Appendix

B

STATUS OF WATER QUALITY
OTTAWA RIVER (LIMA AREA) WATERSHED

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Ohio water quality standards (WQS) use a tiered aquatic life use (ALU) designation system. The two ALU designations found in the Ottawa River watershed are warmwater habitat (WWH) and modified warmwater habitat (MWH). A thorough discussion of each of these uses is located in Appendix C. Several uses were confirmed in previously undesignated streams during the 2010 field survey. In several locations, recommendations to change use designations were made. The use designation change rulemaking process is not yet complete; when it is, the effective rules can be found at http://www.epa.ohio.gov/dsw/document_index/psdindx.aspx.

The majority of the streams in the watershed are designated as primary contact recreation (PCR); two streams are designated as secondary contact recreation (SCR). The Ottawa River is PCR Class A, indicating that it has public access for more frequent recreation usage. The other PCR streams in the watershed are PCR Class B, indicating less frequent use as recreational streams.

B1 Aquatic Life Use Attainment

Multiple data sets were available to assess ambient biological performance in the Ottawa River watershed through time. In one form or another, the Ottawa River has been regularly assessed by Ohio EPA since the early 1970s. Prior Ohio EPA field work has included all or portions of the main stem and selected tributaries, supporting various water quality management goals (e.g., NPDES, stream regionalization, use attainability analysis and reference site monitoring). The first significant attempt to evaluate the entire basin was undertaken in 1996, where the majority of the main stem and major tributaries were systematically sampled (Ohio EPA 1998). Earlier Ohio EPA field efforts, both large and small, were undertaken in 1974, 1976, 1977, 1985, 1989, 1990, 1991, and 1995.

By 2010, 37.5 miles (74%) of the 50.7 linear stream miles of the main stem were found to support the appropriate biological assemblage (fish and macroinvertebrates) at least minimally consistent with WWH biocriteria. The remaining 13.2 (26%) miles failed to support WWH assemblages. However, the magnitude of the departure or degree of impact was not great, as poor to very poor community performance was not observed.

Based on the 2010 survey, where aquatic life use impairment was documented upstream from the City of Lima (primarily Hog and Little Hog creeks), it was primarily caused by nutrients, sediment and habitat alteration from cultivated crop land uses. Impairment in and around the City of Lima (the Ottawa River main stem, the Little Ottawa River, Zurmehly Creek and an unnamed tributary to Lost Creek) was primarily caused by organic enrichment, nutrients, low dissolved oxygen and flow alteration stemming from municipal and industrial point sources, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs) and dams. Aquatic life impairment downstream from the City of Lima (including Honey Run and Plum Creek) was generally caused by nutrients, organic enrichment and sediment stemming from cultivated crop land uses, CSOs and municipal point source discharges.

Figure B-1 shows aquatic life use attainment in the watershed. Table B-1 shows the aquatic life use attainment status for each site sampled for biology. Where impairment was found, probable causes and sources are also listed.

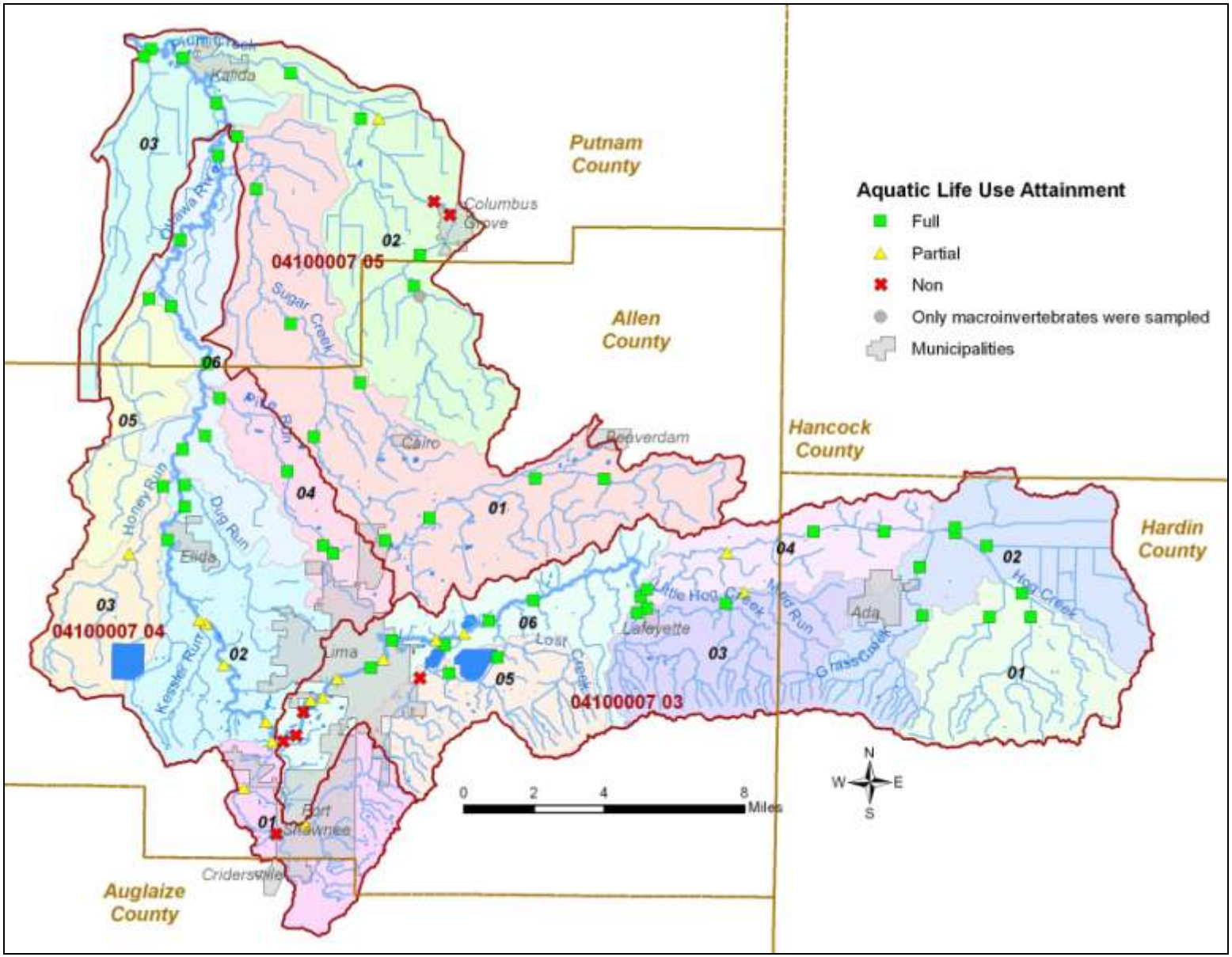

Figure B-1. Aquatic life use attainment in the Ottawa River (Lima area) watershed.

Table B-1. Aquatic life use attainment table for the Ottawa River (Lima area) watershed.

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
Ottawa River main stem (04-200) Eastern Corn Belt Plains **(ECBP) Warmwater Habitat (WWH)**								
46.1 [W]/ 46.0	37[ns]	8.7	48	81.0	Thayer Rd.	FULL	NA	NA
44.3 [W]	39[ns]	9.4	46	70.0	Fetter Rd.	FULL	NA	NA
43.4[W]/ 43.45	35*	8.6	VG[b]	59.5	Dst. Metzger Dam	PARTIAL	Low flow alteration Nutrient/eutrophication biol. indicators Nutrients	Flow alteration from water diversions Impoundment Crop production with subsurface drainage
42.5 [B]	32*	9.0	38	61.3	Dst. Roush Rd.	PARTIAL	Low flow alteration] Nutrient/eutrophication biol. indicators Nutrients D.O. (low, range)	Flow alteration from water diversions Impoundment Crop production with subsurface drainage
41.3 [W] / 41.2	44	9.1	44	71.3	Sugar St.	FULL	NA	NA
40.1 [W]	35*	8.7	40	69.5	Dst. Lovers Lane Dam (dst. CSO)	PARTIAL	Nutrient/eutrophication biol. indicators Nutrients D.O. (range)	Storm sewer overflows CSOs
39.6[W]/ 39.67	37[ns]	9.3	46	71.5	Dst. Elm St. Dam	FULL	NA	NA
38.6 [B]/ 38.65	39[ns]	8.0 [ns]	Low Fair*	46.5	Collett St./ Erie RR Dam pool	PARTIAL	Direct habitat alteration Nutrient/eutrophication biol. indicators Organic enrichment (sewage) biol. indicators D.O. (low, range)	Impoundment CSOs
37.9 [W]	35*	9.3	20*	74.0	Dst. Erie RR Dam Ust. Lima WWTP	PARTIAL	Nutrient/eutrophication biol. indicators D.O. (range) Organic enrichment (sewage) biol. indicators Nutrients Other anthropomorphic substrate alterations	CSOs Impoundment Historic bottom deposits (petroleum from legacy pollution)
37.4 [W]/37.55	34*	9.0	20*	71.8	Dst. Lima WWTP	PARTIAL	Nutrient/eutrophication biol. indicators Ammonia-N Nutrients	Municipal point source discharges CSOs

