



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 28 2018

REPLY TO THE ATTENTION OF:

G-95

Craig W. Butler, Director
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, Ohio 43216-1049

JAN 28 2019

Dear Mr. Butler:


Thank you for your December 14, 2018 request to remove the "Restrictions on Fish and Wildlife Consumption" Beneficial Use Impairment (BUI) at the Cuyahoga River Area of Concern (AOC) located within the City of Cleveland, OH. As you know, we share your desire to restore all the Great Lakes AOCs and to formally delist them.

Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency (EPA) approves your request to remove this BUI from the Cuyahoga River AOC. EPA will notify the International Joint Commission (IJC) of this significant positive environmental change at this AOC.

We congratulate you and your staff as well as the many federal, state and local partners who have been instrumental in achieving this environmental improvement. Removal of this BUI will benefit not only the people who live and work in the Cuyahoga River AOC, but all residents of Ohio and the Great Lakes Basin as well.

We look forward to the continuation of this important and productive relationship with your agency and the Lake Erie Commission as we work together to delist this AOC in the years to come. If you have any further questions, please contact me at (312) 353-8320, or your staff can contact Leah Medley at (312) 886-1307.

Sincerely,

for 
Chris Korleski, Director
Great Lakes National Program Office

cc: Lynn Garrity, Lake Erie Commission



John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

December 14, 2018

Chris Korleski, Director
U.S. Environmental Protection Agency
Great Lakes National Program Office
77 West Jackson Blvd. (G-17J)
Chicago, Illinois 60604-3511

RE: Cuyahoga River Area of Concern (AOC) Restriction on Fish Consumption Beneficial Use Impairment (BUI) Removal Action

Dear Director Korleski:

The State of Ohio and Ohio EPA are dedicated to the restoration and protection of all waterbodies in the state, including Lake Erie and its tributary river systems. A legacy of the industrial past led four Ohio river systems to be designated as Areas of Concern (AOCs) by the International Joint Commission.

In the last two decades, remarkable progress has been made in the Cuyahoga River AOC, largely due to the determination and hard work of the AOC Advisory Committee and partner organizations. Ohio EPA and the Cuyahoga River AOC Advisory Committee are requesting your concurrence with the enclosed recommendation to remove the Restriction on Fish Consumption BUI in the Cuyahoga River AOC.

The Cuyahoga River has come a long way from when it was designated a Great Lakes AOC. I commend the effort of the conscientious individuals, groups, organizations, and industries that comprise the Cuyahoga River AOC Advisory Committee and who made this improvement possible. We anticipate more improvements to come, and we look forward to working with the US EPA and the Cuyahoga River Advisory Committee to remove the remaining BUIs and ultimately delist the Cuyahoga River AOC.

Sincerely,

Craig W. Butler
Director

Enclosure

Removal Recommendation for the Restrictions on Fish / Wildlife Consumption Beneficial Use Impairment in the Cuyahoga River Area of Concern



Photo: generationscnp.org

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Purpose

The purpose of this document is to recommend the removal of the Restrictions on Fish and Wildlife Consumption beneficial use impairment from the Cuyahoga River Area of Concern by demonstrating that applicable removal targets are being met. Wildlife components of the BUI are not designated as impaired and therefore not assessed in this document.

Background

The Cuyahoga River lies in northeast Ohio, flowing into Lake Erie's central basin at the city of Cleveland. Its drainage basin covers an area of 809 square miles (2001 Gazetteer of Ohio Streams). For more than 100 years, the lower Cuyahoga River accepted discharges from many treatment systems (from both municipal and industrial facilities), sewer overflows and storm water runoff. The river had become so severely degraded with loose debris, oil, municipal and industrial wastes that it ignited several times. The last fire, which occurred in 1969, sparked a national environmental outrage that enabled the first Earth Day Celebration and the U.S. EPA, both in 1970, and the Clean Water Act, in 1972.

The Cuyahoga River from the Gorge Dam (River Mile 45.5) to the mouth at Lake Erie, a few neighboring Lake Erie tributary systems and the associated Lake Erie nearshore areas had become so severely degraded that these areas were designated as a Great Lakes Area of Concern (Figure 1) in 1987 under the U.S./Canada Great Lakes Water Quality Agreement. Nine of the potential fourteen beneficial uses were listed as impaired in the Cuyahoga River AOC in the Stage 1 Report. A locally driven BUI, Recreational Access and BUI #11, Degradation of Aesthetics, were formally removed in 2017. Eight BUIs remain in the Cuyahoga River AOC. (Table 1.)

Restrictions on Fish Consumption *	Restriction on Dredging Activities
Degradation of Fish Populations *	Eutrophication of Undesirable Algae
Fish Tumors and Other Deformities	Beach Closings (Recreational Use)
Degradation of Benthos	Loss of Fish Habitat *
* The wildlife components of these BUIs are not designated as impaired	

Restrictions on Fish / Wildlife Consumption BUI Listing Criteria

At the start of the Great Lakes AOC program, including the starting processes of the Cuyahoga River AOC, the listing criteria, set by the International Joint Commission (IJC) stated that an impairment would exist when:

- “Contaminant levels in fish populations exceed current standards, objectives or guidelines, or when public health advisories are in effect for human consumption of fish. Contaminant levels in fish must be due to contaminant input from the watershed.” (IJC)

The State of Ohio current listing criteria states the Restrictions on Fish and Wildlife Consumption beneficial use shall be listed as impaired if:

- An “advisory or restriction to fish or wildlife consumption issued by the Ohio Department of Health in the AOC is more restrictive than one meal per month or Lake Erie advisory.”

Ohio’s listing criteria for this BUI is indirectly based on tissue contaminant concentrations but relies on the experience and expertise of the state’s fish tissue monitoring and consumption advisory program to review data and post consumption frequencies for various species. The posting of consumption advisories as issued by the Ohio Department of Health are the basis of the listing and delisting criteria.

Ohio Sport Fish Tissue Monitoring Program

The State of Ohio has a long history of operating a fish tissue consumption monitoring program as a cooperative effort between the Ohio Department of Health (ODH), the Ohio Department of Natural Resources (ODNR) and the Ohio Environmental Protection Agency (Ohio EPA). Agency technical staffs meet periodically to coordinate fish consumption advisories and other issues related to fish contaminants.

The fish contaminant monitoring sites are typically selected to coordinate with other water quality monitoring survey sites on an annual basis. The State of Ohio Cooperative Fish Tissue Monitoring and Sport Fish Tissue Consumption Advisory Program document (last revised October 2010) provides the assessment procedures for evaluating fish tissue data and advisory decision making and is available online at <http://www.epa.ohio.gov/portals/35/fishadvisory/FishAdvisoryProcedure.pdf>. In cases where an advisory decision is needed for constituents not addressed in the protocol, the protocol is used as a framework for developing appropriate thresholds.

