Appendix

F

RESPONSES TO PUBLIC COMMENTS
OTTAWA RIVER (LIMA AREA) WATERSHED

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The Ottawa River (Lima Area) Watershed Draft TMDL Report was available for public review from April 19 through May 20, 2013. This appendix contains the comments received and responses to those comments.

During the public review period, some dischargers requested more information about the data and models used in the project. This information was posted to the Ohio EPA FTP website for download. The dischargers also requested and were granted an additional two weeks to review the project and submit comments.

Six sets of comments were received on the draft report. The initials in parentheses following each comment denote the specific commenter, as listed in the following table:

Initials	Date Received	Name	Organization
DS	5/20/2013	Dwain Schroeder	Lima Refining Company
RD	5/29/2013	Russell J. Decker	Allen County Office of Homeland Security and Emergency Management, on behalf of the Ottawa River Coalition
BS	5/31/2013	Beth Seibert	Allen County Soil and Water Conservation District
LS	5/31/2013	Lisa Strbik	PCS Nitrogen Ohio, L.P.
BH	5/31/2013	Bill Herz	The Fertilizer Institute
SS	5/31/2013	Stephen P. Samuels	Ice Miller, LLP, on behalf of the City of Lima

Because many comments addressed similar issues and/or were copies of others' comments, the comments were consolidated and organized them into four groups, as follows:

- Biology and water quality
- Modeling
- Permits
- TMDL

A few comments addressed more than one subject, so they have been split and placed in the appropriate section. Page numbers cited in the comments refer to the draft TMDL and may not match those in the final TMDL report. References cited in the responses are listed at the end of the appendix.

F1 Biology and Water Quality

Comment (DS)

Reference Page 33 of the Draft Report - quote "The condition of the fish assemblage downstream from the Lima Refining Co, at RM 37.0 was markedly diminished …. the incidence of deformities, eroded fins, lesions, and tumors (DELT) anomalies rose sharply…"

This analysis was taken from an old 1995 river study, and it is does not accurately describe the current condition of the river downstream of the refinery. In particular, DELTs are now at very low levels as shown in the attached chart which was prepared by the OEPA after the 2010 river monitoring work.

Response: The statement in question accurately describes the longitudinal performance of fish community indexes and related biometrics resulting from the 2010 survey. Relative to adjacent upstream reaches, community measures indicated a general decline beginning at RM 37.0 (e.g., WWH departure for both IBI *and* MIwb, rising DELTs, and loss of sensitive fish taxa). Regarding DELT anomalies, current levels through the reach in question are elevated (0.1-1.3%), and the highest station average on the Ottawa mainstem in 2010 was observed at RM 37.0. This, however, is not intended detract from or otherwise diminish the dramatic improvements (including a radical reduction in DELTs) documented at this and other mainstem monitoring stations when compared against historical survey results.

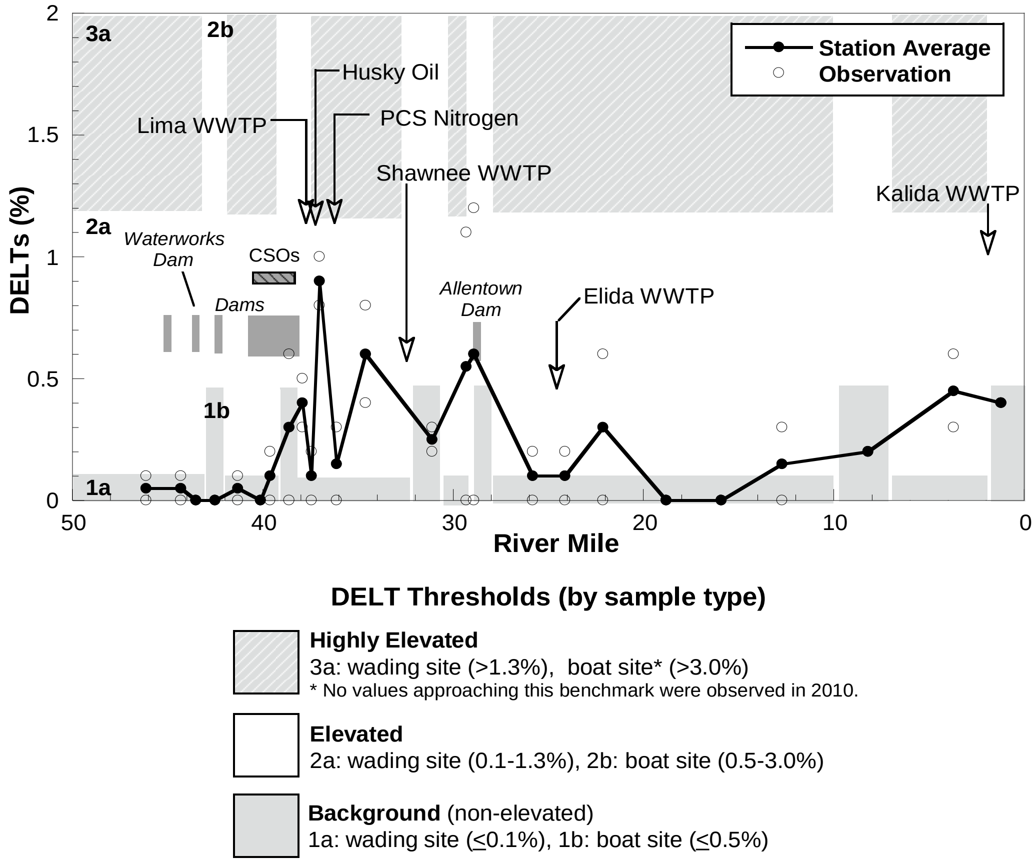

Figure 73. Longitudinal frequency of DELT anomalies for the Ottawa River (mainstem), 2010. Shaded and unshaded areas (1a-3-a and 1b-2b) describe the DELT thresholds by sampler type (wading or boat). (Figure from Ohio EPA, 2013.)

Comment (LS)

iv. Compliance with D.O. Water Quality Standard Not Evaluated

While OEPA selected the 7Q10 flow condition as the critical condition based on OAC 3745-2-05, because dissolved oxygen is an average water quality criterion, we note that the Draft TMDL does not present an evaluation showing that the dissolved oxygen criterion is exceeded under design conditions or that the dissolved oxygen criterion will be achieved when the wasteload allocation for TP is implemented. The only recent D.O. data presented in the TMDL for the Ottawa River are for model calibration (September 14, 2011) and model validation (July 13, 2011). (See, Draft TMDL, Appendix D Figure D-12 and Figure D-18, respectively) In addition, the Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010 (OEPA, April 22, 2013; hereafter, the "Technical Report") presents diurnal data for a 2010 survey (July 26 – 29). (See, Technical Report, Figure 50) Each of these shows that the average D.O. criterion (5 mg/L) is easily achieved below the point source discharges, with average D.O. concentrations exceeding 6 mg/L. The only criterion exceeded is the minimum D.O., and the observed exceedances were relatively minor and over a small stretch of the river and in all are not necessarily indicative of a violation of the water quality standard.

U.S. EPA guidance on the development of TMDLs to address D.O./Eutrophication in rivers and streams[1] indicates that dynamic models should be used in situations where minimum D.O. levels must be attained.

> A dynamic analysis may be justified only if standards require that minimum dissolved oxygen levels be maintained at all times or for a significant portion of the time (i.e., 95 percent of the time) and loads are known to cause variable dissolved oxygen levels in the stream.

(Technical Guidance Manual at 3-6)

Moreover, the assertion that the Ottawa River in the vicinity of the major point source dischargers (i.e., Lima WWTP, Husky Refinery, and PCS) is impaired for dissolved oxygen is not supported by the available data. The Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010 (OEPA, April 22, 2013) provides the following summary of water quality data collected over a period spanning 19 years:

> Data for trends in DO and oxygen demand for the Ottawa River were drawn from the results of chemical and physical sampling, part of four integrated water quality surveys undertaken by Ohio EPA between 1989 and 2010. DO data were derived from two methodologies: daytime field measurements made at an associated station during the various survey years (1989-2010) and diel DO monitoring (48-72 hrs.) from selected stations between late-July and mid-August 1991, 1996, and 2010. Five-day Biochemical Oxygen Demand (BOD5) is no longer a standard Ohio EPA water quality parameter, thus 2010 results are absent from the assessment of trends of oxygen demand.
>
> Based upon daytime field measurements, <u>remarkably few DO criteria exceedances or violations have been observed on the Ottawa River over the past 19 years</u> (Ohio EPA 1991, 1998). Normalized by effort, the frequency of DO criteria excursions declined in recent years: 7.1%, 6.9%, and 1.4% from the survey years, 1991, 1996, and 2010, respectively.

[1] U.S. EPA. 1977. Technical Guidance Manual for Developing Total Maximum Daily Loads. Book 2: Streams and Rivers. Part 1: Biochemical Oxygen Demand/Dissolved Oxygen and Nutrients/Eutrophication. EPA 823-B-97-002. March 1997.

> Actual violations of the minimum WWH DO criterion (values less than 4 mg/l) were limited to a subset of exceedances from 1991 and 1996.

(Technical Report at 81) (Emphasis added)

OEPA is required, under the Clean Water Act, to develop TMDLs to restore designated uses to impaired waters by achieving compliance with applicable water quality standards. It is arbitrary and capricious for the State to develop a D.O. TMDL for waters that are not impaired for D.O.

Comment (SS)
Comment 1.12 Ohio EPA did not adequately demonstrate the link between phosphorus and the designated aquatic life uses.
As Ohio EPA is aware, traditional dose-response relationships do not exist between nutrients and aquatic organisms. Instead, nutrients affect algal growth, which in turn affects dissolved oxygen concentrations. It is the resulting dissolved oxygen concentrations which directly affect aquatic life. In the TMDL, Ohio EPA states that a "leading cause" of impairment in the Ottawa River is nutrient enrichment, but the agency does not quantitatively evaluate or demonstrate this assertion. However, it is clear that many monitoring sites throughout the basin attain designated aquatic life uses even though phosphorus levels are generally above 0.1 milligrams per liter (mg/L) throughout the watershed (compare Tables B-3 through B-7 with Table B-1 in the Report). Therefore, it is not appropriate to assume that lowering phosphorus levels will result in attainment of beneficial uses at all sites.

Without a clear, quantifiable demonstration of the link between phosphorus and aquatic life uses, it is impossible to develop an appropriate management strategy that would restore the use. Ohio EPA should demonstrate this link before finalizing the TMDL. In addition, the following items related to the existing linkage analysis must be corrected:

- Algae levels were not evaluated. It does not appear that algal data were collected or analyzed to support the impairment determination in either the TMDL or 2010 study (Ohio EPA 2013). There were only a few periphyton data points presented. Ohio EPA should collect more robust algal data and quantify the relationship with nutrients and dissolved oxygen in the Ottawa River.
- The TMDL does not adequately demonstrate that the Ottawa River below the Lima wastewater treatment plant (WWTP) is impaired for dissolved oxygen. In the TMDL, Table B-2 indicates that dissolved oxygen criteria were exceeded in the Ottawa River above the Lima WWTP, but not below it. Thus, there is no apparent basis for Ohio EPA's conclusion that the TMDL will adequately address the purported nutrient related impairments.
- The TMDL did not demonstrate a quantifiable linkage between dissolved oxygen impairments and aquatic life use impairments, as discussed in Comment 3.1.

Comment (SS)
Comment 2.7 As discussed in Section Three, the data presented in the TMDLs appear to demonstrate that total phosphorus is not well correlated with aquatic life use impairment in the Ottawa River. Relatedly, the TMDL does not remotely establish that the Ottawa River is impaired for dissolved oxygen.

Comment (SS)
Comment 3.1 The TMDL does not adequately demonstrate the link between phosphorus and the designated aquatic life uses.

As the recently Ohio EPA-promulgated draft TIC outreach documents demonstrate[2], traditional dose-response relationships do not exist between nutrients and aquatic organisms. Instead, nutrients affect algal growth, which in turn affects dissolved oxygen concentrations. It is the resulting dissolved oxygen concentrations which directly affect aquatic life. In the TMDL, Ohio EPA states that a "leading cause" of impairment in the Ottawa River is nutrient enrichment, but the TMDL does not quantitatively evaluate or demonstrate this assertion. Indeed, many of the monitoring sites throughout the basin attain designated aquatic life uses even though phosphorus levels are generally above 0.1 milligrams per liter (mg/L) throughout the watershed. For example, in Table B-3 of the TMDL, the geometric mean total phosphorus for river miles 24.1, 18.8, and 3.7 are 0.34 milligrams per liter (mg/L), 0.3 mg/L, and 0.22 mg/L, yet these sites are in full attainment of aquatic life uses according to Table B-1. Therefore, it is not defensible to assume that lowering phosphorus levels will result in attainment of beneficial uses at all, or even many, sites.

Without a clear, quantifiable demonstration of the link between phosphorus and aquatic life uses, it is premature and inappropriate to impose fabulously expensive nutrient limits on point sources, and impossible to develop a management strategy that would restore the use. The TMDL should not be finalized until and unless a cause-effect link between specific nutrient levels and aquatic life throughout the watershed has been demonstrated. Without limiting the generality of the foregoing, the following items related to the existing linkage analysis must be addressed and corrected:

- Algae levels were not evaluated. It does not appear that algal data were collected or analyzed to support the putative impairment determination in the TMDL or the 2010 study (Ohio EPA 2013). The few periphyton data points included in the QUAL2K calibration run ranged from 64 milligrams per square meter (mg/m^2), to 219 mg/m^2. As a point of reference, 64 mg/m^2 is well below what some states perceive as a 150 mg/m^2 "nuisance threshold"[3]. A valid TMDL requires both a far more robust algal data set, and a legitimate quantification of the relationship of that data with nutrients and dissolved oxygen in the Ottawa River.
- The TMDL does not adequately demonstrate that the Ottawa River below the Lima wastewater treatment plant (WWTP) is impaired for dissolved oxygen. In the TMDL, Table B-2 indicates that dissolved oxygen criteria were exceeded in the Ottawa River above the Lima WWTP, but not below it. As the impact of nutrients in aquatic life is not direct, but mediated by the former's impact on dissolved oxygen levels, Ohio EPA's conclusion that the Ottawa River is impaired for nutrients is contradicted by the data.
- Ohio EPA must demonstrate that dissolved oxygen improvements will result in full aquatic life use attainment. Ohio EPA has used the relationship between dissolved oxygen, algae, and total phosphorus to establish phosphorus WLAs for point sources (See Section 6.1 of the TMDL). Ohio EPA has also assumed a linkage between dissolved oxygen levels and organic enrichment to establish $CBOD_5$ TMDLs (page D-5). Ohio EPA should clearly <u>demonstrate</u> a linkage between purported dissolved oxygen problems to impairments of aquatic life uses before establishing these TMDLs.

  Although not presented in the TMDL, the 2010 study report (Ohio EPA 2013) states that daytime dissolved oxygen readings along the entire Ottawa River only fell below applicable

[2] http://www.epa.ohio.gov/Portals/35/rules/TIC_rationaleandscoring.pdf
[3] See for example, http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22Exhibit+11.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251807046709&ssbinary=true

minimum dissolved oxygen criteria 1.4% of the time in 2010 (page 81). Diel (24-hour period) dissolved oxygen data were also collected and appear to only be below the minimum criterion (4 mg/L for warmwater habitat) at one monitoring site, immediately downstream from the Shawnee WWTP. Because diel data were only reported graphically, it is impossible to determine how long dissolved oxygen levels were below the minimum criterion. It appears as though Ohio EPA considers these few low dissolved oxygen levels to be violations of the dissolved oxygen water quality standards even though occasional dissolved oxygen criteria excursions that are not harmful to aquatic life do occur and therefore, do not necessarily constitute a violation of dissolved oxygen criteria[4]. The TMDL fails to justify how improving dissolved oxygen minimum criterion compliance from 98.6% to 100%, or incrementally increasing minimum dissolved oxygen levels at one monitoring site, will result in improvements in aquatic life use attainment in the Ottawa River.

Response: In areas where background conditions and natural flows predominate, there can be a higher assimilation capacity in the stream for elevated nutrient concentrations (phosphorus and nitrogen). The macroinvertebrate density can increase to higher than normal background or natural conditions (~250 to <1000 organisms/ft.^{2}), but there is an environmental "tipping point" where excess nutrients cause larger diel dissolved oxygen fluctuations sufficient to trigger decreased diversity (loss or decrease of sensitive taxa and / or decreases in the percentage of sensitive taxa) with an increase of facultative and more tolerant taxa. For example, low mean dissolved oxygen exceedances at Roush Rd. (RM 42.30) and excess dissolved oxygen range of > 12 mg/l (> 7 mg/l exceeds reasonable potential to affect aquatic life) with a parallel significant ICI decrease to 38 from very good and a score of 46 (exceptional) 1-2 miles upstream (Tables 6 and 7 in Ohio EPA, 2013). Large diel dissolved oxygen swings (14) with low dissolved oxygen violations corresponded to low macroinvertebrate community quality in dam pool by Collett St. (RM 38.63). Downstream from the largest three dischargers there were high maximum dissolved oxygen readings (13-17 mg/l) and large excess dissolved oxygen range violations (9.2-10.97 mg/l) at Ft. Amanda Rd. (RM 36.3) and Shawnee Rd. (RM 35.44) (Table 7 below, highlighted in yellow).

Table 7. Summary of hourly dissolved oxygen measurements (mg/L) recorded by automatic meters deployed in Ottawa River on July 28 and September 15, 2010. Values highlighted in bold indicate either a violation of the outside mixing zone 24 hr. average criterion (5.0) outside mixing zone minimum criterion (4.0) or a range that exceeds reasonable potential to affect aquatic life (7.0).

River Mile	Mean		Median		Minimum		Maximum		Range	
	7/28	9/15	7/28	9/15	7/28	9/15	7/28	9/15	7/28	9/15
04100007 03 06: Ottawa River below Little Hog Creek to above Little Ottawa River										
45.97	7.74	6.81	6.60	6.47	5.34	5.02	12.12	9.25	6.78	4.23
43.45	7.95		7.98		6.57		9.87		3.30	
42.30	9.56	7.25	7.37	6.59	5.41	5.37	17.43	10.56	**12.02**	5.19
41.16	8.47	7.70	8.29	7.46	6.94	6.32	10.51	9.80	3.57	3.48
40.04	10.06	10.70	9.02	10.33	5.79	6.91	16.21	15.05	**10.42**	**8.14**
38.63	11.87	**4.73**	10.94	4.25	5.42	**3.58**	19.61	7.06	**14.19**	3.48
37.91	11.47	6.77	11.31	5.79	8.03	4.75	15.95	10.35	**7.92**	5.60
37.47	9.90		9.70		7.73		12.52		4.79	
37.00	9.48	7.71	9.06	7.62	6.84	7.11	**13.14**	8.41	6.30	1.30

[4] U.S. Environmental Protection Agency. 1986. Ambient Water Quality Criteria for Dissolved Oxygen. Washington, D.C. USEPA. USEPA-400/5-86-003.

36.30	9.73	7.03	8.32	6.17	6.00	5.35	**16.97**	10.40	**10.97**	5.05
35.44	7.96	6.43	6.82	6.03	4.75	4.99	**14.02**	8.86	**9.27**	3.87
04100007 04 03: Ottawa River below Little Ottawa River to below Dug Run										
34.30		7.21		7.08		4.95		10.09		5.14
32.60		7.75		7.09		5.74		10.79		5.05
31.03	9.03	7.55	6.22	7.19	**3.71**	6.10	20.69	9.61	**16.98**	3.51
30.12		7.81		7.43		6.37		10.03		3.66
29.26	7.54	8.03	6.20	7.64	4.59	6.28	11.40	11.08	6.81	4.80
28.85	7.20	8.03	6.11	7.60	4.89	6.37	10.23	10.76	5.34	4.39
25.75	6.18	7.76	5.94	7.47	4.93	6.44	8.12	9.41	3.19	2.97
04100007 04 06: Ottawa River below Dug Run to above Sugar Creek										
22.14	6.84		6.37		5.49		9.06		3.57	
18.68	7.16	9.02	6.68	8.56	5.48	6.11	10.08	12.89	4.60	6.78
15.98	7.50		6.98		6.02		9.65		3.63	
12.75	7.33	8.75	6.75	8.49	5.72	5.93	10.34	12.38	4.62	6.45
04100007 05 03: Ottawa River below Sugar Creek to Auglaize River										
5.60	7.00		6.70		6.17		8.43		2.26	
0.96	6.77		6.70		5.76		8.12		2.36	

Excess algae downstream from Lima Refinery in the Ottawa River was listed as one of the partial causes of impairment in addition to nutrient /eutrophication biological indicators having been listed at all impaired upstream sites. Low dissolved oxygen and/or excess dissolved oxygen range were listed at many sites as sources along with nutrients or biological indicators for nutrient/eutrophication (see Table B-1 in draft TMDL report). The largest diel dissolved oxygen range occurred downstream from the largest dischargers (by volume flow), which is a normal biological response to excess nutrient enrichment. The minimum dissolved oxygen violations were not “minimal” (see figure below) and algal production would be even higher with larger diel dissolved oxygen ranges if not for good reaeration from rocky riffle substrates and discharged effluents being cooler. In addition, shading from the full riparian corridor near Lima WWTP, Lima Refining Co. and PCS Nitrogen allowed some in-stream assimilation and delayed maximum photosynthesis.

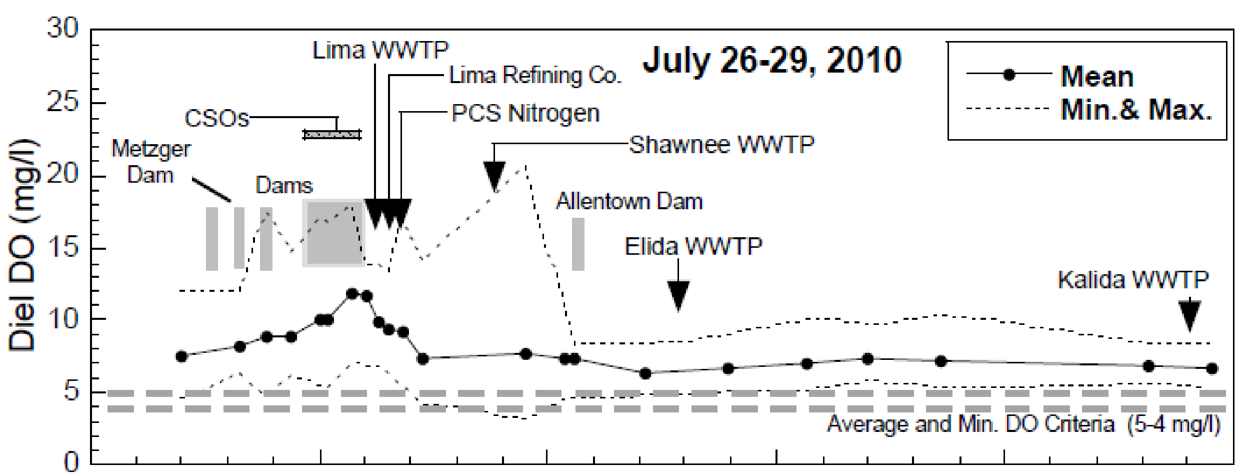

Figure 50. Station average, minimum and maximum DO from continuous monitoring units (Datasonde), Ottawa River: 1991, 1996, and 2010 [excerpt].

In reaches where the use is designated as modified warmwater habitat or less, the low dissolved oxygen exceedances do usually correlate to lower biological diversity or performance, but the biological criteria are lower, and the biological performance met the lower expectations. Other streams where the warmwater habitat criterion was met in the biological community sampled but there was a dissolved oxygen exceedance (Table 7 above), the exceedance would indicate a stress to the aquatic community. That stress might be illustrated in some decreased diversity where some more sensitive taxa were not collected, but the community observed in the biological sample was of sufficient quality to meet the minimum biocriterion.

Research conducted by Ohio EPA indicates that a significant correlation exists between phosphorus and the health of aquatic communities (Miltner and Rankin, 1998). It was concluded that biological community performance in headwater and wading streams was highest where phosphorus concentrations were lowest. It was also determined that the lowest phosphorus concentrations were associated with the highest quality habitats, supporting the notion that habitat is a critical component of stream function. The report recommends warmwater habitat targets of 0.08 mg/l in headwater streams (<20 mi^2 watershed size), 0.10 mg/l in wading streams (>20-200 mi^2) and 0.17 mg/l in small rivers (>200-1000 mi^2). A reduction in phosphorus would decrease the nutrient impacts through these reaches where phosphorus is usually limiting nutrient.

Finally, regarding algal data, the wide dissolved oxygen swings make a compelling case on their own without the need for the benthic chlorophyll levels. The magnitude of the dissolved oxygen swings in and downstream from Lima is clear and incontestable.

Comment (RD)
We find the end targets for the Total Phosphorus (TP) TMDL to be particularly severe and somewhat arbitrary, and do not believe a TP end target, much less one so stringent, is required by the federal Clean Water Act or Ohio's water quality act for the Ottawa River (Lima Area) Watershed. Based on the convincing technical analysis put forth during this public comment period by several of our members, we have no confidence that the nutrient limits that are slated to be integrated into the NPDES permits will accomplish the changes in the watershed that OEPA desires. It is widely held by our members that OEPA has not demonstrated a linkage between TP concentrations and an exceedence of an Ohio Water Quality Standard sufficient to establish a criterion. The enormous cost that would be imposed on point source dischargers in this watershed in the pursuit of attaining these limits with no likelihood of benefit in terms of meeting Water Quality Standards gives us grave concern. We support the call for OEPA to withdraw the proposed TP TMDL, to reevaluate nutrient loading in our watershed using a more appropriate modeling approach, such as the Trophic Index Criterion (TIC) (once that methodology is approved for Ohio by USEPA), and to allow stakeholders opportunity to participate substantively in this process.

Response: Effects of nutrient over-enrichment on water quality were clearly evident in the wide dissolved oxygen swings observed in Ottawa River. Given that the magnitude of the swings exceeded 9.0 mg/l at multiple locations, combined with biological non-attainment, assessment by the proposed TIC would rate most of the mainstem as impaired by nutrients. The link between wide dissolved oxygen swings and nutrient enrichment in rivers and streams has been well-documented in the literature and in the Ohio EPA technical study that supported development of the TIC.

Ohio EPA acknowledges that multiple sources contribute to the nutrient load in the Ottawa River, and that the manifestation of effects of over-enrichment is encouraged by hydrologic alterations within the system. Accordingly, Ohio EPA recognizes that restoring the beneficial use will require a combination of load reductions and structural improvements to the system, most importantly, long-term control of combined sewer overflows. It is in this light that permit limits are recommended in a phased and iterative approach, whereby demonstrated biological attainment would avert the most stringent limits proposed in the fourth phase (Table 6-2 of the draft TMDL report).

Comment (BS)

Causes of impairments: The Executive Summary presents that Total Suspended Solids (TSS), Sediment/siltation, and Low Flow Alterations are several of the significant causes of impairments (Page x). The remaining sections of the report and the analyses fail to provide any evidence that these three elements are causes of impairments to the Ottawa River watershed or to what extent those impairments need to be alleviated. The wasteload allocations (WLAs) presented in the TMDL for the MS4 communities are speculative at best.