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
37.0 [W]	31*	7.7*	20*	70.3	Dst. Husky Refinery	NON	Nutrient/eutrophication biol. indicators Ammonia-N Excess algae Nutrients Chronic toxicity (impairment unknown)	Municipal point source discharge (upst.) Industrial point source discharge Source unknown
36.1 [W]	31*	7.7*	26*	77.3	Dst. PCS Nitrogen	NON	Nutrients Ammonia-N Nutrient/eutrophication biol. indicators D.O. (range) Chronic toxic. (impairment unknown)	Municipal point source discharge (upst.) Industrial point source discharges Source unknown
34.6 [W] / 34.55	29*	7.3*	36	69.3	Adj. Westfield Dr. (Shawnee CC / dst. major dischargers)	PARTIAL	Nutrient/eutrophication biol. indicators Nutrients D.O. (low, range) Chronic toxicity (impairment unknown)	Municipal point source discharge (upst.) Industrial point source discharges Source unknown
31.1 [B] / 30.75	31*	8.3	38	60.0	Elm St. / Dst. Shawnee WWTP	PARTIAL	Nutrient/eutrophication biol. indicators D.O. (low, range) Nutrients Organic enrichment (sewage) biol. indicators	SSOs Municipal point source discharge (upst.) Industrial point source discharges Urban runoff/storm sewers
29.3 [W]	33*	8.3	38	69.5	Copus Rd.	PARTIAL	Nutrient/eutrophication biol. indicators Nutrients Organic enrichment (sewage) biol. indicators	SSOs Municipal point source discharge (upst.) Industrial point source discharges
28.9 [B] / 28.85	32*	9.1	32[ns]	78.0	SR 81 / Allentown Dam Pool	PARTIAL	Nutrient/eutrophication biol. indicators Nutrients Fish-passage barrier	SSOs Municipal point source discharge Dam or impoundment
25.8 [W] /25.75	42	8.2[ns]	40	63.5	Piquad Rd.	FULL	NA	NA
24.1 [W] /24.11	38[ns]	9.2	48	68.3	Dst. Elida WWTP	FULL	NA	NA
22.1 [W] / 22.2	43	8.2[ns]	42	54.3	Neff Rd./ recovery	FULL	NA	NA

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
18.8 [W] / 18.7	41	9.4	VG	66.0	Dst. Gomer/ Dst. Pike Run / SR 12	FULL	NA	NA
Ottawa River main stem Huron Erie Lake Plains **(HELP) (WWH)**								
15.9 [W] / 16.0	45	9.5	42	68.8	@ Rimer / SR 189	FULL	NA	NA
12.7 [W]	43	8.7	36	59.5	Dst. Rimer (CR R17)	FULL	NA	NA
8.2 [B] / 7.75	38	9.5	50	55.5	Ust. Sugar Cr.	FULL	NA	NA
5.6	--	--	46	--	Ust. Kalida off SR115	(FULL)[c]	NA	NA
3.7 [W] / 3.8	35	8.9	50	59.5	Kalida @ SR 224	FULL	NA	NA
1.2 [B] / 0.8	44	9.8	48	56.0	Dst. Kalida (CR 19)	FULL	NA	NA
Hog Creek (forms Ottawa R. @ confluence of Little Hog Cr.) (04-216) **(ECBP) Modified Warmwater Habitat (MWH)** (to Hardin Co. line)								
13.4 [H] / 13.42	40	NA	H Fair	20.0	At TR 85	FULL	NA	NA
10.8 [W] / 10.77	32	6.2	H Fair	24.0	CR 65	FULL	NA	NA
8.7 [W] / 8.72	36	8.1	32	45.0	SR 235 (dst. Ada inputs from Grass Cr.)	FULL	NA	NA
6.7 [W] / 6.6	30	7.9	32	55.3	St. Paul Rd. (TR 25)	FULL	NA	NA
Hog Creek (04-216) **(ECBP) (WWH)** confirmed								
3.8 [W] / 3.9	24*	5.7*	46	63.5	Pevee Rd.	PARTIAL	Nutrient/eutrophication biol. indicators Nutrients Sedimentation	Crop production with subsurface drainage
0.3 [W] / 0.1	39 [ns]	8.5	48	69.5	Swaney Rd. (mouth)	FULL	NA	NA
UT to Hog Creek (@ RM 13.71) (04-263) **(ECBP) Modified Warmwater Habitat (MWH[d]) Recommended[e]**								
0.50 [H] / 0.52	36	NA	H Fair	20.0	TR 50	FULL	NA	NA
Lord Ditch (04-220) **(ECBP) Modified Warmwater Habitat (MWH) Recommended**								
1.2 [H] / -	32	NA	--	36.0	CR 50	(FULL)[c]	NA	NA
Fitzhugh Ditch (04-219) **(ECBP) Modified Warmwater Habitat (MWH) Recommended**								
0.2 [H] / 0.4	32	NA	H Fair	23.0	CR 65	FULL	NA	NA
No. 28 Ditch (04-218) **(ECBP) Modified Warmwater Habitat (MWH) Recommended**								
0.4 [H] / 0.37	36	NA	H Fair	18.0	CR 65	FULL	NA	NA
Grass Creek (04-217) **(ECBP) Modified Warmwater Habitat (MWH) Recommended**								
3.1 [H] / 2.57	30	NA	H Fair	39.8	CR 65/44 (ust.	FULL	NA	NA

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
					Ada)			
1.2 [H]	30	NA	MG	51.0	CR 65 (dst. Ada)	FULL	NA	NA
Little Hog Creek (04-221) **(ECBP) (WWH)**								
3.6 [H] / 3.62	30*	NA	MG[ns]	50.5	Pevee Rd.	PARTIAL	Direct habitat alteration Sedimentation Total suspended solids Nutrients	Crop production with subsurface drainage Streambank destabilization (erosion from riparian vegetation removal)
0.6 [H] / 0.64	38[ns]	NA	Good	55.5	Dst. Lafayette WWTP/Swaney Rd.	FULL	NA	NA
0.3 [H] / 0.64	39[ns]	8.7	46	60.5	Dst. Lafayette (SR 81)	FULL	NA	NA
Mud Run (04-222) **(ECBP) (WWH) Confirmed**								
0.3 [H] / 0.64	36[ns]	NA	Low Fair*	39.3	Dst. Bluffton Bentley Rd.	PARTIAL	Organic enrichment (sewage) biol. indicators D.O. (low) Nutrients	HSTS
UT to Little Hog Creek (@ RM 0.47) (04-294) **(ECBP) (WWH) Recommended**								
0.3 [H] / 0.1	40	NA	Good	51.5	Napoleon Rd.	FULL	NA	NA
Lost Creek (04-214) **(ECBP) (MWH) Recommended (RM 4 to > 0.35)**								
3.6 [H] / 3.56	32	NA	Fair	33.0	Mumaugh Rd.	FULL	NA	NA
1.7 [H]	30	NA	H Fair	40.0	Fenway Drive	FULL	NA	NA
Lost Creek (04-214) **(ECBP) (WWH) Recommended (RM 0.35 – mouth)**								
0.3 [H]	36[ns]	NA	Good	72.0	E. High St (Lower Reservoir Rd.)	FULL	NA	NA
UT to Lost Creek @ RM 1.15 (04-249) **(ECBP) (MWH) Recommended**								
0.6 [H] / 0.62	28	NA	VP*	43.0	Bryn Mawr Ave.	NON	Fish kills Nutrients Organic enrichment (sewage) biol. indicators	Other spill related impacts Urban runoff/ storm sewers
Zurmehly Creek (04-261) **(ECBP) (WWH)**								
0.1 [H] / 0.03	30*	NA	H Fair*	65.0	Ust. Ft. Amanda Rd.	NON	Nutrients Sedimentation Unknown	Urban runoff/storm sewers Source unknown
Little Ottawa River (04-213) **(ECBP) (MWH)** (Headwaters to RM 4.54)								

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
5.5 [H]	26	NA	Low Fair*	57.0	Old S. Dixie Highway	PARTIAL	Organic enrichment (sewage) biol. indicators Nutrients BOD	Unspecified domestic waste from pipe break (small train derailment) Package plant
Little Ottawa River (04-213) **(ECBP) (WWH)** (RM < 4.54 to mouth)								
4.5 [H] / 4.45	28*	NA	High Fair*	67.0	Ft. Shawnee Rd. / Dst. Cridersville WWTP	NON	Organic enrichment (sewage) biol. indicators Nutrients	HSTS Urban runoff/ storm sewers Municipal point source discharge
1.1 [H] / 1.85	26*	NA	MG[ns]	69.3	Zurmehly Rd. / Breese Rd.	PARTIAL	Organic enrichment (sewage) biol. indicators Nutrients Direct habitat alteration	HSTS Urban runoff/ storm sewers Historic channelization upst.
0.1 / 0.03	22*	NA	Good	66.8	Ust. Ft. Amanda Rd.	PARTIAL	Organic enrichment (sewage) biol. indicators Nutrients	SSOs Urban runoff/ storm sewers
Honey Run (04-209) **(HELP) (MWH) Recommended**								
3.6 [H] / 3.58	26	NA	Low Fair*	41.0	Cremeans Rd.	PARTIAL	Nutrients D.O. (low, range) Direct habitat alteration	Crop production with subsurface drainage Channelization (county stream maintenance)
Honey Run (04-209) **(HELP) (WWH) Confirmed**								
0.9 [H] / 1.1	30	NA	Good	46.5	Wapak Rd.	FULL	NA	NA
Dug Run (04-210) **(HELP) (WWH) Confirmed**								
0.2 [H] / 0.19	40	NA	Good	65.0	At Dutch Hollow Rd.	FULL	NA	NA
Beaver Run (04-293) **(HELP) (WWH) Confirmed**								
0.5 [H] / 0.51	30	NA	Good	42.5	At Dutch Hollow Rd.	FULL	NA	NA
Pike Run (04-208) **(HELP) (MWH) Confirmed**								
8.3 [H] / 8.5	24	NA	H Fair	51.0	Ust. American Bath WWTP	FULL	NA	NA
7.6 [H] / 7.56	20	NA	H Fair	58.0	Cole Rd. (Dst. WWTP)	FULL	NA	NA
4.6 [H] / 4.61	26	NA	Good	38.5	State Rd.	FULL	NA	NA
0.8 [H] / 0.84	30	NA	H Fair	41.0	Lima Gomer Rd.	FULL	NA.	NA

