

Urban Environmental Equity Field Report 2: Perceptions of Fish in the Milwaukee Estuary AOC

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Overview

Milwaukee, Wisconsin, a city whose name translates to “the gathering place by the waters,” is strongly tied to the multiple rivers and tributaries that link it to Lake Michigan. With water serving as a cornerstone of Milwaukee’s regional identity, it is perhaps no surprise that many of the area’s residents are interested in the local waterways that make up the Milwaukee River -- as well as the creatures that inhabit them. A series of interviews conducted through UIUC’s Urban Environmental Equity Project revealed the diverse and sometimes complicated ways that (1) local community members think about the fish that populate the Milwaukee, Kinnickinnic, and Menomonee Rivers, and (2) how ongoing environmental remediation work associated with an Area of Concern (AOC) and evolving community dynamics may impact urban fish habitat and the people who rely on fish in turn.

Approach. Interviewees for this study were all residents of Milwaukee and were recruited via online contact forms and snowball sampling. 35 individuals ranging from riparian property owners to members of local government to business and environmental NGOs participated in the semi-structured video interview process, the results of which were then transcribed and analyzed for qualitative content. Discussion of fish was identified as a distinct point of interest through multiple interviews, with 12 of the 35 participants speaking at length about ecosystem and community dynamics with regards to fish (Table 1). Analysis of these transcribed conversations revealed three distinct but overlapping contexts in which stakeholders talked about fish: ecology, recreation, and food supply (Table 2).

Summary of findings. This report categorizes the range of ideas Milwaukee AOC stakeholders have about the complex relationships between fish, humans, and the local ecosystems they share. Three themes emerge: ecology, recreation, and food security. By examining the diversity of opinions on the perceived quality and relative importance of fish held by the residents of the AOC, some specific inferences about how fish are likely to be valued by different stakeholder groups may be drawn from this interview data. The varying and complex interactions with fish that have been explored in this report may provide a framework for facilitating discussions and decision-making with regards to Milwaukee’s fish populations and habitat in the future.

Interview Procedures

Interviews for this project were conducted in Milwaukee at a time and location of each participant's choosing. Interviews lasted from 30-60 minutes and included questions about how long respondents had lived or worked in Milwaukee, their perceptions of change in their community over time, their use of waterways and open spaces, and their knowledge and perceptions of the environmental restoration projects along Milwaukee's rivers.

Table 1.

Characteristics of interviewees

Interviewee	Affiliation	Environmental background	AOC resident
1	Community leader	Y	Y
2	Community leader	Y	Y
3	Environmental NGO	Y	Y
4	Local government	Y	Y
5	Resident	N	Y
6	Community NGO	N	Y
7	Community NGO	N	Y
8	Community NGO	N	Y
9	Local government	Y	Y
10	Environmental NGO	Y	Y
11	Local government	N	Y
12	Community Leader	N	Y

Findings

Ecology: lingering impairments vs. improved waterway habitat and health

The ecology theme refers to how the life cycles of fish are affected by the quality of the ecosystems that they inhabit, and discusses positive and negative impacts to the aquatic environment by causes both natural and man-made. There is a general consensus among interviewees that river cleanups and restoration are improving waterway health, but that lingering pollution and invasive species continue to threaten the local ecosystem. While these impairments were discussed by many stakeholders, there was also much talk of the improving health and numbers of the fish compared to population levels in the past, with respondents largely crediting the naturalization of rivers along with remediation of contaminated sediment in the waterways.

