Lower Fox River Volunteer Monitoring Program

Lower Fox River Basin TMDL

2022 Project Summary

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August 2023

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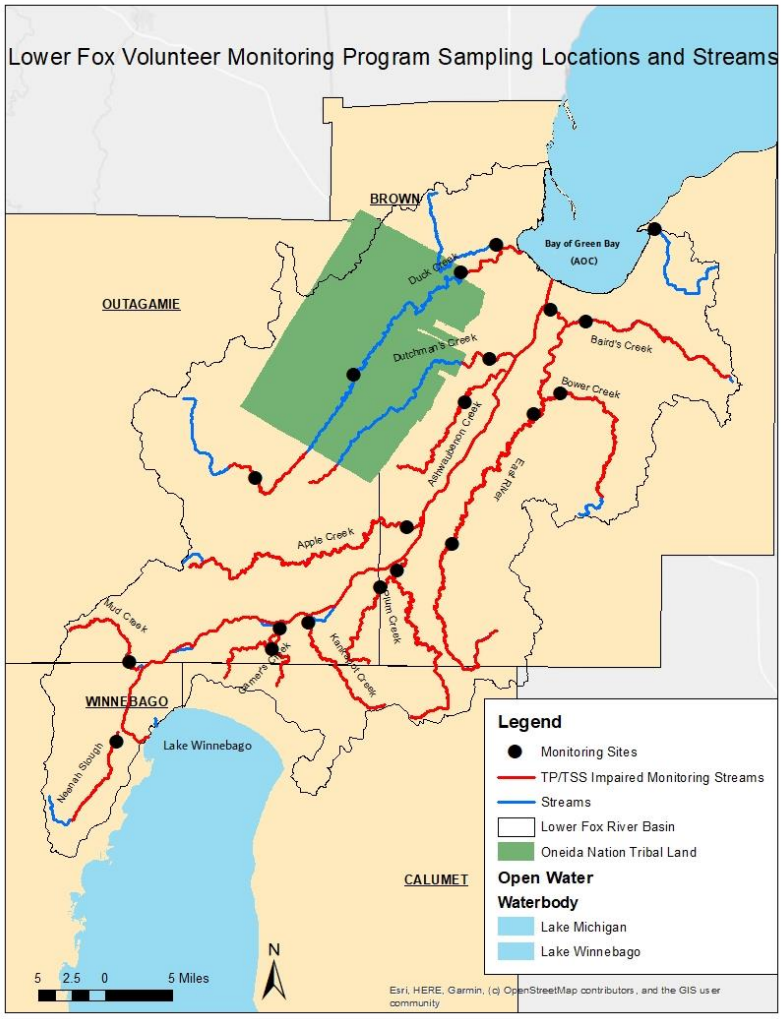
Project Location

The Lower Fox River Volunteer Monitoring Program is in support of the Lower Fox River Basin (LFRB) Total Maximum Daily Load (TMDL). Specifically, the Program monitors 20 sampling locations on 16 streams within the Lower Fox River Basin in Northeast Wisconsin. These tributaries and streams in the Basin contribute nutrients and sediment directly to the Fox River, Lower Green Bay, and Fox River Area of Concern (AOC). The LFRB is approximately 640 sq. miles and extends from the outlet of Lake Winnebago to Green Bay and includes portions of four counties (Outagamie, Brown, Winnebago, and Calumet) and Oneida Nation (map below).

The Program relies on citizen volunteers to collect surface water samples from 20 sampling locations across 16 streams throughout the LFRB. The streams and monitoring locations are displayed in the map below and more detailed location information can be found in Appendix A.



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Project Background

The Lower Fox River TMDL was approved by the EPA in 2012. The goal of the TMDL is to improve water quality by reducing total phosphorus (TP) and total suspended solids (TSS) in the LFRB. The TMDL identifies and quantifies the sources and necessary phosphorus and sediment reductions to meet water quality goals. To facilitate TMDL implementation, smaller sub-basins were identified within the LFRB to help target high phosphorus and sediment loading watersheds. As TMDL implementation progresses, one objective is to evaluate long-term water quality trends within the entirety of the LFRB.

The Lower Fox River Volunteer Monitoring Program (LFRVMP) began in 2015 to achieve some of the monitoring objectives resulting from the TMDL. The program started with 14 sampling locations across 13 tributary streams. Three new sites were added to the program in 2018 and an additional three new sites were added in 2020 to total 20 sampling sites across 16 streams. Some sampling sites were chosen because they represent the confluence of a tributary stream to the Lower Fox River and can therefore help represent the water quality of a TMDL sub-basin. Other sampling locations were chosen due to implementation activities beginning in the watershed or where high phosphorus and sediment loading is occurring.

Given the time commitment and spatial location of the sampling locations, the assistance of volunteers is vital to the success of the program. Volunteers serve the essential role of data collectors, as they collect monthly (May – October) surface water samples at 20 sampling locations across the LFRB. Volunteers are trained on the proper sampling protocol before the sampling season by Wisconsin DNR staff to ensure reliable and accurate results are achieved each month.

Problem Statement

The Lower Green Bay and waters within the LFRB are impaired due to excessive phosphorus and sediment loading. TMDL implementation focuses on restoring waters impaired by excessive sediment and/or high phosphorus concentrations. Phosphorus and sediment cause numerous impairments to waterways, including low dissolved oxygen concentrations, degraded habitat, and excessive turbidity. These impairments adversely impact fish and aquatic life, water quality, recreation, and potentially navigation.

Every two years, Sections 303(d) and 305(b) of the Clean Water Act (CWA) requires states to publish a list of all waters not meeting water quality standards and an overall report on surface water quality status of all waters in the state. Of the 16 sampling streams, 14 are listed as impaired for TP and/or TSS on the 2022 303(d) Impaired Waters List. Appendix B includes more information about the impaired monitoring streams.

All but two of the monitored streams, Lancaster Creek, which is a reference stream, and Wequiock Creek, are impaired due to high levels of TP and/or TSS in the water. In addition, their

downstream receiving waters, the Lower Green Bay and Fox River (LGBFR), are also impaired for TP and TSS and the AOC has a total of 13 Beneficial Use Impairments (BUI's) (11 impairments confirmed, two suspected). The EPA-approved TMDL for the Lower Fox River Basin identifies the reductions needed to meet water quality goals. Since Phosphorus and sediment loading impacts several of the BUI's in the LGBFR AOC, the goals of the AOC and TMDL (removal of the BUI's and meeting the TMDL reductions, respectively) are closely intertwined, and effective implementation of the TMDL is critical to the restoration of the Lower Fox River and Bay.

Project Goals

There are two main goals for this project: (1) increase public awareness and involvement of water quality issues by engaging the public in citizen science and (2) the collection of reliable surface water quality data to assess long-term water quality trends/success. The Program aims to increase community awareness on local water quality issues and the impact of land use decisions around them. The focus is to raise awareness through building a volunteer base and increasing community involvement and engagement.

Through citizen science the Program goal is to collect reliable data to characterize TP, dissolved reactive phosphorus (DRP), diatom phosphorus index (every 10 years), TSS, total nitrogen (TN), and associated chemical and physical characteristics in the Lower Fox tributary streams during the primary algae and aquatic plant "growing season" of May through October. The monitoring data brings focus to which streams are affected by elevated phosphorus and sediment concentrations.

It is important to note, however, that research is currently underway into the relationship between the reduction of TP, DRP, and biological responses. The collection of both TP and DRP will help strengthen the understanding of these relationships and effects they may have on biological responses in the Lower Fox River tributaries.

Additional goals of this project include:

1. Evaluate nutrient and sediment concentrations in the tributaries discharging to the Fox River
2. Monitor the health of the watershed overtime
3. Provide a basis for evaluation of the long-term effectiveness of implementation of the Lower Fox River TMDL; are there water quality improvements in watersheds with the implementation of best management practices?
4. Share water quality data broadly among stakeholders to collectively assess water quality

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Proposed Work and Sampling Procedure

2022 is the eighth year the WDNR has led the Lower Fox River Volunteer Monitoring program. Project structure remained the same in 2022 as implementation of volunteer monitoring efforts are coordinated by WDNR staff. Specifically, the WDNR:

- Continues to develop a well-trained volunteer base through various means of recruitment and community engagement:
    - Volunteers are trained to follow Water Action Volunteer (WAV) (https://wateractionvolunteers.org/) monitoring protocol to ensure consistency is being met in each sample
    - Volunteers collect and ship surface water samples in iced coolers to the Wisconsin State Lab of Hygiene (WSLH) for analysis of TP, DRP, TSS, and TN
    - Volunteers collect streamflow and transparency data at the time of surface water sample collection
    - Duplicate samples are collected at randomly selected sites throughout the sampling season (Appendix I). Duplicates are collected on the same day and at the same time as the regular sample
- Continue to provide support to volunteers as needed
    - Ensure safe access and suitability at each monitoring station
    - Ordering, preparing, and maintaining supplies for volunteers to successfully carry out monitoring activities and shipment of samples
    - Fostering an open line of communication with volunteers to ensure that all stations are being monitored at the frequency outlined in the project QAPP
- Confirm that all 20 monitoring locations are monitored monthly from May to October for a total of 6 monitoring events
- Compile monthly sampling data results to share with volunteers and stakeholders
    - Record data into tables and graphs for analysis
    - Develop an annual report complete with data and figures to share with stakeholders to assess annual water quality

2022 Sampling Season

Summary

Water sampling continued in May 2022. The DNR Coordinator delivered sampling equipment and some supplies to volunteers starting in April. Some sampling supplies such as sample bottles, coolers and liner bags, preservative acid, and DRP supplies were shipped to volunteers from the WSLH. Lab slips and shipping labels were created and shipped from DNR Central Office.

The sample collection completeness for the season was 95.85%, which is 4% more than 2021. There were only two sites with missed samples, Dutchman and Lancaster creeks. A percent completeness by sampling location table is provided in Appendix C.

Shipping changed from FedEx Priority Overnight to the US Postal Service (USPS) Priority Mail in 2021 and USPS was still used in 2022. The switch allowed for more convenient package drop off for volunteers sampling in more remote areas. All shipping labels were printed and provided to volunteers at the start of the season.

A total of 34 DRP samples (including duplicate samples), or 27% of DRP samples collected, were flagged in 2022 due to samples exceeding the 48-hour hold time for DRP analysis. For reference, 73 DRP samples, or 56%, were flagged in 2021. Although these samples are flagged by the lab for exceeding the analysis holding time, they are still able to be processed. All sampling data from 2015 – 2022 is provided in Appendix D. Volunteers are reminded each sampling season to ship samples immediately after collection or as early as possible the next day. Getting samples to the lab and analyzed within 48 hours continues to be an area for improvement as shipping times can vary by carrier and shipping origin. The WSLH may also not have the capacity to analyze samples immediately after receiving them which also impacts sample analysis.

A group of 16 volunteers monitored the 20 sites in 2022. Fifteen volunteers from the 2021 season returned for the 2022 season and the program gained one new volunteer. A program-wide training was not held due to the amount of returning trained volunteers and the ongoing COVID-19 pandemic, so the one new volunteer was trained at their sampling location in May. This style of training will be used for future seasons due to the flexibility with volunteers' schedules and the assurance volunteers are taking their sample at the correct location.

Over the course of seven sampling seasons, over 40 volunteers have participated in the Program. Some volunteers have returned to sample the same location in consecutive years while new volunteers are recruited to sample vacant monitoring sites. The table on the next page displays volunteer participation in the program.

Volunteer Recruitment								
	2015	2016	2017	2018	2019	2020	2021	2022
New	8	11	8	6	1	6	1	1
Returning		1	4	8	12	10	15	15

The LFRVMP receives many inquiries from individuals interested in volunteering. Volunteer recruitment is one aspect of the program that consistently needs to be carried out. The Program should continue to recruit volunteers despite having a volunteer at every stream. It would be better to have multiple volunteers at each sampling location to learn with each other and help each other collect the samples. The more volunteers that are recruited, the more the message gets out in the community, which is a main goal of the Program.

Outreach

- A Lower Fox River Volunteer Monitoring Fact Sheet (Appendix K) was shared broadly to help recruit volunteers
- The DNR Coordinator worked with the Fox Wolf Watershed Alliance Program Coordinator to further extend volunteer recruitment
- Information about the LFRVMP is displayed on the Lower Fox TMDL webpage and the Water Action Volunteer website to further promote the program

Water Quality Data

Wisconsin Listing Methodology

To evaluate stream water quality and TP reductions, the WDNR follows a standard assessment procedure which accounts for sample methods, timing, variability, sample size and statistical confidence to more confidently determine whether a stream meets water quality criteria. The LFRVMP TP sampling data is compared to Wisconsin's TP water quality criteria (WQC) for streams (0.075 mg/L) by calculating a 90% confidence limit around the Growing Season Median (GSM) of the TP sample dataset. A stream is considered impaired for TP if the lower confidence limit (LCL) of the GSM (May – October) TP concentration exceeds the stream WQC. The LCL is used to ensure a stream exceeds the standard with a predetermined level of confidence before it is listed. A stream that is impaired for TP will be de-listed if the upper confidence limit (UCL) of the GSM TP subsequently drops below, or clearly attains, the criteria.[1] See Figure 1.

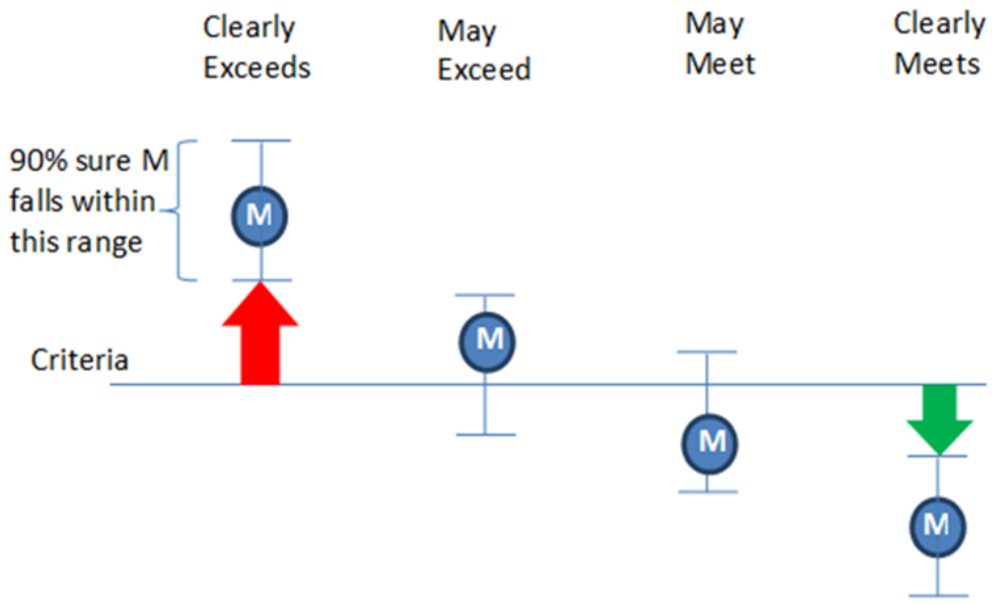

Figure 1: Wisconsin TP criteria confidence table. Criteria line indicates the 0.075 mg/L water quality criteria limit and M represents the Median value.

90% confidence limits were calculated for each monitoring location each year of data collection. A minimum of 6 samples, one per month from May – October, are needed to calculate the confidence limits. In years with less than 6 data points at a location, a data point from the same month from the most recent year of a full dataset was used instead. For example, in 2020 all

[1] WDNR 2020. Guidelines for Monitoring for Watershed Restoration Effectiveness. Wisconsin Department of Natural Resources, Bureau of Water Quality. Madison, Wisconsin. EGAD#3200-2020-26

sampling sites had less than 6 data points collected. Data points from 2019 were used to fill in the months of May – July to calculate confidence limits. In 2022 only two sites needed data from 2021 to calculate the confidence limit, Dutchman and Lancaster Creeks. A confidence limit table is provided in Appendix F.

Since 2015, Lancaster Creek is the only sampling stream where water quality "May Meet" (2015 & 2017) and "Clearly Meets" (2019, 2021, 2022) the State WQC. Currently, Lancaster Creek is not impaired. Three streams (East River at Harold Lewis Trail (2022), Garner's Creek (2018, 2021, 2022), and Neenah Slough (2015, 2017, 2018, 2020, 2021, 2022)) "May Exceed" the WQC, while every other stream in 2022 "Clearly Exceeds" the TP WQC.

Despite the monthly TP concentrations exceeding the WQC for most of the sampling streams, the confidence limits and GSM TP values of 11 of the 14 original sampling locations show an overall decline and improvement towards the WQC. Confidence limit graphs can be found in Appendix G. In addition to decreasing UCL, LCL, and GSM values, some sites also show the UCL, LCL, and GSM value trends narrowing together indicating less sample variability and a truer median value. These sites include Ashwaubenon Creek, Baird Creek, Dutchman Creek, Lower Duck, East River at HWY G, Garner's Creek, Lancaster Creek, and Neenah Slough.

Although the confidence limits calculated for some sampling locations indicate a water quality improvement, water quality within the sampling streams have not significantly improved or declined since the Program started. TP continues to exceed the TP water quality standard across the sampling locations each year. As implementation of the TMDL continues across the Lower Fox River basin, additional sampling data will be useful for detecting changes in water quality.

Total Phosphorus Analysis by Monitoring Station

Although sample collection was less than 100% at some monitoring locations in 2022, TP median values were still calculated. The median values were calculated from only the samples collected during the sampling year compared to the GSM calculated for the TP assessment which used data from previous years if a monthly sample was missed during the sample year. Table 1 breaks down the median TP value for each monitoring station. Red values indicate years with less than 100% sample collection. If sample collection was less than 100% at a location each year, the median value was still calculated. The value in those years may not be a proper representation of the median TP value at that stream location for the specific year.

Nearly all sites from 2015 - 2022 had yearly median values exceeding the State WQC except for Baird Creek (2020), Dutchman Creek (2020), Garner's Creek (2020), Lancaster Creek (2019 & 2021), Neenah Slough (2021), and Wequiock Creek (2020). The lower median TP values in 2020 can be attributed to only 50% sample collection at each site. The only site with a median lower than the WQC in 2022 was Lancaster Creek.

Median	TP (mg/L)							
Stream Name	2015	2016	2017	2018	2019	2020	2021	2022
Apple Creek	0.273	0.297	0.318	*0.168*	0.265	*0.126*	*0.176*	0.270
Ashwaubenon Creek	0.347	0.316	0.321	0.301	*0.485*	*0.119*	*0.319*	0.252
Baird Creek	0.288	*0.172*	0.317	0.289	0.506	*0.075*	*0.170*	0.143
Bower Creek	0.199	*0.229*	0.310	0.323	0.328	*0.232*	*0.230*	0.168
Lower Duck Creek	0.141	0.173	0.192	0.134	0.148	*0.121*	0.156	0.113
Dutchman Creek	*0.306*	*0.117*	0.157	0.141	0.280	*0.069*	*0.098*	*0.127*
Middle East River (G)	0.526	0.472	0.460	0.321	0.421	*0.303*	*0.276*	0.379
Lower East River (HLT)		0.252	0.143	0.321	0.170	*0.253*	0.128	0.182
Garner's Creek	0.139	*0.131*	0.129	0.100	0.128	*0.072*	0.087	0.099
Kankapot Creek	0.365	*0.292*	0.498	0.402	0.355	*0.277*	0.307	0.360
Mud Creek	*0.108*	0.098	0.088	0.097	0.092	*0.096*	0.094	0.151
Neenah Slough	*0.078*	0.112	0.091	0.076	0.110	*0.080*	*0.075*	0.098
Plum Creek		*0.839*	0.532	0.442	0.401	*0.423*	*0.283*	0.339
Lancaster Creek	0.086	0.085	0.076	0.091	0.061	*0.097*	0.049	*0.060*
Upper Duck Creek				0.247	0.154	*0.282*	*0.172*	0.180
Middle Duck Creek				0.158	0.210	*0.154*	0.237	0.180
Upper East River				0.529	0.503	*0.399*	*0.319*	0.500
Trib to Garner's Creek						*0.160*	0.249	0.193
West Plum Creek						*1.710*	0.915	1.099
Wequiock Creek						*0.065*	*0.114*	0.129

Table 1: Lower Fox River monitoring station breakdown (Median TP). Red values indicate years with missing data.

Total phosphorus is a key indicator of water quality. It is an essential nutrient for plant growth and when excess amounts are introduced to a waterbody, water quality can decrease and lead to harmful algal blooms. In 2022, 18 of 115 (16%) TP samples met the WQC for streams, which is 0.075 mg/L. This amount is almost the same as 2021, which had 15% of samples meeting the 0.075 mg/L water quality target. In 2020, samples were only collected in the last half (August – October) of the season which may not accurately represent stream water quality for the year. The TP samples do not account for variations in temperature, precipitation, or implementation of best management practices.

Tables 2 and 3 compare the number of TP samples each year meeting and not meeting WQC, Table 2 is for the original 14 sites only. Since the start of the Program, additional monitoring locations have been added. With the increase of the number of samples collected each year, the number of samples meeting the WQC has also increased. As monitoring continues in the years to come, the table below will be useful for assessing water quality improvements across all monitoring locations.

TP Samples Below 0.075 mg/L									
	2015	2016	2017	2018	2019	2020	2021	2022	Total
# Sites	13	14	14	14	14	14	14	14	
# Samples Collected	62	72	84	83	83	42	76	79	581
# Above 0.075 mg/L	59	65	74	72	71	34	60	65	435
# Below 0.075 mg/L	3	7	10	11	12	8	16	14	67
% Below 0.075 mg/L	4%	9%	12%	13%	14%	19%	21%	18%	**12%**

Table 2: TP Samples compared to TP Water Quality Standard for original 14 sites

TP Samples Below 0.075 mg/L									
	2015	2016	2017	2018	2019	2020	2021	2022	Total
# Sites	14	14	14	17	17	20	20	20	
# Samples Collected	62	72	84	101	101	60	110	115	590
# Above 0.075 mg/L	59	65	74	89	88	50	93	97	518
# Below 0.075 mg/L	3	7	10	12	13	10	17	18	72
% Below 0.075 mg/L	5%	10%	12%	12%	13%	17%	15%	16%	**12%**

Table 3: TP Samples compared to TP Water Quality Standard for all 20 sites

While Phosphorus is a key indicator of water quality, DRP also plays an important role in water quality. DRP is the soluble form of phosphorus and is readily available for plant and algae growth. DRP concentrations can vary widely over short time periods due to plants taking it up and releasing it. Excessive amounts of DRP can also lead to harmful algal blooms and cause poor water quality. Since the start of the Program, DRP concentrations continue to make up a large portion of TP concentrations across all monitoring sites. Appendix H compares each sampling event's TP and DRP concentrations.

Table 3 breaks down each sample collected since 2015 into percentage ranges. Nearly half (332 of 701 or 47%) of TP samples collected since 2015 have had 60 – 80% of their TP concentrations coming from DRP. Another 28% (194 of 701 samples) have had 40 – 60% of their concentrations coming from DRP. As sampling continues, this data will be useful for evaluating implementation progress and effectiveness.

DRP Percentage of TP Ranges								
Year	# Sites	# Samples Collected	< 20% DRP	20 - 40% DRP	40 - 60% DRP	60 - 80% DRP	80 - 100% DRP	> 100% DRP
2015	13	61	4	6	21	29	1	0
2016	14	72	3	13	29	24	3	0
2017	14	84	3	9	30	36	5	1
2018	17	101	3	10	27	53	8	0
2019	17	101	2	3	35	50	11	0
2020	20	60	1	8	14	25	9	3
2021	20	110	7	7	19	59	17	1
2022	20	112	5	12	19	56	18	0
Total		**701**	**28**	**68**	**194**	**332**	**72**	**5**
Percent of Total			**4%**	**10%**	**28%**	**47%**	**10%**	**1%**

Table 3: DRP Percentage of TP (DRP >100% due to sample variance)

Total Phosphorus and Total Suspended Solids Analysis

Although no TSS water quality criteria currently exist for the sampling streams in the Lower Fox River basin, TSS concentrations in general closely align with TP concentrations. Figure 2 compares average TSS and average TP values for each sample month from 2015 – 2022. Total Phosphorus includes particulate phosphorus which is attached to suspended sediments and other suspended materials in the water. Total Phosphorus and Total Suspended Solids data across all monitoring locations for each sample month from 2015 to 2022 were compared to evaluate the relationship between the two parameters. Figures 3 – 8 show each sample month of TP and TSS data. Each graph shows that generally, as TP concentrations increase, TSS concentrations also increase.

