

# A Scoping Exercise to Understand Community Perceptions of Contaminated Sediment Remediation in the Sheboygan River Area of Concern

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## **ABSTRACT**

This report serves as a scoping exercise to document a qualitative analysis of community members' views on sediment remediation in an Area of Concern (AOC). Currently, few studies of qualitative analyses on remediation projects in AOCs exist. A qualitative analysis highlights and provides an in-depth, detailed picture of how a cleanup is perceived by those who are most affected by it.

This qualitative study was conducted in the Sheboygan River AOC in Wisconsin. Data were collected in interview sessions with eleven community members representing different stakeholder groups and analyzed using a coding scheme derived from interview transcriptions. The analysis revealed five key findings: 1) The Sheboygan River was viewed as an asset but has a negative stigma, 2) Depth was the primary concern of the interviewees regarding Sheboygan River, 3) Interviewees believed remediation will result in economic revitalization, 4) The interviewees were mixed in their regard to fish advisories and as to how the remediation will impact fish populations, and 5) Quality of life and aesthetic value were also viewed as potential improvements resulting from the remediation, but the connections were weakly or indirectly made.

The findings provided recommendations for gaining support for a cleanup from local stakeholders. Furthermore, the findings encouraged better education to the public on the relationship between the cleanup and fish health. Lastly, suggestions were made for future study design and implementation.

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## INTRODUCTION

The Great Lakes' industrial past has led to an accumulation of polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and heavy metals in the sediment. Although these contaminants have decreased within the last few decades, significant concentrations still persist within the Great Lakes and its connecting rivers, harbors, and lakes (United States Environmental Protection Agency [EPA], 2009). This contamination and other factors, such as habitat degradation, led the International Joint Commission to create a list of severely polluted areas known as Areas of Concern (AOCs). The EPA, with the help of state agencies, industries, businesses, and local groups, is engaging in remediation and restoration activities that will take the areas off the list of most polluted sites, also known as "delisting" AOCs. Such activities include contaminated sediment remediation, nonpoint source pollution control, and habitat protection and restoration.

In 2002, the Great Lakes Legacy Act (GLLA) was signed into law and is administered by EPA's Great Lakes National Program Office (GLNPO). The GLLA addresses the "legacy" of contamination left behind in the Great Lakes sediment from industrialization and authorizes funding to GLNPO to "monitor or evaluate contaminated sediment; implement a plan to remediate contaminated sediment; or prevent further or renewed sediment contamination" (EPA, n.d.). Before GLLA, sediment remediation in the Great Lakes had a fairly low profile and funding was relatively scarce (Dewees & Schaefer, 2001). GLLA was reauthorized in 2008 and included new provisions, such as the ability to undertake habitat restoration in conjunction with sediment cleanups (EPA, 2009). The act is currently part of the larger Great Lakes Restoration Initiative (GLRI).

The GLLA program is fairly unique from other programs in that it is a cost-share program. A minimum of 35% funding match is required by a non-federal project sponsor, such as the state, local organizations, and private entities. This collaborative process has led to a high level of community involvement throughout the various remediation steps. Because a significant portion of GLLA funding is non-federal, understanding the benefits of sediment remediation in AOCs is important to the Great Lakes community (SedPAC, 1999). Benefits of remediation in one AOC may be applicable to other contaminated sites, and knowledge of such benefits can aid local decision making regarding cleanups (Deweese & Schaefer, 2001). This knowledge may encourage support from various community members and can take many forms, such as cooperation with navigational closures on the water due to dredging or community outreach assistance. Awareness of benefits may even provide incentive for local organizations to become non-federal sponsors and help fund Legacy remediation projects. Furthermore, such awareness can provide justification to Congress to retain funding for further sediment remediation under the GLRI.

