

Department of
Environmental
Conservation

ROCHESTER EMBAYMENT AREA OF CONCERN

Restrictions on Fish and Wildlife Consumption
Beneficial Use Impairment Removal Report

AUGUST 2020



Rochester Embayment Area of Concern
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August 2020

Prepared by:

New York State Department of Environmental Conservation

And

Monroe County Department of Public Health

This Beneficial Use Impairment (BUI) Removal Report was prepared by the New York State Department of Environmental Conservation (NYSDEC) and the Monroe County Department of Public Health (MCDPH) and was substantially funded by the United States Environmental Protection Agency (USEPA) through the Great Lakes Restoration Initiative (GLRI). The NYSDEC and MCDPH have engaged stakeholders and the public, including the Remedial Advisory Committee, throughout the BUI removal process. For more information please contact the Remedial Action Plan Coordinator at MCDPH or the AOC Coordinator at NYSDEC Division of Water.

Table of Contents

<u>Section</u>	<u>Title</u>	<u>Page</u>
1	Introduction and Report Purpose	3
2	Background & BUI Removal	4
2.1	BUI Removal Criteria	4
2.2	BUI Removal Comments and Report Preparation	5
2.3	BUI Indicator Status Resolution	5
2.3.1	Strategy and Rationale	5
3	Addressing BUI Removal Criteria	5
3.1	Criterion 1: Consumption Advisories	6
3.1.1	New York Advisories	6
3.2	Criterion 2: Tissue Contaminant Concentrations	7
3.2.1	Turtle and Bass Samples: Haynes et al 2004	7
3.2.2	Young of the Year Samples	9
3.2.3	2014/2015 Fish Contaminant Assessments	11
3.2.4	Sediment Contaminant Samples	12
3.2.5	Summary	13
4	Evidence Supporting Lake-Wide Issue	14
5	Efforts Implemented to Improve Lake-Wide Conditions	14
6	Public Outreach	15
7	Summary, Conclusions, and Removal Statement	15
7.1	Post-Removal Responsibilities	15

	<u>Appendices</u>	17
Appendix A	List of Remedial Advisory Committee members	18
Appendix B	References	19
	<u>Tables</u>	
Table 1	Current guidelines for chemical concentrations in tissues of aquatic wildlife meant for consumption provided by New York State Department of Health	6
Table 2	Total PCB concentrations in turtle and bass tissues from locations exposed and unexposed to Lake Ontario or its food web	7
Table 3	Mirex+Photomirex concentrations in turtle and bass tissues from locations exposed and unexposed to Lake Ontario or its food web	8
Table 4	Total Dioxin+Furan concentrations in turtle and bass tissues from locations exposed and unexposed to Lake Ontario or its food web	8
Table 5	Mirex concentrations in brown bullhead tissue	10
Table 6	Total PCBs (sum of Aroclors) in brown bullhead tissues	10
Table 7	Dioxin/furan Total TEQ	10
Table 8	PCB and Organochlorine Data from 2014 and 2015 Fish Contaminant Assessments in Lower Genesee River	12
Table 9	Total Dioxin (2,3,7,8-TCDD) Toxic Equivalents (TEQs) in Lower Genesee River Fish, (Standard Fillet)	12
	<u>Figures</u>	
Figure 1	Map of the Rochester Embayment AOC	3

1. Introduction and Report Purpose

In the Great Lakes Basin, the International Joint Commission (IJC) has identified 43 Areas of Concern (AOCs) under Annex 1 of the Great Lakes Water Quality Agreement (GLWQA) where pollution from past industrial production and waste disposal practices has caused significant ecological degradation. Up to fourteen beneficial use impairments (BUIs), or indicators of poor water quality, are used to evaluate the condition of an AOC.

The Rochester Embayment AOC encompasses the lower portion of the Genesee River from the mouth up to the Lower Falls in Rochester, NY and the portion of Lake Ontario within a straight line drawn from Bogus Point to Nine Mile Point (Figure 1). This was originally listed as an AOC due to the known or suspected presence of multiple BUIs, including *Restrictions on Fish and Wildlife Consumption*, which is generally considered “impaired” when waters used as habitat for consumed fish and wildlife exceed standards, objectives, or guidelines for such use.

Following an evaluation of the data and evidence gathered to address this impairment, the New York State Department of Environmental Conservation (NYSDEC) has determined that the specific criteria established to remove (or re-designate from ‘Impaired’ to ‘Not Impaired’) the Fish and Wildlife Consumption BUI have been met. The local community advisory group, called the Remedial Action Committee (RAC), fully supports the removal of this BUI. Accordingly, the purpose of this BUI removal report is to present the rationale and supporting data to remove the *Restrictions on Fish and Wildlife Consumption* BUI from the Rochester Embayment AOC.

