REDMOND PAIRED WATERSHED STUDY

TREND ANALYSIS REPORT: WATER YEARS 2016–2019

Prepared for
City of Redmond

Prepared by
Herrera Environmental Consultants, Inc.

Note:
Some pages in this document have been purposely skipped or blank pages inserted so that this document will print correctly when duplexed.

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TREND ANALYSIS REPORT: WATER YEARS 2016–2019

Prepared for
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February 19, 2021

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EXECUTIVE SUMMARY

The Redmond Paired Watershed Study (RPWS) is one of several effectiveness monitoring studies that was selected for implementation starting in 2014 for the Stormwater Action Monitoring (SAM) program for Puget Sound. The goal of effectiveness monitoring under the SAM program is to provide widely applicable information for improving stormwater management in the region. Phase I and Phase II Municipal Stormwater Permittees in the Puget Sound Region contribute to a Pooled Stormwater Resources Fund that supports the SAM program and associated effectiveness monitoring studies. Selection of the RPWS for implementation under the SAM program was made based on a monitoring proposal that was presented to permittee representatives at workshops that were held on March 20, 2014, and May 6, 2014. The specific study question to be addressed through the RPWS is as follows:

> *How effective are watershed rehabilitation efforts at improving receiving water conditions at the watershed scale?*

In this context, rehabilitation efforts could include any of the following practices:

- Stormwater management retrofits in upland areas that would include facilities for onsite stormwater management (e.g., low impact development [LID] practices), runoff treatment, and flow control.
- Riparian and in-stream habitat improvements.
- Programmatic practices for stormwater management.

To address this study question, a conceptual experimental design for the RPWS was subsequently developed and summarized in the *Redmond Paired Watershed Study Experimental Design Report* (Herrera 2015a). This conceptual experimental design was informed by a literature review (Herrera 2015b) that was conducted to identify lessons learned from past studies that have been implemented to achieve similar objectives. Building on this previous work, a Quality Assurance Project Plan (QAPP) was developed to guide the implementation of all subsequent phases of the RPWS (Herrera 2015c). As described in this QAPP, the experimental design for the RPWS has two primary components:

- **Status and Trends Monitoring**: Routine and continuous measurements of various hydrologic, chemical, physical habitat, and biological indicators of stream health over an extended time frame to quantify improvements in receiving water conditions in response to watershed rehabilitation efforts.
- **Effectiveness Monitoring**: Measurements of hydrologic and chemical parameters over a relatively short timeframe to document the effectiveness of specific structural stormwater controls that have been constructed to improve receiving water conditions.

The Status and Trends Monitoring utilizes a "paired watershed" experimental design that involves collecting these measurements in seven watersheds categorized as follows:

- Three "Application" watersheds with wadeable lowland streams that are moderately impacted by urbanization and prioritized for rehabilitation efforts.
- Two "Reference" watersheds with relatively pristine wadeable lowland streams that do not require rehabilitation.
- Two "Control" watersheds with wadeable lowland streams that are significantly impacted by urbanization and not currently prioritized for rehabilitation.

Fixed monitoring stations were established in each watershed for monitoring various indicators of stream health. Due to the scale of the RPWS and the anticipated lag between applying stormwater controls and resultant improvements in receiving water conditions, quantifying a cause and effect relationship between these events may take many years. Therefore, monitoring at the fixed monitoring stations will occur over an anticipated 10-year timeframe. Furthermore, because the effectiveness of watershed rehabilitation practices (e.g., stormwater retrofits, in-stream habitat improvements, and programmatic practices) may vary for different types of receiving water impairments, a broad suite of indicators for assessing potential improvements are being monitored within the following categories: hydrologic, water quality, physical habitat, sediment quality, and biological. The pattern of interest will be evidence that receiving water conditions are improving based on one or more of these indicators in the Application watersheds while conditions in the Reference and Control watersheds remain relatively static.

Roving stations will be established for the Effectiveness Monitoring component of the RPWS to verify specific structural stormwater controls are constructed properly and performing as designed. The roving stations will be moved from one year to the next once a facility's effectiveness has been verified and new facilities come online. The specific types of monitoring to be performed at each roving station will depend on the type of structural stormwater control that is being evaluated. At present, no new structural stormwater controls have come online in an Application watershed that are suitable for Effectiveness Monitoring.

Data summary reports are being prepared on an annual basis to summarize compiled monitoring data collected through each of the major components of the RPWS. These reports also document any quality assurance issues associated with these data and resultant limitations (if any) on their use or interpretation. Finally, these reports document all rehabilitation efforts that have been implemented by the City of Redmond (City) or King County (County) over the previous year within the application watersheds. Each annual data summary report documents this information based on monitoring that was conducted over the previous water year (WY) spanning from October through September.

In years 4, 6, 8, and 10 of the RPWS' implementation, trend analyses reports will also be prepared as companion documents to the data summary reports described above. These reports will summarize the results of analyses that will be performed on the compiled data from all previous years of monitoring to detect potential improving trends in receiving water conditions related to the implementation of rehabilitation efforts. Each report will also present major conclusions from these analyses.

This document represents the trend analysis report that was prepared for year 4 of the RPWS' implementation. It specifically summarizes analyses that were performed on compiled data from monitoring in WY2016 through WY2019. Data analyses procedures that were performed on the compiled data from monitoring from this period included:

- Tests for correlation between the indicators for improving receiving water conditions and time.
- Hypothesis test to detect changes in indicators in response to specific rehabilitation efforts that have been implemented in the Application watersheds.
- Comparisons of indicator data for physical habitat improvement to regional data.
- Spatial statistical analysis to identify broader landscape influences on stream health across all the watersheds.

Through this phase of the RPWS, rehabilitation efforts in the Application watersheds have been fairly modest in scope. These efforts have generally been confined to the construction of two detention vaults in the Evans Creek watershed, progressively increasing street sweeping in the Monticello Creek watershed, and instream habitat improvement projects in both the Monticello Creek and Tosh Creek watersheds. More broadly, development of data analysis reports for the RPWS was specifically delayed until year 4 of the study's implementation; this was deemed the earliest any response might be detected in an Application watershed following a sufficient period of baseline data collection. Due to these considerations, there were generally few consistent trends detected in the data for each indicator across all the monitoring categories that could be directly tied to a specific rehabilitation strategy or other watershed scale influence (e.g., increased development). While some planned rehabilitation efforts that were scheduled for implementation in this early phase of the RPWS were delayed, the City is now updating the Monticello Watershed Management Plan and will be constructing projects in the watershed next year. Given the anticipated 10-year timeframe for implementing the RPWS, the benefits of these projects can now be assessed over multiple years of operation and varied climatic conditions relative to an extremely robust dataset for baseline conditions.

Despite the relatively short period of implementation for the RPWS thus far, a statistically significant trend was detected through analyses performed to quantify the rainfall runoff response at each station. In general, urban development will increase the volume and peak flow rate for runoff that is generated by a storm event of a given size. Stormwater best management practices (BMPs) are designed to mitigate these impacts. To detect potential changes in the rainfall runoff response that might be related to implementation of stormwater BMPs, continuous flow data from each station and precipitation data were post-processed to delineate the start and stop time of individual storm events with their associated flow volume and maximum flow rate. Correlation analyses were then performed to detect changes in rainfall runoff relationships at each station over time based on the following null (Ho) and alternative (Ha) hypotheses:

> Ho: The flow volumes or maximum flow rate has not changed for a given storm precipitation depth over time
>
> Ha: The flow volumes or maximum flow rate has increased or decreased for a given storm precipitation depth over time

Results from this analysis indicated there was a significant decreasing trend over time in the rainfall runoff response for flow volume at five of the seven stations in the Application watersheds, two of the three stations in the Reference Watersheds, and two of the four stations in the Control watersheds. The same analysis showed there was a decreasing trend over time in the rainfall runoff response for maximum flow rate at six of the seven stations in the Application watersheds, two of the three stations in the Reference Watersheds, and three of the four stations in the Control watersheds. What this implies is that less runoff is being produced for an equivalent amount of rain as you progress from WY2016 to WY2019 and that this is occurring across the city. The only hydrologic driver that could possibly affect nearly all the stations in the same manner must be climate related, specifically, the amount of rainfall in each water year. Hence, follow-up analyses were performed that showed rainfall totals were indeed elevated in the first three years of the study and then decreased dramatically in the fourth year (WY2019). The progressively drier water years from WY2017 to WY2019 likely resulted in less saturation of the landscape and thus increased evapotranspiration and reduced interflow and overland flow (Nash and Sutcliffe 1970). These changes occurred across the entire City and therefore impacted the rainfall runoff response in all the watersheds.

Statistical tests were also performed to detect changes in rainfall runoff relationships resulting from the construction of the two detention vaults in the Evans Creek watershed based on the following null and alternative hypotheses:

> Ho: The flow volume or maximum flow rate has stayed the same or increased for a given storm precipitation depth after the vaults became operational.
>
> Ha: The flow volume or maximum flow rate has decreased for a given storm precipitation depth after the vaults became operational.

Each vault was designed using the Ecology 8 percent performance target that calls for controlling the flow durations of discharges between 8 percent of the forested 2-year discharge and the full 50-year discharge (King County 2014).

The potential benefits of these facilities would only have been realized at one of the two stations in the Evans Creek watershed once they became operational after October 31, 2017. Results from the statistical tests showed there was no significant change in the rainfall runoff response at this station after the vaults became operational. For reference, a significant change in the rainfall runoff response was only observed at two other stations after the vaults became operational; one of these stations was located in another Application watershed and the other was located in a Control watershed.

Because the vaults only provide detention, it is not surprising that the rainfall runoff response for flow volume did not change significantly. However, the vaults would be expected to change the rainfall runoff response for maximum flow rate given their design using the performance target described above. There are several factors that might explain why the vaults did not provide measurable benefits. First, it is possible that one or both vaults have a design defect that reduces their performance relative to design expectations. However, a more likely explanation is the vaults are not treating a sufficient amount of the watershed area to have a detectable impact on flows in the creek. For reference, the Evans Creek watershed has a total area of 397 acres (Table 1). The two vaults are treating a combined impervious area of only 1.18 acres, a small fraction of this total area. Hence, it is likely the benefits of the vaults cannot be detected amongst the “noise” that is generated by unmitigated flows from other, larger portions of the watershed. As documented in the literature review (Herrera 2015b) that was conducted for the RPWS, a large portion (e.g., >50 percent) of the basin must be treated in order to see a measurable difference in receiving water conditions (Ahiablame et al. 2013). Hence, additional rehabilitation efforts are likely needed in this watershed before hydrologic conditions can be expected to improve.

The City was conducting street sweeping on all public roads in the Monticello Creek watershed prior to the onset of the RPWS. The frequency of this street sweeping increased from quarterly to monthly in August of WY2017 and continued throughout WY2018. Beginning in October of WY2019, the frequency of street sweeping increased again from once per month to biweekly. The potential water quality benefits of this street sweeping could have been realized at all three monitoring stations in the watershed (MONM, MONMN, and MONMS) given its coverage.

To directly assess the water quality benefits of the streets weeping, statistical tests were performed to compare pollutant concentrations in samples from periods with “quarterly sweeping,” “monthly sweeping,” and “biweekly sweeping.” The analysis was performed on pollutants that are most likely to be affected by street sweeping; specifically, total suspended solids (TSS), total phosphorus, total nitrogen, total copper, and total zinc. The pattern of interest in this analysis is a consistent decrease in pollutant concentrations across all three periods of street sweeping. Separate analyses were performed for samples collected during storm events and base flow, respectively.

Results from this analysis showed there was a consistent decrease in total nitrogen concentrations from period to period at the MONMS station during storm events; however, this pattern was also observed at one station located in a Control watershed and one station located in a reference watershed, so it would be difficult to conclude that the decrease in concentrations of this pollutant is from street sweeping alone. A consistent decrease from period to period was not observed for any of the pollutant and station combinations during base flow.

A more interesting pattern is observed for TSS and total copper during storm events. A consistent and significant decrease in both pollutants was observed at the MONMS station and at none of the other 13 monitoring stations. A significant decrease in the concentrations of these pollutants during storm events at this station was also confirmed based on separate correlation analyses examining trends in water quality indicators over time. This suggests something unique may be occurring in the basin for MONMS station. While additional research is required to establish a direct causal relationship, this could be an indication that increased sweeping in this basin is reducing concentrations of TSS and total copper in the creek during storm events. The City does not intend to maintain the biweekly sweeping frequency in this watershed; hence, this assertion will be strengthened if concentrations of these pollutants rebound in subsequent years of monitoring.

These results are also consistent with a recent street sweeping study that was implemented by Seattle Public Utilities (SPU) along Martin Luther King Avenue in Seattle, Washington (SPU 2018) that also found a significant relationship between sweeping and decreased pollutant concentrations in stormwater for two pollutants: particulate copper and coarse sediment above 250 microns. Unlike the study discussed herein that examines potential water quality improvements in the receiving water from street sweeping, the SPU study was examining potential water quality improvements in the catch basin directly adjacent to the road being swept; hence, there were likely fewer confounding variables to contend with in the SPU study. Though these studies had very different designs they both came to a similar conclusion, and that is street sweeping appears to have an effect on copper and TSS in stormwater. The fact that these two analyses came to similar conclusions is more evidence that the trend observed herein may in fact be causal with increased sweeping.

Spatial statistical analyses were performed to test the hypothesis that non-point source pollution is inherently tied to watershed landscape characteristics. A growing body of research has focused on using spatial statistical methods to predict water quality outcomes based on watershed landscape characteristics like land use, topographic variables (slope, elevation range, etc.), and urban development metrics. The purpose of this analysis was to assess what percentage of the variability seen in water quality monitoring results across the study area can be attributed to watershed landscape characteristics. This provides a baseline for comparison over the course of the study to quantify what percentage of water quality improvements can be attributed to watershed rehabilitation efforts.

The following watershed characteristic metrics were identified based on significant predictors of water quality that have been considered in other studies:

- **Mean watershed elevation and slope** – Mean elevation and slope of the total upstream watershed were calculated for each monitoring station.
- **Land cover** – Land cover was considered in several classes that are associated with human disturbance and urban development, including percent commercial/industrial, residential, forest, and agriculture.
- **Impervious area** – Percent impervious area (e.g., parking lots, roads, houses) in the total upstream watershed was calculated for each monitoring station.
- **Tree canopy cover** – Percent canopy cover is an alternative metric to looking at percent impervious area and it represents the portion of the watershed with vegetation intact.

- **Riparian vegetation** – The percent of the 100-foot buffer around streams covered in vegetation was calculated for each monitoring station. As riparian vegetation is removed from near streams, stream temperature tends to increase, which can have a negative impact on benthic macroinvertebrates.

- **Hydrologic soils** – Hydrologic soil classifications indicate how quickly water infiltrates soil and provides an indication of whether stormwater runoff is more likely to infiltrate or flow into streams. The percentage of slower-draining soils (Classes C and D) were calculated in the total upstream watershed for each monitoring station.

- **Number of stream crossings** – Locations where road centerlines cross streams were converted to points and counted in the total upstream watershed for each monitoring station.

Stepwise regression was used to identify significant independent variables to include in an optimal multiple regression model with B-IBI scores as the dependent variable. The results of the spatial statistical stepwise regression analysis indicate that a model including the following covariates is statistically significant at $\alpha = 0.10$.

- Percent residential land use

- Percent commercial land use

- Mean watershed elevation

- Mean watershed slope

- Percent Class C soils

However, the r^2 value for the best-fitting model was quite low at 0.267, indicating that most of the variability in B-IBI scores is driven by factors other than watershed landscape characteristics. Most surprising was percent impervious area was not a significant driver of B-IBI scores in this analysis given that it is a widely-accepted predictor of B-IBI scores in the Puget Sound Region, with scores decreasing as impervious area increases. One interpretation of this result is that stormwater BMPs already being implemented in the watershed to target runoff from impervious area are highly effective and are negating this known trend. However, considering that the overall mean B-IBI score (34.4) for stations monitored for the RPWS indicates poor habitat conditions are prevalent, it is more likely that there is some type of human disturbance in the watershed that is impacting these scores. This is supported by the fact that both residential and commercial land use were found to be significant, which are essentially surrogates for impervious area. This human disturbance may be contributing to more localized factors such as stream temperature increases and instream habitat alteration that are impacting B-IBI scores.

Because B-IBI scores in this watershed do not appear to be strongly correlated with landscape variables like urban development, it is also possible this metric may not be the best option for assessing BMP effectiveness at improving habitat quality over time.

INTRODUCTION

The Redmond Paired Watershed Study (RPWS) is one of several effectiveness monitoring studies that was selected for implementation starting in 2014 for the Stormwater Action Monitoring (SAM) program for Puget Sound. The goal of effectiveness monitoring under the SAM program is to provide widely applicable information for improving stormwater management in the region. Phase I and Phase II Municipal Stormwater Permittees in the Puget Sound Region contribute to a Pooled Stormwater Resources Fund that supports the SAM program and associated effectiveness monitoring studies. Selection of the RPWS for implementation under the SAM program was made based on a monitoring proposal that was presented to permittee representatives at workshops that were held on March 20, 2014, and May 6, 2014. The specific study question to be addressed through the RPWS is as follows:

> *How effective are watershed rehabilitation efforts at improving receiving water conditions at the watershed scale?*

To address this study question, a conceptual experimental design for the RPWS was subsequently developed and summarized in the *Redmond Paired Watershed Study Experimental Design Report* (Herrera 2015a). This conceptual experimental design was informed by a literature review (Herrera 2015b) that was conducted to identify lessons learned from past studies that have been implemented to achieve similar objectives. The conceptual experimental design was also developed based on input from a technical advisory committee that was formed for the study. This technical advisory committee currently includes representation from the following jurisdictions and agencies:

- City of Redmond
- City of Seattle
- King County
- Kitsap County
- US Geological Society
- Washington State Department of Ecology (Ecology)

Building on this previous work, a Quality Assurance Project Plan (QAPP) was developed to guide the implementation of all subsequent phases of the RPWS (Herrera 2015c). This QAPP documents the experimental design and procedures that will be used during data collection, processing, and analysis to ensure all results obtained for the RPWS are scientifically defensible.

Monitoring pursuant to this QAPP initiated in 2016 and is anticipated to continue for a 10-year timeframe. Data summary reports are being prepared on an annual basis over this period to summarize compiled monitoring data collected through each of the major components of the RPWS. These reports also document any quality assurance issues associated with these data and resultant limitations (if any) on their use or interpretation. Finally, these reports document all rehabilitation efforts that have been implemented by the City of Redmond (City) or King County (County) over the previous year. They included detailed information on the design and operational status of structural stormwater controls and the frequency and geographic extent of nonstructural stormwater control implementation. Each annual data summary report documents this information based on monitoring that was conducted over the previous water year (i.e., October through September). Data summary reports (Herrera 2017, 2018, 2019, 2020) were prepared previously for data collected over water years 2016, 2017, 2018, and 2019, respectively.

In years 4, 6, 8, and 10 of the RPWS' implementation, trend analyses reports will also be prepared as companion documents to the data summary reports described above. These reports will summarize the results of analyses that will be performed on the compiled data from all previous years of monitoring to detect potential improving trends in receiving water conditions related to the implementation of rehabilitation efforts. Each report will also present major conclusions from these analyses.

This document represents the trend analysis report that was prepared for year 4 of the RPWS' implementation. It specifically summarizes analyses that were performed on compiled data from monitoring in WY2016 through WY2019. It is organized to include the following sections:

- **Background** – An explanation of why the project is needed.
- **Experimental Design** – The sampling process design for the study, including sample types, monitoring locations, and sampling frequency.
- **Rehabilitation Effort Summary** – A summary of the rehabilitation efforts in the Application watersheds.
- **Data Analysis Procedures** – A description of the analyses that were performed on the compiled data to detect potential trends in receiving water conditions related to the implementation of rehabilitation efforts.
- **Results** – A summary of the results from the trend analyses for each major monitoring component of the RPWS.
- **Discussion** – A discussion of the results from the trend analyses and their implications for the City's ongoing watershed rehabilitation efforts and implementation of the RPWS.
- **Conclusions** – A summary of major conclusions from the trend analyses from this phase of the RPWS' implementation.

BACKGROUND

Municipal Stormwater Permits are issued by Ecology to regulate discharges from separated storm sewers owned or operated by Phase I and Phase II cities and counties. The Municipal Stormwater Permits establish the minimum requirements for permittees to address existing and future impacts to receiving waters from urbanization. Municipal Stormwater Permits require cities and counties to execute programmatic (nonstructural) activities and establish design standards for stormwater structural controls triggered by development (onsite stormwater management, runoff treatment, and flow control facilities). In theory, if all developed land in a watershed is equipped with nonstructural and structural stormwater controls, the receiving water would be protected from hydrologic and water quality impacts caused by urbanization. However, while the effectiveness of nonstructural and structural controls has been well documented at the site and parcel scale, limited data exists on the effectiveness of these controls in aggregate for improving conditions in receiving waters at the watershed scale (Herrera 2015b).

In February 2014, Ecology approved a Citywide Watershed Management Plan (WMP) (Herrera 2013) for the City that coordinates stormwater management efforts from the Municipal Stormwater Permit, Section 303(d) of the Clean Water Act, and salmon recovery to allow use of a watershed approach for improving receiving water conditions. Through the implementation of this WMP, the City will focus stormwater best management practices (BMPs) in a subset of priority watersheds that are moderately impacted by urbanization and therefore expected to respond more quickly to rehabilitation efforts. This provides a unique opportunity to study the effectiveness of stormwater BMPs for improving receiving water conditions on an accelerated time frame and at a watershed scale. Recognizing this opportunity, the City is implementing the RPWS to quantify improvements in receiving water conditions with support from the SAM program.

EXPERIMENTAL DESIGN

As described in the *Introduction* to this report, the specific study question to be addressed through the RPWS is as follows:

> *How effective are watershed rehabilitation efforts at improving receiving water conditions at the watershed scale?*

In this context, rehabilitation efforts could include any of the following practices:

- Stormwater management retrofits in upland areas that would include facilities for onsite stormwater management (e.g., low impact development [LID] practices), runoff treatment, and flow control.
- Riparian and in-stream habitat improvements.
- Programmatic practices for stormwater management.

To answer the study question identified above, the experimental design for the RPWP has two primary components:

- **Status and Trends Monitoring**: Routine and continuous measurements of various hydrologic, chemical, physical habitat, and biological indicators of stream health over an extended time frame to quantify improvements in receiving water conditions in response to watershed rehabilitation efforts.
- **Effectiveness Monitoring**: Measurements of hydrologic and chemical parameters over a relatively short timeframe to document the effectiveness of specific structural stormwater controls that have been constructed to improve receiving water conditions.

The Status and Trends Monitoring utilizes a "paired watershed" experimental design that involves collecting these measurements in seven watersheds categorized as follows:

- Three "Application" watersheds with wadeable lowland streams that are moderately impacted by urbanization and prioritized for rehabilitation efforts.
- Two "Reference" watersheds with relatively pristine wadeable lowland streams that do not require rehabilitation.
- Two "Control" watersheds with wadeable lowland streams that are significantly impacted by urbanization and not currently prioritized for rehabilitation.

Table 1 identifies the name, predominant land use/cover, and size of each watershed; the location of all the watersheds is shown in Figure 1. A detailed summary of conditions within each watershed is also provided in the QAPP that was prepared for the study (Herrera 2015c) with information on planned rehabilitation efforts in the Application watersheds as applicable.

Table 1. Application, Reference, and Control Watersheds for the Redmond Paired Watershed Study.

Watershed Name	Watershed Type	Dominant Land Use/Cover	Watershed Total Area (acres)	Watershed Area Inside Redmond (acres)
Evans Creek Tributary 108	Application	Residential	397	0[a]
Monticello Creek	Application	Residential/Commercial	345	264
Tosh Creek	Application	Residential/Commercial	299	276
Colin Creek[a]	Reference	Forest	1,990	90
Seidel Creek[a]	Reference	Forest	1,188	615
Country Creek	Control	Residential/Commercial	212	212
Tyler's Creek	Control	Residential/Commercial	168	167

[a] Watershed is in unincorporated King County.

Fixed monitoring stations were established in each watershed for monitoring various indicators of stream health. Due to the scale of the RPWS and the anticipated lag between applying stormwater controls and resultant improvements in receiving water conditions, quantifying a cause and effect relationship between these events may take many years. Therefore, monitoring at the fixed monitoring stations will occur over an anticipated 10-year timeframe. Furthermore, because the effectiveness of watershed rehabilitation practices (e.g., stormwater retrofits, in-stream habitat improvements, and programmatic practices) may vary for different types of receiving water impairments, a broad suite of indicators for assessing potential improvements are being monitored within the following categories: hydrologic, water quality, physical habitat, sediment quality, and biological. The pattern of interest will be evidence that receiving water conditions are improving based on one or more of these indicators in the Application watersheds while conditions in the Reference and Control watersheds remain relatively static.

The following subsections provide more detailed information on the Status and Trends Monitoring and Effectiveness Monitoring, respectively, including the monitoring stations, measurement frequency, and indicators where applicable. Data analysis procedures for the compiled data from each indicator are described in a subsequent section.

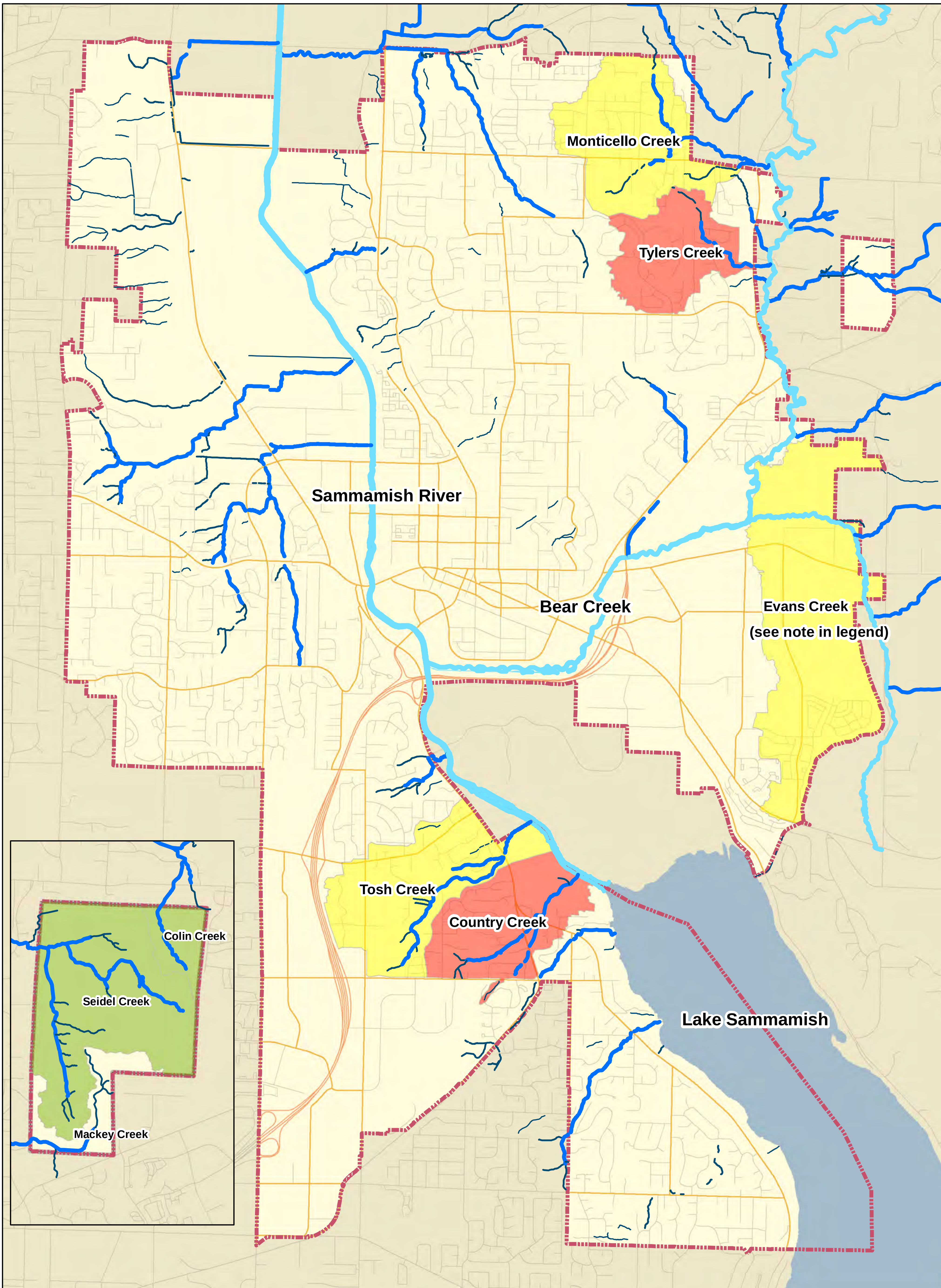

Figure 1 - Application, Reference, and Control Watersheds.

City of Redmond, Washington

06/18/2015

N

0 0.25 0.5 1 1.5 Miles

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- City Limits
- Reference Watersheds
- Application Watersheds
- Control Watersheds

This figure shows Evans Creek watershed within Redmond. Evans 108 is east of Redmond and illustrated in Figure 2.

CityofRedmond WASHINGTON

Disclaimer: This map is created and maintained by the Natural Resources Division of the City of Redmond, Washington, for reference purposes only. The City makes no guarantee as to the accuracy or completeness of the features shown on this map.

Status and Trends Monitoring

This section describes the monitoring stations, measurement frequency, indicators, and data analysis methods that will be used for the Status and Trends Monitoring component of the RPWS. This information is organized under separate subsections for the following monitoring categories: hydrologic, water quality, physical habitat, sediment quality, and biological. The specific indicators of stream health that will be evaluated in these categories are also summarized in Table 2 with their associated measurement frequency. (Note: Tables 2 through 24 are located in a separate section following the References section of this document.)

Hydrologic Monitoring

A total of 14 fixed monitoring stations were established to facilitate hydrologic monitoring in each of the study watersheds. As noted in the literature review (Herrera 2015b) that was performed to inform the experimental design for the RPWS, numerous studies have been conducted with similar goals, but they have generally been conducted at the subbasin scale. In these studies, a hydrologic monitoring station was typically located at the outlet of the study subbasin. Therefore, efforts were made to establish hydrologic monitoring stations at the outlet of each of the study watersheds. However, because the watersheds are relatively large and because much of the rehabilitation will occur in the upper reaches of the Application watersheds, efforts were made to establish hydrologic monitoring stations at a mid-point location in each of the study watersheds as well. This goal could not be achieved for all study watersheds due to issues relating to their size and drainage patterns. The following deviations are specifically noted:

- Monticello Creek has two major tributaries that will be the target of rehabilitation efforts; therefore, three hydrologic monitoring stations were established in the watershed at the outlet and on each of the tributaries.
- The relatively pristine reach of Colin Creek that was identified for monitoring is confined to the Redmond Watershed Preserve Park. Because the watershed area within this park is relatively small, only one hydrologic monitoring station was established in this study watershed.
- The relatively pristine reach of Seidel Creek that was identified for monitoring is confined to the Redmond Watershed Preserve Park. Within this area, two major tributaries of the creek flow into a large wetland complex near the border of the park. To avoid confounding hydrologic and water quality influences from this wetland, hydrologic monitoring stations were established on each tributary; and no outlet station was identified.

In addition to these considerations, the specific location of each monitoring station was also influenced by safety and property access issues. The monitoring stations established in each of the study watersheds are as follows:

Application Watersheds

- Evans Creek Tributary 108: Two stations designated Lower Stream Station (EVALSS) and Midstream Station (EVAMS), respectively (see locations in Figure 2).

- Monticello Creek: One station at the mouth designated Mont-Mouth (MONM); one station at the approximate midpoint of the watershed on the north tributary designated Mont–Mid-N (MONMN); and one station at the approximate midpoint of the watershed on the south tributary designated Mont–Mid-S (MONMS) (see locations in Figure 3).

- Tosh Creek: One station at the mouth designated Tosh-Mouth (TOSMO); and one station at the approximate midpoint of the watershed designated Tosh-Mid (TOSMI) (see locations in Figure 4).

Reference Watersheds

- Colin Creek: One station at the approximate midpoint of the watershed designated Colin-Mid (COLM) (see locations in Figure 5).

- Seidel Creek: One station at the approximate midpoint of the watershed on the north tributary designated Seidel-Mid-N (SEIMN); one station at the approximate midpoint of the watershed on the south tributary designated Seidel-Mid-S (SEIMS) (see locations in Figure 6).

Control Watersheds

- Country Creek: One station at the mouth designated Country-Mouth (COUMO); and one station at the approximate midpoint of the watershed designated Country-Mid (COUMI) (see locations in Figure 7).

- Tyler's Creek: One station at the mouth designated Tylers-Mouth (TYLMO); and one station at the approximate midpoint of the watershed designated Tylers-Mid (TYLMI) (see locations in Figure 8).

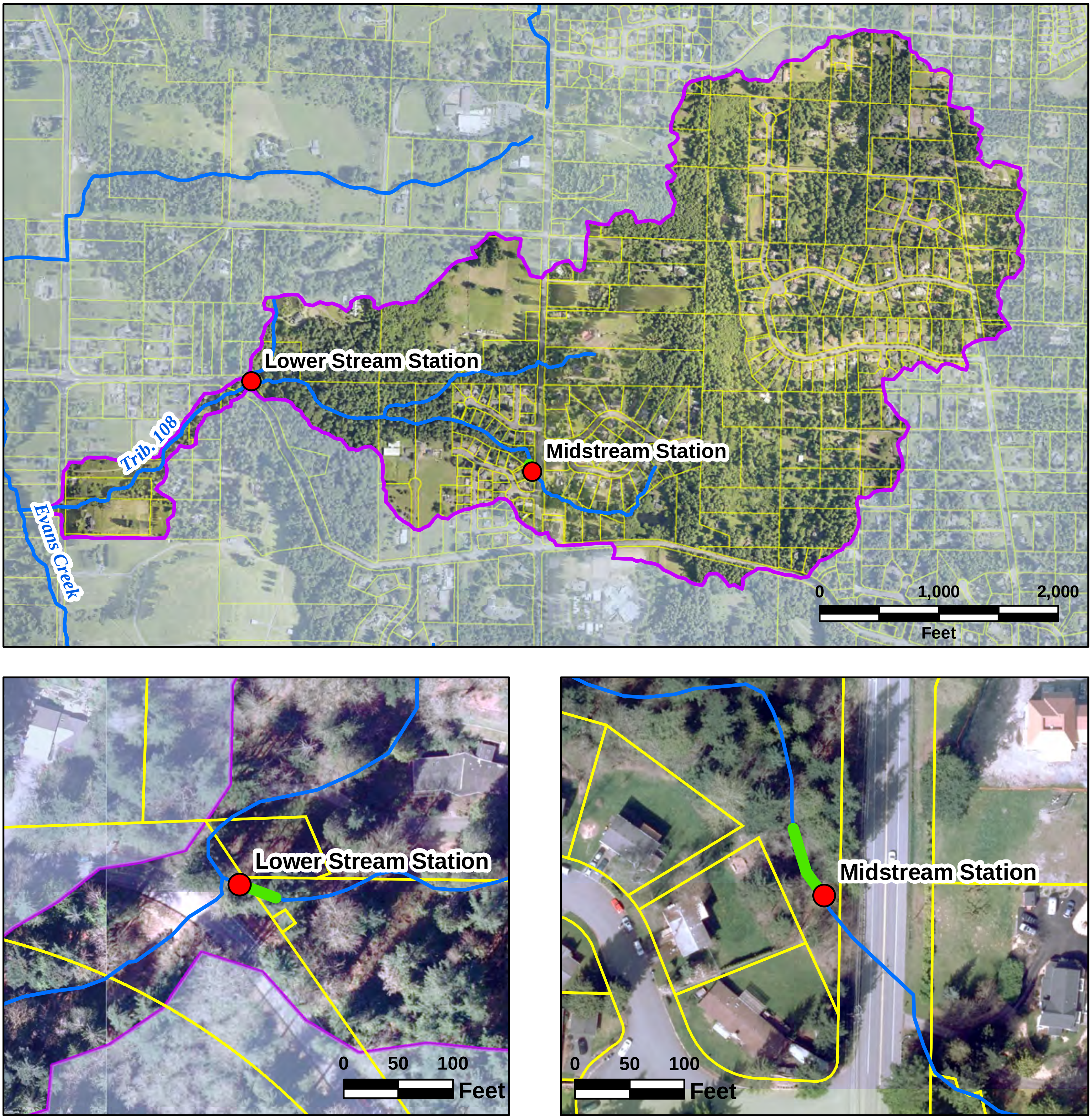

Figure 2 - Evans Trib. 108 Paired Watershed Study Monitoring Locations.

King County, Washington

Dec. 17, 2015

- Flow and WQ Monitoring
- Habitat, Biological, and Sediment Monitoring
- Streams and Rivers
- King County Parcels
- Basin Boundary

King County
Department of Natural Resources and Parks
Water and Land Resources Division

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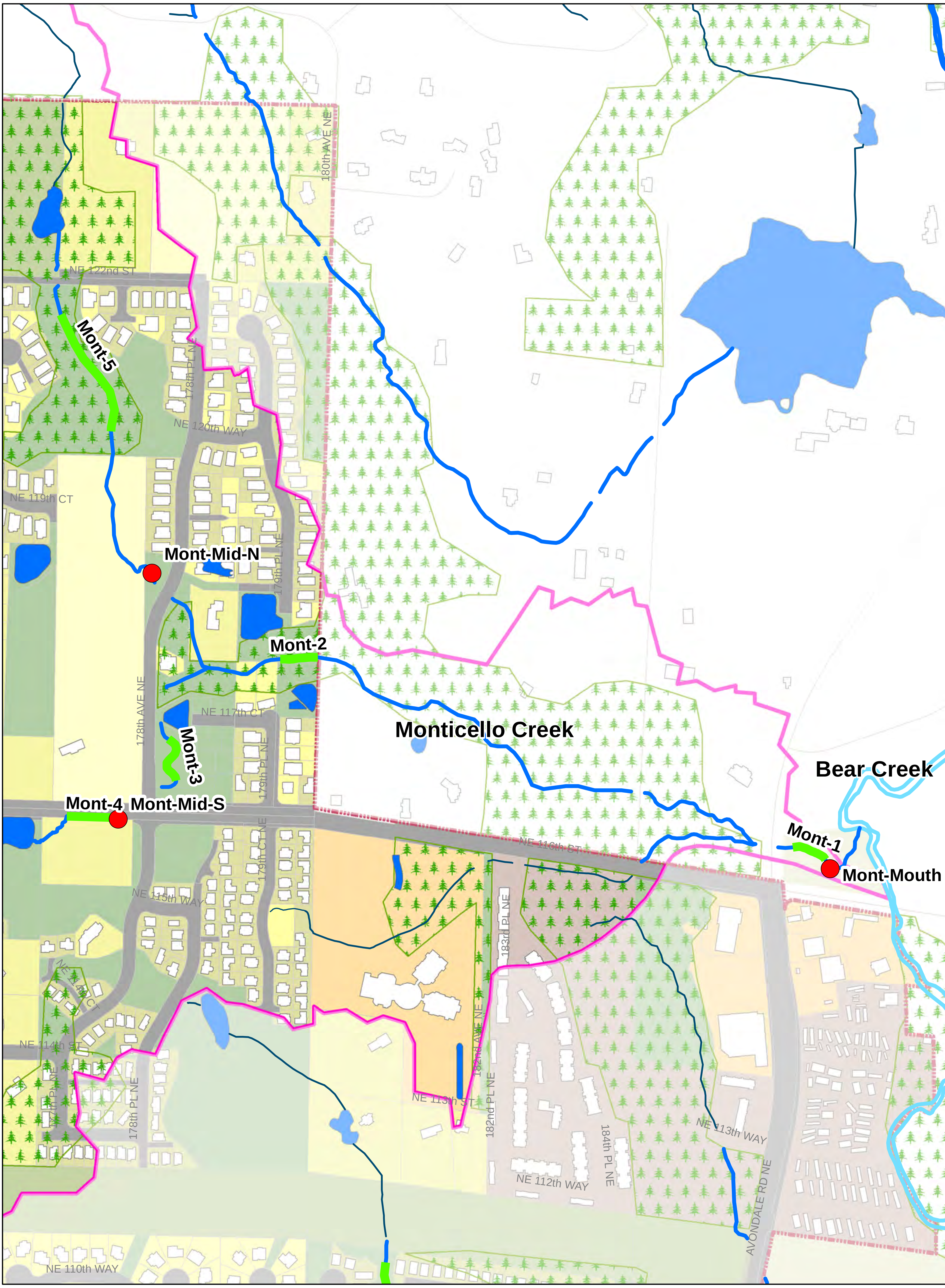

Figure 3. Monticello Creek Paired Watershed Study Monitoring Locations

City of Redmond, Washington

6/25/2015

N

0 0.0375 0.075 0.15 Miles

City of Redmond WASHINGTON

Disclaimer: This map is created and maintained by the Natural Resources Division of the City of Redmond, Washington, for reference purposes only. The City makes no guarantee as to the accuracy or completeness of the features shown on this map.

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- Ponds
- City Limits
- Watershed Boundary
- Commercial
- Industrial
- Multifamily
- Park / Undeveloped
- Public ROW
- Single Family HighDensity
- Single Family Low Density
- Single Family Medium Density
- Single Family Rural Density
- Flow & WQ Monitoring
- Habitat, Sediment & Biological Monitoring

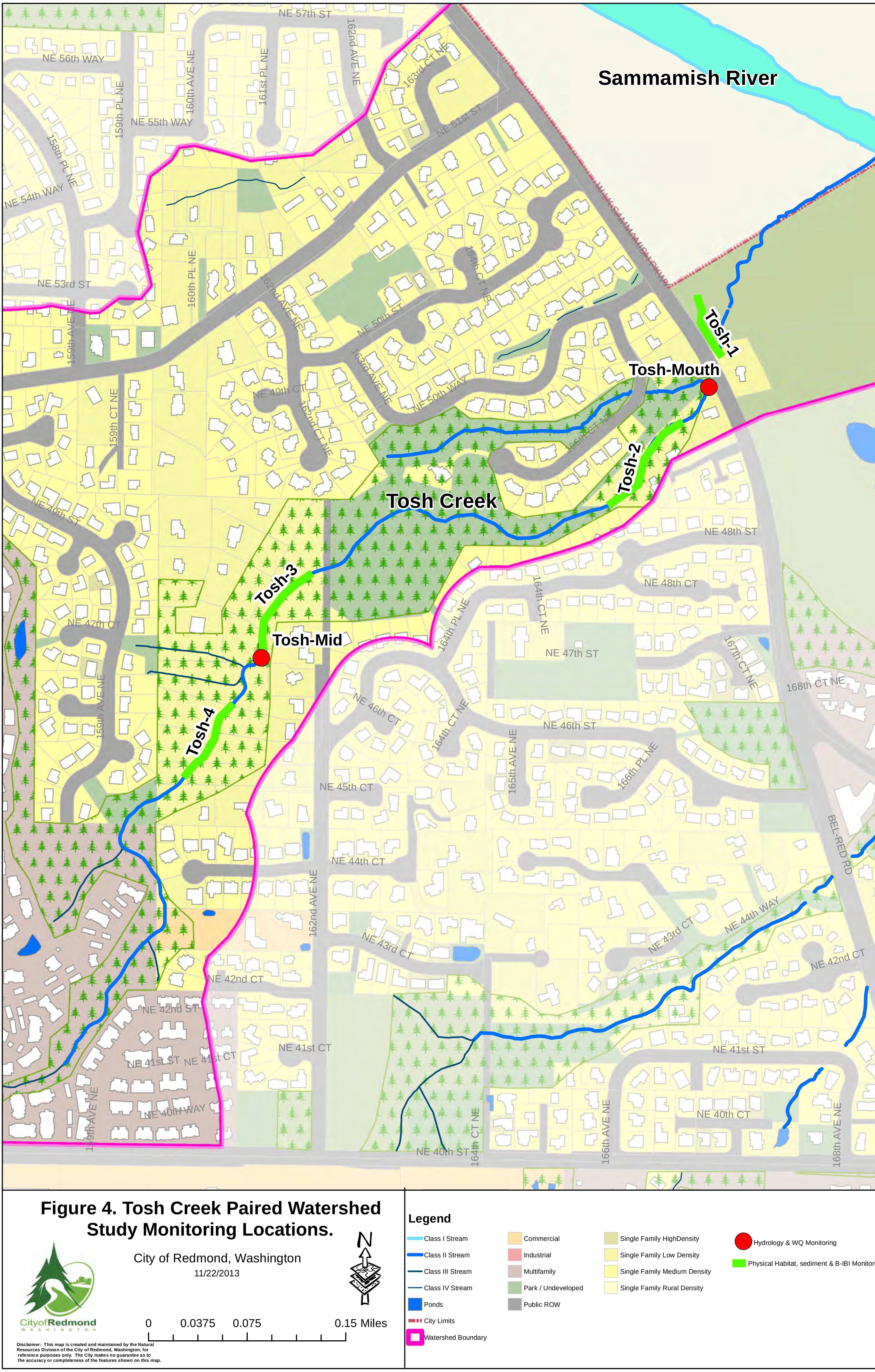

Figure 4. Tosh Creek Paired Watershed Study Monitoring Locations.

City of Redmond, Washington

11/22/2013

Continuous flow monitoring is occurring at all 14 monitoring stations over the duration of the RPWS. Data from the continuous flow monitoring are processed to calculate the following indicators for evaluating hydrologic impacts from urban development as described in DeGasperi et al. (2009):

- **High flow pulse:** Occurrence of daily average flows that are equal to or greater than a threshold set at twice (two times) the long-term daily average flow rate.
    - **High pulse count:** Number of days each water year that discrete high flow pulses occur.
    - **High pulse duration:** Annual average duration (in days) of high flow pulses during a water year.
    - **High pulse range:** Range in days between the start of the first high flow pulse and the end of the last high flow pulse during a water year.
- **Low pulse count:** Occurrence of daily average flows that are equal to or less than a threshold set at 50 percent of the long-term daily average flow rate.
    - **Low pulse count:** Number of times each calendar year that discrete low flow pulses occurred.
    - **Low pulse duration:** Annual average duration (in days) of low flow pulses during a calendar year.
    - **Low pulse range:** Range in days between the start of the first low flow pulse and the end of the last low flow pulse during a calendar year.
- **Flow Reversal:** The number of times that the flow rate changed from an increase to a decrease or vice versa during a water year. Flow changes of less than 2 percent are not considered.
- **Richards-Baker (RB) flashiness index:** A dimensionless index of flow oscillations relative to total flow based on daily average discharge measured during a water year.
- **Flashiness ($T_{Q\ Mean}$):** The fraction of a year that mean daily discharge exceeds annual mean discharge.
- **Storm flow volume:** Total discharge volume during storm events over a water year.
- **Base flow volume:** Total discharge volume during base flow over a water year.
- **Total flow volume:** Total discharge volume over a water year.

To aid in the interpretation of these data, continuous precipitation monitoring is also being conducted at four separate precipitation monitoring stations: three stations were established for the RPWS—Tosh, Monticello, and Evans; and one station is maintained by the County for other purposes—Trilogy (Figure 9). Each station is used for measuring precipitation in the watershed for a specific creek, as follows:

- Tosh station: Tosh Creek and Country Creek
- Monticello station: Tyler Creek and Monticello Creek
- Evans station: Evans Creek
- Trilogy station: Seidel Creek and Colin Creek.

For this report, statistical analyses were performed (see description in Data Analysis Procedures section) to detect trends over time at each monitoring station based on the indicators described above. The pattern of interest is evidence that receiving water conditions are improving based on the detection of statistically significant trends in the data for one or more of these indicators in the Application watersheds while these same trends are not detected in the data for the same indicators in the Reference and Control watersheds.

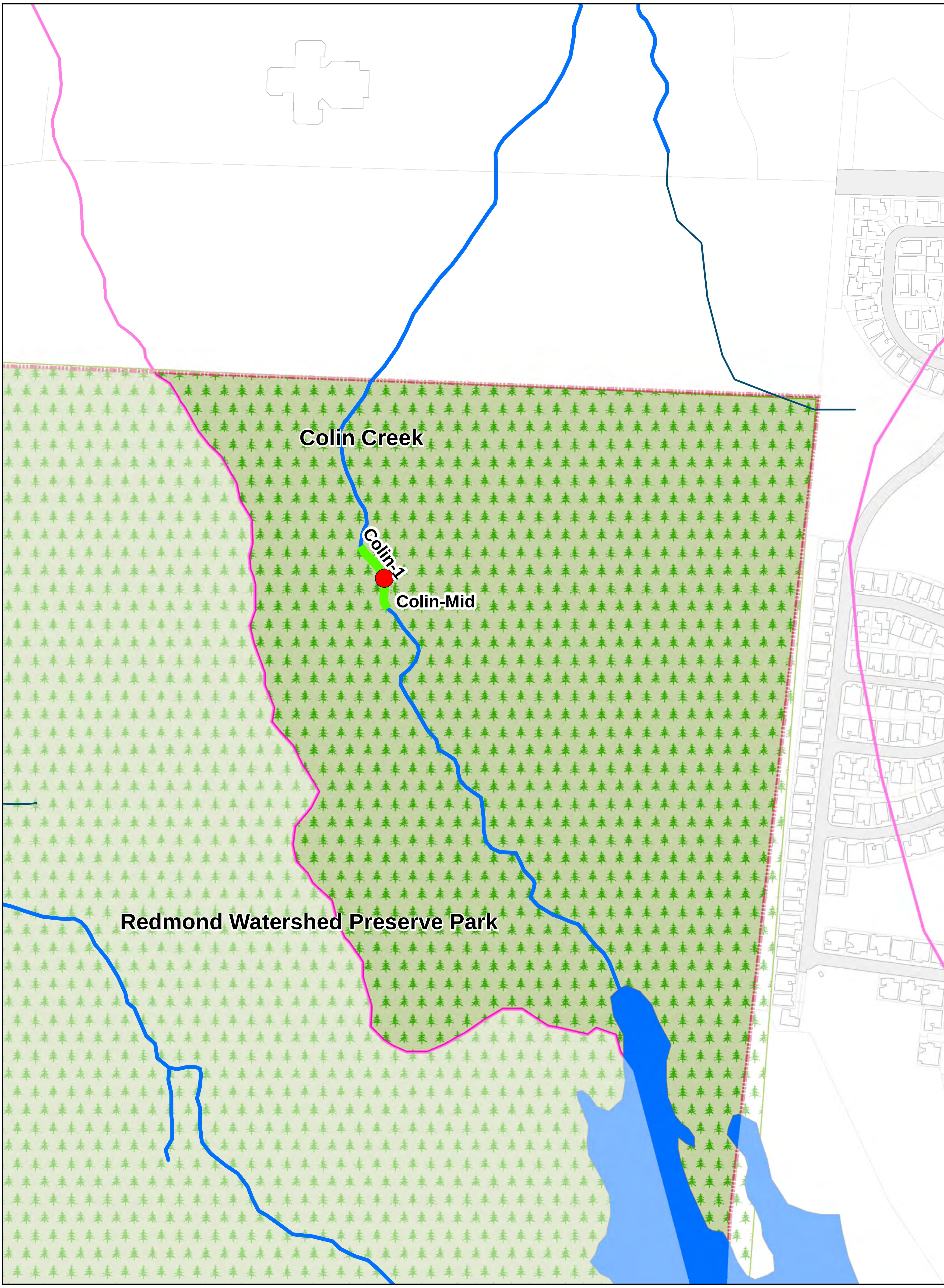

Figure 5 - Colin Creek Paired Watershed Study Monitoring Locations.

City of Redmond, Washington

6/25/2015

N

0 0.0325 0.065 0.13 Miles

City of Redmond WASHINGTON

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Legend

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- Single Family Low Density
- Single Family Medium Density
- Single Family Rural Density
- Flow & WQ Monitoring
- Habitat, sediment & Biological Monitoring

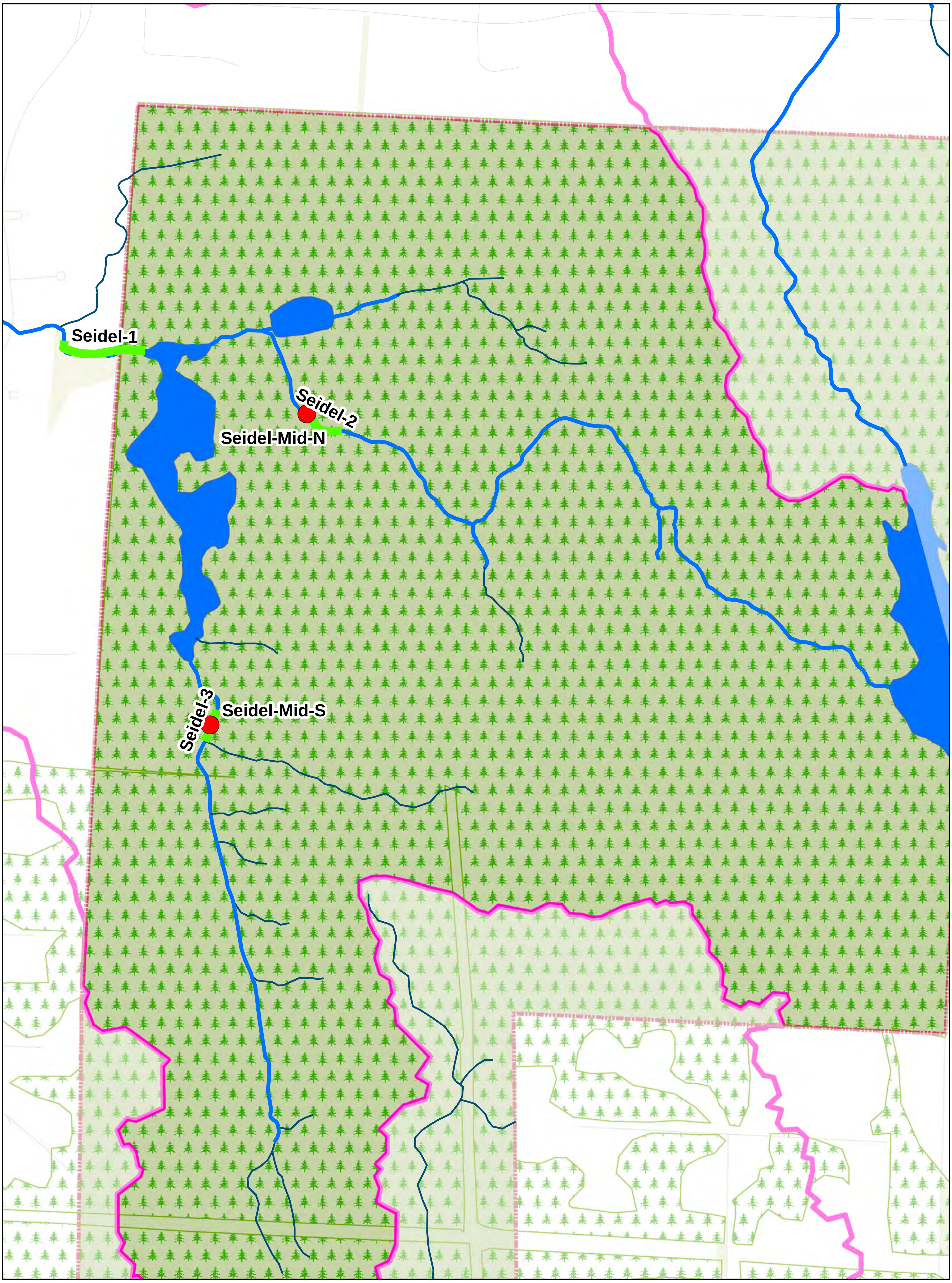

Figure 6 - Seidel Creek Paired Watershed Study Monitoring Locations.

City of Redmond, Washington

11/22/2013

N

0 0.05 0.1 0.2 Miles

City of Redmond WASHINGTON

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- Ponds
- City Limits
- Watershed Boundary
- Commercial
- Industrial
- Multifamily
- Park / Undeveloped
- Public ROW
- Single Family HighDensity
- Single Family Low Density
- Single Family Medium Density
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- Habitat, Sediment & Biological Monitoring

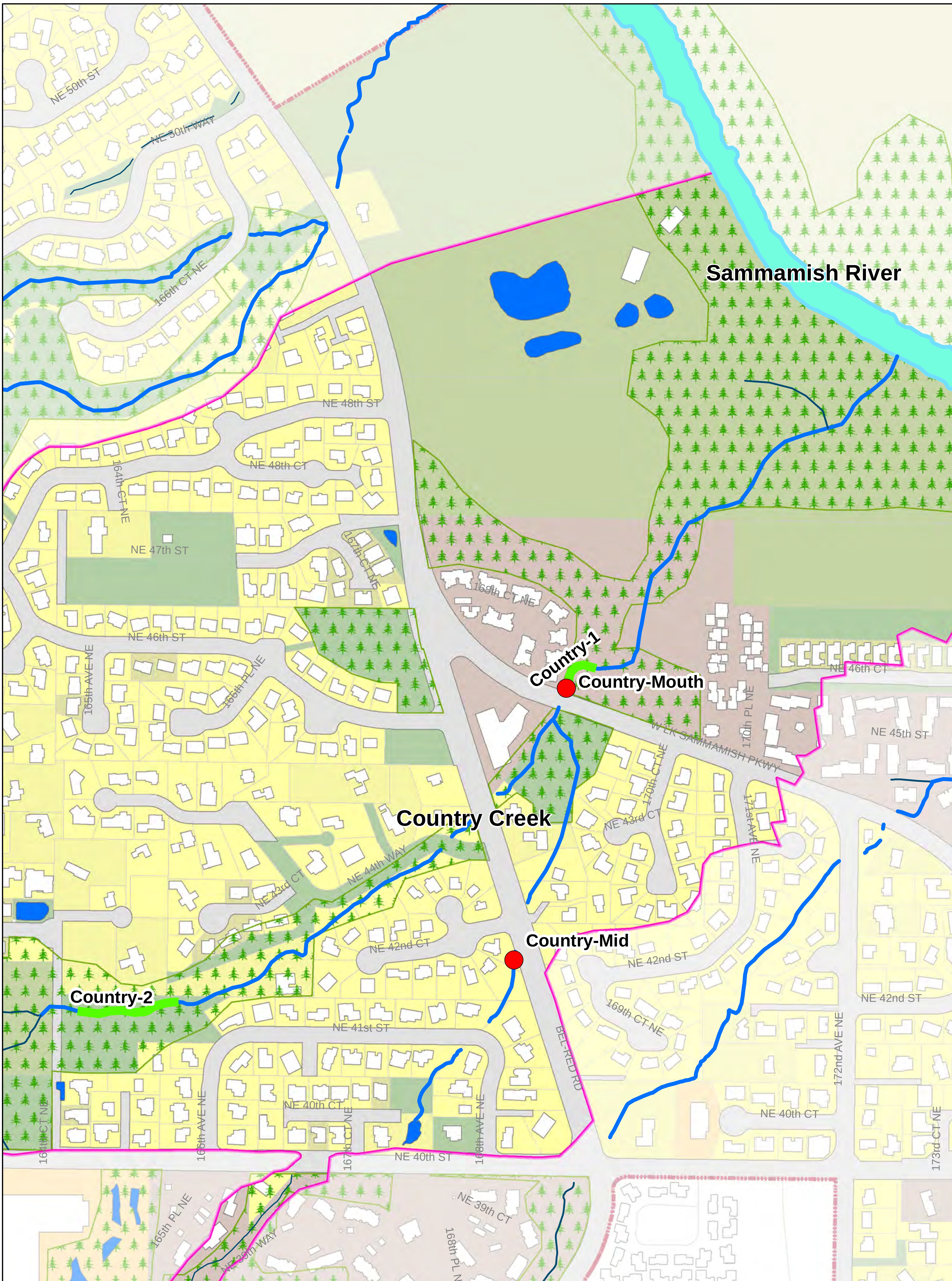

Figure 7 - Country Creek Paired Watershed Study Monitoring Locations.

City of Redmond, Washington

6/25/2015

City of Redmond WASHINGTON

0 0.0325 0.065 0.13 Miles

N

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- Ponds
- City Limits
- Watershed Boundary
- Commercial
- Industrial
- Multifamily
- Park / Undeveloped
- Public ROW
- Single Family HighDensity
- Single Family Low Density
- Single Family Medium Density
- Single Family Rural Density
- Flow & WQ Monitoring
- Habitat, Sediment, & Biological Monitoring

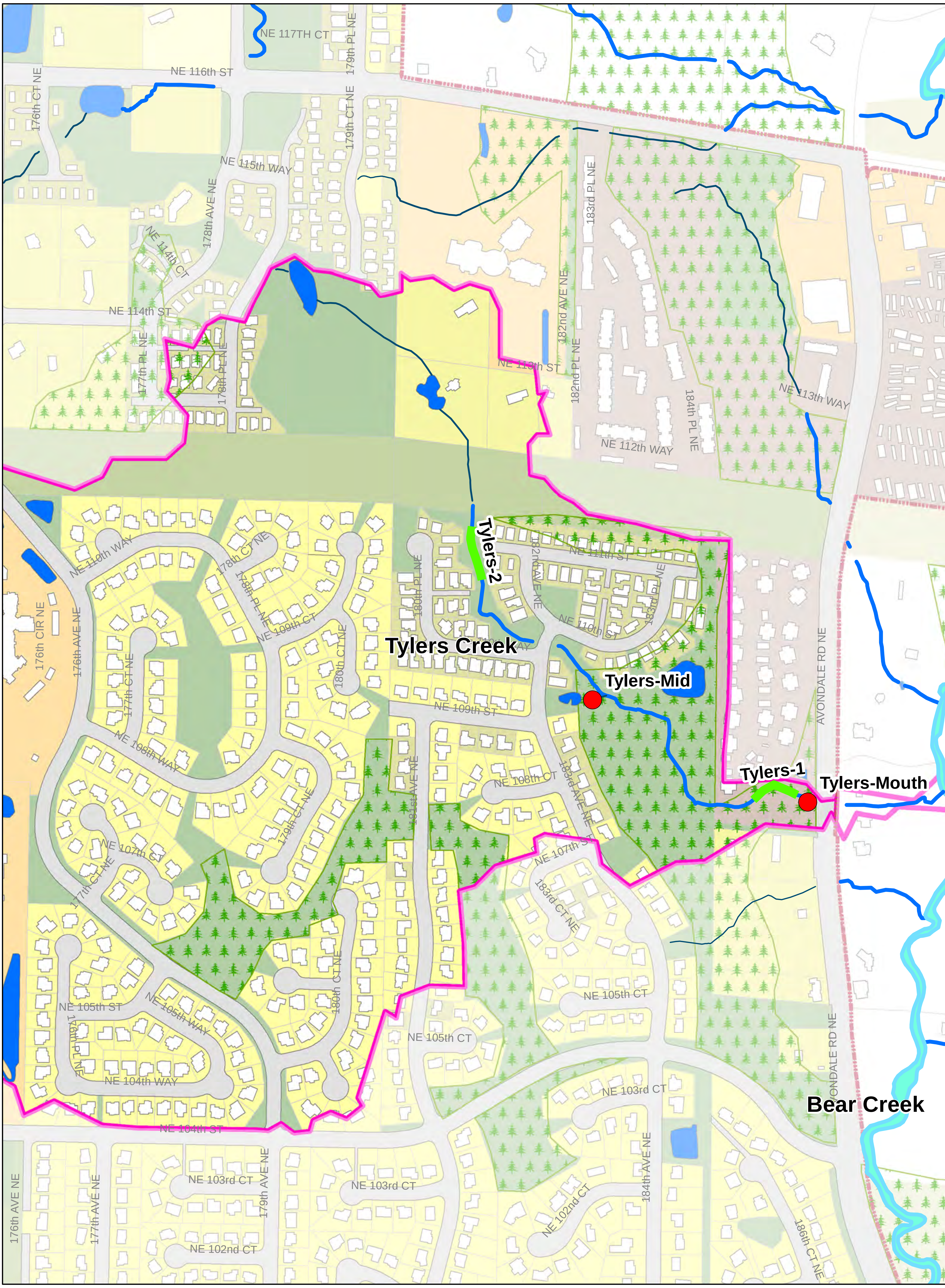

Figure 8 - Tylers Creek Paired Watershed Study Monitoring Locations.

City of Redmond, Washington
6/25/2015

N

0 0.0375 0.075 0.15 Miles

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- Ponds
- City Limits
- Watershed Boundary
- Commercial
- Industrial
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WASHINGTON

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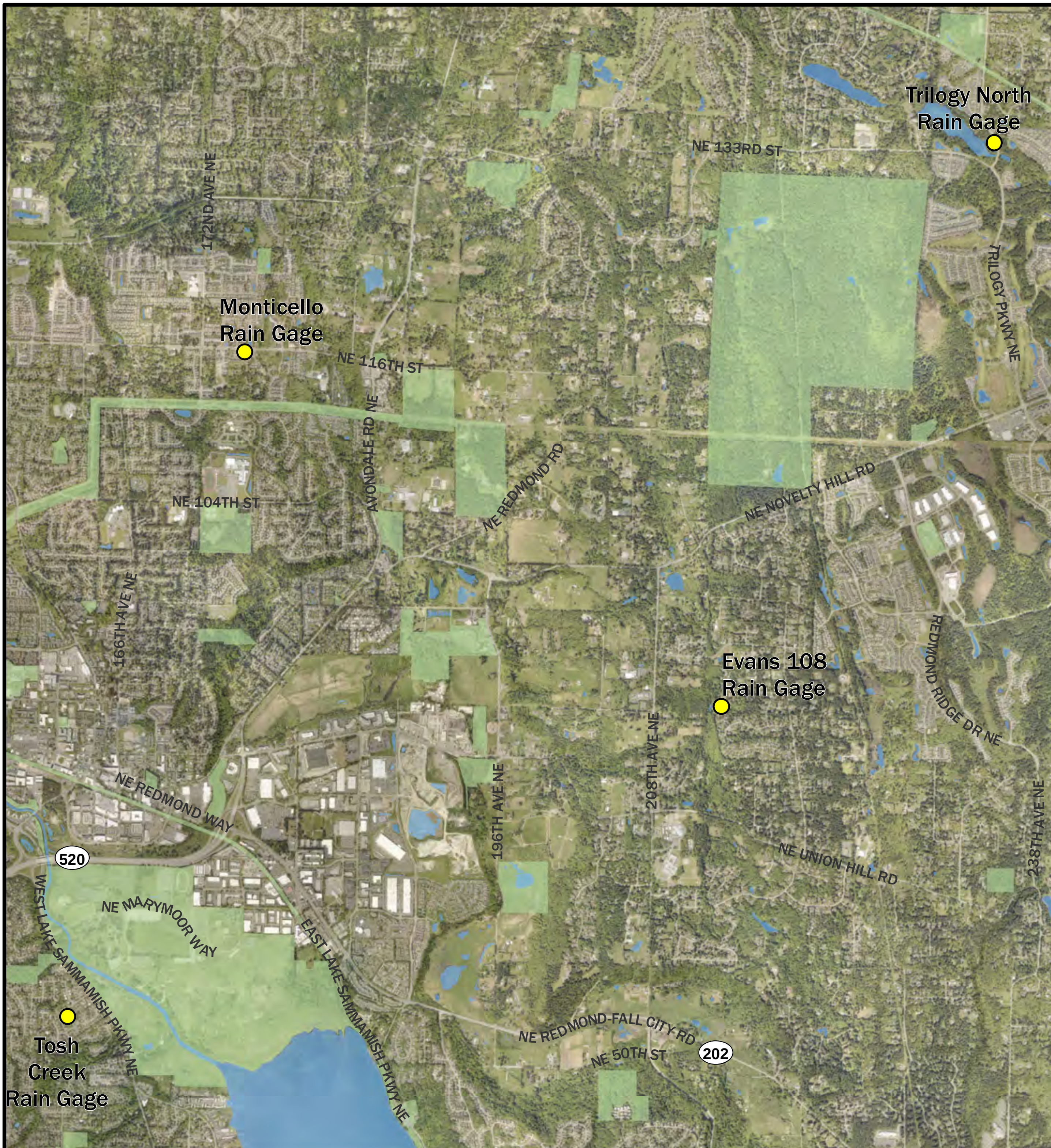

Legend

- Precipitation Monitoring Stations
- Water body
- Park

Figure 9.
Redmond Paired Watershed Precipitation Monitoring Locations.

N

0 1,825 3,650 7,300 Feet

HERRERA

King County Aerial (2019)

K:\Projects\Y2014\14-05806-000\Project\Report\Figure9_PrecMonitorLoc_RPWP.mxd (5/4/2020)

Water Quality Monitoring

A total of 14 fixed monitoring stations were established to facilitate water quality monitoring in each of the study watersheds. These stations are co-located with the monitoring stations described above for hydrologic monitoring (see Figures 2 through 8). Twelve grab samples are collected annually during storm events (three each quarter) at each of the 14 monitoring stations for the duration of the RPWS. In addition, four grab samples are collected annually during base flow (one each quarter) at these stations. Each sample is analyzed for the following indicators for evaluating water quality impacts from urban development:

- Total suspended solids
- Turbidity
- Conductivity
- Hardness
- Dissolved organic carbon
- Fecal coliform bacteria
- Total phosphorus
- Total nitrogen
- Copper, total and dissolved
- Zinc, total and dissolved

In addition, *in situ* probes are used to continuously measure temperature at each station and conductivity at the following subset of stations: EVALSS, EVAMS, MONM, MONMS, TOSMO, SEIMN, SEIMS, COUMO, and TYLMO.

For this report, statistical analyses were performed (see description in *Data Analysis Procedures* section) to detect trends over time at each monitoring station based on the indicators described above and the continuous temperature and conductivity data. The pattern of interest is evidence that receiving water conditions are improving based on the detection of statistically significant trends in the data for one or more of these indicators in the Application watersheds while these same trends are not detected in the data for the same indicators in the Reference and Control watersheds.

Physical Habitat Monitoring

A total of 19 fixed monitoring stations were established to facilitate physical habitat monitoring in each of the study watersheds. As described in the literature review (Herrera 2015b) that was performed to inform the experimental design for the RPWS, most past studies that have been performed to assess physical habitat response to watershed rehabilitation were conducted in reaches where channel rehabilitation measures were directly applied. Consequently, they were designed to only assess the localized effects of these efforts. The RPWS involves both localized channel rehabilitation and watershed scale rehabilitation through the application of structural and programmatic practices for stormwater management. Therefore, a synoptic approach was applied for establishing monitoring stations for physical habitat monitoring where stations were established in the Application watersheds in reaches with rehabilitation efforts and in reaches where no physical alterations to the channel are planned. In this way, the RPWS can assess physical habitat response to both localized and basin-wide rehabilitation efforts. In addition to these considerations, the specific location of each monitoring station was also influenced by safety and property access issues. The monitoring stations established in each of the study watersheds are as follows:

Application Watersheds

- Evans Creek Tributary 108: Two stations designated Lower Stream Station (EVALSS) and Midstream Station (EVAMS), respectively (see locations in Figure 2).
- Monticello Creek: Five stations designated Mont-1, Mont-2, Mont-3, Mont-4, and Mont-5, respectively (see locations in Figure 3).
- Tosh Creek: Four stations designated Tosh-1, Tosh-2, Tosh-3, and Tosh-4, respectively (see locations in Figure 4).

Reference Watersheds

- Colin Creek: One designated Colin-1 (see locations in Figure 5).
- Seidel Creek: Three stations designated Seidel-1, Seidel-2, and Seidel-3, respectively (see locations in Figure 6).

Control Watersheds

- Country Creek: Two stations designated Country-1 and Country-2, respectively (see locations in Figure 7).
- Tyler's Creek: Two stations designated Tylers-1 and Tylers-2, respectively (see locations in Figure 8).

The following monitoring stations were specifically selected to measure the localized physical habitat response in reaches that have either been recently restored or are likely to be restored in the future:

- Mont-3
- Mont-4
- Mont-5
- Tosh-1
- Tosh-3
- Tosh-4

The restoration efforts in Evans Creek do not include installing instream features for which there would be localized physical habitat responses, and therefore no monitoring stations from this watershed are included in the list.

Physical habitat monitoring is conducted annually at each of the 19 monitoring stations over the duration of the RPWS. The characteristic bed-form type is recorded at each monitoring station, and physical habitat quality indicators are measured at 11 cross-sections (transects) and thalweg (line of steepest descent along the streambed) profile for each habitat monitoring station.

The following indicators are measured at each transect:

- Bankfull width, wetted width, and cumulative bar width
- Bankfull depth, wetted depth, substrate class and embeddedness at 11 or more stations across the section
- Fish cover
- Human influence
- Riparian shading
- Riparian vegetation structure
- Presence of desirable/undesirable plant species

The following indicators are measured along the thalweg profile:

- Thalweg depth and the presence of bars and/or edge pools
- Large woody debris and habit unit descriptions
- Side-channel descriptions
- Main channel slope and bearing
- Presence, source, size, of culvert or pipes draining to creek

Post-processing of recorded physical habitat indicators allows monitoring of:

- Channel incision or aggradation
- Channel widening, narrowing, or migration
- Changes in channel slope, sinuosity, and/or bed-form type

For this report, these indicators were evaluated qualitatively (see description in *Data Analysis Procedures* section) to detect trends over time. The pattern of interest is evidence that receiving water conditions are improving for one or more of these indicators in the Application watersheds while the same trends are not detected in the data for the same indicators in the Reference and Control watersheds.

Sediment Quality Monitoring

A total of 19 fixed monitoring stations were established to facilitate sediment quality monitoring in each of the study watersheds. These stations were co-located with the monitoring stations described above for physical habitat monitoring (see Figures 2 through 8). Sediment samples are collected annually at all 19 monitoring stations over the duration of the RPWS. Each sample is analyzed for the following indicators for evaluating sediment quality impacts from urban development:

- Total organic carbon
- Copper
- Zinc
- Polycyclic aromatic hydrocarbons
- Phthalates

For this report, statistical analyses were performed (see description in *Data Analysis Procedures* section) to detect trends over time at each monitoring station based on these indicators. The pattern of interest is evidence that receiving water conditions are improving based on the detection of statistically significant trends in the data for one or more of these indicators in the Application watersheds while these same trends are not detected in the data for the same indicators in the Reference and Control watersheds.

Biological Monitoring

A total of 19 fixed monitoring stations were established to facilitate biological monitoring in each of the study watersheds. These stations were co-located with the monitoring stations described above for physical habitat monitoring (see Figures 2 through 8). Benthic macroinvertebrate samples were collected annually at each monitoring station for the duration of the RPWS. Each sample was processed to calculate the following indicators for use in evaluating stream health:

- Benthic Index of Biotic Integrity (B-IBI)
- Taxa Richness
- Ephemeroptera Richness
- Plecoptera Richness
- Trichoptera Richness
- Clinger Percent
- Long-Lived Richness
- Intolerant Richness
- Percent Dominant
- Predator Percent
- Tolerant Percent

For this report, statistical analyses were performed (see description in *Data Analysis Procedures* section) to detect trends over time at each monitoring station based on these indicators. The pattern of interest is evidence that receiving water conditions are improving based on the detection of statistically significant trends in the data for one or more of these indicators in the Application watersheds while these same trends are not detected in the data for the same indicators in the Reference and Control watersheds.

EFFECTIVENESS MONITORING

Roving stations will be established for the Effectiveness Monitoring component of the RPWS to verify specific structural stormwater controls are constructed properly and performing as designed. The roving stations will be moved from one year to the next once a facility's effectiveness has been verified and new facilities come online. The specific types of monitoring to be performed at each roving station will depend on the type of structural stormwater control that is being evaluated. For example, it is anticipated that only hydrologic monitoring would be performed at roving stations for facilities that are only designed for flow control (e.g., vaults). In these cases, a facility's performance would be verified based on comparisons of measured flow from the roving station to the facility's predicted flow from models used in its design. For facilities that are designed for runoff treatment, monitoring will follow guidelines from Ecology's Technology Assessment Protocol-Ecology (TAPE) (Ecology 2011) and include both hydrologic (e.g., influent and effluent flow) and water quality monitoring. In these cases, a facility's performance would be verified based on comparisons of its measured pollutant removal efficiency relative to targets that are identified in TAPE for specific treatment categories.

At present, no new structural stormwater controls have come online in an Application watershed that are suitable for Effectiveness Monitoring. For planning purposes, it is anticipated that two separate facilities will be completed and made available for monitoring in year 6 of the study, respectively. For each facility, detailed information on the procedures that will be used for data collection, quality assurance and control, management, and analysis will be provided in separate addendums to the QAPP that was prepared for the study (Herrera 2015c).

REHABILITATION EFFORT SUMMARY

As noted in the previous section, the pattern of interest for this study will be evidence that receiving water conditions are improving based on one or more indicators in the Application watersheds while conditions in the Reference and Control watersheds remain relatively static. To increase the likelihood of detecting this trend, conditions in the Application watersheds were characterized over a "baseline" period prior to the implementation of any rehabilitation efforts that generally spanned WY2016. Rehabilitation efforts that have subsequently been implemented by the City or County in each of the Application watersheds are described below.

Evans Creek Tributary 108:

- In WY2017, the County constructed two stormwater detention vaults within the Evans Creek Tributary 108 watershed; one was in front of addresses 20620 and 20626 Northeast 76th Place, and the other was in front of address 20508 Northeast 78th Street.

Monticello Creek:

- Using funding from a King County WaterWorks grant, the City initiated a street sweeping project in the Monticello Creek watershed:
  - Street sweeping increased from quarterly to monthly in August of WY2017 and continued throughout WY2018. The street sweeping occurred on all public roads in the watershed.
  - Beginning in October of WY2019, the frequency of street sweeping increased from once per month to biweekly (twice per month). This street sweeping was implemented to meet the specific goal of improving water quality in the creek and conducted in addition to street sweeping that occurs in the watershed for other operational reasons, such as collecting leaves in fall.
- In WY2017, large woody debris was installed on an approximately 400-foot-long reach of Monticello Creek that extends downstream from Northeast 122nd Street. Approximately 400 feet of additional large woody debris was installed in July of WY2018 on the downstream end of the installation from WY2017.
- In WY2019, invasive species removal and supplemental planting was completed in an approximately 2,000 square feet project area located at the Fischer Village native growth protection easement downstream of 178th Avenue Northeast. Fifty-five trees and 15 shrubs were planted. Himalayan blackberry (*Rubus armeniacus*) was removed from the project area.

Tosh Creek:

- The high flow bypass pipe weir for the Tosh Creek watershed was adjusted in July of WY2017 to divert more high flow stormwater from Tosh Creek.

- Large woody debris was installed on an approximately 300-foot-long reach of Tosh Creek in WY2017, downstream of West Lake Sammamish Parkway. In July of WY2018, adjustments were made to this large woody debris and minor slash was added to the reach.

- In WY2019, a planting was conducted in an approximately 40,000 square feet project area located in the lower section of Tosh Creek, between West Lake Sammamish Parkway and the Sammamish River. Sixty-five shrubs and 627 trees were planted. Normal maintenance was performed at the site, including removal of the invasive species Himalayan blackberries and bittersweet nightshade (*Solanum dulcamara*).

DATA ANALYSIS PROCEDURES

This section describes the data analyses procedures that were performed on the compiled data from monitoring in WY2016 through WY2019. It begins with a section describing the procedures that were applied to these data to detect trends in the individual watersheds for each monitoring category. A concluding section then describes procedures that were used to perform a spatial statistical analysis to identify broader influences on stream health across all the watersheds.

TREND ANALYSIS PROCEDURES

This section describes the data analyses procedures that were performed on the compiled data from monitoring in WY2016 through WY2019 to detect potential improving trends in receiving water conditions related to the implementation of rehabilitation efforts. This information is organized under separate subsections for each of the monitoring categories: hydrologic, water quality, physical habitat, sediment, and biological monitoring. In some cases, trend analyses that were not identified in the QAPP for the RPWS (Herrera 2015c) are identified for evaluating the potential benefits of specific rehabilitation measures that have been implemented in an Application watershed. These instances are noted in the subsections for each monitoring category.

All analyses described herein were performed using the R statistical software. The raw flow, temperature, and conductivity data used in these analyses can be access via King County's Hydrologic Information Center:

<https://green2.kingcounty.gov/hydrology/Data.aspx>.

The raw water and sediment quality data used in these analyses can be accessed via Ecology's Environmental Information Management System:

<https://apps.ecology.wa.gov/eim/search/Eim/EIMSearchResults.aspx?ResultType=LocationList&StudySystemIds=99971043&StudyUserIdSearchType=Equals&StudyUserIds=RSM_EFS1>.

The raw data from biological monitoring used in these analyses can be accessed via Puget Sound Stream Benthos database:

<https://benthos.kingcounty.gov/Biotic-Integrity-Scores.aspx?Agency-Project=Redmond%3A%20RPWS&d=4>.

Hydrologic Monitoring

Analyses conducted for hydrologic monitoring involved correlation tests to look for trends over time and hypothesis tests that compared conditions before and after implementation of rehabilitation efforts in a specific watershed. The procedures used for these analyses are described in the following subsections.

Correlation Analyses for Hydrologic Indicators Versus Time

Trends in hydrology over time at each monitoring station were evaluated using the nonparametric Kendall's tau and parametric Pearson's r tests for correlation between the indicators identified in Table 2 for hydrologic impacts and time. Statistical significance of the correlation coefficients was evaluated based on an α-level of 0.05 for a one-tailed test and the following null and alternative hypotheses related to hydrologic impacts:

- Ho: hydrologic conditions remain unchanged or have deteriorated over time
- Ha: hydrologic conditions have improved over time

The following expected responses to urbanization for each indicator (DeGasperi et al. 2009) were also used in the interpretation of these results:

- High pulse count: increase
- High pulse duration: decrease
- High pulse range: increase
- Low pulse count: increase
- Low pulse duration: decrease
- Low pulse range: decrease
- Flow reversal: increase
- Richards-Baker (RB) flashiness index: increase
- Flashiness (TQ Mean): decrease
- Storm flow volume: increase
- Base flow volume: decrease

Results from the Kendall's tau and Pearson's r correlation tests from this analysis are summarized in Tables 3 and 4, respectively.

Correlation Analyses of Rainfall Runoff Response Versus Time

The rainfall runoff response for a given watershed can be influenced by a number of factors including soil type, available storage, and amount of urban development. In general, urban development will increase the volume and peak flow rate for runoff that is generated by a storm event of a given size. Stormwater BMPs are designed to mitigate these impacts.

Using procedures described in Helsel and Hirsch (2002), potential changes in rainfall runoff response over time at each monitoring station were evaluated using the following steps:

1. Continuous flow data from each station and the applicable precipitation data were post-processed using a custom program written in Visual Basic that delineates the start and stop time of individual storm events based on user selectable storm criteria (e.g., antecedent dry period, minimum rainfall, interevent dry period, etc.). The program then computes the following suite of summary statistics for each storm event:
    - Precipitation start and stop times
    - Precipitation duration
    - Precipitation depth
    - Precipitation average intensity
    - Precipitation maximum intensity
    - Precipitation antecedent dry period
    - Flow start and stop times
    - Flow duration
    - Average flow rate
    - Maximum flow rate
    - Flow volume
2. The storm flow volume and precipitation depth data were then log transformed and plotted for visual inspection. Similar plots were developed for maximum flow rate versus precipitation depth. These plots are provided in Appendix A.
3. Relationships between storm event precipitation depth at each station and runoff response as measured by storm flow volume and maximum flow rate were then characterized by fitting a LOcally WEighted Scatterplot Smooth (LOWESS) through the data from Step 2. LOWESS is a smoothing technique that can be used to describe the relationship between two variables without assuming linearity or normality of residuals.

Scatter plots showing storm event discharge volume and peak flow rate versus precipitation depth are shown in Appendix A with the associated the LOWESS fits.

4. Trends over time in the rainfall runoff response at each monitoring station were evaluated using a Seasonal Kendall test that was applied to the residuals from the LOWESS fits from Step 3. Plots of the residuals over time are also shown in Appendix A. The seasonal Kendall test accounts for seasonality by computing the Mann-Kendall test on each of m seasons separately, and then combining the results. The Seasonal Kendall test was used in this analysis because the rainfall runoff response at each station varied substantially between dry and wet seasons. Seasons were therefore defined in these tests as follows:

   - Wet: November through April
   - Dry: May through October

5. Statistical significance of the correlation coefficients from the seasonal Kendall tests were evaluated based on an α level of 0.05 for a two-tailed test and the following null (Ho) and alternative (Ha) hypotheses:

   - Ho: the flow volumes or maximum flow rate has not changed for a given storm precipitation depth over time
   - Ha: the flow volumes or maximum flow rate has increased or decreased for a given storm precipitation depth over time

Note that a two-tailed test was used for this analysis after visual inspections of the plots from Step 2 suggested there was a consistent trend in the data across most of the watersheds. A two-tailed test was performed to evaluate the statistical significance of this trend (see *Discussion* section for more detailed information). Results from the Seasonal Kendall tests from this analysis are summarized in Table 5. A more detailed summary of the results from these tests is also provided in Appendix B.

This analysis was not identified in the QAPP for the RPWS (Herrera 2015c); rather, it was added following discussion and approval from the technical advisory committee for the RPWS during a meeting on July 29, 2019. It was meant to replace analyses described in the QAPP that would have involved comparisons of continuous flow monitoring data to modeled flows for forested and existing conditions (i.e., conditions when the models were developed) that were derived from existing hydrologic models that have been developed for the Tosh and Monticello. The model based analysis was deemed less useful because existing models are only available for these two watersheds; hence, trends identified through this analysis could not be evaluated relative to conditions in the Reference and Control watersheds. The analysis presented here was applied across all the watersheds and directly assessed the statistical significance of trends in hydrologic conditions without relying on modeled flows.

Comparison of Rainfall Runoff Response Before and After Vault Construction in the Evans Creek Watershed

As described in the *Rehabilitation Effort Summary* section, the County constructed two stormwater detention vaults within the Evans Creek Tributary 108 watershed. The potential benefits of these facilities would only have been realized at the EVALSS station given the location of these vaults in the watershed (Figure 10). To directly assess these benefits, changes in rainfall runoff response over time were evaluated at all the monitoring stations before and after these vaults became operational on October 31, 2017 using the following steps:

1. As described in the previous subsection, continuous flow data from each station and the applicable precipitation data were post-processed using a custom program written in Visual Basic that delineates the start and stop time of individual storm events based on user selectable storm criteria.

2. The storm flow volume and precipitation depth data were then log transformed and plotted for visual inspection. Similar plots were developed for maximum flow rate versus precipitation depth.

3. Relationships between storm event precipitation depth at each station and runoff response as measured by storm flow volume and maximum flow rate were then characterized using a LOWESS fit through the data from Step 2 as described in the previous section. However, these relationships were only evaluated for data collected in WY2016, WY2017, and WY2018. Rainfall patterns in WY2019 were markedly lower; hence, data from these years were excluded to prevent introduction of a confounding variable in the analysis (see *Discussion* section for more detailed information).

4. The rainfall runoff response at each monitoring station before and after the vaults became operational were compared using a Mann-Whitney test that was applied to the residuals from the LOWESS fits from Step 3.

5. Statistically significant differences in the rainfall runoff response from the Mann-Whitney tests were evaluated based on an α level of 0.05 for a one-tailed test and the following null and alternative hypotheses:

    - Ho: the flow volume or maximum flow rate has stayed the same or increased for a given storm precipitation depth after the vaults became operational.

    - Ha: the flow volume or maximum flow rate has decreased for a given storm precipitation depth after the vaults became operational.

Results from the Mann-Whitney tests from this analysis are summarized in Table 6; this table also provides an indication as to whether the flow volume and maximum flow rate generally increased or decreased at particular station after the vaults became operational. Box plots comparing the rainfall runoff response at each station before and after the vaults became operational are also provided in Appendix C. Each box plots shows the following information:

- Line in box: median
- Lower and upper edges of box: 25th and 75th percentiles, respectively
- Lower and upper whiskers: smallest and largest observed values from the dataset that fall within 1.5 times the interquartile range
- Points = values from the dataset that fall outside of 1.5 times the interquartile range

This analysis was not identified in the QAPP for the RPWS (Herrera 2015c); rather, it was added following discussion and approval from the technical advisory committee for the RPWS during a meeting on July 29, 2019.

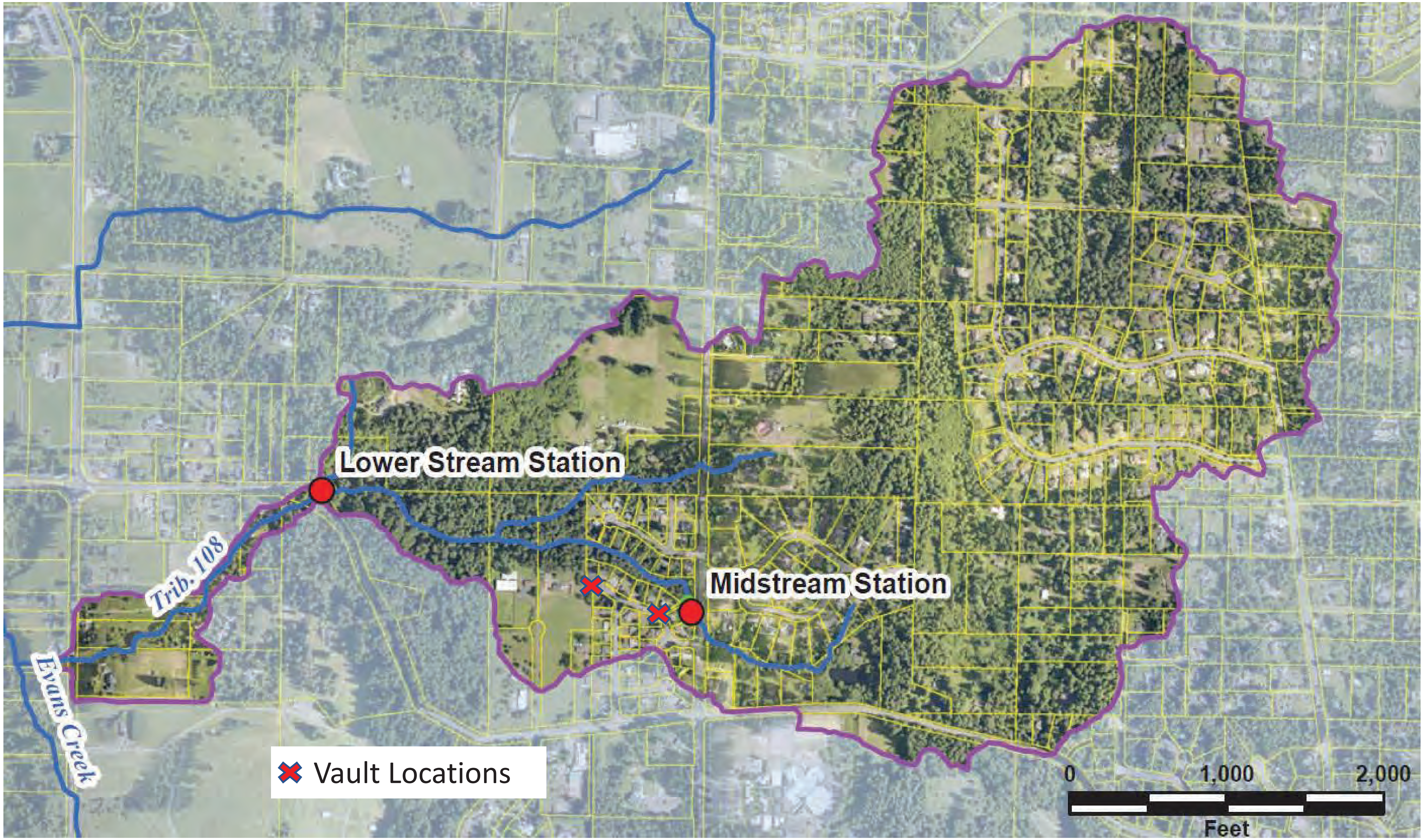

Figure 10. Location of Dention Vaults in the Evans Creek Watershed.

Water Quality Monitoring

Analyses conducted for hydrologic monitoring involved an initial screening step to confirm the representativeness of storm and base flow samples. Subsequent analyses involved correlation tests to look for trends over time and hypothesis tests that compared conditions before and after implementation of rehabilitation efforts in a specific watershed. The procedures used for these analyses are described in the following subsections.

Data Screening Procedures

Analyses performed for the data summary reports that were prepared for monitoring in WY2016 through WY2019 (Herrera 2017, 2018, 2019, 2020) indicated that some storm event samples may have been collected prior to a significant rise in the stream hydrograph at a given station despite the fact that a storm event had commenced and rainfall was falling in the associated watershed. This occurred because the time of concentration (time needed for water to flow from the most remote point in a watershed to the watershed outlet) varied substantially across the watersheds selected for the RPWS depending on their size and amount of development. The time of concentration for larger watersheds will tend to be longer whereas watersheds with more impervious area from development will tend to have a shorter time of concentration.

To confirm the data from these samples truly reflect water quality conditions associated with storm events, all the collected samples were screened using both flow and water quality data to ensure individual samples accurately represent water quality during storm and base flow conditions, respectively, using the following steps:

1. Time series plots were developed showing the timing of storm event and base flow sample collection relative to the hydrograph for each station.

2. Using the plots from Step 1, the timing of storm event and base flow sample collection at each station was visually inspected relative to the stream hydrograph. Storm event samples collected before an appreciable rise in the hydrograph were flagged as “Potential Base Flow.” Similarly, base flow samples that appeared to be collected on the rising limb of the hydrograph were flagged as “Potential Storm Event.” This resulted in four groups of samples: Storm Event, Potential Storm Event, Base Flow, and Potential Base Flow.

3. The median TSS concentration was calculated from the Storm Event and Base Flow samples, respectively, that were collected at each station. The median concentrations from the Storm Event samples were always higher than the median concentrations from the Base Flow samples. Box plots are provided in Figure 11 shows that show the distribution of TSS concentration at each station across the all four of the sample groups identified in Step 2.

4. The median concentrations from the Storm Event and Base Flow samples collected at each station were averaged to designate a representative midway concentration for assessing the anticipated water quality during storm events and base flow, respectively.

5. The TSS concentration of samples classified as Potential Storm Event or Potential Base Flow were compared to the halfway value. If the sample TSS concentration was less than the halfway value, the sample was classified as a Base Flow sample. If the sample TSS classification was greater than or equal to the halfway value, the sample was classified as a Storm Event sample.

A total of 840 samples were collected over WY2016 through WY2019; this total included 616 storm event and 224 base flow samples. Following Step 2, a total of 152 samples were flagged as Potential Base Flow and 2 samples were flagged as Potential Storm Event. Following Step 5, 98 of the Potential Base Flow samples were classified as Base Flow samples and none of the Potential Storm samples were classified as Storm Samples. Table 7 shows the number of storm event and base flow samples collected at each station following this analysis. The specific samples that were reclassified from storm event to base flow through this analysis are documented in Appendix D.

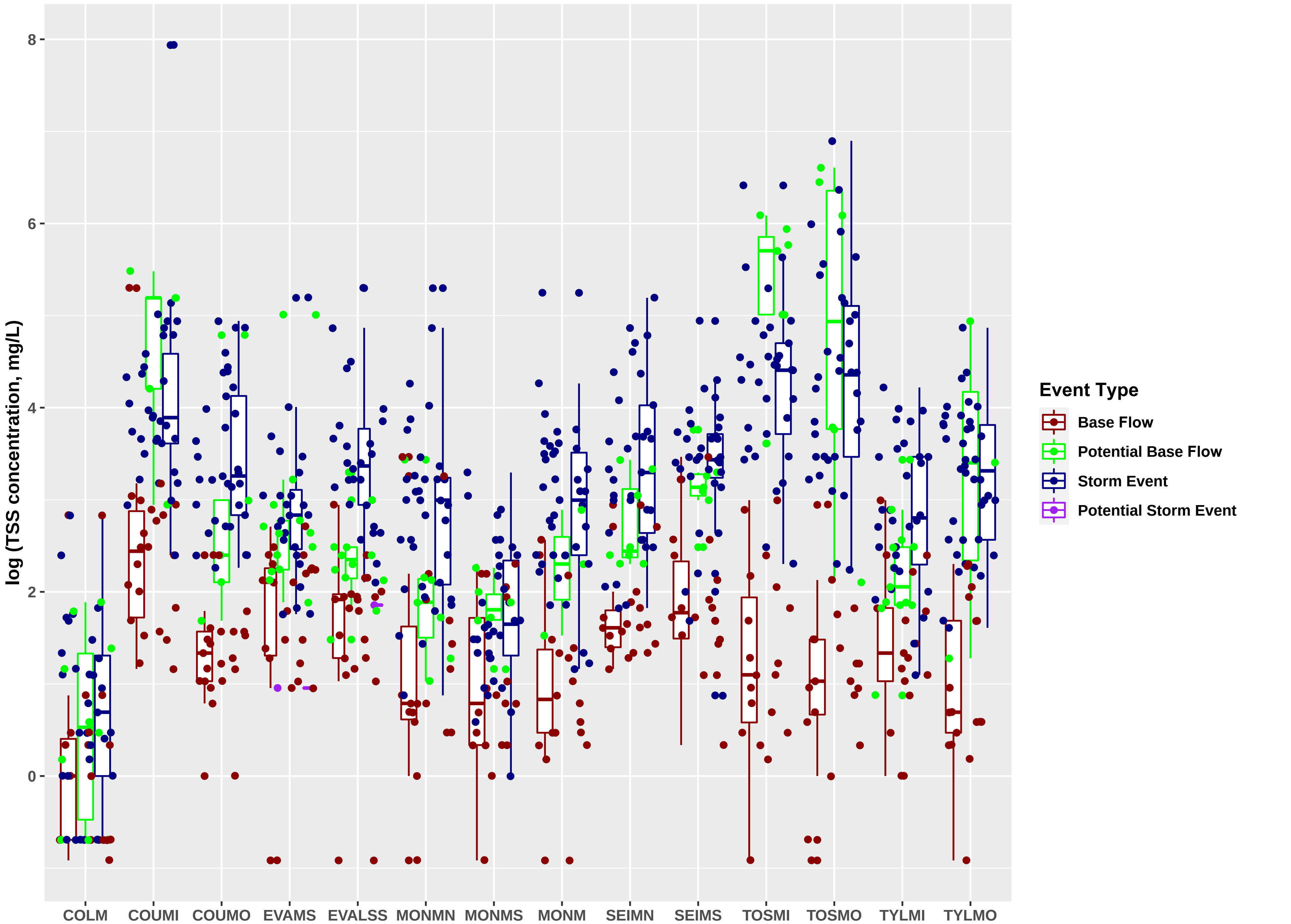

Figure 11. Total Suspend Solids Concentrations at Each Station by Event Type.

The EVALSS and EVAMS stations had the highest number of reclassified samples (16 and 13, respectively). Sampling procedures for these stations have been modified to ensure they are sampled later in the storm event to account for the apparent longer time of concentration for this watershed. Reclassification of the samples for the EVALSS and EVAMS stations will likely reduce the power of statistical tests described in the following subsections for identifying water quality trends across storm events. To quantify this loss of power, the smallest difference in TSS that is detectable 90 percent of the time with an α level of 0.05 was computed based on guidance provided in Zar (1996) using the original number of storm event samples (44) and the final number (28). Results from this analysis indicate the minimum detectable difference increased from 16.3 mg/L with the original number of samples to 23.5 mg/L with the final number. A similar loss of power should not be an issue for the remaining stations since a relatively small number of samples were similarly reclassified.

Correlation Analyses for Water Quality Indicators Versus Time

Trends in water quality over time at each monitoring station were evaluated using the nonparametric Kendall's tau and parametric Pearson's r tests for correlation between the indicators identified in Table 2 for water quality and time. Separate analyses were performed on the storm event and base flow samples from each station, respectively.

For analyses performed on baseflow samples, the raw concentrations were used in the Kendall's tau and parametric Pearson's r tests. For all parameters except hardness and dissolved organic carbon, the statistical significance of the correlation coefficients was evaluated based on an α-level of 0.05 for a one-tailed test and the following null and alternative hypotheses related to water quality impacts:

- Ho: concentrations remain unchanged or have increased over time
- Ha: concentrations have decreased over time

For hardness and dissolved organic carbon, the statistical significance of the correlation coefficients was evaluated based on an α-level of 0.05 for a two-tailed test and the following null and alternative hypotheses related to hydrologic impacts:

- Ho: concentrations remain unchanged over time
- Ha: concentrations have decreased or increased over time

A two-tailed test was used because there is no a priori hypothesis for these parameters that would suggest their concentrations will respond in a specific direction following implementation of watershed rehabilitation efforts. This contrasts with the other parameters where the specific hypothesis is concentrations will decrease in response to these efforts.

For analyses performed on storm event samples, the following steps from Helsel and Hirsch (2002) were performed to remove variation in the indicator data related to changes in stream flow prior to performing the correlation analyses:

1. The steam flow rate at the time each storm event sample was collected was determined for all stations. The flow rates and pollutant concentrations from each storm event sample were then log transformed and plotted for visual inspection. These plots are provided in Appendix E.

2. Relationships between storm event pollutant concentrations and stream flow rate at the time of sample collection were then modeled using simple linear regression. A sufficiently strong relationship was assumed if the slope of the regression model was significantly ($\alpha = 0.05$) different than zero and the associated r^2 value was greater than 0.35. Appendix F summarizes these data from the regression models for each pollutant and station combination.

3. If the relationships between storm event pollutant concentrations and flow rate at the time of sample collection was deemed sufficiently strong for a given station based on the criteria from Step 2, the Kendall's tau and Pearson's r tests were applied to the residuals from the associated linear regression models; otherwise, these tests were performed on the raw concentrations from each sample. The statistical significance of the correlation coefficients was evaluated using the approach describe above for the analyses performed on base flow samples.

Results from the Kendall's tau correlation tests from the analyses are summarized in Tables 8 and 9 for the storm event and base flow samples, respectively. Results from the Pearson's r correlation tests from the analyses are summarized in Tables 10 and 11 for the storm event and base flow samples, respectively.

Correlation Analyses of Mass Loading Estimates Versus Time

To detect potential improvements in receiving water conditions from the combined effects of improved water quality and reduced stormwater runoff, annual mass load estimates were derived for the following subset of indicators: total suspended solids, total phosphorus, total nitrogen, total copper, and total zinc. The specific steps that were performed to develop these estimates are as follows:

- Linear regression models for predicting pollutant loads as a function of stream discharge were generated using the measured pollutant concentrations in storm event and base flow samples from each station and the stream flow rate at the time of sample collection. Because logarithmic data transformations are required to obtain a linear model for these data, a correction factor for transformation bias was added to the models using the nonparametric *smearing* approach described by Helsel and Hirsch (1992). Separate models were developed for each station and pollutant combination using samples collected over a single water year.

- The linear regression models were then applied to the continuous flow record for each station to predict 5-minute pollutant load estimates at each station over the entire water year.

- These 5-minute pollutant load estimates were subsequently summed to quantify pollutant loads at each of the station for each water year.

The linear regression model and estimated annual pollutant loads from this analysis are documented in Appendices G and H. Based on an evaluation of these data, the following pollutant load estimates were rejected for the reasons indicated:

- Load estimates generated for all pollutants at the EVALSS station over WY2016 were rejected because they were unreasonably high. Water quality monitoring in WY2016 commenced in March 2016 or approximately halfway through the water year; hence, it is possible sampling may not have occurred over a sufficient range of flows at this station to develop accurate linear regression models.

- Load estimates generated for the following pollutants at the MONMN station over WY2016 were rejected because the slope coefficients for the associated regression models were not significantly different (= 0.05) from zero: total phosphorus, TSS, and total zinc.

- Load estimates generated for the following pollutants at the COLM station over WY2016 were rejected because the slope coefficients for the associated regression models were not significantly different (= 0.05) from zero: TKN, total phosphorus, and TSS.

- Load estimates generated for the following pollutants at the COUMI station over WY2016 were rejected because the slope coefficients for the associated regression models were not significantly different (= 0.05) from zero: TKN and TSS.

Excluding these rejected estimates, trends in hydrology over time at each monitoring station were subsequently evaluated using the nonparametric Kendall's tau and parametric Pearson's r tests for correlation between the mass load estimates and time. Statistical significance of the correlation coefficients was evaluated based on an α-level of 0.05 for a one-tailed test and the following null and alternative hypotheses related to hydrologic impacts:

- Ho: loads remain unchanged or have increased over time

- Ha: loads have decreased over time

Results from the Kendall's tau and Pearson's r correlation tests from this analysis are summarized in Tables 12 and 13, respectively.

Correlation Analyses of Continuous Temperature and Conductivity Data Versus Time

Continuous data for temperature and conductivity was post-processed to compute monthly average and maximum values from the time series. Trends over time at each monitoring station were evaluated using a seasonal Kendall's tau test (Helsel and Hirsch 2002) of correlation between these values and time with the seasons defined as follows:

- Spring: April through June
- Summer: July through September
- Fall: October through December
- Winter: January through March

The statistical significance of the correlation coefficients was evaluated based on an α-level of 0.05 for a one-tailed test and the following null and alternative hypotheses related to water quality impacts:

- Ho: temperature/conductivity remains unchanged or has increased over time
- Ha: temperature/conductivity has decreased over time

Results from the Seasonal Kendall tests from this analysis are summarized in Table 14. A more detailed summary of the results from these tests is also provided in Appendix I.

Comparison of Water Quality Indicators Before and After Street Sweeping in the Monticello Creek Watershed

As described in the *Rehabilitation Effort Summary* section, the City was conducting quarterly street sweeping on all public roads in the Monticello Creek watershed prior to the onset of the RPWS. The frequency of this street sweeping increased from quarterly to monthly in August of WY2017 and continued throughout WY2018. Beginning in October of WY2019, the frequency of street sweeping increased again from once per month to biweekly. The potential water quality benefits of this street sweeping could have been realized at all the stations in the watershed (MONM, MONMN, and MONMS) given its coverage.

To directly assess the water quality benefits of the streets weeping, pollutant concentrations in samples from periods with "quarterly sweeping," "monthly sweeping," and "biweekly sweeping" were separately grouped and a Kruskal-Wallis test was applied to determine if pollutant concentrations across these "treatments" were significantly different (α = 0.05) from another. Next a Bonferroni/Dunn post-hoc test was performed to determine if there were significant differences in pollutant concentrations between each possible combination of groups (i.e., quarterly versus monthly, quarterly versus biweekly, and biweekly versus monthly). Separate tests were performed on the pollutant concentrations from storm event and base flow samples, respectively.

Results from the Kruskal-Wallis tests from this analysis are summarized in Table 15 for the storm event samples; this table also reports the median concentration for each station, pollutant, and treatment combination (quarterly, monthly, and biweekly sweeping) to aid in the interpretation of these results. Table 16 provides the same information for the base flow samples. Finally, box plots comparing the pollutant concentrations at each station across these different treatments are also provided in Appendix J. Each box plots shows the information described above under the *Hydrologic Monitoring* subsections. The tables and box plots also include annotation that summarize the results from the Bonferroni/Dunn post-hoc tests; treatments that are not significantly different from each other are assigned the same letter ("a", "b", or "c") in these plots.

This analysis was not identified in the QAPP for the RPWS (Herrera 2015c); rather, it was added to augment a previous analysis (Herrera 2020) that only compared pollutant concentrations across the treatments for the stations in the Monticello Creek watershed without considering stations in the other Reference or Control watersheds.

Physical Habitat Monitoring

Over 260 indicators for physical habitat quality were calculated from the field surveys conducted at each station for the RPWS. Based on procedures from King County (2018) and guidance received from the technical advisory committee for the RPWS during a meeting on July 29, 2019, a subset of the following indicators was evaluated for this report to assess potential improvements in physical habitat quality:

- Riparian canopy closure: stream center densiometer measurement (Figure 12)
- Wood: wood volume normalized to a 100-meter reach length (Figure 13)
- Pools: residual pool area (Figure 14)
- Substrate: median particle diameter (Figure 15)
- Bed stability: logarithm of relative bed stability (Figure 16)

There are no state standards for these indicators, so summary statistics for the three watershed treatments (Application, Reference, and Control) were compared with regional data obtained from monitoring stations that were established through the SAM program for status and trends monitoring of lowland streams in the Puget Sound region. Data obtained from the first year of the status and trends monitoring (2015) are summarized in King County (2018) for monitoring locations both within and outside Urban Growth Areas (UGA) as defined by the Growth Management Act. For this analysis, data obtained from monitoring stations in the Application and Control watersheds were compared to regional data obtained from stations within the UGA. Similarly, data obtained from monitoring stations in the Reference watersheds were compared to regional data obtained from monitoring stations outside the UGA.

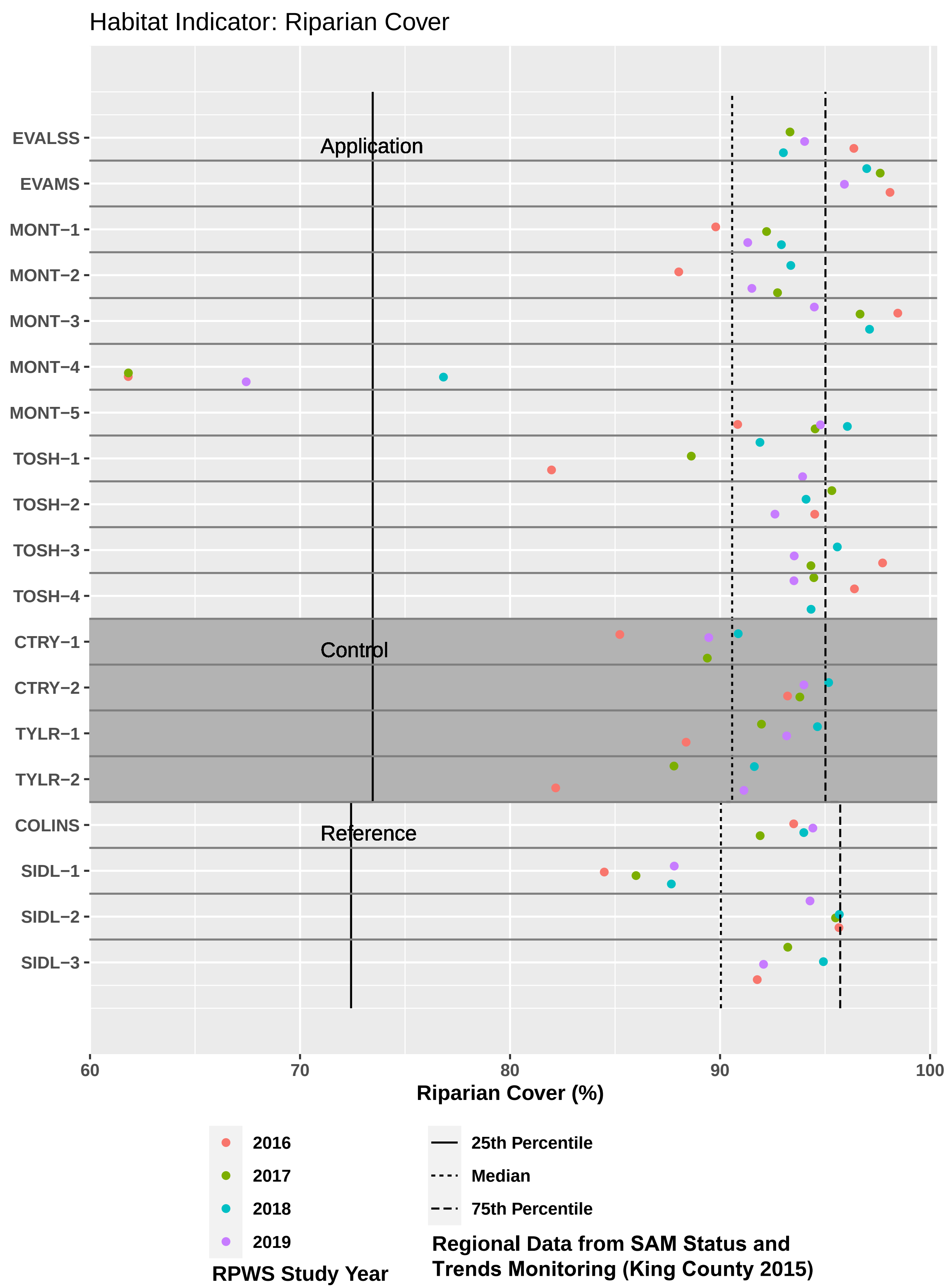

Figure 12. Riparian Cover Measurements at Each Station Compared to Regional Data.

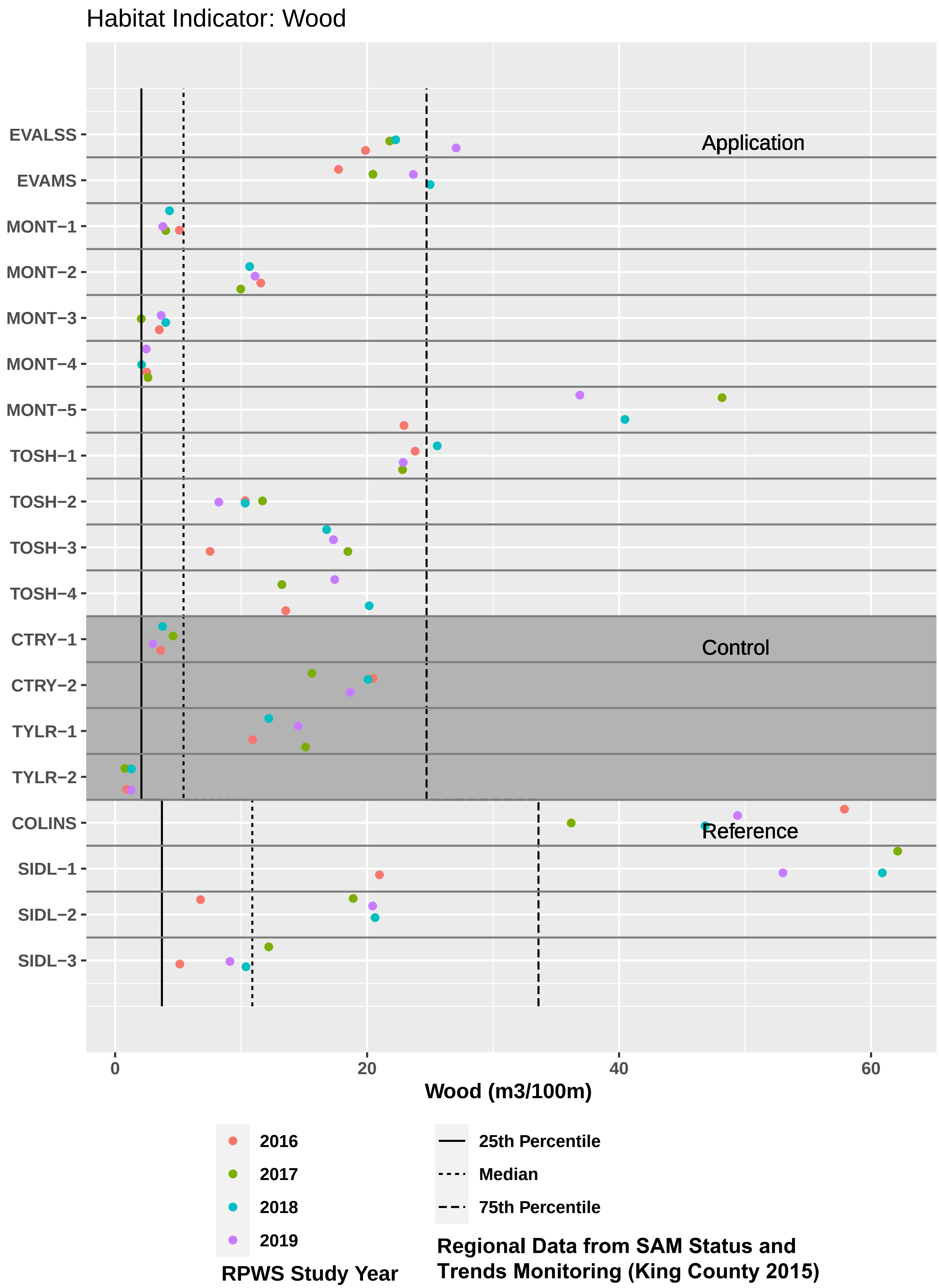

Figure 13. Wood Volume Measurements at Each Station Compared to Regional Data.

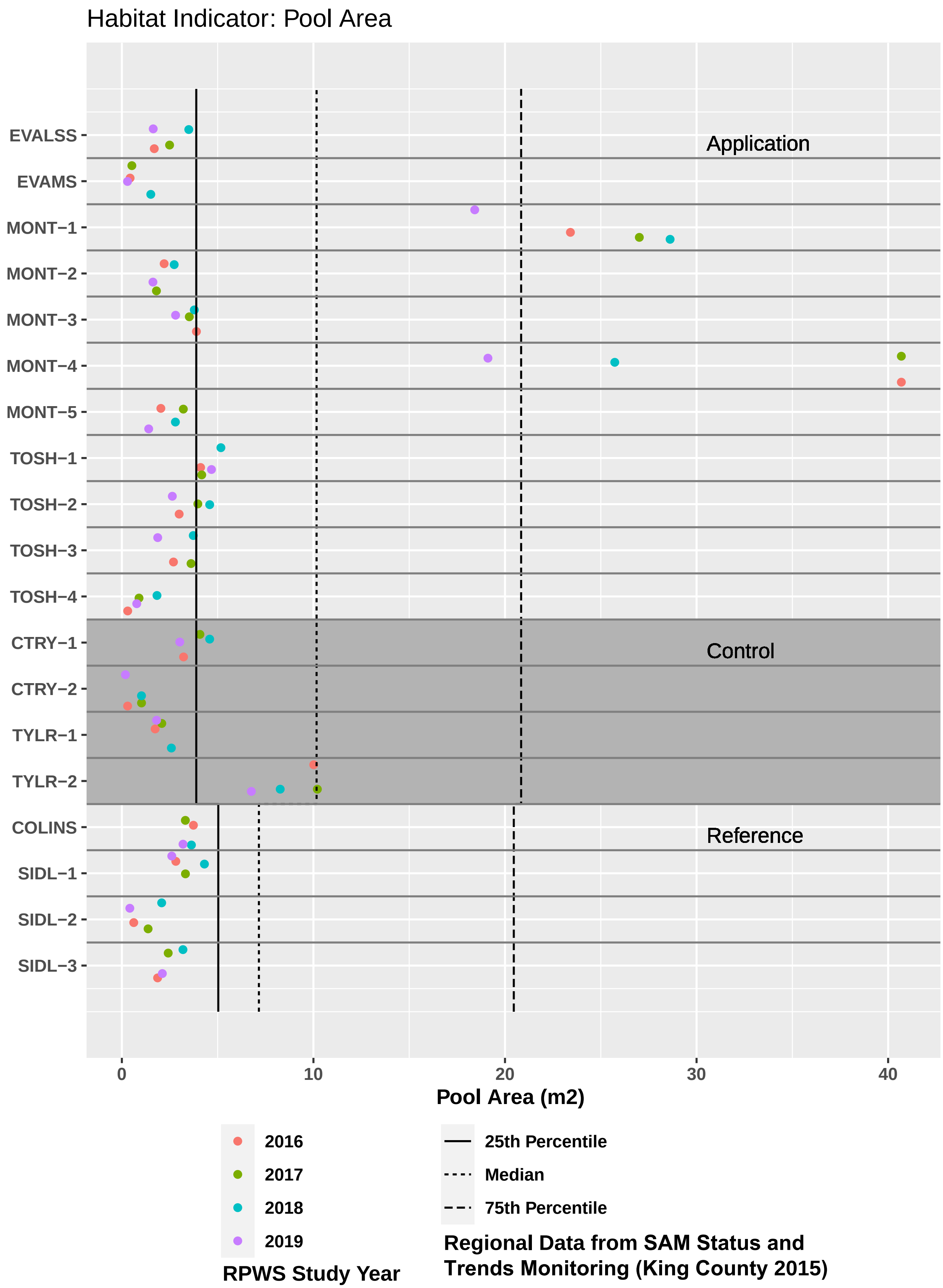

Figure 14. Pool Area Measurements at Each Station Compared to Regional Data.

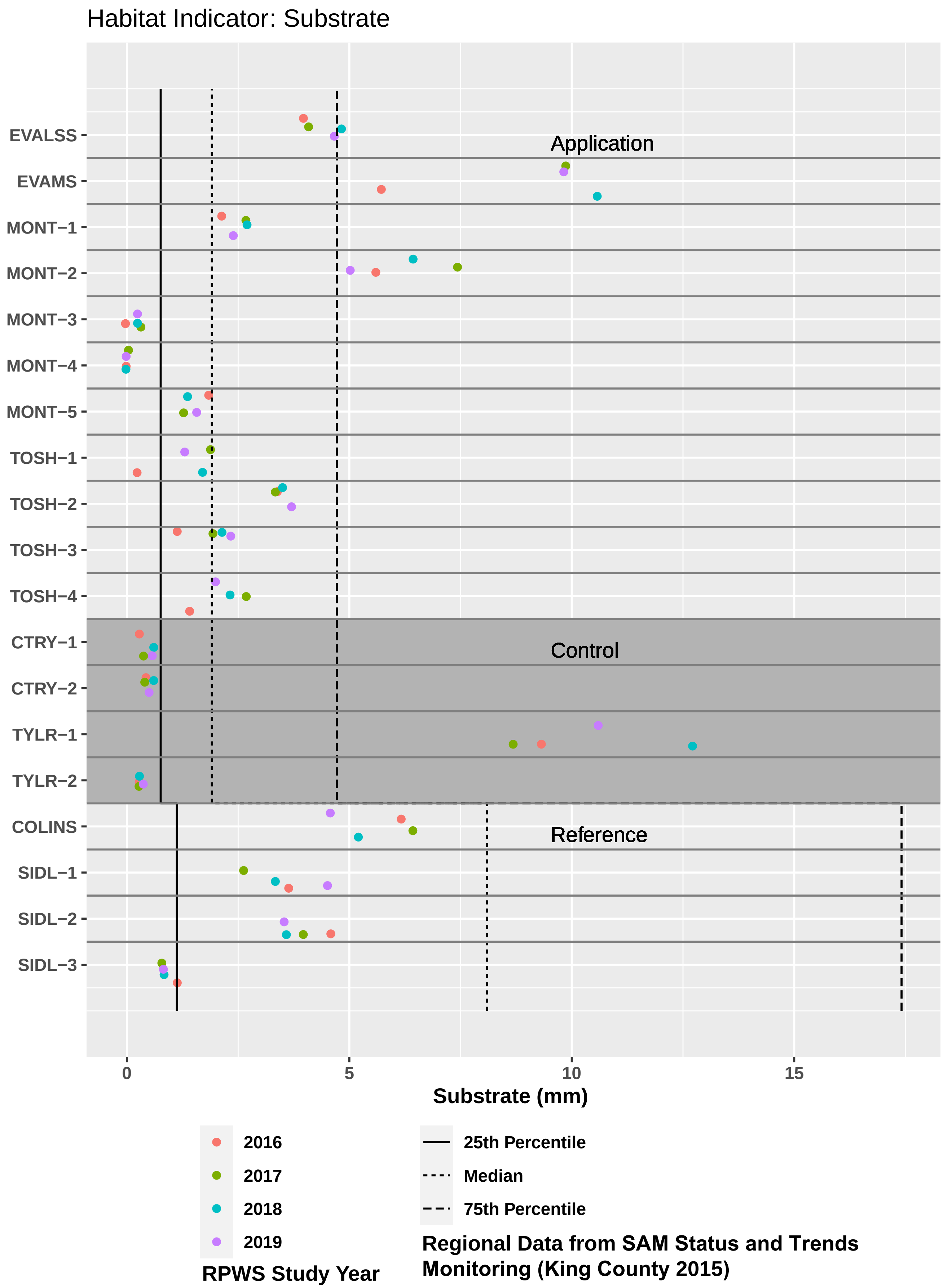

Figure 15. Substrate Size Measurements at Each Station Compared to Regional Data.

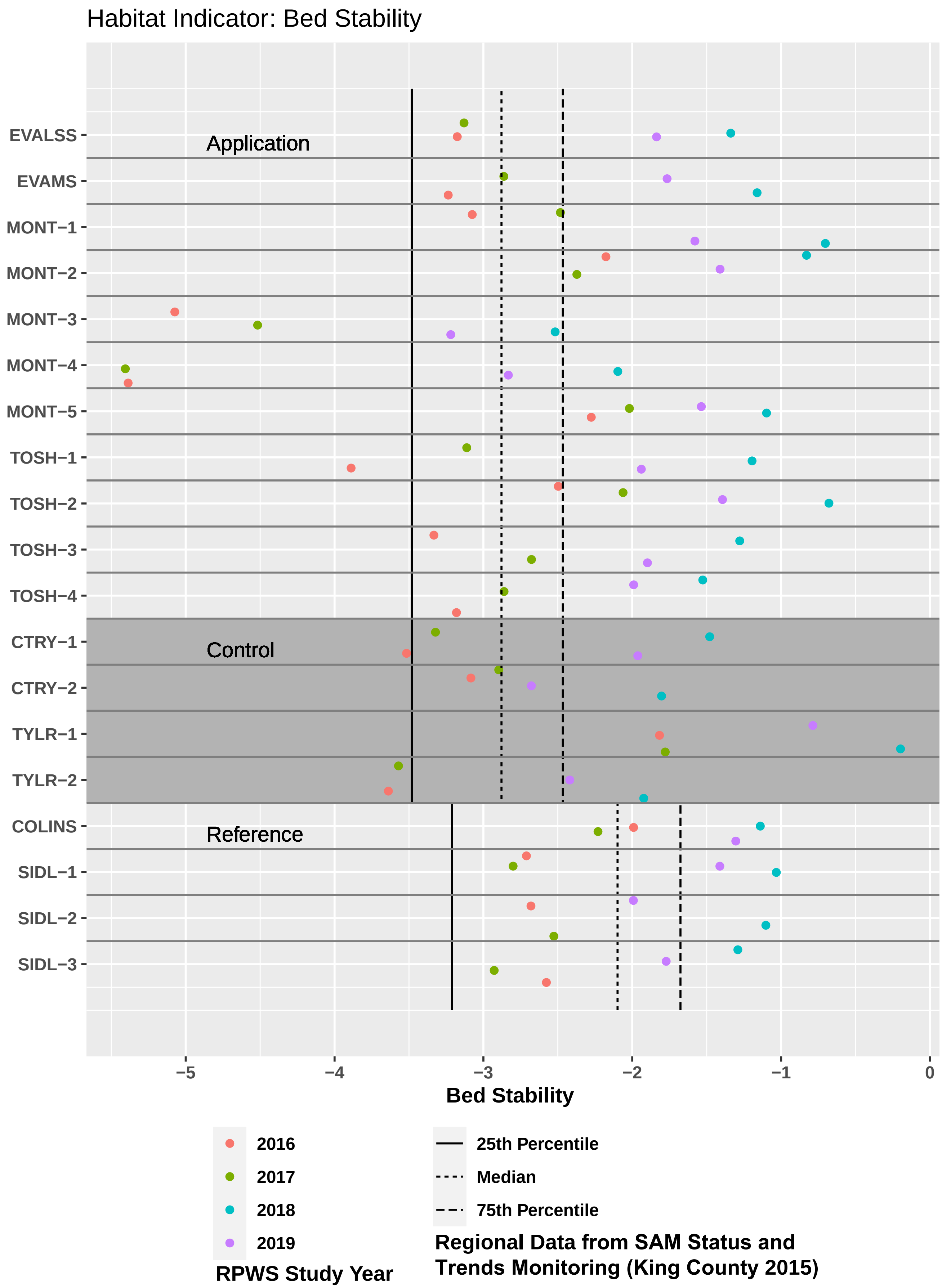

Figure 16. Bed Stability Measurements at Each Station Compared to Regional Data.

Sediment Quality Monitoring

Trends in sediment quality over time at each monitoring station were evaluated using the nonparametric Kendall's tau and parametric Pearson's r tests for correlation between the indicators identified in Table 2 for sediment quality and time. The statistical significance of the correlation coefficients was evaluated based on an α-level of 0.05 for a one-tailed test and the following null and alternative hypotheses related to sediment quality impacts:

- Ho: concentrations remain unchanged or have increased over time
- Ha: concentrations have decreased over time

Results from the Kendall's tau correlation tests from this analysis are summarized in Tables 17, 18, and 19 for the following groupings of pollutants, respectively:

- Total organic carbon, copper, and zinc
- Polycyclic aromatic hydrocarbons
- Phthalates

Results from the Pearson's r correlation tests from this analysis are summarized in Tables 20, 21, and 22 for these same groupings of pollutants, respectively.

Biological Monitoring

Trends in stream health over time at each monitoring station were evaluated using the nonparametric Kendall's tau and parametric Pearson's r tests for correlation between the indicators identified in Table 2 for stream health and time. The statistical significance of the correlation coefficients was evaluated based on an α-level of 0.1 for a one-tailed test and the following null and alternative hypotheses related to stream health:

- Ho: conditions remain unchanged or have declined over time
- Ha: conditions have improved over time

Results from the Kendall's tau and Pearson's r correlation tests from this analysis are summarized in Tables 23 and 24, respectively.

SPATIAL STATISTICAL ANALYSIS

Non-point source pollution is inherently tied to watershed landscape characteristics (Giri and Qiu 2016). A growing body of research has focused on using spatial statistical methods to predict water quality outcomes based on watershed landscape characteristics like land use, topographic variables (slope, elevation range, etc.), and urban development metrics.

The following watershed characteristic metrics were identified based on significant predictors of water quality that have been considered in other studies:

- **Mean watershed elevation and slope** – Mean elevation and slope of the total upstream watershed were calculated for each monitoring station.

- **Land cover** – Land cover was considered in several classes that are associated with human disturbance and urban development, including percent commercial/industrial, residential, forest, and agriculture.

- **Impervious area** – Percent impervious area (e.g., parking lots, roads, houses) in the total upstream watershed was calculated for each monitoring station.

- **Tree canopy cover** – Percent canopy cover is an alternative metric to looking at percent impervious area and it represents the portion of the watershed with vegetation intact.

- **Riparian vegetation** – The percent of the 100-foot buffer around streams covered in vegetation was calculated for each monitoring station. As riparian vegetation is removed from near streams, stream temperature tends to increase, which can have a negative impact on benthic macroinvertebrates.

- **Hydrologic soils** – Hydrologic soil classifications indicate how quickly water infiltrates soil and provides an indication of whether stormwater runoff is more likely to infiltrate or flow into streams. The percentage of slower-draining soils (Classes C and D) were calculated in the total upstream watershed for each monitoring station.

- **Number of stream crossings** – Locations where road centerlines cross streams were converted to points and counted in the total upstream watershed for each monitoring station.

A correlation matrix showing statistically significant relationships between potential watershed characteristics in red ($\alpha = 0.10$) is provided in Appendix K. The information included in this table was used to assess possible combinations of covariates to include in candidate regression models. For example, the percent of impervious area and percent canopy cover are highly negatively correlated ($R = -0.88$), which is to be expected: as pavement increases, tree canopy decreases. In this case, it would be appropriate to pick one covariate or the other to include in a candidate regression model, but not both.

Spatial autocorrelation is inherent in data collected at monitoring locations on freshwater streams because they are part of a larger network of nested watersheds and connected flows. The degree of autocorrelation between sites on a stream network is often highly dependent on whether the sites are connected directly by flow. For example, if an oil spill occurred into the water, it would be expected that concentrations of oil would be dependent for flow-connected sites, but not for flow-unconnected sites.

Candidate regression models based on stream data were created with the Spatial Streams Network (SSN) package in R and incorporated a moving average approach that accounts separately for flow-connected and flow-unconnected sites. Because stream networks are inherently branched, the moving average function splits as it moves upstream and applies weighting to each segment based on the relative contributing area of each stream segment. When weighting functions are only applied upstream of a site, the model is referred to as "tail-up" and correlations are non-zero only for flow-connected sites. Models that allow for covariance between both flow-connected and flow-unconnected sites are referred to as "tail-down" models.

Stepwise regression was used to identify significant independent variables to include in an optimal multiple regression model with B-IBI scores as the dependent variable. Significance was determined using $\alpha = 0.10$, which is a commonly used value for biological data. The covariates for each candidate model were then reviewed for multicollinearity and variables that were highly correlated were removed through a process of trial and error. A multiple regression model was then run in R using both tail-down and tail-up model parameters. Because benthic invertebrates are able to travel upstream but also tend to spend most of their life in a single stream reach, the regression analyses included both a tail-up and tail-down component (Moyle and Randall 2019). Results from the multiple regression model are summarized in Table 25.

RESULTS

This section describes the results from analyses that were performed on the compiled data from monitoring in WY2016 through WY2019. It begins with a section describing the results from analyses that were performed to detect trends in the individual watersheds for each monitoring category. A concluding section then describes the results from spatial statistical analysis to identify broader landscape influences on stream health across all the watersheds.

TREND ANALYSIS RESULTS

This section describes the results from analyses that were performed to detect potential improving trends in receiving water conditions related to the implementation of rehabilitation efforts. This information is organized under separate sections for each watershed type (Application, Reference, and Control). The results are then presented for each watershed under subsections for the following monitoring categories: hydrologic, water quality, physical habitat, sediment quality, and biological monitoring.

Application Watersheds

Trend analysis results are presented herein for the Application Watersheds (Evans Creek, Monticello Creek, and Tosh Creek) that are the focus of ongoing rehabilitation efforts.

Evans Creek Tributary 108

Hydrologic Monitoring

A significant improving trend was detected for "Low Pulse Range" based on the Kendall's tau and Pearson's r tests (Tables 3 and 4, respectively) at the EVAMS station.

There was a significant decreasing trend in the rainfall runoff response at the EVAMS station for flow volume and a significant decreasing trend at the EVALSS and EVAMS stations for maximum flow rate (Table 5).

There was no significant decrease in the rainfall runoff response at the EVALSS and EVAMS stations for both flow volume and maximum flow rate after the vaults in Evan's creek became operational (Table 6).

Water Quality Monitoring

A significant decreasing trend for fecal coliform during storm events was detected at the EVAMS station based on the Kendall's tau test (Table 8). No other trends were detected at the EVAMS and EVALSS stations during storm events and base flow based on the Kendall's tau or Pearson's r tests (Tables 9, 10, and 11).

A significant decrease in total copper mass loading was detected at the EVALSS station based on the Pearson's r test (Table 13). A significant decrease in total nitrogen and TSS mass loading was also detected at the EVAMS station based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively).

No decreasing trends in temperature or conductivity were detected at the EVALSS and EVAMS stations (Table 14).

There were no significant differences in pollutant concentrations during storm events and base flow (Tables 15 and 16, respectively; Appendix J) at the EVALSS and EVAMS stations across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed.

Physical Habitat Monitoring

The indicators for physical habitat quality measured in Evans Creek at the EVALSS and EVAMS station from 2016 through 2019 were compared with regional data from within the UGA.

As shown in Figure 12, riparian cover at both stations was generally consistent across all years. Compared with the regional data, riparian cover at the EVALSS station was between the median and the 75th percentile for all years except 2016 when it was above the 75th percentile. Riparian cover at the EVAMS was above the 75th percentile for all years. Both stations had a mix of conifer and deciduous tree canopy cover, mixed understory, and herbaceous groundcover.

The amount of wood at the EVALSS and EVAMS stations did not change substantially from 2016 through 2019 (Figure 13). When compared to the regional data, wood volume for both stations was around the 75th percentile. The riparian cover along each bank provides potential material for large wood recruitment in the stream that could improve habitat diversity and provide forage material for fish.

The pool area at the EVALSS and EVAMS stations did not show substantial change from 2016 through 2019; pool areas at both stations was below the 25th percentile from the regional data for all years (Figure 14). Although the pool area was low at both stations, the amount of wood present has created substantial habitat diversity, especially at the EVALSS station. The combination of wood and large substrate in the stream has created braided channels, riffles, and quiescent waters along the banks.

Substrate size did not change at the EVALSS station and was around the 75th percentile from the regional data for 2016 through 2019 (Figure 15). For the EVAMS station, substrate size increased from 2016 to 2017 and was above the 75th percentile from the regional data. Both stations have mix of boulders, cobble, and gravel.

Bed stability increased across both stations, with the highest bed stability observed in 2018 (Figure 16). Compared with the regional data, the bed stability of both the EVALSS and EVAMS stations was below the median in 2016 and 2017 and above the 75th percentile in 2018 and 2019. The amount of wood in the stream and large substrate size helped improve bed stability and habitat diversity, providing areas for substrate to settle and stabilize.

Sediment Quality Monitoring

No significant decreasing trends were detected in the indicators for sediment quality at the EVALSS and EVAMS stations based on the Kendall's tau test (Tables 17, 18 and 19) and Pearson's r test (Tables 20, 21, and 22).

Biological Monitoring

The following improving trends were detected in the indicators for stream health at the stations for Evans Creek based on the Kendall's tau and Pearson's r tests (Tables 23 and 24, respectively):

- Increase in score for Ephemeroptera Richness at the EVALSS station based on the Kendall's tau and Pearson's r tests.
- Increase in score for Clinger Richness at the EVALSS station based on the Kendall's tau and Pearson's r tests.
- Increase in score for Intolerant Richness at the EVALSS station based on the Kendall's tau test.
- Increase in score for Plecoptera Richness at the EVAMS station based on the Kendall's tau test.
- Increase in score for Intolerant Richness at the EVAMS station based on the Kendall's tau test.
- Increasing score for Predator Percent at the EVAMS station based on the Kendall's tau test.

Monticello Creek

Hydrologic Monitoring

A significant improving trend was detected for “Low Pulse Duration” and “Flow Reversal” at the MONMS station and “Flow Reversal” at the MONM station based on the Kendall’s tau and Pearson’s r tests (Tables 3 and 4, respectively).

There was a significant decreasing trend in the rainfall runoff response for flow volume and maximum flow rate at all the Monticello Creek stations (Table 5).

There was no significant decreasing trend in the rainfall runoff response at Monticello Creek stations for flow volume and maximum flow rate after the vaults in the Evan’s Creek watershed became operational (Table 6).

Water Quality Monitoring

The following trends were detected during storm events at the stations for Monticello Creek based on the Kendall’s tau and Pearson’s r tests (Tables 8 and 10, respectively):

- Decrease of fecal coliform bacteria at the MONMN station based on the Kendall’s tau and Pearson’s r tests.
- Decrease of total copper at the MONMS station based on the Kendall’s tau and Pearson’s r tests.
- Decrease of total suspended solids at the MONMS station based on the Kendall’s tau and Pearson’s r tests.
- Decrease of total nitrogen at the MONMS station based on the Kendall’s tau and Pearson’s r tests.
- Decrease of fecal coliform bacteria at the MONMS station based on the Pearson’s r test.
- Decrease of fecal coliform bacteria at the MONM station based on the Kendall’s tau and Pearson’s r tests.
- Decrease of total nitrogen at the MONM station based on the Kendall’s tautest.

The following trends were detected during base flow at the stations for Monticello creek based on the Kendall’s tau and Pearson’s r tests (Tables 9 and 11, respectively):

- Increase of dissolved organic carbon at the MONMN station based on the Pearson’s r test.
- Increase of hardness at the MONMN station based on the Kendall’s tau and Pearson’s r tests.

- Decrease in dissolved zinc at the MONM station based on the Kendall's tau and Pearson's r tests.
- Increase in hardness at the MONM station based on the Kendall's tau and Pearson's r tests.
- Decrease in total zinc at the MONM station based on the Pearson's r test.

A significant decrease in total nitrogen mass loading was detected at the MONMN station based on the Kendall's tau (Table 12). A significant decrease in total nitrogen and total phosphorus mass loading was also detected at the MONMS station based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively). Finally, a significant decrease in total copper, total nitrogen, TSS, and total zinc mass loading was detected at the MONM station based on the Kendall's tau and Pearson's r tests.

No decreasing trends in temperature or conductivity were detected at the any of the Monticello Creek stations (Table 14).

There were significant differences in total zinc and total phosphorus concentrations during storm events at the MONMN station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total zinc and total phosphorus concentrations from the period with biweekly sweeping were not significantly different from those from the period with quarterly sweeping; however, they were significantly higher than those from the period with monthly sweeping. Hence, there was no clear decreasing trend related to street sweeping for these parameters at this station.

There were also significant differences in total copper, total nitrogen, and TSS concentrations during storm events at the MONMS station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total copper concentrations during the period with biweekly sweeping were significantly lower than those from the period with quarterly sweeping. However, total copper concentrations from the period with monthly sweeping were not significantly different from concentrations measured during either of the other two periods. Total nitrogen and TSS concentrations during the period with biweekly sweeping were both significantly lower than those measured in the periods with quarterly and monthly sweeping. These results generally suggest a trend of lower pollutant concentrations exists for these parameters during the period of biweekly sweeping at this station.

Finally, there was a significant difference in total phosphorus concentrations during storm events at the MONM station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Concentrations from the period with monthly sweeping were significantly lower than those measured during the periods with quarterly and biweekly sweeping.

During base flow, there was only a significant difference in total copper concentrations at the MONMN station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 16 and Appendix J). In this case, concentrations from the period with biweekly sweeping were significantly higher than those measured during the periods with quarterly and monthly sweeping.

Physical Habitat Monitoring

The indicators for physical habitat quality measured at the five stations in Monticello Creek (MONT-1, MONT-2, MONT-3, MONT-4, and MONT-5) from 2016 through 2019 were compared with regional data from within the UGA. These stations varied widely in condition, from less disturbed stations MONT-1, MONT-2, and MONT-5, to developed and constrained stations MONT-3 and MONT-4.

Riparian cover was high for all the stations except the MONT-4 station, which was lower but showed some improvement from 2016 to 2018. Much of the improvement was likely related to extending the survey upstream of the wetland pond into a forested wetland area. There is no riparian cover through the first half of the station and the limited stream cover comes from native cattail (*Typha latifolia*) and invasive reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*). There were more native plants and shrubs leading up to the wetland pond, but the riparian buffer is narrow. At the MONT-1, MONT-2, and MONT-5 stations, there is a mix of deciduous and coniferous trees and shrubs. The MONT-3 station was recently restored along the upstream portion, with a narrow riparian buffer lining the station between two culverts. The downstream portion of the station flows into a more natural stream within a ravine between residential developments, containing deciduous and coniferous canopy and understory. Compared with the regional data, riparian canopy cover at the MONT-1, MONT-2, MONT-3, and MONT-5 stations generally ranged from above the median to above the 75th percentile (Figure 12). Riparian canopy cover at the MONT-4 station was below the 25th percentile for all years except 2018 when it was below the median.

Excluding the MONT-2 and MONT-5 stations, wood volume at the Monticello Creek stations was generally low. The MONT-2 station is within a ravine between residential developments and has deciduous and coniferous trees that provide potential woody recruitment for the reach. The MONT-5 station was restored in 2015 by adding several large wood pieces to the stream. Most of the wood was placed directly within the stream, parallel to flow. Compared with the regional data, wood density at the MONT-1, MONT-3, and MONT-4 stations fell below the median for all years (Figure 13). Wood volume at the MONT-2 station also showed no change between 2016 and 2019 and was above the median from the regional data. The only station to show improvement was the MONT-5 station; wood volume at this station fell below the 75th percentile from regional data in 2016 but increased to above the 75th percentile in 2017, 2018, and 2019. Several culverts in this watershed prevent downstream movement and migration of large wood.

Excluding the MONT-1 and MONT-4 stations, pool area for most stations in the Monticello Creek watershed was low. Flows in Monticello Creek are low; therefore, the MONT-5 station requires surveys early in the season before portions of the reach run dry. When compared with the regional data, pool area at the MONT-2, MONT-3, and MONT-5 stations was consistently at or below the 25th percentile and showed no change in 2016 through 2019 (Figure 14). The MONT-1 station extends from the mouth to Bear Creek upstream through the culvert beneath Avondale Road Northeast to an undeveloped open area. Pools at this station are generally scour pools formed in hardpan in the lower portions of the station; two plunge pools are also present at the culvert outlet and below a constructed log weir, respectively. Water for the MONT-4 station is supplied from a wetland pond at the upstream end that provides consistent flows. Several pools have formed around trail footbridges and from encroaching emergent vegetation, such as reed canarygrass. For most years (all except 2019), pool area at the MONT-1 and MONT-4 stations was above the 75th percentile from the regional data.

Substrate size was closely aligned with the observed level of disturbance in Monticello Creek and did not change throughout the first 4 years of this study. Substrate size at the MONT-3 and MONT-4 stations was low, below the 25th percentile from the regional data (Figure 15). The MONT-5 station is in the upper-most portion of this watershed; substrate size at this station fell below the median from the regional data. Substrate size at the MONT-1 station near the mouth of the creek was larger, above the median from the regional data; and substrate size at the MONT-2 station was above the 75th percentile for all years.

Bed stability was the only indicator that showed any substantive change from 2016 through 2019. At the MONT-1 station, bed stability was below the median from regional data in 2016 but increasing to at or above the 75th percentile from 2017 through 2019 (Figure 16). Bed stability at the MONT-2 and MONT-5 stations was at or above the 75th percentile for all years and showed similar improvement. The MONT-3 and MONT-4 stations displayed similar patterns of overall improvement with bed stability below the 25th percentile in 2016 and 2017, at or above the 75th percentile in 2018, and near the median in 2019.

Sediment Quality Monitoring

No significant decreasing trends were detected in the indicators for sediment quality at any of the Monticello Creek stations based on the Kendall’s tau test (Tables 17, 18 and 19) and Pearson’s r test (Tables 20, 21, and 22).

Biological Monitoring

The following improving trends were detected in the indicators for stream health at the stations for Monticello Creek based on the Kendall’s tau and Pearson’s r tests (Tables 23 and 24, respectively):

- Percent Dominant score at the Mont-1 station based on the Pearson’s r test.
- Percent Predator score at the Mont-1 station based on the Pearson’s r test.
- Plecoptera Richness score at the Mont-3 station based on the Kendall’s tau and Pearson’s r tests.

- Trichoptera Richness score at the Mont-3 station based on the Kendall's tau and Pearson's r tests.
- Long Lived Richness score at the Mont-3 station based on the Kendall's tau and Pearson's r tests.
- Percent Dominant score at the Mont-3 station based on the Pearson's r test.
- Taxa Richness score at the Mont-4 station based on the Kendall's tau and Pearson's r tests.
- Percent Dominant score at the Mont-4 station based on the Kendall's tau and Pearson's r tests.
- Long Lived Richness score at the Mont-5 station based on the Kendall's tau and Pearson's r tests.
- Tolerant Percent score at the Mont-5 station based on the Kendall's tau and Pearson's r tests.
- Overall score at the Mont-5 station based on the Pearson's r test.

Tosh Creek

Hydrologic Monitoring

A significant improving trend was detected for "High Pulse Range" at the TOSMI station and "Flow Reversal" at the TOSMO station based on the Kendall's tau and Pearson's r tests (Tables 3 and 4, respectively).

There was a significant decreasing trend in the rainfall runoff response at the TOSMI station (Table 5) for flow volume and maximum flow rate.

There was a significant decreasing trend in the rainfall runoff response at the TOSMI station for flow volume and maximum flow rate (Table 6) after the vaults in the Evan's Creek watershed became operational.

Water Quality Monitoring

The following trends were detected during storm events at the stations for Tosh Creek based on the Kendall's tau and Pearson's r tests (Tables 8 and 10, respectively):

- Decrease of dissolved organic carbon at the TOSMO station based on the Kendall's tau and Pearson's r tests.
- Decrease of total nitrogen at the TOSMO station based on the Kendall's tau and Pearson's r tests.

- Decrease of fecal coliform bacteria at the TOSMO station based on the Kendall's tau test.
- Decrease of total copper at the TOSMI station based on the Kendall's tau test
- Decrease of total nitrogen at the TOSMI station based on the Kendall's tau test.

No trends were detected during base flow at the stations for Monticello creek based on the Kendall's tau and Pearson's r tests (Tables 9 and 11, respectively).

No significant decreases in pollutant mass loading were detected at the TOSMO and TOSMI stations based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively).

No decreasing trends in temperature were detected at the TOSMO and TOSMI stations (Table 14). Similarly, no decreasing trends in conductivity were detected at the TOSMO station.

There was a significant difference in total nitrogen concentrations during storm events at the TOSMI station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total nitrogen concentrations during the period with quarterly sweeping were significantly higher than those from the periods with monthly and biweekly sweeping.

There were no significant differences in pollutant concentrations during base flow (Table 16 and Appendix J) at the TOSMO and TOSMI stations across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed.

Physical Habitat Monitoring

The indicators for physical habitat quality were measured at the TOSH-1 station downstream of West Lake Sammamish Parkway, and progressively upstream from the TOSH-2 station to the TOSH-4 station. Data from these stations were compared with regional data from within the UGA.

Riparian cover was consistently high at the TOSH-2, TOSH-3, and TOSH-4 stations with no substantial change from 2016 through 2019 (Figure 12). These stations are within a forested area with a mix of mature deciduous and coniferous trees and understory. Compared with the regional data, riparian cover at these stations was above the median for all years and above the 75th percentile for some years. The TOSH-1 station was the only station that showed consistent improvement with riparian cover below the median in 2016 and 2017, and above the median but below the 75th percentile in 2018 and 2019. The TOSH-1 station was restored in 2013 and canopy cover shows improvements as planted vegetation becomes established and matures.

Large wood was consistently present at all the Tosh Creek stations, with some recruitment observed in the upper TOSH-3 and TOSH-4 stations. Wood volume at each station was above the median from the regional data for all years, and at or above the 75th percentile at the TOSH-1 station (Figure 13). The stations upstream of West Lake Sammamish Parkway (TOSH-2, TOSH-3, and TOSH-4) have opportunity for future recruitment. Much of the wood at the TOSH-1 station was placed and anchored during reach restoration in 2013. Recruitment at this station is limited until vegetation matures. West Lake Sammamish Parkway serves as a barrier preventing downstream migration and movement of large wood from upstream reaches.

Pool area for all stations in Tosh Creek was low and showed no change from 2016 through 2019. Compared with the regional data, pool area at all stations in Tosh Creek was at or below the 25th percentile (Figure 14). Although there is good habitat diversity and wood presence at all stations, the low base flows during summer surveys may not actively engage all features, such as large wood to form pools.

Substrate size also showed no change from 2016 through 2019, although there was more variability among stations. Compared to the regional data, substrate size at the Tosh-1 station was mainly above the 25th percentile but below the median, except 2016 when it fell below the 25th percentile (Figure 15). Substrate size at the remaining stations (TOSH-2, TOSH-3, and TOSH-4) was consistently at or above the median from the regional data.

Bed stability was consistent among the stations but variable through the years. Bed stability at all stations was generally below the 75th percentile from the regional data in 2016 and 2017 and above the 75th percentile in 2018 and 2019, with the highest values consistently observed in 2018 (Figure 16).

Sediment Quality Monitoring

A significant decreasing trend was detected for anthracene at the Tosh-3 station based on the Kendall's tau test (Table 18) and Pearson's r test (Table 21).

Biological Monitoring

The following improving trends were detected in the indicators for stream health at the stations for Tosh Creek based on the Kendall's tau and Pearson's r tests (Tables 23 and 24, respectively):

- Predator Percent score at the Tosh-1 station based on the Kendall's tau and Pearson's r tests.
- Taxa Richness score at the Tosh-2 station based on the Kendall's tau test.
- Overall score at the Tosh-2 station based on Pearson's r tests.
- Ephemeroptera Richness score at the Tosh-3 station based on the Kendall's tau test.

Reference Watersheds

Trend analysis results are presented herein for the Reference Watersheds (Colin Creek and Seidel Creek).

Colin Creek

Hydrologic Monitoring

A significant improving trend was detected for "Low Pulse Range" in the COLM station based on the Pearson's r tests (Table 4); and no significant improving trends were detected for any of the indicators based on the Kendall's tau test (Table 3).

There was no significant trend in the rainfall runoff response at the COLM station for flow volume and maximum flow rate (Table 5).

There was no significant decreasing trend in the rainfall runoff response at the COLM station for flow volume and maximum flow rate after the vaults in the Evan's Creek watershed became operational (Table 6).

Water Quality Monitoring

The following trends were detected during storm events at the stations for Colin Creek based on the Kendall's tau and Pearson's r tests (Tables 8 and 10, respectively):

- Decrease of total nitrogen at the COLM station based on the Kendall's tau and Pearson's r tests.
- Decrease of total suspended solids at the COLM station based on the Kendall's tau test.

An increase of hardness was also detected during base flow at the COLM station based on the Pearson's r test (Table 11).

A significant decrease in total zinc mass loading was detected at the COLM station based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively).

No decreasing trend in temperature was detected at the COLM station (Table 14).

There were significant differences in total nitrogen and total phosphorus concentrations during storm events at the COLM station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total nitrogen concentrations during the period with quarterly sweeping were significantly higher than those from the periods with monthly and biweekly sweeping. Total phosphorus concentrations during the period with monthly sweeping were significantly lower than those from the periods with quarterly and biweekly sweeping.

There were no significant differences in pollutant concentrations during base flow (Table 16 and Appendix J) at the COLM station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed.

Physical Habitat Monitoring

The Colin Creek watershed has only one station (COLINS). The indicators for physical habitat quality for the COLINS station were compared with regional data from outside the UGA.

Riparian cover at the COLINS station showed little change through the years surveyed and was high compared with the regional data (Figure 12). Riparian cover was between the median and 75th percentile across all years. The entire station is in a forested area constrained at one point by a trail with a high footbridge. The vegetation at the station is a mix of deciduous and coniferous trees and understory.

Wood volume at the COLINS station was also high, consistently above the 75th percentile from the regional data (Figure 13). There is a relatively large amount of wood in the upstream end of the station, causing the stream to flow subgrade and along or within fallen large wood pieces. There is also a log jam at the downstream end of the footbridge at the station.

Colin Creek has extremely low flow during the summer and is one of the first streams surveyed before portions of the COLINS station become dry. Pool area is difficult to detect with low flow and did not change throughout the years surveyed. Pool area was below the 25th percentile from the regional data across all years (Figure 14).

Substrate size at the COLINS station did not change through the surveyed years and was consistently below the median from the regional data (Figure 15).

Bed stability was highly variable with results above the median from the regional data in 2016, below the median in 2017, and above the 75th percentile in 2018 and 2019 (Figure 16).

Sediment Quality Monitoring

Significant decreasing trends were detected for dibutyl phthalate and diethyl phthalate at the COLIN-1 station based on the Pearson's r test (Table 22).

Biological Monitoring

The COLIN-1 station goes dry later in the summer season, so samples were not collected during the 2017 season. An improving trend was detected in the Long Lived Richness at COLIN-1 station based on Pearson's r test.

Seidel Creek

Hydrologic Monitoring

A significant improving trend was detected for "Low Pulse Range" at the SEIMN station based on the Kendall's tau and Pearson's r tests (Tables 3 and 4, respectively). A significant improving trend was also detected for "Flow Reversal" at the SEIMN station based on the Kendall's tau test (Table 3)

There was significant decreasing trend in the rainfall runoff response at the SEIMN and SEIMS stations for flow volume and maximum flow rate (Table 5).

There was no significant decreasing trend in the rainfall runoff response at the SEIMN and SEIMS stations for flow volume and maximum flow rate (Table 6) after the vaults in Evan's Creek watershed became operational.

Water Quality Monitoring

The following trends were detected during storm events at the stations for Seidel Creek based on the Kendall's tau and Pearson's r tests (Tables 8 and 10, respectively):

- Decrease of total suspended solids at the SEIMS station based on the Kendall's tau test.
- Decrease of total nitrogen at the SEIMS station based on the Kendall's tau test.
- Decrease of fecal coliform bacteria at the SEIMS station based on the Pearson's r test.

No trends were detected during base flow at the stations for Seidel creek based on the Kendall's tau and Pearson's r tests (Tables 9 and 11, respectively).

No significant decreases in pollutant mass loading were detected at the SEIMN and SEIMS stations based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively).

No decreasing trends in temperature and conductivity were detected at the SEIMN and SEIMS stations (Table 14).

There was a significant difference in total phosphorus concentrations during storm events at the SEIMN station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total phosphorus concentrations during the period with biweekly sweeping were significantly higher than those from the periods with quarterly and monthly sweeping.

There was also a significant difference in total phosphorus concentrations during storm events at the SEIMS station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total phosphorus concentrations during the period with monthly sweeping were significantly lower than those from the periods with quarterly and biweekly sweeping.

There were no significant differences in pollutant concentrations during base flow (Table 16 and Appendix J) at the SEIMN and SEIMS stations across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed.

Physical Habitat Monitoring

The indicators for physical habitat quality were assessed at the three station in Seidel Creek: between the beaver pond and the exit from the Redmond Watershed Preserve (SIDL-1), along the north fork (SIDL-2), and along the south fork (SIDL-3). Like Colin Creek, the results from these were compared to regional data from outside the UGA.

Riparian cover at the SIDL-1 station was relatively low and exhibited little change due to its location in an open area near a beaver pond and border with residential areas outside the Redmond Watershed Preserve. Riparian cover at the SIDL-1 station was below the median from the regional data. Riparian cover at the SIDL-2 and SIDL-3 stations also exhibited little change over the surveyed years but was high compared to the regional data (above the median) (Figure 12). These stations are in a forested area with a mix of deciduous and coniferous tree and understory vegetation.

The amount of wood present at the stations in Seidel Creek is variable. Wood volume at the SIDL-1 station was high (above the 75th percentile from the regional data) for all years but 2016 (Figure 13). Wood volume at the SIDL-2 and SIDL-3 stations was around the median from the regional data for all years. There is opportunity for recruitment at these stations despite some barriers. The SIDL-2 station has a footbridge at its downstream boundary that should not prevent wood migration through the reach, but the SIDL-3 station has a concrete flume in the center of the station that prevents wood from moving to the downstream portion of the station.

Pool area was consistently low in all stations and below the 25th percentile from the regional data (Figure 14).

Substrate size exhibited little change at the Seidel Creeks stations in the years surveyed and was below the median from the regional data at the SIDL-1 and SIDL-2 stations and at or below the 25th percentile at the SIDL-3 station (Figure 15). Downstream sediment transport may be limited by the concrete flume in the center of the SIDL-3 station.

Bed stability at the Seidel Creek stations followed a similar pattern as the station in Colin Creek. Bed stability at the SIDL-1, SIDL-2, and SIDL-3 stations was below the median from the regional data in 2016 and 2017, and above the median (and some years above the 75th percentile) in 2018 and 2019 (Figure 16).

Sediment Quality Monitoring

As shown in Tables 17 through 22, no significant decreasing trends were detected in the indicators for sediment quality at the SIDL-1, SIDL-2, and SIDL-3 stations based on the Kendall's tau and Pearson's r tests.

Biological Monitoring

The following improving trends were detected in the indicators for stream health at the stations for Seidel Creek based on the Kendall's tau and Pearson's r tests (Tables 23 and 24, respectively):

- Tolerant Percent score at the SIDL-1 station based on the Kendall's tau and Pearson's r tests.
- Plecoptera Richness score at the SIDL-1 station based on the Kendall's tau test.
- Intolerant Richness score at the SIDL-3 station based on the Kendall's tau test.
- Predator Percent score at the SIDL-3 station based on the Kendall's tau test.
- Percent Dominant score at the SIDL-3 station based on the Pearson's r test.
- Tolerant Percent score at the SIDL-3 station based on the Pearson's r test.

Control Watersheds

Trend analysis results are presented herein for the Control Watersheds (Country Creek and Tyler's Creek).

Country Creek

Hydrologic Monitoring

A significant improving trend was detected for "High Pulse Range" at the COLMO and COLMI stations based on the Kendall's tau and Pearson's r tests (Tables 3 and 4, respectively).

There was a significant decreasing trend in the rainfall runoff response at the COUMO station for flow volume and maximum flow rate (Table 5). There was also a significant decreasing trend in the rainfall runoff response at the COUMI station for maximum flow rate.

There was a significant decreasing trend in the rainfall runoff response at the COUMO station for flow volume after the vaults in Evan's Creek watershed became operational (Table 6).

Water Quality Monitoring

The following trends were detected during storm events at the stations for Country Creek based on the Kendall's tau and Pearson's r tests (Tables 8 and 10, respectively):

- Decrease of hardness at the COUMO station based on the Kendall's tau and Pearson's r tests.
- Decrease of total nitrogen at the COUMO station based on the Kendall's tau and Pearson's r tests.
- Decrease of fecal coliform at the COUMO station based on Pearson's r test.
- Decrease of fecal coliform bacteria at the COUMI station based on the Kendall's tau test.

A decrease of total nitrogen was also detected during base flow at the COUMO station based on the Kendall's tau and Pearson's r tests. Tables 9 and 11, respectively).

A significant decrease in total nitrogen mass loading was detected at the COUMO station based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively). A significant decrease in total copper and total zinc mass loading was also detected at the COUMI station based on the Pearson's r test.

No decreasing trends in temperature were detected at the COUMO and COUMI stations (Table 14). Similarly, no decreasing trends in conductivity were detected at the COUMO station.

There were significant differences in total nitrogen and total phosphorus concentrations during storm events at the COUMO station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total nitrogen concentrations during the period with quarterly sweeping were significantly higher than those from the periods with monthly and biweekly sweeping. Total phosphorus concentrations during the period with monthly sweeping were significantly lower than those from the periods with quarterly and biweekly sweeping.

There were also significant differences in total zinc and total phosphorus concentrations during storm events at the COUMI station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total zinc concentrations during the period with biweekly sweeping were significantly higher than those from the period with monthly sweeping; however, they were not significantly higher than those from the period with quarterly sweeping. Total phosphorus concentrations during the period with monthly sweeping were significantly lower than those from the periods with quarterly and biweekly sweeping.

During base flow, there were significant differences in total zinc concentrations at both the COUMO and COUMI stations across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 16 and Appendix J). Total zinc concentrations at both stations were highest during the period with biweekly sweeping and lowest during the period with monthly sweeping.

Physical Habitat Monitoring

The indicators for physical habitat quality were assessed at the two stations in Country Creek. The CRTY-1 station has an upstream fork that follows along an assisted living home, crosses through a culvert beneath West Lake Sammamish Parkway, flows adjacent to residential houses and empties into a wetland. The CRTY-2 station is confined within a ravine between two residential neighborhoods, with no manmade barriers or culverts. Data from the stream assessments from 2016 through 2019 were compared with regional data from within the UGA.

There is good riparian cover at both stations on Country Creek. Riparian cover at the CRTY-1 station was around the median from the regional data while riparian cover at the CRTY-2 station was above the median and at or near the 75th percentile for all years (Figure 12). Both stations have coniferous and deciduous trees and understory, although the CRTY-1 station is slightly more disturbed with some of the cover calculated within an existing culvert. The CTRY-1 station also passes by a large building and several residences before flowing into a wetland with less riparian cover.

The amount of wood at the Country Creek stations was consistent across the years but varied among the stations. Wood volume at the CTRY-1 station was below the median from the regional data (Figure 13). Transport of large wood from the upper to lower reaches is prevented by the culvert that travels under West Lake Sammamish Parkway. Although a logjam is present at the downstream station that is formed from relatively large wood, the amount of large wood is low in the rest of the station and there is limited opportunity for recruitment due to the adjacent wetland that limits growth of large trees. The CTRY-2 station is located within a ravine between residential neighborhoods with mature forest; wood density at this station was above the median from the regional data. There are several pieces of large wood present that provide opportunity for future recruitment.

Pool area at the CTRY-1 station was low, around the 25th percentile from the regional data, with several pools and deeper areas leading into the adjacent wetland complex (Figure 14). Lower flows at the CTRY-2 station likely limit pool formation; pool area at this station was below the 25th percentile from the regional data.

Substrate size at both the CRTY-1 and CRTY-2 stations is low, falling below the 25th percentile from the regional data (Figure 15). Fine sediment and sand tend to accumulate at the CRTY-1 station due to its relatively low flows and location adjacent to the wetland; and the CRTY-2 station has eroding sandy, silty banks that contribute to the smaller substrate.

Bed stability was highly variable at the stations in Country Creek. At both stations, bed stability fell below the median from the regional data in 2016 and 2017 but was mostly above the 75th percentile in 2018 and 2019 (Figure 16).

Sediment Quality Monitoring

As shown in Tables 17 and 20, a significant decreasing trend was detected for total zinc at the CTRY-2 station based on Kendall's tau and Pearson's r.

Biological Monitoring

The following improving trends were detected in the indicators for stream health at the stations for Country Creek based on the Kendall's tau and Pearson's r tests (Tables 23 and 24, respectively):

- Long Lived Richness score at the CTRY-1 station based on the Kendall's tau and Pearson's r tests.
- Percent Dominant score at the CTRY-1 station based on the Kendall's tau and Pearson's r tests.
- Taxa Richness score at the CTRY-2 station based on the Kendall's tau and Pearson's r tests.
- Percent Dominant score at the CTRY-2 station based on the Kendall's tau and Pearson's r tests.
- Overall score at the CTRY-2 station based on the Pearson's r test.

Tyler's Creek

Hydrologic Monitoring

A significant improving trend was detected for "High Pulse Duration" at the TYLMI station based on the test Pearson's r test (Table 4); and no significant improving trends were detected for any of the indicators based on the Kendall's tau test (Table 3).

There was a significant decreasing trend in the rainfall runoff response at the TYLMO station for flow volume and maximum flow rate (Table 5). There was also a significant decreasing trend in the rainfall runoff response at the TYLMO station for maximum flow rate.

There was no significant decreasing trend in the rainfall runoff response at the TYLMO and TYLMI stations for flow volume and maximum flow rate after the vaults in Evan's Creek watershed became operational (Table 6).

Water Quality Monitoring

The following trends were detected during storm events at the stations for Tyler's Creek based on the Kendall's tau and Pearson's r tests (Tables 8 and 10, respectively):

- Decrease of dissolved zinc at the TYLMO station based on the Kendall's tau test.
- Decrease of dissolved copper at the TYLMO station based on the Pearson's r test.
- Decrease of total nitrogen at the TYLMO station based on the Pearson's r test.
- Decrease of fecal coliform bacteria at the TYLMI station based on the Kendall's tau test.

No trends were detected during base flow at the TYLMO and TYLMI stations based on the Kendall's tau and Pearson's r tests (Tables 9 and 11, respectively).

A significant decrease in total copper mass loading was detected at the TYLMO station based on the Kendall's tau and Pearson's r tests (Tables 12 and 13, respectively). A significant decrease in total copper and TSS mass loading was also detected at the TYLMI station based on the Kendall's tau test.

No decreasing trends in temperature were detected at the TYLMO and TYLMI stations (Table 14). Similarly, no decreasing trends in conductivity were detected at the TYLMO station.

There was a significant difference in total nitrogen concentrations during storm events at the TYLMO station across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed (Table 15 and Appendix J). Total nitrogen concentrations were lowest during the period with biweekly sweeping and highest during the period with quarterly sweeping.

There were no significant differences in pollutant concentrations during base flow (Table 16 and Appendix J) at the TYLMO and TYLMI stations across the quarterly, monthly, and biweekly street sweeping periods in the Monticello Creek watershed.

Physical Habitat Monitoring

The indicators for physical habitat quality were assessed at the two stations in Tyler's Creek. The lower station (TYLR-1) is adjacent to a condominium complex while the upper station (TYLR-2) is located between residential neighborhoods and flows through a small wetland. Data from the stream assessments from 2016 through 2019 were compared with regional data from within the UGA.

Despite their locations adjacent to residential housing, both stations on Tyler's Creek have relatively good riparian cover with values that are around the median from the regional data (Figure 12). However, riparian cover at these stations is highly variable likely due to the landscaping around the condominium and residences and storm events with high winds that knock down trees. No part of either station flows through culverts or is shaded by large buildings.

The amount of wood in Tyler's Creek is variable depending on the reach. At the TYLR-1 station, wood volume is above the median from the regional data (Figure 13). Despite its location adjacent to a condominium, the area around the TYLR-1 station is less densely populated compared to the upstream reach, allowing a greater buffer for wood recruitment. Wood volume at the TYLR-2 station was below the 25th percentile from the regional data. Wood recruitment at this station is likely limited due to its location between sets of houses where the riparian buffer width is relatively narrow.

Pool area at the TYLR-1 station was low compared to most other stations in the Control and Application watersheds and below the 25th percentile from the regional data (Figure 14). Pool area at the TYLR-2 station was near the median from the regional data and highest among all the stations in the Control watersheds.

Substrate size at the TYLR-1 station was above the 75th percentile from the regional data (Figure 15). The upper portion of the station is formed from a cascade over small boulders, and the lower portion of the station has a mix of small boulders, cobbles, and gravel. The substrate at the TYLR-2 station was smaller and below the 25th percentile from the regional data.

Bed stability at the Tyler's Creek stations was highly variable across the survey years (Figure 16). Bed stability at the TYLR-1 station was above the 75th percentile from the regional data for all years. Bed stability at the TYLR-2 station was below the 25th percentile from the regional data in 2016 and 2017, above the median in 2019, and above the 75th percentile in 2018.

Sediment Quality Monitoring

A significant decreasing trend for total organic carbon was detected at the TYLR-1 station based on Kendall's tau (Table 17).

Biological Monitoring

The following improving trends were detected in the indicators for stream health at the stations for Tyler's Creek based on the Kendall's tau and Pearson's r tests (Tables 23 and 24, respectively):

- Percent Dominant score at the TYLR-1 station based on the Pearson's r test.
- Overall score at the TYLR-2 station based on the Kendall's tau and Pearson's r tests.
- Plecoptera Richness score at the TYLR-2 station based on the Kendall's tau and Pearson's r tests.
- Percent Dominant score at the TYLR-2 station based on the Kendall's tau and Pearson's r tests.
- Long Lived Richness score at the TYLR-2 station based on the Kendall's tautest.

SPATIAL STATISTICAL ANALYSIS

The results of the spatial statistical stepwise regression analysis indicate that a model including the following covariates is statistically significant at $\alpha = 0.10$.

- Percent residential land use
- Percent commercial land use
- Mean watershed elevation
- Mean watershed slope
- Percent Class C soils

The r^2 value for this model is 0.267, which means that approximately 26.7 percent of the variability seen in B-IBI scores can be explained by this combination of watershed characteristics.

DISCUSSION

This section presents a discussion of the results from the trend analyses and their implications for the City and County's ongoing watershed rehabilitation efforts and continued implementation of the RPWS. It begins with a general overview of the key outcomes from this initial phase of monitoring. A discussion is then provided for the following trends that were observed in the data and major components of the analysis:

- Interannual hydrologic trends
- Impact of vault installation in the Evans Creek Watershed
- Impact of street sweeping in the Monticello Creek watershed
- Key findings from spatial statistical analysis

Key conclusions for this discussion are then briefly summarized in the next section.

OVERVIEW OF MONITORING OUTCOMES

As described in the *Experimental Design* section, the pattern of interest for this analysis was evidence that receiving water conditions are improving based on one or more indicators in the Application watersheds while conditions in the Reference and Control watersheds remain relatively static. Except for the trends discussed in the subsections below, there were generally few consistent trends detected in the data for each indicator across all the monitoring categories that could be directly tied to a specific rehabilitation strategy or other watershed scale influence (e.g., increased development). This was to be expected for two reasons.

First, as documented in the literature review (Herrera 2015b) that was conducted for the RPWS, improvements in receiving water conditions from enhanced watershed management strategies can be difficult to detect and may take many years to manifest. This is particularly true for improvements in biological indicators of stream health. To realize improvements in these indicators, all potential limiting factors must be addressed. Figure 17, from the WMP (Herrera 2013), provides an illustration of all the factors upon which the biological health of a stream depends. As described in Herrera (2015b), indicators for hydrologic improvement, the base of the pyramid in Figure 17, are likely to be the most sensitive to watershed alterations and have the shortest response time; indicators for water quality and physical habitat improvement are likely somewhere between the extremes of the biological and hydrologic indicators with regard to their sensitivity and response time. Due to these considerations, the data analysis for the RPWS was delayed until year 4 of the study's implementation; this was deemed the earliest any response might be detected in an Application watershed following a sufficient period of baseline data collection.

A second reason few consistent trends have been detected in the data for each indicator is rehabilitation efforts have been relatively modest in the Application watersheds up to this point. As described in the *Rehabilitation Effort Summary* section, these efforts have generally been confined to the construction of two detention vaults in the Evans Creek watershed, progressively increasing street sweeping in the Monticello Creek watershed, and instream habitat improvement projects in both the Monticello Creek and Tosh Creek watersheds. Some planned rehabilitation efforts involving structural flow control BMPs in the Tosh Creek watershed that were scheduled for implementation in this early phase of the RPWS were delayed. There was also a goal to install deep injection wells in 2020 as part of the retrofit program for the Monticello Creek watershed; however, these wells were deemed infeasible due to geologic conditions. While these delays have been regrettable, they have allowed more time for documenting baseline conditions in the Application watersheds. The City is now updating the Monticello Watershed Management Plan and will be constructing projects in the watershed next year. Given the anticipated 10-year timeframe for implementing the RPWS, the benefits of these projects can now be assessed over multiple years of operation and varied climatic conditions relative to an extremely robust dataset for baseline conditions.

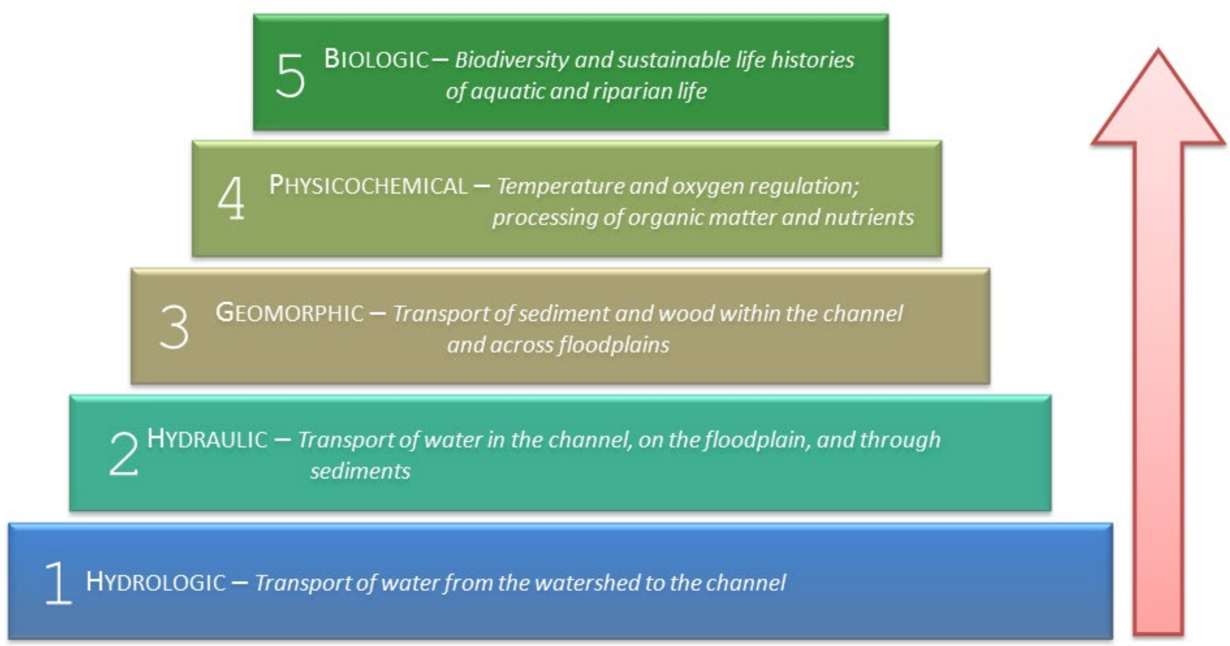

Figure 17. Stream Functions Pyramid.

Interannual Hydrologic Trends

Table 5 in the *Results* section indicates there was a significant decreasing trend over time in the rainfall runoff response for flow volume at 9 of the 14 stations. The same analysis showed there was a decreasing trend over time in the rainfall runoff response for maximum flow rate at 12 of the 14 stations. What this implies is that less runoff is being produced for an equivalent amount of rain as you progress from WY2016 to WY2019 and that this is occurring across the city. If this trend was only occurring in one watershed we might look to changes in impervious cover, installation of hydraulic controls, or groundwater withdrawals as an explanation, but the ubiquity of the phenomenon implies that the cause of this trend lay elsewhere. The only hydrologic driver that could possibly affect nearly all the stations in the same manner must be climate related, specifically, the amount of rainfall in each water year.

Figure 18 presents water year rainfall totals as measured at the four project rain gauges (Tosh, Evans, Monticello, and Trilogy) as well as at the Marymoor gauge. Figure 1 in the *Experimental Design* section presents the location of these gauges relative to the monitoring stations. The project rain gauges did not come online until WY2017, so WY2016 data from the Marymoor gauge were added to Figure 18 for reference. An analysis of rainfall from these gauges indicates that water year rainfall totals were elevated in the first three years of the study and then decreased dramatically in the fourth year (WY2019). The progressively drier water years from 2017 to 2019 likely resulted in less saturation of the landscape and thus increased evapotranspiration and reduced interflow and overland flow (Nash and Sutcliffe 1970). These altered hydrologic dynamics resulted in less water exiting the watersheds via surface flow in the streams. It is important to identify these overall trends so that the hydrologic impacts from projects can be separated from the natural hydrologic variability that occurs from year to year. These trends from the first 4 years of this 10-year study will serve as a baseline for assessing future trends that may be driven by hydrologic controls installed in the Application watersheds.

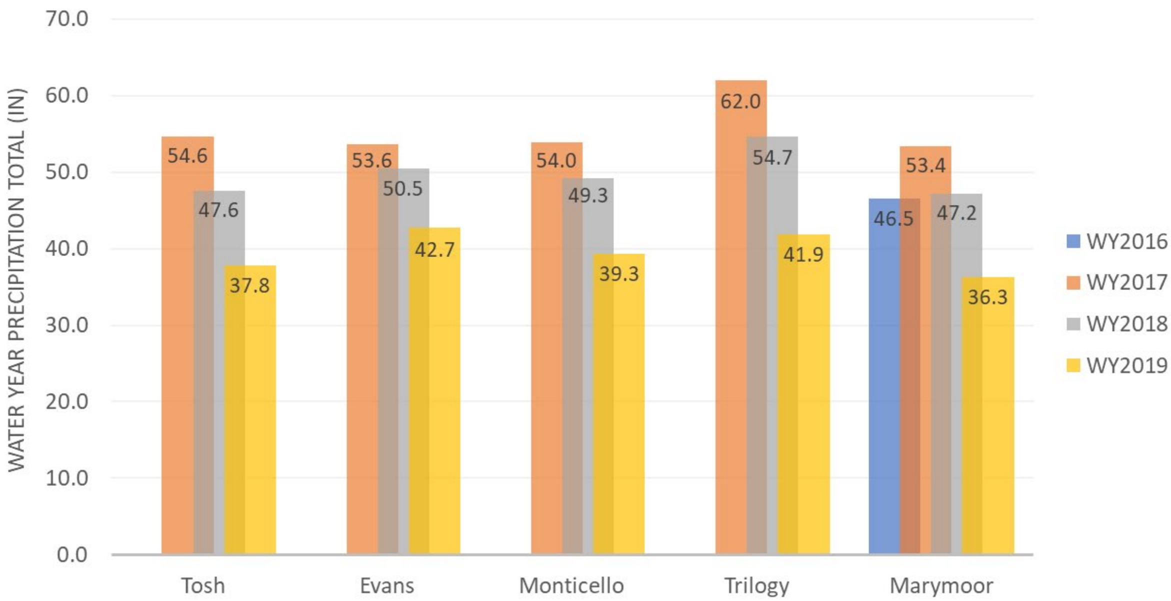

Figure 18. Water Year Precipitation Totals As Measured at The Four Project Rain Gauges and at The King County Marymoor Rain Gauge.

Impact of Vault Installation in the Evans Creek Watershed

As described in the Rehabilitation Effort Summary section, the only structural BMPs that were installed in this early phase of the RPWS were the two stormwater detention vaults in the Evans Creek watershed; one was in front of addresses 20620 and 20626 Northeast 76th Place (C5 Vault), and the other was in front of address 20508 Northeast 78th Street (C6 Vault). Each vault was designed using the Ecology 8 (ECY8%) performance target that calls for controlling the flow durations of discharges between 8 percent of the forested 2-year discharge and the full 50-year discharge (King County 2014). The ECY8% performance target was derived from a retrofit planning effort completed by King County in 2012, called the *Stormwater Retrofit Analysis and Recommendations for Juanita Creek Basin in the Lake Washington Watershed*. Based on this performance target, the C5 Vault was designed with a detention volume of 1,106.42 cubic feet to treat an impervious area of 0.50 acre. The C6 Vault was similarly designed with a detention volume of 1,441.84 cubic feet to treat an impervious area of 0.68 acre. The potential benefits of these facilities would only have been realized at the EVALSS station given the location of these vaults in the watershed (Figure 10) once they became operational after October 31, 2017.

Results from the Mann-Whitney tests showed there was no significant change in the rainfall runoff response at the EVALSS station before and after the vaults became operational (Table 6). For reference, a significant change in the rainfall runoff response was only observed at two stations after the vaults became operational: flow volume and maximum flow rate decreased for a given storm precipitation depth at the TOSMI station, and flow volume decreased for a given storm precipitation depth at the COUMO station. Because the vaults only provide detention, it is not surprising that the rainfall runoff response for flow volume did not change significantly. However, the vaults would be expected to change the rainfall runoff response for maximum flow rate given their design using the ECY8% performance target described above.

There are several factors that might explain why the vaults did not provide measurable benefits at the EVALSS station. First, it is possible that one or both vaults have a design defect that reduces their performance relative to design expectations. However, a more likely explanation is the vaults are not treating a sufficient amount of the watershed area to have a detectable impact on flows in the creek at the EVALSS station. For reference, the Evans Creek watershed has a total area of 397 acres (Table 1). The two vaults are treating a combined impervious area of only 1.18 acres, a small fraction of this total area. Hence, it is likely the benefits of the vaults cannot be detected amongst the "noise" that is generated by unmitigated flows from other, larger portions of the watershed. As documented in the literature review (Herrera 2015b) that was conducted for the RPWS, a large portion (e.g., >50 percent) of the basin must be treated in order to see a measurable difference in receiving water conditions (Ahiablame et al. 2013). Hence, additional rehabilitation efforts are likely needed in this watershed before hydrologic conditions can be expected to improve.

IMPACT OF STREET SWEEPING IN THE MONTICELLO CREEK WATERSHED

In March 2020, Herrera completed the Monticello Basin Street Sweeping Water Quality Trend Analysis (Herrera 2020) and observed a decrease in copper and TSS concentrations collected during storm events. This observed water quality improvement was coincident with an increase in street sweeping in the basin from quarterly, to monthly, to biweekly. At the time of that analysis it was observed that there are many confounding factors when interpreting variations in water quality over different time periods in urban watersheds (e.g., timing of sample collection, climatic variation, land use land cover changes, etc.) (Bertrand-Krajewski et al. 1998; Lee et al. 2002; and Hatt et al. 2004), and confirming that the observed trends were related to street sweeping would be difficult without comparisons to results from other nearby watersheds where sweeping was not increased. Now that data from all seven of the study watersheds have been reduced and analyzed, this comparison is possible.

Tables 15 and 16 in the *Results* section present the results of Kruskal Wallace tests comparing pollutant concentrations in storm event and base flow samples, respectively, from periods with "quarterly sweeping," "monthly sweeping," and "biweekly sweeping." The time periods are specifically: March 18, 2016 to August 11, 2017 (quarterly sweeping in all basins), August 12, 2017 to October 11, 2018 (monthly sweeping in Monticello, quarterly sweeping in other basins), and October 12, 2018, to September 30, 2019 (biweekly sweeping in Monticello and quarterly sweeping in other basins). The analysis was performed on pollutants that are most likely to be affected by street sweeping; specifically, TSS, total phosphorus, total nitrogen, total copper, and total zinc. The pattern of interest in this analysis is a consistent decrease in pollutant concentrations across all three periods of street sweeping. By "consistent" we mean the data move in one direction through each of the time periods. It is possible to have a significant difference among the three time periods but not have it move in one consistent direction (e.g., elevated concentrations in the first time period, significantly lower in the second, but then elevated again in the third time period). This is a less interesting pattern because sweeping was progressively increased through the time periods, so any improvement in water quality caused by increased sweeping should also follow this trend (i.e., consistent improvement through each time period).

The pollutants that follow this pattern of consistent and significant improvement can easily be identified by the shading provided in Table 15. As is apparent total nitrogen consistently decreases from period to period at the MONMS station during storm events; however, this pattern was also observed at the COLM and COUMO stations (which are located in a different watershed), so it would be difficult to conclude that the decrease in concentrations of this pollutant is from street sweeping alone. A consistent decrease from period to period was not observed for any of the pollutant and station combinations during base flow (Table 16).

More interesting is the pattern observed for TSS and total copper during storm events. A consistent and significant decrease in both pollutants was observed at the MONMS station during storms and at none of the other 13 monitoring stations (Table 15). Boxplots of the data grouped by sweeping period are presented in Appendix F for the subset of pollutants used in this analysis and all the monitoring stations; two figures from this appendix are presented in this section to highlight the observed differences in TSS (Figure 19) and total copper (Figure 20) at the MONMS station. A significant decrease in the concentrations of these pollutants during storm events at the MONMS station was also confirmed based on the results from the Kendall's tau and Pearson's r tests (Tables 8 and 9, respectively) for correlation between the water quality indicators and time. This suggests something unique may be occurring in the MONMS basin. While additional research is required to establish a direct causal relationship, this could be an indication that increased sweeping in this basin is reducing concentrations of TSS and total copper in the creek during storm events. The City does not intend to maintain the biweekly sweeping frequency in this watershed; hence, this assertion will be strengthened if concentrations of these pollutants rebound in subsequent years of monitoring.

These results are also consistent with a recent street sweeping study that was implemented by Seattle Public Utilities (SPU) along Martin Luther King Avenue in Seattle, Washington (SPU 2018). This study also found a relationship between sweeping and decreased pollutant concentrations in stormwater for two pollutants: particulate copper and coarse sediment above 250 microns. Unlike the study discussed herein that examines potential water quality improvements in the receiving water from street sweeping, the SPU study was examining potential water quality improvements in the catch basin directly adjacent to the road being swept; hence, there were likely fewer confounding variables to contend with in the SPU study. Though these studies had very different designs they both came to a similar conclusion, and that is street sweeping appears to have an effect on copper and TSS in stormwater. The fact that these two analyses came to similar conclusions is more evidence that the trend observed herein may in fact be causal with increased sweeping.

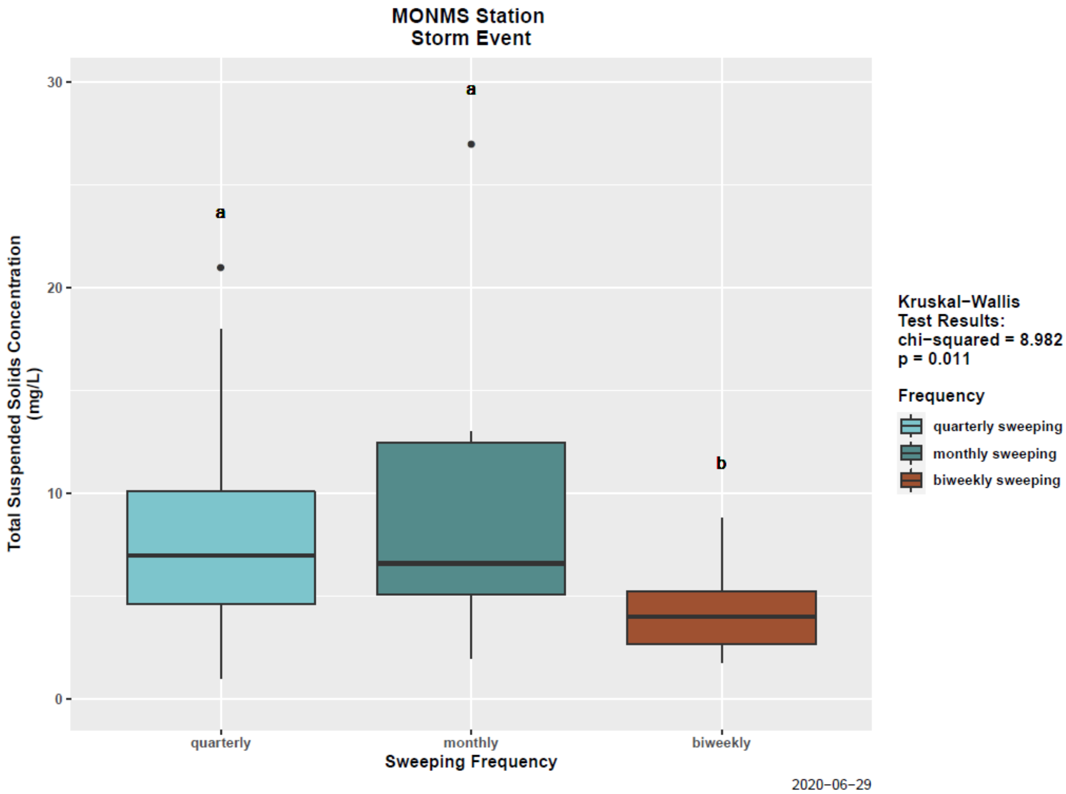

Figure 19. Total Suspended Solids Concentrations for Storm Events at Monms During the Three Sweeping Periods.

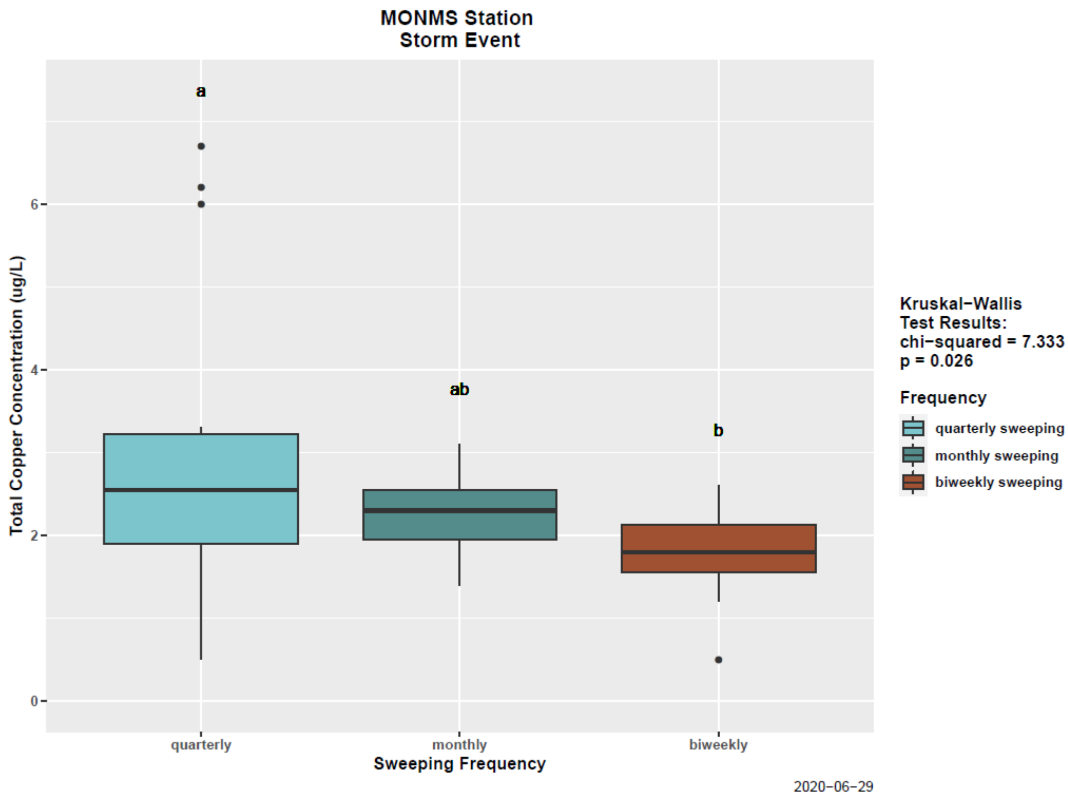

Figure 20. Total Copper Concentrations For Storm Events at Monms During the Three Sweeping Periods.

