Michigan Department of Health & Human Services

FINAL REPORT:

Assessing Michigan's Beneficial Use of Sport-Caught Fish

Funded by the USEPA-Great Lakes Restoration Initiative

Report submitted to Elizabeth Murphy, EPA GLNPO Project Officer
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Photo Credit: Kathy Evans, Muskegon Lake PAC

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Background and Initial Steps

In 2011, the Michigan Department of Health and Human Services (MDHHS, formerly the Michigan Department of Community Health) received a Great Lakes Restoration Initiative award to work with the Michigan Department of Environmental Quality (MDEQ) to assess the current status of three fish focused Beneficial Use Impairments (BUIs): Restrictions on Fish and Wildlife Consumption BUI in five Areas of Concern (AOCs): Deer Lake, the Menominee River, the River Raisin, the Rouge River, and the St Marys River; the Fish Tumors or Other Deformities BUI in the St Marys River and the Rouge River; and the Tainting of Fish and Wildlife Flavor BUI in the Detroit River. In addition, in Fiscal Years 2012 and 2013, the U.S. EPA also provided additional funds to MDHHS to assess the status of the Fish Consumption BUI in Torch Lake (Houghton Co) and provide fish consumption communication and outreach in the White Lake and Muskegon Lake AOCs.

MDHHS dedicated the full time effort of one of their health educators to oversee the grant project and serve as the primary liaison between MDEQ, MDHHS, and the Public Advisory Councils (PAC) in each of the targeted Areas of Concern. The MDHHS Health Educator/Project Manager (HE/PM) also undertook the development and dissemination of the fish consumption outreach materials in the targeted AOCs, working closely with local stakeholders to ensure the information was provided to residents of the area who were most at risk – frequent fish consumers, children, and individuals who were planning on having children.

Getting Started

Each one of Michigan AOCs is unique – not only from the standpoint of historical problems and contaminants, but also from the standpoint that there are a variety of individuals involved in the Public Advisory Councils - their motivations and their level of involvement vary from place to place. Some PACs are primarily made of engaged citizens who have been with the PAC since the beginning; others are comprised of government appointees who turn over on a regular basis; some are a combination of both; some are highly organized, and others are not. There is a steep learning curve when one attempts to begin to understand all of the moving parts and players and how they coalesce under the large umbrella of Areas of Concern. The jargon is also a challenge. It behooves one to quickly learn that one removes a BUI, delists an AOC, and that the word “recommendation” has a much greater meaning than Merriam-Webster could define in the Area of Concern program.

Therefore, the first step in the process was for the HE/PM to begin to immerse herself in the program. She read multiple Remedial Action Plans for the targeted Areas of Concern, reached out to talk to the people involved both in the MDEQ and the Public Advisory Councils, and began to familiarize herself with the distinctions between each location. She also had to learn about BUIs and the criteria used to assess the status of the three primary BUIs included in this grant:

- Restrictions on Fish and Wildlife Consumption,
- Tainting of Fish and Wildlife Flavor, and
- Fish Tumors or Other Deformities.

Although the learning curve was steep, coming into this field as an outsider made the HE/PM’s job of communicating to the public that much easier. The jargon wasn’t as entrenched and the nuanced history of each Area of Concern came to light, as she discovered and shared with the residents and visitors to these AOCs, the often unappreciated beauty of each of Michigan’s “toxic hot spots.”

Summary of Work Accomplished

The following section summarizes the analytical work accomplished on the project, *Assessing Michigan's Beneficial Use of Sport-Caught Fish.*

Status of Assessment Activities for Fish Consumption (as of 1/31/2016):

AOC or Reference Site	Current Status of Fish Assessment				
	Sampling Plan	Collected	Processed	At Lab	Assessment Completed
Deer Lake	X	X	X	X	X
Menominee River	X	X	X	X	X
River Raisin	X	X	X	X	X
Rouge River	X	X	X	X	X
St Clair River	X	X	X	X	X
Muskrat Analysis*	X	X	X	X	X
St Marys River	X	X	X	X	X
Torch Lake	X	X	X	X	X
Les Cheneaux Islands	X	X	X	X	X
Little Bay de Noc	X	X	X	X	X

*Collection and analysis not funded by this GLRI grant. Effort supported by MDEQ, MDHHS, and Environment Canada.

Assessing the Restrictions on Fish and Wildlife Consumption BUI

The Restrictions on Fish and Wildlife Consumption BUI (here forward known as the Fish Consumption BUI, as Michigan did not include wildlife consumption as impaired in any of the sites) is wholly passive – dependent on the overall ecological state of the lake or river, which is often dependent on the status of the other BUIs. This is why systematic assessment of the fish contaminants can be a cost-effective and relevant indicator for the status of the rest of the AOC. Fish contaminant monitoring also provides critical public health information for the fish consumers who live and vacation in these locations.

The first step toward assessing the status of the Fish Consumption BUI is a review of the original Remedial Action Plan or RAP and any updated versions that had been produced, with careful consideration of the removal criteria. Each AOC has a RAP that explains the history behind the site and the historical reasoning for the selection of the BUIs associated with that site.

The MDEQ has established three tiers of criteria for the removal of a BUI which most PACs have adopted without amendment; however, some PACs have developed their own criteria, and these anomalies were taken into account when developing sampling plans.

Per the Michigan Department of Environmental Quality's (MDEQ) Guidance for Delisting Michigan's Great Lakes Areas of Concern, three criteria exist for the removal of Restrictions on Fish Consumption and Wildlife BUI. The BUI is restored when:

- The fish consumption advisories in the Area of Concern (AOC) are the same or less restrictive than the associated Great Lake or appropriate control site.

OR, if the advisory in the AOC is more stringent than the associate Great Lake or control site:

- A comparison study of fish tissue contaminant levels demonstrates that there is no statistically significant difference in fish tissue concentrations of contaminants causing fish consumption advisories in the AOC compared to a control site.

OR, if a comparison study is not feasible because of the lack of a suitable control site:

- Analysis of trend data (if available) for fish with consumption advisories shows similar trends to other appropriate Great Lakes trend sites.

For the most sites, the second tier is the most appropriate as it compares like species in the same moment of time using the same methodologies. The first tier is not scientifically robust, given variations in lab analysis and data assessment over time, which fail to allow for a direct comparison between consumption guidelines then and now. However, the third tier is a viable option for locations when a suitable reference site cannot not be identified or agreed upon by involved parties.

Assessment Process: Sampling Plan

The MDEQ Fish Contaminant Specialist undertook the primary review of the RAP and development of the draft sampling plans [Appendix A], that were then reviewed by the MDEQ AOC Coordinator and MDHHS HE/PM for accuracy and clarity. The HE/PM served as the liaison between the PAC and MDEQ, presenting the draft sampling plan to the PAC, compiling public and interdepartmental comments, and overseeing the finalization of the sampling plan prior to the fish collection.

The sampling plans each included relevant criteria, such as:

- Species of fish to be sampled
    - Generally one bottom feeder, as they serve as a good indicator of worst-case contaminant loads (often carp)
    - Generally one sport fish, as these are the fish that are most often consumed (often bass), which are also a good indicator because they also fulfill the third criteria of:
    - A species that has good site fidelity, meaning they don't migrate and tend to live their entire lives in one location

- Contaminants to be sampled for per the RAP
    - Generally mercury and PCBs; although, some sites also included dioxins
    - The MDHHS Lab analysis actually includes a large suite of contaminants; however, the only chemicals that are relevant for the BUI assessment are those that originally were responsible for the inclusion of the BUI in the RAP.

- Reference Site
    - To be an acceptable reference site, the water body needs to have like regional inputs, but also
    - Be free from direct contaminant inputs, and
    - Have similar fish populations and species to allow for direct comparison

The approval process for the sampling plans can sometimes be contentious, as myriad interests and concerns need to be taken into account. A reference site sets the stage for BUI removal for those AOCs using the MDEQ Tier 2 removal criterion. Finding a proper site that is scientifically defensible and fulfills all three requirements takes a finesse that can only be achieved by someone very knowledgeable with both regional inputs and also historical contamination inputs. Thankfully, the MDEQ's current Fish Contaminant Specialist assisting on the project has the wherewithal to identify not only location, but also have familiarity with the fish species that can be found in that area, therefore ensuring the collection process is efficient, as well as justifiable when the time comes to compare AOC to reference site fish contaminant results.

Quality Assurance Project Plan

Prior to the fish collection and analysis, a Quality Assurance Project Plan (QAPP) needs to be approved by the U.S. EPA. Per the approval of their U.S. EPA project officer, MDHHS operated under the QAPP approved for the previous Great Lakes Restoration Initiative (GLRI) grant, Enhance State of Michigan Fish Consumption Advisories [GL-00E00457-2]. MDHHS submitted the original QAPP to the EPA for approval with an addendum for the targeted AOCs on June 19, 2012. An additional addendum to the 2012 QAPP was submitted in 2013, and another was submitted in 2015 [Appendix B].

Assessment Process: Collection Process

Once the sampling plans are agreed upon by the PACs and MDEQ AOC Coordinator, the MDEQ Fish Contaminant Specialist submits a request to partners at the MDEQ and Michigan Department of Natural Resources (MDNR) Fisheries to collect the fish specified in the plans. Funding for the collection of 170 fish were included in this grant. The MDEQ and MDHHS were able to leverage this funding to allow for the collection and analysis of nearly 500 more fish from the targeted AOCs to provide for a much more robust data set than initially planned [Appendix C].

