

Evaluation of Fish Consumption Advisory Signs on Dane County Shorelines (Pilot Project)

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With contributions from the MEJO Board of Directors

Background

Fishing is a culturally important activity and a source of food for anglers from a variety of racial, ethnic, and economic backgrounds in Wisconsin. Unfortunately, Wisconsin governmental agencies, like others around the U.S., issue fish consumption advisory warnings due to mercury and PCBs in fish tissues. A 2007 study found that although levels of mercury in walleye in northern Wisconsin lakes decreased by 0.5% a year from 1982-2005, fish mercury levels in lakes in the southern part of Wisconsin increased by 0.8% per year during this time (Rasmussen et al., 2007). A more recent study found that Hmong immigrants in northeastern Wisconsin are at risk of elevated PCB exposures from consumption of locally caught fish (Schantz et al., 2009).

A variety of studies around the country, however, have shown that many anglers and fish consumers, especially minorities and lower income people, are not aware of fish advisories for a number of reasons (Beehler et al., 2001, 2003; Burger et al. 1999; Burger & Gochfeld, 2006; Gliori et al., 2006; Imm et al., 2005; Powell 2004; Powell et al. 2007; Steenport et al., 2000).

This project focuses on the evaluation of a pilot fish consumption advisory sign project in one county in Wisconsin—Dane County. Mercury and polychlorinated biphenyls (PCBs) are found at high enough levels in Dane County fish that people should limit their consumption of certain fish. Women of childbearing age, pregnant women, and children are especially at risk for developmental, neurological and long term health problems from exposure to PCBs and mercury, and elderly fish consumers are also more vulnerable. It is particularly critical that these groups receive and follow advisories.

Dane County lakes and rivers are surrounded by heavily urbanized areas, and in addition to PCBs and mercury, several other contaminants such as polycyclic aromatic hydrocarbons (PAHs), pesticides, lead, arsenic, other metals, and a variety of other contaminants have been found in sediments of area waterways at relatively high levels. Although these compounds have not been monitored in fish, some are likely present in fish tissues along with mercury and PCBs (see 2001 DNR Lower Rock River report and 2006 UW Nelson Institute report).

Shoreline anglers in Dane County are predominantly racial/ethnic minorities (Hmong, Latino, African American), and many regularly consume fish and share it with family and friends. MEJO's past surveys show that many shoreline anglers are not aware of fish advisories, and exceed consumption levels recommended to avoid negative health effects.

Unfortunately, local and state public agencies in Wisconsin and University of Wisconsin researchers have very little data about fish consumption habits among Dane County shoreline anglers or toxin levels in locally caught fish. Consequently, the health impacts of fish consumption on low-income and minority citizens are unknown. Further, minority and lower income groups are often not reached via government risk communication strategies and not engaged in public policy discussions and decisions about these issues. Outlining, addressing, and hopefully reducing these race and class-based disparities are central components of environmental justice, and key aspects of MEJO's work.

Even without comprehensive fish toxin and fish consumption data, the common good and sound public health policy are served by informing all anglers and others who eat fish of known risks associated with consuming too many of certain kinds of fish, so they can make informed choices about what kinds of fish to catch, eat, and serve to their families—and also so they can learn about environmental health issues in their communities more generally.

Fish Advisory Sign Development & Installation

In 2006, MEJO made presentations at two international mercury conferences held in Madison, and began focusing our work on locally caught fish. MEJO members asked the Lakes and Watershed Commission to better communicate fish consumption advisories—in part by installing signs along public shorelines where people fished (which Hmong anglers, in particular, asked for many times in community meetings). The Commission created a subcommittee to look into it, but the committee never met.

In January 2008, County Supervisor Ashok Kumar contacted MEJO about introducing a resolution to install fish consumption advisory signs. We provided him with information and he did introduce such a resolution. In July 2008, MEJO released “The State of Shoreline Fishing in Dane County: A Report on Fishing, Fish Consumption and Public Health Advisories,” showing that many Dane County shoreline anglers regularly eat the fish they catch and some, particularly minorities, exceed advisories. Based on this, again MEJO suggested that language-appropriate signs in the actual locations where people fish would better reach all anglers, and particularly low-income and minority communities who are not accessing other information sources for a variety of reasons.

From 2007-2008, MEJO built political and agency support to fund the development and placement of permanent fish advisory signs, in Hmong, Spanish and English on Dane County waterways at popular publicly-accessible shoreline fishing locations. Beginning in fall 2008, the Executive Director, Hmong outreach coordinator, and other board members began meeting with Public Health MDC to discuss the development and placement of these signs. MEJO's community organizers worked with Public Health MDC to design a fish advisory sign that

compiled existing Public Health, DHS and DNR fish consumption advice and included local species that anglers most commonly consume.

