294.8									
16	12.20	10.3	8.42	295									
17	12.44	9.9	8.42	294.9									
18	12.44	9.8	8.41	294.9									
19	12.45	9.7	8.41	295			Dup Surface	9.42	20.9	8.48	296.7		

Is the Duplicate O₂ reading within ±0.5 mg/L of the initial surface reading? ☒ YES ☐ NOIf no, calibration verified? ☐ YES ☐ NO

Flag Comments

Flag codes: K = No measurement or observation made; U = Suspect measurement or observation; F1, F2, etc. = misc. flags assigned by field crew.
Explain all flags in comment sections.

mm

Site ID: NLA17 TORCH

Date: 07 / 05 / 2017

SECCHI DISK TRANSPARENCY

If the disappearance depth is <1.0 meter, determine the depth to the nearest 0.05 meter by marking the line at the nearest depth marker and measuring the remaining length with a tape measure or meter stick. Otherwise, estimate the disappearance depth to the nearest 0.1 meter.

Depth Disk Disappears (XX.X)	Depth Disk Reappears (XX.X)	Comments	Clear to Bottom
1.1.5.0 (m)	1.1.2.0 (m)		<input type="radio"/>

DEPTH OF INTEGRATED SAMPLE (SECCHI REAPPEARANCE DEPTH X 2 OR 2 METERS, WHICHEVER IS LESS)

NOTE: If euphotic zone depth is < 2 m (secchi < 1 m), take multiple "short" integrated samples to collect the required volume of water (8L total).

E. COLI (BACT)

(Target Volume = 200mL)

No Sample Collected ☐

Sample ID	Comments
856084	

FISH eDNA (FDNA)

(Target Volume = 1000ml)

No Sample Collected ☒

Sample ID	Comments

ALGAL TOXIN (Microcystin) (MICX)

(Target Volume = 500mL)

No Sample Collected ☐

Sample ID	Comments
856082	

ALGAL TOXIN (Microcystin) (MICZ)

(Target Volume = 500mL)

No Sample Collected ☒

Sample ID	Comments

ATRAZINE PESTICIDE SCREEN (TRIA)

(Target Volume = 60mL)

No Sample Collected ☐

Sample ID	Comments
856083	

NUTRIENTS (NUTS)

(Target Volume = 250mL)

No Sample Collected ☐

Sample ID	Number of Ampoules (Max 2)	pH <2	Comments
856086	1	<input checked="" type="radio"/>	

CHEMISTRY (CHEM)

(Target Volume = 4L)

No Sample Collected ☐

Sample ID	Comments
856080	

Use comment section to explain: Suspect measurement, observations or no measurements taken.

7718295661

Site ID: NLA17_ TORCHDate: 07 / 05 / 2017mm**DISSOLVED GAS CONCENTRATION (GSCA & GSCB)**

(Two Samples: Target Volume = 30mL gas)

No Sample Collected ☒

Sample ID - GSCA	Water Temp (°C)	Comments
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>
Sample ID - GSCB	Water Temp (°C)	Comments
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

DISSOLVED GAS ISOTOPE (GSIA & GSIB)

(Two Samples: Target Volume = 30mL gas)

No Sample Collected ☒

Sample ID - GSIA	Water Temp (°C)	Comments
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>
Sample ID - GSIB	Water Temp (°C)	Comments
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

AIR (GSAA & GSAB)

(Two Samples: Target Volume = 30mL gas)

No Sample Collected ☒

Sample ID - GSAA	Comments
<u> </u>	<u> </u>
<u> </u>	<u> </u>
Sample ID - GSAB	Comments
<u> </u>	<u> </u>
<u> </u>	<u> </u>

PHYTOPLANKTON (PHYX)

(Target Volume = 1000mL)

No Sample Collected ☐

Sample ID	Lugols	Comments
<u>8,5,6,0,8,7</u>	<input checked="" type="radio"/>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

CHLOROPHYLL-a (CHLX)

(Target Volume = 1000mL; max vol = 2000 mL)

No Sample Collected ☐

Sample ID	Volume Filtered (mL)	Comments
<u>8,5,6,0,8,1</u>	<u>750</u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

Use comment section to explain: Suspect measurement, observations or no measurements taken.

FORM IS-1: NLA 2017 INDEX SAMPLE COLLECTION (Page 3 of 3)

Reviewed by (initial):

mm

Site ID: NLA17_ TORCH

Date: 0.7 / 0.5 / 2017

ZOOPLANKTON COARSE (150 micron mesh) (ZOCN)

No Sample Collected ☐

Sample ID	Number and length of tow:	# of Jars	Narcotized (CO ₂)	Preserved (ETOH)
8,5,6,0,9,4	<input checked="" type="radio"/> 1 tow (5m) <input type="radio"/> 5 tows (1m/ea.) <input type="radio"/> 2 tows (2.5m/ea.) <input type="radio"/> 10 tows (0.5m/ea.)	(<input checked="" type="radio"/>	<input checked="" type="radio"/>

Comments

ZOOPLANKTON FINE (50 micron mesh) (ZOFN)

No Sample Collected ☐

Sample ID	Number and length of tow:	# of Jars	Narcotized (CO ₂)	Preserved (ETOH)
8,5,6,0,9,5	<input checked="" type="radio"/> 1 tow (5m) <input type="radio"/> 5 tows (1m/ea.) <input type="radio"/> 2 tows (2.5m/ea.) <input type="radio"/> 10 tows (0.5m/ea.)	1	<input checked="" type="radio"/>	<input checked="" type="radio"/>

Comments

SEDIMENT ORGANIC CARBON (SEDC)

(Target Volume = 50mL)

No Sample Collected ☐

Sample ID	Comments
8,5,6,0,9,6	

SEDIMENT CONTAMINANTS (SEDO)

(Target Volume = 100mL)

No Sample Collected ☐

Sample ID	Comments
8,5,6,0,9,7	

SEDIMENT GRAIN SIZE (SEDG)

(Target Volume = 100mL)

No Sample Collected ☐

Sample ID	Comments
8,5,6,0,9,8	

Use comment section to explain: Suspect measurement, observations or no measurements taken.

FORM LS-1: NLA 2017 LITTORAL SAMPLE COLLECTION

Reviewed by (initial): mmSite ID: NLA17_ TorchDate: 07 / 05 / 2017

BENTHIC MACROINVERTEBRATES (BENT)

No Sample Collected ☐

Sample ID	Number of jars	Preserved (ETOH)	Comments
<u>856099</u>	<u>1</u>	<input checked="" type="radio"/>	

STATIONS

SUBSTRATE CODES: R - Rocky/Cobble/Woody debris; M - Macrophyte beds; F - Fines (sand, mud, organic); L - Leaf Pack; O - Other (Flag and explain in comments)

COLLECTION CODES: B - Boat; W - Wading

A	B	C	D	E	F	G	H	I	J		
Sub	Sub	Sub	Sub	Sub	Sub	Sub	Sub	Sub	Sub	Sub	Sub
<input checked="" type="radio"/> R	<input checked="" type="radio"/> R	<input type="radio"/> R	<input checked="" type="radio"/> R	<input checked="" type="radio"/> R	<input type="radio"/> R	<input checked="" type="radio"/> R	<input type="radio"/> R	<input type="radio"/> R	<input checked="" type="radio"/> R	<input type="radio"/> R	<input type="radio"/> R
<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M	<input type="radio"/> M
<input type="radio"/> F	<input type="radio"/> F	<input checked="" type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F	<input checked="" type="radio"/> F	<input type="radio"/> F	<input checked="" type="radio"/> F	<input checked="" type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F
<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L	<input type="radio"/> L
<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O	<input type="radio"/> O
Coll	Coll	Coll	Coll	Coll	Coll	Coll	Coll	Coll	Coll	Coll	Coll
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B
<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input checked="" type="radio"/> W	<input type="radio"/> W	<input type="radio"/> W
Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag	Flag

Flag	Comments

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_TORCHDate: 07 / 05 / 2017Reviewed by (initial): mmSTATION: ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐IS IT AN ISLAND? Yes ☐ No ☒DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT
STATION
(10 m offshore) 0.8 (m)NAD 83
(Decimal
Degrees)LAT: 44.97174LONG: 85.28255

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m)

Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ☐ No ☒

Height: _____ (m)

Dist: _____ (m)

☐ Flat (<5°) ☒ Gradual (5-30°) ☐ Steep (30-75°)☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____

Flag: _____

Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)

☒ 1 ☐ 2 ☐ 3 ☐ 4

Boulders (250-4000mm; basketball-car)

☒ 1 ☐ 2 ☐ 3 ☐ 4

Cobble (64-250mm; tennis ball-basketball)

☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

Gravel (2-64mm; ladybug to tennis ball size)

☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

Sand (0.06 - 2mm; gritty between fingers)

☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

Silt, Clay, or Muck (<0.06mm; not gritty)

☒ 1 ☐ 2 ☐ 3 ☐ 4

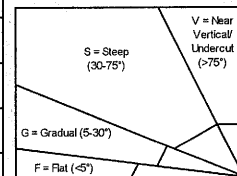
Woody Debris

☒ 1 ☐ 2 ☐ 3 ☐ 4

Organic (Leaf Pack, Detritus)

☒ 1 ☐ 2 ☐ 3 ☐ 4

Vegetation or Other

☒ 1 ☐ 2 ☐ 3 ☐ 4BANK ANGLE
CLASSES

AQUATIC MACROPHYTES

Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent

☒ 1 ☐ 2 ☐ 3 ☐ 4

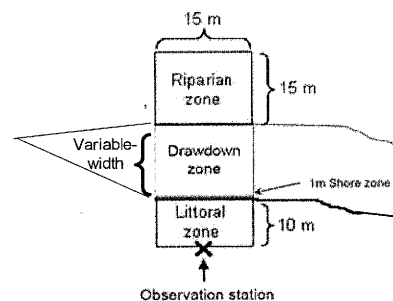
Emergent

☒ 1 ☐ 2 ☐ 3 ☐ 4

Floating

☒ 1 ☐ 2 ☐ 3 ☐ 4

Total Aquatic Macrophyte Cover

☒ 1 ☐ 2 ☐ 3 ☐ 4

FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present)

Flag

Aquatic and Inundated Herbaceous Veg.