Each of these fish are fileted per the specifications detailed in MDEQ's Fish Contaminant Monitoring Program Fish Collection and Processing Procedure (Attachment 2 of the QAPP). In short, the fish are fileted as if they are to be eaten. Only the filets – with skin on or off, depending on common preparation – are sent to the MDHHS Analytical Chemistry Laboratory for analysis.

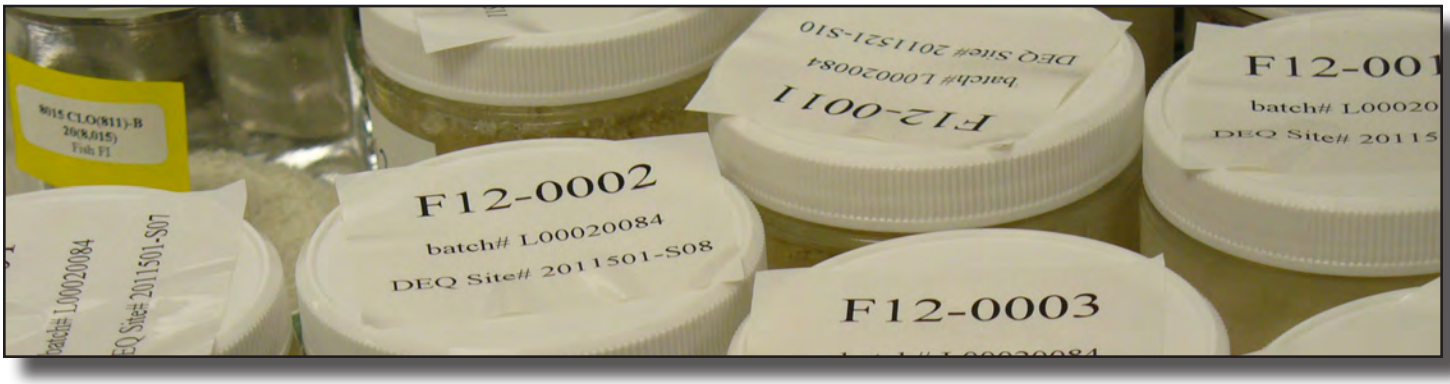
Assessment Process: Laboratory Analysis

Once at the MDHHS Lab, the filets are each processed and analyzed individually for a full suite of contaminants including, but not limited to, contaminants commonly found in AOCs: mercury, PCBs, and sometimes dioxins. The analytical data is then shared with MDEQ and MDHHS where the Fish Contaminant Specialist and MDHHS's toxicologists assess the data.

Assessment Process: Reporting Results

The MDEQ Fish Contaminant Specialist uses the data to create a robust Staff Report that compares the AOC fish contaminant data with the chosen reference site fish contaminant data [Appendix D]. The report stops short at recommending BUI removal or continued assessment, as that responsibility lies with the AOC Coordinator and the PAC.

The MDHHS HE/PM synthesizes the technical report into a presentation that is meant for the layperson, and presents the results at the respective PAC's meeting and answers questions as her skill set allows. She then delivers the full report to the AOC Coordinator and PAC Chair for further review and deliberation for next steps with regard toward potential BUI removal or future assessment.



Status of Fish Consumption Data Analysis

Deer Lake AOC: Delisted!

In partnership with the MDEQ, MDHHS completed the analysis of fish from the Deer Lake AOC:

Fish Collection and Analysis: Deer Lake				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
Carp River Basin				
	Northern Pike	10	13	13
	White Sucker	10	10	10
	Walleye	--	2	2
	Yellow Perch	--	1	1

After the EPA and City of Ishpeming completed the last management action – restoring the flow of Partridge Creek from the mines back into its bed, thereby removing the largest source of mercury entering into Deer Lake – the EPA approved MDEQ's request to remove the Beneficial Use Impairment for Restrictions on Fish Consumption in Deer Lake in February 2014.

With the removal of the last BUI, the Deer Lake Area of Concern was delisted on October 30, 2014. The Deer Lake AOC and the White Lake AOC (the Fish Consumption BUI assessment was covered under a separate award) were the first two AOCs in Michigan to be delisted on that day.

Deer Lake Delisting Celebration
November 14, 2014

Menominee River AOC

Michigan and Wisconsin share the Menominee River AOC site.

Fish were collected from the area in cooperation of the Wisconsin Department of Natural Resources (WNDR). And in partnership with the MDEQ, MDHHS completed the analysis of fish from the Menominee River AOC:

Fish Collection and Analysis: Menominee River				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
River Mouth				
	Carp	10	10	10
	Smallmouth Bass	10	10	8
	Black Crappie	--	10	10
	Bluegill	--	10	10
	Northern Pike	--	9	9
	Redhorse	--	1	1
	Rock Bass	--	10	10
	Yellow Perch	--	9	8
Lower Scott Flowage				
	Carp	10	10	6
	Smallmouth Bass	10	10	1
	Redhorse Sucker	--	12	5
	Rock Bass	--	14	10
	Yellow Perch	--	3	--
	Bluegill	--	3	--

Per the MDEQ Staff Report and other regional investigations, it appears the majority of the contaminants affecting this section of the river are actually from sources located outside of the AOC, be it from air deposition or other direct regional inputs.

The MDEQ, WDNR, and the Menominee River Citizens Advisory Committee are currently reviewing the data and various reports. Based on recent conversations, the HE/PM assumes the Fish Consumption BUI will likely be removed in 2016.

Details can be viewed in the Menominee River AOC Fish Consumption BUI Status Staff Report in Appendix D.

Anglers at Hattie Street Dam, Menominee, MI

River Raisin AOC

In partnership with the MDEQ, MDHHS completed the analysis of fish from the River Raisin AOC:

Fish Collection and Analysis: River Raisin				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
Monroe				
	Carp	10	10	10
	Rock Bass	10	10	10
	Smallmouth Bass	10	--	--
	Largemouth Bass (collected in place of smallmouth)	--	10	10

Removal of the Fish Consumption BUI in the River Raisin is not imminent.

PCB levels in carp and bass were greater than the Huron River reference site. However, mercury levels in carp and bass and DDT levels in carp and bass were lower than all like populations sampled. As remediation work continues and time passes, the PCB contaminant levels in fish will continue to drop, though, eventually leading to removal of this BUI. In the meantime, recent River Raisin dam removals have greatly improved fish habitat and spawning possibilities, ensuring that the River Raisin will one day be a great fishery for both catching and eating.

Details can be viewed in the River Raisin AOC Fish Consumption BUI Status Staff Report in Appendix D.

Rouge River AOC

In their original grant narrative, MDHHS stated that should the assessment of the Tumor and Deformities BUI necessitate a fish collection, MDHHS would also collect fish to assess the Restrictions on Fish Consumption BUI on the Rouge River AOC.

Therefore, per the approved sampling plan, fish were collected in late fall 2013 and sent to the MDHHS Analytical Chemistry Lab for analysis.

In partnership with the MDEQ, MDHHS completed the analysis of fish from the Rouge River AOC:

Fish Collection and Analysis: Rouge River				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
Newburgh Lake				
	Carp	10	10	10
	Largemouth Bass	10	10	10
	Rock Bass	10	0	--
	Bluegill/ Pumpkinseed	--	10	10
Main Branch downstream of Ford Dam				
	Carp	10	10	10
	Largemouth/ Smallmouth Bass	10	10	10
	Rock Bass	10	10	10

Removal of the Fish Consumption BUI in the Rouge River is not imminent.

Per the recent analysis, PCB levels in bass continue to be greater than the Huron River and Ford Lake reference site. However, PCB levels in carp were not statistically different than the Huron River and Ford Lake reference site, illustrating that perhaps conditions are improving at some trophic levels.

Main Branch Rouge River bass continue to have higher mercury concentrations than bass from the Huron River mouth reference site. However, total mercury concentrations in Rouge River carp were low compared to carp from the other waterbodies sampled, and mercury concentrations in bass from the Newburgh Lake were similar to concentrations in Ford Lake bass.

Details can be viewed in the Rouge River AOC Fish Consumption BUI Status Staff Report in Appendix D.

Volunteers at Rouge-A-Palooza, Wayne, MI

St Clair River AOC

The St Clair River AOC is one of Michigan's two binational PACs (BPAC), with members from both the United States and Canada represented. Although both parties in the BPAC operate independently to remove BUIs from the St Clair River, they meet, share data, and mirror removals of BUIs when possible.

In partnership with the MDEQ, MDHHS completed the analysis of fish from the St Clair River AOC:

Fish Collection and Analysis: St Clair River				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
Algonac				
	Carp	10	10	10
	Smallmouth Bass	10	10	10
	Rock Bass	10	10	10

Removal of the Fish Consumption BUI from the St Clair River is imminent.

Total PCB and lipid normalized PCB concentrations in carp, rock bass, and yellow perch from the St Clair River were not greater than concentrations in those fish from Les Cheneaux Islands and Little Bay De Noc. Although total PCB concentrations in smallmouth bass from the St Clair River were greater than in smallmouth bass from Les Cheneaux Islands, the lipid normalized concentrations were not significantly different.

