

# FISH CONSUMPTION RISK PERCEPTION AMONG ANGLERS IN AN INDUSTRIAL URBAN AREA

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**Abstract.**—Over two summers, we conducted field interviews with anglers in the industrial Calumet Region of northwest Indiana and southeast Chicago. The data collected provide insight into how anglers assess the risks of eating the fish they catch. Some anglers practiced catch and release because of concerns about water pollution while others just did not eat fish. Those who ate fish they caught expressed a range of beliefs (some accurate, some not) about detecting pollution, choosing “safe” fishing spots, and removing pollution from fish. There was widespread uncertainty about how people can know what is safe or unsafe to eat (both fish and other foods). Almost no one had read official state-issued fishing guidebooks yet some were familiar with information available in the guidebooks. In light of these findings, we consider the many challenges of conveying accurate fish consumption risk information to a diverse urban fishing population.

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## 1.0 PURPOSE OF THE RESEARCH

This research grew out of concerns raised by environmental organizations and park and natural resource managers in the industrial Calumet region of southeast Chicago, the south Chicago suburbs, and northeast Indiana. Observers saw people fishing almost everywhere in the region during good weather but little was known about who the anglers were, what they were catching, and whether they were eating caught fish. Resource managers were also unsure about how to reach out to local anglers, especially those fishing on private property or at locations that were not officially sanctioned for fishing. This project was designed to collect basic

information from Calumet anglers about whether they were eating their catch and what they thought about the potential health risks of eating fish from Calumet waters.

## 1.1 Environmental History of the Calumet Region

[T]here was a grove of trees just south of the [Altgeld Gardens public housing] project, and running south and west of that was the Calumet River, where you could sometimes see men flick fishing lines lazily into darkening waters. But the fish that swam those waters were often strangely discolored, with cataract eyes and lumps in their gills. People ate their catch only if they had to.

– Barack Obama, *Dreams from my Father: A Story of Race and Inheritance*, p. 164

The history of the Calumet Region is the story of the Industrial Revolution in America. Starting in the 1850s, giant steel manufacturing facilities were built across the region along with grain elevators, shipyards, and other industries over the decades. Many of these facilities were enormous—factory complexes covering hundreds of acres, shipyards and port facilities stretching for miles along lakes and rivers, and, later, landfills (both regulated and unregulated) the size of 20 city blocks. Generations of immigrant workers and Calumet’s extensive transportation infrastructure of waterways, railroad lines, and roads made this development possible.

For most of Calumet’s industrial history, smoke churning out of factory stacks meant jobs and prosperity for local people. Industrial waste products such as chemical sludge, steel slag, and construction debris were dumped in the nearest convenient place, often wetlands or unused land. The environmental laws of the 1970s and 1980s eventually decreased active pollution of Calumet’s air, water, and soil. In the 1980s, the dramatic decline of the steel industry shuttered factories all over Calumet; this continued to reduce the sources of pollution but was devastating to the local economy.



Figure 1.—Aerial view of the Calumet River, looking north to Lake Michigan, January 1975. Photo used with permission of the Southeast Historical Society.

Today, Calumet has diverse communities that were strongly shaped by the region's industrial heritage and waves of immigration. The U.S. Census data in Table 1 help tell the story of the region's racial, ethnic, and income diversity. Whole neighborhoods that grew up around giant steel mills have begun to try to reinvent themselves but the local economy has struggled in the wake of the manufacturing decline as the high (but varying) unemployment and poverty statistics suggest.

Despite its industrial history, Calumet has a patchwork of remnant wetlands and natural areas, some with excellent habitat quality, that continue to support native species of plants, birds, insects, land animals, and fish. At a BioBlitz event in 2002, hundreds of volunteer scientists and residents conducting a species inventory found more than 2200 species in the natural areas around Lake Calumet in 24 hours (The Field Museum 2007). Calumet's wetland patches provide important bird stopover and breeding habitat along the Midwest's migratory bird flyways.

Many residents, agencies, and organizations recognize Calumet's ecological importance and value its remaining

natural areas. The Calumet Initiative, for example, is a coalition of educational, government, nonprofit, cultural, business, and philanthropic organizations that has been working for almost 10 years on projects and partnerships to revitalize the region's economy and environment. The Marquette Plan has also provided a large-scale vision for connecting, attracting investment to, and providing public access to the beaches and natural areas along the south shore of Lake Michigan.

