Lower Fox River Basin Volunteer Monitoring Program

Lower Fox River Basin TMDL

2024 Annual Report

February 17th, 2025

WDNR Contacts

Katherine Rynish, Project Coordinator – WDNR
(920) 296-5126
Katherine.Rynish@wisconsin.gov

Keith Marquardt, Fox-Wolf TMDL Project Manager – WDNR
(920) 303-5435
KeithA.Marquardt@wisconsin.gov

Andrew Hudak, East District Water Resources Field Supervisor – WDNR
(920) 662-5117
Andrew.Hudak@wisconsin.gov

Eric Evensen, Water Quality Biologist – WDNR
(920) 240-5058
Eric.Evensen@wisconsin.gov

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Table of Contents

Project Summary

Project Location

The Lower Fox River Basin (LFRB) volunteer monitoring program is in support of the Lower Fox River Basin Total Maximum Daily Load (TMDL). Specifically, the volunteer program includes 20 monitoring sites on 16 streams within the LFRB 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 (Figure 1).

The LFRB volunteer monitoring program relies on citizen volunteers to collect surface water samples from 20 monitoring sites throughout the LFRB. The streams and monitoring sites are displayed in Figure 1 and more detailed location information can be found in Appendix A.

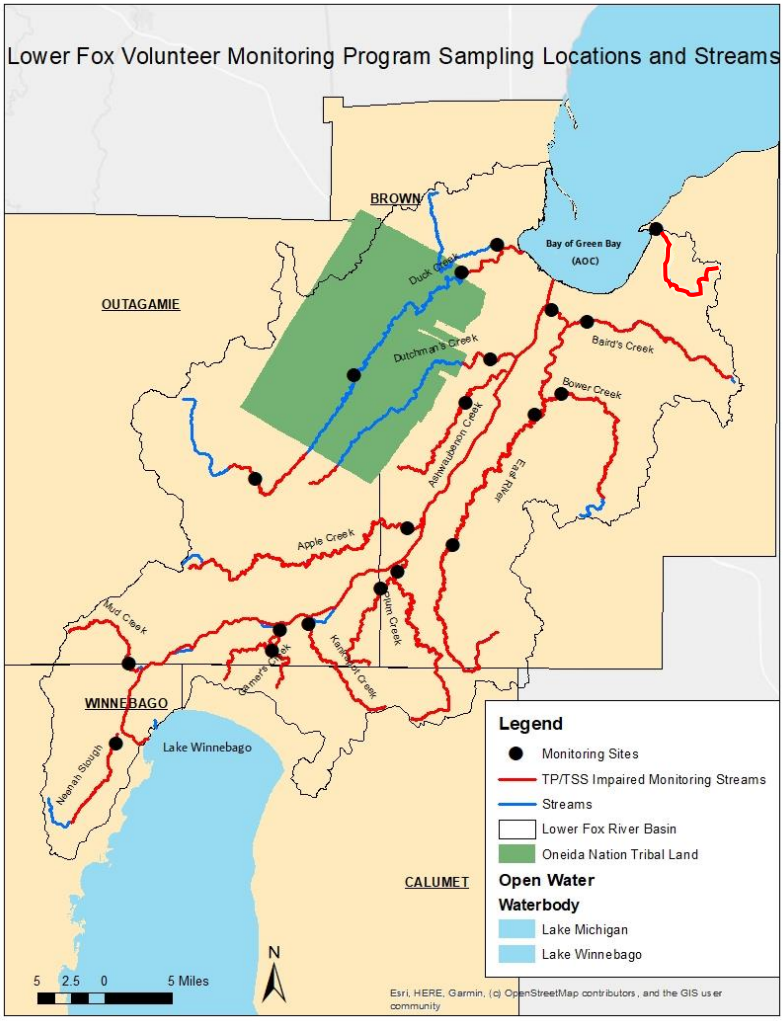


Figure 1: Lower Fox River Basin volunteer monitoring site locations.

Project Background

The Lower Fox River Basin TMDL was approved by the U.S. Environmental Protection Agency (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 LFRB volunteer monitoring program began in 2015 to achieve some of the monitoring objectives resulting from the TMDL. The program started with 14 monitoring sites 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 monitoring sites across 16 streams. Some monitoring 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 monitoring sites 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 monitoring sites, 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 monitoring sites 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 collected 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 monitoring streams, 15 are listed as impaired for TP and/or TSS on the 2024 303(d) Impaired Waters List. Appendix B includes more information about the impaired monitoring streams.

Up until 2024, the two monitored streams not on the impaired list were Lancaster Creek, a reference stream, and Wequiock Creek. Wequiock Creek was added to the impaired list in 2024 due to the high levels of TP coming from non-point sources in recent years. In addition, the downstream receiving waters of the LFRB, the Lower Green Bay and Fox River (LGBFR), are also impaired for TP and TSS and the AOC has a total of ten Beneficial Use Impairments, also known

as BUIs (there were originally 13 BUIs in 1980 but three have been removed). The U.S. EPA approved TMDL for the LFRB identifies the reductions needed to meet water quality goals. Since phosphorus and sediment loading impacts several of the BUIs 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 in 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/successes. The LFRB volunteer monitoring 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 LFRB volunteer monitoring program's goal is to collect reliable data to characterize TP, dissolved reactive phosphorus (DRP), diatom phosphorus index (every 10 years if funding is available), 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 sampling data brings focus to which streams are affected by elevated phosphorus and sediment concentrations.

The collection of TP, DRP, and TN will help strengthen the understanding of the 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.

Proposed Work and Sampling Procedure

2024 is the tenth year the WDNR has led the LFRB volunteer monitoring program. Project structure remained the same in 2024 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/) sampling 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 (if able).
    - Duplicate samples are collected at randomly selected sites throughout the sampling season (Appendix K). Duplicates are collected on the same day and at the same time as the regular sample.
- Continues to provide support to volunteers as needed:
    - Ensures safe access and suitability at each monitoring site.
    - Orders, prepares, and maintains supplies for volunteers to successfully carry out monitoring activities and shipment of samples.
    - Fosters an open line of communication with volunteers to ensure that all sites are being monitored at the frequency outlined in the project QAPP.
- Confirms that all 20 monitoring sites are monitored monthly from May to October for a total of six sampling events.
- Compiles monthly sampling data results to share with volunteers and stakeholders:
    - Records data into tables and graphs for analysis.
    - Develops an annual report complete with data and figures to share with stakeholders to assess annual water quality.

2024 Sampling Season

Summary

2024 was the tenth year for the LFRB volunteer monitoring program and water sampling began in May. The DNR Coordinator delivered sampling equipment and 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. In the past, lab slips and shipping labels were generated by DNR central office staff, but in 2024 the volunteer coordinator took over the role. This improved consistency with the supplies and made the coordinator the main point of contact for any issues volunteers ran into.

The sample collection completeness for the season was 100%, which is 1% more than 2023. This high percentage of sample completeness could be due to all the volunteers returning from previous seasons, they understand how important it is to take their sample every month. There was also an increase of communication from the DNR coordinator, they were available to take a sample if the volunteer could not. The coordinator took one sample for a volunteer, it was in May when there was high water, the volunteer did not feel comfortable sampling. A table with the percent completeness by monitoring site is provided in Appendix C.

The shipping courier has changed throughout the years of the program, FedEx Priority Overnight was used at the start and in 2021 it changed to US Postal Service (USPS) Priority Mail. While USPS allowed for convenient drop off, shipment reliability decreased in 2023. More samples arrived late to the lab and some shipments got lost for multiple weeks. Due to the issues with USPS, shipping changed to UPS in 2024 for their dependability and fast shipping times. There were no issues with using UPS in 2024, and UPS will stay the courier for the foreseeable future. All shipping labels were printed and provided to volunteers at the start of the season.

A total of 28 DRP samples, or 23% of DRP samples collected, were flagged in 2024 due to samples exceeding the 48-hour hold time for DRP analysis. For reference, 57 DRP samples (48%) were flagged in 2023. The shipping courier changed from USPS to UPS, this is a large reason there were less samples flagged in 2024. There were no lost packages, and most of the samples arrived at the lab the day after collection. Even though most of the samples arrived the day after collection, some of these samples were still flagged because they were analyzed by the lab later than 48 hours after collection. The lab receives a high volume of samples during the summer months due to the increase in water sampling across the state, and these months had the highest number of samples flagged. The coordinator will bring this issue up to lab staff to hopefully prevent this in future seasons. Although these samples are flagged by the lab for exceeding the analysis holding time, they are still able to be analyzed and the results are used. 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.

A group of 16 volunteers monitored the 20 sites in 2024. All 16 volunteers for the 2024 season were returning from the 2023 season. Prior to 2020 a large volunteer training event was held each year, but due to the large number of returning volunteers and COVID concerns there has not been a training event like this in recent seasons. Beginning in 2020, new volunteers have been trained individually at their site by the DNR coordinator. To train volunteers, the DNR coordinator goes to the site with the volunteer and they take the May sample together. 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. Training was not needed in 2024 due to all the volunteers having experience.

Over the course of 10 sampling seasons, over 40 volunteers have participated in the program. Many volunteers have returned to sample the same location for multiple years while new volunteers are recruited to sample vacant monitoring sites. Table 1 details volunteer participation in the program.

Volunteer Recruitment										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
New	8	11	8	6	1	6	1	1	2	0
Returning		1	4	8	12	10	15	15	14	16

Table 1: Volunteer Recruitment for the LFRB volunteer monitoring program from 2015-2024.

Volunteer recruitment is one aspect of the program that consistently needs to be carried out. The coordinator should continue to recruit volunteers despite having a volunteer at every stream. It is better to have multiple volunteers at each monitoring site to learn with each other and help 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 LFRB volunteer monitoring program.

Outreach

- The LFRB Volunteer Monitoring Fact Sheet (Appendix M) was shared broadly to DNR staff and county land and water programs to help recruit volunteers.
- A DNR press release was published on March 4th, 2024 to promote the program and recruit volunteers for future seasons (Appendix N).
- Information about the program is displayed on the Lower Fox TMDL webpage and the Water Action Volunteer website.
- A presentation was given to a local Rotary Club in December 2024 to give background on water quality in the LFRB and promote the volunteer 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 LFRB volunteer monitoring program 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 criteria 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 2.

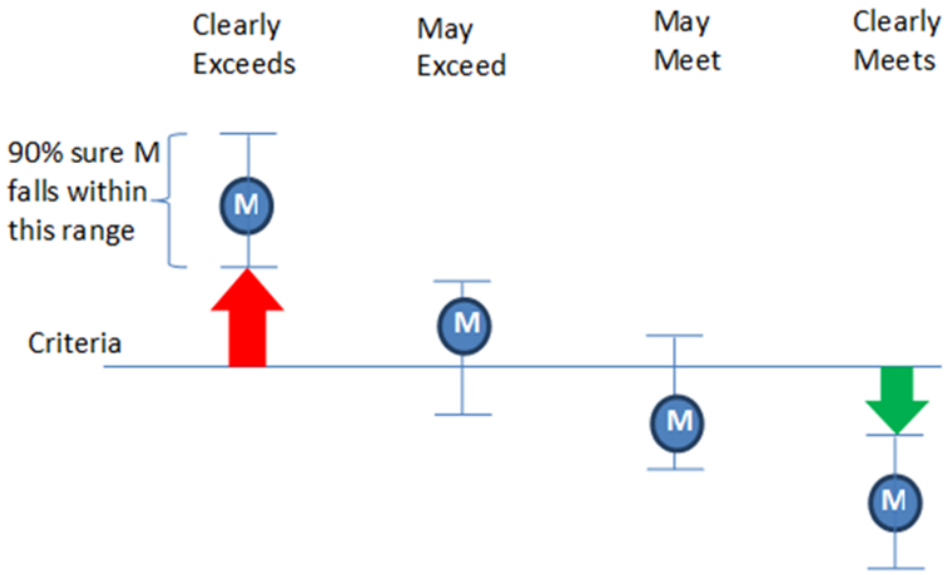


Figure 2: Wisconsin's TP criteria confidence table. Criteria line indicates the 0.075 mg/L WQC limit and M represents the Median value.

90% confidence limits were calculated for each monitoring site each year of data collection. A minimum of six samples, one per month from May – October, are needed to calculate the confidence limits. In years with less than six 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 monitoring sites had less than six data points collected. Data points from 2019 were used to fill in the months of May – July to calculate confidence limits. The 2024 confidence limits were calculated with only 2024 data as there were no missed samples. A confidence interval table is provided in Appendix E.

[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

From 2015-2023, Lancaster Creek was the only monitoring stream where water quality "May Meet" (2015, 2017, 2023) and "Clearly Meets" (2019, 2021, 2022) the State WQC for multiple years. Currently, Lancaster Creek is not impaired. In 2023 Neenah Slough became the only other stream that "Clearly Meets" the TP WQC, but in 2024 water quality "May Exceed" the State WQC. In 2024, Mud Creek joined Lancaster Creek, as both of their water quality "May Meet" the State WQC. The streams that "May Exceed" the WQC in 2024 are Dutchman Creek, Lower East River (Harold Lewis Trail), Garner's Creek, and Neenah Slough, all other sites (besides Lancaster and Mud Creek) "Clearly Exceeds" the TP WQC.

Despite the monthly TP concentrations exceeding the WQC for most of the monitoring streams, the confidence limits and GSM TP values of 13 of the 20 monitoring sites show an overall decline and improvement towards the WQC since the start of sampling. These sites include Apple Creek, Baird Creek, Dutchman Creek, East River (CTH G), Garner's Creek, Kankapot Creek, Lancaster Creek, Mud Creek, Lower Duck Creek (Pamperin Park), Neenah Slough, Plum Creek, Upper Duck Creek (CTH S), and West Plum Creek. Confidence interval graphs can be found in Appendix F. Some sites also show the UCL, LCL, and GSM value trends narrowing together indicating less sample variability and a truer median value. Despite some sites showing this trend, there were also sites with high variability in 2024 and a larger gap between the UCL and LCL. This could be due to large rainfall events during the first half of the season, volunteers are not expected to avoid sampling around these events and there could be higher than average nutrient concentrations due to increased runoff.

Although the confidence limits calculated for some monitoring sites indicate a water quality improvement, TP continues to exceed the TP WQC across the monitoring sites each year. As implementation of the TMDL continues across the LFRB, this sampling will be useful for detecting changes in water quality and will provide insight into the proper timing for more rigorous watershed wide monitoring.

Total Phosphorus Analysis by Monitoring Site

The TP median value was calculated for all monitoring sites, the median is calculated instead of the mean in accordance with Wisconsin Consolidated Assessment and Listing Methodology (WisCALM) protocol for streams and rivers. Median is used for datasets with high variability to ensure results are not skewed by one extremely high or low value; streams and rivers tend to have higher variability in concentrations compared to lakes where the mean is used. 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; there were no missed samples in 2024. Appendix G breaks down the median TP value for each monitoring site, red values indicate years with less than 100% sample collection. The median value for years with missing data may not be a proper representation of the median TP value at that monitoring site for the specific year. All sampling data from 2015 – 2024 is provided in Appendix D.

Nearly all sites from 2015 - 2024 had yearly median TP values exceeding the State WQC except for Baird Creek (2020), Dutchman Creek (2020), Garner's Creek (2020), Lancaster Creek (2019, 2021, 2022, 2023), Neenah Slough (2021, 2023), and Wequiock Creek (2020). The lower median

TP values in 2020 can be attributed to only 50% sample collection at each site. In 2024 the two monitoring sites with medians below the TP WQC were Lancaster Creek and Mud Creek.

Total phosphorus is a key indicator of water quality. It is an essential nutrient for plant growth however, when excess amounts are introduced to a waterbody, water quality can decrease and lead to excess algae growth and harmful algal blooms. In 2024, 17 of 120 (14%) TP samples met the WQC for streams, which is 0.075 mg/L. This percentage is slightly lower than previous seasons, as the percentage of samples meeting the 0.075 mg/L water quality target in 2022 and 2023 was 16%. This percentage has stayed within a 3% range consistently and the number of samples meeting the TP WQC has not increased by much since the start of the program.

Table 2 compares the number of TP samples each year meeting and not meeting the WQC. When monitoring sites were added in 2018 and 2020, the number of samples meeting the WQC increased, but since 2020 the number of monitoring sites has stayed the same and the number of samples meeting WQC has been consistent.

TP Samples Below 0.075 mg/L										
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
# Sites	14	14	14	17	17	20	20	20	20	20
# Samples Collected	62	72	84	101	101	60	110	115	119	120
# Above 0.075 mg/L	59	65	74	89	88	50	93	97	100	103
# Below 0.075 mg/L	3	7	10	12	13	10	17	18	19	17
% Below 0.075 mg/L	**5%**	**10%**	**12%**	**12%**	**13%**	**17%**	**15%**	**16%**	**16%**	**14%**

Table 2: TP samples compared to TP WQC for the LFRB monitoring sites.

Dissolved Reactive Phosphorus Analysis by Monitoring Site

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 LFRB volunteer monitoring program, DRP concentrations continue to make up a large portion of TP concentrations across all monitoring sites. Appendix J compares each sampling event's TP and DRP concentrations.

Table 3 breaks down each DRP sample collected since 2015 into percentage ranges. Nearly half (442 of 940 or 47%) of TP samples collected since 2015 had 60 – 80% of their TP concentrations coming from DRP. Another 28% (262 of 940 samples) have had 40 – 60% of their concentrations coming from DRP. These numbers show that DRP makes up a large percentage of the TP during the sampling season, this can lead to excessive algal growth. The number of DRP samples in each percentage range has stayed consistent since the beginning of the season, the range with the largest difference is 80-100%, with 2% of DRP samples in that range in 2015 and it has steadily increased to 15% in 2024. As sampling continues, this data will be useful for evaluating implementation progress and effectiveness at reducing DRP.

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	14	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	20	57	18	0
2023	20	119	3	14	36	48	17	1
2024	20	120	4	5	31	61	18	1
Total		940	35	87	262	442	107	7
Percent of Total			**4%**	**9%**	**28%**	**47%**	**11%**	**1%**

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

Total Suspended Solids Analysis by Monitoring Site

There is no statewide TSS WQC, nor is there one defined by the LFRB TMDL for the monitoring streams. A graph showing the median TSS values for each monitoring site can be found in Appendix H. For 15 of the monitoring sites, the median TSS results were higher in 2024 compared to 2023, this could be due to the increased precipitation in 2024 as more precipitation results in more runoff. There is no clear trend showing the median TSS values increase or decreasing since the beginning of the program, it varies by site.

Figure 3 compares median TSS and median TP values for each sample month from 2015 – 2024. Total phosphorus includes particulate phosphorus which is attached to suspended sediments and other suspended materials in the water. This graph shows that generally, in the months where TSS concentrations are higher, TP concentrations are also higher. Figure 4 compares median TSS values with median TN values. A similar relationship can be seen, in general the months with higher TSS concentrations also have higher TN concentrations. This helps demonstrate that these parameters have a similar cycle throughout the season, with results peaking in the beginning or middle of the season and decreasing from August to October.

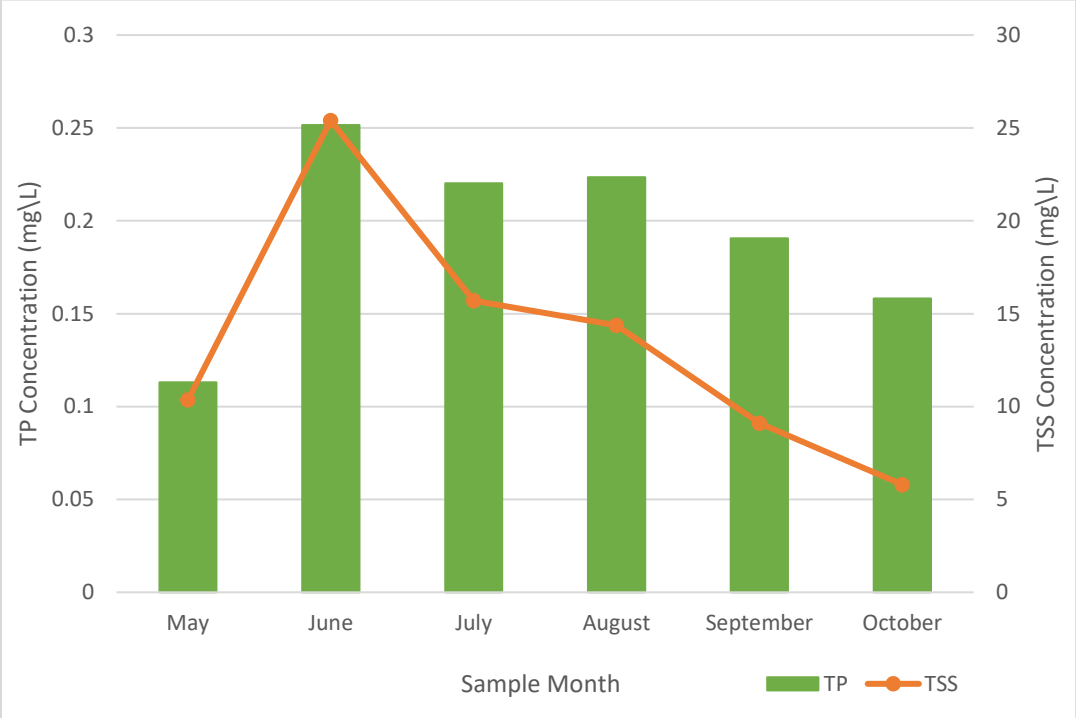


Figure 3: Median TSS and TP values compared by sample month.

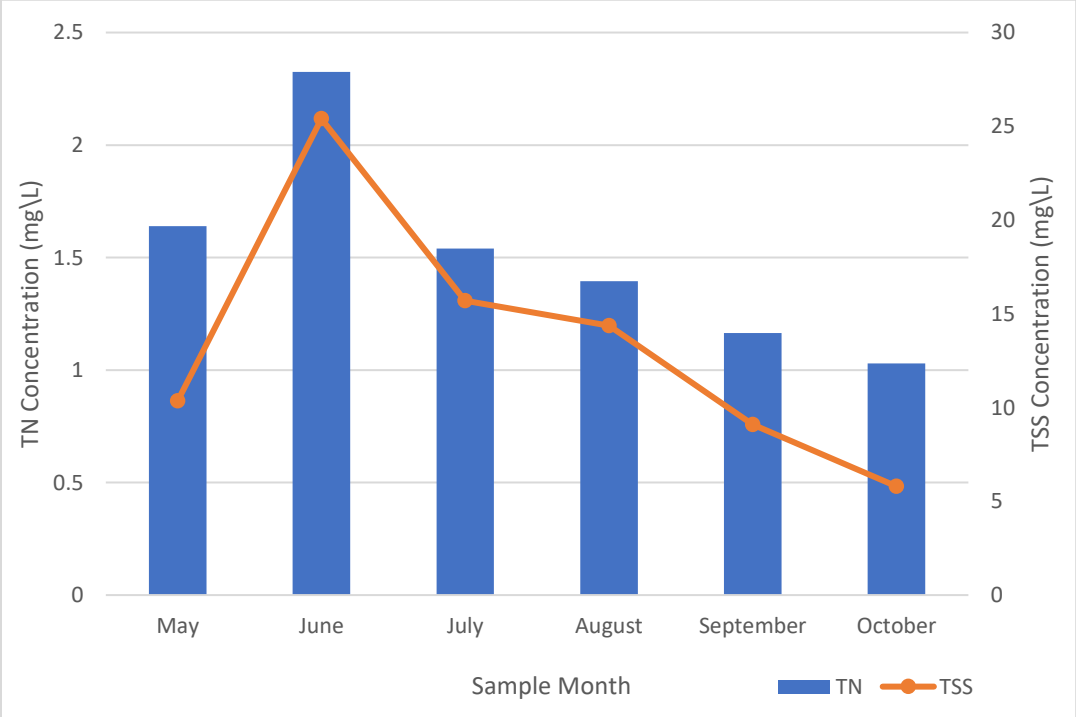


Figure 4: Median TSS and TN values compared by sample month.

Total Nitrogen Analysis by Monitoring Site

Total nitrogen has been sampled for in the LFRB volunteer monitoring program since 2020. There is no WQC for nitrogen in Wisconsin and the TMDL does not define a TN goal. A graph showing the TN medians for each site from 2020-2024 is in Appendix I. Medians vary by site with no clear trend of TN concentrations increasing or decreasing since 2020. There is no clear trend in TN concentrations, but median TN results peaked in 2024 for twelve of the monitoring sites.