Total mercury concentrations in carp, smallmouth bass, and yellow perch collected from the St Clair River were not significantly different from concentrations in those species collected from the reference sites. Total mercury concentrations in rock bass from the St Clair River were higher than in rock bass from Little Bay De Noc but not significantly different from those collected from Les Cheneaux Islands. Length standardized mercury concentrations in fish from the St Clair River were not significantly different than concentrations in fish from Les Cheneaux Islands but tended to be higher than in fish from Little Bay De Noc.

Total DDT concentrations in samples from the St Clair River were less than the concentrations measured at either Les Cheneaux Islands or Little Bay De Noc. All carp samples were analyzed for dioxin TEQ and the concentrations in those fish collected from the St Clair River were less than the concentrations in carp from Les Cheneaux Islands and Little Bay De Noc.

Details can be viewed in the St Clair River AOC Fish Consumption BUI Status Staff Report in Appendix D.

Anglers on the Blue Water River Walk, Port Huron, MI

Photo credit: Sheri Faust, St Clair River PAC

St Marys River AOC

St Marys is also a binational site. The BPAC has not only American and Canadian representation, but also tribal representation. Although both parties in the BPAC operate independently to remove BUIs from the St Marys River, they meet, share data, and mirror removals of BUIs when possible.

In partnership with the MDEQ, MDHHS completed the analysis of fish from the St Marys River AOC:

Fish Collection and Analysis: St Marys River				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
Munuscong Bay				
	Carp	10	10	10
	Northern Pike	10	0	--
	Rock Bass	--	3	--
	Brown Bullhead	--	10	--
	Pumpkinseed	--	10	10
	Redhorse Sucker	--	7	7
	Rock Bass	--	10	10
	Smallmouth Bass (alternate for pike)	--	10	10
	Walleye	--	8	8
	Yellow Perch	--	10	10

Removal of the Fish Consumption BUI in the St Marys River is not imminent, per the HE/PM's best estimate.

Although chemical concentrations in most of the fish species tested came back the same or lower than the chosen reference sites, it's unlikely that the Fish Consumption BUI can be removed soon due to an anomaly in mercury concentrations in two species.

Total PCB concentrations in fish samples collected from the St Marys River were the same or lower than the concentrations measured in samples from either Les Cheneaux Islands or Little Bay De Noc. Total DDT concentrations in samples from the St Marys River were less than the concentrations measured at either Les Cheneaux Islands or Little Bay De Noc.

Total mercury concentrations in carp, pumpkinseed, redhorse sucker, smallmouth bass, and walleye from the St Marys River were the same or lower than the concentrations measured in those species from one or both of the reference sites. However, total mercury concentrations in rock bass and yellow perch were higher than the concentrations measured at the reference sites in 2013. Even with follow up collection and analysis in 2015, those two species of fish – yellow perch and rock bass – continue to show elevated mercury levels beyond what would be expected in the area, and exceeding the levels found in the reference site.

Details can be viewed in the St Marys River AOC Fish Consumption BUI Status Staff Reports in Appendix D.

Anglers on the St Marys River, Sault Ste Marie, MI

Photo credit: Michelle Walk, MSU Extension

Torch Lake AOC

The Torch Lake AOC is located in Michigan's Upper Peninsula, in the Keweenaw Peninsula. Added to this grant through additional funding granted by the EPA in February of 2014, the Torch Lake AOC although small in scope is large with unknowns. One of the unknowns was the current status of fish contaminants.

In partnership with the MDEQ and the Keweenaw Bay Indian Community, MDHHS completed the collection and analysis of fish from the Torch Lake AOC:

Fish Collection and Analysis: Torch Lake				
		Fish Collection Goal	Fish Collected	Lab Analysis Complete
Torch Lake & Portage Lake				
	Walleye	10	10	10
	Northern Pike	10	10	10
	Smallmouth Bass	10	10	10
Huron Bay				
	Walleye	10	12	12
	Northern Pike	10	7	7
	Smallmouth Bass	10	0	0
L'Anse Bay				
	Northern Pike	10	13	13

Removal of the Fish Consumption BUI in Torch Lake is not imminent.

Given the MDEQ Remediation and Redevelopment Division's continued characterization of the contamination on the shoreline of the AOC of sediment that could theoretically contribute as an uncontrolled source of contamination for the AOC, in addition to the scope of the contamination that is known, it is unlikely this BUI will be removed soon.

Per this assessment, total PCB concentrations in fish collected from Torch Lake were higher than in the same species collected in Huron Bay and L'Anse Bay. In addition, total PCB concentrations in Torch Lake northern pike and walleye were elevated compared to levels in those species collected in recent years from inland lakes in both the Upper and Lower Peninsulas, although the differences were not always statistically significant.

However, total PCB concentrations in fish from Torch Lake have decreased since monitoring began in 1988, which is a common pattern throughout the Great Lakes region.

Total mercury concentrations in Torch Lake northern pike were higher than in northern pike collected from L'Anse Bay, but were not statistically different than in those fish from Huron Bay. Also of note, total mercury concentrations in Torch Lake walleye were higher (statistically significant) than walleye collected from Huron Bay.

However, Northern pike, smallmouth bass, and walleye from Torch Lake had mercury concentrations similar to the concentrations in those species from other inland lakes. Total mercury concentrations in Torch Lake fish have tended to increase since monitoring began in 1988. However, per a December 2015 report from the International Joint Commission, entitled *Atmospheric Deposition of Mercury in the Great Lakes Basin*, there has been a trend of increasing or level mercury levels in all Great Lakes region fish, and this is not necessarily unique to the Torch Lake AOC.

Status of Outputs

✓	The MDHHS will develop a fish sampling plan for the Deer Lake, St. Mary's River, St. Clair River, Menominee River, River Raisin, and Rouge River AOCs in close collaboration with the MDEQ and with each PAC. [See Appendix A.]
✓	The MDHHS will, in collaboration with the MDEQ and the MDNR, develop and submit to the US EPA a Quality Assurance Project Plan (QAPP) for fish sampling. The QAPP will comply with US EPA quality management and assurance requirements as described on the US EPA website (http://www.epa.gov/QUALITY/exmural.html). [See Appendix B.]
✓	The MDHHS will, in collaboration with the MDEQ and the MDNR, implement AOC fish sampling plans for the Deer Lake, St. Mary's River, St. Clair River, Menominee River, River Raisin, and Rouge River AOCs to include: • Year One: Six novel fish collections in the Deer Lake, St. Mary's River, St. Clair River, Menominee River, and Rouge River AOCs • Year Three: One novel fish collection in the River Raisin AOC early in Year Three. [See Appendix C.]
✓	In Year Two, the MDHHS laboratory will analyze fish samples collected in year one.
✓	Late in Year Three, the MDHHS laboratory will analyze fish samples collected in the River Raisin AOC.
✓	The MDHHS and the MDEQ will produce a BUI assessment summary that will include the evaluation of each sampled AOC's fish contaminant data compared to a referent site and provide a recommendation for next steps to assess the AOC-specific fish BUI. [See Appendix D.]
✗	MDHHS, in collaboration with the MDEQ, will conduct a written assessment of progress towards delisting the Restriction of Fish Consumption BUI at each AOC not cited above. • **Explanation:** Given additional funding was provided to MDHHS from the U.S. EPA to assess the remaining AOCs during this grant cycle, this output was no longer relevant. Instead, MDHHS continued to work with MDEQ to prepare sampling plans and organize collection activities for the remaining AOCs.
✓	The MDHHS will submit quarterly reports and a final project report, including an accounting of funds expended, to facilitate U.S. EPA oversight and administration of the proposed activities. [See Appendix E.]
✓	The MDHHS will remain available to US EPA for meetings and conference calls to update Region 5 staff of progress on completion of the proposed activities.

White Lake 'Life After Delisting' Briefing, Whitehall, MI

Status of Outcomes

✓	AOC-specific plans and procedures will be developed that will enable the State of Michigan agencies and the AOC PACs to evaluate fish contaminant data.
✓	AOCs where further remedial actions are needed before fish BUIs can be lifted will be identified. Further actions could range from gathering additional data to recommendations for cleanup efforts. The following list summarizes the status of the Fish Consumption BUI in each of the targeted AOCs as of the reporting date to the best of the HE/PM's knowledge: • River Raisin: Fish Consumption BUI Removal Not Imminent • Rouge River: Fish Consumption BUI Removal Not Imminent • St Marys River: Fish Consumption BUI Removal Not Imminent • Torch Lake: Fish Consumption BUI Removal Not Imminent
✓	AOCs where sufficient data are available to recommend delisting removal of fish BUIs will be identified and plans to achieve delisting will be developed and recommended. • Deer Lake AOC: Delisted in 2014 • Menominee River AOC: BUI removal likely in 2016 • St. Clair River AOC: BUI removal likely in 2016

Lakeshore Arts Festival, Muskegon, MI

Assessing the Tainting of Fish and Wildlife Flavor BUI

The only AOC that still had the Tainting of Fish and Wildlife Flavor BUI in place at the time of this grant being issued was the Detroit River AOC.

Per the MDEQ's Guidance for Delisting Michigan's Great Lakes Areas of Concern, two criteria exist for the removal of Tainting of Fish and Wildlife Flavor BUIs. This document states that the BUI is considered restored when:

- No more than three reports of fish tainting have been made to the MDNR or MDEQ for a period of three years.

