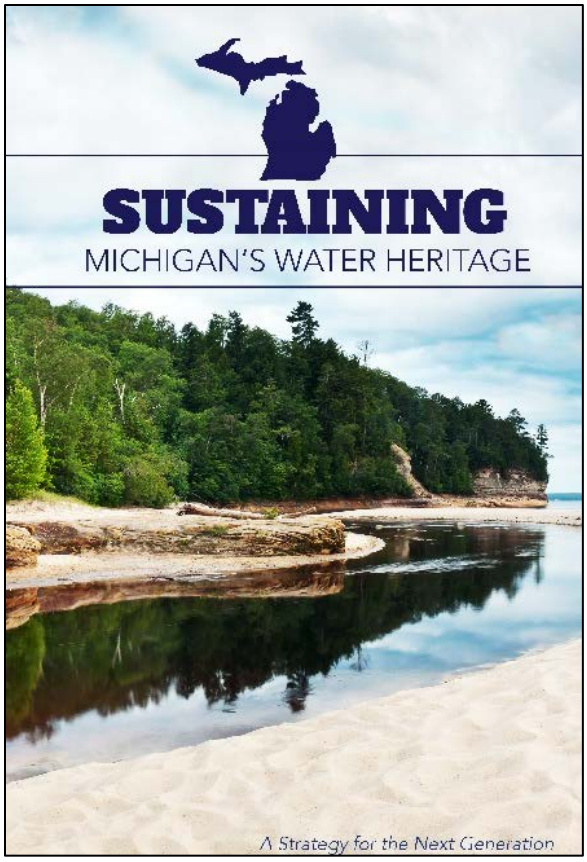
The Michigan Water Heritage Project

Connecting communities and water through storytelling

FINAL REPORT

Funding for this project was provided by Fred A. and Barbara M. Erb Family Foundation

Introduction



The Water Heritage Project is a collaborative initiative that developed Great Lakes specific exhibit panels to travel to various communities throughout Michigan. The project supports The State of Michigan Water Strategy goals to inspire stewardship for water resources and increase knowledge of our water system.

Launched in June 2018, the Michigan Water Heritage Project visited seven communities throughout the state of Michigan, actively engaging individuals in these communities through facilitated conversation and water-themed exhibits. The project uses the 'conversation model' as a place-based approach for community engagement to connect with a broad array of Michigan's population to capture people's stories and connection to Michigan's waters within the exhibit setting. Through facilitated conversations, this project actively engages individuals to listen to their story about why water matters to them personally. The collection and evaluation of this data will allow communities to better understand the knowledge and perceptions held by community members regarding local water resources. This will aid in identifying local priorities and informing and engaging individuals, businesses, and government in strategies to improve their communities.

Specifically, the four desired project outcomes are:

- To facilitate a deeper understanding of Michigan's water heritage and stewardship needs through outreach and water-themed museum exhibitions.
- To establish a deeper understanding of the issues impacting water and quality of life in Michigan.
- To evaluate the impact of the Water Heritage Project on participants' perceptions, knowledge, and behaviors toward water resources.
- To make project deliverables available to Michigan communities throughout the grant period and over a three-year period following the conclusion of programming.

In order to meet these project outcomes, the Water Heritage Project facilitated conversations and hosted exhibitions in six rural communities chosen through the Michigan Humanities Council's partnership with the Smithsonian Museum on Main Street Water/Ways exhibition. After the Smithsonian Waterways exhibit returned to Washington D.C. the Michigan Water Heritage Project was displayed at Michigan Science Center in downtown Detroit for the summer of 2019.

Connecting Communities

The project team consisted of:

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Sites were selected by the Michigan Humanties Council in conjunction with the criteria set forth by the Smithsonian's Museum on Main Street Program. The main condition was that the population of each of these communities was to be less than 20,000. In each of the rural communities a pre-exhibit community meeting was held, explaining the goals and components of the project to community leaders with the goal of facilitating connections between the project and community organizations and initiatives. Five of the exhibit panels focused on Great Lakes specific issues. Designed in conjuntion with each community a 6th panel was created to highlight the local community's current and historical connection with water. This community focused panel was given to the community after the display left for the next location.

While the exhibit was on location multiple individuals were interviewed and asked to describe memories associated with Michigan waters, as well as how they value and connect to water in their daily lives. Community members were also asked to participate in a value-sort activity (Q-sort) where they ranked pre-defined values based on their personal connection to water within their community.

Members of MSU's Abundant Resources Research Group created electronic survey materials and evaluated the project data collected through the interviews and q-sorts to determine the project outcome. Evaluation of the project's impact post-visit focused on three target areas.

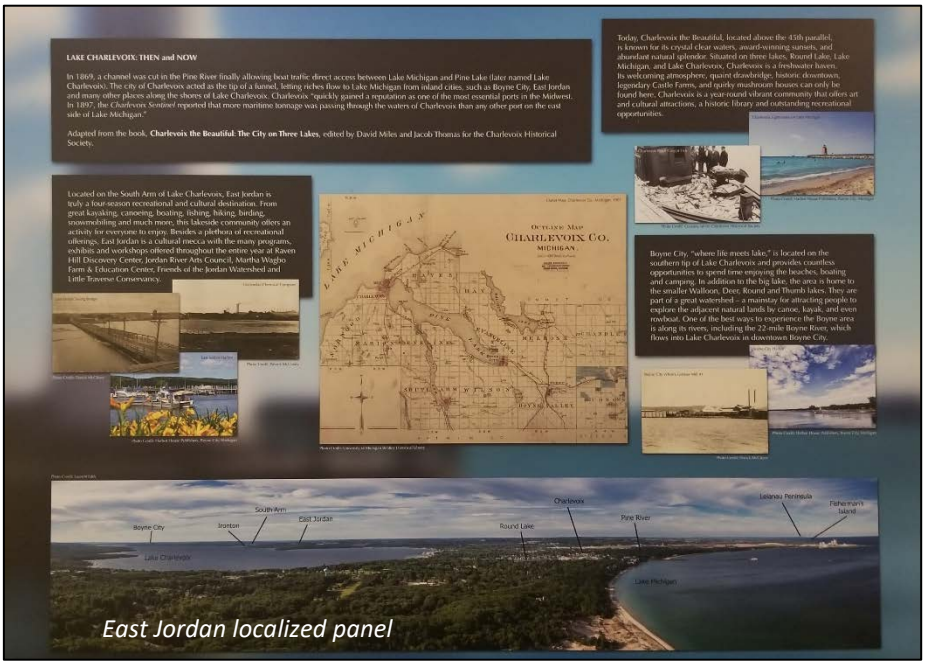
- CHANGE IN PERCEPTION: Did your awareness of the historical, current and future value of water and role of water in daily life change?
- CHANGE IN KNOWLEDGE: Are you more knowledgeable about issues impacting water quality and quality of life in your local community and the State of Michigan?

- CHANGE IN BEHAVIOR: Are you aware of daily activities, choices, behaviors or actions you can take to improve water resources in your community? Are you more likely to engage in or act on water related issues in your community as a result of this project?

Project Sites

Social media marketing from BIHS Facebook page

Beaver Island: The initial installation was hosted by the Beaver Island Historical Society (BIHS) Museum from June 23rd through August 5th, 2018. As the first site, the project kickoff event was held here, with several days of training for volunteers from all sites culminating in a grand opening gala. BIHS hosted a number of events including a water-related symposium, with speakers discussing the historical, scientific and cultural role of water in the Beaver Island community. Total attendance during the 6 week stance was 2,132. Thirty five Q-sorts and eight interviews were collected during this time. The interviews consisted of year-round residents, as well as part-time residents who owned homes on the island and vacationers from all over Michigan and beyond.



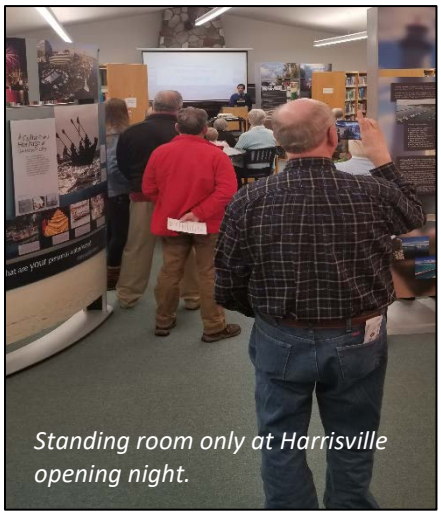
East Jordan localized panel

East Jordan: Site two was at Raven Hill Discovery Center in East Jordan, whose attendance was 9,237 between August 11th and September 23rd, 2018. Raven HIll had numerous events including a speakers series, a community Water Festival, a kayak paddle on a local river, and a Great Lakes Literacy for K - 12 Teachers workshop. Multiple school groups were brought through the exhibit at this location, and water-related art programs and contests were held for children and adults. Nineteen Q-sorts and 12 interviews were collected during this time. Interviewees were both local community members and vacationers from across the state.