Background. The Milwaukee Estuary AOC, which includes segments of the Milwaukee, Kinnickinnic, and Menomonee rivers and their tributaries, is impacted by 11 out of 14 beneficial use impairments as defined by the International Joint Commission, indicating that the health of

the aquatic ecosystems is heavily compromised (US EPA 2013). One of the root causes of this ecological malaise is river sediment contaminated with pollutants emitted from the ironworks, steel mills, and other heavy industries that formed Milwaukee's economic backbone in the past (Wisconsin Department of Natural Resources, 2015). With the help of the EPA, WDNR, and other governmental and community organizations, Milwaukee has worked to clean the river of the mercury, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), and other contaminants deposited in river sediment by industrial operations in the past. These toxins degrade the benthic organisms at the bottom of the food chain, which stresses the fish populations that feed on them. PAHs are believed to cause tumors in fish, while mercury and PCBs build up in the body tissues of benthic organisms and the fish that prey upon them, which may impair the health of the fish themselves and anything else that eats them -- including human beings (Wisconsin Department of Natural Resources, 2015). Although sediment dredging projects along Lincoln Creek and the Milwaukee River have reduced these risks in specific parts of the AOC, remaining pollutants in untreated areas continue to limit the quality of the aquatic ecosystem (US EPA 2013).

In addition to sediment remediation projects, Milwaukee's rivers are being naturalized through the removal of dams and concrete lining as well as the planting of native vegetation along waterways. Fish native to the Milwaukee area migrate up- and downstream during their life cycle to gain access to spawning grounds or feeding areas. Migration can be difficult for these populations due to fish passage impediments such as concrete-lined channels and the presence of dams, and a number of concrete removal and shoreline restoration projects are currently underway or have been completed along all three of Milwaukee's major rivers (Milwaukee Metropolitan Sewerage District, 2015).

Interviewee responses. Legacy industrial pollutants remain one of respondents' largest concerns for waterway health for both environmental agencies and for local residents interviewed through this project, with a number of interviewees specifically mentioning the contaminants with regards to their impacts on fish (#2, #3, #4, #10). Respondents acknowledged that despite improvements, much of the AOC was still "not fishable" (#8) and that attaining these qualities for the watershed as a whole was going to be difficult. There was also uncertainty among interviewees about when, if ever, riparian habitats will be made completely healthy, and how long it will take for fish and other aquatic organisms to be "clean" again (#2).

Improving fish passage was cited as an environmental concern multiple times among the interviewees as well. One respondent described the historic condition of Lincoln Creek, a Milwaukee river tributary, as straight, trapezoidal, and either too fast-flowing or dry for fish to successfully migrate through. They went on to describe the now-restored creek's improved fish habitat, mentioning returning salmon populations so plentiful that the Wisconsin Department of Natural Resources needed to collect and remove the bodies of fish that had died after they had successfully spawned in the area (#8). One of the more controversial moves toward creating passages for fish, according to respondents, was the removal of the North Avenue dam in 1997 (#3). While removing the dam eliminated the low-oxygen, high-temperature water

conditions that had negatively impacted aquatic species and collected decades of debris, some residents were distressed by the loss of the structure because it calmed the current and raised water levels in the river, which had previously allowed for more recreational opportunities. There was also a lingering perception among some stakeholders that dams kept invasive species, such as zebra mussels, Eurasian water milfoil, and phragmites, from traveling further upriver, though other interviewees were quick to dismiss these claims (#4). One respondent directly credited the removal of the dam with improved fishing conditions he had personally observed in the two decades since the structure had been demolished (#7). Another stakeholder touched on Ozaukee County's successful fish passage program that other counties in the Milwaukee area could use as a model for keeping invasive species out while reintegrating native fish populations (#4). Interviewees suggested that by informing stakeholders in the community about the benefits of dam removal, there could be less reticence towards other riparian changes to remove these fish passage impediments.

Recreation: sport-fishing, water-based pastimes, and improved aesthetic appeal

The theme of recreation identifies the importance of fish for recreational fishermen in the community who enjoy these resources primarily for non-consumptive purposes, but also includes recreational fishermen who occasionally eat a portion of their catch. This theme summarizes how interview subjects perceive the quality of fish populations and habitat in the context of leisure time and aesthetic enjoyment, and how the values of recreational fishermen shape their ideas about human-nature interaction along Milwaukee's rivers.

Background. Recreational fishing brings in over \$2,267,000,000 in revenue to the state of Wisconsin on an annual basis (American Sportfishing Association, 2013), and is a particularly popular pastime along Milwaukee's waterways. Over 50 species of fish populate Milwaukee's rivers, including popular sport- and fly-fishing species like bass, trout, and salmon (Milwaukee Riverkeeper, 2015).

