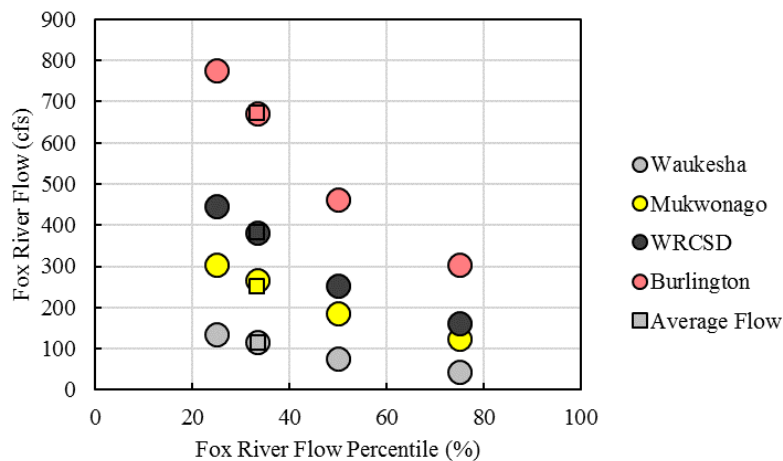


Western Racine County Sewerage District – Adaptive Management Plan Request Supporting Information

Fox River Flows

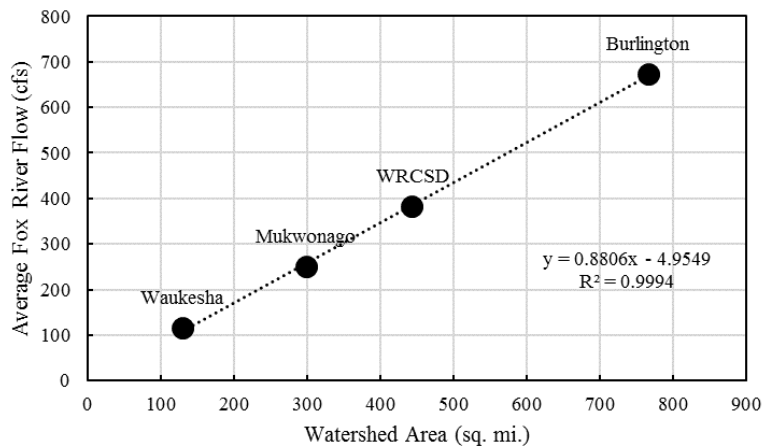
To evaluate Adaptive Management (AM) at the Western Racine County Sewerage District (WRCSD), the average flow of the Fox River at WRCSD was estimated. The Pollutant Reduction Estimate Tool (PRESTO) from the Wisconsin Department of Natural Resources (WDNR) was used to estimate the watershed area and Fox River flow. As Watershed areas and Fox River flow percentiles were determined for several communities along the Fox River, as included in the Appendix. These data were then compared to the average Fox River flows reported in recently completed Adaptive Management Plan (AMPs) for Burlington and Mukwonago. In cases where an average flow was unavailable, the 33rd-percentile flow was used as an approximation of the average flow. Figure 1 demonstrates that this approximation was valid for all communities evaluated.

Figure 1: Fox River Flow vs. Fox River Flow Percentile



To confirm the relationship between watershed area and average flow of the Fox River, the average Fox River Flow was then plotted as a function of the watershed area. As seen in Figure 2, there was a linear relationship for all communities evaluated.

Figure 2: Fox River Flow vs. Watershed Area



Upstream Fox River NR 217 Median Growing Season Phosphorus Concentration

The median growing season phosphorus concentration was then determined for the Fox River immediately upstream of the outfall at WRCSO. This upstream Fox River phosphorus concentration was determined to be 0.098 mg/L, based on 28-day rolling averages from August 2015 – July 2020. The full dataset is included in the Appendix.

Eligibility, Point of Compliance Phosphorus Level, and Ultimate Reductions Required

Although the upstream median concentration of 0.098 mg/L meets the Water Quality Criterion (WQC) of 0.100 mg/L, a mass balance determined that the receiving water (point of compliance) does not meet the WQC.