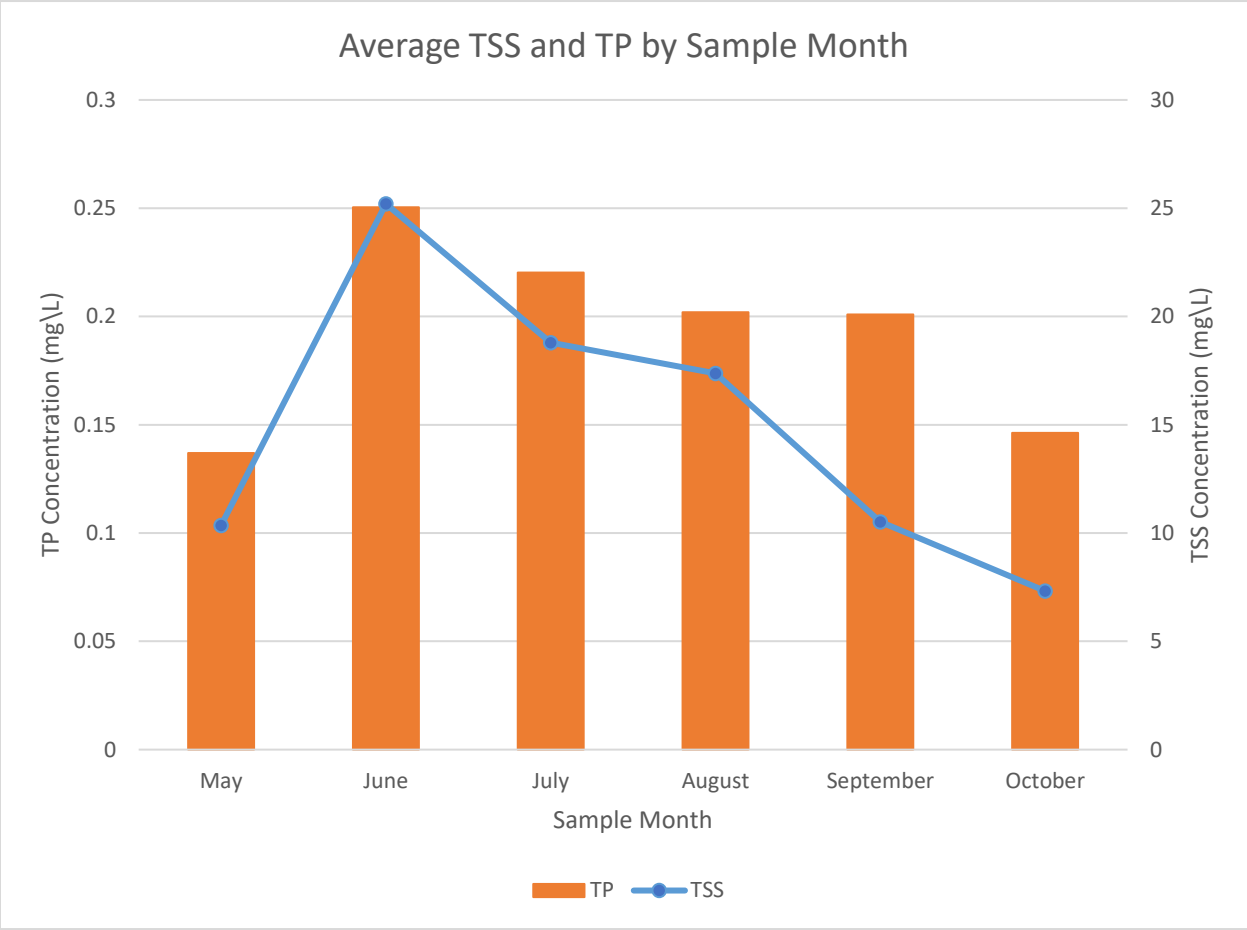

Figure 2: Average TSS and TP values compared by sample month

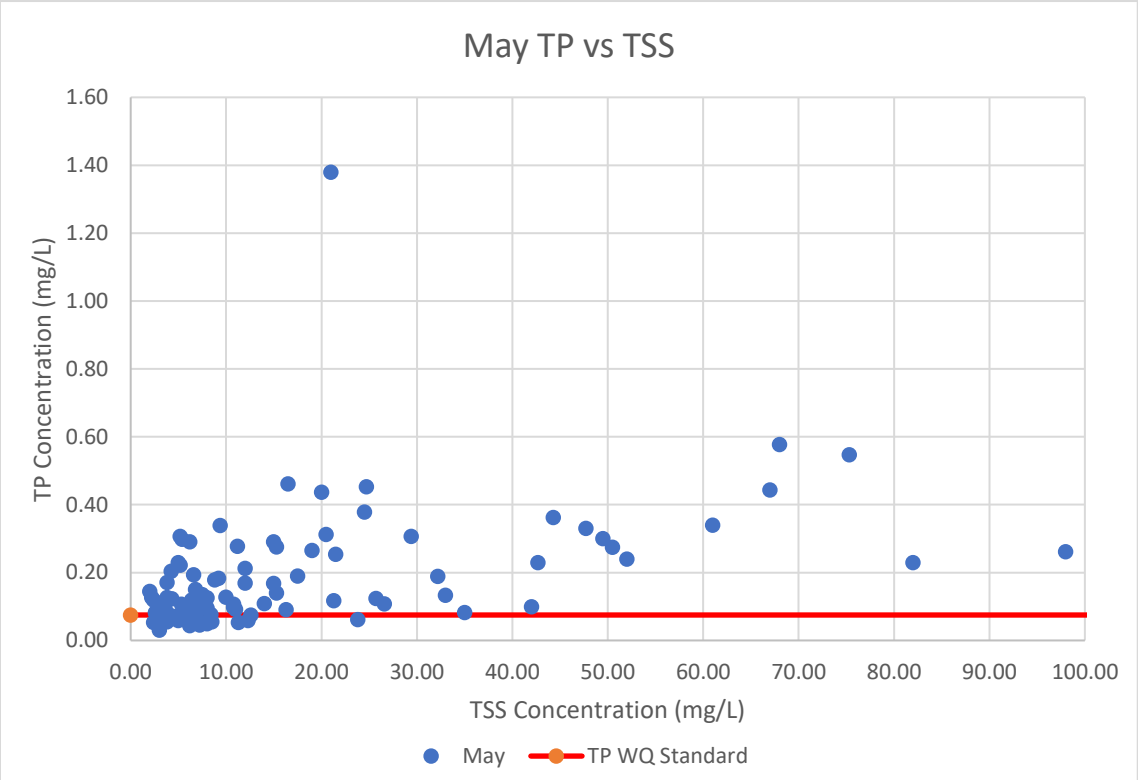

Figure 3: May TP and TSS sample concentrations

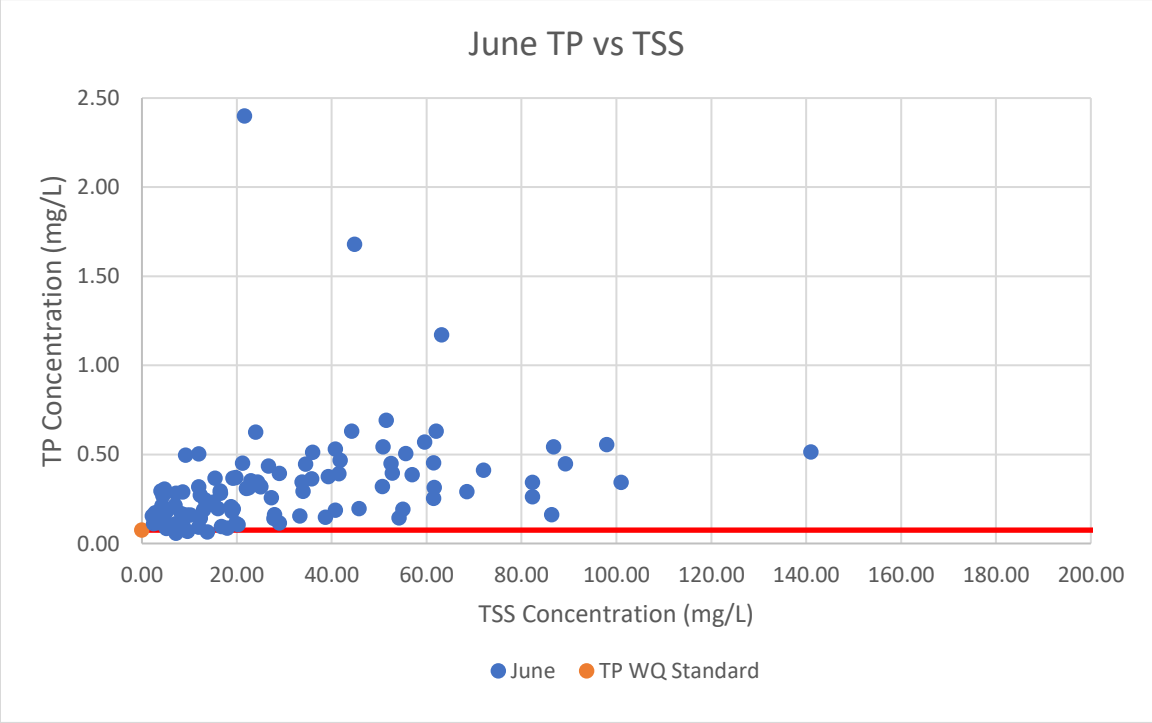

Figure 4: June TP and TSS sample concentrations.

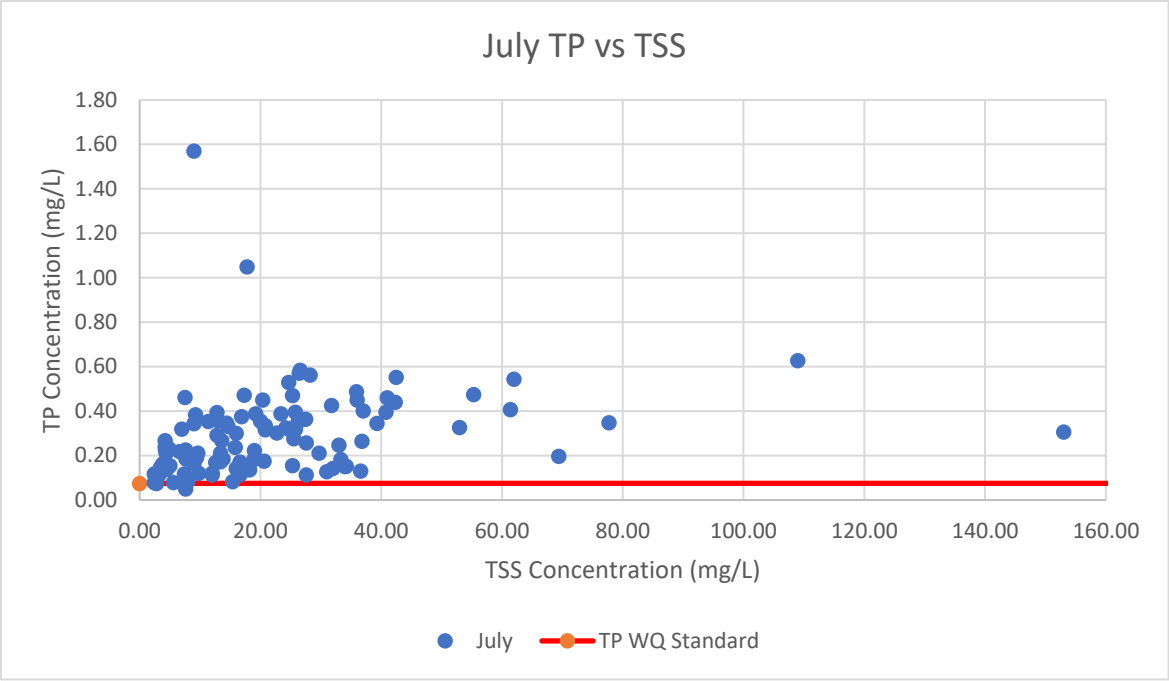

Figure 5: July TP and TSS concentrations.

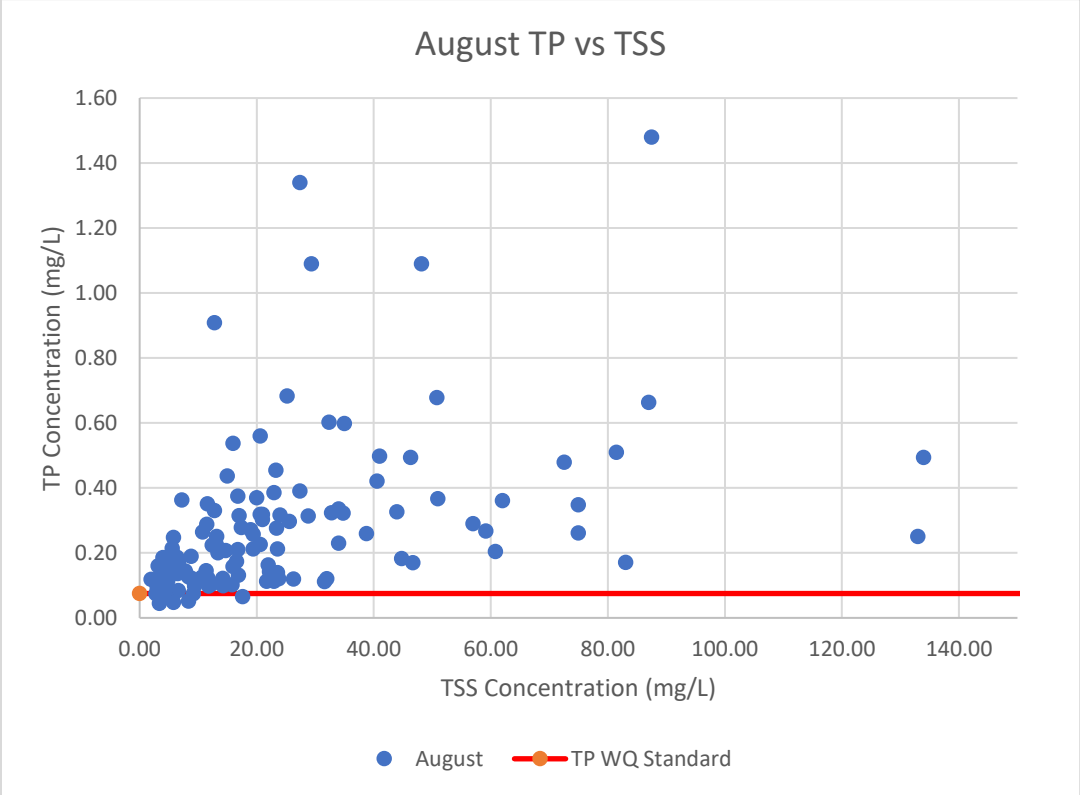

Figure 6: August TP and TSS concentrations.

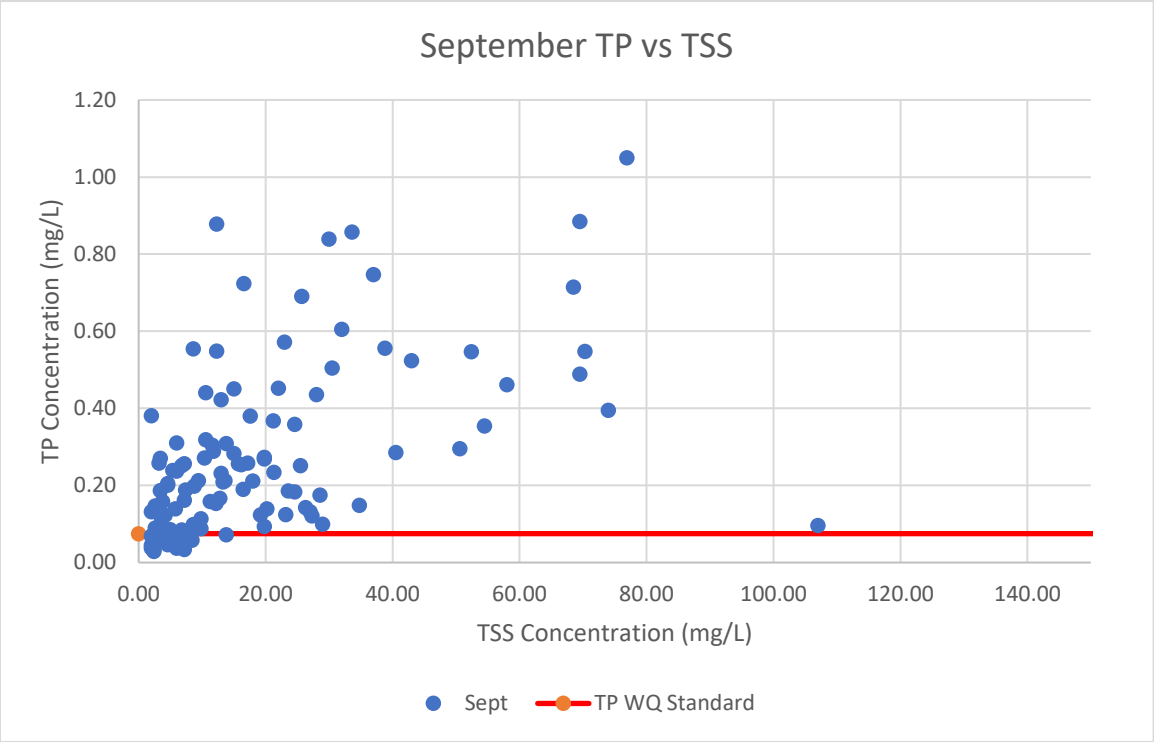

Figure 7: September TP and TSS concentrations.

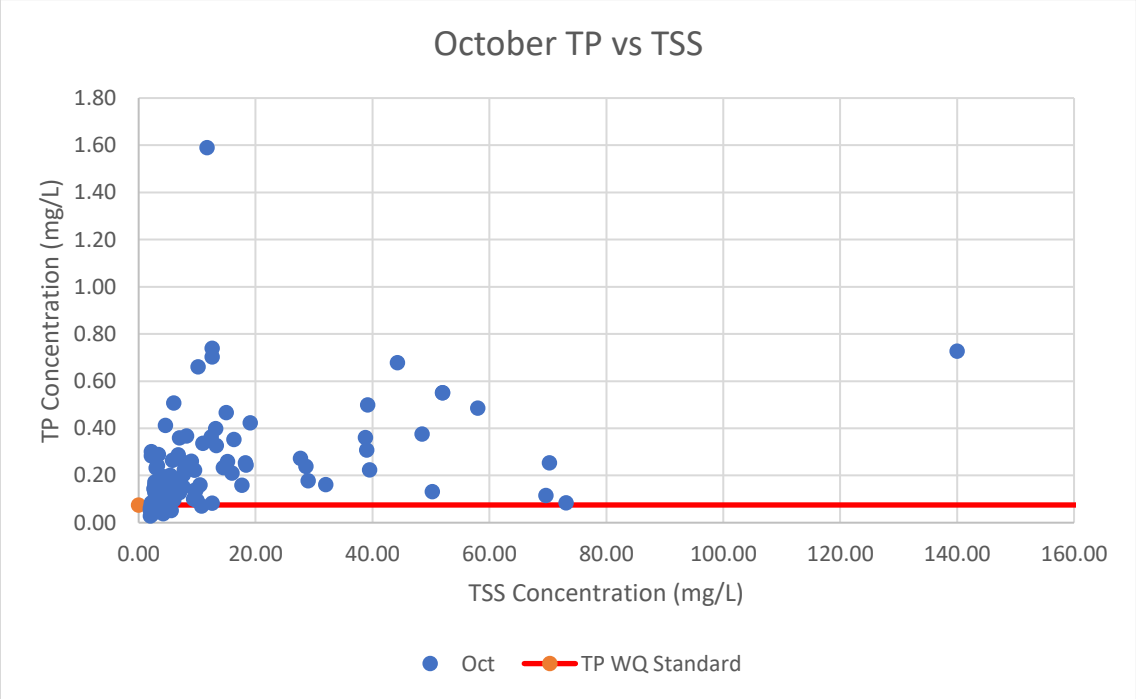

Figure 8: October TP and TSS concentrations.

Field Quality Assurance/Quality Control Duplicate Samples

To document the accuracy and precision of the field data collected by volunteers, ten percent of the samples that are monitored for TP are chosen each year to participate in collection of additional quality assurance/quality control (QA/QC) samples. The samples are randomly selected from the list of stations that are monitored. These QA/QC tests document the accuracy and precision of the data collected and look at natural variability and sampling error.

Duplicate samples are collected on the same day and time as the regular samples. The result of the additional sampling is an additional sample for each parameter mailed to the lab. Duplicate samples were collected at 11 sampling locations in 2022. Duplicate sample results were compared to the regular sample result and an absolute difference was calculated. The absolute difference between the two sets of samples is compared to each test's Level of Quantification (LOQ) and is considered good data quality if the value falls below the LOQ. Relative percent difference between the regular and duplicate samples was also calculated, the results are flagged if the percentage is greater than 30% as this indicates a variance between the two sample results. There was one sample result with high variance in 2022, the September TSS result for East River at Highway G had a 36.22% difference. This variance could be due to sampling error by the volunteer or error during the analysis at the lab. Duplicate sample results are in Appendix I.

Stream Flow and Transparency

In addition to collecting water chemistry data each month, volunteers measure stream flow and water transparency. Stream flow is affected by the amount of water within a watershed and increases with rainstorms or snowmelt and decreases during dry periods. Flow defines the shape, size, and course of the stream.

Volunteers measure streamflow using a velocity-area approach. A 20 ft. length of stream is assessed followed by measuring the width and the water depth at numerous locations across the width. Water velocity is determined by measuring the time it takes for a tennis ball to float along the stream length. Streamflow data can be found in Appendix J.

Water transparency is collected each month with a 120 cm transparency tube. Water clarity is affected by suspended sediment, dissolved material, and algae. Based on previous years data we see that as TSS concentrations increase, Transparency readings decrease, and as TSS concentrations decrease, Transparency readings increase.

Key Takeaways for 2015-2022

- Lancaster Creek (reference stream) is the only site with GSM TP concentrations below the Administrative Code NR 102 TP standard of 0.075 mg/L for multiple years from 2015-2022
- GSM TP concentrations from 2015-2022 appear to be decreasing across many of the sampling sites. In addition, some sites' LCL and/or UCL appear to be trending closer to the GSM value indicating less sample variability
- DRP concentrations across all monitoring sites continue to stay high. Samples are collected around the same time each month, so sample data does not reflect event sampling and is random. 47% of the DRP samples collected since 2015 make up 60 – 80% of their TP concentrations. There has also been an increase in the number of DRP samples in the 80 – 100% range. This data will be useful as implementation continues to ramp up across the Lower Fox River basin
- TP and TSS concentrations generally correlate across sampling months. As TP concentrations increase, TSS concentrations also increase. Monthly TSS concentrations still seem to be more variable than TP concentrations
- Monthly TSS concentrations and transparency readings show that as TSS concentrations increase/decrease, transparency readings decrease/increase

Data Conclusions

The data collected thus far continues to make a strong case for the establishment of best management practices in each watershed. Since 2015, every stream but Lancaster Creek (our reference stream), based on their GSM concentrations, has exceeded the 0.075 mg/L water quality standard set in Wisconsin Administrative Code NR 102.

At this moment in time, there is not enough data to see a definitive trend in the sampling streams. The program is still young, and trends will change throughout its existence, especially when best management practices and implementation start to grab hold and improve the water quality in given watersheds. Raw data may suggest that variations in weather patterns, temperature, and time of year may have an impact on the TP, DRP, TSS, and TN concentrations. These are additional reasons definitive conclusions cannot be made at this time.

Dissolved phosphorus continues to make up a large portion of total phosphorus concentrations across all monitoring sites. Appendix H provides a table of the percentage of DRP making up each TP sample and table 3 categorizes the values into percentage categories. Since 2015 nearly half of the TP samples collected had 60-80% of concentrations coming from DRP while another 28% of TP samples have 40-60% of their concentrations coming from DRP.

The dissolved form of phosphorus is readily available for plant uptake and contribute to harmful algal blooms. Some key questions include: What does this mean for TMDL implementation? What are the sources of DRP; is it mainly from non-point sources or point source dischargers? What types of BMPs are most effective at reducing dissolved phosphorus? As monitoring continues and implementation occurs on the landscape, these questions may be answered.

Throughout the entirety of the project, there have been many TSS samples that reported no detects (ND) or less than 4 mg/L. Many low concentrations are occurring in the Autumn months of September and October in more urbanized watersheds of the Lower Fox River basin. TSS concentrations appear to be more variable than TP samples as well.

