
**ANGLER SURVEY: ANALYSIS OF ANGLER AWARENESS
OF EIGHTEENMILE CREEK AREA OF CONCERN FISH
CONSUMPTION ADVISORY**



NIAGARA COUNTY SOIL AND WATER CONSERVATION DISTRICT

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EXECUTIVE SUMMARY

During the fall of 2007, the Niagara County Soil and Water Conservation District completed a survey of anglers who fished at Eighteenmile Creek's Fishermen's Park. The objectives of this survey were: to determine how many anglers are aware that a fish consumption advisory exists for the creek; to assess the need for consumption advisory signage; to determine angler consumption habits and; to identify the most efficient pathways of communicating fish consumption advisories to anglers. In order to assess these objectives, we studied how often anglers, when asked, recalled that there was a fish consumption advisory for Eighteenmile Creek, how well anglers remembered and understood the advisory, how the advisory affected their consumption habits, and what pathways were preferred for the communication of advisories to anglers. The consumption advisory for the lower reach of Eighteenmile Creek is, "No American eel, channel catfish, carp, lake trout, chinook salmon, rainbow trout, white perch, coho salmon over 21 inches or brown trout over 20 inches should be eaten from this area. In addition, no more than one meal per month of white sucker, coho salmon under 21 inches, and brown trout less than 20 inches should be eaten." (NYSDOH 2007)

When asked, "Are you aware of a health advisory regarding the consumption of fish caught from Eighteenmile Creek," 494 (83.3%) of anglers responded that they were aware of a consumption advisory for the creek. Ninety nine (16.7%) of the interviewees responded that they were not aware of a consumption advisory. Anglers were also asked what the advisory said. The most frequent response, 59.7%, was, "eat no fish." The next most common response was, "Eat no more than one meal per month", 19.2%. More than 80% of the anglers surveyed reported that they felt it was "very important" (21.9%) or "important" (59%) to follow the consumption advisory. Nineteen (19%) percent of the anglers who were aware of the consumption advisory felt that it was of little or no importance to follow the advisory. Fifty five percent (55%) of the anglers surveyed answered that erecting signage along Eighteenmile Creek was either "very important" (8.4%) or "important" (46.6%) versus 36.5% who felt signage was "not too important" and 8.4% who felt it was "not important at all." Fifty one percent (252 anglers) of the surveyed indicated that they changed their eating habits after learning of the advisory whereas 49% (242 anglers) did not. Anglers were asked how they had heard of the advisory. Their responses show that the New York State Freshwater Fishing Regulations Guide, which is given to anglers when they purchase a fishing license, was the most frequent source of learning of the advisory. The next most common responses include, family members or friends (10.5%), internet (9.5%), and fellow

anglers (8.4%). All anglers that participated in the survey (593) were also asked to suggest the best way(s) to reach anglers fishing at the creek with information about fish consumption advisories. Most of those surveyed (46.7%) responded with the NYS Freshwater Fishing Regulation Guide. The next most common response (43.2%) was signage at fishing locations.

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INTRODUCTION

Due to the presence of contaminants in the aquatic environment, fish may become contaminated, and this presents a health concern to humans if the fish are eaten regularly. In New York State, the New York State Department of Health (NYSDOH) assesses the potential risks of consuming chemicals in fish and issues consumption advisories when chemical levels are high enough to warrant such. NYSDOH issues these advisories based upon information that the New York State Department of Environmental Conservation (NYSDEC) gathers on contaminant levels in fish and game. (NYSDOH, 2007) A NYSDOH advisory for the consumption of fish, turtles and waterfowl has been in effect for Eighteenmile Creek since 1994.

Eighteenmile Creek (Figure 1-1) is divided into two segments when speaking of consumption advisories. The area below Burt Dam is populated by fish that migrate from Lake Ontario; therefore, the NYSDOH advisory for Lake Ontario extends into this area. The advisory is based upon Polychlorinated Biphenyls (PCBs), mirex and dioxins. No American eel, channel catfish, carp, lake trout, chinook salmon, rainbow trout, white perch, coho salmon over 21 inches or brown trout over 20 inches should be eaten from this area. In addition, no more than one meal per month of white sucker, coho salmon under 21 inches, and brown trout less than 20 inches should be eaten. No fish of any species and size should be eaten from Eighteenmile Creek above Burt Dam due to PCB levels found in fish. (NYSDOH, 2007)

The International Joint Commission (IJC) of United States and Canada identified 43 Areas of Concern (AOCs) in the Great Lakes Basin where the beneficial uses of the water were considered impaired. Eighteenmile Creek was identified as one of the 29 original United States AOCs. The Eighteenmile Creek Area of Concern (AOC) is located in the Town of Newfane, Niagara County, in Western New York State (Figure 1-2). The creek has been polluted by past industrial and municipal discharges, the disposal of waste and the use of pesticides. In addition to the consumption advisories that exist because of PCBs, the health of benthic organisms has been impaired by PCBs and metals found in sediments. PCB and metal contamination prevents open lake disposal of dredged sediment material. Bird and animal health is likely impaired by the PCBs, dioxins, and dieldrin found in fish flesh. Additionally, 2 of the beneficial uses identified by the IJC, the existence of fish tumors & other deformities and the status of fish & wildlife populations are classified as "unknown" but have recently been investigated. Results are expected sometime in 2008. (Ecology & Environment, 2008)

In 2005, Environmental Protection Agency (EPA) Region 2 staff visited Eighteenmile Creek's Fisherman's Park to conduct a bi-annual water quality analysis for contaminants. During the visit, it was observed that the park was inundated with anglers, some traveling from other states and countries. The Town of Newfane manages the park and estimates that approximately 13,000 anglers visit the park annually. (Town of Newfane, 2006) This shocked EPA staff because of the severity of the fish consumption advisory that exists for Eighteenmile Creek. EPA collaborated with New York State Department of Health (NYSDOH) to design consumption advisory signage for the creek. As the United States and New York State have no jurisdiction regarding consumption advisory signage placement, the Town of Newfane has decided not to erect signage at this time. It should also be noted that the advisory is posted at Newfane Town Hall and at a bait shop located at the mouth of the creek.

