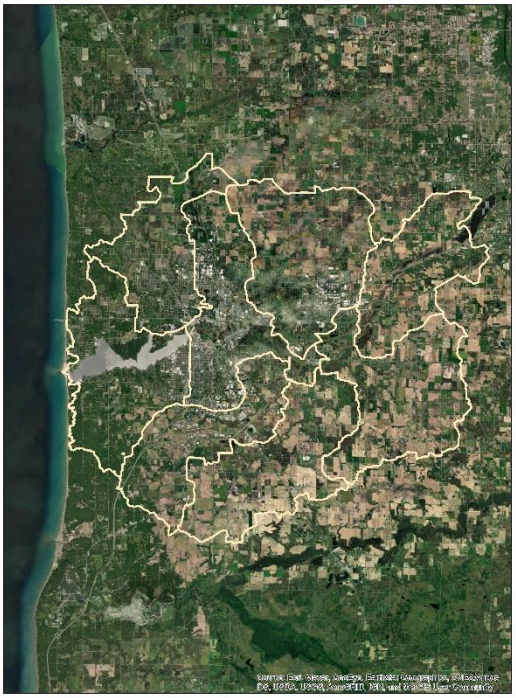

Report of Results

2021 Macatawa Watershed Residential/Agricultural Survey

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GRAND VALLEY STATE UNIVERSITY
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Table of Contents

Appendices

Executive Summary

In January 2021, the ODC Network contracted the GVSU Social Science Lab to conduct a survey of residential and agricultural property owners in the Macatawa Watershed. The purpose of the survey was to inform the development of educational and informational messaging strategies in the 2021 updates to the Macatawa Watershed Management Plan and to provide feedback to the Project Clarity partners on the extent to which the public is aware of and satisfied with the project's efforts.

The survey was distributed by mail to 1,200 households from January – March 2021. In total, 327 completed questionnaires were returned to GVSU (a 27% response rate). The majority of respondents were white, college-educated males who have lived in the watershed for a long period of time – 35 years on average.

The survey results indicate that Macatawa Watershed residents value water resources and are employing many best management practices to reduce the environmental footprint of their property in the watershed. The use of cover crops by farmers in the watershed shows a particularly high rate of adoption. However, there are opportunities for further investments. Many residential property owners are unfamiliar with nature-based solutions for managing stormwater runoff, and vegetated stream buffers are less commonly used on agricultural properties than several other important practices.

Survey respondents were generally satisfied with the quality of water in the Macatawa Watershed for many of their favorite water-based activities. Levels of concern about pollutants in the watershed remain consistent with data from previous years (i.e. the 2010 Agricultural Survey), and respondents are more confident in their ability to evaluate the severity of visible pollutants than chemical or biological impairments to water quality.

More respondents to the 2021 survey reported accessing information online than did respondents in previous surveys. Knowledge of watershed terminology was similar to previous years' data, although 2021 respondents demonstrated more awareness about stormwater and its fate. Additionally, awareness of Project Clarity is growing in the watershed, although few respondents reported attending presentations or community events. Consequently, few respondents were able to offer an informed assessment of the impacts Project Clarity is having to improve conditions in the watershed.

On average, respondents are willing to personally invest $115 per year in water quality improvements in the Macatawa Watershed. However, many respondents expressed needing more detailed information about what their donations would be spent on, how previous funds have been spent, and what outcomes were achieved with these prior projects.

This report is divided into a review of the methodology used to conduct the survey, followed by a discussion of the characteristics of the watershed and survey participants. In the report of results, descriptive statistics are reviewed with comparisons between residential and agricultural property owners noted, as well as comparisons to the results of previous surveys conducted in the watershed.

Survey Methodology

The GVSU Social Science Lab surveyed property owners in the Macatawa Watershed to evaluate residents' awareness of water quality and common pollutants, use of best management practices, and general knowledge about watershed issues. The survey was developed from a template provided by the Social Indicators Data Management and Analysis (SIDMA) system managed by Michigan State University. GVSU assisted with tailoring the SIDMA survey tool to the needs of the Project Clarity partners, including integrating questions from previous waves of surveys conducted by the MACC, and developing additional contingent valuation (willingness to pay) questions to inform and support the fundraising goals of the ODC Network.

The survey sample was drawn using the most recently available tax parcel data from Ottawa and Allegan Counties. The tax parcel data contain a comprehensive list of property owners in each county, ensuring that the random sample generated was representative of residents in the study area. The tax parcel data were cleaned by reducing the list to properties zoned residential or agricultural improved and removing duplicate property owners. Additionally, all property owners previously on the mailing list for the Pigeon River Watershed Residents Survey (Ottawa County, June 2020) were removed from the sampling frame to reduce the risk of nonresponse due to survey fatigue. After reducing the sampling frame using these criteria, the list was randomized and a sample of 1,200 property owners was drawn with the goal of obtaining a sufficient number of responses to achieve a +/- 5% margin of error at a 95% confidence interval, or approximately 400 completed questionnaires.

The survey was distributed from January – March 2021 using a five-wave mailing protocol consistent with the Tailored Design method. The first mailing consisted of an advanced notice letter notifying prospective participants that their household was selected for participation in the study. The second mailing consisted of a paper copy of the questionnaire, a cover letter containing instructions and information about participants' rights, and a postage paid envelope to return the completed questionnaire. The third mailing was a thank you / reminder post card with a brief message thanking respondents for completing the survey and a reminder for non-respondents to complete and send back their survey. The fourth mailing consisted of a replacement packet with a second paper copy of the questionnaire, a cover letter with instructions for completing the survey, and a postage paid envelope. The fifth mailing was a final notice letter announcing the conclusion of the study and requesting that the recipient complete and return their questionnaire.

Undergraduate research assistants in the Social Science Lab assisted with preparing mailing packets and entering data from returned, completed questionnaires into an SPSS electronic database. Students worked in pairs to conduct quality assurance reviews, with one student entering data and a second student reviewing all entries and correcting discrepancies between the data file and the physical copy of each survey. The faculty supervisor reviewed an additional 10% of all entered, reviewed surveys.

The Macatawa Watershed and Its Residents

The Macatawa Watershed stretches across 175 square miles of land in Ottawa and Allegan Counties, serving as the drainage basin for the Cities of Holland and Zeeland as well as Park, Port Sheldon, Laketown, Olive, Holland, Fillmore, Overisel, Blendon, and Zeeland Townships. The United States Census Bureau American Community Survey (ACS) estimates that approximately 73,000 residents live in the eight subwatersheds of the Macatawa (2013-2017 ACS estimates), with nearly half of that population concentrated in the City of Holland. On the outer fringes of the watershed the population density declines to less than 150 people per square mile, with agricultural operations dominating the landscape. Due to these diverse land uses, the ecological function of the watershed faces challenges associated with residential and commercial land development, nutrient loading from agricultural runoff, and loss of wetlands.

The demographic characteristics of residents in the Macatawa Watershed vary across subwatersheds. Racial/ethnic diversity is most apparent in the Lower Macatawa River subwatershed, where the Census Bureau estimates nearly one-quarter of residents to be Hispanic. Likewise, the Macatawa Bay and the North Branch of the Macatawa River have robust Hispanic populations, with 16% of residents estimated to be Hispanic. In five of the subwatersheds white residents comprise 91-96% of the population. In contrast, 77% of residents in the Lower Macatawa River subwatershed, which includes portions of the City of Holland, are white. Across the watershed a substantial proportion of household incomes are estimated to be above the national median ($57,652, 2013-2017 ACS estimates), with 32-56% of households in each subwatershed earning incomes at or above $75,000. Likewise, education attainment levels are at or above the national average in all but the South Branch and North Branch subwatersheds. Post-secondary degree attainment is highest in the Macatawa Bay subwatershed, where 41% of residents are estimated to hold bachelor's or graduate degrees (compared to the national average of 30.9%).

Figure 1. Map of the Macatawa Watershed

A summary describing the characteristics of the 327 survey respondents compared to ACS estimates of the watershed population appears in Table 1. Seventy-one percent of survey respondents (n=231) own residential properties in the Macatawa Watershed while 29% of respondents (n=96) own agricultural properties. In this report, property type can be thought of as a proxy indicator for urban/suburban residents who live "in-town" and rural/exurban residents who live "out-of-town" on larger land parcels. This is an important distinction because property type

can be expected to affect management priorities, and while urban dwellers may relate to land and water resources in the Macatawa Watershed primarily through recreation, rural and exurban dwellers may have working relationships with land used to cultivate food and crops, raise livestock, or grow forage. These differing ways of relating to natural resources in the watershed should be kept in mind when considering similarities and differences in responses between these two groups of residents.

Table 1. Participant Demographics

	Mean or %	Census Estimates
Property Type		
Residential	71%	--
Agricultural	29%	--
Gender		
Male	67%	49%
Female	33%	51%
Age	60	--
18-64 years old	58%	81%
65 years and older	42%	19%
Education Level		
High school or less	20%	34%
Two-year or some college	25%	35%
Four-year degree or more	55%	31%
Race		
White	93%	75%
Non-white	7%	25%
Years lived in watershed	35	--
<5 years	9%	--
5-9 years	8%	--
10-24 years	22%	--
25-39 years	24%	--
40-54 years	14%	--
55+ years	24%	--
Residency		
Absentee	5%	--
Seasonal	5%	--
Permanent	90%	--

Male respondents (67%) are overrepresented in our survey results compared to the ACS estimates of their representation in the Macatawa Watershed. This likely reflects the survey instructions, which asked that the questionnaire be completed by the member of the household most actively involved in property management decisions. Survey respondents were also older on average than the general Macatawa Watershed population, with 42% of survey respondents aged 65-years or older compared to ACS estimates finding 19% of the watershed population in this age range.

Survey respondents reported higher levels of education attainment compared to ACS estimates for watershed residents, with 55% holding a Bachelor's or graduate degree. That is higher even than the above-average education levels estimated for the Macatawa Bay subwatershed. Racial minority groups are underrepresented in the survey respondent pool, with only 7% of survey participants reporting Asian, Hispanic, American Indian, or multi-racial identities. Many survey respondents were long-term residents in the Macatawa Watershed. While the average length of residence was 35 years, it is worth noting that 62% of respondents have lived in the watershed for 25 years or more. Most respondents were full-time residents (90%).

The 96 owners of agricultural properties who responded to the survey manage, on average, 363 acres of land in the Macatawa Watershed. Farm size ranges considerably, with individuals reporting as little as no tillable acreage (i.e., greenhouse growers, blueberry farmers), and as many as 4,400 tillable acres in their operations. The majority of agricultural respondents were long-time farmers, reporting an average of 34 years in the farming business. Nearly one-quarter reported that they have been running their operation for 50 years or more.

Most operations are family farms, with 73% of respondents reporting that they make decisions with their spouse or with family partners. An additional 13% of respondents make decisions along with a tenant, 5% work with non-family business partners, and 9% of respondents reported that decisions are made entirely by a tenant or spouse, or by a combination of family and business partners or family members and tenants. The most common production activity reported was row cropping (66% of operations), followed by hay or silage production (37% of operations), and livestock production (26% of operations). Additionally, 18% of respondents had land in non-row crops or vegetables, 14% care for non-commercial livestock (such as horses, goats, or 4-H projects), 12% engage in fruit production, 10% harvest timber on their land, 7% have land enrolled in the Conservation Reserve Program, and 3% manage dairy operations.