Few benefits assessments of contaminated sediment exist because concern about contaminated sediment is fairly recent (Deweese & Schaefer, 2001). Another reason is that few studies on the relationship between sediment remediation and the actual ecological impacts exist. A better understanding of the ecological impacts would help identify positive economic impacts. Another possible reason for the scarcity of research is that some benefits are easy to quantify and others are difficult or intangible. For example, market benefits arise from the buying and selling of goods or services, such as charter fishing, are easy to quantify (Deweese & Schaefer, 2001). Non-market benefits are items that are not generally bought or sold but still have value, such as the socio-cultural value of boating down a clean river with one's family. Economic valuation for

the cleanup of contaminated sediment is complex because it includes non-market values (Northeast-Midwest Institute [NE-MWI], 2001a). This complexity creates uncertainty and incomplete knowledge. The cost of a sediment cleanup is straightforward in that it takes the form of easily monetizable goods like dredge equipment and employee time. However, many of the benefits are non-market and indirect, such as improved ecosystem integrity and community perception.

To design a comprehensive benefits assessment on sediment remediation, Bishop (2001) recommends a three step approach: 1) gather background information about the study site and define the research questions, 2) establish the minimum benefits necessary to justify costs of remediation (determine remediation costs), perform a qualitative assessment to scope potential benefits, make a rough quantitative estimate of benefits, and 3) select the method to answer the research questions.

### **Previous Research**

Previous research to understand benefits of sediment remediation has included qualitative methods, such as scoping exercises, and quantitative methods. A scoping exercise by the Sierra Club (1993) included four case studies that inferred potential economic benefits of sediment remediation, including recreation, navigation, economic development, and human health. A study by Dewees and Schaefer (2001) revealed four additional types of economic benefits, including ecosystem integrity, commercial activities, socio-cultural benefits, and deferred costs to agriculture and industry (Dewees & Schaefer, 2001). A group called the Blue Ribbon Panel of Great Lakes Resource Economists developed a scoping exercise to gain a basic understanding of the economic benefits to sediment remediation (NE-MWI, 2001b). Interviews from this study in three AOCs (Ashtabula River, St. Louis River, and Waukegan Harbor) provided information on



economic characteristics, the level of sediment contamination, and sediment remediation plans. Interviewees spoke about the negative impact of contaminated sediment on shipping, economic development, property values, fishing, recreational boating, tourism, natural resources, and flood management. In addition to interviews, market data, such as marine revenues, creel surveys, port authority dredging costs, property values, and numbers of boat launch tickets were collected.

Past quantitative methods to measure benefits of sediment remediation include hedonic analysis (Braden, Patunru, Chattopadhyay, & Mays, 2004; Braden *et al.*, 2008a; Braden *et al.*, 2008b; McMillen, 2003) and contingent valuation (Braden *et al.*, 2004; Braden *et al.*, 2008a; Braden *et al.*, 2008b). The results from the hedonic analyses are consistent with one another, revealing that contamination negatively affects property values in multiple AOCs (Sheboygan River, Buffalo River, Waukegan Harbor, and Grand Calumet River). In the contingent valuation portion, residents expressed a willingness to pay for a cleanup in the studies. Braden *et al.* (2008a, 2008b, and 2004) measured attitudinal variables like beauty, economic importance, environmental safety, quality of life, and likeliness for redevelopment in relation to the river. These attitudinal variables helped provide context for the quantitative analyses and acknowledged that contamination can have a variety of impacts on society.

## **Purpose**

This paper reports on phase one of a two-part study to understand community perspectives on benefits of contaminated sediment remediation in the Sheboygan River AOC. The purpose of phase one was to do a scoping exercise of remediation benefits of the Sheboygan River. We conducted a qualitative assessment to gain a deeper understanding of the community's views on restoration and remediation. A qualitative approach puts emphasis on context and allows for further investigation of complex cognitions like values and belief systems, which may

be difficult to obtain with quantitative methods. We intended to represent various perspectives and capture the detailed opinion of community members. While phase one interviews were performed prior to GLLA remediation, phase two interviews will be performed upon remediation completion to allow for comparison of expected benefits and realized benefits, as recommended by NE-MWI (2001a).