Key Finding from Spatial Statistical Analysis

There is some evidence from this analysis to support the original hypothesis that urban development has a negative impact on B-IBI scores. However, the r^2 value for the best-fitting model was quite low at 0.267, indicating that most of the variability in B-IBI scores is driven by factors other than the watershed landscape characteristics considered in this analysis. A similar analysis completed by King County in 2015 on the Bear Creek watershed found that the stream segment itself rather than stream conditions explained nearly 80 percent of the variability seen in scores without there being consistent significant trends in land use or in-stream conditions (Brady 2017). However, it is possible that this finding may be due to the analysis being conducted on a small geographic area without a sufficient range of urban and non-urban sites watersheds. Additional work done by King County in 2019 on a more variable dataset across the Puget Lowlands found good correlation with basin-wide urban development and poorer correlation with riparian-wide or site-specific facts (King County 2019).

Percent impervious area was not a significant driver of B-IBI scores in this analysis. This is surprising given that it is a widely-accepted predictor of B-IBI scores in the Puget Sound Region, with scores decreasing as impervious area increases (Puget Sound Stream Benthos Monitoring 2019). One interpretation of this result is that stormwater BMPs already being implemented in the watershed to target runoff from impervious area are highly effective and are negating this known trend. However, considering that the overall mean B-IBI score (34.4) for stations monitored for the RPWS indicates poor habitat conditions are prevalent, it is more likely that there is some type of human disturbance in the watershed that is impacting these scores. This is supported by the fact that both residential and commercial land use were found to be significant, which are essentially surrogates for impervious area. This human disturbance may be contributing to more localized factors such as stream temperature increases and instream habitat alteration that are impacting B-IBI scores.

Because B-IBI scores in this watershed do not appear to be strongly correlated with landscape variables like urban development, it is also possible this metric may not be the best option for assessing BMP effectiveness at improving habitat quality over time in this study area. However, given that analyses conducted on sites across the broader Puget Sound area have consistently shown a strong negative correlation between increased urban development and B-IBI scores, it is also possible that there are additional confounding factors that are obscuring this relationship in the Redmond study area.

CONCLUSIONS

As described in the *Introduction* to this report, the specific study question to be addressed through the RPWS is as follows:

> *How effective are watershed rehabilitation efforts at improving receiving water conditions at the watershed scale?*

Monitoring for the study initiated in 2016 and is anticipated to continue for a 10-year timeframe. In years 4, 6, 8, and 10 of the RPWS' implementation, trend analyses reports will be prepared to summarize analyses that were performed to detect potential improving trends in receiving water conditions related to the implementation of rehabilitation efforts. This document represents the trend analysis report that was prepared for year 4 of the RPWS' implementation. Major conclusions from this phase of the RPWS' implementation are as follows:

- Few consistent trends have been detected in the data for each indicator because rehabilitation efforts have been relatively modest in the Application watersheds thus far into the study. Furthermore, data analysis for the RPWS was delayed until year 4 of the study's implementation because this was deemed the earliest any response might be detected in an Application watershed following a sufficient period of baseline data collection. The City will be constructing projects in the Application watersheds next year that can now be assessed over multiple years of operation and varied climatic conditions relative to an extremely robust dataset for baseline conditions.

- An interannual hydrologic trend was detected in the rainfall runoff response across most stations located in the Application, Reference, and Control watersheds. This trend was traced to climate related changes over the 4 years of study implementation. Specifically, progressively drier water years from 2017 to 2019 likely resulted in less saturation of the landscape and thus increased evapotranspiration and reduced interflow and overland flow (Nash and Sutcliffe 1970). These altered hydrologic dynamics resulted in less water exiting the watersheds via surface flow in the streams. These trends from the first 4 years of this 10-year study will serve as a baseline for assessing future trends that may be driven by hydrologic controls installed in the Application watersheds.

- The two detention vaults constructed in the Evans Creek watershed appeared to provide no measurable benefit based on analyses of the rainfall runoff response in the creek before and after they became operational. The likely explanation is the vaults are not treating a sufficient amount of the watershed area to have a detectable impact on flows in the creek at the EVALSS station. Hence, the benefits of the vaults cannot be detected amongst the "noise" that is generated by unmitigated flows from other, larger portions of the watershed.

- A consistent and significant decrease in TSS and total copper concentrations was observed at the MONMS station in the Monticello Creek watershed. This could be an indication the progressive increase in street sweeping frequency in the watershed is benefiting water quality. These results are consistent with a recent street sweeping study that was implemented by Seattle Public Utilities (SPU) along Martin Luther King Avenue in Seattle, Washington (SPU 2018). This study also found a relationship between sweeping and decreased pollutant concentrations in stormwater for two pollutants: particulate copper and coarse sediment above 250 microns. The fact that these two analyses came to similar conclusions is evidence that the trend observed herein may in fact be causal with increased sweeping.

- Results from the spatial statistical analyses indicated that most of the variability in B-IBI scores is driven by factors other than watershed landscape characteristics. One interpretation of this result is that stormwater BMPs already being implemented in the watershed to target runoff from impervious area are highly effective and are negating this known trend. However, considering that the overall mean B-IBI score (34.4) for stations monitored for the RPWS indicates poor habitat conditions are prevalent, it is more likely that there is some type of human disturbance in the watershed that is impacting these scores. This is supported by the fact that both residential and commercial land use were found to be significant, which are essentially surrogates for impervious area. This human disturbance may be contributing to more localized factors such as stream temperature increases and instream habitat alteration that are impacting B-IBI scores. However, it is possible that this finding may be due to the analysis being conducted on a small geographic area without a sufficient range of urban and non-urban watersheds or other confounding factors.

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TABLES

Table 2. Indicators of Stream Health for the Redmond Paired Watershed Study.

Indicator	Measurement Frequency
Hydrology Monitoring	
Flow	**Continuous**
High pulse count High pulse duration High pulse range Low pulse count Low pulse duration Low pulse range Flow reversal Richards-Baker (RB) flashiness index Flashiness ($T_{Q\ Mean}$) Storm flow volume Base flow volume Total flow volume	Post-processed from continuous flow measurements
Water Quality Monitoring	
Total suspended solids Turbidity Conductivity Hardness Dissolved organic carbon Fecal coliform bacteria Total phosphorus Total nitrogen Copper, total and dissolved Zinc, total and dissolved	Twelve grab samples collected annually during storm events (three each quarter) Four grab samples collected annually during base flow (one each quarter)
Temperature Conductivity	Continuous
Physical Habitat Monitoring	
Bankfull width Wetted width Cumulative bar width	Annually
Physical Habitat Monitoring (continued)	
Bankfull depth Wetted depth Substrate class Substrate embeddedness Fish cover Thalweg depth Presence of bars Presence of edge pools Main channel slope and bearing Large woody debris tally, including notation of diameter, length, category, zone, and key-pieces Evidence of vegetation colonization below the ordinary high water mark (OHWM) that persists more than 1 year Slopes vegetated over the crown of the bank Presence of desirable native plant species Presence of invasive plant species Presence of good-habitat indicator liverwort species Channel incision or aggradation Channel widening, narrowing, or migration Changes in channel slope, sinuosity, and/or bed-form type	Annually
Sediment Quality Monitoring	
Total organic carbon; sieved, 2 mm Copper; sieved, 63 µm Zinc; sieved, 63 µm Polycyclic aromatic hydrocarbons; sieved, 2 mm Phthalates; sieved, 2 mm	Annually
Biological Monitoring	
Benthic macroinvertebrates	Annually
Benthic Index of Biotic Integrity Taxa Richness Ephemeroptera Richness Plecoptera Richness Trichoptera Richness Clinger Percent Long-Lived Richness Intolerant Richness Percent Dominant Predator Percent Tolerant Percent	Post-processed from benthic macroinvertebrate data

Table 3. Kendall's Tau Correlation Coefficients for Hydrologic Indicators Versus Time (WY2016 through WY2019).

Station	Watershed Type	High Pulse Count (count)		High Pulse Duration (days)		High Pulse Range (days)		Low Pulse Count (count)		Low Pulse Duration (days)		Low Pulse Range (days)		Flow Reversal (count)		Richards-Baker Flashiness Index		TQ Mean (fraction of the year)		Storm Volume (cf)		Base Volume (cf)	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	-0.33	0.38	-0.67	1.00	0.00	1.00	-0.18	0.36	0.67	0.17	0.33	0.38	-0.67	0.17	-0.67	1.00	0.67	1.00	-0.67	0.17	0.33	0.38
EVAMS	A	-0.33	0.38	-0.33	1.00	0.33	1.00	0.55	1.00	-0.67	1.00	1.00	**0.04**	-0.33	0.38	-0.67	1.00	0.33	1.00	-0.33	0.38	-0.33	1.00
MONMN	A	-0.33	0.38	-0.33	1.00	0.67	1.00	0.67	1.00	-0.33	1.00	-0.33	1.00	-0.67	0.17	-0.33	1.00	0.33	1.00	-0.67	0.17	0.00	1.00
MONMS	A	-0.67	0.17	-0.33	1.00	1.00	1.00	-0.55	0.14	1.00	**0.04**	-0.33	1.00	-1.00	**0.04**	-0.67	1.00	0.67	1.00	-0.67	0.17	-0.33	1.00
MONM	A	-0.67	0.17	-0.33	1.00	1.00	1.00	0.33	1.00	-0.33	1.00	-0.67	1.00	-1.00	**0.04**	-0.33	1.00	0.00	1.00	-0.33	0.38	0.00	1.00
TOSMO	A	-0.33	0.38	0.00	1.00	0.00	1.00	0.67	1.00	-1.00	1.00	0.67	0.17	-1.00	**0.04**	-0.67	1.00	0.67	1.00	-0.33	0.38	-0.33	1.00
TOSMI	A	-0.67	0.17	0.33	0.38	-1.00	**0.04**	0.67	1.00	-0.67	1.00	-0.55	1.00	-0.33	0.38	-1.00	1.00	0.67	1.00	-0.67	0.17	0.33	0.38
COLM	R	-0.67	0.17	0.33	0.38	-0.33	0.38	-0.33	0.38	0.33	0.38	0.67	0.17	-0.67	0.17	-1.00	1.00	0.67	1.00	-0.33	0.38	0.00	1.00
SEIMN	R	-0.33	0.38	-0.33	1.00	-0.33	0.38	-0.33	0.38	0.33	0.38	1.00	**0.04**	-1.00	**0.04**	-0.67	1.00	0.33	1.00	-0.33	0.38	0.00	1.00
SEIMS	R	-0.33	0.38	-0.33	1.00	-0.33	0.38	0.18	1.00	-0.33	1.00	0.00	1.00	-0.67	0.17	-0.67	1.00	0.67	1.00	-0.67	0.17	0.00	1.00
COUMO	C	-0.67	0.17	0.00	1.00	-1.00	**0.04**	1.00	1.00	-0.67	1.00	0.67	0.17	0.00	1.00	-1.00	1.00	0.00	1.00	-0.33	0.38	-0.67	1.00
COUMI	C	-0.67	0.17	0.67	0.17	-1.00	**0.04**	0.33	1.00	-0.33	1.00	0.33	0.38	-0.67	0.17	-1.00	1.00	0.00	1.00	0.00	1.00	-0.33	1.00
TYLMO	C	-0.67	0.17	-0.33	1.00	0.00	1.00	0.33	1.00	0.00	1.00	-0.67	1.00	-0.67	0.17	-1.00	1.00	0.67	1.00	-0.67	0.17	-0.33	1.00
TYLMI	C	-0.33	0.38	0.67	0.17	1.00	1.00	0.67	1.00	-0.67	1.00	0.33	0.38	-0.67	0.17	-0.33	1.00	0.55	1.00	0.00	1.00	-0.33	1.00

Values in **bold** indicate significant trend ($\alpha = 0.05$).

A = Application

R = Reference

C = Control

Table 4. Pearson's r Correlation Coefficients for Hydrologic Indicators Versus Time (WY2016 through WY2019).

Station	Watershed Type	High Pulse Count (count)		High Pulse Duration (days)		High Pulse Range (days)		Low Pulse Count (count)		Low Pulse Duration (days)		Low Pulse Range (days)		Flow Reversal (count)		Richards-Baker Flashiness Index		TQ Mean (fraction of the year)		Storm Volume (cf)		Base Volume (cf)	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	-0.37	0.32	-0.93	1.00	0.25	1.00	-0.31	0.35	0.86	0.07	0.55	0.23	-0.80	0.10	-0.85	1.00	0.81	1.00	-0.68	0.16	0.29	0.36
EVAMS	A	-0.27	0.37	-0.49	1.00	0.16	1.00	0.77	1.00	-0.69	1.00	0.97	**0.02**	-0.18	0.41	-0.67	1.00	0.23	1.00	-0.44	0.28	-0.24	1.00
MONMN	A	-0.45	0.28	-0.07	1.00	0.73	1.00	0.65	1.00	-0.46	1.00	-0.44	1.00	-0.85	0.08	-0.54	1.00	0.00	1.00	-0.72	0.14	-0.28	1.00
MONMS	A	-0.59	0.21	-0.58	1.00	0.96	1.00	-0.66	0.17	0.94	**0.03**	-0.36	1.00	-0.95	**0.03**	-0.48	1.00	0.82	1.00	-0.83	0.09	-0.46	1.00
MONM	A	-0.59	0.21	0.00	0.50	0.98	1.00	0.62	1.00	-0.34	1.00	-0.40	1.00	-0.98	**0.01**	-0.70	1.00	0.06	1.00	-0.63	0.19	-0.59	1.00
TOSMO	A	-0.36	0.32	0.28	0.36	0.25	1.00	0.86	1.00	-0.94	1.00	0.84	0.08	-0.98	**0.01**	-0.69	1.00	0.86	1.00	-0.41	0.30	-0.69	1.00
TOSMI	A	-0.88	0.06	0.33	0.34	-0.93	**0.04**	0.72	1.00	-0.55	1.00	-0.37	1.00	-0.42	0.29	-0.97	1.00	0.89	1.00	-0.81	0.10	0.72	0.14
COLM	R	-0.52	0.24	0.25	0.38	-0.28	0.36	-0.37	0.32	0.17	0.42	0.91	**0.05**	-0.78	0.11	-0.99	1.00	0.64	1.00	-0.22	0.39	-0.18	1.00
SEIMN	R	-0.42	0.29	-0.51	1.00	-0.29	0.36	-0.22	0.39	0.28	0.36	0.97	**0.02**	-0.87	0.07	-0.88	1.00	0.66	1.00	-0.71	0.15	-0.22	1.00
SEIMS	R	-0.58	0.21	-0.37	1.00	-0.49	0.26	0.16	1.00	-0.26	1.00	0.02	0.49	-0.69	0.16	-0.85	1.00	0.79	1.00	-0.81	0.10	-0.27	1.00
COUMO	C	-0.54	0.23	0.27	0.37	-0.95	**0.03**	0.91	1.00	-0.58	1.00	0.95	**0.03**	0.27	1.00	-0.96	1.00	0.18	1.00	-0.49	0.26	-0.89	1.00
COUMI	C	-0.84	0.08	0.70	0.15	-0.99	**0.01**	0.38	1.00	-0.49	1.00	0.26	0.37	-0.83	0.09	-0.95	1.00	0.17	1.00	-0.47	0.27	-0.36	1.00
TYLMO	C	-0.84	0.08	0.05	0.48	-0.01	0.50	0.27	1.00	-0.01	1.00	-0.38	1.00	-0.85	0.08	-0.94	1.00	0.88	1.00	-0.80	0.10	-0.55	1.00
TYLMI	C	-0.34	0.33	0.93	**0.04**	0.95	1.00	0.69	1.00	-0.68	1.00	0.43	0.29	-0.84	0.08	-0.50	1.00	0.64	1.00	0.33	1.00	-0.74	1.00

Values in **bold** indicate significant trend (α = 0.05).

A = Application

R = Reference

C = Control

Table 5. Seasonal Kendall's Tau Correlation Coefficients for Rainfall Runoff Response (flow volume and maximum flow rate) Versus Time (WY2016 through WY2019).				
	Flow Volume vs. Precipitation Depth		**Maximum Flow Rate vs. Precipitation Depth**	
Station	**Coefficient**	**p-value**	**Coefficient**	**p-value**
EVALSS	-0.034	0.245	-0.114	**<0.001**
EVAMS	-0.072	**0.013**	-0.089	**0.002**
MONM	-0.130	**<0.001**	-0.138	**<0.001**
MONMN	-0.125	**<0.001**	-0.132	**<0.001**
MONMS	-0.205	**<0.001**	-0.182	**<0.001**
TOSMO	-0.009	0.760	-0.056	0.060
TOSMI	-0.141	**<0.001**	-0.200	**<0.001**
COLM	-0.023	0.451	-0.056	0.066
SEIMN	-0.124	**<0.001**	-0.138	**<0.001**
SEIMS	-0.090	**0.002**	-0.101	**<0.001**
COUMO	-0.243	**<0.001**	-0.144	**<0.001**
COUMI	-0.041	0.169	-0.106	**<0.001**
TYLMO	-0.153	**<0.001**	-0.126	**<0.001**
TYLMI	0.055	0.068	0.065	**0.031**

Values in **bold** indicate significant decreasing trend (α = 0.05)

Table 6. Mann-Whitney Test Comparing Rainfall Runoff Response (flow volume and maximum flow rate) Before and After Vaults Became Operational (October 31, 2017).

	Natural Log (flow volume [cf]) vs. Natural Log (precipitation depth [in])				
Station	**Chi-Squared Value**	**p-value**	**Median–Before**	**Median–After**	**Trend**
EVALSS	0.002	1.000	-0.045	-0.005	+
EVAMS	1.161	1.000	-0.051	-0.017	+
MONM	0.324	0.285	0.104	0.029	-
MONMN	0.013	1.000	0.108	0.152	+
MONMS	0.591	1.000	-0.024	0.072	+
TOSMO	2.329	0.063	0.006	-0.080	-
TOSMI	3.795	**0.026**	0.015	-0.072	-
COLM	13.414	1.000	0.062	0.329	+
SEIMN	3.077	1.000	0.002	0.126	+
SEIMS	3.549	1.000	-0.055	-0.001	+
COUMO	5.87	**0.008**	0.046	-0.080	-
COUMI	7.01	1.000	-0.014	0.146	+
TYLMO	0.266	1.000	-0.005	0.002	+
TYLMI	4.997	1.000	-0.07	0.110	+
	Natural Log (maximum flow rate [cfs]) vs. Natural Log (precipitation depth [in])				
Station	**Chi-Squared Value**	**p-value**	**Median–Before**	**Median–After**	**Trend**
EVALSS	0.524	0.235	-0.010	-0.035	-
EVAMS	2.244	1.000	-0.027	-0.024	+
MONM	0.235	0.314	0.046	0.045	-
MONMN	0.074	0.393	0.072	0.060	-
MONMS	0.052	1.000	-0.005	0.031	+
TOSMO	2.005	0.078	0.014	-0.025	-
TOSMI	8.669	**0.002**	0.064	-0.099	-
COLM	11.631	1.000	0.058	0.309	+
SEIMN	2.992	1.000	0.022	0.083	+
SEIMS	6.011	1.000	-0.075	0.052	+
COUMO	1.066	0.151	0.029	-0.063	-
COUMI	6.593	1.000	-0.019	0.134	+
TYLMO	1.821	0.089	0.043	-0.036	-
TYLMI	9.081	1.000	-0.082	0.231	+

Values in **bold** indicate significant decreasing trend ($\alpha = 0.05$)

\- Decreasing trend based on comparison of median before and after values

\+ Increasing trend based on comparison of median before and after values

Table 7. Number of Storm Event and Base Flow Samples Before and After Screening Process.					
Station	**Watershed Type**	**Original Number of Base Flow Samples**	**Original Number of Storm Event Samples**	**Final Number of Base Flow Samples**	**Final Number of Storm Flow Samples**
EVALSS	A	16	44	32	28
EVAMS	A	16	44	29	31
MONM	A	16	44	20	40
MONMN	A	16	44	24	36
MONMS	A	16	44	19	41
TOSMO	A	16	44	21	39
TOSMI	A	16	44	21	39
COLM	R	16	44	23	37
SEIMN	R	16	44	23	37
SEIMS	R	16	44	19	41
COUMO	C	16	44	25	35
COUMI	C	16	44	23	37
TYLMO	C	16	44	18	42
TYLMI	C	16	44	25	35
Total Number		224	616	322	518

Table 8. Kendall's Tau Correlation Coefficients for Storm Event Pollutant Concentrations Versus Time (WY2016 through WY2019).																								
		Dissolved Copper		**Dissolved Organic Carbon**		**Dissolved Zinc**		**Fecal Coliform**		**Hardness, Total as CaCO3**		**Total Copper**		**Total Phosphorus**		**Total Suspended Solids**		**Total Zinc**		**Turbidity**		**Total Nitrogen**	
Station	**Watershed Type**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**	**Co-efficient**	**p-value**
EVALSS	A	-0.01	0.46	-0.01	0.98	0.12	1.00	-0.17	0.10	-0.06	0.68	0.03	1.00	0.18	1.00	0.14	1.00	-0.08	0.30	0.31	1.00	0.00	0.49
EVAMS	A	0.00	1.00	0.07	0.56	-0.09	0.27	-0.23	**0.04**	-0.04	0.73	-0.13	0.17	-0.01	0.46	-0.20	0.06	-0.16	0.13	0.12	1.00	0.01	1.00
MONMN	A	0.33	1.00	-0.02	0.88	0.29	1.00	-0.27	**0.01**	0.23	0.05	0.23	1.00	-0.06	0.31	0.01	1.00	0.02	1.00	0.25	1.00	0.05	1.00
MONMS	A	0.03	1.00	-0.16	0.14	0.02	1.00	-0.12	0.14	0.19	0.09	-0.30	**<0.01**	-0.03	0.38	-0.21	**0.03**	-0.08	0.24	-0.12	0.13	-0.28	**<0.01**
MONM	A	0.27	1.00	0.09	0.40	0.06	1.00	-0.25	**0.01**	0.20	0.07	-0.03	0.40	-0.01	0.47	-0.15	0.10	-0.08	0.25	0.08	1.00	-0.19	**0.05**
TOSMO	A	-0.03	0.41	-0.26	**0.02**	-0.16	0.08	-0.24	**0.02**	0.14	0.20	-0.11	0.17	-0.04	0.35	-0.02	0.43	0.01	1.00	0.22	1.00	-0.21	**0.03**
TOSMI	A	0.02	1.00	-0.15	0.19	-0.03	0.41	-0.09	0.21	-0.11	0.35	-0.21	**0.03**	-0.12	0.14	-0.06	0.30	-0.09	0.21	0.12	1.00	-0.19	**0.04**
COLM	R	0.03	1.00	0.08	0.51	0.03	1.00	-0.16	0.09	0.01	0.97	0.02	1.00	-0.14	0.12	-0.24	**0.02**	-0.10	0.23	-0.04	0.38	-0.32	**<0.01**
SEIMN	R	0.01	1.00	0.05	0.65	NC	1.00	-0.06	0.30	0.09	0.44	0.28	1.00	0.12	1.00	0.24	1.00	-0.01	0.48	0.37	1.00	-0.14	0.12
SEIMS	R	0.02	1.00	0.06	0.57	-0.12	0.17	-0.04	0.34	0.02	0.86	-0.14	0.12	0.02	1.00	-0.18	**0.05**	0.00	0.49	0.18	1.00	-0.22	**0.02**
COUMO	C	0.01	1.00	-0.05	0.68	0.06	1.00	-0.13	0.13	-0.24	**0.04**	-0.07	0.29	0.08	1.00	0.02	1.00	0.02	1.00	0.26	1.00	-0.28	**0.01**
COUMI	C	0.11	1.00	-0.12	0.28	-0.03	0.40	-0.21	**0.03**	-0.08	0.52	-0.05	0.32	0.06	1.00	0.07	1.00	0.01	1.00	0.26	1.00	-0.13	0.13
TYLMO	C	-0.09	0.21	-0.09	0.41	-0.23	**0.02**	0.03	1.00	-0.04	0.75	-0.04	0.35	0.08	1.00	0.10	1.00	0.04	1.00	0.29	1.00	-0.18	0.05
TYLMI	C	-0.01	0.46	-0.08	0.54	-0.19	0.06	-0.24	**0.02**	-0.03	0.84	-0.12	0.16	0.03	1.00	-0.12	0.16	-0.09	0.23	0.11	1.00	-0.20	0.05

Values in **bold** indicate significant decreasing trend ($\alpha = 0.05$) for all parameters except Dissolved Organic Carbon and Hardness based on one-tailed test.

Values in **bold** indicate for Dissolved Organic Carbon and Hardness significant decreasing or increasing trend ($\alpha = 0.05$) based on two-tailed test.

Shaded values indicate coefficients were calculated using the residuals from regression models for predicting concentration as function of stream flow rate (see description in Data Analysis Procedures section.

A = Application

R = Reference

C = Control

NC = not calculable due to high number of nondetect values.

Table 9. Kendall's Tau Correlation Coefficients for Base Flow Pollutant Concentrations Versus Time (WY2016 through WY2019).

Station	Watershed Type	Dissolved Copper		Dissolved Organic Carbon		Dissolved Zinc		Fecal Coliform		Hardness, Total as CaCO3		Total Copper		Total Phosphorus		Total Suspended Solids		Total Zinc		Turbidity		Total Nitrogen	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.02	1.00	0.11	0.36	-0.01	0.48	0.03	1.00	0.13	0.31	0.20	1.00	0.29	1.00	0.21	1.00	0.25	1.00	0.46	1.00	-0.04	0.37
EVAMS	A	NC	1.00	0.10	1.00	NC	1.00	0.05	1.00	0.07	1.00	NC	1.00	0.25	1.00	0.01	1.00	NC	1.00	0.39	1.00	-0.02	0.46
MONMN	A	0.43	0.99	0.22	0.14	NC	NC	0.00	0.50	0.46	**<0.01**	0.26	0.94	0.25	0.95	0.07	0.68	0.24	0.94	0.10	0.76	-0.03	0.43
MONMS	A	0.32	1.00	-0.19	0.26	0.07	1.00	0.01	1.00	0.29	0.09	0.03	1.00	0.24	1.00	0.23	1.00	0.01	1.00	0.10	1.00	-0.07	0.34
MONM	A	0.32	1.00	-0.08	0.63	-0.42	**0.01**	0.12	1.00	0.38	**0.03**	-0.03	0.44	0.05	1.00	-0.06	0.35	-0.21	0.10	0.03	1.00	-0.17	0.16
TOSMO	A	0.22	1.00	-0.02	0.90	0.21	1.00	-0.10	0.26	0.19	0.27	0.18	1.00	0.10	1.00	-0.11	0.25	0.21	1.00	0.16	1.00	0.02	1.00
TOSMI	A	0.46	1.00	0.02	0.93	0.26	1.00	-0.01	0.49	0.01	0.95	0.24	1.00	0.02	1.00	0.01	1.00	0.25	1.00	0.20	1.00	0.17	1.00
COLM	R	-0.05	0.39	0.07	0.65	NC	1.00	0.01	1.00	0.45	**<0.01**	-0.21	0.11	0.34	1.00	-0.17	0.14	0.04	1.00	-0.08	0.29	0.03	1.00
SEIMN	R	NC	1.00	-0.09	0.56	NC	1.00	0.02	1.00	0.12	0.44	0.00	1.00	0.22	1.00	0.00	1.00	NC	1.00	0.32	1.00	-0.02	0.44
SEIMS	R	NC	1.00	0.16	0.34	NC	1.00	0.08	1.00	0.19	0.28	NC	1.00	0.05	1.00	-0.20	0.12	0.29	1.00	0.28	1.00	0.02	1.00
COUMO	C	0.12	1.00	0.11	0.44	0.12	1.00	0.19	1.00	0.12	0.43	0.12	1.00	0.23	1.00	-0.18	0.11	0.08	1.00	-0.14	0.17	-0.24	**0.04**
COUMI	C	0.13	1.00	0.11	0.49	-0.14	0.19	-0.14	0.18	0.26	0.09	0.18	1.00	0.29	1.00	0.27	1.00	0.01	1.00	0.42	1.00	-0.13	0.20
TYLMO	C	0.58	1.00	-0.09	0.60	-0.17	0.18	-0.13	0.22	0.15	0.40	0.06	1.00	0.14	1.00	0.15	1.00	-0.06	0.36	0.20	1.00	0.12	1.00
TYLMI	C	0.22	1.00	0.00	1.00	0.10	1.00	0.03	1.00	0.20	0.16	0.28	1.00	0.33	1.00	0.03	1.00	0.31	1.00	0.12	1.00	0.19	1.00

Values in **bold** indicate significant decreasing trend ($\alpha = 0.05$) for all parameters except Dissolved Organic Carbon and Hardness based on one-tailed test.

Values in **bold** indicate for Dissolved Organic Carbon and Hardness significant decreasing or increasing trend ($\alpha = 0.05$) based on two-tailed test.

A = Application

R = Reference

C = Control

NC = not calculable due to high number of nondetect values.

Table 10. Pearson's r Correlation Coefficients for Storm Event Pollutant Concentrations Versus Time (WY2016 through WY2019).

Station	Watershed Type	Dissolved Copper		Dissolved Organic Carbon		Dissolved Zinc		Fecal Coliform		Hardness, Total as CaCO3		Total Copper		Total Phosphorus		Total Suspended Solids		Total Zinc		Turbidity		Total Nitrogen	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.05	1.00	0.08	0.68	0.18	1.00	-0.29	0.07	-0.02	0.93	-0.07	0.36	-0.01	0.48	-0.05	0.39	-0.09	0.33	0.17	1.00	-0.19	0.17
EVAMS	A	0.01	1.00	0.23	0.22	0.04	1.00	-0.27	0.07	-0.07	0.71	-0.15	0.22	0.09	1.00	-0.24	0.10	-0.07	0.37	-0.09	0.31	-0.22	0.12
MONMN	A	0.18	1.00	0.01	0.96	0.30	1.00	-0.38	**0.01**	0.31	0.07	0.06	1.00	0.04	1.00	0.06	1.00	0.06	1.00	0.28	1.00	0.22	1.00
MONMS	A	-0.07	0.34	-0.23	0.14	0.11	1.00	-0.31	**0.02**	0.24	0.14	-0.35	**0.01**	-0.10	0.26	-0.31	**0.02**	-0.08	0.32	-0.24	0.06	-0.38	**0.01**
MONM	A	0.36	1.00	0.13	0.43	0.07	1.00	-0.32	**0.02**	0.20	0.21	-0.07	0.33	0.04	1.00	-0.03	0.44	-0.09	0.29	0.16	1.00	-0.24	0.07
TOSMO	A	-0.22	0.09	-0.39	**0.02**	-0.13	0.22	-0.08	0.31	0.15	0.37	-0.25	0.06	-0.21	0.10	-0.07	0.33	-0.09	0.29	0.26	1.00	-0.30	**0.03**
TOSMI	A	-0.05	0.37	-0.27	0.10	0.01	1.00	-0.16	0.16	-0.06	0.73	-0.24	0.07	-0.19	0.12	-0.11	0.25	-0.12	0.24	0.14	1.00	-0.22	0.09
COLM	R	0.03	1.00	0.16	0.35	0.03	1.00	-0.26	0.06	0.09	0.61	0.01	1.00	-0.17	0.15	-0.22	0.10	-0.12	0.23	-0.03	0.44	-0.42	**0.01**
SEIMN	R	0.00	1.00	0.01	0.97	NC	1.00	0.12	1.00	0.00	0.99	0.20	1.00	0.24	1.00	0.16	1.00	0.04	1.00	0.42	1.00	-0.13	0.23
SEIMS	R	0.02	1.00	0.09	0.59	-0.06	0.36	-0.27	**0.05**	-0.15	0.36	0.00	1.00	-0.06	0.35	-0.13	0.21	0.19	1.00	0.23	1.00	-0.19	0.12
COUMO	C	-0.06	0.37	-0.05	0.79	-0.06	0.37	-0.31	**0.04**	-0.43	**0.01**	-0.13	0.23	0.09	1.00	-0.08	0.32	0.00	0.50	0.17	1.00	-0.40	**0.01**
COUMI	C	-0.03	0.44	-0.21	0.22	0.16	1.00	-0.16	0.17	-0.07	0.67	-0.17	0.16	-0.12	0.24	-0.12	0.25	-0.02	0.45	-0.04	0.42	-0.21	0.11
TYLMO	C	-0.29	**0.03**	-0.17	0.30	0.15	1.00	-0.25	0.06	-0.04	0.81	-0.07	0.34	0.15	1.00	0.14	1.00	0.17	1.00	0.31	1.00	-0.31	**0.02**
TYLMI	C	-0.03	0.43	-0.13	0.45	-0.01	0.47	-0.27	0.06	-0.04	0.83	-0.19	0.13	0.13	1.00	-0.15	0.20	-0.02	0.45	0.20	1.00	-0.21	0.11

Values in **bold** indicate significant decreasing trend ($\alpha = 0.05$) for all parameters except Dissolved Organic Carbon and Hardness based on one-tailed test.

Values in **bold** indicate for Dissolved Organic Carbon and Hardness significant decreasing or increasing trend ($\alpha = 0.05$) based on two-tailed test.

Shaded values indicate coefficients were calculated using the residuals from regression models for predicting concentration as function of stream flow rate (see description in Data Analysis Procedures section).

A = Application

R = Reference

C = Control

NC = not calculable due to high number of nondetect values.

Table 11. Pearson's r Correlation Coefficients for Base Flow Pollutant Concentrations Versus Time (WY2016 through WY2019).

Station	Watershed Type	Dissolved Copper		Dissolved Organic Carbon		Dissolved Zinc		Fecal Coliform		Hardness, Total as CaCO3		Total Copper		Total Phosphorus		Total Suspended Solids		Total Zinc		Turbidity		Total Nitrogen	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.03	1.00	0.18	0.34	0.00	1.00	0.16	1.00	0.18	0.32	0.27	1.00	0.48	1.00	0.28	1.00	0.22	1.00	0.65	1.00	-0.15	0.20
EVAMS	A	NC	1.00	0.12	0.54	NC	1.00	0.24	1.00	0.15	0.44	NC	1.00	0.37	1.00	0.03	1.00	NC	1.00	0.58	1.00	-0.11	0.29
MONMN	A	0.56	1.00	0.41	**0.05**	NC	1.00	-0.13	0.27	0.61	**<0.01**	0.47	1.00	0.26	1.00	0.10	1.00	0.28	1.00	0.16	1.00	0.02	1.00
MONMS	A	0.44	1.00	-0.18	0.46	0.01	1.00	0.22	1.00	0.30	0.21	0.10	1.00	0.42	1.00	0.30	1.00	-0.12	0.32	0.20	1.00	-0.18	0.23
MONM	A	0.45	1.00	0.01	0.98	-0.46	**0.02**	0.14	1.00	0.50	**0.02**	0.03	1.00	0.12	1.00	-0.08	0.37	-0.43	**0.03**	0.01	1.00	-0.28	0.12
TOSMO	A	0.28	1.00	-0.01	0.98	0.38	1.00	0.11	1.00	0.28	0.23	0.26	1.00	0.22	1.00	0.11	1.00	0.42	1.00	0.28	1.00	0.01	1.00
TOSMI	A	0.63	1.00	0.17	0.47	0.29	1.00	-0.10	0.34	-0.06	0.79	0.45	1.00	0.27	1.00	0.25	1.00	0.41	1.00	0.34	1.00	0.27	1.00
COLM	R	-0.01	0.48	0.02	0.93	NC	1.00	-0.16	0.24	0.47	**0.02**	-0.18	0.21	0.40	1.00	0.08	1.00	0.03	1.00	-0.10	0.32	-0.07	0.39
SEIMN	R	NC	1.00	-0.15	0.50	NC	1.00	-0.20	0.18	0.24	0.27	0.00	0.50	0.35	1.00	0.02	1.00	NC	1.00	0.43	1.00	0.02	1.00
SEIMS	R	NC	1.00	0.24	0.33	NC	1.00	-0.02	0.48	0.30	0.21	NC	1.00	0.09	1.00	-0.10	0.34	0.37	1.00	0.40	1.00	0.24	1.00
COUMO	C	0.16	1.00	0.21	0.33	0.25	1.00	0.24	1.00	0.20	0.33	0.06	1.00	0.36	1.00	-0.22	0.15	0.20	1.00	-0.07	0.37	**-0.35**	**0.05**
COUMI	C	0.16	1.00	0.13	0.55	0.07	1.00	-0.21	0.17	0.34	0.11	0.15	1.00	0.43	1.00	0.09	1.00	0.21	1.00	0.30	1.00	-0.15	0.25
TYLMO	C	0.72	1.00	-0.12	0.63	-0.25	0.16	-0.04	0.44	0.24	0.34	0.28	1.00	0.29	1.00	0.31	1.00	0.08	1.00	0.40	1.00	0.13	1.00
TYLMI	C	0.47	1.00	0.04	0.86	0.02	1.00	0.09	1.00	0.22	0.29	0.46	1.00	0.42	1.00	0.06	1.00	0.29	1.00	0.14	1.00	0.14	1.00

Values in **bold** indicate significant decreasing trend ($\alpha = 0.05$) for all parameters except Dissolved Organic Carbon and Hardness based on a one-tailed test.

Values in **bold** indicate for Dissolved Organic Carbon and Hardness significant decreasing or increasing trend ($\alpha = 0.05$) based on a two-tailed test.

A = Application

R = Reference

C = Control

NC = not calculable due to high number of nondetect values.

Table 12. Kendall's Tau Correlation Coefficients for Mass Load Estimates Versus Time (WY2016 through WY2019).

Station	Parameter	Number of Water Years	Kendall's Tau	p-value
EVALSS	Total Copper	3	-1.00	0.17
EVALSS	Total Nitrogen	3	-1.00	0.17
EVALSS	Total Phosphorus	3	0.33	1.00
EVALSS	Total Suspended Solids	3	-0.33	0.50
EVALSS	Total Zinc	3	-0.33	0.50
EVAMS	Total Copper	4	-0.67	0.17
EVAMS	Total Nitrogen	4	-1.00	**0.04**
EVAMS	Total Phosphorus	4	-0.67	0.17
EVAMS	Total Suspended Solids	4	-1.00	**0.04**
EVAMS	Total Zinc	4	-0.67	0.17
MONM	Total Copper	4	-1.00	**0.04**
MONM	Total Nitrogen	4	-1.00	**0.04**
MONM	Total Phosphorus	4	-0.67	0.17
MONM	Total Suspended Solids	4	-1.00	**0.04**
MONM	Total Zinc	4	-1.00	**0.04**
MONMN	Total Copper	4	-0.67	0.17
MONMN	Total Nitrogen	4	-1.00	**0.04**
MONMN	Total Phosphorus	3	1.00	1.00
MONMN	Total Suspended Solids	3	0.33	1.00
MONMN	Total Zinc	3	0.33	1.00
MONMS	Total Copper	4	-0.67	0.17
MONMS	Total Nitrogen	4	-1.00	**0.04**
MONMS	Total Phosphorus	4	-1.00	**0.04**
MONMS	Total Suspended Solids	4	-0.33	0.38
MONMS	Total Zinc	4	-0.67	0.17
TOSMO	Total Copper	4	-0.67	0.17
TOSMO	Total Nitrogen	4	-0.67	0.17
TOSMO	Total Phosphorus	4	-0.33	0.38
TOSMO	Total Suspended Solids	4	-0.67	0.17
TOSMO	Total Zinc	4	-0.33	0.38
TOSMI	Total Copper	4	-0.67	0.17
TOSMI	Total Nitrogen	4	-0.67	0.17
TOSMI	Total Phosphorus	4	-0.67	0.17
TOSMI	Total Suspended Solids	4	-0.33	0.38
TOSMI	Total Zinc	4	-0.33	0.38
COLM	Total Copper	4	0.00	1.00
COLM	Total Nitrogen	3	-1.00	0.17
COLM	Total Phosphorus	3	-1.00	0.17
COLM	Total Suspended Solids	3	-0.33	0.50
COLM	Total Zinc	4	-1.00	**0.04**

Table 12 (continued). Kendall's Tau Correlation Coefficients for Mass Load Estimates Versus Time (WY2016 through WY2019).				
Station	**Parameter**	**Number of Water Years**	**Kendall's Tau**	**p-value**
SEIMN	Total Copper	4	0.33	1.00
SEIMN	Total Nitrogen	4	-0.33	0.38
SEIMN	Total Phosphorus	4	0.33	1.00
SEIMN	Total Suspended Solids	4	0.33	1.00
SEIMN	Total Zinc	4	-0.33	0.38
SEIMS	Total Copper	4	-0.67	0.17
SEIMS	Total Nitrogen	4	-0.33	0.38
SEIMS	Total Phosphorus	4	-0.67	0.17
SEIMS	Total Suspended Solids	4	-0.67	0.17
SEIMS	Total Zinc	4	-0.33	0.38
COUMO	Total Copper	4	-0.67	0.17
COUMO	Total Nitrogen	4	-1.00	**0.04**
COUMO	Total Phosphorus	4	-0.67	0.17
COUMO	Total Suspended Solids	4	-0.67	0.17
COUMO	Total Zinc	4	-0.33	0.38
COUMI	Total Copper	4	-0.67	0.17
COUMI	Total Kjeldahl Nitrogen as N	3	-1.00	0.17
COUMI	Total Nitrogen	4	-0.67	0.17
COUMI	Total Phosphorus	4	-0.33	0.38
COUMI	Total Suspended Solids	3	-1.00	0.17
COUMI	Total Zinc	4	-0.67	0.17
TYLMO	Total Copper	4	-1.00	**0.04**
TYLMO	Total Nitrogen	4	-0.67	0.17
TYLMO	Total Phosphorus	4	-0.67	0.17
TYLMO	Total Suspended Solids	4	-0.67	0.17
TYLMO	Total Zinc	4	0.00	0.63
TYLMI	Total Copper	4	-1.00	**0.04**
TYLMI	Total Nitrogen	4	0.00	0.63
TYLMI	Total Phosphorus	4	-0.33	0.38
TYLMI	Total Suspended Solids	4	-1.00	**0.04**
TYLMI	Total Zinc	4	-0.33	0.38

Values in **bold** indicate significant decreasing trend (α = 0.05)

Table 13. Pearson's r Correlation Analyses for Mass Load Estimates Versus Time (WY2016 Versus WY2019).

Station	Parameter	Number of Water Years	Pearson's r	p-value
EVALSS	Total Copper	3	-1.00	**0.02**
EVALSS	Total Nitrogen	3	-0.98	0.06
EVALSS	Total Phosphorus	3	0.33	1.00
EVALSS	Total Suspended Solids	3	-0.80	0.21
EVALSS	Total Zinc	3	-0.08	0.47
EVAMS	Total Copper	4	-0.88	0.06
EVAMS	Total Nitrogen	4	-0.91	**0.05**
EVAMS	Total Phosphorus	4	-0.47	0.26
EVAMS	Total Suspended Solids	4	-0.97	**0.01**
EVAMS	Total Zinc	4	-0.68	0.16
MONM	Total Copper	4	-0.98	**0.01**
MONM	Total Nitrogen	4	-0.98	**0.01**
MONM	Total Phosphorus	4	-0.86	0.07
MONM	Total Suspended Solids	4	-0.98	**0.01**
MONM	Total Zinc	4	-0.95	**0.03**
MONMN	Total Copper	4	-0.65	0.18
MONMN	Total Nitrogen	4	-0.87	0.07
MONMN	Total Phosphorus	3	0.99	1.00
MONMN	Total Suspended Solids	3	0.22	1.00
MONMN	Total Zinc	3	0.83	1.00
MONMS	Total Copper	4	-0.86	0.07
MONMS	Total Nitrogen	4	-0.96	**0.02**
MONMS	Total Phosphorus	4	-0.99	**0.01**
MONMS	Total Suspended Solids	4	-0.66	0.17
MONMS	Total Zinc	4	-0.60	0.20
TOSMO	Total Copper	4	-0.73	0.14
TOSMO	Total Nitrogen	4	-0.79	0.11
TOSMO	Total Phosphorus	4	-0.58	0.21
TOSMO	Total Suspended Solids	4	-0.66	0.17
TOSMO	Total Zinc	4	-0.80	0.10
TOSMI	Total Copper	4	-0.67	0.16
TOSMI	Total Nitrogen	4	-0.50	0.25
TOSMI	Total Phosphorus	4	-0.47	0.26
TOSMI	Total Suspended Solids	4	-0.30	0.35
TOSMI	Total Zinc	4	-0.53	0.24
COLM	Total Copper	4	0.03	1.00

Table 13 (continued). Pearson's r Correlation Analyses for Mass Load Estimates Versus Time (WY2016 Versus WY2019).				
Station	**Parameter**	**Number of Water Years**	**Pearson's r**	**p-value**
COLM	Total Nitrogen	3	-0.97	0.09
COLM	Total Phosphorus	3	-0.90	0.15
COLM	Total Suspended Solids	3	-0.38	0.38
COLM	Total Zinc	4	-0.95	**0.03**
SEIMN	Total Copper	4	0.43	1.00
SEIMN	Total Nitrogen	4	-0.31	0.35
SEIMN	Total Phosphorus	4	0.69	1.00
SEIMN	Total Suspended Solids	4	0.46	1.00
SEIMN	Total Zinc	4	-0.60	0.20
SEIMS	Total Copper	4	-0.88	0.06
SEIMS	Total Nitrogen	4	-0.85	0.07
SEIMS	Total Phosphorus	4	-0.84	0.08
SEIMS	Total Suspended Solids	4	-0.86	0.07
SEIMS	Total Zinc	4	-0.44	0.28
COUMO	Total Copper	4	-0.86	0.07
COUMO	Total Nitrogen	4	-0.99	**0.01**
COUMO	Total Phosphorus	4	-0.86	0.07
COUMO	Total Suspended Solids	4	-0.71	0.15
COUMO	Total Zinc	4	-0.86	0.07
COUMI	Total Copper	4	-0.92	**0.04**
COUMI	Total Nitrogen	4	-0.89	0.06
COUMI	Total Phosphorus	4	-0.66	0.17
COUMI	Total Suspended Solids	3	-0.89	0.15
COUMI	Total Zinc	4	-0.92	**0.04**
TYLMO	Total Copper	4	-0.97	**0.02**
TYLMO	Total Nitrogen	4	-0.88	0.06
TYLMO	Total Phosphorus	4	-0.80	0.10
TYLMO	Total Suspended Solids	4	-0.64	0.18
TYLMO	Total Zinc	4	-0.01	0.49
TYLMI	Total Copper	4	-0.80	0.10
TYLMI	Total Nitrogen	4	-0.12	0.44
TYLMI	Total Phosphorus	4	-0.61	0.19
TYLMI	Total Suspended Solids	4	-0.86	0.07
TYLMI	Total Zinc	4	-0.02	0.49

Values in **bold** indicate a significant decreasing trend ($\alpha = 0.05$)

Table 14. Seasonal Kendall's Tau Correlation Coefficients for Average/Maximum Monthly Temperature and Conductivity Versus Time (WY2016 through WY2019).

	Average Monthly Temperature		Maximum Monthly Temperature		Average Monthly Conductivity		Maximum Monthly Conductivity	
Station	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
EVALSS	-0.07	0.25	-0.09	0.18	0.36	1.00	0.08	1.00
EVAMS	-0.06	0.30	-0.09	0.23	0.14	1.00	0.02	1.00
MONM	-0.08	0.26	-0.06	0.32	0.40	1.00	0.21	1.00
MONMN	-0.01	0.49	-0.18	0.05	–	–	–	–
MONMS	-0.08	0.26	-0.16	0.08	0.33	1.00	0.17	1.00
TOSMO	-0.05	0.33	0.00	0.50	0.25	1.00	0.10	1.00
TOSMI	-0.08	0.26	0.02	1.00	–	–	–	–
COLM	-0.01	0.49	0.04	1.00	–	–	–	–
SEIMN	-0.07	0.28	0.00	0.50	0.10	1.00	-0.07	0.29
SEIMS	-0.02	0.46	0.05	1.00	0.39	1.00	0.38	1.00
COUMO	-0.13	0.13	0.03	1.00	-0.05	0.37	0.18	1.00
COUMI	-0.08	0.24	0.00	1.00	–	–	–	–
TYLMO	-0.07	0.28	0.04	1.00	0.20	1.00	0.11	1.00
TYLMI	-0.06	0.30	-0.05	0.35	–	–	–	–

Values in **bold** indicate significant decreasing trend.

Table 15. Kruskall-Wallis Test Results Comparing Storm Event Pollutant Concentrations During Periods in the Monticello Creek Watershed with Quarterly, Monthly, and Biweekly Street Sweeping.

		Total Copper							Total Zinc							Total Nitrogen							Total Phosphorus							Total Suspended Solids						
Station	**Water-shed Type**	**p-value**	**Median Quarterly Sweeping (ug/L)**		**Median Monthly Sweeping (ug/L)**		**Median Biweekly Sweeping (ug/L)**		**p-value**	**Median Quarterly Sweeping (ug/L)**		**Median Monthly Sweeping (ug/L)**		**Median Biweekly Sweeping (ug/L)**		**p-value**	**Median Quarterly Sweeping (mg/L)**		**Median Monthly Sweeping (mg/L)**		**Median Biweekly Sweeping (mg/L)**		**p-value**	**Median Quarterly Sweeping (mg/L)**		**Median Monthly Sweeping (mg/L)**		**Median Biweekly Sweeping (mg/L)**		**p-value**	**Median Quarterly Sweeping (mg/L)**		**Median Monthly Sweeping (mg/L)**		**Median Biweekly Sweeping (mg/L)**	
EVALSS	A	0.82	1.10		1.50		1.15		1.00	2.5		2.5		2.5		0.75	2.09		1.92		1.86		0.26	0.046		0.041		0.060		0.39	23.0		33.0		29.0	
EVAMS	A	0.33	0.50		0.85		0.50		0.71	2.5		2.5		2.5		0.73	2.47		2.34		2.28		0.28	0.044		0.024		0.044		0.14	20.0		17.0		14.0	
MONM	A	0.52	2.00		2.30		1.90		0.22	21.0		15.0		21.0		0.35	0.96		0.95		0.80		**0.01**	0.070	a	0.041	b	0.072	a	0.70	19.0		23.0		16.0	
MONMN	A	0.12	1.45		1.90		2.00		**0.04**	9.9	a,b	6.9	b	13.0	a	0.86	0.85		0.79		0.80		**0.02**	0.071	a	0.032	b	0.075	a	0.58	19.5		17.0		20.0	
MONMS	A	**0.03**	2.55	a	2.30	a,b	1.80	b	0.08	7.1		2.5		5.5		**<0.01**	1.02	a	0.94	a	0.62	b	0.07	0.046		0.030		0.041		**0.01**	7.0	a	6.6	a	4.0	b
TOSMO	A	0.13	11.5		8.10		7.50		0.31	130.0		58.5		50.0		0.07	1.96		1.21		1.07		0.19	0.200		0.108		0.170		0.56	118.5		72.0		80.0	
TOSMI	A	0.06	13.0		9.50		8.95		0.15	120.0		65.5		82.0		**0.03**	1.63	a	1.11	b	1.26	b	0.18	0.170		0.091		0.135		0.79	92.0		77.0		95.0	
COLM	C	0.25	0.50		0.50		0.50		0.52	2.5		2.5		2.5		**<0.01**	0.86	a	0.59	b	0.58	b	**0.00**	0.021	a	0.009	b	0.019	a	0.06	3.1		1.7		1.0	
SEIMN	C	0.11	1.10		1.60		1.60		0.90	2.5		2.5		2.5		0.13	0.90		0.74		0.66		**0.02**	0.052	b	0.039	b	0.100	a	0.14	21.0		35.0		40.0	
SEIMS	C	0.27	0.80		1.10		0.50		0.13	2.5		2.5		2.5		0.05	1.12		0.77		0.83		**<0.01**	0.071	a	0.050	b	0.084	a	0.10	37.0		27.0		28.0	
COUMO	R	0.75	6.00		5.00		4.45		0.24	44.5		30.0		49.5		**0.02**	1.31	a	1.01	b	0.95	b	**0.01**	0.098	a	0.061	b	0.100	a	0.94	26.5		25.0		30.0	
COUMI	R	0.25	6.20		3.70		4.10		**0.02**	35.0	a,b	25.0	b	63.0	a	0.17	1.32		0.91		1.08		**<0.01**	0.150	a	0.100	b	0.180	a	0.24	76.0		39.0		57.0	
TYLMO	R	0.50	6.45		5.55		6.50		0.73	25.0		23.0		25.0		**0.04**	1.27	a	0.78	a,b	0.82	b	0.43	0.081		0.083		0.095		0.72	29.0		22.5		34.0	
TYLMI	R	0.29	5.30		3.70		4.65		0.80	20.5		12.0		13.5		0.10	1.33		1.03		0.99		0.16	0.057		0.040		0.064		0.55	18.0		12.0		13.5	

Values in **bold** indicate there is a significant difference ($\alpha = 0.05$) between periods of street sweeping.

Treatments that are not significantly different from each other are assigned the same letters ("a", "b", or "c").

Shading indicates a consistent decreasing trends is present in the data over all three periods of sweeping.

A = Application

R = Reference

C = Control

NC = not calculable due to high number of nondetect values.

ug/L = micrograms per liter

mg/L = milligrams per liter

Table 16. Kruskall-Wallis Test Results Comparing Base Flow Pollutant Concentrations During Periods in the Monticello Creek Watershed with Quarterly, Monthly, and Biweekly Street Sweeping.																																				
		Total Copper							Total Zinc							Total Nitrogen							Total Phosphorus							Total Suspended Solids						
Station	Water-shed Type	p-value	Median Quarterly Sweeping (ug/L)		Median Monthly Sweeping (ug/L)		Median Biweekly Sweeping (ug/L)		p-value	Median Quarterly Sweeping (ug/L)		Median Monthly Sweeping (ug/L)		Median Biweekly Sweeping (ug/L)		p-value	Median Quarterly Sweeping (mg/L)		Median Monthly Sweeping (mg/L)		Median Biweekly Sweeping (mg/L)		p-value	Median Quarterly Sweeping (mg/L)		Median Monthly Sweeping (mg/L)		Median Biweekly Sweeping (mg/L)		p-value	Median Quarterly Sweeping (mg/L)		Median Monthly Sweeping (mg/L)		Median Biweekly Sweeping (mg/L)	
EVALSS	A	0.22	0.50		0.50		0.50		0.19	2.5		2.5		2.5		0.63	1.86		1.73		1.83		**0.02**	0.022	b	0.018	b	0.036	a	0.49	6.8		8.6		7.1	
EVAMS	A	NC	0.50		0.50		0.50		NC	2.5		2.5		2.5		0.75	2.24		2.22		2.18		0.13	0.015		0.016		0.028		1.00	8.7		8.3		4.4	
MONM	A	0.53	0.50		0.50		0.50		0.07	11.0		7.1		8.2		0.14	0.81		0.42		0.58		0.56	0.030		0.043		0.036		0.13	3.6		4.6		1.6	
MONMN	A	**0.03**	0.50	b	0.50	b	1.20	a	0.09	2.5		5.8		5.3		0.31	0.57		0.44		0.55		0.22	0.027		0.068		0.051		0.76	2.8		4.2		2.8	
MONMS	A	0.18	0.80		0.50		1.05		0.62	2.5		2.5		4.1		0.25	0.96		0.37		0.73		0.56	0.025		0.029		0.041		0.33	1.5		2.2		8.0	
TOSMO	A	0.46	0.50		0.75		1.00		0.24	10.0		6.8		34.0		0.88	0.80		0.71		0.79		0.30	0.053		0.068		0.062		0.42	3.7		2.7		2.0	
TOSMI	A	0.45	1.50		1.40		2.30		0.18	14.0		20.5		74.0		0.21	1.03		0.87		1.20		0.81	0.054		0.068		0.061		0.77	3.4		4.9		2.8	
COLM	C	0.26	0.50		0.50		0.50		0.97	2.5		2.5		2.5		0.25	0.67		0.94		0.59		0.17	0.011		0.014		0.020		0.35	1.2		0.5		0.5	
SEIMN	C	0.32	0.50		0.50		0.50		NC	2.5		2.5		2.5		0.25	0.71		0.46		0.60		0.54	0.029		0.035		0.039		0.50	5.2		10.0		5.0	
SEIMS	C	NC	0.50		0.50		0.50		0.25	2.5		2.5		2.5		0.19	0.59		0.34		0.58		0.68	0.036		0.041		0.048		0.69	6.5		5.9		4.6	
COUMO	R	0.65	0.50		0.50		0.90		**0.04**	6.8	a,b	5.7	b	13.0	a	0.12	0.89		0.58		0.63		0.08	0.049		0.076		0.063		0.50	4.5		4.2		3.8	
COUMI	R	0.28	0.50		0.50		1.50		**<0.01**	11.0	b	5.2	c	17.0	a	0.08	0.62		0.78		0.50		0.10	0.073		0.130		0.130		0.15	7.4		16.0		18.0	
TYLMO	R	0.90	1.25		1.35		1.15		0.89	8.3		8.1		4.4		0.51	0.81		0.47		0.75		0.70	0.035		0.061		0.045		0.88	2.0		3.6		3.6	
TYLMI	R	0.07	1.95		2.10		3.50		0.21	5.4		11.0		10.0		0.80	1.08		1.15		1.15		0.18	0.025		0.028		0.033		0.06	3.4		6.6		4.9	

Values in **bold** indicate there is a significant difference (α = 0.05) between periods of street sweeping.

Treatments that are not significantly different from each other are assigned the same letters ("a", "b", or "c").

Shading indicates a consistent decreasing trends is present in the data over all three periods of sweeping.

A = Application

R = Reference

C = Control

NC = not calculable due to high number of nondetect values

ug/L = micrograms per liter

mg/L = milligrams per liter

Table 17. Kendall's Tau Correlation Coefficients for Sediment Quality Indicators (total organic carbon, copper, and zinc) Versus Time (WY2016 through WY2019).

Station	Watershed Type	Total Organic Carbon		Total Copper		Total Zinc	
		Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
EVALSS	A	0.67	1.00	0.00	1.00	-0.33	0.38
EVAMS	A	0.33	1.00	-0.18	0.36	0.00	1.00
MONT-1	A	0.00	1.00	-0.33	0.38	-0.33	0.38
MONT-2	A	-0.33	0.38	-0.33	0.38	-0.18	0.36
MONT-3	A	0.67	1.00	0.67	1.00	0.33	1.00
MONT-4	A	-0.18	0.36	0.67	1.00	0.00	1.00
MONT-5	A	0.00	1.00	0.33	1.00	0.33	1.00
TOSH-1	A	-0.33	0.38	-0.33	0.38	0.67	1.00
TOSH-2	A	0.33	1.00	0.00	1.00	0.67	1.00
TOSH-3	A	0.67	1.00	-0.18	0.36	0.67	1.00
TOSH-4	A	0.00	1.00	0.00	1.00	0.00	1.00
COLIN-1	R	-0.33	0.50	-0.33	0.50	0.33	1.00
SIDL-1	R	1.00	1.00	0.00	1.00	0.00	1.00
SIDL-2	R	0.67	1.00	0.33	1.00	0.00	1.00
SIDL-3	R	0.18	1.00	-0.55	0.14	-0.55	0.14
CTRY-1	C	0.00	1.00	0.33	1.00	0.33	1.00
CTRY-2	C	0.55	1.00	0.33	1.00	-1.00	**0.04**
TYLR-1	C	-1.00	**0.04**	0.00	1.00	0.00	1.00
TYLR-2	C	0.00	1.00	-0.67	0.17	-0.33	0.38

Values in **bold** indicate significant trend (α = 0.05)

A = Application

R = Reference

C = Control

Table 18. Kendall's Tau Correlation Coefficients for Sediment Quality Indicators (polycyclic aromatic hydrocarbons) Versus Time (WY2016 through WY2019).

Station	Watershed Type	1-Methylnaphthalene		2-Methylnaphthalene		Acenaphthene		Acenaphthylene		Anthracene		Benz[a]anthracene		Benzo(a)pyrene		Benzo(b)fluoranthene		Benzo(ghi)perylene	
		Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
EVALSS	A	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.33	1.00
EVAMS	A	-0.67	0.17	-0.67	0.17	0.00	1.00	-0.67	0.17	-0.67	0.17	0.67	1.00	1.00	1.00	1.00	1.00	0.33	1.00
MONT-1	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
MONT-2	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
MONT-3	A	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	1.00	1.00	1.00	0.67	1.00
MONT-4	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
MONT-5	A	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
TOSH-1	A	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.00	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
TOSH-2	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
TOSH-3	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	-1.00	**0.04**	0.33	1.00	0.33	1.00	0.33	1.00	0.55	1.00
TOSH-4	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.33	1.00	0.67	1.00
COLIN-1	R	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00
SIDL-1	R	0.67	1.00	0.67	1.00	0.67	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.33	1.00	0.33	1.00	0.00	1.00
SIDL-2	R	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00
SIDL-3	R	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
CTRY-1	C	0.67	1.00	0.67	1.00	1.00	1.00	1.00	1.00	0.67	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00
CTRY-2	C	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
TYLR-1	C	-0.33	0.38	-0.33	0.38	-0.33	0.75	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38
TYLR-2	C	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-0.33	0.38	-0.18	0.36	0.00	1.00	-0.33	0.38

Values in **bold** indicate significant trend ($\alpha = 0.05$)

A = Application

R = Reference

C = Control

Table 18 (continued). Kendall's Tau Correlation Coefficients for Sediment Quality Indicators (polycyclic aromatic hydrocarbons) Versus Time (WY2016 through WY2019).																				
	Watershed	Benzo(j,k)fluoranthene		Chrysene		Dibenzo(a,h)anthracene		Fluoranthene		Fluorene		Indeno(1,2,3-cd)pyrene		Naphthalene		Phenanthrene		Pyrene	
Station	**Type**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
EVALSS	A	0.00	1.00	0.00	1.00	0.33	1.00	0.00	1.00	0.33	1.00	0.00	1.00	0.33	1.00	0.33	1.00	0.00	1.00
EVAMS	A	0.00	1.00	0.67	1.00	-0.67	0.17	0.33	1.00	-0.67	0.17	0.67	1.00	-0.67	0.17	0.00	1.00	0.67	1.00
MONT-1	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
MONT-2	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
MONT-3	A	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	1.00
MONT-4	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
MONT-5	A	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
TOSH-1	A	0.67	1.00	0.67	1.00	0.33	1.00	0.55	1.00	0.33	1.00	0.67	1.00	0.33	1.00	0.67	1.00	0.67	1.00
TOSH-2	A	0.67	1.00	0.67	1.00	0.33	1.00	0.33	1.00	0.00	1.00	0.67	1.00	0.00	1.00	0.67	1.00	0.67	1.00
TOSH-3	A	0.33	1.00	0.33	1.00	-0.33	0.38	0.33	1.00	0.00	1.00	0.67	1.00	0.00	1.00	0.33	1.00	0.33	1.00
TOSH-4	A	0.00	1.00	0.67	1.00	0.00	1.00	0.67	1.00	0.00	1.00	0.67	1.00	0.00	1.00	0.00	1.00	0.67	1.00
COLIN-1	R	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00
SIDL-1	R	0.00	1.00	0.00	1.00	0.67	1.00	0.33	1.00	0.67	1.00	0.33	1.00	0.67	1.00	0.00	1.00	0.33	1.00
SIDL-2	R	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00
SIDL-3	R	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.33	1.00
CTRY-1	C	0.33	1.00	0.33	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.33	1.00	0.67	1.00	0.55	1.00	0.67	1.00
CTRY-2	C	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00	0.67	1.00
TYLR-1	C	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38	-0.33	0.38
TYLR-2	C	1.00	1.00	0.33	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.18	1.00	0.18	1.00

Values in **bold** indicate significant trend ($\alpha = 0.05$)

A = Application

R = Reference

C = Control

Table 19. Kendall's Tau Correlation Coefficients for Sediment Quality Indicators (phthalates) Versus Time (WY2016 through WY2019).													
		Butyl Benzyl Phthalate		Di-n-octyl Phthalate		Di(2-ethylhexyl) Phthalate		Dibutyl Phthalate		Diethyl Phthalate		Dimethyl Phthalate	
Station	Watershed Type	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.00	1.00	0.00	1.00	0.33	1.00	-0.33	0.38	-0.33	0.38	0.00	1.00
EVAMS	A	-0.55	0.14	-0.55	0.14	0.00	1.00	-0.67	0.17	-0.67	0.17	-0.33	0.38
MONT-1	A	0.00	1.00	0.00	1.00	0.00	1.00	-0.33	0.38	-0.67	0.17	0.00	1.00
MONT-2	A	0.00	1.00	0.00	1.00	-0.33	0.38	-0.33	0.38	-0.67	0.17	0.00	1.00
MONT-3	A	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00	0.33	1.00
MONT-4	A	0.00	1.00	0.00	1.00	0.67	1.00	-0.33	0.38	-0.33	0.38	0.00	1.00
MONT-5	A	0.00	1.00	0.00	1.00	0.00	1.00	-0.18	0.36	-0.18	0.36	0.67	1.00
TOSH-1	A	0.67	1.00	0.67	1.00	0.33	1.00	0.18	1.00	0.18	1.00	0.33	1.00
TOSH-2	A	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.33	1.00
TOSH-3	A	0.00	1.00	0.00	1.00	0.00	1.00	-0.33	0.38	-0.33	0.38	0.00	1.00
TOSH-4	A	0.00	1.00	0.00	1.00	0.33	1.00	-0.33	0.38	-0.33	0.38	0.00	1.00
COLIN-1	R	0.33	1.00	0.33	1.00	-1.00	0.17	-1.00	0.17	-1.00	0.17	0.33	1.00
SIDL-1	R	0.18	1.00	0.18	1.00	0.18	1.00	0.33	1.00	0.18	1.00	0.67	1.00
SIDL-2	R	0.33	1.00	0.33	1.00	0.00	1.00	0.00	1.00	-0.18	0.36	0.55	1.00
SIDL-3	R	0.00	1.00	0.00	1.00	0.00	1.00	-0.33	0.38	-0.33	0.38	0.67	1.00
CTRY-1	C	0.33	1.00	0.33	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.33	1.00
CTRY-2	C	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	-0.33	0.38	0.67	1.00
TYLR-1	C	-0.33	0.38	-0.33	0.38	-0.67	0.17	-0.33	0.38	-0.33	0.38	-0.33	0.38
TYLR-2	C	0.00	1.00	0.00	1.00	0.00	1.00	-0.33	0.38	-0.33	0.38	0.33	1.00

Values in **bold** indicate significant trend (α = 0.05)

A = Application

R = Reference

C = Control

Table 20. Pearson's r Correlation Coefficients for Sediment Quality Indicators (total organic carbon, copper, and zinc) Versus Time (WY2016 through WY2019).

Station	Watershed Type	Total Organic Carbon		Total Copper		Total Zinc	
		Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
EVALSS	A	0.60	1.00	-0.20	0.40	-0.63	0.19
EVAMS	A	0.36	1.00	-0.67	0.17	-0.45	0.28
MONT-1	A	-0.46	0.27	-0.29	0.36	-0.21	0.40
MONT-2	A	-0.36	0.32	-0.44	0.28	-0.38	0.31
MONT-3	A	0.81	1.00	0.50	1.00	0.53	1.00
MONT-4	A	-0.12	0.44	0.59	1.00	0.14	1.00
MONT-5	A	0.28	1.00	0.36	1.00	0.44	1.00
TOSH-1	A	0.03	1.00	-0.41	0.30	0.80	1.00
TOSH-2	A	0.38	1.00	-0.12	0.44	0.88	1.00
TOSH-3	A	0.80	1.00	-0.36	0.32	0.90	1.00
TOSH-4	A	0.00	1.00	-0.07	0.47	-0.06	0.47
COLIN-1	R	-0.65	0.28	0.00	1.00	0.62	1.00
SIDL-1	R	0.85	1.00	-0.53	0.24	-0.02	0.49
SIDL-2	R	0.87	1.00	0.12	1.00	-0.01	0.50
SIDL-3	R	0.32	1.00	-0.63	0.19	-0.51	0.25
CTRY-1	C	0.26	1.00	0.43	1.00	0.65	1.00
CTRY-2	C	0.71	1.00	0.32	1.00	-0.91	**0.05**
TYLR-1	C	-0.96	0.02	0.21	1.00	0.21	1.00
TYLR-2	C	0.39	1.00	-0.69	0.16	-0.40	0.30

Values in **bold** indicate significant trend (α = 0.05)

A = Application

R = Reference

C = Control

Table 21. Pearson's r Correlation Coefficients for Sediment Quality Indicators (polycyclic aromatic hydrocarbons) Versus Time (WY2016 through WY2019).

Station	Watershed Type	1-Methylnaphthalene		2-Methylnaphthalene		Acenaphthene		Acenaphthylene		Anthracene		Benz[a]anthracene		Benzo(a)pyrene		Benzo(b)fluoranthene		Benzo(ghi)perylene	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.22	1.00	0.22	1.00	0.22	1.00	0.22	1.00	0.22	1.00	-0.09	0.46	0.03	1.00	0.08	1.00	0.34	1.00
EVAMS	A	-0.74	0.13	-0.74	0.13	-0.02	0.98	-0.74	0.13	-0.74	0.13	0.83	1.00	0.95	1.00	0.98	1.00	0.69	1.00
MONT-1	A	-0.16	0.42	-0.16	0.42	-0.16	0.84	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.70	0.15	-0.61	0.20	-0.16	0.42
MONT-2	A	-0.23	0.39	-0.23	0.39	-0.23	0.77	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39
MONT-3	A	0.96	1.00	0.96	1.00	0.96	1.00	0.96	1.00	0.96	1.00	0.96	1.00	0.86	1.00	0.93	1.00	0.89	1.00
MONT-4	A	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00
MONT-5	A	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00
TOSH-1	A	0.29	1.00	0.29	1.00	0.29	1.00	0.29	1.00	0.25	1.00	0.63	1.00	0.67	1.00	0.65	1.00	0.67	1.00
TOSH-2	A	-0.07	0.47	-0.07	0.47	-0.07	0.93	-0.07	0.47	0.23	1.00	0.80	1.00	0.77	1.00	0.84	1.00	0.77	1.00
TOSH-3	A	0.04	1.00	0.04	1.00	0.04	1.00	0.04	1.00	-0.97	**0.02**	0.53	1.00	0.50	1.00	0.68	1.00	0.71	1.00
TOSH-4	A	-0.05	0.48	-0.05	0.48	-0.05	0.95	-0.05	0.48	-0.05	0.48	-0.05	0.48	-0.05	0.48	0.59	1.00	0.91	1.00
COLIN-1	R	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00
SIDL-1	R	0.79	1.00	0.79	1.00	0.79	1.00	0.59	1.00	0.44	1.00	-0.25	0.38	0.35	1.00	0.35	1.00	0.15	1.00
SIDL-2	R	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00
SIDL-3	R	0.82	1.00	0.82	1.00	0.82	1.00	0.82	1.00	0.82	1.00	0.66	1.00	0.39	1.00	0.66	1.00	0.82	1.00
CTRY-1	C	0.78	1.00	0.78	1.00	0.88	1.00	0.93	1.00	0.92	1.00	0.76	1.00	0.70	1.00	0.65	1.00	0.65	1.00
CTRY-2	C	0.36	1.00	0.45	1.00	0.31	1.00	0.32	1.00	0.27	1.00	0.27	1.00	0.27	1.00	0.27	1.00	0.28	1.00
TYLR-1	C	-0.20	0.40	-0.20	0.40	-0.20	0.80	-0.20	0.40	-0.20	0.40	0.20	1.00	0.23	1.00	0.24	1.00	0.22	1.00
TYLR-2	C	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00	-0.22	0.39	-0.19	0.41	0.08	1.00	-0.53	0.24

Values in **bold** indicate significant trend ($\alpha = 0.05$)

A = Application

R = Reference

C = Control

Table 21 (continued). Pearson's r Correlation Coefficients for Sediment Quality Indicators (polycyclic aromatic hydrocarbons) Versus Time (WY2016 through WY2019).

Station	Water-shed Type	Benzo(j,k)fluoranthene		Chrysene		Dibenzo(a,h)anthracene		Fluoranthene		Fluorene		Indeno(1,2,3-cd)pyrene		Naphthalene		Phenanthrene		Pyrene	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.18	1.00	0.10	1.00	0.22	1.00	-0.02	0.49	0.22	1.00	0.26	1.00	0.22	1.00	0.22	1.00	-0.01	0.50
EVAMS	A	0.18	1.00	0.86	1.00	-0.74	0.13	0.65	1.00	-0.74	0.13	0.77	1.00	-0.74	0.13	0.64	1.00	0.79	1.00
MONT-1	A	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.16	0.42	-0.60	0.20
MONT-2	A	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.23	0.39	-0.25	0.38
MONT-3	A	0.96	1.00	0.96	1.00	0.96	1.00	0.81	1.00	0.96	1.00	0.96	1.00	0.96	1.00	0.96	1.00	0.79	1.00
MONT-4	A	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00	0.17	1.00
MONT-5	A	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00	0.79	1.00
TOSH-1	A	0.71	1.00	0.65	1.00	0.29	1.00	0.61	1.00	0.29	1.00	0.81	1.00	0.29	1.00	0.61	1.00	0.59	1.00
TOSH-2	A	0.76	1.00	0.80	1.00	0.40	1.00	0.68	1.00	-0.07	0.47	0.88	1.00	-0.07	0.47	0.77	1.00	0.78	1.00
TOSH-3	A	0.75	1.00	0.66	1.00	-0.51	0.25	0.44	1.00	0.04	1.00	0.83	1.00	0.04	1.00	0.40	1.00	0.57	1.00
TOSH-4	A	-0.05	0.48	0.85	1.00	-0.05	0.48	0.72	1.00	-0.05	0.48	0.82	1.00	-0.05	0.48	-0.05	0.48	0.81	1.00
COLIN-1	R	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00	0.45	1.00
SIDL-1	R	0.50	1.00	-0.31	0.35	0.79	1.00	0.48	1.00	0.79	1.00	0.54	1.00	0.79	1.00	-0.11	0.45	0.43	1.00
SIDL-2	R	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00	0.64	1.00
SIDL-3	R	0.82	1.00	0.66	1.00	0.82	1.00	0.47	1.00	0.82	1.00	0.82	1.00	0.82	1.00	0.44	1.00	0.76	1.00
CTRY-1	C	0.83	1.00	0.72	1.00	0.85	1.00	0.68	1.00	0.92	1.00	0.58	1.00	0.78	1.00	0.86	1.00	0.76	1.00
CTRY-2	C	0.30	1.00	0.27	1.00	0.51	1.00	0.26	1.00	0.28	1.00	0.28	1.00	0.42	1.00	0.26	1.00	0.26	1.00
TYLR-1	C	-0.20	0.40	0.23	1.00	-0.20	0.40	0.24	1.00	-0.20	0.40	0.22	1.00	-0.20	0.40	0.21	1.00	0.24	1.00
TYLR-2	C	0.99	1.00	0.23	1.00	0.99	1.00	0.04	1.00	0.99	1.00	0.11	1.00	0.99	1.00	0.12	1.00	0.16	1.00

Values in **bold** indicate significant trend (α = 0.05)

A = Application

R = Reference

C = Control

Table 22. Pearson's r Correlation Coefficients for Sediment Quality Indicators (phthalates) Versus Time (WY2016 through WY2019).

Station	Watershed Type	Butyl Benzyl Phthalate		Di-n-octyl Phthalate		Di(2-ethylhexyl) Phthalate		Dibutyl Phthalate		Diethyl Phthalate		Dimethyl Phthalate	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	-0.19	0.41	-0.19	0.41	0.22	1.00	-0.12	0.44	-0.28	0.36	-0.20	0.40
EVAMS	A	-0.29	0.36	-0.29	0.36	-0.04	0.48	-0.61	0.20	-0.62	0.19	-0.51	0.25
MONT-1	A	-0.01	0.50	-0.01	0.50	-0.21	0.40	-0.13	0.44	-0.90	0.05	-0.21	0.40
MONT-2	A	-0.25	0.38	-0.25	0.38	-0.27	0.37	-0.29	0.36	-0.30	0.35	-0.25	0.38
MONT-3	A	0.09	1.00	0.09	1.00	0.60	1.00	0.06	1.00	0.06	1.00	0.37	1.00
MONT-4	A	0.23	1.00	0.23	1.00	0.42	1.00	-0.63	0.19	-0.47	0.27	0.21	1.00
MONT-5	A	0.45	1.00	0.52	1.00	0.40	1.00	-0.25	0.38	-0.20	0.40	0.79	1.00
TOSH-1	A	0.31	1.00	0.31	1.00	0.32	1.00	0.26	1.00	0.26	1.00	0.58	1.00
TOSH-2	A	-0.18	0.41	-0.18	0.41	0.11	1.00	-0.17	0.42	-0.24	0.38	0.09	1.00
TOSH-3	A	-0.04	0.48	-0.06	0.47	-0.04	0.48	-0.09	0.46	-0.09	0.46	-0.06	0.47
TOSH-4	A	-0.23	0.39	-0.23	0.39	0.21	1.00	-0.21	0.40	-0.31	0.35	-0.24	0.38
COLIN-1	R	0.57	1.00	0.57	1.00	-0.99	0.05	-1.00	**0.01**	-1.00	**0.01**	0.44	1.00
SIDL-1	R	0.71	1.00	0.71	1.00	0.72	1.00	0.05	1.00	0.26	1.00	0.79	1.00
SIDL-2	R	0.22	1.00	0.22	1.00	-0.09	0.46	0.19	1.00	-0.12	0.44	0.65	1.00
SIDL-3	R	0.08	1.00	0.08	1.00	0.32	1.00	-0.37	0.32	-0.37	0.32	0.84	1.00
CTRY-1	C	0.15	1.00	0.15	1.00	0.15	1.00	0.10	1.00	0.10	1.00	0.22	1.00
CTRY-2	C	0.36	1.00	0.00	1.00	0.15	1.00	0.19	1.00	-0.66	0.17	0.72	1.00
TYLR-1	C	-0.22	0.39	-0.22	0.39	-0.45	0.28	-0.39	0.31	-0.39	0.31	-0.27	0.37
TYLR-2	C	-0.20	0.40	-0.20	0.40	-0.13	0.44	-0.14	0.43	-0.33	0.34	-0.12	0.44

Values in **bold** indicate significant trend (α = 0.05)

A = Application

R = Reference

C = Control

Table 23. Kendall's Tau Correlation Coefficients for Biological Indicators Versus Time (WY2016 through WY2019).

Station	Watershed Type	Overall Score		Taxa Richness Score		Ephemeroptera Richness Score		Plecoptera Richness Score		Trichoptera Richness Score		Clinger Richness Score		Long Lived Richness Score		Intolerant Richness Score		Percent Dominant Score		Predator Percent Score		Tolerant Percent Score	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.00	1.00	0.67	0.17	0.82	**0.06**	-0.24	1.00	0.00	1.00	0.82	**0.06**	-0.24	1.00	0.71	**0.09**	0.00	1.00	0.33	0.38	-0.18	1.00
EVAMS	A	0.00	1.00	0.18	0.36	-0.18	1.00	0.71	**0.09**	-0.33	1.00	0.00	1.00	0.24	0.33	0.71	**0.09**	0.33	0.38	0.71	**0.09**	0.00	1.00
MONT-1	A	0.33	0.38	0.18	0.36	-0.33	1.00	-0.71	1.00	0.00	1.00	-0.33	1.00	-0.55	1.00	-0.55	1.00	0.67	0.17	0.67	0.17	-0.33	1.00
MONT-2	A	0.00	1.00	0.00	1.00	0.00	1.00	-0.18	1.00	-0.18	1.00	0.00	1.00	0.18	0.36	-0.18	1.00	0.00	1.00	0.67	0.17	-0.67	1.00
MONT-3	A	0.67	0.17	0.24	0.33	0.24	0.33	0.82	**0.06**	0.82	**0.06**	0.55	0.14	0.82	**0.06**	NC	NC	0.55	0.14	0.55	0.14	-0.67	1.00
MONT-4	A	0.33	0.38	1.00	**0.04**	0.00	1.00	-0.18	1.00	0.00	1.00	0.00	1.00	0.18	0.36	-0.24	1.00	1.00	**0.04**	0.33	0.38	-0.33	1.00
MONT-5	A	0.67	0.17	0.67	0.17	-0.24	1.00	-0.24	1.00	0.24	0.33	0.00	1.00	0.82	**0.06**	-0.24	1.00	0.00	1.00	0.67	0.17	1.00	**0.04**
TOSH-1	A	-0.67	1.00	0.24	0.33	-0.82	1.00	-0.18	1.00	-0.55	1.00	-0.91	1.00	-0.33	1.00	NC	NC	0.33	0.38	1.00	**0.04**	-0.67	1.00
TOSH-2	A	0.67	0.17	0.71	**0.09**	-0.71	1.00	0.24	0.33	-0.71	1.00	0.55	0.14	0.18	0.36	NC	NC	0.33	0.38	0.00	1.00	0.55	0.14
TOSH-3	A	0.33	0.38	0.24	0.33	0.71	**0.09**	-0.18	1.00	0.18	0.36	0.24	0.33	0.55	0.14	NC	NC	0.00	1.00	0.33	0.38	0.67	0.17
TOSH-4	A	0.33	0.38	NC	NC	0.18	0.36	NC	NC	-0.71	1.00	NC	NC	0.00	1.00	NC	NC	-0.71	1.00	0.67	0.17	0.00	1.00
COLIN-1	R	1.00	0.17	1.00	0.17	1.00	0.17	0.82	0.11	0.82	0.11	1.00	0.17	1.00	0.17	0.82	0.11	1.00	0.17	0.33	0.50	-1.00	1.00
SIDL-1	R	0.00	1.00	0.55	0.14	-0.55	1.00	0.71	**0.09**	-0.18	1.00	0.18	0.36	0.00	1.00	-0.71	1.00	0.00	1.00	-0.67	1.00	1.00	**0.04**
SIDL-2	R	0.00	1.00	-0.33	1.00	0.18	0.36	-0.33	1.00	-0.18	1.00	-0.91	1.00	-0.91	1.00	0.55	0.14	0.33	0.38	0.55	0.14	-0.33	1.00
SIDL-3	R	0.67	0.17	0.18	0.36	0.41	0.22	-0.55	1.00	0.24	0.33	0.41	0.22	-0.67	1.00	0.71	**0.09**	0.33	0.38	0.71	**0.09**	0.67	0.17
CTRY-1	C	0.33	0.38	0.24	0.33	NC	NC	-0.18	1.00	NC	NC	NC	NC	0.91	**0.04**	NC	NC	0.91	**0.04**	NC	NC	-0.33	1.00
CTRY-2	C	0.67	0.17	0.91	**0.04**	-0.71	1.00	0.55	0.14	-0.55	1.00	-0.55	1.00	0.41	0.22	-0.82	1.00	1.00	**0.04**	-0.33	1.00	0.00	1.00
TYLR-1	C	0.67	0.17	0.24	0.33	-0.71	1.00	0.00	1.00	0.18	0.36	0.00	1.00	0.00	1.00	NC	NC	0.67	0.17	0.67	0.17	-0.91	1.00
TYLR-2	C	1.00	**0.04**	NC	NC	-0.24	1.00	0.82	**0.06**	NC	NC	NC	NC	0.71	**0.09**	NC	NC	1.00	**0.04**	NC	NC	0.67	0.17

Values in **bold** indicate significant trend (α = 0.1)

NC = Not Calculable

A = Application

R = Reference

C = Control

Table 24. Pearson's r Correlation Coefficients for Biological Indicators Versus Time (WY2016 through WY2019).

Station	Watershed Type	Overall Score		Taxa Richness Score		Ephemeroptera Richness Score		Plecoptera Richness Score		Trichoptera Richness Score		Clinger Richness Score		Long Lived Richness Score		Intolerant Richness Score		Percent Dominant Score		Predator Percent Score		Tolerant Percent Score	
		Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value	Co-efficient	p-value
EVALSS	A	0.48	0.26	0.81	**0.10**	0.89	**0.06**	-0.26	1.00	-0.36	1.00	0.89	**0.06**	-0.26	1.00	0.77	0.12	0.15	0.43	0.67	0.17	-0.50	1.00
EVAMS	A	0.31	0.35	0.38	0.31	-0.09	1.00	0.77	0.12	-0.30	1.00	0.05	0.48	0.26	0.37	0.77	0.12	0.52	0.24	0.77	0.12	-0.15	1.00
MONT-1	A	0.56	0.22	0.15	0.43	-0.59	1.00	-0.77	1.00	0.00	1.00	-0.29	1.00	-0.62	1.00	-0.66	1.00	0.87	**0.07**	0.91	**0.05**	-0.39	1.00
MONT-2	A	0.04	0.48	0.05	0.48	-0.07	1.00	-0.20	1.00	-0.34	1.00	-0.03	1.00	0.30	0.35	-0.12	1.00	0.30	0.35	0.66	0.17	-0.81	1.00
MONT-3	A	0.59	0.21	0.26	0.37	0.26	0.37	0.89	**0.06**	0.89	**0.06**	0.39	0.31	0.89	**0.06**	NC	NC	0.85	**0.08**	0.87	**0.07**	-0.81	1.00
MONT-4	A	0.57	0.22	0.99	**0.01**	0.07	0.47	-0.31	1.00	0.00	1.00	0.14	0.43	0.53	0.24	-0.26	1.00	0.97	**0.02**	0.65	0.18	-0.51	1.00
MONT-5	A	0.90	**0.05**	0.76	0.12	-0.26	1.00	-0.26	1.00	0.26	0.37	0.08	0.46	0.89	**0.06**	-0.26	1.00	0.25	0.38	0.78	0.11	0.98	**0.01**
TOSH-1	A	-0.81	1.00	0.26	0.37	-0.89	1.00	-0.42	1.00	-0.67	1.00	-0.91	1.00	-0.40	1.00	NC	NC	0.35	0.33	0.94	**0.03**	-0.66	1.00
TOSH-2	A	0.81	**0.10**	0.77	0.12	-0.77	1.00	0.26	0.37	-0.77	1.00	0.67	0.17	0.32	0.34	NC	NC	0.79	0.11	0.07	0.47	0.59	0.21
TOSH-3	A	0.47	0.27	0.26	0.37	0.77	0.12	-0.12	1.00	0.22	0.39	0.26	0.37	0.62	0.19	NC	NC	0.12	0.44	0.39	0.31	0.74	0.13
TOSH-4	A	0.19	0.41	NC	NC	0.34	0.33	NC	NC	-0.77	1.00	NC	NC	-0.01	1.00	NC	NC	-0.77	1.00	0.56	0.22	0.14	0.43
COLIN-1	R	0.94	0.11	0.84	0.19	0.93	0.12	0.76	0.23	0.76	0.23	0.88	0.16	0.99	**0.06**	0.76	0.23	0.93	0.13	0.92	0.13	-0.98	1.00
SIDL-1	R	0.13	0.44	0.57	0.22	-0.60	1.00	0.77	0.12	-0.32	1.00	0.32	0.34	-0.38	1.00	-0.77	1.00	-0.09	1.00	-0.81	1.00	0.95	**0.03**
SIDL-2	R	0.00	1.00	-0.43	1.00	0.12	0.44	-0.40	1.00	0.01	0.50	-0.95	1.00	-0.95	1.00	0.73	0.14	0.61	0.20	0.32	0.34	-0.45	1.00
SIDL-3	R	0.75	0.13	0.58	0.21	0.45	0.28	-0.67	1.00	0.26	0.37	0.45	0.28	-0.83	1.00	0.77	0.12	0.82	**0.09**	0.77	0.12	0.84	**0.08**
CTRY-1	C	0.59	0.21	0.26	0.37	NC	NC	-0.12	1.00	NC	NC	NC	NC	0.94	**0.03**	NC	NC	0.93	**0.04**	NC	NC	-0.03	1.00
CTRY-2	C	0.87	**0.07**	0.93	**0.04**	-0.77	1.00	0.72	0.14	-0.63	1.00	-0.51	1.00	0.45	0.28	-0.89	1.00	0.97	**0.02**	-0.41	1.00	0.56	0.22
TYLR-1	C	0.41	0.30	0.26	0.37	-0.77	1.00	0.00	1.00	0.19	0.41	-0.01	1.00	0.00	1.00	NC	NC	0.88	**0.06**	0.79	0.11	-0.88	1.00
TYLR-2	C	0.97	**0.02**	NC	NC	-0.26	1.00	0.89	**0.06**	NC	NC	NC	NC	0.77	0.12	NC	NC	0.98	**0.01**	NC	NC	0.75	0.13

Values in **bold** indicate significant trend (α = 0.1)

NC = Not Calculable

A = Application

R = Reference

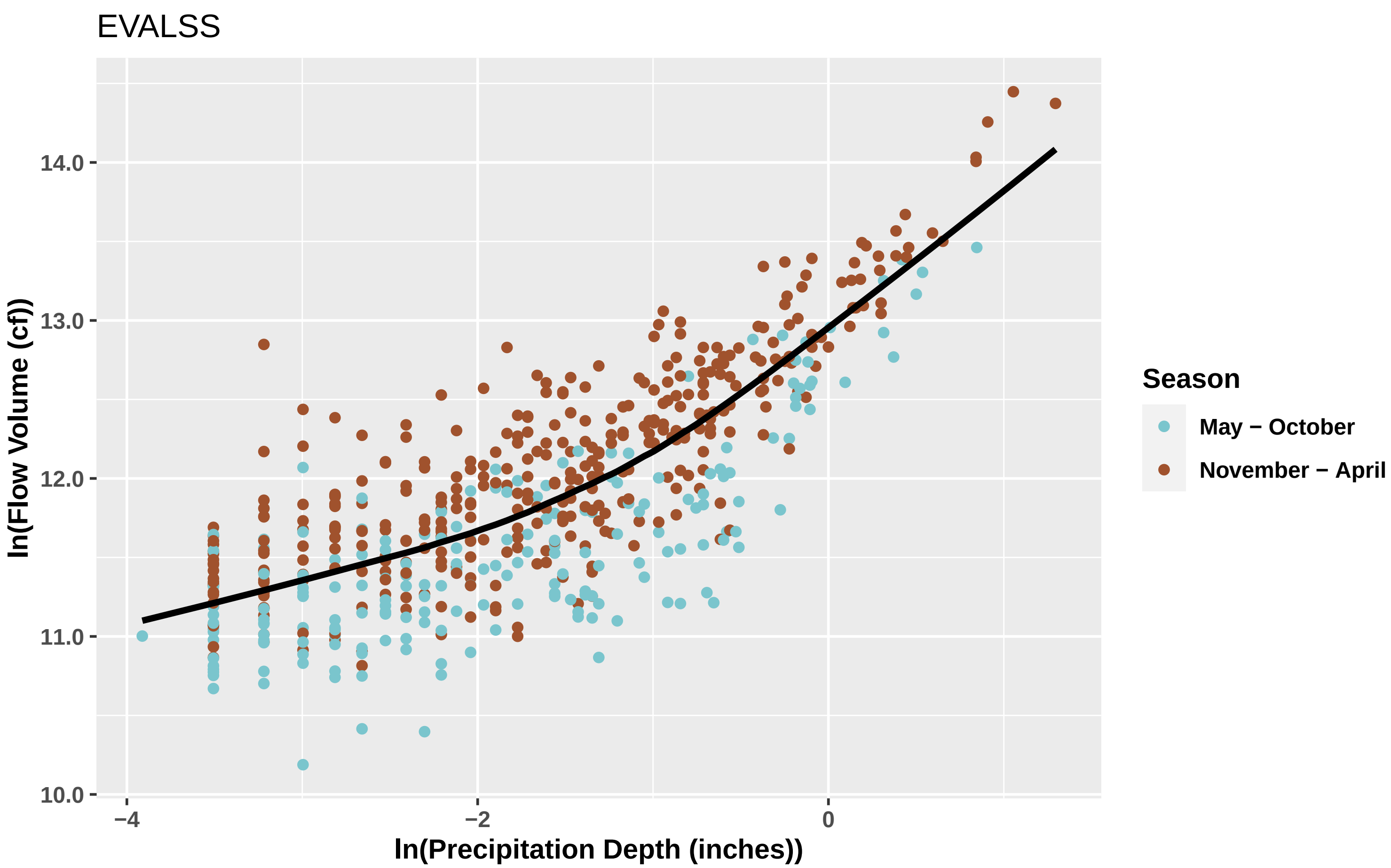
C = Control

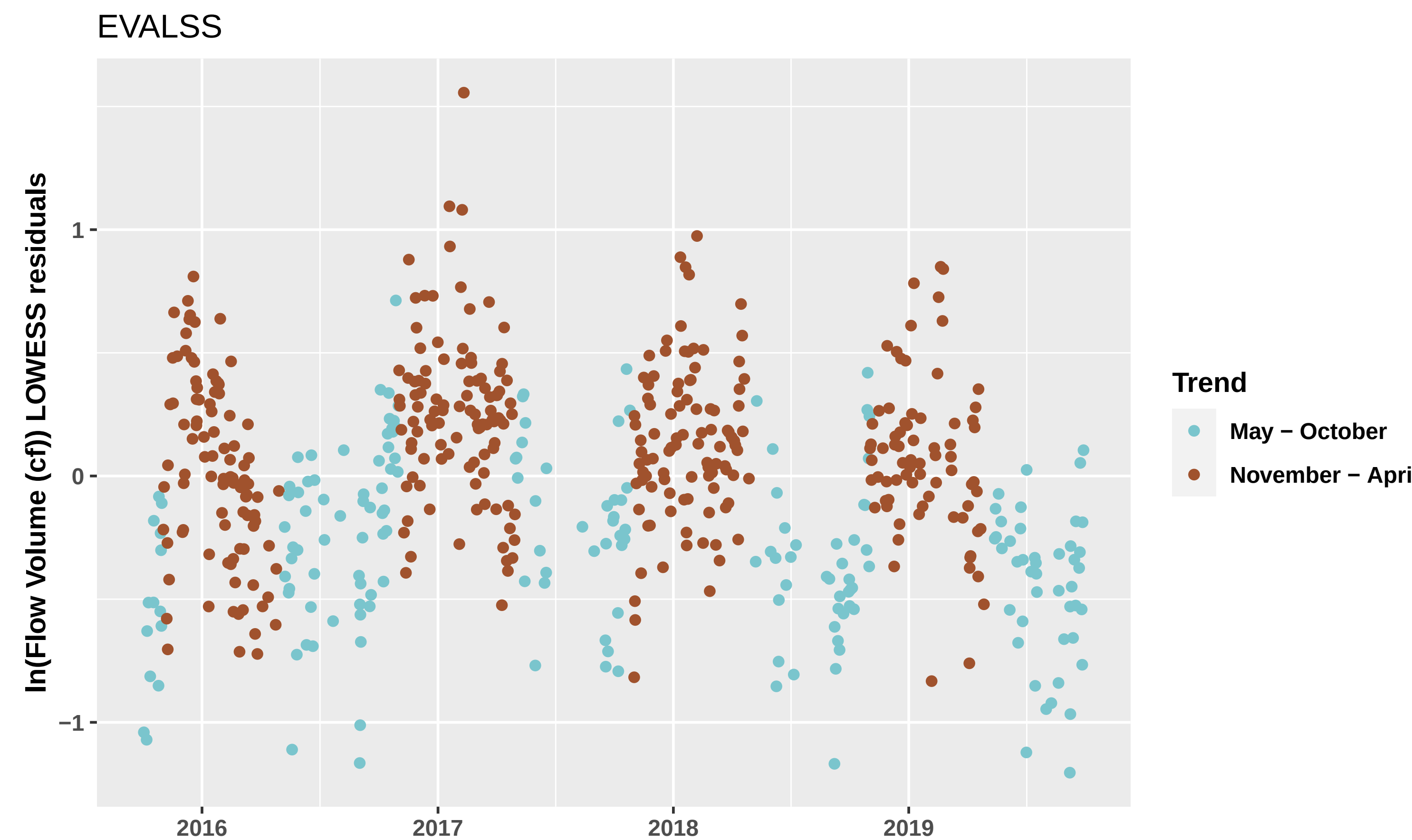
Table 25. Spatial Statistical Multiple Regression Model Results.				
Coefficient	**Estimate**	**Standard Error**	**t-value**	**p-value**
Intercept	30.13	12.27	2.46	**0.02**
Percent Residential Land Use	30.00	15.73	2.08	**0.05**
Percent Commercial Land Use	-929.05	417.41	-2.23	**0.03**
Percent Class C Soils	516.15	209.83	2.46	**0.02**
Mean Watershed Elevation	0.12	0.04	3.42	**0.0011**
Mean Watershed Slope	-2.89	0.64	-4.53	**0.00003**
Covariance Parameter				
Exponential Tail-up Sill	99.65			
Exponential Tail-up Range	409,355.23			
Exponential Tail-down Sill	199.84			
Exponential Tail-down Range	2,739.48			
Nugget Sill	4.43			
Residual standard error	17.43			
Generalized r-squared	0.27			

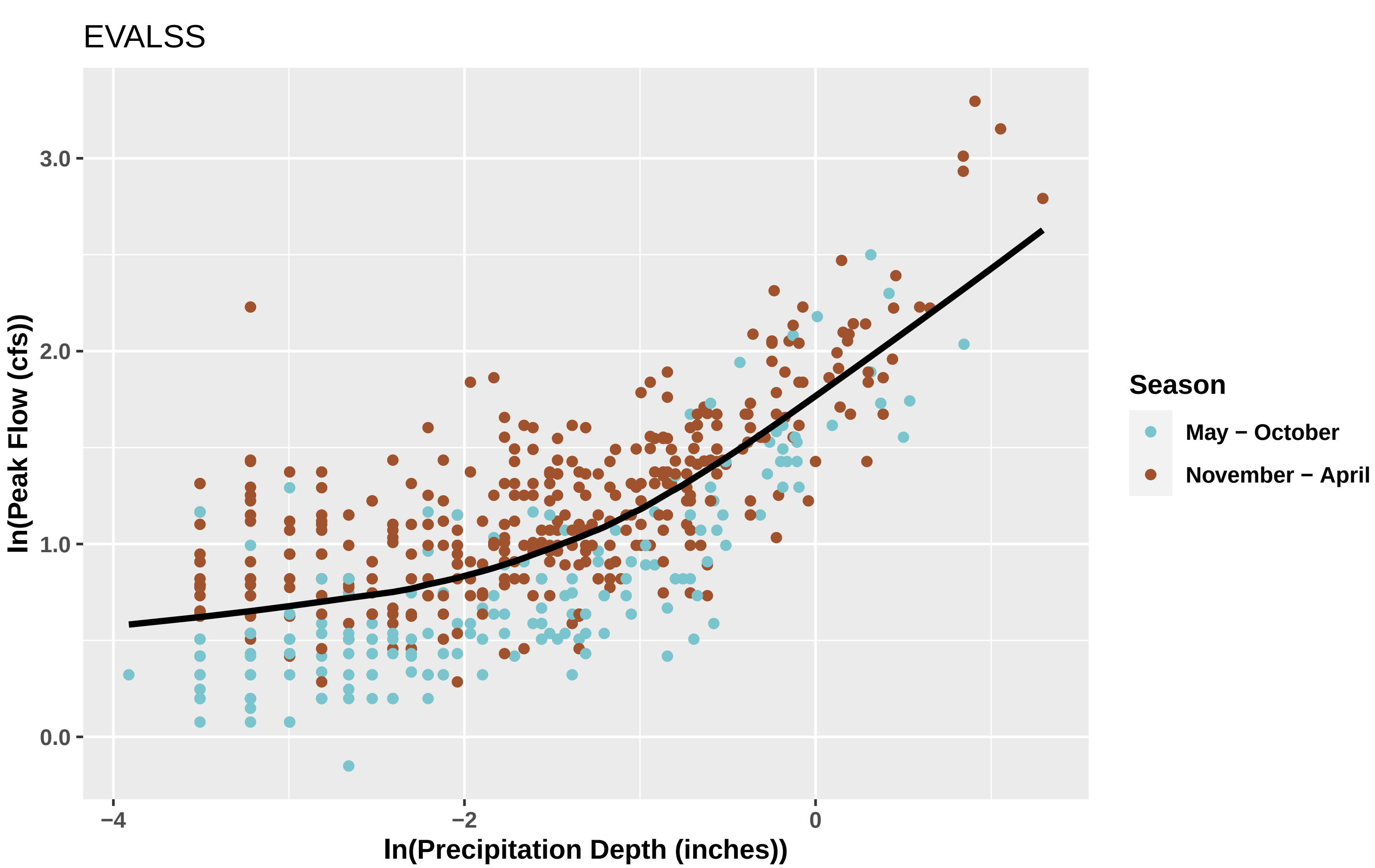
Values in **bold** indicate significant value (α = 0.1)

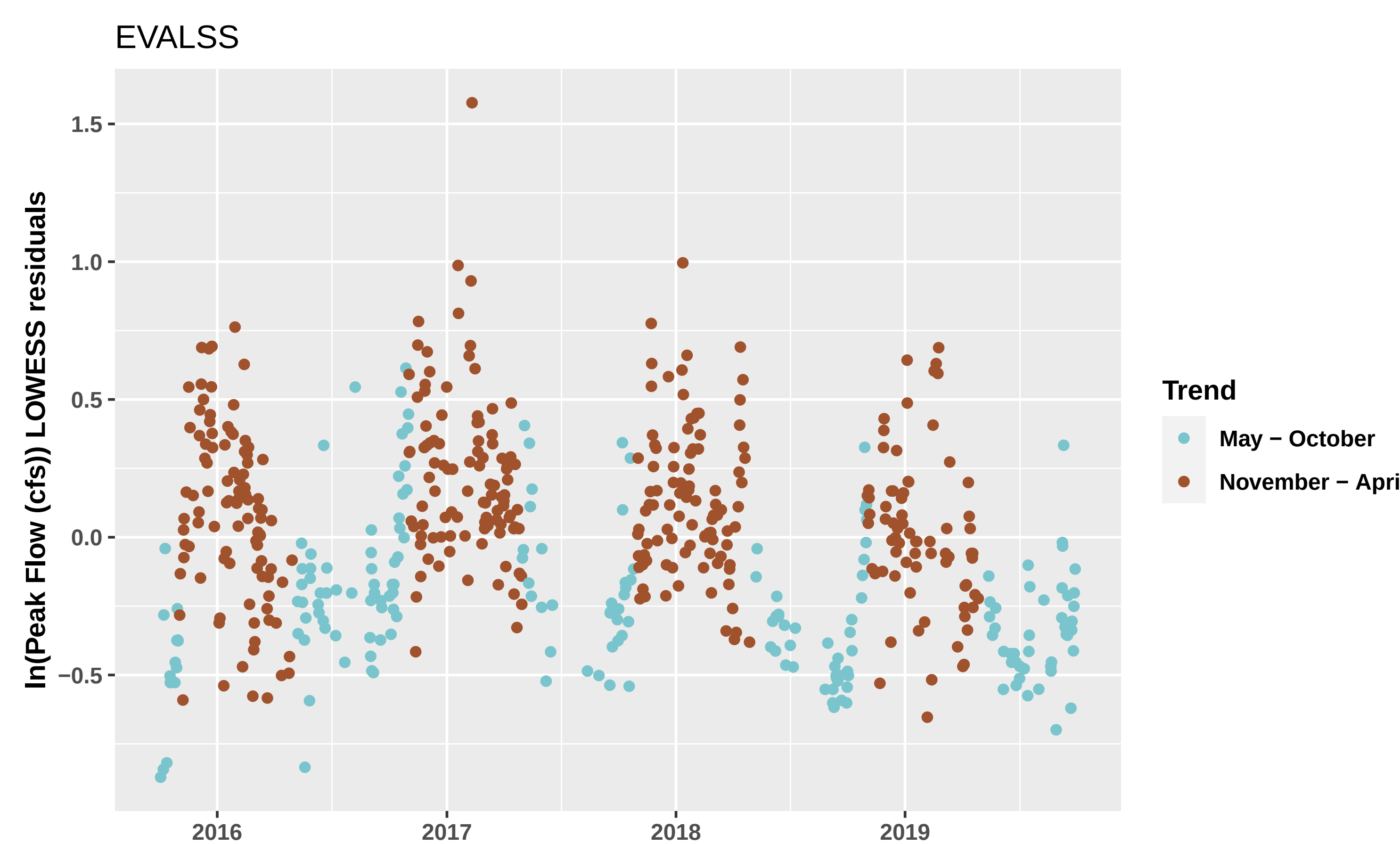
APPENDIX A

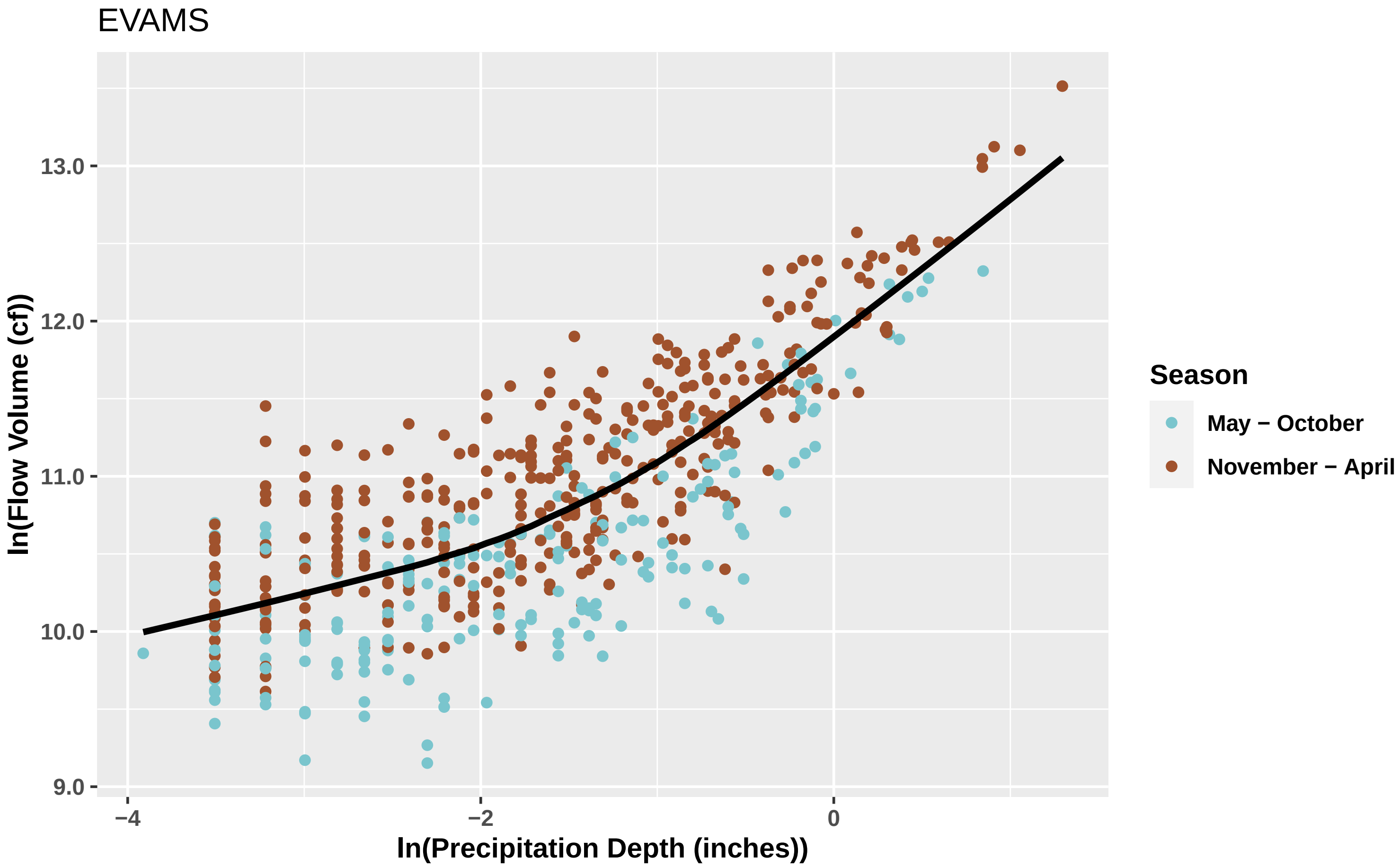
Summary Plots from Rainfall Runoff Analysis

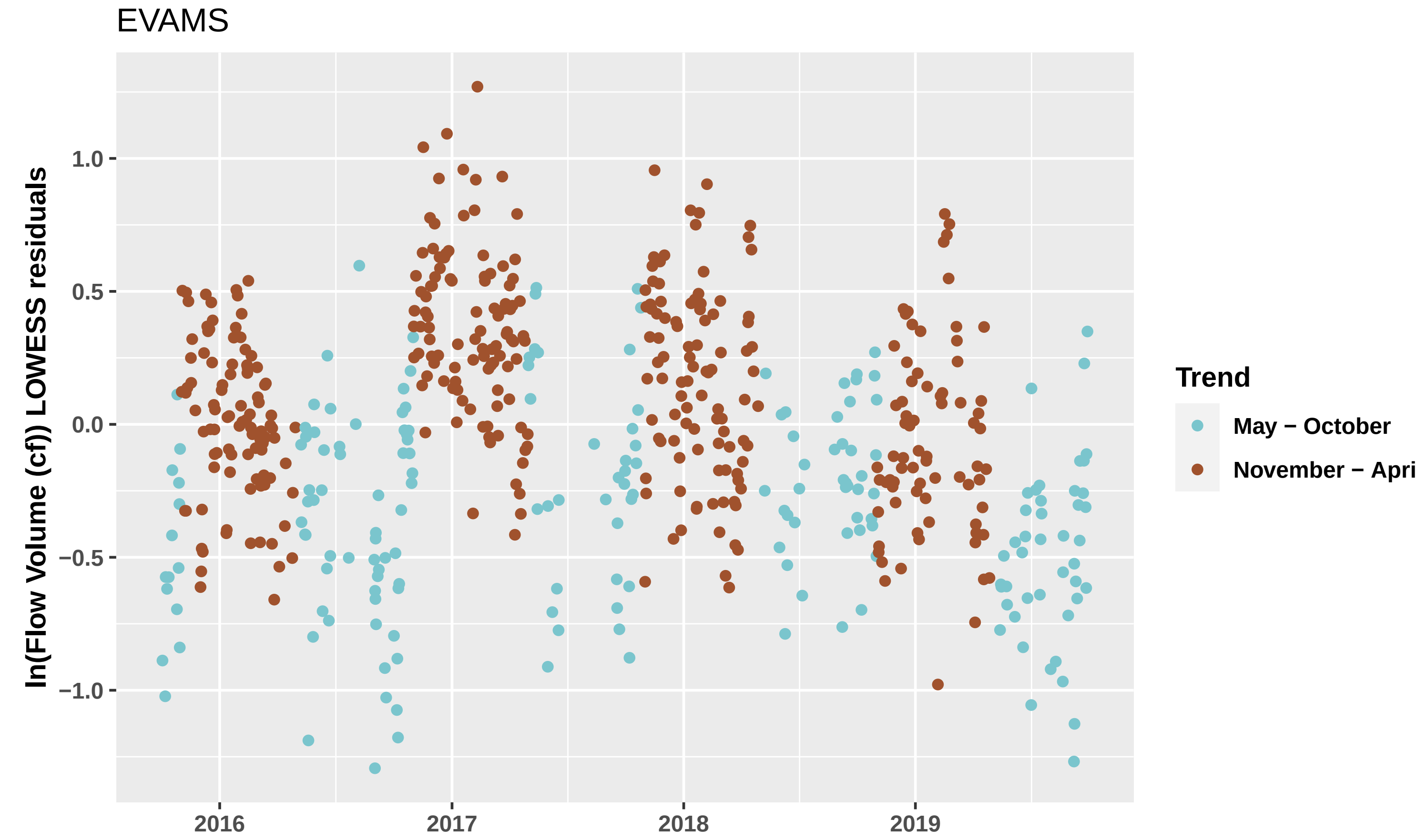

EVALSS
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
14.0
13.0
12.0
11.0
10.0
−4
−2
0
Season
May – October
November – April

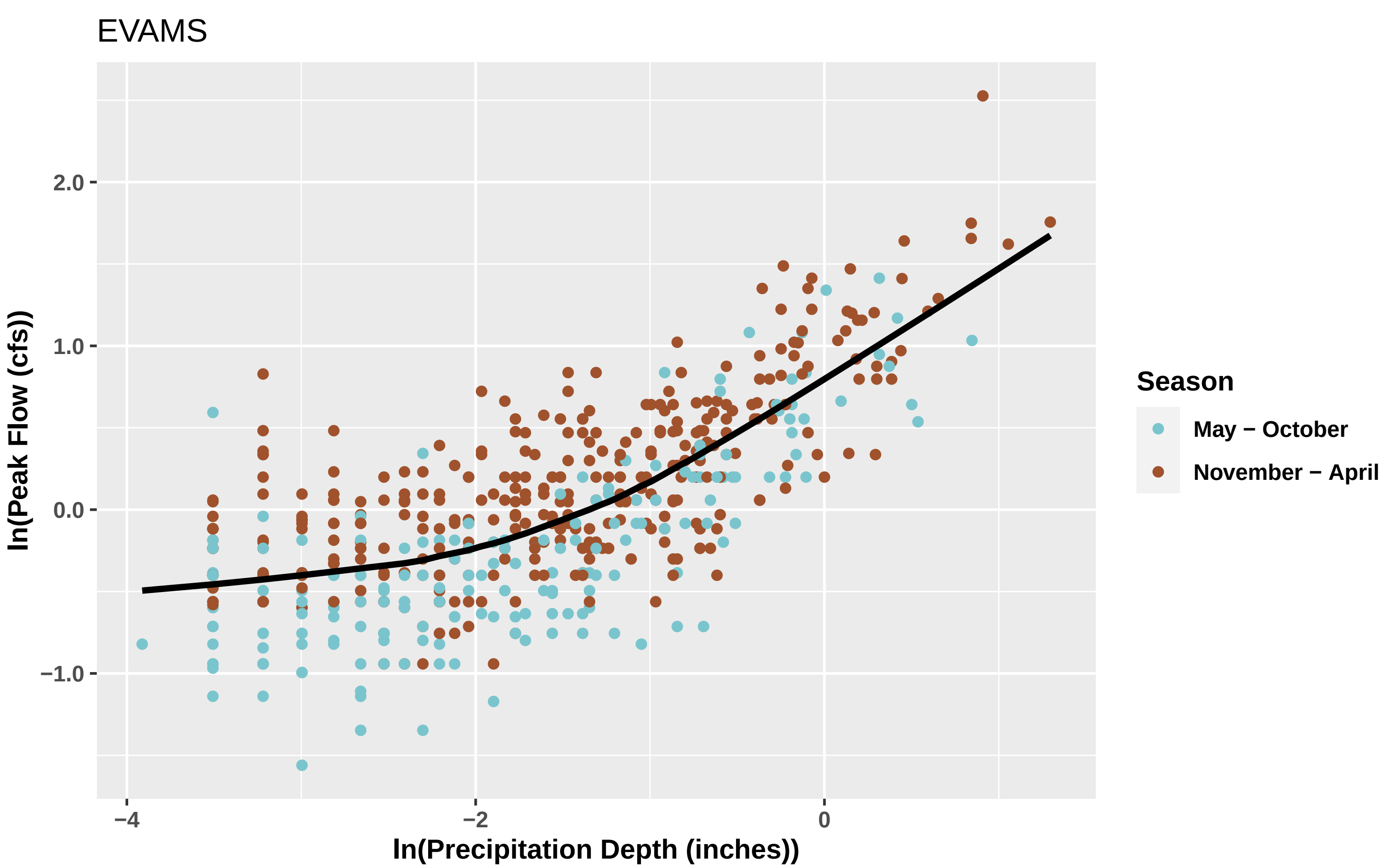

EVALSS
ln(Flow Volume (cf)) LOWESS residuals
1
0
−1
2016
2017
2018
2019
Trend
May – October
November – April

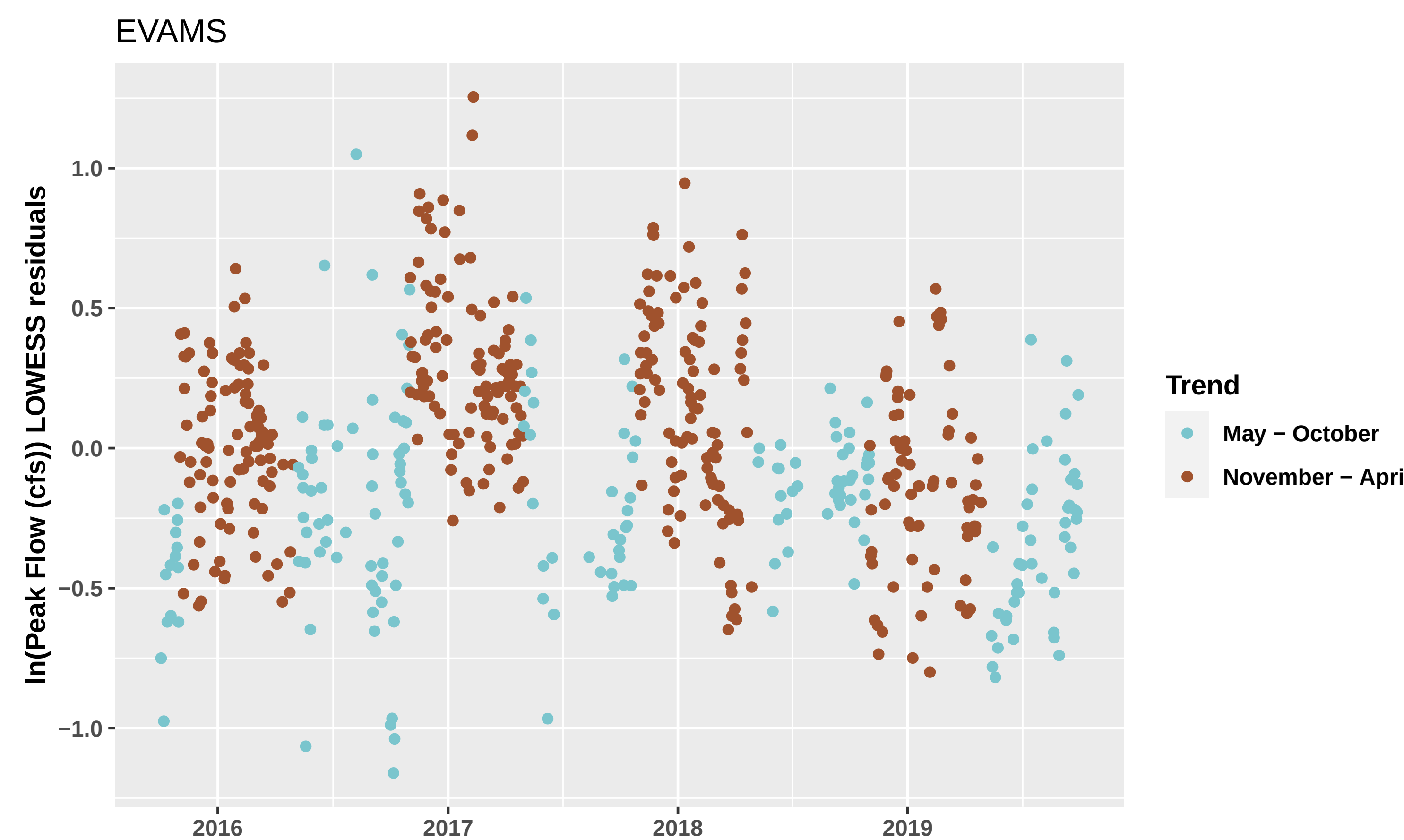

EVALSS
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
3.0
2.0
1.0
0.0
−4
−2
0
Season
May – October
November – April

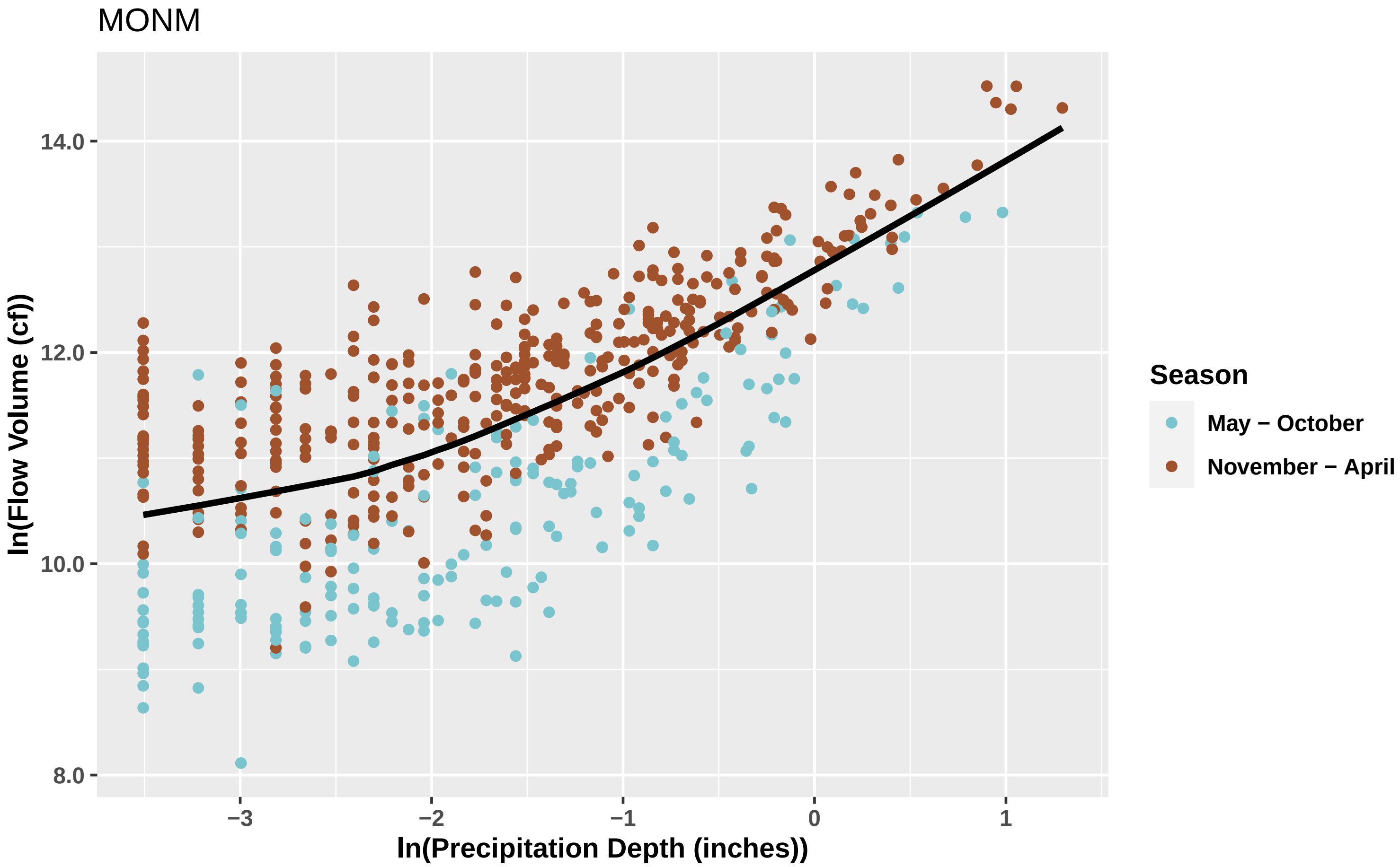

EVALSS
ln(Peak Flow (cfs)) LOWESS residuals
1.5
1.0
0.5
0.0
−0.5
2016
2017
2018
2019
Trend
May – October
November – April

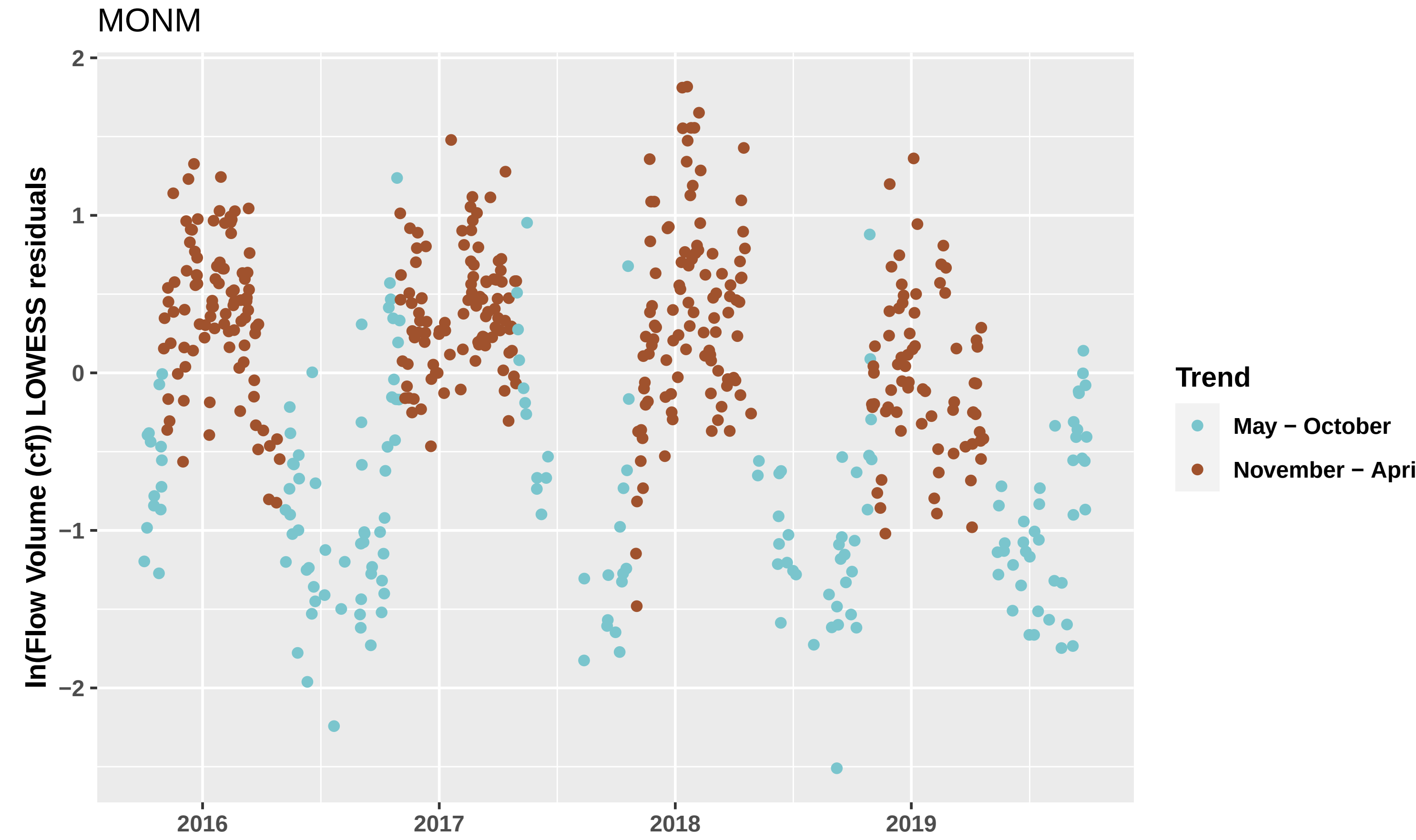

EVAMS
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
13.0
12.0
11.0
10.0
9.0
−4
−2
0
Season
May – October
November – April

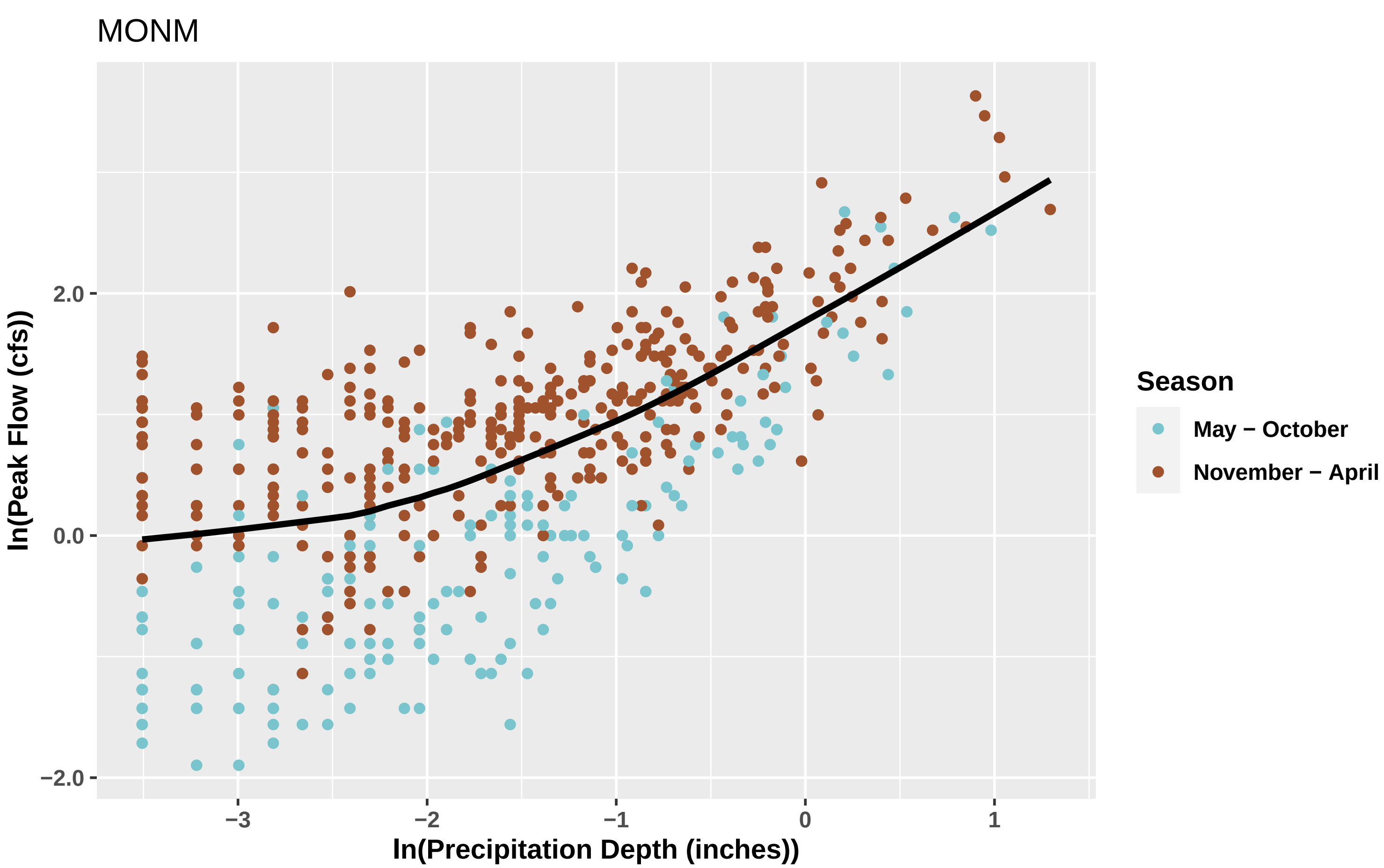

EVAMS
ln(Flow Volume (cf)) LOWESS residuals
1.0
0.5
0.0
−0.5
−1.0
2016
2017
2018
2019
Trend
May – October
November – April

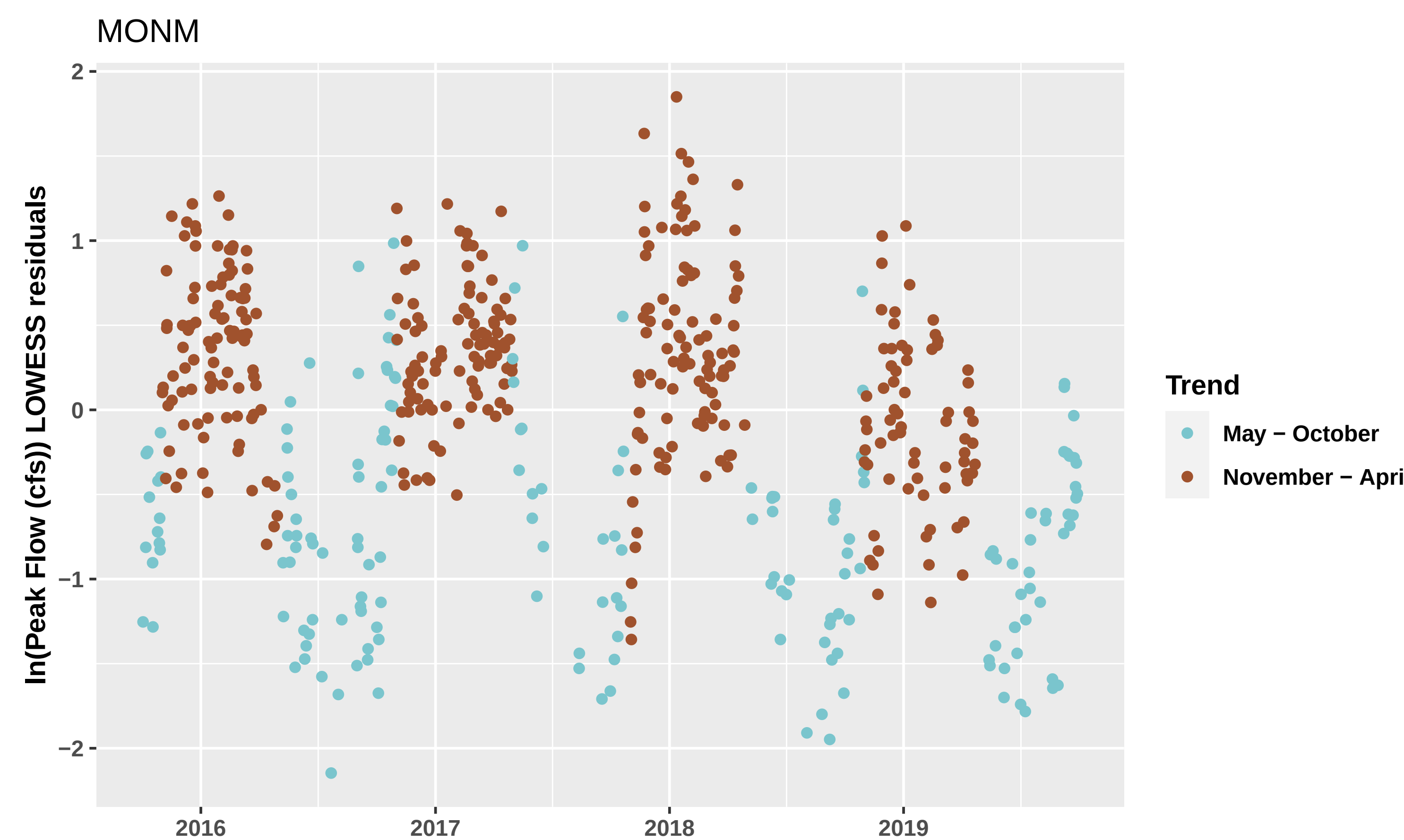

EVAMS
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
2.0
1.0
0.0
−1.0
−4
−2
0
Season
May – October
November – April

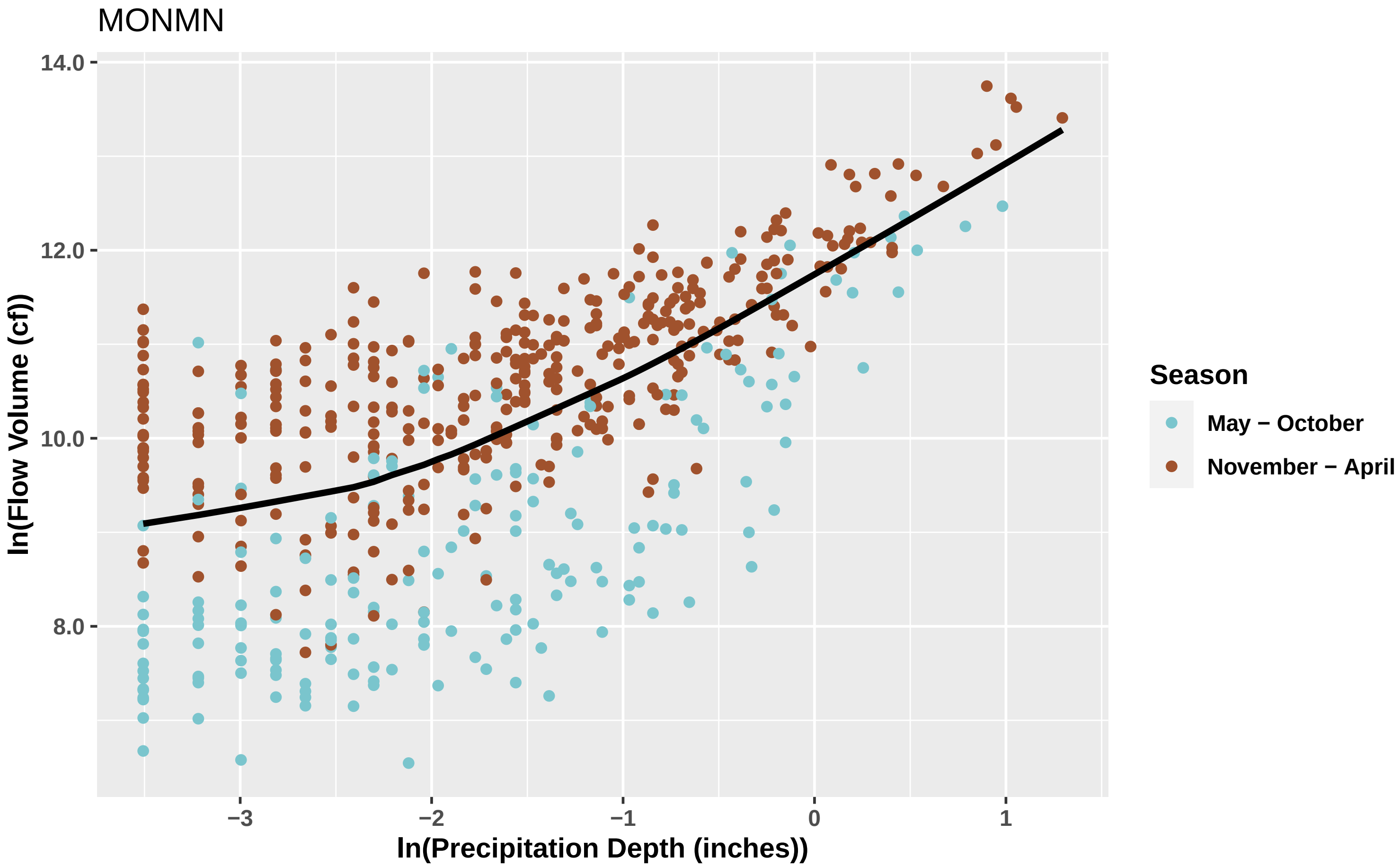

EVAMS
ln(Peak Flow (cfs)) LOWESS residuals
1.0
0.5
0.0
−0.5
−1.0
2016
2017
2018
2019
Trend
May – October
November – April

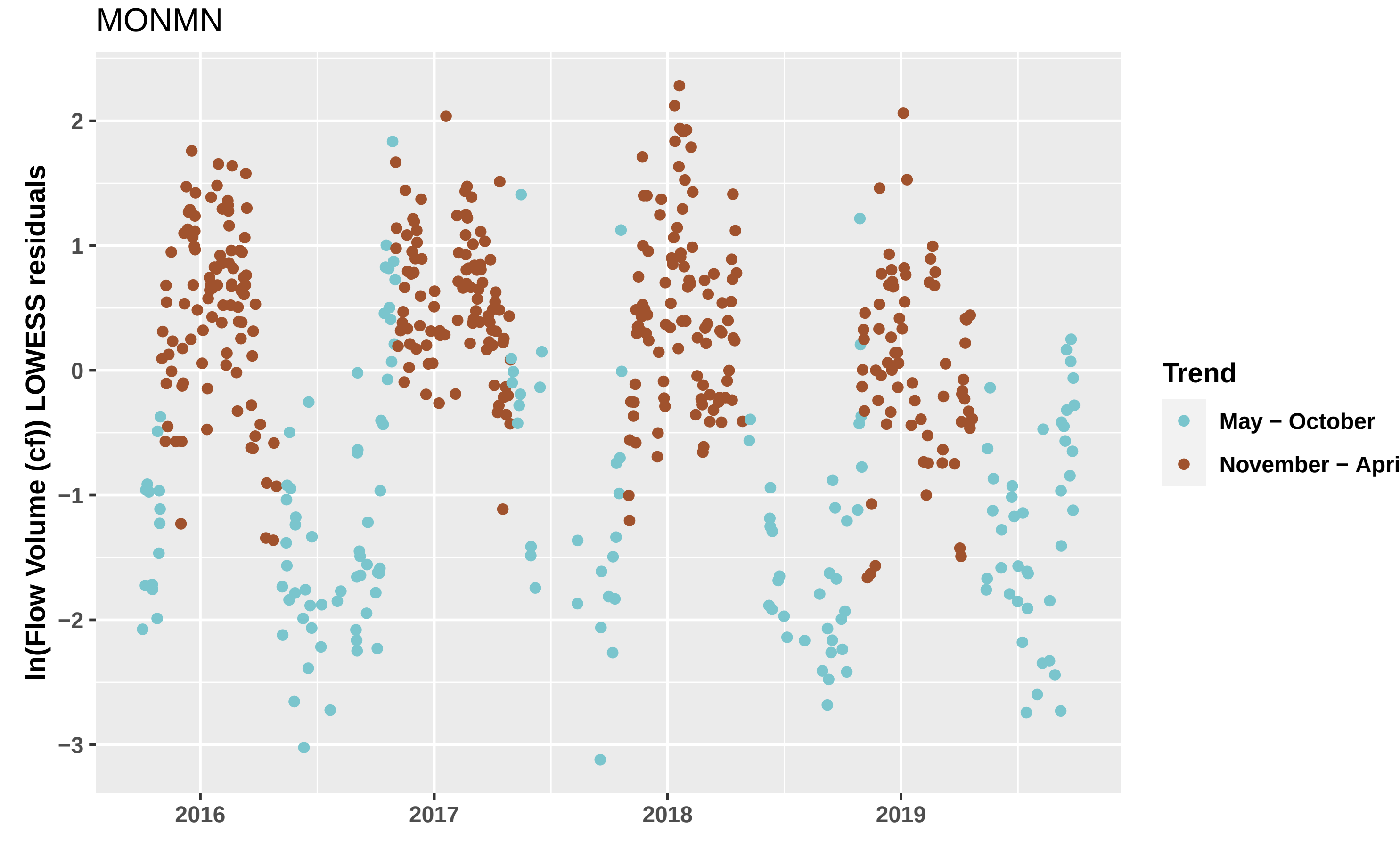

MONM
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
Season
May – October
November – April

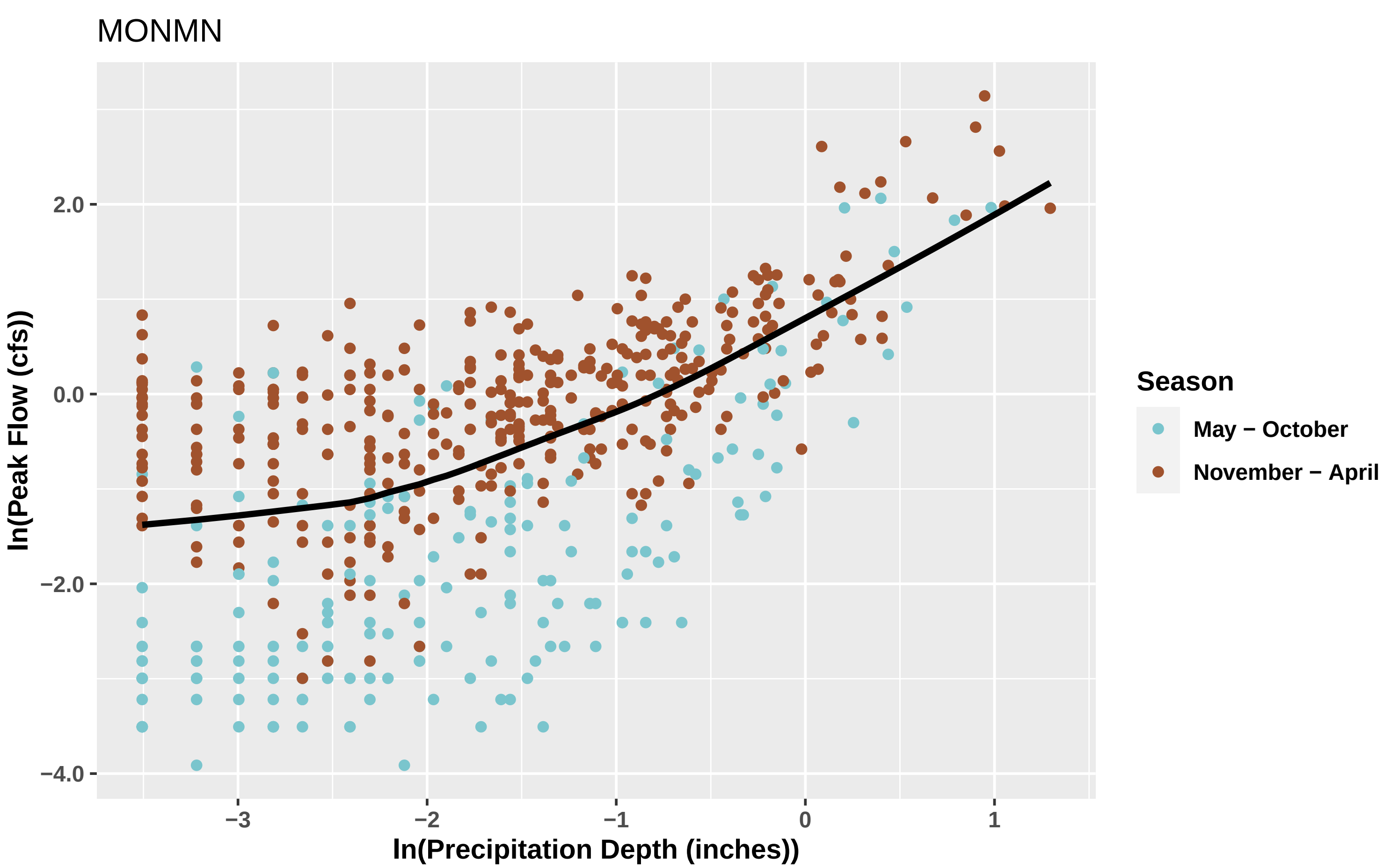

MONM
ln(Flow Volume (cf)) LOWESS residuals
Trend
May – October
November – April

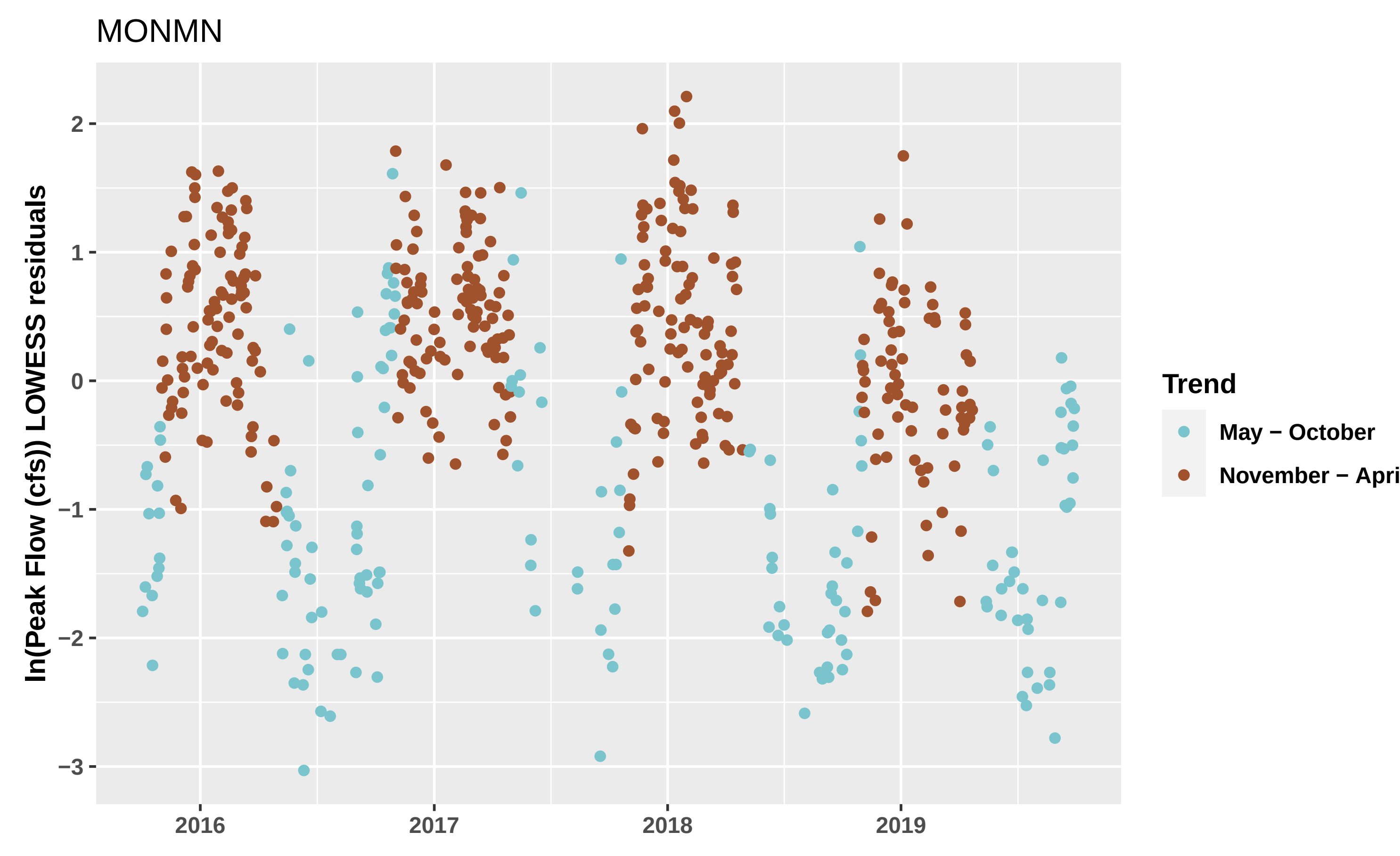

MONM
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
Season
May – October
November – April

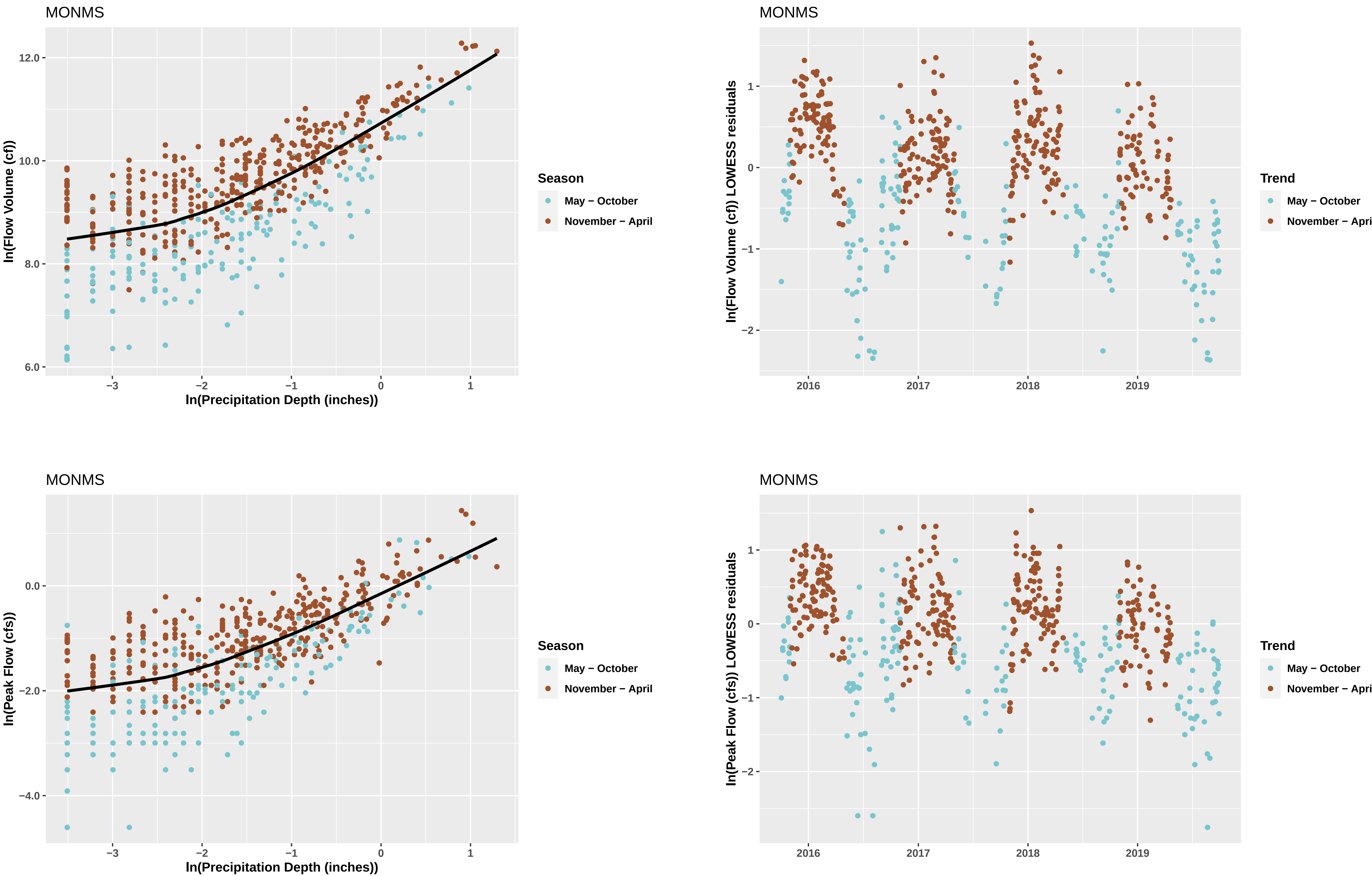

MONM
ln(Peak Flow (cfs)) LOWESS residuals
Trend
May – October
November – April

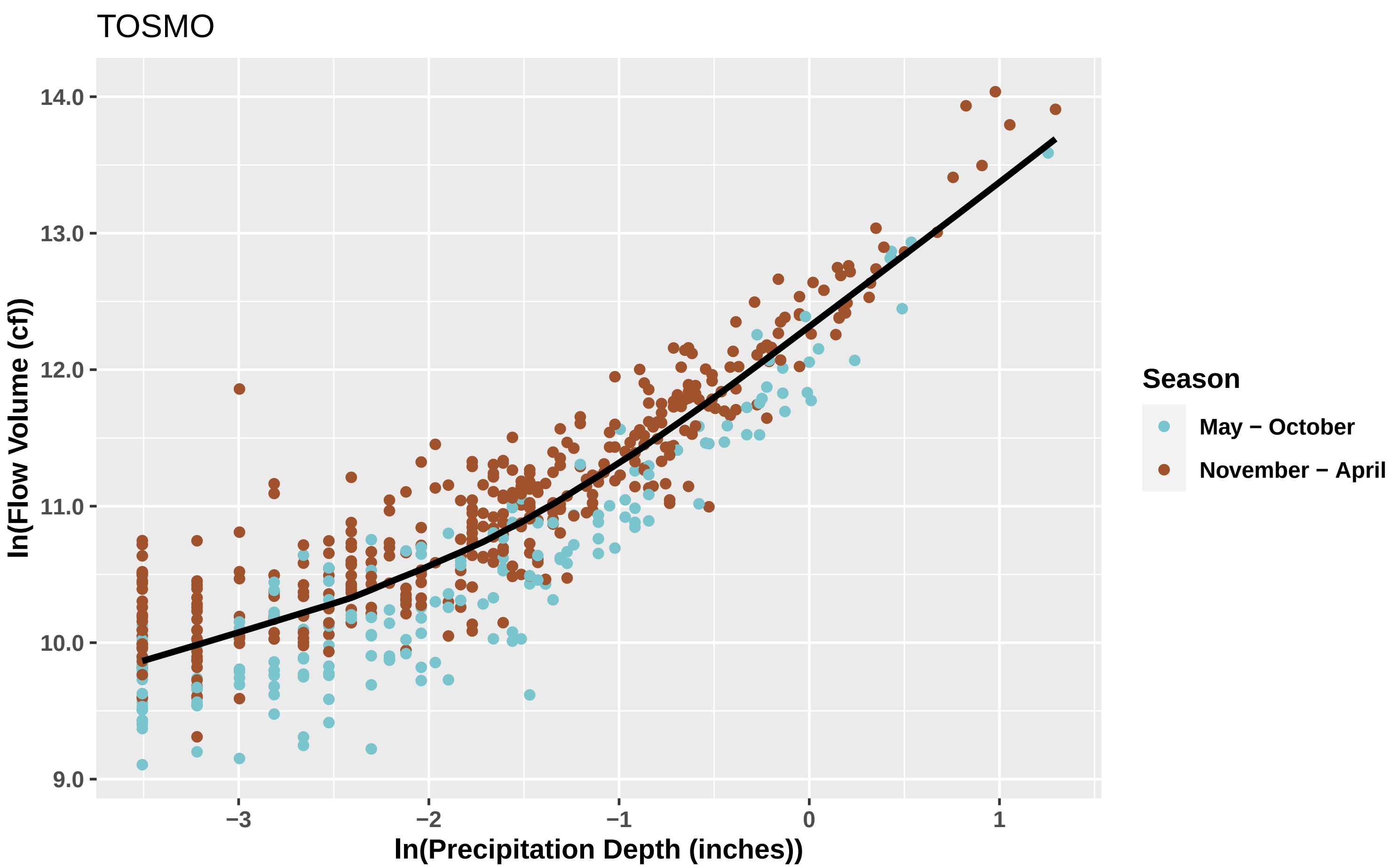

MONMN
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
14.0
12.0
10.0
8.0
−3
−2
−1
0
1
Season
May − October
November − April

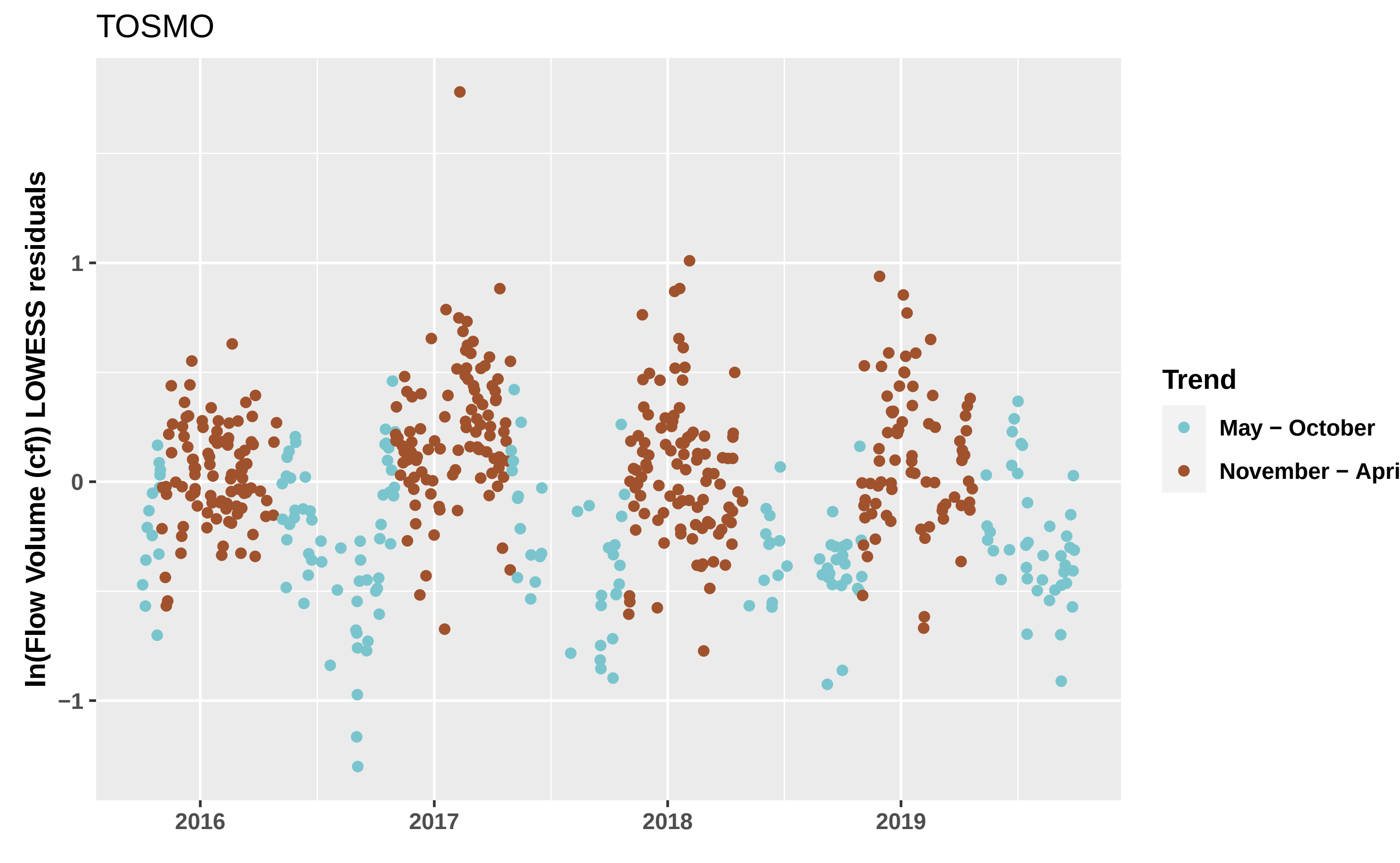

MONMN
ln(Flow Volume (cf)) LOWESS residuals
2
1
0
−1
−2
−3
2016
2017
2018
2019
Trend
May − October
November − April

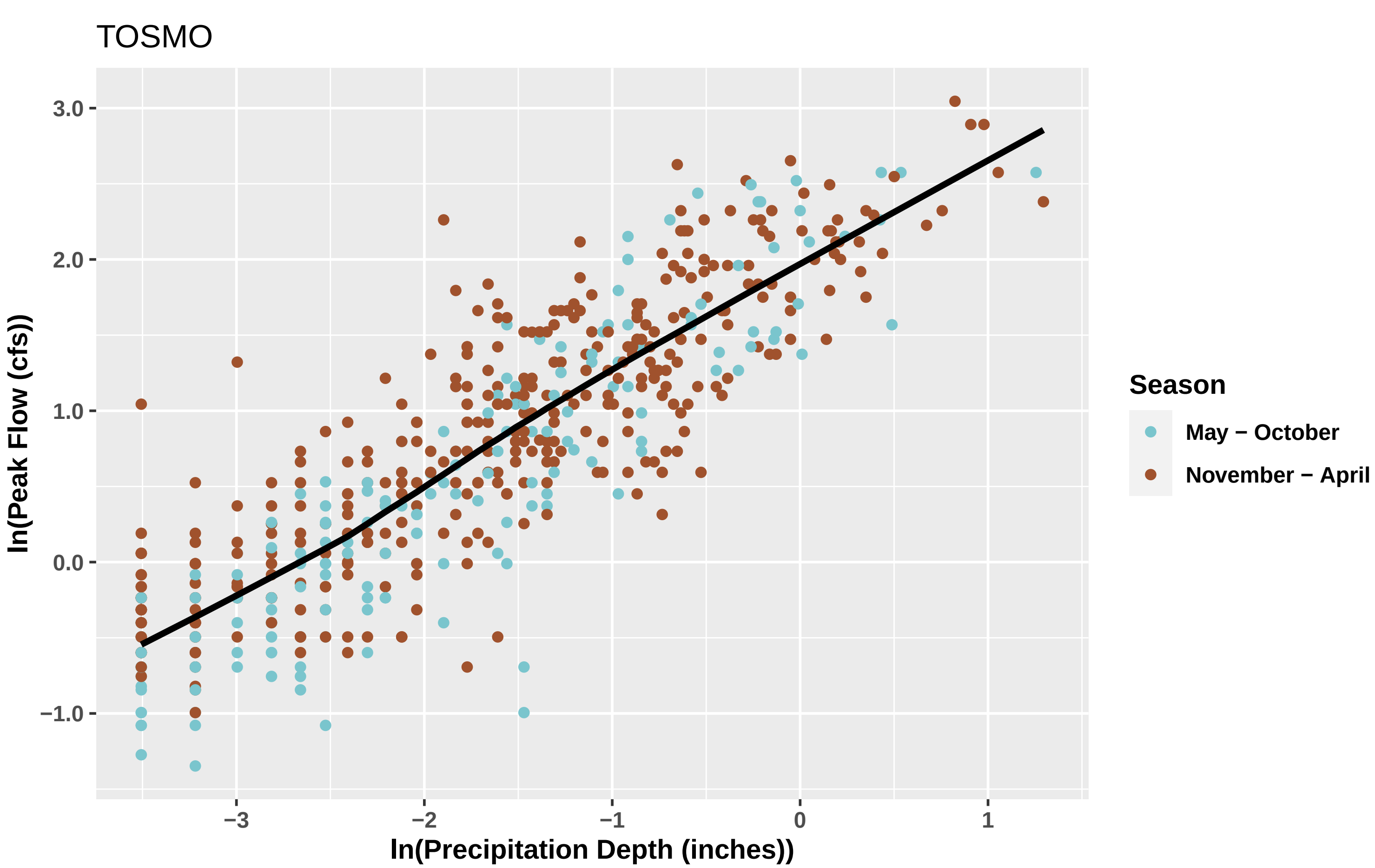

MONMN
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
2.0
0.0
−2.0
−4.0
−3
−2
−1
0
1
Season
May − October
November − April

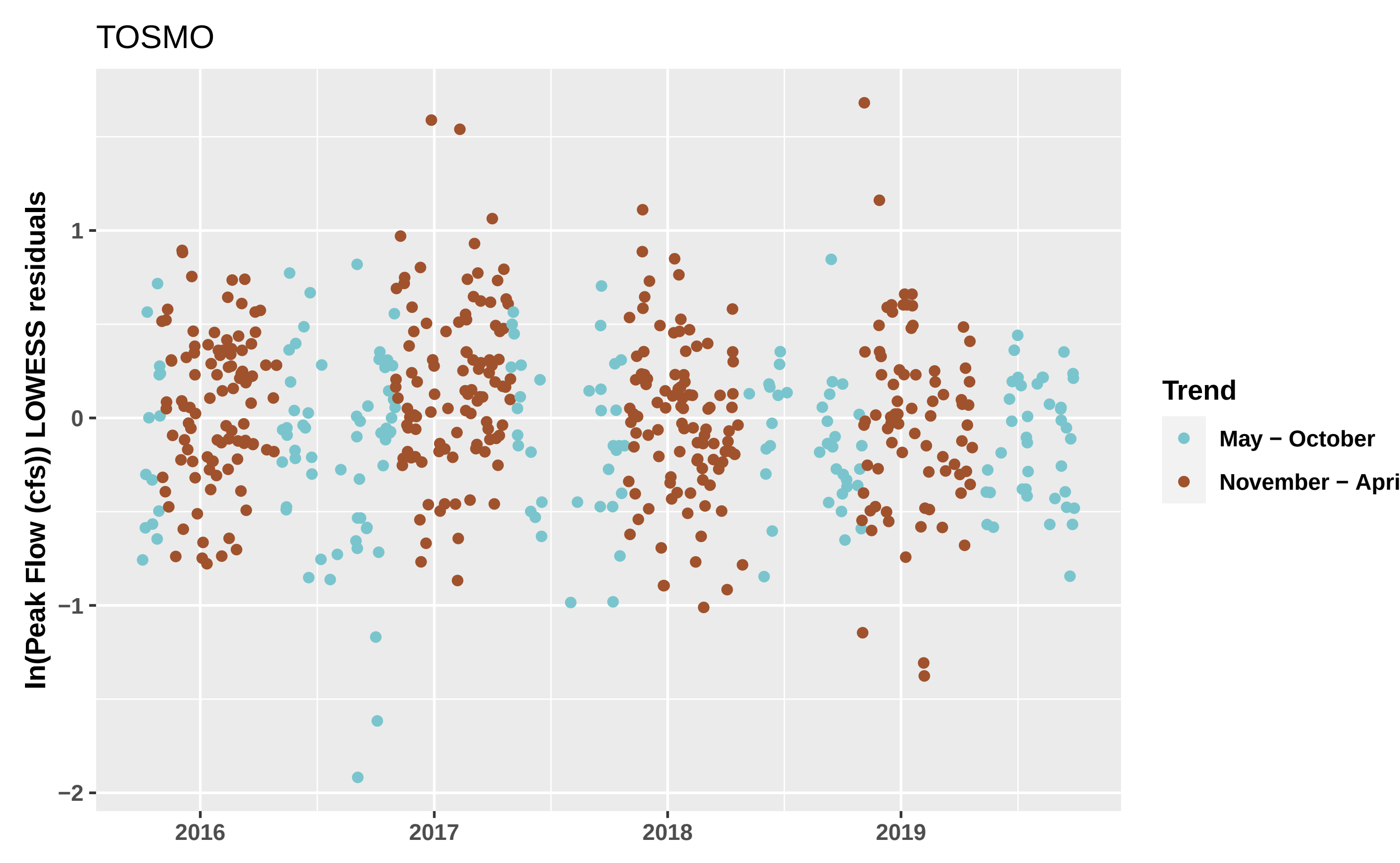

MONMN
ln(Peak Flow (cfs)) LOWESS residuals
2
1
0
−1
−2
−3
2016
2017
2018
2019
Trend
May − October
November − April

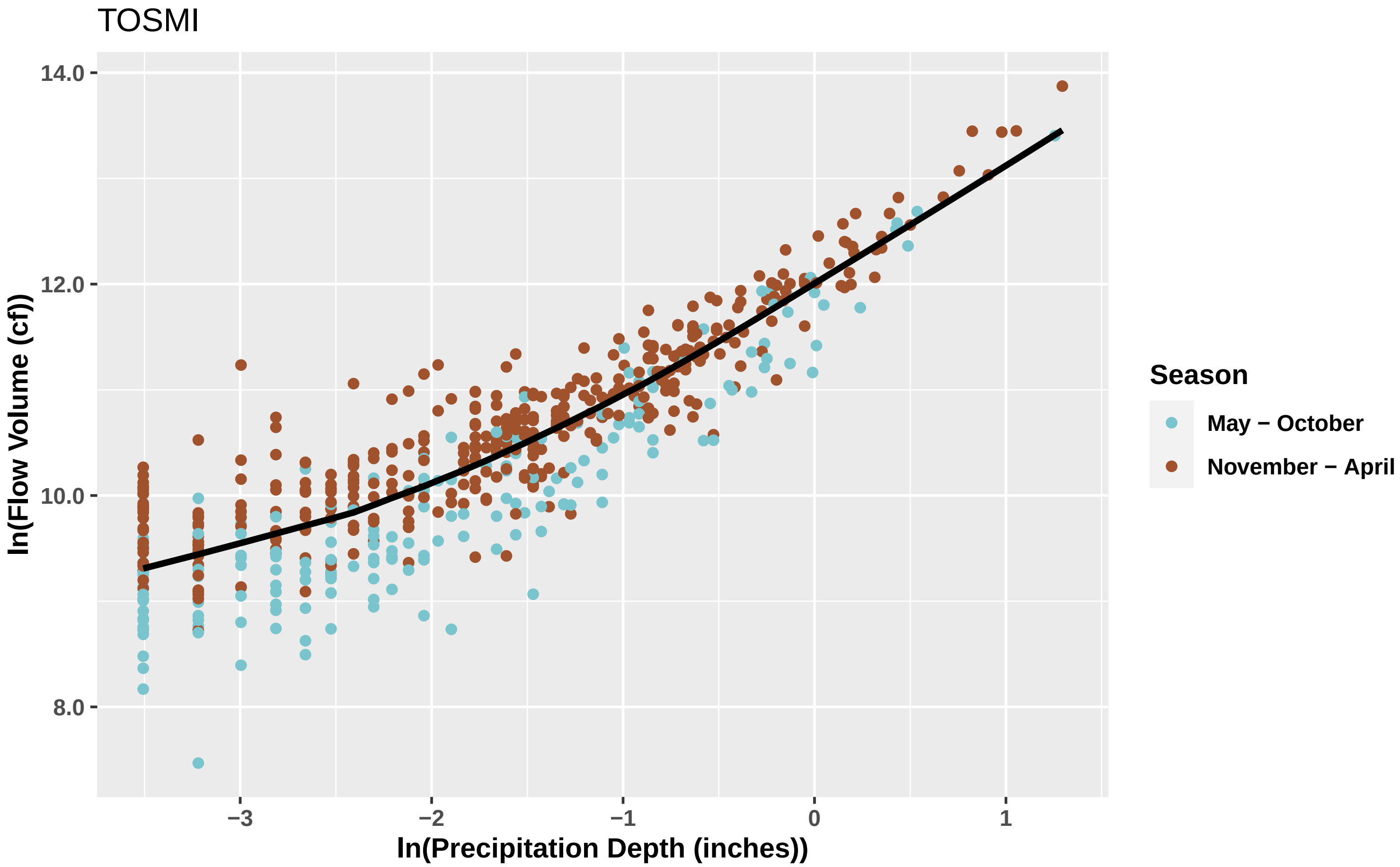

MONMS
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
Season
May – October
November – April
MONMS
ln(Flow Volume (cf)) LOWESS residuals
Trend
May – October
November – April
MONMS
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
Season
May – October
November – April
MONMS
ln(Peak Flow (cfs)) LOWESS residuals
Trend
May – October
November – April

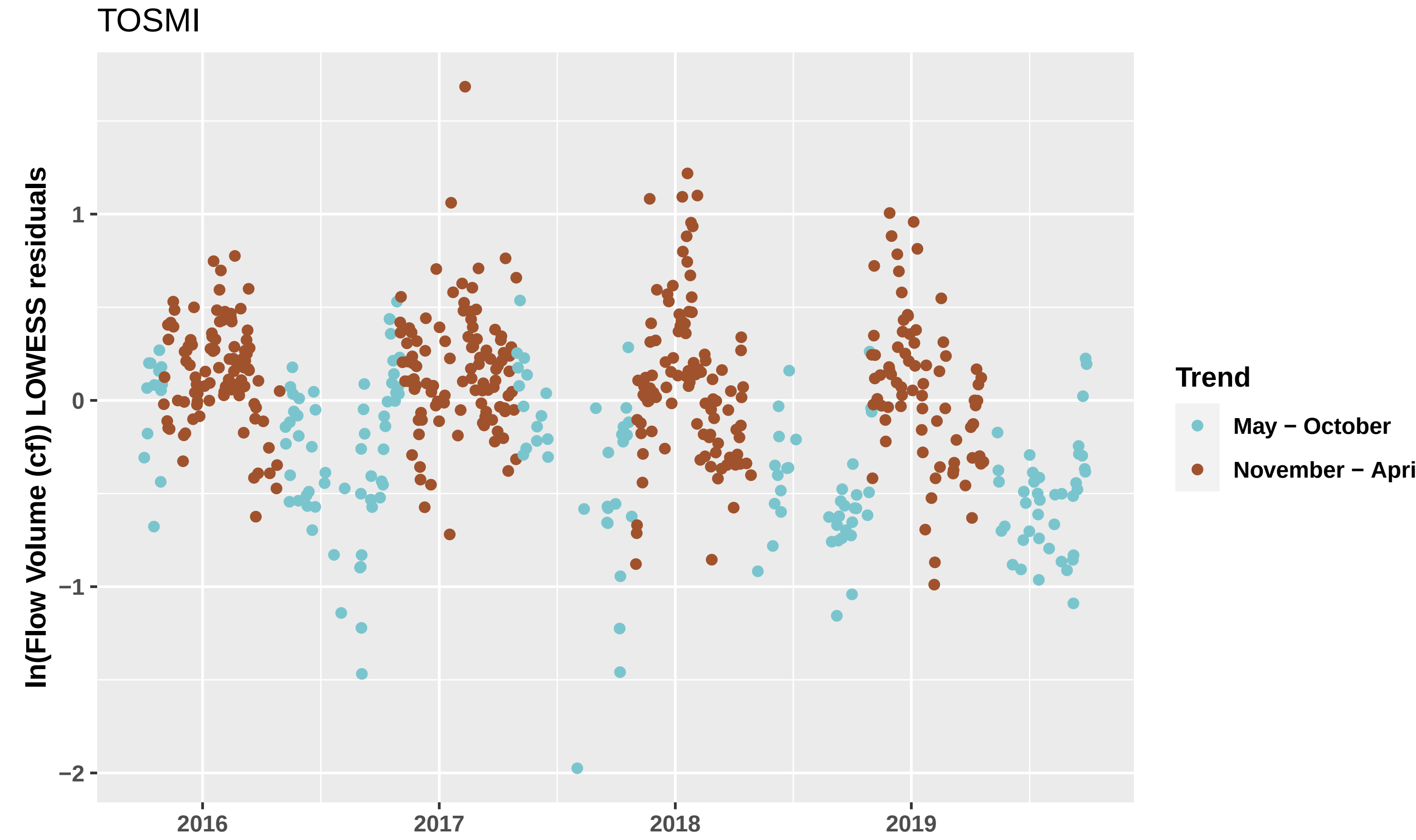

TOSMO
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
Season
May – October
November – April
14.0
13.0
12.0
11.0
10.0
9.0
−3
−2
−1
0
1

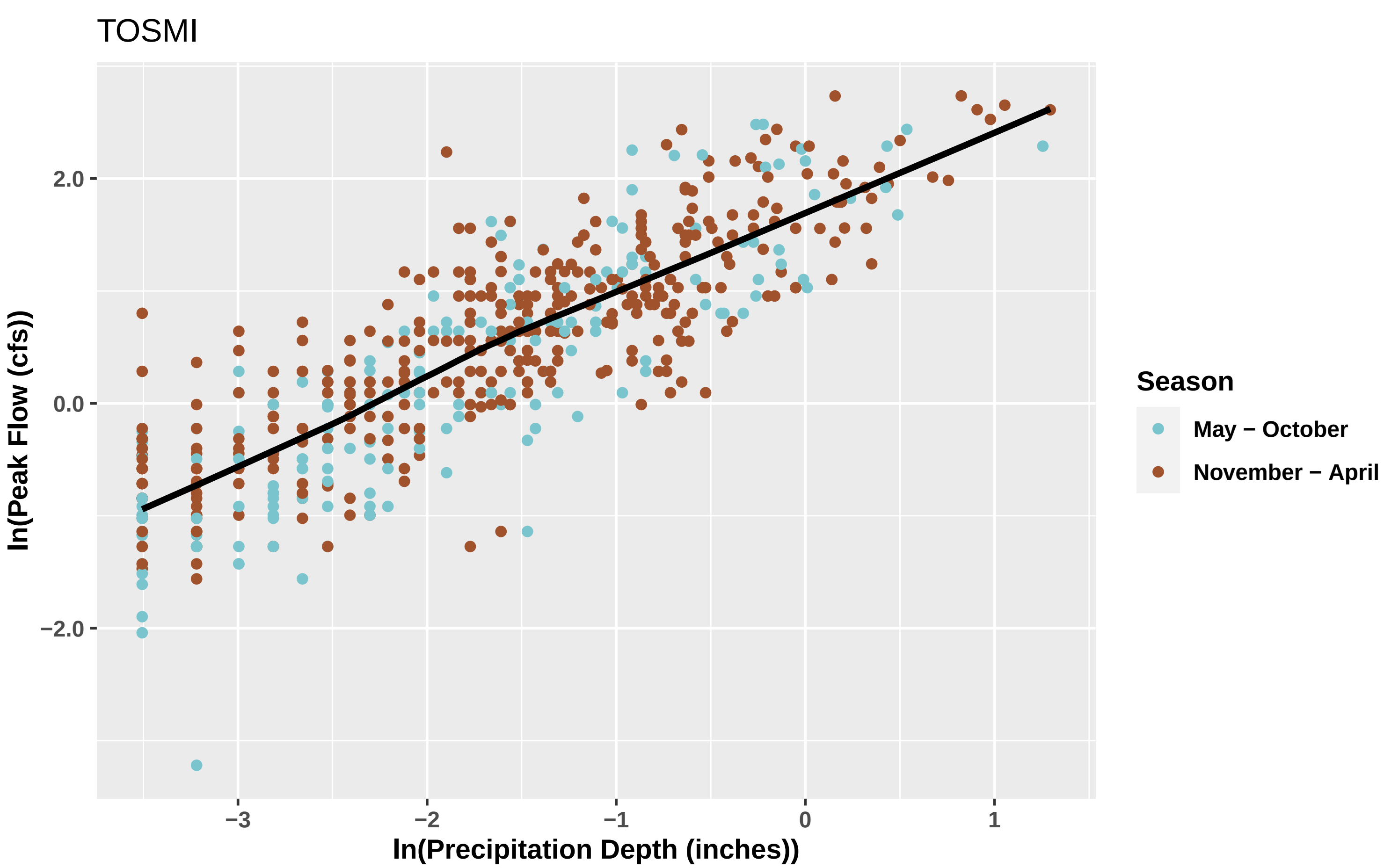

TOSMO
ln(Flow Volume (cf)) LOWESS residuals
Trend
May – October
November – April
1
0
−1
2016
2017
2018
2019

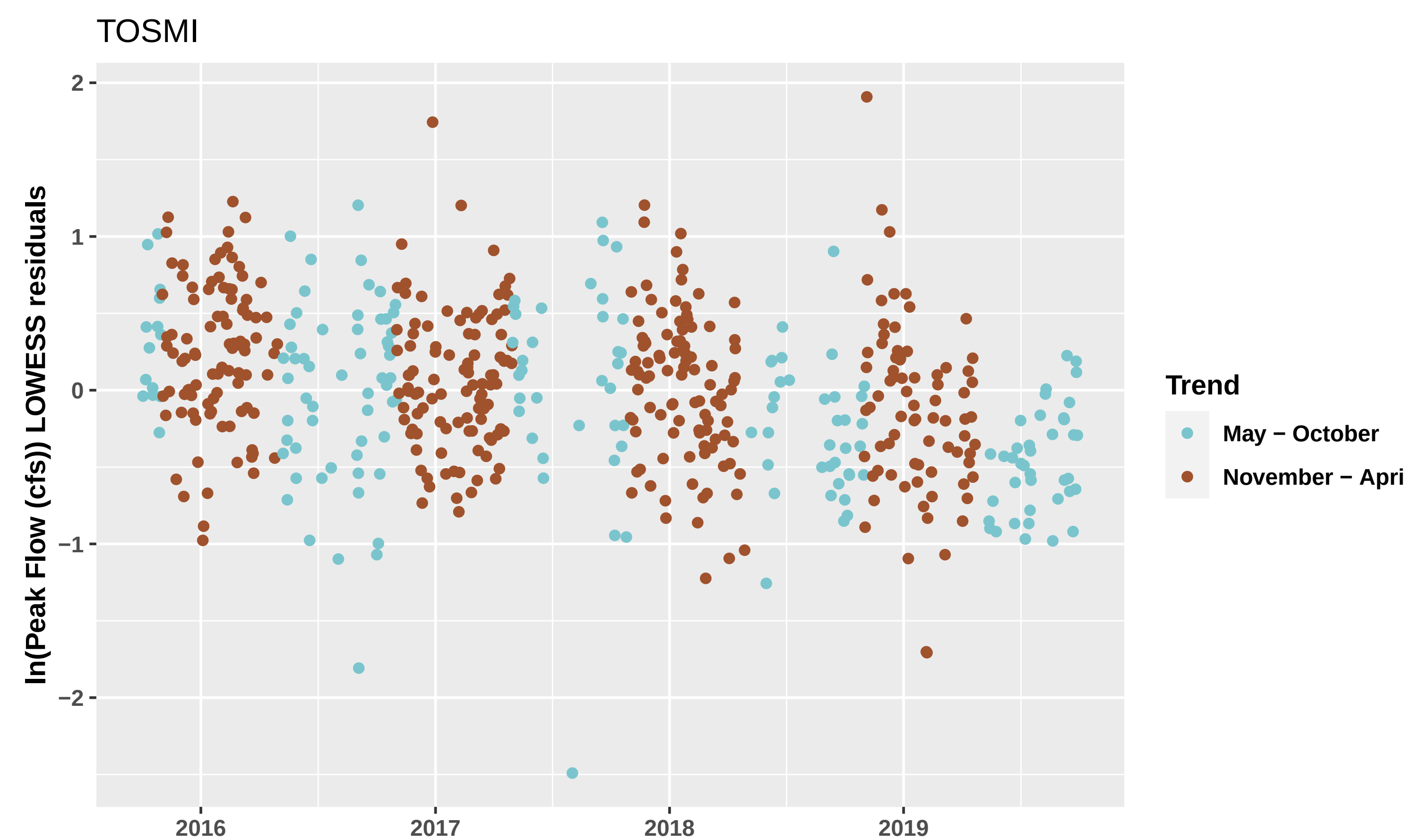

TOSMO
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
Season
May – October
November – April
3.0
2.0
1.0
0.0
−1.0
−3
−2
−1
0
1

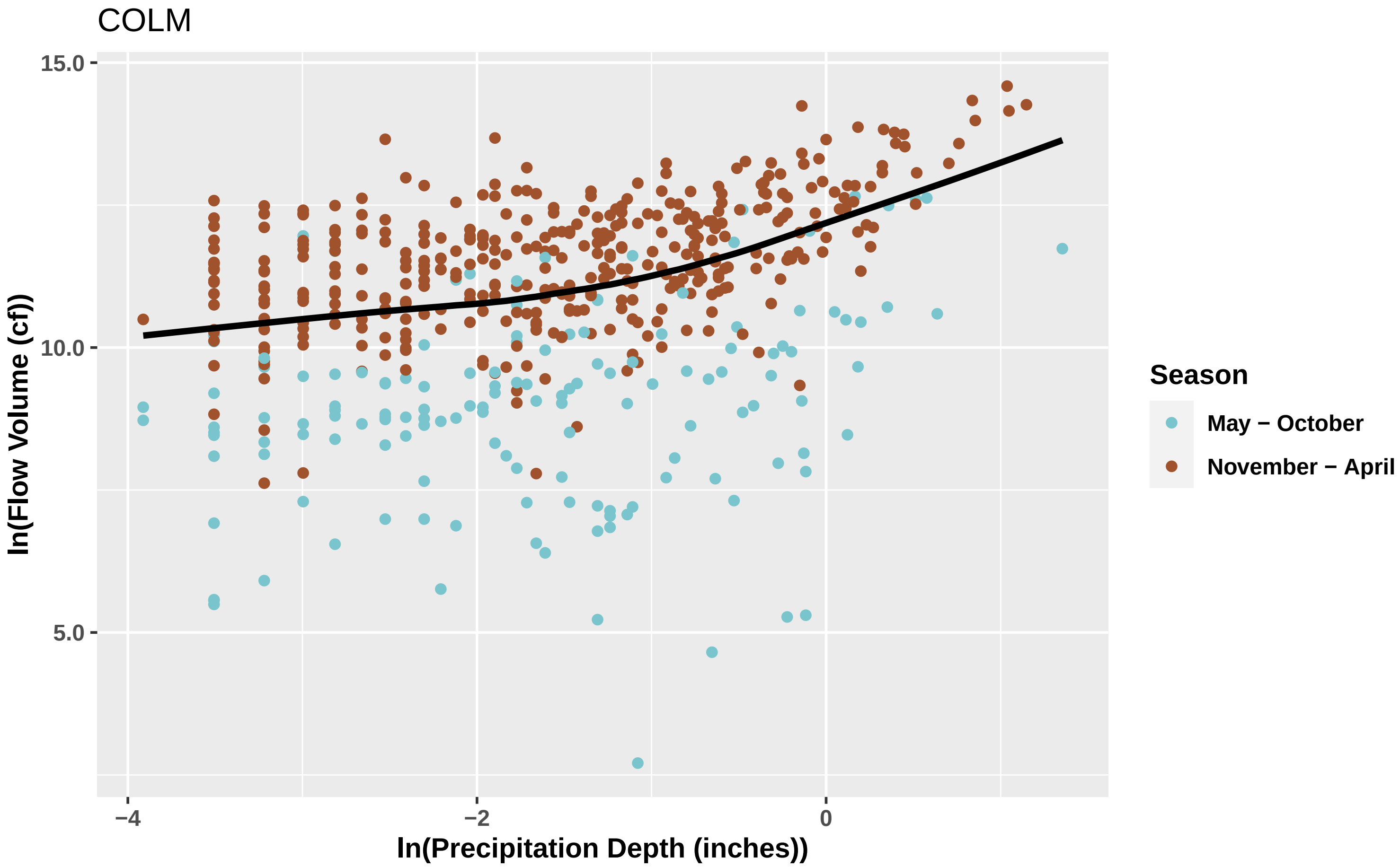

TOSMO
ln(Peak Flow (cfs)) LOWESS residuals
Trend
May – October
November – April
1
0
−1
−2
2016
2017
2018
2019

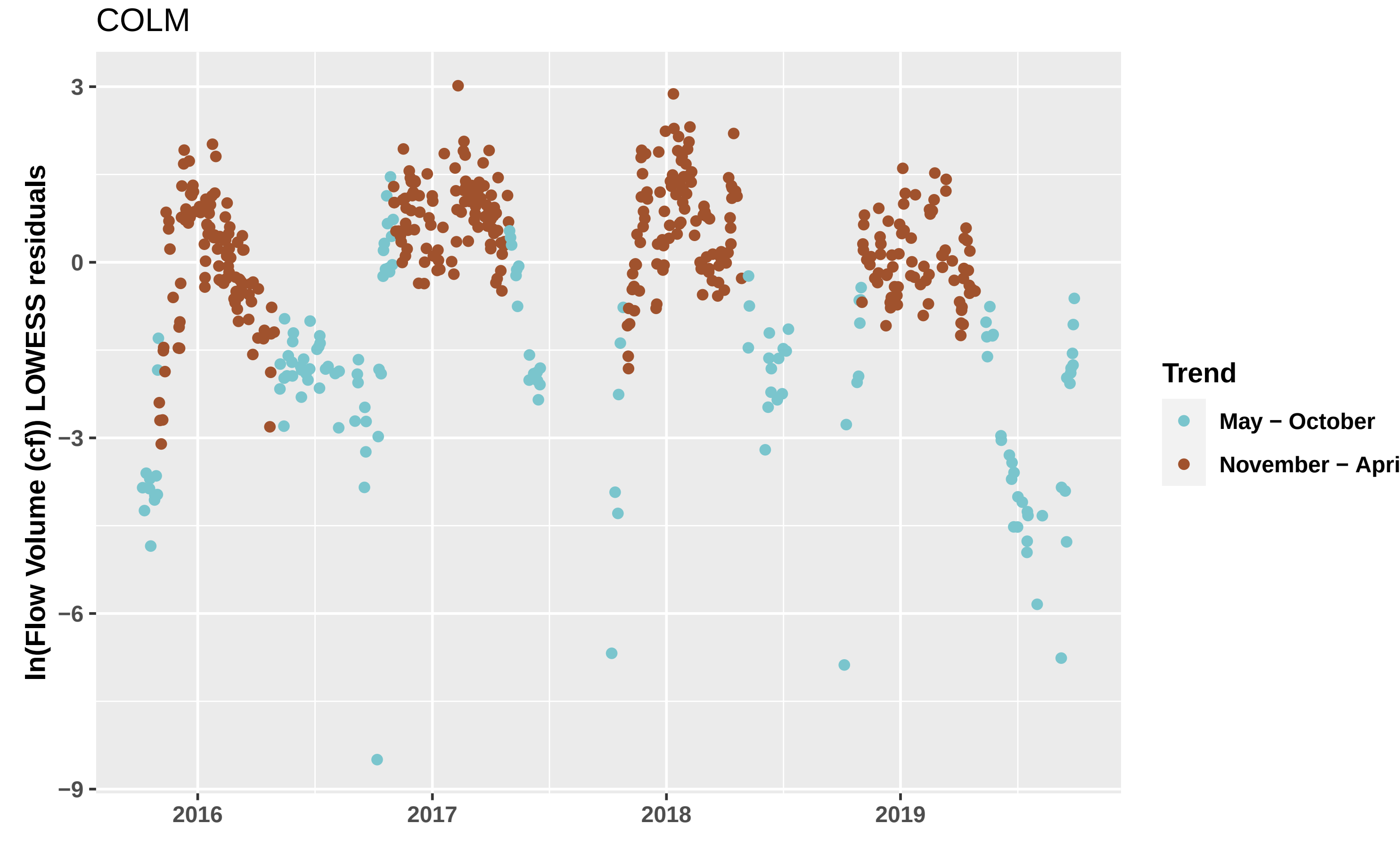

TOSMI
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
14.0
12.0
10.0
8.0
−3
−2
−1
0
1
Season
May – October
November – April

