

# **Subsistence consumption of locally caught fish in Rochester, New York: 2009 Rapid Assessment Report**

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For updated information on this project, please visit:  
<http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/fish.html>

## I. Introduction

The University of Rochester Environmental Health Sciences Center's Community Outreach and Education Core (COEC) conducted a rapid assessment to study the awareness of local fish consumption advisories and to understand fish consumption patterns for the population of the city of Rochester and surrounding areas. This project was funded by a \$7,000 grant from the Great Lakes Protection Fund (2008); support for a summer intern was provided by the University of Rochester's Reach Internship Funds program. The COEC partnered with Action for a Better Community's Community Building in Action (CBA) program. This report summarizes data collected through September 2009.

This study was initiated in spring 2009 with input from an ad-hoc advisory council including the Monroe County Department of Public Health, the New York State Department of Health, the New York State Department of Environmental Conservation, Buffalo Niagara Riverkeepers, and New York Sea Grant. Staff from these and other organizations helped with study design, reviewing protocols, and giving feedback on results. In addition to the undergraduate intern from the University of Rochester, interns from the Rochester community were hired through CBA to collect survey and interview data during the summer months. Throughout the study, CBA facilitated access to key community members and public events such as health fairs. CBA staff also assisted with scheduling, planning and review.

As background for the field work, COEC staff conducted a literature review and corresponded with colleagues at other universities who have done similar research. Researchers in several other areas of the country have found that certain population groups – often minorities, immigrants, and low-income urban populations – may consume excessive quantities of contaminated fish. Anecdotal information from government agency staff suggested that this might be the case in Rochester, but these agencies lacked the resources to assess whether this was in fact a problem. Many previous studies in other regions have assessed subsistence fish consumption by local populations, and they typically have involved substantial time and resources. There have been no recent studies of subsistence angling in the Rochester area. Thus, in addition to identifying possible methods of future outreach for at-risk populations, an overarching goal of this project was to develop a rapid assessment protocol for assessing the level of risk from consumption of contaminated fish in Rochester and similar cities. Subsistence is defined in this study as anglers who consume their catch as a regular food source.

### Background Information on Fish Consumption Advisories

The New York State Department of Health (DOH) develops annual fish consumption advisories that are specific to local waterbodies. These advisories are based on the risks of consuming fish that may be contaminated with methylmercury, PCBs, dioxins and other harmful chemicals. Although eating fish is beneficial to one's health, excess consumption of contaminated fish can cause health problems. Because of potential developmental effects of these contaminants, pregnant women and young children are at greatest risk. Certain population groups (particularly urban, low-income, and low English literacy) may not be aware of, understand, or follow the state's consumption advisories and may therefore be at greater risk for these health effects. These advisories are disseminated by the DOH and the New York State Department of Environmental Conservation (DEC), published in DOH booklets and brochures, and included in the informational booklet provided to individuals who purchase DEC fishing licenses.

The published advice includes a general statewide advisory which states that people should eat no more than one meal a week of fish caught in New York State fresh waters and some marine waters at the mouth of the Hudson River. However, fish from certain waterbodies have higher levels of contaminants than others. The advisory lists these waterbodies separately and singles out species that have stricter recommendations than the general advisory. Children under the age of 15 and women of childbearing age are advised to eat no fish from this list of waters with specific advisories. Women beyond childbearing age and adult males are advised to only eat the

recommended amount for each species listed and to follow the general advisory (eat no more than one meal per week) for any fish species not listed.

Under the New York State advisory, women of childbearing age and children under 15 are advised to eat no fish from Lake Ontario and connecting waters (tributaries to the first barrier impassable by fish):

Lake Ontario advice for women beyond childbearing age and adult males is as follows:

Eat none of: channel catfish, carp, lake trout over 25" and brown trout over 20" (and white perch if they are caught West of Point Breeze)

Eat no more than one 8 oz. meal per month of: chinook salmon, rainbow trout, white sucker, smaller lake trout, smaller brown trout and coho salmon over 25" (and white perch caught East of Point Breeze).

Eat no more than one 8 oz. meal per week of any fish species not listed above.

This information is shown in tabular form as seen in the 2008-2009 New York Freshwater Fishing Official Regulations Guide (advice for Lake Ontario did not change between 2008 and 2009; Figure 1). These advisories are created as a public health message in an effort to prevent exposure to toxins found in fish. For Lake Ontario and connecting water bodies the chemicals of primary concern are PCBs, mirex and dioxins (NYSDOH, 2009). As part of this study, participants who reported having seen or heard the advisories were asked questions to gauge their understanding of the complex advisory messages.

Lake Durant and Rock Pond (Hamilton)	Largemouth bass over 15"	1 meal/month
Lake Eaton (Hamilton)	Yellow perch over 10", smallmouth bass	1 meal/month
Lake Ontario (Whole Lake) (note: harvest/possession of Niagara River, Lake Ontario and St. Lawrence River American eel is prohibited per NYSDEC Regulations.)	Channel catfish, carp, lake trout over 25" and brown trout over 20" Chinook salmon, rainbow trout, white sucker, smaller lake trout smaller brown trout, coho salmon over 25"	Eat none 1 meal/month
• West of Point Breeze	White perch	Eat none
• East of Point Breeze	White perch	1 meal/month
Lincoln Pond (Essex)	Largemouth bass > 15"	1 meal/month
Loch Sheldrake (Sullivan)	Walleye	1 meal/month
Loft's Pond (Nassau)	Carp and goldfish	1 meal/month
Long Lake (Hamilton)	Northern Pike	1 meal/month
Long Pond-Croghan (Lewis)	Splake over 12"	Eat none
Lower & Upper Sister Lakes (Hamilton)	Yellow perch > 10"	Eat none

Women of childbearing age, infants and children under the age of 15 should not eat any fish from the waters listed above.


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2008-09 FRESHWATER FISHING GUIDE

Figure 1 – Health Advisories as displayed in the DEC's NY Freshwater Fishing 2008-09 Official Regulations Guide

## II. Materials and Methods

This study involved four components to characterize consumption of locally caught fish. First, key informants (state and local officials, local anglers familiar with fishing patterns, and community leaders) were identified with the help of the project's advisory council. These individuals assisted with identifying popular fishing sites, fishing patterns, and populations who consume local fish.

Second, staff observed anglers at fishing sites, recording their time spent at the site, and the number and demographics of anglers observed. This observation component allowed for the anonymous inclusion of anglers who were unavailable (due to time, language, or other constraints) or unwilling to take part in interviews.

Third, a short survey (referred to in this report as “community survey” or “survey”) was developed to determine community consumption patterns. Surveys were administered at various public events such as the public market and block club meetings. Community survey locations were selected in order to target low-income and minority populations. The survey included questions about frequency of fish consumption, distinguishing between locally caught fish and fish purchased from a store or restaurant. It also included a set of True or False questions relating to the local fish consumption advisories. These questions were used to gauge respondents’ understanding of key points in the advisories.

Lastly, an interview guide (referred to in this report as “angler interview” or “interview”) was developed for anglers. These interviews were conducted in person at public fishing sites along the banks of Lake Ontario, the Genesee River, Irondequoit Bay, and connecting waterbodies (Figure 2). Interviews covered topics such as frequency of fish consumption; cleaning and preparation; types of fish consumed; advisory awareness, comprehension and compliance; and demographic information. The interview also addressed household consumption of fish and the sharing of fish with others. Because interviewing resources were limited, we designed our interview schedule to capture a diversity of fishing populations by visiting during various times (e.g., morning, weekday, evening, weekend) at as many sites as possible. As with the community surveys, the interview recruitment strategy was designed to identify low-income and subsistence fishers, for example by focusing on shore-based (as opposed to charter or private boating) anglers. Fishing locations identified by key informants as being frequented primarily by minority and/or low-income anglers were visited most often.