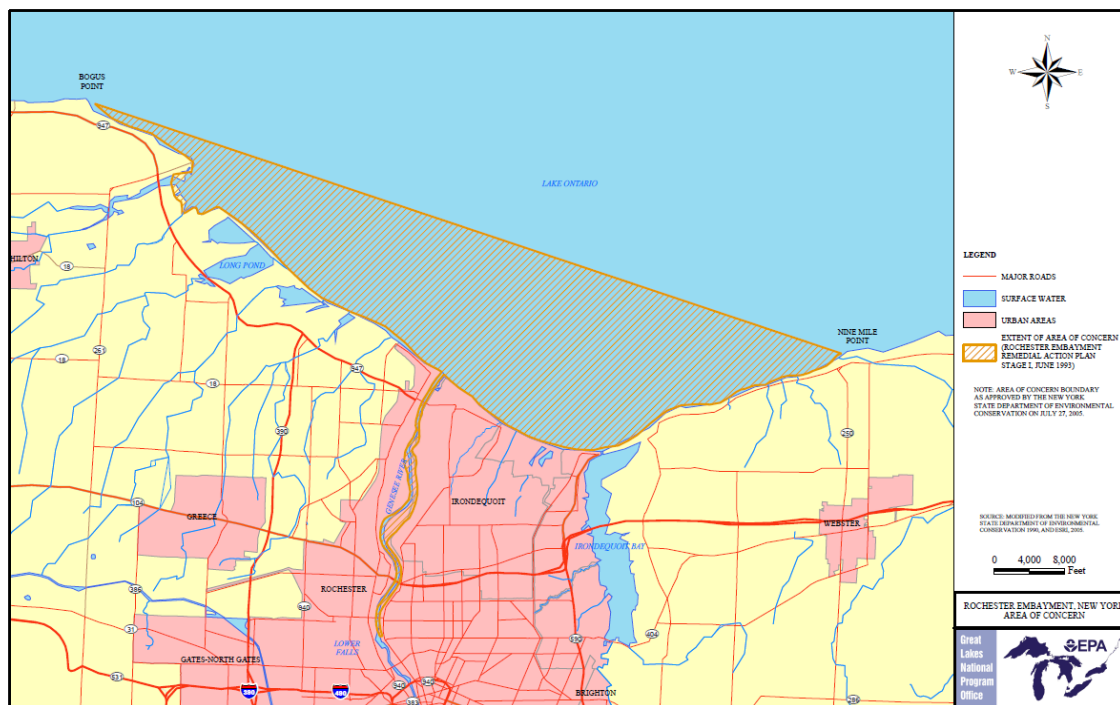


Figure 1. Map of the Rochester Embayment AOC.

2. Background & BUI Removal

All AOCs develop a Remedial Action Plan (RAP) in three stages, which collectively identifies specific BUIs and their causes (Stage I), outlines the restoration work needed (Stage II), and documents completion of these restoration activities and the delisting of the AOC (Stage III). Currently, the RAP for the Rochester Embayment AOC consists of Stage I and Stage II documents.

The *Restrictions on Fish and Wildlife Consumption* BUI was originally listed as impaired in the Stage I and Stage II RAPs due to:

- The contamination of waterways in the Rochester Embayment AOC through exposure to harmful chemicals such as mirex, PCBs, and Dioxin,
- The bioaccumulation of these chemicals in fish and wildlife included in the food chain of Lake Ontario,
- Exposure to greater concentrations of pollutants to persons of the Rochester Embayment AOC through consumption of local fish and wildlife.

2.1. BUI Removal Criteria

The removal criteria and monitoring methods for the *Restrictions on Fish and Wildlife Consumption* BUI were first reported in the 2002 Addendum to the Stage II RAP developed by the RAP Oversight Committee in conjunction with the Water Quality Management Advisory Committee. These removal criteria were reevaluated in 2008 by the RAP Coordinator as well as the RAP Oversight Committee. The RAP Oversight Committee determined that the use of these criteria should continue due to their continued relevance to the local conditions at the Rochester Embayment and the delisting guidelines provided by the IJC for this BUI.

As stated in the Rochester Embayment Area of Concern Beneficial Use Impairment Delisting Criteria Report (E&E 2009), the Fish and Wildlife Consumption BUI can be removed when:

“Contaminant levels in fish and wildlife populations do not exceed current standards, objectives, or guidelines, and no public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must not be due to contaminant input from the watershed.”

This can be demonstrated by meeting the BUI removal criteria (MCDPH, 2002):

- **There are no AOC-specific fish and wildlife consumption advisories issued by New York State; and**
- **There is no significant contamination input from the Rochester Embayment AOC contributing to contaminant levels in fish and wildlife tissue that require fish and wildlife consumption advisories, as indicated by the following: Tissue concentrations of contaminants of concern in representative samples of resident fish and wildlife are lower than guidelines requiring advisories.**

The above BUI removal criteria are consistent with United States Environmental Protection Agency (USEPA) Delisting Guidance document (USPC 2001) and the International Joint Commission (IJC) delisting guidelines (IJC 1991).

2.2. BUI Removal Comments and Report Preparation

The following questions were considered when evaluating whether to proceed with the removal of the *Restrictions on Fish and Wildlife Consumption* BUI:

1. Are the methods and results cited in the report or presentation materials technically and scientifically sound?
2. Does the information cited in the report regarding restoration of the impaired beneficial use support the delisting criteria?
3. Does the RAC and general public concur that the delisting criteria have been met?

The evaluation included conducting a thorough review of technical reports and supporting documents.

2.3. BUI Indicator Status Resolution

The *Restrictions on Fish and Wildlife Consumption* BUI can be removed primarily because the removal criteria that were established for this BUI have been substantially met. There are additional BUI removal scenarios that have been developed to account for unique conditions where the established removal criteria may not have been explicitly met but still warrant removal of the BUI. Some of these alternative scenarios are also applicable for the *Restrictions on Fish and Wildlife Consumption*, and are described below.