## **METHODS**

### **Study Area**

We conducted our study with participants residing within the Sheboygan River AOC. The Sheboygan River AOC includes approximately 14 miles of the Sheboygan River, located about 60 miles (97 km) north of Milwaukee, WI. The AOC extends from the Sheboygan Harbor breakwater in Lake Michigan to the Sheboygan Falls Dam. Within the AOC are several local jurisdictions including: the City of Sheboygan, the City of Sheboygan Falls, and the Village of Kohler.

There is a strong local identity with Lake Michigan and Sheboygan River, and community members depend on them for commercial purposes. The river is lined with businesses such as bait shops, ice-cream parlors, restaurants, clothing boutiques, and a hotel. Parks, boat clubs, and a running trail are also located along the river. Commercial fishing boats are housed on the river. Fishing competitions are a regular past time for community members along the river.

### **Data Collection**

The participants of phase one included city officials, business owners, residents, boaters, anglers, other recreationalists, landowners near the river, and environmental awareness group members. The study sample was formed through snowball sampling (Frank & Snijders, 1994)

from referrals of participants who know of others who possess characteristics of interest for research purposes. We had a small sample size of eleven community members; the study was cut short due to concerns about whether or not the researchers as federal grantees were subject to the Paperwork Reduction Act (PRA; it was confirmed five months later that the researchers were not subject to PRA). We therefore cannot generalize the findings to the entire Sheboygan River community; rather it represents the values and opinions of a small, but varied, subset of community members.

Each interview lasted approximately 30 minutes to an hour, depending on how long the interviewee chose to speak. We conducted 10 interviews in person and one over the phone. We audio-recorded interviews with permission of the interviewees. We took notes of main themes that emerged and transcribed all interviews shortly after the interview had taken place.

Interviews were semi-structured, and began with questions about interviewees' general attitudes and concerns toward the river (see appendix). This was followed by numerous prompts about specific aspects of the river in its current state. These aspects were informed by past research (Bishop, 2001; Braden *et al.*, 2008a; Braden *et al.*, 2008b; Braden *et al.* 2004; Dewees & Schaefer, 2001; NE-MWI, 2001b; Sierra Club, 1993; Stoll, Bishop, and Keillor, 2002) and include: beauty of the river, river's effect on quality of life, river's effect on property values, environmental safety of the river (fish consumption, waterfowl consumption, wading, family outings, environmentally, etc.), a place for fish and wildlife to live and grow (habitat quality and amount), depth of the river (boat docking and access), river's effect on the local economy [business, tourism (charter fishing, boating)], and likeliness of new development along the river. After several general questions on the participants' views on the river cleanup and restoration, we prompted the interviewees again to speak about the specific aspects. However, this time we

asked participants to imagine their views on the future state of the river with restoration and remediation activities completed. The interviews concluded with questions regarding outreach efforts to get a better understanding of how the community receives and would like to receive their information on how the cleanup will affect the river.

### **Data Analysis**

Once all interviews were transcribed, we performed a conventional content analysis (Hsieh & Shannon, 2005), meaning we derived codes from the data rather than defining codes before. We chose this coding technique because of the limited amount of past qualitative research on the subject. Two coders thoroughly read the transcriptions while taking notes and marking key phrases. These notes and phrases were then categorized into themes, or labels. We found 25 labels total. We then combined labels according to broader thematic relationships with one another. Labels with similar traits were combined into five groups called codes. These codes were then tallied numerically and examined in context of the transcription. The two coders compared codes and noted that findings were similar. Within the transcription, the coders marked quotes that best represented the codes.

### **FINDINGS**

Analysis of the transcripts and notes from the interviews revealed five key findings: 1) The Sheboygan River was viewed as an asset but has a negative stigma. The remediation will help remove the stigma; 2) Depth was the primary concern of the interviewees regarding Sheboygan River. While the intention of the GLLA is primarily contamination removal, side benefits of increased depth can be highlighted to promote community support; 3) Interviewees believed remediation will result in economic revitalization, fueling redevelopment and helping the community utilize the river to its full potential; 4) The interviewees were mixed in their

regard to fish advisories and as to how the remediation will impact fish populations; and 5) Quality of life and aesthetic value were also viewed as potential improvements resulting from the remediation, but the connections were weakly or indirectly made. Despite the diversity in participants, themes recurred in most of the interviews.