The TN and TP medians for each monitoring site are compared in Figure 10, there is no clear trend to note. The TP medians were calculated with data from 2020-2024 because that is when TN was sampled for. For about half the sites TN and TP median concentrations correlate with each other, when TP concentrations are higher/lower TN concentrations are also higher/lower.

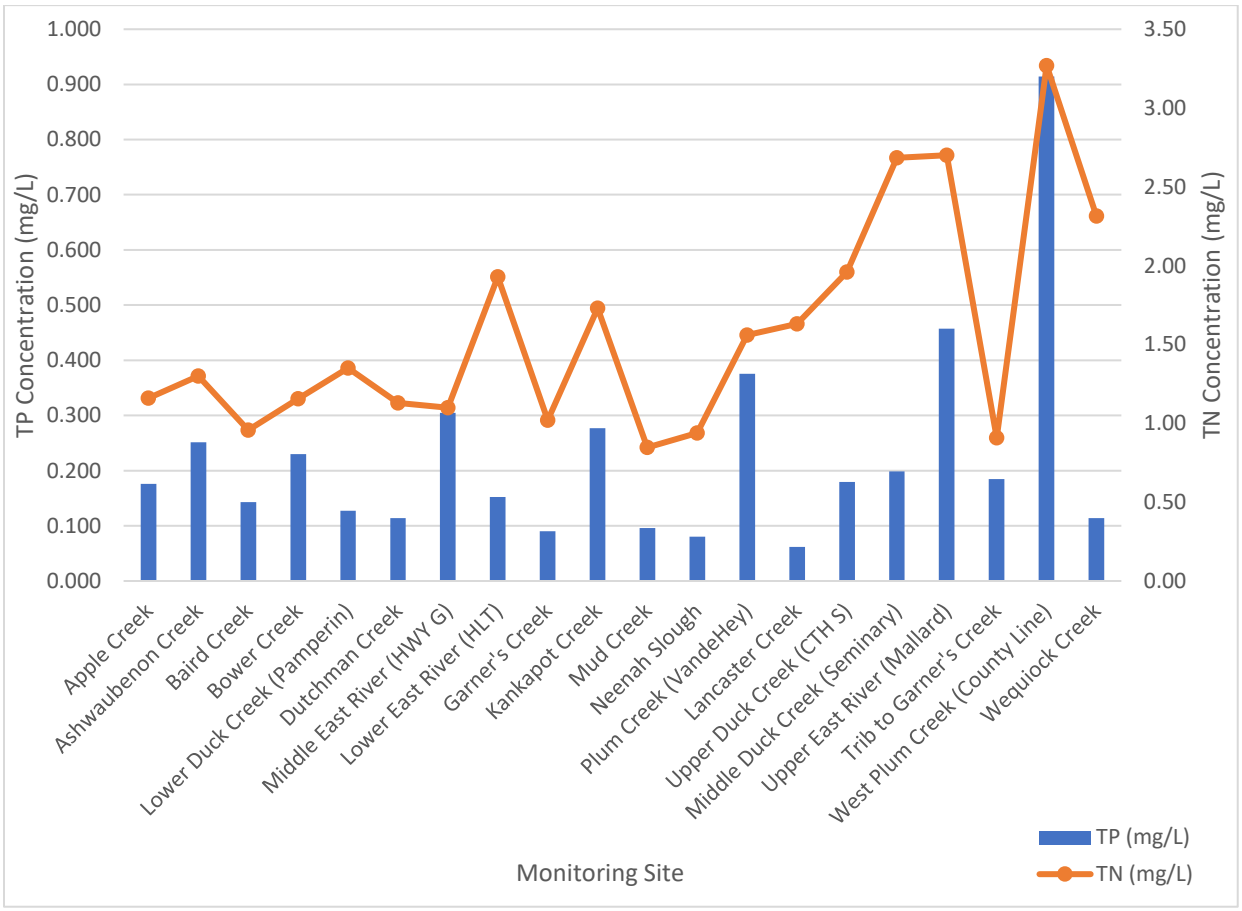


Figure 5: Median TN vs TP by monitoring site (2020-2024 Data).

Field Quality Assurance/Quality Control Duplicate Samples

To document the accuracy and precision of the field data collected by volunteers, two duplicate samples were taken as quality assurance/quality control (QA/QC) samples in 2024. In previous years 10% of the samples taken also had a duplicate sample, there were fewer duplicate samples in 2023 and 2024 due to budget constraints. The duplicate sample locations were

randomly selected from the list of sites 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, they are analyzed for the same parameters as the regular samples. 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. The absolute difference for all parameters for the 2024 duplicate samples were below the LOQ, meaning it is good quality data. 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. The relative percent difference for each parameter was below 30% for both duplicate samples, indicating limited variance. Duplicate sample results are in Appendix K.

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. Streamflow and transparency data can be found in Appendix L.

Volunteers measure streamflow using a velocity-area approach, the stream needs to be wadable and two people are required. 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.

Water transparency is collected each month with a 120cm transparency tube. Water clarity is affected by suspended sediment, dissolved material, and algae. Transparency readings range from 0-120cm, clear water with minimal dissolved material has a reading of 120cm. In 2024, 11 of the 111 (10%) transparency readings taken were 120cm, this is less than 2023, where 17% of the readings were 120cm. Heavy rain events at the beginning of the season which could have affected transparency readings; heavy rain can cause more particles in the streams, which would decrease the transparency reading. Transparency readings will be analyzed in future seasons to determine if water clarity is increasing across the LFRB. Based on previous years data we see that as TSS concentrations increase, transparency readings decrease, and as TSS concentrations decrease, transparency readings increase.

To help visualize transparency and suspended solids results, volunteers were provided a mason jar in 2024. During their sampling each month they were asked to fill the mason jar with water from their site, take a photo of the mason jar, and take a photo of their site. They sent these photos to the volunteer coordinator to compile in a document along with the total suspended solids results from that month. This document helps give a visual representation of total suspended solids results, for example higher results generally means cloudier water, and shows how the stream looks across the season. A shortened version of the document can be found in Appendix O, the full version is on the volunteer monitoring webpage.

Key Takeaways for 2015-2024

- Two sites had GSM TP concentrations below the Administrative Code NR 102 TP WQC of 0.075 mg/L in 2024, Lancaster Creek and Mud Creek. From 2015-2024 Lancaster Creek is the only site to meet this criteria for multiple years (2015, 2019, 2021, 2022, 2023, 2024).
- GSM TP concentrations from 2015-2024 have decreased across some of the monitoring sites.
    - Some sites' LCL and/or UCL appeared to be trending closer to the GSM value indicating less sample variability, but in 2024 sample variability was higher and the LCL/UCL range was larger than previous seasons.
- DRP concentrations across all monitoring sites continue to stay high. Samples are collected around the same time each month, meaning sample data does not reflect precipitation events. 47% of the DRP samples collected since 2015 have dissolved phosphorus concentrations that account for 60 – 80% of the TP concentrations. There has also been an increase in the number of DRP samples in the 80 – 100% range.
- TSS concentrations have a similar cycle as TP and TN concentrations across sampling months. The sampling months with higher concentrations happen at the beginning or middle of the season, and concentrations decrease from August to October.
- Monthly TSS concentrations and transparency readings show that as TSS concentrations increase/decrease, transparency readings decrease/increase.
- TN results peaked in 2024 for 12 of the monitoring sites. There is no trend of TN increasing or decreasing since sampling started in 2020.
- Weather conditions across the sampling season are important to note. Most of the 2024 season had higher precipitation amounts than normal. From May-August the LFRB received over two inches more rain than average, which was the opposite of the 2023 season that averaged less rain.
    - More precipitation means more runoff entering the monitoring streams, this could cause nutrient results to be higher than average.

Data Conclusions

2024 was the tenth year for the LFRB volunteer monitoring program, we can see trends in water quality for some of the monitoring streams. It's important to continually monitor the water quality in the LFRB because best management practices and implementation are hopefully increasing throughout the basin, which should result in improved water quality. 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. 2024 had more precipitation than average during the sampling season, which can affect median results for all parameters.

Since 2015, Lancaster Creek (our reference stream), is the only monitoring site with GSM concentrations below the TP WQC of 0.075 mg/L for multiple years (2015, 2019, 2021, 2022, 2023, 2024). In 2024 Mud Creek was the only other monitoring site with a GSM below 0.075 mg/L. The percentage of TP samples meeting the WQC has remained between 14-17% since 2020, meaning there has not been an increase in samples meeting the TP WQC.

Dissolved phosphorus continues to make up a large portion of total phosphorus concentrations across all monitoring sites. Appendix J 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 percentage of DRP samples in most ranges has stayed consistent, but there has been an increase in samples in the 80-100% range since 2015.

The dissolved form of phosphorus is readily available for plant uptake and contributes to excessive algae growth and potentially harmful algal blooms. Conservation efforts and BMPs have been installed in the LFRB TMDL area since the start of the volunteer program in 2015, yet DRP results remain high. The high DRP results may demonstrate that the BMPs installed are not effective at reducing DRP runoff. These results may also show the affect other agricultural practices, like tiles lines, can have as they have been shown to increase DRP and are common in the LFRB. It will be important to think about if DRP is mainly coming from point or nonpoint sources and which agricultural practices have the biggest influence on DRP.

Total suspended solids concentrations vary for each site and there is no clear trend since the start of the program. There is no statewide criteria or goal for TSS. The TSS median for 15 of the monitoring sites was higher in 2024 than 2023, this could be due to the increased precipitation in 2024. When compared to TP and TN, TSS has a similar cycle throughout the monitoring season, higher concentrations happen at the beginning or middle of the season and decrease in the second half of the season.

Total nitrogen was added to the list of parameters in 2020 and currently there is no WQC established for TN. TN trends vary by site, with some concentrations steadily going up over the four years while others are going down. Total nitrogen medians peaked for 12 of the 20 sites in 2024. Appendix I shows the median TN concentration by site from 2020-2024. The relationship between TN and other parameters was analyzed, and there is no clear correlation between TN and the other parameters. The medians for TN and TP, were compared by site and about half

the sites showed higher TN concentrations meant higher TP concentrations, while the other half of the sites showed no relationship between the two parameters. TN was also compared to TSS and there were similar results. It is important to continue sampling for TN to determine its relationship with the other parameters and if concentrations decrease due to the installation of BMPs. Most of the land use in the LFRB is agricultural and nitrogen is often found and used in this setting. Sampling for TN will be important for better understanding its impacts to surface water quality and helping develop a WQC for TN.

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

Program Conclusions

One of the main goals of the LFRB 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 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 what 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 well received, and many people commented on how the information opened their eyes to the issue we are seeing in the LFRB.

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. Volunteers appreciated the increased communication from the DNR coordinator in 2023 and 2024.

This water quality monitoring data is also important in measuring implementation progress. There are ten 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%

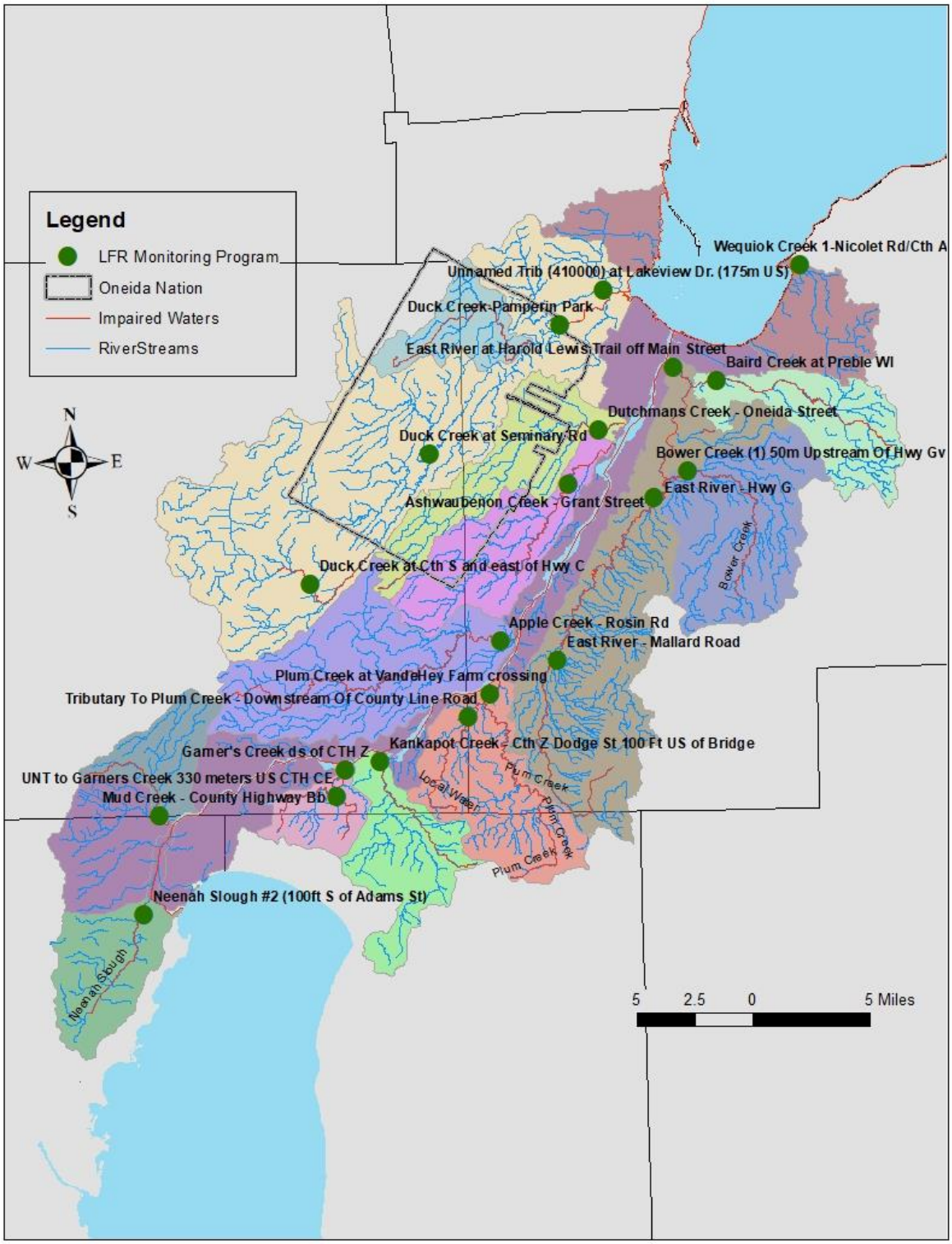
overall TSS reduction from all sources to meet water quality goals. The TMDL calls for a 78% TP reduction and 60% TSS reduction from agricultural sources in the watershed. The active 9 Key Element watershed plans focus on non-point source agricultural implementation. As implementation of these plans continue, sampling data can be utilized to help track implementation progress and assist in determining where/when 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 Basin volunteer monitoring program possible. Thank you to the Wisconsin DNR and the WAV program for funding and support. The WAV program manages a nutrient data database, where results can be viewed for monitoring sites across the state (WAV Data Dashboard (wisc.edu)).

Appendices

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



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

Appendix B: Impaired Monitoring 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	4	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	19.9			Total Phosphorus	Low DO	
									Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
Ashwaubenon Creek	10834	122200	Brown	0	14.15	14.2	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 by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Degraded Habitat	
	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	5	4/1/1998	NPS	Total Phosphorus	Degraded Habitat	TMDL approved by EPA in 2012 (4A)
									Sediment/Total Suspended Solids	Low DO	
	10851		Outagamie	25.69	32.9	7.2	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	PS/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)
									Sediment/Total Suspended Solids	Degraded Habitat	
	10680		Brown, Calumet	14.15	42.25	28.1	4/1/1998		Total Phosphorus	Low DO, Degraded Biological Community	
									Sediment/Total Suspended Solids	Degraded Habitat	
Garners 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)
									Sediment/Total Suspended Solids	Degraded Habitat	

	357763		Calumet, Outagamie	2.66	9.57	6.91			Total Phosphorus Sediment/Total Suspended Solids	Degraded Habitat Degraded Habitat	
Mud Creek	10846	129500	Outagamie, Winnebago	0	3.71	3.71	4/1/2008	PS/NPS	Total Phosphorus Sediment/Total Suspended Solids	Degraded Habitat	TMDL approved by EPA in 2012 (4A)
	10847		Outagamie	3.71	6.87	3.16	4/1/1998		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 by EPA in 2012 (4A)
	357915			2.77	3.54	0.77				Low DO	
	357955			3.55	6.12	2.57				Low DO, Degraded Biological Community	
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		Brown, Calumet	13.87	16.42	2.55	4/1/1998		Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
	357719		Calumet	16.4	19.5	3.1	4/1/1998		Sediment/Total Suspended Solids	Elevated Water Temperature, Degraded Habitat	
West Plum Creek	5690388	125200	Brown, Outagamie	0	9.4	9.4	3/31/2018	NPS	Total Phosphorus	Degraded Biological Community	Watershed Plan (5W)
Local Water (Trib to Garner's Creek)	3993962	5022162	Calumet, Outagamie	0	4.71	4.71	4/1/2016	NPS	Total Phosphorus	Degraded Biological Community	Watershed Plan (5W)
Wequiock Creek	1479576	3000022	Brown	0	8.4	8.4	4/2/2024	NPS	Total Phosphorus	Impairment Unknown	Watershed Plan (5W)

Appendix C: Percent Completeness by Monitoring Site

Sample Collection Completeness (%) - Out of 6 samples per year										
Monitoring Site	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	100%	100%	100%	83.3%	100%	50%	83%	100%	100%	100%
Ashwaubenon Creek	100%	100%	100%	100%	83.3%	50%	83%	100%	100%	100%
Baird Creek	100%	83.3%	100%	100%	100%	50%	83%	100%	100%	100%
Bower Creek	100%	66.67%	100.0%	100%	100%	50%	83%	100%	100%	100%
Lower Duck Creek (Pamperin Park)	100%	100%	100%	100%	100%	50%	100%	100%	100%	100%
Dutchman Creek	50.0%	33.3%	100.0%	100%	100%	50%	83%	50%	100%	100%
Middle East River (CTH G)	100%	100%	100%	100%	100%	50%	83%	100%	100%	100%
Lower East River (Harold Lewis Trail)	0%	100%	100%	100%	100%	50%	100%	100%	100%	100%
Garner's Creek	100%	83.3%	100%	100%	100%	50%	100%	100%	100%	100%
Kankapot Creek	100%	83.3%	100%	100%	100%	50%	100%	100%	100%	100%
Mud Creek	50.0%	100%	100%	100%	100%	50%	100%	100%	100%	100%
Neenah Slough	100%	100%	100%	100%	100%	50%	83%	100%	100%	100%
Plum Creek (VandeHey)		50%	100%	100%	100%	50%	83%	100%	100%	100%
Lancaster Creek	50%	100%	100%	100%	100%	50%	100%	67%	100%	100%
Upper Duck Creek (CTH S)				100%	100%	50%	100%	100%	100%	100%
Middle Duck Creek (Seminary Rd)				100%	100%	50%	100%	100%	100%	100%
Upper East River (Mallard Rd)				100%	100%	50%	83%	100%	100%	100%
Trib to Garner's Creek						50%	100%	100%	100%	100%
West Plum Creek (County Line)						50%	100%	100%	100%	100%
Wequiock Creek						50%	83%	100%	83%	100%
Combined Percentage	80.77%	85.71%	100.00%	99.02%	99.02%	50.00%	91.52%	95.85%	99.15%	100.00%

Appendix D: 2015-2024 Sampling Data

TP (mg/L)											
Monitoring Site	Month	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	May	0.34	0.0714	0.331	0.168	0.23	-	-	0.0308	0.0716	0.0549
	June	0.268	0.342	1.67	0.244	0.262	-	0.514	0.184	0.103	0.166
	July	0.354	0.407	0.345	0.319	0.267	-	0.176	0.376	0.462	0.334
	August	0.278	0.251	0.207	-	0.288	0.267	0.186	0.888	0.277	0.321
	September	0.199	0.954	0.305	0.147	0.273	0.126	0.0942	0.355	0.185	0.169
	October	0.224	0.141	0.254	0.0691	0.224	0.122	0.0673	0.0762	0.189	0.17
Ashwaubenon Creek	May	0.513	0.3	0.254	0.291	-	-	-	0.291	0.221	0.678
	June	0.435	0.295	0.529	0.293	0.313	-	0.512	0.309	0.373	0.923
	July	0.472	0.332	0.388	0.332	0.544	-	0.264	0.335	0.23	0.268
	August	0.226	0.259	0.204	0.313	0.317	0.223	0.323	0.212	0.222	0.789
	September	0.258	0.489	0.239	0.309	0.715	0.0989	0.232	0.159	0.165	0.202
	October	0.259	0.678	0.466	0.289	0.485	0.119	0.319	0.0986	0.111	0.115
Baird Creek	May	0.477	0.123	0.204	0.23	0.578	-	-	0.127	0.148	0.157
	June	0.317	0.179	0.393	0.191	0.502	-	0.281	0.2	0.124	0.252
	July	0.319	0.212	0.45	0.348	0.201	-	0.17	0.155	0.173	0.439
	August	0.181	-	0.363	0.187	0.51	0.16	0.479	0.264	0.178	0.493
	September	0.258	0.252	0.271	0.555	0.572	0.0691	0.167	0.131	0.101	0.16
	October	0.127	0.133	0.137	0.499	0.253	0.0753	0.115	0.0691	0.0843	0.0925
Bower Creek	May	0.179	0.126	0.135	0.0927	0.262	-	-	0.127	0.105	0.572
	June	0.187	0.257	0.318	0.344	0.289	-	0.63	0.37	0.233	0.119
	July	0.401	0.388	0.302	0.384	0.395	-	0.197	0.301	0.243	0.193
	August	0.21	0.2	0.224	0.326	0.367	0.319	0.23	0.174	0.206	0.247
	September	0.213	-	0.451	0.319	0.436	0.154	0.175	0.162	0.19	0.242
	October	0.152	-	0.36	0.152	0.233	0.232	0.244	0.137	0.148	0.272
Lower Duck Creek (Pamperin Park)	May	0.094	0.0666	0.0694	0.0589	0.0742	-	0.194	0.0939	0.0627	0.318
	June	0.314	0.142	0.193	0.319	0.192	-	0.343	0.133	0.262	0.32

	July	0.172	0.183	0.276	0.186	0.237	-	0.118	0.223	0.128	0.17
	August	0.122	0.163	0.145	0.0975	0.104	0.121	0.361	0.142	0.139	0.137
	September	0.159	0.257	0.19	0.114	0.269	0.0344	0.045	0.0865	0.0552	0.142
	October	0.0967	0.203	0.308	0.153	0.0867	0.2	0.0405	0.0561	0.127	0.0937
Dutchman Creek	May	0.547	0.107	0.0977	0.104	0.363	-	-	0.0535	0.442	0.0923
	June	0.231	-	0.271	0.569	0.196	-	0.159	0.173	0.199	0.205
	July	0.306	-	0.212	0.165	0.396	-	0.113	-	0.133	0.368
	August	-	0.126	0.102	0.116	0.113	0.126	0.098	-	0.184	0.099
	September	-	-	0.187	0.201	0.423	0.0538	0.0907	0.14	0.184	0.129
	October	-	-	0.127	0.106	0.128	0.0692	0.0836	-	0.0988	0.0689
Middle East River (CTH G)	May	0.307	0.275	0.444	0.276	0.23	-	-	0.307	0.265	0.254
	June	0.631	0.449	0.554	0.366	0.447	-	0.386	0.543	0.479	0.372
	July	1.05	0.585	0.475	0.471	0.394	-	0.316	0.45	0.449	0.457
	August	0.598	0.494	0.494	0.261	0.37	0.303	0.276	0.56	0.571	0.33
	September	0.453	0.885	0.289	0.368	0.605	0.209	0.213	0.272	0.184	0.279
	October	0.361	0.368	0.336	0.159	0.551	0.363	0.239	0.264	0.299	0.274
Lower East River (HLT)	May	-	0.0923	0.0589	0.14	0.0827	-	0.109	0.108	0.0776	0.0579
	June	-	0.189	0.624	0.294	0.0954	-	0.691	0.206	0.0779	0.324
	July	-	0.347	0.211	0.155	0.182	-	0.137	0.628	0.416	0.148
	August	-	0.314	0.12	0.348	0.29	0.121	0.131	0.158	0.551	1.94
	September	-	0.524	0.124	0.623	0.381	0.548	0.125	0.296	0.0721	0.142
	October	-	0.178	0.161	0.375	0.158	0.253	0.0821	0.1	0.181	0.156
Garner's Creek	May	0.124	0.0769	0.118	0.0457	0.075	-	0.0896	0.0568	0.0394	0.0732
	June	0.14	-	0.147	0.155	0.143	-	0.162	0.161	0.124	0.129
	July	0.326	0.131	0.14	0.142	0.151	-	0.0843	0.142	0.198	0.0709
	August	0.099	0.183	0.139	0.122	0.113	0.125	0.17	0.12	0.125	0.107
	September	0.395	0.132	0.114	0.0779	0.143	0.0722	0.0599	0.0778	0.0981	0.0714
	October	0.137	0.0883	0.0873	0.0375	0.07	0.0594	0.0511	0.0567	0.0862	0.121
Kankapot Creek	May	0.379	0.169	0.313	0.437	0.222	-	0.278	0.0556	0.133	0.209
	June	0.321	0.392	0.412	0.366	0.345	-	0.45	0.362	0.289	0.37

