

2016 Biennial Assessment of Ohio River Water Quality Conditions



305B REPORT 2010-2014



Weight of Evidence Approach



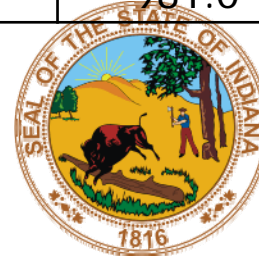
- Recommended by the Technical Committee and approved by the Commission, October 2011.
- Weight of evidence utilized in the 2016 assessments.
- Weight of evidence had effects on aquatic life use, mercury fish consumption, and public water supply assessments.



2016 Assessment Summary



	States	Number Miles Use is Impaired				
		Aquatic Life	Contact Recreation	Public Water Supply	Fish Consumption for PCBs & Dioxin	Fish Consumption for Mercury
PA	0.0-40.2	0	40.2	0	40.2	0
OH-WV	40.2-317.1	0	242.2	0	276.9	0
OH-KY	317.1-491.3	0	65.0	0	174.2	0
IN-KY	491.3-848.0	0	243.6	0	356.7	0
IL-KY	848.0-981.0	0	40.6	0	133.0	0
TOTAL	981.0	0	631.6	0	981.0	0

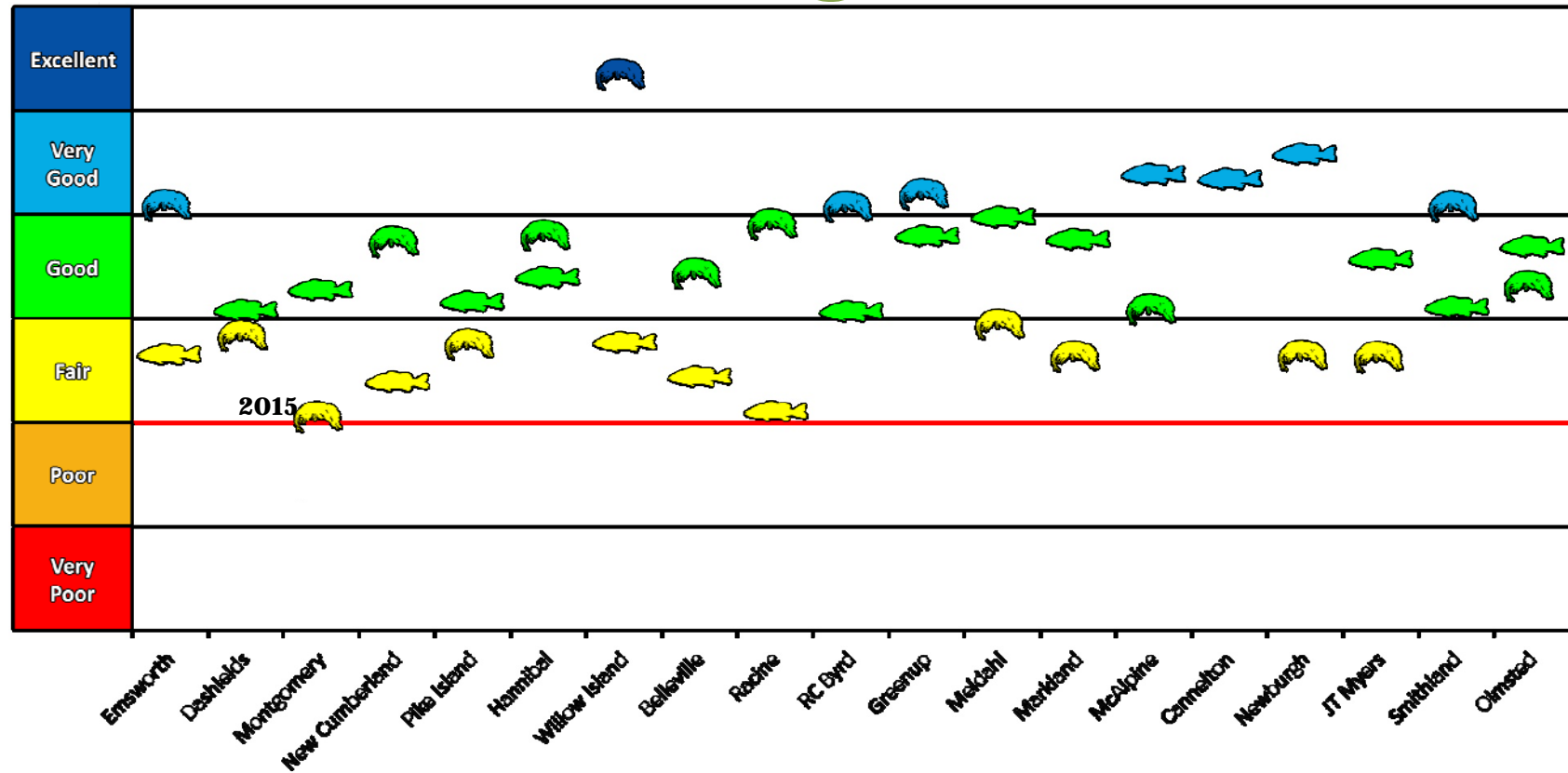


Aquatic Life Use Assessment



- “Weight-of-Evidence Approach” relies on biological assessments including fish and macroinvertebrate indices.
- First assessment including macroinvertebrate index.
- Criteria violations > 10% indicate impairment.
- Aquatic life criteria exceeded for:
 - ✦ Total iron (states’ criteria)
 - ✦ Dissolved oxygen
 - ✦ Temperature
- 305b workgroup recommended against using DO & Temperature data that are collected only during worst-case summer months.
- Bioassessments indicate full support river-wide.

2016 305(b) Biological Data



= Avg. Pool Fish Condition

= Avg. Pool Macro Condition

Aquatic Life Water Criteria Violations

Iron, 2010 – 2014

Site Name	River Mile	Criteria (µg/L)	Total Samples	WQC Violations	% Violations