**Key Finding #1. The Sheboygan River was viewed as an asset but has a negative stigma.**

**The remediation will help remove the stigma.**

The Sheboygan River was viewed as an asset, providing beautiful views from the shoreline and entertainment opportunities like boating, kayaking, and fishing. The river helps drive the local economy by supporting river-oriented businesses, serving as a highway to Lake Michigan, and bringing in tourists. (I = Interviewee quote):

I<sub>1</sub>: Good sightseeing. Plenty of things to do along the river. From fishing to lodging to fine dining to bar hopping to gift shopping. And now an ice cream parlor. So, we have pretty much everything.

I<sub>2</sub>: You have places for the kids to fish. You have canoers, you have kayakers, you have people that drive up and down this thing on a rubber raft on a daily basis. So, it actually, it's a great thing for people do to in Sheboygan. It's a resource that not everybody has.

However, interviewees felt the Sheboygan River suffers from the negative stigma of pollution, associated with being an AOC. Although Sheboygan River is an asset, the stigma causes the river to fall short of its full potential. Interviewees stated that residents see the water as unclean and some are hesitant and even afraid to come in contact with the water.

I<sub>3</sub>: It's got the perception of being dirty. I wouldn't go swimming in it by choice.

I<sub>4</sub>: A lot of people don't want to swim in this river.

I<sub>5</sub>: Well, I think of – as being an avid kayaker the scariness of touching the water knowing what's in that water and it's always dirty and really, it's just I think the public perception. And, it's been this public perception for so long that it's a bad thing and you can't go in the water and there's just kind of this whole eerie feel to, you know, what the river has to offer. And, you know, I look at it as a sad thing for the City of Sheboygan as the river spans some key areas of the entire city and it's got this negative rap to it.

Interviewees believe that local and outside perceptions of Sheboygan River will improve as a result of the remediation, with some stating perception change as the most important result of the remediation. The remediation will help remove the negative stigma of pollution, allowing Sheboygan River to be seen more widely for the benefits it offers to the community.

I<sub>6</sub>: I think recently some of the efforts to clean up the river kind of take away that stigmatism, people are willing to invest in the river because they see something's going to happen to get rid of that stigmatism...I think it's just going to get rid of this perception that the community has that there's something wrong with the river.

I<sub>7</sub>: It's got to be removed. If we can get rid of that, then we can get the nice name of the Sheboygan River as a good, healthy place. And, that will promote everything.

I<sub>8</sub>: ...it will be 180 degree turn. Because people will see it now as an economic opportunity; they'll see it as a recreational opportunity; they'll see it as an environmental opportunity.

**Key Finding #2. Depth was the primary concern of the interviewees regarding Sheboygan River. While the intention of the GLLA is primarily contamination removal, side benefits of increased depth can be highlighted to promote community support.**

Depth was unanimously recognized by all interviewees as a major threat currently facing Sheboygan River. All interviewees remarked on depth without being prompted to, which illustrates the importance of river depth for the community. Depths were reported as low as three feet in some areas of the navigation channel. The shallow depth of the river in its current state impedes navigation upstream, causing limited to negligible access for larger boats and sailboats. This further limits recreational opportunities like sailing and commercial opportunities like cargo transport and business development upriver for the community. Docking and launching problems were also reported. Interviewees were able to provide concrete examples of how depth has affected various aspects of the community, further illustrating its importance.

I<sub>9</sub>: Because of the shallow depth, the current state prohibits commerce because heavy vessels that draw more than four feet or five feet of water cannot use it.

I<sub>10</sub>: Yeah, the only boats that we can put in up there are like the 18, the 20 footers. Nobody, and the sailboats have all moved to the south side because they can't get their boats in. And, like we said we have stopped selling gas because the bigger boats cannot, the boats can't get in here.