It is important to numerous stakeholders to determine how many anglers are aware that the consumption advisory exists for the creek. Numerous government agencies are interested in the need for signage along Eighteenmile Creek. It is also of interest to determine angler consumption habits. Assessing the most efficient pathways of communicating fish consumption advisories is a top priority as well. Currently, fish consumption advisories are available in a NYSDOH document entitled, Health Advisories: Chemical in Sportfish and Game booklet. They are also available in the NYSDEC Freshwater Fishing Regulations Guide.

FIGURE 1-1 EIGHTEENMILE CREEK WATERSHED

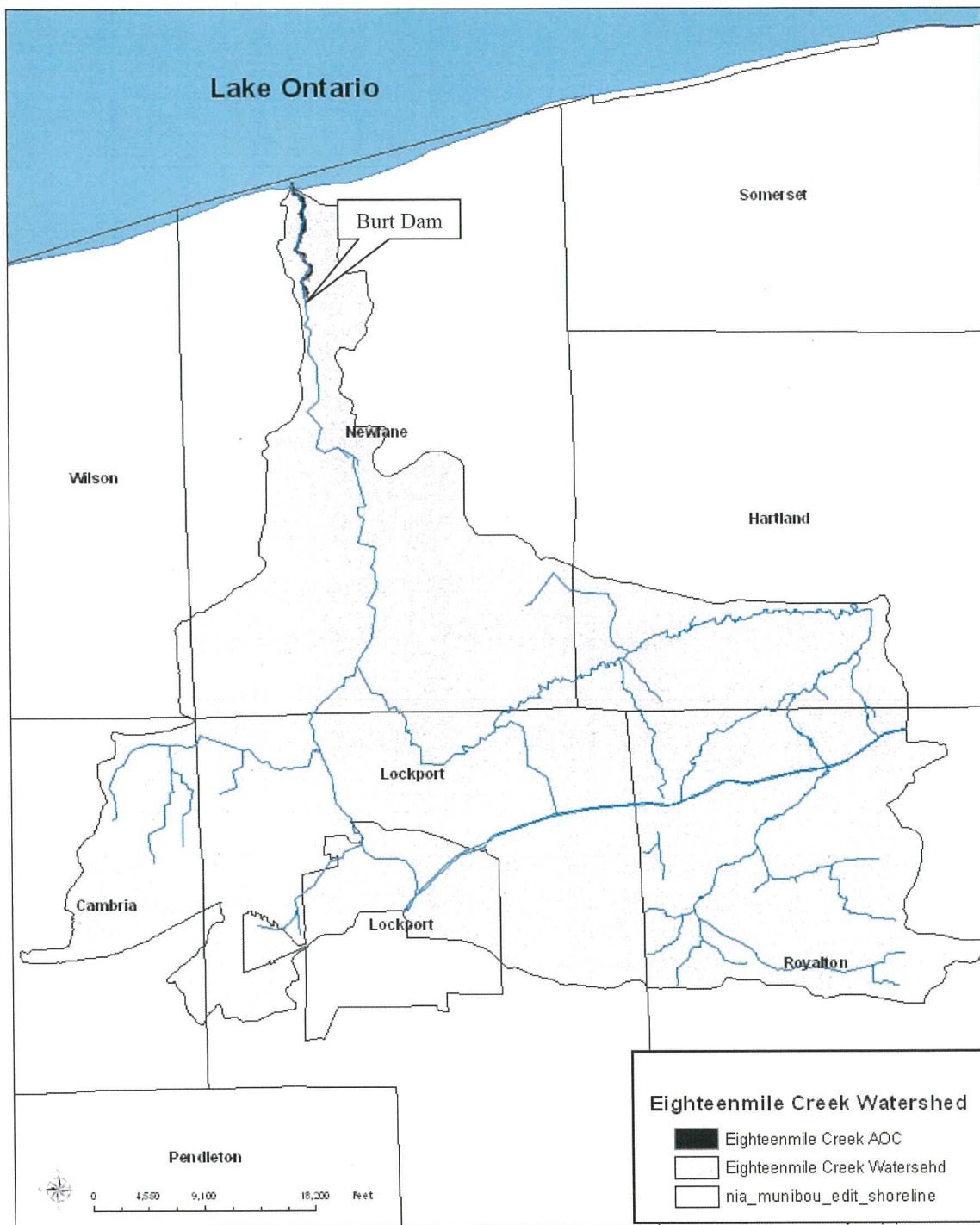
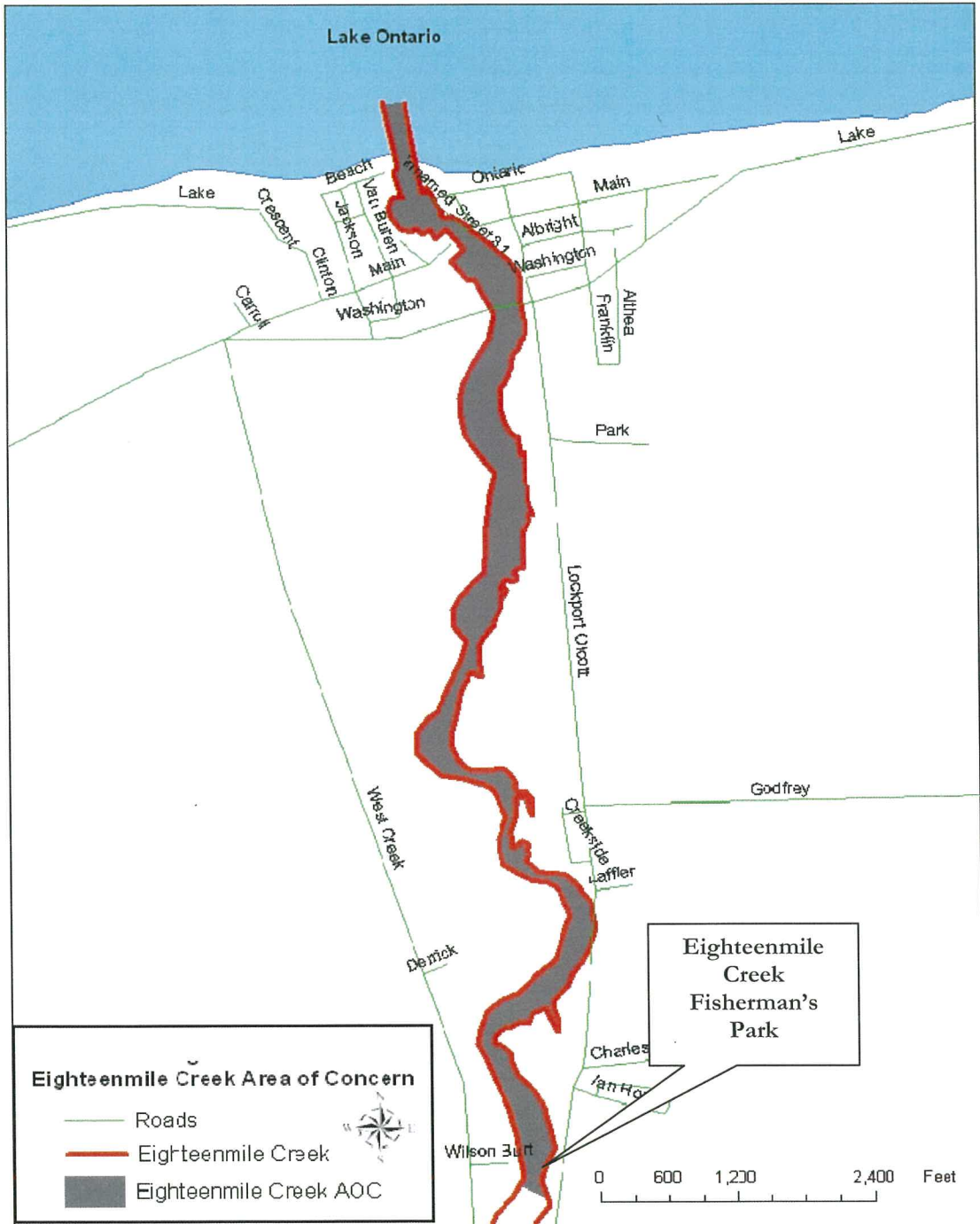