Originally, funds were approved for only four signs, but after repeated requests by MEJO to the city/county, funds were provided for 24 signs and city parks agreed to install the signs. The team also decided to make eight laminated signs to place in existing kiosks at various fishing locations. In the spring of 2009, our Hmong outreach coordinator and community organizer surveyed potential shoreline fishing locations and selected locations that are most heavily fished by shoreline anglers and/or where there were good places to post signs (e.g., existing poles, etc).

Signs were installed in 22 locations by parks department staff in May 2009.¹ See Appendix 5 for the list of sign locations.

Fish Consumption Advisory Evaluation Methodology

A questionnaire to assess awareness of fish advisories and effectiveness of the posted signs was developed collaboratively by MEJO and Public Health MDC and used to survey anglers on location. The questionnaire was translated into Hmong and Spanish. The English version of the questionnaire can be found in **Appendix 1**.

Data Collection & Analyses

After extensive discussion among team members, and interview training, MEJO and Public Health MDC staff and interns surveyed anglers at fishing locations from June through August 2009.

In total, 199 surveys were completed. MEJO's Executive Director and Hmong Outreach Coordinator went out to fishing locations several times from June through August and in total completed 145 surveys. Public Health MDC staff and interns also surveyed at various fishing locations from June through August and in total completed 54 surveys.

Fixed answers from the questionnaires were coded and entered into SPSS (by Maria Powell). Proportions of interviewees selecting responses for each question were calculated. This data is summarized in **Appendix 2**.

Any relevant notes that were jotted onto survey forms by interviewers were summarized in the "Qualitative Data Table"—see **Appendix 3**.

A form was also developed by MEJO and Public Health MDC to assess the condition of the fish signs that were posted (included in Appendix 1, first part of questionnaire). Interviewers assessed the condition of signs each time they went out to interview. They also assessed how many people were fishing at various locations and how many were fishing near each sign. Results of this component of the project are summarized in **Appendix 4**.

¹ Unfortunately, two of the metal signs and most of the laminated signs were never posted. Also, parks staff who installed the signs place screws directly over important words (e.g., "one" in "one meal per month") on some signs.

Caveats about research methodology and results are described in **Appendix 5**.

Costs (MEJO only)

Including meetings, communications, sign placement, surveying, data analyses, other staff time and management costs, copies, etc., MEJO project costs were approximately \$15,500. This is in addition to the \$1,000 costs of developing the fish advisory sign layout and text. Both are offered as in-kind services to Public Health MDC.²

² A comparable study done through the University of Wisconsin would likely cost at least \$50,000, to cover administrative costs, researchers' and research assistants' time, training, and data analyses.

Key Findings (See Appendices 2 - 4 for more detailed data)

1) Fish Consumption patterns

- Whole group –60.8% regularly eat fish
 - Whites 29.1% regularly eat fish
 - Nonwhites 73.6% regularly eat fish
- Range of fish meals eaten per month: .08-14 (Removed outliers)³

2) Awareness of fish advisory information/reading the signs:

- **Awareness of fish advisory information (before being surveyed):**
 - Whites: 72.7% have seen information before
 - Nonwhites: 38.5% have seen information before
- **Of those who had seen fish advisory information before being surveyed, where did they see it?**

	White	Nonwhite
Fish advisory signs	38.5%	60.0%
Television	51.5%	16.0%
Family/Friends	30.8%	20.0%
Newspaper	28.3%	14.0%
Internet	20.5%	6.0%
Radio	18.1%	4.0%
Other	5.1%	12.0%

People could check more than one category, so percentages don't always add up to 100%.
Oddly, no respondents mentioned seeing the DHS or DNR advisory brochures

- **52.6% of the people surveyed said they read the signs**
 - Whites: 69.1% said they read the signs
 - Nonwhites: 46.1% said they read the signs
- **Reasons for not reading the signs (of those who answered this question) were:**

	White	Nonwhite
Didn't notice it	46.7%	83.5%
Don't eat fish	13.3%	6.5%
Already know	26.7%	6.6%
Other	13.3%	9.8%

³ Assessment of fish consumption was not the focus of this survey; we aimed to get general approximations. Numbers of fish meals/month are likely underestimated—see caveats about fish consumption numbers on page 7.