Perceptions of Water Quality and Stewardship Attitudes

To begin, residents were asked about the importance of several water-based recreational activities, their perceptions of the quality of water in the Macatawa Watershed for those activities, and about

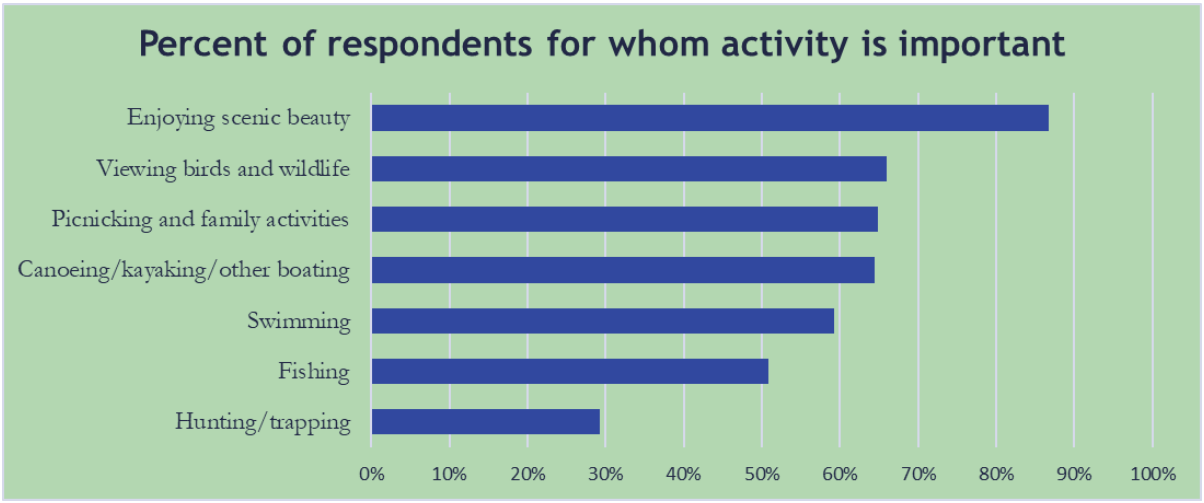

Figure 2. Chart of Important Water Activities

their perception of their personal impact on water resources. Survey respondents reported a wide-range of favorite water-based hobbies and were largely satisfied with the quality of water for most of these activities. Most respondents also highly valued local water quality and recognized the impact of their personal property management decisions on the health of the watershed.

The importance of water-based activities was a dichotomous measure, with respondents selecting important activities from a list of six items, as pictured in Figure 2. Enjoying scenic beauty was the most important water-related recreational activity for survey participants, with 87% indicating that the aesthetic value of local waterways was important to them. Viewing birds and wildlife (66%), picnicking and family activities (65%), and boating activities (65%) were also popular activities for survey respondents. Although hunting and trapping ranked lower overall compared to other activities, 57% of agricultural respondents said that hunting was an important activity, compared to only 18% of residential respondents.

Concerning respondents' perceptions of the quality of water for enjoying their favorite activities (Figure 3), the majority of respondents ranked water quality as "good" or "okay" for most activities, with the perceived quality of water for enjoying scenic beauty, picnicking, boating activities, and fish and wildlife habitat being particularly high. Respondents were not as positive in their assessments of water quality for swimming, with 19% indicating that they thought local waterways are in poor condition for this activity. Notably, a larger proportion of respondents were unsure about the safety of consuming harvested fish or game, with 27% of respondents saying they "don't know" about this aspect of water quality.

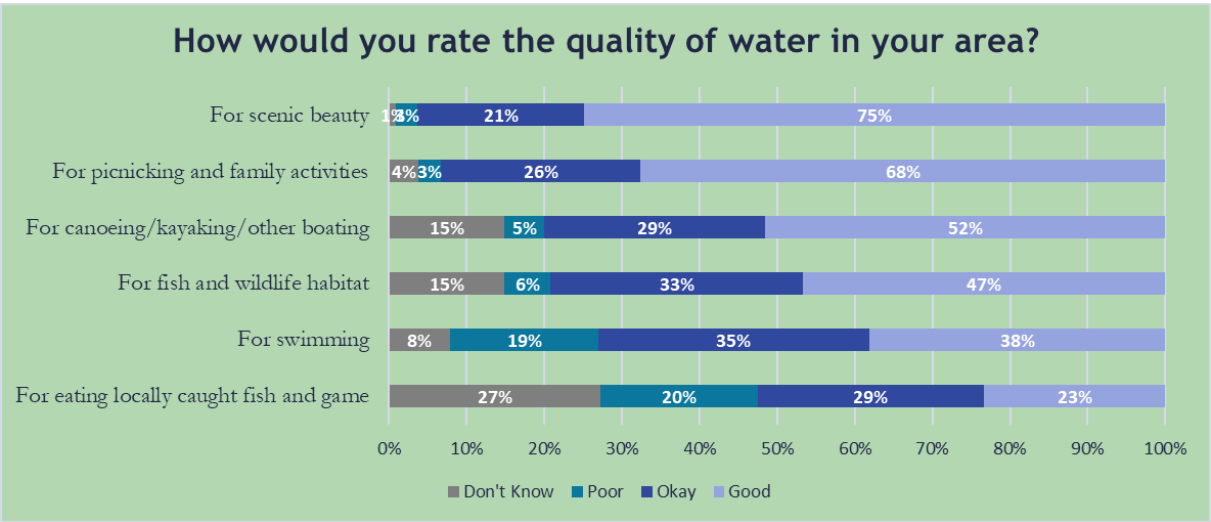

Figure 3. Graph of Perceptions of Water Quality

People's attitudes about stewardship matter when it comes to shaping their perception of the environment and what they are willing to do to improve it. Therefore, survey respondents were asked a series of questions about the importance of water quality in the watershed and their personal willingness to act in the interests of promoting water quality. Each item contained a statement with five answer options ranging from "strongly disagree" to "strongly agree." The statements and mean respondent scores (on a 5-point scale) appear in Figure 4. Six items are

phrased such that agreement indicates pro-stewardship attitudes, while for two items disagreement indicates pro-stewardship attitudes. With most mean scores in the "agree" (4) range, it is clear that Macatawa Watershed residents highly value water quality and take a personal interest in stewarding water resources. Respondents were somewhat less likely to agree that protecting water resources should take priority over economic development or that they would be willing to change their lawncare practices. It is possible that respondents expressing neutral opinions to those items see environmental and economic goals as complementary rather than competing priorities, and that they are already engaging in lawncare practices that promote water quality. Low mean scores on the statements, "Taking action to improve water quality is too expensive for me," and, "My actions have little impact on water quality," are consistent with pro-stewardship attitudes.

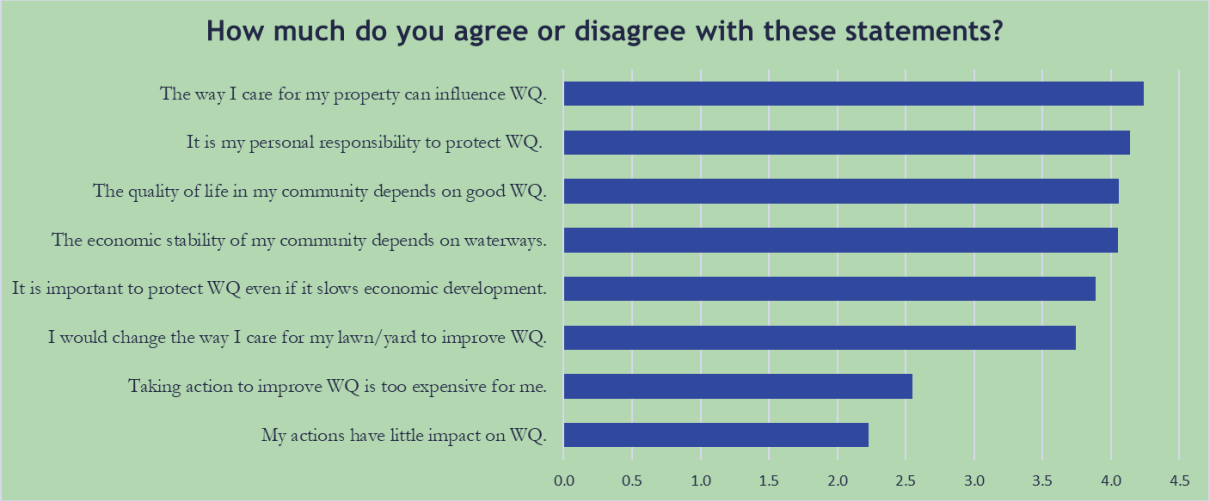

Figure 4. Graph of Attitudes about Water Quality (WQ)

Water Quality Impairments

Survey respondents were asked to evaluate the extent to which they believe various water quality impairments, sources of water pollution, and consequences of poor water quality are a problem in the Macatawa Watershed. Each measure used a four-point Likert scale with answer options ranging from "not a problem" (1) to "severe problem" (4). Higher scores therefore represent a greater level of concern about a particular pollutant, and its contributors and consequences. Additionally, respondents could report that they "don't know" how much of a problem each issue is in the watershed. Figures 5-7 compare the mean scores on these three sets of items for respondents to the 2010 agricultural survey, the 2021 agricultural survey, and the 2021 residential survey.[2] To facilitate comparison, the 2021 survey used language consistent with the 2010 survey. Full question stems for each item can be found in Appendix 4.

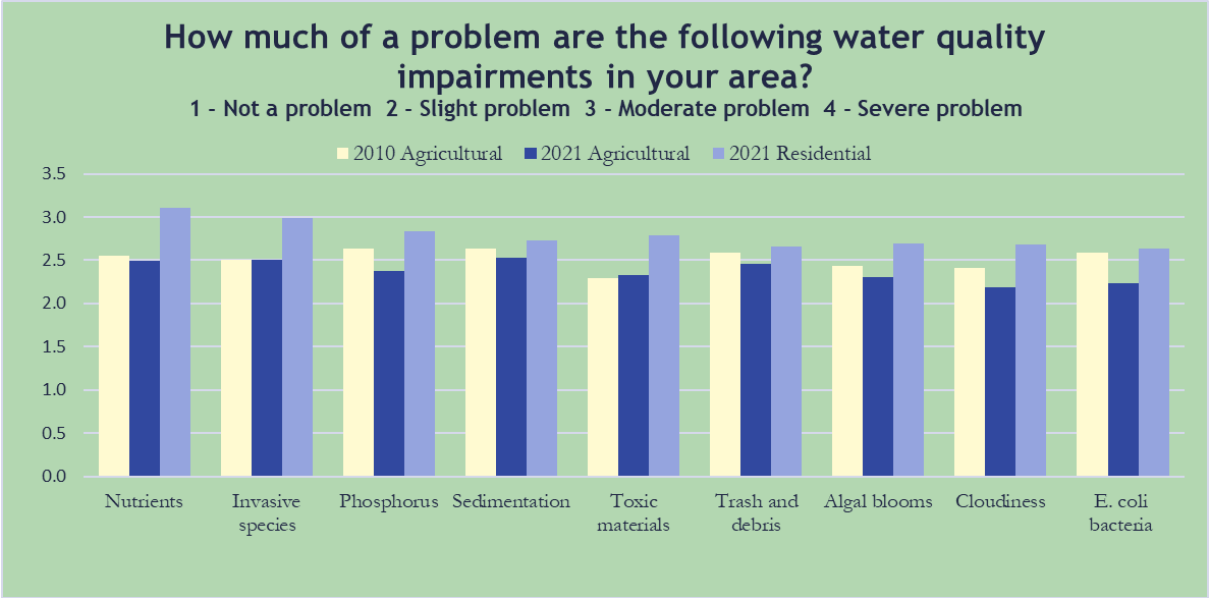

Figure 5. Chart of Perception of Pollution Types

Respondents perceived all nine water pollutants as representing a slight-to-moderate problem in the watershed (Figure 5). Compared to the 2010 study, 2021 agricultural respondents reported similar levels of concern about each pollutant, with 2021 mean scores for concern about phosphorus (2.4), the cloudiness of water (2.2), and the presence of *E. coli* bacteria (2.2) being slightly lower than in 2010. Residential respondents to the 2021 survey evaluated each impairment as more severe than agricultural respondents from either the 2010 or 2021 survey. This was particularly true for nutrients from fertilizers, invasive aquatic plants and animals, and toxic materials in the water. One exception was perceptions of problems associated with *E. coli* bacteria, for which the mean score for 2021 residential respondents was identical to 2010 agricultural respondents (2.6).