FIGURE 1-2
EIGHTEENMILE CREEK AREA OF CONCERN



SURVEY DESIGN AND EXECUTION

The survey was designed and executed by the Niagara County Soil and Water Conservation District (NCSWCD) with the assistance of a student from Niagara University. The first step of the survey design consisted of consulting with a select number of local researchers and reviewing available research literature to assist in the development of the survey instrument. Based upon the stated objectives of the project, the survey required questions aimed at: determining baseline angler fishing behavior; assessing angler awareness of Eighteenmile Creek fish consumption advisories; identifying angler consumption habits; assessing the need for fish consumption advisory signage and; identifying ideal pathways of communicating consumption advisories. Since the advisory is specific to a number of different species of fish, it was also suggested that the survey address what type of fish anglers are hoping to catch. Other suggestions regarding the design of the survey included: using simple and easy-to-understand language; asking important questions first and asking secondary (demographic) questions at the end; avoiding biased or leading questions that indicate the preferred answer; using open-ended questions to avoid influencing anglers' responses and; only asking questions that directly address the survey objectives. (Stewart, 2007)

Based upon the stated objectives of the project and the literature reviewed, a comprehensive list of 46 potential survey questions was created. From this list, a total of 17 questions were chosen to be included in a final questionnaire. The final questionnaire was field tested over a one week period. A total of 17 anglers were approached to complete the survey. Fifteen (15) of the 17 anglers approached agreed to complete the survey. Time to complete the surveys ranged from 2 minutes and 50 seconds to 4 minutes and 20 seconds. During the field test, it was observed that a number of the anglers interviewed had something else to add once the questioning was completed. Based upon this observation, it was decided to include a question at the end of the survey that would ask if the respondents had any other comments or concerns relevant to the consumption advisory and/or the creek restoration work that was completed in 2007. A copy of the final questionnaire is attached as Appendix A.

SURVEY LOCATION

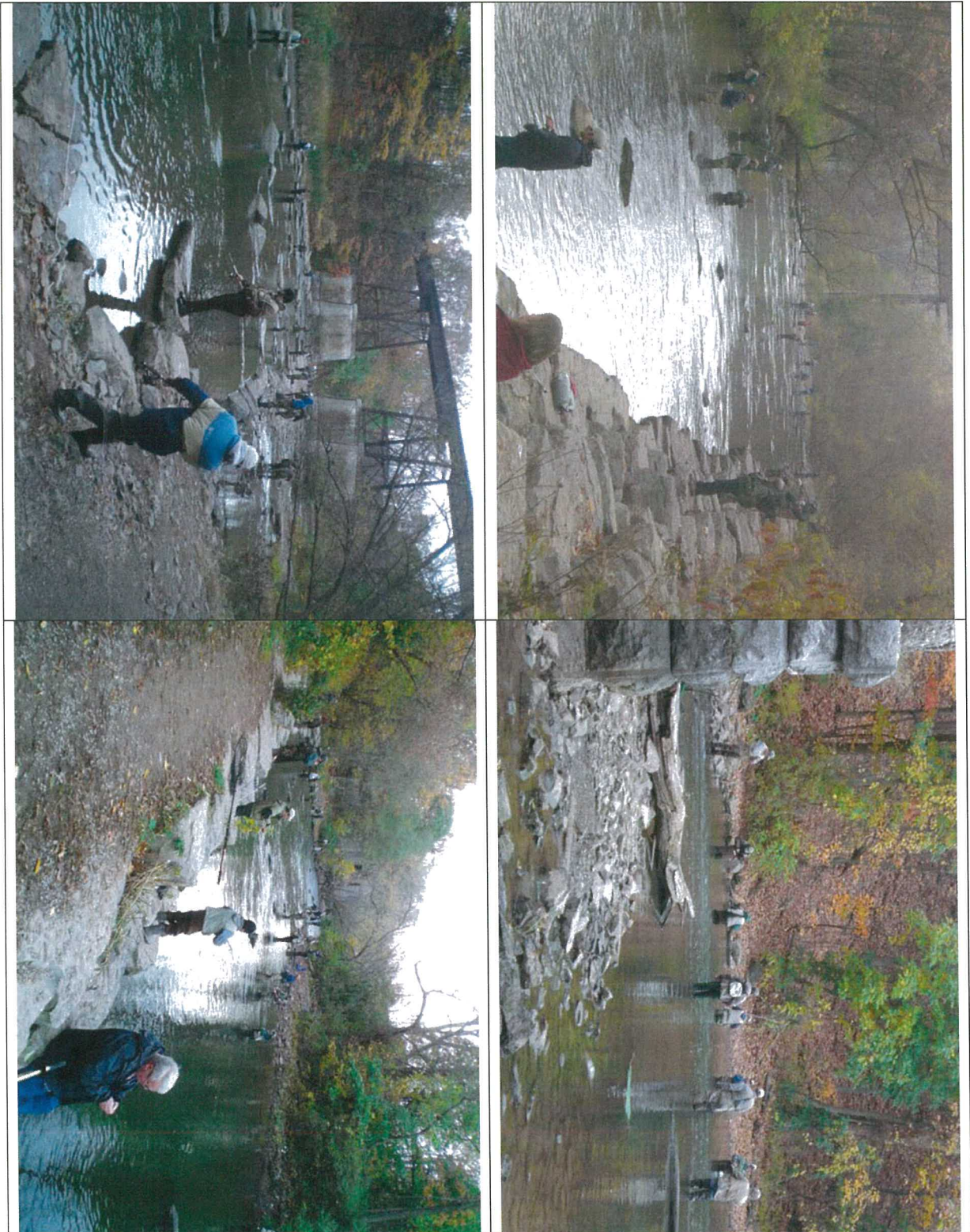
The NYSDEC began a Lake Ontario Tributary Angler Survey in the Fall of 2005 to gather baseline data for what is a regular survey (every three years) of Lake Ontario and its tributaries. The survey involved data collection through interviewing anglers at 28 Lake Ontario tributaries, including Eighteenmile Creek (Fisherman's Park). While some of the smaller tributaries were visited less frequently for surveying

