

THE CLINTON RIVER WATERSHED MANAGEMENT PLAN

for improving water quality in the North Branch Clinton River, Lake St. Clair, and the Great Lakes

The Social Survey

For the North Branch Clinton River Watershed

Your Views on the North Branch Clinton River Water Resources

Your local watershed project is conducting this survey to identify the needs and concerns in your community regarding water quality.

We ask that this survey be completed by the person in your household who makes most of the land management decisions and is at least 18 years old. Your participation in this survey is completely voluntary. Your answers will be kept confidential and will be released only as summaries where individual answers cannot be identified.

Unless otherwise instructed, please check the box that corresponds to the answer category that best describes you and your situation or opinion. The survey should take approximately 20-30 minutes to complete. Please read each question carefully.

If you prefer to take the survey on-line, please go to:
http://www.surveymonkey.com/s.aspx?em=ZpUEZagcWin9EldzCAXeg_3d_3d
 Be sure to enter the identification number from the top page of this survey.

THE SOCIAL SURVEY
FOR THE NORTH BRANCH CLINTON RIVER WATERSHED

JANUARY 2011

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EXECUTIVE SUMMARY

In early spring of 2009, the Subwatershed Advisory Group for the North Branch of the Clinton River conducted two social surveys within the watershed. One survey was focused on agricultural producers and the other was sent to residential property owners. The format was a mail survey with the option given to complete it on-line. Administered by the Macomb County Public Works Office, the two social surveys produced a statistically significant sample for the North Branch subwatershed. There were 144 responses from agricultural producers and 201 from residential property owners for a total of 345 respondents. The response rate was 35%. The survey assessed: public awareness, perception, and knowledge of the watershed and storm pollution issues; current activities impacting water resources; and willingness to take action to protect water resources. Following are some of the key findings revealed by the survey.

RESULTS

Watershed Knowledge

Seventy-four percent of respondents knew what a “watershed” was, yet only forty-eight percent of respondents knew what watershed they lived in. Seventy-eight percent of respondents knew that stormwater flows directly to lakes, streams, and groundwater.

Insight

Together, these indicate a need for heightened awareness about which watershed residents live in. An easy way to accomplish this is through posting watershed signs at key road-stream crossings and other sites with educational potential, such as parks.

Perceptions of Current Water Quality

Respondents felt that the current water quality was good for its scenic beauty and for picnicking and family activities. Conversely, respondents felt that the water quality was only okay for fish habitat, canoeing, kayaking, and other boating, and for eating fish caught in local waters. Respondents felt that local water quality was poor for swimming.

Insight

If local residents’ needs are being met by the currently perceived water quality conditions, then it will be difficult to motivate them to improve conditions. For marketing purposes it would be best to communicate proposed actions as necessary to preserve the current level of amenities for the future rather than improving conditions for activities that may not be supported.

Your Water Resources

The most important activities to respondents were:

1. Enjoying scenic beauty/enjoyment (72%)
2. Picnicking and family activities (40%)
3. Fish habitat for fishing (37%)
4. Eating fish caught in local waters (26%)
5. Swimming (22%)
6. Canoeing /kayaking /other boating (17%)

Water Impairments, Sources of Pollutants, and Consequences of Poor Water Quality

Water quality testing and expert opinion have identified: sediment, phosphorous, bacteria, low dissolved oxygen, flow alterations, and habitat alterations as key water impairments. Sources of these impairments are located throughout the watershed and have led to the State classifying several reaches as not attaining some of the designated uses. The survey results indicated a low awareness of the sources of water impairments, the impairments themselves, and the consequences associated with the presence of these impairments.

Practices to Improve Water Quality

The survey looked at respondents' awareness of, and willingness to adopt various best management practices (BMPs) designed to protect water quality. Results from this section are complex. In summary, the respondents believe they are doing a good job of implementing BMPs which may or may not be true. Respondents were overwhelmingly willing to adopt the majority of the surveyed agricultural and residential practices. BMPs requiring construction received the least support, perhaps due to the perceived expense.

Making Management Decisions

This section solicited responses on perceived constraints to adopting new management practices. Examples of constraints included cost, skill level required to implement, and available equipment. Fourteen of seventeen constraints pose barriers to roughly two-thirds of the agricultural respondents. Eleven of fourteen constraints pose barriers to roughly two-thirds of the residential respondents.

Insight

Regardless of people's willingness to adopt BMPs, if the constraints are perceived to be too great for property owners, then the BMPs will not be adopted. Survey results indicated a lack of understanding surrounding many of the BMPs. Public education programs on the BMPs, terminology, and the required skill for implementation will help overcome the perceived barriers.

Septic Systems

Ninety-five percent of agricultural respondents had septic systems. Fifty-two percent of residential property owners had septic systems. The average age for respondents' septic systems was over 40 years. The age of the septic systems presents a looming problem.

Information Sources and Policy

The top three trusted sources for information by agricultural respondents were MSU Extension, Soil and Water Conservation District and the Michigan Department of Agriculture. The least trusted sources of information by agricultural respondents was Environmental Groups in general (not the Clinton River Watershed Council). The top three trusted sources indicated by residential respondents were MSU Extension, the Clinton River Watershed Council, and the Michigan Department of Agriculture. The least trusted sources of information for residential respondents was lawn care companies.

Agricultural respondents supported partnering with other communities to work on environmental issues. Residential respondents supported increasing parks and open space. The least supported policy items were increasing access to local waterways and sponsoring water-related recreational activities.

Significant Correlations between Survey Variables

Correlations with Willingness to Try BMPs

The following constraints significantly correlated with agricultural respondents' willingness to continue or try the following BMPs:

- *Out of pocket expenses and personal views about effective farming* were correlated with *soil testing*. This would seem to indicate that soil testing is consistent with their current views on land management and that they would be sensitive to increases to the cost of this service.

- *Out of pocket expenses* were correlated with *using precise equipment* and *rotating crops*. This correlation suggests that these two BMPs, in particular, were cited as being cost prohibitive to implement.
- The practices that respondents indicated would most easily fit with current practices were *avoiding fall applications of manure* and *calibrating fertilizer equipment*.
- *Profitability* was correlated with *using integrated pest management practices*. The significant correlation suggests that respondents perceive *using integrative pest management practices* as possibly impacting their profitability.
- Respondents indicated that they perceived an environmental benefit to *constructing sediment basins* and *following fertilizer manufacturer's instructions* when applying it to their lawn or garden.
- Respondents considered the environmental damage that would occur if they implemented or did not continue to implement the following practices:
 - No till
 - Consider nitrogen contribution from legumes in fertilizer application
 - Construct sediment basin
 - Use field ditch
 - Herbaceous wind barrier
 - Follow forest management plan
- The concern over *learning new skills or methods* was correlated with *planting vegetated riparian buffers*, *planting forested riparian buffers*, and *protecting streambanks with structures*. This would suggest that if there is a desire to implement these BMPs, then it should be preceded by a concentrated education effort in order to overcome this barrier.
- There was correlation between respondents' *concern about yields* and three BMPs; *no till*, *rotating crops*, and *disposing of household waste*. It appears that respondents are concerned about implementing *no till* and *rotating crop practices* due to their impact on yields. *Disposing of household waste* appears to be a spurious relationship.
- The following BMPs were correlated with being *difficult to implement due to not having access to equipment*: This suggests that their access to equipment may expedite the implantation of these BMPs.
 - Plant vegetated riparian buffer
 - Plant forested riparian buffer
 - Improve upland wildlife habitat
 - Plug well
- The following BMPs were correlated with *not having enough information*: These correlations point to the need for additional information on these BMPs to be provided to the agricultural community.
 - Follow comprehensive nutrient plan
 - Construct a sediment basin
 - Use filter strip
 - Plant trees
 - Construct pond
 - Plant vegetated riparian buffer
 - Improve upland wildlife habitat
 - Plug well

- Properly dispose of household waste

The constraints significantly correlated with residential respondents' *willingness to try or continue the following BMPs*:

- Respondents considered the environmental damage that would occur if they implemented or did not continue to implement the following practices:
 - Create a rain garden
 - Properly dispose of household waste
 - Use a rain barrel
 - Plant vegetated riparian buffer
- Respondents indicated that they perceived an environmental benefit to *creating a rain garden, properly disposing of household waste, and fusing a rain barrel*.

Correlations with Information Sources

For residential respondents, different information outlets were correlated with some of the best management practices. This indicates that the respondents were more likely to trust information on these best management practices when received from a particular information source. The following BMPs and information sources were correlated:

USEPA

- Properly dispose of household waste
- Use rain barrel

Extension

- Not planting trees and shrubs over septic system
- Cap well

Local project

- Construct pond
- Plant vegetated riparian buffer
- Plant forested riparian buffer
- Protect streambanks and/or shorelines with vegetation

State Environmental Agency

- Create a rain garden
- Properly dispose of household waste
- Use rain barrel
- Cap well

Environmental Groups

- Use rain barrel
- Stabilize natural channel
- Plant vegetated riparian buffer
- Plant forested riparian buffer

State Agricultural Agency

- Not planting trees and shrubs over septic system

Correlations with Family Farms

Sixteen BMPs were correlated with existing family farms that have been farmed for several generations. They are:

- Nutrient management
- Soil tests
- Nitrogen from legumes
- Adjust crop fertilization
- Fall manure application
- Variable rate application
- Integrated pest management
- Calibration of equipment
- Precise equipment
- No till
- Sediment basin
- Field ditch
- Rotation
- Cover crops
- Filter strip
- Phosphate free fertilizer

This suggests that family farm operators are more likely to be good stewards of their land.

There is a significant correlation between anticipating that the farm will remain in the family in five years and either currently using or willing to adopt the use of filter strips.

Correlations with Demographic Information

There was a significant correlation between agricultural respondents' education and the current use of or willingness to *manage irrigation water to reduce soil erosion*. This may be due to the respondents achieving a certain comfort level with irrigation techniques through their education.

Residential respondents' income level was correlated with *following manufacturer's fertilizer application instructions*. This relationship is most likely spurious.

Residential respondents' education level was correlated with *following manufacturer's pesticide application instructions*. This is most likely due to the general effect of education.

Information Methods

Newsletters, the internet, and trade publications were the methods of communication that were most significantly correlated (five or more BMPs) with collecting information on adopting best management practices. This suggests that if information on adopting BMPs is to be circulated through the agricultural community, then these three communication methods should always be included.

RECOMMENDATIONS

The following recommendations are based solely on the results of the Social Survey. They do not consider either the Unified Stream Assessment (USA) or the Unified Subwatershed Site Reconnaissance (USSR) survey. Furthermore, there are not intended to be any recommendations that duplicate NPDES Phase II storm water permit requirements (e.g. street sweeping). The recommendations are as follows:

1. Move to the next stage in the public education process. Respondents indicated they knew what a watershed was but not necessarily which watershed they live in. Also, public education should move towards incorporating more information on impairments and the consequences associated

with them; where to purchase eco-friendly products; as well as on techniques available to protect waterways (e.g. no-mow buffers).

2. Focus marketing messages on enjoying the local scenic beauty, family activities and fishing. These are the most important activities to respondents.
3. All existing and new programs should be cross referenced with the constraints identified by respondents as documented in this report, and then tailored to help the target audience reach the desired behavior. For example, work with local suppliers to feature eco-friendly products, especially when manufacturer's sales are occurring.
4. If construction activities are to occur on riparian property, local agencies should consider offering forms of support to property owners if they adhere to best management practices during construction, and implement post construction controls on the site. These can take the form of incentives such as fee reductions, technical support, or even physical assistance.
5. Institute a septic system program aimed at the inspection and maintenance of existing systems.
6. The distribution of water quality information intended for farm operations should be, at a minimum, transmitted through MSU Extension, NRCS, and the Farm Bureau. For residential land owners, the transmission vehicles should be MSU Extension, The Clinton River Watershed Council and Michigan Department of Agriculture.
7. The two most supported policy directions were partnering with adjacent communities to undertake action, and increasing parks and open space. Therefore, the existing subwatershed council should self promote more of the work it has been doing. Also, the subwatershed group should consider working more closely with the Six Rivers Regional Land Conservancy in an effort to demonstrate to the public that open space is being increased.
8. With regard to agricultural producers, the data seems to indicate that they feel they are already doing a good job. Efforts to work with producers through programs such as Farm-A-Syst and Crop-A-Syst should be increased to help them better understand all the options available to them.
9. Certain information sources should distribute certain types of information, especially if it concerns BMPs. Not all information sources (e.g. Farm Bureau) carry equal credibility for all BMPs, so the message and delivery mechanism (e.g. internet) should be coordinated to be most effective.
10. The internet is increasingly becoming the preferred information delivery method. Efforts should be made to strengthen links between the subwatershed program information page and trusted information sources, such as with the Farm Bureau.

INTRODUCTION

PURPOSE OF THE STUDY

The social data collected for this project is intended to develop indicators to serve both as intermediate measures for the purpose of performance review, and information to assist in the design of effective outreach and education interventions for Non-Point Source (NPS) pollution management. The purpose of the evaluation is to collect baseline information on environmental awareness and attitudes for the North Branch watershed management plan.

PROBLEM DEFINITION AND RATIONALE

Data collection is for socio-behavioral information. NPS projects involve the interaction of humans with their natural environment. Evaluating the effectiveness of programs to reduce NPS water pollution, therefore, needs to include an assessment of the human behavior underlying the pollution. Water quality problems have built up over many decades and may take decades to amend. Even when appropriate practices are put into place, there will be a lag before water quality shows improvement. Confirming the adoption of corrective practices, and other beneficial attitudinal changes, provides more immediate indications of anticipated water quality change.

Evaluating the social component of NPS water quality programs and projects involves more than identifying changes in behavior in critical areas of the watershed; it also requires consideration of the continuum of knowledge, awareness, attitudes, constraints, and capacity that eventually leads to behavioral change. Because decisions regarding individual behaviors are influenced by a complex interplay of factors, measuring the precursors or contributing factors leading to the change will give managers additional information that will help insure that funded activities will accomplish water quality goals, and provide direction for future projects. If an NPS project or program positively influences the precursors, it is advancing the goal of achieving the desired behavioral change.

Measuring change in behavioral precursors requires the use of a variety of *social indicators* that represent or reflect those precursors. *Social indicators are measures that describe the capacity, skills, knowledge, values, beliefs, and behaviors of individuals, households, organizations, and communities.* By measuring these indicators, water quality managers can determine whether policies, programs, and initiatives are likely to lead to the intended behavioral change in a watershed's most critical areas and, ultimately, to improvements in water quality.

TOOLS

This project used the Social Indicator Planning and Evaluation System (SIPES) for NPS management and an on-line data tool – the Social Indicators Data Management and Analysis (SIDMA) system.

STUDY DESIGN AND ANALYSIS

Questions

The data collected for this project is intended to serve both as an intermediate measure for the purpose of performance review, and as information to assist in the design of effective interventions outreach, and education interventions for NPS pollution management. Data will help to answer a variety of questions related to awareness, attitudes, and behavior related to non point source pollution. Questions in the survey will help to determine public awareness or misconceptions about topics such as:

- Connections between storm water and pollution
- The community's level of concern about pollution
- Individual practices that contribute to non point pollution

- Individual characteristics and barriers to behavior change

Questions and answers have been designed to provide information in order that staff representing watershed stakeholders can work towards the following intended outcomes:

- Increased awareness of relevant technical issues and/or recommended practices in critical areas;
- Changed attitudes to facilitate desired behavior change in critical areas;
- Reduced constraints to behavior change;
- Increased capacity to leverage resources in critical areas;
- Increased capacity to support appropriate practices in critical areas;
- Increased adoption of practices to maintain or improve water quality in critical areas;
- Increased adoption of improved management of septic systems; and
- Increased efficiency and effectiveness in delivery of information to the public.

Sample Size

The project planned to survey a sample population of the target audience, estimated at 388 landowners total, 82 of which are targeted to be farm owners. A total of 348 responses were collected, 145 of them from the agricultural community. Responses from individual landowners are confidential and anonymous.

Survey Process

The survey process included a series of mailings and follow-up phone calls after the second mailing. Respondents were given the option to complete the survey on-line or return the survey by mail. Identification numbers, included in the mailed survey packet, were required to access the on-line system in order to ensure that duplication did not occur.

The survey was administered using the following steps:

Step 1: Send an initial letter of introduction to notify the homeowner that they would be receiving a survey and to stress the importance of completing and returning it.

Returned letters were dropped and replaced on the master list of recipients.

Step 2: One to two weeks after the introduction letter is mailed, the survey itself is delivered, along with an accompanying letter and pre-paid return envelope.

Step 3: One to two weeks after the survey is delivered, a reminder post card explaining the importance of filling out the survey is sent.

Three to four weeks after the survey is sent out, a second survey is mailed out.

A final reminder letter is mailed out one to two weeks after the second survey is delivered.

Respondents who submit surveys have their names removed from the follow-up list and are not contacted again.

SIDMA DATA ANALYSIS AND INTERPRETATION

The SIDMA report presents the frequency of the results and the averages for each survey question. The report also produces calculated scores for the social indicators. Average values for each question provide a quick and easy way to understand how respondents answered each question. The SIDMA report provides an idea of the overall strengths and weaknesses within the watershed. Are people familiar with the practices you are hoping to have installed? Does the population as a whole understand the sources and consequences of the pollutants of concern? These are the sorts of questions answered by frequency and average data. The SIDMA report also helps to find important relationships in the survey results. While the averages will help identify characteristics that may facilitate or impede practice adoption for the watershed, it may miss important trends that can help focus future efforts.

The first analysis of the survey results is based on practice adoption. SIDMA examines the results for those who have already adopted a given practice. The analysis will help identify the key traits of respondents who overcame barriers to practice adoption. Next SIDMA compares those who have adopted a practice to those who are willing to adopt (WTA) a practice, those who will consider adoption (maybe) and respondents not willing to adopt a practice (NWTa). Again, SIDMA will present the relationships that appear important based on the survey results. Since this part of the analysis compares different stages of adoption (adopted, WTA, maybe, and NWTa) it answers different questions. Is there an identifiable group (such as farmers with more acreage) that is more likely to adopt a given practice? Do those who have already adopted a riparian buffer believe financial assistance is more or less important than those who have not adopted one already? By comparing these different groups a picture of which factors are most likely to lead to adoption will be better understood.

Additionally, SIDMA reports Pearson's Chi-square tests to look at relationships between two different variables. Briefly, this test examines whether one variable exerts an influence on another variable. For example, are larger farms more or less concerned about practice cost than smaller farms? Are longer-term residents more or less knowledgeable about a practice of interest? Pearson's chi-square test can help us answer these types of questions. This will be done automatically. The SIDMA report will present the relationships SIDMA flagged as potentially important.

The pre-project survey results will be used to establish social outcomes. SIDMA broadly defines **Social Outcomes** as *the social changes needed to bring about and sustain the environmental conditions you are trying to achieve in your project area*. These outcomes will address the changes in awareness, attitudes, capacity, constraints, and behaviors that will help achieve the project's environmental goals and management objectives. These social changes are outcomes project activities are expected to achieve, and they form the foundation for the I&E effort contained in the North Branch Clinton River Watershed Plan.

ORGANIZATION OF THIS DOCUMENT

The surveys for the residential and agricultural land owners were very similar. Twelve (12) categories of questions were asked of the residents whereas the agricultural community was asked 13 categories of questions. This document looks at each questionnaire category. When residential and agricultural surveys are very similar, the information is presented together. For areas where the surveys were very different, those topics are discussed individually. Within each category, information is presented on the specific questions asked, the raw results, and a brief analysis with observations. A summary of overall recommendations follows the survey categories results. .

The following survey question categories are included in this report:

- Your watershed (residential and agricultural)
- Rating of water quality (residential and agricultural)
- Your water resources (residential and agricultural)
- Your opinions (residential and agricultural)
- Water impairments (residential and agricultural)
- Sources of water pollutants (residential and agricultural)
- Consequences of water pollutants (residential and agricultural)
- Practices to improve water quality (residential)
- Practices to improve water quality (agricultural)
- Septic systems (residential and agricultural)
- Making management decisions (residential and agricultural)
- Information sources and policies (residential and agricultural)
- About your farming operations (agricultural)
- Demographics (residential and agricultural)

YOUR WATERSHED

This section is designed to determine respondents’ basic knowledge of their watershed. It consists of three questions.

QUESTIONNAIRE

a. Of the following, which best fits your definition of what a watershed is? Check the box that corresponds to your answer.

- An area that retains water like a swamp or a marsh
- The land area that drains into a specific water body
- Water intake area that feeds a water treatment plant
- A small building where water is stored
- None of the above
- I don’t know

b. Do you know the name of your watershed?

- No, I don’t know the name of my watershed
- Yes, I know the name of my watershed
- The name of my watershed is: _____

c. Where does stormwater (rainwater) go after it enters a storm drain or roadside ditch in your community?