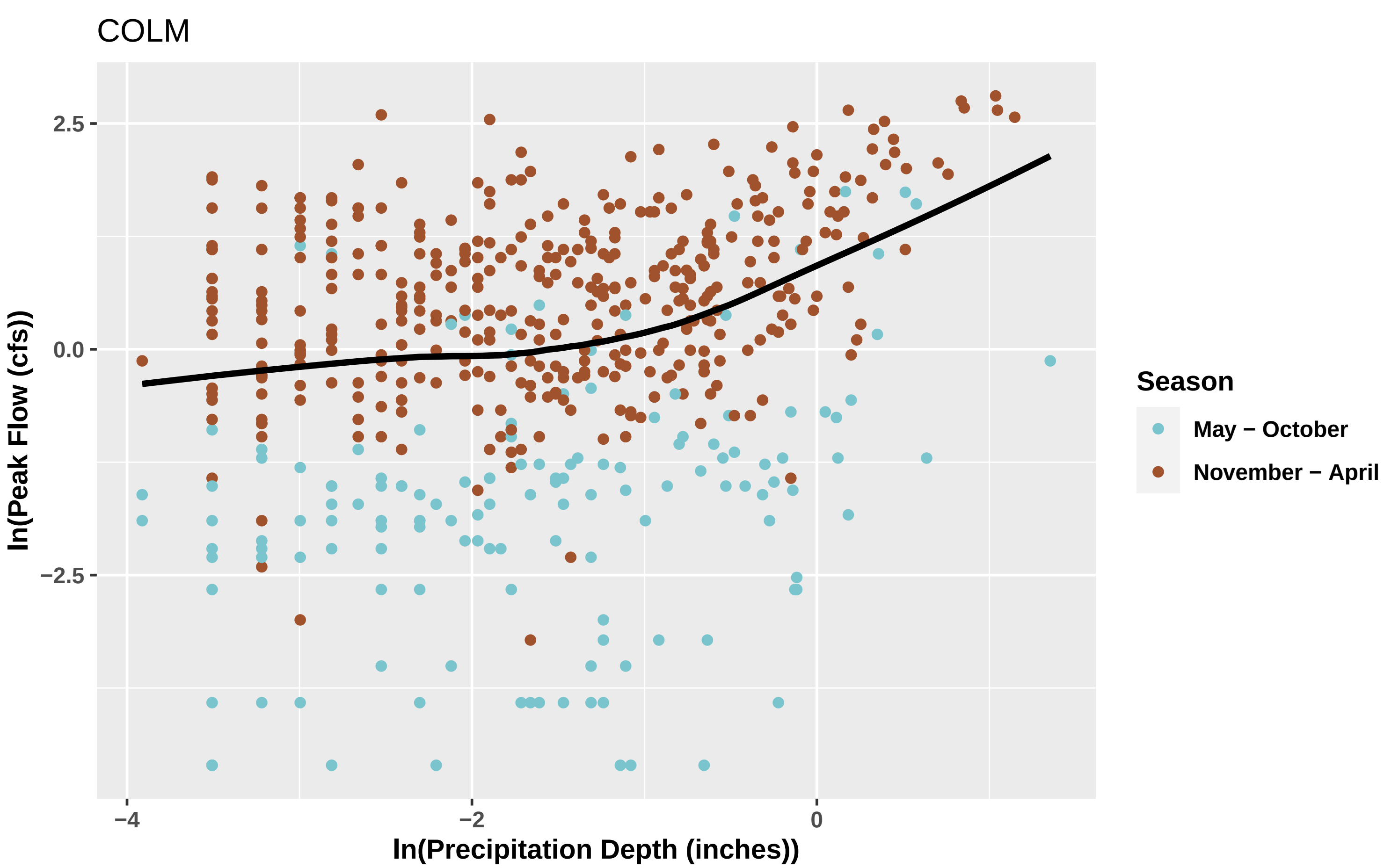

TOSMI
ln(Flow Volume (cf)) LOWESS residuals
1
0
−1
−2
2016
2017
2018
2019
Trend
May – October
November – April

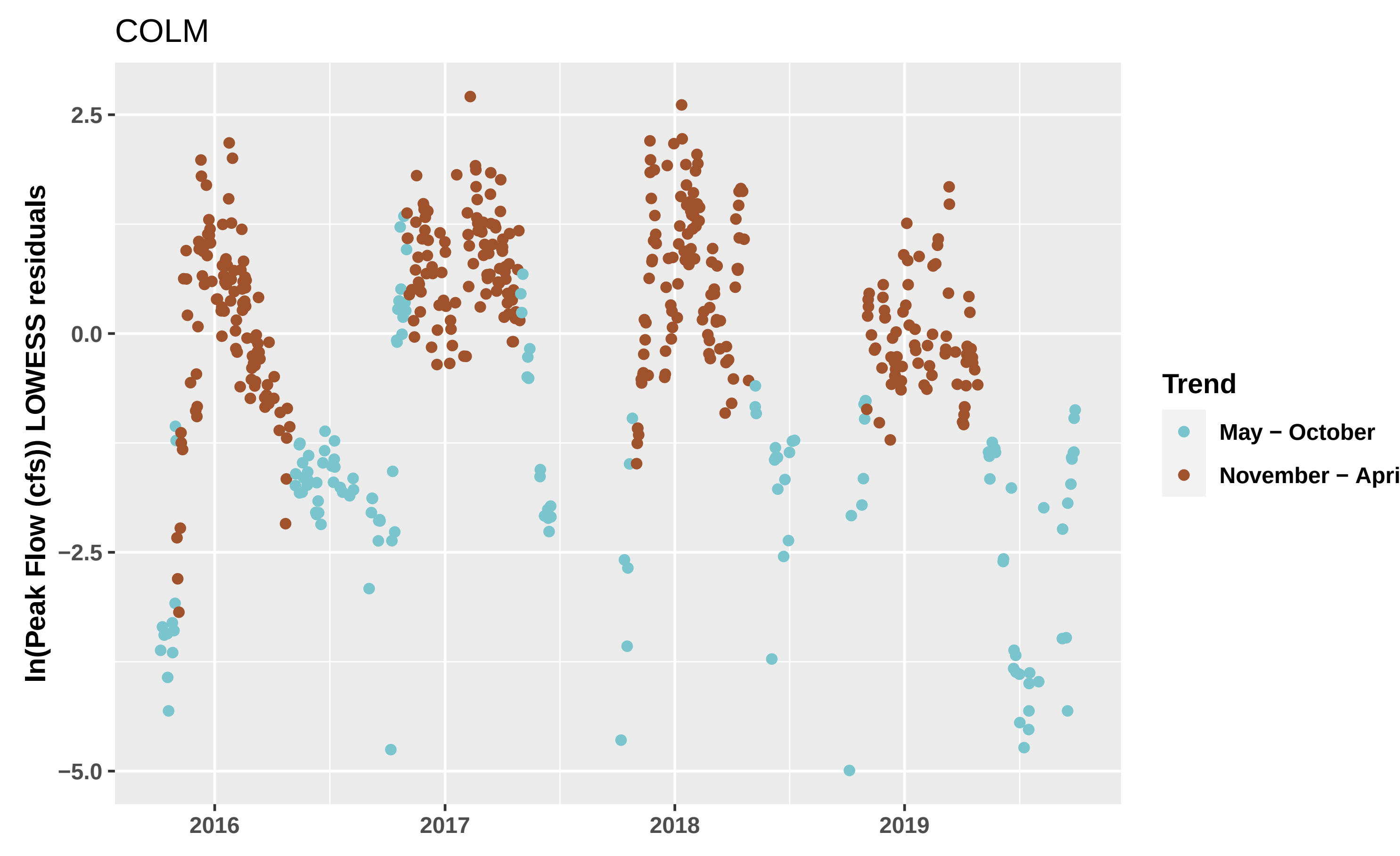

TOSMI
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
2.0
0.0
−2.0
−3
−2
−1
0
1
Season
May – October
November – April

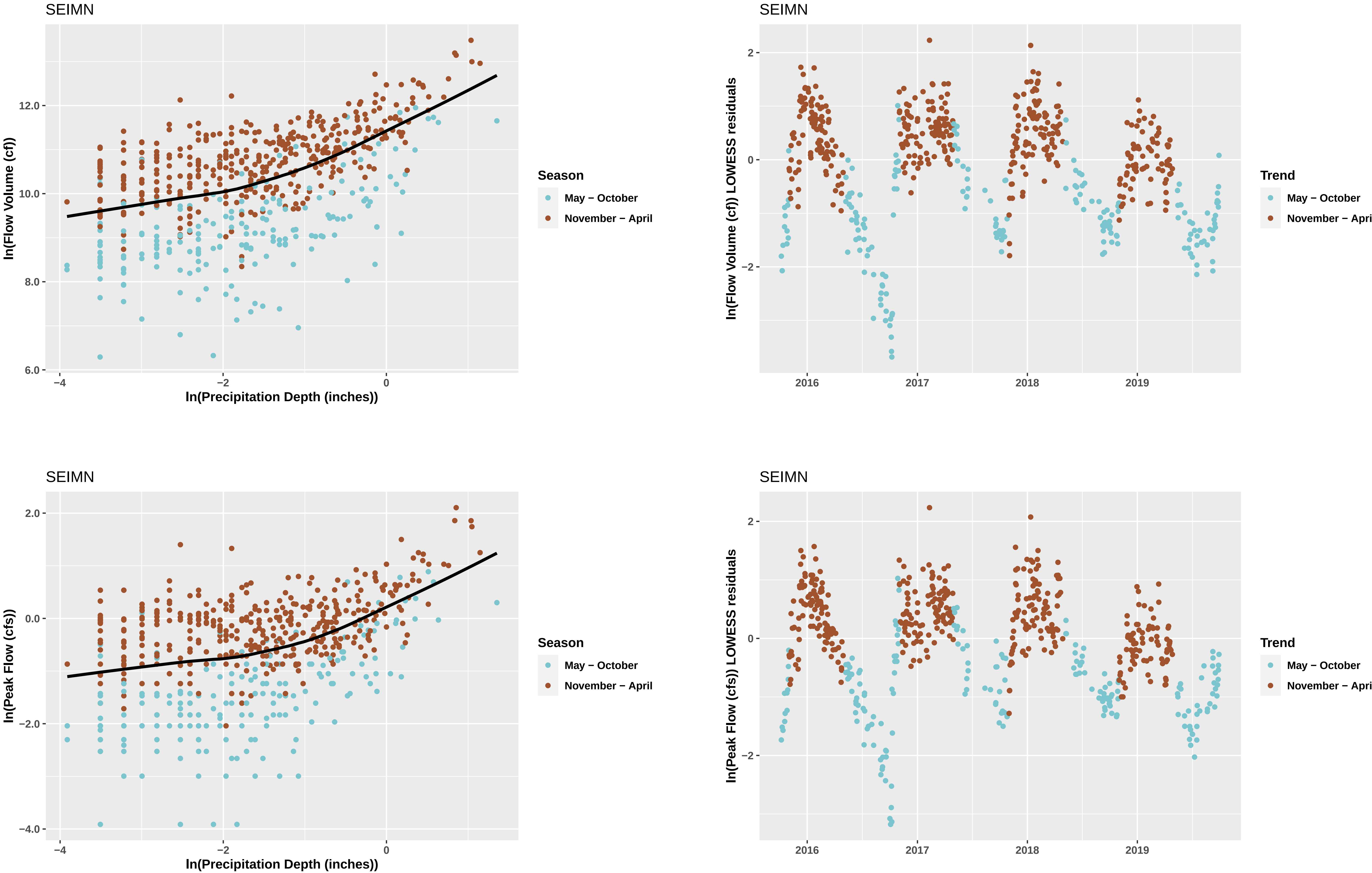

TOSMI
ln(Peak Flow (cfs)) LOWESS residuals
2
1
0
−1
−2
2016
2017
2018
2019
Trend
May – October
November – April

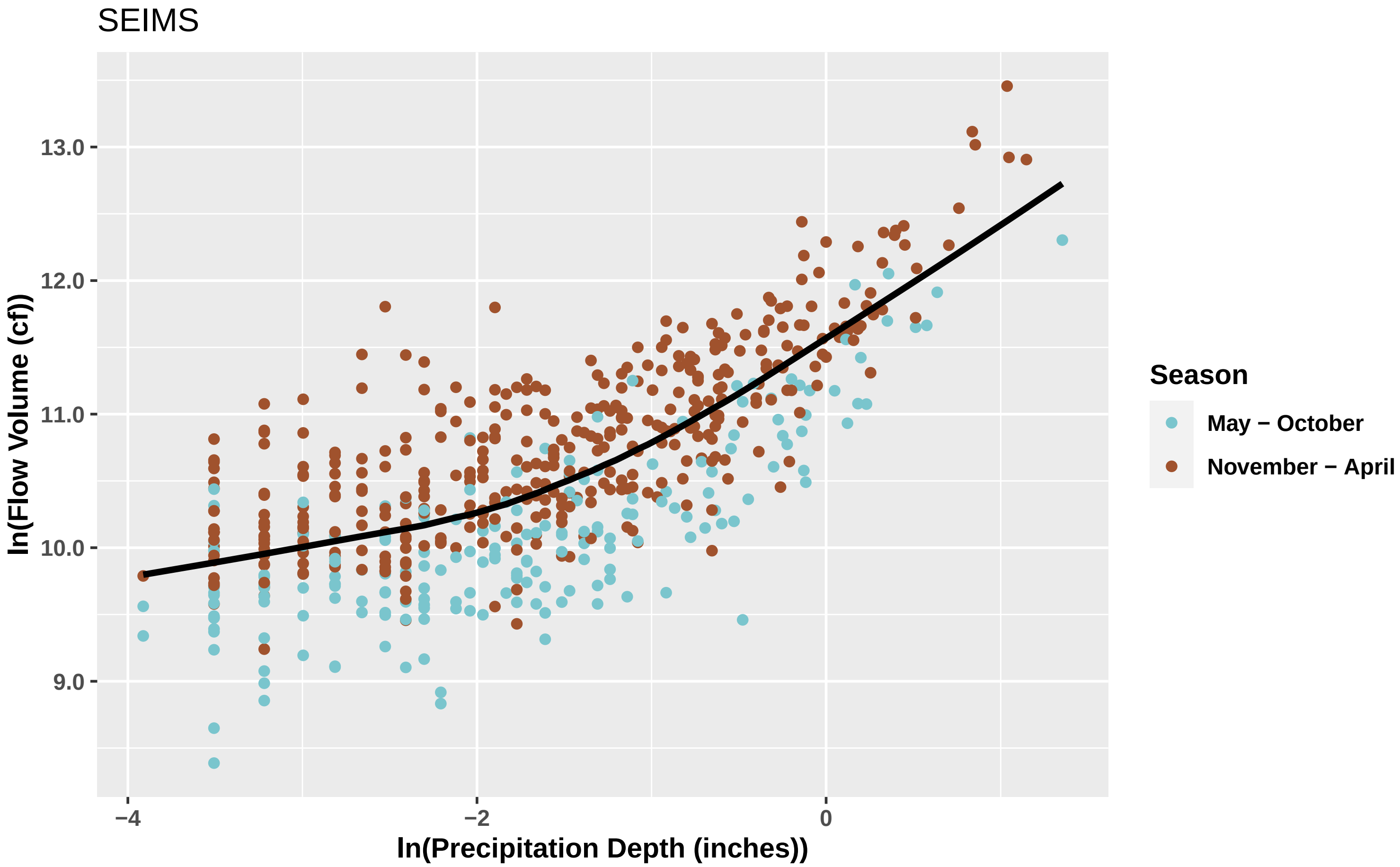

COLM
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
Season
May – October
November – April

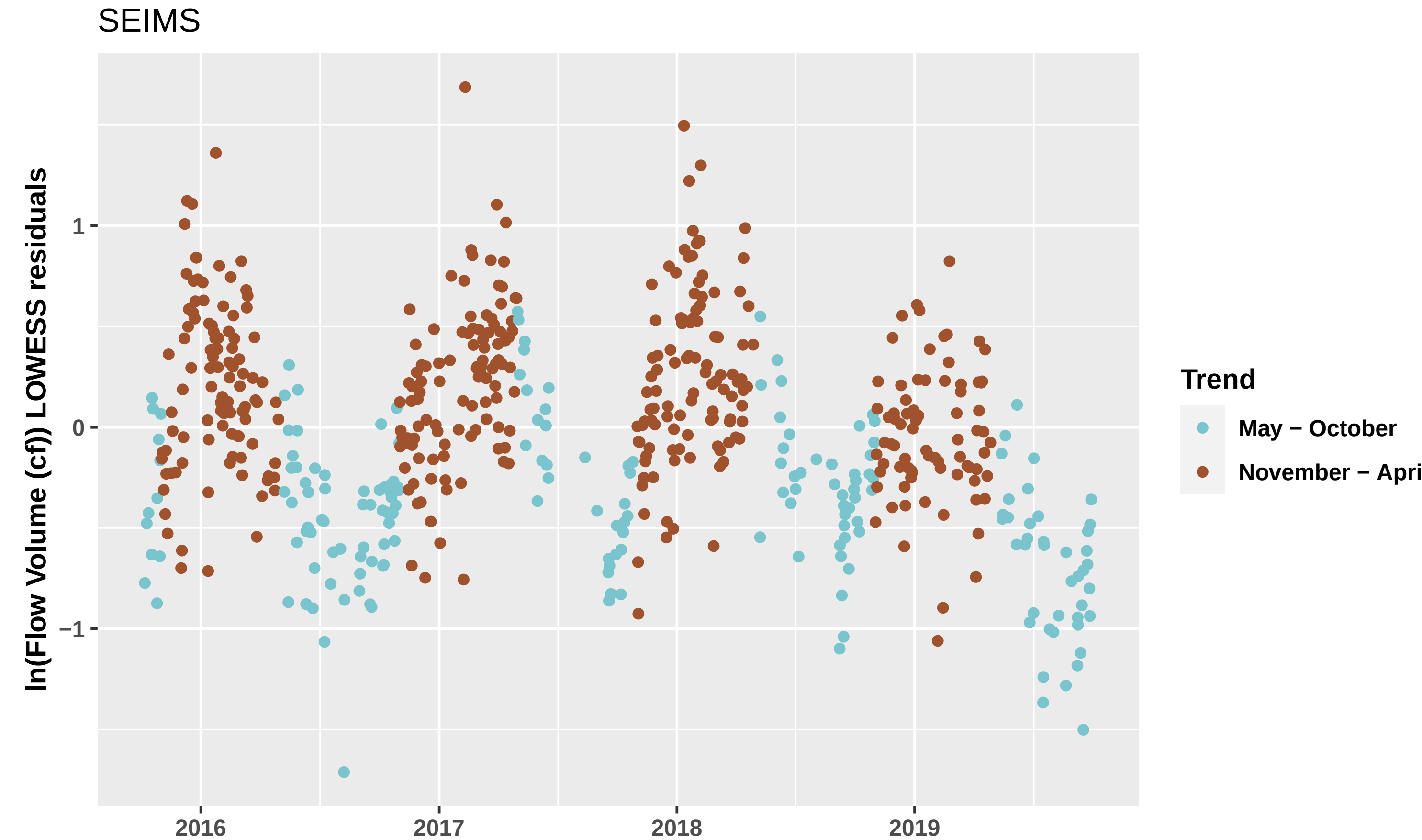

COLM
ln(Flow Volume (cf)) LOWESS residuals
Trend
May – October
November – April

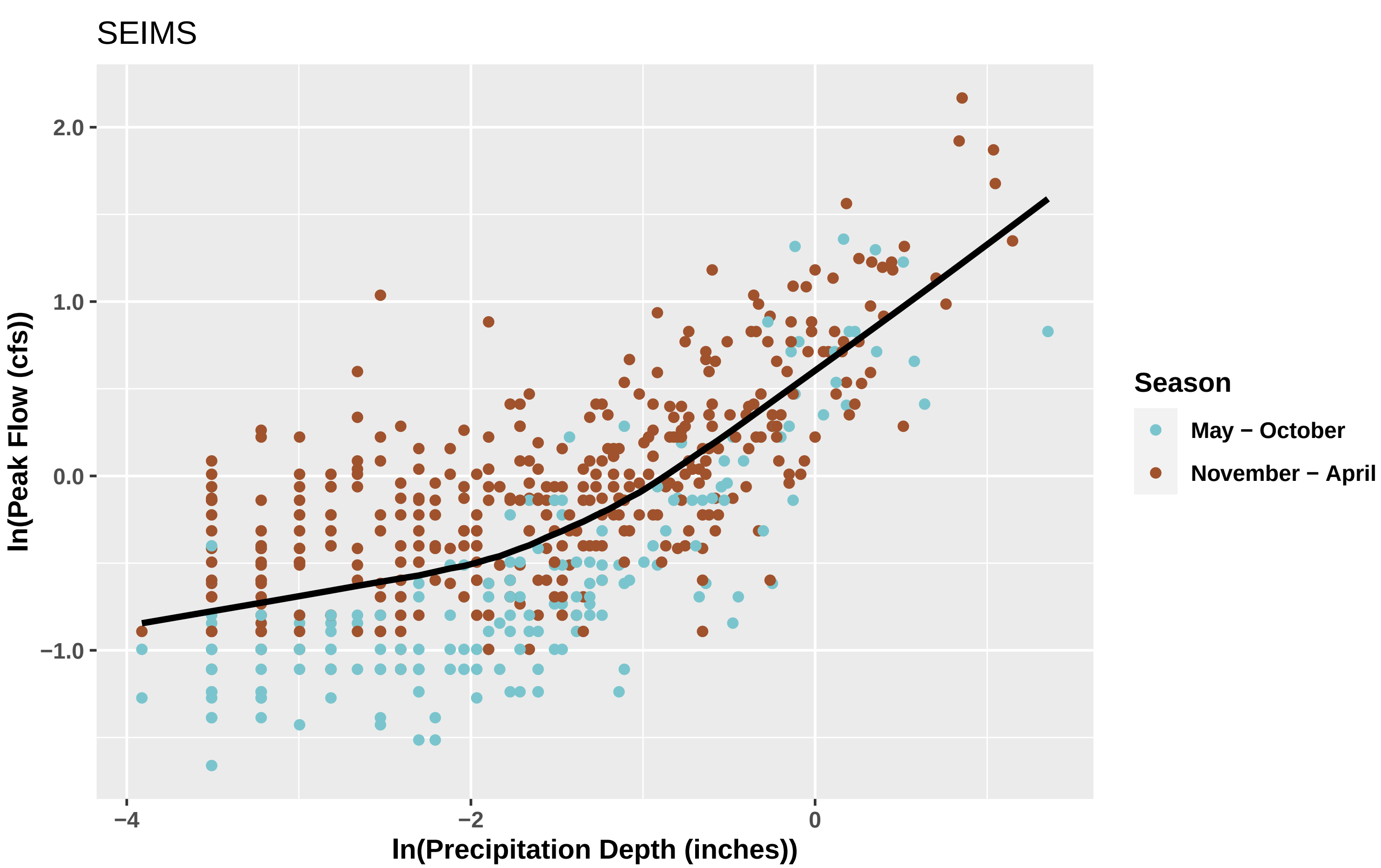

COLM
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
Season
May – October
November – April

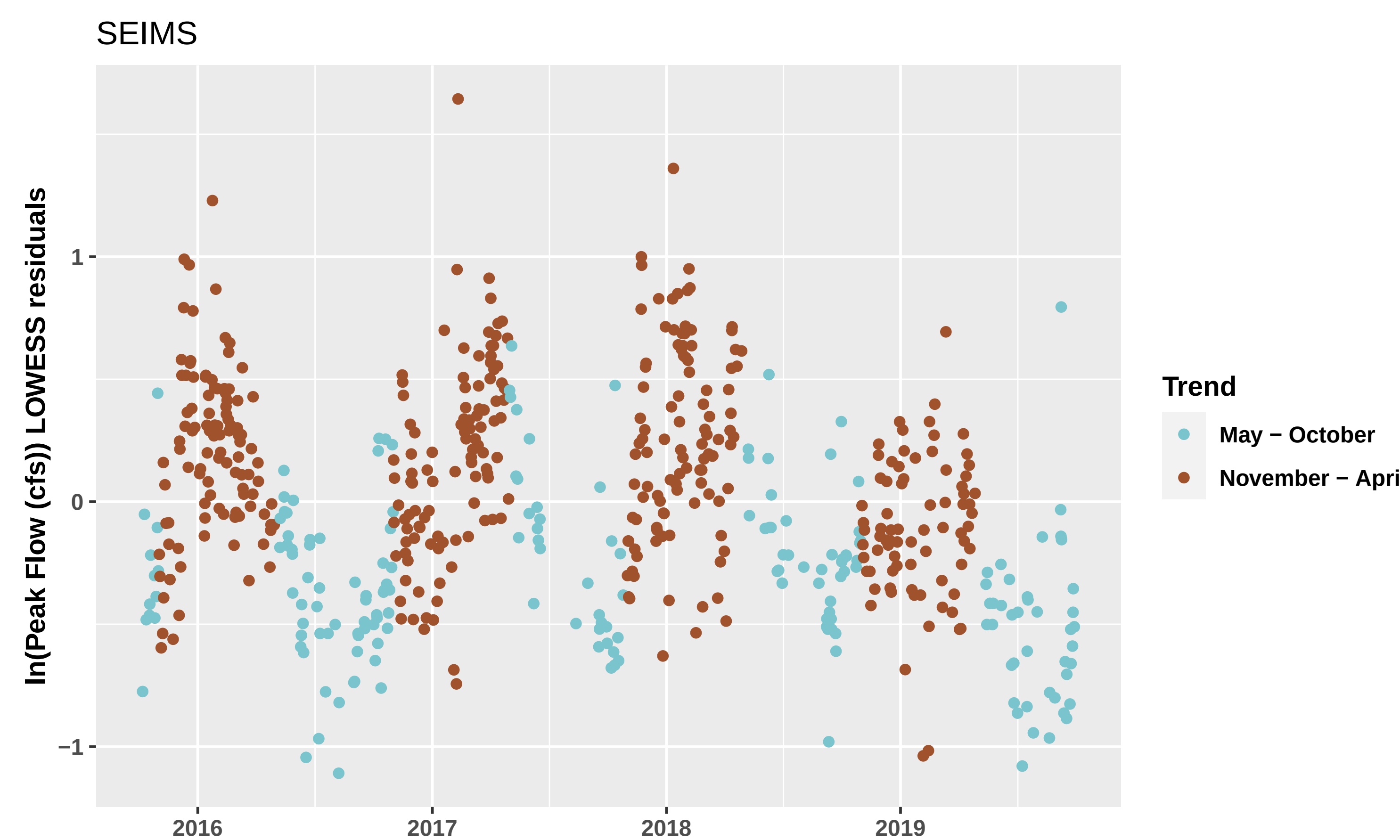

COLM
ln(Peak Flow (cfs)) LOWESS residuals
Trend
May – October
November – April

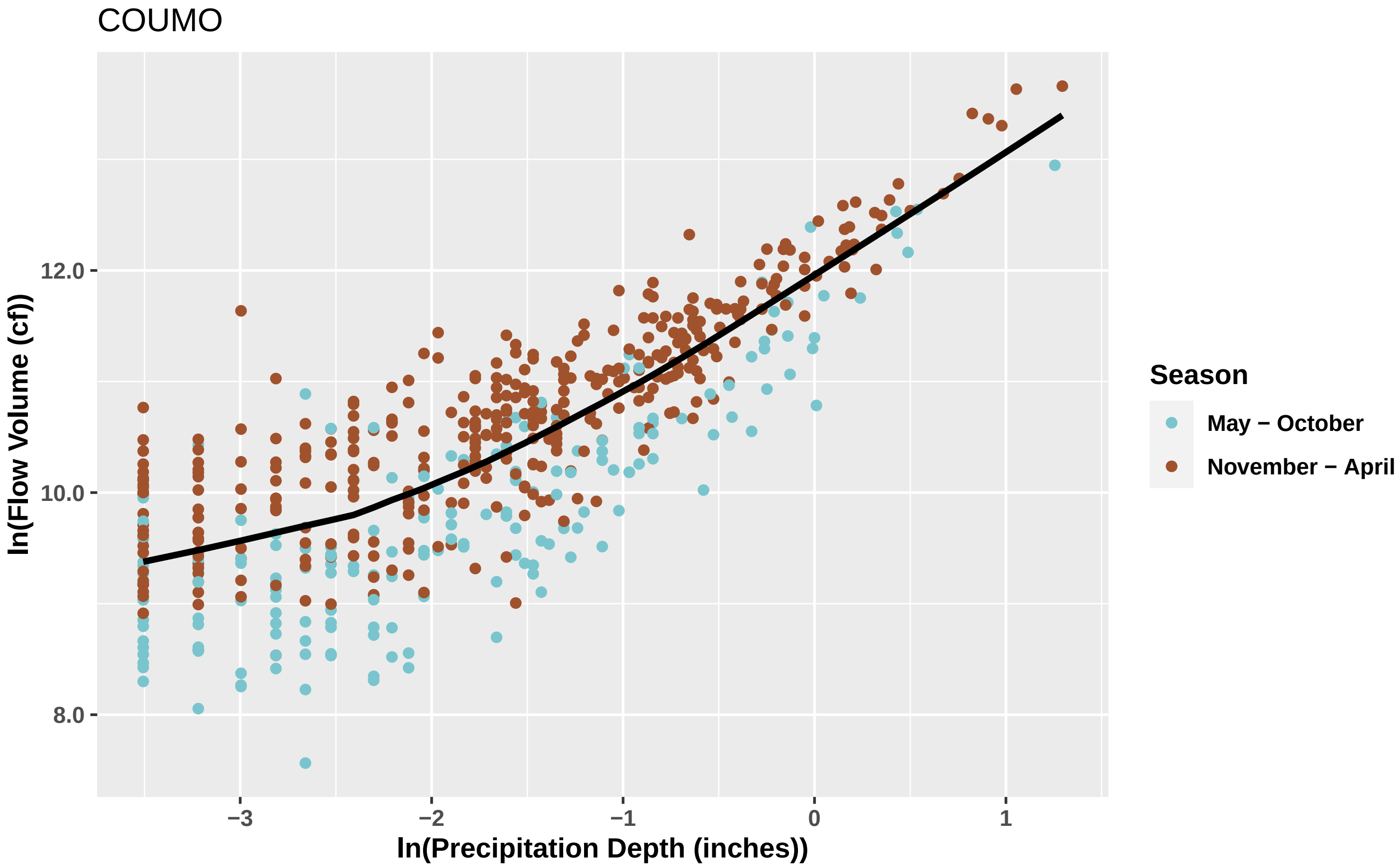

SEIMN
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
Season
May – October
November – April
SEIMN
ln(Flow Volume (cf)) LOWESS residuals
Trend
May – October
November – April
SEIMN
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
Season
May – October
November – April
SEIMN
ln(Peak Flow (cfs)) LOWESS residuals
Trend
May – October
November – April

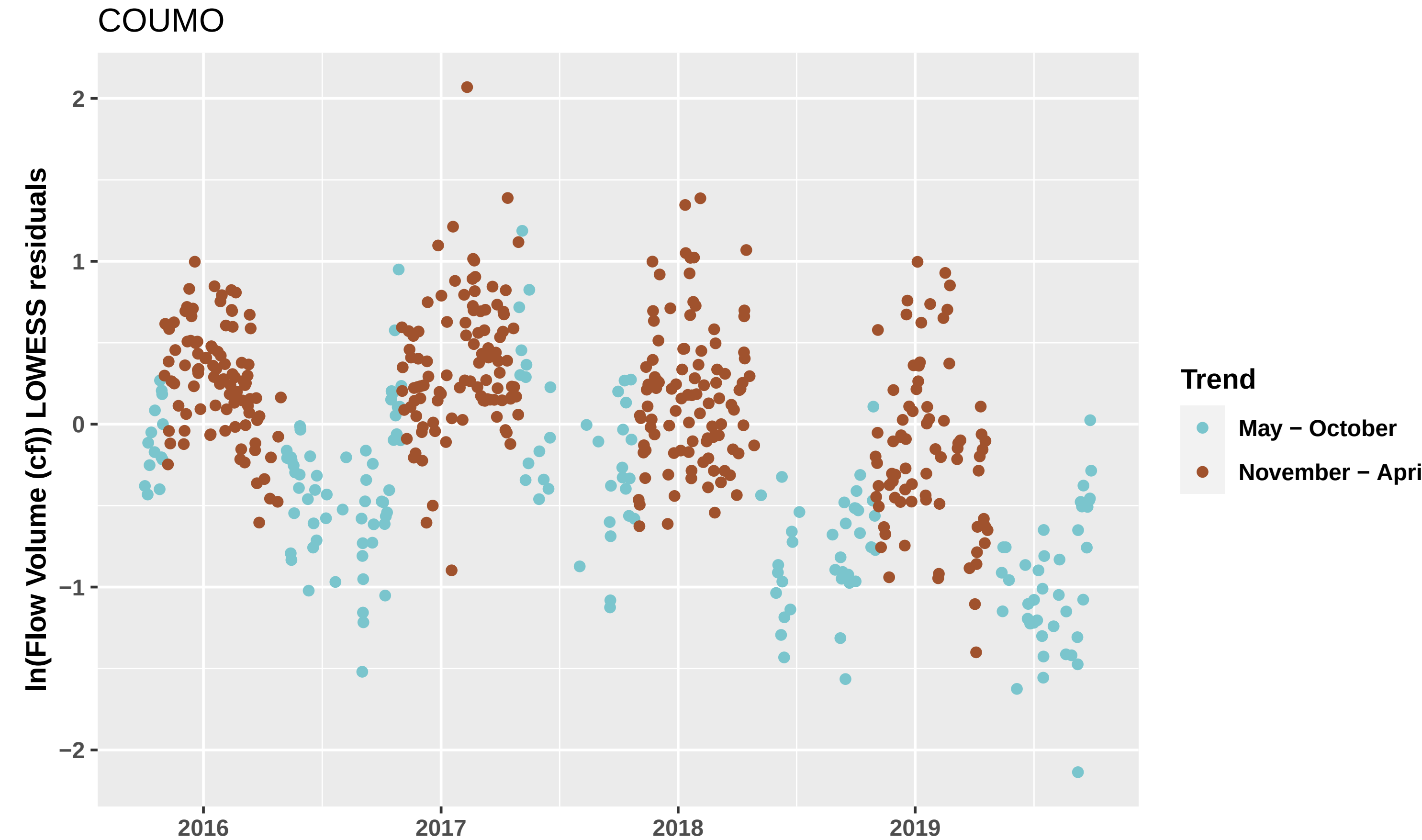

SEIMS
ln(Flow Volume (cf))
13.0
12.0
11.0
10.0
9.0
−4
−2
0
ln(Precipitation Depth (inches))
Season
May – October
November – April

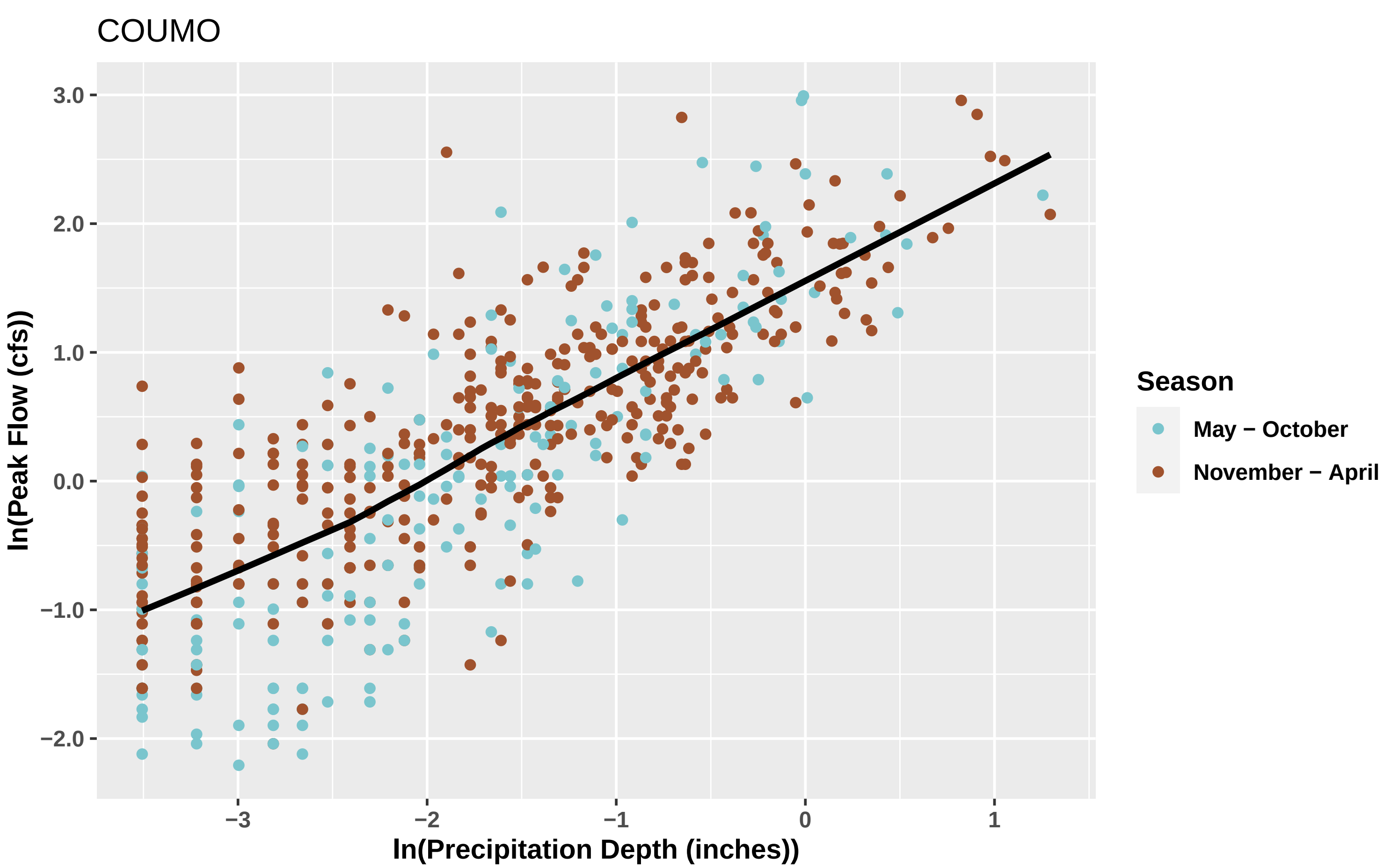

SEIMS
ln(Flow Volume (cf)) LOWESS residuals
1
0
−1
2016
2017
2018
2019
Trend
May – October
November – April

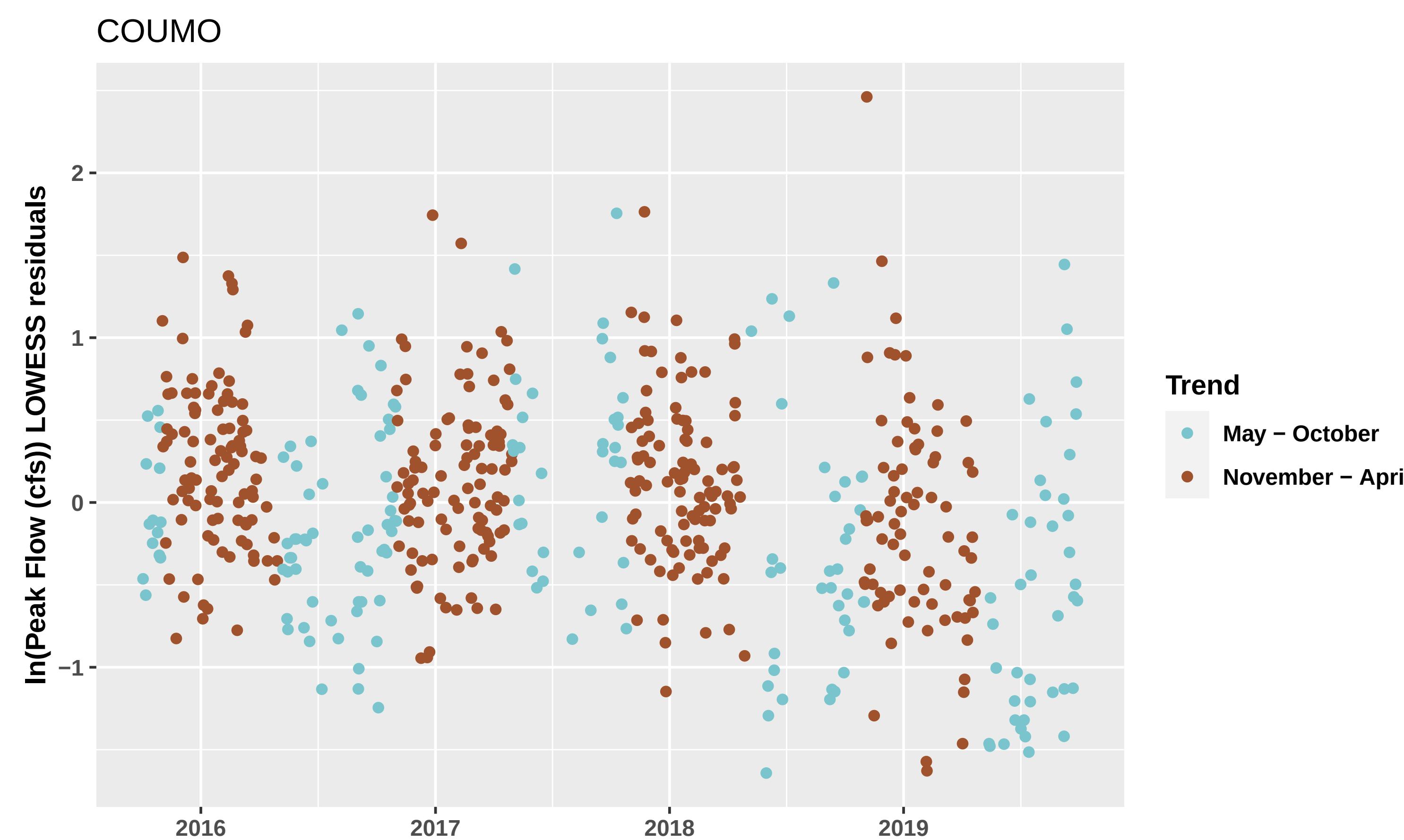

SEIMS
ln(Peak Flow (cfs))
2.0
1.0
0.0
−1.0
−4
−2
0
ln(Precipitation Depth (inches))
Season
May – October
November – April

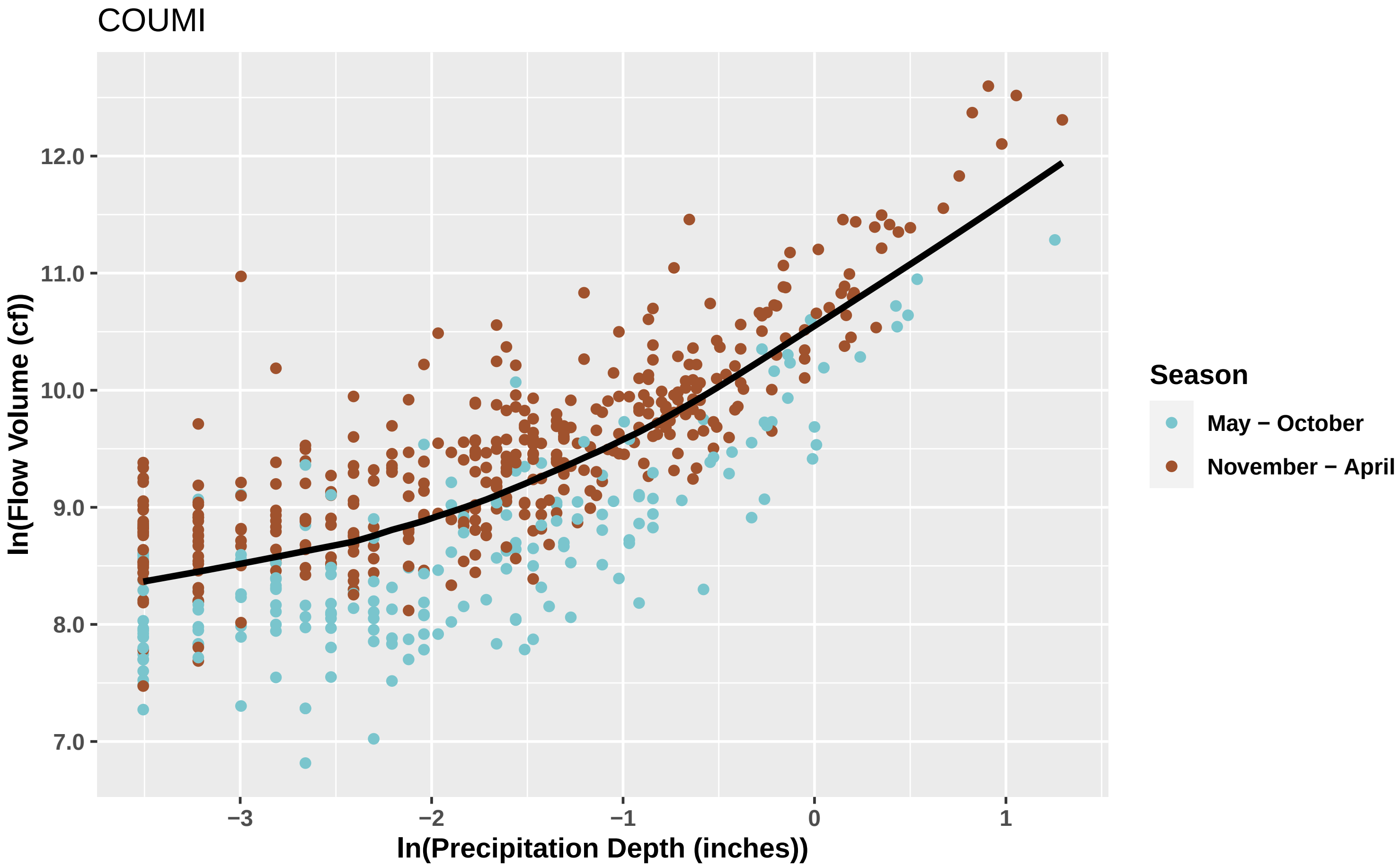

SEIMS
ln(Peak Flow (cfs)) LOWESS residuals
1
0
−1
2016
2017
2018
2019
Trend
May – October
November – April

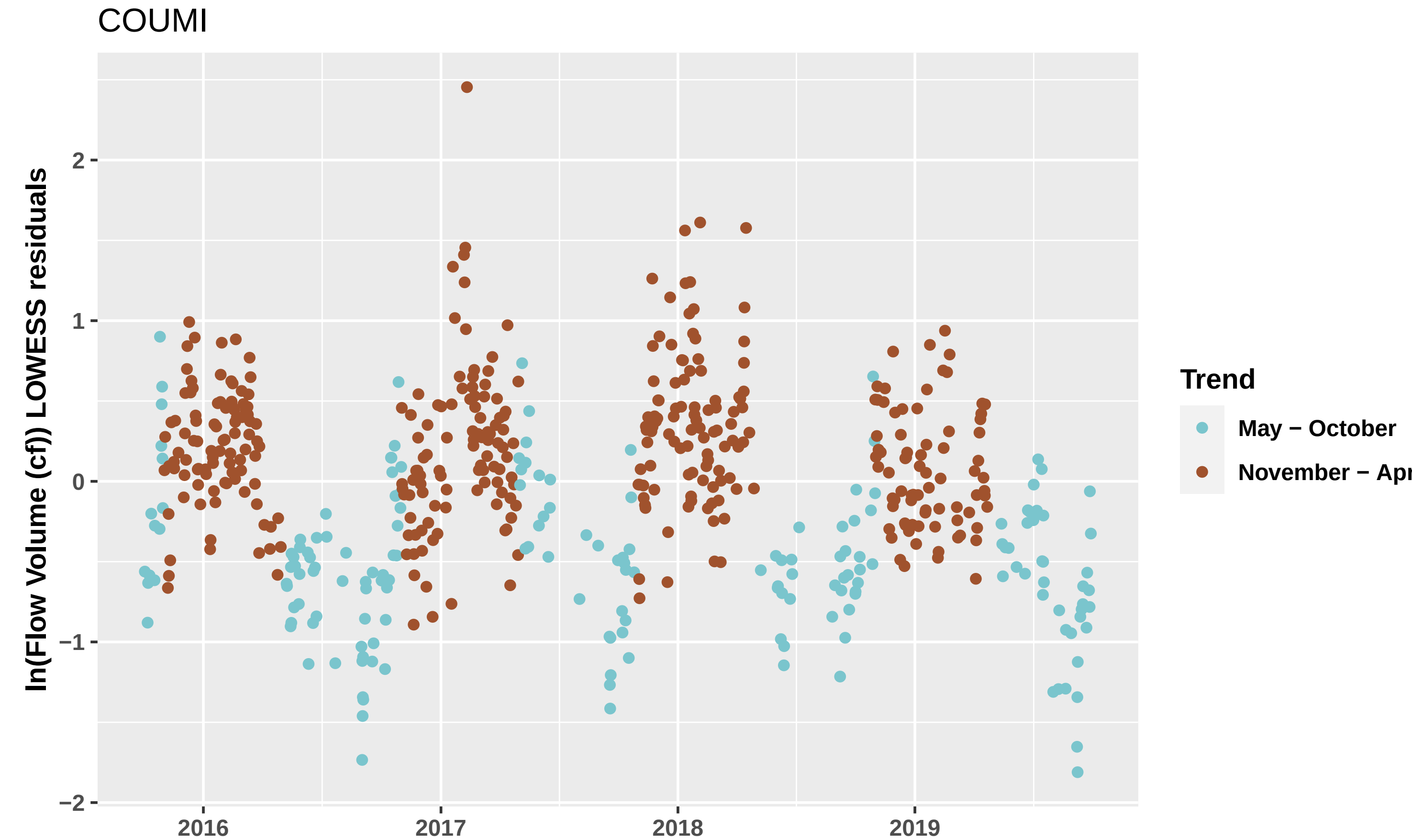

COUMO
ln(Flow Volume (cf))
12.0
10.0
8.0
−3
−2
−1
0
1
ln(Precipitation Depth (inches))
Season
May − October
November − April

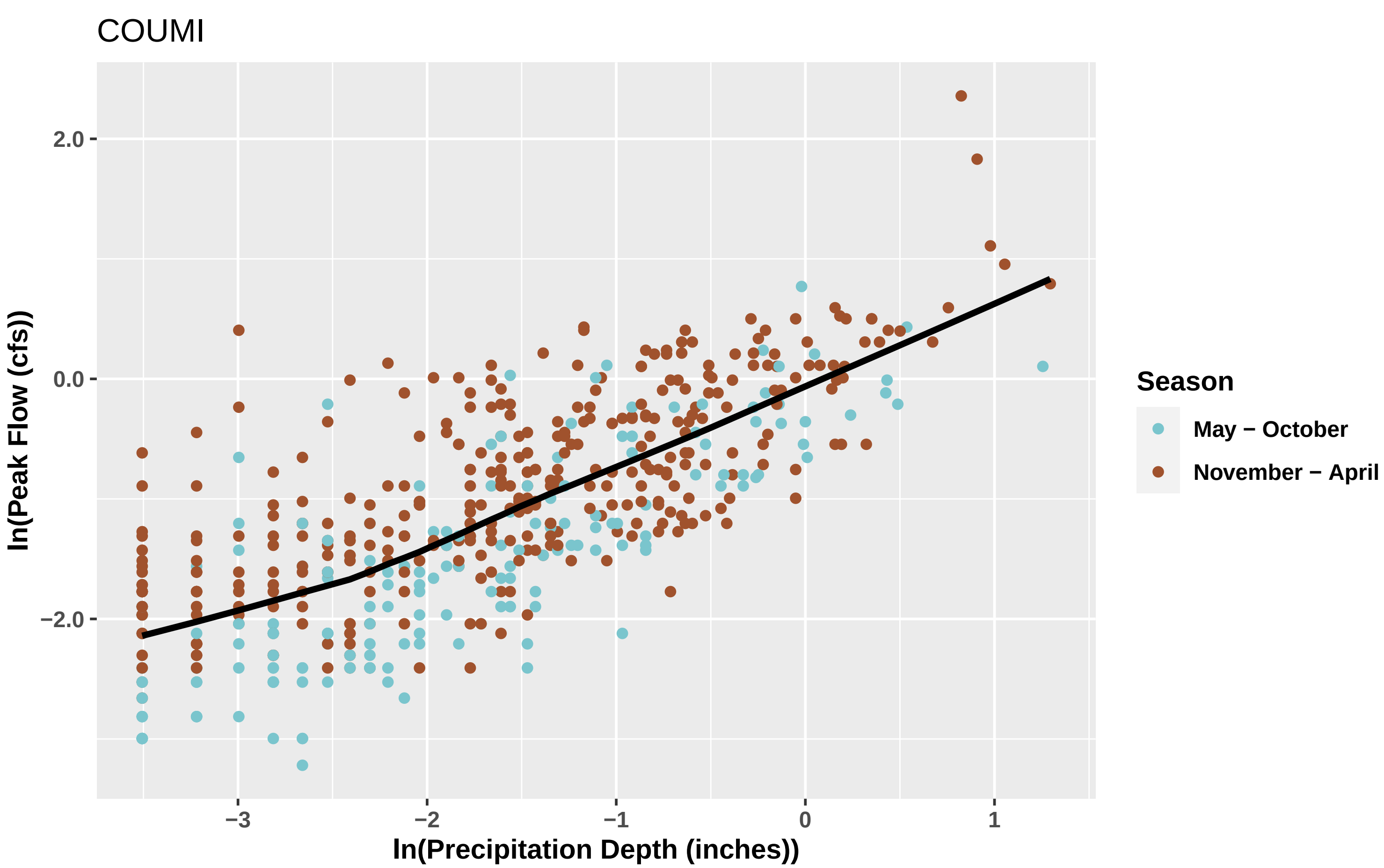

COUMO
ln(Flow Volume (cf)) LOWESS residuals
2
1
0
−1
−2
2016
2017
2018
2019
Trend
May − October
November − April

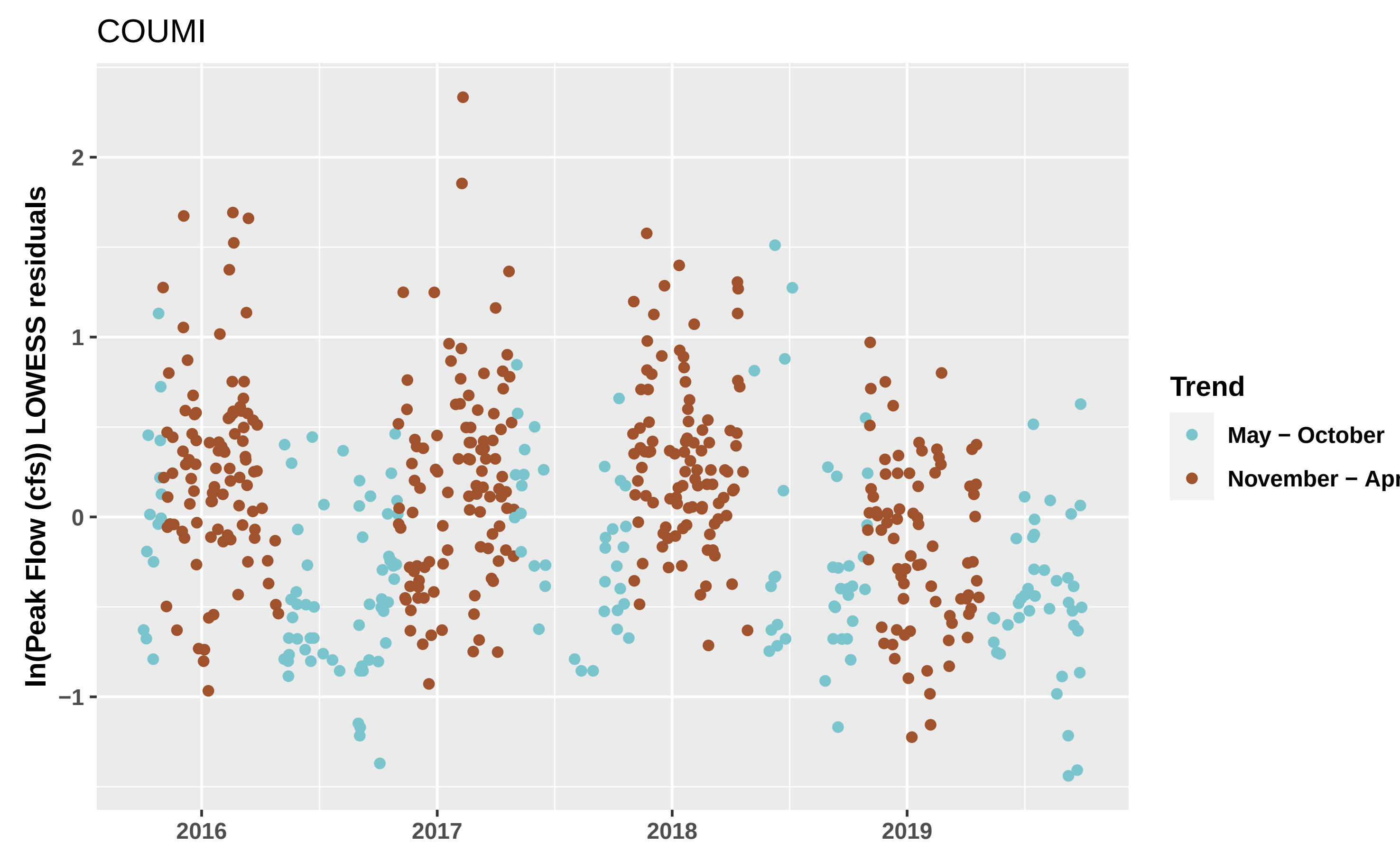

COUMO
ln(Peak Flow (cfs))
3.0
2.0
1.0
0.0
−1.0
−2.0
−3
−2
−1
0
1
ln(Precipitation Depth (inches))
Season
May − October
November − April

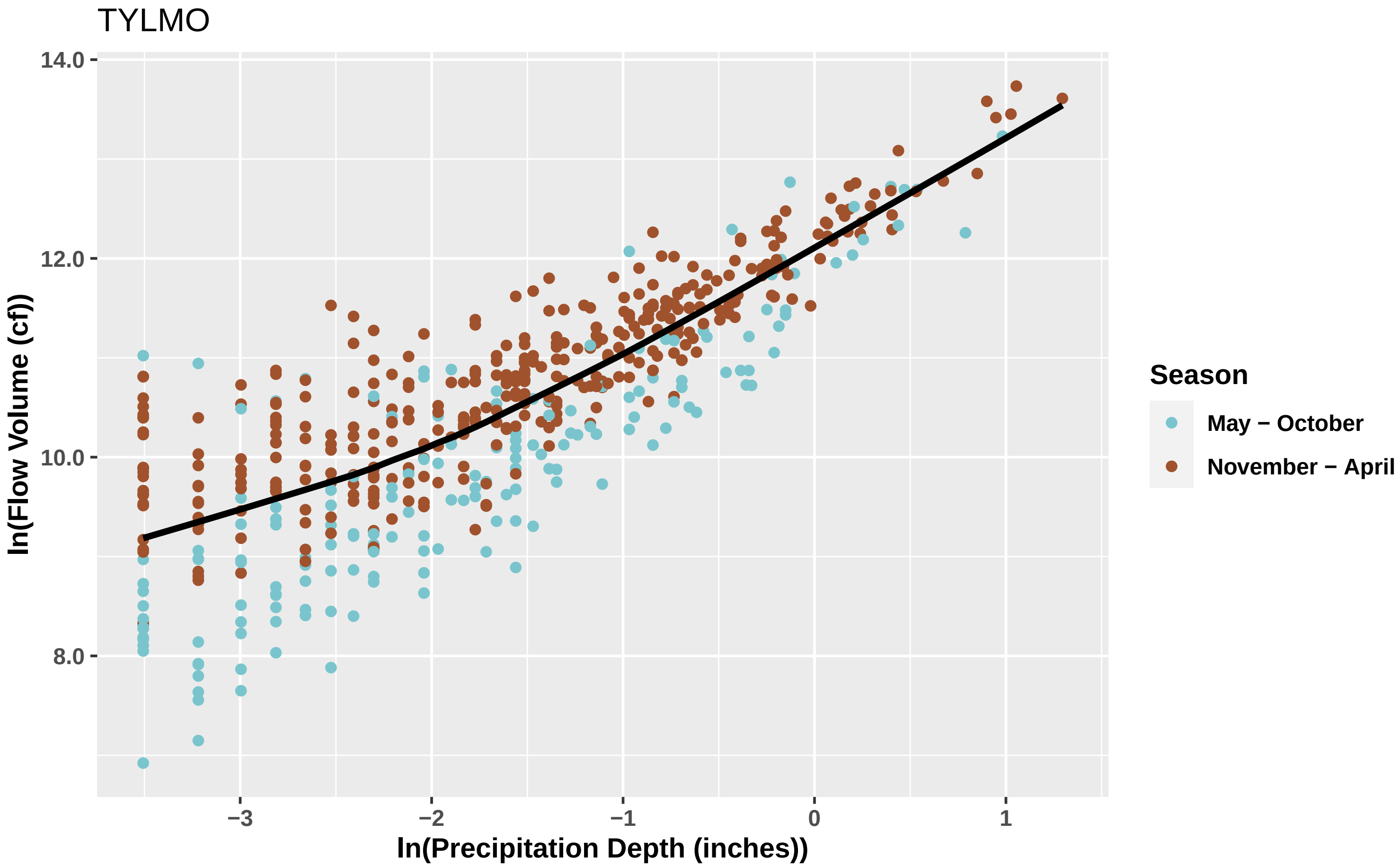

COUMO
ln(Peak Flow (cfs)) LOWESS residuals
2
1
0
−1
2016
2017
2018
2019
Trend
May − October
November − April

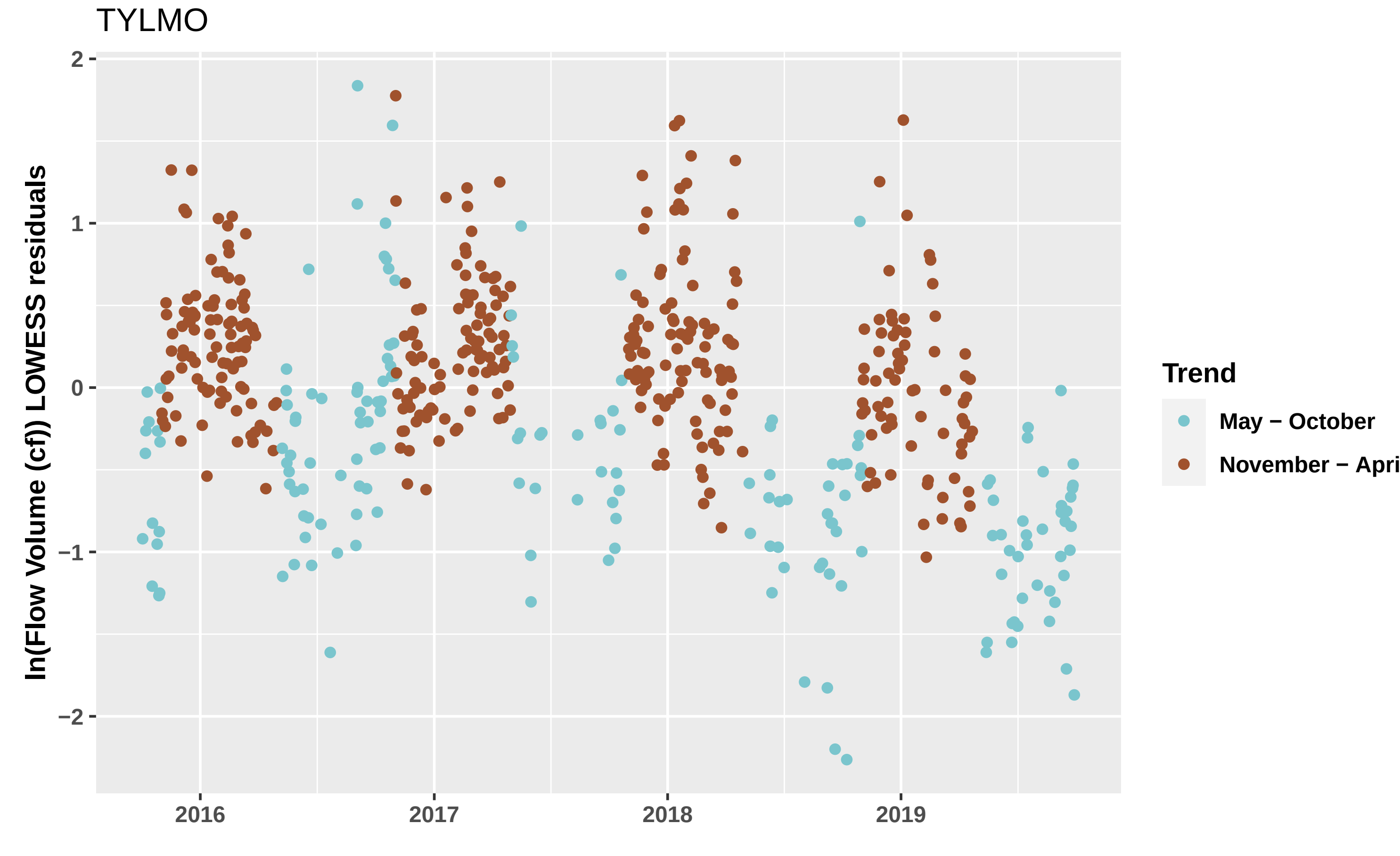

COUMI
ln(Flow Volume (cf))
ln(Precipitation Depth (inches))
12.0
11.0
10.0
9.0
8.0
7.0
−3
−2
−1
0
1
Season
May − October
November − April

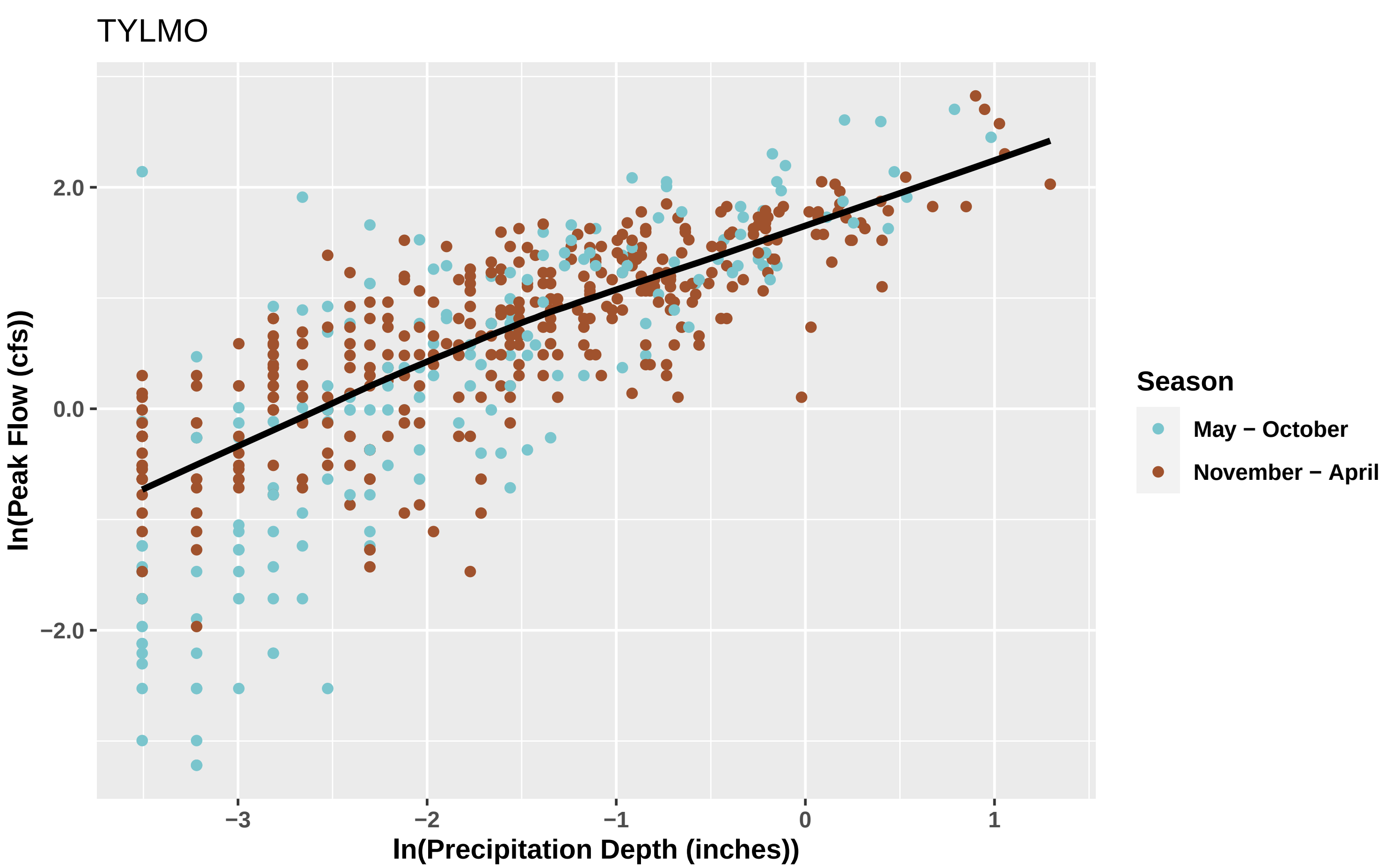

COUMI
ln(Flow Volume (cf)) LOWESS residuals
2
1
0
−1
−2
2016
2017
2018
2019
Trend
May − October
November − April

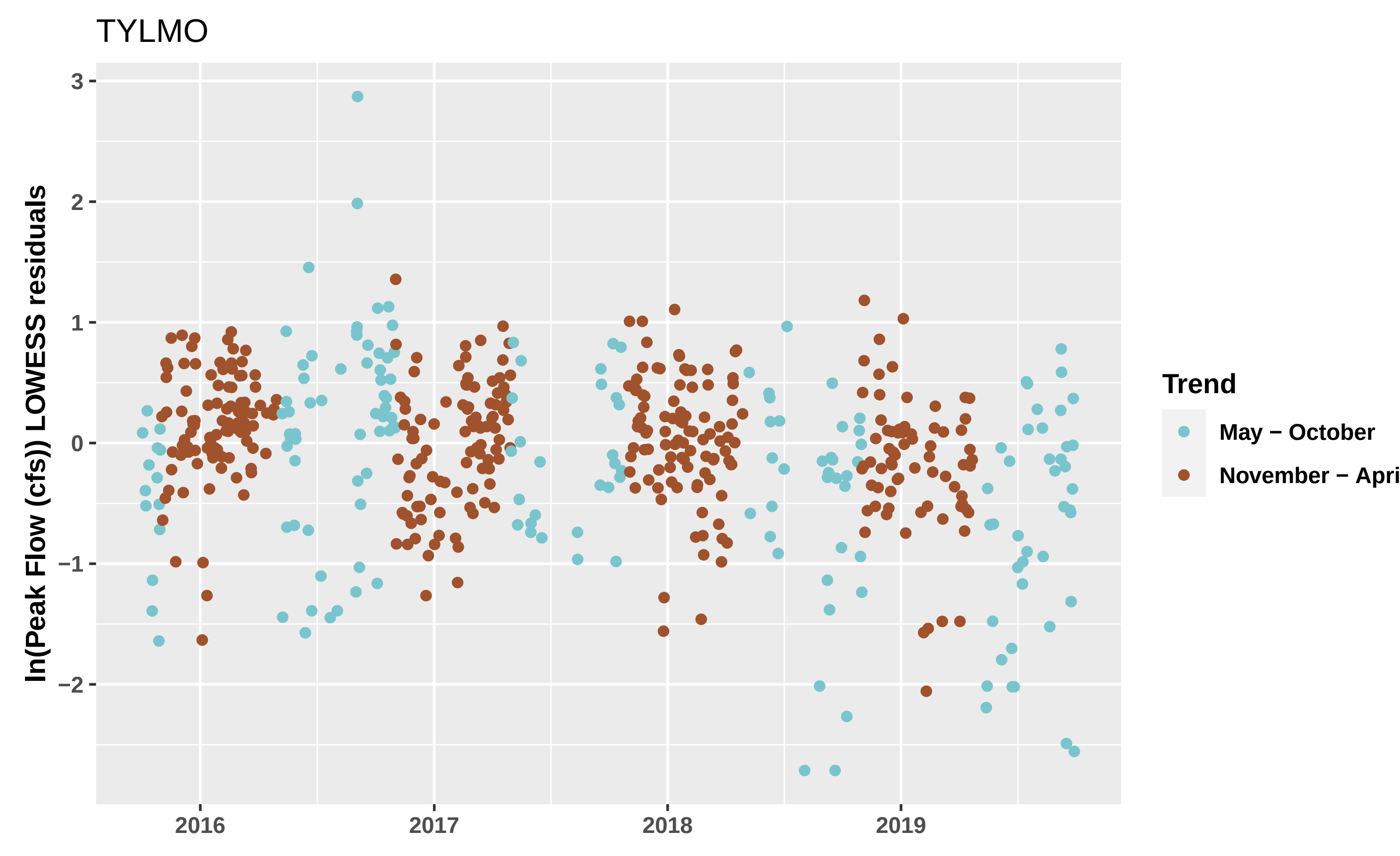

COUMI
ln(Peak Flow (cfs))
ln(Precipitation Depth (inches))
2.0
0.0
−2.0
−3
−2
−1
0
1
Season
May − October
November − April

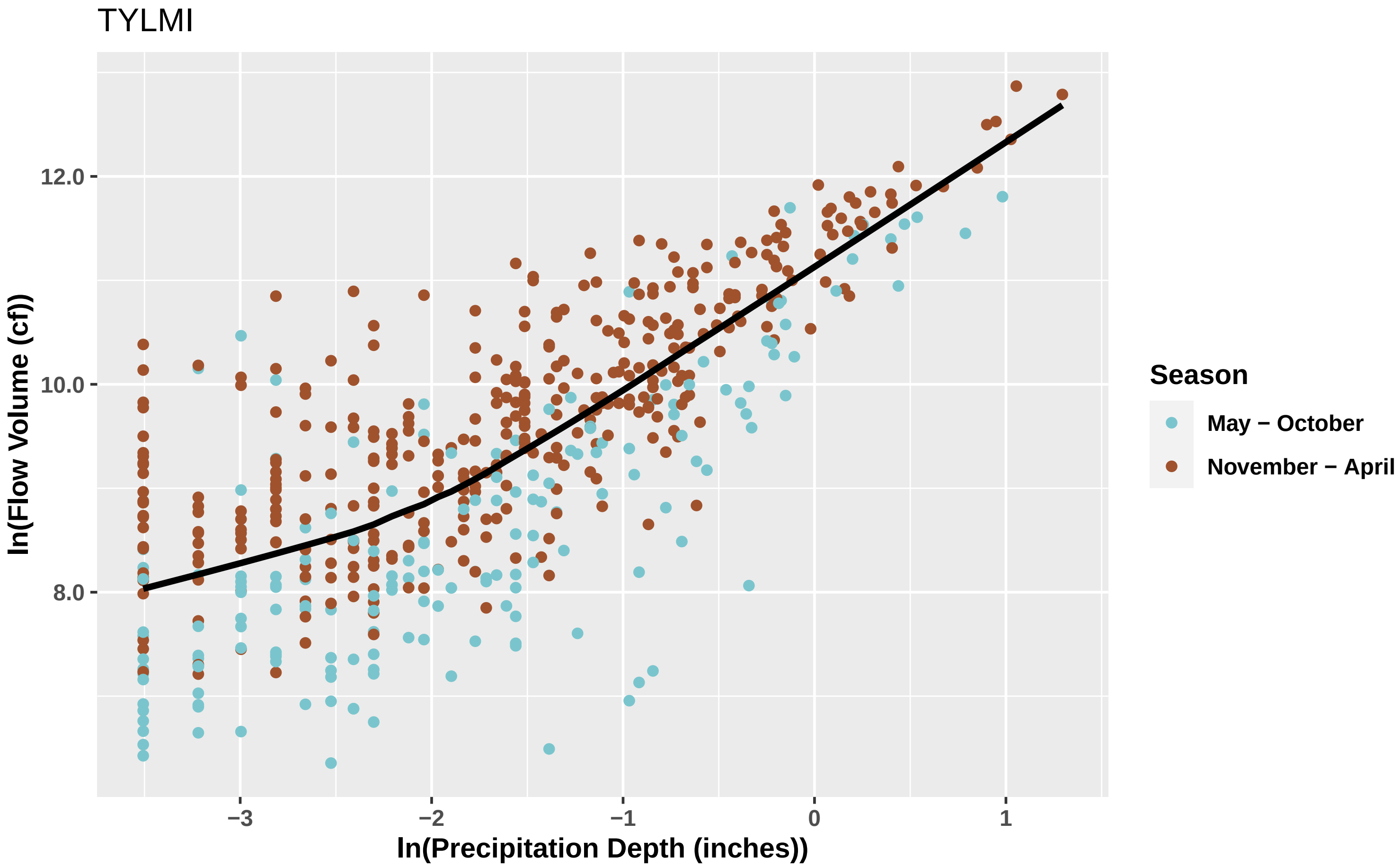

COUMI
ln(Peak Flow (cfs)) LOWESS residuals
2
1
0
−1
2016
2017
2018
2019
Trend
May − October
November − April

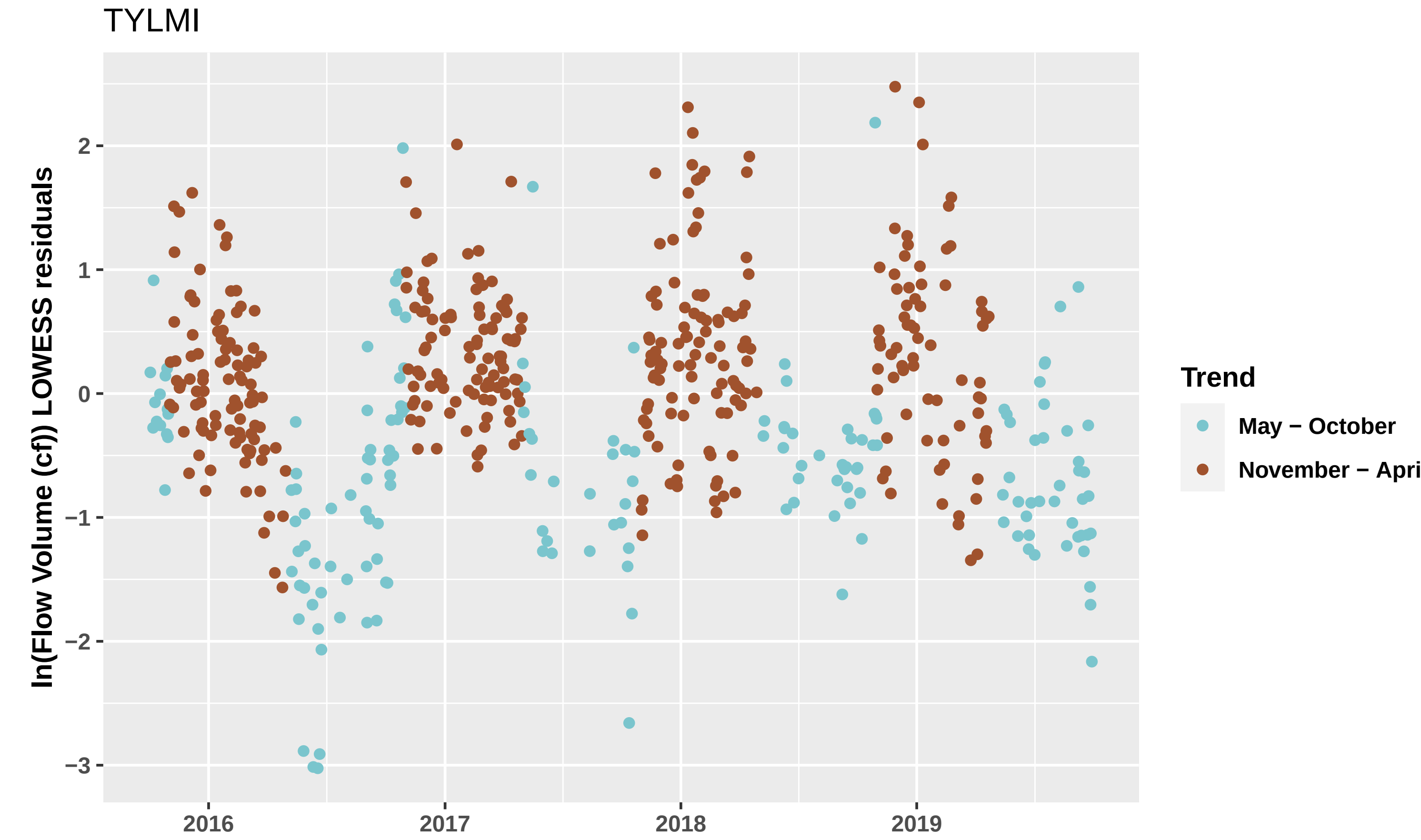

TYLMO
14.0
12.0
10.0
8.0
ln(Flow Volume (cf))
−3
−2
−1
0
1
ln(Precipitation Depth (inches))
Season
May − October
November − April

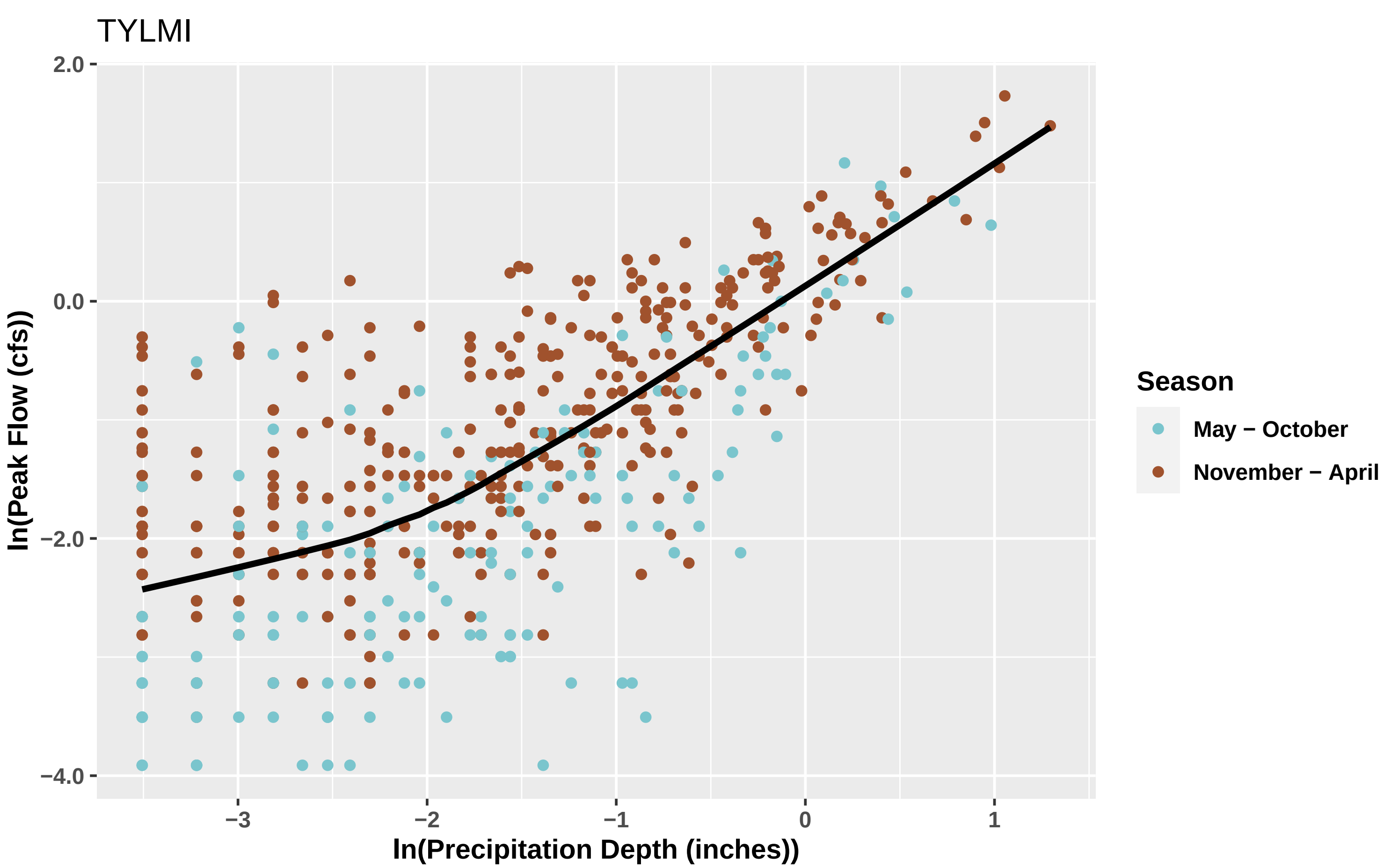

TYLMO
2
1
0
−1
−2
ln(Flow Volume (cf)) LOWESS residuals
2016
2017
2018
2019
Trend
May − October
November − April

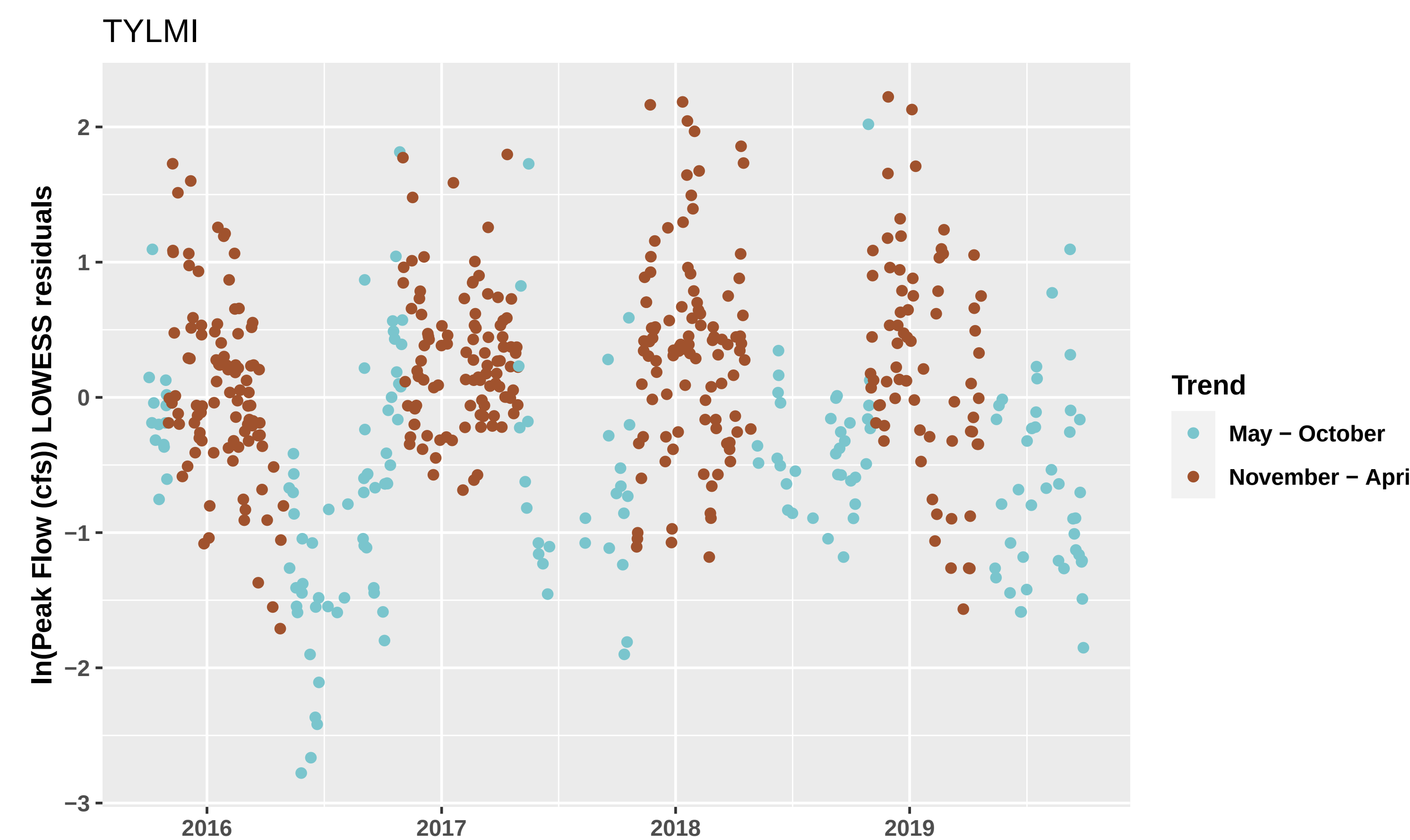

TYLMO
2.0
0.0
−2.0
ln(Peak Flow (cfs))
−3
−2
−1
0
1
ln(Precipitation Depth (inches))
Season
May − October
November − April


TYLMO
3
2
1
0
−1
−2
ln(Peak Flow (cfs)) LOWESS residuals
2016
2017
2018
2019
Trend
May − October
November − April


TYLMI
ln(Flow Volume (cf))
12.0
10.0
8.0
−3
−2
−1
0
1
ln(Precipitation Depth (inches))
Season
May − October
November − April


TYLMI
ln(Flow Volume (cf)) LOWESS residuals
2
1
0
−1
−2
−3
2016
2017
2018
2019
Trend
May − October
November − April


TYLMI
ln(Peak Flow (cfs))
2.0
0.0
−2.0
−4.0
−3
−2
−1
0
1
ln(Precipitation Depth (inches))
Season
May − October
November − April


TYLMI
ln(Peak Flow (cfs)) LOWESS residuals
2
1
0
−1
−2
−3
2016
2017
2018
2019
Trend
May − October
November − April

APPENDIX B

Results from Seasonal Kendall Analysis on Rainfall Runoff Response

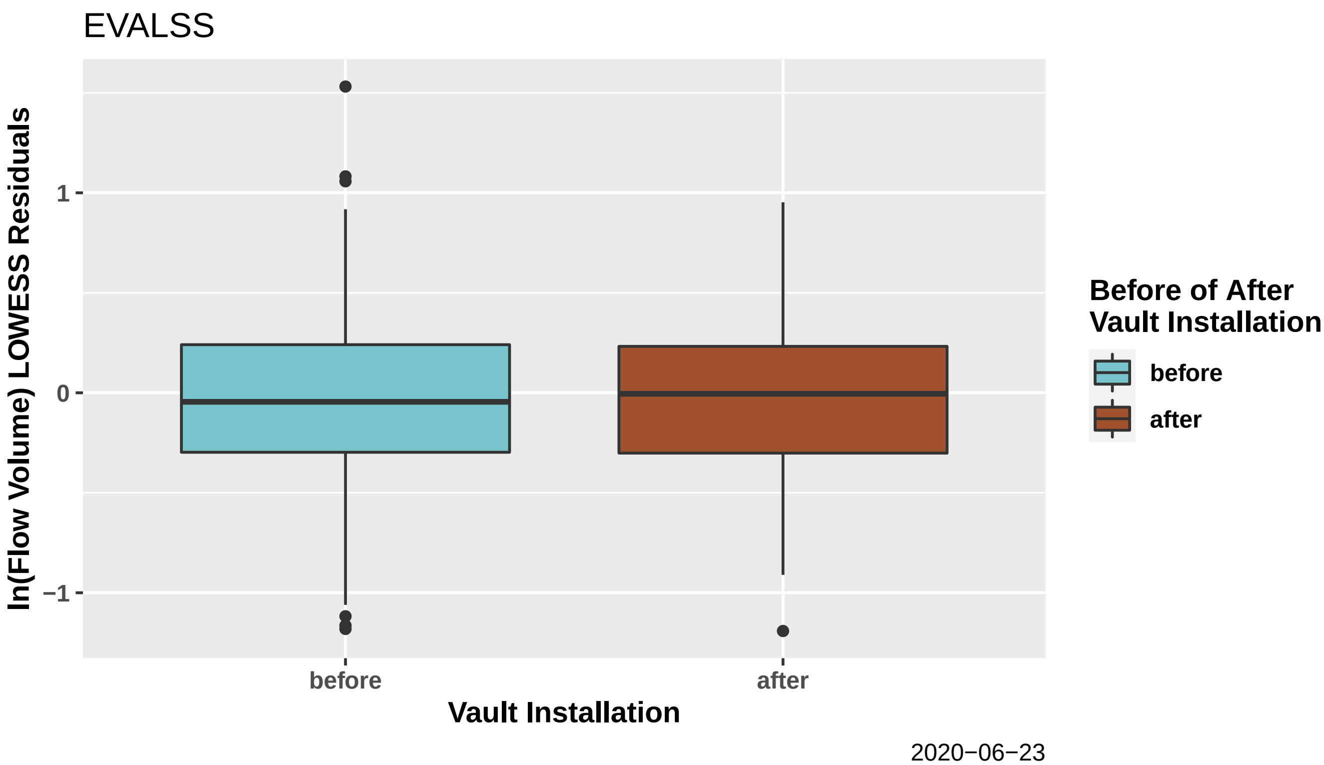
Appendix B. Seasonal Kendall's Tau Correlation Coefficients for Rainfall Runoff Response (Flow Volume and Maximum Flow Rate) versus Time (WY2016 through WY2019).							
LOWESS fit: Natural Log of Flow Volume (cf) vs. Natural Log of Precipitation Depth (in)				LOWESS fit: Natural Log of Peak Flow (cfs) vs. Natural Log of Precipitation Depth (in)			
Station	Season	Tau	P-value	Station	Season	Tau	P-value
EVALSS	Winter	-0.022	0.522	EVALSS	Winter	-0.118	<0.001
EVALSS	Summer	-0.077	0.110	EVALSS	Summer	-0.099	0.040
EVALSS	Both	-0.034	0.245	EVALSS	Both	-0.114	<0.001
EVAMS	Winter	-0.088	0.011	EVAMS	Winter	-0.120	<0.001
EVAMS	Summer	-0.013	0.796	EVAMS	Summer	0.025	0.605
EVAMS	Both	-0.072	0.013	EVAMS	Both	-0.089	0.002
MONM	Winter	-0.150	<0.001	MONM	Winter	-0.157	<0.001
MONM	Summer	-0.040	0.428	MONM	Summer	-0.056	0.271
MONM	Both	-0.130	<0.001	MONM	Both	-0.138	<0.001
MONMN	Winter	-0.161	<0.001	MONMN	Winter	-0.158	<0.001
MONMN	Summer	0.030	0.560	MONMN	Summer	-0.021	0.680
MONMN	Both	-0.125	<0.001	MONMN	Both	-0.132	<0.001
MONMS	Winter	-0.208	<0.001	MONMS	Winter	-0.189	<0.001
MONMS	Summer	-0.191	<0.001	MONMS	Summer	-0.150	0.003
MONMS	Both	-0.205	<0.001	MONMS	Both	-0.182	<0.001
TOSMO	Winter	0.008	0.824	TOSMO	Winter	-0.067	0.053
TOSMO	Summer	-0.080	0.108	TOSMO	Summer	-0.007	0.883
TOSMO	Both	-0.009	0.760	TOSMO	Both	-0.056	0.060
TOSMI	Winter	-0.118	<0.001	TOSMI	Winter	-0.182	<0.001
TOSMI	Summer	-0.237	<0.001	TOSMI	Summer	-0.277	<0.001
TOSMI	Both	-0.141	<0.001	TOSMI	Both	-0.200	<0.001
COLM	Winter	-0.020	0.561	COLM	Winter	-0.059	0.085
COLM	Summer	-0.047	0.399	COLM	Summer	-0.040	0.473
COLM	Both	-0.023	0.451	COLM	Both	-0.056	0.066
SEIMN	Winter	-0.148	<0.001	SEIMN	Winter	-0.167	<0.001
SEIMN	Summer	-0.023	0.634	SEIMN	Summer	-0.016	0.740
SEIMN	Both	-0.124	<0.001	SEIMN	Both	-0.138	<0.001
SEIMS	Winter	-0.079	0.020	SEIMS	Winter	-0.100	0.003
SEIMS	Summer	-0.138	0.005	SEIMS	Summer	-0.106	0.030
SEIMS	Both	-0.090	0.002	SEIMS	Both	-0.101	<0.001
COUMO	Winter	-0.225	<0.001	COUMO	Winter	-0.150	<0.001
COUMO	Summer	-0.321	<0.001	COUMO	Summer	-0.119	0.017
COUMO	Both	-0.243	<0.001	COUMO	Both	-0.144	<0.001
COUMI	Winter	-0.037	0.285	COUMI	Winter	-0.122	<0.001
COUMI	Summer	-0.056	0.259	COUMI	Summer	-0.037	0.456
COUMI	Both	-0.041	0.169	COUMI	Both	-0.106	<0.001
TYLMO	Winter	-0.132	<0.001	TYLMO	Winter	-0.120	<0.001
TYLMO	Summer	-0.245	<0.001	TYLMO	Summer	-0.154	0.002
TYLMO	Both	-0.153	<0.001	TYLMO	Both	-0.126	<0.001
TYLMI	Winter	0.065	0.063	TYLMI	Winter	0.073	0.036
TYLMI	Summer	0.010	0.848	TYLMI	Summer	0.027	0.594
TYLMI	Both	0.055	0.068	TYLMI	Both	0.065	0.031

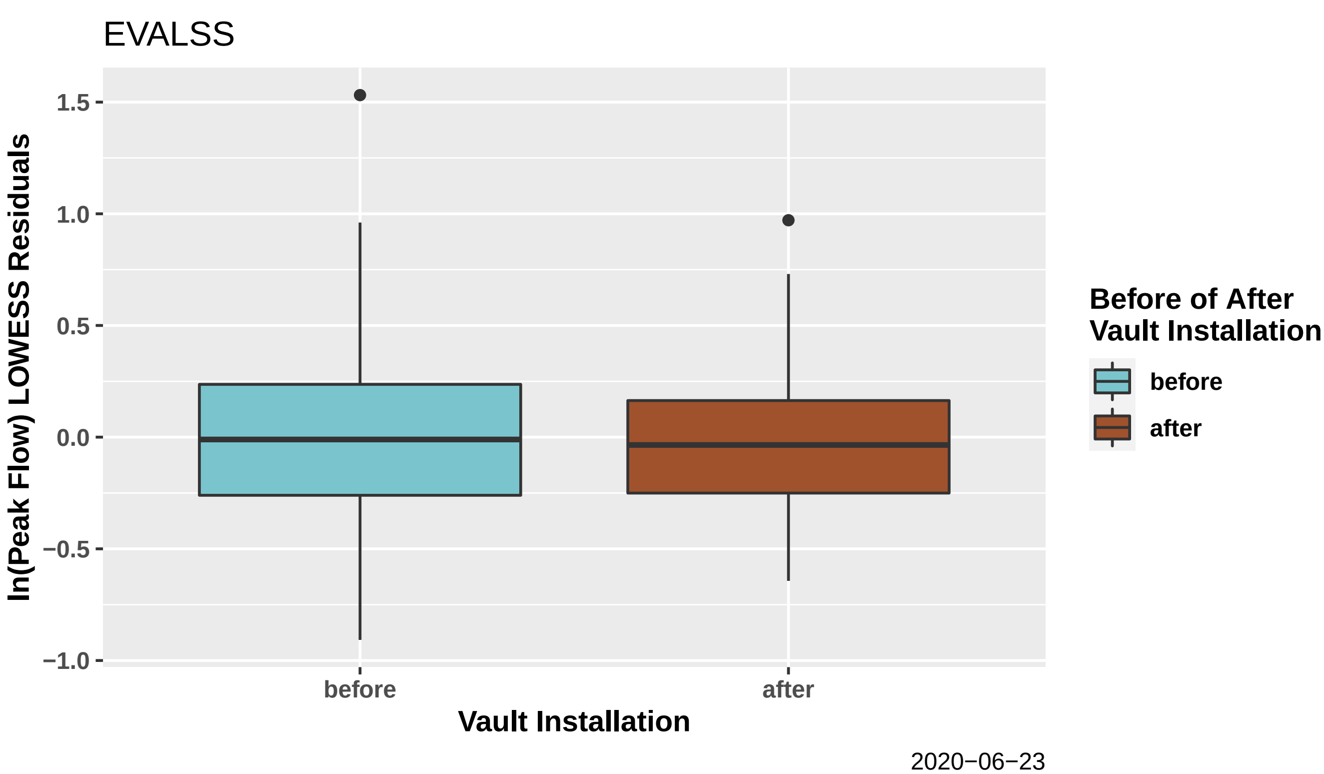
Winter Season = November through April

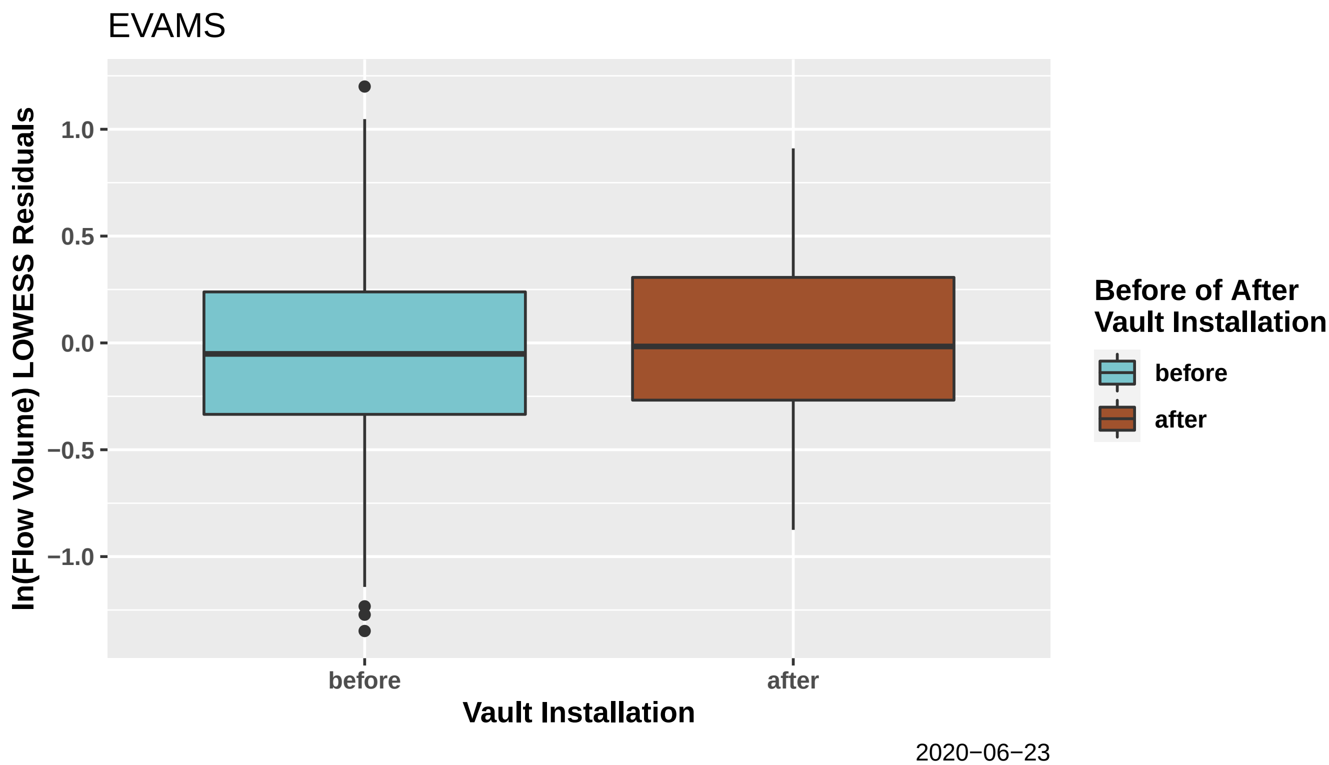
Summer Season = May through October

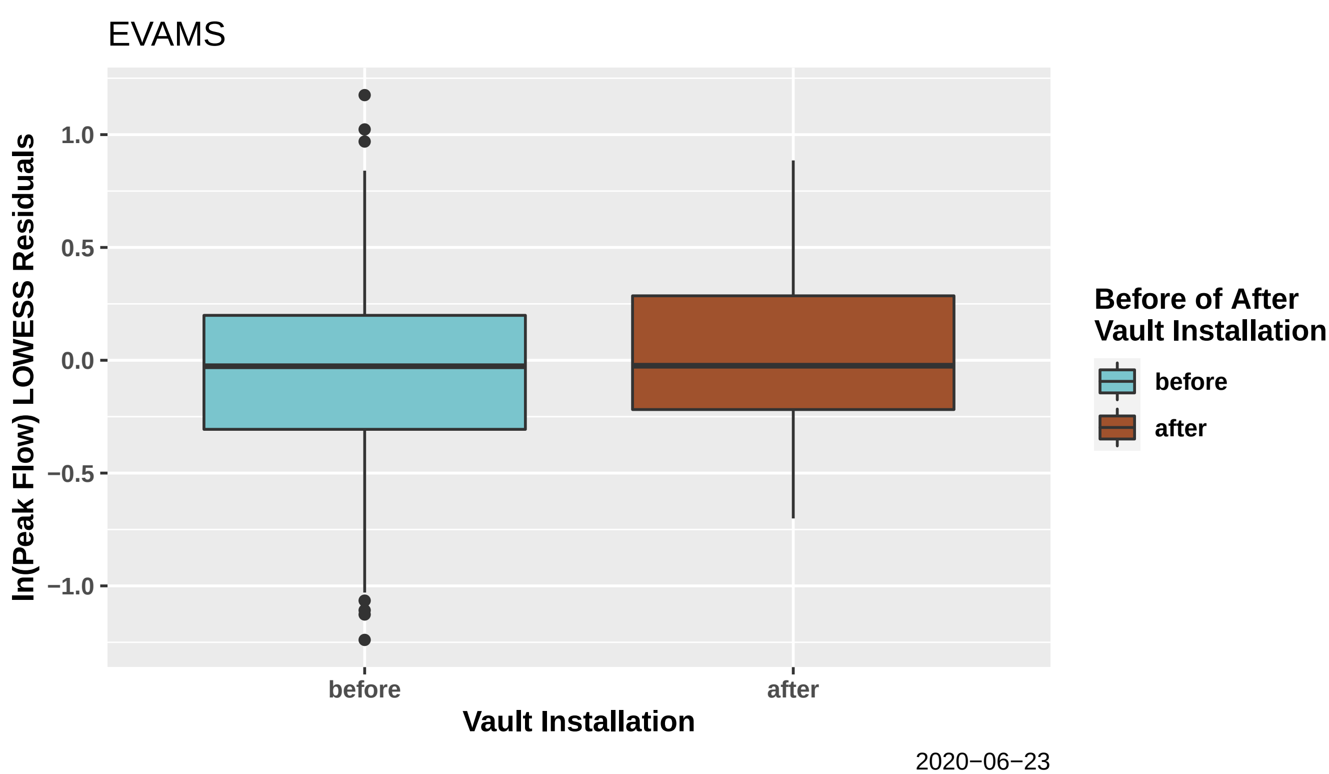
APPENDIX C

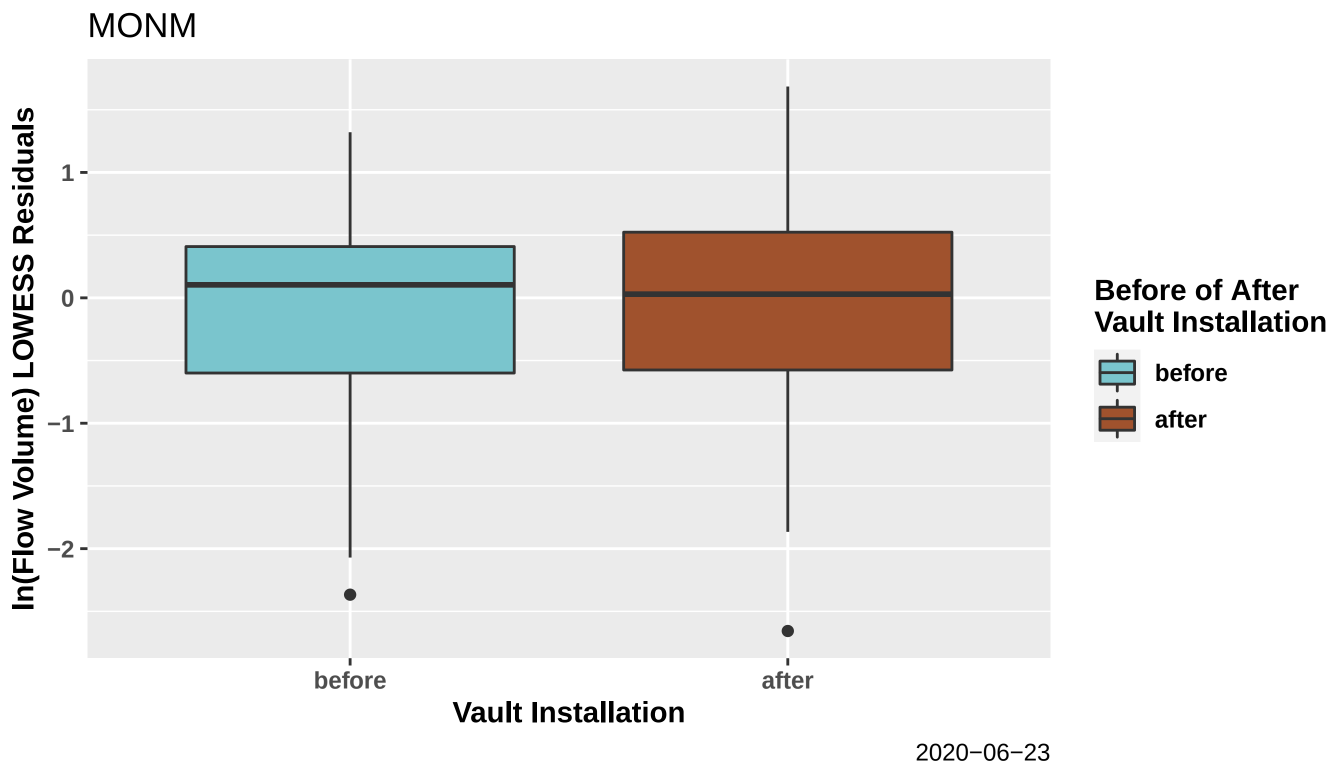
Box Plots Comparing Rainfall Runoff Response Before and After Vault Installation in the Evans Creek Watershed

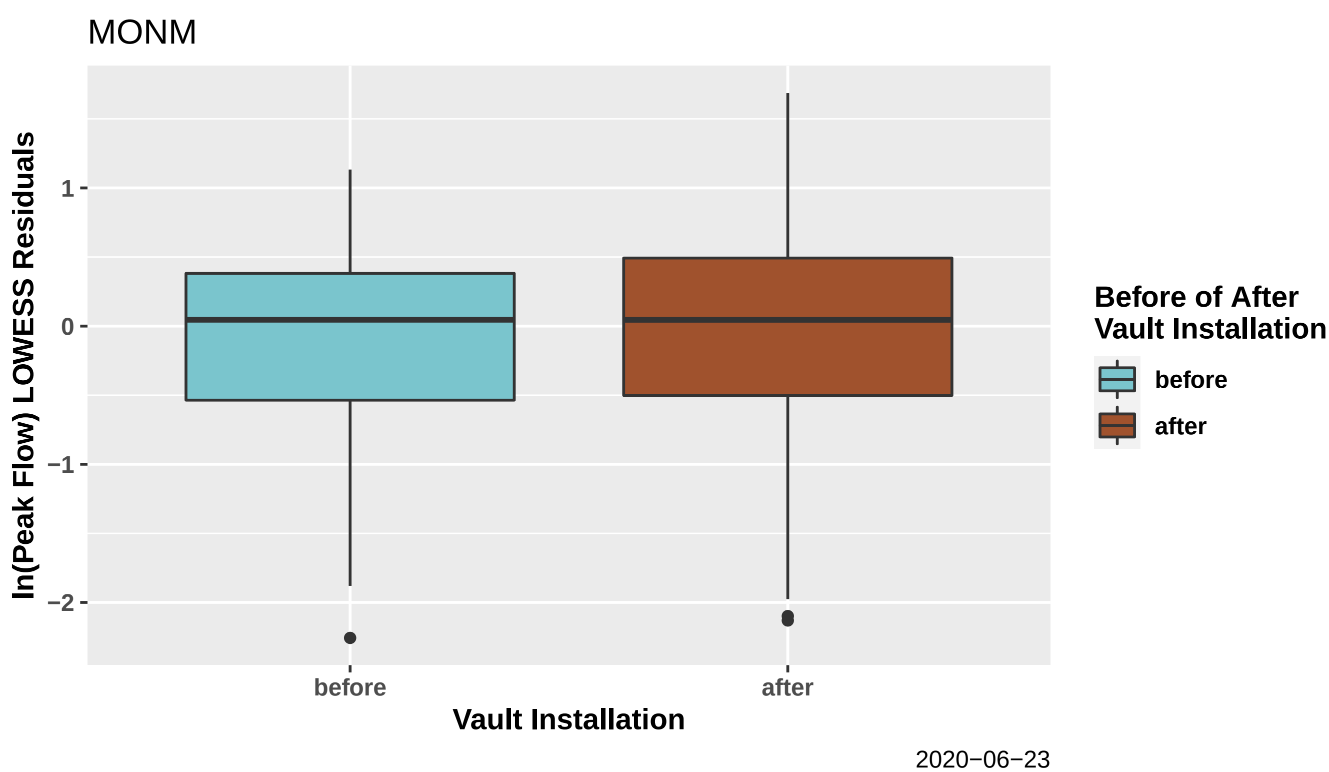

EVALSS
ln(Flow Volume) LOWESS Residuals
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

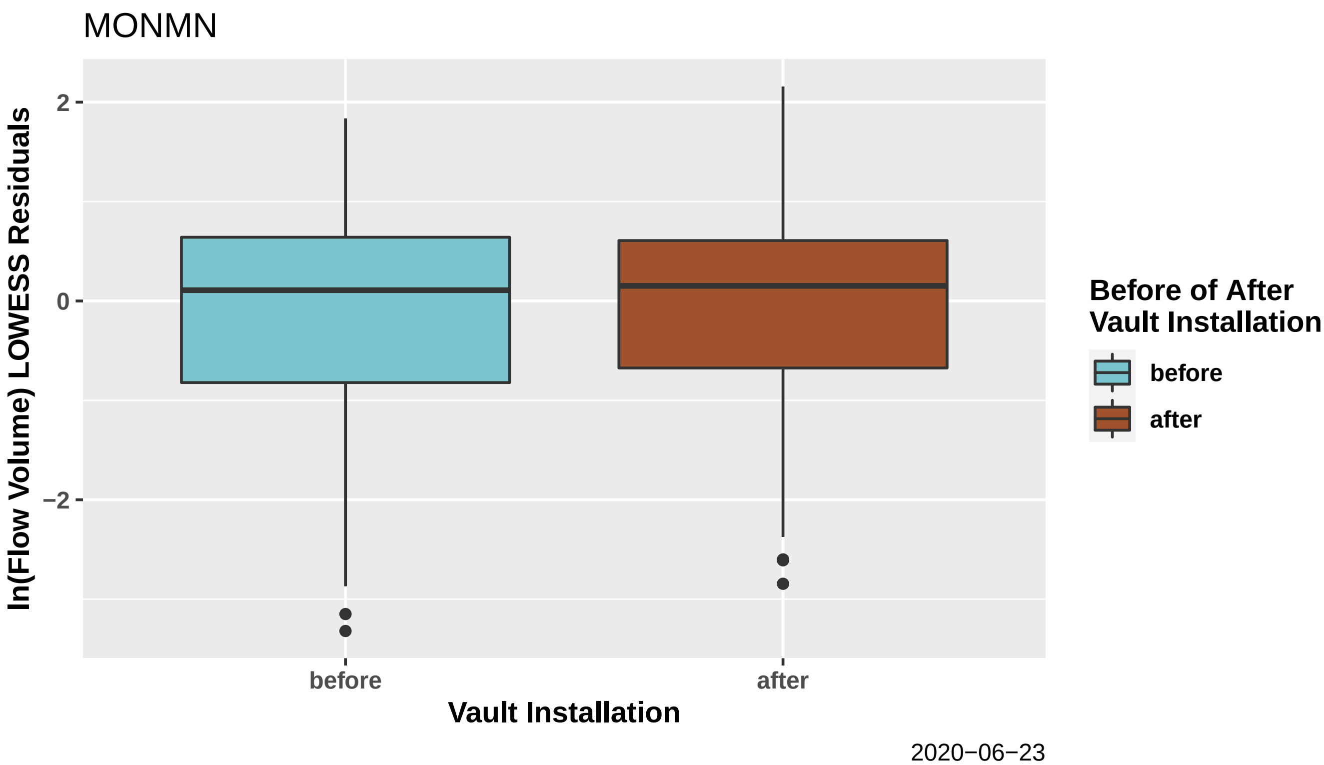

EVALSS
ln(Peak Flow) LOWESS Residuals
1.5
1.0
0.5
0.0
−0.5
−1.0
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

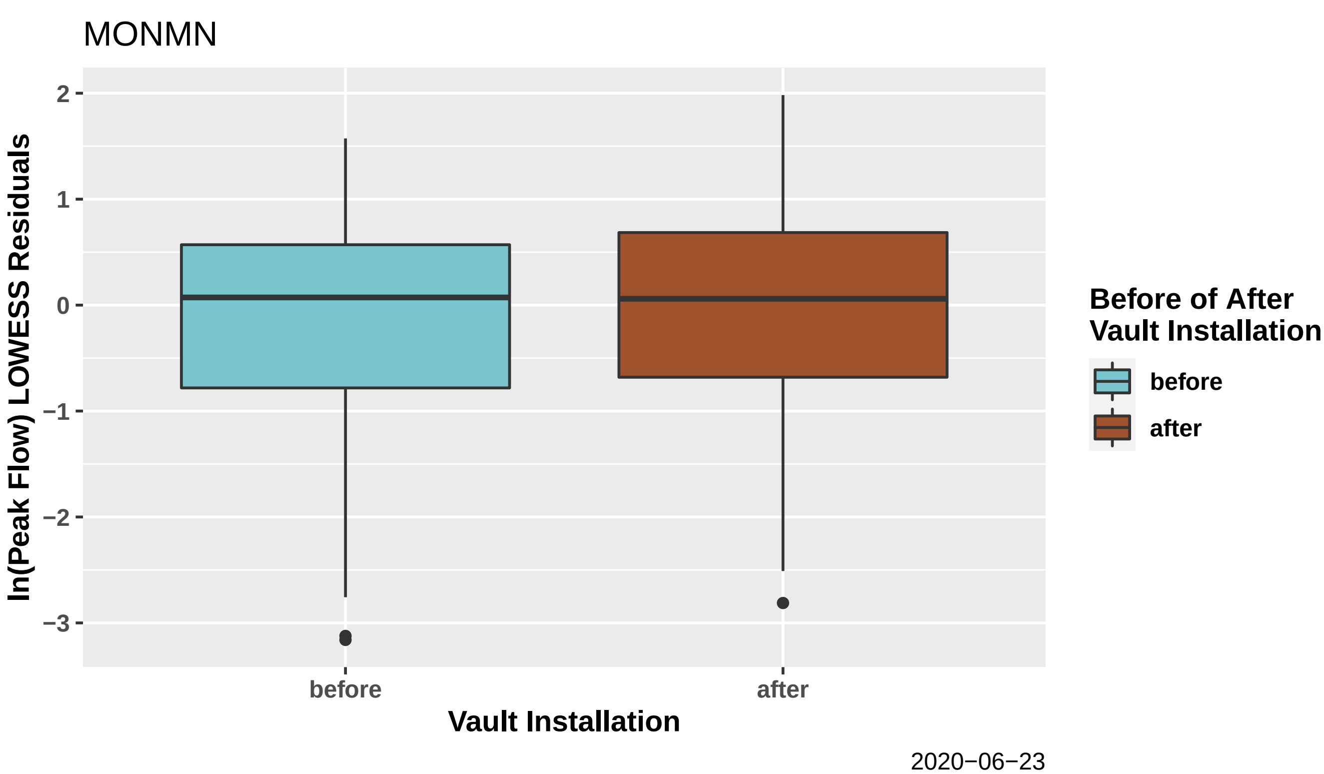

EVAMS
ln(Flow Volume) LOWESS Residuals
1.0
0.5
0.0
−0.5
−1.0
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

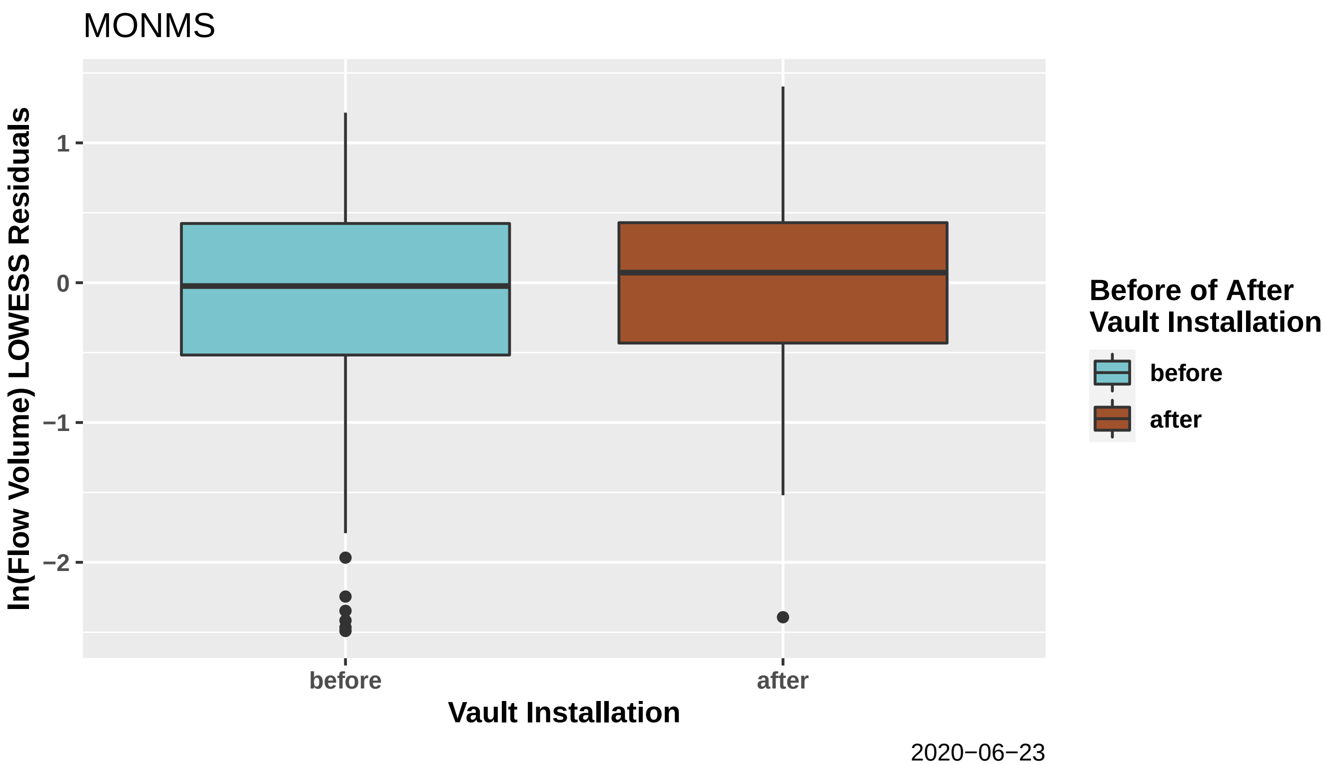

EVAMS
ln(Peak Flow) LOWESS Residuals
1.0
0.5
0.0
−0.5
−1.0
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

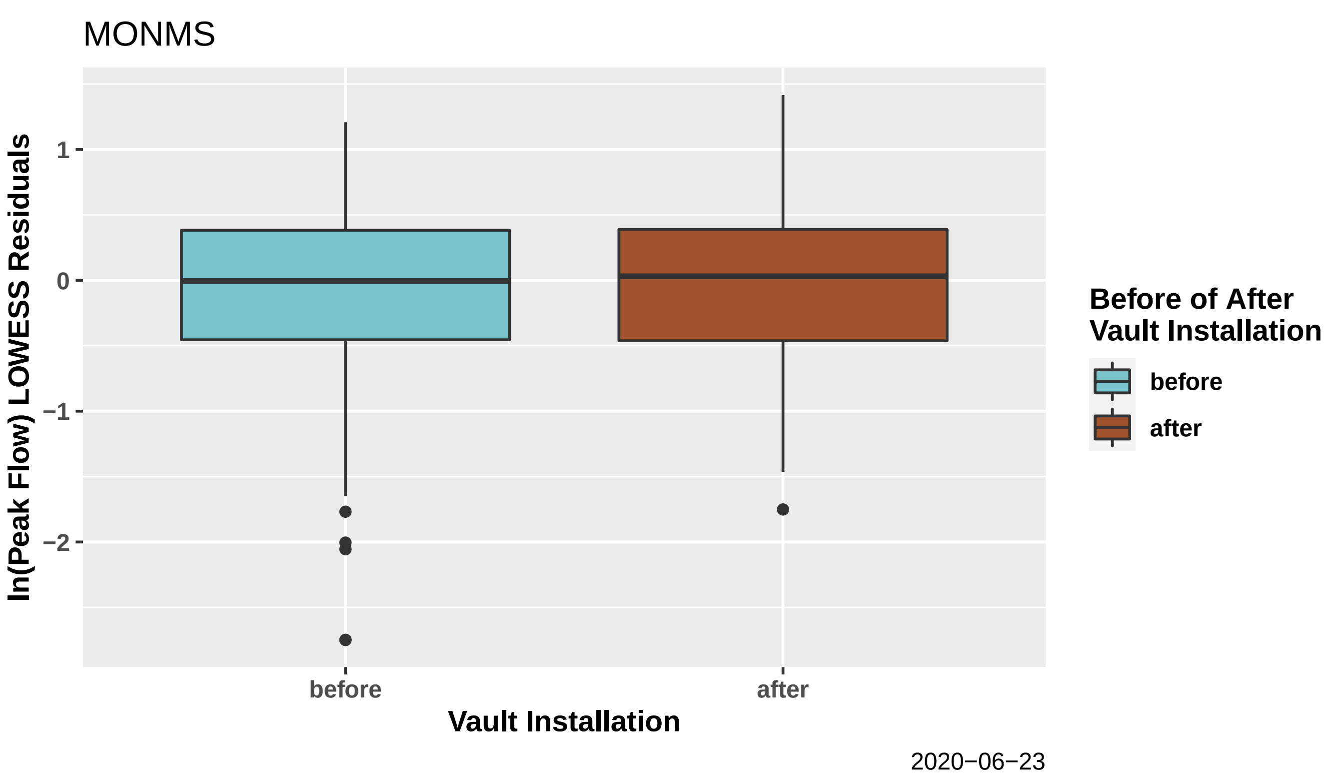

MONM
ln(Flow Volume) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

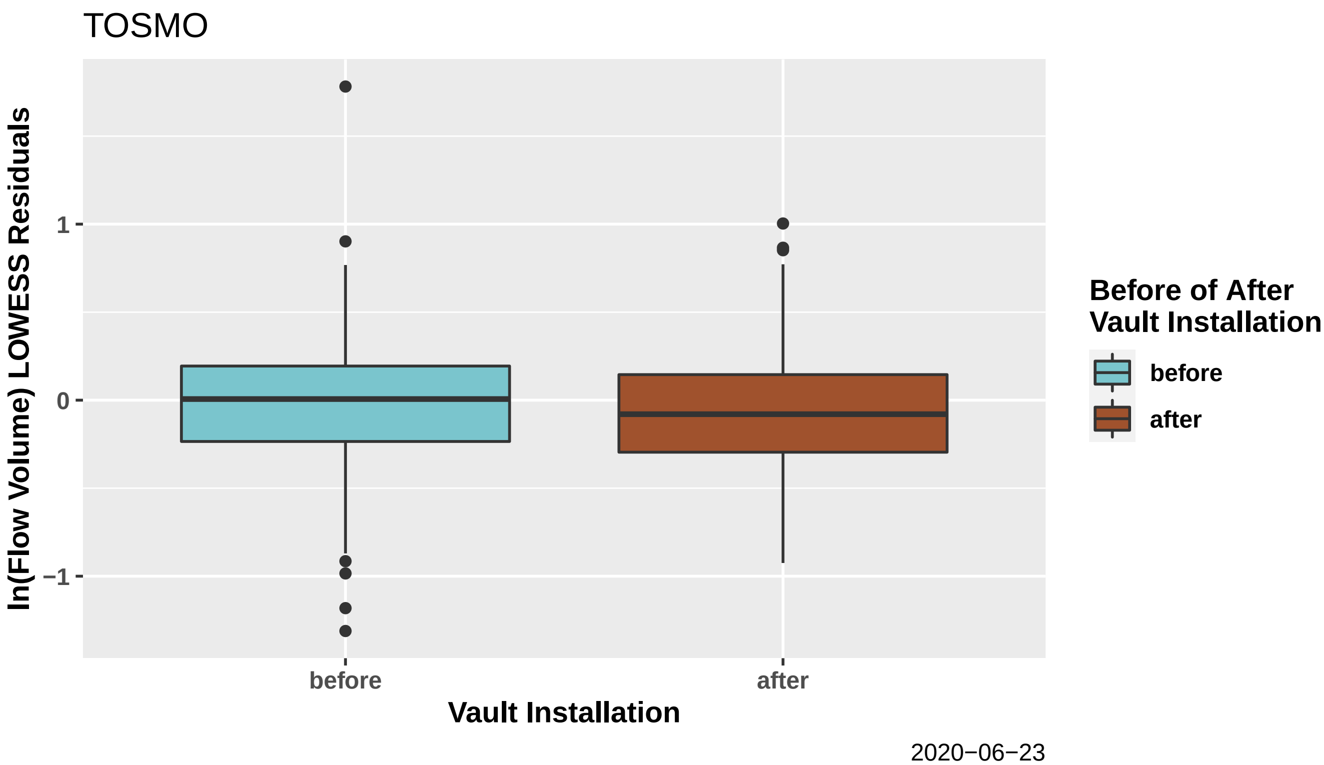

MONM
ln(Peak Flow) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

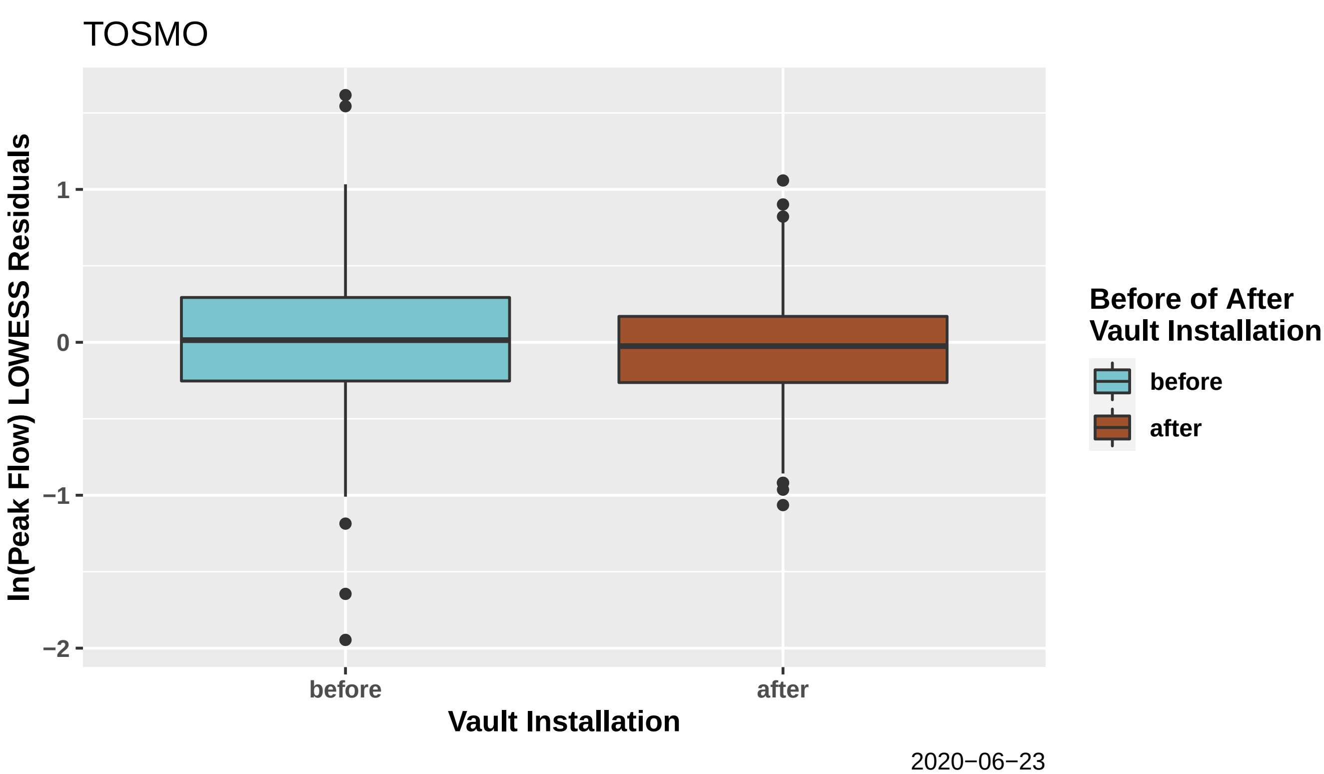

MONMN
ln(Flow Volume) LOWESS Residuals
2
0
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

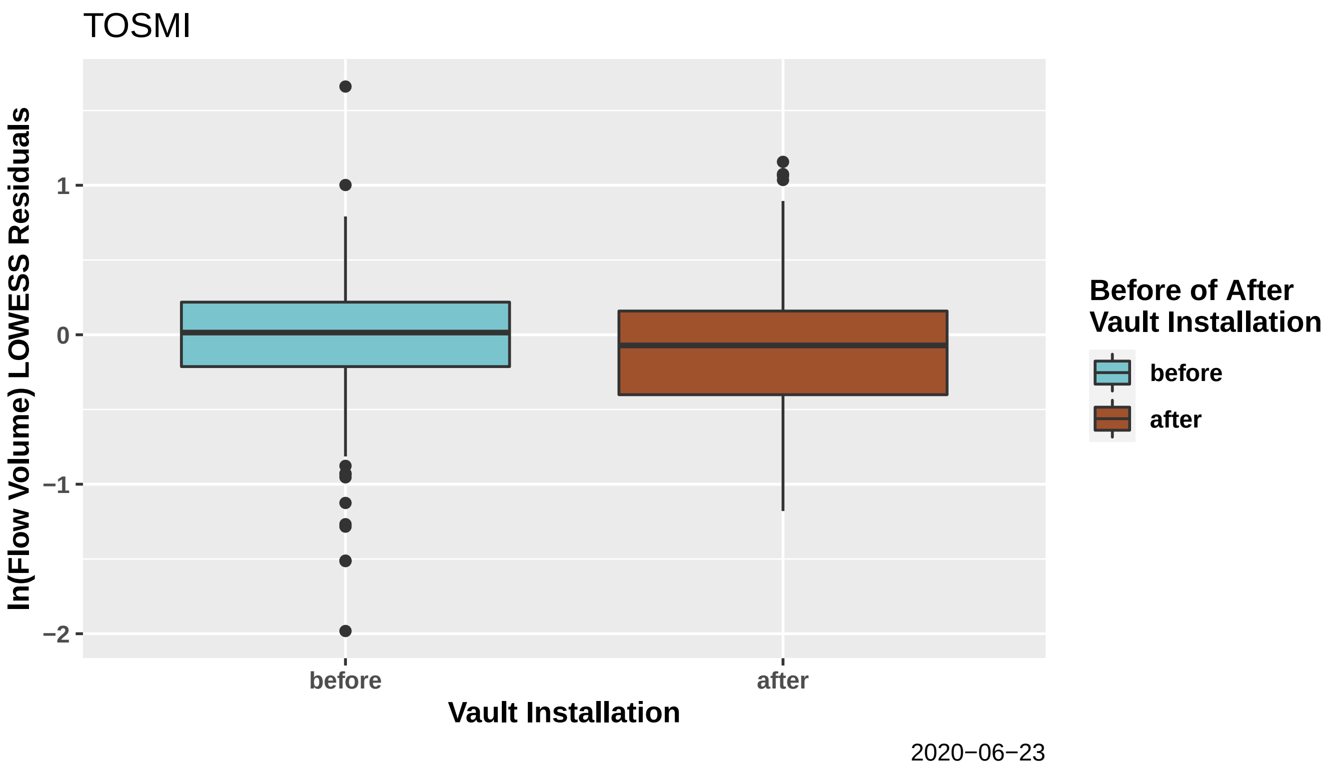

MONMN
ln(Peak Flow) LOWESS Residuals
2
1
0
−1
−2
−3
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

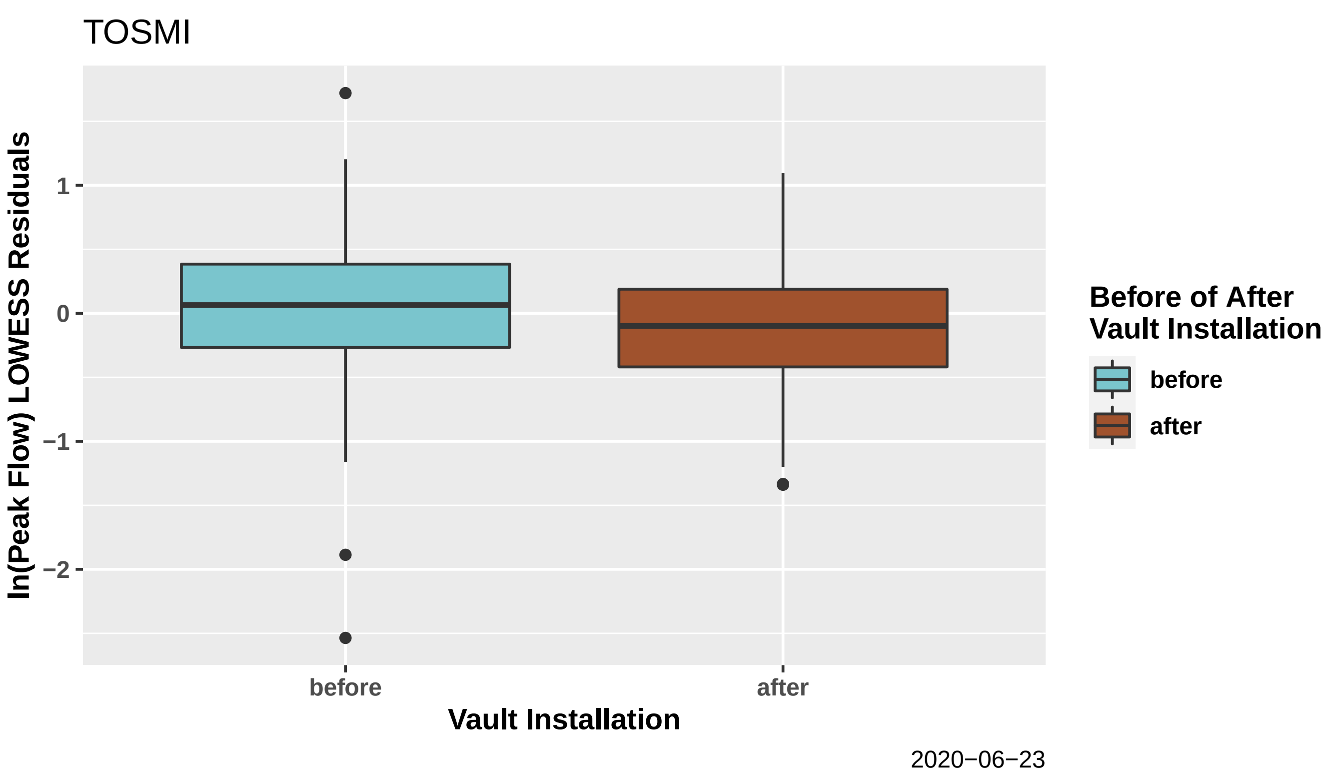

MONMS
ln(Flow Volume) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

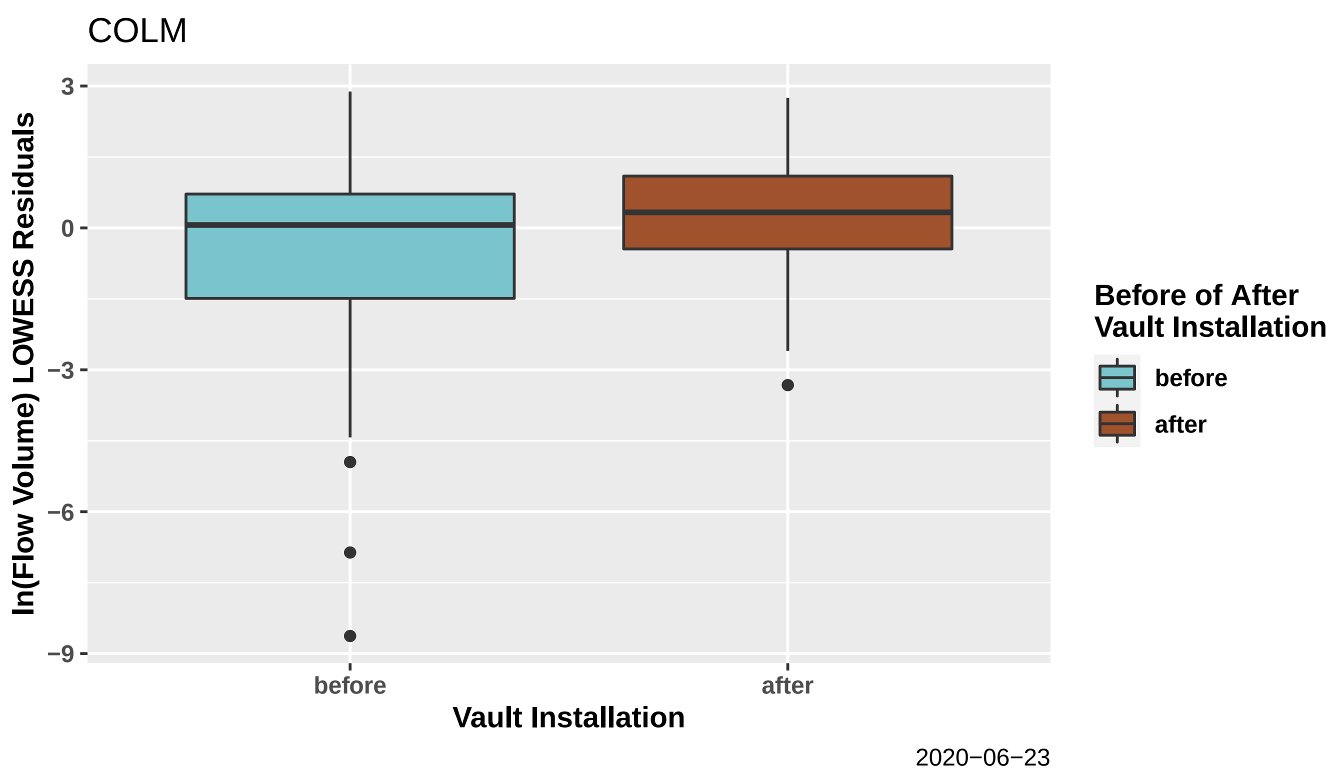

MONMS
ln(Peak Flow) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23


TOSMO
ln(Flow Volume) LOWESS Residuals
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

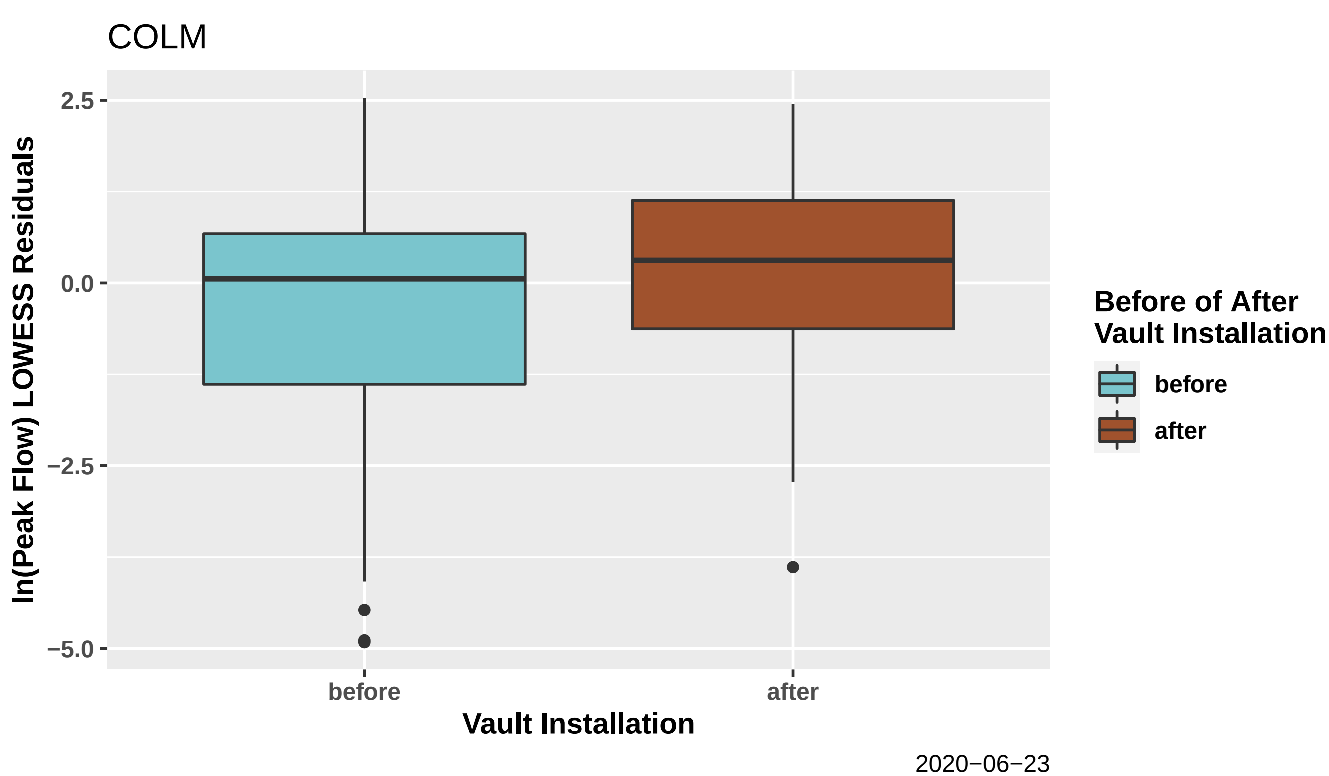

TOSMO
ln(Peak Flow) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23


TOSMI
ln(Flow Volume) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

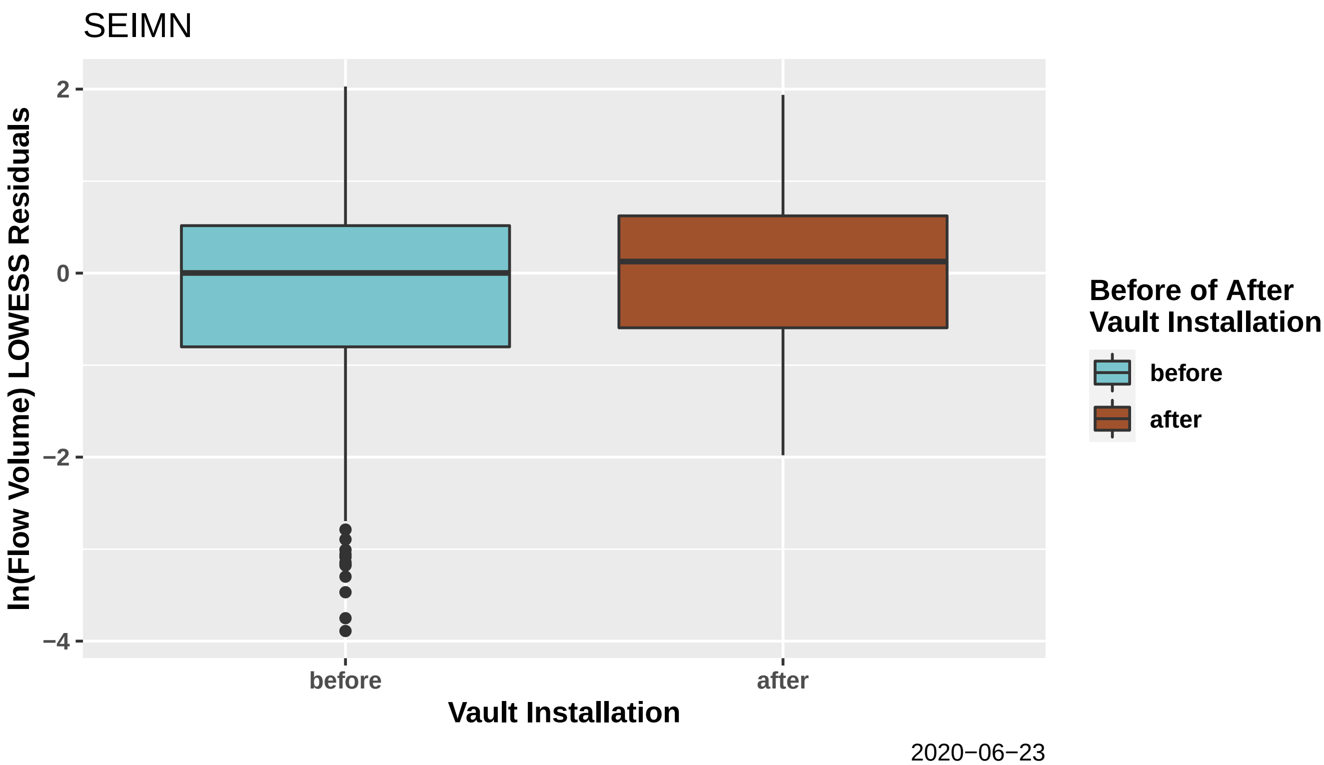

TOSMI
ln(Peak Flow) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

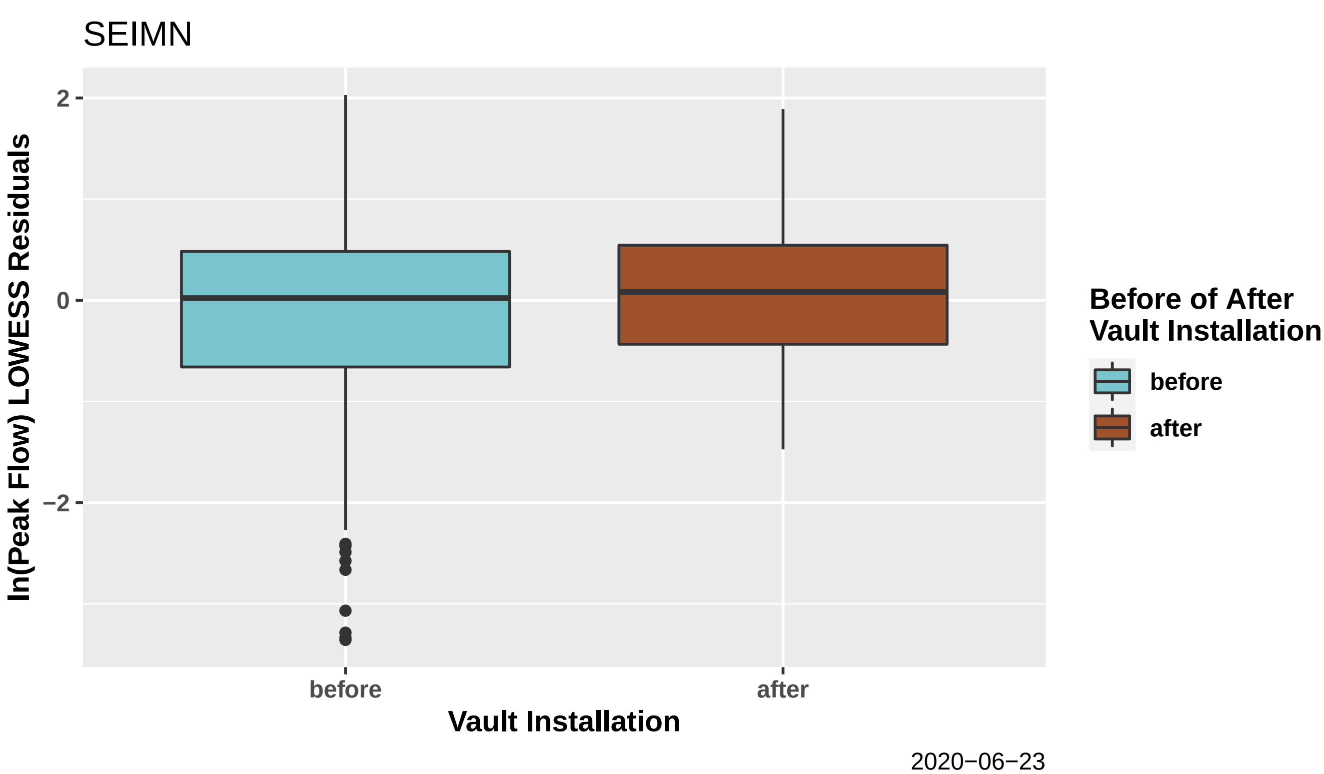


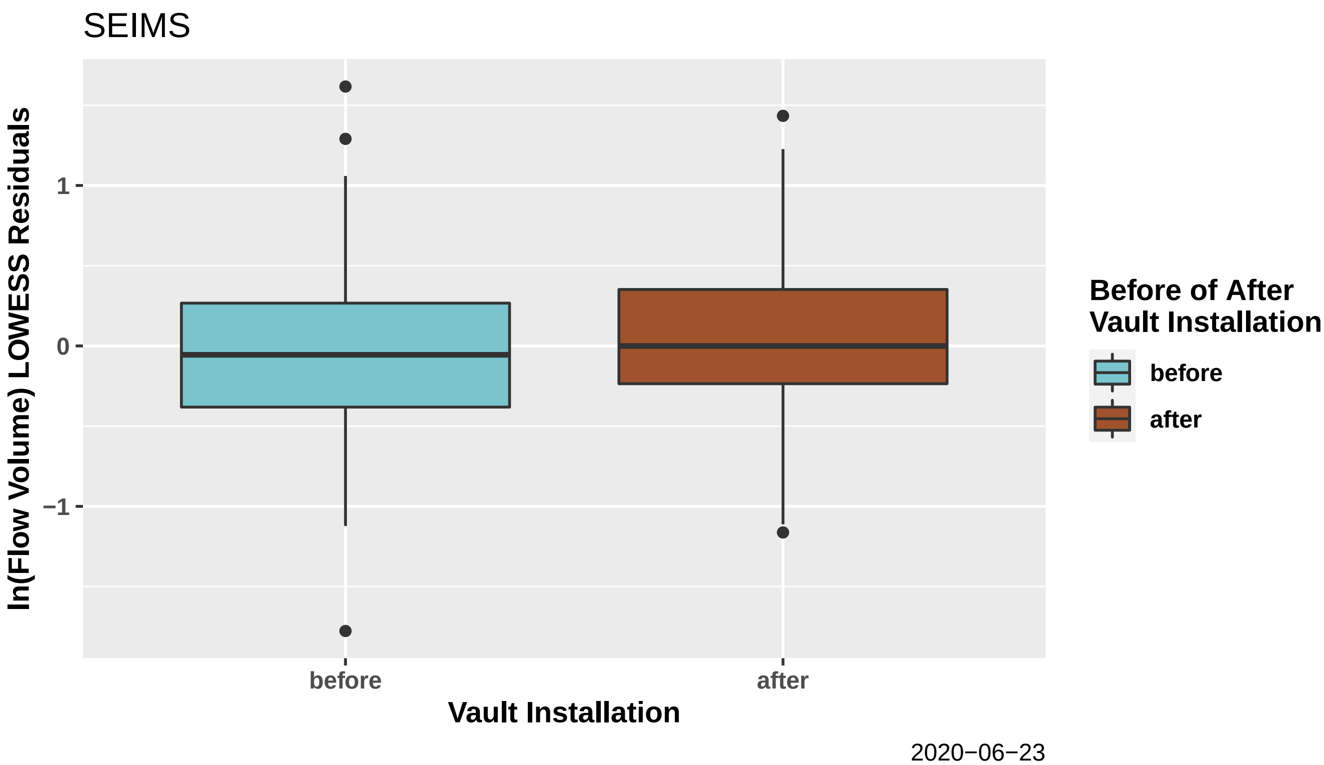
COLM
3
0
−3
−6
−9
ln(Flow Volume) LOWESS Residuals
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

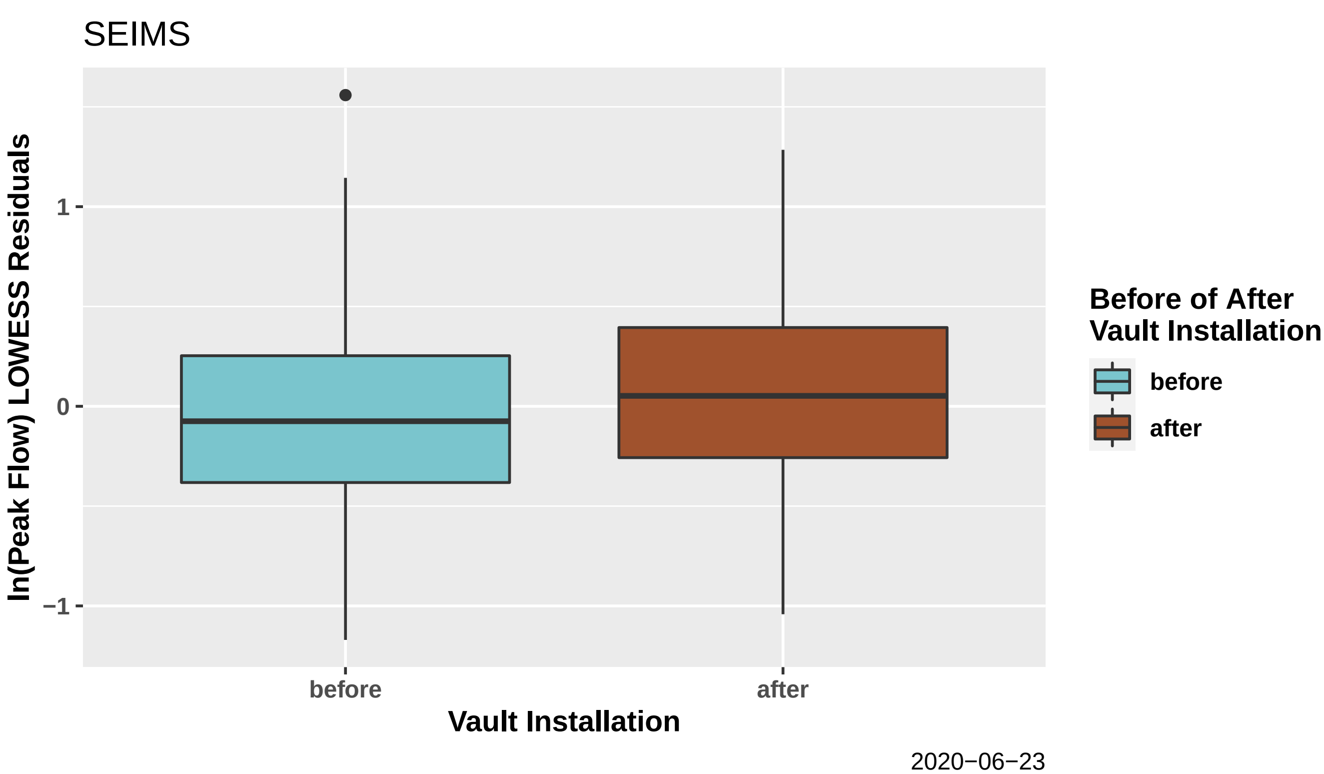


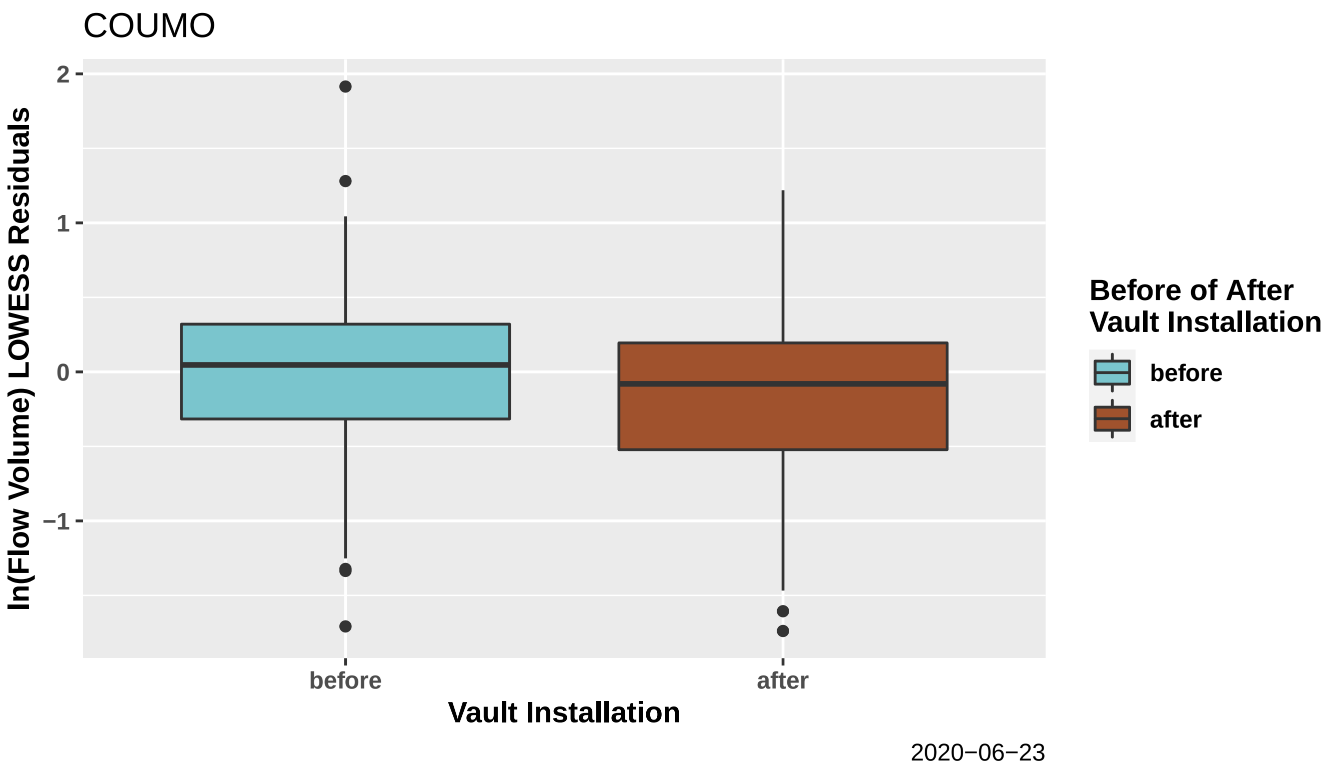
COLM
2.5
0.0
−2.5
−5.0
ln(Peak Flow) LOWESS Residuals
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

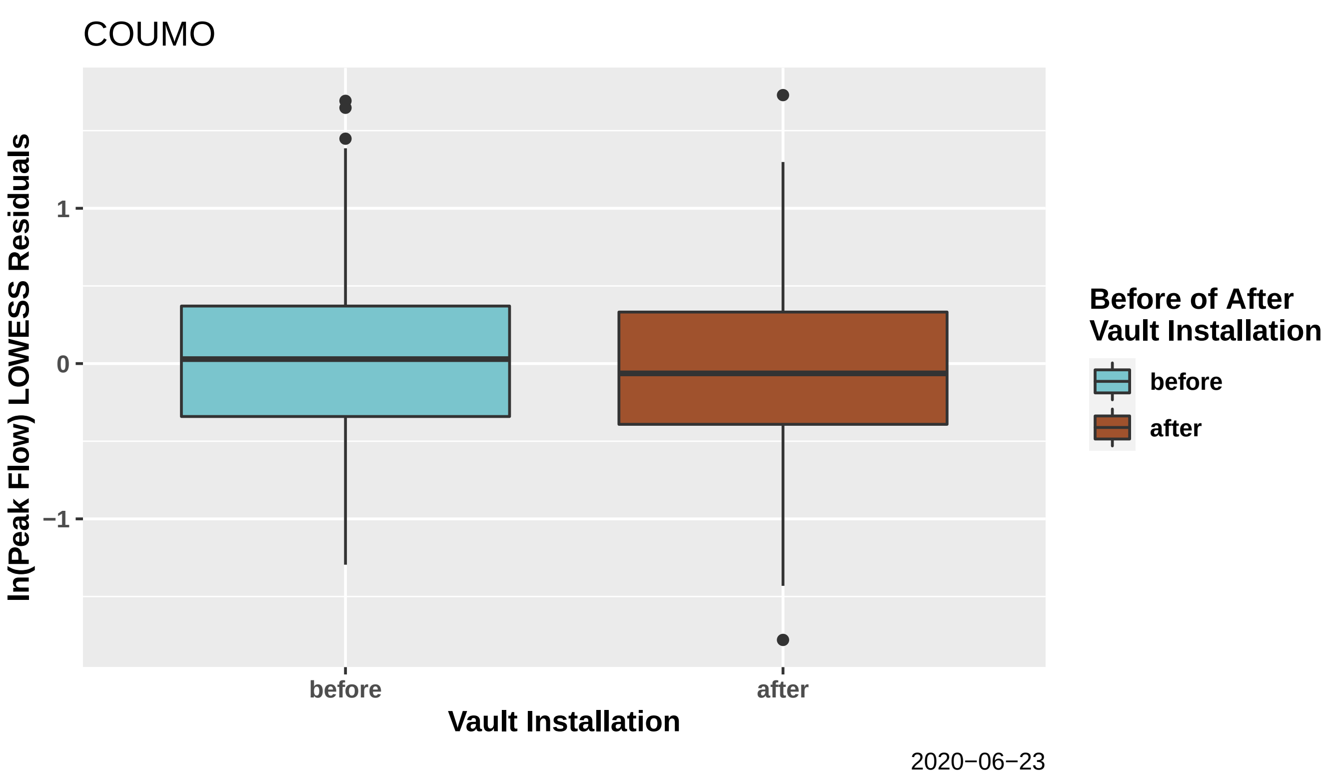

SEIMN
2
0
−2
−4
ln(Flow Volume) LOWESS Residuals
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

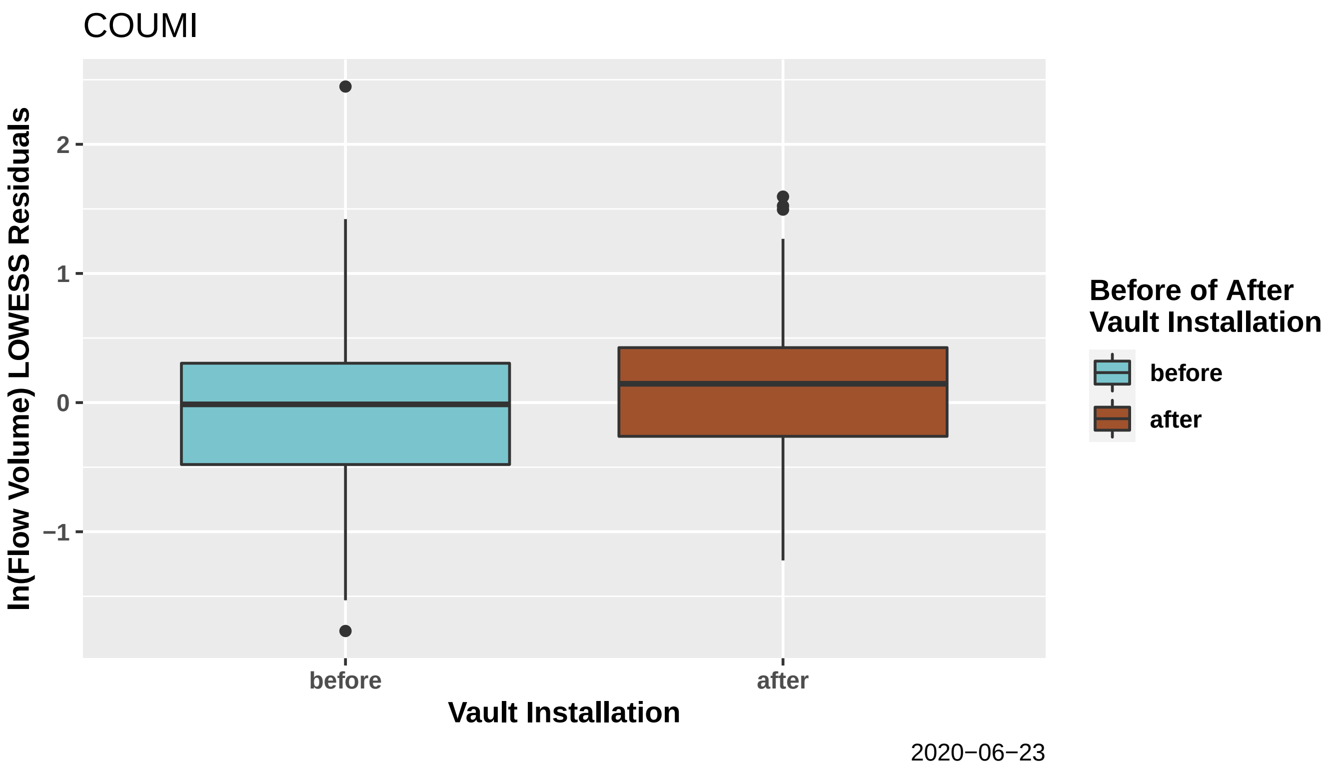

SEIMN
2
0
−2
ln(Peak Flow) LOWESS Residuals
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

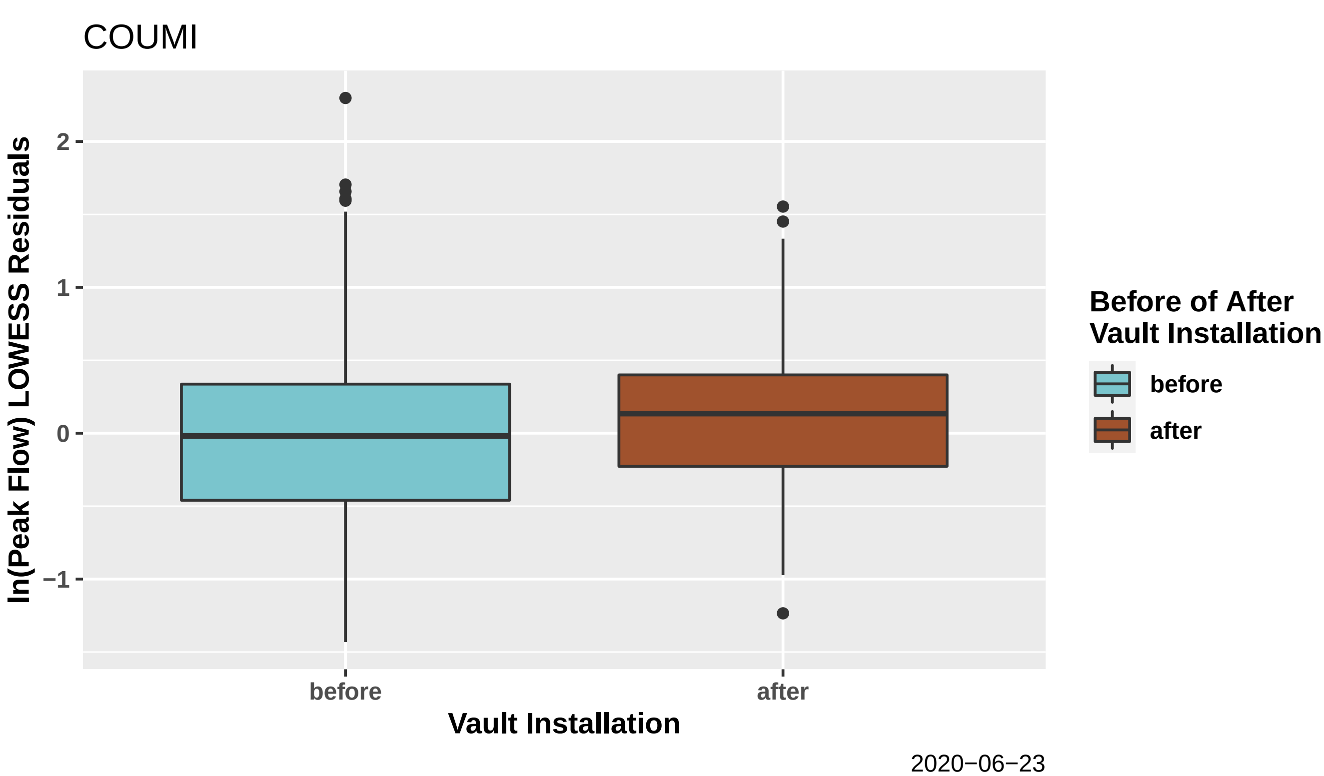

SEIMS
ln(Flow Volume) LOWESS Residuals
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

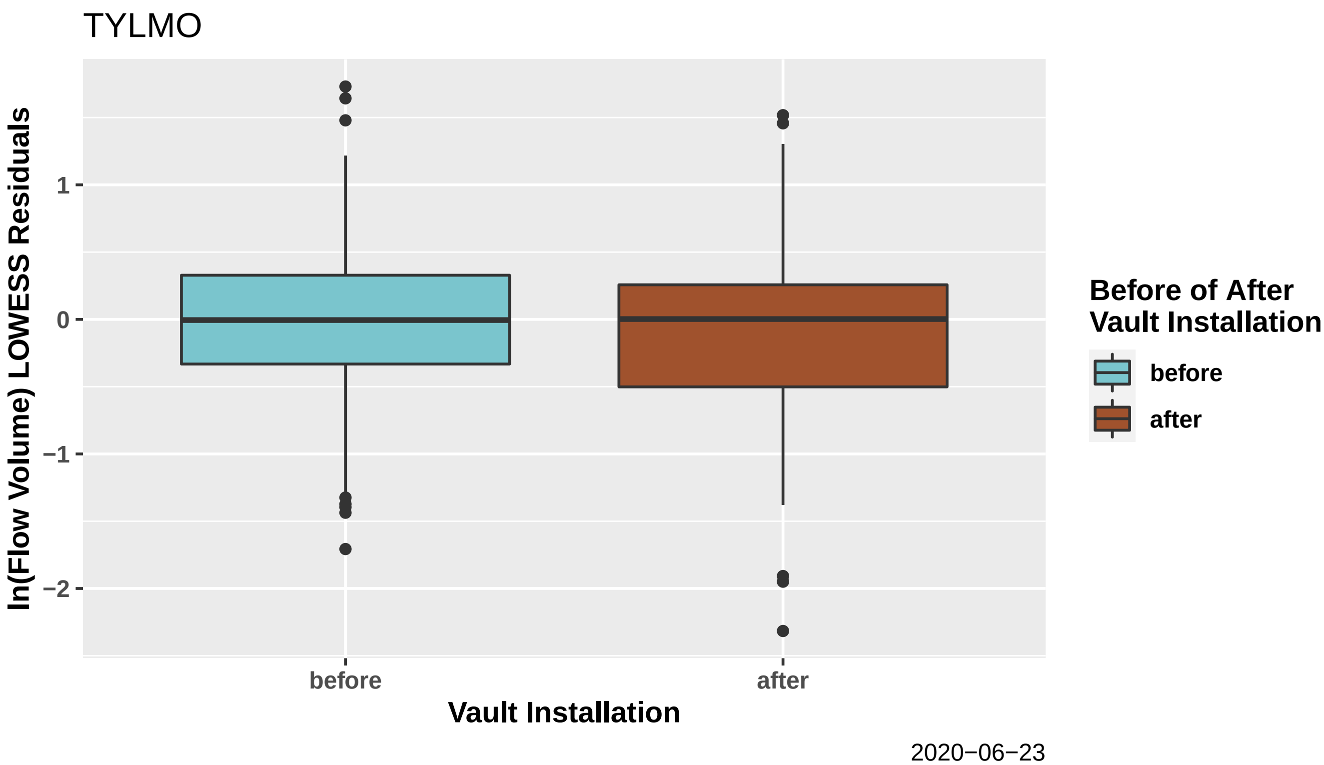

SEIMS
ln(Peak Flow) LOWESS Residuals
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

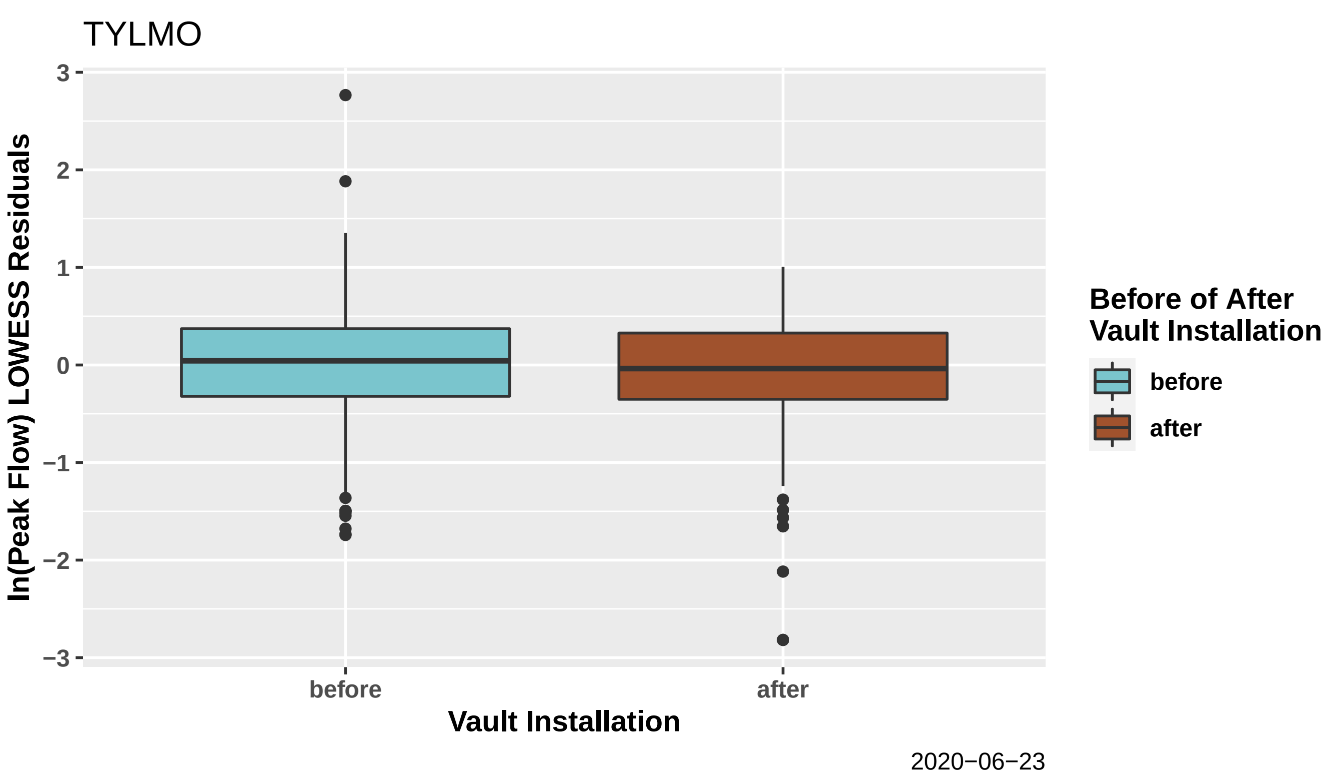

COUMO
ln(Flow Volume) LOWESS Residuals
2
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

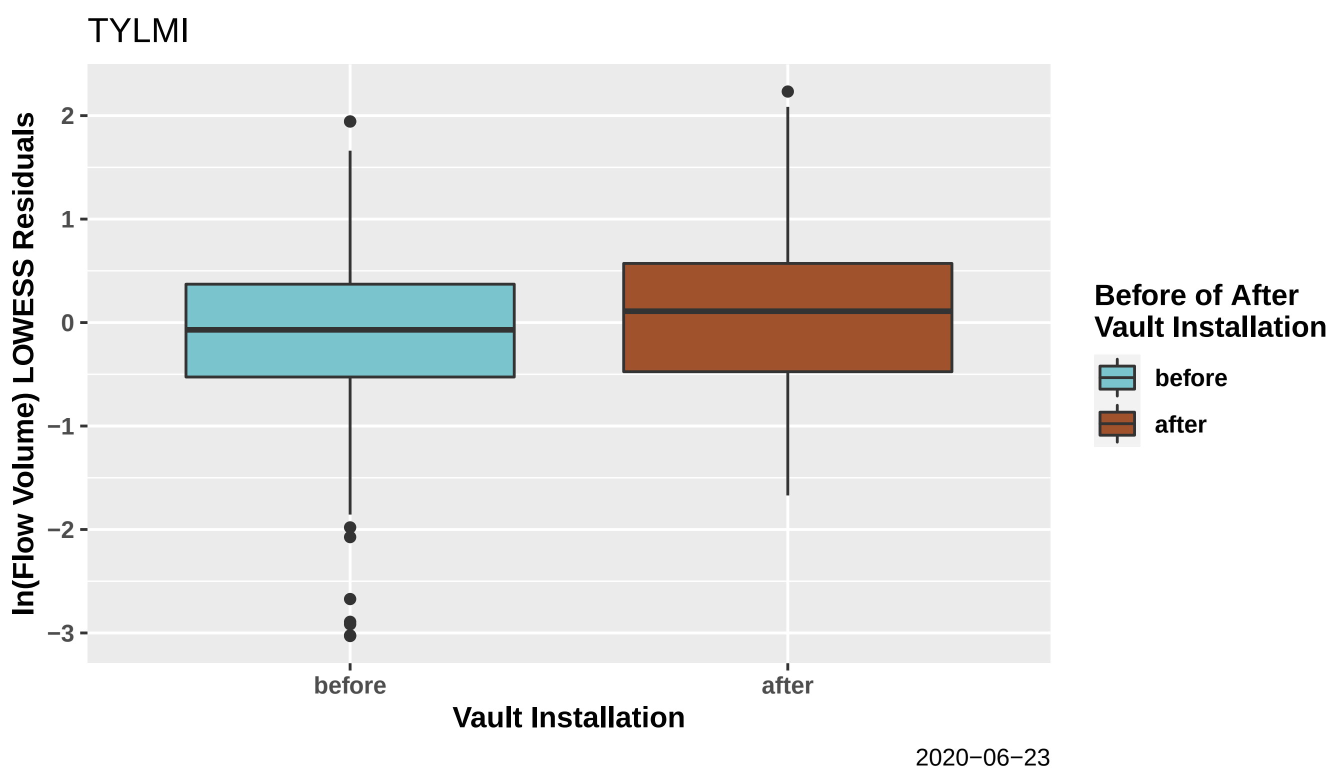

COUMO
ln(Peak Flow) LOWESS Residuals
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23


COUMI
ln(Flow Volume) LOWESS Residuals
2
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

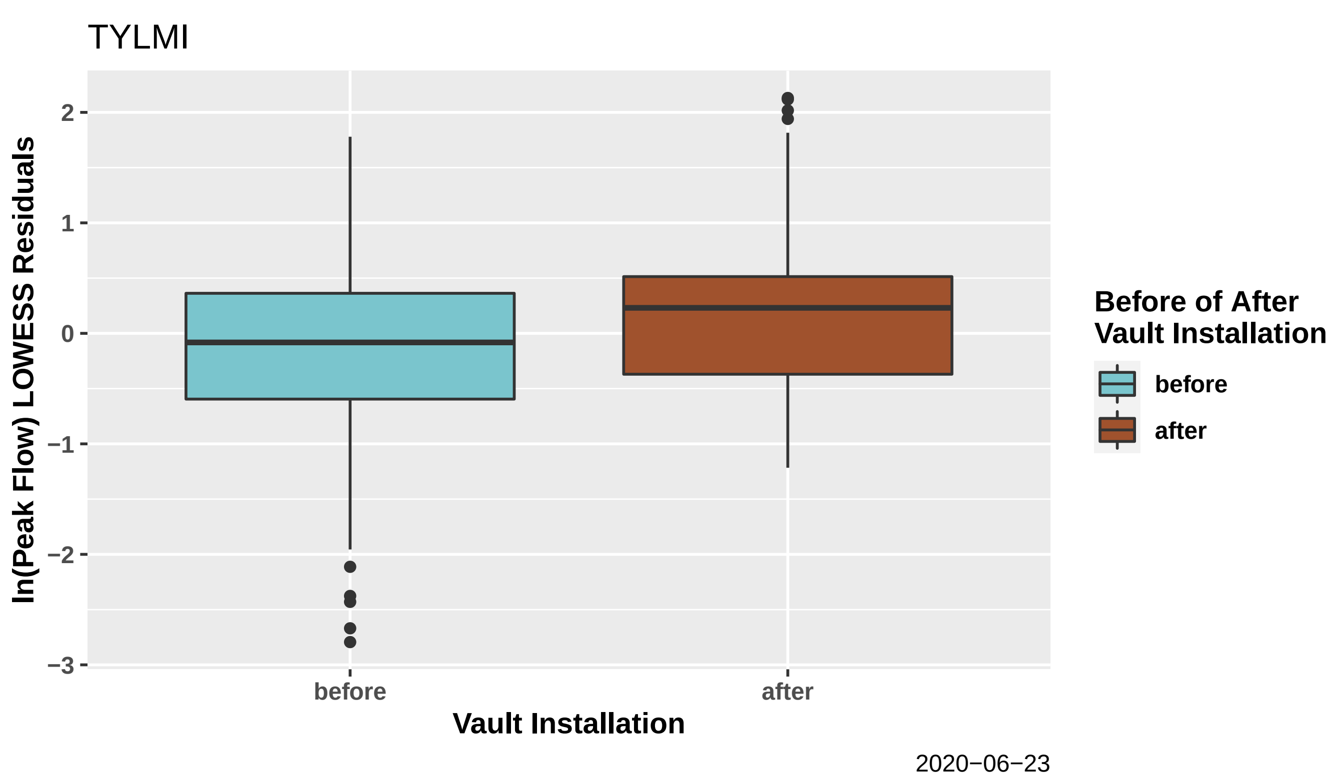

COUMI
ln(Peak Flow) LOWESS Residuals
2
1
0
−1
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23


TYLMO
ln(Flow Volume) LOWESS Residuals
1
0
−1
−2
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23


TYLMO
ln(Peak Flow) LOWESS Residuals
3
2
1
0
−1
−2
−3
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23



TYLMI
ln(Flow Volume) LOWESS Residuals
2
1
0
−1
−2
−3
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23



TYLMI
ln(Peak Flow) LOWESS Residuals
2
1
0
−1
−2
−3
before
after
Vault Installation
Before of After
Vault Installation
before
after
2020−06−23

APPENDIX D

Results from Water Quality Data Screening Process

Appendix D. Summary of Storm Event and Base Flow Sample Screening Process				
Sample Collection Date and Time	Station	Original Event Classification	Classification based on Visual Hydrograph Inspection (Step 2)	Final Event Classification (Step 5)
9/6/2016 0:40	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 10:10	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
1/5/2017 14:10	EVALSS	Base Flow	Potential Storm Event	Base Flow
1/8/2017 14:05	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 8:55	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 17:50	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
6/15/2017 13:40	EVALSS	Storm Event	Potential Base Flow	Storm Event
11/12/2017 19:15	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
11/19/2017 18:55	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
1/17/2018 16:40	EVALSS	Storm Event	Potential Base Flow	Storm Event
1/23/2018 11:20	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
1/29/2018 11:35	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
2/28/2018 18:10	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
3/8/2018 11:45	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
6/8/2018 15:05	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
12/17/2018 17:50	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
7/10/2019 9:00	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
9/17/2019 9:00	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 8:55	EVALSS	Storm Event	Potential Base Flow	**Base Flow**
9/6/2016 0:25	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 9:50	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
1/5/2017 13:50	EVAMS	Base Flow	Potential Storm Event	Base Flow
1/8/2017 13:35	EVAMS	Storm Event	Potential Base Flow	Storm Event
1/17/2017 8:25	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
5/4/2017 18:10	EVAMS	Storm Event	Potential Base Flow	Storm Event
5/15/2017 17:30	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
6/15/2017 13:30	EVAMS	Storm Event	Potential Base Flow	Storm Event
11/12/2017 18:50	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
11/19/2017 18:35	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
1/17/2018 16:25	EVAMS	Storm Event	Potential Base Flow	Storm Event
1/23/2018 11:00	EVAMS	Storm Event	Potential Base Flow	Storm Event
1/29/2018 11:15	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
2/28/2018 17:50	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
3/8/2018 11:30	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
6/8/2018 14:45	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
12/17/2018 17:35	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
2/1/2019 8:10	EVAMS	Storm Event	Potential Base Flow	Storm Event
7/10/2019 8:45	EVAMS	Storm Event	Potential Base Flow	**Base Flow**
9/17/2019 8:45	EVAMS	Storm Event	Potential Base Flow	Storm Event
9/22/2019 8:45	EVAMS	Storm Event	Potential Base Flow	**Base Flow**

Appendix D. Summary of Storm Event and Base Flow Sample Screening Process				
Sample Collection Date and Time	Station	Original Event Classification	Classification based on Visual Hydrograph Inspection (Step 2)	Final Event Classification (Step 5)
5/21/2016 6:00	MONM	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 11:05	MONM	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 14:45	MONM	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 18:50	MONM	Storm Event	Potential Base Flow	Storm Event
6/8/2018 17:40	MONM	Storm Event	Potential Base Flow	**Base Flow**
5/21/2016 6:20	MONMN	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 10:25	MONMN	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 13:55	MONMN	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 18:15	MONMN	Storm Event	Potential Base Flow	**Base Flow**
6/15/2017 14:10	MONMN	Storm Event	Potential Base Flow	Storm Event
6/8/2018 17:30	MONMN	Storm Event	Potential Base Flow	**Base Flow**
10/25/2018 21:15	MONMN	Storm Event	Potential Base Flow	**Base Flow**
9/17/2019 10:45	MONMN	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 9:00	MONMN	Storm Event	Potential Base Flow	**Base Flow**
5/21/2016 6:35	MONMS	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 10:45	MONMS	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 14:15	MONMS	Storm Event	Potential Base Flow	Storm Event
5/15/2017 18:30	MONMS	Storm Event	Potential Base Flow	Storm Event
6/15/2017 14:35	MONMS	Storm Event	Potential Base Flow	Storm Event
6/8/2018 17:50	MONMS	Storm Event	Potential Base Flow	**Base Flow**
7/10/2019 14:50	MONMS	Storm Event	Potential Base Flow	Storm Event
9/22/2019 9:05	MONMS	Storm Event	Potential Base Flow	Storm Event
9/6/2016 0:30	TOSMO	Storm Event	Potential Base Flow	**Base Flow**
11/5/2016 8:20	TOSMO	Storm Event	Potential Base Flow	Storm Event
12/9/2016 9:15	TOSMO	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 13:00	TOSMO	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 12:35	TOSMO	Storm Event	Potential Base Flow	**Base Flow**
5/4/2017 18:20	TOSMO	Storm Event	Potential Base Flow	Storm Event
6/15/2017 13:05	TOSMO	Storm Event	Potential Base Flow	Storm Event
12/17/2018 18:00	TOSMO	Storm Event	Potential Base Flow	**Base Flow**
9/17/2019 9:05	TOSMO	Storm Event	Potential Base Flow	Storm Event
9/22/2019 8:25	TOSMO	Storm Event	Potential Base Flow	Storm Event
9/6/2016 0:40	TOSMI	Storm Event	Potential Base Flow	**Base Flow**
11/5/2016 7:55	TOSMI	Storm Event	Potential Base Flow	Storm Event
12/9/2016 8:30	TOSMI	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 12:30	TOSMI	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 12:55	TOSMI	Storm Event	Potential Base Flow	Storm Event
5/4/2017 17:10	TOSMI	Storm Event	Potential Base Flow	Storm Event
6/15/2017 12:35	TOSMI	Storm Event	Potential Base Flow	Storm Event
10/18/2017 17:40	TOSMI	Storm Event	Potential Base Flow	Storm Event
12/17/2018 16:50	TOSMI	Storm Event	Potential Base Flow	**Base Flow**
9/17/2019 8:20	TOSMI	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 8:10	TOSMI	Storm Event	Potential Base Flow	Storm Event