purposes, angler surveys at Eighteenmile Creek accounted for a large part of the effort. In comparison to other Lake Ontario tributaries, the survey revealed that Eighteenmile Creek has the highest number of angler hours of any tributary of Lake Ontario, excluding the Salmon River. The number of chinook salmon, steelhead and brown trout caught were also relatively high in comparison to other tributaries. The number of steelhead caught in Eighteenmile Creek was the highest of any tributary, excluding the Salmon River, which is attributed to more successful steelhead stocking in the western portion of Lake Ontario. The number of brown trout caught and harvested was highest in Eighteenmile Creek (Prindle et. al. 2005).

Despite the fact that it falls within the Eighteenmile Creek Area of Concern, Fisherman's Park is a major angler destination. Fisherman's Park represents a publicly accessible outlet for freshwater anglers. Eighteenmile Creek is a highly productive tributary of Lake Ontario and is popular for salmon, steelhead, and trout fishing during the fall month spawning runs from Lake Ontario. The Creek will hold salmon and trout October through November. By December, the Creek will contain primarily steelhead and rainbow trout. (Ecology & Environment, Inc. 2008)

Based upon the volume of anglers that visit Fisherman's Park annually and the sheer concentration of anglers on any given day during the fall fish migrations, it is only logical to utilize Fisherman's Park as the location to execute the survey. Figure 1-3 portrays how congested the park can become during the fall salmon migration.

FIGURE 1-3
PHOTOS OF ANGLERS WITHIN FISHERMAN'S PARK - 11/5/2007



INTERVIEW PROCESS & SURVEY STRATEGY

After consulting with the Town of Newfane and shop owners within Olcott Harbor, it became apparent that approximately 85% of the 13,000 anglers that visit the creek do so between October 1 and November 15. This timeframe coincides with the typical fall salmon, steelhead, and brown trout runs within Eighteenmile Creek. To insure that a wide cross-section of anglers would be included, it was determined that the majority of the survey work would be completed during this time frame.

Actual interviews were conducted between October 3 and December 12, over a total of 16 days. To obtain objective information of anglers' awareness of the consumption advisory, a survey instrument was created that would avoid influencing anglers' responses. The survey instrument began with open-ended questions about whether anglers were aware of an advisory, and if so, where they learned it and what the advisory said (Questions 2-4, Appendix A). At the end of the survey, all anglers were asked if they received a copy of the New York State Freshwater Fishing Regulations Guide and if they recall seeing an advisory listed for Eighteenmile Creek (Questions 14-15, Appendix A). If the angler did not divulge knowledge of an advisory in questions 2-4, and answered in the affirmative for questions 14 and 15, the angler was re-directed back to question #4, "What did the advisory say?"

Secondly, so as not to bias the response, multiple answers were possible for one key question, "What are the best ways to reach people fishing at the creek with information about fish consumption advisories?" The interviewer was instructed to check the boxes that most closely fit the answers given by the angler. Answers that did not fit any given category were recorded as "other."

Based upon successful similar studies and the population base of approximately 13,000 anglers annually, it was determined that 500 (<5%) surveys would be a sufficient sample size. A total of 593 surveys were completed as part of this project. The completed surveys were entered into a database via the website, www.surveymonkey.com, and the responses were analyzed using the sites statistical program.

RESULTS

Demographics

Age, sex, and place of origin of interviewees

Participants in the survey were 97.9% (581 anglers) male versus 2.1% (12 anglers) female.

Most of the respondents were adults between the ages of 35 and 54, with the greatest proportion in the range 45 to 54, 32.0%, and a lesser proportion in the 35 to 44 year range, 24.6%. People age 65 and older constituted only 2.5% of the interviewees. Table 1 illustrates the age distribution of all survey respondents.

**TABLE 1
AGE DISTRIBUTION OF RESPONDENTS**

<u>AGE</u>	<u>FREQUENCY</u>	<u>PERCENTAGE</u>
<18	14	2.4%
18 - 24	16	2.7%
25 - 34	76	12.9%
35 - 44	145	24.6%
45 - 54	189	32.0%
55 - 64	135	22.9%
65+	15	2.5%
Subtotal	590	100%
No answer	3	0.50%
TOTAL	593	---

Anglers at Fishermen's Park, within the Eighteenmile Creek AOC, hailed from various places in and out of New York State. To simplify the data, respondents from New York State were classified as being Western New Yorkers or non Western New Yorkers. All remaining respondents were categorized by their home state or Country. Table 2 illustrates the distribution of survey respondents by place of origin.