	July	0.351	0.292	0.488	0.462	0.364	-	0.325	0.357	0.446	0.4
	August	0.315	0.257	0.663	0.678	0.386	0.351	0.39	0.498	0.261	0.229
	September	0.38	-	0.747	0.311	0.462	0.277	0.212	0.547	0.271	0.186
	October	0.812	0.353	0.507	0.208	0.327	0.21	0.288	0.192	0.176	0.21
Mud Creek	May	0.108	0.0819	0.071	0.0829	0.0441	-	0.119	0.0619	0.0589	0.0576
	June	0.119	0.108	0.102	0.112	0.0836	-	0.113	0.154	0.116	0.0871
	July	-	0.147	0.186	0.142	0.138	-	0.114	0.212	0.084	0.114
	August	0.0746	0.0959	0.114	0.119	0.101	0.122	0.0752	0.152	0.122	0.0773
	September	-	0.0996	0.0688	0.0744	0.121	0.0294	0.0331	0.149	0.0603	0.0656
	October	-	0.093	0.0745	0.0498	0.0585	0.096	0.0724	0.0618	0.126	0.0538
Neenah Slough	May	0.134	0.0746	0.1	0.19	0.0962	-	-	0.0673	0.0748	0.0909
	June	-	0.352	0.159	0.167	0.102	-	0.0885	0.147	0.0641	0.194
	July	0.0784	0.231	0.0813	0.0614	0.118	-	0.0749	0.162	0.0435	0.114
	August	0.0935	0.0614	0.0606	0.0379	0.0525	0.0804	0.084	0.0449	0.0433	0.137
	September	0.0571	0.086	0.0451	0.088	0.234	0.0376	0.0463	0.0847	0.0339	0.0298
	October	0.0761	0.138	0.115	0.0649	0.131	0.223	0.0509	0.111	0.0382	0.0362
Plum Creek (VandeHey)	May	-	-	0.462	0.266	0.184	-	-	0.189	0.14	1.03
	June	-	-	0.395	0.446	0.375	-	0.467	1.17	0.184	0.422
	July	-	-	0.46	0.529	0.426	-	0.257	0.318	0.397	0.338
	August	-	1.34	0.602	0.437	0.335	0.375	0.297	0.212	0.485	0.485
	September	-	0.839	0.878	1.05	0.505	0.549	0.283	0.359	0.372	0.279
	October	-	0.661	1.59	0.283	0.727	0.423	0.261	0.703	0.379	0.126
Lancaster Creek	May	0.0538	0.0493	0.0549	0.0908	0.0621	-	0.0708	-	0.0262	0.134
	June	0.086	0.106	0.115	0.0918	0.0576	-	0.0642	0.0687	0.0688	0.0691
	July	0.128	0.113	0.0836	0.12	0.072	-	0.0504	0.0791	0.0883	0.0937
	August	-	0.251	0.0746	0.171	0.0656	0.112	0.0478	0.0519	0.0813	0.0577
	September	-	0.0647	0.077	0.0582	0.059	0.0969	0.0372	-	0.0542	0.0521
	October	-	0.0557	0.0579	0.0278	0.0284	0.0836	0.027	0.0378	0.0285	0.0443
Upper Duck Creek (CTH S)	May	-	-	-	0.24	0.073	-	0.171	0.104	0.0674	0.0588
	June	-	-	-	0.253	0.109	-	0.495	0.112	0.12	0.289

	July	-	-	-	0.355	0.171	-	0.121	0.226	0.212	0.144
	August	-	-	-	0.537	0.136	0.322	0.144	0.147	0.356	0.177
	September	-	-	-	0.238	0.254	0.189	0.184	0.123	0.308	0.15
	October	-	-	-	0.071	0.273	0.282	0.172	0.0567	0.448	0.155
Middle Duck Creek (Seminary Rd)	May	-	-	-	0.107	0.128	-	0.299	0.145	0.119	0.319
	June	-	-	-	0.172	0.29	-	0.282	0.214	0.207	0.28
	July	-	-	-	0.224	0.247	-	0.191	0.268	0.311	0.223
	August	-	-	-	0.214	0.173	0.154	0.33	0.248	0.223	0.22
	September	-	-	-	0.144	0.286	0.0859	0.109	0.132	0.19	0.249
	October	-	-	-	0.143	0.0941	0.162	0.104	0.0723	0.19	0.137
Upper East River (Mallard Rd)	May	-	-	-	0.453	0.213	-	-	0.339	0.323	0.802
	June	-	-	-	0.505	0.452	-	1.68	0.543	0.575	0.542
	July	-	-	-	0.553	0.562	-	0.44	0.571	0.529	0.386
	August	-	-	-	0.683	0.454	0.421	0.319	0.909	0.809	0.369
	September	-	-	-	0.556	0.691	0.252	0.257	0.441	1.27	0.391
	October	-	-	-	0.196	0.551	0.399	0.301	0.457	0.445	0.523
Trib to Garner's Creek	May	-	-	-	-	-	-	0.226	0.119	0.0936	0.0843
	June	-	-	-	-	-	-	0.306	0.196	0.157	0.418
	July	-	-	-	-	-	-	0.218	0.239	0.342	0.13
	August	-	-	-	-	-	0.183	0.271	0.19	0.182	0.257
	September	-	-	-	-	-	0.0897	0.205	0.186	0.343	0.143
	October	-	-	-	-	-	0.16	0.292	0.241	0.137	0.226
West Plum Creek (County Line)	May	-	-	-	-	-	-	1.38	0.151	0.306	0.3
	June	-	-	-	-	-	-	2.4	1.34	0.761	0.812
	July	-	-	-	-	-	-	0.344	1.57	1.21	0.772
	August	-	-	-	-	-	1.09	1.09	1.48	1.61	0.767
	September	-	-	-	-	-	1.71	0.724	0.858	0.76	0.737
	October	-	-	-	-	-	3.3	0.739	0.412	0.773	1.07
Wequiock Creek	May	-	-	-	-	-	-	-	0.0479	0.0718	0.0658
	June	-	-	-	-	-	-	0.211	0.117	0.133	0.14

	July	-	-	-	-	-	-	0.114	0.153	-	0.153
	August	-	-	-	-	-	0.123	0.166	0.201	0.237	0.189
	September	-	-	-	-	-	0.0651	0.0668	0.14	0.0855	0.194
	October	-	-	-	-	-	0.0369	0.101	0.0611	0.0771	0.178

DRP (mg/L)											
Monitoring Site	Month	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	May	0.16	0.0266	0.141	0.0861	0.109	-	-	ND	0.0293	0.0358
	June	0.18	0.187	0.323	0.167	0.123	-	0.26	0.132	0.0767	0.116
	July	0.27	0.259	0.251	0.264	0.219	-	0.082	0.306	0.386	0.189
	August	0.201	0.173	0.126	-	0.136	0.095	0.143	0.348	0.146	0.218
	September	0.139	0.341	0.238	0.0724	0.188	0.0623	0.0605	-	0.102	0.116
	October	0.182	0.106	0.15	0.0341	0.16	0.0861	0.0452	0.0463	0.125	0.103
Ashwaubenon Creek	May	-	0.17	0.156	0.207	-	-	-	0.199	0.163	0.293
	June	0.221	0.19	0.383	0.102	0.242	-	0.409	0.253	0.303	0.247
	July	0.306	0.247	0.288	0.256	0.352	-	0.17	0.279	0.146	0.355
	August	0.128	0.103	0.071	0.0869	0.259	0.159	0.254	0.153	0.119	0.651
	September	0.126	0.288	0.191	0.199	0.498	0.07	0.155	0.126	0.0779	0.166
	October	0.203	0.486	0.375	0.259	0.346	0.0938	0.301	0.0713	0.0776	0.0874
Baird Creek	May	0.345	0.0573	0.142	0.158	0.278	-	-	0.0747	0.0917	0.105
	June	0.216	0.0994	0.243	0.106	0.337	-	0.208	0.122	0.0744	0.189
	July	0.183	0.1335	0.276	0.152	0.145	-	0.106	0.106	0.0942	0.36
	August	0.12	-	0.29	0.134	0.274	0.109	0.293	0.193	0.12	0.287
	September	0.188	0.154	0.216	0.476	0.439	0.0746	0.0914	0.0899	0.058	0.127
	October	0.0983	0.0963	0.101	0.326	0.158	0.0711	0.0839	0.042	0.0568	0.0731
Bower Creek	May	0.112	0.0661	0.0471	0.0444	0.142	-	-	0.0736	0.052	0.161
	June	0.0969	0.154	0.229	0.232	0.192	-	0.363	0.271	0.163	0.0747
	July	0.118	0.293	0.21	0.265	0.251	-	0.0933	0.17	0.175	0.121
	August	0.108	0.119	0.13	0.174	0.178	0.14	0.145	0.105	0.129	0.129

	September	0.145	-	0.295	0.244	0.306	0.0468	0.117	0.098	0.113	0.174
	October	0.12	-	0.0296	0.0946	0.113	0.118	0.181	0.0803	0.0725	0.199
Lower Duck Creek (Pamperin Park)	May	0.0433	0.0189	0.0248	0.0182	0.0333	-	0.137	0.0557	0.0154	0.159
	June	0.141	0.0802	0.121	0.193	0.0928	-	0.134	0.108	0.177	0.174
	July	0.0914	0.131	0.18	0.113	0.19	-	0.0792	0.161	0.0738	0.134
	August	0.0735	0.0773	0.0953	0.0302	0.0594	0.0405	0.227	0.0836	0.0826	0.103
	September	0.111	0.179	0.124	0.0814	0.196	0.0127	0.0167	0.0561	0.0161	0.117
	October	0.0466	0.156	0.177	0.12	0.0631	0.167	0.0212	0.0183	0.0767	0.0763
Dutchman Creek	May	0.0839	0.0318	0.0406	0.0462	0.246	-	-	0.0144	0.306	0.0517
	June	0.176	-	0.198	0.378	0.136	-	0.104	0.118	0.143	0.159
	July	0.193	-	0.164	0.115	0.286	-	0.0516	-	0.103	0.305
	August	-	0.0495	0.0454	0.0669	0.0558	0.108	0.073	-	0.145	0.0706
	September	-	-	0.146	0.163	0.343	0.0319	0.0533	0.103	0.113	0.0668
	October	-	-	0.103	0.0796	0.0874	0.0429	0.0679	-	0.0627	0.0565
Middle East River (CTH G)	May	0.205	0.146	0.199	0.184	0.12	-	-	0.207	0.168	0.193
	June	0.396	0.294	0.302	0.282	0.265	-	0.243	0.413	0.333	0.248
	July	0.831	0.488	0.195	0.375	0.349	-	0.234	0.4	0.361	0.313
	August	0.455	0.288	0.314	0.171	0.274	0.206	0.22	0.45	0.459	0.205
	September	0.341	0.526	0.232	0.311	0.467	0.169	0.162	0.205	0.122	0.224
	October	0.256	0.312	0.293	0.107	0.338	0.291	0.161	0.199	0.246	0.209
Lower East River (HLT)	May	-	0.0186	0.022	0.0837	0.0525	-	0.0301	0.0424	0.0336	0.0264
	June	-	0.104	0.296	0.165	0.0435	-	0.114	0.0814	0.00862	0.23
	July	-	0.257	0.122	0.0454	0.105	-	0.0622	0.0886	0.0969	0.0658
	August	-	0.0931	0.147	0.0175	0.0365	0.0246	0.0499	0.0533	0.151	0.145
	September	-	0.336	0.038	0.194	0.194	0.0623	0.0249	0.0946	0.00807	0.00778
	October	-	0.0775	0.056	0.171	0.0954	0.124	0.0948	0.0659	0.0414	0.0234
Garner's Creek	May	0.0424	0.031	0.0316	0.0109	0.0089	-	0.0488	0.0105	ND	0.0382
	June	0.0562	0.0589	0.0531	0.0604	0.0391	-	0.088	0.0481	0.0635	0.0627
	July	0.0212	0.0591	0.0809	0.0645	0.0673	-	0.056	0.0799	0.0631	0.0404
	August	0.019	0.0491	0.0675	0.0768	0.0264	0.0445	0.0896	0.0485	0.0504	0.0361

	September	0.0181	0.0031	0.0637	0.0489	0.0607	0.0395	0.0362	0.0478	0.0412	0.0386
	October	0.0398	0.0311	0.0518	0.0232	0.0326	0.0374	0.0266	0.0276	0.0207	0.0871
Kankapot Creek	May	0.171	0.0769	0.182	0.306	0.149	-	0.157	0.00991	0.0673	0.117
	June	0.186	0.224	0.218	0.221	0.149	-	0.351	0.219	0.165	0.181
	July	0.236	0.179	0.282	0.335	0.255	-	0.236	0.26	0.279	0.255
	August	0.197	0.113	0.424	0.448	0.246	0.229	0.302	0.317	0.128	0.123
	September	0.235	-	0.564	0.213	0.304	0.161	0.15	0.373	0.173	0.116
	October	0.471	0.206	0.384	0.122	0.194	0.146	0.23	0.0941	0.0698	0.144
Mud Creek	May	0.0326	0.027	0.0299	0.0232	0.01	-	0.053	0.0224	0.0227	0.0292
	June	0.0569	0.0587	0.066	0.0662	0.0196	-	0.0857	0.104	0.0658	0.0533
	July	-	0.0959	0.0962	0.0956	0.0886	-	0.0791	0.168	0.0475	0.0699
	August	0.0376	0.049	0.0551	0.0712	0.0646	0.0892	0.054	0.104	0.0831	0.047
	September	-	0.0324	0.0394	0.0474	0.0454	0.0264	0.0134	0.0674	0.0265	0.0172
	October	-	0.0602	0.0433	0.0235	0.0363	0.0565	0.0392	0.037	0.0316	0.0191
Neenah Slough	May	0.0399	0.0305	0.0155	0.119	0.0464	-	-	0.024	0.0211	0.00491
	June	-	0.223	0.0998	0.115	0.0549	-	0.057	0.112	0.0291	0.111
	July	0.0332	0.163	0.0489	0.0359	0.102	-	0.0476	0.128	0.0114	0.0546
	August	0.0706	0.0376	0.0284	0.007	0.0362	0.0399	0.0455	0.0289	0.0262	0.0992
	September	0.0313	0.0498	0.0193	0.0548	0.146	0.0182	0.0135	0.0479	0.00711	0.0163
	October	0.05	0.094	0.0541	0.0417	0.0848	0.164	0.0144	0.0548	0.0203	0.0154
Plum Creek (VandeHey)	May	-	-	0.321	0.159	0.108	-	-	0.101	0.0657	0.536
	June	-	-	0.26	0.311	0.284	-	0.367	0.858	0.116	0.237
	July	-	-	0.354	0.319	0.331	-	0.177	0.191	0.209	0.266
	August	-	0.197	0.29	0.326	0.227	0.222	0.196	0.0717	0.381	0.298
	September	-	0.633	0.726	0.877	0.393	0.326	0.187	0.254	0.228	0.146
	October	-	0.571	1.21	0.203	0.399	0.318	0.2	0.466	0.266	0.065
Lancaster Creek	May	0.0181	0.0106	0.0339	0.043	0.0207	-	0.0356	-	0.0108	0.0173
	June	0.0429	0.0515	0.0459	0.051	0.0434	-	0.0299	0.0377	0.0302	0.039
	July	0.0635	0.0513	0.0388	0.0767	0.049	-	0.0336	0.0554	0.0495	0.0484
	August	-	0.0369	0.0449	0.0339	0.0325	0.0743	0.0354	0.0332	0.0499	0.032

	September	-	0.0342	0.0408	0.0284	0.0346	0.0385	0.0262	-	0.0339	0.0316
	October	-	0.0234	0.0309	0.0164	0.0233	0.0306	0.0194	0.00645	0.017	0.0284
Upper Duck Creek (CTH S)	May	-	-	-	0.124	0.04	-	0.0966	0.0593	0.025	0.0356
	June	-	-	-	0.0895	0.064	-	0.378	0.0707	0.0721	0.165
	July	-	-	-	0.225	0.138	-	0.0814	0.18	0.15	0.101
	August	-	-	-	0.37	0.105	0.198	0.101	0.106	0.27	0.128
	September	-	-	-	0.158	0.169	0.115	0.113	0.0847	0.186	0.107
	October	-	-	-	0.046	0.151	0.217	0.126	0.0402	0.259	0.114
Middle Duck Creek (Seminary Rd)	May	-	-	-	0.0598	0.0707	-	0.0966	0.106	0.0633	0.195
	June	-	-	-	0.128	0.122	-	0.184	0.176	0.159	0.194
	July	-	-	-	0.174	0.18	-	0.152	0.234	0.262	0.168
	August	-	-	-	0.169	0.156	0.112	0.249	0.195	0.177	0.185
	September	-	-	-	0.111	0.213	0.0513	0.0799	0.101	0.142	0.21
	October	-	-	-	0.113	0.0731	0.141	0.0871	0.0438	0.138	0.108
Upper East River (Mallard Rd)	May	-	-	-	0.345	0.139	-	-	0.277	0.252	0.589
	June	-	-	-	0.17	0.313	-	1.53	0.358	0.482	0.418
	July	-	-	-	0.153	0.491	-	0.31	0.522	0.595	0.315
	August	-	-	-	0.578	0.353	0.33	0.271	0.853	0.712	0.311
	September	-	-	-	0.414	0.492	0.195	0.216	0.371	1.04	0.341
	October	-	-	-	0.139	0.338	0.346	0.271	0.396	0.372	0.455
Trib to Garner's Creek	May	-	-	-	-	-	-	0.189	0.0824	0.0537	0.0619
	June	-	-	-	-	-	-	0.261	0.0503	0.128	0.252
	July	-	-	-	-	-	-	0.17	0.209	0.302	0.106
	August	-	-	-	-	-	0.134	0.184	0.114	0.142	0.106
	September	-	-	-	-	-	0.0615	0.18	0.0809	0.279	0.115
	October	-	-	-	-	-	0.0683	0.26	0.194	0.0922	0.18
West Plum Creek (County Line)	May	-	-	-	-	-	-	1.22	0.0909	0.164	0.26
	June	-	-	-	-	-	-	2.13	1.12	0.618	0.632
	July	-	-	-	-	-	-	0.28	1.4	1.07	0.598
	August	-	-	-	-	-	0.845	0.897	0.905	1.47	0.604

	September	-	-	-	-	-	1.23	0.653	-	0.621	0.588
	October	-	-	-	-	-	2.86	0.618	0.338	0.541	0.95
Wequiock Creek	May	-	-	-	-	-	-	-	0.00822	0.0371	0.044
	June	-	-	-	-	-	-	0.137	0.0734	0.0915	0.101
	July	-	-	-	-	-	-	0.0892	0.114	-	0.116
	August	-	-	-	-	-	0.0968	0.138	0.143	0.151	0.146
	September	-	-	-	-	-	0.0734	0.0477	0.0938	0.0583	0.128
	October	-	-	-	-	-	0.0422	0.0738	0.0273	0.0481	0.119

TSS (mg/L)											
Monitoring Site	Month	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	May	61	3.2	47.7	15	82	-	-	3	3	ND
	June	4.4	82.3	1010	13.3	82.3	-	141	698	ND	9.6
	July	11.4	61.4	39.3	7	13.6	-	20.6	16.9	2	66.8
	August	17.4	13.2	14.7	-	11.5	59.2	4	378	18.4	23.4
	September	8.75	420	11.6	2.6	19.8	NA	19.8	54.5	13.2	8.2
	October	7.8	3.2	7.8	ND	39.5	NA	ND	2.2	7	34
Ashwaubenon Creek	May	-	49.5	21.5	15	-	-	-	6.2	10.3	193
	June	26.7	16.5	40.8	34	22.5	-	36	22	16.8	250
	July	17.3	14.6	19.2	20.7	62	-	36.8	20.8	22.5	72.8
	August	20.6	38.8	60.8	670	24	13.2	32.8	19.4	16.4	15.8
	September	17.2	69.5	5.4	13.8	68.5	8.6	13	3.8	10.2	5
	October	15.2	44.3	15	3.4	58	ND	ND	ND	2.5	ND
Baird Creek	May	ND	4.33	4.25	5	68	-	-	2.2	3	4
	June	12	19	29	5.5	12	-	7.2	4.4	3.8	10.4
	July	24.8	13.4	36	77.7	8.2	-	12.6	5	17.6	12
	August	ND	-	7.2	6.4	81.5	3.2	72.6	10.8	8.4	48.8
	September	3.2	6.8	3.4	8.6	23	2.8	12.8	ND	10.2	2.8
	October	2.8	3.2	ND	39.2	18.3	2.4	ND	ND	3	ND

Bower Creek	May	8.8	8	7.5	3.6	98	-	-	3.8	5.25	239
	June	40.8	27.3	25.1	24.4	8.6	-	44.2	19.8	6.4	7.8
	July	37	23.4	22.7	9.25	40.8	-	69.4	16	11.5	22.8
	August	16.8	13.4	12.4	44	51	21	34	16.6	9.4	10.4
	September	9.4	-	15	10.6	28	12.2	28.6	7.2	6.4	3.8
	October	7.6	-	7	ND	14.5	3	18.4	9.8	4.8	2
Lower Duck Creek (Pamperin Park)	May	7.2	ND	4.75	5	6.3	-	6.6	ND	5	74
	June	61.6	12.3	19.3	50.7	55	-	101	ND	42	64.5
	July	13.4	18.9	25.5	13.8	15.8	-	7.4	19	7.4	5.33
	August	11.7	22	11.4	11.8	12.3	23.8	62	22.2	11.8	3.4
	September	11.3	15.7	16.5	3.6	19.8	7.2	2	3	7.4	ND
	October	4.75	7.67	39	3.8	4.2	5.4	ND	2.6	8.2	ND
Dutchman Creek	May	75.3	10.8	10.8	6	44.3	-	-	2.4	53	5.8
	June	15	-	12.3	59.6	16	-	10.2	2.8	3.2	10.8
	July	153	-	9.6	9	25.8	-	27.6	-	5.2	14.8
	August	-	8.4	15.8	10.8	21.7	5	9.4	-	5	4.4
	September	-	-	3.4	4.6	13	6.6	8.6	5.8	15	5
	October	-	-	3.5	ND	7	3.2	2.2	-	ND	ND
Middle East River (CTH G)	May	5.2	50.5	67	15.3	42.7	-	-	29.4	31	10.8
	June	62	52.5	98	19.2	89.3	-	57	50.8	41.8	51
	July	17.8	26.6	55.3	25.3	12.8	-	20.8	20.4	11.2	71.3
	August	35	134	46.3	75	20	21	23.4	20.6	21.3	38.5
	September	22	69.5	11.8	21.2	32	13.3	13.6	10.4	14.4	8.8
	October	38.8	8.2	11	2.8	52	12.4	28.6	5.8	7	8.8
Lower East River (HLT)	May	-	11	12.3	15.3	35	-	14	26.6	10	6.4
	June	-	13	24	4	16.8	-	51.5	18.8	6.75	20
	July	-	14.4	29.7	25.3	33.3	-	18.2	109	29.6	20.8
	August	-	28.8	26.3	75	57	32	16.9	16	198	142
	September	-	43	19.2	201	2	70.3	23.2	50.6	14	44
	October	-	29	32	48.5	17.7	70.3	12.6	9.4	30.2	40