Per the Adaptive Management Technical Handbook, the first requirement for AM eligibility is whether “the receiving water is exceeding the applicable phosphorus criterion”. The receiving water is determined at the confluence of the WRCSO effluent outfall and the Fox River. Based on Table 1, a mass balance shows that the receiving water, also known as the point of compliance, receives approximately 75,991 lb/yr of phosphorus loading. For the Fox River to meet the WQC of 0.100 mg/L, the loading cannot exceed 75,595 lb/yr. Therefore, the phosphorus loading exceeds the WQC limit, and ultimate reductions of 396 lb/yr would be required to meet the WQC. Therefore, WRCSO meets the first requirement of AM eligibility.

Table 1: Reductions Required Based on Fox River Sampling				
Fox River Sampling (Aug 2015-Jul 2020)	Flow (MGD)	Phosphorus Loading (lb/yr)	Phosphorus Conc. (mg/L)	% of Total Loading
Sum Upstream	247	73,725	0.098	97%
WRCSO Effluent (2015-2020)	1.2	2,266	0.62	3%
Point of Compliance - Current	248	75,991	0.101	-
Point of Compliance - Limit	248	75,595	0.100	-
Ultimate Reductions Required	-	396	-	-

The second requirement for AM eligibility is based on whether filtration would be required to meet the new limit. Based on an upstream median concentration of 0.098 mg/L, the Water Quality Based Effluent Limit (WQBEL) at WRCSO would remain below 0.2 mg/L. As detailed in the Preliminary Compliance Alternatives Plan, WRCSO’s effluent could not comply with a WQBEL below 0.2 mg/L without tertiary filtration or nonpoint source compliance alternatives. At WRCSO’s design flow of 2.53 mgd and an estimated 7Q2 of 72 cfs, the WQBEL would be 0.137 mg/L. Therefore, WRCSO meets the second requirement of AM eligibility.

The third requirement for AM eligibility is based on whether nonpoint sources contribute at least 50% of the total phosphorus entering the receiving water. Based on the PRESTO report for WRCSO in the Appendix (Reach ID 200211805), it is most likely that nonpoint sources contribute approximately 65% of the loading at the point of compliance, with a possibility of up to 80% of the load estimated for Adaptive Management eligibility determinations. Therefore, more than 50% of the loading is derived from nonpoint sources, and WRCSO meets the third requirement for AM eligibility.

The final requirements for AM eligibility are based on WRCSO’s 1) willingness to partner with other phosphorus contributors in its action area and 2) capability to meet an interim phosphorus limit of 0.60 mg/L. Based on its proposed AMP partners and its current effluent concentration of 0.62 mg/L, WRCSO is willing and able to meet these requirements. Therefore, WRCSO meets all requirements for AM eligibility.

Required Reductions – Permit Term 1

Based on Table 1, ultimate reductions of 396 lb/yr will be necessary to meet the WQC at the point of compliance. These ultimate reductions will be required by the end of the second permit term (Year 10 of the AMP). The WDNR specifies two calculations for determine the minimum reductions to occur by the end of the first permit term (Year 5 of the AMP).

Proportional Loading Minimum Reductions

As shown in Table 2, the first method is a proportional loading minimum reduction. In this method, the proportional phosphorus loading of WRCSD was determined to be 3%, as shown in Table 1. This proportion is then multiplied by the ultimate required reductions of 396 lb/yr to yield a product of 12 lb/yr. This minimum reduction is the absolute minimum reduction that the WDNR will accept to maintain continued eligibility for AM.

On-Track (50%) Minimum Reductions

The actual target first-term reductions will be at least 198 lb/yr, based on the on-track minimum reductions shown in Table 2. WDNR guidance from the AM Technical Handbook states that:

“Adaptive management applicants should consider offsetting more than the required amount when the overall water quality load reduction goal is far greater than the minimum reduction requirement or when the receiving water is likely to respond slowly to changes in land use in the watershed. In these scenarios, it is recommended to target 50% of the load reduction needed to meet water quality criteria, rather than the minimum offset required”

The ultimate reductions required are far greater than the proportional loading minimum reduction requirement. Therefore, at least half (198 lb/yr) of the ultimate reductions (396 lb/yr) will be targeted within the first permit term. Notably, these reductions will consist of both point source reductions as well as nonpoint source reductions. A proposed breakdown will be included in the Adaptive Management Plan.