- Don’t know
- Directly to lakes, streams and groundwater without treatment
- To lakes and streams after receiving some treatment
- To a wastewater treatment plant

RESULTS

Seventy-four percent (74%) of respondents knew that a watershed was “land area that drains into a specific water body.” Nine percent (9%) more agricultural respondents correctly answered this question than did residential respondents.

Table 1: Watershed Definition

	Residential	Agricultural	Total
Number of valid responses	196 (96.6%)	141 (97.2%)	337 (96.8%)
Response	Response Percentage	Response Percentage	Weighted Average
An area that retains water like a swamp or a marsh	14.3%	12.8%	13.7%
The land area that drains to a specific water body	70.4%	79.4%	74.2%
Water intake area that feeds a water treatment plant	0.5%	1.4%	0.9%
Small building where water is stored	1.5%	0.0%	0.9%
None of the above	0.5%	2.1%	1.2%
I don’t know	12.8%	4.3%	9.2%
Total	100.0%	100.0%	100.0%

Forty-eight percent (48%) of respondents indicated they knew the name of their watershed, while fifty-two (52%) did not. When asked to name their watershed over ninety percent (90%) named the North Branch or one of its catchments.

Table 2: Know Your Watershed

	Residential	Agriculture	Total
Number of valid responses	192 (94.6%)	135 (93.1%)	327 (94.0%)
Response	Response Percentage	Response Percentage	Weighted Average
No	55.7%	46.7%	52.0%
Yes	44.3%	53.3%	48.0%
Total	100.0%	100.0%	100.0%

Seventy-eight percent (78%) of respondents knew that stormwater flows directly to lakes, streams, and groundwater. Broken down by groups, agricultural respondents selected the correct answer ninety one percent (91%) of the time while residential respondents answered correctly sixty nine percent (69%) of the time. Twenty two percent (22%) of residential respondents did not know where stormwater goes.

Table 3: Where Does Stormwater Go

	Residential	Agricultural	Total
Number of valid responses	192 (94.6%)	135 (93.1%)	327 (94%)
Response	Response Percentage	Response Percentage	Weighted Average
Don't know	21.9%	8.5%	16.4%
Directly to lakes, streams and groundwater without treatment.	69.2%	90.8%	78.1%
To lakes and streams after receiving some treatment.	4.5%	0.0%	2.6%
To a wastewater treatment plant.	4.5%	0.7%	2.9%
Total	100.0%	100.0%	100.0%

ANALYSIS AND OBSERVATIONS

The general knowledge demonstrated by the results of this section indicates that respondents are familiar with the concept of a watershed, and where stormwater goes. Unfortunately, only about half of them know which watershed they reside in.

It can be concluded from this section that there needs to be a heightened awareness of which watershed residents live in. An easy way to accomplish this is through posting watershed signs at key road-stream crossings, and other sites with educational potential, such as parks. Interpretive signage erected in public areas may also serve to elevate the residents' knowledge of where storm water flows.

RATING OF WATER QUALITY

This section is intended to gauge the respondents' perceptions of water quality needed to engage in various water-related recreational activities.

QUESTIONNAIRE

Overall, how would you rate the quality of water in your area?

	Poor	Okay	Good	Don't Know
1. For canoeing / kayaking / other boating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. For eating fish caught in the water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. For swimming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. For picnicking and family activities near water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. For fish habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. For scenic beauty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

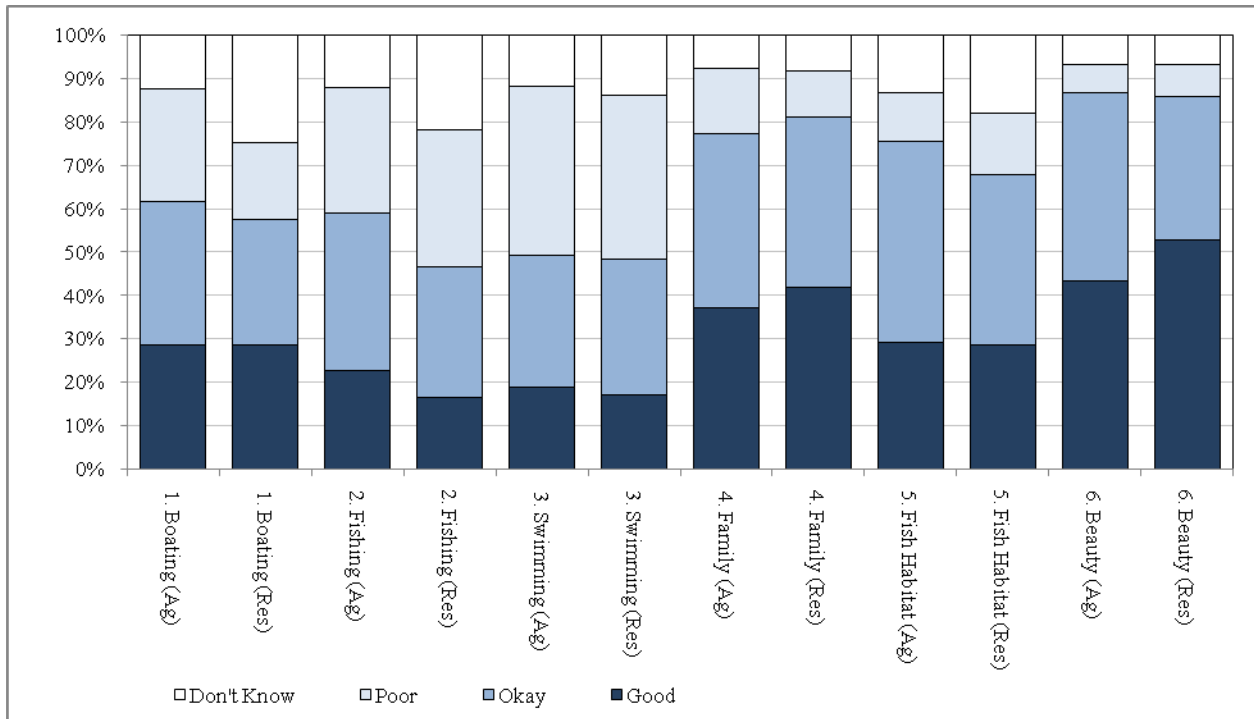
RESULTS

A summary of the water quality ratings is provided in Table 4 and in Figure 1. In order to calculate an overall average score for each question, the responses “poor”, “okay”, and “good” were assigned a point value of 1, 2, and 3 respectively. The “don't know” responses were ignored in the average rating calculation. A mean and standard deviation (SD) were then computed using the assigned point value.

Table 4: Perceived Water Quality Rating

Assigned Points			1	2	3	N/A	
Number of Responses			Poor	Okay	Good	Don't Know	Mean (SD)
1. For canoeing / kayaking / other boating	Agricultural	130 (90%)	26.2%	33.1%	28.5%	12.3%	2.03 (0.79)
	Residential	189 (93%)	17.5%	29.1%	28.6%	24.9%	2.15 (0.77)
	Weighted Avg	319 (92%)	21.0%	30.7%	28.6%	19.8%	
2. For eating fish caught in the water	Agricultural	132 (91%)	28.8%	36.4%	22.7%	12.1%	1.93 (0.77)
	Residential	189 (93%)	31.7%	30.2%	16.4%	21.7%	1.80 (0.76)
	Weighted Avg	321 (92%)	30.5%	32.7%	19.0%	17.8%	
3. For swimming	Agricultural	126 (87%)	38.9%	30.2%	19.0%	11.9%	1.77 (0.78)
	Residential	188 (93%)	37.8%	31.4%	17.0%	13.8%	1.76 (0.76)
	Weighted Avg	314 (90%)	38.2%	30.9%	17.8%	13.0%	
4. For picnicking and family activities	Agricultural	132 (91%)	15.2%	40.2%	37.1%	7.6%	2.24 (0.72)
	Residential	191 (94%)	10.5%	39.3%	41.9%	8.4%	2.34 (0.68)
	Weighted Avg	323 (93%)	12.4%	39.7%	39.9%	8.1%	
5. For fish habitat	Agricultural	127 (88%)	11.0%	46.5%	29.1%	13.4%	2.21 (0.65)
	Residential	189 (93%)	14.3%	39.2%	28.6%	18.0%	2.17 (0.70)
	Weighted Avg	316 (91%)	13.0%	42.1%	28.8%	16.2%	
6. For scenic beauty	Agricultural	134 (92%)	6.7%	43.3%	43.3%	6.7%	2.39 (0.62)
	Residential	191 (94%)	7.3%	33.0%	52.9%	6.8%	2.49 (0.64)
	Weighted Avg	325 (93%)	7.1%	37.2%	48.9%	6.8%	

Figure 1: Perceived Water Quality Rating



ANALYSIS AND OBSERVATIONS

The majority of respondents indicated that current water quality was “good” for its scenic beauty and for picnicking and family activities. The majority of respondents said that the water quality was only “okay” for Fish Habitat, Canoeing/Kayaking/Other Boating, and for Eating Fish Caught in Local Waters. Finally, the majority of respondents thought that local water quality was poor for swimming.

These activities will be matched with the activities that are most important to respondents in the next section.

YOUR WATER RESOURCES

This section solicits responses on what water related activities respondents find important, and relates them to their perception of water quality.

QUESTIONNAIRE

Of these activities, which is the most important to you? Check all that apply.

- Canoeing / kayaking/ other boating
- Picnicking and family activities near water
- Eating fish caught in the water
- Fish habitat / fishing
- Swimming
- Scenic beauty / enjoyment

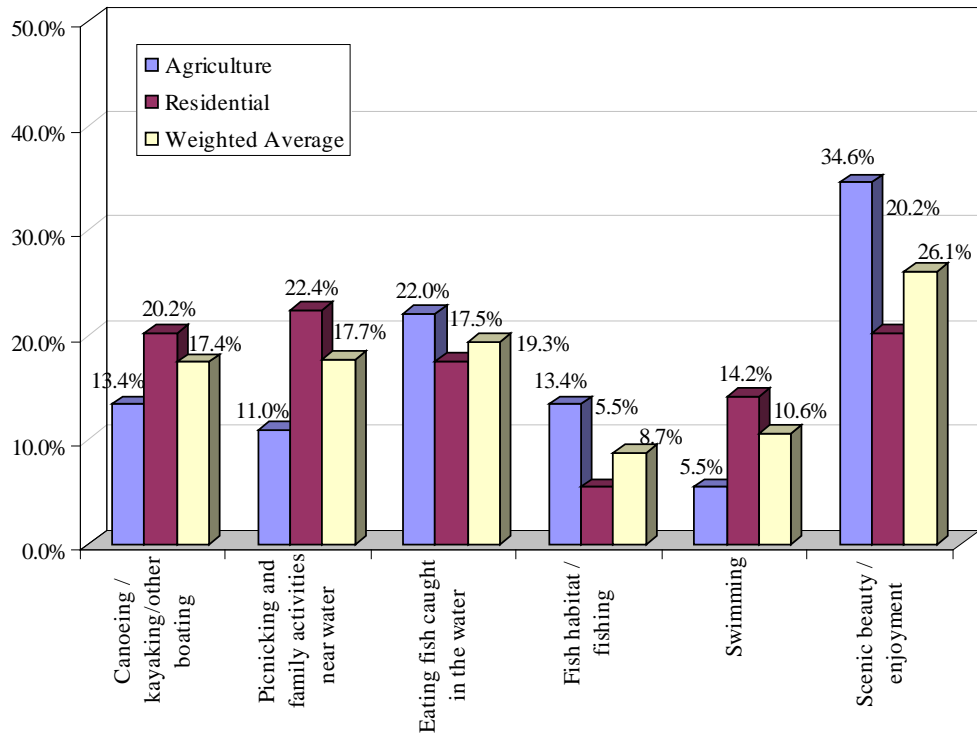
RESULTS

Table 5 summarizes the results for this section. Figure 2 provides the same summary information in a graphical form.

Table 5: Activity Importance

	Agricultural	Residential	Weighted Average
Number of valid responses	183 (90%)	127 (88%)	310 (89%)
Canoeing / kayaking/other boating	13.4%	20.2%	17.4%
Picnicking and family activities near water	11.0%	22.4%	17.7%
Eating fish caught in the water	22.0%	17.5%	19.3%
Fish habitat / fishing	13.4%	5.5%	8.7%
Swimming	5.5%	14.2%	10.6%
Scenic beauty / enjoyment	34.6%	20.2%	26.1%

Figure 2: Of these activities, which is most important to you?



ANALYSIS AND OBSERVATIONS

The most important activities to respondents were 1. *Enjoying scenic beauty/enjoyment* (26.1%); 2. *Eating fish caught in local waters* (19.3%); 3. *Picnicking and Family Activities* (17.7%); 4. *Canoeing /kayaking /other boating* (17.4%). *Swimming* (10.6%) and *fish habitat for fishing* (8.7%) received low support.

Comparison of the perceptions of the current water quality and the activities that respondents like to engage in would seem to indicate that they perceive the current conditions as being sufficient to support these activities.

If local residents' needs are being met by the currently perceived water quality conditions, then it will be difficult to motivate them to improve conditions. In terms of marketing watershed activities, it would be most effective to communicate activities as necessary to preserve the current level of amenities for the future rather than improving them for activities that may not be broadly supported (e.g. swimming).

YOUR OPINIONS

The questions in this section are designed to elicit a response to specific statements regarding the benefits, sense of personal responsibility and norms surrounding the protection of water quality at the producer or household level.

QUESTIONNAIRE

Please indicate your level of agreement or disagreement with the statements below.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. The economic stability of my community depends upon good water quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Using recommended management practices on farms improves water quality. (Agricultural Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The way that I care for my lawn and yard can influence water quality in local streams and lakes. (Residential Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is my personal responsibility to help protect water quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is important to protect water quality even if it slows economic development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. What I do on my land doesn't make much difference in overall water quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Investing in water quality protection puts the farmer at an economic disadvantage (Agricultural Only).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Farm management practices do not have an impact on water quality. (Agricultural Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lawn and yard-care practices (on individual lots) do not have an impact on water quality. (Residential Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. My actions have an impact on water quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Taking action to improve water quality is too expensive for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. It is okay to reduce water quality to promote economic development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. It is important to protect water quality even if it costs me more.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I would be willing to pay more to improve water quality (for example: through local taxes or fees).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I would be willing to change management practices to improve water quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. The quality of life in my community depends on good water quality in local streams, rivers and lakes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESULTS

A summary of the respondents' perceived benefits and responsibilities is provided in Table 6 and Figure 3. In order to calculate an overall average and standard deviation for each question, the responses "strongly disagree", "disagree", "neither agree nor disagree", "agree" and "strongly agree" were assigned a point value of 1 through 5 respectively. A mean and standard deviation (SD) were then computed using the assigned point value. Figure 4 graphs the mean (illustrated as the horizontal bar), and plus/minus one standard deviation (illustrated as the vertical bar) of the resultant score computed for each question.

Table 6: Perceived Benefits and Responsibilities

		Agricultural (A) Residential (R)	Number of Responses	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Mean	Standard Deviation
	Assigned Points			1	2	3	4	5		
1	The economic stability of my community depends upon good water quality.	A	140 (97%)	0.7%	7.9%	21.4%	48.6%	21.4%	3.82	0.88
		R	193 (95%)	1.6%	6.2%	28.0%	37.3%	26.9%	3.82	0.10
2	Recommended management practices on farms improves water quality	A	141 (97%)	0.0%	1.4%	9.9%	56.0%	32.6%	4.20	0.67
	The way that I care for my lawn and yard can influence water quality	R	196 (97%)	2.6%	5.6%	10.2%	49.5%	32.1%	4.03	0.94
3	It is my personal responsibility to help protect water quality.	A	141 (97%)	0.0%	1.4%	5.7%	63.1%	29.8%	4.21	0.61
		R	194 (96%)	0.0%	1.5%	10.3%	54.6%	33.5%	4.20	0.68
4	It is important to protect water quality even if it slows economic development.	A	141 (97%)	0.0%	5.0%	13.5%	55.3%	26.2%	4.03	0.77
		R	192 (95%)	0.0%	6.3%	22.9%	44.8%	26.0%	3.91	0.86
5	What I do on my land doesn't make much difference in overall water quality.	A	136 (94%)	19.9%	44.1%	17.6%	16.2%	2.2%	2.37	1.05
		R	195 (96%)	27.7%	45.6%	12.8%	11.8%	2.1%	2.15	1.02
6	Investing in water quality protection puts the farmer at an economic disadvantage	A	141 (97%)	8.5%	22.7%	36.2%	29.8%	2.8%	2.96	0.99
7	Farm management practices do not have an impact on water quality	A	142 (98%)	19.7%	61.3%	8.5%	7.7%	2.8%	2.13	0.91
	Lawn and yard-care practices do not have an impact on water quality	R	196 (97%)	28.6%	48.5%	10.2%	9.7%	3.1%	2.10	1.02
8	My actions have an impact on water quality.	A	142 (98%)	0.7%	5.6%	15.5%	64.1%	14.1%	3.85	0.75
		R	195 (96%)	1.5%	4.1%	11.8%	56.9%	25.6%	4.01	0.82
9	Taking action to improve water quality is too expensive for me.	A	137 (94%)	6.6%	24.1%	48.9%	16.8%	3.6%	2.87	0.90
		R	194 (96%)	8.2%	28.9%	46.9%	12.9%	3.1%	2.74	0.90
10	It is okay to reduce water quality to promote economic development.	A	139 (96%)	23.7%	61.2%	10.1%	3.6%	1.4%	1.98	0.78
		R	196 (97%)	32.7%	44.9%	14.3%	6.1%	2.0%	2.00	0.95
11	It is important to protect water quality even if it costs me more.	A	135 (93%)	3.7%	11.9%	37.8%	40.7%	5.9%	3.33	0.90
		R	195 (96%)	2.6%	8.2%	36.4%	42.1%	10.8%	3.50	0.89
12	I would be willing to pay more to improve water quality (for example: through local taxes or fees).	A	139 (96%)	15.8%	28.8%	35.3%	19.4%	0.7%	2.60	1.00
		R	195 (96%)	9.2%	19.0%	33.8%	31.8%	6.2%	3.07	1.06
13	I would be willing to change management practices to improve water quality.	A	138 (95%)	0.7%	6.5%	29.0%	58.7%	5.1%	3.61	0.72
		R	193 (95%)	0.5%	2.1%	25.9%	59.6%	11.9%	3.80	0.69
14	The quality of life in my community depends on good water quality in local streams, rivers and lakes.	A	141 (97%)	0.7%	5.7%	19.1%	63.8%	10.6%	3.78	0.74
		R	195 (96%)	0.0%	6.7%	21.5%	50.8%	21.0%	3.86	0.82