Sewickly*	11.8	PA (1500 µg/L)	44	8	18%
East Liverpool*	42.6	PA (1500 µg/L)	34	3	9%
Pike Island	84.2	WV (1500 µg/L)	30	2	7%
Hannibal	126.4	WV (1500 µg/L)	30	2	7%
Willow Island	161.8	WV (1500 µg/L)	30	3	10%
Belleville	203.9	WV (1500 µg/L)	29	6	21%
R.C. Byrd	279.2	WV (1500 µg/L)	30	1	3%
Greenup	341.0	KY (3500 µg/L)	29	4	14%
Meldahl	436.2	KY (3500 µg/L)	30	3	10%
Markland	531.5	IN (2340 µg/L)	30	4	13%
McAlpine	606.8	IN (2340 µg/L)	28	9	32%
Cannelton	720.7	IN (2340 µg/L)	30	8	27%
Newburgh	776.0	IN (2340 µg/L)	30	9	30%
J.T. Myers	846.0	IN (2340 µg/L)	30	9	30%
Smithland	918.5	KY (3500 µg/L)	30	4	13%
L&D 52	938.9	KY (3500 µg/L)	30	4	13%

* PADEP data

Contact Recreation Use Assessment



- **Assessment includes:**
 - ✦ Bacteria data from 15 historical river-wide longitudinal surveys.
 - ✦ Contact recreation data from the past 5 years collected seasonally in the 6 largest CSO communities.
 - ✦ Vast majority of river is assessed based on historical longitudinal surveys.
- **States' criteria used for assessment.**
- **Criteria violations > 10% indicate Partial Support.
> 25% indicate Not Supporting.**
- **Approximately $\frac{2}{3}$ of river impaired for contact recreation use: Consistent with past assessments.**



Public Water Supply Use Assessment



- Impairment based on finished water MCL violations caused by Ohio River water quality.
- Accessed USEPA data base of MCL violations and water utility surveys.
- 6 utilities had MCL violations for trihalomethanes, one for HAA5's, two for Fecal coliform.
- Attributed to treatment issues.
- Entire river assessed as fully supporting public water supply use.

