2025 Livingston County Tributary Water Quality Monitoring Program: USDA Streams, Unassessed Waters, and Reference Streams

Daniel T. Beers[1], Grace Trebilcock[1], and Dr. Michael F. Chislock[1]

January 15th, 2026, Rev. 0

[1]Department of Environmental Science & Ecology, SUNY- Brockport, 350 New Campus Drive, Brockport, NY 14420

Signature

Laboratory Director and Quality Assurance Officer: Michael Chislock**,** mchislock@brockport.edu, 585-395-5961
SUNY-Brockport Limnology Laboratory, ELAP #12116
125 Lennon Hall, Monroe Avenue, Brockport, NY 14420-2997, Monroe County
350 New Campus Drive, Brockport, NY 14420

Project Sponsor: Heather Ferrero, Livingston County Planning Department, Government Center, 6 Court St. Rm 304 Geneseo, NY

QAPP ID: QAPP-WQM-0019_V25-1_FLLOWPA-LIVI

Effective: March 24, 2025; **Expires:** March 24, 2026

*This final report summarizes the results of data collected under QAPP-WQM-0019_V25-1_FLLOWPA-LIVI, which also describes the sampling plan and procedures. This report and summarized results pertain only to the samples collected and tested under the above QAPP. The QAPP, full dataset, and data usability and assessment report (DUAR) for 2025 Livingston County Tributary Water Quality Monitoring Program: USDA Streams, Unassessed Waters, and Reference Streams are also part of this final report.

Contents

1.0 Executive Summary and Recommendations

Summary

1.1 Sixteen tributaries of Conesus Lake were sampled five times for water quality from March to June 2025, including during one period of elevated runoff conditions (“storm event”). One field duplicate (“QC”) and one equipment blank (“EB”) were also collected each sampling trip.

1.2 Each water quality sampling event consisted of (1) *in situ* water chemistry measurements for water temperature, dissolved oxygen (DO), pH, specific conductivity (SPC), and turbidity; and (2) collecting water samples for laboratory analyses, including total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN), nitrate/nitrite (NO_x), and orthophosphate.

1.3 This report provides a synopsis of data collected during the project for each of the sites to assess water quality in each tributary and ultimately concentrations of nutrients and suspended sediments transported to Conesus Lake.

In Situ *Water Chemistry Data*

1.4 *In situ* water chemistry data varied across all sixteen tributaries as well as over time within a given tributary.

1.4.1 pH was consistent across sites and over time within a site, with most levels around 8. pH in the Inlet was slightly lower than the other monitored tributaries.

1.4.2 DO concentrations at the Inlet were lower than all other monitored sites. Lower DO is likely the result of flowing through upstream wetland habitat. As expected, DO concentrations also decreased at all sites over time as water temperatures increased.

1.4.3 South McMillan, the Inlet, and North McMillan tended to have lower SPC than the other tributaries. SPC was highest in Hanna’s Creek. SPC also tended to be highest in March/April for most tributaries and decreased over time. SPC was lowest during the elevated flow event in April. When compared to historical data, SPC for the Inlet, South McMillan, and North McMillan is now significantly higher, likely a consequence of anthropogenic influences (e.g., deicing salts).

1.4.4 In general, turbidity tended to be low during baseflow across most tributaries, with 5574E, Graywood, the Inlet, and Northend being exceptions. Turbidity was very high during the storm event, with levels several orders of magnitude higher in some cases. In particular, extremely high turbidities were observed in Long Point, 5574E, Cottonwood, Southwest Creek, and No Name Creek during the storm event. Turbid flows from several of the monitored tributaries resulted in prominent sediment plumes in nearshore areas of Conesus Lake.

Laboratory Analyses: Nutrients and Sediment Data

1.5 Nitrogen

1.5.1 Concentrations of total nitrogen (TN), which includes dissolved (e.g., nitrate + nitrite – NO_x and ammonia – NH_3) as well as particulate forms of N, were generally consistent from March to June for each tributary. TN was consistently higher for Graywood Gully, 6009W, No Name, and Long Point when compared to the other tributaries. Interestingly, storm event TN in Southwest Creek was elevated, relative to baseflow concentrations from March-June. Nitrogen pollution (e.g., ammonia) from the Southwest Creek subwatershed is likely important during high flow events, which was also supported by the observed “manure” scent documented during the 2025 storm event sampling. It should also be emphasized that the majority of monthly TN concentrations for eight of the tributaries were above the 1.88 mg/L guidance value of USEPA for the ecoregion.

1.5.2 Soluble nitrogen in the form of nitrate + nitrite (“NO_x”) patterns largely mirrored those for TN and were also above the 1.88 mg/L TN threshold for many of the tributaries. No obvious temporal patterns were found from March-June for each tributary. NO_x was highest during the storm event for the Southwest Creek subwatershed vs. baseflow conditions during the monitoring period. Elevated NO_x concentrations are often associated with inputs from agricultural and urban runoff, leaking septic systems, as well as atmospheric inputs in some cases. Agricultural runoff is the likely source of elevated dissolved and total nitrogen in this subwatershed.

1.6 Phosphorus

1.6.1 Concentrations of total phosphorus (TP) were significantly higher for all tributaries, except Sutton Point Gully, during the storm event vs. baseflow conditions from March-June 2025. Baseflow TP concentrations were highest in Southwest Creek and Graywood, with elevated concentrations also observed in Sutton Point and Sand Point.

1.6.2 Median TP concentrations for 4 tributaries (Cottonwood, Graywood, Sandpoint, Southwest) exceeded the 75 µg/L NYSDEC guidance value for protection of aquatic life in flowing waters. In general, average TP concentrations (including the storm event) for the monitoring period were high for numerous sites, with mean levels for 11 tributaries exceeding the 75 µg/L NYSDEC guidance value. Dissolved orthophosphate, a measure of bioavailable phosphorus, concentrations were also very high for several of the tributaries with levels approaching (e.g., for Cottonwood, No Name, Long Point, Sand Point) or exceeding (e.g., for Graywood, Southwest Creek) the 75 µg/L NYSDEC guidance value for TP. Biologically available forms of phosphorus are strongly associated with nearshore algal growth (e.g., metaphyton), macrophyte density, and can contribute to harmful algal blooms (HABs).

1.7 Total Suspended Solids (TSS)

1.7.1 Elevated TSS was observed during storm events for all sites. Excessive sediments during the storm event were observed to be a major issue for several of the tributaries, with prominent plumes in nearshore areas of Conesus Lake.

Recommendations

1.8 Water quality and quantity data are essential to watershed planning as well as for all stakeholders focused on maintaining, preserving, and improving these water resources. Installation of additional streamgages would provide better estimates on water quantity. These gages also provide an opportunity for collaboration and outreach among lake users. Wilkins Creek would be one logical location for another streamgage(s) and could also involve students in the Livonia school district as well as SUNY students. North McMillan is another important location for a future streamgage. These gages would better inform future water quality monitoring efforts.

1.9 SPC concentrations have increased by >20-25% across many previously monitored tributaries, including the 3 subwatersheds comprising over 50% of tributary inputs to the lake (i.e., the Inlet, North McMillan Creek, South McMillan Creek). Water chemistry monitoring for salts (e.g., chlorides; sodium) as well as calcium and alkalinity should be a future priority.

1.10 Biologically available phosphorus is a large proportion of total phosphorus during baseflow for many of the tributaries. Exploring methods to reduce this fraction are important for controlling nearshore nuisance algae and invasive species.

1.11 We recommend that a historical database be developed using past reports and publications across the watersheds. For cases where electronic and/or hard copies of data sheets are unavailable, we recommend that data be digitized and converted to Excel (or Access) format to facilitate use in future management decisions.

1.12 Increased year-round sampling of selected priority tributaries as well as other tributaries on a rotating basis is important. This includes sampling storm events more frequently as storm events have the potential to carry much greater concentrations and loads of nutrients into Conesus Lake than baseflow conditions. Heavy storm events are predicted to become more common in the future with climate change. BMP implementation and assessment of BMP effectiveness should also be considered in the context of storm event occurrence and climate change.

2.0 Introduction and Background

Protecting diminishing water resources is one of the most pressing global environmental issues and will become more challenging as climate change, species invasions, and eutrophication continue to degrade water quality and quantity (Smith and Schindler 2009). Rivers, streams, and lakes play a vital cultural and economic role, facilitating recreation, fishing, tourism, agriculture, manufacturing, and hydroelectric power. Globally, streams, rivers, and lakes are also among the world's most polluted ecosystems (Malmqvist and Rundle 2002). Stream water quality can be affected when watersheds are altered via changes in vegetation; sediment balance; and/or fertilizer use from industry, urban areas, or conversion of forests and grasslands to agriculture. Protection of stream water quality and remediation of beneficial use impairment requires a clear understanding of current environmental conditions as well as responses of these systems to management efforts. These efforts are particularly important in major watersheds to Conesus Lake due to the connection of these watersheds to the Great Lakes (e.g, Lake Ontario); the vital importance of sustainable agriculture to the region; and future development within the area.

Nutrient and sediment pollution can have a myriad of impacts on aquatic ecosystem health and function. Nutrient and sediment pollution can also affect human use of water resources including drinking water, recreation, and aesthetics. There is no national standard for total suspended solids (TSS) in streams; however, high TSS can have negative impacts on aquatic ecosystem health. TSS can affect water clarity and light attenuation in the water column, which can have direct impacts on submerged aquatic vegetation and phytoplankton production. TSS can also affect the types of organisms that can survive in the system. Fine soil particles can clog gills in aquatic invertebrates and affect fish inhabitance. TSS includes inorganic soil particulates as well as organic particles including algae, leaves, and decomposing matter. TSS can be impacted by runoff, erosion, pollution, and disruptions of bottom sediment.