Big Rapids: The exhibit was installed at Artworks, a nonprofit arts center in Big Rapids and had 3,136 visitors between September 29th and November 11th, 2018. Artworks partnered with other organizations to create 6 weeks of outstanding programming that included but was not limited to: a water ceremony performed by local tribal members, special exhibitions by local artists, various speakers who spoke of history, ecology and other topics related to the Muskegon River, a photogrphy class on how to photograph moving water, and a number of cleanups along the Muskegon river in several communities. During this time many locals and a few vistors contributed to the 19 Q-sorts and 14 interviews that were collected.

Anishinaabe Native American White Wolf Drum members, Scott and Aden Herron.

Harrisville: The fourth site to host the project, from November 17th through December 30th, 2018, was the Alcona Public Library in Harrisville. Many school groups visited the exhibit on field trips, and Cranbrook Freshwater Forum's Water on the Go! program also visited 4th, 5th, and 6th grade students to teach water-focused lessons after the classes visited the exhibit and help connect what they learned in the exhibit to their daily lives. A variety of events were held including fish art workshop for kids,and a community Water Festival. The library reported 6,488 visitors and 13 Q-sorts and 10 interviews were collected during this time.



Standing room only at Harrisville opening night.

Niles: The exhibit was open January 5th through February 17th, 2019, at the Niles Public Library. Some of the events hosted in conjunction with the exhibit was a Honor and Protect: a talk presented by Andy Jackson, Pokagon Band of Potawatomi on the traditional uses of water in the Potawatomi culture, a tour of the local wastewater treatment plant, and an expo that featured organizations and people in the community that are making a difference with the local waterways. Attendance numbers for this location are not available, 12 Q-sorts and 8 interviews were collected during this time.

Owosso: The project was hosted at the Shiawassee Arts Center in Owosso from February 23rd through April 7th, 2019. Total attendance was 1,664 and 15 Q-sorts and 11 interviews were collected during this time. This was the final location where Water Heritage Project shared a location with Museum on Main's Water/Ways exhibit. A number of events were held including a poetry contest for local 8th graders, a river critters exhibit by local 6th graders and a lecture sponsored by friends of the Shiawasee River.

A photograph of the Shiawassee river taken with a drone by a local middle school student and featured on the exhibit panel and exhibit marketing materials.

Detroit: The final host of the Water Heritage exhibit was the Michigan Science Center in Detroit during the summer of 2019. The Water Heritage exhibit was hosted at the same time as a separate water-related exhibit "Depth" created by Science Gallery Detroit. Science Gallery Detroit is an iniatative from Michigan State University. The mission of Science Gallery is to act as a collider of art and science, and to engage 15-25 year olds in connective, participative, and surprising ways. It was more difficult to engage visitors in participating in the q-sort and interview at this location. Ten Q-sorts and 10 interviews were collected during this time, a combination of science center volunteers and volunteers at the "Depth" exhibit, local community members, and visitors to the city from elsewhere in Michigan.

Evaluation

Between June 2018 and April 2019, the Smithsonian Institution's Water/Ways exhibit traveled to six small, rural towns in Michigan as part of the Museum on Main Street program. The exhibit highlighted the central role that water plays in our social, environmental, and economic systems. Recognizing the Smithsonian exhibit as an opportunity to explore the importance of Michigan's abundant water resources, the Michigan Humanities Council, Michigan Office of the Great Lakes and Cranbrook Institute of Science developed the Michigan Water Heritage Project, a companion exhibit and engagement project focused specifically on the Great Lakes. The Water Heritage Project traveled alongside the Water/Ways exhibit to the six towns and was also exhibited on its own at the Michigan Science Center in Detroit during the summer of 2019 (Table 1).

Data was collected throughout the duration of the Water Heritage Project to both increase its impact by fostering more value focused conversations with participants and evaluate the effect the exhibit had on visitors afterwards. Information was obtained via three different methodologies: (1) Q Sort, (2) interviews, and (3) online surveys. These methodologies were chosen to be complimentary approaches, with the strengths of one making up for the weaknesses of the other. The Q sort and interviews were conducted during the exhibit, while

participants were surrounded by the images and stories about Michigan's water heritage. The follow up survey was sent following participants visit, to assess whether (and to what degree) the exhibit had a lasting impact on visitors. In this report, the findings of these evaluative efforts are presented beginning with the Q Sort and qualitative interview findings, followed by the results of the survey questionnaire.

Table 1. Total number of participants across various evaluation methods

	Number of participants		
Location	*Q sort*	*Interviews*	*Survey*
Beaver Island	*35*	*8*	*9*
Big Rapids	*19*	*14*	*9*
Detroit	*10*	*10*	*5*
East Jordan	*24*	*12*	*13*
Harrisville	*13*	*10*	*4*
Niles	*12*	*8*	*9*
Owosso	*15*	*11*	*8*
Total	*128*	*73*	*57*

Q Sort and Interviews

Q Methodology

Developed by William Stephenson (1958), the goal of Q methodology is to explore subjectivities within groups through the extraction of a person's self-referenced values. Founded in factor analytic theory, study participants rank statements (or collection of photographs) from most to least important during a Q sorting exercise (also known as a Q Sort) to capture an individual's perception or point of view, which can then be explored and compared (Brodt et al., 2006). The statements comprise values or preferences driven by personal experience regarding a particular phenomenon and are developed either via naturalistic inquiry (i.e., researchers draw statements directly from conversations with participants during interviews) or prior research (i.e., researchers draw statements from literature reviews, existing scales, or standardized items) (McKeown & Thomas, 1988). As such, Q methodology does not impose meanings *a priori*, but rather invites participants to decide what has value from their own perspective (i.e., democratizes the research process) (Brown, 1980; Barry & Proops, 1999). Q methodology is predominantly used in a case study context with relatively small sample sizes ($n = < 60$) to uphold the nuances within the data and protect the quality and complexity of the results (Raje, 2007; Stergiou & Airey, 2011; Watts & Stenner, 2012).

During the Q Sort, individuals place value statements in a diamond-shape chart that encourages (but does not require) ranking to approximate a normal distribution. The charts are then statistically analyzed and put into groups, called factors, allowing for a 'scientific' study of subjective phenomena that resembles other quantitative social science research methods through the application of statistical techniques (McKeown & Thomas 1988; Goldman 1999; Previte et al., 2007). Rather than simply describing highly ranked items for the group as a whole (e.g., as with standardized surveys), Q methodology is unique because it allows the researcher to explore the range of values that stakeholders may have by exposing diversity within a sample population (Stephenson, 1958).

Data Collection and Application of Q Methodology

The value statements utilized in the study were developed by naturalistic inquiry (McKeown & Thomas, 1988), drawing statements directly from semi-structured, in-depth interviews that were collected as part of an EGLE community vibrancy study (Rutty & Goralnik). These statements were then analyzed alongside a literature review on human relationships with natural resources and expanded. Interviewees from four towns across Michigan (Alpena, Sault Ste. Marie, Manistee, Port Huron) were first identified through convenience sampling, which relied on personal contacts and existing relationships with local officials. Following the first few interviews in each town, researchers employed a snowball technique to identify other key stakeholders with knowledge about development, natural resources, and water restoration in place. Final samples in each town included representatives from community foundations, municipal governments, natural resource management agencies, volunteer groups, and recreation and tourism organizations. A total of 15 values were identified (Table 2), with one blank card that allowed for participants to identify an additional value if needed.

Using these same 15 values, Q sorts were performed in an additional seven communities across Michigan where the Water/Ways and Michigan Water Heritage Project was held. Community members were invited to rank the statements as expressing the priority that they would place on a value if they encountered trade-offs in a practical or policy decision. A total of 128 Q sorts were completed (Table 1). The results were then coded to represent the distribution of the Q sort and imported into the statistical computing tool R for analysis using the package QMethod by Aiora Zabala (2014). Factor retention strategies such as centroid factor analysis (Newman and Ramlo 2010, Brown 1993), parallel analysis (Walder and Kantelhardt, 2018), and principal component analysis (Pereira et al., 2010) are typically used to offer statistical guidance in retaining factor but often yield different results. It is therefore up to researchers to determine the final number of factors guided by one or more of these strategies. For the purposes of this study, an initial analysis was performed to generate a set of 4-9 factors using parallel and principal component analysis, which was then analyzed qualitatively by the research team (Rutty, Goralnik & Brunacini) to guide the factor retention process. The combined process resulted in the retention of six final factors, grouping community members into six distinct value frames to help explain their perspectives toward how they value water resources in their town.

