

## Perspectives on Water Resources among Anishinaabe and Non-Native Residents of the Great Lakes Region

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**Abstract:** Climate change and human population growth could reduce household water availability in the historically water-rich Great Lakes region. It is critical to understand human-water relationships in advance of policy actions that could result from reduced water supplies. Research on household water conservation typically occurs in a reactionary nature, in settings that are already water-stressed. Furthermore, few studies involve Native American perspectives on this important topic. We used semi-structured interviews to assess residents' perspectives of Great Lakes water resources and views on household conservation, involving distinct samples of Native American and non-Native residents. Although interviewees deeply value the region's water resources, few practice household conservation or plan to do so in the future. Few perceive others in the region as conserving water. Beliefs about water-related problems are focused more on water quality than supply. Native American interviewees expressed deeper spiritual values toward water than non-Native interviewees. Findings can help inform policy and outreach strategies and provide a rich foundation for follow-up quantitative research testing the Theory of Planned Behavior's ability to explain household conservation intentions in the Great Lakes region.

**Keywords:** *Great Lakes, water, conservation, Native American, Anishinaabe, theory of planned behavior*

Water is extremely sacred in the culture of North America's Great Lakes Anishinaabe ("First People"; also commonly referred to as Ojibwe or Chippewa). Themes involving water pervade countless Anishinaabe traditional stories, including those involving creation and migration. Water is the blood that flows through Mother Earth to nourish and purify her (Benton-Banai 1988; Reynolds 2003). The Anishinaabe migration to the Great Lakes region followed a prophecy to seek wild rice (*manoomin*), the food that grows on the water, which was historically abundant throughout the region (Johnston 1976; Benton-Banai 1988). Water-dwelling animals and plants are particularly sacred and greatly influenced historical lifeways. For instance, the location and abundance of various fish species often determined seasonal movements of tribes to ensure critical sustenance throughout

the year (Ettawageshik 2008; McGregor 2012; Gagnon 2016). Northern white cedar (*giizhik*) and many other medicinal plants require wetland habitats, as does the black ash (*aagimaak*) historically used for baskets and many other goods.

Anishinaabe worldviews involving water are not relegated to history; numerous contemporary examples show that water remains sacred. Female symbolism associated with water is expressed through women's ongoing role as keepers of the water (Reynolds 2003; McGregor 2005, 2012, 2013; Ettawageshik 2008; Szach 2013; Whyte 2014; Kozich 2016a, 2016b). Despite challenges, members of many tribes are simultaneously rediscovering traditions and exercising treaty rights through fishing, including traditional spear-fishing (Ettawageshik 2008; Gagnon 2016). Wild rice remains a healthy, staple food and its annual planting and harvesting endures as a sacred

tradition across the Great Lakes region (Reynolds 2003; GLIFWC 2007, 2008; Kimmerer 2013). Across the Great Lakes region, tribes appear to be increasingly expressing sovereignty through their own natural resource management, particularly involving water resources (GLIFWC 2018).

While Anishinaabe lifeways are inexorably linked to the abundant Great Lakes water resources, there are reasons to be concerned about water's local-scale sustainability in light of contamination events, increasing human demands, and climate change (USEPA 2014; IJC 2016a; GLIN 2018). Negative impacts to water resources could affect household water availability, in addition to cultural lifeways. Residents of Flint and Bay City, Michigan have faced major disruptions to their water service due to contamination and problematic infrastructure (IJC 2016a). Increasing human demands, including excessive groundwater withdrawals, have impacted water availability in many municipalities (IJC 2016a). Eutrophication of Lake Erie – likely due to agricultural runoff and climate change – has increased waterborne disease risk for residents of many municipalities (Patz et al. 2008; IJC 2016a). With over 30 million residents dependent on Great Lakes water, it is critical to increase our knowledge of residents' perspectives on water-related topics (USEPA 2014; Floress et al. 2015; IJC 2016a, 2016b). Across all Great Lakes cultures, it is currently unclear how residents may react to policy actions calling for conservation. This paper begins to fill knowledge voids related to Great Lakes residents' views on water, including Anishinaabe and non-Native perspectives on household conservation.

As is true in most geophysical contexts, Great Lakes households play a key role in regional conservation planning. In times of scarcity they are typically early targets for conservation policies through measures such as lawn-watering restrictions, drought-tolerant landscaping requirements, and penalties for high use – particularly compared to economically-critical sectors such as agriculture, industry, and energy (Harlan et al. 2009; Great Lakes Commission 2013; USEPA 2015; Wittwer 2015). As the public supply sector contributes to 34% of Great Lakes water use, households may cumulatively hold the greatest potential towards meeting established

basin-wide conservation goals (IJC 2016a).

