

Grand Valley State University

Pentwater Watershed Planning Survey 2023

Report of Results



Image Credit: Kendra Stanley-Mills

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Executive Summary

The Grand Valley State University (GVSU) Social Science Lab conducted the Pentwater Watershed Planning Survey on behalf of the Friends of the Pentwater River Watershed, gathering landowner input from November-December 2023. Respondent feedback will direct watershed planning efforts and grant-writing activities supporting water quality and habitat improvement projects along the river.

The Friends of the Pentwater River Watershed (Friends) is a committee of the Pentwater Lake Association that supports conservation efforts in the watershed through competing for foundation funding and state/federal grants, conducting routine monitoring, and implementing improvement projects.

The Social Science Lab is an applied research center at GVSU that assists community organizations engaged in stewardship efforts with incorporating local knowledge into the plans and priorities that drive their work.

The Pentwater Watershed Planning Survey was mailed to 850 property owners in the Pentwater River watershed. We received completed questionnaires from 168 landowners representing a broad cross-section of Pentwater River watershed properties. The survey completion rate was 21%.

We learned that watershed property owners are hunting and fishing enthusiasts who enjoy the scenic beauty of the area and are interested to learn more about opportunities to engage with water stewardship activities and organizations. The survey revealed knowledge gaps regarding sources of water pollution and consequences of poor water quality that will be important topics for future outreach. Additionally, rural residential respondents were more likely than farming respondents to say that they needed more information about conservation management on their properties, indicating a key constituency for messaging. Streamlining digital communications will be an important way to broaden outreach about opportunities for engagement in introductory stewardship activities, such as invasive species or trash clean-up days.

In the report that follows, we begin by reviewing background information on the watershed and the community survey. Next, we review what respondents told us about living in the watershed and their conservation priorities. We go on to assess respondents' awareness and concern about various threats to water quality and their use of property management practices that protect water quality. We conclude with recommendations for future outreach and communication strategies concerning conservation in the Pentwater River watershed.

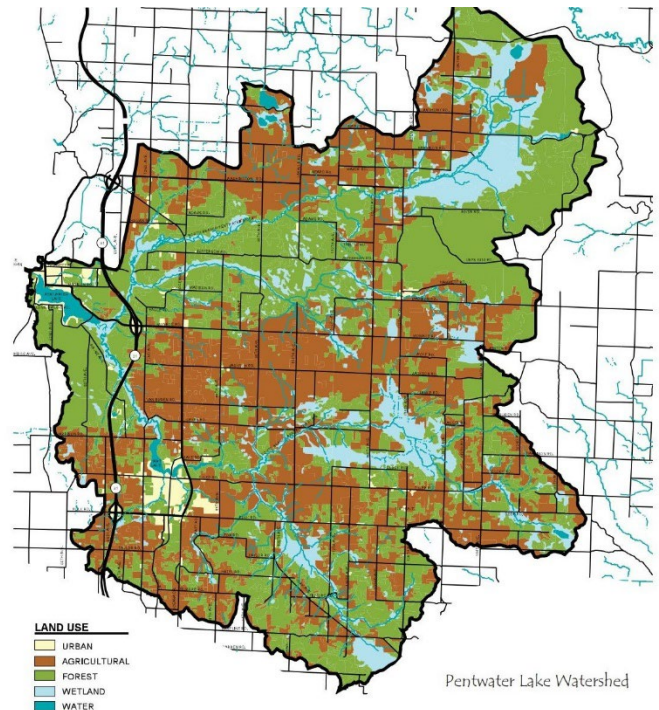
Background and Methods

The Pentwater River watershed contains roughly 166 square miles of land in Oceana and Mason Counties. The surrounding landcover is a mix of farmland and forests. The North Branch of the watershed has historically had high quality water resources, with large wetland areas providing habitat for a healthy fishery and abundant wildlife.

A watershed management plan was developed for the South Branch of the watershed in 1998 to assess sources of non-point source water pollution and outline a strategic plan to resolve degradation associated with streambank erosion, direct livestock access to waterways, and insufficient road/stream crossings.

Having an updated watershed management plan is a precursor to applying for state and federal funding awards supporting watershed improvement projects. A watershed management plan requires assessment of ecological, structural, and biological factors affecting water quality and often includes an assessment of human beliefs and behaviors impacting water resources.

Collecting information from community members at the outset of watershed planning allows landowner experiences and priorities to drive the planning process, keeping the vision for the watershed's future connected to landowners' values and interests. With these intentions in mind, the GVSU Social Science Lab worked with the Friends to develop a questionnaire using the social indicators planning and evaluation system (SIPES), which assesses landowner knowledge, attitudes, and property management actions related to water quality (Genskow and Prokopy, 2011)¹. These parameters are helpful for directing programmatic priorities and focusing the Friends' outreach efforts in the watershed.



¹ Genskow, K., and Prokopy, L. (eds.) 2011. The social indicators planning and evaluation system for nonpoint source management: A handbook for watershed projects. 3rd Edition. Great Lakes Regional Water Program. (104 pages).

Survey Methods

The West Michigan Shoreline Regional Development Commission provided tax parcel records for all landowners within the Pentwater River watershed, from which the survey sampling frame was drawn. To ensure that a robust selection of agricultural landowners was represented in the survey sample, duplicate property owner names and mailing addresses were retained in the initial randomized selection of 850 parcels to include in the survey sample. Duplicates were then removed from the sample and replaced from a randomized back-up pool until the desired number of 850 unique parcels was obtained. The sample size was determined based on a mix of population, response rate, and budgetary estimates, with the goal of obtaining a final participant pool of approximately 300 respondents.

Participants were mailed requests to complete the survey from November – December 2023. Survey distribution followed a modified tailored design protocol (Dillman et al. 2014)², which consisted of three waves of mailing: 1) a pre-notice letter, 2) a questionnaire packet, and 3) a reminder postcard.

We received 168 completed questionnaires. After removing 53 addresses that were returned by the U.S. Postal service as undeliverable, the survey response rate was 21%. This response rate, although typical in modern mail survey research (Stedman et al., 2019)³, was lower than desired, resulting in an estimated 7% margin of error, which is slightly higher than our target (5%). Therefore, we should focus on results indicating wide divergences in experiences or viewpoints and be aware of potential biases related to nonresponse error, wherein the people motivated to respond to a survey may be qualitatively different from the people who did not respond (i.e., more interested in or knowledgeable about the subject matter than the general population).

Despite these limitations, it is worth noting that survey respondents were not necessarily current users of common conservation programs in the watershed (see page 9, below), nor were they likely to be Pentwater Lake Association or Friends members (see page 4). This suggests that the survey reached an audience beyond those already affiliated with area conservation organizations, broadening the pool of property owners whose viewpoints are represented in the data compared to online survey distribution methods relying on convenience sampling frames, wherein those receiving solicitations to complete the survey must already be connected to the surveyor in some manner.

² Dillman, D.A., Smyth, J.D., and Christian, L.M. 2014. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. Hoboken, NJ: Wiley.

³ Stedman, R.C., Connelly, N.A., Heberlein, T.A., Decker, D.J., Allred, S.B., 2019. The end of the (research) world as we know it? Understanding and coping with declining response rates to mail surveys. *Soc. Nat. Resour.* 32, 1139–1154.

Survey Respondents

We evaluated how the characteristics of survey respondents compared to the U.S. Census Bureau American Community Survey (ACS) (2015-2019) population estimates for the watershed. As shown in **Table 1**, males, individuals 65 years old and older, and those with a bachelor's or advanced degree were overrepresented in our dataset compared to ACS estimates of the presence of these groups in the watershed.

Table 1. Characteristics of Survey Respondents

	N	% Respondents	% ACS Estimates
Gender			
Male	124	73.8	51.6
Female	38	22.6	48.4
Declined to answer	6	3.6	--
Race			
White alone	154	92.8	78.9
Amer. Indian, Asian, or Latino	4	2.4	21.5
Declined to answer	10	6.0	--
Age			
18-64 years old	53	31.5	56.1
65 years and older	103	61.3	22.2
Declined to answer	12	7.1	--
Education Level			
High school / GED or less	17	10.2	47.5
Some college	48	28.7	31.3
Four-year degree or more	101	60.5	21.2
Declined to answer	1	0.6	--
Pentwater Lake Association/Friends Membership			
Member	30	18.1	--
Not a member	136	81.9	--
Number of Months in Watershed Home			
Full-time residents (9-12 mo)	97	57.7	--
Part-time residents (0-8 mo)	71	42.3	--

Some of these differences reflect the imperfect fit of Census Bureau data (which include full-time, permanent residents), compared to our survey sampling frame (which included part-time and seasonal property owners). For example, whereas 51% (n=49) of respondents who live full-time in their Pentwater River watershed home (9-months of the year or more) have a bachelor's or graduate degree, 73% (n=52) of part-time or seasonal respondents reported having this level of education. However, part-time residents were not any more likely to be 65 years old or older than were full-time residents. The over-representation of men in our survey data compared to women likely reflects the survey instructions, which directed the adult in the household who typically makes property management decisions to complete the questionnaire.