2.3.1. Strategy and Rationale:

The United States Environmental Protection Agency (USEPA) Delisting Guidance document, Restoring United States Great Lakes Areas of Concern: Delisting Principles and Guidelines, accepted by the United States Policy Committee (USPC 2001) states the following:

“Re-designation of a BUI from impaired to unimpaired can occur if it can be demonstrated that:

- Approved delisting criteria for that BUI have been met;
- The impairment is not solely of local geographic extent, but is typical of upstream conditions OR conditions outside of the AOC boundaries on a regional scale. Such re-designation would be contingent upon evidence that sources within the AOC are controlled;
- It can be demonstrated that the impairment is due to natural rather than human causes.”

The IJC delisting guidelines (IJC, 1991) state that the *Restrictions on Fish and Wildlife Consumption* BUI may be deemed Not Impaired when: **“Contaminant levels in fish and wildlife populations do not exceed current standards, objectives, or guidelines, and no public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must not be due to contaminant input from the watershed.”** (IJC, 1991).

3. Addressing BUI Removal Criteria

A compilation of data collected on the conditions of Lake Ontario including areas both within and external to the Rochester Embayment AOC were compared resulting in the

measurements supporting the removal of the *Restrictions on Fish and Wildlife Consumption* BUI described below:

3.1. Criterion 1: Consumption Advisories
 3.1.1. New York Advisories

The Lake Ontario lake-wide fish consumption advisory is applicable to the area of Lake Ontario including its tributaries up to the first impassible barrier. The New York State Department of Health (NYSDOH) includes these tributaries because of the potential for contaminated fish to travel between the lake and inland. The Rochester Embayment AOC is included in this definition due to the fact that it is part of Lake Ontario and its tributary system. This lake-wide advisory includes tributaries without any distinction as to whether they are significant sources of contamination. There are no other specific advisories listed for the Rochester Embayment or the lower Genesee River. In addition to fish consumption advisories, the NYSDOH also has a consumption advisory due to PCBs in snapping turtles (*Chelydra serpentina*) and PCBs, mirex, chlordane, and DDT in wild waterfowl that applies to the entire state. Current New York State consumption guidelines for contaminants of concern listed for fish consumption in Lake Ontario: PCB, Mirex, and Dioxin can be observed in Table 1. It is expected that considerable time will be required for the lake-wide and state-wide consumption advisories to be lifted due to widespread low level contamination. No additional local actions would accelerate the removal of the lake-wide or state-wide advisories.

Chemical	General Advisory	One Meal per Month	Do Not Eat
PCB	< 1 ppm	> 1ppm - < 2ppm	> 2ppm
Mirex	< 0.1 ppm	> 0.1ppm - < 0.3 ppm	> 0.3 ppm
Dioxin	< 10 ppt	> 10 ppt - < 30 ppt	> 30 ppt

Table 1: Current guidelines for chemical concentrations in tissues of aquatic wildlife meant for consumption provided by New York State Department of Health (NYSDOH 2019).

It should be noted that the above values are general guidelines and are only one factor used by the NYSDOH in determining consumption advisories. Other factors include, but are not limited to: fish sample characteristics, fish species characteristics, data consistency, health risks posed by contaminants, human populations at greater potential risk, the U.S. Food and Drug Administration action levels/guidelines, health benefits of fish consumption and risk communication issues. This means that even if fish tissue contaminant concentrations are lower than advisory guidelines, other factors are still weighed in the determination of whether a specific advisory is warranted for fish from a particular waterbody or game from a particular area.

The general advice from the NYSDOH is that people may consume a one-half pound serving of fish up to four times a month from a body of water if there is no specific advice for that body of water. Specific advice, such as to eat a limited number of meals or none for a given species, is provided for a body of water where the level of contaminants in fish are elevated. Infants, children under the age of 15 and women under age 50 are advised not to eat any fish from these waters with specific advice (NYSDOH 2019). Improving contaminant trends throughout Lake Ontario has led NYSDOH to ease the specific lakewide consumption advisory. A review of NYS Advisory literature for the AOC and watershed indicates, however, that no waterbodies of the AOC have advisories except the ones listed in the Stage I (Lake Ontario and Tributaries to the first impassible falls, Irondequoit Bay (non-AOC), Canadice Lake (non-AOC), and, Rushford Lake (non-AOC).

The original status determination for this BUI was based on fish consumption advisories listed for Lake Ontario as a whole for PCBs, mirex and dioxin. Since then neither the Rochester

Embayment nor the Genesee River within the boundaries of the Rochester Embayment AOC has been listed specifically by New York State as having a fish and/or wildlife consumption advisory.

3.2. Criterion 2: Tissue Contaminant Concentrations

3.2.1. Turtle and Bass Samples: Haynes et al 2004

The RAC sub-committee (Oversight Committee) developed monitoring protocols for sentinel fish and wildlife species to evaluate Bioaccumulative Chemicals of Concern (BCC) and their effects on the key species as they contributed to the fish and wildlife consumption advisories. A study by SUNY Brockport adapted these protocols and Haynes et al. (2004) evaluated BCCs, including dioxins/furans, PCBs and mirex/photomirex in tissue samples from sentinel fish and wildlife species as well as samples of air, water, and sediment from AOC and non-AOC areas. This study was also designed to separate samples into groups both exposed and unexposed to Lake Ontario waters. The sentinel fish and wildlife species chosen were largemouth bass (*Micropterus salmoides*) and snapping turtle. Sampling locations for both exposed and non-exposed samples of this study can be observed in appendix 1 of Haynes et al 2004.