For local anglers, there are compelling reasons to fish in Calumet waterways. There is a diversity of fish species and many now-abandoned industrial sites are relatively quiet and isolated, providing peaceful getaway spots within the city. Many Calumet anglers have a personal or family history of fishing in the region.

### **1.1 The Waterways of the Calumet Region and Fish Consumption Advisories**

The Calumet Region is an unofficially defined area that stretches roughly from the south Chicago neighborhoods of East Side, South Deering, Hegewisch, and Pullman along the southern shore of Lake Michigan into Indiana

**Table 1.—Comparative statistics for selected Calumet communities from 2000 U.S. Census**

City or Neighborhood	Total Population	% Black	% Non-Hispanic White	% Hispanic or Latino	Median household income	% Individuals below poverty line	% Unemployed <sup>c</sup>
Chicago neighborhood of East Side <sup>a</sup>	23,653	1.8	29.4	68.1	\$39,184	12.4	12.5
Chicago neighborhood of Hegewisch <sup>a</sup>	9,781	1.6	67.0	28.8	\$43,903	10.6	7.9
Chicago neighborhood of Pullman <sup>a</sup>	8,921	82.5	8.5	8.9	\$32,111	22.4	17.2
Chicago neighborhood of South Chicago <sup>a</sup>	38,596	70.3	2.9	27.4	\$28,785	29.7	18.2
Chicago neighborhood of South Deering <sup>a</sup>	16,990	62.0	7.6	30.5	\$35,684	19.6	11.9
City of Calumet City, Illinois <sup>b</sup>	39,071	53.9	34.4	10.9	\$38,902	12.2	8.0
City of East Chicago, Indiana <sup>b</sup>	32,414	36.8	12.1	51.6	\$26,538	24.4	15.4
City of Gary, Indiana <sup>b</sup>	102,746	85.3	10.1	4.9	\$27,195	25.8	14.9
City of Hammond, Indiana <sup>b</sup>	83,048	15.3	62.4	21.0	\$35,528	14.3	8.9

<sup>a</sup> Census data by Chicago neighborhood is from the Metropolitan Chicago Information Center.

<sup>b</sup> City data is from the U.S. Census website.

<sup>c</sup> For comparison, in 2000 the Chicago-wide unemployment rate was 10.1%, the Lake County, Indiana, unemployment rate was 7.5%, and the national unemployment rate was 5.8% (data from U.S. Census website).

including the cities of Gary, Hammond, Whiting, and East Chicago (see Fig. 2). The major waterways in the region are Lake Michigan, the Calumet River, the Little Calumet River, the Grand Calumet River, the Indiana Harbor Canal, and Lake Calumet. Other waterways like Wolf Lake on the Illinois/Indiana border and smaller lakes like Powderhorn, Flatfoot, Lake George, and Lake Etta are not barge-navigable but are open for recreational activities including boating and fishing. The region also has dozens of smaller wetland areas, many of which are used for fishing.

All of Calumet's major waterways are alongside or within sight of active or abandoned industrial facilities and most, if not all, have been manipulated and changed over time by human activity. For navigable waterways, this has included filling along shorelines, hardening banks, cutting shipping slips, and dredging channels to allow barge traffic. Wetlands have been filled and shaped using construction debris, steel slag, and/or dredge spoils from other waterways.

Today, Calumet's waterbodies have varying water and sediment quality. At the time of this research, it was difficult for the average person to get definitive

and up-to-date water quality information for local waterways. The states of Illinois and Indiana offer official guidebooks that provide some fish consumption advice for anglers based on water and sediment quality data; the guidebooks are available online and in hard copy where fishing licenses are sold. At the time of the research fieldwork, Illinois had a statewide mercury advisory for all waters and the Calumet area in Illinois had a polychlorinated biphenyl (PCB) advisory for carp, channel catfish, sunfish, and several bass species (Illinois Department of Natural Resources 2002). The Indiana guidebook provided only a general overview of consumption advisories and several fish cleaning techniques for mitigating consumption risks but the guidebook directed people to the Internet for detailed information about consumption advisories (Indiana Department of Natural Resources 2002). Anglers who took the time to go online for this information would have found that the Indiana State Department of Health advised limiting consumption of a long list of fish species from Calumet waterways because of PCBs. There were also very strict "Do Not Eat" advisories for all carp and catfish plus large fish of nine other species from Lake Michigan tributary waters and for all fish from the Grand Calumet River and the Indiana Harbor Canal in Indiana.



