Abstract

We conducted a participant observation study of recreational fishing in the industrialized Calumet region of northwest Indiana and southeast Chicago to gage the extent of fishing for consumption and to learn about perceptions of the risks of eating contaminated fish. Of the 97 study participants who provided definitive information about their fish consumption habits, 70% reported ever eating fish from Calumet waters. When assessing pollution, anglers relied mainly on their senses, personal experiences, judgment, and/or information from friends, family, and other anglers rather than on written fishing guides, local officials, or the media. When considering consumption risks, they focused on four primary factors: the general environment, water quality, fish characteristics, and observable human health. Different anglers used different risk assessment cues. There were also differences in risk perceptions and fish consumption patterns across racial-ethnic lines. Finally, we consider the challenges of disseminating risk information to diverse urban populations.

Keywords: *urban angling/fishing, fish consumption, risk perception,*

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risk influence their behaviors. These questions were initially raised by land managers and other decision makers in the Calumet Initiative, a coalition of not-for-profit, government, education, and research partners working on environmental, economic and related social issues in the Calumet region. This article focuses on Calumet anglers' pollution assessment reasoning and their related perceptions of the risks of eating fish from Calumet waters. These findings supplement the existing — and largely quantitative — literature on anglers' perceptions of fish consumption risks and will help natural resource managers, policy makers, planners, and public health officials as they devise strategies to manage fishing sites and effectively communicate fish consumption risk information to diverse populations of urban anglers.

Urban Fishing and Risk

Managing specific behaviors to minimize personal risk is not easy for people to do. The wide variety of available information sources — including science and medicine, anecdotes, and popular culture — offer a range of often contradictory risk messages. These messages may also be encountered separated from their original source or context, making them even more difficult to understand and interpret. The result is a potentially confusing array of abstract risk assessment factors, suggestions, and cautions that individuals must sort through, consider, and choose from as they make decisions about their behaviors and their health.

Weinstein (1999) breaks down personal risk assessment into four basic elements: identification of possible outcomes, evaluation of the severity of the outcomes, assessment of the probability of harm, and assessment of an individual's relative probability of harm. There is subjectivity in the judgments and decisions made at each stage of the risk assessment process and there are seldom "right" or "wrong" conclusions except those that can be identified in hindsight. Weinstein (1999) also discusses "optimistic bias" whereby people at risk (in that study, it was smokers) minimize their perception of risk by taking an optimistic — often much too optimistic — view of their chances of harm from the risky behavior.

Assessing the risks of fish consumption means sorting through (or choosing not to sort through) the conflicting messages about the possible risks and benefits. The potential benefits of a fish-rich diet include reduced heart disease, lowered cholesterol, improved vision, and decreased risk of developing diseases and disorders like asthma, dementia, and various forms of cancer (Sidhu 2003; Verbeke et al. 2005). The potential risks of fish consumption are mainly linked to the ingestion of toxins (like mercury, polychlorinated biphenyls (PCBs) and pesticide residues) that may be present in fish tissues and may build up to harmful levels over time in humans or in developing fetuses (Knuth et al. 2003; Imm et al. 2005). A recent meta-analysis of the benefits and risks of eating fish found that the benefits generally outweigh the risks (Mozaffarian and Rimm 2006).

The scientific interpretation and general public dissemination of fish consumption risk information can also be inconsistent. Belton et al. (1986) found that two different risk calculation methods suggest considerably different conclusions about the degree of the risk of developing cancer from eating fish contaminated with PCBs. Information about the risks and benefits of fish consumption is also not necessarily evenly distributed throughout the population. In a Burger (2005) survey of New Jersey supermarket shoppers who ate either store-bought or sport-caught fish, 77% had heard warn- [illegible]

filiated with Calumet fishing and/or fishing sites including bait shop owners, site managers, municipal employees, educators, fish-fry attendees, meeting attendees (e.g., Friends of ABC Lake), and other site users. Of the 127 anglers and associates, 97 gave definitive responses about whether or not they

Consumption-oriented anglers sometimes said or implied that *not* eating sport-caught fish would have been a waste of effort and of perfectly good, high quality, healthy food that would be costly to buy in a restaurant or store. They talked about sharing fish with friends and family as one of the social aspects of fishing, as part of being a good neighbor, and/or as part of being a good provider. For example, 14 participants had held summer fish fries with family and friends; these important social events were made even better — or sometimes made possible or more affordable — by successful fishing in local waters.