Ohio EPA is responsible for collecting Ohio fish tissue samples for Ohio's Fish Tissue Monitoring Program. Fish tissue collection is performed in accordance with the Ohio Fish Tissue Collection Manual. For fish tissue contamination, levels of the contamination are tiered in accordance with five levels of consumption frequency, developed to be protective of human health. In the Cuyahoga River AOC, the current contaminants of concern are polychlorinated biphenyls (PCBs) and mercury. The tiered levels of consumption frequency for PCB and mercury are shown in Table 2.

Table 2. Ohio Fish Consumption Advisory Chemicals: (ODH 10/25/99) Fillet Chemical Upper Bound Limit Concentrations (PPM) and Advisory Meal Consumption Rate Using the Great Lakes' Governors Procedure						
PCBs, mg/kg	Unrestricted		1 meal/week	1 meal/month	1 meal/2 months	Do Not Eat
	<0.050		0.050 to 0.220	2.221 to 1.000	1.000 to 1.999	> 1.999
Mercury, mg/kg	Unrestricted	2 meals/week	1 meal/week	1 meal/month		Do Not Eat
	<0.050	0.051 to 0.110	0.111 to 0.220	0.221 to 0.999		> 1.000

In February 2007, Ohio officially adopted the April 2006 Mercury Addendum to the Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory. The main changes to the fish advisory program are 1) the addition of a "Two Meals Per Week" category based upon mercury fillet concentrations only and 2) the elimination of the 1 meal per two-month category for mercury only. PCBs will continue to be monitored using the advisory levels set forth in the original 1993 Protocol.

Cuyahoga River AOC's Impaired Listing for Fish Consumption

In the 1992 Cuyahoga River Stage 1 report (please see attached), the AOC Committee determined that the fish consumption component of the Fish and Wildlife BUI was impaired only in the Lake Erie nearshore area and only for channel catfish and common carp. The 1994 impaired listing was based on an Ohio Department of Health's fish consumption advisory for Lake Erie that had been in effect since 1987. The Stage 1 Report listed the status of the fish consumption component as unknown for both the navigation channel and the reach upstream of the navigation channel. At the time, no advisories were posted for any fish species caught from either the navigation channel, the upstream reach of the Cuyahoga River or any other area in the AOC. Fish samples were collected in late summer of 1990, but analytical results were not available for consideration for the Stage 1 report.

In the November 1995 Cuyahoga River Remedial Action Plan Stage One Update Report (please see attached), the AOC Committee added impaired designations for the fish consumption component in both the navigation channel and the reach upstream of the navigation channel. The change was based

on Ohio Department of Health's newly posted consumption advisories in these areas. The AOC's updated impaired designation for the fish consumption component was warranted according to the listing criteria in effect at the time. No other streams, either tributary to the mainstem or tributary to Lake Erie, within the AOC have fish consumption advisories and therefore, these tributary systems are not listed as impaired for the fish consumption component of this BUI.

In the Stage 1 report, the AOC Committee determined that the wildlife consumption component of the Fish and Wildlife BUI was unknown because, at the time, "no standards, objectives or guidelines were known to exist for contaminant levels in area wildlife tissue." The wildlife component of this BUI was subsequently designated as not impaired in the November 1995 update. As no impairment exists for the wildlife component of this BUI, the remainder of this removal recommendation will focus on the fish consumption component of this BUI.

History of Cuyahoga River Fish Consumption Advisories

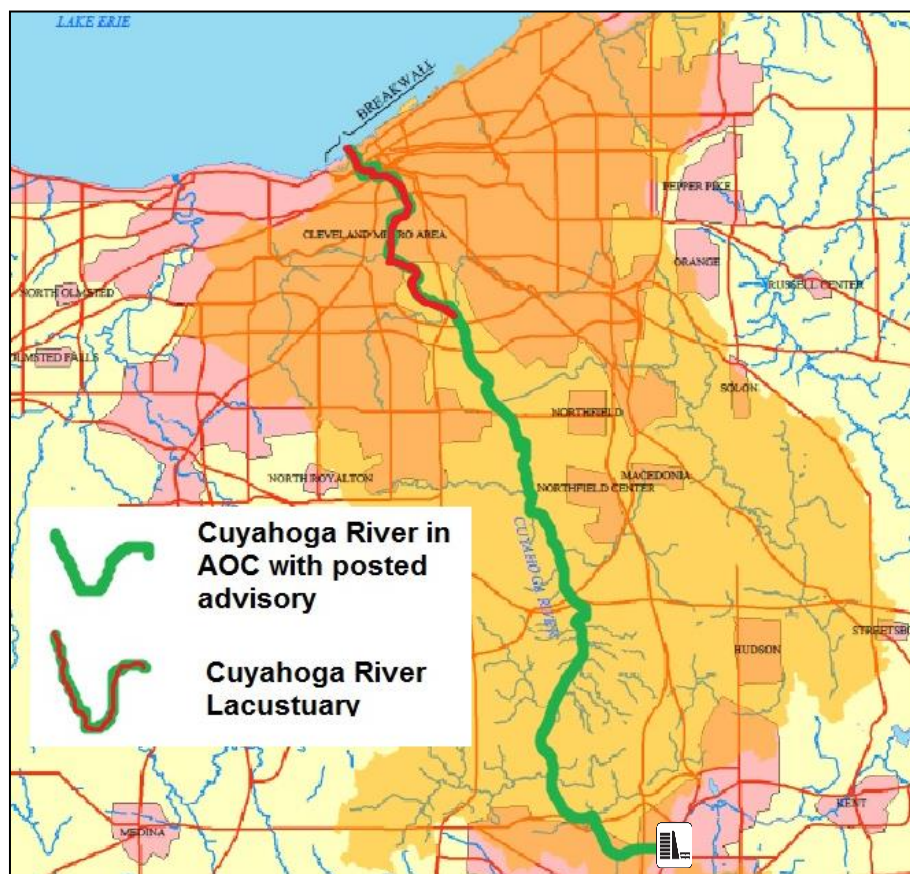


Figure 1. Lacustrine area within advisory area

A history of the fish consumption advisories for the Cuyahoga River posted since 1994 can be seen in Table 3 and the tissue concentrations can be found in Appendix D. A map of the Cuyahoga River mainstem in the AOC with fish consumption advisories, including the lacustrine reach, can be seen in Figure 1; lacustrine means relating to or associated with lakes. Any posted advisory remains in effect until modified. The current advisory list for the Cuyahoga River AOC includes the brown bullhead, channel catfish, common carp and white sucker species in the mainstem from the Gorge Dam pool (see symbol on map) north to the river mouth at Lake Erie. No other areas of the AOC have posted fish consumption advisories.