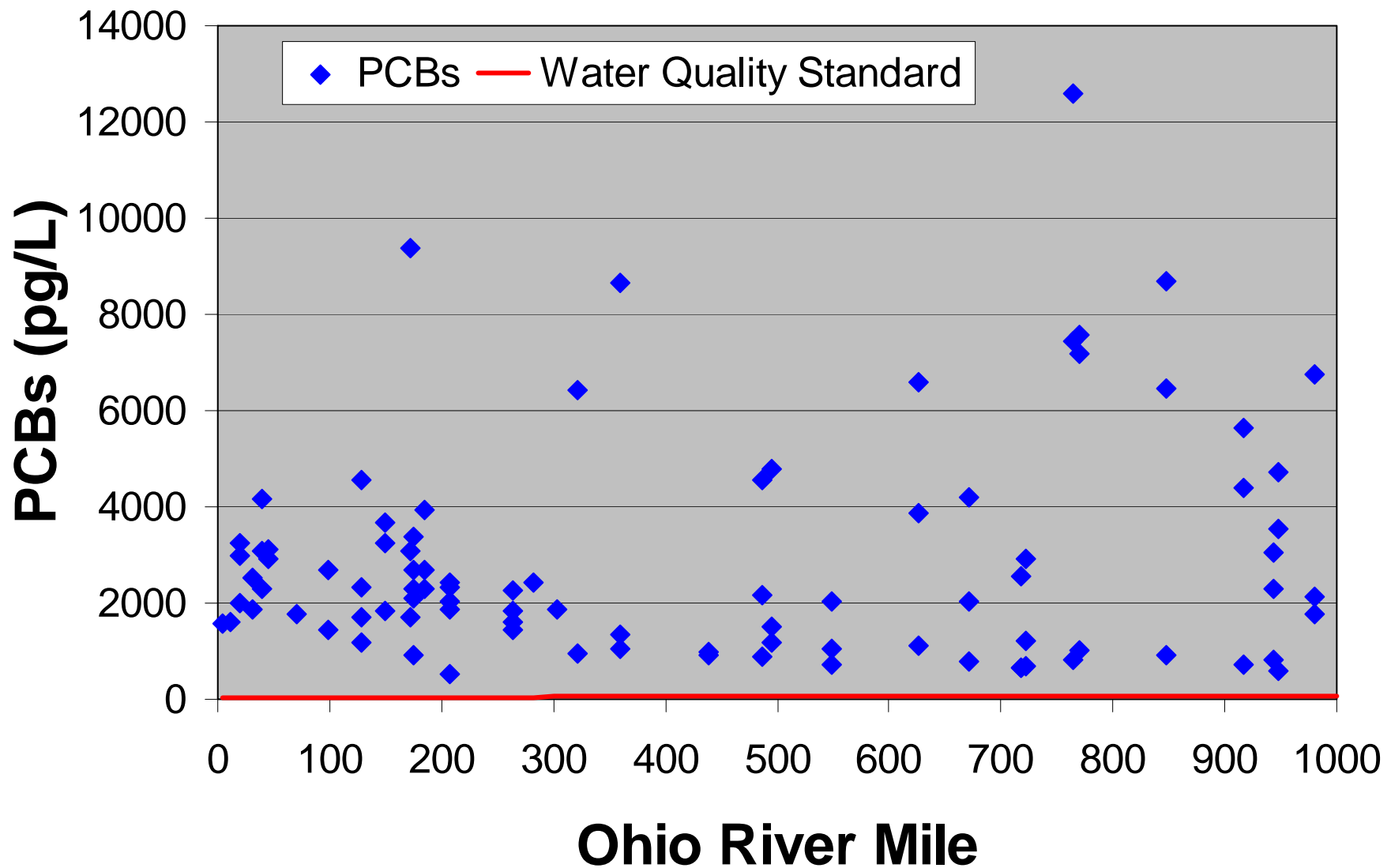
Fish Consumption Use Assessment



- The entire Ohio River is designated as impaired for PCBs and dioxin.
- ORSANCO directed by TEC to use US EPA's approach for determining impairment based on methylmercury fish tissue data.
- Collected data necessary to use EPA's methodology.
- Violations of mercury water quality criterion in $> 10\%$ of samples indicates impairment.
- Using "WOE Approach", entire river Full Support for fish consumption based on Methylmercury.