Defining and Detecting "Pollution"

We found that study participants, when asked, were able to articulate reasoned assessments of the health risks of eating local fish based mainly on beliefs and perceptions about whether or not the sites were polluted. Most of the people who talked about pollution indicated that they expected to be able to detect and identify pollutants in the water or fish with their senses. They pointed to a number of observable factors about the surrounding environment, the water, or the fish in support of their beliefs that the water was polluted or that it was not, that the fish were contaminated or they were not, and that it was safe to eat the fish or not. Anglers in our study would also point to observable impacts on human health as a part of their decision criteria. These categories frame our discussion of participants' assessments of pollution and its potential impacts.

[Participants #77 and #78] both said they would not eat fish from here, they wouldn't trust it to be safe because of possible pollution. They didn't read or hear that this water is polluted but said they could infer possible risk just by looking around, and they pointed out the trash by the shore, stuff that was thrown in the water, and where we were (i.e. in the city). One of them explained that it is like the episode of "The Simpsons" when they catch the three-eyed catfish from the nuclear plant cooling lake: you just know by its being by the nuclear plant, and that they caught a three eyed fish, that it was not a good idea to eat any of the fish. It is the same here.

In the exchange that followed I explained [to Participant #12] that I had heard that the stream could support fish again because they were oxygenating it, but I had also heard that undisinfected effluent was still going into the river, so I was not sure it was cleaner. He said it looked dirty like sand, and that definitely everything including the bull frogs had died, but now the fish and everything were back, "so it had to be cleaner."

At some point Participant #79 said that he used to work at U.S. Steel. They would use high-powered hoses to clean off the floors and all that oil and stuff would go down the sewer and "where do you think that all goes?" (i.e. into Lake Michigan and the Grand Calumet River). He was citing this as a reason not to eat fish from those water bodies and he made it clear that he does not fish there.

Figure 3. Calumet anglers on assessing the environment and ecology (based on comments from 36 participants)

Site Selection and Assessing the Environment and Ecology of a Site

This section draws on information from 36 anglers. In discussions about pollution concerns, interviewees often made comments about the general condition of the environment around a fishing site and/or the presence of other anglers or people using the site for different kinds of recreation. Some anglers looked at the debris in and around the fishing area for clues about levels of contamination. For them, excessive garbage, dumping, and litter were signs of a degraded environment and potential pollution. So, too, were densely developed urban locations, particularly ones with obvious industry nearby. Generally anglers believed that any nearby industry would be a polluting one. Some had worked at nearby facilities, or knew people who had, and their concerns were based on knowledge of actual practices at the facilities, while others believed local stories about which industries were polluting.

When it came to observations about ecology, several interviewees pointed to a diversity of fish and plant species or the re-emergence of lost species as indicators of general ecological health and therefore as an indicator of good water quality. Anglers that mentioned species diversity felt that more fish species meant that it was safer to eat fish caught at that location because water quality was good. Study participants occasionally meant that the predominance of carp in a water body indicated that the water was polluted.

In discussing the chances of catching contaminated fish from a specific water body, a few anglers said in effect that active management (i.e. on-site presence of game wardens or park rangers) and promotion of specific locations for fishing should mean that fish caught there were safe for consumption. The reverse was also believed to be true: officials would not let people fish in places where the fish were not safe to eat. Some anglers said that they most often fished for consumption at "pay lakes" (where anglers paid a fee to fish for the day and the lakes were stocked regularly with specific game species). Unless they were visibly injured, fish from pay lakes were considered safe to eat because anglers presumed the fish had been raised elsewhere in clean waters and had only been in local waters for a short time. A variant on this belief was that ponds or lakes were stocked with prey species or small fish that provided clean food for wild or larger fish. At locations where frequency and dates of stocking were not posted, anglers did not seem to consider the possi-

bility that stocked fish may have been present for a long time or that they might be catching wild fish. Finally, in about

[Participant #48 was holding up the fish and] he kept saying it was a nice fish and "clean" fish because the side of it was light colored and "clear." In his view, the skin would be darker and spotted if the water were polluted. The side of the fish was very light most of the way up, silver giving way to green only near the dorsal surface. He contrasted this [pond's] clean water with that at Oxbow, saying the fish there are darker because Oxbow is more polluted than here. I asked where he learned how to tell this; he said it was what he has been told by other fishermen.