Approximately one-quarter of respondents had owned their property in the Pentwater River watershed for less than ten years. Twenty-five percent had been landowners for 10-24 years, while another 25% had owned their property for 25-38 years. The quarter of survey participants with the most longevity in the watershed ranged from 45 years to multiple generations. Half of survey respondents owned properties under 3 acres in size, while another half owned properties ranging from 3-900 acres. However, there were a few large landowners in our dataset, 10% (n=14) reporting that they owned properties over 100 acres. Forty-two percent (n=71) reported owning properties located in-town, 38% (n=63) owned rural residential properties, 13% (n=22) said they owned a farm in the watershed, and 5% (n=8) owned businesses.

Table 2. Survey Respondents by Township

Location	Respondents (n)
Oceana County	195
City of Hart	8
Colfax Twp.	2
Crystal Twp.	15
Elbridge Twp.	16
Ferry Twp.	2
Golden Twp.	7
Hart Twp.	31
Leavitt Twp.	4
Pentwater Twp.	41
Shelby Twp.	1
Village of Pentwater	40
Weare Twp.	28
Mason County	19
Eden Twp.	5
Logan Twp.	4
Riverton Twp.	9
Summit Twp.	1

Table 2 reports the number of survey responses from each county and township. Because there are more parcels in geographic areas with higher housing density, the probability of selecting households from Pentwater Township, the Village of Pentwater, and Hart Township was higher compared to rural locations when using random sampling methods. Further, only small outreaches of the watershed boundary stretch into Colfax, Ferry, Leavitt, Logan, Shelby, and Summit Townships, with the result that few property owners from these townships were included in our original sampling frame.

Living in Pentwater River Watershed

To learn about how Pentwater River watershed property owners connect with water, we asked about the recreational activities they enjoy, and parks and water access locations they frequent in the watershed. We also asked for recommendations regarding what would make recreational areas in the watershed more accessible for visitors to enjoy.

Figure 1 displays respondents' evaluations of favorite water-based activities enjoyed in the watershed. Among individuals who responded to this set of questions, twenty-six percent of respondents (n=60) said that fishing and hunting were the most important water-based recreational activity they participated in, 24% (n=55) said that enjoying scenic beauty was most important, while boating was the most important activity for 19% of respondents (n=45).

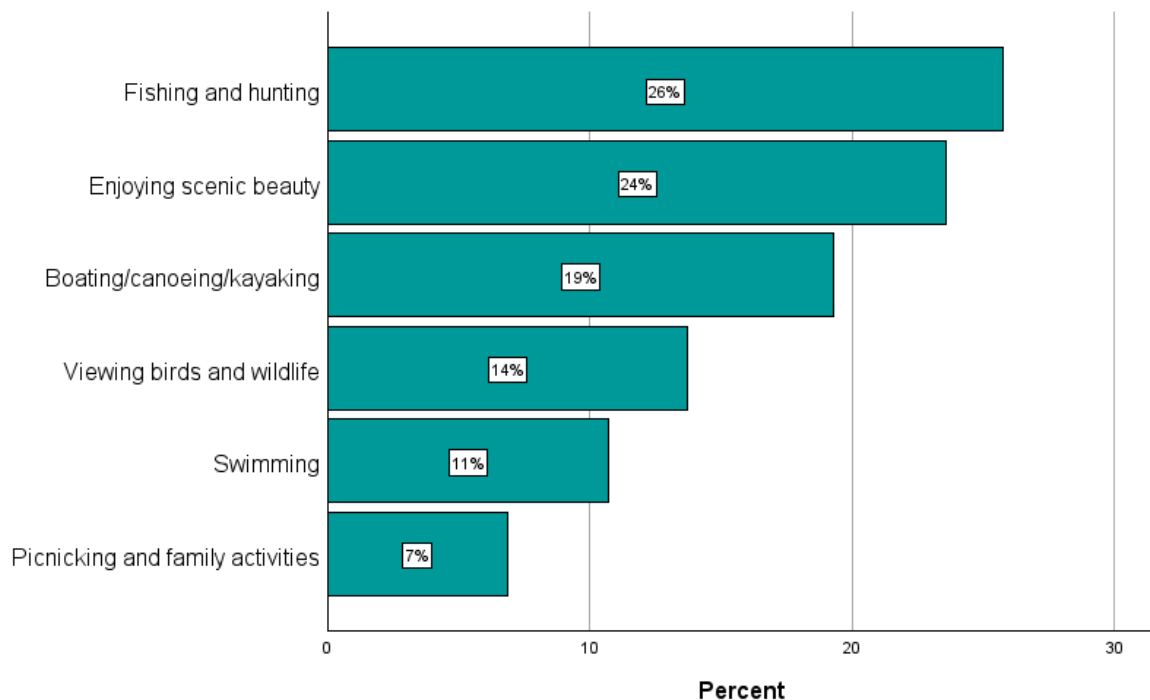


Figure 1. Percent of Respondents for Whom Each Activity is Important

Given the large number of respondents from the Village of Hart and the widespread interest in fishing/hunting and boating, it should come as no surprise that the Longbridge Rd. boat ramp, the Hart Dam, and the Monroe Rd. boat launch were the locations survey respondents were most likely to report having regularly visited in the watershed (**Table 3**). To a lesser extent, the State Game Area and Gurney Park were also noted as regularly visited locations.

Table 3. Participants who Have Visited Each Park

Location	Visitors (n)
Longbridge Rd. Boat Ramp	74
Hart Dam	62
Monroe Rd. Boat Launch	48
State Game Area	42
Gurney Park	37
Gales Pond	31
Lake St. Boat Ramp	27
Crystal Valley Park	25
Rivertown Twp. Park	9

Regarding features respondents believed would be important to add for making each location easier for all visitors to enjoy (**Figure 2**), the improvements recommended most frequently at all locations were benches, wheelchair-accessible bathrooms, boardwalks, and – where appropriate – wheelchair-accessible boat launches.

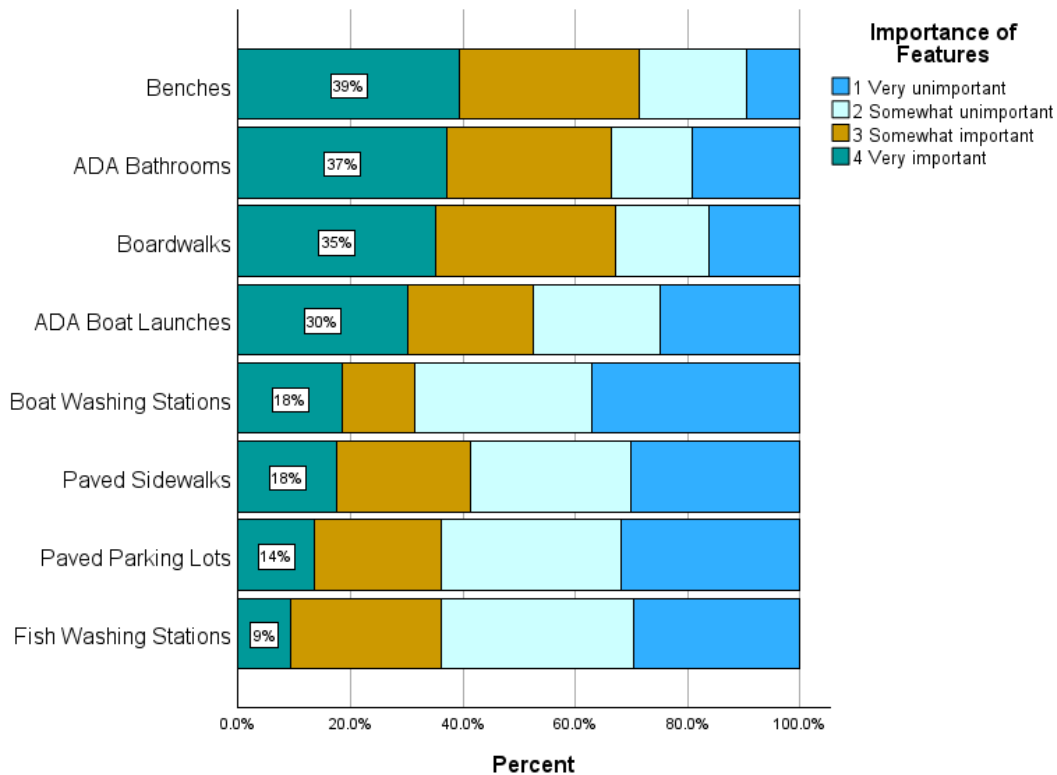


Figure 2. Recommendations for Improving Ease of Visitation

We also assessed recommendations by respondents' visitation to each location to ensure that recommendations for each park roughly matched users (**Table 4**). Each site has different existing features and uses, with the result that not all potential improvements are relevant to each location. For example, there are already paved parking areas at all boat ramps and at Hart Dam. Therefore, we examined Google Earth aerial imagery for each location and excluded features that appeared irrelevant or existent from the summary presented in Table 4. Additionally, because the number of users varied considerably across locations (from as many as 74 to as few as 9), we present results as percentages to allow for proportionate comparisons.