Table 3. History of Fish Consumption Advisories in the Cuyahoga River

Year Issued	Stream Reach		Species	Contaminant	Advisory Frequency (meal per)
1994	AOC	Ohio Edison Dam Pool to mouth	White Sucker (<11")	Hg	Week
			Common Carp, White Sucker (≥11")	Hg	Month
			Brown Bullhead, Yellow Bullhead	PCBs	2 Months
1998	AOC	Ohio Edison Dam Pool to mouth	White Sucker (<11")	Hg	Week
			Common Carp, White Sucker (≥11"), Largemouth Bass	Hg	Month
			Brown Bullhead, Yellow Bullhead	PCBs	2 Months
2004	Upstream of AOC	State Route 87 (Russell Park) to Winchell Road	Common Carp (≥24"), White Sucker (≥16")	Hg	Month
		Winchell Road to Ohio Edison Dam Pool	Common Carp (≥24")	Hg	Month
	AOC	Ohio Edison Dam Pool to Bath Road	Brown Bullhead, Yellow Bullhead	PCBs	2 months
			White Sucker, Largemouth Bass	Hg	Month
		Bath Road to Lake Erie	Brown Bullhead, Yellow Bullhead	PCBs	2 months
			White Sucker (≥11"), Common Carp (≥24")	Hg	Month
2007	Upstream of AOC	State Route 87 to SR 303	Common Carp (≥24"), White Sucker (≥16")	Hg	Month
		SR 303 to Ohio Edison Dam Pool	Common Carp (≥24"), Smallmouth Bass, White Sucker (≥16")	Hg	Month
	AOC	Ohio Edison Dam Pool to Bath Road	Brown Bullhead, Yellow Bullhead	PCBs	2 months
			White Sucker	Hg	Month
			Common Carp (>24"), Smallmouth Bass	Hg	Month
		Bath Road to Lake Erie	Brown Bullhead, Yellow Bullhead	PCBs	2 months
			White Sucker (≥11")	Hg	Month
			Common Carp (>24"), Smallmouth Bass	Hg	Month
2010 (to Current)	Upstream of AOC	State Route 87 to Ohio Edison Dam Pool	Common Carp	PCBs	Month
			Black Crappie, White Sucker (≥16")	Hg	Month
	AOC	Ohio Edison Dam Pool to mouth	Brown Bullhead, Channel Catfish, Common Carp	PCBs	Month
			White Sucker (≥16")	Hg	Month

Fish Consumption Component Restoration Criteria

To address the numerous impacts and issues in all four Ohio AOCs, Ohio's AOC Coordinators and Lake Erie program staff developed state-wide, standardized and measurable BUI removal criteria and targets, including the Restrictions on Fish and Wildlife Consumption BUI. Generally, the 2017 update of the Ohio guidance document, *Delisting Guidance and Restoration Targets for Ohio Areas of Concern* (please see attached), states that beneficial use impairments can be removed under any of these scenarios:

- Specific restoration targets have been met and follow up monitoring or other evaluations confirm that the beneficial use has been restored;
- It can be demonstrated that the BUI is due to natural rather than human causes;
- It can be demonstrated that the impairment is not limited to the local geographic extent of the AOC, but rather is typical of lake-wide, region-wide, or area-wide conditions (under this situation, the beneficial use may be incorrectly recognized as impaired); or
- The impairment is caused by sources outside the AOC. The impairment is not restored, but the impairment classification can be removed or changed to "impaired-not due to local sources."

In 2003, a general state-wide restriction was issued advising not to eat more than one meal per week of fish caught from any waters in Ohio due to widespread low levels of mercury. This blanket statewide

advisory is protective of the most sensitive human populations. Since a one meal per week general advisory frequency is in effect for all waters in Ohio, it is not posted in Ohio's annual Sport Fish Consumption Advisory table (http://epa.ohio.gov/portals/35/fishadvisory/fishadvisory_pamphlet.pdf) but this advisory level remains in effect. The next restrictive frequency level (one meal per month), which is posted in the advisory table, is used as the removal target for the fish consumption component of this BUI in riverine systems.

The 2017 Ohio guidance for the Restrictions of Fish and Wildlife Consumption BUI can be found in Appendix A:

- In the riverine waters, upstream from the lake affected waters (lacustrine or fresh water estuary), when the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less restrictive than one meal per month;
AND
- In the lacustrine waters, when the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less restrictive than the current Lake Erie advisories;
OR
- When consumption advisories in the AOC are more restrictive than the respective state-wide or lake-wide advisories and a study was conducted that demonstrates either:
 - The source of contamination originates outside of the AOC or
 - The fish tissue concentrations within the AOC are not statistically different than non-AOC areas, reference sites or region-wide, background concentrations.

Discussion

Fish consumption component meets removal criteria

Ohio's removal criteria for the fish consumption component is dependent upon the type of stream (riverine or lacustrine) from which the fish were caught. Ohio's Sport Fish Consumption Program, however, does not differentiate between riverine and lacustrine reaches. In the AOC, the Cuyahoga River mainstem has consumption advisories for brown bullhead, channel catfish, common carp and white suckers. The white sucker consumption advisory is only for individuals equal to or greater than 16-inches in length. The consumption advisories posted for these species are for both the riverine and lacustrine reaches and for each species the advisories are at a one meal per month frequency.

Riverine reach of the Cuyahoga River mainstem

In the riverine reach of the Cuyahoga River (from the Gorge Dam at River Mile 44.5 to the upper end of the lacustrine at River Mile 7.1), the advisory frequencies for all four species are listed at a one meal per month frequency which meets Ohio's removal target for riverine reaches and is therefore eligible to be listed as not impaired. (Table 4.)