Surveys and interviews were conducted by an undergraduate intern hired through University of Rochester and a CBA intern. Educational materials were provided to respondents following the surveys. Participants who indicated that they had not seen or heard advisories but ate local fish regularly were offered materials outlining advisory information and guidelines for cleaning and cooking fish. The following outreach materials were distributed:

1. EPA - Should I Eat the Fish I Catch? ([www.epa.gov/ost/fish/fisheng.pdf](http://www.epa.gov/ost/fish/fisheng.pdf))
2. NYS Department of Health – Chemicals in Sportfish and Game 2008-2009 Health Advisories ([www.health.state.ny.us/environmental/outdoors/fish/docs/fish.pdf](http://www.health.state.ny.us/environmental/outdoors/fish/docs/fish.pdf))
3. George, Valerie – Fish Consumption Table (Appendix I)

Surveys and interviews began in May 2009. The bulk of the field work was conducted June through August. In total, 301 surveys and 78 interviews had been conducted. Because this is an exploratory research project, data collection was approached as a fluid process in which the study team made several adjustments to the protocols over time. These modifications were influenced by key informants, members of our advisory council, an angler focus group, and by researchers’ observations and experiences in the field.

Modifications included changing the wording of True or False questions in the interview based on feedback from the community survey. Several of these questions were clarified prior to conducting the angler interviews. For example, the statement “eating fish is good for your heart” was changed to “eating fish is good for you.” The intent of the rewording was to better capture an overall awareness of nutrition messages about fish; with the original wording, some respondents replied “False” despite knowing fish is healthy. One replied “ah, that’s a trick question; it’s good for your brain!” Additionally, the statement “I can always tell by looking at a fish whether it is safe to eat or not” was added for the interviews because several people told us during informal conversations or during the surveys that many anglers judge the safety of a fish by its appearance or smell.

Other changes throughout the interview process included formatting and organization of the interview itself. A shortened interview guide was also developed for anglers who did not have time to complete the entire interview. About halfway through the surveying, it was realized that residence data (zip code) would be useful in characterizing the sample, so this was added to the survey form.

A Chi-Squared significance test was run to compare consumption among different races on the survey results. The angler interview data set is too small to analyze statistically. Likewise, Asians, bi-racial and “other” ethnic groups were eliminated from the Chi-Square analysis of survey data due to small sample size. Interview data were analyzed to produce summary statistics; qualitative answers were coded by the research team to identify common themes.

### III. Results

#### Community Survey Results

Table 1 summarizes community survey participant demographic information. These surveys were conducted at block club meetings and other public settings (such as the Rochester Public Market). The primary goal of these surveys was to gauge the prevalence of local fish consumption in the Rochester communities that, based on our background research, were expected to be at highest risk of excess consumption of local fish. The survey was also used to identify whether certain populations (e.g., specific ethnic or age groups) within these communities might be at greater risk to pollutant exposure through fish consumption than others. The survey gathered demographic information to highlight patterns of fish consumption among certain groups. Demographic information was compared to 2000 US Census data for the City of Rochester (Table 1). Researchers visited locations where a large proportion of people were presumed to be from high-risk groups. There were a total of 301 participants. About 40% of the respondents were male. Latinos were underrepresented in the surveys, but the composition of respondents otherwise appeared to reflect the ethnic composition of the overall Rochester population. However, our results cannot be extrapolated to the entire Rochester population since our sampling strategy was not designed to capture a representative sample.

Nineteen percent of survey participants reported that they regularly eat locally caught fish (Table 2). Twenty seven percent of those who reported that they eat local fish consume it more than once per week (Table 2). Although we did not capture income information, these surveys were conducted in settings frequented by low-income people. Therefore, they are useful for giving us an initial sense of fish consumption patterns among low-income communities.

The Chi-Square analysis of fish consumption showed a significant difference in prevalence of local fish consumption among racial groups ( $p$ -value < 0.001). More Black respondents reported consuming locally caught fish than any other group. Based on the frequency of consumption, it also appears as though a large proportion of Hispanics and Latinos who consume locally caught fish do so more frequently than recommended (Table 2).

Table 3 summarizes survey responses to the True or False questions regarding the DOH’s fish consumption advisories. While 90% (265) of survey respondents knew that eating fish is good for your heart, only 51% (148) answered correctly that “the government suggests limiting how much locally caught fish you eat.” Surprisingly, only 9% (15) of respondents who answered all five True or False questions answered all of them correctly.

Fish eaters did not seem to be better-informed than the overall sample. Of the 69 respondents who fish locally and answered the True or False questions, 57% (39) knew that the government suggests limiting intake of local fish (just slightly better than the 51% of all respondents who answered this correctly). However, only 44% (24) of the 53 respondents who eat their catch and answered the True or False questions knew that the government publishes fish consumption advisories. Because women under the age of 55 are most likely to become pregnant or to have children under the age of 15 living in their homes, their knowledge about risk from fish consumption is particularly important. Survey results suggest that they are not better-informed than the overall sample; 57% (69) percent of women under the age of 55 answered correctly that women who are or may become pregnant and young children should not eat any fish from Lake Ontario and its connecting waters. Ironically, older women were better informed than younger women; 67% (33) of women over 55 answered that question correctly. Of all male

respondents, 58% (66) answered correctly that women of child bearing age and young children should not eat fish caught in Lake Ontario.

**Table 1 – Community Members Demographic Profile**

<b>Demographic Information (Ethnicity, Age, Gender)</b>	<b>Total Number of Respondents</b>	<b>Percent of Respondents</b>	<b>Percent of Rochester Population*</b>
Hispanic or Latino	25	9%	13%
Black	92	32%	39%
White	144	51%	48%
Native American	0	0%	1%
Asian	6	2%	2%
Bi- or multi-racial	13	5%	4%
Other	5	2%	
18-20	11	4%	5%
21-61	218	74%	55%
62-74	55	19%	6%
75+	10	3%	5%
Male	116	40%	48%
Female	177	60%	52%

\*United States Census Bureau (2000)

\*\*Blanks denote unavailable census data

**Table 2 – Community Members Demographic and Local Fish Consumption Information**

Demographic Information (Ethnicity, Age, Gender)	Responses to question	Eat local fish		% of local fish eaters who eat >1 meal per week of local fish
		Number	Percent	
Hispanic or Latino	23	5	22%	40%
Black	90	31	34%	36%
White	140	11	8%	0%
Native American	0	-	-	-
Asian	6	0	0%	0%
Bi-multiracial	12	3	25%	33%
Other	5	3	60%	0%
18-20	11	3	27%	33%
21-61	211	38	18%	61%
62-74	53	11	21%	82%
75+	7	1	14%	0%
Male	108	24	22%	71%
Female	174	29	17%	52%
<b>Total</b>	<b>289</b>	<b>55</b>	<b>19%</b>	<b>27%</b>