Contaminant levels in tissue samples from largemouth bass (bass) and snapping turtles (turtles) showed that overall, increased exposure to the Lake Ontario food web resulted in increased levels of BCCs in both bass and turtles. Specific findings included:

- The concentration of total PCB and mirex/photomirex in muscle were higher in bass and turtles ($P = 0.019$, $P = 0.001$) exposed to Lake Ontario than in unexposed animals (Table 2).
- Mirex/photomirex in both turtle and bass eggs was higher in exposed than in unexposed samples (Table 3); There was no difference in total PCB in bass eggs or in total dioxins in muscle tissue between exposed and unexposed samples, but total dioxins in turtle adipose tissue was higher in exposed than in unexposed samples (Table 3); and in no case was a BCC concentration higher in unexposed animals than exposed animals (See tables 2 through 4 for contaminant levels).
- Contaminant levels in unexposed samples fall below current guidelines for chemical concentration levels used for setting specific consumption advisories and fall in the category of "general advice" which is applicable to all waters of New York State not listed in the New York State Department of Health guide "Health Advice on Eating Sportfish and Game."

Total PCB (ug/g)					
Exposed	N	Mean	SEM.	Min	Max
Turtle limb	15	0.02	0.005	0.003	0.064
Bass fillet	15	0.072	0.019	0.005	0.29
Bass eggs	6	0.161	0.039	0.025	0.309
Turtle eggs	5	0.260	0.069	0.109	0.469
Unexposed					
Turtle limb	15	0.012	0.001	0.006	0.018
Bass fillet	15	0.028	0.007	0.009	0.103
Bass eggs	6	0.166	0.045	0.035	0.287
Turtle eggs	6	0.147	0.035	0.024	0.268

Table 2. Total PCB concentrations in turtle and bass tissues from locations exposed and unexposed to Lake Ontario or its food web. SEM=standard error of mean. (Haynes et al 2004).

Mirex+Photomirex (ug/g)					
Exposed	N	Mean	SEM.	Min	Max
Turtle limb	15	0.001	0	ND	0.006
Bass fillet	15	0.002	0	ND	0.006
Bass eggs	6	0.009	0.004	ND	0.028
Turtle eggs	5	0.03	0.007	0.009	0.047
Unexposed					
Turtle limb	15	0	0	ND	ND
Bass fillet	15	0	0	ND	0.002
Bass eggs	6	0.004	0.003	ND	0.017
Turtle eggs	6	0	0	ND	0.002

Table 3. Mirex+Photomirex concentrations in turtle and bass tissues from locations exposed and unexposed to Lake Ontario or its food web. SEM=standard error of mean. ND=Non Detect (Haynes et al 2004).

Total Dioxin+Furan (ng-TEO/Kg dry)					
Exposed	N	Mean	SEM	Min	Max
Turtle limb	5	0.002	0	ND	0.003
Turtle adipose	5	16.291	4.937	6.611	34.707
Bass fillet	5	0.002	0.001	0.001	0.005
Unexposed					
Turtle limb	5	0.001	0	0.001	0.002
Turtle adipose	5	0.123	0.072	0.018	0.325
Bass fillets	5	0.003	0.001	0.001	0.008

Table 4. Total Dioxin+Furan concentrations in turtle and bass tissues from locations exposed and unexposed to Lake Ontario or its food web. SEM=standard error of mean. ND=Non Detect (Haynes et al 2004).

Based on these findings, the researchers concluded that the conditions underlying the *Restrictions on Fish and Wildlife Consumption* BUI in the Rochester Embayment AOC are due to the influence of Lake Ontario, not sources within the AOC, and they supported the delisting of the *Restrictions on Fish and Wildlife Consumption* BUI (Haynes et al 2004). Additionally, none of the samples from the unexposed group exceeded the NYSDOH current guidelines for chemical concentrations in tissues of aquatic wildlife meant for consumption.

3.2.2 Young-of-the-Year Samples

Young-of-the-Year (YoY) are those fish that can be reasonably inferred to have been born within the past year based on their physiological development. YoY fish are uniquely useful as bioindicators of contaminant presence within a given ecosystem, as they provide controls for such factors as migratory patterns and diet-based bioaccumulation. In addition to monitoring the concentrations of contaminants in the tissue of adult fish likely to be consumed by anglers, NYSDEC monitors the presence of contaminants in YoY fish as a line of evidence to determine overall contaminant trends within regional ecosystems.