☒ 1 ☐ 2 ☐ 3 ☐ 4

Woody Debris/Snags > 0.3 m Dia.

☒ 1 ☐ 2 ☐ 3 ☐ 4Woody Brush/Woody Debris <0.3 m dia.
(alive or dead)☒ 1 ☐ 2 ☐ 3 ☐ 4

Inundated Live Trees >0.3 m dia

☒ 1 ☐ 2 ☐ 3 ☐ 4

Overhanging Veg. within 1 m of Surface

☒ 1 ☐ 2 ☐ 3 ☐ 4

Ledges or Sharp Dropoffs

☒ 1 ☐ 2 ☐ 3 ☐ 4

Boulders

☒ 1 ☐ 2 ☐ 3 ☐ 4

Human Structures - Docks, Landings, etc

☐ 0 ☐ 1 ☐ 2 ☒ 3 ☐ 4

Flag codes: K = No measurement made, U = Suspect measurement., F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_ Torch

Date: 07/05/2017

Reviewed by (initial): mm

STATION: ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m dBH) ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Small Trees (Trunk <0.3 m dBH) ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings ☐ 0 ☐ 1 ☐ 2 ☒ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Tall Herbs, Grasses, & Forbs ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Ground Cover (<0.5m)

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Woody Shrubs & Saplings ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Herbs, Grasses and Forbs ☐ 0 ☐ 1 ☐ 2 ☒ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Standing Water or Inundated Vegetation ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Barren, Bare Dirt, Litter Duff or Buildings ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Buildings ☐ 0 ☒ 1 ☐ C

☐ 0 ☐ P ☐ C

Commercial ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Park Facilities/Man-made beach ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Docks/Boats ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Walls, dikes or revetments ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Trash/Landfill ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Roads or Railroad ☐ 0 ☒ 1 ☐ C

☐ 0 ☐ P ☐ C

Power lines ☐ 0 ☒ 1 ☐ C

☐ 0 ☐ P ☐ C

Row Crops ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Pasture/Range/Hay Field ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Orchard ☒ 0 ☐ P ☐ C

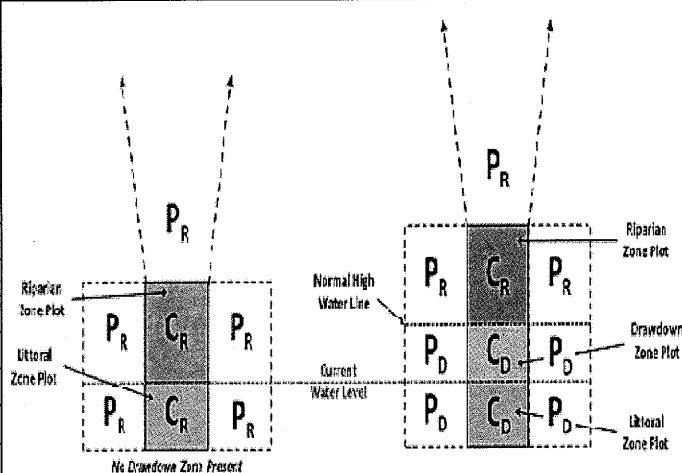
☐ 0 ☐ P ☐ C

Lawn ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Other (Flag & explain in comments) ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C



Flag Comments Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_TORCH

Date: 07 / 10 / 5 / 20 / 17

Reviewed by (initial): mm

STATION: ☐ A ☒ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐

IS IT AN ISLAND? Yes ☐ No ☒

DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT STATION (10 m offshore) 6.0 9 (m)

NAD 83 (Decimal Degrees)

LAT: 44 919 55 LONG: 85 288 06

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m)

Horizontal Dist.: _____ (m)

Drawdown:

Yes ☐ No ☒

Height: _____ (m)

Dist: _____ (m)

Bank Angle (see diagram below):

☐ Flat (<5°) ☒ Gradual (5-30°) ☐ Steep (30-75°)
☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____

Flag: _____

Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____

Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

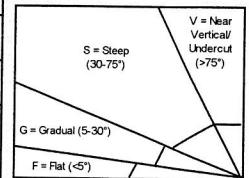
Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)	<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Boulders (250-4000mm; basketball-car)	<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Cobble (64-250mm; tennis ball-basketball)	<input type="radio"/> 0 <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Gravel (2-64mm; ladybug to tennis ball size)	<input type="radio"/> 0 <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Sand (0.06 - 2mm; gritty between fingers)	<input type="radio"/> 0 <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Silt, Clay, or Muck (<0.06mm; not gritty)	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Woody Debris	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Organic (Leaf Pack, Detritus)	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Vegetation or Other	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	



BANK ANGLE CLASSES

AQUATIC MACROPHYTES

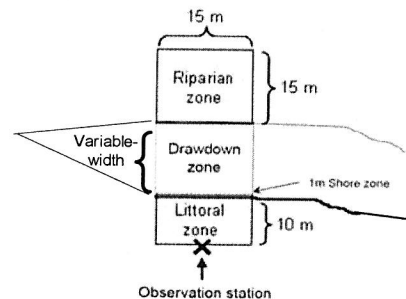
Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Emergent	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Floating	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	



FISH COVER

0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Inundated Live Trees >0.3 m dia	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Overhanging Veg. within 1 m of Surface	<input type="radio"/> 0 <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Ledges or Sharp Dropoffs	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Boulders	<input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
Human Structures - Docks, Landings, etc	<input type="radio"/> 0 <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_TORCH

Date: 07/05/2017

Reviewed by (initial): MM

STATION: ☐ A ☒ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☒ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

Big Trees (Trunk >0.3 m dBH)

☐ 0 ☐ 1 ☐ 2 ☒ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Small Trees (Trunk <0.3 m dBH)

☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Understory (0.5-5m)

Riparian Zone

☒ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

Woody Shrubs & Saplings

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☒ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Tall Herbs, Grasses, & Forbs

☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Ground Cover (<0.5m)

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Woody Shrubs & Saplings

☐ 0 ☐ 1 ☐ 2 ☒ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Herbs, Grasses and Forbs

☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Standing Water or Inundated Vegetation

☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Barren, Bare Dirt, Litter Duff or Buildings

☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Buildings

☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Commercial

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Park Facilities/Man-made beach

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Docks/Boats

☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Walls, dikes or revetments

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Trash/Landfill

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Roads or Railroad

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Power lines

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Row Crops

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Pasture/Range/Hay Field

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Orchard

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Lawn

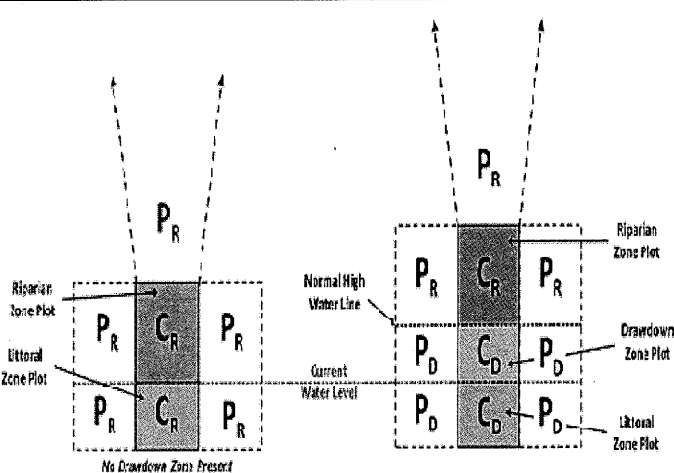
☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Other (Flag & explain in comments)

☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C



Flag Comments

Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_TORCH

Date: 07 / 05 / 2017

Reviewed by (initial): mm

STATION: ☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐

IS IT AN ISLAND? Yes ☐ No ☒

DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT STATION (10 m offshore) 0.7 (m)

NAD 83 (Decimal Degrees)

LAT: 44.86476 LONG: 85.2827

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m)

Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ☐ No ☒

Height: _____ (m)

Dist: _____ (m)

☐ Flat (<5°) ☐ Gradual (5-30°) ☐ Steep (30-75°)

☒ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____

Flag: _____

Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____

Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____



























































































SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

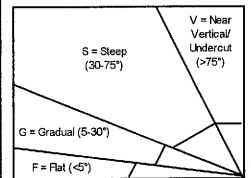
Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)													
Boulders (250-4000mm; basketball-car)													
Cobble (64-250mm; tennis ball-basketball)													
Gravel (2-64mm; ladybug to tennis ball size)													
Sand (0.06 - 2mm; gritty between fingers)													
Silt, Clay, or Muck (<0.06mm; not gritty)													
Woody Debris													
Organic (Leaf Pack, Detritus)													
Vegetation or Other													



BANK ANGLE CLASSES

AQUATIC MACROPHYTES

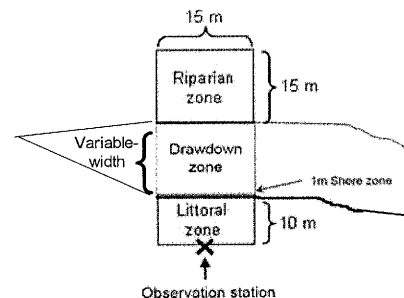
Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Emergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Floating	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	



FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Inundated Live Trees >0.3 m dia	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Overhanging Veg. within 1 m of Surface	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Ledges or Sharp Dropoffs	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Boulders	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Human Structures - Docks, Landings, etc	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_TORCH

Date: 07 / 05 / 2017

Reviewed by (initial): MM

STATION: ☐ A ☐ B ☒ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m DBH) 0 1 2 3 4

0 1 2 3 4

Small Trees (Trunk <0.3 m DBH) 0 1 2 3 4

0 1 2 3 4

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Tall Herbs, Grasses, & Forbs 0 1 2 3 4

0 1 2 3 4

Ground Cover (<0.5m)

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Herbs, Grasses and Forbs 0 1 2 3 4

0 1 2 3 4

Standing Water or Inundated Vegetation 0 1 2 3 4

0 1 2 3 4

Barren, Bare Dirt, Litter Duff or Buildings 0 1 2 3 4

0 1 2 3 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Buildings 0 P C

0 P C

Commercial 0 P C

0 P C

Park Facilities/Man-made beach 0 P C

0 P C

Docks/Boats 0 P C

0 P C

Walls, dikes or revetments 0 P C

0 P C

Trash/Landfill 0 P C

0 P C

Roads or Railroad 0 P C

0 P C

Power lines 0 P C

0 P C

Row Crops 0 P C

0 P C

Pasture/Range/Hay Field 0 P C

0 P C

Orchard 0 P C

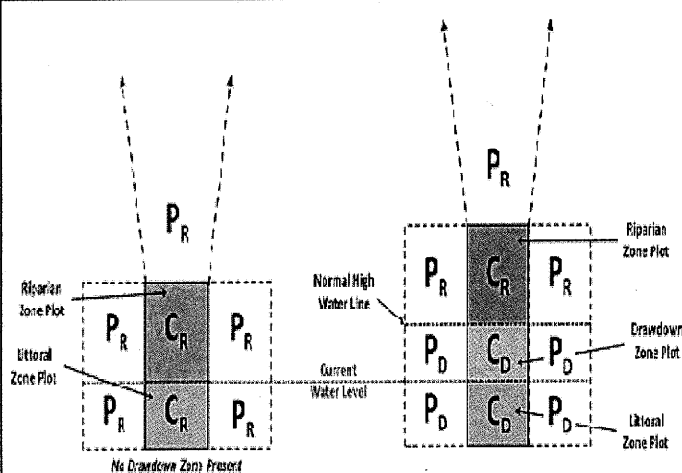
0 P C

Lawn 0 P C

0 P C

Other (Flag & explain in comments) 0 P C

0 P C



Flag Comments

Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_TORCHDate: 07 / 05 / 2017Reviewed by (initial): mmSTATION: ☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐IS IT AN ISLAND? Yes ☐ No ☒DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT
STATION
(10 m offshore) 1.0 (m)NAD 83
(Decimal
Degrees)LAT: 44.87636LONG: 85.32034

Shoreline Flooding:

Yes ☐ No ☒

Depth:

_____ (m)

Horizontal Dist.:

_____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ☐ No ☒

Height:

_____ (m)

Dist:

_____ (m)

☐ Flat (<5°) ☐ Gradual (5-30°) ☒ Steep (30-75°)☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____

Flag: _____

Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

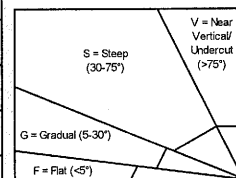
Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Boulders (250-4000mm; basketball-car)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Cobble (64-250mm; tennis ball-basketball)	<input type="radio"/> 0	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4
Gravel (2-64mm; ladybug to tennis ball size)	<input type="radio"/> 0	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Sand (0.06 - 2mm; gritty between fingers)	<input type="radio"/> 0	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Silt, Clay, or Muck (<0.06mm; not gritty)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Debris	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Organic (Leaf Pack, Detritus)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Vegetation or Other	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	

BANK ANGLE
CLASSES

AQUATIC MACROPHYTES

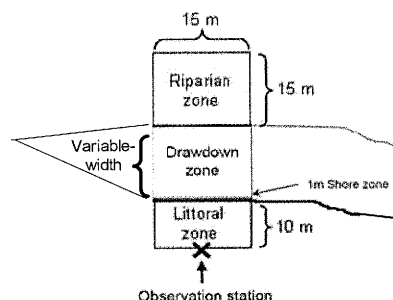
Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Emergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Floating	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	



FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Inundated Live Trees >0.3 m dia	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Overhanging Veg. within 1 m of Surface	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Ledges or Sharp Dropoffs	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Boulders	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Human Structures - Docks, Landings, etc	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_TORCH

Date: 07 / 05 / 2017

Reviewed by (Initial): mm

STATION: ☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☒ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m dBH) ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Small Trees (Trunk <0.3 m dBH) ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Understory (0.5-5m)

Riparian Zone

☒ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Tall Herbs, Grasses, & Forbs ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Ground Cover (<0.5m)

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Woody Shrubs & Saplings ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Herbs, Grasses and Forbs ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☒ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Standing Water or Inundated Vegetation ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Barren, Bare Dirt, Litter Duff or Buildings ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Buildings ☐ 0 ☒ P ☐ C

☐ 0 ☐ P ☐ C

Commercial ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Park Facilities/Man-made beach ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Docks/Boats ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Walls, dikes or revetments ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Trash/Landfill ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Roads or Railroad ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Power lines ☐ 0 ☒ P ☐ C

☐ 0 ☐ P ☐ C

Row Crops ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Pasture/Range/Hay Field ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Orchard ☒ 0 ☐ P ☐ C

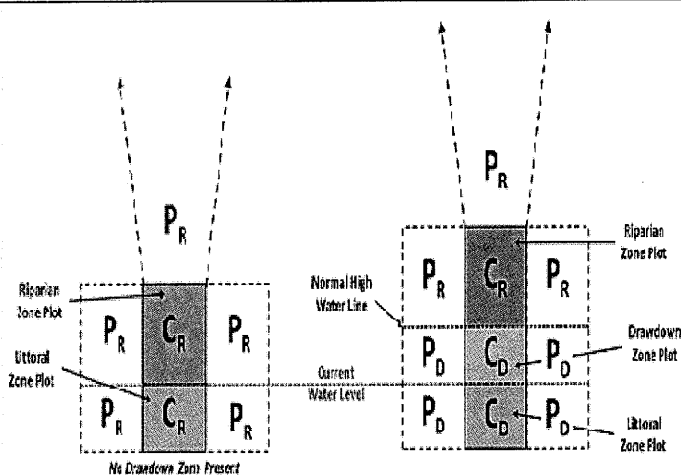
☐ 0 ☐ P ☐ C

Lawn ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Other (Flag & explain in comments) ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C



Flag Comments

Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_ TORCH

Date: 07/05/2017

Reviewed by (initial): mm

STATION: ☐ A ☐ B ☐ C ☐ D ☒ E ☐ F ☐ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐

IS IT AN ISLAND? Yes ☐ No ☒

DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT STATION (10 m offshore) 0.8 (m)

NAD 83 (Decimal Degrees)

LAT: 44.92886

LONG: 85.32259

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m)

Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ☐ No ☒

Height: _____ (m)

Dist: _____ (m)

☐ Flat (<5°) ☐ Gradual (5-30°) ☒ Steep (30-75°)

☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____

Flag: _____

Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____

Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

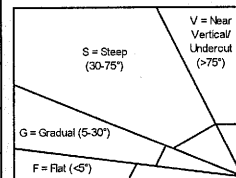
Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Boulders (250-4000mm; basketball-car)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Cobble (64-250mm; tennis ball-basketball)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Gravel (2-64mm; ladybug to tennis ball size)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Sand (0.06 - 2mm; gritty between fingers)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Silt, Clay, or Muck (<0.06mm; not gritty)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Woody Debris	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Organic (Leaf Pack, Detritus)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Vegetation or Other	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	