\*Dashes are used where no members of the listed group were surveyed

**Table 3 – Community Responses to True or False Statements**

Statement	Correct Answer	Participants who answered correctly
Eating fish is good for your heart	True	90%
Young women and children should not eat fish caught from Lake Ontario	True	59%
No one should eat fish caught around Rochester	False	63%
Lake Ontario fish caught farther from Rochester are safer to eat	False	39%
The government suggests limiting how much local fish you eat	True	51%
Answered all True or False statements correctly		9%

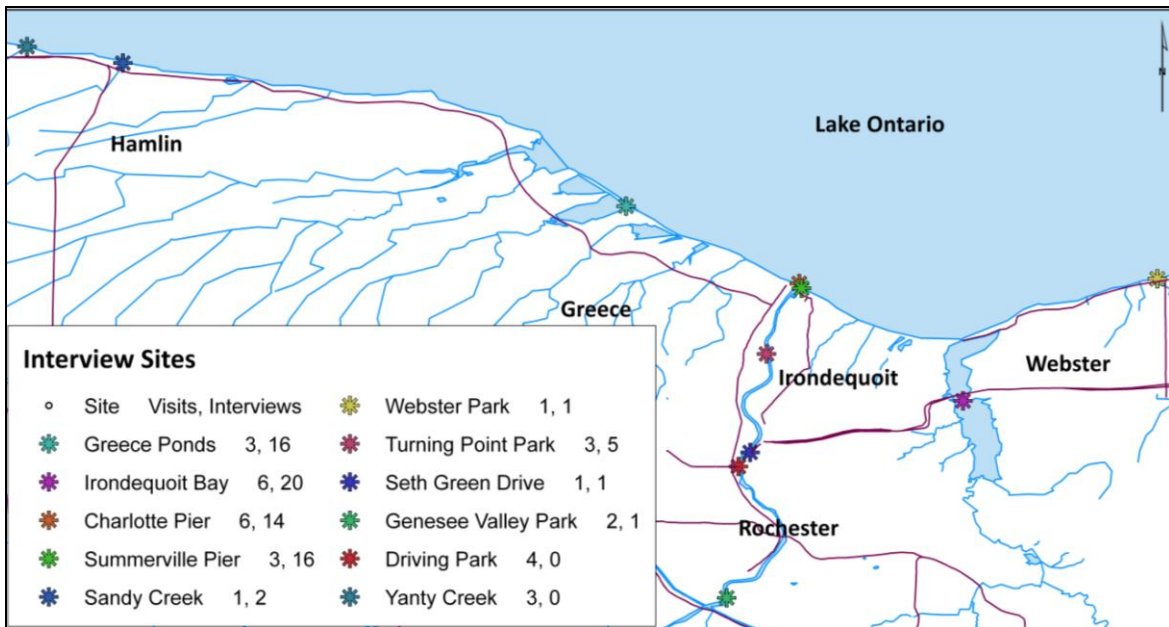
### Angler Interview Results

Figure 2 shows the locations visited for the angler interviews and the number of interviews conducted at each fishing site. As noted above, we were able to conduct interviews at multiple times at most of the sites. Of the 86 anglers approached, 78 (91%) consented to an interview (one of the 78 interviews was conducted over the phone; another was completed by a focus group participant).



Table 4 summarizes the angler interview participant demographic information. These values are compared to US Census data for Rochester (1999). Of the 58 respondents who shared their annual household income, 10% (6) reported having an annual household income of less than \$10,000 per year and 34% (20) reported having an annual household income of between \$35,000 and \$75,000 per year. Twenty-one percent (12) are near or under the poverty threshold as defined by the US Department of Health and Human Services (Table 5), while 19% (7) stated they were on social services or other government support. Those living near or under the poverty threshold and those on social services or government support constitute 22% (8) and 19% (7) of anglers interviewed who eat locally caught fish and answered income information, respectively.

Eighty-five percent (66) of angler interviewees were male and 46% (35) were white. Seventy-six percent (56) were between the ages of 21 and 61. Thirty percent (21) had not graduated high school, compared to 22% for all of Rochester (US Census Bureau, 1999).



**Figure 2** – Angler interview locations; the total number of visits and interviews conducted are shown for each site. There were a total of 78 interviews: one was conducted over the phone; one was the result of a focus group; 76 were conducted in the field (pictured here). Genesee Valley Park falls under the general state advisory because it is upstream of falls impassible by fish. The Greece Ponds include: Buck Pond; Long Pond; Cranberry Pond; Braddock’s Bay. There were three interview locations on Irondequoit Bay: Sutter’s Marina on the west side of the bay; the east side of the mouth of the bay; the west side of the mouth of the bay.

**Table 4 – Angler Interview Data: Demographic Profile**

Demographic Information	Responses to Question	Percent of Respondents	Percent of Rochester Population*
<b>GENDER</b>			
Male	66	85%	48%
Female	12	15%	52%
<b>ETHNICITY</b>			
Hispanic or Latino	11	14%	13%
Asian	4	5 %	2%
Black	27	35%	39%
White	35	46%	48%
Bi/multi-racial	0	-	4%
Other	0	-	n/a
<b>AGE</b>			
18-20	0	-	5%
21-61	56	75.7%	55%
62-74	14	18.9%	6%
75+	4	5.4%	5%
<b>EDUCATION</b>			
High school or less	21	30%	22%
High school graduate	19	27%	28%
Some college, no degree	17	24%	18%
Associate degree	4	6%	8%
Bachelor's degree	4	6%	13%
Graduate or Professional degree	2	3%	10%
Other	4	6%	
<b>ANNUAL HOUSEHOLD INCOME</b>			
less than \$10,000	6	10%	19%
\$10,000 - 14,999	3	5%	8%
\$15,000-24,999	9	16%	18%
\$25,000 - 34,999	16	28%	14%
\$35,000 - 74,999	20	34%	29%
\$75,000 or more	4	7%	10%

\*United States Census Bureau (2000)

\*\*Dashes are used where no members of the listed group were surveyed

\*\*\*Blanks denote unavailable census data

**Table 5 – Angler Interview Data: Poverty Thresholds (n = 58)**

People in household	Poverty Threshold* (Household Income)	Respondents Under or Near Poverty Threshold
1	\$ 10,830	3
2	\$ 14,570	3
3	\$ 18,310	0
4	\$ 22,050	2
5	\$ 25,790	2
6	\$ 29,530	1
7	\$ 33,270	1
8	\$ 37,010	0
<b>Total</b>		12

\*United States Department of Health and Human Services (2009)

Not surprisingly, more than twice as many angler interviewees than community survey respondents consume locally caught fish; fifty-one percent (36) reported that they regularly eat locally caught fish. According to the interview data, anglers are somewhat better informed about fish consumption advisories than the community survey respondents.

Sixty-eight percent (46) of the anglers interviewed indicated that they have seen or heard about the fish consumption advisories. Although no anglers answered them all incorrectly, only 12% (8) answered them all correctly (Table 6). As previously noted, the wording of these questions changed between the surveys and interviews, so they cannot be statistically compared. Of the interviewees who said they consume locally caught fish, 38% (12) said they *had not* seen or heard local advisories. Of all the participants who reported that they *had* seen or heard the advisories, only 13% (6) answered all of the True or False questions correctly. In general, older (over 55), white males with higher levels of education answered more True or False questions correctly. None of the 10 female anglers and none of the 11 Hispanic or Latino anglers we interviewed answered all of the True or False questions correctly. Table 6 shows the True or False statements included in the interview and the percent of correct responses by all interview participants.