Phosphorus is a critical nutrient required for life and is often a limiting nutrient in aquatic ecosystems. Total phosphorus (TP) is the total of all dissolved and particulate forms of phosphorus. Excessive phosphorus can occur from poor agricultural practices, urban runoff, sewage treatment plant discharges, and from leaking septic systems (USEPA 2021). Excessive phosphorus in aquatic ecosystems can cause increased algal and plant growth and can lead to decreased dissolved oxygen and eutrophication. Algal blooms caused by excessive nutrient inputs (both phosphorus and nitrogen) can produce toxins in water which are often harmful to aquatic and human health (USEPA 2021). There is no national standard set by the EPA; however, in NYS, total phosphorus guidelines for most lakes and reservoirs is 20 µg/L (NYSDEC N.D.). Draft water quality guidance values to regulate phosphorus in New York State surface waters (https://dec.ny.gov/news/press-releases/2024/12/dec-seeks-public-comment-on-proposed-ambient-water-quality-guidance-values-for-phosphorus) now list 25, 30, and 75 µg/L as potential guidance values for lotic systems, depending on watershed and region of the state.

Nitrogen (dissolved and total) pollution is often caused by livestock manure runoff, human sewage, fertilizers, and can also occur from the erosion of natural deposits. The USEPA (2022) states the maximum contaminant level for nitrate is 10 mg/L in drinking water sources. If these levels are exceeded in drinking water resources, potential health effects, including blue baby syndrome (methemoglobinemia, a temporary blood disorder) in infants of less than six months old can occur (USEPA 2022).

3.0 Methods

Sixteen tributaries to Conesus Lake (Table 1) were sampled monthly from March-June 2025, as well as during one period of elevated runoff conditions ("storm event"), for a total of five sampling dates. Each water quality sampling event consisted of (1) *in situ* water chemistry measurements using a calibrated YSI ProDSS multiparameter sonde for water temperature (°C), dissolved oxygen (mg/L), pH, specific conductivity (SPC, µS/cm), and turbidity (NTUs) and (2) collecting water samples for laboratory analyses, including total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN), nitrate + nitrite (NO_x), and orthophosphate (Table 2). One field duplicate ("QC") and one equipment blank ("EB") were also collected each sampling trip.

Water chemistry samples were collected from flowing water using a grab sampler and bucket that was rinsed with deionized water and respective stream water at each site prior to sample collection. Water was not collected from sites that contained stagnant water or were dry. Samples were appropriately processed and placed into pre-cleaned and labeled bottles according to standard methods and stored on ice while in the field (Table 2). Orthophosphate and nitrate/nitrite samples were immediately filtered on site with 0.45-µm syringe filters. One field duplicate and an equipment blank were collected during each sampling event for all analytes. All water chemistry samples were analyzed by the SUNY-Brockport Limnology Laboratory (ELAP ID #12116) within standard hold times.

SPC data for 2025 (and for 2024) were compared to historical data for previously studied tributaries (Makarewicz and Forest 1986) to assess potential trends. Concentration data from each site are presented monthly and for the storm event. In addition, data from each tributary are presented on box plots to represent the spread and the median of the data (Supplementary Figures) to compare 2023-2025 data. Concentration data were compared using ANOVA and Tukey's post-hoc tests to determine if significant differences existed between the sites for selected *in situ* parameters and lab analytes. Prior to statistical analysis, data were log-transformed as necessary to meet assumptions of statistical tests. All statistical analyses were conducted using IBM SPSS Statistics (Version 31). A summary of data and observations is provided below as well as in Supplementary Figures at the end of the report.

4.0 Results and Discussion

4.1 In Situ *Water Chemistry Data*

In situ water chemistry varied across the 16 monitored Conesus Lake tributaries as well as over time within each tributary. pH was an exception as values were similar across most tributaries and were consistent across the sampling period (Figure 1). Dissolved oxygen concentrations at the Inlet were lower than all other monitored sites (Figure 2). The Inlet is the largest tributary and flows through wetland habitat. Lower dissolved oxygen is likely indicative of this wetland influence. SPC was consistently highest at Hanna's Creek and lowest at South McMillan, and the Inlet (ANOVA: $F_{15,62} = 8.22$; $P < 0.001$). SPC tended to be highest in March and April for most tributaries and decreased in the later months. SPC was lowest for all tributaries during the storm event in April (ANOVA: $F_{4,73} = 6.25$; $P < 0.001$) (Figure 3). When compared to historical data (Makarewicz and Forest 1986), SPC for the Inlet, South McMillan, and North McMillan is now significantly higher, a likely consequence of anthropogenic influences (i.e, runoff and application of deicing salts). This pattern is similar for other previously monitored tributaries (ANOVA: $F_{2,130} = 3.98$; $P = 0.021$) (Supplementary Figure S1). In general, turbidity tended to be low during baseflow across most tributary sites, with 5574E, Graywood, the Inlet, and Northend being exceptions. Turbidity was extremely high during the storm event, with levels several orders of magnitude higher than baseflow for some tributaries (ANOVA: $F_{4,73} = 31.24$; $P < 0.001$). In particular, extremely high turbidities were observed in Long Point, 5574E, Cottonwood, Southwest Creek, and No Name Creek during the storm event (Figure 4). Turbid flows from several of the tributaries resulted in prominent sediment plumes in nearshore areas of Conesus Lake during storm events.

4.2 *Laboratory Analyses: Nutrients and Sediment Data*

It is important to emphasize that nutrient and sediment concentrations vary spatially and temporally, especially in flowing bodies of water. There is no single national or New York State standard for nitrogen, phosphorus, or sediments, and it is difficult to identify thresholds for impairment. However, New York State has recently suggested 75 µg/L as an ambient water quality value for total phosphorus for protection of aquatic life in flowing waters in our ecoregion (i.e., nutrient ecoregion VII) (USEPA 2000) (https://dec.ny.gov/environmental-protection/water/water-quality/standards-classifications/nutrient-guidance-values). Furthermore, USEPA (USEPA 2000) provides a range of 0.46-1.88 mg/L as a guidance value for reference conditions for total nitrogen for our ecoregion. These values will be used as benchmarks for the interpretation of the results of this study.

4.3 Nitrogen

4.3.1 Concentrations of total nitrogen (TN), which includes dissolved (e.g., nitrate + nitrite – NO_x and ammonia – NH_3) as well as particulate forms of N, were generally consistent from April to June for each tributary. TN was consistently higher for Graywood Gully as well as for 6009W, No Name, and Long Point Gully when compared to the other tributaries (ANOVA: $F_{15,62} = 41.54$; $P < 0.001$). Interestingly, storm event TN in Southwest Creek was elevated, relative to baseflow concentrations from March-June (Figure 5). Nitrogen pollution (e.g., ammonia) from the Southwest Creek subwatershed is likely important during high flow events, which was also supported by the observed "manure" scent documented during 2025 storm event sampling. It should also be emphasized that the majority of monthly TN concentrations for 8 of the tributaries exceeded the 1.88 mg/L guidance value of USEPA for the ecoregion.

4.3.2 Soluble nitrogen in the form of nitrate + nitrite ("NO_x") patterns largely mirrored those for TN (ANOVA: $F_{15,62} = 11.72$; $P < 0.001$) and were also above the 1.88 mg/L TN threshold for many of the tributaries. No obvious temporal patterns were found from April-June for each tributary, with the exception of Southwest Creek. NO_x was also higher during the storm event for the Southwest Creek subwatershed (Figure 6). Elevated NO_x concentrations are often associated with inputs from agricultural and urban runoff, leaking septic systems, as well as atmospheric inputs in some cases. Agricultural runoff is the likely source of elevated dissolved and total nitrogen in this particular subwatershed. As inorganic N (i.e., NH_3 and NO_x) is bioavailable, elevated levels can lead to excess growth of aquatic plants and algae within the stream as well increased risks of filamentous algal growth (e.g., *Cladophora*) and cyanobacteria (e.g., harmful algal blooms) in lakes.

4.4 Phosphorus

4.4.1 Concentrations of total phosphorus (TP) were significantly higher for all tributaries, except Sutton Point Gully, during the storm event vs. baseflow conditions from March-June in 2025 (ANOVA: $F_{4,73} = 21.33$; $P < 0.001$. Baseflow TP concentrations were highest in Southwest Creek and Graywood Gully, with elevated concentrations also observed in Sutton Point and Sand Point Gullies (Figure 7).

4.4.2 Median TP concentrations for 4 tributaries (Cottonwood, Graywood, Sandpoint, Southwest) in 2025 exceeded the 75 µg/L NYSDEC guidance value for protection of aquatic life in flowing waters (Figure 7; Supplementary Figures). In general, average TP concentrations (including the storm event) for the monitoring period were high for numerous sites, with mean levels for 11 tributaries exceeding the 75 µg/L NYSDEC guidance value.

4.4.3 Dissolved orthophosphate, a measure of bioavailable phosphorus, concentrations were also very high for several of the tributaries with levels approaching (e.g., for Cottonwood, No Name, Long Point, Sand Point) or exceeding (e.g., for Graywood, Southwest Creek) the 75 µg/L NYSDEC guidance value for TP (ANOVA: $F_{15,62} = 6.54$; $P < 0.001$) (Figure 8). Biologically available forms of phosphorus are strongly associated with nearshore algal growth (e.g., metaphyton) as well as macrophyte beds and can also contribute to harmful algal blooms (HABs).

4.5 Total Suspended Solids (TSS)

4.5.1 Elevated TSS was observed during storm events for all sites (ANOVA: $F_{4,73} = 17.17$; $P < 0.001$) (Figure 9). Excessive sediments during the storm event were observed to be a major issue for several of the tributaries, with prominent plumes in nearshore areas of Conesus Lake.

4.6 Discussion

It should be emphasized that late winter/early spring high flow events (e.g., snow melt) were not captured during 2025 sampling. Furthermore, one storm event is not necessarily representative of all storm events throughout the year as well as other storm events within a given season of the year. One challenge of characterizing conditions at the sites is that many of the tributaries are smaller and very reactive (relative to the Inlet, North McMillan, and South McMillan). As a result, it is difficult to capture high flow conditions across all sampling sites in a single day. Installation of additional streamgages and/or precipitation gages would ensure that peak flows are captured during storm event sampling. Furthermore, autosamplers could also be used to capture water samples during peak flow conditions for sites where equipment could be secured and protected.