BANK ANGLE CLASSES

AQUATIC MACROPHYTES

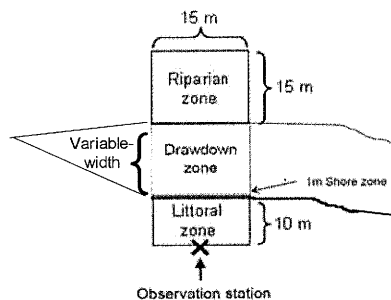
Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent	<input checked="" type="radio"/> 1 2 3 4	
Emergent	<input checked="" type="radio"/> 1 2 3 4	
Floating	<input checked="" type="radio"/> 1 2 3 4	
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/> 1 2 3 4	



FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Inundated Live Trees >0.3 m dia	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Overhanging Veg. within 1 m of Surface	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Ledges or Sharp Dropoffs	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Boulders	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	
Human Structures - Docks, Landings, etc	<input checked="" type="radio"/> 1 2 3 4		<input checked="" type="radio"/> 1 2 3 4	

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_TORCH

Date: 07 / 05 / 2017

Reviewed by (initial): MM

STATION: ☐ A ☐ B ☐ C ☐ D ☒ E ☐ F ☐ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

Big Trees (Trunk >0.3 m dBH)

☒ 1 2 3 4

Small Trees (Trunk <0.3 m dBH)

☒ 1 2 3 4

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

☐ 1 2 3 4

☐ 1 2 3 4

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

Woody Shrubs & Saplings

☒ 1 2 3 4

Tall Herbs, Grasses, & Forbs

☐ 1 2 3 4

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed

FLAG

☐ 1 2 3 4

☐ 1 2 3 4

Ground Cover (<0.5m)

Riparian Zone

FLAG

Woody Shrubs & Saplings

☒ 1 2 3 4

Herbs, Grasses and Forbs

☐ 1 2 3 4

Standing Water or Inundated Vegetation

☒ 1 2 3 4

Barren, Bare Dirt, Litter Duff or Buildings

☐ 1 2 3 4

Drawdown Zone (if present)

FLAG

☐ 1 2 3 4

☐ 1 2 3 4

☐ 1 2 3 4

☐ 1 2 3 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Buildings

☐ ☒ ☐

Commercial

☒ ☐ ☐

Park Facilities/Man-made beach

☒ ☐ ☐

Docks/Boats

☐ ☒ ☐

Walls, dikes or revetments

☒ ☐ ☐

Trash/Landfill

☒ ☐ ☐

Roads or Railroad

☒ ☐ ☐

Power lines

☐ ☒ ☐

Row Crops

☒ ☐ ☐

Pasture/Range/Hay Field

☒ ☐ ☐

Orchard

☒ ☐ ☐

Lawn

☐ ☐ ☒

Other (Flag & explain in comments)

☒ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

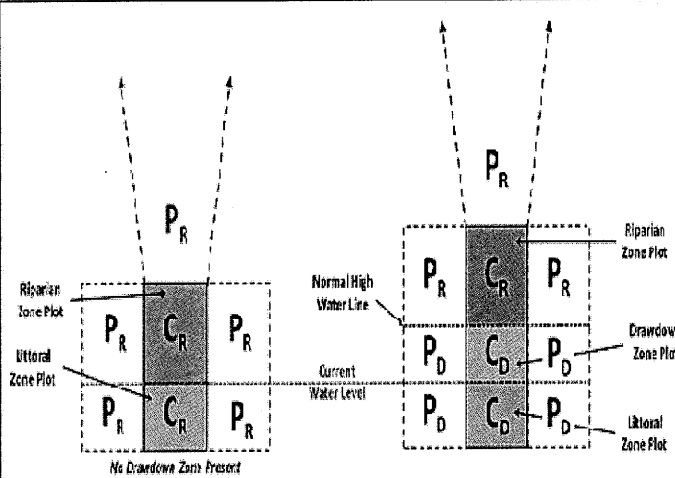
☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐

☐ ☐ ☐



Flag Comments

Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement., F1,F2, etc. = misc. flags assigned by each field crew.
Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_TORCH1

Date: 07/05/2017

Reviewed by (initial): MM

STATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☒ F ☐ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐

IS IT AN ISLAND? Yes ☐ No ☒

DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT STATION (10 m offshore) 0.9 (m)

NAD 83 (Decimal Degrees)

LAT: 44.98516

LONG: 85.31965

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m)

Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ☐ No ☒

Height: _____ (m)

Dist: _____ (m)

☐ Flat (<5°) ☐ Gradual (5-30°) ☒ Steep (30-75°)

☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____

Flag: _____

Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____

Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

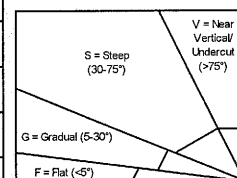
Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Boulders (250-4000mm; basketball-car)	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Cobble (64-250mm; tennis ball-basketball)	<input type="radio"/> 0	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Gravel (2-64mm; ladybug to tennis ball size)	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
Sand (0.06 - 2mm; gritty between fingers)	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3
Silt, Clay, or Muck (<0.06mm; not gritty)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Woody Debris	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
Organic (Leaf Pack, Detritus)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Vegetation or Other	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3



BANK ANGLE CLASSES

AQUATIC MACROPHYTES

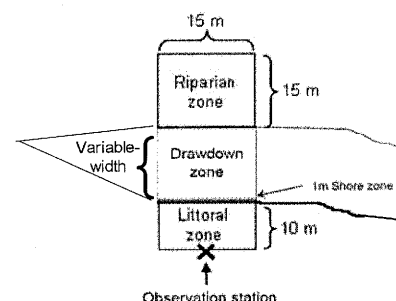
Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Emergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Floating	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	



FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Inundated Live Trees >0.3 m dia	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Overhanging Veg. within 1 m of Surface	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Ledges or Sharp Dropoffs	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Boulders	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Human Structures - Docks, Landings, etc	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_ TORCHDate: 07/05/2017Reviewed by (initial): mmSTATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☒ F ☐ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m dBH)

Small Trees (Trunk <0.3 m dBH)

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☒ Coniferous ☐ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings

Tall Herbs, Grasses, & Forbs

Ground Cover (<0.5m)

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Woody Shrubs & Saplings

Herbs, Grasses and Forbs

Standing Water or Inundated Vegetation

Barren, Bare Dirt, Litter Duff or Buildings

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Buildings

Commercial

Park Facilities/Man-made beach

Docks/Boats

Walls, dikes or revetments

Trash/Landfill

Roads or Railroad

Power lines

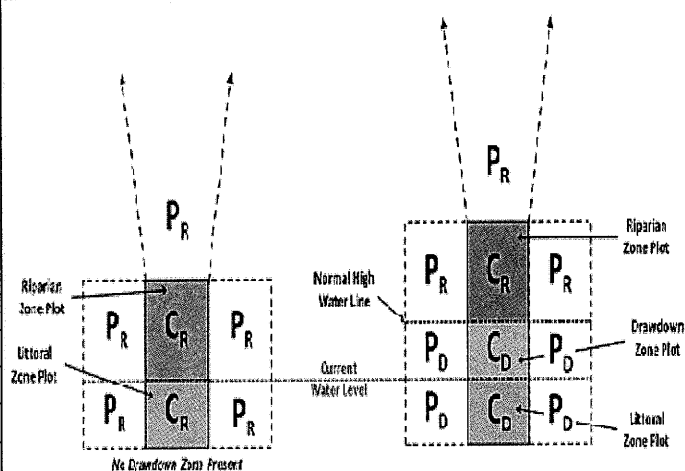
Row Crops

Pasture/Range/Hay Field

Orchard

Lawn

Other (Flag & explain in comments)



Flag Comments

1 Juniper

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_TORCHDate: 07/05/2017Reviewed by (initial): hmSTATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☒ G ☐ H ☐ I ☐ J STATION RELOCATED: ☐IS IT AN ISLAND? Yes ☐ No ☒DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT
STATION
(10 m offshore) 1.1 (m)NAD 83
(Decimal
Degrees)LAT: 45.03784 LONG: 85.33322

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m) Horizontal Dist.: _____ (m)

Drawdown:

Yes ☐ No ☒

Height: _____ (m) Dist: _____ (m)

Bank Angle (see diagram below):

☐ Flat (<5°) ☐ Gradual (5-30°) ☒ Steep (30-75°)
☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____ Flag: _____
Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____
Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)

☒ 1 2 3 4

Boulders (250-4000mm; basketball-car)

☐ 0 ☒ 1 2 3 4

Cobble (64-250mm; tennis ball-basketball)

☐ 0 ☒ 1 2 3 4

Gravel (2-64mm; ladybug to tennis ball size)

☐ 0 ☒ 1 2 3 4

Sand (0.06 - 2mm; gritty between fingers)

☐ 0 ☒ 1 2 3 4

Silt, Clay, or Muck (<0.06mm; not gritty)

☒ 1 2 3 4

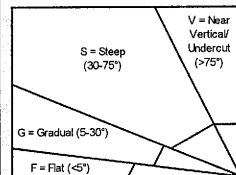
Woody Debris

☒ 1 2 3 4

Organic (Leaf Pack, Detritus)

☒ 1 2 3 4

Vegetation or Other

☒ 1 2 3 4BANK ANGLE
CLASSES

AQUATIC MACROPHYTES

Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent

☒ 1 2 3 4

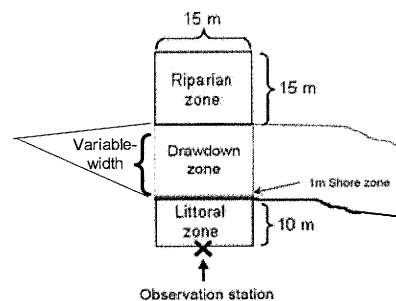
Emergent

☒ 1 2 3 4

Floating

☒ 1 2 3 4

Total Aquatic Macrophyte Cover

☒ 1 2 3 4

FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.