Table 2. Values Selected for Q Sort

Beauty	The aesthetic value of a place, for human enjoyment and appreciation
Economic Opportunity	Financial benefits from the production and consumption of local goods and services
Ecosystem Services	The landscape's ability to support *human* wellbeing by regulating threats (e.g. climate, pollution) and providing services (e.g. clean air, water)
Education	Opportunities for formal and informal learning
Family	Opportunities to strengthen family relationships
Health - Mental	Opportunities to cultivate stillness, connection, and emotional wellbeing
Health - Physical	Outdoor opportunities to cultivate human fitness and physical wellbeing
Landscape Health	The integrity and wellbeing of the land as a system
Recreation	Outdoor leisure activities by *residents* during non-work time
Sense of Place	The special connection one feels to a place
Social	Opportunities to build and nurture relationships with people
Spiritual	A landscape's impact on the human spirit or soul
Tourism	Attraction of a place as a destination by *non-residents*
Transportation	The movement of goods or materials from one place to another (e.g., shipping)
Wildlife Habitat	The landscape's ability to support the wellbeing of *nonhuman* nature
(Blank)	Filled in by the participant for any value not represented

Results & Discussion

Value statements with eigenvalues greater than 1 or less than -1 are generally considered characteristic for a factor and are indicated in the typologies below. Positive eigenvalues indicate that participants who load onto that factor place higher priority on the value than the overall sample; conversely, negative eigenvalues suggest that participants who load onto the factor place lower priority on the value. Based on the positive and negative values characteristic of each factor, community members were grouped into one of six typologies, which are defined below. Interviews were analyzed to provide insight into how these types of community members value water resources in their town, with exemplar texts from the interview transcripts provided.

1) **Water as Refuge:** *A non-consumptive appreciation of water. Being around and experiencing water brings a sense of awe or feeling of belonging.*
   - Positive: Beauty, Sense of Place, Wildlife Habitat
   - Negative: Economic Opportunities, Tourism, Transport

   "I think that out of probably all of those together, when I add up a lake or body of water and curiosity about what's in it, enjoying the quiet and stillness of the place, and I guess just also it's always a beautiful place to be."

2) **Water has Intrinsic Value:** *Clean, healthy water is important in and of itself and for all life on earth (i.e., not simply for the benefit of humans).*
   - Positive: Environmental Benefits, Landscape Health, Wildlife Habitat
   - Negative: none

   "Well I think that's the whole key to life on Earth, is water. So, whether it's just environment for humans or environment for anything, plants or animals, we've got to have a sustainable fresh water system. Without that nothing else is going to make a difference."

   "I think wildlife have the first dibs on the water and we should always protect them in anything that we do on the water and on the shore…I think that that's their home and we're visiting it."

3) **Water for Use:** *Water as a resource to be used and shared by humans and wildlife*
   - Positive: Environmental Benefits, Recreation, Wildlife Habitat
   - Negative: Spiritual, Transportation

   "My family and I love to kayak and so, we're out on the water and it's peaceful and it's quiet. With the recreation comes the habitat, we've got swans out on our lake, and loons, and they're just beautiful and when you're kayaking it's quiet and you get the chance to experience them without disturbing them too much."

4) **Water as a Basic Need:** *Water plays a central role in meeting our daily needs, and it is important for people to understand this*
   - Positive: Education, Family, Mental Health
   - Negative: Beauty, Tourism, Economic Opportunity

   "I think that we have to take care of our families and if we don't have water we're not going to be able to take care of anything. So, I think that we really, and especially with all the environmental things that are going on with all our water getting polluted and so on and so forth, I believe that it's showing more and more that we have to be careful with our water in order to keep the family safe."

"If people aren't educated about how we're using water then nothing's really going to change about it and it's not really going to hold anyone accountable for actually fixing the problem."

5) **Water as a Service Provider:** *Water is necessary for life on Earth*
   - Positive: Environmental Benefits
   - Negative: Education, Sense of Place, Social

   "I think that's the whole key to life on Earth, is water. So, whether it's just environment for humans or environment for anything, plants or animals, we've got to have a sustainable fresh water system. Without that nothing else is going to make a difference."

6) **Water as Medicine:** *The impact of water on one's health and well-being*
   - Positive: Environmental Benefits, Mental Health, Physical Health
   - Negative: Education, Social, Sense of Place

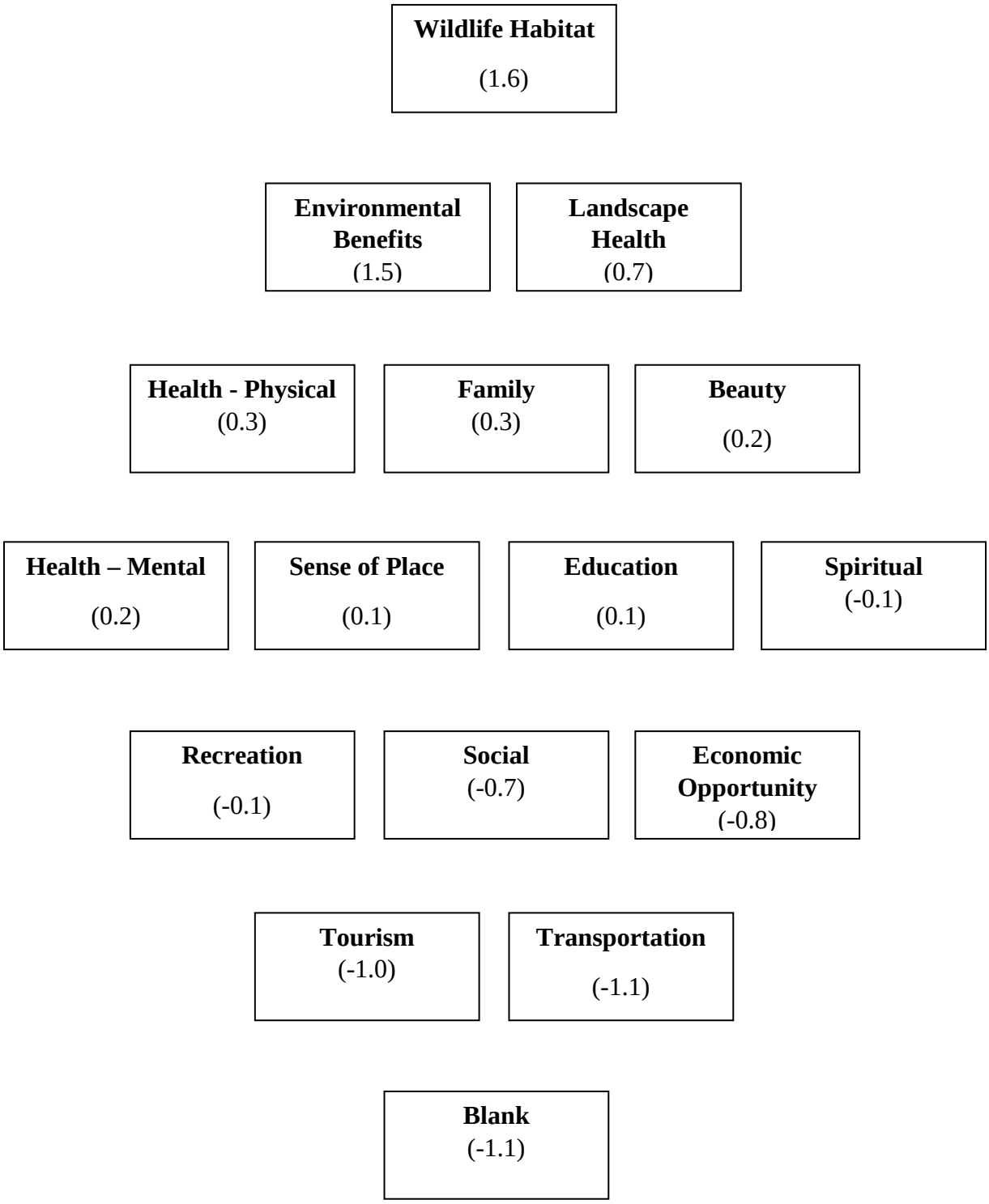
   "Physical health, I believe that would be, like, number one priority with water because we need it and everything on Earth needs water. Mental health, I feel like water plays a special role in mental health, like, it could be therapeutic…and for environmental benefits, I believe, like I said before, that everything on Earth depends on water so I believe that environmental benefits are good for water."

   "I work in Flint, so therefore am very conscious about water and what happens when it's not good, so that's why I chose the environmental first, and physical health, which goes with that, then mental health."