3) Sign effectiveness (among those who read them):

- 96.5% said they understood the signs (but some race/ethnic disparities probably based on language issues)
- 97.4% said they think the signs are important (see caveat below)⁴
- 83% said they would talk to family and friends about it
- 55% suggested ways the info could be better presented, including:
 - Could be simplified 5.6%,
 - Make sign more visible 16.7%
 - Sign too small 33.4%
 - Other 50.0%

“Other” included: adding size requirements, explaining it more, making information more specific, making information more accessible, putting information in handbook with fishing license, including more info about prevention, having advisory information at bass events, posting information where licenses are sold, providing more information about what chemicals are in lakes, putting signs “all over in all places,” and “clean water is better information.”

(4) Sign condition over time

None of the signs were vandalized, removed, or defaced, though some were a bit loose at the base and one appears to have been run into by a truck (probably parks maintenance), bending it on one side. Unfortunately, on some of the signs, important fish consumption text was obscured by bolts driven through them to fasten them to metal stakes (although many signs were fastened carefully and did not have bolts driven through important text). Additionally, the recommended laminated signs for boat launch kiosks and other locations were never installed.⁵

⁴ On some surveys, MEJO interviewers asked people if they felt the information was important even if they didn't read the sign. In retrospect, all interviewers should have asked everyone that question. Even if people hadn't read the sign, asking about it made them curious and then we talked about it—at which point it seemed appropriate to ask them if they thought it was important. MEJO interviewers (but not Public Health MDC interviewers) also distributed color copies of the advisory sign to people who were interested. Nearly everyone wanted them.

⁵ At the time this report was written, these signs had been posted for only a few months. In time, signs may be written on, removed, and/or otherwise defaced.

CONCLUSIONS

The key purpose of this project was to evaluate the effectiveness of the fish consumption advisory signs placed along Dane County waterways (as a pilot project). We feel that this project was sufficient for this purpose.⁶ In sum, results of this evaluation project suggest that:

- ▶ Fish consumption signs posted at popular fishing locations, in English, Hmong and Spanish, were read by many anglers and appear to be the most common source of this information. While only about half of shoreline anglers (52.6%) we surveyed said they read the signs—data suggest that this is probably because there are too few of them. Also, at the time we surveyed anglers, signs had only been in place for < 1 month to 3 months. In time, more anglers will notice them;
- ▶ The majority of shoreline anglers who did read advisory signs said they understand them and feel that they are important;
- ▶ Many anglers said they want *more* fish advisory signs and other information about fish contaminants and water quality in Dane County lakes;
- ▶ Our conversations with anglers, and survey results, suggest that the signs will likely encourage discussions among anglers and their friends/families about fish advisories and consumption.

However, there are still many substantial race-based disparities in awareness about fish advisories, fish consumption, and in information environments. We outline these below.

Race-based disparities (similar to those seen in many other studies):

- ▶ Data reveal substantial differences by race in fish consumption—higher proportions of non-whites (73.6%) say they eat the fish they catch than whites (29.1%).
- ▶ Although mean numbers of fish meals/month do not appear to vary that much by race, if you break it down by proportions and look at only those consuming more than 4 fish meals a month (which exceeds advisory advice for most fish), you see differences—e.g., 23.2% of non-whites eat >4 fish meals/month, and only 9.1% of whites eat > 4 fish meals/month (see caveat below about fish consumption numbers).
- ▶ Data reveal substantial difference by race in who has seen fish advisory information before--higher proportions of whites (72.7%) say they have seen fish advisory information before than non-whites (38.5%).
- ▶ Patterns in data suggest differences in information environments between whites and non-whites. The most common source of fish advisory information listed for non-whites was fish advisory signs (60%), and many mentioned seeing the signs we posted at other sites on previous fishing trips. Among whites, TV was the most commonly cited source

⁶ See Appendix 5 on pg. 19 for caveats about methodology and results

for fish advisory information (51.5%), and advisory signs the second most common. Whites overall mentioned seeing this information in a higher variety of sources than non-whites, relying on mass media sources more than non-whites. We speculate that non-whites are less likely to see or pay attention to mass mediated information about fish consumption advisories because they are not native English speakers (and most info in mass media is in English) and/or perhaps because they do not watch the kinds of sport-fishing programs or environmental shows white anglers are likely to watch.

- ▶ Data reveal substantial differences by race in who read signs posted at fishing locations—higher proportions of whites say they have read the signs than other racial/ethnic groups (other than Hispanic). There are probably many reasons for this disparity, including language and culture (non-white data included many who do not speak or are not comfortable with English), trust in authority, comfort with written information, and overall differences in information environments of whites compared to non-whites. Also, many of the African Americans interviewed were from outside of Madison (usually Milwaukee).
- ▶ Even though only 10 Laotians were interviewed, it is clear that there are some language and/or cultural issues in reaching this group of anglers. Many cannot read English or do not read at all. Laotians speak a different language than Hmong (although our outreach specialist also speaks Laotian). Hmong were a small group of ethnic minorities in Laos, so many had to learn both languages (in addition to French) to survive.