Garner's Creek	May	25.7	8.4	21.3	7.25	12.6	-	6.8	6.2	4	6.6
	June	27.8	40	38.7	33.3	54.2	-	28	86.4	12.4	30
	July	53	36.6	16.5	16	34	-	8	32	47.2	14.7
	August	14.3	44.8	23.6	14.2	23	10.6	46.7	23.1	29	6.6
	September	74	27	9.8	4.6	26.3	13.8	3.4	6.2	13.8	3.6
	October	9.6	5.4	3.67	4.2	10.8	4.4	2	2.2	16.4	2.4
Kankapot Creek	May	24.5	12	20.5	20	5.2	-	11.2	3.8	5.75	16.6
	June	25	41.5	72	15.4	33.8	-	21.2	35.8	15.2	63.6
	July	26.2	12.8	35.9	7.5	27.5	-	24.2	13	23.4	62
	August	17	19.4	87	50.8	23	11.6	27.4	41	65.6	29.5
	September	17.6	-	37	6	58	NA	18	52.4	12.8	6.4
	October	ND	16.3	6	ND	13.3	16	6.8	4.4	18.7	3.4
Mud Creek	May	7.4	2.6	ND	2.6	6.2	-	6.4	ND	3.2	4.6
	June	4.25	7.25	ND	2.5	5.2	-	19.8	2.2	ND	ND
	July	-	3.4	7.65	ND	4.5	-	3.2	4.4	4.4	22.6
	August	2.8	4.4	4.8	2	ND	3.2	4.2	ND	ND	2.8
	September	-	29	2	2.6	27.3	2.4	2.4	34.8	4.4	3.4
	October	-	10	3	2.4	4.6	6	4.4	2	54.8	3.6
Neenah Slough	May	33	4.2	42	17.5	8	-	-	5.4	10.8	14.4
	June	-	23	9.5	8.33	4.8	-	6.2	2.6	4	10
	July	2.4	4.86	ND	ND	2.4	-	2.8	3.8	3.2	6.5
	August	3	ND	ND	ND	ND	4.4	6.6	3.4	2	4.4
	September	ND	ND	ND	9.8	21.3	6	4.6	6.8	3.6	3
	October	2.8	3.8	69.7	2.6	50.23	9.6	5.6	5.2	11.2	3.2
Plum Creek (VandeHey)	May	-	-	16.5	19	9.2	-	-	32.2	21.7	322
	June	-	-	52.8	34.5	39.3	-	41.8	63.2	11.7	37.6
	July	-	-	41	24.7	31.8	-	27.6	25.8	13.6	17
	August	-	27.4	32.4	15	34	16.8	25.6	23.6	23	13.2
	September	-	30	12.3	76.9	30.5	12.3	15	24.6	9.4	18.4
	October	-	10.2	11.7	2.2	140	19.1	9	12.6	15.6	2.4

Lancaster Creek	May	11.3	8	8.5	16.3	23.8	-	7	-	2.4	88.3
	June	18	20.3	29	12	7.2	-	13.8	9.6	10.6	13
	July	31	12	15.4	12	7.6	-	7.6	5.6	18.2	22.8
	August	-	133	9.2	83.1	17.6	31.6	5.8	8.4	8.2	9.4
	September	-	3.2	4	8.4	5.6	107	2	-	6.6	5.4
	October	-	ND	ND	ND	2	73.1	ND	2.4	ND	3
Upper Duck Creek (CTH S)	May	-	-	-	52	5	-	3.8	3.4	2.8	2.2
	June	-	-	-	61.5	7	-	9.2	8.6	7	45
	July	-	-	-	20	16.6	-	9.8	7.6	6.8	10.4
	August	-	-	-	16	6.5	34.8	7.8	5.4	8	4
	September	-	-	-	6	16.2	7.4	24.6	4.2	69.6	2.2
	October	-	-	-	ND	27.7	ND	2.8	ND	91.2	2
Middle Duck Creek (Seminary Rd)	May	-	-	-	5.33	10	-	5.4	2	2.75	24.5
	June	-	-	-	5	68.5	-	16.6	7	9.8	21
	July	-	-	-	4.25	33	-	9.4	4.2	5	14.2
	August	-	-	-	5.6	6.67	4.4	12.8	5.8	3.8	4.4
	September	-	-	-	ND	40.5	5	ND	2	2.4	3.4
	October	-	-	-	2.6	2.75	6	ND	ND	-	ND
Upper East River (Mallard Rd)	May	-	-	-	24.7	12	-	-	9.4	13	88
	June	-	-	-	55.6	61.5	-	44.8	86.8	43	46
	July	-	-	-	42.5	28.2	-	42.3	26.4	33	22.4
	August	-	-	-	25.2	23.3	40.6	20.6	12.8	30.8	10.6
	September	-	-	-	38.8	25.7	25.5	7.2	10.6	6	11
	October	-	-	-	4	52	13.2	2.2	ND	6.2	ND
Trib to Garner's Creek	May	-	-	-	-	-	-	ND	2.4	4.75	ND
	June	-	-	-	-	-	-	4.8	45.8	7	56.5
	July	-	-	-	-	-	-	6.6	4.2	2.6	ND
	August	-	-	-	-	-	5	19	8.8	5.6	19.6
	September	-	-	-	-	-	2.6	4.6	23.6	7	ND
	October	-	-	-	-	-	10.5	ND	3.2	3.6	ND

West Plum Creek (County Line)	May	-	-	-	-	-	-	21	6.8	21.2	4.8
	June	-	-	-	-	-	-	21.6	852	14	31.8
	July	-	-	-	-	-	-	9	9	2.2	14.9
	August	-	-	-	-	-	29.4	48.2	87.5	2.4	6.4
	September	-	-	-	-	-	NA	16.6	33.6	6.2	10.6
	October	-	-	-	-	-	NA	12.6	4.6	24.6	7
Wequiock Creek	May	-	-	-	-	-	-	-	3	10.6	2.2
	June	-	-	-	-	-	-	4.25	3.2	2	12.4
	July	-	-	-	-	-	-	16.6	34.2	-	2.8
	August	-	-	-	-	-	8.8	4.6	5.6	19.8	ND
	September	-	-	-	-	-	3.2	3.4	20.2	7.6	14
	October	-	-	-	-	-	ND	3	4.2	ND	6.4

TN (mg/L)						
Monitoring Site	Month	2020	2021	2022	2023	2024
Apple Creek	May	-	-	1.14	2.01	3.46
	June	-	23.1	2.22	0.746	3.58
	July	-	1.18	1.89	1.08	3.04
	August	1.16	0.976	3.99	1.06	2.97
	September	1.44	0.858	3.27	0.758	0.944
	October	0.122	0.594	0.555	0.829	0.724
Ashwaubenon Creek	May	-	-	1.16	2.23	4.36
	June	-	1.56	4.32	1.27	5.14
	July	-	1.93	1.4	1.24	2.03
	August	1.71	2.18	1.33	1.02	4.41
	September	1.3	1.25	1.03	1.14	1.06
	October	0.823	0.826	0.643	0.702	0.679
Baird Creek	May	-	-	1.27	1.04	1.47
	June	-	0.957	1.17	0.653	1.55

	July	-	1.61	0.698	0.624	1.88
	August	0.734	1.63	4.59	0.933	6.66
	September	0.433	0.919	1.26	0.612	0.964
	October	0.389	0.938	0.578	0.328	0.357
Bower Creek	May	-	-	1.12	1.08	3.29
	June	-	1.35	1.19	0.963	1.51
	July	-	1.1	1.33	1.01	1.03
	August	1.11	1.34	1.08	1.07	1.43
	September	0.856	0.908	1.19	0.611	0.683
	October	0.876	1.23	0.548	0.53	0.656
Lower Duck Creek (Pamperin Park)	May	-	1.43	1.88	1.55	4.75
	June	-	10.6	1.31	6.02	5.73
	July	-	2.02	1.07	0.919	4.07
	August	1.26	1.92	1.16	0.933	1.52
	September	1.35	1.22	1.62	0.632	0.876
	October	3.87	1.44	0.925	1.44	0.582
Dutchman Creek	May	-	-	1.16	5.73	1.93
	June	-	1.14	0.92	1.27	1.34
	July	-	0.857	-	0.989	2.05
	August	0.944	1.47	-	0.852	2.1
	September	0.926	0.937	1.3	1.42	1.1
	October	0.879	0.784	-	0.692	0.813
Middle East River (CTH G)	May	-	-	1.52	1.5	1.64
	June	-	13.8	1.32	17.3	3.18
	July	-	1.74	0.969	0.907	2.86
	August	1.02	1.93	0.938	1.29	2.19
	September	0.751	1.07	0.867	0.612	0.716
	October	7.05	1.21	0.793	0.476	0.529
Lower East River (HLT)	May	-	1.51	1.76	1.92	1.65
	June	-	13.1	2.1	1.36	2.77

	July	-	1.27	4.63	2.57	1.51
	August	1.39	1.24	1.25	2.56	14
	September	3.79	1.47	2.59	1.18	1.54
	October	3.07	1.77	1.56	2.15	1.6
Garner's Creek	May	-	1.14	0.894	0.819	1.08
	June	-	1.17	1.4	0.956	1.19
	July	-	1.16	1.05	1.2	1.19
	August	0.938	1.23	1.22	0.888	1.28
	September	0.875	0.502	0.988	0.624	0.638
	October	0.493	0.711	0.49	0.845	0.503
Kankapot Creek	May	-	1.47	0.827	1	1.34
	June	-	1.47	4.7	1.39	2.96
	July	-	2.05	1.14	1.47	3.53
	August	1.73	2.32	2.61	1.56	2.18
	September	1.23	1.11	4	0.954	1.19
	October	4.39	0.985	1.65	2.04	5.11
Mud Creek	May	-	1.38	0.636	0.861	0.751
	June	-	0.632	1.03	0.654	0.851
	July	-	0.953	0.731	0.766	1.21
	August	0.897	0.522	1.18	0.698	1.17
	September	0.366	0.706	1.16	0.453	0.517
	October	1.07	0.93	0.426	1.06	0.843
Neenah Slough	May	-	-	1.12	1.44	1.69
	June	-	0.746	1.24	0.924	1.15
	July	-	0.988	0.883	0.748	1.3
	August	0.938	0.767	0.801	0.689	1
	September	0.582	0.837	1.15	0.538	0.859
	October	1.48	0.905	0.782	0.899	0.602
Plum Creek (VandeHey)	May	-	-	4.19	1.57	9.87
	June	-	1.2	3.02	1.07	6.34

	July	-	1.37	1.18	2.76	2.98
	August	1.31	1.51	2.16	1.55	4.08
	September	1.21	0.931	2.08	0.898	2.08
	October	11.9	1.09	1.58	4.51	1.39
Lancaster Creek	May	-	1.94	-	1.42	1.28
	June	-	1.48	1.34	1.56	1.47
	July	-	1.49	1.34	1.27	1.36
	August	1.4	2.04	1.48	1.15	1.35
	September	1.91	1.77	-	1.88	1.22
	October	2.15	1.46	0.857	1.46	0.696
Upper Duck Creek (CTH S)	May	-	2.08	2.6	3.18	6.49
	June	-	1.8	4.8	1.98	6.6
	July	-	4.6	1.87	1.49	6.77
	August	1.68	3.22	1.86	1.61	2.25
	September	0.992	3.46	3.51	1.57	1.77
	October	0.217	3.95	3.36	0.983	1.13
Middle Duck Creek (Seminary Rd)	May	-	1.84	2.35	2.51	6.98
	June	-	13.6	1.87	16.6	5.57
	July	-	2.79	1.82	1.74	4.9
	August	2.26	1.89	1.96	1.73	2.19
	September	3	2.92	3.02	1.49	2.08
	October	4.33	2.58	1.96	3.08	1.54
Upper East River (Mallard Rd)	May	-	-	2.47	2.77	8.05
	June	-	2.57	3.72	3.05	4.14
	July	-	2.53	1.9	4.54	3.2
	August	2.7	2.43	1.44	2.32	3.1
	September	2.15	2.28	2.48	1.3	3.13
	October	5.85	2.01	0.978	8.3	1.65
Trib to Garner's Creek	May	-	0.932	0.599	0.678	0.65
	June	-	0.968	2.3	0.625	1.6

	July	-	1.13	0.656	0.632	0.685
	August	0.981	1.73	1.16	0.698	1.22
	September	0.509	0.743	1.3	0.967	0.698
	October	1.49	0.606	0.623	0.441	0.584
West Plum Creek (County Line)	May	-	2.68	1.35	2.79	2.75
	June	-	4.24	14.6	1.8	3.67
	July	-	5.74	2.52	1.45	3.07
	August	1.91	1.79	5.1	1.97	3.47
	September	2.9	2.09	4.73	1.97	4.22
	October	4.54	4.12	0.933	2.14	1.96
Wequiock Creek	May	-	-	1.61	3.14	2.9
	June	-	18.9	2.71	1.49	2.4
	July	-	4.26	3.5	-	3.52
	August	2.91	3.33	6.03	4.76	2.22
	September	2.07	2.25	4.84	-	1.17
	October	1.26	1.53	1.76	0.721	0.715

ND indicates sample concentration was not detected.

Appendix E: Confidence Interval Table

Monitoring Site	TP Calculation	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	**U90% (mg/L)**	0.311	0.452	0.598	0.239	0.272	0.253	0.262	0.462	0.273	0.235
	Median (mg/L)	0.273	0.297	0.318	0.188	0.265	0.246	0.181	0.270	0.187	0.170
	L90% (mg/L)	0.237	0.154	0.243	0.126	0.241	0.160	0.111	0.077	0.101	0.104
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	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	0.275	0.683
	Median (mg/L)	0.347	0.316	0.321	0.301	0.401	0.257	0.305	0.252	0.222	0.473
	L90% (mg/L)	0.275	0.296	0.257	0.294	0.336	0.150	0.266	0.194	0.168	0.263
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	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	0.159	0.307
	Median (mg/L)	0.288	0.176	0.317	0.289	0.506	0.181	0.226	0.143	0.136	0.206
	L90% (mg/L)	0.194	0.145	0.214	0.228	0.306	0.111	0.171	0.102	0.113	0.105
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	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	0.230	0.340
	Median (mg/L)	0.199	0.207	0.310	0.323	0.328	0.276	0.237	0.168	0.198	0.245
	L90% (mg/L)	0.174	0.164	0.216	0.170	0.277	0.218	0.199	0.107	0.166	0.149
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds

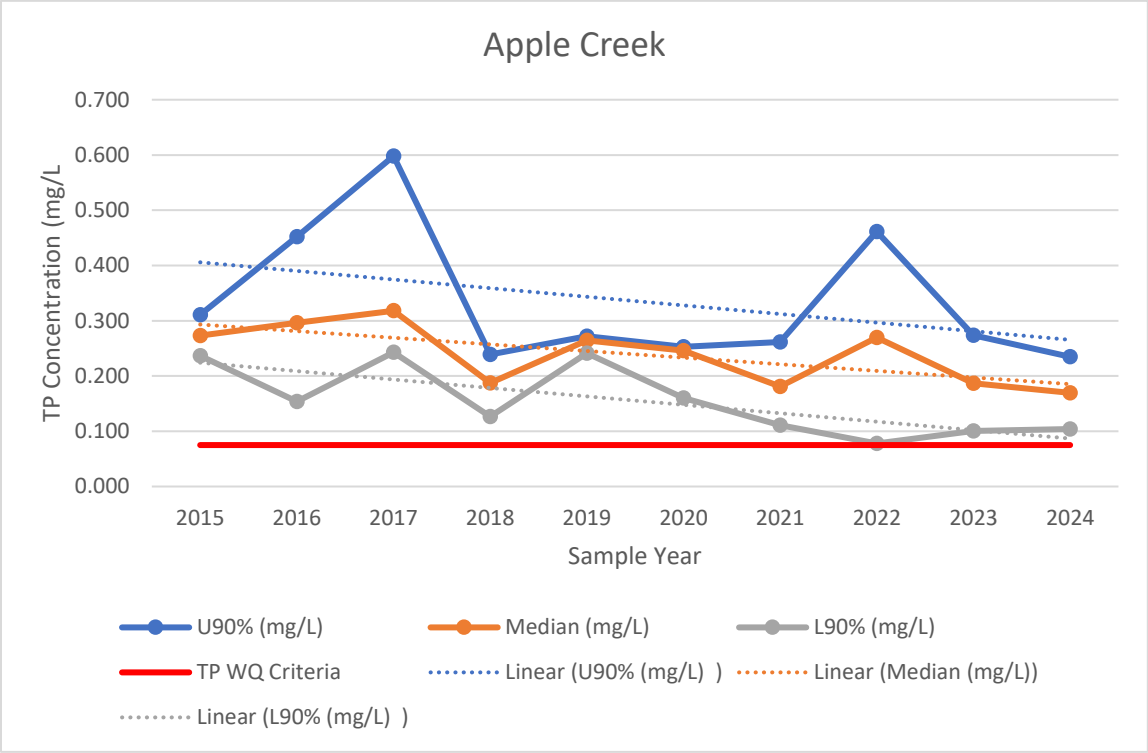
Lower Duck Creek (Pamperin Park)	**U90% (mg/L)**	0.191	0.207	0.245	0.191	0.198	0.186	0.235	0.149	0.173	0.216
	Median (mg/L)	0.141	0.173	0.192	0.134	0.148	0.157	0.156	0.113	0.128	0.156
	L90% (mg/L)	0.111	0.118	0.129	0.095	0.102	0.076	0.074	0.077	0.082	0.096
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Dutchman Creek	**U90% (mg/L)**	0.308	0.202	0.199	0.251	0.337	0.254	0.181	0.161	0.258	0.183
	Median (mg/L)	0.209	0.157	0.157	0.141	0.280	0.161	0.106	0.127	0.184	0.114
	L90% (mg/L)	0.148	0.131	0.120	0.115	0.165	0.093	0.093	0.093	0.110	0.045
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed
Middle East River (CTH G)	**U90% (mg/L)**	0.680	0.606	0.490	0.377	0.509	0.375	0.310	0.462	0.465	0.351
	Median (mg/L)	0.526	0.472	0.460	0.321	0.421	0.333	0.258	0.379	0.374	0.305
	L90% (mg/L)	0.399	0.374	0.363	0.239	0.336	0.260	0.237	0.295	0.283	0.258
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Lower East River (HLT)	**U90% (mg/L)**		0.343	0.261	0.399	0.246	0.260	0.244	0.304	0.255	0.599
	Median (mg/L)		0.252	0.143	0.321	0.170	0.152	0.128	0.182	0.129	0.152
	L90% (mg/L)		0.164	0.101	0.201	0.119	0.111	0.098	0.060	0.003	-0.295
	Relation to Criteria		Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	May Exceed	May Exceed

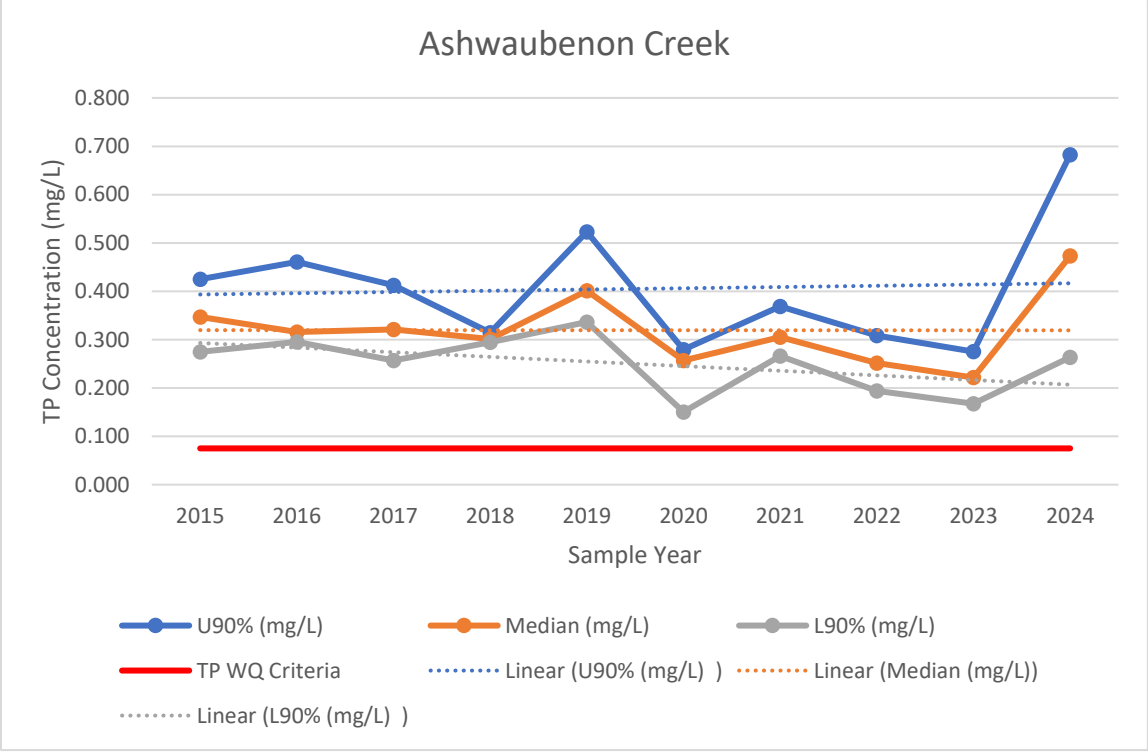
Garner's Creek	**U90% (mg/L)**	0.248	0.146	0.138	0.121	0.136	0.124	0.125	0.127	0.143	0.107
	Median (mg/L)	0.139	0.132	0.129	0.100	0.128	0.100	0.087	0.099	0.111	0.090
	L90% (mg/L)	0.126	0.099	0.109	0.059	0.090	0.077	0.069	0.071	0.079	0.074
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	Clearly Exceeds	Clearly Exceeds	May Exceed	May Exceed	Clearly Exceeds	May Exceed
Kankapot Creek	**U90% (mg/L)**	0.497	0.358	0.606	0.489	0.397	0.333	0.369	0.473	0.332	0.276
	Median (mg/L)	0.365	0.323	0.498	0.402	0.355	0.311	0.307	0.360	0.266	0.220
	L90% (mg/L)	0.324	0.244	0.414	0.302	0.296	0.249	0.268	0.246	0.200	0.163
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Mud Creek	**U90% (mg/L)**	0.120	0.115	0.121	0.115	0.110	0.108	0.108	0.187	0.119	0.085
	Median (mg/L)	0.104	0.098	0.088	0.097	0.092	0.090	0.094	0.151	0.100	0.071
	L90% (mg/L)	0.091	0.091	0.076	0.073	0.065	0.052	0.060	0.114	0.081	0.058
	Relation to Criteria	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	May Exceed	May Exceed	May Exceed	May Exceed	Clearly Exceeds	Clearly Exceeds	May Meet
Neenah Slough	**U90% (mg/L)**	0.158	0.194	0.113	0.126	0.149	0.136	0.085	0.126	0.053	0.141
	Median (mg/L)	0.086	0.112	0.091	0.076	0.110	0.099	0.079	0.098	0.043	0.102
	L90% (mg/L)	0.072	0.085	0.065	0.060	0.083	0.068	0.059	0.070	0.034	0.064
	Relation to Criteria	May Exceed	Clearly Exceeds	May Exceed	May Exceed	Clearly Exceeds	May Exceed	May Exceed	May Exceed	Clearly Meets	May Exceed