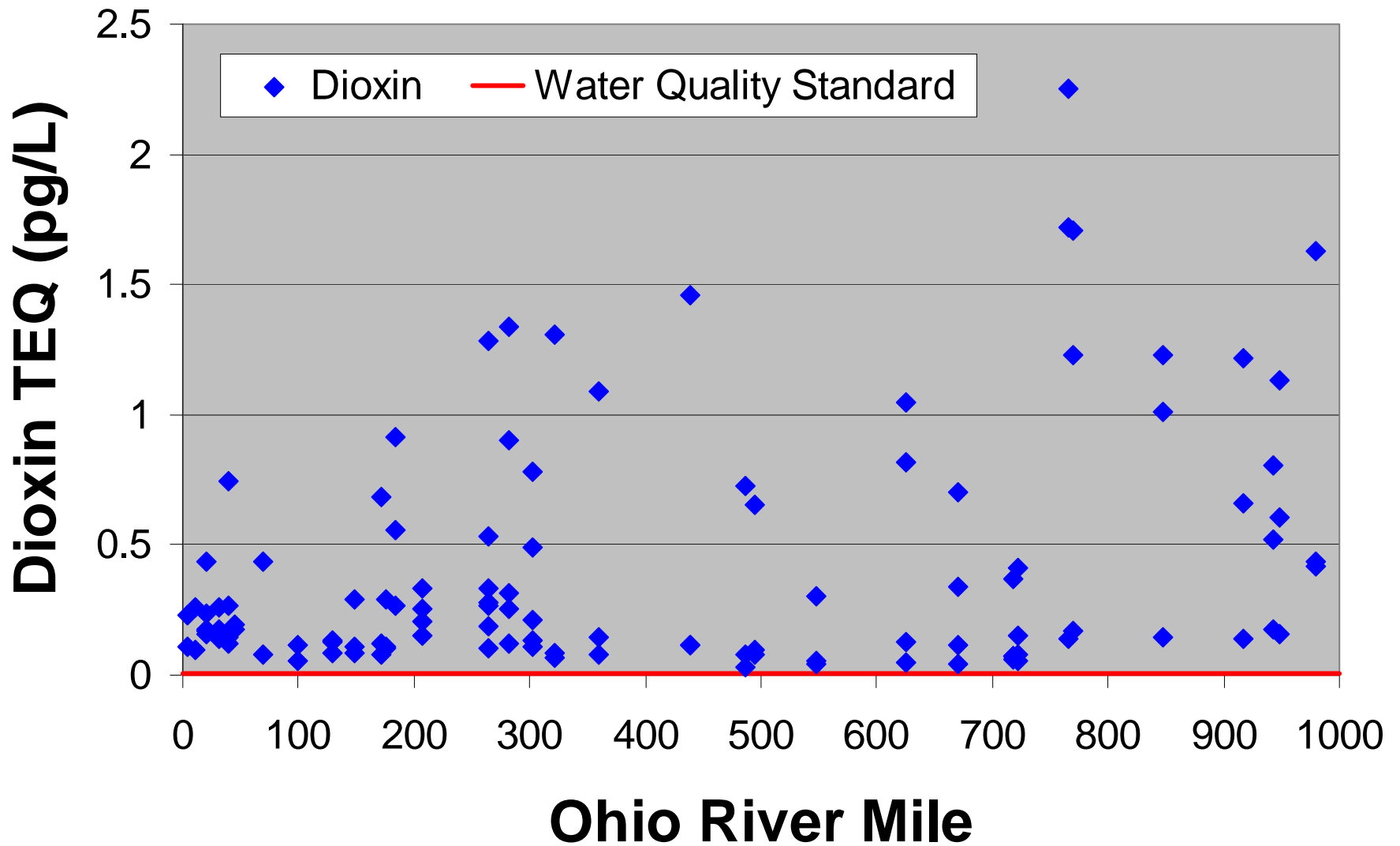
PCB Levels in the Ohio River

1997-2004



Dioxin Levels in the Ohio River

1997 - 2004



Total Mercury Water Violations

Mile Pt.	SiteName	Count of Hg Violations	Max Result, ng/L	# of Events	% Violations
84.2	Pike Island	1	12.5	30	3%
126.4	Hannibal	1	13.6	30	3%
161.8	Willow Island	1	19.1	30	3%
341	Greenup	3	16.5	30	10%
436.2	Meldahl	1	17.6	29	3%
477.5	And. Ferry	1	13.4	9	11%
531.5	Markland	3	19.4	30	10%
600.6	Louisville	3	20.6	9	33%
606.8	McAlpine	2	26.1	28	7%
776	Newburgh	4	17.8	30	13%
846	J.T. Myers	6	40.6	30	20%
918.5	Smithland	2	15.2	29	7%
938.9	L&D 52	4	18.0	29	14%

Averaging Data Across Trophic Levels

$$C_{\text{avg}} = \frac{3.8 * C_2 + 8.0 * C_3 + 5.7 * C_4}{(3.8 + 8.0 + 5.7)}$$

Where:

C_2 = average mercury concentration for trophic level 2

C_3 = average mercury concentration for trophic level 3

C_4 = average mercury concentration for trophic level 4

****Calculation is based on apportioning the 17.5 grams/day national default consumption rate for freshwater fish by trophic level**

5.7 grams/day of TL 4 fish