Caveats about fish consumption data:⁷

Fish consumption assessment was not the focus of this survey, and the question about fish consumption was intended to provide only a general idea of how many meals per month anglers ate. Unfortunately, on a significant number of surveys, the fish consumption questions were not answered. Fish consumption numbers that were recorded are likely skewed lower than they actually are. Some interviewers said they sensed that people said they didn't eat fish (or didn't eat very many) because they understood what the project was about and didn't want to look like they were eating too many fish.

For example, one interviewer said that he thinks that $\frac{3}{4}$ of the people he interviewed who said they don't eat fish probably do eat it because given the expense of their bait and tackle he thinks they are getting more out of it than the joy of catch and release. So his fish consumption numbers were definitely lower than what they would have been if people had told the truth. He also mentioned seeing many Hmong fishing who he didn't interview but he said they all mentioned that they eat most if not all they catch. He said there were definitely language barriers, or "the pretence of one" (to avoid being interviewed). Another interviewer commented that he felt that many people who said they weren't eating fish came from significant distances (Beloit, Janesville, Milwaukee, etc.) and that it was unlikely that they would travel that distance to fish just for fun. Further, many anglers fish with several poles and had buckets of fish. Finally, some anglers said they do not eat very much fish themselves but clearly share it with family, friends, and neighbors.

⁷ Again, caveats about the projects' methodologies and results are discussed in Appendix 5 on page 20.

RECOMMENDATIONS

- ▶ Permanent metal signs in several languages posted at fishing locations are an inexpensive method of getting information to the people who need it the most. Our analyses suggest that signs posted in this pilot project were effective in building awareness about fish consumption advisories, even over a relatively short period of time. **More signs should be posted along Dane County waterways in order to reach more anglers with fish advisory information.**
- ▶ Information about fish consumption advisories should be placed in several languages (Hmong, Spanish, Laotian, other relevant languages) in a variety of mass media, ethnic/minority and neighborhood publications and radio/TV shows, as well as fishing publications.
- ▶ Fish consumption advisory brochures developed by the Wisconsin Department of Health Services and the Department of Natural Resources do not appear to be reaching shoreline anglers. Efforts should be developed to get this information into the hands of these anglers and their families, especially those most at risk (minorities, subsistence anglers, women, elderly, etc) and that they have the capacities to understand the information and make healthy choices about their fish consumption.
- ▶ Posted signs, media outreach, and advisory brochure dissemination should complement a core strategy of comprehensive, *in-person, long-term community outreach and engagement* approaches to teach diverse angling communities about fish consumption risk issues and help them build capacities to address these and other environmental health issues within their communities—on their own terms.

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Our air and water pollution has disproportionate health impacts on poor and minorities. Our institutions and our community as a whole need to do much more to address, reduce, and eventually eliminate these disparities and sources of pollution—for the benefit of everyone.

The Madison Environmental Justice Organization educates the community about environmental justice issues and facilitates the community's ability to address these issues collectively.

www.mejo.us

Appendix : Questionnaire



PUBLIC HEALTH – MADISON & DANE COUNTY

Fish Advisory Survey

Date: _____ Sign No./ Location _____ / _____

Interviewer: _____

The interviewer prior to conducting survey will collect this information

Sign Condition

- | | | | |
|----------------|---|---|---|
| Good Condition | <input type="checkbox"/> Y <input type="checkbox"/> N | Obscured from view/ vegetation | <input type="checkbox"/> Y <input type="checkbox"/> N |
| Removed | <input type="checkbox"/> Y <input type="checkbox"/> N | Vandalized/ Defaced | <input type="checkbox"/> Y <input type="checkbox"/> N |
| Damaged | <input type="checkbox"/> Y <input type="checkbox"/> N | If graffiti present, can it be removed? | <input type="checkbox"/> Y <input type="checkbox"/> N |
| Weathering | <input type="checkbox"/> Y <input type="checkbox"/> N | | |

Does the sign need to be replaced? Y N

If yes, briefly explain _____

Anglers in the Area?

How many anglers are fishing at this location (estimate): _____

How many anglers are fishing close to the fish advisory sign (estimate): _____

(continued on next page)

The information below is to evaluate the public response to the information contained on the fish advisory signs. Please interview up to 10 people (if possible) fishing near the signs to collect the required information.

Participant no. _____ Sign #/Location _____ / _____
Date and Time _____

I. Survey Questions

1.) Do you regularly eat the fish you catch from Dane County lakes? Y N

If yes, how often? _____

2.) Have you read the fish advisory sign? (point to a sign if not obvious) Y N

If not, why not?

