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# White Lake Survey 2021 Results

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## Executive Summary

In May 2021, GVSU awarded Rylie Dorman a stipend to conduct research through the Student Summer Scholar's program. This program is designed to allow undergraduate students to facilitate their own research project over the course of 12 weeks. For this research project, a survey was conducted in the White Lake/White River watershed with the purpose of assessing perspectives on lakeshore use and restoration efforts of a formally polluted lake. White Lake was previously listed as a Great Lakes Area of Concern (AOC) and this survey aimed to get residential feedback in order to better understand if/how people's relationship with their environment recovers after severe contamination.

The survey was distributed to 1200 households from June – August 2021. In total, 319 completed surveys were returned via mail or Qualtrics (a 26.5% response rate). The majority of respondents were white, college-educated, and over the age of 64. Gender was relatively equally divided. Almost half (49.8%) of respondents had lived in the White Lake area for over 30 years.

The survey results indicate that many residents are interested in continuing stewardship and protection of White Lake. However, respondents did express some uncertainty regarding the status of water quality.

## Survey Background and Methodology

White Lake is a 2,571 acre, drowned-river mouth lake located in the western region of Michigan (Rediske et al., 2004). The White Lake area has had a long history of environmental pollution and degradation. By 1987, White Lake was named an Area of Concern (AOC) by the Environmental Protection Agency under the Great Lakes Water Quality Agreement. After years of restoration projects, totaling \$13,700,000, White Lake was finally delisted in 2014 (EPA, 2016).

1200 property owners in the White Lake/White River watershed were randomly selected from open access GIS parcel data for the cities of Whitehall and Montague, and the townships of Whitehall, Montague, and Fruitland. The parcels were restricted to include only those fully within the watershed boundary and those labeled residential-improved. The records were also cleaned to exclude LLC properties, duplicate owners, and boat slips.

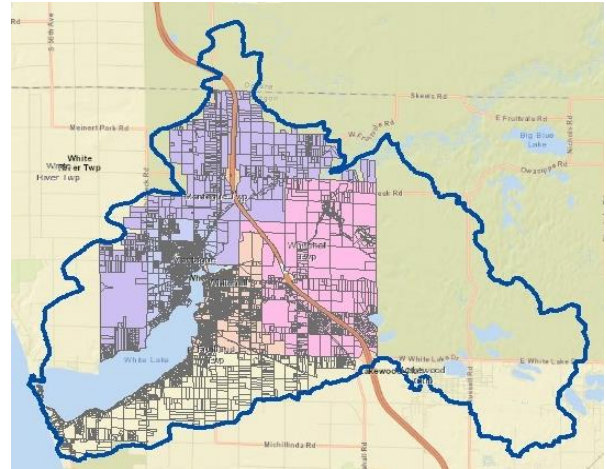
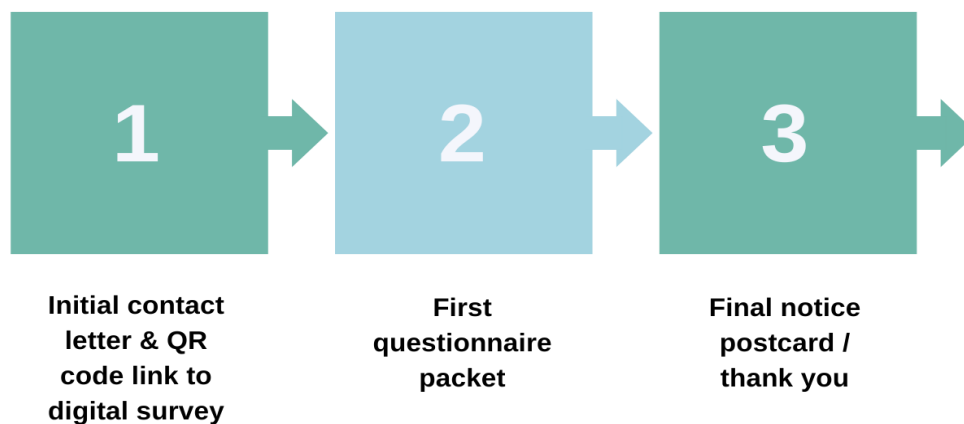


Figure 1. White Lake/White River Watershed Parcel Sample

This survey was distributed using a modified version of the Tailored Design (Dillman 2014). Three waves of mail were sent:



Returned surveys were entered into an SPSS database. The paper returned copies were stored in a locked filing cabinet, and the online survey responses were stored in a secure network file on a password protected computer.