More variation was observed concerning perceived sources of water pollution in the Macatawa Watershed (Figure 6). While mean scores on all ten items again remained consistently in the slight-to-moderate problem range, both 2021 agricultural and residential respondents were more concerned about pollutants contributed by soil erosion from shorelines and/or streambanks (2.7 and 3.1, respectively) than were 2010 agricultural respondents (2.3). This increase in concern likely reflects the mediating factor of record high water levels in Lake Michigan and other inland water bodies during the year preceding this study (2020). Likewise, concern about impacts associated with land development and an increase in impervious surfaces was slightly higher in 2021 than in 2010. The U.S. Census Bureau estimates that the population of Ottawa County increased 11.7% during this decade, making Ottawa County the fastest growing county in Michigan. The survey data suggest that some respondents are concerned about the impacts of this rapid growth and development in the watershed.

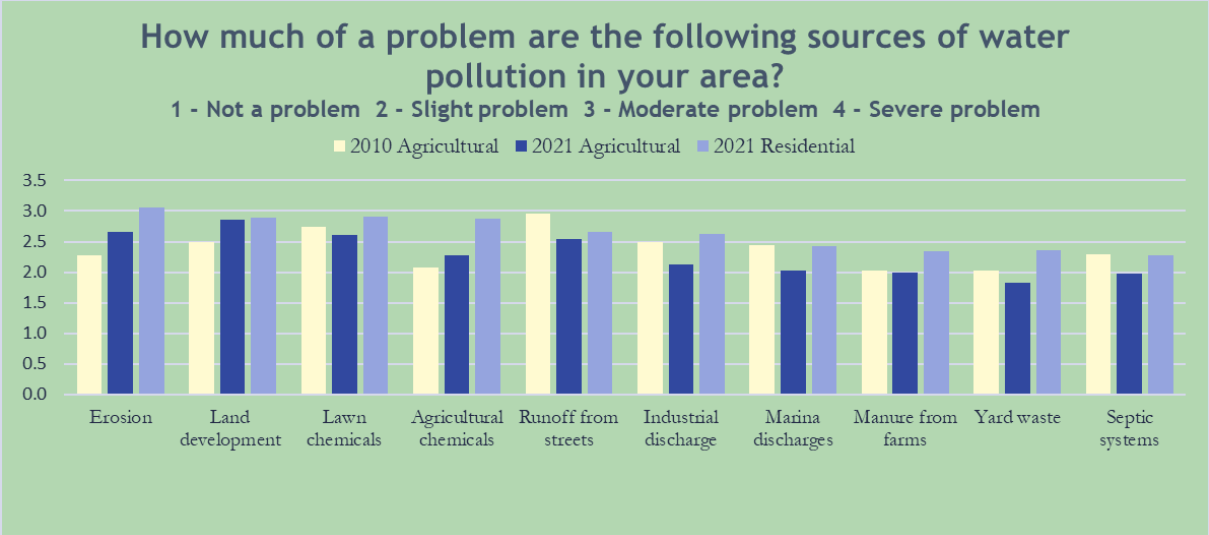

Figure 6. Chart of Perception of Pollution Sources

Respondents in 2021 were also slightly more concerned about pollution from agricultural fertilizers and/or pesticides than were respondents in 2010, with residential respondents evaluating this source of pollution as more problematic (M=2.9) than agricultural respondents (M=2.3). It is possible that educational messages communicated to residents from 2010-2021 are raising awareness about the impacts of nutrients in the watershed. Evaluations for most other sources of pollution were consistent with the pattern of responses observed for pollution types, with agricultural respondents in 2021 slightly less concerned than respondents in 2010, and residential respondents as concerned or more concerned than 2010 respondents.

Respondents evaluated most consequences of pollution as not a problem or a slight problem in the watershed (Figure 7). Respondents in 2021 were most concerned about algal blooms, habitat loss, and impacts to fish populations, with mean scores reaching into the "slight problem" range, particularly for residential respondents. Respondents were least concerned about reduced

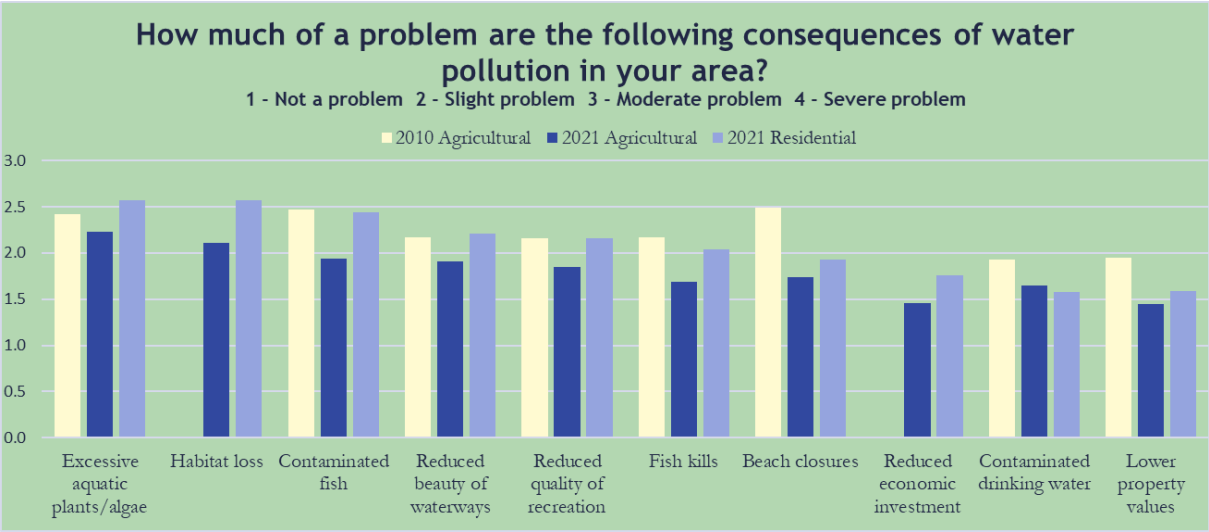

Figure 7. Chart of Perception of Pollution Consequences

economic investment, contaminated drinking water, and lower property values in the watershed, with mean scores for these items falling into the "not a problem" range. Again, we see that, for most consequences, mean scores for agricultural respondents in 2021 are equal to or lower than those of the 2010 agricultural respondents, with 2021 residential respondents reporting more concern about every pollution consequence than 2021 agricultural respondents. One exception is contaminated drinking water, which has been a topic of focus in Ottawa County due to aquifer depletion and chloride contamination that are impacting rural and exurban well water.[3]

In addition to evaluating which pollutants are of greatest concern to watershed residents, it is important to review the impairments, pollution sources, and consequences of poor water quality that respondents were unable to assess due to a lack of knowledge or experience. Figures 8-10 display the percentage of respondents who said they "don't know" how much of a problem each pollutant, source, or consequence is in the Macatawa Watershed. Responses for residential and agricultural respondents are compared. Substantial proportions of survey respondents said they "don't know" how much of a problem most water quality impairments are in the watershed. Residential respondents were less sure about most pollutants and their sources and consequences than agricultural respondents.

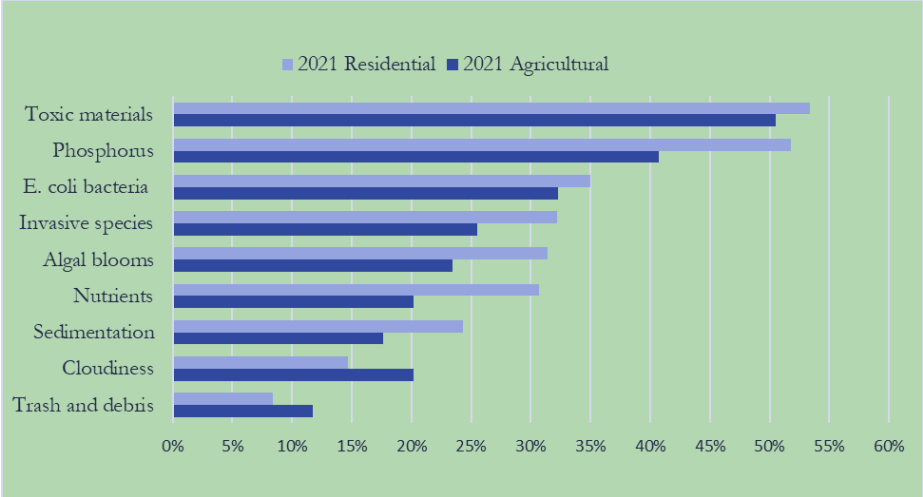

Figure 8. Graph for "Don't Know" about Pollution Types

In particular, 30-50% of all respondents did not know how much of a problem toxic materials, phosphorus, or *E. coli* are in the watershed (Figure 8), suggesting that invisible chemical impairments are

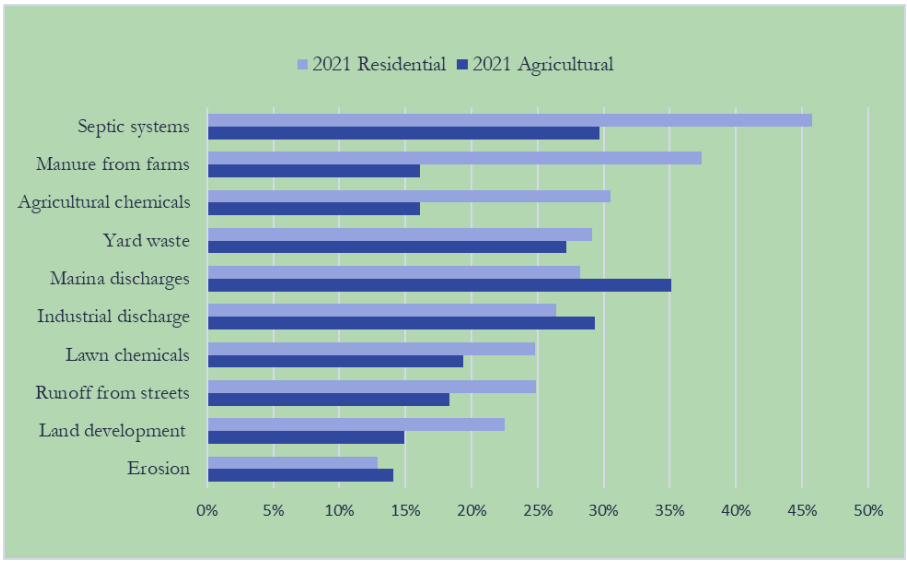

Figure 9. Chart for "Don't Know" about Pollution Sources

harder for all watershed residents to evaluate. Respondents were better able to evaluate the severity of pollutants that have a visible presence in the watershed, such as trash and debris, the cloudiness of the water, and sedimentation. Residential respondents were also unsure about the severity of the sources of pollutants associated with the chemical impairments they were most uninformed about (Figure 9), with one-third or more saying they did not know about pollution contributed by poorly maintained septic systems, manure, or agricultural fertilizers and pesticides. Agricultural respondents were less sure about pollutants from marina or industrial discharges.