Table 4. Percent of Regular Visitors Saying Each Feature is Important

Location	Bench	ADA Bathroom	Boardwalk	ADA Boat Launch	Boat Wash	Paved Sidewalk	Paved Parking	Fish Wash
Longbridge Rd. Ramp	72	77	76	67	51	--	--	57
Hart Dam	81	75	78	--	--	56	--	--
Monroe Rd. Launch	78	78	73	67	50	--	--	54
State Game Area	81	89	82	78	59	53	44	66
Gurney Park	86	--	78	51	35	--	--	43
Gales Pond	--	76	73	--	--	42	36	--
Lake St. Boat Ramp	92	81	73	76	61	--	--	52
Crystal Valley Park	79	71	75	--	--	48	26	--
St. Mary's Boat Ramp	100	86	71	86	57	57	75	71

Google Earth aerial imagery revealed that public bathrooms or portable restrooms are unavailable at the Longbridge, Monroe, and Lake St. boat ramps. It was also unclear whether public bathrooms or portable restrooms were available at the State Game Area or St. Mary's boat launches. Improving the accessibility of sanitary facilities at these water access locations is an important starting point for investments in public access to waterways. **Given the popularity of the Longbridge Rd. ramp in the watershed, prioritizing restrooms at that location would be a sound investment.**

The State Game Area stood out as a location where respondents thought fish washing stations and boardwalks would be particularly important. Wheelchair-accessible boat launches were evaluated as important by over 60% of respondents who regularly visit the

boat ramps at Longbridge Road, Monroe Road, and Lake Street, and the State Game Area, and 50% of these respondents (or more) recommended paved sidewalks be added or expanded to improve access. While benches were the most important addition recommended, regardless of location, respondents who visit Gurney Park, the Lake Street boat ramp, and St. Mary’s boat ramp were particularly likely to recommend that benches be added. **Several respondents commented that additional needs at watershed recreation locations are trash receptacles and sources of drinking water.**

Stewarding Pentwater River

Understanding how residents interact with water and their values regarding protection of water resources is important for identifying communication frameworks that will broadly resonate (Druckman, 2004)⁴. We therefore asked several questions assessing landowners’ conservation actions, priorities, and perceptions of conservation outcomes over time.

We assessed participation in nine conservation programs sponsored by local or state conservation entities (see list in **Table 5**). In total, 37% (n=63) of respondents reported participating in one or more conservation program, with household hazardous waste programs being the most used. Twenty-nine individuals reported participating in a household hazardous waste program alone, while 34 respondents reported participating in something other than the household hazardous waste program. Many respondents that participated have been active in more than one program, with general conservation programs, invasive species management programs, and environmental quality incentive programs being the most common.

Table 5. Participation in Conservation Programs

Program	Users n (%)
Household hazardous waste programs	47 (28)
Conservation stewardship programs	15 (9)
Invasive species management programs	12 (7)
Environmental quality incentive programs	10 (6)
Agricultural conservation easement programs	6 (4)
MI Agricultural Environmental Assurance Program	6 (4)
MI Forestry Assistance Program	5 (3)
Trout Unlimited conservation programs	4 (2)
Wetland reserve easement	3 (2)

⁴ Druckman, J.N., 2004. Political preference formation: Competition, deliberation, and the (ir)relevance of framing effects. *American Political Science Review*, 98(4): 671-686, DOI:10.1017/S0003055404041413.

We also asked survey respondents if they were willing to engage in watershed stewardship by joining a volunteer work group, joining a Facebook group, donating money, or becoming a dues-paying conservation group member (**Figure 3**). Response options included “yes,” “no,” and “already doing it.” Notably, fewer than 10% (n<17) of those who answered these questions reported that they are already involved in any stewardship activities. However, approximately one-quarter (n=29-47) expressed willingness to try each of these stewardship activities, signaling opportunities for future engagement.

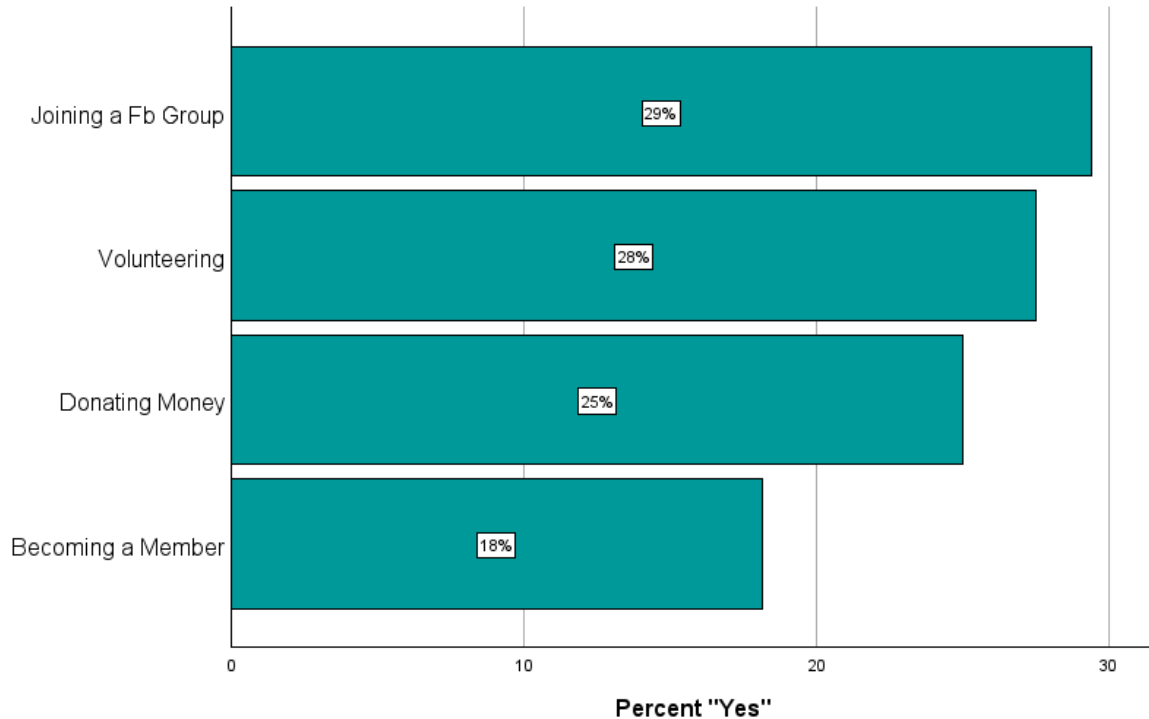


Figure 3. Willingness to Try Water Stewardship Activities

Respondents were slightly less interested in becoming a dues-paying member of a conservation group compared to joining a Facebook group, volunteering, or donating money, but these differences were statistically insignificant. Further signaling the new opportunities that exist for public engagement, half of survey respondents were interested in receiving an email newsletter about water stewardship (recall that only 18% are currently PLA/Friends members).

Regarding the conservation efforts to be prioritized in the watershed, respondents could rate the importance of five proposed conservation goals on a three-point scale, from “Not a priority” (1) to “High priority” (3) (**Figure 4**). On average, respondents believed that providing fish and wildlife habitat, reducing erosion and stormwater runoff, and educating the public about water quality were moderate (2)-to-high (3) priorities. Increasing recreational access

and adapting to the effects of climate change were somewhat less important to most respondents, with average scores on these items in the low (1)-to-moderate (2) priority range.