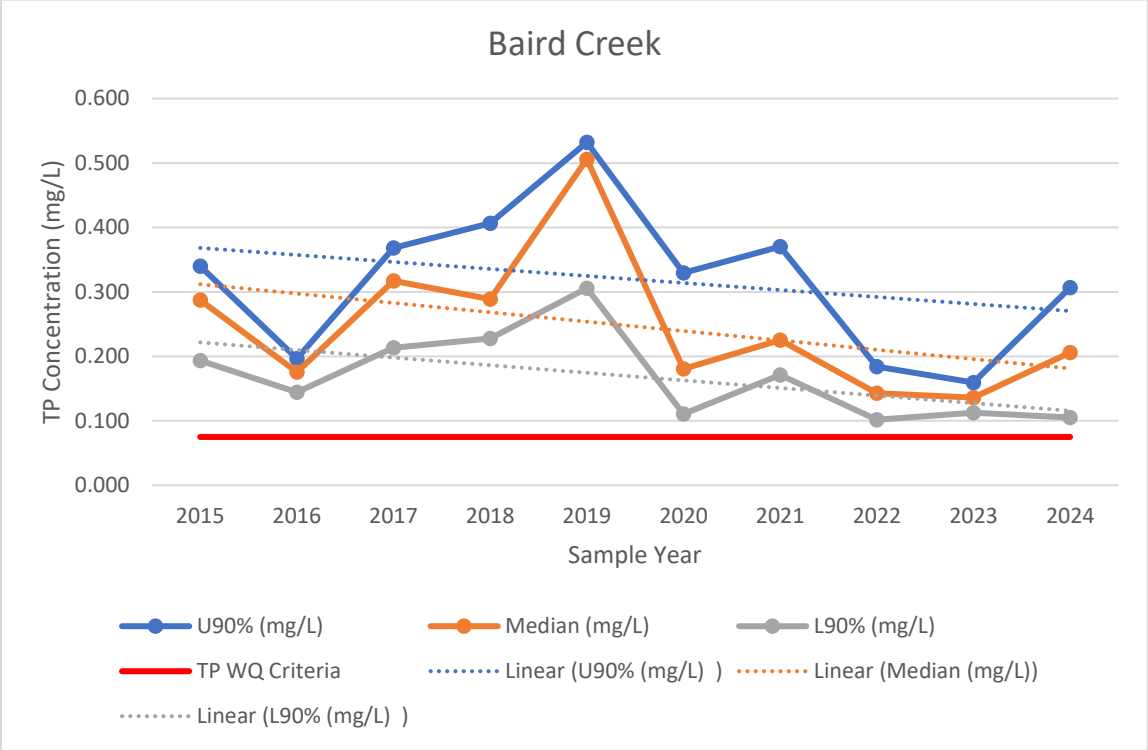
Plum Creek (VandeHey)	**U90% (mg/L)**			0.781	0.605	0.516	0.462	0.336	0.572	0.458	0.571
	Median (mg/L)			0.562	0.442	0.401	0.399	0.272	0.339	0.376	0.380
	L90% (mg/L)			0.508	0.332	0.297	0.296	0.234	0.105	0.293	0.189
	Relation to Criteria			Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	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	0.078	0.084
	Median (mg/L)	0.075	0.085	0.076	0.091	0.061	0.078	0.049	0.060	0.062	0.063
	L90% (mg/L)	0.063	0.063	0.064	0.055	0.045	0.067	0.038	0.051	0.045	0.043
	Relation to Criteria	May Meet	May Exceed	May Meet	May Exceed	Clearly Meets	May Exceed	Clearly Meets	Clearly Meets	May Meet	May Meet
Upper Duck Creek (CTH S)	**U90% (mg/L)**				0.362	0.208	0.237	0.256	0.152	0.349	0.198
	Median (mg/L)				0.247	0.154	0.180	0.172	0.118	0.260	0.153
	L90% (mg/L)				0.160	0.113	0.120	0.141	0.083	0.171	0.107
	Relation to Criteria				Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Middle Duck Creek (Seminary Rd)	**U90% (mg/L)**				0.192	0.247	0.214	0.270	0.226	0.237	0.274
	Median (mg/L)				0.158	0.210	0.158	0.237	0.180	0.199	0.236
	L90% (mg/L)				0.137	0.141	0.126	0.145	0.133	0.160	0.198
	Relation to Criteria				Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds

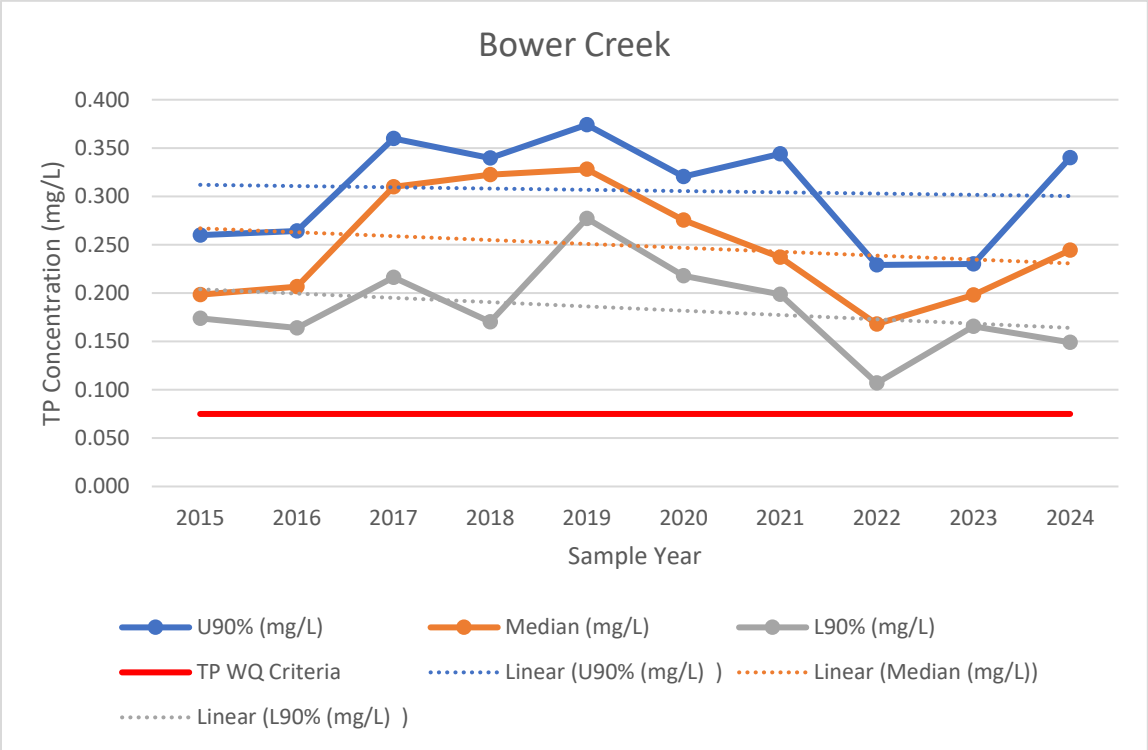
Upper East River (Mallard Rd)	**U90% (mg/L)**				0.599	0.587	0.454	0.622	0.621	0.761	0.558
	Median (mg/L)				0.529	0.503	0.410	0.310	0.500	0.552	0.457
	L90% (mg/L)				0.353	0.359	0.290	0.253	0.379	0.343	0.356
	Relation to Criteria				Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Trib to Garner's Creek	**U90% (mg/L)**							0.1925	0.2204	0.2353	0.258
	Median (mg/L)							0.1865	0.193	0.1695	0.185
	L90% (mg/L)							0.1184	0.1656	0.1037	0.111
	Relation to Criteria							Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
West Plum Creek (County Line)	**U90% (mg/L)**							1.3429	1.4630	1.0423	0.922
	Median (mg/L)							0.897	1.099	0.767	0.770
	L90% (mg/L)							0.7053	0.7350	0.4917	0.617
	Relation to Criteria							Clearly Exceeds	Clearly Exceeds	Clearly Exceeds	Clearly Exceeds
Wequiock Creek	**U90% (mg/L)**							0.10019	0.16407	0.15087	0.195
	Median (mg/L)							0.082	0.1285	0.10925	0.166
	L90% (mg/L)							0.06483	0.09293	0.06763	0.136
	Relation to Criteria							May Exceed	Clearly Exceeds	May Exceed	Clearly Exceeds

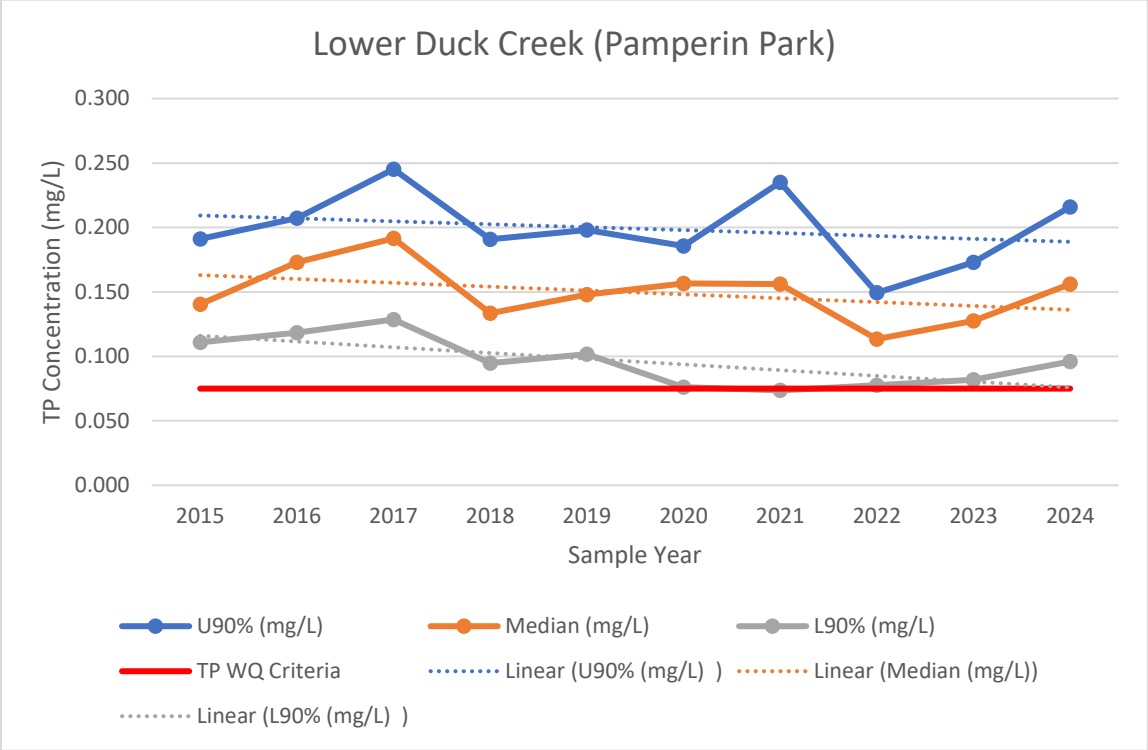
Appendix F: Confidence Interval Graphs

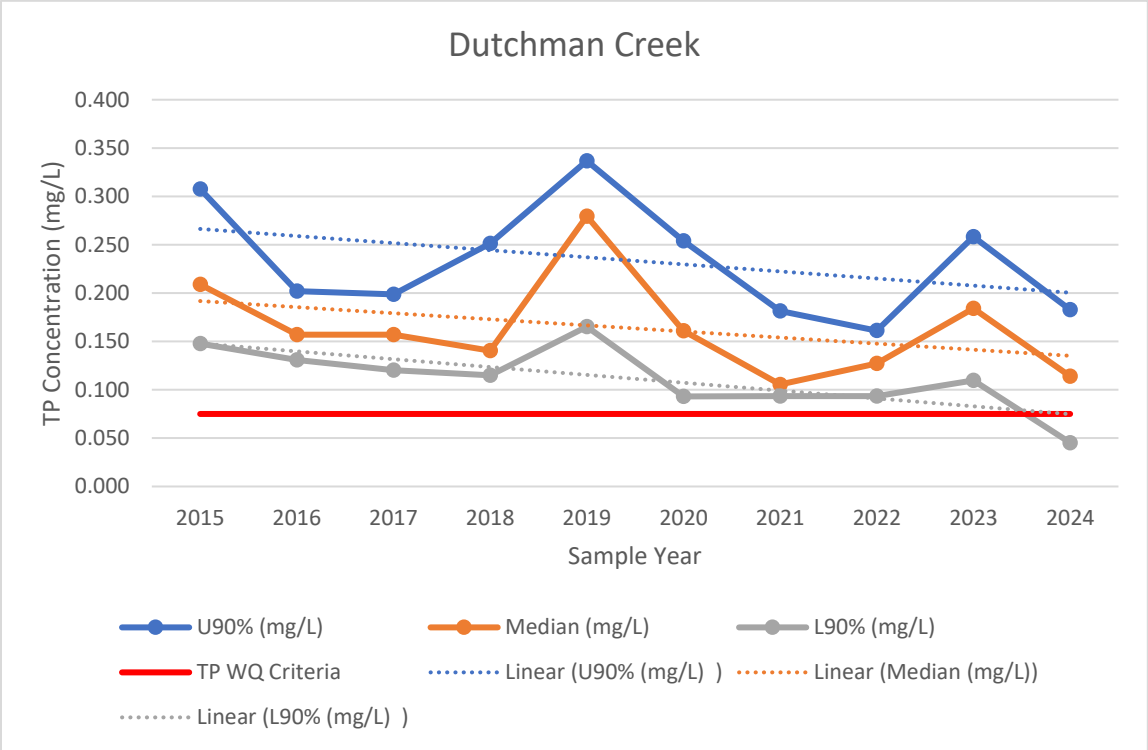


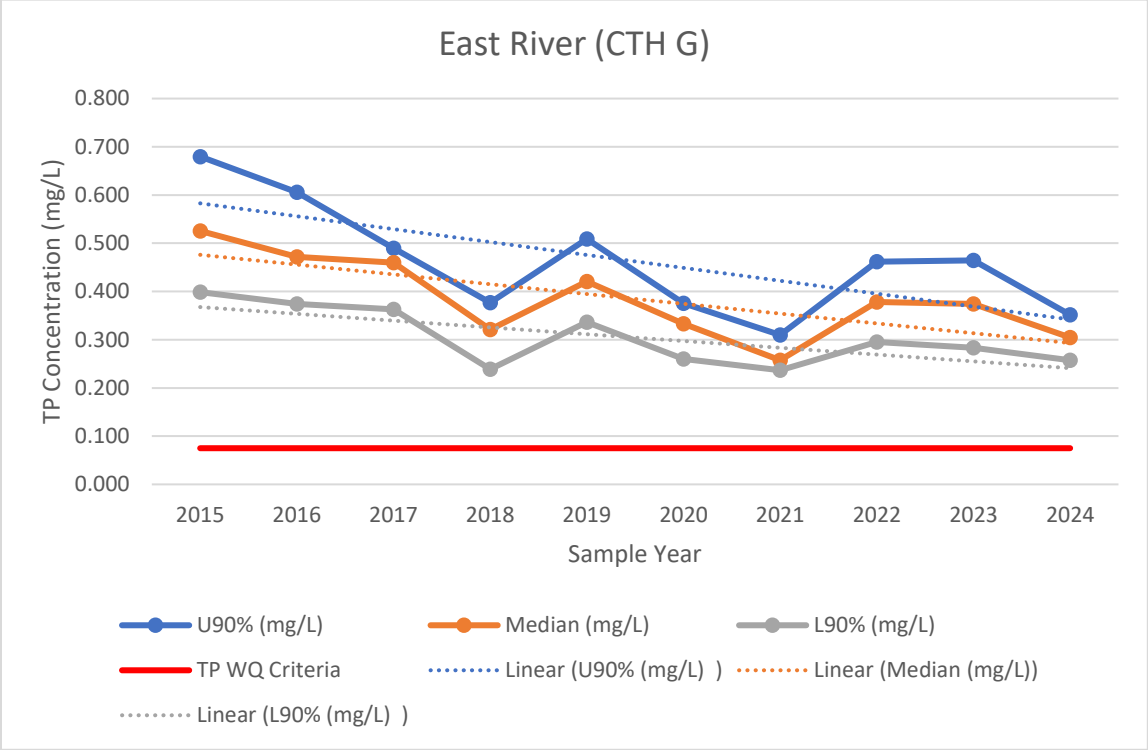


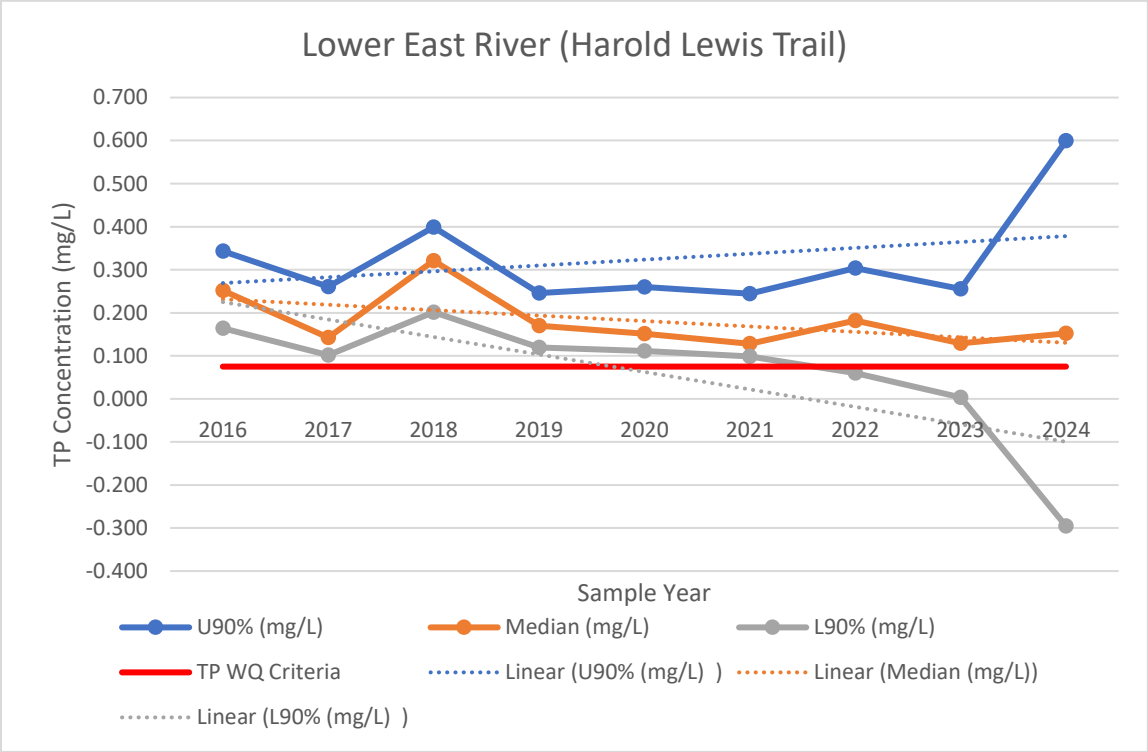

Baird Creek
TP Concentration (mg/L)
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

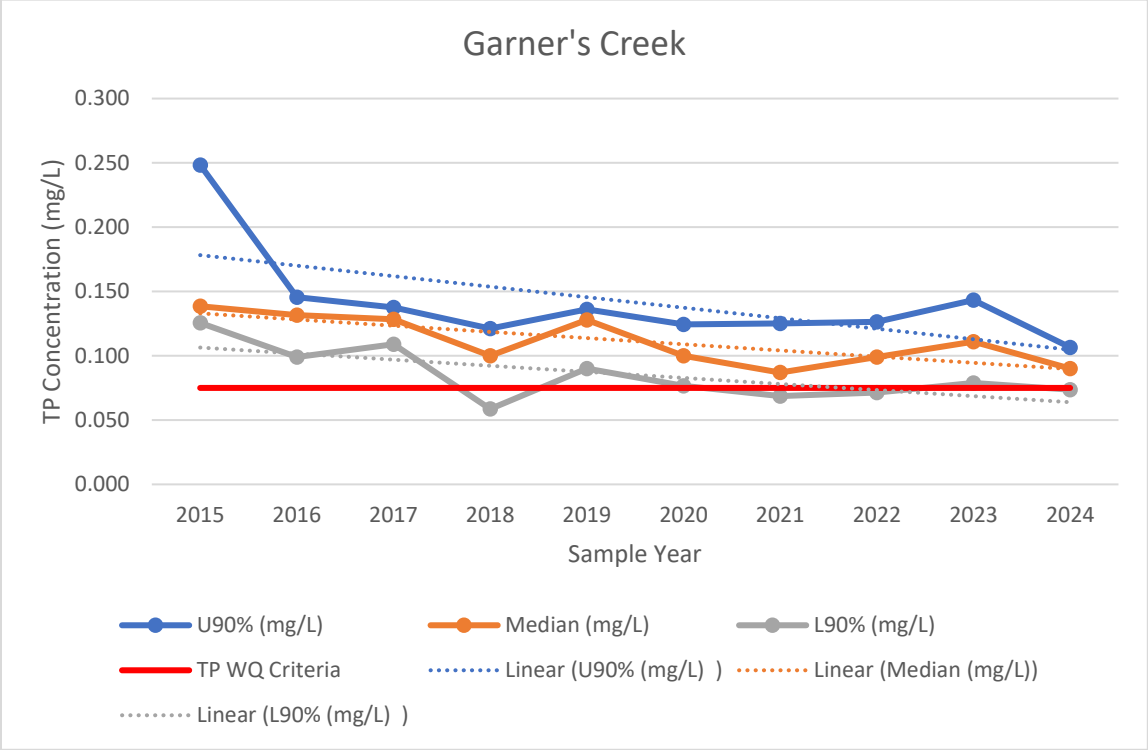

Bower Creek
TP Concentration (mg/L)
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

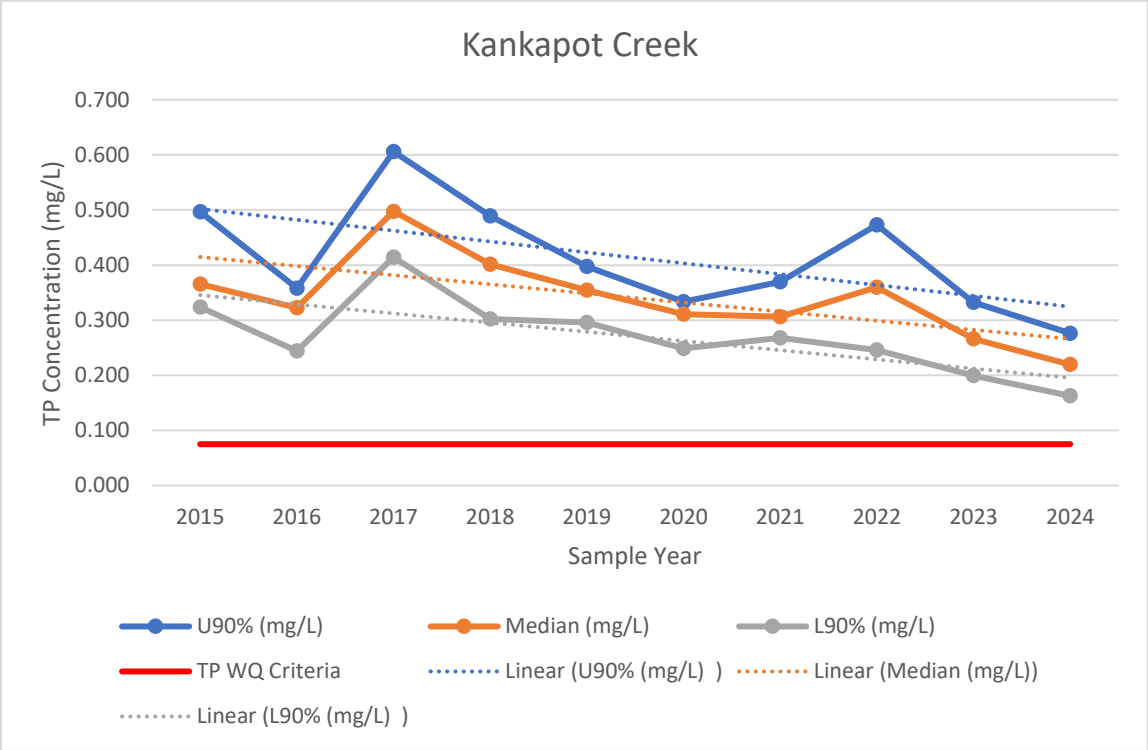

Lower Duck Creek (Pamperin Park)
TP Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