Appendix D. Summary of Storm Event and Base Flow Sample Screening Process				
Sample Collection Date and Time	Station	Original Event Classification	Classification based on Visual Hydrograph Inspection (Step 2)	Final Event Classification (Step 5)
12/9/2016 12:00	COLM	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 15:50	COLM	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 15:45	COLM	Storm Event	Potential Base Flow	Storm Event
5/15/2017 19:30	COLM	Storm Event	Potential Base Flow	Storm Event
11/19/2017 21:05	COLM	Storm Event	Potential Base Flow	**Base Flow**
1/23/2018 12:15	COLM	Storm Event	Potential Base Flow	Storm Event
1/29/2018 13:05	COLM	Storm Event	Potential Base Flow	Storm Event
6/8/2018 15:40	COLM	Storm Event	Potential Base Flow	**Base Flow**
10/25/2018 21:50	COLM	Storm Event	Potential Base Flow	**Base Flow**
3/11/2019 22:59	COLM	Storm Event	Potential Base Flow	Storm Event
7/10/2019 13:55	COLM	Storm Event	Potential Base Flow	Storm Event
9/17/2019 10:10	COLM	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 10:10	COLM	Storm Event	Potential Base Flow	**Base Flow**
9/6/2016 2:00	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 11:00	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 15:30	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 18:50	SEIMN	Storm Event	Potential Base Flow	Storm Event
6/15/2017 12:30	SEIMN	Storm Event	Potential Base Flow	Storm Event
1/29/2018 12:25	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
3/8/2018 12:45	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
6/8/2018 16:20	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
7/10/2019 13:20	SEIMN	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 9:25	SEIMN	Storm Event	Potential Base Flow	Storm Event
12/9/2016 11:30	SEIMS	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 15:00	SEIMS	Storm Event	Potential Base Flow	Storm Event
5/15/2017 19:35	SEIMS	Storm Event	Potential Base Flow	Storm Event
6/15/2017 15:15	SEIMS	Storm Event	Potential Base Flow	Storm Event
1/29/2018 13:20	SEIMS	Storm Event	Potential Base Flow	Storm Event
6/8/2018 17:20	SEIMS	Storm Event	Potential Base Flow	Storm Event
7/10/2019 14:45	SEIMS	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 10:10	SEIMS	Storm Event	Potential Base Flow	Storm Event
9/5/2016 23:40	COUMO	Storm Event	Potential Base Flow	**Base Flow**
11/5/2016 7:25	COUMO	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 8:15	COUMO	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 12:20	COUMO	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 7:25	COUMO	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 16:10	COUMO	Storm Event	Potential Base Flow	**Base Flow**
6/15/2017 12:25	COUMO	Storm Event	Potential Base Flow	Storm Event
6/8/2018 14:25	COUMO	Storm Event	Potential Base Flow	**Base Flow**
10/25/2018 19:25	COUMO	Storm Event	Potential Base Flow	**Base Flow**
12/17/2018 17:05	COUMO	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 8:00	COUMO	Storm Event	Potential Base Flow	Storm Event

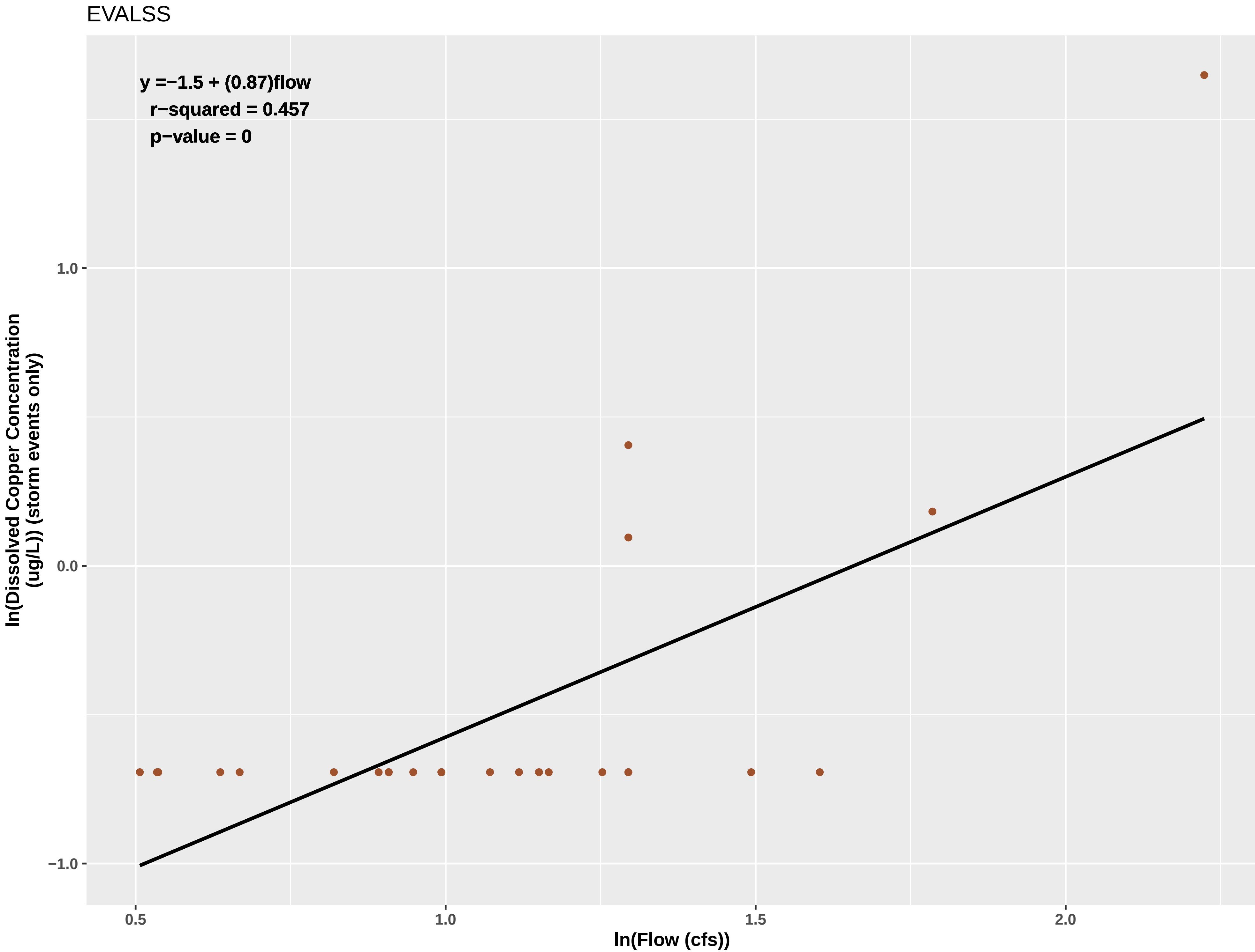
Appendix D. Summary of Storm Event and Base Flow Sample Screening Process

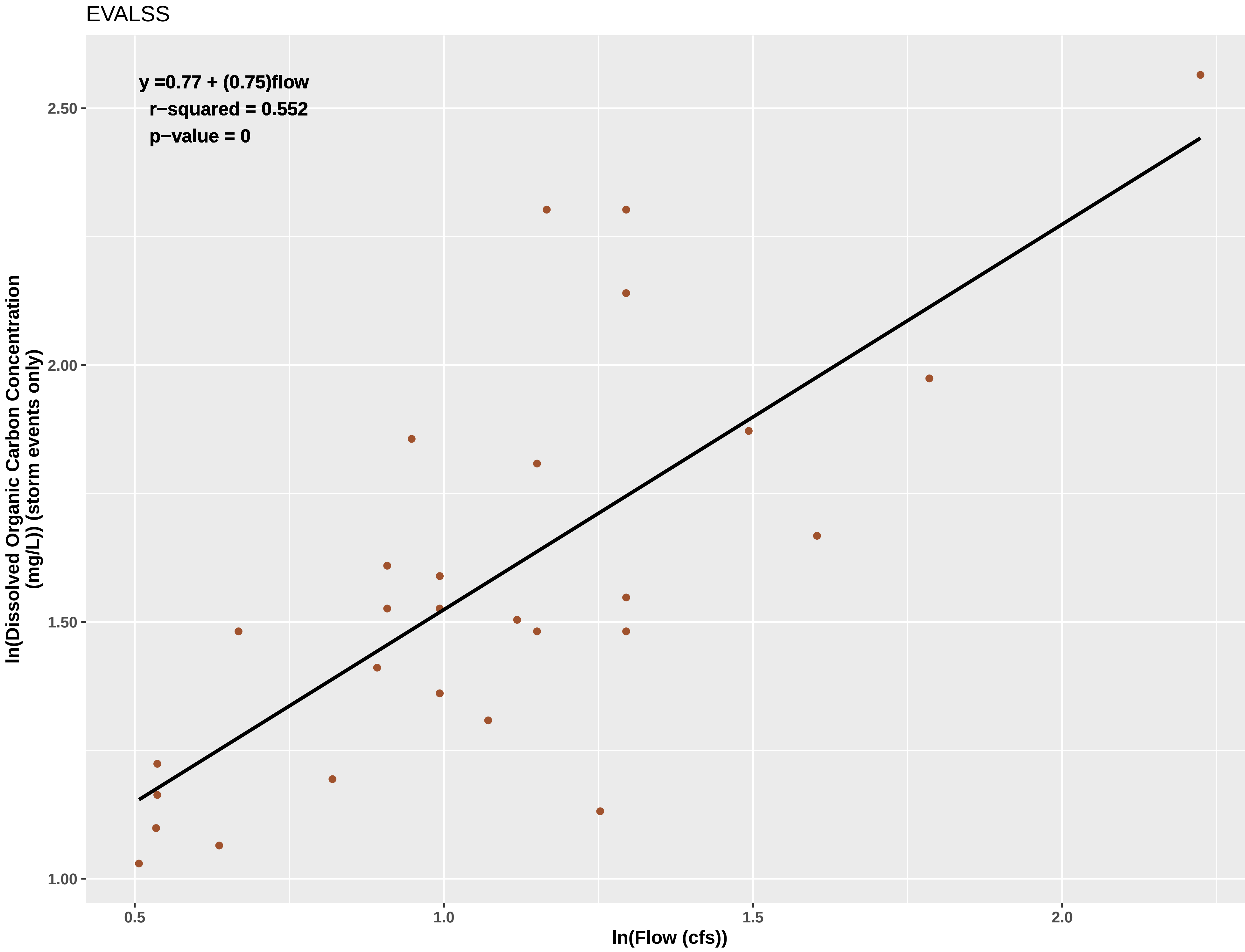
Sample Collection Date and Time	Station	Original Event Classification	Classification based on Visual Hydrograph Inspection (Step 2)	Final Event Classification (Step 5)
9/6/2016 0:00	COUMI	Storm Event	Potential Base Flow	**Base Flow**
11/5/2016 7:40	COUMI	Storm Event	Potential Base Flow	Storm Event
12/9/2016 8:40	COUMI	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 12:40	COUMI	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 7:45	COUMI	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 16:25	COUMI	Storm Event	Potential Base Flow	**Base Flow**
6/15/2017 12:45	COUMI	Storm Event	Potential Base Flow	Storm Event
6/8/2018 14:55	COUMI	Storm Event	Potential Base Flow	**Base Flow**
10/25/2018 19:50	COUMI	Storm Event	Potential Base Flow	Storm Event
12/17/2018 17:30	COUMI	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 8:15	COUMI	Storm Event	Potential Base Flow	Storm Event
9/6/2016 1:00	TYLMO	Storm Event	Potential Base Flow	**Base Flow**
12/9/2016 9:35	TYLMO	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 13:10	TYLMO	Storm Event	Potential Base Flow	Storm Event
5/15/2017 17:25	TYLMO	Storm Event	Potential Base Flow	Storm Event
9/6/2016 1:25	TYLMI	Storm Event	Potential Base Flow	Storm Event
12/9/2016 10:00	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
1/8/2017 13:30	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
1/17/2017 13:45	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
5/15/2017 17:50	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
6/15/2017 13:50	TYLMI	Storm Event	Potential Base Flow	Storm Event
1/23/2018 11:40	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
3/8/2018 12:25	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
6/8/2018 16:40	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
12/17/2018 19:00	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
2/1/2019 9:15	TYLMI	Storm Event	Potential Base Flow	Storm Event
3/11/2019 22:40	TYLMI	Storm Event	Potential Base Flow	Storm Event
9/17/2019 9:40	TYLMI	Storm Event	Potential Base Flow	**Base Flow**
9/22/2019 9:30	TYLMI	Storm Event	Potential Base Flow	Storm Event

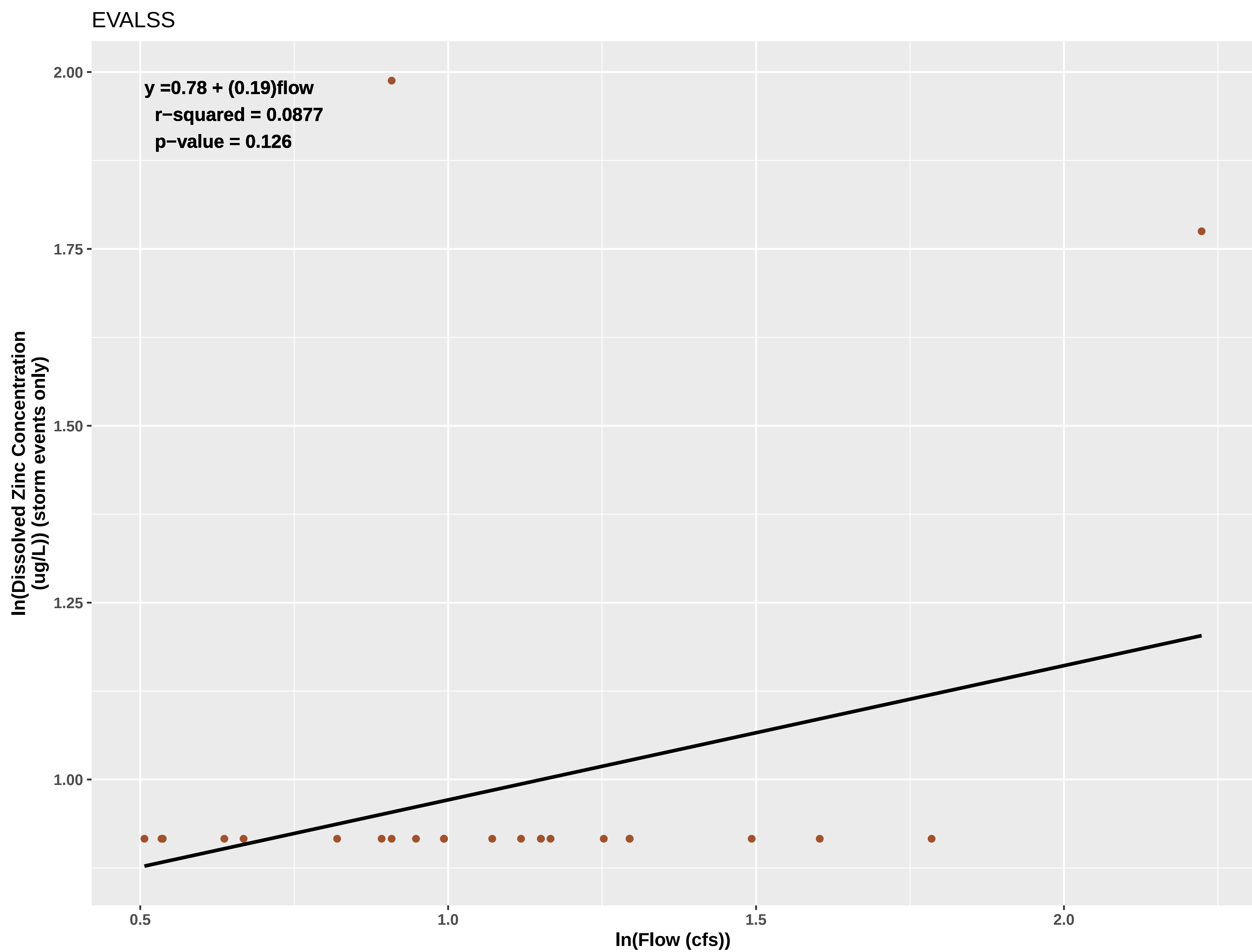
APPENDIX E

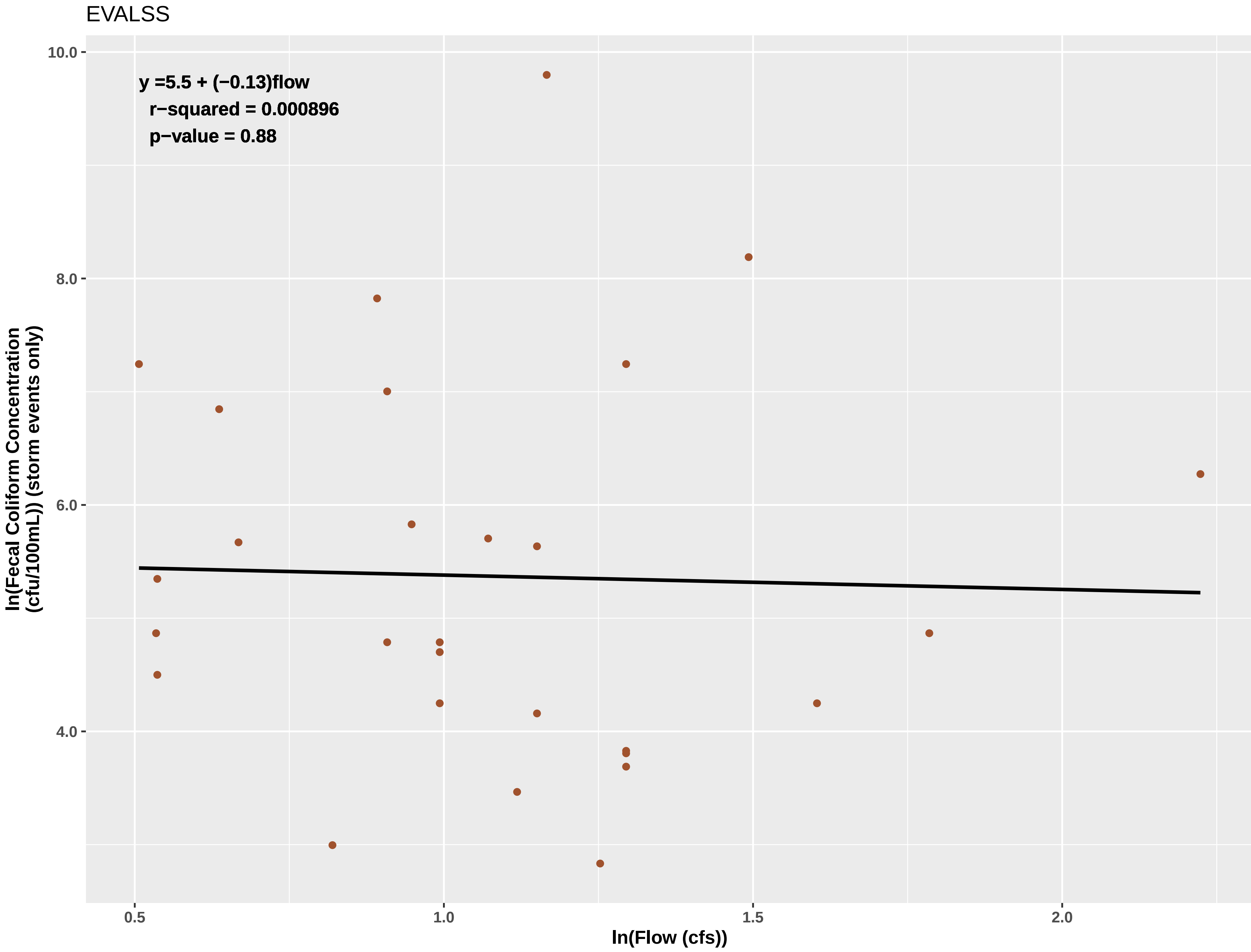
Relationships Between Storm Event Pollutant Concentrations and Stream Flow Rate at Sample Collection Time

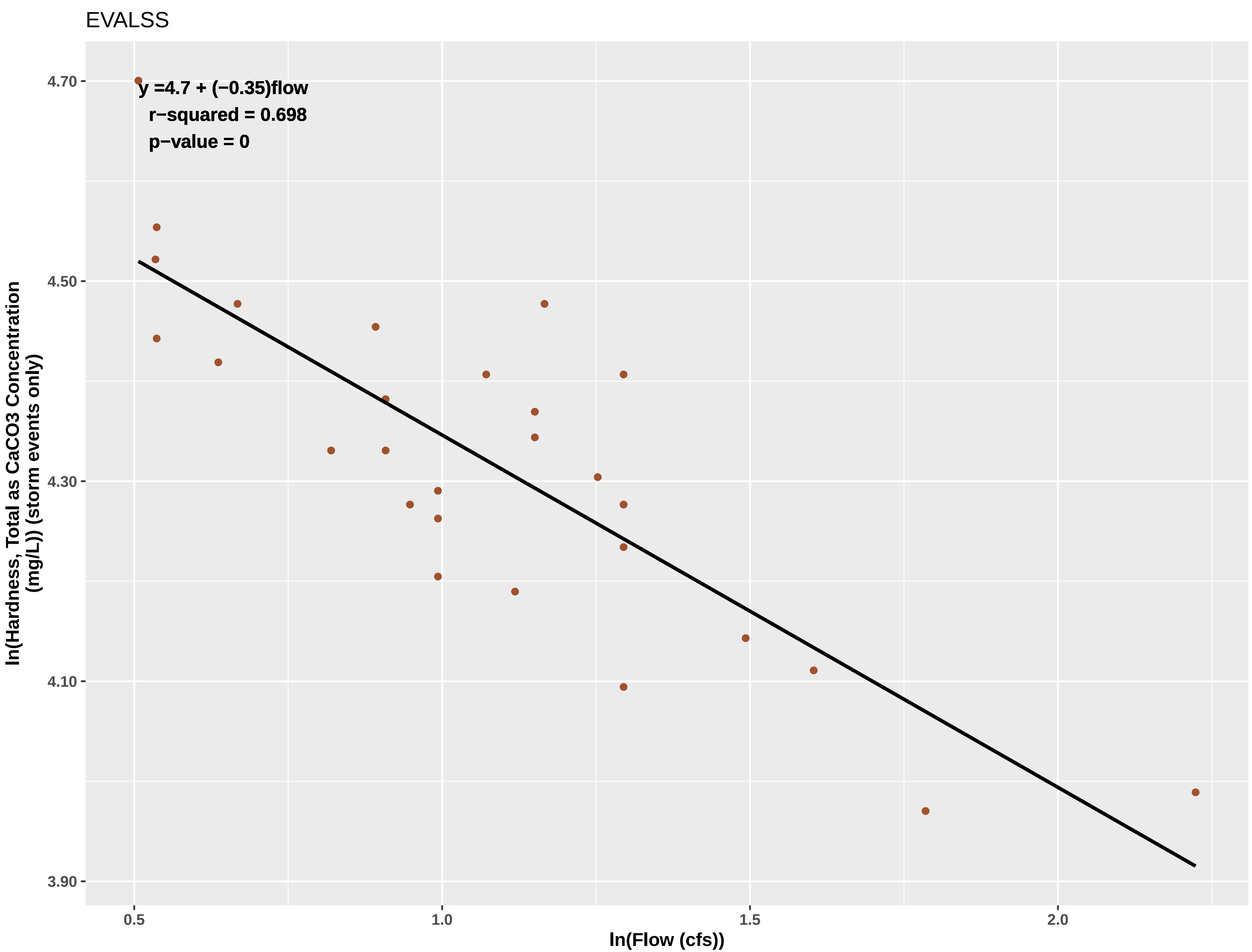
HERRERA


EVALSS
y =−1.5 + (0.87)flow
r−squared = 0.457
p−value = 0
1.0
0.0
−1.0
0.5
1.0
1.5
2.0
ln(Flow (cfs))
ln(Dissolved Copper Concentration (ug/L)) (storm events only)


EVALSS
y =0.77 + (0.75)flow
r−squared = 0.552
p−value = 0
ln(Dissolved Organic Carbon Concentration
(mg/L)) (storm events only)
2.50
2.00
1.50
1.00
0.5
1.0
1.5
2.0
ln(Flow (cfs))

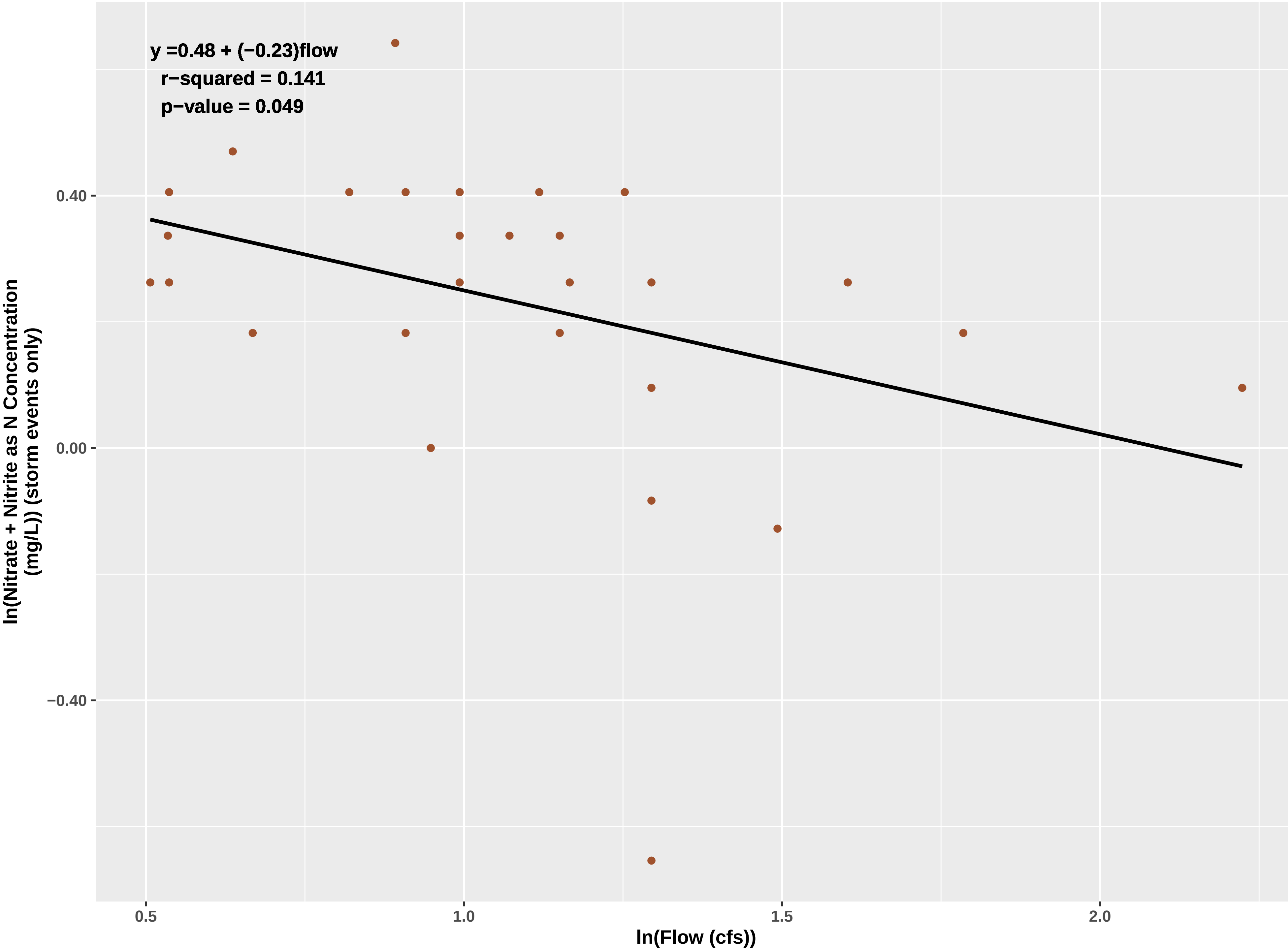

EVALSS
y =0.78 + (0.19)flow
r−squared = 0.0877
p−value = 0.126
2.00
1.75
1.50
1.25
1.00
0.5
1.0
1.5
2.0
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
ln(Flow (cfs))


EVALSS
y =5.5 + (−0.13)flow
r−squared = 0.000896
p−value = 0.88
10.0
8.0
6.0
4.0
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
0.5
1.0
1.5
2.0
ln(Flow (cfs))

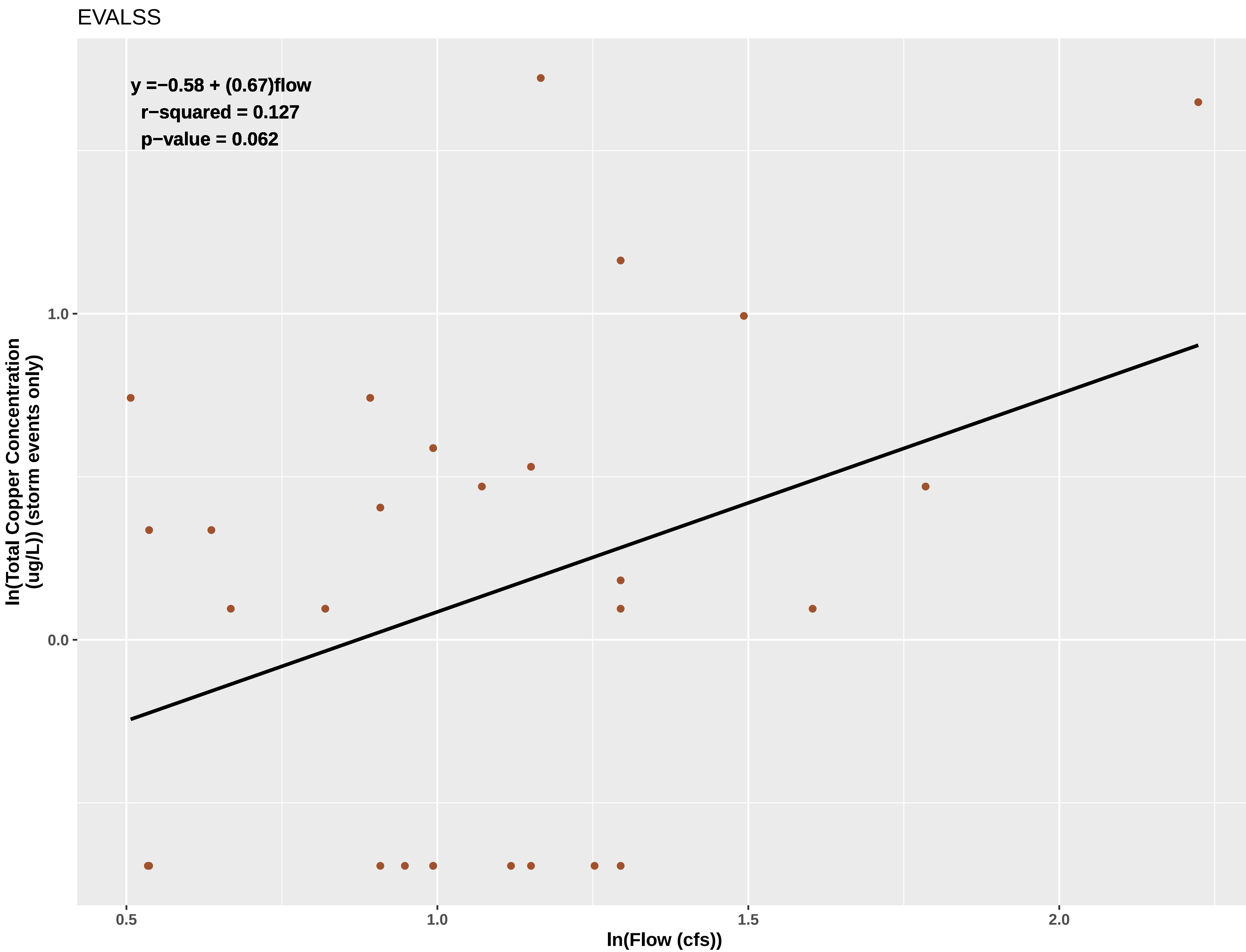


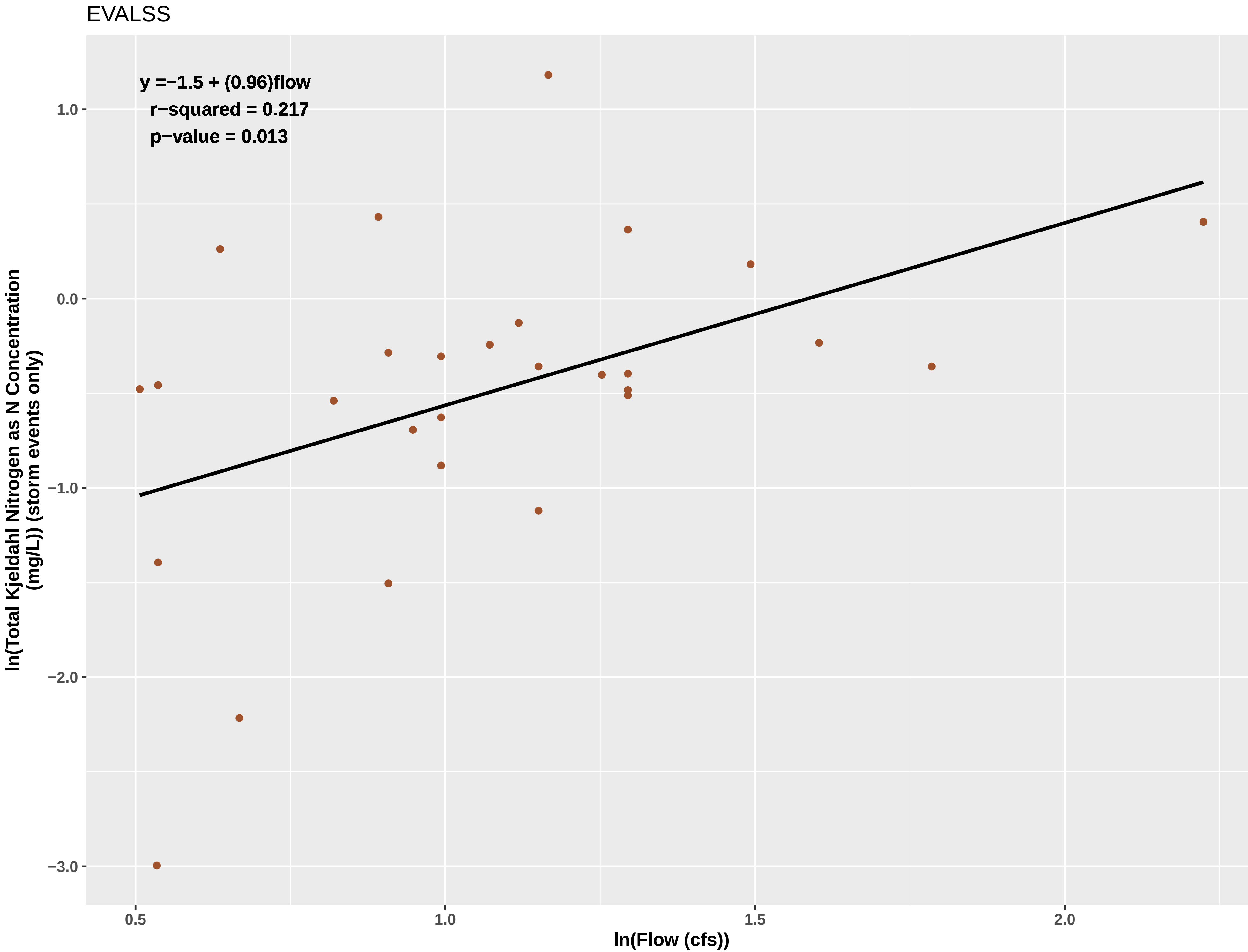
EVALSS
y =4.7 + (−0.35)flow
r−squared = 0.698
p−value = 0
4.70
4.50
4.30
4.10
3.90
0.5
1.0
1.5
2.0
ln(Flow (cfs))
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)

EVALSS

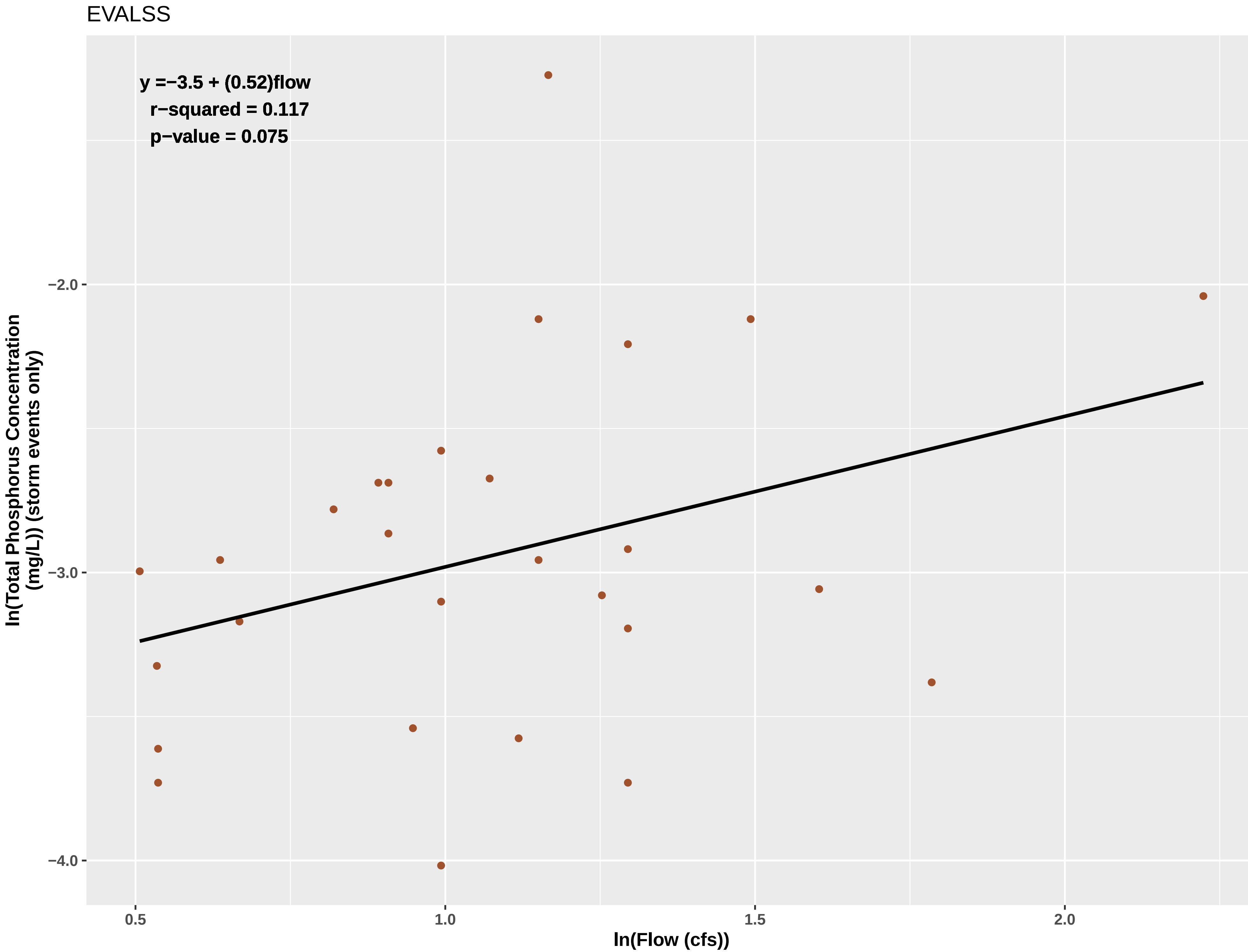


y =0.48 + (−0.23)flow
r−squared = 0.141
p−value = 0.049
0.40
0.00
−0.40
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
0.5
1.0
1.5
2.0
ln(Flow (cfs))

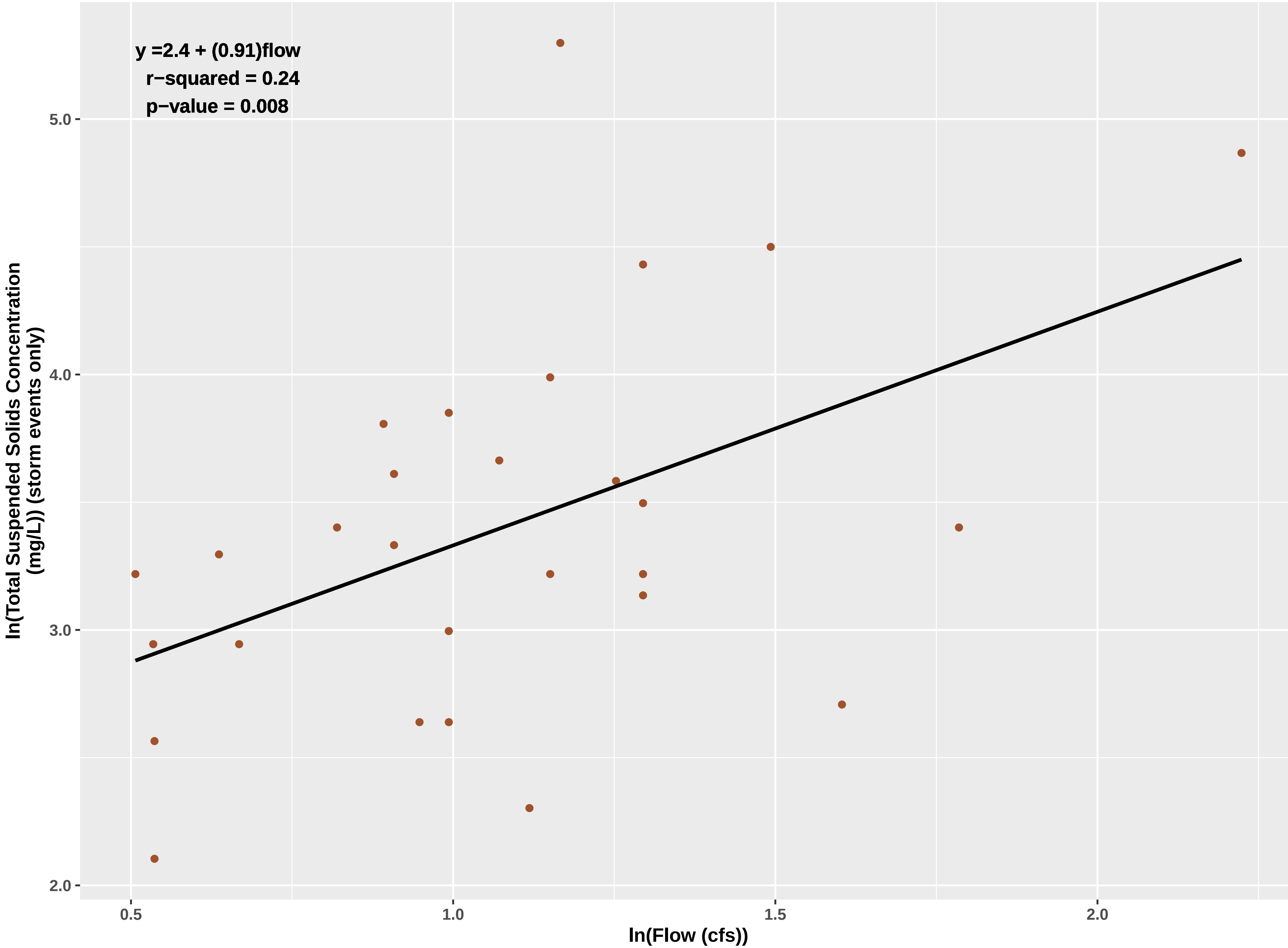

EVALSS
y =−0.58 + (0.67)flow
r−squared = 0.127
p−value = 0.062
1.0
0.0
0.5
1.0
1.5
2.0
ln(Flow (cfs))
ln(Total Copper Concentration
(ug/L)) (storm events only)



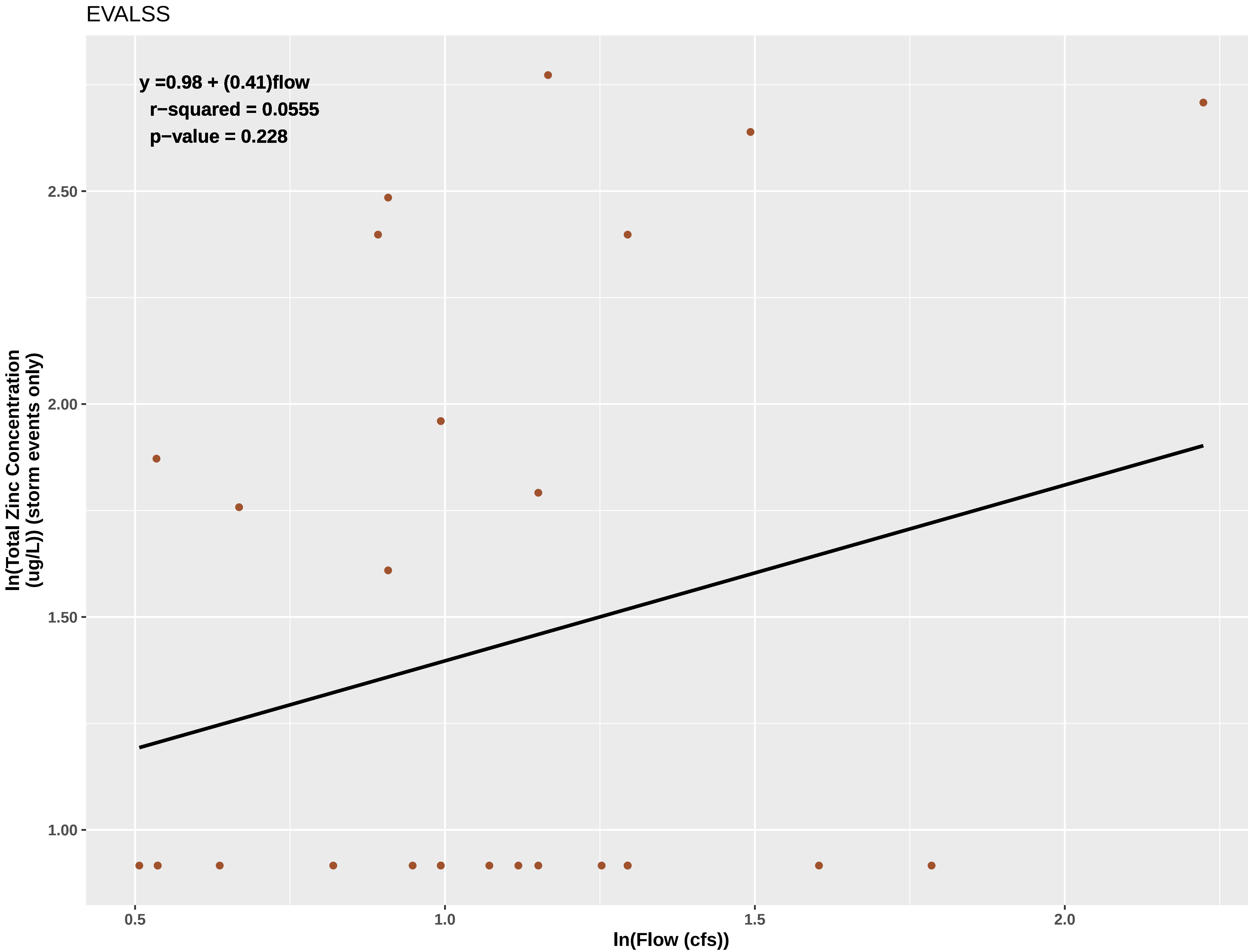
EVALSS
y =−1.5 + (0.96)flow
r−squared = 0.217
p−value = 0.013
1.0
0.0
−1.0
−2.0
−3.0
0.5
1.0
1.5
2.0
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)


EVALSS
y =−3.5 + (0.52)flow
r−squared = 0.117
p−value = 0.075
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
−2.0
−3.0
−4.0
0.5
1.0
1.5
2.0
ln(Flow (cfs))

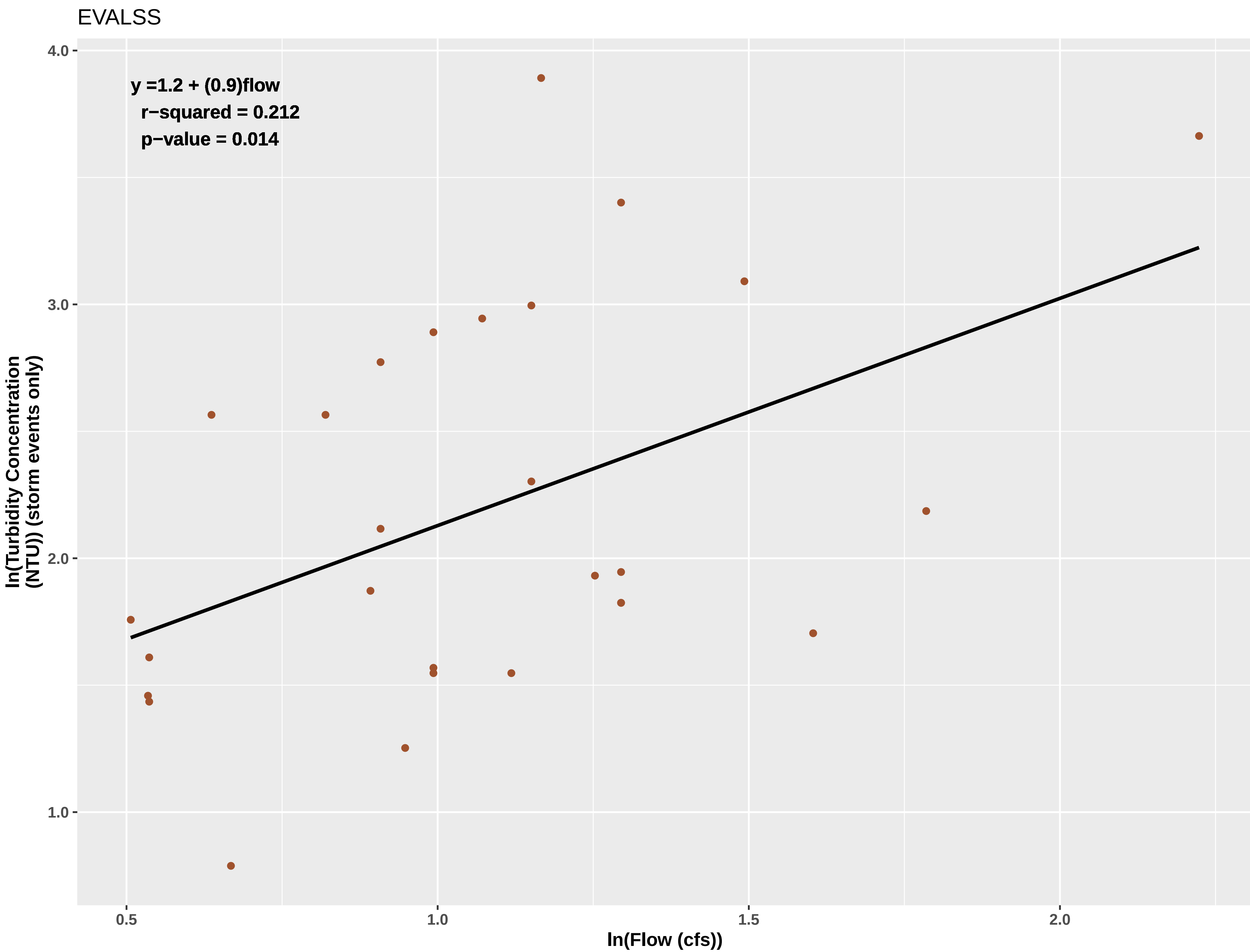
EVALSS

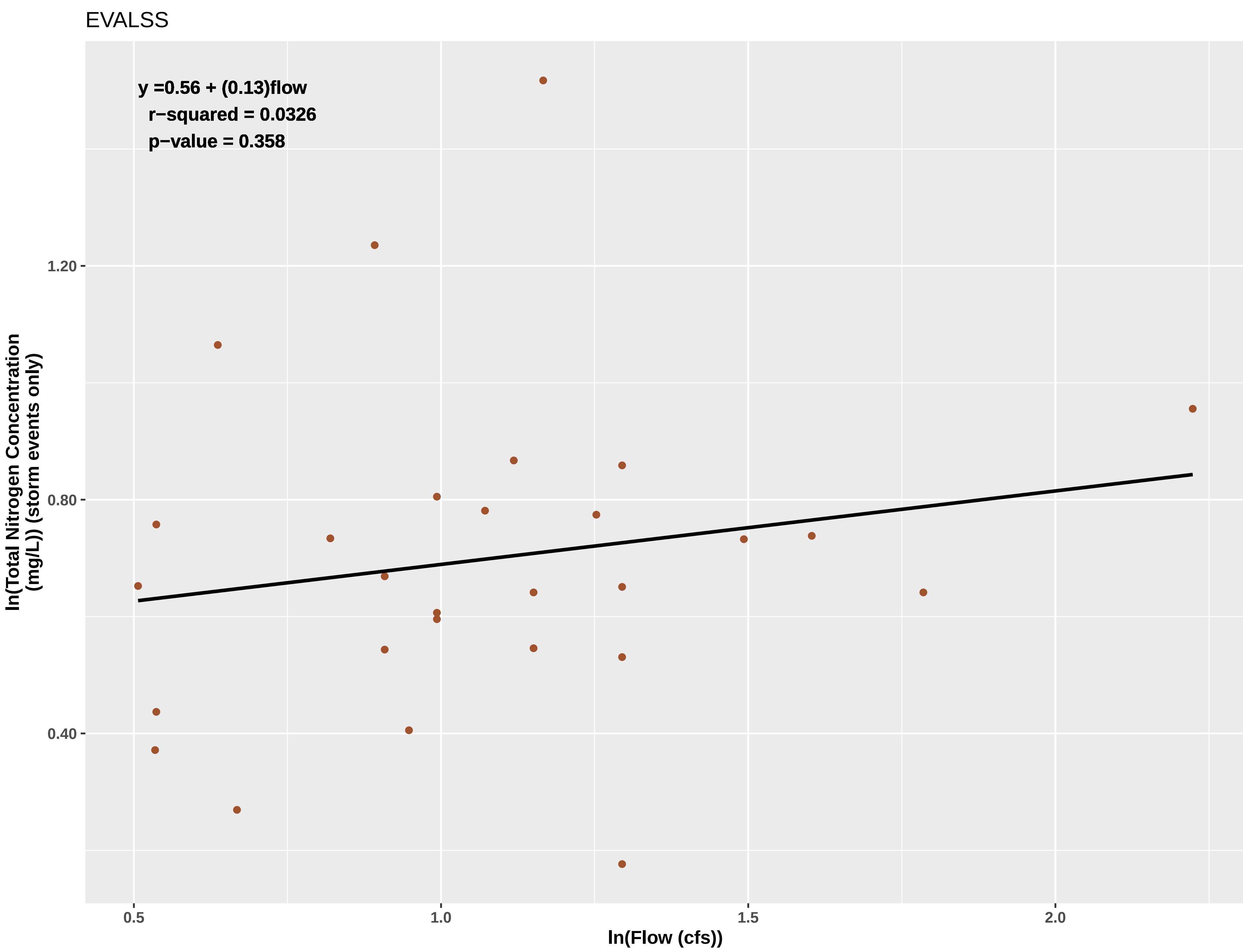


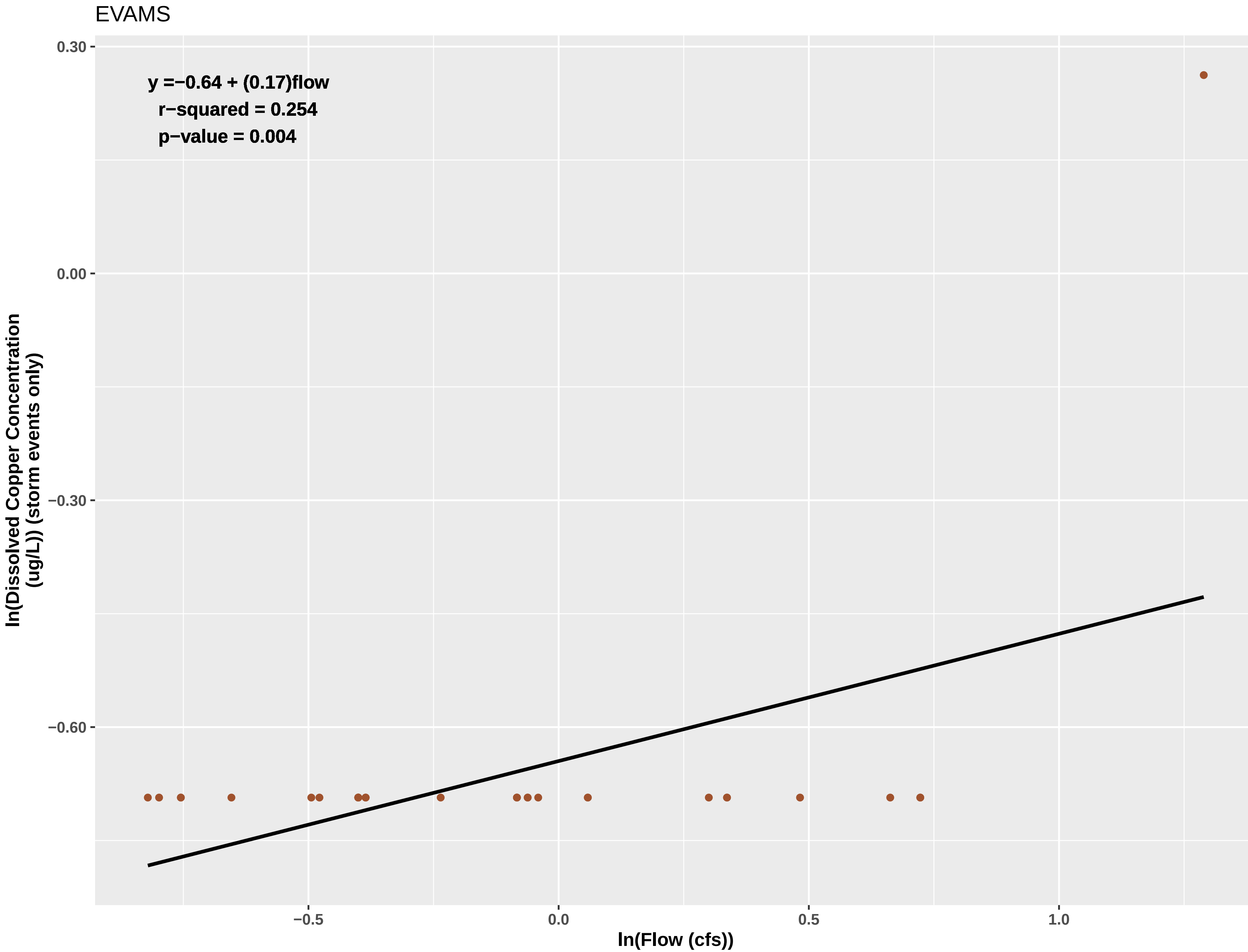
y =2.4 + (0.91)flow
r−squared = 0.24
p−value = 0.008
5.0
4.0
3.0
2.0
0.5
1.0
1.5
2.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

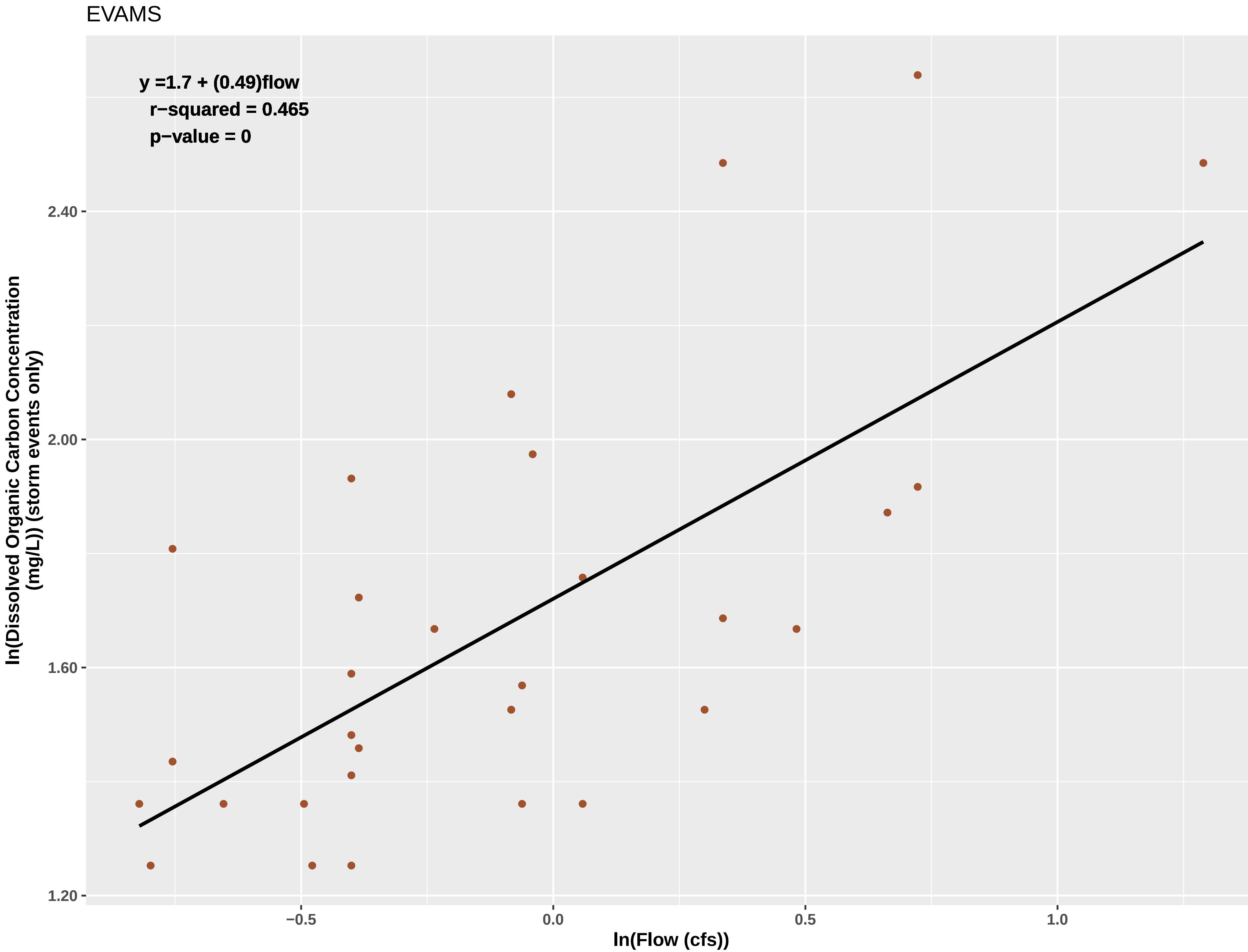


EVALSS
y =0.98 + (0.41)flow
r−squared = 0.0555
p−value = 0.228
2.50
2.00
1.50
1.00
ln(Total Zinc Concentration (ug/L)) (storm events only)
0.5
1.0
1.5
2.0
ln(Flow (cfs))

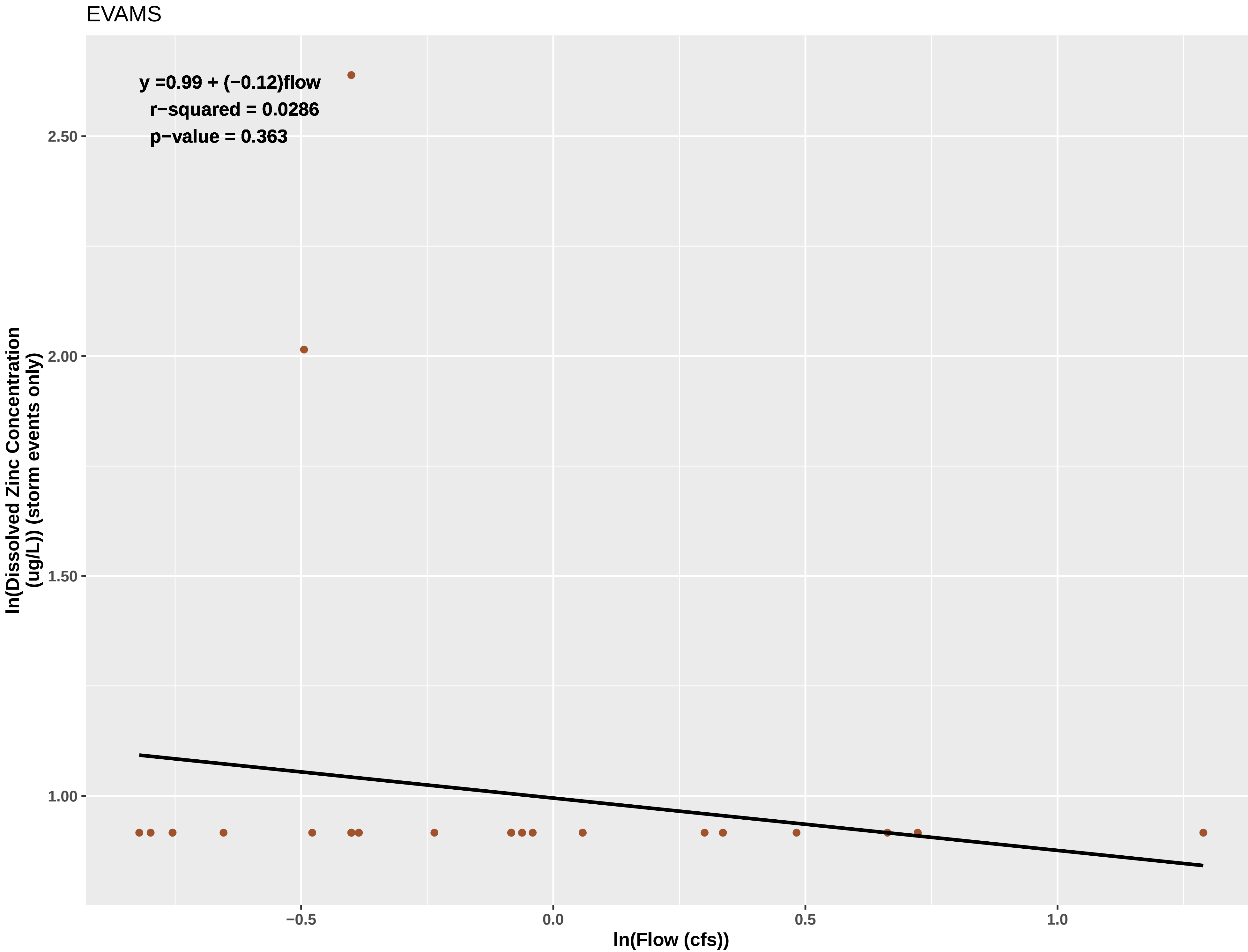

EVALSS
y =1.2 + (0.9)flow
r−squared = 0.212
p−value = 0.014
4.0
3.0
2.0
1.0
0.5
1.0
1.5
2.0
ln(Turbidity Concentration (NTU)) (storm events only)
ln(Flow (cfs))


EVALSS
y =0.56 + (0.13)flow
r−squared = 0.0326
p−value = 0.358
1.20
0.80
0.40
0.5
1.0
1.5
2.0
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

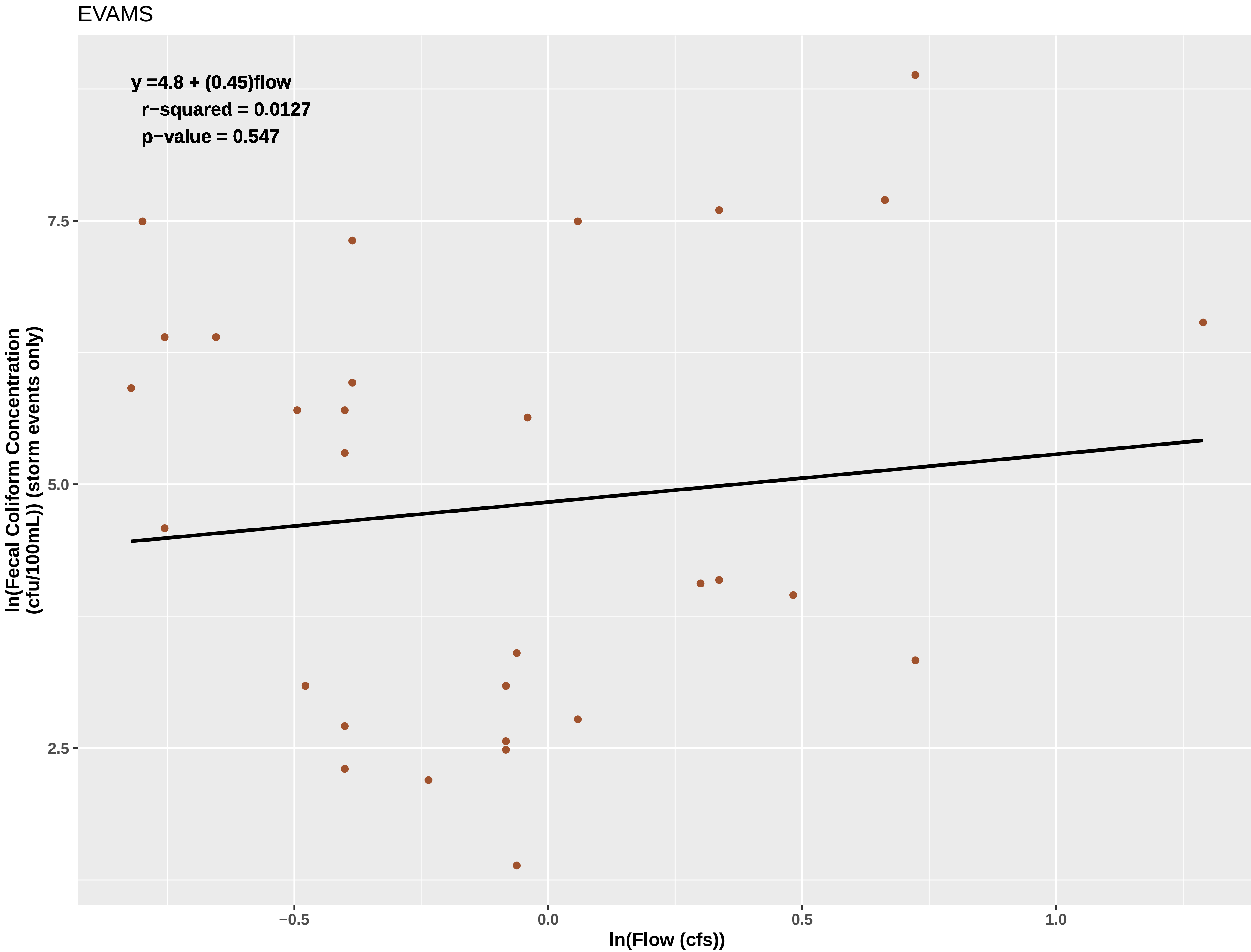

EVAMS
y =−0.64 + (0.17)flow
r−squared = 0.254
p−value = 0.004
0.30
0.00
−0.30
−0.60
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
−0.5
0.0
0.5
1.0
ln(Flow (cfs))



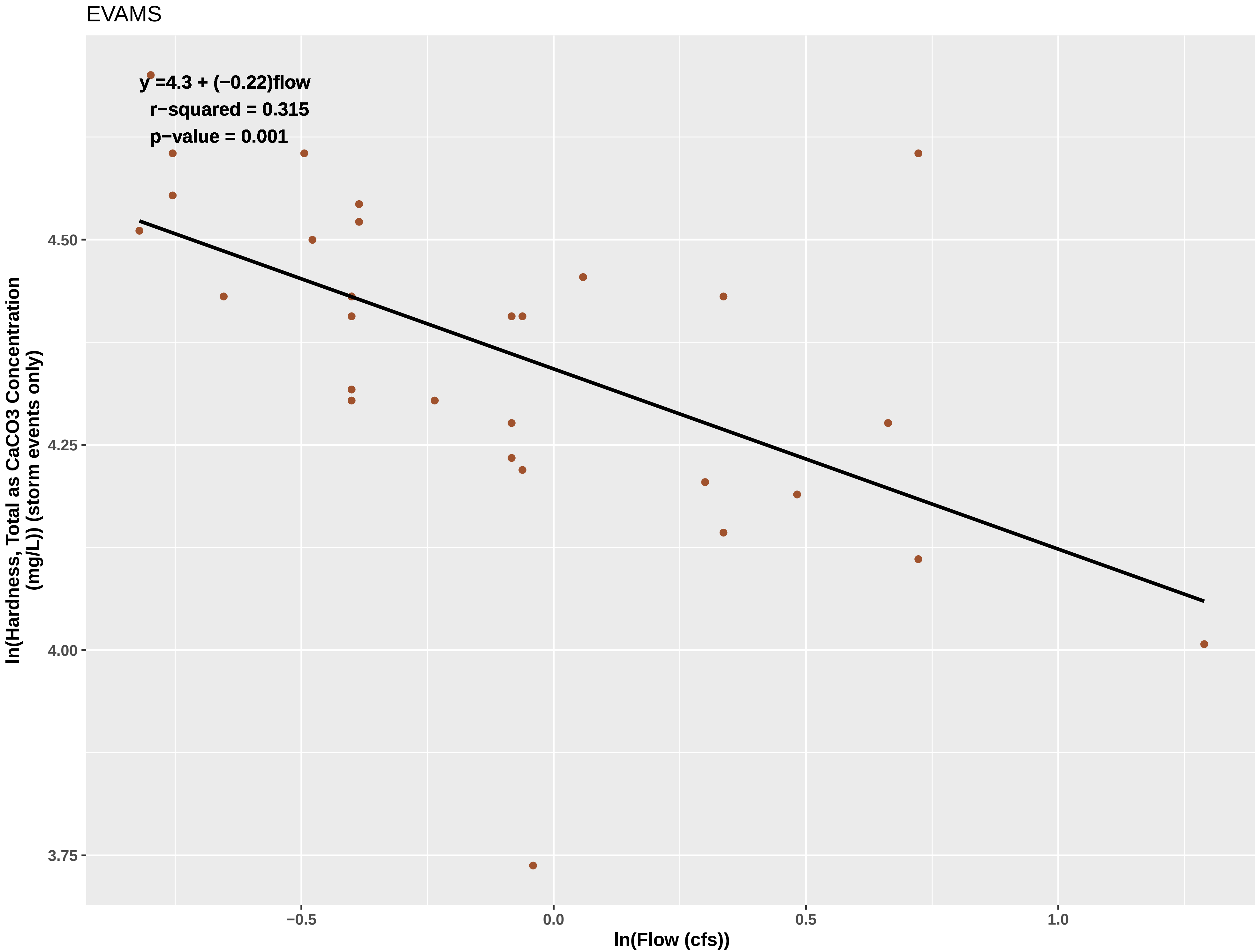
EVAMS
y =1.7 + (0.49)flow
r−squared = 0.465
p−value = 0
2.40
2.00
1.60
1.20
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)

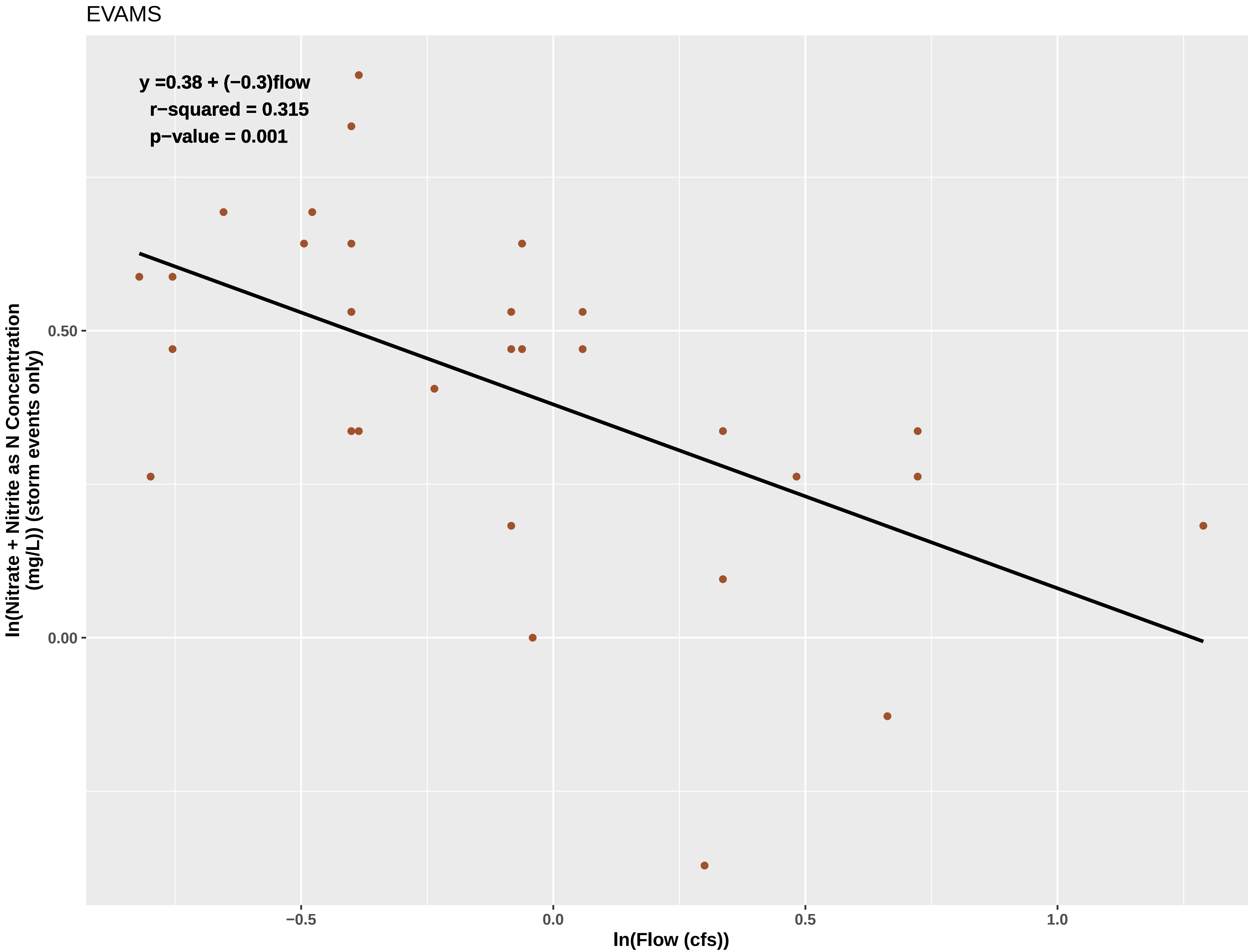


EVAMS
y =0.99 + (−0.12)flow
r−squared = 0.0286
p−value = 0.363
2.50
2.00
1.50
1.00
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

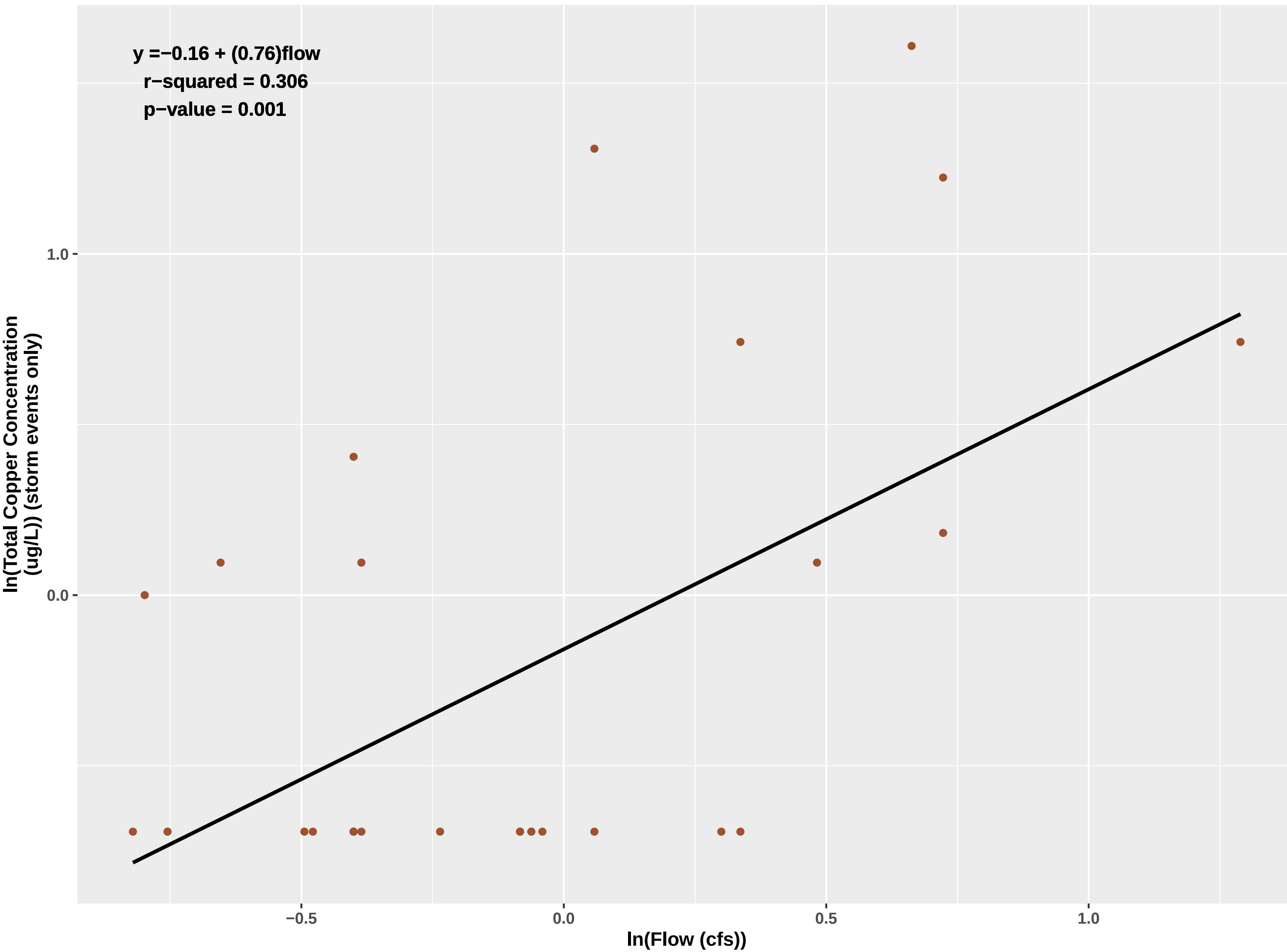


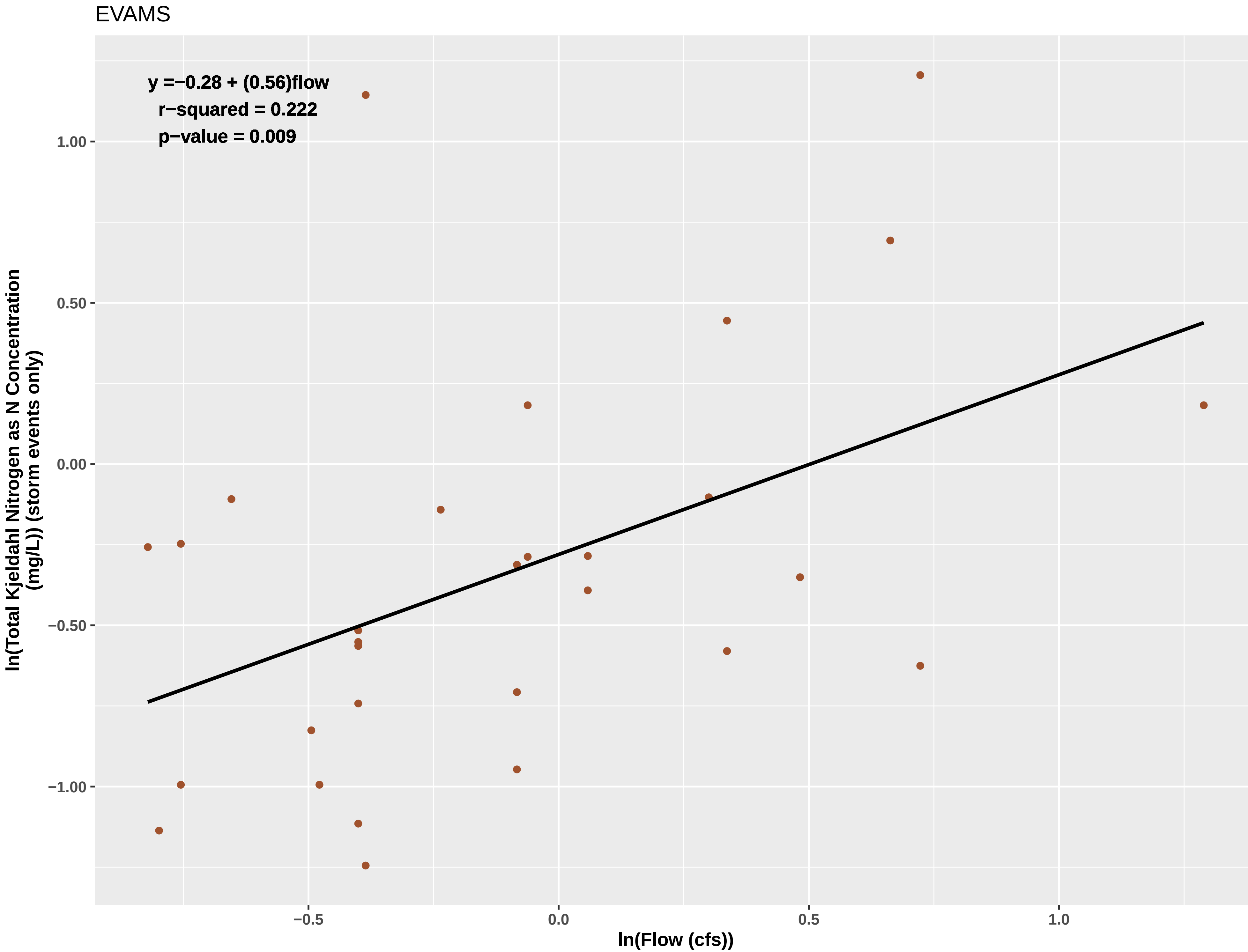
EVAMS
y =4.8 + (0.45)flow
r−squared = 0.0127
p−value = 0.547
7.5
5.0
2.5
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Fecal Coliform Concentration
(cfu/100mL)) (storm events only)


EVAMS
y =4.3 + (−0.22)flow
r−squared = 0.315
p−value = 0.001
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
4.50
4.25
4.00
3.75
−0.5
0.0
0.5
1.0
ln(Flow (cfs))


EVAMS
y =0.38 + (−0.3)flow
r−squared = 0.315
p−value = 0.001
0.50
0.00
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Nitrate + Nitrite as N Concentration
(mg/L)) (storm events only)

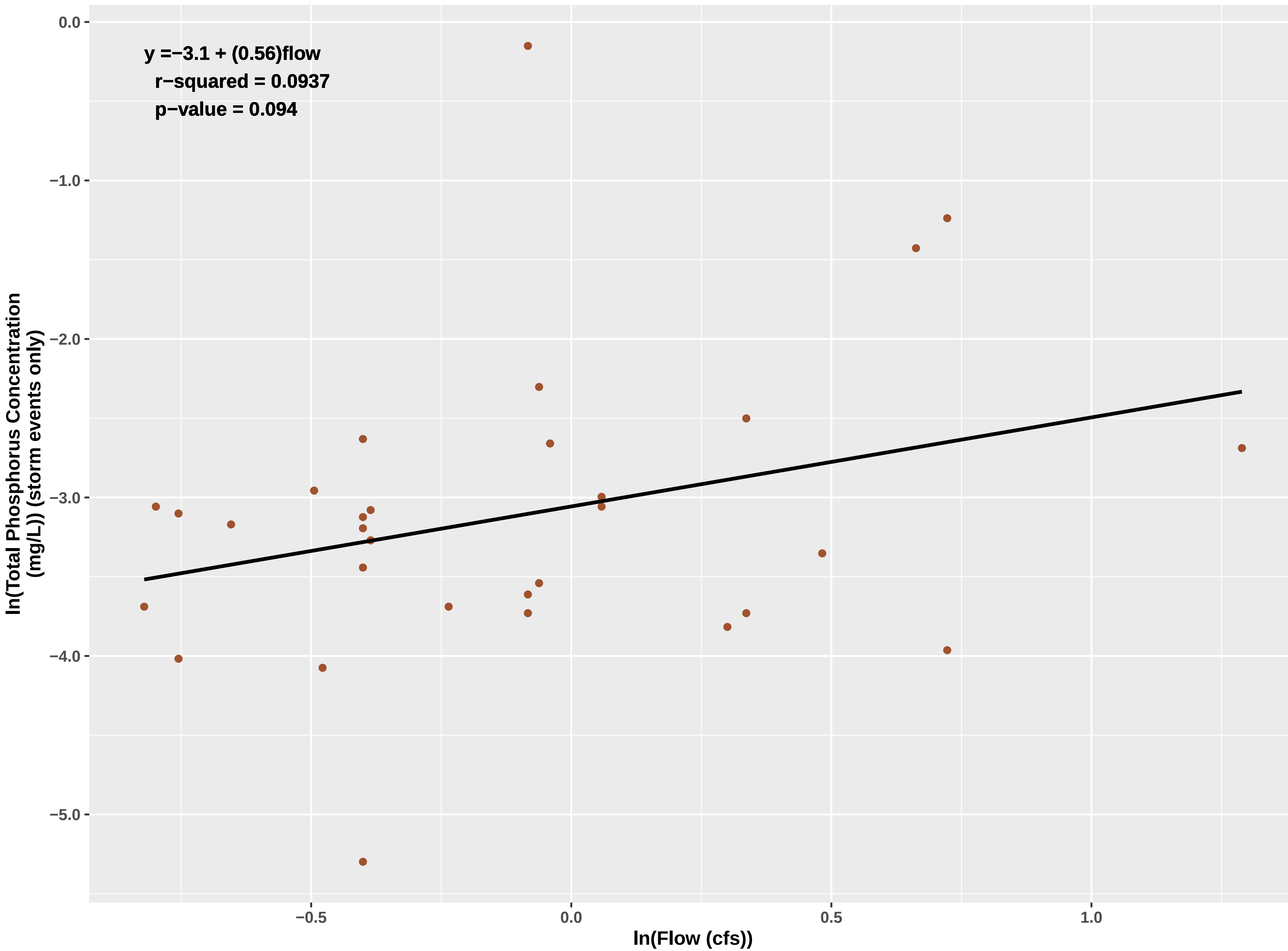
EVAMS


y =−0.16 + (0.76)flow
r−squared = 0.306
p−value = 0.001
1.0
0.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Total Copper Concentration (ug/L)) (storm events only)

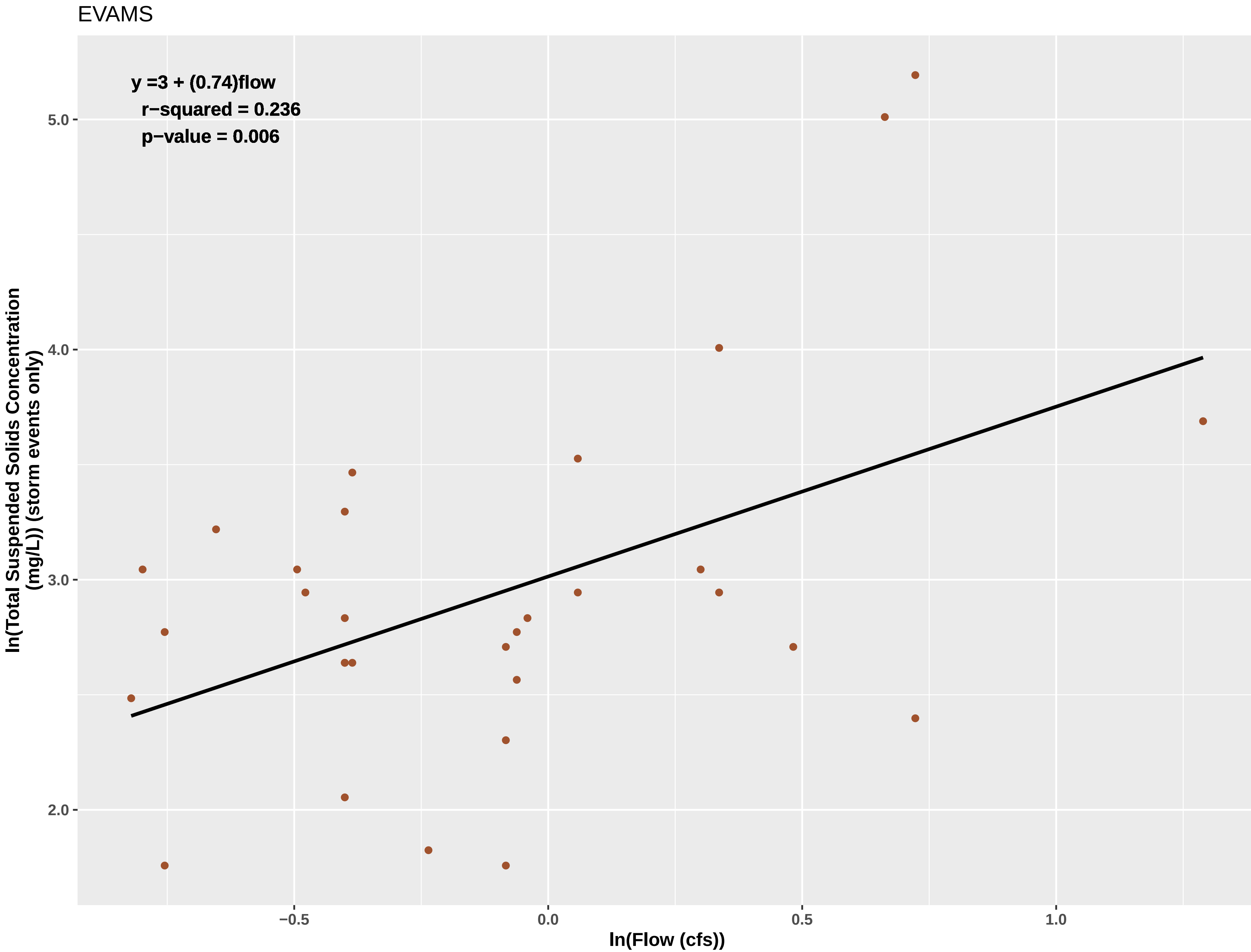


EVAMS
y =−0.28 + (0.56)flow
r−squared = 0.222
p−value = 0.009
1.00
0.50
0.00
−0.50
−1.00
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)

EVAMS

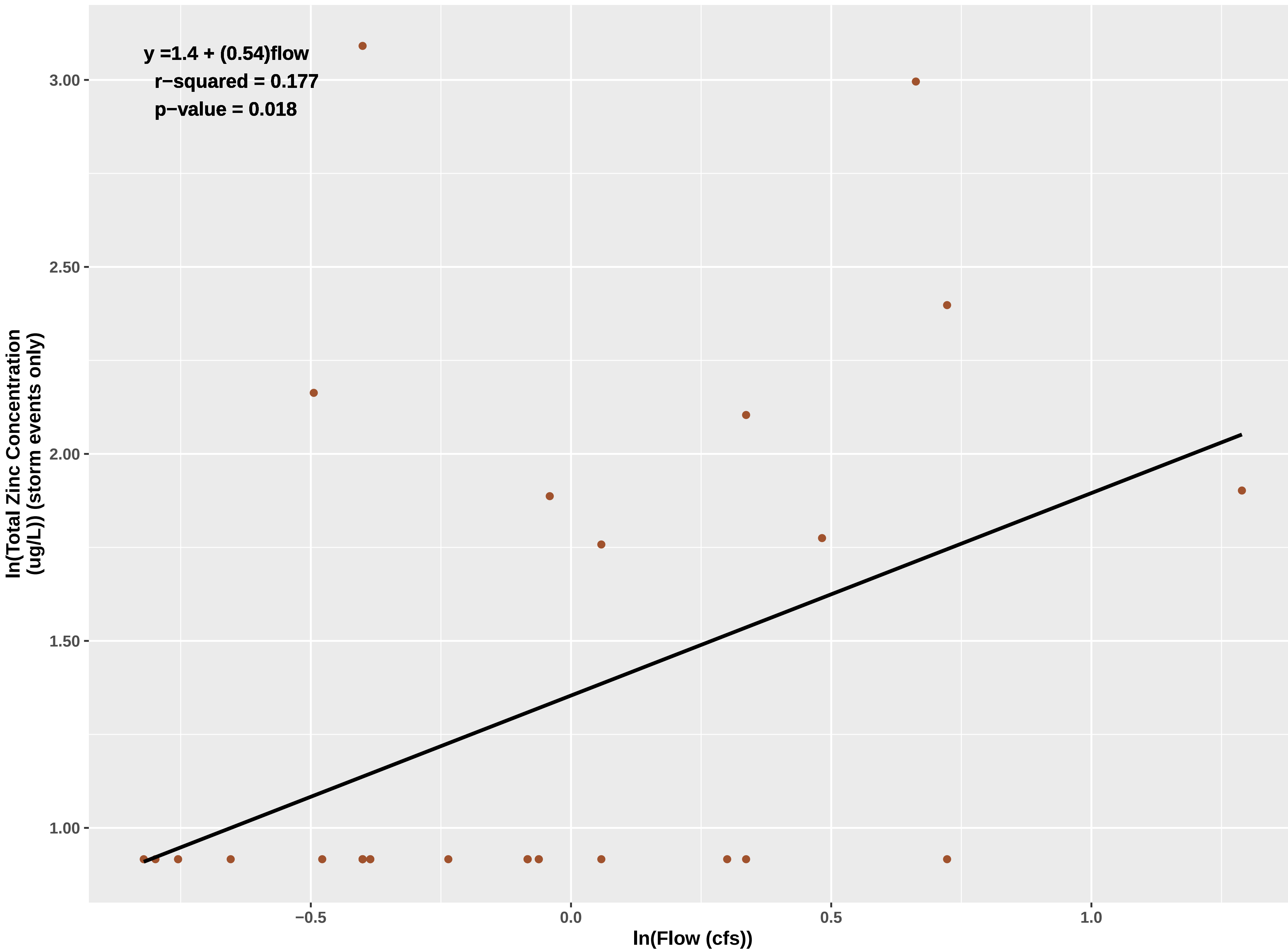


y =−3.1 + (0.56)flow
r−squared = 0.0937
p−value = 0.094
0.0
−1.0
−2.0
−3.0
−4.0
−5.0
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

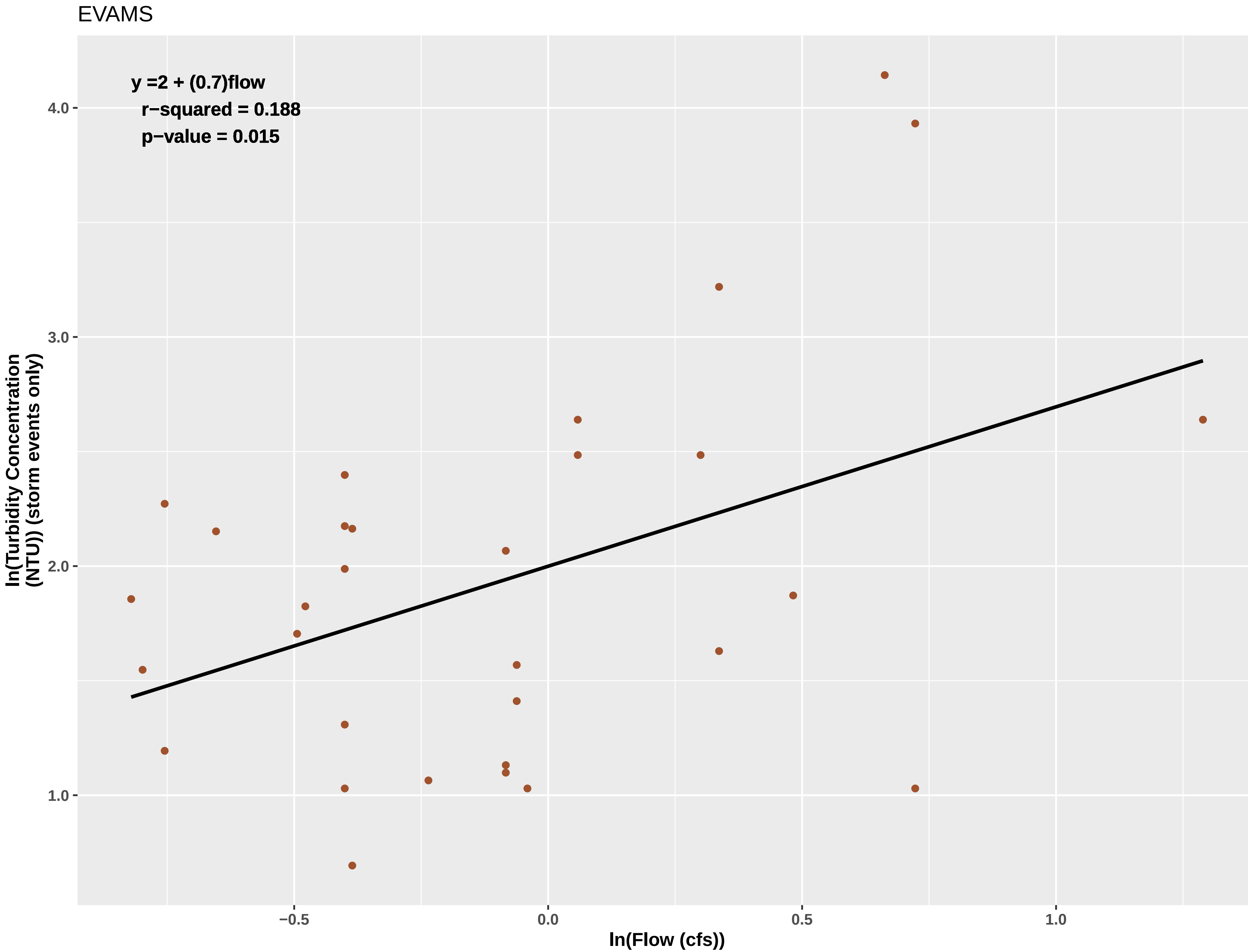


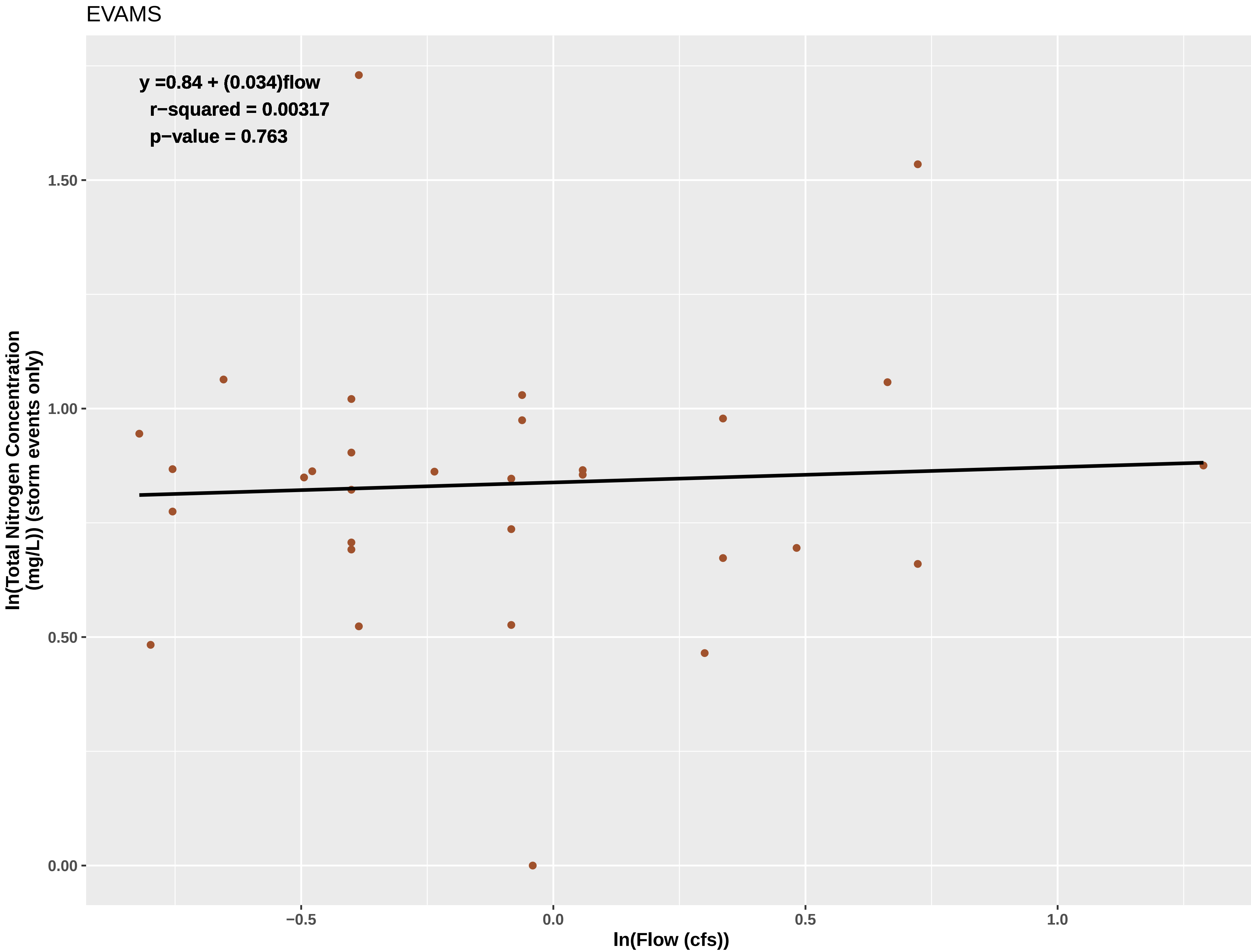
EVAMS
y =3 + (0.74)flow
r−squared = 0.236
p−value = 0.006
5.0
4.0
3.0
2.0
−0.5
0.0
0.5
1.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

EVAMS

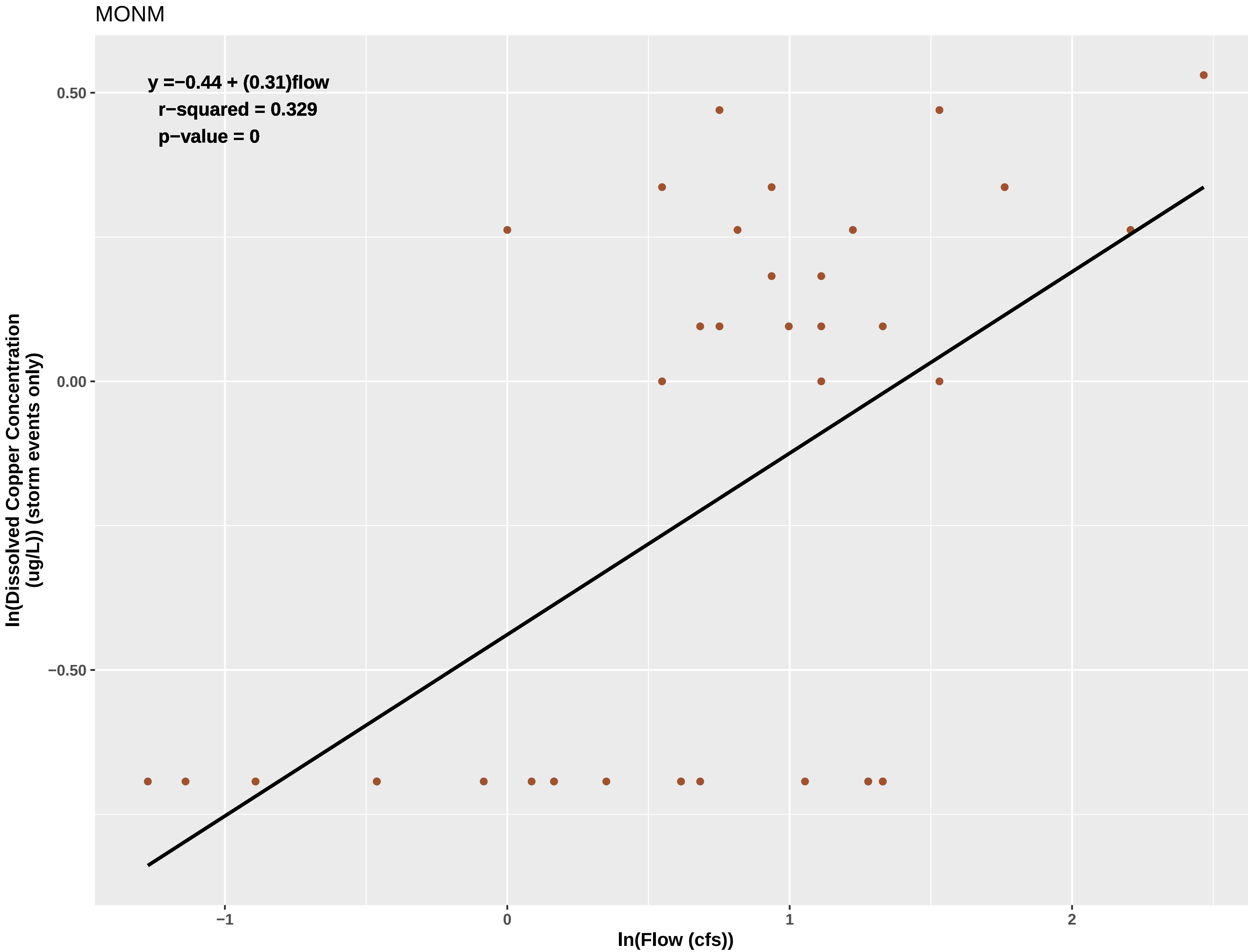


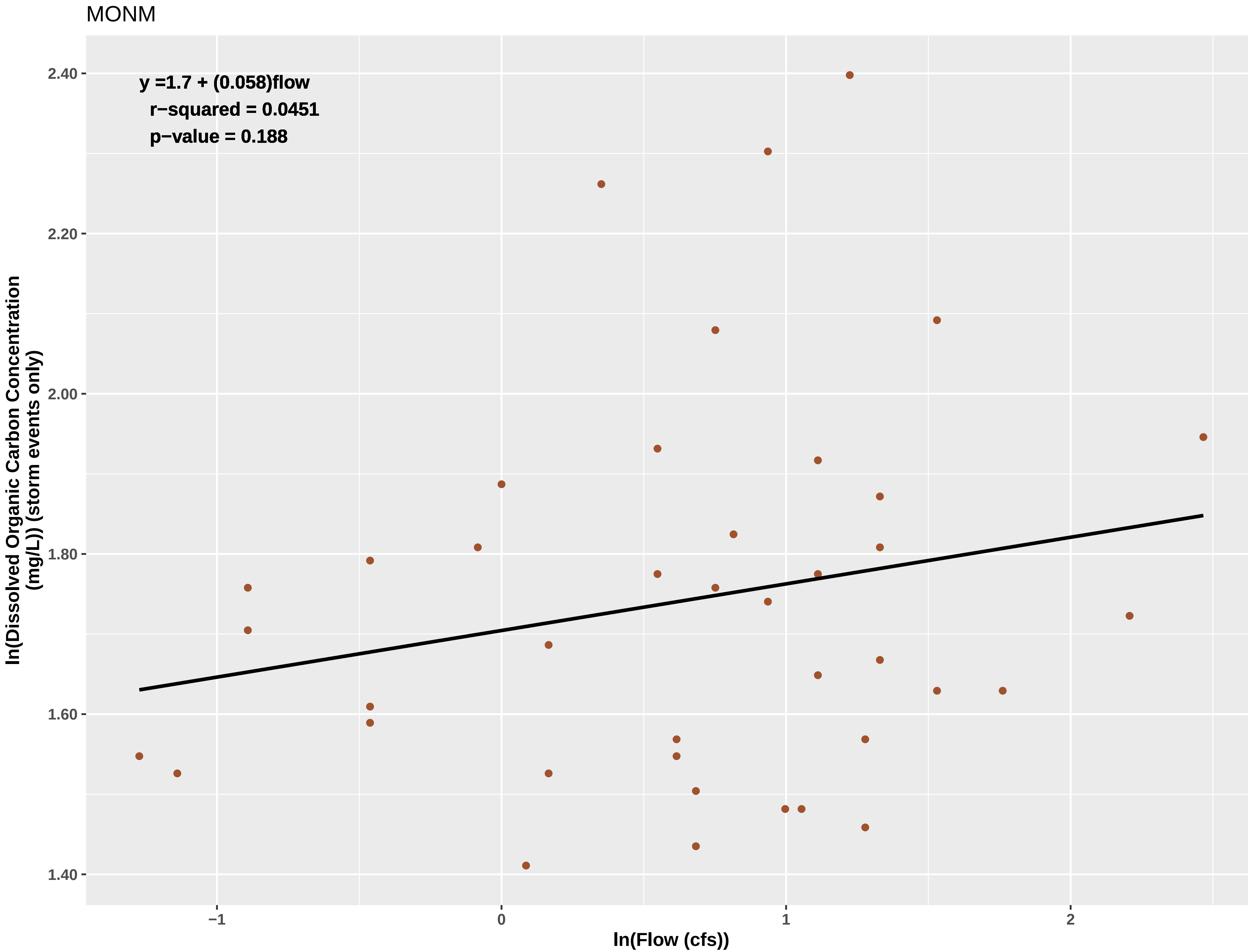
y =1.4 + (0.54)flow
r−squared = 0.177
p−value = 0.018
3.00
2.50
2.00
1.50
1.00
ln(Total Zinc Concentration (ug/L)) (storm events only)
−0.5
0.0
0.5
1.0
ln(Flow (cfs))


EVAMS
y =2 + (0.7)flow
r−squared = 0.188
p−value = 0.015
4.0
3.0
2.0
1.0
ln(Turbidity Concentration (NTU)) (storm events only)
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

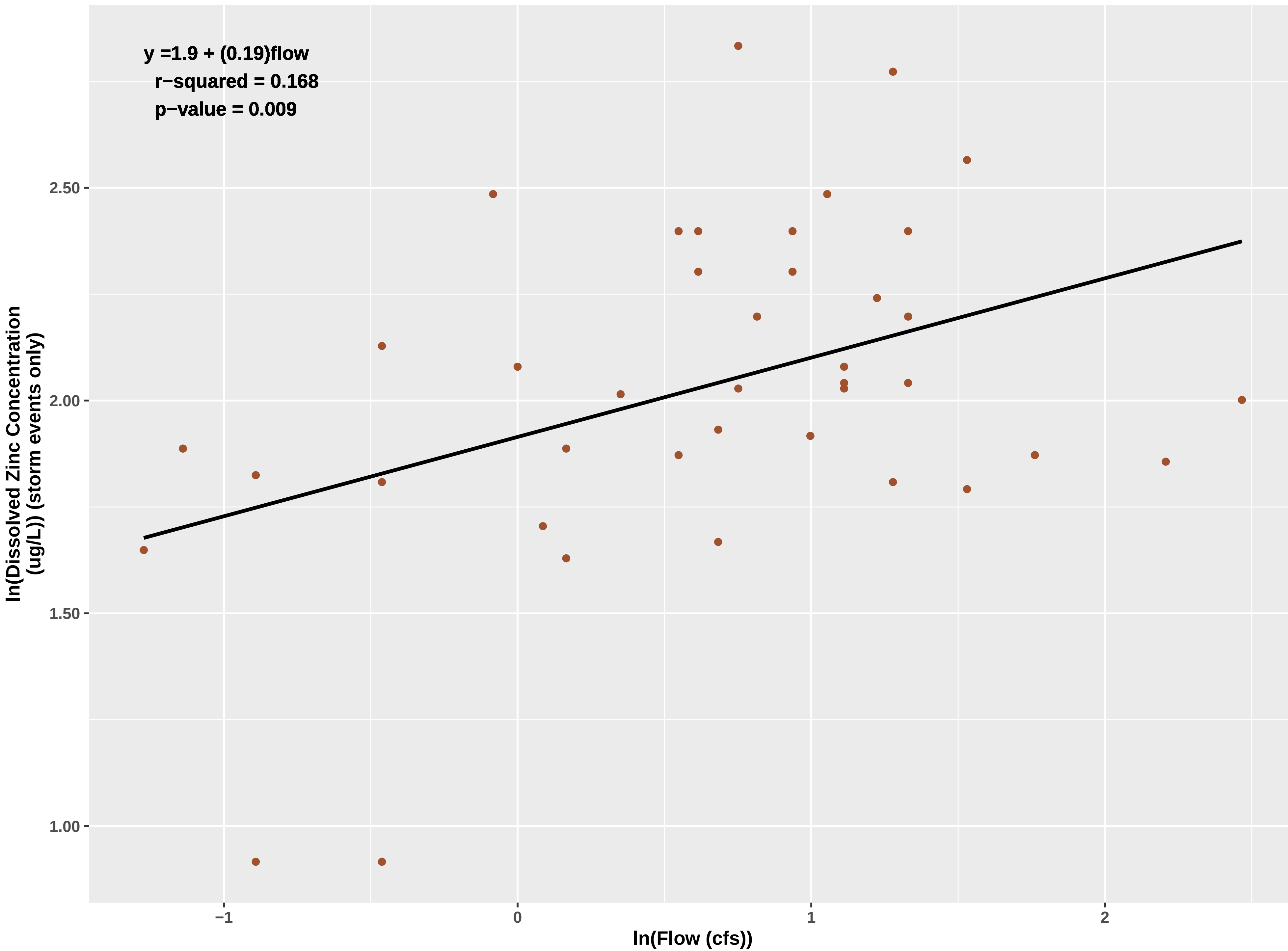


EVAMS
y =0.84 + (0.034)flow
r−squared = 0.00317
p−value = 0.763
1.50
1.00
0.50
0.00
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Total Nitrogen Concentration (mg/L)) (storm events only)

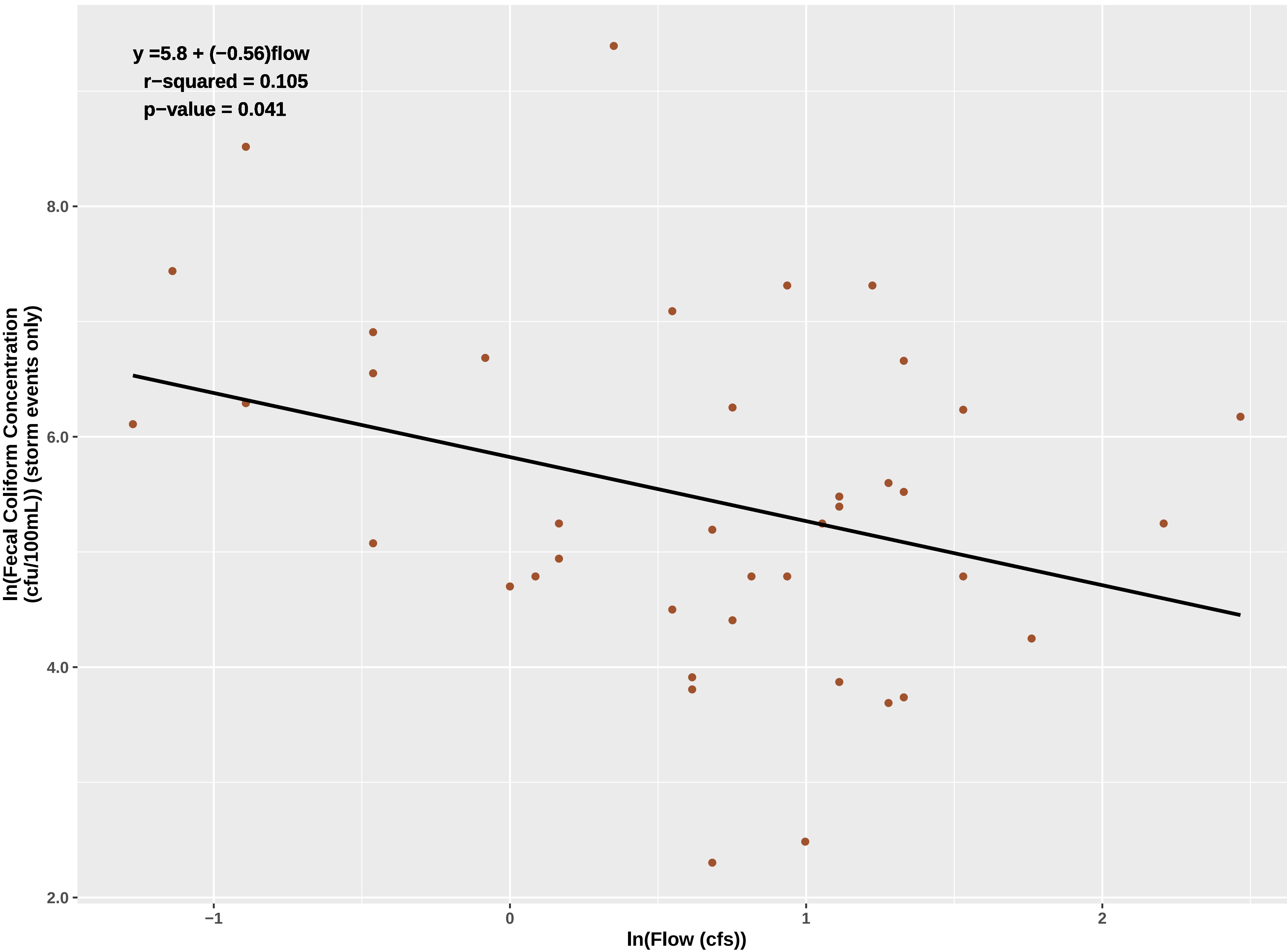

MONM
y =−0.44 + (0.31)flow
r−squared = 0.329
p−value = 0
0.50
0.00
−0.50
ln(Dissolved Copper Concentration
(ug/L)) (storm events only)
−1
0
1
2
ln(Flow (cfs))


MONM
y =1.7 + (0.058)flow
r−squared = 0.0451
p−value = 0.188
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
2.40
2.20
2.00
1.80
1.60
1.40
−1
0
1
2
ln(Flow (cfs))

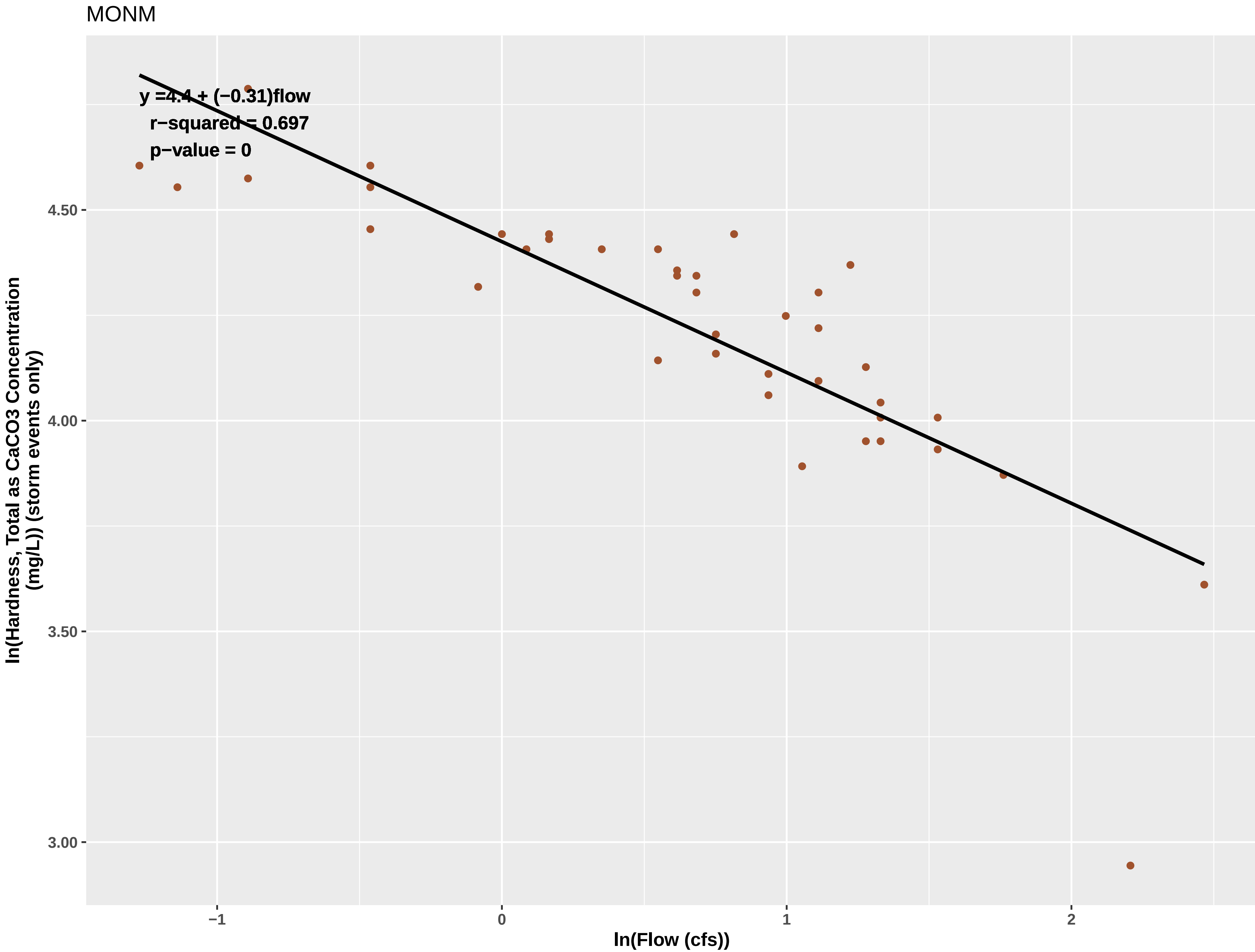
MONM


y =1.9 + (0.19)flow
r−squared = 0.168
p−value = 0.009
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
2.50
2.00
1.50
1.00
−1
0
1
2
ln(Flow (cfs))

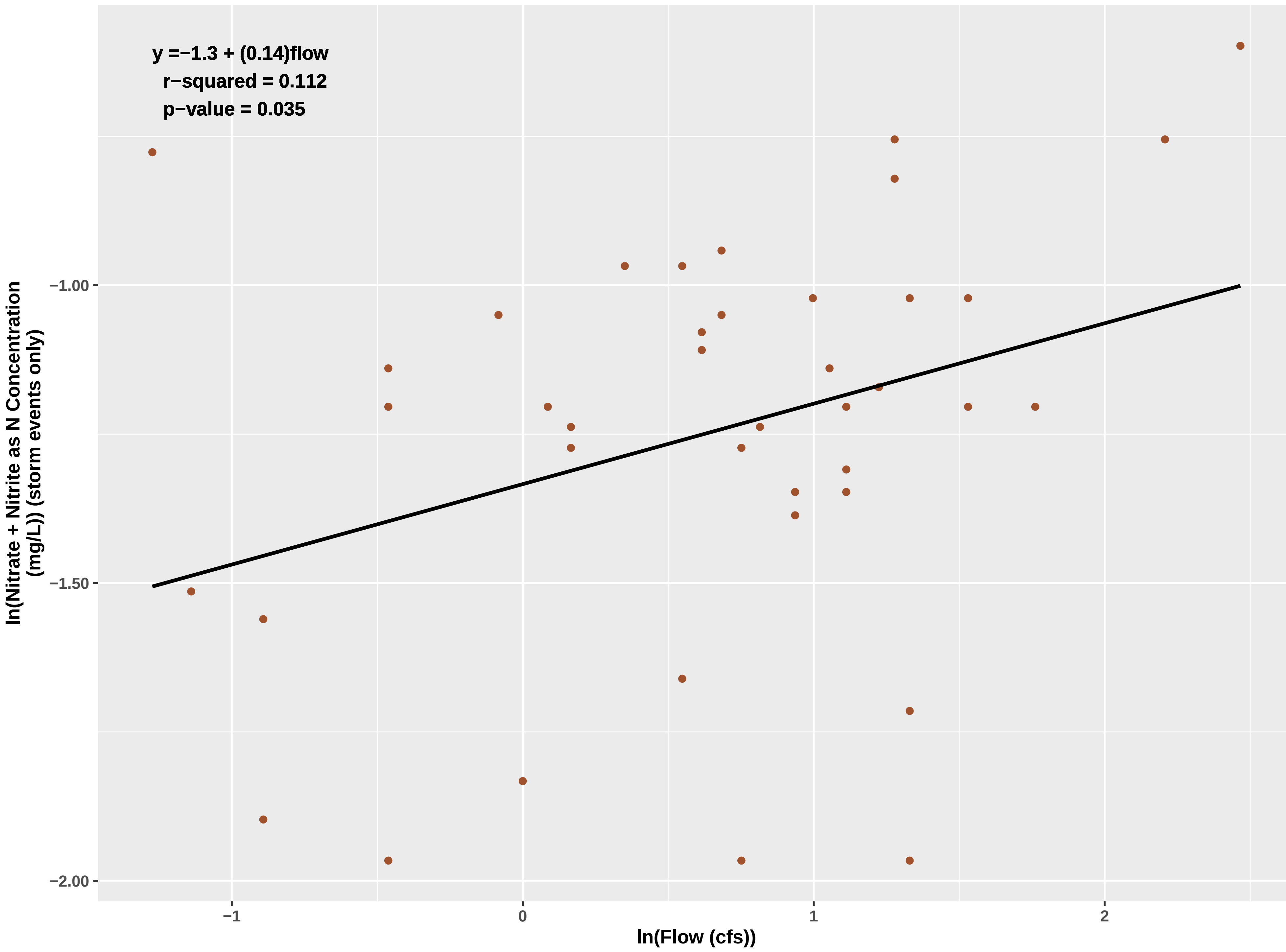
MONM



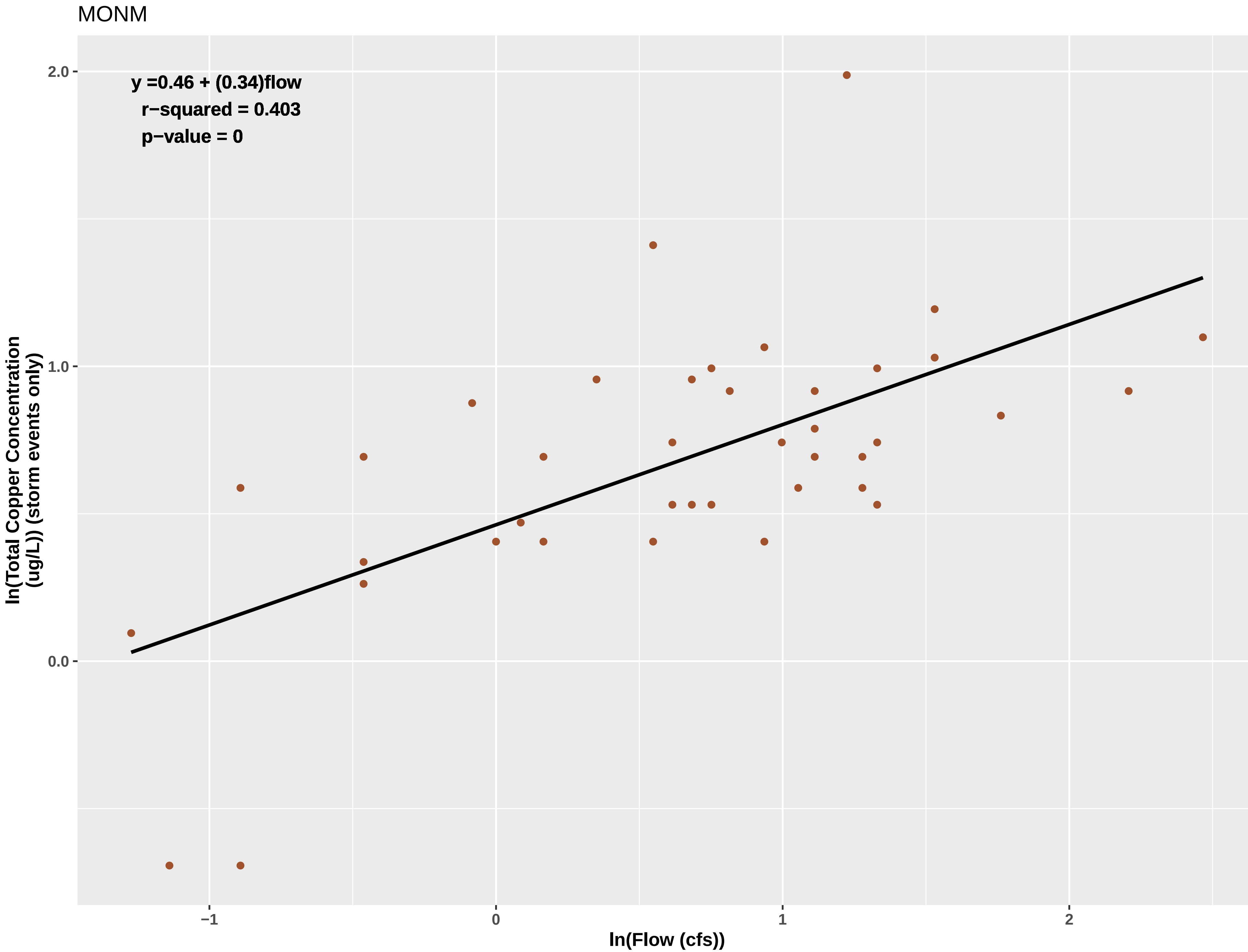
y =5.8 + (−0.56)flow
r−squared = 0.105
p−value = 0.041
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
8.0
6.0
4.0
2.0
−1
0
1
2
ln(Flow (cfs))

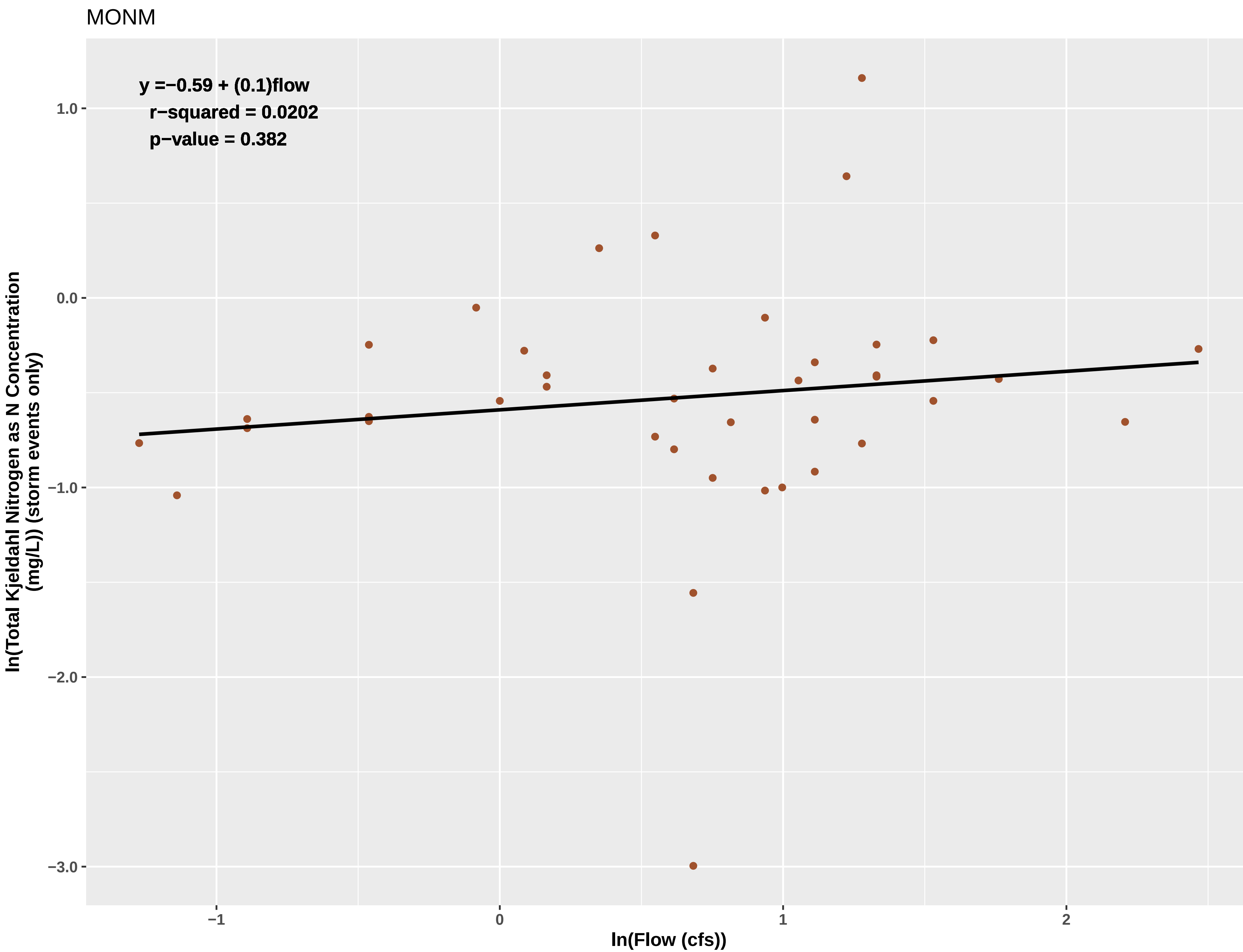

MONM
y =4.4 + (−0.31)flow
r−squared = 0.697
p−value = 0
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
4.50
4.00
3.50
3.00
−1
0
1
2
ln(Flow (cfs))

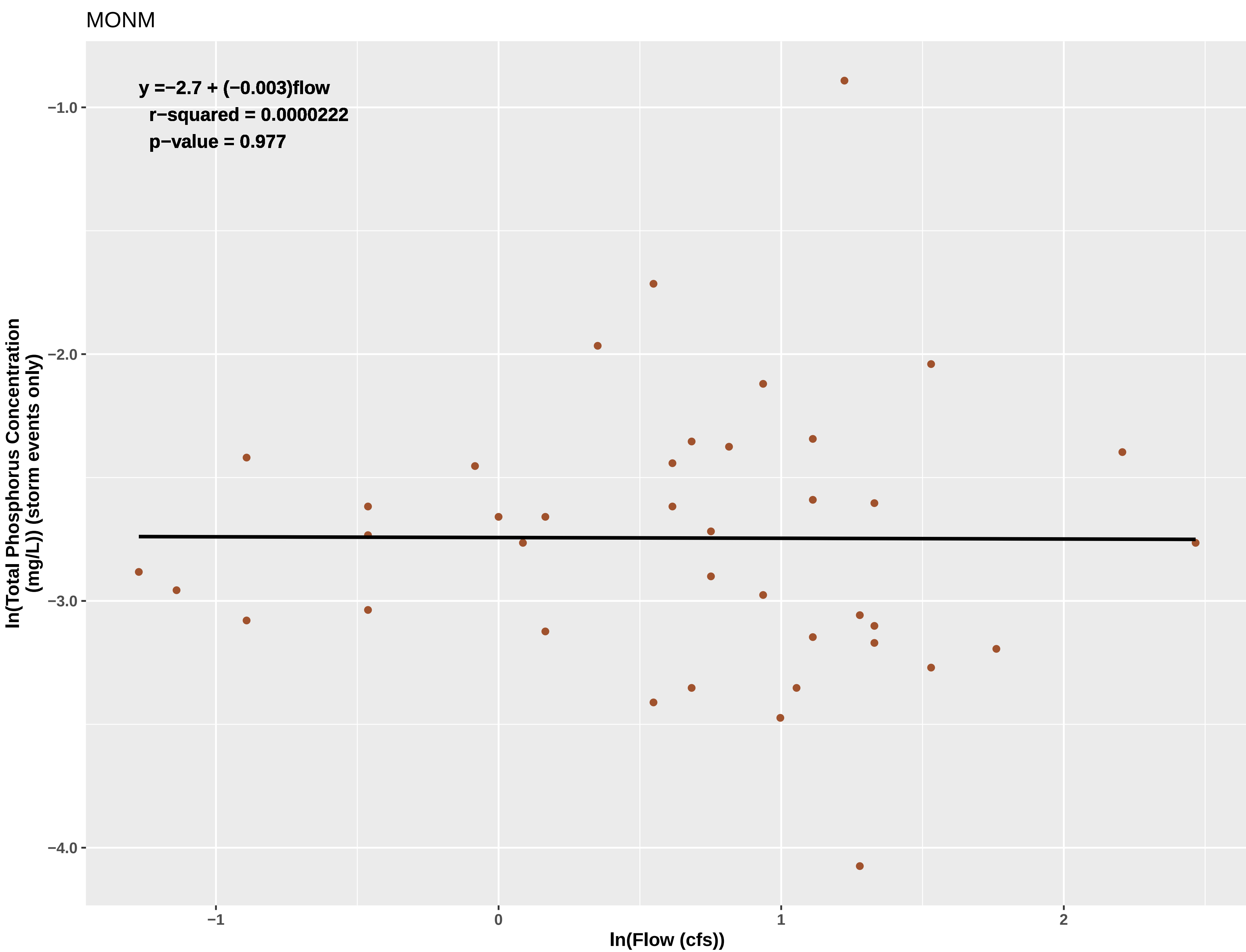
MONM

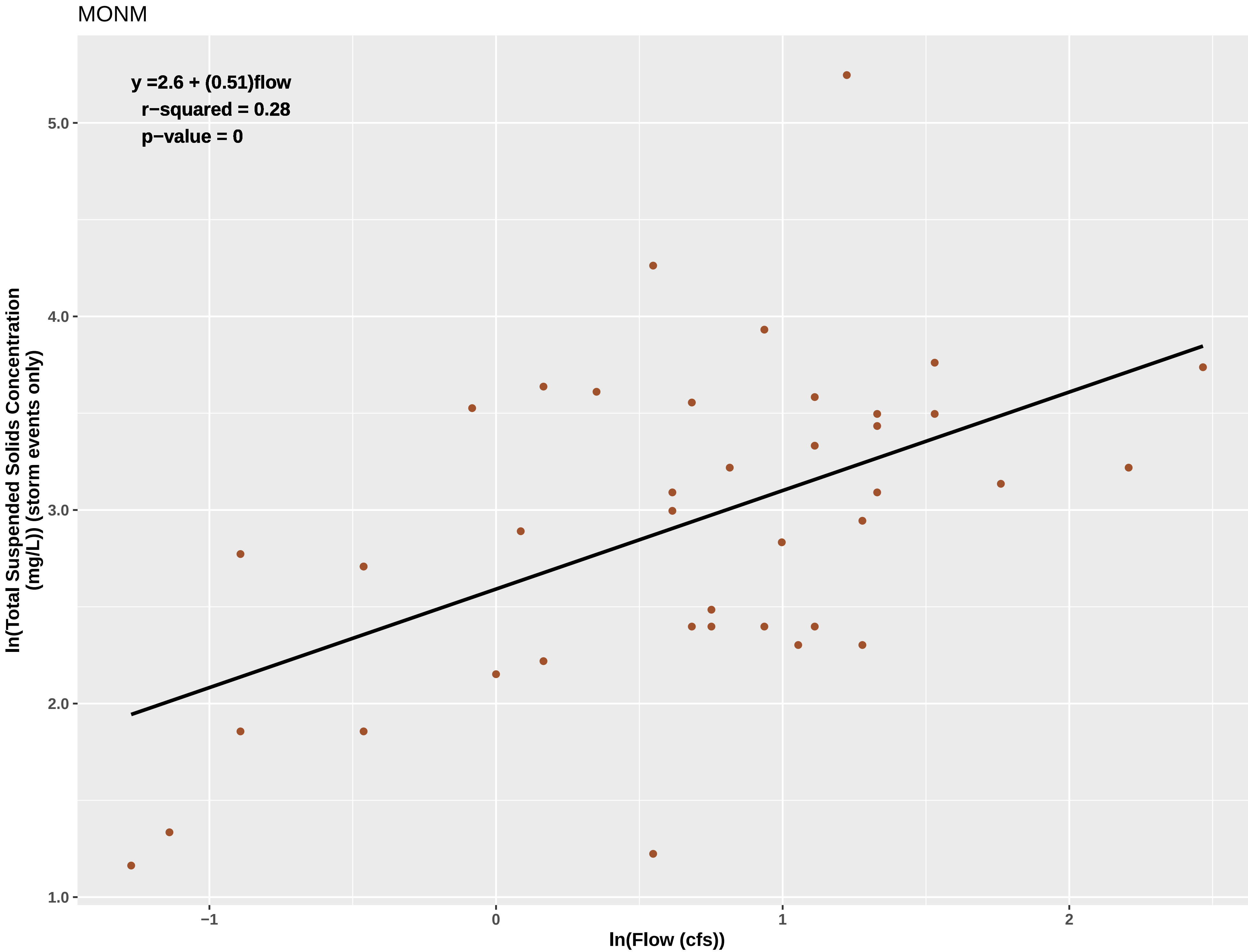


y =−1.3 + (0.14)flow
r−squared = 0.112
p−value = 0.035
−1.00
−1.50
−2.00
−1
0
1
2
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

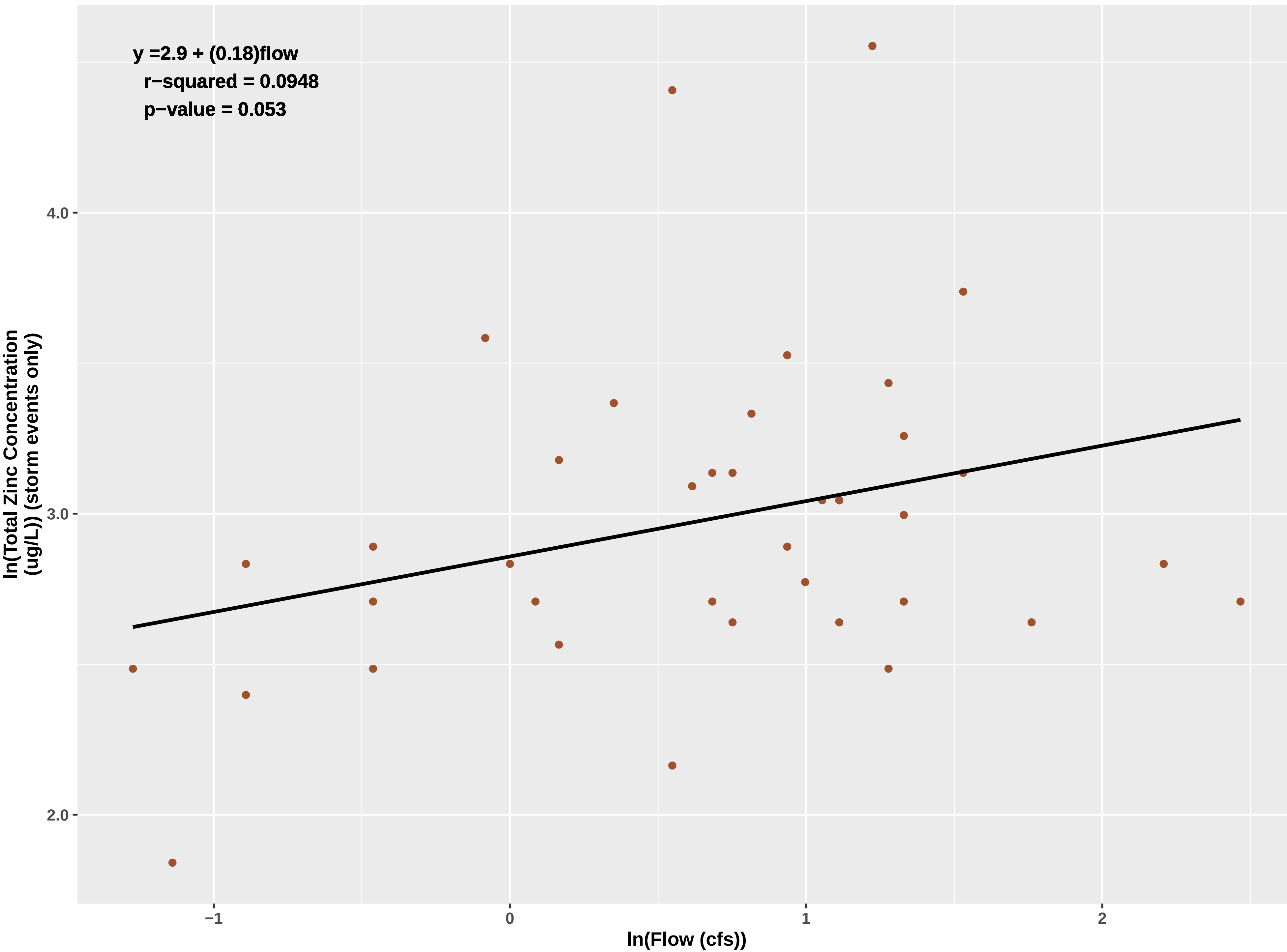

MONM
y =0.46 + (0.34)flow
r−squared = 0.403
p−value = 0
2.0
1.0
0.0
−1
0
1
2
ln(Total Copper Concentration (ug/L)) (storm events only)
ln(Flow (cfs))


MONM
y =−0.59 + (0.1)flow
r−squared = 0.0202
p−value = 0.382
1.0
0.0
−1.0
−2.0
−3.0
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)
−1
0
1
2
ln(Flow (cfs))

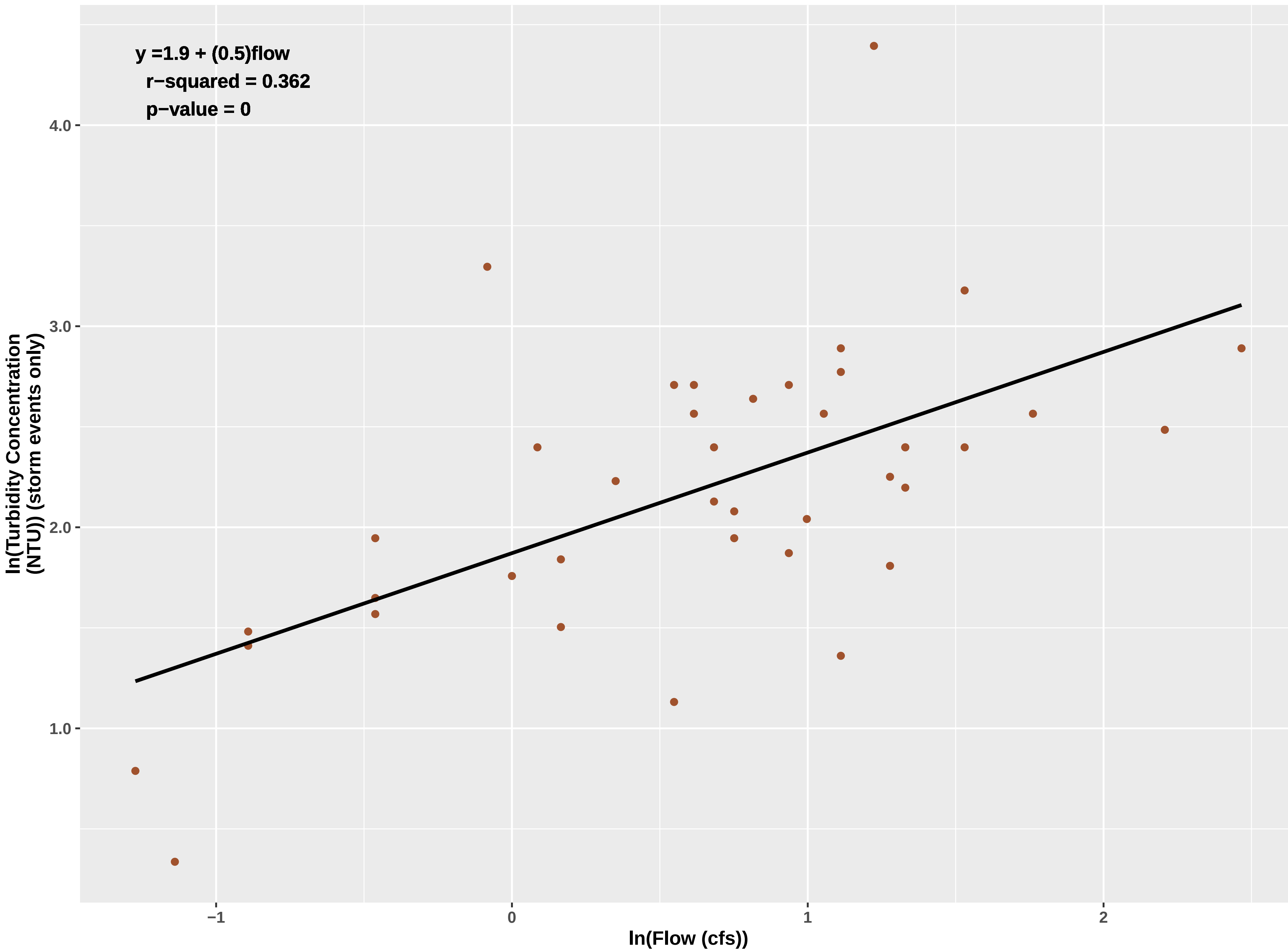

MONM
y =−2.7 + (−0.003)flow
r−squared = 0.0000222
p−value = 0.977
−1.0
−2.0
−3.0
−4.0
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
−1
0
1
2
ln(Flow (cfs))

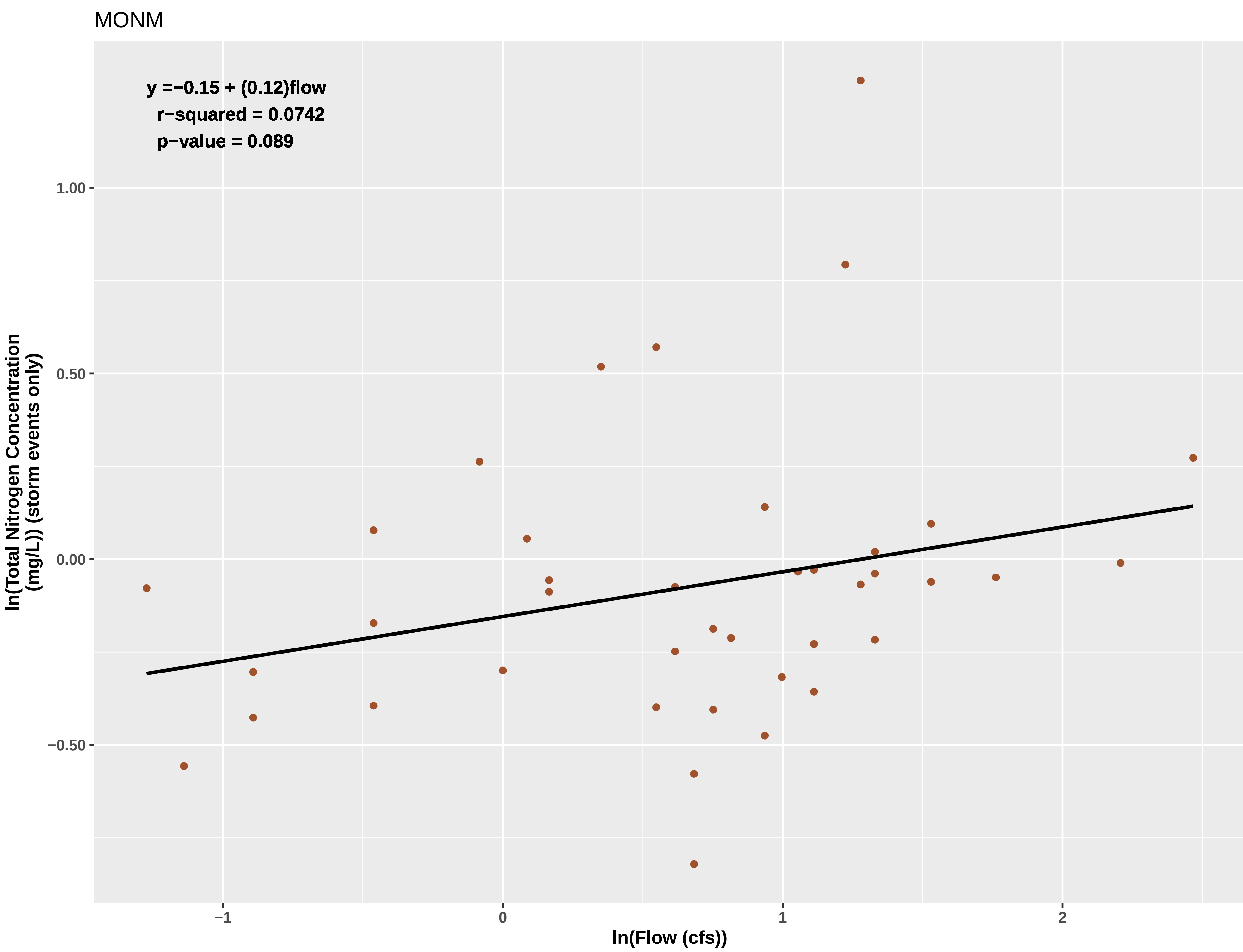

MONM
y =2.6 + (0.51)flow
r−squared = 0.28
p−value = 0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
ln(Flow (cfs))
5.0
4.0
3.0
2.0
1.0
−1
0
1
2

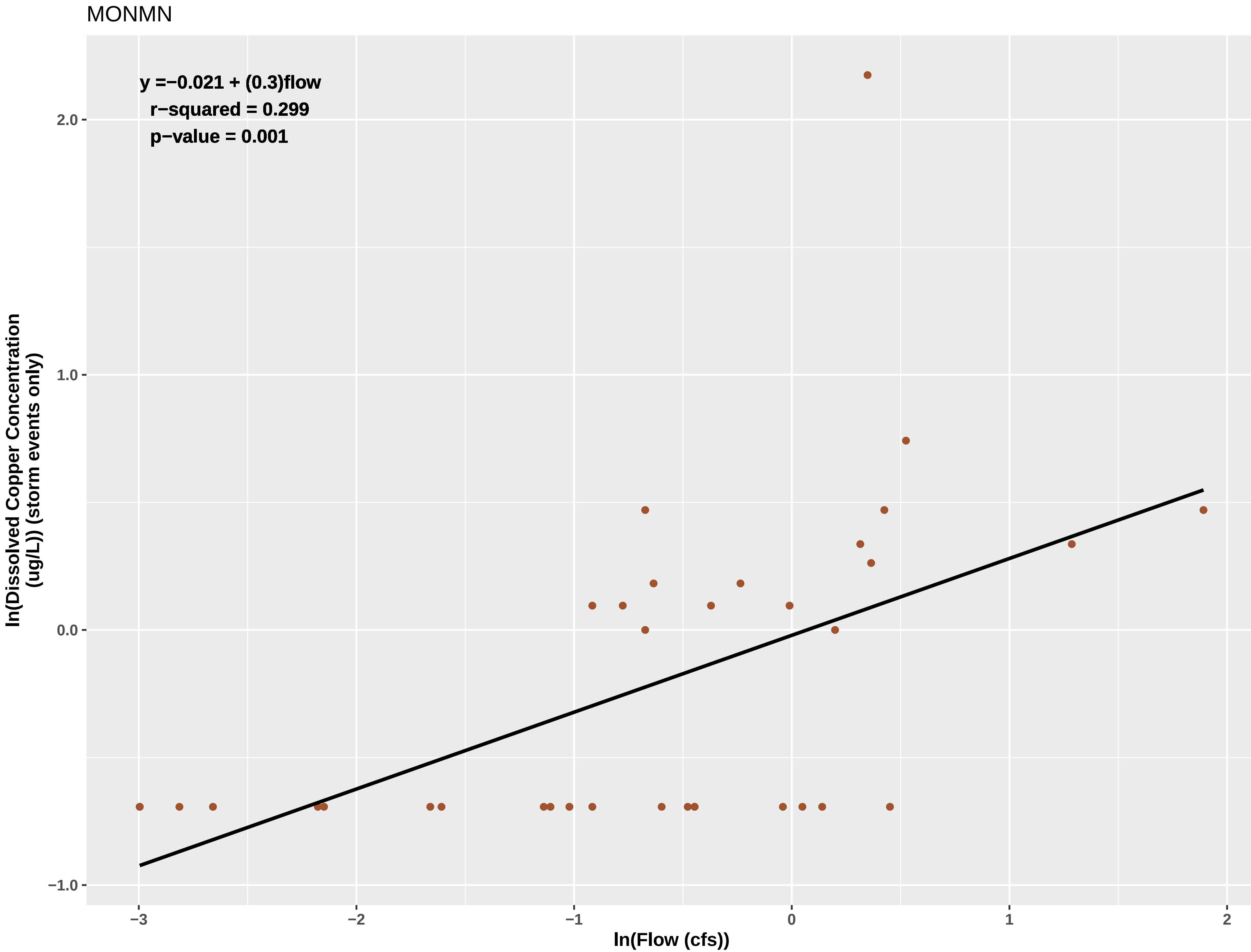
MONM

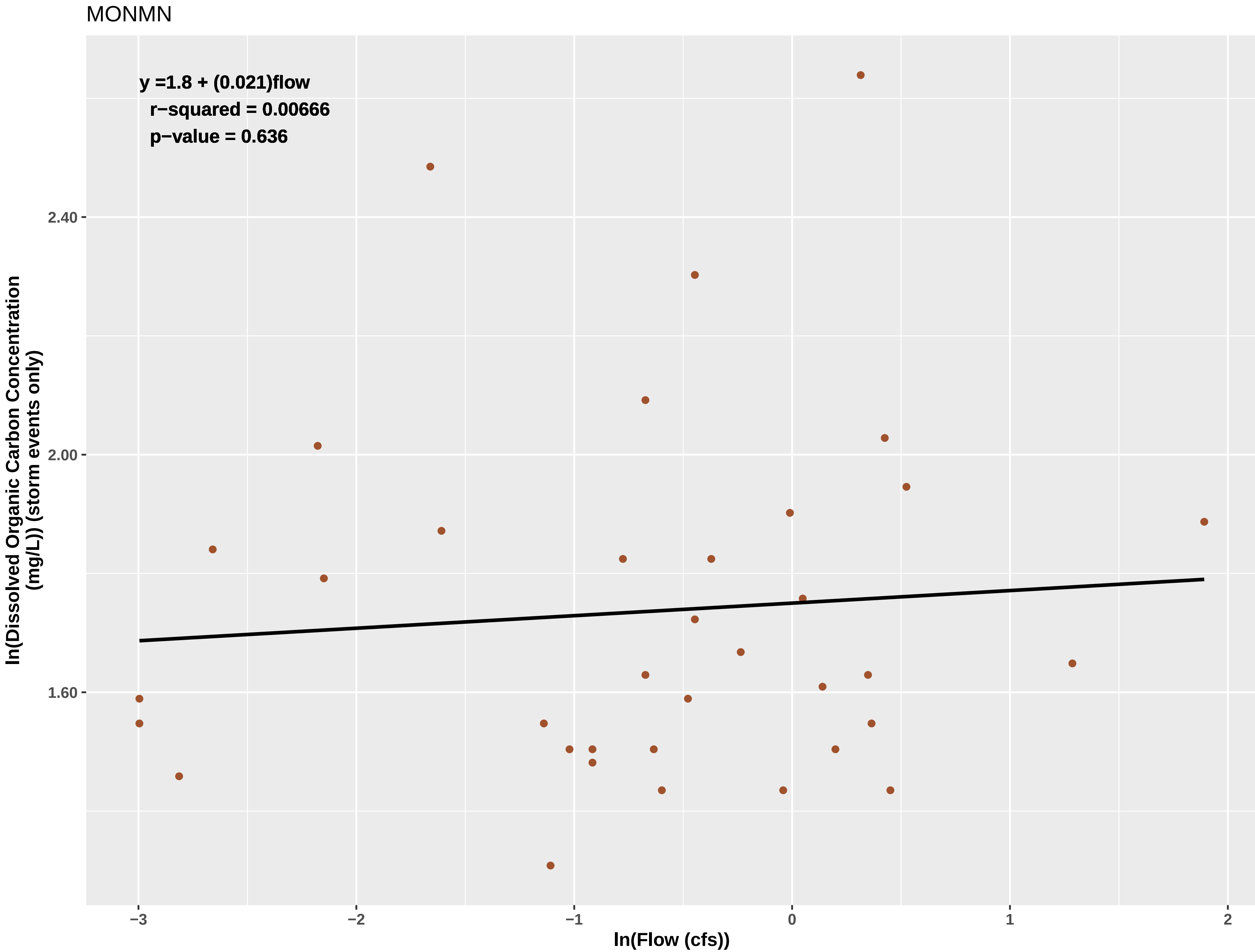

y =2.9 + (0.18)flow
r−squared = 0.0948
p−value = 0.053
4.0
3.0
2.0
ln(Total Zinc Concentration (ug/L)) (storm events only)
−1
0
1
2
ln(Flow (cfs))

MONM

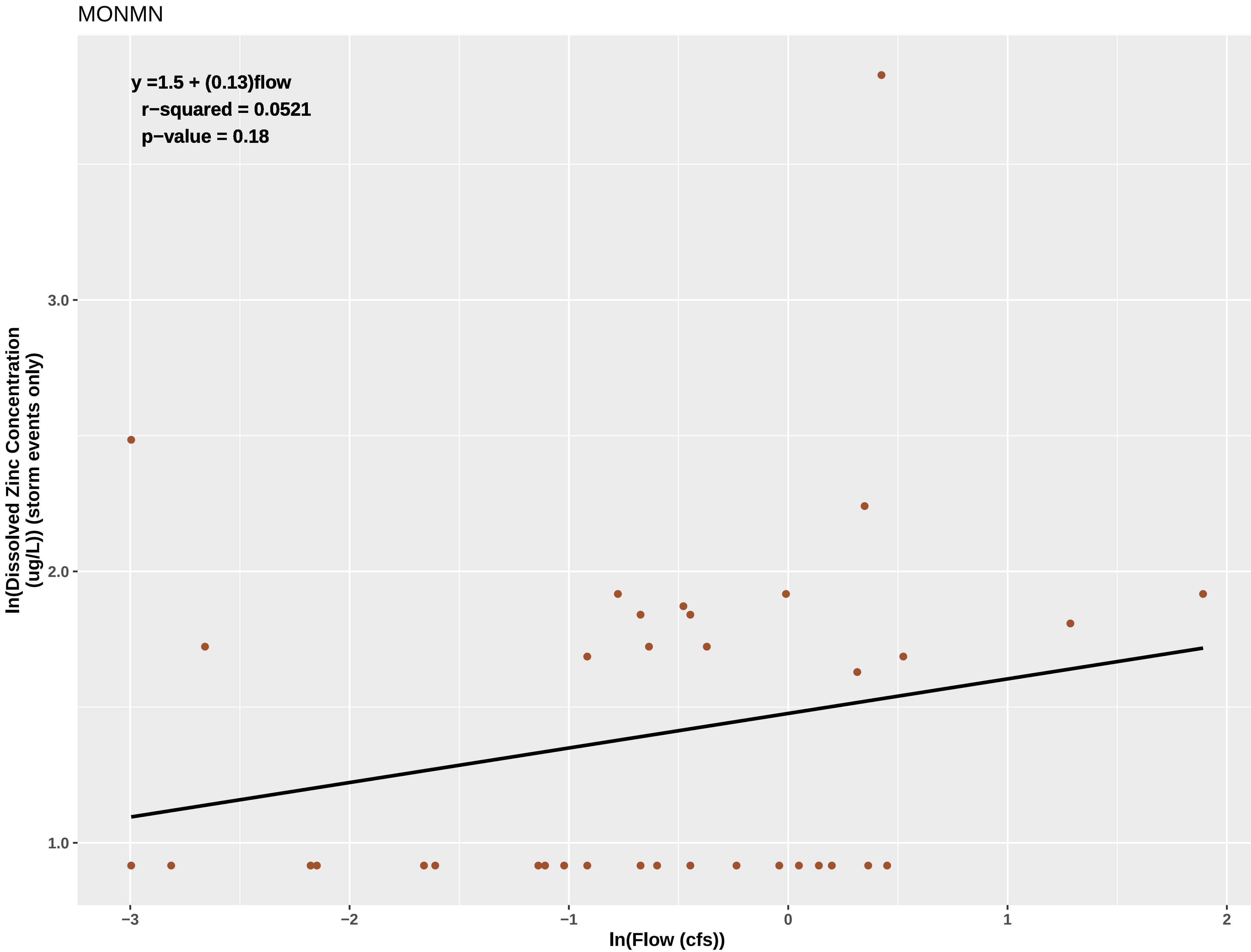

y =1.9 + (0.5)flow
r−squared = 0.362
p−value = 0
4.0
3.0
2.0
1.0
−1
0
1
2
ln(Flow (cfs))
ln(Turbidity Concentration
(NTU)) (storm events only)


MONM
y =−0.15 + (0.12)flow
r−squared = 0.0742
p−value = 0.089
1.00
0.50
0.00
−0.50
−1
0
1
2
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

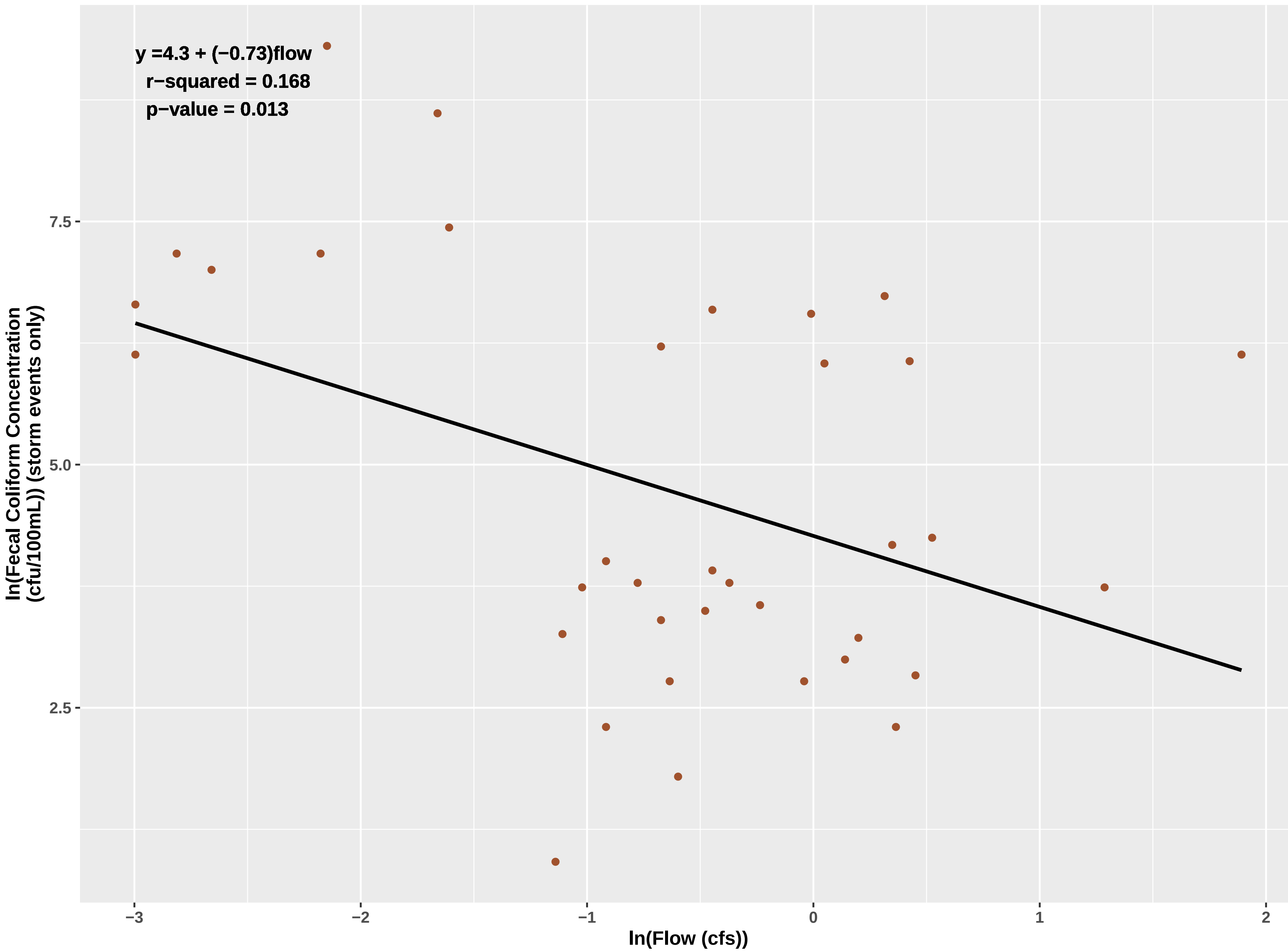

MONMN
y =−0.021 + (0.3)flow
r−squared = 0.299
p−value = 0.001
2.0
1.0
0.0
−1.0
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
−3
−2
−1
0
1
2
ln(Flow (cfs))

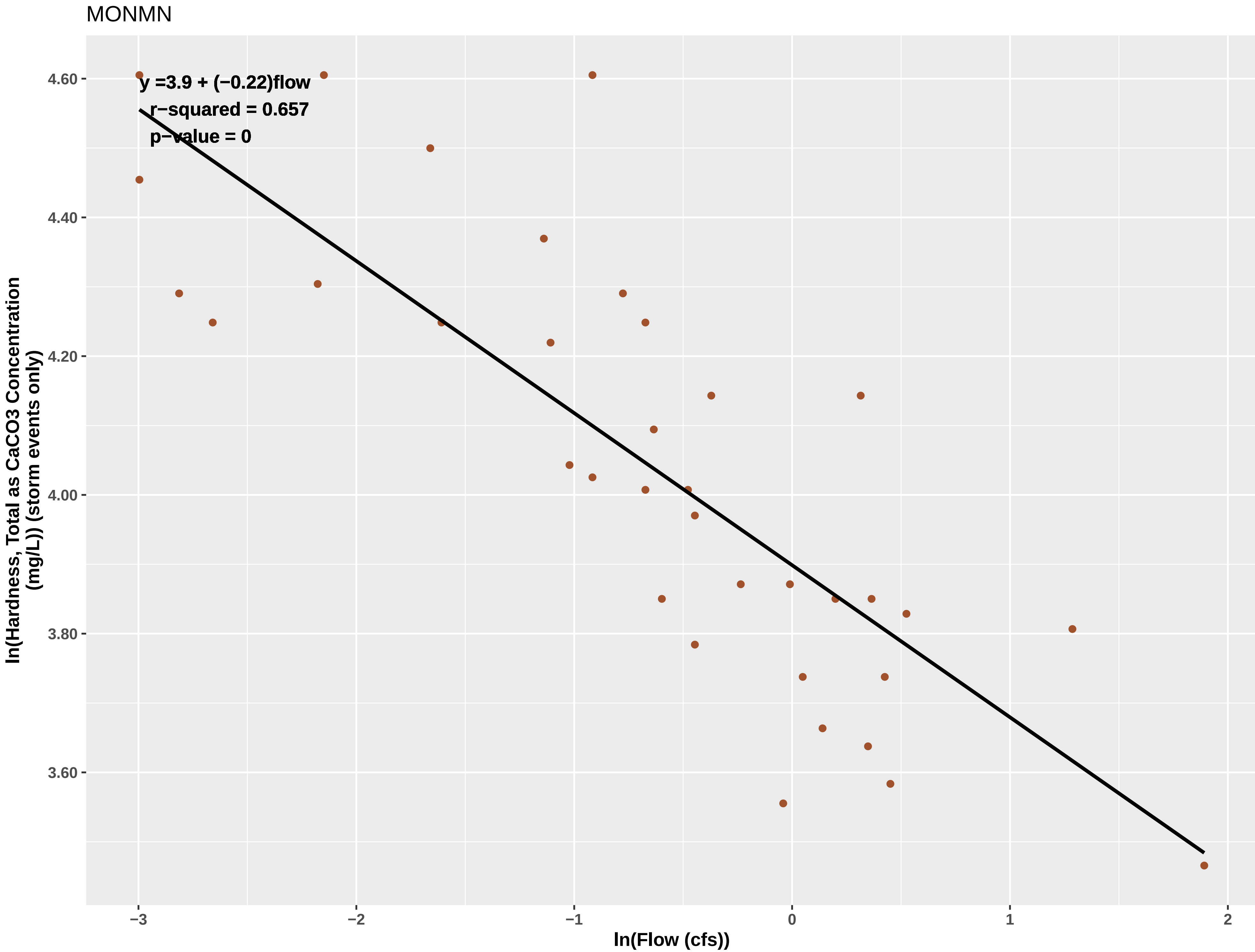


MONMN
y =1.8 + (0.021)flow
r−squared = 0.00666
p−value = 0.636
2.40
2.00
1.60
−3
−2
−1
0
1
2
ln(Flow (cfs))
ln(Dissolved Organic Carbon Concentration
(mg/L)) (storm events only)

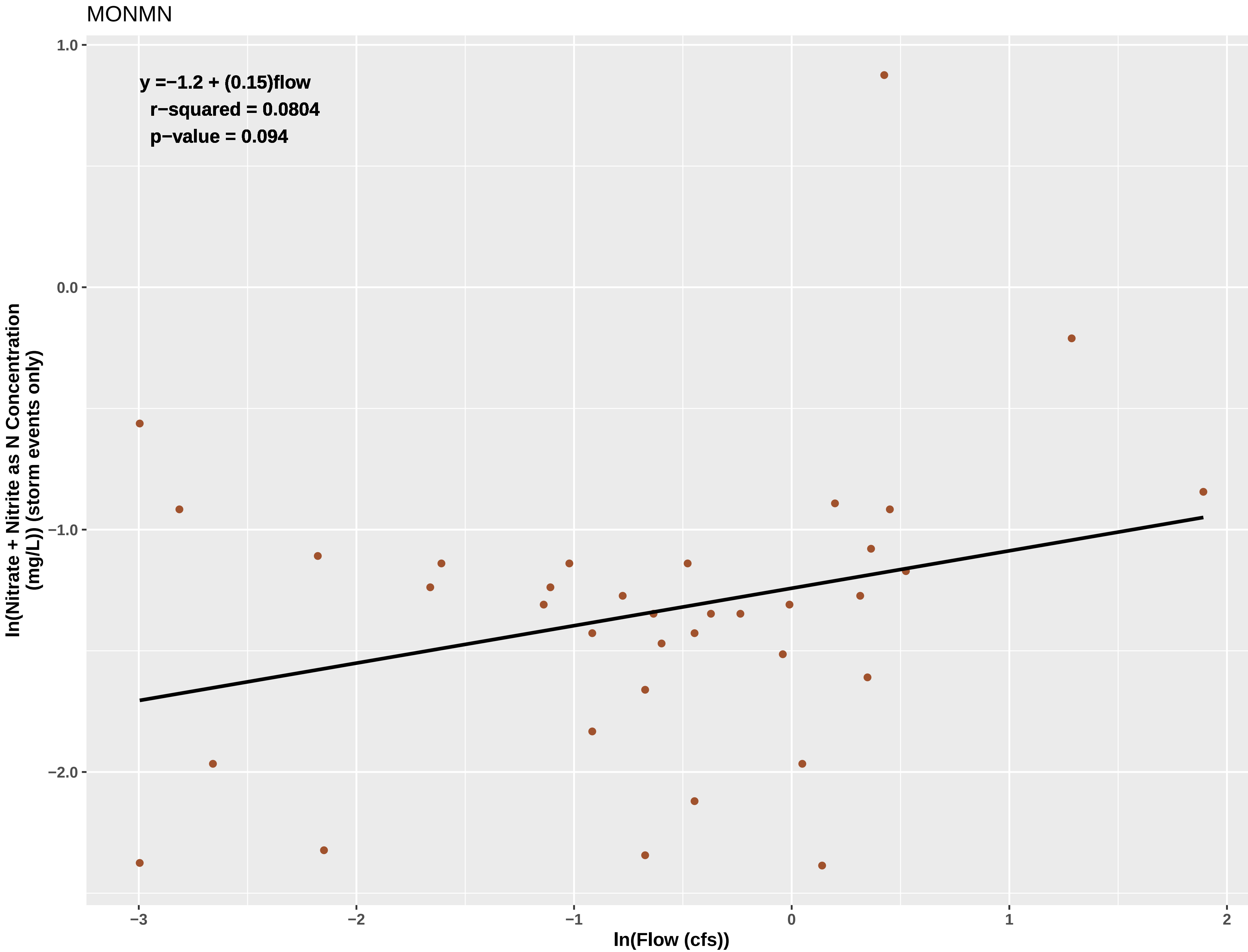

MONMN
y =1.5 + (0.13)flow
r−squared = 0.0521
p−value = 0.18
3.0
2.0
1.0
ln(Dissolved Zinc Concentration
(ug/L)) (storm events only)
−3
−2
−1
0
1
2
ln(Flow (cfs))

MONMN

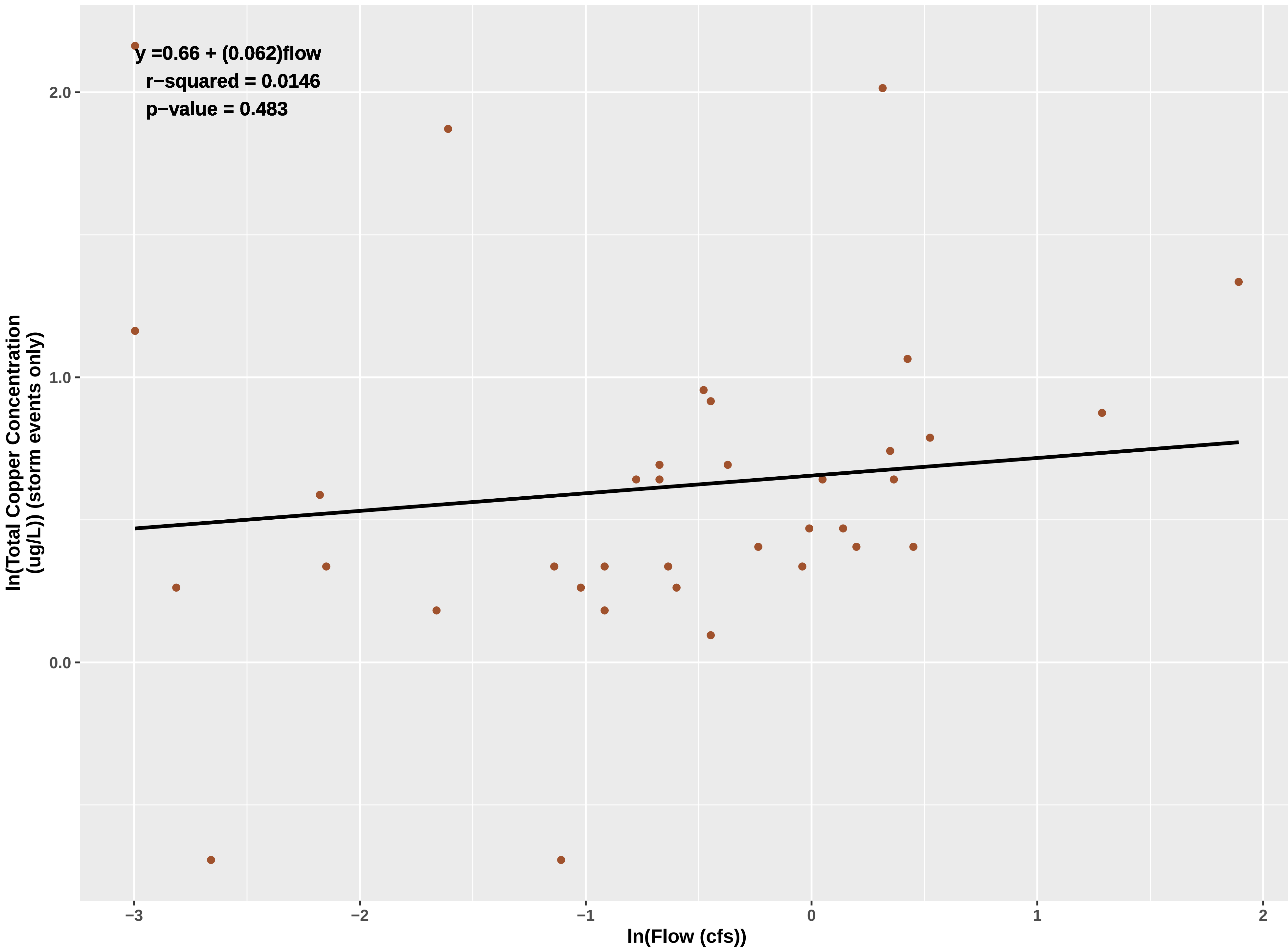

y =4.3 + (−0.73)flow
r−squared = 0.168
p−value = 0.013
7.5
5.0
2.5
−3
−2
−1
0
1
2
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
ln(Flow (cfs))



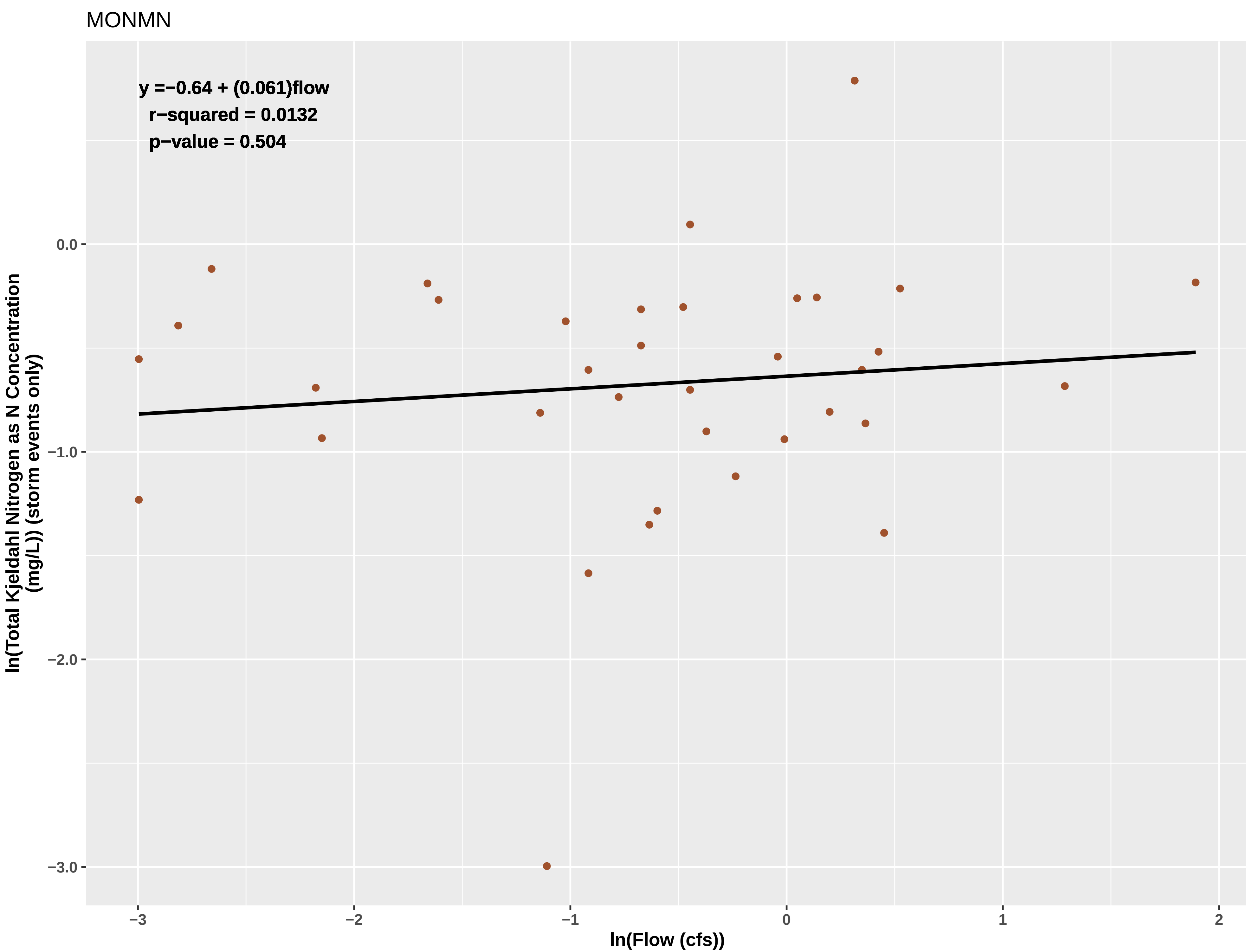
MONMN
y =3.9 + (−0.22)flow
r−squared = 0.657
p−value = 0
ln(Hardness, Total as CaCO3 Concentration
(mg/L)) (storm events only)
4.60
4.40
4.20
4.00
3.80
3.60
−3
−2
−1
0
1
2
ln(Flow (cfs))

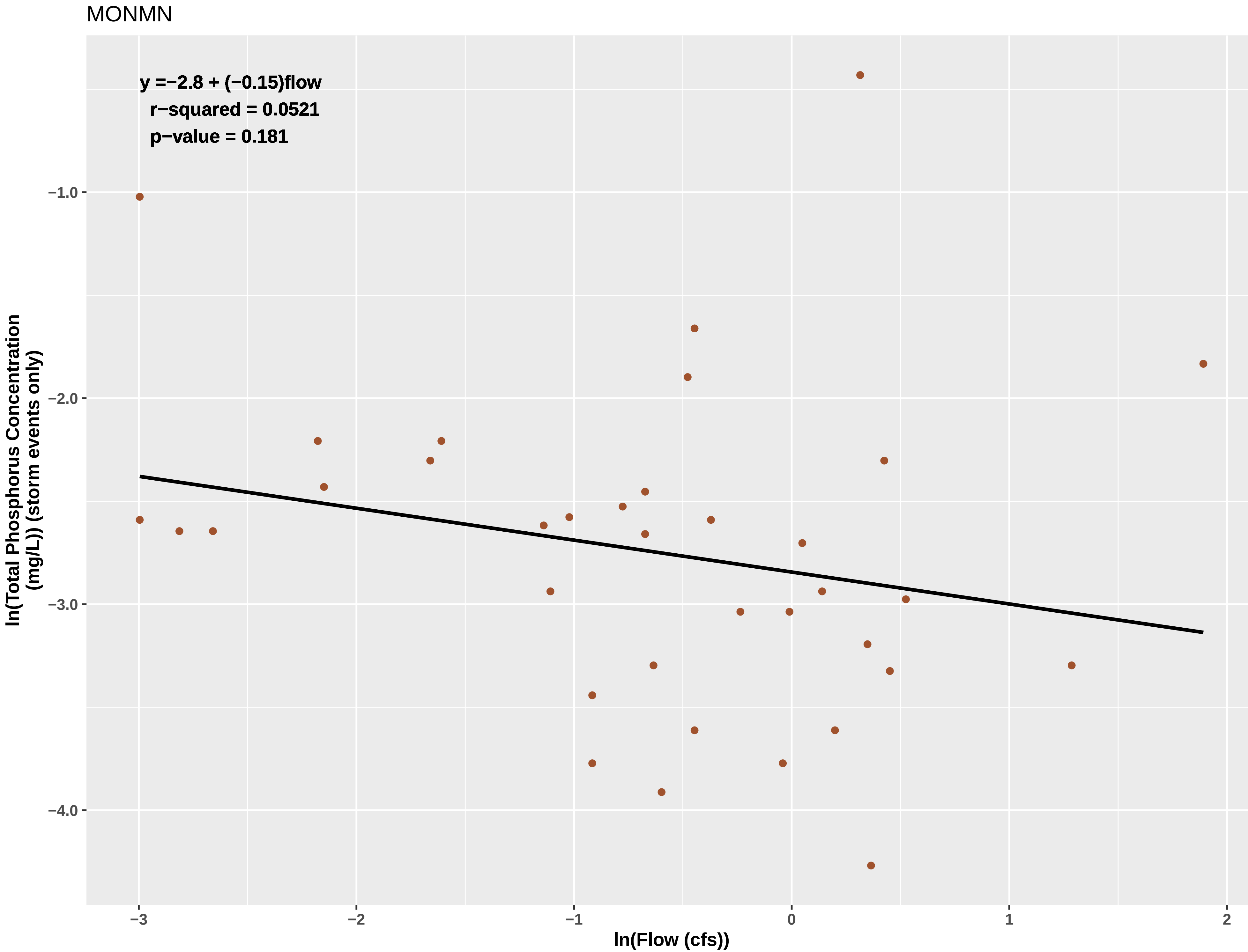

MONMN
y =−1.2 + (0.15)flow
r−squared = 0.0804
p−value = 0.094
1.0
0.0
−1.0
−2.0
−3
−2
−1
0
1
2
ln(Flow (cfs))
ln(Nitrate + Nitrite as N Concentration
(mg/L)) (storm events only)