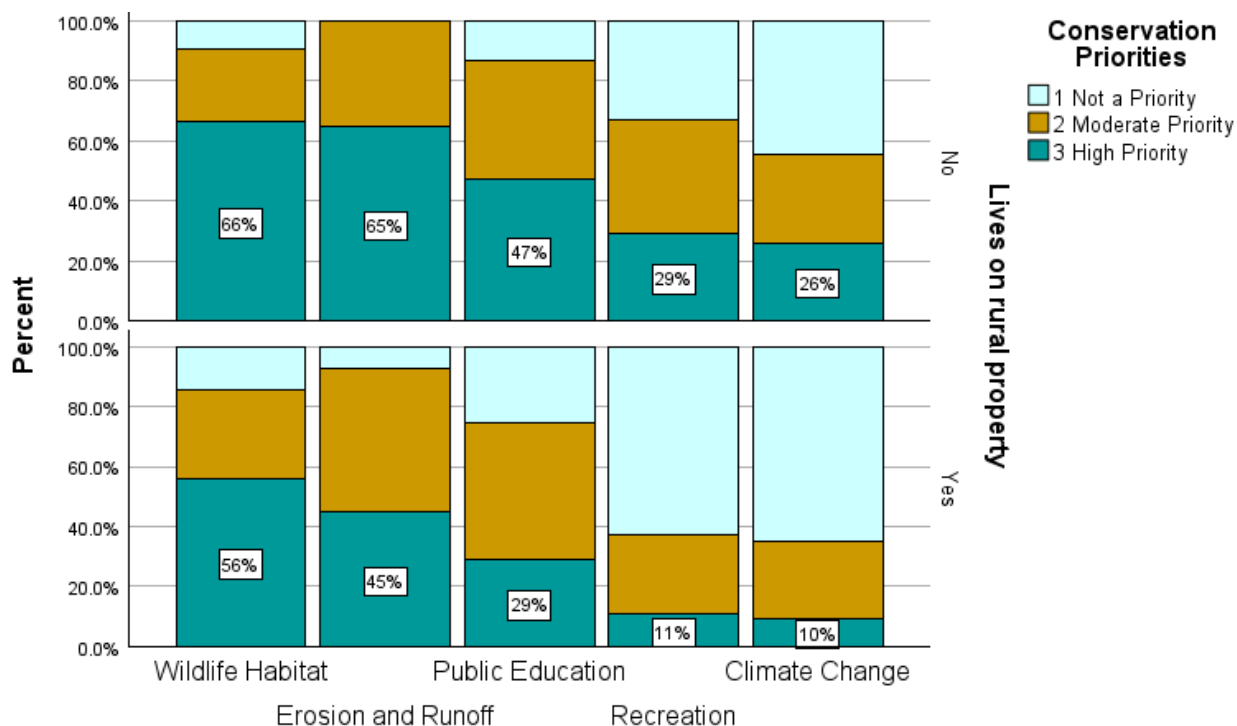


Figure 4. Respondent Views on Conservation Priorities by Residence Type

We evaluated differences between respondents based on characteristics such as full-time versus part-time residency and the type of residence owned. While there were no significant differences based on residency, we found significant difference in the average evaluation of the importance of increasing recreational access between rural residents and farmers ($M=1.8$, $SD=0.8$) compared to residents dwelling in town ($M=2.3$, $SD=0.7$); $t(137)=-3.54$, $p<.001$, with rural residents rating recreational access as slightly less important than in-town dwellers (**Figure 4**). Likewise, there was a significant difference in the average evaluation of the importance of adapting to climate change between rural residents and farmers ($M=1.8$, $SD=0.8$) compared to residents dwelling in town ($M=2.2$, $SD=0.8$); $t(134)=-3.14$, $p<.01$, with rural residents evaluating climate adaptations as a lower priority on average than in-town dwellers.

To evaluate watershed residents’ perceptions of how conservation efforts are making a difference, we presented survey respondents with a list of nine activities and issues (see **Table 6**), asking whether they thought each has gotten worse, better, or stayed the same over the past ten years. Response options were on a five-point scale, from “Much worse” (1) to “Much better” (5). We compared the scores of the 2023 survey respondents to scores

submitted by respondents to an identical set of questions asked on a 1998 watershed survey. Because the total number of respondents is different across the two surveys, we present answers as percentages to allow for the proportionate comparison of two different-sized groups. Additionally, we collapsed the “Much better” and “Better” responses into “Better”, as well as the “Much worse” and “Worse” responses into “Worse” for ease of analysis and because fewer than 20 respondents selected much better/worse on each item, reducing the statistical utility of these answer options.

Table 6. Evaluations of Conditions in the Watershed, 1998 and 2023 Surveys

	Worse (%)	Same (%)	Better (%)
Littering			
1998	49	47	4
2023	46	32	22
Fishing			
1998	47	37	16
2023	39	39	22
Water Quality			
1998	41	47	12
2023	35	41	25
Streambank Erosion			
1998	30	44	25
2023	38	46	16
Canoeing/Boating			
1998	26	48	26
2023	10	66	24
Hunting			
1998	24	60	16
2023	21	44	36
Observing Wildlife			
1998	21	53	26
2023	12	56	31
Drinking Water			
1998	20	80	6
2023	11	74	15

Looking across these items, there is some consistency in responses across the 25-year timespan, with littering, fishing, water quality, and streambank erosion being top concerns across both surveys. Interestingly, the 2023 cohort was significantly more likely to say that hunting has improved over the past ten years compared to the 1998 cohort. To a lesser extent, the 2023 cohort also had slightly more optimistic perspectives of water quality than the 1998 cohort. Roughly half of survey respondents thought that conditions associated with streambank erosion, canoeing/boating, and observing wildlife have stayed the same, and

well over half report no change in drinking water. Overall, while most respondents evaluated this set of conditions as unchanging, there are no significant increases in negative assessments (percent evaluating a condition as getting “worse”) when comparing the 2023 survey responses to the 1998 survey responses. In fact, on several items the percentage of respondents answering that something is “worse” has shifted to “same” from 1998 to 2023 – a modest sign of increasing confidence in conservation efforts.

Impressions of Water Quality

We used measures assessing perception of water quality from the social indicators planning and evaluation system (SIPES) (Genskow and Prokopy, 2011). We asked survey respondents to evaluate how severely they believed water pollutants, their sources, and consequences of poor water quality were impacting the Pentwater River watershed (**Table 7**). For each item, respondents ranked severity on a 4-point scale, from “not a problem” (1) to “severe problem” (4). Respondents could also indicate that they “don’t know” about the severity of a pollutant in the watershed.

Table 7. Respondent Evaluations of Water Pollutants

	n	Min-Max	Mean (SD)	% “Severe”	% “Don’t Know”
Opinions about pollutant types					
Invasive aquatic plants and animals	160	1-4	3.2 (0.8)	33	17
Nutrients from fertilizer in the water	159	1-4	3.0 (0.9)	17	34
Pesticides in the water	158	1-4	2.8 (1.0)	17	34
Sediment in the water	157	1-4	2.6 (0.8)	8	21
Trash or debris in the water	160	1-4	2.5 (0.9)	13	13
<i>E. coli</i> or fecal matter in the water	159	1-4	2.5 (1.0)	11	36
High water temperature	159	1-4	2.2 (1.0)	6	24
Opinions about pollutant sources					
Excessive use of lawn/turf fertilizers	160	1-4	2.9 (0.9)	21	24
Agricultural fertilizers	160	1-4	2.9 (1.0)	23	26
Poorly maintained septic systems	158	1-4	2.7 (0.9)	13	33
Littering/illegal dumping of waste	159	1-4	2.6 (0.9)	13	29
Soil erosion along stream/riverbanks	159	1-4	2.5 (0.8)	7	23
Removal of streambank vegetation	158	1-4	2.4 (1.1)	12	32
Manure from farm animals	159	1-4	2.2 (0.9)	7	34
Upstream impoundment (damming)	158	1-4	2.0 (0.9)	4	40
Opinions about pollutant consequences					
Excessive plants/algae in the water	161	1-4	3.2 (0.8)	35	14
Loss of desirable fish species	160	1-4	2.9 (0.9)	20	19
Contaminated drinking water	157	1-4	2.5 (1.1)	16	29
Reduced beauty of lakes or streams	158	1-4	2.5 (1.0)	12	32
Odor	159	1-4	2.0 (1.0)	8	17

The mean scores for pollutant types, their sources, and the consequences of poor water quality ranged from “slight” (2) to “moderate” (3) on all items. Across this set of items, invasive aquatic plants and animals stands out as the impairment to water quality that respondents were most concerned about, with one-third evaluating this as “severely” impacting the watershed. Respondents were consistently more concerned about nutrient pollution, its sources, (lawn and agricultural fertilizers, failing septic systems) and its consequences (algal blooms) compared to other water quality impairments. However, another third of respondents were unable to evaluate the severity of these threats, indicating that they “don’t know” how much of a problem nutrients, pesticides, *E. coli* pollution, manure runoff, or poorly maintained septic systems are in the watershed.

Respondents were least concerned about damming, high water temperature, and unpleasant odors. The lack of concern and knowledge about damming (4% “severe,” 40% “don’t know”) and elevated water temperature (6% “severe,” 24% “don’t know”) is interesting considering the relationship between these problems. Downstream reaches of dammed waterways have been documented to have warmer average August temperatures compared to upstream reaches, particularly where dams cause widening of the waterway (Zaidel et al., 2020)⁵. Likewise, lack of knowledge was high about problems associated with removal of riparian vegetation (32% “don’t know”), which reduces shade along waterways (contributing to warming) and increases sedimentation (further increasing warming). Together, this suite of challenges degrades the quality of aquatic habitat supporting fish populations, particularly for coldwater species (Albertson et al., 2018)⁶. Considering that 20% of survey respondents were concerned about loss of desirable fish species, **outreach regarding factors contributing to warming waters and habitat degradation will be important going forward.**

Open comments left by respondents reinforced the prevalence of uncertainty about the consequences of chemical contaminants associated with agricultural activities, lawn fertilization, and weed control in lakes. Respondents wrote:

“Every year weed control is done in the summer. I have found dead turtles that were killed from this. I have pictures. Weeds on the surface of our back water help to keep the temperature lower in the lake. Please leave it alone.”