☒ 1 2 3 4

Woody Debris/Snags > 0.3 m Dia.

☒ 1 2 3 4Woody Brush/Woody Debris <0.3 m dia.
(alive or dead)☒ 1 2 3 4

Inundated Live Trees >0.3 m dia

☒ 1 2 3 4

Overhanging Veg. within 1 m of Surface

☒ 1 2 3 4

Ledges or Sharp Dropoffs

☒ 1 2 3 4

Boulders

☐ 0 ☒ 1 2 3 4

Human Structures - Docks, Landings, etc

☐ 0 ☒ 1 2 3 4

Flag codes: K = No measurement made, U = Suspect measurement., F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_ TORCH

Date: 07 / 05 / 2017

Reviewed by (Initial): mm

STATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☒ G ☐ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☒ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed
FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed
FLAG

Big Trees (Trunk >0.3 m dBH) ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Small Trees (Trunk <0.3 m dBH) ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Understory (0.5-5m)

Riparian Zone

☒ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed
FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed
FLAG

Woody Shrubs & Saplings ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Tall Herbs, Grasses, & Forbs ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Ground Cover (<0.5m)

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Woody Shrubs & Saplings ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Herbs, Grasses and Forbs ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Standing Water or Inundated Vegetation ☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Barren, Bare Dirt, Litter Duff or Buildings ☐ 0 ☒ 1 ☐ 2 ☐ 3 ☐ 4

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Human Influence

0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Buildings ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Commercial ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Park Facilities/Man-made beach ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Docks/Boats ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Walls, dikes or revetments ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Trash/Landfill ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Roads or Railroad ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Power lines ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Row Crops ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Pasture/Range/Hay Field ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C

Orchard ☒ 0 ☐ P ☐ C

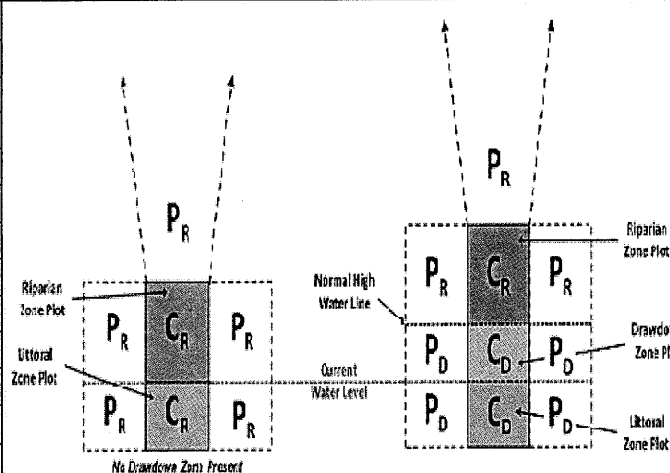
☐ 0 ☐ P ☐ C

Lawn ☐ 0 ☐ P ☒ C

☐ 0 ☐ P ☐ C

Other (Flag & explain in comments) ☒ 0 ☐ P ☐ C

☐ 0 ☐ P ☐ C



Flag

Comments

Flag

Comments

Flag codes: K = No measurement made, U = Suspect measurement., F1,F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_ TORCHDate: 07 / 05 / 2017Reviewed by (initial): mmSTATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☒ H ☐ I ☐ J STATION RELOCATED: ☐IS IT AN ISLAND? Yes ☐ No ☒DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT STATION
(10 m offshore) 0.8 (m)NAD 83
(Decimal
Degrees)LAT: 45.08958 LONG: 85.3528

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m) Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):



















Drawdown: Yes ☐ No ☒ Height: _____ (m) Dist: _____ (m) ☐ Flat (<5°) ☐ Gradual (5-30°) ☒ Steep (30-75°) ☐ Near vertical/undercut (>75°)

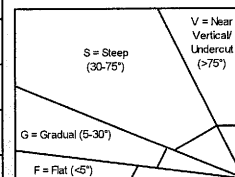
LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____ Flag: _____
Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____
Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Bottom Flag 1 Meter Shoreline Zone Flag

Bedrock (>4000mm; larger than a car)		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4				<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Boulders (250-4000mm; basketball-car)		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0	<input type="radio"/> 1		<input type="radio"/> 3	<input type="radio"/> 4	
Cobble (64-250mm; tennis ball-basketball)		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0	<input type="radio"/> 1		<input type="radio"/> 3	<input type="radio"/> 4	
Gravel (2-64mm; ladybug to tennis ball size)	<input type="radio"/> 0	<input type="radio"/> 1		<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0		<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Sand (0.06 - 2mm; gritty between fingers)	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2		<input type="radio"/> 4				<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Silt, Clay, or Muck (<0.06mm; not gritty)		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4				<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Debris		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0		<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Organic (Leaf Pack, Detritus)		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4				<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Vegetation or Other		<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4			<input type="radio"/> 0		<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	



BANK ANGLE CLASSES

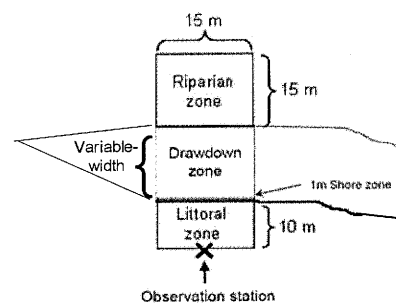
AQUATIC MACROPHYTES

Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone Flag

Submergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Emergent	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Floating	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	



FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone Flag Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Inundated Live Trees >0.3 m dia	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Overhanging Veg. within 1 m of Surface	<input type="radio"/> 0	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Ledges or Sharp Dropoffs	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Boulders	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	
Human Structures - Docks, Landings, etc	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4		<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_ TORCH

Date: 07 / 05 / 2017

Reviewed by (initial): mm

STATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☒ H ☐ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m dBH) 0 1 2 3 4

0 1 2 3 4

Small Trees (Trunk <0.3 m dBH) 0 1 2 3 4

0 1 2 3 4

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Tall Herbs, Grasses, & Forbs 0 1 2 3 4

0 1 2 3 4

Ground Cover (<0.5m)

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Herbs, Grasses and Forbs 0 1 2 3 4

0 1 2 3 4

Standing Water or Inundated Vegetation 0 1 2 3 4

0 1 2 3 4

Barren, Bare Dirt, Litter Duff or Buildings 0 1 2 3 4

0 1 2 3 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone

FLAG

Drawdown Zone (if present)

FLAG

Buildings 0 1 2 3 4

0 P C

Commercial 0 1 2 3 4

0 P C

Park Facilities/Man-made beach 0 1 2 3 4

0 P C

Docks/Boats 0 1 2 3 4

0 P C

Walls, dikes or revetments 0 1 2 3 4

0 P C

Trash/Landfill 0 1 2 3 4

0 P C

Roads or Railroad 0 1 2 3 4

0 P C

Power lines 0 1 2 3 4

0 P C

Row Crops 0 1 2 3 4

0 P C

Pasture/Range/Hay Field 0 1 2 3 4

0 P C

Orchard 0 1 2 3 4

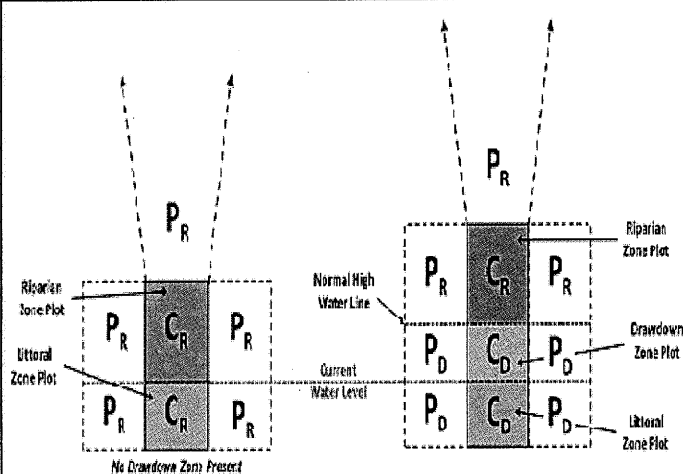
0 P C

Lawn 0 1 2 3 4

0 P C

Other (Flag & explain in comments) 0 1 2 3 4

0 P C



Flag Comments

Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement., F1,F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_Torcn