Didn't notice it Already know about advisories
Don't eat fish Don't think fish are contaminated
Other _____

If no to Question #2 skip to Question #7

3.) Do you understand the information? Y N

If no, why not?

It was confusing
Too many words
Had words I didn't understand
Didn't understand languages
Other _____

4.) (If yes to Question #3) Do you feel the information could be better presented? Y N

Could be simplified
Make sign more visible
Sign too small
Too technical
Other _____

5.) Do you feel the information is important? Y N Why/ Why not? _____

6.) Will you talk to friends/ family about the information from the sign? Y N

7.) Have you seen information before about how much fish is safe to eat? Y N

If yes, where did you get this information? (check all that apply)

Internet Television Radio Newspaper
 Fish Advisory Sign Family/ Friends Other (please specify) _____

II. General information

Age _____ Gender: M F Race/ Ethnicity _____

Appendix 2: Quantitative Data Summary

Group	Eat fish (% yes)*	Meals/ Month (mean)**	See info before? (% yes)* ¹	Read sign? (% yes)* ²	Understand sign? (% yes)*	Info better presented? (% yes)*	Think sign important? (% yes)*	Talk family friends? (% yes)*
All (199)	60.8	3.10	48.0	52.6	96.5	55.0	97.4	83.5
Whites (55)	29.1	2.69 (.08-14)	72.7	69.1	100	40.0	95.2	79.1
Non-whites (144)	73.6	3.13 (.08-16)	38.5	46.1	94.4	63.4	98.6	85.9
African Amer. (85)	77.6	3.10 (.08-16)	40.0	47.0	93.0	50.0	97.8	82.0
Hmong (27)	66.7	2.14 (.33-8)	37.0	44.4	91.7	66.7***	55.6***	91.7
Hispanic (18)	66.7	1.83 (.13-8)	50.0	70.6	100	92.9	100	100
Laotian (10)	90.0	8.0** (6-10)	0	0	N/A	N/A	N/A	N/A
Other (Thai, Ho Chunk, mixed) (4)	25.0	.21 (.21-.21)	50	50.0	100	100	100	50

Total sample number = 199

Number of people surveyed at various locations:

Law—18, Brittingham—64, Yahara—1, Warner—6, Cherokee—36, Tenney—65, Lake Farm—1, Olbrich—3, Wingra—3, Vilas—2

* % yes for all categories is of those who answered the question (not counting missing data)

** One outlier removed--a Laotian angler who eats “a fish meal” every day. Also, there was a lot of unclear or missing data on this question.

*** Possible based on answer patterns that interviewer misinterpreted these two questions for a number of surveys (mostly with Hmong anglers)

Please note that in categories with very small numbers, percentages can be misleading (e.g., 100% in the “other” category can mean only two people—e.g., those who answered the question).

Appendix 3: Qualitative Data Table (includes notes from surveys in which interviewees made comments)

Survey #	Demographics	Fish consumption	Read sign, think important, other notes	Improve info, seen adv info before, other notes
1	53 year old white man	“Every week”	Yes, read sign, but doesn’t think it’s important because it “doesn’t affect me”	Also heard about it in Milwaukee
11	58 year old white man	1/week	Yes, read sign.	Suggests adding size requirements on sign
13	50 year old black woman	Catches fish but gives them all away	Didn’t read sign.	
15	65 year old black woman	“not that often”	Read sign, but doesn’t understand info. Thinks info is important.	“Explain it more”
17	25 year old “melting pot” male	2-3 meals/year	Read sign. Does understand info. Does think it’s important. “Most people know the risks—if visitors don’t know, then it’s helpful.”	Says info could be “more specific”. More going on this year, VHS, bluegill population dying. Mom works for DNR.
18	64 year old black man	1/month	Didn’t read sign. Thinks info is important. Already knows about advisories. “I’m aware of the problems, I’m not about to poison myself.” Is seeing the signs, showing other people. But says minority populations are very wary of govt info/media. They see ads in the paper depicting people of color and they feel targeted in a negative way. They are suspicious and mistrustful. Is it a conspiracy?	A lot of anglers heard the info but don’t believe it. But information can change behavior. Is seeing generational changes—younger people not fishing. Not cheap, tackle, bait and equipment are expensive. Says solution is for companies to stop polluting.
19	57 year old white male	Doesn’t eat, likes to fish for the fight	Didn’t read sign. Thinks info important.	Has overheard conversations about fish advisories, and also saw info on TV
21	55 year old black man	not clear how much he eats/month	Read sign. Thinks info important.	He saw the sign (before this interview) and was very concerned so he called the DNR and they sent him literature
23	73 year old black man	1/week	Read sign. Thinks info is important. Says info on sign “not accessible”	Had not seen info before
24	71 year old black woman	1/week	Didn’t read sign. Thinks info important. “Some people eat them every day, if people knew it might change their behavior	Had not seen info before.