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
Leatherwood Ditch (04-207) **(HELP) (WWH) Confirmed**								
0.5 [H] / 0.48	36	NA	Good	30.5	State Rd.	FULL	NA	NA
Sugar Creek (04-203) **(ECBP) Confirmed (Headwaters to dst. SR 65 - RM 17.0) (MWH) Recommended**								
26.0 [H]	24	NA	H Fair	44.3	Napoleon Rd.	FULL	NA	NA
23.9 [H] / 23.85	26	NA	H Fair	51.0	Thayer Rd.	FULL	NA	NA
20.1 [H] /20.05	26	NA	Good	45.5	Stewart Rd.	FULL	NA	NA
Sugar Creek (04-203) **(ECBP) Confirmed (Headwaters to dst. SR 65 - RM 17.0) (WWH)**								
18.2 [W] /18.24	40	8.1[ns]	MG[ns]	65.5	Dst. Bluelick Rd (lower crossing)	FULL	NA	NA
Sugar Creek (04-203) **(HELP) Confirmed (< RM 17.0 to Mouth) (WWH)**								
13.4 [W] / 13.5	38[ns]	8.1[ns]	44	52.3	Ust. Old US Rt. 30 (Lincoln Highway)	FULL	NA	NA
8.8 [W] / 8.55	40	7.1[ns]	40	56.0	St. Rt. 115	FULL	NA	NA
3.6 [W] / 4.8[RR]	41	8.8	36	45.8	Co. Rd. Q	FULL	NA	NA
0.6 [W] / 0.64	39	8.9	36	60.9	Co. Rd. 16-O	FULL	NA	NA
Rattlesnake Creek (04-204) **(HELP) (MWH) Confirmed**								
1.7 [H]	28	NA	Good	44.0	Hofferbert Rd.	FULL	NA	NA
Plum Creek (04-201) **(HELP) Confirmed (WWH)**								
14.9 [H] / 14.35	26[ns]	NA	Good	39.5	TR 11-R/ Ust. Columbus Grove	FULL	NA	NA
Plum Creek (04-201) **(HELP) Confirmed (MWH)**								
12.9 [H] / 12.95	16*	NA	VP*	60.5	Ust. Columbus Grove WWTP (Wayne St.)	NON	Toxicity (impairment unknown) Fish kill Organic enrichment (sewage) biol. indicators	CSOs
12.1 [H] / 12.14	12*	NA	VP*	37.5	Dst. Columbus Grove & WWTP (TR 11)	NON	Nutrient/eutrophication biol. indicators Organic enrichment (sewage) biol. indicators D.O. (low) & CBOD Ammonia (total) Nutrients	Municipal point source discharge CSOs
8.1 [W] / 8.12	29	8.4	14*	40.0	TR O	PARTIAL	Nutrients Nutrient/eutrophication biol. indicators D.O. (low)	Crop production with subsurface drainage Channelization

River Miles Fish / Invert.	IBI	MIwb	ICI	QHEI[a]	Landmark	Attainment Status	Cause(s)[1]	Source(s)[2]
							Sedimentation (sand)	
Plum Creek (04-201) **(HELP) Confirmed (WWH)**								
4.6[W] / 4.62	30[ns]	8.8	44	29.8	TR M-10	FULL	NA	NA
0.2[W] / 0.19	29[ns]	7.7[ns]	Good	51.3	St. Rt. 114	FULL	NA	NA
Sycamore Creek (04-202) **(HELP) Confirmed (MWH)**								
0.8[H]	28	NA	MG	39.0	Dst. Searfoss Rd.	FULL	NA	NA
UT to Sycamore Creek (at RM 0.85) (04-295) **(ECBP) Confirmed (MWH)**								
0.26	--	NA	MG	--	Searfoss Rd.	--	NA	NA
UT to Plum Creek (at RM 7.30) (04-229) **(HELP) Confirmed (WWH)**								
0.4[H]	34	NA	MG[ns]	35.3	TR O west of CR13	FULL	NA	NA
UT to Ottawa River (at RM 0.70) (04-290) **(HELP) Confirmed (WWH)**								
0.4[H]	36	NA	Good	64.5	TR M-17	FULL	NA	NA

Ecoregional Biological Criteria

	Eastern Corn Belt Plains (ECBP)				Huron Erie Lake Plains (HELP)			
INDEX – Site Type	WWH	EWH	MWH	MWH	WWH	EWH	MWH	MWH
IBI - Headwaters	40	50	24	Impounded	28	50	20	Impounded
IBI – Wading Sites	40	50	24		32	50	22	
IBI – Boat Sites	42	48	24	30	34	48	20	22
Modified Index of Well-Being (MIwb) - Wading	≥ 8.3	≥ 9.4	≥ 6.2	≥ 5.8	≥ 7.9	≥ 9.4	≥ 5.6	
Modified Index of Well-Being (MIwb) – Boat Sites	≥ 8.5	≥ 9.6	≥ 5.8	≥ 6.6	≥ 8.6	≥ 9.6	≥ 5.7	≥ 5.7
Invert. Community Index - ICI	36	46	22	22	34	46	22	22

Footnotes

Yellow shading indicates partial attainment; pink shading indicates non-attainment.

[1] D.O. = dissolved oxygen; CBOD = carbonaceous biological oxygen demand; total P = total phosphorus; BOD = biochemical oxygen demand

[2] CSOs = combined sewer overflows; SSOs = sanitary sewer overflows; HSTS = home sewage treatment systems

* Significant departure from ecoregional biocriteria: poor and very poor results underlined.

ns Nonsignificant departure from ecoregional biocriteria for WWH or EWH (≤ 4 IBI, ≤ 4 ICI, or ≤ 0.5 MIwb units).

NA Not applicable to headwater streams (≤ 20 mi.^{2}).

[a] Quality Habitat Evaluation Index (QHEI) values based on Ohio EPA (1989).

[b] Narrative evaluation used in lieu of ICI (E= Exceptional; VG= Very Good; G= Good; MG= Marginally Good; LF= Low Fair; F= Fair; HF= High Fair; P= Poor; VP= Very Poor).

[c] Attainment status based on one organism group is place in parentheses ( ).
[d] Modified Warmwater Habitat criteria for channel modified streams.
[e] Attainment is given for the proposed status when a change is recommended.
[H] Headwater site (drainage area < 20 miles^2) sampled with wading methods and analyzed with only ICI biocriteria metrics calibrated for small streams.
[W] Wading method used for fish sampling with particular IBI and MIwb biocriteria metrics calibrated for stream and rivers of intermediate drainage area.
[B] Boat method used for fish sampling with particular IBI biocriteria and MIwb metrics calibrated for deeper rivers and those of larger drainage area.

B1.1 Causes and Sources of Impairment

Figures B-2 through B-7 show the proportion each cause and source contributes to aquatic life use impairment in each subwatershed.

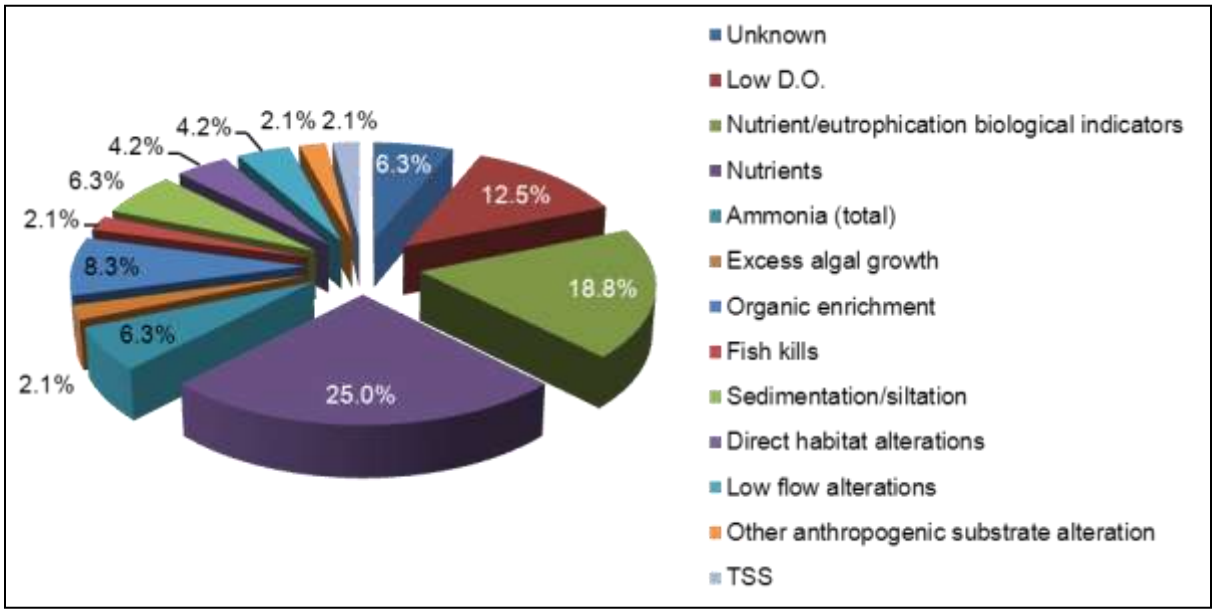

Figure B-2. Frequency of occurrence of each cause, relative to other causes, for impaired sites in the Upper Ottawa River subwatershed.