Table 4. Current Fish Consumption Advisories, Riverine Reach within AOC				
Species	Contaminant	Advisory Frequency	Removal Target	BUI Assessment
Brown Bullhead	PCBs	1 per month	1 per month	Meets Removal Target
Channel Catfish				
Common Carp				
White Sucker ($\geq 16''$)	Hg			

Lacustrine reach of the Cuyahoga River mainstem

In the lacustrine reach (from River Mile 7.1 to the mouth at Lake Erie, River Mile 0.0), Ohio's removal target is having frequencies equal to or less restrictive than those posted for identical fish species caught from Lake Erie. For the brown bullhead, channel catfish and common carp species, the consumption frequencies for individuals caught from the lacustrine are equal to or less restrictive than for fish caught from Lake Erie and therefore the removal targets are met or exceeded, for these species, and eligible to be listed as not impaired. (Table 5)

Table 5. Current Fish Consumption Advisories, Cuyahoga River Lacustrine within AOC					
Species	Contaminant	Advisory Frequency	Lake Erie Frequency	Frequency Comparison	BUI Assessment
Brown Bullhead	PCBs	1 per month	1 per month	Equal	Meets Removal Target
Channel Catfish	PCBs	1 per month	1 per month	Equal	Meets Removal Target
Common Carp ($\geq 27''$)	PCBs	1 per month (regardless of size)	1 per 2 months ($\geq 27''$)	Less Restrictive	Exceeds Removal Target
Common Carp ($< 27''$)	PCBs		1 per month ($< 27''$)	Equal	Meets Removal Target
White Sucker ($\geq 16''$)	Hg	1 per month	Species not Assessed	Frequency Comparison and BUI Assessment not possible	

Unfortunately, a comparison of frequencies between the lacustrine and Lake Erie is not possible as white suckers is not a species commonly assessed for Lake Erie by the Ohio Sport Fish Consumption Program and therefore cannot meet the comparison. According to Ohio's guidance document, when consumption advisories in the AOC are more restrictive than the respective state-wide or lake-wide advisories, a study can be conducted to demonstrate either:

- The source of contamination originates outside of the AOC or
- The fish tissue concentrations within the AOC are not statistically different than non-AOC areas, reference sites or region-wide, background concentrations.

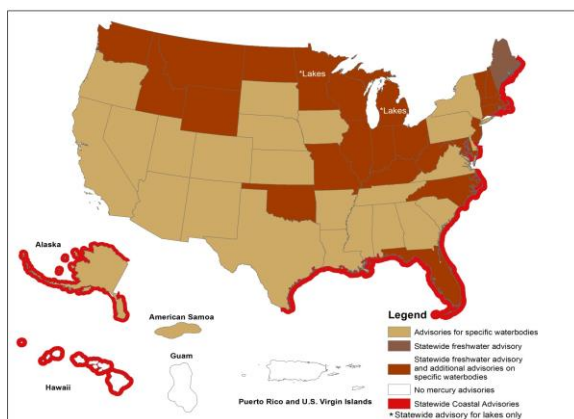


Figure 2. Fish Consumption Advisories for Mercury-2011

The contaminant of concern for the white sucker consumption advisory is mercury. Mercury is a ubiquitous contaminant across the Midwest due to aerial deposition from sources such as coal-fired power plants. As reported by US EPA in their 2011 National Listing of Fish Advisories, mercury-based fish consumption advisories are a regional problem, common in many mid-western states (Figure 2). A review of the April 2017 Ohio Sport Fish Consumption Advisory list shows that of the Ohio bodies of water with a sport fish consumption advisory, over 82% have a posted mercury advisory either alone or with another contaminant. In fact, in the upstream reach of the AOC

(which is much less urban and industrialized) has the same consumption advisory for white suckers, again equal to or longer than 16", as what is listed for the Cuyahoga River mainstem reach in the AOC. Direct comparison of white sucker mercury tissue concentrations is not possible. Therefore, mercury data from the last 10 years were compared for white suckers collected in the AOC and from inland waters located within the Ohio Lake Erie Basin. The average mercury tissue concentration from AOC white suckers was found to be lower than what was found in Ohio Lake Erie Basin white suckers. Finally, as part of the study referenced by Ohio's AOC delisting guidelines, a statistical analysis was performed by the Ohio EPA Sport Fish Consumption Advisory Coordinator (Attachment C) on white sucker data for the Ohio Lake Erie basin that showed that white suckers from the Cuyahoga River AOC were statistically lower in mercury concentration than those from remainder of the Ohio Lake Erie basin.

Wildlife consumption is not impaired in the AOC

As previously stated, with no wildlife consumption advisories posted for any area of the Cuyahoga River AOC the wildlife consumption component of this BUI is not listed as impaired.

Conclusions and Recommendation

The Cuyahoga River AOC has long been an urban and industrialized area with a history of environmental degradation and therefore, its inclusion in the Great Lakes Area of Concern program and the impaired listing for the Restrictions on Fish and Wildlife Consumption BUI were unquestionably warranted, given the listing criteria at the time. The river and area will remain urban and industrialized so its restoration to a pristine water resource is outside the scope of the AOC program, but since the onset of the AOC process in the Cuyahoga River, improvements have been seen and well documented. In 2017, the Degradation of Aesthetics BUI was removed from the AOC as was the locally driven Public Access BUI.

Ohio EPA and the Cuyahoga River Advisory Committee contend that the Restrictions on Fish and Wildlife Consumption BUI should be removed from the AOC because:

- There are no wildlife consumption advisories in the AOC,
- All current AOC fish consumption advisories in the AOC riverine reach of the mainstem meet the Ohio removal target of having a consumption frequency of one meal per month,
- The current AOC consumption advisories for brown bullhead, channel catfish and common carp in the lacustrine reach meet the Ohio removal target of having a consumption frequency of being equal to or less restrictive than Lake Erie consumption advisories for identical species,
- The contaminant of concern for the lacustrine white sucker consumption advisory is mercury. There are no known specific sources of mercury in either the AOC or reach upstream of the AOC, but an identical white sucker consumption advisory exists in the mainstem upstream of the AOC.
- A statistical study shows that the tissue mercury level in Cuyahoga AOC lacustrine white suckers is lower than for white suckers from the Ohio Lake Erie Basin.

A public meeting was hosted by Ohio EPA on September 22, 2018, followed by a 30-day public review period, to present the proposed removal of BUI 1a in the Cuyahoga River AOC. No public comments were received.

Ohio EPA and the Cuyahoga River Advisory Committee request concurrence that the Ohio removal criteria has been met and recommend the removal of the Restrictions on Fish and Wildlife Consumption BUI from the Cuyahoga River AOC.

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Appendix A

State of Ohio BUI removal Criteria for Fish and Wildlife Consumption

BUI 1: Restrictions on Fish and Wildlife Consumption

IJC Listing Guideline

An impairment will be listed when contaminant levels in fish or wildlife populations exceed current standards, objectives or guidelines, or public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must be due to contaminant input from the watershed.

State of Ohio Listing Guideline

This beneficial use shall be listed as impaired if:

1) An advisory or restriction to fish or wildlife consumption issued by the Ohio Department of Health in the AOC is more stringent than one meal per month or Lake Erie advisory.

State of Ohio Restoration Target

For Fish Consumption:

In the riverine waters upstream from the lake affected waters (lacustrary or fresh water estuary), the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than one meal per month; **AND**

In the lake affected waters (lacustrary or fresh water estuary), the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than the current Lake Erie advisories; **OR**

If consumption advisories in the AOC are more stringent than the respective state-wide or lake-wide advisories and a study was conducted that demonstrates either (1) the source of contamination originates outside of the AOC or (2) the fish tissue concentrations within the AOC are not statistically different than non-AOC areas, reference sites or region-wide, background concentrations.