I<sub>11</sub>: The only active boat launch that we have that is usable is right in the harbor itself. The other two...when you get your boat in you can't get it back out.

Interviewees also reported having to navigate around extremely shallow portions of the river (marked by buoys), and some had heard of or had personally incurred extensive boat damage due to the shallow depth of the river in some places.

I<sub>12</sub>: ...it's nothing but sediment filled, and because of it there's been a lot of damage at times to the boat engine because it's sucking sediment into the cooling systems. The boat actually has a channel that is dredged with its propeller going in and out. There are times when one of the fish pumps farther down the dock, you can't even nick the turn in the river when the water starts to drop at the low point period in February because he's dragging bottom.

Likewise, interviewees unanimously agreed that larger depths would be a major benefit of the remediation, with many stating it as the number one improvement for the river. Many predicted an increase in boating activity as a result of the remediation.

I<sub>13</sub>: I think it'll definitely increase activity. It'll liven up some of the boat clubs up the river and make more access to boat landings. The Sheboygan Lakefront Boat Landing is a very busy, newer landing. But, 8<sup>th</sup> Street Landing, 14<sup>th</sup> Street Landing, the Outboard Club Landing, Kiwanis Park Landing, all of them landings are pretty much non-usable because of the shallow water. So, that'll help boating activity tremendously, I think.

When speaking about increases to the river depth, interviewees displayed hopeful and excited emotions, smiling and joking about their future plans.

I<sub>14</sub>: Well, from what they've talked about with the dredging and everything, I think the depth of the river is going to be great. My wife's not real impressed about it because it's going to get us a boat that's about 12 feet bigger than the one we have now.

**Key Finding #3. Interviewees believed remediation will result in economic revitalization, fueling redevelopment and helping the community utilize the river to its full potential.**

The Sheboygan River is viewed as a community asset, but many interviewees spoke of the economic benefit of the river in terms of potential and not in its realized value. The river was



often described as “underutilized,” with derelict buildings lining portions of the shoreline. Because the river had not been dredged for many years, there was disbelief that it ever would be dredged again. This combined with the unclean stigma of the river has resulted in little interest to invest along the river in the past couple decades.

I<sub>15</sub>: I think it’s a hindrance, and I think that people just have this perception that there, they just kind of shy away from it...there’s a little bit more use, but I would say it’s definitely not used at the capacity that it could be used. And, I think it comes back to that negative of so many years of those people hearing that it’s a bad thing.

I<sub>16</sub>: The biggest threat right now is the economic threat of the river. There are environmental threats but economically not being able to utilize the river especially upstream of the 8<sup>th</sup> Street Bridge as a navigable channel is the under-utilization of a great asset.

Alternatively, interviewees almost unanimously envisioned that remediation would cause redevelopment and economic revitalization. The community would see the river as the resource it should be, with the economy unrestrained by the limits of shallow depth and contamination. Redevelopment would then bring people back to the river, increasing property values.

I<sub>17</sub>: I think the cleaner the river is and the more likely people are looking to build along there and see it as an asset versus a liability.

I<sub>18</sub>: I think you’ll get more business growth. We’re getting it already on South Pier District, on South Pier Drive. I think you’ll get more businesses opening up. More water activity. More boat traffic. It’ll increase all of that for sure.

I<sub>19</sub>: I think once the projects and activities have been done you’re going to see development increase. You’re going to see people using it...not only bringing the tourists

back, but giving something for the people in this city to be doing...So, develop the river, put up buildings that people can actually look at that are pristine and nice and everything; people are going to go to them, because it's a nice place to go.

I<sub>20</sub>: When it comes right down to it those who would invest in the river and want to develop this property, they are really after the water access. Area can't be dredged for navigation...something that people are going to access from the boats they can't access it's going to hold back their boat. So I think the dredging that's proposed is going to be a catalyst.