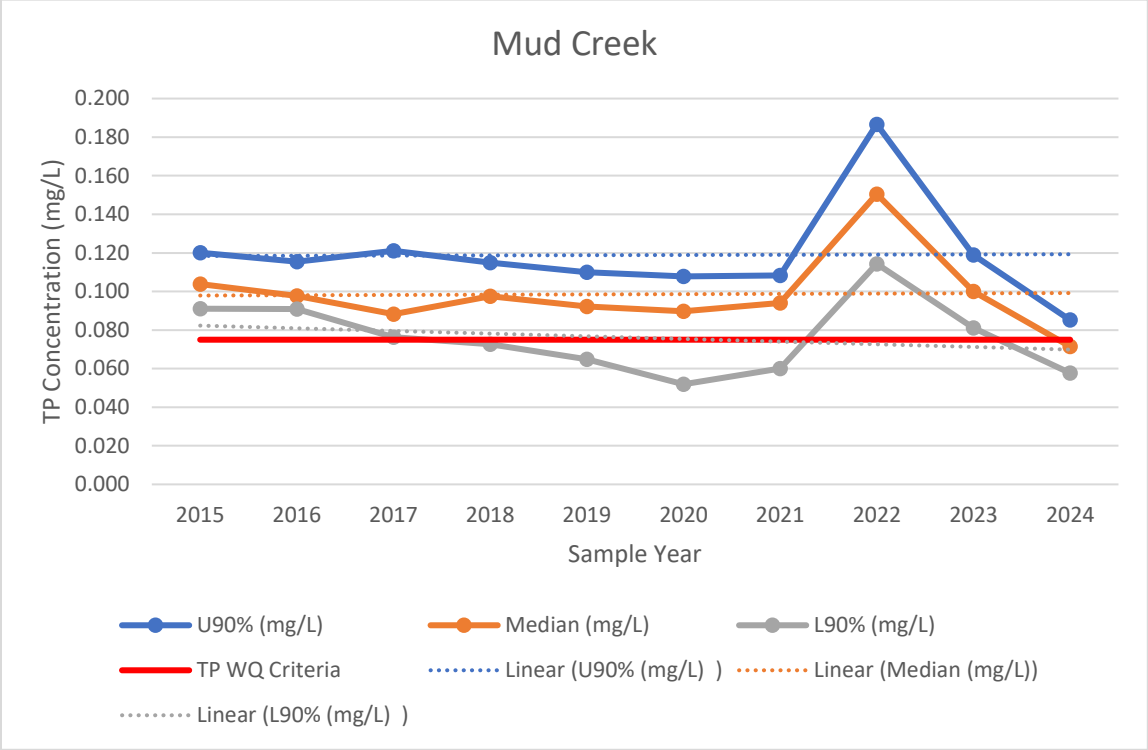

Dutchman Creek
TP Concentration (mg/L)
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

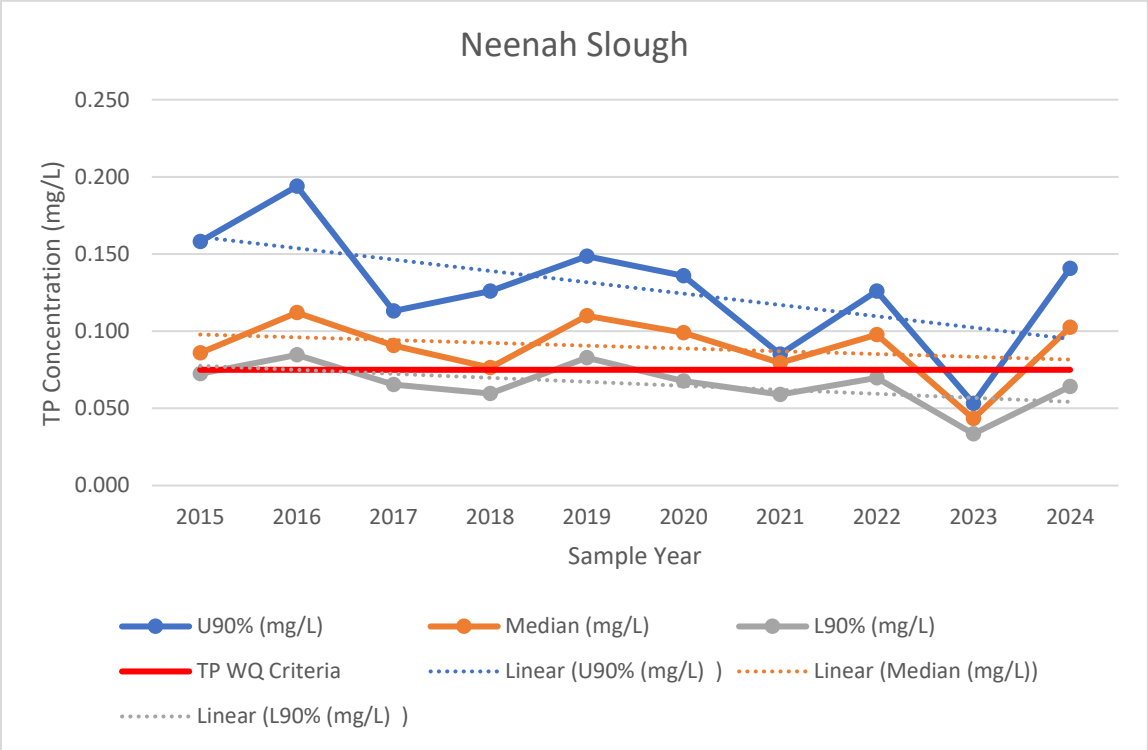

East River (CTH G)
TP Concentration (mg/L)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

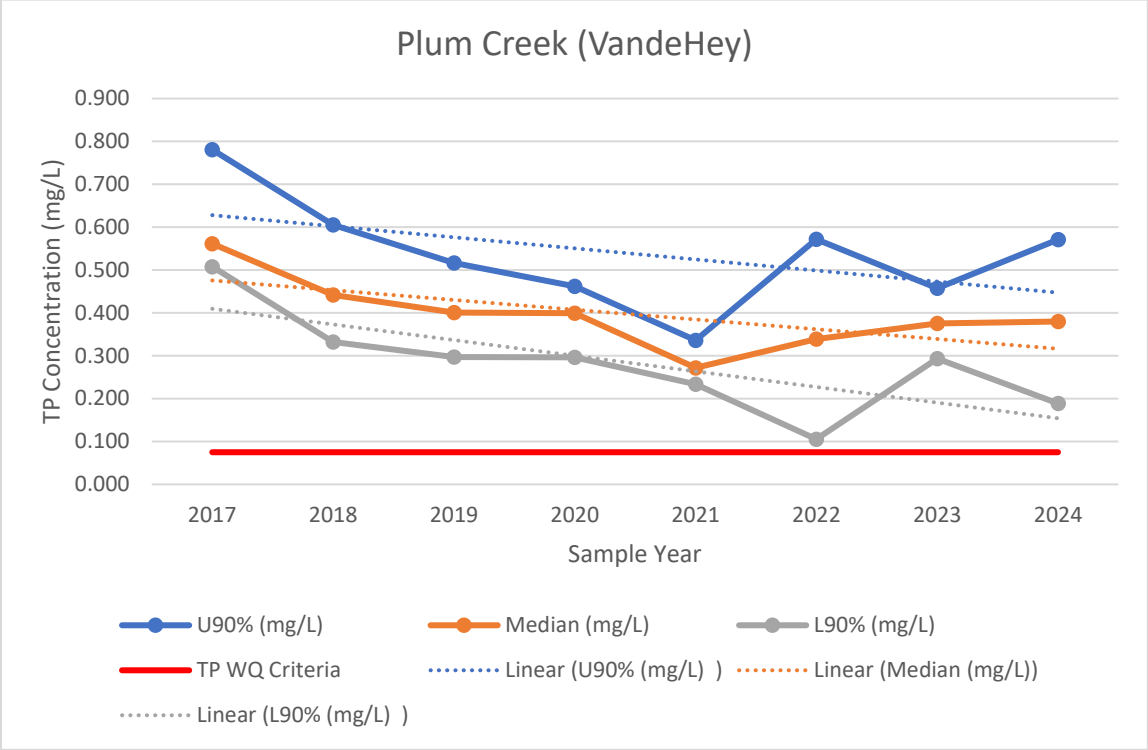

Lower East River (Harold Lewis Trail)
TP Concentration (mg/L)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-0.100
-0.200
-0.300
-0.400
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

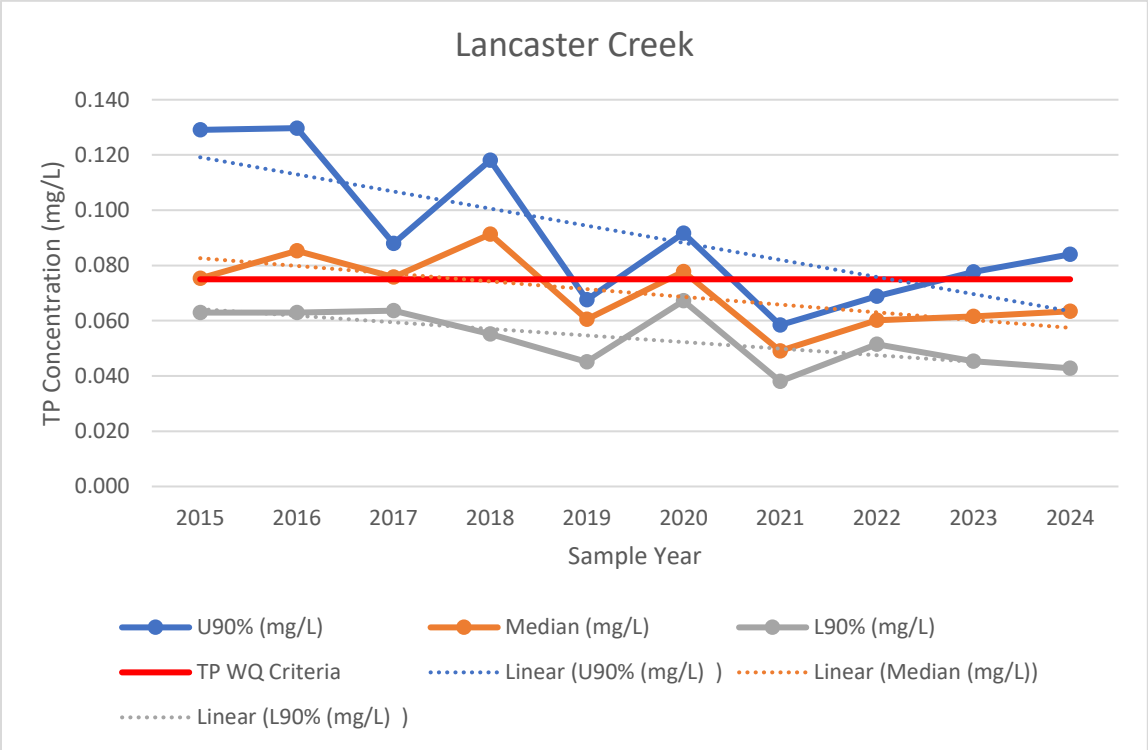

Garner's Creek
TP Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

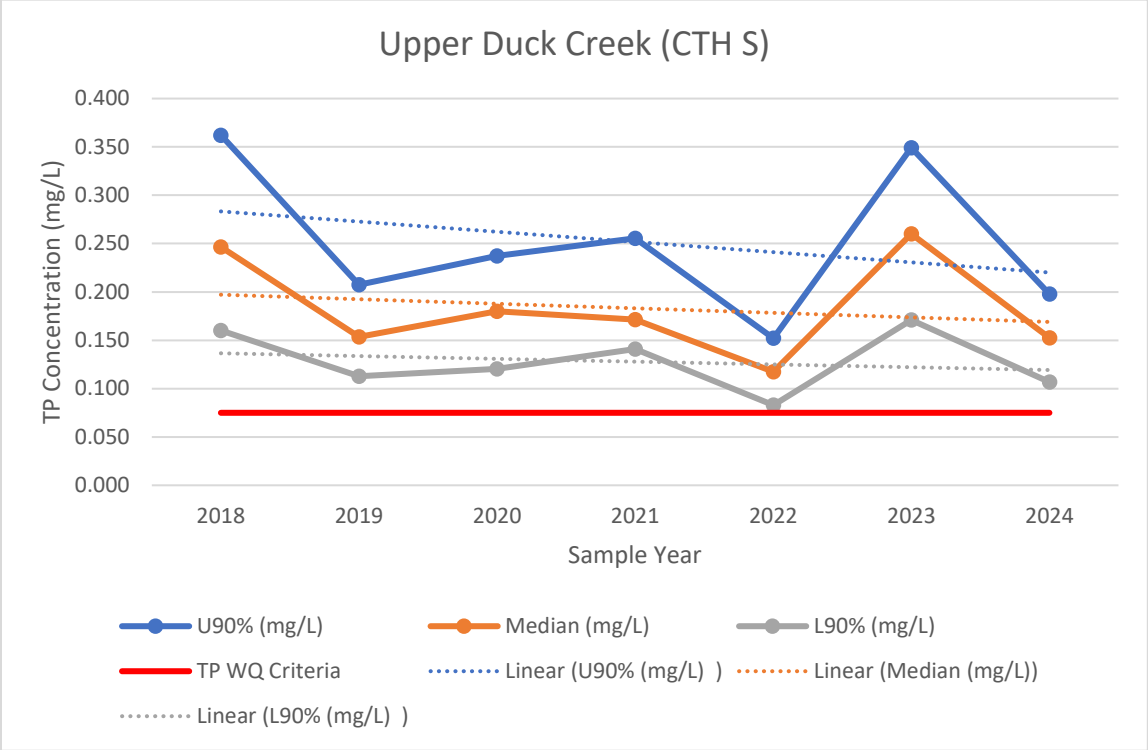

Kankapot Creek
TP Concentration (mg/L)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

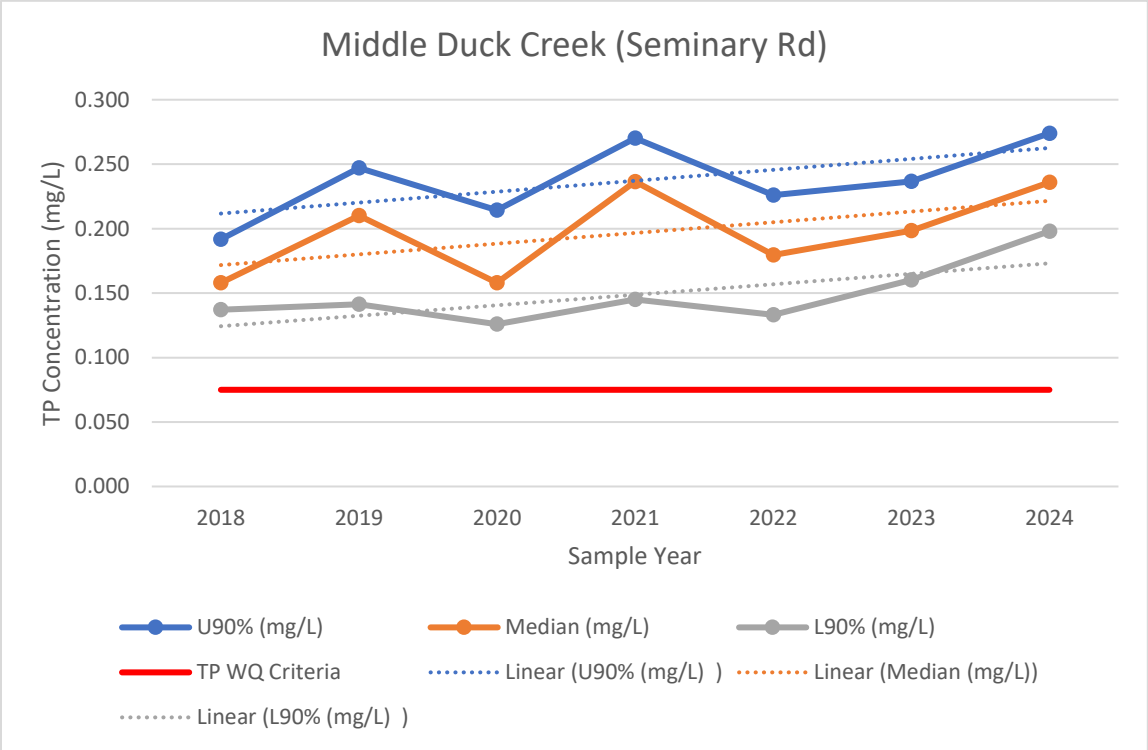

Mud Creek
TP Concentration (mg/L)
0.200
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

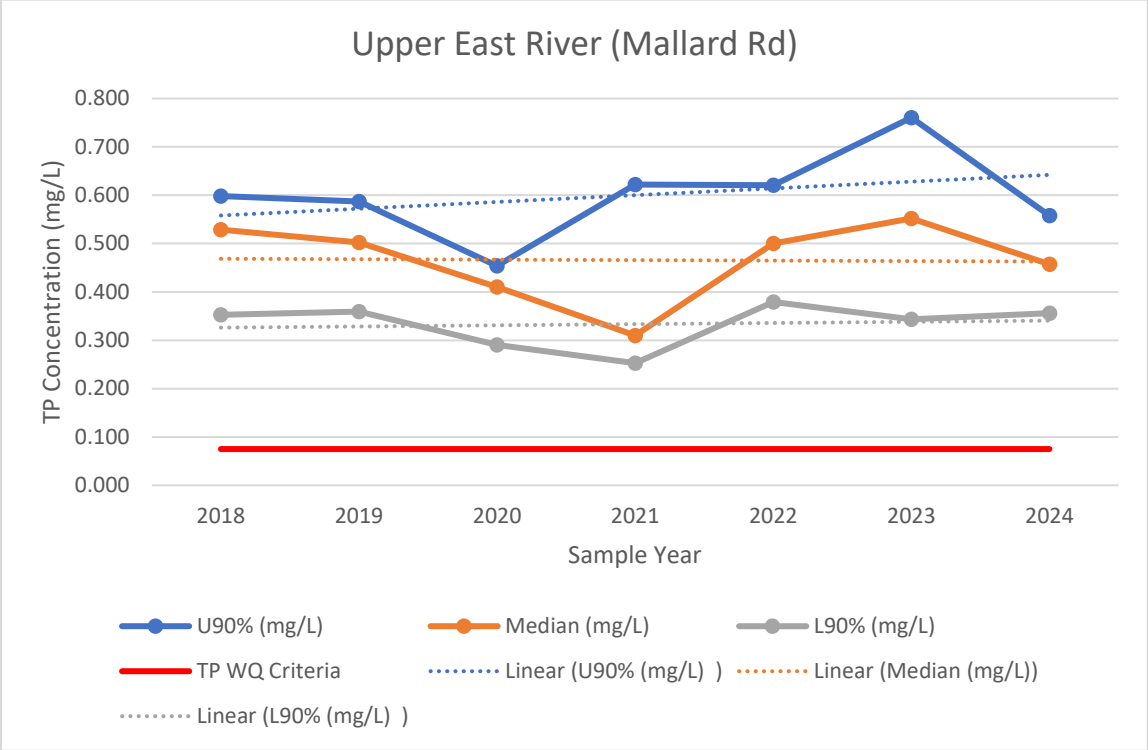

Neenah Slough
TP Concentration (mg/L)
0.250
0.200
0.150
0.100
0.050
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

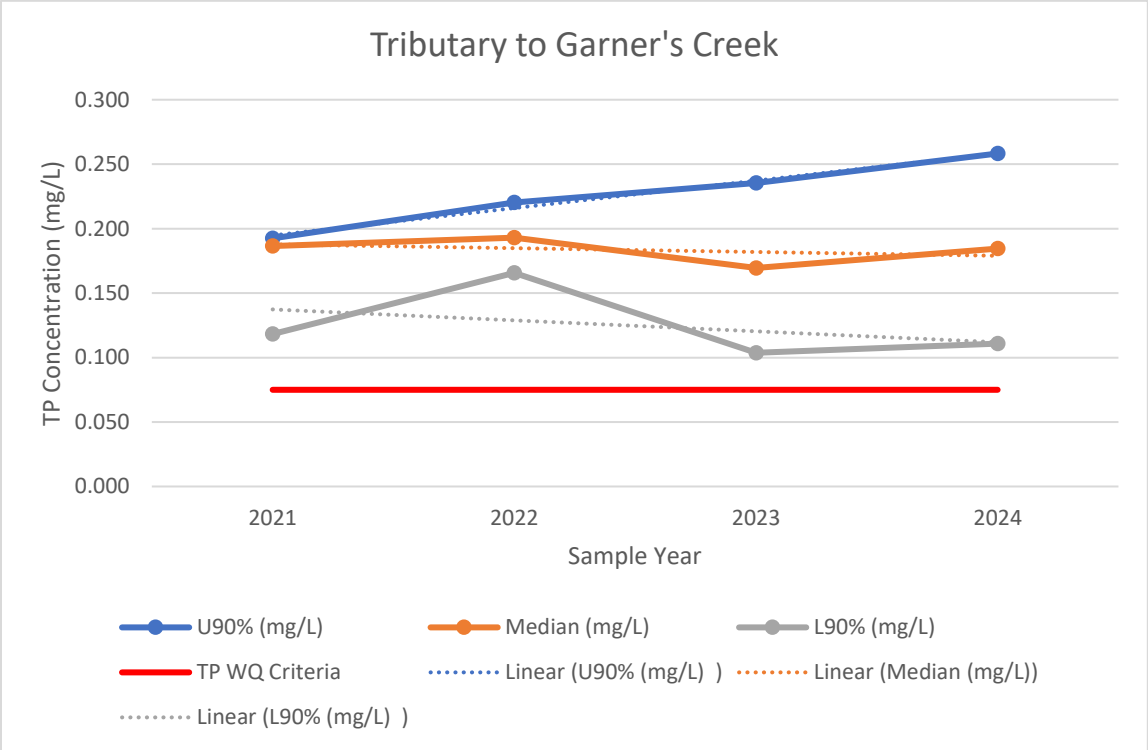

Plum Creek (VandeHey)
TP Concentration (mg/L)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

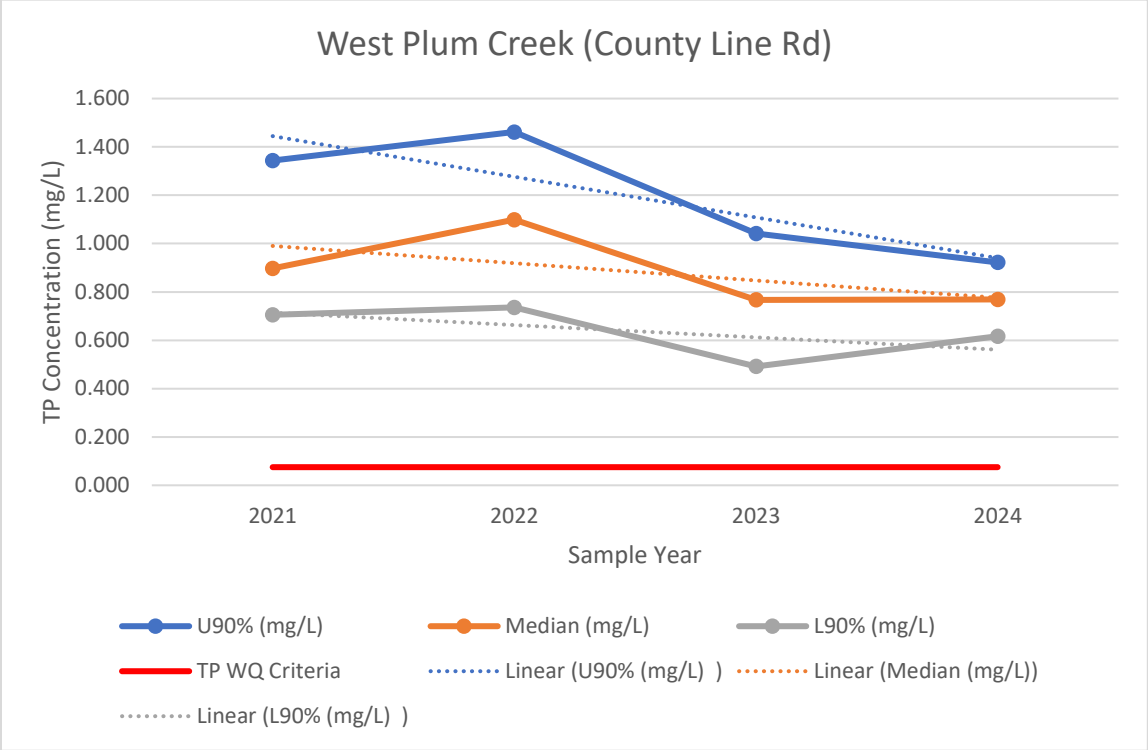

Lancaster Creek
TP Concentration (mg/L)
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