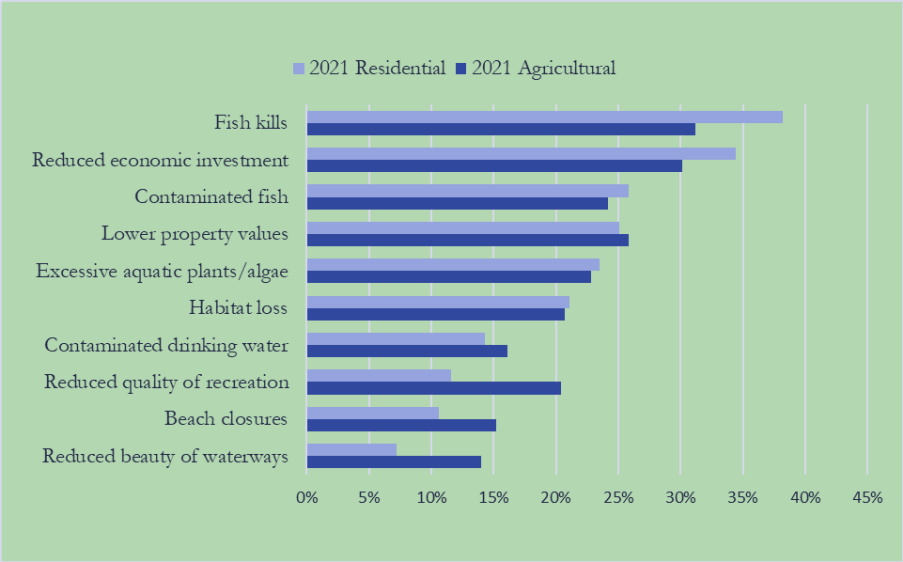

Figure 10. Graph of "Don't Know" about Pollution Consequences

Concerning consequences of water quality impairments (Figure 10), one-quarter or more of all respondents didn't know how much of a problem fish kills, reduced economic investment, contamination of fish, or lower property values were in the watershed. Agricultural respondents were less likely than residential respondents to be able to evaluate negative impacts to recreational quality, beach closures, or the scenic beauty of local waterways, presumably because they spend less time on related leisure activities.

Awareness and Use of Best Management Practices

In order to evaluate awareness about and use of best management practices (BMPs) among Macatawa Watershed property owners, the survey asked respondents about several practices known to protect and improve water quality. Owners of residential properties were presented a list of eight BMPs typically associated with household impacts to watersheds while owners of agricultural properties were presented a list of ten BMPs associated with farming impacts to watersheds. Both sets of items were measured with a four-point Likert scale ranging from "never heard of it" to "currently use it," with intermediate categories indicating that respondents are "somewhat familiar with it" and that respondents "know how to use it; [but are] not using it." Respondents could also indicate that a BMP was "not relevant" for their property. Results for residential and agriculture property owners are presented separately.

Residential Respondents

Survey respondents reported high levels of familiarity with and use of several BMPs important for reducing non-point source pollutants from residential properties (Figure 11). Seventy-five percent of residential respondents said that they currently keep grass clippings and leaves out of roads and/or ditches near their home, 74% take care to properly dispose of household wastes, and 68%

avoid overapplying nutrients by following the manufacturer's instructions when fertilizing their lawn or garden. A large proportion of respondents also reported properly disposing of pet waste, with 48% saying that they currently use this practice.[4] Fifty-nine percent of residential respondents do not have septic systems, but the majority of those that do said they service their system regularly.

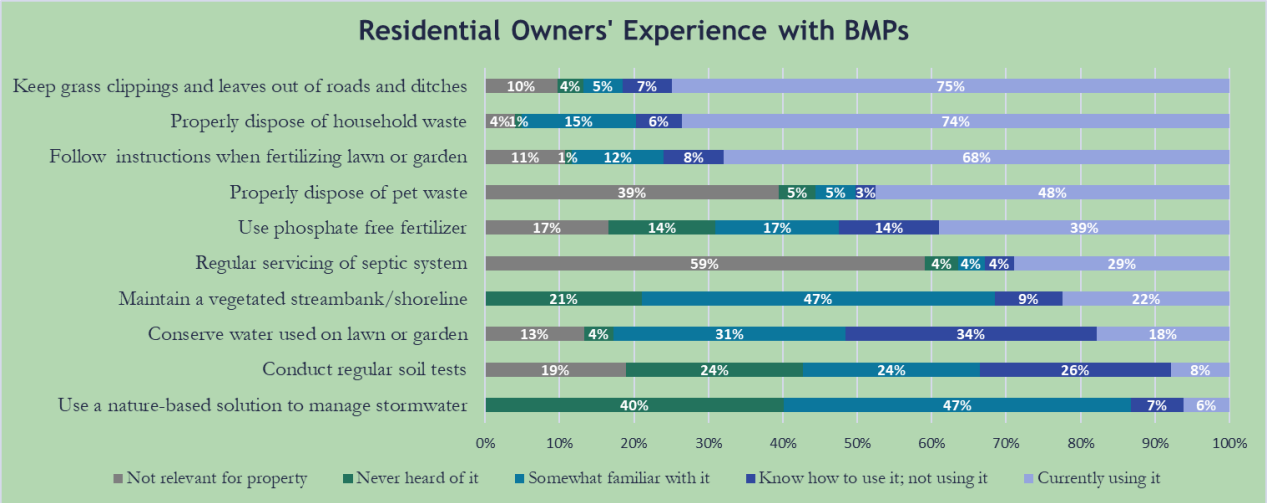

Figure 11. Graph of Residential Respondents' Use of Water Quality BMPs

Concerning target areas for improving residential BMP implementation, 47% of respondents said that they had never heard of using a nature-based solution to manage stormwater. Only 6% of respondents (n=14) are currently using this practice. Forty-eight percent of residential respondents had never heard of or were only somewhat familiar with conducting regular soil tests, while 35% had limited knowledge on implementing water conservation practices in outdoor watering. Additionally, 68% of residential respondents said that they had never heard of or were only somewhat familiar with maintaining a vegetated streambank or shoreline on riparian zones. A handful of respondents did pencil in comments noting that there is a seawall on their property.

The survey contained follow-up questions for BMPs of particular interest to future planning in the Macatawa Watershed. For residential respondents, this included vegetated streambanks and using a nature-based solution (NBS) to manage stormwater. Figure 12 compares residential

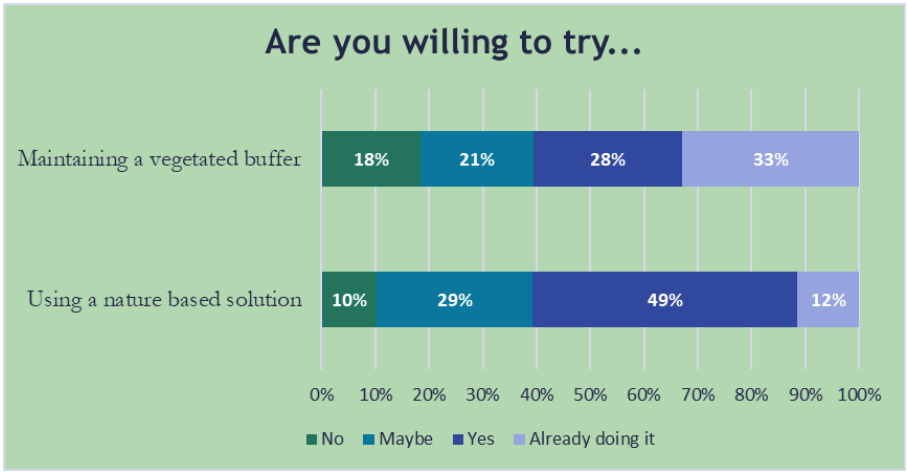

Figure 12. Graph of Willingness to Try BMPs, Residential Respondents

respondents' willingness to implement vegetated streambanks and NBS installments. While larger proportions of respondents report currently maintaining a vegetated streambank than using a NBS, more respondents are willing to try implementing a NBS, indicating a potential opportunity going forward. Forty-nine percent of residential respondents (n=110) are willing to try a NBS, compared to the 28% of riparian residential property owners who are willing to try vegetating their streambanks or shorelines.

Additionally, residential property owners expressed interest in participating in a cost-share program that would require a one-time, flat fee to match a grant for implementing NBS projects (Figure 13). Only 20% of respondents (n=44) were definitely or probably not willing to participate. Two-thirds would probably or definitely contribute $25-$50, half would pay $100, and an additional third would pay $200. Fewer than one-quarter of all respondents would pay $300-$500.

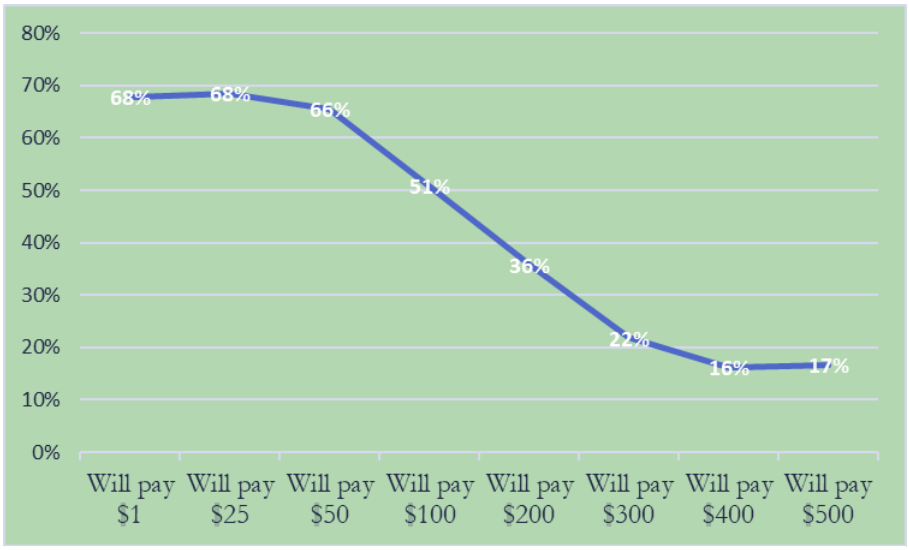

Figure 13. Chart of Amount Residents Will Pay for NBS

To take a closer look at whether respondents' perceptions of vegetated streambank characteristics match conservation planners' definitions, responses to the vegetated streambank implementation question were cross-tabulated with responses to a follow-up question that asked what type of vegetation surrounds the waterway on the respondent's property (Figure 14). Among residential respondents who said they are currently maintaining a vegetated streambank (n=17), nine described the riparian vegetation on their property as grasses and shrubs that are rarely mowed, five said their riparian zone is forested and never mowed, and only three said their mowed lawn abuts the waterway. This suggests that most respondents who said they are implementing a vegetated buffer have a fairly good understanding of this practice.