**Table 6 – Angler Responses to True or False Statements (n = 66)**

Statement	Correct Answer	Participants who answered correctly
Eating fish is good for you	True	97%
Children and women who may become pregnant should not eat fish caught in Lake Ontario	True	55%
No one should eat fish caught in Lake Ontario	False	73%
Some species of locally caught fish are safer to eat than others	True	76%
I can always tell by looking at a fish whether it is safe to eat or not	False	71%
Lake Ontario fish caught farther from Rochester are safer to eat	False	36%
Answered all True or False correctly		12%

The next section of the interview was designed to inform outreach strategies by determining where anglers got their information. Forty-four percent (21) of anglers who had seen or heard the health advisories reported having seen them in the New York Freshwater Fishing Official Regulations Guide. Twenty-five percent (12) cited TV, 17% (8) cited a Newspaper, and 19% (9) cited other anglers as the source for their advisories. Some respondents had seen or heard the information from multiple sources. Other sources less frequently cited were DEC Officials, the internet and the radio (Table 7).

**Table 7 – Angler Interview data: Participants Sources for the Advisories**

Regulations Guide	TV	Newspaper	Other Anglers	Internet	Total Number of Participants who cited sources
21 (44%)	12 (25%)	8 (17%)	9 (19%)	3 (6%)	48

Demographic patterns of fish consumption are outlined in Table 8. Because of the limited sample size, we present summary statistics but did not attempt to determine significance. Nonetheless, our data suggest several patterns that may be useful for designing outreach strategies and/or merit further exploration. Seventy percent (7) of female anglers interviewed consume the fish they catch; 48% (29) of males interviewed consume locally caught fish. Of the various ethnic groups interviewed, it appears that the groups most likely to consume the fish they catch are Blacks (75%; 18) and Hispanics or Latinos (55%; 6). Conversely, only 28% (9) of whites who fish locally consume the fish. Only two Asians were interviewed during field research. Although these sample sizes are too small to draw conclusions about the overall subsistence angling population, this data does suggest that targeted outreach to females, Blacks and Hispanics is especially important.

Table 9 outlines the frequency of consumption by demographic variables. A greater proportion of Blacks consume locally caught fish than any other racial group – 75% (18) of Black anglers reported that they regularly eat locally caught fish compared to 55% (6) and 28% (9) for Hispanics and Whites respectively. However, it appears that Hispanic and Latino anglers who eat locally caught fish typically do so more frequently than the state-wide

recommendation of one 8 oz. meal per week. Of the Hispanic and Latino anglers who said that they regularly eat locally caught fish, 60% (3) said that they eat more than one meal per week of locally caught fish.

It also appears that lower income anglers are more likely to consume the fish they catch: 55% of respondents who reported an annual household income below \$35,000 per year eat locally caught fish, compared to 32% of those with higher household income. There were not clear patterns associated with educational attainment or age, although older anglers (over age 70) appeared to be most likely to eat local fish. Larger sample sizes may reveal different patterns (e.g., very few anglers with college educations were interviewed).

Seven of the ten (70%) female anglers interviewed consume locally caught fish; two out of the three (67%) female anglers who answered questions about frequency consume fish more than once per week. Likewise, only 20% (2) of the ten female anglers interviewed were aware that women and young children should not eat fish caught in Lake Ontario.

Thirty-five of the interviewees who reported eating local fish also reported how they typically clean and prepare their fish. Sixty-seven percent (22) of these subsistence anglers said that they filet the fish. Eighty-six percent (30) usually fry the fish, and 54% (19) grill, bake or broil their fish (multiple responses were allowed).

**Table 8 – Local fish consumption by Anglers**

Demographic Information	Responses to Question (n)	Eat Locally Caught Fish	
		Number	Percent
<b>GENDER</b>			
Male	61	29	48%
Female	10	7	70%
<b>ETHNICITY</b>			
Hispanic or Latino	11	6	55%
Asian	3	2	67%
Black	24	18	75%
White	32	9	28%
Bi /multi-racial	0	-	-
Other	0	-	-
<b>AGE</b>			
18-30	6	3	50%
31-55	33	13	39%
56-70	21	10	48%
>70	7	6	86%
<b>EDUCATION</b>			
High school or less	20	11	55%
High school grad	19	7	37%
Some college, no degree	14	5	36%
Associate degree	4	2	50%
Bachelor's degree	4	2	50%
Graduate or Professional degree	2	2	100%
Other	3	2	67%
<b>ANNUAL HOUSEHOLD INCOME</b>			
less than \$10,000	5	4	80%
\$10,000 - 14,999	3	2	67%
\$15,000-19,999	4	1	25%
\$20,000 - 24,999	3	2	67%
\$25,000 - 29,999	5	1	20%
\$30,000 - 34,999	11	7	64%
\$35,000 - 74,999	18	6	33%
\$75,000 or more	4	1	25%
<b>Total</b>	<b>71</b>	<b>36</b>	<b>51%</b>

\*Dashes are used where no members of the listed group were surveyed

**Table 9 - Frequency of Locally Caught Fish Consumption by Anglers**

Demographic Information	Responses to Question (n)	Eat Locally Caught Fish							
		>once per week	%	once per week	%	<once/week, >twice/month	%	<twice per month	%
<b>GENDER</b>									
Male	21	7	33%	2	10%	5	24%	7	33%
Female	3	2	67%	0	0%	0	0%	1	33%
<b>ETHNICITY</b>									
Hispanic or Latino	5	3	60%	0	0%	1	20%	1	20%
Asian	2	2	100%	0	0%	0	0%	0	0%
Black	13	4	31%	2	15%	2	15%	5	38%
White	4	0	0%	0	0%	2	50%	2	50%
Bi /multi-racial	0	-	-	-	-	-	-	-	-
Other	0	-	-	-	-	-	-	-	-
<b>AGE</b>									
18-30	1	0	0%	0	0%	0	0%	1	100%
31-55	11	4	36%	2	18%	2	18%	3	27%
56-70	8	3	38%	0	0%	2	25%	3	38%
>70	3	1	33%	0	0%	1	33%	1	33%
<b>EDUCATION</b>									
High school or less	6	5	83%	0	0%	1	17%	0	0%
High school grad	6	1	17%	1	17%	2	33%	2	33%
Some college, no degree	4	1	25%	0	0%	1	25%	2	50%
Associate degree	2	0	0%	1	50%	0	0%	1	50%
Bachelor's degree	2	0	0%	0	0%	0	0%	2	100%
Graduate or Professional degree	2	0	0%	0	0%	1	50%	1	50%
Other	0	-	-	-	-	-	-	-	-
<b>ANNUAL HOUSEHOLD INCOME</b>									
< \$10,000	3	1	33%	0	0%	2	67%	0	0%
\$10,000 - 14,999	0	-	-	-	-	-	-	-	-
\$15,000-19,999	1	1	100%	0	0%	0	0%	0	0%
\$20,000-24,999	1	0	0%	1	100%	0	0%	0	0%
\$25,000-29,999	1	0	0%	0	0%	1	100%	0	0%
\$30,000-39,999	6	2	33%	1	17%	0	0%	3	50%
\$40,000-74,999	6	0	0%	0	0%	2	33%	4	67%
\$75,000 +	0	-	-	-	-	-	-	-	-
<b>Total</b>	<b>25</b>	<b>9</b>	<b>40%</b>	<b>1</b>	<b>8%</b>	<b>5</b>	<b>20%</b>	<b>8</b>	<b>32%</b>

\*\*Dashes are used where no members of the listed group were surveyed

## IV. Angler Perception of Risk

General comments regarding the safety of eating fish revealed a broad spectrum of opinions. Many anglers expressed that they will not eat fish caught in Lake Ontario, or are very selective in what they take or what part of the lake it comes from. One angler noted that they “just don’t trust Lake Ontario” because of the “high concentrations of stuff in the water.” Several anglers, particularly those who don’t eat locally caught fish, stated that the “water’s filthy,” citing not only the appearance and smell of the water but also mercury and other chemicals. Few specifically listed chemicals other than mercury in the water, but many referred to them as carcinogens.