Examination of data used for the 1998 LAMP report, contained in a NYSDEC paper on results of data collection in 1997, and including data generated from past sampling events and years, indicates that bioaccumulation of Contaminants of Concerns (CoCs) in AOC fish is at a lower rate and to a lower concentration than in many other areas of the lake, both AOC and non AOC (Peddice et al, 2002). While Table 4 of the 2002 report shows presence of PCB aroclors 1016/1248, 1254/1260, DDE, DDD, present in nearly 100% of Emerald Shiners and 100% of Spottail Shiners sampled, and mirex present in 89% of Spottail Shiners sampled, similar exposure rates for OPCB's and DDT metabolites are also reported for the (non-AOC) Black River area, and Sodus Bay, also non-AOC. While the 89% of Spottail Shiners from the AOC contained mirex, there is no documented use of manufacture of mirex in the Rochester area or upstream in the Genesee River watershed. A comparison of mirex values with those measured for the Salmon River, also an area with no documented use, suggest that this CoC originates elsewhere, perhaps as part of the migration of fish species from the lake inland. These fish bioaccumulate mirex and other CoC's during their time in the open lake, and then return to their adoptive streams of introduction where they spawn and die, at which point the bioaccumulated chemicals would be deposited into the sediments or released to the water column (Lewis 1988). As illustrated in the Peddice et al 2002 report, PCB Aroclor concentrations at Sodus Bay are more than double, and DDE concentrations more than triple, those measured in fish from the AOC site (Table 6, Peddice et al. 2002). Additionally from this article a ranking of Lake Ontario tributaries for PCB concentrations can be observed with the Rochester Embayment ranking next to lowest, and lower than all Lake Erie and Niagara River sites (Table 8, Peddice et al. 2002). It is indicated that there were no detections for dioxins in AOC YoY fish with measurable concentrations of only one furan (Table 18, Peddice et al. 2002). The recommendation section of the report contains no mention of additional sampling needed in the Rochester Embayment AOC (Peddice et al. 2002).

In 2011 and 2012, NYSDEC collected YoY samples from 24 near-shore locations throughout New York's Great Lakes basin. These samples were analyzed for PCBs (as Aroclors 1242, 1254/1260), organochlorine pesticides, and mercury as part of an ongoing contaminant monitoring program that was established in the 1980s. One of the sampling locations was in Lake Ontario just east of the mouth of the Genesee River. NYSDEC staff collected 7 emerald shiner and 5 gizzard shad composite samples from this location in 2011. As a result of this sampling, YoY fish sampled from the Genesee River site were found to meet the IJC whole fish objectives for organochlorine pesticides and PCBs. The absence of contaminants including chlordane and dieldrin at the lake Ontario site near the Genesee River in 2011 demonstrate declining trends

since the 1980s and points to the success of clean-up programs and bans within the Great Lakes basin (Paul et al. 2018).

Additional fish tissue was collected in 2011 as part of a US Army Corps Genesee River characterization study (Battelle 2012A). Fifteen brown bullhead were collected from in and around the Turning Basin in the Genesee River and analyzed for contaminant levels for chemicals of concern. Results of the analysis show that the maximum measured levels of mirex in fillets and whole fish were 0.0019ppm and 0.0037ppm respectively, below FDA action level of 0.1ppm (Table 5). Maximum PCBs levels in both fillets and whole fish were 0.127ppm and 0.247ppm respectively, within the range of the NYSDOH general consumption advisory guideline of <1ppm (Table 6). The maximum levels of dioxin/furan TEQs in fillets and whole fish were 5.27ppt and 3.93ppt respectively, below the NYSDOH guideline of 10ppt for fish flesh for human consumption (Table 7).

Number of Samples	Number of Detects	Chemical Name	Tissue Type	Concentration (ppm wet weight)			Standard Deviation
				Min	Max	Mean	
15	5	Mirex	Fillet	ND	0.0019	0.00057	0.00045
15	9	Mirex	Offal	ND	0.0045	0.0019	0.0012
15	9	Mirex	Whole Fish	ND	0.0037	0.0017	0.0012

Table 5. Mirex concentrations in brown bullhead tissue. Tissues were analyzed using methods defined in U.S. E.P.A. SW 846 8081A (Battelle 2012A).

Number of Samples	Number of Detects	Chemical Name	Tissue Type	Concentration (ppm wet weight)			Standard Deviation
				Min	Max	Mean	
15	15	Total PCBs	Fillet	.018	.127	.051	.033
15	15	Total PCBs	Offal	.064	.270	.168	.071
15	15	Total PCBs	Whole Fish	.054	.247	.145	.065

Table 6. Total PCBs (sum of Aroclors) in brown bullhead tissues. Tissues were analyzed using methods defined in U.S. E.P.A SW 846 8082A. (Battelle 2012A).

Number of Samples	Number of Detects	Dioxin/Furan	Tissue Type	Concentration (ppt wet weight)			Standard Deviation
				Min	Max	Mean	
15	15	Total TEQ	Fillet	0.40	5.27	1.5	1.3
15	15	Total TEQ	Offal	0.46	4.2	1.7	1.2
15	15	Total TEQ	Whole Fish	0.51	3.93	1.7	1.1

Table 7. Dioxin/furan Total TEQ. Tissues were analyzed using methods defined in U.S. E.P.A. SW 846 8082A (Battelle 2012A).

3.2.3 2014/ 2015 Fish Contaminant Assessments

In October 2014, NYSDEC and the United States Geological Survey (USGS) conducted a focused assessment of BCCs in fish tissue within the lower Genesee River portion of the Rochester Embayment AOC. The objective of this project was to specifically assess the status of the second criterion for the *Restrictions on Fish and Wildlife Consumption* BUI. To this end, NYSDEC and USGS staff collected a total of 31 fish samples from six sites within the lower Genesee River. Target species included carp, channel catfish, and white perch. Samples were analyzed for PCBs (as Aroclor mixtures), mirex, and dioxins/furans.