**Key Finding #4. The interviewees were mixed in their regard to fish advisories and as to how the remediation will impact fish populations.**

The majority of interviewees believed that the fish in the river are not clean; they would not eat them out of the river, especially those fish living in it for their entire life span. They were aware of fish advisories and generally followed them. These interviewees also believed that the general community had a good awareness of fish consumption safety. A majority of their fishing for consumption is on the lake. If they fished on the river, they did catch and release. Some of the interviewees were able to make a solid connection between sediment contamination and effects on fish.

I<sub>21</sub>: So, I think this whole, the general public is the perception is that it's bad and that it, don't eat the fish out of there because there's contaminated sediments from years ago manufacturing. And, it just, it's not something people do.

I<sub>22</sub>: So, growing up here you know you don't want to eat the fish in the river because of the, reading the reports of elevated levels of PCBs and things like that

I<sub>23</sub>: I mean we promote eating fish, and then we turn around and say, “Oh, but don’t eat them out of the Sheboygan River!”

Many interviewees felt remediation would have a positive effect on recreational fishing and fish consumption. They thought the frequency of fishing in the community would increase and the remediation of contaminated sediment would make fish consumption safer.

I<sub>24</sub>: You’ll also see an increase in use by the sport fishing community. That they would fish the river knowing that they could harvest. So, it’d be an increase, definitely be an increase in recreational aspect.

I<sub>25</sub>: The only thing is people are going to be more comfortable...if they do catch a fish in the river, the potential is that they probably could still eat it and not suffer any ill effects from it.

I<sub>26</sub>: ...it’s going to be nice when it gets cleaned up and people can start actually eating the fish...

On the other hand, a couple interviewees had a certain disregard for the fish advisories. They had always fished in the river or knew someone who had, and they were in fine health. This disregard is likely due to the abstract relationship between consuming contaminated fish and human health, which can be difficult for people to understand.

I<sub>27</sub>: People will eat the fish. I know my uncle does. My uncle fishes it all the time. He eats the fish out of it. And, he’s now at 82 years old, so...that kind of gives you a pretty good idea there of what I think of the quality of the fish that are here. Hasn’t killed him yet, it’s probably not going to!

A few interviewees, including community leaders, were uncertain about the remediation’s effect on the fish. One person even thought it might have a negative impact on the fish because he

feared the remediation would change the color of the river, making it uninhabitable for baitfish and salmon.

I<sub>28</sub>: I don't know what type of fish consumption advisories can get removed, so I think that's going to be a big part of it.

I<sub>29</sub>: I'm not sure about the...how the contaminants affect life and everything, but I would imagine that it's probably not as good as it can be.

I<sub>30</sub>: I don't think so. I think that (fish consumption safety) will still be the same. I mean, cleaning the sediments up I guess, yeah maybe I'm wrong it probably would help.

**Key Finding #5. Quality of life and aesthetic value were also viewed as potential improvements resulting from the remediation, but the connections were weakly or indirectly made.**

In addition to depth, economic revitalization, and fish consumption, most interviewees spoke about quality of life and aesthetic value as possible improvements. However, these connections were made weakly; in most cases, interviewees only commented on these aspects after being specifically prompted to. When they commented on them, they did not go into much detail or provided vague responses.

I<sub>31</sub>: Yeah, it'll change. It'll be positive. I don't know if there is...I mean the beauty of the river. It's just going to impact it. It's going to be – obviously it's going to impact it. It's going to have a positive effect.

Moreover, interviewees often linked these specific aspects directly back to depth. For example, interviewees had the following comments about depth when asked about how beauty of the river and how quality of life might be affected by the remediation, respectively.

I<sub>32</sub>: I think it'll be able to be that vital resource that we have neglected for so long and be able to utilize it to its fullest extent. I don't know that this...a lot of this project is going to be done under the water so, you're not going to see a lot of upfront changes. But, I think it'll also, it's, there's been this no dredging for so long there wasn't really any capabilities to try to get it to a depth that's been official to boaters and fishermen, and those types of people.