- The report acknowledges that “TSS is commonly used as a loading parameter; however, gathering data that is reliable for calibration and validation is often uncertain” (page 52). The study makes no attempt to directly monitor, sample, or directly quantify TSS as a cause of impairment. Ohio EPA should not provide this statement as justification for failing to collect reliable data for a pollutant that is suggested as a main cause of impairment to the river system. A scientific understanding of the role TSS plays within the river system could be obtained with readily available monitoring equipment and protocols. Since no attempt at TSS data collection and evaluation is made, the validity of the TMDL to allocate sediment wasteload allocations should be considered as inadequate and invalid. There is no reasonable assurance that the Sediment TMDL suggested in the report can be allocated confidently, or if implemented, result in quantifiable improvements towards attainment. The Sediment TMDL, as outlined, would result in the expenditure of significant money that may fail to improve the beneficial uses of the stream, or due to the lack of scientific bases, even harm the river system.

Comment (SS)

Comment 6.2 Causes of impairments – The Executive Summary asserts that Total Suspended Solids (TSS), Sediment/siltation, and Low Flow Alterations are several of the significant causes of impairments (Page x). The remaining sections of the report and the analyses fail to provide any evidence that these three elements are causes of impairments to the Ottawa River watershed or to what extent those impairments need to be alleviated. The wasteload allocations (WLAs) presented in the TMDL for the MS4 communities are speculative at best.

- The report acknowledges that “TSS is commonly used as a loading parameter; however, gathering data that is reliable for calibration and validation is often uncertain” (page 52). The study makes no attempt to directly monitor, sample, or directly quantify TSS as a cause of impairment, and OEPA’s erroneous claim that data collection may be somewhat difficult is not a valid justification for failing to collect reliable data for a pollutant that OEPA asserts is a main cause of impairment to the river system. A scientific understanding of the role TSS plays within the river system could be obtained with readily available monitoring equipment and protocols. Since no attempt at TSS data collection and evaluation is made, the validity of the TMDL to allocate sediment wasteload allocations should be considered inadequate and invalid. There is no reasonable assurance that the Sediment TMDL suggested in the report can be allocated confidently, or if implemented, result in quantifiable improvements towards attainment. The Sediment TMDL, as outlined, would result in the expenditure of significant money that may fail to improve the beneficial uses of the stream, or due to the lack of scientific bases, even harm the river system.

Response: First, the Executive Summary simply lists the causes of impairment, without assigning rank or "significance." Second, as stated in the main body of the report, TSS was listed only once as a cause of impairment and was directly related to more prominent causes listed. The more prominent causes—direct habitat alteration, sediment/siltation and low flow alterations—were listed in some reaches. The causes and sources of each reach are listed in Table 1 in the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA, 2013) and in Appendix B of the TMDL report. TSS was collected during the 2010 water quality survey along with many other chemical parameters. The discussion on page 52 is referring to components of QHEI being used as goals or measurable endpoints to habitat improvements, which would be decreasing sediment/siltation and its related chemical parameter, TSS.

Taxa richness, recruitment, and the performance of other important measures of ecological function and organization of lotic fish and invertebrate communities are closely linked to the particle size of streambed sediments. The most immediate and consequential effect of excessive sedimentation upon riverine habitat is the smothering or embedding of coarser bed material by sands, clayey silts and related fines, resulting in loss or diminution of substrate interstices. It is through the associated loss or degradation of living space (critical feeding and breeding substrates) that aquatic communities are negatively affected by sediment (Fajen and Layzer 1993, Waters 1995).

Comment (BS)

The report uses a Qualitative Habitat Evaluation Index (QHEI) score as a surrogate for a TSS TMDL. The report fails to provide a scientific link between the potential impairment caused by TSS and the QHEI score. The statement "The QHEI measures the end result of high sediment loading (either from the landscape or in-stream sources) as it impacts the biological community" (page 52) is unsubstantiated. There are many complex factors that influence the QHEI score, not just sediment loading. The report fails to quantify or distinguish the independent influences of the various factors on the QHEI. The QHEI evaluation in the Sediment TMDL considers the sub-metrics for Substrate, Channel Morphology, and Bank Erosion and Riparian Zone. Channel morphology and bank erosion are the manifestations of a complex series of channel geomorphic conditions with a strong scientific foundation. No attempt was taken to understand the geomorphic conditions of the stream system, nor determine the cause of the observed conditions. Simplifying the cause of impairment as "TSS" or "Sediment" undermines the broad scientific understanding of channel geomorphology. The report failed to even attempt to perform a meaningful geomorphic analysis or bed load analysis to understand or attribute causes of stream instability. The sediment TMDL is therefore without merit and should be abandoned.

Response: The correlation between good quality habitat and good biological performance has been long established (Rankin, 1989; Rankin, 1995). The QHEI metrics score appropriately measures the relative quality of the stream habitat regardless of geomorphic stream type. Ecoregional differences in stream type have been incorporated into Ohio's biological criteria since its formative beginnings (Omernik, 1987; Omernik and Gallent 1988) and are built into regional performance expectations, which can differ in subbasins in various parts of the state. Reference sites in different ecoregions display a range of habitat and, accordingly, illustrate local expectations for local natural conditions.

The rationale, development, application and predictive power of the QHEI are found in Rankin (1989, 1995), Ohio EPA (2006), Miltner, Rankin and Yoder (2009). Appraisal of macrohabitat quality and computation of the resulting index value are not overly complex, thus the resulting score is easily deconstructed and the performance of each subcomponent is easily examined. The degree of sedimentation is determined through direct observation by trained field staff, the process disciplined through the QHEI. If deleterious, the effects of sedimentation are manifest in various biological response variables within the fish and macrobenthos assemblages. In this way, the effects of sediment are identified, appraised, and linked directly to aquatic life use attainment. Similarly, the QHEI's descriptive measures of channel form and riparian condition (referenced above) describe riverine features that have both a direct bearing on capacity of the stream channel to process sediment (convey, sort, and deposit) and reflect existing source(s) and volume of the sediment loads. Ultimately, Ohio EPA is managing for a biological end point, not a discrete sediment budget. The QHEI directly reflects the end product or sum total of the fluvial and landscape processes manifest at a given monitoring station. This is not to say additional lines of evidence, including quantitative measures of channel form and function, would not yield useful information.

Actions recommended within the TMDL regarding sediment-related impacts are voluntary and not substantively different from the BMPs long advocated by multiple federal, state and local government agencies [e.g., National Resource Conservation Service (NRCS), Ohio Department of Agriculture (ODA), Ohio Department of Natural Resources (ODNR) and Ohio's Soil and Water Conservation Districts (SWCDs)]. Over multiple decades, the same said conservation practices were conceived and tested and are now widely practiced throughout the nation, including Ohio. The impetus behind these efforts was the abatement of excessive sediment loss from agricultural areas—a soil loss that was plainly manifest and widely acknowledged by agronomists and agriculturalists alike (Batie, 1983). The cumulative effects of the full suite of modern tillage and related soil and water conservation practices has resulted in significant reduction in gross erosion documented at national and regional scales since the late 1970s (NRCS 2007). Furthermore, studies within the Maumee River basin and other discrete watersheds have demonstrated an association between agricultural BMPs, reduced soil loss, in-stream sedimentation and a concurrent positive response of the ambient biology (Barton and Farmer 1997, Myer and Metzker 2000, Yoder et al. 2004, Richards et al. 2009, and Tessler and Gottgens 2012). These findings parallel emerging phenomena Ohio EPA has observed, state-wide, regarding the reestablishment of formerly imperiled, substrate sensitive fish taxa (e.g., *Notrpois amblobs* and *Etheostoma pellucida*). The ongoing naturally directed restoration of aquatic taxa acutely sensitive to the ecological effects of sedimentation serves as broad and functional indicator of ultimate effects.

The success of sediment controls thus far regarding in-stream sedimentation has been achieved without the benefit of fine scale understanding of sediment dynamics on a local or regional scale. Furthermore, the significant reduction in erosion and sedimentation documented to date has not precipitated catastrophic destabilization of the waterways of the Middle West, following broad adoption of modern conservation practices on agricultural lands.

Comment (BS)

Causes of impairments: The Executive Summary presents that Total Suspended Solids (TSS), Sediment/siltation, and Low Flow Alterations are several of the significant causes of impairments (Page x). The remaining sections of the report and the analyses fail to provide any evidence that these three elements are causes of impairments to the Ottawa River watershed or to what extent those impairments need to be alleviated. The wasteload allocations (WLAs) presented in the TMDL for the MS4 communities are speculative at best….

- The report fails to clearly define the meaning of flow alterations. It is unclear if the alterations are physical channel alterations or hydrologic in character, resulting from watershed modifications. Additionally, the report inconsistently uses the term "low flow alterations" and "flow alterations." It is not clear if only low flows are of concern or if all flow alterations are classified as causes of impairments. Only one stream gage along the main channel was used to evaluate flows within the entire watershed and tributaries. This paucity of data is insufficient to formulate a conclusion as to the influence of flow alterations on the river's impairment. The report failed to even take the basic analytical steps to understand the hydrology and flows of the watershed and stream systems. The report failed to develop a calibrated hydrologic model to evaluate the flows within the various tributaries and the main channel, which is required to draw meaningful conclusions to the influence of various flow regimes. The habitat TMDL is therefore without merit and should be abandoned.

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Response: The term *Flow Alteration* as applied to the waters referenced above refers to sites or river segments affected by altered flow/discharge, due to controlled releases from impoundments or areas affected by upstream water withdrawals. More detail is in the attainment table and in the written stream evaluations in the habitat, fish, and macroinvertebrate portions of the TSD (*Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA, 2013)). The TMDL summarizes conditions that are discussed in detail in the aforementioned report and focuses on how to deal with the stream impairments that were documented.

Flow alteration was identified as a primary contributory cause of aquatic life use impairment for an approximately two mile segment of the Ottawa River between the Metzger Dam spillway (RM 43.4) and Sugar St. (RM 41.3). This reach is positioned downstream from multiple municipal water intakes and terminates where surface flow is augmented, incidentally, by surplus quarry wash water. It is in this segment where both WWH impairment and hypereutrophic conditions were first observed, longitudinally, on the Ottawa River mainstem in 2010. The benefits of flow augmentation at Sugar St. are dissipated as the Ottawa River enters the first in a series of impoundments situated through the urban areas of Lima. Through this segment, the Ottawa River accrues additional stressors, modifications and pollution sources. The want of adequate dilution flow through this area is acknowledged and has been the subject of study by the city of Lima itself.

In general terms, the conditions described above are not uncommon throughout Ohio, where a large municipality relies upon an adjacent river or stream as a primary water source. The river reach between the lowest intake structure (typically upstream from the municipality) and the point of discharge of the treated municipal wastewater (typically downstream from the municipality) is flow starved. In comparison with unaltered segments, streams so affected may be impacted by reduced pool depth, reduced current velocity, decreased channel width, reduced substrate quality, elevated temperature, and reduced assimilative capacity (Zale et al. 1993). After having served various municipal and industrial uses, the diverted water is then returned to the river in the form of treated effluent from the POTW, thus effectively restoring the waterbody's normal, if not augmented, flow.

Comment (SS)

Comment 6.3 Sources of stressors – The narrative of the Executive Summary suggests several stormwater related stressors, such as crop production, urban runoff/storm sewers, streambank destabilization (from riparian removal), and channelization. The report and analysis fails to provide any quantifiable evaluation of the outlined sources, which is required to develop an effective implementation plan.

- The report fails to evaluate or quantify loads from the various land uses in each sub-watershed. Without an understanding of the source of the potential pollutant, an effective implementation plan cannot be developed.
- The report fails to analyze, or even demonstrate a fundamental understanding of, how loads are impacted by land use and hydrology. For example, the discussion of the Lost Creek watershed disregards the fact that the watershed is comprised of Urban and major Agricultural land uses. Further, all urban land is aggregated into a single category. There are four identified urban/developed land on Figure 2-2: Developed Open Space, Developed Low Intensity, Developed Medium Intensity, and Developed High Intensity. A park (developed open space) should not be treated the same as an urban industrial park (developed high intensity).
- The report fails to attribute loads within a watershed based on land uses, or quantify existing loads to evaluate the implications of load reductions on a particular land use. In several cases, such as Lost Creek, load reduction is based on two samples (page D-33) and no evaluation was conducted of the current loading from the mixture of urban and agricultural land. There is no reasonable assurance that the estimated loads within the tributary are accurate, the source of the pollutant is accurate, or the specified load reductions would result in attainment.

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Response: The detail mentioned in the comment is in the attainment table and in the written stream evaluations in the habitat, fish, and macroinvertebrate portions of the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013). The TMDL (and biological report) contain sufficient information to identify best management practices to address the various sources. Certain “loads” like sedimentation from riparian removal are measured better by prescriptive endpoints (e.g., a riparian buffer improved along stream reach or set aside to stay natural). The subsequent improvements in land use would be measured by improved QHEI (habitat) and ultimately more stable biological communities.

Biological sampling indicated that there were issues in the Unnamed Tributary to Lost Creek resulting from historical fish kills from spills, nutrients, and organic enrichment (sewage) biological indicators, from storm water from SSOs and urban inputs (see Table 1 in Ohio EPA 2013). Trend data showed habitat improvement near the mouth with subsequent attainment of biological criteria in the lower reach. The upper reach of Lost Creek was agricultural and had a modified channel, but the biology met the lower MWH expectations. The loads that caused impairments were largely from the urban segments.

These summary comments are true of urban streams whose hydrology has been modified, as is the case with these streams by various means. These observations were documented in the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013).

Comment (BS)

<u>Report Narrative:</u> The report narrative presents general statements on the condition of the watershed and unsubstantiated and potentially misleading causes of the observed conditions. The misleading statements, and the invalidity of the TMDLs, could result in significant expenditures of funds in an attempt to solve an observed condition, without fully understanding the cause of the problem.

- On Page 22, the report states "To varying degrees nearly all of these waters labor under numerous and deleterious effects of well-drained, urban and suburban landscape that typifies all or most of their respective watersheds. Chief among these effects is a flashy or compressed flow regime…" This statement is offered with no back up of data. The report presents only one flow gage for the entire watershed. There is no measured flow data for any of the upper river reaches or numerous tributary streams. It is misleading to suggest and classify all streams as "flashy or having a compressed flow regime" (page 22) without data. It is negligent to take a single gage along the Ottawa River and then simply extrapolate the flow based on tributary area equally across the watershed, regardless to land cover or topography, particularly for the use in a regulatory TMDL.
- The report fails to indicate that any consideration was given to the fact that fluvial geomorphology is impacted by both the change in flows (which is not documented) and the potential reduction in sediment delivery from an urban environment as compared to an undeveloped watershed. The sediment load balance could be disrupted in very urban or modified watersheds. No consideration was given that urban runoff may actually lack sufficient sediment as it enters the stream. If the sediment transport capacity exceeds sediment load, the water is "hungry" and tends to pick up sediment from the streambed or banks. The report fails to make any attempt to quantify the equilibrium between sediment transport capacity and sediment load, which varies along a river system. The report also fails to link the bed load analysis and condition to recommended actions or impairments.

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Response: Ohio EPA biologists observe bank and substrate type and quality while sampling. When flashiness in a stream is referred to, it implies the power to erode due to hardening of the watershed (sedimentation hardens bottom substrates or artificial channel with concreted bottom and sides/width, or piped channel). Storm water in urban paved settings can form newly eroded banks (increasing sediment suspended loads from bottom sediments, if present) from the power in fast storm flows. Larger bottom substrates become embedded and “cemented” as silt/sediment fill in spaces between larger substrates, limiting utility, habitat, and quality of substrates. Whether or not geomorphology terms are expressed, the effects of storm water on stream reaches are observed, discussed, and included as part of Ohio EPA’s assessment.

Causes and sources of impairment are linked to observed biological responses in sampled stream reaches where the biological communities did not meet the ecoregional and stream use designated biocriteria. These impaired reaches are documented and discussed in the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013).

Regarding sediment balance, recommendations contained within the TMDL are consistent with BMPs promoted by NRCS and its State and county proxies. Widespread adoption of modern tillage and various other conservation practices promoted by Federal State and local agricultural agencies have resulted in significant reduction in soil erosion (NRCS 2010, Myer and Metzker 2000, Yoder et al. 2004, and Richards et al. 2009), without damage to stream channels. Heavy deposits of fine clayey silt in the wetted channel are direct indications of sediment in excess of transport capacity. Numerous factors that directly affect the hydrology, sediment delivery and thus the fluvial process are ever changing (land use changes, new field tile installation, regular maintenance of drainage ways, etc.), thus the notion of a fixed equilibrium does not comport with reality on the ground. Any number of actions by public or private entities, including those mentioned above, have a greater potential to disrupt an existing sediment budget or equilibria on a reach- or local-scale, than the recommended BMPs contained within the TMDL.

Comment (LS)
<u>TP Criteria</u>: A review of the data used to support the warm water habitat statewide criterion for TP indicates that the analysis is not scientifically defensible. The assessment was conducted in 1999, prior to the development of several relevant guidance documents on the derivation of numeric nutrient criteria by U.S. EPA and a Science Advisory Board review of empirical methods for numeric nutrient criteria development in 2010. The OEPA statewide TP criterion is deficient because it does not account for the confounding factors, particularly related to habitat, which must be considered for the criterion to be scientifically defensible. Moreover, data presented in the TMDL specifically show that aquatic life uses are attained in stream segments with TP concentrations an order of magnitude higher than the statewide criterion. Consequently, application of the TP criterion in this Draft TMDL is not necessary to restore aquatic life uses. In all, the selected TP criterion is not a valid threshold for compliance with the aquatic life designated use and it is not an appropriate or lawful tool for OEPA to use in attempting to achieve water quality standards.

Response: The targets suggested in the *Associations* document are quite literally targets, not numeric criteria, and are within ranges suggested as thresholds by numerous studies. The identification of nutrient over-enrichment as a cause of impairment in the Ottawa River mainstem is unequivocal and robust, and reductions in phosphorus concentrations as a first step toward restoration of the beneficial use are therefore necessary.

Comment (LS)
Total Phosphorus (TP) Endpoint Used in TMDL Not Justified
a. Background on Development of TP Endpoint
The Ottawa River (Lima Area) Watershed Draft TMDL for Total Phosphorus (TP) is based on a conceptual model predicting that excessive TP causes nuisance growth of aquatic weeds and algae that either directly impairs aquatic life or cause reduced dissolved oxygen levels that impair aquatic life. Appendix D to the Draft TMDL identifies the basis for the selected TP endpoint.

> The narrative rules establish the authority of the Ohio EPA to impart nutrient limits for watersheds where biological attainment is not met. However, numerical criteria have not been established. Ohio EPA staff developed a document, *Association between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams* (Ohio EPA 1999), that relates total phosphorus concentrations to attainment of stream biology. This report was used for the water quality targets for the Ottawa River watershed TMDLs: 0.1 mg/l based on wadeable streams in Ohio (200 mi2 > drainage area > 20 mi2) designated as warmwater habitat. It is important to note that these nutrient targets are not codified in Ohio's water quality standards; therefore, there is a certain degree of flexibility regarding their use in TMDL development.

(Draft TMDL, Appendix D at D-7).
Notably, the referenced guidance document does not appear to have undergone public notice and comment and, as discussed in detail below, is not, by its own language, intended as a binding standard.

Response: In this case, the commenter has correctly surmised that that the target is not a criterion. In other comments by this commenter, the target is incorrectly referred to as a criterion. Ohio EPA has been forthright in explaining the target and has demonstrated flexibility in using the target in the Ottawa River TMDL project.

Comment (LS)
b. TMDL TP Endpoint not Scientifically Defensible
i. TP Endpoint Development Approach Contrary to EPA Guidance
The approach set forth in Appendix D is not generally appropriate for establishing nutrient endpoints in streams. EPA's *Nutrient Criteria Technical Guidance Manual – Rivers and Streams* (July 2000) notes that nutrients may cause ecosystem impacts to upper level organisms (invertebrates, fishes), but never directly:

> "[F]ish and macroinvertebrates do not directly respond to nutrients, and therefore may not be as sensitive to changes in nutrient concentrations as algal assemblages. It is recommended that relations between biotic integrity of algal assemblages and nutrients be defined and then related to biotic integrity of macroinvertebrate and fish assemblages in a stepwise, mechanistic fashion."

Rivers and Streams Document @ 85.

EPA's published guidance indicates that invertebrate and fish populations may be affected only when plant growth rises to a level where extensive/excessive plant growth causes those ecosystem changes. These changes are not documented to occur directly due to nutrients as this parameter is not a toxicant and does not have a direct impact on sensitive organisms. OEPA's documentation does not scientifically link the TP value to impact on invertebrate and fish populations. Rather, TP is linked to IBI score by association without any attempt to demonstrate that TP, rather than some other covarying factor, is causing the observed effect. Consequently, the 0.1 mg/L TP endpoint used in this TMDL is suspect, not defensible, and may not be used to impose stringent limits on PCS' discharge. In fact, OEPA's Draft TMDL essentially establishes a reduction of over 92% in PCS' discharge, which discharge was de minimis to begin with when compared to background TP contributions. A more detailed review of the background and watershed data (below) further confirms that the TP endpoint is not set at a level that is necessary to restore aquatic life uses.

ii. TP Endpoint in Support Document Not Scientifically Defensible
The basis for selecting a TP endpoint of 0.1 mg/L for this TMDL is identified as an Ohio EPA document, *Association between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams* (Ohio EPA 1999). (Hereafter, the "Support Document") A review of the Support Document confirms that the TP endpoint used in the draft Ottawa River TMDL is not scientifically defensible as a threshold for aquatic life use protection. This document presents a discussion of water quality data in relation to fish (IBI) and macroinvertebrate (ICI) metrics and makes recommendations for statewide criteria (See, Table 2 in Support Document at 5). The basis for this recommendation is not clearly presented in the document. It is either based on an assessment of nutrient concentrations in reference streams or it is based on a bivariate analysis of variance (ANOVA) comparing TP concentration to IBI score. In either case, the assessment is not scientifically defensible.

In the first case, statistical evaluations of nutrient concentrations in reference streams provide no information on the threshold concentration beyond which aquatic life uses are impaired. If the endpoint used in the TMDL was derived from a statistical evaluation of TP concentrations in reference streams, the resulting TMDL has no credibility related to restoring aquatic life uses because the criterion value is not set at a threshold for impairment. The "reference stream" approach was used by the U.S. EPA to develop numeric nutrient criteria for streams in Florida and was struck down by the Court (Florida Wildlife Federation, Inc., et. al. v. Jackson, Case 4:08-cv-00324-RH-WSC, Doc. 351; N.D. Fla., February 18, 2012) as insufficient to show that the criteria were necessary to maintain designated uses. As in Florida, the "reference stream" approach is also insufficient for use in Ohio. In this case, OEPA cannot make a scientifically justified claim that the TP TMDL is necessary to restore stream biology. Consequently, the draft TMDL based on the statewide TP criterion is arbitrary and capricious.

If the statewide TP criterion was based on an ANOVA, this resulting criterion (0.1 mg/L) is not scientifically defensible, and the TMDL developed using the statewide TP criterion is arbitrary and capricious. The Support Document states that ANOVAs were run on three categories of TP concentration to determine where differences in IBI scores between categories were significant. (See, Support Document at 5, footnote 2) This approach is equivalent to the regression-style analyses proposed by U.S. EPA to derive numeric nutrient criteria in 2009. The EPA Science Advisory Board (SAB) conducted a peer review of empirical methods proposed by EPA for developing numeric nutrient criteria in 2009 and found that these methods were insufficient because they presumed cause-and-effect relationships and did not account for the numerous confounding factors that influence the results.[5]

[5] See, http://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/E09317EC14CB3F2B85257713004BED5F/$File/EPA-SAB-10-006-unsigned.pdf.

> The statistical methods in the Guidance require careful consideration of confounding variables before being used as predictive tools. … Without such information, nutrient criteria developed using bivariate methods may be highly inaccurate.

(SAB Final Report at 24) (Emphasis added)

> For criteria that meet EPA's stated goal of "protecting against environmental degradation by nutrients," the underlying causal models must be correct. Habitat condition is a crucial consideration in this regard (e.g., light [for example, canopy cover], hydrology, grazer abundance, velocity, sediment type) that is not adequately addressed in the Guidance. Thus, a major uncertainty inherent in the Guidance is accounting for factors that influence biological responses to nutrient inputs. Addressing this uncertainty requires adequately accounting for these factors in different types of water bodies.
>
> Numeric nutrient criteria developed and implemented without consideration of system specific conditions (e.g., from a classification based on site types) can lead to management actions that may have negative social and economic and unintended environmental consequences without additional environmental protection.

(SAB Final Report at 38) (Emphasis added)

These concerns also apply to OEPA's used of ANOVA on TP and IBI data pairs. TP concentration does not cause the observed IBI score. Rather, TP along with numerous other factors influences algal growth which, in turn, influences IBI score along with other numerous factors. This is not new information. The Support Document included detailed discussions on the influence of habitat on IBI and ICI scores.

> Stream substrate quality is also strongly associated with exceptional biological communities in Ohio (Rankin 1989, 1995; see habitat section of this paper) and the dynamics involved may suggest some possible interactions with TP. For example, silt and muck substrates (associated with low IBI scores) not only have negative effects and provide poor habitat for large macroinvertebrates and fish (Rabeni and Smale 1995), but can provide a significant supply of dissolved phosphorus for nuisance algal growth (Sharpely *et al.* 1994). The lower TP concentrations associated with the highest IBI and ICI values suggests that TP or some covariate (*e.g.*, sediment, other wastewater constituents) directly influence biological community performance.

(Support Document at 26)

> A comparison of TP with a measure of habitat quality, the Qualitative Habitat Evaluation Index (QHEI) shows that TP concentrations are typically lowest at locations with high quality habitat (*i.e.,* higher QHEI scores; Figure 15). Habitat quality, and consequently biological community performance, is influenced by riparian quality on two scales - locally at the site and by the cumulative condition of the riparian zone throughout a watershed.

(Support Document at 27)

> Phosphorus dynamics in rivers and streams are clearly influenced by the quality of the instream habitat and riparian zone.

(Support Document at 28)

> Habitat quality is a principal determinant of aquatic community performance in Ohio streams and rivers (Rankin 1989; 1995) and elsewhere (Karr and Schlosser 1977; Gorman and Karr 1978).

(Support Document at 32)

Following the SAB review, EPA finalized its stressor-response guidance in 2010.[6] In addition to describing the various statistical methods for analyzing data, the Guidance presented detailed information on the need to prepare conceptual models and to classify the data. Data are classified in an effort to account for confounding factors that significantly influence the response of aquatic ecosystems to nutrients.

> [M]any **confounding variables** must be considered when estimating the effects of nitrogen/phosphorus pollution on a measure of aquatic life in streams (e.g., a macroinvertebrate index).

(EPA Stressor-Response Guidance at 11) (Emphasis added)

> Before finalizing candidate criteria based on stressor-response relationships, one should systematically evaluate the scientific defensibility of the estimated relationships and the criteria derived from those relationships. More specifically, one should consider whether estimated relationships **accurately** represent known relationships between stressors and responses and whether estimated relationships are **precise** enough to inform decisions.

