



Attention: Ryan Meske  
Email: ryanmeske@hotmail.com

Subject: **2021 Monitoring Report for Hagerman Lake**

September 24, 2021

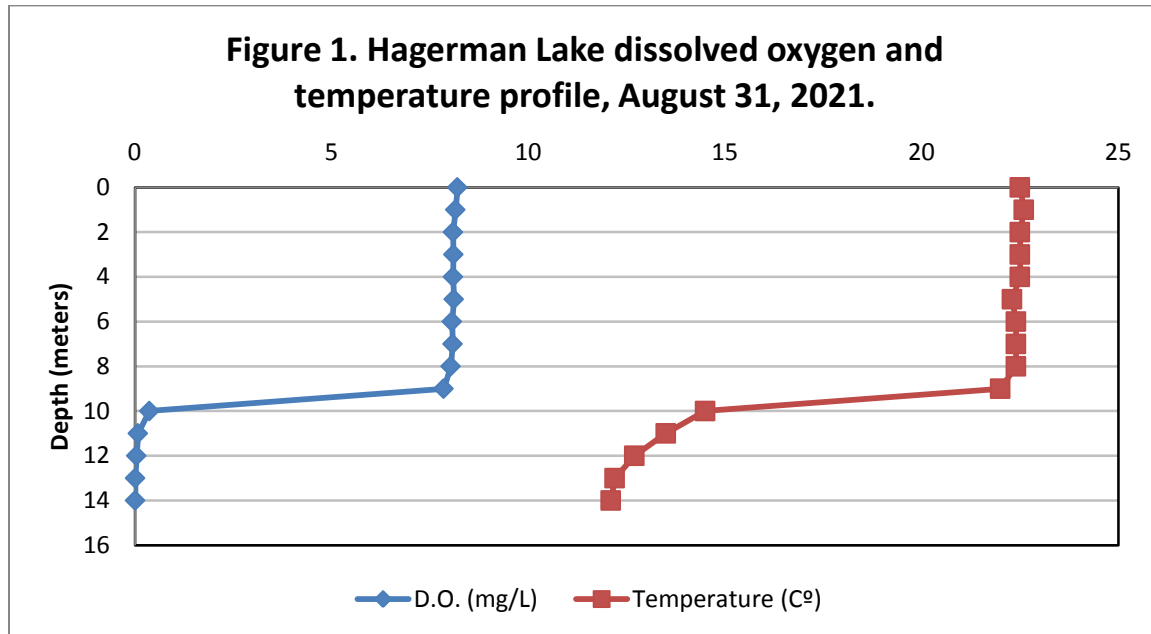
White Water Associates, Inc. has been retained by the Hagerman Lake Property Owners Association to conduct monitoring of Hagerman Lake (Iron County, Michigan). Monitoring in 2021 included a dissolved oxygen and temperature profile and Secchi transparency taken in the field. While in the field, we collected surface (epilimnion) and bottom (hypolimnion) water samples. Water samples were analyzed at White Water's laboratory for chlorophyll *a* (surface sample only), total phosphorus, nitrate-nitrite, total Kjeldahl Nitrogen, ammonia-N, pH, hardness, alkalinity, calcium, magnesium and conductivity. An *E. coli* sample was taken within the buoys at the swimming beach. Angie Stine (White Water Associates, Aquatic Biologist) conducted the work with assistance from Hagerman Lake volunteer Chad Johnson. Johnson's watercraft was used to conduct the field work that took place on August 31, 2021 starting at 1100 hours CT. This document reports our findings.

Table 1 provides the results of the water chemistry samples. The lab report is found at the end of this report. The Secchi Depth was 27 feet. This is slightly higher transparency than in 2019 and is classified as "very good."