TABLE 2
PLACE OF ORIGIN

PLACE OF ORIGIN	FREQUENCY	PERCENTAGE
Western New Yorkers	173	29.2%
Non Western New Yorkers	113	19.0%
Canada	16	2.7%
California	2	0.40%
Colorado	10	1.7%
Connecticut	15	2.5%
Georgia	10	1.7%
Maine	4	0.60%
Maryland	7	1.2%
Montana	4	0.60%
Nevada	2	0.40%
New Jersey	22	3.7%
New Mexico	2	0.40%
Ohio	28	4.7%
Pennsylvania	127	21.4%
Virginia	12	2.0%
West Virginia	46	7.8%
TOTAL	593	100%

Fishing history at Eighteenmile Creek

A majority of the respondents said that they had fished at Eighteenmile Creek for 3 to 9 years, with the greatest proportion in the range of 3 to 4 years, 34.1%%, and a slightly lesser proportion in the 5 to 9 year range, 33.4%. Anglers fishing at Eighteenmile Creek for more than 10 years constituted 18% of the interviewees. Table 1 illustrates the age distribution of all survey respondents.

TABLE 3
LENGTH OF TIME FISHING AT EIGHTEENMILE CREEK

HOW LONG HAVE YOU FISHED AT EIGHTEENMILE CREEK?	FREQUENCY	PERCENTAGE
Less than one month	13	2.2%
More than one month, but less than one year	0	0.0%
1 - 2 Years	72	12.2%
3 - 4 Years	201	34.1%
5 - 9 Years	197	33.4%
10 Years or more	106	18%
Sub-total	589	100%
No Answer	4	0.7%
TOTAL	593	----

Knowledge of fish consumption advisory

When asked, "Are you aware of a health advisory regarding the consumption of fish caught in Eighteenmile Creek," 494 (83.3%) of anglers responded that they were aware of a consumption advisory for the creek. Ninety nine (16.7%) of the interviewees responded that they were not aware of a consumption advisory for Eighteenmile Creek.

Places advisory seen or heard

Anglers that were aware of the advisory, 494 (83.3%), were asked how they had heard of the advisory. Their responses, which are shown in Table 4, show that the New York State Freshwater Fishing Regulations Guide, which is given to anglers when they purchase a fishing license, was the most frequent source of the advisory.

TABLE 4
PLACES ADVISORY SEEN OR HEARD

HOW DID YOU LEARN OF THE ADVISORY?	FREQUENCY	PERCENTAGE
Fishing Regulation Guide	271	54.8%
Family member/friend	52	10.5%
Online	47	9.5%
Fellow angler	41	8.4%
Bait shop	34	6.9%
Can't remember specifically	28	5.7 %
Television	18	3.6%
Fishing scout/guide	3	0.6%
Sub-total	494	100%
Were not aware of the advisory	99	16.7%
Total	593	---

What the advisory said

Anglers that were aware of the advisory, 494 (83.3%), were asked what the advisory said. The most frequent response, 59.7%, was, “eat no fish.” The next most common response was, “Eat no more than one meal per month”, 19.2%. Table 5 shows a breakdown of what anglers thought the consumption advisory said.

**TABLE 5
ANGLERS' REPORT OF WHAT THE ADVISORY SAID**

WHAT DID THE ADVISORY SAY?	FREQUENCY	PERCENTAGE
Eat no fish	295	59.7%
Eat no more than 1 meal per month	95	19.2%
Don't eat any fish greater than 21"	39	7.9%
One meal per month of fish smaller than 21"	25	5.1%
Can't remember	14	2.8%
Eat only Brown Trout less than 21"	8	1.7%
Depends on size and species	7	1.5%
Eat no more than 8 ounces per month	4	0.9%
Don't eat any skin or fat	3	0.7%
Fish less 21" OK, 1 meal per month of fish greater than 21"	2	0.5%
Sub-total	494	100%
No answer because not aware of advisory	99	16.7%
Total	593	---

Effect of advisory on consumption habits

Anglers that were aware of the advisory, 494 (83.3%), were asked if they had changed their consumption habits after learning of the advisory. Fifty one percent (252 anglers) of the surveyed indicated that they changed their eating habits after learning of the advisory whereas 49% (242 anglers) did not. The most frequent response for not changing consumption habits was that anglers were already not eating fish from the creek, or already practicing catch and release, 68.2%. Slightly over 11% of the respondents believe that the method in which fish are tested for contaminants is flawed. Table 6 presents the responses of all anglers that did not change consumption habits as a response to the advisory.

TABLE 6
REASONS FOR NOT CHANGING FISH CONSUMPTION HABITS

WHY DIDN'T YOU CHANGE YOUR CONSUMPTION HABITS?	FREQUENCY	PERCENTAGE
Already only release or never ate fish from Eighteenmile Creek	165	68.2%
Don't eat very much or too often	31	12.8%
The way fish are tested is flawed	27	11.2%
Too much of anything is bad for you/A lot of things can kill me	14	5.8%
Don't believe advisory/Don't care	3	1.2%
First time fishing here, never eaten before	1	0.4%
Cheeseburgers will kill me too. What's the difference?	1	0.4%
Sub-total	242	100%
No answer because not aware of advisory or skipped question	99	16.7%
No answer because angler changed consumption habits	252	42.5%
Total	593	---

How consumption habits changed

As indicated earlier, 51% of anglers responded that they did change their consumption habits after learning of the advisory. The most frequent response to the advisory was to stop eating all fish from Eighteenmile Creek, 68.3%. The next most common response was that anglers ate less fish from the creek, 19%. Table 7 presents the responses of all anglers that changed their consumption habits as a response to the advisory.

TABLE 7
CHANGES TO CONSUMPTION HABITS AFTER LEARNING OF THE ADVISORY

HOW DID YOU CHANGE YOU CONSUMPTION HABITS?	FREQUENCY	PERCENTAGE
Stopped eating all together/Only practice catch and release	172	68.3%
I eat less	48	19.0%
I eat small fish only	10	4.0%
I eat one meal per month	5	2.0%
I eat one meal per year	4	1.6%
I release everything except Brown Trout less than 21"	4	1.6%
I eat a couple of meals per year	3	1.2%
I release everything larger than 21"	3	1.2%
I stopped eating large Salmon	3	1.2%
Sub-total	252	100%
No answer because not aware of advisory or skipped question	99	16.7%
No answer because angler did not changed consumption habits	242	40.8%
Total	593	---

Best method to communicate advisories to anglers

When asked to report the best ways to reach people fishing at the creek with information about fish consumption advisories, most anglers (46.7%) responded with the NYS Freshwater Fishing Regulation Guide. The next most common response (43.2%) was signage at fishing locations. Table 8 presents the responses of all anglers who participated in the survey.