Total Nitrogen was added to the list of parameters in 2020 and currently there is no WQC established for total nitrogen. There are three years of data and trends vary by site, with some concentrations steadily going up over the three years while others are going down. Appendix E shows the median TN concentration by site from 2020-2022. Nitrogen is often found and used in agricultural settings, so testing for it may prove important as most land use coverage in the Lower Fox basin is agricultural. Sampling for TN will be important for better understanding its impacts to surface water quality and helping develop WQC for TN. As more data is collected, the relationship between TN and TP will be evaluated. Future questions to answer regarding total nitrogen in the Lower Fox River basin include: Does Total Nitrogen have similar impacts to water quality as Phosphorus does? Will Nitrogen and Phosphorus concentrations correlate each

sampling month? As the program moves forward, this data will be useful for further understanding the water quality impacts of TN and data correlations between different parameters.

Given the consistently high levels of phosphorus and dissolved reactive phosphorus, it is recommended to continue this program at its current capacity.

Program Conclusions

The main goal of the Lower Fox River Volunteer Monitoring Program is the engagement of the public and increasing their awareness on water quality issues. In total, there have been over 40 volunteers that have collected samples for the program since it started in 2015. However, several of the 40 volunteers were/are a part of larger organizations that are involved with the program, possibly making the volunteer contribution much higher. With the knowledge our past and present volunteers possess, they can teach others and be an extension of the program. Our volunteers can talk about their experiences and the things they have seen with others, which allows the information to be carried out to even more individuals in the basin.

Volunteer recruitment has been carried out in several ways throughout the project. Two main contributions to volunteer recruitment have been newsletter articles and presenting for larger organizations. Newsletter articles allowed the DNR to recruit volunteers on a bigger platform. The articles reached a bigger audience and many contacts have been made to the DNR following the release of different articles. Presentations were also a key contributor to spreading awareness of water quality issues. PowerPoint presentations provided information to the public and individuals that may not realize the impact of water quality on everyday life. The presentations were very well received, and many people commented on how the information opened their eyes to the issue we are seeing in the Lower Fox River Basin.

The use of volunteers has proved important for success. Many volunteers are involved with the program which requires constant coordination and communication by the DNR coordinator to ensure success of the program. Communication proves to be the most important aspect of the DNR coordinators position. The coordinator is the liaison between the volunteers and other DNR staff that are involved within the program. Without proper communication, some aspects of the program can potentially be impacted.

As funding and resources become available additional sites are added to the monitoring program. Most of the sampling sites represent the confluence of tributary streams. These sites give us good insight of the water quality of those basins. We can use the water quality data to determine where additional monitoring should occur when additional resources become available.

This water quality monitoring data is also important in measuring implementation progress. There are 10 active 9 Key Element Plans within the Lower Fox River TMDL area. These plans assess the causes and sources of pollution and prioritize restoration and protection strategies to address

water quality problems. Watersheds with active 9 Key Element Plans include Plum Creek & Kankapot Creek (2015), Upper East River (2016), Upper Duck Creek (2016), Apple Creek (2017), Lower East River (2018), Mainstem Lower Fox River (2019), Garner's Creek (2019), Bower Creek (2019), Ashwaubenon Creek & Dutchman Creek (2020), and Middle and Lower Duck Creek (2022). The Lower Fox River TMDL calls for a 59% overall TP reduction and 55% overall TSS reduction from all sources to meet water quality goals. The TMDL calls for a 78% TP reduction and 60% TSS reduction from agricultural sources in the watershed. The active 9 Key Element watershed plans focus on non-point source agricultural implementation. As implementation of these plans continue, monitoring data can be utilized to help track implementation progress and assist in determining where additional data and information is needed to track progress.

Acknowledgements

Thank you to all the volunteers, present and past, that have made the Lower Fox River Volunteer Monitoring Program possible. Thank you to the Wisconsin DNR and the WAV program for funding and support.

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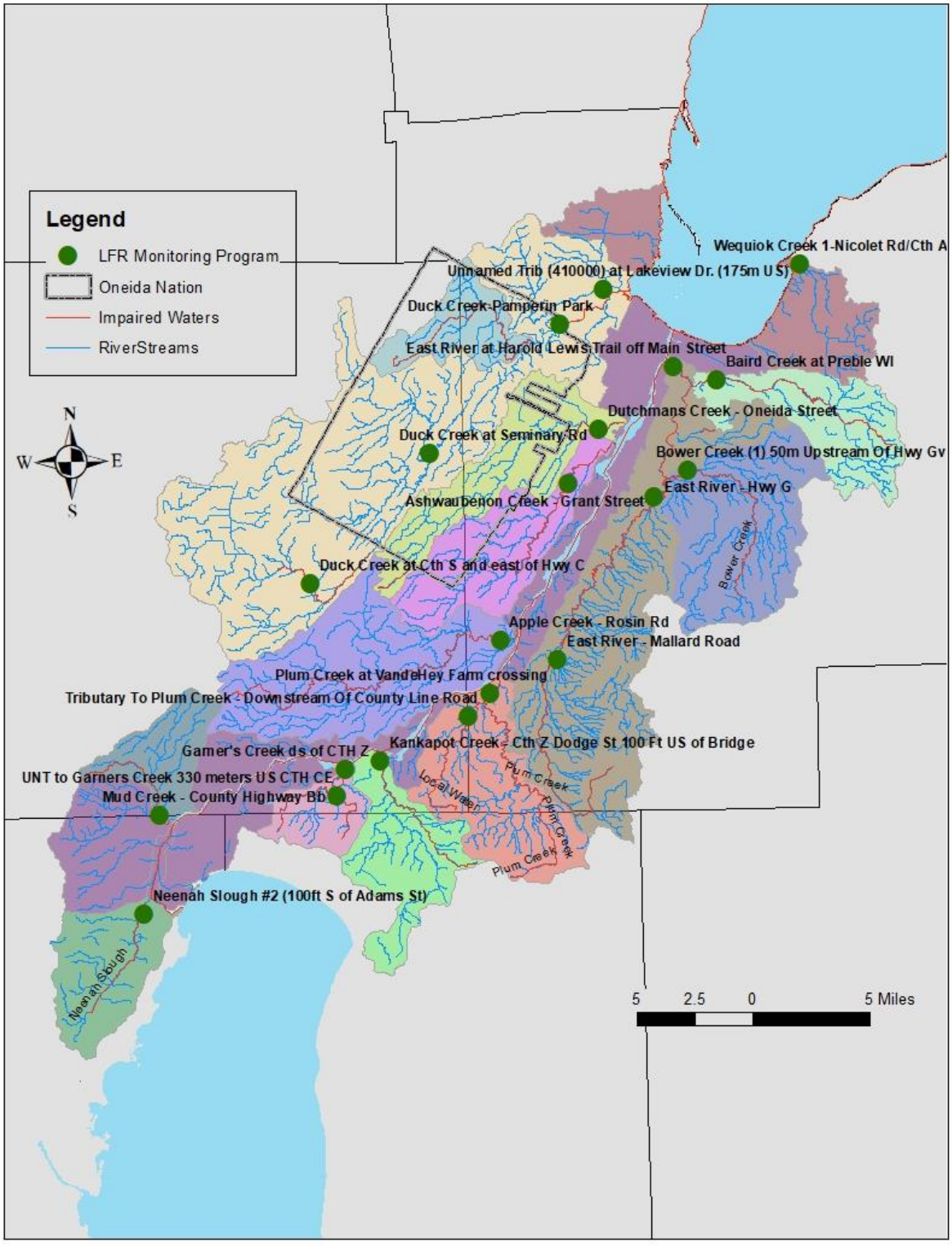
Appendix A: Lower Fox River Basin and TMDL Sub-basin Boundaries



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Stream Name	SWIMS ID	SWIMS Station Name	X	Y
Ashwaubenon Creek	10016502	Ashwaubenon Creek - Grant Street	-88.101373	44.445027
Duck Creek	10038644	Duck Creek - Pamperin Park	-88.102972	44.543283
Wequiock Creek	10010769	Nicolet Rd/Cty A	-87.890966	44.576114
Bower Creek	10009445	Bower Creek (1) 50m Upstream of Hwy Gv	-87.99585	44.453503
East River	53508	East River at Mallard Rd	-88.111276	44.335537
West Plum Creek	10016494	Downstream of County Line Rd	-88.191967	44.29915
Duck Creek	453255	Duck Creek at Seminary Rd	-88.215525	44.466286
Baird Creek	53683	Baird Creek at Preble WI	-87.970044	44.507873
East River	10043279	East River @ Harold Lewis Trail off Main Street	-88.0065	44.515369
Plum Creek	10046999	Plum Creek - VandeHey Farm Crossing	-88.17243	44.313688
Trib to Garners Cr	10047157	US CTH CE	-88.30943	44.251832
Dutchman Creek	10015851	Dutchmans Creek - Oneida Street	-88.073155	44.478821
Duck Creek	10029975	Duck Creek at CTH S	-88.31982	44.389055
Garner's Creek	10043028	Garner's Creek - DS of Cty Z	-88.296227	44.26877
Kankapot Creek	453261	Kankapot Creek - Cth Z Dodge St 100 Ft US of Bridge	-88.264213	44.276284
Lancaster Creek	10034510	Unnamed Trib. (410000) - Lakeview Dr	-88.063943	44.56433
Mud Creek	453258	Mud Creek - County Highway BB	-88459029	44.243669
East River	53675	East River - Hwy G	-88.026784	44.434625
Apple Creek	53684	Apple Creek - Rosin Rd	-88.160301	44.345476
Neenah Slough	10032175	Neenah Slough #2 (100ft S of Adams St)	-88.473302	44.18332

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Appendix B: Impaired Sampling Streams

Local Waterbody Name	Waters ID	WBIC	County	Start Mile	End Mile	Total Size	Date Listed	Source Category	Pollutant	Impairment	Listing Condition Category
Apple Creek	313933	124100	Brown	0	3.99	3.99	4/1/1998	NPS	Total Phosphorus	Low DO	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
	10839		Brown, Outagamie	3.99	23.88	19.89			Total Phosphorus	Low DO	
									Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
Ashwaubenon Creek	10834	122200	Brown	0	14.15	14.15	4/1/2008	PS/NPS	Total Phosphorus	Low DO	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Degraded Habitat	
Baird Creek	10681	118100	Brown	0	3.5	3.5	4/1/2006	NPS	Total Phosphorus	Low DO	TMDL approved

									Sediment/Total Suspended Solids	Degraded Habitat	by EPA in 2012 (4A)
	10682			3.5	13.1	9.6	4/1/2008	PS/NPS	Total Phosphorus	Low DO	
									Sediment/Total Suspended Solids	Degraded Habitat	
Bower Creek	10683	118400	Brown	0	3	3	4/1/2008	NPS	Total Phosphorus	Low DO, Degraded Biological Community	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Degraded Habitat	
	10684			3	13	10			Total Phosphorus	Low DO	
									Sediment/Total Suspended Solids	Degraded Habitat	
Duck Creek	10850	409700	Brown	0	4.96	4.96	4/1/1998	NPS	Total Phosphorus	Low DO	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Degraded Habitat	
	10851		Outagamie	25.69	32.9	7.21	4/1/1998	PS/NPS	Total Phosphorus	Low DO	

									Sediment/Total Suspended Solids	Degraded Habitat	
Dutchman Creek	10832	121600	Brown	0	4.04	4.04	4/1/1998	NPS	Total Phosphorus	Low DO, Degraded Biological Community	TMDL approved by EPA in 2012 (4A)
	1854741		Outagamie	16.05	17.97	1.91			Total Phosphorus	Low DO	
East River	10679	118000	Brown	0	14.15	14.15	4/1/1998	PS/NPS	Total Phosphorus	Low DO, Degraded Biological Community, High Phosphorus Levels	TMDL approved by EPA in 2012 (4A)
								NPS	Sediment/Total Suspended Solids	Degraded Habitat	
	10680	118000	Brown, Calumet	14.15	42.25	28.1	4/1/1998	NPS	Total Phosphorus	Low DO, Degraded Biological Community	
									Sediment/Total Suspended Solids	Degraded Habitat	

Garner's Creek	10845	127700	Calumet, Outagamie	0	6.99	6.99	4/1/2008	PS/NPS	Total Phosphorus	Degraded Biological Community, Degraded Habitat	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Degraded Habitat	
Kankapot Creek	10844	126800	Outagamie	0	2.66	2.66	4/1/2008	PS/NPS	Total Phosphorus	Degraded Biological Community, Degraded Habitat	TMDL approved by EPA in 2012 (4A)
	357763		Calumet, Outagamie	2.66	9.57	6.91			Sediment/Total Suspended Solids	Degraded Habitat	
Mud Creek	10846	129500	Outagamie, Winnebago	0	3.71	3.71	4/1/2008	PS/NPS	Total Phosphorus	Degraded Habitat	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids		
	10847	129500	Outagamie	3.71	6.87	3.16	4/1/1998	PS/NPS	Sediment/Total Suspended Solids		
Neenah Slough	10848	130800	Winnebago	0	2.77	2.77	4/1/1998	PS/NPS	Total Phosphorus	Low DO	TMDL approved
	357915			2.77	3.54	0.77				Low DO	

	357955			3.55	6.12	2.57				Low DO, Degraded Biological Community	by EPA in 2012 (4A)
Plum Creek	10841	125100	Brown	0	13.86	13.86	4/1/2008	PS/NPS	Total Phosphorus	Degraded Biological Community, Degraded Habitat	TMDL approved by EPA in 2012 (4A)
							4/1/1998		Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
	357670	125100	Brown, Calumet	13.87	16.42	2.55	4/1/1998	PS/NPS	Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
Local Water (Trib to Garner's Creek)	3993962	5022162	Calumet, Outagamie	0	4.71	4.71	4/1/2016	PS/NPS	Total Phosphorus	Degraded Biological Community	Watershed Plan (5W)

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Appendix C: Percent Completeness by Sampling Site

Sample Collection Completeness (%) - Out of 6 samples per year								
Station Name	2022	2021	2020	2019	2018	2017	2016	2015
Apple Creek	100%	83%	50%	100%	83.3%	100%	100%	100%
Ashwaubenon Creek	100%	83%	50%	83.3%	100%	100%	100%	100%
Baird Creek	100%	83%	50%	100%	100%	100%	83.3%	100%
Bower Creek	100%	83%	50%	100%	100%	100.0%	66.67%	100%
Dutchman Creek	50%	83%	50%	100%	100%	100.0%	33.3%	50.0%
Garner Creek	100%	100%	50%	100%	100%	100%	83.3%	100%
Kankapot Creek	100%	100%	50%	100%	100%	100%	83.3%	100%
Lancaster Creek	67%	100%	50%	100%	100%	100%	100%	50%
Lower Duck Creek	100%	100%	50%	100%	100%	100%	100%	100%
East River @ HLT	100%	100%	50%	100%	100%	100%	100%	0%
Mid Duck Creek	100%	100%	50%	100%	100%			
East River @ HWY G	100%	83%	50%	100%	100%	100%	100%	100%
Mud Creek	100%	100%	50%	100%	100%	100%	100%	50.0%
Neenah Slough	100%	83%	50%	100%	100%	100%	100%	100%
Plum Creek	100%	83%	50%	100%	100%	100%	50%	
Upper Duck Creek	100%	100%	50%	100%	100%			
Upper East River	100%	83%	50%	100%	100%			
Trib to Garner's Creek	100%	100%	50%					
West Plum Creek	100%	100%	50%					
Wequiock Creek	100%	83%	50%					
Combined Percentage	95.85%	91.52%	50.00%	99.02%	99.02%	100.00%	85.71%	80.77%

Appendix D: 2015-2022 Sampling Data

		TP (mg/L)							
Stream Name	Month	2015	2016	2017	2018	2019	2020	2021	2022
Apple Creek	May	0.34	0.0714	0.331	0.168	0.23	-	-	0.0308
	June	0.268	0.342	1.67	0.244	0.262	-	0.514	0.184
	July	0.354	0.407	0.345	0.319	0.267	-	0.176	0.376
	August	0.278	0.251	0.207	-	0.288	0.267	0.186	0.888
	September	0.199	0.954	0.305	0.147	0.273	0.126	0.0942	0.355
	October	0.224	0.141	0.254	0.0691	0.224	0.122	0.0673	0.0762
Ashwaubenon Creek	May	0.513	0.3	0.254	0.291	-	-	-	0.291
	June	0.435	0.295	0.529	0.293	0.313	-	0.512	0.309
	July	0.472	0.332	0.388	0.332	0.544	-	0.264	0.335
	August	0.226	0.259	0.204	0.313	0.317	0.223	0.323	0.212
	September	0.258	0.489	0.239	0.309	0.715	0.0989	0.232	0.159
	October	0.259	0.678	0.466	0.289	0.485	0.119	0.319	0.0986
Baird Creek	May	0.477	0.123	0.204	0.23	0.578	-	-	0.127
	June	0.317	0.179	0.393	0.191	0.502	-	0.281	0.2
	July	0.319	0.212	0.45	0.348	0.201	-	0.17	0.155
	August	0.181	-	0.363	0.187	0.51	0.16	0.479	0.264
	September	0.258	0.252	0.271	0.555	0.572	0.0691	0.167	0.131
	October	0.127	0.133	0.137	0.499	0.253	0.0753	0.115	0.0691
Bower Creek	May	0.179	0.126	0.135	0.0927	0.262	-	-	0.127
	June	0.187	0.257	0.318	0.344	0.289	-	0.63	0.37
	July	0.401	0.388	0.302	0.384	0.395	-	0.197	0.301
	August	0.21	0.2	0.224	0.326	0.367	0.319	0.23	0.174
	September	0.213	-	0.451	0.319	0.436	0.154	0.175	0.162
	October	0.152	-	0.36	0.152	0.233	0.232	0.244	0.137
Lower Duck Creek @ Pamperin Park	May	0.094	0.0666	0.0694	0.0589	0.0742	-	0.194	0.0939
	June	0.314	0.142	0.193	0.319	0.192	-	0.343	0.133
	July	0.172	0.183	0.276	0.186	0.237	-	0.118	0.223
	August	0.122	0.163	0.145	0.0975	0.104	0.121	0.361	0.142
	September	0.159	0.257	0.19	0.114	0.269	0.0344	0.045	0.0865
	October	0.0967	0.203	0.308	0.153	0.0867	0.2	0.0405	0.0561
Dutchman Creek	May	0.547	0.107	0.0977	0.104	0.363	-	-	0.0535
	June	0.231	-	0.271	0.569	0.196	-	0.159	0.173
	July	0.306	-	0.212	0.165	0.396	-	0.113	-
	August	-	0.126	0.102	0.116	0.113	0.126	0.098	-
	September	-	-	0.187	0.201	0.423	0.0538	0.0907	0.14

	October	-	-	0.127	0.106	0.128	0.0692	0.0836	-
Middle East River (G)	May	0.307	0.275	0.444	0.276	0.23	-	-	0.307
	June	0.631	0.449	0.554	0.366	0.447	-	0.386	0.543
	July	1.05	0.585	0.475	0.471	0.394	-	0.316	0.45
	August	0.598	0.494	0.494	0.261	0.37	0.303	0.276	0.56
	September	0.453	0.885	0.289	0.368	0.605	0.209	0.213	0.272
	October	0.361	0.368	0.336	0.159	0.551	0.363	0.239	0.264
Lower East River @ Harold Lewis Trail	May	-	0.0923	0.0589	0.14	0.0827	-	0.109	0.108
	June	-	0.189	0.624	0.294	0.0954	-	0.691	0.206
	July	-	0.347	0.211	0.155	0.182	-	0.137	0.628
	August	-	0.314	0.12	0.348	0.29	0.121	0.131	0.158
	September	-	0.524	0.124	0.623	0.381	0.548	0.125	0.296
	October	-	0.178	0.161	0.375	0.158	0.253	0.0821	0.1
Garner's Creek	May	0.124	0.0769	0.118	0.0457	0.075	-	0.0896	0.0568
	June	0.14	-	0.147	0.155	0.143	-	0.162	0.161
	July	0.326	0.131	0.14	0.142	0.151	-	0.0843	0.142
	August	0.099	0.183	0.139	0.122	0.113	0.125	0.17	0.12
	September	0.395	0.132	0.114	0.0779	0.143	0.0722	0.0599	0.0778
	October	0.137	0.0883	0.0873	0.0375	0.07	0.0594	0.0511	0.0567
Kankapot Creek	May	0.379	0.169	0.313	0.437	0.222	-	0.278	0.0556
	June	0.321	0.392	0.412	0.366	0.345	-	0.45	0.362
	July	0.351	0.292	0.488	0.462	0.364	-	0.325	0.357
	August	0.315	0.257	0.663	0.678	0.386	0.351	0.39	0.498
	September	0.38	-	0.747	0.311	0.462	0.277	0.212	0.547
	October	0.812	0.353	0.507	0.208	0.327	0.21	0.288	0.192
Mud Creek	May	0.108	0.0819	0.071	0.0829	0.0441	-	0.119	0.0619
	June	0.119	0.108	0.102	0.112	0.0836	-	0.113	0.154
	July	-	0.147	0.186	0.142	0.138	-	0.114	0.212
	August	0.0746	0.0959	0.114	0.119	0.101	0.122	0.0752	0.152
	September	-	0.0996	0.0688	0.0744	0.121	0.0294	0.0331	0.149
	October	-	0.093	0.0745	0.0498	0.0585	0.096	0.0724	0.0618
Neenah Slough	May	0.134	0.0746	0.1	0.19	0.0962	-	-	0.0673
	June	-	0.352	0.159	0.167	0.102	-	0.0885	0.147
	July	0.0784	0.231	0.0813	0.0614	0.118	-	0.0749	0.162
	August	0.0935	0.0614	0.0606	0.0379	0.0525	0.0804	0.084	0.0449
	September	0.0571	0.086	0.0451	0.088	0.234	0.0376	0.0463	0.0847
	October	0.0761	0.138	0.115	0.0649	0.131	0.223	0.0509	0.111
Plum Creek	May	-	-	0.462	0.266	0.184	-	-	0.189
	June	-	-	0.395	0.446	0.375	-	0.467	1.17

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	July	-	-	0.46	0.529	0.426	-	0.257	0.318
	August	-	1.34	0.602	0.437	0.335	0.375	0.297	0.212
	September	-	0.839	0.878	1.05	0.505	0.549	0.283	0.359
	October	-	0.661	1.59	0.283	0.727	0.423	0.261	0.703
Lancaster Creek	May	0.0538	0.0493	0.0549	0.0908	0.0621	-	0.0708	-
	June	0.086	0.106	0.115	0.0918	0.0576	-	0.0642	0.0687
	July	0.128	0.113	0.0836	0.12	0.072	-	0.0504	0.0791
	August	-	0.251	0.0746	0.171	0.0656	0.112	0.0478	0.0519
	September	-	0.0647	0.077	0.0582	0.059	0.0969	0.0372	-
	October	-	0.0557	0.0579	0.0278	0.0284	0.0836	0.027	0.0378
Upper Duck Creek @ CTH S	May	-	-	-	0.24	0.073	-	0.171	0.104
	June	-	-	-	0.253	0.109	-	0.495	0.112
	July	-	-	-	0.355	0.171	-	0.121	0.226
	August	-	-	-	0.537	0.136	0.322	0.144	0.147
	September	-	-	-	0.238	0.254	0.189	0.184	0.123
	October	-	-	-	0.071	0.273	0.282	0.172	0.0567
Middle Duck Creek @ Seminary Rd	May	-	-	-	0.107	0.128	-	0.299	0.145
	June	-	-	-	0.172	0.29	-	0.282	0.214
	July	-	-	-	0.224	0.247	-	0.191	0.268
	August	-	-	-	0.214	0.173	0.154	0.33	0.248
	September	-	-	-	0.144	0.286	0.0859	0.109	0.132
	October	-	-	-	0.143	0.0941	0.162	0.104	0.0723
Upper East River @ Mallard Rd	May	-	-	-	0.453	0.213	-	-	0.339
	June	-	-	-	0.505	0.452	-	1.68	0.543
	July	-	-	-	0.553	0.562	-	0.44	0.571
	August	-	-	-	0.683	0.454	0.421	0.319	0.909
	September	-	-	-	0.556	0.691	0.252	0.257	0.441
	October	-	-	-	0.196	0.551	0.399	0.301	0.457
Trib to Garner's Creek	May	-	-	-	-	-	-	0.226	0.119
	June	-	-	-	-	-	-	0.306	0.196
	July	-	-	-	-	-	-	0.218	0.239
	August	-	-	-	-	-	0.183	0.271	0.19
	September	-	-	-	-	-	0.0897	0.205	0.186
	October	-	-	-	-	-	0.16	0.292	0.241
West Plum Creek	May	-	-	-	-	-	-	1.38	0.151
	June	-	-	-	-	-	-	2.4	1.34
	July	-	-	-	-	-	-	0.344	1.57
	August	-	-	-	-	-	1.09	1.09	1.48
	September	-	-	-	-	-	1.71	0.724	0.858