In October 2015, fish tissue samples were collected within the lower Genesee River as part of the Resource Conservation and Recovery Act (RCRA) investigation into Operable Unit 5 (OU5) of the Eastman Business Park site. Species collected as part of this effort included gizzard shad, channel catfish, smallmouth bass, largemouth bass, and carp. Samples were analyzed for PCBs (as Aroclor mixtures), organochlorine pesticides, polychlorinated dibenzo-*p*-dioxins (PCDDs) and dibenzofurans (PCDFs), and metals.

Results from these sampling events indicate that concentrations of BCCs in target fish are below those thresholds requiring more restrictive consumption advisories as established by NYSDOH. This further reinforces the conclusion that the Rochester Embayment is not a significant source of contaminants to the Lake Ontario ecosystem, thereby supporting the conclusion that the second removal criterion for the *Restrictions on Fish and Wildlife Consumption* BUI has been met. NYSDEC Division of Fish and Wildlife Staff validated the data collected as part of these assessment and prepared Data Usability Summary Reports (DUSRs) for each discrete data set. These data sets and their DUSRs were shared with NYSDOH in order to inform their decision-making with regards to the relevant BUI removal criteria. NYSDOH agreed with the conclusion from these assessments that the Rochester Embayment is not a significant source of contaminants to the Lake Ontario ecosystem, and supports the removal of the *Restrictions of Fish and Wildlife Consumption* BUI. Data from the 2014 and 2015 sampling efforts are summarized below in **Table 8** and in **Table 9**.

Species	Coll. Year	No. of Fish	Avg. Total PCB in ppm (range)	Avg. Total Mirex in ppm (range)	Avg. Total DDT in ppm (range)	Avg. Total Dieldrin in ppm (range)	Avg. Total Chlordane in ppm (range)
Carp	2014	10	1.1 (0.03-4.7)	0.04 (ND-0.28)	0.30 (0.01-1.4)	0.005 (0.002-0.011)	0.05 (0.004-0.18)
	2015	11	0.50 (0.064-1.1)	Not analyzed	0.14 (0.014-0.28)	0.0094 (0.003-0.016)	0.015 (0.005-0.030)
Channel Catfish	2014	10	0.48 (0.17-0.83)	0.012 (0.05-0.22)	0.13 (0.05-0.22)	0.005 (0.001-0.015)	0.02 (0.01-0.04)
	2015	14	0.57 (0.18-1.8)	Not analyzed	0.011 (0.007-0.014)	0.011 (0.003-0.029)	0.003 (0.003-0.004)
Largemouth Bass	2015	4	0.063 (0.045-0.11)	Not analyzed	0.011 (0.007-0.014)	0.002 (0.002-0.003)	0.003 (0.003-0.004)
Smallmouth Bass	2015	15	0.087 (0.044-0.28)	Not analyzed	0.024 (0.006-0.092)	0.003 (0.002-0.005)	0.004 (0.003-0.005)
White Perch	2014	4	0.07 (0.06-0.08)	0.0008 (0.0003-0.0011)	0.03 (0.02-0.03)	0.001 (0.0005-0.0013)	0.003 (0.002-0.003)
Yellow Perch	2014	7	0.07 (0.04-0.14)	0.001 (0.0005-0.002)	0.022 (0.015-0.035)	0.0007 (0.0005-0.0008)	0.003 (0.002-0.006)
DOH Advisory Guideline			1 ppm	0.1 ppm	5 ppm	0.3 ppm	0.3 ppm

Table 8. PCB and Organochlorine Pesticide Data from 2014 and 2015 Fish Contaminant Assessments in Lower Genesee River (Unpublished NYSDEC data)

Species	Coll. Year	No. of Fish	Avg. Percent Lipid (range)	Avg. Total TEQS in ppt (range), assuming non-detects = 0	Avg. Total TEQS in ppt (range), assuming non-detects = ½ Detection Limit
Carp	2014	10	11 (3.1-17)	3.0 (0.18-13)	3.1 (0.27-13)
	2015	9	8.6 (5.7-17.3)	3.7 (0.28-7.9)	4.5 (2.7-8.5)
Channel Catfish	2014	10	8.6 (3.3-17)	1.8 (0.75-4.5)	2.0 (0.85-4.6)
	2015	6	9.4 (3.2-16)	5.0 (2.4-10)	5.1 (2.4-10)
White Perch	2014	4	3.6 (3.2-4.1)	0.30 (0.11-0.59)	0.41 (0.27-0.63)
Yellow Perch	2014	7	1.8 (0.9-4.4)	0.13 (ND-0.51)	0.25 (0.15-0.53)
DOH Advisory Guideline (Eat up to one meal per month)					10

Table 9. Total Dioxin (2,3,7,8-TCDD) Toxic Equivalents (TEQs) in Lower Genesee River Fish, (Standard Fillet) (Unpublished NYSDEC data)

3.2.4 Sediment Contaminant Samples:

A 1996 NYSDEC source tracking study estimated chemical contaminant loading rates of PCBs, pesticides, mercury, dioxins/furans, mirex and PAHs in the eight major tributaries and some minor tributaries to Lake Ontario, including the AOC tributaries Genesee River, Eighteenmile Creek and the delisted Oswego River (Litten 1996). This study measured toxic equivalents (TEQs) of dioxin-like compounds in the AOC portion of the Genesee River and summarized results showed dioxin concentrations in sediments exceeding guidance values at the time. The 1996 study determined that PCBs were present in moderate levels in the Genesee River and high levels were found in Eighteenmile Creek and the Black River. High levels of PCBs were also found in several minor non-AOC tributaries including the Kelsey/Oily Creeks, Ley Creek, Skaneateles Creek and Wine Creek.