For Wildlife Consumption:

Wildlife consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than one meal per month.

Potential Data Sources

- State of Ohio Sport Fish Consumption Advisories www.epa.state.oh.us/dsw/fishadvisory/index.aspx
- Ohio EPA fish tissue data
- Other fish tissue studies

Rationale

While most Ohio sport fish are of high quality and a good source of protein, levels of chemicals such as PCBs, mercury, lead, and other metals and pesticides have been found in some fish from certain waters. To ensure the continued good health of Ohioans, the Ohio Department of Health, in cooperation with the Ohio Environmental Protection Agency and Ohio Department of Natural Resources, issues fish consumption advisories per Chapter 3701 of the Ohio Revised Code. Ohio uses the *Protocol for a Uniform Great Lakes Sport Fish Advisory* (1993) and the 2005 addendum to establish fish consumption advisories for PCBs and mercury, respectively. These are the contaminants that drive most of the advisories in Ohio waters.

Ohio EPA refers to the area where river and lake water mix as a lacustrary (combination of the terms lacustrine and estuary). These areas could also be described as drowned river mouths (lake water flows into the river essentially “drowning” the river mouth).

Snapping turtles are currently the only wildlife species with a consumption advisory in effect as issued by the Ohio Department of Health. This advisory was listed based on the results of a one-time study done in 1997. All turtles had high levels of PCB and mercury in fat and liver tissue and advisories stress not eating those portions of the turtle. Currently, turtles from the Black, Ashtabula and Maumee Rivers have a one meal per week advisory for mercury which is similar to the statewide blanket advisory for fish, and not considered impaired. The Ottawa River has a do not eat advisory due to mercury, and it is the only portion of an AOC with a wildlife consumption impairment.

Sources of contaminants originating outside an AOC (upstream, long range transport of contaminants released to the air and deposited in the AOC, from open lake waters, etc.) that result in a fish or wildlife consumption advisory should not impinge on the ability to delist an AOC. In order to document that the BUI can be removed due to sources outside the AOC a pollutant source study or other investigation could be conducted. Alternatively, a comparison study of fish tissue contaminant levels can show that the fish tissue concentrations within the AOC are not statistically different than non-AOC areas or selected reference sites. If a trend analysis shows similarity between the sites, then the BUI should be considered restored. Whenever possible, Ohio EPA will attempt to ensure that another responsible party or existing regulatory program is addressing source control outside the AOC boundaries.

Up-to-date comprehensive fish and wildlife consumption advice is available on the Ohio EPA web page at: www.epa.state.oh.us/dsw/fishadvisory/index.html. In 2003, a general state-wide restriction was issued advising not to eat more than one meal per week of fish caught from any waters in Ohio due to widespread low levels of mercury. This blanket statewide advisory is protective of the most sensitive human populations and pre-empted the listing of other one meal per week advisories that were mostly due to PCBs. In order to keep the fish consumption advisory information as simple as possible, the web page now only lists the more restrictive one month or greater advisories. This does not mean the PCBs have gone away. Therefore, when conducting a study to determine if the local advisories are strictly related to sources from outside an AOC, it is important to examine the actual fish tissue data for the area in question and not just whether an advisory is listed on the web page. In the *Ohio Integrated Report*, beginning in 2006, water body impairments were included based on fish tissue concentrations as related to water quality criteria. Information about fish consumption advisories and where to obtain fish tissue data are available from Ohio EPA at: www.epa.ohio.gov/dsw/fishadvisory/index.aspx. Integrated Reports can be found at www.epa.state.oh.us/dsw/tmdl/OhioIntegratedReport.aspx. Please note that the Integrated Report data are somewhat different than the concentrations that trigger fish consumption advisories and are offered here for informational purposes only. For the BUI restoration targets, we will continue to keep the targets focused on the existence of fish consumption advisories rather than fish tissue concentrations.

Appendix B

1999-2008 Cuyahoga River White Sucker Basin Tissue Mercury Data

Cuyahoga River Basin White Sucker Mercury Tissue Data, 1999-2008				
	Year	River System	River Mile	Tissue Hg in mg/kg
Within AOC	2008	Cuyahoga	0.92	0.061
	1999	Cuyahoga	7.1	0.036
	2005	Cuyahoga	20.8	0.118
	2001	Cuyahoga	29.08	0.094
	2008	Cuyahoga	33.2	0.114
	2005	Cuyahoga	35.95	0.107
	2005	Cuyahoga	38.95	0.108
	1999	Cuyahoga	41.71	0.0486
	Average for AOC			
Cuyahoga River, Upstream of AOC				
Upstream of AOC	2001	Cuyahoga	52.63	0.032
	2005	Cuyahoga	63.26	0.287
	2001	Cuyahoga	72.61	0.175
	1999	Cuyahoga	83.8	0.275
	2001	Cuyahoga	83.8	0.264
Cuyahoga River Tributary, Within AOC but not in Mainstem				
Tributary within AOC	1999	Cuyahoga	11.3	0.122
Average for All Cuyahoga Sites				0.132

Appendix C

1999-2008 Ohio Lake Erie Basin White Sucker Basin Tissue Mercury Data

Other Ohio Lake Erie Basin White Sucker Mercury Tissue Data, 1999-2008							
Year	River System	River Mile	Tissue Hg in mg/kg	Year	River System	River Mile	Tissue Hg in mg/kg
2000	Auglaize	39.57	0.167	2000	Portage	2.23	0.191
2000	Auglaize	80.29	0.103	2000	Portage	4.94	0.0954
2000	Auglaize	92.48	0.115	2000	Portage	8.35	0.158
2000	Black River	1.2	0.401	2000	Rocky F	7.27	0.137
2000	Black River	11.34	0.168	2000	Rocky Ford Cr	7.27	0.148
2000	Black River	18.94	0.186	2000	Rocky River	1.28	0.0871
2000	Black River	25.3	0.132	2000	Rocky River	10	0.0642
2000	Black River	29.39	0.0913	2000	Rocky River	35.5	0.18
2000	Black River	30	0.156	2000	Sandusky	52.58	0.12
2000	Black River	37.3	0.142	2000	Sandusky	57.34	0.154
2000	Black River	38.74	0.198	2000	Sandusky	61.1	0.09
2000	Black River	45	0.141	2000	St Joseph	4.77	0.0504
1999	Blanchard	0.2	0.114	1999	St. Mary's	43.4	0.108
1999	Blanchard	9	0.16	1999	St. Mary's	61.5	0.214
1999	Blanchard	21.02	0.148	1999	St. Mary's	75.07	0.192
1999	Blanchard	32.8	0.126	1999	St. Mary's	87.8	0.13
1999	Blanchard	46.49	0.127	1999	St. Mary's	95.12	0.0755
1999	Blanchard	56.32	0.13	2000	Sugar Creek	18.84	0.099
1999	Ottawa	11.67	0.0708	2000	Sugar Creek	20.05	0.132
Average for Other Lake Erie Basin Sites							0.140