	October	-	-	-	-	-	3.3	0.739	0.412
Wequiock Creek	May	-	-	-	-	-	-	-	0.0479
	June	-	-	-	-	-	-	0.211	0.117
	July	-	-	-	-	-	-	0.114	0.153
	August	-	-	-	-	-	0.123	0.166	0.201
	September	-	-	-	-	-	0.0651	0.0668	0.14
	October	-	-	-	-	-	0.0369	0.101	0.0611

DRP (mg/L)

Stream Name	Month	2015	2016	2017	2018	2019	2020	2021	2022
Apple Creek	May	0.16	0.0266	0.141	0.0861	0.109	-	-	ND
	June	0.18	0.187	0.323	0.167	0.123	-	0.26	0.132
	July	0.27	0.259	0.251	0.264	0.219	-	0.082	0.306
	August	0.201	0.173	0.126	-	0.136	0.095	0.143	0.348
	September	0.139	0.341	0.238	0.0724	0.188	0.0623	0.0605	-
	October	0.182	0.106	0.15	0.0341	0.16	0.0861	0.0452	0.0463
Ashwaubenon Creek	May	-	0.17	0.156	0.207	-	-	-	0.199
	June	0.221	0.19	0.383	0.102	0.242	-	0.409	0.253
	July	0.306	0.247	0.288	0.256	0.352	-	0.17	0.279
	August	0.128	0.103	0.071	0.0869	0.259	0.159	0.254	0.153
	September	0.126	0.288	0.191	0.199	0.498	0.07	0.155	0.126
	October	0.203	0.486	0.375	0.259	0.346	0.0938	0.301	0.0713
Baird Creek	May	0.345	0.0573	0.142	0.158	0.278	-	-	0.0747
	June	0.216	0.0994	0.243	0.106	0.337	-	0.208	0.122
	July	0.183	0.1335	0.276	0.152	0.145	-	0.106	0.106
	August	0.12	-	0.29	0.134	0.274	0.109	0.293	0.193
	September	0.188	0.154	0.216	0.476	0.439	0.0746	0.0914	0.0899
	October	0.0983	0.0963	0.101	0.326	0.158	0.0711	0.0839	0.042
Bower Creek	May	0.112	0.0661	0.0471	0.0444	0.142	-	-	0.0736
	June	0.0969	0.154	0.229	0.232	0.192	-	0.363	0.271
	July	0.118	0.293	0.21	0.265	0.251	-	0.0933	0.17
	August	0.108	0.119	0.13	0.174	0.178	0.14	0.145	0.105
	September	0.145	-	0.295	0.244	0.306	0.0468	0.117	0.098
	October	0.12	-	0.0296	0.0946	0.113	0.118	0.181	0.0803
Lower Duck Creek @ Pamperin Park	May	0.0433	0.0189	0.0248	0.0182	0.0333	-	0.137	0.0557
	June	0.141	0.0802	0.121	0.193	0.0928	-	0.134	0.108
	July	0.0914	0.131	0.18	0.113	0.19	-	0.0792	0.161
	August	0.0735	0.0773	0.0953	0.0302	0.0594	0.0405	0.227	0.0836

Lower Fox River Volunteer Monitoring Program

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	September	0.111	0.179	0.124	0.0814	0.196	0.0127	0.0167	0.0561
	October	0.0466	0.156	0.177	0.12	0.0631	0.167	0.0212	0.0183
Dutchman Creek	May	0.0839	0.0318	0.0406	0.0462	0.246	-	-	0.0144
	June	0.176	-	0.198	0.378	0.136	-	0.104	0.118
	July	0.193	-	0.164	0.115	0.286	-	0.0516	-
	August	-	0.0495	0.0454	0.0669	0.0558	0.108	0.073	-
	September	-	-	0.146	0.163	0.343	0.0319	0.0533	0.103
	October	-	-	0.103	0.0796	0.0874	0.0429	0.0679	-
Middle East River (G)	May	0.205	0.146	0.199	0.184	0.12	-	-	0.207
	June	0.396	0.294	0.302	0.282	0.265	-	0.243	0.413
	July	0.831	0.488	0.195	0.375	0.349	-	0.234	0.4
	August	0.455	0.288	0.314	0.171	0.274	0.206	0.22	0.45
	September	0.341	0.526	0.232	0.311	0.467	0.169	0.162	0.205
	October	0.256	0.312	0.293	0.107	0.338	0.291	0.161	0.199
Lower East River @ Harold Lewis Trail	May	-	0.0186	0.022	0.0837	0.0525	-	0.0301	0.0424
	June	-	0.104	0.296	0.165	0.0435	-	0.114	0.0814
	July	-	0.257	0.122	0.0454	0.105	-	0.0622	0.0886
	August	-	0.0931	0.147	0.0175	0.0365	0.0246	0.0499	0.0533
	September	-	0.336	0.038	0.194	0.194	0.0623	0.0249	0.0946
	October	-	0.0775	0.056	0.171	0.0954	0.124	0.0948	0.0659
Garner's Creek	May	0.0424	0.031	0.0316	0.0109	0.0089	-	0.0488	0.0105
	June	0.0562	0.0589	0.0531	0.0604	0.0391	-	0.088	0.0481
	July	0.0212	0.0591	0.0809	0.0645	0.0673	-	0.056	0.0799
	August	0.019	0.0491	0.0675	0.0768	0.0264	0.0445	0.0896	0.0485
	September	0.0181	0.0031	0.0637	0.0489	0.0607	0.0395	0.0362	0.0478
	October	0.0398	0.0311	0.0518	0.0232	0.0326	0.0374	0.0266	0.0276
Kankapot Creek	May	0.171	0.0769	0.182	0.306	0.149	-	0.157	0.00991
	June	0.186	0.224	0.218	0.221	0.149	-	0.351	0.219
	July	0.236	0.179	0.282	0.335	0.255	-	0.236	0.26
	August	0.197	0.113	0.424	0.448	0.246	0.229	0.302	0.317
	September	0.235	-	0.564	0.213	0.304	0.161	0.15	0.373
	October	0.471	0.206	0.384	0.122	0.194	0.146	0.23	0.0941
Mud Creek	May	0.0326	0.027	0.0299	0.0232	0.01	-	0.053	0.0224
	June	0.0569	0.0587	0.066	0.0662	0.0196	-	0.0857	0.104
	July	-	0.0959	0.0962	0.0956	0.0886	-	0.0791	0.168
	August	0.0376	0.049	0.0551	0.0712	0.0646	0.0892	0.054	0.104
	September	-	0.0324	0.0394	0.0474	0.0454	0.0264	0.0134	0.0674
	October	-	0.0602	0.0433	0.0235	0.0363	0.0565	0.0392	0.037
Neenah Slough	May	0.0399	0.0305	0.0155	0.119	0.0464	-	-	0.024

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	June	-	0.223	0.0998	0.115	0.0549	-	0.057	0.112
	July	0.0332	0.163	0.0489	0.0359	0.102	-	0.0476	0.128
	August	0.0706	0.0376	0.0284	0.007	0.0362	0.0399	0.0455	0.0289
	September	0.0313	0.0498	0.0193	0.0548	0.146	0.0182	0.0135	0.0479
	October	0.05	0.094	0.0541	0.0417	0.0848	0.164	0.0144	0.0548
Plum Creek	May	-	-	0.321	0.159	0.108	-	-	0.101
	June	-	-	0.26	0.311	0.284	-	0.367	0.858
	July	-	-	0.354	0.319	0.331	-	0.177	0.191
	August	-	0.197	0.29	0.326	0.227	0.222	0.196	0.0717
	September	-	0.633	0.726	0.877	0.393	0.326	0.187	0.254
	October	-	0.571	1.21	0.203	0.399	0.318	0.2	0.466
Lancaster Creek	May	0.0181	0.0106	0.0339	0.043	0.0207	-	0.0356	-
	June	0.0429	0.0515	0.0459	0.051	0.0434	-	0.0299	0.0377
	July	0.0635	0.0513	0.0388	0.0767	0.049	-	0.0336	0.0554
	August	-	0.0369	0.0449	0.0339	0.0325	0.0743	0.0354	0.0332
	September	-	0.0342	0.0408	0.0284	0.0346	0.0385	0.0262	-
	October	-	0.0234	0.0309	0.0164	0.0233	0.0306	0.0194	0.00645
Upper Duck Creek @ CTH S	May	-	-	-	0.124	0.04	-	0.0966	0.0593
	June	-	-	-	0.0895	0.064	-	0.378	0.0707
	July	-	-	-	0.225	0.138	-	0.0814	0.18
	August	-	-	-	0.37	0.105	0.198	0.101	0.106
	September	-	-	-	0.158	0.169	0.115	0.113	0.0847
	October	-	-	-	0.046	0.151	0.217	0.126	0.0402
Middle Duck Creek @ Seminary Rd	May	-	-	-	0.0598	0.0707	-	0.0966	0.106
	June	-	-	-	0.128	0.122	-	0.184	0.176
	July	-	-	-	0.174	0.18	-	0.152	0.234
	August	-	-	-	0.169	0.156	0.112	0.249	0.195
	September	-	-	-	0.111	0.213	0.0513	0.0799	0.101
	October	-	-	-	0.113	0.0731	0.141	0.0871	0.0438
Upper East River @ Mallard Rd	May	-	-	-	0.345	0.139	-	-	0.277
	June	-	-	-	0.17	0.313	-	1.53	0.358
	July	-	-	-	0.153	0.491	-	0.31	0.522
	August	-	-	-	0.578	0.353	0.33	0.271	0.853
	September	-	-	-	0.414	0.492	0.195	0.216	0.371
	October	-	-	-	0.139	0.338	0.346	0.271	0.396
Trib to Garner's Creek	May	-	-	-	-	-	-	0.189	0.0824
	June	-	-	-	-	-	-	0.261	0.0503
	July	-	-	-	-	-	-	0.17	0.209
	August	-	-	-	-	-	0.134	0.184	0.114

	September	-	-	-	-	-	0.0615	0.18	0.0809
	October	-	-	-	-	-	0.0683	0.26	0.194
West Plum Creek	May	-	-	-	-	-	-	1.22	0.0909
	June	-	-	-	-	-	-	2.13	1.12
	July	-	-	-	-	-	-	0.28	1.4
	August	-	-	-	-	-	0.845	0.897	0.905
	September	-	-	-	-	-	1.23	0.653	-
	October	-	-	-	-	-	2.86	0.618	0.338
Wequiock Creek	May	-	-	-	-	-	-	-	0.00822
	June	-	-	-	-	-	-	0.137	0.0734
	July	-	-	-	-	-	-	0.0892	0.114
	August	-	-	-	-	-	0.0968	0.138	0.143
	September	-	-	-	-	-	0.0734	0.0477	0.0938
	October	-	-	-	-	-	0.0422	0.0738	0.0273

TSS (mg/L)									
Stream Name	Month	2015	2016	2017	2018	2019	2020	2021	2022
Apple Creek	May	61	3.2	47.7	15	82	-	-	3
	June	4.4	82.3	1010	13.3	82.3	-	141	698
	July	11.4	61.4	39.3	7	13.6	-	20.6	16.9
	August	17.4	13.2	14.7	-	11.5	59.2	4	378
	September	8.75	420	11.6	2.6	19.8	NA	19.8	54.5
	October	7.8	3.2	7.8	ND	39.5	NA	ND	2.2
Ashwaubenon Creek	May	-	49.5	21.5	15	-	-	-	6.2
	June	26.7	16.5	40.8	34	22.5	-	36	22
	July	17.3	14.6	19.2	20.7	62	-	36.8	20.8
	August	20.6	38.8	60.8	670	24	13.2	32.8	19.4
	September	17.2	69.5	5.4	13.8	68.5	8.6	13	3.8
	October	15.2	44.3	15	3.4	58	ND	ND	ND
Baird Creek	May	ND	4.33	4.25	5	68	-	-	2.2
	June	12	19	29	5.5	12	-	7.2	4.4
	July	24.8	13.4	36	77.7	8.2	-	12.6	5
	August	ND	-	7.2	6.4	81.5	3.2	72.6	10.8
	September	3.2	6.8	3.4	8.6	23	2.8	12.8	ND
	October	2.8	3.2	ND	39.2	18.3	2.4	ND	ND
Bower Creek	May	8.8	8	7.5	3.6	98	-	-	3.8
	June	40.8	27.3	25.1	24.4	8.6	-	44.2	19.8
	July	37	23.4	22.7	9.25	40.8	-	69.4	16
	August	16.8	13.4	12.4	44	51	21	34	16.6

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	September	9.4	-	15	10.6	28	12.2	28.6	7.2
	October	7.6	-	7	ND	14.5	3	18.4	9.8
Lower Duck Creek @ Pamperin Park	May	7.2	ND	4.75	5	6.3	-	6.6	ND
	June	61.6	12.3	19.3	50.7	55	-	101	ND
	July	13.4	18.9	25.5	13.8	15.8	-	7.4	19
	August	11.7	22	11.4	11.8	12.3	23.8	62	22.2
	September	11.3	15.7	16.5	3.6	19.8	7.2	2	3
	October	4.75	7.67	39	3.8	4.2	5.4	ND	2.6
Dutchman Creek	May	75.3	10.8	10.8	6	44.3	-	-	2.4
	June	15	-	12.3	59.6	16	-	10.2	2.8
	July	153	-	9.6	9	25.8	-	27.6	-
	August	-	8.4	15.8	10.8	21.7	5	9.4	-
	September	-	-	3.4	4.6	13	6.6	8.6	5.8
	October	-	-	3.5	ND	7	3.2	2.2	-
Middle East River (G)	May	5.2	50.5	67	15.3	42.7	-	-	29.4
	June	62	52.5	98	19.2	89.3	-	57	50.8
	July	17.8	26.6	55.3	25.3	12.8	-	20.8	20.4
	August	35	134	46.3	75	20	21	23.4	20.6
	September	22	69.5	11.8	21.2	32	13.3	13.6	10.4
	October	38.8	8.2	11	2.8	52	12.4	28.6	5.8
Lower East River @ Harold Lewis Trail	May	-	11	12.3	15.3	35	-	14	26.6
	June	-	13	24	4	16.8	-	51.5	18.8
	July	-	14.4	29.7	25.3	33.3	-	18.2	109
	August	-	28.8	26.3	75	57	32	16.9	16
	September	-	43	19.2	201	2	70.3	23.2	50.6
	October	-	29	32	48.5	17.7	70.3	12.6	9.4
Garner's Creek	May	25.7	8.4	21.3	7.25	12.6	-	6.8	6.2
	June	27.8	40	38.7	33.3	54.2	-	28	86.4
	July	53	36.6	16.5	16	34	-	8	32
	August	14.3	44.8	23.6	14.2	23	10.6	46.7	23.1
	September	74	27	9.8	4.6	26.3	13.8	3.4	6.2
	October	9.6	5.4	3.67	4.2	10.8	4.4	2	2.2
Kankapot Creek	May	24.5	12	20.5	20	5.2	-	11.2	3.8
	June	25	41.5	72	15.4	33.8	-	21.2	35.8
	July	26.2	12.8	35.9	7.5	27.5	-	24.2	13
	August	17	19.4	87	50.8	23	11.6	27.4	41
	September	17.6	-	37	6	58	NA	18	52.4
	October	ND	16.3	6	ND	13.3	16	6.8	4.4
Mud Creek	May	7.4	2.6	ND	2.6	6.2	-	6.4	ND

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	June	4.25	7.25	ND	2.5	5.2	-	19.8	2.2
	July	-	3.4	7.65	ND	4.5	-	3.2	4.4
	August	2.8	4.4	4.8	2	ND	3.2	4.2	ND
	September	-	29	2	2.6	27.3	2.4	2.4	34.8
	October	-	10	3	2.4	4.6	6	4.4	2
Neenah Slough	May	33	4.2	42	17.5	8	-	-	5.4
	June	-	23	9.5	8.33	4.8	-	6.2	2.6
	July	2.4	4.86	ND	ND	2.4	-	2.8	3.8
	August	3	ND	ND	ND	ND	4.4	6.6	3.4
	September	ND	ND	ND	9.8	21.3	6	4.6	6.8
	October	2.8	3.8	69.7	2.6	50.23	9.6	5.6	5.2
Plum Creek	May	-	-	16.5	19	9.2	-	-	32.2
	June	-	-	52.8	34.5	39.3	-	41.8	63.2
	July	-	-	41	24.7	31.8	-	27.6	25.8
	August	-	27.4	32.4	15	34	16.8	25.6	23.6
	September	-	30	12.3	76.9	30.5	12.3	15	24.6
	October	-	10.2	11.7	2.2	140	19.1	9	12.6
Lancaster Creek	May	11.3	8	8.5	16.3	23.8	-	7	-
	June	18	20.3	29	12	7.2	-	13.8	9.6
	July	31	12	15.4	12	7.6	-	7.6	5.6
	August	-	133	9.2	83.1	17.6	31.6	5.8	8.4
	September	-	3.2	4	8.4	5.6	107	2	-
	October	-	ND	ND	ND	2	73.1	ND	2.4
Upper Duck Creek @ CTH S	May	-	-	-	52	5	-	3.8	3.4
	June	-	-	-	61.5	7	-	9.2	8.6
	July	-	-	-	20	16.6	-	9.8	7.6
	August	-	-	-	16	6.5	34.8	7.8	5.4
	September	-	-	-	6	16.2	7.4	24.6	4.2
	October	-	-	-	ND	27.7	ND	2.8	ND
Middle Duck Creek @ Seminary Rd	May	-	-	-	5.33	10	-	5.4	2
	June	-	-	-	5	68.5	-	16.6	7
	July	-	-	-	4.25	33	-	9.4	4.2
	August	-	-	-	5.6	6.67	4.4	12.8	5.8
	September	-	-	-	ND	40.5	5	ND	2
	October	-	-	-	2.6	2.75	6	ND	ND
Upper East River @ Mallard Rd	May	-	-	-	24.7	12	-	-	9.4
	June	-	-	-	55.6	61.5	-	44.8	86.8
	July	-	-	-	42.5	28.2	-	42.3	26.4
	August	-	-	-	25.2	23.3	40.6	20.6	12.8

	September	-	-	-	38.8	25.7	25.5	7.2	10.6
	October	-	-	-	4	52	13.2	2.2	ND
Trib to Garner's Creek	May	-	-	-	-	-	-	ND	2.4
	June	-	-	-	-	-	-	4.8	45.8
	July	-	-	-	-	-	-	6.6	4.2
	August	-	-	-	-	-	5	19	8.8
	September	-	-	-	-	-	2.6	4.6	23.6
	October	-	-	-	-	-	10.5	ND	3.2
West Plum Creek	May	-	-	-	-	-	-	21	6.8
	June	-	-	-	-	-	-	21.6	852
	July	-	-	-	-	-	-	9	9
	August	-	-	-	-	-	29.4	48.2	87.5
	September	-	-	-	-	-	NA	16.6	33.6
	October	-	-	-	-	-	NA	12.6	4.6
Wequiock Creek	May	-	-	-	-	-	-	-	3
	June	-	-	-	-	-	-	4.25	3.2
	July	-	-	-	-	-	-	16.6	34.2
	August	-	-	-	-	-	8.8	4.6	5.6
	September	-	-	-	-	-	3.2	3.4	20.2
	October	-	-	-	-	-	ND	3	4.2

TN (mg/L)

Stream Name	Month	2020	2021	2022
Apple Creek	May	-	-	1.14
	June	-	23.1	2.22
	July	-	1.18	1.89
	August	1.16	0.976	3.99
	September	1.44	0.858	3.27
	October	0.122	0.594	0.555
Ashwaubenon Creek	May	-	-	1.16
	June	-	1.56	4.32
	July	-	1.93	1.4
	August	1.71	2.18	1.33
	September	1.3	1.25	1.03
	October	0.823	0.826	0.643
Baird Creek	May	-	-	1.27
	June	-	0.957	1.17
	July	-	1.61	0.698

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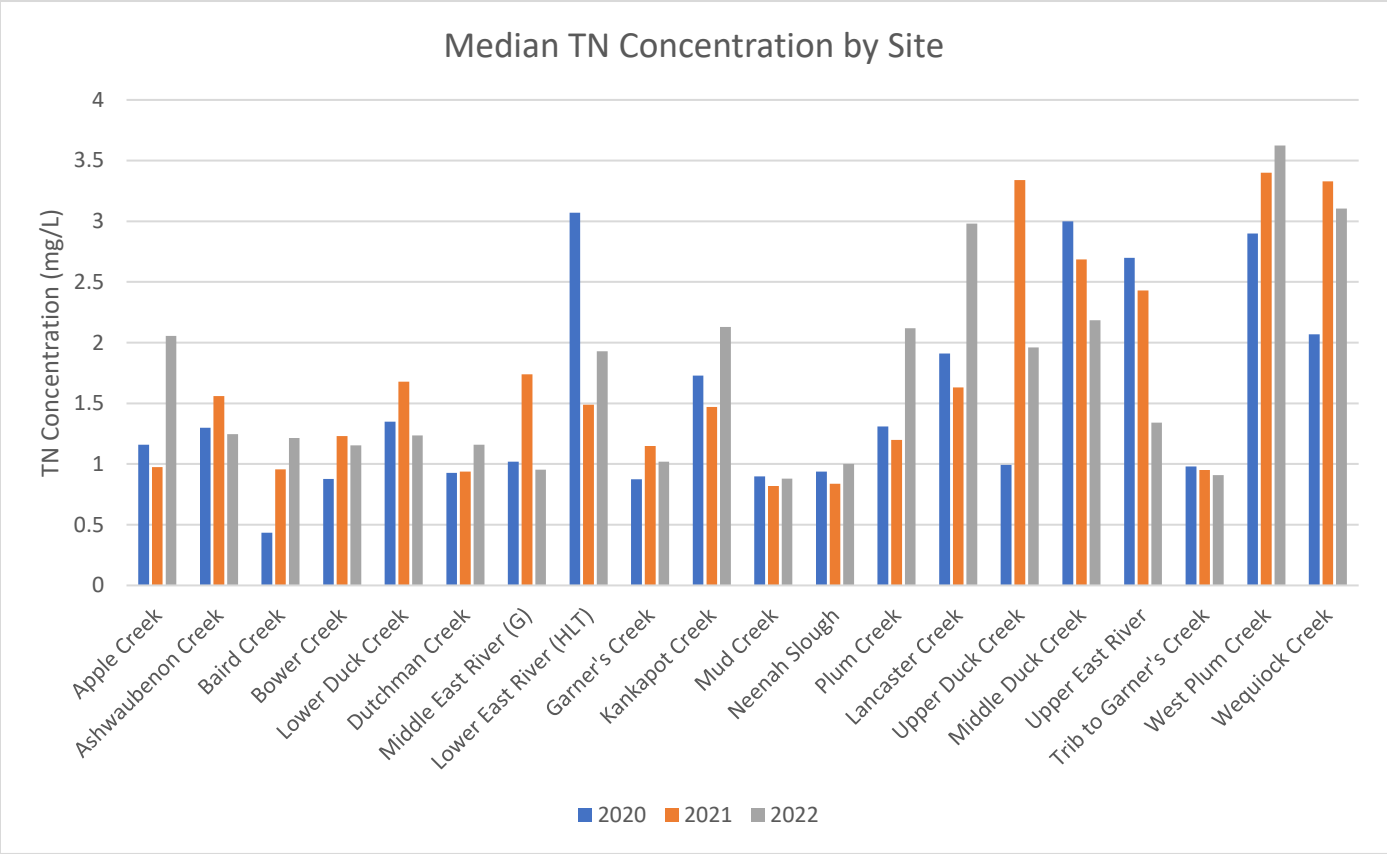
	August	0.734	1.63	4.59
	September	0.433	0.919	1.26
	October	0.389	0.938	0.578
Bower Creek	May	-	-	1.12
	June	-	1.35	1.19
	July	-	1.1	1.33
	August	1.11	1.34	1.08
	September	0.856	0.908	1.19
	October	0.876	1.23	0.548
Lower Duck Creek @ Pamperin Park	May	-	1.43	1.88
	June	-	10.6	1.31
	July	-	2.02	1.07
	August	1.26	1.92	1.16
	September	1.35	1.22	1.62
	October	3.87	1.44	0.925
Dutchman Creek	May	-	-	1.16
	June	-	1.14	0.92
	July	-	0.857	-
	August	0.944	1.47	-
	September	0.926	0.937	1.3
	October	0.879	0.784	-
Middle East River (G)	May	-	-	1.52
	June	-	13.8	1.32
	July	-	1.74	0.969
	August	1.02	1.93	0.938
	September	0.751	1.07	0.867
	October	7.05	1.21	0.793
Lower East River @ Harold Lewis Trail	May	-	1.51	1.76
	June	-	13.1	2.1
	July	-	1.27	4.63
	August	1.39	1.24	1.25
	September	3.79	1.47	2.59
	October	3.07	1.77	1.56
Garner's Creek	May	-	1.14	0.894
	June	-	1.17	1.4
	July	-	1.16	1.05
	August	0.938	1.23	1.22
	September	0.875	0.502	0.988
	October	0.493	0.711	0.49