NYSDEC conducted a follow up Lake Ontario Study in 2009 to more closely examine dioxin sources from Eighteenmile Creek, Genesee River, Oswego River, Salmon River and Black River, and also examined PCB and mercury loading to Lake Ontario from these tributaries. Relative to the Rochester Embayment AOC, the study evaluated the Genesee River at sites upstream of the AOC and in the Erie Canal. Seasonal sampling in the Erie Canal indicated that most of the source of dioxins to the Genesee River is the Erie Canal, transferring dioxins from the Tonawanda/Lockport area to the Genesee River during periods of operation for boat navigation. Sources of two dioxin congeners found in sediment and water were not conclusively tracked down, and thought to be from undetermined air sources outside the AOC (Litten 2009). Based on their results the researchers concluded the dioxins present within the Rochester Embayment AOC sediment originated from sources outside the AOC. These results contribute to demonstrating the AOC is not a direct source of dioxin to the lake. The 2009 study also determined that PCB concentrations and loading rates from the Genesee River were similar to the rates detected at non-AOC tributaries. This suggests the Rochester Embayment AOC contribution of PCBs to Lake Ontario are not any more responsible than non-AOC sources for the cause of restrictions on the consumption of fish and wildlife and provide support for delisting of this BUI.

Additional sediment characterization studies concluded that the overall analysis of sediments indicate that serious sediment quality concerns do not exist at the Rochester Embayment AOC at sites tested (Neuderfer 2007, Battelle 2012B, Goehl 2009). A large portion of the results showed no impacts from contaminants and only minimal sediment quality guideline exceedances. Very limited samples were shown to demonstrate toxicity to indicator organisms (Neuderfer 2007). The lack of toxicity observed in the 10-day solid phase amphipod tests and low sediment contamination quotients indicate a low probability for negative biological impacts (Battelle 2012B). The Battelle data suggest that the average sediment contamination levels fall within the definition of a Class B - Moderate contamination (chronic toxicity to aquatic life) as defined by the NYSDEC TOGS 5.1.9 (NYSDEC 2004). Through TOGS 5.1.9, NYSDEC also defines sediment contaminant thresholds that are indicative of no appreciable contamination (Class A – no toxicity to aquatic life) and of significant contamination (Class C – acute toxicity to aquatic life). BCC results of core samples were higher and exceedances of TEC (Threshold Effect Concentration) were more widespread but these samples were all at a depth below the biologically active sediment zone. BCC results of surficial samples exhibited values exceeding the TEC but all were below PEC (Probable Effect Concentration) (Battelle 2012B, Neuderfer 2007). Results from extensive sampling in Braddock Bay subsequent to the Haynes and Neuderfer studies found no evidence of elevated heavy metal, pesticide, Aroclor, or dioxin/furan contamination in sediments sampled (Goehl 2009).

3.2.5 Summary

The concentrations of contaminants in fish and wildlife within the AOC are below levels necessitating specific consumption advisories. Data presented herein illustrate that the Rochester Embayment AOC is not a significant contributor of contaminants to the Lake Ontario food web. However, fish and wildlife of the Rochester Embayment AOC are subject to the Lake Ontario lake-wide consumption advisory. Sources of contaminants contributing to consumption advisories were found to be outside the AOC and concentrations and loading rates of contaminants were found to be similar to or less than non-AOC tributaries to Lake Ontario. As such, there is no evidence of significant contaminant input from Rochester Embayment AOC contributing to contaminant levels in fish and wildlife tissue.

4. Evidence Supporting Lake-Wide Issue

The intent of the AOC program is to remedy the impairment when the AOC is the source. Studies have demonstrated that sources of contaminants contributing to Lake Ontario fish and wildlife consumption advisories (PCBs, mirex and dioxin) are not attributable to the Rochester Embayment AOC. Studies show that tissue samples taken from fish and wildlife within the AOC and not exposed to Lake Ontario and its food web have less BCCs than those samples that were exposed to Lake Ontario and its food web, indicating that Lake Ontario is the primary source of contaminants that are responsible for the *Restrictions on Fish and Wildlife Consumption* BUI for the Rochester Embayment AOC. Source tracking studies have also indicated that the Genesee River and Rochester Embayment contributions of BCCs responsible for the Lake Ontario fish consumption advisories are comparable to the contributions from non AOC tributaries to Lake Ontario. Fish consumption advisories listed by New York State are Lake Ontario-specific and include the Rochester Embayment AOC as well as all other tributaries to Lake Ontario to the first impassible barrier to fish.

The evidence presented herein should not be construed to support the broad statement that the fish in Lake Ontario or the lower Genesee River are safe to eat. The current fish consumption advisories issued by NYSDOH for Lake Ontario, which includes tributaries to the first impassible barrier, are still in effect. The intent of this report is to detail how these advisories are not the result of activities within the AOC, and are not specific to the AOC.