TABLE 8
BEST WAYS TO REACH ANGLERS REGARDING AN ADVISORY

WHAT'S THE BEST WAY TO COMMUNICATE ADVISORIES?	FREQUENCY	PERCENTAGE
NYS Freshwater Fishing Regulations Guide	425	46.7%
Signs at fishing locations	393	43.2%
Posters at bait shops	66	7.3%
Other (internet, phone calls)	16	1.9%
Television	7	0.7%
Talking to anglers at fishing locations	2	0.2%
Newspaper	0	0%
Radio	0	0%
Sub-total	909 responses	100%
No answer	0	0%
Total	593 Anglers	---

Importance of advisory

Anglers were asked how important they felt it was to follow the consumption advisory. More than 80% of the anglers surveyed reported that they felt it was “very important” (21.9%) or important (59%) to follow the consumption advisory. The answers to this question are presented in Table 9.

TABLE 9
IMPORTANCE OF FOLLOWING CONSUMPTION ADVISORY

<i>HOW IMPORTANT DO YOU FEEL IT IS TO FOLLOW THE CONSUMPTION ADVISORY?</i>	<i>FREQUENCY</i>	<i>PERCENTAGE</i>
Very Important	130	21.9%
Important	350	59.0%
Not too important	104	17.5%
Not important at all	9	1.5%
Total	593	100%

Importance of consumption advisory signage along Eighteenmile Creek

Anglers were also asked how important they felt it was to erect consumption advisory signage along Eighteenmile Creek. Fifty five percent (55%) of the anglers surveyed answered that the signage along Eighteenmile Creek was either “very important” (8.4%) or “important” (46.6%). All the answers to this question are summarized in Table 10.

TABLE 10
IMPORTANCE OF ADVISORY SIGNAGE ALONG EIGHTEENMILE CREEK

<i>HOW IMPORTANT DO YOU THINK IT IS TO ERECT CONSUMPTION ADVISORY SIGNAGE?</i>	<i>FREQUENCY</i>	<i>PERCENTAGE</i>
Very Important	50	8.4%
Important	276	46.6%
Not too important	216	36.5%
Not important at all	51	8.4%
Total	593	100%

Targeted fish species

Anglers were asked what species of fish they were targeting on the day of the survey. Their answers are presented in Table 11. A majority of anglers (54.3%) targeted various trout species on the day of the survey.

**TABLE 11
TARGETED FISH SPECIES**

SPECIES	FREQUENCY	PERCENTAGE
Salmon	214	36.1%
Trout	322	54.3%
Any Species	57	9.5%
No answer	1	0.1%
Total	593	100%

Intent to harvest fish caught

When asked, “Do you plan to harvest any fish today for the purposes of consumption,” 239 (40.3%) of anglers responded that they were harvesting fish for the purposes of consumption. Three hundred fifty-four (59.7%) of the interviewees responded that they were not going to harvest fish caught from Eighteenmile Creek.

Knowledge of the Area of Concern status

When asked, “Are you aware that Eighteenmile Creek is currently listed as a Great Lakes Area of Concern (AOC),” 222 (37.4%) of the anglers responded that they were aware of the AOC designation. Three hundred seventy-one (62.6%) anglers responded that they were not aware of the AOC designation.

Receipt of NYS Freshwater Fishing Regulations Guide

When asked, “When purchasing your fishing license, do you recall receiving a copy of the NYS Freshwater Fishing Regulations Guide Book,” 373 (63%) of the anglers responded that they did receive the guide book. Two hundred nineteen (37%) anglers responded that they did not receive a copy of the regulations when they purchased their fishing license.

Recollection of seeing advisory in the NYS Freshwater Fishing Regulations Guide

When asked, “Do you recall seeing a fish consumption advisory for Eighteenmile Creek in the NYS Freshwater Fishing Regulations Guide Book,” 322 (86%) of the 373 anglers who received the Guide Book responded that they did remember seeing the Eighteenmile Creek advisory. Fifty one (14%) anglers responded that they did not recall seeing the advisory for Eighteenmile Creek in the NYS publication.

Other comments

At the conclusion of the survey, anglers were asked if they had any comments relevant to the consumption advisory and/or the creek restoration work that was completed in 2007. Their comments are presented in Table 12.

TABLE 12
OTHER COMMENTS

COMMENTS	# OF RESPONSES
Fish advisory testing procedure is flawed.	17
I like the improvements to the creek. / or it looks nice.	15
People should read the NYS fishing Guide Book.	7
Signs not needed. Guide book is enough.	6
Signs are a good idea.	5
Additional creek access is great.	5
Any improvement to this park is better than what it was.	2
Signs not needed. Everyone knows not to eat the fish.	2
This park gets nicer and nicer. Best trip of the year.	2
Signs not needed or necessary.	2
I prefer the way the creek looked when I was a kid.	2
I caught a nice brown trout under the railroad bridge.	1
Advisory is common knowledge. Signs not needed.	1
Improvements are not good for fly casting. Not enough room.	1
There is too much rock down here.	1
Signs are an eyesore.	2
There are too many signs already.	1
Been eating the fish for years. I don't see a problem.	1
I like the fact that people aren't fishing on top of each other any more.	1
I like the creek. My young son can come and not have to stay on the far bank.	1
My first time here. This creek is amazing!	1
I like the way it was. NATURAL.	1
Looks better.	1
Leave the creek alone.	1
Much safer than it was 10 years ago.	1
Great fishing.	1
TOTAL	81

DISCUSSION

The objectives of this survey were: to determine how many anglers are aware that a fish consumption advisory exists for the creek; to assess the need for consumption advisory signage; to determine angler consumption habits and; to identify the most efficient pathways of communicating fish consumption advisories to anglers. In order to assess these objectives, we studied how often anglers, when asked, recalled that there was a fish consumption advisory for Eighteenmile Creek, how well anglers remembered and understood the advisory, how the advisory affected their consumption habits, and what pathways were preferred for the communication of advisories to anglers. This assessment was completed on the recommendation of the Eighteenmile Creek Remedial Advisory Committee (RAC).