Date: 07 / 05 / 2017

Reviewed by (initial): mm

STATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☒ I ☐ J STATION RELOCATED: ☐

IS IT AN ISLAND? Yes ☐ No ☒

DROPPED: ☐

NEW STATION (K, L) _____

DEPTH AT STATION (10 m offshore) 1.2 (m)

NAD 83 (Decimal Degrees)

LAT: 45.07494 LONG: 85.32201

Shoreline Flooding:

Yes ☐ No ☒

Depth: _____ (m) Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ☐ No ☒

Height: _____ (m) Dist: _____ (m)

☐ Flat (<5°) ☐ Gradual (5-30°) ☒ Steep (30-75°) ☐ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ☐ Scum ☐ Algal Mat ☐ Oily ☐ Other _____ Flag: _____
Substrate Odor: ☒ None ☐ H₂S ☐ Anoxic ☐ Oil ☐ Chemical ☐ Other _____
Substrate Color: ☐ Black ☐ Gray ☒ Brown ☐ Red ☐ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

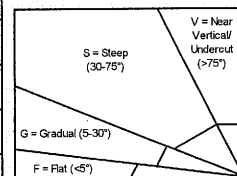
Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boulders (250-4000mm; basketball-car)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cobble (64-250mm; tennis ball-basketball)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gravel (2-64mm; ladybug to tennis ball size)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sand (0.06 - 2mm; gritty between fingers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Silt, Clay, or Muck (<0.06mm; not gritty)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Woody Debris	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organic (Leaf Pack, Detritus)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetation or Other	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



BANK ANGLE CLASSES

AQUATIC MACROPHYTES

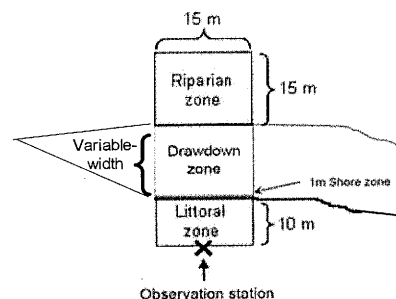
Do macrophytes extend lakeward more than 10 meters from shore?

Yes ☐ No ☒

Littoral Zone

Flag

Submergent	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emergent	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floating	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Total Aquatic Macrophyte Cover	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present) Flag

Aquatic and Inundated Herbaceous Veg.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Woody Debris/Snags > 0.3 m Dia.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Woody Brush/Woody Debris <0.3 m dia. (alive or dead)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inundated Live Trees >0.3 m dia	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overhanging Veg. within 1 m of Surface	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ledges or Sharp Dropoffs	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boulders	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Human Structures - Docks, Landings, etc	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Flag codes: K = No measurement made, U = Suspect measurement., F1,F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_ TORCH

Date: 07 / 05 / 2017

Reviewed by (Initial): MM

STATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☒ I ☐ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m dBH) 0 1 2 3 4

0 1 2 3 4

Small Trees (Trunk <0.3 m dBH) 0 1 2 3 4

0 1 2 3 4

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Tall Herbs, Grasses, & Forbs 0 1 2 3 4

0 1 2 3 4

Ground Cover (<0.5m)

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Herbs, Grasses and Forbs 0 1 2 3 4

0 1 2 3 4

Standing Water or Inundated Vegetation 0 1 2 3 4

0 1 2 3 4

Barren, Bare Dirt, Litter Duff or Buildings 0 1 2 3 4

0 1 2 3 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Buildings 0 P C

0 P C

Commercial 0 P C

0 P C

Park Facilities/Man-made beach 0 P C

0 P C

Docks/Boats 0 P C

0 P C

Walls, dikes or revetments 0 P C

0 P C

Trash/Landfill 0 P C

0 P C

Roads or Railroad 0 P C

0 P C

Power lines 0 P C

0 P C

Row Crops 0 P C

0 P C

Pasture/Range/Hay Field 0 P C

0 P C

Orchard 0 P C

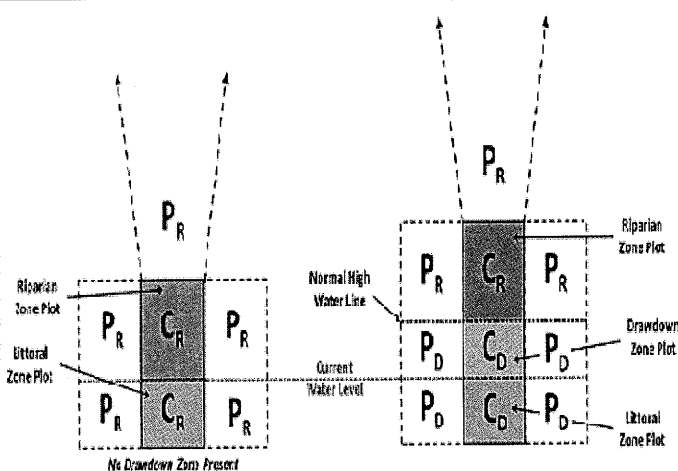
0 P C

Lawn 0 P C

0 P C

Other (Flag & explain in comments) 0 P C

0 P C



Flag Comments

Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM P-1: NLA 2017 PHAB (Front)

Site ID: NLA17_ Torchi

Date: 07 / 05 / 2017

Reviewed by (initial): mm

STATION: ○ A ○ B ○ C ○ D ○ E ○ F ○ G ○ H ○ I ○ J STATION RELOCATED: ○

IS IT AN ISLAND? Yes ○ No ☒

DROPPED: ○

NEW STATION (K, L) _____

DEPTH AT STATION
(10 m offshore) 0.9 (m)NAD 83
(Decimal
Degrees)

LAT: 45.0237.5 LONG: 85.29839

Shoreline Flooding:

Yes ○ No ☒

Depth: _____ (m) Horizontal Dist.: _____ (m)

Bank Angle (see diagram below):

Drawdown:

Yes ○ No ☒

Height: _____ (m) Dist: _____ (m)

○ Flat (<5°) ☒ Gradual (5-30°) ○ Steep (30-75°)

○ Near vertical/undercut (>75°)

LITTORAL ZONE

Surface film type: ☒ None ○ Scum ○ Algal Mat ○ Oily ○ Other _____

Flag: _____

Substrate Odor: ☒ None ○ H₂S ○ Anoxic ○ Oil ○ Chemical ○ Other _____Substrate Color: ○ Black ○ Gray ☒ Brown ○ Red ○ Other _____

SUBSTRATE 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Bottom

Flag

1 Meter Shoreline Zone

Flag

Bedrock (>4000mm; larger than a car)

☒ 1 2 3 4

Boulders (250-4000mm; basketball-car)

☒ 1 2 3 4

Cobble (64-250mm; tennis ball-basketball)

☒ 1 2 3 4

Gravel (2-64mm; ladybug to tennis ball size)

☒ 1 2 3 4

Sand (0.06 - 2mm; gritty between fingers)

☒ 1 2 3 4

Silt, Clay, or Muck (<0.06mm; not gritty)

☒ 1 2 3 4

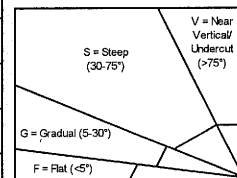
Woody Debris

☒ 1 2 3 4

Organic (Leaf Pack, Detritus)

☒ 1 2 3 4

Vegetation or Other

☒ 1 2 3 4

BANK ANGLE CLASSES

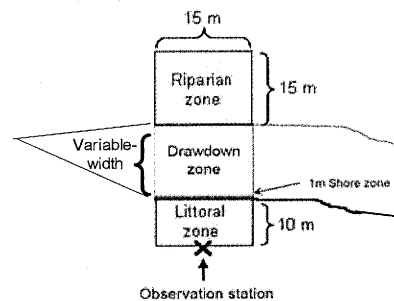
AQUATIC MACROPHYTES

Do macrophytes extend lakeward more than 10 meters from shore?

Yes ○ No ☒

Littoral Zone

Flag

Submergent ☒ 1 2 3 4Emergent ☒ 1 2 3 4Floating ☒ 1 2 3 4Total Aquatic Macrophyte Cover ☒ 1 2 3 4

FISH COVER 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Littoral Zone

Flag

Drawdown Zone (if present)

Flag

Aquatic and Inundated Herbaceous Veg. ☒ 1 2 3 4Woody Debris/Snags > 0.3 m Dia. ☒ 1 2 3 4Woody Brush/Woody Debris <0.3 m dia. (alive or dead) ☒ 1 2 3 4Inundated Live Trees >0.3 m dia ☒ 1 2 3 4Overhanging Veg. within 1 m of Surface ☒ 1 2 3 4Ledges or Sharp Dropoffs ☒ 1 2 3 4Boulders ☒ 1 2 3 4Human Structures - Docks, Landings, etc ☒ 1 2 3 4

Flag codes: K = No measurement made, U = Suspect measurement., F1, F2, etc. = misc. flags assigned by each field crew.