Kankapot Creek	May	-	1.47	0.827
	June	-	1.47	4.7
	July	-	2.05	1.14
	August	1.73	2.32	2.61
	September	1.23	1.11	4
	October	4.39	0.985	1.65
Mud Creek	May	-	1.38	0.636
	June	-	0.632	1.03
	July	-	0.953	0.731
	August	0.897	0.522	1.18
	September	0.366	0.706	1.16
	October	1.07	0.93	0.426
Neenah Slough	May	-	-	1.12
	June	-	0.746	1.24
	July	-	0.988	0.883
	August	0.938	0.767	0.801
	September	0.582	0.837	1.15
	October	1.48	0.905	0.782
Plum Creek	May	-	-	4.19
	June	-	1.2	3.02
	July	-	1.37	1.18
	August	1.31	1.51	2.16
	September	1.21	0.931	2.08
	October	11.9	1.09	1.58
Lancaster Creek	May	-	1.94	-
	June	-	1.48	1.34
	July	-	1.49	1.34
	August	1.4	2.04	1.48
	September	1.91	1.77	-
	October	2.15	1.46	0.857
Upper Duck Creek @ CTH S	May	-	2.08	2.6
	June	-	1.8	4.8
	July	-	4.6	1.87
	August	1.68	3.22	1.86
	September	0.992	3.46	3.51
	October	0.217	3.95	3.36
Middle Duck Creek @ Seminary Rd	May	-	1.84	2.35
	June	-	13.6	1.87
	July	-	2.79	1.82

	August	2.26	1.89	1.96
	September	3	2.92	3.02
	October	4.33	2.58	1.96
Upper East River @ Mallard Rd	May	-	-	2.47
	June	-	2.57	3.72
	July	-	2.53	1.9
	August	2.7	2.43	1.44
	September	2.15	2.28	2.48
	October	5.85	2.01	0.978
Trib to Garner's Creek	May	-	0.932	0.599
	June	-	0.968	2.3
	July	-	1.13	0.656
	August	0.981	1.73	1.16
	September	0.509	0.743	1.3
	October	1.49	0.606	0.623
West Plum Creek	May	-	2.68	1.35
	June	-	4.24	14.6
	July	-	5.74	2.52
	August	1.91	1.79	5.1
	September	2.9	2.09	4.73
	October	4.54	4.12	0.933
Wequiock Creek	May	-	-	1.61
	June	-	18.9	2.71
	July	-	4.26	3.5
	August	2.91	3.33	6.03
	September	2.07	2.25	4.84
	October	1.26	1.53	1.76

Appendix E: Median Total Nitrogen Concentration by Site



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Appendix F: 2015-2022 Confidence Limit Table

River	TP Calculation	2015	2016	2017	2018	2019	2020	2021	2022
Apple Creek	**U90% (mg/L)**	0.311	0.452	0.598	0.239	0.272	0.253	0.262	0.462
	Median (mg/L)	0.273	0.297	0.318	0.188	0.265	0.246	0.181	0.270
	L90% (mg/L)	0.237	0.154	0.243	0.126	0.241	0.160	0.111	0.077
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Ashwaubenon Creek	**U90% (mg/L)**	0.425	0.461	0.412	0.314	0.523	0.279	0.369	0.309
	Median (mg/L)	0.347	0.316	0.321	0.301	0.401	0.257	0.305	0.252
	L90% (mg/L)	0.275	0.296	0.257	0.294	0.336	0.150	0.266	0.194
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Baird Creek	**U90% (mg/L)**	0.340	0.197	0.368	0.406	0.532	0.329	0.370	0.184
	Median (mg/L)	0.288	0.176	0.317	0.289	0.506	0.181	0.226	0.143
	L90% (mg/L)	0.194	0.145	0.214	0.228	0.306	0.111	0.171	0.102
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Bower Creek	**U90% (mg/L)**	0.260	0.264	0.360	0.340	0.374	0.321	0.344	0.229
	Median (mg/L)	0.199	0.207	0.310	0.323	0.328	0.276	0.237	0.168
	L90% (mg/L)	0.174	0.164	0.216	0.170	0.277	0.218	0.199	0.107
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Lower Duck Creek	**U90% (mg/L)**	0.191	0.207	0.245	0.191	0.198	0.186	0.235	0.149
	Median (mg/L)	0.141	0.173	0.192	0.134	0.148	0.157	0.156	0.113
	L90% (mg/L)	0.111	0.118	0.129	0.095	0.102	0.076	0.074	0.077
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	Clearly Exceeds
Dutchman Creek	**U90% (mg/L)**	0.308	0.202	0.199	0.251	0.337	0.254	0.181	0.161
	Median (mg/L)	0.209	0.157	0.157	0.141	0.280	0.161	0.106	0.127
	L90% (mg/L)	0.148	0.131	0.120	0.115	0.165	0.093	0.093	0.093
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
East River (G)	**U90% (mg/L)**	0.680	0.606	0.490	0.377	0.509	0.375	0.310	0.462
	Median (mg/L)	0.526	0.472	0.460	0.321	0.421	0.333	0.258	0.379
	L90% (mg/L)	0.399	0.374	0.363	0.239	0.336	0.260	0.237	0.295
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds

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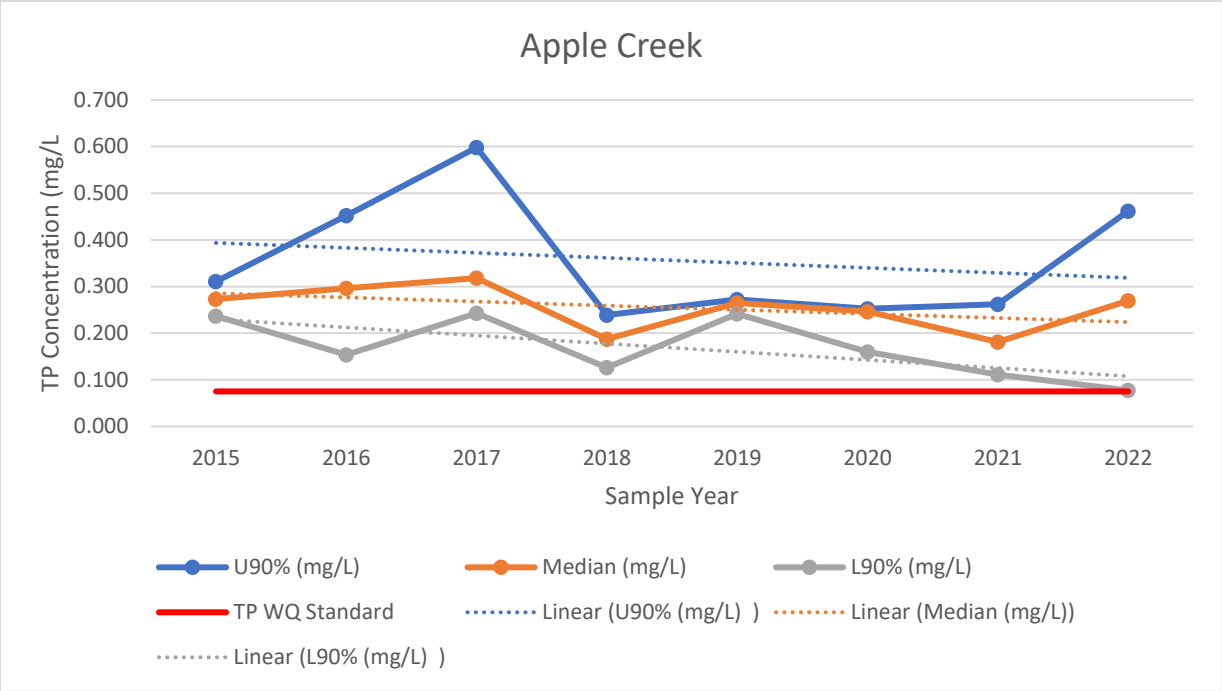
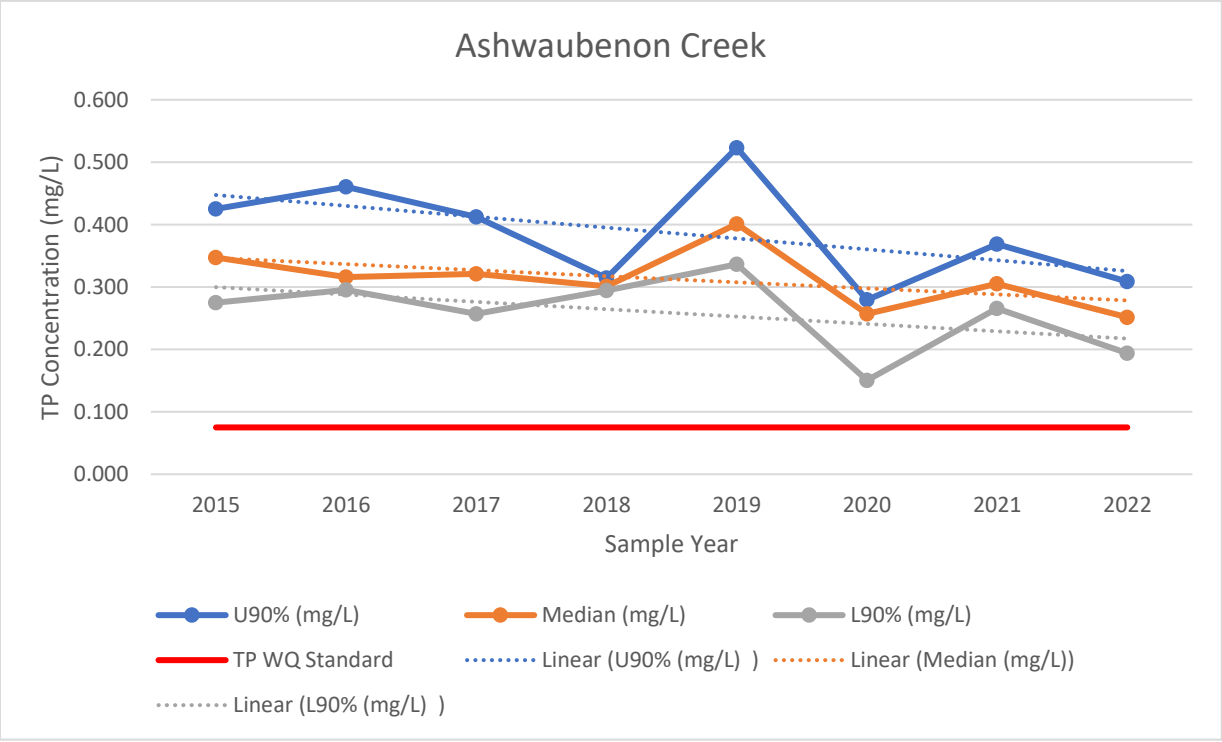
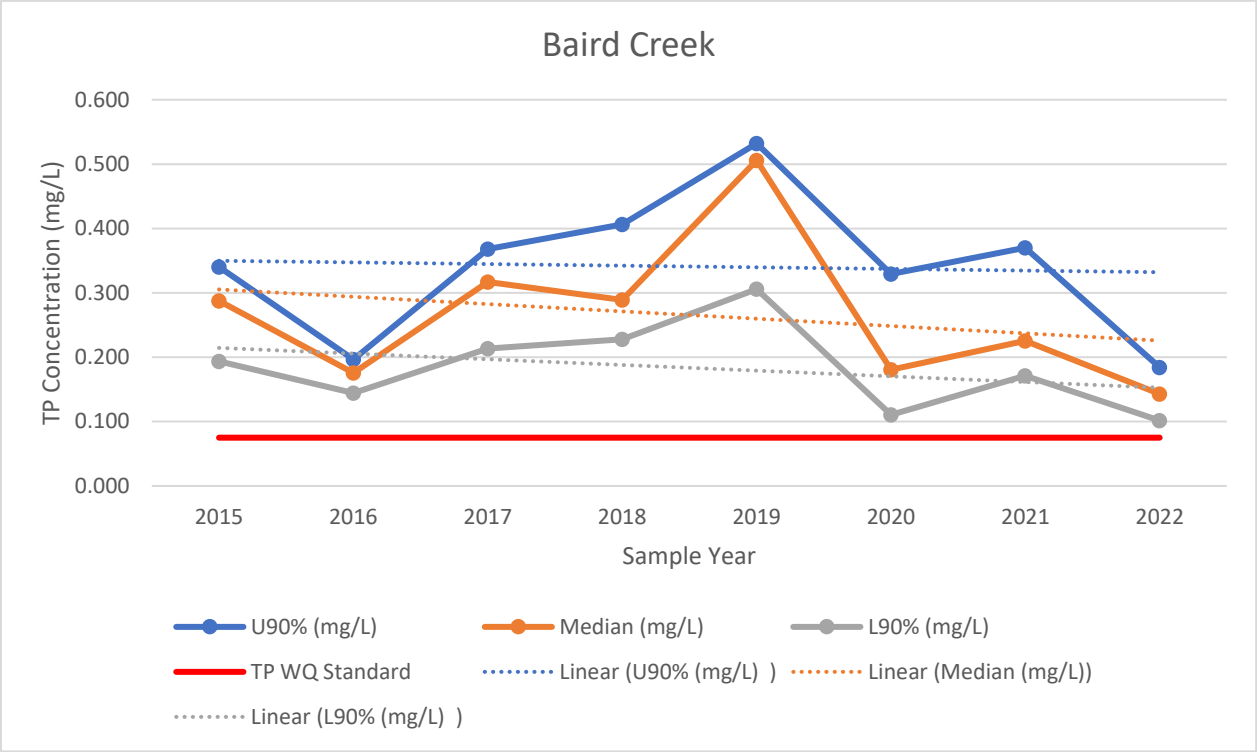
East River @Harold	**U90% (mg/L)**		0.343	0.261	0.399	0.246	0.260	0.244	0.304
	Median (mg/L)		0.252	0.143	0.321	0.170	0.152	0.128	0.182
	L90% (mg/L)		0.164	0.101	0.201	0.119	0.111	0.098	0.060
	Relation to Criteria		Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed
Garner's Creek	**U90% (mg/L)**	0.248	0.146	0.138	0.121	0.136	0.124	0.125	0.127
	Median (mg/L)	0.139	0.132	0.129	0.100	0.128	0.100	0.087	0.099
	L90% (mg/L)	0.126	0.099	0.109	0.059	0.090	0.077	0.069	0.071
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	Clearly Exceeds	Clearly Exceeds	May Exceed	May Exceed
Kankapot Creek	**U90% (mg/L)**	0.497	0.358	0.606	0.489	0.397	0.333	0.369	0.473
	Median (mg/L)	0.365	0.323	0.498	0.402	0.355	0.311	0.307	0.360
	L90% (mg/L)	0.324	0.244	0.414	0.302	0.296	0.249	0.268	0.246
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Lancaster Creek	**U90% (mg/L)**	0.129	0.130	0.088	0.118	0.068	0.092	0.058	0.069
	Median (mg/L)	0.075	0.085	0.076	0.091	0.061	0.078	0.049	0.060
	L90% (mg/L)	0.063	0.063	0.064	0.055	0.045	0.067	0.038	0.051
	Relation to Criteria	May Meet	May Exceed	May Meet	May Exceed	Clearly Meets	May Exceed	Clearly Meets	Clearly Meets
Mud Creek	**U90% (mg/L)**	0.120	0.115	0.121	0.115	0.110	0.108	0.108	0.187
	Median (mg/L)	0.104	0.098	0.088	0.097	0.092	0.090	0.094	0.151
	L90% (mg/L)	0.091	0.091	0.076	0.073	0.065	0.052	0.060	0.114
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	May Exceed	May Exceed	May Exceed	Clearly Exceeds
Neenah Slough	**U90% (mg/L)**	0.158	0.194	0.113	0.126	0.149	0.136	0.085	0.126
	Median (mg/L)	0.086	0.112	0.091	0.076	0.110	0.099	0.079	0.098
	L90% (mg/L)	0.072	0.085	0.065	0.060	0.083	0.068	0.059	0.070
	Relation to Criteria	May Exceed	Clearly Exceeds	May Exceed	May Exceed	Clearly Exceeds	May Exceed	May Exceed	May Exceed
Plum Creek	**U90% (mg/L)**			0.781	0.605	0.516	0.462	0.336	0.572
	Median (mg/L)			0.562	0.442	0.401	0.399	0.272	0.339
	L90% (mg/L)			0.508	0.332	0.297	0.296	0.234	0.105
	Relation to Criteria			Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
East River @ Mallard	**U90% (mg/L)**				0.599	0.587	0.454	0.622	0.621
	Median (mg/L)				0.529	0.503	0.410	0.310	0.500
	L90% (mg/L)				0.353	0.359	0.290	0.253	0.379

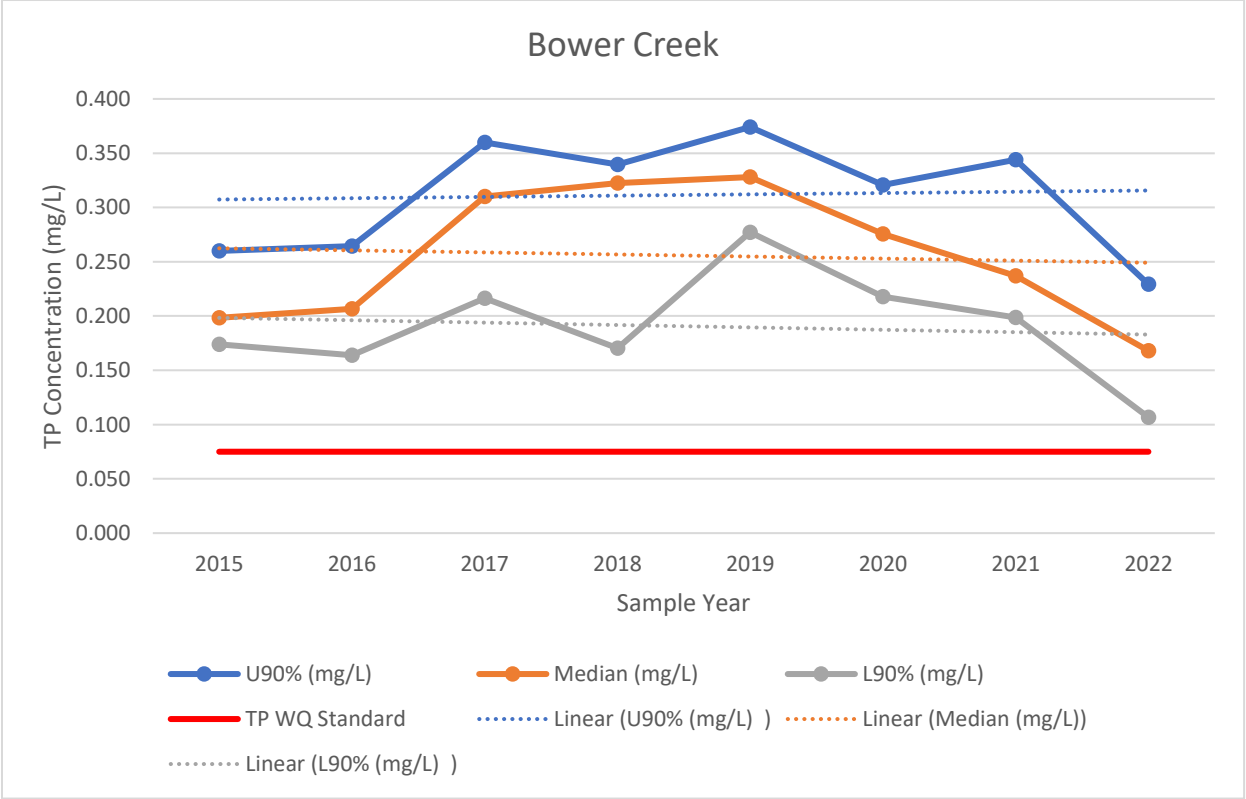
	Relation to Criteria				Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Upper Duck Creek	**U90% (mg/L)**				0.362	0.208	0.237	0.256	0.152
	Median (mg/L)				0.247	0.154	0.180	0.172	0.118
	L90% (mg/L)				0.160	0.113	0.120	0.141	0.083
	Relation to Criteria				Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Mid Duck Creek	**U90% (mg/L)**				0.192	0.247	0.214	0.270	0.226
	Median (mg/L)				0.158	0.210	0.158	0.237	0.180
	L90% (mg/L)				0.137	0.141	0.126	0.145	0.133
	Relation to Criteria				Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Trib to Garner's Creek	**U90% (mg/L)**							0.1925	0.2204
	Median (mg/L)							0.1865	0.193
	L90% (mg/L)							0.1184	0.1656
	Relation to Criteria							Clearly Exceeds	Clearly Exceeds
West Plum Creek	**U90% (mg/L)**							1.3429	1.4630
	Median (mg/L)							0.897	1.099
	L90% (mg/L)							0.7053	0.7350
	Relation to Criteria							Clearly Exceeds	Clearly Exceeds
Wequiock Creek	**U90% (mg/L)**							0.10019	0.16407
	Median (mg/L)							0.082	0.1285
	L90% (mg/L)							0.06483	0.09293
	Relation to Criteria							May Exceed	Clearly Exceeds