Interviewees also indirectly linked aspects of aesthetics and quality of life back to depth. Often, they stated how increased depth would lead to redevelopment and reinvestment in the river, which would then increase the beauty of the river or quality of life.

I<sub>34</sub>: You have the potential with the river being navigable to take that same beauty that we have from the 8<sup>th</sup> Street Bridge on down and bring that all the way up the 14<sup>th</sup> Street all through the downtown.

I<sub>35</sub>: I think it will have a positive effect on the quality of life. Maybe businesses will want to invest there...it (depth) is a limitation to development. It really has limited what can be done on the river.

## **DISCUSSION**

This study was phase one of a two-part study to scope social and economic benefits of contaminated sediment remediation in the Sheboygan River AOC. In phase one, our objective was to better understand the impacts of contaminated sediment on society and benefits associated with remediation and restoration from the point of view of stakeholders. Our analysis revealed five key findings, identifying important community concerns and perspectives.

We found that community members view the Sheboygan River as an asset; however contamination and shallow depths have caused a negative stigma and underutilization.

Interviewees foresee sediment remediation improving the river's image. Depth was overwhelmingly a major concern for all interviewees. Often without the need of a prompt, interviewees unanimously expressed shallow depth of the Sheboygan River as the source of many community problems. The primary goal of the GLLA is to remove contamination from the Great Lakes watershed. The design of all GLLA projects is guided by contamination, rather than depth. However, depth is often a side benefit of many of these projects, especially projects that include dredging as a remedial action. Therefore, while outreach on the GLLA should acknowledge contaminant removal as the primary goal, it can also strongly highlight increased depth as a side benefit of such projects to help increase community support.

Interviewees also envisioned economic revitalization as a result of the cleanup, with increased river depth a mediating factor. Interviewees believed river depth would make the river more accessible, bringing more people, activity, and therefore investment to the river. Removing contamination would remove the stigma, further boosting investment and development downtown. Interviewees had a difficult time connecting the cleanup to aspects like quality of life and beauty of the river, but river depth again served as a mediating factor for improving such aspects. These connections may have been weak because these aspects are more conceptual and abstract, making them cognitively difficult to understand.

In addition, interviewees had mixed feelings on how remediation would impact fish populations and advisories. Some interviewees felt the cleanup would improve recreational and fish consumption opportunities, some were unsure, and one interviewee thought the cleanup would harm fish populations in the long-term. The majority was unsure but curious as to how the cleanup would affect fish advisories. Better education is needed on 1) the relationship between contaminated sediment and fish, including the process in which contaminants bioaccumulate in

fish, and 2) how sediment cleanups help remove contaminants like PCBs from the food chain, making the water a safer, cleaner place for fish to live and grow.

Previous research to scope benefits of sediment remediation and perform economic valuation was scarce. Previous benefits assessments relied primarily on quantitative methods, such as hedonic analysis and attitudinal surveys, to describe residents' perspectives towards an AOC (Braden *et al.* 2004; Braden *et al.* 2008a; Braden *et al.* 2008b). Our qualitative scoping exercise allowed for rich descriptions of benefits in context, while past quantitative valuations were able to reveal information about a large sample of people. A qualitative scoping approach was successful in that it allowed a deeper understanding of perceptions of the Sheboygan River community. The approach allowed us to achieve a full description of complex cognitions like values and belief systems. We could ask for further explanations of difficult concepts. We could probe further when responses were unclear or when we felt the interviewee could say more on the matter.

### **Future Recommendations**

We conclude with a few key recommendations for future application of our study, based on lessons learned from the Sheboygan River AOC scoping investigation. Our study represented a variety of residents from landowners to boaters to city officials, but had a small sample size. We suggest a larger sample size for more complete investigations. Snowball sampling helped us capture a diversity of perspectives. To increase the likelihood of capturing diverse perspectives even further, we recommend interviewing community leaders that are less obvious stakeholders like educators, business owners, and religious leaders. We also recommend that the study be performed in additional AOCs to help contribute to the bank of literature existing in the Great Lakes on this issue. This will allow for comparison of community perspectives across AOCs; by

using community characteristics as predictive variables, differences in perceived benefits among AOCs can be better understood. The findings then become more concrete and reliable, leading to endorsement for AOC cleanups.