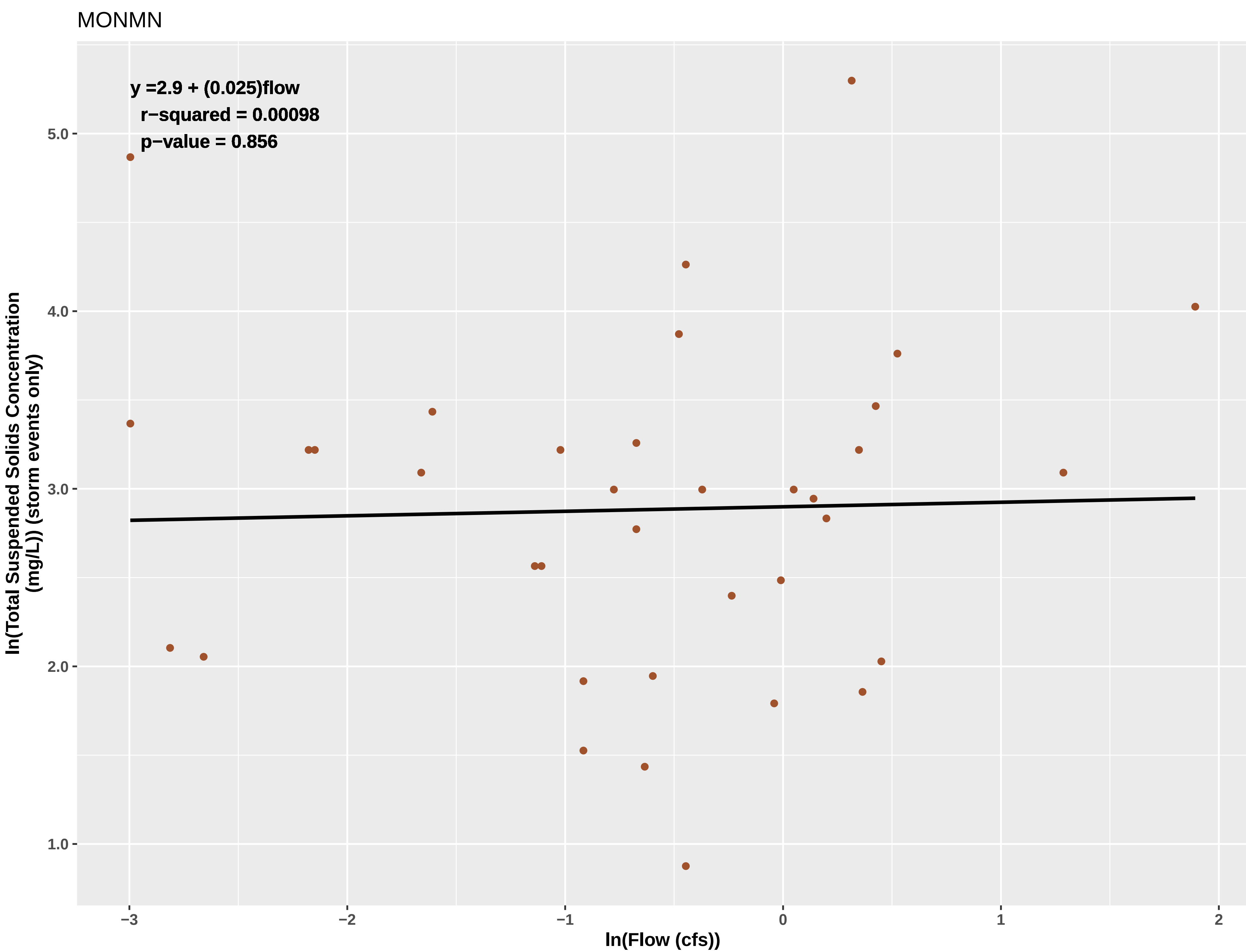
MONMN

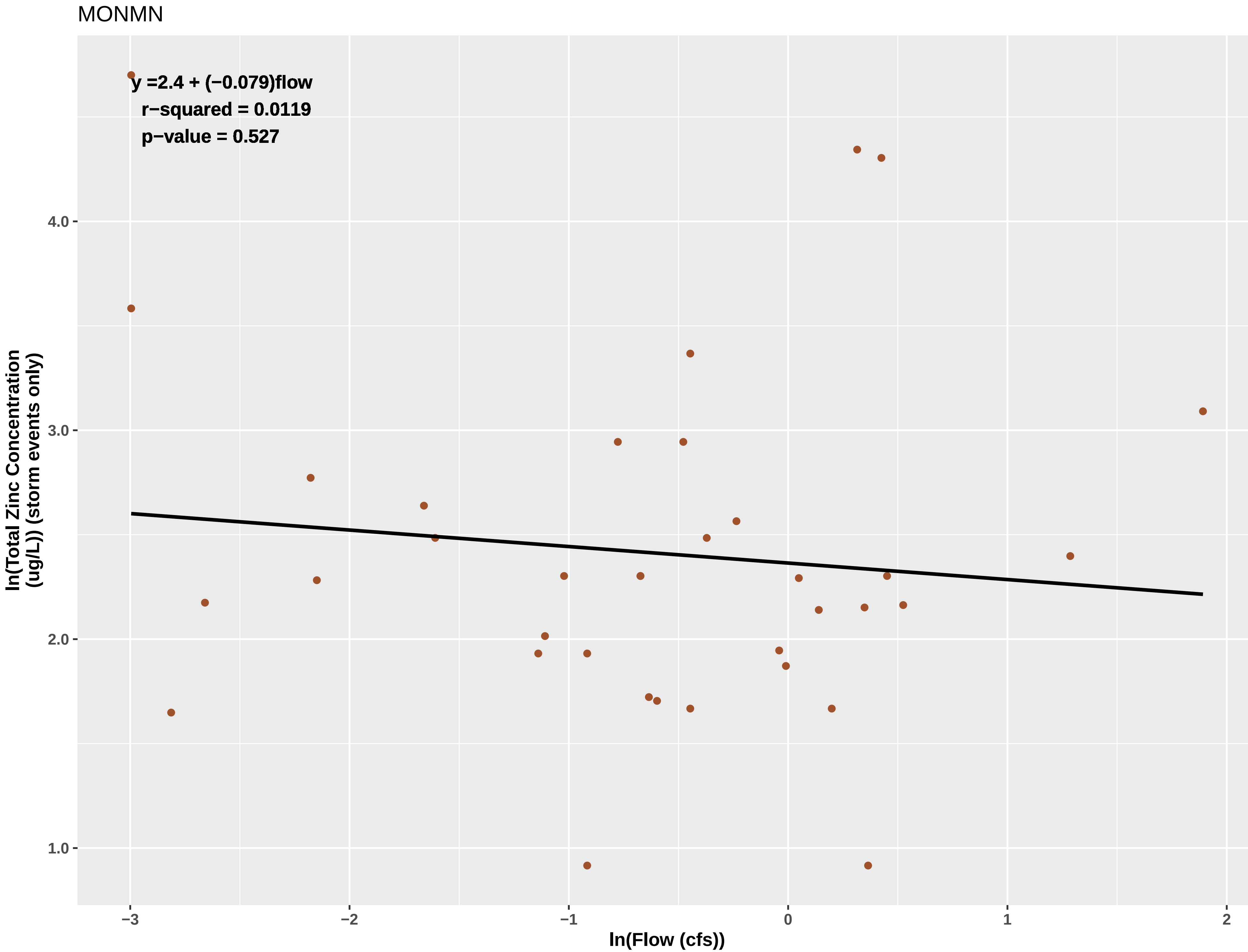


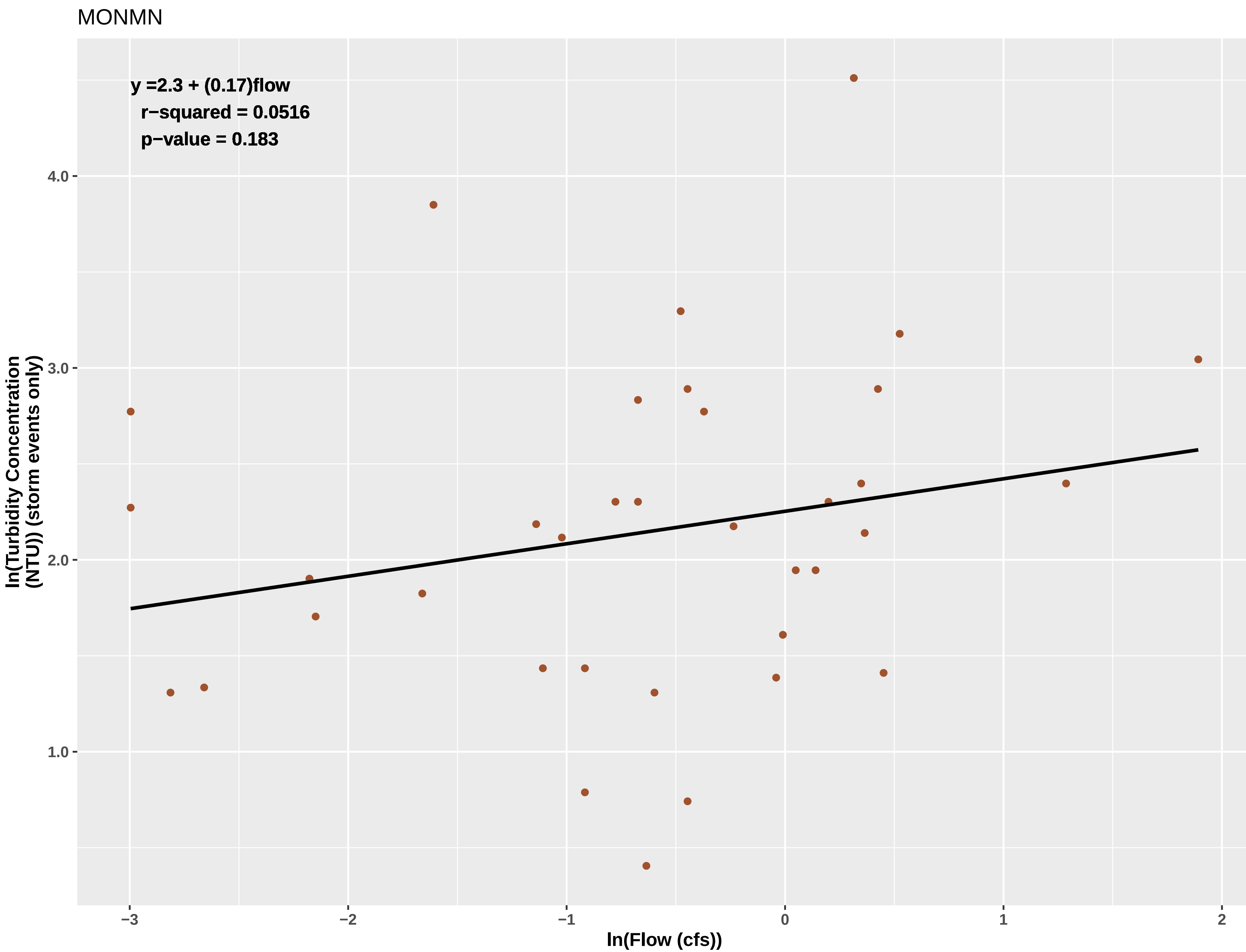
y =0.66 + (0.062)flow
r−squared = 0.0146
p−value = 0.483
2.0
1.0
0.0
−3
−2
−1
0
1
2
ln(Flow (cfs))
ln(Total Copper Concentration (ug/L)) (storm events only)

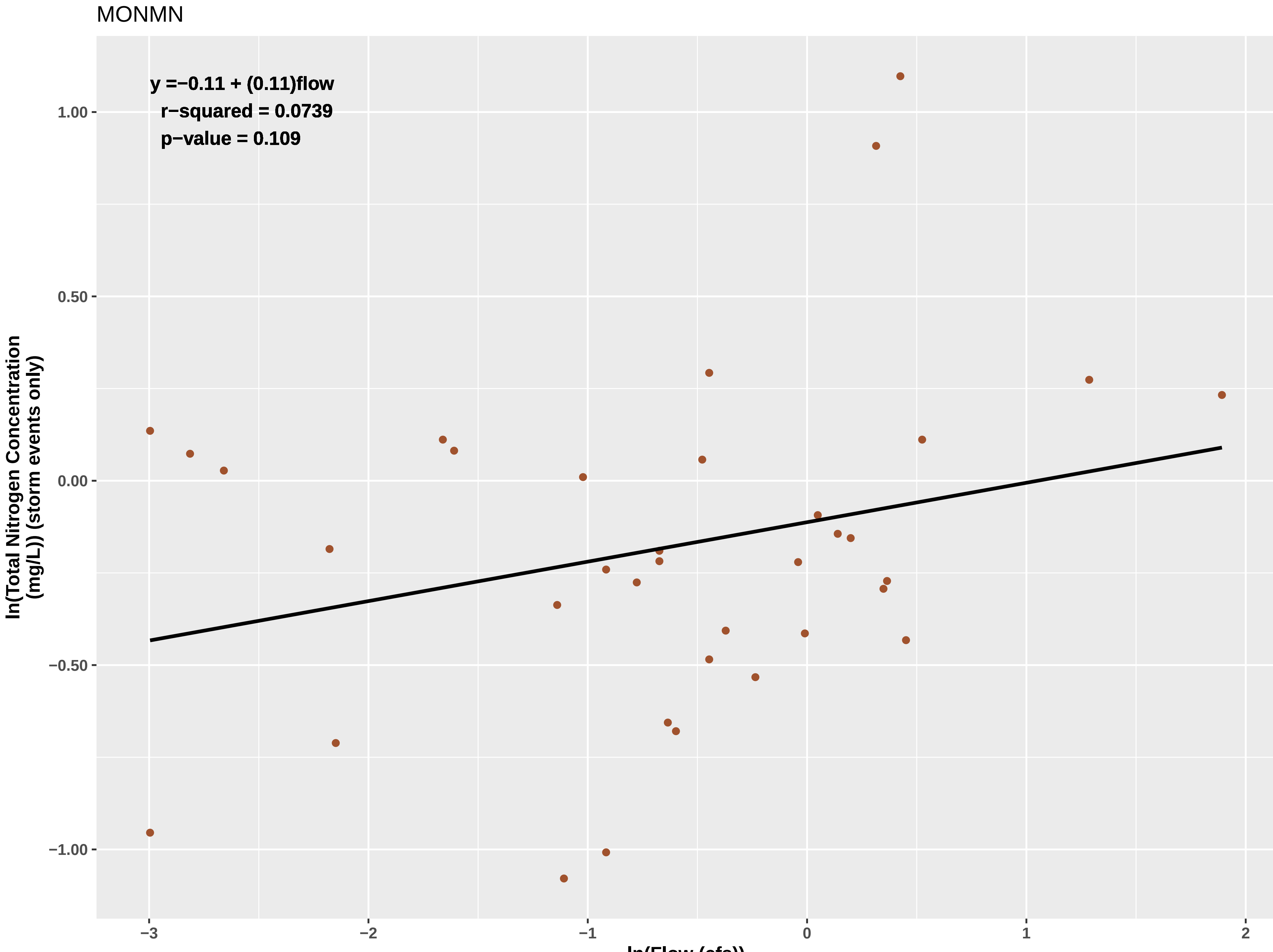

MONMN
y =−0.64 + (0.061)flow
r−squared = 0.0132
p−value = 0.504
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)
0.0
−1.0
−2.0
−3.0
−3
−2
−1
0
1
2
ln(Flow (cfs))


MONMN
y =−2.8 + (−0.15)flow
r−squared = 0.0521
p−value = 0.181
−1.0
−2.0
−3.0
−4.0
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
−3
−2
−1
0
1
2
ln(Flow (cfs))

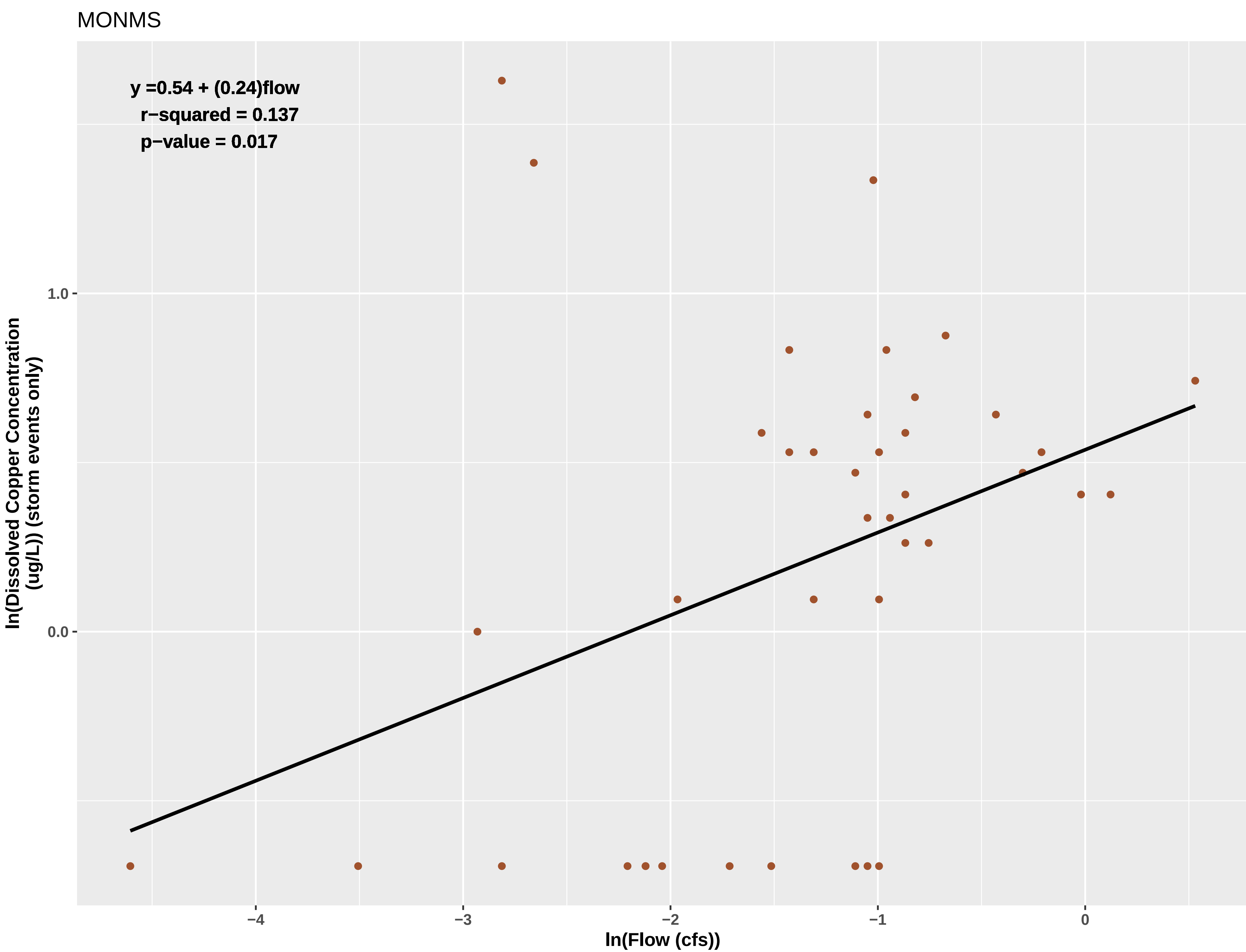

MONMN
y =2.9 + (0.025)flow
r−squared = 0.00098
p−value = 0.856
5.0
4.0
3.0
2.0
1.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
−3
−2
−1
0
1
2
ln(Flow (cfs))

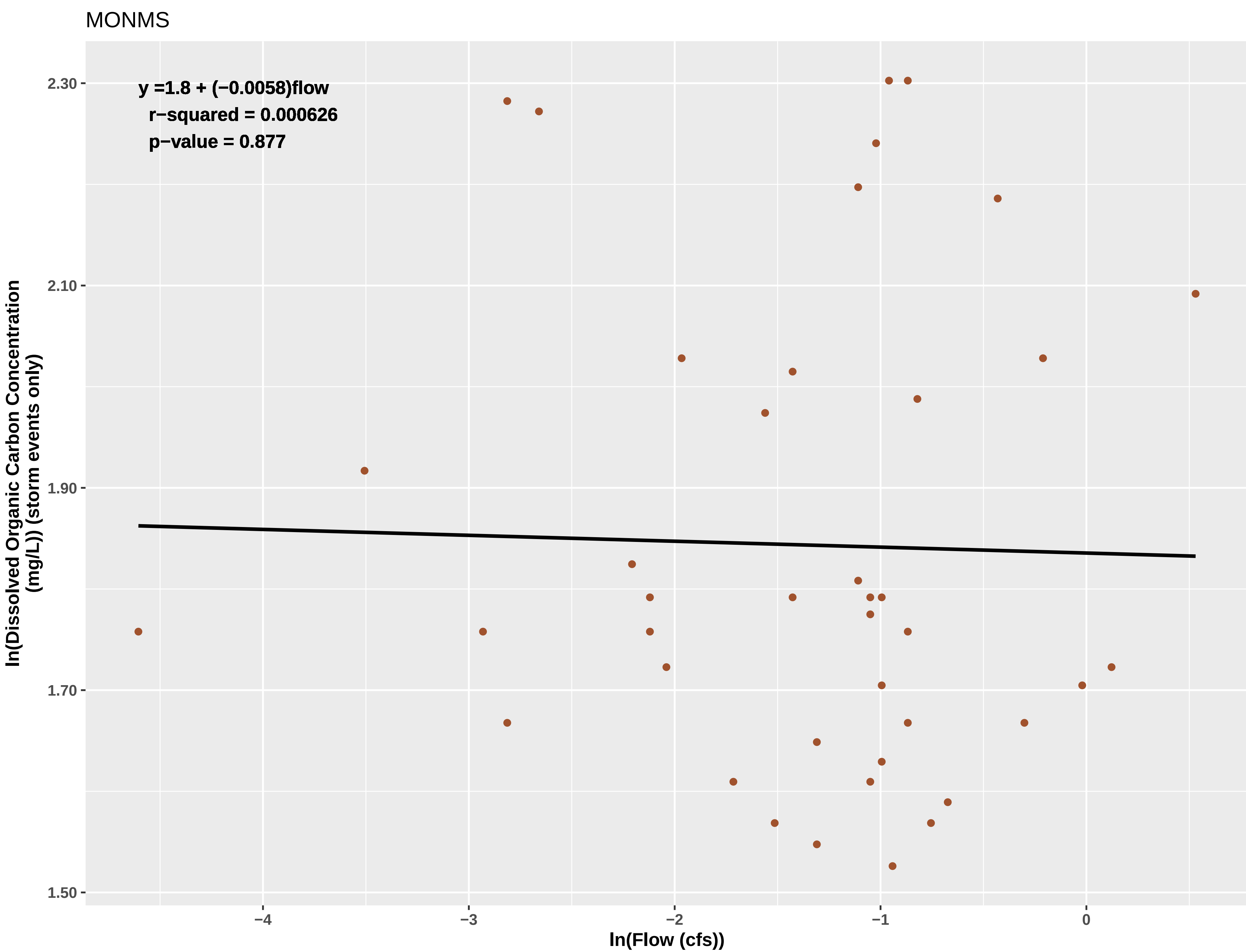

MONMN
y =2.4 + (−0.079)flow
r−squared = 0.0119
p−value = 0.527
4.0
3.0
2.0
1.0
−3
−2
−1
0
1
2
ln(Flow (cfs))
ln(Total Zinc Concentration (ug/L)) (storm events only)


MONMN
y =2.3 + (0.17)flow
r−squared = 0.0516
p−value = 0.183
4.0
3.0
2.0
1.0
ln(Turbidity Concentration (NTU)) (storm events only)
−3
−2
−1
0
1
2
ln(Flow (cfs))

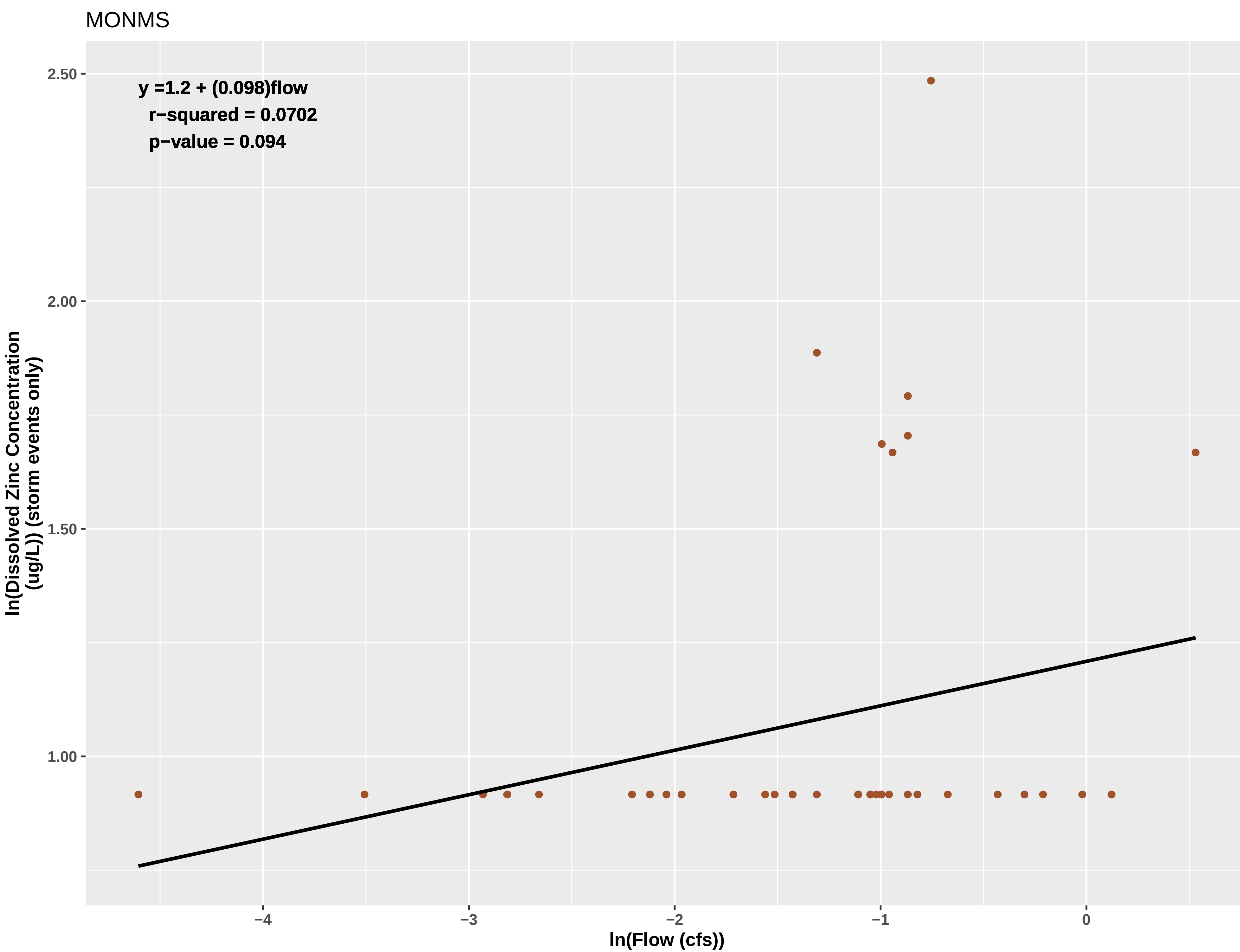


MONMN
y =−0.11 + (0.11)flow
r−squared = 0.0739
p−value = 0.109
1.00
0.50
0.00
−0.50
−1.00
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
−3
−2
−1
0
1
2
ln(Flow (cfs))

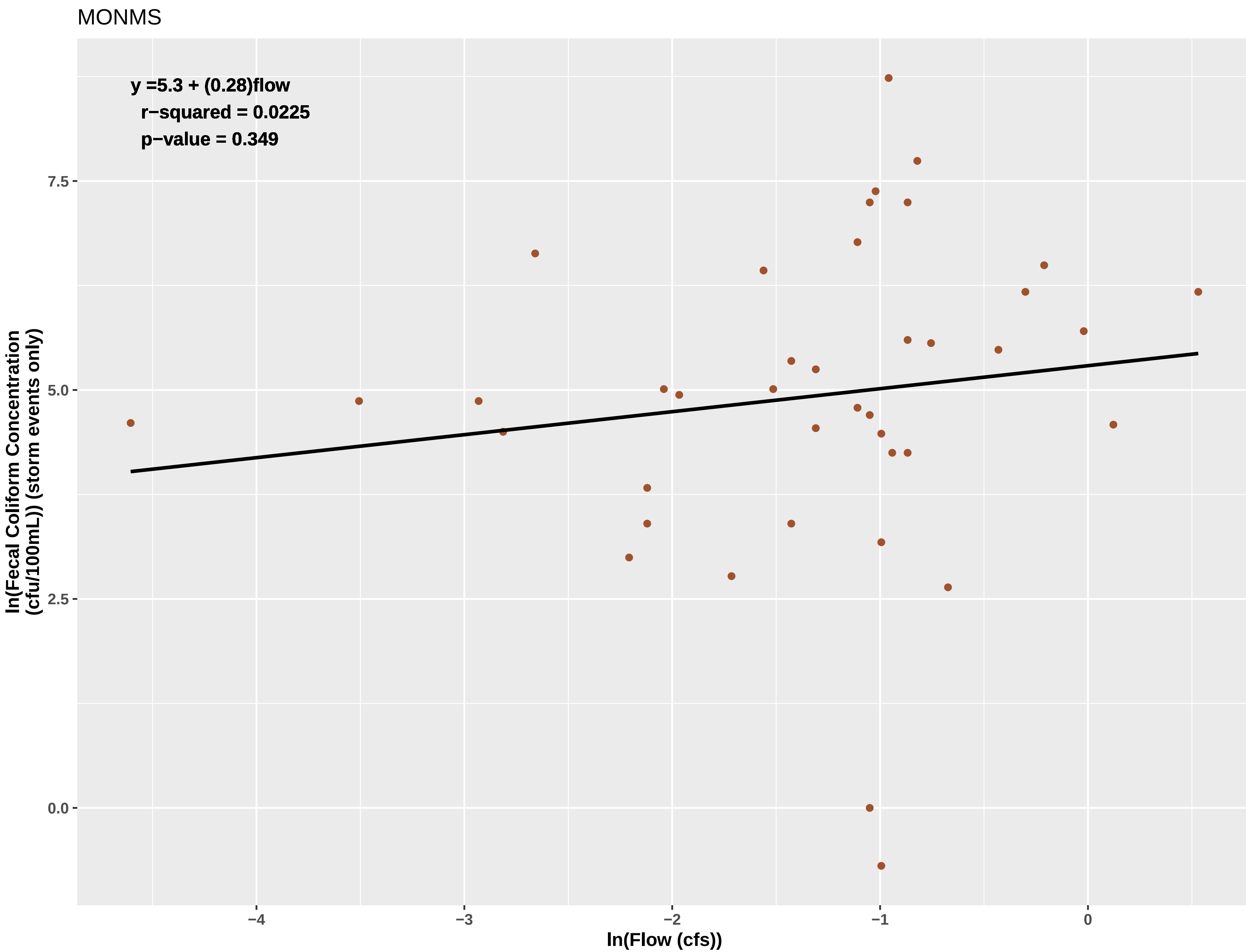

MONMS
y =0.54 + (0.24)flow
r−squared = 0.137
p−value = 0.017
1.0
0.0
ln(Dissolved Copper Concentration
(ug/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))



MONMS
y =1.8 + (−0.0058)flow
r−squared = 0.000626
p−value = 0.877
2.30
2.10
1.90
1.70
1.50
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)

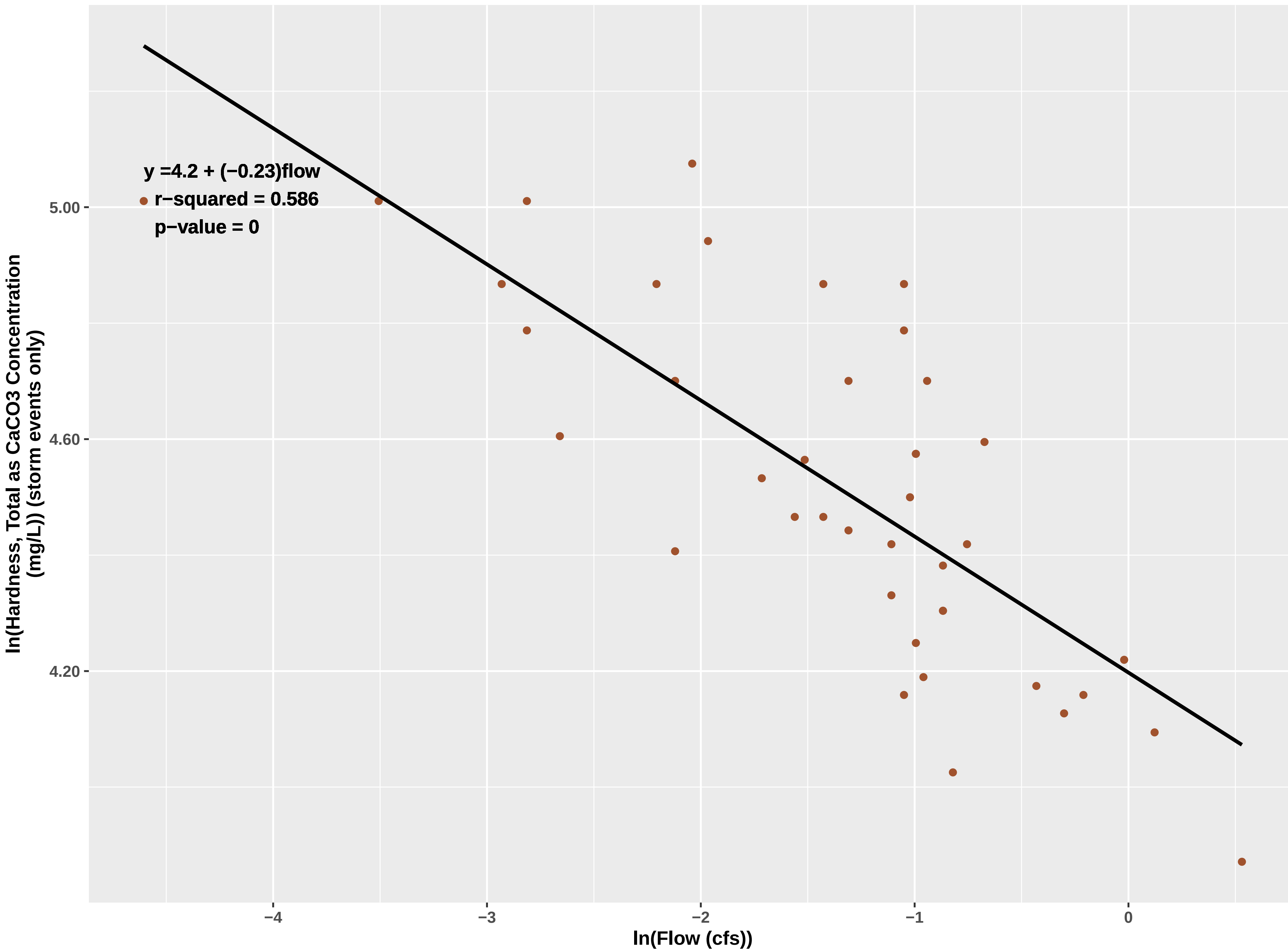


MONMS
y =1.2 + (0.098)flow
r−squared = 0.0702
p−value = 0.094
2.50
2.00
1.50
1.00
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))

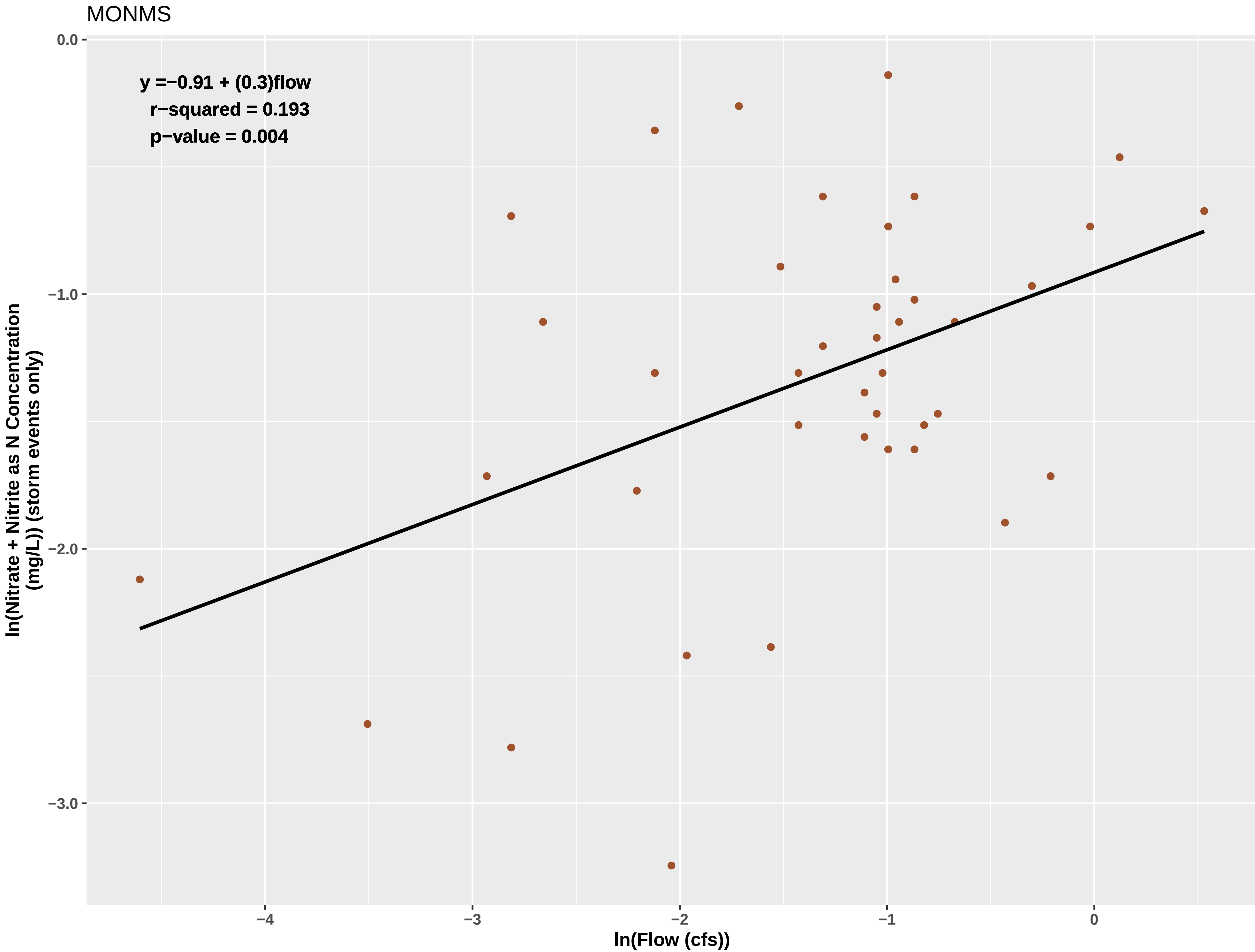


MONMS
y =5.3 + (0.28)flow
r−squared = 0.0225
p−value = 0.349
7.5
5.0
2.5
0.0
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)

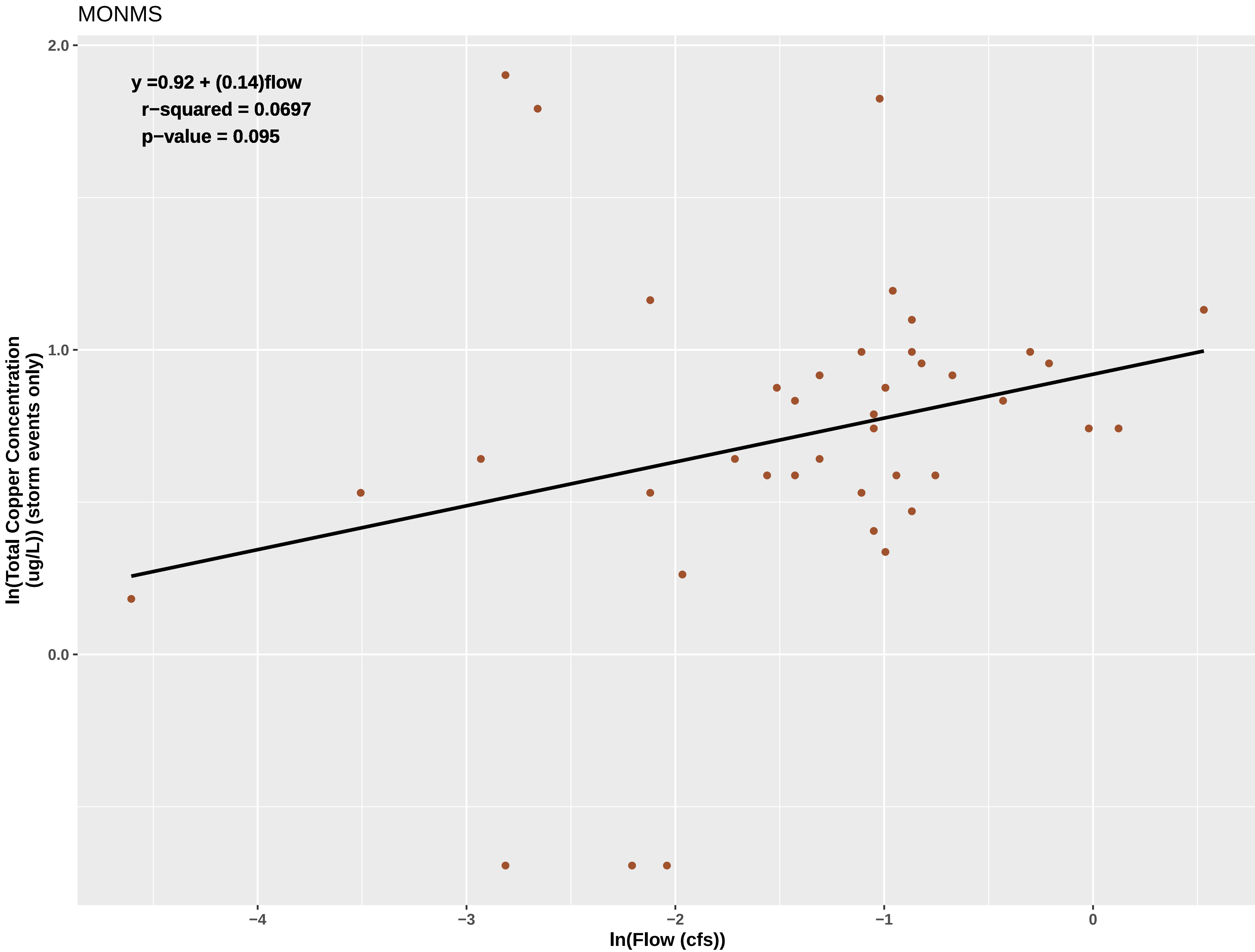
MONMS

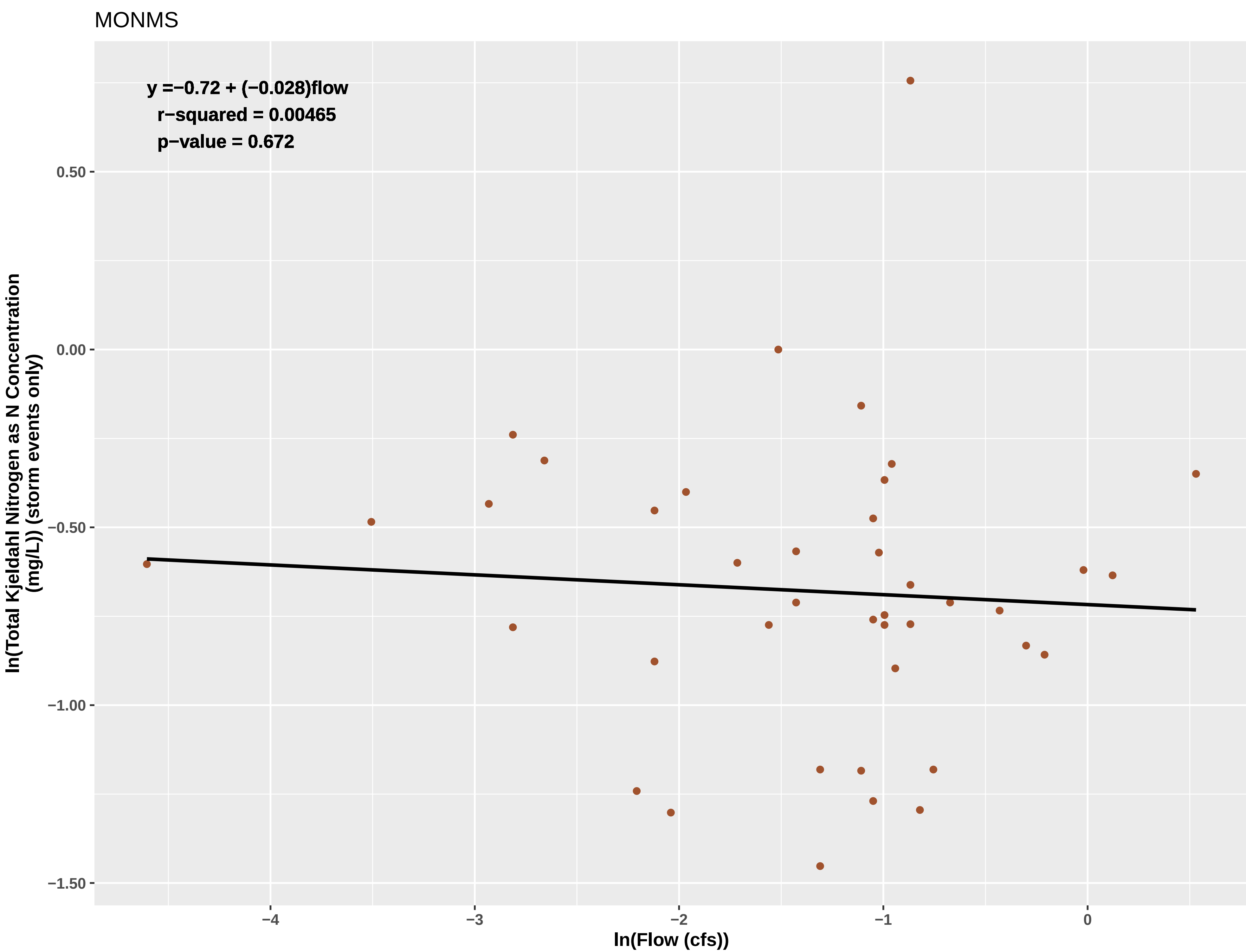


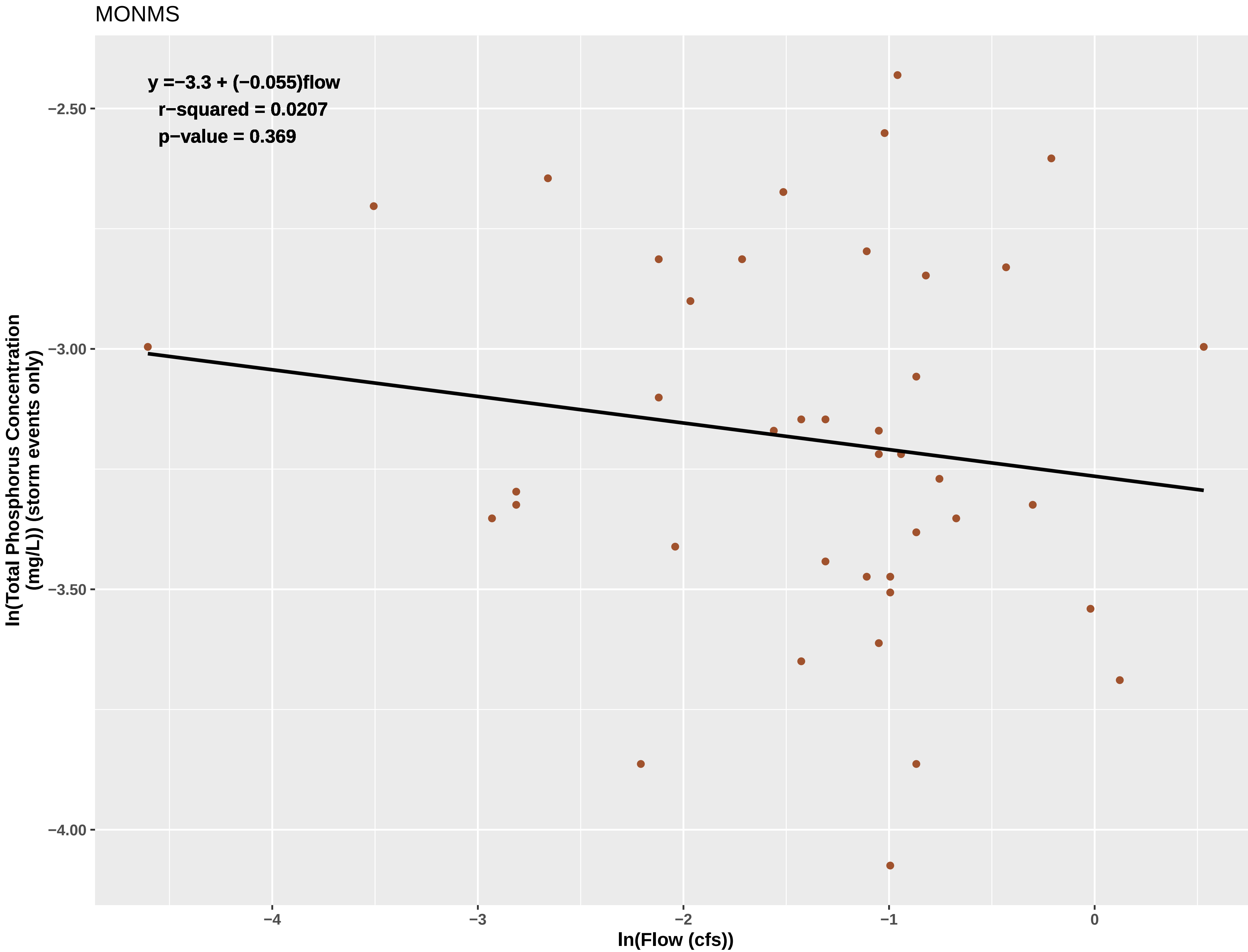
y =4.2 + (−0.23)flow
r−squared = 0.586
p−value = 0
5.00
4.60
4.20
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)



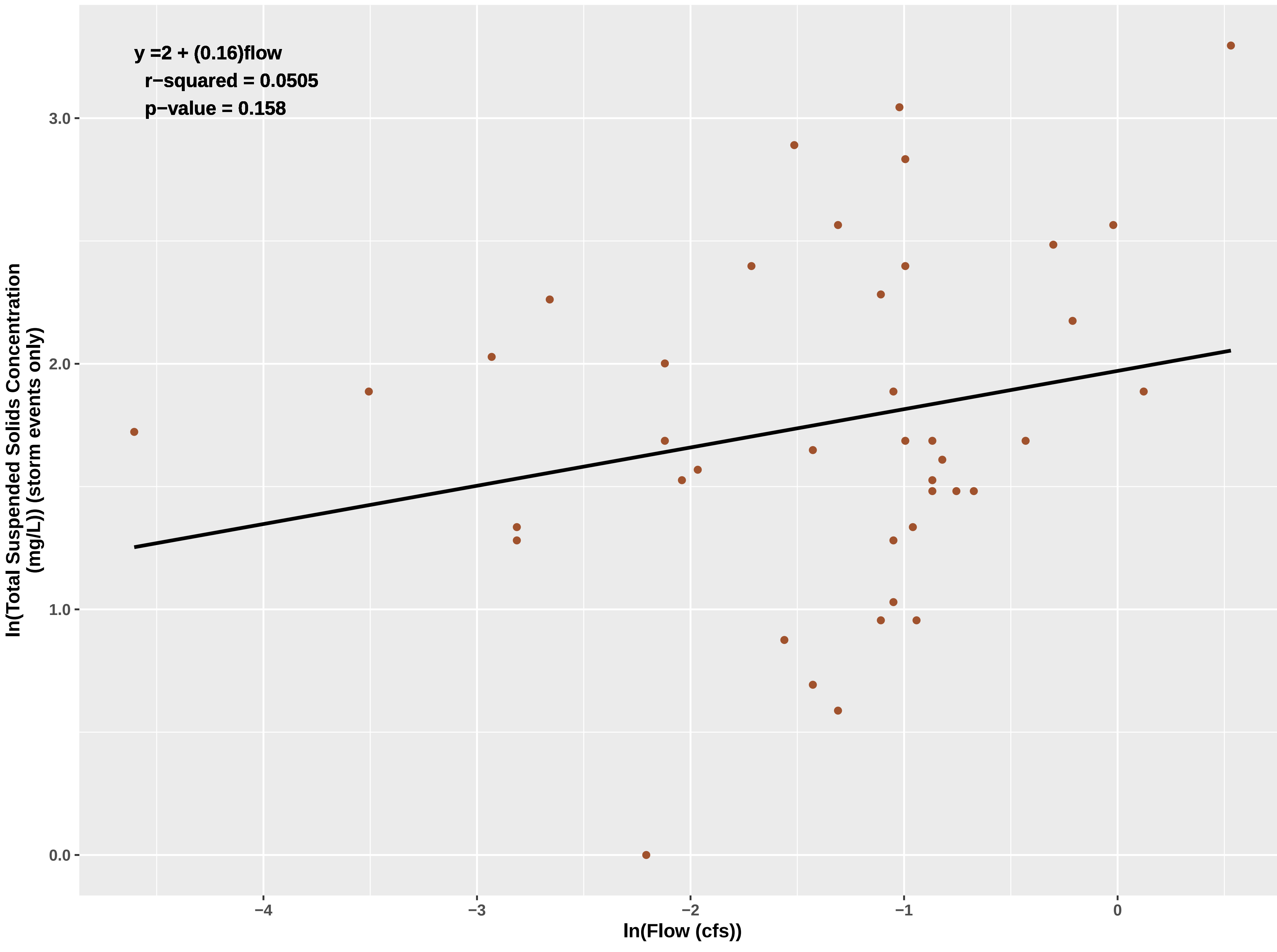
MONMS
y =−0.91 + (0.3)flow
r−squared = 0.193
p−value = 0.004
0.0
−1.0
−2.0
−3.0
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)


MONMS
y =0.92 + (0.14)flow
r−squared = 0.0697
p−value = 0.095
2.0
1.0
0.0
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Total Copper Concentration
(ug/L)) (storm events only)


MONMS
y =−0.72 + (−0.028)flow
r−squared = 0.00465
p−value = 0.672
0.50
0.00
−0.50
−1.00
−1.50
−4
−3
−2
−1
0
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

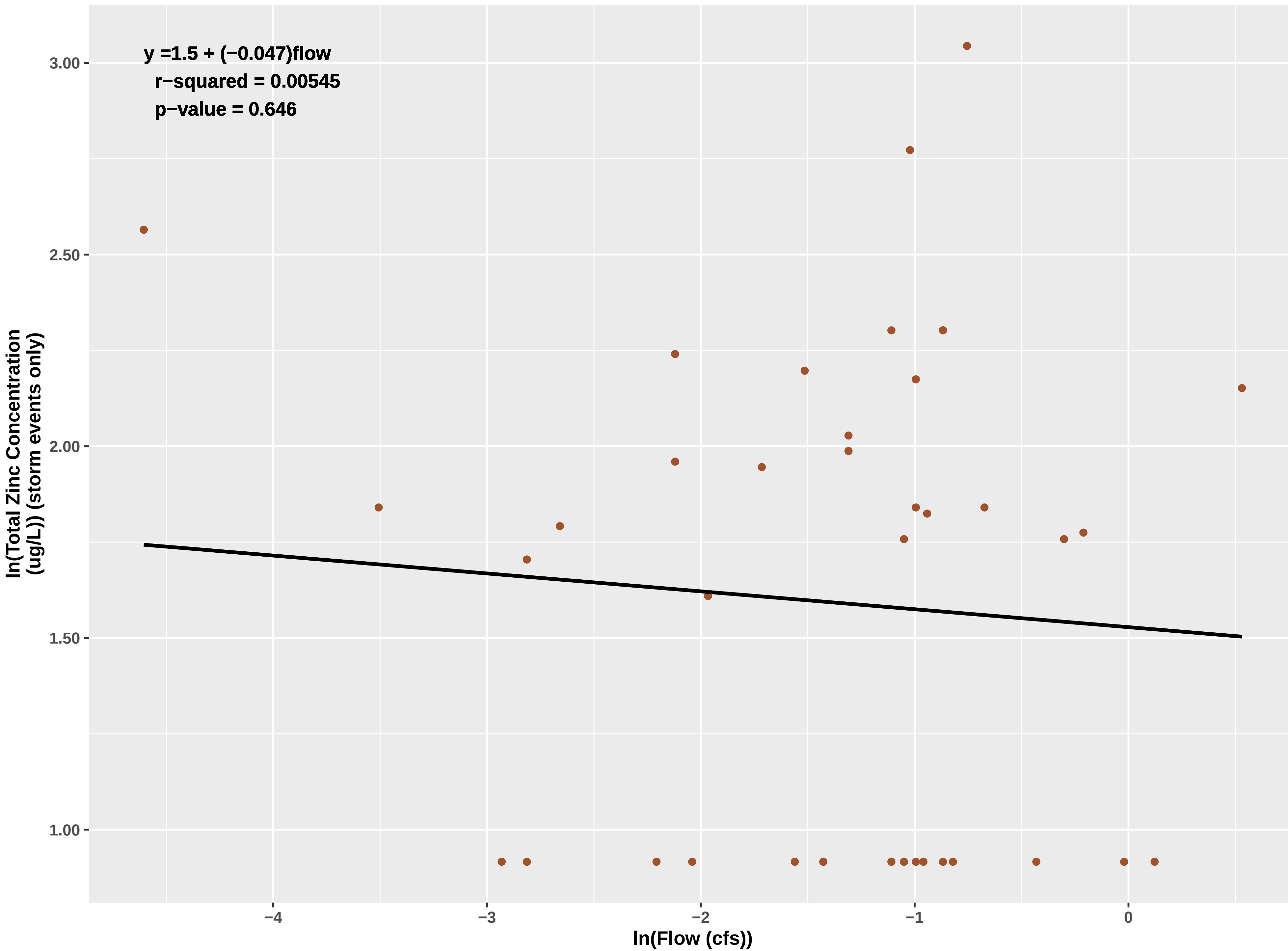

MONMS
y =−3.3 + (−0.055)flow
r−squared = 0.0207
p−value = 0.369
−2.50
−3.00
−3.50
−4.00
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Total Phosphorus Concentration (mg/L)) (storm events only)

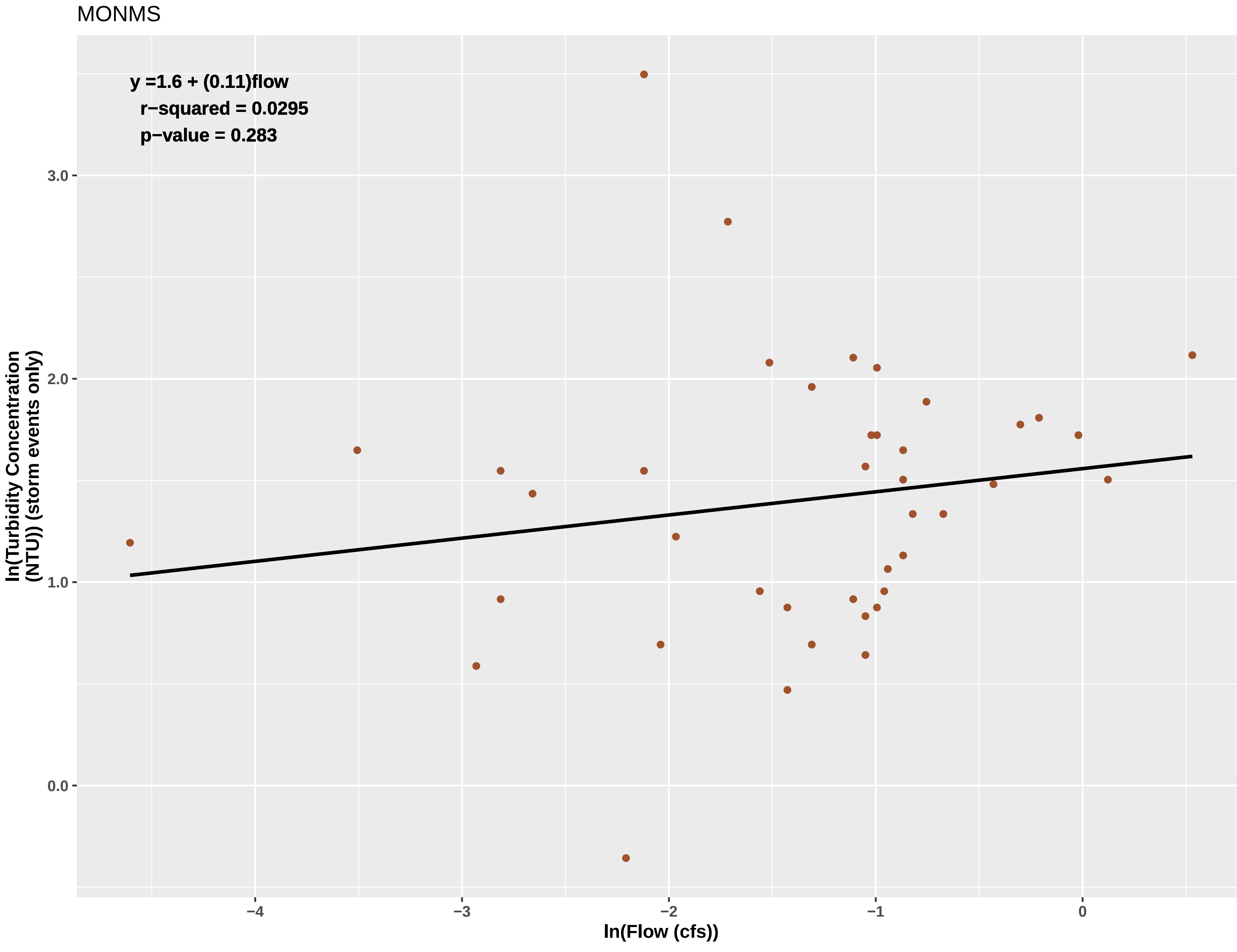
MONMS

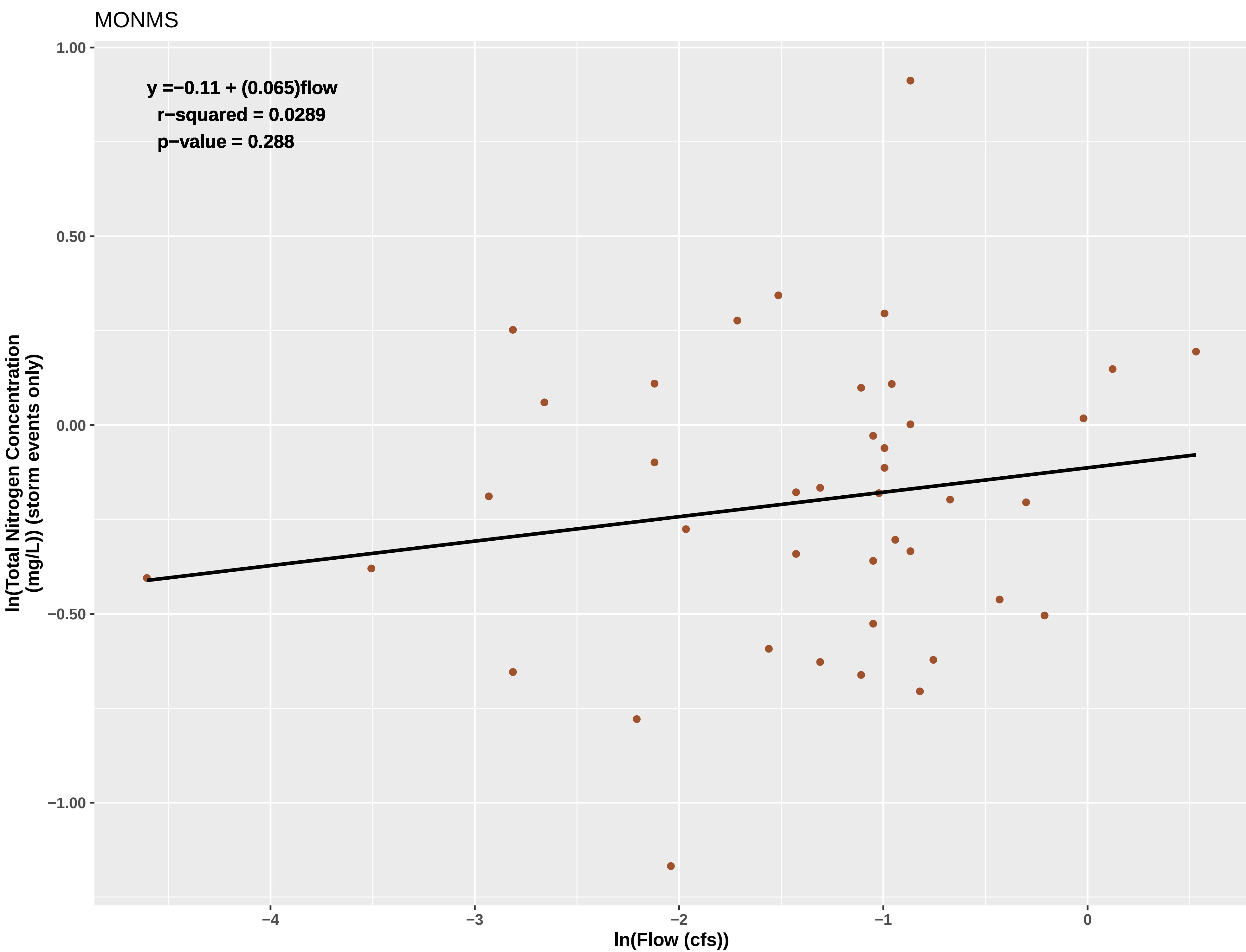


y =2 + (0.16)flow
r−squared = 0.0505
p−value = 0.158
3.0
2.0
1.0
0.0
−4
−3
−2
−1
0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

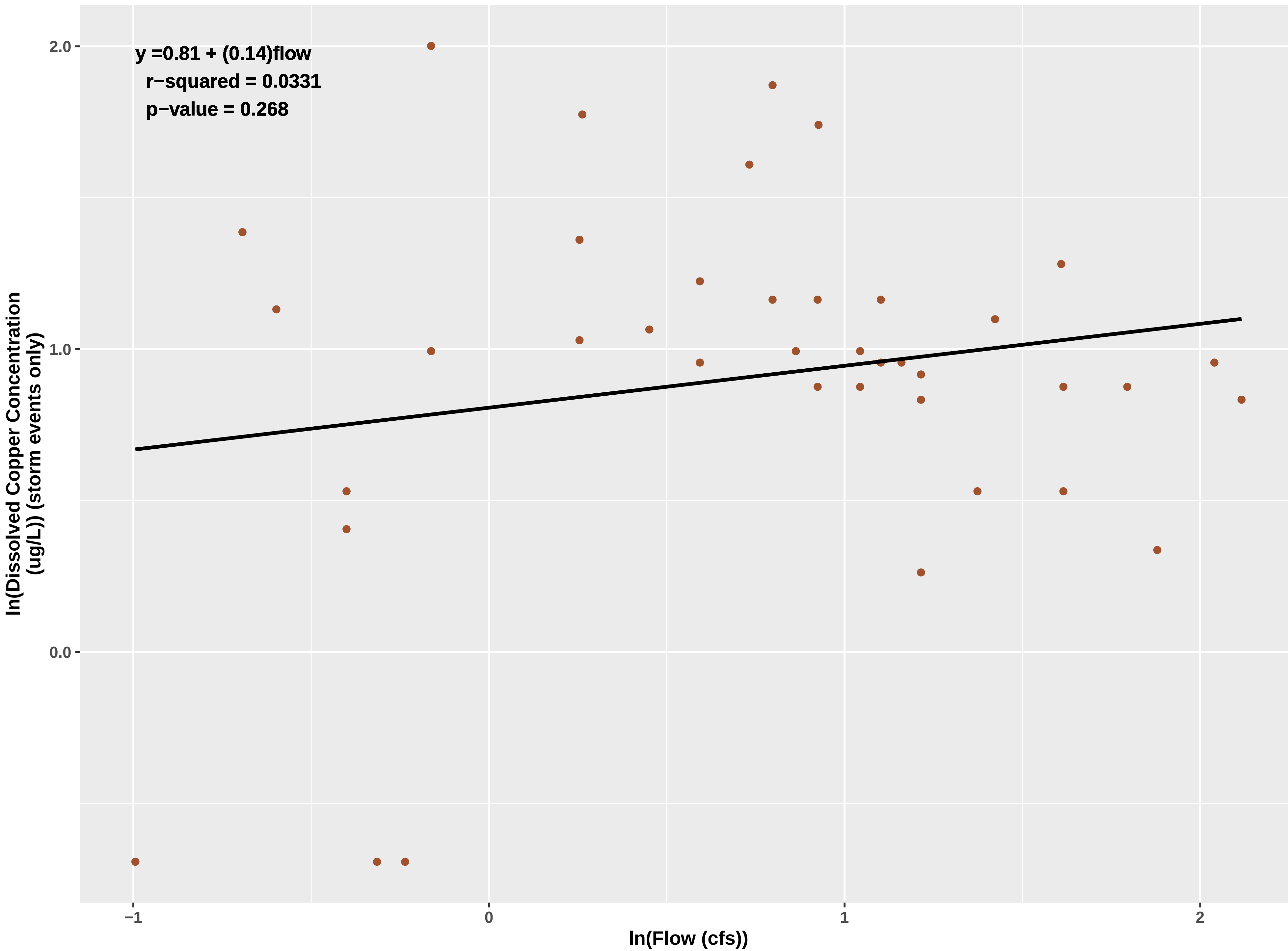
MONMS

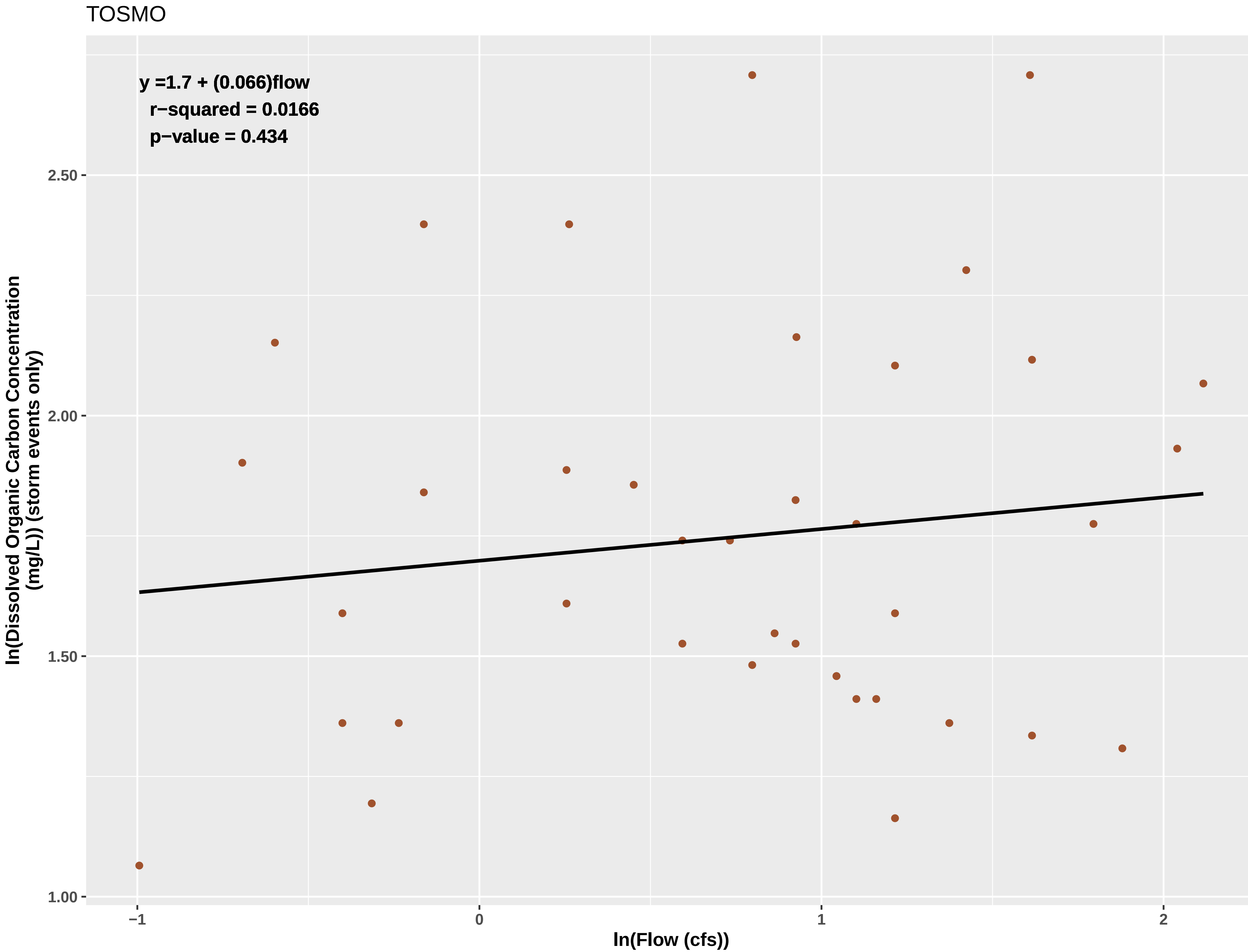

y =1.5 + (−0.047)flow
r−squared = 0.00545
p−value = 0.646
3.00
2.50
2.00
1.50
1.00
ln(Total Zinc Concentration (ug/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))


MONMS
y =1.6 + (0.11)flow
r−squared = 0.0295
p−value = 0.283
3.0
2.0
1.0
0.0
ln(Turbidity Concentration (NTU)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))


MONMS
y =−0.11 + (0.065)flow
r−squared = 0.0289
p−value = 0.288
1.00
0.50
0.00
−0.50
−1.00
ln(Total Nitrogen Concentration
(mg/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))

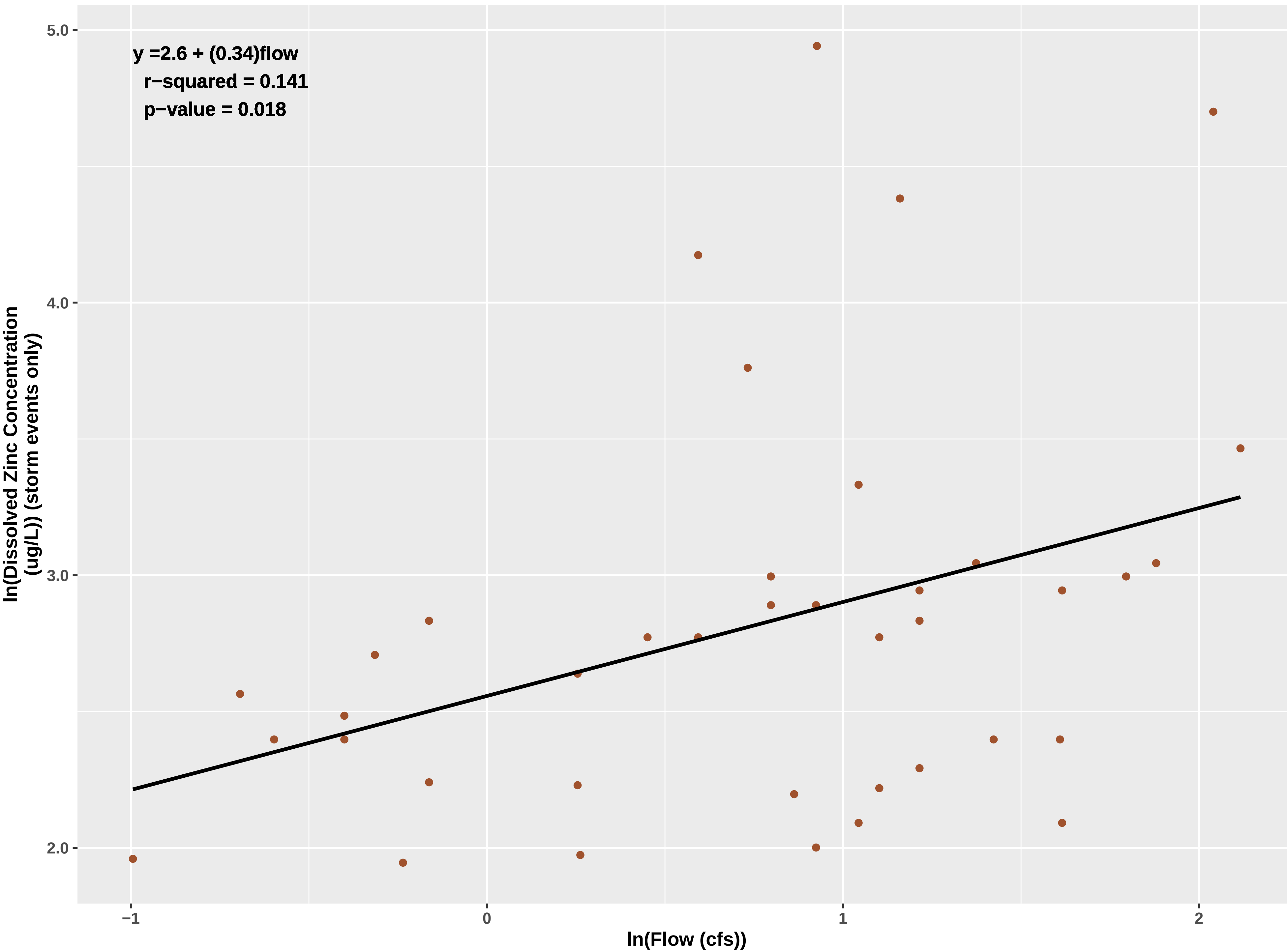
TOSMO


y =0.81 + (0.14)flow
r−squared = 0.0331
p−value = 0.268
2.0
1.0
0.0
−1
0
1
2
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
ln(Flow (cfs))

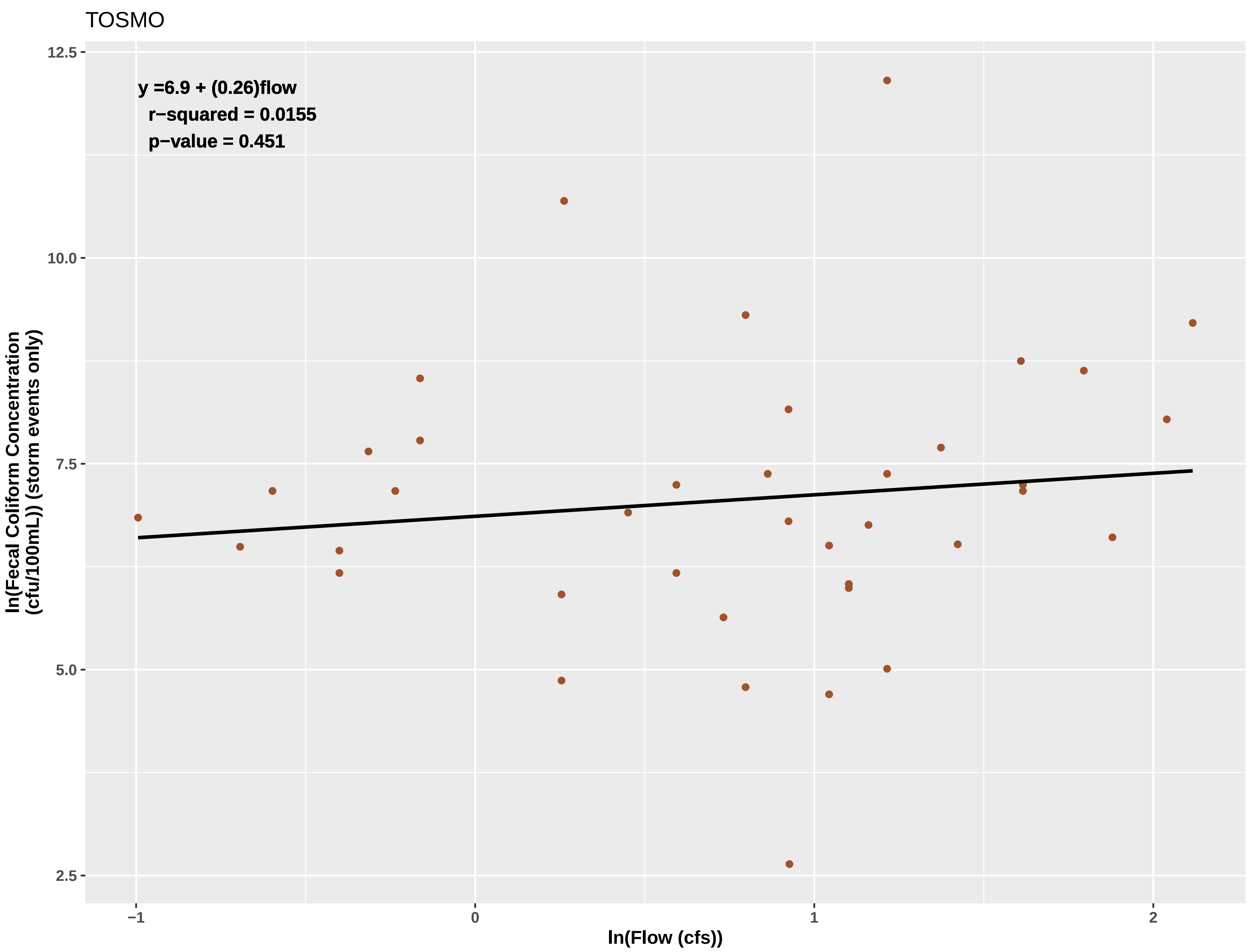


TOSMO
y =1.7 + (0.066)flow
r−squared = 0.0166
p−value = 0.434
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
2.50
2.00
1.50
1.00
−1
0
1
2
ln(Flow (cfs))

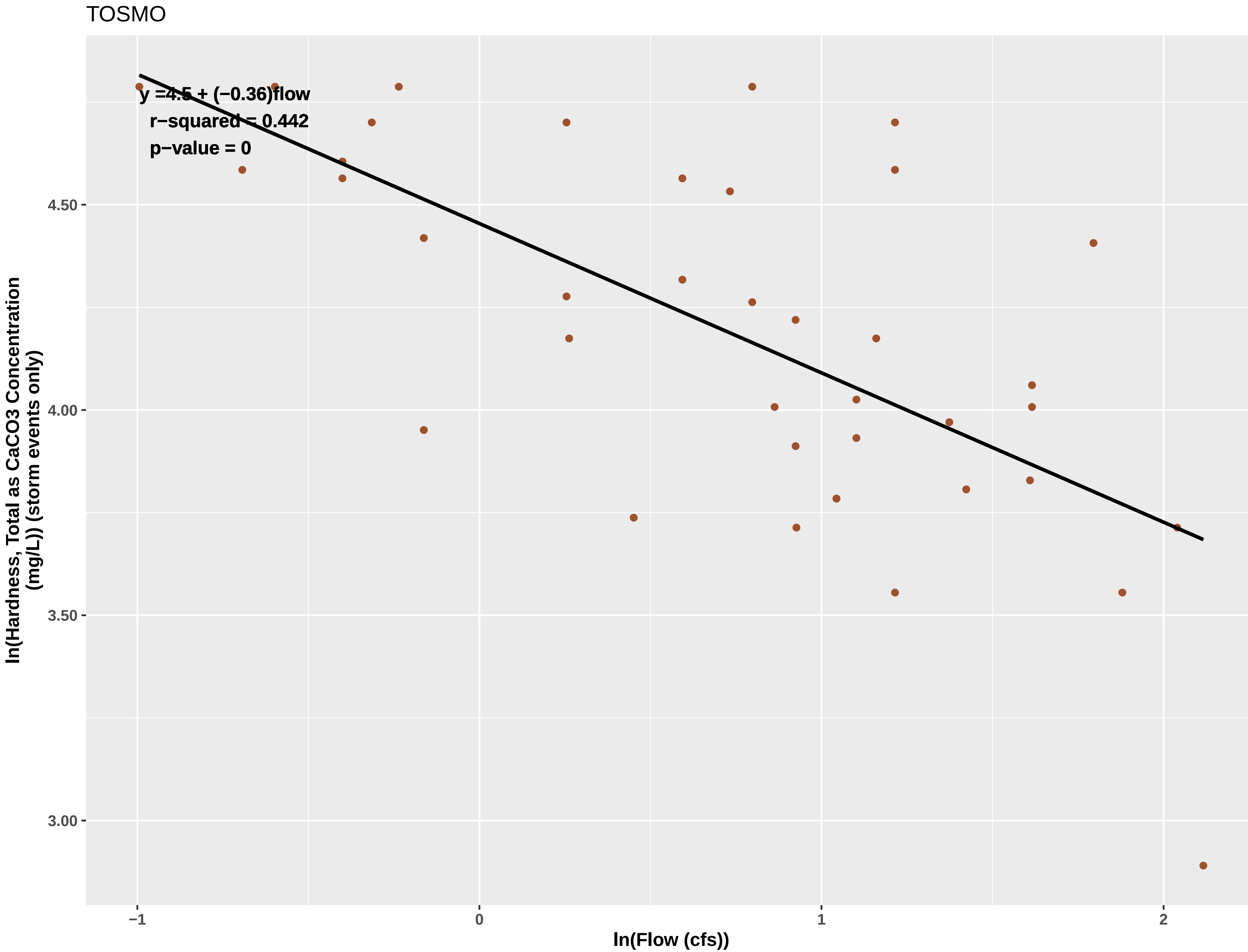
TOSMO

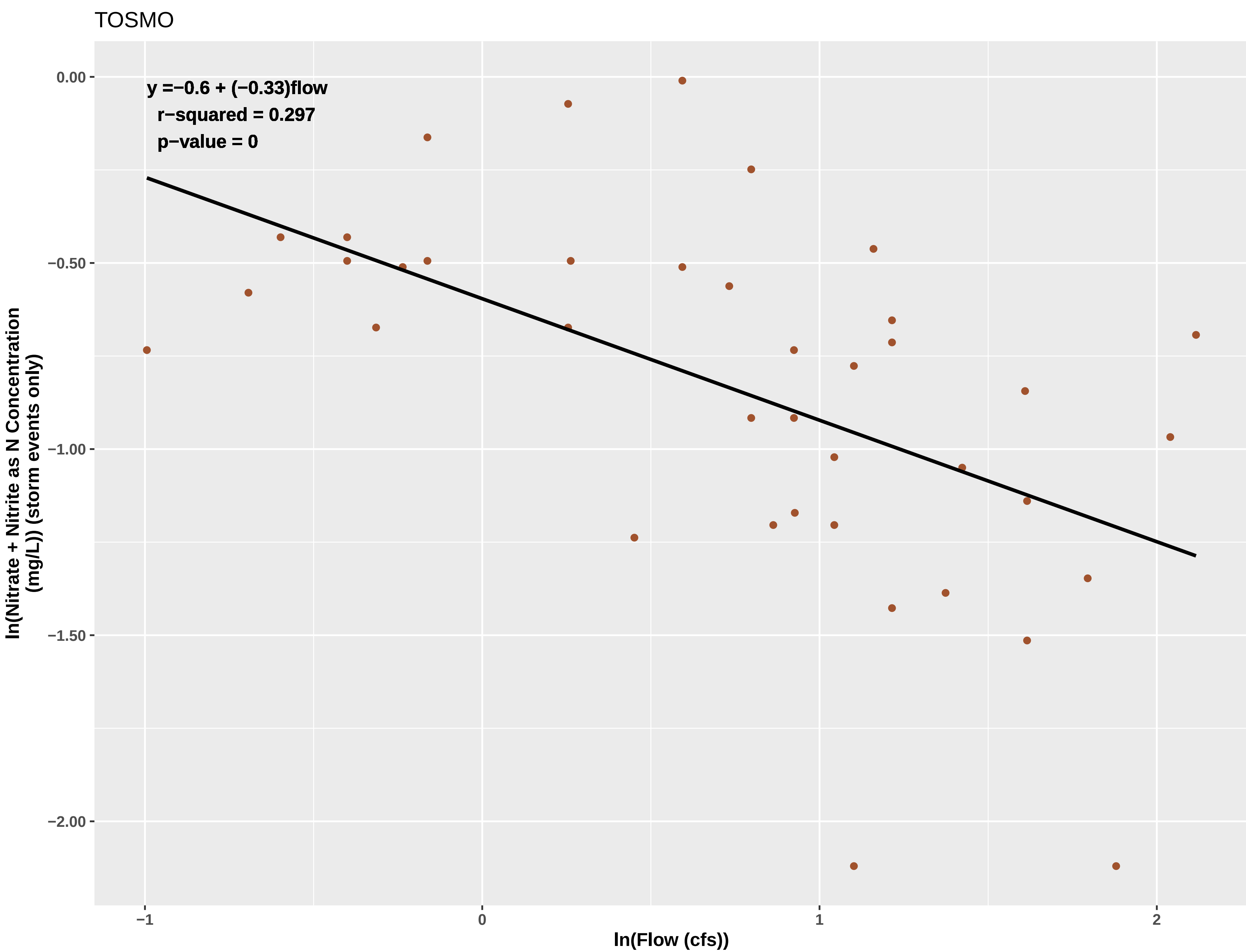


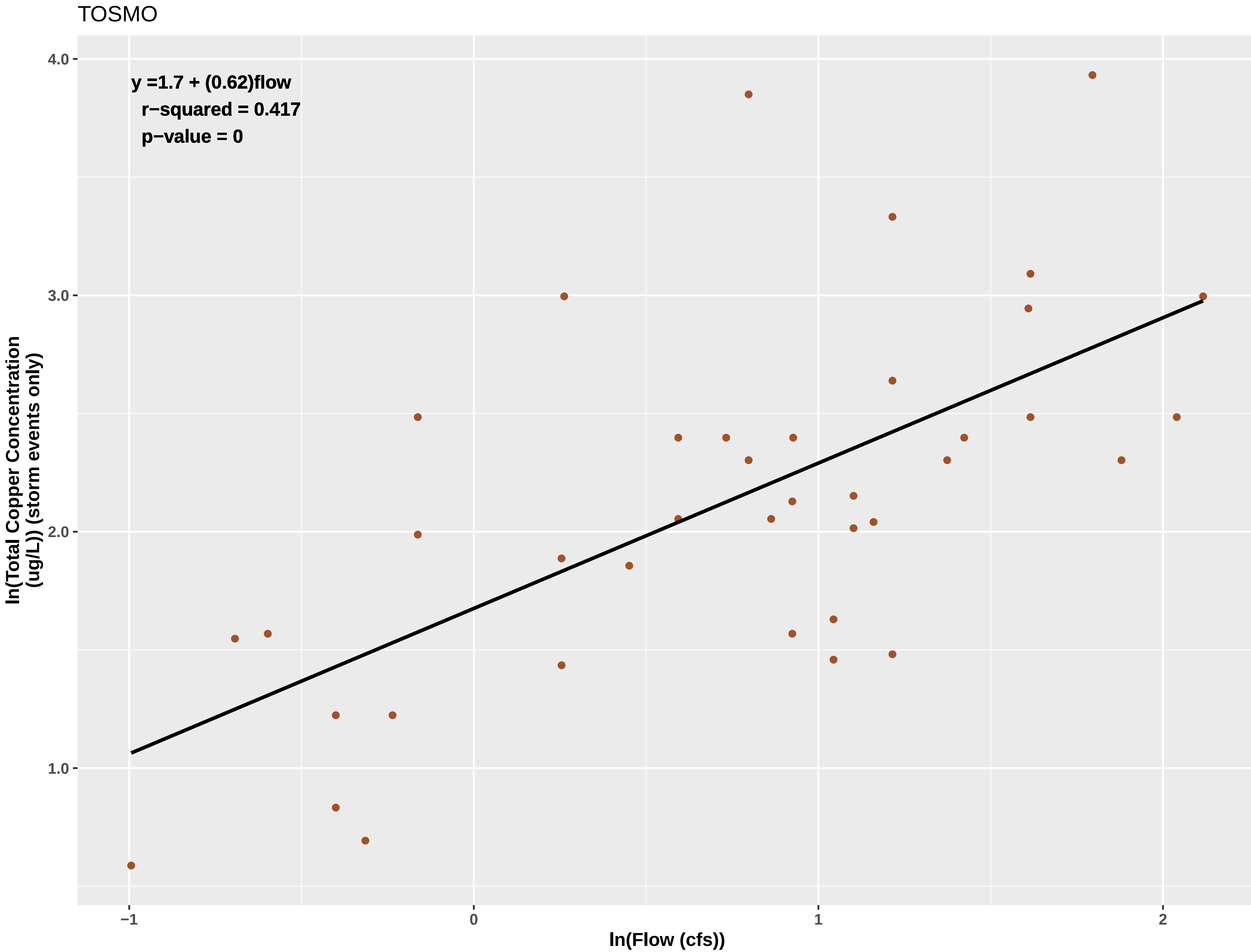
y =2.6 + (0.34)flow
r−squared = 0.141
p−value = 0.018
5.0
4.0
3.0
2.0
−1
0
1
2
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
ln(Flow (cfs))

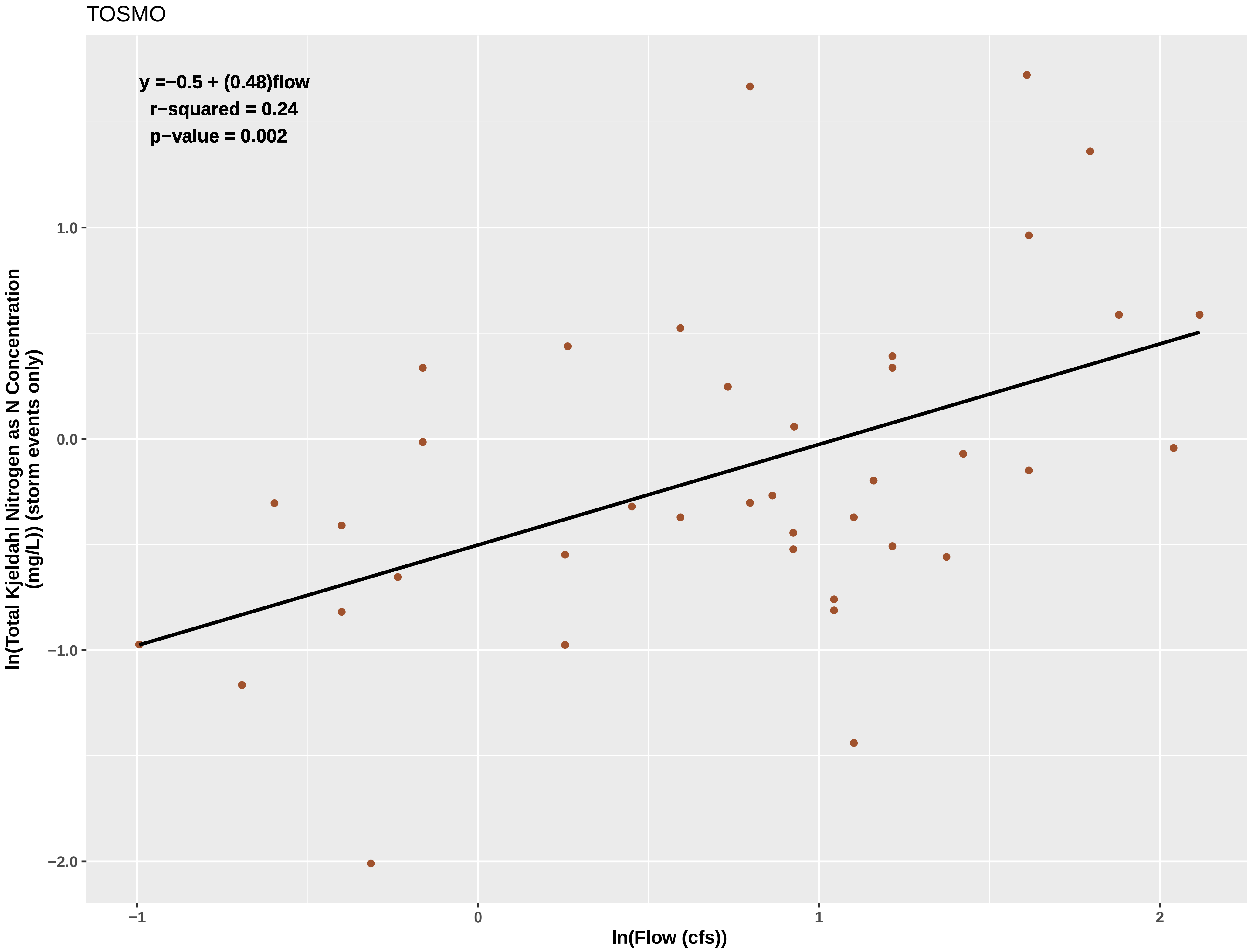


TOSMO
y =6.9 + (0.26)flow
r−squared = 0.0155
p−value = 0.451
12.5
10.0
7.5
5.0
2.5
−1
0
1
2
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
ln(Flow (cfs))

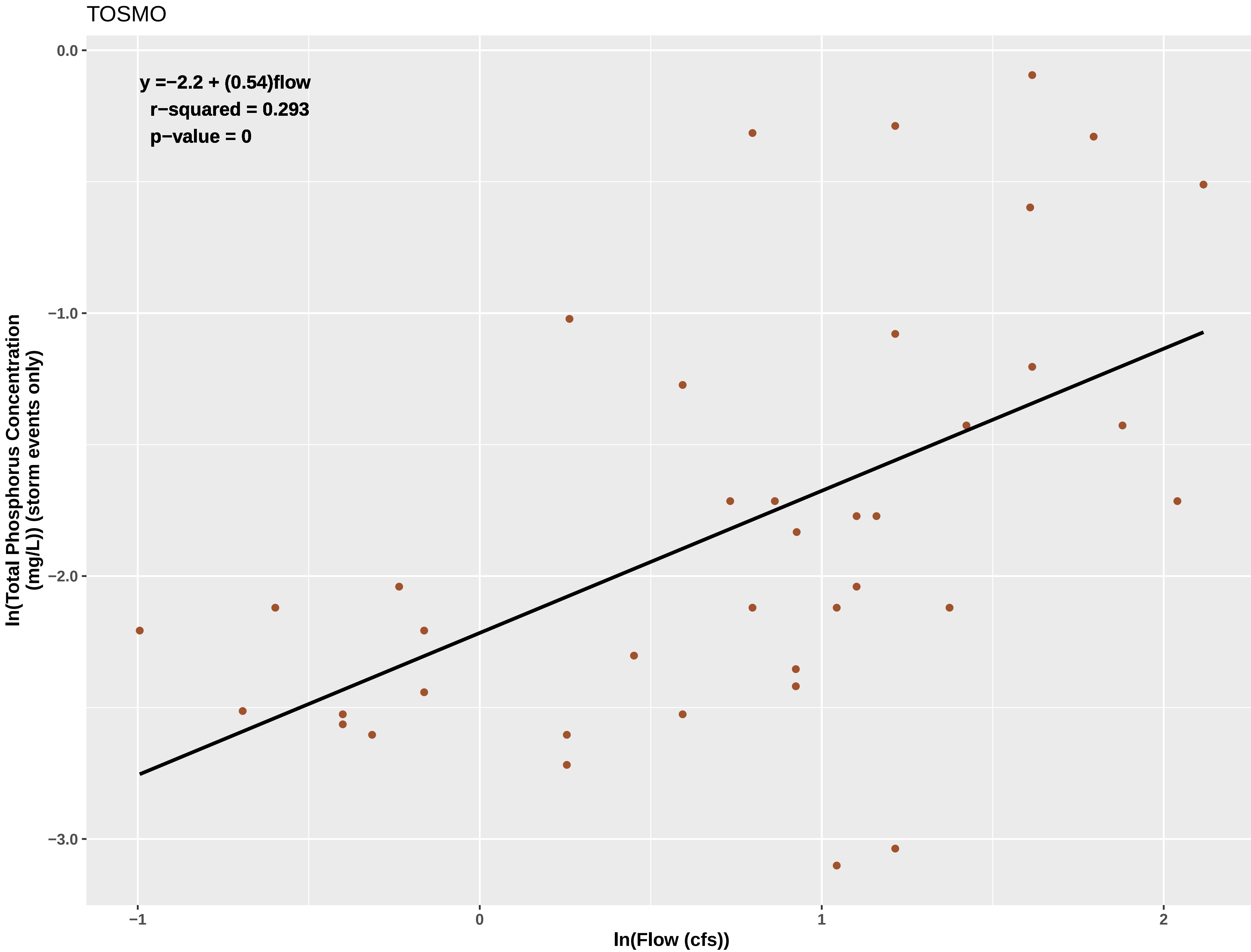

TOSMO
y =4.5 + (−0.36)flow
r−squared = 0.442
p−value = 0
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
4.50
4.00
3.50
3.00
−1
0
1
2
ln(Flow (cfs))

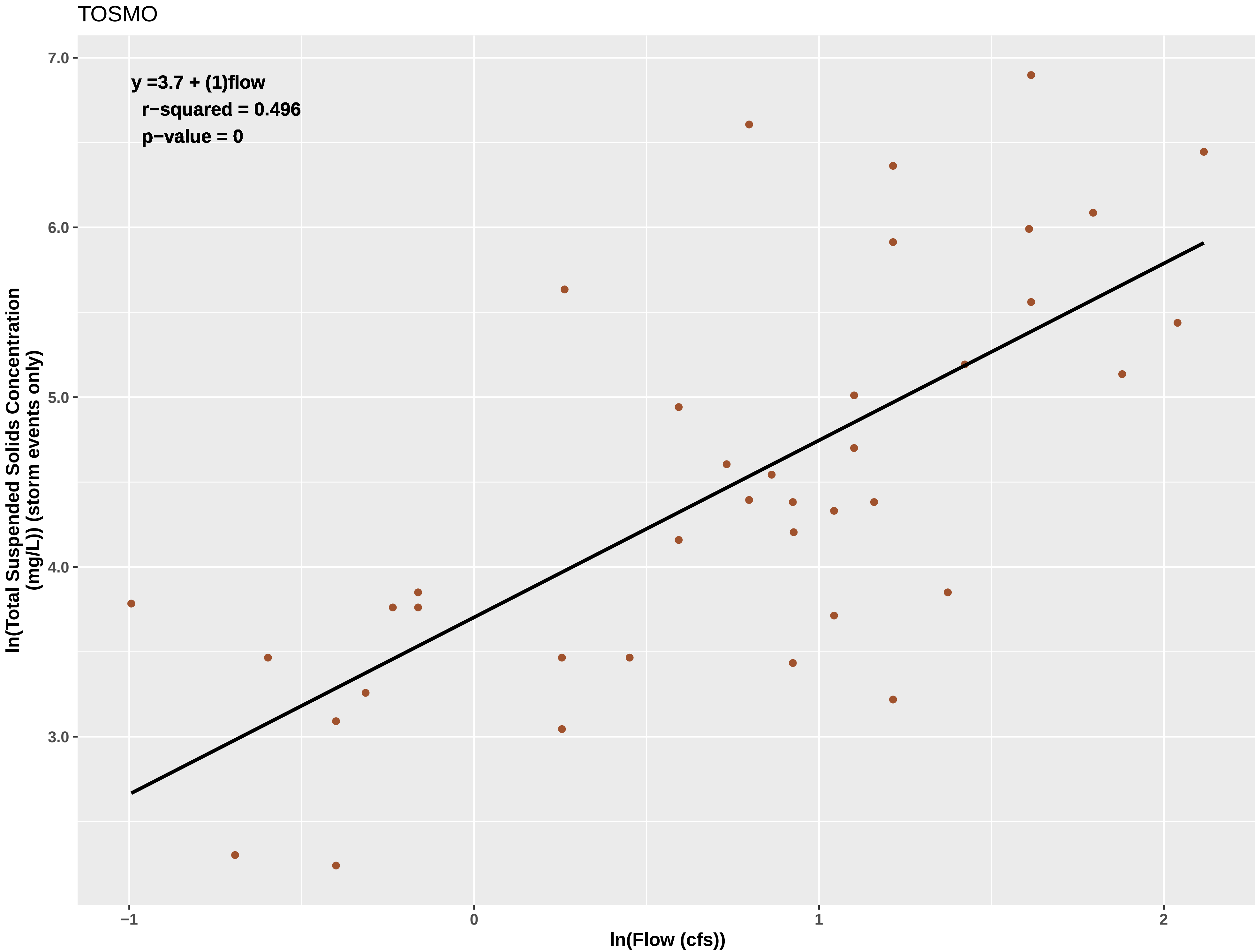

TOSMO
y =−0.6 + (−0.33)flow
r−squared = 0.297
p−value = 0
0.00
−0.50
−1.00
−1.50
−2.00
−1
0
1
2
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

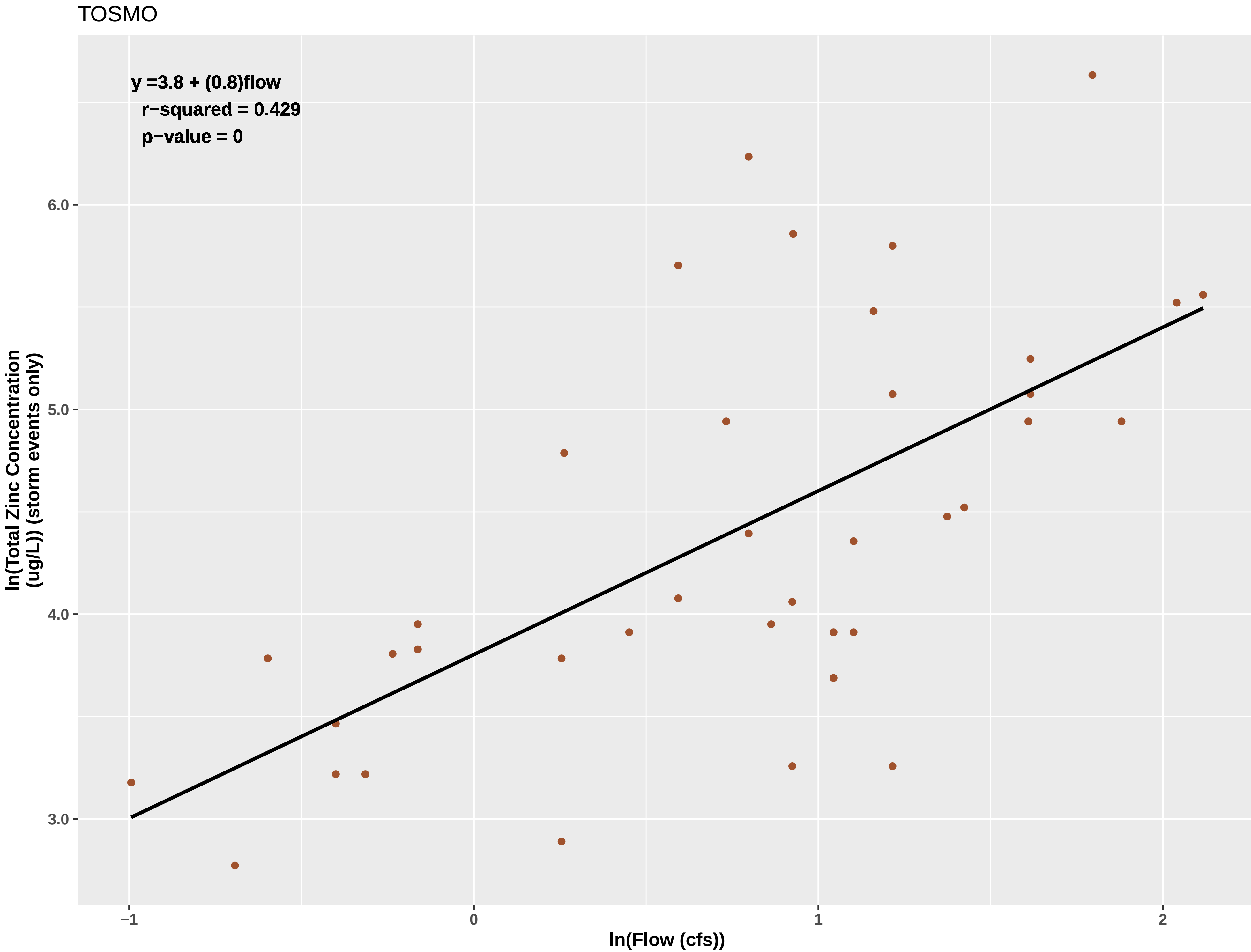

TOSMO
y =1.7 + (0.62)flow
r−squared = 0.417
p−value = 0
4.0
3.0
2.0
1.0
−1
0
1
2
ln(Total Copper Concentration (ug/L)) (storm events only)
ln(Flow (cfs))



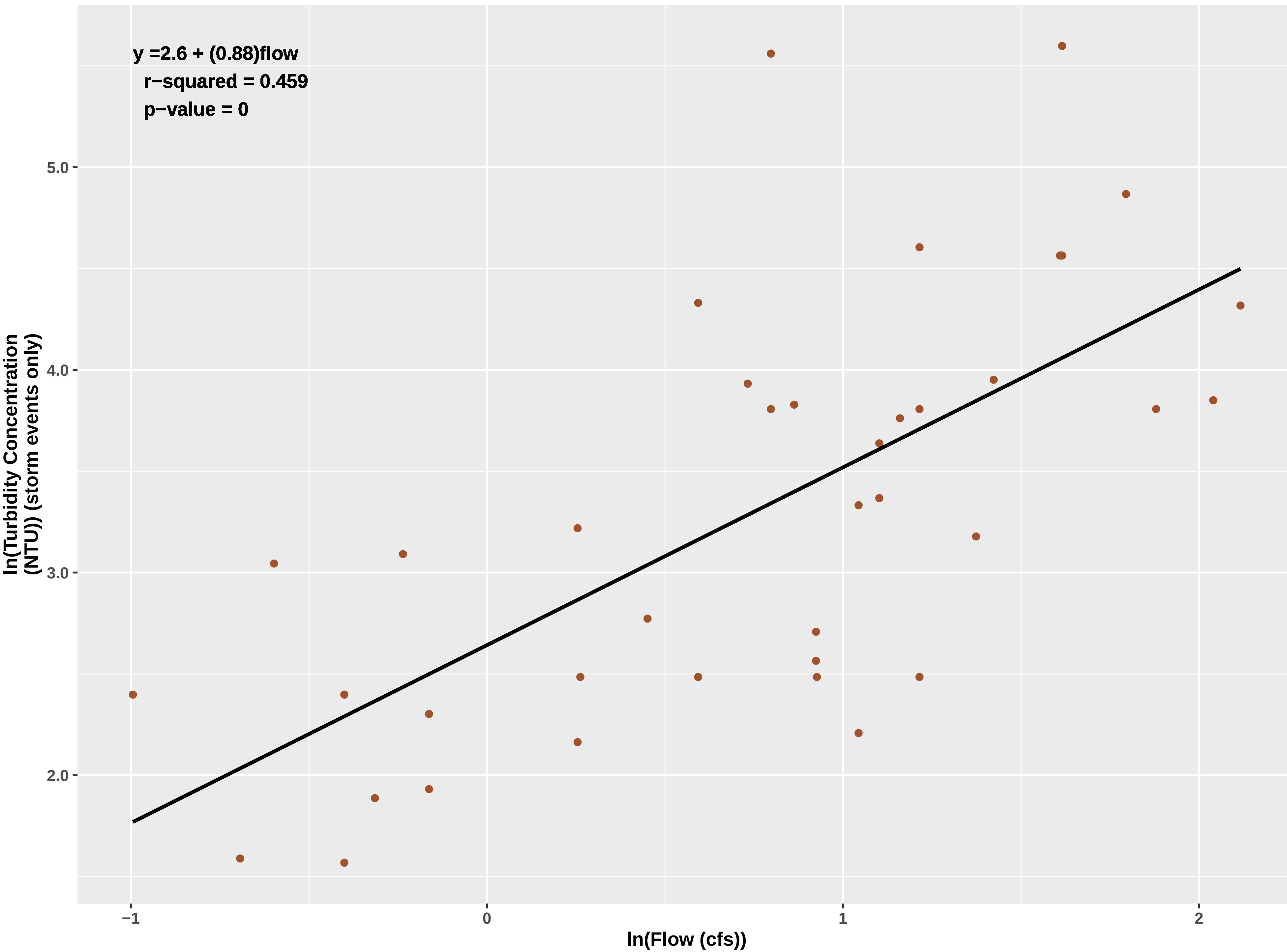
TOSMO
y =−0.5 + (0.48)flow
r−squared = 0.24
p−value = 0.002
1.0
0.0
−1.0
−2.0
−1
0
1
2
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration
(mg/L)) (storm events only)


TOSMO
y =−2.2 + (0.54)flow
r−squared = 0.293
p−value = 0
0.0
−1.0
−2.0
−3.0
−1
0
1
2
ln(Flow (cfs))
ln(Total Phosphorus Concentration (mg/L)) (storm events only)

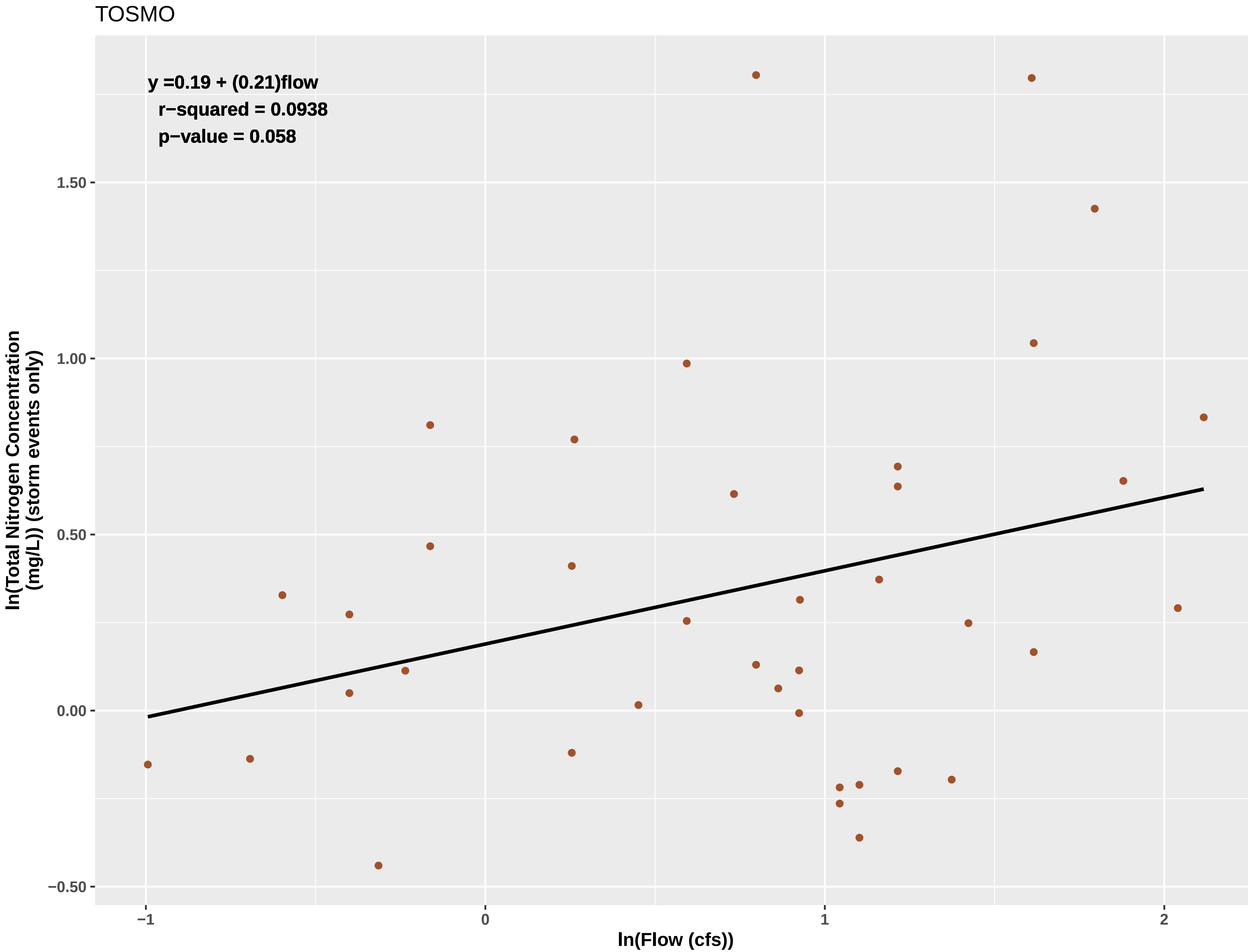

TOSMO
y =3.7 + (1)flow
r−squared = 0.496
p−value = 0
7.0
6.0
5.0
4.0
3.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
−1
0
1
2
ln(Flow (cfs))


TOSMO
y =3.8 + (0.8)flow
r−squared = 0.429
p−value = 0
6.0
5.0
4.0
3.0
−1
0
1
2
ln(Flow (cfs))
ln(Total Zinc Concentration (ug/L)) (storm events only)

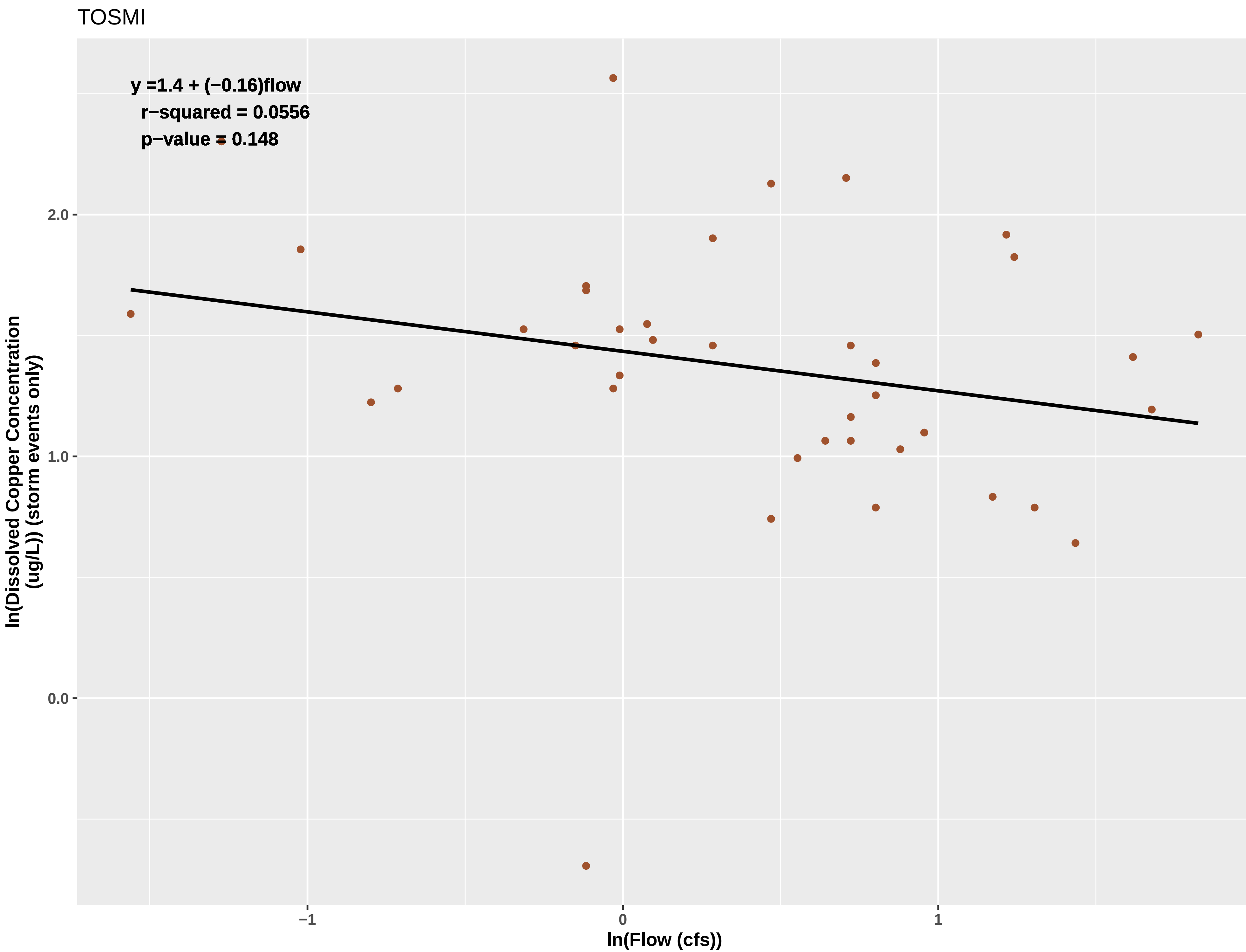
TOSMO

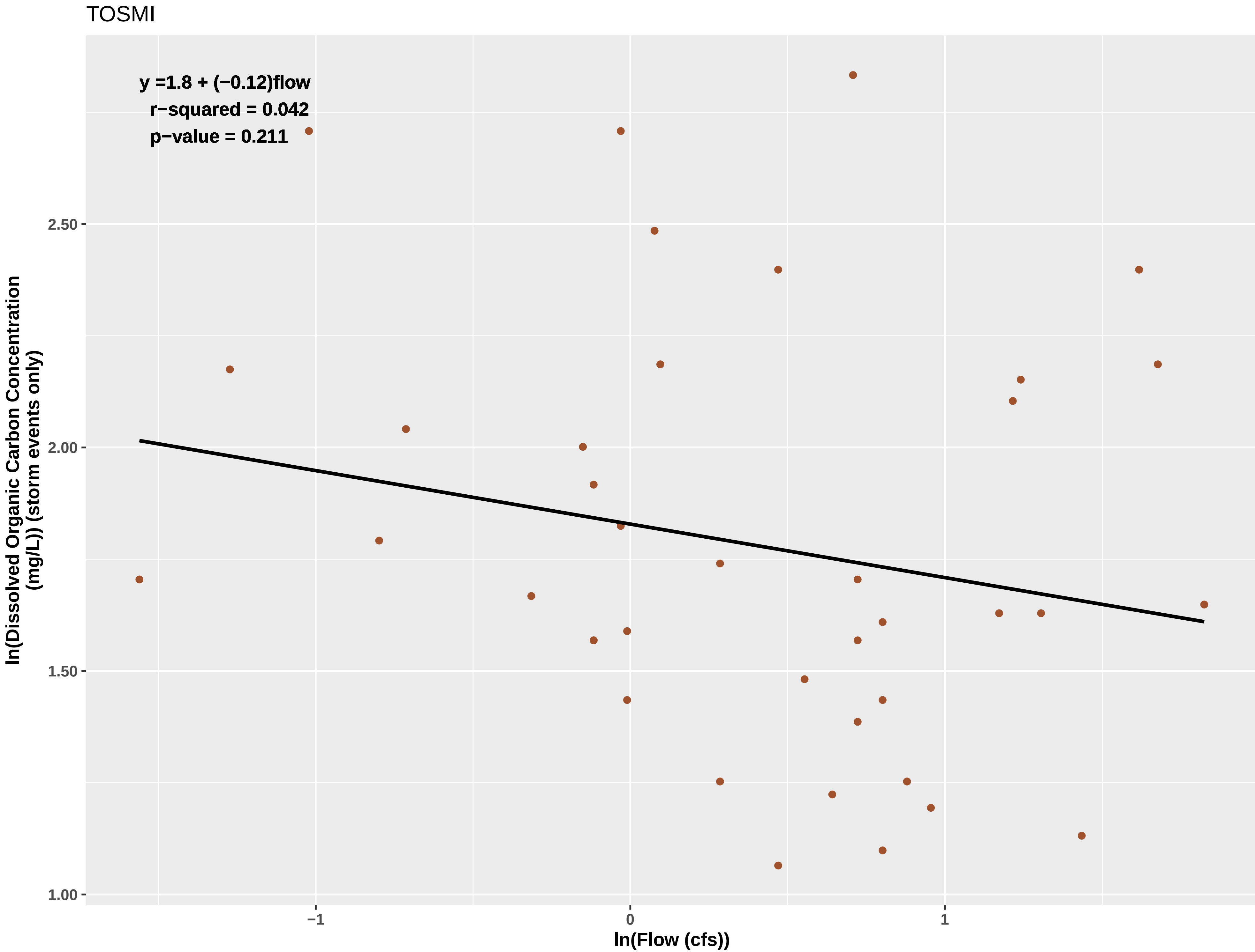


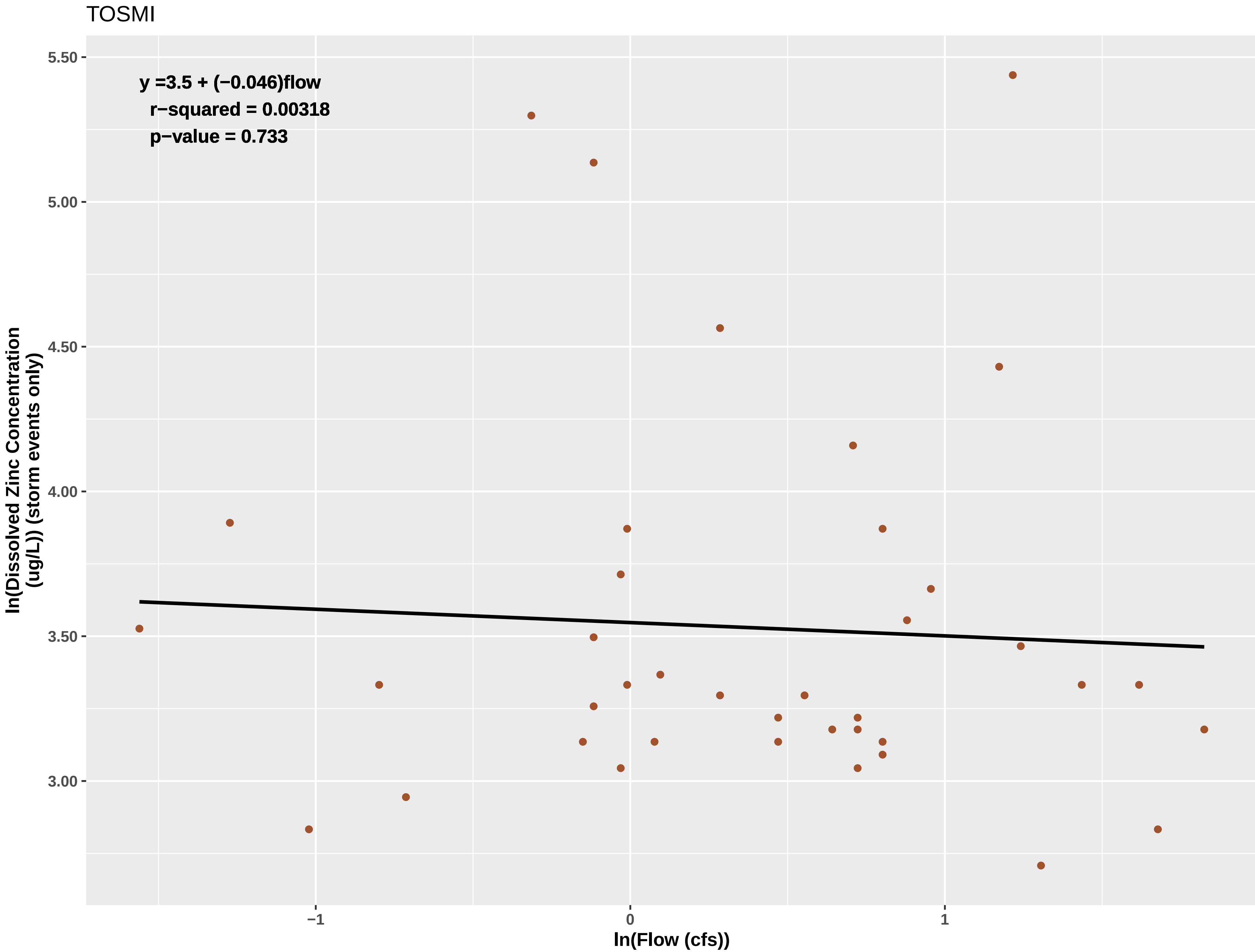
y =2.6 + (0.88)flow
r−squared = 0.459
p−value = 0
5.0
4.0
3.0
2.0
ln(Turbidity Concentration (NTU)) (storm events only)
−1
0
1
2
ln(Flow (cfs))

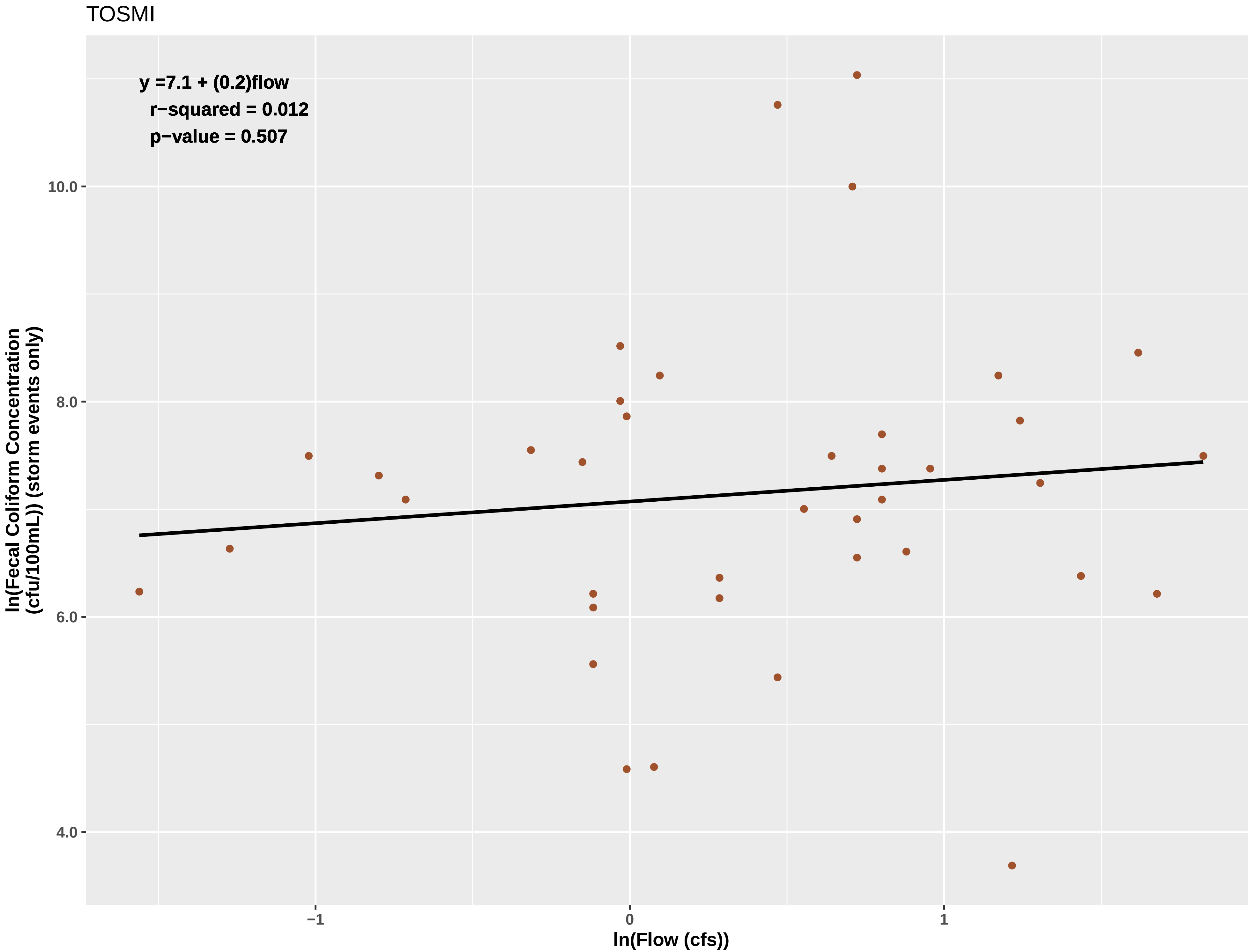


TOSMO
y =0.19 + (0.21)flow
r−squared = 0.0938
p−value = 0.058
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
1.50
1.00
0.50
0.00
−0.50
−1
0
1
2
ln(Flow (cfs))


TOSMI
y =1.4 + (−0.16)flow
r−squared = 0.0556
p−value = 0.148
2.0
1.0
0.0
−1
0
1
ln(Flow (cfs))
ln(Dissolved Copper Concentration (ug/L)) (storm events only)

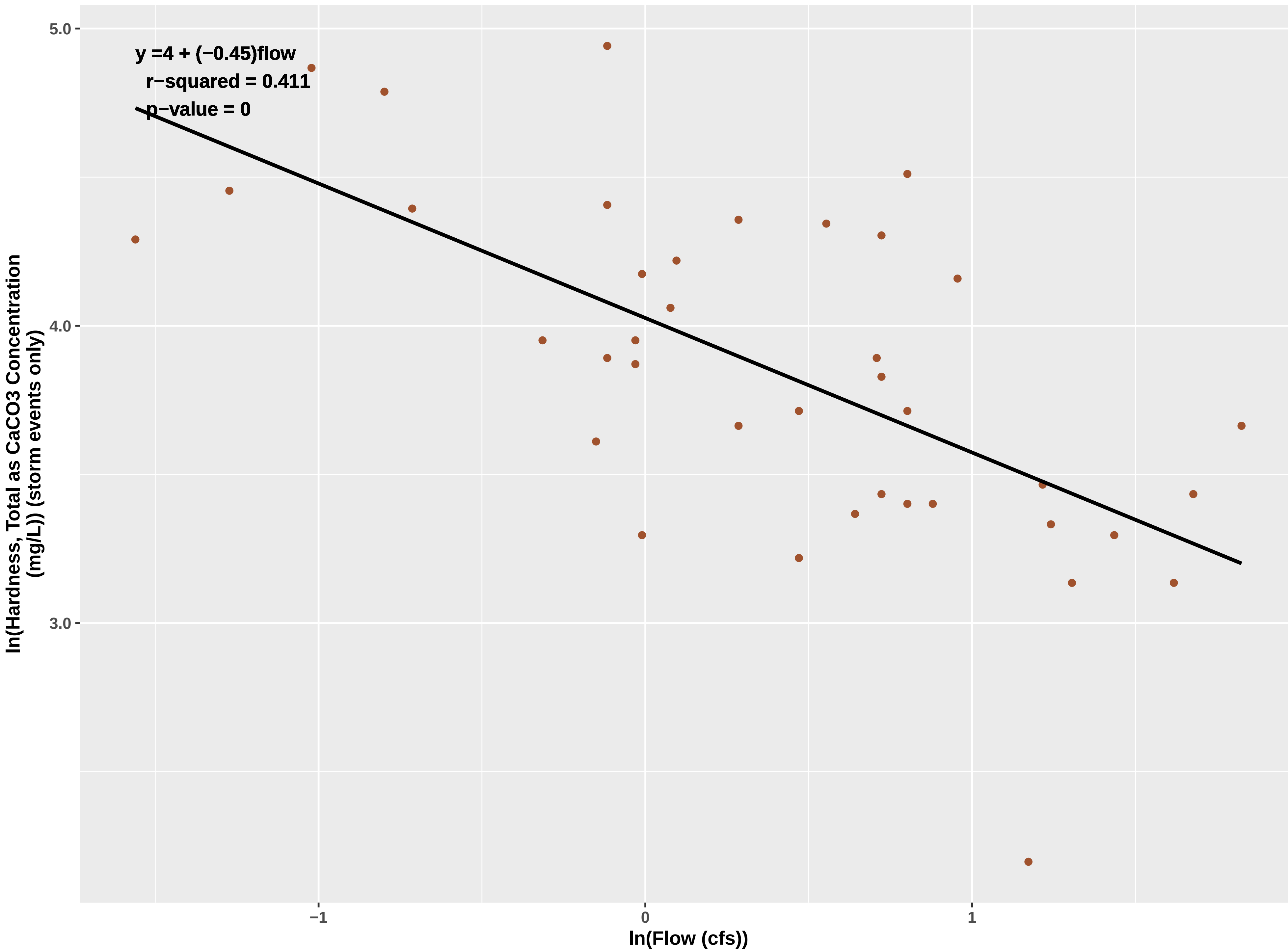

TOSMI
y =1.8 + (−0.12)flow
r−squared = 0.042
p−value = 0.211
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
2.50
2.00
1.50
1.00
−1
0
1
ln(Flow (cfs))


TOSMI
y =3.5 + (−0.046)flow
r−squared = 0.00318
p−value = 0.733
5.50
5.00
4.50
4.00
3.50
3.00
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
−1
0
1
ln(Flow (cfs))

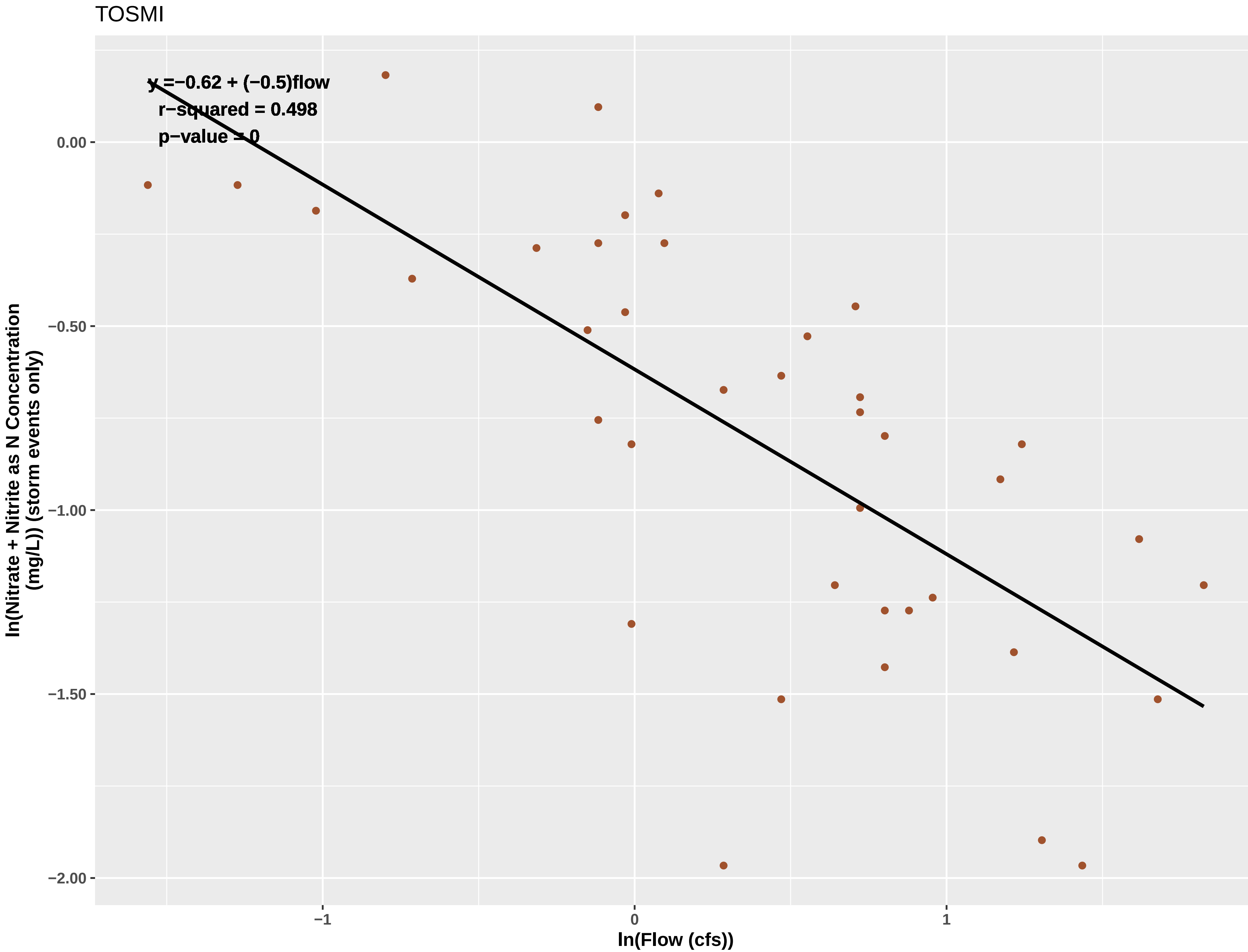


TOSMI
y =7.1 + (0.2)flow
r−squared = 0.012
p−value = 0.507
10.0
8.0
6.0
4.0
−1
0
1
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
ln(Flow (cfs))

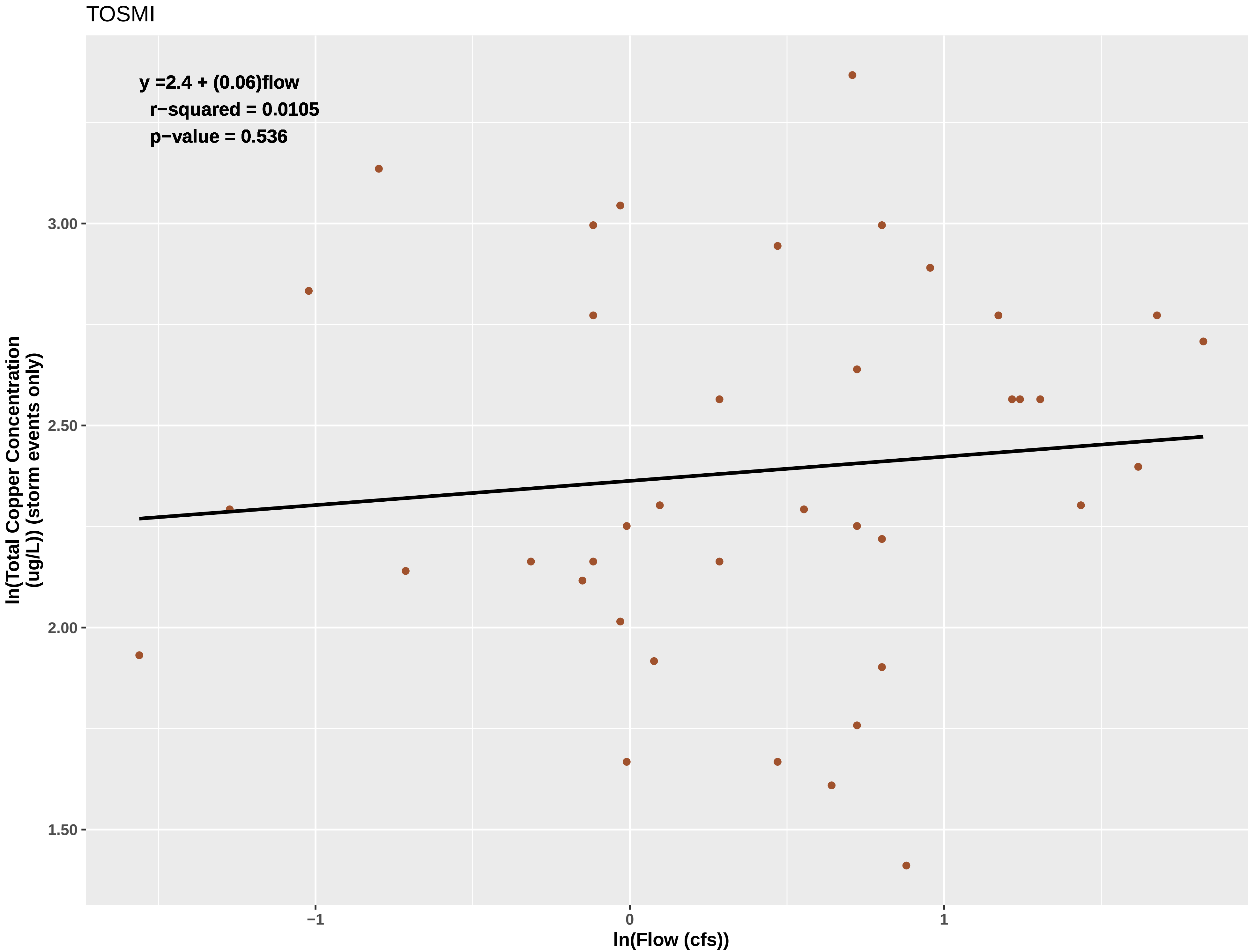
TOSMI

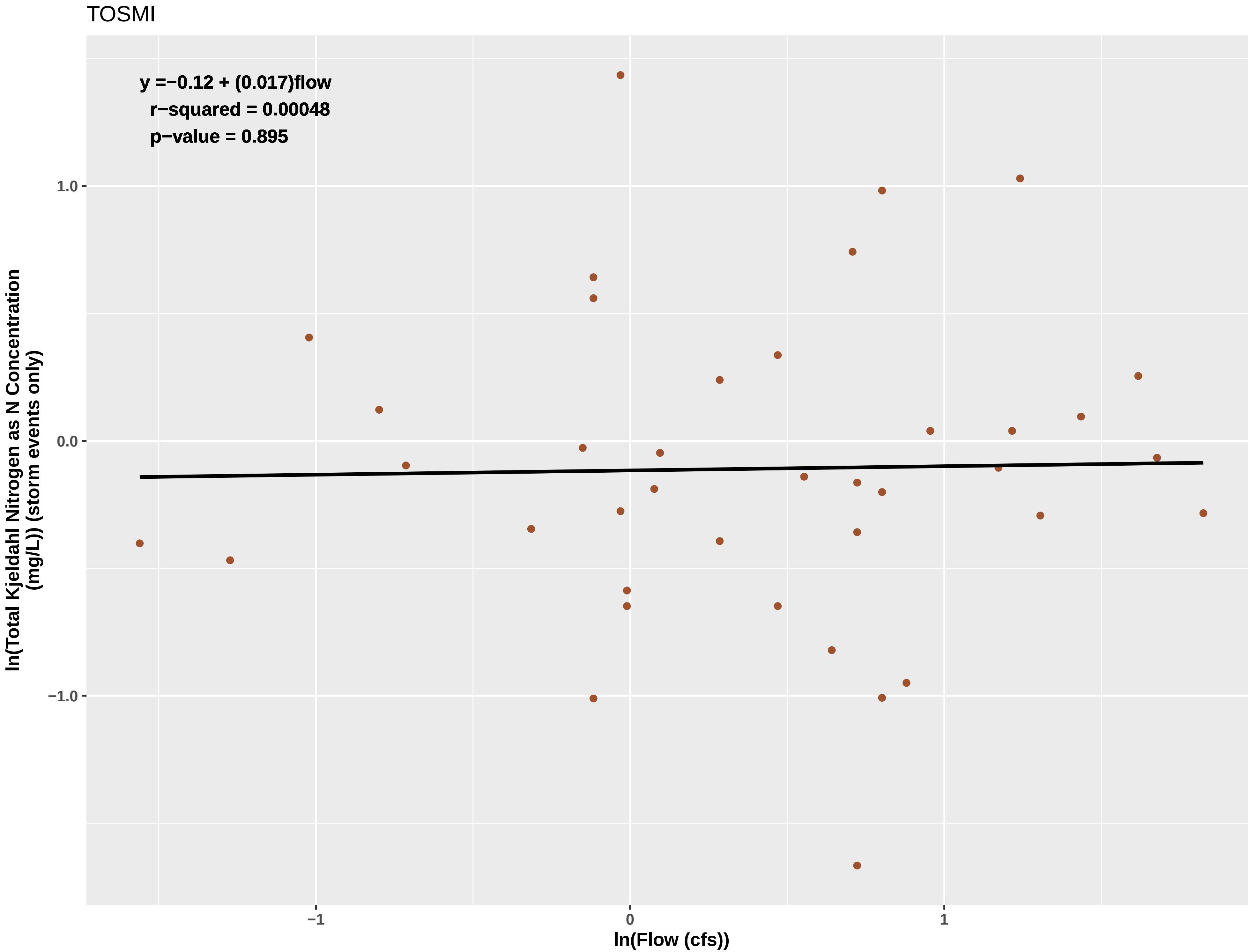


y =4 + (−0.45)flow
r−squared = 0.411
p−value = 0
5.0
4.0
3.0
−1
0
1
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

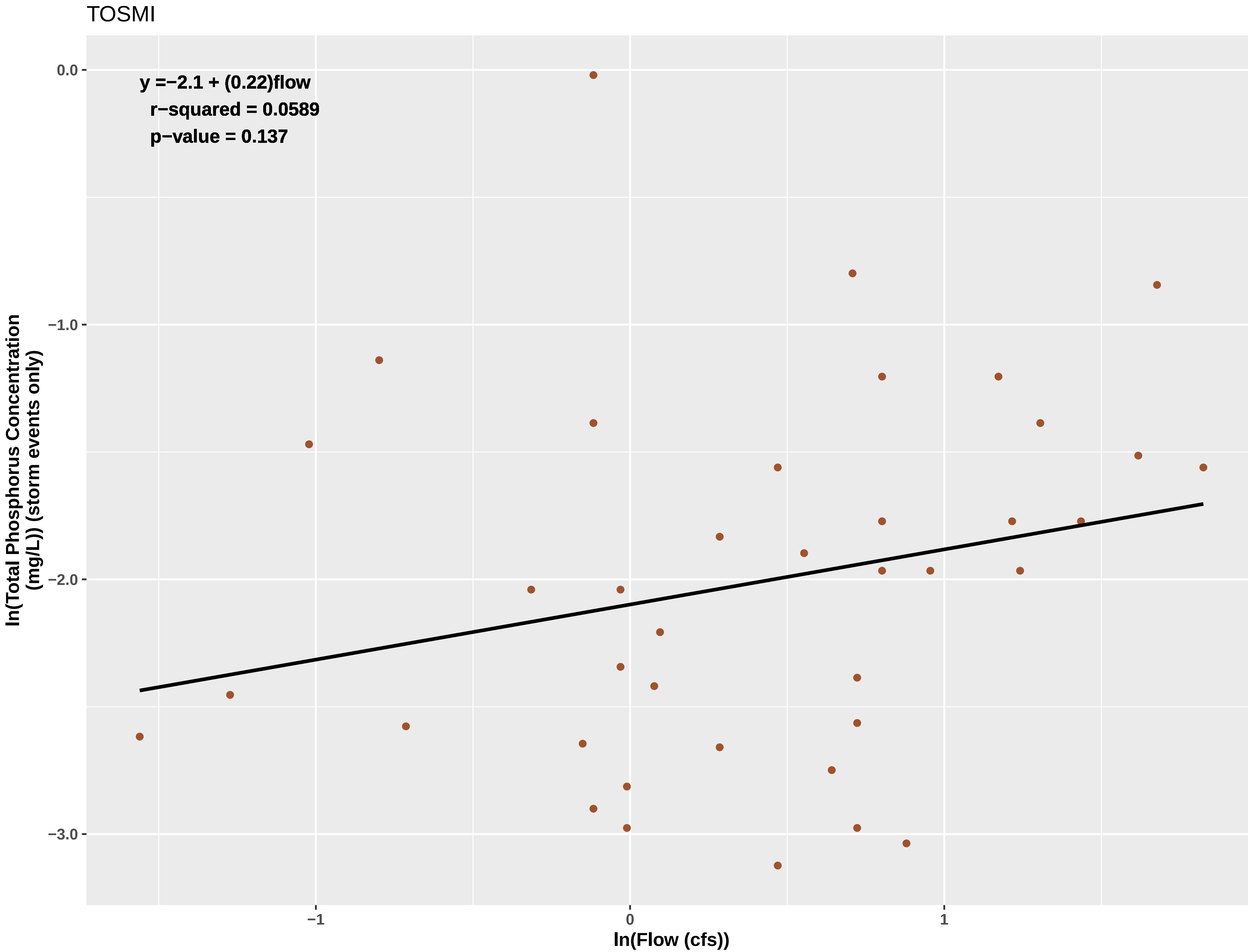


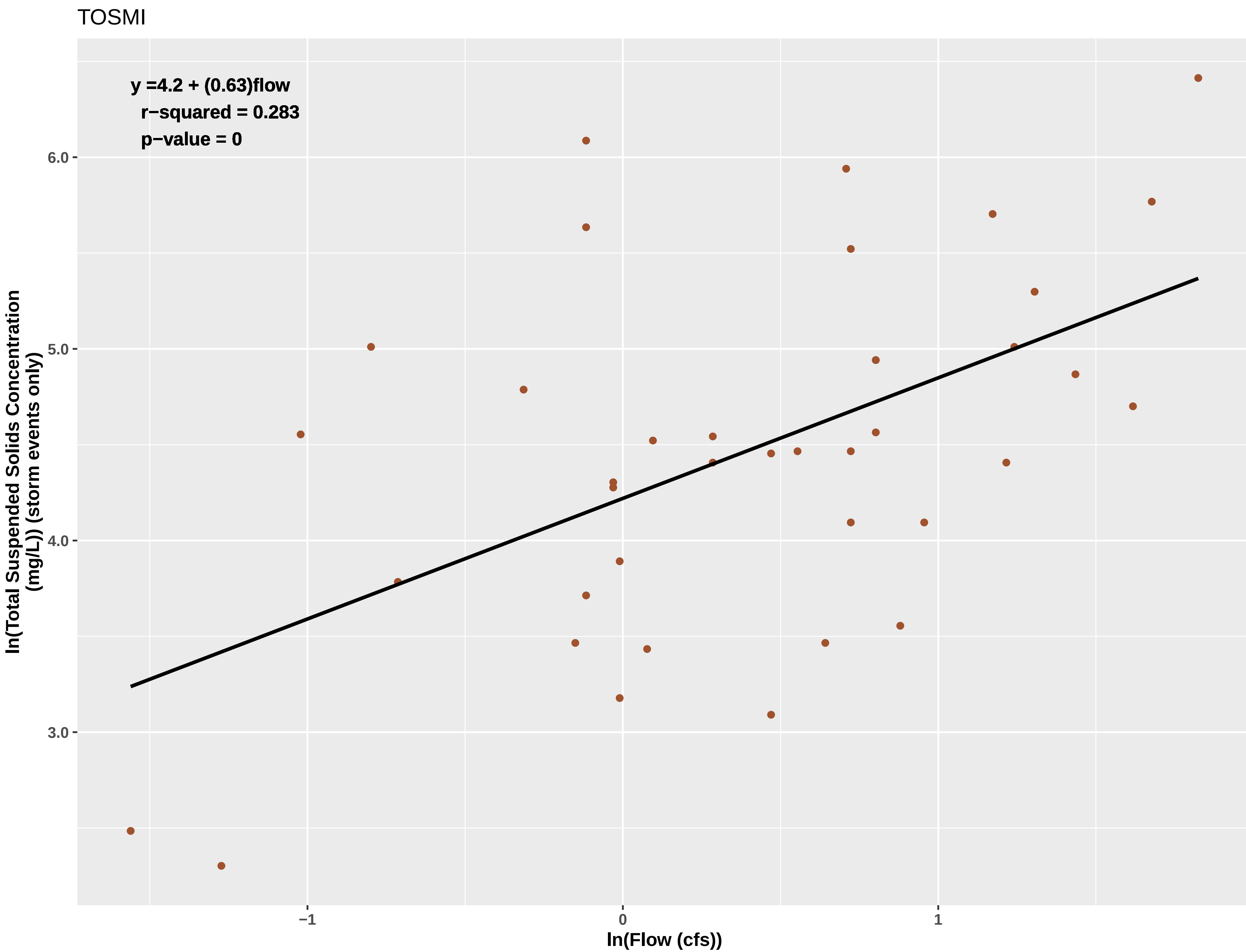
TOSMI
y =−0.62 + (−0.5)flow
r−squared = 0.498
p−value = 0
0.00
−0.50
−1.00
−1.50
−2.00
−1
0
1
ln(Flow (cfs))
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)


TOSMI
y =2.4 + (0.06)flow
r−squared = 0.0105
p−value = 0.536
3.00
2.50
2.00
1.50
−1
0
1
ln(Total Copper Concentration (ug/L)) (storm events only)
ln(Flow (cfs))

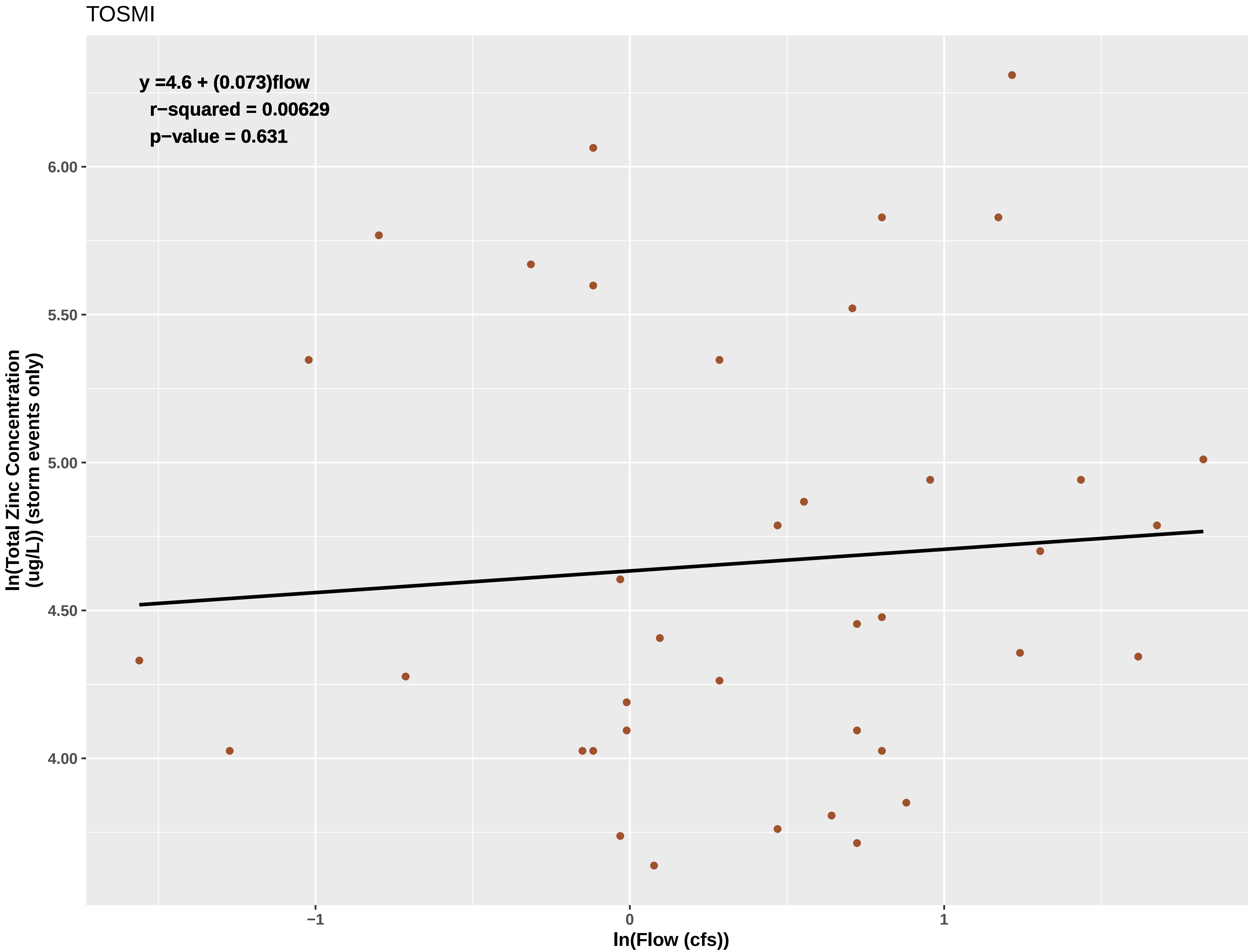


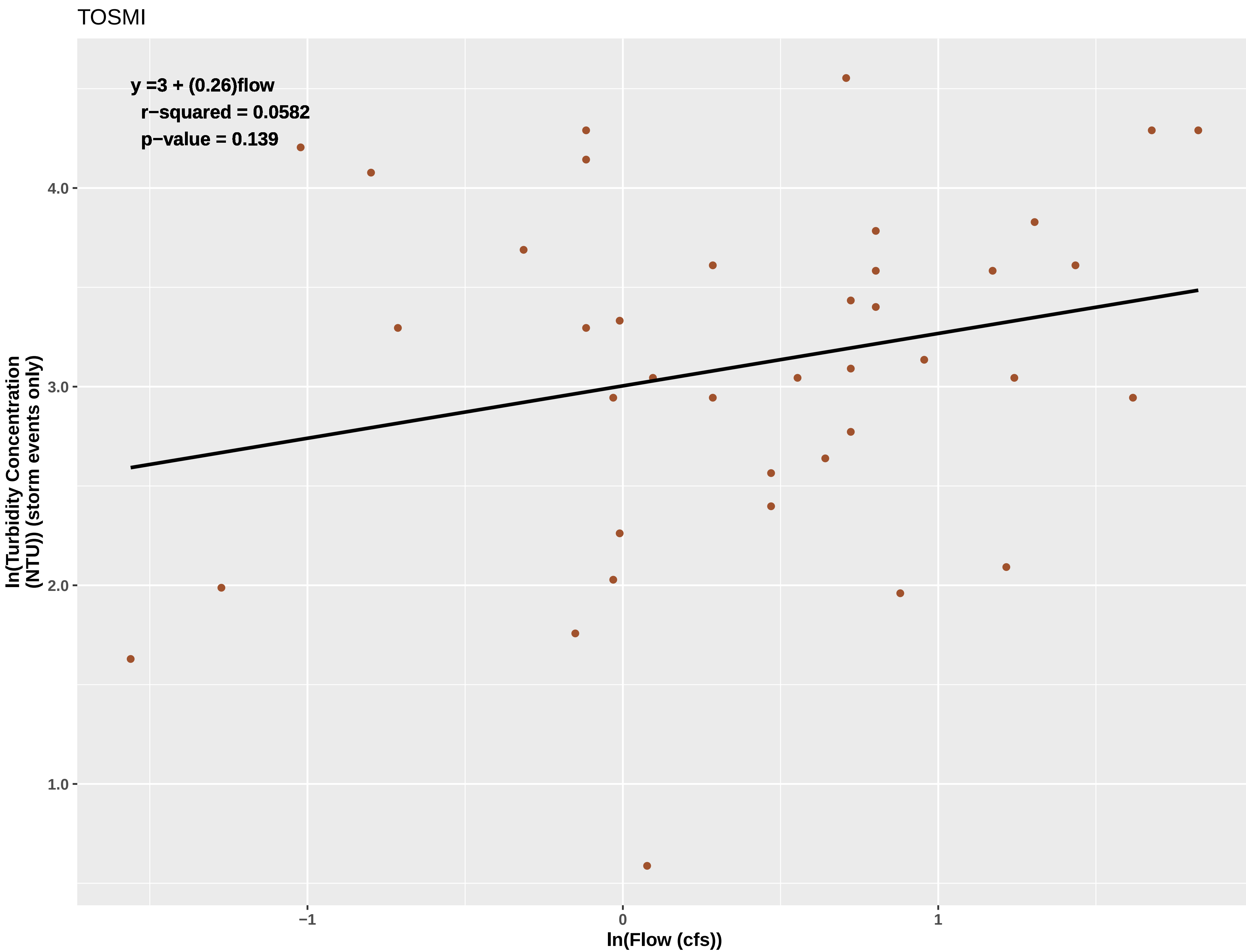
TOSMI
y =−0.12 + (0.017)flow
r−squared = 0.00048
p−value = 0.895
1.0
0.0
−1.0
−1
0
1
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)

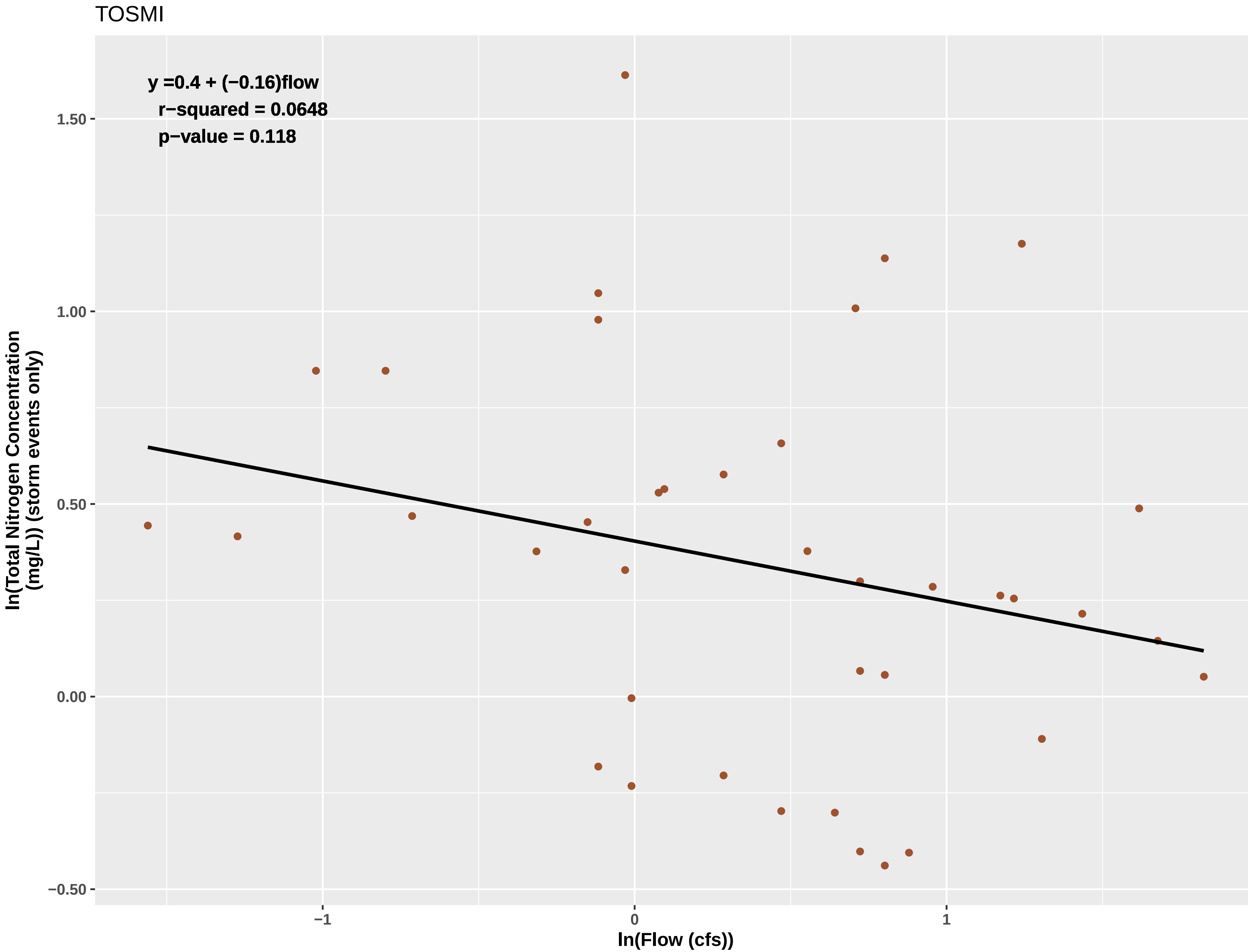

TOSMI
y =−2.1 + (0.22)flow
r−squared = 0.0589
p−value = 0.137
0.0
−1.0
−2.0
−3.0
−1
0
1
ln(Flow (cfs))
ln(Total Phosphorus Concentration (mg/L)) (storm events only)



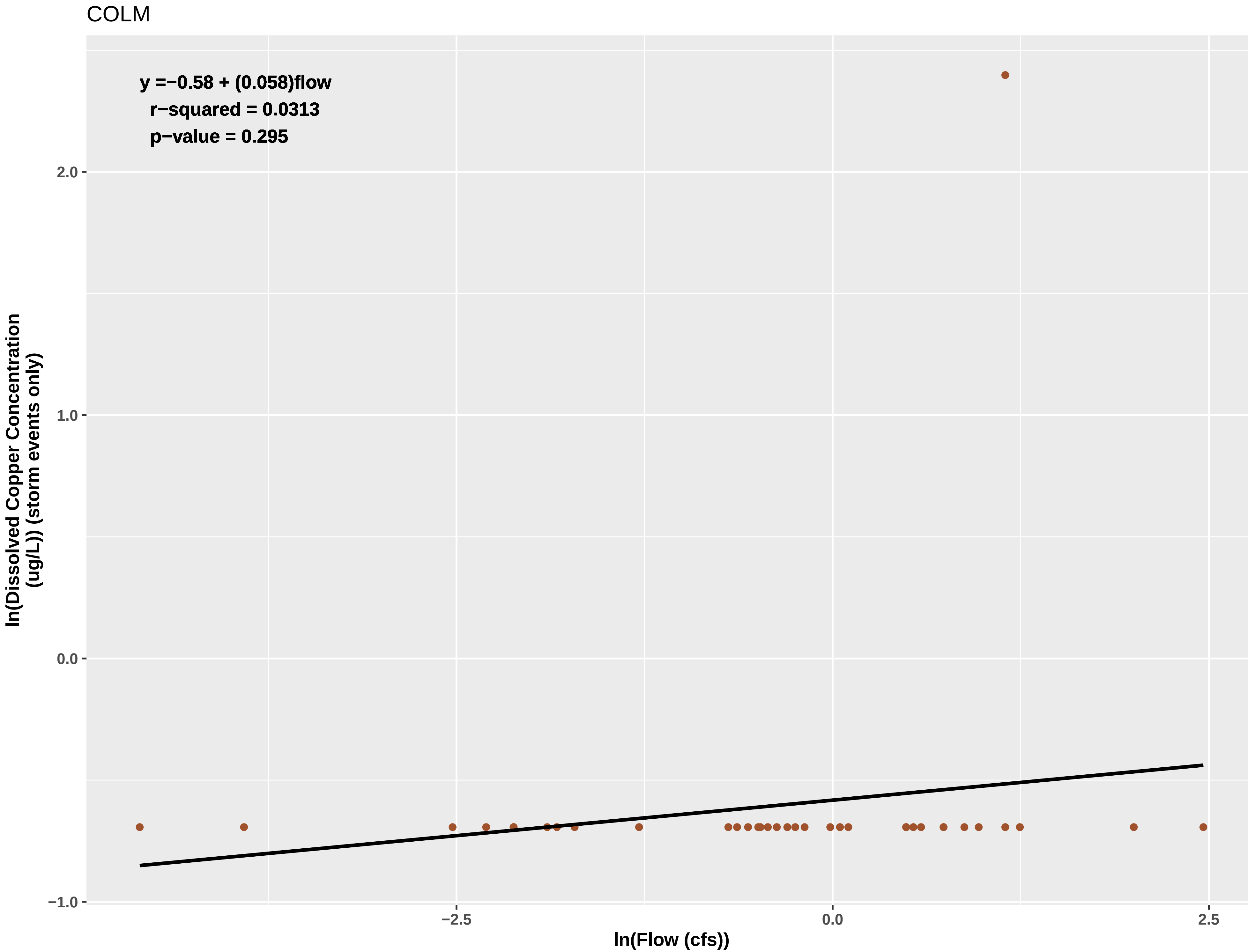
TOSMI
y =4.2 + (0.63)flow
r−squared = 0.283
p−value = 0
6.0
5.0
4.0
3.0
−1
0
1
ln(Flow (cfs))
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)

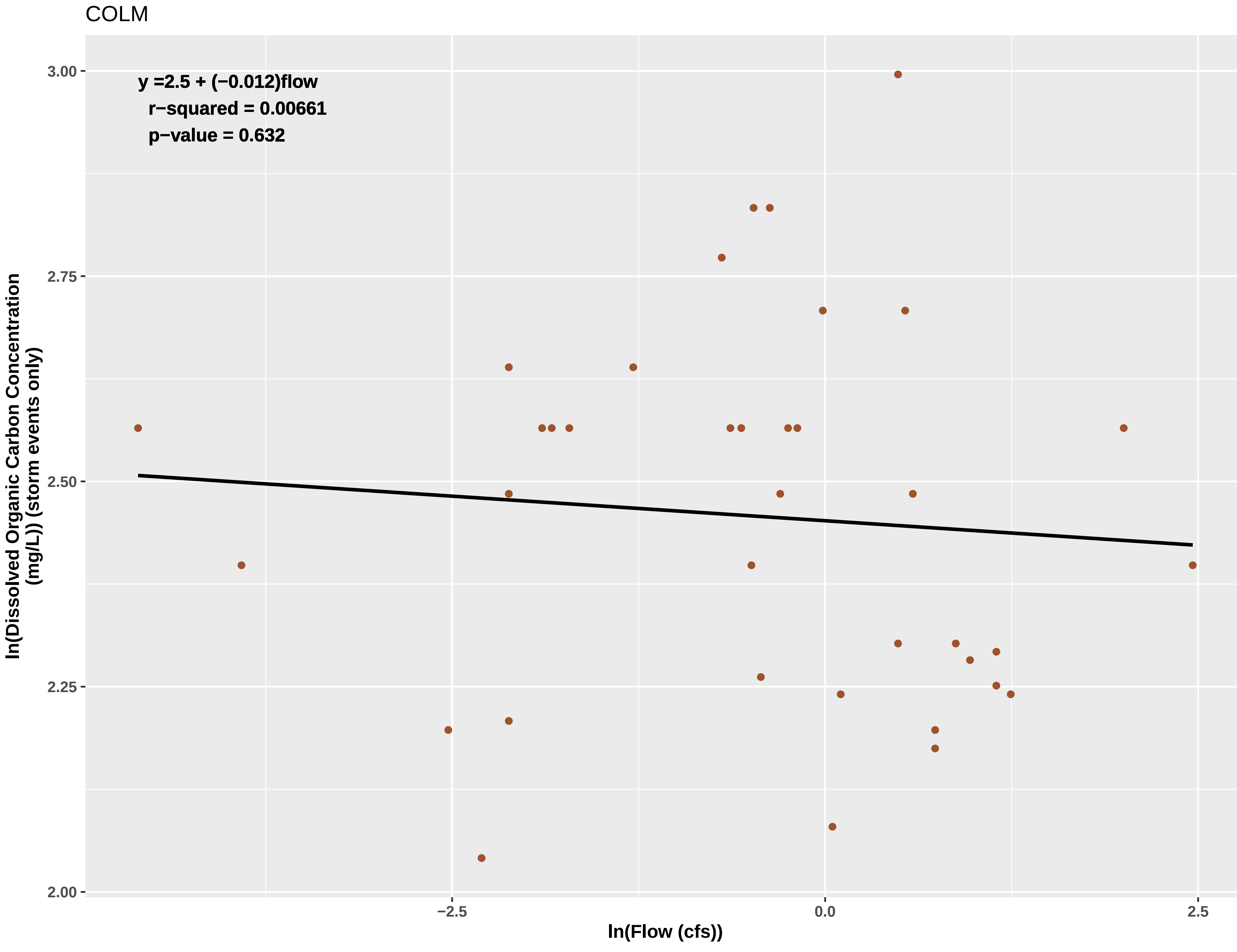

TOSMI
y =4.6 + (0.073)flow
r−squared = 0.00629
p−value = 0.631
6.00
5.50
5.00
4.50
4.00
ln(Total Zinc Concentration (ug/L)) (storm events only)
−1
0
1
ln(Flow (cfs))


TOSMI
y =3 + (0.26)flow
r−squared = 0.0582
p−value = 0.139
4.0
3.0
2.0
1.0
−1
0
1
ln(Flow (cfs))
ln(Turbidity Concentration (NTU)) (storm events only)

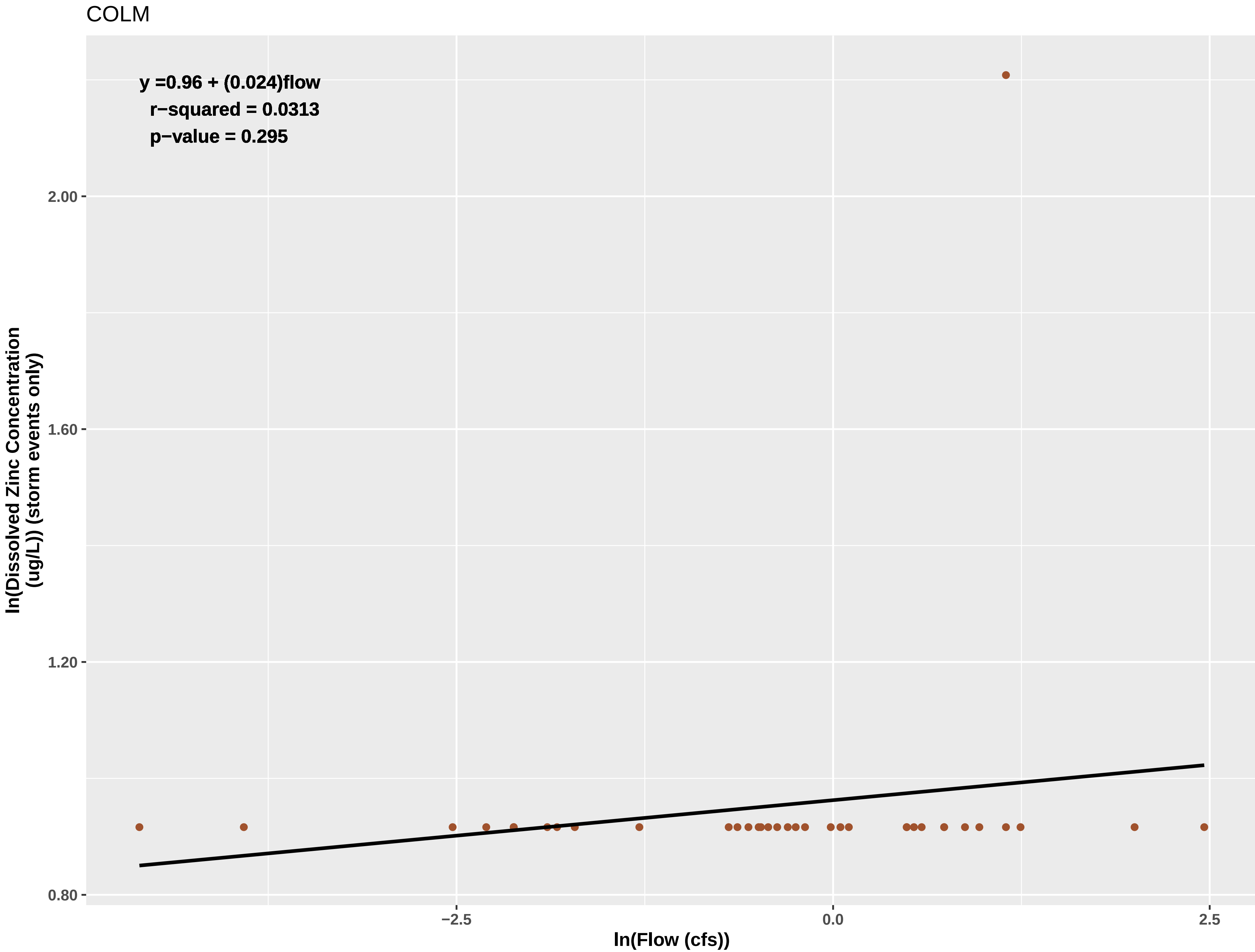


TOSMI
y =0.4 + (−0.16)flow
r−squared = 0.0648
p−value = 0.118
1.50
1.00
0.50
0.00
−0.50
−1
0
1
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

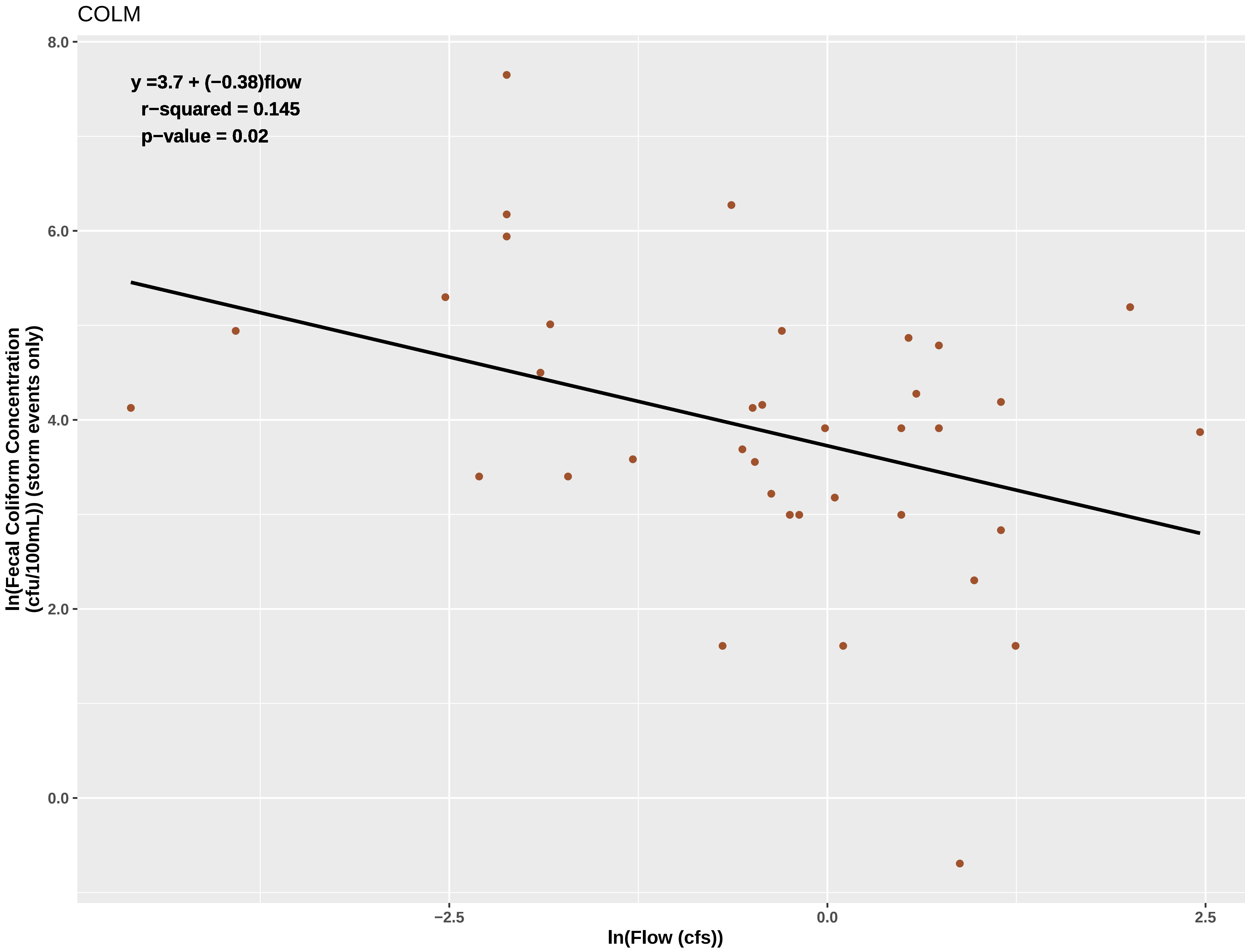

COLM
y =−0.58 + (0.058)flow
r−squared = 0.0313
p−value = 0.295
2.0
1.0
0.0
−1.0
ln(Dissolved Copper Concentration
(ug/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))



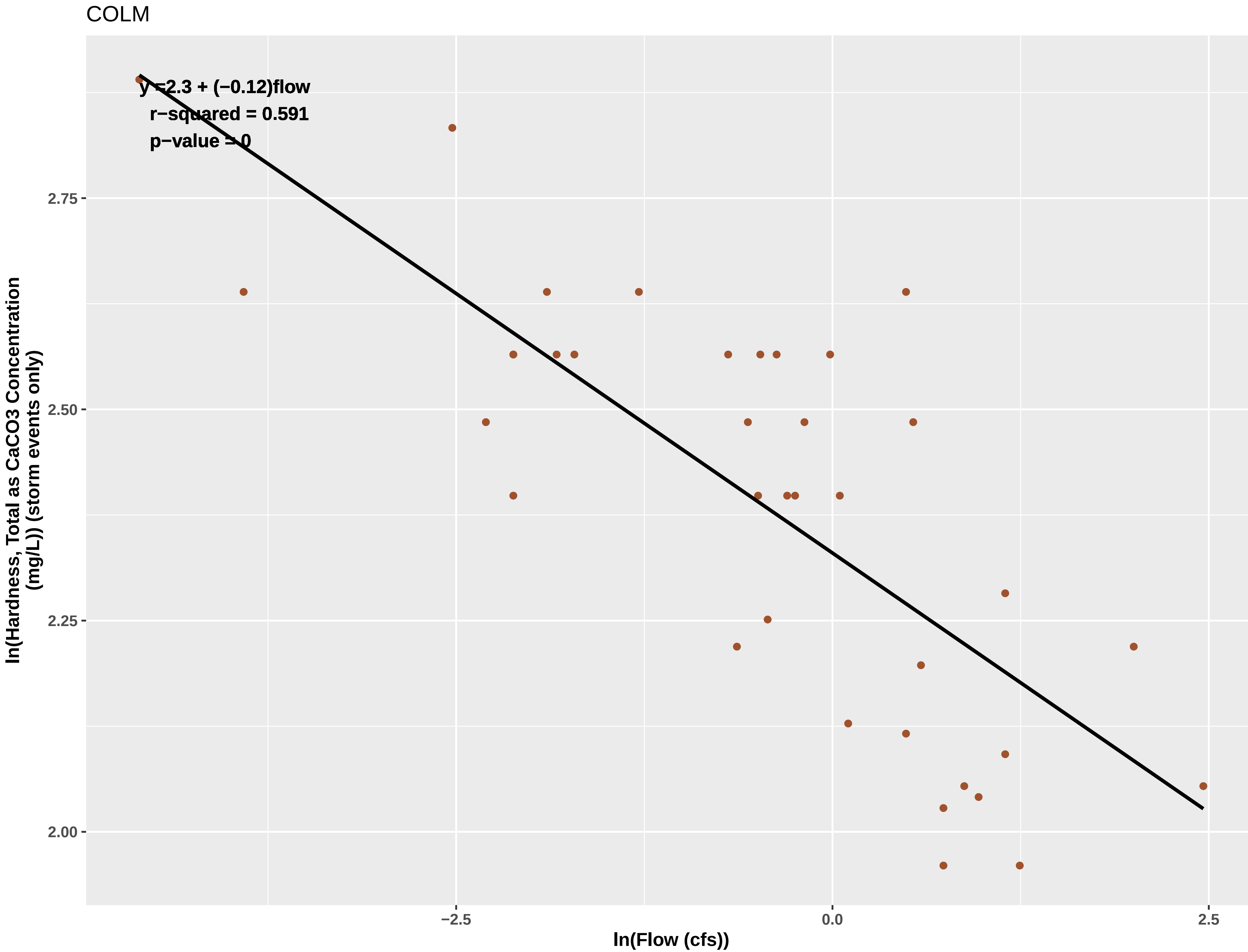
COLM
y =2.5 + (−0.012)flow
r−squared = 0.00661
p−value = 0.632
3.00
2.75
2.50
2.25
2.00
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))



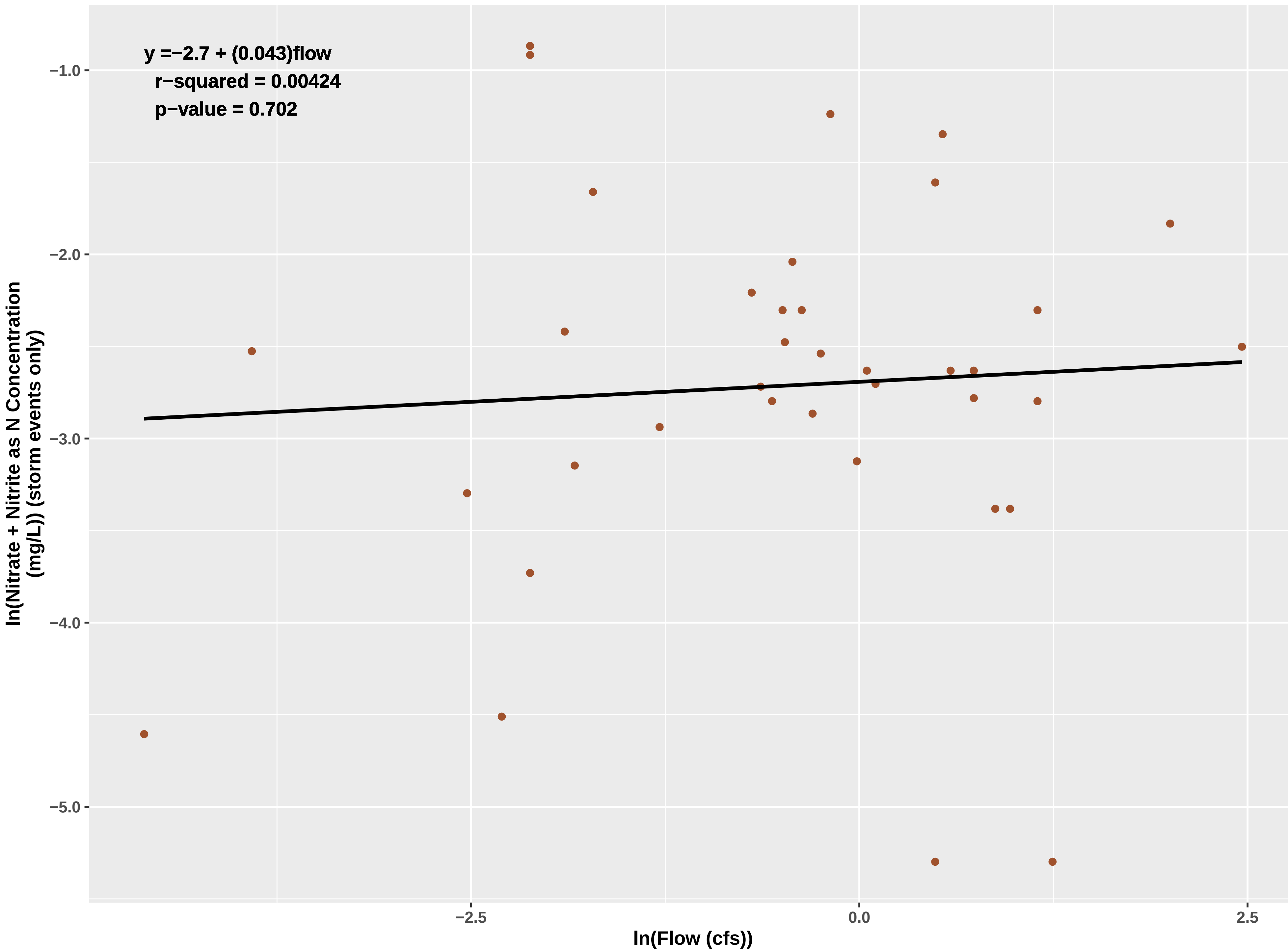
COLM
y =0.96 + (0.024)flow
r−squared = 0.0313
p−value = 0.295
2.00
1.60
1.20
0.80
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))



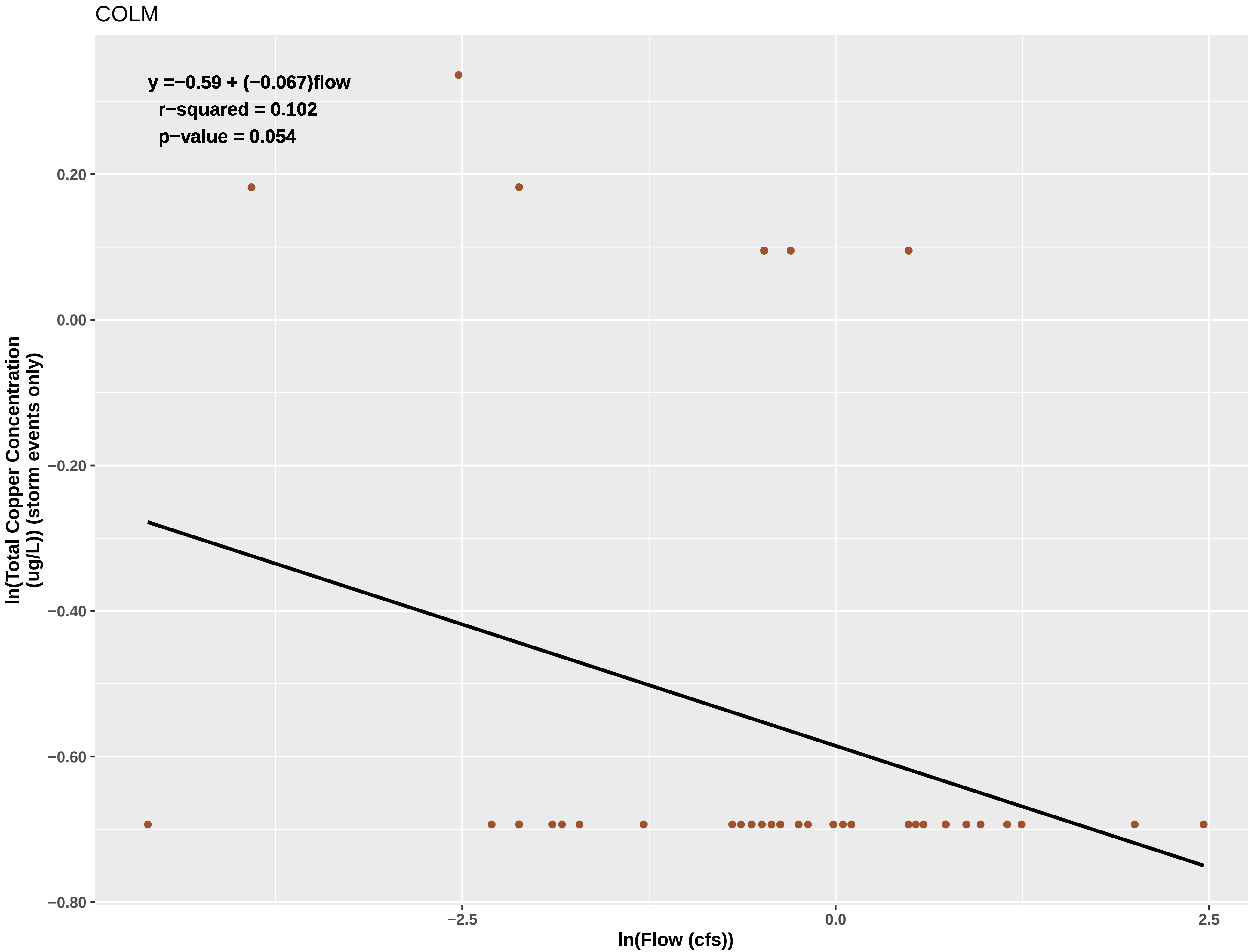
COLM
y =3.7 + (−0.38)flow
r−squared = 0.145
p−value = 0.02
8.0
6.0
4.0
2.0
0.0
−2.5
0.0
2.5
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
ln(Flow (cfs))