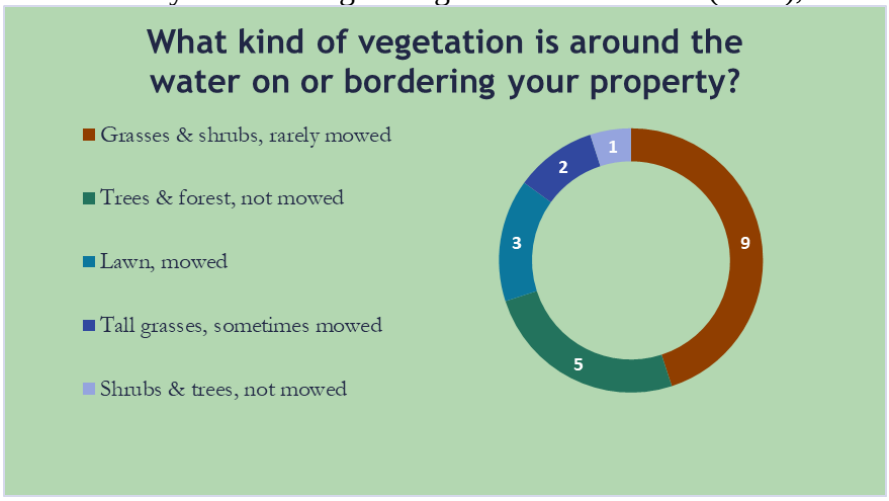

Figure 14. Circle Graph of Riparian Zone Characteristics, Residential Respondents

When asked about factors limiting their implementation of BMPs (Figure 15), residential property owners cited lack of information about practices as the top-ranking barrier to reducing their footprint in the watershed, followed by the cost of implementation. Forty percent of respondents or more said that physical abilities, lacking social ties to people who are using the practice, doubting the efficacy of the practice, or access to equipment were not at all a reason that they could not implement a practice.

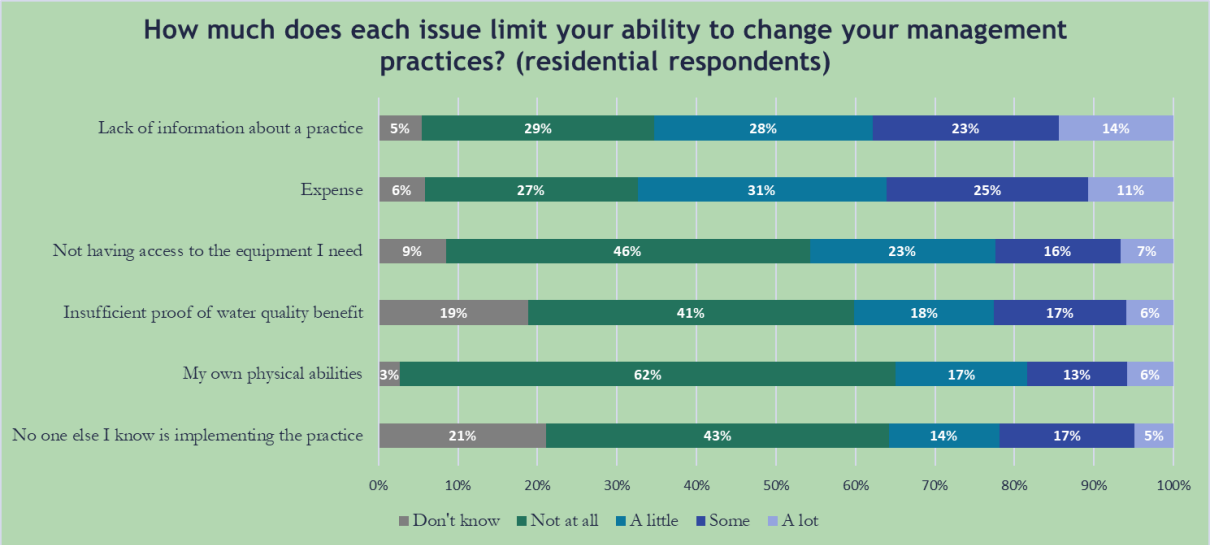

Figure 15. Graph of Barriers to Implementing BMPs, Residential Respondents

Agricultural Respondents

Agricultural respondents likewise reported engaging in a wide-range of activities important for maintaining good water quality (Figure 16). Agricultural property owners were much more likely to have a septic system than residential owners, and 69% of agricultural respondents reported servicing their septic systems every 3-5 years. Grassed waterways and cover crops are also

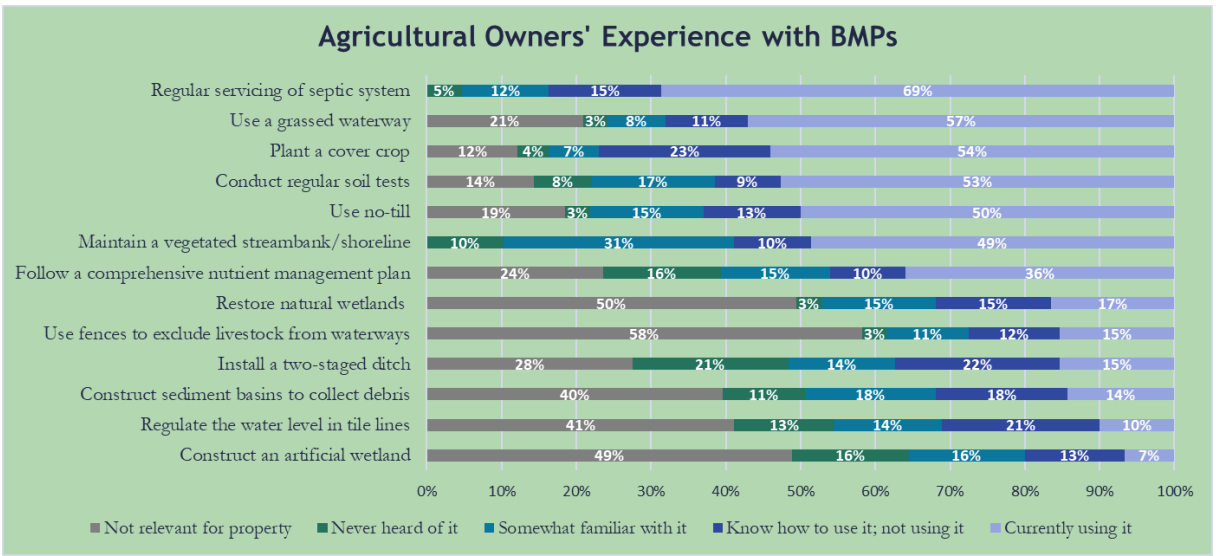

Figure 16. Graph of Agricultural Respondents' Use of Water Quality BMPs

commonly used in the watershed, with 57% and 54% of respondents saying they currently use these BMPs, respectively. Fifty-three percent of agricultural property owners are conducting soil tests on a regular basis, 50% use no-till in their row-crop production, and 49% maintain a vegetated streambank or shoreline.

For agricultural property owners, practices that are not widely used have large proportions of responses indicating that they are not relevant rather than that they are not known about. For example, 49% of agricultural property owners said that constructing an artificial wetland was not relevant for their property, 50% said that they did not have natural wetlands to restore, and 58% indicated that livestock exclusion fencing was not relevant for them. In general, the proportion of agricultural respondents who said that they had never heard of or were only somewhat familiar with each BMP was considerably lower than for residential respondents. Of those BMPs agricultural property owners had less familiarity with, maintaining a vegetated streambank or shoreline stands out, with 41% saying that they did not know anything or very much about this management practice.

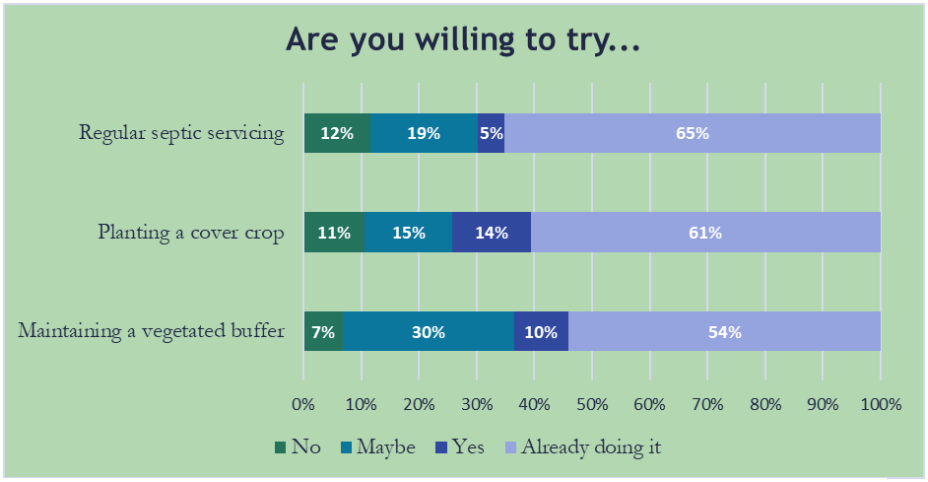

Figure 17. Graph of Willingness to Try BMPs, Agricultural Respondents

As with residential owners, agricultural respondents were asked follow-up questions about their use of vegetated streambanks, regular septic servicing, and use of cover crops. Figure 17 compares agricultural respondents' willingness to implement these practices. Only a small minority of agricultural respondents are not at all interested in trying any of the BMPs asked about – 12% or fewer across all items. The majority of respondents indicated that they are already using these BMPs. Interest in cover cropping is particularly impressive, with those saying they are willing to try or are already implementing this practice

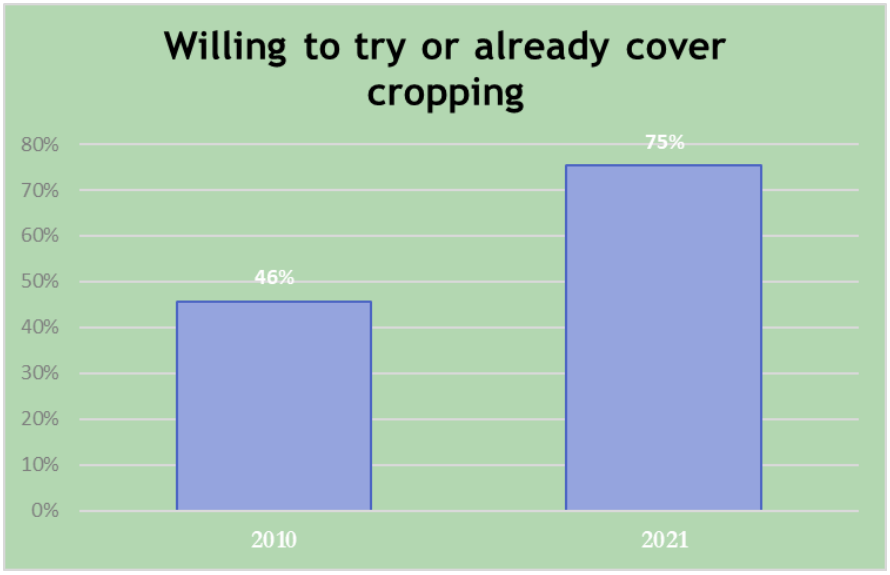

Figure 18. Chart for Willing to Try Cover Crops, 2010 vs. 2021

increasing 63% from 2010 to 2021 (Figure 18). The greatest opportunity for further adoption appears to lie with implementing vegetated streambanks. Forty percent of agricultural respondents said that they might be or are willing to try planting vegetated buffers.

Among agricultural respondents who said they are currently maintaining a vegetated streambank (n=37), 22 described the vegetation around the waterway on their property as crop land or grazing (Figure 19). Eighteen of those 22 respondents (82%) also said that their riparian zone consists of tall grasses that are rarely mowed, indicating that most respondents with cropping and grazing in their riparian zones also are incorporating conservation buffers. Seventeen respondents have streambanks bordered by shrubs and trees or forested land that is never mowed, twelve have grasses and shrubs that are rarely mowed, and only five describe the land adjacent to their waterway as a mowed lawn, again indicating that most property owners' definitions of stream buffers align with conservation planners'.