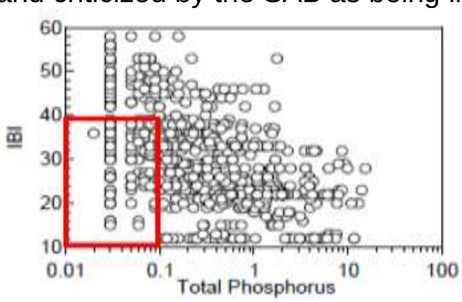
(EPA Stressor-Response Guidance at 65) (Emphasis added)

> Beyond the possible effects of **confounding variables**, one should also consider whether **assumptions** inherent in the chosen statistical model are supported by the data.

(EPA Stressor-Response Guidance at 67) (Emphasis added)

OEPA did not attempt to control for confounding factors when it prepared its ANOVA to derive statewide criteria for TP. As a consequence, it is not possible to determine whether the ANOVA represents the effect of TP on IBI or the effect of habitat on IBI, or some other factor influencing IBI that covaries with TP. Without such an analysis, there is no confidence that the TMDL will restore aquatic life uses and the TP TMDL must be reevaluated as outlined in these comments.

This lack of confidence becomes even more apparent if the data used to derive the OEPA TP endpoint are considered. Figure 18 from the Support Document presented scatter plots of IBI versus TP concentration for headwater streams in the Eastern Corn Belt Plains ecoregion. These data clearly show that TP control is incapable of providing any reasonable assurance that IBI scores will be restored to the level necessary to indicate attainment of the aquatic life use (e.g., IBI = 40). It would appear from the data in the figure that the stream biology remains impaired for at least 50% of the observations at or below TP = 0.1 mg/L (shown in the red box). In fact, the analysis made by OEPA is the exact type of evaluation presented by USEPA in 2009 and criticized by the SAB as being insufficient for developing numeric nutrient criteria.



(Support Document at 31, Figure 18)

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[6] USEPA. November 2010. Using Stressor-response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001. (Hereafter, EPA Stressor-Response Guidance)

For all these reasons, the statewide TP endpoint selected by OEPA is not scientifically sound and it is arbitrary and capricious and not in accordance with law for OEPA to use the selected endpoint as the basis for the TP TMDL.

Response: Nutrient over-enrichment, stimulated by high levels of phosphorus and nitrogen, was unequivocally demonstrated to be a cause of aquatic life impairment in the Ottawa River. Phosphorus load reductions are a necessary first step toward restoring the beneficial use.

Ohio EPA has noted in cause and source discussions where other issues were also affecting the biological communities. Over 40% of the discharged total phosphorus load from the four largest dischargers was from PCS Nitrogen—not a *de minimus* concentration. The background (i.e., the upstream) concentration of total phosphorus upstream from PCS Nitrogen would be below the Lima WWTP discharge, which contributed 45% of the load from the four major dischargers. There were significant dissolved oxygen dial swings that exceed reasonable potential to affect aquatic life downstream from PCS Nitrogen (and Lima WWTP) at RM 36.3 (adjacent to Ft. Amanda Rd.) and RM 35.44 (Shawnee Rd.) (see Table 7 in *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013); excerpted below). On 7/28/10, the maximum dissolved oxygen readings at those same downstream sampling locations from PCS Nitrogen (16.97 and 14.02 mg/l dissolved oxygen, respectively) are definitely indicative of nutrient enrichment with supersaturated dissolved oxygen readings.

Table 7 (excerpt). Summary of hourly dissolved oxygen measurements (mg/L) recorded by automatic meters deployed in Ottawa River on July 28 and September 15, 2010. Values highlighted in bold indicate either a violation of the outside mixing zone 24 hr. average criterion (5.0) outside mixing zone minimum criterion (4.0) or a range that exceeds reasonable potential to affect aquatic life (7.0).

River Mile	Mean		Median		Minimum		Maximum		Range	
	7/28	9/15	7/28	9/15	7/28	9/15	7/28	9/15	7/28	9/15
04100007 03 06: Ottawa River below Little Hog Creek to above Little Ottawa River										
45.97	7.74	6.81	6.60	6.47	5.34	5.02	12.12	9.25	6.78	4.23
43.45	7.95		7.98		6.57		9.87		3.30	
42.30	9.56	7.25	7.37	6.59	5.41	5.37	17.43	10.56	**12.02**	5.19
41.16	8.47	7.70	8.29	7.46	6.94	6.32	10.51	9.80	3.57	3.48
40.04	10.06	10.70	9.02	10.33	5.79	6.91	16.21	15.05	**10.42**	**8.14**
38.63	11.87	**4.73**	10.94	4.25	5.42	**3.58**	19.61	7.06	**14.19**	3.48
37.91	11.47	6.77	11.31	5.79	8.03	4.75	15.95	10.35	**7.92**	5.60
37.47	9.90		9.70		7.73		12.52		4.79	
37.00	9.48	7.71	9.06	7.62	6.84	7.11	13.14	8.41	6.30	1.30
36.30	9.73	7.03	8.32	6.17	6.00	5.35	16.97	10.40	**10.97**	5.05
35.44	7.96	6.43	6.82	6.03	4.75	4.99	14.02	8.86	**9.27**	3.87

The reference range approach used in the *Associations* document includes statistical ranges of nutrient concentrations found at reference sites, as well as ranges found at all sites stratified by IBI ranges. The target values derived from the percentile ranges listed in the *Associations* document were chosen in light of both sets of information, not the reference sites exclusively.

The comments on confounding factors are simply not true. The ANOVA models used in the *Associations* document were essentially those of Miltner and Rankin 1998, wherein confounding variables were accounted for in terms of percent variation explained by various water quality parameters and a measure of habitat quality (the QHEI). Confounding factors were very carefully considered.

Figure 18 (of Ohio EPA, 2013) is a scatter plot of raw data showing a typical biological response over an environmental gradient. The relationship is statistically highly significant; that is, it is not a chance occurrence. When covariates are included (to control for the confounding factors mentioned throughout the body of these comments), a significant difference in mean IBI score is detectable between sites categorized as having phosphorus concentrations greater than 0.1 mg/l and those with concentrations less than 0.1 mg/l. Relative to sites with phosphorus concentrations exceeding 0.1 mg/l, sites with phosphorus concentrations less than 0.1 mg/l, in fact, have a much better than even chance of meeting an IBI score of 40, whereas those with concentrations greater than 0.1 mg/l have a less than even chance of meeting an IBI of 40 given similar habitat levels. The latter analysis is also available in the technical support document for the nutrient criteria development.

The arguments presented above do not refute the fact that the Ottawa River is clearly over-enriched and that phosphorus reductions are necessary.

Comment (DS)

"Lima Refining Company endorses the comments submitted on behalf of Potash Corp., including those to the effect that:

- a nutrient endpoint for Total Phosphorous is not appropriate for use in streams.
- Ohio EPA's data set shows multiple locations within the Ottawa River watershed which achieve full attainment of biological criteria with TP concentrations well above the low levels proposed for limitation on Lima Refining Company's discharge.

Therefore, there is no reasonable basis on which to impose the phosphorous limitations suggested by the TMDL."

Comment (LS)

iii. Available Data for Ottawa River Watershed Confirms TP Endpoint Not Necessary to Ensure Aquatic Life Use Attainment

Data presented in the Draft TMDL for designated use attainment and water chemistry indicate that the TP endpoint is not justified based on biological attainment. There are multiple locations along the river where aquatic life designated uses are assessed as fully attaining with TP concentrations well above the TMDL TP endpoint of 0.1 mg/L. Side-by-side comparisons of the aquatic life use attainment and water chemistry results for the Upper, Middle, and Lower Ottawa River subwatersheds (See Attachment) show stations with TP concentrations 4 (>0.4 mg/L) to 20 (>2.0 mg/L) times greater than the TMDL endpoint that fully attain aquatic life uses. OEPA cannot rely on a default value that is contradicted by real-world data. See *Am. Coke & Coal Chems. Inst. v. EPA*, 452 F.3d 930, 943 (D.C.Cir.2006) and *Upper Blackstone WatershedPoll'n Abatement Dist. v. EPA,* 690 F.3d 9, [get page] (1st Cir. 2012). In addition, OEPA's own November 27, 2000 Water Quality Standard Guidance strongly supports this position, affirmatively stating that "some water attain aquatic life criteria at higher concentrations" and reiterating that effluent limits selected in the TMDL process for nutrients should be done on a "case by case" basis. *Legal and Technical Basis for Nutrient Target Values Used in TMDL Projects,* Water Quality Standard Guidance #4 (dated November 27, 2000). OEPA's Water Quality Standard Guidance concludes with the following statement:

> Because the values in the technical report are initial target concentrations only and are not codified in regulations, there is a certain degree of flexibility as to how they can be used in a TMDL setting. A TMDL must be flexible in its consideration of load reduction, habitat improvements, the degree of wastewater effluent flow predominance, and other features that determine attainment of biological criteria.

(Guidance at 4.)

The Guidance further provides a range of important factors that must be considered when selecting the appropriate nutrient target, including the fact that "some water attain aquatic life criteria at higher concentrations" and that "habitat quality" will influence nutrient impacts. Guidance at 4. As noted above, OEPA's intended purpose for the TP TMDL is the attainment of biological criteria. The TP TMDL cannot achieve this goal without habitat restoration. However, the site-specific data for the Ottawa River Watershed demonstrate that the biological criteria can be achieved without TP reduction where the habitat is not degraded. Thus, the proposed TP wasteload allocations are not necessary to restore the use.

As a related matter, the Guidance further provides that where a water quality standard (such as the "nuisance" standard) is not attained, even "significant" contributors of phosphorus may discharge up to 1.0 mg/L. This concentration is over twelve times the TP allocation assigned to PCS in the Draft TMDL (0.0762 mg/L), and PCS is not even a "significant contributor" given non-point and other sources of TP in the Watershed. In sum, the 0.1 "default" value is inconsistent with existing data and specifically contrary to OEPA's Guidance.

These results indicate that either TP is not causing the impairment observed in the Lima Area, in which case the TP TMDL must be withdrawn, or other factors mitigate the influence of TP on aquatic life use attainment. In the latter case, the TMDL should provide for alternative approaches to mitigate the aquatic life use impairment. For these reasons, OEPA should withdraw the Draft TMDL and reevaluate the basis for its TP wasteload allocation.

c. Summary

Based on the information presented above, it is apparent that the TP endpoint used in the draft Ottawa River TMDL is not a necessary or appropriate tool to address the water quality exceedance identified in the Watershed and is not based on sound science. Additionally, OEPA relies on default values that directly contradict real data from the target Watershed and does not establish a direct correlation or a valid factual foundation between the new TP limits and the water quality standards, as required by law. See *Gen. Elec. Lighting v. Koncelik*, 10th Dist. No 05AP-310, 2006-Ohio-1655. In fact, it is likely that attainment of the TMDL for TP would have no effect on restoring aquatic life uses to the impaired segments of the Ottawa River watershed. Therefore, the draft TMDL for TP should be withdrawn as inappropriate to address the observed impairments.

Response: Ohio EPA can point to many examples where a numeric water quality criterion was exceeded by a given chemical but biological scores were good or excellent. The conclusion that the criterion is therefore false is unsupported.

TMDLs must be developed for pollutants causing impairment. Nutrient over-enrichment, stimulated by phosphorus, contributed to non-attainment in the Ottawa River. Allocations must be calculated to meet targets. Permits must be consistent with allocations, but there can be flexibility in when the limits are imposed. The flexibility that the commenter refers to in the Water Quality Standard Guidance #4 is abundantly demonstrated in the recommended adaptive management approach to TMDL implementation.

Multiple factors were identified as contributing to aquatic life use impairment through the stream reach in question, each one reasonable and supported by direct measures, field observation and reasonable inference, consistent with past and current practices. Diel dissolved oxygen and pH through the reach in question provide unambiguous evidence of runaway or otherwise highly stimulated in-stream productivity (i.e., nutrient enrichment). Multiple and interrelated factors control or otherwise influence the degree to which a nutrient load is expressed in lotic waters. On the Ottawa River nutrient enrichment was identified as a cause of aquatic life use impairment only where multiple lines of evidence converged. In areas where high ambient TP was observed, but other indicators meet expectation, it was concluded that the nutrient load was either safely assimilated locally or passed through, or both.

Comment (LS)
(Attachment referred to in previous comment; text provided on following figures.)

Attachment – Review of Ottawa River (Lima Area) Watershed Draft TMDL Report

Upper Ottawa River Subwatershed

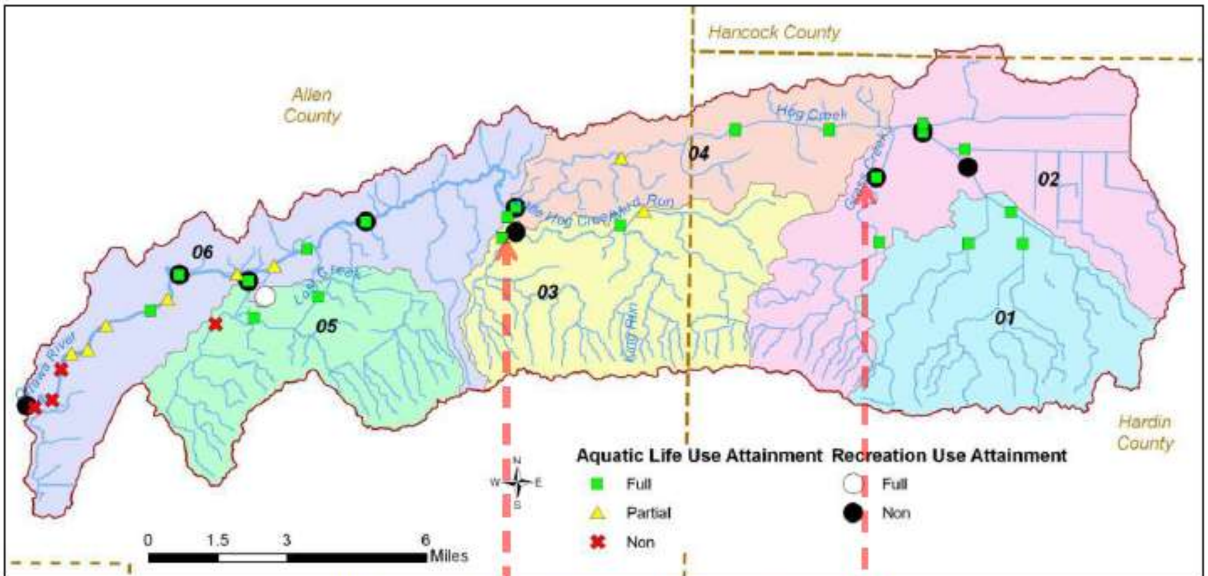

Figure 3-2. Attainment results for the Upper Ottawa River subwatershed

Red arrows illustrate stream segments that are fully attaining for aquatic life use with elevated TP (>0.4 mg/L).

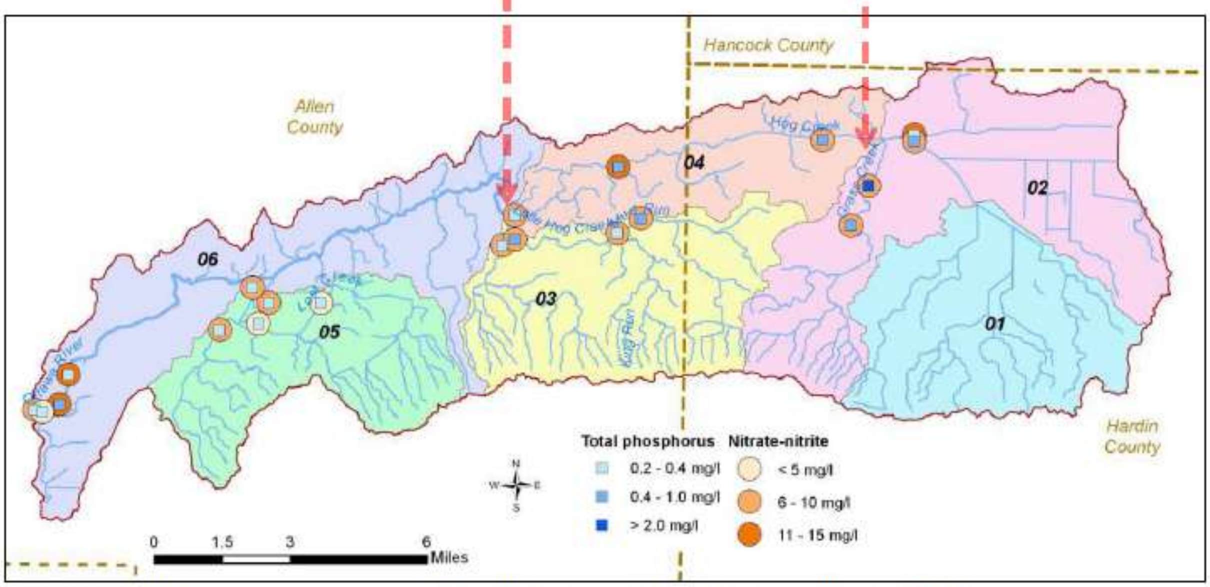

Figure 3-4. Water chemistry results for the Upper Ottawa River subwatershed

Middle Ottawa River Subwatershed

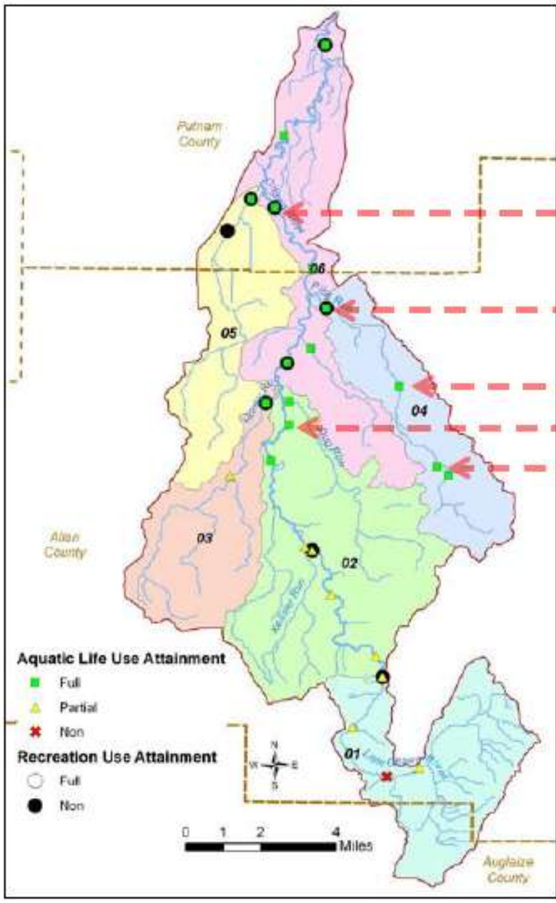

Figure 3-7. Attainment Results

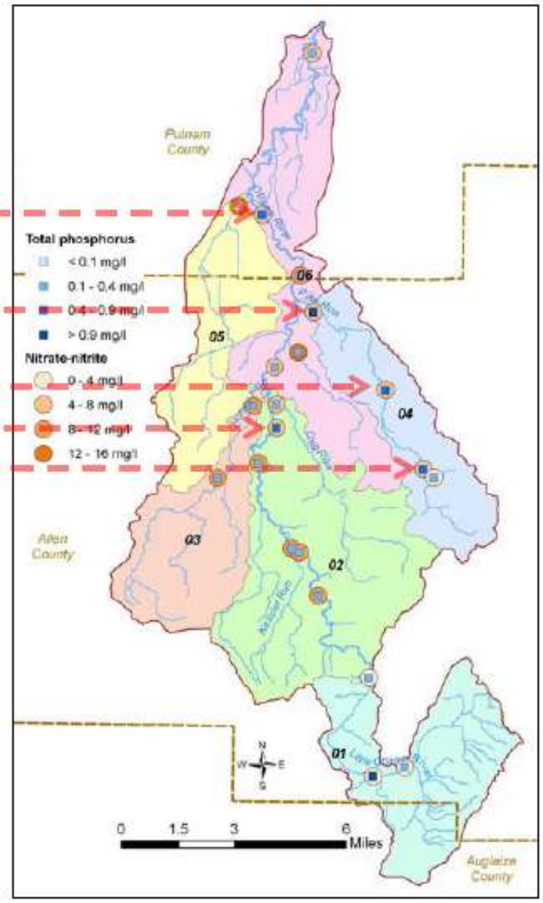

Figure 3.9. Water chemistry

Red arrows illustrate stream segments that are fully attaining for aquatic life use with elevated TP (>0.9 mg/L).

Lower Ottawa River Subwatershed

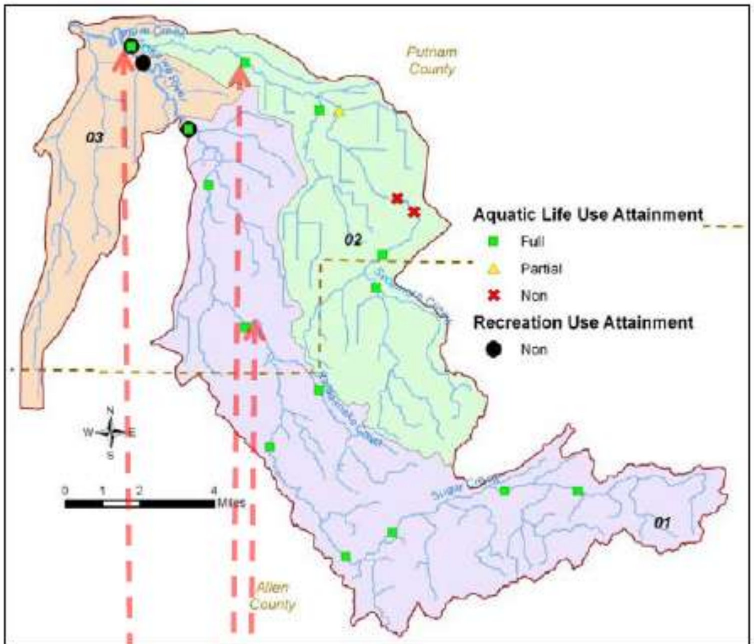

Figure 3-12. Attainment results

Red arrows illustrate stream segments that are fully attaining for aquatic life use with elevated TP (>0.5 mg/L).

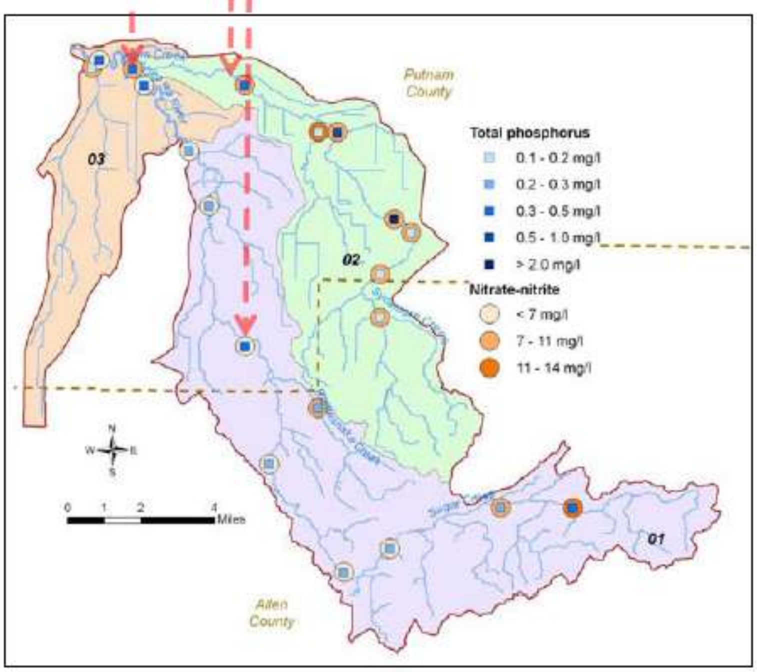

Figure 3-14. Water chemistry results

Response:
Ottawa River

- RM 24.1, Dst. Elida WWTP, WWH-ECBP
- RM 15.9, Dst. Rimer Rd/SR 189, WWH-HELP
- RM 1.2,Dst. Kalida, WWH-HELP

Grass Fork

- RM 1.2, Dst Ada WWTP, MWH-ECBP

Little Hog Creek

- RM 0.6, Dst Lafayette WWTP, WWH-ECBP

Pike Run

- RM 7.6, Cole Rd., Dst. American Bath WWTP, MWH-HELP
- RM 4.6, State Rd., MWH-HELP
- RM 0.8, Lima Gomer Rd., MWH-HELP

Plum Creek

- RM 4.6, TR M-10, WWH-HELP
- RM 0.2, SR 114, WWH-HELP

Sugar Creek

- RM 8.8, SR 115, WWH-HELP

The results from eleven monitoring stations, on all or portions of six waterbodies, are offered as apparent contradiction, because elevated phosphorus concentrations were concurrent with full aquatic life use attainment. However, these comments fail to recognize that nine of these stations, encompassing five of the six waterbodies identified, were evaluated against MWH criteria (existing or recommended use designation) or are contained within the HELP ecoregion, or both. By design, the MWH use reflects lower ambient biological potential inherent to surface waters that have been subjected to extensive hydromodification and are formally maintained in an artificial state so as to serve as a drainage conveyance. Waters evaluated as part of the 2010 Ottawa River survey were reconciled against those maintained by the local governments, and the MWH use was applied where appropriate. Similarly, biocriteria for the waters of the HELP ecoregion are substantially lower when compared with other four ecoregions within Ohio. This is because of the very poor natural drainage attendant to the lake plain. By and large, much of the waters draining the HELP have been systematically modified to facilitate human habitation and agriculture and are maintained as such. Regionally calibrated biocriteria of the HELP directly reflects this high degree of hydromodification in the form of lower biological performance standards. For a more detailed treatment of the rationale, derivation and regional calibration of Ohio's biocriteria, the reader is directed to Ohio EPA (1987).

Either singularly or in combination, the lower biocriteria associated with both the MWH use and HELP ecoregion account for the vast majority of waters identified as a bearing a high phosphorus load and simultaneously supporting aquatic communities meeting their respective biocriteria. These waters include: Sugar Creek (RM 8.8), lower Plum Creek (RMs 4.6 and 0.2), Pike Run (RMs 7.6, 4.6, 0.8), and Grass Fork (RM 1.2). Equally important to this discussion is the agreed upon fact that ambient phosphorus levels alone are a poor indicator or predictor of nutrient enrichment effects. There are a host of complex and interacting factors (riparian condition, hydrology, in-stream macrohabitat complexity, etc.) that affect or otherwise determine whether a given phosphorus load will be assimilated, passed through, or serve to over stimulated in-stream productivity. Presently, Ohio EPA relies upon multiple lines of evidence for the determination of nutrient effects and to ascribe nutrient enrichment as a cause of aquatic life use impairment. At the remaining sites identified above (lower Ottawa River and lower Little Hog Creek), most appeared to have adequate habitat complexity, namely sustained flow and developed riffle/run complexes, and selected stations supported mature riparian vegetation. Regardless of the influence of these and other ameliorative features, strong evidence of runaway productivity (e.g., high diel pH and dissolved oxygen flux, or otherwise highly skewed dissolved oxygen regime) were not evident at these sites. Thus, relatively high ambient phosphorus load identified at these sites did not serve to create hypereutrophic conditions or result in beneficial use impairment.