“We are against the lake spraying that is done – very harmful to fish, carp are gone. Just read the MSDS sheets before you use it. I have been a commercial pesticide

⁵ Zaidel, P.A., Roy, A.H., Houle, K.M., Lambert, B., Letcher, B.H., Nislow, K.H., Smith, C. 2020. Impacts of small dams on stream temperature. *Ecological Indicators*, 120: 106878, <https://doi.org/10.1016/j.ecolind.2020.106878>.

⁶ Albertson, L.K., Ouellet, V., Daniels, M.D. 2018. Impacts of stream riparian buffer land use on water temperature and food availability for fish. *Journal of Freshwater Ecology*, 33(1): 195-210, <https://doi.org/10.1080/02705060.2017.1422558>.

applicator for 45 years and would never handle what they dump in the lake that ends up in Lake Michigan.”

“North Branch Pentwater River is in a valley and farmland sits above. How much of what is used on those fields is safe/environmentally friendly? How much gets into the river?”

“I see all the nice houses with very green lawns on Hart Lake and Pentwater Lake. Sometimes what we want isn’t always the best. Where does it end? I don’t know.”

“When it rains the river and east end of the lake turn a chocolate brown with suspended sediments and stay that way for 2-3 days until it all settles... The weed and algae growth in the lake are the worse I’ve seen in my lifetime, and the city responds by chemical treatment twice a year instead of addressing the root cause. The lake (Hart Lake) in the downtown area is also burdened with trash.”

A second topic of concern that surfaced repeatedly in open comments left on the back cover of the survey related to water withdrawals, with respondents noting:

“I am very concerned about the field wells lowering water levels, creating dry wells!”

“Stop allowing private dams for irrigation use on Crystal Creek.”

“Pentwater - water use is paid for by the month. Meters would maybe limit use. No incentives to preserve.”

Finally, aquatic plant growth was mentioned by several respondents concerned about impacts to recreation, including those concerned about excessive growth and those concerned about removal of riparian vegetation:

“We used to kayak on Pentwater River 3-4 times a year. But in the last few years the river has not been as attractive. This seems to be due to invasive aquatic plants.”

“Increased vegetation is an ongoing problem. Sometimes you have to wade through 70’ of vegetation to get to clear water on Pentwater Lake.”

“Kayakers and canoers for years have been cutting fallen trees from across the river and cutting back foliage from the trees hanging over the water. So, there is less cover over the river and in the river for fish and animals.”

Balancing control of excessive or invasive species with maintaining beneficial riparian habitat is certainly a difficult management challenge worthy of further investigation.

Property Management Practices

A primary way that watershed landowners impact water quality is through the practices used to manage the land and water resources on their properties. Therefore, the landowner survey assessed management decisions related to water wells, septic systems, streambanks and shorelines, and farms. This section of the survey sought to characterize these aspects of properties among respondents as well as gauge familiarity with recommended best management practices (BMPs) to protect and improve water quality. Questions were also asked about barriers that limit respondents' ability to use recommended management practices.

Water Wells

Sixty-seven percent (n=112) of survey respondents reported having a water well on their property. The age of wells ranged from less than one year to 75 years, with a median of 21 years. Among those with wells, water was commonly used for drinking (95%, n=106), general household uses (93%, n=104), and watering gardens (70%, n=78).

When asked how frequently they have their well water tested (**Figure 5**), roughly one-third reported having their water tested every five years or more often, another third tested their wells 6-10 years or less than every ten years, and the final third had never had their well water tested. Approximately one third (31%, n=35) said they use a filtration device before consuming their well water.

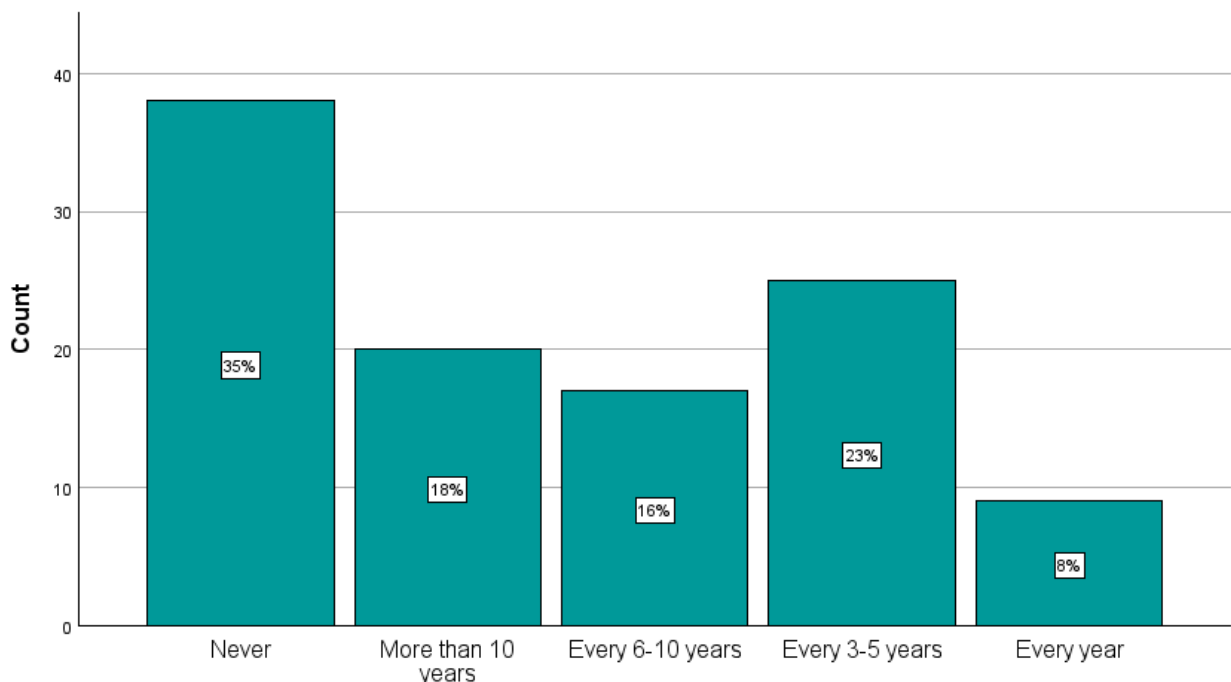


Figure 5. Frequency of Well Water Testing

Most respondents with water wells (n=112) reported no change in the level of their water table (75%, n=84), the amount of sediment in their water (75%, n=85), the taste of their water (79%, n=89), the odor of their water (81%, n=92), or the color of their water (84%, n=96). While only 57 respondents reported having natural springs on their property, most respondents with spring-fed water reported no change in the flow of their natural springs (88%, n=50).

Septic Systems

Sixty percent (n=101) of survey respondents reported having an on-site sanitation system on their property. The reported age of systems ranged from brand new (less than one-year old systems) to 63-year-old systems, with a median of 20 years. Three-quarters of systems were thirty years old or less, well within the industry-expected lifespan of a septic system (50 years) (U.S. EPA, 2023)⁷.

Among respondents with septic systems, most reported having their tank pumped every 3-5 years (45%, n=45) or 6-10 years (29%, n=29), and only 14% (n=14) said they had never had their tank pumped (**Figure 6**). However, when it comes to having the soundness of their system’s function assessed by a septic technician, the response proportions were nearly inverted (**Figure 7**). Forty-five percent (n=44) had never had their system inspected while 28% (n=27) said they have their system inspected every 3-5 years.