OR, if there have been reports of tainting:

- A one-time analysis of representative fish species in an AOC in accordance with MDEQ Surface Water Assessment Section (SWAS) Procedure #55 (now SWAS #006) for conducting taste and odor studies indicates that there is no tainting of fish flavor [APPENDIX F].

Friends of the Detroit River Survey and BUI Removal

The Friends of the Detroit River had previously received a grant to survey anglers on tainting of flavor of fish from the Detroit River, and their work was already underway when the MDHHS was awarded this grant.

Rather than compete or recreate the wheel, the HE/PM determined that the value she could bring to the effort was assisting with communications and outreach after the survey was completed.

In 2012, the Friends of the Detroit River released their final report showing that overall perception of fish flavor from the river was positive, and the few complaints were mainly related to personal preference relating to the "fishiness" of the fish, which could be a result of species or storage. Through the efforts of the Friends of the Detroit River, the Tainting of Fish and Wildlife Flavor BUI was removed in September 2013. The final report can be viewed here: http://www.michigan.gov/documents/deq/Detroit_River_Fish_Tainting_BUI_Removal_Documentation_450337_7.pdf.

Tainting of Fish Flavor BUI Outreach Materials

To ensure that the misnomers recorded in the survey with regard to the Tainting of Fish Flavor were not perpetuated, leading to public backlash upon the removal of the BUI despite fish still tasting "fishy" and meat "mushy", the HE/PM focused her efforts on the development of a fact sheet [Appendix G] that explained the Fish Tainting BUI and stressed a few key points to correct these misconceptions:

- "tainted fish flavor" does not include "fishiness" or other concerns that were raised in the Friends of the Detroit River Fish Flavor survey report,
- Fish with meat that is softer than normal is not considered to be part of the Tainting of Fish Flavor BUI,
- Sores or tumors on the fish are not part of the Tainting of Fish Flavor BUI,
- the Tainting of Fish Flavor BUI is not the same as the Restrictions on Fish Consumption BUI. The chemicals that cause fish consumption guidelines to be issued do not affect the flavor or appearance of fish.

This fact sheet was distributed in media packets and to participants at the celebration event held on Fighting Island on May 7, 2014. It continues to be available on the MDHHS Eat Safe Fish website (www.michigan.gov/eatsafefish) under the Find Your Area/Detroit River section.

Removal of Detroit River Fish Tainting BUI Celebration, Fighting Island, ON

Assessing the Fish Tumor or Other Deformities BUI

MDHHS was funded to assist MDEQ to assess the status of the three remaining Michigan AOCs that still had the Fish Tumor or Other Deformities BUI: Detroit River, Rouge River, and the St Marys River. Working with MDHHS and the PACs, the MDEQ Fish Contaminant Specialist developed sampling plans for each of the sites [Appendix H].

Although none of the affected AOCs have been able to remove this BUI as of the report date, more is known about the current status of the Fish Tumor and Deformities BUI at each site.

Per the MDEQ's Guidance for Delisting Michigan's Great Lakes Areas of Concern, two criteria exist for the removal of Fish Tumor or Other Deformities BUI. The BUI is restored when:

- No reports of fish tumors or deformities due to chemical contaminants which have been verified through observation and analysis by the Michigan Department of Natural Resources (MDNR) or the MDEQ for a period of five years.

Or, in cases where any tumors have been reported:

- A comparison study of resident benthic fish (e.g. brown bullhead) of comparable age and at maturity (3 years), or of fish species that have been historically associated with this BUI, in the AOC and a non-impacted control site indicates that there is no statistically significant difference (with a 95% confidence interval) in the incidence of liver tumors or deformities.

Detroit River AOC

MDEQ looked for visible tumors and lesions in bullhead collected from the Detroit River during 2011.

The data from MDEQ's assessment of twenty-one (21) bullhead showed that those fish taken from the main branch of the river seemed to be in good health and free of tumors. However, the U.S. Geological Survey (USGS) provided the final report detailing their tumor survey of fish tumors in the Detroit River and Trenton Channel. However, the USGS assessment of brown bullhead taken from the Trenton Channel shows a higher than normal rate of tumor growth (https://pubs.usgs.gov/of/2014/1105/pdf/ofr2014-1105.pdf).

To determine next steps, the HE/PM convened a series of conference calls between representatives from MDEQ, the EPA, the Detroit River AOC PAC, USGS, and Environment Canada to assess the data available and identify any data gaps that need to be addressed prior to consideration for removal.

In fact, to supplement the known information, over the summer, the Detroit River PAC chair, Mary Bohling, MDHHS, and MDEQ put in requests with all agencies working in the Trenton Channel to collect any bullhead incidentally caught during their unrelated actions on the river. Unfortunately, none were caught – leading to a few potential conclusions – bullhead are not choosing to live there or if they are there, they are just elusive; there is also concern on behalf of both the US and Canadian sides of the total population of brown bullhead in the river. Environment Canada had scaled their collection back for concern of population depletion. Both the US and Canada are looking into the feasibility of substituting white sucker for future assessments.

It was determined that the given the unknowns related to the Trenton Channel and the limited availability of fish to sample from that area, currently, that it would be most prudent to delay further assessment of BUI removal until after Great Lakes Legacy Act dredging takes place in the coming year.

The MDEQ Fish Contaminant Specialist proposed a three year recovery period after dredging before sampling again to allow for fish born after the dredging to reach maturity. It was concluded that a study of the most susceptible fish from one of the Detroit River AOC's PAH (polycyclic aromatic hydrocarbon) hot spots will provide a more defensible picture of the status of the BUI than fish taken from the main branch of the Detroit River which is largely unaffected by PAHs, exposure to which are most commonly linked with tumors in susceptible fish populations. Given that the Detroit River has many other BUIs to remove before delisting is possible, a slight delay to ensure greater scientific integrity will not have an effect on the eventual delisting of the Detroit River AOC.

Rouge River AOC

Although the original incidence of tumors appeared to be statistically lower than one would expect to impose a BUI, the MDEQ moved forward with a fish collection and tumor review. During the collection, MDEQ staff saw only one possible external tumor-like lesion in 41 white sucker collected from the Main Branch Rouge. The MDEQ collection crew were fairly confident that they collected a robust representative sample of white sucker from that reach of the river. Given the time of year, these were most likely resident fish.

Out of 147 white sucker (plus 38 hogsucker) collected from the Upper Rouge, the staff did not see any with tumors. A few parasites were identified, as pictured here.

All fish were in good health; there were no signs of malnutrition or stress.

Although these findings are indicative of an imminent removal of the Tumors or Other Deformities BUI on the Rouge River, as of December, the MDEQ AOC Coordinator for the Rouge River stated it is unlikely the Tumor and Deformities BUI will be removed until the sediment cleanups are completed. MDEQ and EPA data confirm hot spots remaining in the main channel, and there are a number limiting factors in the original analysis, leading to a lack of confidence that no tumors actually are present in the fish population. The AOC Coordinator is investigating whether there are any feasible actions to undertake at this point to more thoroughly assess this BUI, including the possibility of a histological survey, since the sediment work will not be completed for a number of years.

MDEQ and EPA data confirm multiple contaminant hot spots in the main channel of the Rouge River. Unfortunately, the sediment work won't be completed for a number of years. However, a slight delay to ensure greater scientific integrity will not have an effect on the eventual delisting of the Rouge River AOC.

St Marys River AOC

In 2012, MDEQ examined ten bullhead from the St Marys Rivers and found that no lesions or visible liver tumors were observed. In addition, MDEQ biologists also examined sixty-seven fish of seven other species and found no gross tumors. Although no histological survey was done, these findings are significant because the sample did include eight walleye. In 1987, near the beginning of the AOC program, this BUI was included for the St Marys River because there were some grossly observable liver tumors in walleye.

However, a more robust study of one hundred white suckers that was funded by Environment Canada in 2009 demonstrated that some fish still showed a higher than expected rate of liver tumors. Per 2015 BPAC Report, in August 2015, Environment Canada repeated the fish tumor survey by collecting an additional one hundred white suckers from the AOC. These fish are now being analyzed for liver tumors to obtain more information on tumor prevalence and exposure after remediation events. Findings will be discussed with the BPAC in the latter half of 2016. It is likely that Michigan MDEQ will await the results of this study before determining next steps for this BUI.

See Appendix I: Staff Reports for Tumors for additional details.

Fish Tumor BUI Outreach Materials

The HE/PM created a fact sheet called *Fish Tumors or Other Deformities in Michigan's Areas of Concern* [Appendix J] to encourage people to report fish with tumors to the Michigan Department of Natural Resources, as reporting relates directly to the first MDEQ criteria for removal.

A parasite on a hogsucker from the Rouge River, 2013

Fish Consumption BUI & Community Outreach Activities

The HE/PM undertook a tiered approach when developing outreach materials for the targeted AOCs. Given the need for data prior to determining if any fish consumption BUIs will be lifted and determining what new fish consumption guidelines may be issued in the AOC, area-specific outreach was predominantly on hold until 2014. Because of this, the HE/PM developed a hierarchy of outreach strategies, and assigned each AOC to a tier of communication depending on the status of the BUI assessment process.