In general, orthophosphate, total phosphorus (TP), turbidity, and total suspended solids (TSS) were higher for all the monitored sites during events vs. non-event conditions. As increased stormwater runoff and concomitant erosion is a leading cause of nonpoint particulate phosphorus and sediment pollution, most P losses from watersheds (particularly agricultural watersheds) occur during storm events. In particular, total phosphorus and sediment inputs during a few storm events (especially during spring in agricultural watersheds) may represent a large proportion of annual phosphorus export from watersheds (Ross et al. 2022). Conservation tillage techniques, when effectively implemented, have been demonstrated to be effective in reducing soil erosion, total suspended solid loads, and export of particulate phosphorus from agricultural watersheds (Kelly et al. 2019). It is likely that the results observed here for several of the sites are influenced by conservation practices that have been implemented in the previous decade.

While phosphorus and sediment loading are often a focus of programs aimed at reducing eutrophication and preserving water quality, loading of inorganic and particulate forms of nitrogen are also of concern. In general, total nitrogen (TN) concentrations were comparable for event- and non-event conditions across streams. Therefore, in conjunction with the effects of events on total phosphorus highlighted above, storm events across watersheds can be characterized by relatively low N:P supply ratios, compared to baseflow conditions. This is important as low N:P ratios play an important role in structuring lake algal communities, as low N:P often leads to greater dominance of cyanobacteria due to the ability of some taxa to fix atmospheric nitrogen. Consequently, reduced N:P supply may play a role in facilitating harmful algal blooms and subsequent beneficial use impairments. Collection of additional samples for dissolved inorganic nitrogen (i.e., ammonia) during the winter/spring runoff period would be informative.

Conservation tillage (e.g., reduced- and no-till) is one of the most commonly utilized management approaches in agricultural watersheds. Interestingly, while conservation tillage is very effective in reducing soil erosion and associated concentrations of total phosphorus and total suspended solids, tillage has also been shown to increase the accumulation of soluble forms of nutrients (especially phosphorus – e.g., orthophosphate) (Kelly et al. 2019). Storm event concentrations of orthophosphate were higher in 2025 for only Graywood Gully. This indicates that particulate forms of P are likely the predominant form of P transported to Conesus Lake during storm events for most monitored tributaries. However, it is important to emphasize that tile drains also have important effects on particulate vs. bioavailable P dynamics (Vidon and Cuadra 2011). Future study of seasonal changes in particulate vs. soluble forms of nutrients (both N & P) in relation to storm events and tile drains would be informative.

5.0 Priorities and Recommendations for Future Projects

5.1 Installation and assessment of additional streamgages.

This should be a high priority in conjunction with SUNY, the Conesus Lake Association, and other stakeholders such as local schools.

5.2 Assessment of salts (e.g., sodium and chloride) as well as calcium and alkalinity in subwatersheds.

This should be a high priority for the monitoring program given observed trends in SPC for tributaries, implications for human health, and importance for lake properties (e.g., stratification; hypoxic/anoxia; internal nutrient loading; whitings and picocyanobacterial blooms; etc).

5.3 Seasonal changes in particulate vs. soluble forms of nitrogen (N) and phosphorus (P) in relation to storm events and land use (e.g., tile drains).

This should be a high priority for the monitoring program given observed trends in SPC for tributaries, implications for human health, and importance for lake properties (e.g., stratification; hypoxic/anoxia; internal nutrient loading; whitings and picocyanobacterial blooms; etc).

5.4 Consequences of external nutrient loading for nearshore processes (e.g., macrophyte and metaphyton dynamics) and potential effects of Eurasian rudd.

Nearshore macrophytes and metaphyton provide an important buffer for the effects of external nutrients and sediments on Conesus Lake. Factors that potentially influence this buffer (e.g., turbidity; whitings; rudd; nutrients) have important larger consequences for the lake ecosystem.

5.5 Creation of a well-organized, accessible, historical database using past reports, publications, etc. for tributaries to the lake.

For cases where electronic and/or hard copies of data sheets are unavailable, we recommend that data be digitized and converted to Excel (or Access) format to facilitate use in future management decisions.

6.0 Acknowledgements

Data collection was funded by FLLOWPA/NYSDEC via the Livingston County Planning Department. Brayden Link, Mia Lamanna, Juliana Smith, Jolie Acton, Jillian Ray, Billy Kedley, and Lola Scott assisted with field measurements and sample collection.

7.0 References

7.1 Lodge, D.M. 2010. It's the water, stupid! BioScience 60:6-7.

7.2 Kelly, P.T., W.H. Renwick, L. Knoll, and M.J. Vanni. 2019. Stream nitrogen and phosphorus loads are differentially affected by storm events and the difference may be exacerbated by conservation tillage. Environmental Science and Technology 53:5613-5621.

7.3 Makarewicz, J.C., and H. Forest. 1986. Water quality of Conesus Lake, 1985-1986. The College at Brockport: State University of New York Digital Commons @Brockport.

7.4 Malmqvist, B., and S. Rundle. 2002. Threats to running water ecosystems of the world. Environmental Conservation 29:134-153.

7.5 NYSDEC. N.D. Nutrient Criteria. Available at: https://www.dec.ny.gov/chemical/77704.html

7.6 Ross, C.A., L. I. Moslenko, K.M. Biagi, C.J. Oswald, C.C. Wellen, J.L. Thomas, M. Raby, and R.J. Sorichetti. 2022. Total and dissolved phosphorus losses from agricultural headwater streams during extreme runoff events. Science of the Total Environment 848:157736.

7.7 Smith, V.H., and D.W. Schindler. 2009. Eutrophication science: where do we go from here? Trends in Ecology & Evolution 24:201-207.

7.8 USEPA. 2000. Ambient water quality criteria recommendations. Information supporting the development of state and tribal nutrient criteria for rivers and streams in nutrient ecoregion VII. EPA 822-B-00-018.

7.9 USEPA. 2021. Indicators: Phosphorus. Available at: https://www.epa.gov/national-aquatic-resource-surveys/indicators-phosphorus July 17, 2021.

7.10 USEPA. 2022. National primary drinking water standards. Available at https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations. January 26, 2022.

7.11 Vidon, P., and P.E., Cuadra. 2011. Phosphorus dynamics in tile-drain flow during storms in the US Midwest. Agricultural Water Management 98:532-540.

8.0 Tables

Table 1. Proposed Sampling Locations, Justifications, and Data Collection

Site Code	Sampling Location	GPS Coordinates		Sample Justification	Field Measurements[1]	Water Chemistry[2]
		North	West			
COTT	Cottonwood Gully	42.757887	-77.727248	USDA stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
EAGL	Eagle Point Gully	42.798258	-77.719621	Unassessed stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
GRAY	Graywood Gully	42.810421	-77.716416	USDA stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
INLT	Conesus Lake Inlet	42.715397	-77.712280	Reference stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
DENS	Densmore Gully	42.792362	-77.707392	Unassessed stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx,

						total suspended sediments
HANN	Hanna's Creek	42.833364	-77.707621	Agricultural non-BMP	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
LONG	Long Point Gully	42.780157	-77.722837	USDA stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
NEND	North End Creek	42.833584	-77.696457	Unassessed stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
NMDN	Downstream-North McMillan	42.725611	-77.707056	Remediated site for Erosion Control and Streambank Remediation Study; historical reference stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
NNAM	No Name Creek	42.748912	-77.727358	Agricultural non-BMP	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
SAND	Sand Point Gully	42.786988	-77.722795	USDA stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx,

						total suspended sediments
SMCM	South McMillan	42.719152	-77.705499	Reference stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
SUTT	Sutton Point Gully	42.741986	-77.727513	USDA stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
SWCK	Southwest Creek	42.73532	-77.72480	USDA stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
5574E	Unnamed tributary at 5574 E Lake	42.750459	-77.712519	Unassessed stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments
6009W	Unnamed tributary at 6009 W Lake	42.727483	-77.720087	Unassessed stream	Multiprobe	Total phosphorus, total nitrogen, orthophosphate, NOx, total suspended sediments

[1]Water temperature (°C), specific conductivity (µS/cm), pH, dissolved oxygen (LDO - %, mg/L). [2]Total phosphorus (µg/L), orthophosphate (µg/L), nitrate + nitrite (mg/L), total nitrogen (mg/L), and total suspended solids (TSS) (mg/L).

Table 2a: Lab parameters, analytical specifications, QA/QC requirements, and laboratories processing samples.