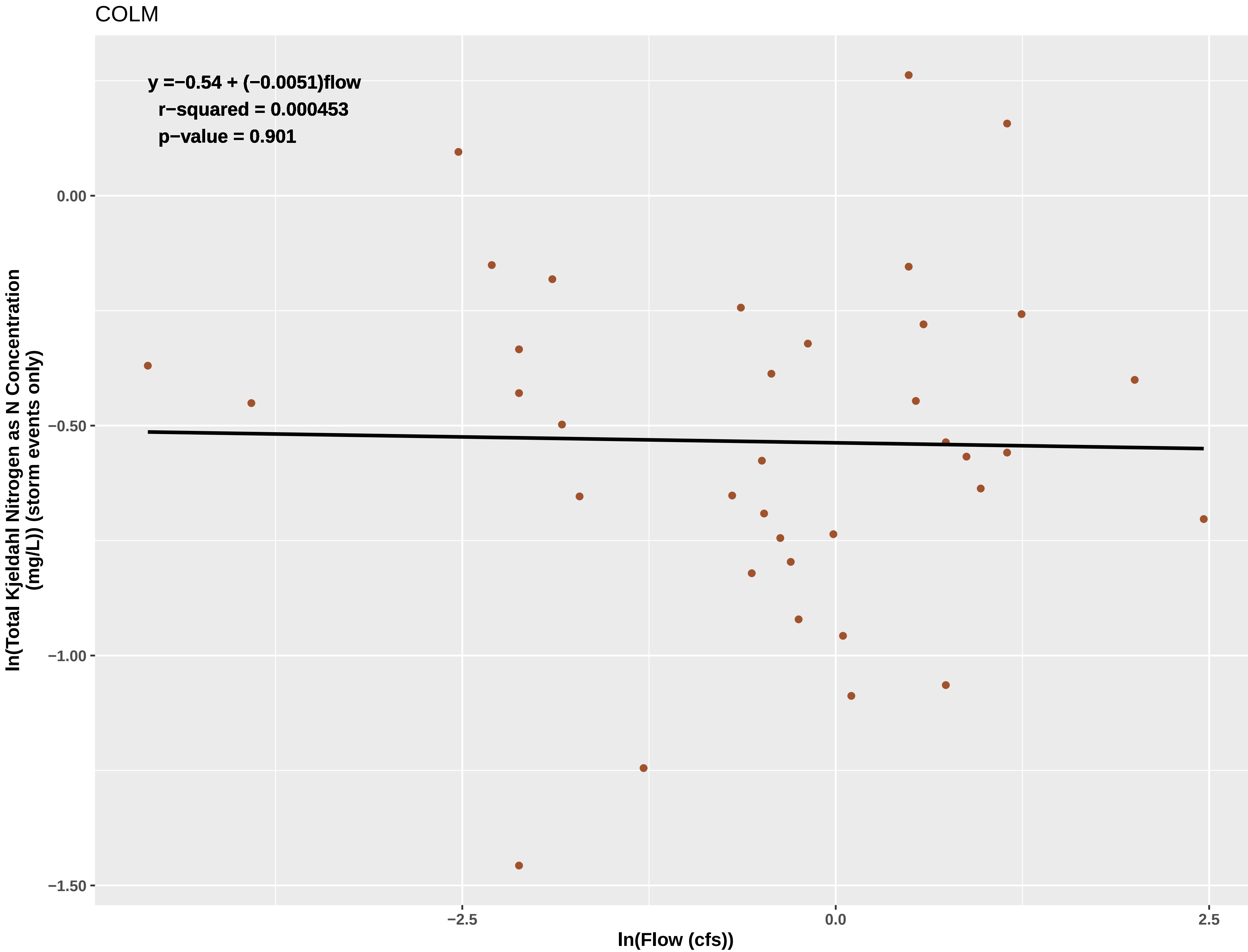

COLM
y =2.3 + (−0.12)flow
r−squared = 0.591
p−value = 0
ln(Hardness, Total as CaCO3 Concentration
(mg/L)) (storm events only)
2.75
2.50
2.25
2.00
−2.5
0.0
2.5
ln(Flow (cfs))

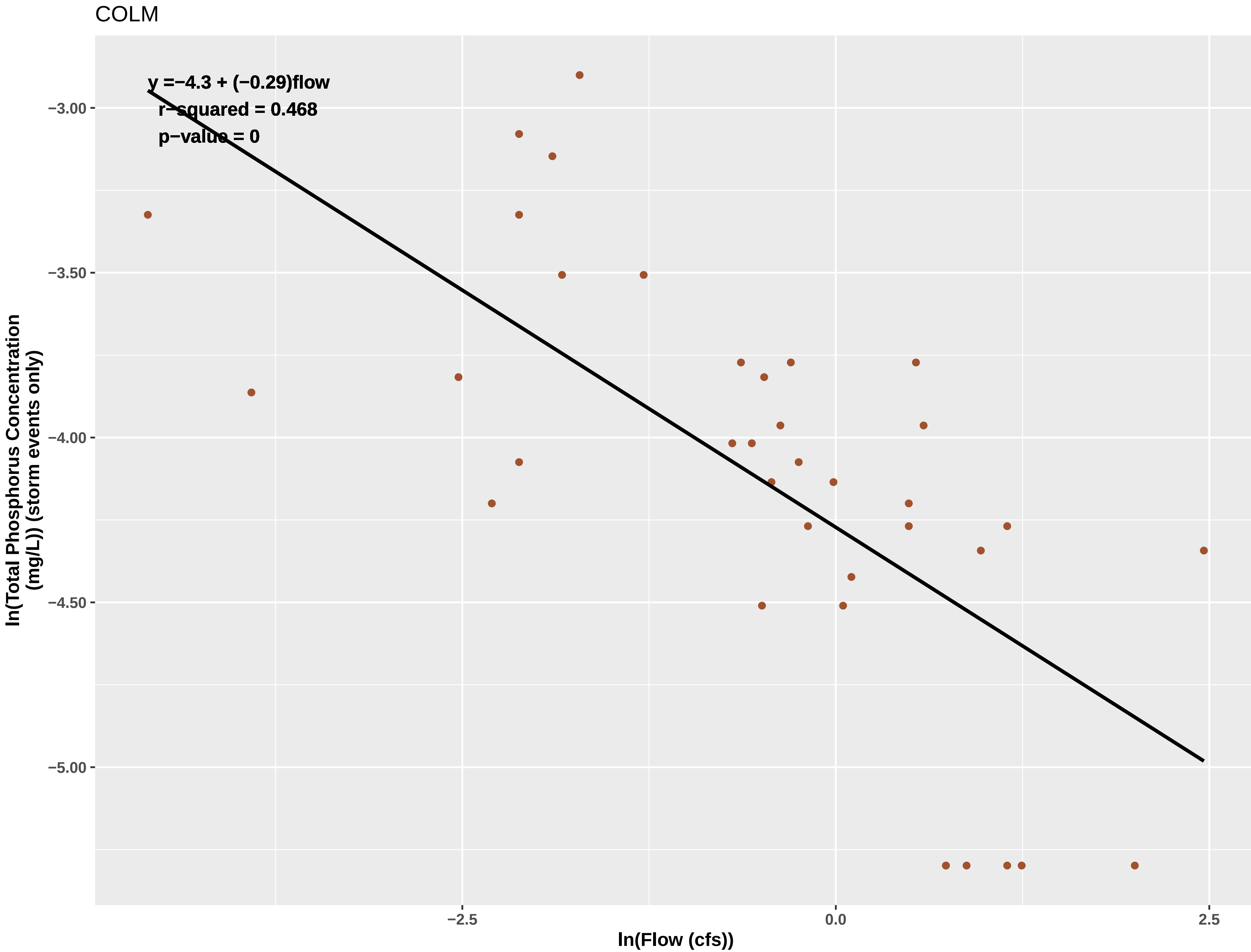
COLM



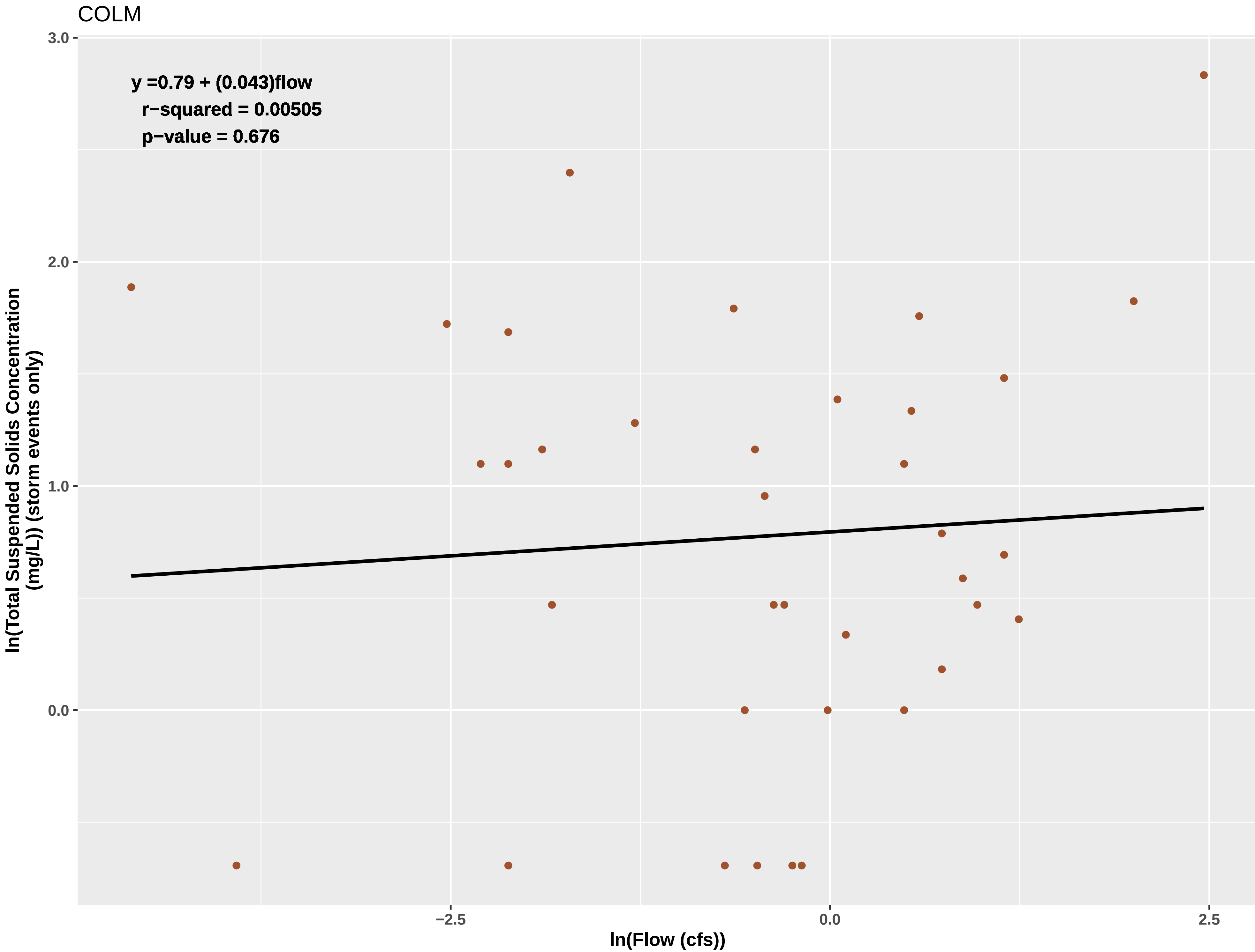
y =−2.7 + (0.043)flow
r−squared = 0.00424
p−value = 0.702
−1.0
−2.0
−3.0
−4.0
−5.0
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))

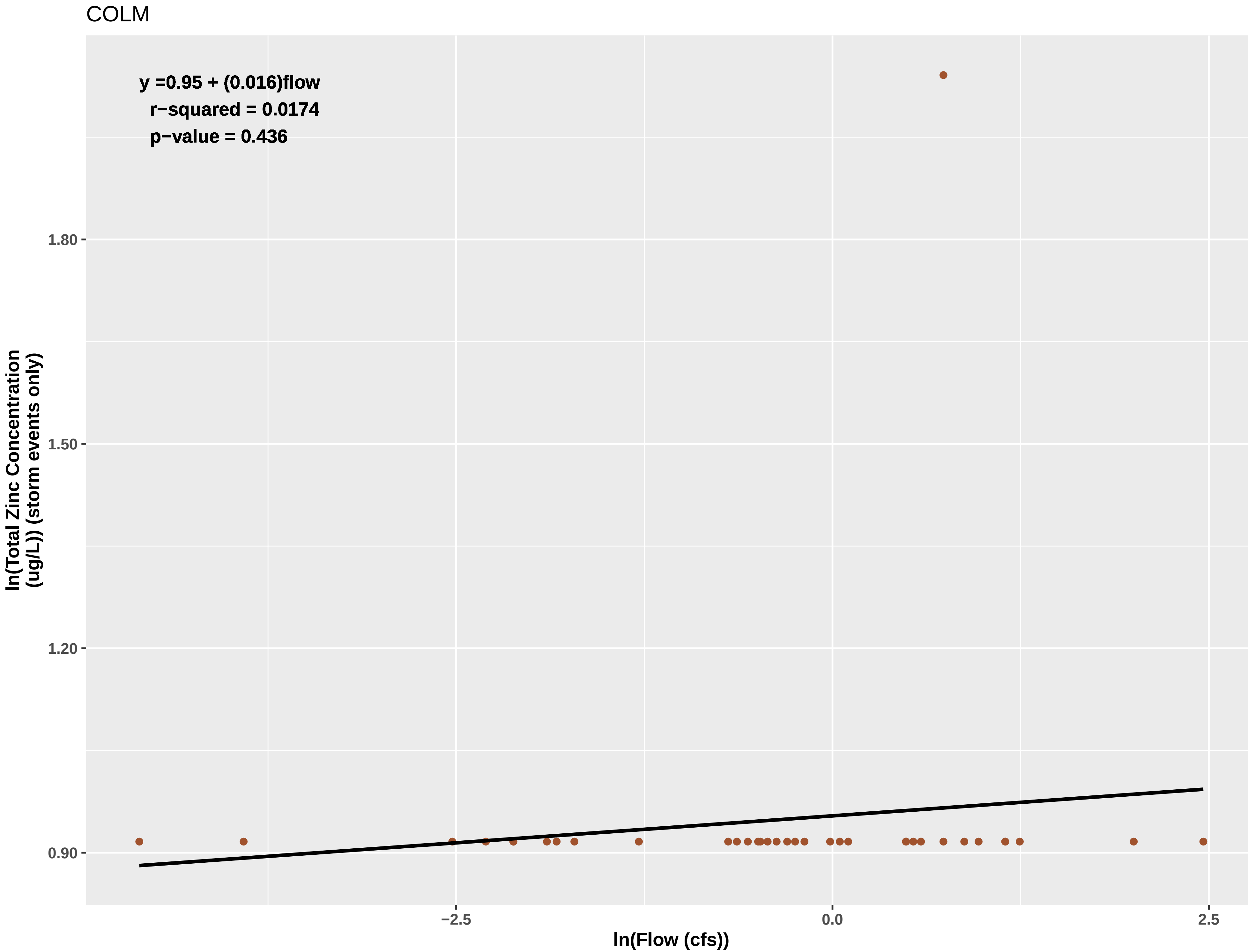

COLM
y =−0.59 + (−0.067)flow
r−squared = 0.102
p−value = 0.054
0.20
0.00
−0.20
−0.40
−0.60
−0.80
ln(Total Copper Concentration (ug/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))

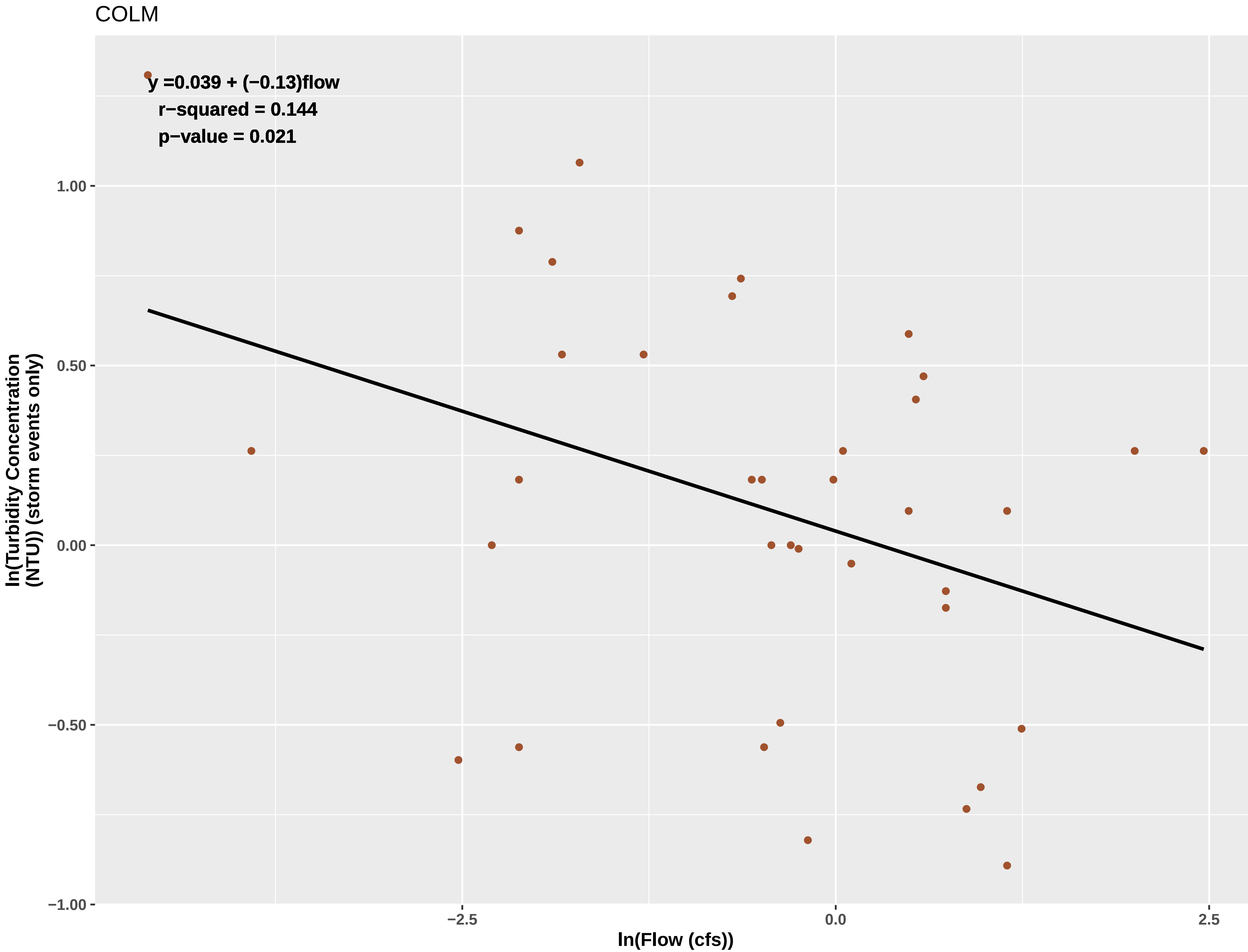

COLM
y =−0.54 + (−0.0051)flow
r−squared = 0.000453
p−value = 0.901
0.00
−0.50
−1.00
−1.50
−2.5
0.0
2.5
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)

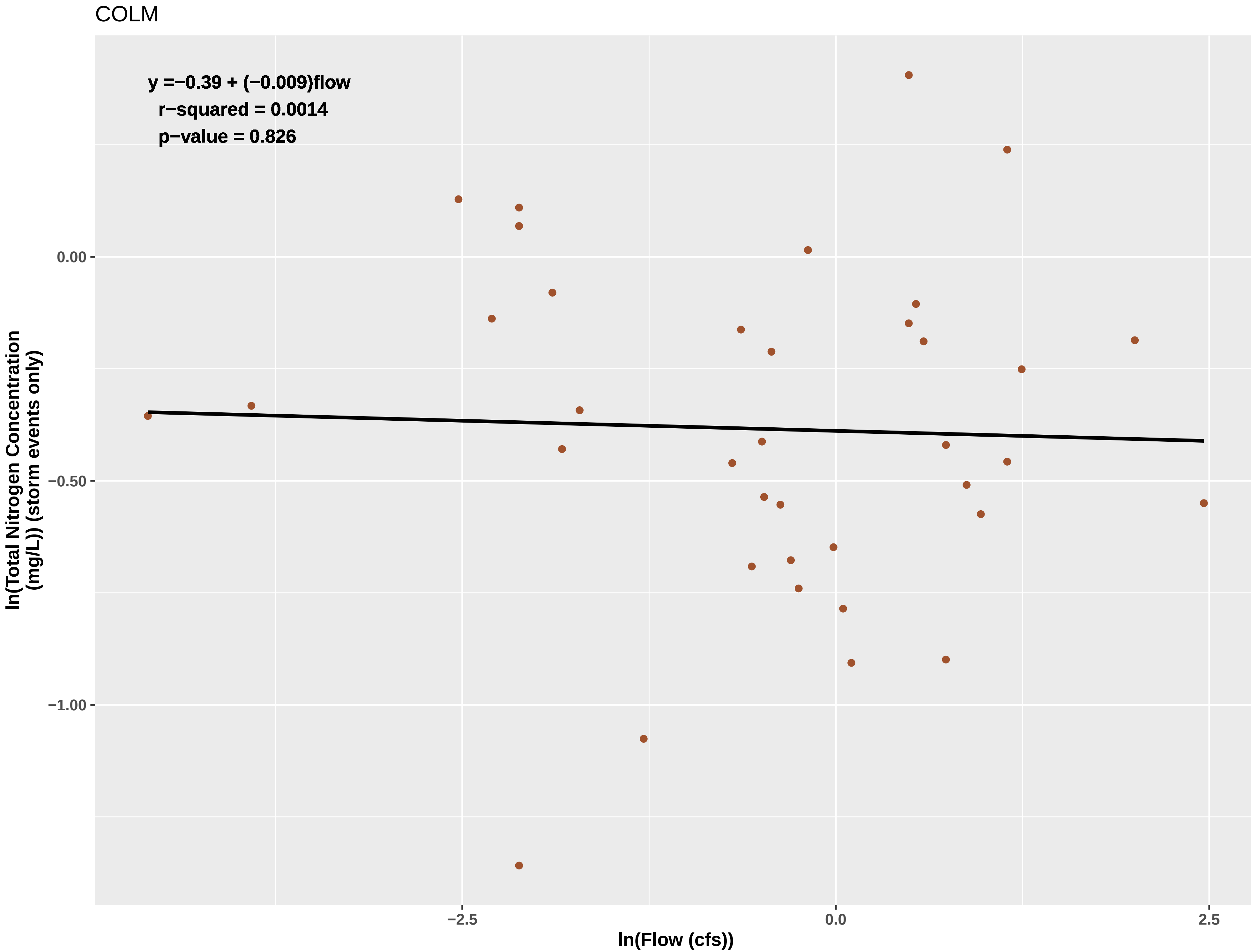


COLM
y =−4.3 + (−0.29)flow
r−squared = 0.468
p−value = 0
−3.00
−3.50
−4.00
−4.50
−5.00
−2.5
0.0
2.5
ln(Flow (cfs))
ln(Total Phosphorus Concentration (mg/L)) (storm events only)


COLM
y =0.79 + (0.043)flow
r−squared = 0.00505
p−value = 0.676
3.0
2.0
1.0
0.0
−2.5
0.0
2.5
ln(Flow (cfs))
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)

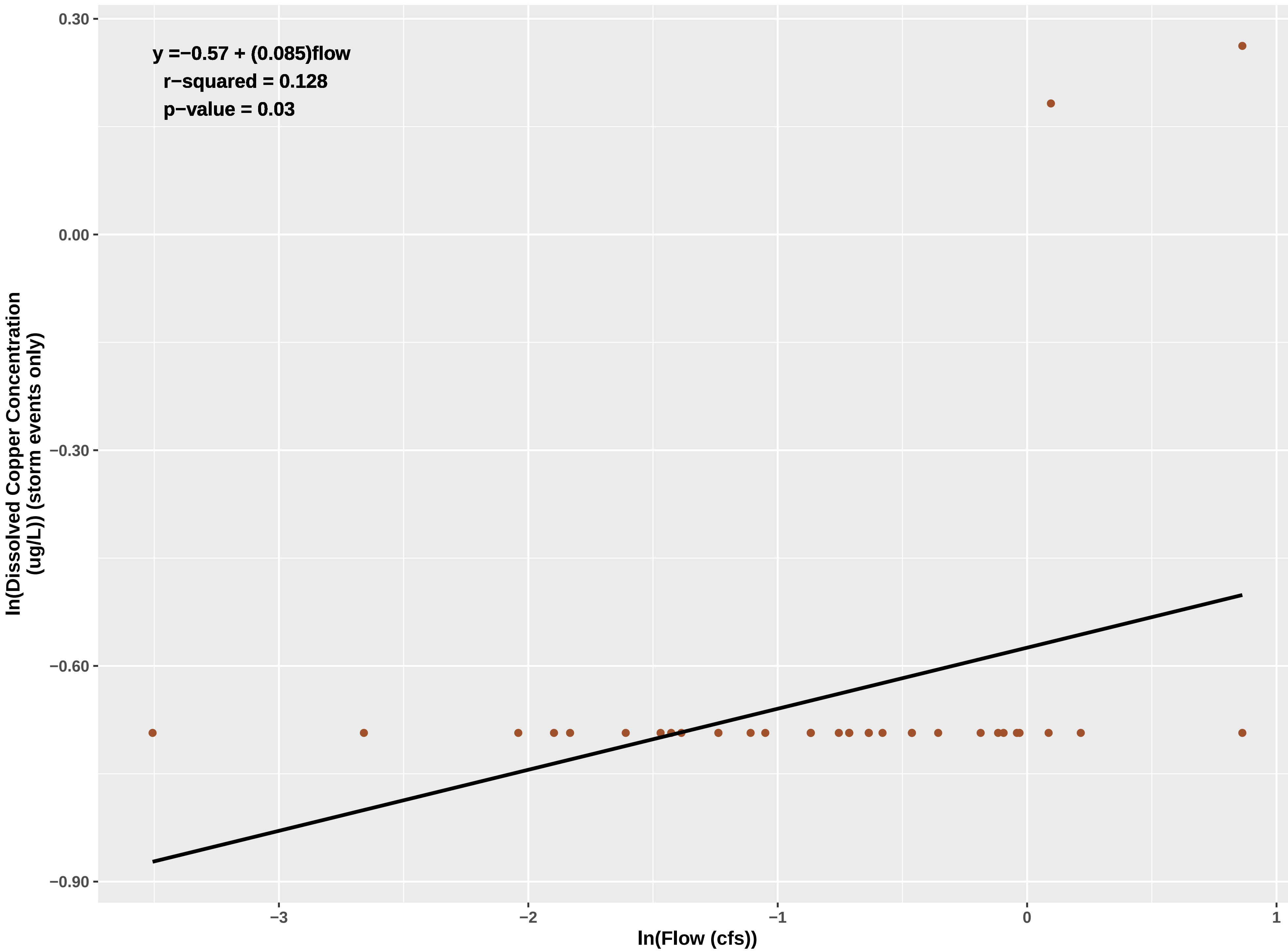

COLM
y =0.95 + (0.016)flow
r−squared = 0.0174
p−value = 0.436
1.80
1.50
1.20
0.90
ln(Total Zinc Concentration
(ug/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))


COLM
y =0.039 + (−0.13)flow
r−squared = 0.144
p−value = 0.021
1.00
0.50
0.00
−0.50
−1.00
−2.5
0.0
2.5
ln(Turbidity Concentration (NTU)) (storm events only)
ln(Flow (cfs))

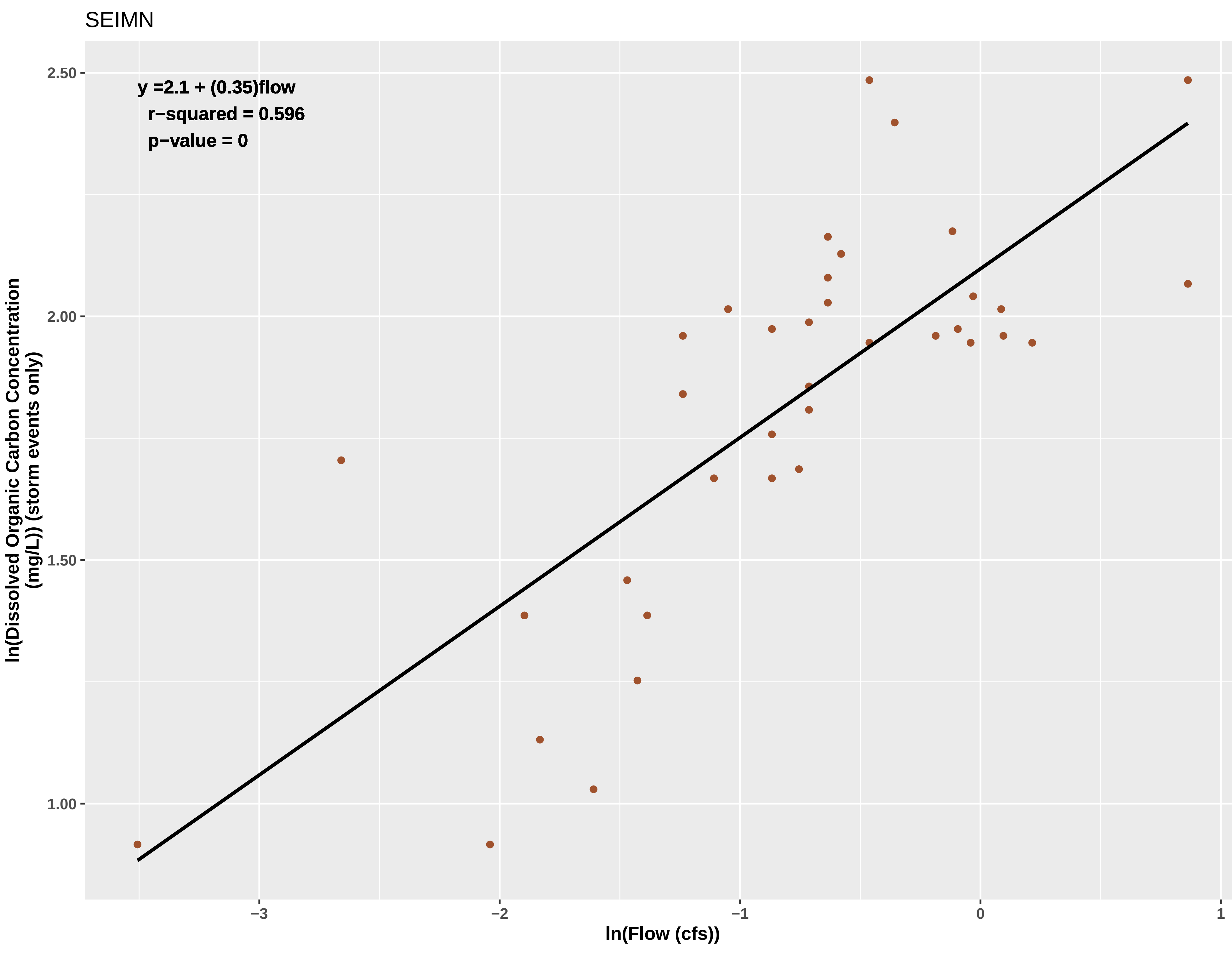


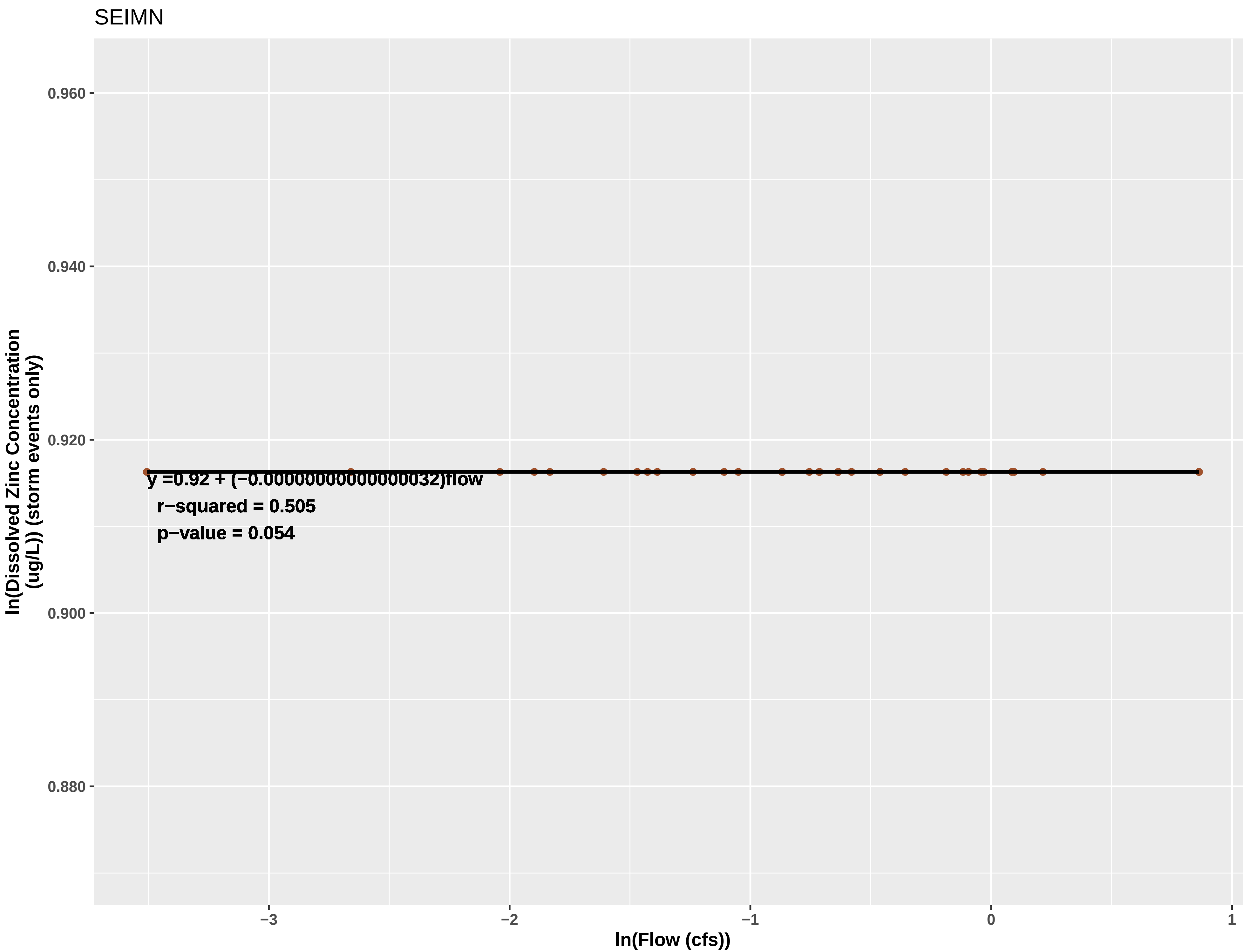
COLM
y =−0.39 + (−0.009)flow
r−squared = 0.0014
p−value = 0.826
0.00
−0.50
−1.00
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
−2.5
0.0
2.5
ln(Flow (cfs))

SEIMN

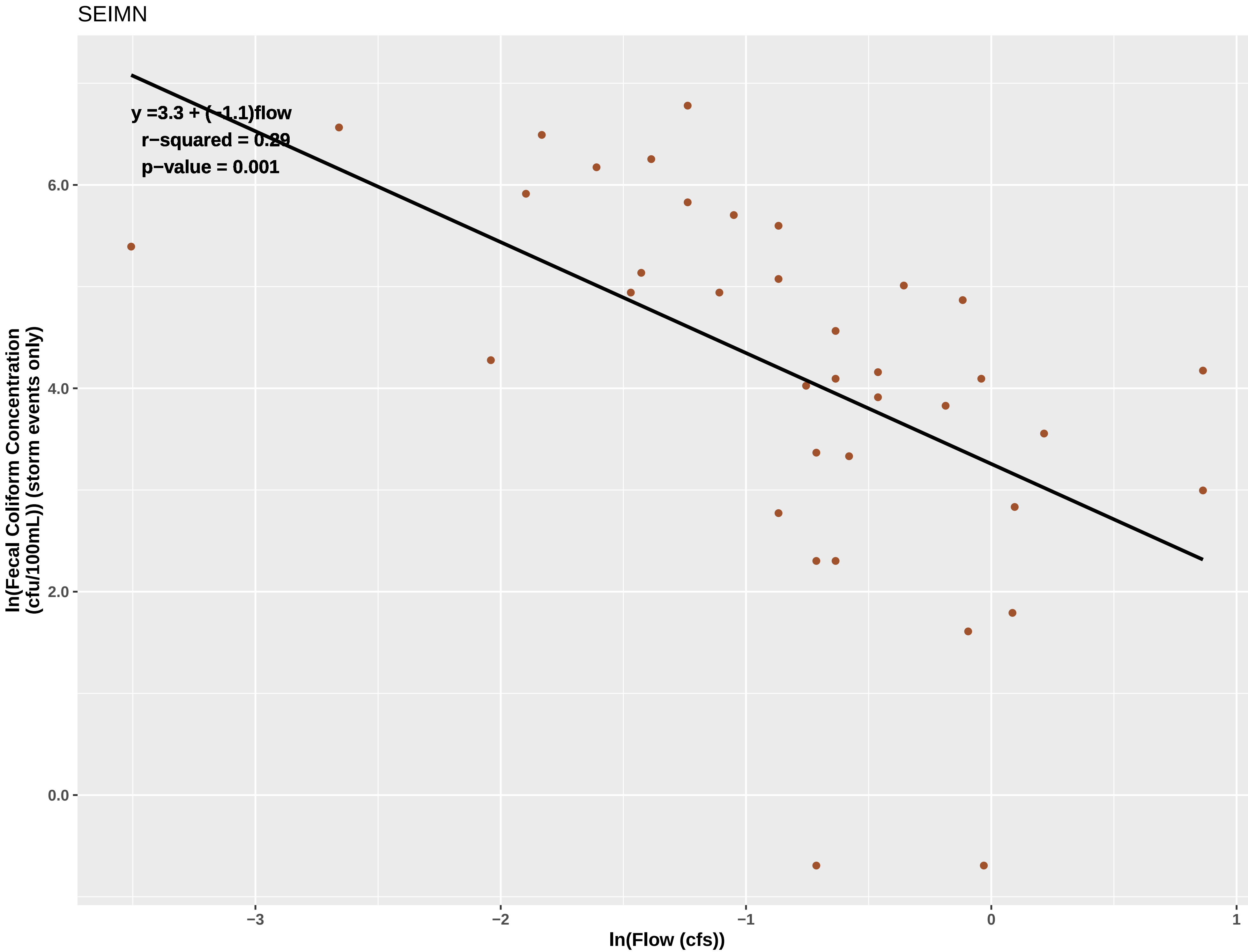


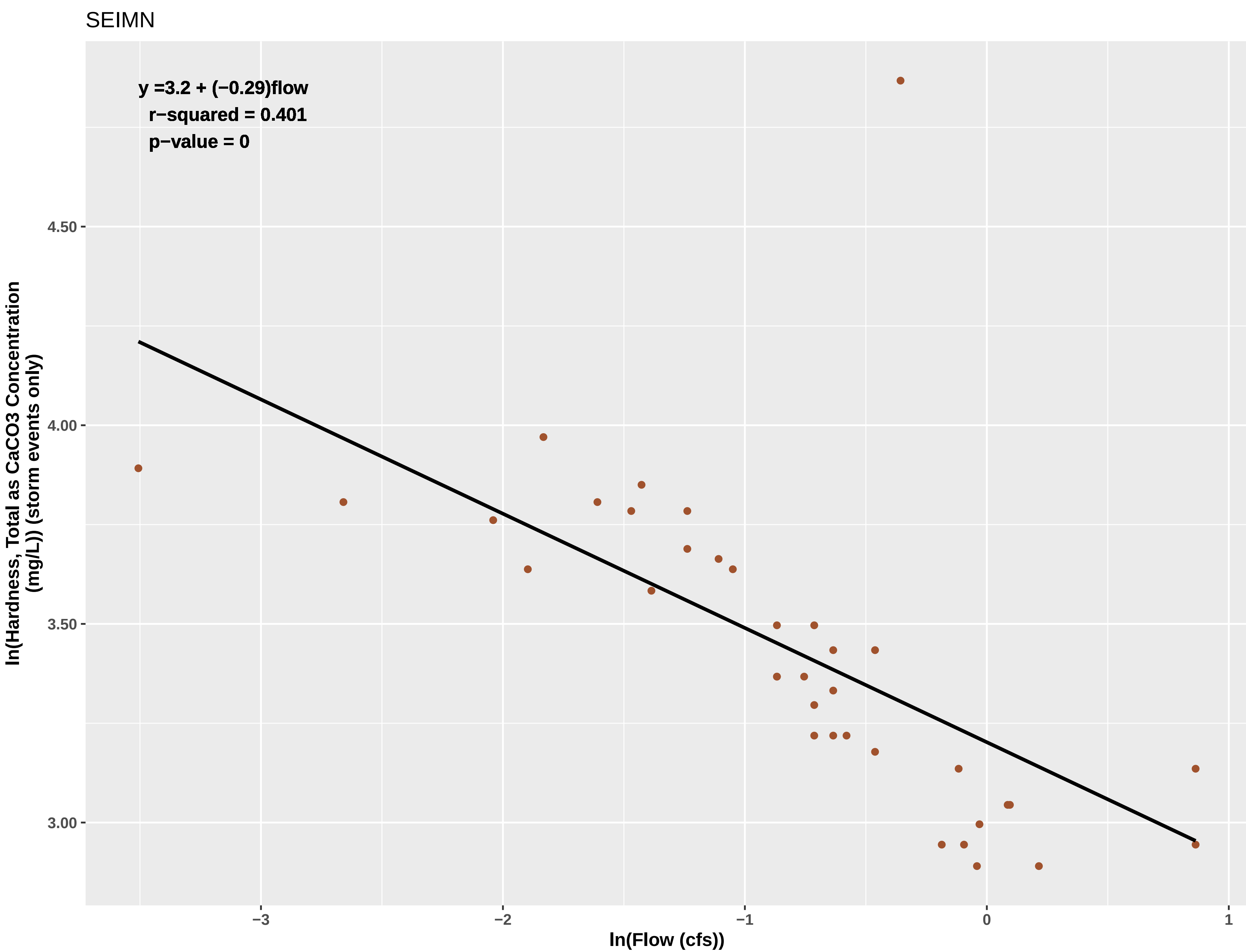
y =−0.57 + (0.085)flow
r−squared = 0.128
p−value = 0.03
0.30
0.00
−0.30
−0.60
−0.90
−3
−2
−1
0
1
ln(Flow (cfs))
ln(Dissolved Copper Concentration (ug/L)) (storm events only)

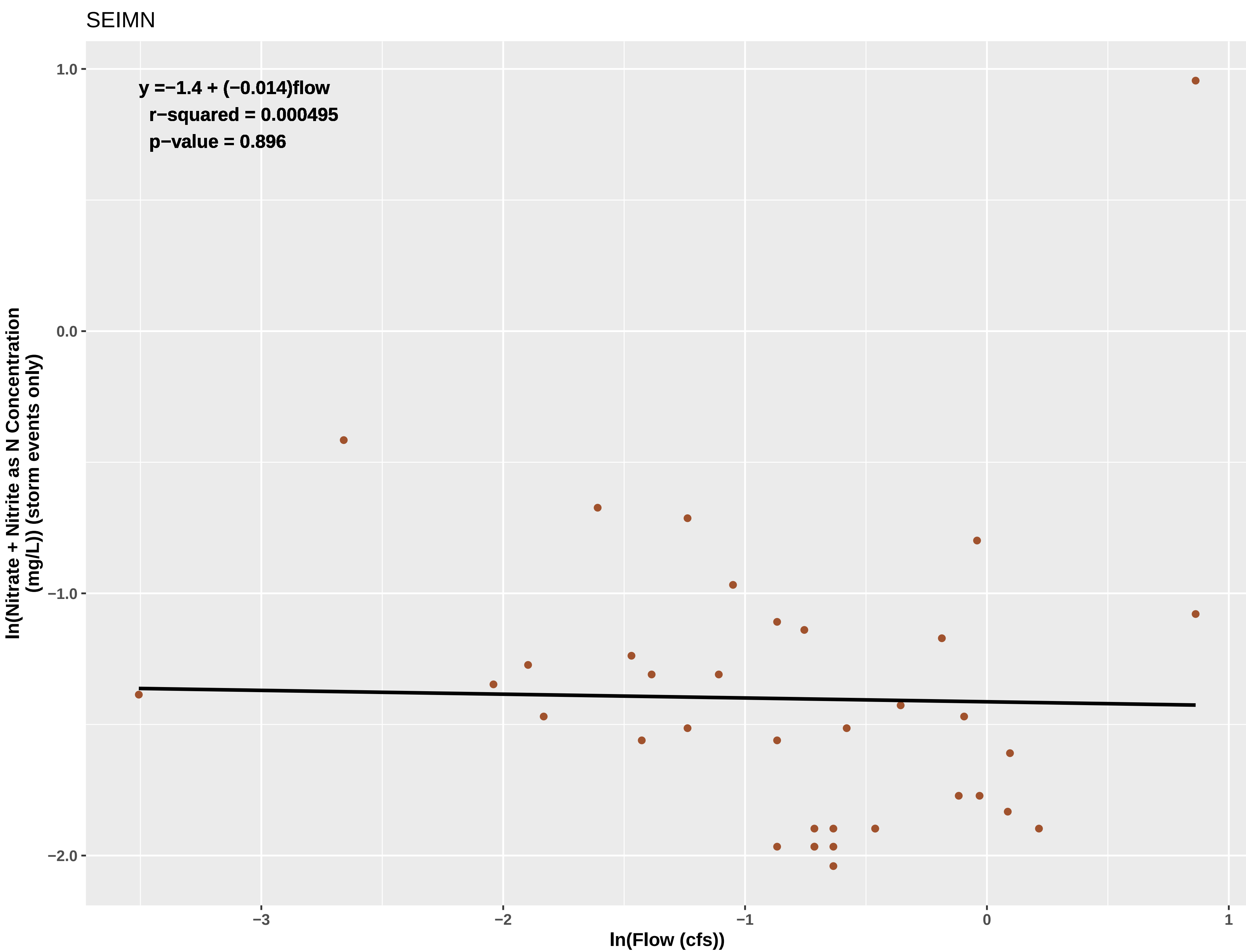

SEIMN
y =2.1 + (0.35)flow
r−squared = 0.596
p−value = 0
2.50
2.00
1.50
1.00
−3
−2
−1
0
1
ln(Flow (cfs))
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)



SEIMN
y =0.92 + (−0.0000000000000032)flow
r−squared = 0.505
p−value = 0.054
0.960
0.940
0.920
0.900
0.880
−3
−2
−1
0
1
ln(Flow (cfs))
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)

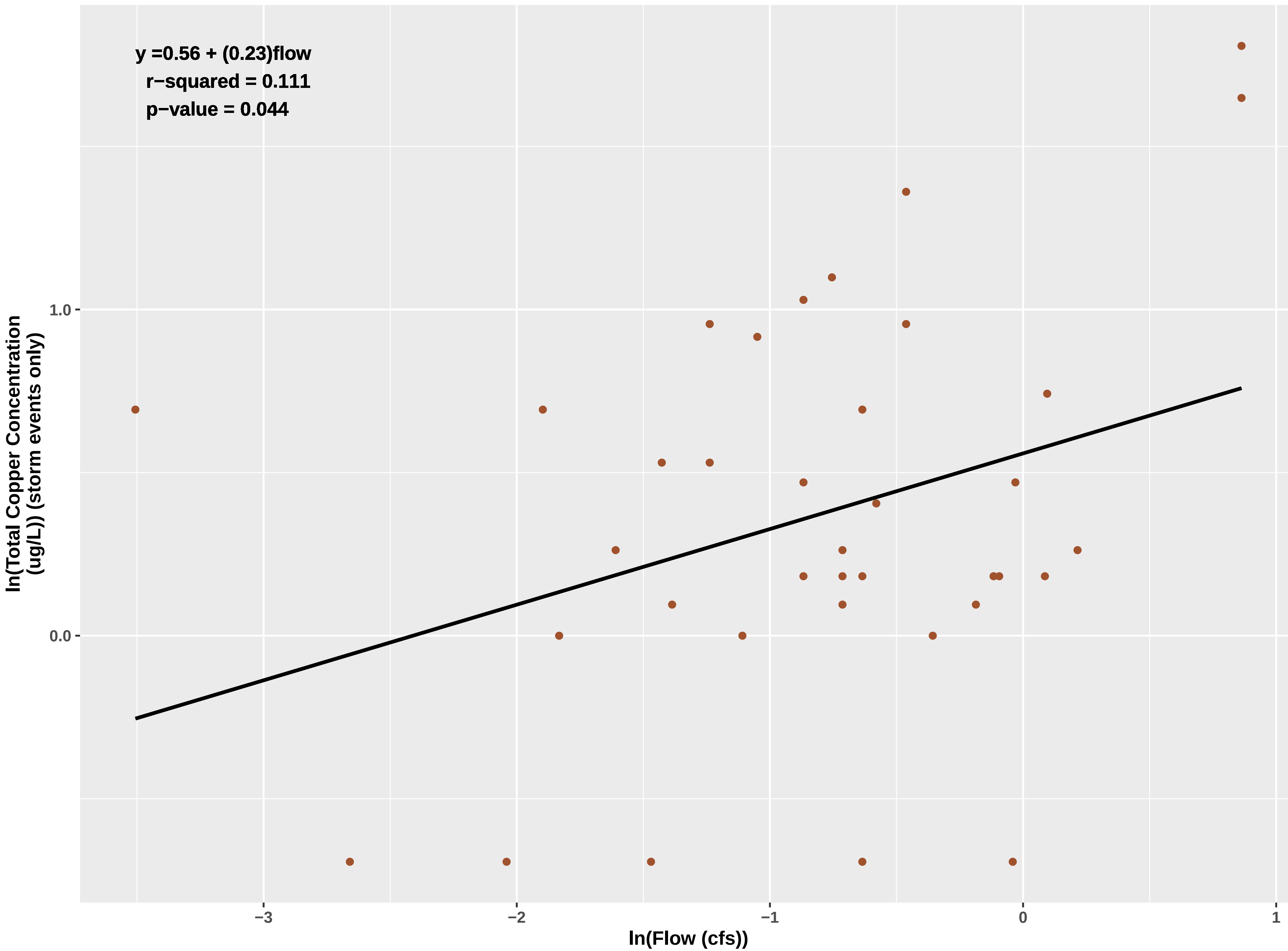

SEIMN
y =3.3 + (−1.1)flow
r−squared = 0.29
p−value = 0.001
6.0
4.0
2.0
0.0
−3
−2
−1
0
1
ln(Flow (cfs))
ln(Fecal Coliform Concentration
(cfu/100mL)) (storm events only)

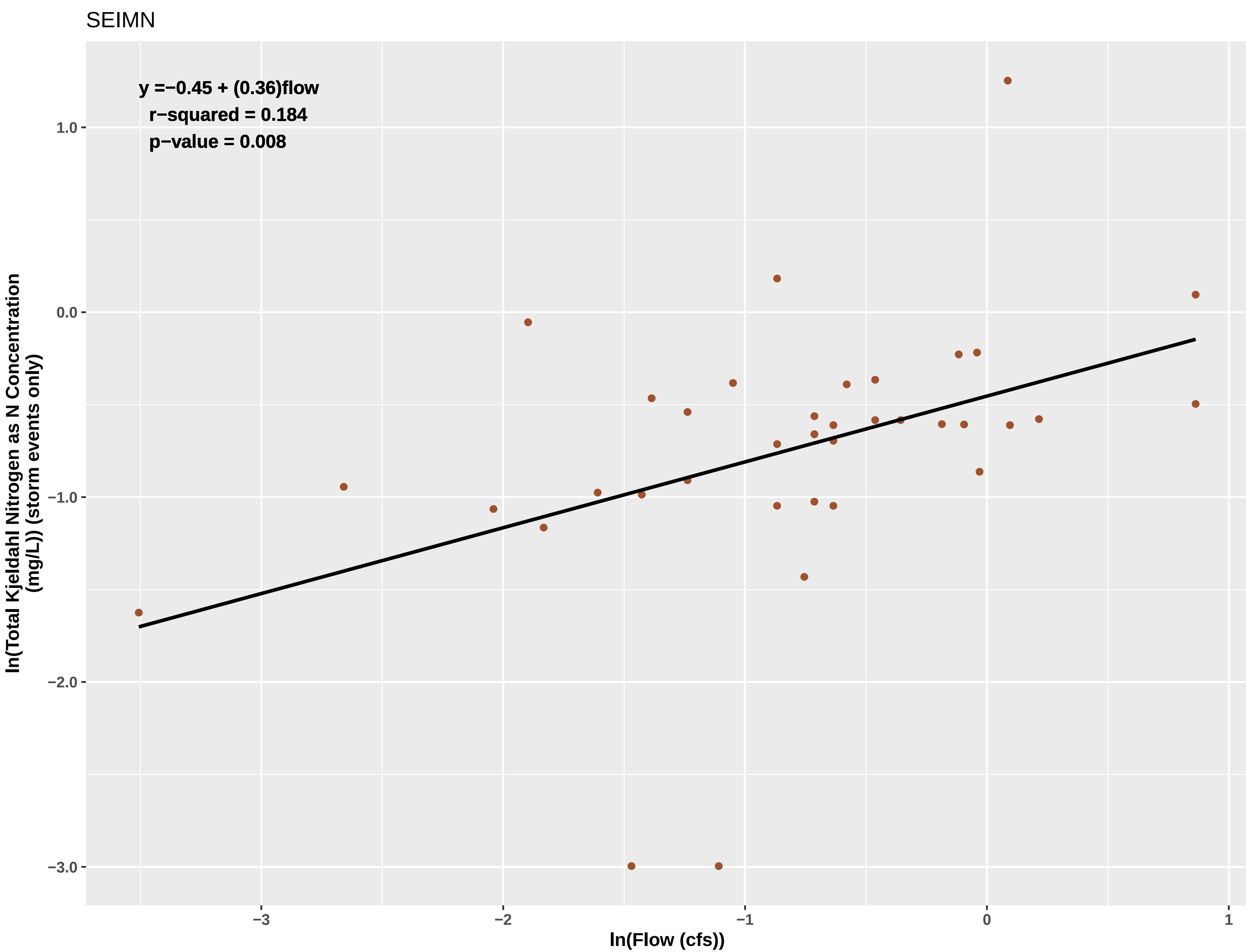

SEIMN
y =3.2 + (−0.29)flow
r−squared = 0.401
p−value = 0
4.50
4.00
3.50
3.00
ln(Hardness, Total as CaCO3 Concentration
(mg/L)) (storm events only)
−3
−2
−1
0
1
ln(Flow (cfs))

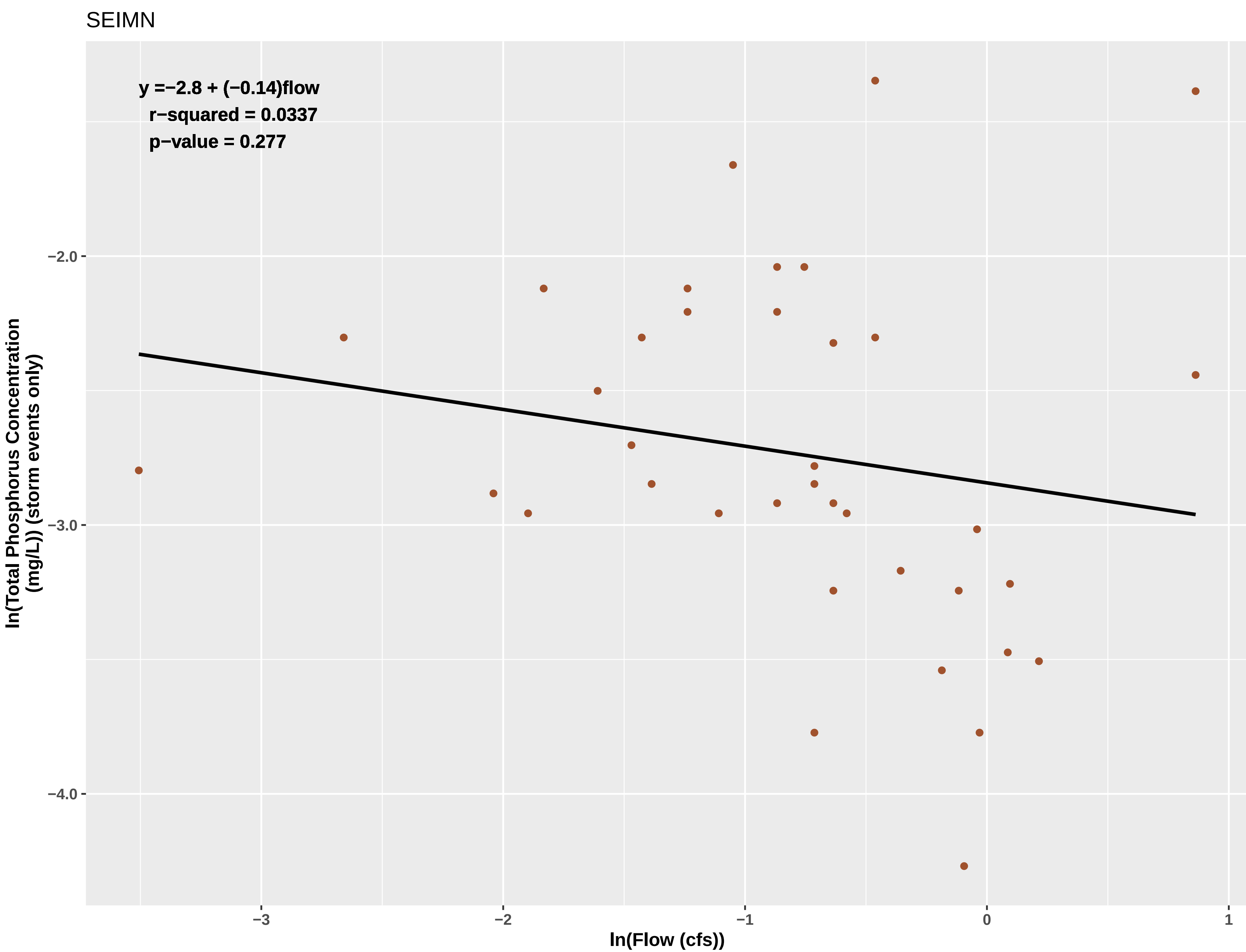


SEIMN
y =−1.4 + (−0.014)flow
r−squared = 0.000495
p−value = 0.896
1.0
0.0
−1.0
−2.0
−3
−2
−1
0
1
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

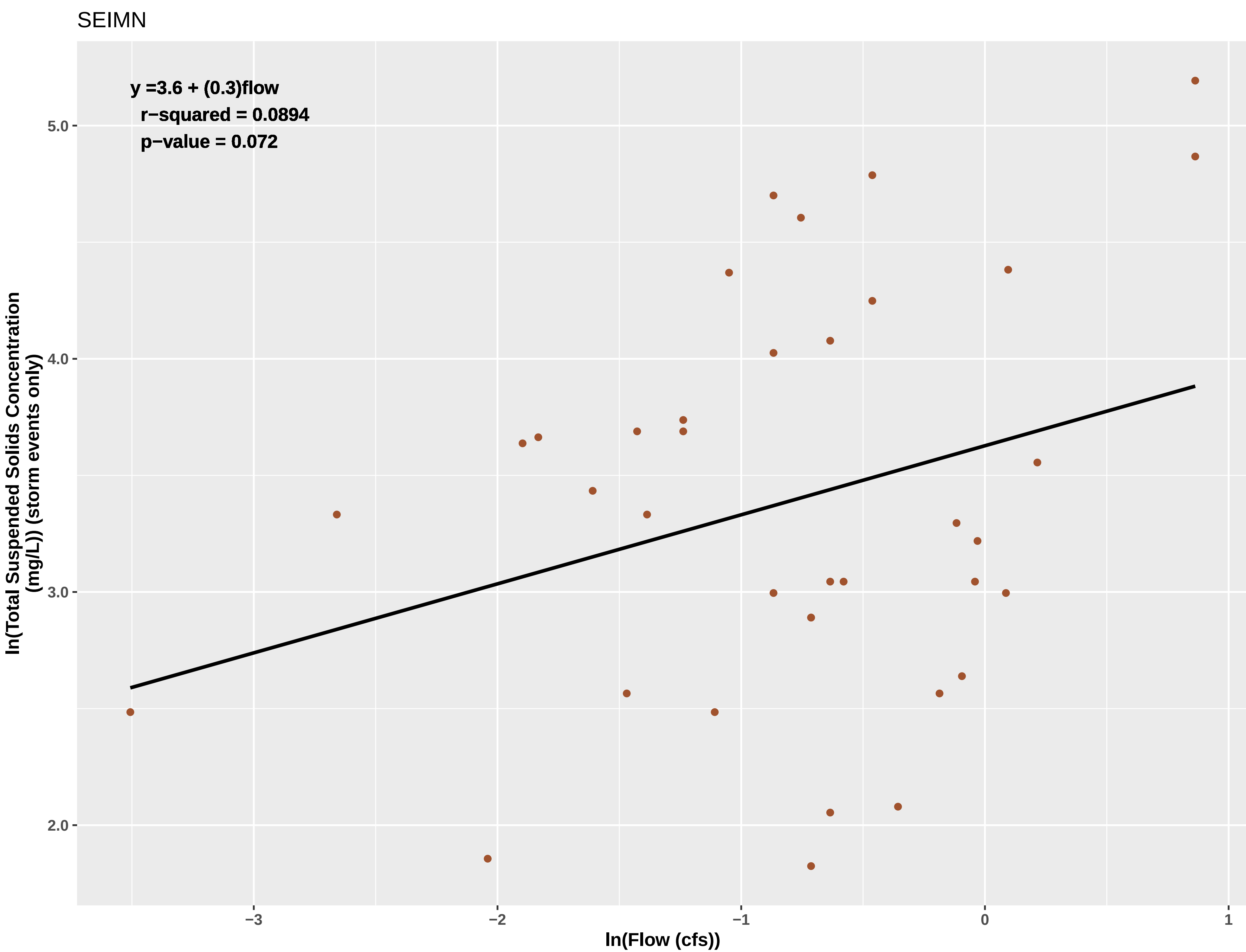
SEIMN


y =0.56 + (0.23)flow
r−squared = 0.111
p−value = 0.044
ln(Total Copper Concentration (ug/L)) (storm events only)
1.0
0.0
−3
−2
−1
0
1
ln(Flow (cfs))

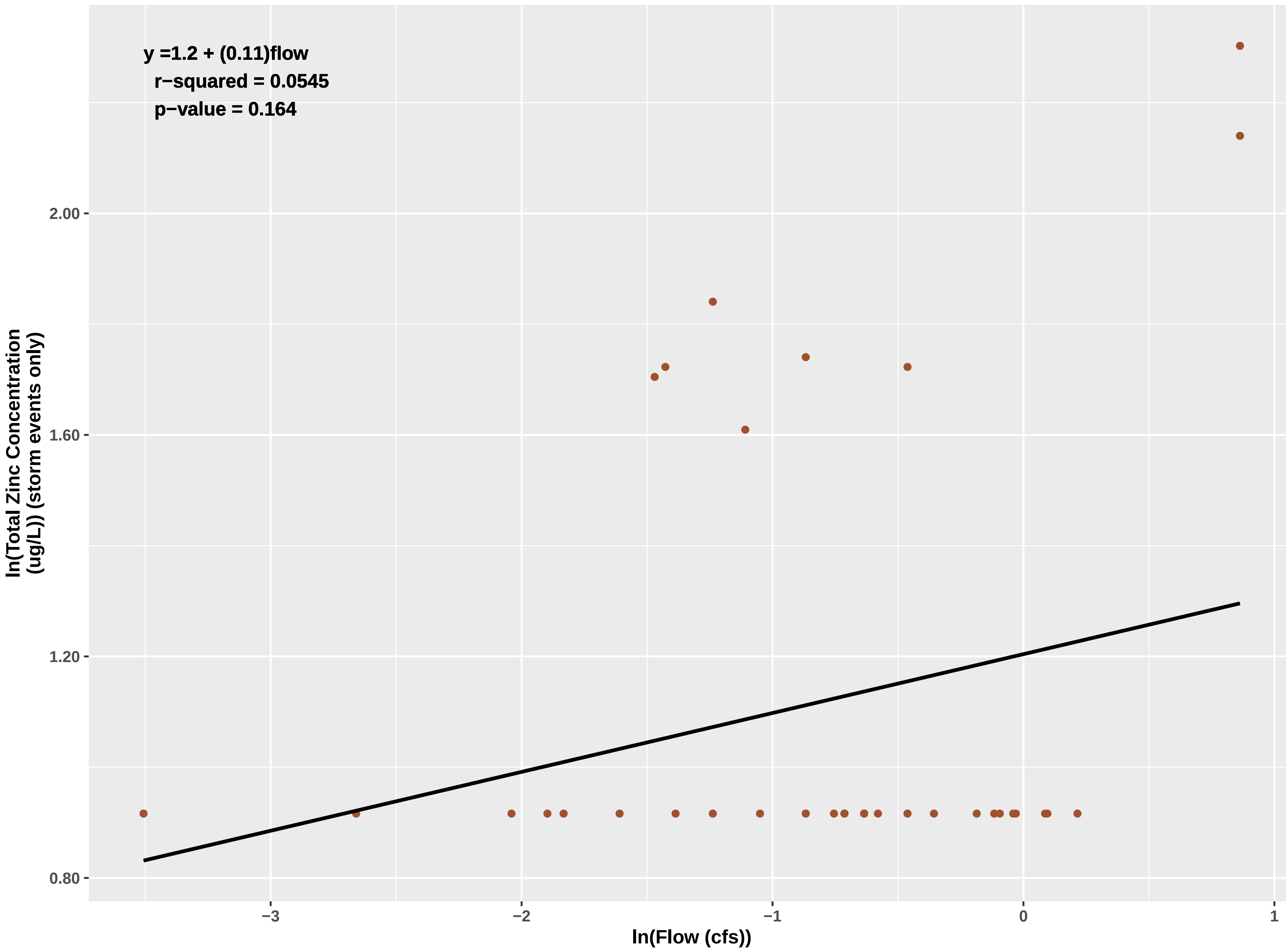

SEIMN
y =−0.45 + (0.36)flow
r−squared = 0.184
p−value = 0.008
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)
1.0
0.0
−1.0
−2.0
−3.0
ln(Flow (cfs))
−3
−2
−1
0
1



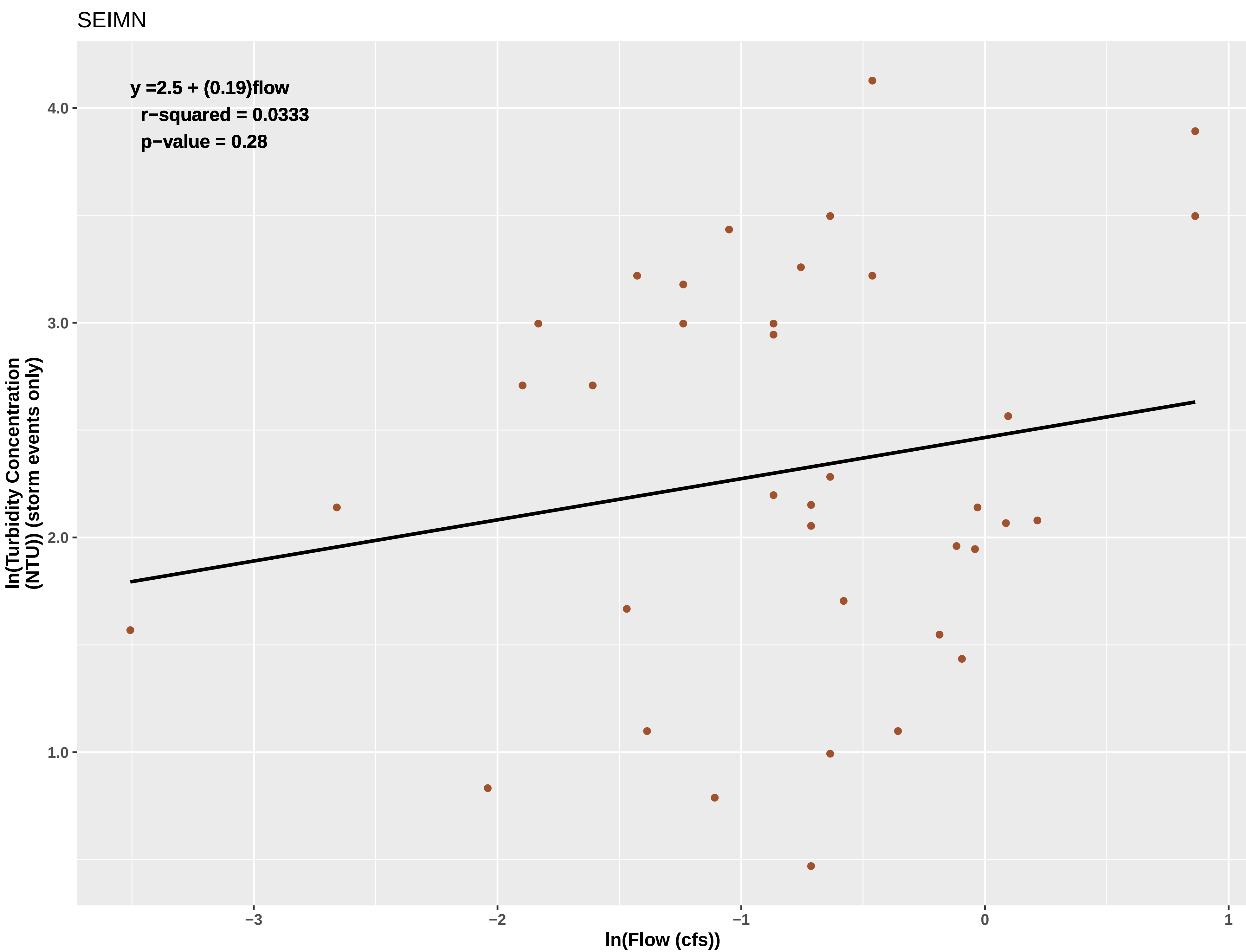
SEIMN
y =−2.8 + (−0.14)flow
r−squared = 0.0337
p−value = 0.277
−2.0
−3.0
−4.0
−3
−2
−1
0
1
ln(Flow (cfs))
ln(Total Phosphorus Concentration (mg/L)) (storm events only)


SEIMN
y =3.6 + (0.3)flow
r−squared = 0.0894
p−value = 0.072
5.0
4.0
3.0
2.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
−3
−2
−1
0
1
ln(Flow (cfs))

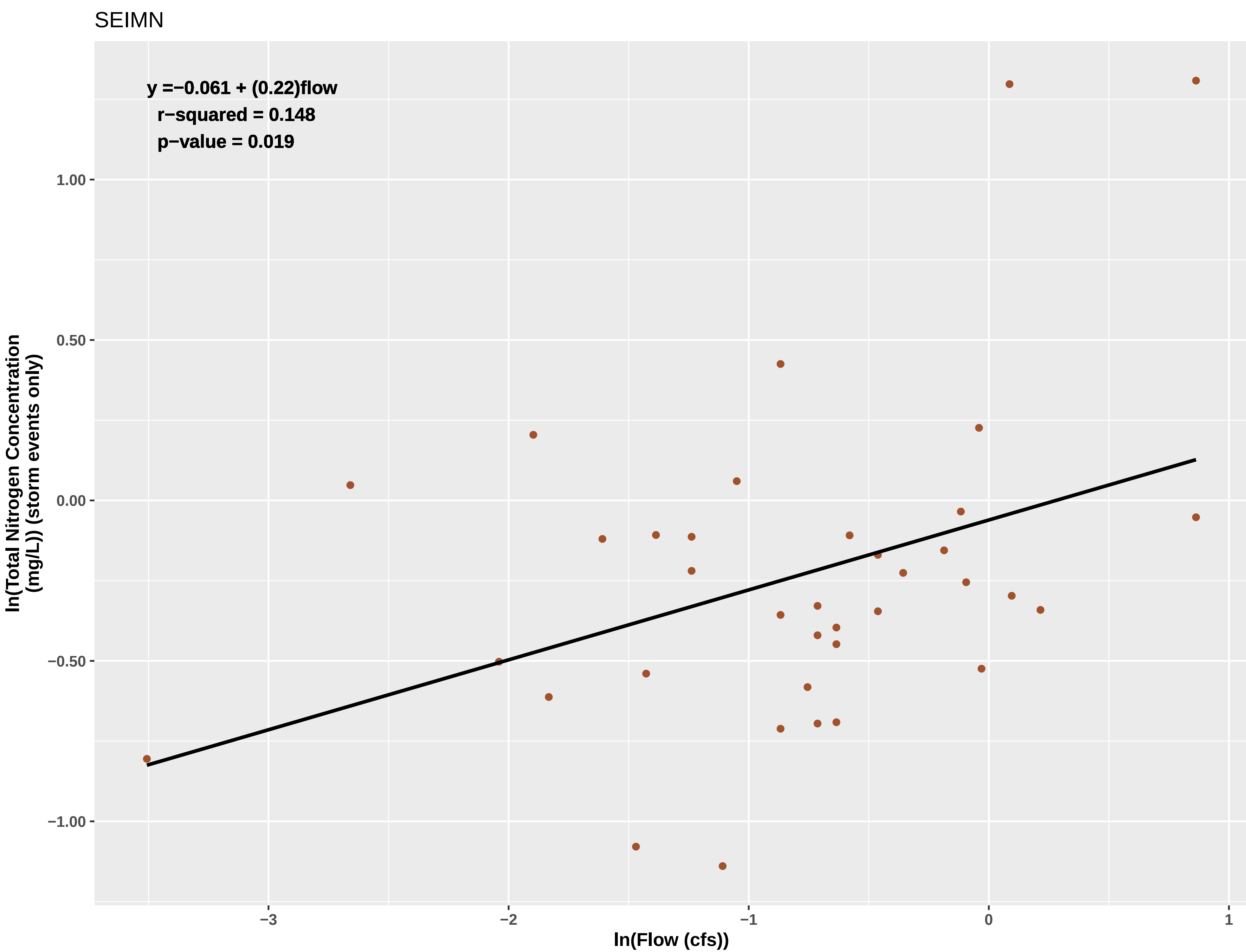
SEIMN



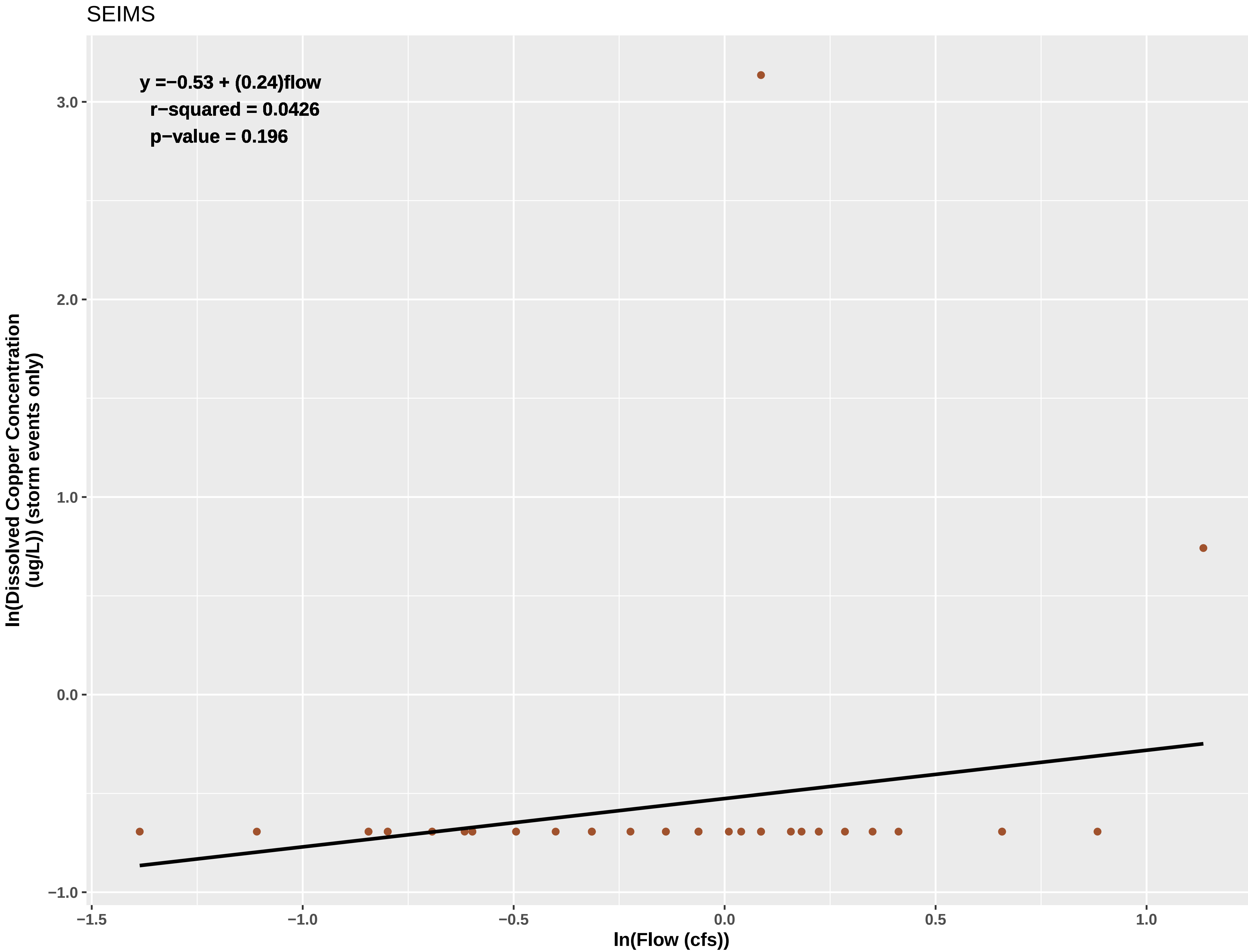
y =1.2 + (0.11)flow
r−squared = 0.0545
p−value = 0.164
2.00
1.60
1.20
0.80
ln(Total Zinc Concentration (ug/L)) (storm events only)
−3
−2
−1
0
1
ln(Flow (cfs))

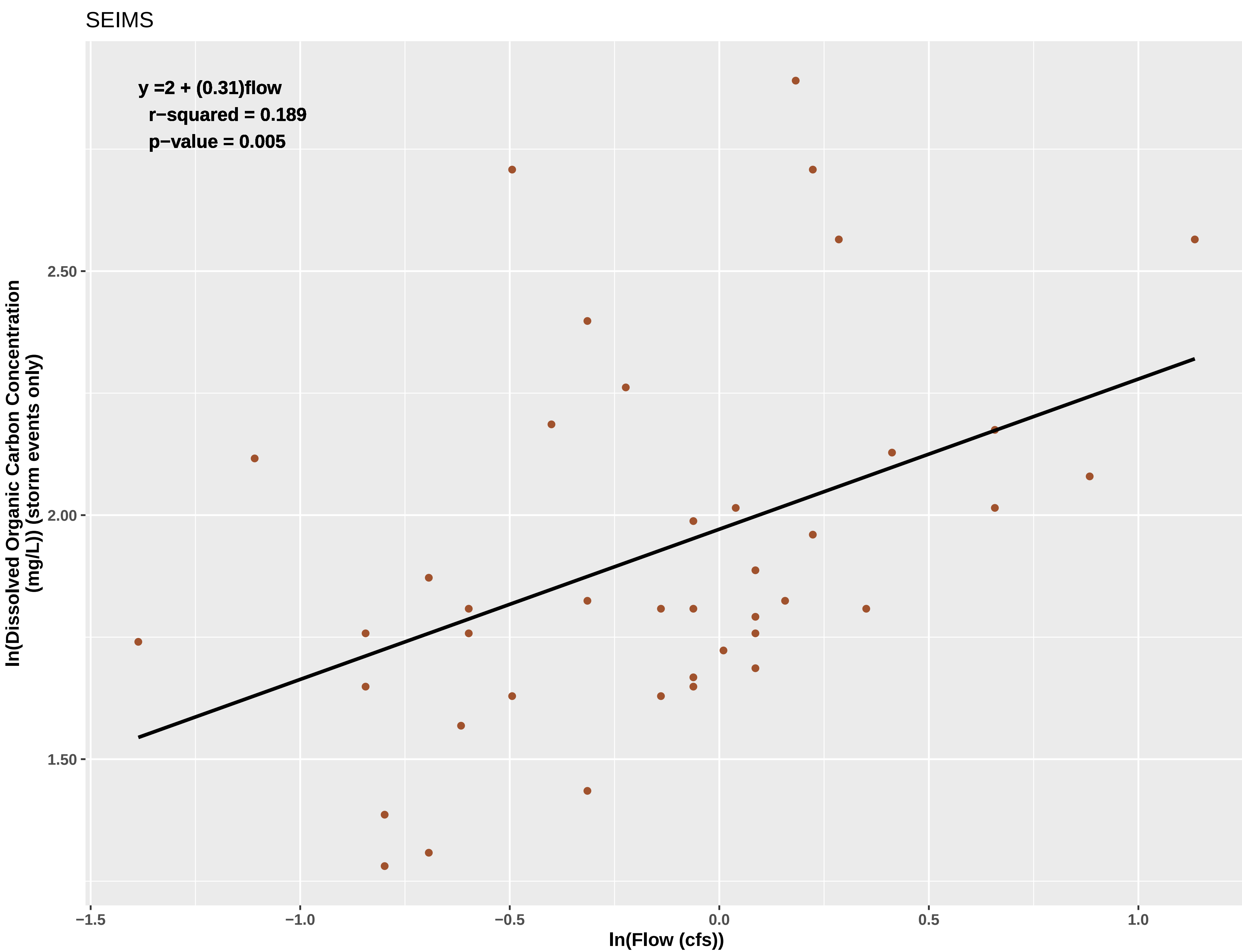


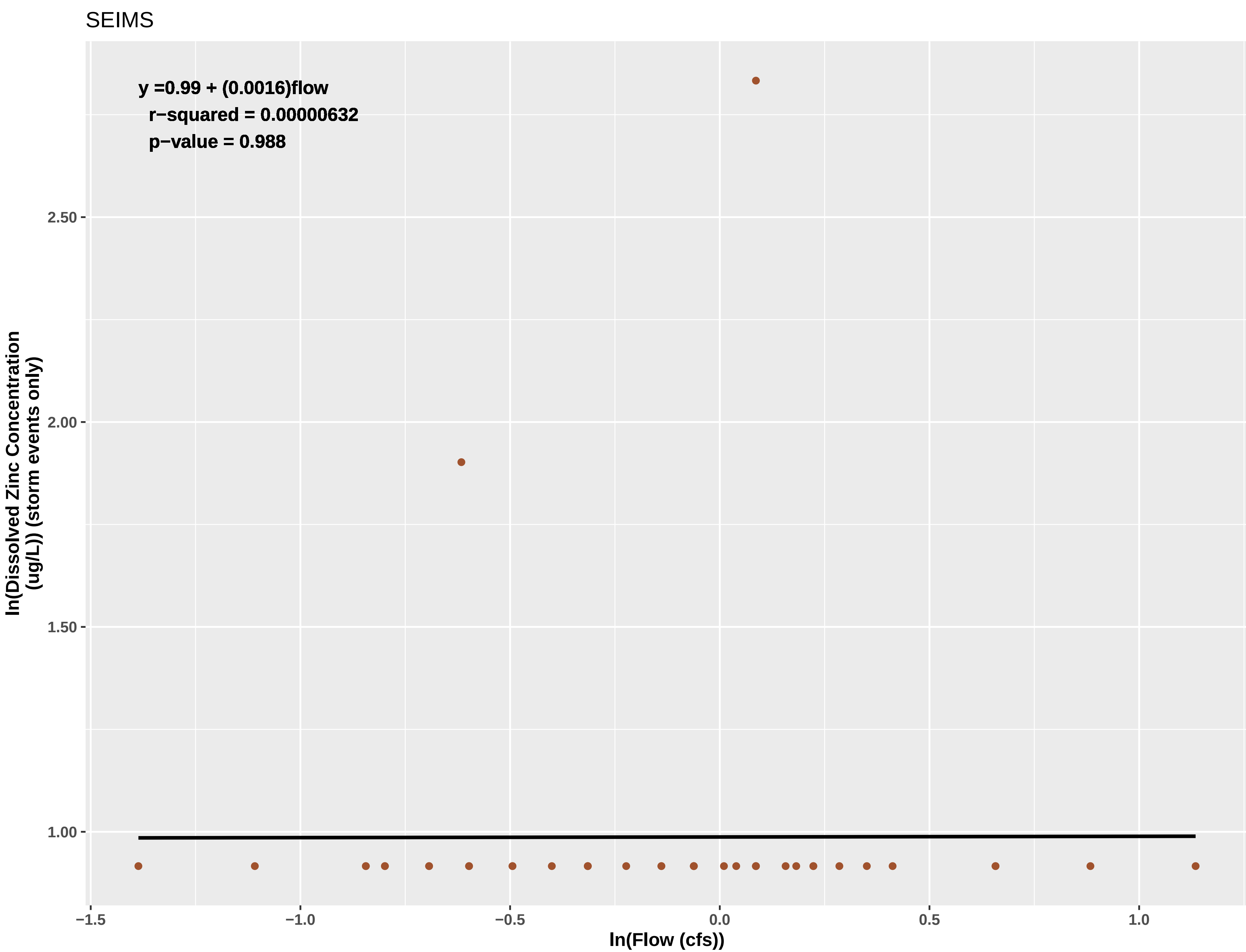
SEIMN
y =2.5 + (0.19)flow
r−squared = 0.0333
p−value = 0.28
ln(Turbidity Concentration (NTU)) (storm events only)
4.0
3.0
2.0
1.0
−3
−2
−1
0
1
ln(Flow (cfs))

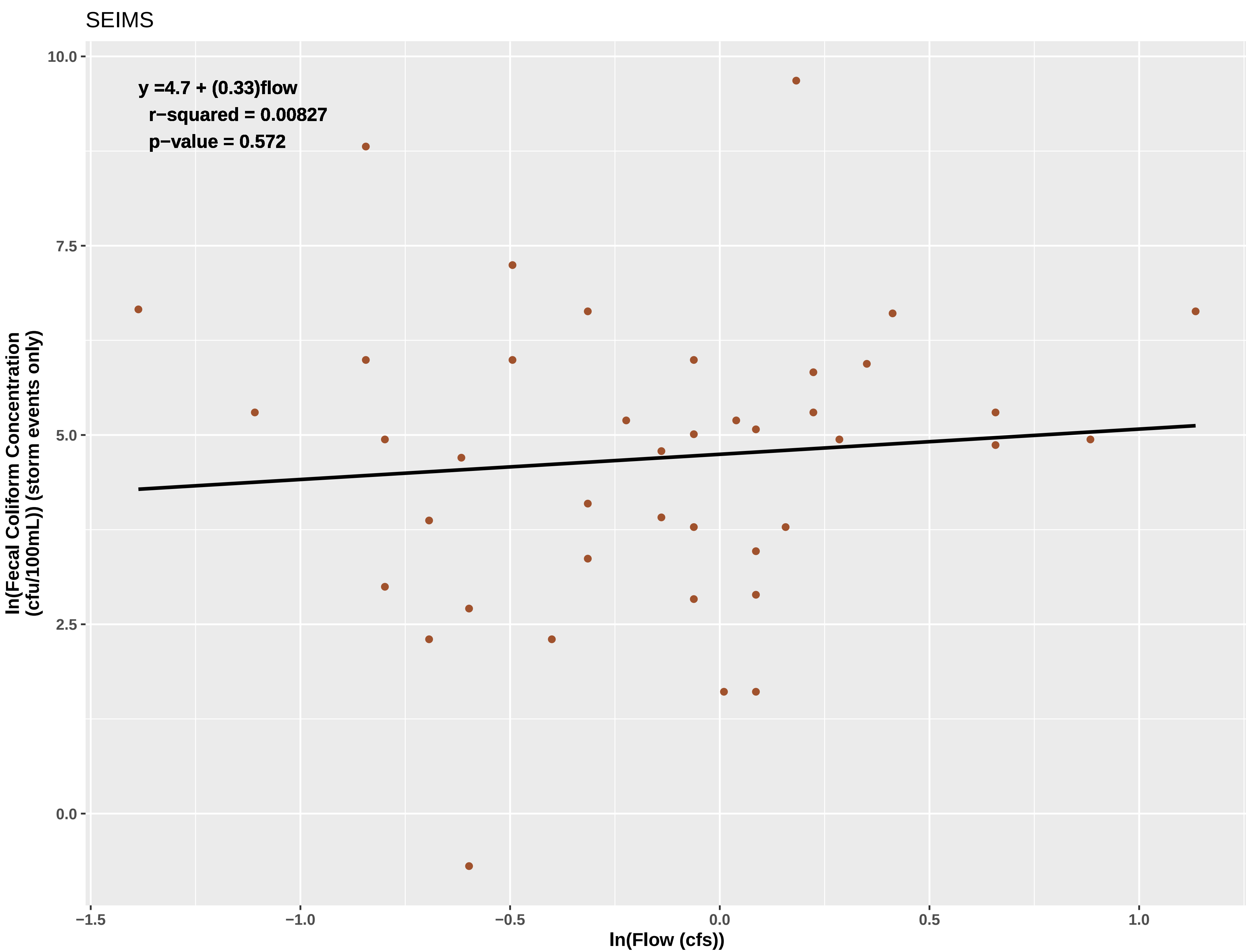


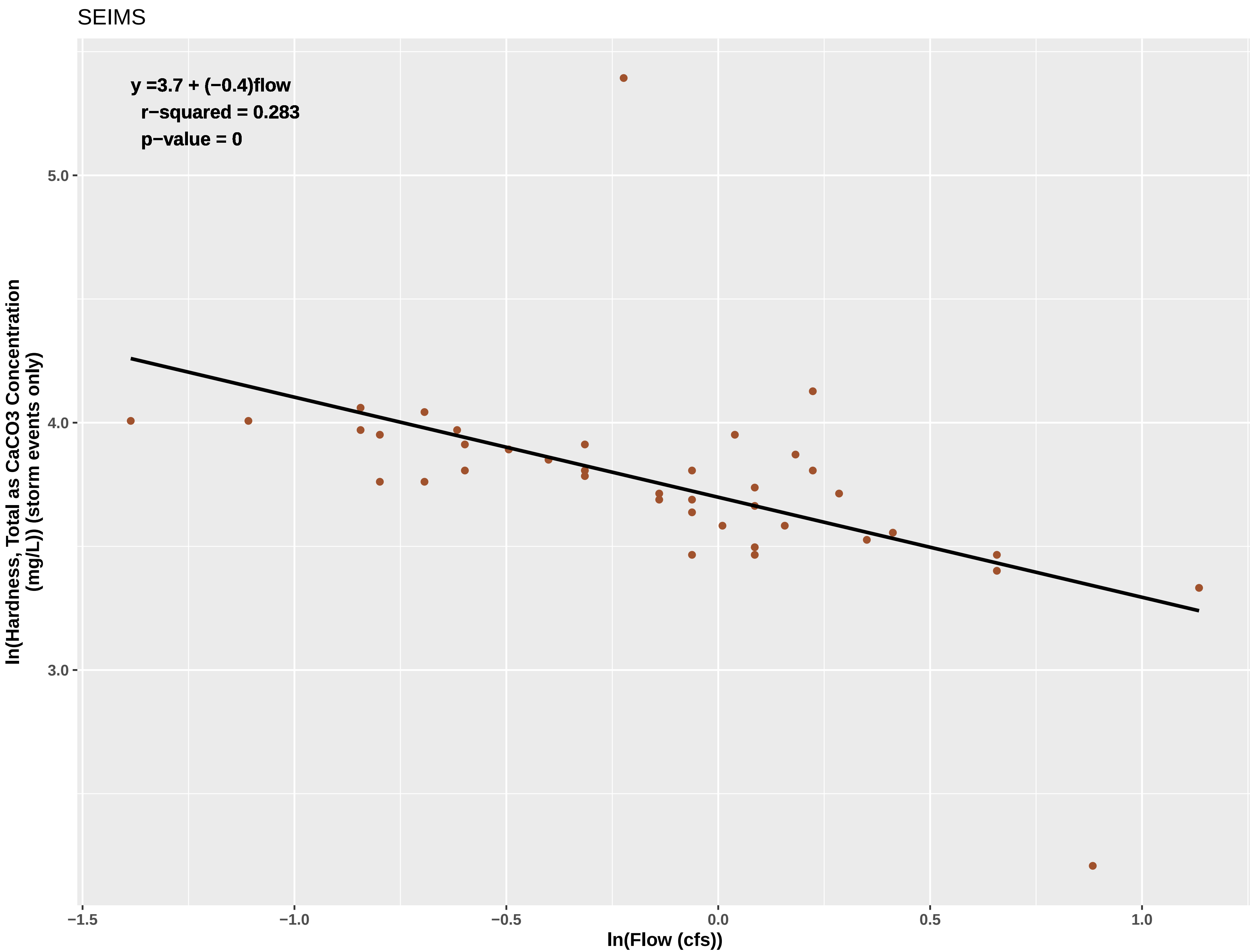
SEIMN
y =−0.061 + (0.22)flow
r−squared = 0.148
p−value = 0.019
1.00
0.50
0.00
−0.50
−1.00
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
−3
−2
−1
0
1
ln(Flow (cfs))


SEIMS
y =−0.53 + (0.24)flow
r−squared = 0.0426
p−value = 0.196
3.0
2.0
1.0
0.0
−1.0
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

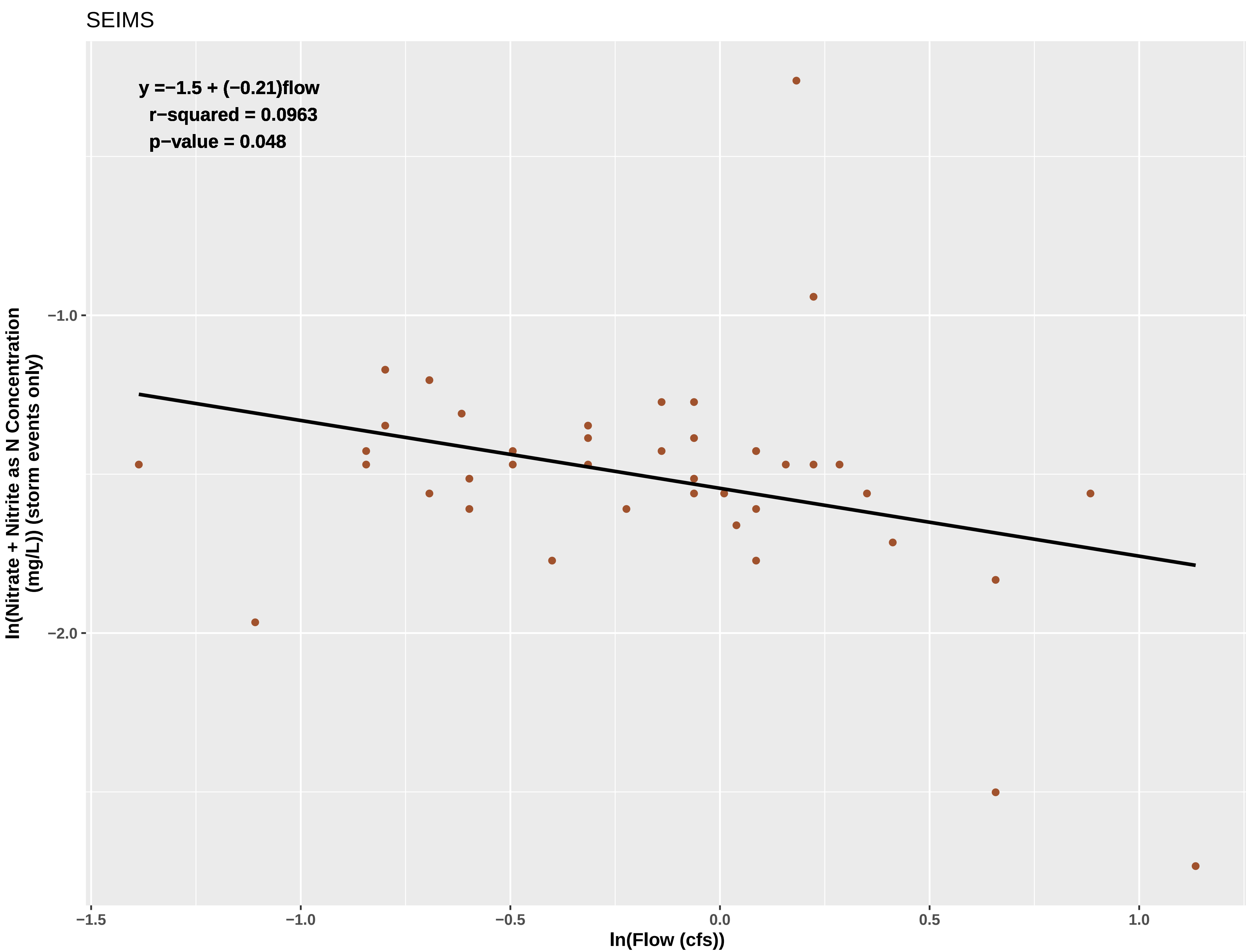

SEIMS
y =2 + (0.31)flow
r−squared = 0.189
p−value = 0.005
ln(Dissolved Organic Carbon Concentration
(mg/L)) (storm events only)
2.50
2.00
1.50
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

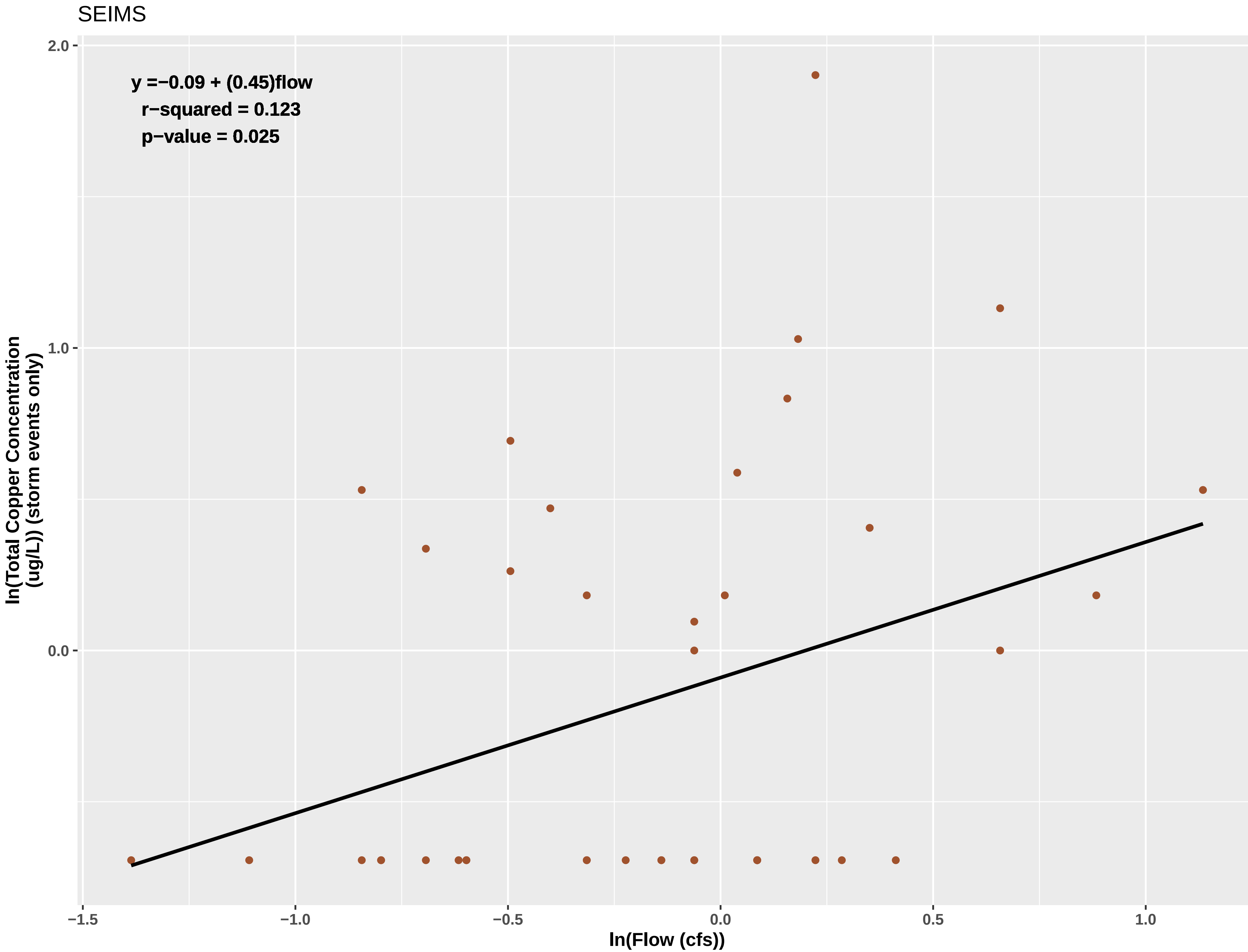

SEIMS
y =0.99 + (0.0016)flow
r−squared = 0.00000632
p−value = 0.988
2.50
2.00
1.50
1.00
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))


SEIMS
y =4.7 + (0.33)flow
r−squared = 0.00827
p−value = 0.572
10.0
7.5
5.0
2.5
0.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))
ln(Fecal Coliform Concentration
(cfu/100mL)) (storm events only)

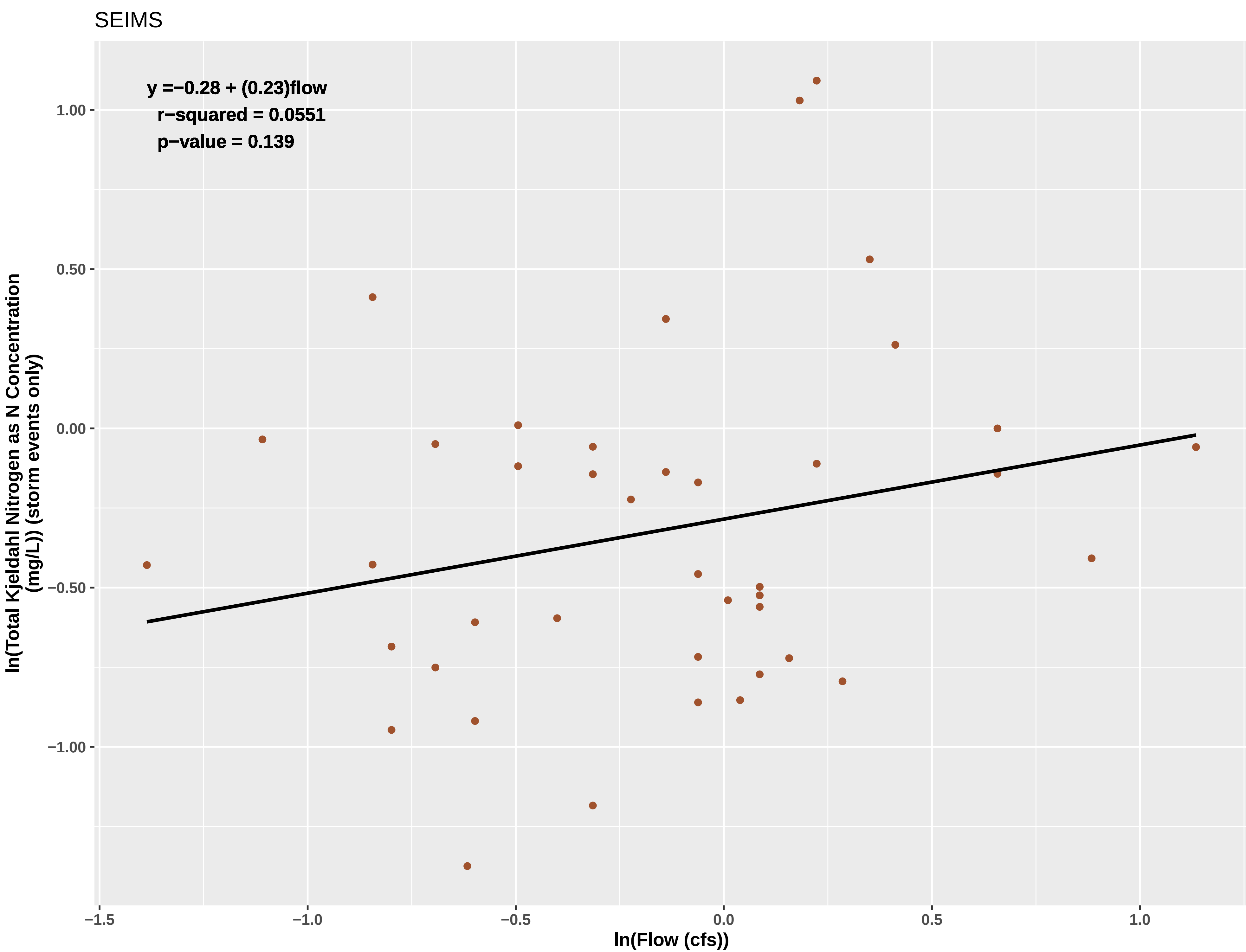


SEIMS
y =3.7 + (−0.4)flow
r−squared = 0.283
p−value = 0
5.0
4.0
3.0
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

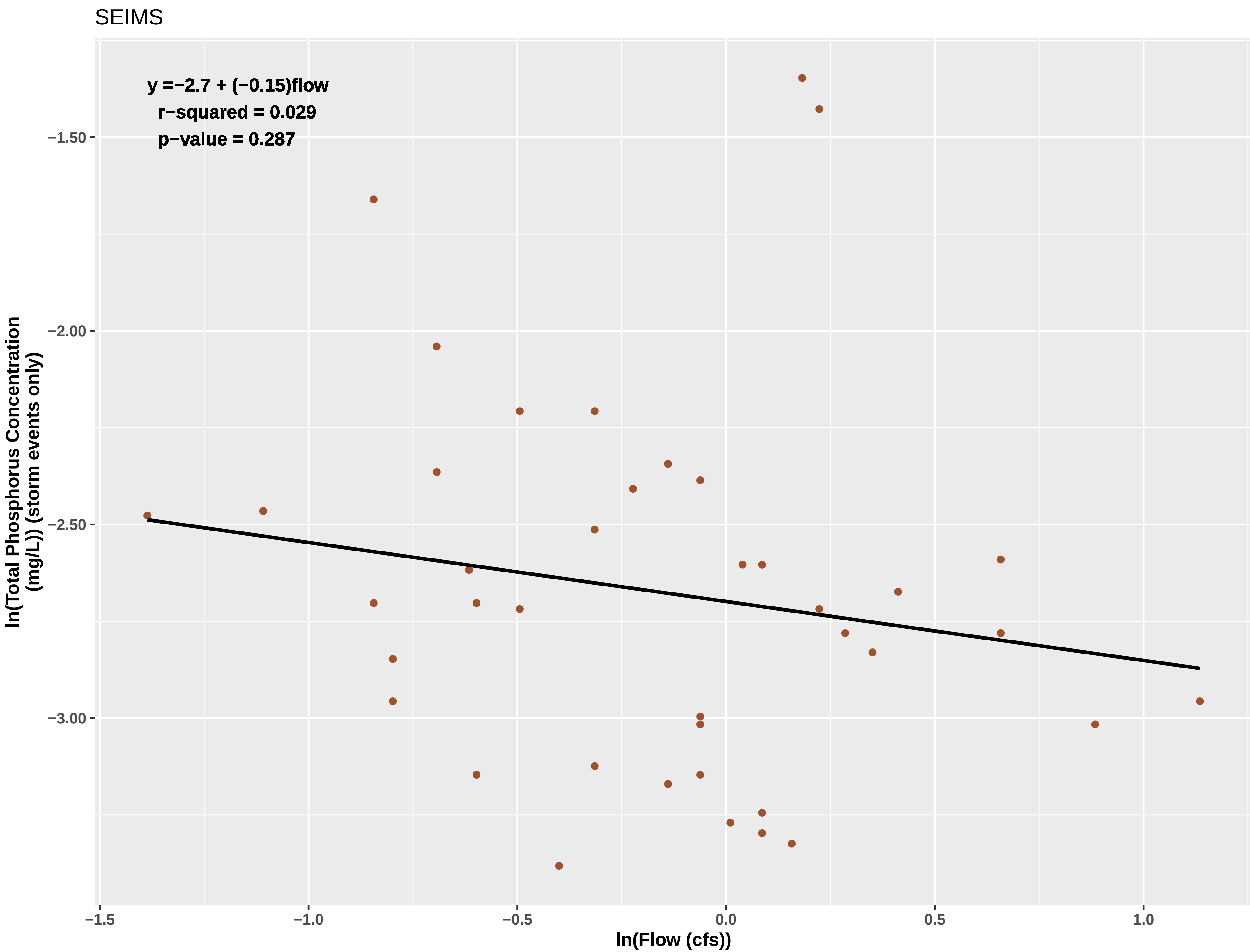

SEIMS
y =−1.5 + (−0.21)flow
r−squared = 0.0963
p−value = 0.048
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
−1.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

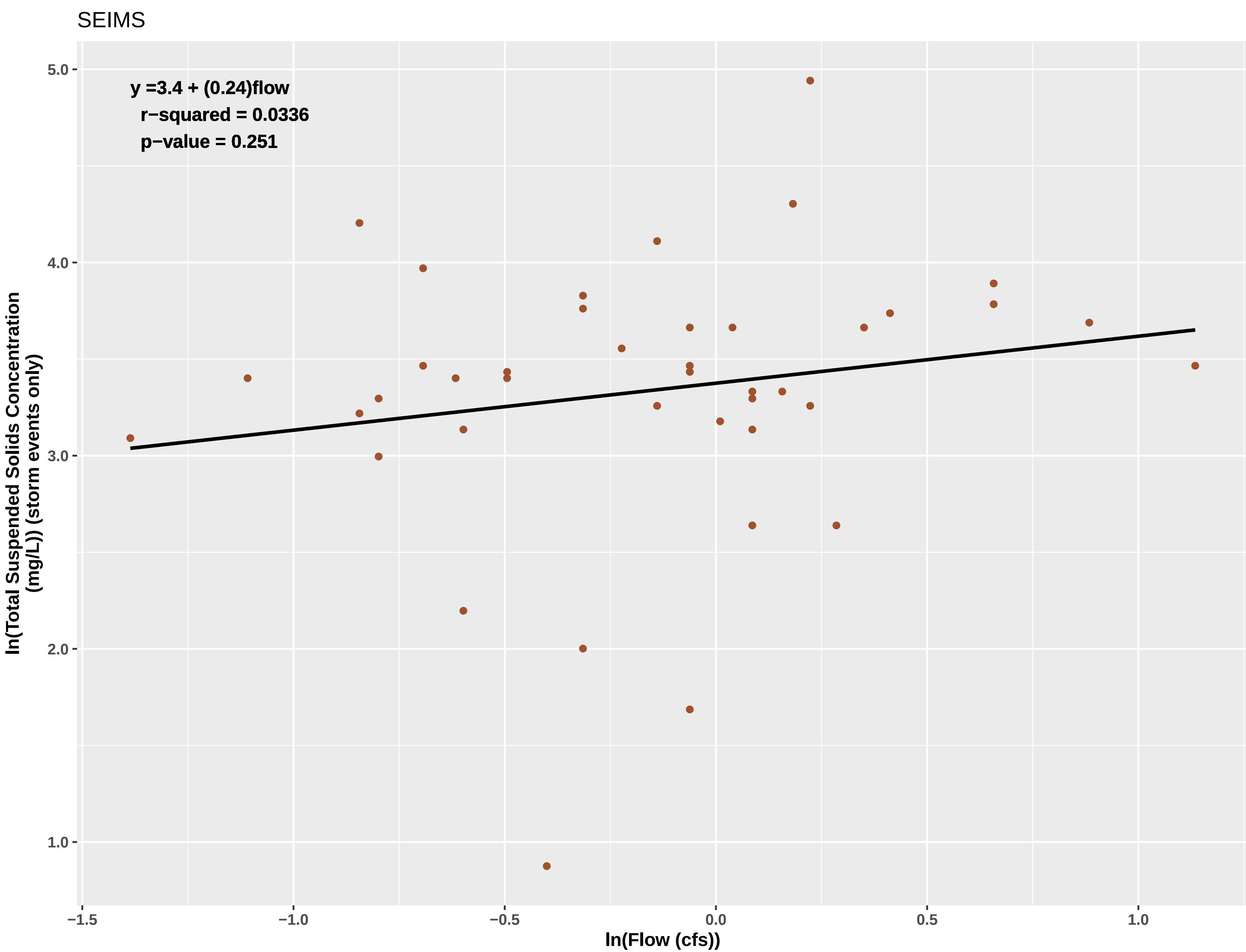


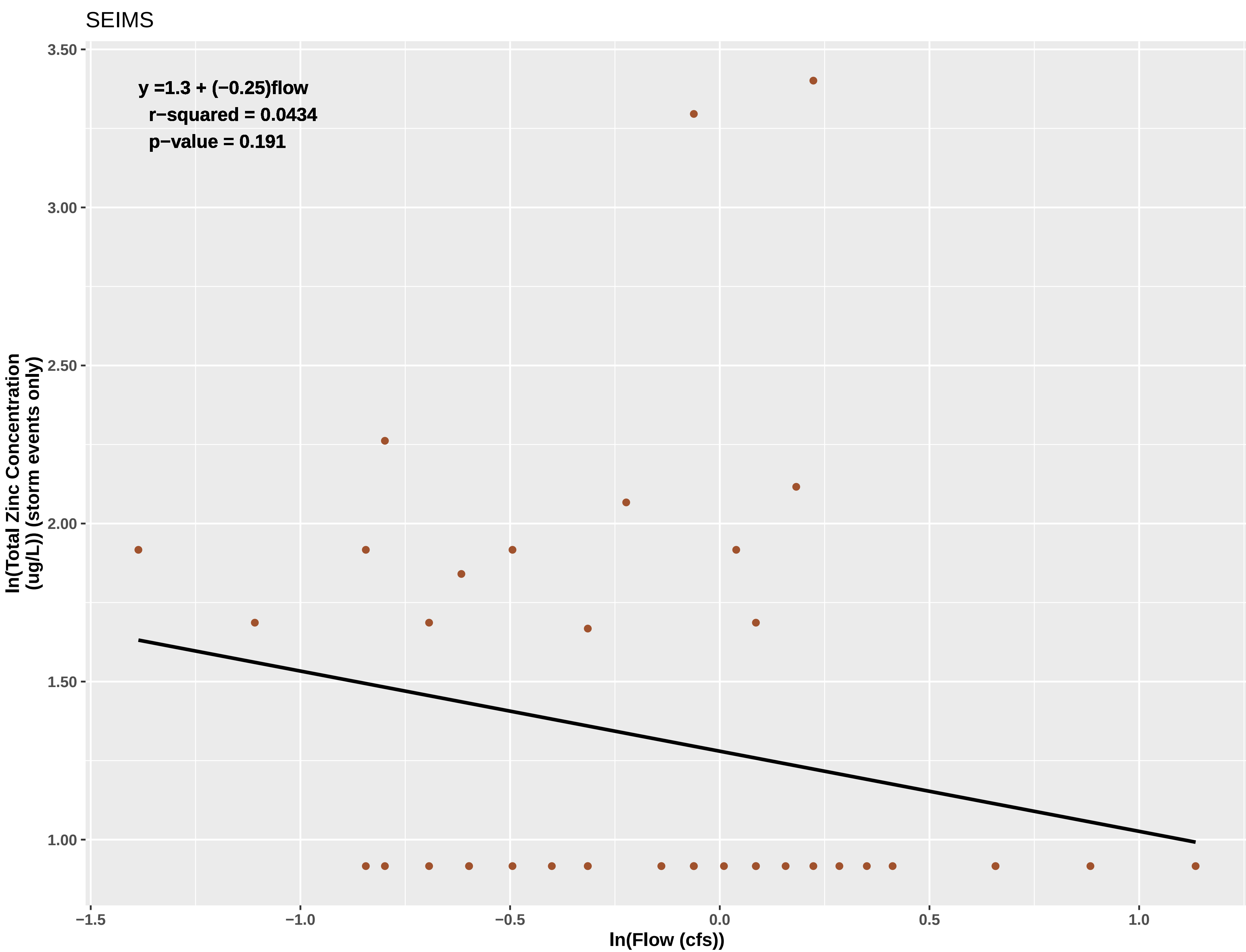
SEIMS
y =−0.09 + (0.45)flow
r−squared = 0.123
p−value = 0.025
2.0
1.0
0.0
ln(Total Copper Concentration
(ug/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

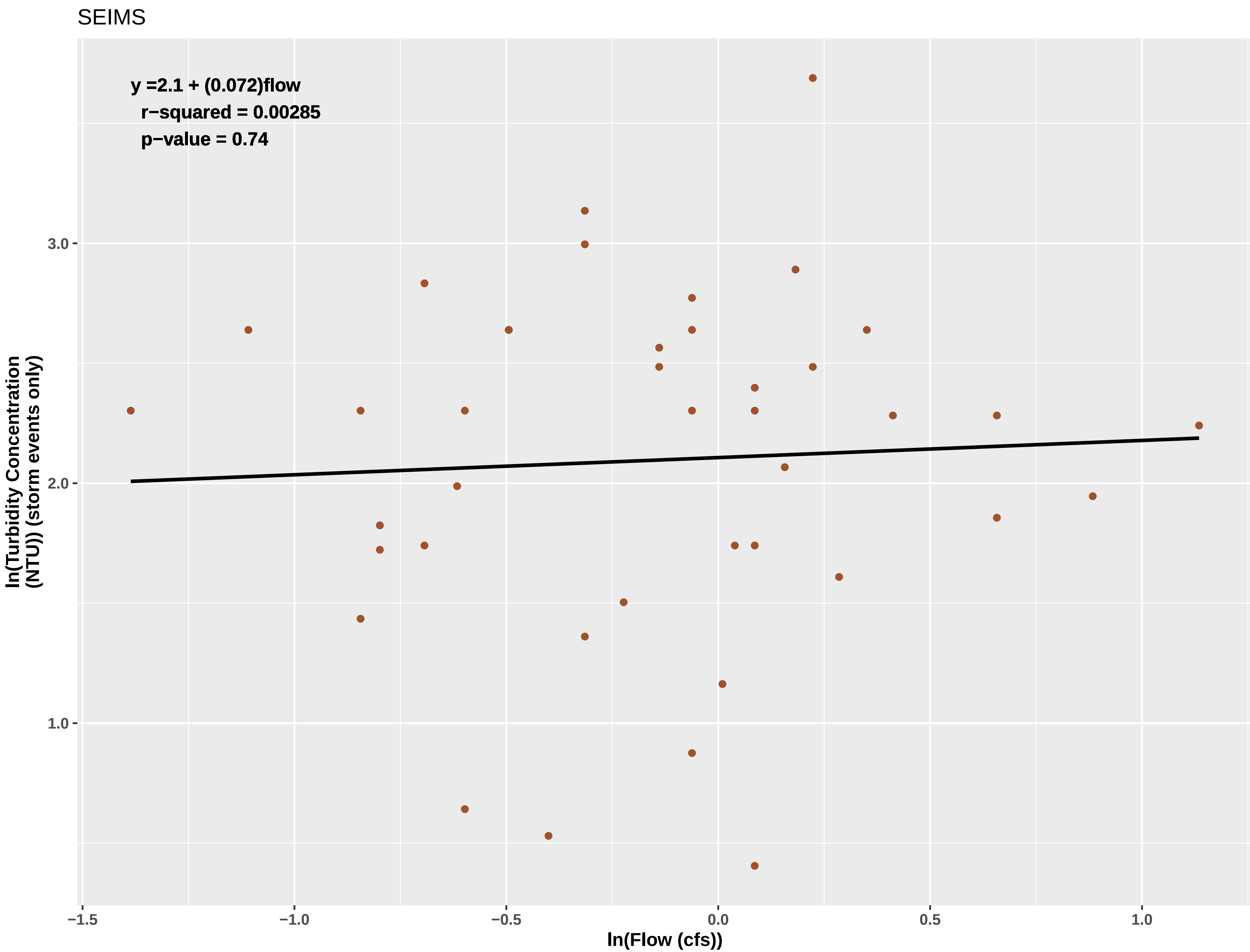


SEIMS
y =−0.28 + (0.23)flow
r−squared = 0.0551
p−value = 0.139
1.00
0.50
0.00
−0.50
−1.00
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

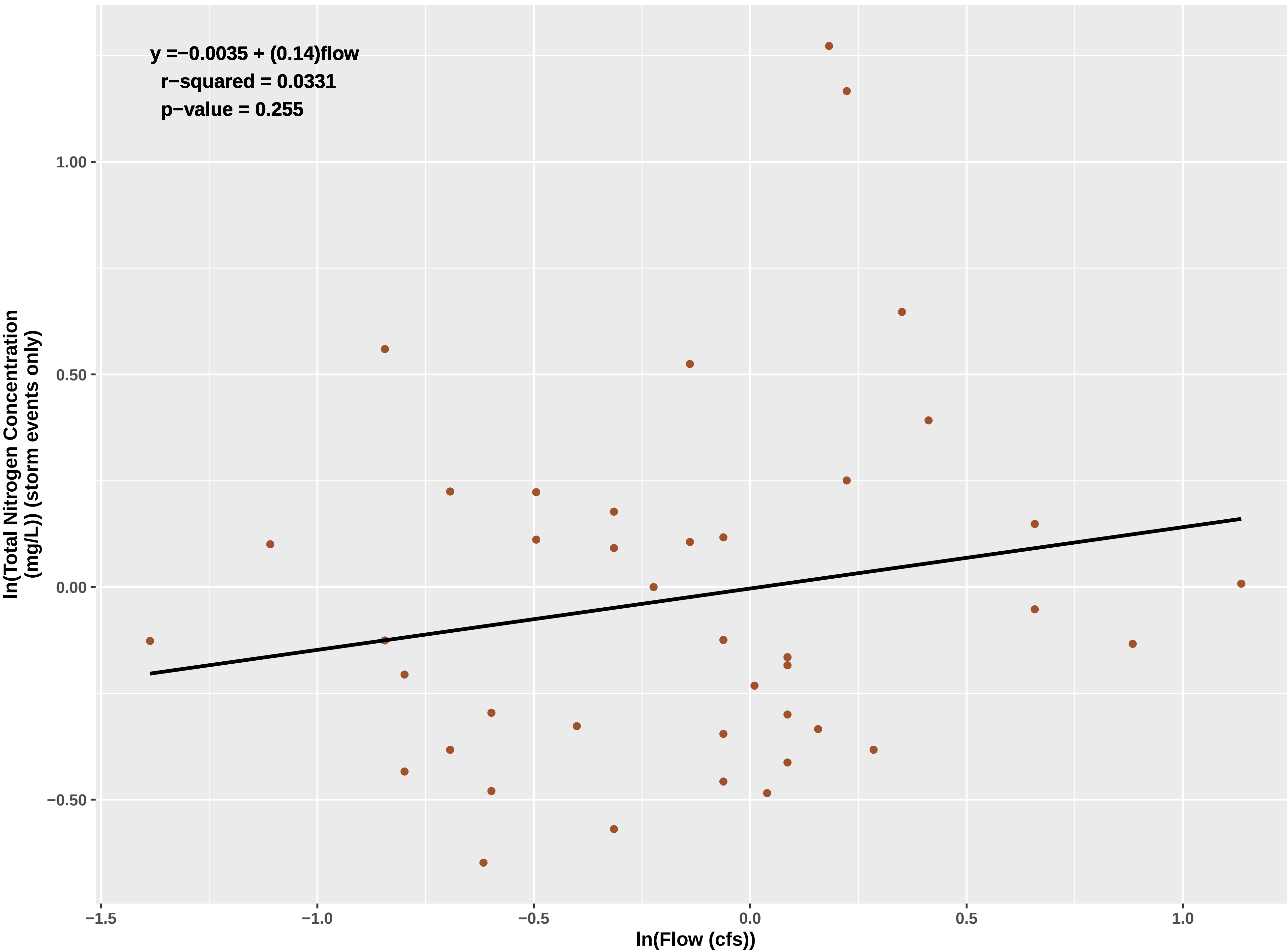

SEIMS
y =−2.7 + (−0.15)flow
r−squared = 0.029
p−value = 0.287
ln(Total Phosphorus Concentration
(mg/L)) (storm events only)
−1.50
−2.00
−2.50
−3.00
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))


SEIMS
y =3.4 + (0.24)flow
r−squared = 0.0336
p−value = 0.251
5.0
4.0
3.0
2.0
1.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

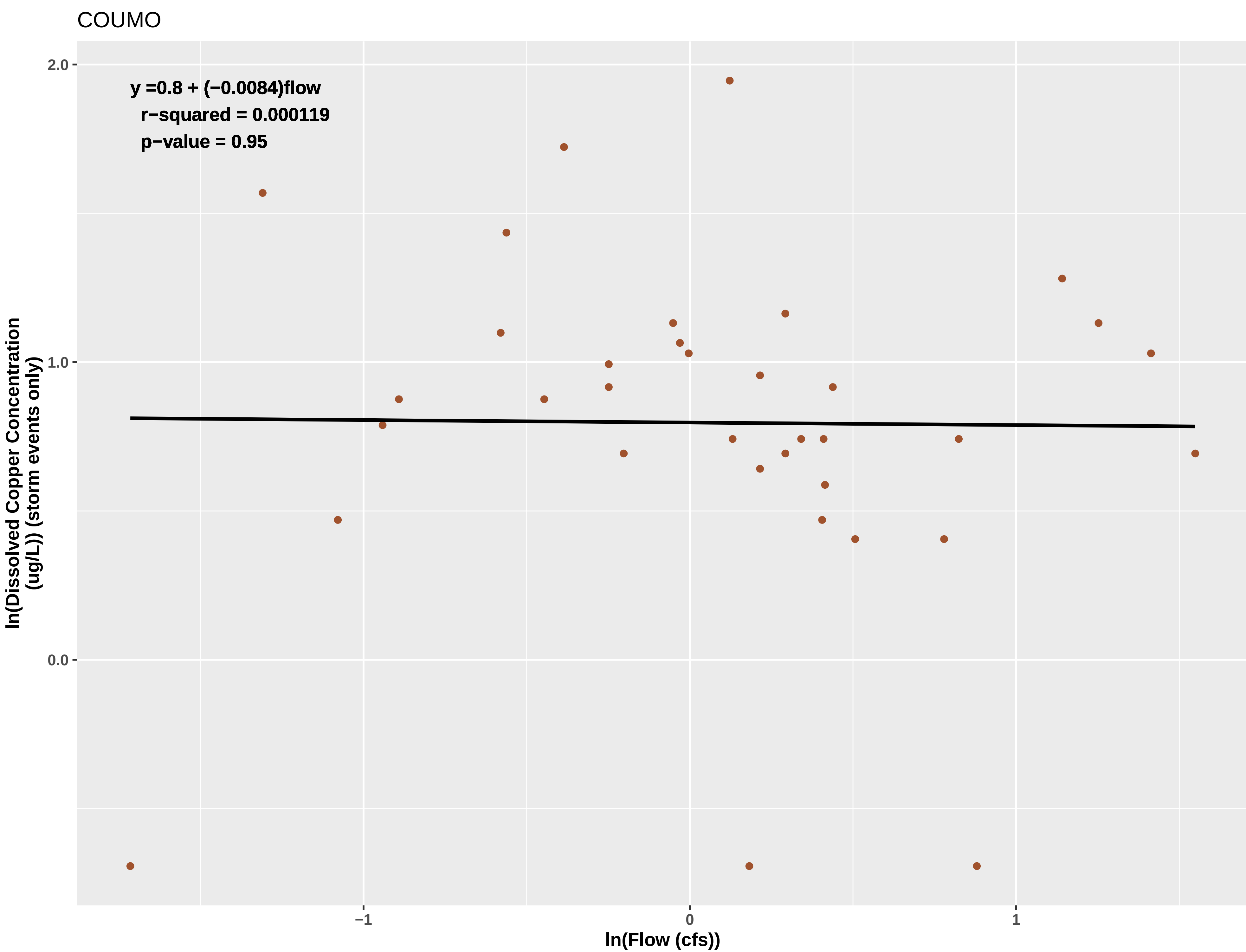

SEIMS
y =1.3 + (−0.25)flow
r−squared = 0.0434
p−value = 0.191
3.50
3.00
2.50
2.00
1.50
1.00
ln(Total Zinc Concentration
(ug/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))


SEIMS
y =2.1 + (0.072)flow
r−squared = 0.00285
p−value = 0.74
ln(Turbidity Concentration (NTU)) (storm events only)
3.0
2.0
1.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

SEIMS

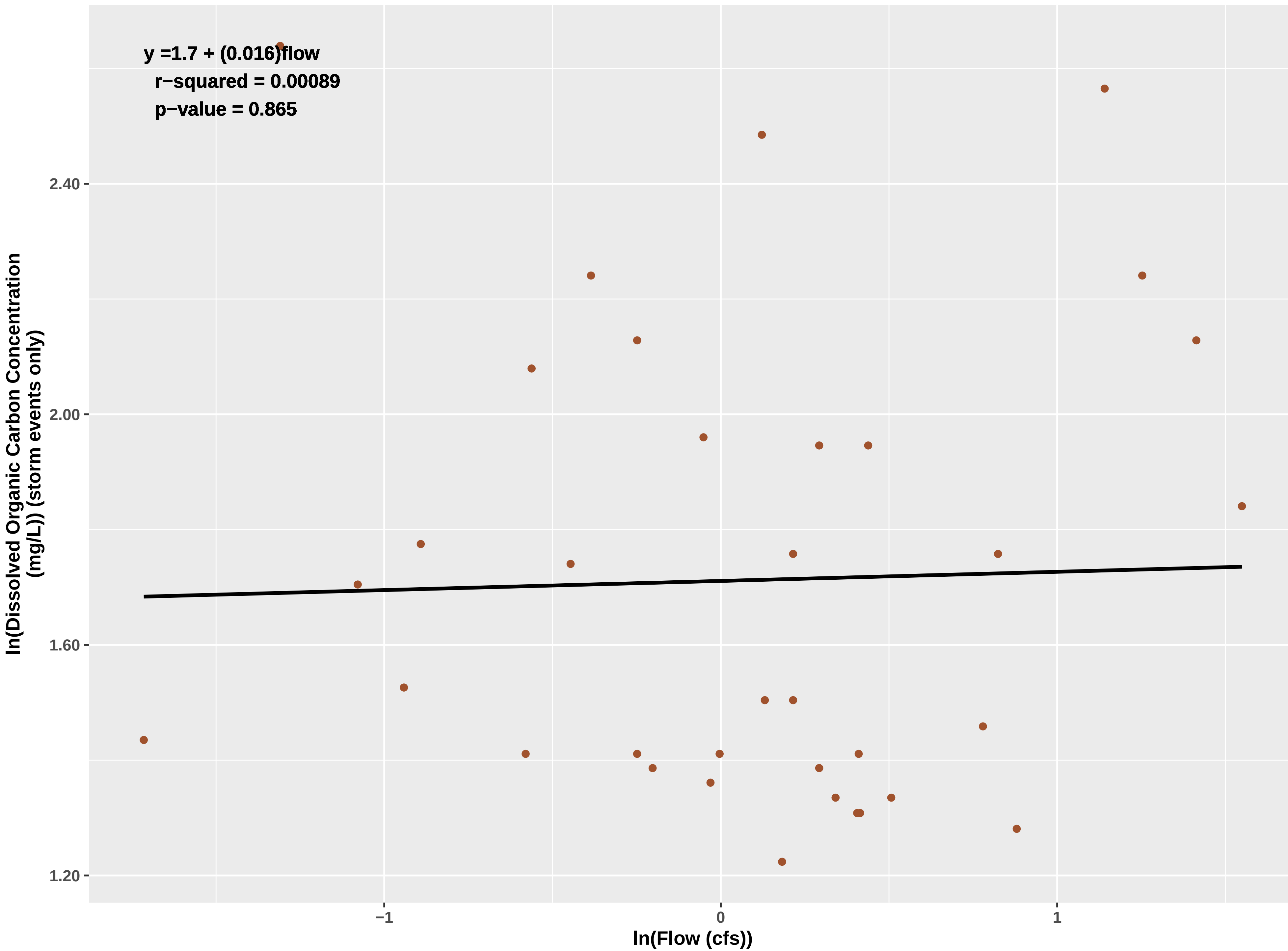


y =−0.0035 + (0.14)flow
r−squared = 0.0331
p−value = 0.255
1.00
0.50
0.00
−0.50
In(Total Nitrogen Concentration (mg/L)) (storm events only)
−1.5
−1.0
−0.5
0.0
0.5
1.0
ln(Flow (cfs))

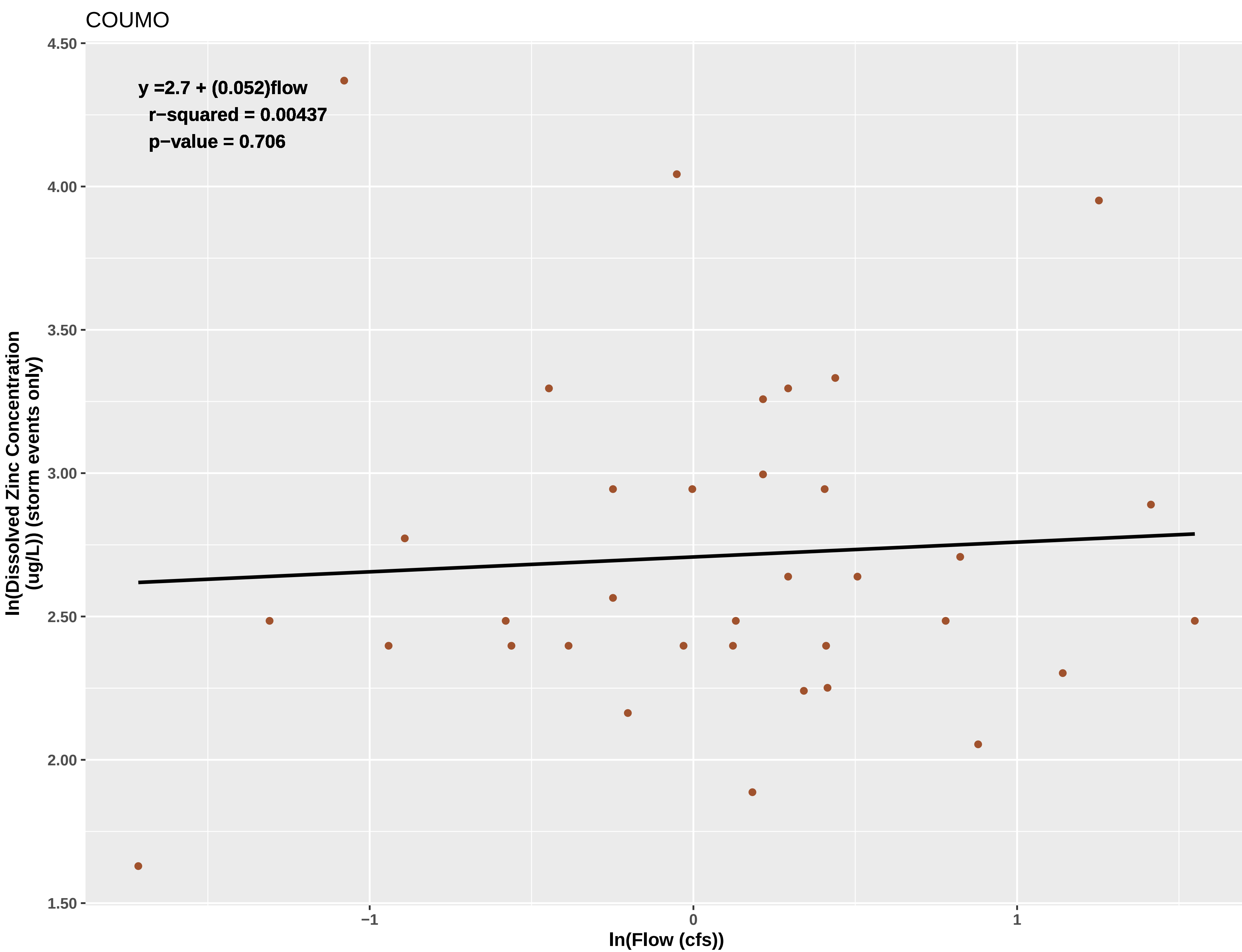


COUMO
y =0.8 + (−0.0084)flow
r−squared = 0.000119
p−value = 0.95
2.0
1.0
0.0
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
−1
0
1
ln(Flow (cfs))

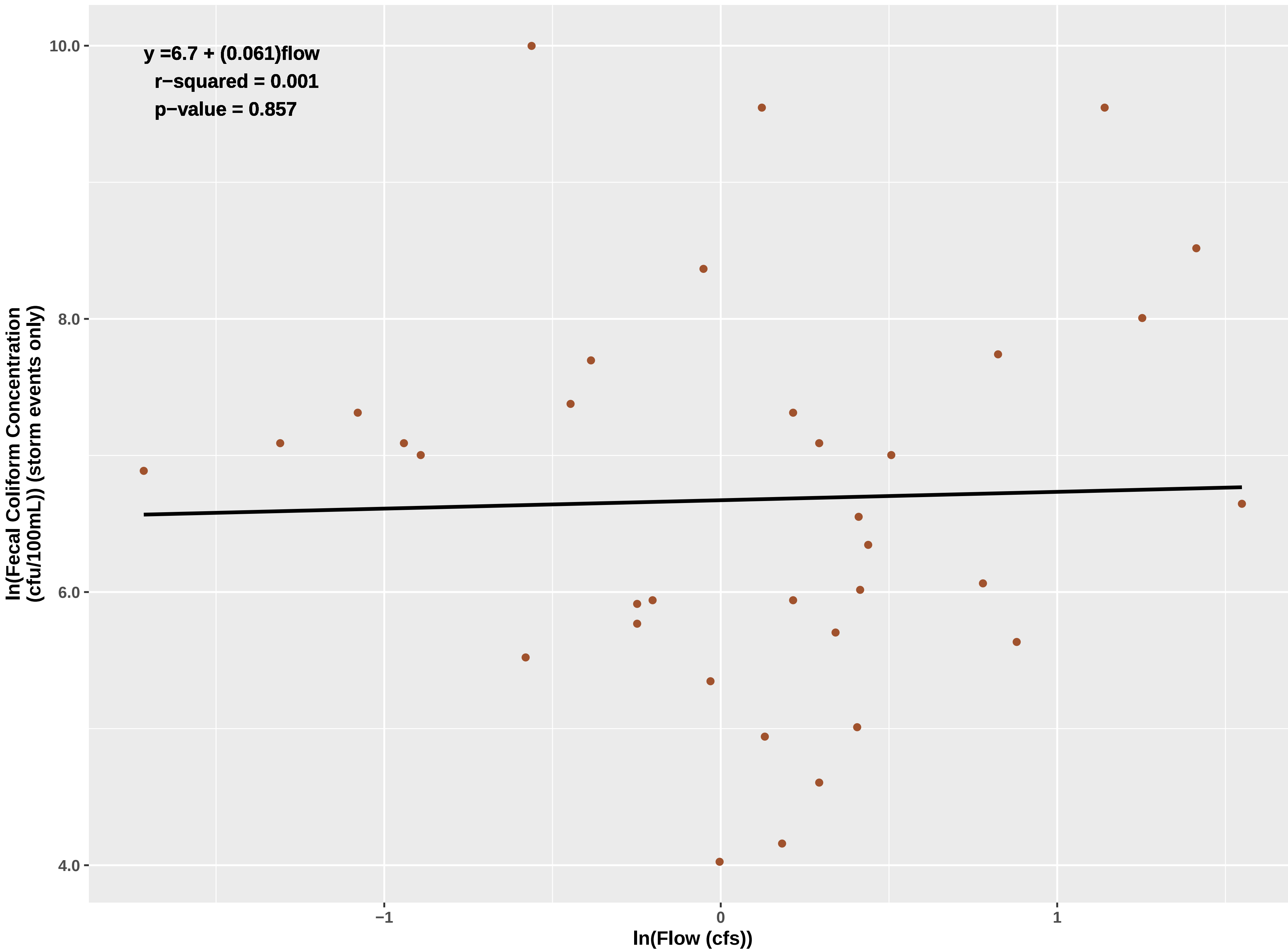
COUMO



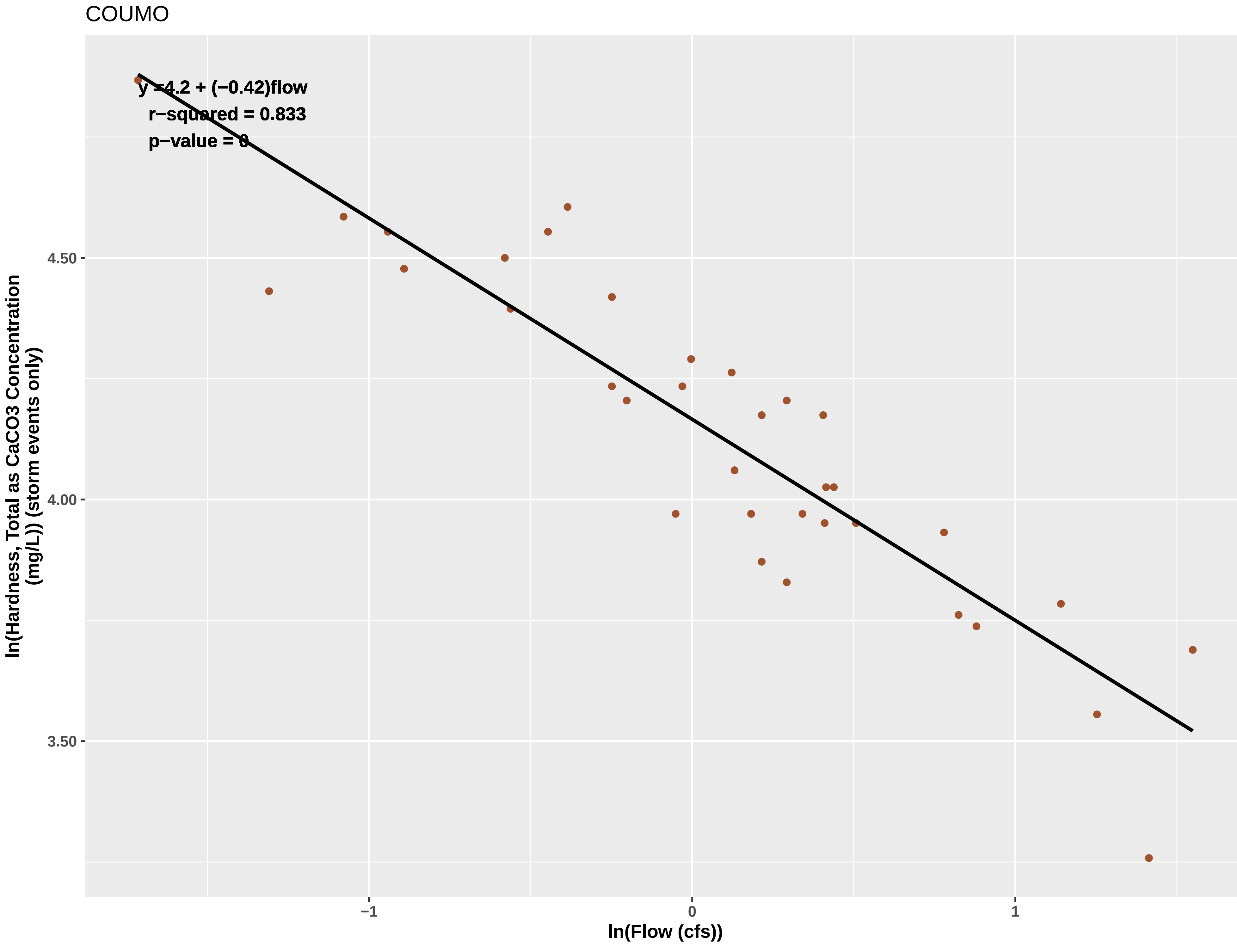
y =1.7 + (0.016)flow
r−squared = 0.00089
p−value = 0.865
2.40
2.00
1.60
1.20
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
−1
0
1
ln(Flow (cfs))

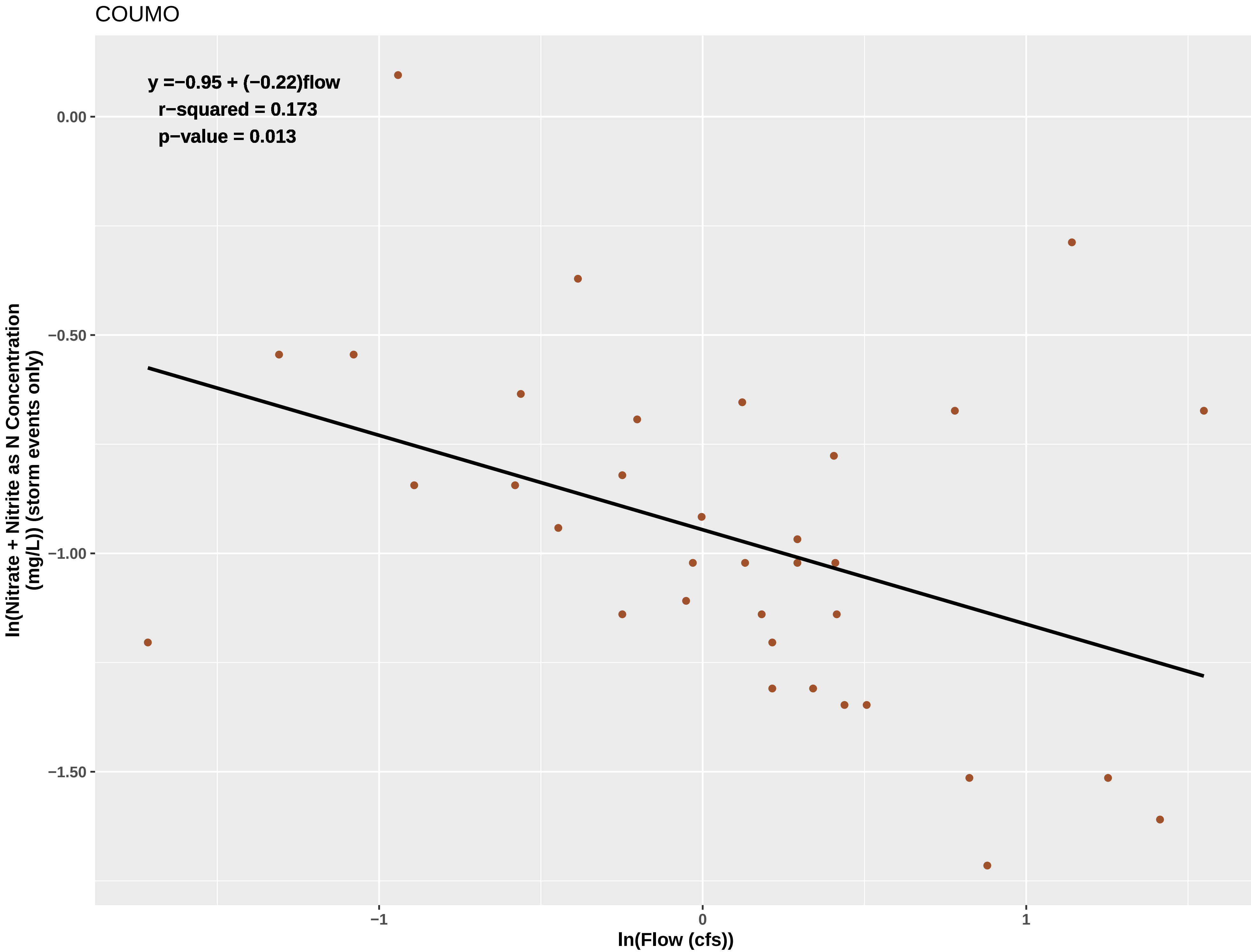

COUMO
y =2.7 + (0.052)flow
r−squared = 0.00437
p−value = 0.706
4.50
4.00
3.50
3.00
2.50
2.00
1.50
−1
0
1
ln(Flow (cfs))
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)

COUMO

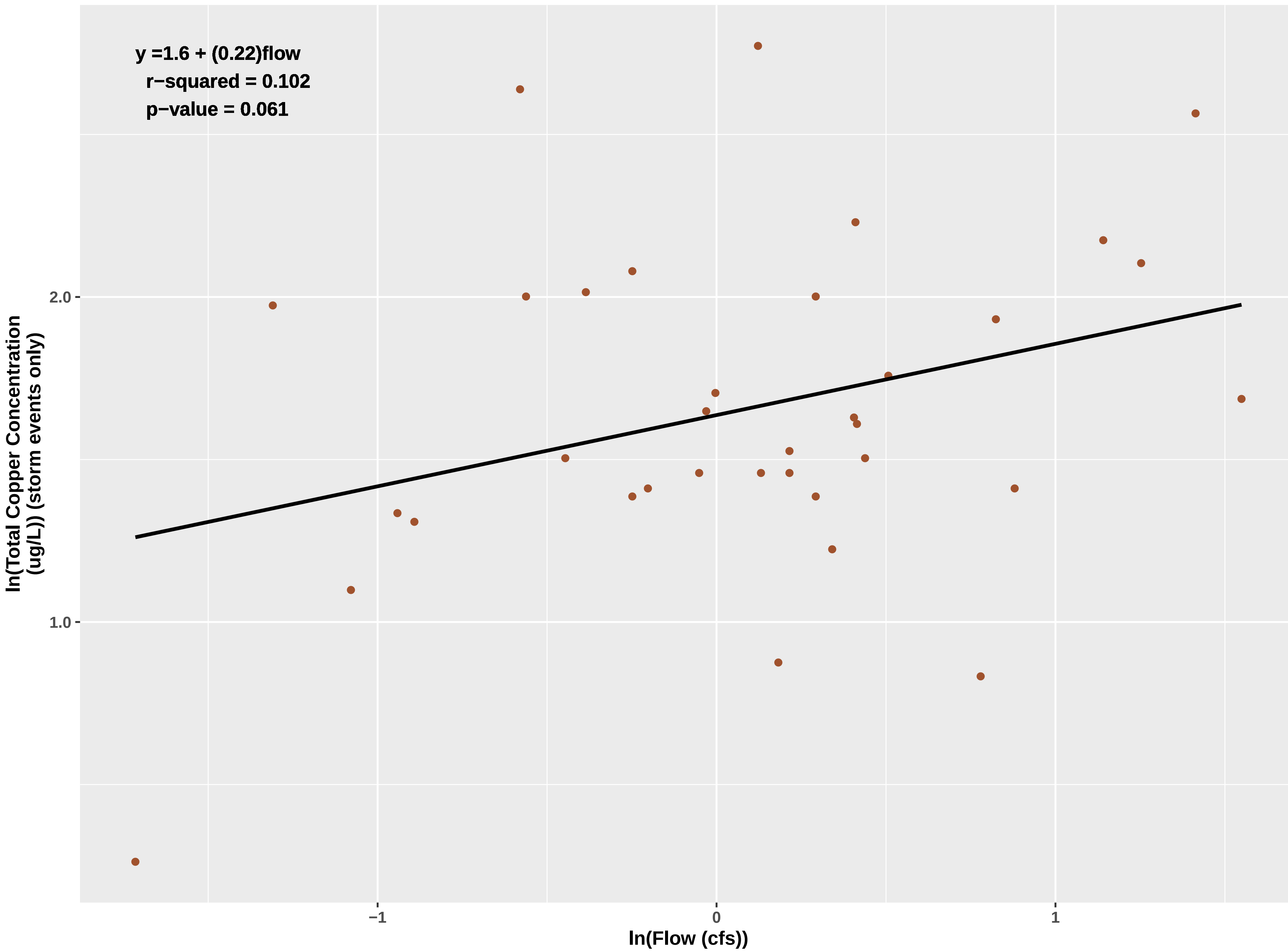


y =6.7 + (0.061)flow
r−squared = 0.001
p−value = 0.857
10.0
8.0
6.0
4.0
−1
0
1
ln(Flow (cfs))
ln(Fecal Coliform Concentration
(cfu/100mL)) (storm events only)

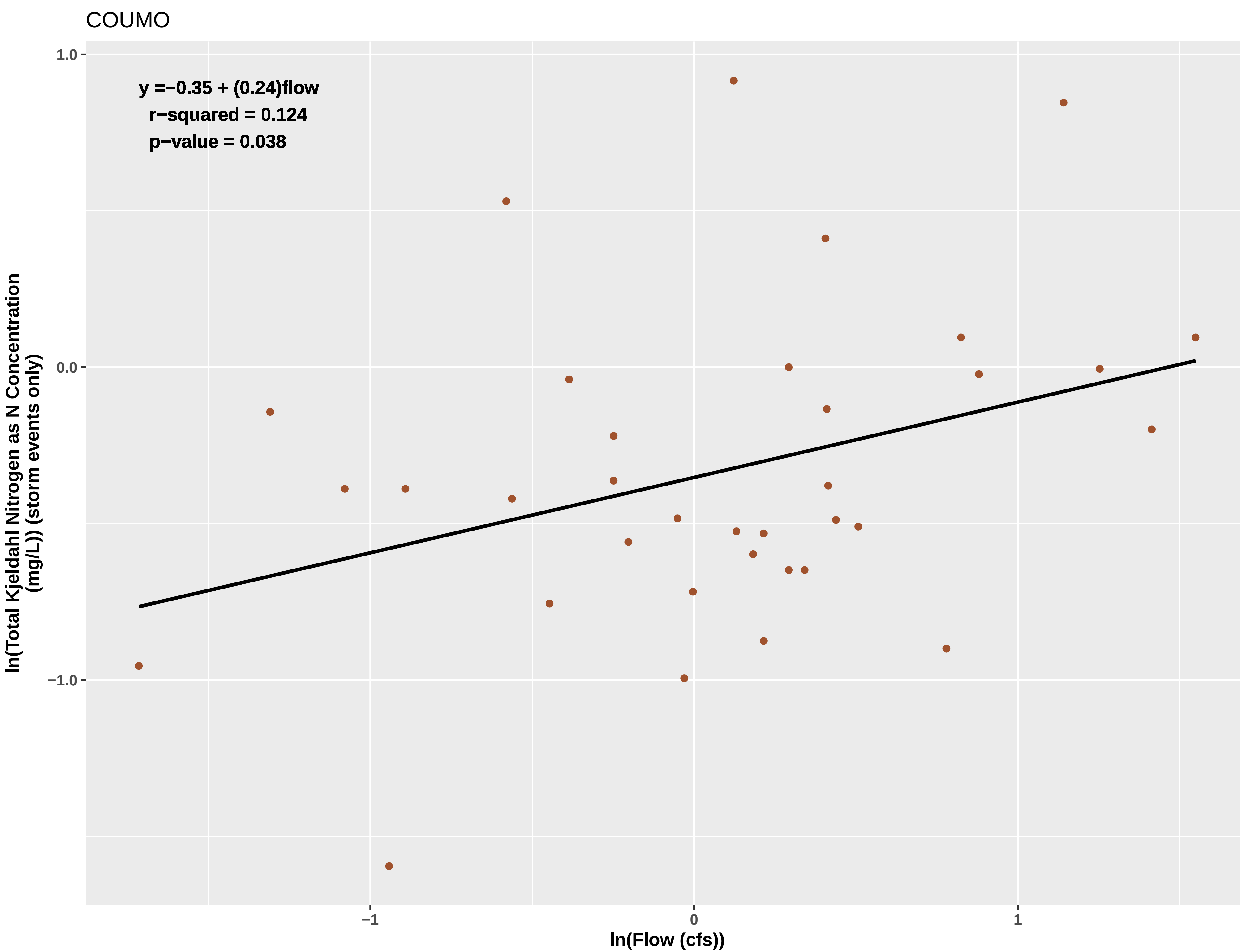

COUMO
y = 4.2 + (−0.42)flow
r−squared = 0.833
p−value = 0
4.50
4.00
3.50
−1
0
1
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
ln(Flow (cfs))


COUMO
y =−0.95 + (−0.22)flow
r−squared = 0.173
p−value = 0.013
0.00
−0.50
−1.00
−1.50
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
−1
0
1
ln(Flow (cfs))

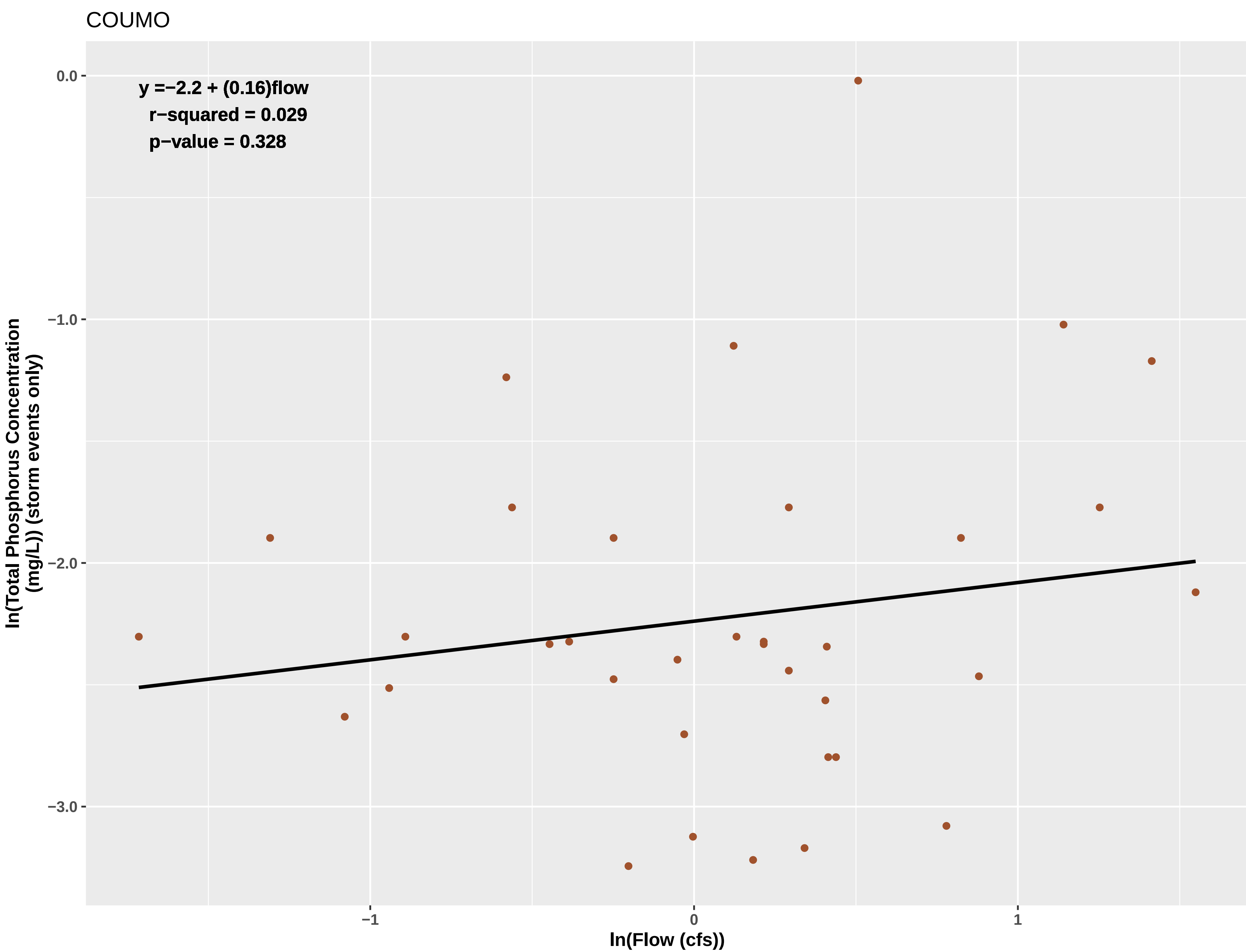
COUMO



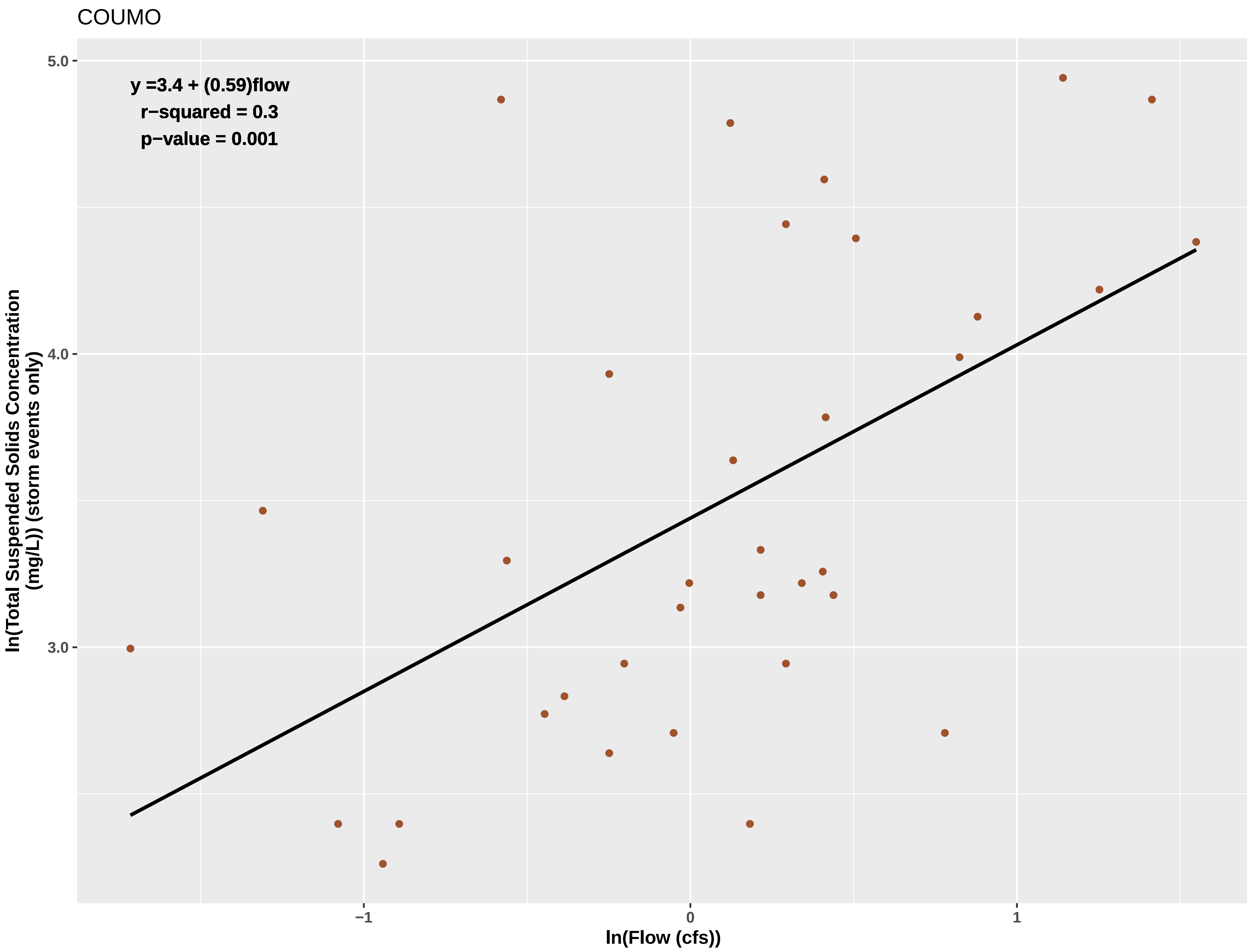
y =1.6 + (0.22)flow
r−squared = 0.102
p−value = 0.061
2.0
1.0
ln(Total Copper Concentration (ug/L)) (storm events only)
−1
0
1
ln(Flow (cfs))



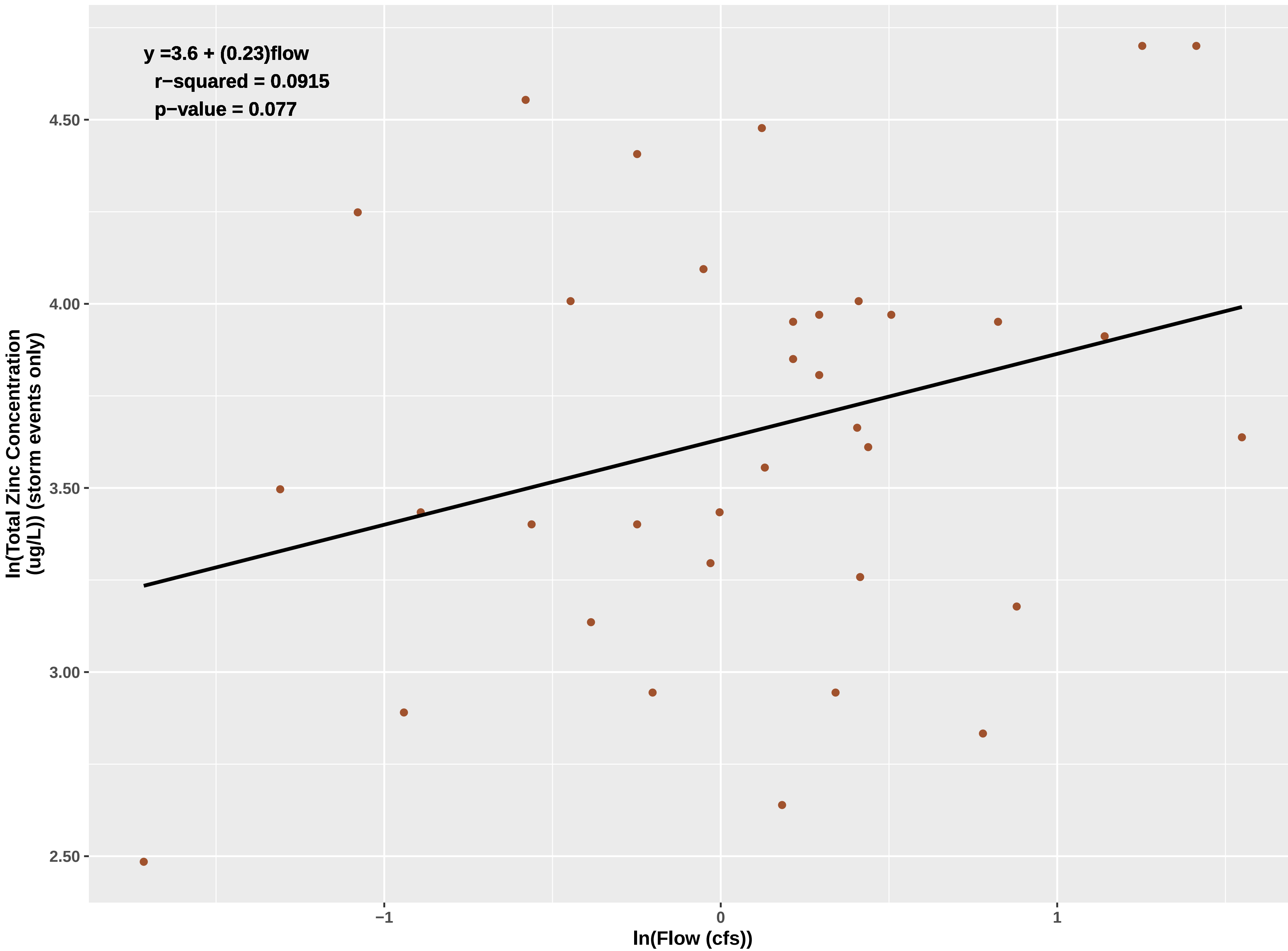
COUMO
y =−0.35 + (0.24)flow
r−squared = 0.124
p−value = 0.038
1.0
0.0
−1.0
−1
0
1
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration
(mg/L)) (storm events only)



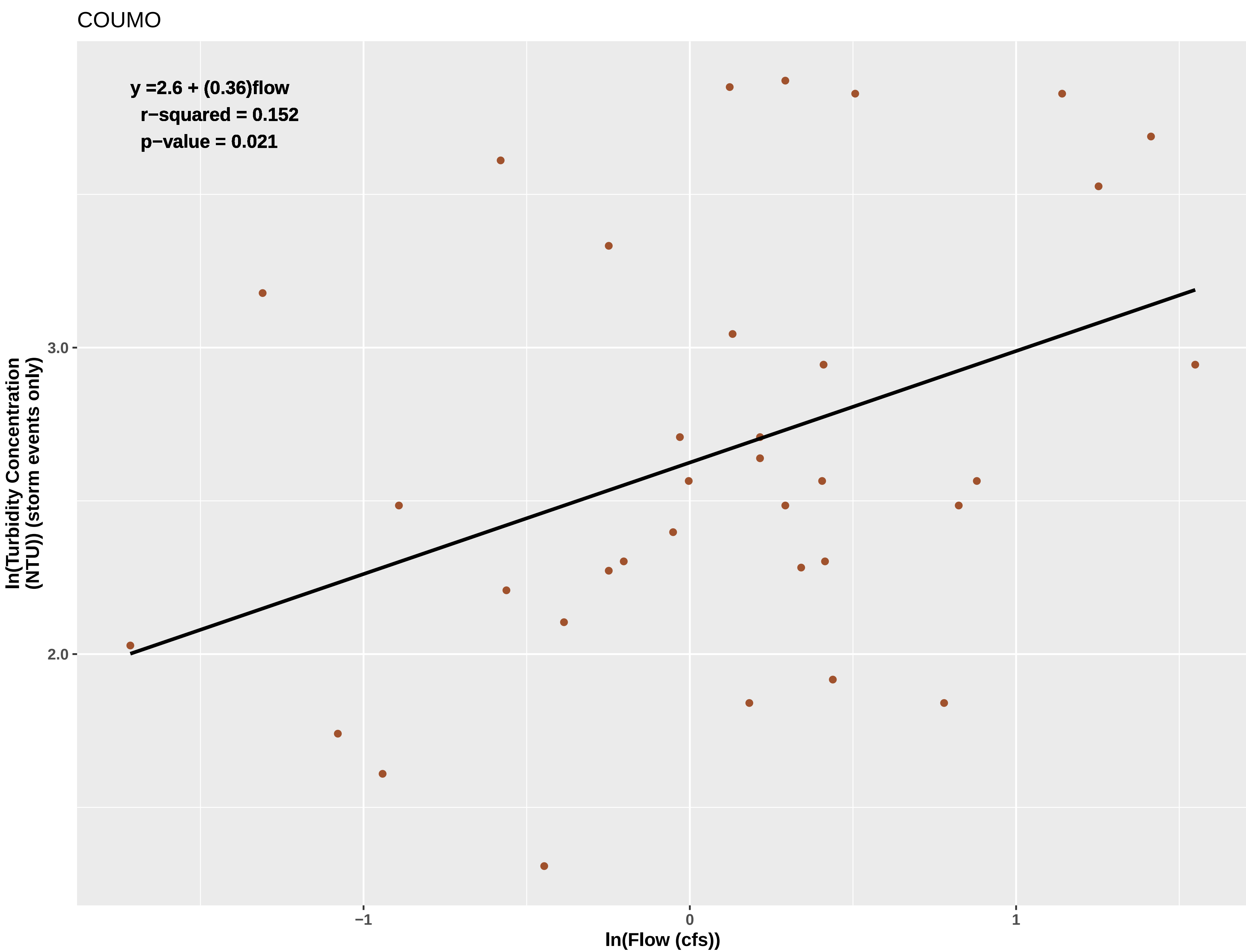
COUMO
y =−2.2 + (0.16)flow
r−squared = 0.029
p−value = 0.328
0.0
−1.0
−2.0
−3.0
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
−1
0
1
ln(Flow (cfs))

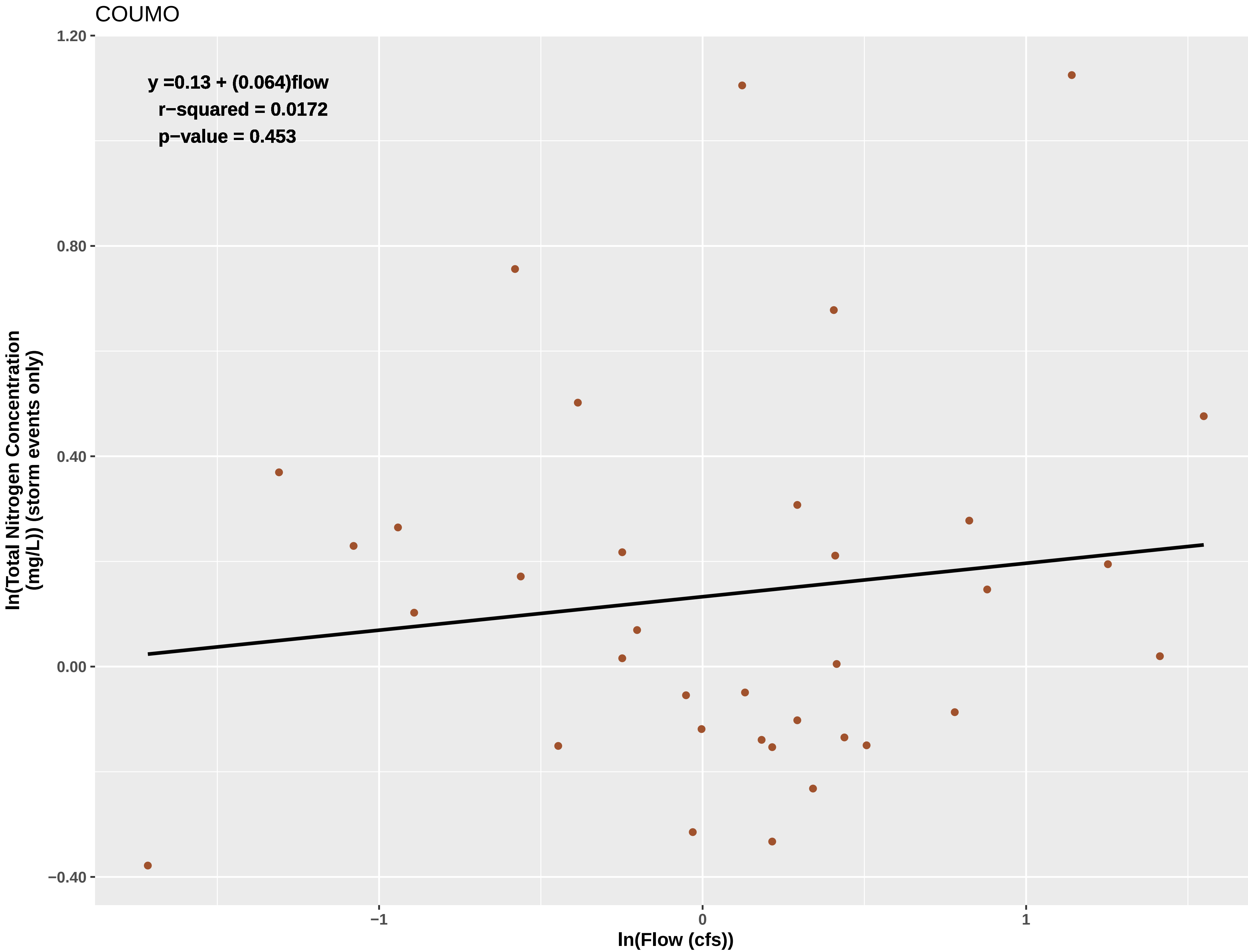

COUMO
y =3.4 + (0.59)flow
r−squared = 0.3
p−value = 0.001
5.0
4.0
3.0
−1
0
1
ln(Flow (cfs))
ln(Total Suspended Solids Concentration
(mg/L)) (storm events only)

COUMO

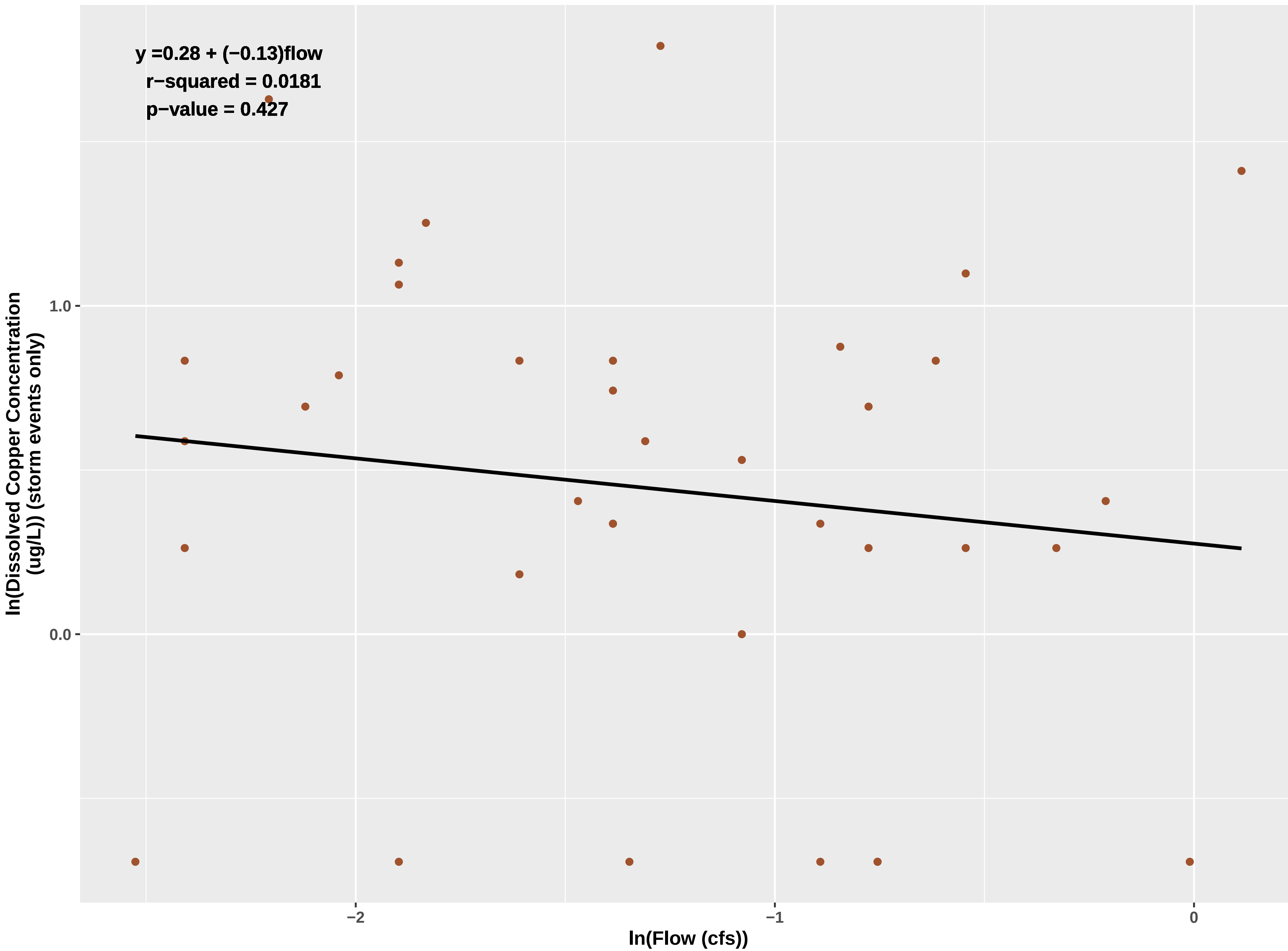


y =3.6 + (0.23)flow
r−squared = 0.0915
p−value = 0.077
4.50
4.00
3.50
3.00
2.50
ln(Total Zinc Concentration (ug/L)) (storm events only)
−1
0
1
ln(Flow (cfs))

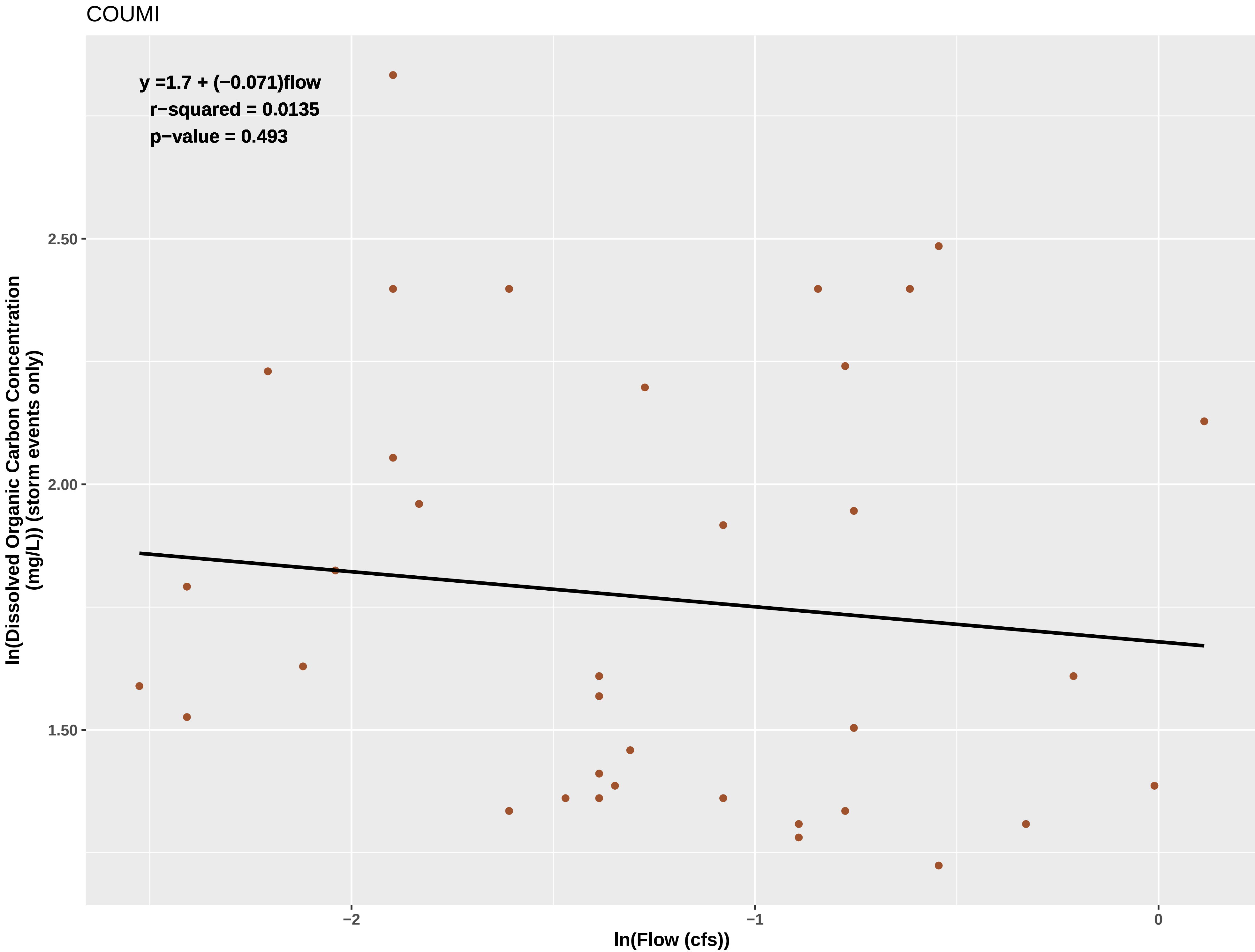

COUMO
y =2.6 + (0.36)flow
r−squared = 0.152
p−value = 0.021
ln(Turbidity Concentration (NTU)) (storm events only)
3.0
2.0
−1
0
1
ln(Flow (cfs))


COUMO
y =0.13 + (0.064)flow
r−squared = 0.0172
p−value = 0.453
1.20
0.80
0.40
0.00
−0.40
−1
0
1
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

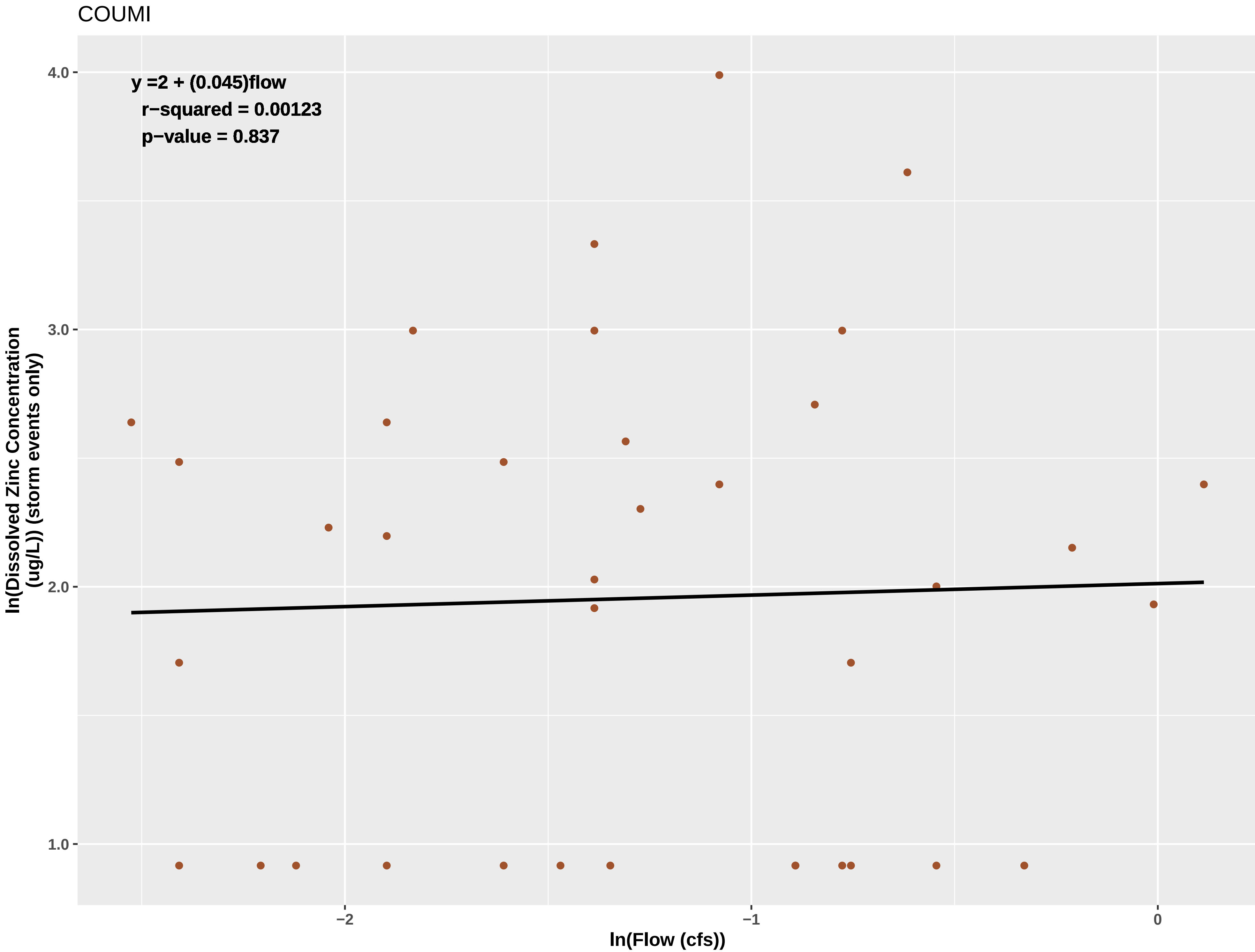
COUMI



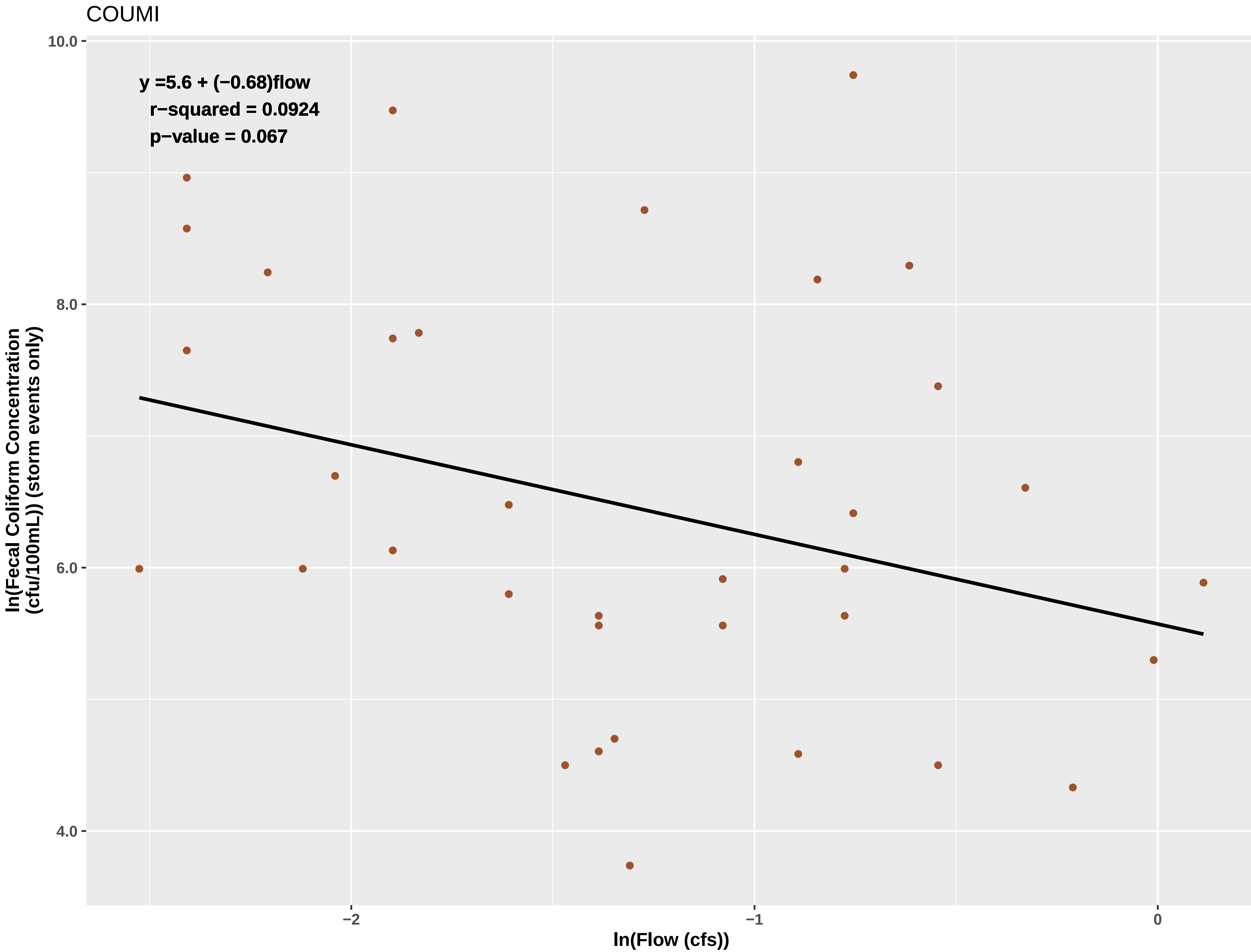
y =0.28 + (−0.13)flow
r−squared = 0.0181
p−value = 0.427
1.0
0.0
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
−2
−1
0
ln(Flow (cfs))