## Survey Respondents

White Lake (W -86° 22' 29.39", N 43° 22' 22.79") coexists in a watershed with White River located in Muskegon County, Michigan. Whitehall and Montague are the neighboring cities along White Lake and consist of roughly 5,500 people total (Census, 2019). Whitehall has a reported median age of 44.4 years; Montague’s median age is slightly lower at 38.9 years. The largest ethnic group in both cities is White (Non-Hispanic) which is slightly above 85 percent in both areas (Census, 2019).

A summary describing demographic characteristics of the 319 survey respondents for the White Lake area appears in Table 1. White respondents are slightly overrepresented at 97 percent in comparison to Census estimates. Over half of respondents are over the age of 64 and 49.8% have lived in the WL area for over 30 years, making older, long-term residents overrepresented in the dataset.

**Table 1.** Population Characteristics (N=319)

	n	%/Mean
Gender		
Male	147	48.7%
Female	155	51.3%
Ethnicity		
White	295	97.4%
Non-White	8	2.6%
Education		
High school diploma or less	30	9.8%
Some or 2-year college	123	40.1%
4-year college or more	154	50.2%
Age		
18-29	7	2.3%
30-49	58	19.4%
50-64	78	26.1%
64+	156	52.2%
Location of WL Home		
City of Whitehall	78	25.3%
City of Montague	71	23.1%
Whitehall Township	59	19.2%
Montague Township	32	10.4%
Fruitland Township	68	22.1%
Years lived in WL Area		
Less than 7 years	54	17.6%
8-29 years	100	32.6%
30+ years	153	49.8%

There was a relatively equal distribution of respondents from each location within the White Lake Area. Montague Township had the fewest respondents, with only 10.4 percent of responses coming from this area of the watershed. This area is predominantly farmland, so parcels are fewer and dispersed.

## White Lake and Me

To assess residents' relationship with White Lake, survey respondents were asked questions about how they feel when they visit the lake, how frequently they visit, what they like to do at the lake, and what issues limit their ability to visit.

Respondents were asked four questions that sought to measure how attached they were to White Lake (Table 2). These items were intended to measure a natural dimension of place attachment.

Table 2. Natural Attachment to White Lake

Variables	N	Mean	SD	MIN	MAX
How true are the following statements for you?					
I feel happiest when I am at White Lake	311	2.7	0.96	1	4
White Lake is the best place to do things I enjoy	310	2.5	0.97	1	4
I worry about the quality of water in White Lake	312	2.8	1.02	1	4
I miss White Lake when I am away too long	311	2.6	1.05	1	4

Answer options ranged from "not at all true" (1) to "very true" (4). Results indicate average responses in the range of two to three which is between "slightly true" and "somewhat true". Resident's responses leaned more towards higher levels of natural attachment to White Lake.