<b>Table 1. Water chemistry results.</b>								
Analyte and Units	Epilimnion Value				Hypolimnion Value			
	2015	2017	2019	2021	2015	2017	2019	2021
Secchi depth (feet)	23	16	22	27				
Chlorophyll "a" (mg/m <sup>3</sup> )	1.6	2.1	1.6	2.1				
Total Phosphorus (µg/L)	ND	ND	ND	9	20	63	36	85
Nitrate-Nitrite (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND
Total Kjeldahl Nitrogen (mg/L)	0.44	0.31	0.32	0.25	0.35	0.52	0.43	0.55
Ammonia-N (mg/L)	0.02	0.01	ND	ND	ND	0.04	ND	0.04
pH (pH units)	8.0	8.1	8.3	7.7	7.2	6.9	6.7	6.4
Conductivity (µmhos/cm)	130	130	130	130	140	140	140	130
Calcium (mg/L)		15	14	15		17		
Magnesium (mg/L)		5.8	5.8	6.3		6.1		
Alkalinity (mg/L)	58	64	56	66	62	66	57	69
Hardness (mg/L)	66	62	60	64	67	68	64	69
<i>E. coli</i> (MPN/100 mL) at swim beach	4	4	12	35				
"ND" (non-detect) indicates a value less than the laboratory detection limit								

The values for phosphorus and chlorophyll “a” are quite low in the epilimnion sample. This combined with the high Secchi reading would suggest a classification of oligotrophic (this is consistent with past readings). The pH is near neutral to slightly alkaline. The *E. coli* value is very low and not of concern.

Figure 1 and Table 2 provides the temperature and dissolved oxygen profile data. A thermocline existed around the 9 meter depth. Dissolved oxygen below this depth was very low. This is a typical pattern of lakes at this time of year.



<b>Table 2. Temperature and Dissolved Oxygen Profile, August 31, 2021.</b>			
<b>DEPTH (M)</b>	<b>TEMPERATURE (°C)</b>	<b>DISSOLVED OXYGEN (mg/L)</b>	<b>% SATURATION</b>
Surface	22.5	8.20	99.9
1	22.6	8.15	99.5
2	22.5	8.09	98.7
3	22.5	8.10	98.8
4	22.5	8.09	98.6
5	22.3	8.11	98.4
6	22.4	8.06	98.1
7	22.4	8.08	98.4
8	22.4	8.03	97.8
9	7.85	7.85	94.7
10	0.37	0.37	3.8
11	0.08	0.08	0.8
12	0.04	0.04	0.4
13	0.01	0.01	0.1
14	0.01	0.01	0.1

We appreciate the opportunity to serve the Hagerman Lake Property Owners Association. If there are any questions about this report or special need of services, please contact us at your convenience.

**WHITE WATER ASSOCIATES, INC.**



(Signature)

September 24, 2021

(Date)

Dean B. Premo, Ph.D., President

Phone: 906-822-7889

Email: dean.premo@white-water-associates.com



429 River Lane • PO Box 27 Amasa, MI 49903 • Ph (906) 822-7889 • Fax -7977

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**Client:** Premo, Dean

**WWA Job #:** 96549

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**Project:** Hagerman Lake

**Date Received:** 9/1/2021

**Date Reported:** 9/21/2021

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Sample Number	Client Sample ID	Date/Time Sampled	Sample Matrix
96549-001	Epi	8/31/2021 12:10	Water
96549-002	Hypo	8/31/2021 11:57	Water
96549-003	E coli	8/31/2021 13:56	Water



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**Comments (if any):**

**Key to Laboratory Flags:**

\*: RPD/RSD exceeds limits.

B: The analyte was found in the associated blank as well as in the sample.

J: The quantitation is an estimated value because the result is less than the sample quantitation limit but greater than the detection limit.

M: A matrix effect was present.

Q: Batch QC data associated with the analysis does not meet the stated objectives

H: Indicates analytical holding time exceedance.

ND = Not Detected, MDL = Method Detection Limit, MQL = Method Quantitation Limit

ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid)

For coliform, Negative = No coliform bacteria detected, Positive = Coliform bacteria detected

Sample Types:

S = Solids, DW = Drinking water, D = Dissolved, T = Total, TC = TCLP extract, SP = SPLP extract

All samples were received intact and properly preserved unless otherwise noted. The results reported relate only to the samples tested. This report shall not be reproduced, except in full, without the written approval of this laboratory. The Chain of Custody is attached.