Comment (SS)
Comment 1.2 The limits established by the TMDL must be closely correlated to the water body impacts that the TMDL limits are meant to address.
For example, for the phosphorus TMDL limit, the TMDL fails to clearly identify the adverse impact that is putatively caused by phosphorus loadings. Instead, it merely sets forth vague references to general impairments in the Ottawa River watershed that result from a number of stressors such as urbanization, dams, stream flow and gradient, non-point source discharges, toxicants, or loss of riparian cover.

Response: Causes and sources of impairment are linked to observed biological responses in sampled stream reaches where the biological communities did not meet the ecoregional and stream use designated biocriteria. These impaired reaches and documented and discussed in the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013).

Comment (SS)
Comment 1.5 The Draft TMDL Report must comprehensively evaluate the stressors that cause water body impairments.
The Draft TMDL Report is largely focused on how to achieve a phosphorus target, and does not address the multitude of other factors that contribute to water body impairment. The models and analyses *as applied* in these TMDLs are not nearly rigorous enough to demonstrably link impairments that Ohio EPA <u>presumes</u> are causally related to the source(s) or cause(s) of impairments. Although the TMDL states that wet weather phenomena such as combined sewer overflow (CSO) discharges likely contribute organic enrichment and can be expressed during low-flow conditions as residual sediment oxygen demand, CSOs and other flow-variable phenomena are not modeled or accounted for in the QUAL2K model, *i.*e., there is no quantitative linkage.

The TMDL asserts that low-head dams exacerbate the impacts of nutrient enrichment and that removal of such dams will improve water quality. However, the model files provided by Ohio EPA (i.e., Phases 1, 2, and 3) do not depict improvements in Ottawa River water quality that could be attributed to dam removal alone. In regards to dam removal, Ohio EPA did not adequately demonstrate that accumulated phosphorus within trapped sediments is properly accounted for in Phase 1, 2, and 3 model runs. That is, the representation of dam removal appears to be limited to changes in reach hydrogeometry. Ohio EPA should have considered changes that may occur in background phosphorus flux, percent coverage of sediment oxygen demand, and channel slope (an important parameter for the selected reaeration equation). In short, the TMDL fails to provide sufficient modeling scenarios that adequately describe and justify dam removal.

Some of these concerns could be addressed by additional model scenario runs with QUAL2K, while others would require Ohio EPA to adopt a different model to capture important time and flow variable processes. The Water Quality Analysis Simulation Program (WASP), among others, is a model capable of addressing many of the complexities identified in these TMDLs.

Another example of important stressors that were ignored in the TMDL has to do with toxicants in the river sediments. Table B-8 shows that there several metals and polyaromatic hydrocarbons (PAHs) in river sediment within the City that are well above Ohio's Sediment Reference Values. Table B-1 lists chronic toxicity as a cause of non-attainment. Chronic toxicity is not considered in the TMDL.

Of the stressors that were considered, Ohio EPA assessed each stressor as the limiting factor for aquatic life. This conclusion is not substantiated by the data presented and, equally, does not allow implementation activities to be focused on the stressors that are, in fact, the most limiting for aquatic life at each site. These shortcomings result in an overly conservative implementation strategy, which will result in unnecessary expenditures of public resources.

Response: Nutrient over-enrichment as a cause of impairment in the Ottawa River was unequivocal and obvious. See many other responses for additional information.

The Ohio EPA has many documented instances of low-head dam removal improving stream quality and biological performance and diversity. It is not just hydrogeometry improvements but also lower magnitude diel dissolved oxygen swings and decreased putrification in lentic pool reaches behind dams with lower biochemical oxygen demand. The *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013) recommends some future resampling or other work (e.g., continued monitoring of certain areas of stream sediments) in Future Monitoring Needs.

Describing the causes and sources associated with observed impairments revealed by the biological criteria and linking this with pollution sources involves an interpretation of multiple lines of evidence, including but not limited to, water chemistry data, sediment data, habitat data, discharge monitoring report data, biomonitoring results, direct field observations, land use, and biological response signatures within the biological data themselves. Thus the assignment of principal causes and sources of impairment represents the association of impairments (defined by response indicators) with stressor and exposure indicators.

It is imperative that the weight of evidence approach practiced by Ohio EPA regarding causes and sources of impaired waters be viewed in full light of historical use. Not only has this approach been legally affirmed through the years, but, more importantly, it has successfully documented the recovery of hundreds of miles of previously impaired stream sites, statewide, for well over two decades (see Table G-1 in the 2012 Integrated Report at http://www.epa.ohio.gov/portals/35/tmdl/2012IntReport/IR12SectionGfinal.pdf depicting trends of aquatic life use attainment status across Ohio over the last 20 years). This is particularly true of the Ottawa River, as a combination of full and partial implementation of recommendations contained within the previous assessment (Ohio EPA 1998) has resulted in significant improvement at nearly all previously impacted sites. This improvement was not manifest only in improved instream biology, but also in other important environmental measures. Presently, the Ottawa River mainstem is very near full WWH attainment; Ohio EPA believes this is a result of all of pollution abatement activities undertaken to date. This is not to say that the process cannot be improved upon, and to that end Ohio EPA supports the inclusion of more robust statistical analysis as it is developed and made available in the scientific literature to enhance the traditional weight of evidence approach. However, it is nearly impossible to confidently partition and rank causes and sources of impairment in a system with a history of long standing, severe and complex environmental problems as those of the Ottawa River.

Comment (SS)
Comment 1.6 The TMDL should incorporate Ohio EPA's future nutrient rulemaking based on a trophic index criterion (TIC) instead of developing a TMDL limit for phosphorus, sediment, and habitat.

Ohio EPA is in the process of developing a nutrient rulemaking based on a trophic index criterion (TIC). Ohio EPA should wait to finalize the TMDL for phosphorus until the Ohio EPA's TIC is finalized and can be applied to the Ottawa River. The Draft TMDL Report could reference Ohio EPA's TIC work and automatically incorporate it into the TMDL once the Ohio EPA has finalized the TIC. A significant amount of agency time and resources have gone into developing the TIC concept, and the comments on it from the regulated community have been favorable. In light of this, it is likely that a more biologically appropriate and defensible approach for the Ottawa (Lima Area) TMDL is appropriate for restoring beneficial uses to the Ottawa River and its tributaries. Also, this approach should result in more predictable, consistent, and fair application of the Ohio water regulations to the regulated community.

Comment (SS)
Comment 2.1 Ohio EPA is in the process of developing a nutrient rulemaking based on a trophic index criterion (TIC), which was the subject of generally supportive comments by the City of Lima and the AOMWA (copies attached and incorporated herein by reference). It appears that the Ottawa River could be scored as meeting the TIC, depending on how the TIC approach is ultimately finalized and implemented.[7] However, the phosphorus limits proposed in the TMDL are based on the 1999 Associations Report, which even its principal author, Robert Miltner (who is also the principal developer of the TIC), has roundly criticized as a basis for making management decisions regarding phosphorus limits. Accordingly, Ohio EPA should wait to finalize the TMDL until the TIC is more fully developed and can be applied to the Ottawa River to determine whether point source nutrient limitations are necessary, and what they should be. For example:

Comment (BS)
We support OEPA using the pending Trophic Index Criterion (TIC), with some improvements, over the 1999 Associations Report methodology that was the foundation of this TMDL.

Response: The commenter incorrectly characterizes Bob Miltner's comments. Miltner is on record as saying Ohio EPA has successfully applied the *Associations* document's numbers. His criticism is based on the fact that newer stream data are available, which is the basis of the TIC framework. However, TMDLs must be calculated using existing water quality standards. Ohio EPA does not anticipate the TIC being incorporated into rule in the immediate future. Therefore, Ohio EPA will proceed using the *Associations* document as it has for numerous other TMDLs.

[7] Among the matters that need clarification are: (1) whether the TIC should be applied to a site or a stream segment, (2) how multiple datasets should be combined, (3) how individual fish and macroinvertebrate (bug) scores should be combined to interpret the biological scores; and (4) what constitutes a "non-significant" departure. As specifically applicable to the TMDL, it is unclear whether and to what extent periphyton was collected in 2010 in the Ottawa River and how that data was applied. Although there are a handful of data points in the QUAL2K model presented in the TMDL, dramatically different nutrient limits result depending on whether the highest or lowest periphyton data are utilized in the TIC.

The suggested phased implementation of the TMDL will allow ample opportunity to consider any future nutrient rules in future Ottawa River TMDLs.

At any rate, with dissolved oxygen swings greater than 9 mg/l and impaired biology, the TIC will rate the river as impaired for nutrients, so nothing would be different in terms of the need for addressing the nutrient over-enrichment issue. At best it might suggest that other stressors are also limiting, but again, that would not reveal anything new.

Comment (SS)

Comment 1.9 The TMDL should incorporate a Use Attainability Analysis (UAA) and Lima's Long-Term Control Plan (LTCP).

The City contends that extant conditions in portions of the Ottawa River affected by the lowhead dams' demand its redesignation from warmwater habitat (WWH) to modified warmwater habitat (MWH). The City has invested considerable resources in developing a LTCP for the CSOs as part of an integrated plan. The LTCP and Integrated Plan are being embodied in a federal Consent Decree, consistent with the principles of U.S. EPA's new (June 2012) integrated planning framework for wastewater and stormwater[8]. By incorporating an UAA, the applicable bacterial standard will be consistent with the Lima Integrated Plan. Additionally, the TMDL should recognize that CSOs should be considered controlled if they met the LTCP requirements.

Response: The reaches affected by dams are short reaches behind lowhead dams. Two reaches have been sampled and demonstrated full or partial attainment of warmwater habitat biocriteria. Because of this demonstration, they have not been recommended to be redesignated as modified warmwater habitat. In addition, downstream uses must be protected, so actions would still be required to help biological performance downstream where the Ottawa River is not currently meeting its designated use.

The request for a UAA and a change in the aquatic life use designation assigned to the Ottawa River in Lima would not have any impact on the applicable bacterial standard. Bacteria criteria (*E. coli*) are determined by the designated recreation use. OAC 3745-1-07, Table 7-16 assigns the Class A primary contact recreation use to the segment of river in Lima. These are the effective standards and the Agency believes they are appropriate water quality targets for CSO abatement design under the LTCP.

Comment (SS)

Comment 1.11 The habitat and sediment TMDLs which are based on Ohio EPA's QHEI scores should be dropped from the TMDL document because the QHEI is not a valid target.

TMDLs are to be calculated for pollutants. The QHEI[9] is an inappropriate surrogate for a TMDL. Ohio EPA did not make any demonstration that the sediment and habitat issues are related to the discharges of pollutants in the watershed.

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[8] http://cfpub.epa.gov/npdes/integratedplans.cfm

[9] The QHEI is "a physical habitat index designed to provide an empirical, quantified evaluation of the general lotic macrohabitat characteristics that are important to fish communities." It is a multi-metric index comprised of 6 qualitative metrics: (1) substrate; (2) instream cover; (3) channel morphology; (4) riparian zone and bank erosion; (5) pool/glide and riffle-run quality; and (6) map gradient. Source: Ohio EPA, 2006, http://www.epa.state.oh.us/portals/35/documents/qheimanualjune2006.pdf .

Ohio EPA is arbitrarily using the QHEI as the TMDL target. For example, the agency acknowledges that targets for habitat do not exist for modified warmwater habitat (MWH) streams. The TMDL states however that "[t]here is a reasonable expectation that, even in MWH systems where lower biological standards are in place, habitat that is degraded to some extent will influence biological attainment." (p. 53).

Comment (SS)
Comment 1.13 The qualitative habitat evaluation index (QHEI) method used to conduct habitat and sediment analyses must be clarified.
As discussed previously, the QHEI methods used by Ohio EPA are inappropriate and should be removed from the TMDL. If the QHEI approach is retained, Ohio EPA must provide the information to justify how it derived the TMDL targets. For example, Section D3.2 of the draft TMDL refers to statistical analyses that were used to establish the targets, but these analyses are not presented.

Response: High sediment/silt loads decrease aquatic habitat and decrease biological diversity. Components of QHEI measure quality of portions of the habitat through metric scoring. Improving scores in certain habitat metrics relate directly to improved habitat quality and consequently can be directly related to improved biological performance. These QHEI habitat metric components have been implemented in other TMDLs, and the habitat metrics' correlation to quality biological communities has been documented (Rankin 1989; 1995).

Comment (SS)
Comment 1.14 The reasons for developing a TMDL based on sediment quantity are unclear. According to the TMDL (page B-18), "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." Therefore, there is no apparent justification for the inclusion of a loading limit for sediment.

Comment (SS)
Comment 3.3 The reasons for developing a TMDL based on sediment quantity are not provided.
According to the TMDL (page B-18), "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." In light of this admission, there is no basis for the TMDL to include a loading limit for sediment.

Response: The referenced section of Appendix B focuses on the chemical quality of sediment to determine if contaminant levels are high enough to be toxic to aquatic life or be a risk to human health. For example, a Do Not Wade or Swim advisory is recommended if levels of PCBs or PAHs are high. Sediment contaminants also have the potential to bioaccumulate in the food chain and drive sport fish consumption advisories.

This section of Appendix B is not intended to evaluate the physical impact that sediment has on stream ecology. The turbidity caused by suspended sediment can make the water less aesthetically pleasing for recreation, cause it to warm more quickly and retain heat and reduce productivity by limiting energy from the sun. The sedimentation occurs as particles settle, fill the spaces between rocks, and reduce the diversity of habitat. It can also smother the nests of certain types of fish.

Comment (SS)
Comment 2.4 The TMDL should be the foundation by which an implementation plan is developed to restore the portions of the Ottawa River and its tributaries such that aquatic life and recreational uses are reasonably expected to attain their designated use. The TMDL does not provide that foundation.

a. For aquatic life, the TMDL does not provide a valid factual foundation to support the designation of warmwater habitat (WWH) for the segments of the Ottawa River within the City that are affected by flow alterations and impoundments.
b. The TMDL appears to take a “shotgun” approach on several (but not all) stressors on aquatic life. Many of the stressors are listed, although there are more stressors listed in the executive summary than in subsequent chapters, and many important stressors are not addressed at all in the TMDL.
   i. For example, Table B-8 shows that there several metals and polyaromatic hydrocarbons (PAHs) in river sediment within the City that are well above Ohio’s Sediment Reference Values. Table B-1 lists chronic toxicity as a cause of non-attainment. Chronic toxicity is not considered in the TMDL.
   ii. The TMDL failed to properly evaluate the impact of the municipal separate storm sewer (MS4) and agricultural contributions to “sediment”. Ohio EPA did not analyze the geomorphological conditions or bedload conditions that are likely contributing to the erosion problems. Sediment load from urban and agricultural stormwater is typically too clean, which can result in flow becoming sediment-starved (“hungry water”). This makes the stream prone to erosion of the channel bed and banks, producing channel incision (downcutting), coarsening of bed material, and loss of appropriate habitat for fish and macroinvertebrates. Therefore, if a more balanced approach to evaluating appropriate remediation of these conditions is not taken, reducing sediment from various sources could actually exacerbate erosion problems in the watershed.
   iii. Ohio EPA failed to adequately demonstrate that the approach used for the sediment TMDL will address the impairments in habitat. For example, Table D-21 lists the three QHEI categories (substrate, channel, and riparian) used in the sediment TMDL. For the Ottawa River near Lima (Section 03 06, River Miles 43.45 to 37.91), the substrate scores range from 6 to 11, with the target for MWH being greater than or equal to (≥) 9 and WWH being ≥ 13. The channel scores for these locations range from 6.5 to 11, with the MWH target being ≥ 10 and the WWH target being ≥ 14. The riparian scores range from 3 to 10, with the MWH target being ≥4 and the WWH target being ≥ 5. Will improving the substrate conditions be sufficient to improve habitat or are combinations of substrate, channel and riparian needed to achieve the desired “total sediment score”?
c. Of the stressors that were considered, Ohio EPA labeled each stressor as the limiting factor for aquatic life. However, there is no regression or other analysis to substantiate this assumption. In addition, even if the assumption could be validated, the failure to quantify the impact of the various stressors does not allow implementation activities to be focused on the stressors that are most limiting for aquatic life at each site, and is inevitably overly conservative, which will result in unnecessary expenditures of public resources.

Response: Impairments were established from the Ottawa River 2010 survey results and conclusions. In the attainment table (see Ohio EPA 2013, or TMDL Appendix Table B-1), causes and sources of impairment are typically listed in order of importance. Some causes and sources are interrelated and improvement/remediation work on one cause and source can and often does improve or reduce impacts of other listed causes. Land use inputs are linked to sample site location, influenced by direct and indirect local and upstream sources (whether nonpoint source sediment, chemical inputs, riparian cover, erosion, watershed hardening, adjacent agriculture, grazing, etc.).

The reaches affected by dams are short reaches behind lowhead dams. Two reaches have been sampled and demonstrated full or partial attainment of warmwater habitat biocriteria. Because of this demonstration, they have not been recommended to be redesignated as modified warmwater habitat. In addition, downstream uses must be protected, so actions would still be required to help biological performance downstream where the Ottawa River is not currently meeting its designated use.

Ohio EPA biologists observe bank and substrate type and quality while sampling. When flashiness in a stream is referred to, it implies the power to erode due to hardening of the watershed (sedimentation hardens bottom substrates or artificial channel with concreted bottom and sides/width, or piped channel). Storm water in urban paved settings can form newly eroded banks (increasing sediment suspended loads from bottom sediments, if present) from the power in fast storm flows. Larger bottom substrates become embedded and “cemented” as silt/sediment fill in spaces between larger substrates, limiting utility, habitat, and quality of substrates. Whether or not geomorphology terms are expressed, the effects of storm water on stream reaches are observed, discussed, and included as part of Ohio EPA’s assessment.

Using habitat metric scores to propose habitat improvement is a valid method to address habitat as a cause of impairment in TMDLs. Habitat improvement is in many instances tied to bank stabilization, widening riparian corridor to improve stability. Habitat improvements (bank stability and substrate improvements with a decrease of sediment/silt) can be site specific prescriptions for specific stream reaches.

Comment (SS)
Comment 3.2 Ohio EPA failed to demonstrate that the low biological scores in the Ottawa River near Lima are limited by water quality instead of other factors such as habitat.
The TMDL notes that habitat quality in the Ottawa River decreases sharply in the Lima area (page 33). However, habitat is only listed as a cause of impairment at one (RM 38.6) of the 26 mainstem Ottawa River sampling sites (Table B-1), despite the fact that there are other locations where the QHEI score was less than 60. Ohio EPA states that mean QHEI values “equal to or greater than 60.0 generally indicate a level of macrohabitat quality sufficient to support an assemblage of aquatic organisms fully consistent with the WWH aquatic life use designation” (page 114 of the 2010 data report). As Ohio EPA correctly observes, poor habitat conditions will limit the aquatic community and affect use attainment. Ohio EPA should not impose nutrient load reductions without establishing whether these reductions will materially improve aquatic life uses where habitat is the limiting factor.

Response: Through the segment in question, the Ottawa River accrues additional stressors, pollution sources, and modifications, longitudinally, including diminished discharge (flow alteration), impoundment, SSOs, CSOs, and eventually treated wastewater from major municipal and industrial point sources. In comparison with the uppermost stations at Thayer and Fetter Roads, the decline in macrohabitat quality of the Ottawa River was sharp as it entered the greater Lima area. However, as measured by the QHEI, macrohabitat quality declined into minimal WWH range at the Metzger Dam and Roush Road stations (QHEI of 59.5 and 61.3, respectively), and remained well above the WWH benchmark at all remaining free flowing stations through and immediately downstream from Lima. Severely deficient macrohabitat (QHEI of 46.5) was identified only in the Collet Street Dam Pool. Consequently, the macrohabitat complexity of the free flowing segments of the Ottawa River through Lima appeared capable of supporting fish and macroinvertebrate communities at least minimally consistent with the WWH biocriteria, thus the effects of macrohabitat are controlled for and departures from the WWH biocriteria are attributable to other variables. This is not just a rational inference drawn from the predictive power of the QHEI; rather it is demonstrated within the 2010 data themselves. In the heart of the urban environs of Lima, stream segments between impoundments meet or nearly meet WWH. Previous biosurveys through the same said reaches found aquatic assemblages severely impacted. The significant improvements documented to date are concurrent with improved CSO and SSO management by Lima.

F2 Modeling

Comments are grouped into categories according to loading analysis method. Within each method, comments were further grouped based on type of comment or question.

F2.1 QUAL2K

Comment (LS)
Water Quality Modeling: The water quality modeling presented in the Draft TMDL is fundamentally flawed and cannot be used to justify the proposed wasteload allocations for TP. The model used to assess compliance with OEPA D.O. criteria is a low flow, steady state model. In order to be scientifically defensible, this model must be capable of predicting (1) average D.O. concentrations that occur in response to organic loads, (2) benthic algal concentrations that occur in response to TP loads, and (3) the influence of the benthic algal biomass on diel D.O. concentration. This model is not capable of predicting the benthic algal levels that exist instream under low flow conditions because it is a steady-state model. Benthic algae development is not a steady-state problem, but accrues over time in response to ambient conditions. The model is not calibrated to the observed benthic algal growth. This prediction is critical to assessing whether the proposed wasteload allocations will achieve the average and minimum D.O. criteria. Although the stated purpose for creating the model is to show compliance with the D.O. criteria, the Draft TMDL does not present an assessment of D.O. criteria compliance under the proposed wasteload allocations for TP. Moreover, data presented in supporting documents with the Draft TMDL suggest that the river is not impaired for D.O., making this entire analysis unnecessary. Finally, as noted above, the TP endpoint used in the model is not appropriate and a demonstration has not been made linking the TP endpoint to compliance with the applicable water quality standards for aquatic life uses. These fundamental flaws make the model incapable of reasonably representing the Ottawa River and, for this reason, the model cannot be used to derive wasteload allocations for this Draft TMDL.

Comment (LS)
2. QUAL2K Modeling Obviously Incorrect/Deficient
a. Background on QUAL2K Model Application
The QUAL2K model is a water quality simulation program that is typically used to assess compliance with the dissolved oxygen water quality standard. QUAL2K is a steady-state model that can be used to evaluate the effects of eutrophication at steady-state conditions. Justification for the use of the QUAL2K model is presented in the draft TMDL at Section 4.2 of the report (at 44, et seq.).

> QUAL2K is a one-dimensional, steady-state model that is used to simulate dissolved oxygen (DO), carbonaceous biological oxygen demand (CBOD), algae as chlorophyll-a, organic and inorganic phosphorus, and the nitrogen series.
>
> QUAL2K is an in-stream kinetics water quality model that allows more exact representation of the processes that affect water quality. Once calibrated and validated the model can be used to simulate critical stream conditions and compare strategies for remediation.
>
> The strengths and weaknesses of QUAL2K also help to justify the use of the model in this scenario. QUAL2K explicitly grows algae, which are grown based on the availability of resources they need with nutrients being one of the major resources. This allows the nutrients to become dynamic in the system which allows for nutrient loading to be looked at not only as a mass balance, but also as from the standpoint of how the system responds to nutrient inputs. One weakness of QUAL2K is the inability to represent nonpoint source loads that are more important when stream flow is not dominated by point sources. The critical condition limits the exposure to the limitation because it is a time when point sources dominate the flow. However residual impacts from sources occurring outside of the critical condition are not fully accounted for.

(Draft TMDL at 44 – 46) (Emphasis added)

In this particular instance, the model was used to simulate instream TP concentrations under drought flow conditions in order to establish wasteload allocations for PCS and three additional point source dischargers. The reason for conducting the evaluation under drought flow conditions was discussed in Appendix D to the draft TMDL.

> The critical flow condition is dictated by the cause of impairment that is being modeled. According to Ohio Administrative Code 3745-2-05, if the cause of impairment is an average water quality criterion, in this instance dissolved oxygen, 7Q10 flows should be used for modeling and wasteload allocations (WLAs). The 7Q10 flow is the flow regime representing the annual minimum 7 day average flow on a 10 year recurrence interval (Straub 1997). In this instance the final WLA is for total phosphorus because it is identified as the limiting nutrient for algal growth and associated eutrophication impacts.

(Draft TMDL Appendix D at D-31)

According to this rationale, the cause of impairment is dissolved oxygen. The conceptual model for eutrophication, simulated by the program, is well known. Nutrients stimulate plant growth (particularly, benthic algae (i.e., periphyton) in flowing streams). As plant growth increases to excessive levels, the photosynthesis-respiration cycle amplifies the diurnal dissolved oxygen swing (peak D.O. observed in the late afternoon in response to prolonged exposure to sunlight; minimum D.O. observed prior to dawn in response to respiration). This diurnal swing is superimposed on the average D.O. resulting from the other sources and sinks influencing the response (algal decay, BOD, SOD, re-aeration, etc.).

For use of the QUAL2K model in this TMDL to be scientifically defensible, the model must be able to simulate the growth of aquatic plants (phytoplankton, periphyton) under critical conditions and predict the influence of those aquatic plants on D.O. in the river. See O.A.C., § 3745-2-11(A).

b. Modeling Deficiencies Make TMDL Unsupportable

i. Steady-State Model Inappropriate for Evaluating Eutrophication in Ottawa River

The primary causal variable addressed in the TMDL is phosphorus, because phosphorus is considered to control the degree of enrichment or excessive algal growth. However, algal growth is dynamic and it is not appropriate to develop a nutrient TMDL using a steady-state model to predict the standing crop of periphyton under low flow conditions. Assuming, *arguendo*, that the TP endpoint is appropriate to limit periphyton growth, this TMDL might at best ensure compliance with the D.O. water quality standard for drought conditions during the growing season. But it does not address use attainment for the remaining portion of the growing season.

Under typical growing season conditions, phosphorus from agricultural field runoff and other non-point sources will likely be sufficient to stimulate periphyton growth to the levels that can cause exceedances of the minimum dissolved oxygen water quality standard. Under lower flow conditions, the periphyton community that formed in response to typical conditions does not simply disappear but remains in place to potentially cause D.O. impairments under low flow conditions. The QUAL2K model cannot simulate the growth of periphyton in response to periodic non-point source loads of phosphorus as acknowledged in the TMDL. Consequently, it is unlikely that the TMDL based on low flow, steady-state modeling will mitigate any of the D.O. impairments that currently exist, as alluded to in the Draft TMDL.

> Nutrient impairments that manifest as effects on the aquatic community are exacerbated by times of low flow where sunlight and temperatures are also not limiting. These conditions are associated with summer months when precipitation is typically the lowest, temperatures are the highest and daylight is the longest. These are the times that algae is least likely to be limited by anything other than nutrient availability. The result is the ability to reduce stress on aquatic communities by restricting algal growth by limiting nutrients. <u>In systems where high nutrient inputs are not associated with these critical conditions there is still a link to aquatic life communities. Nutrients that are assimilated to the system during flow regimes outside of the critical condition can be released during the critical condition creating an internal nutrient source.</u> This is especially true with phosphorus which often enters waters bound to sediment that can accumulate on the streambed.

(Draft TMDL Appendix D at D-7) (Emphasis added)

Alternatively, if the TP endpoint does not limit plant growth, the QUAL2K model could simulate the periphyton level that would develop in response to the ambient TP concentration and use of this model might be appropriate. However, if plant growth is not limited at the TP endpoint, the D.O. standard cannot be achieved and the draft TMDL wasteload allocations for TP cannot assure restoration of designated uses.