On the other hand, many anglers feel safe eating fish caught in Lake Ontario. One noted that he’d “rather have fish out of [Lake Ontario] than store bought” because he knows where it comes from. Other anglers emphasized the importance of consuming fish in moderation, stating that their habits are “probably within the guidelines.” Another consensus among several anglers was that they “would expect to see the warnings on a sign [near the fishing sites]” if there were anything wrong with eating the fish.

Anglers who had seen or heard the consumption advisories were asked whether they believe them or not, and if the advice influenced their decisions. Some replied that they strongly agreed with the advice. Advisories are seen by these anglers as “helpful guidelines” that “influence [consumption] decisions to a certain extent.” Others said they generally agree with the advisories but don’t always closely follow or believe all of it. Various reasons are given for this, including that it’s “hard to say when you’re hungry,” implying that sometimes there’s no choice between feeding your family and following the advice. Other anglers, however, are strongly opposed to the advice, and/or mistrust the government’s reasoning behind publishing the advisories. One angler’s response reflected a common sentiment: “I’ve got a mind of my own...eat what you want and be happy because we’re just passing through [life].” Several other anglers are of the opinion that it’s “just talk” and these anglers often said they eat everything they catch and have been for years. When asked why there were advisories, the answers were equally as varied. While the most common answers were along the lines of “so we don’t eat something that would kill us” or “to caution people so they don’t get diseases,” others were not so trusting of the government’s intentions. Some anglers believe the advisories are for “insurance reasons,” while others claim they might be “to keep you from fishing so that you buy the fish.”

Anglers who hadn’t seen or heard the local consumption advice were asked whether they think eating locally caught fish is safe for everyone. Several anglers noted that people are often allergic to fish, but that locally caught fish are otherwise safe for everyone. Some, however, did state that women and children should be careful and/or not eat fish caught in Lake Ontario. One such angler emphasized that eating locally caught fish is “not [safe] if you’re a child or a pregnant woman...there are standard guidelines that say you should limit how much you eat.”

Regardless of the opinion of the advisories, most anglers had their own ideas of what fish are safe to eat. While some anglers only take large fish “if they don’t look diseased,” most stick to smaller species (e.g., bass, yellow perch, sunfish, bullheads), or younger fish of larger predator species. Often anglers noted that older fish are “mushy” or taste old and shouldn’t be eaten. Many anglers stated that they never eat sheepshead, gobies, carp or catfish. According to many anglers, catfish, carp and other bottom feeders “clean the water, so they’re dirty.”

## V. Discussion

### Applicability of Study Results

Other groups across the country who study fish consumption have noticed patterns among certain populations within their communities. In many of these regions, the high-risk populations have shifted over time with immigration. For example, Rochester has immigrant and refugee communities from a number of different cultures/ethnicities. The cultural backgrounds of these populations are constantly changing as refugees and



immigrants from different parts of the world arrive in Rochester. With this fluidity in mind, the intent of the study was therefore to develop a rapid protocol that would allow us to represent the demographic composition of the angling community with restricted resources.

The design of this rapid assessment limits the extent to which we can generalize from its results. For example, only six Asians were surveyed and only two Asian anglers were interviewed. While none of those surveyed consume locally caught fish, both of the Asian anglers did. With a sample size of six Asians, it is impossible to make conclusions regarding fish consumption patterns within that population, not to mention potential differences among different social, ethnic and economic communities of Asians. Community survey data for Latinos, Blacks and Whites did, however, confirm that there are different patterns of consumption among different population groups that should be incorporated into educational and outreach strategies.

The low number of Asian participants demonstrates that, while we tried to accurately recognize all groups during interviews, a large portion of ethnic minorities were not found or interviewed. Several barriers were encountered, as outlined below, that may contribute to misrepresentation of certain demographic minorities in the interviews. COEC staff have been working to connect with local community groups who are more connected to these minority groups to better understand their fishing patterns.

As noted above, several changes were made to survey questions when they were brought to the interview form, and even the format of the interviews was changed. The fluid nature of these study materials makes it difficult to compare the surveys to the interviews. For example the True or False questions used in the community survey are different than those used for the anglers, and therefore no conclusions can be made about the differences between general community and angler responses.

## Barriers to and Concerns with Data Collection

### *Language and Culture*

Language barriers that impeded data collection were encountered in the field. This was mostly a concern with Asian anglers. For example, three Asian anglers declined interviews due to language barriers. Others were only able to complete partial interviews in an informal format. Similarly, we had difficulties communicating with several Eastern European interviewees. In these cases, the language barrier may have limited the completeness of responses to interviews and surveys, and certainly limited the number of responses. Language has also been an issue with Hispanic and Latino survey respondents, particularly at the Latino Health Fair. Unfortunately, an interpreter was unavailable for this event and many potential respondents were unable to complete the survey. Most Latino anglers were able to complete the interview in English.

While language barriers make it difficult to draw information from certain anglers, recognition of the barrier itself is important in identifying subpopulations of the Rochester area that may not be receiving necessary health messages. That is, some Eastern European, Hispanic/Latino, Asian, and other non-English-speaking anglers are unlikely to be aware of or comprehend the advisories which are only written in English for this region. Other cultural factors may make anglers feel uncomfortable speaking with the interviewer. Interviewers made note of anglers who declined interviews and their stated reasons to determine demographic characteristics (if any) that are common to those who choose not to be interviewed, but no patterns emerged. Current efforts are aimed at learning more about the fishing behaviors of ethnic groups that were difficult to reach through field interviews.

### *Location*

Angler interviews were primarily conducted in public, onshore areas. Private fishing sites, smaller or secluded areas and deep water only accessible by boat were typically excluded. Some of these locations excluded in our study are also locations that the DEC does not regularly patrol or have the authority to patrol. An example of

such a location was found on the Genesee River where the site was small, secluded and very difficult to access. Several interviewees suggested that such inaccessible locations that are not frequently visited by the DEC Law Enforcement patrols attract anglers who do not have fishing licenses. Thus it is possible that a subset of the fishing population that does not have access to the fishing handbook that contains the consumption advisories (because a license was not purchased) was missed in this study. Likewise, it is expected that most of the sites we visit tend to be populated by anglers who possess licenses and therefore the advisories. To avoid conflict or misunderstandings in this study, anglers were not asked whether they possessed a license.

Because interviews were restricted to the shores of water bodies, higher income anglers were likely excluded from our study. Some anglers interviewed expressed that if they were able to afford boats, they would fish out in the lake where the “water is cleaner”. However, the primary focus of this study was to interview subsistence anglers, who were assumed to be more likely to have lower income (and therefore not own boats). Our data suggest that lower income may be more likely to eat what they catch; however there is insufficient data to formally make this conclusion. It is possible that the exclusion of anglers with boats has eliminated a certain group at higher risk, since these anglers have better access to large predator fish that typically contain higher levels of contaminants (e.g., trout, salmon, and walleye). Thus, anglers who do frequently eat these fish are likely to be at higher risk. However, since these anglers are likely to be higher-income and higher-education, we hypothesized that they would have a better understanding of the advisories, although our study did not address this question.