Figure 3: Perceived Benefits and Responsibilities

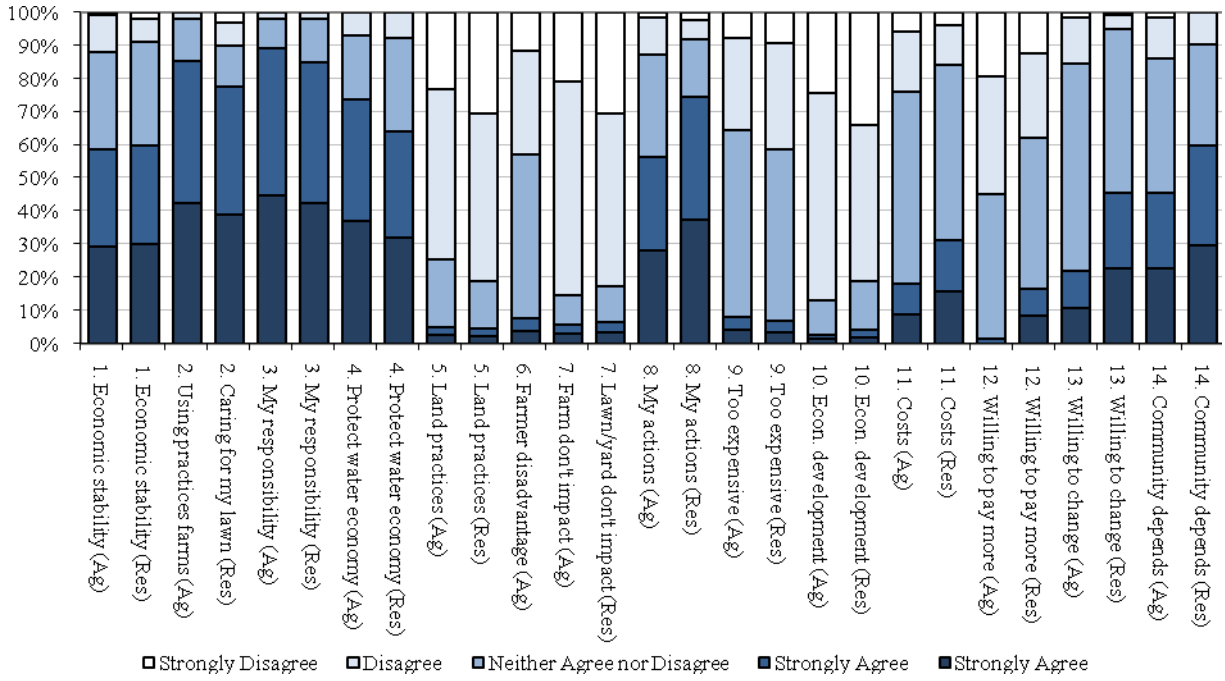
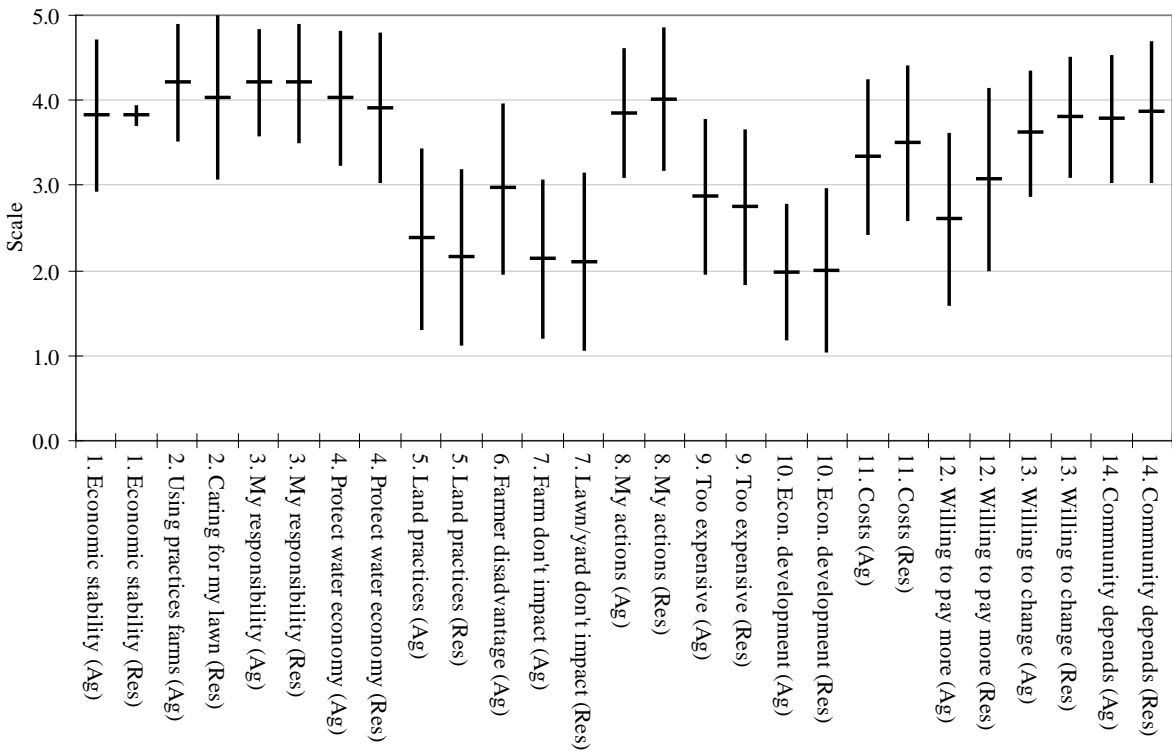


Figure 4: Averaged Benefits and Responsibilities



ANALYSIS AND OBSERVATIONS

The above questions were used to create constructs. These constructs are designed to elicit a respondent's strength of feelings concerning the benefits, personal responsibility, and norms about protecting water quality at the producer or household level. The indicator value for an individual respondent is calculated by averaging the values of their responses. Projected values are the average of individual scores. Some of the questions used to score this indicator are scored in reverse because of negative phrasing. Table 7 below illustrates how the constructs are created from the statements for agricultural respondents. A similar method was used for the residential respondents. Table 8 summarizes the attitudinal results using the same strongly disagree (1) to strongly agree scale (5).

Table 7: Agricultural Grouping for Attitudinal Constructs

Construct	Question number	Reverse coding	Attitudinal Statement
1. Personal Impact	8		My actions have an impact on water quality.
	5	R	What I do on my land doesn't make much difference in overall water quality.
2. Value importance of water quality	1		The economic stability of my community depends upon good water quality.
	14		The quality of life in my community depends on good water quality in streams and rivers.
3. Farm Management Impact	2		Using recommended management practices on farms improves water quality.
	7	R	Farm management practices do not have an impact on water quality.
4. Economics verse water quality	6	R	Investing in water quality protection puts the producer at an economic disadvantage.
	10	R	It is okay to reduce water quality to promote economic development.
	4		It is important to protect water quality even if it slows economic development.
5. Personal Action / Responsibility	3		It is my personal responsibility to help protect water quality.
	12		I would be willing to pay more to improve water quality (for example: through local taxes or fees).
	13		I would be willing to change management practices to improve water quality.
	11		It is important to protect water quality even if it costs me more.
	9	R	Taking action to improve water quality is too expensive for me.

Table 8: Attitudinal Indicator Results

General Water Quality Related Attitudes	Agricultural		Residential	
	Mean (SD)	Valid Answers	Mean (SD)	Valid Answers
1. Construct: Personal impact	3.74(0.91)	278	3.93(0.93)	390
2. Construct: Value importance of water quality	3.80(0.81)	281	3.84(0.89)	388
3. Construct: Farm management impact	4.04(0.82)	283		
4. Construct: Lawn and Yard management impact			3.96(0.98)	392
5. Construct: Economics vs. water quality	3.70(0.97)	421	3.95(0.91)	388
6. Construct: Personal action / responsibility	3.38(0.99)	690	3.57(0.94)	971
OVERALL	3.66(0.95)	1953	3.79(0.95)	2529

SD = standard deviation

Respondents indicated generally strong attitudes for each of the attitudinal constructs. They recognized the importance of having good water quality and that their actions impact it. There was also recognition that the cost of protection (economics) influences decisions. Respondents generally felt responsible for their actions that have an impact on water quality.

These findings are encouraging since it commonly requires a high level of conviction by individuals to carry through with their intentions (to protect water quality) if the barriers to implementation are high. This observation is upheld by the willingness to improve water quality construct results detailed below.

An attitudinal indicator to measure the “willingness to improve water quality” was also constructed . This indicator used the “Practices to Improve Water Quality” responses to construct the indicator and were calculated by first assigning a value of either 1 (No), 1.5 (Maybe), or 2 (Yes) and then summing the new values for each respondent and dividing by the number of practices that “apply”, (i.e., the respondent did not indicate “does not apply” -- the denominator for the Construct Question is the total number of rows for which the individual provided a response other than “does not apply”). Because a mean response can result from several different response patterns, it is also beneficial to know the percentage of respondents who answered in each response category (see the Practices to Improve Water Quality Section).

Table 9: Willingness to Take Action to Improve Water Quality

	Agricultural		Residential	
	Mean (SD)	Valid Answers	Mean (SD)	Valid Answers
Willingness to take action to improve water quality.	1.65 (0.43)	3947	1.74 (0.37)	2583

Respondents indicated an overall willingness to adopt practices to improve water quality. As previously mentioned, this will vary by individual best management practice and depends on the perceived barriers to implementation, but as a group, there was a general tendency toward the adoption of the practices presented.

WATER IMPAIRMENTS

This question asks respondents to indicate from a list, how much of a problem they perceive each of the potential pollutants and conditions to be in their area.

QUESTIONNAIRE

Below is a list of water pollutants and conditions that are generally present in water bodies to some extent. The pollutants and conditions become a problem when present in excessive amounts. In your opinion, how much of a problem are the following water impairments in your area?

	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know
1. Sedimentation/Silt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Nutrients (Phosphorous and Nitrogen) (Residential Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nitrate (Agricultural Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nitrogen (Agricultural Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phosphorus (Agricultural Only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. <i>E. coli</i> (Bacteria)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Trash/Debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Salt/Chlorides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Oil and grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Industrial Discharges (toxic material)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Pesticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Algae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Low Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Invasive Aquatic Plants and/or Animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Low Flow or Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Wildlife Habitat Alteration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Increased Water Temperatures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Turbidity (cloudy water)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESULTS

Table 10 summarizes the results from the survey, and Figure 5 provides the same information in a graphical form. In order to calculate an overall average and standard deviation for each question the responses “not a problem,” “slight problem,” “moderate problem,” and “severe problem” were assigned a numerical point value of 1 through 4 respectively. The “don’t know” response was ignored in the computations. A mean and standard deviation (SD) were then computed using the assigned point value. Figure 6 graphs the mean (illustrated as the horizontal bar) and plus/minus one standard deviation (illustrated as the vertical bar) of the resultant score computed for each question.

Table 10: Perceived Water Impairments

		Agricultural (A) Residential (R)	Number of Responses	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Mean	Standard Deviation
				1	2	3	4			
			Assigned Points							
1	Sedimentation/Silt	A	139 (96%)	19.4%	23.0%	28.1%	5.8%	23.7%	2.26	0.93
		R	191 (94%)	8.9%	14.1%	28.3%	6.3%	42.4%	2.55	0.88
2	Nitrate	A	138 (95%)	22.5%	13.8%	18.1%	7.2%	38.4%	2.16	1.06
	Nitrogen	A	134 (92%)	23.1%	15.7%	17.2%	6.0%	38.1%	2.10	1.02
	Phosphorus	A	133 (92%)	21.1%	14.3%	16.5%	6.8%	41.4%	2.15	1.05
	Nutrients (P and N)	R	190 (94%)	6.3%	12.1%	19.5%	10.0%	52.1%	2.69	0.95
3	<i>E. coli</i>	A	131 (90%)	16.0%	13.0%	22.1%	16.8%	32.1%	2.58	1.11
		R	193 (95%)	10.4%	6.2%	16.1%	27.5%	39.9%	3.01	1.12
4	Trash/Debris	A	135 (93%)	11.1%	23.7%	31.9%	19.3%	14.1%	2.69	0.96
		R	194 (96%)	5.2%	20.1%	29.4%	19.1%	26.3%	2.85	0.89
5	Salt/Chlorides	A	136 (94%)	16.2%	15.4%	22.8%	9.6%	36.0%	2.40	1.03
		R	189 (93%)	6.3%	13.8%	15.9%	11.6%	52.4%	2.69	0.99
6	Oil and grease	A	138 (95%)	31.2%	14.5%	13.0%	10.1%	31.2%	2.03	1.12
		R	191 (94%)	15.2%	14.7%	9.4%	14.7%	46.1%	2.44	1.17
7	Industrial Discharges (toxic material)	A	139 (96%)	28.1%	11.5%	11.5%	16.5%	32.4%	2.24	1.23
		R	189 (93%)	13.8%	8.5%	11.1%	17.5%	49.2%	2.64	1.22
8	Pesticides	A	138 (95%)	28.3%	20.3%	11.6%	8.0%	31.9%	1.99	1.03
		R	193 (95%)	7.3%	11.4%	19.7%	19.7%	42.0%	2.89	1.02
9	Algae	A	133 (92%)	18.8%	18.0%	27.8%	4.5%	30.8%	2.26	0.94
		R	191 (94%)	8.4%	12.6%	26.2%	9.9%	42.9%	2.66	0.94
10	Low Dissolved Oxygen	A	138 (95%)	13.0%	10.1%	13.8%	2.9%	60.1%	2.16	0.98
		R	189 (93%)	5.3%	7.9%	11.6%	3.7%	71.4%	2.48	0.95
11	Invasive Aquatic Plants/Animals	A	138 (95%)	18.8%	15.2%	18.1%	13.8%	34.1%	2.41	1.12
		R	191 (94%)	7.3%	8.9%	17.8%	18.3%	47.6%	2.90	1.04
12	Low Flow or Flooding	A	140 (97%)	13.6%	27.9%	24.3%	20.0%	14.3%	2.59	1.02
		R	193 (95%)	10.9%	15.5%	23.3%	19.7%	30.6%	2.75	1.04
13	Wildlife Habitat Alteration	A	136 (94%)	30.1%	14.0%	14.7%	4.4%	36.8%	1.90	0.99
		R	193 (95%)	13.0%	9.3%	21.2%	14.5%	42.0%	2.64	1.09
14	Increased Water Temperatures	A	136 (94%)	30.1%	9.6%	8.1%	2.9%	49.3%	1.68	0.95
		R	193 (95%)	14.0%	3.6%	17.1%	6.2%	59.1%	2.38	1.11
15	Turbidity (cloudy water)	A	138 (95%)	23.9%	19.6%	16.7%	4.3%	35.5%	2.02	0.95
		R	192 (95%)	13.0%	12.5%	15.6%	11.5%	47.4%	2.49	1.09

Figure 5: Perceived Water Impairments

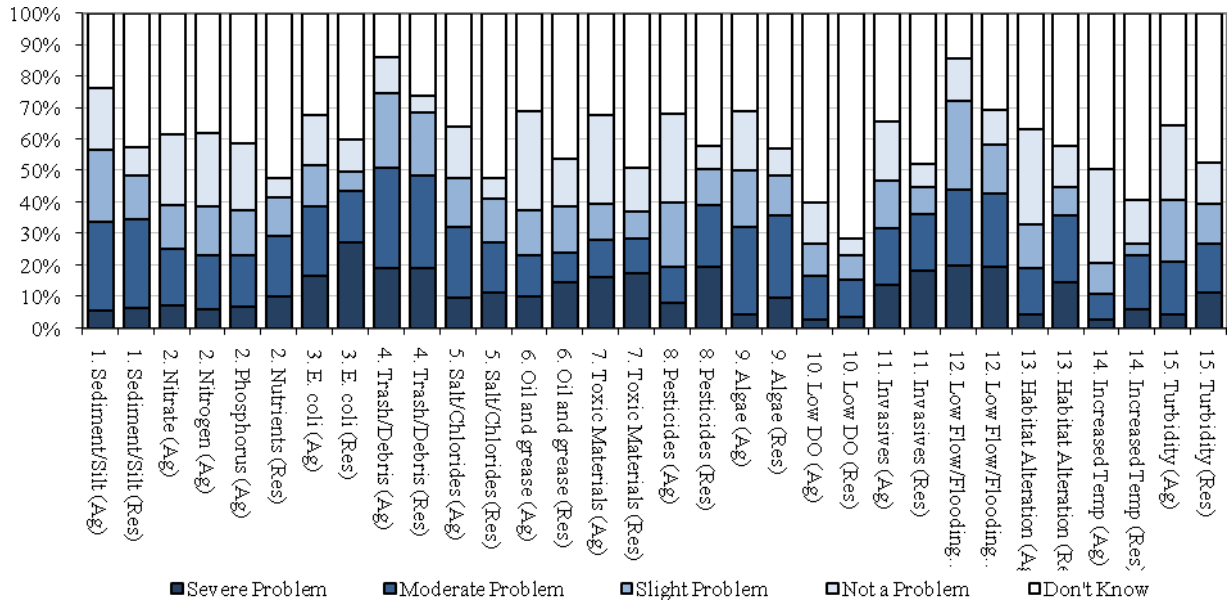
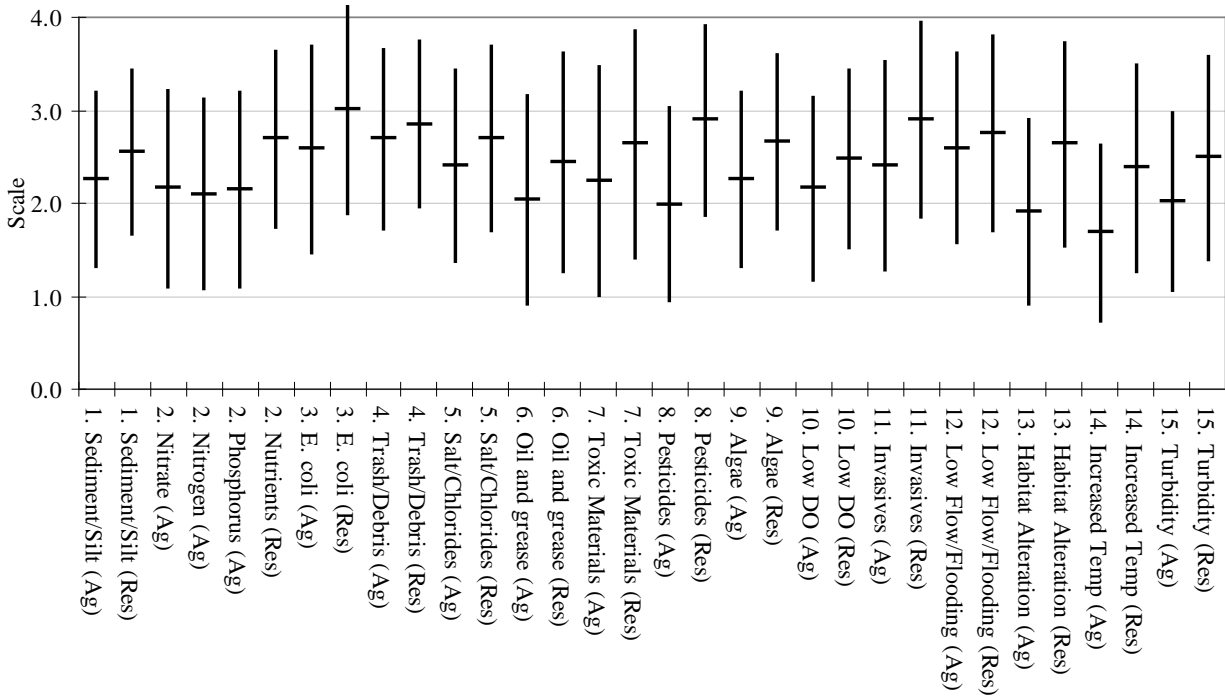


Figure 6: Averaged Water Impairments Results



ANALYSIS AND OBSERVATIONS

Out of a possible 32 questions, 17 agricultural and 15 residential, a total of 5,192 responses were provided. However, 2,113 of these were “don’t know” which equates to forty percent (40%) of all responses. Pollutants most likely to be marked “don’t know” were dissolved oxygen and water temperature. *E. coli*, trash/debris and sedimentation were seen as moderate problems by both sets of respondents. Thirty-one percent (31.2%) of agricultural respondents saw oil and grease as not being a problem, and forty-two percent (41.5%) perceive flow alterations as not being a problem or a being a slight problem.

SOURCES OF WATER POLLUTANTS

This question asks respondents to indicate from a list how much of a problem they perceive each of the potential sources of pollutants to be in their area.

QUESTIONNAIRE

The items listed below are sources of water quality pollution across the country. In your opinion, how much of a problem are the following sources in your area?

	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know
1. Discharges from industry into streams and lakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Discharges from sewage treatment plants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Soil erosion from construction sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Soil erosion from farm fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Soil erosion from shorelines and/or streambanks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Excessive use of lawn fertilizers and/or pesticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Improperly maintained septic systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Manure from farm animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Street salt and sand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Droppings from geese, ducks and other waterfowl/wildlife	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Waste material from pets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Crop production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Pasture grazing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Land development or redevelopment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Residential stormwater runoff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Landfill(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Improper septic discharge (e.g. cheater pipes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Dredging of streams, ditches and drains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Removal of streambank vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Groundwater loadings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Turf management (e.g. golf courses, sports fields)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESULTS

Table 11 summarizes the results from the survey and Figure 7 provides the same information in a graphical form. In order to calculate an overall average and standard deviation for each question, the responses “not a problem,” “slight problem,” “moderate problem,” and “severe problem” were assigned a numerical point value of 1 through 4 respectively. The “don’t know” response was ignored in the computations. A mean and standard deviation (SD) were then computed using the assigned point value. Figure 8 graphs the mean (illustrated as the horizontal bar) and plus/minus one standard deviation (illustrated as the vertical bar) of the resultant score computed for each question.