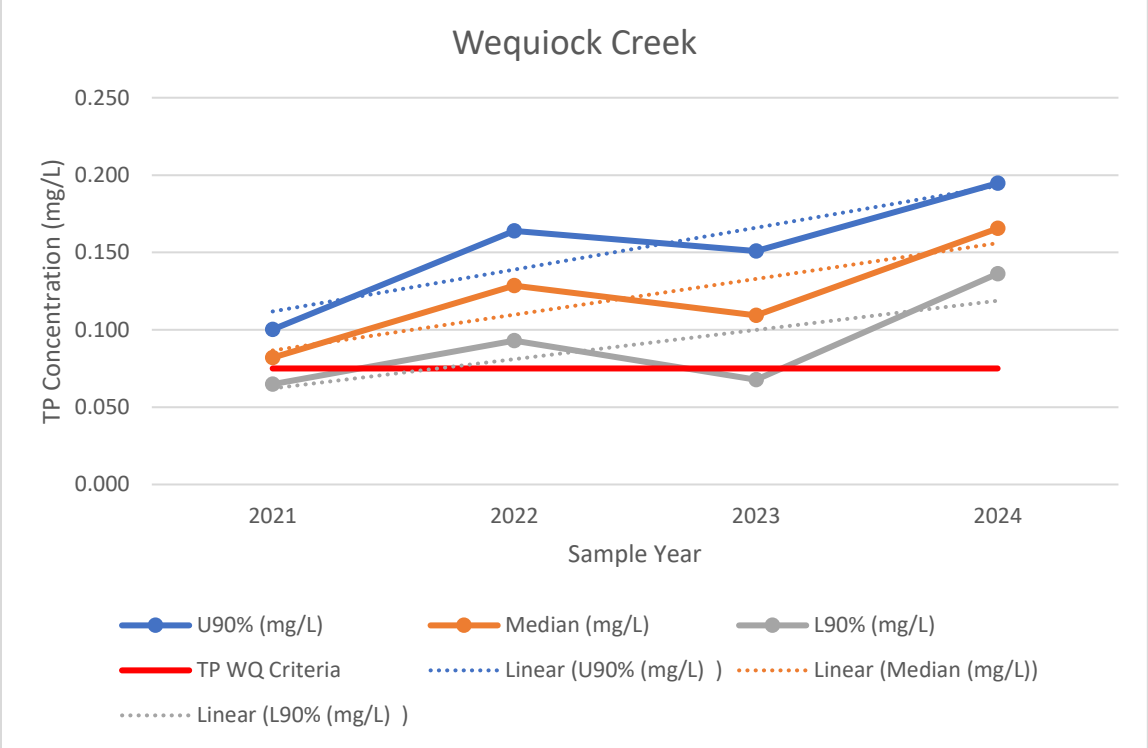

Upper Duck Creek (CTH S)
TP Concentration (mg/L)
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Middle Duck Creek (Seminary Rd)
TP Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Upper East River (Mallard Rd)
TP Concentration (mg/L)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
2018
2019
2020
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Tributary to Garner's Creek
TP Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


West Plum Creek (County Line Rd)
TP Concentration (mg/L)
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))


Wequiock Creek
TP Concentration (mg/L)
0.250
0.200
0.150
0.100
0.050
0.000
2021
2022
2023
2024
Sample Year
U90% (mg/L)
Median (mg/L)
L90% (mg/L)
TP WQ Criteria
Linear (U90% (mg/L))
Linear (Median (mg/L))
Linear (L90% (mg/L))

Lower Fox River Basin Volunteer Monitoring Program

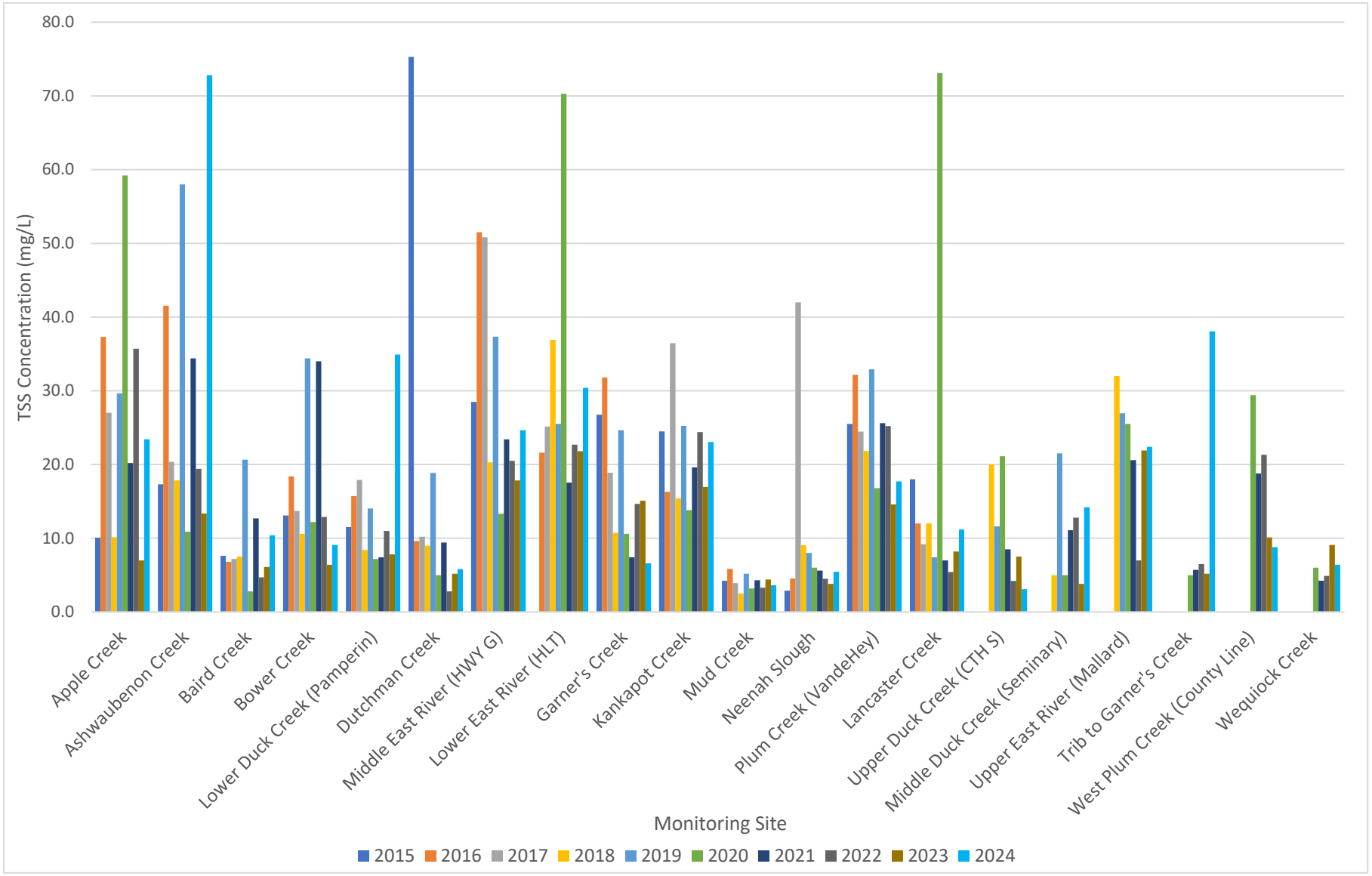
2024 Annual Report

Appendix G: Median Total Phosphorus Concentration by Monitoring Site

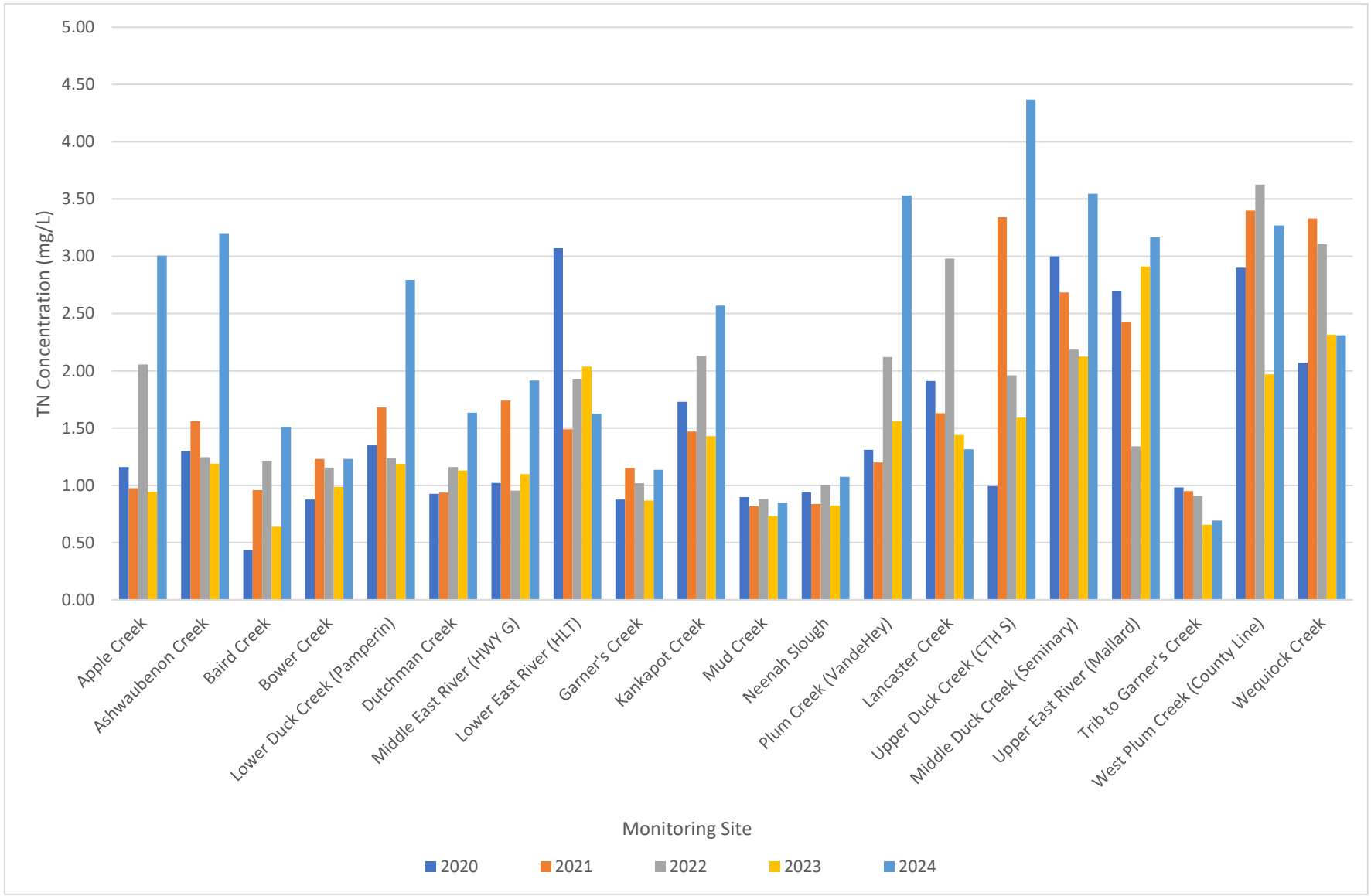
Median TP (mg/L)										
Monitoring Site	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	0.273	0.297	0.318	0.168	0.265	0.126	0.176	0.270	0.187	0.170
Ashwaubenon Creek	0.347	0.316	0.321	0.301	0.485	0.119	0.319	0.252	0.222	0.473
Baird Creek	0.288	0.172	0.317	0.289	0.506	0.075	0.170	0.143	0.136	0.206
Bower Creek	0.199	0.229	0.310	0.323	0.328	0.232	0.230	0.168	0.198	0.245
Lower Duck Creek (Pamperin Park)	0.141	0.173	0.192	0.134	0.148	0.121	0.156	0.113	0.128	0.156
Dutchman Creek	0.306	0.117	0.157	0.141	0.280	0.069	0.098	0.127	0.184	0.114
Middle East River (CTH G)	0.526	0.472	0.460	0.321	0.421	0.303	0.276	0.379	0.374	0.305
Lower East River (HLT)		0.252	0.143	0.321	0.170	0.253	0.128	0.182	0.129	0.152
Garner's Creek	0.139	0.131	0.129	0.100	0.128	0.072	0.087	0.099	0.111	0.090
Kankapot Creek	0.365	0.292	0.498	0.402	0.355	0.277	0.307	0.360	0.266	0.220
Mud Creek	0.108	0.098	0.088	0.097	0.092	0.096	0.094	0.151	0.100	0.071
Neenah Slough	0.078	0.112	0.091	0.076	0.110	0.080	0.075	0.098	0.043	0.102
Plum Creek (VandeHey)		0.839	0.532	0.442	0.401	0.423	0.283	0.339	0.376	0.380
Lancaster Creek	0.086	0.085	0.076	0.091	0.061	0.097	0.049	0.060	0.062	0.063
Upper Duck Creek (CTH S)				0.247	0.154	0.282	0.172	0.180	0.260	0.153
Middle Duck Creek (Seminary Rd)				0.158	0.210	0.154	0.237	0.180	0.199	0.236
Upper East River (Mallard Rd)				0.529	0.503	0.399	0.319	0.500	0.552	0.457
Trib to Garner's Creek						0.160	0.249	0.193	0.170	0.185
West Plum Creek (County Line)						1.710	0.915	1.099	0.767	0.770
Wequiock Creek						0.065	0.114	0.129	0.077	0.166

Red values indicate years with at least one missed sample.

Appendix H: Median Total Suspended Solids Concentration by Monitoring Site



Appendix I: Median Total Nitrogen Concentration by Monitoring Site



Lower Fox River Basin Volunteer Monitoring Program

2024 Annual Report

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

DRP % of TP																			
	Apple Creek	Ashwaubenon Creek	Baird Creek	Bower Creek	Lower Duck Creek (Pamperin Park)	Dutchman's Creek	Middle East River (CTH G)	Lower East River (HLT)	Garner's Creek	Kankapot Creek	Mud Creek	Neenah Slough	Plum Creek (VandeHey)	Lancaster Creek	Upper Duck Creek (CTH S)	Middle Duck Creek (Seminary Rd)	Upper East River (Mallard Rd)	Trib to Garner's Creek	West Plum Creek (County Line)	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%***	53%	***20%***	***40%***	46%	***33%***	***41%***	-	***22%***	-	-	-	-	-	-
Jun-16	55%	64%	56%	60%	56%	-	65%	55%	-	57%	***54%***	63%	-	***49%***	-	-	-	-	-	-
Jul-16	64%	74%	63%	76%	72%	-	83%	74%	***45%***	61%	65%	71%	-	***45%***	-	-	-	-	-	-
Aug-16	69%	40%	-	60%	47%	***39%***	58%	30%	***27%***	44%	***51%***	***61%***	15%	***15%***	-	-	-	-	-	-
Sep-16	36%	59%	61%	-	70%	-	59%	64%	***2%***	-	***33%***	***58%***	75%	***53%***	-	-	-	-	-	-
Oct-16	75%	72%	72%	-	77%	-	85%	44%	***35%***	58%	***65%***	68%	86%	***42%***	-	-	-	-	-	-
May-17	43%	61%	***70%***	***35%***	***36%***	***42%***	45%	***37%***	***27%***	58%	***42%***	***16%***	69%	***62%***	-	-	-	-	-	-
Jun-17	19%	72%	62%	72%	63%	73%	55%	47%	***36%***	53%	***65%***	63%	66%	***40%***	-	-	-	-	-	-
Jul-17	73%	74%	61%	70%	65%	77%	41%	58%	58%	58%	52%	***60%***	77%	***46%***	-	-	-	-	-	-
Aug-17	61%	***35%***	80%	58%	66%	***45%***	64%	**123%**	***49%***	64%	***48%***	***47%***	48%	***60%***	-	-	-	-	-	-
Sep-17	78%	80%	80%	65%	65%	78%	80%	***31%***	***56%***	76%	***57%***	***43%***	83%	***53%***	-	-	-	-	-	-
Oct-17	59%	80%	***74%***	***8%***	57%	81%	87%	***35%***	***59%***	76%	***58%***	***47%***	76%	***53%***	-	-	-	-	-	-

May-18	51%	71%	69%	48%	***44%***	***44%***	67%	60%	***24%***	70%	***28%***	63%	60%	***47%***	52%	***56%***	76%	-	-	-
Jun-18	68%	35%	55%	67%	66%	66%	77%	56%	***39%***	60%	***59%***	69%	70%	***56%***	35%	74%	34%	-	-	-
Jul-18	83%	77%	44%	69%	70%	70%	80%	***29%***	***45%***	73%	***67%***	***58%***	60%	64%	63%	78%	28%	-	-	-
Aug-18	-	28%	72%	53%	***58%***	***58%***	66%	***5%***	**63%**	66%	60%	***18%***	75%	***20%***	69%	79%	85%	-	-	-
Sep-18	***49%***	64%	86%	76%	81%	81%	85%	31%	***63%***	68%	***64%***	***62%***	84%	***49%***	66%	77%	74%	-	-	-
Oct-18	***49%***	90%	65%	62%	75%	75%	67%	46%	***62%***	59%	***47%***	***64%***	72%	***59%***	*65%*	79%	71%	-	-	-
May-19	47%	-	48%	54%	45%	68%	52%	***63%***	***12%***	67%	***48%***	***48%***	59%	***33%***	***55%***	***55%***	65%	-	-	-
Jun-19	47%	77%	67%	66%	48%	69%	59%	***46%***	***27%***	43%	***54%***	***54%***	76%	***75%***	***59%***	42%	69%	-	-	-
Jul-19	82%	65%	72%	64%	80%	72%	89%	58%	***45%***	70%	86%	86%	78%	***68%***	81%	73%	87%	-	-	-
Aug-19	47%	82%	54%	49%	57%	*49%*	74%	***13%***	***23%***	64%	***69%***	***69%***	68%	***50%***	77%	90%	78%	-	-	-
Sep-19	69%	70%	77%	70%	73%	81%	77%	**51%**	***42%***	66%	***62%***	62%	78%	***59%***	67%	74%	71%	-	-	-
Oct-19	71%	71%	62%	48%	73%	68%	61%	**60%**	***47%***	59%	***65%***	65%	55%	***82%***	55%	***78%***	61%	-	-	-
May-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jun-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jul-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug-20	36%	71%	68%	44%	***33%***	86%	68%	***20%***	***36%***	65%	***73%***	***50%***	59%	***66%***	61%	73%	78%	73%	78%	79%
Sep-20	***49%***	***71%***	***108 %***	***30%***	***37%***	***59%***	81%	***11%***	***55%***	58%	***90%***	***48%***	59%	***40%***	61%	60%	77%	***69%***	72%	***113%***
Oct-20	***71%***	***79%***	***94%***	51%	84%	***62%***	80%	49%	***63%***	70%	**59%**	74%	75%	***37%***	77%	87%	87%	***43%***	87%	***114%***
May-21	-	-	-	-	71%	-	-	***28%***	***54%***	56%	***45%***	-	-	***50%***	56%	32%	-	84%	88%	-
Jun-21	51%	80%	74%	58%	39%	16%	63%	16%	54%	78%	76%	***64%***	79%	***47%***	76%	65%	91%	85%	89%	65%
Jul-21	47%	64%	62%	47%	67%	11%	74%	***45%***	***66%***	73%	69%	***64%***	69%	***67%***	67%	80%	70%	78%	81%	78%
Aug-21	77%	79%	61%	63%	63%	***10%***	80%	***38%***	53%	77%	***72%***	***54%***	66%	***74%***	70%	75%	85%	68%	82%	83%
Sep-21	***64%***	67%	55%	67%	***37%***	***9%***	76%	***20%***	***60%***	71%	***40%***	***29%***	66%	***70%***	61%	73%	84%	88%	90%	***71%***
Oct-21	***67%***	94%	73%	74%	***52%***	***8%***	67%	**115%**	***52%***	80%	***54%***	***28%***	77%	***72%***	73%	84%	90%	89%	84%	***73%***

May-22	-	68%	***59%***	***58%***	***59%***	***27%***	67%	***39%***	***18%***	***18%***	***36%***	***36%***	53%	-	***57%***	73%	82%	69%	60%	***17%***
Jun-22	72%	82%	61%	73%	81%	68%	76%	40%	***30%***	60%	68%	76%	73%	***55%***	***63%***	82%	66%	***26%***	84%	***63%***
Jul-22	81%	83%	68%	56%	72%	-	89%	14%	56%	73%	79%	79%	60%	***70%***	80%	87%	91%	87%	89%	75%
Aug-22	39%	72%	73%	60%	59%	-	80%	***34%***	***40%***	64%	68%	***64%***	***34%***	***64%***	72%	79%	94%	60%	61%	71%
Sep-22	-	79%	69%	60%	***65%***	74%	75%	32%	***61%***	68%	***45%***	***57%***	71%	-	69%	77%	84%	43%	-	67%
Oct-22	***61%***	***72%***	***61%***	59%	***33%***	-	75%	***66%***	***49%***	49%	***60%***	***49%***	66%	***17%***	***71%***	***61%***	87%	80%	82%	***45%***
May-23	***41%***	74%	62%	***50%***	***25%***	69%	63%	***43%***	***0%***	***51%***	***39%***	***28%***	***47%***	***41%***	***37%***	***53%***	78%	***57%***	54%	***52%***
Jun-23	74%	81%	***60%***	70%	68%	72%	70%	***11%***	***51%***	57%	***57%***	***45%***	63%	***44%***	***60%***	77%	84%	82%	81%	69%
Jul-23	84%	63%	54%	72%	***58%***	77%	80%	23%	***32%***	63%	***57%***	***26%***	53%	***56%***	71%	84%	112%	88%	88%	-
Aug-23	53%	54%	67%	63%	59%	79%	80%	27%	***40%***	49%	68%	***61%***	79%	***61%***	76%	79%	88%	78%	91%	64%
Sep-23	55%	47%	***57%***	59%	***29%***	61%	66%	***11%***	***42%***	64%	***44%***	***21%***	61%	***63%***	60%	75%	82%	81%	82%	***68%***
Oct-23	66%	70%	***67%***	***49%***	60%	***63%***	82%	***23%***	***24%***	***40%***	***25%***	***53%***	70%	***60%***	58%	73%	84%	67%	70%	***62%***
May-24	***65%***	43%	67%	28%	50%	***56%***	76%	***46%***	***52%***	56%	***51%***	***5%***	52%	***72%***	***61%***	61%	73%	***73%***	87%	***67%***
Jun-24	70%	27%	75%	***63%***	54%	78%	67%	71%	***49%***	49%	***61%***	57%	56%	***73%***	57%	69%	77%	60%	78%	72%
Jul-24	57%	132%	82%	63%	79%	83%	68%	***44%***	***57%***	64%	***61%***	***48%***	79%	***63%***	70%	75%	82%	82%	77%	76%
Aug-24	68%	83%	58%	52%	75%	***71%***	62%	7%	***34%***	54%	***61%***	72%	61%	***58%***	72%	84%	84%	41%	79%	77%
Sep-24	69%	82%	79%	72%	82%	***52%***	80%	***5%***	***54%***	62%	***26%***	***55%***	52%	***50%***	71%	84%	87%	80%	80%	66%
Oct-24	61%	76%	***79%***	73%	81%	***82%***	76%	***15%***	72%	69%	***36%***	***43%***	***52%***	***54%***	74%	79%	87%	80%	89%	67%

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

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

Lower Fox River Basin Volunteer Monitoring Program
2024 Annual Report

Appendix K: Duplicate Sample Data

Monitoring Site	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 CTH Z	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		0.268	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
Plum Creek at VandeHey Farm crossing	6/19/2023	PHOSPHORUS TOTAL	0.185	0.184	0.001	MG/L	0.54
	6/19/2023	PHOSPHATE ORTHO DISS	0.119	0.116	0.003	MG/L	2.55
	6/19/2023	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	13.3	11.7	1.6	MG/L	12.80
	6/19/2023	NITROGEN TOTAL	1.07	1.07	0	MG/L	0.00
Ashwaubenon Creek - Grant Street	8/21/2023	PHOSPHORUS TOTAL	0.215	0.222	0.007	MG/L	3.20
	8/21/2023	PHOSPHATE ORTHO DISS	0.118	0.119	0.001	MG/L	0.84
	8/21/2023	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	16.8	16.4	0.4	MG/L	2.41
	8/21/2023	NITROGEN TOTAL	1.02	1.02	0	MG/L	0.00
Garner's Creek DS of CTH Z	6/27/2024	PHOSPHORUS TOTAL	0.128	0.129	0.001	MG/L	0.78
	6/27/2024	PHOSPHATE ORTHO DISS	0.0636	0.0627	0.0009	MG/L	1.43
	6/27/2024	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	29	30	1	MG/L	3.39
	6/27/2024	NITROGEN TOTAL	1.16	1.19	0.03	MG/L	2.55
East River - HWY G	8/13/2024	PHOSPHORUS TOTAL	0.331	0.33	0.001	MG/L	0.30
	8/13/2024	PHOSPHATE ORTHO DISS	0.205	0.205	0	MG/L	0.00
	8/13/2024	RESIDUE TOTAL NFLT (TOTAL SUSPENDED SOLIDS)	37.6	38.5	0.9	MG/L	2.37
	8/13/2024	NITROGEN TOTAL	2.2	2.19	0.01	MG/L	0.46