Differences in how water is valued across the seven communities was also examined, with mean scores from each community site provided in the Appendix. The communities were largely in agreement, with Environmental Benefits, Landscape Health, and Wildlife Habitat consistently ranked as the top three values. The two exceptions were Owosso and Niles, which instead of Landscape Health, placed Education and Physical Health in the top three, respectively. The bottom three values were also similarly ranked across the seven communities, with Transportation, Tourism, and Economic Opportunities ranking as the lowest value. The two exceptions are Harrisville and Niles, which placed Social instead of Tourism in the bottom three.

The Q sort mean scores for the responses across all seven towns is located in Figure 1. The average responses for each of the seven individual towns can be found in the appendix.

Figure 1. Q sort mean scores for across all sites, in response to the prompt: "The most important impact of water for me is…"



Interview Methodology and Analysis

In addition to the Q sort ranking activity, participants were invited to take part in a short, structured interview to describe their sorting process (i.e., explain their ranking of the values within the grid). Those who agreed to an interview were asked questions about water resources in Michigan and the Water/Ways exhibit. These questions included sharing a favorite story or memory relating to water in Michigan, providing examples of how they (the interviewee) expressed their water values in everyday life, and reflecting on their experience with the exhibit (for results from non-Q sort related questions, see the interview analysis report below). These interviews ranged from approximately three to five minutes in length, and were conducted with a total of 73 people (Table 1).

Interviews were audio recorded for accuracy and transcribed into text files. Qualitative analysis of the interview transcripts was an iterative and collaborative process. All interviews were coded for emergent themes (Miles, Huberman, and Saldana 2014) by two researchers, who each manually coded one interview from each town and met three times to develop a working codebook. The codebook included 71 total codes (7 main codes, 34 primary subcodes, 27 secondary subcodes, and 3 tertiary codes). The two researchers used this codebook to independently code four more interviews, meeting one additional time to discuss coding strategy, work through disagreement, and streamline code and category definitions. This conversation continued until inter rater reliability reached 90%, which is a commonly accepted threshold for agreement (Neuendorf 2002), where the researchers agreed on the application of at least nine out of ten codes. When the codebook was saturated and stable (Mason 2010), one of the researchers coded the entire set of interviews using Dedoose, a qualitative analytical and organizational software. Exemplar text from the codes was extracted from the transcripts and placed into data display tables organized by town (Rubin and Rubin 2012**).** Summary statements and memos about the patterns and trends identified within and across towns were created by the primary researcher.

This report focuses on the synthesis of responses related to interviewee's favorite stories or memories about Michigan water, how they live their water values in everyday life, and their experience with the exhibit; for more information on how interviewees described their value sorting process, see the Q Sort Results section of this report. Results are included below, with exemplar interview excerpts provided for context.

Results and Discussion

Based on analysis of the interviews, several key characteristics of how people experience and relate to the Great Lakes, major rivers, and other water bodies in Michigan emerged. Michigan's water resources can be described as:

- **Gathering places where we connect with family and friends, creating memories and traditions over time and especially across generations**
    - "I think of our waterways as a gathering place. People vacation at the waterways, everyone comes from all over the world to celebrate water and being together on the water is a great way to spend the day whether you're on a boat or just at the

beach. It's peaceful and calm and beautiful, and you can have a picnic, and you can play in the water, and swim, and catch fish, and it's just an awesome place to be."

- "Well, the place where we always go is up, where my parents used to take us, my grandfather built a cabin up on Higgins Lake and from toddler-size I can remember going up there, rowing boats, fishing with my parents, my dad especially. Just playing in the sand, we were always in the water, you know, we got burned to a crisp but we still enjoyed it. I mean, we would do it year after year after year and now I'm part owner of that cabin so I'm still carrying on with my kids so it's pretty neat."

- **Part of our families, personal histories, and individual as well as collective identities; the water is deeply connected to who we are**
  - "[The water is] like a part of my family…every summer all of our family would gather there and 'cause all of my favorite family memories are at the water."
  - "When I associate where I grew up and part of who I am, I think of the geography of where I grew up which I associate with water and being on the lake and stuff like that. It's like a part of my family."

- **Giving us spaces where we can enjoy the full spectrum of recreation, from physically active to fully relaxing; these activities, in turn, build relationships with people and the water**
  - "All of the restorative benefits that has for all of us through recreation, and a beautiful place to be, and it helps, you know, your mental health to be out in nature and certainly getting together with people, and so many of my friends, their vacation spots revolve around water, and being on boats, and being at the beach, and all of that and that's how people build so many memories."
  - "I think, my being in the Great Lakes area my entire life has really made me appreciate the lakes obviously, and we just love camping, and coming to Lake Michigan, and Lake Superior, and just spending the time together as a family and playing in the waves and just enjoying that time together as a family and building our relationships."

- **Helping us feel connected to our shared environment and local ecosystems, increasing an ethic of care for protecting the water as a resource and habitat**
  - "I'm more interested in supporting the wild animal life, and the habitat, and the environment, so that we can continue to support the quality of life in our communities. These things are necessary for human health and habitation. So, it's kind of like taking care of the base so that we can take care of other things."
  - "I think we have to take care of our environment and the water helps us to be able to do that, and we got to take care of the water for that, and to take care of the animals. Water helps take care of the animals and give them their home and so we need to be conscious about that."

- **Providing us with a sense of peace or tranquility, enhancing our mental health and well-being**
    - "We're all plugged in and we're going a million miles a minute, and we're all looking at our phones and we need to unplug, literally. Turn the internet off, and when you're out on the water, or even on the beach looking at the water, and you're quiet it just raises your whole thought up, and you're quiet enough that you can then solve all the other issues you need to deal with."
    - "It's just a great thing to sit by a river or the creek and just listen, just listen to the noise the water makes and it just brings you peace, it just seeps in all your bones and remains."

- **Inspiring in us a sense of awe, reverence, or spiritual connectedness**
    - "We lived very close to the lake and I remember going to the lake and just sitting on the sand dune looking at this huge body of water and it just made you realize that whatever your problems were they're kind of really small."
    - "I really believe water can have an impact on your own personal spirit. If I'm feeling down or bad being around water really makes a difference. It's so calming and soothing…you know when you hear the water at night when you're going to sleep it's soothing and calming."

- **Our happy place**
    - "The feeling I get from Lake Superior is like no other, it's my medicine. To lay on those sun-warmed rocks listening to the water, whether it's the roar of the waves or just the gentle lapping rolling those little pebbles up on the beach, yeah, I have to have that once a year [laughter]. So that was really my happy place."
    - "I've always just been attracted to the water, I love being around the water, I feel very relaxed, I love listening to it. When I need a happy place to go to in my mind I go to the water."

Michigan waterways also offer residents professional opportunities in the forms of employment and other livelihood activities. However, there is concern that too much of a focus on economic development or growth could adversely impact water resources, including negative impacts from the growing tourism industry: "It's interesting because I am a tourist, I love to come here and it refreshes me, but…I think, sadly, a lot of people that come here are not appreciating the top things and they're actually kind of destroying it instead of cherishing it." Interviewees expressed a desire for striking a balance between taking advantage of economic opportunities and protecting water resources.

Interviewees articulated a belief that raising more awareness about Michigan water resources through education and engagement would be beneficial for creating support for protection and conservation efforts. A few key messages found throughout the Water/Ways and Water Heritage exhibits were identified as particularly engaging, including how much of the world's limited fresh water supplies are held in the Great Lakes, the amount of water it takes to produce items used on a daily basis (e.g., food, clothing, smart phones), and the impacts that degraded water supplies have on communities in Michigan and beyond. A significant amount of

people expressed an understanding that water resources are part of interconnected social-ecological systems that are fundamental to human, as well as non-human, health and well-being. These interviewees recognized that caring for the water requires caring for all aspects of life that water supports, from humans to wildlife to landscapes. Interviewees expressed the belief that without water, we will not be able to have other things we value. In other words, everything we care about flows from the quality and quantity of our water resources. Thus, the water takes care of us, so we need to take care of the water.

Several interviewees highlighted the importance of awareness in explaining how their values of water resources translated into action in their lives. For example, an educator explained that she puts her values into practice, "Just in my habits and trying to manage water that I'm using, or just thinking about where my food is coming from and realizing how much water it takes to produce food as well. So, I think really being critical about my own habits as well as what example I'm having on the kids I'm teaching." Many of the interviewees who spoke about their values-in-action mentioned efforts to live more sustainably by conserving water resources and to rebuild connections to local water bodies in their families and communities.