This report satisfies the requirements of your project but has not been prepared to comply with NELAP reporting requirements.

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and White Water Associates Standard Operating Procedures. Exceptions, if any, are discussed in the accompanying sample narrative. Release of this Final Report is authorized by White Water Associates management, as is verified by the following signature.

**Approved By:** Electronically signed by Bette J. Premo

Bette J. Premo

WI DNR Lab Certification Number: 999971280

MI EGLE Certification Number: 9306

DoD-ELAP Accreditation Number: 65802 by PJLA  
for Environmental Testing

ISO/IEC 17025:2005 Accredited



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### Sample Results

Sample No. / ID / Description / Matrix	Result	Flags	Units	Date/Time	Method	MDL	MQL	Analyst
<b>96549-001 / Epi / Water</b>								
<b>General Chemistry Parameters</b>								
Alkalinity (t) as CaCO <sub>3</sub>	66		mg/L	9/7/2021 16:34	310.2	9.1	30	NK
Ammonia-N	ND		mg/L	9/3/2021 15:54	4500-NH <sub>3</sub> G	0.03	0.10	NK
Chlorophyll a	2.1		mg/m <sup>3</sup>	9/10/2021 13:10	10200H	NA	NA	AC
Conductivity Lab	130		umho/cm	9/15/2021 12:20	2510B	1	1	NK
Hardness (t)	64		mg/L	9/8/2021 18:21	2340B	0.3	1.3	CL
Nitrate/Nitrite-N	ND		mg/L	9/1/2021 16:22	4500-NO <sub>3</sub> - F	0.13	0.40	NK
Nitrate-N	ND		mg/L	9/1/2021 16:22	4500-NO <sub>3</sub> - F	0.13	0.40	NK
Nitrite-N	ND		mg/L	9/1/2021 13:49	4500-NO <sub>3</sub> - F	0.01	0.04	NK
pH Lab	7.7	*	pH Units	9/1/2021 9:37	4500H+ B	0.10	0.10	JA
Total Kjeldahl Nitrogen (t)	0.25	J	mg/L	9/2/2021 11:28	351.2	0.14	0.50	NK
Total Phosphorus LL (t)	0.009	J	mg/L	9/3/2021 12:10	365.4	0.008	0.050	NK
<b>Trace Metals - Total</b>								
Calcium (t)	15		mg/L	9/8/2021 18:21	200.7	0.05	0.20	CL
Magnesium (t)	6.3		mg/L	9/8/2021 18:21	200.7	0.05	0.20	CL



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### Sample Results

Sample No. / ID / Description / Matrix	Result	Flags	Units	Date/Time	Method	MDL	ML Analyst
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#### 96549-002 / Hypo / Water

##### General Chemistry Parameters

Alkalinity (t) as CaCO <sub>3</sub>	69		mg/L	9/7/2021 16:35	310.2	9.1	30	NK
Ammonia-N	0.04	J	mg/L	9/3/2021 15:55	4500-NH <sub>3</sub> G	0.03	0.10	NK
Conductivity Lab	130		umho/cm	9/15/2021 12:22	2510B	1	1	NK
Hardness (t)	69		mg/L	9/8/2021 18:35	2340B	0.3	1.3	CL
Nitrate/Nitrite-N	ND		mg/L	9/1/2021 16:23	4500-NO <sub>3</sub> - F	0.13	0.40	NK
Nitrate-N	ND		mg/L	9/1/2021 16:23	4500-NO <sub>3</sub> - F	0.13	0.40	NK
Nitrite-N	ND		mg/L	9/1/2021 13:51	4500-NO <sub>3</sub> - F	0.01	0.04	NK
pH Lab	6.4		pH Units	9/1/2021 9:37	4500H+ B	0.10	0.10	JA
Total Kjeldahl Nitrogen (t)	0.55		mg/L	9/2/2021 11:30	351.2	0.14	0.50	NK
Total Phosphorus LL (t)	0.085		mg/L	9/3/2021 12:11	365.4	0.008	0.050	NK

#### 96549-003 / E coli / Water

##### General Chemistry Parameters

E. coli	35	H	MPN/100mL	9/1/2021 10:14	9223B	1	1	JT
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**Job # (WWA office use):**