Explain all flags in comment section on back page.

0159613454

FORM P-1: NLA 2017 PHAB (Back)

Site ID: NLA17_TORCH

Date: 07 / 05 / 2017

Reviewed by (Initial): mm

STATION: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☒ J

NEW STATION (K, L) _____

Canopy (>5m) 0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Big Trees (Trunk >0.3 m dBH) 0 1 2 3 4

0 1 2 3 4

Small Trees (Trunk <0.3 m dBH) 0 1 2 3 4

0 1 2 3 4

Understory (0.5-5m)

Riparian Zone

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☒ Mixed FLAG

Drawdone Zone (if present)

☐ Deciduous ☐ Broadleaf Evergreen ☐ Coniferous ☐ Mixed FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Tall Herbs, Grasses, & Forbs 0 1 2 3 4

0 1 2 3 4

Ground Cover (<0.5m)

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Woody Shrubs & Saplings 0 1 2 3 4

0 1 2 3 4

Herbs, Grasses and Forbs 0 1 2 3 4

0 1 2 3 4

Standing Water or Inundated Vegetation 0 1 2 3 4

0 1 2 3 4

Barren, Bare Dirt, Litter Duff or Buildings 0 1 2 3 4

0 1 2 3 4

Human Influence 0 = Not Present P = Present outside plot C = Present within plot

Riparian Zone FLAG

Drawdown Zone (if present) FLAG

Buildings 0 P C

0 P C

Commercial 0 P C

0 P C

Park Facilities/Man-made beach 0 P C

0 P C

Docks/Boats 0 P C

0 P C

Walls, dikes or revetments 0 P C

0 P C

Trash/Landfill 0 P C

0 P C

Roads or Railroad 0 P C

0 P C

Power lines 0 P C

0 P C

Row Crops 0 P C

0 P C

Pasture/Range/Hay Field 0 P C

0 P C

Orchard 0 P C

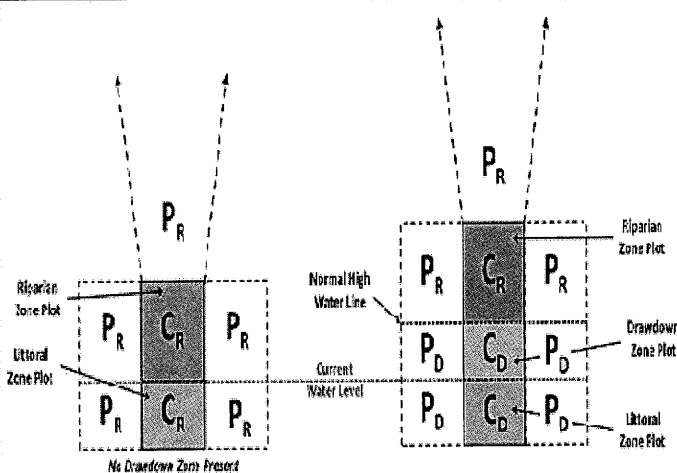
0 P C

Lawn 0 P C

0 P C

Other (Flag & explain in comments) 0 P C

0 P C



Flag Comments Flag Comments

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = misc. flags assigned by each field crew. Explain all flags in comment section.

FORM A-1: NLA 2017 ASSESSMENT (Front)

Reviewed by (initials) mmSite ID: NLA17_tolecDate: 07 / 05 / 2017

LAKE/CATCHMENT SITE ACTIVITIES AND DISTURBANCES OBSERVED

(Intensity: Blank=Not observed, L=Low, M=Moderate, H=Heavy)

BLANK FIELD INDICATES ABSENCE: ☐

Residential	Recreational	Agricultural	Industrial	Lake Management
<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> Residences <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> Maintained Lawns <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> Construction <input type="radio"/> <input type="radio"/> <input type="radio"/> Pipes, Drains <input type="radio"/> <input type="radio"/> <input type="radio"/> Dumping <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> Roads <input type="radio"/> <input type="radio"/> <input type="radio"/> Bridges/Causeway <input type="radio"/> <input type="radio"/> <input type="radio"/> Sewage Treatment	<input type="radio"/> <input type="radio"/> <input type="radio"/> Hiking Trails <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> Parks, Campgrounds <input type="radio"/> <input type="radio"/> <input type="radio"/> Primitive Parks, Camping <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> Resorts <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> Marinas <input type="radio"/> <input type="radio"/> <input type="radio"/> Trash/Litter <input type="radio"/> <input type="radio"/> <input type="radio"/> Surface Films, Scums, or Slicks	<input type="radio"/> <input type="radio"/> <input type="radio"/> Cropland <input type="radio"/> <input type="radio"/> <input type="radio"/> Pasture <input type="radio"/> <input type="radio"/> <input type="radio"/> Livestock Use <input type="radio"/> <input type="radio"/> <input type="radio"/> Orchards <input type="radio"/> <input type="radio"/> <input type="radio"/> Poultry <input type="radio"/> <input type="radio"/> <input type="radio"/> Feedlot <input type="radio"/> <input type="radio"/> <input type="radio"/> Water Withdrawal	<input type="radio"/> <input type="radio"/> <input type="radio"/> Industrial Plants <input type="radio"/> <input type="radio"/> <input type="radio"/> Mines/Quarries <input type="radio"/> <input type="radio"/> <input type="radio"/> Oil/Gas Wells <input type="radio"/> <input type="radio"/> <input type="radio"/> Power Plants <input type="radio"/> <input type="radio"/> <input type="radio"/> Logging <input type="radio"/> <input type="radio"/> <input type="radio"/> Evidence of Fire <input type="radio"/> <input type="radio"/> <input type="radio"/> Odors <input type="radio"/> <input type="radio"/> <input type="radio"/> Commercial	<input type="radio"/> <input type="radio"/> <input type="radio"/> Liming <input type="radio"/> <input type="radio"/> <input type="radio"/> Chemical Treatment <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> Angling Pressure <input type="radio"/> <input type="radio"/> <input type="radio"/> Drinking Water Treatment <input type="radio"/> <input type="radio"/> <input type="radio"/> Macrophyte Control <input type="radio"/> <input type="radio"/> <input type="radio"/> Water Level Fluctuations <input type="radio"/> <input type="radio"/> <input type="radio"/> Fish Stocking

GENERAL LAKE INFORMATION

Hydrologic Lake Type: ☐ Reservoir ☒ Drainage (outlets present) ☐ Seepage (no outlets observed)Outlet Dams: ☐ None ☐ Artificial ☐ NaturalLow Elevation Flight Hazards: ☐ Yes ☐ NoMotor Boat Density: ☒ High ☐ LowMotor Boat Restrictions: ☒ None ☐ Restricted ☐ BannedSwimmability: ☒ Good ☐ Fair ☐ Not SwimmableLake Level Changes: ☐ Zero ☐ Elevation Change = _____ m

SHORELINE CHARACTERISTICS (% of shoreline)

Forest ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☒ Moderate (26 to 75%) ☐ Extensive (>75%)Grass ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☒ Moderate (26 to 75%) ☐ Extensive (>75%)Shrub ☐ Rare (<5%) ☒ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☐ Extensive (>75%)Wetland ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☐ Extensive (>75%)Bare Ground ☒ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☐ Extensive (>75%)Agriculture ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☐ Extensive (>75%)Shoreline Mods (docks, riprap) ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☒ Extensive (>75%)Development (Residential & Urban) ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☒ Extensive (>75%)

QUALITATIVE MACROPHYTE SURVEY

Emergent/Floating Coverage (% Lake Area) ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☐ Extensive (>75%)Submergent Coverage (% Lake Area) ☐ Rare (<5%) ☐ Sparse (5 to 25%) ☐ Moderate (26 to 75%) ☐ Extensive (>75%)Macrophyte Density ☒ Absent ☐ Sparse ☐ Moderate ☐ High

WATERBODY CHARACTER

Pristine ☐ 5 ☐ 4 ☒ 3 ☐ 2 ☐ 1 Highly DisturbedAppealing ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Unappealing

FORM A-1: NLA 2017 ASSESSMENT (Back)

Reviewed by (initial): mmSite ID: NLA17_ TORCHDate: 07 / 05 / 2017

QUALITATIVE ASSESSMENT OF ENVIRONMENTAL VALUES

Ecological Integrity: ☐ Excellent ☒ Good ☐ Fair ☐ Poor

General Assessment:

Large deep, oligotrophic lake with heavy recreational use, mostly motorized. Shoreline mostly residences.

Wildlife Observed:

Zebra mussels

Trophic State: ☒ Oligotrophic ☐ Mesotrophic ☐ Eutrophic ☐ Hypereutrophic

Visual Assessment:

Highly modified shoreline, rip rap docks, etc. No macrophytes

Algal Abundance & Type:

Significant periphyton mats covering much of sand & cobble. Cyanobacteria

Nutrient Sources:

Runoff through fertilized lawns, possible septic.