Water conservation is further heightened as a key component of the 2008 Great Lakes-St. Lawrence River Basin Water Resources Compact. The Compact is a state and federal law that prescribes how regional stakeholders will work collaboratively to ensure the sustainability of Great Lakes water resources (Great Lakes-St. Lawrence River Basin Water Resources Compact 2008; Council of Great Lakes Governors 2015). States and provinces bounding the Great Lakes are required to develop and submit water conservation plans every five years (Great Lakes-St. Lawrence River Basin Water Resources Compact 2008). Insight on residents' water-related perspectives and conservation behaviors is critical for agency personnel tasked with developing and implementing these plans.

In the scientific literature, examinations of household water use reveal few consistent trends describing who conserves and why. Studies often report conflicting relationships between water use and traditionally-examined demographic variables such as income, age, or gender (Hurlimann et al. 2009; Jorgensen et al. 2009; Russell and Fielding 2010; Fielding et al. 2012). For instance, some researchers have found higher-income households likely to use more water, while others have found them likely to use less because they can afford to install water-saving appliances or fixtures (Lam 1999; Millock and Nauges 2010). Older residents are typically more inclined towards water conservation but they also spend more time in the home, leading to higher household water use (Lyman 1992; Fielding et al. 2012). Women tend to be more environmentally conscious than men but they often use more water by taking longer and more frequent showers (Domene and Sauri 2006; Makki et al. 2011).

The inconsistency of demographic variables to explain household water use has led to the call for research frameworks focusing on socio-psychological variables over demographic ones (Randolph and Troy 2008; Russell and Fielding 2010; Farrelly and Brown 2011; Heberlein 2012; Floress et al. 2015). The Theory of Planned Behavior (TPB) is one such framework that has been used to examine many environment-impacting behaviors, including recycling, littering, industrial pollution,

energy conservation, agricultural practices, and participation in landowner management programs (Armitage and Conner 2001).

As Figure 1 shows, the TPB proposes that intentions to perform a behavior are determined by three variables: attitudes towards the behavior, perceived social norms surrounding the behavior, and perceived control over the performance of the behavior (Ajzen 1991). Intentions to perform a behavior will be high if these three factors all support the performance of it (Ajzen 1991; Fishbein and Ajzen 2010). Regarding household water conservation, the TPB predicts that conservation is most likely for individuals who perceive the ability to conserve, perceive that important others approve of conservation, and have a positive attitude towards conservation. All TPB variables have been shown as effective predictors of household water conservation, although most studies occurred in water-stressed contexts (Lam 1999, 2006; Trumbo and O’Keefe 2001; Clark and Finley 2007). Little is known about the ability of the TPB or other theoretical models to predict household water conservation in contexts historically perceived as water-rich. Gaps in our understanding of Great Lakes residents’ perspectives on water limit the ability of water managers to effectively promote household conservation.

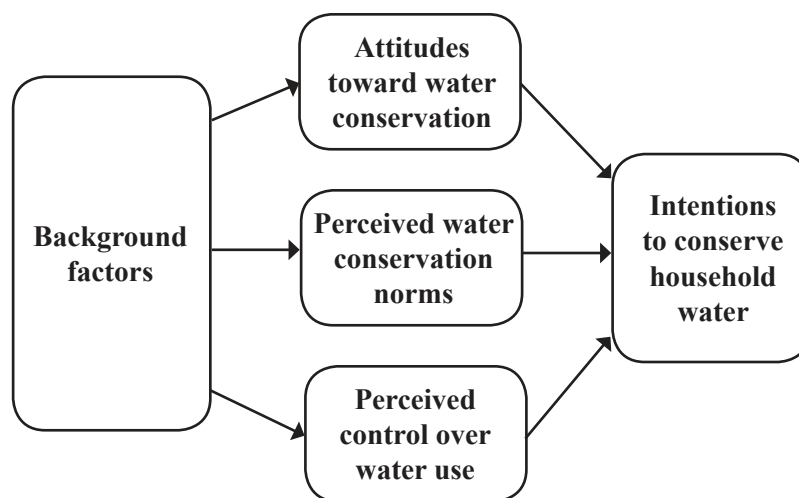
The broad objective of our research is to more fully understand the range of variables influencing intentions to conserve household water in the Great Lakes region, including potential differences

across cultures. This paper describes a qualitative examination of water-related perspectives to serve as a rich foundation for follow-up quantitative studies based on the TPB. The inclusion of Anishinaabe perspectives provides insight from a population typically under-represented in the scientific literature and speaks to potential differences in the ways water is valued. Findings provide valuable insight for policy-makers, regional water managers, and those tasked with developing pro-conservation messages to the public.