Communication Outreach Plans

Tier 1

During the initial grant downtime as the fish collection and analysis got underway, the HE/PM focused on distributing general "Eat Safe Fish" materials that promote the Michigan fish consumption guidelines and messages that are applicable statewide, not just in AOCs. The goal of this outreach was to normalize the concept of fish consumption guidelines. The objective was to build awareness of the need to "choose safe fish" throughout the state of Michigan.

The HE/PM proposed that many members of the public are unaware of the terms Area of Concern, Beneficial Use Impairment, and with the MDHHS Eat Safe Fish Guide. With the assumption that fish consumption BUIs will be removed in the near future in many AOCs in Michigan, the HE/PM felt it was important to first saturate the AOC market with information about the fish consumption guidelines and presenting them as a statewide "fact of life," prior to introducing the concept of Fish Consumption BUIs. The HE/PM hypothesized that in general, the public will be more accepting of the removal criteria 'no worse than a like body of water' if they understand that fish consumption guidelines exist statewide and that the fish consumption guidelines on their local lake and river are the norm rather than an exception.

Tier 2

The HE/PM also felt that as fish consumption BUIs were removed, that it was important that the public are introduced to the concepts of AOCs and fish consumption BUIs in a clear, concise manner. It is also important that the public is clear on the distinct differences between a fish consumption BUI and the MDHHS fish consumption guidelines. It was with this goal in mind that the HE/PM developed, in partnership with the MDEQ AOC Coordinators, the "Eat Safe Fish in Areas of Concern" fact sheet [Appendix K]. MDHHS and MDEQ planned to distribute this fact sheet to media prior to any fish consumption BUI removal, and to the public during BUI removal public comment sessions and other related events.

The fact sheet, as well as multiple general Eat Safe Fish outreach materials, were developed to support this grant work and continue to be distributed to the targeted AOCs to create familiarity and generate local support of the fish consumption guidelines even as this first grant period draws to a close.

Tier 3

Once MDHHS received updated fish contaminant data, the HE/PM worked with the PACs to develop area-specific appropriate outreach materials that serve to educate the public about the AOC, the BUI, and the fish consumption guidelines applicable to their area.

Annual White Lake Fish Boil, 2014

Photo credit: White Lake Area Sportfishing Association

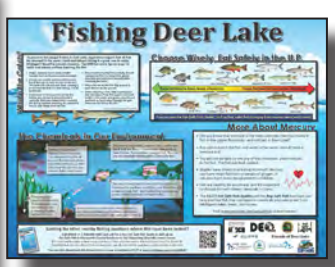
Deer Lake AOC: Delisted!

The HE/PM finalized an area-specific brochure that highlights fishing locations and fish consumption guidelines for MDHHS-tested fish from waterbodies in Marquette County. The MDHHS also added the MDNR's family friendly fishing locations onto the map, which will allow individuals to identify areas to go fishing which are easily accessible and have good catch rates of panfish in particular. Panfish tend to be lower in contaminants.

The MDHHS conferred with Cliffs Natural Resources with regard to the Consent Agreement and sign posting. Cliffs has posted the signs at both the old and new boat launches, as well as several other shoreline fishing locations around the lake. The HE/PM also continues to negotiate permissions with other city and county organizations to get additional sites posted along Carp River and Carp Creek.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Friends of Deer Lake
- City of Ishpeming
- Marquette County Health Department
- Central Upper Peninsula Sport Fishing Association
- MDNR
- Marquette County Convention and Visitor's Center



Signs posted at the Deer Lake MDNR Boat Launch

*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

Menominee River AOC

MDHHS collaborated with the Menominee River AOC Citizens Advisory Committee (CAC), MDEQ, Wisconsin DNR, and the University of Wisconsin Extension to develop outreach materials that can be distributed in both states.

MDHHS's updates to the fish advisory program brought Michigan's Menominee River fish consumption guidelines more in consensus with Wisconsin's existing guidelines; however, they don't match exactly currently due to analysis methodology. MDHHS has proposed working with the Wisconsin DNR to identify points of latitude so that the consumption guidelines will correspond in both states for this shared waterbody. Should this endeavor prove successful, the two states will be able to more easily correlate outreach materials, mitigating confusion in these closely intertwined bi-state communities and allowing for economy of scale when ordering in the future.

Until that happens, MDHHS has provided WDNR and the Menominee River CAC with state-specific signs that can be posted on both sides of the river, as well as brochures and other outreach materials which WDNR and other partners will distribute at events the HE/PM cannot attend.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Menominee & Marinette Great Lakes Sport Fishermen Association
- Public Health of Delta & Menominee County
- MDNR - Wells State Park and Marinas
- Spies Public Library

Sign posted on the Menominee River

Photo credit: Laurel Last, WDNR

*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

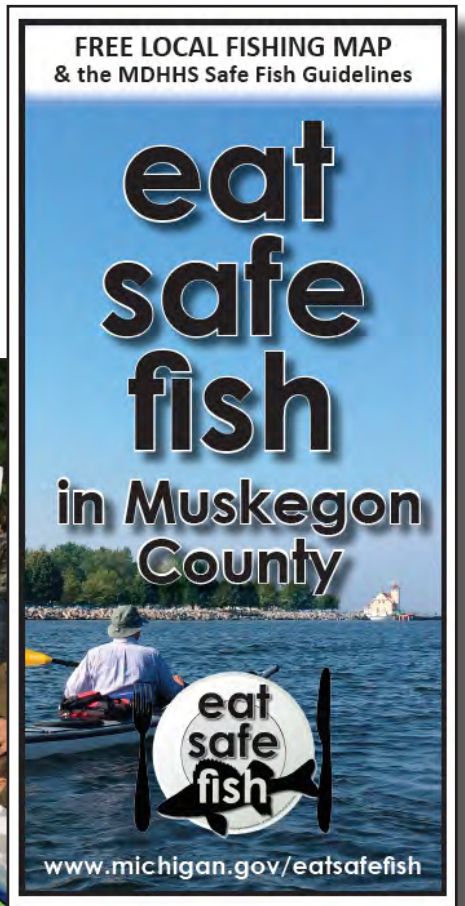
For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

Muskegon Lake AOC

MDHHS convened a stakeholder group with members from the MDEQ, the MDNR, the Menominee Lake AOC PAC, local health, and others to develop brochures and signs to facilitate the consumption of safe fish from Muskegon Lake.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Muskegon County Convention and Visitors Bureau
- Muskegon Lake Watershed Partnership
- West Michigan Shoreline Regional Development Commission
- Muskegon Area Sportsmen for Youth
- MDNR and Muskegon State Park
- Public Health Muskegon County



Muskegon Area Sportsmen for Youth Day

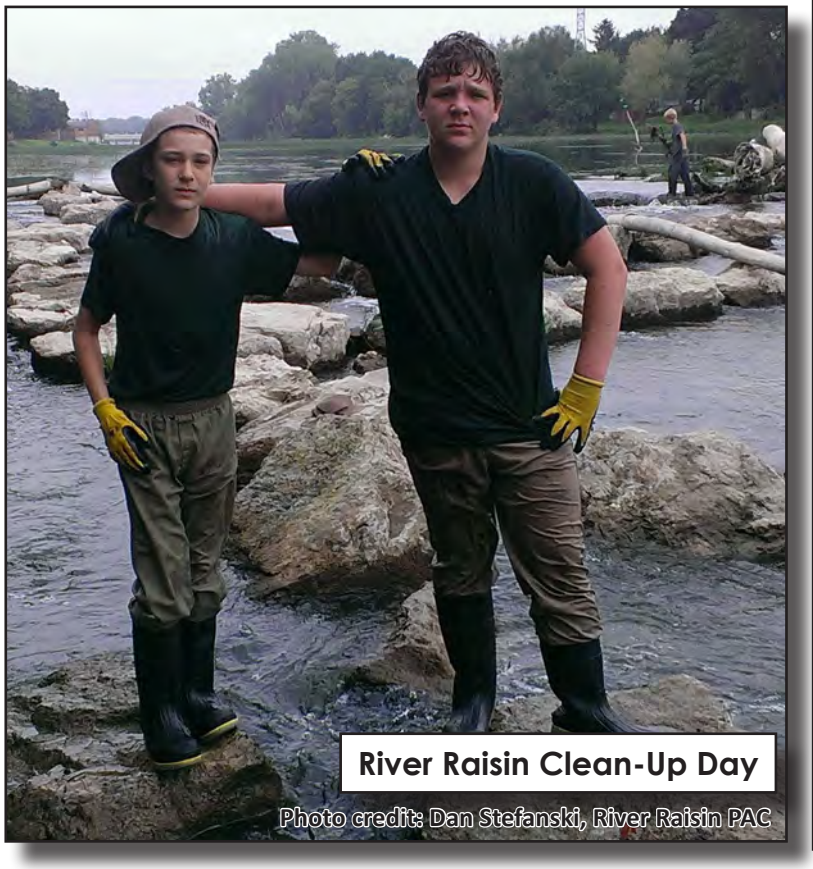
*For the full list of stakeholders involved in AOC outreach, please see Appendix O.
For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