Figure 2.—Aerial photo of the Calumet Region from Google Earth.

## 2.0 LITERATURE REVIEW

In the past 20 years or so, a range of research has focused on the consumption of sport-caught fish in different areas of the United States. A subset has looked at how anglers think about the risks of eating sport-caught fish (Beehler et al. 2001, Burger et al. 1999, Burger 1997, Burger et al. 1998, Burger et al. 1993, Knuth et al. 2003, May and Burger 1996, Pflugh et al. 1999). To summarize, this research has found that anglers expect to be able to detect pollution in water and fish and therefore underestimate the presence of contaminants that cannot be detected with the human senses. There are also disparities among people (e.g., of different races or ethnicities, different education levels, and different income levels) when it comes to assessing fish consumption risks and applying perceived risks to behavioral choices.

Previous research has also looked at fish consumption advisory awareness among anglers who are fishing in contaminated waters (Anderson et al. 2004, Beehler et al. 2001, Beehler et al. 2003, Bienenfeld et al. 2003, Burger 1998, Burger 2004, Burger and Waishwell 2001, Campbell et al. 2002, Imm et al. 2005, Sheaffer and

O’Leary 2005, Tilden et al. 1997). All have found that relatively few anglers (usually less than 50 percent) have read formal advisories and that knowledge of details from advisories is highly variable among anglers. In addition, all of these studies have found that many people who know about advisories still eat sport-caught fish from contaminated waters if they are inclined to do so.

The Sheaffer and O’Leary (2005) study looked specifically at fish consumption patterns among Indiana anglers. The authors carefully calculated a safe consumption threshold of about 30 grams of fish per day based on health data and Indiana water contamination data. They found that 16 percent of anglers ate more than 30 grams per day and non-White anglers were significantly more likely than White anglers to be eating more than the threshold amount.

## 3.0 METHODS

Over two summers (2002 and 2003), we conducted field interviews with Calumet anglers. An ethnographer (co-author Longoni) from the Field Museum brought fishing gear to a range of Calumet fishing spots, actually

did some fishing himself at each site, made notes about the number of anglers and their fishing practices, and interviewed a selection of anglers. The ethnographer participated in fishing himself in order to put other anglers at ease since many of the fishing sites were not officially sanctioned. When requesting an interview, the ethnographer always made clear that he worked for the Field Museum and was conducting a research study. Interviews were semi-structured around three main topics of interest: 1) fish consumption patterns; 2) knowledge and perception of fish consumption risks; and 3) anglers' strategies for minimizing fish consumption risks. Interviewees were allowed to guide the course of each conversation and to bring up any topic that they considered related to fish consumption.

This was a qualitative research project designed to collect a wealth of information about how Calumet anglers think about the risks of eating locally caught fish. As such, the results are meant to be informative but do not include extensive statistical analysis. The dataset was the ethnographer's extensive during- and after-interview notes. Some interviews were recorded and recordings were used to supplement interview notes. All participants were promised confidentiality and anonymity. A total of 170 people participated including 127 anglers and people with them at fishing sites (for example, friends or spouses who were not fishing).

At each fishing site, the ethnographer noted how many people were fishing and requested interviews from representative numbers of Blacks, Whites, and Hispanics, whenever possible. Supplemental interviews were conducted with people like bait shop owners, local fish fry attendees, and conservation officers. The data were uploaded to Atlas.ti and NVivo 7 qualitative software for two comprehensive rounds of theme coding and analysis by the authors. See Westphal et al. (2008) for a full description of the data collection and analysis procedures.

## **4.0 RESULTS**

### **4.1 Interviewees' Fish Consumption**

Ninety-seven interviewees provided definitive information about their sport fish consumption habits. About two-thirds reported eating Calumet fish at least

once that summer and about 45 percent ate their catch whenever they went fishing. Many anglers also gave caught fish away to others to eat. There were distinct differences in fish consumption patterns between Blacks, Whites, and Hispanics. Blacks were the most likely to have eaten fish from Calumet waters (about 93 percent had) and 68 percent reported regularly fishing specifically for fish to eat. About 78 percent of Hispanics and 57 percent of Whites had eaten Calumet fish; about 50 percent of Hispanics but only 20 percent of Whites said they regularly fished for fish to eat. Because of the qualitative nature of the data collection, these statistics are not necessarily generalizable to the larger Calumet angler population.