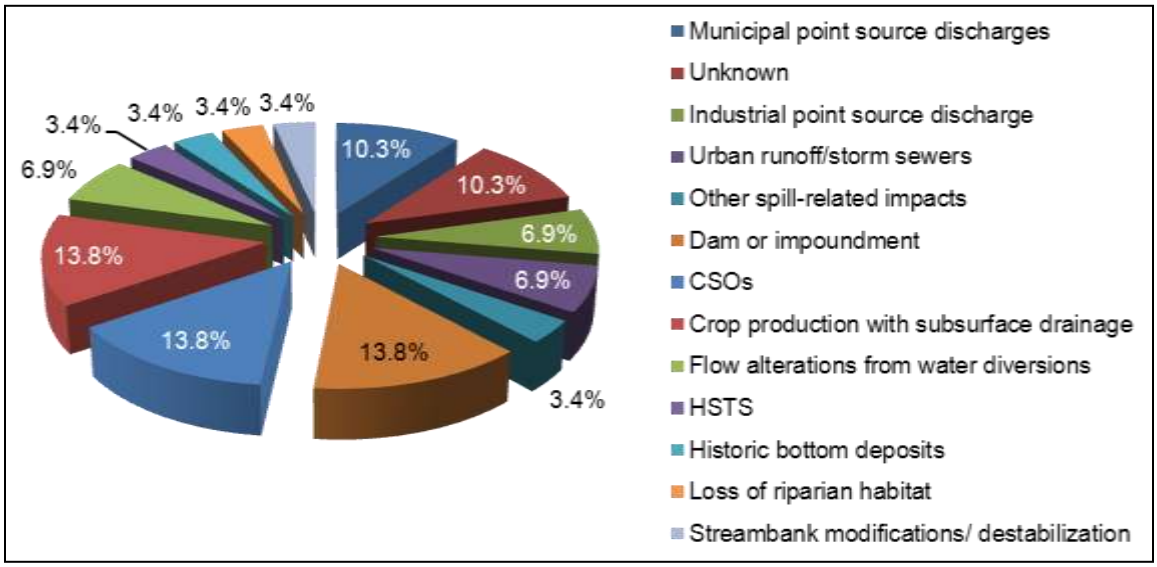

Figure B-3. Frequency of occurrence of each source, relative to other sources, for impaired sites in the Upper Ottawa River subwatershed.

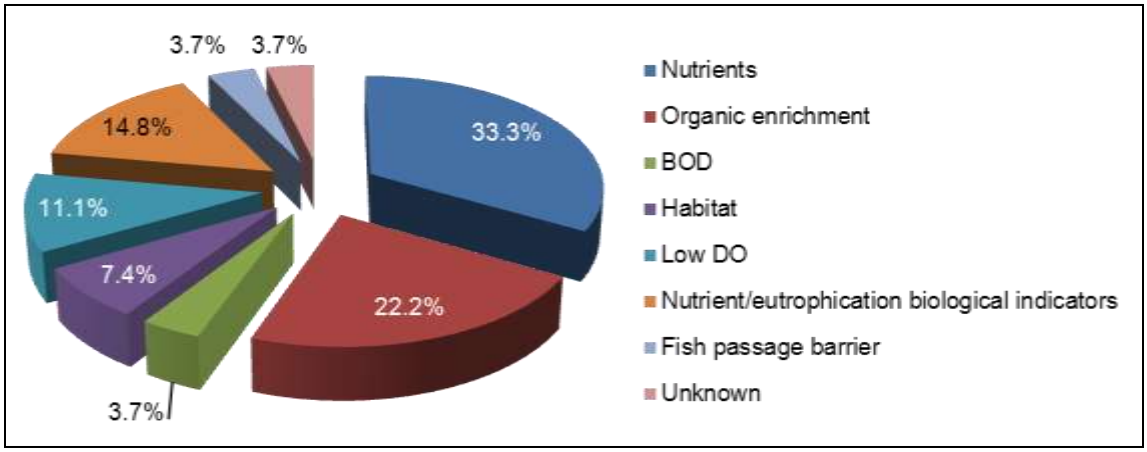

Figure B-4. Frequency of occurrence of each cause, relative to other causes, for impaired sites in the Middle Ottawa River subwatershed.

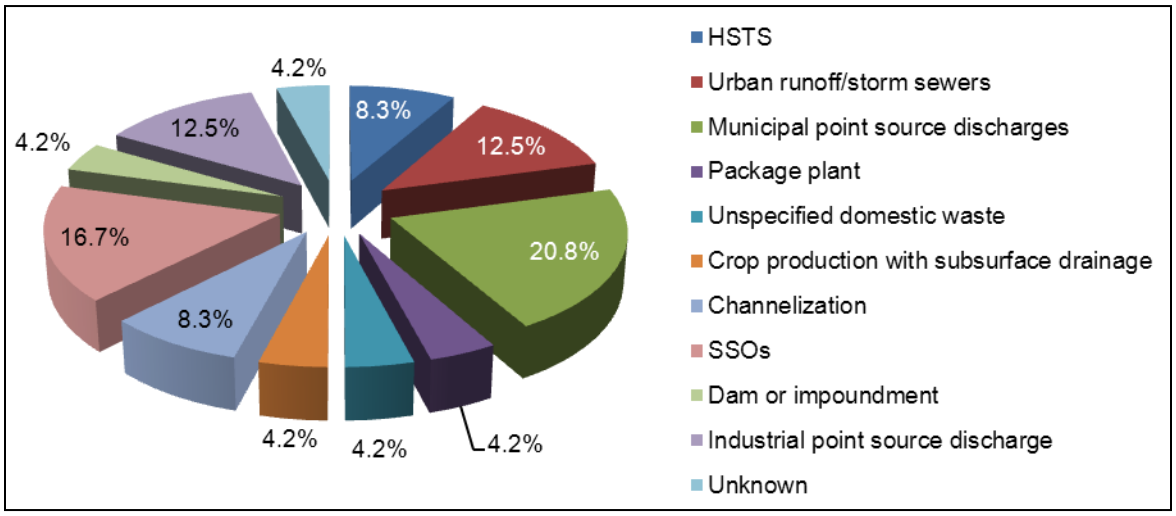

Figure B-5. Frequency of occurrence of each source, relative to other sources, for impaired sites in the Middle Ottawa River subwatershed.

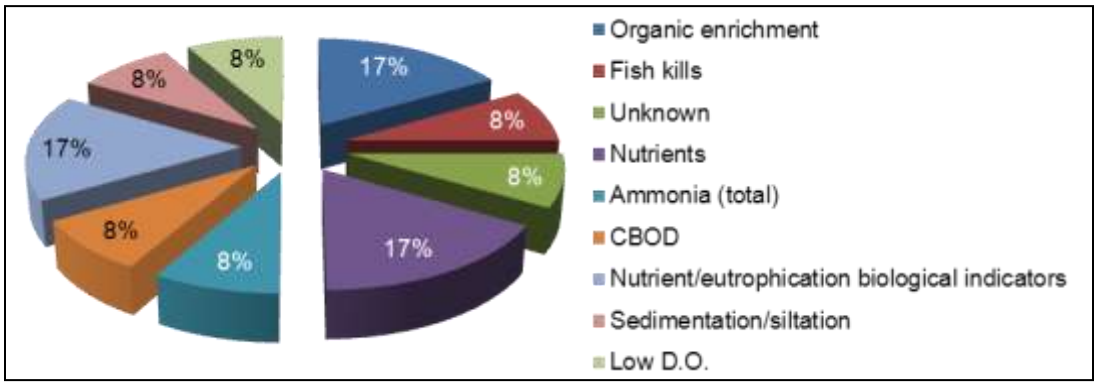

Figure B-6. Frequency of occurrence of each cause, relative to other causes, for impaired sites in the Lower Ottawa River subwatershed.

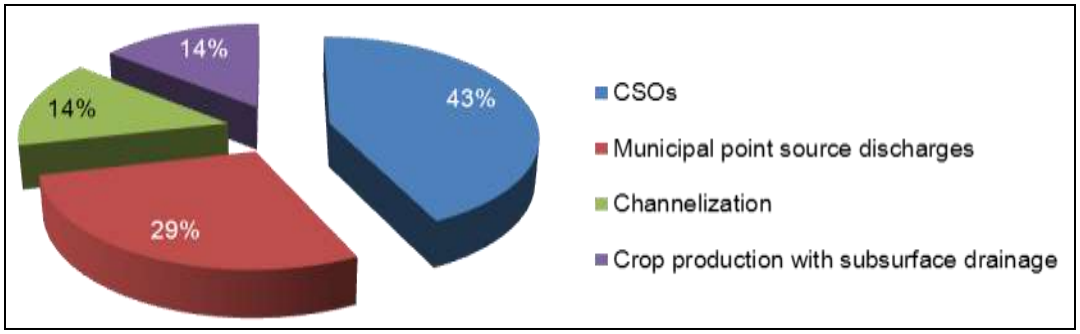

Figure B-7. Frequency of occurrence of each source, relative to other sources, for impaired sites in the Lower Ottawa River subwatershed.

B1.2 Water and Sediment Chemistry

Water Chemistry

The Ottawa River main stem was generally free of water quality standard exceedances along the 46-mile stretch from Thayer Road to the mouth. An influence from headwater streams was reflected in the upper segment where a few high pH and low DO readings were recorded. Within the Lima urban area, multiple sites had selenium and/or ammonia exceedances. The high ammonia values are attributed to an upset at the Lima wastewater treatment facility over a period of several days in July. Selenium is present in crude oil processed by the Lima Refining Company. Loads to the river have decreased significantly since a selenium removal system was installed in 2008, but levels above the OMZA are still documented on occasion. Land use speaks directly to water quality standard exceedances documented in the tributary streams. In many areas agricultural production is only possible because of the network of artificially drained fields. Many small streams have been channelized to support the tile drainage system, which contributes to nutrient and sediment runoff. Nutrients that stimulate algae blooms and a lack of riparian shade led to pervasive low dissolved oxygen levels in the warm, dry months of the survey.