## Discussion of Study Results

One of the goals of this study was to identify and classify “high risk populations” in Rochester for elevated exposure to PCBs, Dioxins, Mirex, and other toxins found in fish caught around Rochester, NY. Our objective was to identify demographic groups who regularly eat locally caught fish and who do not comply with the local fish consumption advisories. Of particular concern are women who are or may become pregnant and children under the age of 15 due to the particularly detrimental impacts that these toxins have on development.

Several initial trends based on the data collected thus far indicate that there are sub-populations of the Rochester community who consume excessive amounts of locally caught fish. There is insufficient data to conclude whether higher local fish consumption is associated with lower education and lower income, but data collected thus far suggests this is the case. The primary trend found in this study is that certain ethnic and racial groups in Rochester consume more locally caught fish than others. While more Blacks consume locally caught fish than any other group, Hispanics and Latinos reported consuming locally caught fish more often than other groups. Such differences in how the local fish resource is used by different groups are one indication of how conducting outreach will be tricky in this area.

Another indication of the complexity of outreach that will be required is that there are many different levels at which the health messages “break down.” Some individuals have not been exposed to the health messages regarding fish consumption. Others have seen advisories but don’t understand them; still others understand them but choose not to comply. For example, in the community members survey responses we found that 57% (69) of women under the age of 56 know that the Department of Health advises women of childbearing age and children under the age of 15 to not eat fish caught in Lake Ontario. Of the 43% (52) of women 55 and younger who replied “false” or “don’t know”, 21% (11) eat local fish regularly. This is based on answers to the True or False statement in the survey “*Young women and children should not eat fish from Lake Ontario.*” However, it should be noted that only 15% (18) of the women age 55 and under who participated in the community survey consume locally caught fish; less than 10% (11) of women under 55 eat locally caught fish more than once per week. Patterns in fish consumption also presented themselves among the women who responded to the survey. Eight of the 11 women who did not know about the advisories and reported eating local fish regularly were Black. The remaining 3 were Hispanic or Latino. Women 55 and younger were of particular concern because they are more likely to have

children under the age of 15 in their household. This indicates that the group for whom a certain advisory directly applies is largely unaware of the factors that directly affect their wellbeing.

Likewise, in the angler interviews, only 26% (6) of the Black angler interviewees (compared to 64% (7) for Hispanic or Latino and 73% (22) and White anglers, respectively) knew that children and women who may become pregnant should not eat fish caught in Lake Ontario. It is also important for male anglers to understand this recommendation because many share their catch with their families.

In a study that addressed the effectiveness of education strategies with expectant mothers and their fish consumption, it was found that many of the women who learned about mercury in fish modified their diets either by eating less fish or changing the types of fish they eat (Glori et al, 2006). This suggests that a more effective education strategy for women of childbearing age could lead to behavior changes among young women. Glori et al (2006) found that after having mailed outreach materials such as brochures and posters that included advisory information to various public and private health clinics throughout Wisconsin, 79% of the women surveyed had not recognized the posters and 89% did not recognize the pamphlet. The authors suggested that a public service announcement or a media campaign might have been a more effective means of circulating this health message. A more interactive approach to disseminating the information contained in the advisories might be to have outreach programs based out of WIC clinics and doctor's offices especially in Obstetrics and Gynecology. The lack of knowledge in the community by females about the important fish consumption messages indicates that a preventative outreach strategy for reaching this group is necessary. As indicated by the experiences outlined above, a more interactive strategy that targets WIC centers and other nutrition groups are likely to be effective, while more passive strategies such as disseminating fliers and brochures is likely to be less effective. Because many more Black women who responded to the community survey and said they eat local fish regularly did not know about the advisories, and more Black anglers also did not know the advisories for women and children, outreach should be targeted to this group. There are still several women in other ethnic groups who do not know of or understand the advice for children and women of childbearing age. These groups should also be clearly identified and targeted with educational information through outreach.

Community survey and angler interview results showed that more Black anglers in general consume locally caught fish than other ethnic groups (Table 2, Table 8). However, Hispanic and Latino anglers also appear to be at greater risk of exposure to contaminants because they consume fish more often than is recommended (Table 9).

This study also briefly explored why some anglers might know of the advisories but still not follow the advice. While over 80% of both White and Hispanic or Latino anglers who have seen the advisories reported that the health advisories influence their decision of whether or not to eat locally caught fish, only 50% (7) of Black anglers said that the advisories had an influence in their fish consumption. It is important to note that 87% (13) of Black anglers interviewed agree with the advisories. Statements such as "it's really not a choice when you're hungry" may help explain the reason for such a big difference between believing in and following the advice. However, several participants whose decisions are not influenced by the advisories typically gave answers such as "I've got a mind of my own," "I live by higher laws," and "I eat the fish I like."

Male Hispanic and Latino anglers may also be at risk due to the frequency at which many eat fish. Of the Hispanic or Latino anglers who said that they regularly eat locally caught fish, 60% (3) said that they eat more than one meal per week of locally caught fish and all (6) of these anglers reported that they fry their fish, which is the least healthy way to prepare contaminated fish. Based on this data even if a small proportion of Hispanics in Rochester are eating locally caught fish, they eat it much more frequently posing an elevated risk for greater intake of the toxins in the fish.

As another measure of risk, anglers were asked to indicate their methods of fish preparation and cooking. Some methods of preparation and cooking can reduce the contaminants in a fish meal. For instance, selecting only the filet and cutting away skin and body fat can reduce the level of some organic pollutants (e.g., PCBs) Likewise, grilling, baking and broiling fish are better alternatives to frying because these methods allow fat and its soluble contaminants to drain away from the portion of fish one may eat. The DOH fish advisory (found in DOH fish advisory

publications and the DEC Freshwater Fishing Regulations Guide) includes information on ways of preparing locally caught fish to reduce organic pollutants such as PCBs, Dioxins and Furans, Chlordane, DDT, Dieldrin and Mirex that tend to accumulate in the fat of fish and other animals. Heavy metals such as methylmercury, however, are ubiquitous in fish tissues and therefore cannot be removed by cutting out the fat or using cooking methods that allow fat release (USEPA, 1997).

Fifty-four percent (19) of anglers who eat local fish reported that they grill, bake or broil their fish while 86% (30) say they fry it (multiple responses were allowed). Frying fish tends to retain more fat and thus does not help reduce toxins. On a positive note, most (67% of 33) anglers reported that they do cut out the body fat and only use the filet of the fish, and most mentioned that they only fish for smaller species. These statements are encouraging because it implies that, even for anglers who don't know of or follow the printed advisories, many understand that certain species or sizes and ways of preparation are safer to eat than others. About twice as many anglers who were surveyed or interviewed fish for and eat smaller panfish species than large game species. This also means that attempts at changing behavior to more closely follow the consumption advisories may be easier to work into existing habits.