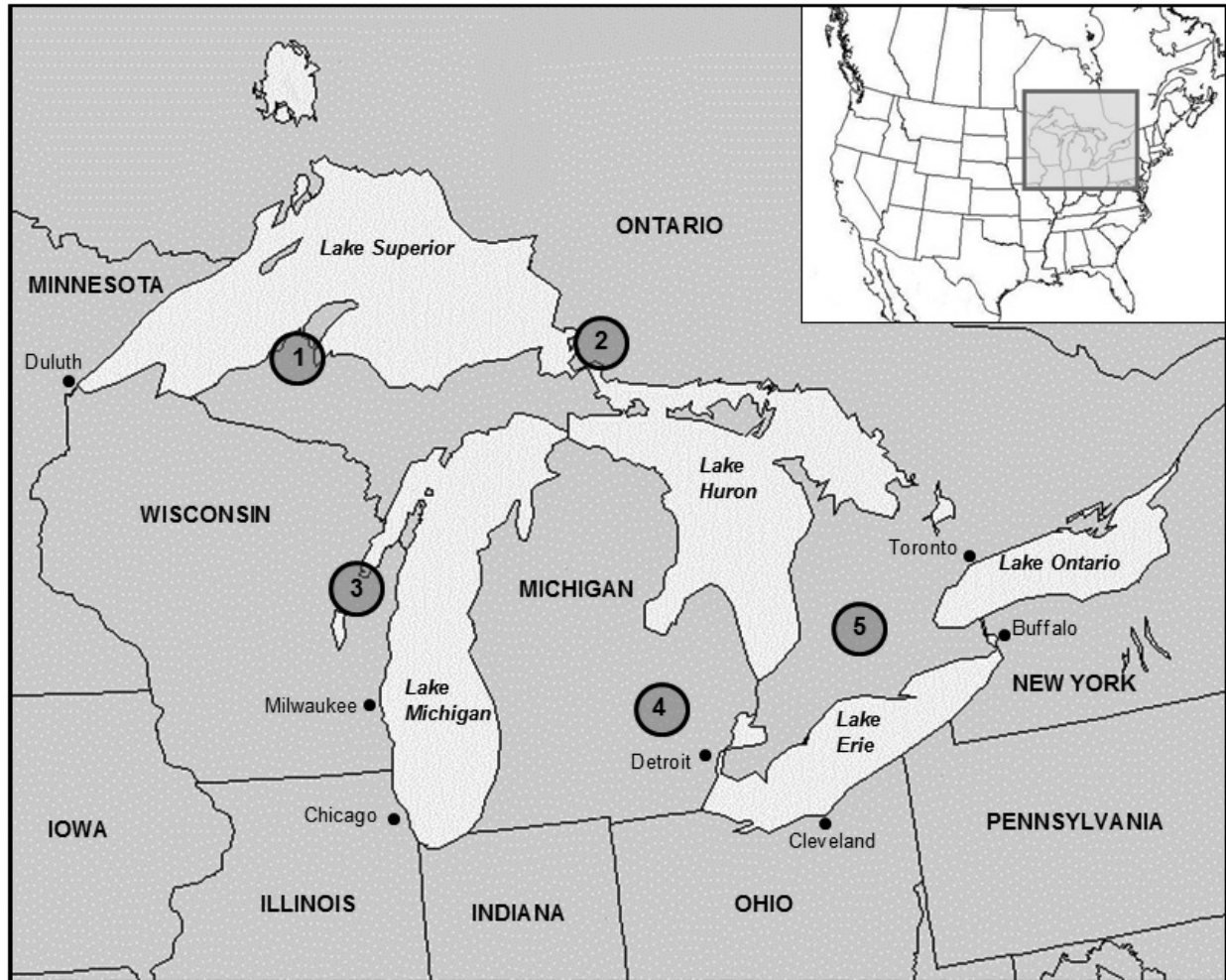
## Methods

We conducted semi-structured interviews with residents in five Great Lakes sub-regions to gain a richer understanding of viewpoints on water resources (Fig. 2). Study areas were chosen simply to provide a useful snapshot of the region as a whole, with varying population sizes and distances from the nearest Great Lake. Interviews with Anishinaabe residents occurred on or near reservations of the Keweenaw Bay Indian Community (Keweenaw Peninsula) and the Bay Mills Indian Community (Sault Ste. Marie), as part of study areas in Michigan’s Upper Peninsula (U.P.). Table 1 shows details about each interview location.

Interviews were conducted between 2014 and 2017, with a minimum of seven interviews at each study area. Interviews at each site were conducted over a minimum of three days,



**Figure 1.** Conceptual model based on the Theory of Planned Behavior (Ajzen 1991).



**Figure 2.** Research study areas: (1) Keweenaw Peninsula; (2) Sault Ste. Marie; (3) Green Bay; (4) southeastern Michigan; and (5) rural southern Ontario (Image: Kozich). Interviews with Anishinaabe residents occurred in areas 1 and 2.

including at least one weekday and one weekend day and at various times throughout each day. We used convenience sampling to solicit interviews, randomly approaching residents in public settings while seeking balanced representation across gender and age. Outdoor interview settings included downtown sidewalk benches, college campuses, and other open gathering places. Indoor interviews occurred in coffee houses and eateries, shopping centers, bookstores, and libraries. To avoid over-sampling in leisure environments, we also conducted interviews in settings likely visited as part of day-to-day routines, such as grocery stores, gas stations, and post offices. Rural Anishinaabe residents were interviewed at a tribal college, community center, and powwow.