Elevated nutrient concentrations are typically associated with either farming, animal husbandry or the treatment of wastewater. Levels are evaluated by comparing the geometric mean value calculated at a site to a set of targets tiered by drainage area and aquatic life use designation. The Ottawa River between Thayer Road and the Lima WWTP exhibited only occasional values above the total phosphorus and nitrate-nitrite targets. The frequency of elevated values for both nutrients increased downstream from the Lima CSOs and WWTP discharge and persisted all the way to the mouth of the river. Nutrient levels above target were also common in tributary streams, mostly because of the predominance of agricultural land uses. Elevated nutrients at some locations could be attributed to point source discharges. In the Upper Ottawa River subwatershed (04100007 03), the Ada WWTP had chronic ammonia exceedances that impacted water quality in Grass Creek. Several medium size livestock operations and failing home sewage treatment systems also likely contribute to elevated nutrient levels in Hog Creek. In the Middle Ottawa River subwatershed (04100007 04), the Cridersville WWTP impacted water quality in the Little Ottawa River. The unsewered community of Rimer and failing home sewage treatment systems also likely contribute to elevated nutrient levels. In the Lower Ottawa River subwatershed (04100007 05), the Columbus Grove WWTP impacted water quality in Plum Creek. The unsewered communities of Gomer and Vaughnsville and failing home sewage treatment systems also likely contribute to elevated nutrient levels in Pike Run and Sugar Creek, respectively.

Table B-2 shows exceedances of Ohio WQS in the Ottawa River watershed. Tables showing where nutrients exceed targets are shown in Table B-3 and Tables B-5 through B-7.

Table B-2. Exceedances of Ohio Water Quality Standards criteria (OAC 3745-1) for chemical and physical parameters measured in the Ottawa River watershed in 2010.
Note: Bacteria exceedances are presented in Section B2. Data are evaluated on both existing use and recommended use, where applicable. Number of samples (N) is five unless indicated.

Location with River Mile (RM)	**Parameter (value – mg/l unless noted)**
Warmwater Habitat (WWH) Stream Sites	
Ottawa River @ Thayer Rd (RM 45.97)	pH (SU) – 9.09[1] (N=6)
Ottawa River @ Dst Metzger Dam (RM 43.45)	pH (SU) – 9.36[1] (N=6), Nitrate-nitrite – 21.9[3], Iron – 1960, 685, 353, 722, 904[3] , Atrazine – 3.38 µg/l[3] (N=1)
Ottawa River @ Roush Rd (RM 42.30)	Dissolved oxygen (mg/l) – 4.93[1] (N=6), Nitrate-nitrite – 12.0[3], Iron – 1600, 389, 668, 475[3]
Ottawa River @ Collett St (RM 38.63)	Dissolved oxygen (mg/l) – 4.53[1] (N=6)
Ottawa River @ Dst Lima WWTP (RM 37.47)	Ammonia – 5.41[1]
Ottawa River @ Dst Husky Refinery (RM 37.00)	Ammonia – 2.81[1], Selenium – 5.9[1] µg/l, Temp (ºC)-27.81[1] (N=6)
Ottawa River Adj. Ft. Amanda Rd (RM 36.3)	Ammonia – 1.79[1]
Ottawa River @ Shawnee Rd (RM 35.44)	Ammonia (mg/l) – 3.16[1], 0.67[1], (N=7), Selenium – 5.5[1], 6.5[1] µg/l
UT to Hog Creek @ TR 50 (RM 0.52)	Dissolved Oxygen – 3.96[2], 2.71[2], 4.02[1]
Lord Ditch @ CR 50 (RM 1.2)	Dissolved Oxygen – 3.86[2], 3.63[2]
Fitzhugh Ditch @ CR 75 (RM 0.4)	Dissolved Oxygen – 4.85[1], 4.76[1], 4.56[1], 4.60[1], 3.19[2]
Grass Creek @ CR 44 upst Ada WWTP (RM 2.57)	Ammonia – 0.56[1]
Grass Creek @ CR 65 dst Ada WWTP (RM 1.24)	Ammonia – 0.876[1]
Mud Run @ Bentley Rd (RM 0.65)	Dissolved Oxygen – 3.76[2]
Hog Creek @ Peevee Rd (RM 3.8)	Ammonia – 0.25[1]
Hog Creek @ Swaney Rd (RM 0.27)	pH (SU) – 9.07[1], Ammonia 0.13[1]
Honey Run @ Cremean Rd (RM 3.58)	Dissolved Oxygen – 4.05[1], 4.98[1]
Honey Run @ Wapak Rd (RM 0.9)	Dissolved Oxygen – 4.29[1], 4.01[1]
Leatherwood Ditch @ TR 19 (RM 0.48)	Dissolved Oxygen – 4.23[1]
Beaver Run @ Bussert Rd (RM 0.51)	Dissolved Oxygen – 4.32[1]
Sugar Creek @ Napoleon Rd (RM 26.03)	Dissolved Oxygen – 4.24[1]
Sugar Creek @ Thayer Rd (RM 23.85)	Dissolved Oxygen – 4.70[1]
Sugar Creek @ Stewart Rd (RM 20.05	Dissolved Oxygen – 4.98[1]
Sugar Creek @ SR 115 (RM 9.27)	Dissolved Oxygen – 4.03[1], 4.92[1]
Sugar Creek @ CR Q (RM 3.51)	Dissolved Oxygen – 4.41[1]
Sugar Creek @ CR 16-O (RM 0.64)	Dissolved Oxygen – 4.56[1], 4.42[1]
Rattlesnake Creek @ Hofferbert Rd (RM 1.74)	Dissolved Oxygen – 3.91[2]
Plum Creek @ TR 11-R (RM 14.92)	Dissolved Oxygen – 3.91[2]
Plum Creek @ TR 11 (RM 12.14)	Dissolved Oxygen – 3.05[2], Ammonia – 7.92[1]
Plum Creek @ SR 114 (RM 0.19)	Dissolved Oxygen – 4.62[1], 4.60[1]
Sycamore Creek @ Searfoss Rd (RM 0.65)	Dissolved Oxygen – 4.88[1]
UT to Plum Creek @ TR O (RM 0.41)	Dissolved Oxygen – 4.17[1], 4.28[1]
UT to Ottawa River @ TR M-17 (RM 0.33)	Dissolved Oxygen – 3.96[2]
Modified Warmwater Habitat (MWH) Stream Sites	
Hog Creek @ TR 85 (RM 13.42)	Dissolved Oxygen – 3.53[1], 3.01[1], 3.69[1]

Location with River Mile (RM)	Parameter (value – mg/l unless noted)
UT to Hog Creek @ TR 50 (RM 0.52)	Dissolved Oxygen – 3.96[1], 2.71[2]
Hog Creek @ CR 65 (RM 10.77)	Dissolved Oxygen – 3.98[1]
Hog Creek @ TR 25 (RM6.67)	Dissolved Oxygen – 4.45[1]
Fitzhugh Ditch @ CR 75 (RM 0.4)	Dissolved Oxygen – 3.19[1]
Rattlesnake Creek @ Hofferbert Rd (RM 1.74)	Dissolved Oxygen – 3.91[1]
Plum Creek @ TR 11 (RM 12.14)	Dissolved Oxygen – 3.05[1], Ammonia – 7.92

[1] Exceedance of the aquatic life Outside Mixing Zone Average water quality criterion (below **24 hour** average for D.O).
[2] Exceedance of the aquatic life Outside Mixing Zone Maximum water quality criterion (below minimum for D.O.).
[3] Exceedance of the Human Health drink and non-drink criterion.

Table B-3. Seasonal geometric mean values (mg/L) for nutrients calculated from grab samples collected in the Ottawa River.

Site River Mile	Phosphorus Concentration	Nitrate-Nitrite Concentration
Wadeable Stream (20 ≥ drainage area mi^2 < 200		
04100007 03 06: Ottawa River below Little Hog Creek to above Little Ottawa River		
45.97	0.16	0.64
43.45	0.17	0.86
42.30	0.13	0.72
41.16	0.10	0.98
40.04	0.06	1.21
39.58	0.10	0.76
38.63	0.10	0.85
37.91	0.14	0.74
37.47	0.18	4.71
37.00	0.17	5.00
36.30	0.30	5.21
35.44	0.29	5.56
04100007 04 03: Ottawa River below Little Ottawa River to below Dug Run		
31.03	0.23	5.98
29.26	0.25	4.86
28.85	0.23	4.91
25.75	0.25	4.82
24.11	0.34	5.03
04100007 04 06: Ottawa River below Dug Run to above Sugar Creek		
22.14	0.29	4.45
Small River (200 ≥ drainage area mi^2 < 1000		
18.68	0.30	4.35
15.98	0.25	4.82
8.12	0.28	3.32
04100007 05 03: Ottawa River below Sugar Creek to Auglaize River		
5.60	0.24	2.75
3.67	0.22	3.01
0.96	0.25	3.10

Target levels for phosphorus are 0.10 mg/L in wadeable streams and 0.17 mg/L for small rivers.
The target level for nitrate-nitrite is 1.0 mg/L.
Highlighting indicates that the geometric mean exceeds the target.

Table B-4 shows nutrient targets for applicable beneficial uses that were used to determine exceedances in Tables B-5 through B-7.

Table B-4. Nutrient geometric mean targets for warmwater habitat (WWH) and modified warmwater habitat (MWH) streams.

	WWH		MWH	
	Headwater	Wadeable	Headwater	Wadeable
Phosphorus	0.08	0.10	0.34	0.28
Nitrate-nitrite	1.0	1.0	1.0	1.6

Table B-5. Seasonal geometric mean values (mg/L) for nutrients calculated from grab samples collected in the Upper Ottawa River tributaries.