Table 2: Reductions Required			
	% of Ultimate Reductions Required	Phosphorus Loading (lb/yr)	Source
Ultimate Reductions Required		396	Table 2: 396 lb/yr required for Fox River to meet WQC.
Proportional Loading Minimum Reduction	3%	12	Table 2: WRCSD loading is 3% of Total Loading to Point of Compliance.
On-Track (50%) Minimum Reduction	50%	198	AM Technical Handbook: 50% of ultimate reductions required as minimum reduction within first permit term.

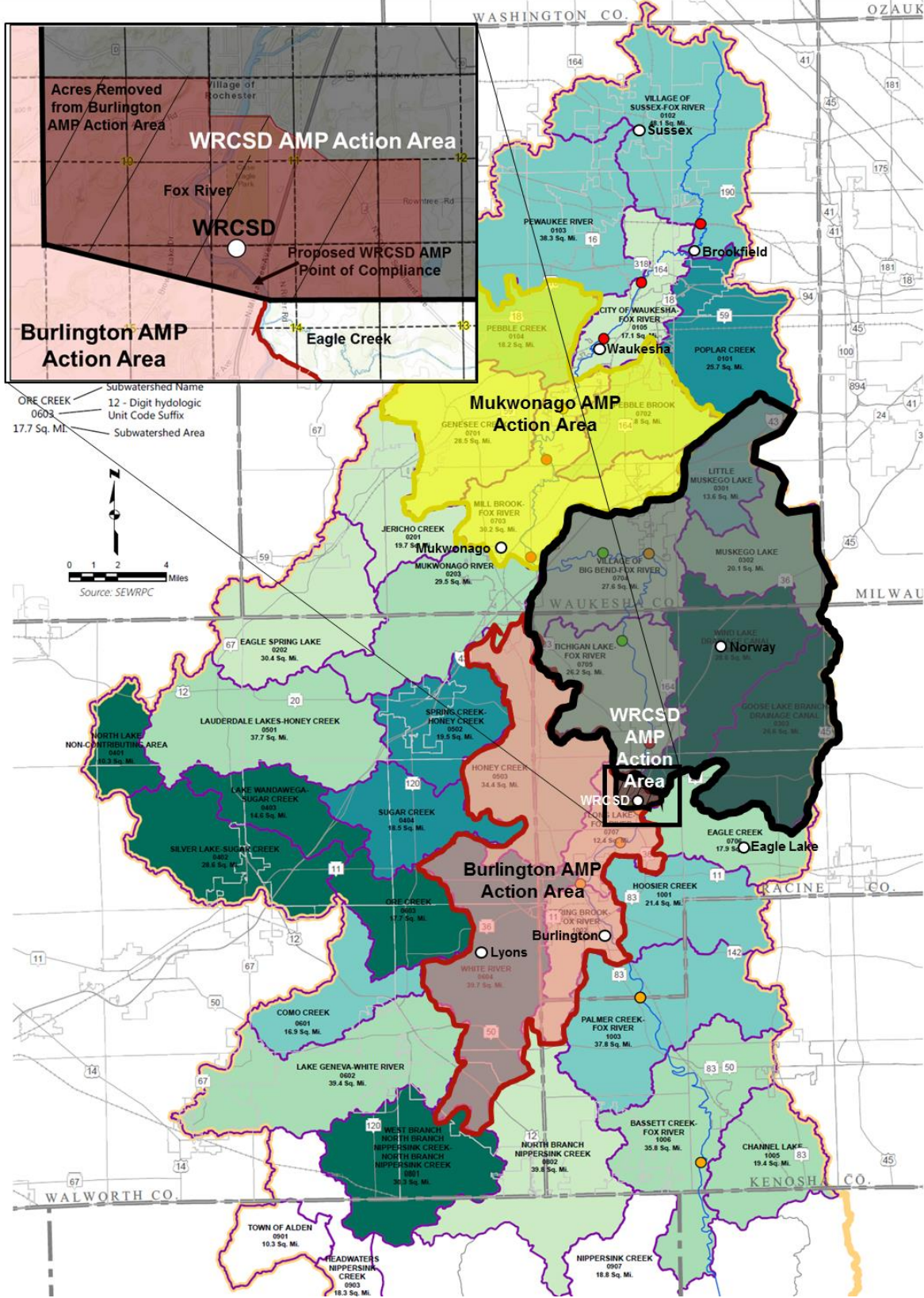
WRCSD Adaptive Management Plan Action Area