In total we approached 65 residents, yielding 60 who agreed to be interviewed (including 20 Anishinaabe interviewees). As shown in Table 2, participants were fairly similar to the greater regional population across key characteristics, aside from cultural identity.

Our interview sampling methodology and size were not designed to produce findings generalizable to the broader population; this objective will be addressed through a follow-up quantitative mail survey. Instead, our goal was simply to capture a rich range of water-related perspectives that exist across the region, following Becker (1998), to serve as a valuable foundation for the survey while providing useful insight for policy-makers and water district managers.

**Table 1.** Details of interview study areas.

Study area	Number of interviews	Population (2010)	Approximate distance to Great Lake
<b>Rural Keweenaw Peninsula area</b>			
Houghton/Hancock, Michigan	9	11,644	15 km
L'Anse/Baraga, Michigan (Anishinaabe community)	10	3,392	<1 km
<b>Sault Ste. Marie area</b>			
Sault Ste. Marie, Ontario	7	79,800	5 km
Sault Ste. Marie, Michigan (Anishinaabe community)	7	14,144	5 km
<b>Urban Green Bay area</b>			
Metropolitan Green Bay, Wisconsin	7	306,241	5 km
<b>Urban southeastern Michigan area</b>			
Metropolitan Flint, Michigan	4	425,790	85 km
Waterford, Michigan	3	73,150	65 km
<b>Rural southern Ontario area</b>			
Woodstock, Ontario	4	37,765	60 km
Chatham, Ontario	5	44,074	20 km
Tilbury, Ontario	4	4,809	10 km

(Data sources: U.S. Census Bureau 2010; Statistics Canada 2011)

Interview questions focused on water and lifeways in the Great Lakes region, concerns about water resources, and perspectives on household water conservation (Appendix 1). Questions designed to enrich follow-up quantitative studies were linked to key elements of the TPB, including conservation-related beliefs, norms, and attitudes and intentions to conserve in the future. Through the semi-structured format we welcomed interviewees to share stories, elaborate on topics of particular interest or concern, and raise points not addressed by our pre-determined list of questions. The average interview lasted 30 minutes, and all interviews were digitally recorded and transcribed verbatim. Transcripts were first analyzed and coded at the item (question) level; upon completion of item-level coding, similar codes were grouped into themes and sub-themes to identify important patterns across interviews (Babbie 1995; LeCompte and Schensul 1999). These patterns are reflected in the key themes described in our results.

## Results

Analysis of interview transcripts resulted in the identification of the following key themes expressed by interviewees: (1) water characterizes “the way of life” in the region; (2) interviewees are more concerned about water quality than water quantity; and (3) differences in water-related values exist between Anishinaabe and non-Native residents. Each theme is elaborated upon in the paragraphs that follow. Percentages related to interviewee responses are included simply for reporting transparency and to indicate salience of issues across interviewees; they are not intended to be generalizable to the regional population.

### Water Characterizes “the Way of Life” in the Region

Most interviewees are long-time residents of the Great Lakes, with an average residence time of 26 years. When asked how long they have lived in the

**Table 2.** Demographic characteristics of interviewees (N=60) versus Michigan, Wisconsin, and Ontario populations.

Category	Interviewees	Michigan residents	Wisconsin residents	Ontario residents
Male	47%	49%	50%	49%
Female	53%	51%	50%	51%
<b>Age<sup>1</sup></b>				
18-39	40%	40%	35%	34%
40-59	38%	33%	39%	39%
60+	22%	27%	26%	27%
<b>Cultural identity</b>				
Native American	33%	1%	1%	2%
Not Native American	67%	99%	99%	98%
<b>Educational attainment</b>				
Some high school	7%	8%	6%	13%
High school diploma	33%	32%	31%	28%
Some college	30%	32%	33%	30%
Bachelor degree or higher	30%	26%	27%	29%
<b>Residence</b>				
House/mobile home	67%	72%	67%	61%
Apartment/condo	33%	23%	30%	38%
<b>Residential water service</b>				
Municipal water supply	75%	71%	65%	80%
Private well water supply	25%	29%	35%	20%

<sup>1</sup>Age data for states/provinces after removing percent of population below age 18.  
(Data sources: U.S. Census Bureau 2010; Statistics Canada 2011)

region, the most common response was “my whole life.” Most interviewees also live close to water and are accustomed to viewing or interacting with it as part of daily life; 52 of 60 (87%) said that they live one kilometer or less from a significant water body and view it at least once a week. Anishinaabe and non-Native interviewees alike described the region’s water resources as an essential component of their lifestyles:

*I grew up between two lakes. Water’s always been an important part of my life. I can’t*