Site River Mile	Phosphorus Concentration	Nitrate-Nitrite Concentration
Headwater Stream (drainage area mi^2 < 20)		
04100007 03 01: Hog Creek headwaters to above Fitzhugh Ditch		
Hog Creek (MWH)		
13.42	0.12	1.61
UT to Hog Creek @ RM 13.71 (MWH recommended)		
0.52	0.25	0.55
Lord Ditch (WWH)		
1.2	0.18	1.31
04100007 03 02: Hog Creek above Fitzhugh Ditch to below Grass Creek		
Fitzhugh Ditch (MWH recommended)		
0.4	0.13	0.46
Grass Creek (MWH recommended)		
2.57	0.11	0.88
1.24	0.53	6.02
04100007 03 03: Little Hog Creek		
L. Hog Creek (WWH)		
3.62	0.13	0.45
0.64	0.18	3.43
UT to L. Hog Creek @ RM 0.47 (WWH recommended)		
0.30	0.18	1.13
Mud Run (WWH recommended)		
0.65	0.24	0.57
04100007 03 05: Lost Creek		
Lost Creek (MWH recommended)		
3.56	0.13	0.29
1.7	0.14	0.78
Lost Creek (WWH recommended)		
0.35	0.12	0.84
UT to Lost Creek @ RM 1.15 (MWH recommended)		
0.62	0.14	1.27
04100007 03 06: Ottawa River below L. Hog Creek to above L. Ottawa River		
Zurmehly Creek (WWH)		
0.03	0.10	0.70
Wadeable Stream (20 ≥ drainage area mi^2 < 200)		
04100007 03 02: Hog Creek above Fitzhugh Ditch to below Grass Creek		
Hog Creek (MWH)		
10.77	0.09	0.72
04100007 03 04: Hog Creek below Grass Creek to above L. Hog Creek		
Hog Creek (MWH)		
8.72	0.43	2.16
6.67	0.34	0.73
Hog Creek (WWH)		
3.8	0.15	0.75
0.27	0.11	0.74

Table B-6. Seasonal geometric mean values (mg/L) for nutrients calculated from grab samples collected in the Middle Ottawa River tributaries.

Site River Mile	Phosphorus Concentration	Nitrate-Nitrite Concentration
Headwater Stream (drainage area mi^2 < 20		
04100007 04 01: Little Ottawa River		
Little Ottawa River (MWH recommended)		
5.50	0.07	1.25
Little Ottawa River (WWH)		
4.45	0.44	1.33
0.03	0.18	1.05
04100007 04 02: Honey Run		
Honey Run (MWH recommended)		
3.58	0.20	1.35
0.90	0.23	1.03
Dug Run (WWH recommended)		
0.19	0.20	2.06
04100007 04 04: Pike Run		
Pike Run (MWH)		
8.21	0.06	0.86
7.56	0.31	3.98
4.61	0.27	3.29
0.84	0.32	3.78
04100007 04 05: Leatherwood Ditch		
Leatherwood Ditch (WWH recommended)		
0.48	0.04	0.47
Beaver Run (WWH recommended)		
0.51	0.15	1.35

Table B-7. Seasonal geometric mean values (mg/L) for nutrients calculated from grab samples collected in the Lower Ottawa River tributaries.

Site River Mile	Phosphorus Concentration	Nitrate-Nitrite Concentration
Headwater Stream (drainage area mi^2 < 20)		
04100007 05 01: Sugar Creek		
Sugar Creek (MWH recommended)		
26.03	0.28	0.83
23.85	0.21	0.95
Rattlesnake Creek (MWH recommended)		
1.74	0.15	0.56
04100007 05 02: Plum Creek		
Plum Creek (WWH)		
14.92	0.07	0.46
Plum Creek (MWH recommended)		
12.95	0.11	0.40
12.14	0.44	1.87
UT to Sycamore Creek @ RM 0.85 (MWH recommended)		
0.65	0.11	0.60
UT to Plum Creek @ RM 7.30 (WWH recommended)		
0.41	0.08	0.43
04100007 05 03: Ottawa River below Sugar Creek to Auglaize River		
UT to Ottawa River @ RM 0.70 (WWH recommended)		
0.33	0.10	1.46

Sediment Chemistry

Sampling locations were selected in the study plan to determine background sediment quality, assess the impact from point sources and urban non-point runoff and evaluate downstream transport and recovery. Samples were collected following the *Sediment Sampling Guide and Methodologies* (Ohio EPA 2001). The goal is to collect a representative sample that is composed of > 30% silt and clay particles. These fine grained particles are much more physically, chemically and biologically reactive because they hold more interstitial water and have unbalanced electrical charges that can attract contaminants.

Most of the Ottawa River contains little in the way of fine grained sediment in large enough volumes to have much of an ecological impact. This is due in part to a largely intact natural stream morphometry and suitable gradient. This allows for fine particles to be deflected into the floodplain or washed downstream. Exceptions to this include impounded segments, isolated eddies and in the headwater where feeder streams are channelized.

A total of nine sediment samples were collected in the Ottawa River between Thayer Rd (RM 45.97) and Putnam CR 19 (RM 0.96). Sediment samples were analyzed for metals, s-VOCs (PAHs), PCBs and pesticides (organo-chlorine insecticides). Samples below the Lima WWTP and Husky Refinery were also analyzed for VOCs. No PCBs, pesticides or VOCs were detected in any of the samples.

Sediment sample results were evaluated using Tier I procedures for aquatic life described in the *Guidance on Evaluating Sediment Contaminant Results* (Ohio EPA 2010). Numeric Sediment Quality Guidelines (SQGs) that are used include Ohio Sediment Reference Values (SRVs) for metals contained in the *Ecological Risk Assessment Guidance* (Ohio EPA 2008) and toxicity values in the *Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald et al. 2000). When contaminants are at concentrations above the SQGs either appropriate treatment options should be explored to remediate the problem or consideration should be given to investigate if bioavailability affects toxicity. This would likely require further studies to be done.

A summary of parameters measured above SQGs is presented in Table B-8. Metals that were above their TEC, but that did not exceed their SRV are not displayed. Heavy metals and PAHs are common contaminants in urban areas because of vehicular emissions, asphalt pavement and their use in industrial processes. For example, mercury is used in the production of chlorine gas and caustic soda and in the manufacture of batteries and compact fluorescent light bulbs. It is also common in the atmosphere from coal burned to produce electricity. Besides urban storm water runoff and atmospheric deposition, other likely sources include municipal and industrial wastewater and CSOs in the Lima sewage collection system, since there are several categorical industries that use the system. Another potential source is oily waste escaping from the L-5 landfill, although this load should be much reduced since retaining wall and rip-rap were installed to contain leachate. There are also legacy pipelines in the area that occasionally leak oily waste.

Table B-8. Chemical parameters measured above sediment quality guidelines in surficial sediment samples collected by Ohio EPA in the Ottawa River during 2010.
Note: Harmful effects are unlikely below the threshold effect concentration (TEC) and likely above the probable effect concentration (PEC).

Parameter	Result (mg/kg)	SRV (mg/kg)	TEC (mg/kg)	PEC (mg/kg)
Lima Reservoir-Ottawa River (04100007 03 06)				
Ottawa River @ Thayer Road (RM 45.97)				
No exceedances				
Ottawa River @ Metzger Road dam pool (RM 43.45)				
Cadmium	1.17	0.90	0.99	4.98
Ottawa River @ Collett Street dam pool (RM 38.63)				
Cadmium	1.15	0.90	0.99	4.98
Copper	46.9	34.0	31.6	149
Zinc	191	160	121	459
Total PAH	37.36	---	1.61	22.8
Ottawa River downstream Lima WWTP (RM 37.47)				
Cadmium	1.37	0.90	0.99	4.98
Copper	49.2	34.0	31.6	149
Mercury	0.177	0.12	0.18	1.06
Zinc	269	160	121	459
Total PAH	33.42	---	1.61	22.8
Ottawa River downstream Husky Refinery (RM 37.0)				
Cadmium	1.50	0.90	0.99	4.98
Copper	84.1	34.0	31.6	149
Lead	61.7	47.0	35.8	128
Mercury	0.252	0.12	0.18	1.06
Zinc	283	160	121	459
Total PAH	25.59	---	1.61	22.8
Ottawa River downstream PCS Nitrogen (RM 36.3)				
Cadmium	1.52	0.90	0.99	4.98
Copper	71.4	34.0	31.6	149
Lead	155	47.0	35.8	128
Mercury	0.627	0.12	0.18	1.06
Zinc	277	160	121	459
Total PAH	23.94	---	1.61	22.8
Dug Run – Ottawa River (04100007 04 03)				
Ottawa River @ Allentown Road dam pool (RM 28.85)				
Cadmium	1.11	0.90	0.99	4.98
Copper	40.7	34.0	31.6	149
Mercury	0.14	0.12	0.18	1.06
Zinc	215	160	121	459
Kalida – Ottawa River (04100007 05 03)				
Ottawa River @ US Route 224 (RM 3.67)				
No exceedances				
Ottawa River @ Putnam Co Rd 19 (RM 0.96)				
No exceedances				

B1.3 Trends

Multiple data sets were available to assess ambient biological performance in the Ottawa River watershed through time. In one form or another, the Ottawa River has been regularly assessed by Ohio EPA since the early 1970s. Prior Ohio EPA field work has included all or portions of the

main stem and selected tributaries, supporting various water quality management goals (e.g., NPDES, stream regionalization, use attainability analysis and reference site monitoring). The first significant attempt to evaluate the entire basin was undertaken in 1996, where the majority of the main stem and major tributaries were systematically sampled (Ohio EPA 1998). Earlier Ohio EPA field efforts, both large and small, were undertaken in 1974, 1976, 1977, 1985, 1989, 1990, 1991, and 1995.