### **4.2 Interviewees' Perceptions of Fish Consumption Risks**

Each of the topics introduced below was brought up and discussed by at least 20 interviewees. A more comprehensive presentation of the research results is available in Westphal et al. (2008).

When asked to talk about whether or not it was safe to eat the fish they caught, the anglers expressed a wide range of attitudes and opinions. Some longtime residents had been eating locally caught fish all their lives without noticeable health impacts while others scoffed at the idea of eating the fish they caught in Calumet. Most who did eat the fish trusted what they had been told by friends, family, and other anglers about where the water and the fish were "clean" and where they weren't—even if they had gotten this information many years before.

Almost no one had read the official state-issued fishing guidebooks but many had gleaned information available in the guidebooks from other sources like the media or other anglers. For example, some anglers removed the belly fat of fish before cooking in order to remove contaminants; many health organizations recommend this to remove PCBs and other fat-concentrated toxins but it may not affect mercury and other contaminants that collect in fish muscles or organs. Anglers rarely offered or understood this level of detail about contaminant threats. Some stated that they avoided "bottom-feeders" like carp and catfish for a variety of reasons (e.g., they disliked the taste of those species or were put off by detritus- or garbage-eating fish). This

turns out to correspond with advisory warnings since bottom-feeders like carp and catfish are more likely than upper water column fish to be contaminated with PCBs. On the other hand, some anglers specifically sought out carp or catfish to catch, keep, and eat.

Many interviewees expressed common-sensical, if sometimes inaccurate, beliefs about how careful site selection could ensure safe-to-eat fish. Anglers who were new to the area figured it was safe to fish where others were fishing. Some believed that certain waterbodies were “spring-fed” (according to local legend or reputation) and that these were automatically cleaner and safer. Study sites included “pay lakes” where the fish were stocked from outside sources and fed by hand. Anglers paid a daily fee to fish at pay lakes and they believed that the fish there were safe to eat since they had been raised somewhere else and fed presumably uncontaminated food. This seems reasonable but we did not have data to prove or disprove it.

Most anglers and others believed that they would be able to tell if water was polluted by using their senses, their own common sense, and/or their experience as anglers and residents of the area. They thought that contaminated water would look funny, have a rainbow sheen on the surface, smell bad, or be cloudy, stagnant, or discolored. Some thought that visible nearby industry (active or inactive) and debris such as dumped garbage near the water automatically signaled pollution. Certain local waterbodies or portions of waterbodies were routinely avoided for consumption-oriented fishing because they had a local reputation (usually rightfully so) for being polluted.

When asked how they would tell if a fish was contaminated, many anglers said they did not know or said they would look for discolored flesh, disease, or deformities. Many interviewees stated that “fresh” fish was safe to eat; they believed the health threat from fish consumption was largely bacterial food poisoning. They also generally believed that eating seemingly healthy fish was completely safe or that eating contaminated fish would result in immediate sickness (within 24 hours). The interviewees almost never mentioned and seemed largely unaware of or unconcerned about the possible long-term health effects of slowly bioaccumulating toxins in the human body.

## 5.0 DISCUSSION AND LESSONS LEARNED

This research clearly demonstrated that almost all participants had given some thought to pollution issues related to both fishing and life in general in Calumet. Both fish eaters and non-eaters offered reasonable explanations about how pollution might or might not affect them, based on their experiences, beliefs and level of knowledge and awareness of scientific and health information. Once the interviewer initiated conversations, most people were eager to talk about these topics and many expressed a sincere interest in learning more about fish preparation, pollution mitigation, and assessing risk.

Personal knowledge and accurate information about the risks of eating sport-caught fish varied considerably from individual to individual among the research participants. Official advisories and guidebooks, including online sources, offered a wealth of information about how to avoid or mitigate the effects of eating contaminated fish but this information rarely seemed to reach anglers in any coherent way. Instead, they pieced together their knowledge and beliefs over time from a range of sources, the most influential of which were friends, family, other anglers, personal experience, and the media.