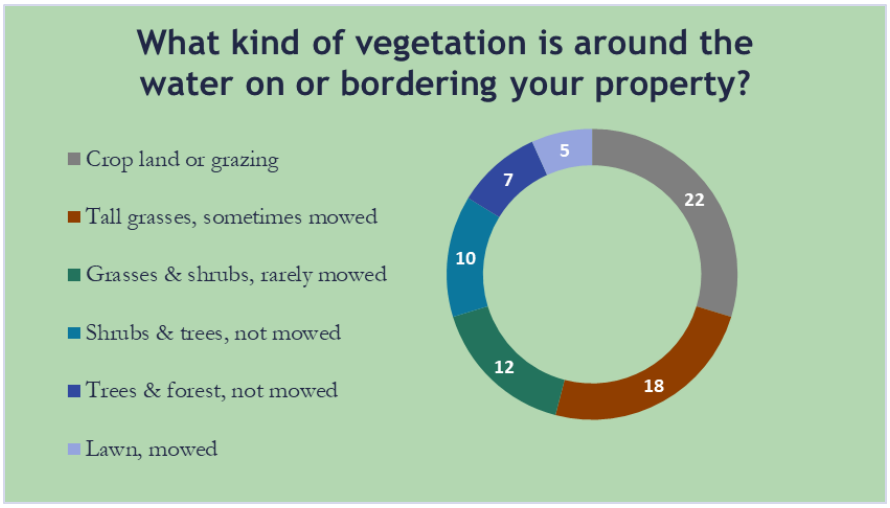

Figure 19. Circle Graph of Riparian Zone Characteristics, Ag Respondents

When asked about factors limiting their implementation of BMPs (Figure 20), agricultural property owners cited the expense of adoption as the top-ranking barrier to reducing their footprint in the watershed, followed closely by the requirements and restrictions of government-sponsored conservation programs and lack of information about BMPs. Expense was also reported as the factor explaining "a lot" of the reason that agricultural respondents

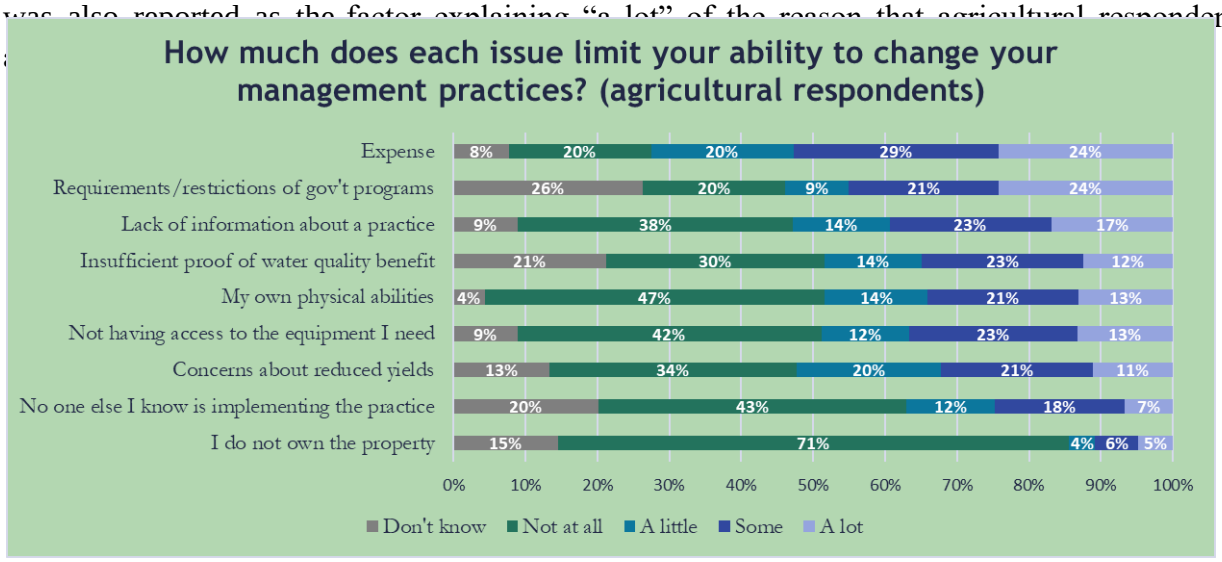

Figure 20. Graph of Barriers to Implementing BMPs, Agricultural Respondents

vegetated streambanks (23%), regular septic servicing (12%), and cover crops (28%). When it comes to planting cover crops, lacking equipment is a problem for 20% of respondents. Notably, 74% of respondents said that lacking information about cover cropping was not at all a problem, and 71% said that the desire to keep things the same was not at all a problem. This suggests that Macatawa farmers are knowledgeable about the benefits of cover cropping and see it as a valuable component of conservation agriculture, but may benefit from access to cost sharing or equipment rentals.

Watershed Knowledge and Information Sources

To develop effective communication strategies and identify knowledge gaps, the 2021 watershed survey asked respondents where they commonly seek information and used questions about watershed terminology from previous surveys, for comparison. Because of their focus on urban stormwater, the terminology questions were presented to residential property owners only, while general questions about the information sources and networks that respondents are connected to were asked on both the residential and agricultural surveys. All property owners were also asked a series of questions about their engagement and satisfaction with Project Clarity initiatives.

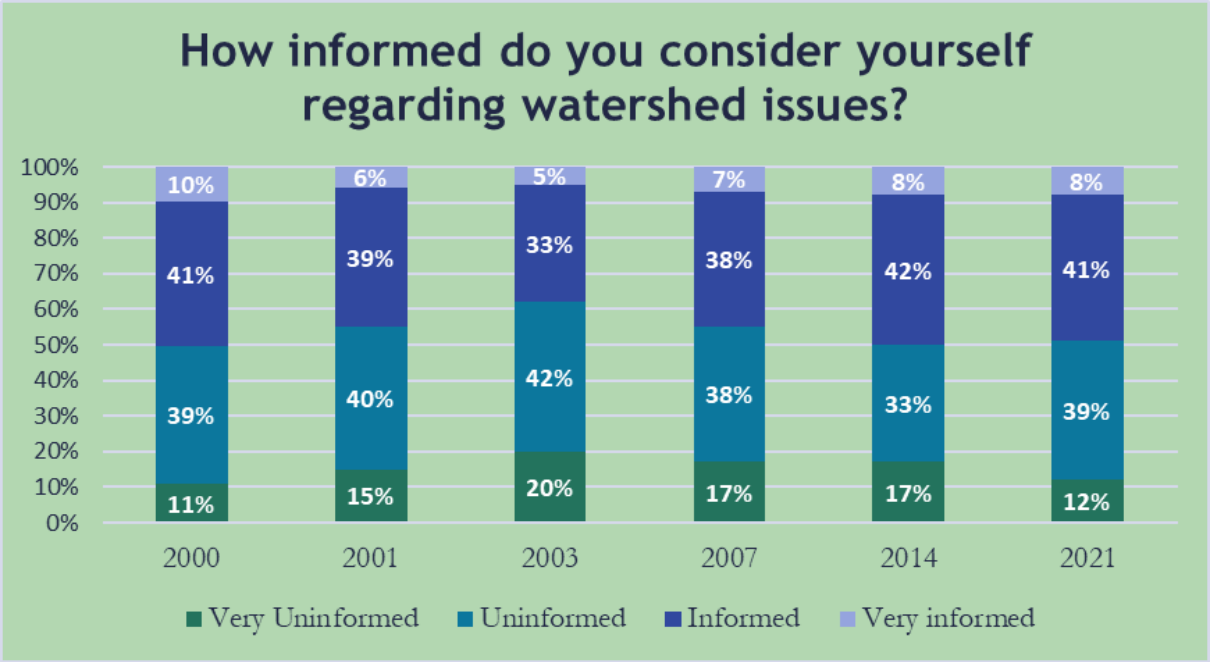

Figure 21. Graph of Residents' Self-Assessment of Watershed Knowledge

When asked to generally reflect on the extent to which they stay up-to-date on issues of concern to the Macatawa Watershed, respondents to the 2021 survey (both residential and agricultural respondents) reported feeling informed at levels consistent with past waves of polling (Figure 21).

Further, when asked if they could explain what a watershed is, residential respondents in 2021 reported similar rates of confidence in defining this term as respondents did in 2007 and 2014 (Figure 22). Some improvements are evident in residents' knowledge about what stormwater is and where it ends up after entering a storm drain. Nearly half of 2021 respondents knew that stormwater is "anything that ends up in the storm drain," compared to 31% of respondents in 2014 and 28% in 2007 (Figure 23). Other definitions of stormwater include 53 respondents (23%) who selected both answer options. Twelve respondents entered their own definitions (see Appendix 4), most of which demonstrate knowledge of the concept, such as, "Any precipitation that doesn't soak into the ground," or "Rain/snowmelt that carries pollutants into the ground or watershed."

When asked where rain or snowmelt goes after it enters a storm drain (Figure 24), only 12% of respondents selected "treatment facility" rather than "lake or stream." Among those who answered the question, the percentage of respondents who incorrectly think that stormwater is treated before discharge continues to decline.