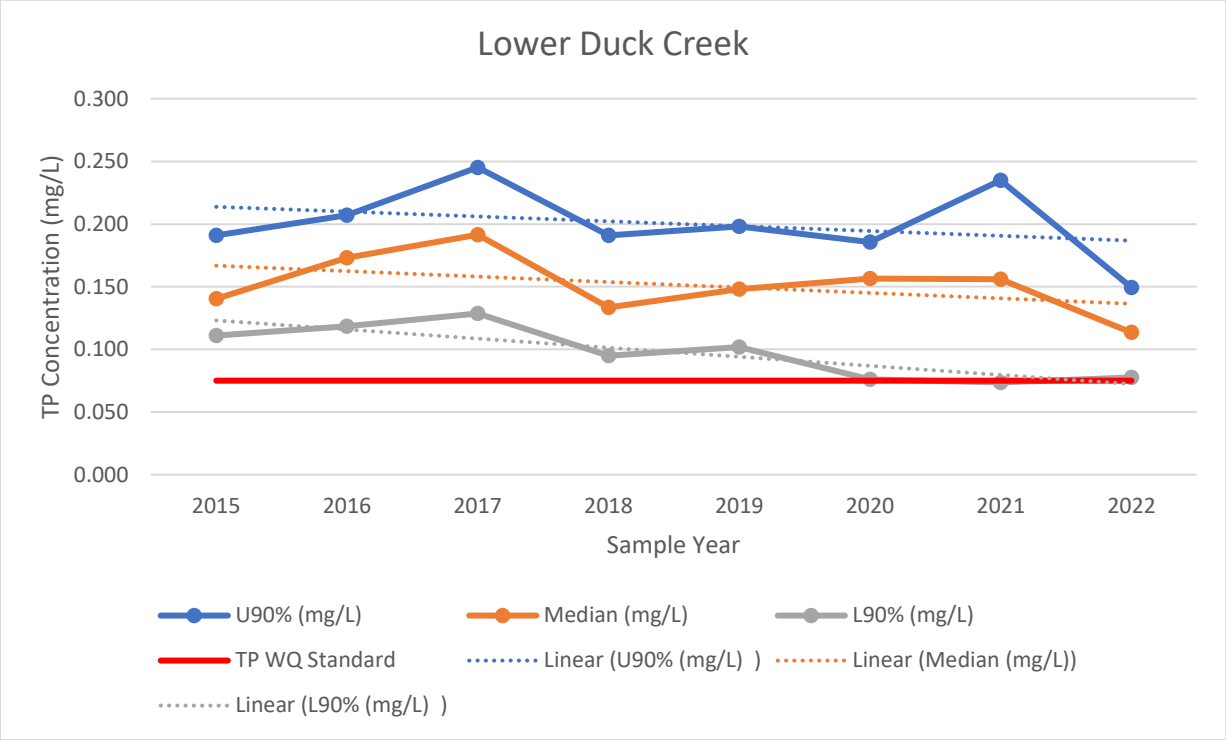
Appendix G: Confidence Interval Graphs

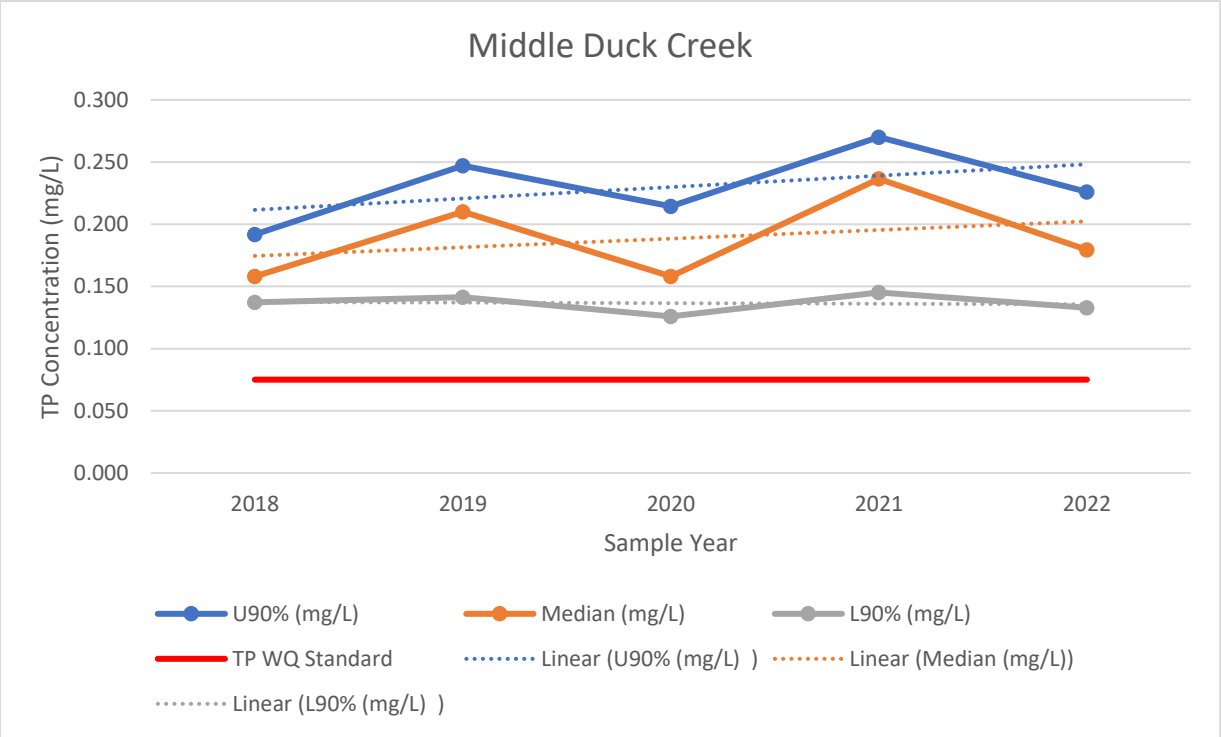





Baird Creek
TP Concentration (mg/L)
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2015
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Bower Creek
TP Concentration (mg/L)
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Lower Duck Creek
TP Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Middle Duck Creek
TP Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

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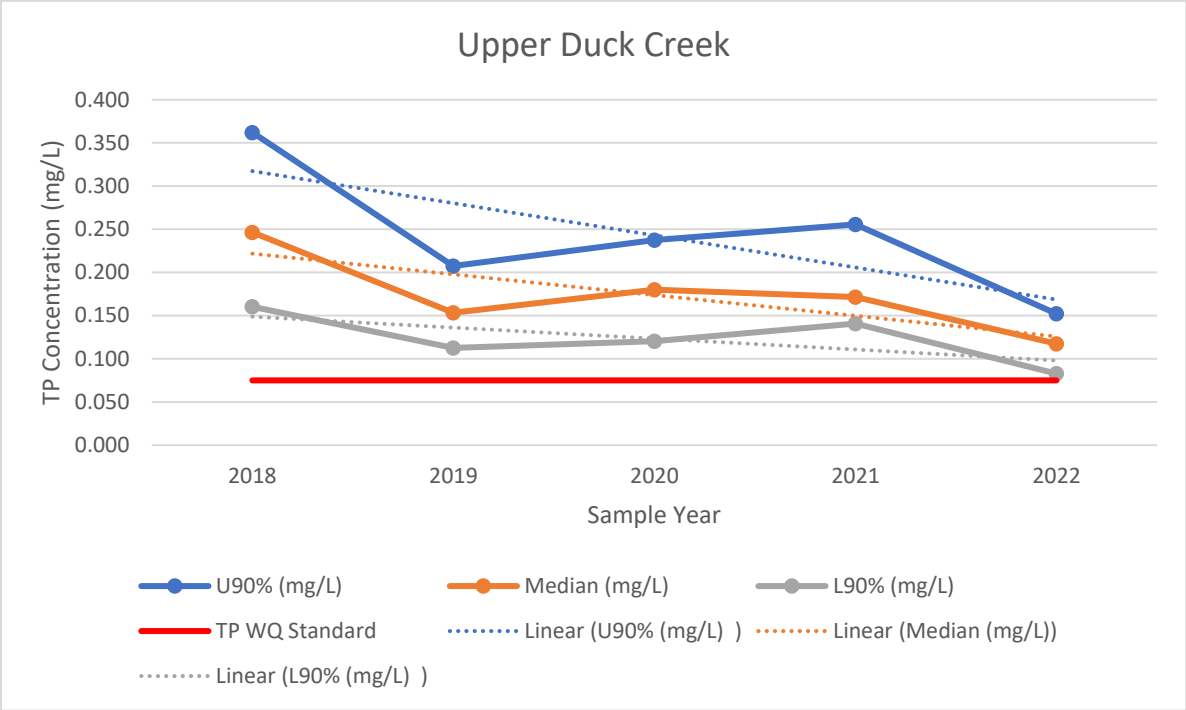

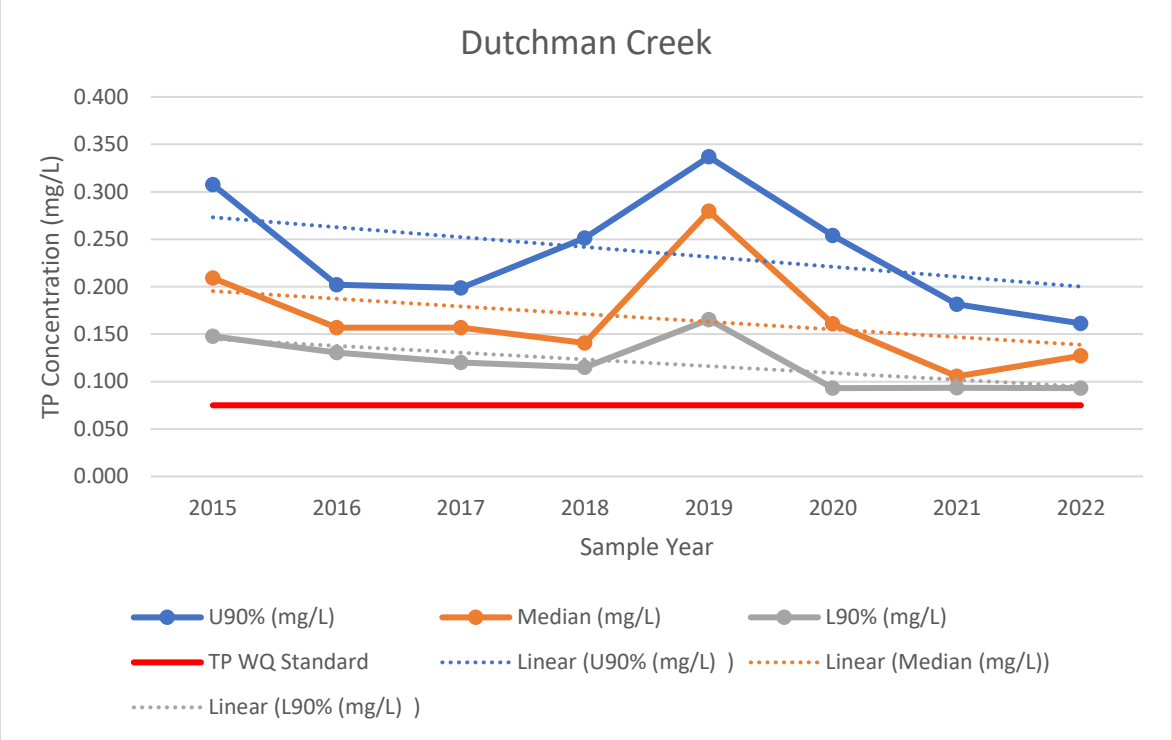

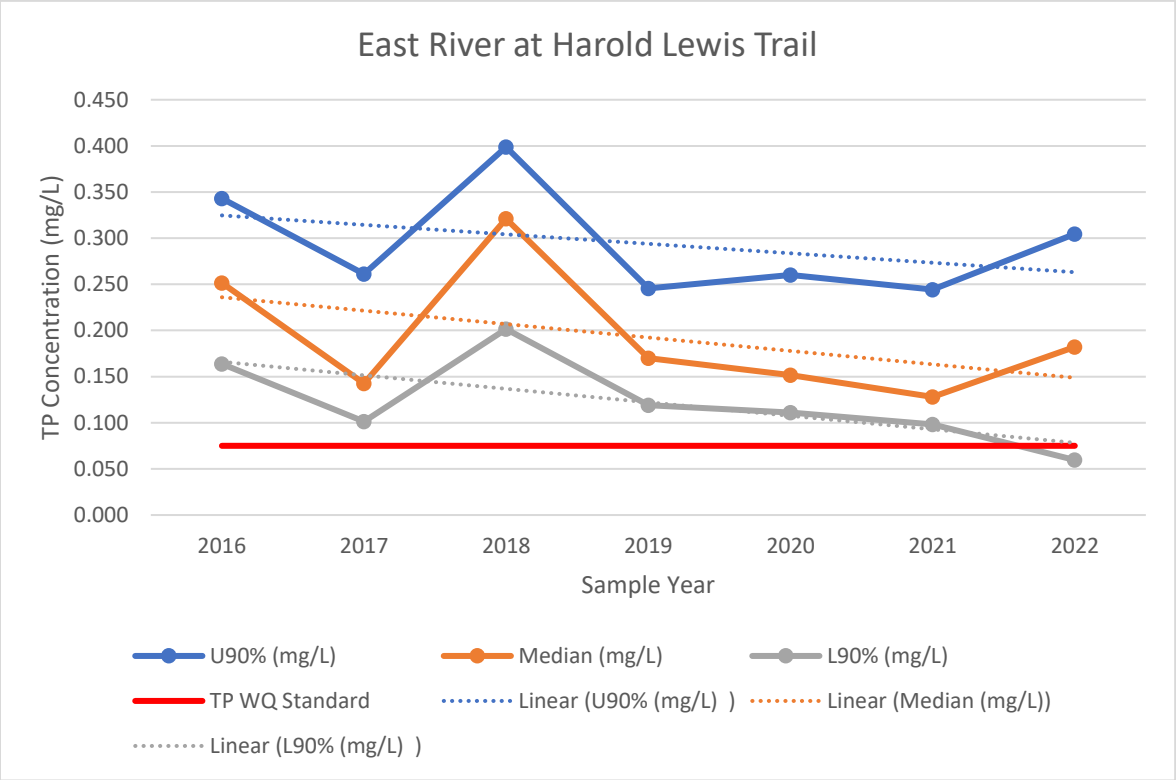
East River at Harold Lewis Trail
TP Concentration (mg/L)
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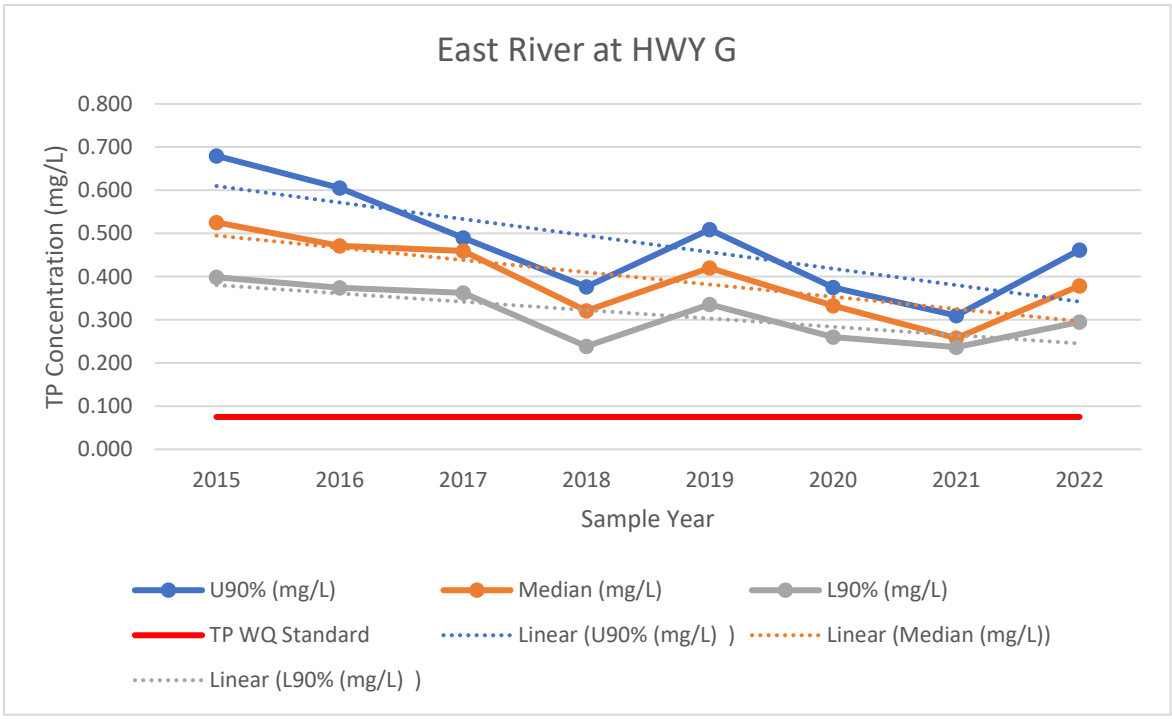
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


East River at HWY G
TP Concentration (mg/L)
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0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2015
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

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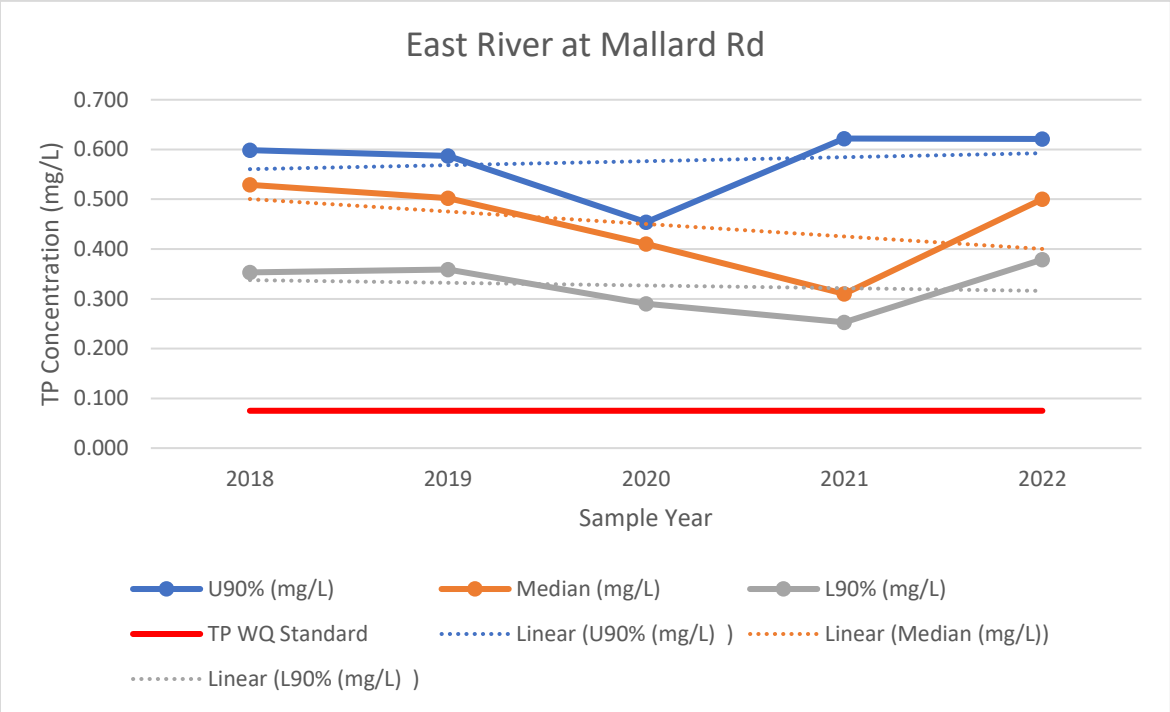
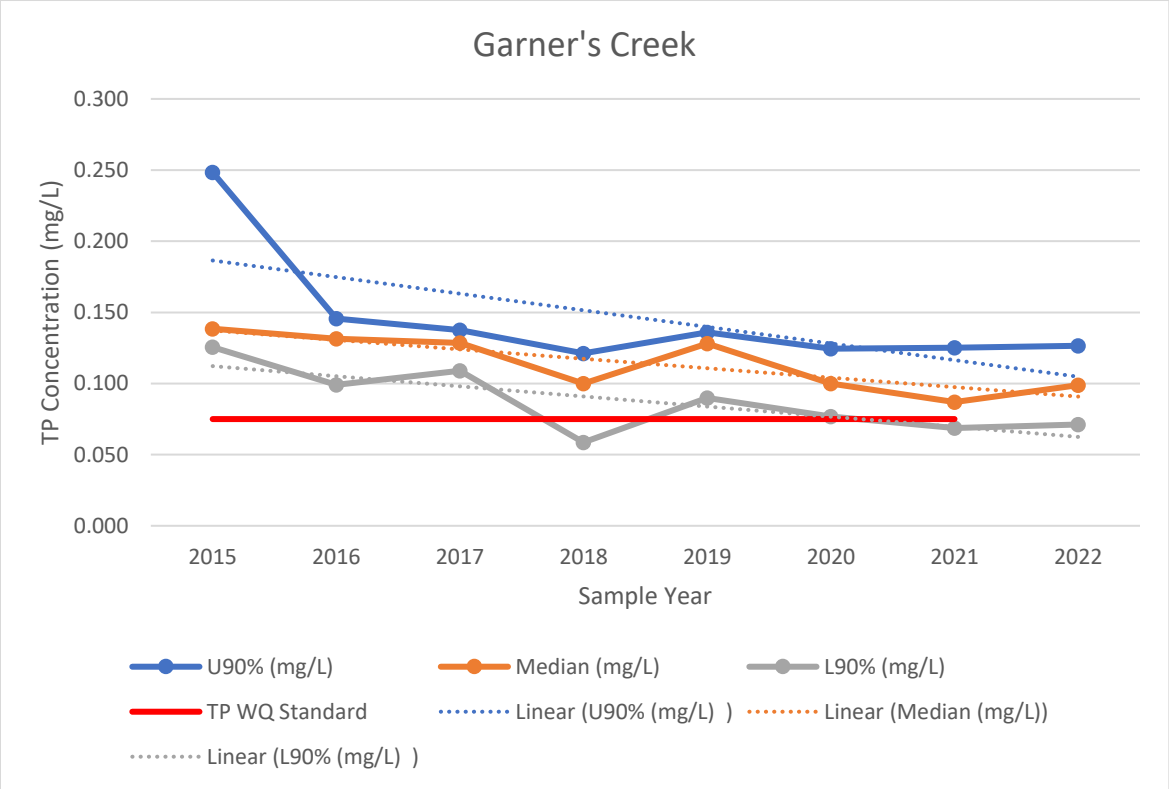
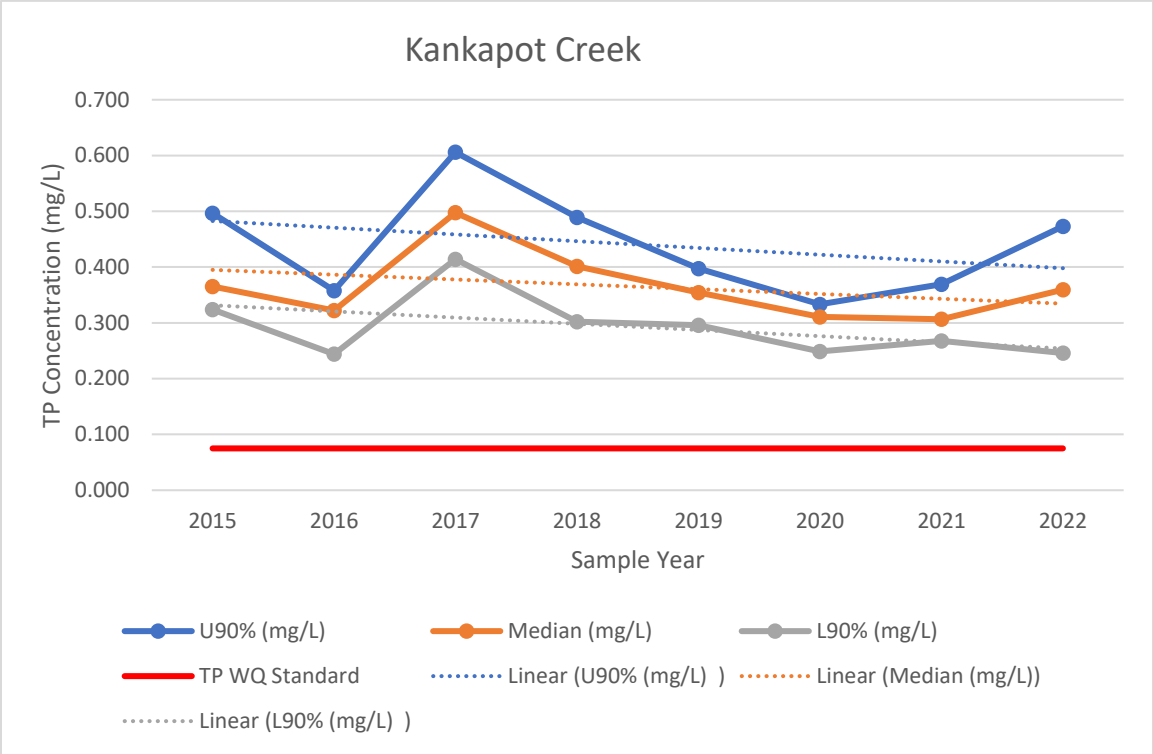
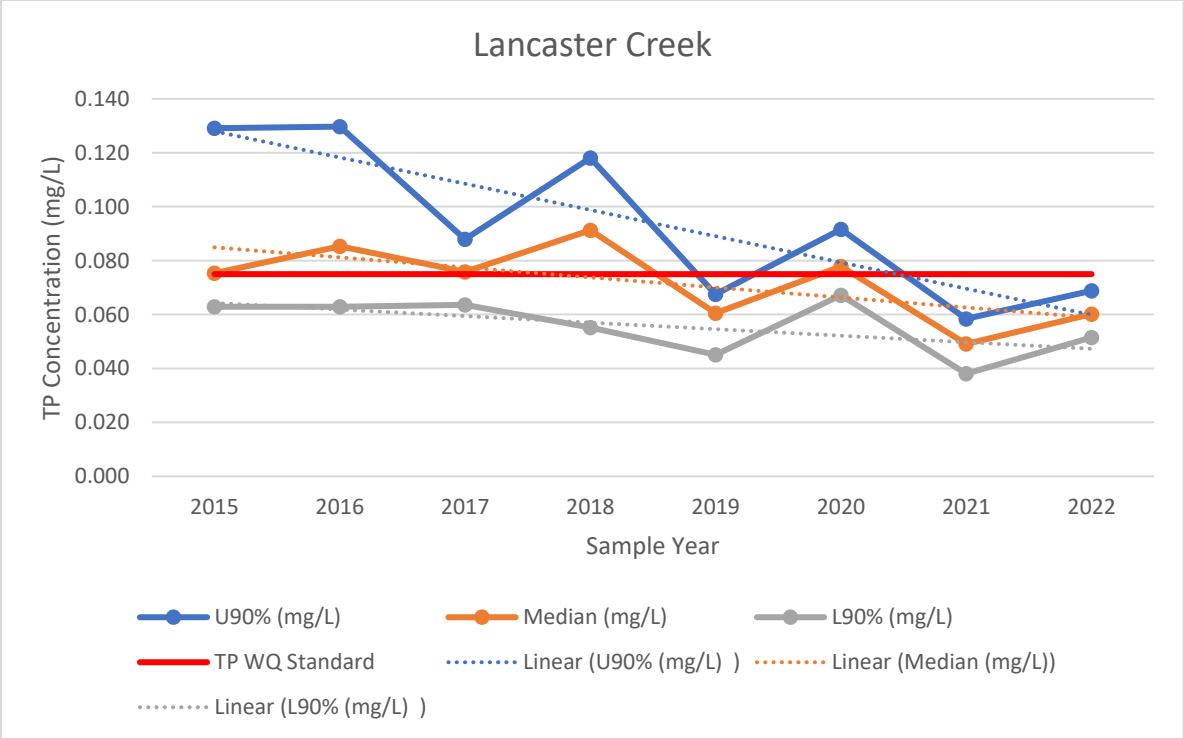