Lab Measurements Analyte	Method	Minimum Volume/ Container	Preservative	QC Sample	Frequency	QC Acceptance Limits	Corrective Action	Holding Time	Method Detection Limit	Report Limit
Ammonia	SM 4500-NH3 H	125 ml plastic	filter 0.45µm, H2SO4 to pH<2, cool 4°C	Method Blank	10%	< 0.002 mg/L	Reanalyze or Qualify data	28 days	0.002 mg/l	0.010 mg/l
				ICC/LCS	10%	% Recovery between 90% to 110%	Reanalyze or Qualify data			
				Lab Duplicate	10%	RPD within ± 10%	Reanalyze or Qualify data			
				Matrix spike duplicate set	10%	% Recovery between 90% to 110% RPD within ± 10%	Qualify data Reanalyze or Qualify data			
Nitrate + Nitrite	EPA 353.2, Rev. 2.0 (1993)	125 ml plastic	filter 0.45µm, cool 4°C	Method Blank	10%	< 0.003 mg/L	Reanalyze or Qualify data	2 days	0.003 mg/l	0.010 mg/l
				ICC/LCS	10%	% Recovery between 90% to 110%	Reanalyze or Qualify data			
				Lab Duplicate	10%	RPD within ± 10%	Reanalyze or Qualify data			
				Matrix spike duplicate set	10%	Between 90% to 110%	Qualify data Reanalyze or Qualify data			
Orthophosphate	SM 4500-P G-2011	125 ml plastic	filter 0.45µm, cool 4°C	Method Blank	10%	< 0.0006 mg P/L	Reanalyze or Qualify data	2 days	0.0006 mg/l	0.001 mg/l
				ICC/LCS	10%	% Recovery between 90% to 110%	Reanalyze or Qualify data			
				Lab Duplicate	10%	RPD within ± 10%	Reanalyze or Qualify data			
				Matrix spike duplicate set	10%	Between 90% to 110%	Qualify data Reanalyze or Qualify data			
Total phosphorus	SM 4500-P H-2011	125 ml plastic	H2SO4 to pH<2, cool 4°C	Method Blank	10%	< 0.002 mg P/L	Reanalyze or Qualify data	28 days	0.002 mg/l	0.003 mg/l
				ICC/LCS	10%	% Recovery between 90% to 110%	Reanalyze or Qualify data			
				Lab Duplicate	10%	RPD within ± 10%	Reanalyze or Qualify data			
				Matrix spike duplicate set	10%	Between 90% to 110%	Qualify data Reanalyze or Qualify data			
Total suspended solids	SM 2540 D-2011	1000 ml plastic	Cool 4°C	Method Blank	10%	< 0.4 mg/L	Reanalyze or Qualify data	7 days	*0.3 mg/L *For 1000 mL sample	*0.3 mg/L *For 1000 mL sample
				ICC/LCS	10%	% Recovery between 90% to 110%	Reanalyze or Qualify data			
				Lab Duplicate	10%	RPD within ± 10%, ±50% for values < 5 mg/L	Reanalyze or Qualify data			
				Matrix spike duplicate set	NA	NA	NA			

Table 2b: Field parameters, analytical specifications, QA/QC requirements, and laboratories processing samples.

Field Measurements **Parameter**	**Method**	**Calibration/ Verification**	**Precision**	**Range**
Temperature	YSI, *in situ*	Factory set annual check with NIST-reference thermometer	±0.20 C	-5 to 70℃
Luminescent Dissolved oxygen	YSI, *in situ*	Daily	±0.1 mg/L or 1%	0 to 50 mg/L
pH	YSI, *in situ*	Daily	±0.2	0 to 14
Conductivity	YSI, *in situ*	Daily	±0.001 mS/cm or 0.5%	0 to 200 mS/cm
Turbidity	YSI, *in situ*	Daily	±0.3 FNU or 2%	0-4000 FNU

9.0 Figures:

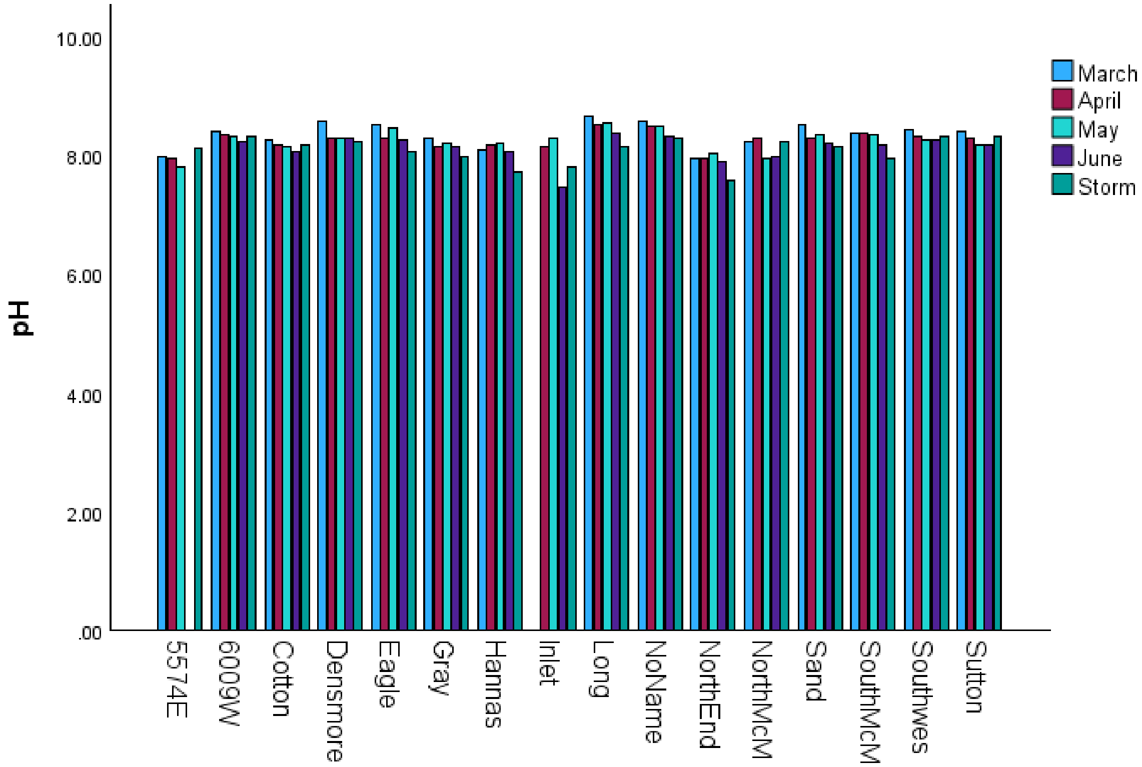

Figure 1. 2025 monthly and storm event pH for the sixteen monitored Conesus Lake tributaries.

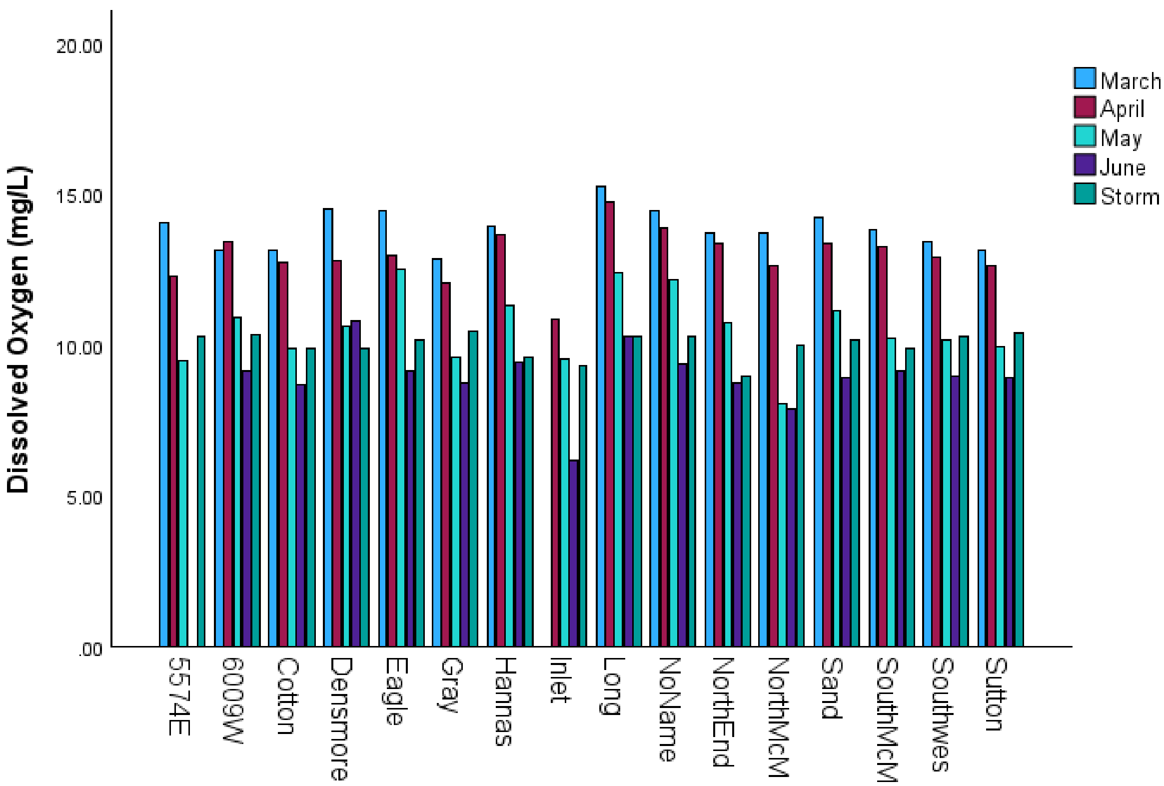

Figure 2. 2025 monthly and storm event dissolved oxygen (DO) concentrations for the sixteen monitored Conesus Lake tributaries.