28	48 years old black man	2/week	Didn't read sign.	Hasn't seen fish advisory info before and said "No, I don't want to see info if there's a problem with the fish"
29	48 year old black man	2/week	Read sign. Thinks info important. Info should be in handbook, with fishing license.	I've known about this issue for 20 years and will talk to people about it but only if they are fishing with me
30	52 year old black man (from Milwaukee)	1/week	Didn't read sign.	Never heard of fish advisories before. Fishes in Madison 1-3 times a week
31	35 year old black man (from Milwaukee)	1/week	Didn't read sign.	Never heard of fish advisories . Fishes in Madison 1-3 times a week
32	24 year old white man	Doesn't eat	Read sign. Thinks important. Sign looks good, understandable; can't hurt to have it	Yahara River just before it flows into Monona—good spot for bass
33	69 year old black woman	2/week	Read sign. Yes, info important "to stay healthy"	Saw info before on TV, advisory signs.
42	26 year old black man	Said he doesn't eat fish but interviewer sensed that this wasn't true	Didn't read sign but he said he saw it. This guy seemed distrustful at first and was hesitant about wanting more info...	...but his wife said "I want more info" so I gave her a copy of the sign
43	20 year old black man	1/week	Saw sign but said he didn't have time to read it. But he said he knew it was about how much fish to eat a week. Doesn't think fish adv info is important but likes fish pictures because they tell him what fish are here.	Has never seen advisory info before. His family does a lot of fishing, they always have, he doesn't think anyone should tell them how much to eat.
46	45 year old black man	1/week	Read sign. Info very important, especially for pregnant women, "but if I was pregnant I would want to eat it"	Had seen signs at Warner, Tenney already. Very interested, wanted more info
47	60 year old black man	1/week	Read sign. Info important. Had worked on farms in south applying pesticides and "now we know DDT is bad but we didn't know then." Concerned about cleaning up contaminants.	Had seen advisory signs at other parks already—Warner, Tenney.
48	30 year old white man	Doesn't eat	Saw sign but didn't read it, knows about it already. Thinks info is important.	Saw info before in magazines. Woman with him said "I just assumed that no one eats this fish, everyone knows it's bad."
49	50 year old black man	1/month	Didn't notice sign, never saw info before.	Fishing for big catfish, fishes there often for catfish, which he loves to eat.
50	54 year old black man (from Milwaukee)	3/month	Didn't read, didn't notice. Signs are important, "people should know"	Hadn't seen info before

52	52 year old black man (from Milwaukee)	1/month	Read sign. Saw sign on other side of river. Info important. Said there should be more signs. "nothing by the locks, people don't see it"	"People need to know about mercury, what's in lake, what kinds of fish to keep and what to release"
53	72 year old black female (from Milwaukee)	1/week	Saw sign but didn't read it, no time Info is important. "Wouldn't put up signs if it's not important. I just talked to my son about it"	Has seen advisory signs all over Madison (she fishes on several lakes here).
54	37 year old white man	3-4/week. Catches, bluegill, catfish, walleye, eats all of them	Saw and read sign but already knew about it. Thinks they're really stupid, doesn't pay attention. "It's propaganda, probably PETA put the signs up. Drink water, eat pizza, whatever...and it will give you cancer...I eat fish all the time and never glowed in the dark"	Saw info before. When asked if info could be better presented "Yes, more about prevention...should get the F#@!in boats off the water, which will never happen. Boats are the #1 polluters, oil/gas from boats, gets into fish"
55	43 year old white man	Said he doesn't eat fish because has no license bc he didn't pay child support. Not sure this is true.	Yes he read sign, thinks it is important. Doesn't think people will pay attention, will eat fish anyway.	"Dump out these lakes and make new ones. Sad that water is so dirty people can't even swim."
56	55 year old black man	Said he doesn't eat fish because has no license bc he didn't pay child support. Not sure this is true.	Said he didn't read signs, but they are important for those people who fish. "People destroy lakes by throwing bikes, trash into them. People should take care of their own fishing spots. Pesticides are good for tourists, they need pesticides to please tourists but they get info lakes.	When selling people licenses, we should ask people to volunteer to clean up. Should have info at bass events (?). Should post info where they give licenses. This guy had lots of knowledge about shoreline fishing from streams/rivers.
57	29 year old white woman	1/year (I suspect more)	Yes, have read them, think they're important	Have seen advisory signs "all over Madison"
59	18 year old black man (from Milwaukee)	Doesn't eat	Didn't read signs, but think important. Yes, important	Heard about it through water program in Milwaukee (run by the former Schooner School guy).
60	80 year old black woman (from Milwaukee) Also fishes in Montello and surrounding area. Has been fishing all her life	3-4/week	Didn't read sign, but thinks important. He asked "are these fish contaminated? I don't fish in Milwaukee because I thought the fish there were contaminated" Knows D & C baitshop in Milw.	Never saw any information before.