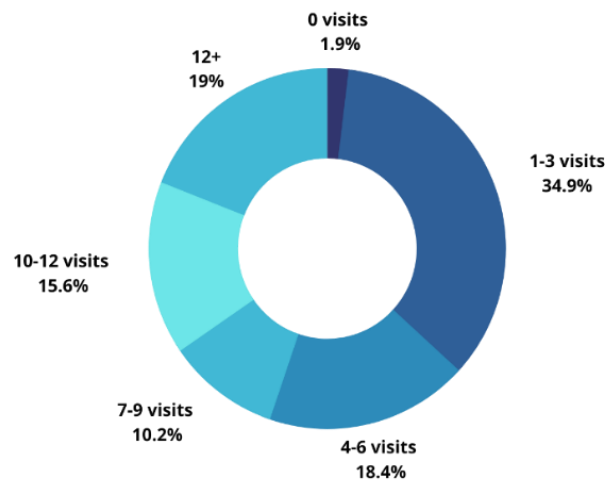
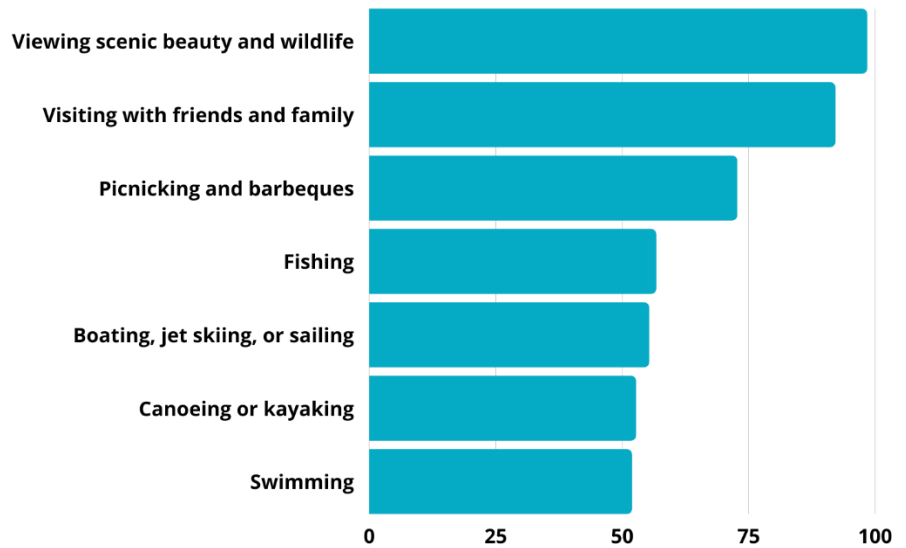


Figure 2. Frequency of Visits to White Lake

Respondents were asked how frequently they visit White Lake during a typical summer month in order to assess residents' current level of engagement with the lake. As shown in Figure 2, a very small portion of respondents reported visiting zero times per month. Overall, there was a relatively

even mix of rare, moderate, and frequent visitors to White Lake, with the largest portion of respondents (34.9%) reporting visiting 1-3 visits per month.

Respondents were also asked which water-based activities they enjoyed partaking in at White Lake while visiting. They were given the option to select “yes” or “no” for each activity. Results are reported in Figure 3. Most respondents reported enjoying viewing scenic beauty and wildlife (98.4%), visiting with friends and family (92.1%), and picnicking and barbeques (72.7%). About half of respondents said they engage



*Figure 3. Percent of Respondents Engaging in Lake Activities*

in activities that require specific equipment or skills, such as fishing (56.7%); boating, jet skiing, or sailing (55.3%), and canoeing or kayaking (52.7%). Swimming was the lowest reported activity at White Lake (51.9%).

The questionnaire included nine statements about potential issues limiting individuals’ ability to visit White Lake (see Table 3). Respondents were asked to indicate how much each factor limited their ability to visit, with answer options ranging from “not at all” (1) to “a lot” (4). Being told the lake is polluted and there not being enough public access to the lake were the highest noted barriers to visiting. It should be noted that scores on most items are in the “not at all” range.

Table 3. Barriers to Visiting White Lake

Variables	N	Mean	SD	MIN	MAX
I don’t have transportation to get to the lake	311	1.1	0.41	1	4
It is too expensive to visit the lake	306	1.1	0.43	1	4
I don’t know where I can access the lake	307	1.2	0.68	1	4
My own physical abilities	310	1.4	0.81	1	4
There is nothing I like to do at the lake	307	1.4	0.71	1	4
I don’t have the equipment that I need	305	1.5	0.85	1	4
I don’t have enough time to visit the lake	307	1.6	0.83	1	4
There is not enough public access to the lake	308	1.8	1.05	1	4
I’ve been told that the lake is polluted	308	1.9	0.98	1	4



## The White Lake Legacy

To evaluate residents' knowledge and opinions of the White Lake AOC restoration, the survey asked respondents about their knowledge of the AOC history, how they feel about the lake's removal from the AOC list, how they would grade community groups for maintaining environmental quality, and how the lake has changed since 1987.