Since the four stated objectives of the survey and their relevance to Eighteenmile Creek has never been investigated, it was decided to review other reports and surveys that have probed angler awareness of consumption advisories. The reports that were reviewed include the following. The Wisconsin Medical Journal published a report that provided information about fish consumption and advisory awareness among pregnant women (Gliori, et al., 2006). This study consisted of surveys mailed to 1000 women who had given birth within a certain time frame. The Wisconsin Department of Health and Family Services conducted a survey of Great Lakes states residents to assess consumption of commercial and sport fish and awareness of state-issued consumption advisories for Great Lakes fish (Imm et al., 2005). The New York State Sport Fishing & Aquatic Resources Education Program at Cornell University completed a project that assessed fish consumption health advisory awareness, attitudes, and extent of adherence among the youth (Cornell, 1995). Cornell University, College of Agriculture and Life Sciences has also investigated angler response to consumption advisories through surveys mailed to 30,000 anglers in New York and other bordering Great Lakes states (Cornell, 1993).

Awareness of Consumption Advisory

When asked, “Are you aware of a health advisory regarding the consumption of fish caught from Eighteenmile Creek,” 494 (83.3%) of anglers responded that they were aware of a consumption advisory for the creek. Ninety nine (16.7%) of the interviewees responded that they were not aware of a consumption advisory for Eighteenmile Creek. Angler awareness of the advisory for Eighteenmile Creek was high compared to studies conducted outside of New York. Compared to studies conducted within New York, angler awareness of a consumption advisory for Eighteenmile Creek is comparable.

Gliori et al. (2006) reported that 31% of Washington women surveyed had a specific awareness of the advisory, while 32% reported a general awareness, for a total of 63%. Imm et al. (2005) reported that 49% of adults who consumed fish from the Great Lakes were aware of a health advisory that had been issued by their state health department. Cornell (1995) reported that 87% of the New York families whose children participated in the study were aware of a consumption advisory. Cornell (1993) reported that 80% of those New Yorkers surveyed were aware of the consumption advisory. Increased awareness of a consumption advisory in the study completed for Eighteenmile Creek, as compared to studies conducted outside of New York, may have been due to several factors including a greater awareness of the contamination present due to the high profile of the creek as a Great Lakes AOC, the elevated number of advisories throughout New York as compared to other Great Lakes states, and length of time fishing at one place. Studies conducted in New York may also report greater percentages of awareness because of a larger public awareness and media campaign that exists, as compared to other Great Lakes states.

Comprehension of Consumption Advisory

In order to determine if anglers understood the advisory, they were asked what the advisory said. The most frequent response, 59.7%, was, “eat no fish.” The next most common response was, “Eat no more than one meal per month”, 19.2%. Table 5 shows a breakdown of what anglers think is the consumption advisory. Other responses to this question displayed a moderate understanding of certain aspects of the advisory, such as the advisory is size and species specific and that one meal per month applies to certain species.

Given the complexity of the advisory for this reach of Eighteenmile Creek (No American eel, channel catfish, carp, lake trout, chinook salmon, rainbow trout, white perch, coho salmon over 21 inches or brown trout over 20 inches should be eaten from this area. In addition, no more than one meal per month of white sucker, coho salmon under 21 inches, and brown trout less than 20 inches should be eaten), it is not surprising that the majority of anglers surveyed could not recall the exact advisory. It is interesting that not one angler could recall or produce a copy of the exact advisory for the creek. There appears to be some confusion within the angler population as to where the more severe upstream consumption advisory ends (upstream of the Burt Dam) and where the less severe, but more complicated consumption advisory begins (downstream of the Burt Dam). The consumption advisory for the upstream reach of Eighteenmile Creek is, “eat no fish of any species” (NYSDOH, 2007).

Gliori et al. (2006) reported that only 3% of those surveyed said they knew “a lot” about the consumption advisory, while 28% knew “something” about it, while 32% knew “only a little”. Cornell (1995) reported that only half (53%) of the families who were aware of the advisory were also aware of the most important caution suggested by the advisory which stated that children under 15 should not eat fish. Cornell (1995) also reported that 33% of those surveyed knew that the advisory recommended that no one eat more than one fish per month.

Reactions Toward the Consumption Advisory

The survey included questions to assess the anglers’ reactions after learning of the consumption advisory. Anglers were asked how important they felt it was to abide by the consumption advisory. More than 80% of the anglers surveyed reported that they felt it was “very important” (21.9%) or “important” (59%) to follow the consumption advisory. Nineteen (19%) percent of the anglers who were aware of the consumption advisory felt that it was of little or no importance to follow the advisory. From this response, it is apparent that a majority of anglers consider the advisory as important and would change their eating habits.

Anglers were also asked how important they felt it was to erect consumption advisory signage along Eighteenmile Creek. Fifty five percent (55%) of the anglers surveyed answered that the signage along Eighteenmile Creek was either “very important” (8.4%) or “important” (46.6%) versus 36.5% who felt signage was “not too important” and 8.4% who felt it was “not important at all.” From the responses that were collected in regards to how important it was to follow the advisory, it would seem likely that more anglers would have suggested that signage be erected. This may suggest that advisory signage is not the most preferred method of delivering consumption advisory information.

Effect of Advisory on Consumption Habits

Anglers that were aware of the advisory, 494 (83.3%), were asked if they had changed their consumption habits after learning of the advisory. Fifty one percent (252 anglers) of the surveyed indicated that they changed their eating habits after learning of the advisory whereas 49% (242 anglers) did not. The most frequent response for not changing consumption habits was that anglers were already not eating fish from the creek, or already practicing catch and release, 68.2%. Slightly over 11% of the respondents believe that the method in which fish are tested for contaminants is flawed. Table 6 presents the responses of all anglers that did not change consumption habits as a response to the advisory.

As indicated, 51% of anglers responded that they did change their consumption habits after learning of the advisory. The most frequent responses to hearing the advisory was “stopped eating all fish from Eighteenmile Creek” (68.3%), “ate less fish from the creek” (19%), and “eat small fish only” (4%). Table 7 presents the responses of all anglers that changed their consumption habits as a response to hearing the advisory.

The advisory obviously motivated some anglers (51%) to change their eating habits. Most anglers (49%) who reported that they did not change their eating habits was because they were already not eating the fish or practicing “catch & release.” Therefore, a large majority of the anglers surveyed either protected themselves by changing their consumption habits (51% of all anglers surveyed) or never intended to eat the fish (33% of all anglers surveyed). The most intriguing response to why anglers did not change their eating habits was they felt the method in which fish are tested for contaminants is flawed. Most of the anglers who thought this way did not agree with the “whole fish” method that NYSDOH utilizes to assess contaminant levels in fish. Most anglers surveyed contend that once the fish is separated from the edible fillet, the threat of consuming contaminants is greatly minimized.