Finally, interviewees had a difficult time acknowledging the difference between prompts in the present state and future state. Many participants would jump around, even after we would remind them to focus on the river “in its current state,” or “after the projects have taken place.” We had to clarify continuously which state interviewees were talking about, so that we were adequately recording the data. One suggestion to remedy this is to discard the demarcation of future and present states when asking about aspects of the river. Ask the prompts about the river in general and note whether participants speak about the river in the current or future state. This in itself would be additionally informative on what the participant is more concerned with: the current state of the AOC or the future state after remediation and restoration has occurred. Then, ask the interviewee about the state which they did not describe. Alternatively, ask interviewees to write their thoughts on paper. Provide paper that is divided down the middle by a line, with “current” written on the top of one side and “future” on the other. This may help organize interviewee thoughts.

Our qualitative assessment helped us gain insight on community members’ perceptions of the AOC and their beliefs and expectation of the cleanup; the findings will help inform phase two of our project. Furthermore, our findings can be applied to benefits assessments in other AOCs, to help gain a Great Lakes-wide understanding of sediment remediation benefits. The scoping approach allowed for examination of community benefits and concerns of remediation projects, which can inform the decision-making process, generate local support for remediation, and motivate interest in non-federal sponsorship of GLLA.



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## **APPENDIX A. INTERVIEW QUESTIONS**

1. What thoughts come to your mind when you think of the Sheboygan River?
2. Are you active on the river (for recreation or work)? How often do you view/work on/recreate on (fishing, boating, wading, etc) the river?
3. What is the most important aspect of the river for you? What do you value the most about the river?
4. What are the biggest problems and threats currently facing the river?
5. Now I'm going to name some aspects of the river. Please tell me your thoughts about each aspect that I name.
  - a. Beauty of river
  - b. River's effect on quality of life
  - c. River's effect on property values
  - d. Safety of river (fish consumption, waterfowl consumption, wading, family outings, environmentally...)
  - e. A place for fish and wildlife to live and grow (habitat quality and amount)
  - f. Depth of the river (Boat docking and access)
  - g. River's effect on the local economy [business, tourism (charter fishing, boating)]
  - h. Likelihood of new development along the river

A number of large-scale remediation and restoration activities have taken place over the past decade and are currently taking place on the Sheboygan River.

6. How will your view of the river change after the remediation and restoration activities are complete?
7. What do you think will change the most as a result of the remediation and restoration?
8. Now we'll go through each of the aspects identified in past research. Please tell me how you think your view of the river will change for each aspect once remediation and restoration are complete.

- a. Beauty of river
  - b. River's effect on quality of life
  - c. River's effect on property values
  - d. Safety of river (fish consumption, waterfowl consumption, wading, family outings, environmentally...)
  - e. A place for fish and wildlife to live and grow
  - f. Depth of the river (Boat docking and access)
  - g. River's effect on the local economy [business, tourism (charter fishing, boating)]
  - h. Likelihood of new development along the river
9. Awareness/Participation in Outreach Activities
- a. Have you received any information regarding remediation and restoration activities on the river?
    - i. IF YES, where did you receive the information (pamphlets/public meetings)? Was it easy to understand? Why?
  - b. Do you have a desire to be more informed about remediation and restoration activities?
    - i. IF YES... What is the best way to inform you about remediation and restoration activities (newspaper, door-door pamphlets, church bulletin, school announcements, website)?
  - c. Have you in any way been involved in the remediation and restoration activities? Why did you participate?
  - d. Have your expectations about the remediation and restoration been met so far?
10. Any suggestions on whom else I should talk to? Do you have any recommendations on whom to talk to about tracking changes in fishing, park use, or boating?
11. Is there anything else you'd like to say about the Sheboygan River or EPA remediation and restoration in Sheboygan?