Interviewee responses. The 'recreation' theme refers to the activities and preferences of individual stakeholders who enjoy fishing as a hobby and includes non-local anglers who travel to Milwaukee to take advantage of the region's many waterways. Interviewees described anglers and fly-fishers with high-quality gear regularly using the river for recreation, and also mentioned the state of Wisconsin's extensive water-based tourism industry and its second-highest number of fishing licenses in the United States (#3). Recreational fishing was also noted as a particularly strong cultural value among the African-American community in the Lincoln Creek area (#12). Many interviewees expressed personal attachment to fishing and hiking near the river, which are the two largest recreational uses of this area. Most respondents discussed fishing, and watching others enjoy fishing, in a very positive light. A few specifically said that they were excited about the higher and healthier fish populations in the river because it meant more fishing opportunities. Other recreational activities that were discussed included canoeing, kayaking, and boating, with boating and fishing licenses mentioned as being economically important to the area (#3).

Interviewees generally felt that Milwaukee's water systems have dramatically improved over the past two decades, allowing residents better opportunities for recreational fishing (#1, #4, #3, #7). Changes in the landscape were also credited as improving recreational fishing opportunities: naturalized shoreline and recovered floodplains were noted as both practical and aesthetically pleasing for fishermen spending time along the rivers. Respondents commented on natural aesthetics in relation to the fish much less than other aspects of the waterways, but when they did it was mostly positive. Some interviewees said that at one time the fish populations were not much to speak of but are now improving greatly, and were enthusiastic about fish in the river increasing the "natural look" of the area (37A). The presence or removal of dams, which impact fish migration along Milwaukee's rivers, was also discussed with regards to waterway aesthetics: stakeholders mentioned a "nice waterfall" near one of the dams (37A) but also commented on the area looking more pleasant without the concrete from other dams that had been removed in the past. Respondents also commented that it was enjoyable to see other people fishing on the water, and that the presence of this type of recreation made the area even more appealing to passers-by.

Food Security: knowledge of human health risks vs. necessity of subsistence fishing

While fishing for recreation and for consumption are not mutually exclusive, this theme focuses specifically on the latter. Milwaukee's waterways serve as a valued source of food to numerous AOC residents, many of whom are socioeconomically disadvantaged and rely upon catching fish to supplement their diets. Specifically, the African-American, Hispanic, and Hmong communities have been identified as minority groups that regularly partake in sustenance fishing. These groups may not be aware of the risks associated with eating fish caught from the river, such as the elevated levels of industrial contaminants found within the fish.

Background. Industrial contaminants such as heavy metals, PCBs, and PAHs linger in the body tissues of animals and humans that ingest them for years, causing metabolic disturbances and negatively impacting health. Risks of PCBs include damage to the reproductive, endocrine, and immune systems as well as developmental impairment in children, while heavy metals like mercury can damage the immune system and cause mental impairment and developmental delays (Wisconsin Department of Natural Resources, 2015).

Interviewee responses. Our respondents suggested that risks associated with fish consumption are relatively larger for subsistence fishermen due to higher levels of exposure to the environmental contaminants. While non-consumptive recreationists may not worry about these pollutants, which build up in the bodies of fish and can negatively impact human health when eaten, those that do consume some of the fish they catch must be educated about levels of various contaminants in the river (#2). While none of the individuals interviewed for this project fished primarily for subsistence themselves, some guessed that fishing for food among the African-American and Hmong communities was due as much to cultural norms as necessity (#3). A few interviewees speculated that the Hmong community in particular were used to harvesting food from the river and would be reluctant to change their behavior despite fish

advisories and other outreach material posted in their native language, but this information was anecdotal and not elaborated upon much further (#2). Efforts to engage and dialogue with the Hmong community, as well as other stakeholder groups still fishing primarily for consumption, may help outreach coordinators further refine their message with cultural sensitivity in mind.