	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

Lower Fox River Basin Volunteer Monitoring Program
2024 Annual Report

Appendix L: Stream Flow and Transparency Data

Stream Flow (CFS)											
Monitoring Site	Month	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	May	-	-	40.1	-	-	-	-	-	-	-
	June	-	-	55.7	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	-	-	-
	August	-	-	-	-	-	-	-	-	-	-
	September	-	-	6.2	-	-	-	-	-	-	-
	October	-	-	-	-	-	-	-	-	-	-
Ashwaubenon Creek	May	-	0.818	-	-	-	-	-	42.3	3.5	-
	June	-	-	-	-	-	-	NA	2.2	100	-
	July	-	14.6	-	-	27.1	-	13	0	0.9	53.3
	August	-	0	46.4	0	0	-	1.2	0.9	0	-
	September	-	16.8	13.9	0	-	-	0.61	0	0	-
	October	-	54	36.6	0	-	0	-	0	0	-
Baird Creek	May	-	2.5	11.2	4.94	-	-	-	60.2	4.9	-
	June	-	0.56	12.6	74.69	18.44	-	20.2	29.6	1.5	-
	July	-	-	10	6.1	2.57	-	-	-	217.6	-
	August	-	-	4.5	47.23	38.25	1.02	-	16.8	2.2	27.46
	September	-	-	-	59.9	-	18.4	59.9	67.13	0.01	-
	October	-	4.5	4.1	-	-	-	56.1	0.19	1.7	-
Bower Creek	May	-	1.178	8.6	19.2	-	-	-	-	-	-
	June	-	1	2.2	-	84.47	-	-	-	-	-
	July	-	-	2.3	1.3	-	-	-	-	-	-
	August	-	-	3.5	0	-	-	-	-	-	-
	September	-	-	-	12.8	-	-	-	-	-	-
	October	-	-	4.2	23.5	-	-	-	-	-	-
Lower Duck Creek (Pamperin Park)	May	-	10.95	49.5	74.1	-	-	36.1	31.7	306	742.2
	June	-	14.9	42.2	510.3	54.7	-	316.8	16.2	77.7	471.3
	July	-	7.1	40.5	16.5	97.2	-	31.7	20.4	13.7	54.1

	August	-	3.8	52.9	7.2	102	20.3	431.2	34.7	12.1	18.2
	September	-	27.2	40.1	49.3	240	10.2	15.2	32.2	10	7.61
	October	-	34.1	98.3	-	154.9	82.1	19.7	16.2	32.2	12.9
Dutchman Creek	May	-	7.713	38.54	19.5	-	-	-	-	-	-
	June	-	-	-	-	-	-	-	-	-	-
	July	-	-	7.1	1.3	-	-	-	-	-	-
	August	-	-	-	1.3	-	-	-	-	-	-
	September	-	-	-	-	-	-	-	-	-	-
	October	-	-	-	0.5	-	-	-	-	-	-
Middle East River (CTH G)	May	-	10.7	26.3	6.5	0	-	-	-	-	-
	June	-	-	33.1	6	-	-	-	-	-	-
	July	-	-	31	-	-	-	-	-	-	-
	August	-	-	42.4	16.8	-	-	-	-	-	-
	September	-	-	9.5	8	-	-	-	-	-	-
	October	-	-	4.9	-	-	-	-	-	-	-
Lower East River (HLT)	May	-	-	-	-	-	-	-	-	-	-
	June	-	-	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	-	-	-
	August	-	-	-	-	-	-	-	-	-	-
	September	-	-	-	-	-	-	-	-	-	-
	October	-	-	-	-	-	-	-	-	-	-
Garner's Creek	May	-	8.24	8.24	8.35	16.97	-	-	-	-	6.88
	June	3.52	13.85	13.85	14.6	9.55	-	7.3	-	-	9.3
	July	-	2.31	2.31	1.83	5.74	-	4.02	-	-	-
	August	-	3.77	0	1.93	3.79	-	27	-	-	6.77
	September	-	5.3	-	6.83	26.66	-	0	-	-	-
	October	-	0	3.22	8.08	25.53	-	-	-	-	-
Kankapot Creek	May	-	0.0015	-	-	25.6	-	0.559	1.127	-	-
	June	-	10.6	16.6	-	0.8	-	0.125	1.9	-	-
	July	-	0	2.1	0	139	-	0.497	0.36	-	-

	August	-	0.17	1.5	0	0.17	-	0.628	0.95	-	-
	September	-	-	0.269	0	-	0.097	-	0.59	-	-
	October	-	0.3	1.868	0	1.33	1	0.26	0.118	-	-
Mud Creek	May	-	12.9	14.7	3.2	0	-	0.8	1.3	-	-
	June	-	-	7.4	6.4	-	-	1.2	-	-	-
	July	-	-	24.7	2.6	-	-	7.2	-	-	-
	August	-	3740	24.6	0.6	-	1.18	2.6	-	-	-
	September	-	223.51	0.2	7.5	-	0.9	9.6	-	-	-
	October	-	4.2	45.7	-	-	18.7	6.9	-	-	-
Neenah Slough	May	-	12.4	-	4.59	0	-	-	-	-	-
	June	-	-	-	20.87	-	-	-	-	-	-
	July	-	15.41	7	5.3	-	-	-	-	-	-
	August	-	13.2	9.7	-	-	-	-	-	-	-
	September	-	-	26	-	-	0	-	-	-	-
	October	-	7.7	13.4	-	-	-	-	-	-	-
Plum Creek (VandeHey)	May	-	-	3.7	2.3	13.2	-	-	-	-	-
	June	-	-	16	36.3	4.9	-	1.2	-	-	-
	July	-	-	4.7	3.3	3.3	-	10	-	-	-
	August	-	2.6	0.9	0.8	7	0.7	6.73	-	-	-
	September	-	2.7	-	9.1	-	0.8	2	-	-	-
	October	-	2.6	1.3	7	66.3	13	1.9	-	-	-
Lancaster Creek	May	-	-	24.9	4.9	-	-	-	-	-	-
	June	-	0	-	6.4	-	-	-	-	-	-
	July	-	0	8.64	2.49	-	-	-	-	-	-
	August	-	0	8.99	-	-	0	-	-	-	-
	September	-	0	2.98	23.4	-	-	-	-	-	-
	October	-	0	5.07	6.12	-	-	-	-	-	-
Upper Duck Creek (CTH S)	May	-	-	-	-	55.6	-	-	6.3	4.1	21.5
	June	-	-	-	-	9.2	-	-	-	0	-
	July	-	-	-	-	28.7	-	30	0	1.5	47

	August	-	-	-	-	2.9	-	0.7	2.2	0	27
	September	-	-	-	-	-	0	36.2	1.9	0	-
	October	-	-	-	-	-	0	10.3	7.5	-	-
Middle Duck Creek (Seminary Rd)	May	-	-	-	-	-	-	16.4	22.4	18.7	296.2
	June	-	-	-	-	232	-	191.5	13.1	35.1	221
	July	-	-	-	-	46	-	20.8	-	8.3	17.8
	August	-	-	-	-	20.2	6.1	229.6	24.3	8.2	8.7
	September	-	-	-	-	127.3	3.9	9.4	15.1	8.1	4.1
	October	-	-	-	-	63.7	34.7	12.3	12.1	21.1	6.13
Upper East River (Mallard Rd)	May	-	-	-	5.6	32	-	-	-	-	-
	June	-	-	-	49.6	8.7	-	-	-	-	-
	July	-	-	-	3.4	6.2	-	15	-	-	-
	August	-	-	-	0.7	15.7	1.4	4.65	-	-	-
	September	-	-	-	23.5	-	1.5	3.9	-	-	-
	October	-	-	-	13.7	-	23.5	5.1	-	-	-
Trib to Garner's Creek	May	-	-	-	-	-	-	-	-	-	-
	June	-	-	-	-	-	-	1.2	-	-	-
	July	-	-	-	-	-	-	-	-	-	-
	August	-	-	-	-	-	-	-	-	-	-
	September	-	-	-	-	-	-	-	-	-	-
	October	-	-	-	-	-	-	-	-	-	-
West Plum Creek (County Line)	May	-	-	-	-	-	-	3.1075	-	-	-
	June	-	-	-	-	-	-	0	-	-	-
	July	-	-	-	-	-	-	0.978	-	-	-
	August	-	-	-	-	-	0	0.732	-	-	-
	September	-	-	-	-	-	-	-	-	-	-
	October	-	-	-	-	-	-	3.34	-	-	-
Wequiock Creek	May	-	-	-	-	-	-	-	-	12.5	-
	June	-	-	-	-	-	-	8.21	-	-	61.5
	July	-	-	-	-	-	-	8.2	-	-	-

	August	-	-	-	-	-	-	7.68	-	-	9.5
	September	-	-	-	-	-	0.192	-	-	-	35
	October	-	-	-	-	-	0.05	11.3	-	-	-

Transparency (CM)											
Monitoring Site	Month	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Apple Creek	May	-	-	10.48	41.4	-	-	-	120	120	120
	June	-	-	5	59	12	-	-	60	120	66
	July	-	-	5.11	46.5	-	-	-	46	120	12
	August	-	-	-	-	-	25	-	4	34	31
	September	38.5	-	7.4	0.5	32	26	81	16.5	35	-
	October	-	-	-	70	-	-	-	109	83	101
Ashwaubenon Creek	May	-	18	-	42.3	-	-	-	49.93	46.8	4
	June	-	31.1	-	17.33	-	-	18	23.9	24.5	3
	July	-	40.4	-	12.33	27.3	-	16	21.73	24	7.3
	August	-	15.2	15.5	32	25.7	28.49	31	29.53	47.13	28
	September	17.9	11.5	68	21	9.2	51.4	39.27	77.9	48.8	78.5
	October	-	17.6	21	35	13	101	115	110	92.7	102
Baird Creek	May	-	120	110.3	79.2	17	-	-	105	120	120
	June	-	55.2	23.5	54	-	-	60	97	120	63
	July	-	-	18.35	10	36	-	40	-	66	45
	August	-	-	-	76	7.5	120	12	63	53	12.25
	September	82.5	-	102.35	55	39.5	115	-	120	51	91
	October	-	81.2	120	26	29.3	20.32	120	120	120	-
Bower Creek	May	-	97	84.7	62	15	-	-	60	83	5
	June	-	34.6	-	21	55	-	35	36	83	6
	July	-	-	10.7	64	21	-	10	-	45	44
	August	-	-	80	78	15	37	33	39	58	30
	September	36.2	-	56.15	38	17	27	42	-	67	105

	October	-	-	56	113	58	-	102	-	50	110
Lower Duck Creek (Pamperin Park)	May	-	55	99.1	105	120	-	85.1	100	91.7	15.5
	June	-	21.7	45.4	32.5	15.1	-	27.2	100	41.3	15.2
	July	-	28.3	25.1	46.3	31	-	92	40.1	80.1	79.7
	August	-	31.5	55.25	52.5	44.85	25.1	23.5	-	60.2	110
	September	-	55	52.5	93	29	83.5	100	92.6	66.1	100
	October	-	78	22.7	-	95.5	68.5	100	97.2	100	100
Dutchman Creek	May	-	72	55.1	83	17	-	-	85	15	120
	June	-	-	47	14	37	-	83	120	120	54
	July	-	-	58	45	24	-	19	-	99	40
	August	-	55.01	35	62	26	35	61.5	-	81	100
	September	-	-	105	62.8	29	108.5	50	88	32	66
	October	-	-	2	120	34	-	103	-	115	120
Middle East River (CTH G)	May	-	23	16	16	29	-	-	28	26	47
	June	-	-	9.6	24	12	-	18	-	28	15.2
	July	-	-	14.5	15	36.5	-	33	31	45	16
	August	-	-	9.55	27	28	39	26	28	45	20
	September	-	1.5	44.45	16.1	-	50.5	55	43	36	44.6
	October	-	-	-	74	21	27	85	70	65	47.2
Lower East River (HLT)	May	-	40	50	32	0.31	-	34	29	38	41
	June	-	-	30	15	0.5	-	0.18	30	45	34
	July	-	-	16	21	32	-	7	11	24	20
	August	-	-	29	-	11	0.25	24	29	7	0
	September	-	-	32	4	6	-	20	15	-	10
	October	-	-	29	14	33	15	0.41	40	28	15
Garner's Creek	May	-	23	23	45	53.3	-	-	-	-	66
	June	22	9	9	16	13	-	67	-	-	19
	July	-	25	25	26.5	21.5	-	52	-	-	38
	August	-	13	19	29.5	22.25	41	11.5	-	-	45
	September	-	22.5	35	63.5	20.5	34	114	-	-	81

	October	-	32	80	120	43	96	120	-	-	105
Kankapot Creek	May	-	56	16.2	-	78.2	-	44	78	78	37.5
	June	-	10.23	7.46	28	22	-	24.2	25	21.8	10.2
	July	-	5.3	12	54	27	-	24	34.6	21.4	14.2
	August	-	18	44	9	26	55	15.08	12	13.2	15.2
	September	-	-	7.5	0.09	13.4	32	43.1	15	31	55.2
	October	-	44.1	42.5	90	30.2	40	45	58	29.5	68.4
Mud Creek	May	-	120	100.2	84.1	67	-	45	120	120	112
	June	-	53	114.2	93.1	81.2	-	120	120	120	120
	July	-	120	76	101.5	-	-	120	120	58	-
	August	-	94	78.8	108	-	-	113	120	120	115
	September	-	47.9	71.2	88.95	-	120	120	25	111	120
	October	-	120	79.65	120	-	56	80	120	17	65
Neenah Slough	May	18	120	41.8	117.4	45.8	-	-	-	50	62.4
	June	-	19.1	42.7	114	87.4	-	50.61	86.3	106	63.95
	July	-	93.2	120	120	120	-	120	91.5	102	70.06
	August	-	120	118	120	115	81.1	106	92.5	1.098	1.13
	September	-	-	120	120	26	65.5	111	57.78	112.5	9.83
	October	-	116	45.5	120	50.23	31.3	86.7	79.52	36.5	95.6
Plum Creek (VandeHey)	May	-	-	34	26	51.5	-	-	21.5	25	3
	June	-	-	12	13.8	20	-	22.2	11	36	17
	July	-	-	15	20.5	21.5	-	22	22.5	39	28
	August	-	19	15	29.5	18	29.5	27	25	25	40
	September	-	6.5	46.3	8	20.5	41.5	30.5	-	-	-
	October	-	32	29.8	75	6	22	51	35	-	-
Lancaster Creek	May	-	89	104.33	65	43.6	-	104.1	-	120	25
	June	-	0	-	61.3	101.3	-	-	104	69	58.1
	July	-	54.3	65.2	64.6	-	-	-	107	41	37.6
	August	-	12.3	77.47	22.9	84.6	120	120	120	67	76.1
	September	-	117	120	95.2	120	120	-	-	91	80

	October	-	117.2	120	120	120	105.5	-	120	120	120
Upper Duck Creek (CTH S)	May	-	-	-	82	56	-	15.5	71.2	84.3	100
	June	-	-	-	65	69.9	-	54.2	35.55	59.3	12
	July	-	-	-	33	47.6	-	57	41.5	61	59
	August	-	-	-	35	54.6	34.26	21	59.7	47	53
	September	-	-	-	58	34.2	31	33.4	71.4	39.5	81
	October	-	-	-	69	25	67	76.66	115	-	83
Middle Duck Creek (Seminary Rd)	May	-	-	-	120	51	-	92	100	97.2	15.2
	June	-	-	-	83	13.75	-	30.1	71.2	72	21.1
	July	-	-	-	75	45.5	-	58.7	-	89.6	41.4
	August	-	-	-	67	75.1	90	19.7	-	91	97.9
	September	-	-	-	1.5	40.5	95	100	96	100	95
	October	-	-	-	-	100	83	100	94.7	100	100
Upper East River (Mallard Rd)	May	-	-	-	24.5	50.5	-	-	53	47	6
	June	-	-	-	14.5	12.25	-	-	10	15	12
	July	-	-	-	12.75	24	-	19.5	24	22	18
	August	-	-	-	32.5	27	16	28	30	22	33
	September	-	-	-	15	20	27	58	32	-	-
	October	-	-	-	66.5	10.5	30	100	-	-	-
Trib to Garner's Creek	May	-	-	-	-	-	-	120	120	76	120
	June	-	-	-	-	-	-	120	20	55	11
	July	-	-	-	-	-	-	65	66	90	-
	August	-	-	-	-	-	48.5	23	60	65	19
	September	-	-	-	-	-	120	37	33	65	120
	October	-	-	-	-	-	26	80	53	95	113
West Plum Creek (County Line)	May	-	-	-	-	-	-	18	73.5	35	108
	June	-	-	-	-	-	-	23.50	26	43	19
	July	-	-	-	-	-	-	44.92	45	110	14
	August	-	-	-	-	-	23	18.50	9	99	64
	September	-	-	-	-	-	16	32.33	17	120	39

	October	-	-	-	-	-	15	38.23	30.5	120	88
Wequiock Creek	May	-	-	-	-	-	-	-	-	120	115
	June	-	-	-	-	-	-	68.00	-	-	-
	July	-	-	-	-	-	-	63.00	-	-	106
	August	-	-	-	-	-	69	48.00	-	41.5	118
	September	-	-	-	-	-	120	-	-	120	120
	October	-	-	-	-	-	115	82.00	-	120	120

Appendix M: Lower Fox River Basin Volunteer Monitoring Fact Sheet

Lower Fox River Basin Volunteer Monitoring Fact Sheet

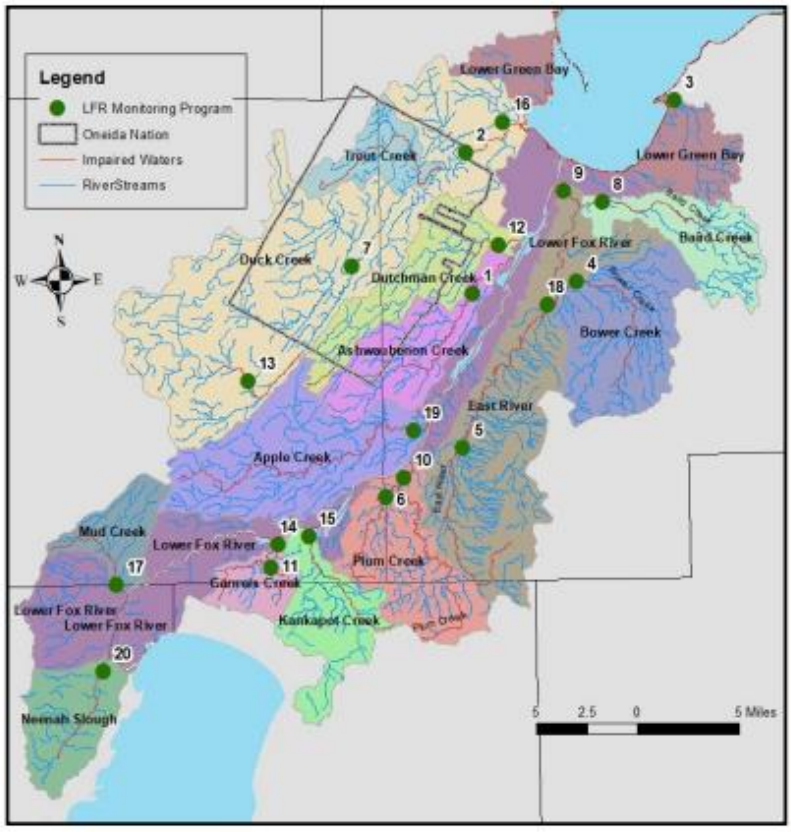
In 2012, the U.S Environmental Protection Agency (EPA) approved the Lower Fox River Total Maximum Daily Load (TMDL). The TMDL identifies the need for pollutant reductions in waterbodies throughout the basin to meet water quality standards. There are 27 stream segments in the Lower Fox basin listed as 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.

Lower Fox 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:

Katherine Rynish
Water Resource Management Specialist
Natural Resource Program Coordinator
Phone: (920) 296-5126
Email: Katherine.Rynish@wisconsin.gov

See backside for exact sample locations.

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

	Stream Name	WBIC	SWIMS ID	SWIMS Station Name	Latitude	Longitude	Impairment
1	Ashwaubenon Creek	122200	10016502	Ashwaubenon Creek at Grant Street	44.44508	-88.09875	TP and TSS
2	Lower Duck Creek	409700	10038644	Duck Creek at Pamperin Park	44.54773	-88.10285	TP and TSS
3	Wequiock Creek	3000022	10010769	Wequiock Creek at Nicolet Rd/CTH A	44.57651	-87.89083	
4	Bower Creek	118400	10009445	Bower Creek (1) 50m Upstream of CTH 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	West Plum Creek 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 Creek	118100	53683	Baird Creek at Preble WI	44.50741	-87.96754	TP and TSS
9	East River	118000	10043279	East River at Harold Lewis Trail off Main Street	44.51633	-88.00587	TP and TSS
10	Plum Creek	125100	10046999	Plum Creek at VandeHey Farm Crossing	44.31540	-88.17154	TP and TSS
11	Tributary to Garner's Creek	5022162	10047157	Trib. to Garner's Creek at CTH CE	44.25392	-88.30658	TP
12	Dutchman Creek	121600	10015851	Dutchman Creek at 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 Downstream of CTH Z	44.2701	-88.29816	TP and TSS
15	Kankapot Creek	126800	453261	Kankapot Creek at CTH Z Dodge St 100 Ft upstream of Bridge	44.27504	-88.26778	TP and TSS
16	Lancaster Creek	410000	10034510	Unnamed Trib. (410000) at Lakeview Dr	44.56583	-88.06471	
17	Mud Creek	129500	453258	Mud Creek at CTH BB	44.24417	-88.46037	TP and TSS
18	East River	118000	53675	East River at CTH G	44.43550	-88.02457	TP and TSS
19	Apple Creek	124100	53684	Apple Creek at 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.

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

Appendix N: 2024 WI DNR Press Release

DNR SEEKING VOLUNTEERS FOR STREAM MONITORING IN CENTRAL AND NORTHEASTERN WISCONSIN

Volunteers are needed to help sample streams and rivers in the Lower Fox, Upper Fox and Wolf River and Northeast Lakeshore basins.
Photo credit: Wisconsin DNR

MADISON, Wis. – The Wisconsin Department of Natural Resources (DNR) is seeking volunteers to help monitor streams and rivers in several river basins located in central and northeastern Wisconsin, specifically the Lower Fox, Upper Fox and Wolf River and Northeast Lakeshore basins. Sampling is essential for monitoring water quality improvements, assessing implementation activities and evaluating long-term land use changes.

There are multiple monitoring locations in each basin that need volunteers, and more than one volunteer can sample each site. Sampling occurs once a month from May through October, which is the prime algae growing season, making it easier to determine which streams are affected by

elevated nutrient and suspended sediment concentrations.

Monitoring locations are located at or near road crossings and are chosen for their ease of access. Volunteers should be comfortable wading into the water, but no previous water quality experience is needed. Volunteers will be trained on DNR protocol, and all equipment will be supplied except for boots/waders.

When sampling, each volunteer will need to fill three bottles with water from the stream and take up to two field measurements; the entire process takes about one hour each month. The samples then need to be packed on ice in the provided cooler and dropped off at the closest U.S. post office to be shipped to the State Laboratory of Hygiene in Madison for analysis.

The Lower Fox, Upper Fox and Wolf River and Northeast Lakeshore basins have total maximum daily loads, which identify a need for pollutant reductions to meet water quality standards and provide a framework to meet those standards. The volunteer programs help to fulfill monitoring goals.

Volunteers are crucial for these monitoring programs. The DNR would not be able to monitor as many waterbodies without volunteers' help. Water resources are important for many reasons, including recreation, habitat and health. This program is a great way for volunteers to learn about the water quality in their area and how they can become involved.

For more information about volunteering at these sites, contact Katherine Wendorf at Katherine.Wendorf@wisconsin.gov or 920-296-5126 or visit the DNR website:

- Lower Fox River Basin
- Upper Fox and Wolf River Basins
- Northeast Lakeshore Basin

Appendix O: Mason Jar Photos