Table 11: Perceived Sources of Water Pollutants

		Agricultural (A) Residential (R)	Number of Responses	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Mean	Standard Deviation
			Assigned Points	1	2	3	4			
1	Discharges from industry into streams and lakes	A	140 (97%)	26.4%	20.7%	12.1%	11.4%	29.3%	2.12	1.09
		R	197 (97%)	18.3%	13.2%	20.3%	15.2%	33.0%	2.48	1.12
2	Discharges from sewage treatment plants	A	138 (95%)	30.4%	14.5%	11.6%	16.7%	26.8%	2.20	1.21
		R	196 (97%)	17.3%	8.7%	20.4%	15.3%	38.3%	2.55	1.15
3	Soil erosion from construction sites	A	137 (94%)	27.7%	24.1%	23.4%	3.6%	21.2%	2.04	0.92
		R	196 (97%)	16.8%	17.9%	23.0%	10.7%	31.6%	2.40	1.03
4	Soil erosion from farm fields	A	137 (94%)	27.7%	33.6%	18.2%	4.4%	16.1%	1.99	0.87
		R	194 (96%)	12.4%	23.7%	22.2%	8.2%	33.5%	2.40	0.93
5	Soil erosion from shorelines/streambanks	A	139 (96%)	23.0%	30.2%	15.8%	5.8%	25.2%	2.06	0.91
		R	192 (95%)	18.8%	16.7%	21.9%	6.3%	36.5%	2.25	0.99
6	Excessive use of lawn fertilizers/pesticides	A	139 (96%)	18.0%	23.7%	19.4%	15.8%	23.0%	2.43	1.06
		R	197 (97%)	9.6%	18.3%	26.4%	19.3%	26.4%	2.75	0.99
7	Improperly maintained septic systems	A	136 (94%)	24.3%	23.5%	23.5%	2.2%	26.5%	2.05	0.88
		R	194 (96%)	11.3%	17.0%	19.1%	11.9%	40.7%	2.53	1.02
8	Manure from farm animals	A	139 (96%)	41.0%	28.8%	7.2%	1.4%	21.6%	1.61	0.73
		R	193 (95%)	17.6%	15.5%	20.7%	6.7%	39.4%	2.27	1.01
9	Street salt and sand	A	139 (96%)	21.6%	28.8%	25.9%	7.2%	16.5%	2.22	0.93
		R	192 (95%)	11.5%	17.2%	29.2%	9.9%	32.3%	2.55	0.94
10	Droppings from geese, ducks and other waterfowl	A	138 (95%)	24.6%	34.1%	17.4%	7.2%	16.7%	2.09	0.92
		R	196 (97%)	13.8%	20.9%	25.5%	13.3%	26.5%	2.52	1.00
11	Waste material from pets	A	138 (95%)	42.8%	26.1%	8.0%	1.4%	21.7%	1.59	0.75
		R	196 (97%)	28.6%	21.9%	13.8%	2.0%	33.7%	1.84	0.86
12	Crop production (Non-irrigated)	A	136 (94%)	52.2%	22.8%	6.6%	0.0%	18.4%	1.44	0.64
		R	193 (95%)	27.5%	16.6%	14.5%	2.6%	38.9%	1.87	0.92
13	Pasture grazing	A	139 (96%)	56.8%	19.4%	5.0%	0.0%	18.7%	1.36	0.60
		R	195 (96%)	34.9%	14.9%	8.2%	1.5%	40.5%	1.60	0.82
14	Land development or redevelopment	A	137 (94%)	24.8%	19.7%	27.7%	8.8%	19.0%	2.25	1.01
		R	192 (95%)	13.5%	20.3%	22.9%	10.9%	32.3%	2.46	0.99
15	Residential stormwater runoff	A	138 (95%)	19.6%	24.6%	24.6%	13.0%	18.1%	2.38	1.02
		R	190 (94%)	15.3%	17.9%	26.3%	10.5%	30.0%	2.46	1.00
16	Landfill(s)	A	132 (91%)	28.0%	14.4%	16.7%	14.4%	26.5%	2.24	1.16
		R	192 (95%)	16.1%	8.3%	14.6%	17.7%	43.2%	2.60	1.20
17	Septic disposal	A	137 (94%)	24.1%	25.5%	16.1%	8.0%	26.3%	2.11	0.99
		R	193 (95%)	13.0%	16.6%	12.4%	15.0%	43.0%	2.52	1.11
18	Dredging of streams	A	134 (92%)	41.8%	22.4%	7.5%	2.2%	26.1%	1.60	0.79
		R	192 (95%)	22.9%	13.0%	14.1%	6.3%	43.8%	2.06	1.05
19	Removal of riparian vegetation	A	138 (95%)	37.7%	20.3%	10.9%	2.2%	29.0%	1.68	0.84
		R	193 (95%)	16.1%	12.4%	15.0%	8.3%	48.2%	2.30	1.08
20	Groundwater loadings	A	133 (92%)	27.1%	15.8%	6.0%	1.5%	49.6%	1.64	0.81
		R	193 (95%)	10.4%	10.9%	9.8%	0.5%	68.4%	2.02	0.85
21	Turf management (golf courses, sports fields)	A	138 (95%)	24.6%	21.0%	21.7%	5.8%	26.8%	2.12	0.97
		R	196 (97%)	17.9%	19.4%	18.4%	5.1%	39.3%	2.18	0.95

Figure 7: Perceived Sources of Water Pollutants

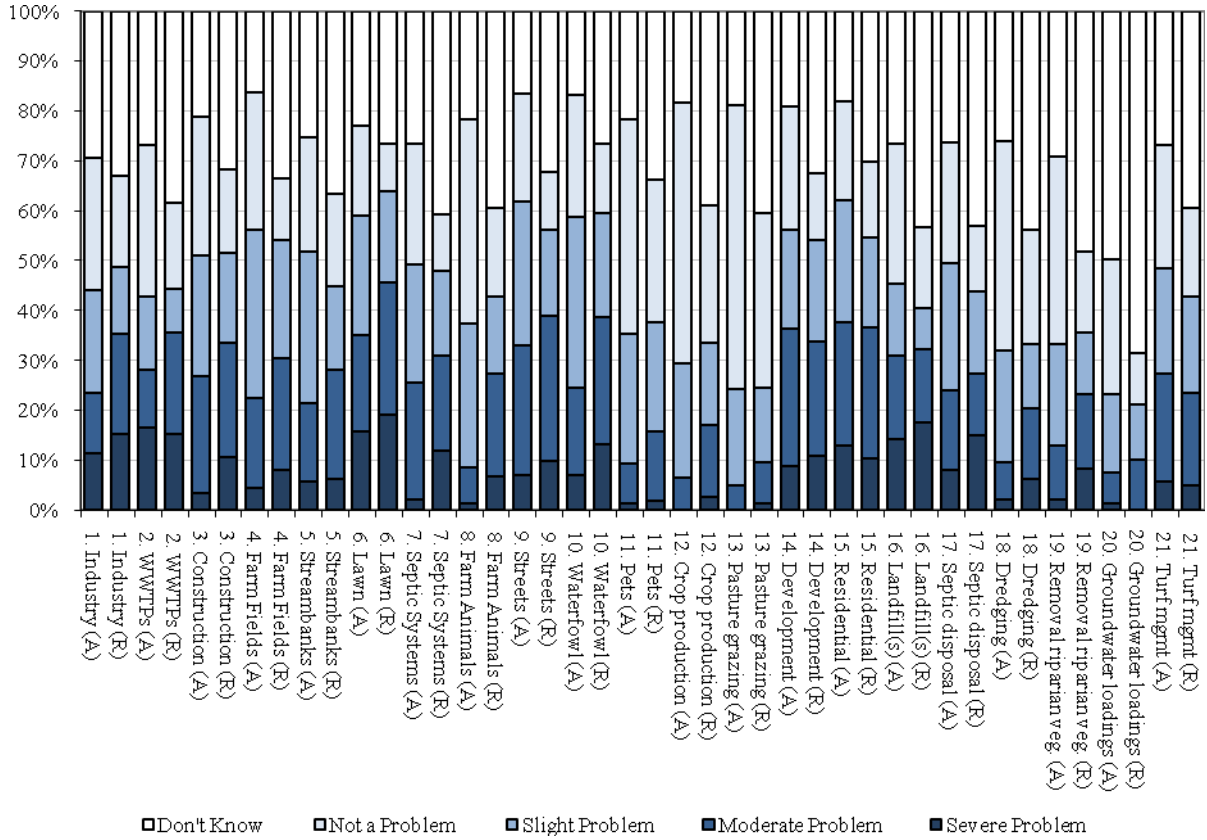
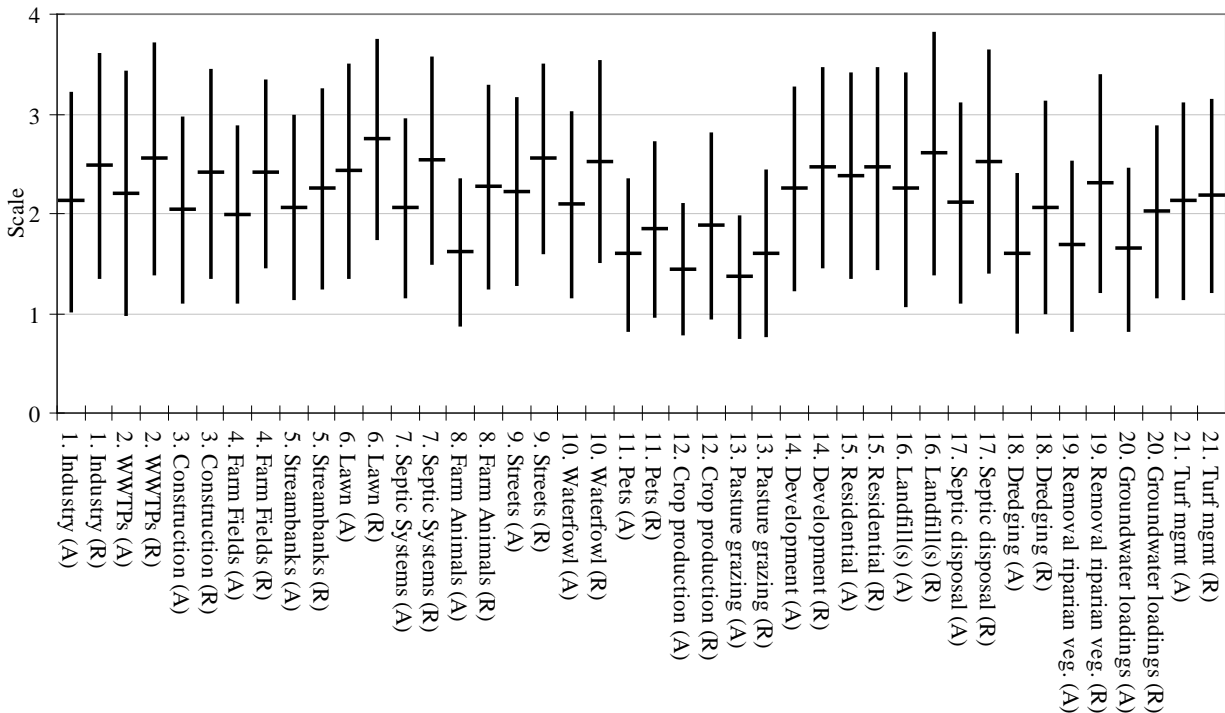


Figure 8: Averaged Sources of Water Pollutants



ANALYSIS AND OBSERVATIONS

Out of a possible 42 questions, 21 agricultural and 21 residential, a total of 6,954 responses were provided. However 2,238 of these were “don’t know,” which is equivalent to thirty-two percent (32.2%) of all responses. The most frequently marked source as “don’t know” was *groundwater loadings*; 68.4% by residential and 49.6% by agricultural. Residential respondents ranked the following other sources more than 40% of the time as “don’t know”: *removal of riparian vegetation* (48.2%), *dredging of streams* (43.8%), *landfills* 43.2%), *septic disposal* (43%), *improperly maintained septic systems* (40.7%) and *pasture grazing* (40.5%). Agricultural respondents appear more confident in their answers by marking the “don’t know” response on average 14% less than the residential respondents.

The top three sources identified by the agricultural respondents as “not a problem” included *pasture grazing* (56.8%), *non-irrigated crop production* (52.2%), and *waste material from pets* (42.8%) followed closely by *dredging of streams* (41.8%) and *manure from farm animals* (41.0%). The top three sources identified by the residential respondents as “not a problem” included *pasture grazing* (34.9%), *waste material from pets* (28.6%) and *non-irrigated crop production* (27.5%).

The top three “severe problem” sources identified by the agricultural respondents were *discharge from sewage treatment plants* (16.7%), *excessive use of lawn fertilizers and/or pesticides* (15.8%), and *landfills* (14.4%). The top three “severe problems” included listed by residential respondents were *excessive use of lawn fertilizers and/or pesticides* (19.3%), *landfills* (17.7%), and *discharge from sewage treatment plants* (15.3%).

When considering the assigned point value of the responses and averaging the data together, the sources ranked highest were: *excessive use of lawn fertilizers and/or pesticides* (2.43), *residential stormwater runoff* (2.38), and *land development/redevelopment* (2.25) for the agricultural respondents. The corresponding residential responses were: *excessive use of lawn fertilizers and/or pesticides* (2.75), *landfills* (2.60), and a tie between *discharges from sewage treatment plants* and *street salt/sand* (2.55). The agricultural respondents consistently ranked the sources of pollutants less severe than did the residential respondents.

CONSEQUENCES OF WATER POLLUTANTS

This series of questions asks respondents to indicate from a list, how much of a problem they perceive each of the consequences of poor water quality to be in their area.

QUESTIONNAIRE

Poor water quality can lead to a variety of consequences for communities. In your opinion, how much of a problem are the following issues in your area?

	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know
1. Contaminated drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Polluted swimming areas/beach closures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Contaminated fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. High drinking water treatment costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Loss of desirable fish species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Reduced beauty of lakes or streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Reduced opportunities for water recreation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Excessive aquatic plants or algae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Fish kills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Odor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESULTS

Table 12 summarizes the results from the survey, and Figure 9 provides the same information in a graphical form. In order to calculate an overall average and standard deviation for each question, the responses “not a problem”, “slight problem”, “moderate problem”, and “severe problem” were assigned a numerical point value of 1 through 4 respectively. The “don’t know” response was ignored in the computations. A mean and standard deviation (SD) were then computed using the assigned point value. Figure 10 graphs the mean (illustrated as the horizontal bar) and plus/minus one standard deviation (illustrated as the vertical bar) of the resultant score computed for each question.

Table 12: Perceived Consequences of Water Pollutants

		Agricultural (A) Residential (R)	Number of Responses	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Mean	Standard Deviation
			Assigned Points	1	2	3	4			
1	Contaminated drinking water	A	139 (96%)	43.9%	25.9%	6.5%	6.5%	17.3%	1.70	0.92
		R	196 (97%)	40.3%	14.3%	12.2%	8.7%	24.5%	1.86	1.07
2	Polluted swimming areas/beach closures	A	138 (95%)	25.4%	23.2%	20.3%	15.2%	15.9%	2.30	1.09
		R	195 (96%)	15.4%	12.8%	28.2%	21.5%	22.1%	2.72	1.08
3	Contaminated fish	A	136 (94%)	25.7%	22.1%	16.2%	11.8%	24.3%	2.18	1.07
		R	189 (93%)	14.3%	10.6%	24.9%	19.6%	30.7%	2.72	1.09
4	High drinking water costs	A	138 (95%)	31.2%	15.9%	18.1%	5.8%	29.0%	1.98	1.02

		Agricultural (A) Residential (R)	Number of Responses	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Mean	Standard Deviation
	treatment costs	R	194 (96%)	20.1%	10.8%	25.8%	10.3%	33.0%	2.39	1.07
5	Loss of desirable fish species	A	137 (94%)	26.3%	19.7%	12.4%	9.5%	32.1%	2.08	1.07
		R	192 (95%)	13.0%	12.0%	17.7%	17.2%	40.1%	2.65	1.12
6	Reduced beauty of lakes or streams	A	139 (96%)	33.8%	28.1%	15.1%	9.4%	13.7%	2.00	1.00
		R	194 (96%)	17.5%	20.1%	23.7%	17.5%	21.1%	2.52	1.07
7	Reduced opportunities for water recreation	A	139 (96%)	33.1%	23.0%	18.0%	5.8%	20.1%	1.95	0.97
		R	193 (95%)	19.2%	15.5%	25.9%	15.0%	24.4%	2.49	1.08
8	Excessive aquatic plants or algae	A	138 (95%)	19.6%	23.2%	19.6%	10.9%	26.8%	2.30	1.03
		R	191 (94%)	11.0%	16.8%	20.4%	15.2%	36.6%	2.63	1.03
9	Fish kills	A	138 (95%)	34.1%	16.7%	8.0%	7.2%	34.1%	1.82	1.03
		R	191 (94%)	16.2%	15.2%	14.7%	12.0%	41.9%	2.39	1.11
10	Odor	A	139 (96%)	41.7%	18.0%	11.5%	5.0%	23.7%	1.74	0.95
		R	195 (96%)	25.6%	20.0%	15.4%	11.8%	27.2%	2.18	1.09

Figure 9: Perceived Consequences of Water Pollutants

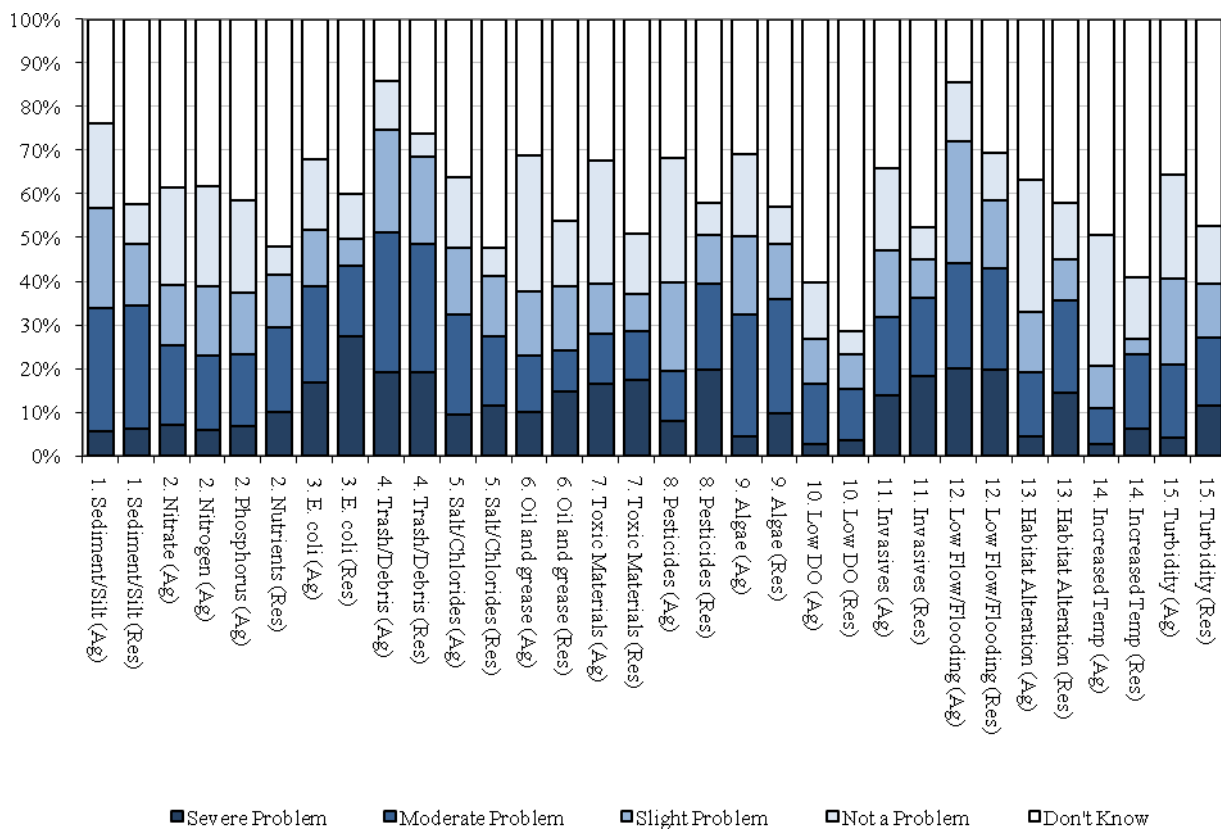
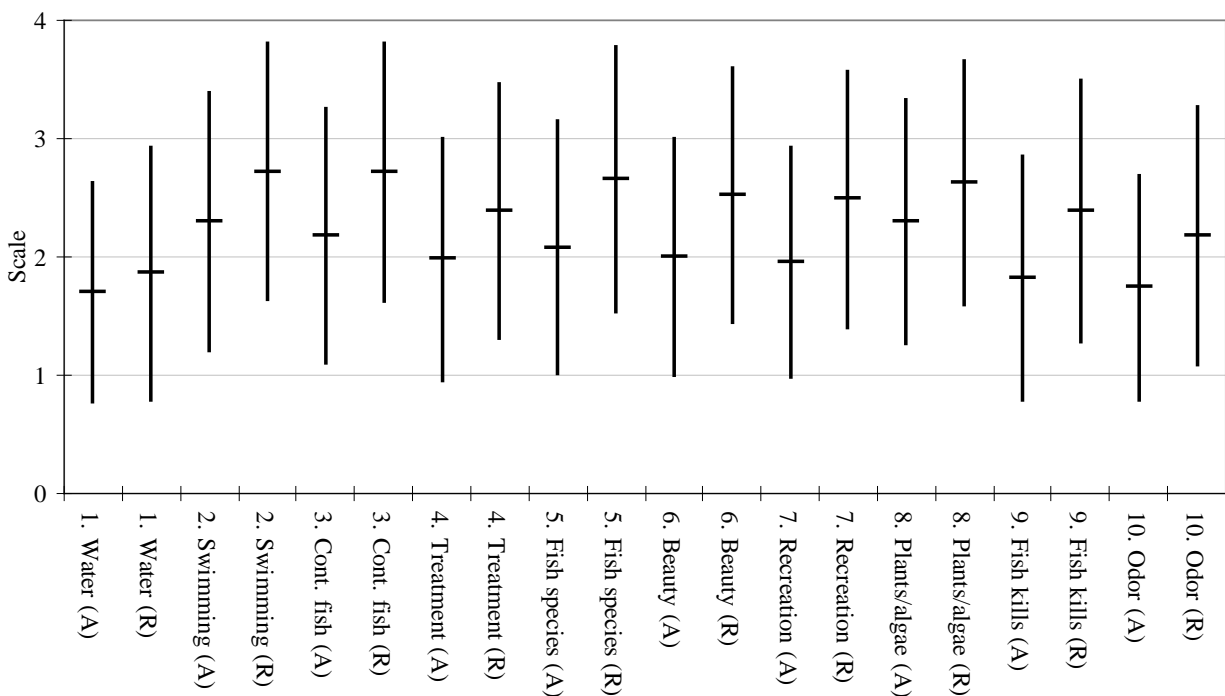


Figure 10: Averaged Consequences of Water Pollutants



ANALYSIS AND OBSERVATIONS

Out of a possible 20 questions, 10 agricultural and 10 residential, a total of 3,311 responses were provided. However, 908, or twenty-seven percent (27.4%) of these were “don’t know.” More than a third of the residential respondents indicated that they did not know if the following problems were in their area: *fish kills* (41.9%), *loss of desirable fish species* (40.1%), *excessive aquatic plants or algae* (36.6%), and *high drinking water treatment costs* (33.0%). Similarly the agricultural respondents did not know if *fish kills* (34.1%) were a problem.