## CHAIN-OF-CUSTODY RECORD



**WHITE WATER**  
ASSOCIATES, INC.

429 River Lane, P.O. Box 27  
Amasa, Michigan 49903

Phone: (906) 822-7889, Fax -7977  
Web: [white-water-associates.com](http://white-water-associates.com)

CLIENT NAME / BILL TO <b>Dean Tremo</b> <b>Hagerman Lake</b>					EMAIL ADDRESS														
ADDRESS					TELEPHONE														
CITY			STATE		ZIP		CONTRACT / PO / PROJECT NAME / WSSN#												
SAMPLER NAME (print first/last name) <b>Angie Stone</b>					COUNTY OF LOCATION					PAGE <b>1</b> OF <b>1</b>		Indicate if more than one page of COC records used							
SAMPLER'S SIGNATURE <b>an Stone</b>					Check off preservatives for each bottle upon arrival and indicate total number of bottles. WWA database contains bottle preservation details.														
<b>SAMPLE ID AND LOCATION</b> Containers for each sample may be combined on one line.					DATE		TIME		SAMPLE MATRIX					CONTAINERS / PRESERVATIVES					Total Number of Containers
									Drinking water	Aqueous	Sed.	Soil	Other:	None	H2SO4	HNO3	HCl	NaOH	

**ANALYSIS TYPE REQUESTED (Attach list if needed)**



**Instructions to White Water**  
Send my report by:

\_\_\_\_\_ email  
\_\_\_\_\_ mail

Unless otherwise noted, drinking water report copies are sent to MDEQ and Health Dept.

**REMARKS** (Note any special instructions provided by client or conditions of receipt noted by WWA lab staff. Also note any residual chlorine.)

[illegible]

Relinquished by: 	Date: 9-1-21	Time:	Received by:	Date:	Time:	Comments/Sample temp. on receipt:	Packing: Ice Cooler <input checked="" type="checkbox"/>
Relinquished by:	Date:	Time:	Received by: 	Date: 9/1/21	Time: 8:30	4	

UPS ☐ FedEx ☐ USPS ☐ Client ☐ Other WWA





## Login Checklist

**Project No.:** 96549      **Date logged in.:** 9/1/2021      **Login person's initials:** JT  
**Client:** Premo, Dean      **Number of coolers:** 1  
**Project name:** Hagerman Lake      **Courier/shipper:** WWA

- ☒ 1. Custody seals/original packing tape were intact (if applicable).
- ☒ 2. Samples are in good condition, i.e. not broken or leaking.
- ☒ 3. Samples were received within holding times.
- ☒ 4. Samples were received on ice (in direct contact with the samples).
- ☒ 5. Temperature of the samples was between 0-6°C. Temp.:

NOTES on #4:

NOTE: Samples not between 0-6°C that are received at the laboratory on the day of sample collections do not require client notification.

- ☒ 6. Samples matched the Chain of Custody (COC).
- ☒ 7. Proper containers were used.
- ☒ 8. Samples were collected in White Water lab containers.
- ☒ 9. There is adequate sample volume for requested analyses and QC.
- ☐ 10. For water VOC samples, headspace is less than the size of a pea.
- ☒ 11. Samples are preserved to the proper pH. Sample bottles and preservation are noted in LIMS Sample Container Section.
- ☒ 12. The COC is signed. (either Sampler or Relinquished by)
- ☐ 13. Sub-sampling (SS) is required. Bottles created are noted in sample containers section of log-in form.
- ☒ 14. For Dissolved Analysis (when applicable), samples were filtered in the lab.
- ☐ 15. For soil VOCs, methanol preserved samples were received.
- ☐ 16. For Soil VOCs, samples were preserved with methanol in the lab.
- ☐ 17. Client contact is necessary. Provide documentation below.

**COMMENTS/CORRECTIVE ACTION**

**CLIENT RESPONSE**

**Note: If hold time, volume, and received on ice or temperature criteria are not met when required by the method, results may not be able to be used for regulatory purposes. Check with your reporting agency for more information.**