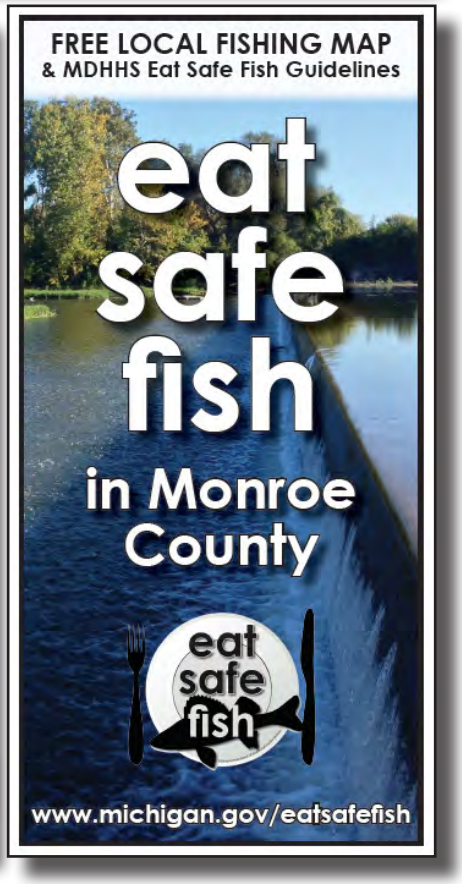
River Raisin AOC

MDHHS worked closely with stakeholders on the PAC to develop signs and brochures for the area, in addition to providing input and artwork for outreach items developed by local groups active in the AOC.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Monroe County Health Department
- Monroe Parks and Recreation
- MDNR - Sterling State Park
- River Raisin Clean-Up Day organizers
- Monroe County Food Day organizers





*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

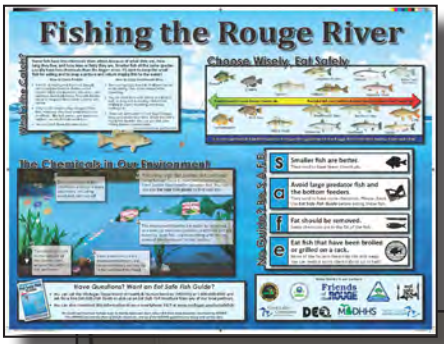
For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

Rouge River AOC

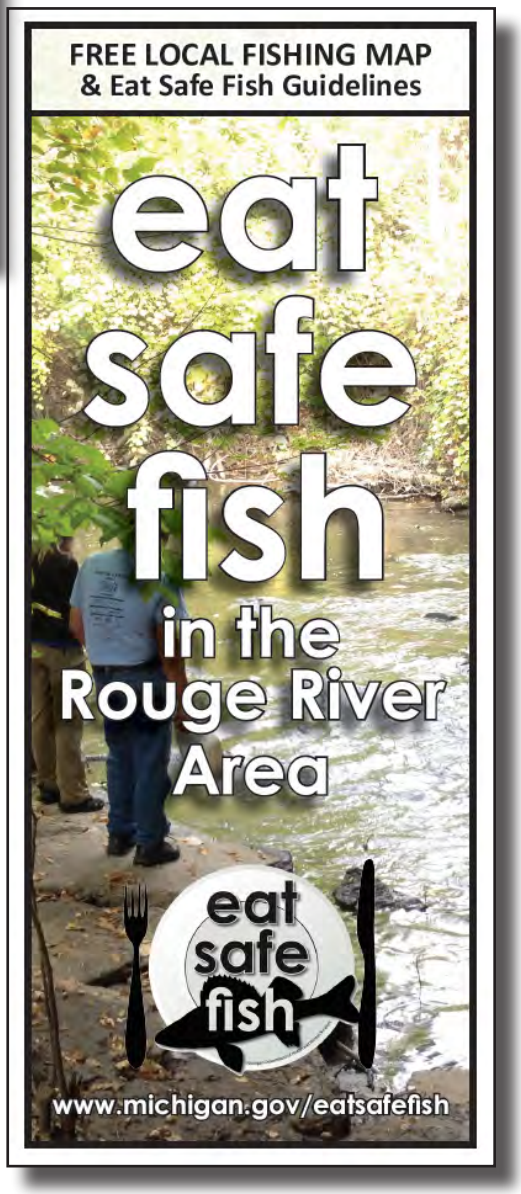
MDHHS collaborated with the Rouge River PAC, Friends of the Rouge River, MDNR, and MDEQ to develop outreach for the area.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Friends of the Rouge River
- Alliance of Rouge Communities
- City of Southfield
- Parent Teacher Associations for local schools
- Wayne County Parks



Rouge River Water Festival Class Activity



*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

St Clair River AOC

MDHHS collaborated with the St Clair River BPAC, MDEQ, and members of the Watershed Council to develop the outreach materials in use in communities along the St Clair River.

The brochures have been distributed at special events and to key partners along the St Clair River.

MDHHS delivered the signs to the Watershed Council in early July 2015. Each of the respective townships took ownership of the signs and have posted them in locations frequently accessed by shoreline and boat anglers. The St Clair County Health Department will maintain the extra signs and distribute as needed for replacements in the future.

The HE/PM also worked with the BPAC and local health department to develop a fact sheet with regard to muskrat consumption given the local popularity of the meat during Lent. Although the BUI does not include wildlife, the BPAC and HE/PM felt this was an important message to share with people who live within the AOC.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- St Clair County Health Department
- organizers of the annual Sturgeon Festival
- MDNR Creel Clerks

Sign posted on the St Clair River

*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

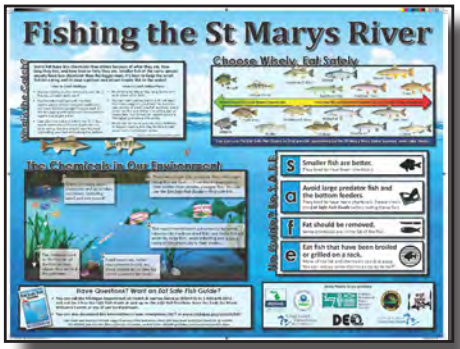
St Marys River AOC

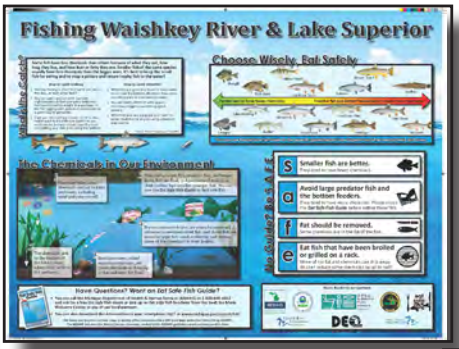
MDHHS collaborated with the St Marys BPAC, MDEQ, the Sault Tribe, and other local stakeholders to develop the outreach items for the St Marys AOC.

The HE/PM has distributed brochures, bobbers, and tape measures to all bait and tackle stores and boat repair shops border the AOC, as well as the Michigan Welcome Center in Sault Ste Marie. The HE/PM has also scouted site locations for signage and will be working with local partners to get signs posted this spring.

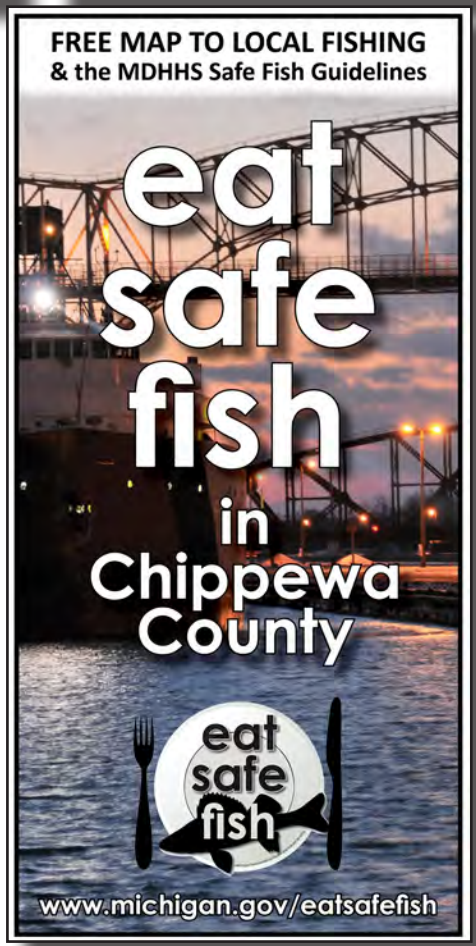
The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Sault Tribe Health Center
- Chippewa County Health Department
- MSU Extension
- Michigan Welcome Center in Sault Ste Marie





Statewide brochures provided to local campground



*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

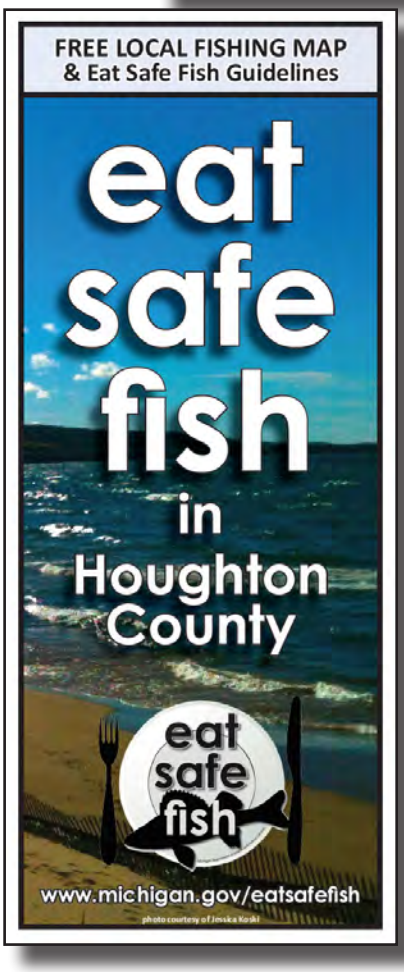
Torch Lake AOC

MDHHS collaborated with the Keweenaw Bay Indian Community (KBIC) and MDEQ to develop outreach materials for the Torch Lake area.

The HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

- Keweenaw Bay Indian Community Natural Resources and Health Department
- Western Upper Peninsula Health Department
- Keweenaw Convention & Visitor's Bureau
- Houghton Keweenaw Conservation District
- Michigan Tech University

KBIC Environmental Fair, 2015



*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

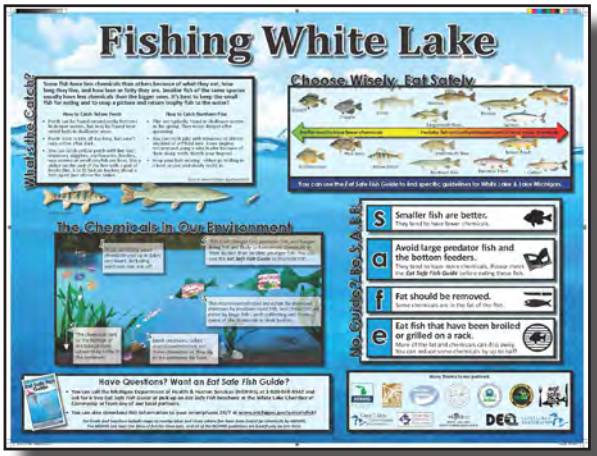
White Lake AOC: Delisted!

MDHHS collaborated with the White Lake PAC and MDEQ to develop outreach materials for the White Lake area.

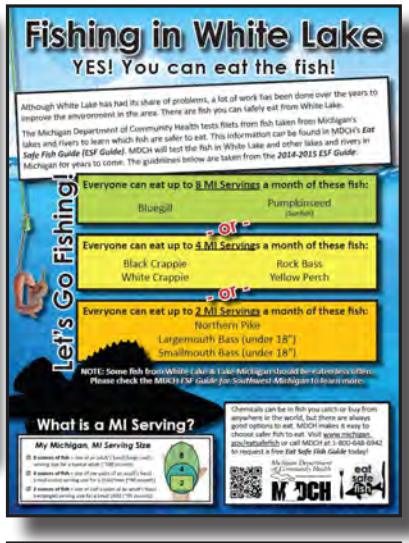
White Lake has long been perceived as polluted by individuals who live in the area and visitors, ironically due to the many clean-up projects which have ultimately greatly improved the ecological health of White Lake. So, although the HE/PM is conscientious about promoting fishing in all sites, she especially focused using positive messaging in the White Lake area, including incorporating the slogan, “Yes! You can eat the fish!” on many of the area specific outreach items, including flyers and posters distributed to local businesses.

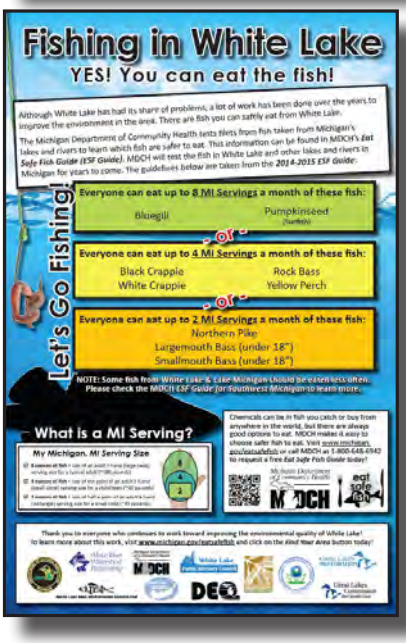
In addition, the HE/PM has established relationships with many key stakeholders in the area and has provided outreach items to many organizations, including, but not limited to*, the

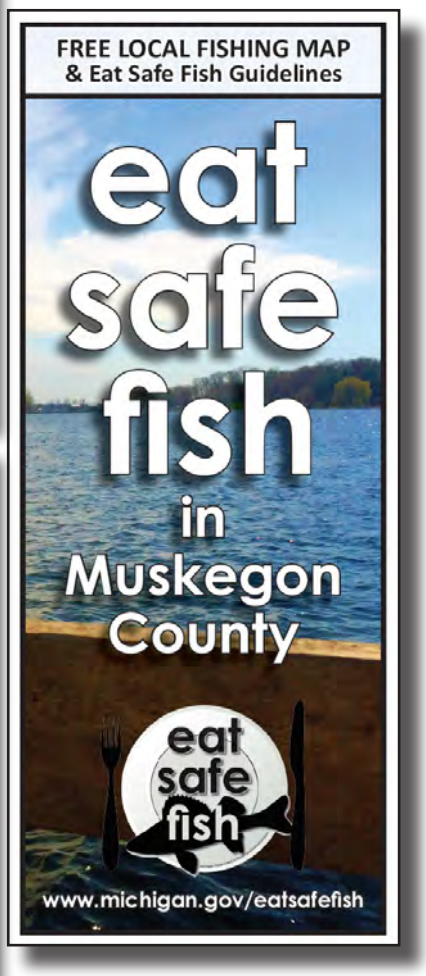
- White Lake Association
- White Lake Area Sportfishing Association
- Muskegon Conservation District
- White River Watershed Partnership



White Lake Delisting Celebration, 2014







*For the full list of stakeholders involved in AOC outreach, please see Appendix O.

For the full versions of the above and other outreach items created for AOC outreach, please see Appendix N.

Outreach Summarized

Over the four and a half years covered by this grant, the HE/PM worked to build trust and lasting relationships with members of the public advisory councils and other stakeholders at the targeted sites.

The HE/PM taught basic principles of bioaccumulative and persistent chemicals with regard to fish consumption through poster presentations and informational booths at local and national symposiums and summits. She also continued to serve as a liaison between public health and environmental advocates bringing together state, federal, and local stakeholders to address beneficial use impairments in the targeted Areas of Concern.

She also attended public meetings, participated in planning sessions and BUI removal events, collaborated with federal and state partners as part of the Great Lakes Consortium for Fish Advisories and at the annual EPA Review Team meeting, participated in AOC delisting events, and participated in myriad conference calls and email conversations regarding AOC issues all with the goal of establishing the necessary social framework that will continue to sustain the fish consumption messaging in these communities long after the funding for the HE/PM is discontinued.

Besides the many stakeholders in each of the communities, the MDHHS HE/PM also collaborated with members of the St Marys BPAC at Lake Superior State University and partners at the Great Lakes Commission to facilitate the development of the outreach materials integral to the success of this project.

Status of Outputs

✓	The MDHHS will develop a Community-Based Fish Consumption Advisory plan for the Deer Lake, St. Mary's River, St. Clair River, Menominee River, Muskegon Lake, River Raisin, Rouge River, Torch Lake, and White Lake AOCs in close collaboration with the MDEQ and with each AOC PAC.
✓	In collaboration with the PACs named above, MDHHS will develop community-specific materials that may include: • Location-specific fish consumption advisory brochures • Fish consumption advisory awareness items • Design and installation of fish consumption advisory signs
✓	In collaboration with the PACs named above, MDHHS will participate in or host community-specific events: • Conduct community meetings • Participate in community events to distribute information • Conduct awareness activities such as an art contest for school children
✓	The MDHHS and the MDEQ will produce a report summarizing community outreach activities in participating Michigan AOCs.
✓	The MDHHS will submit quarterly reports and a final project report, including an accounting of funds expended, to facilitate US EPA oversight and administration of the proposed activities.
✓	The MDHHS will remain available to US EPA for meetings and conference calls to update Region 5 staff of progress on completion of the proposed activities.

Status of Outcomes

✓	Through the Community-based Fish Consumption Advisory program, communities will have the information they need to make safe choices about consumption of local fish. • Over 250,000 Eat Safe Fish-branded items were distributed to stakeholders in targeted AOCs for distribution to core audiences, including nearly 40,000 *Eat Safe Fish in Michigan* brochures. The roll out of the immensely popular area-specific brochures is just beginning. [APPENDICES M & N.] • The HE/PM attended over 20 local events hosted in the targeted AOCs and directly interacted with nearly 13,000 individuals and families over four years [Appendix L]. • The HE/PM developed relationships and provided materials to over 160 unique stakeholders in the targeted AOCs [Appendix O]. The HE/PM also held many informal Train the Trainer sessions for stakeholders in WIC departments and sportfishing groups to ensure a lasting legacy of messaging in these communities. • The HE/PM provided materials to stakeholders for events she couldn't attend.
✓	Michigan families will be enabled to make informed decisions about safe fish consumption and will enjoy improved health because they will be protected from the harmful effects of exposure to contaminants in fish. • See page 32 for list of outreach items created/adapted for this grant and included in Appendix N.
✓	Michigan families will have a safe, low cost, nutritious source of protein for their families.
✓	Sport fishing in Michigan will promote local food consumption and that, in turn, will benefit local economies. • The HE/PM has provided outreach materials to multiple businesses and organizations who rely on sportfishing either as a livelihood or a way of life, including: restaurants, sportfishing associations, regional tourist and convention centers, tribes, and MDNR fishing license distributors.