Although fish advisories and signage posted along the rivers serve as valuable educational resources, some interviewees suggested that face-to-face communication may be more efficient and effective in some circumstances (#2). A respondent who works with local environmental groups proposed that fishermen be interviewed to better assess their concerns and awareness of the quality of Milwaukee’s fish (#2). There are mixed views on whether signage indicating possible risks is seen, understood, or beneficial. It is also important to understand that groups participating in subsistence fishing may understand the risks associated with fish consumption, but still fish because they are food-stressed.

Alternative communication methods should be explored to convey the hazards of eating fish caught from the river. Considering the motivations behind subsistence fishing and addressing healthy food access issues may be a better approach to solving this problem. To eliminate these concerns, it may be beneficial to work with key community stakeholders and leaders who frequently interact with the individuals most likely consuming fish from the river. Facilitating important conversations among these groups will dispense new knowledge and keep people informed, thereby reducing the negative health effects caused by environmental pollutants still in the area.

Table 2.

Summary of themes discussed in relation to fish. In total, we coded 199 statements related to fish.

Theme	Description	Example statement	Interviewees
Ecology	Discussion of ecosystem health or dysfunction including contaminated sediment, concrete channelization, historic dams, invasive species, and the steps being taken to mitigate or restore them. This section focuses on the ecosystem’s direct impacts on fish rather than fish-related human activities.	“I would like people to realize the river is cleaner than ever. That the particular contamination issues related to fish is being addressed” (2).	2, 3, 4, 7, 9, 10
Recreation	Discussion of the relative popularity of fishing as a pastime, the types of individuals doing the fishing, what species were valued for recreational fishing, the economic impact of recreational fishing, and environmental aesthetics that impacted both fish health and human enjoyment.	“There are people down there...we see them fishing and enjoying themselves. I think the big difference is a lot of them are doing catch and release, maybe some of them are eating what they are catching, but it is more recreational” (3).	2, 3, 4, 6, 8, 9, 11, 12
Food Security	Discussion of fish consumption and its potential health impacts, as well as the stakeholder groups inclined to fish for	“There’s signage that talks about the fish populations and how to properly eat them, and also how to restrict intake if you’re	1, 2, 3, 5

sustenance and educational/outreach material on the subject.

pregnant or a child, but I do think that's kind of lost on the main population that fishes" (2).

Conclusion

As sediment remediation and habitat restoration continues throughout Milwaukee's waterways, it will be important to consider the wide range of attitudes surrounding changes to the rivers. In the case of dam and concrete liner removal, recreationalists and ecologists both value the increased mobility for fish because it leads to enhanced fishing opportunities as well as an enhanced life cycle for fish. However, dam removal can also alter water levels, which may be undesirable for recreational fishers because it impedes boating and other access to fishing areas. Interests of aesthetic value and ecosystem functionality may conflict with one another, because an aesthetically pleasing area may actually be built up and "unnatural."

Overall, ecologically-minded individuals are likely to be more concerned about species richness and environmental stability than any other group. Recreational fishermen may value certain fish species differently than ecologists do, and plans to restore rivers to their native species compositions may pose a threat to desired species compositions that are important recreationally. Invasive species may be more of a concern for people who value fish from an ecological or recreational standpoint than for people who value fish from a simple aesthetic standpoint.

Additionally, there may be different perceptions of even the pollution remediation projects' relative importance: contaminant loading may concern ecologists more than it would concern those who fish recreationally or for cultural reasons, even though fishermen themselves are the group most likely to be negatively impacted by the pollutants themselves due to direct interaction with the fish and the contaminated sediment in their habitat. People who fish for sustenance are even more likely to be affected by this contamination, but in some cases avoiding this risk may be a lower priority for them than being able to supplement their food supply in the first place.

Throughout these interviews, it is clear that enhancing communication between stakeholder groups and decision-makers will be important to developing a more coherent vision for why and how Milwaukee residents use and value fish. Creating dialogue focused on understanding the ways that different groups value fish could lead to increased cooperation between groups and a more cohesive vision about how to manage the vital natural resource of the Milwaukee Estuary AOC.

Citations

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