The maximum area negatively influenced by the Ottawa River in the first half of the twentieth century extended downstream through the Auglaize River to include a portion of the Maumee River. Through early pollution abatement efforts, by the mid-1970s, impacts had contracted significantly to include only the Ottawa River, with an incipient recovery evident near the mouth (Ohio EPA 1979). However, water quality through the historically degraded reach downstream from Lima remained extremely poor, as the cumulative pollutant load continued to exceed the river's assimilative capacity. Specifically, biological impacts paralleled water quality standards violations for dissolved oxygen, ammonia, chromium, phenols, and surfactants, which were numerous and regularly observed downstream from all the major facilities near Lima. Localized toxicity associated with private dischargers and the Lima WWTP was also identified, as well as the deleterious effects of pollutant loads derived from Lima's CSOs and SSOs (Ohio EPA 1979). Improved waste treatment and stricter enforcement attending additional amendments to the Federal Water Pollution Control Act (i.e., the Clean Water Act) resulted in additional water quality improvements and associated biological recovery through the 1980s and into the early 1990s, particularly when compared to the gross pollution identified in the previous decades. Despite the significant improvements achieved during this period of time, substantial pollution problems persisted through and downstream from Lima (U.S. EPA 1984; Ohio EPA 1992).

Biological communities showed a trend of significant recovery in 2010. However, these data results also clearly delineated impacted areas (and corresponding recovery through time) relative to major pollution sources, stressors or limiting factors on the Ottawa River. Prior to 2010, historical surveys portrayed significant and unambiguous depressions in community performance (indices and other biometrics) both through and downstream from Lima, with a secondary depression evident well downstream from Lima, beginning in the vicinity of Elida and extending to Kalida. Persistent local departures from the associated biocriteria and diminutions of other biometrics were documented immediately upstream from Lima as well.

By 2010, 37.5 miles (74%) of the 50.7 linear stream miles of the main stem were found to support the appropriate biological assemblage (fish and macroinvertebrates) at least minimally consistent with WWH biocriteria. The remaining 13.2 (26%) miles failed to support WWH assemblages. However, the magnitude of the departure or degree of impact was not great, as poor to very poor community performance was not observed. Figure B-8 illustrates the biological improvements over time (from 1985 – 2010, including the 1991 and 1996 surveys).

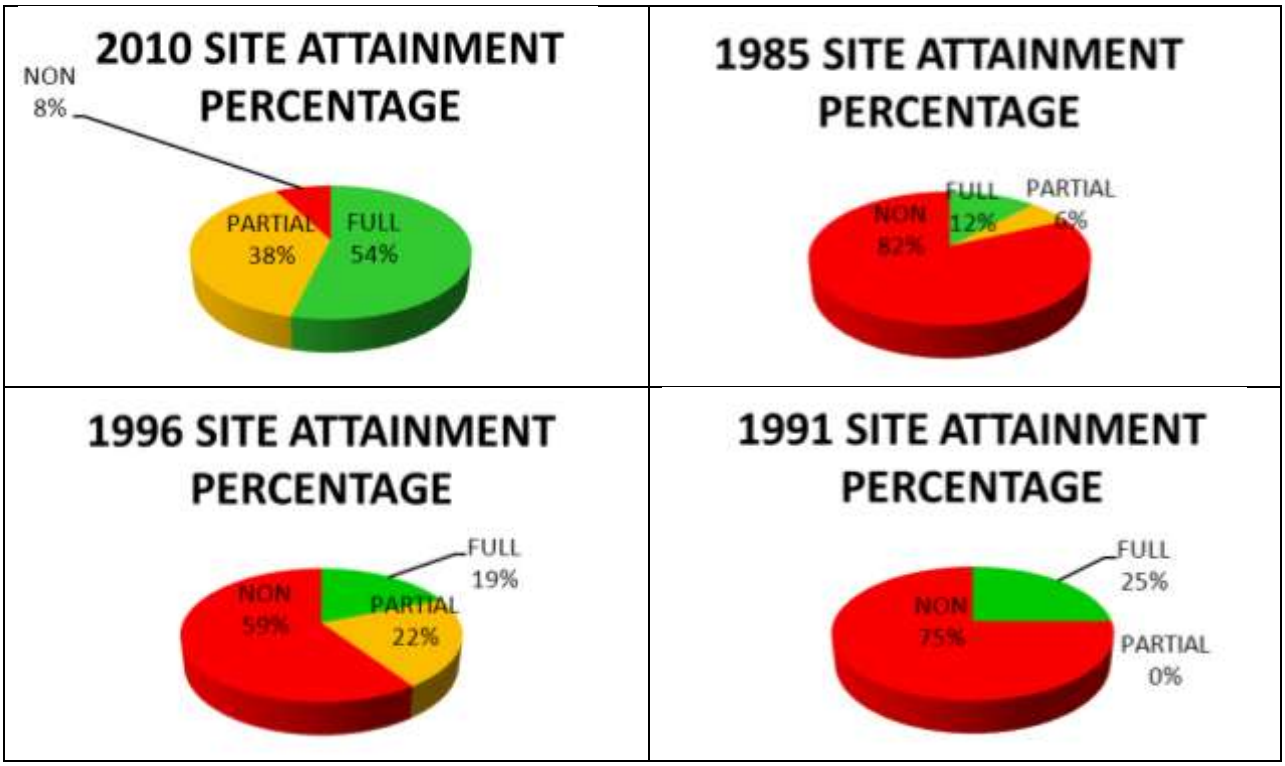

Figure B-8. Site attainment percentage trends for the Ottawa River main stem during 2010, 1996, 1991 and 1985 surveys.

B2 Recreation Use Attainment

Only one site sampled in 2010 (Metzger Reservoir) attained recreation use criteria. The highest samples of *E. coli* bacteria occurred in Hog, Little Hog and Grass creeks and Pike Run. Pike Run, Sugar Creek, Honey Run and Grass Creek had the highest geometric means of *E. coli* concentrations in the watershed. Most of the bacteria likely came from inadequately treated municipal wastewater and combined sewer overflows, plus rural homes with failing sewage treatment systems and manure spreading in farm fields. Figure B-9 shows recreation use attainment in the watershed and Figure B-10 shows ranges of *E. coli* geometric means. Site-by-site recreation use attainment with probable sources is shown in Table B-9.

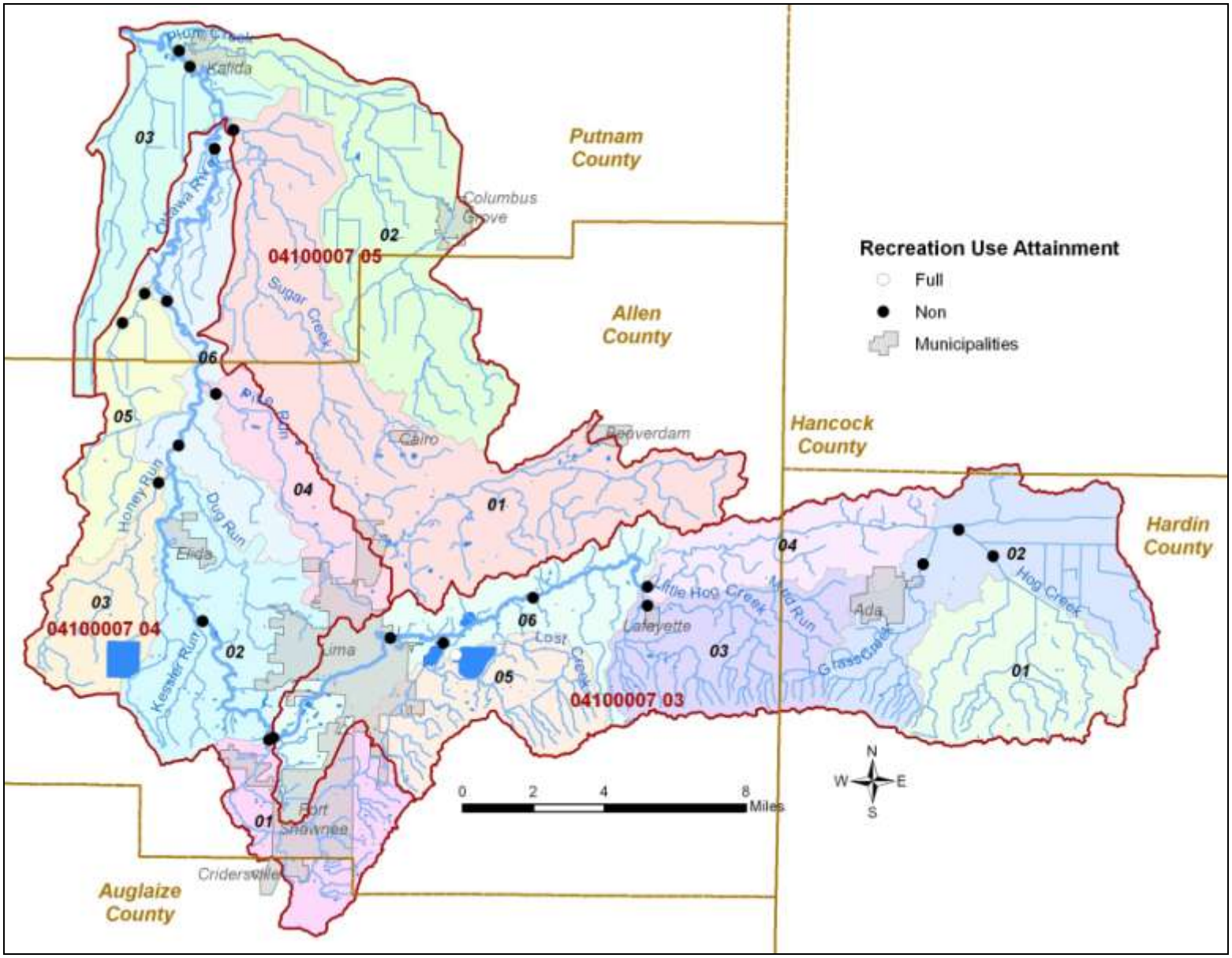

Figure B-9. Recreation use attainment in the Ottawa River (Lima area) watershed.