Compliance with the D.O. criteria by TP control can only be assessed by considering the entire growing season to ensure that algal growth is sufficiently controlled when low-flow conditions occur. This can only be assessed using a hydrodynamic model that simulates changing flow conditions as well as water quality leading up to low flow conditions. The QUAL2K model does not do this. As a consequence, this modeling tool is not appropriate for evaluating cultural eutrophication in the Ottawa River. Therefore, this TMDL cannot provide any reasonable assurance that aquatic life uses or D.O. criteria will be achieved when the TP wasteload allocations are implemented.

ii. Low-flow Critical Condition Inappropriate for Nutrient TMDL

The QUAL2K model was developed to establish wasteload allocations necessary to restore designated uses at the 7Q10 flow, noting that nutrients are most likely to cause impairment during low flow conditions. (See, Draft TMDL Appendix D at D-30) This notation regarding nutrients is not correct. Phosphorus is not a toxic parameter at the ambient concentrations evaluated in this TMDL. The adverse effects attributed to phosphorus occur when aquatic plant growth reaches excessive amounts. This process, the growth of aquatic plants to an excessive level, does not occur over a period of seven days associated with the low flow condition. Rather, it is a process that is ongoing and is more appropriately evaluated under hydrodynamically varying flow conditions.

Low flow is the critical condition for D.O. criteria compliance when organic decay is the primary driver because the 7-day low flow period is sufficient to develop a D.O. sag in response to low flow conditions. The effect of algal respiration is superimposed on the resulting D.O. sag. However, the range in diel D.O. concentration around the sag depends upon the amount of periphyton chlorophyll-a present. Periphyton growth does not become excessive in response to low flow conditions but is a complicated function related to factors such as nutrient concentration, current velocity, light availability, predation, and accrual time since the last scouring event. As such, the critical period for periphyton accumulation may not coincide with drought flow conditions. Consequently, a dynamic model is required to assess periphyton growth and the effect of this growth on diel D.O.

iii. Model Calibration
Even if it was appropriate to use a low flow, steady-state model to evaluate eutrophication-related impairments in the Ottawa River, the QUAL2K model was not appropriately calibrated to support its use in the TMDL. The model was specifically selected because of its ability to predict algal growth, but it is not calibrated to aquatic plant growth, as acknowledged in the TMDL.

> The model is predicting algae values in the correct range but error is still easily discernible in many places. Potential sources of this error are more linked with the error in the collection of the data. Algae data change readily from day to day and even throughout the day. The result is that algae samples do not always represent the environmental condition precisely. However the field data did represent a condition where the relative abundance of the different types of algae varies between sections. In the upstream section of the river the phytoplankton dominate due to mostly pooled and sluggish conditions that are observed. Once the major point sources discharge the streamflow increases dramatically and the lowhead dams that cause the pooled conditions cease; as a result the stream tends to grow more benthic algae compared to phytoplankton.
>
> Because of the weaknesses of calibrating to direct indicators of primary productions (algae abundance) dissolved oxygen becomes very important. Dissolved oxygen is heavily impacted by primary production and as a result can be used to determine when algae growth rates are at a proper level. The final adjustments to rates affecting algae were made based on the influence on dissolved oxygen concentrations in the system. The dissolved oxygen model had a very good fit with observed data which is amongst the most robust of the field data collected as observations are recorded hourly for 24 hours.

(Draft TMDL Appendix D at D-22, 23)

The benthic algae and phytoplankton calibration plot (Figure D-11 in the Draft TMDL Appendix D at D-22, presented below) shows that the model does not properly predict periphyton or phytoplankton in Segment 2 (effluent dominated portion of the river) and no algal growth data were reported with the validation data set (July 13, 2011).

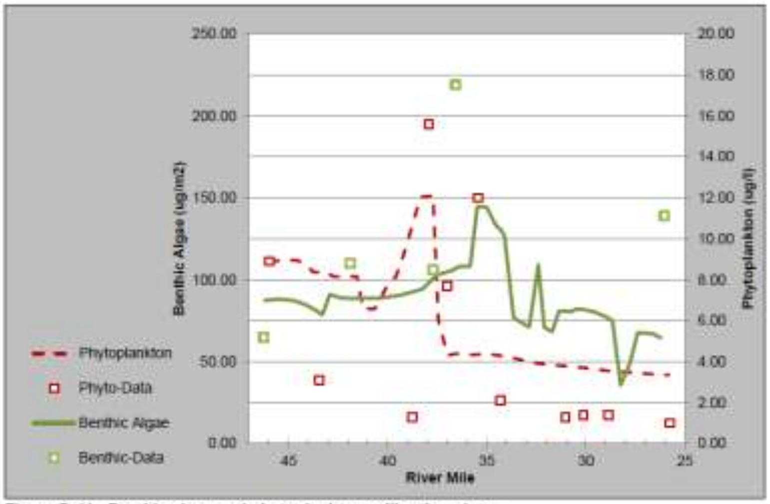

Figure D-11. Benthic algae and phytoplankton calibration plots.

The TMDL report suggests that this lack of calibration for algal growth can be overcome by calibrating the model to dissolved oxygen. This approach is not scientifically defensible. The model cannot properly represent the impact of primary production on diurnal D.O. variation in the river if the plant growth is not properly calibrated. An inspection of Figure D-11 confirms that the model does not remotely predict benthic algae levels below river mile 37, where D.O. criteria excursions are predicted to occur. Consequently, the impact of these algae on D.O. cannot be assessed properly. The model greatly under-predicts the amount of periphyton growth. To compensate for this, the model must over-estimate the effect of the predicted algal biomass on diurnal D.O. in the river to calibrate with the D.O. data. As a consequence, the model does not present an accurate representation of conditions in the river and it cannot reliably predict D.O. conditions under reduced TP loads. As a consequence of these deficiencies, use of this model for establishing load and wasteload allocations in the TMDL is arbitrary and capricious and is not in compliance with law. See O.A.C., § 3745-2-11(A).

Model calibration for controlling the effects of eutrophication generally requires a demonstration that aquatic plant life responds to varying concentrations of nutrients such that a reduction in nutrient concentration results in a reduction in algae. No evaluation is presented to assess the reduction in TP necessary to reduce plant growth. In fact, the calibration and validation data correspond to conditions where plant growth is unlimited by TP. The calibration and verification data sets for ambient TP concentrations in Segment 2 range from 0.25 – 0.35 mg/L. These concentrations are greatly in excess of the TP concentration expected to limit plant growth, as acknowledged in the Supporting Document.

> The lack of association between TP and biotic index scores in larger streams and rivers may be because TP is present in concentrations saturating to algal growth (i.e., not limiting), given the high background concentrations (>0.1 mg/L, Appendix Table 1; Figure 13).

(Supporting Document at 26-27)

However, the model is supposedly being used to set a TP concentration where algal growth is sufficiently limited so that diurnal D.O. swings do not cause an exceedances of the minimum D.O. criterion. There are no data relating periphyton growth to TP concentration and there is no discussion in the TMDL explaining how OEPA determined that periphyton growth would be limited at TP concentrations approaching 0.1 mg/L. Consequently, the algal growth response to reduced levels of TP cannot be verified with these data. Without this calibration, the necessary linkage between TP and algal growth, and algal growth and diurnal D.O. variation cannot be authenticated and there is no assurance that the model provides a reasonable representation of the Ottawa River. It is therefore arbitrary and capricious for OEPA to rely on this model in the establishment of the TP TMDL.

Also, contrary to the statement regarding the goodness of fit between the dissolved oxygen data and the model projections, the model does not accurately predict the dissolved oxygen sag in the river for the calibration period. (See, Figure D-12 in the Draft TMDL Appendix D at D-23).

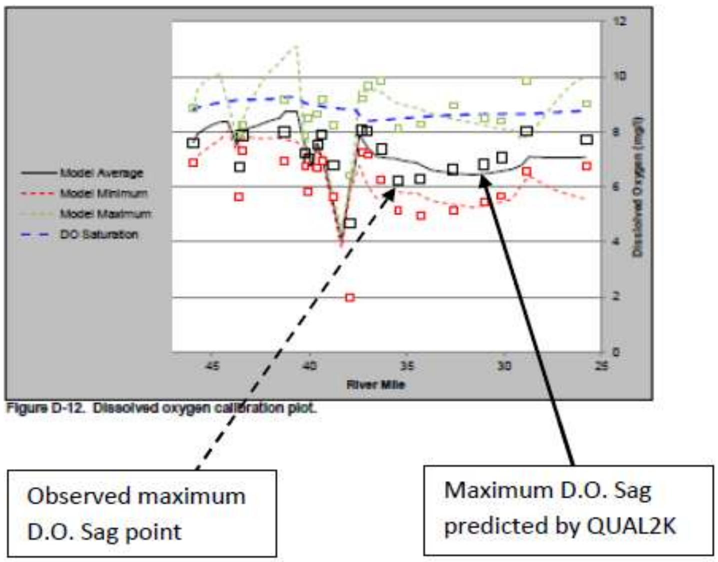

Figure D-12. Dissolved oxygen calibration plot.

v. TP Endpoint Incapable of Reducing Algal Growth

The final wasteload allocations were established to target an instream TP concentration not to exceed 0.1 mg/L. The use of the QUAL2K model in this TMDL appears to be limited to assessing compliance with the TP endpoint of 0.1 mg/L (e.g., See, Figure D-30 from the Draft TMDL Appendix D at D-54). Figure D-30 from Appendix D (at D-54) shows that instream TP concentrations in Segment 2 range from about 0.09 – 0.10 mg/L under the TMDL scenario. As noted previously (Supporting Document at 26-27), these concentrations of TP are not expected to limit algal growth. Consequently, the TMDL scenario will not result in D.O. concentrations significantly different than the conditions that currently exist.

Benthic algae (periphyton) are expected to be the dominant form of algal growth influencing diurnal D.O. swings in Segment 2 of the river. Walter Dodds, a recognized expert in periphyton growth has noted that "Attached algae might be able to attain impressive biomass in nutrient-poor water because periphyton can use the small amounts of nutrients that continuously flow by." (Walter K. Dodds. 2006. "Eutrophication and trophic state in rivers and streams." Limnol. Oceanogr. 51(1, part 2) p 671 – 680, at 677). Nutrient poor waters typically have phosphorus concentrations below 0.01 mg/L. If nutrient poor waters sustain periphyton growth, the TP endpoint used in this TMDL will be incapable of reducing plant growth, making the TMDL unnecessary.

The USEPA attempted to develop TP endpoints for use in several TMDLs in Pennsylvania.[10] The report documenting the endpoint development included assessments of periphyton growth in relationship to TP concentration, noting that full periphyton growth potential can be achieved at levels of TP significantly lower than the 0.1 mg/L threshold used by OEPA.

> The samples with the highest algal biomass were collected by the PADEP -Pennsylvania State University periphyton study, which focused on the targeted watersheds. Surprisingly, the highest algal biomass occurred at sites where TP concentrations were relatively low (14–35 μg/L). It is possible that algal growth has been saturated even at this low level.

(Paul and Zheng (2007) at 16)

> In natural, shaded streams [such as those evaluated in the Dodds et al. (2002) model], it is difficult to assess the full growth potential of algae. Algal growth potential has been evaluated using artificial stream channels that are fully exposed to nutrient and light gradients. Previous studies (Horner et al. 1983, Bothwell 1989) demonstrated that in artificial streams, algal growth could be saturated (i.e., achieved maximum growth rate) at 25–50 μg/l phosphorus.

(Paul and Zheng (2007) at 22-23).

These observations are supported by several recent nutrient TMDLs. EPA prepared a nutrient TMDL for Wissahickon Creek in Pennsylvania in 2003 to address D.O. impairments. The Wissahickon Creek is an effluent dominated stream (98% effluent under 7Q10 flow conditions) like the Ottawa River. This TMDL was the subject of a scientific paper in the Journal of Environmental Engineering in 2006.[11] This paper, coauthored by Tetra Tech and EPA, concluded that nutrient (TP) control to address periphyton growth was infeasible due to the low concentrations of TP capable of supporting plant growth.

> [W]hile periphyton activities were identified as one of the major causes of the DO violation, it was finally determined to be <u>infeasible to control the periphyton through reducing nutrient load from point sources</u>. Several model sensitivity runs show that the phosphorus concentration from the dischargers need to be reduced by almost 99% before we can impose a significant limiting effect on periphyton growth. This is because under critical low flow conditions, the discharge flows account for more than 98% of the total flow in the channel, resulting in no dilution condition in the stream. At the same time, periphyton only needs very low concentration of phosphorus to support its growth.

(Zou et. al., 2006 at 564 (emphasis added)).

Another nutrient TMDL was prepared by EPA for the Jackson River, Virginia. This TMDL also identified phosphorus as the primary stressor causing impairment of aquatic life uses due to excessive periphyton growth and D.O. criteria excursions. This TMDL was implemented through a cooperative agreement with the single, primary point source discharger. Following implementation of phosphorus reductions at the point source, water quality monitoring was conducted to assess periphyton growth. The results are illustrated in Figure 1. These results show that, although the instream concentration of total dissolved phosphorus decreased from

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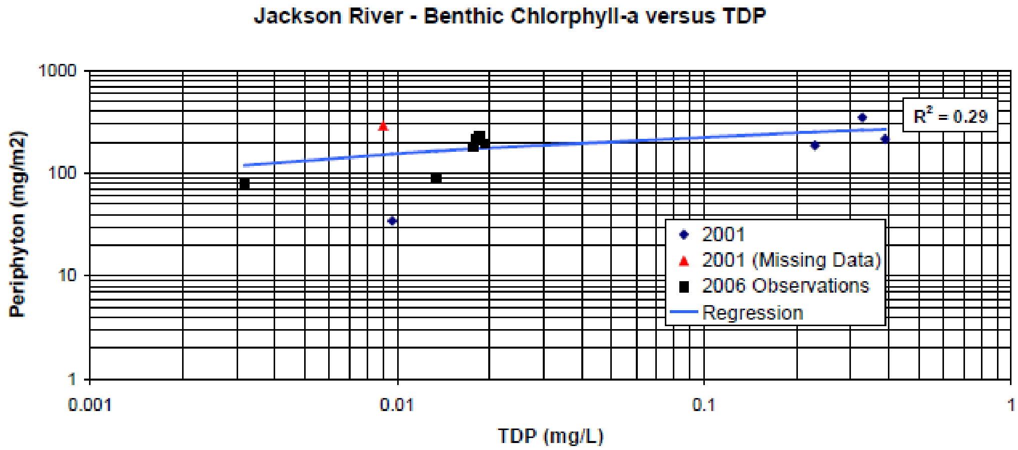
[10] Michael J. Paul and Lei Zheng. November 20, 2007. Development of Nutrient Endpoints for the Northern Piedmont Ecoregion of Pennsylvania: TMDL Application.

[11] Zou, R., S. Carter, L. Shoemaker, A. Parker, and T. Henry. April 2006. Integrated Hydrodynamic and Water Quality Modeling System to Support Nutrient Total Maximum Daily Load Development for Wissahickon Creek, Pennsylvania. J. Env. Eng. April 2006. 555 – 566.

about 0.3 mg/L to less than 0.02 mg/L, there was no change in the seasonal average periphyton growth in the river below the outfall, with periphyton chlorophyll-a averaging 200 mg/m^2.

Figure 1. Regression Analysis for Seasonal Average 2001, 2006 Jackson River Data



Subsequently, EPA[12] determined that periphyton reduction cannot be achieved by nutrient reduction. An alternative management plan is being considered to periodically scour the river using dam releases to achieve the target periphyton concentration in the river.

> The results of the modeling indicate that the selected PO4-P endpoint of 0.038 mg/L and the corresponding chlorophyll a target of 100 mg/m2 cannot be reached in the Jackson River with nutrient reductions alone. This is due to the fact that the Jackson River is not a free flowing river, and also due to the fact that MeadWestvaco, the main nutrient contributor to the Jackson River, has reached its limits of technology in terms of phosphorus reductions. The remaining option that will help the Jackson River achieve the TMDL endpoints and a healthy, balanced biologic community is to mimic the natural hydrology and flows that existed before the operation of the Gathright Dam.

(Decision Rationale at 6)

These literature studies and TMDLs indicate that stringent TP controls as proposed in the Draft TMDL are not appropriate or justifiable to limit periphyton growth. Therefore, the proposed TP TMDL is not necessary and is unlawful and must be withdrawn.

c. Summary

In order to determine if the discharge of phosphorus is responsible for exceedances of the D.O. water quality standard in the Ottawa River near Lima due to excessive plant growth, as indicated in the draft TMDL and supporting documents, OEPA must use a model capable of simulating plant growth throughout the growing season to confirm that algal growth causes minimum D.O. criterion excursions. The analysis presented in the TMDL is deficient because the QUAL2K model does not account for the factors that influence periphyton growth (e.g. antecedent phosphorus concentration, accrual time). The QUAL2K model used for the TMDL cannot predict the level of plant growth observed in the river under existing conditions.

[12] Decision Rationale. Total Maximum Daily Load. Dissolved Oxygen and Aquatic Life Use (Benthic) Impairments in the Jackson River. Alleghany, Bath, Craig and Highland Counties, Virginia. USEPA Region III. July 21, 2010. http://www.epa.gov/waters/tmdldocs/38981_JacksonRiveDR.pdf.

Consequently, the overall calibration to D.O. is unreliable and there is no confidence that the TMDL D.O. projections (if provided) reasonably represent water quality conditions in the Ottawa River. Additionally, there does not appear to be a basis to conclude that the Watershed is in non-attainment of the applicable D.O. water quality standard, negating the need for the TP TMDL. Moreover, for the TMDL to provide reasonable assurance that TP control will achieve compliance with the D.O. criterion, the overall load of TP entering the river must reduce periphyton growth to acceptable levels. However, all of the available data on the influence of TP on periphyton growth indicate that establishing a stringent TP endpoint as this Draft TMDL has done is not a reasonable and justifiable approach to addressing the non-attainment of water quality standards set forth in the Draft TMDL. Even if the point source loads were zeroed out, it is likely that nutrient loads from the upstream agricultural drainage are sufficient to support unlimited plant growth. The TMDL did not evaluate this probability nor did it assess the level of periphyton required to ensure compliance. As a consequence, there is no reasonable assurance that implementation of the TP TMDL will restore aquatic life uses in the Ottawa River. Given these significant deficiencies, the draft Ottawa River Watershed TMDL is not reasonable or lawful and must be withdrawn.

Comment (DS)
Reference Page 80 & 81 of the Draft Report – Recommended permit conditions for phosphorus limits the Lima Refining Company:
It is noted that several other Permit holders have higher proposed phosphorus concentration allocations than the Lima Refinery. The Report should provide a more detailed explanation of this inconsistency.

Comment (DS)
"Lima Refining Company endorses the comments submitted on behalf of Potash Corp., including those to the effect that:

- The QUAL2K model is not properly applied to TP. The claimed mechanism is that TP leads to algal growth, causing a reduction in DO. However, the report does not indicate any calibration and verification of this assumption at the TP levels encountered in the effluent dominated portion of the stream, nor at the endpoint of 0.1 mg/l targeted by the TMDL. In any event, a TP endpoint at 0.1 mg/l is not capable of reducing algae as claimed, and as a result the proposed TP endpoint would have no effect on DO.
- TP effects on plant growth are not related to toxicity, but rather to growth effects over longer periods of time, so that TP should be evaluated not at 7Q10 critical low flow conditions, but rather at average flow. As a result, proposed limitations on TP are improperly calculated at a level much more restrictive than required.

Comment (DS)
Reference Page 44 of the Draft Report – quote "These conditions are associated with summer months when precipitation is typically lowest, temperatures are highest, and daylight is the longest."
Precipitation is generally higher during summer months and tends to drop off in late summer and fall, based on weather records. Reference: Intellicast - Weather Service International – Charts showing historic average daily and monthly precipitation rates for Lima, Ohio (http://www.intellicast.com/Local/History.aspx?location=USOH0510).

Comment (RD)
Nonpoint source (NPS) pollution appears to be grossly under-represented within the TMDL waste load allocations (WLA). The one and only reference to NPS in regard to a WLA was

with the Total Phosphorus TMDL in Table 5-7 where it only accounts for 0.287% of the TMDL in the modeled stream stretch.

Comment (SS)
Comment 1.8 Ohio EPA did not adequately address the appropriate permit limits and the City will incur significant expenses to comply with monthly limits.
The Report proposes a monthly average phosphorus limit for the publicly owned treatment works (POTWs) (page 80). Ohio EPA chose to calculate the TMDL using a very conservative seven-day, 10-year low flow condition without demonstrating how this flow condition relates to excessive algal growth in the river. The fact is that seasonal or annual average loads are more appropriate and are more consistent with how algae and other aquatic life respond to nutrient stressors. Further, Ohio EPA failed to evaluate the impact of phosphorus loads from POTWs during wet weather. The impact of POTWs and other municipal discharges (such as CSOs and stormwater) during wet weather are likely negligible in light of the loading from other sources across all flow regimes.

Comment (SS)
Comment 1.10 The modeling process used in the Draft TMDL Report is incomplete.
As articulated by U.S. EPA (2009), the modeling process should include an evaluation phase. Model evaluation seeks to describe the quality of the model application. Understanding the quality of the model is important to determine if the application is sufficient to inform or justify a regulatory decision. Two components of the model evaluation phase are missing from the Ottawa River analysis as reported by the TMDL. These two components include sensitivity and uncertainty analyses. In combination, these analyses quantify the probability that pollution control or restoration measures will result in beneficial use attainment. Particularly given the substantial capital expenditures Lima will need to expend to comply with just the treatment plant draft allocations, the TMDL needs to include a robust model evaluation. Such a revision would also support a more quantitative approach to clean water decision-making in the watershed.

Several key model assumptions are weakly supported or unclear. Below are a number of issues where additional clarity or revision is needed.

- Total phosphorus has not been demonstrated to be an accurate and reliable surrogate for organic enrichment in the Ottawa River. The TMDL process is a site-specific endeavor. Therefore, models (such as the QUAL2K used in this TMDL) applied to the waters in question should be used to determine if total phosphorus is an accurate and reliable surrogate for organic enrichment. The QUAL2K model is fully capable of evaluating the surrogate approach via statistical comparisons between simulated total phosphorus, water column organic matter (OM), OM flux to the streambed, carbon pools, and nitrogen pools, but this was not done. Such a comparison is a key sensitivity evaluation that should be completed prior to any consideration of a pollutant surrogate approach. Further, we question the need for a surrogate when QUAL2K and other contemporary models directly simulate organic enrichment. Use of a surrogate adds unnecessary uncertainty to an already problematic and complicated TMDL.
- A key component (detritus) in the simulation of nutrient cycling and organic matter appears to be insufficiently considered by Ohio EPA in the QUAL2K model. In QUAL2K nomenclature, detritus represents particulate non-living organic matter. Our review of the available modeling files suggests that Ohio EPA did not calibrate to detritus data. Justification of this approach could not be found in Appendix D, which is surprising given that: (1) organic enrichment is listed as a cause of impairment, and (2) sediment oxygen demand is a function of detrital loads. In addition, it appears that Ohio EPA assumed that

point sources discharged zero detritus, which is a weak assumption for all but the most treated or mineral effluents.

- It is not clear why effluents from some permitted facilities are assumed to contain significant concentrations of phytoplankton (suspended algae). For example, the calibration file provided by Ohio EPA indicates that the Lima Refinery and PCS Nitrogen both discharge 30 micrograms per liter (µg/L) phytoplankton (as chlorophyll-a). In our review of Appendix D, we could not find rationale or data supporting this rather unique assumption. This assumption should be justified with data or the model should be recalibrated.

The model calibration was deficient. Even with the limitations associated with the current data, the model calibration should have been more robust. In addition, the TMDL should also have addressed the following:

- It appears that some model rates were modified in the validation run. These rates include but are not limited to: phytoplankton growth rate, phytoplankton respiration rate, and benthic algae respiration rate. This is not normal practice and no justification is provided.
- The heat budget calibration needs to be improved. Errors associated with the calibration of temperature will affect the rates of change of many key model parameters.
- In addition to detritus calibration, Ohio EPA should improve goodness-of-fit for several key model constituents. These constituents include biochemical oxygen demand (BOD), conductivity, pH, and daily minimum dissolved oxygen.
- It is not clear in the TMDL how well the model predicts dissolved oxygen throughout the diel cycle. Ohio EPA should have compared continuous sonde data to diel predictions. Such a comparison would assess the reasonableness of reaeration estimates. This would likely also improve the ability of the model to capture minimum dissolved oxygen and the difference between the daily minimum and maximum.
- Bottom algae (*e.g.*, periphyton, benthic algae) data are included in the model calibration run but appear to be absent in the validation run. Given the shallowness of the Ottawa River at low-flow, it is likely that periphyton dynamics significantly influence the dissolved oxygen regime. Accordingly, the TMDL should have corroborated periphyton parameterization with a second set of data.

Comment (SS)
Comment 2.3 The TMDL lacks quantification of nonpoint source nutrient loads from agriculture or other land uses. This creates two major problems. First, it makes it impossible to determine, with any reasonable assurance, that meeting the point source load reductions will result in improvements in water quality or that the wasteload and aggregate load allocations can be achieved. Second, it makes it impossible to evaluate the potential impact of nutrient loads from nonpoint sources on an annual average or seasonally averaged basis. It is the average total (point and non-point) nutrient loads (not the nutrient loads during low flow conditions) that are likely to cause excessive algal growth in the Ottawa River.

Comment (SS)
Comment 2.8 As discussed in Section Four, the fact is that the QUAL2K model and analyses applied in these TMDLs are premature and insufficient for the complexity of the problem that the TMDLs are trying to address. The TMDL should not be finalized until these issues are adequately resolved.

a. The QUAL2K model, if properly calibrated, could determine if there is in fact a direct linkage between phosphorus and organic enrichment, which is listed as a significant impairment, but this essential analysis was not performed by Ohio EPA.

b. The modeling process is incomplete due to a lack of sensitivity and uncertainty analyses. As described in Section Four, several key model assumptions are weakly supported or unclear. Further, the model calibration and verification is inadequate.

Comment (SS)
Comment 2.12 Additional explanation/presentation of data used to calibrate/verify models in the TMDL is needed. It is not possible to conclude that the QUAL2K model is adequately calibrated.

Comment (SS)
Comment 4.1 The technical approach used by Ohio EPA is insufficient to account for and address the complexity of the Ottawa River issues.
The models and analyses *as applied* in these TMDLs are not rigorous enough to link impairments presumed by Ohio EPA to the source(s) or cause(s) of impairments. As a result, the wasteload and load allocations are not necessary or sufficient to remove those impairments. For example:

- The TMDL acknowledges that wet weather phenomena such as combined sewer overflow (CSO) discharges may contribute organic enrichment and be expressed during low-flow conditions as residual sediment oxygen demand. However, CSOs and other flow-variable phenomena are not modeled or accounted for in the QUAL2K model (i.e., no quantitative linkage).
- Ohio EPA contends that low-head dams exacerbate the impacts of nutrient enrichment and that removal of such dams will improve water quality. Ohio EPA did not adequately demonstrate this with the documentation that was provided. For example, the model files provided by Ohio EPA do not sufficiently demonstrate that improvements in Ottawa River water quality can be attributed to dam removal alone. In regards to dam removal, Ohio EPA did not show how accumulated phosphorus within trapped sediments is accounted for in Phase 1, 2, and 3 model runs. That is, the representation of dam removal appears to be limited to changes in reach hydrogeometry, and does not consider changes that may occur in background phosphorus flux, percent coverage of sediment oxygen demand, and channel slope (an important parameter for the selected reaeration equation).