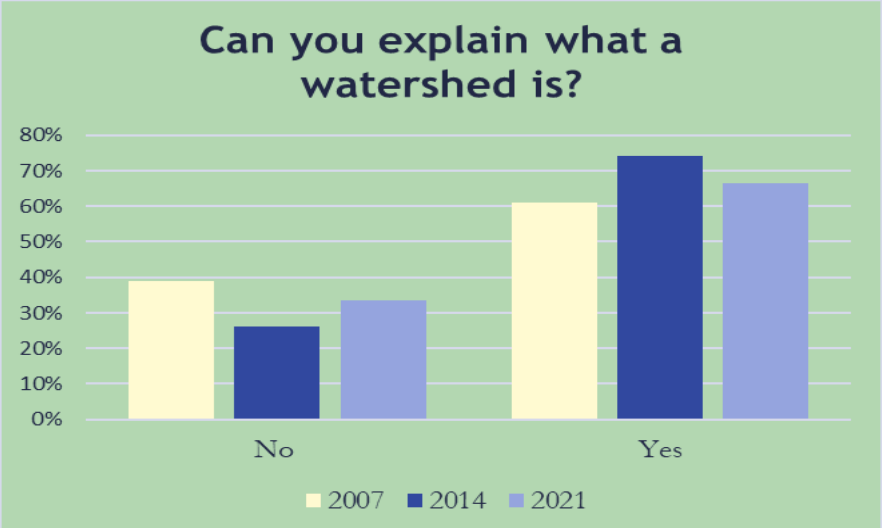

Figure 22. Chart for Knowledge of Watershed Definition

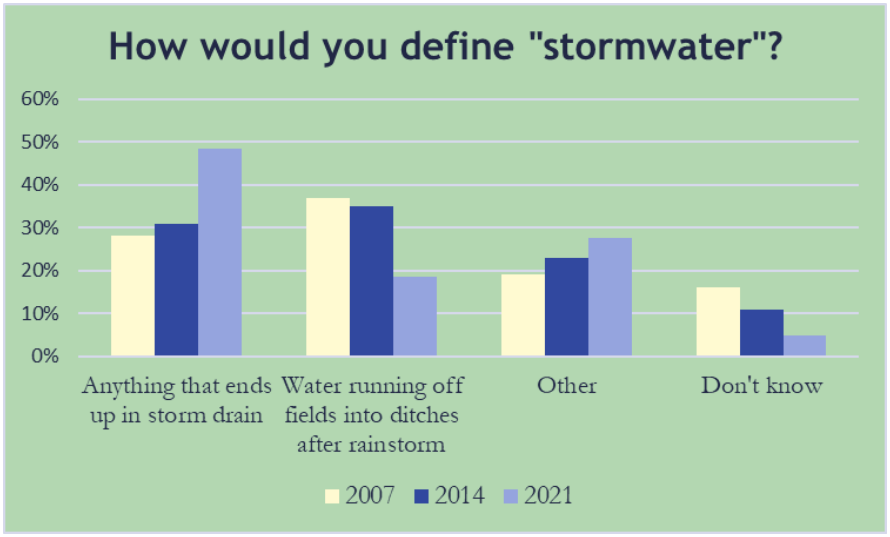

Figure 23. Chart for Knowledge of Stormwater Definition

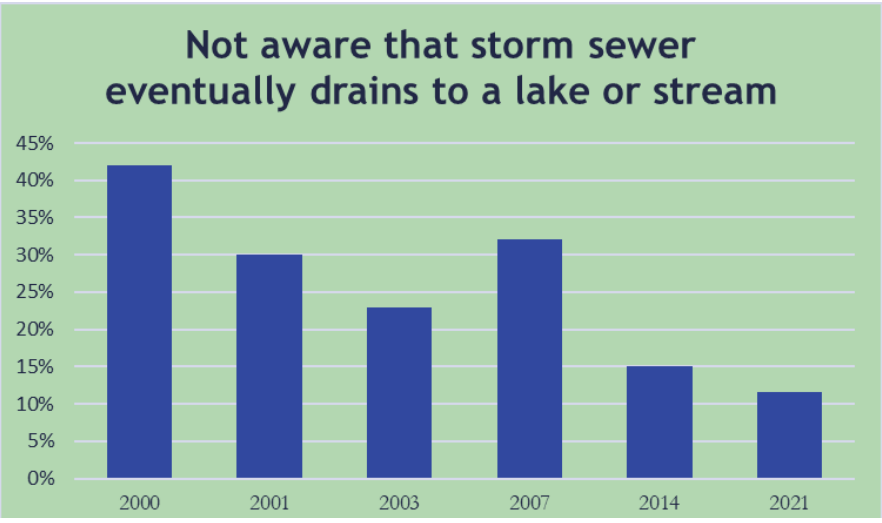

Figure 24. Chart for Knowledge of Stormwater Fate

Project Clarity's name recognition is growing in the watershed (Figure 25). Forty-six percent of all 2021 survey respondents had heard of Project Clarity, compared to only 26% in 2014. Most of this increased recognition is associated with respondents seeing Project Clarity signs in the watershed – 34% of all respondents have seen Project Clarity signage. Agricultural respondents are engaging directly with Project Clarity, with 22% reporting that they have received funding to implement water quality BMPs on their properties. A small number of respondents have attended a Project Clarity presentation (12%), and less than 10% of respondents say they have changed management practices because of Project Clarity or attended the Macatawa Watershed Festival. With active engagement in the project being so low, it follows that roughly two-thirds of respondents were not able to evaluate the impacts Project Clarity is having (Figure 26), answering that they "don't know" how much Project Clarity is improving various conditions in the watershed.

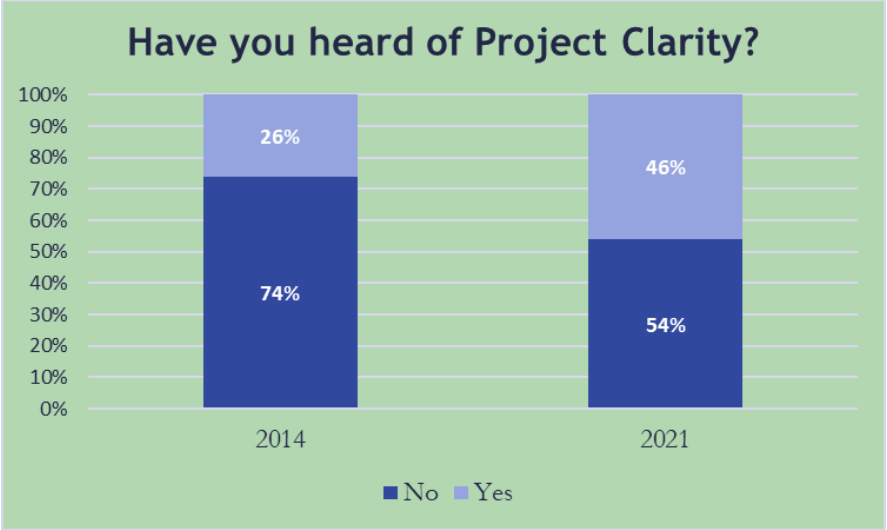

Figure 25. Chart for Project Clarity Name Recognition

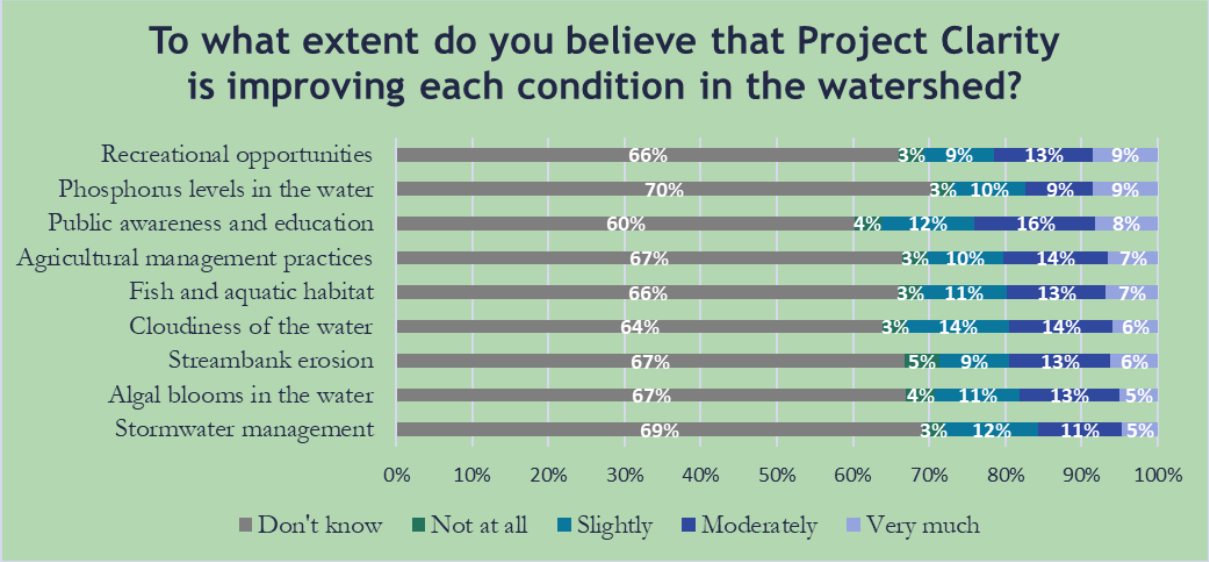

Figure 26. Graph of Perceived Impacts of Project Clarity

Survey respondents were asked about the information channels they consult for information about watershed issues. Figure 27 compares responses from the 2021 survey to responses collected in a 2014 survey conducted by Hope College. Larger proportions of 2021 respondents reported receiving information about the watershed from most communication mediums compared to 2014,

with the exception of newspapers. Whereas only 11% of respondents in 2014 said that they get information from the Internet, in 2021 60% said they get information online. In 2014, 6% of respondents learned about the watershed from newsletters and factsheets, compared to 57% in 2021. Fourteen percent of 2014 respondents talked about watershed issues with others, compared to 52% in 2021. Social media is also more important for communication about watershed issues in 2021 compared to 2014. When we compare 2021 responses by landowner type (Figure 28), we see that digital networks are more widely used by residential respondents, while agricultural respondents prefer face-to-face communications.

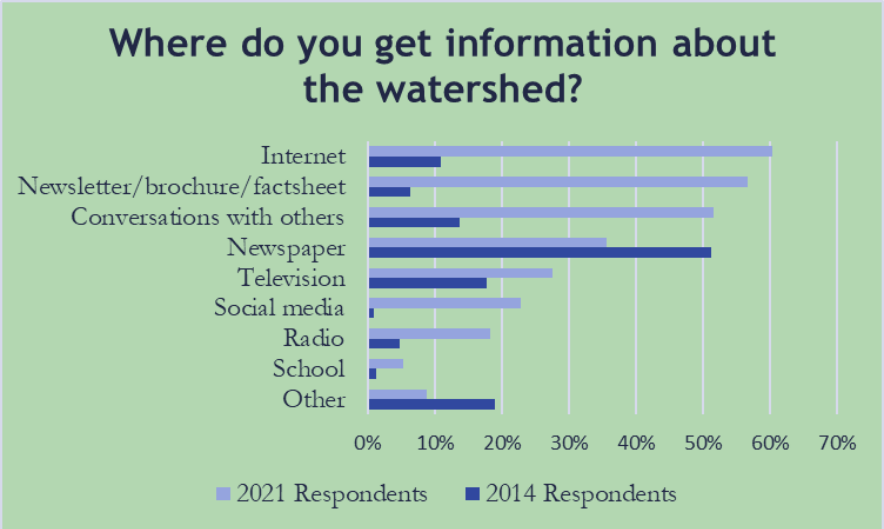

Figure 27. Graph of Information Channels, 2014 vs. 2021

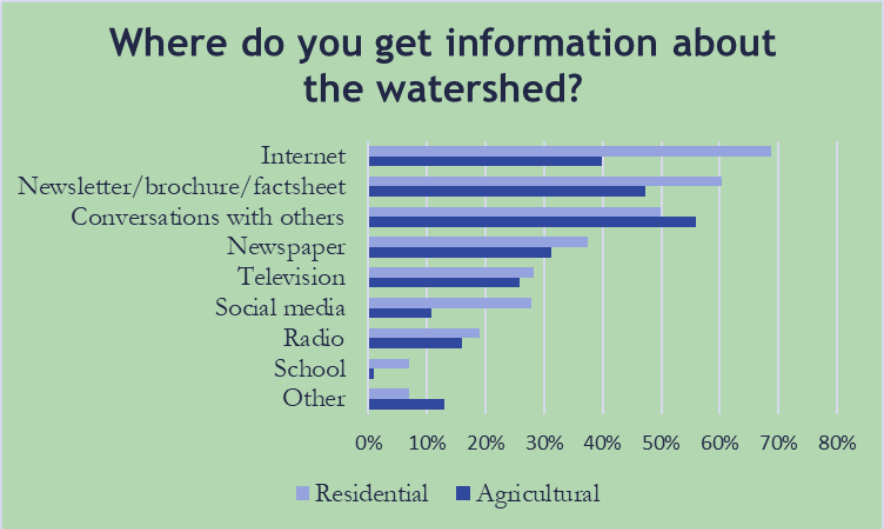

Figure 28. Graph of Information Channels, Residential vs. Agricultural

When asked about how much they trust various sources for information about water quality, the Macatawa Watershed Partnership and MSU Extension were ranked as moderately or very trusted sources of information by nearly 70% of respondents. Of note in Figure 29, 54% of respondents said they are "not familiar" with the ODC Network, and 41% were not familiar with Project Clarity, indicating opportunities for further marketing and outreach. Respondents were most skeptical about information from neighbors and friends, suggesting that many do value the expertise provided by local conservation organizations.