Conclusions from data collected during the exhibit

People living in Michigan, as well as those visiting, feel strong connections to the Michigan's water resources, including the Great Lakes, major rivers, and other water bodies. In fact, one of the most common phrases used by interviewees to describe their relationship with Michigan's water was "love". Water plays a central role in the lives and memories of those who shared their stories with us. In addition to these emotional and historical dimensions, there is a shared understanding that water is critical to the health and wellbeing of both human and ecological communities. Combined, these connections motivate an ethic of care for protecting the water as a resource and habitat. Educational exhibits and engagement events like those featured in the Water Heritage Project serve as a promising way to encourage communities to explore their water values and relationships. These types of projects are also valuable in helping to raise awareness and build support around water protection and conservation efforts.

Follow-up Survey

An invitation to participate in an online survey was emailed to all 117 visitors who participated in the Q Sort activity, or who attended the exhibit and volunteered to receive one. Depending on which exhibit location respondents visited they received the follow up survey anywhere from 8 months (Beaver Island) to a few weeks (Detroit) after their visit. After the initial invitation three reminders sent over the span of 12 days. The survey was split into four sections beginning with (1) demographic questions, (2) impact of the exhibit and what visitors remembered, (3) thoughts on who has the responsibility of stewardship and care of Michigan's waters, and (4) how individual behavior may have changed as a result of the exhibit. A total of 57 respondents completed the survey (Table 1), for a response rate of 48%.

Demographic characteristics of survey respondents

Just over half of the visitors to the Water Heritage exhibit came from out of town, with 56% of respondents reporting that they live in a city other than the one where the exhibit was located (Table 3). The majority (74%) state that they had a special connection to a specific body of water. Of those 42 respondents, 15 indicated a special connection with a Great Lake, including 11 respondents that had a special connection to Lake Michigan. Three respondents reported a special connection with the Shiawassee River, while the rest reported other local lakes and rivers. Only 14% of visitors reported being a member of a water conservation group. Of those eight, two were members of the Friends of the Shiawassee River organization.

Table 3. Demographic information of survey respondents

	Total	Beaver Island	Big Rapids	Detroit	East Jordan	Harrisville	Niles	Owosso
Number of respondents	**57**	9	9	5	13	4	9	8
Age								
Mean	**51**	49	63	25	47	64	54	52
Min	**18**	20	49	18	20	61	43	40
Max	**82**	82	79	34	72	66	67	64
Are you a resident of [city where the exhibit was located]?								
Yes	**20**	2	5	1	1	2	5	4
No	**32**	7	4	3	11	1	2	4
Do you have a special connection to a specific body of water?								
Yes	**42**	8	8	3	9	3	6	5
No	**11**	1	1	1	3	1	1	3
Are you a member of a water conservation group?								
Yes	**8**	0	3	0	2	1	0	2
No	**44**	9	6	4	10	2	7	6

Exhibit impact and recall

All but three people (95%) reported learning something new about Michigan's Great Lakes history as a result of visiting the exhibit. When asked to recall an example of what they learned, 14 respondents reported specific facts (*e.g.*, 1/5 of the world's fresh water, the various uses of water, the water cycle). Nine visitors mentioned the numerous threats to Michigan water and five remarked on how precious and vital our water resources are. Five respondents also mentioned an appreciation for the history surrounding water in Michigan. These answers closely mirrored those given for what stuck out most to visitors, with the most common responses categorized as "what water is used for/how much is needed" (8 respondents), "threats to our water" (8), "how precious and vital water is" (6) (Table 4).

Table 4. Exhibit impact and recall

	Total	Beaver Island	Big Rapids	Detroit	East Jordan	Harrisville	Niles	Owosso
During this visit, did you learn something from the exhibit about Michigan's Great Lakes history that you didn't know before?								
Yes	**53**	9	9	5	10	4	8	8
No	**3**	0	0	0	3	0	0	0
Which of the following ways of presenting information were most impactful for you? (check all that apply)								
Photos/images	**45**	8	6	3	9	3	8	8
Text	**22**	3	4	2	5	1	4	3
Conversations at, or about, the exhibit	**35**	6	6	2	11	3	6	1
Localized information	**18**	2	3	1	5	1	4	2
Personal reflection afterwards	**12**	2	2	1	2	1	3	1
Was there anything that you learned at the exhibit that really stuck out in your mind?								
Yes	**29**	5	4	2	9	3	3	3
No	**27**	4	5	3	4	1	5	5
After visiting the exhibit, how much more knowledgeable do you feel about issues impacting water quality in your local community and in Michigan?								
(1-5, "not at all" - "a great deal")	**3.29**	3.56	3.22	3.20	3.08	3.50	3.63	3.00

Responsibility for care

Respondents were asked the extent to which they agreed that various organizations were both responsible for caring for water resources in their community and the extent to which they were doing so. Regarding the perceived responsibility to care for water, there was little difference across either the entities asked about or the location where respondents viewed the exhibit. However, Tribal councils and local businesses were seen as bearing less responsibility than others (Table 5).

Table 5. Responsibility for care (all questions were set on a 1 "strongly disagree" to 5 "strongly agree" scale)

	Total	Beaver Island	Big Rapids	Detroit	East Jordan	Harrisville	Niles	Owosso
The responsibility to care for water resources (e.g., lakes, rivers, beaches) in my community falls upon…								
State and federal agencies	**4.35**	3.44	4.22	4.80	4.77	4.25	4.71	4.25
Local government	**4.29**	3.89	4.11	4.80	4.46	4.50	4.43	4.13
Tribal councils	**3.94**	3.29	3.78	4.80	4.54	4.33	4.00	3.00
Local businesses	**4.06**	3.78	3.67	4.80	4.31	4.25	4.14	3.71
Community residents	**4.35**	3.89	4.33	4.80	4.54	4.25	4.57	4.13
Citizen groups (volunteers)	**4.33**	3.78	4.22	4.80	4.77	4.75	4.00	4.13
Myself	**4.35**	3.88	4.11	4.80	4.75	4.75	4.57	3.75

Answers were more varied in response to whether or not these entities were carrying out that responsibility. Respondents were given options of “Yes,” “No,” and “I don’t know” to the question of, “*In your opinion, are these organizations actively working to care for your community's water?*” Across all the exhibit sites, respondents reported that private citizens were active in caring for water resources more than governmental agencies. There was the most uncertainty about the actions of tribal councils, with local businesses receiving the second highest amount of “I don’t know” responses. State and federal agencies and local businesses received the highest amount of “No” responses (Figure 2).