Ohio EPA has not adequately addressed these concerns in the TMDL by, for example, running additional model scenario runs with QUAL2K. Also, the other problems identified in these comments indicate that Ohio EPA needs to utilize a different model to capture important time and flow variable processes. The Water Quality Analysis Simulation Program (WASP), among others, is a model capable of addressing many of the complexities identified in these TMDLs.

Comment (SS)
Comment 4.2 The modeling process is incomplete, which invalidates the TMDL.
As described by US EPA (2009), the modeling process needs to include an evaluation phase. Model evaluation seeks to describe the quality of the model application. Understanding the quality of the model is important to determine whether the application is sufficient to inform or justify a regulatory decision. Two components of the model evaluation phase are missing from the Ottawa River analysis as reported by the TMDL. These two components include sensitivity and uncertainty analyses. In combination, these analyses quantify the probability that pollution control or restoration measures will result in beneficial use attainment. Given the substantial capital expenditures needed to comply with the draft allocations, the TMDL needs to include a robust model evaluation. Such a revision will support a more quantitative approach to clean water decision-making in the watershed. In the absence of such evaluation, Ohio EPA is not

following an appropriate modeling process, and the wasteload and load allocations resulting from the TMDL cannot be justified.

Comment (SS)
Comment 4.3 Several key model assumptions are weakly supported or unclear, further invalidating the TMDL.
Some of these concerns are listed below, along with a brief description. The list of problems is not exhaustive, but does demonstrate the need for TMDL revisions to provide clarity and to ensure that all assumptions are supported in a manner that is consistent with the use of models for regulatory decision-making[13]. For example:

- Total phosphorus has not been demonstrated to be an accurate and reliable surrogate for organic enrichment in the Ottawa River. The TMDL process is a site-specific endeavor. Therefore, models (i.e., QUAL2K) applied to the waters in question should be used to determine whether total phosphorus is an accurate and reliable surrogate for organic enrichment. The QUAL2K model is fully capable of evaluating the surrogate approach via statistical comparisons between simulated total phosphorus, water column organic matter (OM), OM flux to the streambed, carbon pools, and nitrogen pools, but these analyses were not performed. Such a comparison is a key sensitivity evaluation that should be completed prior to any consideration of a pollutant surrogate approach. Further, we question the need for a surrogate when QUAL2K and other contemporary models directly simulate organic enrichment. The TMDL should be revised to either directly simulate organic enrichment or to evaluate the accuracy and reliability of total phosphorus as a surrogate for organic enrichment. Until such revisions are made, the wasteload and load allocations resulting from the TMDL cannot be justified.
- A key component (detritus) in the simulation of nutrient cycling and organic matter is insufficiently considered by Ohio EPA in the QUAL2K model. Ohio EPA did not demonstrate that it calibrated the model to detritus data. This is problematic given that: (1) organic enrichment is listed as a cause of impairment, and (2) sediment oxygen demand is a function of detrital loads. In addition, it appears that Ohio EPA assumed that point sources discharged zero detritus, which is a poor assumption for all but the most treated or mineral effluents. The TMDL should be revised to fully account for the effect of detritus and to calibrate to detritus data. Until such revisions are made, there is no assurance that the wasteload and load allocations are justified.
- Based on the modeling files, Ohio EPA assumed that effluents from some permitted facilities contained significant concentrations of phytoplankton (suspended algae). For example, the calibration file provided by Ohio EPA indicates that the Lima Refinery and PCS Nitrogen both discharge 30 micrograms per liter (µg/L) phytoplankton (as chlorophyll-a). Ohio EPA failed to present a rationale or data supporting this relatively unique assumption. This assumption should be justified with data or the model should be recalibrated. Otherwise, the wasteload and load allocations resulting from the TMDL may be inaccurate.

Comment (SS)
Comment 4.4 The model was not sufficiently calibrated.
Even with the limitations associated with the current data, the TMDL should be revised to incorporate improved model calibration. In addition to addressing the issues identified above, Ohio EPA should address (for example):

[13] For an example of guidance on development of models for regulatory decision-making, see EPA. 2009. “Guidance on the Development, Evaluation, and Application of Environmental Models.” EPA/100/K-09/003.

- Some important model rates were modified in the validation run. These rates include but are not limited to: phytoplankton growth rate, phytoplankton respiration rate, and benthic algae respiration rate. This is not a normal practice and no justification is provided. The TMDL should be revised to reflect unmodified model rates.
- Deficiencies in the heat budget calibration should be fixed and then the model should be re-calibrated. Errors associated with the calibration of temperature will affect the rates of change of many key model parameters.
- In addition to detritus calibration, Ohio EPA needs to address the lack of goodness-of-fit for several key model constituents. These constituents include carbonaceous biochemical oxygen demand (CBOD), conductivity, pH, and daily minimum dissolved oxygen.
- The TMDL does not adequately address how the model predicts dissolved oxygen throughout the diel (24-hour) cycle. The TMDL should be revised after Ohio EPA compares continuous sonde data to diel predictions. Such a comparison would assess the reasonableness of reaeration estimates. This would likely also improve the ability of the model to capture minimum dissolved oxygen and the difference between the daily minimum and maximum.
- Periphyton (*i.e.*, bottom algae) data are included in the model calibration run but are absent in the validation run. Given the shallowness of the Ottawa River at low-flow, it is likely that periphyton dynamics significantly influence the dissolved oxygen regime. We do not understand why Ohio EPA did not corroborate periphyton parameterization with a second set of data. Ohio EPA should revise the TMDL to accurately account for the effects of periphyton on dissolved oxygen in the Ottawa River, and should include those data during model validation.

References

US Environmental Protection Agency (US EPA), 2009. Guidance on the Development, Evaluation, and Application of Environmental Models. EPA/100/K-09/003. Office of the Science Advisor, Council for Regulatory Environmental Modeling, Washington, DC. 99 pp.

Response: Ohio EPA weighs many factors in choosing what model to apply for each project, and plans for collecting data suitable for the modeling approach chosen. The QUAL2K model is supported by U.S. EPA for cases of impairment in situations similar to the conditions observed in the Ottawa River. After this project was completed, the Water Environment Research Foundation (WERF) developed the nutrient model selection tool (WERF 2013) to aid in selecting an appropriate water quality model for modeling nutrients and setting nutrient goals. This model selection tool also indicates that the QUAL2K model is appropriate for the Ottawa River project.

Eutrophication effects are manifest at low flow, and sustained by continual inputs of phosphorus by point sources; therefore, modeling at the low flow condition is appropriate.

Ohio EPA concedes that the QUAL2K model for the Ottawa River at Lima could be more robust, as can any model. Indeed, this is why the implementation plan in the draft TMDL incorporates a step-wise adaptive implementation approach that begins with the obvious need for CSO controls and allows for further study and refinement. The TMDL has been clarified to indicate that numeric permit limits for phosphorus for the major Lima dischargers (in the QUAL2K model area) will not be lowered until an enhanced model and subsequent TMDL is developed (including an opportunity for public comment). Ohio EPA expects that a new model would be developed after Ohio EPA revisits the Ottawa to measure the stream condition following CSO improvements, as laid out in the Chapter 6 of the final TMDL.

The biological performance (mostly attainment upstream from Lima with some non-attainment) with documented concentrations from survey work and follow-up modeling gives a reason to believe that use support is probable. If, for instance, the 4R program (IPNI, 2012) results in reductions of nonpoint source loads and there are point source improvements, then there is a very good future for improvement and more biological attainment than in 2010. Sometimes improvement has been incremental. The improvements in the Ottawa River from the 1990-1991, to 1996 and to the 2010 surveys provide a good example of this incremental progress.

F2.2 Load Duration Curves

Comment (DS)
Reference Tables 5-17 and 5-22 – *E. coli* TMDL tables
These and other tables in the Draft Report attempt to set TMDLs for *E. coli* based on samples taken at differing water levels in the river. However, many of these tables, in particular Tables 5-17 and 5-22, propose to set a TMDL for high flow and for dry weather flows without showing or referencing any data on which to base the conclusion. All TMDLs in the Report should include references to samples taken at each flow rate, and data from these samples should clearly support the conclusions reached in the TMDLs.

Comment (BS)
The concerns we have with the assignation of Lima MS4 wasteload allocations in Appendix D are numerous:

1. Table D-13 TP TMDL for Lost Creek at Reservoir Rd (data is reflected in Table 6-4)
    a. 100% of the WLA has been assigned to the Lima MS4
    b. The WLA is based on ONLY 2 wet weather and 3 normal samples
2. Table D-14 TP TMDL for Zurmehly Creek at Fort Amanda Rd (data is reflected in Table 6-4)
    a. 100% of the WLA has been assigned to the Lima MS4
    b. The WLA is based on ONLY 3 wet weather and 3 normal samples
3. Table D-15 TP TMDL for Little Ottawa River at Fort Amanda Rd (data is reflected in Table 6-4)
    a. 54% of the WLA has been assigned to the Lima MS4
    b. The Cridersville MS4 permit needs assigned here
    c. The WLA is based on ONLY 2 wet weather and 2 normal samples
4. Table D-19 TP TMDL for the Modeled Stream Reach
    a. Despite the fact that it is largely within the Lima Ohio Urbanized Area, no WLA has been assigned to any MS4 permit
    b. Nonpoint source pollution is grossly under-represented here at 0.3% of the load
5. Table D-20 $CBOD_5$ TMDL for the Lima Reservoir-Ottawa River subwatershed
    a. 11% of the WLA has been assigned to the Lima MS4
6. Tables D-21 and D-22 Sediment/Habitat TMDL
    a. We object to what appears to be the exclusive use of QHEI scores to set TMDLs for sediment and habitat in our watershed. The process seems over-simplified. Ours is a complex stream dynamic that deserves a more complex characterization methodology.
    b. The Lima Ohio Urbanized Area is represented within these stream miles.
7. Table D-24 E. coli TMDL for Lost Creek at E. High St. (data is reflected in Table 6-4)
    a. Over 99% of the WLA has been assigned to the Lima MS4
    b. The samples here are about twice the number we observed in the TP
8. Table D-25 E. coli TMDL for Ottawa River at Shawnee Rd.
    a. 46% of the WLA has been assigned to the Lima MS4

   b. The WLA is based on ONLY 4 wet weather 4 normal samples
9. Table D-26 E. coli TMDL for Little Ottawa River at Ft Amanda Rd (data is reflected in Table 6-4)
   a. 93% of the WLA has been assigned to the Lima MS4
   b. The Cridersville MS4 permit also needs assigned here
   c. The WLA is based on 4 wet weather samples and 5 normal samples
10. Table D-27 E. coli TMDL for Ottawa River at Copus Rd.
   a. 61% of the WLA has been assigned to the Lima MS4
   b. The WLA is based on ONLY 3 wet weather and 5 normal samples
   c. This table should reflect WLA assignations in Table D-25 for the upstream segment
11. Table D-29 E. coli TMDL for Ottawa River at US-224 (data is reflected in Table 6-4)
   a. 63% of the WLA has been assigned to the Lima MS4
   b. The WLA is based on ONLY 4 wet weather and 4 normal samples
   c. This table should reflect WLA assignations in Tables D-25 and D-27 for the upstream segments
12. Table D-30 E. coli TMDL for Pike Run at Lima-Gomer Rd (data is reflected in Table 6-4)
   a. 88% of the WLA has been assigned to the Lima MS4
   b. The WLA is based on ONLY 4 wet weather and 5 normal samples
13. Table D-32 E. coli TMDL for Sugar Creek @ CR-O (data is reflected in Table 6-4)
   a. 100% of the WLA has been assigned to the Lima MS4
   b. The WLA is based on 6 wet weather and ONLY 2 normal samples

Comment (BS)

<u>Appendix D – Load Allocation:</u>

The report heavily used Load Duration Curves (LDC); however, the lack of sufficient data raises substantial question to the validity of the analysis and results.

- There is no measured pollutant load data from any of the land uses. The LDCs used in the report rely on insufficient samples to draw any reliable conclusions. For example, the LDC is divided into five flow regimes. For Lost Creek, three of the regimes have no phosphorus data (page D-48). Only two phosphorus samples are available for the Wet Weather flow regime. The two samples appear to significantly follow the assumed Target Load Duration Curve; however, due to the lack of data and an inappropriate averaging of the two data points, the report concludes that an 82.4% reduction in Total Phosphorus (TP) loads for the Wet Weather flow regime. The other four flow regimes show no reduction, primarily due to lack of any data, yet Ohio EPA still calculates TMDLs. The LDC method that was used was fundamentally flawed, and may be over reaching because of insufficient data. The analysis failed to demonstrate that TP limits were exceeded. With the paucity of data, there may be a good chance that calculated loads would be within acceptable limits, however the assigned allocations results in onerous load reductions for the Lima MS4.
- It appears that the analysis of the basic underlying data for the MS4 areas and Allen County is flawed. In addition to the overreaching use of the scarce data, other examples are prevalent. On page D-49 of Appendix D, a wasteload allocation is assigned to the Lima MS4 for Zurmehly Creek; however, the City of Lima MS4 permit boundary is not tributary to this watershed. Additionally, the Allen County MS4 is not referenced anywhere in the report besides Table A-2, nor is it provided any wasteload allocation.
- The report analysis fails to take even a fundamental approach to understand the potential pollutant loads from potential sources. Ohio EPA used an overly simplified approach of aggregating MS4 and other loads based on a percentage of land use. The agency failed to even take a minimum approach of evaluating loadings from contributing land uses to understand the hydrology and the pollutant delivery mechanism. Instead, Ohio EPA heavily relied on only a few samples (only two samples for the Lost Creek example) that represent

an aggregate of all contributing land uses. The approach disregards the land use composition of the watershed. The agency did not consider or distinguish between the large agriculture land area as compared to dense urban development. The narrative discusses at length the importance of the agriculture contribution from tiled areas and offers no solid discussion to urban runoff; however, the load calculations presented in Appendix D directly conflicts with the narrative.

- A minimum approach to understand the potential pollutant loads from potential sources should consist of: Obtain land use maps; Quantify pollutant loads based on hydrology (rainfall events) and land use; Evaluate delivery mechanism; Quantify pollutant load under various conditions; Attribute loads and evaluate relative contributions of loads based on actual loads; Evaluate and calibrate in-stream measured data to surface water loadings; and Determine required load reductions, considering pollutant load sources, land uses, and delivery mechanisms.

Comment (LS)
3. Load Duration Curves Not Appropriate for establishing TP TMDL
The TMDL presents a discussion on the use of Load Duration Curves (LDCs) to establish load reduction requirements for total phosphorus (TP). (See, Draft TMDL at 40 et seq.)

> The flow curve is converted into a load duration curve by taking the product of the flow, the water quality target (0.1 mg/L for WWH) and a conversion factor. The load in kilograms per day is the TMDL for each flow condition.
> (Draft TMDL at 40)
>
> All of the area beneath the TMDL is considered the total phosphorus loading capacity of the stream. The difference between this area and the area representing the current loading conditions is the load that must be reduced to meet water quality standards/targets. The final step to create an LDC is to determine where reductions need to occur. The likelihood of a source affecting the stream varies by flow regime and likely sources in the five flow regimes are indicated in Table 4-4.
> (Draft TMDL at 41)

Notwithstanding the comments presented above regarding the arbitrary use of the 0.1 mg/L TP statewide criterion, this approach to TMDL development for nutrients is misdirected and should be deleted from the TMDL for the following reasons:

a. Averaging Period
Nutrients do not present a toxicity concern and elsewhere, for instance, the USEPA has considered proposed numeric nutrient criteria to be annual or growing season average values. The LDC approach treats the TP criterion as a daily maximum value which cannot be exceeded. This approach is not recognized as scientifically defensible. An averaging period needs to be assigned and the allowable load needs to be integrated based on the duration of the various flow conditions to determine whether the criterion is achieved for the specified averaging period. For example, if low flow conditions only occur five percent of the time, an exceedance of the LDC for this period may be inconsequential when averaged over the remainder of the averaging period.

b. Margin of Safety
The Draft TMDL indicates that an explicit margin of safety of 5% was used for the TMDLs derived from nutrient LDCs to account for uncertainty in the response of the waterbody to

loading reductions. (See, Draft TMDL at 59) This rationale is without merit.[14] Given that the LDC is established so that the water quality criterion is not exceeded at any flow, there is no need for a margin of safety. If, however, the margin of safety is included to account for uncertainty in the water quality criterion, this would be a clear indication that the water quality criterion is unsuitable and should be withdrawn.

c. Flow Regime

The Draft TMDL presents five flow regimes for consideration. (See, Draft TMDL at 41). The evaluations presented in Appendix D indicate that independent load reductions are calculated for each flow range. (e.g., See, Draft TMDL Appendix D at D-45) Thus, in the case of Hog Creek, the TP TMDL is as follows:

TMDL	High Flow (0-5%)	Wet Weather (5-40%)	Normal Range (40-80%)	Dry Weather (80-95%)	Low Flow (95-100%)
Flow Basis (cfs)	544	49.1	14.6	6.05	3.72
Median Sample Load (kg/day)	372	N/A	1.75	2.91	N/A
Load Reduction	66.9%	No Data	NA	67.0%	No Data
LDC (kg/day)	132.99	12.01	3.56	1.48	0.91
Load Allocation (kg/day)	122.83	10.32	2.46	0.53	0.01

In this example, no load reduction is required under normal flow conditions when the median observed load is 1.75 kg/day and the allowable daily load averages 3.56 kg/day. However, under dry weather conditions, when the current median load is 2.91 kg/day, the TMDL would require a 67% reduction to meet the TP criterion. Similarly, under high flow conditions, the allowable TP loading is 133 kg/day, with 123 kg/day from non-point sources (margin of safety subtracted from load allocation).

(i) Effect of High Flow Loads

This approach to nutrient regulation is doomed to fail and cannot restore aquatic life uses, even if the TP criterion is appropriate for use in the Ottawa River Watershed. Consider, for example, the high flow load allocation. This allocation is authorized for 5% of the time when flows are considered high. The overall contribution of this load to the watershed is 6.14 kg/day (e.g., 122.83 kg/day x 5%). This allocation is double the allowable load when stream flows are in the normal to dry range. If most of this load is particulate, it is likely to precipitate further downstream and contribute to aquatic life impairments. Even if the load is not primarily particulate, this high flow load may be capable of supporting excessive algal growth that impairs the aquatic life use. It is commonly known that periphyton are able to store excess phosphorus and use the stored phosphorus for growth at a later time. The high flow load provides more than enough phosphorus to support such growth. Consequently this TMDL cannot ensure that aquatic life uses will be restored. The influence of these high flow loads on periphyton biomass cannot be assessed using the LDC approach but must be assessed using a dynamic water quality model capable of simulating the interaction between varying nutrient load and algal growth.

(ii) Load Reduction Requirements may be Unnecessary

[14] The entire basis of the TMDL program is predicated on the concept that a reduction in load yields a defined change in ambient water quality. Moreover, the TMDL treats TP as a conservative substance. If the load and flow is known, there is no uncertainty regarding the resulting ambient concentration.

Under low flow conditions, the TMDL indicates that a load reduction of 67% is required to reduce the TP load from 2.91 kg/day to the TMDL of 1.48 kg/day. However, under normal flow conditions, the current load is 1.75 kg/day, half of the allowable TMDL. Given that the non-point source loads account for 99% of the loading, the marked increase in daily loading between the normal flow condition (1.75 kg/day) and the dry weather flow condition (2.91 kg/day) is highly suspect and needs to be reevaluated. Notwithstanding this problem with the data, the average TP load for the combined normal to dry flow range is about 2.1 kg/day. If an appropriate averaging period is used, this load would be considered acceptable and no dry weather load reduction would be required.

Alternatively, although the median high flow load (372 kg/day) is significantly higher than the corresponding LDC allocation, the high flow load may primarily pass through the subwatershed without having any impact on plant growth if the detention time is sufficiently short and/or high flows scour periphyton from the stream. In this case, the high flow load is irrelevant and there is no need for load reduction under this flow condition. Moreover, even if the river is actually impaired for dissolved oxygen, at higher flows the dissolved oxygen dynamics of the stream change radically and phosphorus reduction may become irrelevant to compliance with the D.O. criterion. In either case, the high flow TMDL for TP based on LDC is unnecessary.

(iii) Point Source Load Reductions cannot restore Aquatic Life Uses
Finally, the high flow condition is currently estimated to contribute 372 kg/day and this load is entirely attributed to cultivated crop land uses. (See, Draft TMDL at 75). Based on the source of this load (cultivated crops) and the conditions under which the load is delivered (high flow conditions), there is no reasonable assurance that such loads can be significantly reduced by this TMDL. This load is equivalent to 18.6 kg/day over the entire year and greatly exceeds the low flow TMDL calculated for the point dischargers, 10.6 kg/day. (See, Draft TMDL Table 5-7 at 64) Even if the point source loads are reduced to zero, there is sufficient high flow load from the Hog Creek subwatershed to exceed the wasteload allocation in the Lima area for the entire growing season. The LDC analysis ignores the overall load and presumes that the high flow load disappears when the flow recedes. Such an assumption cannot be assessed without a properly calibrated dynamic water quality model. Without such an assessment there is no confidence that the TMDL is necessary to restore aquatic life uses to the Ottawa River watershed.

Comment (SS)
Comment 1.7 The analysis of pollutant loadings and reductions in this TMDL should not be used to direct or advise regulatory actions.
The costs to the City associated with meeting the TMDL-recommended limits will be significant and will likely not meet the arbitrary targets set forth in this TMDL. A primary advantage of the load duration curve (LDC) approach used in the TMDL is the ability to differentiate loads based on flow regime. An associated weakness is that for a given flow regime, it is not possible to differentiate specific sources. Further, the flow data used for the LDC approach in this TMDL is inaccurate for all but the gauged location, water quality data were not collected in all flow regimes throughout the watershed, and the impacts of assimilation and resuspension are unknown. Therefore, the recommended implementation actions for this TMDL are rendered unusable, particularly for the development of modified permit conditions, mandated corrective actions, or the allocation of limited grant funding to address nonpoint sources of phosphorus.

Comment (SS)
Comment 1.15 The load duration curve (LDC) approach to derive loads and associated reductions is inappropriate.

As detailed in subsequent comments, weaknesses in the LDC approach have resulted in conclusions that mischaracterize the scope and extent of purported phosphorus and E. coli impairments. This, in turn, will require costly pollution control measures for regulated entities that may be ineffective at producing measurable improvements in water quality in the Ottawa River. There are a number of inherent and TMDL-specific weaknesses of the LDC approach.

Comment (SS)
Comment 1.16 The simplistic, flow-based approach to pollutant loadings used in the TMDL fails to reflect the high variability of phosphorus and bacteria levels throughout the watershed. A key principle of the LDC approach is that pollutant loads vary directly with the flow in a water body. This concept is not applicable to phosphorus or bacteria for the Ottawa River and its tributaries. The complexity of pollutant fate and transport in these systems is given little attention in this TMDL.

For phosphorus, the TMDL states that some of the load is attributable to phosphorus bound to sediment that accumulates in the water body and, over time, is released. In reality, however, this is a complex process – pollutant release rates, amounts of phosphorus assimilated or released, and the overall distribution of sediments, although critical variables, are not evaluated in the TMDL.

For bacteria, flow is not directly correlated with levels present in the water column. Bacteria levels are influenced by die-off and propagation within the water body. Research has shown the resuspension of sediments after rain events can cause measurable changes in bacteria levels within the water column (Cho, 2010), indicating sediments are a viable source of this pollutant and an influencer of overall water quality.

For both phosphorus and bacteria, the LDC outputs used to calculate load reductions, daily loads, and potential regulatory actions, are not representative of real-world conditions and should be viewed as highly inaccurate estimates, at best.

Comment (SS)
Comment 1.17 If the LDC approach is to be used, larger water quality datasets are needed to make the TMDLs credible.
A component of a viable dataset is adequate samples from all flow regimes. These data are critical to accurately depicting pollutant loads in all conditions, particularly those deemed critical to the impairments of concern. In the Ottawa River TMDL, numerous flow regimes in each sub watershed were not sampled or no data were used to calculate daily loads. This issue applies to both the phosphorus and bacteria TMDLs. Even worse, some watersheds were not sampled during low flow, identified in the TMDL as a critical condition for phosphorus impairments.

Ohio EPA attempts to mitigate the lack of meaningful data for the bacteria TMDLs – addressing the data gap issue by setting an exceptionally large (20%) margin of safety in some instances. Ohio EPA acknowledges this issue in the TMDL, but chooses to minimize this significant data gap rather than address it through additional data collection. The paucity of data available undermines the credibility of the results using the LDC.

Comment (SS)
Comment 1.18 Insufficient flow data were used to calculate the LDCs.
The LDC approach relies on accurate flow data to compute loadings and needed reductions. For this TMDL, flow data were only available for one gauging station, located on the Ottawa River at the City of Lima. The flows were extrapolated for each sub watershed, using a simple

ratio of the area of sub watershed compared to the large watershed of the Ottawa River. However, this approach is only viable if the physical characteristics of each watershed are relatively similar. The flow within the Ottawa River, particularly in the sections directly above and below the Lima gauge, is influenced by a number of large NPDES-permitted discharges. In contrast, flow in the sub watersheds is not influenced by such large, relatively continuous discharges. This means flow is likely inaccurately estimated, which in turn renders the LDCs for these sub watersheds unusable. Ohio EPA indicates that flow issues associated with NPDES discharges is addressed through the addition of flow into the duration curves, but the methods used and "corrections" made are not spelled out in the draft TMDL. This issue adversely affects the conclusions of both the phosphorus and bacteria TMDLs.

Comment (SS)
Comment 1.19 The LDC generates a one-size-fits-all phosphorus allocation that is likely conservative for most conditions.
Phosphorus does not have a continuous or acute impact to water quality and aquatic biota. Effects of phosphorus vary based on other conditions, such as temperature and levels of sunlight, which influence the propagation of algal blooms that produce the direct adverse effects on aquatic biota. Daily loads, generated by the LDC curve, do not accurately account for all conditions, which may vary considerably during a given month.

Comment (SS)
Comment 1.20 The LDC approach is not suitable for complex water bodies, flow regimes, or pollutant fate and transport scenarios involving pollutants such as phosphorus and bacteria. Unlike continuous simulation models such as Water Quality Analysis Simulation Program (WASP), the LDC duration approach cannot evaluate or assess the impacts of sediment transport, flow alterations associated with dams, segment-specific flow variations, water column/benthos interactions, or other factors that influence the extent and distribution of pollutants within a given water body. This issue adversely affects the conclusions of both the phosphorus and bacteria TMDLs.

Comment (SS)
Comment 2.9 As discussed in Section Five, the load duration curve (LDC) method is inappropriate for establishing TMDLs for the Ottawa River. The weaknesses of the LDC approach have resulted in conclusions that mischaracterize the scope and extent of purported phosphorus and E. coli impairments. This, in turn, will require costly pollution control measures for regulated entities that may be ineffective at producing measurable improvements in water quality in the Ottawa River.

Comment (SS)
Comment 2.12 Additional explanation/presentation of data used to calibrate/verify models in the TMDL is needed…. For the LDCs, the data is insufficient to judge whether the stream segments are actually out of compliance with the TMDL at every flow regime.