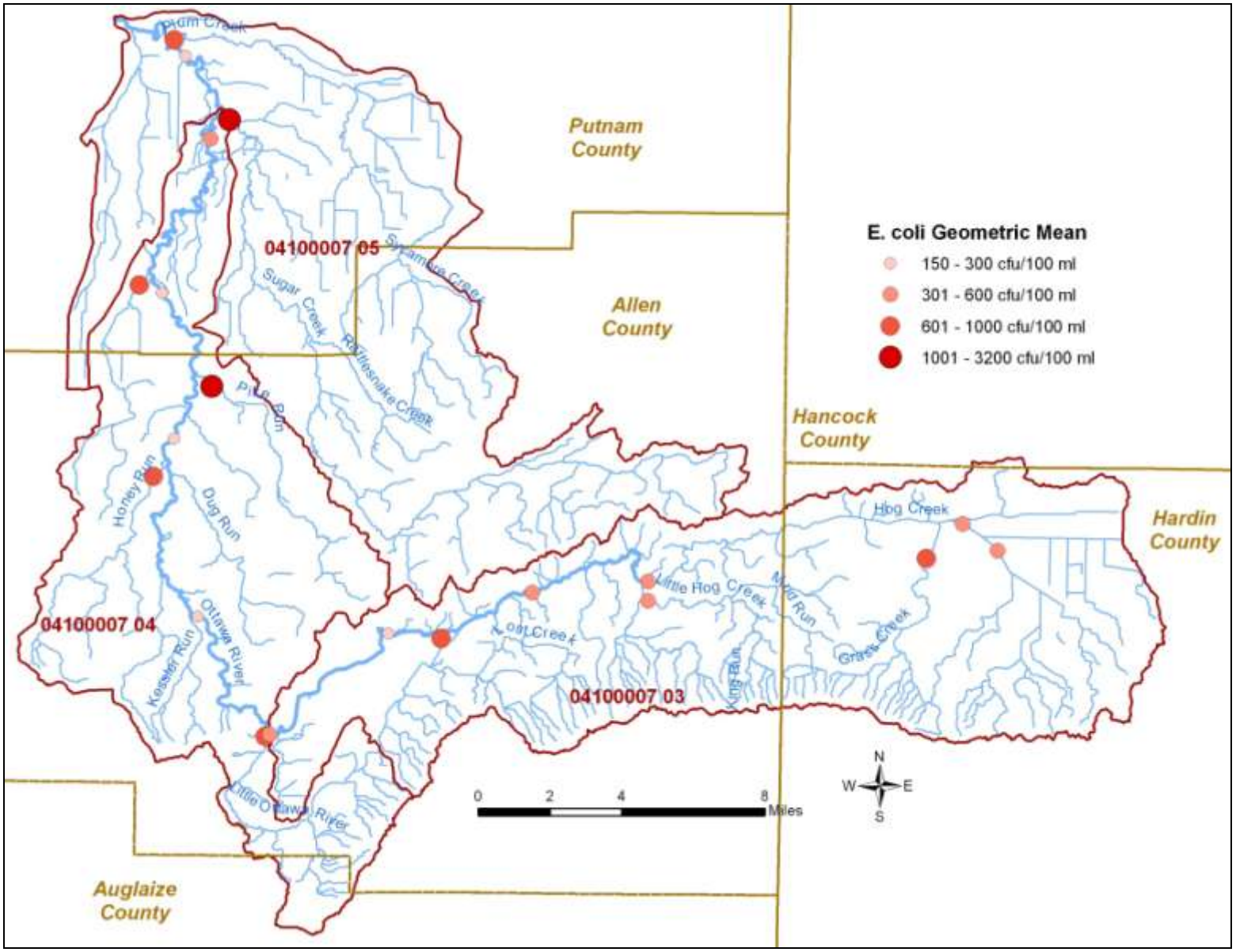

Figure B-10. *E. coli* geometric means in the Ottawa River (Lima area) watershed.

Table B-9. Recreation use attainment table for the Ottawa River (Lima area) watershed.

Location	River Mile	HUC12	Use	# of Samples	Geometric Mean	Maximum Value	Attainment Status	Probable Source(s) of Bacteria
Ottawa River @ Thayer	45.97	03 06	PCR-A	9	336	1200	NON	Unknown
Ottawa River @ Sugar	41.16	03 06	PCR-A	9	>223	>2400	NON	Lima CSOs
Ottawa River @ Shawnee	35.44	03 06	PCR-A	9	549	2400	NON	Lima CSOs
Ottawa River @ Copus	29.26	04 02	PCR-A	9	299	2420	NON	Shawnee SSOs, HSTS (Piquad Rd)
Ottawa River @ Neff	22.14	04 06	PCR-A	9	150	2420	NON	Municipal point source discharge (Elida)
Ottawa River @ SR 189	15.98	04 06	PCR-A	9	224	1600	NON	Unsewered community (Rimer)
Ottawa River @ CR- P	8.12	04 06	PCR-A	9	>326	>2420	NON	Unknown
Ottawa River @ U.S. 224	3.67	05 03	PCR-A	9	>270	>2420	NON	Unknown
Hog Creek	12.03	03 02	PCR-B	12	457	7700	NON	CAFO
Hog Creek	10.77	03 02	PCR-B	12	432	7300	NON	Unknown
Grass Creek	1.24	03 02	PCR-B	12	>905	>24000	NON	Municipal point source discharge (Ada)
Little Hog Creek	0.3	03 03	PCR-B	12	332	20000	NON	HSTS, municipal point source discharge (Lafayette)
Hog Creek	0.27	03 04	PCR-B	12	337	7700	NON	Unknown
Lost Creek	0.35	03 05	PCR-B	12	>717	3000	NON	Lima SSOs
Little Ottawa River	0.03	04 01	PCR-B	11	637	3900	NON	Package plant, Shawnee SSOs, municipal point source discharge (Cridersville)
Honey Run	0.9	04 03	PCR-B	11	>946	3100	NON	Unknown
Pike Run	0.84	04 04	PCR-B	11	3144	7700	NON	Unsewered community (Gomer)
Leatherwood Ditch TR19	0.48	04 05	PCR-B	4	816	1700	NON	HSTS
Leatherwood Ditch TR19	1.5	04 05	PCR-B	5	546	1500	NON	CAFO
Sugar Creek	0.64	05 01	PCR-B	9	1052	2900	NON	Unsewered community (Vaughnsville)
Plum Creek	0.19	05 02	PCR-B	12	707	2800	NON	Municipal point source discharge and CSOs (Columbus Grove)

B3 Public Drinking Water Supply Use Attainment

Lima, with a population near 40,000 people, obtains its drinking water from several sources (see Table B-10). The City of Lima uses several upground reservoirs to store drinking water. The "East Reservoir Complex" comprises of Ferguson Reservoir, Metzger Reservoir and Lost Creek Reservoir. They are connected in a series and water flows from one to the next by gravity. Source water is obtained from the Ottawa River via an automated pump station located at Metzger Road (RM 43.45) and a seldom-used back-up pump located at Roush Road (RM 42.3). There is also a manual pump station located on Lost Creek that can pump water directly into Lost Creek Reservoir. It is only used if the water level in the reservoirs is low and flow in the creek is high enough. Water from Lost Creek Reservoir can flow directly to the water treatment plant or be further stored in Twin Lakes Reservoir located next to the plant. The lakes are open to public fishing, but swimming is not allowed. Ferguson and Metzger have primitive boat ramps and Lost Creek is accessible by carry-in boat. Only electric motors are permitted. Fish management activities include routine stocking, population monitoring, angler harvest studies and tissue analysis.

Table B-10. Public drinking water supply use information from the 2012 Integrated Report.

Name/Community	Stream	Nitrate Status	Atrazine Status	Impairment (Y/N)
Lost Creek (04100007 03 05)				
City of Lima	Lost Creek	None	None	Insufficient data to assess
Lima Reservoir-Ottawa River (04100007 03 06)				
City of Lima	Ottawa River	None	None	Insufficient data to assess
Honey Run (04100007 04 03)				
City of Lima	Ottawa River	None	None	Insufficient data to assess

The PDWS use was evaluated based on Safe Drinking Water Act maximum contaminant levels (MCLs) for nitrate (10 parts per million [ppm]) and atrazine (3 parts per billion [ppb]). None of the lake samples exceeded any of these levels. These compounds were also tested in source water from the Ottawa River. A sample collected during late spring of 2010 had very high levels of nitrate (36.8 ppm) and atrazine slightly above the MCL (3.38 ppb). Pumping under these conditions should be avoided. A whole water phytoplankton sample from the lake collected in the fall of 2010 was enumerated to assess the need to test liver and nerve toxins produced by Cyanobacteria (blue green algae). Toxin samples were submitted when results showed a dominance of Cyanobacteria. Levels of Cylindrospermopsin and Saxitoxin were below their respective reporting limit and Microcystin was detected at 1.2 ppb. No toxin was detected in a complimentary finished water sample. Microcystin was also detected in a toxin sample submitted in the fall of 2011 at 0.61 ppb.

B4 Human Health Use Attainment

Fish tissue was assessed at twelve sites on the Ottawa River main stem and one site each in Ferguson and Metzger reservoirs (see Table B-11).

Table B-11. Human health (fish contaminants) use information from the 2012 Integrated Report.

Waters Sampled	Impairment (Y/N)	Pollutants (Concentration)
Lost Creek (04100007 03 05)		
Ferguson Reservoir	N	N/A
Metzger Reservoir	N	N/A
Lima Reservoir-Ottawa River (04100007 03 06)		
Ottawa River	Y	PCBs (58 ppb)[1]

[1] PCBs stands for polychlorinated biphenyls; ppb stands for parts per billion.

B5 References

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