Kankapot Creek
TP Concentration (mg/L)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2015
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Lancaster Creek
TP Concentration (mg/L)
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2015
2016
2017
2018
2019
2020
2021
2022
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Standard
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

Lower Fox River Volunteer Monitoring Program

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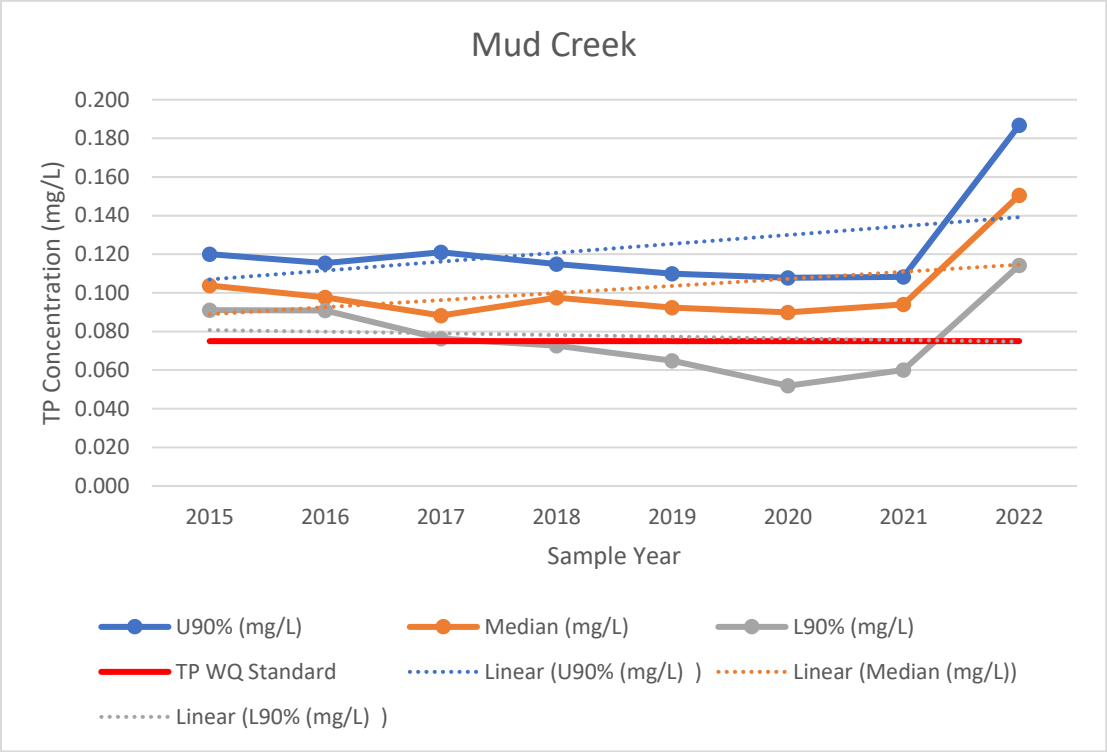

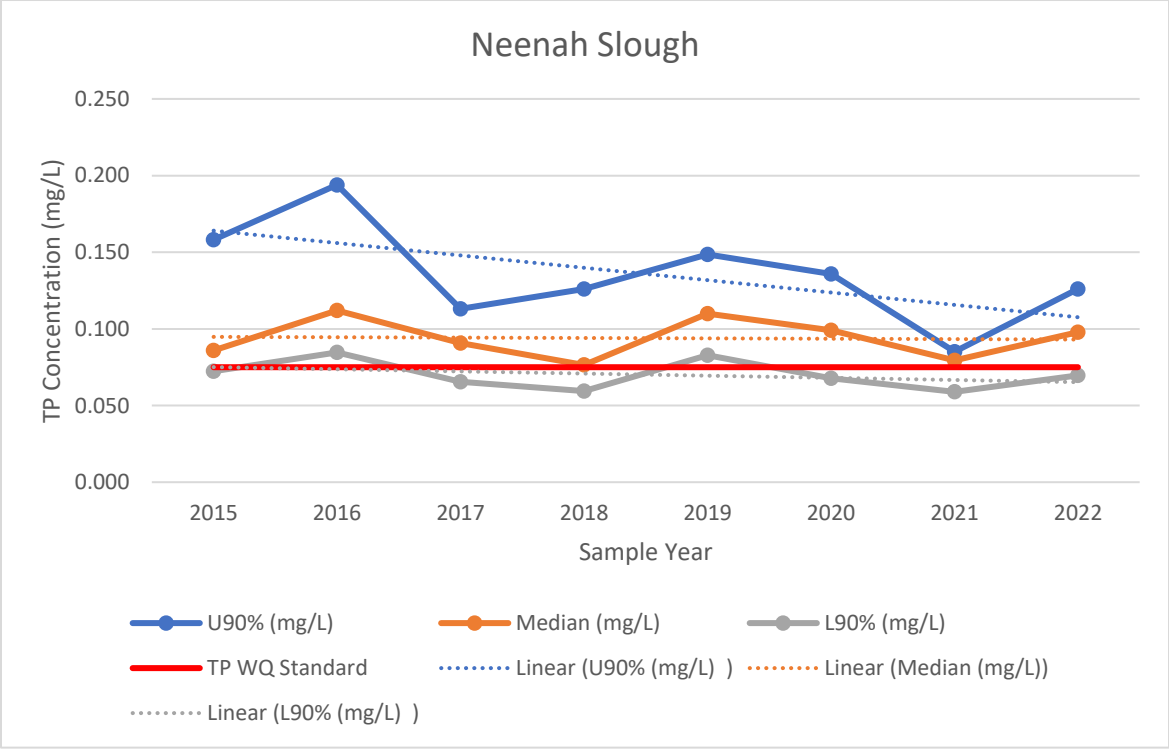

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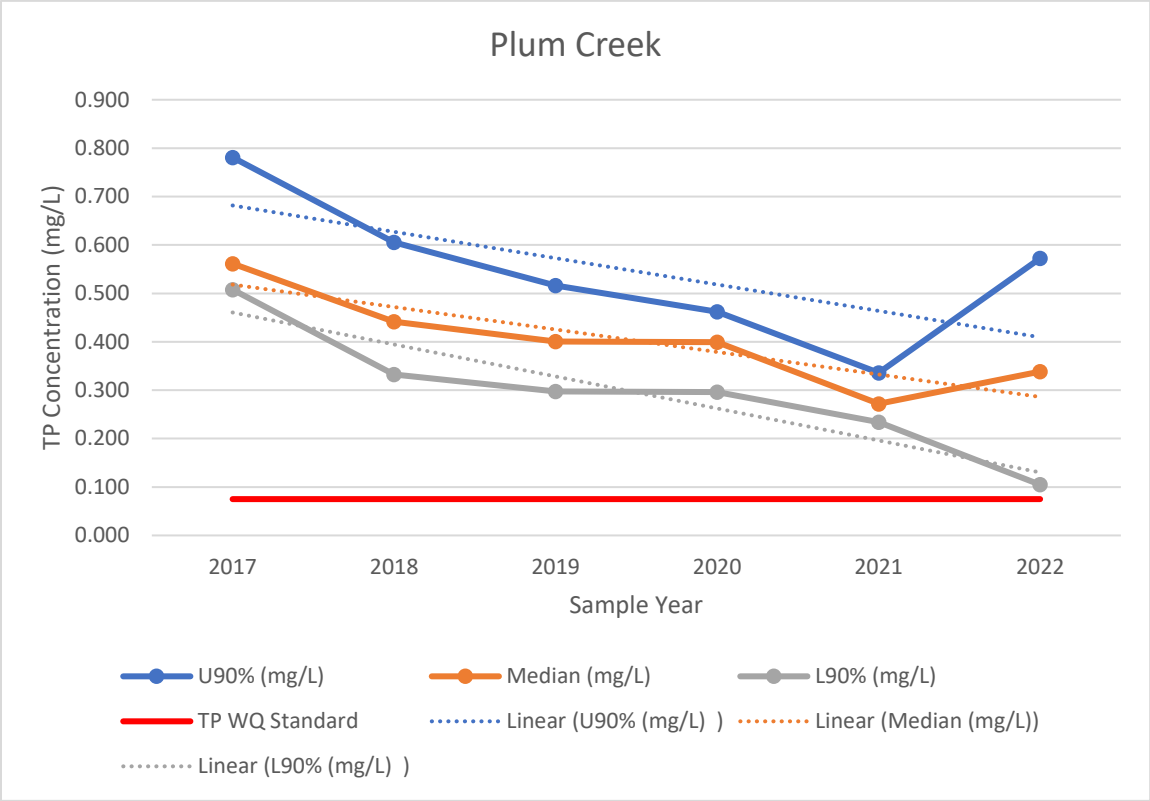

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Appendix H: Percentage of Total Phosphorus Concentrations from Dissolved Reactive Phosphorus

DRP % of TP																			
	Apple Creek	Ashwaubenon Creek	Baird's Creek	Bower Creek	Lower Duck Creek	Dutchman's Creek	East River @ HLT	East River @ HWY G	Garner's Creek	Kankapot Creek	Mud Creek	Neenah Slough	Plum Creek	Lancaster Creek	Upper East River	Upper Duck Creek	Mid Duck Creek	Trib to Garner's Creek	West Plum Creek	Wequiock Creek
May-15	47%	NA	72%	63%	***46%***	15%		67%	***34%***	45%	***30%***	***30%***		***34%***						
Jun-15	67%	51%	68%	52%	45%	76%		63%	***40%***	58%	***48%***			***50%***						
Jul-15	76%	65%	57%	29%	53%	63%		79%	***7%***	67%		***42%***		***50%***						
Aug-15	72%	57%	66%	51%	***60%***			76%	***19%***	63%	***50%***	***76%***								
Sep-15	70%	49%	73%	68%	70%			75%	***5%***	62%		***55%***								
Oct-15	81%	78%	77%	79%	***48%***			71%	***29%***	58%		***66%***								
May-16	***37%***	57%	***47%***	***52%***	28%	***30%***	***20%***	53%	***40%***	46%	***33%***	***41%***		***22%***						
Jun-16	55%	64%	56%	60%	56%		55%	65%		57%	***54%***	63%		***49%***						
Jul-16	64%	74%	63%	76%	72%		74%	83%	***45%***	61%	65%	71%		***45%***						
Aug-16	69%	40%		60%	47%	***39%***	30%	58%	***27%***	44%	***51%***	***61%***	15%	***15%***						
Sep-16	36%	59%	61%		70%		64%	59%	***2%***		***33%***	***58%***	75%	***53%***						
Oct-16	75%	72%	72%		77%		44%	85%	***35%***	58%	***65%***	68%	86%	***42%***						
May-17	43%	61%	***70%***	***35%***	***36%***	***42%***	***37%***	45%	***27%***	58%	***42%***	***16%***	69%	***62%***						
Jun-17	19%	72%	62%	72%	63%	73%	47%	55%	***36%***	53%	***65%***	63%	66%	***40%***						
Jul-17	73%	74%	61%	70%	65%	77%	58%	41%	58%	58%	52%	***60%***	77%	***46%***						
Aug-17	61%	***35%***	80%	58%	66%	***45%***	123%	64%	***49%***	64%	***48%***	***47%***	48%	***60%***						
Sep-17	78%	80%	80%	65%	65%	78%	***31%***	80%	***56%***	76%	***57%***	***43%***	83%	***53%***						
Oct-17	59%	80%	***74%***	***8%***	57%	81%	***35%***	87%	***59%***	76%	***58%***	***47%***	76%	***53%***						

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DRP % of TP																			
	Apple Creek	Ashwaubenon Creek	Baird's Creek	Bower Creek	Lower Duck Creek	Dutchman's Creek	East River @ HLT	East River @ HWY G	Garner's Creek	Kankapot Creek	Mud Creek	Neenah Slough	Plum Creek	Lancaster Creek	Upper East River	Upper Duck Creek	Mid Duck Creek	Trib to Garner's Creek	West Plum Creek	Wequiock Creek
May-18	51%	71%	69%	48%	***44%***	***44%***	60%	67%	***24%***	70%	***28%***	63%	60%	***47%***	76%	52%	***56%***			
Jun-18	68%	35%	55%	67%	66%	66%	56%	77%	***39%***	60%	***59%***	69%	70%	***56%***	34%	35%	74%			
Jul-18	83%	77%	44%	69%	70%	70%	***29%***	80%	***45%***	73%	***67%***	***58%***	60%	64%	28%	63%	78%			
Aug-18		28%	72%	53%	***58%***	***58%***	***5%***	66%	***63%***	66%	60%	***18%***	75%	***20%***	85%	69%	79%			
Sep-18	***49%***	64%	86%	76%	81%	81%	31%	85%	***63%***	68%	***64%***	***62%***	84%	***49%***	74%	66%	77%			
Oct-18	***49%***	90%	65%	62%	75%	75%	46%	67%	***62%***	59%	***47%***	***64%***	72%	***59%***	71%	*65%*	79%			
May-19	47%		48%	54%	45%	68%	***63%***	52%	***12%***	67%	***48%***	***48%***	59%	***33%***	65%	***55%***	***55%***			
Jun-19	47%	77%	67%	66%	48%	69%	***46%***	59%	***27%***	43%	***54%***	***54%***	76%	***75%***	69%	***59%***	42%			
Jul-19	82%	65%	72%	64%	80%	72%	58%	89%	***45%***	70%	86%	86%	78%	***68%***	87%	81%	73%			
Aug-19	47%	82%	54%	49%	57%	*49%*	***13%***	74%	***23%***	64%	***69%***	***69%***	68%	***50%***	78%	77%	90%			
Sep-19	69%	70%	77%	70%	73%	81%	**51%**	77%	***42%***	66%	***62%***	62%	78%	***59%***	71%	67%	74%			
Oct-19	71%	71%	62%	48%	73%	68%	**60%**	61%	***47%***	59%	***65%***	65%	55%	***82%***	61%	55%	***78%***			
May-20																				
Jun-20																				
Jul-20																				
Aug-20	36%	71%	68%	44%	***33%***	86%	***20%***	68%	***36%***	65%	***73%***	***50%***	59%	***66%***	78%	61%	73%	73%	78%	79%
Sep-20	***49%***	***71%***	***108%***	***30%***	***37%***	***59%***	***11%***	81%	***55%***	58%	***90%***	***48%***	59%	***40%***	77%	61%	60%	***69%***	72%	***113%***
Oct-20	***71%***	***79%***	***94%***	51%	84%	***62%***	49%	80%	***63%***	70%	**59%**	74%	75%	***37%***	87%	77%	87%	***43%***	87%	***114%***
May-21	-	-	-	-	71%	-	***28%***	-	***54%***	56%	***45%***	-	-	***50%***	-	56%	32%	84%	88%	-
Jun-21	51%	80%	74%	58%	39%	16%	16%	63%	54%	78%	76%	***64%***	79%	***47%***	91%	76%	65%	85%	89%	65%
Jul-21	47%	64%	62%	47%	67%	11%	***45%***	74%	***66%***	73%	69%	***64%***	69%	***67%***	70%	67%	80%	78%	81%	78%
Aug-21	77%	79%	61%	63%	63%	***10%***	***38%***	80%	53%	77%	***72%***	***54%***	66%	***74%***	85%	70%	75%	68%	82%	83%
Sep-21	***64%***	67%	55%	67%	***37%***	***9%***	***20%***	76%	***60%***	71%	***40%***	***29%***	66%	***70%***	84%	61%	73%	88%	90%	***71%***
Oct-21	***67%***	94%	73%	74%	***52%***	***8%***	115%	67%	***52%***	80%	***54%***	***28%***	77%	***72%***	90%	73%	84%	89%	84%	***73%***
May-22	-	68%	***59%***	***58%***	***59%***	***27%***	***39%***	67%	***18%***	***18%***	***36%***	***36%***	53%	-	82%	***57%***	73%	69%	60%	***17%***
Jun-22	72%	82%	61%	73%	81%	68%	40%	76%	***30%***	60%	68%	76%	73%	***55%***	66%	***63%***	82%	***26%***	84%	***63%***
Jul-22	81%	83%	68%	56%	72%	-	14%	89%	56%	73%	79%	79%	60%	***70%***	91%	80%	87%	87%	89%	75%
Aug-22	39%	72%	73%	60%	59%	-	***34%***	80%	***40%***	64%	68%	***64%***	***34%***	***64%***	94%	72%	79%	60%	61%	71%
Sep-22	-	79%	69%	60%	***65%***	74%	32%	75%	***61%***	68%	***45%***	***57%***	71%	-	84%	69%	77%	43%	-	67%
Oct-22	***61%***	***72%***	***61%***	59%	***33%***	-	***66%***	75%	***49%***	49%	***60%***	***49%***	66%	***17%***	87%	***71%***	***61%***	80%	82%	***45%***

Red percentages indicate the DRP concentration exceeded the TP concentration (DRP >100%)

Italicized and bold percentages indicate the DRP sample concentration was below the 0.075 mg/L criteria

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Appendix I: Duplicate Sample Dates and Data

Site Name	Date	Parameter	Duplicate Sample	Regular Sample	Absolute Difference		Relative Percent Difference
Duck Creek-Pamperin Park	8/14/2018	PHOSPHATE ORTHO DISS	0.0301	0.0302	0.0001	MG/L	0.33
	8/14/2018	PHOSPHORUS TOTAL	0.103	0.0975	0.0055	MG/L	5.49
	8/14/2018	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	18.8	11.8	7	MG/L	45.75
Neenah Slough #2 (100ft S of Adams St)	9/25/2018	PHOSPHATE ORTHO DISS	0.04944	0.0548	0.00536	MG/L	10.28
	9/25/2018	PHOSPHORUS TOTAL	0.078	0.088	0.01	MG/L	12.05
	9/25/2018	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	31.4	9.8	21.6	MG/L	104.85
Apple Creek - Rosin Rd	9/15/2020	PHOSPHATE ORTHO DISS	0.063	0.0623	0.0007	MG/L	1.12
	9/15/2020	PHOSPHORUS TOTAL	0.125	0.126	0.001	MG/L	0.80
	9/15/2020	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	22.3	NA	NA	MG/L	
	9/15/2020	NITROGEN TOTAL	1.43	1.44	0.01	MG/L	0.70
West Plum Creek - DS of County Line Rd	9/14/2020	PHOSPHORUS TOTAL	1.7	1.71	0.01	MG/L	0.59
	9/14/2020	PHOSPHATE ORTHO DISS	1.21	1.23	0.02	MG/L	1.64
	9/14/2020	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	33.8	NA	NA	MG/L	
	9/14/2020	NITROGEN TOTAL	2.92	2.9	0.02	MG/L	0.69
Upper East River - Mallard Rd	6/16/2021	PHOSPHORUS TOTAL	1.67	1.68	0.01	MG/L	0.60
	6/16/2021	PHOSPHATE ORTHO DISS	1.49	1.53	0.04	MG/L	2.65
	6/16/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	33	44.8	11.8	MG/L	30.33
	6/16/2021	NITROGEN TOTAL	2.59	2.57	0.02	MG/L	0.78
Trib to Garner's	6/23/2021	PHOSPHORUS TOTAL	0.311	0.306	0.005	MG/L	1.62
	6/23/2021	PHOSPHATE ORTHO DISS	0.262	0.261	0.001	MG/L	0.38
	6/23/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	6.2	4.8	1.4	MG/L	25.45
	6/23/2021	NITROGEN TOTAL	0.993	0.968	0.025	MG/L	2.55
Duck Creek-Pamperin Park	6/28/2021	PHOSPHORUS TOTAL	0.367	0.343	0.024	MG/L	6.76
	6/28/2021	PHOSPHATE ORTHO DISS	0.134	0.134	0	MG/L	0.00
	6/28/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	108	101	7	MG/L	6.70
	6/28/2021	NITROGEN TOTAL	10.6	10.6	0	MG/L	0.00
Baird Creek at Preble WI	7/6/2021	PHOSPHORUS TOTAL	0.17	0.17	0	MG/L	0.00
	7/6/2021	PHOSPHATE ORTHO DISS	0.107	0.106	0.001	MG/L	0.94
	7/6/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	13.4	12.6	0.8	MG/L	6.15
	7/6/2021	NITROGEN TOTAL	1.65	1.61	0.04	MG/L	2.45
Wequiock Creek - Nicolet Rd/CTY A	7/19/2021	PHOSPHORUS TOTAL	0.113	0.114	0.001	MG/L	0.88
	7/19/2021	PHOSPHATE ORTHO DISS	0.0885	0.0892	0.0007	MG/L	0.79
	7/19/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	10	16.6	6.6	MG/L	49.62
	7/19/2021	NITROGEN TOTAL	4.26	4.29	0.03	MG/L	0.70
Ashwaubenon Creek - Grant Street	7/21/2021	PHOSPHORUS TOTAL	0.265	0.264	0.001	MG/L	0.38
	7/21/2021	PHOSPHATE ORTHO DISS	0.165	0.17	0.005	MG/L	2.99
	7/21/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	34.6	36.8	2.2	MG/L	6.16
	7/21/2021	NITROGEN TOTAL	1.93	1.93	0	MG/L	0.00
Plum Creek at VandeHey Farm crossing	8/24/2021	PHOSPHORUS TOTAL	0.293	0.297	0.004	MG/L	1.36
	8/24/2021	PHOSPHATE ORTHO DISS	0.195	0.196	0.001	MG/L	0.51
	8/24/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	22.6	27.6	5	MG/L	19.92