I asked if there are certain kinds of fish that are less safe to eat compared to other kinds. [Participant #70] said the scavengers are less safe to eat. I asked which those are, and she said like carp and catfish. I asked if they ever eat carp. She said they throw them back, "we won't eat them." I asked why. She asked me, as though thinking out loud expressing hesitation, "Can I tell you this?" And then she told me "very few Black people will eat carp."

I asked Participant #87 if he has any way to tell from looking at a fish if it is good to eat or bad. He said "not that I know of. But you can go to a bait shop and they will cut it up and tell you what it has been eating."

Figure 5. Calumet anglers on assessing the fish (based on comments from 21 participants)

fish were mentioned most frequently as species to avoid, but the response to catfish and carp varied across ethnic groups. White anglers almost uniformly spoke of carp as "junk" or "garbage" fish that live in and eat from the bottom of lakes and rivers; they frequently expressed visceral disgust at the thought of eating carp. Black anglers who discussed carp were divided in their views. About half said that they did eat carp when they caught them; several mentioned removing the "mud vein" (a swath of dark-colored flesh) when cleaning the fish as a way to remove contaminants and/or to preserve the flavor of the lighter meat. The other half of Black anglers did not eat carp because they thought it was a junk fish or because they did not know how to clean or cook the fish; they did not, however, express disgust at the idea of eating carp. The small sample of Latino anglers who mentioned carp mostly shared Whites' perceptions of carp as disgusting and inedible although one Latino angler reported enthusiastically that he enjoys consuming carp he caught with family and friends.

Catfish inspired similarly divided views but without the expressions of visceral disgust. For Blacks and Latinos, catfish was frequently the most desired target species for consumption. White anglers, on the other hand, were about evenly divided between those who kept catfish for consumption and those who did not. Among the non-eaters, some said that catfish were undesirable for consumption because they were bottom-feeding fish and some said they did not target catfish because the fish's spines made them tricky or dangerous to handle.

At the time of the research, carp and catfish were the most frequently-named species in Calumet area consumption advisories but study participants almost never mentioned advisories when they talked about their feelings and beliefs in favor or against eating catfish and/or carp. A handful of anglers from each of the three ethnic groups did say that they had heard from the media or other anglers (or that it was just common knowledge) that people should limit their consumption of salmon or large bass caught in the Calumet area. This roughly corresponds with official advisories from that time.

Assessing Human Health

This section is based on data from 20 anglers. Assessments about human health took place on two levels: a general level related to the popularity of local waters for recreation, and a more specific level connected to the angler's own health or the health of family members and other anglers they knew. On the general level, anglers reported that people swimming, windsurfing, or fishing in the area (especially if other anglers were taking fish with them for consumption) in-

[Participant 31] added that he has never heard of anyone getting sick from eating fish from these places and it was a long time ago, like when he was about four, when he heard about pollution. I asked if pollution would stop him from eating fish he catches. He said no, he would eat catfish if he caught it. He'd been hearing about pollution since he was a kid, but does not know anyone who has ever gotten sick from eating the fish and never heard that anyone died from the pollution. His brother eats the fish all the time and he is real healthy and so are his kids.

I asked Participant #1 if he did anything special in preparing the fish he catches. He said he cuts, guts and throws them in the grease. He is not aware of any special preparation processes but, "If I thought it was detrimental to my health, I would not be out here. No way."

I asked Participant #40 if he had ever heard of anyone getting sick from pollution in a fish. He said he knew a woman who said her son had gotten a fungus from eating a fish they caught. He qualified his answer, saying he didn't know if she was right (in her diagnosis) or what the circumstances were, but that is what she told him.