Thirty-eight percent (12) of the angler interview respondents who said that they regularly eat local fish reported they had not heard or seen the fish consumption advisories. Therefore, we are concerned that a significant portion of subsistence anglers may not have access to the health messages contained in the advisories. Four (67%) of the Hispanic and Latino anglers interviewed and 5 (31%) of the Black anglers who participated in the angler interview reported that they regularly eat the fish they catch and were not aware of the advisories. The same is also true for 8 out of 17 anglers (47%) whose highest level of education is a high school degree or lower. Interestingly, those who eat local fish and *have not* seen the advisories tended to report higher incomes compared to those who eat local and *have* seen the advisories. It is important to note that these results are based on a very small sample size, and more data is needed to determine any patterns between income or education and consumption.

Only 8 out of the 66 anglers (12%) who answered all of the True False questions gave the correct responses. Of the 68% (46) of anglers who said that they had heard or seen advisories, only 13% (6) answered all of the True or False questions correctly. This suggests that while the informational vehicles currently employed do reach most anglers, the content may be unclear. Unfortunately, it is difficult to condense the information included in the advisory in a clear and easily remembered way because they are so complex. The True or False questions used in this study were aimed at capturing some of the key health messages that all anglers should be aware of, regardless of knowing specific species or sizes.

The low correct response rate on the True/False questions may be a reflection of the sources from which anglers receive the advisory information. Five of the 6 anglers who got all of the answers to the True or False questions right reported having seen the advisories in the Freshwater Fishing Guide. However, this is only 24% of those who had seen the advisories in the guide. This may indicate that, while the Official Regulations Guide is an excellent resource for getting the advisories to some anglers, it is not effective for many others. This may be related to the depth at which the angler reads this booklet, the language or wording of information, or the location of the Health Advisories in the guide (pages 110-118 out of 129 total pages).

The interviews also revealed several misconceptions held by many anglers. For example, many interview participants directly correlated the quality of fish with the appearance of the water from which it was caught. This further supported our finding that, of those participants who were prompted with the True or False statement: *Lake Ontario fish caught farther from Rochester are safer to eat*, only 36% (24) responded correctly recognizing that this is a false statement. Many anglers followed this question by stating their belief that fish in deeper waters or along the shores far from Rochester (e.g., near Sodus) are "safer because the water is cleaner." This statement is not necessarily true because, while there may be some fish in certain parts of the lake that contain lower concentrations of contaminants, it is difficult to say where these locations are. This concept is also reflected in the belief of several anglers that fish caught above upper falls in the Genesee River (falling under the general state

advisory) are less safe to eat than fish caught in the lake (falling under the stricter advisory) because the water in the river appears dirty. Some anglers also reported that they often fish where there are other anglers, or in areas that friends or older family members tell them is safe. This way of judging the safety of fishing location using visual clues puts anglers at greater risk because they may have unfounded confidence in the fish they catch from “safer areas,” and perhaps consume more fish than recommended.

Many anglers also answered in the True or False section that they can tell by looking at a fish whether it is safe to eat or not. Anglers often listed sores, swollen or discolored organs, odd smells and other indicators detectable by the senses as the only reasons why they wouldn't keep a fish. If the fish looks, smells, and tastes good, they often won't think twice about consuming it. This again increases risk for anglers who may have unfounded confidence in the safety of consuming fish that have no physical signs of being contaminated.

For some anglers, the decision of whether to consume locally caught fish seemed to be based more on an individual cost-benefit analysis than on the health advisories. For example, when faced with the True or False statement of Children and women who may become pregnant should not eat fish caught in Lake Ontario, one angler said, “if somebody's hungry they're gonna eat it.” We found that this sentiment is held by many anglers.

### Moving Forward

The results discussed above highlight two important findings: 1) increased education of anglers and their families regarding safe fish consumption is needed, and 2) the diversity of Rochester's fishing community will make designing an effective outreach strategy very difficult. There are three essential components to fish consumption advisories (knowledge of, understanding of, and belief in) that all must be addressed in Rochester. Using these results as a guide for selecting target communities, COEC staff have been soliciting input on the most effective ways to communicate the fish consumption advisories to high-risk populations. This information could be used to create outreach programs that will promote understanding of and compliance with the advisories. Our pilot study suggests that the existing outreach approaches are insufficient to insure understanding of advisories by populations at risk for excessive consumption of contaminated fish in the Rochester area. Although understanding of advisories does not guarantee compliance with them, survey data suggest that lack of understanding is one current barrier to safe fish consumption by certain populations. Likewise, as Giori *et al* (2006) noted, people who are well informed of fish consumption advisories, particularly women, will change their consumption behavior to make safer choices about the species and amount of fish consumed.

Outreach strategies that extend beyond the use of printed materials should be considered for higher risk populations. For instance, although a small percentage of our sample was Hispanic or Latino, results suggest targeting outreach specifically at this population since Hispanic or Latino respondents who ate local fish did so more frequently than any other demographic group, and 4 (67%) anglers interviewed out of 6 who consume locally caught fish have not seen or heard the advisories. Because of the small sample size, it is not yet clear whether this is a widespread trend. Although informal conversations with members of this community suggest that this is indeed a widespread trend within the community, further investigation is needed.

The study results also suggest that Black communities in Rochester may be at particular risk of consuming excessive amounts of local fish. More Black anglers than any other racial group consumed locally caught fish. Almost 70% (11) of Black anglers who eat locally caught fish said they have seen the advisories, but 50% (7) of Black anglers who have seen or heard the advisories reported that the warnings do not influence their decision of whether to eat locally caught fish. In this instance, these anglers appear to have access to the message and have made their own health decisions. However, responses to the True or False questions suggest that many Black anglers do not fully understand the advisories; only 1 out of 16 (6%) Black anglers who said they had heard or seen the advisories got the answers to all True or False questions correct. It is important to find more effective strategies in communicating the advisories and to target Black anglers who have not yet seen or heard the advisories.

Improving the accessibility of advisory information should also be a priority. Interview results indicate that a large portion of subsistence anglers (anglers who eat their catch) have read the fish consumption advisories in the New York Freshwater Fishing Official Regulations Guide. This resource is distributed with the purchase of a fishing license, which is required for most anglers age 16 and older. Although there is no way to know what proportion of anglers have a license and therefore received the Regulations Guide, there is reason to believe this proportion may decrease in the future, particularly among low-income anglers. For the 2008-2009 fishing year, the cost of the annual fishing license was \$19.00; in 2009-2010 the same license now costs \$29.00 (NYSDEC, 2010). A price increase may dissuade or prevent some anglers from buying a license and thus prevent access to the Fishing Regulations Guide and the included advisory information. There is even more of a concern when considering that 21% of the interviewed anglers who shared their household income information were near or below the poverty line as defined by the United States Department of Health and Human Services. Although the advisories are available in DOH booklets and brochures (disseminated via various other state agencies, local health departments and various nonprofit organizations and directly to anglers on request, and the DEC Freshwater Fishing Regulations Guide available free of charge), online (NYSDOH, 2009), and at locations where one can buy a fishing license, it is unlikely that anglers who do not purchase licenses will know to or take the time to access these materials without encouragement. It is imperative that an effective educational tool be developed that reaches beyond licensed anglers.

The clarity of information provided in the advisories should also be addressed. DOH has produced material that includes all of the information and disseminates it in a way that appears to be accessible to many anglers. However, the complexity of the advisory information makes it difficult to develop materials that contain all of the information in a clear and concise manner legible by all anglers. Our data suggest that many of those who read the advisories do not fully understand them.