Appendix D

History of Cuyahoga Basin White Sucker Tissue Mercury Data

History of Cuyahoga River Mainstem White Sucker Mercury Tissue Data			
Stream Type	Year	River Mile	Tissue Hg in mg/kg
Lacustrary – In AOC	2008	0.92	0.061
	1999	7.1	0.036
Riverine – In AOC	1989	9	0.12
	1990	9	0.07
	1992	9	0.0553
	1989	9.7	0.12
	1989	20.8	0.2
	1989	20.8	0.2
	1990	20.8	0.05
	1992	20.8	0.0688
	2005	20.8	0.118
	2001	29.08	0.094
	2008	33.2	0.114
	2005	35.95	0.107
	1989	36.52	0.251
	1990	36.52	0.1
	1989	37	0.251
	1992	37	0.0649
	2005	38.95	0.108
	1989	41	0.172
	1992	41	0.139
	1989	41.71	0.172
1999	41.71	0.0486	
Riverine – Upstream of AOC	2001	52.63	0.032
	1974	53.4	0.24
	1990	63.26	0.27
	1992	63.26	0.172
	2005	63.26	0.287
	2001	72.61	0.175
	1999	83.8	0.275
	2001	83.8	0.264

Appendix E

Ohio Sport Fish Consumption Coordinator Review

This is to inform the Cuyahoga River Area of Concern (AOC) Advisory Committee that, on their behalf, I have analyzed the fish tissue data for the Cuyahoga River AOC and for Lake Erie Basin and have determined that Ohio's Sport Fish Consumption Advisory program can support the removal of the fish consumption component of the Cuyahoga River BUI.

To reach this conclusion, I provided technical review and conducted a detailed evaluation of fish contaminant data which demonstrates that BUI removal is warranted at the Cuyahoga River AOC, according to Ohio's published removal guidelines (Figure 1).

State of Ohio Restoration Target

For Fish Consumption:
In the riverine waters upstream from the lake affected waters (lacustrary or fresh water estuary), the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than one meal per month; **AND**

In the lake affected waters (lacustrary or fresh water estuary), the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than the current Lake Erie advisories; **OR**

If consumption advisories in the AOC are more stringent than the respective state-wide or lake-wide advisories and a study was conducted that demonstrates either (1) the source of contamination originates outside of the AOC or (2) the fish tissue concentrations within the AOC are not statistically different than non-AOC areas, reference sites or region-wide, background concentrations.

For Wildlife Consumption:
Wildlife consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than one meal per month.

Potential Data Sources

- State of Ohio Sport Fish Consumption Advisories
www.epa.state.oh.us/dsw/fishadvisory/index.aspx
- Ohio EPA fish tissue data
- Other fish tissue studies

Figure 1: Ohio's removal criteria for restrictions on fish and wildlife consumption BUI

To do this, I evaluated the available contaminant data and advisory levels for fish species in the Cuyahoga River (Figure 2) and compared these advisories to the BUI Removal Criteria for Fish Consumption.

Cuyahoga River	State Route 87 (Russell Park) to Ohio Edison Dam Pool (Geauga, Portage, Summit counties)	Common Carp	One/month	PCBs
		Black Crappie, White Sucker 16" and over	One/month	Mercury
	Ohio Edison Dam Pool to mouth (Lake Erie) (Cuyahoga, Summit counties)	Brown Bullhead, Channel Catfish, Common Carp	One/month	PCBs
		White Sucker 16" and over	One/month	Mercury

Figure 2: Ohio’s fish consumption advisories for the Cuyahoga River

The Cuyahoga River advisories were also compared to the Lake Erie consumption advisory levels for the same species (Figure 3)

Lake Erie	All waters (Ashtabula, Cuyahoga, Erie, Lake, Lorain, Lucas, Ottawa, Sandusky counties)	Common Carp 27" and over	One/two months	PCBs
		Smallmouth Bass	One/month	PCBs and Mercury
		Channel Catfish, Common Carp under 27", Freshwater Drum, Lake Trout, Steelhead Trout, White Bass, Whitefish 19" and over, White Perch	One/month	PCBs
		Brown Bullhead	One/month	Mercury

Figure 3: Ohio’s fish consumption advisories for Lake Erie

This evaluation began with the first portion of Ohio’s removal criteria, which centers on the riverine portion of the AOC (requiring that “In the riverine waters [...] the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than one meal per month”). After reviewing Ohio’s published consumption advisories, I was able to determine that all fish species in the riverine portion of the Cuyahoga River had fish consumption advisories that were the same or less frequent than one meal per month. As such, all fish species in the riverine portion of the Cuyahoga River meet the removal criteria.

Next, I evaluated the second (lacustrary) component of the fish consumption removal criteria which involves the evaluation of fish affected by Lake Erie water (requiring that “in the lake affected waters [...] the fish consumption advisories issued by the Ohio Department of Health in the AOC are the same or less stringent than the current Lake Erie advisories”). As part of this evaluation most fish species in the Lake affected water of the Cuyahoga River met the criteria for removal. However, one species (white sucker) in the Cuyahoga River has never been sampled in Lake Erie, and so there is no basis for comparison to Lake Erie advisories.

Therefore, the white sucker advisory in the Cuyahoga River could be seen as being more restrictive than within Lake Erie and did not meet that portion of the removal criteria. A more detailed study was conducted for this species under Ohio’s alternative removal criterion which states that if “a study was conducted that demonstrates either (1) the source of contamination originates outside of the AOC or (2) the fish tissue concentrations within the AOC are not statistically different than non-AOC areas, reference sites or region-wide, background concentrations, the fish consumption component of this BUI can be removed.” I found that white suckers met both portions of this criterion, as detailed further in this document, concluding that the Cuyahoga River

therefore meets the established removal criteria for all species and can be recommended for BUI removal at this time.

Further evaluation of Cuyahoga River white suckers

For the first prong of this removal criterion (“a study was conducted that demonstrates [that] the source of contamination originates outside of the AOC”), there is special consideration given for mercury advisories in the AOCs due to the fact that mercury contamination in fish tissue generally originates from distant sources such as coal power plants, many of which are outside of Ohio altogether.