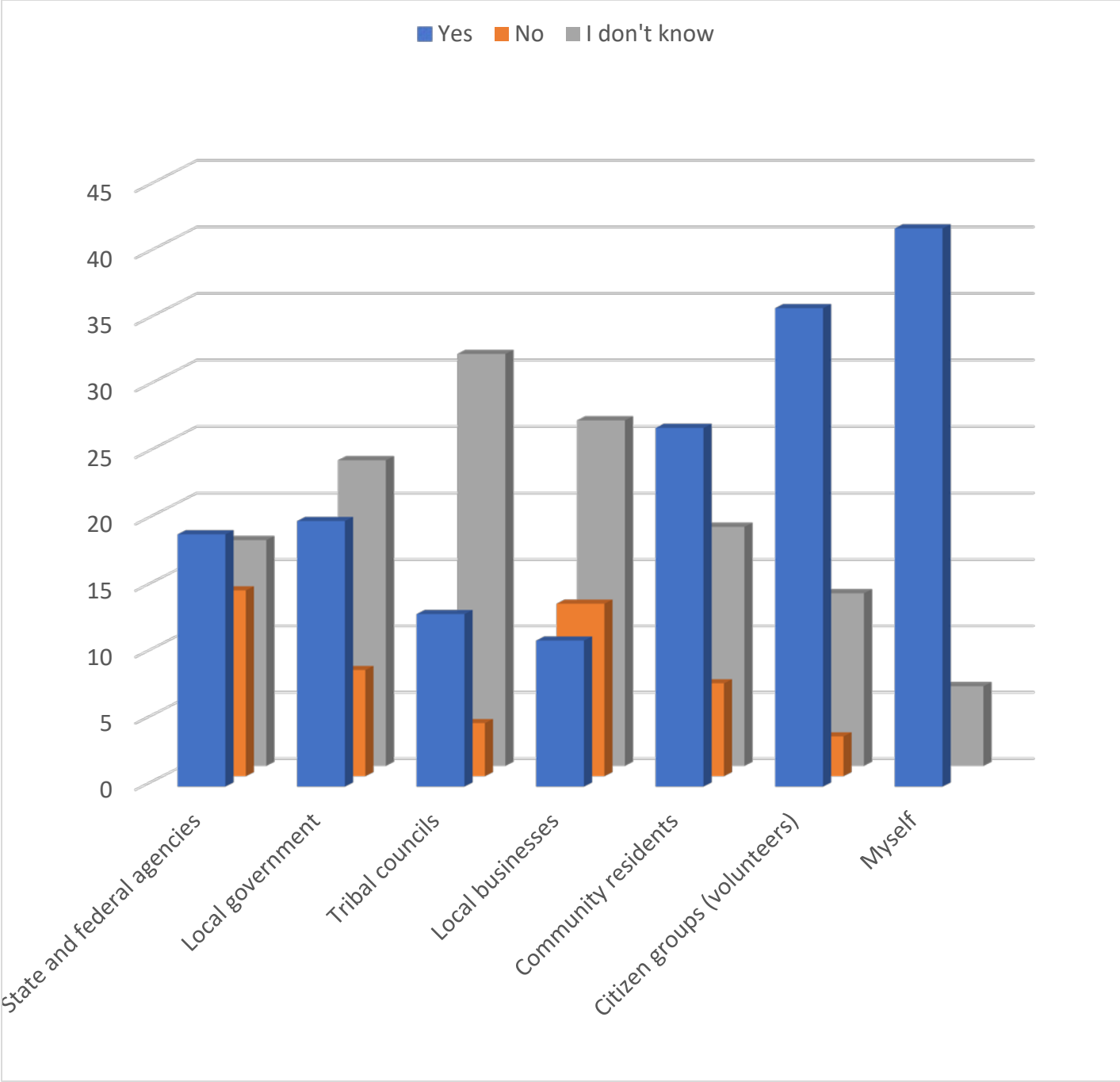


Figure 2. Total responses across communities to the question: "In your opinion, are these organizations actively working to care for your community's water?" (responses for each entity across communities are located in the appendix)

Follow up behaviors

The last section of the survey consisted of a series of questions to gauge the effect that the Water Heritage exhibit had on visitor's behaviors. The initial questions were more general, followed by specific examples. Overall, exhibit visitors said their view of the role water plays in their daily life changed a fair amount, and they were equally more aware of decisions they could make to protect Michigan's waters (Table 6). The main way respondents reported that their views on water had changed was through being more thoughtful about how they use, conserve and waste water (18 mentions) in their daily life. A more abstract appreciation for the importance of water was also reported (6 mentions). Eight respondents reported that they had already been very concerned about their daily use of water, but this exhibit increased those concerns. In regards to changes in behavior, the exhibit left visitors feeling much more likely to take action to improve waters in their community than before.

Table 6. Questions regarding general follow up behaviors

	Total	Beaver Island	Big Rapids	Detroit	East Jordan	Harrisville	Niles	Owosso
After experiencing the exhibits, how much has your view of the role water plays in your daily life changed? (1, "not at all" to 5, "a great deal")	**3.15**	3.11	2.89	3.80	3.08	3.75	3.29	2.75
To what extent did the exhibit make you aware of everyday decisions you can take to protect Michigan's waters? (1, "not at all" to 5, "a great deal")	**3.22**	3.67	2.67	3.40	3.23	3.25	3.71	2.75
To what extent did seeing the exhibit make you more or less likely to take action to improve water resources in your community? (1, "extremely less likely " to 5, "extremely more likely")	**4.24**	4.00	4.11	4.20	4.38	4.50	4.57	4.00

Respondents were then given a series of specific behaviors and asked if they have performed them or consider performing them. The most common behavioral change attributed to visiting the Water Heritage exhibit was to begin safely disposing of hazardous materials, with 26 respondents stating they had or will begin doing this (Table 7). Twenty one respondents reported changing, or planning to change, their gardening and landscaping habits with 18 people also stating they have, or will, change the use of chemicals on their land. Only nine people reported that they had not changed any habits or behaviors as a result of exhibit.

Table 7. "After seeing the exhibit, have you changed any of your habits or started a new behavior to better care for your local waters?

	Total	Beaver Island	Big Rapids	Detroit	East Jordan	Harrisville	Niles	Owosso
Changed (or plan to change) the use of chemicals and/or fertilizers on my land	**18**	4	4	0	4	2	3	1
Changed (or plan to change) my gardening/landscaping habits	**21**	5	2	0	3	3	4	4
Installed a rain barrel	**6**	2	1	0	0	1	1	1
Safely disposed of cleaners, chemicals, and oil (or other hazardous materials)	**26**	7	4	2	4	2	4	3
Dispose of pet waste more promptly	**8**	2	2	0	2	2	0	0
Became involved with a local watershed group	**3**	0	0	0	1	0	0	2
Volunteered with an adopt-a-beach or adopt-a-stream group	**2**	1	0	0	0	0	0	1
Other	11	1	4	1	2	0	2	1
I did not change any habits or behaviors	9	1	1	1	2	0	2	2

Finally, the survey concluded with a picture of the Bucket of Care that was present at the exhibit and a reminder that is asked how they would care for Michigan's water resources. Respondents were then asked what they would put in the bucket today, with an opportunity to write an open-ended response. Those responses could largely be grouped into three themes, all of which were focused on motivating others to work for the health of Michigan's waters. Eight respondents said they would advocate for less litter and less single use plastics, and eight other respondents stated they would bring attention to the issues of runoff and the sources of contamination associated with it. There were also eight other comments that focused on advocating for more general conservation at the policy level. From these responses, it appears clear that the overall impact of the Water Heritage exhibit was to emphasize that Michigan's water resources need more than just individual actions to ensure their protection for generations to come.

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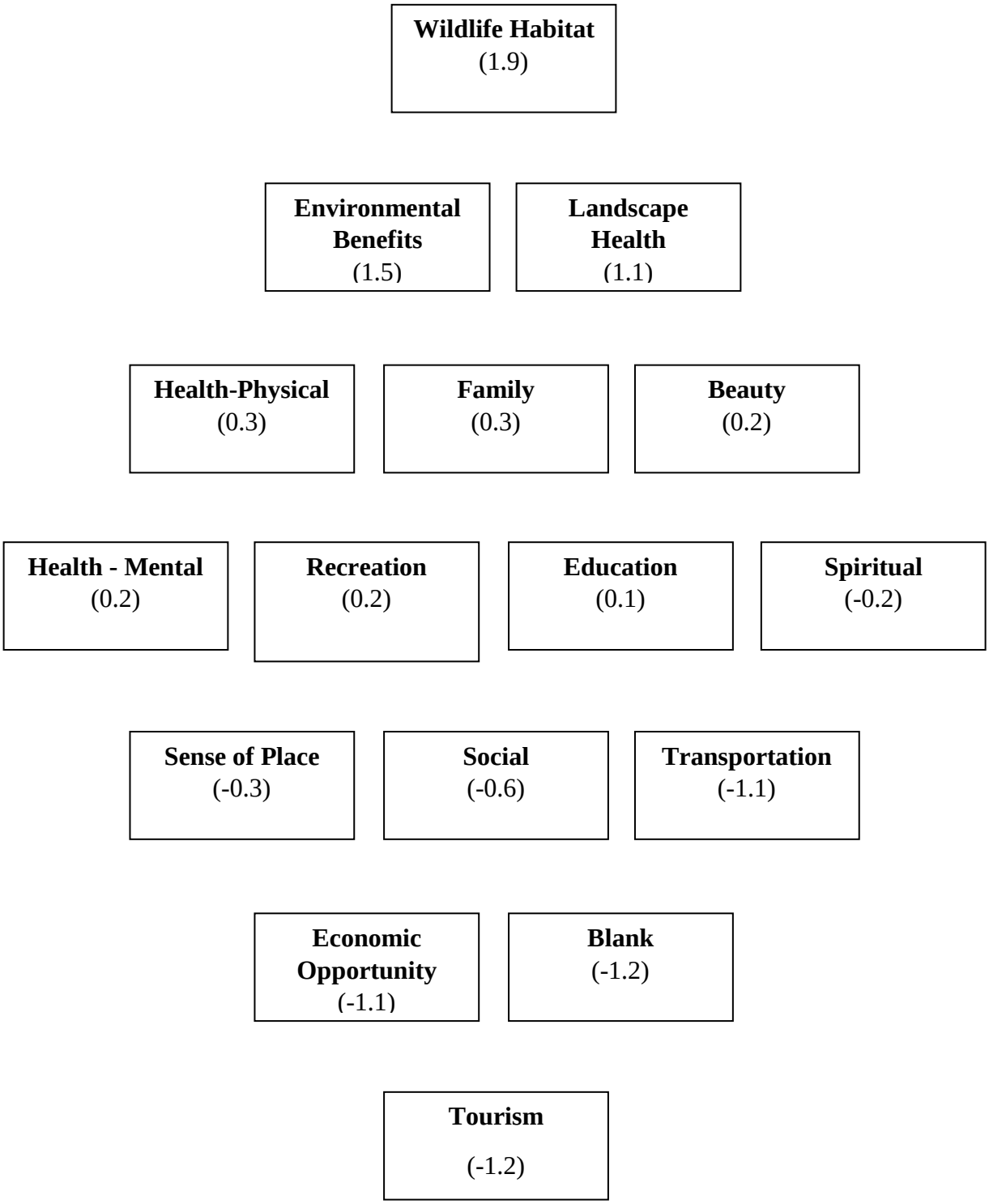
Appendix