Other:

Recreational Value: ☒ Excellent ☐ Good ☐ Fair ☐ Poor

Conditions and Local Contacts:

Observations (e.g. accessibility, boating, fishing, swimming, health concerns):

Easily accessible. Boating and swimming

COMMENTS

APPENDIX B

LABORATORY CHEMISTRY DATA (WATER AND SEDIMENT)



Project Number: 2410-00

September 11, 2017

Torch Lake-NLA

Attention: Peg Comfort

Project Description: Water Quality Sampling

Dear Client,

Enclosed is a copy of your laboratory report relating to samples, as they were received. All tests were performed within the maximum holding times and have met or exceeded QC criteria. Visit our web site for a full list of tests for which we are accredited by the National Environmental Laboratory Accreditation Conference (NELAC).

Please don't hesitate to call if you have questions or require further information.

Data Qualifiers:

U = Analyte not detected

J = Estimated result below the RL but above the MDL

Sincerely,

Michelle A. Moore

Laboratory Coordinator and Research Scientist/Nutrient Chemistry



Great Lakes Environmental Center

739 Hastings St., Traverse City MI 49686 - (231) 941-2230 - FAX: (231) 941-2240

Client ID: 2410-00

Torch Lake NLA

REPORT OF ANALYSIS

Total Kjeldahl Nitrogen

<u>LabSampleID</u>	<u>SampleDescription</u>	<u>Sample Date</u>	<u>Result</u>	<u>Units</u>	<u>Rep Limit</u>	<u>MDL</u>	<u>Lab Qualifie</u>	<u>AnalysisDate</u>	<u>Comments</u>	<u>Initials</u>
TO07050002	856086	7/5/2017	0.458	mg/L	0.3	0.08		7/28/2017		BSC

LabQualifiers:

U - Analyte not detected.

J - Result between MDL and RL should be considered estimated.

Page 1 of 1

Monday, September 11, 2017

Method: EPA 351.2

Great Lakes Environmental Center

739 Hastings St., Traverse City MI 49686 - (231) 941-2230 - FAX: (231) 941-2240

Client ID: 2410-00

Torch Lake NLA

REPORT OF ANALYSIS

pH

LabSampleID	SampleDescription	Sample Date	Result	Units	Rep Limit	MDL	Lab Qualifie	AnalysisDate	Comments	Initials
TO07050001	856080	7/5/2017	8.24	SU	0.1	0.1		7/6/2017		BSC

LabQualifiers:

U - Analyte not detected.

J - Result between MDL and RL should be considered estimated.

Page 1 of 1

Monday, September 11, 2017

Method: SM 4500-H+-B

Great Lakes Environmental Center

739 Hastings St., Traverse City MI 49686 - (231) 941-2230 - FAX: (231) 941-2240

Client ID: 2410-00

Torch Lake NLA

REPORT OF ANALYSIS

Chlorophyll a

LabSampleID	SampleDescription	Sample Date	Result	Units	Rep Limit	MDL	Lab Qualifie	AnalysisDate	Comments	Initials
TO07050003	856081	7/5/2017	0.00033	mg/L	0.0007	0.0002	J	7/25/2017		BSC

LabQualifiers:

U - Analyte not detected.

J - Result between MDL and RL should be considered estimated.

Page 1 of 1

Monday, September 11, 2017

Method: SM 10200 H

Great Lakes Environmental Center

739 Hastings St., Traverse City MI 49686 - (231) 941-2230 - FAX: (231) 941-2240

Client ID: 2410-00

Torch Lake NLA

REPORT OF ANALYSIS

Total Phosphorus

LabSampleID	SampleDescription	Sample Date	Result	Units	Rep Limit	MDL	Lab Qualifie	AnalysisDate	Comments	Initials
TO07050002	856086	7/5/2017	<0.0007	mg/L	0.003	0.0007	U	7/31/2017		BSC

LabQualifiers:

U - Analyte not detected.

J - Result between MDL and RL should be considered estimated.

Page 1 of 1

Monday, September 11, 2017

Method: SM 4500-P F



Field Data Sheet - BACTERIA
Project: 2410-00 Torch Lake, Michigan

Great Lakes Environmental Center, Inc. collected and analyzed one bacteria sample from the index site on Torch Lake in Michigan. The sample was collected and analyzed for E. Coli and Total Coliforms utilizing the 2017 EPA National Lakes Assessment (NLA) protocol.

Site ID: NLA17_Torch Lake
Sample ID: 856084
GLEC BS #: 760

Date Collected: 07/05/2017
Date Received: 07/06/2017

Results

Total Coliforms			Escherichia Coli		
Large Wells	Small Wells	MPN	Large Wells	Small Wells	MPN
5	0	5.2	0	0	<1

Notes:

MPN – Most Probable Number

Minimum Reporting Limit = 1.0

Maximum Detection Limit = 2419.6

APPENDIX C

**ZOOPLANKTON DATA
MACROINVERTEBRATE DATA
PHYTOPLANKTON DATA**

Balcer Taxonomy - Macro-zooplankton Identification Sheet for National Lakes Assessment Samples

Coarse Net NLA Sample ID # 8560944 Lake Code NLA 17 Torch

Date Collected 7-52017

Split Level 1/2

Analyzed by M Balcer

Date Analyzed 26 Sept 2017

Tow depth (m) 5

Tow Volume m3 0.1571

Taxon	Sex	Count A	Count B	Count C	Total	#/Jar	Density #/m3	Biomass/ind ug	Biomass/m3 ug
<i>Daphnia mendotae</i>		0	2		2	2	12.7	0.980	12
<i>Bosmina longirostris</i>		60	50		110	110	700.3	0.988	692
<i>Diacyclops thomasi</i>	male	1	0		1	1	6.4	3.410	22
	female	1	1		2	2	12.7	4.550	58
<i>Leptodiatomus minutus</i>	male	4	8		12	12	76.4	3.484	266
	female	3	5		8	8	50.9	3.727	190
Calanoid copepodids (Diaptomus)		252	267		519	519	3304.1	1.493	4,934
Cyclopoid copepodids		61	60		121	121	770.3	1.402	1,080
<i>Epischura copepodids</i>		1	1		2	2	12.7	7.647	97
Total		383	394		777	777	4,947		7,351

General Comments

Calanoid copepodids are Diaptomus spp

Cyclopoid copepodids are mainly Mesocyclops spp, no Mesocyclops adults in sample

Balcer Taxonomy - Micro-zooplankton Identification Sheet for National Lakes Assessment Samples

Fine Net NLA Sample ID # _____ 856095 Lake Code _____ NLA17 Torch _____

Date Collected _____ 7-5-2017 _____ Split Level _____ 1 _____

Tow Depth m 5

Working volume (ml) _____ 19.28 Subsample size (ml) _____ 2.14

Tow Volume m3 0.1571

Analyzed by _____ M Balcer _____ Date Analyzed _____ 9-22-2017 _____

Taxon	Subsample A	Subsample B	Total	#/Jar	Density #/m3	Biomass/ind (ug)	Biomass/m3(ug)			
<i>Asplanchna priodonta</i>	34	22	56	252.3	1605.9	0.9318	1496.40	5.651056	12.77516	11713.38
<i>Ascomorpha ovalis</i>	6	5	11	49.6	315.5	0.0119	3.76	1.110029	0.032059	
<i>Collotheca mutabilis</i>	34	33	67	301.8	1921.4	0.0147	28.31	6.761085	0.241672	
<i>Conochilus unicornis</i>	7	14	21	94.6	602.2	0.0314	18.94	2.119146	0.161678	
<i>Kellicottia longispina</i>	5	3	8	36.0	229.4	0.0083	1.90	0.807294	0.016203	
<i>Keratella cochlearis</i>	56	59	115	518.0	3297.9	0.0014	4.69	11.60485	0.040056	
<i>Keratlla crassa</i>	9	18	27	121.6	774.3	0.0037	2.88	2.724617	0.024577	
<i>Gastropus stylifer</i>	29	26	55	247.8	1577.3	0.0153	24.19	5.550145	0.206511	
<i>Ploesoma truncatum</i>	1	3	4	18.0	114.7	0.0156	1.78	0.403647	0.01523	
<i>Ploesoma hudsoni</i>	1	2	3	13.5	86.0	0.8495	73.09	0.302735	0.623949	
<i>Polyarthra vulgaris</i>	19	12	31	139.6	889.0	0.0493	43.79	3.128263	0.373836	
<i>Polyarthra remata</i>	1	0	1	4.5	28.7	0.0264	0.76	0.100912	0.006465	
<i>Synchaeta spp</i>	7	11	18	81.1	516.2	0.0411	21.23	1.816411	0.181263	
<i>Dreissenid veliger</i>	62	66	128	576.6	3670.7	0.1593	584.90	12.9167	4.993399	
<i>Dreissenid postveliger</i>	45	57	102	459.5	2925.1	0.2962	866.35	10.293	7.396249	
Copepod nauplii	164	180	344	1549.6	9865.1	0.8657	8540.42	34.71363	72.9117	
TOTAL	480.00	511.00	991.00	4464.13	28,420		11,713			

General Comments