A variety of mistaken beliefs weakened anglers’ assessments of the risks of eating locally caught fish. These included: pollution is obvious in water or in fish; clear water is not polluted; pollution comes only or mainly from active industry; the adverse health effects of eating contaminated fish are immediate; experienced anglers know where not to fish to avoid pollution; and spring-fed waters are unlikely to be polluted. Most anglers had a very limited understanding about how contaminants can bioaccumulate in both fish and humans and why this matters. Because they did not read the official guidebooks, few seemed aware, for example, that children are more at risk from eating contaminated fish, that consumption advisories apply even to healthy males, or that basic preparation techniques can affect whether contaminants are retained in fish flesh – for example, frying fish can seal in toxins that may drain away if the fish are cooked some other way (Burger et al. 2003).

On the other hand, some personal knowledge strengthened anglers' assessments of the risks of eating Calumet-caught fish. Many were very knowledgeable about local ecology and sought out the most ecologically healthy waterbodies for fishing. Many were also intimately familiar with local fishing spots and avoided the most contaminated waters either on purpose or by chance. Several people who had worked at local industrial facilities had first-hand knowledge of what pollutants had been dumped in specific waterbodies; this was always a motivation to avoid those places when fishing or to avoid eating caught fish.

It is important to note that the general message that eating fish is good for your health had gotten through to the vast majority of study participants through the media and other health information sources. In addition, for people who ate locally caught fish, the experience of eating Calumet fish over the years and not getting "sick" in any directly attributable way reinforced the notion that it was safe to eat Calumet fish. These two factors together make it even more difficult to convey cautionary information about fish consumption to Calumet anglers.

## 6.0 MANAGEMENT IMPLICATIONS

Fish consumption risk information is complex and difficult to apply to one's personal circumstances. Conflicting information is available from legitimate sources and it is not always clear what is safest or best. Like other studies, this research strongly suggests that state agencies and health officials cannot count on getting important fish consumption information to anglers through official guidebooks or advisories. Even the Internet may not be a viable outreach tool for older or low-income anglers and immigrants, especially recent immigrants. Instead, less conventional outreach methods may be necessary.

Two anecdotal examples about signage from this research provide food for thought. In one instance, an interviewee saw a sign at one site that said an herbicide had been applied in the water (to combat invasive Eurasian milfoil) and that fishing was prohibited for several days. He mistrusted the sign and thought that lake managers were trying to keep anglers away from an area that had recently been stocked with fish—and so he fished there

anyway. Another example highlights the management dilemma of providing signage about water pollution. One angler reported seeing an official-looking sign at one site that warned that the water was polluted. He heeded the warning and did not fish there. But seeing that sign led him to expect that signs would be posted wherever the water was polluted and that, conversely, sites without signs had clean water.

This research suggests that it may be effective to convey key information to Calumet anglers in person as often as possible and that thinking outside the cultural box may help reach elusive population segments. For example, members of Calumet sportsman's clubs are overwhelmingly non-Hispanic Whites so giving talks at sportsman's club meetings will not get important information to all anglers. Instead, outreach efforts might want to target non-angling groups like church social clubs or block groups. In addition, experienced anglers are already important and trusted sources of fishing and fish consumption information in Calumet. To capitalize on this, a "Master Anglers" program, modeled on Master Gardeners, could be created to offer classes and informational sessions on angling skills and safe fish-consumption practices to people who already enjoy fishing. This would produce local citizen experts who could disseminate important skills and information to others in the field while they are fishing.

The research interviews also uncovered hints of distrust among non-White anglers toward conservation officers and other law enforcement personnel. This suggests that anglers are not likely to turn to people in enforcement roles for information about the risks of eating locally caught fish and that people in law enforcement roles should work on building relationships and credibility with anglers before attempting to do informational outreach.

Additional suggestions for reaching out to Calumet anglers include focusing on the biggest known risks (specific fish species and specific waterbodies, for example) and targeting the most at-risk populations (non-Whites and people with health problems, for example). Instead of reaching out to anglers, it might make sense to present information to those who cook

sport-caught fish, perhaps with demonstrations of fish cleaning and cooking at local outdoor events or health fairs. Simple waterbody-specific handouts with pictures and clear messages might be effective outreach at fishing sites. For example, the Field Museum division of Environment, Culture, and Conservation is developing a comic book for anglers and their families that conveys in English and Spanish simple health safety messages about fish consumption. Finally, written and verbal communication efforts in Calumet – as in many urban areas – need to be in multiple languages and message crafters need to be sensitive to cultural issues for all local cultures.

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