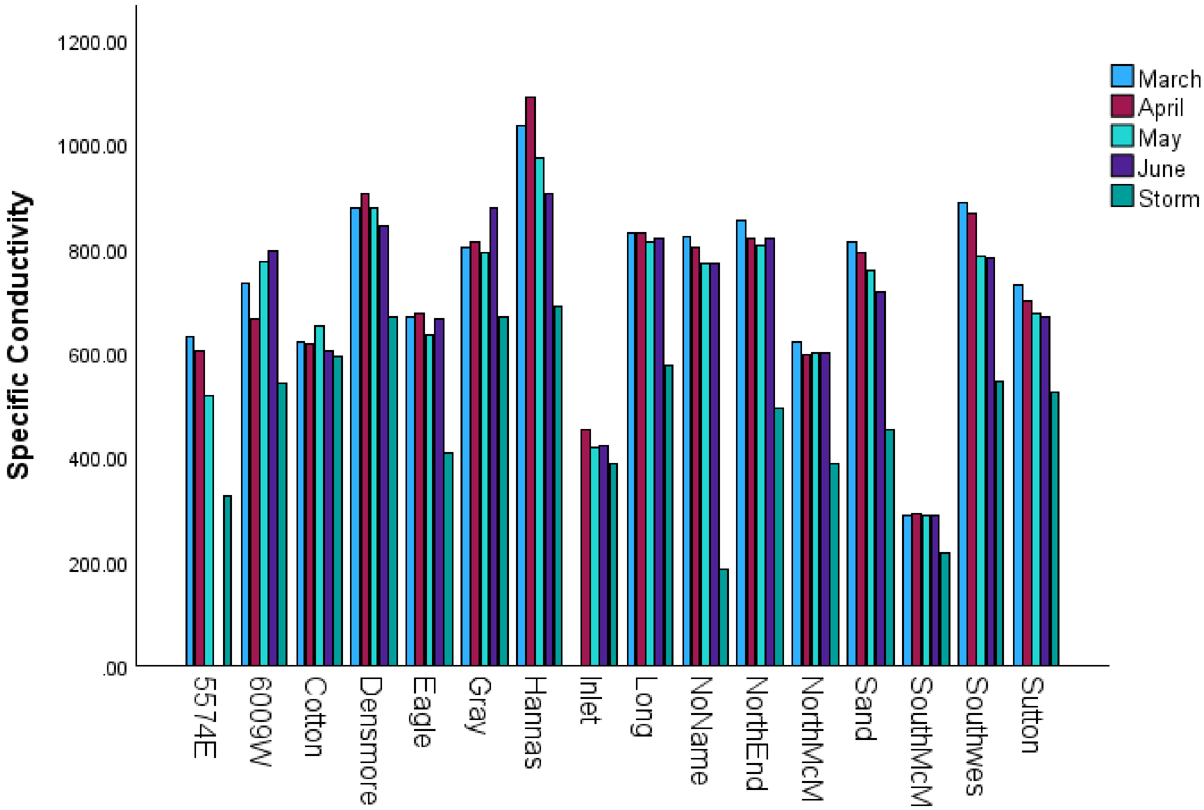

Figure 3. 2025 monthly and storm event specific conductivity (SPC) for the sixteen monitored Conesus Lake tributaries.

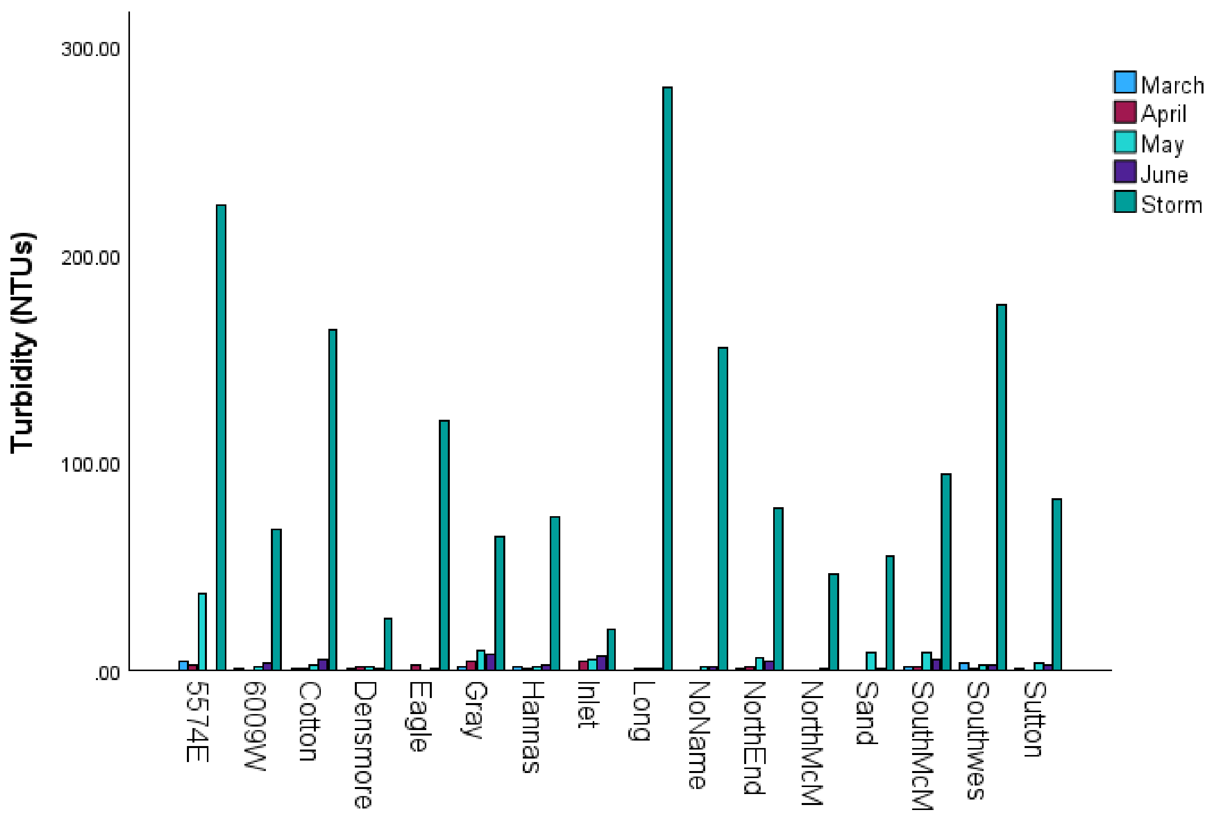

Figure 4. 2025 monthly and storm event turbidity for the sixteen monitored Conesus Lake tributaries.

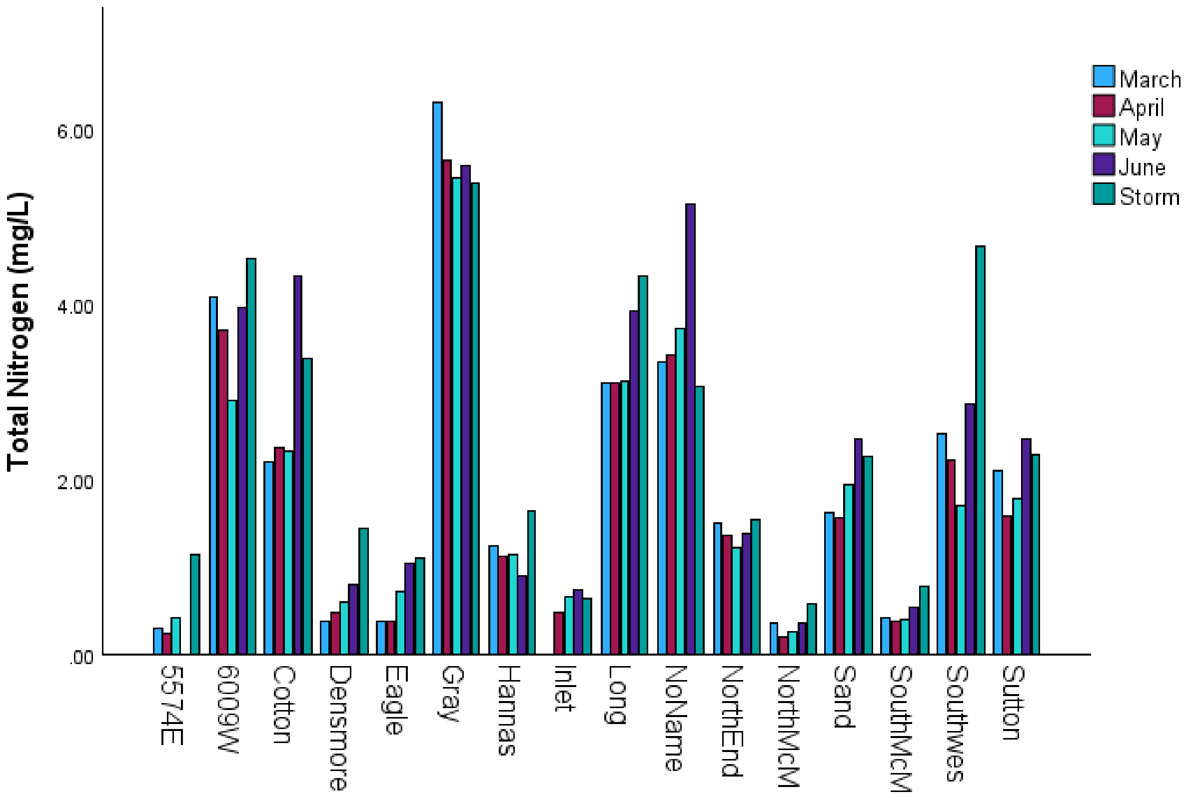

Figure 5. 2025 monthly and storm event total nitrogen (TN) concentration for the sixteen monitored Conesus Lake tributaries.