	8/24/2021	NITROGEN TOTAL	1.49	1.51	0.02	MG/L	1.33
Unnamed Trib.(410000)-Lakeview Dr.	8/25/2021	PHOSPHORUS TOTAL	0.0445	0.0478	0.0033	MG/L	7.15
	8/25/2021	PHOSPHATE ORTHO DISS	0.0342	0.0354	0.0012	MG/L	3.45
	8/25/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	4.8	5.8	1	MG/L	18.87
	8/25/2021	NITROGEN TOTAL	1.95	2.04	0.09	MG/L	4.51
Mud Creek - County Highway Bb	9/16/2021	PHOSPHORUS TOTAL	0.0329	0.0331	0.0002	MG/L	0.61
	9/16/2021	PHOSPHATE ORTHO DISS	0.0132	0.0134	0.0002	MG/L	1.50
	9/16/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	2	2.4	0.4	MG/L	18.18
	9/16/2021	NITROGEN TOTAL	0.712	0.706	0.006	MG/L	0.85
East River at Harold Lewis Trail off Main Street	9/27/2021	PHOSPHATE ORTHO DISS	0.0273	0.0249	0.0024	MG/L	9.20
	9/27/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	28.8	23.2	5.6	MG/L	21.54
	9/27/2021	NITROGEN TOTAL	1.73	1.47	0.26	MG/L	16.25
	9/27/2021	PHOSPHORUS TOTAL	0.178	0.125	0.053	MG/L	34.98
Upper Duck Creek - CTH S	10/13/2021	PHOSPHORUS TOTAL	0.171	0.172	0.001	MG/L	0.58
	10/13/2021	PHOSPHATE ORTHO DISS	0.126	0.126	0	MG/L	0.00
	10/13/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	2.4	2.8	0.4	MG/L	15.38
	10/13/2021	NITROGEN TOTAL	3.9	3.46	0.44	MG/L	11.96
Bower Creek (1) 50m Upstream Of Hwy Gv	8/24/2021	PHOSPHORUS TOTAL	0.243	0.23	0.013	MG/L	5.50
	8/24/2021	PHOSPHATE ORTHO DISS	0.147	0.145	0.002	MG/L	1.37
	8/24/2021	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	38.6	34	4.6	MG/L	12.67
	8/24/2021	NITROGEN TOTAL	1.36	1.34	0.02	MG/L	1.48
East River - HWY G	9/28/2022	PHOSPHORUS TOTAL	0.272	0.272	0	MG/L	0.00
	9/28/2022	PHOSPHATE ORTHO DISS	0.203	0.205	-0.002	MG/L	-0.98
	9/28/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	15	10.4	4.6	MG/L	36.22
	9/28/2022	NITROGEN TOTAL	0.899	0.867	0.032	MG/L	3.62
Baird Creek at Preble WI	9/24/2022	PHOSPHORUS TOTAL	0.131	0.131	0	MG/L	0.00
	9/24/2022	PHOSPHATE ORTHO DISS	0.0907	0.0899	0.0008	MG/L	0.89
	9/24/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	2	0	2	MG/L	200.00
	9/24/2022	NITROGEN TOTAL	1.26	1.26	0	MG/L	0.00
Kankapot Creek - CTH Z Dodge St 100 ft US of Bridge	9/14/2022	PHOSPHORUS TOTAL	0.544	0.547	-0.003	MG/L	-0.55
	9/14/2022	PHOSPHATE ORTHO DISS	0.379	0.373	0.006	MG/L	1.60
	9/14/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	51	52.4	-1.4	MG/L	-2.71
	9/14/2022	NITROGEN TOTAL	4.01	4	0.01	MG/L	0.25
Mud Creek - County Highway Bb	8/16/2022	PHOSPHORUS TOTAL	0.15	0.152	-0.002	MG/L	-1.32
	8/16/2022	PHOSPHATE ORTHO DISS	0.106	0.104	0.002	MG/L	1.90
	8/16/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	0	0	0	MG/L	
	8/16/2022	NITROGEN TOTAL	1.19	1.18	0.01	MG/L	0.84
Garner's Creek ds of CTHZ	8/15/2022	PHOSPHORUS TOTAL	0.117	0.12	-0.003	MG/L	-2.53
	8/15/2022	PHOSPHATE ORTHO DISS	0.0484	0.0485	-0.0001	MG/L	-0.21
	8/15/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	21.6	23.1	-1.5	MG/L	-6.71
	8/15/2022	NITROGEN TOTAL	1.23	1.22	0.01	MG/L	0.82
Tributary to Plum Creek - Downstream of County Line Road	8/7/2022	PHOSPHORUS TOTAL	1.47	1.48	-0.01	MG/L	-0.68
	8/7/2022	PHOSPHATE ORTHO DISS	0.925	0.905	0.02	MG/L	2.19
	8/7/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	89	87.5	1.5	MG/L	1.70

	8/7/2022	NITROGEN TOTAL	5.08	5.1	-0.02	MG/L	-0.39
Duck Creek at Seminary Rd	7/27/2022	PHOSPHORUS TOTAL	0.269	0.268	0.001	MG/L	0.37
	7/27/2022	PHOSPHATE ORTHO DISS	0.235	0.234	0.001	MG/L	0.43
	7/27/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	4.6	4.2	0.4	MG/L	9.09
	7/27/2022	NITROGEN TOTAL	1.82	1.82	0	MG/L	0.00
Duck Creek - Pamperin Park	7/27/2022	PHOSPHORUS TOTAL	0.227	0.223	0.004	MG/L	1.78
	7/27/2022	PHOSPHATE ORTHO DISS	0.167	0.161	0.006	MG/L	3.66
	7/27/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	18	19	-1	MG/L	-5.41
	7/27/2022	NITROGEN TOTAL	1.08	1.07	0.01	MG/L	0.93
Apple Creek - Rosin Rd	7/5/2022	PHOSPHORUS TOTAL	0.381	0.376	0.005	MG/L	1.32
	7/5/2022	PHOSPHATE ORTHO DISS	0.304	0.306	-0.002	MG/L	-0.66
	7/5/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	14	16.9	-2.9	MG/L	-18.77
	7/5/2022	NITROGEN TOTAL	1.9	1.89	0.01	MG/L	0.53
Dutchman Creek - Oneida Street	6/30/2022	PHOSPHORUS TOTAL	0.172	0.173	-0.001	MG/L	-0.58
	6/30/2022	PHOSPHATE ORTHO DISS	0.123	0.118	0.005	MG/L	4.15
	6/30/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	2.8	2.8	0	MG/L	0.00
	6/30/2022	NITROGEN TOTAL	0.924	0.92	0.004	MG/L	0.43
Bower Creek (1) 50m Upstream Of Hwy GV	6/26/2022	PHOSPHORUS TOTAL	0.421	0.37	0.051	MG/L	12.90
	6/26/2022	PHOSPHATE ORTHO DISS	0.272	0.271	0.001	MG/L	0.37
	6/26/2022	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	21	19.8	1.2	MG/L	5.88
	6/26/2022	NITROGEN TOTAL	1.23	1.19	0.04	MG/L	3.31

	Level of Detection (LOD) mg/L	Level of Quantification (LOQ) mg/L
TP	0.00900	0.0300
DRP	0.00400	0.0130
TSS	2.0	2.0
TN	0.058	0.192

Highlighted cells indicate variance (relative percent difference >30%) between regular and duplicate sample results

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Appendix J: Stream Flow and Transparency Data

		Stream Flow (CFS)								Transparency (CM)							
Stream Name	Month	2022	2021	2020	2019	2018	2017	2016	2015	2022	2021	2020	2019	2018	2017	2016	2015
Apple Creek	May	-	-	-	-	-	40.1	-	-	120	-	-	-	41.4	10.48	-	-
	June	-	-	-	-	-	55.7	-	-	60	-	-	12	59	5	-	-
	July	-	-	-	-	-	-	-	-	46	-	-	-	46.5	5.11	-	-
	August	-	-	-	-	-	-	-	-	4	-	25	-	-	-	-	-
	September	-	-	-	-	-	6.2	-	-	16.5	81	26	32	0.5	7.4	-	38.5
	October	-	-	-	-	-	-	-	-	109	-	-	-	70	-	-	-
Ashwaubenon Creek	May	42.3	-	-	-	-	-	0.818	-	49.93	-	-	-	42.3	-	18	-
	June	2.2	NA	-	-	-	-	-	-	23.9	18	-	-	17.33	-	31.1	-
	July	0	13	-	27.1	-	-	14.6	-	21.73	16	-	27.3	12.33	-	40.4	-
	August	0.9	1.2	-	0	0	46.4	0	-	29.53	31	28.49	25.7	32	15.5	15.2	-
	September	0	0.61	-	-	0	13.9	16.8	-	77.9	39.27	51.4	9.2	21	68	11.5	17.9
	October	0	-	0	-	0	36.6	54	-	110	115	101	13	35	21	17.6	-
Baird Creek	May	60.2	-	-	-	4.94	11.2	2.5	-	105	-	-	17	79.2	110.3	120	-
	June	29.6	20.2	-	18.44	74.69	12.6	0.56	-	97	60	-	-	54	23.5	55.2	-
	July	-	-	-	2.57	6.1	10	-	-	-	40	-	36	10	18.35	-	-
	August	16.8	-	1.02	38.25	47.23	4.5	-	-	63	12	120	7.5	76		-	-
	September	67.13	59.9	18.4	-	59.9	-	-	-	120	-	115	39.5	55	102.35	-	82.5
	October	0.19	56.1	-	-	-	4.1	4.5	-	120	120	20.32	29.3	26	120	81.2	-
Bower Creek	May	-	-	-	-	19.2	8.6	1.178	-	60	-	-	15	62	84.7	97	-
	June	-	-	-	84.47	-	2.2	1	-	36	35	-	55	21	-	34.6	-
	July	-	-	-	-	1.3	2.3	-	-	-	10	-	21	64	10.7	-	-
	August	-	-	-	-	0	3.5	-	-	39	33	37	15	78	80	-	-
	September	-	-	-	-	12.8		-	-	-	42	27	17	38	56.15	-	36.2
	October	-	-	-	-	23.5	4.2	-	-	-	102	-	58	113	56	-	-
Lower Duck Creek @ Pamperin Park	May	31.7	36.1	-	-	74.1	49.5	10.95	-	100	85.1	-	120	105	99.1	55	-
	June	16.2	316.8	-	54.7	510.3	42.2	14.9	-	100	27.2	-	15.1	32.5	45.4	21.7	-
	July	20.4	31.7	-	97.2	16.5	40.5	7.1	-	40.1	92	-	31	46.3	25.1	28.3	-
	August	34.7	431.2	20.3	102	7.2	52.9	3.8	-	-	23.5	25.1	44.85	52.5	55.25	31.5	-
	September	32.2	15.2	10.2	240	49.3	40.1	27.2	-	92.6	100	83.5	29	93	52.5	55	-
	October	16.2	19.7	82.1	154.9	-	98.3	34.1	-	97.2	100	68.5	95.5	-	22.7	78	-

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Dutchman Creek	May	-	-	-	-	19.5	38.54	7.713	-	85	-	-	17	83	55.1	72	-
	June	-	-	-	-	-	-	-	-	120	83	-	37	14	47	-	-
	July	-	-	-	-	1.3	7.1	-	-	-	19	-	24	45	58	-	-
	August	-	-	-	-	1.3	-	-	-	-	61.5	35	26	62	35	55.01	-
	September	-	-	-	-		-	-	-	88	50	108.5	29	62.8	105	-	-
	October	-	-	-	-	0.5	-	-	-	-	103	-	34	120	2	-	-
Middle East River @ HWY G	May	-	-	-	0	6.5	26.3	10.7	-	28	-	-	29	16	16	23	-
	June	-	-	-	-	6	33.1	-	-	-	18	-	12	24	9.6	-	-
	July	-	-	-	-	-	31	-	-	31	33	-	36.5	15	14.5	-	-
	August	-	-	-	-	16.8	42.4	-	-	28	26	39	28	27	9.55	-	-
	September	-	-	-	-	8	9.5	-	-	43	55	50.5	-	16.1	44.45	1.5	-
	October	-	-	-	-	-	4.9	-	-	70	85	27	21	74			-
Lower East River @ Harold Lewis Trail	May	-	-	-	-	-	-	-	-	29	34	-	0.31	32	50	40	-
	June	-	-	-	-	-	-	-	-	30	0.18	-	0.5	15	30	-	-
	July	-	-	-	-	-	-	-	-	11	7		32	21	16	-	-
	August	-	-	-	-	-	-	-	-	29	24	0.25	11	-	29	-	-
	September	-	-	-	-	-	-	-	-	15	20	-	6	4	32	-	-
	October	-	-	-	-	-	-	-	-	40	0.41	15	33	14	29	-	-
Garner's Creek	May	-	-	-	16.97	8.35	8.24	8.24	-	-	-	-	53.3	45	23	23	-
	June	-	7.3	-	9.55	14.6	13.85	13.85	3.52	-	67	-	13	16	9	9	22
	July	-	4.02	-	5.74	1.83	2.31	2.31	-	-	52	-	21.5	26.5	25	25	-
	August	-	27	-	3.79	1.93	0	3.77	-	-	11.5	41	22.25	29.5	19	13	-
	September	-	0	-	26.66	6.83	-	5.3	-	-	114	34	20.5	63.5	35	22.5	-
	October	-	-	-	25.53	8.08	3.22	0	-	-	120	96	43	120	80	32	-
Kankapot Creek	May	1.127	0.559	-	25.6	-	-	0.0015	-	78	44	-	78.2	-	16.2	56	-
	June	1.9	0.125	-	0.8	-	16.6	10.6	-	25	24.2	-	22	28	7.46	10.23	-
	July	0.36	0.497	-	139	0	2.1	0	-	34.6	24	-	27	54	12	5.3	-
	August	0.95	0.628	-	0.17	0	1.5	0.17	-	12	15.08	55	26	9	44	18	-
	September	0.59	-	0.097	-	0	0.269	-	-	15	43.1	32	13.4	0.09	7.5	-	-
	October	0.118	0.26	1	1.33	0	1.868	0.3	-	58	45	40	30.2	90	42.5	44.1	-
Mud Creek	May	1.3	0.8	-	0	3.2	14.7	12.9	-	120	45	-	67	84.1	100.2	120	-
	June	-	1.2	-	-	6.4	7.4	-	-	120	120	-	81.2	93.1	114.2	53	-
	July	-	7.2	-	-	2.6	24.7	-	-	120	120	-	-	101.5	76	120	-
	August	-	2.6	1.18	-	0.6	24.6	3740	-	120	113	-	-	108	78.8	94	-

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	September	-	9.6	0.9	-	7.5	0.2	223.51	-	25	120	120	-	88.95	71.2	47.9	-
	October	-	6.9	18.7	-	-	45.7	4.2	-	120	80	56	-	120	79.65	120	-
Neenah Slough	May	-	-	-	0	4.59	-	12.4	-	-	-	-	45.8	117.4	41.8	120	18
	June	-	-	-	-	20.87	-	-	-	86.3	50.61	-	87.4	114	42.7	19.1	-
	July	-	-	-	-	5.3	7	15.41	-	91.5	120	-	120	120	120	93.2	-
	August	-	-	-	-	-	9.7	13.2	-	92.5	106	81.1	115	120	118	120	-
	September	-	-	0	-	-	26		-	57.78	111	65.5	26	120	120	-	-
	October	-	-	-	-	-	13.4	7.7	-	79.52	86.7	31.3	50.23	120	45.5	116	-
Plum Creek	May	-	-	-	13.2	2.3	3.7		-	21.5	-	-	51.5	26	34		-
	June	-	1.2	-	4.9	36.3	16		-	11	22.2	-	20	13.8	12		-
	July	-	10	-	3.3	3.3	4.7		-	22.5	22	-	21.5	20.5	15		-
	August	-	6.73	0.7	7	0.8	0.9	2.6	-	25	27	29.5	18	29.5	15	19	-
	September	-	2	0.8	-	9.1	-	2.7	-	-	30.5	41.5	20.5	8	46.3	6.5	-
	October	-	1.9	13	66.3	7	1.3	2.6	-	35	51	22	6	75	29.8	32	-
Upper Duck Creek @ CTH S	May	6.3	-	-	55.6	-	-	-	-	71.2	15.5	-	56	82	-	-	-
	June	-	-	-	9.2	-	-	-	-	35.55	54.2	-	69.9	65	-	-	-
	July	0	30	-	28.7	-	-	-	-	41.5	57	-	47.6	33	-	-	-
	August	2.2	0.7	-	2.9	-	-	-	-	59.7	21	34.26	54.6	35	-	-	-
	September	1.9	36.2	0	-	-	-	-	-	71.4	33.4	31	34.2	58	-	-	-
	October	7.5	10.3	0	-	-	-	-	-	115	76.66	67	25	69	-	-	-
Middle Duck Creek @ Seminary Rd	May	22.4	16.4	-	-	-	-	-	-	100	92	-	51	120	-	-	-
	June	13.1	191.5	-	232	-	-	-	-	71.2	30.1	-	13.75	83	-	-	-
	July	-	20.8	-	46	-	-	-	-	-	58.7	-	45.5	75	-	-	-
	August	24.3	229.6	6.1	20.2	-	-	-	-	-	19.7	90	75.1	67	-	-	-
	September	15.1	9.4	3.9	127.3	-	-	-	-	96	100	95	40.5	1.5	-	-	-
	October	12.1	12.3	34.7	63.7	-	-	-	-	94.7	100	83	100	-	-	-	-
Upper East River @ Mallard Rd	May	-	-	-	32	5.6	-	-	-	53	-	-	50.5	24.5	-	-	-
	June	-	-	-	8.7	49.6	-	-	-	10	-	-	12.25	14.5	-	-	-
	July	-	15	-	6.2	3.4	-	-	-	24	19.5	-	24	12.75	-	-	-
	August	-	4.65	1.4	15.7	0.7	-	-	-	30	28	16	27	32.5	-	-	-
	September	-	3.9	1.5	-	23.5	-	-	-	32	58	27	20	15	-	-	-
	October	-	5.1	23.5	-	13.7	-	-	-	-	100	30	10.5	66.5	-	-	-
Lancaster Creek	May	-	-	-	-	4.9	24.9	-	-	-	104.1	-	43.6	65	104.33	89	-
	June	-	-	-	-	6.4	-	0	-	104	-	-	101.3	61.3	-	0	-

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	July	-	-	-	-	2.49	8.64	0	-	107	-	-	-	64.6	65.2	54.3	-
	August	-	-	0	-		8.99	0	-	120	120	120	84.6	22.9	77.47	12.3	-
	September	-	-	-	-	23.4	2.98	0	-	-	-	120	120	95.2	120	117	-
	October	-	-	-	-	6.12	5.07	0	-	120	-	105.5	120	120	120	117.2	-
Trib to Garner's Creek	May	-	-	-	-	-	-	-	-	120	120	-	-	-	-	-	-
	June	-	1.2	-	-	-	-	-	-	20	120	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	-	66	65	-	-	-	-	-	-
	August	-	-	-	-	-	-	-	-	60	23	48.5	-	-	-	-	-
	September	-	-	-	-	-	-	-	-	33	37	120	-	-	-	-	-
	October	-	-	-	-	-	-	-	-	53	80	26	-	-	-	-	-
West Plum Creek	May	-	3.1075	-	-	-	-	-	-	73.5	18	-	-	-	-	-	-
	June	-	0	-	-	-	-	-	-	26	23.50	-	-	-	-	-	-
	July	-	0.978	-	-	-	-	-	-	45	44.92	-	-	-	-	-	-
	August	-	0.732	0	-	-	-	-	-	9	18.50	23	-	-	-	-	-
	September	-	-	-	-	-	-	-	-	17	32.33	16	-	-	-	-	-
	October	-	3.34	-	-	-	-	-	-	30.5	38.23	15	-	-	-	-	-
Wequiock Creek	May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	June	-	8.21	-	-	-	-	-	-	-	68.00	-	-	-	-	-	-
	July	-	8.2	-	-	-	-	-	-	-	63.00	-	-	-	-	-	-
	August	-	7.68	-	-	-	-	-	-	-	48.00	69	-	-	-	-	-
	September	-	-	0.192	-	-	-	-	-	-	-	120	-	-	-	-	-
	October	-	11.3	0.05	-	-	-	-	-	-	82.00	115	-	-	-	-	-

Appendix K: Lower Fox River Volunteer Monitoring Fact Sheet

Lower Fox River Basin Monitoring Fact Sheet

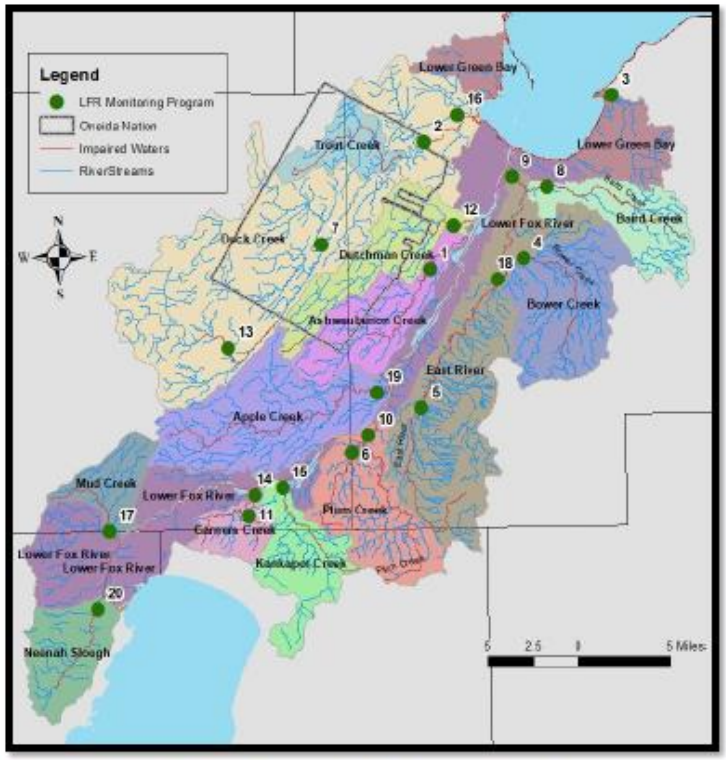
In 2012, the EPA approved the Lower Fox River Total Maximum Daily Load (TMDL). The TMDL identifies the need for pollutant reductions in waterbodies throughout the basin to meet water quality standards. There are 27 stream segments in the Lower Fox basin listed as impaired due to excess phosphorus and/or sediment loading.

Phosphorus is an essential nutrient for plant growth, but can have detrimental effects on lakes, rivers, and streams when excessive amounts are introduced to these systems. Common forms of pollutant delivery in these systems include surface runoff from urban and agricultural areas and discharges from wastewater treatment facilities, industrial businesses, and farms. Excess phosphorus in a river system can create harmful algal blooms during the summer months which impact human, plant, and animal life.

In 2015, the Lower Fox River Volunteer Monitoring program began to help achieve the monitoring goals outlined in the TMDL. There are 20 stream monitoring locations total across 16 tributary streams which are monitored by citizen volunteers. Volunteers are relied upon to collect surface water samples following WDNR protocol on a monthly basis between the months of May and October. Water samples are shipped to the State Lab of Hygiene in Madison and are analyzed for Total Phosphorus, Total Suspended Solids, and Total Nitrogen

Basin facts

- Watershed area: 641 square miles (403,657 acres)
- Includes 4 counties (Brown, Outagamie, Calumet, Winnebago) and Oneida Tribal Land
- 27 impaired waterbody segments
- Approx. 300 farms
- 29 MS4s*
- 32 Dischargers
  - 14 municipal
  - 18 industrial



Want to get involved or have questions? Contact:

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*MS4s - municipal separate storm sewer system; municipalities with WPDES permits for stormwater management.

More information can be found at: https://dnr.wisconsin.gov/topic/TMDLs/LowerFox/index.html

See backside for exact sample locations

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	Stream Name	WBIC	SWIMS ID	SWIMS Station Name	Latitude	Longitude	Impairment
1	Ashwaubenon Creek	122200	10016502	Ashwaubenon Creek - Grant Street	44.44508	-88.09875	TP and TSS
2	Lower Duck Creek	409700	10038644	Duck Creek - Pamperin Park	44.54773	-88.10285	TP and TSS
3	Wequiock Creek	3000022	10010769	Nicolet Rd/CTY A	44.57651	-87.89083	
4	Bower Creek	118400	10009445	Bower Creek (1) 50m Upstream of Hwy Gv	44.45179	-87.99543	TP and TSS
5	Upper East River	118000	53508	East River at Mallard Rd	44.33542	-88.11198	TP and TSS
6	West Plum Creek	125200	10016494	Downstream of County Line Rd	44.30296	-88.18901	TP
7	Mid Duck Creek	409700	453255	Duck Creek at Seminary Rd	44.46608	-88.21892	TP and TSS
8	Baird's Creek	118100	53683	Baird Creek at Preble WI	44.50741	-87.96754	TP and TSS
9	East River	118000	10043279	East River @ Harold Lewis Trail off Main Street	44.51633	-88.00587	TP and TSS
10	Plum Creek	125100	10046999	Plum Creek - VandeHey Farm Crossing	44.31540	-88.17154	TP and TSS
11	Tributary to Garners Creek	5022162	10047157	US CTH CE	44.25392	-88.30658	TP
12	Dutchman's Creek	121600	10015851	Dutchmans Creek - Oneida Street	44.47859	-88.0723	TP
13	Upper Duck Creek	409700	10029975	Duck Creek at CTH S	44.38665	-88.32509	TP and TSS
14	Garner's Creek	127700	10043028	Garner's Creek - DS of Cty Z	44.2701	-88.29816	TP and TSS
15	Kankapot Creek	126800	453261	Kankapot Creek - Cth Z Dodge St 100 Ft US of Bridge	44.27504	-88.26778	TP and TSS
16	Lancaster Creek	410000	10034510	Unnamed Trib. (410000) - Lakeview Dr	44.56583	-88.06471	
17	Mud Creek	129500	453258	Mud Creek - County Highway BB	44.24417	-88.46037	TP and TSS
18	East River (G)	118000	53675	East River - Hwy G	44.43550	-88.02457	TP and TSS
19	Apple Creek	124100	53684	Apple Creek - Rosin Rd	44.34861	-88.16119	TP and TSS
20	Neenah Slough	130800	10032175	Neenah Slough #2 (100ft S of Adams St)	44.18274	-88.47481	TP

*SWIMS – Surface Water Integrated Monitoring System; a Wisconsin DNR information system that holds chemistry (water, sediment), physical, and biological (macroinvertebrate, aquatic invasive species) surface water data.