*imagine not living near water. When I think of Michigan and the Great Lakes region, I just always think of water. I took swimming lessons when I was four or five years old. When I was growing up, we fished, being that we lived right there on the lake. My dad always took me up north to the U.P. for fishing, with all the clean lakes and streams everywhere you turn. Now whenever I have a day off and have some free time, I think ‘where’s the nearest body of water I can get to?’ (Interviewee #37; non-Native)*

*I enjoy spending time around the water, sitting by the water, walking by the water. I think about all the fresh water we have – the abundance of water around us – when I think of the Great Lakes. I just think of how much people around here enjoy living near the water because of the beauty of it. I just think we are fortunate to live in an area where there's so much fresh water. (Interviewee #44; Anishinaabe)*

As the above quotes demonstrate, interviewees emphasized the abundance of water as uniquely characteristic of the Great Lakes region. Many compared the region's typical scenery to other parts of the country where one can drive for hours without seeing water. When asked to describe what comes to mind when they think about the Great Lakes region, 40 interviewees (67%) focused on the abundance, cleanliness, and variety and of water features. One remarked, "It's hard to miss it; you see water everywhere you look" (Interviewee #17; non-Native). Another used the example of Lake Superior to illustrate the vastness of the area's water:

*The size of Lake Superior – that you can drive for hours, and it's still Lake Superior. My grandchildren have Lake Superior in Marquette. And then they come here to visit, and this is still Lake Superior. And they just can't believe it could possibly be that big. (Interviewee #42; non-Native)*

Interviewees used many examples to describe the aesthetic features characteristic of the region. Forty-two (70%) discussed the serenity that water provides and specifically used the words "peace," "quiet," "space," or "relaxation" in their responses. Interviewee #54 (Anishinaabe) summarized this notion concisely, stating "I feel very happy to live near the water because water is very calming and soothing and helps me to relax." Over half discussed sounds, smells, or textures associated with the water in addition to its visual appeal. One remarked on the unmistakable purity of the water by saying, "When you're near the water, you can always smell it in the air; it's a very fresh feeling" (Interviewee #5; non-Native).

Water-related recreation is very important to all interviewees, many of whom integrated comments

about recreation at several points throughout their interviews. All 60 said they engage in water-related recreation at least once per month, and over two-thirds (42) said they do so at least once per week. Many described these activities as so central to their lifestyles that they would not enjoy living in an area that lacks abundant water. When asked what water-related recreational activities they engage in, most interviewees listed several. The most commonly-cited activities include water-related walking/sightseeing (75%), visiting beaches (65%), fishing (63%), and camping/picnicking near water (60%).

Many explained how water plays important roles in their daily or weekly routines beyond recreational excursions. Forty-four interviewees (73%) described seeking water for activities that do not involve direct engagement with it; commonly-cited examples include using waterfront parks, trails, or seating areas as locations to exercise, read, eat lunch, or otherwise take a relaxing break. Like this interviewee, many go out of their way to do things near water simply "because it's there":

*I've lived in Chatham since 1993 and I just love to come down here and bring a bottle of water or stop at Tim Horton's and get a coffee or ice-cap or something. I'll just sit here for an hour or so in the afternoon. I don't fish. I don't swim anymore. I'm too old – I'd just sink. But I'll come down here by the river and sit for a couple hours just shooting the breeze. (Interviewee #30; non-Native)*

Water also strongly influences interviewees' family vacations, camping trips, and other similar traditions that happen on a seasonal or annual basis. Many explained how family traditions involving water are among their most deeply-valued and memorable life experiences. These examples occurred through stories by 44 interviewees in response to a broad question about "anything that makes the region's water resources special." Many who described memorable childhood experiences involving water said they now carry on these traditions with their own children, as shown by this interviewee:

*Vacation time, spending time on the Great Lakes, camping, going fishing. You know, you go and enjoy the water. I remember lots of*

*family vacations growing up and chances to be out with friends. And it's always like, 'Yeah, we're heading up north' or 'Yeah, we're going to go out in the water here.' Between fishing, lodging, recreational places, a lot of people have cabins up north. You know, growing up I heard that phrase a lot – 'going up north'. And now I do that with my own kids. (Interviewee #7; non-Native)*

### **Interviewees Are More Concerned About Water Quality than Quantity**

Interviewees expressed many concerns about the region's water resources, typically focusing on water quality rather than supply. Their remarks were in response to the open-ended question, "Please share any concerns you may have about water in our region." Of the 10 most frequently cited concerns, seven can be described as pollution, including intentional dumping/littering (cited by 63%), industrial pollution (52%), sewage discharge (43%), and inadvertent nonpoint pollution (43%). Only seven interviewees specifically mentioned concerns about reduced water availability.