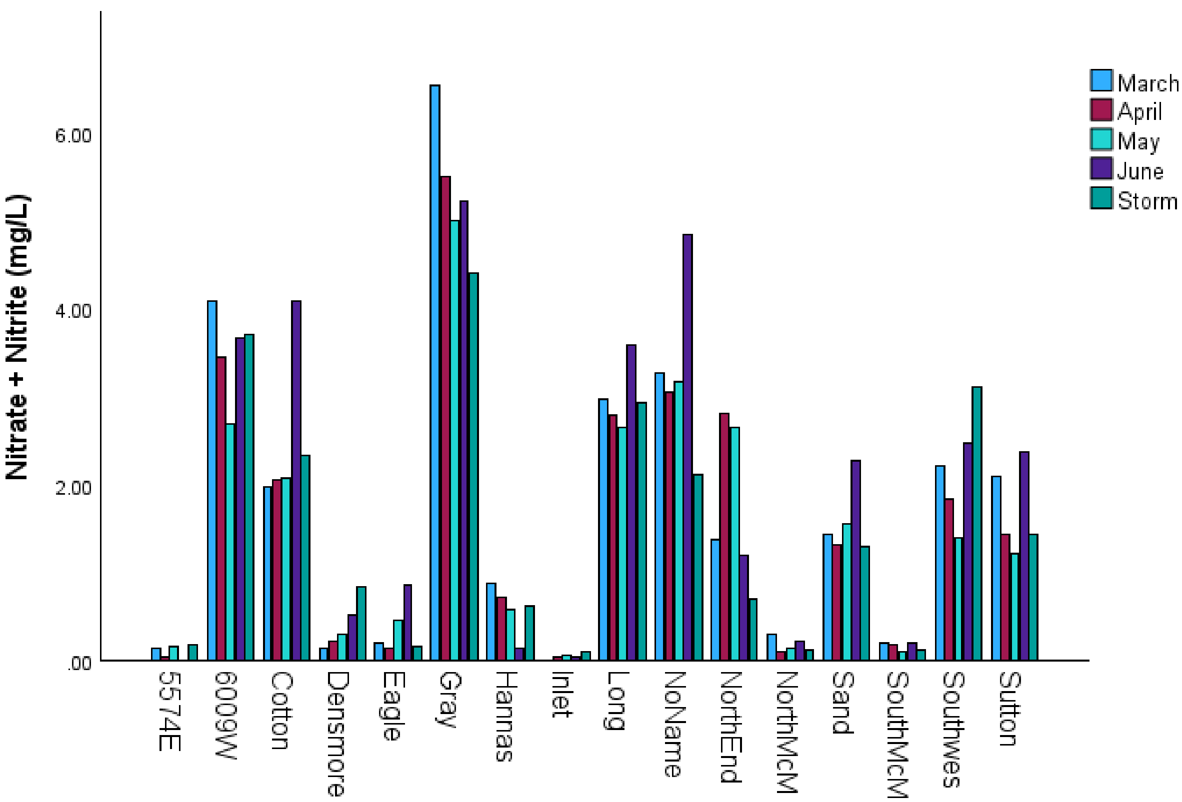

Figure 6. 2025 monthly and storm event nitrate + nitrite (NO_x) concentration for the sixteen monitored Conesus Lake tributaries.

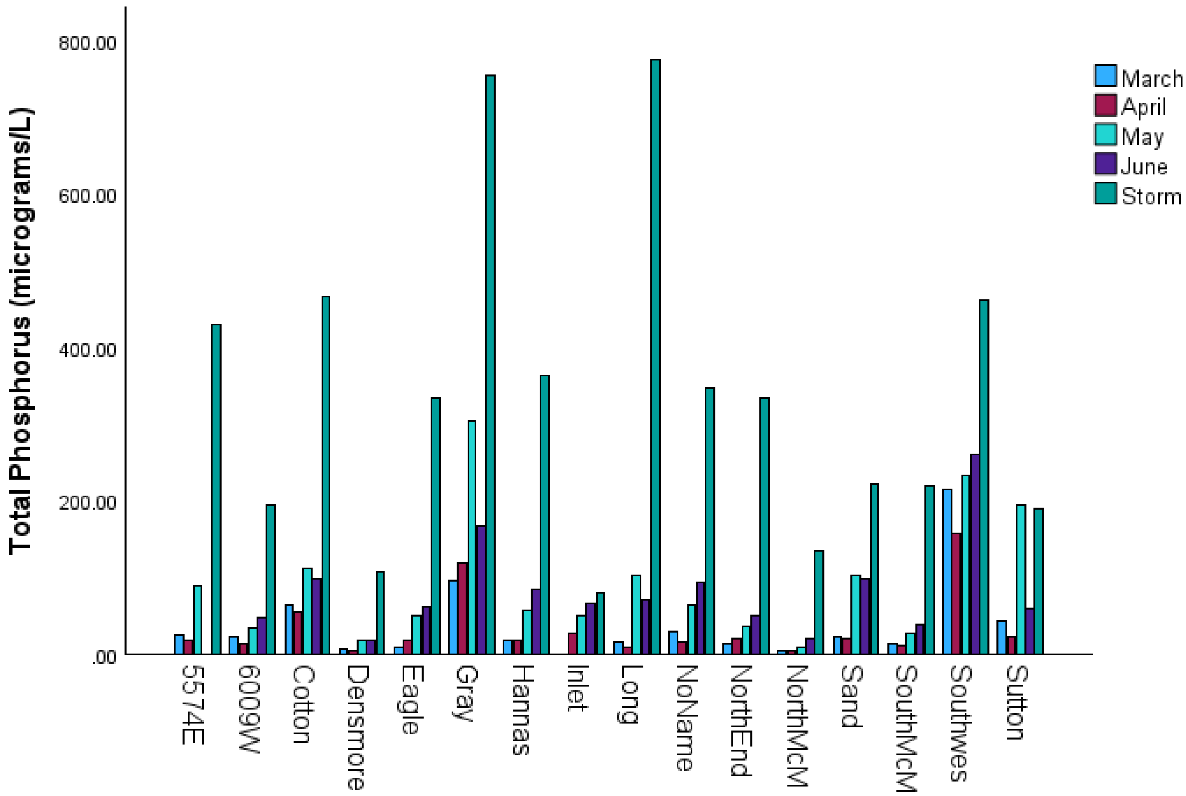

Figure 7. 2025 monthly and storm event total phosphorus (TP) concentration for the sixteen monitored Conesus Lake tributaries.

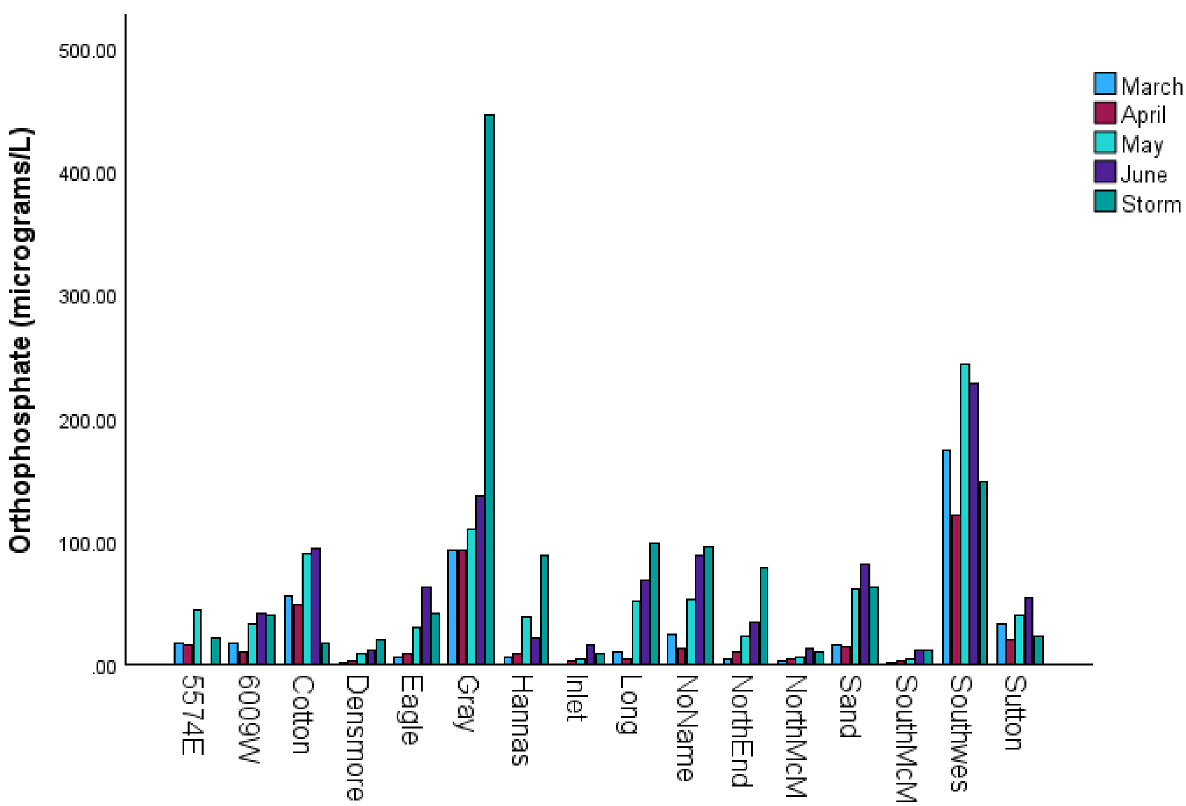

Figure 8. 2025 monthly and storm event orthophosphate concentration for the sixteen monitored Conesus Lake tributaries.

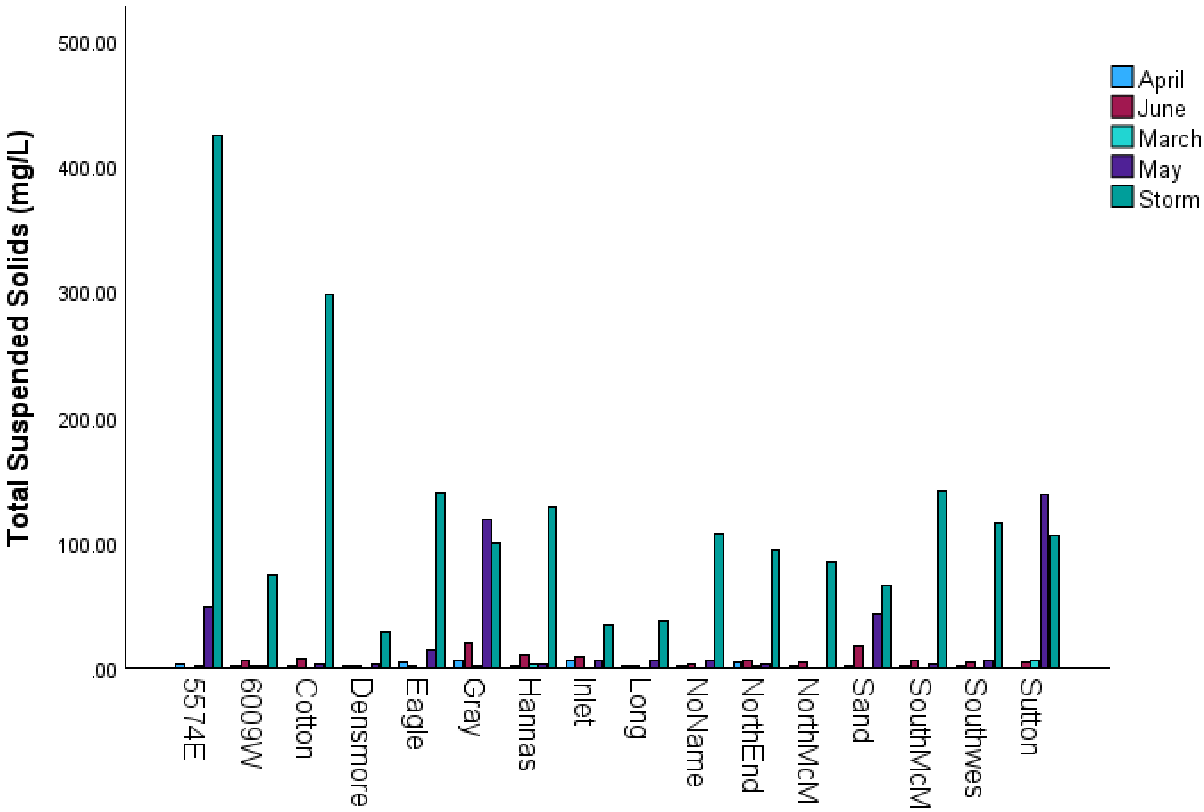

Figure 9. 2025 monthly and storm event total suspended solids (TSS) concentration for the sixteen monitored Conesus Lake tributaries.