The 2021 survey also included a series of questions gauging the extent to which Macatawa Watershed residents trust different stakeholder groups to manage their properties in a manner that protects water quality. Stakeholder groups included homeowners, business owners, farmers, and county, state, and national governing agencies. Mean scores (on a 5-point Likert scale) for agricultural and residential respondents appear in Figure 30. Trust in farmers, local government,

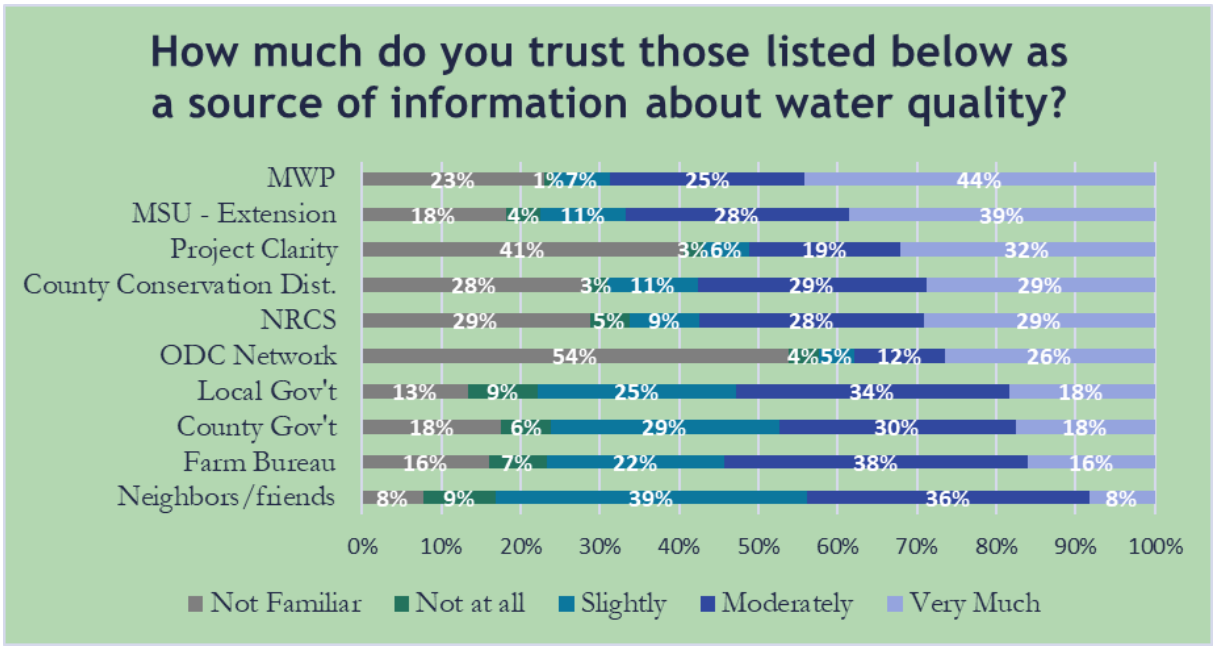

Figure 29. Graph of Trusted Information Sources

business owners, and homeowners is moderate for both types of property owners, with agricultural respondents reporting slightly higher levels of trust in farmers' management than residential respondents. Trust in authorities from the state and national government is lowest for all respondents, and particularly for agricultural respondents. This suggests that public messaging should emphasize locally-sponsored initiatives.

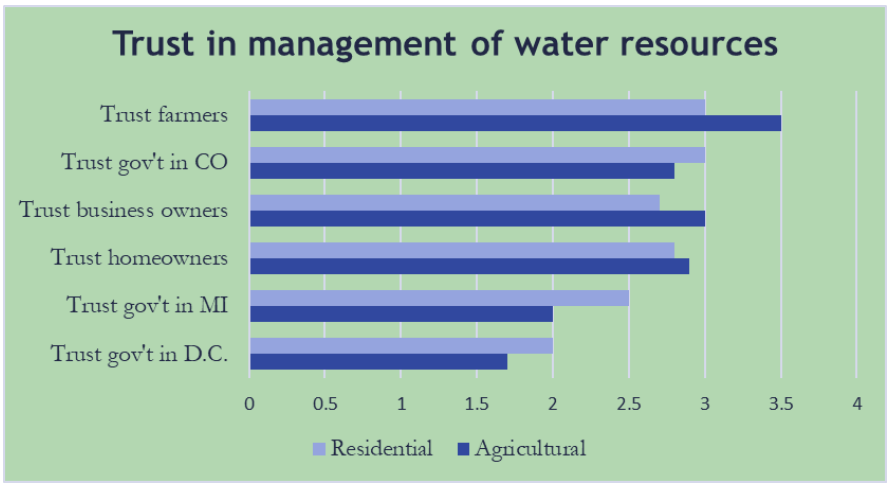

Figure 30. Graph of Trust in Watershed Stakeholder Groups

Willingness to Pay for Water Quality Improvements

All respondents were asked a series of questions intended to measure Macatawa Watershed residents' willingness to pay for improvements to water quality. Multiple contingent valuation methods were employed. First, respondents were presented information about financial investments already made to improve the watershed, followed with a single binary choice question asking if they believed improving water quality in the Macatawa Watershed is worth donating $50 per year to a water quality fund. Of the 319 responses to this question, 35% (n=112) responded

affirmatively while 16% (n=51) declined. Nearly half (49% or 156 respondents) selected "don't know" or "I don't want to answer."

Following the single binary choice question, respondents were given an open text question that asked them to write in the maximum amount their household would donate to a water quality fund per year. Forty percent of respondents were willing to donate (N=132). Amounts ranged from $5 to $3,000, with a mean response of $115. The most frequently entered response was $50 (n=39), followed by $100 (n=37).

Finally, respondents were presented with a series of protest options consisting of six statements describing reasons people may not want to pay for water quality improvements, and a space for respondents to write in "other" reasons not captured in the suggested protest options. Response options to each item were on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Mean scores for each item appear in Figure 31.[5] Among those who are not willing to pay for water quality, the sense that there is already enough money to support watershed improvements and that it is unfair to ask the respondent to pay were the most common reasons for not being willing to donate. Satisfaction with the current management of water resources, and inability to pay followed closely. Generally speaking, respondents disagreed with the statements suggesting that water quality does not concern them, or that they refuse to think of water quality in monetary terms. Among the "other" reasons that respondents wrote in to explain why they would not pay (see Appendix 4), the most common reason was that the respondent needed more information about what their donation would be spent on, why it was needed, and what had been achieved with previous investments.

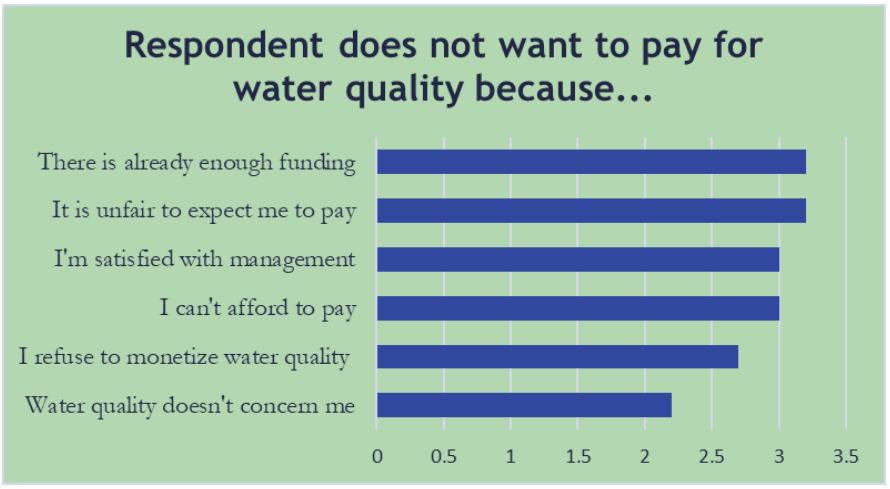

Figure 31. Graph of Mean scores, not willing to pay for water quality

Recommendations and Conclusions

The importance and value of watershed health expressed by survey respondents suggest that water resources are a large attraction drawing residents to the Macatawa Watershed. Whether for recreational, entrepreneurial, or agricultural pursuits, good water quality supports a high standard of living and thus inspires residents to contribute – through their actions and their generosity – to efforts to improve the watershed.

The 2021 Macatawa Watershed Residential/Agricultural Survey found that scenic beauty and recreation associated with family activities were particularly important to residents from all corners of the watershed. When constructing education/information messages, these highly valued aspects of water resources should be incorporated in framing strategies used to communicate the relevance and importance of suggested property management practices or new infrastructure installments.

When it comes to perceptions of pollution in the watershed, most respondents were better able to evaluate visible consequences of water pollution than the presence of chemical or biological impairments in waterways. Educational messaging should therefore work to provide residents with information explaining priority pollutants in the watershed, their common sources, and the consequences of these impairments. The communication strategy could incorporate a graphic or visual model that familiarizes residents with, a) the sources of priority NPS pollutants in the watershed, b) how they are transported into waterways, and c) the impact they can have on the watershed ecosystem. Developing a series of communications that can be enclosed in water and utility bills, featured in electronic newsletters, or shared on social media may help circulate the information to new audiences.

Further, urban residents are generally more concerned about water pollution than rural and exurban residents. Social scientists have documented that "culture clash" can occur in regions experiencing rapid population growth from in-migration, as is the Macatawa Watershed. New residents bring different values and policy preferences that prioritize preserving natural resources for recreational use into areas where traditional land use policy has favored economic activities (i.e. agriculture or extraction). Some open comments left by respondents point to the presence of a cultural clash in the Macatawa Watershed (see Appendix 4). Urban residents are unfamiliar with – and therefore have anxiety about – the impacts of agricultural practices, and farmers are squeezed between competing land uses.

In developing an educational strategy that can bridge this cultural divide, it will be important to work to unify different stakeholder groups so that they see themselves as part of the same team instead of members of competing teams. Methods for achieving this may include:

- Holding public workshops that bring together urban and rural residents to collaborate on developing an advertising, education, or BMP implementation campaign.
- Acknowledging and celebrating efforts both stakeholder groups are already making to improve water quality in the watershed.
- Ensuring that the benefits and burdens of policies and resource investments are equitably dispersed across urban and rural communities within the watershed.
- Emphasizing that environmental and economic goals are complementary, rather than competing, priorities.

Consistent with the high value of water resources expressed by survey respondents, many also reported using a wide-range of BMPs to improve and protect water quality. However, the survey results identified opportunities for improvement in several key areas. For urban and suburban residents, priorities should include:

- Using nature-based solutions to manage stormwater runoff.
- Conducting regular soil tests to determine if chemical lawn treatments are necessary.
- Installing water-efficient household appliances and reducing water used on outdoor landscaping by watering outside of peak evaporation times, watering deeply and infrequently, installing drip irrigation, or using grey water.
- Overcoming conservation knowledge limitations.

For rural and exurban residents, BMP priorities should include:

- Effective installation and maintenance of vegetated stream buffers.
- Targeted analysis to identify and develop relationships with landowners who have potential for implementing wetland restoration, stormwater retention structures, or livestock exclusion fencing.
- Overcoming financial and equipment limitations.

Given the low levels of confidence survey respondents expressed in federal and state governance, public messaging for BMP campaigns should emphasize local partnerships and clarify the services that local conservation organizations can provide in navigating regulatory and reporting processes associated with grant programs.

The 2021 watershed survey results underscore the growing importance of digital communication networks, but in-person communication remains important for rural and exurban residents. Using diverse mediums for outreach targeted to the intended audience will increase the effectiveness of communication strategies. Holding public meetings and community events at a variety of times, or piggy-backing them on existing meetings of environmental or agricultural organizations may help increase active engagement with Project Clarity and recognition of the ODC Network.

Finally, many watershed residents who are not able to participate in community events may be willing to donate to water quality initiatives if provided compelling information about current projects, goals, and outcomes of existing efforts to improve the Macatawa Watershed. Many survey respondents requested more details about how Project Clarity funds are spent and what their donations would be used for, indicating that they would need this information to be able to decide whether they would make a charitable contribution. The responses of some individuals also indicate confusion about how Project Clarity has been funded to-date; several respondents said they were not interested in donating because they are already overtaxed, but Project Clarity has relied primarily on donations rather than tax revenues. Adding clarity to the project's mission, accomplishments, and existing resources in future communications will help increase residents' confidence and willingness to contribute.