Comment (SS)
Comment 5.1 The use of the load duration curve (LDC) approach to derive loads and associated reductions is inappropriate.
Weaknesses of the LDC approach have resulted in conclusions that mischaracterize the scope and extent of purported phosphorus and E. coli impairments. This, in turn, will require costly pollution control measures for regulated entities that may not be necessary or sufficient to produce measurable improvements in water quality in the Ottawa River. There are a number of inherent and TMDL-specific weaknesses of the LDC approach, the effect of which is little

confidence that the following have been adequately established in the TMDL: quantification of the impairments, linkages between sources and impairments, calculation of the TMDL, and identification of the appropriate implementation measures. The TMDL should be revised to use an approach that addresses the concerns raised below, rather than the LDC approach.

Comment (SS)
Comment 5.2 The simplistic, flow-based approach to pollutant loadings in the TMDL fails to capture the high variability of phosphorus and bacteria levels throughout the watershed.
A key principle of the LDC approach is that pollutant loads vary directly with the flow in a waterbody. This concept is not applicable to phosphorus or bacteria. The complexity of pollutant fate and transport is given little attention in this TMDL resulting in overly conservative wasteload and load allocations that may be unnecessary.

For phosphorus, the Ottawa River TMDL states that some of the load is attributable to phosphorus bound to sediment that accumulates in the waterbody of concern and, over time, is released. This is a complex process – pollutant release rates, amounts of phosphorus assimilated or released, and the overall distribution of sediments, all of which are important variables, are not characterized in the TMDL.

For bacteria, flow is not directly correlated with levels present in the water column. Bacteria levels are influenced by die-off and propagation within the waterbody. Research has shown the resuspension of sediments after rain events can cause measurable changes in bacteria levels within the water column (Cho, 2010), indicating sediments are a viable source of this pollutant and an influencer of overall water quality.

For both phosphorus and bacteria, the resulting LDC outputs used to calculate load reductions, daily loads, and potential regulatory actions, are not representative of real-world conditions and are highly inaccurate estimates, at best. As a result, a TMDL based on the LDC approach will result in erroneous and overly conservative wasteload and load allocations. The TMDL should be revised to account for the high variability and complexity of phosphorus and bacteria levels before the regulated community is asked to spend substantial amounts on nutrient reduction technologies to meet load allocations that are not related to improving impairments in the Ottawa River.

Comment (SS)
Comment 5.3 There are insufficient data to support the LDC approach.
In order to have a legitimate dataset for the LDC, it is essential that it be supported by adequate samples from all flow regimes. These data are critical to accurately depicting pollutant loads in all conditions, particularly those deemed critical to the impairments of concern. In the Ottawa River TMDL, numerous flow regimes in each sub watershed were either not sampled or no data was used to calculate daily loads. This issue applies to both the phosphorus and bacteria TMDLs. Even worse, some watersheds were not sampled during low flow, and low flow was identified in the TMDL as a critical condition for phosphorus impairments.

The TMDL attempts to offset the lack of adequate data for bacteria by setting an exceptionally large (20%) “margin of safety” in some instances. This is not an adequate response because this large margin of safety results in artificially diminished assimilative capacity, which could have been addressed by establishing proper data collection protocols before embarking on the TMDL calculations. The paucity of data available undermines the credibility of the results using the LDC. If Ohio EPA insists on using the LDC approach, the TMDL should be revised after collection of substantially more data to account for all flow regimes. In the absence of sufficient data, the TMDL cannot be deemed credible, and the resulting wasteload and load allocations cannot be justified.

Comment (SS)
Comment 5.4 Insufficient flow data were used to calculate the LDCs.
The LDC approach relies on accurate flow data to compute loadings and needed reductions. For this TMDL, flow data was only available for one gauging station, located on the Ottawa River at the City of Lima. This flow was extrapolated for each sub watershed, using a simple ratio of the area of sub watershed compared to the large watershed of the Ottawa River. This approach is legitimate only if the physical characteristics of each watershed are relatively similar. The flow within the Ottawa River, particularly in the sections directly above and below the Lima gauge is influenced by a number of large NPDES-permitted discharges. In contrast, flow in the sub watersheds is not influenced by such large, relatively continuous discharges. This means flow is likely inaccurately estimated and in turn, renders the LDCs for these sub watersheds unusable. Although Ohio EPA indicates that flow issues associated with NPDES discharges is addressed through the addition of flow into the duration curves, the methods used and “corrections” made are not spelled out in the draft TMDL. This issue adversely affects the conclusions of both the phosphorus and bacteria TMDLs. The TMDL should be revised after Ohio EPA gathers sufficient flow data to support the chosen approach. Otherwise, the TMDL is invalid.

Comment (SS)
Comment 5.5 The LDC generates a one-size-fits-all phosphorus allocation that is likely conservative for most conditions.
Phosphorus does not have a continuous or acute impact to water quality and aquatic biota. Effects of phosphorus vary based on other conditions, such as temperature and levels of sunlight, which influence the propagation of algal blooms that produce the direct adverse effects on aquatic biota. Daily loads, generated by the LDC curve, do not accurately account for all conditions, which may vary considerably during a given month. The LDC methodology therefore treats phosphorus like an acute pollutant that must be limited to very low levels (0.1 mg/L) at all flow regimes. The TMDL is therefore overly conservative and overpredicts the amount of reductions needed from direct dischargers and other sources.

Comment (SS)
Comment 5.6 The LDC approach is not suitable for complex waterbodies, flow regimes, or pollutant fate and transport scenarios involving pollutants such as phosphorus and bacteria. Unlike continuous simulation models such as Water Quality Analysis Simulation Program (WASP), the LDC duration approach cannot evaluate or assess the impacts of sediment transport, flow alterations associated with dams, segment-specific flow variations, water column/benthos interactions, or other factors that influence the extent and distribution of pollutants within a given waterbody. This issue adversely affects the conclusions of both the phosphorus and bacteria TMDLs. The TMDL should be revised to incorporate an approach that can account for the complexity of the Ottawa River. To be valid, the TMDL must employ a model that can integrate these complexities to ensure that the TMDL will result in management actions that will address the impairments identified in the Ottawa River.

Comment (SS)
Comment 5.7 The analysis of pollutant loadings and reductions in this TMDL should not be used to direct or advise regulatory actions.
The costs to the City of meeting the TMDL-driven effluent limits will be significant and will likely not meet the arbitrary targets set forth in this TMDL. As stated in the TMDL, a primary

advantage of the LDC approach is the ability to differentiate loads based on flow regime. An associated weakness is that for a given flow regime, it is not possible to differentiate specific sources. Further, the flow data used for the LDC approach in this TMDL is inaccurate for all but the single gauged location, water quality data were not collected in all flow regimes throughout the watershed, and the impacts of assimilation and re-suspension are unknown. As a result, the recommended implementation actions in the TMDL are indefensible, particularly for the development of modified permit conditions, mandated corrective actions, or the allocation of limited grant funding to address nonpoint sources of phosphorus.

References

Kyung Hwa Cho, Y.A. Pachepsky, Joon Ha Kim, A.K. Guber, D.R. Shelton, R. Rowland. "Release of Escherichia coli from the bottom sediment in a first-order creek: Experiment and reach-specific modeling", Journal of Hydrology, July 23, 2010.

Comment (SS)

Comment 6.6 Appendix D – Load Allocation

The report heavily used Load Duration Curves (LDC); however, the lack of sufficient data raises substantial question to the validity of the analysis and results.

- There is no measured pollutant load data from any of the land uses. The LDCs used in the report rely on insufficient samples to draw any reliable conclusions. For example, the LDC is divided into five flow regimes. For Lost Creek, three of the regimes have no phosphorus data (page D-48), and only two phosphorus samples are available for the Wet Weather flow regime. The two samples appear to significantly follow the assumed Target Load Duration Curve. However, due to the lack of data and an inappropriate averaging of the two data points, the report concludes that an 82.4% reduction in Total Phosphorus (TP) loads is needed for the Wet Weather flow regime. The other four flow regimes show no reduction, primarily due to lack of any data, yet Ohio EPA still calculates TMDLs. Because of insufficient data, the LDC method that was used is fundamentally flawed. The analysis failed to demonstrate that TP limits were exceeded. Given the paucity of data, Ohio EPA has no basis for assigning allocations that result in astronomically expensive and technically problematic (if not impossible) calculated loads for the Lima MS4.
- In addition to the speculative use of inadequate data, the analysis of the basic underlying data for the MS4 areas and Allen County is flawed. For example, on page D-49 of Appendix D, a wasteload allocation is assigned to the Lima MS4 for Zurmehly Creek. However, the Lima MS4 boundary is not tributary to this watershed. Additionally, the Allen County MS4 is not referenced anywhere in the report, nor is it provided any wasteload allocation.
- The report fails to apprehend the potential pollutant loads from potential sources. Ohio EPA used an overly simplified approach of aggregating MS4 and other loads based on a percentage of land use; and failed to evaluate loadings from contributing land uses to understand the hydrology and the pollutant delivery mechanism. Instead, Ohio EPA heavily relied on only a few samples (only two samples for the Lost Creek example) that represent an aggregate of all contributing land uses. This approach disregards the land use composition of the watershed. The agency did not consider or distinguish between the large agriculture land area and the dense urban development. The narrative discusses at length the importance of the agriculture contribution from tiled areas, but in addition to the speculative use of inadequate data, presents no solid discussion regarding urban runoff. The load calculations presented in Appendix D directly conflicts with the narrative.
- A minimally acceptable approach to understand the potential pollutant loads from potential sources should consist of: Obtain land use maps; Quantify pollutant loads based on hydrology (rainfall events) and land use; Evaluate delivery mechanism; Quantify pollutant load under various conditions; Attribute loads and evaluate relative contributions of loads

based on actual loads; Evaluate and calibrate in-stream measured data to surface water loadings; and Determine required load reductions, considering pollutant load sources, land uses, and delivery mechanisms.

Response: Ohio EPA recognizes advantages and disadvantages with all loading analysis methods. Some techniques take a more mechanistic approach and some such as load duration curves are more empirical in nature. Multiple examples can be provided where U.S. EPA has accepted phosphorus and bacteria TMDLs based on load duration curves for Ohio streams (e.g., U.S. EPA 2010; U.S. EPA 2013) and in many other states. Based on these past decisions and Ohio EPA's experience with TMDLs, the agency believes that load duration curves can be an effective tool for calculating TMDLs for phosphorus and bacteria.

TMDLs are not calculated based on water quality samples. The data points represent the data that are collected to assess the water body and determine its attainment status relative to the criteria. Once a stream is assessed and determined to be impaired, TMDLs are calculated for all flow regimes. The TMDL is derived from the stream flow (including the point source flows) and concentration for the stream based on a water quality standard or target. Therefore it is not necessary for a flow regime to include measured data to accurately calculate a TMDL. The percent reductions prescribed from the measured data are included because they can serve as useful information in understanding the nature of the impairment and suggesting appropriate implementation measures.

Gage location stream flows are not used in the raw to develop drainage area yield relationships for tributary flows duration curves. In the case of the Ottawa River gage, the gage is affected by two significant discharges—the Ada WWTP (2PB00050) and the National Lime and Stone Company (2IJ00013). Both of these facilities are required to report flows as part of their NPDES permit and these values were used to adjust the gage flows to represent a non-impacted drainage area yield. Also at sites where LDCs were developed, the point sources discharging at that location were added to the drainage area yield at full design capacity so enough flow was available in the stream to account for the wasteload allocations the facilities received.

The LDC accounts for all sources of flow. Numerous assumptions are used in order to perform allocations (i.e., MS4 communities only receive allocations in the normal, wet weather and high flow regimes). For the purposes of the TMDL, MS4 areas are considered on an urbanized area basis. The TMDL tables have been changed to list the MS4 allocation as "Lima area MS4 communities" in the final report. Based on this update, the MS4 communities can infer the portion of the load in which they have been allocated based on the portion of the MS4 area in the watershed occupied by the entity. If wasteload allocations change between sites for the MS4 communities, it is because the proportional area drained by MS4 land changes between the sites.

Ohio EPA chose a 5% margin of safety for the total phosphorus load durations curves and 20% margin of safety for bacteria load duration curves. The margin of safety is not concretely linked to any specific factor but instead considers potential sources of uncertainty, such as background flows used to create the flow duration curve, natural variation in the pollutant when sampling, and the spatial uniformity of the pollutant. The reason the two parameters do not use the same margin of safety is linked to differences in natural variability and spatial uniformity of the pollutant.

F2.3 Carbonaceous Biochemical Oxygen Demand (5-day)

Comment (SS)
Comment 1.8 Ohio EPA did not adequately address the appropriate permit limits and the City will incur significant expenses to comply with monthly limits …
Section 6 of the draft TMDL does not provide a specific TMDL for the City's CSOs, although Table 5-8 (page 65) includes a wasteload allocation (WLA) for the CSOs. The CSOs that remain after the implementation of the City's Long Term Control Plan (LTCP)—which will cost Lima $66 million—will only occur during extreme wet weather events. Therefore, the WLA for the CSO discharges should be keyed actual flow conditions in the River. Ohio EPA's methodology for calculating the TMDL is therefore flawed and the CBOD5 TMDL for the CSOs should be removed from the Report.

Comment (SS)
Comment 2.10 The method(s) used in the TMDL for calculating $CBOD_5$ are unclear. The wasteload allocation (WLA) for Lima's Combined Sewer Overflows ("CSOs") do not appear to be tied to any modeling, and are absent from the QUAL2K model. The WLA for the CSO discharges would also be dependent on flow conditions in the river, and it is highly unlikely that the CSOs that remain after the implementation of the City's long-term control plan would occur during all but the highest river flows.

Further, it is unlikely that a $CBOD_5$ TMDL is needed for the Ottawa River downstream of Lima. The 2010 Study Report states: "By 2010, compelling evidence of excessive loads of oxygen demanding waste immediately downstream from Lima was absent. On the contrary, classic demand-related impacts of the past appeared supplanted by hyper eutrophic conditions with related nutrient enrichment near Lima, and the eutrophic conditions identified through the lower Ottawa in 1996 appeared more abated." (p. 84)

Comment (LS)
4. Additional Comments
a. CBOD5 Wasteload Allocation
The Draft TMDL present a very brief summary of CBOD5 modeling results and, with very little technical discussion or support, establishes a waste load allocation for CBOD5 for point source dischargers, including PCS. As discussed above, the need for CBOD5 allocations has not been demonstrated if the receiving waters are not impaired for D.O. Moreover, Section 6 of the Draft TMDL confirms that no new permit limits will be imposed on the point source discharges as a result of this allocation, other than those conditions set forth in the City's Long Term Control Plan. *Draft TMDL* at 83. For clarity, if the CBOD5 wasteload allocations are not discarded as unnecessary, the revised Draft TMDL should mirror the Section 6 language as a footnote to Table 5-8, further confirming that these allocations are within existing permit limits (that is, Table 5-8 is written as a monthly average daily load (monthly kg/day)).

Based on the affirmative statements in the Draft TMDL that a more stringent CBOD5 limit will not be imposed on PCS, PCS has not raised objections specific to the CBOD5 allocation but, should the revised Draft TMDL impose a more stringent CBOD5 limit on PCS, PCS reserves all rights to review the full information underlying the CBOD5 allocation as well as the allocation itself and to comment on these components of the TMDL.

Response: Ohio EPA decided to focus on the other pollutants and has removed the $CBOD_5$ TMDL from the final TMDL report.

F2.4 Qualitative Habitat Evaluation Index

Comment (SS)

Comment 2.6 The habitat and sediment TMDLs, which are based on Ohio EPA's QHEI scores, should be dropped from the TMDL document because the QHEI is not a valid target.

a. TMDLs are to be calculated for pollutants. The QHEI[15] is an inappropriate surrogate for a TMDL. The TMDL does not set forth any evidence that the sediment and habitat issues are related to the discharges of pollutants in the watershed.
b. Ohio EPA is arbitrarily using the QHEI as the TMDL target for the sediment and habitat TMDLs. Ohio EPA has not provided documentation that justifies how this multi-metric index can be segregated into separate sediment and habitat scores for warmwater habitat uses. Further, the agency acknowledges that targets for habitat do not exist for modified warmwater habitat (MWH) streams. However, the TMDL states that "[t]here is a reasonable expectation that, even in MWH systems where lower biological standards are in place, habitat that is degraded to some extent will influence biological attainment." (p. 53)

Comment (SS)

Comment 6.2 Causes of impairments – The Executive Summary asserts that Total Suspended Solids (TSS), Sediment/siltation, and Low Flow Alterations are several of the significant causes of impairments (Page x). The remaining sections of the report and the analyses fail to provide any evidence that these three elements are causes of impairments to the Ottawa River watershed or to what extent those impairments need to be alleviated. The wasteload allocations (WLAs) presented in the TMDL for the MS4 communities are speculative at best….

- The report uses a Qualitative Habitat Evaluation Index (QHEI) score as a surrogate for a TSS TMDL. The report fails to provide a scientific link between the potential impairment caused by TSS and the QHEI score. The statement "The QHEI measures the end result of high sediment loading (either from the landscape or in-stream sources) as it impacts the biological community" (page 52) is unsubstantiated. There are many complex factors that influence the QHEI score, not just sediment loading. The report fails to quantify or distinguish the independent influences of the various factors on the QHEI. The QHEI evaluation in the Sediment TMDL considers the sub-metrics for Substrate, Channel Morphology, and Bank Erosion and Riparian Zone. Channel morphology and bank erosion are the manifestations of a complex series of channel geomorphic conditions with a strong scientific foundation. No attempt was taken to understand the geomorphic conditions of the stream system, nor determine the cause of the observed conditions. Simplifying the cause of impairment as "TSS" or "Sediment" undermines the broad scientific understanding of channel geomorphology. The report failed to even attempt to perform a meaningful geomorphic analysis or bed load analysis to understand or attribute causes of stream instability. The sediment TMDL is therefore without merit and should be abandoned.

Comment (BS)

<u>Causes of impairments</u>: The Executive Summary presents that Total Suspended Solids (TSS), Sediment/siltation, and Low Flow Alterations are several of the significant causes of

[15] The QHEI is "a physical habitat index designed to provide an empirical, quantified evaluation of the general lotic macrohabitat characteristics that are important to fish communities." It is a multi-metric index comprised of 6 qualitative metrics: (1) substrate; (2) instream cover; (3) channel morphology; (4) riparian zone and bank erosion; (5) pool/glide and riffle-run quality; and (6) map gradient. Source: Ohio EPA, 2006, http://www.epa.state.oh.us/portals/35/documents/qheimanualjune2006.pdf .

impairments (Page x). The remaining sections of the report and the analyses fail to provide any evidence that these three elements are causes of impairments to the Ottawa River watershed or to what extent those impairments need to be alleviated. The wasteload allocations (WLAs) presented in the TMDL for the MS4 communities are speculative at best….

- The report uses a Qualitative Habitat Evaluation Index (QHEI) score as a surrogate for a TSS TMDL. The report fails to provide a scientific link between the potential impairment caused by TSS and the QHEI score. The statement "The QHEI measures the end result of high sediment loading (either from the landscape or in-stream sources) as it impacts the biological community" (page 52) is unsubstantiated. There are many complex factors that influence the QHEI score, not just sediment loading. The report fails to quantify or distinguish the independent influences of the various factors on the QHEI. The QHEI evaluation in the Sediment TMDL considers the sub-metrics for Substrate, Channel Morphology, and Bank Erosion and Riparian Zone. Channel morphology and bank erosion are the manifestations of a complex series of channel geomorphic conditions with a strong scientific foundation. No attempt was taken to understand the geomorphic conditions of the stream system, nor determine the cause of the observed conditions. Simplifying the cause of impairment as "TSS" or "Sediment" undermines the broad scientific understanding of channel geomorphology. The report failed to even attempt to perform a meaningful geomorphic analysis or bed load analysis to understand or attribute causes of stream instability. The sediment TMDL is therefore without merit and should be abandoned.

Response: The correlation between good quality habitat and good biological performance has been long established (Rankin 1989; Rankin 1995). The QHEI metrics score appropriately measures the relative quality of the stream habitat regardless of geomorphic stream type. Ecoregional differences in stream type have been incorporated into Ohio's biological criteria since its formative beginnings (Omernik 1987 and Omernik and Gallent 1988) and are built into regional performance expectations, which can differ in subbasins in various parts of the state. Reference sites in different ecoregions display a range of habitat and, accordingly, illustrate local expectations for local natural conditions.

Sedimentation is a common cause of impairment in Ohio, with nearly 60% of impaired watersheds listing sedimentation/siltation as a contributing cause of impairment (Ohio EPA 2012). Ohio EPA believes that the QHEI is the most effective tool available to assess this cause of impairment in Ohio waterways. U.S. EPA has thoroughly reviewed the methodology for using the QHEI analysis as a method to address sediment and for several years has approved TMDLs using it (e.g., U.S. EPA 2009).

F3 Permits

Comment (DS)

Reference Page 80 of the Report – Recommended permit conditions for phosphorus limits for the Lima Refining Company:
The proposed final phosphorus limit of 0.08 mg/liter at the outfall is unrealistic for effective waste water treatment operations. Phosphorus, in the form of phosphoric acid, is currently added to the refinery WWTP aeration basins as a nutrient to assist in the digestion of pollutants. This is a common and necessary industry practice. At the refinery, the waste loading varies considerably from day to day, and consequently the nutrient demand for the digestion process varies in a like fashion. In order to insure that an ample supply of phosphorus is available, it is common industry practice to maintain a slight excess of phosphorus at the WWTP effluent. A

target concentration of 0.5 to 1.0 mg/liter at the clarifiers is recommended in the refinery's WWTP operating manual. This concentration significantly exceeds the TMDL recommended value of 0.08 mg/liter.

Comment (RD)
The approval of this TMDL will result in more restrictive NPDES permit limits for sixteen (16) individual entities within our regulated community without the proper demonstration that these new limits are necessary to correctly address the target water quality standards. As drafted, the TMDL is expected to result in over one hundred million dollars in compliance costs, with no supportable expectation of river improvement.

Response: Ample evidence of the degraded water quality condition and expected improvements is included in other responses; see especially Section F1. Ohio EPA will follow an adaptive management approach in implementing this TMDL. This means that significant action to improve water quality will be followed by new stream assessments and revised TMDLs. The first action is to control Lima's CSOs, so this TMDL will not result in NPDES changes for a large number of permit holders (including the refinery). This step-wise approach represents a large resource commitment by Ohio EPA to ensure that unnecessary actions are not requested.

Comment (SS)
Comment 2.11 The TMDL will affect future NPDES permit limits for the City and other point source dischargers. The TMDL should be revised to include clarifying language as to how the TMDL calculations will be reflected in the NPDES permits. For example, the E. coli limits in the NPDES permits are expressed as most probable number (MPN) and not colony forming units (cfu) per 100 milliliters. Estimates in MPN and cfu have intrinsic variability, which Ohio EPA did not address in the TMDL. Ohio EPA should include a statement that despite this variability, permit writers should consider current NPDES permit limits as sufficient for complying with the WLAs in the TMDL. Further, the TMDL fails to acknowledge that the City's long-term control plan has not been finalized and that the targets expressed in the TMDL will ultimately be implemented in the permit by requiring performance of the combined sewer system in accordance with the control measures specified in the long-term control plan. The simplified LDC method that Ohio EPA chose for the bacteria TMDL presents unnecessarily restrictive WLAs for the CSOs and is inconsistent with the long-term control plan.

Response: In NPDES permits, including the one just issued for the City of Lima WWTP, *E. coli* limits are expressed as #/100 ml, which correlates to cfu per 100 ml. Most probable number is not included as a unit in permits.

Table 6-3 states that no change is recommended to *E. coli* permit limits for several facilities. Where average weekly or monthly limits are recommended in other cases, the limits are considered standard practice based on water quality standards.

The draft TMDL report does address that the long-term control plan is not yet finalized:

> "The City of Lima is working toward a consent decree with U.S. EPA that will require the city to implement the recommendations in a long term control plan (LTCP). The LTCP chapters are being submitted and reviewed, and early action projects were included in the draft renewal NPDES permit." [Pg. 93]

F4 Total Maximum Daily Load

Comment (SS)
Comment 2.14 Several of the tables are lacking units. This could lead to the tables being interpreted incorrectly.

Comment (SS)
Comment 2.15 Ohio EPA should use consistent terms and units. For example, site locations and units should be referenced consistently throughout the document and the appendices. This makes it difficult to adequately review and comment on the TMDL and could lead to inappropriate interpretation of the TMDL.

Response: Thank you for the comment. This report has been reviewed to find these issues and the final report has been corrected.

Comment (DS)
Reference Pages 86-89 of the Draft Report –Phased Implementation of Phosphorus Reduction Targets
OAC Section 3745-2-12(E), referenced in this Draft Report, allows for a phased approach to TMDL implementation plans, based on the variety of factors listed in the Draft Report. However, 3745-2-12(E) also requires that "the TMDL implementation plan shall reflect reasonable assurances that water quality standards will be attained in a reasonable period of time." This Draft Report contains no such assurances, in fact, makes no mention of proposed timing for each phase, nor does it describe the methods Ohio EPA will use in determining when it is proper to commence the next phase. The only references to the timing of phases are in connection with the progression of the Lima CSO LTCP, without stating what parameters are in place to measure the progression of the LTCP, or its impact on the nutrient enrichment of the Ottawa River. Therefore, the Report should make clear the expected timeframe for each phase, including references to the nature and duration of reassessments after implementation of each phase.

Response: The timing for the initial phase will be driven by the City of Lima's substantial progress is addressing the CSOs. The subsequent monitoring and revision of the TMDL report will provide a clearer picture of next steps and allow for a refined timeline. The expectation is that as CSOs are eliminated or otherwise addressed, improvements in water quality will be measurable through biological sampling, possibly leading to attainment of water quality standards before all the phases mentioned in this TMDL report are completed. This step-wise approach outline for this project ensures that unnecessary actions are not requested.

Comment (RD)
We understand that OEPA has a timeline for approving this TMDL based on the deadlines associated with a grant that funded the study and report. The long term goals and rules of this TMDL must be established based upon due process and good science and not be limited in an expedited process to satisfy funding obligations. It would be more cost-effective in the long run to implement a valid and defensible plan that is consistent with the requirements of state and federal law, maximizing the return on that long term investment.

Response: While a U.S. EPA grant did fund the monitoring and TMDL work on the Ottawa River, completion of the TMDL is not driven by the grant commitment. U.S. EPA has accepted the draft TMDL as a placeholder, to be replaced when the final TMDL report is submitted to U.S. EPA for approval.

Ohio's typical TMDL process (including public meetings, news releases, public review period) has been followed and exceeded. The work on the Ottawa River is defendable based on science as presented in the draft and final TMDL reports and in the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (see http://epa.ohio.gov/dsw/document_index/psdindx.aspx).

Comment (RD)
In light of the considerable time it has taken for the City of Lima and USEPA to complete the CSO Long Term Control Plan (LTCP), and recognizing the sizeable investment that it represents, we do appreciate that OEPA is allowing a period of time for the associated improvements to be implemented as part of this TMDL. Water quality improvements associated with implementation of the LTCP should be tracked to better understand the watershed response while the TMDL is being reconsidered.