Beaver Island - Q Sort Mean Scores[1] ("The most important impact of water for me is…")



[1] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

Big Rapids - Q Sort Mean Scores[2] ("The most important impact of water for me is…")

		Environmental Benefits (1.9)		
	Wildlife Habitat (1.6)		**Landscape Health** (0.6)	
Family (0.5)		**Beauty** (0.3)		**Health-Mental** (0.2)
Education (0.1)	**Spiritual** (0.1)		**Sense of Place** -(0.1)	**Health - Physical** (-0.2)
Recreation (-0.4)		**Social** (-0.8)		**Blank** (-0.8))
	Transportation (-0.8)		**Tourism** (-1.1)	
		Economic Opportunity (-1.3)		

[2] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

Detroit - Q Sort Mean Scores[3] ("The most important impact of water for me is…")

		Wildlife Habitat (1.9)				
	Environmental Benefits (1.5)		**Landscape Health** (1.3)			
Health-Mental (0.8)		**Health - Physical** (0.8)		**Spiritual** (0.2)		
Education (0.1)		**Family** (0.0)		**Sense of Place** -(0.4)		**Beauty** (-0.4)
Transportation (-0.6)		**Social** (-0.7)		**Recreation** (-0.8)		
	Blank (-0.9)		**Economic Opportunity**			
		Tourism (-1.6)				

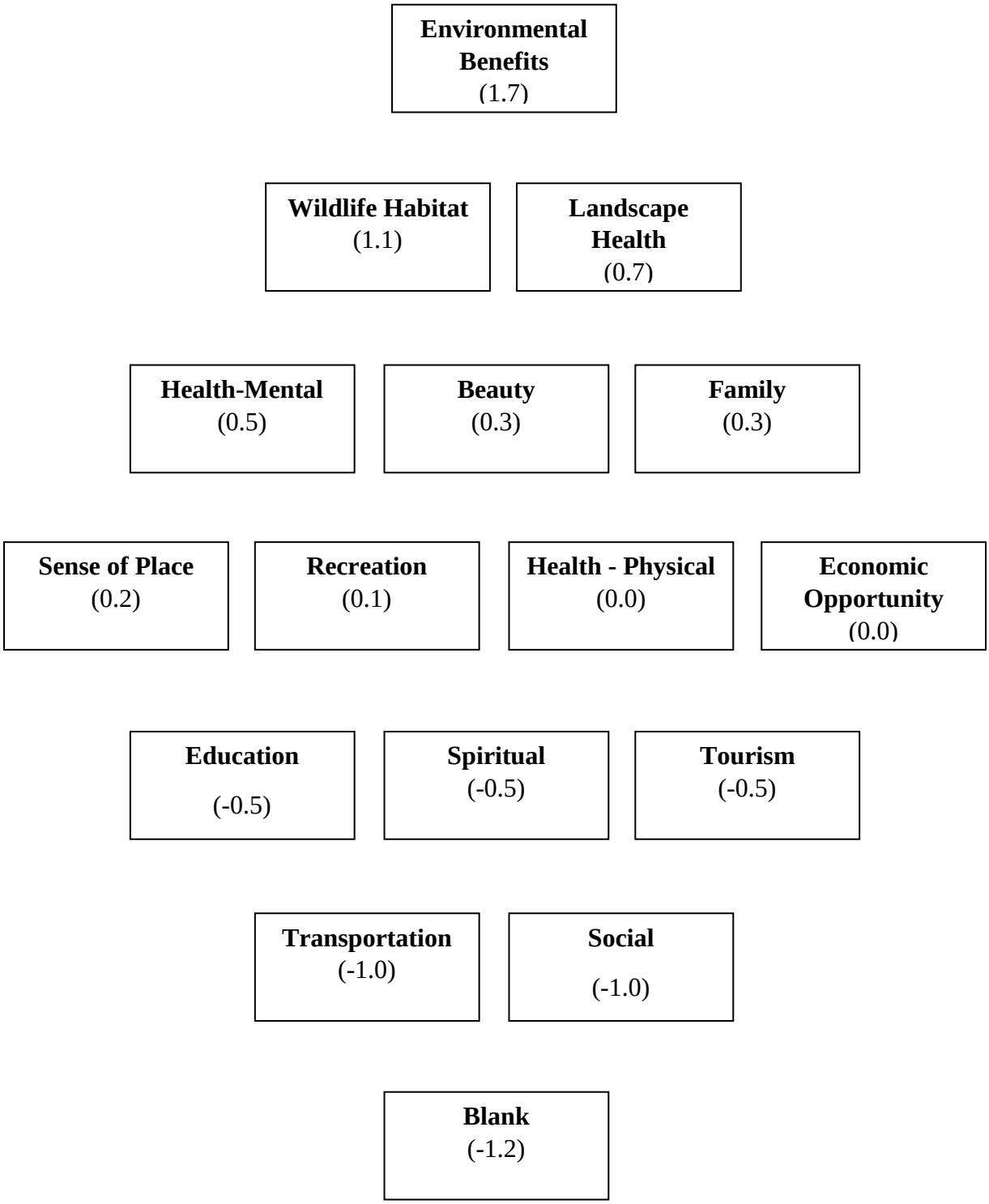
[3] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

East Jordan - Q Sort Mean Scores[4] ("The most important impact of water for me is…")

		Environmental Benefits (1.6)		
	Wildlife Habitat (1.4)		**Landscape Health** (0.8)	
Sense of Place (0.8)		**Beauty** (0.4)		**Family** (0.3)
Education (0.2)	**Health-Mental** (0.1)		**Health - Physical** (0.0)	**Spiritual** (-0.1)
Recreation (-0.2)		**Economic Opportunity** (-0.6)		**Social** (-0.7)
	Transportation (-1.0)		**Tourism** (-1.4)	
		Blank (-1.4)		

[4] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

Harrisville - Q Sort Mean Scores[5] ("The most important impact of water for me is…")



[5] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

Owosso - Q Sort Mean Scores[6] ("The most important impact of water for me is…")

		Wildlife Habitat (1.7)		
	Environmental Benefits (1.1)		**Health - Physical** (0.5)	
Education (0.5)		**Family** (0.5)		**Landscape Health** (0.3)
Beauty (0.3)	**Health-Mental** (0.2)		**Spiritual** (0.2)	**Recreation** (0.1)
Sense of Place (0.0)		**Social** (-0.7)		**Tourism** (-0.8)
	Economic Opportunity (-0.9)		**Blank** (-1.5)	
		Transportation (-1.5)		

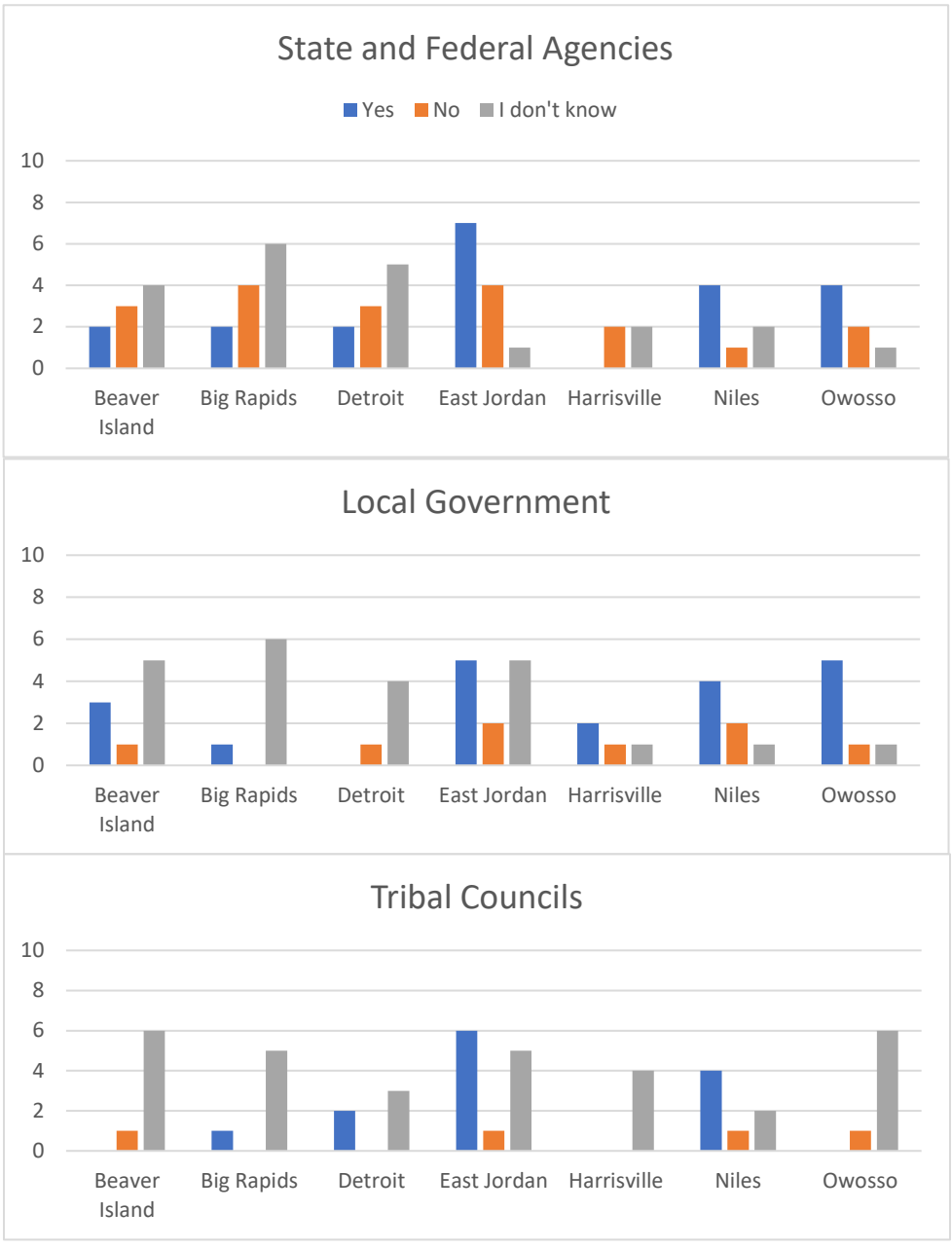
[6] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