Agricultural respondents indicated that the top three issues that were “not a problem” were *contaminated drinking water* (43.9%), *odor* (41.7%), and *fish kills* (34.1%). The corresponding top three issues identified by the residential respondents were *contaminated drinking water* (40.3%), *odor* (25.5%), and *high drinking water treatment costs* (20.1%).

Both the agricultural and residential respondents indicated that *polluted swimming areas* (agricultural 15.2%, residential 21.5%) and *contaminated fish* (agricultural 11.8% and residential 19.6%) were severe problems. The agricultural respondents marked *excessive aquatic plants or algae* (10.9%) as their third ranked severe problem whereas the residential respondents selected *reduced beauty of lakes or streams* (17.5%).

When considering the assigned point value of the responses and averaging the data together, the perceived problems ranked highest were *polluted swimming areas* and *excessive aquatic plants or algae* for both sets of respondents. The agricultural respondents consistently ranked the sources of pollutants less severe than the residential respondents.

PRACTICES TO IMPROVE WATER QUALITY - RESIDENTIAL

Property owners were asked their opinion on nineteen (19) stormwater management practices. The questions are intended to measure overall awareness, experience, and willingness to use practices tied to improving water quality. Respondents were asked to indicate one of the following: does not apply; never heard of it; I've heard of it, but I'm not very familiar with it; I am familiar with it, but I've never done it; I have tried it, but I no longer do it; I currently use it. They were also asked whether they would be willing to adopt the management practice if they had not already done so; Yes); might be willing to adopt the practice (Maybe) and would not be willing to adopt the practice (No).

QUESTIONNAIRE

The practices below have the potential to improve water quality in your area. Please indicate which statement most accurately describes your level of experience with each practice. Be sure to answer part "A" and part "B" for this set of practices.

	A. Please indicate which statement most accurately describes your level of experience with each practice.						B. Would you be willing to try or continue using this practice?		
	Does not apply	I've never heard of it.	I've heard of it, but I'm not very familiar with it.	I am familiar with it, but I've never done it.	I have tried it, but I no longer do it.	I currently use it.	Yes	No	Maybe
Household Management									
1. Follow fertilizer instructions for lawn/gardens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Create a rain garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Keep leaves/grass clippings out of roads/ditches/gutters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Follow pesticide application instructions lawn/garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Use phosphate free fertilizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Properly dispose of pet waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Properly dispose of household waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Use rain barrels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Not planting trees and shrubs over the septic system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Close abandoned well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Manage roof runoff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woodland Management									
12. Plant native trees/shrubs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ponds									
13. Construct pond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Seal or line pond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoreline/Streambank Restoration									
15. Stabilize natural river/creek channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Plant vegetated riparian buffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Plant forested riparian buffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Protect streambanks/shorelines with vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Protect streambanks and/or shorelines with structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESULTS

Results of the survey are tabulated in Table 13.

Table 13: Residential Practices to Improve Water Quality

	Number of Responses	A. Please indicate which statement most accurately describes your level of experience with each practice.						B. Would you be willing to try or continue using this practice?		
		Does not apply	I've never heard of it	I've heard of it, but I'm not very familiar with it	I am familiar with it, but I've never done it	I have tried it, but I no longer do it	I currently use it	Yes	No	Maybe
Household Management										
1. Fertilizer instructions	190 (94%)	17.4%	3.2%	3.7%	3.2%	2.1%	70.5%	91.1%	2.6%	6.3%
2. Create a rain garden	185 (91%)	20.0%	52.4%	10.3%	16.2%	0.0%	1.1%	31.4%	27.6%	41.1%
3. Leaves/grass clippings	189 (93%)	15.3%	2.1%	3.7%	3.2%	3.2%	72.5%	87.3%	5.8%	6.9%
4. Pesticide instruction	190 (94%)	22.6%	1.1%	3.2%	3.7%	3.2%	66.3%	87.9%	5.3%	6.8%
5. Phosphate free fertilizer	188 (93%)	26.6%	18.1%	13.3%	14.9%	2.7%	24.5%	60.6%	12.2%	27.1%
6. Pet waste	189 (93%)	41.3%	9.0%	3.2%	2.6%	1.6%	42.3%	81.5%	11.6%	6.9%
7. Household waste	190 (94%)	3.7%	0.0%	3.7%	7.9%	3.7%	81.1%	90.0%	3.7%	6.3%
8. Use rain barrels	184 (91%)	27.7%	12.0%	14.1%	36.4%	3.8%	6.0%	38.6%	29.3%	32.1%
9. Septic system	186 (92%)	42.5%	3.2%	1.6%	4.8%	0.5%	47.3%	82.3%	12.4%	5.4%
10. Close abandoned well	187 (92%)	75.4%	5.9%	2.1%	5.3%	1.1%	10.2%	74.3%	13.9%	11.8%
11. Manage roof runoff	188 (93%)	13.8%	12.2%	10.1%	10.6%	1.1%	52.1%	81.9%	6.4%	11.7%
Woodland Management										
12. Plant trees/shrubs	189 (93%)	17.5%	6.9%	4.8%	16.4%	3.2%	51.3%	80.4%	9.5%	10.1%
Ponds										
13. Construct pond	188 (93%)	58.5%	2.7%	6.4%	18.6%	2.1%	11.7%	54.8%	30.9%	14.4%
14. Seal or line pond	185 (91%)	62.2%	5.9%	7.6%	17.3%	1.6%	5.4%	49.2%	35.1%	15.7%
Shoreline/Streambank										
15. Stabilize channel	188 (93%)	45.7%	21.8%	12.2%	14.9%	0.5%	4.8%	43.1%	25.5%	31.4%
16. Vegetated buffer	187 (92%)	38.0%	39.6%	7.5%	10.7%	0.0%	4.3%	37.4%	19.8%	42.8%
17. Forested buffer	186 (92%)	38.2%	41.4%	6.5%	11.3%	0.0%	2.7%	38.7%	21.0%	40.3%
18. Streambanks vegetation	189 (93%)	45.5%	10.1%	19.0%	17.5%	0.5%	7.4%	49.2%	16.9%	33.9%
19. Streambanks structure	187 (92%)	50.8%	13.9%	18.7%	14.4%	1.1%	1.1%	33.2%	30.5%	36.4%

ANALYSIS AND OBSERVATIONS

For discussion purposes the nineteen (19) management practices are organized into the following categories: 1) greater than fifty percent (50%) of the respondents have already adopted the practice 2) mixed results and; 3) greater than forty percent (40%) of respondents indicated that the management practice “does not apply.”

Over 50% of Respondent's Currently Use

Questions that fell in this grouping included those on fertilizer instructions, leaves/grass clippings, pesticide instruction, household waste, managing roof runoff and planting trees/shrubs. Response rates range from fifty-one to eighty-one percent (51.3% to 81.1%) in this grouping. There is a nine percent

(9%) or greater spread between the “currently use” and the “willing to adopt” categories. This illustrates opportunities for small gains for further adoption of these management practices.

The message for these management practices should be a two pronged approach that 1) positively reinforces the adoption of these practices and 2) communicates the correct management techniques.

Mixed Use

Respondents gave no clear answer for the management practices in the mixed results category. Responses were not distributed evenly throughout the possible answers, but there was a tendency towards either the “does not apply” or “never heard of it” answers. Management practices for rain gardens and riparian buffers (questions numbered 2, 16 and 17) all have relatively high response rates for the “never heard of it” category. This indicates that the public is unfamiliar with these terms.

The relatively high response rate for *use a rain barrel* in the “I am familiar with it but have never done it” coupled with the mediocre willingness to adopt this management practice suggests there is either a misconception about their applicability or a perceived barrier to adoption.

Overall, the responses in this category point to the need for education on basic stormwater management concepts, as well as application techniques. The generally mixed rating in the “willing to adopt category” further reinforces this dual need.

Majority of Respondents (greater than 40%) replied "Does Not Apply"

Questions in this grouping included those on pet waste, septic systems, closing abandoned wells, ponds, stabilize channel, and streambank vegetation and structure. For each of the management practices in this group, the response rate in the “does not apply category” was over forty percent (40%). This indicates that there may not be many opportunities for the public at large to implement these practices. The management practices in this grouping may, in fact, not apply if the landowner does not reside adjacent to a river or have sufficient property for their implementation. The exception to this is the question on closing a well (question number 10) which requires that the landowner have a well in need of closing.

The general willingness to adopt these management practices, even though not all respondents will be able to implement them, points to the need to develop programs targeted to specific residents.

PRACTICES TO IMPROVE WATER QUALITY – AGRICULTURAL

Agricultural respondents were asked their opinion on forty-three (43) stormwater management practices. The majority of practices are specific to farming operations, while some are broader in scope and relate to the management of any household. The questions are intended to measure overall awareness, experience, and willingness to use practices tied to improving water quality. Respondents were asked to indicate one of the following: does not apply; never heard of it; I've heard of it, but I'm not very familiar with it; I am familiar with it, but I've never done it; I have tried it, but I no longer do it; I currently use it. They were also asked whether they would be willing to adopt the practice (if they had not already done so); (Yes); might be willing to adopt the practice (Maybe) and would not be willing to adopt the practice (No).

QUESTIONNAIRE

The practices below have the potential to improve water quality in your area. Please indicate which statement most accurately describes your level of experience with each practice. Be sure to answer part "A" and part "B" for this set of practices.

A. Please indicate which statement most accurately describes your level of experience with each practice. B. Would you be willing to try or continue using this practice?

	Does not apply	I've never heard of it.	I've heard of it, but I'm not very familiar with it.	I am familiar with it, but I've never done it.	I have tried it, but I no longer do it.	I currently use it.	Yes	No	Maybe
Nutrient Management									
1. Follow a comprehensive nutrient management plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Conduct regular soil tests for pH, phosphorus, nitrogen, and potassium, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Use manure in accordance with its nutrient content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Consider the nitrogen contribution from legumes in rotation when establishing nitrogen fertilizer application	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Consider location and soil characteristics to minimize leaching or runoff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Avoid fall application of manure or nitrogen fertilizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Use variable rate application technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Calibrate of fertilizer application equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pesticide Management									
9. Use integrated pest management strategies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Calibrate of pesticide application equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Replace applicators with more precise equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Erosion and Sediment Management									
12. Use conservation tillage to reduce erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Construct a sediment basin to reduce erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Use a field ditch for surface drainage to reduce erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Rotate crops to maintain/improve soil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Use cover crops for erosion and soil improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Manage irrigation water to reduce erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Use a grassed waterway to reduce erosion and soil loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A. Please indicate which statement most accurately describes your level of experience with each practice.

B. Would you be willing to try or continue using this practice?

	Does not apply	I've never heard of it.	I've heard of it, but I'm not very familiar with it.	I am familiar with it, but I've never done it.	I have tried it, but I no longer do it.	I currently use it.	Yes	No	Maybe	
19. Use herbaceous wind barriers to reduce field soil loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. Use a filter strip to trap sediment below a critical area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Woodland Management										
21. Plant trees/shrubs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
22. Restore native plant communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
23. Follow a forest management plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Wetland Management										
24. Create wetland	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
25. Restore wetland	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ponds										
26. Construct pond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
27. Seal or line pond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shoreline/Streambank Restoration										
28. Stabilize natural channel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
29. Plant vegetated riparian buffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
30. Plant forested riparian buffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
31. Protect streambanks/shorelines with vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
32. Protect streambanks and/or shorelines with structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Wildlife Management										
33. Improve upland wildlife habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other										
34. Close abandoned well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
35. Manage roof runoff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Household Management										
36. Follow lawn/garden fertilizer instructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
37. Create a rain garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
38. Keep leaves/grass clippings out of roads/ditches/gutters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
39. Follow lawn/garden pesticide application instructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
40. Use phosphate free fertilizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
41. Properly dispose of pet waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
42. Properly dispose of household waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
43. Use rain barrels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

RESULTS

Results of the survey are tabulated in Table 14.

Table 14: Agricultural Practices to Improve Water Quality

	Number of Responses	A. Please indicate which statement most accurately describes your level of experience with each practice.						B. Would you be willing to try or continue using this practice?		
		Does not apply	I've never heard of it	I've heard of it, but I'm not very familiar with it	I am familiar with it, but I've never done it	I have tried it, but I no longer do it	I currently use it	Yes	No	Maybe
Nutrient Management										
1. Comprehensive plan	131 (90%)	16.0%	11.5%	15.3%	11.5%	3.1%	42.7%	59.5%	19.1%	21.4%
2. Soil tests	134 (92%)	12.7%	2.2%	6.0%	6.0%	12.7%	60.4%	73.1%	9.7%	17.2%
3. Use manure	130 (90%)	46.9%	3.1%	6.2%	10.8%	8.5%	24.6%	55.4%	25.4%	19.2%
4. Nitrogen from legumes	135 (93%)	24.4%	5.2%	9.6%	7.4%	5.2%	48.1%	65.2%	17.0%	17.8%
5. Adjust in risk areas	132 (91%)	18.9%	1.5%	7.6%	6.8%	2.3%	62.9%	72.0%	15.9%	12.1%
6. Avoid fall application	135 (93%)	28.1%	3.7%	4.4%	7.4%	3.0%	53.3%	64.4%	20.0%	15.6%
7. Use variable rate	132 (91%)	20.5%	3.0%	4.5%	22.7%	3.8%	45.5%	59.8%	20.5%	19.7%
8. Calibrate equipment	135 (93%)	19.3%	2.2%	0.7%	3.0%	1.5%	73.3%	80.0%	11.1%	8.9%
Pesticide Management										
9. Integrated strategies	134 (92%)	20.1%	5.2%	6.7%	5.2%	4.5%	58.2%	70.1%	16.4%	13.4%
10. Calibrate equipment	134 (92%)	23.1%	3.0%	1.5%	1.5%	4.5%	66.4%	76.9%	14.9%	8.2%
11. Replace equipment	133 (92%)	30.1%	2.3%	3.8%	11.3%	3.8%	48.9%	61.7%	18.8%	19.5%
Erosion Sediment Mgmt										
12. Use no-till	133 (92%)	22.6%	1.5%	2.3%	6.0%	3.0%	64.7%	71.4%	16.5%	12.0%
13. Sediment basin	132 (91%)	38.6%	3.8%	8.3%	18.2%	4.5%	26.5%	51.5%	31.8%	16.7%
14. Field ditch	132 (91%)	22.0%	1.5%	1.5%	2.3%	3.8%	68.9%	78.0%	14.4%	7.6%
15. Rotate crops	132 (91%)	19.7%	0.0%	0.8%	2.3%	1.5%	75.8%	83.3%	12.1%	4.5%
16. Cover crops	129 (89%)	24.0%	0.0%	1.6%	9.3%	7.8%	57.4%	70.5%	18.6%	10.9%
17. Irrigation water	133 (92%)	55.6%	0.0%	3.0%	9.0%	0.8%	31.6%	42.9%	42.9%	14.3%
18. Grassed waterways	134 (92%)	28.4%	0.7%	4.5%	8.2%	2.2%	56.0%	67.9%	17.9%	14.2%
19. Wind barriers	133 (92%)	48.9%	5.3%	5.3%	18.8%	3.0%	18.8%	42.1%	36.1%	21.8%
20. Filter strip	134 (92%)	47.0%	5.2%	6.7%	14.9%	1.5%	24.6%	47.8%	29.9%	22.4%
Woodland Management										
21. Plant trees/shrubs	133 (92%)	32.3%	3.0%	3.0%	17.3%	1.5%	42.9%	60.2%	23.3%	16.5%
22. Restore native plants	133 (92%)	45.1%	3.8%	4.5%	23.3%	3.0%	20.3%	39.1%	39.1%	21.8%
23. Forest mgmt plan	133 (92%)	45.1%	1.5%	9.0%	18.8%	3.8%	21.8%	36.8%	38.3%	24.8%
Wetland Management										
24. Create wetland	127 (88%)	59.8%	1.6%	3.9%	25.2%	3.1%	6.3%	17.3%	64.6%	18.1%
25. Restore wetland	132 (91%)	56.1%	0.8%	6.1%	26.5%	3.0%	7.6%	22.0%	56.8%	21.2%
Pond Management										
26. Construct pond	134 (92%)	51.5%	0.0%	2.2%	20.9%	1.5%	23.9%	38.1%	47.0%	14.9%
27. Seal or line pond	130 (90%)	63.8%	1.5%	3.8%	24.6%	0.8%	5.4%	15.4%	66.9%	17.7%
Streambank Restoration										
28. Restore nat. channel	130 (90%)	60.8%	5.4%	4.6%	18.5%	2.3%	8.5%	34.6%	39.2%	26.2%
29. Plant vegetated buffer	123 (85%)	54.5%	6.5%	10.6%	17.9%	0.8%	9.8%	31.7%	40.7%	27.6%
30. Plant forested buffer	130 (90%)	57.7%	6.2%	10.8%	16.9%	2.3%	6.2%	19.2%	45.4%	35.4%
31. Protect with vegetation	131 (90%)	44.3%	3.8%	11.5%	13.0%	1.5%	26.0%	44.3%	32.1%	23.7%
32. Protect with structures	131 (90%)	52.7%	5.3%	9.2%	17.6%	1.5%	13.7%	28.2%	45.0%	26.7%

	Number of Responses	A. Please indicate which statement most accurately describes your level of experience with each practice.						B. Would you be willing to try or continue using this practice?		
		Does not apply	I've never heard of it	I've heard of it, but I'm not very familiar with it	I am familiar with it, but I've never done it	I have tried it, but I no longer do it	I currently use it	Yes	No	Maybe
Wildlife Management										
33. Improve habitat	130 (90%)	40.0%	0.8%	9.2%	23.1%	1.5%	25.4%	43.4%	36.4%	20.2%
Other										
34. Plug well	128 (88%)	47.7%	0.0%	2.3%	15.6%	2.3%	32.0%	64.1%	27.3%	8.6%
35. Manage roof runoff	121 (83%)	28.9%	4.1%	0.8%	14.9%	1.7%	49.6%	64.5%	20.7%	14.9%
36. Fertilizing lawn	131 (90%)	23.7%	0.8%	0.8%	3.1%	0.0%	71.8%	85.5%	10.7%	3.8%
Household Management										
37. Create a rain garden	127 (88%)	44.9%	18.1%	8.7%	17.3%	0.8%	10.2%	32.3%	45.7%	22.0%
38. Grass clippings	129 (89%)	15.5%	0.8%	3.1%	8.5%	0.8%	71.3%	82.2%	7.0%	10.9%
39. Fertilizer instructions	131 (90%)	17.6%	0.0%	0.8%	2.3%	0.0%	79.4%	90.1%	6.9%	3.1%
40. Phosphate free fertilize	126 (87%)	32.5%	7.1%	6.3%	23.8%	4.8%	25.4%	39.7%	38.1%	22.2%
41. Pet waste	123 (85%)	44.7%	4.9%	1.6%	4.9%	0.0%	43.9%	74.8%	14.6%	10.6%
42. Household waste	128 (88%)	5.5%	0.0%	0.8%	3.1%	0.0%	90.6%	90.6%	3.9%	5.5%
43. Use rain barrels	129 (89%)	34.9%	5.4%	8.5%	31.8%	7.8%	11.6%	29.5%	43.4%	27.1%

ANALYSIS AND OBSERVATIONS

The forty-three (43) stormwater management practices were placed into the following groupings: 1) greater than fifty percent (50%) of the respondents have already adopted the practice; 2) mixed results and; 3) greater than forty percent (40%) of respondents indicated that the management practices “did not apply” to their situation.