I asked if being assured of getting fish was the main reason to go to a pay lake. They said it was, so I explained that I am interested in knowing if people go to them to avoid water pollution. Participant #20 said, "People eat the fish here. This lake is clean, people swim in it, you see them all the time."

Figure 6. Calumet anglers on assessing human health (based on comments from 20 participants)

dicated that the waters were clean and the fish were safe — a safety-in-numbers, or "we-can't-all-be-wrong" assessment technique.

Anglers who ate their catch could be more specific, and they often made comments about how eating locally-caught fish in the past (and/or over time) had not adversely impacted their own health or the health of their family members, friends, or other anglers (especially older anglers). Interviewees sometimes stated or implied that they were healthier than other people *because* they had fish in their diets. Their repeated experiences of eating locally-caught fish and not seeming to get sick reinforced their belief that local fish were safe to eat. They expected any adverse health impacts to be observable and directly attributable to the fish consumption. This was clear from a dozen interviewees who talked about pollutants in fish as infectious agents that you could "catch" directly from the fish and that caused illnesses like food poisoning. Among these participants, there was a general lack of awareness or concern about the kind of chemical or metal toxins that scientific experts are most likely to warn about — i.e. those that could bioaccumulate over time and cause long-term or developmental health problems.

I asked if [Participant #57] had ever heard about anywhere he should not catch and eat the fish because they are not safe. He said he watches the news quite regularly but he just does not know what to believe. They say one thing one week and then the next week say that is not true. "What are you supposed to believe? You hear things like you shouldn't eat X because it 'causes cancer.' Fish is supposed to be good for you. If you can't eat it, what are you supposed to eat?!" "What are you supposed to eat" was a kind of refrain for him in responding to this question. He didn't seem angry or annoyed, just kind of exasperated with food safety info. Finally he talked about trusting God and that God will decide how long he is supposed to live.

Participant #29: Sometimes I've heard about pollution here. You read it in the paper. I don't care.

Ethnographer: Now you are saying you don't care, why is that?

Participant #29: Pollution is everywhere. The air is polluted; everything is polluted. If you live in the country, it would probably be better. Here in the city, if you think about it [pollution], you would not eat anything.

#71 said with farm raised fish it is the responsibility of the hatchery/farm to make sure the fish are safe. They have to check the fish for toxins to make sure that they don't exceed a certain level. She went on to add emphatically, "So yeah, I do feel safer at a pay lake."

Figure 7. Calumet anglers attitudes about fish consumption risks (based on comments from 23 participants)

Anglers' Attitudes about Fish Consumption Risks

Twenty-three study participants discussed risk (and fish consumption risk in particular) in more depth, sharing explicit beliefs about which information is useful in risk assessment, which is not, and what people can or should do to control risk. Of these 23, many said that there was simply no way to know for sure which fish consumption risk information to believe or trust. For some, dire warnings about the potential hazards of eating fish from Calumet waters did not match up with their positive personal experiences of having done so. Several interviewees said that just being in a city meant being constantly exposed to pollution — i.e. a little pollution exposure through eating fish was the same as getting it from anywhere else. There were also subscribers to the "something's-got-to-kill-me" school of thought; they believed that the pleasure of eating the fish they caught outweighed vague concerns about long-term impacts on health. Several people also asked some variation of the question, "If not fish, then what are you supposed to eat?" They felt that there were no absolutely safe food consumption choices.

Sources of Information about Fish Consumption Risks

Thirty-nine anglers spoke about their sources of information about fish consumption risk. They almost never referred to state-issued guidebooks or websites as sources for fish consumption advisories. At the same time, we found that many interviewees were familiar with some of the information that can be found in the official guides and advisories — they had gotten it second-hand from other anglers, media reports, or television programs about fishing. For example, anglers often want to catch big fish ("trophy fish") as part of the thrill of the sport. But when it comes to consumption, official guides generally advise eating smaller (younger) fish of many species since they would have had less time to ingest or absorb pollutants from their environment and from their food. While only two of the study participants reported learning this from an official source, others seemed to view the idea as common sense. Official guidebooks also generally recommend minimizing meals of predator fish because they tend to build up toxins in their tissues when they eat smaller fish that are carrying those toxins. No study participants specifically referred to this food chain-related bioaccumulation process.