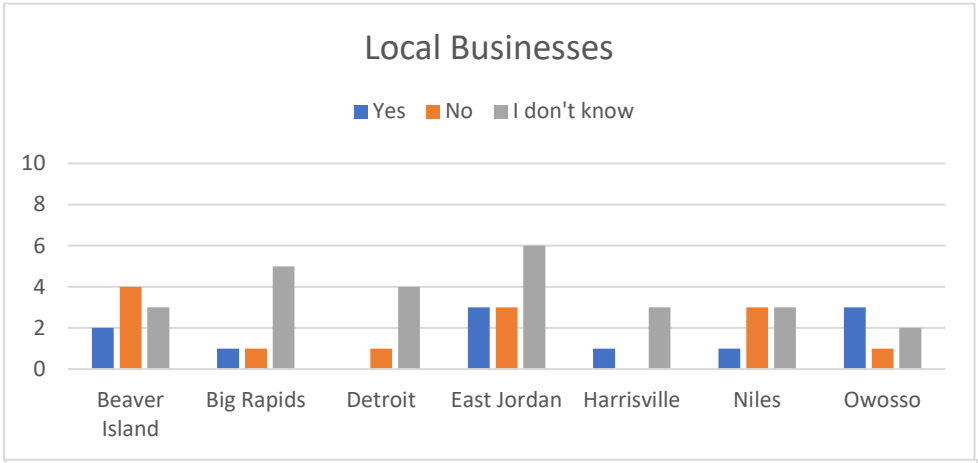
Niles - Q Sort Mean Scores[7] ("The most important impact of water for me is…")

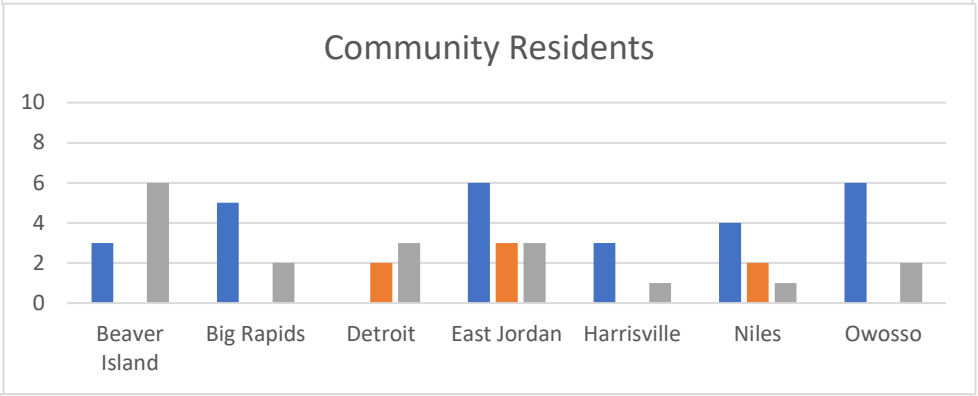
		Environmental Benefits (1.5)		
	Wildlife Habitat (1.5)		**Health - Physical** (0.6)	
Sense of Place (0.4)		**Beauty** (0.3)		**Landscape Health** (0.3)
Recreation (0.2)	**Family** (0.0)		**Education** (-0.1)	**Spiritual** (-0.3)
Economic Opportunity		**Health-Mental** (-0.4)		**Tourism** (-0.5)
	Social (-0.7)		**Blank** (-0.9)	
		Transportation (-1.4)		

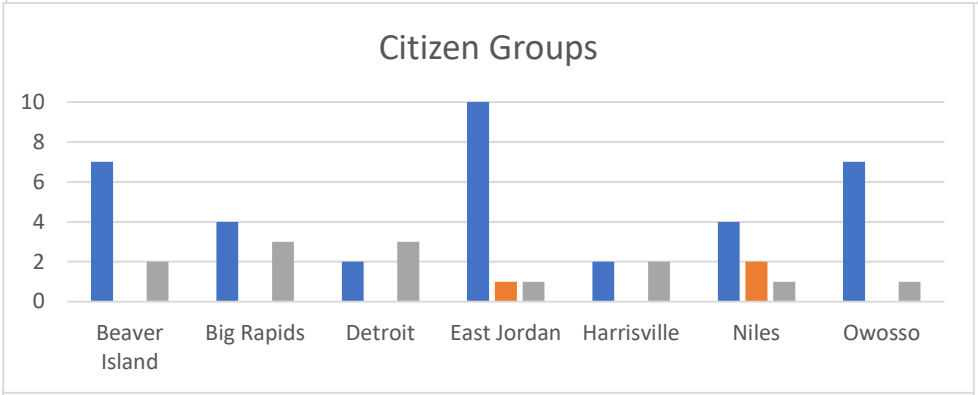
[7] Value cards placed at the top of the grid were given a score of +3, the second row +2, third row +1, middle row 0, fourth row -1, fifth row -2, six row -3.

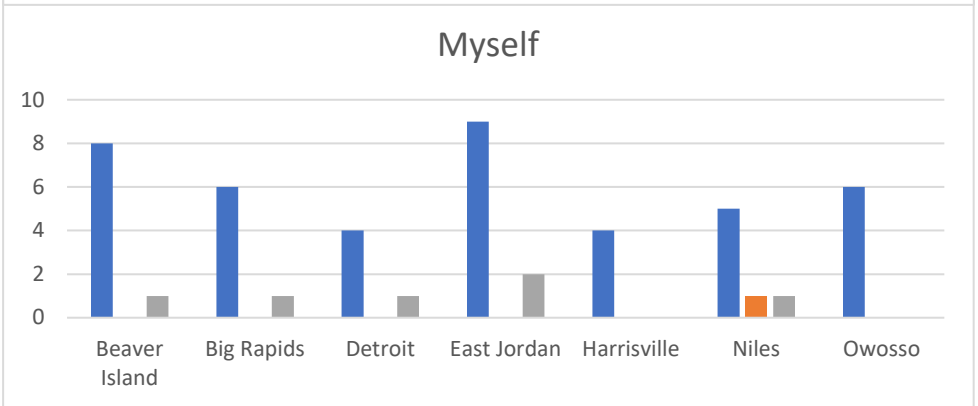
Responses for each entity across communities to the question, “In your opinion, are these organizations actively working to care for your community's water?”




Local Businesses
Yes
No
I don't know
10
8
6
4
2
0
Beaver Island
Big Rapids
Detroit
East Jordan
Harrisville
Niles
Owosso


Community Residents
10
8
6
4
2
0
Beaver Island
Big Rapids
Detroit
East Jordan
Harrisville
Niles
Owosso


Citizen Groups
10
8
6
4
2
0
Beaver Island
Big Rapids
Detroit
East Jordan
Harrisville
Niles
Owosso


Myself
10
8
6
4
2
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Beaver Island
Big Rapids
Detroit
East Jordan
Harrisville
Niles
Owosso