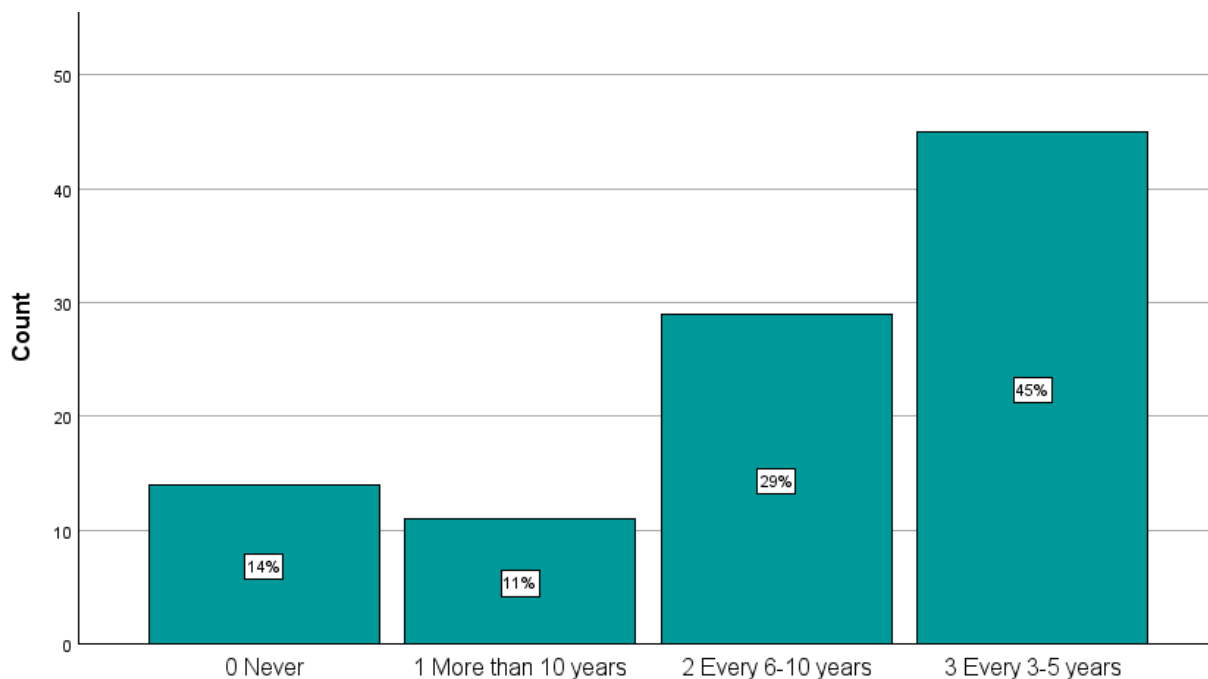


Figure 6. Frequency of Septic System Servicing

⁷ United States Environmental Protection Agency. 2023. Frequent Questions on Septic Systems. Accessed 23 April 2024 (<https://www.epa.gov/septic/frequent-questions-septic-systems>).

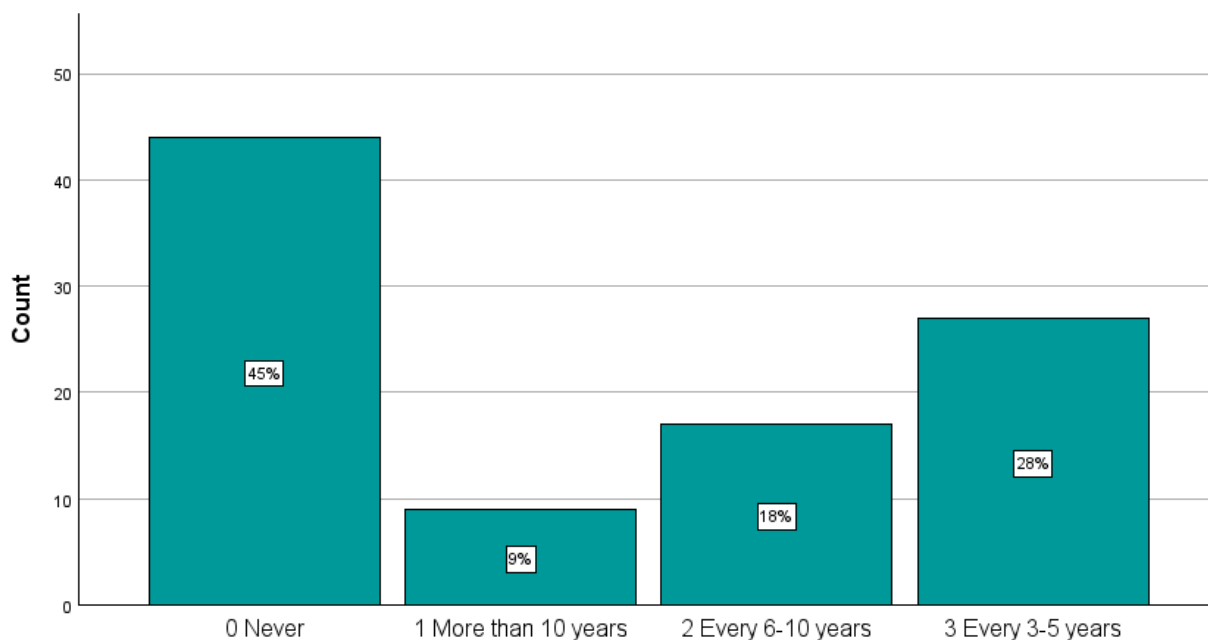


Figure 7. Frequency of Septic System Inspection

Regarding routine septic system maintenance activities and preventative actions (**Figure 8**), respondents were most familiar with checking their tank cover for proper closure (32%, n=42 currently use this practice) and checking for wet spots from sewage back-ups in their drain field (33%, n=42 currently use this practice). They were somewhat less familiar with checking the drain field for root encroachment, and 32% had never heard of checking the effluent filter for clogs⁸. When asked about factors that limit their ability to properly maintain their septic systems, over 50% of respondents indicated that lacking time, money, awareness, or information were not at all a problem for them. Of these barriers, the cost, access to information, and awareness of importance caused “some” or “a lot” of trouble for one-quarter of respondents, but having the time was less problematic.

Recently, the Michigan legislature has considered several proposals to increase regulatory oversight of septic systems. We therefore asked survey respondents about which actions they might support to encourage people to service their septic systems regularly (**Table 8**). Survey respondents were largely supportive of each proposed action to encourage landowners to responsibly manage septic systems, with over 50% supporting four of the five proposals. **Respondents were most unsure about cost share assistance programs, pointing to a need for further outreach regarding how these programs are funded and the importance of cost share assistance for low-income or fixed-income households.**

⁸ Effluent filters are not present on all systems and may not be included in older septic systems.

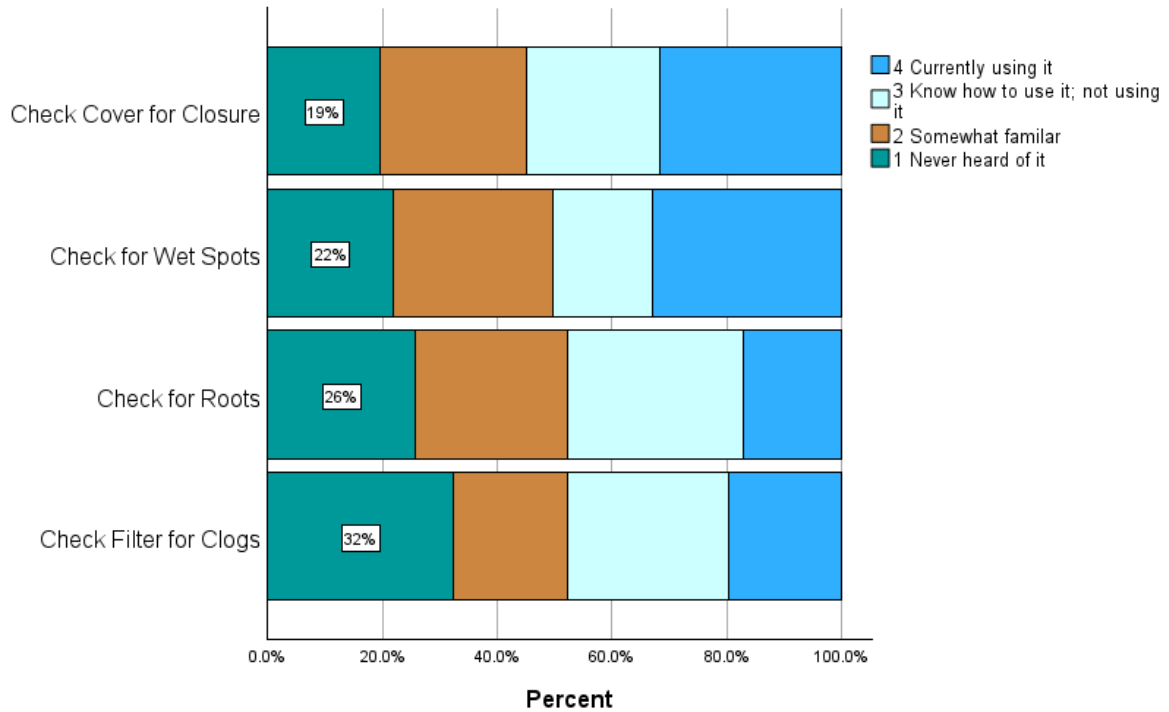


Figure 8. Use of Septic System Best Management Practices

Table 8. Support for Actions to Encourage Regular Septic Servicing

	n	Mean (SD)	Support n (%)	Unsure n (%)	Oppose n (%)
More education about how important this is	96	2.6 (0.6)	66 (69)	21 (22)	9 (9)
A required inspection when selling a home	97	2.5 (0.8)	67 (69)	11 (11)	19 (20)
A reminder from the Health Department	97	2.3 (0.8)	53 (54)	19 (20)	25 (26)
A tax refund for servicing system every 3-5 years	98	2.3 (0.8)	52 (53)	26 (26)	20 (21)
Cost share assistance to help cover expenses	98	2.1 (0.8)	39 (40)	32 (33)	27 (27)

Streambanks and Shorelines

We also asked Pentwater River watershed landowners about waterways on their property and use of BMPs for maintaining streambanks and shorelines. Roughly half of survey respondents (n=88, 52%) *did not have* a waterway on their property, another indication that the respondent pool was broader than simply lakeshore residents with direct interests in watershed stewardship. Among the 66 respondents who *did have* water on their property, lakes (n=52), creeks (n=37), and wetlands (n=36) were most common (**Figure 9**), and most respondents with water reported having more than one type of feature.