61	76 year old black woman (from Milwaukee)	1/month (but I sensed she ate more)	Didn't read sign. But says info is important.	Never saw any info before. Wanted copy of sign (so I gave her one).
70	65 year old Laotian woman	1/week	Didn't read sign because she cannot read	
71	50 year old Hispanic man	1/month	Didn't read sign, Speaks very little English	
75	68 year old Laotian man	Eats "one meal every day during fishing season"	Didn't read sign, didn't notice it	Never seen info before.
81	54 year old white man	3/year	Read sign, but said "Just heard about it" (from interview?). Info important "for women."	"Didn't know sign was there." (implied—until interviewer pointed it out). Saw info before in newspaper, on radio.
82	66 year old Laotian man	"sometimes"	Didn't read sign, Doesn't know how to read	Never saw/heard advisory info before.
88	21 year old Hispanic man	Eats "1 or 2 per month"	Didn't notice sign, speaks only a little English	Didn't see/hear info before
90	51 year old white man	Doesn't eat fish	Didn't read sign but volunteers for health dept. (so assumed he knows)	From Colorado, seen info there
91	37 year old black man (from Milwaukee)	1/month	Read it, thinks important	Seen info in Milwaukee
92	32 year old black woman (from Milwaukee)	1/month	Read it, thinks important	Seen info in Milwaukee
101	25 year old white female	1/ month	Read sign, thinks it's important "if you are pregnant women"	Saw info before on fish advisory sign
126	30 year old white man	Doesn't eat fish	Read it, thinks important "to keep people aware"	Saw info before in magazines
129	38 year old white woman	3-4/month	Read sign and understands info, and says info is important "if you eat a lot of fish"	Says "no don't waste money" when asked if info could be better presented. Heard about fish advisories from internet, newspaper, and at school
143	46 year old white woman	Doesn't eat fish	Didn't read it, already knows. Thinks its important	Saw info before on TV. When asked if info could be better presented, she said "Clean water is better information"
147	51 year old black man	2/month	Read info, thinks important	Never saw info before. Sign could be better if it "tells us what's in the water"
158	28 year old white man	Doesn't eat fish	Read info, thinks important.	Never saw it before. Would like more info on "what chemicals are in the lake"

172	30 year old white man	Doesn't eat fish	Read info, think important Think should add red sign to top of existing sign with red circle/cross out over fish ("do not eat")	Saw info before on internet, TV, radio
175	49 year old Latino man	Doesn't eat fish	Read sign, thinks info important. Catch and release in Dane Co. but eats fish from up north around Waupaca. Gives away larger fish he catches to other Latino friends. Said he would be more careful to ask if pregnant women he gives fish to are going to eat the fish.	Saw info before on TV. Fishes all over county but prefers Cherokee. Knows where all the signs are located. Says he sees a lot of Latinos fishing that use broom handle as cross piece tied to line to secure and tug or snag their catch.
181	34 year old Latino man	Eats fish "every once in a while, if I catch a good one"	Didn't read sign, didn't notice. Comes over the train tressel from the Naughty Gal side of the tracks	Never saw information before. Says we should put signs "all over in all places"
188	32 year old white man	Eats fish (doesn't say how much)	Read sign, thinks important. Fishing with his nephews for a weekend of fishing before school starts—starts them on rivers and moves into lakes.	Seen info before in newspaper, from family/friends.
196	32 year old Latino male	Eats fish (doesn't say how much)	Read sign, thinks important, but interviewer noted that "he thinks they are lying, he's sure they eat what they catch."	Had not seen info before.