Survey results indicate that the majority of respondents consider themselves "Informed" (52.8%) or "Very Informed" (13.4%). Only 4.7% of respondents reported they "Don't know" about White Lake's history as an Area of Concern (Figure 4).

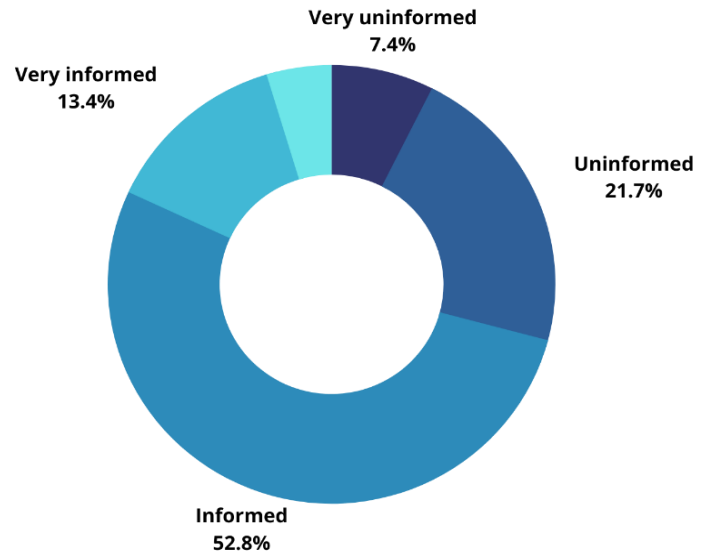


Figure 4. Informed on Area of Concern History

Respondents were asked how the removal from the AOC list made them feel (Figure 5). They were given five different options to select from and they were allowed to check all that apply. Results show that over half of respondents felt "relieved that the water quality has improved" (54.6%) and "unsure that all of the contamination is gone" (52.3%). Forty-one percent of respondents also felt "worried about the longevity of restoration efforts" and only 27.5% of respondents "feel a sense of pride". Very few respondents had no feelings towards matter (5.9%).

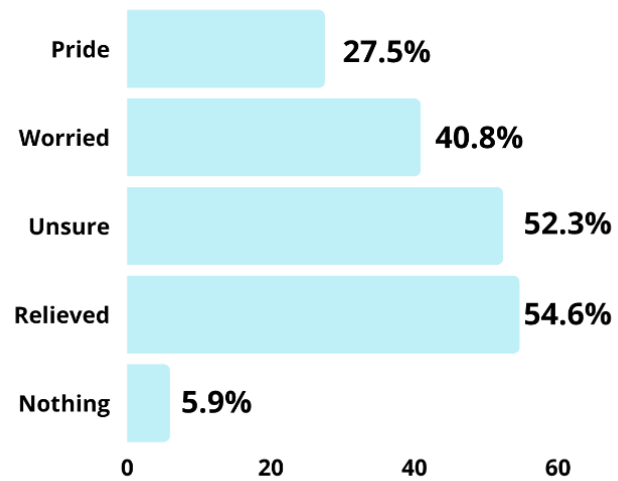


Figure 5. Feelings about removal from Area of Concern list

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Survey respondents were also asked to grade how well various community groups have done to maintain environmental quality, on a scale of "A-F". Environmental organizations received the highest grade with a score of 3.9. Local businesses (3.7), local residents (3.6), and local government (3.6), were all close behind and graded similarly. Area farms (3.4) and industry and factories (3.1) were the two community groups that received the lowest scores for maintaining environmental quality in the White Lake Area.