Response: Ohio EPA's commitment to return to the watershed periodically will document improvements. Should the City of Lima and/or the other stakeholders opt to augment this monitoring, please be sure to consult Ohio's credible data law to ensure that such monitoring can be used in any future TMDL or similar work. Information can be found at http://www.epa.ohio.gov/dsw/credibledata/index.aspx.

Comment (RD)
While the stakeholders such as ORC and its members have appreciated the presentations made by OEPA at various times, we believe that greater stakeholder involvement is necessary to ensure compliance with public input requirements and to produce a TMDL that reflects the best science and a reasonable and defensible approach to meeting Water Quality Standards in the Ottawa River (Lima Area) Watershed. On behalf of our members and partners, we request that OEPA work with stakeholder representatives to address all the concerns raised during the public comment period, before OEPA proposes a revised draft TMDL.

Comment (LS)
4. Additional Comments
b. *Compliance with Public Participation Requirements*
OEPA summarizes what it calls "Public Involvement" in Section 1.2 of the Draft TMDL. However, as noted in the Draft TMDL, the public's involvement has been limited, in very large measure, to annual updates by OEPA. It is evident that key stakeholders, including point source dischargers, have not had the opportunity to provide meaningful input and feedback into the technical documents and models that underlie the Draft TMDL. These stakeholders, including PCS, carry almost the sole burden of implementing the TMDL which, as drafted, could expose the company and other dischargers to up to tens of millions of dollars in compliance costs. Adequate public participation is a critical component of TMDL development, as noted by OEPA in the Draft TMDL, and absent this involvement and given the corresponding harm to the dischargers, the Draft TMDL must be reevaluated with discharger involvement. See *Draft TMDL* at 5; 40 C.F.R. § 130.7(a) (referencing the requirement for affected dischargers to be involved in the water quality planning process associated with implementation of CWA § 303(d)).

Response: On this project, Ohio EPA provided many opportunities for interaction (as outlined in the draft TMDL), frequently with the assistance of the Ottawa River Coalition, which is composed of over thirty businesses, agencies and other organizations with interests in the watershed. Ohio EPA also made available all model runs, inputs and data and allowed an extended public comment period in response to requests from dischargers.

As described in Section 1.2 of the draft report, Ohio EPA has met with watershed stakeholders multiple times, as detailed below:

- The Ottawa River Coalition coordinated a meeting to provide input to Ohio EPA's TMDL assessment and then attended the pre-field season planning meeting in April 2010.
- Following completion of the assessment work in the summer of 2010, the Ohio EPA and other state agencies were invited to participate in a dam forum on December 8, 2010.
- Ohio EPA met with citizens, city and county officials, consultants and conservation groups on March 23, 2011 to present the preliminary findings of the water quality survey as they related to the mainstem of the Ottawa River.
- The Ottawa River Coalition hosted public information sessions in the morning and evening of June 20, 2012 in which Ohio EPA asked for public suggestion and comments on the draft implementation plan. Representatives of Ohio EPA participated in the outdoor watershed information event on the river in downtown Lima during the afternoon. An electrofishing demonstration was completed during the event.

The agency also held a meeting prior to the public comment period (on March 26, 2013) in Lima to introduce the draft TMDL and present the findings. The meeting was held by the Ottawa River Coalition and attended by many of its members.

Ohio EPA also made available all model runs, inputs and data and allowed an extended public comment period in response to requests from dischargers.

Comment (LS)

<u>Executive Summary</u>

The Draft TMDL seeks to impose stringent limits on TP from point source dischargers, including PCS, in order to address impairments of Ohio Water Quality Standards for the aquatic life uses designated for the Ottawa River Watershed, particularly in the vicinity of Lima, Ohio. As generally summarized in this Executive Summary and as set forth in detail in these comments, the TP TMDL is arbitrary and capricious, not supported by sound science or by the Watershed data itself, and therefore unlawful for OEPA to (a) use the selected TP endpoint as a standard driving the allocation and (b) to rely upon the QUAL2K D.O. model.

Comment (LS)

As drafted, the Draft TMDL would impose unreasonable and unlawful controls of TP on point source dischargers, including PCS, that would burden these parties with tens of millions of dollars in unnecessary costs. For the reasons outlined in these comments, PCS respectfully submits that, to comply with Ohio law and its water quality regulations, OEPA must (a) withdraw the proposed Draft TMDL (b) reevaluate the findings as they relate to TP in a manner consistent with these comments and in coordination with public input, and (c) prepare a revised Draft TMDL for public comment reflecting these efforts.

Comment (BH)
As drafted, TFI reiterates PCS' analysis that the Draft TMDL would impose unreasonable and unlawful controls of TP on point source dischargers, including PCS, which would burden stakeholders with tens of millions of dollars in unnecessary costs. For the reasons outlined in these and the PCS comments, TFI respectfully submits that, to comply with Ohio law and its water quality regulations, OEPA must:
(a) Withdraw the proposed Draft TMDL;
(b) Reevaluate the findings as they relate to TP in a manner consistent with these comments and in coordination with public input; and
(c) Prepare a revised Draft TMDL for public comment reflecting these efforts.

Comment (BS)
We respectfully request that OEPA not approve this TMDL at this time. The watershed study should be resumed and the methodology adjusted or strengthened in order to best reflect the complexities of this watershed.

Response: Recommended implementation in Section 6 of the report is phased to allow for monitoring as conditions change in the streams, which acknowledges the costs associated with some of the implementation recommendations.

Ohio EPA communicated with the public and with watershed stakeholders at length prior to the public review period. Ohio EPA has a lengthy history of evaluating total phosphorus and believes evaluation of total phosphorus in the draft TMDL report has been accurate. Ohio EPA will submit the TMDL to U.S. EPA for approval.

Comment (LS)
4. Additional Comments
c. *Reservation of rights to challenge any future permit limits and requirement to perform a technical feasibility and economic reasonableness analysis.*
PCS reserves all rights to challenge any future reduction in its allowable TP (or other) discharge upon the issuance by OEPA of a NPDES Permit to PCS containing such limits, whether or not such limits are specifically set forth in any final TMDL. In addition, OEPA must perform a technical feasibility and economic reasonableness analysis on any proposed permit limits, including limits derived as part of a TMDL. This analysis was not performed as part of the "recommended" permit limits in the Draft TMDL and this analysis must be completed before any permit limits are finalized. R.C. 6111.03(J)(3).

Response: Future permit limits must be consistent with an approved TMDL. The process to develop permit conditions is separate from the process to develop TMDLs and provides for public comment as an action of the director of Ohio EPA.

Comment (LS)
4. Additional Comments
d. *TP TMDL De Minims Provision*
As a matter of practice, EPA often includes de minimis provisions in its TMDLs. These provisions document that where a discharge has an inconsequential effect on the receiving water's ability to meet the target water quality standard, that discharge is deemed de minimis and not subject to limitations on the discharge. Given that any reduction in TP discharges by point source dischargers in the 03 subwatershed has not been correlated to a benefit in meeting

water quality standards, any future draft TP TMDL for the Watershed should contain a de minimis provision.

Response: Numerous responses in Section F1 of this appendix attest to the influence of various dischargers on the impairments in the Ottawa River. PCS cannot be considered a de minimus discharge.

Comment (LS)
4. Conclusion
Based on the foregoing, PCS submits that, for the Draft TMDL to meet regulatory standards, the Draft TMDL must be withdrawn as it relates to TP and must be reassessed and revised in a coordinated process involving the key stakeholders and addressing the comments raised herein. PCS appreciates the opportunity to submit these comments on the Draft TMDL and looks forward to working with OEPA in the next steps of the TMDL review process.

Response: After full consideration of all comments submitted (see responses throughout Appendix F), Ohio EPA respectfully disagrees with the commenter.

Comment (BH)
TFI represents the nation's fertilizer industry including producers, importers, retailers, wholesalers and companies that provide services to the fertilizer industry. Its membership is served by a full-time Washington, D.C., staff in various legislative, educational and technical areas as well as with information and public relations programs.

TFI members own and operate fertilizer manufacturing and distribution facilities on the Ottawa River, including PCS Nitrogen. As such, TFI members may incur significant compliance costs to meet the proposed TMDL.

Therefore, TFI supports and adopts the PCS Nitrogen comments by reference.

Response: Please see the responses to comments submitted by PCS Nitrogen.

Comment (BH)
Finally, TFI has assisted with efforts in the Lake Erie region in reducing non-point source discharges utilizing the 4R paradigm (using the right nutrient source at the right rate, time and place.) Ohio, as a result of national industry efforts to increase the awareness of 4R nutrient stewardship, (as well as inclusion of the 4Rs in USDA NRCS nutrient management and 590 guidelines), TFI and Ohio Agribusiness Association (OABA) members took action to help farmers reduce edge of field nutrient losses.

In the spring of 2011, the Ohio fertilizer industry increased engagement in Ohio state water quality issues using the 4Rs and began a 4R educational program to their stakeholders. Industry efforts led to recognition by stakeholder groups like The Nature Conservancy and the Sandusky River Watershed Coalition. Meanwhile, the Ohio State Department of Agriculture (ODA), the Ohio Department of Natural Resources (ODNR), the Ohio Governor's Office and the Ohio EPA were considering voluntary ways to address non-point nutrient losses from agriculture in response to state water quality issues and the EPA guidance memo. As a result of Ohio fertilizer industry efforts and additional stakeholder engagement, the 4Rs were named the foundation of nutrient management efforts in Ohio for non-point sources.

Given the announcement by the ODA and the ODNR, 4Rs gained broader recognition. In 2012, the Ohio governor's office appropriated $3M to encourage farmer adoption of the 4Rs. Currently, a group of precision agriculture providers in the state are developing a voluntary 4R certification program which will be used to recognize organizations and individuals capable of assisting growers with 4R implementation.

TFI strongly suggests that this type of system be also put into place as a part of Ohio's nutrient reduction strategy in the river, and OABA and TFI are willing to assist with this effort.

Response: Ohio EPA appreciates your organization's efforts to minimize nutrients entering waters of the State of Ohio and the U.S. Many of the efforts described in the comment are particularly directed at the Maumee River watershed because it is recognized as the major contributor of phosphorus to the western basin of Lake Erie. Since the Ottawa River is part of the Maumee watershed, 4R programming will likely be widely available to agricultural interests in the project area.

Comment (SS)
Comment 1.1 Prior to implementation, any TMDL must comply with the procedural and substantive requirements applicable to a rule.

Ohio EPA cannot regulate through unpromulgated guidelines. *Jackson Cnty. Envtl. Comm. v. Schregardus*, 642 N.E.2d 1142 (10th Dist. 1994). Under Ohio law, all rules must be adopted by an agency through the promulgation procedures in R.C. Chapter 119. Rulemaking requirements are meant to allow for a complete analysis of the validity and impact of the proposed rule. *Concerned Citizens of Cent. Ohio v. Schregardus*, 10th Dist. No. 01AP-765, 2002-Ohio-1074. A "rule" is statutorily defined as *any* rule, regulation, or standard that has general and uniform operation. R.C.119.01. Therefore, before the Ohio EPA can enforce a rule that has general and uniform operation, it must first be formally promulgated.

The final Ottawa River TMDL will be a rule of general and uniform operation. It will impact a large geographic area and multiple political subdivisions and industries, existing and future, which discharge, directly or indirectly, into the Ottawa River watershed. Thus, consistent with the Ohio authorities cited above, and the federal courts that have considered this issue, Ohio EPA cannot implement or enforce the TMDL until and unless it has engaged in the formal rulemaking process. *Arasco Inc. v. Idaho*, 138 Idaho 719, 69 P.3d 139 (2003); *Comm'rs of Pub. Works v. S.C. Dep't of Health and Envtl. Control*, 372 S.C. 351, 641 S.E.2d 763 (2007)

As a predicate to rulemaking in Ohio, Ohio EPA is required to consider costs and benefits of the TMDL before the rule can be adopted. *See* ORC 127.18; Exec. Order 2011-01K ("Common Sense Initiative"). The Common Sense Initiative specifies that Ohio's regulatory framework must promote economic development, be transparent and responsive to regulated businesses, and provide rules that are predictable and easy to follow. This process requires Ohio EPA to determine the economic impact of rules, such as the TMDL, and choose the rule or regulation that accomplishes the objective, but is the least economically burdensome.

Because Ohio EPA will be substantially limited in its ability to deviate from the approved TMDL, it needs to determine the economic impact of the Draft TMDL Report at this time, rather than after the TMDL has been submitted to U.S. EPA. To Lima's knowledge, Ohio EPA has not performed a financial evaluation of the cost to the regulated community associated with the implementation of the TMDL. Just for Lima, and just to meet the phosphorus limits at the wastewater treatment plant, the estimated capital cost is $58,000,000, with annual operation and maintenance costs of $1,179,000. It is not possible, based on the information in the TMDL, to estimate Lima's cost to comply with the MS4- related portion of the TMDL.

Comment (BH)
The Fertilizer Institute (TFI), on behalf of its member companies, submits these comments in response to the Ohio Environmental Protection Agency's (OEPA or Agency) Proposed Rulemaking entitled *Ohio Environmental Protection Agency Ottawa River (Lima area) Total Maximum Daily Load (April 19, 2013).*

Response: Development of a TMDL is not a state rulemaking. While a state may develop *recommended* TMDLs, those TMDLs have no legal force and effect until they are approved by U.S. EPA. *See Monongahela Power Co. v. Chief, Office of Water Res., Div. of Envtl. Prot.*, 211 W. Va. 619, 629 (W. Va. 2002) (holding that development of a TMDL is not a state rulemaking).

Comment (SS)
Comment 2.2 The draft TMDL document is confusing and poorly structured. A team of professional engineers and scientists intimately familiar with TMDLs were unable to ascertain the methods, data, and assumptions that Ohio EPA used in calculating the five TMDLs (habitat, sediment, total phosphorus, $CBOD_{5,}$ and E. Coli). The TMDL does not provide answers to a number of basic critical questions such as: how were the impairments established? Which ones are the most important at what locations? What are the most important stressors? What are the contributions of the different types of urban and agricultural land uses and how effectively can pollutant load reductions be implemented? Will reductions in the pollutant loads called for in the TMDL result in attainment of the appropriate designated uses? Are the pollutant load reductions called for in the TMDL attainable, and if not, are Use Attainability Analyses (UAAs) needed to define the highest attainable uses?

Comment (SS)
Comment 1.3 The Draft TMDL Report fails to elucidate how the five TMDL limits were derived. For each of the five TMDL limits (habitat, sediment, total phosphorus, $CBOD_{5,}$ and E. Coli), the Draft TMDL Report fails to 1) identify and explain the method used to calculate the limit; 2) identify and explain the data that were used in identifying and quantifying the water body impairment; and 3) explain the relationship between the TMDL limit and how it will address the water body impairments. The TMDL Report is confusing and does not clearly explain the derivation of the TMDL limits or the nature of Ottawa River impairments or the relationship between the TMDL limits and the water body impairments.

Comment (BS)
In our review of the draft report of the TMDL for the Ottawa River Watershed we have had the opportunity to consider it with a substantial number of local watershed partners and stakeholders. This process has brought in a number of outside consultants, who have experience with other TMDLS across this nation.   We have found it extremely disconcerting that reviewer after reviewer, unbeknownst to one another, is returning the same startling warning about the Ottawa River Watershed TMDL – the data that critical regulatory decisions will be predicated on is insufficient and based on the wrong methodology.

Comment (SS)
Comment 6.1 The Report narrative, Executive Summary and Chapters, is at best inconsistent with the Loading Analysis of Appendix D and the Implementation and Reasonable Assurances of Appendix E. The report narrative is misleading, making general statements and presenting speculative assumptions as facts. The statements and assumptions are not substantiated with the data or the quantitative analysis presented in the draft TMDL. The TMDL therefore is not suitable for thorough review and comment in terms of the potential impact on municipal separate storm sewer system (MS4) communities. A few examples of the issues are presented below.

Comment (BS)
The Report narrative, Executive Summary and Chapters, is at best inconsistent with the *Loading Analysis* of Appendix D and the *Implementation and Reasonable Assurances* of Appendix E. The report narrative is misleading, making general statements and presenting speculative assumptions as facts. The statements and assumptions are not substantiated with the data or the quantitative analysis presented in the draft TMDL. The TMDL therefore is not suitable for thorough review and comment in terms of the potential impact on municipal separate storm sewer system (MS4) communities. A few examples of the issues are presented below.

Response: Ohio TMDLs do look a little different than those from other states because TMDLs are completed on a watershed basis and because biological criteria form the basis of impairments and serve as the ultimate endpoints for TMDL "success." It is understandable that consultants familiar only with segment-based TMDLs that rely on chemical criteria might view Ohio's product as somewhat confusing to them.

The biological report and its appendices (Ohio EPA 2013) answer many of the questions posed in the comment, including a discussion of UAAs. The draft TMDL report takes into account some of the challenges inherent in implementing water quality improvement measures, which is why a phased approach and adaptive implementation are recommended. The logic of the organization of the report, as laid out in the table of contents, begins with background and definition of TMDLs, followed by a discussion of the watershed conditions, the loading analysis to address impairments, and then the implementation actions recommended to address impairments.

As the result of the 2010 survey sampling, many aquatic life uses for many streams in the Ottawa River basin were confirmed, verified, and/or were recommended for changes. Biological performance, habitat quality potential, and historical/present land uses are all factors in aquatic life use determinations/recommendations.

Describing the causes and sources associated with observed impairments revealed by the biological criteria and linking this with pollution sources involves an interpretation of multiple lines of evidence, including water chemistry data, sediment data, habitat data, effluent data, biomonitoring results, land use data, and biological response signatures within the biological data themselves. Thus the assignment of principal causes and sources of impairment represents the association of impairments (defined by response indicators) with stressor and exposure indicators.

Comment (SS)
Comment 1.4 A more specific implementation plan, that accurately reflects the time and expense of complying with the TMDL, must be provided.
While the implementation plan provided in Appendix E lists some potentially useful actions, there are no timeframes or recognition of the challenges associated with implementation (such as funding). In order to be enforceable, the TMDL must have an implementation plan, and the implementation plan needs to address how to attain the water quality standards for each pollutant for which a TMDL has been assigned.

Comment (SS)
Comment 2.5 While the implementation plan provided in Appendix E lists some potentially useful actions, there are no timeframes or recognition of the challenges associated with implementation (such as funding, land use implications, site-specific challenges and effectiveness of BMPs).

Response: Appendix E outlines options, serving as a repository of different programs that exist to aid in implementing water quality improvement, outside of any specific watershed or political jurisdiction. It is essentially a "boilerplate" appendix included in all recent Ohio TMDLs. Thus, time frames and implications for a specific watershed are not appropriate.

TMDLs are planning documents that are implemented through federal, state, and local programs and the actions of public and private stakeholders. The TMDL analyzes the water quality conditions and recommends what needs to happen to improve water quality (see Chapter 6 of the TMDL). Also in Chapter 6, Ohio EPA indicates how it plans to use its resources, authority and responsibility in the watershed.

Using this information, local stakeholders should identify actions that they can take to restore water quality. Frequently, local watershed groups (such as the Ottawa River Coalition) lead a local effort to develop a watershed action plan and procure funding for actions. Ohio EPA provides technical assistance to these local efforts when requested. Funding for planning and on-the-ground actions is available from federal and state agencies and private foundations.

Comment (SS)
Comment 2.13 The 2010 data was just published in April 2013. Commenters should be provided more time to review these data to evaluate whether Ohio EPA's interpretation of the data is appropriate.

Response: The technical support document was published in 2013 (see http://epa.ohio.gov/dsw/document_index/psdindx.aspx); however, preliminary data were presented to stakeholders at several meetings in previous years. In addition, commenters were well aware that the Ohio EPA surveyed the watershed's condition in 2010 and data are always available by simply requesting it. The survey data was also available on Ohio EPA's web site.

Comment (SS)
Comment 6.5 Recommendations for Watershed Improvements
Appendices D: Load Allocation and E: Implementation and Reasonable Assurance fail to forge any meaningful link between the types of recommended Best Management Practices (BMP) to potential sources of pollution. There was no attempt to attribute pollutants and loads to the land

use, nor align BMPs to address pollutant sources. This means that there is no reasonable assurance that BMPs will result in load reductions that will help restore the beneficial uses.

Comment (BS)
Recommendations for Watershed Improvements:
Appendices D: *Load Allocation* and E: *Implementation and Reasonable Assurance* fail to forge any meaningful link between the types of recommended Best Management Practices (BMP) to potential sources of pollution. There was not an attempt to attribute pollutants and loads to the land use nor align BMPs to address pollutant sources. This means that there is no reasonable assurance that BMPs will result in load reductions that will help restore the beneficial uses.

Response: Table 6-1 associates causes with sources, and categories of implementation actions are recommended based on these cause/source associations. Reasonable assurances are discussed in Section 6.6 and are supported by Tables 6-1, 6-6, 6-7 and 6-8. The BMPs listed are well known and utilized for nonpoint source sediment and nutrient runoff reduction by state, local, and national agencies and are endorsed by the agricultural and soil conservation community. Ohio EPA acknowledges the importance of locally-led implementation, so it has not been overly prescriptive in the nonpoint source-based actions recommended to implement the TMDLs.

Comment (SS)
Comment 6.7 Implementation – The report states that “An adaptive management approach will be taken in the watershed.” (pg E-35) However, the lack of data and the flawed scientific approach fail to provide the means to follow an adaptive management approach. The lack of data and quantification of current conditions provides no baseline for future comparison.

- The approach taken in the TMDL to allocate a speculative wasteload to only one MS4 provides no method of quantifying improvements. The flawed approach allocates urban stormwater wasteload on the overly simplified basis of land area.
- The means of allocation presented in the report provides no scientific basis for quantifying the loads, while neglecting even the most fundamental attempt to attribute the source and quantify of pollutant to the land use and hydrology.
- The report narrative provides a misleading, general statement that adaptive management approach will be taken, without providing any foundation from which to quantify improvements. The approach to quantify existing conditions loads must be consistent with evaluating load reduction strategies to provide a foundation for adaptive management. Ignorance of the pollutant source and loading prevents an effective adaptive management process.

Comment (BS)
<u>Implementation:</u> The report states that “An adaptive management approach will be taken in the watershed.” (pg E-35) The lack of data and the flawed scientific approach fails to provide the means to follow an adaptive management approach. The lack of data and quantification of current conditions provides no baseline for future comparison.

- The approach taken in the TMDL to allocate a speculative wasteload to only one MS4 provides no method of quantifying improvements. The flawed approach allocates urban stormwater wasteload on the overly simplified basis of land area.
- The means of allocation presented in the report provides no scientific basis for quantifying the loads, while neglecting even the most fundamental attempt to attribute the source and quantify pollutants to the land use and hydrology.

- The report narrative provides a misleading, general statement that adaptive management approach will be taken, without providing any foundation from which to quantify improvements. The approach to quantify existing conditions loads must be consistent with evaluating load reduction strategies to provide a foundation for adaptive management. Ignorance of the pollutant source and loading prevents an effective adaptive management process.

Comment (RD)
Even though Appendix A defines six NPDES MS4 permittees, the urban stormwater waste load allocations are exclusively being assigned to the City of Lima MS4 permit number 2GQ00021. The majority of the stream segments targeted in Table 6-4 are outside of the City of Lima's jurisdiction.

Response: The urbanized area covering all six MS4 permits was combined into one WLA. The final report has been improved to show the WLA split according to permittee and area.

Ohio EPA collected data in 2010 and 2011 to assess the current conditions, and it is on those data that the TMDLs are based. Results of biological performance were ascribed to causes and sources, which were tied to land use and hydrology (see the *Biological and Water Quality Study of the Ottawa River and Principal Tributaries, 2010. Allen, Auglaize, Hardin, Hancock and Putnam Counties, Ohio* (Ohio EPA 2013)).

An adaptive management approach allows for changes in the management strategy as environmental indicators suggest that the current actions are working or not. Improvements are measured by Ohio EPA in biological performance as has happened in previous surveys that documented improvements after previous actions and continued/newly revealed issues. As Ohio EPA collects more data in the watershed after Lima makes substantial progress with implementing the long-term control plan, the new data will inform future decisions.

Comment (SS)
Comment 6.8 Storm Water Program
The report states that "Through the Storm Water Program, the Ohio EPA will ensure that the storm water related recommendations of this TMDL are applied." (pg E-26). The report fails to clearly define the storm water recommendations. The only narrative discussion for "Recommendations for regulatory action" with respect to storm water pertains to BMPs that increase infiltration to address organic enrichment. (pg xi). Ohio EPA fails to present any information that links increased infiltration of stormwater with reductions in organic enrichment. This is important because the agency is presuming that the MS4 wasteload allocations can be met with BMPs that focus on infiltration. This could result in permit requirements at a later date that specify technologies that will be ineffective at restoring the beneficial uses of the river.

Comment (BS)
<u>Storm Water Program:</u>
The report states that "Through the Storm Water Program, the Ohio EPA will ensure that the storm water related recommendations of this TMDL are applied." (pg E-26). The report fails to clearly define the storm water recommendations. The only narrative discussion for "Recommendations for regulatory action" with respect to storm water pertains to BMPs that increase infiltration to address organic enrichment. (pg xi). Ohio EPA failed to present any information that links increased infiltration of stormwater with reductions in organic enrichment. This is important because the agency is presuming that the MS4 wasteload allocations can be

met with BMPs that focus on infiltration. This could result in permit requirements at a later date that specify technologies that will be ineffective at restoring the beneficial uses of the river.

Comment (BS)
We appreciate this opportunity to comment on the Ottawa River Watershed Draft TMDL. From what we understand, when this TMDL is approved by USEPA, it effectively becomes law in that it has the power to dictate the permit levels for specific parameters within the regulated community of the Ottawa River watershed, including the MS4 permits. Allen County ETAL is the permittee and operator of MS4 permit# 2GQ00010*BG. Our permit covers approximately 40 square miles (~73%) of the Lima Ohio Urbanized Area. Therefore we recognize the serious implications of this TMDL and its wasteload allocations to further unfunded mandates that the MS4 Program represents for Allen County and its citizens….

This TMDL does not assign the WLAs between the different MS4 permits. The following questions and concerns arise from the information in Table 6-4:

1. The City of Lima's MS4 permit is referenced exclusively.
2. Ohio EPA has not provided any information as to how the wasteload allocation for the MS4s will be incorporated into the permits. Language should be added to Section 6.1 to address this.
3. Is Section 6.1 the extent of the MS4 regulatory recommendations, or the "law", that can be imposed on our MS4 permits? Appendix D Loading Analysis Information, Section D4 Results would suggest otherwise, especially with regard to WLA assignations to the Lima MS4 for $CBOD_5$ and Sediment/Habitat TMDLS.

Response: The commenter has been misinformed: TMDLs do not "effectively" become law (or a rule). Any subsequent permit for the parameter in question must be consistent with the TMDL, but there is wide latitude in what constitutes consistency in terms of timeframes, numeric vs. narrative conditions, etc. These decisions are made at the time the permit is issued and are subject to public comment as an action of the director of Ohio EPA.

Ohio EPA's intention here is that MS4s should be aware of applicable TMDLs and make informed decisions on a proper suite of BMPs, selected in order to address water quality concerns as noted in an associated TMDL. These BMPs shall be of the variety that once implemented, would be effective in establishing improvements towards water quality.

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