Appendix 4: Sign Condition Summary

Sign Location & Number	Dates surveyed	Condition	Number of people fishing at location	Number of people fishing near sign
Cherokee				
M1 (Burn WW)	7/19	Good	13	2
	8/3		0	0
M2	7/19	Good, but screw over	0	0
	8/3	“one”	0	0
M3	8/3	Good	0	0
M4	8/3	Good	0	0
M5	8/3	Good, but sign not very visible	0	0
Warner				
M6	7/20	Good, but screw over	0	0
	7/25	“one” and	14	12
	7/29	sign a tiny bit	4	4
	8/1	loose in its base	0	0
	8/3		0	0
Tenney				
M7	7/15	Bent on left side, looks like car/truck	20	8
	7/25	ran into it;	35	10
	7/25	screw over	10	10
	7/29	“one”	24	24
	8/1		20	10
	8/3			
M8	7/15	Good, but screw over	20	1
	7/25	“one”	35	20
	7/25		1	1
	7/29		8	8
	8/1		6	4
	8/3		4	0
M9	7/15	Good	20	0
	7/25		35	2
	8/29		10	1
	8/3		10	1
	8/3		5	1
Olbrich				
M10	7/13	Good, but too high to read	0	0
	8/5		4	4
Yahara				

M11	7/16 8/5 8/12	Good (but screw over “one”?)	0 3 0	0 0 0
Law Park				
M12*	7/15 7/27 7/29 8/5 8/12	Good	10 12 6 3 0	0 2 1 0 0
M13*	7/15 7/27 7/29 8/5 7/13 7/20	Good	10 12 6 3 0 10	0 2 1 0 0 0
Brittingham				
M14**	6/22 7/13 7/15 7/18 7/20 8/5 8/24	Good	0 0 0 10 3 2 18	0 0 0 4 3 0 18
M15	6/22 7/13 7/15 7/18 7/20 7/22 8/5 8/24	Good But post foundation unstable	10 20 6 7 10 13 3 18	10 20 3 3 2 3 0 0
M16**	6/22 7/13 7/15 7/18 7/22 8/5 8/24	Good	0 0 2 9 13 3 18	0 0 2 2 0 0 0
M17	6/22 7/13 7/15 7/18 7/22 8/5 8/12 8/24	Good, but post foundation unstable	0 0 5 0 13 1 4 18	0 0 2 0 0 0 2 0

M18	6/22	Good	8	4
	7/15		6	6
	7/16		15	4
	5/12		13	4
	8/12		8	4
	8/24		18	0
Wingra				
M19	7/18	Construction blocking sign	0	0
	8/12		0	0
Vilas				
M20	7/18	Construction blocking sign	0	0
	8/12		0	0
M21	7/18	Good	0	0
	8/12		0	0
M22	7/18	Good	6	0
	8/12		3	0
Laminated Signs				
LP1 (Tenney)	7/29	Not there	10	0
	8/12		3	0
LP2 (Olbrich)	7/13	Not there	0	0
	8/5		0	0
	8/12		5	0
LP3 (Olbrich)	7/13	Not there	0	0
	8/5		4	0
	8/12		7	1
LP4 (Law)	7/29	Not there	6	1
LP5 (Vilas)	??	??	??	??
LP6 (LF)	7/20	Good	4	0
LP7 (LF)	7/20	Good	4	0
LP8 (LF)	7/20	Good	0	0

* M12 and M13 are not near the wall where people fish. M12. On many days there was no one fishing near the sign but many people fishing on the wall.

** At these locations, the signs are posted right next to the train trestle. People were not fishing near this sign but often there were many people fishing on the train trestle (and were not counted).

Appendix 5: Caveats about methodology and results

These results are based on relatively small numbers (particularly in certain racial/ethnic groups) and non-random sampling, so claims about representativeness/generalizability or reliability in a statistical sense cannot be made from them. Random sampling, however, is not only extremely difficult when surveying anglers in person on location, but it would not be appropriate for an evaluation like this since it would not assess the effectiveness of signs in particular locations with particular groups of anglers. Random sampling, quantitative surveys typically under-represent certain minority groups, for a variety of reasons. *Random sample-based surveys would also not provide the kind of nuanced contextual, cultural, and social information we obtained in this project.*

Regardless of its limitations, this data provides useful and important information on a number of levels, and the proportional quantitative analyses we did is appropriate since we make no claims of representativeness, generalizability, or reliability in a formal statistical sense. Certainly, the white and black groups provide the most reliable data since they are the largest. Also, if all of the non-white respondents are combined into one group, this is a large enough number to feel confident running some statistics to assess general patterns in associations.

There were also several limitations in the interviewing—and therefore the results—most of which are to be expected with such limited resources and minimally and/or inconsistently trained people (including some volunteers) going out to do interviews. For example, there were several questions that some interviewers didn't always ask, didn't answer clearly (or at all) or didn't probe sufficiently. This is often the case with in-person interviewing (which can be very challenging--some interviewers are more comfortable with interviewing than others) and with interviewers and respondents from several different race/ethnicities and cultures.

Consequently, there was some "missing data"--including some on key variables like "how much fish do you eat?" and on the questions about how the information on the signs could be better presented, etc. On a significant number of surveys, the fish consumption questions were not answered.