The proposed WRCSD AMP Action Area is shown in Table 3 and Figure 3. It is anticipated that many opportunities for nonpoint source reductions will be available in the subwatersheds of the Wind Lake Drainage Canal (0304) and Goose Lake Branch Drainage Canal (0303). Other opportunities will be explored in the remaining subwatersheds. In addition, approximately 2.3 square miles of the Long Lake – Fox River Subwatershed (0707) will be removed from the existing Action Area for Burlington and added to the Action Area for the WRCSD AMP. This area is immediately adjacent to WRCSD, which will allow for the point of compliance (POC) to be downstream of WRCD’s effluent outfall.

Table 3: WRCSD AMP Action Area			
Subwatershed (HUC 12)		Area (sq. mi)	% of Action Area
Little Muskego Lake	071200060301	13.6	9%
Muskego Lake	071200060302	20.1	14%
Goose Lake Branch Drainage Canal	071200060303	26.6	18%
Wind Lake Drainage Canal	071200060304	28.6	20%
Village of Big Bend-Fox River	071200060704	27.6	19%
Tichigan Lake - Fox River	071200060705	26.2	18%
Long Lake - Fox River*	071200060707	2.3	2%
WRCSD AMP Action Area		145.0	

*Note: only 18% of 071200060707 is included in Action Area

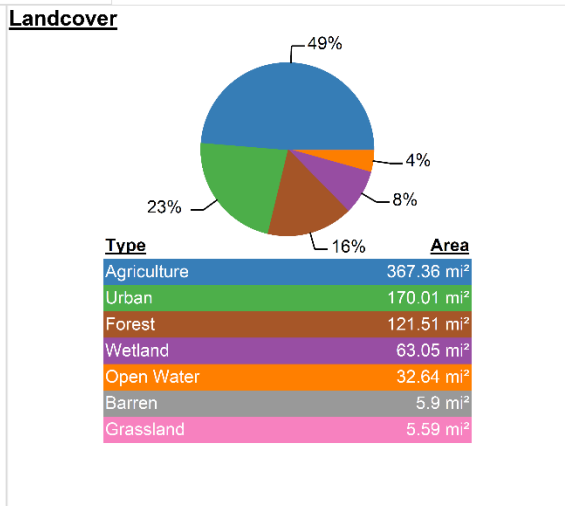
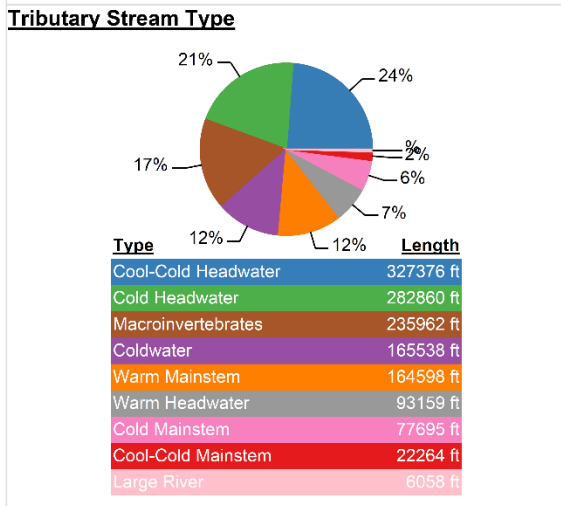
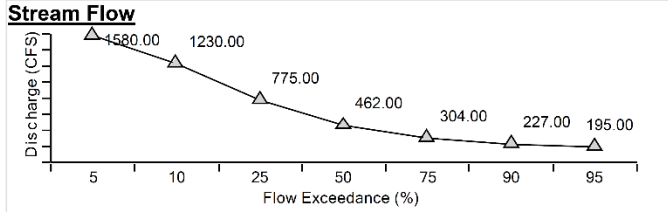
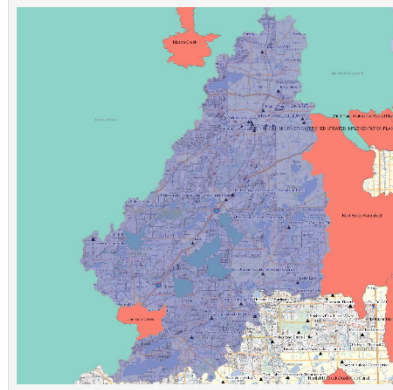
Figure 3: WRCS AMP Action Area