Table 4. Environmental Grades

Variables	N	Mean	SD	MIN	MAX
Local government	292	3.55	0.9	1	5
Local residents	280	3.59	0.78	1	5
Local businesses	272	3.67	0.86	1	5
Area farms	251	3.40	0.99	1	5
Industry and factories	279	3.10	1.05	1	5
Environmental organizations	247	3.89	0.88	1	5

Survey respondents were asked how much they think White Lake has changed since it was first listed as an AOC in 1987. They were asked to evaluate the improvement of three different measures on a scale ranging from "a lot worse" (1) to "a lot better" (5): fish and wildlife habitat, amount of pollution, and scenic beauty. Both fish and wildlife habitat (4.2) and the amount of pollution (4.4) were in between the ranges of "better" and "a lot better". Scenic beauty was ranked the lowest (3.8), with average scores between "no change" and "better." Many residents made note of the decline in scenic beauty due to overdevelopment in a section at the very end of the survey reserved for open comments.

Table 5. Open Comments about Development

Quotes

"Concerned about tannery bay destroying wetlands and overbuilding on White Lake"

"Sad to see so much housing development on the lakeshore"

"I am concerned about the Tannery Bay development on White Lake"

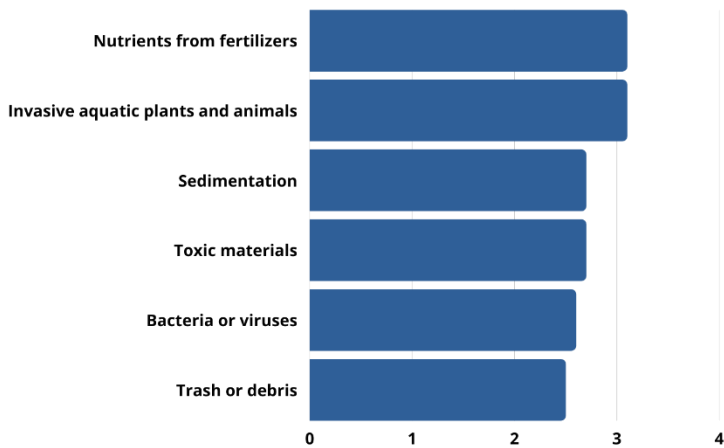
"It is very regrettable that so much development has been allowed on the lakeshore"

"As for the "beauty" of the lake itself, the view is spotted by boat parking lots + home development"

"...development on the Whitehall side of the lake which blocks the view"

"There are too many homes being built along the lakeshore + looks very over crowded"

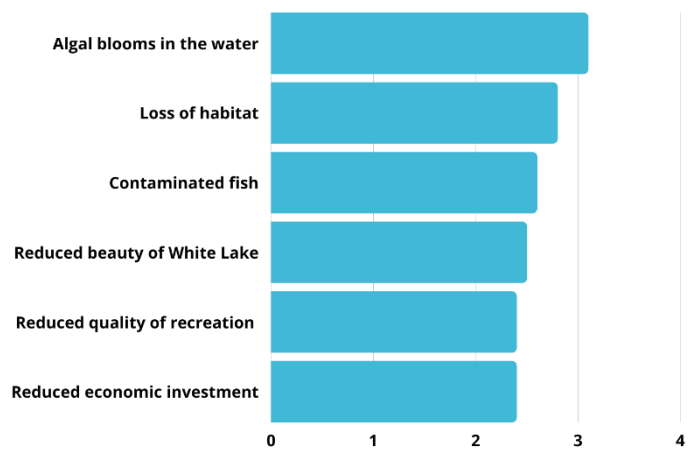




**Figure 6. Perception of Impairments in White Lake**

To gain more insight on residents’ concerns about specific pollutants or problems in White Lake, survey respondents were asked how severe they believe a variety of water quality impairments and consequences of poor water quality are in the lake (Figure 6). Answer options ranged from “not a problem” (1) to “severe problem” (4). Toxic materials (2.7), sedimentation (2.7), bacteria or viruses (2.6), and trash or debris (2.5) were all within the “slight problem” to “moderate problem” range.