Greater than 50% of Respondents Currently Use

One-third (15 out of 43) of the questions fall into this category. Questions included in this grouping include half of the nutrient management questions, most of the pesticide, erosion and sediment questions, 3 out of 7 of the household management questions, and the question on fertilizing lawns.

For the questions in this group, when the percentage for “currently using” is added to the “does not apply” responses all but *conduct a regular soil test* (question number 2) and *integrated pest management* (question number 9) sum to greater than eighty percent (80%). This indicates that there is little room for an increase in the number of farming operations that are able to adoption these BMPs. With regard to *conducting a regular soil test*, 12% of respondents indicated that they have conducted a soil test but no longer do so. This would seem to indicate that some respondents feel there may not be a need to continually conduct soil testing.

The message for these management practices should be a two pronged approach that 1) positively reinforces the adoption of these practices and 2) communicates the correct management techniques.

There may be more opportunity to have people adopt some practices in this group by dispelling commonly held misconceptions. This is based on the greater than 10% spread between the “currently use it” and the “willing to use it” totals for some of the management practices. Also, there may be some misconceptions by the general farming population. For example, 28.9% of respondents indicated that

managing runoff from roof tops is not applicable when in it is more likely that they are not aware of the various management practices available (e.g. rain barrels and rain gardens) for managing roof runoff.

Mixed Results

Respondents as a group gave no clear answer for each of the management practices in the mixed results category. Responses were not distributed evenly throughout the possible answers, but there was a tendency towards “currently using it” answer. However the willingness to adopt cumulative response totals were higher than the “currently using” totals, sometimes significantly (25% difference).

Significant findings surround the *use of a nutrient management plan, phosphorous free fertilizer and rain barrels*. With regard to the use of a *nutrient management plan*, 11.5% of respondents said that they had “never heard of it” and 15.3% said that they “had heard of it but do not use it.” Together with the almost 60% “willing to adopt” result would seem to indicate there is an unmet need in the community.

Perhaps the management practice with the greatest opportunity to increase adoption by the agricultural community is to *properly dispose of pet waste*. Although 43.9% and 44.7% of respondents indicated that they currently use the practice or it does not apply to them, 74.8% of those with pets said that they would be willing to try or continue using the practice. This represents an over 30% potential increase in adoption of the practice.

Majority of Respondents (> 40%) replied "Does Not Apply"

Eighteen out of 43 questions (42%) of the questions fall in this grouping. Questions in this grouping include the use of manure for nutrient management; no pesticide management questions; one third of the erosion and sediment questions; two-thirds of the woodland management questions; all of the wetland, pond, streambank, and wildlife management questions; and the questions on properly closing abandoned wells, and properly disposing of pet waste.

Use manure in accordance with its nutrient content received an 8.5% rating in the “I have tried it, but I no longer do it” category. Similar to the *soil testing* management practice discussed above, the application of manure result would seem to indicate that some respondents feel there may not be a need to continually check whether they are applying manure in accordance with its nutrient content. This message should be continually reinforced with the farm community.

This group of questions can be further sub-divided based on the willingness to adopt. For about half of the questions the respondents indicated that more than 40% of the time, they would not be willing to use this management practice. Management practices that fall into this sub-grouping include: managing irrigation water to reduce erosion (#17), creating a wetland (#24), restoring/enhancing a wetland (#25), constructing a pond (#26), sealing or lining a pond (#27), planting a vegetated riparian buffer (#29), planting a forested riparian buffer (#30), protecting streambanks and/or shorelines with structures (#32), and creating a rain garden (#37). These management practices will be the hardest to get people to adopt in the short-term. Education needs to occur to both familiarize the public with terms like rain gardens, as well as inform where and how these management practices are best applied.

SEPTIC SYSTEMS

This section is intended to solicit information from respondents owning septic systems, to determine their knowledge and behavior regarding their systems.

QUESTIONNAIRE

1. Do you have a septic system?
 - No (Please skip to next Section)
 - Don't Know (Please skip to next Section)
 - Yes, it was installed in _____(year) (Please answer the questions in this section)
2. How frequently do you have your septic system cleaned out? Every
 - Less than every three years
 - 3-5 years
 - 5 – 10 years
 - Greater than ten years
 - Never
 - Don't know
3. In the future, would you like a reminder from your local health department regarding inspection/maintenance of your septic system?
 - Yes
 - No
 - Don't know
4. How would you know if your septic system was NOT working properly? (Check all that apply)
 - Slow drains
 - Wet spots in lawn
 - Sewage backup in house
 - Pumping tank monthly or more
 - Bad smells
 - Straight pipe to ditch
 - Toilet backs up
 - Don't know
 - Other (_____)
5. Do you think a local government agency should handle inspection and maintenance of septic systems?
 - Yes
 - No
 - Don't know

RESULTS

Ninety-six percent (95.5%) of all agricultural respondents and fifty-two percent (51.8%) of residential property owners had septic systems. The average age for a septic system was 42 years for farm operations and 47 years for residential property owners. The median (half the scores are above and half below) is 23 years. These results indicate that there is likely a significant number of aging septic systems (greater than 25 years) that may be contributing bacteria to local waterways.

Table 15: Do you have a septic system?

	Residential	Agricultural	Total
Number of Valid Responses	197 (97%)	133 (91.7%)	330 (94.8%)
Response	Response Percentage	Response Percentage	Weighted Average
Yes	51.8%	95.5%	69.4%
<i>Responses with construction year</i>	86 (44%)	112 (84%)	
<i>Range of construction</i>	1950 to 2008	1950 to 2009	
<i>Average year built</i>	1962	1967	
<i>Median year built</i>	1986.5	1986	
No	47.7%	3.8%	30.0%
Don't Know	0.5%	0.8%	0.6%
Total	48.2%	4.6%	30.6%

Roughly two-thirds of respondents cleaned out their septic system within a five year period and that rose to about eighty-five (85%) when up to 10 years is included.

Table 16: Frequency of Cleaning Septic

	Residential	Agricultural	Total
Number of Valid Responses	102 (44.0%)	130 (56.0%)	232 (100%)
Response	Response Percentage	Response Percentage	Weighted Average
Never	10.8%	6.2%	8.2%
Don't Know	1.0%	2.3%	1.7%
Less than 3 years	38.2%	23.8%	30.1%
3 to 5 years	29.4%	40.8%	35.8%
6 to 10 years	16.7%	20.8%	19.0%
Greater than ten years	3.9%	6.2%	5.2%
Total	100.0%	100.0%	100.0%

When asked if “you would like a reminder from your local health department regarding inspections/maintenance of your septic system” approximately three-quarters or more of the respondents indicated that they would not like this.

Table 17: Would you like a reminder to inspect/maintain your septic?

	Residential	Agricultural	Total
Number of Valid Responses	101 (49.8%)	128 (88.3%)	229 (65.8%)
Response	Response Percentage	Response Percentage	Weighted Average
Yes	15.9%	7.0%	10.9%
No	75.2%	81.3%	78.2%
Don't Know	8.9%	11.7%	10.5%
Total	100.0%	100.0%	99.5%

Two-thirds or more of the respondents knew the ways to tell that that a septic system is not functioning properly for five of the eight signs tested. They did not seem to know that excessive pumping, a frozen septic and having a straight pipe to the ditch were also signs that a septic system is not working properly.

Table 18: How would you know if your septic system was NOT working properly?

	Residential	Agricultural	Total
Number of Valid Responses	103 (50.7%)	126 (86.9%)	229 (65.8%)
Response	Response Percentage	Response Percentage	Weighted Average
Slow drains	67.0%	75.4%	71.6%
Sewage backup in house	70.9%	65.1%	67.7%
Bad smells	66.0%	65.1%	65.5%
Toilet backs up	68.0%	67.5%	67.7%
Wet spots in lawn	72.8%	66.7%	69.4%
Pumping tank monthly or more	26.2%	23.8%	24.9%
Frozen Septic	1.9%	0.0%	0.9%
Straight pipe to ditch	13.6%	8.7%	10.9%
Don't know	1.9%	2.4%	2.2%
Other	2.9%	0.0%	1.3%

Almost seventy percent (70%) of respondents did not wish local government to manage the inspection and maintenance of septic systems and another 19.6% were unsure.

Table 19: Should local government handle inspection and maintenance?

	Residential	Agricultural	Total
Number of Valid Responses	102 (50.2%)	126 (86.9%)	228 (65.5%)
Response	Response Percentage	Response Percentage	Weighted Average
Yes	10.8%	12.7%	11.9%
No	69.6%	69.0%	69.3%
Don't Know	19.6%	18.3%	18.9%
Total	100.0%	100.0%	100.0%

ANALYSIS AND OBSERVATIONS

There are many septic systems within the watershed, many of them quite old. They pose a potential threat to local waterways if not maintained properly. Fortunately, a majority of respondents indicated that they were maintaining their systems. The overwhelming response to not having local government involved points to voluntary and educational programs as being the preferred management approach.

MAKING MANAGEMENT DECISIONS

This set of questions was required by both agricultural and residential respondents and is designed to collect information regarding the constraints individuals have for implementing practices to improve water quality. There were seventeen (17) questions on the agricultural survey and fourteen (14) on the residential.

QUESTIONNAIRE

The agricultural survey asked the question: “When you make decisions about new management practices for your farm operation, how important is each of the following?” The residential survey phrased the question as “When you make decisions about changing the lawn care and/or stormwater practices, how important is each of the following?” Questions specific to agricultural practices are denoted by (A), and those specific to residential are denoted by (R).

	Not at all important	Somewhat important	Undecided	Important	Very Important
1. Personal out-of-pocket expense	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. My own views about effective (farming or land management) or (lawn and yard maintenance) methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. How easily a new practice fits with my current methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. My own physical abilities (R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The need to learn new skills or methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Lack of government funds for cost share (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Too much time required for implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Not having access to the equipment that I need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Lack of available information about a practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. No one else I know is implementing the practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Concerns about reduced yields (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Approval of my neighbors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Don't want to participate in government programs (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Requirements/restrictions of (government programs) or (covenants in my subdivision)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Possible interference with my flexibility to change land use practices (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Don't know where to get information and/or assistance about the practice (R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Environmental damage caused by practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Environmental benefit of practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Profitability (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

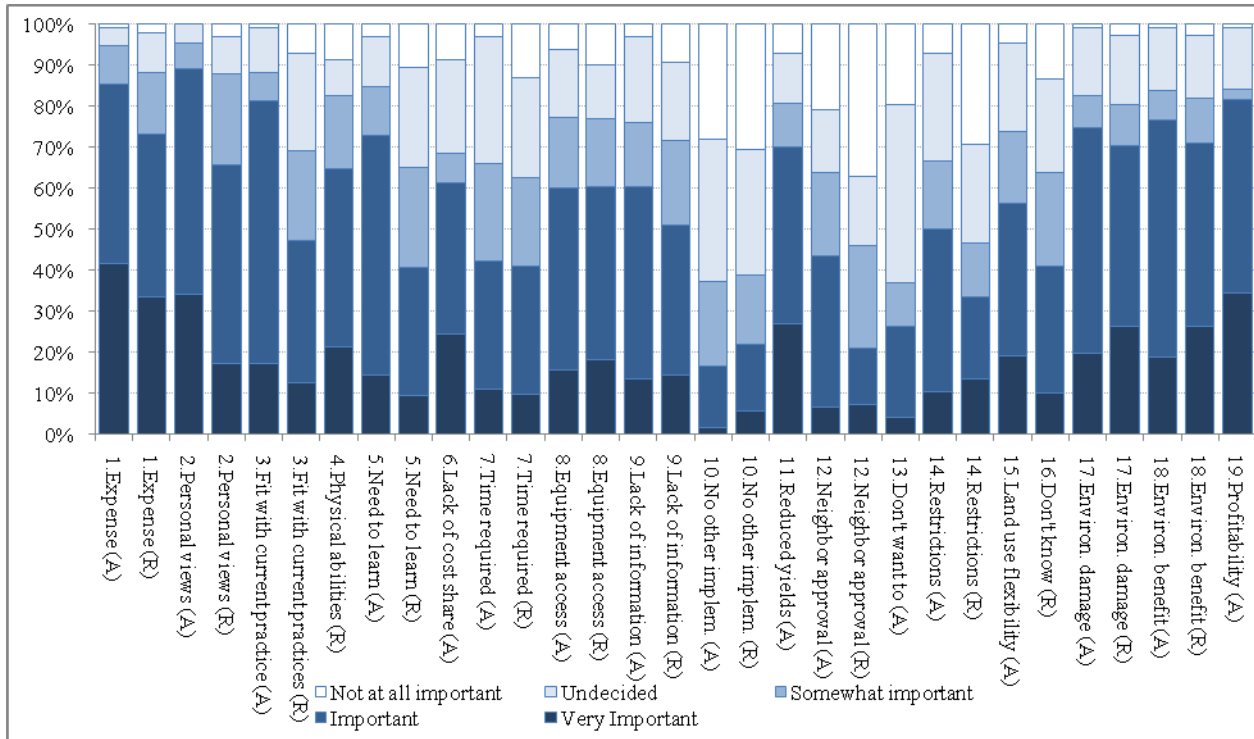
RESULTS

Table 20 summarizes the results from the survey and Figure 11 provides the same information in a graphical form.

Table 20: Management Decisions

No	Question	Agricultural (A) Residential (R)	Number of Responses	Not at all important	Somewhat important	Undecided	Important	Very Important
1	Personal out-of-pocket expense	A	130 (90%)	0.8%	9.2%	4.6%	43.8%	41.5%
		R	185 (91%)	2.2%	15.1%	9.7%	39.5%	33.5%
2	My own views about effective (farming or land management) or (lawn and yard maintenance) methods	A	129 (89%)	0.0%	6.2%	4.7%	55.0%	34.1%
		R	186 (92%)	3.2%	22.0%	9.1%	48.4%	17.2%
3	How easily the new action fits with my current practices	A	127 (88%)	0.8%	7.1%	11.0%	63.8%	17.3%
		R	184 (91%)	7.1%	21.7%	23.9%	34.8%	12.5%
4	My own physical abilities	R	182 (90%)	8.8%	17.6%	8.8%	43.4%	21.4%
5	The need to learn new skills or methods	A	125 (86%)	3.2%	12.0%	12.0%	58.4%	14.4%
		R	180 (89%)	10.6%	24.4%	24.4%	31.1%	9.4%
6	Lack of government funds for cost share	A	127 (88%)	8.7%	7.1%	22.8%	37.0%	24.4%
7	Too much time required for implementation	A	126 (87%)	3.2%	23.8%	31.0%	31.0%	11.1%
		R	184 (91%)	13.0%	21.7%	24.5%	31.0%	9.8%
8	Not having access to the equipment that I need	A	127 (88%)	6.3%	17.3%	16.5%	44.1%	15.7%
		R	181 (89%)	9.9%	16.6%	13.3%	42.0%	18.2%
9	Lack of available information about a practice	A	128 (88%)	3.1%	15.6%	21.1%	46.9%	13.3%
		R	179 (88%)	9.5%	20.7%	19.0%	36.3%	14.5%
10	No one else I know is implementing the practice	A	121 (83%)	28.1%	20.7%	34.7%	14.9%	1.7%
		R	179 (88%)	30.7%	16.8%	30.7%	16.2%	5.6%
11	Concerns about reduced yields	A	123 (85%)	7.3%	10.6%	12.2%	43.1%	26.8%
12	Approval of my neighbors	A	124 (86%)	21.0%	20.2%	15.3%	37.1%	6.5%
		R	183 (90%)	37.2%	25.1%	16.9%	13.7%	7.1%
13	Don't want to participate in government programs	A	122 (84%)	19.7%	10.7%	43.4%	22.1%	4.1%
14	Requirements/restrictions of (government programs) or (covenants in my subdivision)	A	126 (87%)	7.1%	16.7%	26.2%	39.7%	10.3%
		R	170 (84%)	29.4%	12.9%	24.1%	20.0%	13.5%
15	Possible interference with my flexibility to change land use practices as conditions warrant	A	126 (87%)	4.8%	17.5%	21.4%	37.3%	19.0%
16	Don't know where to get information and/or assistance about the practice	R	179 (88%)	13.4%	22.9%	22.9%	30.7%	10.1%
17	Environmental damage caused by practice	A	126 (87%)	0.8%	7.9%	16.7%	54.8%	19.8%
		R	182 (90%)	2.7%	9.9%	17.0%	44.0%	26.4%
18	Environmental benefit of practice	A	123 (85%)	0.8%	7.3%	15.4%	57.7%	18.7%
		R	182 (90%)	2.7%	11.0%	15.4%	44.5%	26.4%
19	Profitability	A	125 (86%)	0.8%	2.4%	15.2%	47.2%	34.4%

Figure 11: Management Decisions



The agricultural respondent’s top three ranked considerations in the “very important” category included personal out-of-pocket expense (41.5%), profitability (34.4%) and my own views about effective farming or land management methods (34.1%). The corresponding residential respondents selected personal out-of-pocket expense (33.5%), environmental damage caused by practice (26.4%) and environmental benefit of practice (26.4%).

The least important considerations ranked by the agricultural respondents using the “not at all important” category included no one else I know is implementing the practice (28.1%), approval of my neighbors (21.0%), and don’t want to participate in government programs (19.7%). Similarly the residential respondents selected approval of my neighbors (37.2%), no one else I know is implementing the practice (30.7%), and restrictive covenants in my subdivision (29.4%).

AGRICULTURAL RESPONSE ANALYSIS

Correlation of Constraints with Willingness to Try

The constraints listed below significantly correlated with agricultural respondents’ “willingness to try or continue” the following BMPs from the practices to improve water quality section (question 8 on the survey):

- Out of pocket expenses (constraints 1) and personal views (constraint 2) were correlated with conducting regular soil tests (question 8.2). This would seem to indicate that soil testing is consistent with their current views on land management and that they would be sensitive to increases to the cost of this service.

- Out of pocket expenses (constraint 1) were correlated with using precise equipment (question 8.7) and rotating crops (question 8.15). This correlation suggests that these two BMPs, in particular, were cited as being cost prohibitive to implement.
- The practices that respondents indicated would most easily fit (constraint 3) with current practices were avoiding fall applications of manure (question 8.6) and calibrating fertilizer equipment (question 8.8).
- The profitability constraint (constraint 17) was correlated with using integrated pest management practices (question 8.9). The significant correlation suggests that respondents perceive using integrative pest management practices as possibly impacting their profitability.
- Respondents indicated that they perceived an environmental benefit (constraint 16) to constructing sediment basins (question 8.13) and following fertilizer manufacturer's instructions when applying it to their lawn or garden (question 8.36).
- Respondents considered the environmental damage that would occur if they implemented or did not continue to implement the following practices:
 - No till (question 8.12)
 - Consider nitrogen contribution from legumes in fertilizer application (question 8.4)
 - Construct sediment basin (question 8.13)
 - Use field ditch (question 8.14)
 - Plant Herbaceous wind barrier (question 8.19)
 - Follow forest management plan (question 8.23)
- The concern over learning new skills or methods (constraint 5) was correlated with planting vegetated riparian buffer (question 8.29), planting forested riparian buffer (question 8.30) and protecting streambanks with structures (question 8.32). This would suggest that if there is a desire to implement these BMPs then it should be preceded by a concentrated education effort in order to overcome this barrier.
- There was correlation between respondents' concern about yields (constraint 11) and three BMPs; no till (question 8.12), rotating crops (question 8.15), and disposing of household waste (question 8.42). It appears that respondents are concerned about implementing no till and rotating crop practices due to their impact on yields. The disposing of household waste appears to be a spurious relationship.
- The BMPs listed below were correlated with being difficult to implement due to not having access to equipment (constraint 8). This suggests that their access to equipment may expedite the implementation of these BMPs.
 - Plant vegetated riparian buffer
 - Plant forested riparian buffer
 - Improve upland wildlife habitat
 - Plug abandoned well
- The following BMPs were correlated with not having enough information (constraint 9):
 - Follow comprehensive nutrient plan
 - Construct a sediment basin
 - Use filter strip
 - Plant trees
 - Construct pond
 - Plant vegetated riparian buffer
 - Improve upland wildlife habitat

- Plug abandoned well
- Properly dispose of household waste

These correlations point to the need for additional information to be provided to the agricultural community on these BMPs.

Analysis and Observations

Overwhelmingly, the constraints pose barriers for agricultural respondents to implement BMPs. As BMPs are to be implemented, the above constraints should be considered and actions to address them developed. Addressing the correlated constraints before attempting to implement BMPs should increase the chances of their adoption.