Mercury is an atypical fish contaminant in that much of the mercury contamination in Ohio (and elsewhere) comes from sources which are geographically far removed from the rivers and streams which become contaminated. This is a contaminant which affects broad swaths of the landscape, across the midwestern US and other regions. Because of this ubiquitous mercury contamination, all of Ohio has a blanket “one meal per week” consumption advisory for all species without site- or species-specific advisories in place. Mercury contamination in freshwater fish is generally attributed primarily to coal combustion at power plants, which can travel long distances before being deposited with precipitation or dry form. We have conducted a study to review some of the available information on the subject to support my belief that the mercury in Cuyahoga River white suckers is highly unlikely to be attributable to sources inside of the AOC.

There is a lack of known specific sources of any considerable mercury discharges in the watershed and this corroborates my conclusion that the mercury in Cuyahoga River white suckers very likely comes from external sources, such as regional coal power plants across the Midwestern U.S. I also conducted a review of various information sources (including documents from USEPA, The Council of Great Lakes Governors’ Fish Consumption Advisory Task Force, and the scientific literature—detailed below) and found repeated confirmation that the prevailing paradigm, backed by empirical evidence, in the fish contaminant monitoring community is that the primary source of mercury in fish tissue is regional in nature, dominated by the atmospheric deposition of mercury.

For example, see Hammerschmidt and Fitzgerald (2006)¹, “Methylmercury in Freshwater Fish Linked to Atmospheric Mercury Deposition.” This journal article concludes that “when fish and atmospheric mercury results are combined at the state level, wet atmospheric Hg [mercury] deposition accounts for about two-thirds of the variation in bass MeHg [methyl-mercury] among most states.... This suggests the accumulation of MeHg in wild fish populations is linked to atmospheric Hg loadings, two-thirds of which are estimated to be from anthropogenic sources.” Other sources which identify atmospheric deposition of mercury as a primary source of fish tissue contamination include USEPA’s “How People Are Exposed to Mercury”² web page, USEPA’s “Mercury Maps: A Quantitative Spatial Link Between Air Deposition and Fish Tissue”³ peer reviewed final report, and The Council of Great Lakes Governors’ Fish Consumption Advisory Task Force document, “A Protocol for Mercury-based Fish Consumption Advice.”⁴

Based on my study reviewing the technical literature, I feel there is a strong weight of evidence that the Cuyahoga River AOC meets Ohio’s removal criterion which states “the source of contamination originates outside of the AOC... [and] the fish consumption component of this BUI can be removed.”

Under the second portion of this removal criterion, the BUI can be removed if Ohio conducts a study that demonstrates that “the fish tissue concentrations within the AOC are not statistically different” than reference sites or region-wide, background concentrations. In this case, Ohio’s portion of the Lake Erie Basin, excluding the Cuyahoga AOC itself, was chosen as the background area, due to a lack of any white sucker data for Lake Erie itself in Ohio’s tissue database. Note that the removal criterion does not

¹Hammerschmidt, Chad R., and William F. Fitzgerald (2006). “Methylmercury in Freshwater Fish Linked to Atmospheric Mercury Deposition.” *Environmental Science & Technology* 2006 40 (24), 7764-7770. DOI: 10.1021/es061480i

² <http://www.epa.gov/mercury/how-people-are-exposed-mercury>

³ USEPA (2001) “Mercury Maps: A Quantitative Spatial Link Between Air Deposition and Fish Tissue.” EPA-823-R-01-009.

⁴ <http://www.health.state.mn.us/divs/eh/fish/consortium/pastprojects/mercuryprot.pdf>

require that the Cuyahoga River fish be statistically cleaner than the Lake Erie Basin fish, but only that the Cuyahoga River fish “are not statistically different” than Lake Erie Basin fish. In essence, the BUI can be removed if the AOC fish are not worse than background conditions.

Statistical comparisons within the white sucker data were analyzed using a two-sample, two-tailed T-tests. All of Ohio’s white sucker data for the Lake Erie Basin was retrieved from Ohio’s fish tissue database and investigated, which included data from both inside and outside of the Cuyahoga AOC. White suckers were last sampled from the Cuyahoga River AOC in 2008, and would have been evaluated at that time using Ohio’s 10-year window (1999-2008) for consumption advisories. This same window was used in the present study, for both the Cuyahoga AOC data and the regional background data, in order to provide the most-recent paired data set available.

Because the mercury results in the data set were not normally-distributed, a log-transformation was applied to each data point in order to achieve normality (a requirement of the T-test), and a 2-sample, two-tailed T-test was performed on the data. This test showed that white suckers from the Cuyahoga AOC were statistically cleaner than samples collected from the rest of the Lake Erie basin during this time period (p=0.045 for fillet samples only; p=0.016 for fillet and whole-body data combined). See figures 4 and 5 below for statistical output for the test on fillet samples only, which is the data set used to evaluate and set fish consumption advisories in Ohio.

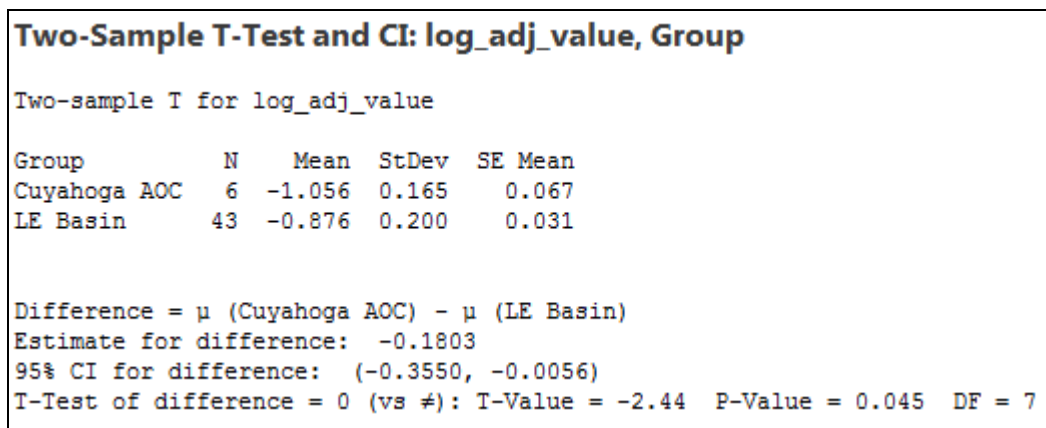


Figure 4: Statistical output for a two-sample, two-tailed T-test for Cuyahoga River AOC white suckers vs. white suckers from the rest of Ohio's portion of the Lake Erie Basin, using log-adjusted fillet mercury data. The data shows that white suckers from the Cuyahoga River AOC (1999-2008) showed statistically-lower levels of mercury contamination compared to samples from elsewhere in the basin.