APPENDIX

City of Burlington PRESTO-Lite Watershed Delineation Report

Reach ID: 200006075
 Watershed Name: Spring Brook-Fox River
 Waterbody Name: Fox River
 HUC08: Upper Fox
 Watershed Area: 766.14 mi²
 Average Annual Precipitation: 33.98in

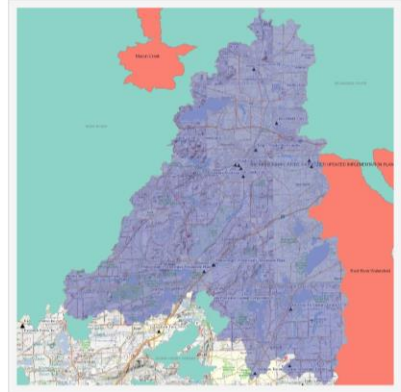


PRESTO Phosphorus Load Estimate

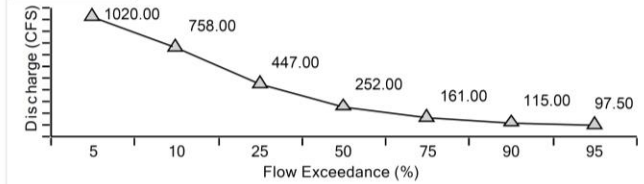
Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	114,492 (51,001 - 257,020) lbs
Number of Facilities (Individual Facility Information below)	15
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	43,376lbs
Most Likely Point : Nonpoint Phosphorous Ratio	27% : 73%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	14% : 86%

Western Racine County Sewerage District PRESTO-Lite Watershed Delineation Report

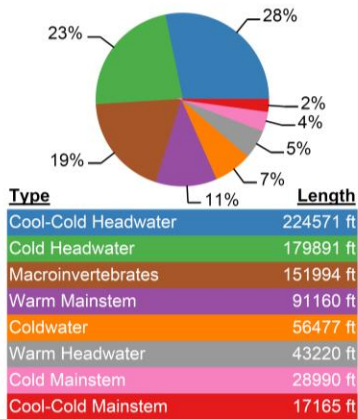
Reach ID: 200211805
Watershed Name: Long Lake-Fox River
Waterbody Name: Fox River
HUC08: Upper Fox
Watershed Area: 443.19 mi ²
Average Annual Precipitation: 33.66in



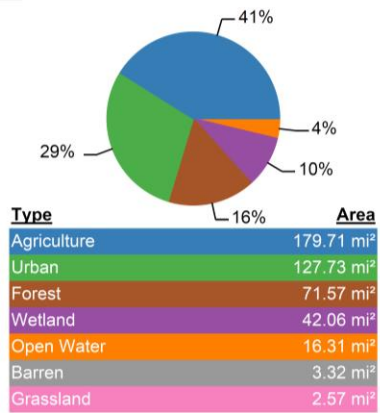
Stream Flow



Tributary Stream Type



Landcover

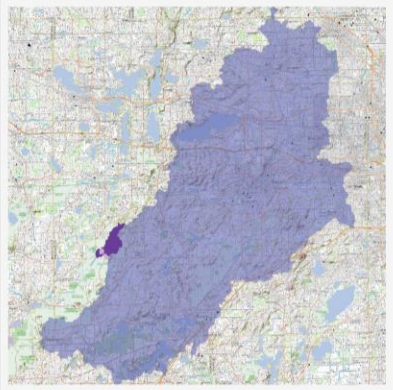


PRESTO Phosphorus Load Estimate

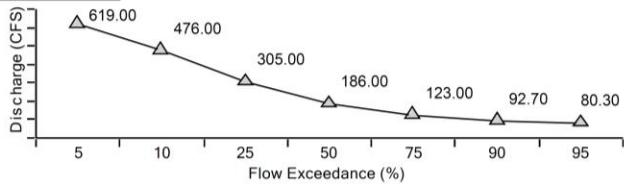
Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	62,032 (27,707 - 138,881) lbs
Number of Facilities (Individual Facility Information below)	8
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	33,742lbs
Most Likely Point : Nonpoint Phosphorous Ratio	35% : 65%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	20% : 80%