RESIDENTIAL RESPONSE ANALYSIS

Correlation of Constraints with Willingness to Try

The constraints significantly correlated with residential respondents' willingness to try or continue using the following BMPs from the 'practices to improve water quality' section (question 8 on the survey):

- Respondents considered the environmental damage (constraint 17) that would occur if they implemented or did not continue to implement the following practices:
 - Create a rain garden (question 8.2)
 - Properly dispose of household waste (question 8.7)
 - Use a rain barrel (question 8.8)
 - Plant vegetated riparian buffer (question 8.16)
- Respondents indicated that they perceived an environmental benefit (constraint 18) to creating a rain garden (question 8.2), properly disposing of household waste (question 8.7) and using a rain barrel (question 8.8).

Analysis and Observations

Overwhelmingly, the constraints posed barriers for residential respondents to implement BMPs. As BMPs are to be implemented, the above constraints should be considered and actions to address them developed. Addressing the correlated constraints before attempting to implement BMPs should increase the chances of their adoption.

INFORMATION SOURCES AND POLICY

The question pertaining to information sources helps us to understand what sources the public trusts to give them information regarding water quality issues. The policy question is designed to better understand the actions that might be undertaken by local government that would be supported (or not) by the public. This question is similar to one asked in a previous survey of the watershed in 2004.

QUESTIONNAIRE

1. People get information about water quality from a number of different sources. To what extent do you trust those listed below as a source of information about soil and water?

Source	Not at all	Slightly	Moderately	Very Much	Am Not Familiar
1. Clinton River Watershed Council	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Soil and Water Conservation District (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Local Government (R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Natural Resource Conservation Service (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. U.S. Environmental Protection Agency (R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. MSU Extension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. MI Dept. of Agriculture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. MI Dept. of Environmental Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Environmental groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Farm Bureau (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Fertilizer Representative (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Local Garden Center (R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Crop Consultant (A)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Lawn Care Company (R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Other landowners/friends/neighbors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Macomb County Health Department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How supportive would you be of your local government undertaking the following:

	Not Supportive	Supportive	Very Supportive
1. Programs to protect local wetlands/woodlands/natural features	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Increasing public access to local waterways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Increasing parks and open space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Sponsoring water-related recreational activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Partnering with communities to work on environmental issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Other (_____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

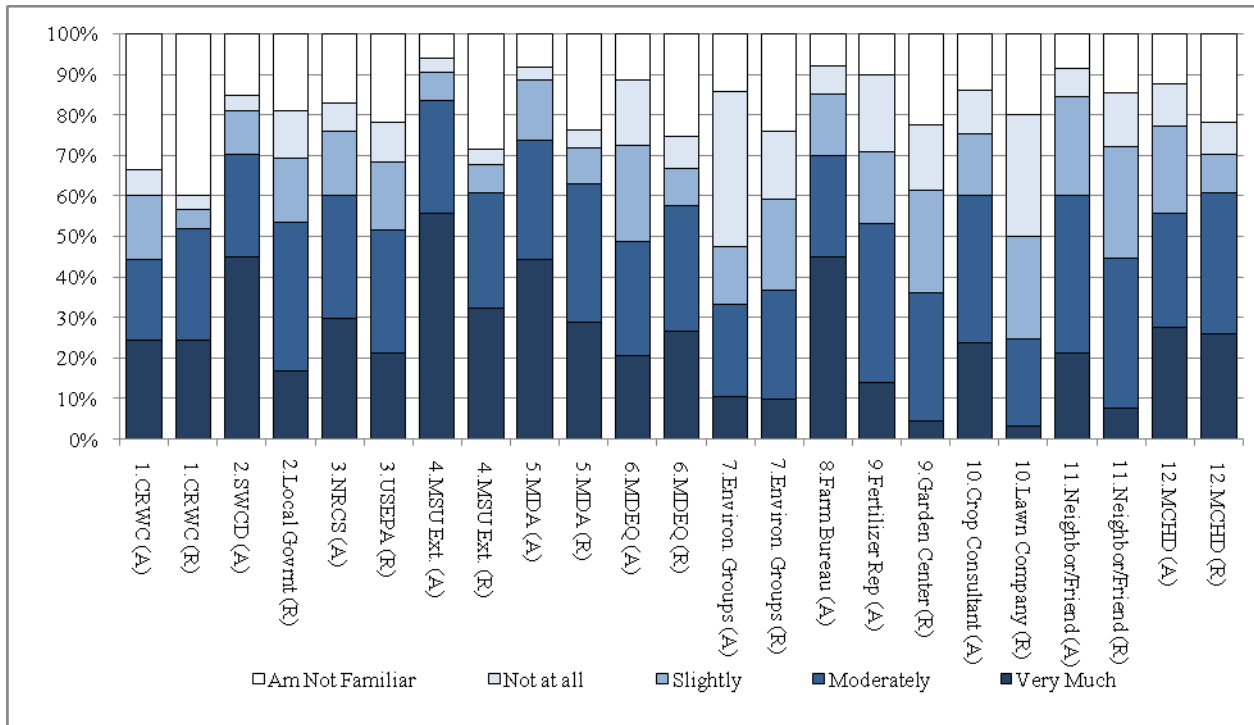
RESULTS

Table 21 summarizes the results from the survey and Figure 12 provides the same information in a graphical form. In order to calculate an overall average and standard deviation for each source, the responses “not at all”, “slightly”, “moderately”, and “very much” were assigned a point value of 0 through 3 respectively. Responses for “am not familiar” were ignored. A mean and standard deviation (SD) were then computed using the assigned point value. Figure 14 graphs the mean (illustrated as the horizontal bar) and plus/minus one standard deviation (illustrated as the vertical bar) of the resultant score computed for each question.

Table 21: Information Source Level of Trust

No.	Source	Agricultural (A) Residential (R)	Number of Responses	Not at all	Slightly	Moderately	Very Much	Am Not Familiar	Mean	Standard Deviation
1	Clinton River Watershed Council	A	131 (90%)	6.1%	16.0%	19.8%	24.4%	33.6%	1.94	0.99
		R	185 (91%)	3.2%	4.9%	27.6%	24.3%	40.0%	2.22	0.81
2	Soil and Water Conservation District	A	131 (90%)	3.8%	10.7%	25.2%	45.0%	15.3%	2.31	0.86
	Local Government	R	185 (91%)	11.9%	15.7%	36.8%	16.8%	18.9%	1.72	0.96
3	Natural Resources Conservation Service	A	128 (88%)	7.0%	15.6%	30.5%	29.7%	17.2%	2.00	0.95
	U.S. Environmental Protection Agency	R	184 (91%)	9.8%	16.8%	30.4%	21.2%	21.7%	1.80	0.98
4	MSU Extension	A	135 (93%)	3.7%	6.7%	28.1%	55.6%	5.9%	2.44	0.79
		R	183 (90%)	3.8%	7.1%	28.4%	32.2%	28.4%	2.24	0.84
5	MI Department of Agriculture	A	133 (92%)	3.0%	15.0%	29.3%	44.4%	8.3%	2.25	0.85
		R	178 (88%)	4.5%	9.0%	34.3%	28.7%	23.6%	2.14	0.84
6	MI Department of Environmental Quality	A	131 (90%)	16.0%	23.7%	28.2%	20.6%	11.5%	1.60	1.04
		R	181 (89%)	7.7%	9.4%	30.9%	26.5%	25.4%	2.02	0.95
7	Environmental Groups	A	126 (87%)	38.1%	14.3%	23.0%	10.3%	14.3%	1.06	1.10
		R	183 (90%)	16.9%	22.4%	26.8%	9.8%	24.0%	1.39	0.97
8	Farm Bureau	A	127 (88%)	7.1%	15.0%	25.2%	44.9%	7.9%	2.17	0.97
9	Fertilizer Representatives	A	130 (90%)	19.2%	17.7%	39.2%	13.8%	10.0%	1.53	1.00
	Local Garden Center	R	186 (92%)	16.1%	25.3%	31.7%	4.3%	22.6%	1.31	0.86
10	Crop Consultants	A	130 (90%)	10.8%	15.4%	36.2%	23.8%	13.8%	1.85	0.97
	Lawn Care Company	R	186 (92%)	30.1%	25.3%	21.5%	3.2%	19.9%	0.97	0.90
11	Other Landowners/ friends/ neighbors	A	128 (88%)	7.0%	24.2%	39.1%	21.1%	8.6%	1.81	0.88
		R	184 (91%)	13.0%	27.7%	37.0%	7.6%	14.7%	1.46	0.86
12	Macomb County Health Department	A	131 (90%)	10.7%	21.4%	28.2%	27.5%	12.2%	1.79	1.03
		R	188 (93%)	8.0%	9.6%	34.6%	26.1%	21.8%	1.71	1.12

Figure 12: Information Source Level of Trust



The top trusted sources by agricultural respondents, given a “Very Much” rating are MSU Extension (55.6%), Soil Water Conservation District (45.0%), Farm Bureau (44.9%), and the Michigan Department of Agriculture (44.4%). When looking at the calculated averaged score using the assigned point system, the most trusted sources of information for the agricultural respondents is MSU Extension (2.44), Soil and Water Conservation District (2.31), and Michigan Department of Agriculture (2.25). Refer to Figure 13 for level of trust results ignoring the “am not familiar with” responses. Environmental Groups in general (not the Clinton River Watershed Council) received the lowest level of trust with 38.1% of the respondents reporting that they trust these groups “Not At All” and a computed average score of 1.06.

The residential respondents did not rank as high within the “Very Much” category. Six agencies ranked “Very Much” between 21% and 32% (the highest ranking). These agencies included: Michigan State University Extension (32.2%), Michigan Department of Agriculture (28.7%), Michigan Department of Environmental Quality (26.5%), Macomb County Health Department (26.1%), Clinton River Watershed Council (24.3%), and the US EPA (21.2%). Using the point system and calculating an average score, the top three ranked are MSU Extension (2.24), Clinton River Watershed Council (2.22) and Michigan Department of Agriculture (2.14). Lawn Care Companies in general received the lowest level of trust with 30.1% of the respondents reporting that they trust these groups “Not At All”, and a computed average score of 0.97.

Figure 13: Information Source Level of Trust (ignoring “am not familiar with”)

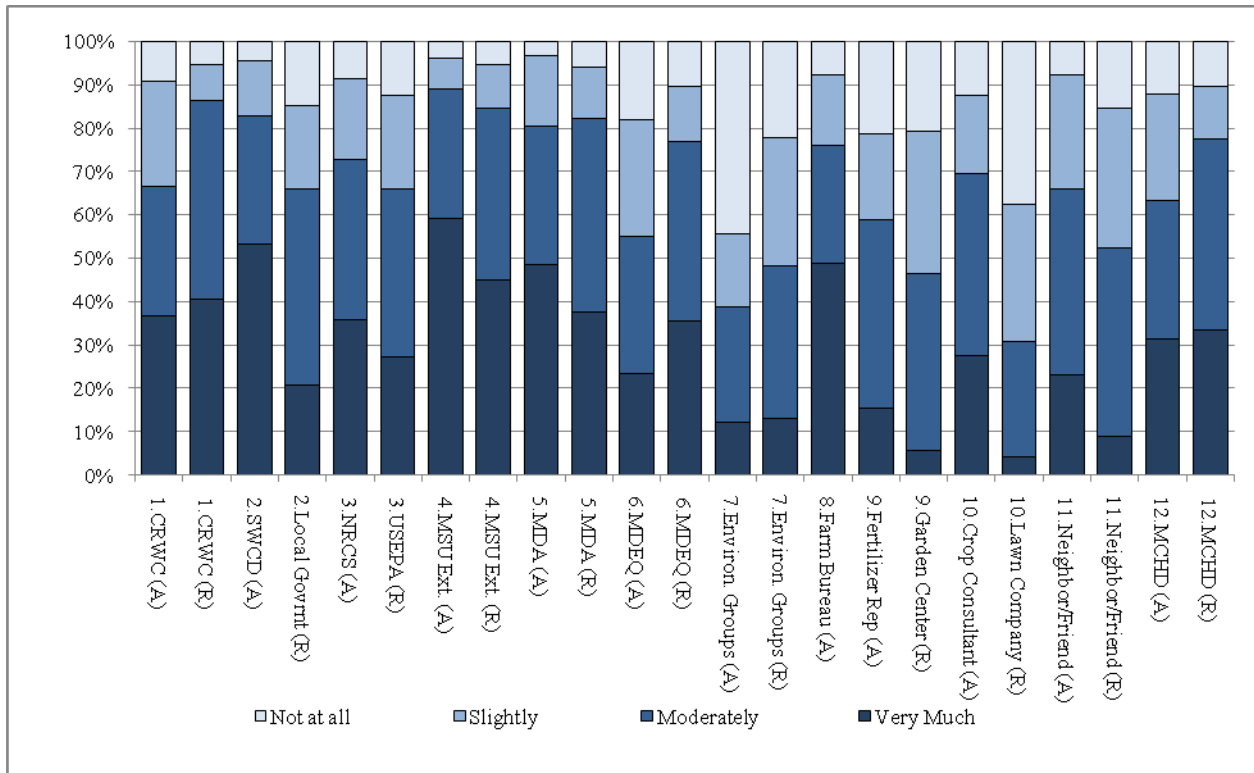
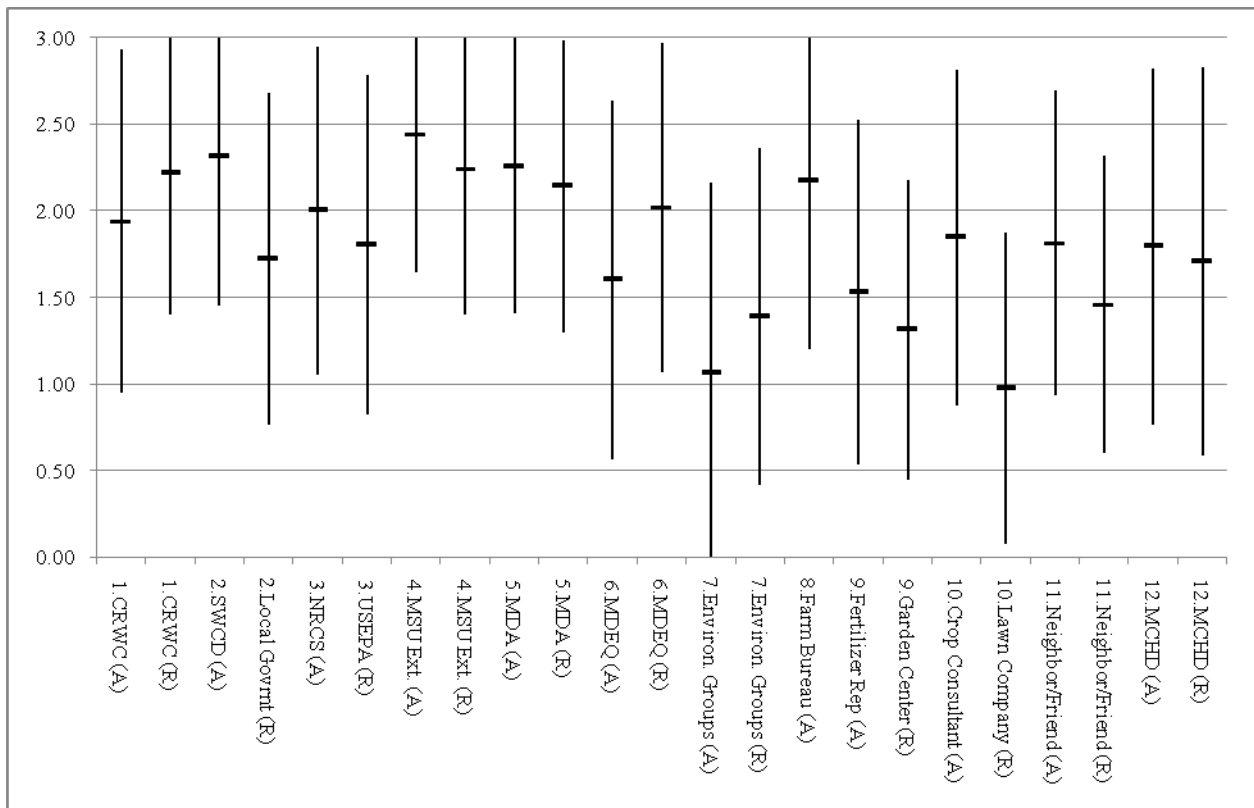


Figure 14 Averaged Information Source Level of Trust



Presented in Table 22 and Figure 15 are the results for how supportive the respondents would be of their local government undertaking various policies. In order to calculate an overall average and standard deviation for each question, the responses “not supportive”, “supportive”, and “very supportive” were assigned a numerical point value of 0 through 2 respectively. A mean and standard deviation (SD) were then computed using the assigned point value. Figure 16 graphs the mean (illustrated as the horizontal bar) and plus/minus one standard deviation (illustrated as the vertical bar) of the resultant score computed for each question.

Table 22: Support for Policy Options

No.	Source	Agricultural (A) Residential (R)	Number of Responses	Not Supportive	Supportive	Very Supportive	Mean	Standard Deviation
				Assigned Points	0	1		
1	Implementing programs to protect local wetlands, woodlands, and other natural features	A	134	35.8%	59.0%	5.2%	0.69	0.57
		R	188	14.4%	63.8%	21.8%	1.08	0.60
2	Increasing public access to local waterways	A	135	51.9%	40.7%	7.4%	0.55	0.63
		R	187	20.9%	60.4%	18.7%	0.98	0.63
3	Increasing parks and open space	A	131	29.0%	58.8%	12.2%	0.83	0.62
		R	189	14.8%	60.3%	24.9%	1.10	0.62
4	Sponsoring water-related recreational activities	A	123	41.5%	53.7%	4.9%	0.63	0.58
		R	185	32.4%	55.1%	12.4%	0.80	0.64
5	Partnering with other communities to work on environmental issues	A	130	20.8%	69.2%	10.0%	0.89	0.55
		R	189	15.9%	65.6%	18.5%	1.03	0.58
6	Other	A	3	66.7%	0.0%	33.3%	0.67	1.15
		R	13	46.2%	15.4%	38.5%	1.00	0.96

Figure 15: Support for Policy Options

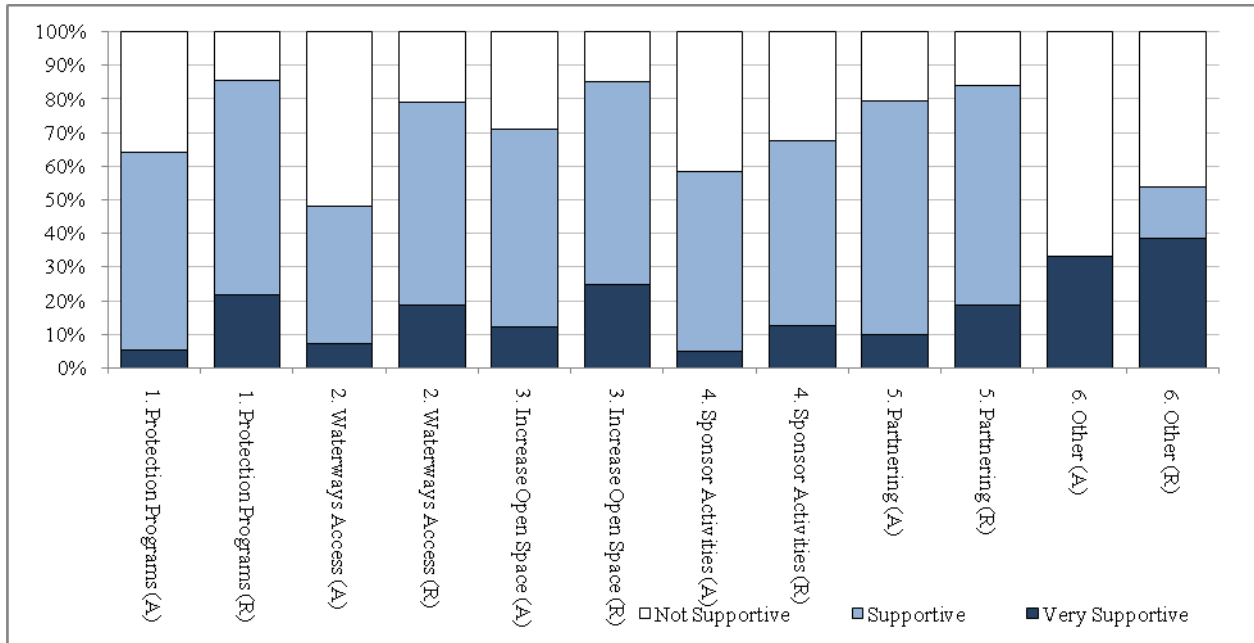
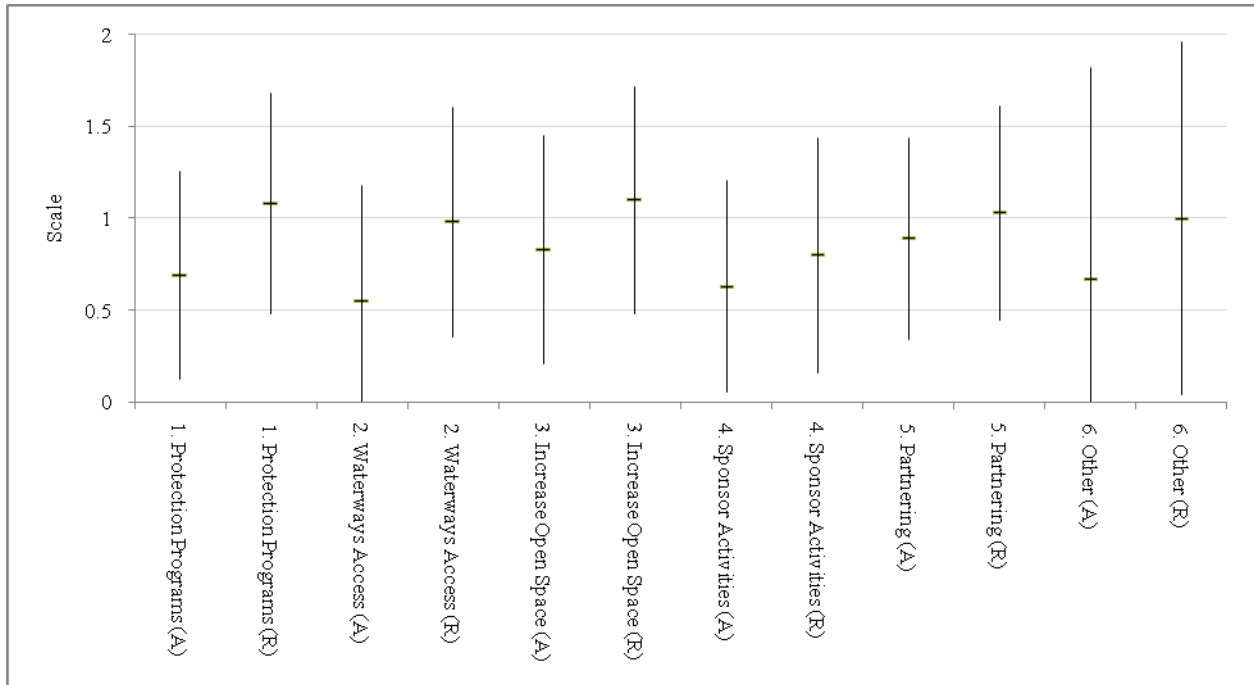


Figure 16: Support for Policy Options Rating



Agricultural respondents supported partnering with other communities to work on environmental issues the most, while residential respondents supported increasing parks and open space. The least supported

policy items were *increasing access to local waterways* for agricultural respondents, and *sponsoring water-related recreational activities*.