Many water quality concerns were based on personal observations. Of the 38 interviewees who discussed intentional dumping or littering, 31 elaborated with at least one specific example of something they had witnessed firsthand. In some study areas we heard consistent stories among interviewees about local water issues that could warrant follow-up investigation by local personnel. For instance, nine of 10 interviewees in one Anishinaabe community described perceived pollution issues at a local power plant. In the southern Ontario study area, all 13 interviewees described problems with agricultural runoff, like this interviewee who provided a detailed account:

*Out where I live, there's a pig farm across the road. And every time it rains, there's about 500 acres that just runs downhill into the ditches, into the crick, and eventually it ends up in the lake. I see it. And when they spread the manure on the fields, they're supposed to turn it under within 48 hours. Sometimes they do and sometimes they don't. And they can't control the rain. I've even seen the bedding from the pig farm floating down through the ditches. And when they're moving the manure*

*from one farm to another, the paved road that they used is so covered in poop that you can't drive on it. If you do, it sticks to the bottom of your car and stinks for weeks. (Interviewee #23; non-Native)*

Few expressed confidence in the ability of government regulators to control pollution into water bodies, intensifying perceptions of uncontrolled pollution. For example, among the 31 interviewees who discussed industrial pollution, 27 believe that discharges into water are rampant and that facilities are not adequately regulated by government agencies.

As household water conservation is a key theme of our research, we designed interview questions to link to variables in the conceptual model (the TPB), beginning with questions about current water use and conservation behaviors. We found very few interviewees to have already adopted significant conservation measures in their homes. Thirty-one (52%) admitted that they regularly engage in highly-consumptive outdoor uses such as gardening, lawn watering, or car washing. Only nine (15%) told us that they re-use water, had installed at least one water-efficient appliance or fixture, or had discontinued specific uses (e.g., lawn watering) for the purpose of conservation. None of the remaining 51 provided an example of a significant conservation measure they have adopted beyond small steps like turning water off while they brush their teeth. Most discussed their habits in vague terms such as "We try not to waste it" or "We don't leave it running." Like the interviewee below, most appeared to believe that they are no more wasteful than others:

*Let's put it this way, I don't over-use water. We have plenty and I'm probably average when it comes to that. I mean, do I leave a faucet running and walk away, or leave the hose running and walk away? No. I just have these normal practices. (Interviewee #6; non-Native)*

The interviewee above clearly spoke to water-use norms, which was the next topic on our question list. We asked interviewees if they believe other people in the region are doing anything to conserve water. Only four of 60 confidently replied "yes," while 38 believed others do not conserve and 18 were unsure (typically claiming that they do not pay



attention to others). The phrase “They take it for granted” was mentioned repeatedly at this point in our conversations, with many interviewees sharing stories about neighbors’ water-wasting behaviors. When asked if they feel any social pressures to conserve water, only five interviewees said “yes.”

We asked interviewees about their ability to reduce water use in their home, linking to the TPB variable of perceived control. Forty interviewees (67%) indicated a perception that they lack the ability to adopt conservation measures because it would require uncomfortable lifestyle changes or because there are too many water-users to oversee in their household. Regarding conservation attitudes, 31 stated that it seems unnecessary because water is abundant or inexpensive. Regarding intentions to conserve in the future, only seven of 60 described intentions to conserve water in the future by citing a specific example such as eliminating outdoor use or installing efficiency-improving technologies. An additional 13 (22%) merely used vague language such as “I could use less.” The remaining 40 interviewees expressed no intentions whatsoever to conserve in the future.

### **Differences in Water-Related Values Exist between Anishinaabe and Non-Native Residents**

We discovered an undeniable trend across the Anishinaabe residents we interviewed, as all 20 spoke about significant cultural and spiritual values involving water. Similar perspectives were shared by only two of 40 non-Native interviewees, who briefly mentioned prayer among the activities they do near water.

Eighteen of 20 Anishinaabe interviewees spoke specifically (and typically at great length) about water’s role in traditional creation or migration stories. Thirteen repeated the identical phrase – that their ancestors were instructed by the Creator to find “the place where food grows on the water” – which is a common reference to the wild rice that was historically abundant across the Great Lakes region. Like the interviewee below, most identified water as the single most significant aspect of their ancestral homeland:

*This is where our people have been for countless generations. We came here because it is the place where food grows on the water. The water makes up the life in our bodies and*

*supports the rice and the rice nourishes us. Everything is connected and it all starts with water. Water is everywhere in our traditional stories, our ceremonies, our songs, and our prayers. I don’t hold anything against non-Natives; they just don’t realize this and they don’t think about water the way we do. Water is life and it’s a gift from the Creator. We have to take care of it. We have to not pollute it and not waste it. (Interviewee #58; Anishinaabe)*

In keeping with traditional values, many Anishinaabe interviewees also spoke of the role women play in the care of water resources. Seventeen of 20, like the one below, described the traditional and contemporary importance of women as leaders in the protection and management of water resources:

*The women were the water-keepers; we were the ones to care for the water. I’m happy that we have so many women doing important work nowadays at the NRD [Tribal Natural Resource Department], but I think overall our women need to get together more to care for the water. Whether it’s just getting together for water ceremonies or walks or praying for the water or being the ones to speak up and be community leaders, that’s what we need to do. It’s the women that need to lead the way. (Interviewee #54; Anishinaabe)*