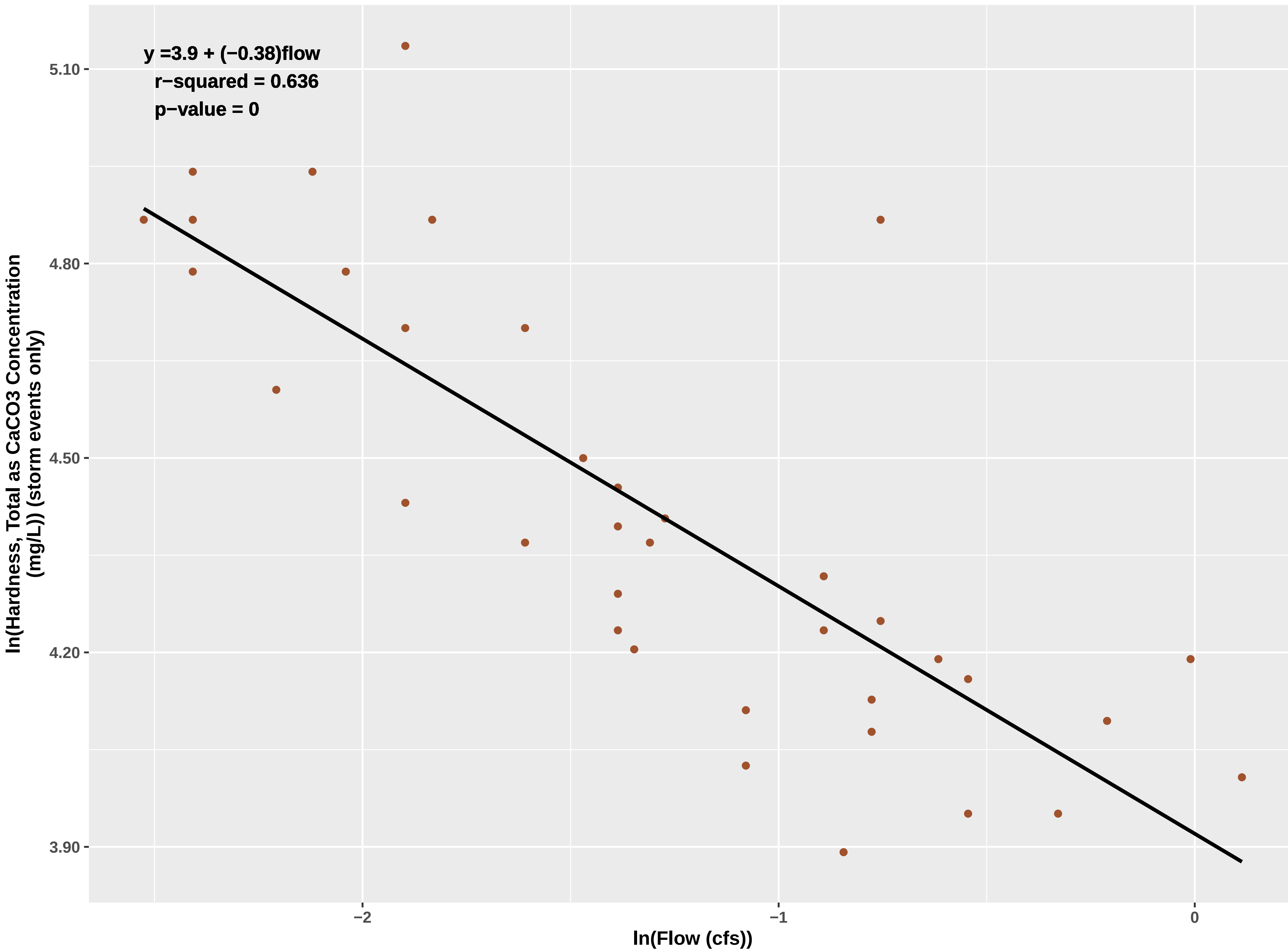
COUMI
y =1.7 + (−0.071)flow
r−squared = 0.0135
p−value = 0.493
2.50
2.00
1.50
−2
−1
0
ln(Flow (cfs))
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)



COUMI
y =2 + (0.045)flow
r−squared = 0.00123
p−value = 0.837
4.0
3.0
2.0
1.0
−2
−1
0
ln(Flow (cfs))
ln(Dissolved Zinc Concentration
(ug/L)) (storm events only)

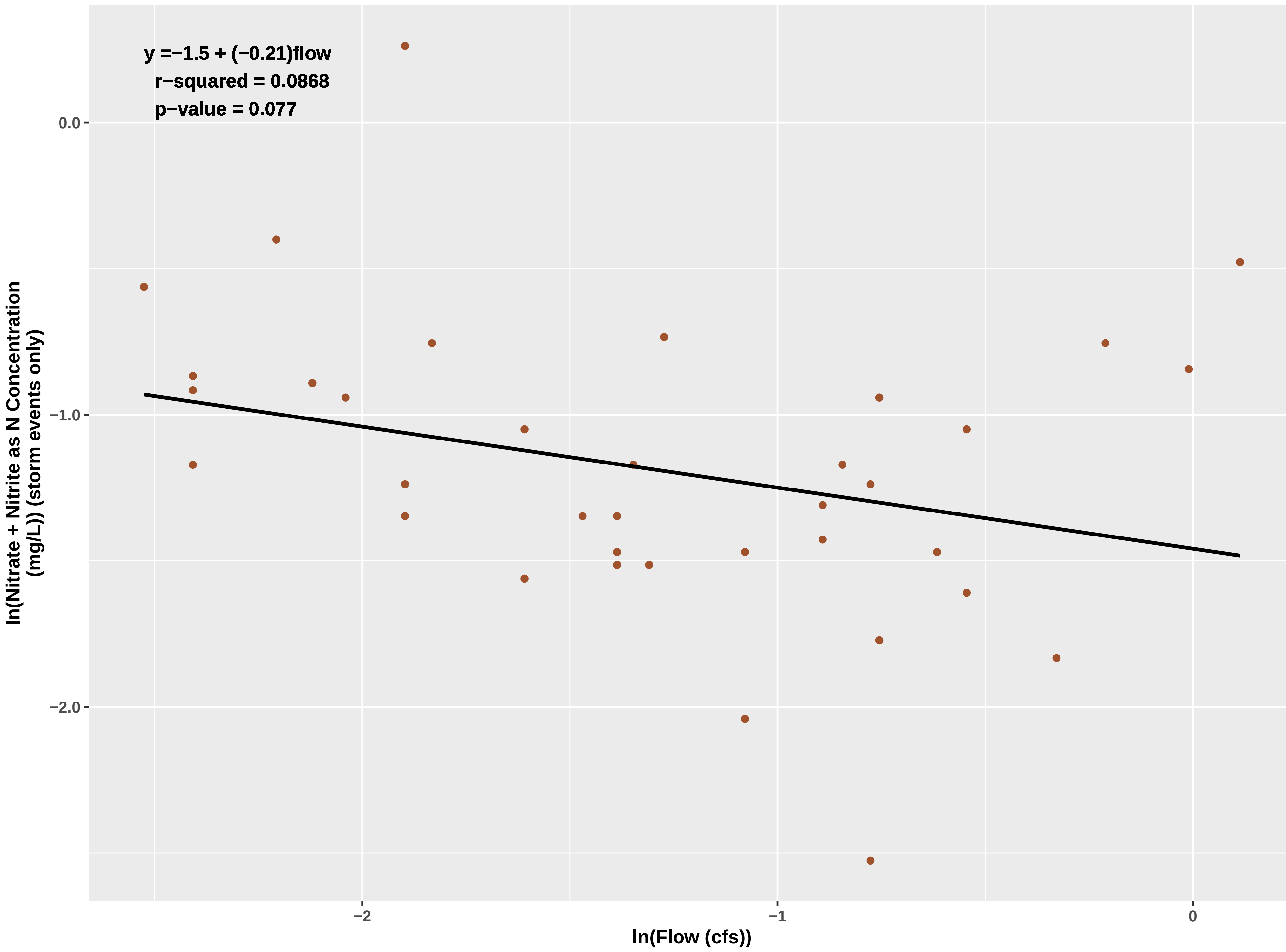

COUMI
y =5.6 + (−0.68)flow
r−squared = 0.0924
p−value = 0.067
10.0
8.0
6.0
4.0
−2
−1
0
ln(Flow (cfs))
ln(Fecal Coliform Concentration
(cfu/100mL)) (storm events only)

COUMI

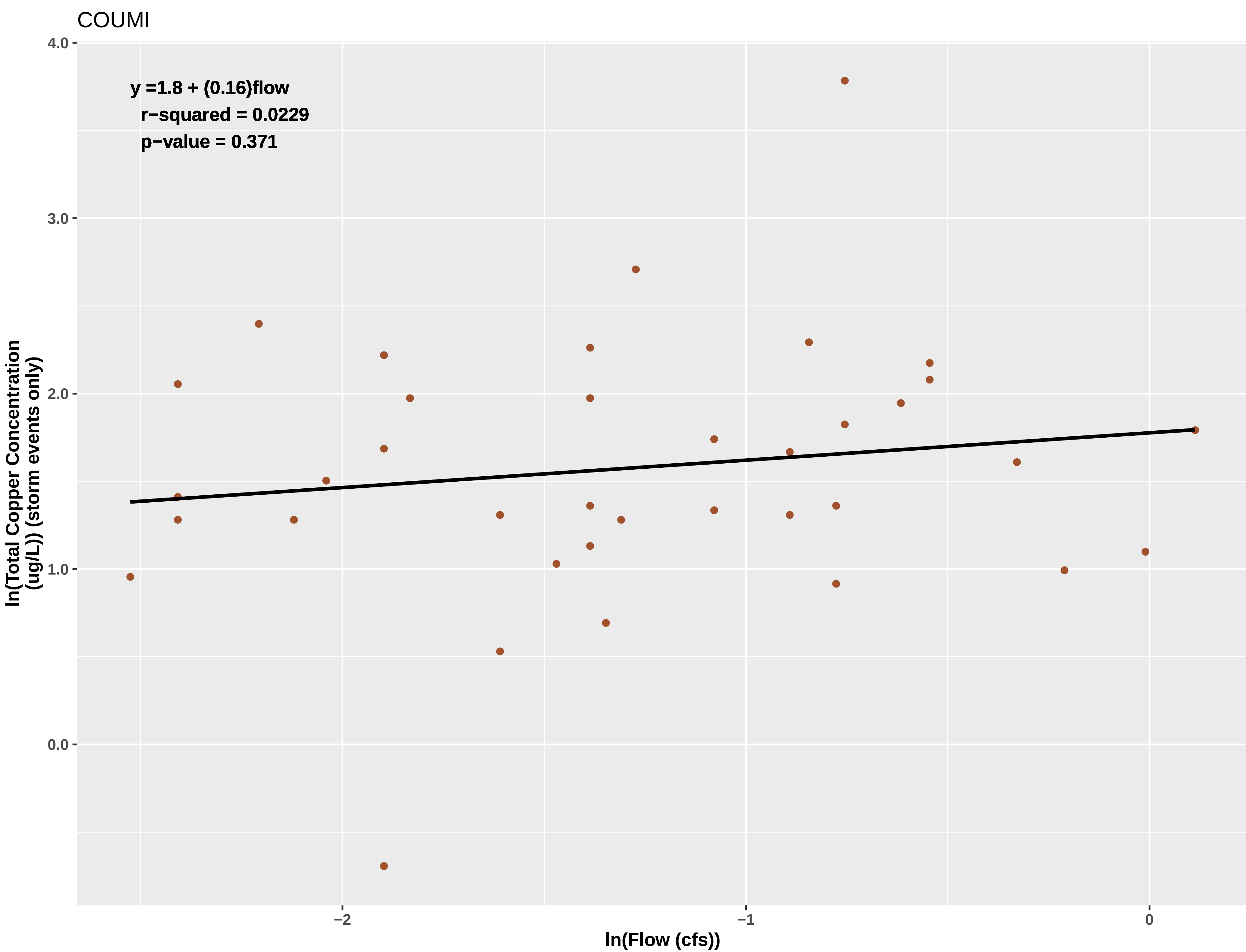


y =3.9 + (−0.38)flow
r−squared = 0.636
p−value = 0
5.10
4.80
4.50
4.20
3.90
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
−2
−1
0
ln(Flow (cfs))

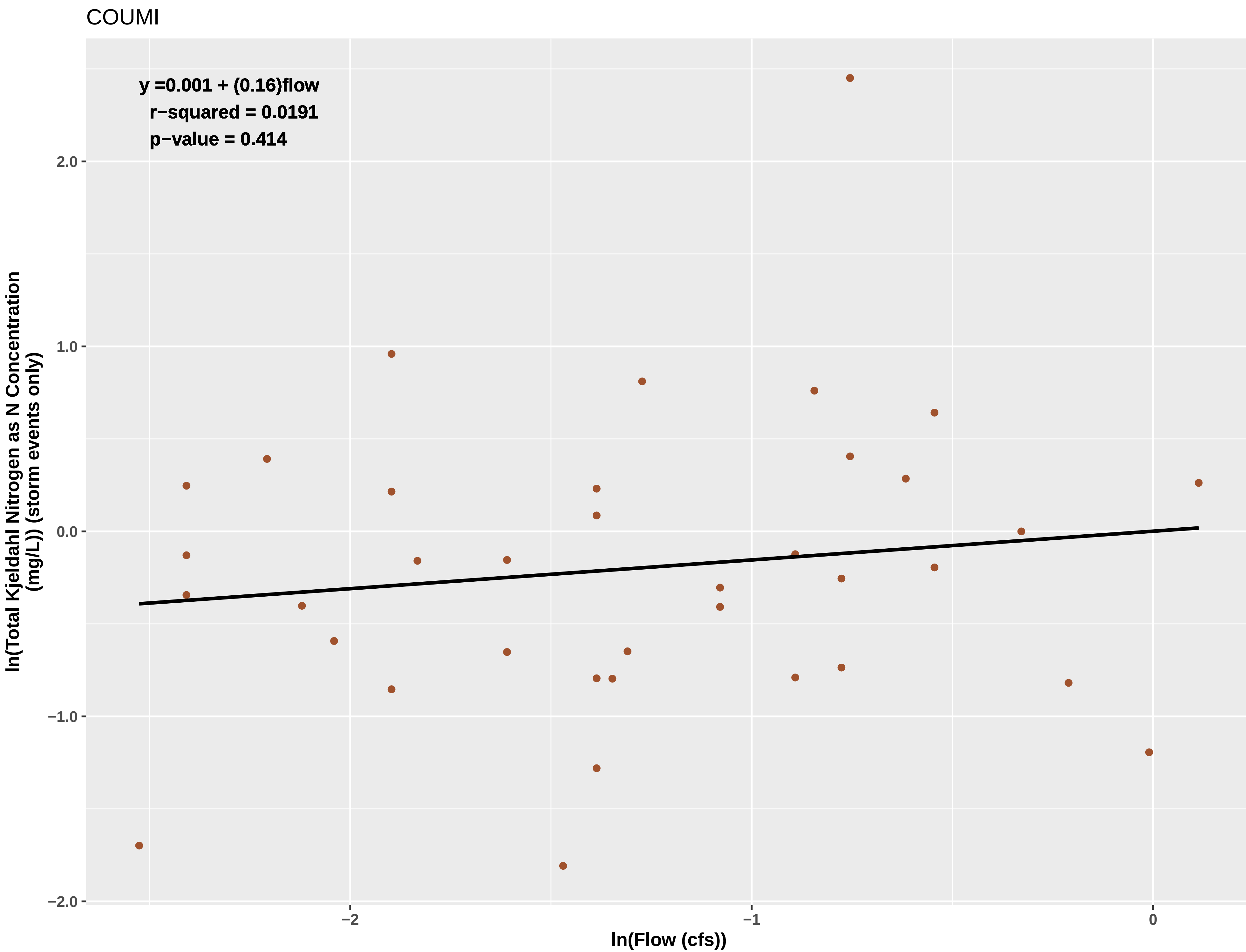
COUMI



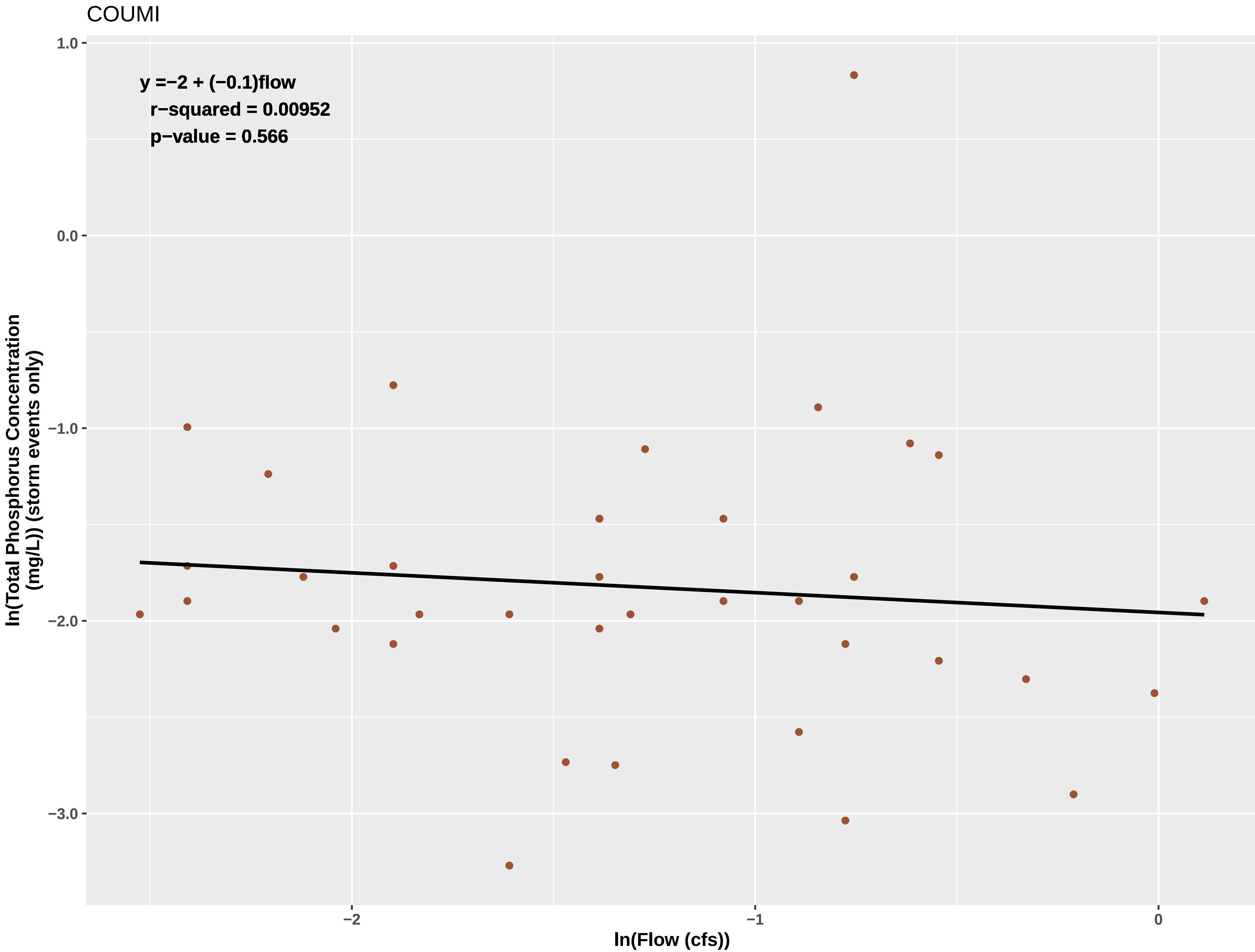
y =−1.5 + (−0.21)flow
r−squared = 0.0868
p−value = 0.077
0.0
−1.0
−2.0
−2
−1
0
ln(Flow (cfs))
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)



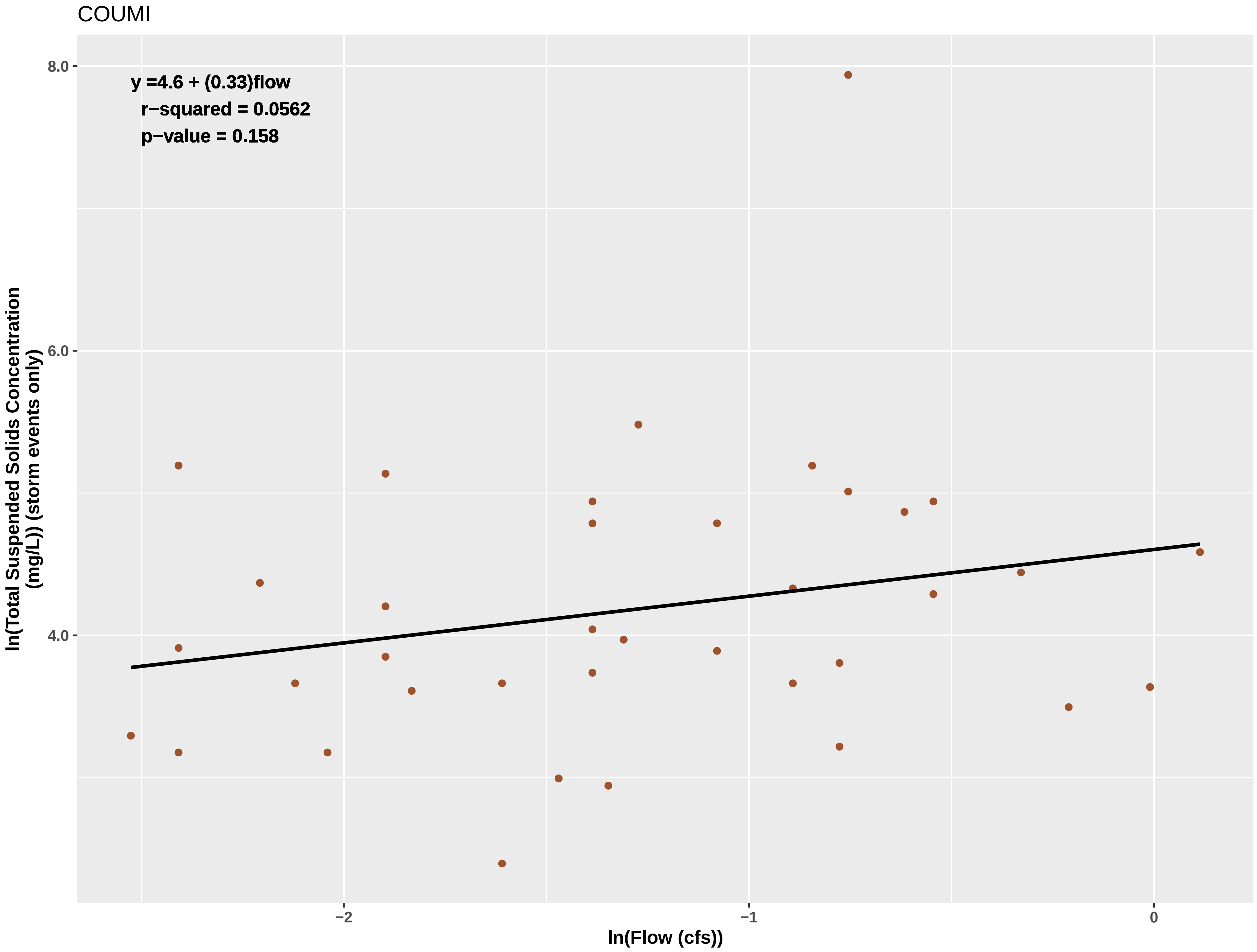
COUMI
y =1.8 + (0.16)flow
r−squared = 0.0229
p−value = 0.371
4.0
3.0
2.0
1.0
0.0
−2
−1
0
ln(Flow (cfs))
ln(Total Copper Concentration (ug/L)) (storm events only)



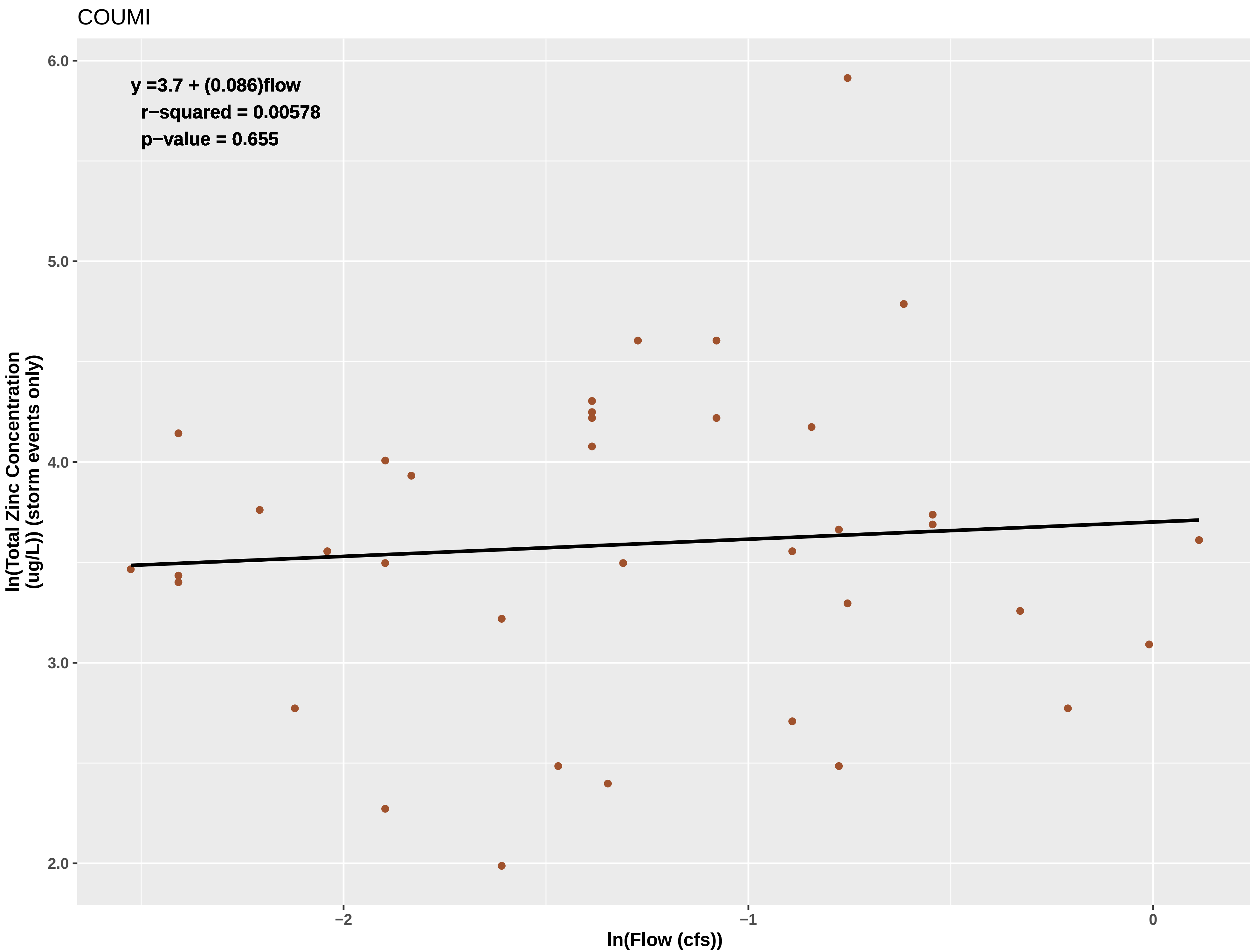
COUMI
y =0.001 + (0.16)flow
r−squared = 0.0191
p−value = 0.414
2.0
1.0
0.0
−1.0
−2.0
−2
−1
0
ln(Flow (cfs))
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)

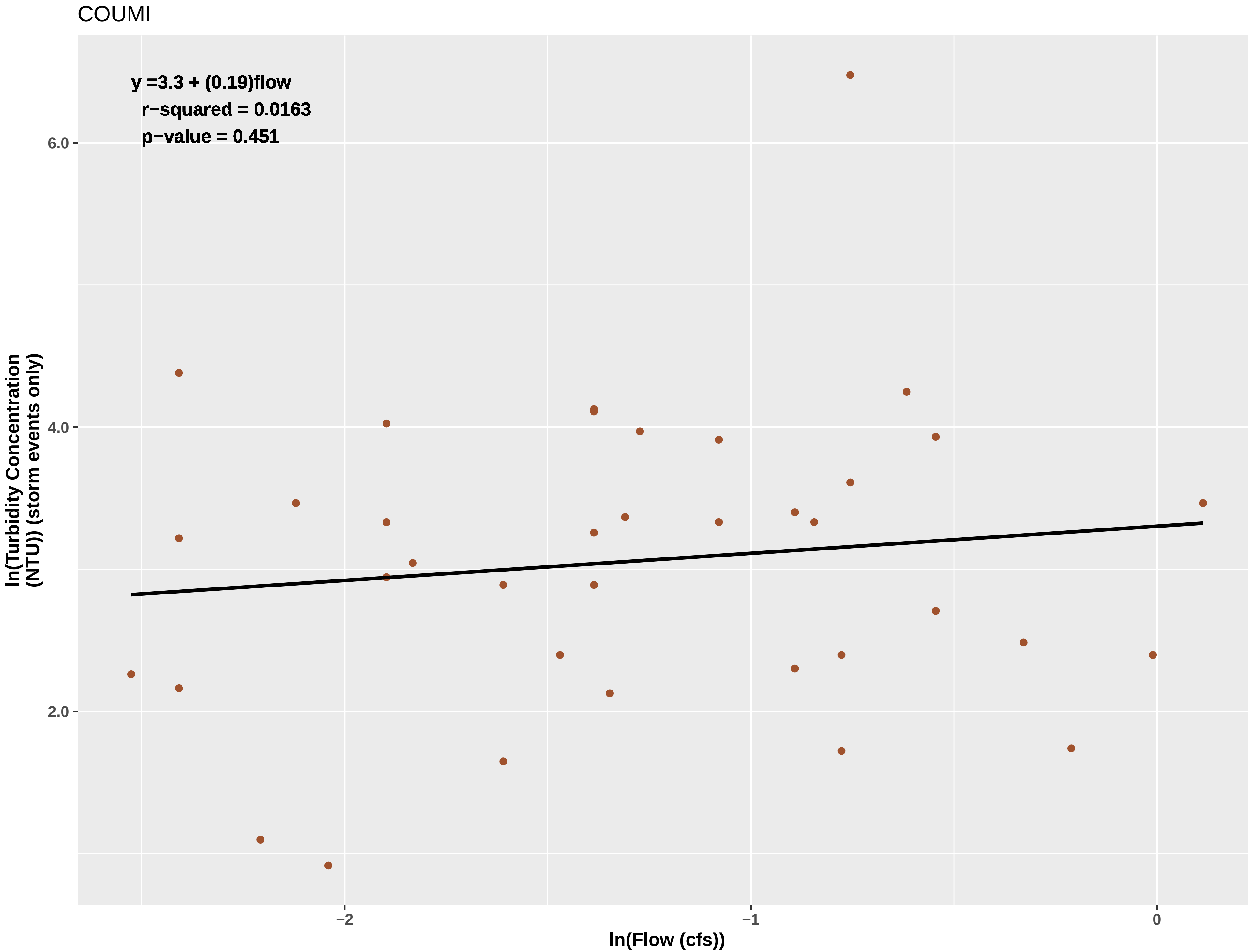


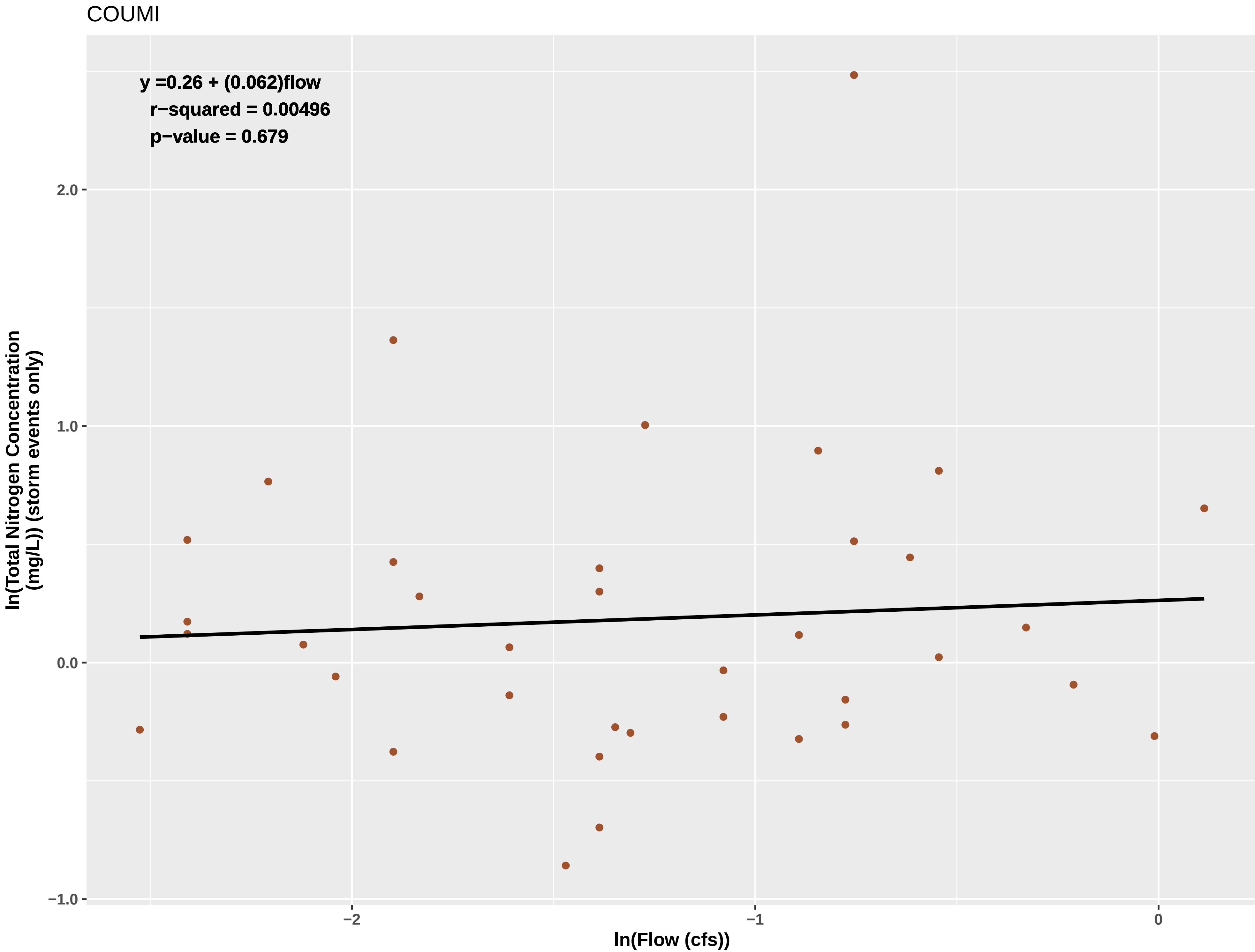
COUMI
y =−2 + (−0.1)flow
r−squared = 0.00952
p−value = 0.566
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
1.0
0.0
−1.0
−2.0
−3.0
−2
−1
0
ln(Flow (cfs))



COUMI
y =4.6 + (0.33)flow
r−squared = 0.0562
p−value = 0.158
8.0
6.0
4.0
−2
−1
0
ln(Flow (cfs))
ln(Total Suspended Solids Concentration
(mg/L)) (storm events only)

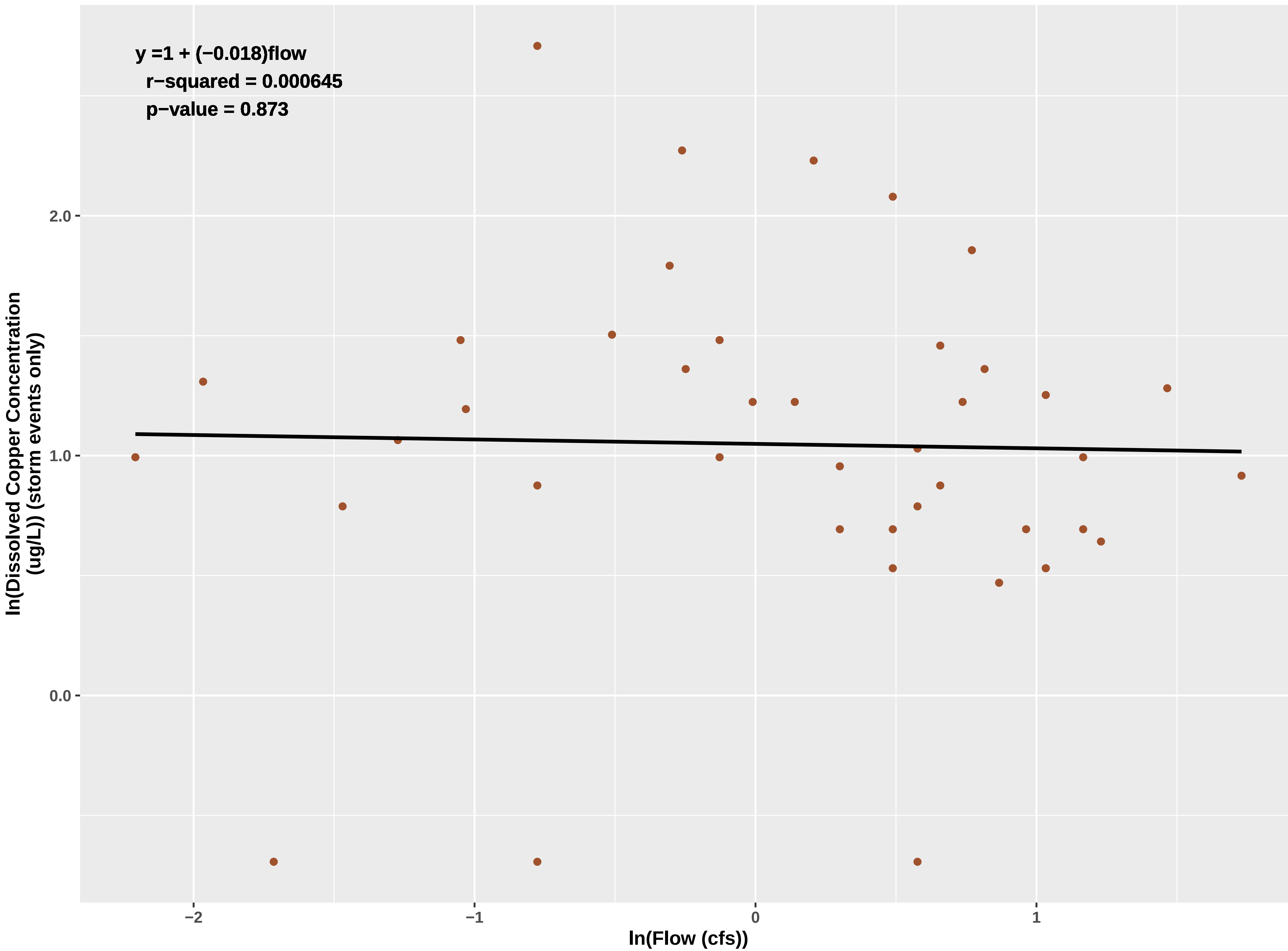

COUMI
y =3.7 + (0.086)flow
r−squared = 0.00578
p−value = 0.655
6.0
5.0
4.0
3.0
2.0
−2
−1
0
ln(Flow (cfs))
ln(Total Zinc Concentration (ug/L)) (storm events only)


COUMI
y =3.3 + (0.19)flow
r−squared = 0.0163
p−value = 0.451
6.0
4.0
2.0
−2
−1
0
ln(Flow (cfs))
ln(Turbidity Concentration
(NTU)) (storm events only)



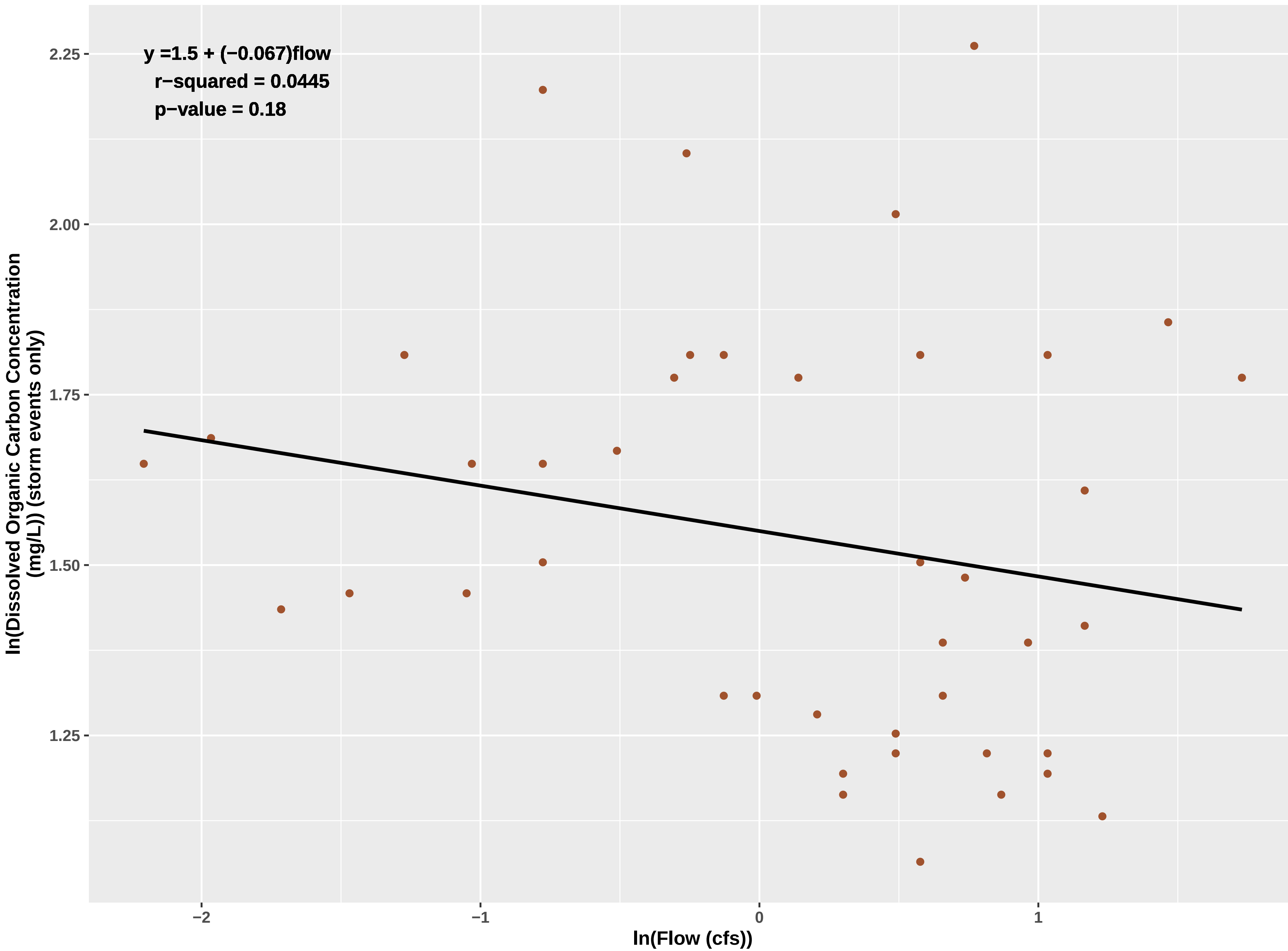
COUMI
y =0.26 + (0.062)flow
r−squared = 0.00496
p−value = 0.679
2.0
1.0
0.0
−1.0
−2
−1
0
ln(Flow (cfs))
ln(Total Nitrogen Concentration (mg/L)) (storm events only)

TYLMO

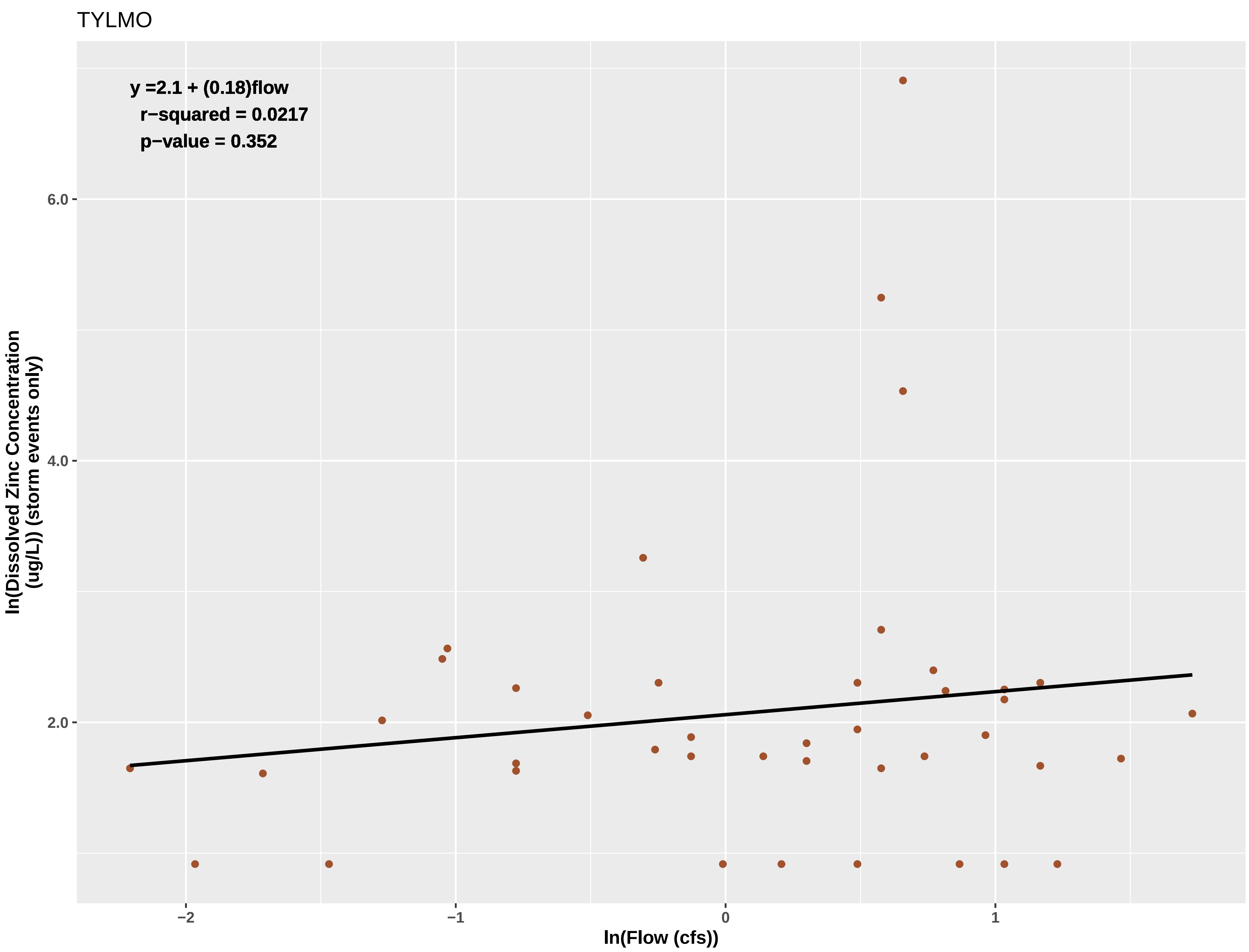


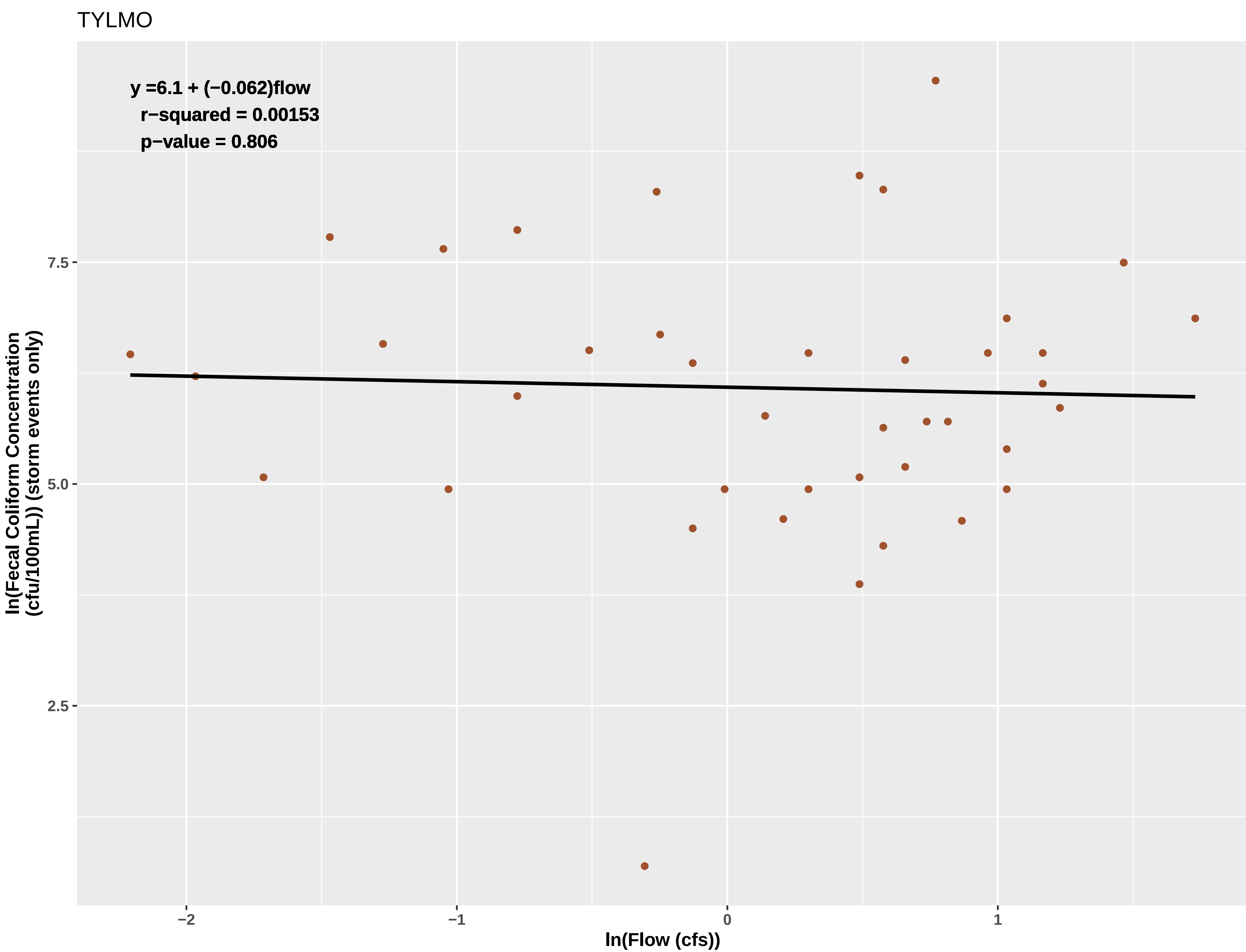
y =1 + (−0.018)flow
r−squared = 0.000645
p−value = 0.873
2.0
1.0
0.0
ln(Dissolved Copper Concentration (ug/L)) (storm events only)
−2
−1
0
1
ln(Flow (cfs))

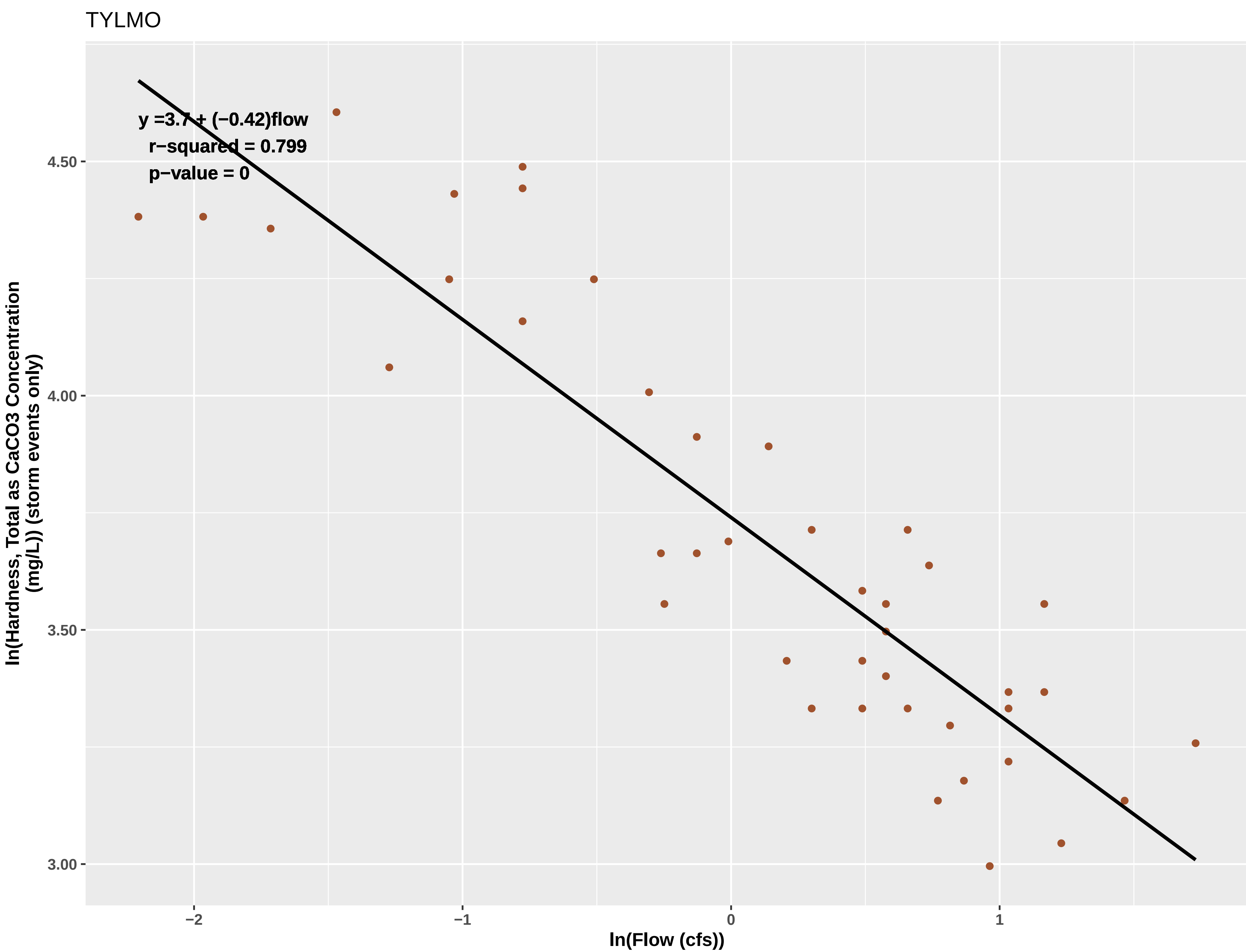
TYLMO



y =1.5 + (−0.067)flow
r−squared = 0.0445
p−value = 0.18
2.25
2.00
1.75
1.50
1.25
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
−2
−1
0
1
ln(Flow (cfs))

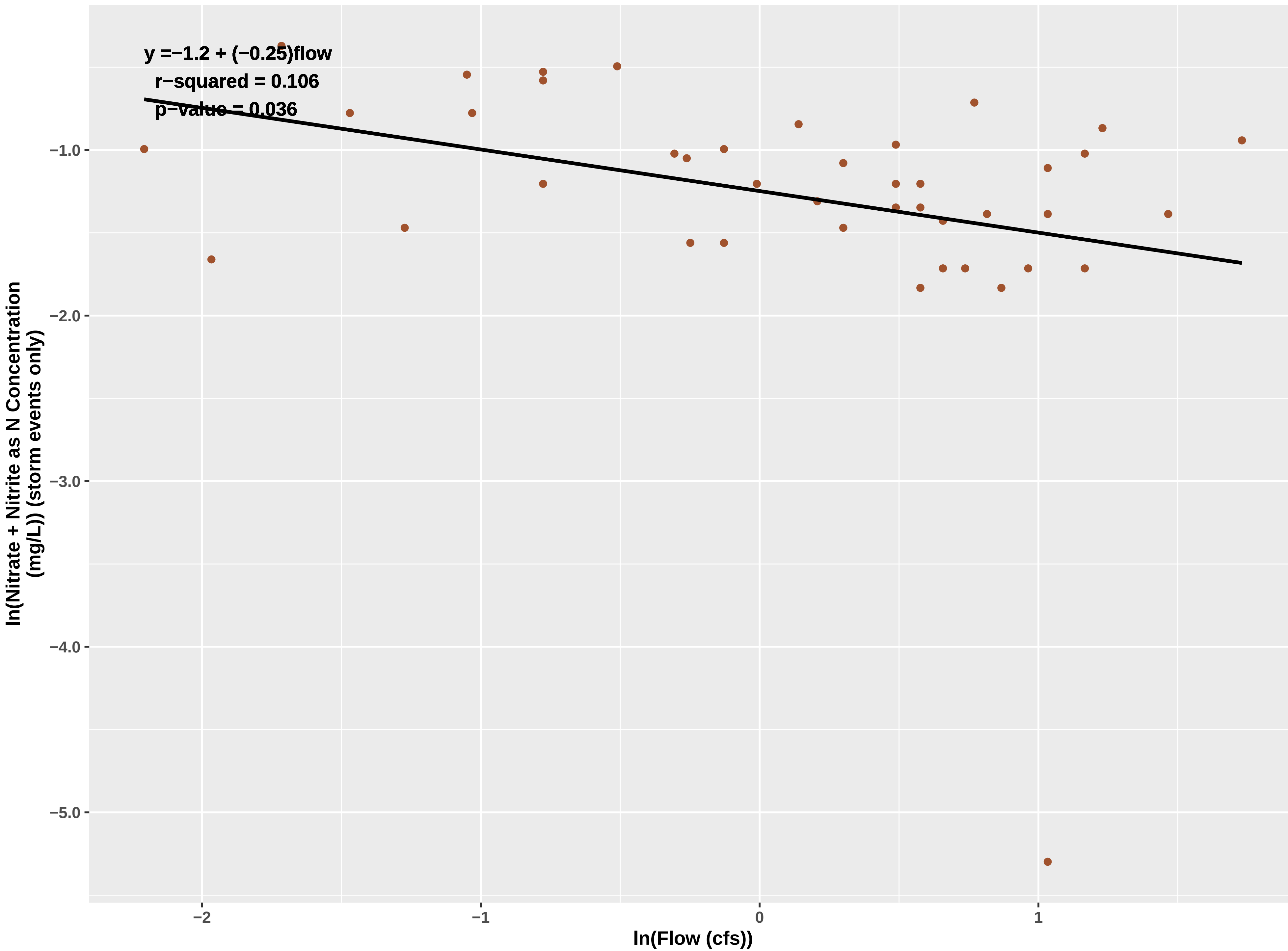

TYLMO
y =2.1 + (0.18)flow
r−squared = 0.0217
p−value = 0.352
6.0
4.0
2.0
−2
−1
0
1
ln(Flow (cfs))
ln(Dissolved Zinc Concentration
(ug/L)) (storm events only)


TYLMO
y =6.1 + (−0.062)flow
r−squared = 0.00153
p−value = 0.806
7.5
5.0
2.5
−2
−1
0
1
ln(Flow (cfs))
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)

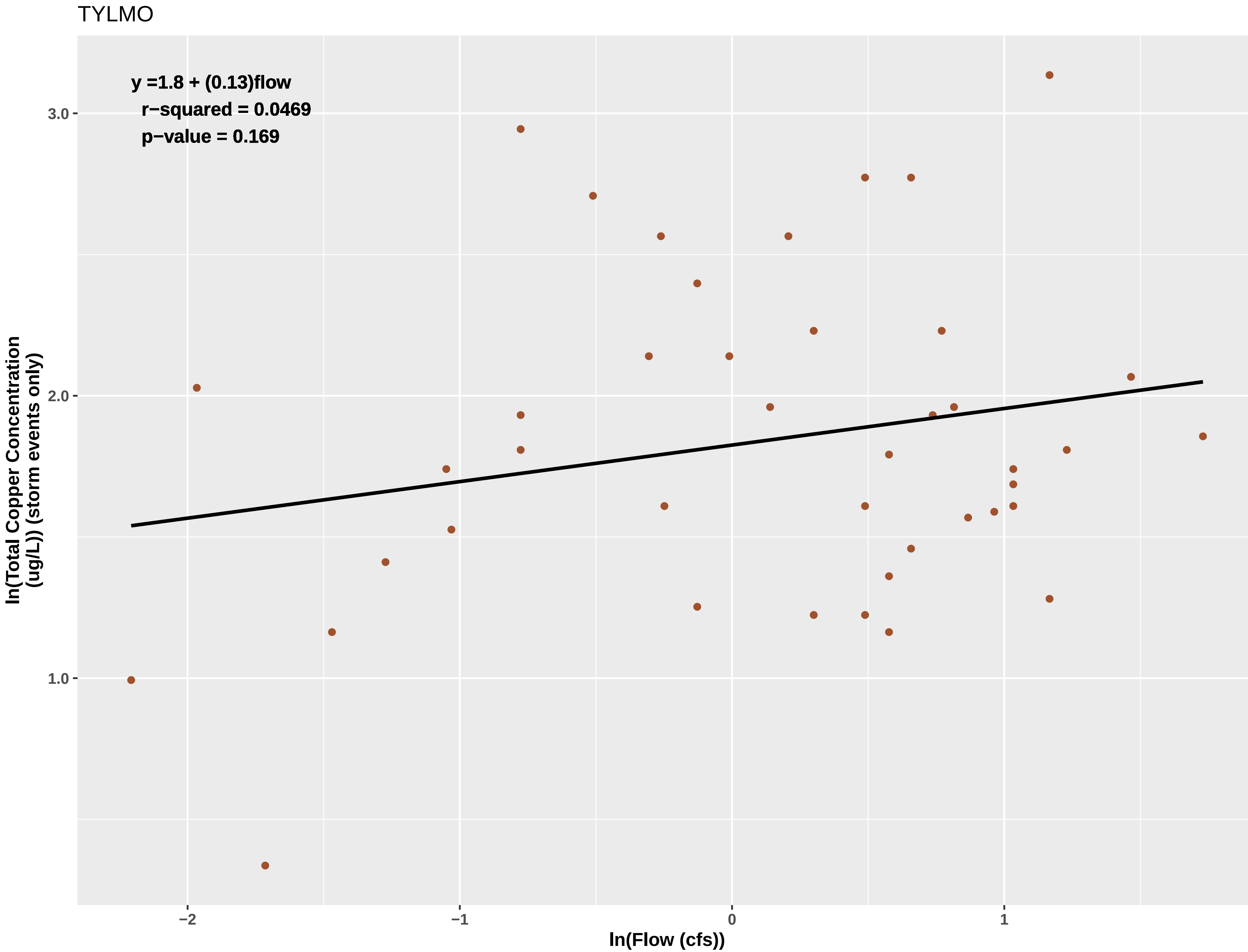


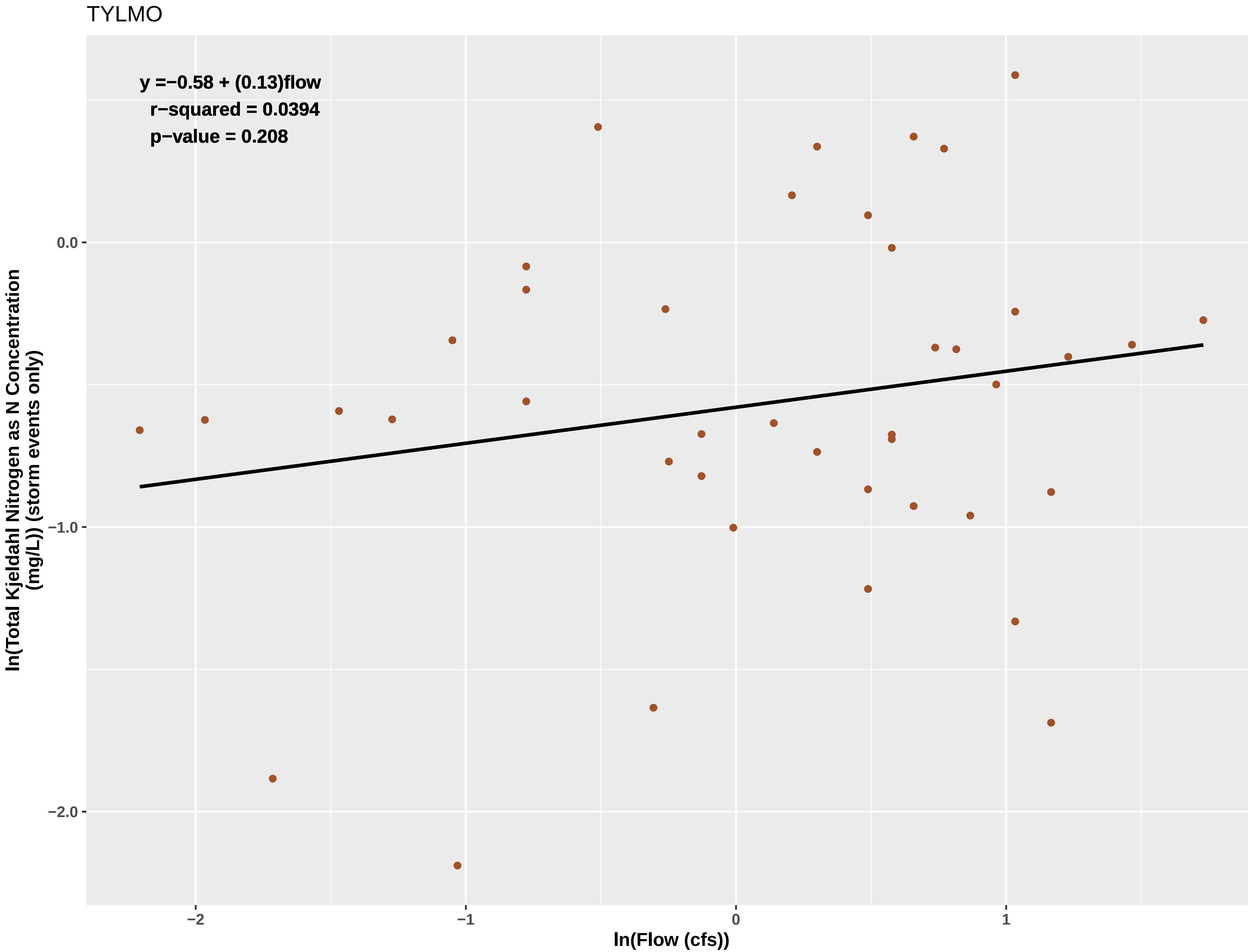
TYLMO
y =3.7 + (−0.42)flow
r−squared = 0.799
p−value = 0
4.50
4.00
3.50
3.00
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)
−2
−1
0
1
ln(Flow (cfs))

TYLMO

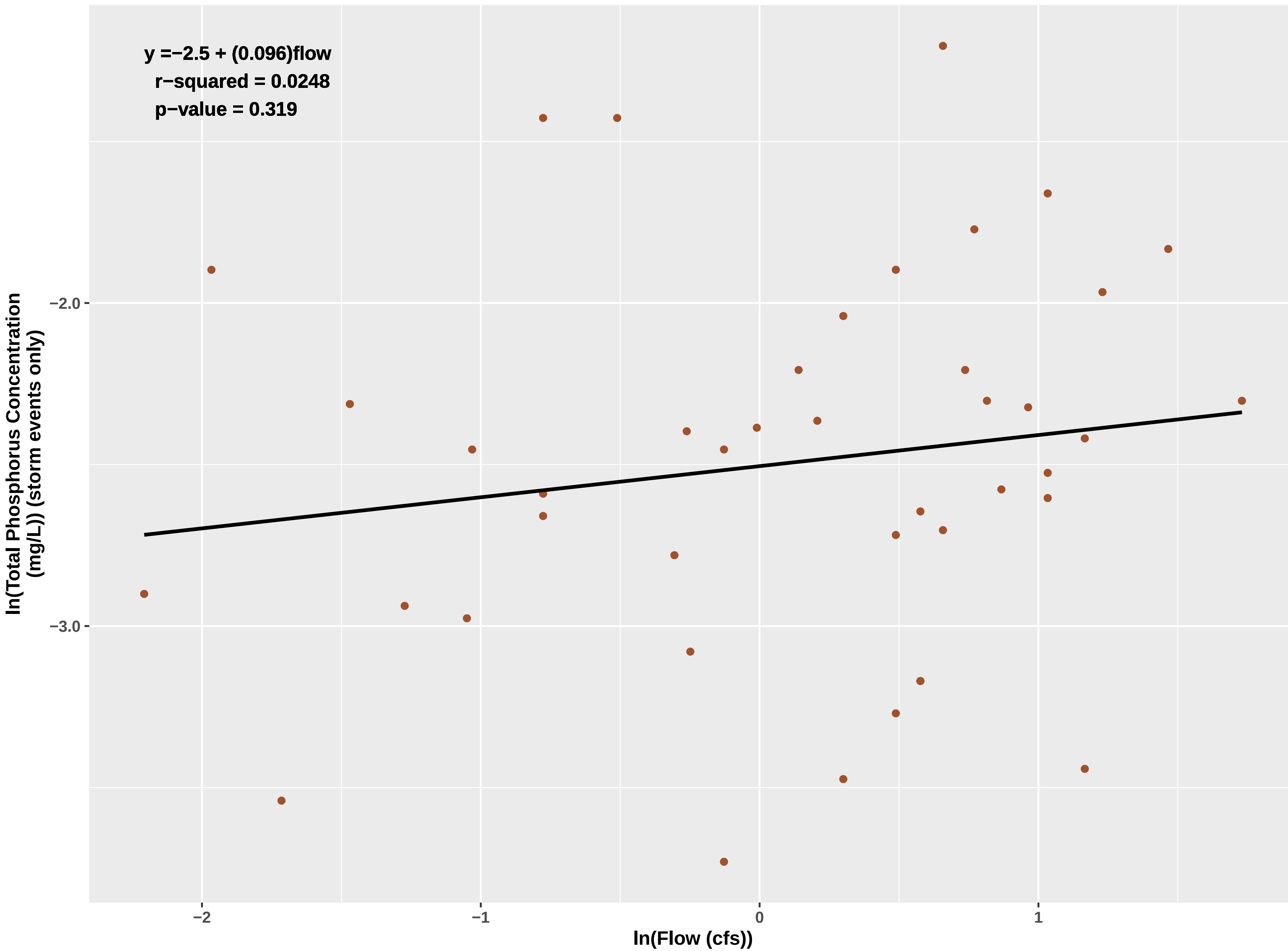


y =−1.2 + (−0.25)flow
r−squared = 0.106
p−value = 0.036
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
−1.0
−2.0
−3.0
−4.0
−5.0
−2
−1
0
1
ln(Flow (cfs))


TYLMO
y =1.8 + (0.13)flow
r−squared = 0.0469
p−value = 0.169
3.0
2.0
1.0
−2
−1
0
1
ln(Flow (cfs))
ln(Total Copper Concentration (ug/L)) (storm events only)

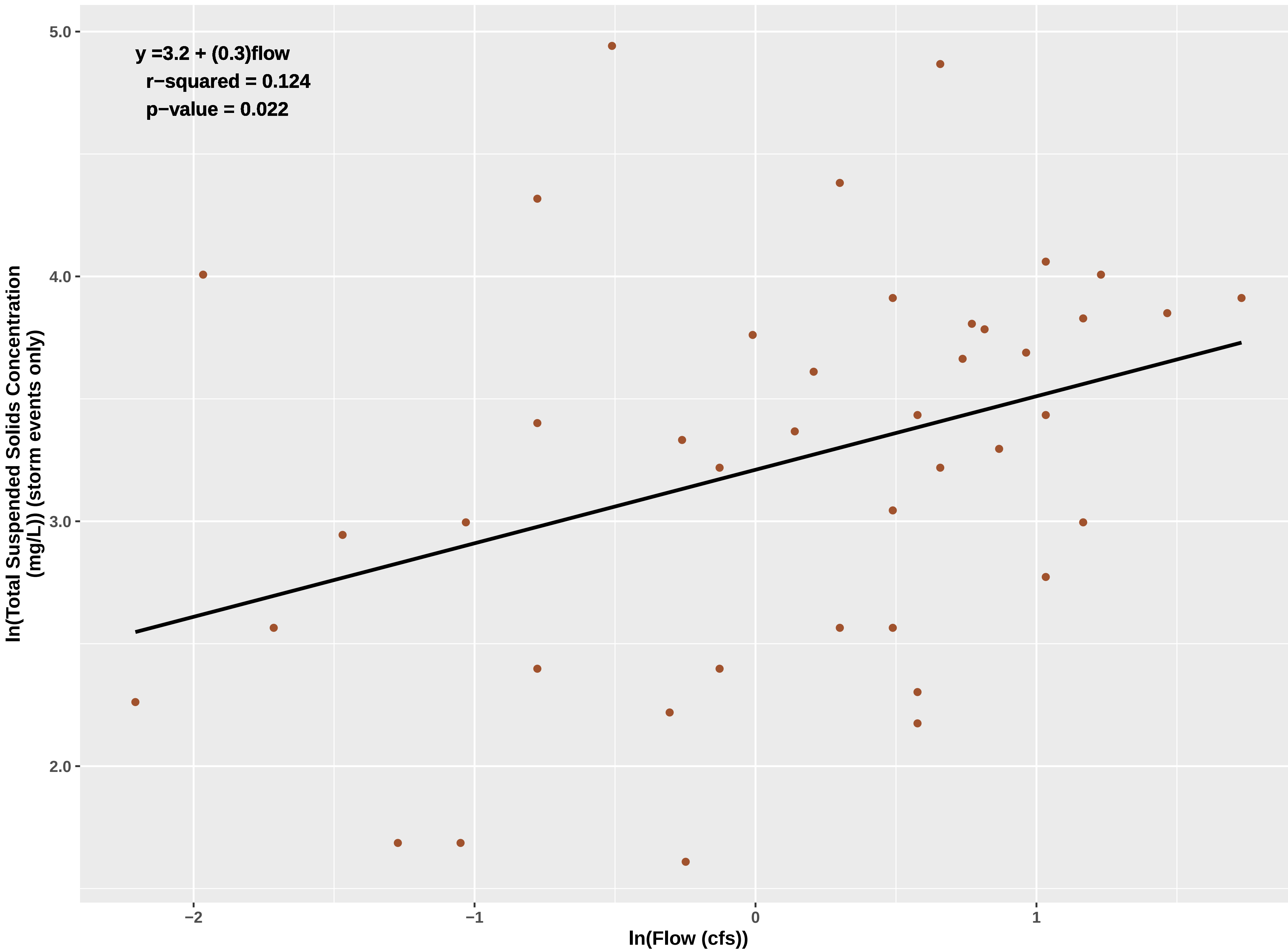

TYLMO
y =−0.58 + (0.13)flow
r−squared = 0.0394
p−value = 0.208
0.0
−1.0
−2.0
−2
−1
0
1
ln(Total Kjeldahl Nitrogen as N Concentration (mg/L)) (storm events only)
ln(Flow (cfs))

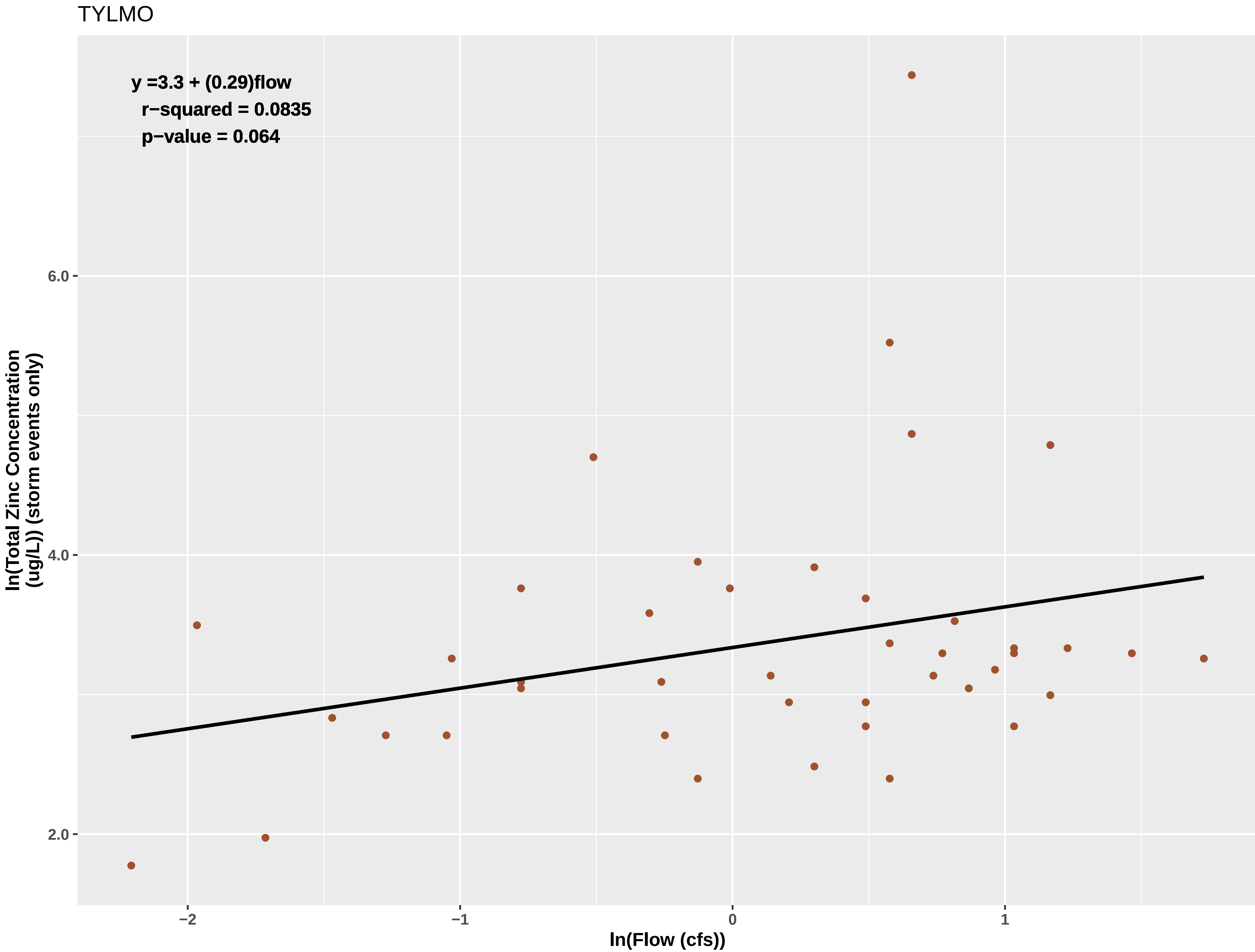
TYLMO

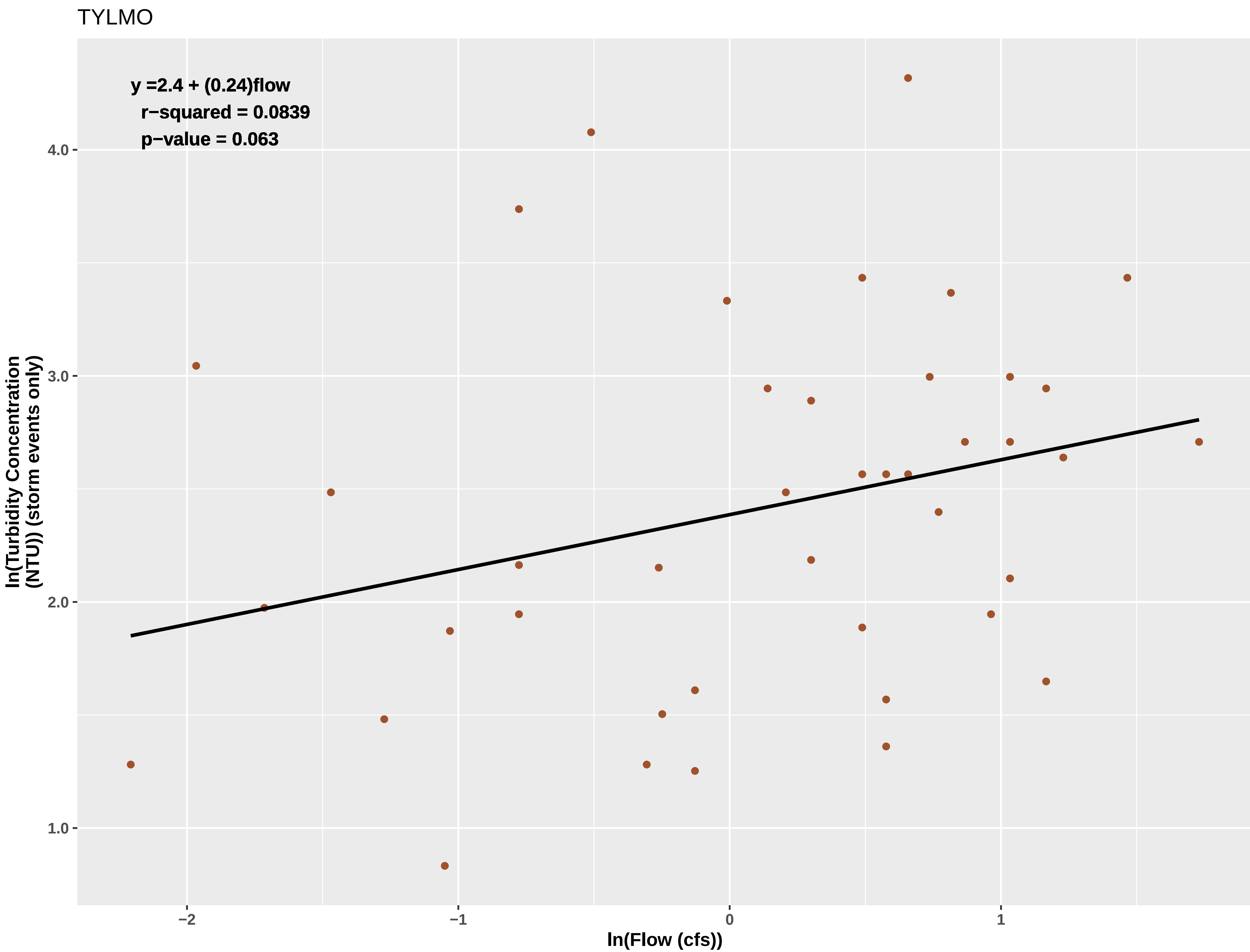


y =−2.5 + (0.096)flow
r−squared = 0.0248
p−value = 0.319
−2.0
−3.0
ln(Total Phosphorus Concentration (mg/L)) (storm events only)
−2
−1
0
1
ln(Flow (cfs))

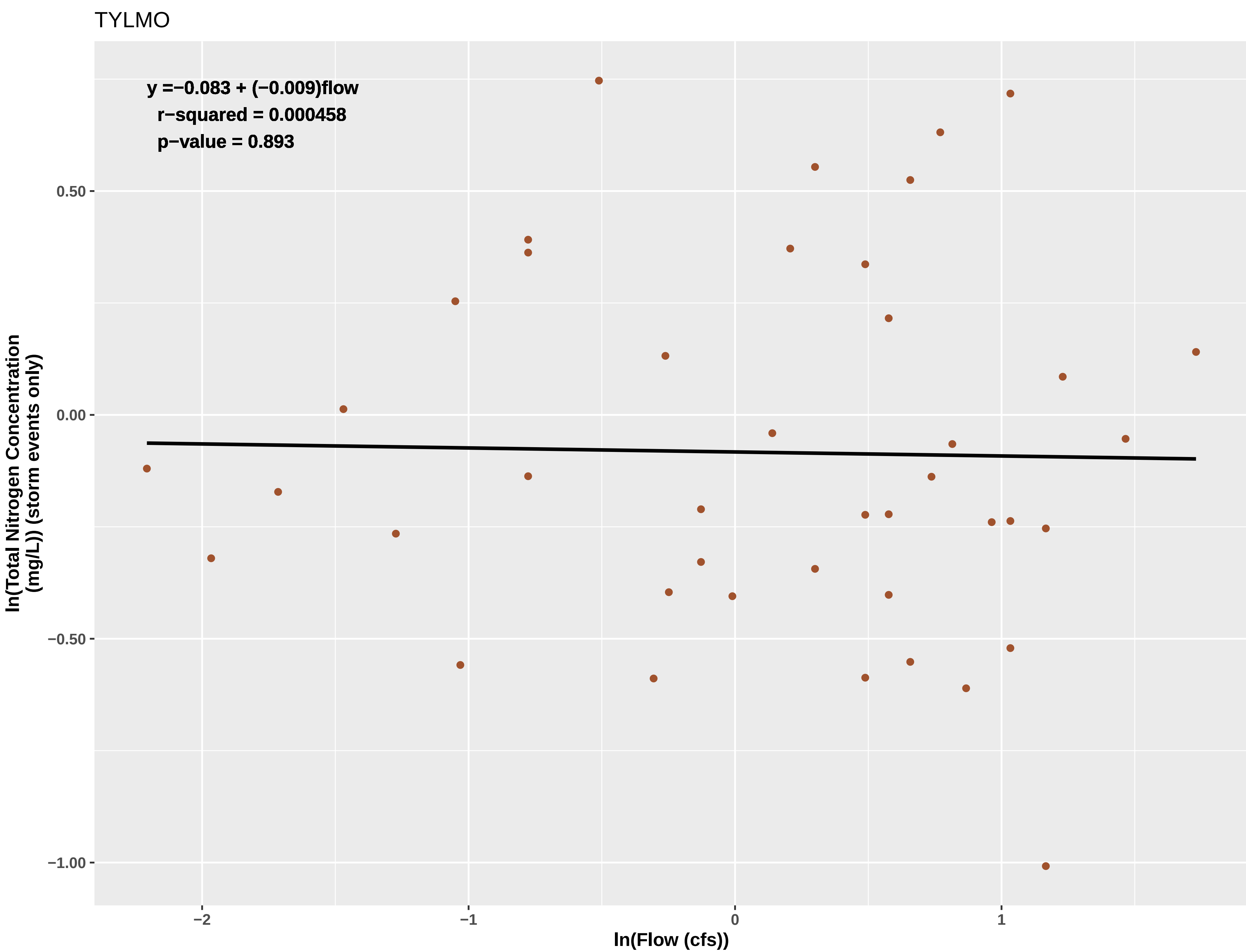
TYLMO

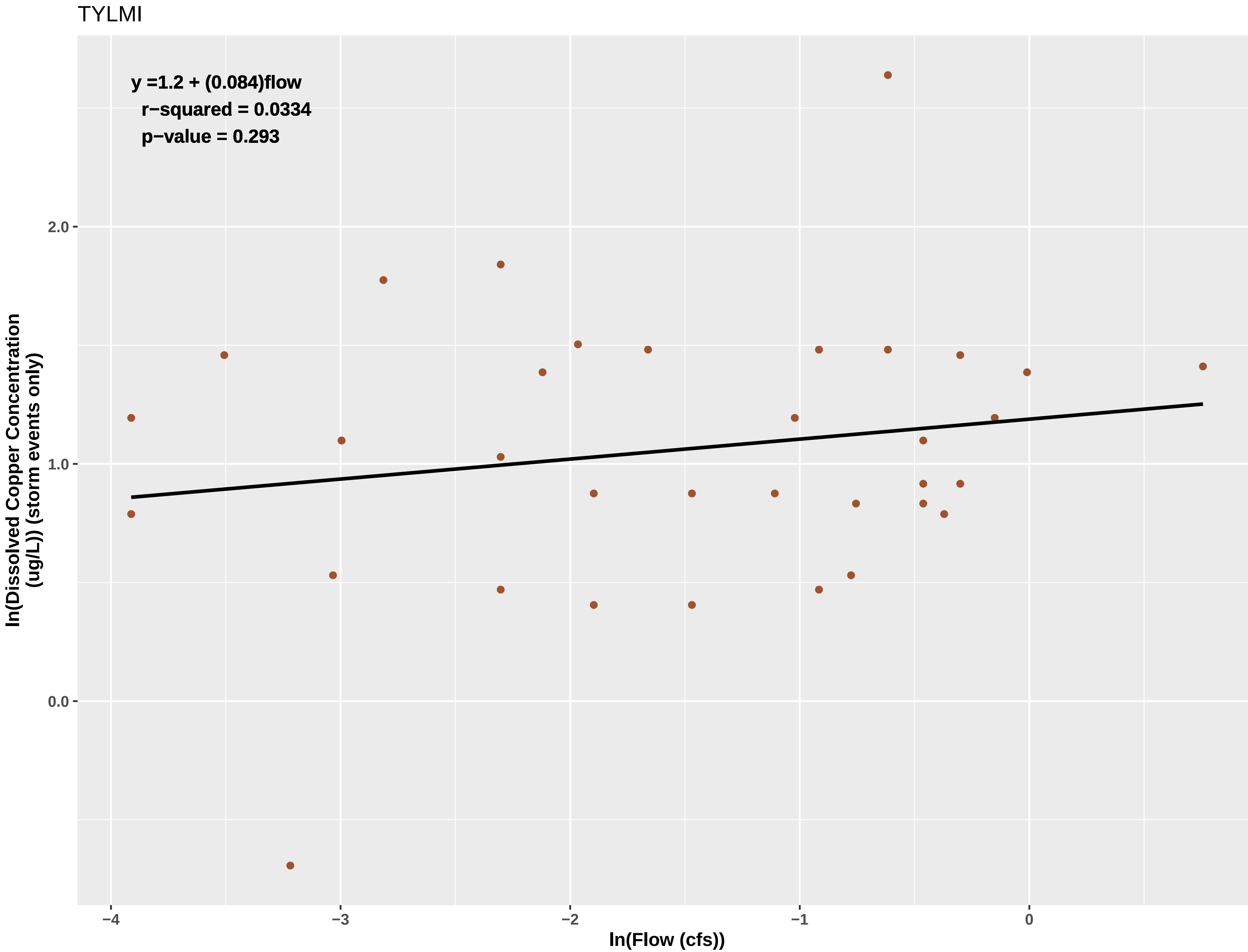

y =3.2 + (0.3)flow
r−squared = 0.124
p−value = 0.022
5.0
4.0
3.0
2.0
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)
−2
−1
0
1
ln(Flow (cfs))

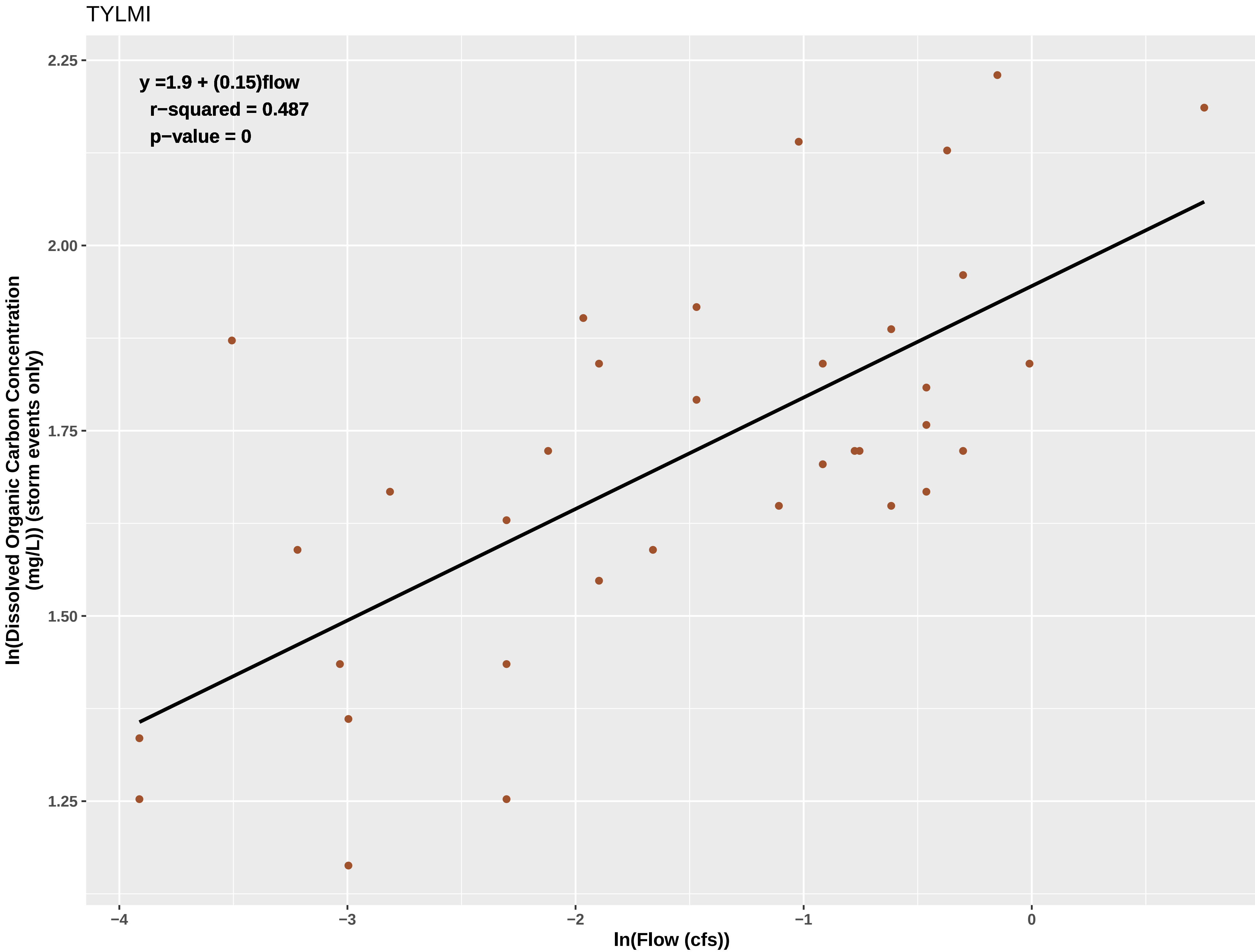

TYLMO
y =3.3 + (0.29)flow
r−squared = 0.0835
p−value = 0.064
6.0
4.0
2.0
−2
−1
0
1
ln(Flow (cfs))
ln(Total Zinc Concentration
(ug/L)) (storm events only)



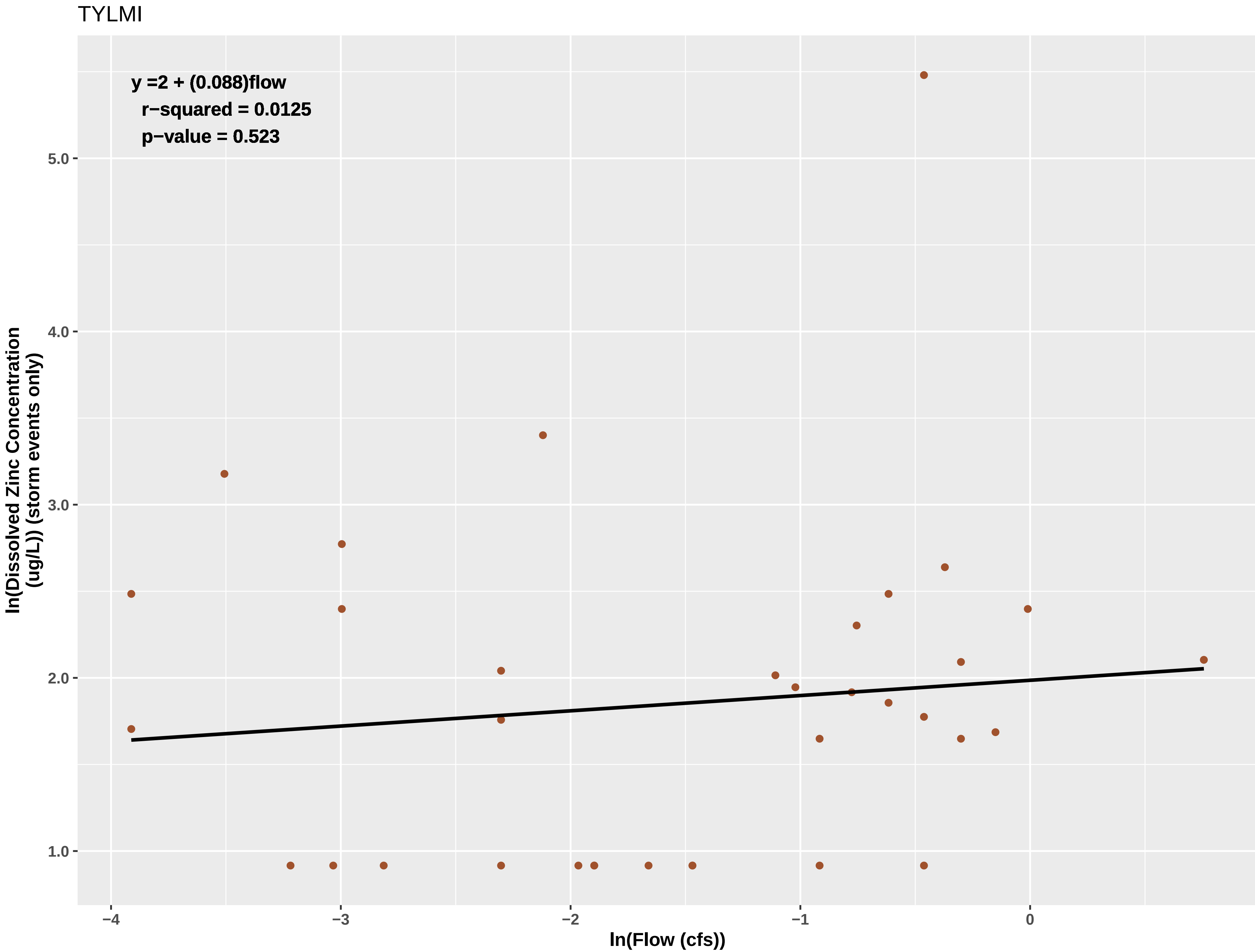
TYLMO
y =2.4 + (0.24)flow
r−squared = 0.0839
p−value = 0.063
4.0
3.0
2.0
1.0
−2
−1
0
1
ln(Turbidity Concentration (NTU)) (storm events only)
ln(Flow (cfs))


TYLMO
y =−0.083 + (−0.009)flow
r−squared = 0.000458
p−value = 0.893
0.50
0.00
−0.50
−1.00
−2
−1
0
1
ln(Flow (cfs))
ln(Total Nitrogen Concentration (mg/L)) (storm events only)

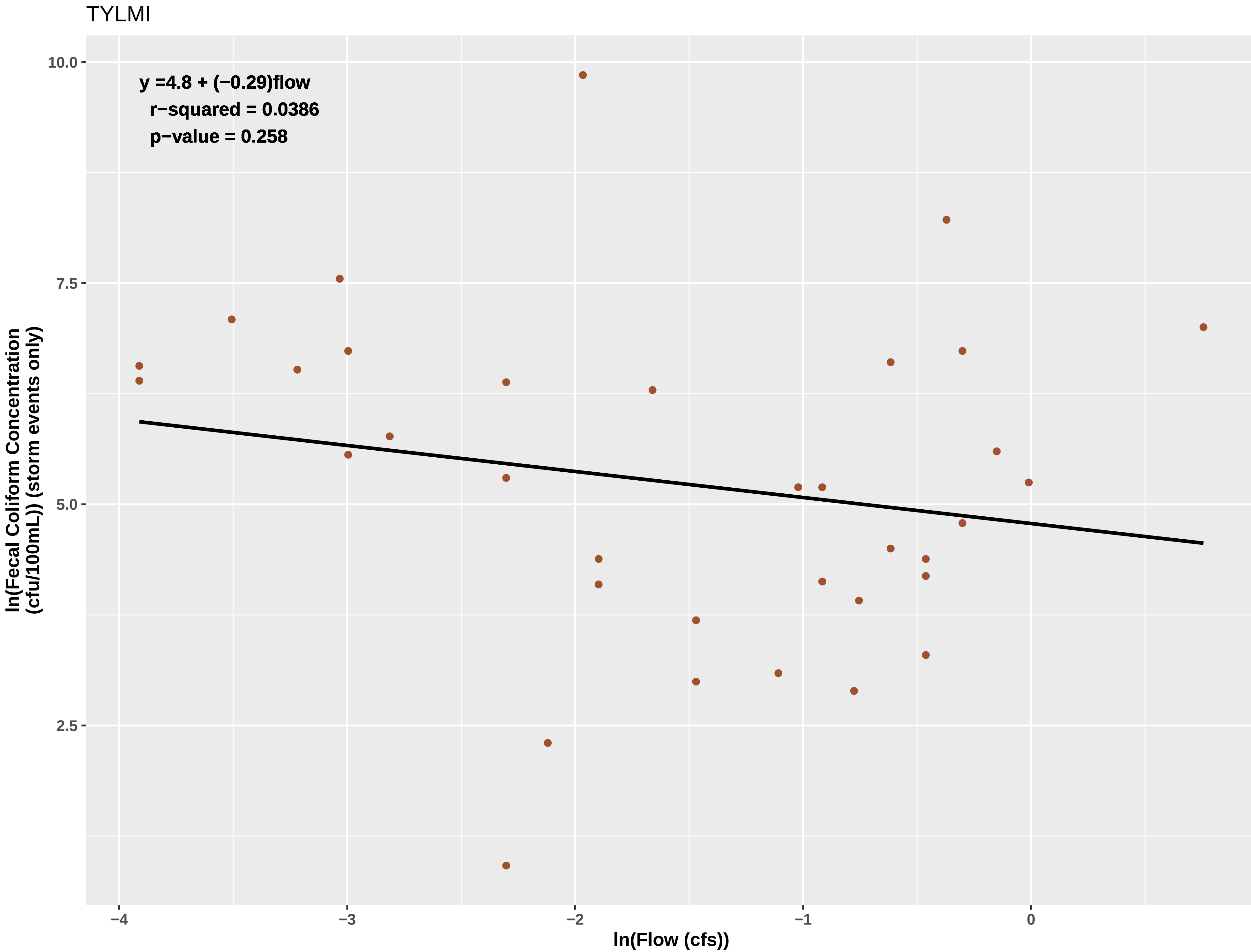

TYLMI
y =1.2 + (0.084)flow
r−squared = 0.0334
p−value = 0.293
2.0
1.0
0.0
ln(Dissolved Copper Concentration
(ug/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))

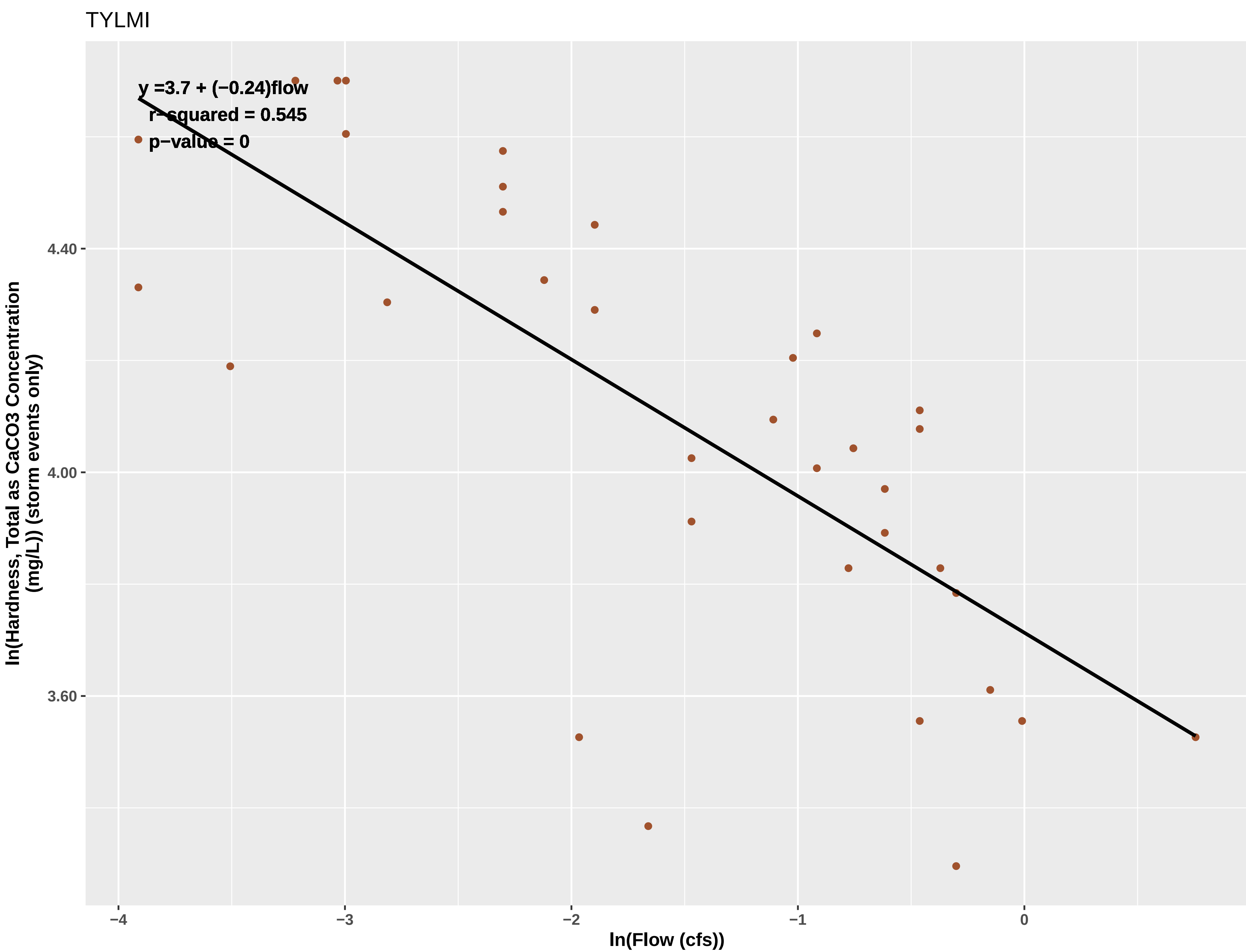


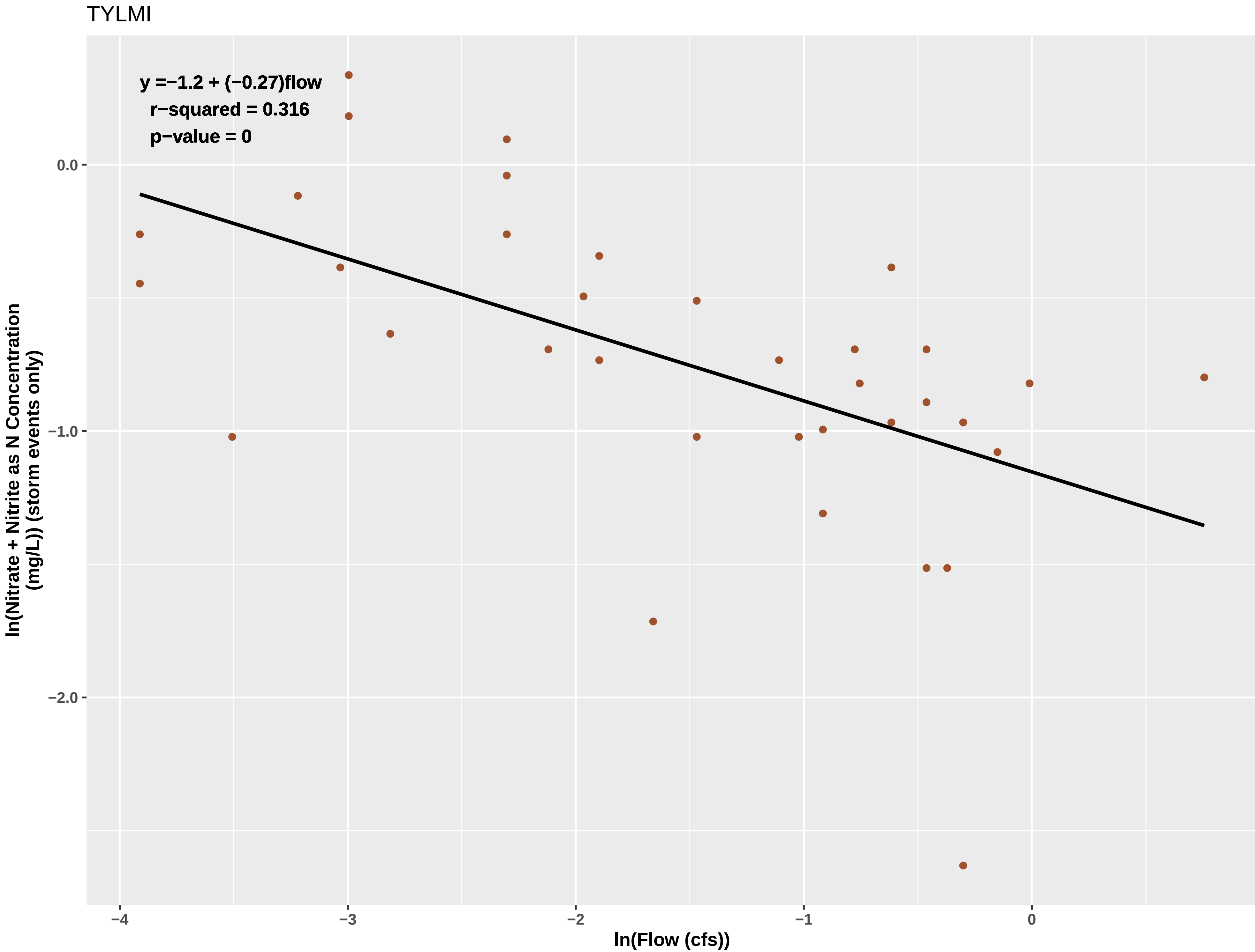
TYLMI
y =1.9 + (0.15)flow
r−squared = 0.487
p−value = 0
ln(Dissolved Organic Carbon Concentration (mg/L)) (storm events only)
2.25
2.00
1.75
1.50
1.25
−4
−3
−2
−1
0
ln(Flow (cfs))

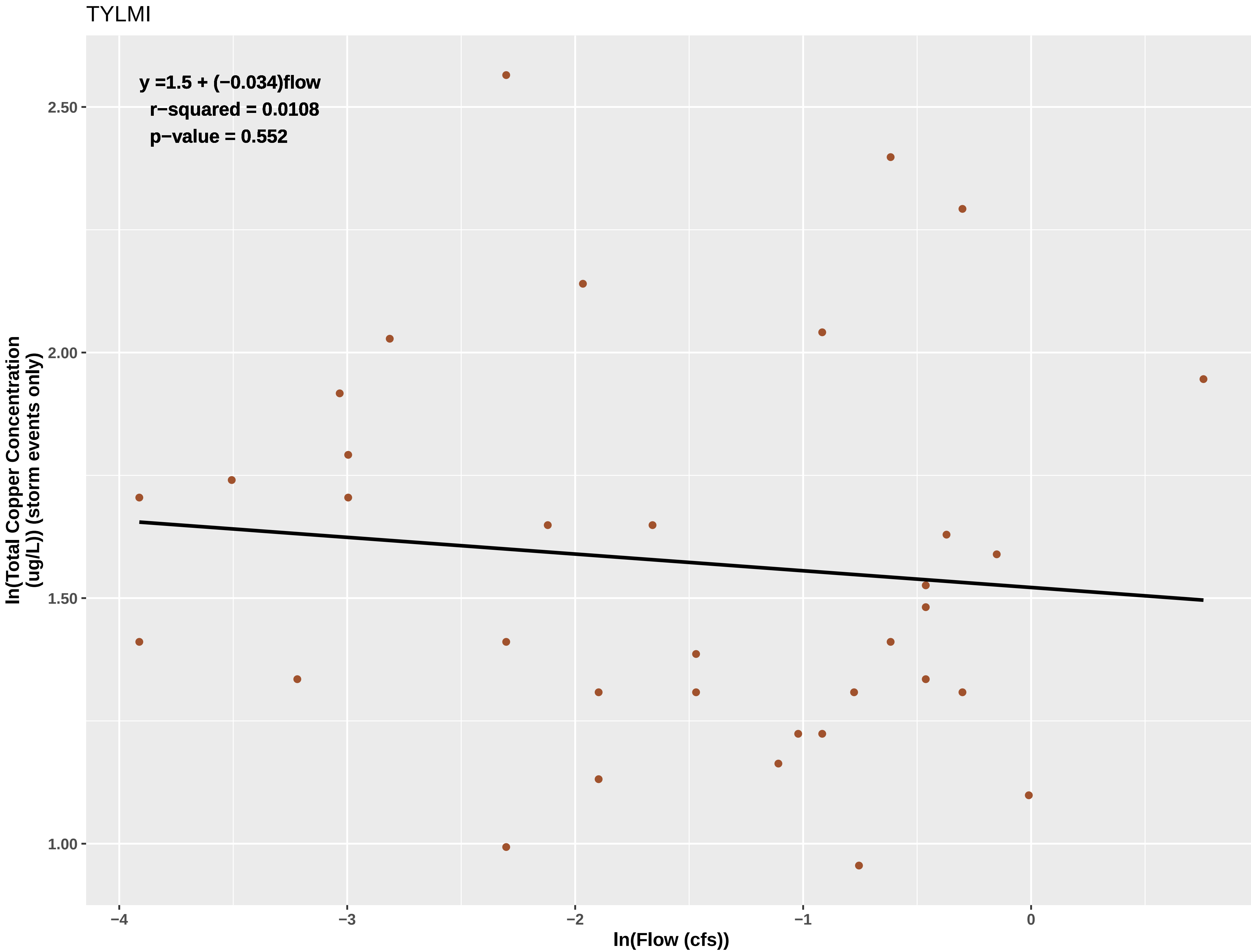


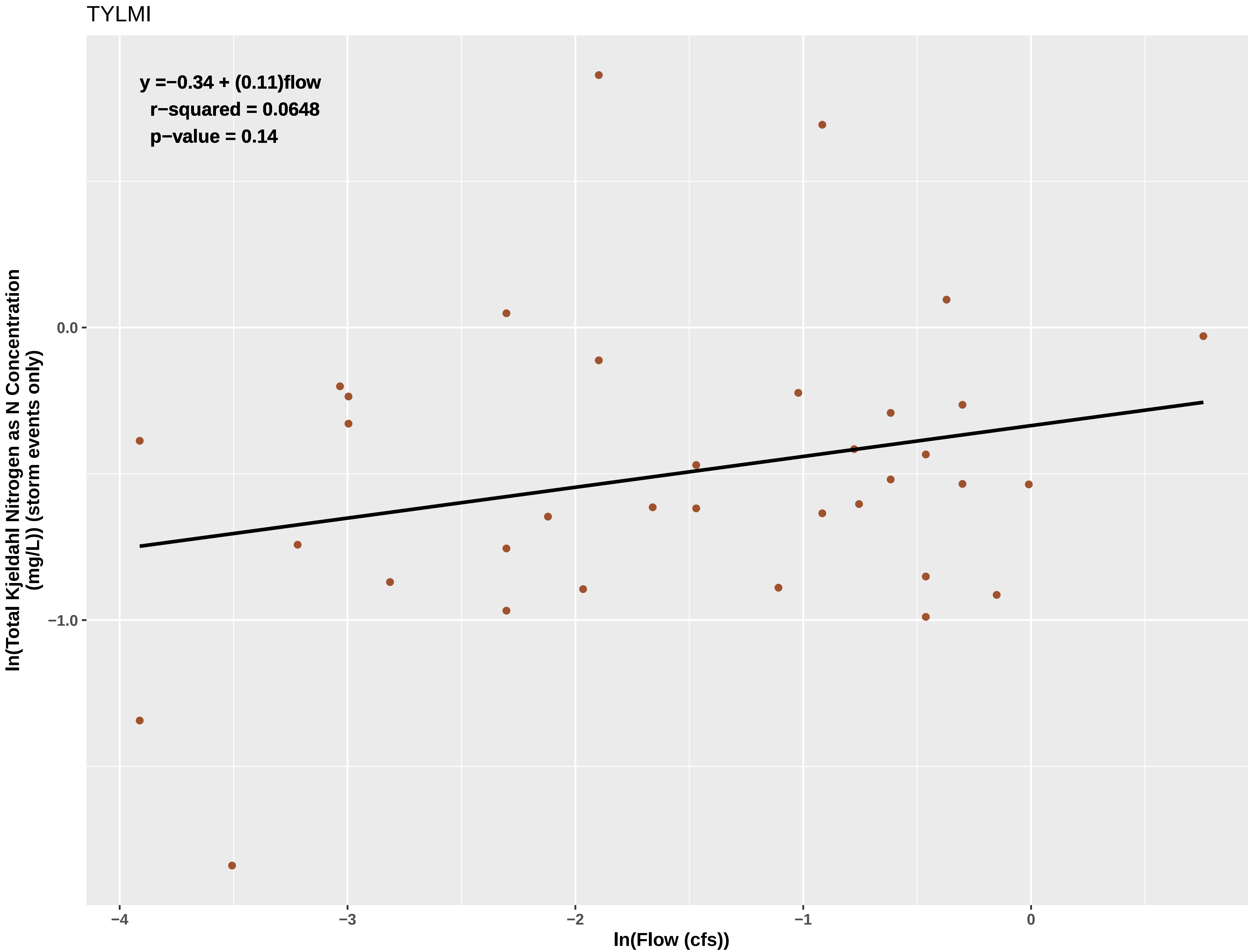
TYLMI
y =2 + (0.088)flow
r−squared = 0.0125
p−value = 0.523
5.0
4.0
3.0
2.0
1.0
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Dissolved Zinc Concentration (ug/L)) (storm events only)

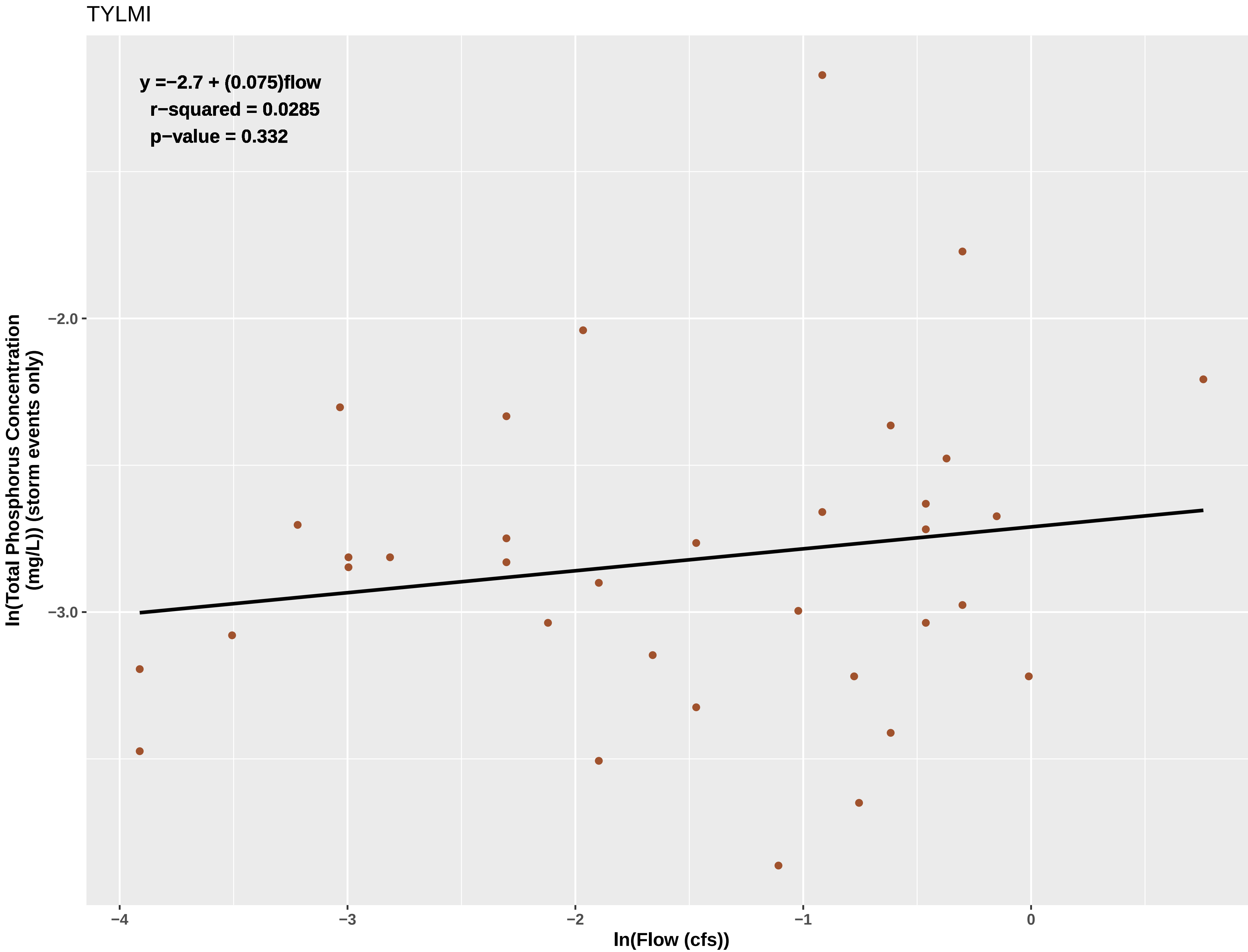

TYLMI
y =4.8 + (−0.29)flow
r−squared = 0.0386
p−value = 0.258
10.0
7.5
5.0
2.5
−4
−3
−2
−1
0
ln(Fecal Coliform Concentration (cfu/100mL)) (storm events only)
ln(Flow (cfs))


TYLMI
y =3.7 + (−0.24)flow
r−squared = 0.545
p−value = 0
4.40
4.00
3.60
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Hardness, Total as CaCO3 Concentration (mg/L)) (storm events only)

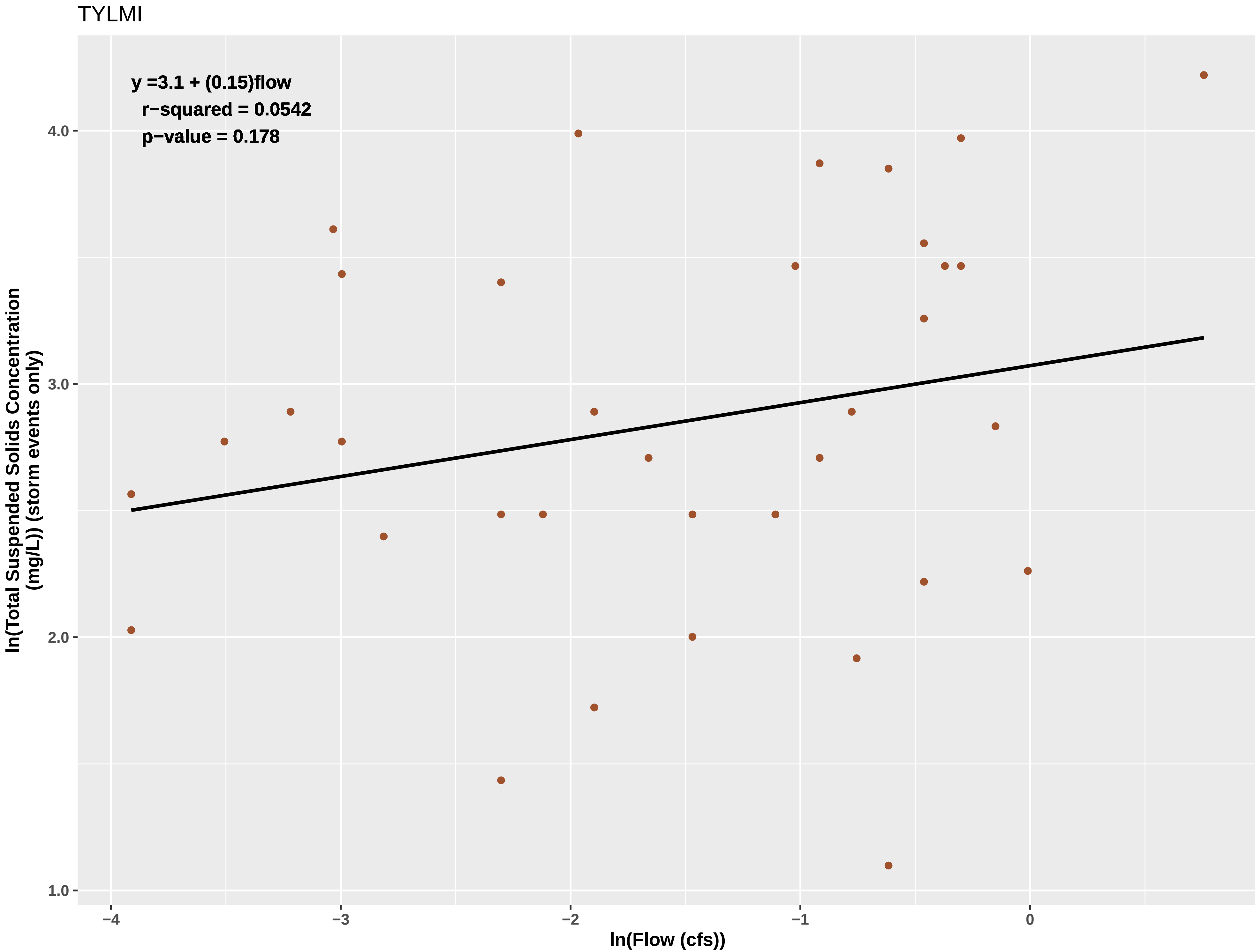

TYLMI
y =−1.2 + (−0.27)flow
r−squared = 0.316
p−value = 0
ln(Nitrate + Nitrite as N Concentration (mg/L)) (storm events only)
0.0
−1.0
−2.0
−4
−3
−2
−1
0
ln(Flow (cfs))


TYLMI
y =1.5 + (−0.034)flow
r−squared = 0.0108
p−value = 0.552
ln(Total Copper Concentration (ug/L)) (storm events only)
2.50
2.00
1.50
1.00
−4
−3
−2
−1
0
ln(Flow (cfs))

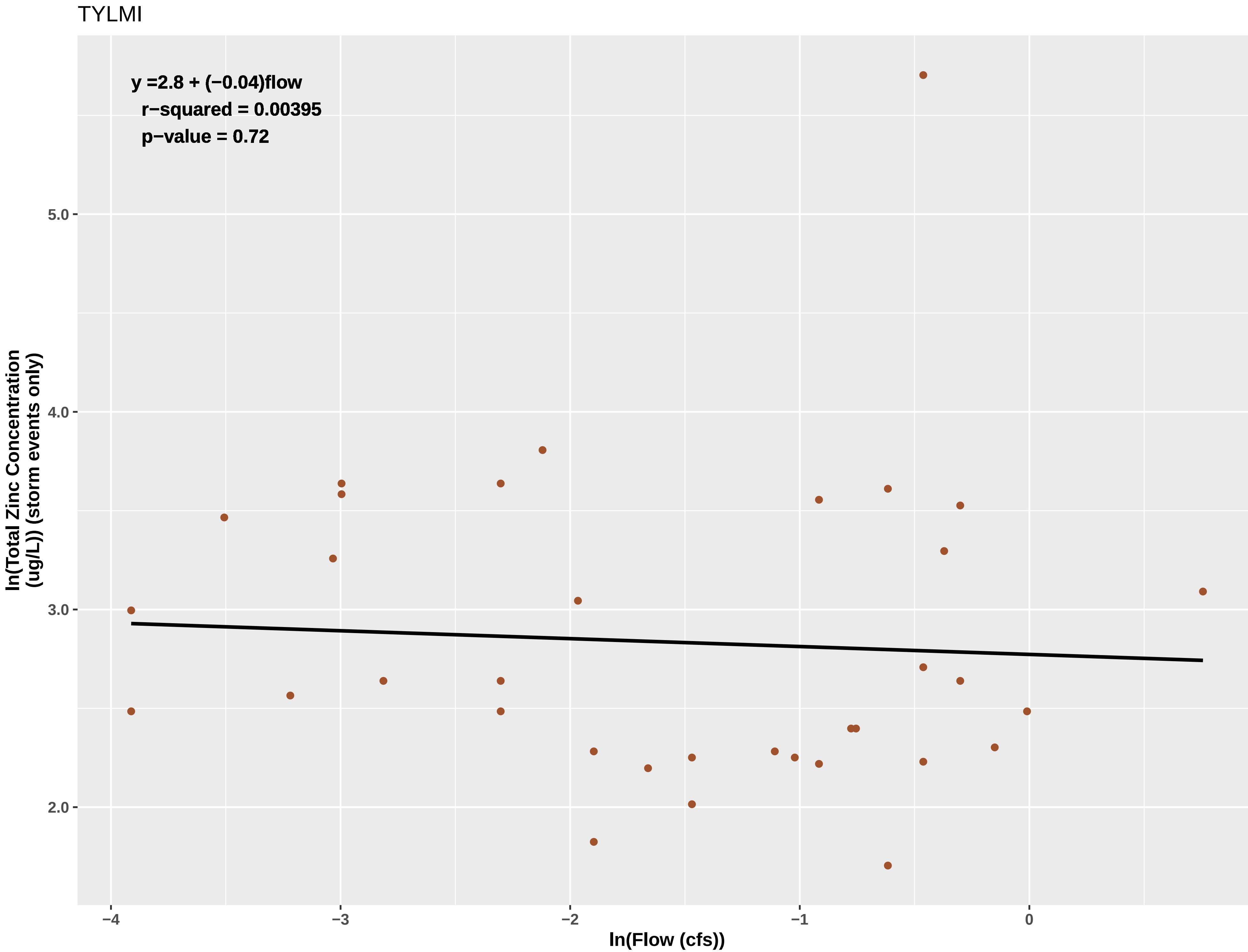

TYLMI
y =−0.34 + (0.11)flow
r−squared = 0.0648
p−value = 0.14
ln(Total Kjeldahl Nitrogen as N Concentration
(mg/L)) (storm events only)
0.0
−1.0
−4
−3
−2
−1
0
ln(Flow (cfs))

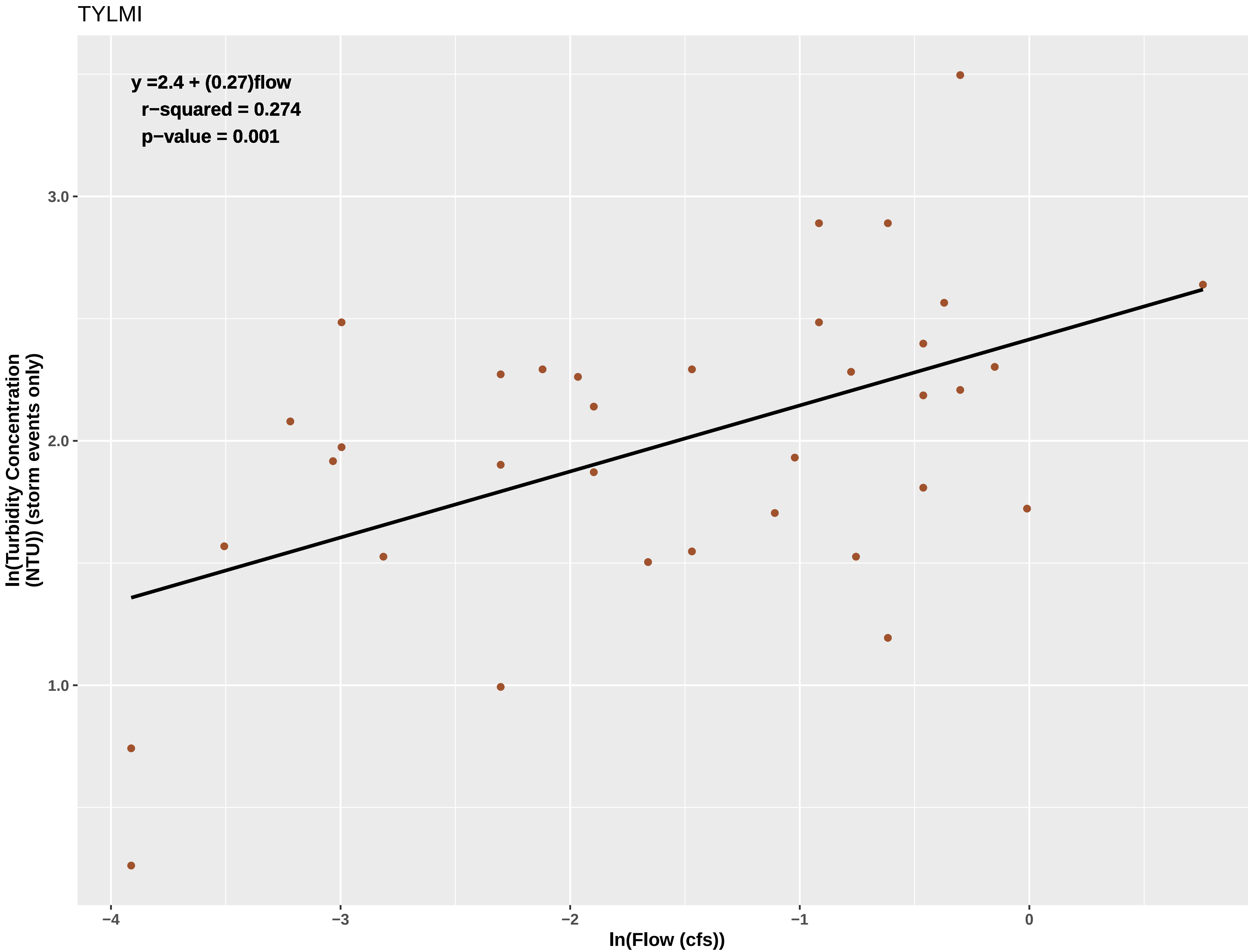


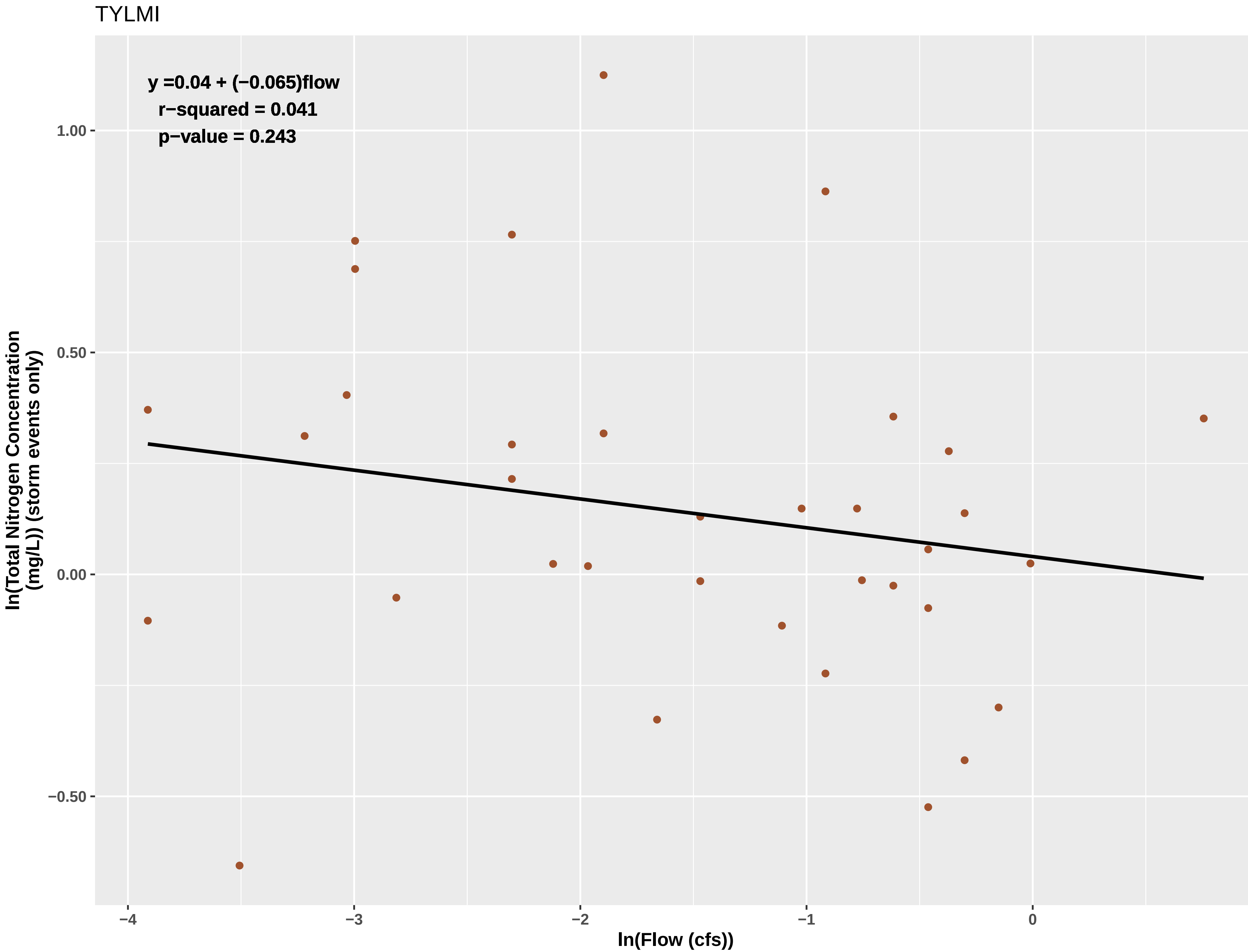
TYLMI
y =−2.7 + (0.075)flow
r−squared = 0.0285
p−value = 0.332
ln(Total Phosphorus Concentration
(mg/L)) (storm events only)
−2.0
−3.0
−4
−3
−2
−1
0
ln(Flow (cfs))



TYLMI
y =3.1 + (0.15)flow
r−squared = 0.0542
p−value = 0.178
4.0
3.0
2.0
1.0
−4
−3
−2
−1
0
ln(Flow (cfs))
ln(Total Suspended Solids Concentration (mg/L)) (storm events only)


TYLMI
y =2.8 + (−0.04)flow
r−squared = 0.00395
p−value = 0.72
5.0
4.0
3.0
2.0
ln(Total Zinc Concentration
(ug/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))


TYLMI
y =2.4 + (0.27)flow
r−squared = 0.274
p−value = 0.001
3.0
2.0
1.0
ln(Turbidity Concentration
(NTU)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))


TYLMI
y =0.04 + (−0.065)flow
r−squared = 0.041
p−value = 0.243
1.00
0.50
0.00
−0.50
ln(Total Nitrogen Concentration (mg/L)) (storm events only)
−4
−3
−2
−1
0
ln(Flow (cfs))

APPENDIX F

Summary of Regression and Correlation Analyses Performed on Water Quality Indicators

Table F1. Summary of Regression and Correlation Analyses Performed on Water Qaulity Indicators.

		Storm Events Only												Base Events Only				
			Correlation (Concentration v Time)				Regression (ln[Concentration] v ln[Flow])			Correlation (Residuals v Time)					Correlation (Concentration v Time)			
Station	Parameter	n	Kendall's Tau	p-value	Pearson's R	p-value	slope	r2	p_value	Kendall's Tau	p-value	Pearson's R	p-value	n	Kendall's Tau	p-value	Pearson's R	p-value
EVALSS	Dissolved Copper	28	0.17	1.00	0.07	1.00	0.87	0.46	0.00	-0.01	0.46	0.05	1.00	32	0.02	1.00	0.03	1.00
EVALSS	Dissolved Organic Carbon	28	0.08	0.54	0.15	0.45	0.75	0.55	0.00	-0.01	0.98	0.08	0.68	32	0.11	0.36	0.18	0.34
EVALSS	Dissolved Zinc	28	0.12	1.00	0.18	1.00	0.19	0.09	0.13					32	-0.01	0.48	0.00	1.00
EVALSS	Fecal Coliform	28	-0.17	0.10	-0.29	0.07	-0.13	0.00	0.88					32	0.03	1.00	0.16	1.00
EVALSS	Hardness, Total as CaCO3	28	-0.11	0.41	-0.18	0.37	-0.35	0.70	0.00	-0.06	0.68	-0.02	0.93	32	0.13	0.31	0.18	0.32
EVALSS	Nitrate + Nitrite as N	28	0.04	1.00	-0.05	0.41	-0.23	0.14	0.05					32	-0.12	0.19	-0.10	0.29
EVALSS	Total Copper	28	0.03	1.00	-0.07	0.36	0.67	0.13	0.06					32	0.20	1.00	0.27	1.00
EVALSS	Total Kjeldahl Nitrogen as N	28	-0.06	0.34	-0.18	0.18	0.96	0.22	0.01					32	0.01	1.00	-0.12	0.25
EVALSS	Total Phosphorus	28	0.18	1.00	-0.01	0.48	0.52	0.12	0.08					32	0.29	1.00	0.48	1.00
EVALSS	Total Suspended Solids	28	0.14	1.00	-0.05	0.39	0.91	0.24	0.01					32	0.21	1.00	0.28	1.00
EVALSS	Total Zinc	28	-0.08	0.30	-0.09	0.33	0.41	0.06	0.23					32	0.25	1.00	0.22	1.00
EVALSS	Turbidity	28	0.31	1.00	0.17	1.00	0.90	0.21	0.01					32	0.46	1.00	0.65	1.00
EVALSS	Total Nitrogen	28	0.00	0.49	-0.19	0.17	0.13	0.03	0.36					32	-0.04	0.37	-0.15	0.20
EVAMS	Dissolved Copper	31	0.00	1.00	0.01	1.00	0.17	0.25	0.00					29	NC	1.00	NC	1.00
EVAMS	Dissolved Organic Carbon	31	0.06	0.62	0.09	0.64	0.49	0.47	0.00	0.07	1.00	0.23	0.22	29	0.10	0.48	0.12	0.54
EVAMS	Dissolved Zinc	31	-0.09	0.27	0.04	1.00	-0.12	0.03	0.36					29	NC	1.00	NC	1.00
EVAMS	Fecal Coliform	31	-0.23	**0.04**	-0.27	0.07	0.45	0.01	0.55					29	0.05	1.00	0.24	1.00
EVAMS	Hardness, Total as CaCO3	31	-0.04	0.73	-0.07	0.71	-0.22	0.32	0.00					29	0.07	0.60	0.15	0.44
EVAMS	Nitrate + Nitrite as N	31	0.02	1.00	-0.02	0.45	-0.30	0.32	0.00					29	-0.05	0.36	-0.18	0.18
EVAMS	Total Copper	31	-0.13	0.17	-0.15	0.22	0.76	0.31	0.00					29	NC	1.00	NC	1.00
EVAMS	Total Kjeldahl Nitrogen as N	30	-0.05	0.35	-0.29	0.06	0.56	0.22	0.01					29	0.04	1.00	0.08	1.00
EVAMS	Total Phosphorus	31	-0.01	0.46	0.09	1.00	0.56	0.09	0.09					29	0.25	1.00	0.37	1.00
EVAMS	Total Suspended Solids	31	-0.20	0.06	-0.24	0.10	0.74	0.24	0.01					29	0.01	1.00	0.03	1.00
EVAMS	Total Zinc	31	-0.16	0.13	-0.07	0.37	0.54	0.18	0.02					29	NC	1.00	NC	1.00
EVAMS	Turbidity	31	0.12	1.00	-0.09	0.31	0.70	0.19	0.02					29	0.39	1.00	0.58	1.00
EVAMS	Total Nitrogen	31	0.01	1.00	-0.22	0.12	0.03	0.00	0.76					29	-0.02	0.46	-0.11	0.29
MONM	Dissolved Copper	40	0.27	1.00	0.36	1.00	0.31	0.33	0.00					20	0.32	1.00	0.45	1.00
MONM	Dissolved Organic Carbon	40	0.09	0.40	0.13	0.43	0.06	0.05	0.19					20	-0.08	0.63	0.01	0.98
MONM	Dissolved Zinc	40	0.06	1.00	0.07	1.00	0.19	0.17	0.01					20	-0.42	**0.01**	-0.46	**0.02**
MONM	Fecal Coliform	40	-0.25	**0.01**	-0.32	**0.02**	-0.56	0.11	0.04					20	0.12	1.00	0.14	1.00
MONM	Hardness, Total as CaCO3	40	0.04	0.73	0.07	0.65	-0.31	0.70	0.00	0.20	0.07	0.20	0.21	20	0.38	**0.03**	0.50	**0.02**
MONM	Nitrate + Nitrite as N	40	-0.15	0.09	-0.20	0.11	0.14	0.11	0.04					20	-0.21	0.10	-0.43	**0.03**
MONM	Total Copper	40	-0.04	0.36	0.02	1.00	0.34	0.40	0.00	-0.03	0.40	-0.07	0.33	20	-0.03	0.44	0.03	1.00
MONM	Total Kjeldahl Nitrogen as N	40	-0.16	0.07	-0.21	0.10	0.10	0.02	0.38					20	-0.04	0.40	-0.10	0.34
MONM	Total Phosphorus	40	-0.01	0.47	0.04	1.00	0.00	0.00	0.98					20	0.05	1.00	0.12	1.00
MONM	Total Suspended Solids	40	-0.15	0.10	-0.03	0.44	0.51	0.28	0.00					20	-0.06	0.35	-0.08	0.37
MONM	Total Zinc	40	-0.08	0.25	-0.09	0.29	0.18	0.09	0.05					20	-0.21	0.10	-0.43	**0.03**
MONM	Turbidity	40	0.12	1.00	0.16	1.00	0.50	0.36	0.00	0.08	1.00	0.16	1.00	20	0.03	1.00	0.01	1.00
MONM	Total Nitrogen	40	-0.19	**0.05**	-0.24	0.07	0.12	0.07	0.09					20	-0.17	0.16	-0.28	0.12
MONMN	Dissolved Copper	36	0.33	1.00	0.18	1.00	0.30	0.30	0.00					24	0.43	1.00	0.56	1.00
MONMN	Dissolved Organic Carbon	36	-0.02	0.88	0.01	0.96	0.02	0.01	0.64					24	0.22	0.14	0.41	**0.05**

Table F1. Summary of Regression and Correlation Analyses Performed on Water Qaulity Indicators.

		Storm Events Only												Base Events Only				
			Correlation (Concentration v Time)				Regression (ln[Concentration] v ln[Flow])			Correlation (Residuals v Time)					Correlation (Concentration v Time)			
Station	Parameter	n	Kendall's Tau	p-value	Pearson's R	p-value	slope	r2	p_value	Kendall's Tau	p-value	Pearson's R	p-value	n	Kendall's Tau	p-value	Pearson's R	p-value
MONMN	Dissolved Zinc	36	0.29	1.00	0.30	1.00	0.13	0.05	0.18					24	NC	1.00	NC	1.00
MONMN	Fecal Coliform	36	-0.27	**0.01**	-0.38	**0.01**	-0.73	0.17	0.01					24	0.00	1.00	-0.13	0.27
MONMN	Hardness, Total as CaCO3	36	0.03	0.81	-0.06	0.73	-0.22	0.66	0.00	0.23	0.05	0.31	0.07	24	0.46	**0.00**	0.61	**0.00**
MONMN	Nitrate + Nitrite as N	36	0.07	1.00	0.22	1.00	0.15	0.08	0.09					24	-0.27	**0.04**	0.02	1.00
MONMN	Total Copper	36	0.23	1.00	0.06	1.00	0.06	0.01	0.48					24	0.26	1.00	0.47	1.00
MONMN	Total Kjeldahl Nitrogen as N	36	-0.05	0.34	0.09	1.00	0.06	0.01	0.50					24	0.15	1.00	0.00	1.00
MONMN	Total Phosphorus	36	-0.06	0.31	0.04	1.00	-0.15	0.05	0.18					24	0.25	1.00	0.26	1.00
MONMN	Total Suspended Solids	36	0.01	1.00	0.06	1.00	0.03	0.00	0.86					24	0.07	1.00	0.10	1.00
MONMN	Total Zinc	36	0.02	1.00	0.06	1.00	-0.08	0.01	0.53					24	0.24	1.00	0.28	1.00
MONMN	Turbidity	36	0.25	1.00	0.28	1.00	0.17	0.05	0.18					24	0.10	1.00	0.16	1.00
MONMN	Total Nitrogen	36	0.05	1.00	0.22	1.00	0.11	0.07	0.11					24	-0.03	0.43	0.02	1.00
MONMS	Dissolved Copper	41	0.03	1.00	-0.07	0.34	0.24	0.14	0.02					19	0.32	1.00	0.44	1.00
MONMS	Dissolved Organic Carbon	41	-0.16	0.14	-0.23	0.14	-0.01	0.00	0.88					19	-0.19	0.26	-0.18	0.46
MONMS	Dissolved Zinc	41	0.02	1.00	0.11	1.00	0.10	0.07	0.09					19	0.07	1.00	0.01	1.00
MONMS	Fecal Coliform	41	-0.12	0.14	-0.31	**0.02**	0.28	0.02	0.35					19	0.01	1.00	0.22	1.00
MONMS	Hardness, Total as CaCO3	41	0.15	0.18	0.20	0.22	-0.23	0.59	0.00	0.19	0.09	0.24	0.14	19	0.29	0.09	0.30	0.21
MONMS	Nitrate + Nitrite as N	41	-0.15	0.09	-0.27	**0.04**	0.30	0.19	0.00					19	**-0.30**	**0.04**	-0.37	0.06
MONMS	Total Copper	41	-0.30	**0.00**	-0.35	**0.01**	0.14	0.07	0.10					19	0.03	1.00	0.10	1.00
MONMS	Total Kjeldahl Nitrogen as N	41	-0.26	**0.01**	-0.29	**0.03**	-0.03	0.00	0.67					19	0.01	1.00	-0.15	0.28
MONMS	Total Phosphorus	41	-0.03	0.38	-0.10	0.26	-0.06	0.02	0.37					19	0.24	1.00	0.42	1.00
MONMS	Total Suspended Solids	41	-0.21	**0.03**	-0.31	**0.02**	0.16	0.05	0.16					19	0.23	1.00	0.30	1.00
MONMS	Total Zinc	41	-0.08	0.24	-0.08	0.32	-0.05	0.01	0.65					19	0.01	1.00	-0.12	0.32
MONMS	Turbidity	41	-0.12	0.13	-0.24	0.06	0.11	0.03	0.28					19	0.10	1.00	0.20	1.00
MONMS	Total Nitrogen	41	-0.28	**0.00**	-0.38	**0.01**	0.07	0.03	0.29					19	-0.07	0.34	-0.18	0.23
TOSMO	Dissolved Copper	39	-0.03	0.41	-0.22	0.09	0.14	0.03	0.27					21	0.22	1.00	0.28	1.00
TOSMO	Dissolved Organic Carbon	39	-0.26	**0.02**	-0.39	**0.02**	0.07	0.02	0.43					21	-0.02	0.90	-0.01	0.98
TOSMO	Dissolved Zinc	39	-0.16	0.08	-0.13	0.22	0.34	0.14	0.02					21	0.21	1.00	0.38	1.00
TOSMO	Fecal Coliform	39	-0.24	**0.02**	-0.08	0.31	0.26	0.02	0.45					21	-0.10	0.26	0.11	1.00
TOSMO	Hardness, Total as CaCO3	39	0.18	0.11	0.24	0.14	-0.36	0.44	0.00	0.14	0.20	0.15	0.37	21	0.19	0.27	0.28	0.23
TOSMO	Nitrate + Nitrite as N	39	0.05	1.00	0.06	1.00	-0.33	0.30	0.00					21	0.06	1.00	0.02	1.00
TOSMO	Total Copper	39	-0.23	**0.02**	-0.32	**0.02**	0.62	0.42	0.00	-0.11	0.17	-0.25	0.06	21	0.18	1.00	0.26	1.00
TOSMO	Total Kjeldahl Nitrogen as N	39	-0.23	**0.02**	-0.32	**0.02**	0.48	0.24	0.00					21	0.01	1.00	0.00	0.50
TOSMO	Total Phosphorus	39	-0.04	0.35	-0.21	0.10	0.54	0.29	0.00					21	0.10	1.00	0.22	1.00
TOSMO	Total Suspended Solids	39	-0.12	0.15	-0.19	0.12	1.00	0.50	0.00	-0.02	0.43	-0.07	0.33	21	-0.11	0.25	0.11	1.00
TOSMO	Total Zinc	39	-0.15	0.09	-0.25	0.07	0.80	0.43	0.00	0.01	1.00	-0.09	0.29	21	0.21	1.00	0.42	1.00
TOSMO	Turbidity	39	0.04	1.00	-0.01	0.47	0.88	0.46	0.00	0.22	1.00	0.26	1.00	21	0.16	1.00	0.28	1.00
TOSMO	Total Nitrogen	39	-0.21	**0.03**	-0.30	**0.03**	0.21	0.09	0.06					21	0.02	1.00	0.01	1.00
TOSMI	Dissolved Copper	39	0.02	1.00	-0.05	0.37	-0.16	0.06	0.15					21	0.46	1.00	0.63	1.00
TOSMI	Dissolved Organic Carbon	39	-0.15	0.19	-0.27	0.10	-0.12	0.04	0.21					21	0.02	0.93	0.17	0.47
TOSMI	Dissolved Zinc	39	-0.03	0.41	0.01	1.00	-0.05	0.00	0.73					21	0.26	1.00	0.29	1.00

Table F1. Summary of Regression and Correlation Analyses Performed on Water Qaulity Indicators.

		Storm Events Only												Base Events Only				
			Correlation (Concentration v Time)				Regression (ln[Concentration] v ln[Flow])			Correlation (Residuals v Time)					Correlation (Concentration v Time)			
Station	Parameter	n	Kendall's Tau	p-value	Pearson's R	p-value	slope	r2	p_value	Kendall's Tau	p-value	Pearson's R	p-value	n	Kendall's Tau	p-value	Pearson's R	p-value
TOSMI	Fecal Coliform	39	-0.09	0.21	-0.16	0.16	0.20	0.01	0.51					21	-0.01	0.49	-0.10	0.34
TOSMI	Hardness, Total as CaCO3	39	0.13	0.26	0.17	0.31	-0.45	0.41	0.00	-0.11	0.35	-0.06	0.73	21	0.01	0.95	-0.06	0.79
TOSMI	Nitrate + Nitrite as N	39	0.10	1.00	0.21	1.00	-0.50	0.50	0.00	-0.17	0.06	-0.21	0.10	21	-0.04	0.39	0.01	1.00
TOSMI	Total Copper	39	-0.21	**0.03**	-0.24	0.07	0.06	0.01	0.54					21	0.24	1.00	0.45	1.00
TOSMI	Total Kjeldahl Nitrogen as N	39	-0.34	**0.00**	-0.32	**0.02**	0.02	0.00	0.90					21	0.25	1.00	0.32	1.00
TOSMI	Total Phosphorus	39	-0.12	0.14	-0.19	0.12	0.22	0.06	0.14					21	0.02	1.00	0.27	1.00
TOSMI	Total Suspended Solids	39	-0.06	0.30	-0.11	0.25	0.63	0.28	0.00					21	0.01	1.00	0.25	1.00
TOSMI	Total Zinc	39	-0.09	0.21	-0.12	0.24	0.07	0.01	0.63					21	0.25	1.00	0.41	1.00
TOSMI	Turbidity	39	0.12	1.00	0.14	1.00	0.26	0.06	0.14					21	0.20	1.00	0.34	1.00
TOSMI	Total Nitrogen	39	-0.19	**0.04**	-0.22	0.09	-0.16	0.06	0.12					21	0.17	1.00	0.27	1.00
COLM	Dissolved Copper	37	0.03	1.00	0.03	1.00	0.06	0.03	0.30					23	-0.05	0.39	-0.01	0.48
COLM	Dissolved Organic Carbon	37	0.08	0.51	0.16	0.35	-0.01	0.01	0.63					23	0.07	0.65	0.02	0.93
COLM	Dissolved Zinc	37	0.03	1.00	0.03	1.00	0.02	0.03	0.30					23	NC	1.00	NC	1.00
COLM	Fecal Coliform	37	-0.16	0.09	-0.26	0.06	-0.38	0.15	0.02					23	0.01	1.00	-0.16	0.24
COLM	Hardness, Total as CaCO3	37	-0.06	0.61	0.05	0.77	-0.12	0.59	0.00	0.01	0.97	0.09	0.61	23	0.45	**0.00**	0.47	**0.02**
COLM	Nitrate + Nitrite as N	37	-0.10	0.18	-0.19	0.14	0.04	0.00	0.70					23	-0.20	0.09	-0.01	0.48
COLM	Total Copper	37	0.02	1.00	0.01	1.00	-0.07	0.10	0.05					23	-0.21	0.11	-0.18	0.21
COLM	Total Kjeldahl Nitrogen as N	37	-0.31	**0.00**	-0.40	**0.01**	-0.01	0.00	0.90					23	0.04	1.00	-0.08	0.36
COLM	Total Phosphorus	37	-0.09	0.23	-0.22	0.09	-0.29	0.47	0.00	-0.14	0.12	-0.17	0.15	23	0.34	1.00	0.40	1.00
COLM	Total Suspended Solids	37	-0.24	**0.02**	-0.22	0.10	0.04	0.01	0.68					23	-0.17	0.14	0.08	1.00
COLM	Total Zinc	37	-0.10	0.23	-0.12	0.23	0.02	0.02	0.44					23	0.04	1.00	0.03	1.00
COLM	Turbidity	37	-0.04	0.38	-0.03	0.44	-0.13	0.14	0.02					23	-0.08	0.29	-0.10	0.32
COLM	Total Nitrogen	37	-0.32	**0.00**	-0.42	**0.01**	-0.01	0.00	0.83					23	0.03	1.00	-0.07	0.39
SEIMN	Dissolved Copper	37	0.01	1.00	0.00	1.00	0.09	0.13	0.03					23	NC	1.00	NC	1.00
SEIMN	Dissolved Organic Carbon	37	0.09	0.45	0.10	0.56	0.35	0.60	0.00	0.05	0.65	0.01	0.97	23	-0.09	0.56	-0.15	0.50
SEIMN	Dissolved Zinc	37	NC	1.00	NC	1.00	0.00	0.51	0.05					23	NC	1.00	NC	1.00
SEIMN	Fecal Coliform	37	-0.06	0.30	0.12	1.00	-1.10	0.29	0.00					23	0.02	1.00	-0.20	0.18
SEIMN	Hardness, Total as CaCO3	37	-0.06	0.61	-0.15	0.37	-0.29	0.40	0.00	0.09	0.44	0.00	0.99	23	0.12	0.44	0.24	0.27
SEIMN	Nitrate + Nitrite as N	37	-0.31	**0.00**	-0.09	0.31	-0.01	0.00	0.90					23	-0.04	0.40	0.19	1.00
SEIMN	Total Copper	37	0.28	1.00	0.20	1.00	0.23	0.11	0.04					23	0.00	1.00	0.00	0.50
SEIMN	Total Kjeldahl Nitrogen as N	37	-0.08	0.26	-0.10	0.27	0.36	0.18	0.01					23	-0.03	0.43	-0.12	0.29
SEIMN	Total Phosphorus	37	0.12	1.00	0.24	1.00	-0.14	0.03	0.28					23	0.22	1.00	0.35	1.00
SEIMN	Total Suspended Solids	37	0.24	1.00	0.16	1.00	0.30	0.09	0.07					23	0.00	1.00	0.02	1.00
SEIMN	Total Zinc	37	-0.01	0.48	0.04	1.00	0.11	0.05	0.16					23	NC	1.00	NC	1.00
SEIMN	Turbidity	37	0.37	1.00	0.42	1.00	0.19	0.03	0.28					23	0.32	1.00	0.43	1.00
SEIMN	Total Nitrogen	37	-0.14	0.12	-0.13	0.23	0.22	0.15	0.02					23	-0.02	0.44	0.02	1.00
SEIMS	Dissolved Copper	41	0.02	1.00	0.02	1.00	0.24	0.04	0.20					19	NC	1.00	NC	1.00
SEIMS	Dissolved Organic Carbon	41	0.06	0.57	0.09	0.59	0.31	0.19	0.01					19	0.16	0.34	0.24	0.33
SEIMS	Dissolved Zinc	41	-0.12	0.17	-0.06	0.36	0.00	0.00	0.99					19	NC	1.00	NC	1.00
SEIMS	Fecal Coliform	41	-0.04	0.34	-0.27	**0.05**	0.33	0.01	0.57					19	0.08	1.00	-0.02	0.48
SEIMS	Hardness, Total as CaCO3	41	0.02	0.86	-0.15	0.36	-0.40	0.28	0.00					19	0.19	0.28	0.30	0.21

Table F1. Summary of Regression and Correlation Analyses Performed on Water Qaulity Indicators.

		Storm Events Only												Base Events Only				
			Correlation (Concentration v Time)				Regression			Correlation (Residuals v Time)					Correlation (Concentration v Time)			
Station	Parameter	n	Kendall's Tau	p-value	Pearson's R	p-value	slope	r2	p_value	Kendall's Tau	p-value	Pearson's R	p-value	n	Kendall's Tau	p-value	Pearson's R	p-value
SEIMS	Nitrate + Nitrite as N	41	-0.15	0.09	-0.27	**0.04**	-0.21	0.10	0.05					19	-0.33	**0.03**	-0.36	0.06
SEIMS	Total Copper	41	-0.14	0.12	0.00	1.00	0.45	0.12	0.03					19	NC	1.00	NC	1.00
SEIMS	Total Kjeldahl Nitrogen as N	41	-0.17	0.06	-0.16	0.16	0.23	0.06	0.14					19	0.21	1.00	0.30	1.00
SEIMS	Total Phosphorus	41	0.02	1.00	-0.06	0.35	-0.15	0.03	0.29					19	0.05	1.00	0.09	1.00
SEIMS	Total Suspended Solids	41	-0.18	**0.05**	-0.13	0.21	0.24	0.03	0.25					19	-0.20	0.12	-0.10	0.34
SEIMS	Total Zinc	41	0.00	0.49	0.19	1.00	-0.25	0.04	0.19					19	0.29	1.00	0.37	1.00
SEIMS	Turbidity	41	0.18	1.00	0.23	1.00	0.07	0.00	0.74					19	0.28	1.00	0.40	1.00
SEIMS	Total Nitrogen	41	-0.22	**0.02**	-0.19	0.12	0.14	0.03	0.26					19	0.02	1.00	0.24	1.00
COUMO	Dissolved Copper	35	0.01	1.00	-0.06	0.37	-0.01	0.00	0.95					25	0.12	1.00	0.16	1.00
COUMO	Dissolved Organic Carbon	35	-0.05	0.68	-0.05	0.79	0.02	0.00	0.87					25	0.11	0.44	0.21	0.33
COUMO	Dissolved Zinc	35	0.06	1.00	-0.06	0.37	0.05	0.00	0.71					25	0.12	1.00	0.25	1.00
COUMO	Fecal Coliform	35	-0.13	0.13	-0.31	**0.04**	0.06	0.00	0.86					25	0.19	1.00	0.24	1.00
COUMO	Hardness, Total as CaCO3	35	-0.02	0.87	-0.08	0.64	-0.42	0.83	0.00	-0.24	**0.04**	-0.43	**0.01**	25	0.12	0.43	0.20	0.33
COUMO	Nitrate + Nitrite as N	35	-0.21	**0.04**	-0.41	**0.01**	-0.22	0.17	0.01					25	-0.32	**0.01**	-0.35	**0.04**
COUMO	Total Copper	35	-0.07	0.29	-0.13	0.23	0.22	0.10	0.06					25	0.12	1.00	0.06	1.00
COUMO	Total Kjeldahl Nitrogen as N	35	-0.18	0.07	-0.30	**0.04**	0.24	0.12	0.04					25	-0.12	0.20	-0.31	0.07
COUMO	Total Phosphorus	35	0.08	1.00	0.09	1.00	0.16	0.03	0.33					25	0.23	1.00	0.36	1.00
COUMO	Total Suspended Solids	35	0.02	1.00	-0.08	0.32	0.59	0.30	0.00					25	-0.18	0.11	-0.22	0.15
COUMO	Total Zinc	35	0.02	1.00	0.00	0.50	0.23	0.09	0.08					25	0.08	1.00	0.20	1.00
COUMO	Turbidity	35	0.26	1.00	0.17	1.00	0.36	0.15	0.02					25	-0.14	0.17	-0.07	0.37
COUMO	Total Nitrogen	35	-0.28	**0.01**	-0.40	**0.01**	0.06	0.02	0.45					25	-0.24	**0.04**	-0.35	**0.05**
COUMI	Dissolved Copper	37	0.11	1.00	-0.03	0.44	-0.13	0.02	0.43					23	0.13	1.00	0.16	1.00
COUMI	Dissolved Organic Carbon	37	-0.12	0.28	-0.21	0.22	-0.07	0.01	0.49					23	0.11	0.49	0.13	0.55
COUMI	Dissolved Zinc	37	-0.03	0.40	0.16	1.00	0.05	0.00	0.84					23	-0.14	0.19	0.07	1.00
COUMI	Fecal Coliform	37	-0.21	**0.03**	-0.16	0.17	-0.68	0.09	0.07					23	-0.14	0.18	-0.21	0.17
COUMI	Hardness, Total as CaCO3	37	0.02	0.84	0.02	0.91	-0.38	0.64	0.00	-0.08	0.52	-0.07	0.67	23	0.26	0.09	0.34	0.11
COUMI	Nitrate + Nitrite as N	37	-0.28	**0.01**	-0.43	**0.00**	-0.21	0.09	0.08					23	-0.26	**0.04**	-0.37	**0.04**
COUMI	Total Copper	37	-0.05	0.32	-0.17	0.16	0.16	0.02	0.37					23	0.18	1.00	0.15	1.00
COUMI	Total Kjeldahl Nitrogen as N	37	-0.08	0.26	-0.17	0.16	0.16	0.02	0.41					23	0.04	1.00	-0.13	0.27
COUMI	Total Phosphorus	37	0.06	1.00	-0.12	0.24	-0.10	0.01	0.57					23	0.29	1.00	0.43	1.00
COUMI	Total Suspended Solids	37	0.07	1.00	-0.12	0.25	0.33	0.06	0.16					23	0.27	1.00	0.09	1.00
COUMI	Total Zinc	37	0.01	1.00	-0.02	0.45	0.09	0.01	0.66					23	0.01	1.00	0.21	1.00
COUMI	Turbidity	37	0.26	1.00	-0.04	0.42	0.19	0.02	0.45					23	0.42	1.00	0.30	1.00
COUMI	Total Nitrogen	37	-0.13	0.13	-0.21	0.11	0.06	0.00	0.68					23	-0.13	0.20	-0.15	0.25
TYLMO	Dissolved Copper	42	-0.09	0.21	-0.29	**0.03**	-0.02	0.00	0.87					18	0.58	1.00	0.72	1.00
TYLMO	Dissolved Organic Carbon	42	-0.09	0.41	-0.17	0.30	-0.07	0.04	0.18					18	-0.09	0.60	-0.12	0.63
TYLMO	Dissolved Zinc	42	-0.23	**0.02**	0.15	1.00	0.18	0.02	0.35					18	-0.17	0.18	-0.25	0.16
TYLMO	Fecal Coliform	42	0.03	1.00	-0.25	0.06	-0.06	0.00	0.81					18	-0.13	0.22	-0.04	0.44
TYLMO	Hardness, Total as CaCO3	42	-0.02	0.89	-0.01	0.93	-0.42	0.80	0.00	-0.04	0.75	-0.04	0.81	18	0.15	0.40	0.24	0.34
TYLMO	Nitrate + Nitrite as N	42	-0.31	**0.00**	-0.47	**0.00**	-0.25	0.11	0.04					18	-0.16	0.18	-0.16	0.27

Table F1. Summary of Regression and Correlation Analyses Performed on Water Qaulity Indicators.

		Storm Events Only												Base Events Only				
			Correlation (Concentration v Time)				Regression (ln[Concentration] v ln[Flow])			Correlation (Residuals v Time)					Correlation (Concentration v Time)			
Station	Parameter	n	Kendall's Tau	p-value	Pearson's R	p-value	slope	r2	p_value	Kendall's Tau	p-value	Pearson's R	p-value	n	Kendall's Tau	p-value	Pearson's R	p-value
TYLMO	Total Copper	42	-0.04	0.35	-0.07	0.34	0.13	0.05	0.17					18	0.06	1.00	0.28	1.00
TYLMO	Total Kjeldahl Nitrogen as N	42	-0.09	0.21	-0.17	0.14	0.13	0.04	0.21					18	0.26	1.00	0.33	1.00
TYLMO	Total Phosphorus	42	0.08	1.00	0.15	1.00	0.10	0.02	0.32					18	0.14	1.00	0.29	1.00
TYLMO	Total Suspended Solids	42	0.10	1.00	0.14	1.00	0.30	0.12	0.02					18	0.15	1.00	0.31	1.00
TYLMO	Total Zinc	42	0.04	1.00	0.17	1.00	0.29	0.08	0.06					18	-0.06	0.36	0.08	1.00
TYLMO	Turbidity	42	0.29	1.00	0.31	1.00	0.24	0.08	0.06					18	0.20	1.00	0.40	1.00
TYLMO	Total Nitrogen	42	-0.18	0.05	-0.31	**0.02**	-0.01	0.00	0.89					18	0.12	1.00	0.13	1.00
TYLMI	Dissolved Copper	35	-0.01	0.46	-0.03	0.43	0.08	0.03	0.29					25	0.22	1.00	0.47	1.00
TYLMI	Dissolved Organic Carbon	35	-0.02	0.90	0.06	0.73	0.15	0.49	0.00	-0.08	0.54	-0.13	0.45	25	0.00	1.00	0.04	0.86
TYLMI	Dissolved Zinc	35	-0.19	0.06	-0.01	0.47	0.09	0.01	0.52					25	0.10	1.00	0.02	1.00
TYLMI	Fecal Coliform	35	-0.24	**0.02**	-0.27	0.06	-0.29	0.04	0.26					25	0.03	1.00	0.09	1.00
TYLMI	Hardness, Total as CaCO3	35	-0.10	0.42	-0.20	0.24	-0.24	0.55	0.00	-0.03	0.84	-0.04	0.83	25	0.20	0.16	0.22	0.29
TYLMI	Nitrate + Nitrite as N	35	-0.10	0.21	-0.13	0.23	-0.27	0.32	0.00					25	0.00	0.49	-0.08	0.35
TYLMI	Total Copper	35	-0.12	0.16	-0.19	0.13	-0.03	0.01	0.55					25	0.28	1.00	0.46	1.00
TYLMI	Total Kjeldahl Nitrogen as N	35	-0.17	0.08	-0.17	0.16	0.11	0.06	0.14					25	0.20	1.00	0.31	1.00
TYLMI	Total Phosphorus	35	0.03	1.00	0.13	1.00	0.08	0.03	0.33					25	0.33	1.00	0.42	1.00
TYLMI	Total Suspended Solids	35	-0.12	0.16	-0.15	0.20	0.15	0.05	0.18					25	0.03	1.00	0.06	1.00
TYLMI	Total Zinc	35	-0.09	0.23	-0.02	0.45	-0.04	0.00	0.72					25	0.31	1.00	0.29	1.00
TYLMI	Turbidity	35	0.11	1.00	0.20	1.00	0.27	0.27	0.00					25	0.12	1.00	0.14	1.00
TYLMI	Total Nitrogen	35	-0.20	0.05	-0.21	0.11	-0.07	0.04	0.24					25	0.19	1.00	0.14	1.00

Values in **bold** indicate significant decreasing trend (α = 0.05) for all paramters except Dissolved Organic Carbon and Hardness based on one-tailed test.

Values in **bold** indicate for Dissolved Organic Carbon and Hardness significant decreasing or increasing trend (α = 0.05) based on two-tailed test.

NC: not calculable due to high number of nondetect values.

APPENDIX G

Table Summary for Mass Loading Regression Models and Estimated Annual Pollutant Loads

HERRERA

Table G. Regression Models and Estimated Annual Pollutant Loads.							
			Regression Model Parameters				
Station	Parameter	Water Year	slope	r2	p-value	Estimated Load (lb)	Result Evaluation
EVALSS	Total Copper	2016	3.60	0.86	0.00	45.6	Reject
EVALSS	Total Copper	2017	1.45	0.59	0.00	3.4	
EVALSS	Total Copper	2018	1.95	0.89	0.00	3.2	
EVALSS	Total Copper	2019	2.00	0.72	0.00	3.0	
EVALSS	Total Kjeldahl Nitrogen as N	2016	4.39	0.58	0.01	114,700.2	Reject
EVALSS	Total Kjeldahl Nitrogen as N	2017	1.44	0.51	0.00	3,193.2	
EVALSS	Total Kjeldahl Nitrogen as N	2018	2.30	0.83	0.00	2,074.9	
EVALSS	Total Kjeldahl Nitrogen as N	2019	1.52	0.59	0.00	1,793.0	
EVALSS	Total Phosphorus	2016	3.29	0.80	0.00	1,191.3	Reject
EVALSS	Total Phosphorus	2017	1.70	0.70	0.00	159.9	
EVALSS	Total Phosphorus	2018	1.45	0.50	0.00	125.1	
EVALSS	Total Phosphorus	2019	1.78	0.79	0.00	177.4	
EVALSS	Total Suspended Solids	2016	4.52	0.89	0.00	5,012,001.4	Reject
EVALSS	Total Suspended Solids	2017	2.41	0.46	0.00	100,698.9	
EVALSS	Total Suspended Solids	2018	2.17	0.74	0.00	73,825.8	
EVALSS	Total Suspended Solids	2019	2.83	0.77	0.00	77,295.2	
EVALSS	Total Zinc	2016	3.24	0.92	0.00	104.2	Reject
EVALSS	Total Zinc	2017	1.44	0.70	0.00	14.5	
EVALSS	Total Zinc	2018	1.52	0.77	0.00	14.1	
EVALSS	Total Zinc	2019	1.38	0.48	0.00	14.5	
EVAMS	Total Copper	2016	2.03	0.88	0.00	1.3	
EVAMS	Total Copper	2017	1.77	0.71	0.00	1.4	
EVAMS	Total Copper	2018	1.57	0.79	0.00	1.1	
EVAMS	Total Copper	2019	1.53	0.70	0.00	0.7	
EVAMS	Total Kjeldahl Nitrogen as N	2016	2.44	0.57	0.01	1,787.0	
EVAMS	Total Kjeldahl Nitrogen as N	2017	1.57	0.82	0.00	1,278.3	
EVAMS	Total Kjeldahl Nitrogen as N	2018	1.62	0.89	0.00	729.2	
EVAMS	Total Kjeldahl Nitrogen as N	2019	1.72	0.72	0.00	591.3	
EVAMS	Total Phosphorus	2016	2.35	0.83	0.00	92.5	
EVAMS	Total Phosphorus	2017	2.27	0.64	0.00	86.6	
EVAMS	Total Phosphorus	2018	1.24	0.49	0.00	33.1	
EVAMS	Total Phosphorus	2019	2.16	0.50	0.00	77.6	
EVAMS	Total Suspended Solids	2016	2.56	0.87	0.00	53,137.1	
EVAMS	Total Suspended Solids	2017	2.17	0.40	0.01	37,718.0	
EVAMS	Total Suspended Solids	2018	1.55	0.72	0.00	17,456.0	
EVAMS	Total Suspended Solids	2019	1.96	0.52	0.00	13,335.2	
EVAMS	Total Zinc	2016	1.84	0.84	0.00	5.6	
EVAMS	Total Zinc	2017	1.89	0.80	0.00	7.1	
EVAMS	Total Zinc	2018	1.28	0.90	0.00	4.1	
EVAMS	Total Zinc	2019	1.47	0.50	0.00	4.0	

Table G. Regression Models and Estimated Annual Pollutant Loads.							
			Regression Model Parameters				
Station	Parameter	Water Year	slope	r2	p-value	Estimated Load (lb)	Result Evaluation
MONM	Total Copper	2018	1.45	0.98	0.00	4.4	
MONM	Total Copper	2019	1.65	0.94	0.00	2.8	
MONM	Total Kjeldahl Nitrogen as N	2016	2.07	0.83	0.00	7,231.5	
MONM	Total Kjeldahl Nitrogen as N	2017	1.29	0.62	0.00	2,033.7	
MONM	Total Kjeldahl Nitrogen as N	2018	1.35	0.94	0.00	1,242.4	
MONM	Total Kjeldahl Nitrogen as N	2019	1.44	0.85	0.00	863.5	
MONM	Total Phosphorus	2016	1.19	0.68	0.00	206.2	
MONM	Total Phosphorus	2017	1.11	0.80	0.00	136.4	
MONM	Total Phosphorus	2018	0.98	0.80	0.00	117.3	
MONM	Total Phosphorus	2019	1.43	0.90	0.00	119.5	
MONM	Total Suspended Solids	2016	1.57	0.55	0.01	70,770.9	
MONM	Total Suspended Solids	2017	1.62	0.57	0.00	65,356.8	
MONM	Total Suspended Solids	2018	1.37	0.84	0.00	47,899.0	
MONM	Total Suspended Solids	2019	2.18	0.91	0.00	32,604.6	
MONM	Total Zinc	2016	1.53	0.81	0.00	96.9	
MONM	Total Zinc	2017	1.35	0.91	0.00	58.0	
MONM	Total Zinc	2018	1.21	0.96	0.00	36.3	
MONM	Total Zinc	2019	1.53	0.94	0.00	30.9	
MONMN	Total Copper	2016	1.10	0.43	0.04	1.5	
MONMN	Total Copper	2017	1.23	0.78	0.00	1.8	
MONMN	Total Copper	2018	1.38	0.99	0.00	1.4	
MONMN	Total Copper	2019	1.29	0.89	0.00	1.1	
MONMN	Total Kjeldahl Nitrogen as N	2016	1.93	0.72	0.00	3,837.3	
MONMN	Total Kjeldahl Nitrogen as N	2017	1.03	0.70	0.00	506.5	
MONMN	Total Kjeldahl Nitrogen as N	2018	1.33	0.95	0.00	447.9	
MONMN	Total Kjeldahl Nitrogen as N	2019	1.17	0.91	0.00	280.0	
MONMN	Total Phosphorus	2016	0.49	0.19	0.22	23.9	Reject
MONMN	Total Phosphorus	2017	0.89	0.75	0.00	40.2	
MONMN	Total Phosphorus	2018	0.93	0.78	0.00	46.6	
MONMN	Total Phosphorus	2019	1.23	0.84	0.00	50.6	
MONMN	Total Suspended Solids	2016	0.59	0.11	0.34	6,740.8	Reject
MONMN	Total Suspended Solids	2017	1.27	0.58	0.00	13,319.6	
MONMN	Total Suspended Solids	2018	1.38	0.83	0.00	19,924.3	
MONMN	Total Suspended Solids	2019	1.43	0.71	0.00	14,816.9	
MONMN	Total Zinc	2016	0.78	0.20	0.20	7.4	Reject
MONMN	Total Zinc	2017	1.31	0.87	0.00	8.0	
MONMN	Total Zinc	2018	1.10	0.86	0.00	7.7	
MONMN	Total Zinc	2019	1.40	0.79	0.00	10.9	

Table G. Regression Models and Estimated Annual Pollutant Loads.							
			Regression Model Parameters				
Station	Parameter	Water Year	slope	r2	p-value	Estimated Load (lb)	Result Evaluation
MONMS	Total Copper	2018	1.42	0.96	0.00	0.5	
MONMS	Total Copper	2019	1.20	0.96	0.00	0.3	
MONMS	Total Kjeldahl Nitrogen as N	2016	1.64	0.84	0.00	286.5	
MONMS	Total Kjeldahl Nitrogen as N	2017	0.89	0.57	0.00	318.0	
MONMS	Total Kjeldahl Nitrogen as N	2018	1.29	0.90	0.00	125.7	
MONMS	Total Kjeldahl Nitrogen as N	2019	0.87	0.95	0.00	85.2	
MONMS	Total Phosphorus	2016	1.28	0.91	0.00	15.5	
MONMS	Total Phosphorus	2017	1.09	0.80	0.00	13.0	
MONMS	Total Phosphorus	2018	1.04	0.95	0.00	10.0	
MONMS	Total Phosphorus	2019	0.97	0.86	0.00	8.7	
MONMS	Total Suspended Solids	2016	1.24	0.68	0.00	1,997.9	
MONMS	Total Suspended Solids	2017	1.45	0.67	0.00	2,869.8	
MONMS	Total Suspended Solids	2018	1.45	0.93	0.00	2,069.4	
MONMS	Total Suspended Solids	2019	0.89	0.79	0.00	888.7	
MONMS	Total Zinc	2016	1.18	0.80	0.00	1.7	
MONMS	Total Zinc	2017	1.28	0.89	0.00	2.6	
MONMS	Total Zinc	2018	1.11	0.92	0.00	1.2	
MONMS	Total Zinc	2019	0.95	0.78	0.00	1.1	
TOSMO	Total Copper	2016	2.39	0.91	0.00	18.1	
TOSMO	Total Copper	2017	2.19	0.90	0.00	28.5	
TOSMO	Total Copper	2018	1.94	0.96	0.00	6.8	
TOSMO	Total Copper	2019	1.97	0.94	0.00	4.6	
TOSMO	Total Kjeldahl Nitrogen as N	2016	2.39	0.91	0.00	2,394.4	
TOSMO	Total Kjeldahl Nitrogen as N	2017	1.73	0.83	0.00	2,232.2	
TOSMO	Total Kjeldahl Nitrogen as N	2018	1.77	0.93	0.00	640.8	
TOSMO	Total Kjeldahl Nitrogen as N	2019	1.71	0.88	0.00	544.1	
TOSMO	Total Phosphorus	2016	1.65	0.92	0.00	224.7	
TOSMO	Total Phosphorus	2017	1.75	0.90	0.00	374.5	
TOSMO	Total Phosphorus	2018	1.29	0.90	0.00	121.2	
TOSMO	Total Phosphorus	2019	1.59	0.94	0.00	136.9	
TOSMO	Total Suspended Solids	2016	2.64	0.86	0.00	281,563.9	
TOSMO	Total Suspended Solids	2017	2.57	0.85	0.00	510,834.6	
TOSMO	Total Suspended Solids	2018	2.57	0.93	0.00	118,375.9	
TOSMO	Total Suspended Solids	2019	2.58	0.88	0.00	80,580.0	
TOSMO	Total Zinc	2016	2.61	0.94	0.00	229.8	
TOSMO	Total Zinc	2017	2.05	0.88	0.00	280.1	
TOSMO	Total Zinc	2018	2.06	0.94	0.00	66.7	
TOSMO	Total Zinc	2019	1.84	0.83	0.00	78.3	

Table G. Regression Models and Estimated Annual Pollutant Loads.							
			Regression Model Parameters				
Station	Parameter	Water Year	slope	r2	p-value	Estimated Load (lb)	Result Evaluation
TOSMI	Total Copper	2018	1.63	0.94	0.00	6.7	
TOSMI	Total Copper	2019	1.53	0.78	0.00	4.5	
TOSMI	Total Kjeldahl Nitrogen as N	2016	1.82	0.96	0.00	832.8	
TOSMI	Total Kjeldahl Nitrogen as N	2017	1.49	0.84	0.00	1,390.1	
TOSMI	Total Kjeldahl Nitrogen as N	2018	1.54	0.91	0.00	509.4	
TOSMI	Total Kjeldahl Nitrogen as N	2019	1.21	0.75	0.00	368.1	
TOSMI	Total Phosphorus	2016	1.30	0.97	0.00	101.2	
TOSMI	Total Phosphorus	2017	1.43	0.85	0.00	196.8	
TOSMI	Total Phosphorus	2018	1.19	0.88	0.00	84.2	
TOSMI	Total Phosphorus	2019	1.29	0.86	0.00	68.3	
TOSMI	Total Suspended Solids	2016	1.99	0.96	0.00	66,381.9	
TOSMI	Total Suspended Solids	2017	2.29	0.84	0.00	237,409.7	
TOSMI	Total Suspended Solids	2018	2.01	0.94	0.00	82,555.0	
TOSMI	Total Suspended Solids	2019	2.34	0.82	0.00	50,394.0	
TOSMI	Total Zinc	2016	1.74	0.95	0.00	95.8	
TOSMI	Total Zinc	2017	1.60	0.89	0.00	138.1	
TOSMI	Total Zinc	2018	1.47	0.93	0.00	56.9	
TOSMI	Total Zinc	2019	1.25	0.64	0.00	75.1	
COLM	Total Copper	2016	0.77	0.44	0.04	0.6	
COLM	Total Copper	2017	1.04	0.96	0.00	1.6	
COLM	Total Copper	2018	0.99	0.97	0.00	1.4	
COLM	Total Copper	2019	1.00	0.98	0.00	0.7	
COLM	Total Kjeldahl Nitrogen as N	2016	-0.22	0.03	0.63	Inf	Reject
COLM	Total Kjeldahl Nitrogen as N	2017	1.11	0.91	0.00	2,343.2	
COLM	Total Kjeldahl Nitrogen as N	2018	0.93	0.88	0.00	1,476.7	
COLM	Total Kjeldahl Nitrogen as N	2019	1.02	0.96	0.00	558.4	
COLM	Total Phosphorus	2016	0.48	0.13	0.31	11.7	Reject
COLM	Total Phosphorus	2017	0.63	0.52	0.00	28.8	
COLM	Total Phosphorus	2018	0.69	0.90	0.00	20.5	
COLM	Total Phosphorus	2019	0.96	0.98	0.00	19.8	
COLM	Total Suspended Solids	2016	0.41	0.08	0.43	1,403.7	Reject
COLM	Total Suspended Solids	2017	0.69	0.41	0.01	4,755.6	
COLM	Total Suspended Solids	2018	1.03	0.74	0.00	9,043.4	
COLM	Total Suspended Solids	2019	1.12	0.87	0.00	2,093.8	
COLM	Total Zinc	2016	1.28	0.87	0.00	8.6	
COLM	Total Zinc	2017	1.08	0.93	0.00	8.4	
COLM	Total Zinc	2018	0.93	0.99	0.00	6.0	
COLM	Total Zinc	2019	0.98	0.99	0.00	2.7	

Table G. Regression Models and Estimated Annual Pollutant Loads.