One possibility for the dissemination of advisory information is to take advantage of existing information streams that are not commonly used for fish consumption advice. This includes the use of media, field staff, and word-of-mouth communication among anglers. For example, many anglers talked about the Round Goby during their interviews. The Round Goby is an invasive species that carries botulism and other diseases. To help stop the spread of this invasive, anglers are instructed to kill gobies and throw them back in the water. Most interviewees noted that they learned to do this from TV, DEC officers, and other fishermen. Because these channels so successfully spread awareness about one topic throughout much of the fishing community, they may also be effective methods of communicating the important health messages about consuming locally caught fish. A study similar to ours suggested taking advantage of the fact that in many cultures, elder anglers are respected for their fishing knowledge. They suggested beginning with older anglers and allowing the information to spread throughout the angler population (Beehler *et al*, 2001). Unfortunately with these avenues there is also ample opportunity for misinformation to spread, which may be confusing or misleading for some anglers.

Several anglers expressed their belief that posted signs would (and should) be present if there are warnings about consuming the fish. This belief signifies a disconnect between what anglers think the practice should be and the actual policies or actions of local and state agencies. According to some of our key informants, sign posting is limited to locations where the advisories recommend eating absolutely no fish from the water, or if a water body has been restored from such a point. Many times, these locations are not on state land and therefore it is difficult or impossible to post signs legally. Likewise, this is a project of tremendous cost, requiring updates, maintenance, and vandalism control. A lower cost project might be to select several main fishing sites and, instead of posting the specific advisories at these locations, post places where one can access updated advisories (DEC website, DOH website, bait shops, a phone number) and include a message like the following from the Indiana Department of Natural Resources (Westphal *et al*, 2008):

*Don't stop eating sport-caught fish. It is a good source of protein and low in saturated fat. You can maximize the benefits and minimize the risk of eating fish by making informed choices about:*

- \* What types of fish to eat*
- \* Where to fish*
- \* How to prepare the fish*
- \* How often and how much to eat*

In summary, we recommend that the following be considered as guidelines for future outreach efforts. First, to get the message across to the general public more easily, simplify the content of the advisory communications. The advisories should be written at a 5<sup>th</sup> grade reading level, with graphical representations for non-English speakers. Because children and infants are at higher risk for harm from toxins found in fish, advice pertaining to children and women of childbearing age should be the clearest and most visible message. Second, the advisories should be distributed in a variety of different mediums and targeted at “high-risk populations” as defined above.

### Rapid Assessment Strategy

An overarching goal of this study was to develop a rapid assessment strategy (RAS) to gain an understanding of the local fishing community. If the issues associated with finding and reaching anglers of high-risk groups and overcoming language barriers can be adequately addressed, it is likely that the interview method will also adequately characterize local fish consumption by anglers. This RAS was designed to be applicable to other areas as well. It is hoped that this or a similar tool will be useful in more frequently updating information about the demographic characteristics of the angling community. It is also hoped that this study and others will more adequately assist New York's strategies of promoting safe fish consumption. The \$7,000 grant we received from the Great Lakes Protection Fund supported some of the COEC staff time and the community intern salary; we received additional funding for an undergraduate summer intern and additional staff time was contributed by COEC. During the spring, COEC staff conducted a literature review, corresponded with researchers and advisors who had done similar work, developed survey/interview guides, and piloted these protocols. The undergraduate intern worked in partnership with interns from Community Building in Action. They conducted the majority of surveys and interviews over an eight-week period. With these limited resources, we were not able to get a comprehensive picture of fishing patterns by all fishing populations, locations and seasons. However, our initial findings provide timely and locally-informed guidance for developing and targeting future outreach efforts. Materials developed during this study, a summary of the study methods and results, literature reviews, and outreach materials are currently available on the web at <http://www2.envmed.rochester.edu/envmed/EHSC/outreach/coec/fish.html>. Our hope is that these materials will facilitate replication of this study both locally and in similar cities.

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## Government Recommendations for Eating Lake Ontario and Store-Bought Fish

Eating fish is very good for your health. Unfortunately, some fish can be contaminated with chemicals that are unsafe for people to eat. This table is a summary of advice from the government on how much store-bought and locally-caught fish is safe to eat.

How often can I eat this fish?	Women who are pregnant, breastfeeding or may become pregnant; children under 15 years:		Men; women who are beyond childbearing years:	
	DOH advice on fish from Lake Ontario and connecting waters (up to the first barrier to fish)	FDA/EPA advice on fish bought in stores or restaurants (commercial fish)	DOH advice on fish from Lake Ontario and connecting waters (up to the first barrier to fish)	FDA/EPA advice on fish bought in stores or restaurants (commercial fish)
Unlimited	Women of childbearing age and children under 15 are advised to <b>EAT NO FISH caught in Lake Ontario or connecting waters.</b>		none	All store-bought fish is safe for men and women who no longer plan to have children. The advisory does recommend a diverse, well-balanced diet.
up to 2 meals/week		canned light tuna, catfish, pollock, salmon, shrimp	none	
up to 1 meal/week		white albacore tuna, tuna steaks	fish not listed below (sunfish/bluegills, yellow perch, bullheads, etc.)	
up to 1 meal/month		none	chinook salmon, coho salmon over 25", rainbow trout, white sucker, white perch (E of Point Breeze), lake trout smaller than 25", brown trout smaller than 20"	
<b>DO NOT EAT</b>		<b>shark, swordfish, king mackerel, tilefish</b>	<b>channel catfish, carp, lake trout over 25", brown trout over 20", white perch (W of Point Breeze)</b>	

\* DOH local fish advice defines a meal as an 8 oz. (half pound) portion; FDA/EPA commercial fish advice defines a meal as a 6 oz. portion

\*A barrier to fish is a structure in the water that fish can't swim past (for example a dam)

## WHO WROTE THE ADVISORY?

Local fish consumption advisories are published by the New York State Department of Health. For more information, visit: <http://www.health.state.ny.us/environmental/outdoors/fish/fish.htm> or call: 1-800-458-1158

The Environmental Protection Agency (EPA) and Food and Drug Administration (FDA) recently joined together to write the federal advisory. This advisory refers only to mercury. For more information, visit <http://www.epa.gov/waterscience/fish/advice/factsheet.html>

## WHY IS THERE AN ADVISORY?

Almost all fish contains some mercury, but some more than others. Fish may also contain organic pollutants like PCBs, Dioxin and Mirex, which are the primary chemicals of concern for fish caught in Lake Ontario. The DOH Fish Advisory states that:

Studies of women and their children show a link between elevated levels of PCBs in their bodies and slight effects on their children's birth weight, short-term memory and learning ability. A study of older adults (49-86 years old) who ate fish containing PCBs suggest that higher PCB exposure is associated with decreased memory and learning. Other studies have suggested a link between increased PCB exposure and effects on the human reproductive system, including changes in sperm quality, time to pregnancy and menstrual cycles. These studies suggest that the effects were caused by PCBs, but other factors may have played a role too. Studies of workers exposed to PCBs raise concerns that these chemicals can cause cancer in people, but the information is not adequate to prove that this is the case.

## WHY IS THE ADVICE DIFFERENT FOR WOMEN AND CHILDREN?

Toxins in fish are more dangerous for women of childbearing age and young children because they affect the body's development. However health benefits of fish play an important role in brain development and are very good for the heart. By following these guidelines, women and children can receive the benefits of eating fish and reduce their exposure to the harmful effects of mercury and other toxins. **The FDA/EPA Advisory recommends that commercial fish not be eaten in the same week that locally-caught fish is eaten.**

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