Eat Safe Fish Outreach Items for AOCs

- Eat Safe Fish-branded tape measures
- Eat Safe Fish-branded bobbers
- Eat Safe Fish-branded can koozies
- Eat Safe Fish-branded tattoos
- Eat Safe Fish-branded magnets
- Eat Safe Fish-branded stickers
- Eat Safe Fish-branded lanyards
- Eat Safe Fish-branded activity sheets for K-3rd grade
- Eat Safe Fish-branded activity sheets for 4th – 6th grade
- Eat Safe Fish in Areas of Concern fact sheet [SEE APPENDIX I]
- Tumors and Deformities BUI in Fish in Areas of Concern fact sheet [SEE APPENDIX J]
- Tainting of Fish Flavor BUI in Areas of Concern fact sheet [SEE APPENDIX G]
- Eat Safe Fish in Marquette County (Deer Lake)
- Fishing Deer Lake signs (Deer Lake)
- Fishing Carp Creek signs (Deer Lake)
- Fishing Carp River signs (Deer Lake)
- FAQs: Eating Fish from the Detroit River (Detroit River)
- Eat Safe Fish in Menominee County (Menominee River)
- Fishing the Menominee River signs for Michigan-side access (Menominee River)
- Fishing the Menominee River signs for Wisconsin-side access in partnership with Wisconsin Department of Natural Resources (Menominee River)
- Fishing Lake Michigan signage (Menominee River)
- Eat Safe Fish in Muskegon County (Muskegon Lake)
- Fishing Muskegon Lake signs (Muskegon Lake)
- Eat Safe Fish in Monroe County (River Raisin)
- Fishing the River Raisin signs (River Raisin)
- Fishing Lake Erie (River Raisin)
- Eat Safe Fish in the Rouge River Area
- Fishing the Rouge River signs (Rouge River)
- Fishing the Upper Long Lake and the Rouge River signs (Rouge River)
- Eat Safe Fish in St Clair County (St Clair River)
- MDHHS Health Consult: Muskrat from the St Clair River (St Clair River)
- Eat Safe Muskrat from the St Clair River (St Clair River)
- Fishing the St Clair River signs (St Clair River)
- Eat Safe Fish in Chippewa County (St Marys River)
- Fishing the St Marys River (St Marys River)
- Fishing Lake Superior (St Marys River)
- Fishing the Waishkey River (St Marys River)
- Eat Safe Fish in Houghton County (Torch Lake)
- Eat Safe Fish in Houghton County (Torch Lake in partnership with the Keweenaw Bay Indian Community)
- Fishing Torch Lake signs (Torch Lake)
- Eat Safe Fish in Muskegon County (White Lake)
- Fishing White Lake signs (White Lake)
- Yes! You Can Eat the Fish! Poster (White Lake)
- Yes! You Can Eat the Fish! Flyer (White Lake)

Reporting Activities

The GLRI reporting requirements specified by the U.S. EPA morphed during the course of this project. MDHHS initially posted quarterly updates in the GLAS reporting system, in addition to preparing written quarterly summaries and semi-annual grant reports. When GLAS was discontinued, the HE/PM continued to submit quarterly and semi-annual grant reports to their U.S. EPA project officer, who was and continues to be a much appreciated advocate for the MDHHS Eat Safe Fish program. [See Appendix E for MDHHS' Semi-Annual Reports.]

Changes to Object Class Categories

MDHHS Accounting had updated the Object Class Categories based on the budget amendment approved by the EPA on 11/15/2012.

Barriers and Corrective Actions

None.

Activity Workplan and Current Status (as of 1/31/2016)

Activity		Percentage Completed	
		Current Reporting Period	For the Project
Restrictions on Fish Consumption BUI Assessment Activities			
	Submit QAPP for EPA Approval	100%	100%
	Develop AOC Fish Sampling Plans for targeted AOCs	100%	100%
	Fish collection	100%	100%
	Processing of fish samples	100%	100%
	Analysis of fish samples	100%	100%
	Analytical reports completed	100%	100%
	Data review and analysis	100%	100%
	Attend AOC advisory council meetings, as necessary	100%	100%
Tainting of Fish Flavor BUI Assessment Activities			
	Evaluate Detroit River data	100%	100%
	Issue reports and recommendations	100%	100%
	Attend AOC advisory council meetings, as necessary	100%	100%
Fish Tumor or Other Deformities BUI Assessment Activities			
	Evaluate Detroit River data	100%	100%
	Develop fish sampling plans, if needed, for St. Marys & Rouge River AOCs	100%	100%
	Fish collection	100%	100%
	Processing of fish samples	100%	100%
	Analysis of fish samples	100%	100%
	Analytical reports completed	100%	100%
	Data review and analysis	100%	100%
	Attend AOC advisory council meetings, as necessary	100%	100%
Community Outreach Activities			
	Develop Community Outreach Plans	100%	100%
	Implement Plans	100%	100%
	Attend AOC advisory council meetings, as necessary	100%	100%

Funding Rates

MDHHS Accounting had updated the Object Class Categories based on the budget amendment approved by the EPA on 11/15/2012. MDHHS's rate of funding use was appropriate for the Workplan. For official accounting, please see Appendix P or contact MDHHS Accounting.

Category	Grant Award	Expend. 10/1/11-1/31/16	% of Award
Lab Salaries	$48,249	$53,027	110%
Lab Fringes	$34,257	$39,384	115%
Lab Supplies	$29,307	$42,959	147%
Lab Maintenance	$10,844	$0	0%
Contractual	$387,365	$396,878	102%
Novel Fish Collection	$33,000	$7,562	23%
Communication	$846	$1,205	142%
DIT Desktop	$6,569	$7,859	120%
Subtotal - Direct	$550,437	$552,956	100%
Random Moment	$8,445	$9,693	115%
Indirect	$5,114	$6,034	118%
Total	$563,996	$568,684	101%

Drawdown Request & Explanation

The final drawdown for this grant occurred on 02/10/2016. MDHHS had made monthly drawdowns, generally around the 20th of each month.

Principal investigator Update

Kory Groetsch replaced Dr. Linda Dykema as the principal investigator for this grant project as of November 2014.

Amendment to Project Period

A final no-cost extension was granted to MDHHS on 01/29/2016 to compensate for a delay of the final drawdown due to technical issues between MDHHS Accounting and U.S. EPA.

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Due to file size, appendices are only available by request.
Please contact Michelle Bruneau of MDHHS at 1-800-648-6942
for access to any of the above.

Even our Stakeholders are Hooked on ESF!

The info has been very well received by my stakeholders. It helps them understand the risks and benefits of eating fish and helps them decide which fish to eat and which to catch and release. The trinkets are great conversation starters allowing me to open the door to more in depth conversations with people.

- Mary Bohling, Michigan SeaGrant
Detroit River AOC

Kids in particular are drawn to the displays and the tape measures for them are quite a hit! We need to get youth more active in fishing but also need to make sure they have good access to the facts about eating them.

- Gail Clark, M&M Great Lakes Sport Fisherman
Menominee River AOC

We live in an area surrounded by water and being that I work with families - a lot of them fish. It's a recreational activity that even the youngest can enjoy. By making people knowledgeable as to what they are catching and consuming smarter choices can be made. It's one of the favorite items which I give out.

- Brittney Dial-Previe, FIT4MOM Muskegon
Muskegon Lake AOC

It seems either people don't think any fish are safe to eat from local waterways or that ALL fish are fine to eat. These materials help people better understand the resource.

- Jennifer Tewkesbury, MDEQ Office of the Great Lakes

Awareness to parents attending kids fishing events. A fun and informative way to get message out. Especially like the measuring tapes. Brochures are good handouts.

- Patrice Hawkins, City of St Clair Recreation
St Clair River AOC

There are always those who are reluctant to share information with you when working in the field. The hand outs, especially if they have kids, are a good way to break the ice. Then, with continued conversation, the discussion about eating safe fish can be expanded.

- Anonymous

Most or our residents do not understand the facts about eating fish. The Eat Safe Fish program is an excellent educational tool to inform and educate our residents.

- Dan Stefanski, City of Monroe
River Raisin AOC

Educating fishermen and women on the facts of consumption takes the unknown out of the question. I like to promote fishing!

- Lori J. Eschenburg, Blueways of St. Clair
St Clair River AOC

Thanks to the U.S. EPA & the Great Lakes Restoration Initiative, people who live in and visit Michigan's AOCs are now better educated about choosing and eating safer fish!

44 # of new outreach items created in partnership with AOC communities for this project

250,000 # of outreach items distributed to AOC partners for their communities

674 # of fish analyzed for contaminants in targeted AOCs leading to potential BUI removals and more robust public health recommendations

1 # of AOCs delisted with help from this work

7 # of Fish Consumption BUIs assessed with these funds

20 # of community events attended by MDHHS in targeted AOCs

13,000 # of people engaged at these events

229 # of Eat Safe Fish signs to be posted in targeted AOCs for long-lasting messaging impact

2 # of imminent BUI removals per data from this work

125,000+ estimated # of at-risk individuals reached with Eat Safe Fish messaging in targeted AOCs during this project period