Those who *had* read about local pollution or consumption advisories typically said that "it was a long time ago" and/or they could not remember the specific source of the information. About 15 anglers reported getting information about fishing risks from newspapers, fishing publications, or television. However, they also complained about the lack of site-specific advisory information in the media; this was corroborated by the ethnographer's informal check of fishing-focused newspaper columns and television programs during the study period.

I asked [Participant #80] where he learned about contamination. He said probably the TV. He watches "Illinois Outdoors" and [another fishing show]. He went on to explain that his [sportsman's] club has their meetings just south of here in the park and they have speakers from [Illinois Department of Natural Resources] come and talk to tell them all the regulations. I asked if they tell the club about mercury and lead. He said yes, all that stuff. I asked, what about zebra mussels. He said Oh, yeah, zebra mussels, gobies, and all those junk fish.

I asked Participant #70 if she had seen anything on fish safety in the guide that you get when you buy your license. She half corrected me, saying the guide is optional when you buy a license and she does not always bother to get one because she does not always read it. She said when she does pick it up she mostly uses it to see what fish are in what areas and where people have caught trophy fish.

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*Participant #63 has never fished here at night, but people have told him it is the best time to fish because the fish are not as afraid to bite (as during the day). When I asked him what his source of this info was…he responded, "People who know," saying it with conviction. I backtracked…explaining that I have been getting info on night fishing from cops and other non-fishers, so I was just trying to narrow down who his hi3.7395 348.[r T*p 0fs,doe4075(b)-7.75-2 Tm*

Figure 8. Calumet anglers sources of information about fish consumption risks (based on comments from 39 participants)

Instead of official or media sources, the vast majority of study participants reported relying on informal social networks — primarily friends and family and secondarily fellow anglers and bait and tackle salespeople — for all fishing-related information. Their accounts demonstrate that information, misinformation, and advice about site selection, target species selection — all of which influence individuals' decisions to consume or not consume locally-caught fish — spread through the angling community along these informal social networks.

Stories about how anglers first came to fish for consumption at specific locations were particularly revealing. Whether they had begun to fish as children or had taken up fishing in adulthood, the majority of anglers had learned about particular fishing spots by accompanying more experienced anglers. A few anglers who fished for consumption reported continuing to avoid locations that they were first told to avoid as children because of pollution. Even more anglers acknowledged fishing for consumption at locations that they were taught were safe many years ago; over time, they never questioned the safety of consuming fish from those locations.

We found that Calumet anglers also relied heavily on personal knowledge gained from experience and observation when making decisions about fishing and assessing fish consumption risks. In fact, many anglers in our study trusted their own observations and judgment over warnings or information from all other sources. This suggests that assumptions, deductions, and beliefs about fish, fishing, pollution, the local environment, particular water bodies, and health strongly influence fishing behaviors and fish consumption decisions.

Pollution Mitigation Strategies

Some guidebooks and advisories offer advice on techniques for cleaning and cooking fish so that if toxins are present they can be minimized or eliminated. These include eating only the fillets of the meat, removing belly fat where tox-

Figure 9. Calumet anglers on pollution mitigation strategies (based on comments from 44 participants)

ins may accumulate, using cooking techniques like grilling or broiling that allow the fat to drain off, avoiding stewing fish because toxins may simply move from the fish into the stew broth, and avoiding deep frying which can seal toxins in the flesh.

Forty-four anglers provided information about how they prepare and cook the fish they catch. Only four of them described their usual fish preparation and cooking methods with explicit references to how these measures might remove chemical toxins, mitigate their effects, or otherwise render

cluding the risks of eating local fish. The clubs thus allowed anglers to interact with resource managers in settings where their role was to provide information or expertise, not enforce fishing regulations or other laws. These encounters allowed White anglers, individually or by association as members of

generally *over*estimating their risk. The third group reported low levels of fish consumption from Calumet waters and expressed various levels of concern about local pollution based on a variety of assessment cues. What was largely missing among study participants' discussions of fish consumption

It is also important to keep in mind that Black and Latino anglers in this study were much more likely than Whites

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