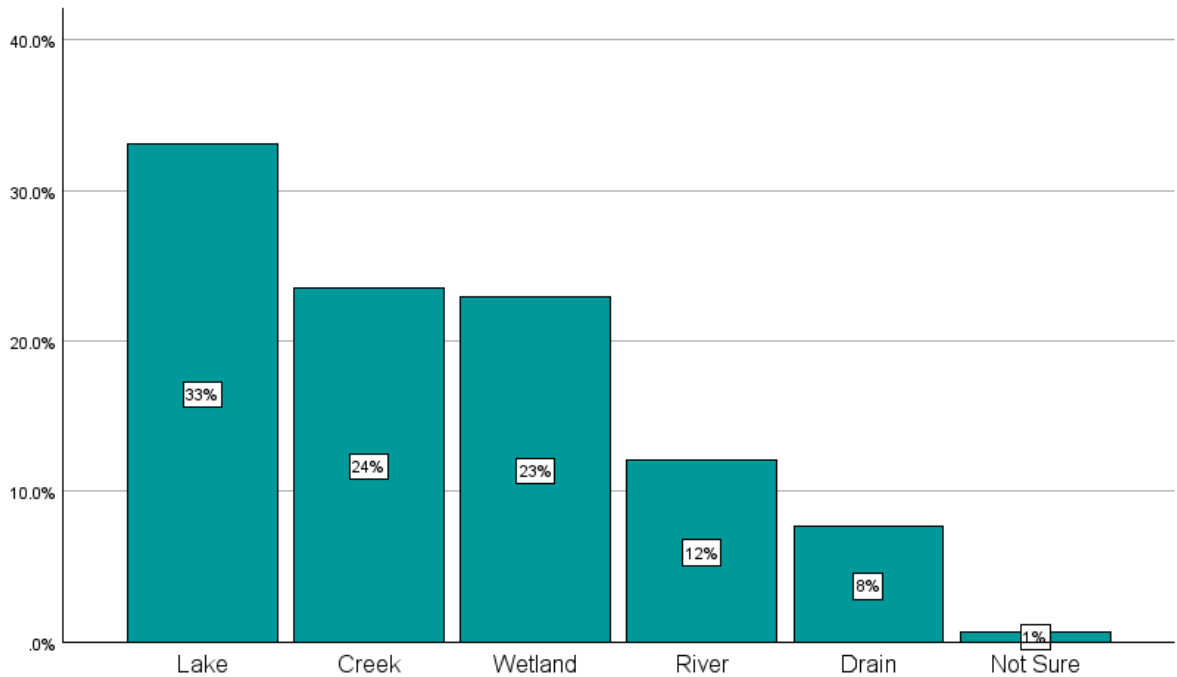


Figure 9. Proportion of Waterway Types Reported on Properties

As shown in **Figure 10**, approximately 30% of respondents with waterways are currently maintaining vegetation along their streambank/shoreline and buffering riparian zones with vegetation. However, nearly half of respondents with water on their property had “never heard of” or were only “somewhat familiar” with vegetating shorelines and buffering riparian zones, indicating that watershed property owners are uncertain about recommended management strategies for streambanks and shorelines on their properties. Respondents were particularly unclear about guidelines for trimming vegetation to access water on their properties, making this an important topic for future outreach.

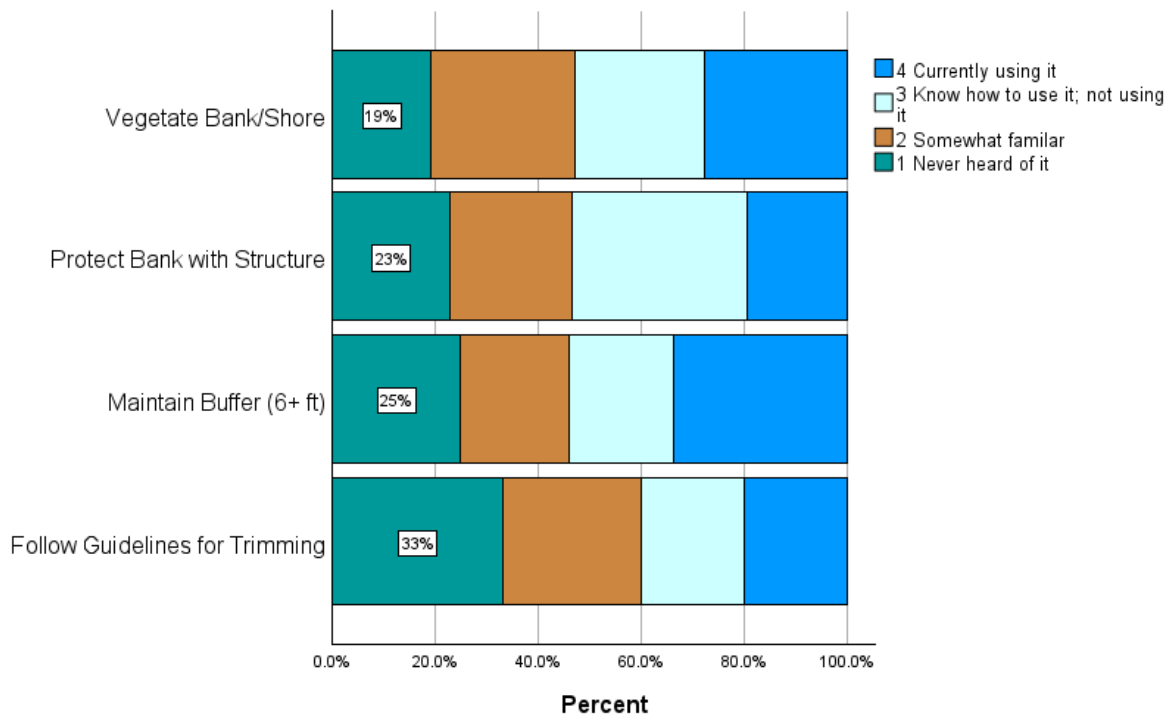


Figure 10. Use of Streambank/Shoreline Best Management Practices

When asked about things that get in their way of using streambank and shoreline BMPs, respondents with waterways said that lack of equipment and lack of information were the two largest barriers, with 42% (n=31) saying not having the equipment or information they need limits their ability to maintain their riparian zone “a lot” or “some” of the time.

Farm Operations

Twenty-two respondents identified their properties as farms. Ten of these farms reported raising animals, 18 raised crops, fruit trees, or ran nurseries, and three declined to identify the type of farming operation managed. All but one of the farming respondents who raised animals last year also raised crops. In the interests of protecting respondents’ privacy, the survey did not distinguish commercial from non-commercial operations or ask about the total value of commodities produced. However, sizable operations were represented in the data, with 11 farm respondents (50%) operating properties larger than 100 acres. In addition to farming respondents, seven rural residents reporting having farm animals, most of which were poultry and horses. Five rural residents reported raising hay, fruit, or vegetables, and one rural residential respondent raised deer.