ANALYSIS AND OBSERVATIONS

For residential respondents, different information outlets were correlated with some of the best management practices. This indicates that the respondents were more likely to trust information on these best management practices when received from a particular information source. The following BMPs and information sources were correlated:

- USEPA
 - Properly dispose of household waste
 - Use rain barrel
- Extension
 - Not planting trees and shrubs over septic system
 - Cap abandoned well
- Local project
 - Construct pond
 - Plant vegetated riparian buffer
 - Plant forested riparian buffer
 - Protect streambanks and/or shorelines with vegetation
- State Environmental Agency
 - Create a rain garden
 - Properly dispose of household waste
 - Use rain barrel
 - Cap abandoned well
- Environmental group
 - Use rain barrel
 - Stabilize natural channel
 - Plant vegetated riparian buffer
 - Plant forested riparian buffer
- State Ag agency
 - Not planting trees and shrubs over septic system

ABOUT YOUR FARMING OPERATIONS

Questions in this section pertain to farming operation size, longevity, and other relevant information. This set of questions was not asked on the residential survey.

QUESTIONNAIRE

1. Please select the option that best describes who generally makes management decisions for your operation.
 - Me alone or with my spouse
 - Me with my family partners (siblings, parents, children)
 - Me with the landowner
 - Me with my tenant
 - Me and my business partners
 - Someone else makes the decisions for the operation
 - Other, Please Specify (_____)
2. Please estimate the total tillable acreage (owned and/or rented) of your farming operation this year.
 - 1-99 acres
 - 100-499 acres
 - 500-999 acres
 - 1,000-1,999 acres
 - 2,000 or more acres
3. This year, how many acres of the following do you manage? If none, please enter a zero.
 - Corn: _____ acres
 - Soybeans: _____ acres
 - Small grains: _____ acres
 - Vegetable Crops: _____ acres
 - Fruit Crops: _____ acres
 - Pasture: _____ acres
 - Conservation set aside/CRP: _____ acres
 - Forest/Woodlot: _____ acres
 - Non-row crops for energy: _____ acres
 - Other:(_____) _____ acres
4. How many years have you been farming? _____ years
5. Did any family member own and operate this farm before you did?
 - No
 - Yes, Number of total years in the family: _____ years
6. How likely is it that any family member will continue farm operations when you retire or quit farming?
 - Will not happen
 - Possibly happen
 - Will definitely happen
 - Not sure
7. Does the property you manage touch a stream, river, lake, or wetland?
 - Yes
 - No

8. Five years from now, which statement will best describe your farm operation?

- It will be about the same as it is today
- It will be larger
- It will be smaller
- I don't know

RESULTS

Results are presented below for each question.

1. Please select the option that best describes who generally makes management decisions for your operation.

Table 23: Who Makes Management Decisions

144 (99%) Number of Valid Responses	
Response Percentage	Option
51.1%	Me alone or with my spouse
32.6%	Me with my family partners (siblings, parents, children)
3.0%	Me with the landowner
4.4%	Me with my tenant
5.2%	Me and my business partners
1.5%	Someone else makes the decisions for the operation
2.2%	Other
100.0%	Total

2. Please estimate the total tillable acreage (owned and/or rented) of your farming operation this year.

Table 24: Tillable Acreage

131 (90%) Number of valid responses	
Response Percentage	Option
49.6%	1-99 acres
29.8%	100-499 acres
14.5%	500-999 acres
6.1%	1,000-1,999 acres
0.0%	2,000 or more acres
100.0%	Total

3. This year, how many acres of the following do you manage?

Table 25: Land Area Managed

Area Managed	Valid Responses	Mean (acres)	Median (acres)	Std Dev. (acres)	Minimum (acres)	Maximum (acres)
Corn:	55 (38%)	154.9	100	179.2	3	1,000
Soybeans:	61 (42%)	238.2	125	261.5	15	1,000
Small grains:	42 (29%)	72.3	53	63.5	5	300
Canning Crops:	34 (23%)	77.1	22.5	161.0	0	750
Clover/Alfalfa:	15 (10%)	57.2	25	69.5	0	250
Pasture:	34 (23%)	17.9	13	14.7	0	50

Area Managed	Valid Responses	Mean (acres)	Median (acres)	Std Dev. (acres)	Minimum (acres)	Maximum (acres)
Conservation set aside/CRP:	4 (3%)	5.0	5	5.8	0	10
Forest/woodland:	42 (29%)	22.3	15	22.4	1	95
Non-row crops for energy:	3 (2%)	6.7	0	11.6	0	20
Other:	21 (14%)	88.9	20	160.5	0	550

4. How many years have you been farming?

Table 26: Farming Duration

	Valid Responses	Mean	Median	Std Dev.	Minimum	Maximum
Years Farming	126 (87%)	37.9	16.6	36.5	4	80

5. Did any family member own and operate this farm before you did?

Table 27: Previous Family Ownership

134 (92%)		Number of valid responses				
Option	Response Percentage	Number of Years				
		Mean	Median	Std. Dev.	Minimum	Maximum
No	53.7%	NA	NA	NA	NA	NA
Yes	44.0%	84.4	75.0	39.1	30	196

6. How likely is it that any family member will continue farm operations when you retire or quit farming?

Table 28: Future Family Ownership

135 (93%)		Number of valid responses	
Response Percentage	Option		
31.1%	Will Not Happen		
34.1%	Likely		
14.1%	Will Definitely Happen		
20.7%	Not Sure		
100.0%	Total		

7. Does the property you manage touch a stream, river, lake, or wetland?

Table 29: Adjacent to Water

134 (92%)		Number of valid responses	
Response Percentage	Option		
67.2%	Yes		
32.8%	No		
100.0%	Total		

8. Five years from now, which statement will best describe your farm operation?

Table 30: Future Plans

135 (93%)		Number of valid responses
Response Percentage	Option	
42.2%	It will be about the same as it is today	
8.9%	It will be larger	
5.2%	It will be smaller	
43.7%	I don't know	
100.0%	Total	

ANALYSIS AND OBSERVATIONS

Sixteen BMPs were correlated with family farms that have been farmed for several generations. They are:

- Nutrient management
- Soil tests
- Nitrogen from legumes
- Adjust crop fertilization
- Fall manure application
- Variable rate application
- Integrated pest management
- Calibration of equipment
- Precise equipment
- No till
- Sediment basin
- Field ditch
- Crop Rotation
- Cover crops
- Filter strip
- Phosphate free fertilizer

This suggests that family farm operators are more likely to be good stewards of their land.

There is a significant correlation between anticipating that the farm will remain in the family in five years and those either currently using or willing to adopt the use of filter strips.

About thirty-five percent of the agricultural respondents thought their farming operation would either remain the same or will increase. A majority of respondents don't know if there would be any changes in their farming operation.

DEMOGRAPHICS

This section asks a series of questions designed to collect demographic information from respondents in order to compare them to the census data. This will help to determine if the survey sample is representative.

QUESTIONNAIRE RESIDENTIAL

1. Do you make the home and lawn care decisions in your household?
 Yes
 No
2. What is your gender?
 Male
 Female
3. In what year were you born? _____
4. What is the highest grade in school you have completed?
 Some formal schooling
 High school diploma/GED
 Some college
 2 year college degree
 4 year college degree
 Post-graduate degree
5. What was your total household income last year?
 Less than \$24,999
 \$25,000 - \$49,999
 \$50,000 - \$74,999
 \$75,000 - \$99,999
 \$100,000 or more
6. What is your occupation? (_____)
7. What is the approximate size of your residential lot?
 ¼ acre or less
 More than ¼ but less than 1 acre
 1 acre to less than 5 acres
 5 acres or more
8. Do you own or rent your home?
 Own
 Rent
9. How long have you lived at your current residence? _____ years
10. In addition to your residence, which of the following do you own or manage? (check all that apply)
 An agricultural operation
 Forested land
 Rural recreational property
 None of these
11. Which of the following best describes where you live?
 In a town, village, or city
 In an isolated, rural, non-farm residence

Rural subdivision or development

12. Do you use a professional lawn care service?

- Yes, just for mowing
- Yes, for mowing and fertilizing
- Yes, just for fertilizing and pest control
- Yes, for mowing, fertilizing and pest control
- No

13. Where are you likely to seek information about soil and water conservation issues ? (Check all that apply)

- Major newspapers
- Internet
- Radio
- Community newspaper
- Television news\government access
- Conversations with others
- None of the above

QUESTIONNAIRE AGRICULTURE

1. What is your gender?

- Male
- Female

2. How long have you lived at your current residence? _____ years

3. What is the highest grade in school you have completed?

- Some formal schooling
- High school diploma/GED
- Some college
- 2 year college degree
- 4 year college degree
- Post-graduate degree

4. In what year were you born? _____

5. Which of the following best describes where you live?

- In a town, village, or city
- In a rural non-farm residence
- On a farm

6. In addition to your residence, which of the following do you own or manage? (check all that apply)

- An agricultural operation
- Forested land
- Rural recreational property
- None of these

7. How many days, if any, did you work at least 4 hours per day off your farm operation for pay in the last year? (Include work on someone else's farm for pay.)

- None
- 1-49 days
- 50-99 days
- 100-199 days

200 days or more

8. Do you consider yourself retired from your farm operation?

- Retired
- Partially retired
- Not retired

9. Where are you likely to seek information about soil and water conservation issues? (Check all that apply)

- Major newspapers
- Internet
- Radio
- Community newspaper
- Conversations with others
- Television news\government access
- None of the above

RESULTS

Table 31 through Table 43 summarize the results obtained from this section of the surveys. Where the same question was asked on both the agricultural survey and the residential survey, the answers are shown in the same table.

Table 31: What is your gender?

	Agriculture	Residential
Survey Question No.	1	2
Number of valid responses	138 (95%)	190 (94%)
Option	Response Percentage	Response Percentage
Male	88.4%	74.2%
Female	11.6%	25.8%
Total	100.0%	100.0%

Table 32: How long have you lived at your current residence?

	Agriculture	Residential
Survey Question No.	2	9
Number of valid responses	140 (97%)	192 (95%)
Mean	32.6	16.9
Std. Dev.	18.9	13.9
Median	30	13
Minimum	2	1
Maximum	91	65

Table 33: What is the highest grade in school you have completed?

	Agriculture	Residential
Survey Question No.	3	4
Number of valid responses	134 (92%)	189 (93%)
Option	Response Percentage	Response Percentage
Some formal schooling	6.7%	3.2%
High school diploma/GED	30.6%	22.8%
Some college	27.6%	31.2%
2 year college degree	11.2%	12.2%
4 year college degree	14.2%	17.5%
Post-graduate degree	9.7%	13.2%
Total	100.0%	100.0%

Table 34: In what year were you born?

	Agriculture	Residential
Survey Question No.	4	3
Number of valid responses	132 (91%)	179 (88%)
Mean	1945	1952
Standard Deviation	12.85	13.87
Median	1947	1954
Minimum	1918	1915
Maximum	1977	1980

Table 35: Which of the following best describes where you live?

	Agriculture	Residential
Survey Question No.	5	11
Number of valid responses	138 (95%)	190 (94%)
Option	Response Percentage	Response Percentage
In a town, village, or city	10.1%	38.4%
In a rural non-farm residence	12.3%	28.9%
On a farm	77.5%	NA
Rural subdivision or development	NA	32.6%
Total	100.0%	100.0%

Table 36: Which of the following do you own or manage?

	Agriculture	Residential
Survey Question No.	6	10
Number of valid responses	140 (97%)	191 (94%)
Option	Response Percentage	Response Percentage
An agricultural operation	77.9	3.1
Forested land	15.7	7.3
Rural recreational property	6.4	5.2
None of these	15.7	85.3

Table 37: What was your total household income last year?

		Residential
Survey Question No.		5
Number of valid responses		147 (72%)
Option	Response Percentage	
Less than \$24,999		15.0%
\$25,000 to \$49,999		21.1%
\$50,000 to \$74,999		23.8%
\$75,000 to \$99,999		19.0%
\$100,000 or more		21.1%
Total		100.0%

Table 38: What is the approximate size of your residential lot?

		Residential
Survey Question No.		7
Number of valid responses		190 (94%)
Option	Response Percentage	
¼ acre or less		35.8%
More than ¼ acre but less than 1 acre		16.3%
1 acre to less than 5 acres		33.2%
5 acres or more		14.7%
Total		100.0%

Table 39: Days worked last year off your farm operation

		Agriculture
Survey Question No.		7
Number of valid responses		139 (96%)
Option	Response Percentage	
None		67.6%
1-49 days		7.2%
50-99 days		1.4%
100-199 days		6.5%
200 days		17.3%
Total		100.0%

Table 40: Do you consider yourself retired from your farm operation?

		Agriculture
Survey Question No.		8
Number of valid responses		139 (96%)
Option	Response Percentage	
Retired		16.5%
Partly retired		25.9%
Not Retired		57.6%
Total		100.0%

Table 41: Do you own or rent your home?

	Residential
Survey Question No.	8
Number of valid responses	194 (96%)
Option	Response Percentage
Own	97.9%
Rent	2.1%
Total	100.0%

Table 42: Where are you likely to seek information about conservation issues?

	Agriculture	Residential
Survey Question No.	9	13
Number of valid responses	137 (94%)	189 (93%)
Option	Response Percentage	Response Percentage
Internet	24.8%	47.6%
Radio	6.6%	11.1%
Workshops/demonstrations/meetings	28.5%	29.1%
Conversations with others	52.6%	34.4%
Trade publications/magazines	23.4%	NA
None of the above	28.5%	15.9%
Newspapers/Magazines	NA	42.9%

NA – Not Applicable (i.e. this question was not asked on the survey)

Table 43: Do you use a professional lawn care service?

	Residential
Survey Question No.	12
Number of valid responses	194 (96%)
Option	Response Percentage
Yes, just for mowing	6.7%
Yes, for mowing and fertilizing	9.3%
Yes, just for fertilizing and pest control	9.8%
Yes, for mowing, fertilizing, and pest control	4.6%
No	69.6%
Total	100.0%

ANALYSIS AND OBSERVATIONS

The North Branch Subwatershed was home to about 38,531 people (as of 2000). The estimated 2009 population of the subwatershed is 43,132. Table 44 provides a comparison of some of the collected demographic information from the survey respondents to statistical demographic information for Macomb County.

Table 44: Comparison of Survey Respondents to Regional Demographics

Demographic		North Branch Clinton River		Agriculture	Residential	Total
Age*		65 +	14%	Mean age is 64 year (std dev. +/-12.9 years). Median age is 62 years.	Mean age is 57 years (std dev. +/-13.9 years). Median age is 55 years.	Weighted average age is 60 years and the median age is 58 years.
		45 to 64	23%			
		25 to 44	31%			
		18 to 24	8%			
		5 to 17	18%			
		< 5	6%			
Education	at least High School	90%		93%	97%	95%
	4 yr. College Degree	18%		14%	18%	16%
Income	NB Average Income	\$64,746		Not Collected	15%	
	Less than \$24,999	20%*				
	\$25,000 to \$49,999	27%*				
	\$50,000 to \$99,999	37%*				
	\$100,000 or more	16%*			21%	

* Macomb County Statistics

The following observations are noted:

- There was a significant correlation between agricultural respondents' education and the current use of, or wiliness to 'manage irrigation water to reduce soil erosion.'
- Residential respondents' income level was correlated with 'following manufacturer's fertilizer application instructions.'
- Residential respondents' education level was correlated with 'following manufacturer's pesticide application instructions.'
- The majority of respondents had some collage education, about 30% for each survey.
- About ninety-eight percent of respondents were property owners.
- Those who did not live on a farm were approximately equally distributed between a city, town, village; a rural non-farm residence, and a rural subdivision.
- The majority of respondents' residential lots were less than 5 acres.
- About thirty percent of respondents use a lawn care service for either mowing, fertilizing, pest control, or some combination of the three.
- Newsletters, the Internet, and trade publications were the methods of communication that were most significantly correlated (five or more BMPs) with the collecting information on adopting best management practices. This suggests that if information on adopting BMPs is to be circulated through the agricultural community, then these three communication methods should always be included.

RECOMMENDATIONS

The following recommendations are based solely on the results of the Social Survey. They do not consider either the Unified Stream Assessment (USA) or the Unified Subwatershed Site Reconnaissance (USSR) survey. Furthermore, there are not intended to be any recommendations that duplicate NPDES Phase II storm water permit requirements (e.g. street sweeping). The recommendations are as follows:

1. Move to the next stage in the public education process. Respondents indicated they knew what a watershed was but not necessarily which watershed they live in. Also, public education should move towards incorporating more information on impairments and the consequences associated with them; where to purchase eco-friendly products; what techniques are available to protect waterways (e.g. no-mow buffers, etc.)
2. Tailor marketing messages around enjoying the local scenic beauty, family activities, and fishing. These are the most important activities to respondents.
3. All existing and new programs should be cross referenced with the constraints identified by respondents, documented in this report, and then tailored to help the target audience reach the desired behavior. For example, working with local suppliers to feature eco-friendly products, especially when manufacturers' sales are occurring.
4. If construction activities are to occur on riparian property, local agencies should consider offering forms of support to property owners if they adhere to best management practices during constructions and implement post construction controls on the site. These can take the form of incentives such as fee reductions, technical support, or even physical assistance.
5. Institute a septic system program aimed at the inspection and maintenance of existing systems.
6. The distribution of water quality information intended for farm operations should at a minimum be transmitted through MSU Extension, NRCS, and the Farm Bureau. For residential land owners, the transmission vehicles should be MSU Extension, The Clinton River Watershed Council, and Michigan Department of Agriculture.
7. The two most supported policy directions were partnering with adjacent communities to undertake action, and increasing parks and open space. Therefore, the existing subwatershed council should promote more of the work it has been doing. Also, the subwatershed group should consider working more closely with the Six Rivers Regional Land Conservancy in an effort to demonstrate to the public that open space is being increased.
8. With regard to agricultural producers, the data seems to indicate they feel that they are already doing a good job. Efforts to work with producers through programs such as Farm-A-Syst and Crop-A-Syst should be increased to help them better understand all the options available to them.
9. Certain information sources should distribute certain types of information, especially if it concerns BMPs. Not all information sources (e.g. Farm Bureau) carry equal credibility for all BMPs, so the message and delivery mechanism (e.g. internet) should be coordinated so they are the most effective.
10. The internet is increasingly becoming the preferred information delivery method. Efforts should be made to strengthen links between the subwatershed program information page and trusted information sources, such as the Farm Bureau.