City of Mukwonago PRESTO-Lite Watershed Delineation Report

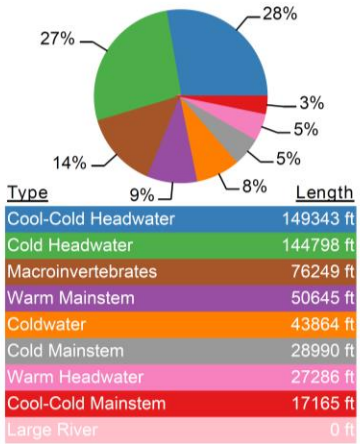
Reach ID: 200212023
Watershed Name: Village of Big Bend-Fox River
Waterbody Name: Fox River
HUC08: Upper Fox
Watershed Area: 298.49 mi ²
Average Annual Precipitation: 33.62in



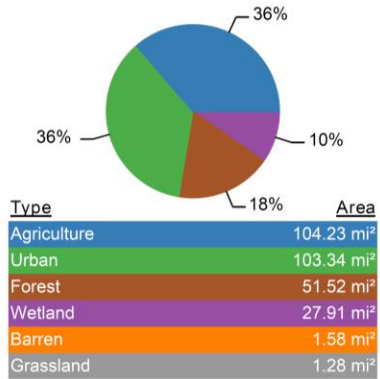
Stream Flow



Tributary Stream Type



Landcover

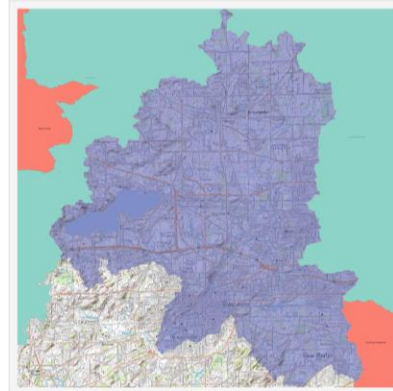


PRESTO Phosphorus Load Estimate

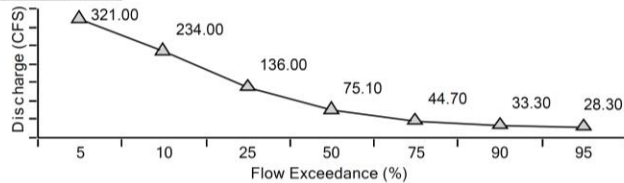
Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	37,021 (16,668 - 82,223) lbs
Number of Facilities (Individual Facility Information below)	5
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	30,519lbs
Most Likely Point : Nonpoint Phosphorous Ratio	45% : 55%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	27% : 73%

City of Waukesha PRESTO-Lite Watershed Delineation Report

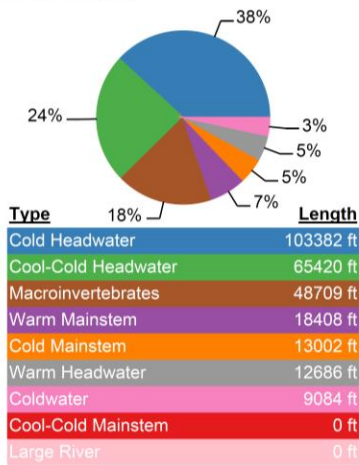
Reach ID: 200212130
Watershed Name: City of Waukesha-Fox River
Waterbody Name: Fox River
HUC08: Upper Fox
Watershed Area: 129.17 mi ²
Average Annual Precipitation: 33.43in



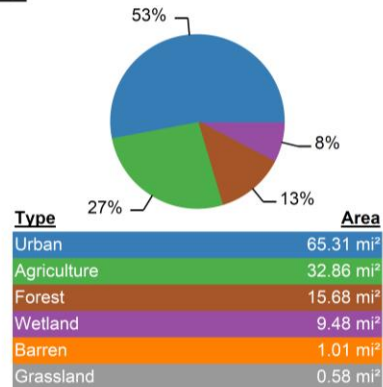
Stream Flow



Tributary Stream Type



Landcover



PRESTO Phosphorus Load Estimate

Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	25,298 (10,788 - 59,324) lbs
Number of Facilities (Individual Facility Information below)	4
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	28,885lbs
Most Likely Point : Nonpoint Phosphorous Ratio	53% : 47%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	33% : 67%