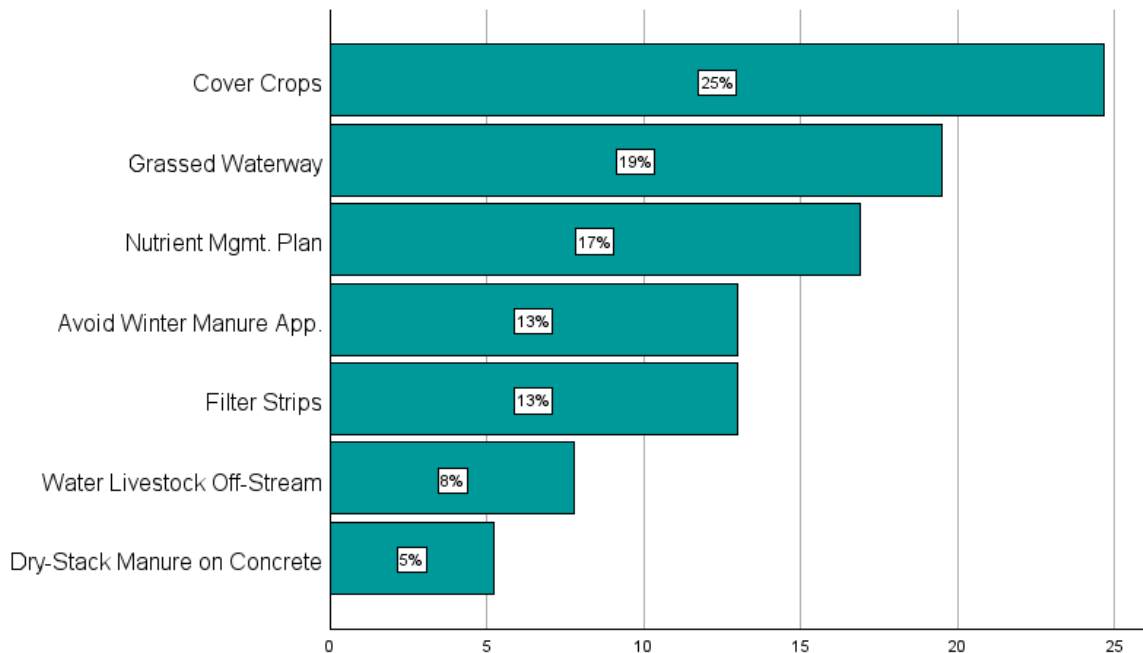


Figure 11. Proportion of Agricultural BMPs Reportedly Used

Farmers in Pentwater River watershed who responded to the survey were widely employing cover crops to help improve soil and water quality (86%, n=19 currently using), followed by grassed waterways (68%, n=15 currently using) and nutrient management plans (59%, n=13 currently using). Few respondents reported raising livestock (n=10 farms, n=7 rural residents); therefore, avoiding winter manure application, using off-stream watering sources, and using dry-stacking facilities were non-applicable practices to over 50% (n=15) of this subset of respondents.

Respondents with farming or livestock operations on their property were less likely than any other group of respondents to indicate that they had “never heard of” one of the seven BMPs evaluated (**Figure 11**). Likewise, 64% (n=14) said that not having enough information was “not at all” a problem that prevented them from utilizing BMPs, suggesting that **further education and outreach are not necessarily helpful at promoting use of water quality BMPs in farm operations**. Lack of access to needed equipment was “not at all” a problem for similar proportions of farmers. However, seasonal conditions, expense, and time were perceived to be “somewhat” or “a lot” of a limitation to approximately one-third of farming respondents, indicating that **grants supporting cost-sharing programs and aerial cover crop seeding may be needed to accelerate the adoption of BMPs in cropping systems**.

Conclusions and Recommendations

The Pentwater Watershed Planning Survey successfully reached a broad cross-section of Pentwater River watershed residents, receiving responses from in-town residents, owners of rural residential properties, and large farm operations. Survey respondents included even proportions of full-time and part-time/seasonal residents, and most respondents were not already connected to the Pentwater Lake Association or Friends of the Pentwater River Watershed organizations. Further, most survey respondents were not currently engaging in watershed stewardship activities, and respondents were evenly split between those who self-identified as “very informed” or “informed” about watershed issues (49%, n=73) and those who said they were “very uninformed” or “uninformed” about watershed issues (51%, n=75). The fact that such a diverse collection of property owners with varying levels of prior engagement in water stewardship took the time to respond to the survey is indicative of the robust opportunities to engage watershed residents’ interest in this topic.

Pentwater River watershed property owners were enthusiastic about fishing, hunting, boating, and enjoying the scenic beauty of the river and its surrounding land. When working to engage residents in watershed stewardship, connecting to these passions will be a top priority. Survey data indicated that increasing recreational access and adapting to climate change were lower conservation priorities compared to habitat preservation/restoration, erosion control, and water quality education, and this was especially true for rural residents in the watershed. **Emphasizing the importance of conservation activities to fish and wildlife habitat, mitigating stormwater impacts, and promoting public education will be more successful frameworks for communicating about conservation activities than will be emphasizing impacts to recreation or climate change.**

Survey respondents were slightly more optimistic about the direction of conservation efforts and environmental quality in the watershed compared to respondents from the 1998 landowner survey. While littering, fishing, water quality, and erosion remain top concerns, the 2023 respondents were more likely than the 1998 respondents to say that hunting and water quality have improved over the past ten years, and the percentage of respondents evaluating conditions in the watershed as “worse” has shifted to “same” from 1998 to 2023, a modest indication of improved outlook.

In looking at assessments of individual water pollutants, their sources, and their consequences in the watershed, it is evident that messaging about water quality threats associated with nutrient runoff is reaching segments the public, but more work remains in clarifying the relationship between nutrient-related impairments, their sources, and their consequences to water quality. Further, some of the sources of impairment that respondents were *least knowledgeable* about (i.e., damming, high water temperature, removal of riparian vegetation) are themselves contributors to consequences of poor water quality that respondents were *most concerned* about (i.e., loss of desirable fish species).

Addressing this disconnect between concerns about water quality and knowledge of impairment sources with targeted messaging will be a fruitful area for future outreach.

Watershed property owners themselves had several suggestions for future outreach and capacity-building activities, writing:

“Fundraisers, like parties or happy hours, are easy and lucrative ways to raise funds. Conservation groups should start annual galas or parties for fun/draising.”

“I feel that one of the most important initiatives to encourage is to educate residential owners to convert their properties to low/no maintenance native plant species to reduce nitrogen-based fertilizer use, excessive lawn watering, and mowing. It’s a reasonably easy task that everyone can do to improve the environment and reduce the effects of climate change, etc.”

“#1 Determine the carrying capacity of the Oceana environment. #2 Limit the number of tourists! #3 Initiate city-wide sewage system! #4 Restrict any/all new construction without attachment to sewer system.”

“I think people that blow their leaves into the lake should be fined. Pentwater Village and Pentwater Township should make an ordinance. Also, people hiring companies come in to cut weeds but leave the weeds in the lake to float around into swimming areas.”

To support the use of property management practices that protect and improve water quality in the watershed, rural residential property owners with septic systems and waterways need more information about recommended management practices. In contrast, farming respondents indicated that they are already getting plenty of information about water quality BMPs. Therefore, outreach and education efforts are best directed at rural residential property owners, while relationships with farm operations would be better supported by collaborating on grant opportunities to support implementation of cover crops, grassed waterways, buffer/filtration strips, and soil testing.

There was a sizable gap between the proportion of watershed property owners who reported regularly having their septic systems pumped and those who reported having their system’s function and structural soundness evaluated by a technician. This indicates that property owners would benefit from further communication about the importance of assessing system function in addition to regularly pumping the holding tank. Similarly, a sizable proportion of respondents said they had never had their well water tested even though nearly all respondents with wells drink their water. Outreach and education about septic inspections and well water testing represents an important opportunity for citizen groups because government entities, such as county conservation districts or health departments, cannot provide residents referrals to individual technicians. When residents contact these entities for referrals, they are typically directed to Google search septic companies in the

county (personal correspondence, Ottawa Conservation District). This requires reliable internet service and an additional investment of time and effort on behalf of the individual seeking information, potentially deterring follow-through. Likewise, county health departments can provide basic well water screenings free of charge, but residents with privacy concerns may be more likely to use a private lab for water quality analytics than their health department. **To streamline access to information, citizens groups can assemble a comprehensive list of contact information for every identifiable septic service excavation company, and water lab in the county, creating a brochure that can be directly distributed by citizen groups at public events or by local government offices.**

Respondents expressed interest in making low-cost investments in conservation activities, such as joining a watershed email list or a Facebook group, as well as volunteering for a workday. **To support this interest, the Friends may consider leveraging digital communication networks more effectively to provide an easy, streamlined point of connection between watershed residents and the Friends group.** For example, circulating a link to a newsletter sign-up organized using a platform such as Google Forms would allow interested users to reach a portal to enter their contact information with a single click. Google Forms then generates a downloadable spreadsheet populated with the submitted contact information.

To reach a wider audience with this newsletter sign-up information, the Friends should consider designing a simple, eye-catching advertisement or graphic that can be circulated by organizations that residents frequently look to for information about watershed issues. According to our survey results, these include local newspapers (consulted by 47%, n=79), conservation publications (type unspecified, consulted by 40%, n=68), Michigan State University Extension (consulted by 31%, n=53), and the Oceana Conservation District (consulted by 31%, n=52). Additionally, because word-of-mouth is an important way that watershed residents receive information (40%, n=64), distributing postcards with newsletter sign-up information at relevant local meetings (i.e., conservation clubs, townships), or events (i.e., summer festivals, fairs) would be a worthwhile investment for broadening the reach of the information the Friends publicize about opportunities for volunteer days, conference participation, or updates on water quality monitoring results, among other important topics.