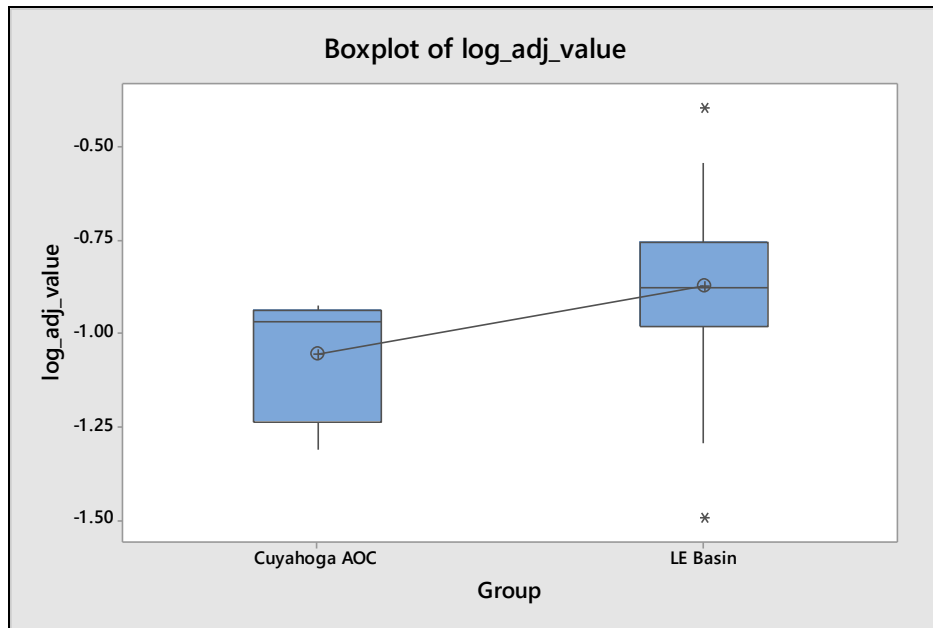


Figure 5: A boxplot showing a comparison of the log-adjusted, white sucker fillet mercury data from the Cuyahoga AOC and elsewhere in the Lake Erie basin.

As mentioned previously, BUI removal criterion does not require that the Cuyahoga AOC fish be statistically cleaner than the reference fish—only that the Cuyahoga AOC fish should *not* be statistically *more-contaminated* than reference fish (“the fish tissue concentrations within the AOC are not statistically different than non-AOC areas, reference sites or region-wide, background concentrations”). This study demonstrates that the Cuyahoga River white suckers are statistically cleaner than reference fish, and therefore exceed the stated requirements for the removal of this BUI.

An argument can be made, based on the literal reading of the BUI removal criterion, that the Cuyahoga AOC white suckers are *so clean* that they *fail to meet* this delisting target—since the Cuyahoga white suckers were statistically cleaner than the Lake Erie Basin white suckers, while the delisting target requires that there should be *no* statistical difference in the data. However, this reading of the delisting guidelines would imply that the Cuyahoga white suckers are *too clean* to remove the beneficial use impairment, which is an irrational conclusion. This suggests that the language in Ohio’s delisting guidelines did not anticipate a situation where the AOC fish might be statistically cleaner than background conditions, and this language should be adjusted in future revisions to more accurately reflect the goals of the AOC program.

Conclusion

As a result of the assessment above, it’s my best professional judgment that the Cuyahoga River fish—including white suckers—are not impaired and are therefore suitable for removal under Ohio’s formal criteria. I have no reservations in supporting this removal based on the available data and BUI removal criteria, as all fish species in the Cuyahoga River AOC clearly meet Ohio’s delisting targets for this BUI.

Gary Klase
 Sport Fish Consumption Advisory Coordinator
 Ohio EPA, Division of Surface Water
 gary.klase@epa.ohio.gov
 614-644-2865

(This review was completed in February, 2018)

Appendix F

Letter of Support – Cuyahoga River AOC Advisory Committee

November 26, 2018

Mr. Craig W. Butler, Director
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, OH 43216-1049



Re: *Removal of Beneficial Use Impairment #1a (Restrictions on Fish Consumption) from the Cuyahoga River Area of Concern*

Dear Director Butler:

The Cuyahoga River Area of Concern (AOC) Advisory Committee has reviewed available data, materials and documents for the removal, in the Cuyahoga River AOC, of the following beneficial use impairment (BUI):

- BUI #1a: Restrictions on Fish Consumption

The Advisory Committee has determined that all applicable data meets or exceeds the State of Ohio removal criteria for this BUI and has voted to support its removal.

Therefore, the Advisory Council requests that the Ohio EPA proceed with the process of approving the removal of this Beneficial Use Impairment from the Cuyahoga River AOC, and forward the necessary request for removal documents to U.S. EPA's Great Lakes National Program Office (GLNPO) for their approval.

With the removal of this BUI, the following impairments will remain in the Cuyahoga River AOC.

- BUI #3: Degradation of Fish Populations
- BUI #4: Fish Tumors or Other Deformities
- BUI #6: Degradation of Benthos
- BUI #7: Restrictions on Navigational Dredging
- BUI #8: Eutrophication or Undesirable Algae
- BUI #10a: Beach Closings (Recreational Contact)
- BUI #14: Loss of Fish Habitat

We are pleased to count this as the third BUI removed to date and expect to see more removals in the near future. We appreciate the effort and expertise that the Ohio EPA has contributed to move our Area of Concern forward and facilitating these essential steps toward delisting.

Meanwhile, the Cuyahoga River AOC Advisory Council will continue its efforts to remove the remaining impairments leading to the delisting and complete restoration of the Cuyahoga River Area of Concern.

Sincerely,

A handwritten signature in black ink, appearing to read "J M Grieser".

Jennifer M. Grieser
Chair, Cuyahoga River AOC Advisory Committee

From: [Murphy, Elizabeth](#)
To: [Medley, Leah](#)
Subject: RE: Cuyahoga AOC BUI TRL review
Date: Wednesday, December 19, 2018 3:24:55 PM

Leah,

Thank you for the opportunity to review the Cuyahoga Fish and Wildlife Consumption BUI removal documents. As you know, I have been involved in the review and development of previous drafts. I feel that this final removal document reflects all agreed upon revisions and adequately justifies the removal of the BUI. I support this recommendation and recommend you send it to the Office Director for review and approval.

To be more specific, I feel that the data collected supports the BUI removal criteria and I feel that the document adequately describes why the white sucker data should be considered to support the removal, despite the inability to collect this species in both the Lake and the AOC. I appreciate the letter of support from the Ohio EPA fish consumption advisory program and concur with the findings. I find the document's information and justification to be clearly laid out and well documented. The necessary attachments and references to support the document's final conclusions are attached to aid in the review.

Please let me know if you need additional comments or justification to support the removal of the BUI.

Beth Murphy

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