Other studies that were examined indicated that anglers did in fact augment their consumption of fish due to the knowledge of an advisory. Cornell (1993) reported that anglers were more prone to alter their preparation techniques (cleaning of fish) rather than reduce the quantity of fish consumed. Imm et al. (2005) reported that compliance rates for types and size of fish that were safe to eat, preparation methods and consumption frequency were 71%, 77% and 52%, respectively.

Best Pathway for Delivering Advisory Information

Anglers that were aware of the advisory, 494 (83.3%), were asked how they had heard of the advisory. Their responses, which are shown in Table 4, show that the New York State Freshwater Fishing Regulations Guide, which is given to anglers when they purchase a fishing license, was the most frequent source of learning of the advisory. The next most common responses include family member or friend (10.5%), internet (9.5%), and fellow anglers (8.4%).

All anglers that participated in the survey (593) were also asked to suggest the best way(s) to reach anglers fishing at the creek with information about fish consumption advisories. So as not to bias the responses given, multiple answers were possible for this question. The interviewer was instructed to check the boxes

that most closely fit the answers given by the angler. Out of a total of 909 responses given by 593 anglers, most of those surveyed (46.7%) responded with the NYS Freshwater Fishing Regulation Guide. The next most common response (43.2%) was signage at fishing locations. Table 8 presents the responses of all anglers who participated in the survey. One similarity can be observed when comparing how anglers responded to the question asking how they actually heard of the advisory (Table 4) with what they thought was the best way to learn of an advisory (Table 8). The NYS Freshwater Fishing Regulations Guide was the most common response to both questions. Therefore, the NYS Freshwater Fish Regulations Guide should not be downplayed as a method of educating anglers of consumption advisories.

Given that a large majority of anglers who visit Eighteenmile Creek are from states other than New York, we felt it was important to determine how many anglers actually receive a copy of the NYS Freshwater Fishing Regulations Guide. When we asked, "When purchasing your fishing license, do you recall receiving a copy of the NYS Freshwater Fishing Regulations Guide Book," 373 (63%) of the anglers responded that they did receive the guide book. Two hundred nineteen (37%) anglers responded that they did not receive a copy of the regulations when they purchased their fishing license.

In contrast, it is apparent that a significant amount of anglers surveyed (66.3%) also thought that signs located at fishing locations would be a viable method to communicate advisory information. Given the facts that these anglers have never seen advisory signage in New York but still consider the option as viable, this strongly suggests that signs could be an effective tool to educate anglers about advisories.

Conclusions

This project measured how many anglers were aware that a consumption advisory exists for Eighteenmile Creek, the need for signage along the creek, angler consumption habits and, the most efficient pathways of communicating fish consumption advisories. The results show that 494 of the 593 anglers interviewed (83.3%) were aware of the consumption advisory. Most of those aware of the advisory identified the NYS Freshwater Fishing Regulations Guide as their main source of information, although other sources included family and friends, the internet, and other anglers. The majority of anglers surveyed (46.7%) thought that the NYS Freshwater Fishing Regulations Guide was the best method of informing anglers of advisories. However, 43.2% of anglers surveyed also thought that signs located at popular fishing locations would also be a viable option to inform anglers. Given the facts that not one angler who was surveyed

could recall or produce a copy of the exact advisory and the percentage of anglers who recited the advisory for Eighteenmile Creek above the Burt Dam, we conclude that placement of signage along Eighteenmile Creek could minimize the confusion that currently exists.

From this survey we have concluded that the proper distribution of the NYS Freshwater Fishing Regulations Guide is the most effective way to reach anglers with information about fish consumption advisories. However, the survey has indicated that advisory signage is also preferred by a significant amount of anglers and that signage should not be downplayed as an effective way to educate anglers.

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APPENDIX A

**ANGLER SURVEY
EIGHTEENMILE CREEK AREA OF CONCERN
NIAGARA COUNTY, NEW YORK**

Survey Location:

Date:

Time:

Observed sex of angler:

1. How long have you been fishing at Eighteenmile Creek?
 - Less than 1 month
 - More than 1 month, but less than 1 year
 - 1-2 years
 - 3-4 years
 - 5-9 years
 - 10 years or more

2. Are you aware of health advisories for consuming fish caught in Eighteenmile Creek?
 - Yes (*Continue*)
 - No (*Go to #8*)

3. How did you learn of the warning?

4. What did the advisory say?

5. After you heard the advisory, did you change your eating habits?

- Yes (*Skip #6, go to #7*)
- No (*Continue*)

5. Why did you not change your eating habits? (*Skip #7, go to #8*)

7. How did you change your eating habits?

8. What are the best ways to reach people fishing at the creek with information about fish consumption advisories? CHECK ALL THAT APPLY.

- Posters or leaflets at Bait Shop
- Television
- Newspaper
- Radio
- Signs at fishing locations

- Talking to anglers at fishing locations
 - Fishing Regulations Guides
 - Other _____
9. How important do you think it is to follow fish consumption advisories?
- Very important
 - Important
 - Not too important
 - Not important at all
10. How important do you think it is to have fish consumption advisory signage along Eighteenmile Creek?
- Very important
 - Important
 - Not too important
 - Not important at all
11. What type of fish species are you targeting today? *Take the first answer only*
- Chinook Salmon (King)
 - Coho Salmon
 - Steelhead
 - Brown Trout
 - Lake Trout
 - Other _____
12. Do you plan to harvest any fish caught today?
- Yes
 - No
13. Are you aware that Eighteenmile Creek is currently listed as a Great Lakes Area of Concern (AOC)?
- Yes
 - No
14. When purchasing your fishing license, do you recall receiving a copy of the New York State Fishing Regulations Guide?
- Yes (*Continue to #15*)
 - No (*Skip #15, Go to #16*)
15. In the NYS Fishing Regulations Guide, do you recall seeing a fish consumption advisory for Eighteenmile Creek?
- Yes
 - No
16. We also need some background information for our survey. What is your age? _____
17. What is the Zip Code of your residence? _____
18. Do you have any other comments you would like to add relevant to the consumption advisory and/or the creek restoration work that was completed in 2007?
- _____

THANK YOU FOR COMPLETING OUR SURVEY