Relating to another traditional value, 15 Anishinaabe interviewees (75%) included in-depth discussions of the cultural significance of local fishing resources. Although many non-Native interviewees also mentioned fishing, they did so only as an example of an important recreational or economic activity and not as something that holds cultural or spiritual value. Anishinaabe interviewees, by contrast, typically shared stories of fishing’s historical role in shaping lifeways in the region:

*You know, traditionally we’re a fishing people. You don’t see it as much now, but back in the day it was one of the main reasons we lived here. We’d catch smelt and brookies in the streams and everything you can imagine from the big lake [Lake Superior]. Year-round – ice fishing and spearing too – the fish*

*determined where we lived any time of the year. As seasons changed we'd move around to different camps to follow the food. Fish are a healthy meal and there were always plenty, like the buffalo to the Plains people. So yeah, I'd say they're sacred to us in ways that non-Natives don't really relate to. It's why we have our own hatchery and stock the waters ourselves. If we didn't have fish, a major part of our cultural identity would be gone.* (Interviewee #46; Anishinaabe)

As Anishinaabe interviewees described human relationships with water, most (80%) discussed its role as a life-giving entity that deserves respect and reciprocity (e.g., several made references to tribal water management and fish-stocking programs). Many elevated water to a status equal to or exceeding that of humans. While many non-Natives also made references to water as a life-giver or as a connecting force in nature, they tended to speak strictly in ecological terms. Typical Anishinaabe interviewees, like the one below, included deep spiritual perspectives that illustrate substantially different worldviews than non-Natives:

*We just had so much respect for everything in our environment. Everything was family – the trees, birds, rocks, plants, water, the sun – it was all family and because of that we had the upmost respect for it all. You don't want to harm your family, and because they give to us, we rely on everything in the natural world for us to live. When we would take we would always give something back – tobacco – because we knew we were dependent on it all. Water doesn't depend on us, but we depend on it to survive. So we value the water, we love the water, we need to pray for the water, the water gives us life, and the water has a spirit. Without water we would not have life. There was always that reverence and respect for it, and we wouldn't ever take it for granted.* (Interview #44; Anishinaabe)

While differences in values were clearly evident between Anishinaabe and non-Native interviewees, fewer differences were noted in conservation attitudes or norms. Similar proportions in both groups considered themselves not to be water-wasters and agreed that most others in the area do

not conserve. The only noteworthy difference we found between groups involves specific behaviors – none of the 20 Anishinaabe interviewees said they use household water for gardening, lawn-watering, or car-washing (compared to 31 of 40 non-Native interviewees who do).

## Discussion

Among the key themes we identified, the most prevalent involves the deep bond interviewees feel with the region's water resources (i.e., place attachment), which has been noted in other recent research (Floress et al. 2015; IJC 2016b). This theme was very strong across Anishinaabe and non-Native interviewees alike, although Anishinaabe interviewees described numerous additional spiritual and cultural values associated with water. All interviewees, however, were very engaged in discussions of how their lives are influenced by the region's water; they provided rich descriptions of recreation, stories about family traditions, and emphasized the importance of serenity associated with water. While these deep values tended to dominate interview discussions and represent an important background factor in our research, they do not appear to translate to water conservation motivations.

References to the region's water quality greatly overshadowed those about supply. Interviewees' deep concerns about intentional pollution are consistent with findings from other studies (IJC 2016b). It is interesting that these concerns appear to linger, likely from historical media images, despite the fact that actions resulting from the 1972 Clean Water Act have largely addressed chronic point-source pollution in the region. Furthermore, we anticipated that the historically-low Great Lakes surface water levels of 1998-2013, which had been widely-reported in the mainstream media, could have garnered meaningful attention in our interviews (NOAA 2015). This was not the case, as low water levels were rarely mentioned. The prevailing belief shared by interviewees appears to be that there is plenty of water to go around and that calls for conservation are unfounded. Follow-up research could more closely investigate residents' sources of information on regional environmental issues as a potential addition to conceptual models;

we did not address this topic in our interview questions.

Interview findings provide initial qualitative insight on relationships between TPB variables (attitudes, perceived norms, perceived behavioral control, and intentions to conserve) that will be examined quantitatively through follow-up survey research. For instance, few interviewees expressed positive attitudes toward household water conservation, with most stating that it would require uncomfortable lifestyle changes or that it does not seem necessary. Findings also indicate a potential link between perceived norms and conservation, as only four of 60 interviewees believe others in the area are conserving. Forty interviewees alluded to issues of control by stating that it would be difficult to monitor the water use of other family members. Therefore according to the TPB, if few interviewees feel a positive attitude, few feel that others conserve, and most perceive difficulties with conservation in their household, it should be no surprise that only seven of 60 interviewees said they intend to conserve more water in the future (Ajzen 1991; Fishbein and Ajzen 2010).