8.0 grams/day of TL 3 fish

3.8 grams/day of TL 2 fish



Fish Consumption-Weighted Methylmercury Fish Tissue

Pool	# Samples	Max. MeHg Conc., ppm	N > 0.3 ppm	MeHg Consumption-Weighted Avg. Concentration (ppm)
Emsworth	7	0.27	0	0.120
Dashields	8	0.23	0	0.160
Montgomery	6	0.17	0	0.125
New Cumb.	4	0.27	0	0.186
Pike Island	4	0.28	0	0.146
Hannibal	10	0.64	3	0.246
Willow Island	18	0.4	1	0.141
Belleville	11	0.29	0	0.168
Racine	9	0.44	3	0.211
RC Byrd	6	0.24	0	0.179
Greenup	10	0.36	2	0.176
Meldahl	8	0.27	0	0.177
Markland	15	0.49	5	0.221
McAlpine	14	0.45	1	0.191
Cannelton	6	0.37	1	0.181
Newburgh	9	0.29	0	0.136
JT Myers	11	0.86	4	0.246
Smithland	14	0.67	6	0.281
Olmsted	11	0.4	2	0.187
Open Water	5	0.49	1	0.145

TEC Considerations



- 1) Assessments endorsed by 305b Workgroup, approved by TEC at Feb 2016 meeting.
- 2) Minor comments by 305b Workgroup on the report have been addressed.
- 3) Consider recommending to the Commission approval of the report.
- 4) Consideration of workplans for PCBs, dioxin & bacteria to update data for future assessments.