10.0 Supplementary Figures:

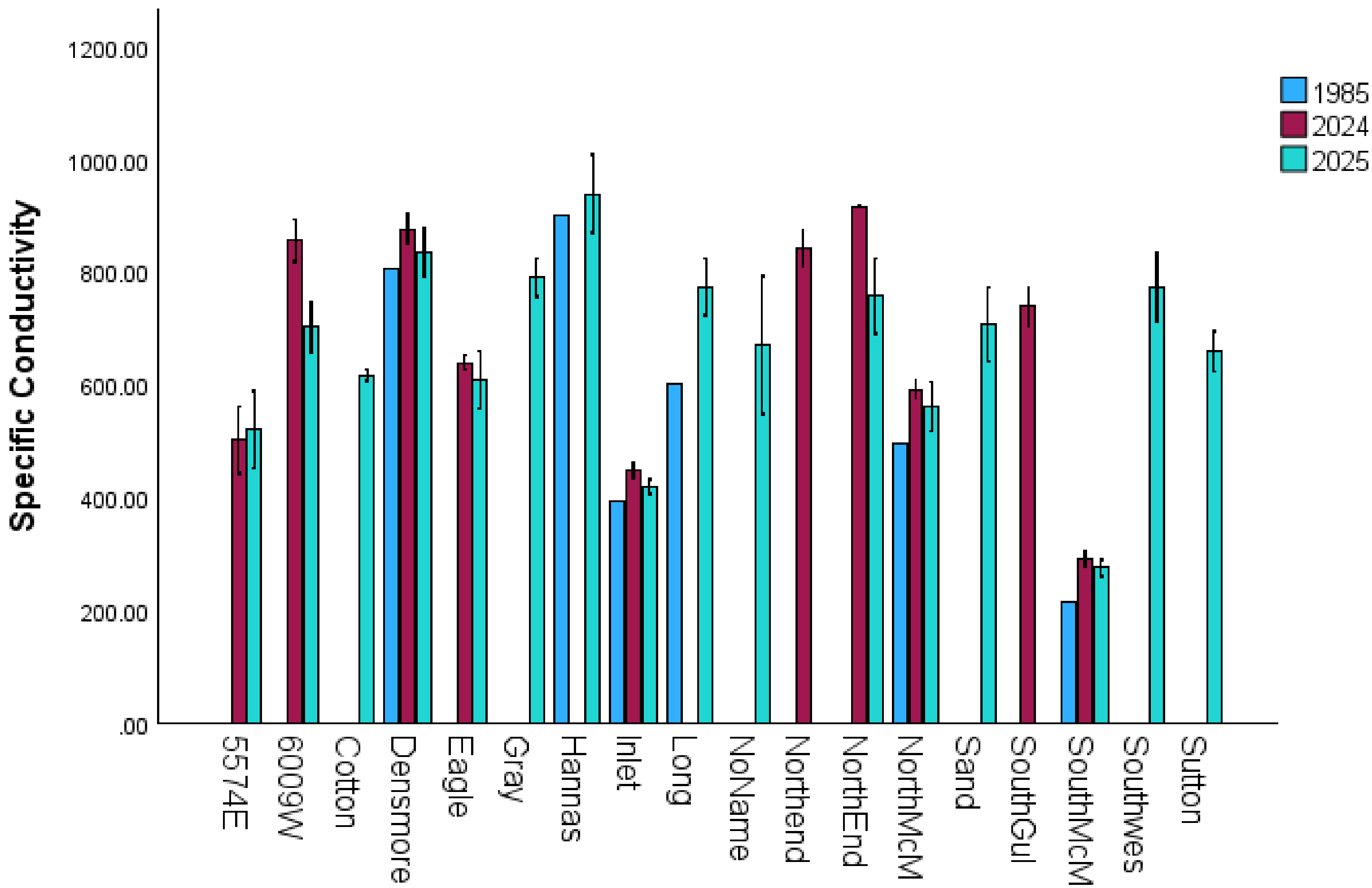

Figure S1. Comparison of specific conductivity (SPC) for the sixteen monitored Conesus Lake tributaries to historical data (Makarewicz and Forest 1986). 2024 and 2025 data represent means +/- 1 standard error. Tributaries were sampled from March-June in 2025, March-November in 2024, and monthly from April 1985 to December 1986 for "1985" data. Only a subset of the sixteen tributaries was sampled in 1985-1986.

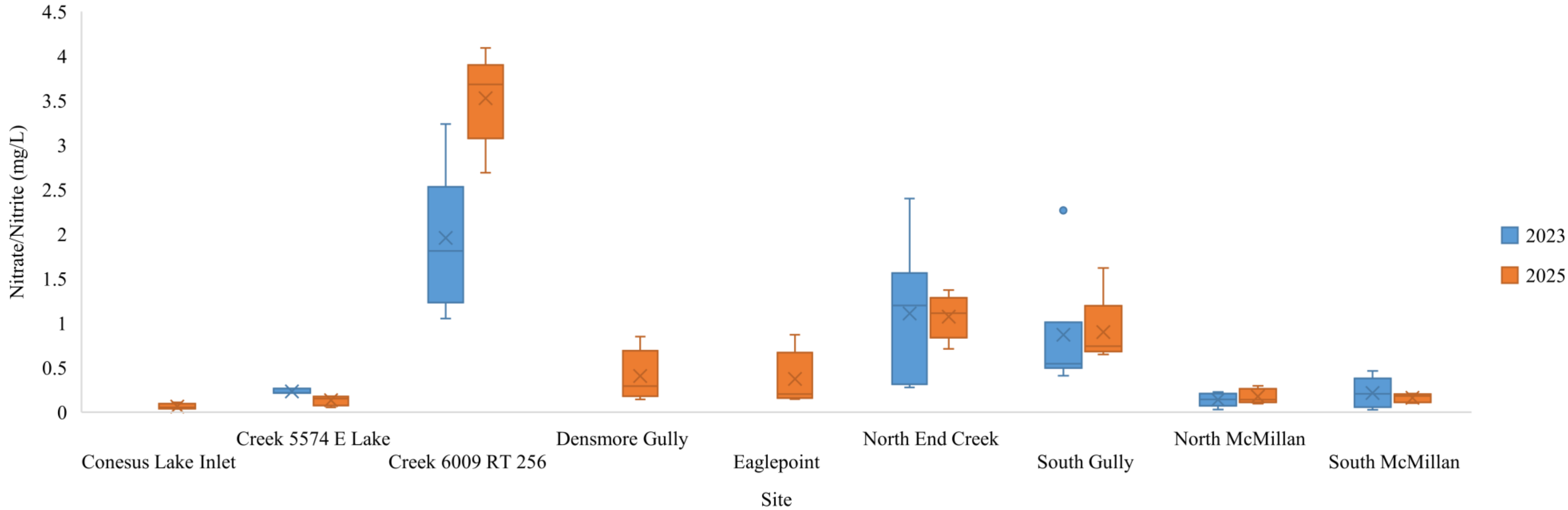

Figure S2. Box pots comparing nitrate + nitrite data across the unassessed and reference streams in 2023 and 2025.

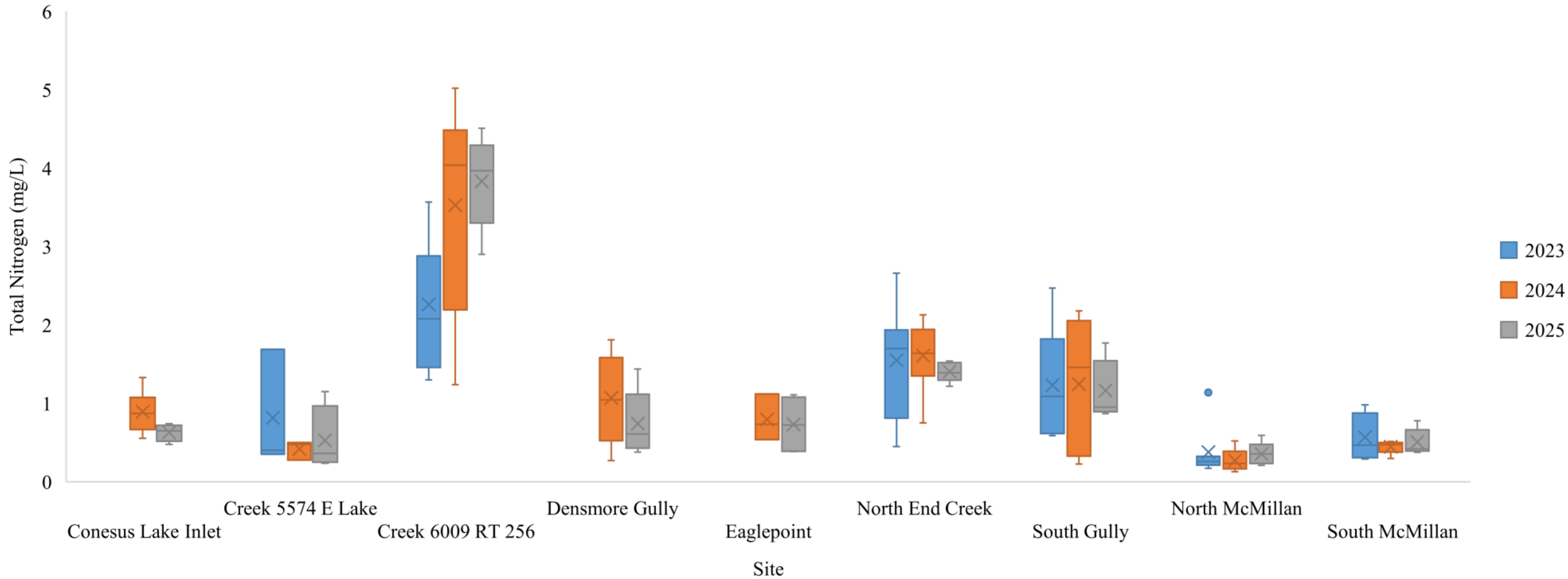

Figure S3. Box pots comparing total nitrogen (TN) data across the unassessed and reference streams in 2023-2025.