Another factor possibly related to conservation intentions involves awareness and understanding of water-related issues. While our findings indicate that water conservation is not a salient issue among interviewees, a possible explanation could be that issues related to water supply in the region are not well-communicated by scientists and water resource managers to the general public stakeholders. For instance, several interviewees who had spent time in comparably arid regions mentioned the frequency of outreach messages in those areas intended to encourage residents to cut back on water use. They remarked they had not seen or heard the same types of messages here in the Great Lakes region. This perception could influence water-conservation norms in the region, which we found almost nonexistent among our interviewees. As mentioned, we did not inquire about sources of information in interviews.

We found substantial differences in the ways Anishinaabe and non-Native residents value water. While this finding was not surprising, we anticipated that Anishinaabe values could result in differences in conservation behaviors. This may be the case regarding current water use – no Anishinaabe

interviewees reported that they are heavy users of outdoor water – but other factors could be involved too, including water services available in Tribal housing, different lawn/landscaping norms in Tribal neighborhoods, or fewer resources to afford higher water bills. We largely found similarities across interviewee groups regarding conservation-related attitudes, norms, and intentions. We suspect that the primary difference we found – that few Anishinaabe interviewees intend to reduce their future household water use – is because they already use less than typical non-Native residents based on an absence of consumptive outdoor use. This question will be addressed in detail in the follow-up survey, giving respondents the opportunity to indicate the extent to which they could “use less water than they already do.”

Anishinaabe residents interviewed shared deep cultural values regarding the spiritual significance of water, while non-Native interviewees emphasized the aesthetic, recreation, and economic value of water. Anishinaabe perspectives on human-nature relationships far exceeded those shared by non-Native interviewees, speaking to the connectedness of the natural world (including humans), the respect that all things in nature deserve, and the notion that all life depends on water. They referenced traditional stories and beliefs that emphasize the central role of water in Anishinaabe lifeways. Based on our interview findings, however, it is unclear how these traditional values could be related to current perspectives on water conservation. While few spoke of their own personal need to increase conservation, some (astutely) suggested that as long as household wastewater is properly treated in rural northern Michigan, it can be safely returned to nature to be used again. No non-Native interviewees made this link when suggesting that there is “plenty of water to go around” in the region. This topic will be further examined in follow-up research.

## Conclusion

The semi-structured interviews we conducted were valuable as a preliminary step in identifying potentially important ideas for future studies. Qualitative findings will guide future modeling efforts and the development of a quantitative mail

survey to test the ability of the TBP to predict and explain household water conservation in the Great Lakes region. Specifically, we gained preliminary insight about perspectives that were most salient among interviewees, and future work will examine linkages between these variables and conservation intentions.

Perspectives shared by interviewees provide rich insight beneficial to resource managers and policy-makers as they develop proactive water management strategies, particularly with conservation policies in the region likely to expand in the future. Effective management of any natural resource depends on a thorough understanding of the people whose behaviors impact that resource.

Findings also benefit outreach personnel who wish to encourage greater conservation behaviors among residents in the region through public informational campaigns. The social information we gathered, combined with findings from follow-up quantitative studies, will help personnel develop effective messaging strategies by better understanding their target audience.

While our findings contain policy implications and help address a knowledge gap involving perspectives on water conservation in the Great Lakes region, our work could ideally be enhanced by further studies in states we did not include due to time and scope limitations. We also encourage follow-up research with Anishinaabe residents, as their perspectives tend to be overlooked in the scientific literature.

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## Appendix 1

Interview question list. Demographic data were collected on a paper questionnaire accompanying the informed consent documents completed by each interviewee.

1. How long have you lived in the area?
2. How close do you live to any water body? What's it like? How often do you see it?
3. Do you enjoy spending time around water? What do you like to do? How often?
4. What comes to mind when you think about the Great Lakes region? Is there anything about the area that makes it special?
5. Please share any concerns you may have about water in our region.
6. Do you think the government(s) are doing enough to protect our water? If not, what do you think should be done?
7. What are your thoughts on Great Lakes water

and any traditional cultural values of the people of the region? [e.g., traditional Native values, religious/spiritual values, etc.]

8. Do you think the same values are being expressed by residents today compared to past generations? How is it similar or different?
9. Do you participate in any cultural, spiritual, or religious activities involving water? Please explain.
10. Is there anything you'd like to share with the general public about what our water means to you personally?
11. Do you use household water for outdoor activities like watering the lawn, gardening, washing cars, and so forth?
12. Do you do anything in particular to try to conserve water in your household? If so, please elaborate.
13. Do you feel social pressures to conserve household water?
14. Do you think other people in the area are doing anything to conserve water?
15. Do you believe you have the ability to reduce water use in your household?
16. Do you plan to take any steps to conserve water in the future? If so, how?
17. What is your neighborhood like? Rural, urban, or suburban? Do you live in a house or apartment?
18. Are you on city water or a well? What do you think about your water, like the rates, quality of water, and so forth?
19. Is there anything you'd like to add? Do you have any questions for us?

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