5. Efforts Implemented to Improve Lake-Wide Conditions

Public awareness of adverse health and environmental impacts of air pollution, coupled with advances to assess the ambient air concentrations of air pollution and technological advances in air pollution control grew to a point which prompted state and federal agencies to issue regulatory mandates. In 1957 the New York State Legislature enacted one of the nation's first comprehensive air pollution control laws by passing the Air Pollution Control Act, Article 12-A of the Public Health Law. By 1962 this policy provided the foundation for an air pollution control program to control emissions from industrial processes and the combustion of fuels in NYS. NYSDEC's State air toxics program applies regulatory authority to dischargers of air emissions to control emissions from industrial processes and the combustion of fuels in NYS. The U.S. EPA implemented emissions requirements to reduce dioxin stack emissions from incinerators in 1987 and the production of several of the organochloride group of herbicides are now banned.

Since the promulgation of these policies dioxins have significantly been reduced in the environment. Additional regulatory actions by USEPA to ban the production and use of PCBs and mirex in the 1970s have greatly contributed to their reduction of in the environment.

The illicit discharges of contaminants in the AOC have been reduced or controlled with the closure of several large industrial operations and rigorous state air emission and water discharge limits on existing or new facilities. Studies of sediment demonstrate no significant toxicity to the aquatic community and are determined to safely remain in place. State and federal regulatory efforts have significantly reduced contaminant levels in the environment.

All known contaminant sources within the AOC have been reduced through State Pollutant Discharge Elimination System. This has resulted in the cessation of direct industrial wastewater releases containing pollutants contributing to advisories on fish and wildlife consumption. Sources of contaminants to the AOC include residual low level contaminated sediments attributed to widespread historic sources that act as sources of elevated levels in sport fish.

6. Public Outreach

NYSDEC and MCDPH will host a virtual outreach event to present the supporting data and rationale for removing this BUI to the general public. NYSDEC and staff from local, state, and federal partners will be available during the meeting to directly answer any questions from local stakeholders. This virtual outreach event will kick off a 30-day comment period for the BUI Removal Report, during which a draft of this document will be available online via the MCDPH website. This section will be updated in the final draft of this document to provide a summary of the virtual outreach event and any comments received by the public.

7. Summary, Conclusion, and Removal Statement

The *Restrictions on Fish and Wildlife Consumption* BUI was originally listed as impaired due the contamination of water ways through exposure to harmful chemical such as mirex, PCBs, and Dioxin from industry and incinerator byproducts, the bioaccumulation of these chemicals in fish and wildlife dependent on the Lake Ontario environment in addition to its food chain, and the increased probability of exposure in Rochester Embayment residents to these concentrations of pollutants through consumption of local fish and wildlife.

Through the RAP process, several management actions have been undertaken to improve water quality and reduce the occurrence of fish and wildlife containing harmful levels of concerning chemicals within the Rochester Embayment AOC to the maximum extent practicable under the RAP. MCDPH and NYSDEC have determined that the established removal criteria for the Fish and Wildlife Consumption BUI have been substantially met. The data presented herein indicate that fish and wildlife within the Rochester Embayment AOC that weren't exposed to the waters of Lake Ontario or the Lake Ontario food web present concentrations of BCCs that are below thresholds requiring specific consumption advisories. Nevertheless, fish and wildlife within the Rochester Embayment are and will continue to be subject to the Lake Ontario lake-wide consumption advisory. The consumption advisory for Lake Ontario is applicable to the lake proper and tributaries up to the first impassable barrier. Although this includes the lower Genesee River portion of the AOC, there is no more restrictive consumption advisory that is applicable to waters of the AOC. The data presented herein demonstrate that the Rochester Embayment AOC is not a significant contributor of contaminants to the food web of the AOC nor Lake Ontario. Therefore, the *Restrictions on Fish and Wildlife Consumption* BUI can be removed, and further actions to address the root problems associated with this BUI should be given to programs with a broader focus, such as the Lake Ontario Lakewide Action and Management Plan, or LAMP. The Rochester Embayment RAC fully supports the removal of this BUI.

7.1. Post-Removal Responsibilities

New York State Department of Environmental Conservation

NYSDEC will continue to support the implementation of the RAP for the Rochester Embayment AOC in coordination with MCDPH. NYSDEC will continue to provide oversight for the remediation and management of former industrial sites through multiple state and federal programs, including RCRA and Superfund. NYSDEC will continue to monitor ecosystem health in the lower Genesee River and throughout the Lake Ontario Basin through a variety of statewide programs and initiatives.

New York State Department of Health

NYSDOH will continue to issue, revise and remove fish consumption advisories throughout the state of New York as appropriate. These consumption advisories will continue to be informed by and based on the latest available data, as well as on emerging knowledge of environmental and public health threats.

United States Environmental Protection Agency

USEPA will continue to provide funding for RAP/RAC coordination and technical assistance to the extent that resources are available to support the removal of remaining BUIs and ultimately the delisting of the Rochester Embayment AOC. NYSDEC Great Lakes Program staff will continue to assist with these efforts.

Monroe County Department of Public Health

With EPA/GLRI funding, MCDPH currently provides a Coordinator for the Rochester Embayment AOC RAP, facilitation with RAC efforts, and technical assistance for AOC documentation and project design. With ongoing funding support, MCDPH will continue in these roles to assist the RAC and USEPA in achieving the long-term goal of delisting the Rochester Embayment AOC.

Remedial Advisory Committee

The RAC will continue to forward the objectives of the RAP by evaluating, supporting, and documenting the restoration of the Rochester Embayment AOC, until all of the Beneficial Use Impairments are restored and the long-term goal of delisting the AOC can be achieved.

Appendices

DRAFT

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