Results for the consequences of water pollution (Figure 7) show that “algal blooms in the water” (3.1) is the biggest concern for survey respondents because it was rated in the “moderate problem” range. The remaining five consequences, including loss of habitat (2.8), contaminated fish (2.6), reduced beauty (2.5), reduced quality of water recreation activities (2.4) and reduced economic investment (2.4), were all rated as “slight problems” by survey respondents.



**Figure 7. Consequences of water pollution in White Lake**

## Stewardship and Protection of White Lake

Respondents were asked whether they would participate in several environmental programs and the maximum amount of money they could afford to contribute. The survey also sought to measure what efforts people think are necessary to continue stewardship and protection of White Lake.

### WOULD YOU PARTICIPATE IN EACH PROGRAM

PROGRAM	NO	YES	ALREADY DOING IT
Rain Garden	32.5%	61.4%	6.1%
Rain Barrels	32.1%	59.3%	8.6%
Solar Panels	26.5%	72.5%	1.0%
Install LED	5.2%	32.2%	62.5%
Vegetated Buffer	22.9%	59.2%	17.8%

*Figure 8. Willingness to participate in environmental programs*

The majority of respondents were willing to participate in each program with the exception of installing LED because almost 63% were already doing it. The mean contribution a household could afford was \$787.53. 194 survey respondents answered this question and a lot of people expressed concerns about wanting to know where their money would be going before giving a definitive estimate.

Respondents were also asked about five different options directed at continuing the protection of White Lake and how necessary they think each item is (Table 6). Answer options ranged from “not at all (1)” to “a lot (4)”. All of the items were in the range of “some” to “a lot” indicating that many residents thought all of the items were needed to continue the protection of White Lake.

Table 6. Future Protection of White Lake

Variables	N	Mean	SD	MIN	MAX
Environmental organizations	292	3.55	0.9	1	5
Continued monitoring and cleanup	280	3.59	0.78	1	5
Water management organization	272	3.67	0.86	1	5
Stewardship opportunities	251	3.40	0.99	1	5
Limiting development along the shoreline	279	3.10	1.05	1	5
Environmental organizations	247	3.89	0.88	1	5

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## Recommendations and Conclusions

This study assessed public opinions about the lasting impacts of the White Lake AOC restoration and whether people's relationship with a historically contaminated body of water can improve. Results show that, overall, most respondents are informed about White Lake's history, had positive assessments of the change in White Lake, and expressed the need for a variety of services designed to continue the protection of White Lake. All of these results suggest that people in the White Lake Area are still engaged with the lake.

There were, however, mixed responses regarding feelings about the lake's removal from the AOC list. There was a distinct divide between those who believe the water quality has improved, and those who still have persisting concerns. This suggests that not everyone has the same confidence in the process and the contamination has had a lasting impact on some people's perception of water quality.

There were several comments about recent developments along the lakeshore, specifically the Tannery Bay Condos. Many people expressed their concerns about this development and the impact it would have on water and soil quality, and wildlife habitat. There were many negative feelings towards this project and suggestions for improvement. This feedback indicates a potential need for future research on lakeshore development in the area.

Respondents also expressed their frustrations with the lack of accessibility and availability of recycling centers in the area. The survey instrument did not ask about recycling, but it was a noted concern by many residents, suggesting that this topic could have been explored in greater depth in the survey and in future research. Some comments included: "We need more availability to recycle in area" and "wish recycling was done at all small businesses in our town".

In order to ensure previously contaminated lakes stay restored, community engagement and stewardship is crucial. The White Lake community is resilient and continues to demonstrate care for their natural resource. Outreach efforts to groups who still have distrust in the environmental quality of White Lake is of utmost importance. Reconnecting people with White Lake through organized and advertised stewardship activities has the potential to ensure a positive future for the community and their natural resources.