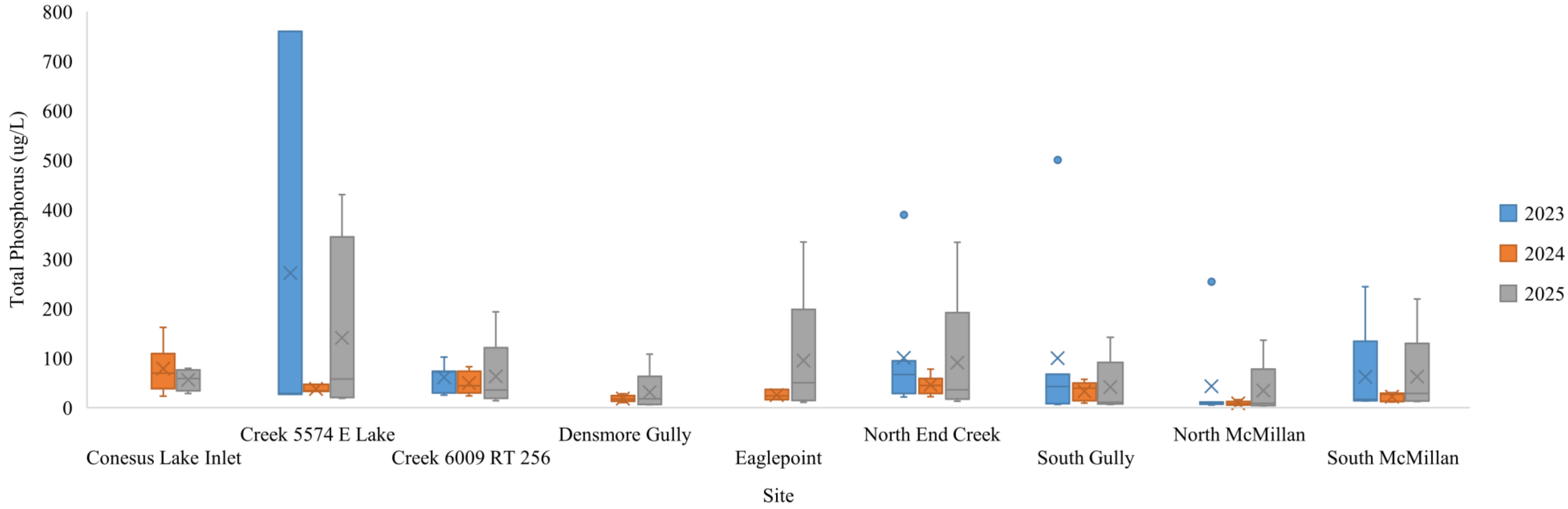

Figure S4. Box pots comparing total phosphorus (TP) data across the unassessed and reference streams in 2023-2025.

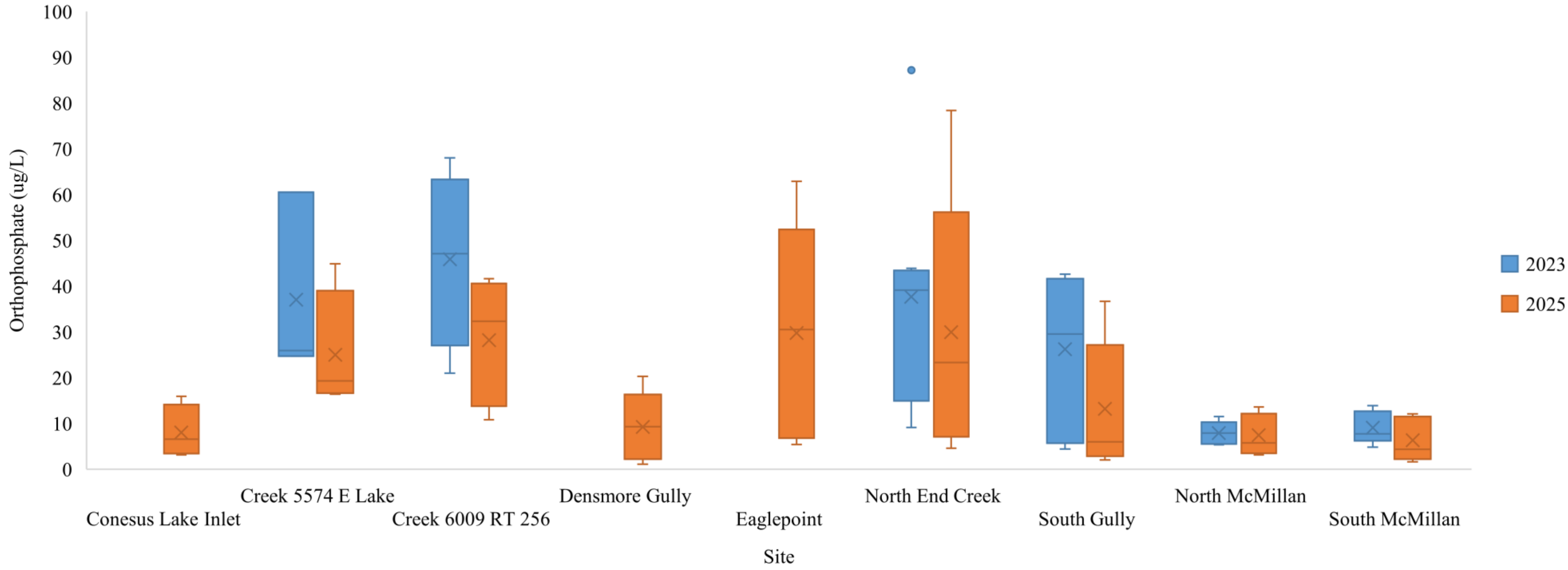

Figure S5. Box pots comparing orthophosphate data across the unassessed and reference streams in 2023 and 2025.

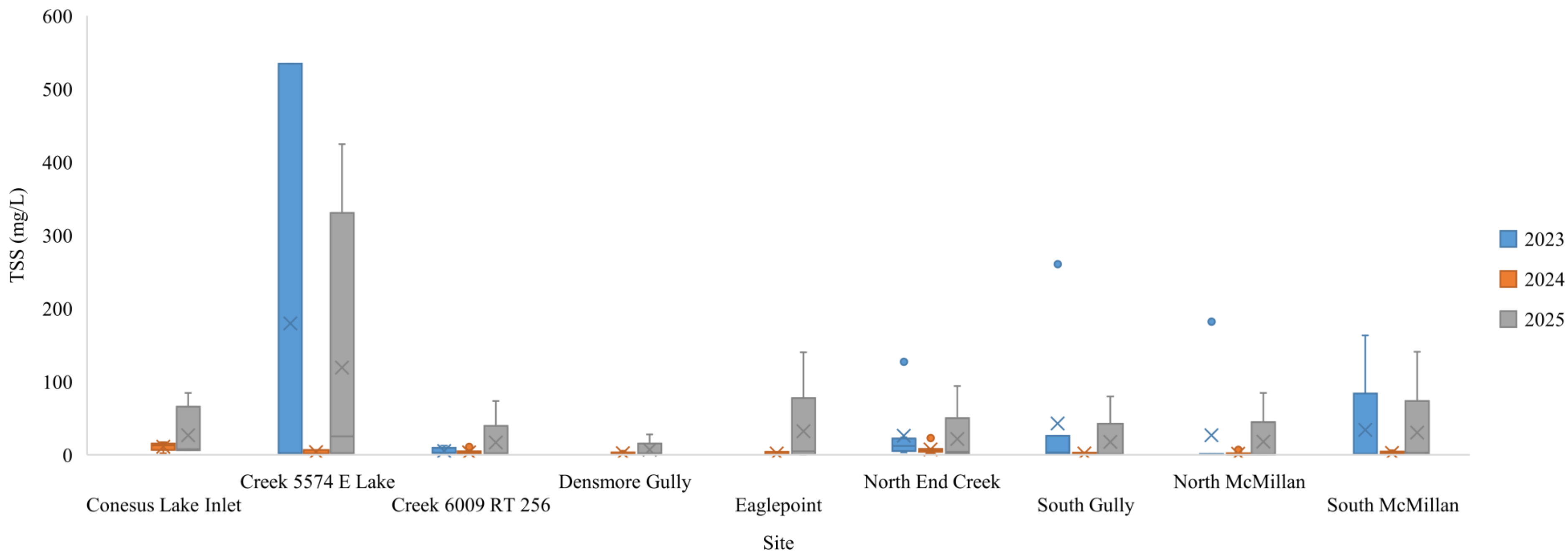

Figure S6. Box pots comparing total suspended solids (TSS) data across the unassessed and reference streams in 2023-2025.

--END OF REPORT; THIS PAGE IS INTENTIONALLY LEFT BLANK.--