Station	Parameter	Water Year	Regression Model Parameters: slope	r2	p-value	Estimated Load (lb)	Result Evaluation
SEIMN	Total Copper	2016	0.87	0.79	0.00	0.4	
SEIMN	Total Copper	2017	0.94	0.44	0.01	1.2	
SEIMN	Total Copper	2018	1.46	0.77	0.00	1.9	
SEIMN	Total Copper	2019	1.57	0.79	0.00	0.9	
SEIMN	Total Kjeldahl Nitrogen as N	2016	1.20	0.55	0.01	298.6	
SEIMN	Total Kjeldahl Nitrogen as N	2017	1.38	0.65	0.00	1,023.0	
SEIMN	Total Kjeldahl Nitrogen as N	2018	1.67	0.91	0.00	580.2	
SEIMN	Total Kjeldahl Nitrogen as N	2019	1.52	0.84	0.00	256.4	
SEIMN	Total Phosphorus	2016	0.71	0.68	0.00	25.0	
SEIMN	Total Phosphorus	2017	0.86	0.48	0.00	50.3	
SEIMN	Total Phosphorus	2018	1.01	0.49	0.00	61.2	
SEIMN	Total Phosphorus	2019	1.04	0.56	0.00	48.5	
SEIMN	Total Suspended Solids	2016	0.72	0.60	0.01	5,231.9	
SEIMN	Total Suspended Solids	2017	1.05	0.27	0.04	29,656.0	
SEIMN	Total Suspended Solids	2018	1.75	0.72	0.00	45,796.9	
SEIMN	Total Suspended Solids	2019	1.64	0.57	0.00	19,913.1	
SEIMN	Total Zinc	2016	1.14	0.94	0.00	3.2	
SEIMN	Total Zinc	2017	0.98	0.90	0.00	2.9	
SEIMN	Total Zinc	2018	1.28	0.92	0.00	3.6	
SEIMN	Total Zinc	2019	1.05	0.82	0.00	1.7	
SEIMS	Total Copper	2016	1.92	0.84	0.00	1.3	
SEIMS	Total Copper	2017	1.22	0.64	0.00	0.8	
SEIMS	Total Copper	2018	1.57	0.84	0.00	1.0	
SEIMS	Total Copper	2019	1.41	0.64	0.00	0.6	
SEIMS	Total Kjeldahl Nitrogen as N	2016	2.38	0.59	0.01	1,322.4	
SEIMS	Total Kjeldahl Nitrogen as N	2017	1.54	0.78	0.00	1,045.5	
SEIMS	Total Kjeldahl Nitrogen as N	2018	2.03	0.85	0.00	516.0	
SEIMS	Total Kjeldahl Nitrogen as N	2019	1.04	0.47	0.00	577.6	
SEIMS	Total Phosphorus	2016	1.34	0.60	0.01	103.1	
SEIMS	Total Phosphorus	2017	1.43	0.68	0.00	66.4	
SEIMS	Total Phosphorus	2018	1.16	0.83	0.00	49.7	
SEIMS	Total Phosphorus	2019	1.19	0.69	0.00	57.4	
SEIMS	Total Suspended Solids	2016	1.76	0.67	0.00	40,068.8	
SEIMS	Total Suspended Solids	2017	2.25	0.66	0.00	45,209.0	
SEIMS	Total Suspended Solids	2018	1.96	0.84	0.00	19,645.3	
SEIMS	Total Suspended Solids	2019	1.68	0.49	0.00	16,381.3	
SEIMS	Total Zinc	2016	1.72	0.87	0.00	5.5	
SEIMS	Total Zinc	2017	1.01	0.65	0.00	3.6	
SEIMS	Total Zinc	2018	0.89	0.80	0.00	3.3	
SEIMS	Total Zinc	2019	1.22	0.45	0.00	4.5	

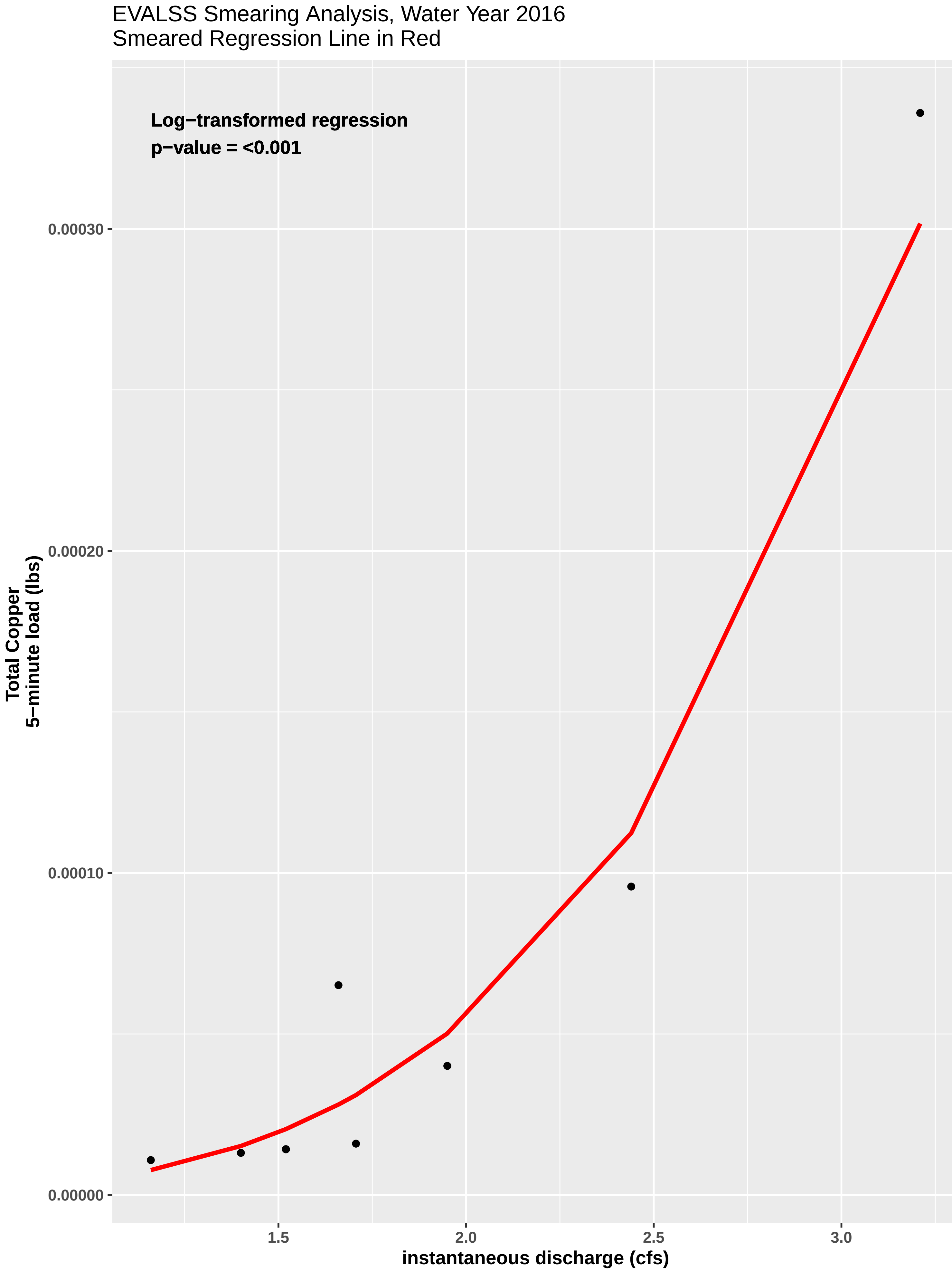
Table G. Regression Models and Estimated Annual Pollutant Loads.							
			Regression Model Parameters				
Station	Parameter	Water Year	slope	r2	p-value	Estimated Load (lb)	Result Evaluation
COUMO	Total Copper	2016	2.14	0.89	0.00	9.1	
COUMO	Total Copper	2017	2.07	0.77	0.00	10.9	
COUMO	Total Copper	2018	1.63	0.90	0.00	3.8	
COUMO	Total Copper	2019	1.72	0.92	0.00	2.4	
COUMO	Total Kjeldahl Nitrogen as N	2016	1.71	0.63	0.01	2,305.7	
COUMO	Total Kjeldahl Nitrogen as N	2017	1.70	0.78	0.00	1,329.2	
COUMO	Total Kjeldahl Nitrogen as N	2018	1.51	0.91	0.00	491.2	
COUMO	Total Kjeldahl Nitrogen as N	2019	1.42	0.88	0.00	283.1	
COUMO	Total Phosphorus	2016	1.59	0.94	0.00	155.8	
COUMO	Total Phosphorus	2017	1.39	0.74	0.00	119.3	
COUMO	Total Phosphorus	2018	1.02	0.89	0.00	61.6	
COUMO	Total Phosphorus	2019	1.29	0.84	0.00	84.0	
COUMO	Total Suspended Solids	2016	2.16	0.97	0.00	52,156.0	
COUMO	Total Suspended Solids	2017	2.18	0.80	0.00	81,619.3	
COUMO	Total Suspended Solids	2018	1.78	0.94	0.00	25,993.8	
COUMO	Total Suspended Solids	2019	2.01	0.92	0.00	18,556.3	
COUMO	Total Zinc	2016	1.83	0.86	0.00	54.4	
COUMO	Total Zinc	2017	1.86	0.81	0.00	57.1	
COUMO	Total Zinc	2018	1.62	0.92	0.00	24.2	
COUMO	Total Zinc	2019	1.49	0.89	0.00	26.1	
COUMI	Total Copper	2016	1.95	0.40	0.05	3.4	
COUMI	Total Copper	2017	2.18	0.82	0.00	3.5	
COUMI	Total Copper	2018	1.72	0.93	0.00	1.2	
COUMI	Total Copper	2019	1.71	0.70	0.00	0.7	
COUMI	Total Kjeldahl Nitrogen as N	2016	2.03	0.33	0.09	652.5	Reject
COUMI	Total Kjeldahl Nitrogen as N	2017	1.42	0.51	0.00	886.5	
COUMI	Total Kjeldahl Nitrogen as N	2018	1.46	0.84	0.00	202.4	
COUMI	Total Kjeldahl Nitrogen as N	2019	1.57	0.70	0.00	123.7	
COUMI	Total Phosphorus	2016	1.32	0.52	0.02	59.1	
COUMI	Total Phosphorus	2017	1.59	0.73	0.00	85.0	
COUMI	Total Phosphorus	2018	0.96	0.79	0.00	33.3	
COUMI	Total Phosphorus	2019	1.24	0.84	0.00	35.2	
COUMI	Total Suspended Solids	2016	1.85	0.39	0.05	26,336.2	Reject
COUMI	Total Suspended Solids	2017	2.50	0.75	0.00	139,878.4	
COUMI	Total Suspended Solids	2018	1.46	0.75	0.00	19,397.2	
COUMI	Total Suspended Solids	2019	1.87	0.80	0.00	11,876.8	
COUMI	Total Zinc	2016	2.03	0.75	0.00	27.5	
COUMI	Total Zinc	2017	1.85	0.77	0.00	19.7	
COUMI	Total Zinc	2018	1.71	0.92	0.00	6.3	
COUMI	Total Zinc	2019	1.85	0.85	0.00	8.0	

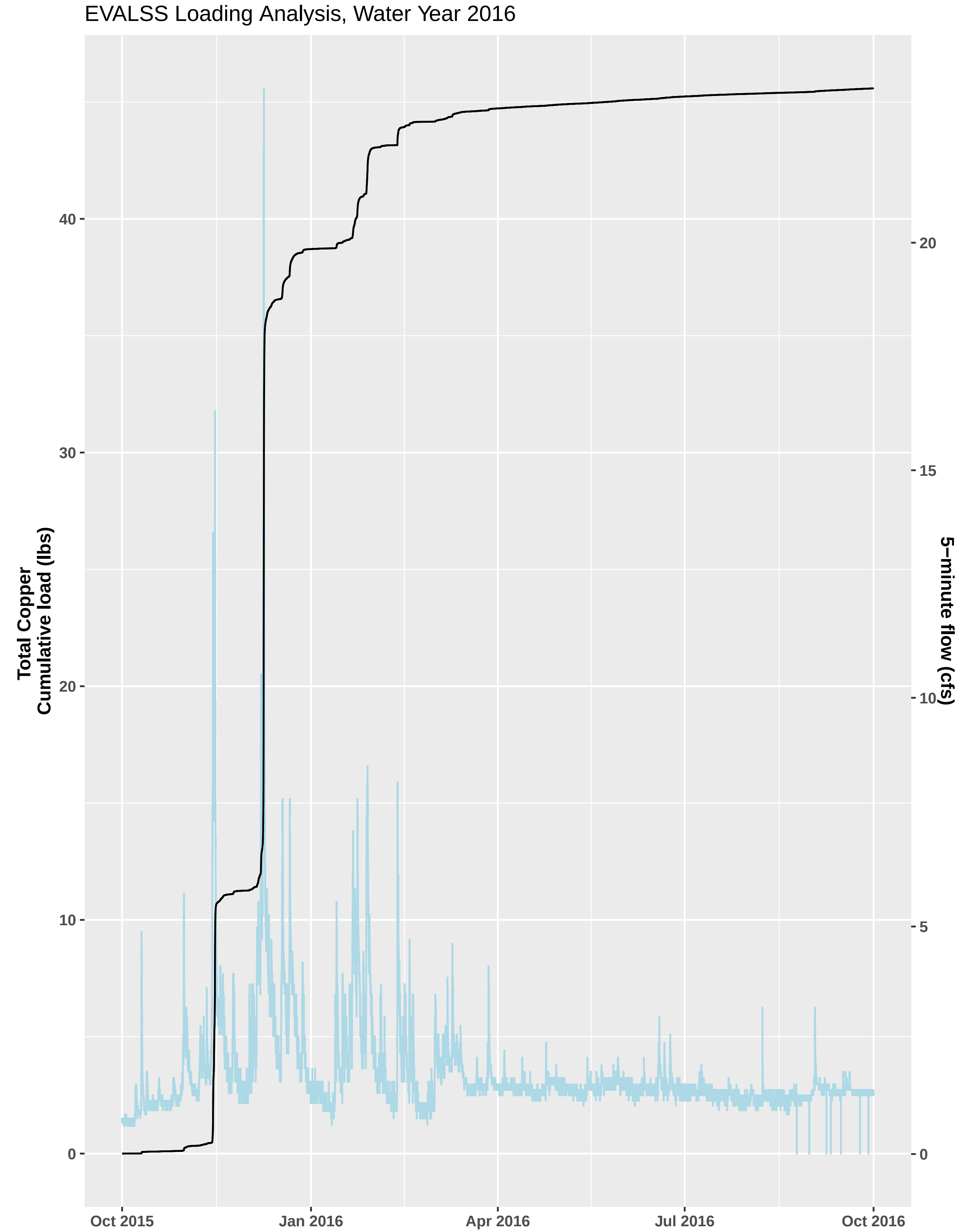
Table G. Regression Models and Estimated Annual Pollutant Loads.							
			Regression Model Parameters				
Station	Parameter	Water Year	slope	r2	p-value	Estimated Load (lb)	Result Evaluation
TYLMO	Total Copper	2016	1.95	0.93	0.00	15.4	
TYLMO	Total Copper	2017	1.66	0.78	0.00	10.8	
TYLMO	Total Copper	2018	1.39	0.97	0.00	4.4	
TYLMO	Total Copper	2019	1.44	0.93	0.00	3.5	
TYLMO	Total Kjeldahl Nitrogen as N	2016	1.67	0.83	0.00	873.8	
TYLMO	Total Kjeldahl Nitrogen as N	2017	1.45	0.82	0.00	1,006.8	
TYLMO	Total Kjeldahl Nitrogen as N	2018	1.34	0.95	0.00	467.4	
TYLMO	Total Kjeldahl Nitrogen as N	2019	1.06	0.93	0.00	284.0	
TYLMO	Total Phosphorus	2016	1.27	0.90	0.00	86.2	
TYLMO	Total Phosphorus	2017	1.36	0.84	0.00	100.8	
TYLMO	Total Phosphorus	2018	1.02	0.90	0.00	61.5	
TYLMO	Total Phosphorus	2019	1.16	0.92	0.00	55.4	
TYLMO	Total Suspended Solids	2016	1.95	0.93	0.00	36,390.6	
TYLMO	Total Suspended Solids	2017	1.82	0.71	0.00	57,583.7	
TYLMO	Total Suspended Solids	2018	1.48	0.90	0.00	24,426.1	
TYLMO	Total Suspended Solids	2019	1.52	0.86	0.00	19,429.9	
TYLMO	Total Zinc	2016	1.75	0.95	0.00	41.0	
TYLMO	Total Zinc	2017	1.70	0.82	0.00	58.7	
TYLMO	Total Zinc	2018	1.32	0.94	0.00	19.8	
TYLMO	Total Zinc	2019	1.57	0.81	0.00	53.4	
TYLMI	Total Copper	2016	1.35	0.73	0.00	3.1	
TYLMI	Total Copper	2017	1.26	0.85	0.00	1.6	
TYLMI	Total Copper	2018	1.27	0.97	0.00	1.5	
TYLMI	Total Copper	2019	1.00	0.85	0.00	1.5	
TYLMI	Total Kjeldahl Nitrogen as N	2016	1.29	0.55	0.02	175.8	
TYLMI	Total Kjeldahl Nitrogen as N	2017	1.35	0.83	0.00	448.2	
TYLMI	Total Kjeldahl Nitrogen as N	2018	1.38	0.94	0.00	237.3	
TYLMI	Total Kjeldahl Nitrogen as N	2019	0.99	0.96	0.00	148.0	
TYLMI	Total Phosphorus	2016	1.43	0.80	0.00	39.0	
TYLMI	Total Phosphorus	2017	1.31	0.88	0.00	21.6	
TYLMI	Total Phosphorus	2018	1.18	0.92	0.00	17.0	
TYLMI	Total Phosphorus	2019	1.29	0.91	0.00	25.6	
TYLMI	Total Suspended Solids	2016	1.89	0.73	0.00	46,449.9	
TYLMI	Total Suspended Solids	2017	1.73	0.78	0.00	13,871.4	
TYLMI	Total Suspended Solids	2018	1.28	0.84	0.00	6,901.1	
TYLMI	Total Suspended Solids	2019	1.48	0.89	0.00	6,333.2	
TYLMI	Total Zinc	2016	1.17	0.41	0.05	6.8	
TYLMI	Total Zinc	2017	1.08	0.56	0.00	6.6	
TYLMI	Total Zinc	2018	1.28	0.80	0.00	11.8	
TYLMI	Total Zinc	2019	0.93	0.69	0.00	4.9	

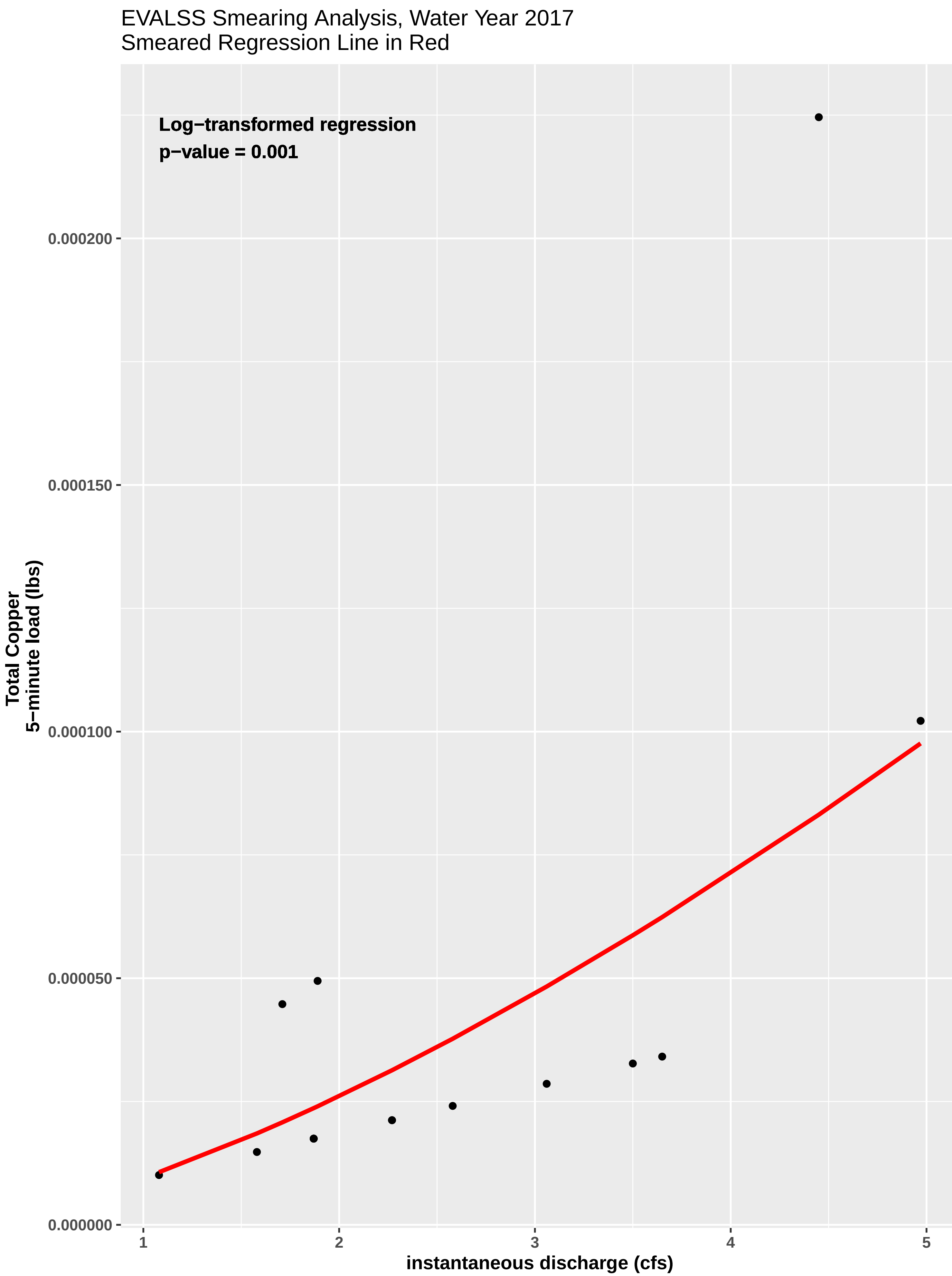
APPENDIX H

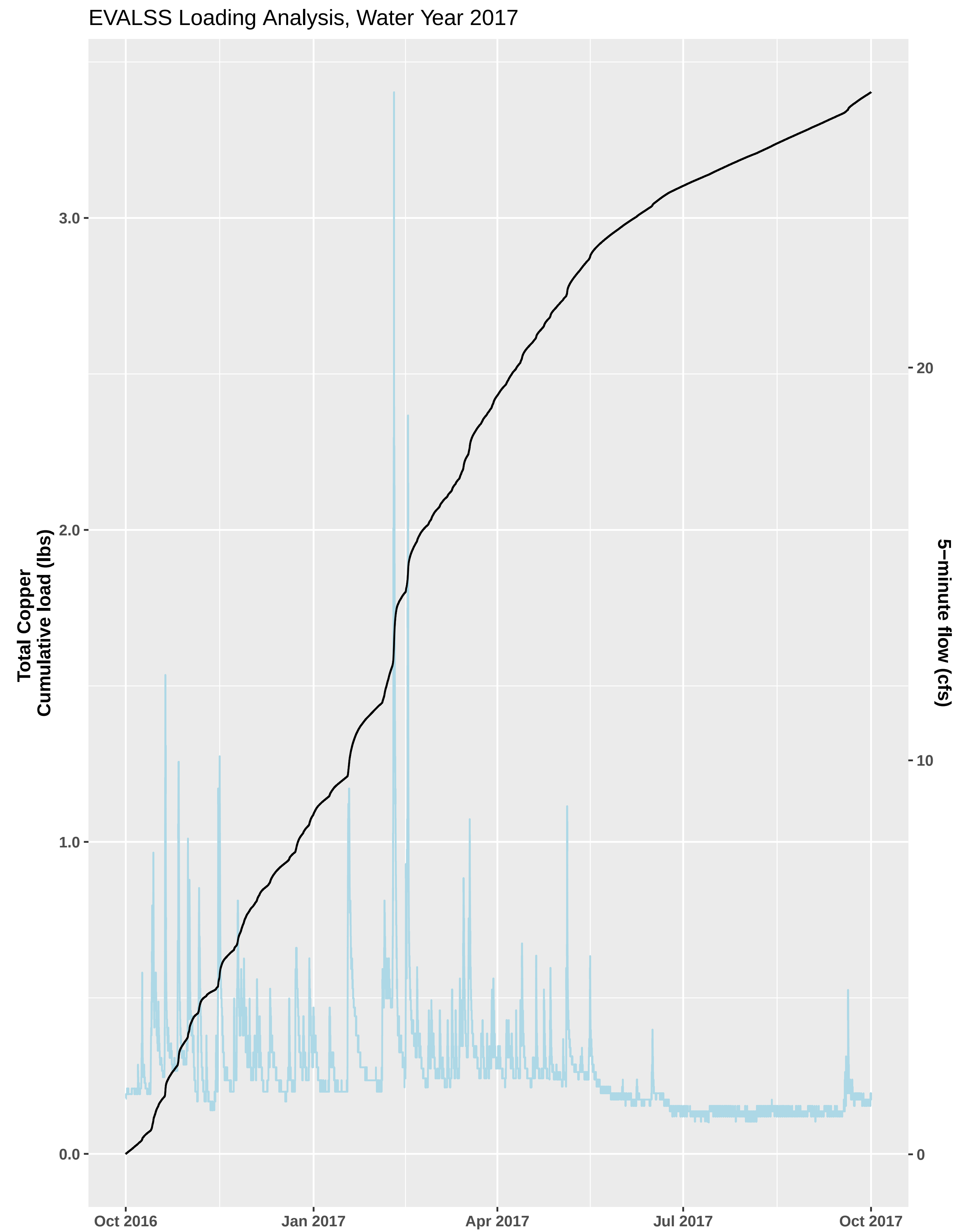
Graphical Summary for Mass Loading Regression Models and Estimated Annual Pollutant Loads

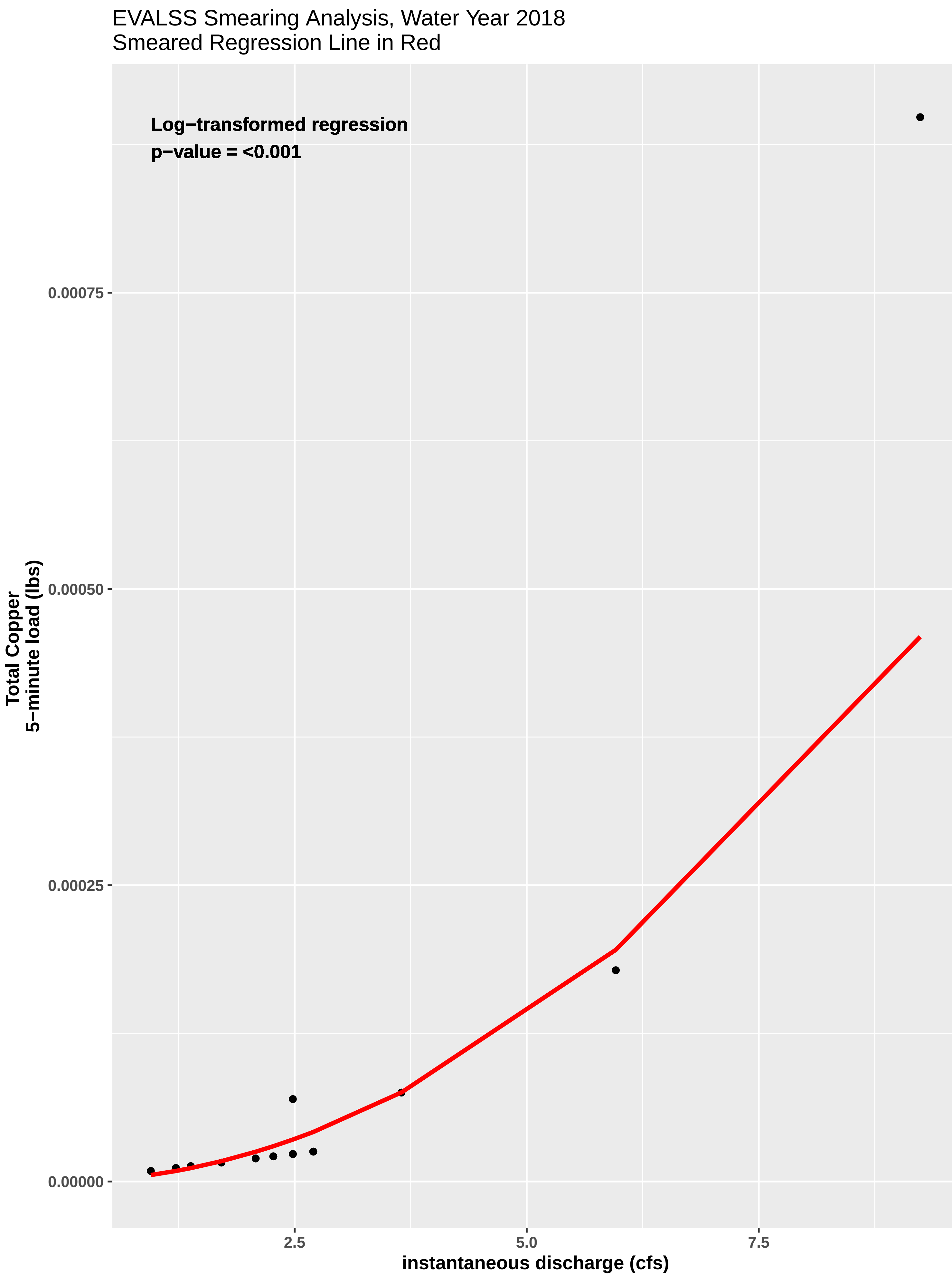
HERRERA

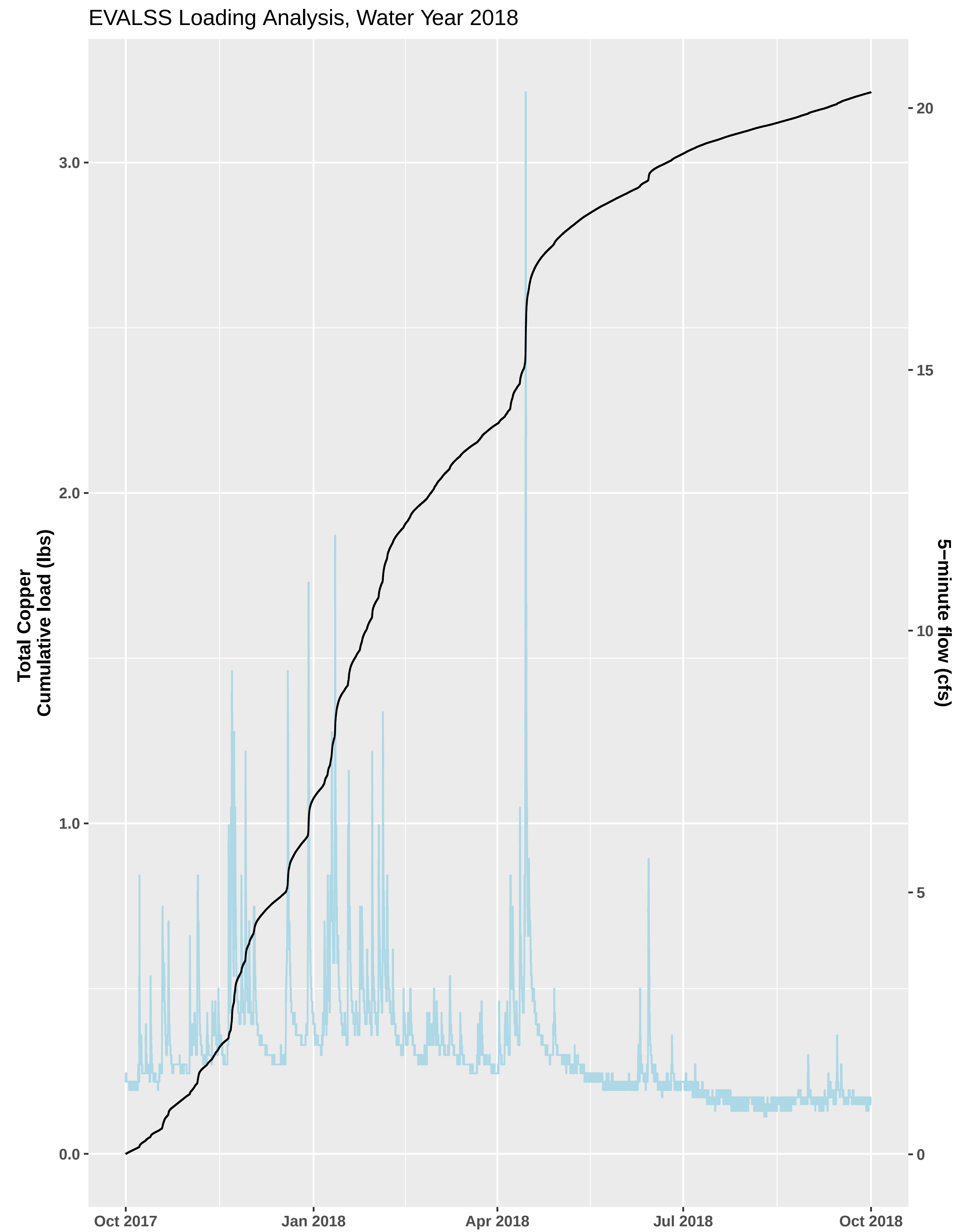

EVALSS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
1.5
2.0
2.5
3.0
instantaneous discharge (cfs)

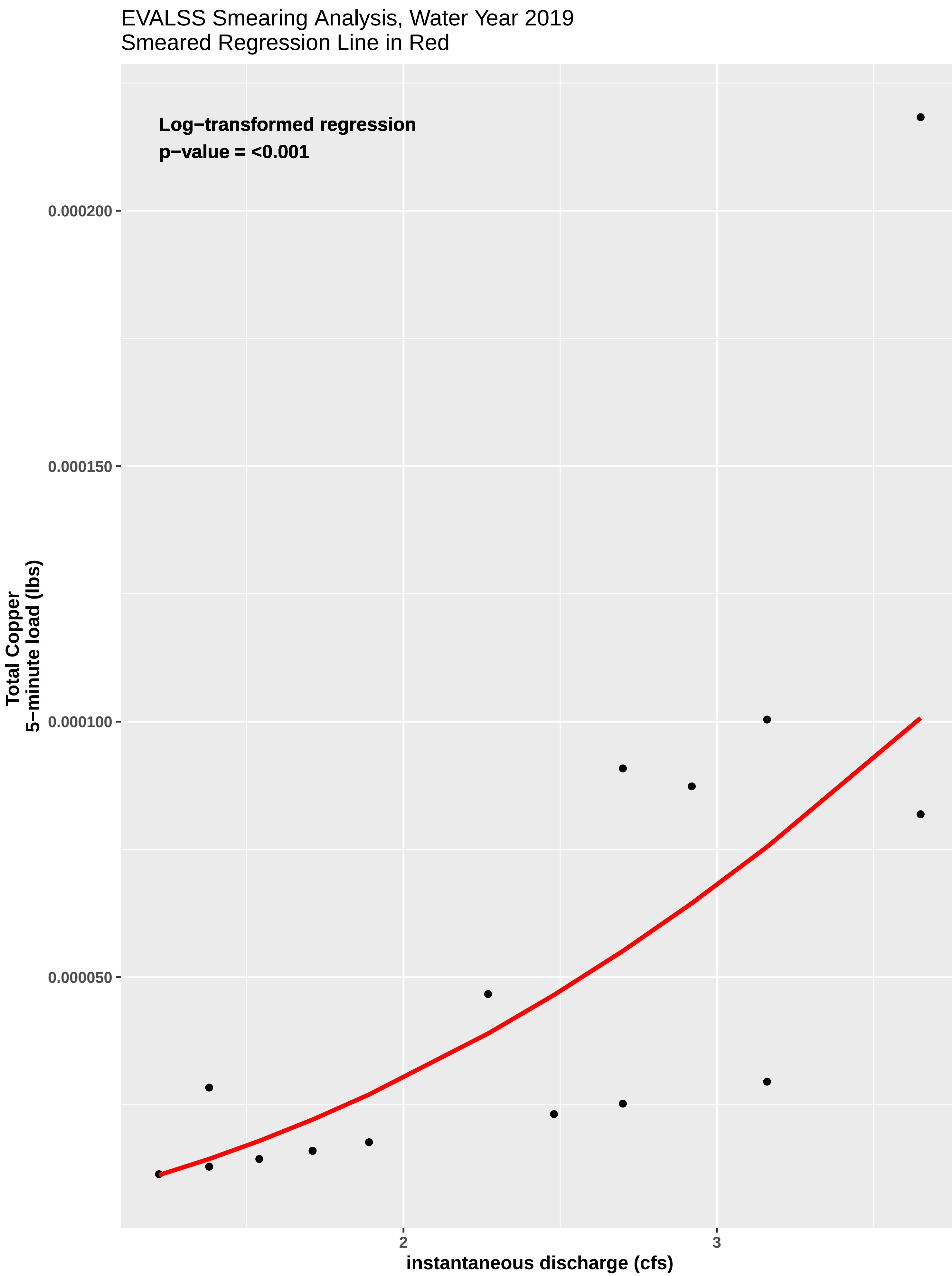

EVALSS Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
0
10
20
30
40
5−minute flow (cfs)
0
5
10
15
20
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


EVALSS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Copper
5−minute load (lbs)
0.000200
0.000150
0.000100
0.000050
0.000000
1
2
3
4
5
instantaneous discharge (cfs)

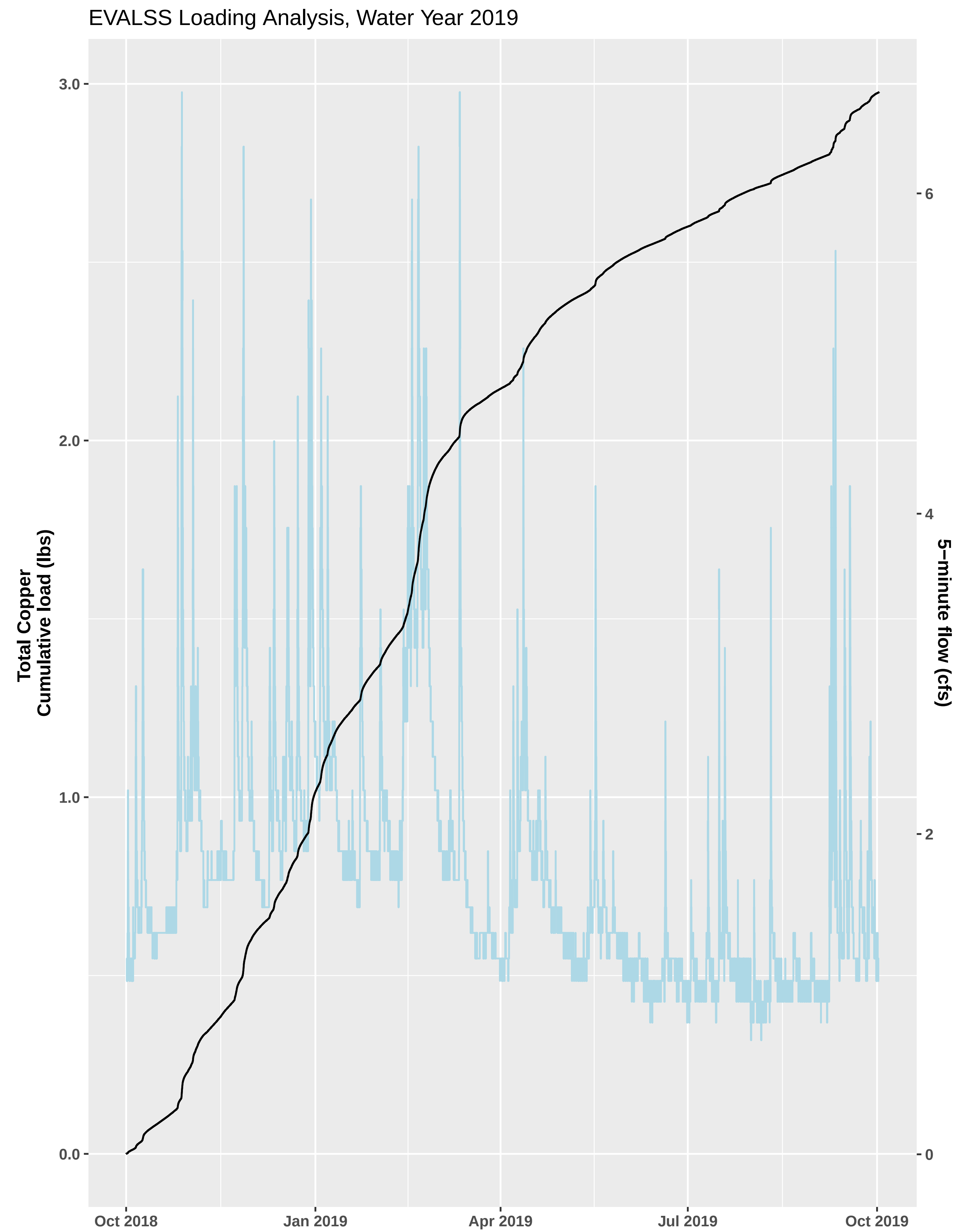

EVALSS Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
3.0
2.0
1.0
0.0
5−minute flow (cfs)
20
10
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


EVALSS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00025
0.00050
0.00075
2.5
5.0
7.5
instantaneous discharge (cfs)

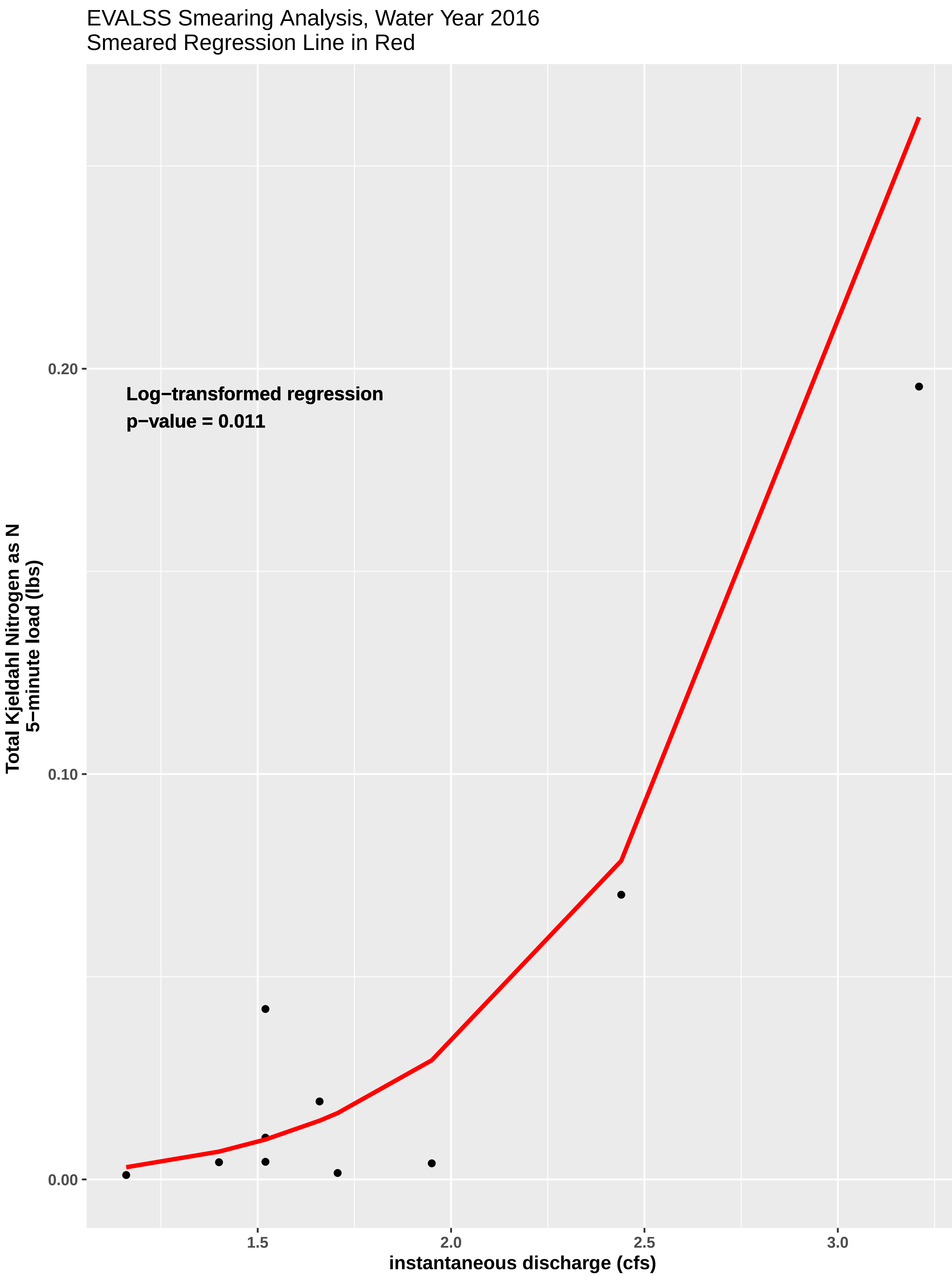

EVALSS Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.0
1.0
2.0
3.0
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

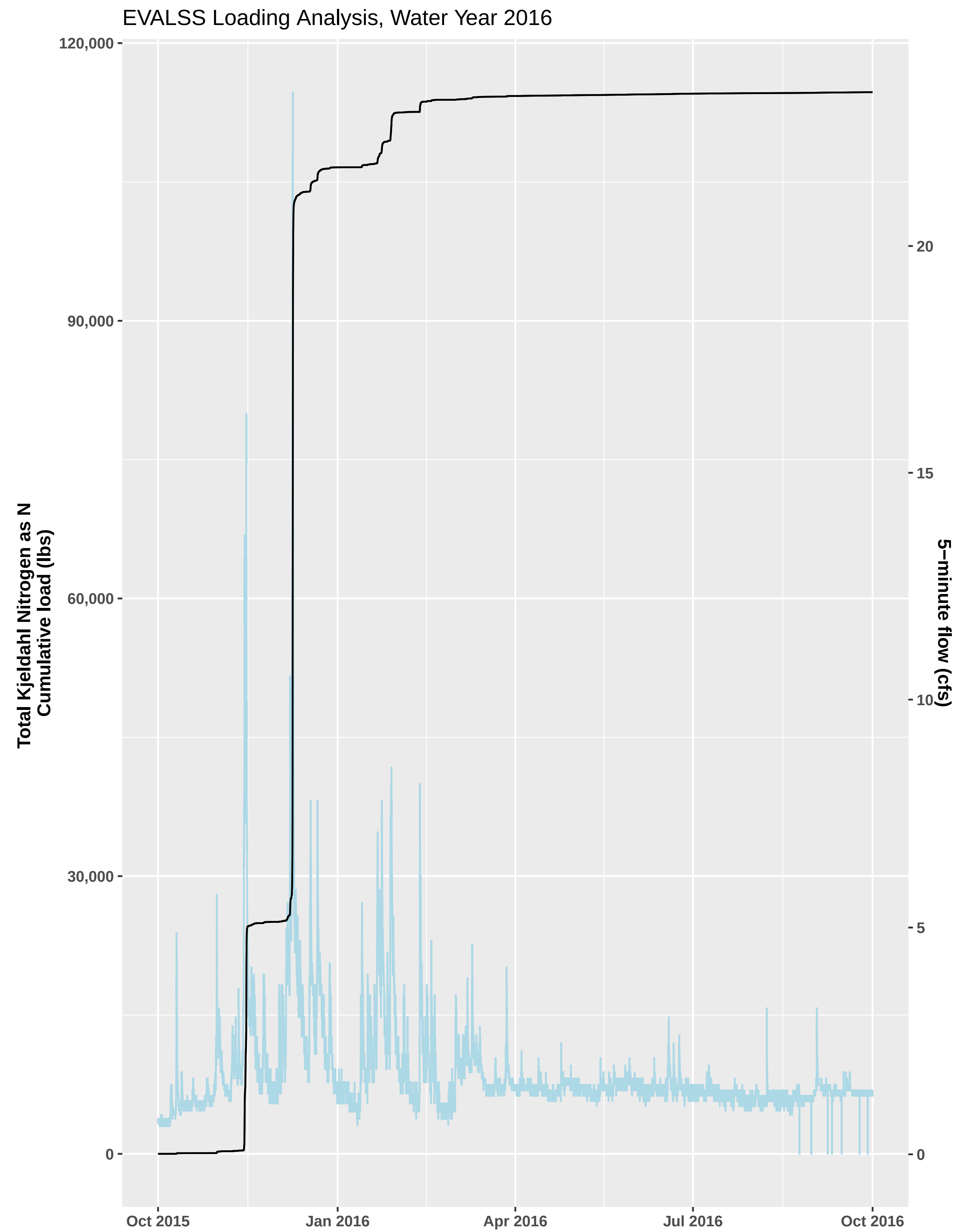


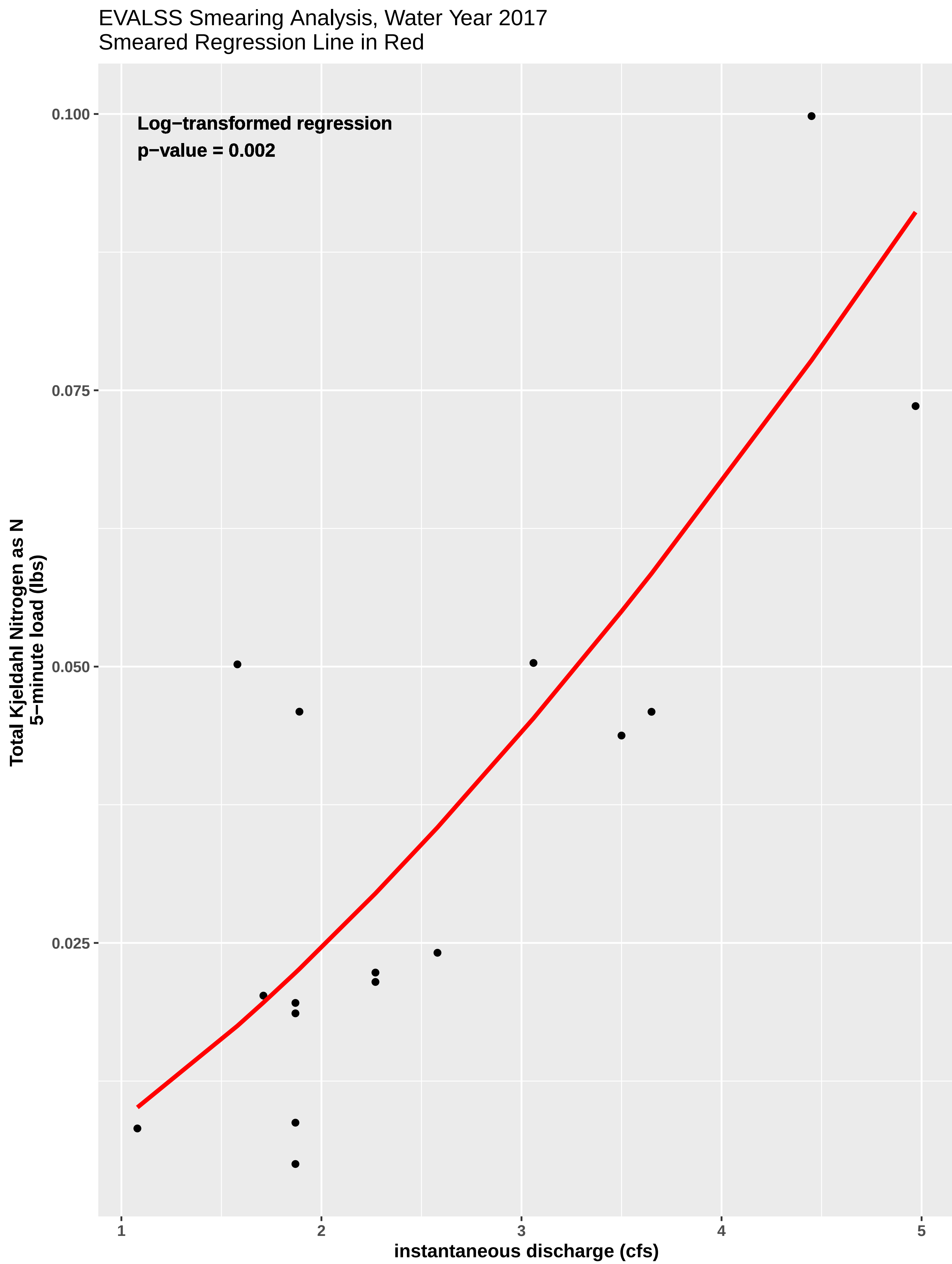
EVALSS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000200
0.000150
0.000100
0.000050
Total Copper
5−minute load (lbs)
2
3
instantaneous discharge (cfs)

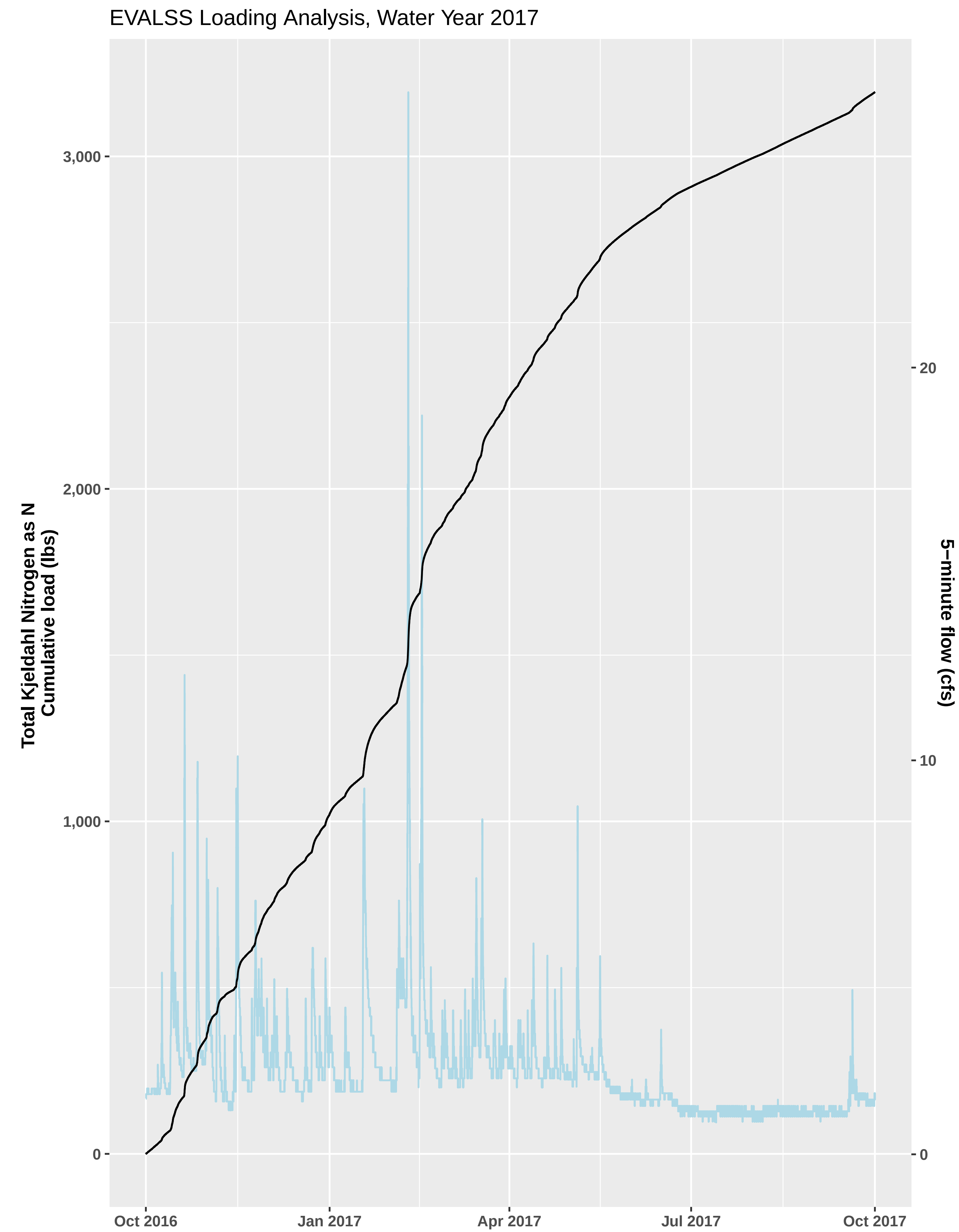


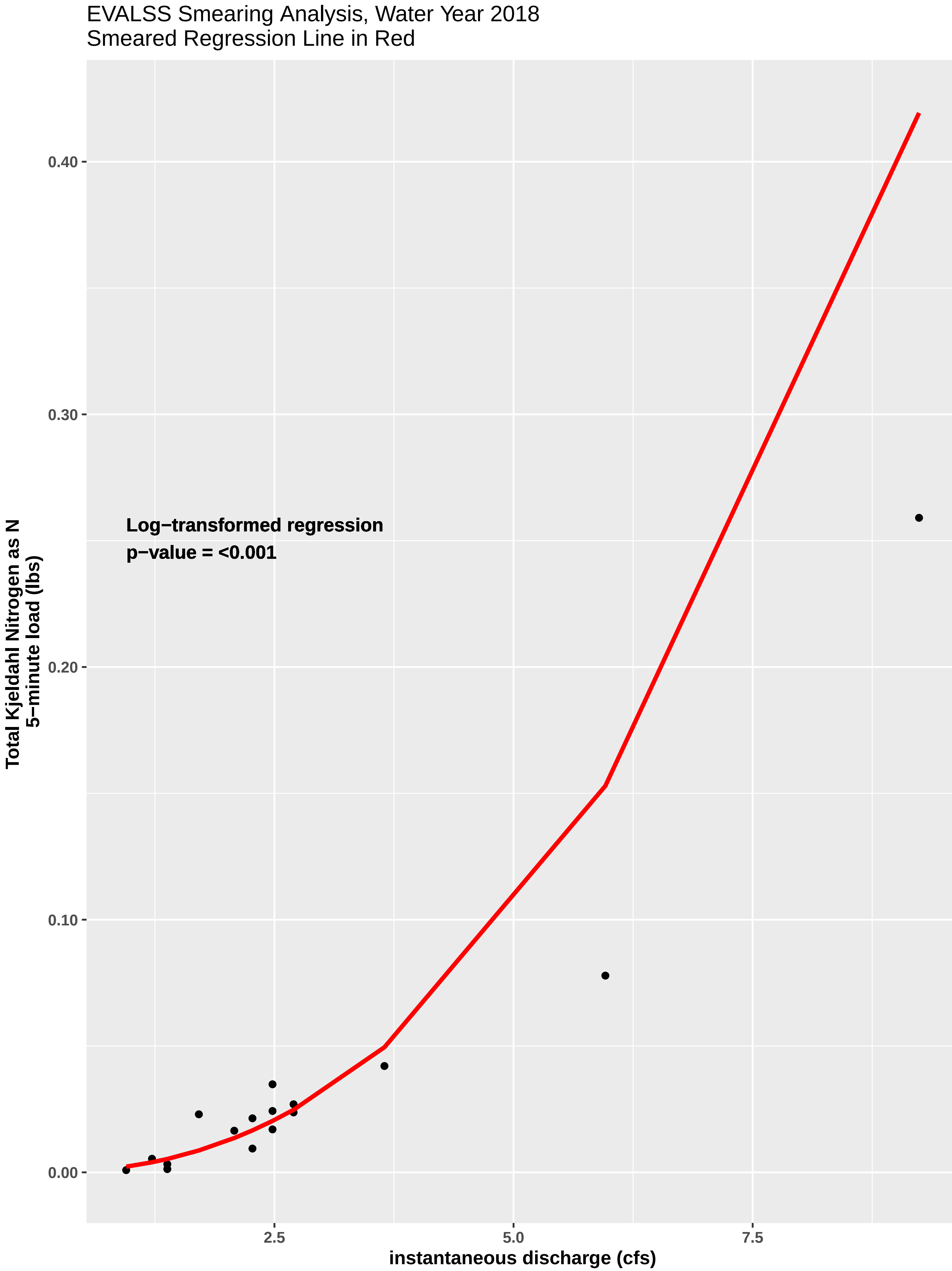
EVALSS Loading Analysis, Water Year 2019
3.0
2.0
1.0
0.0
Total Copper
Cumulative load (lbs)
6
4
2
0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

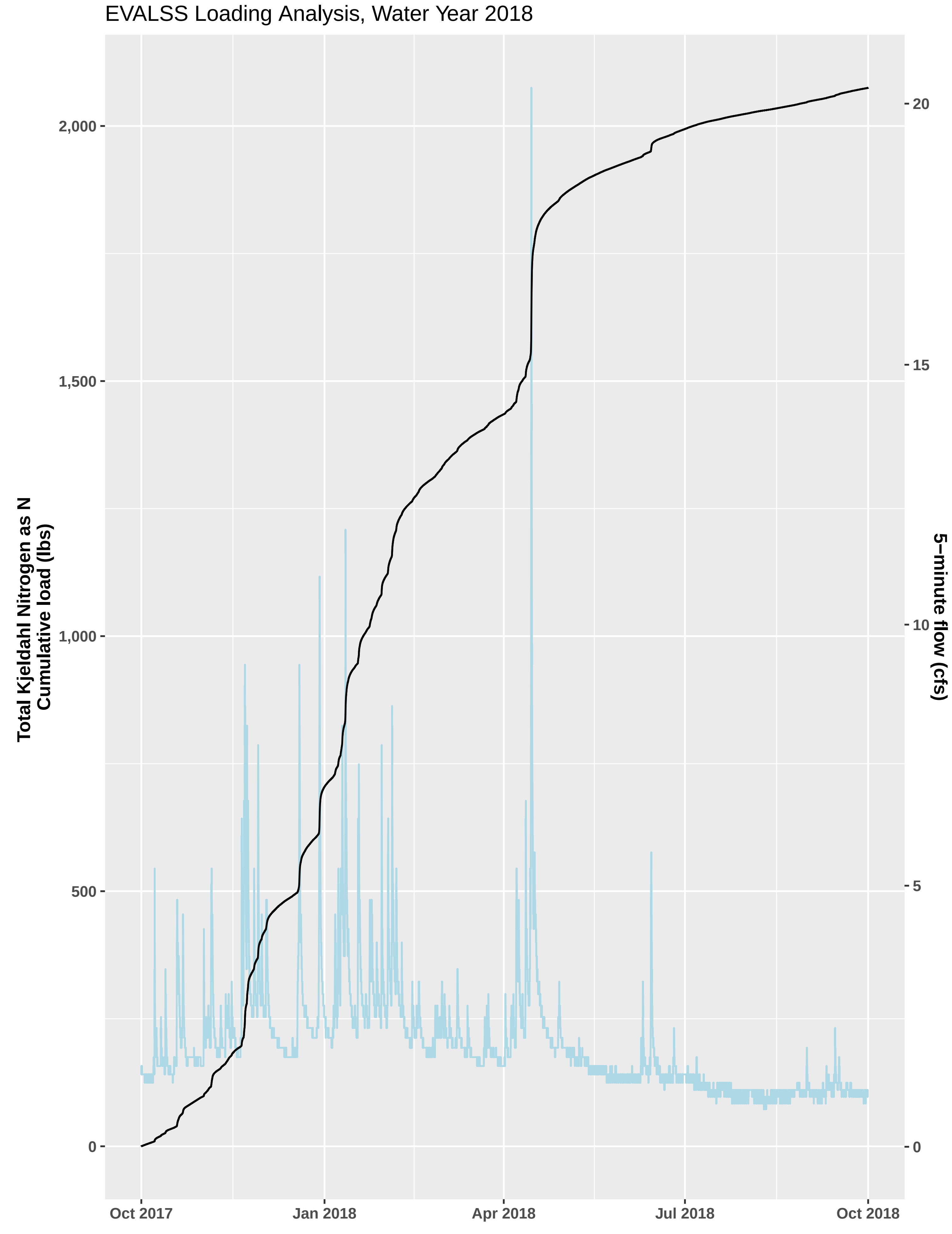

EVALSS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.011
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.00
0.10
0.20
1.5
2.0
2.5
3.0
instantaneous discharge (cfs)

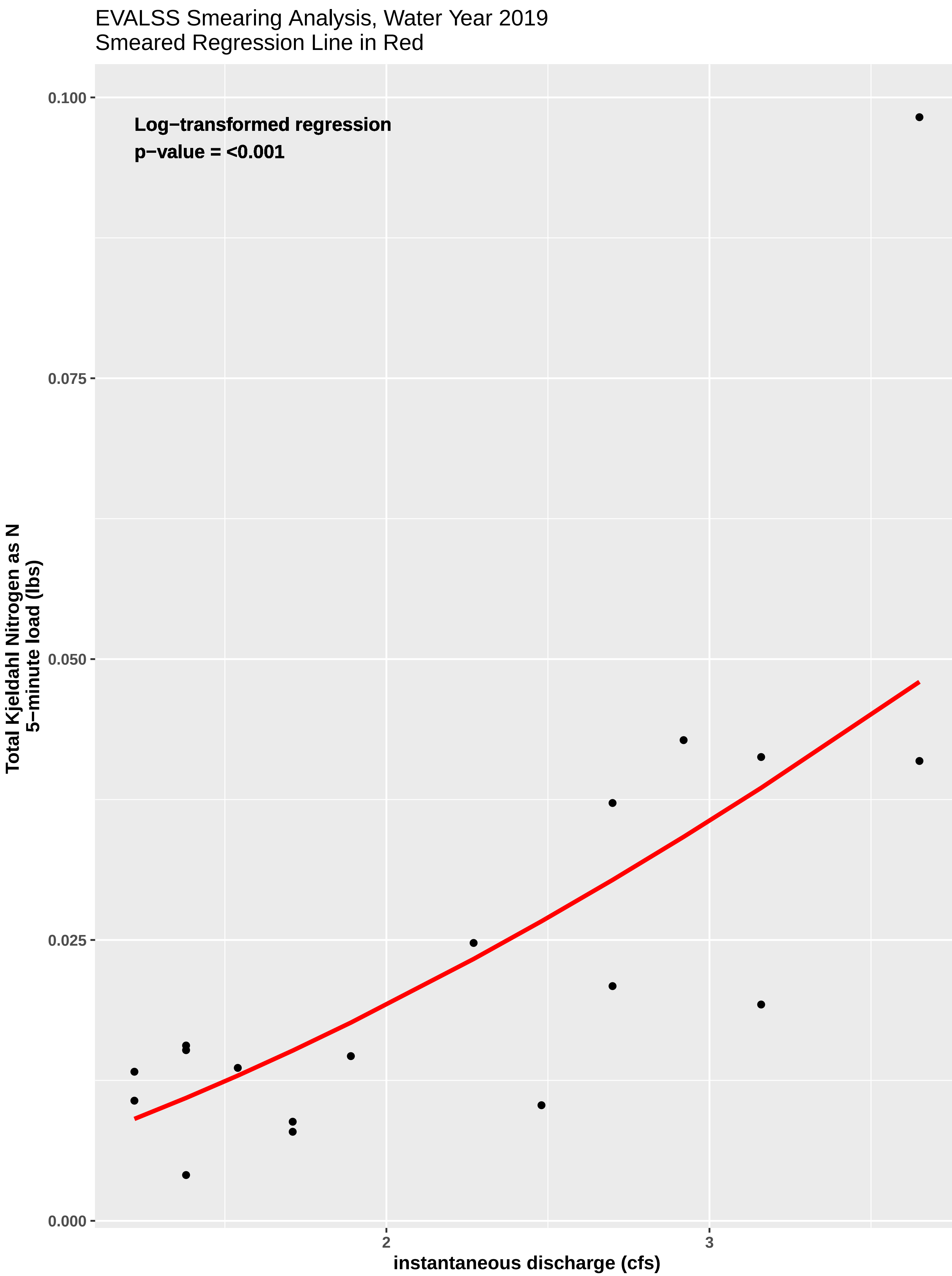

EVALSS Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
30,000
60,000
90,000
120,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

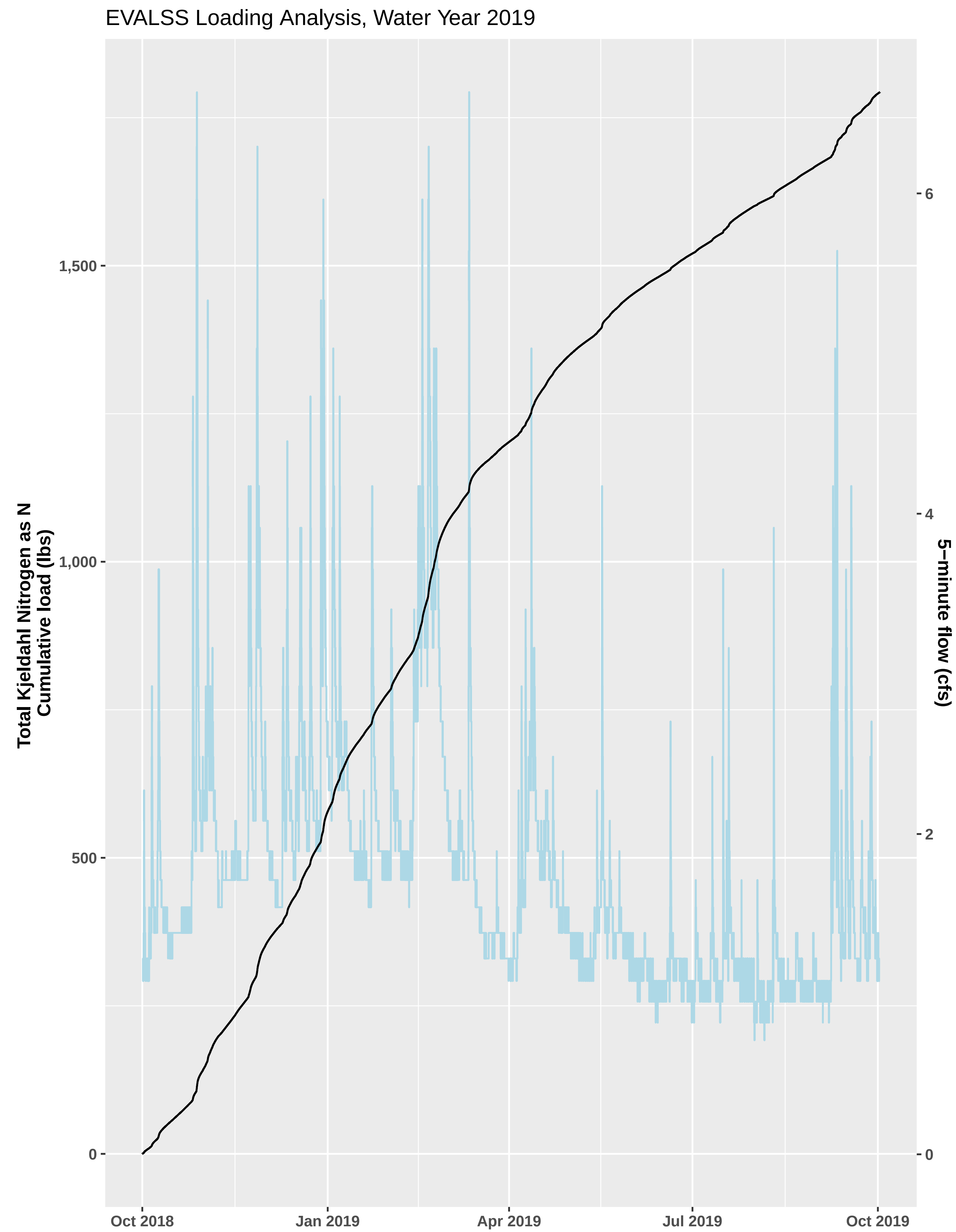

EVALSS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
0.100
0.075
0.050
0.025
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
1
2
3
4
5
instantaneous discharge (cfs)

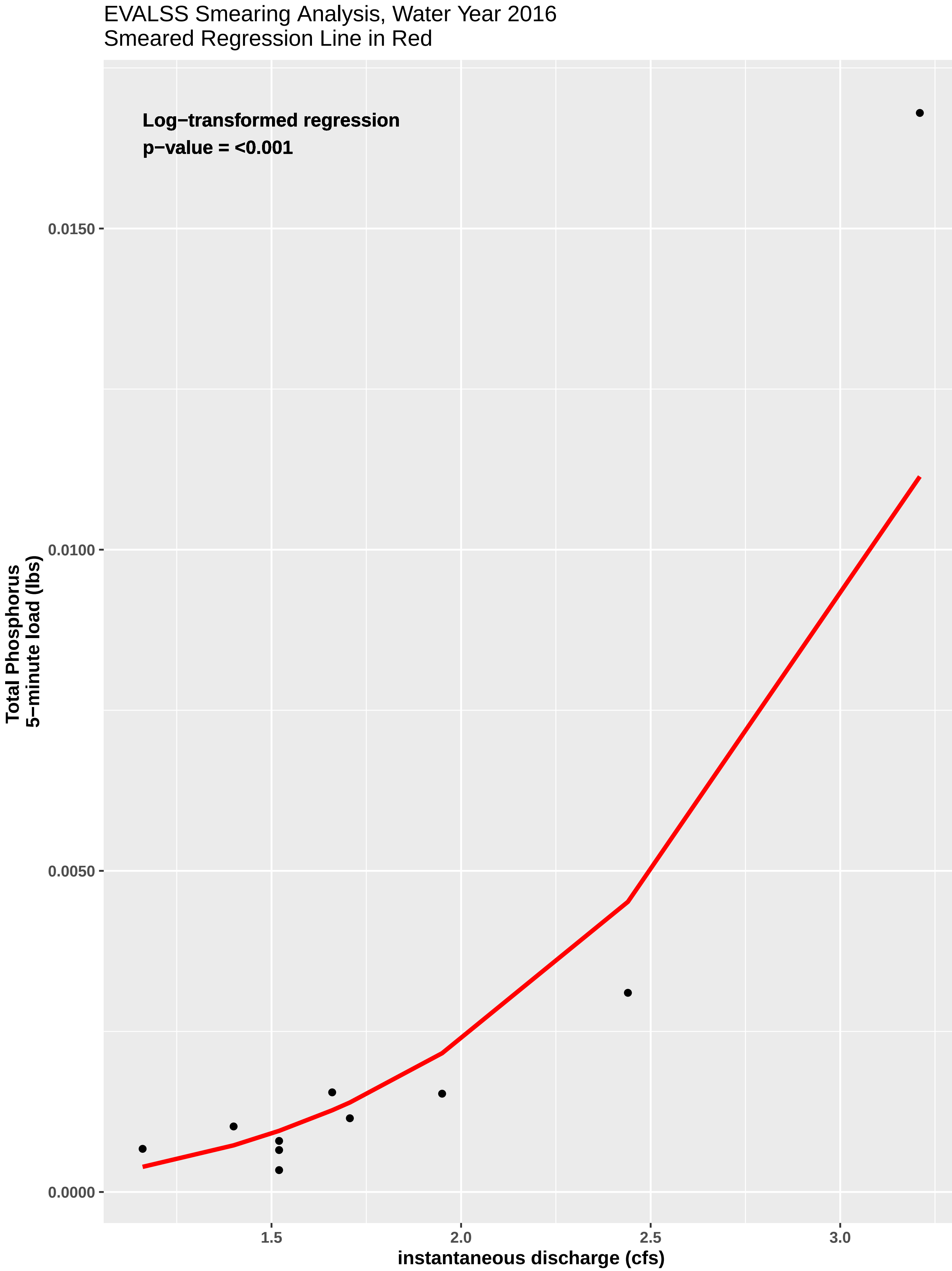

EVALSS Loading Analysis, Water Year 2017
3,000
2,000
1,000
0
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
20
10
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

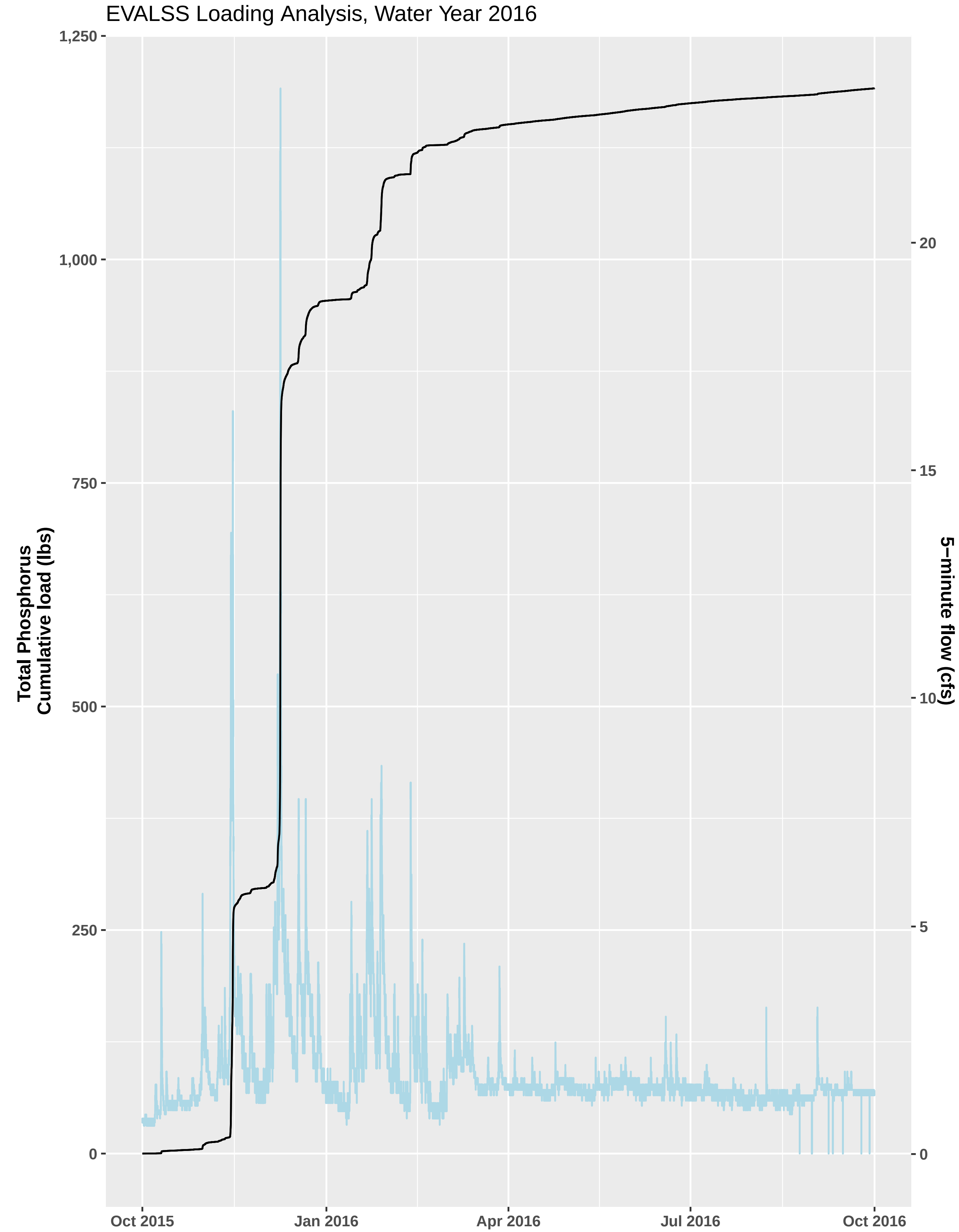

EVALSS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.10
0.20
0.30
0.40
2.5
5.0
7.5

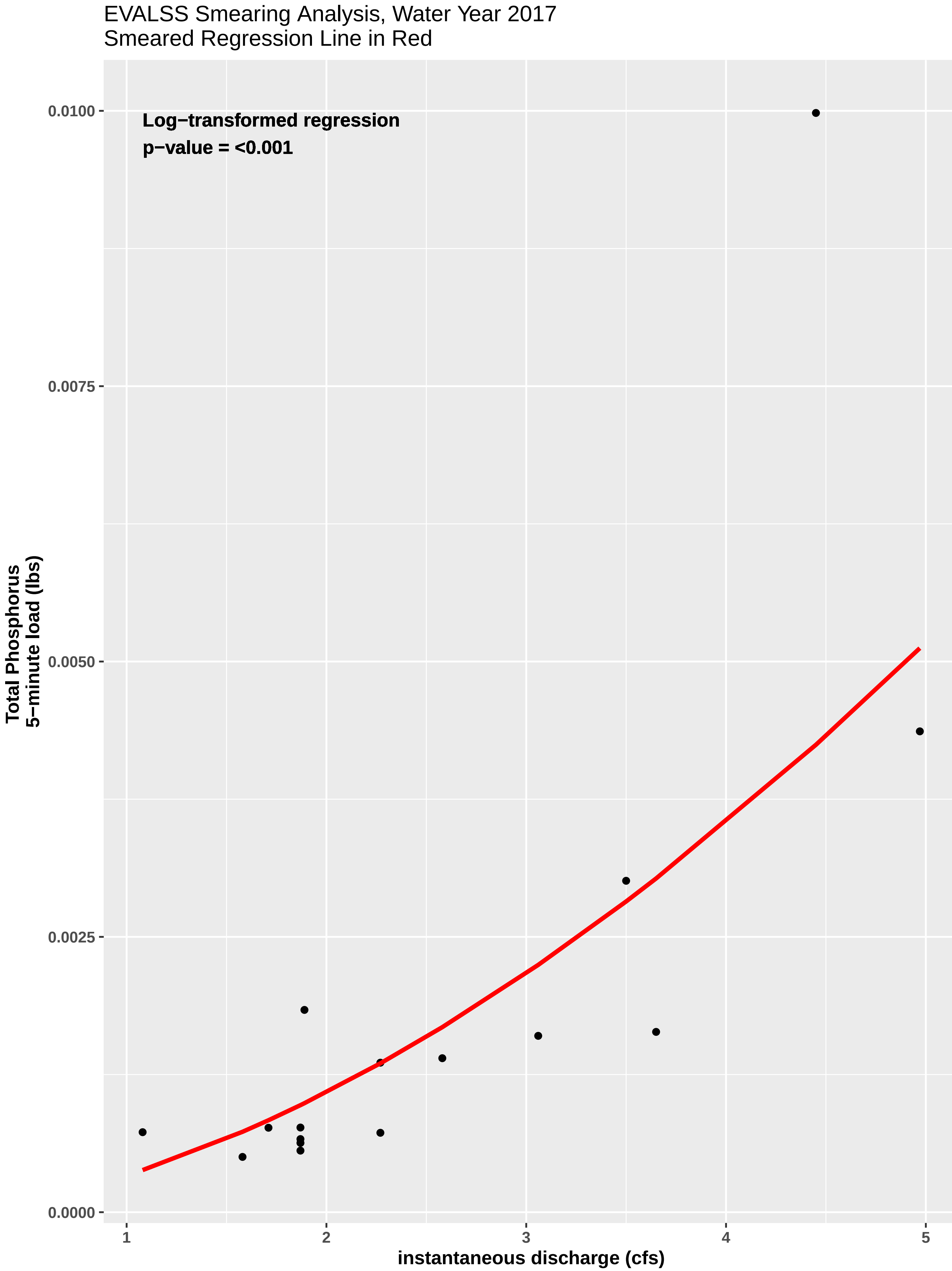

EVALSS Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
0
500
1,000
1,500
2,000
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

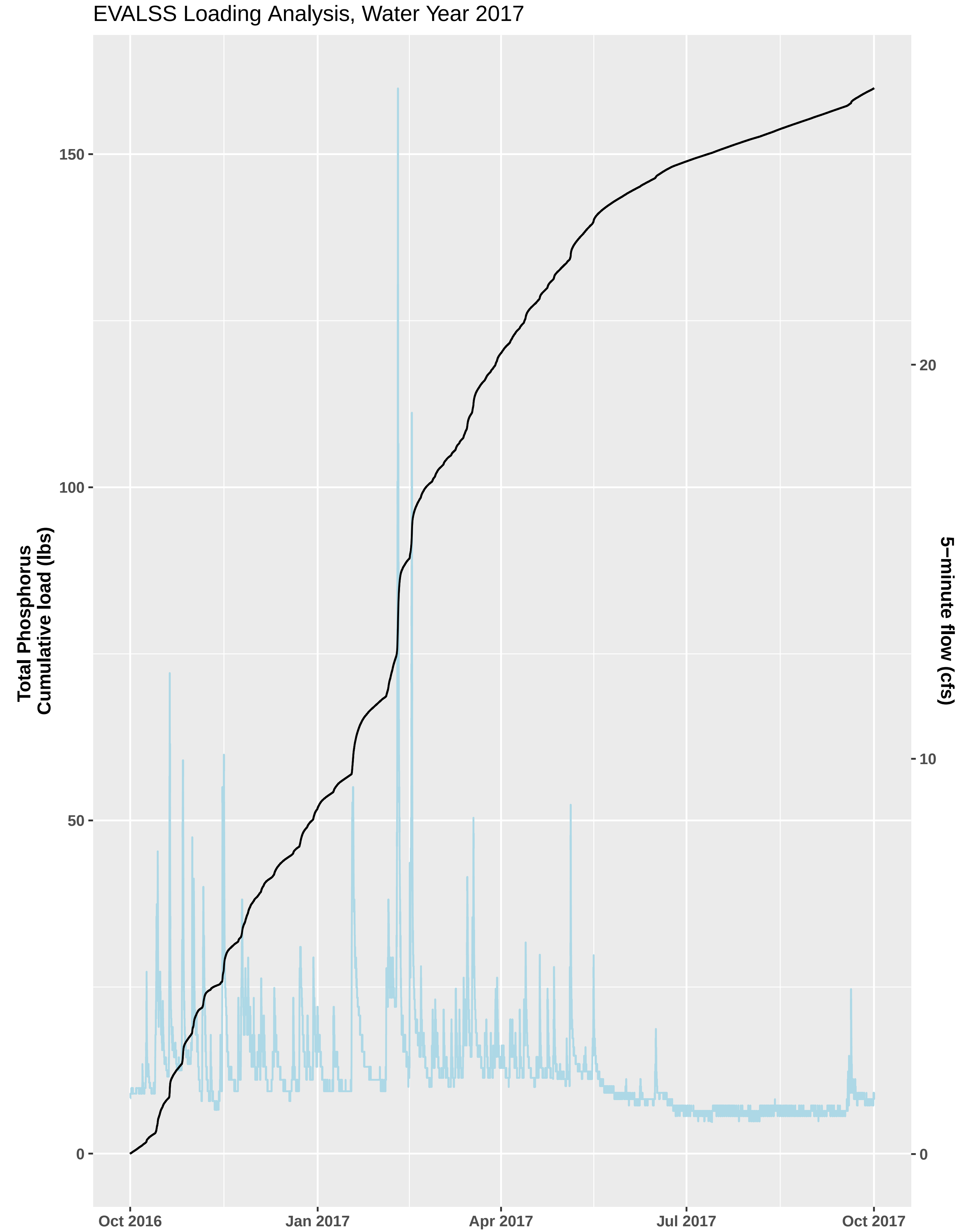

EVALSS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.100
0.075
0.050
0.025
0.000
2
3
instantaneous discharge (cfs)

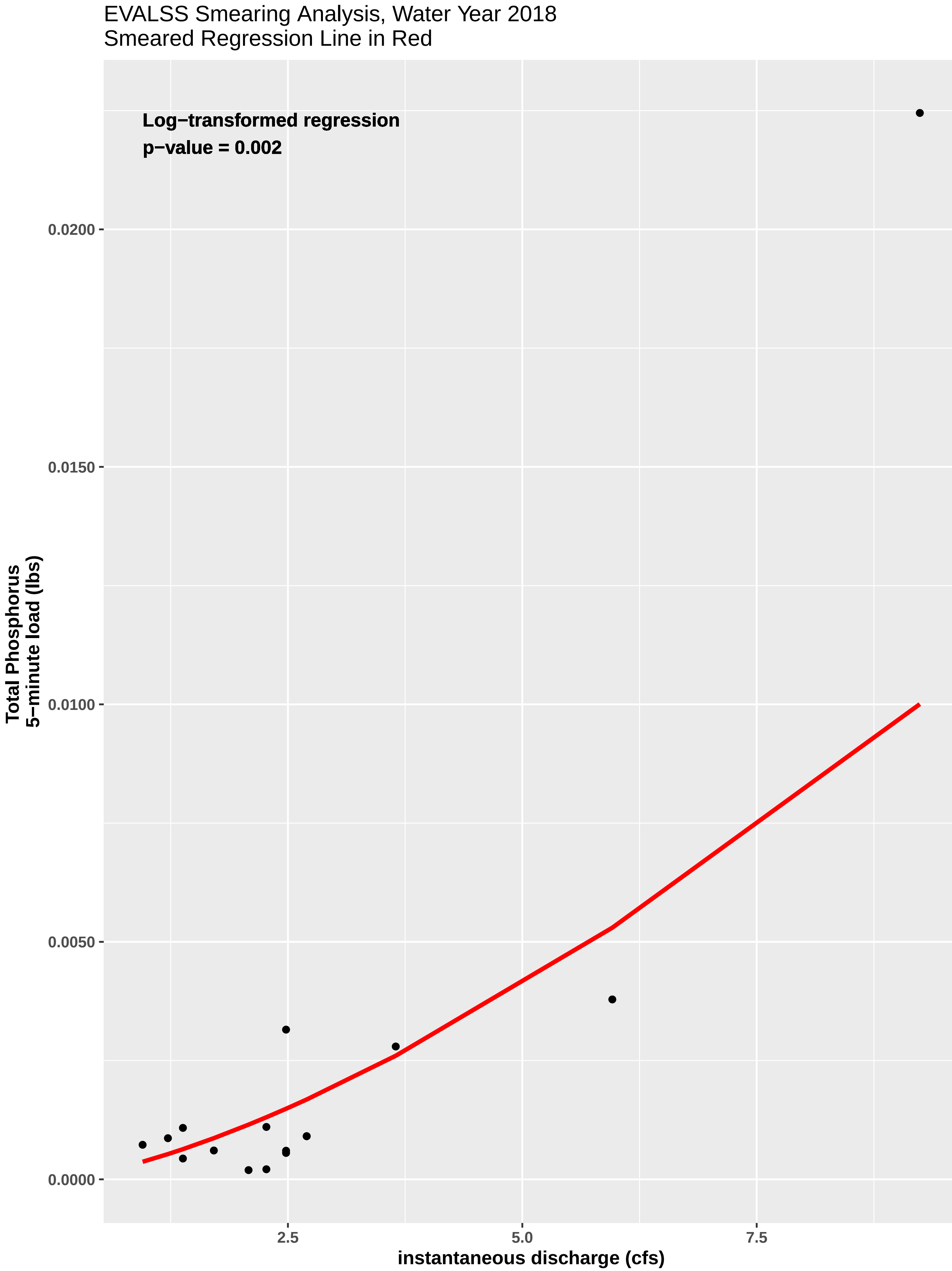

EVALSS Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
1,500
1,000
500
0
5−minute flow (cfs)
6
4
2
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

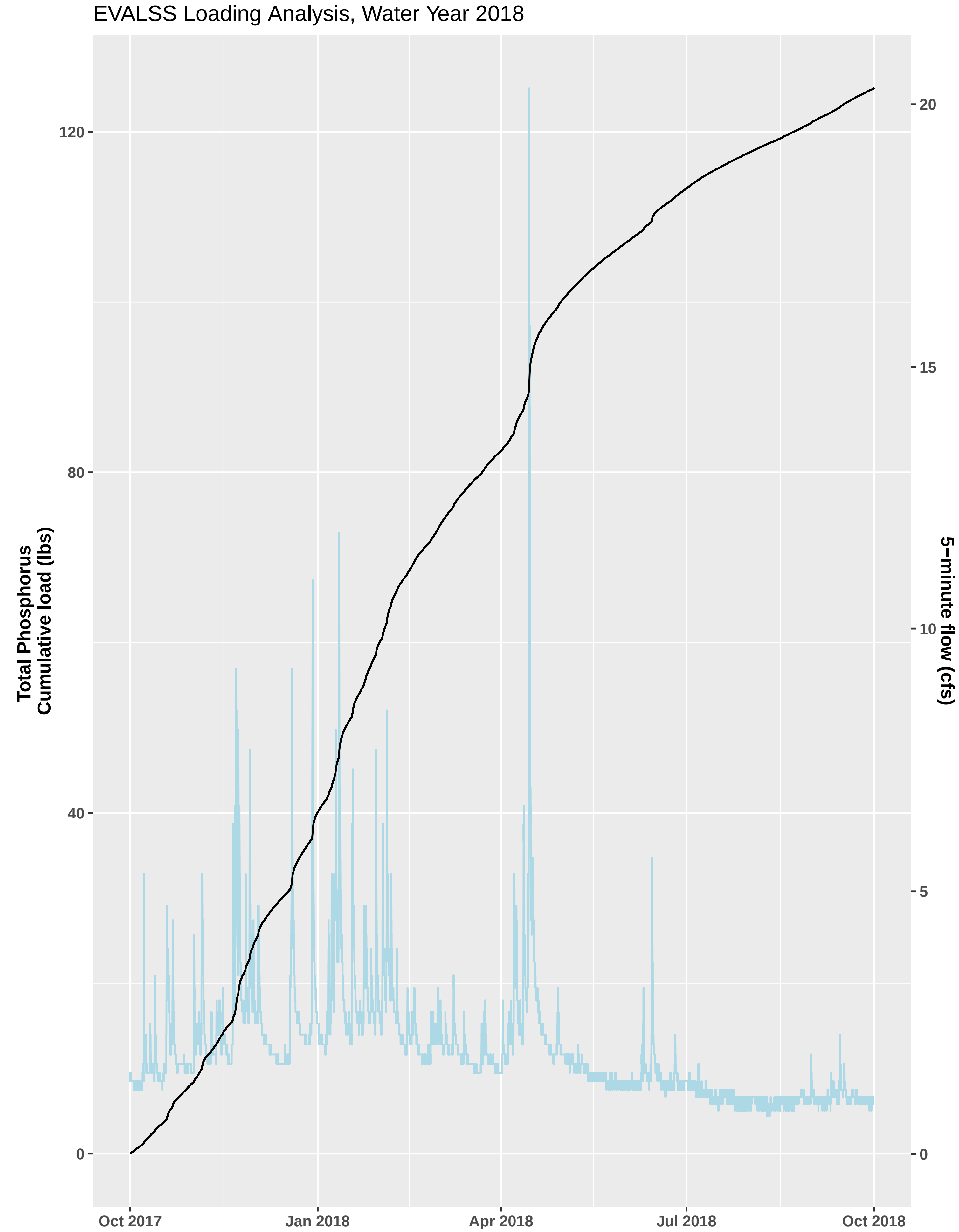

EVALSS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.0150
0.0100
0.0050
0.0000
Total Phosphorus
5−minute load (lbs)
1.5
2.0
2.5
3.0
instantaneous discharge (cfs)

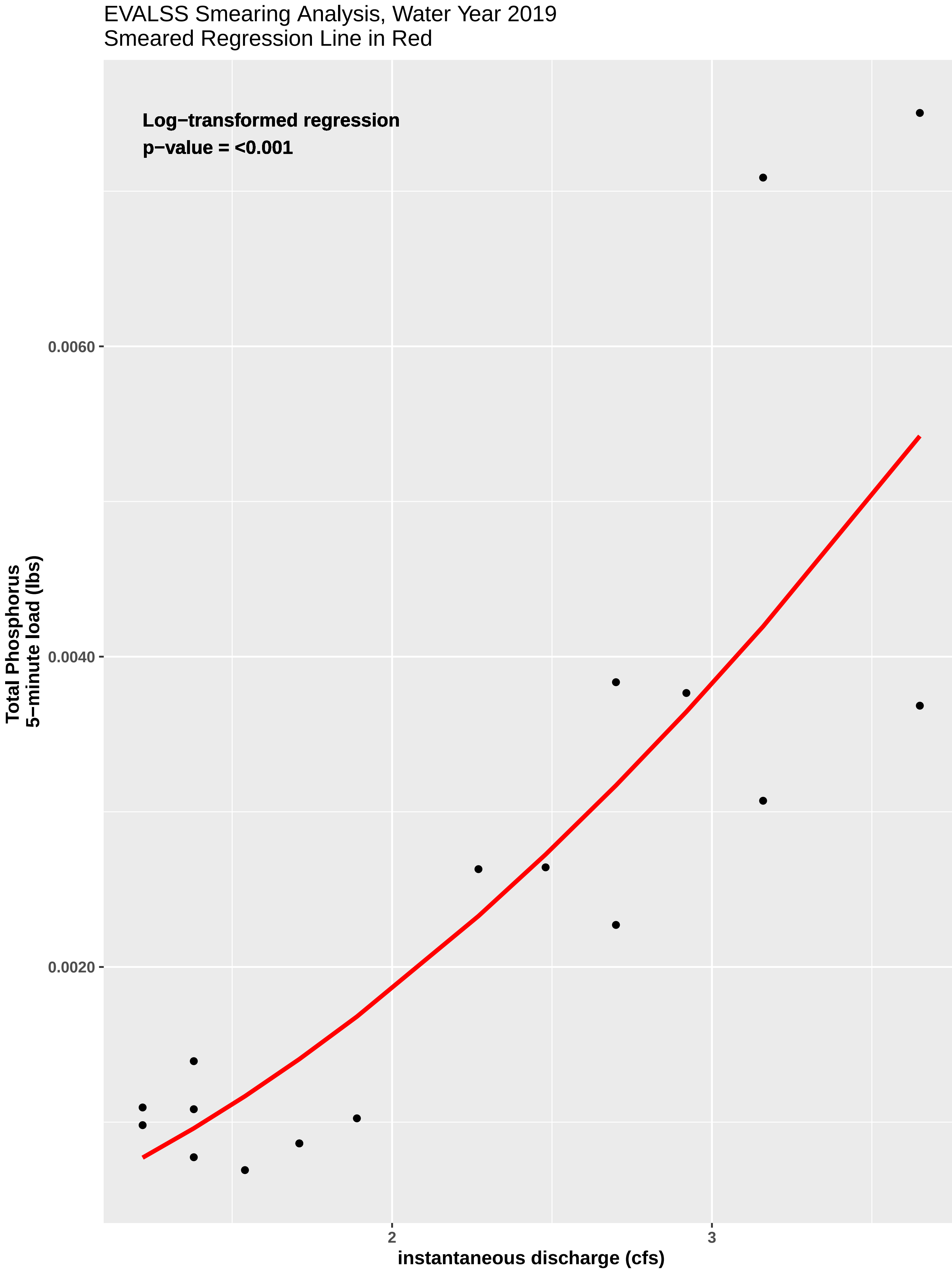

EVALSS Loading Analysis, Water Year 2016
1,250
1,000
750
500
250
0
Total Phosphorus
Cumulative load (lbs)
20
15
10
5
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

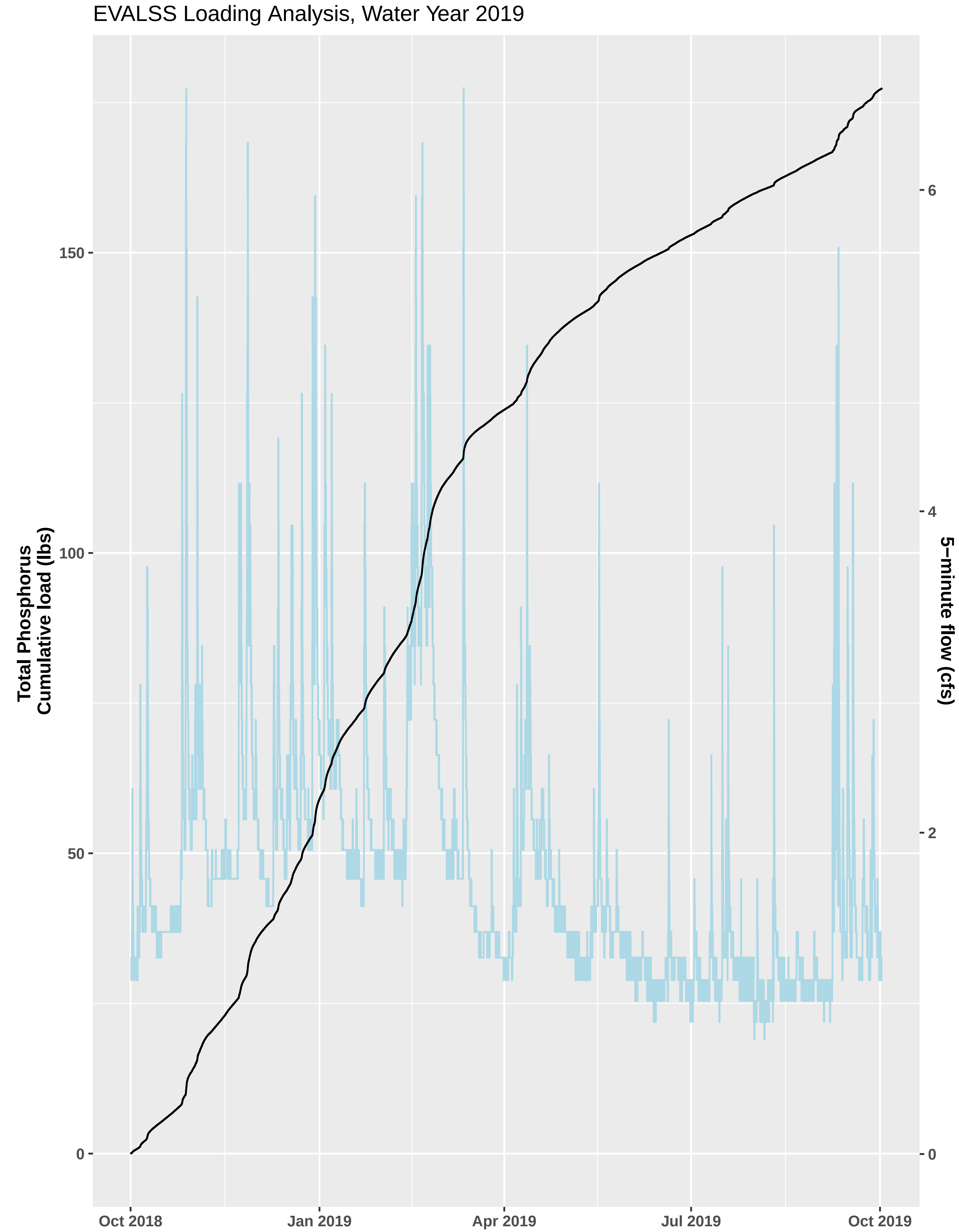

EVALSS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0025
0.0050
0.0075
0.0100
1
2
3
4
5
instantaneous discharge (cfs)

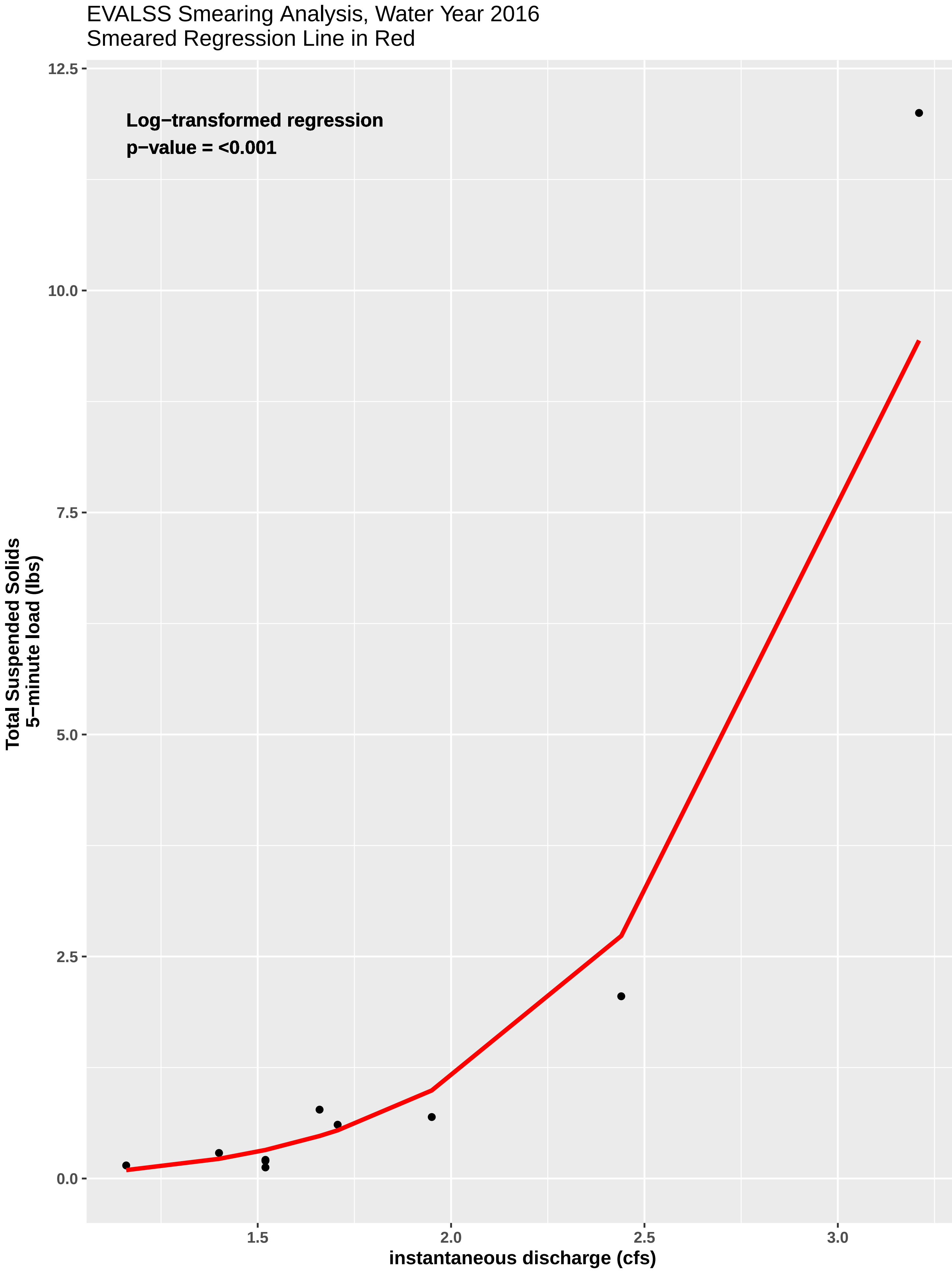

EVALSS Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
50
100
150
5−minute flow (cfs)
0
10
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

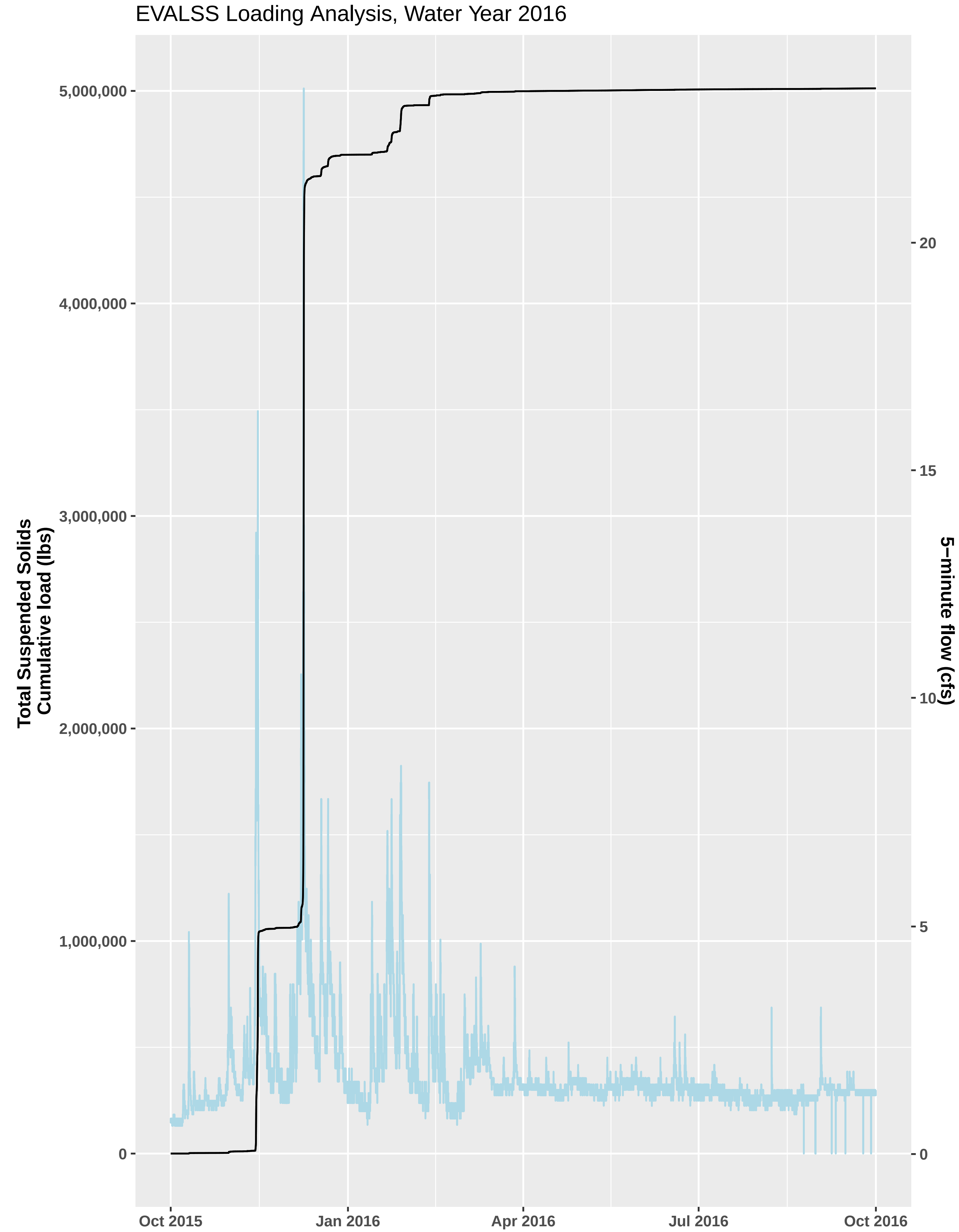

EVALSS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
2.5
5.0
7.5
instantaneous discharge (cfs)

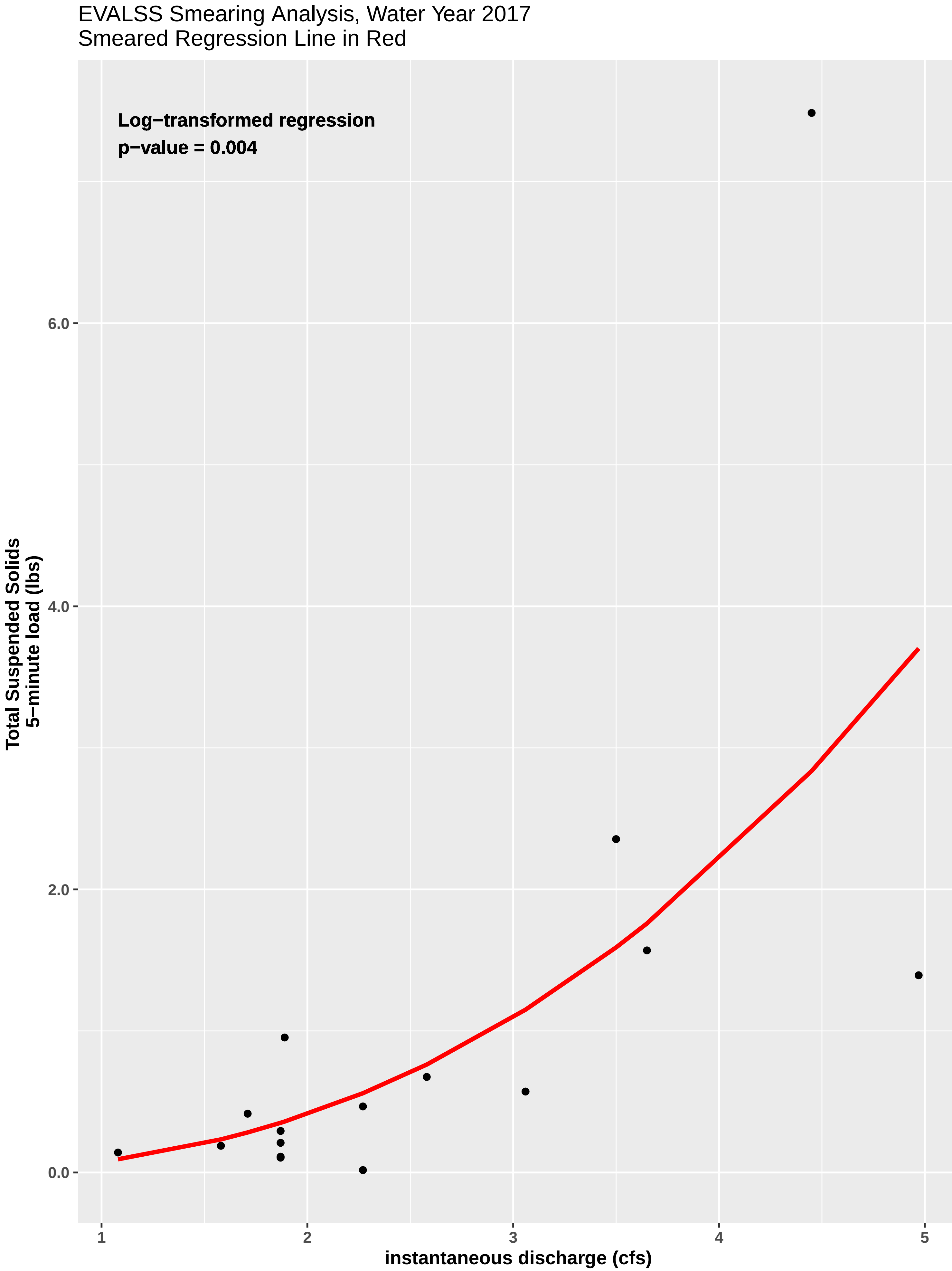

EVALSS Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
40
80
120
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

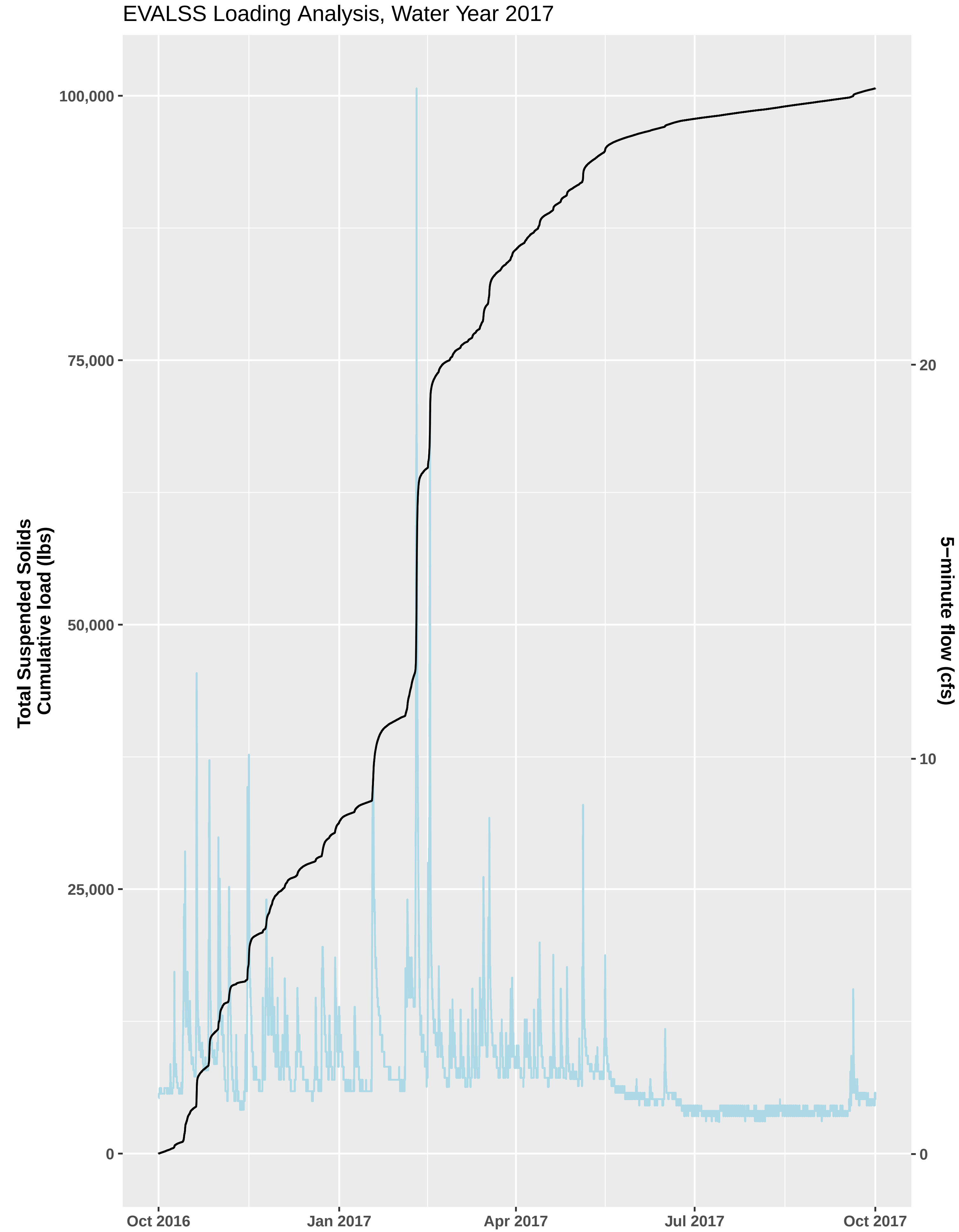

EVALSS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0060
0.0040
0.0020
2
3
instantaneous discharge (cfs)

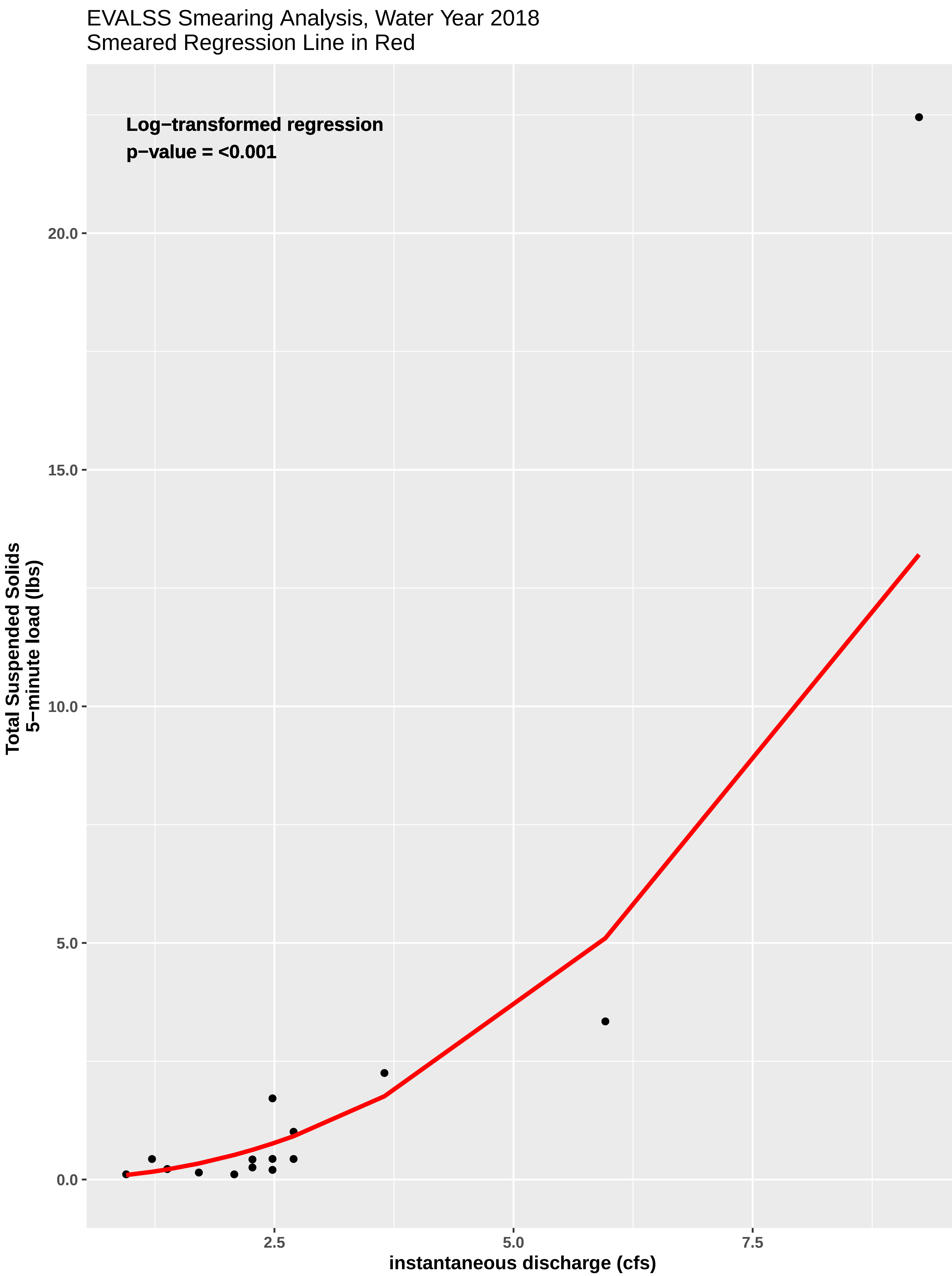

EVALSS Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
150
100
50
0
5−minute flow (cfs)
6
4
2
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

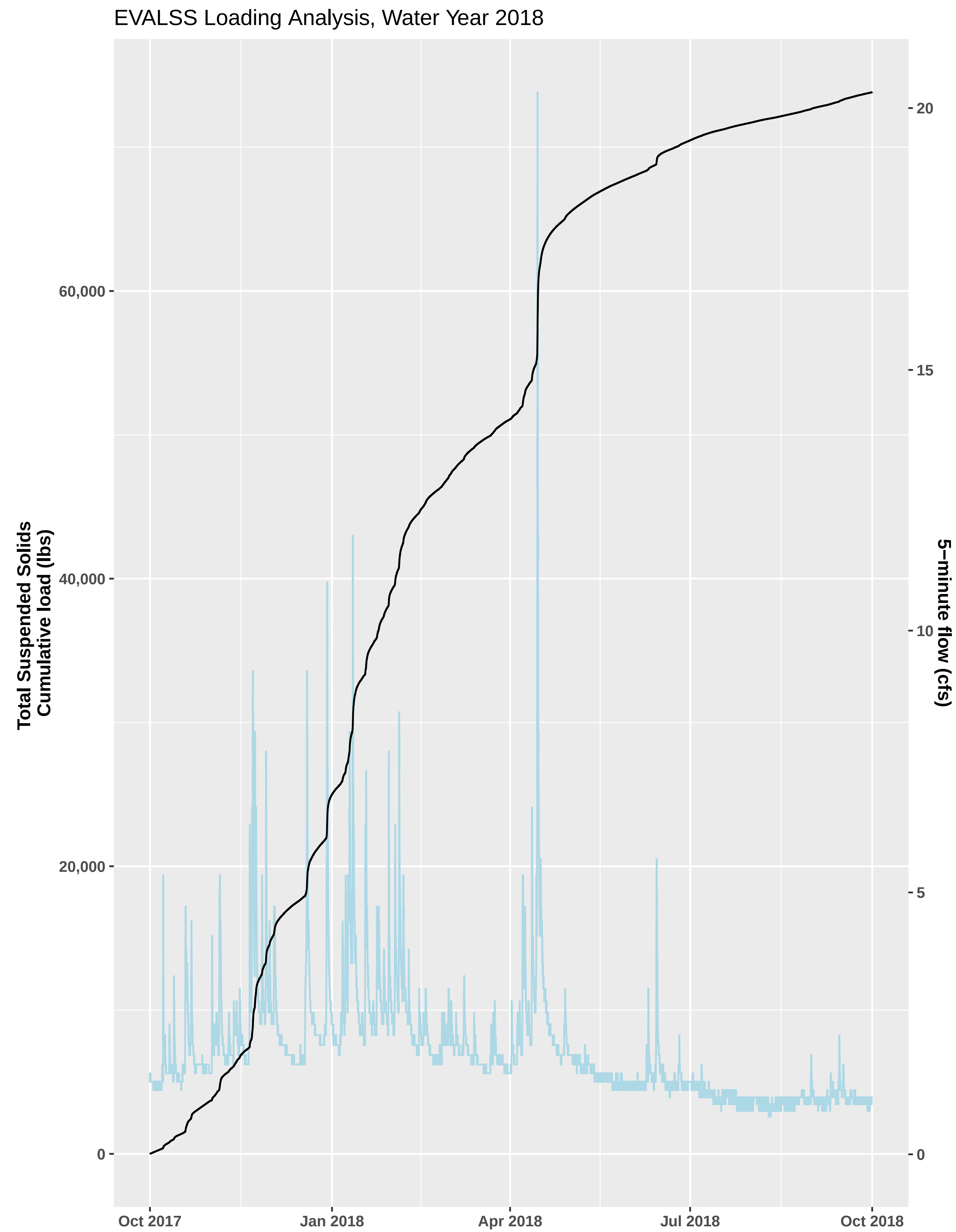

EVALSS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
2.5
5.0
7.5
10.0
12.5
1.5
2.0
2.5
3.0

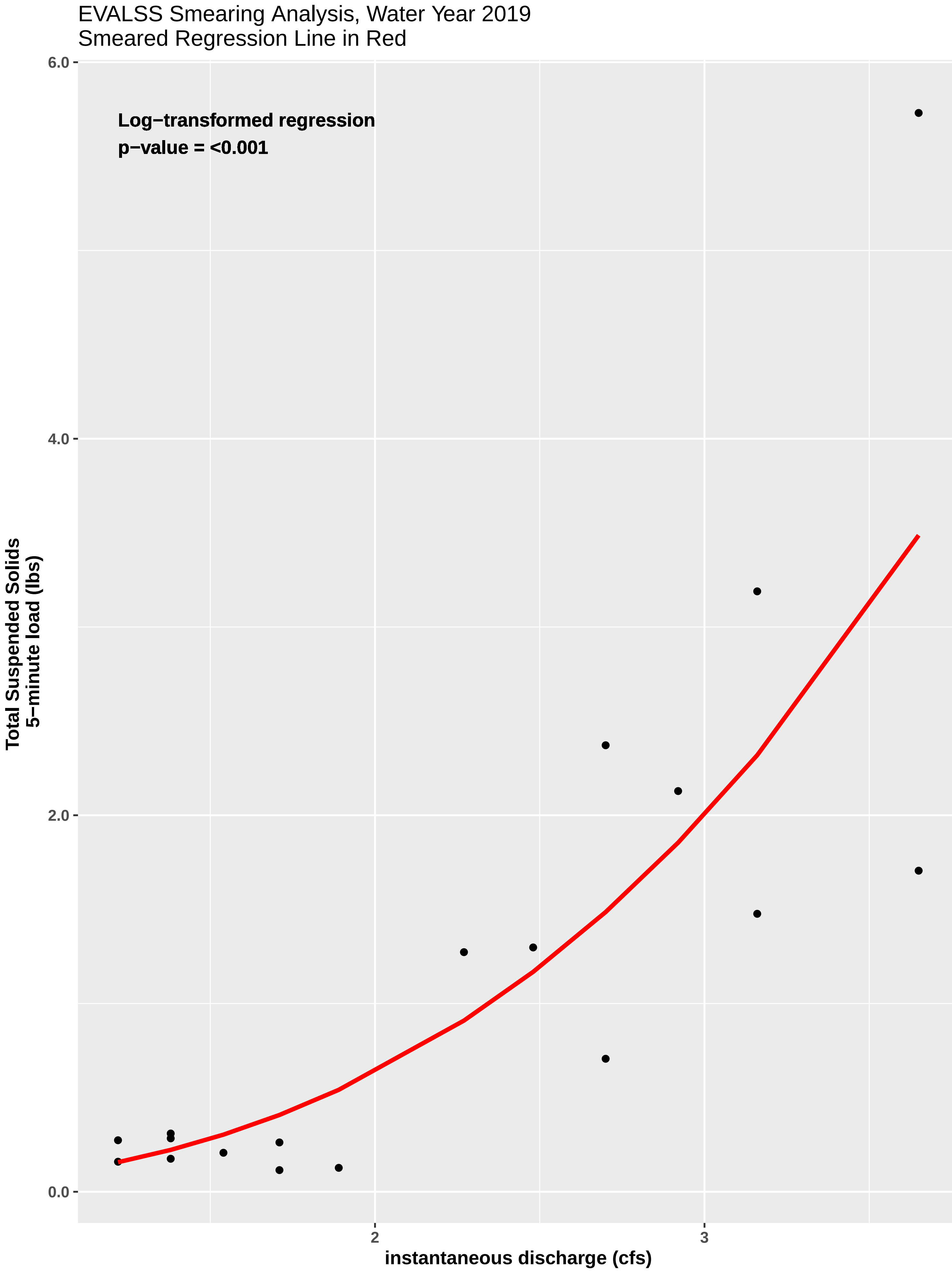

EVALSS Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
1,000,000
2,000,000
3,000,000
4,000,000
5,000,000
0
5
10
15
20
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

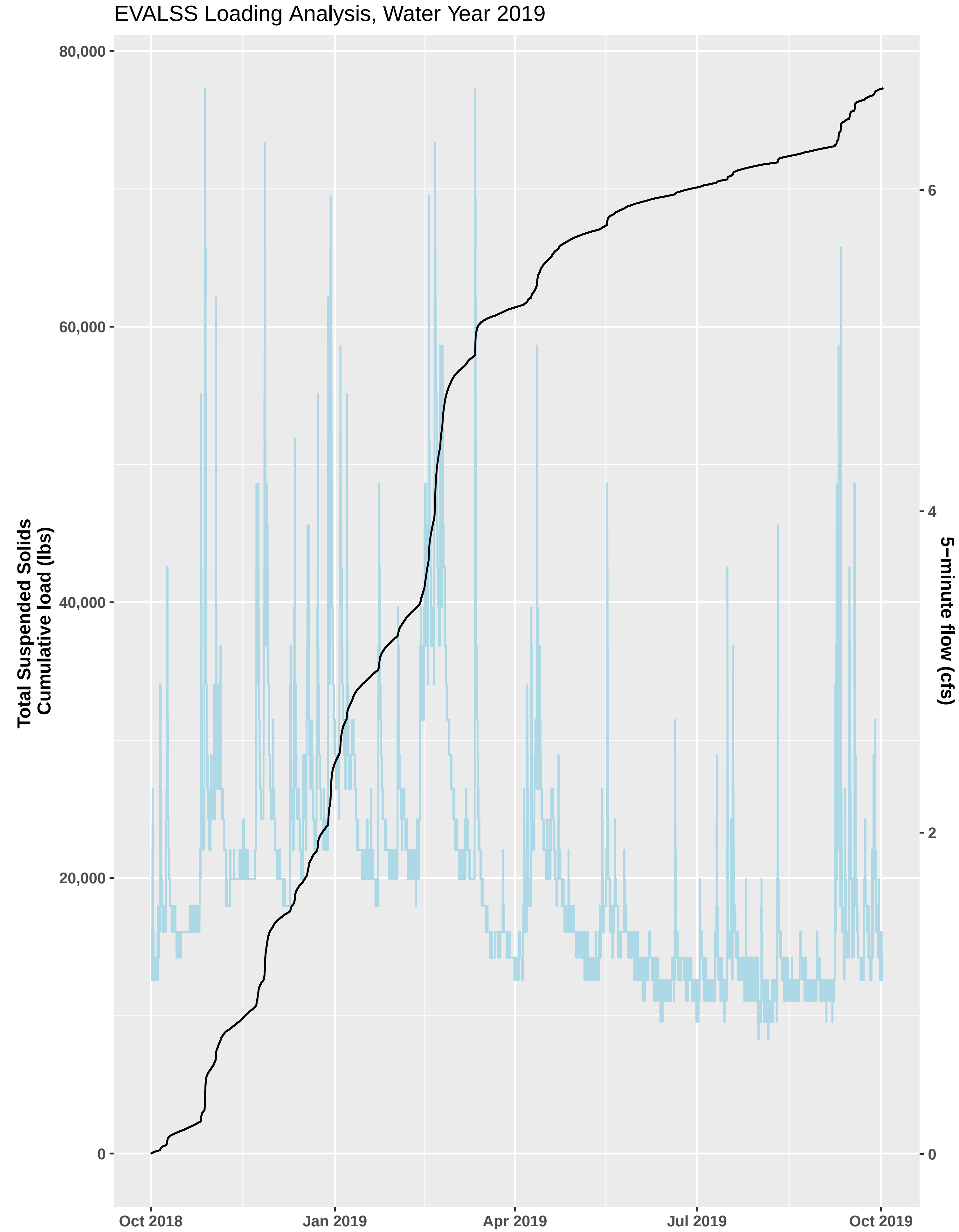

EVALSS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.004
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
2.0
4.0
6.0
1
2
3
4
5

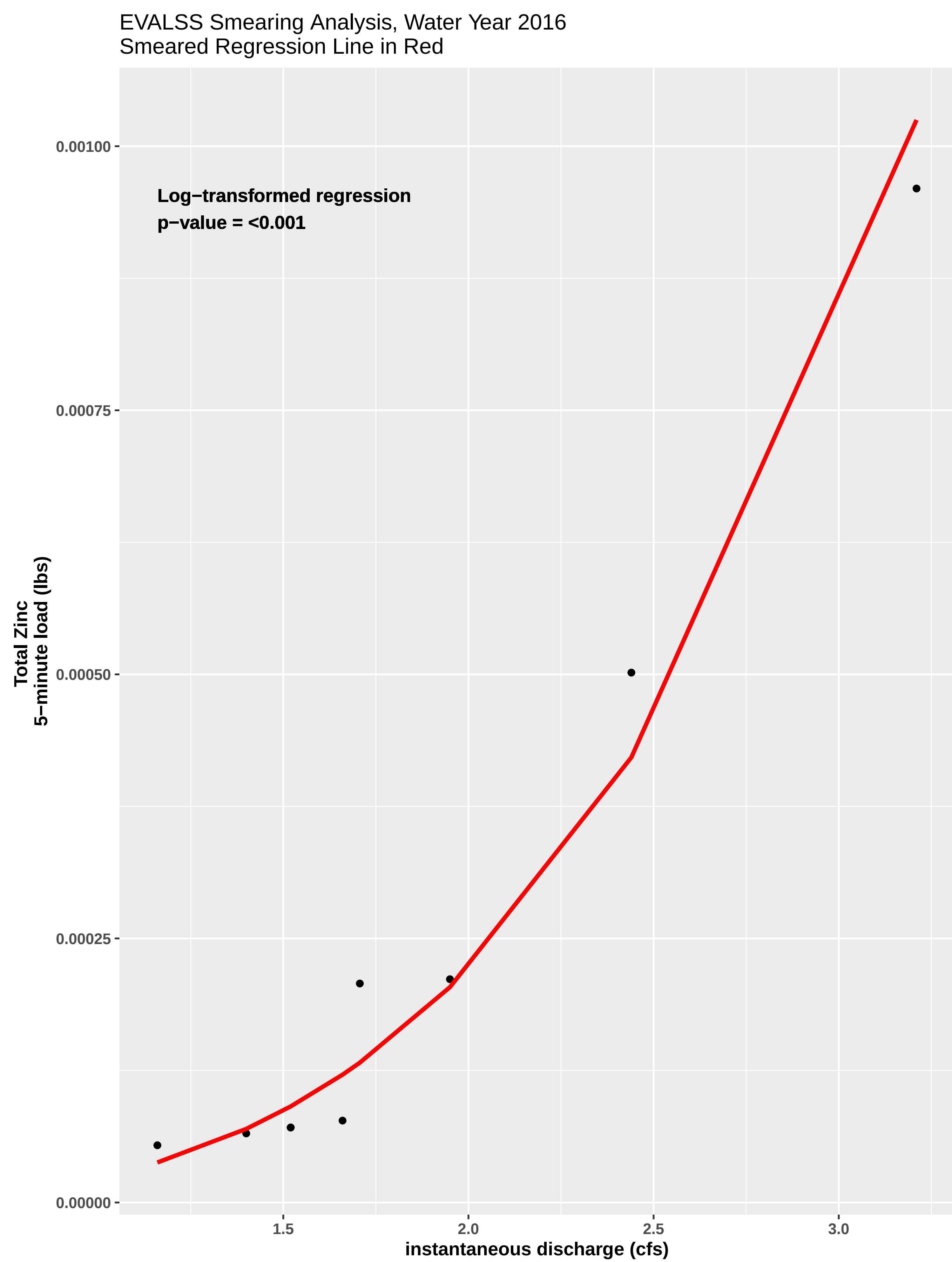

EVALSS Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
25,000
50,000
75,000
100,000
0
10
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

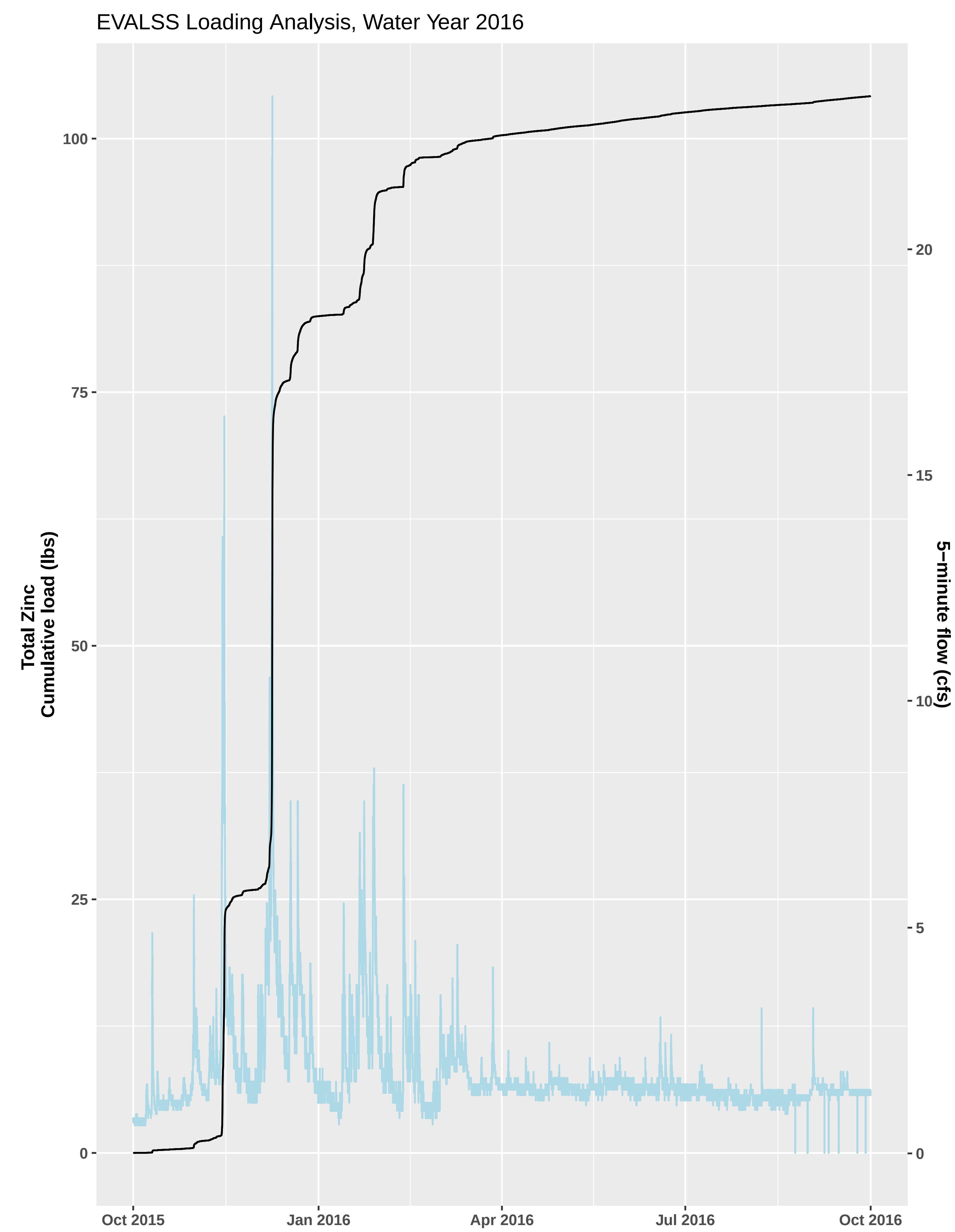

EVALSS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
5.0
10.0
15.0
20.0
2.5
5.0
7.5
instantaneous discharge (cfs)

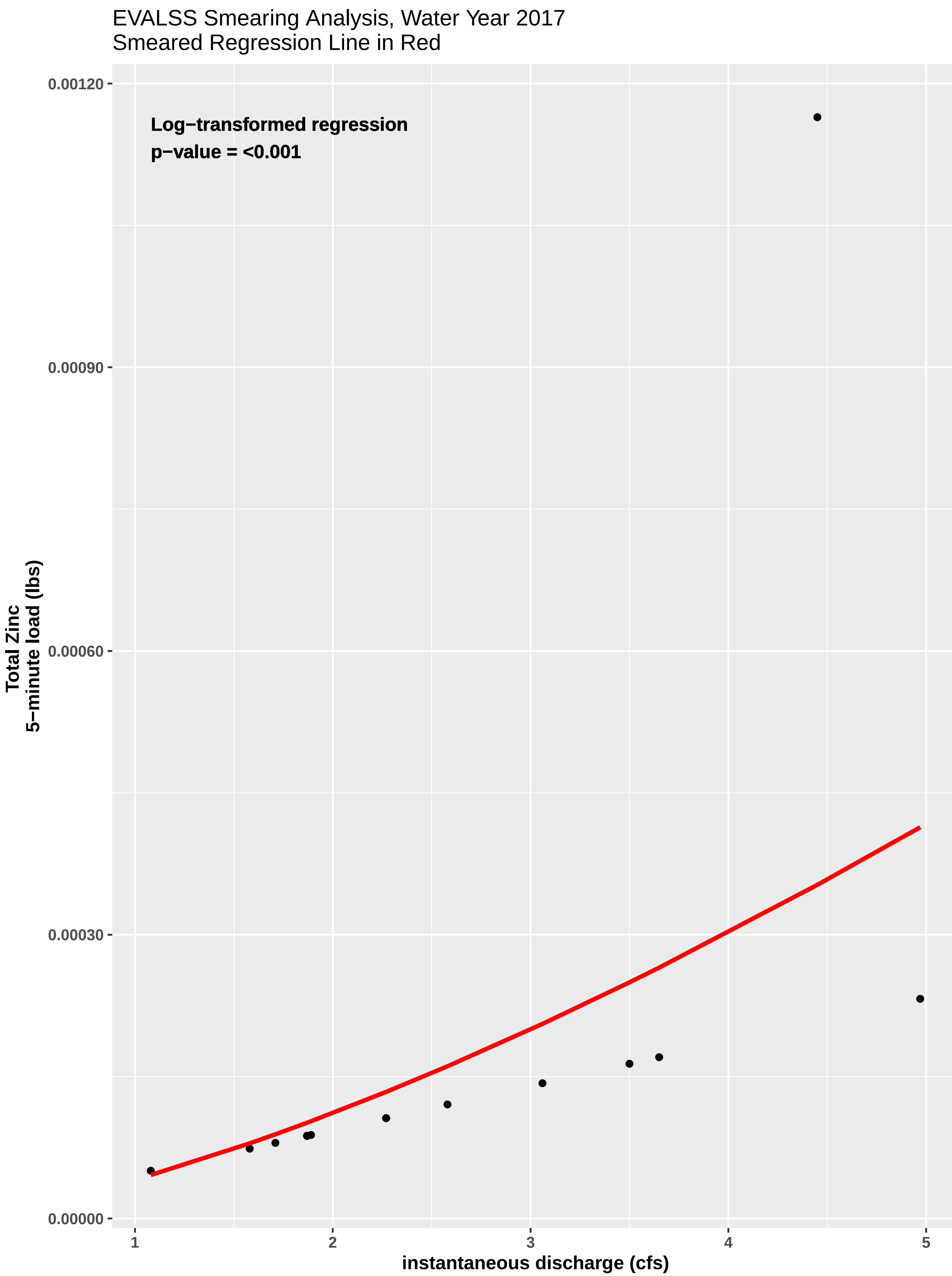

EVALSS Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
20,000
40,000
60,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

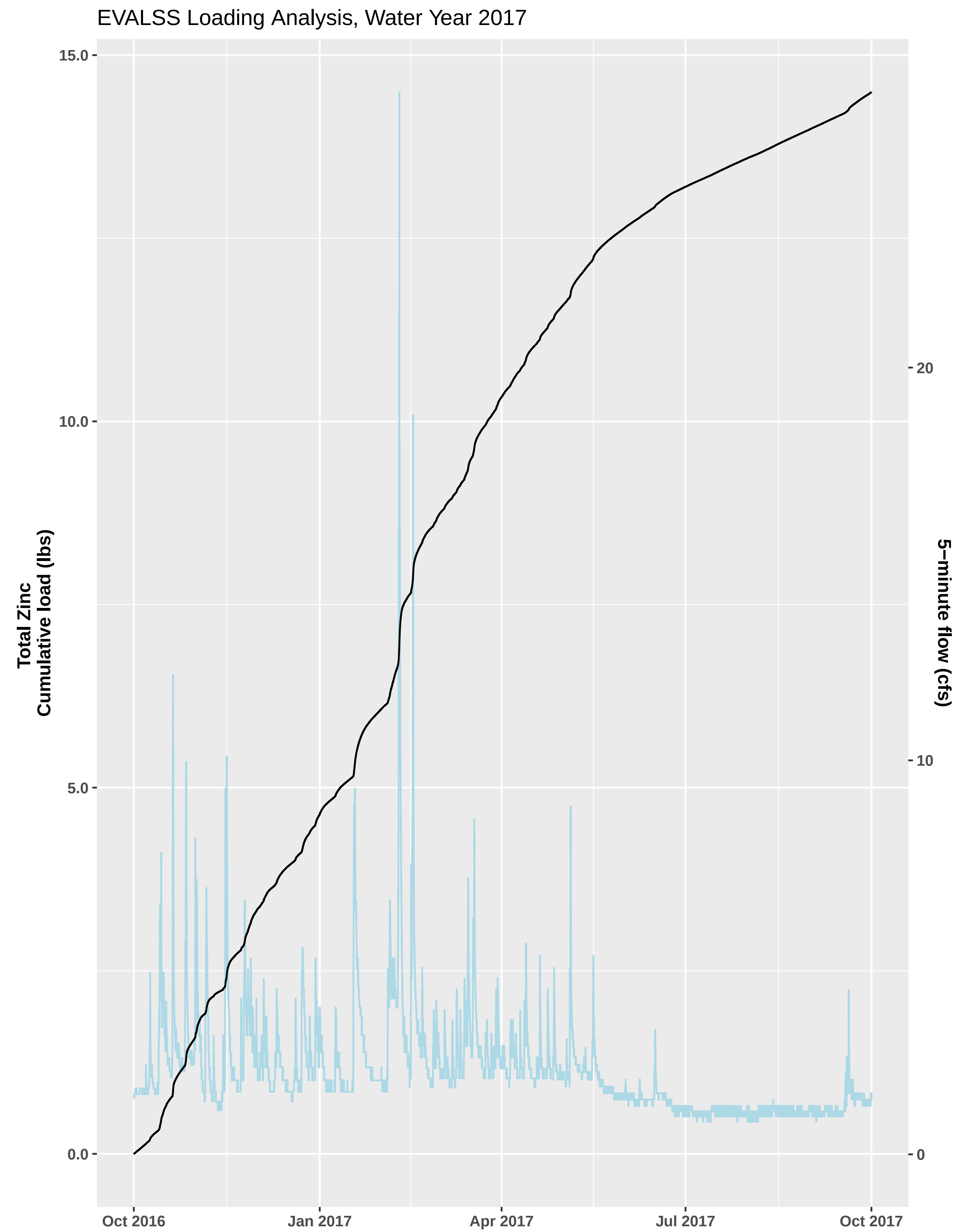

EVALSS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
2.0
4.0
6.0
2
3

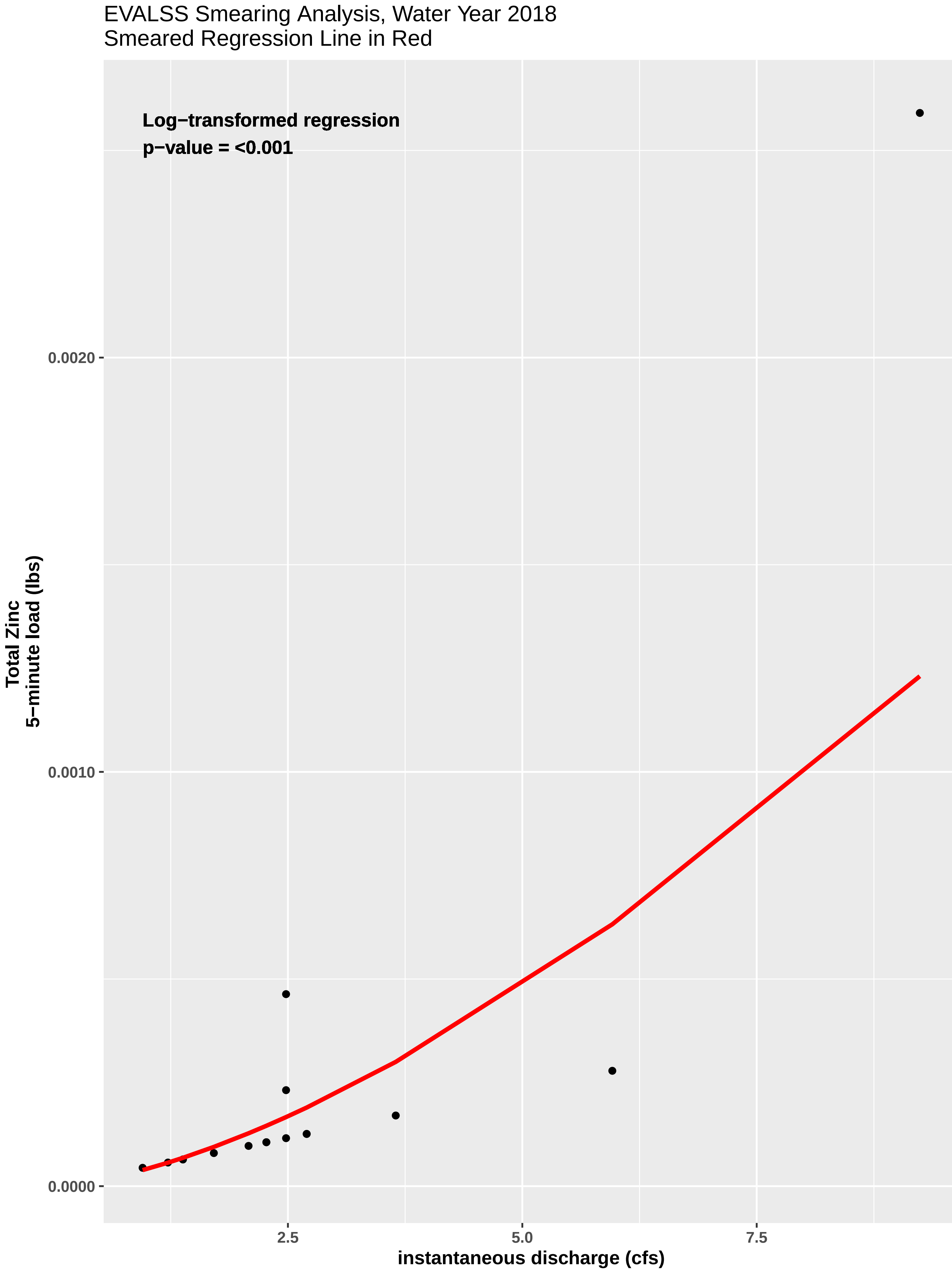

EVALSS Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
20,000
40,000
60,000
80,000
0
2
4
6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

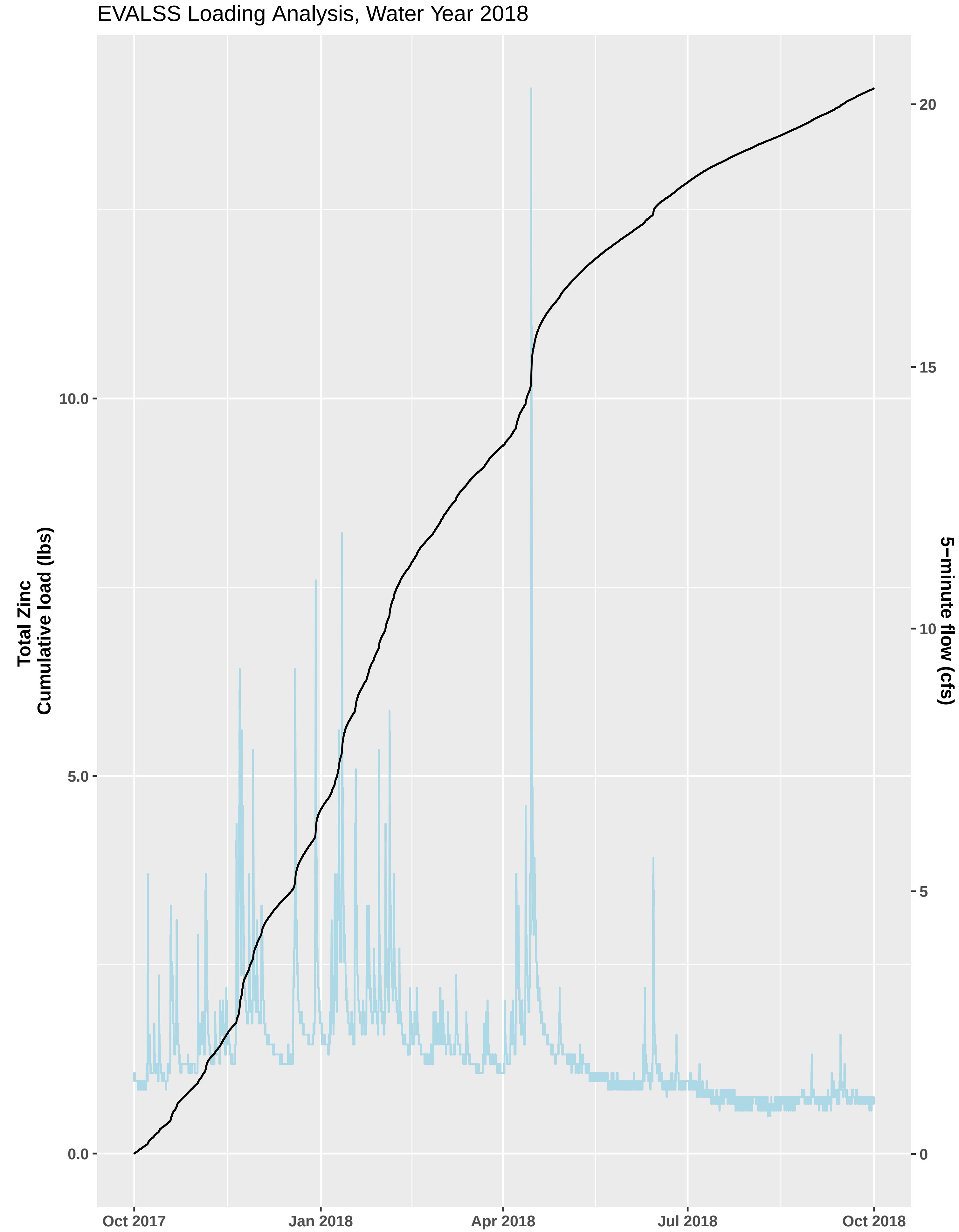

EVALSS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.00100
0.00075
0.00050
0.00025
0.00000
Total Zinc
5−minute load (lbs)
1.5
2.0
2.5
3.0
instantaneous discharge (cfs)

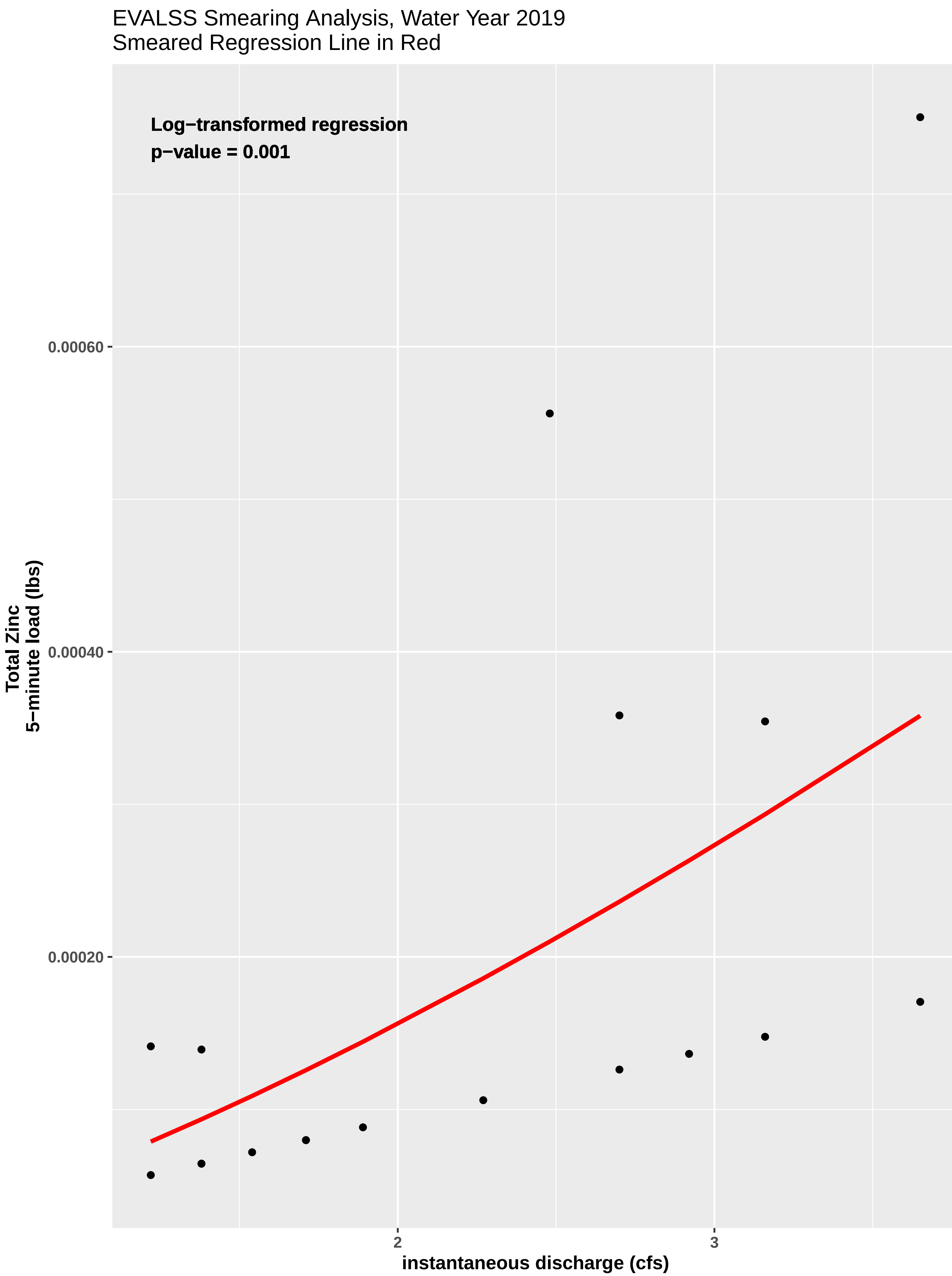

EVALSS Loading Analysis, Water Year 2016
100
75
50
25
0
Total Zinc
Cumulative load (lbs)
20
15
10
5
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

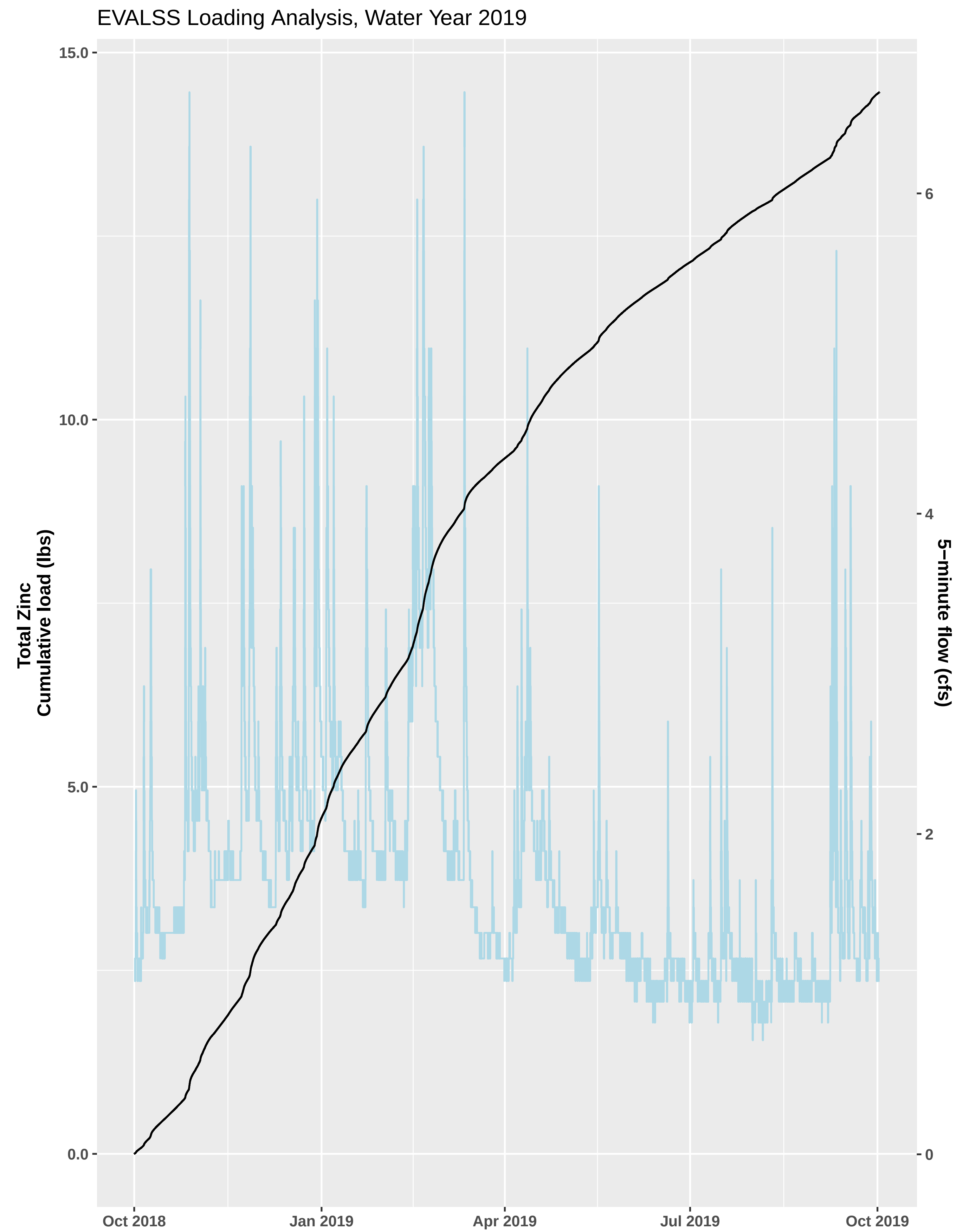

EVALSS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00030
0.00060
0.00090
0.00120
1
2
3
4
5
instantaneous discharge (cfs)

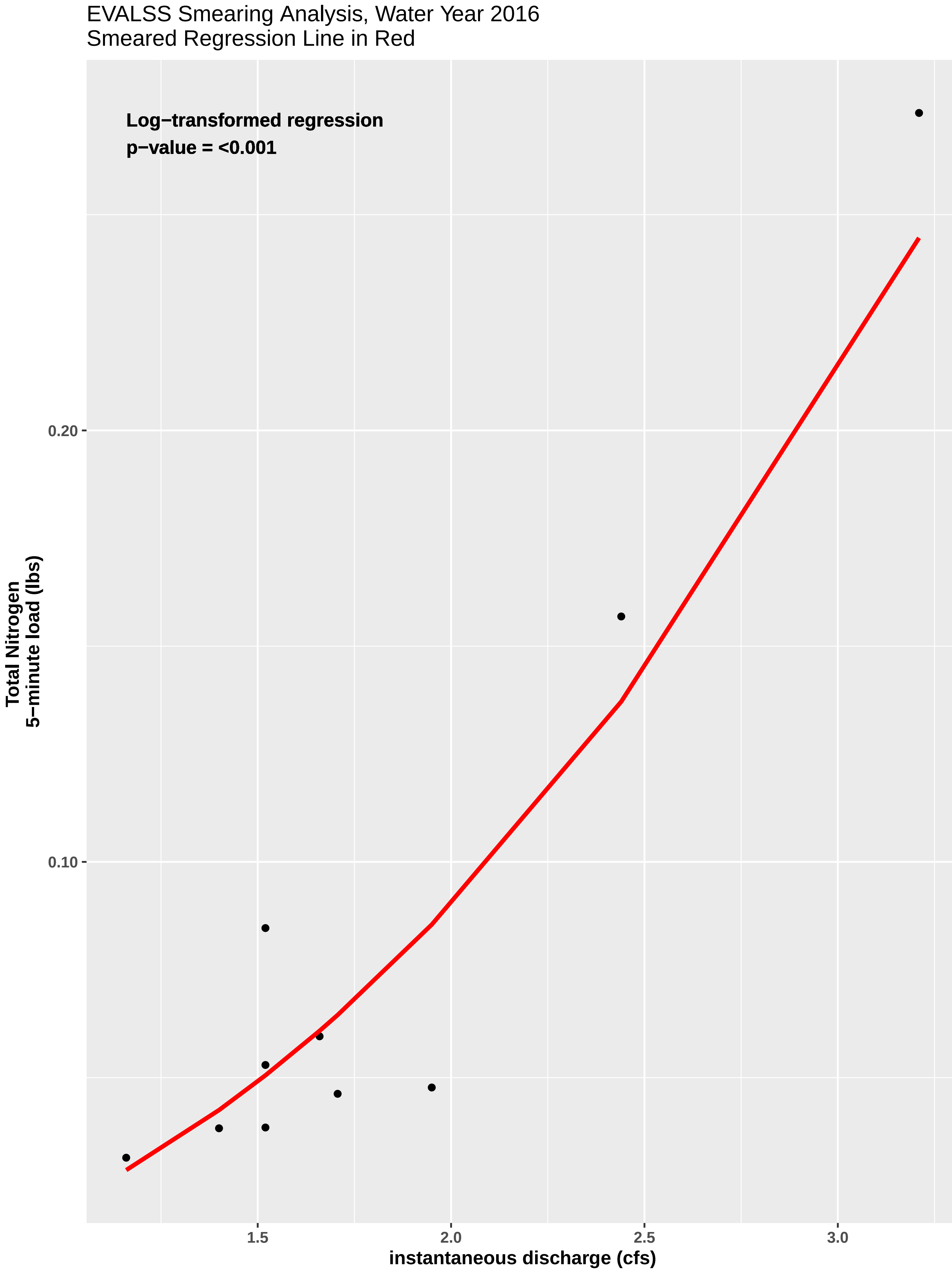

EVALSS Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0.0
5.0
10.0
15.0
5−minute flow (cfs)
0
10
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


EVALSS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0020
0.0010
0.0000
2.5
5.0
7.5
instantaneous discharge (cfs)

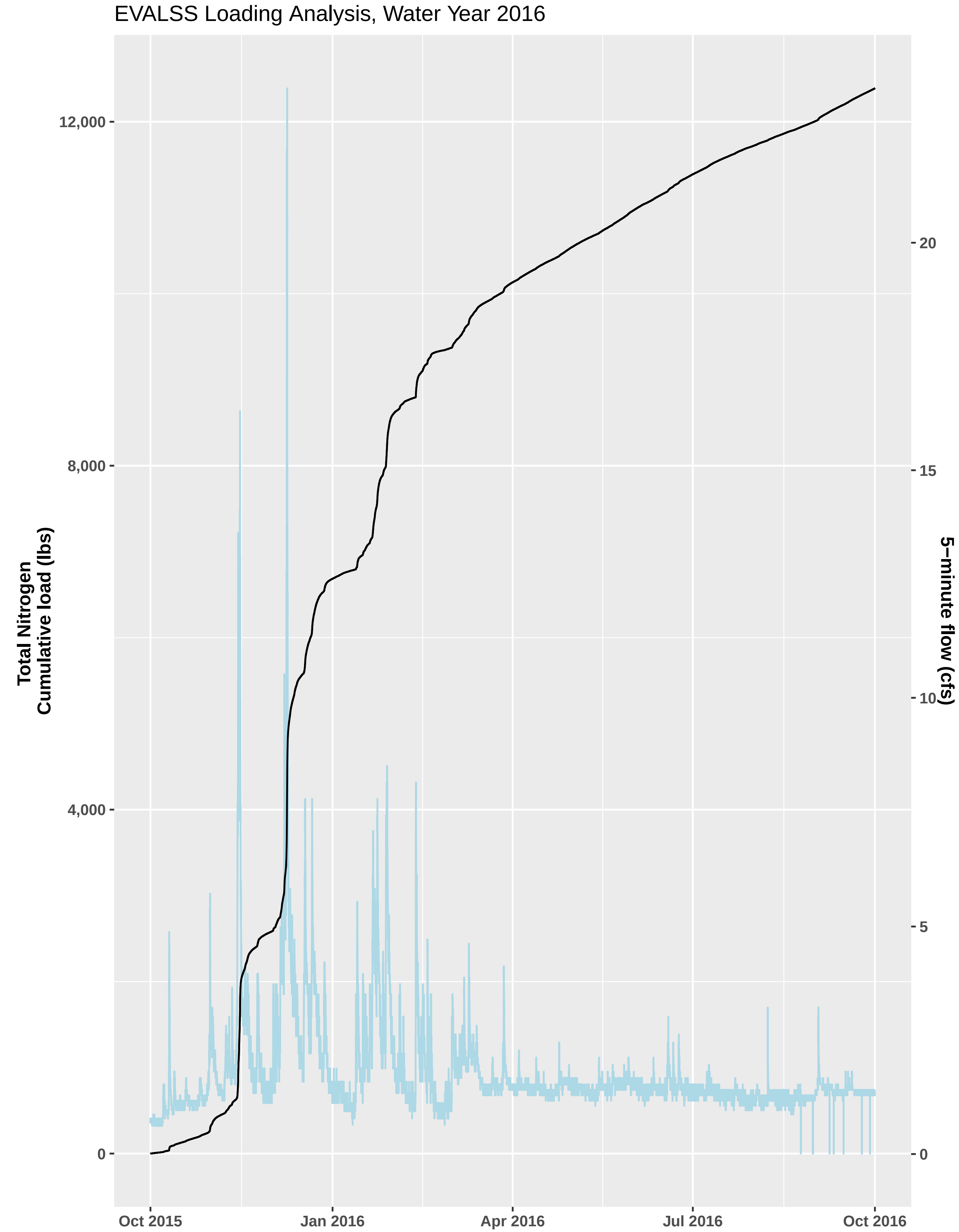

EVALSS Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
10.0
5.0
0.0
5−minute flow (cfs)
20
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


EVALSS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Zinc
5−minute load (lbs)
0.00060
0.00040
0.00020
2
3
instantaneous discharge (cfs)

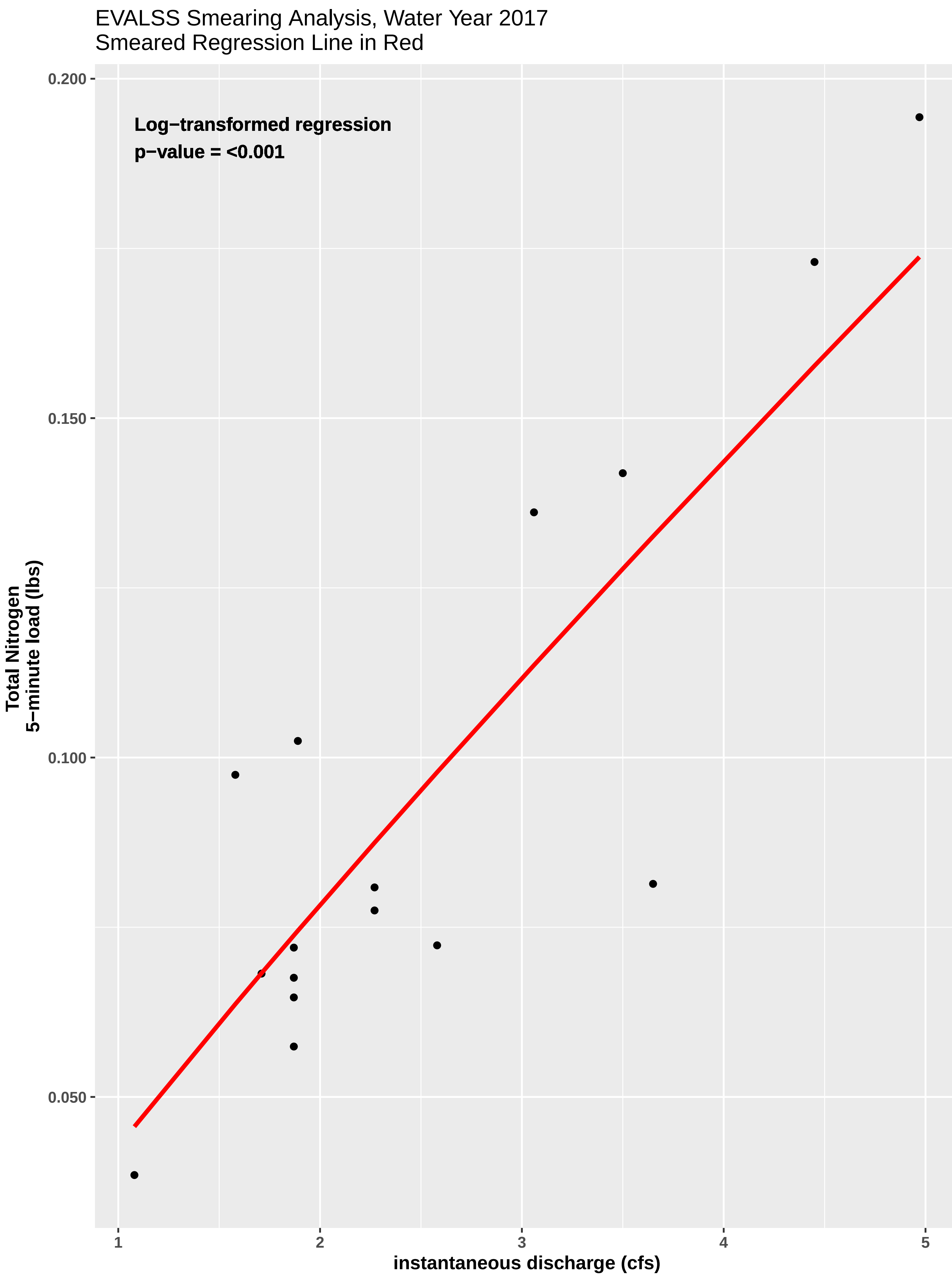

EVALSS Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
15.0
10.0
5.0
0.0
5−minute flow (cfs)
6
4
2
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019



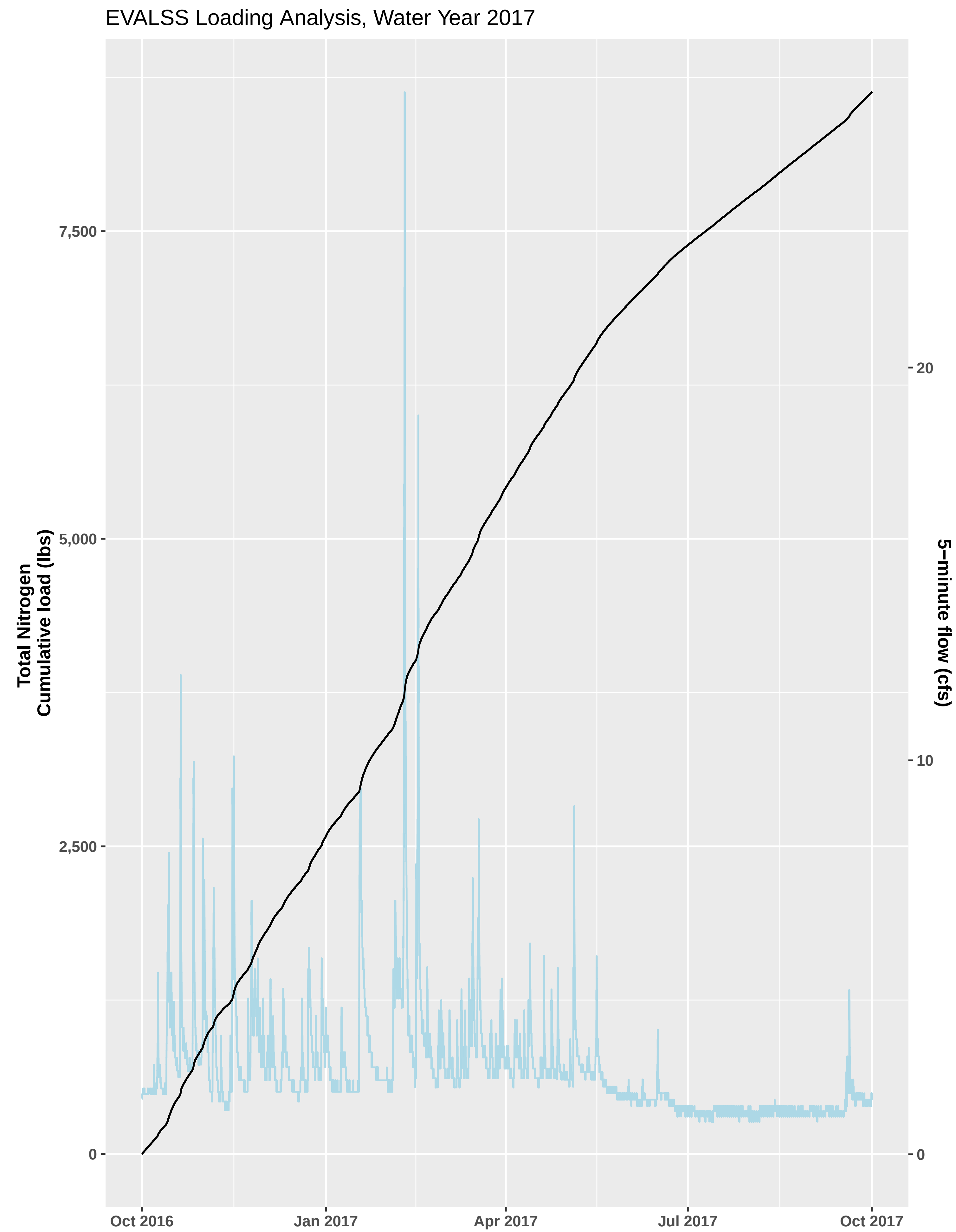
EVALSS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.20
0.10
1.5
2.0
2.5
3.0
instantaneous discharge (cfs)



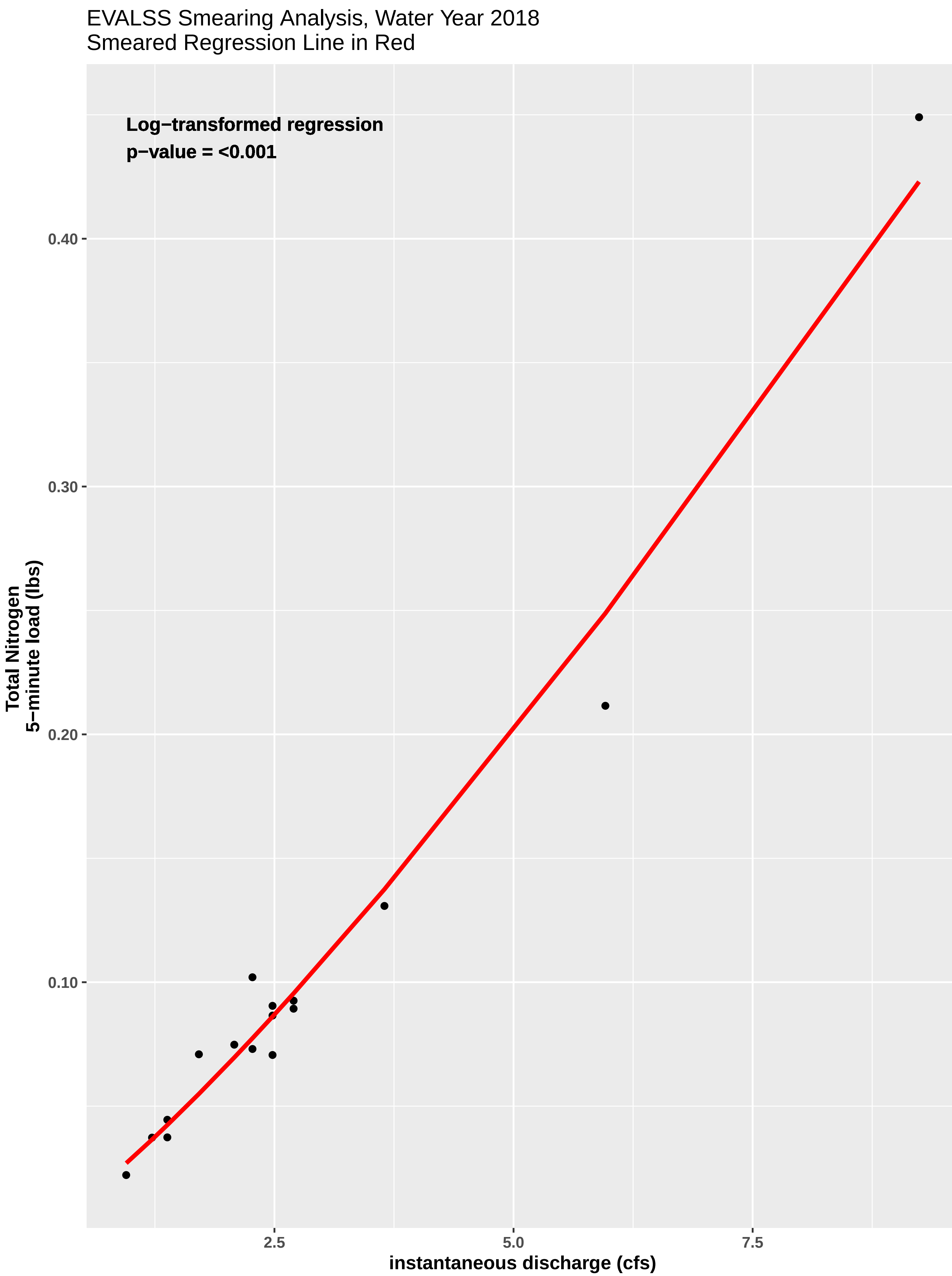
EVALSS Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
12,000
8,000
4,000
0
5−minute flow (cfs)
20
15
10
5
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016



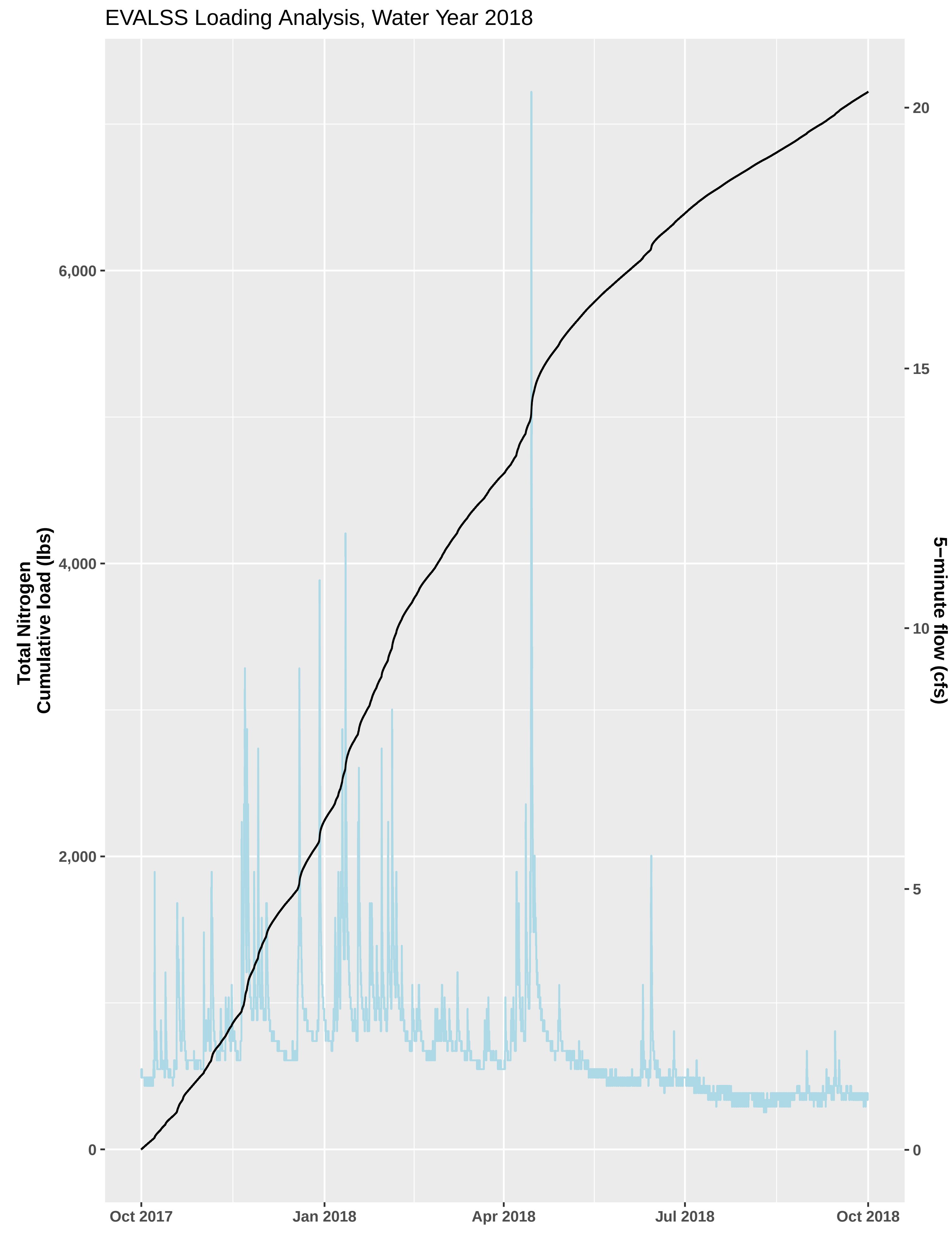
EVALSS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.200
0.150
0.100
0.050
1
2
3
4
5
instantaneous discharge (cfs)



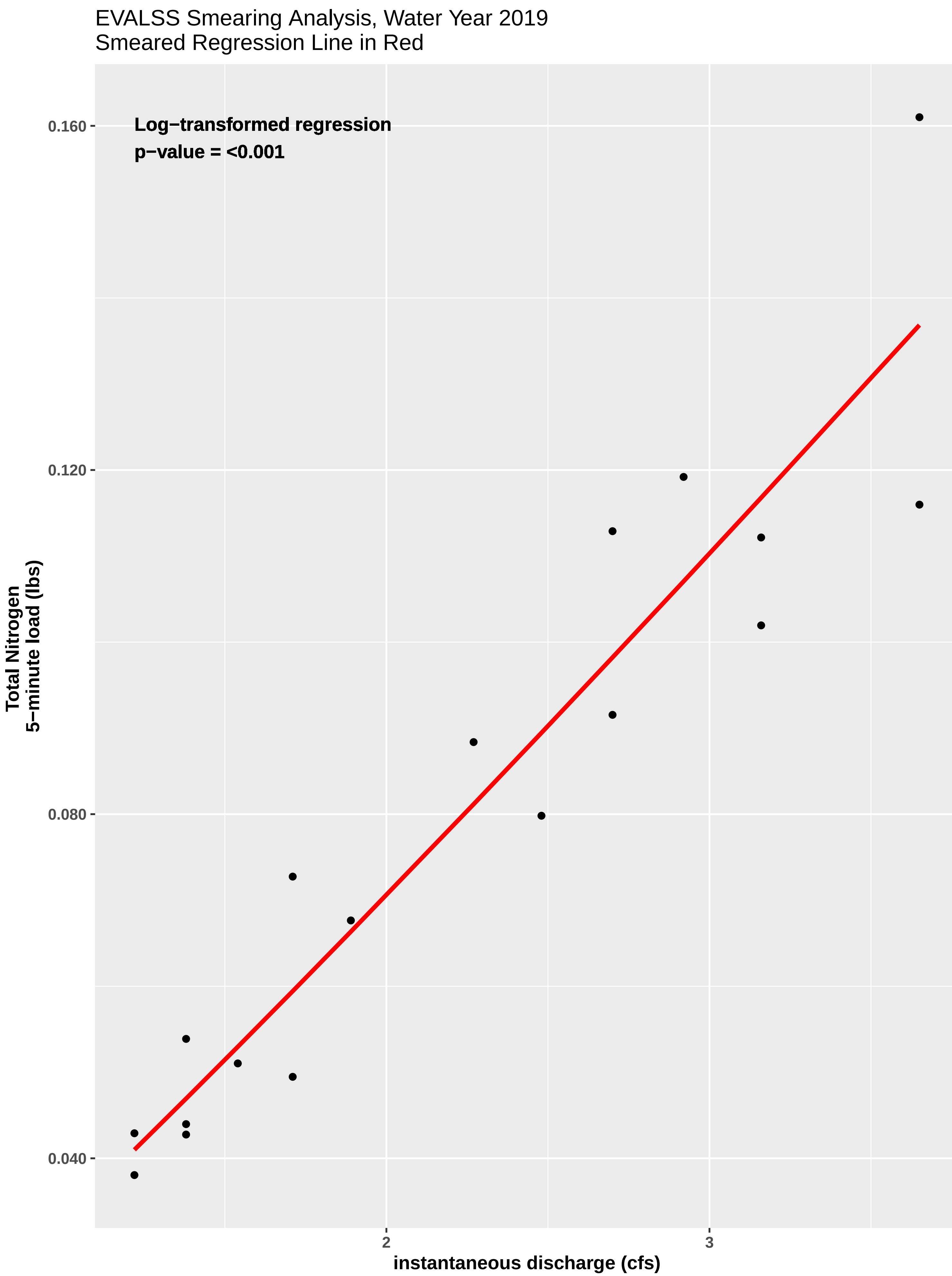
EVALSS Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
7,500
5,000
2,500
0
5−minute flow (cfs)
20
10
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

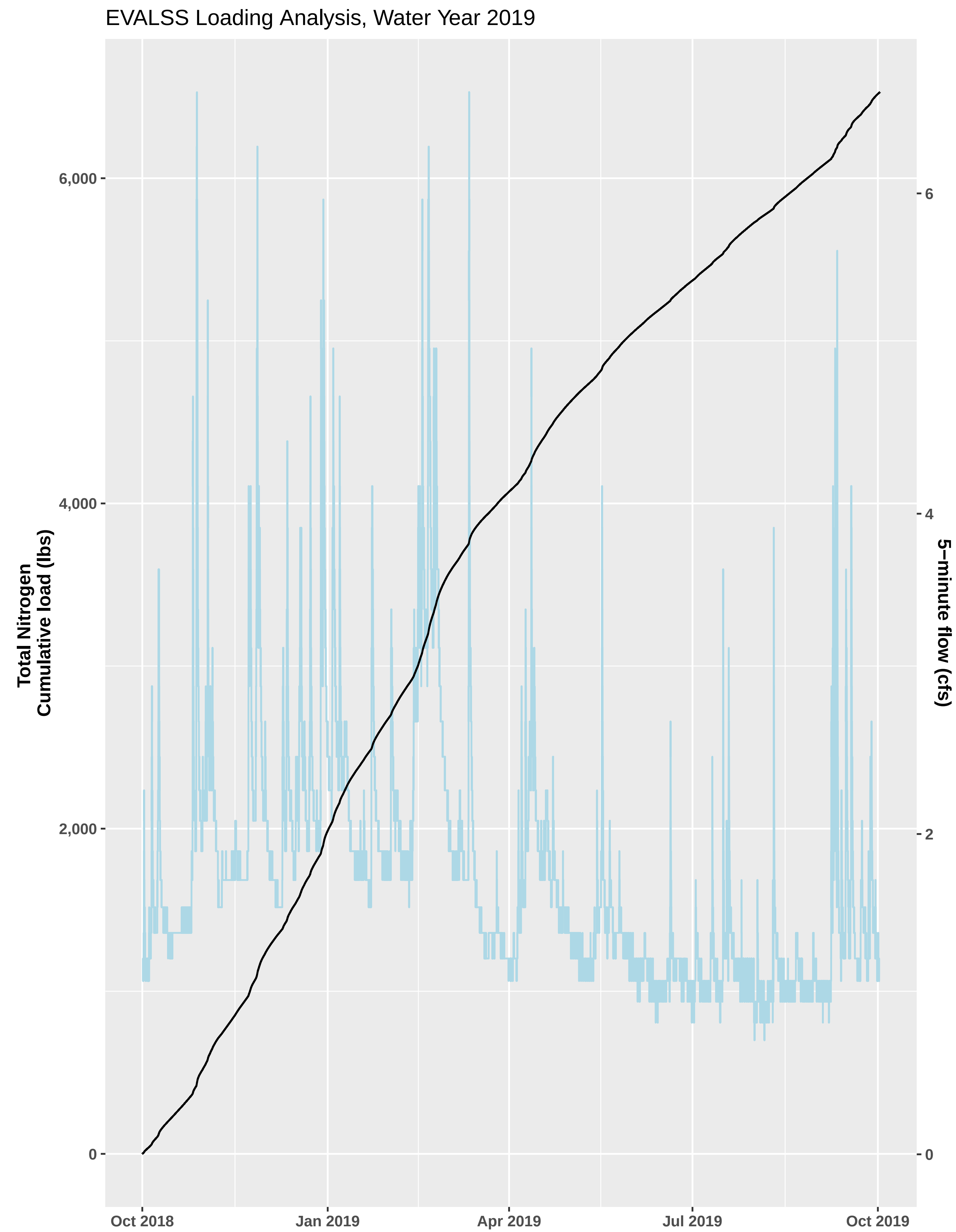


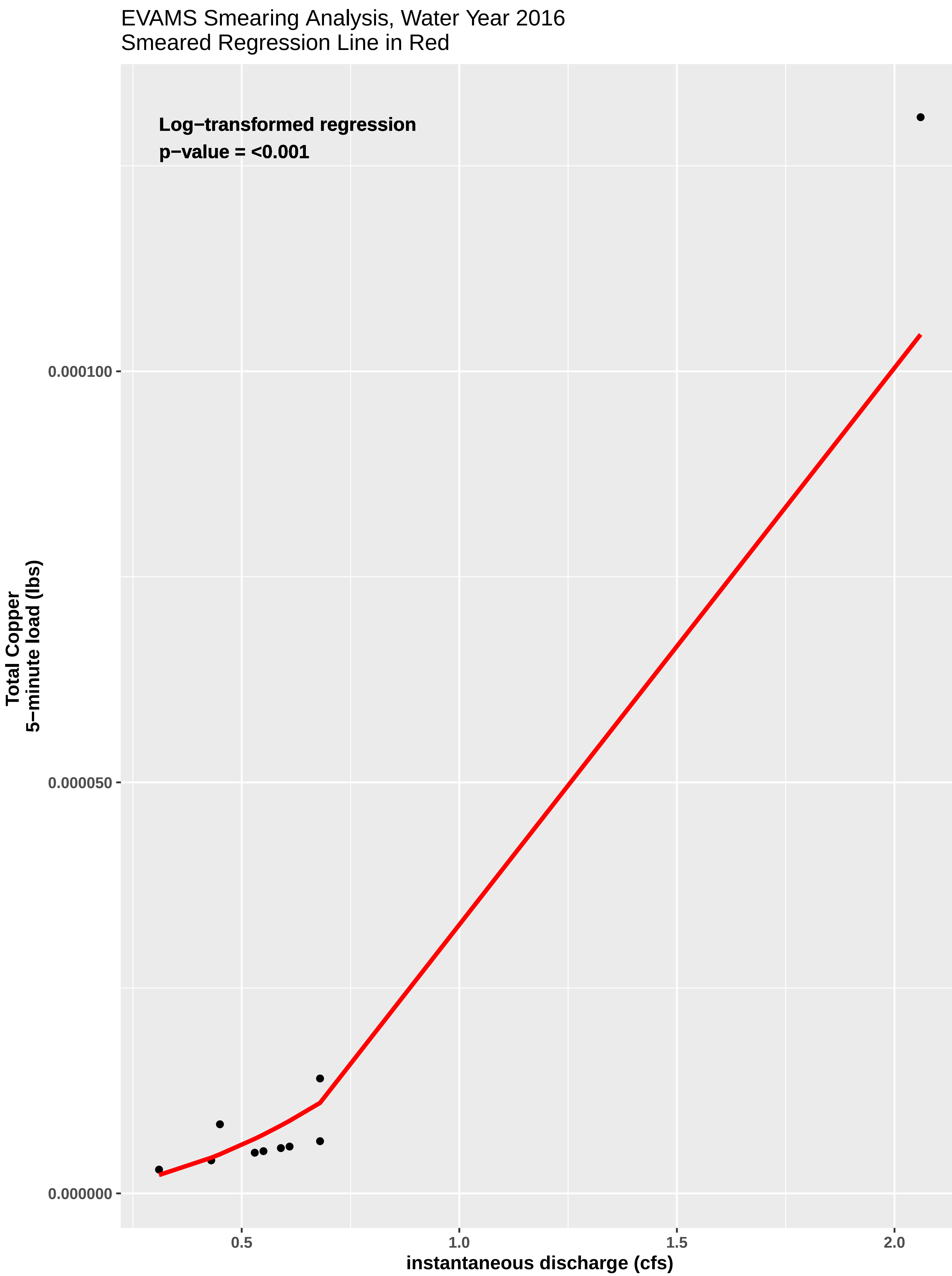
EVALSS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.10
0.20
0.30
0.40
2.5
5.0
7.5
instantaneous discharge (cfs)



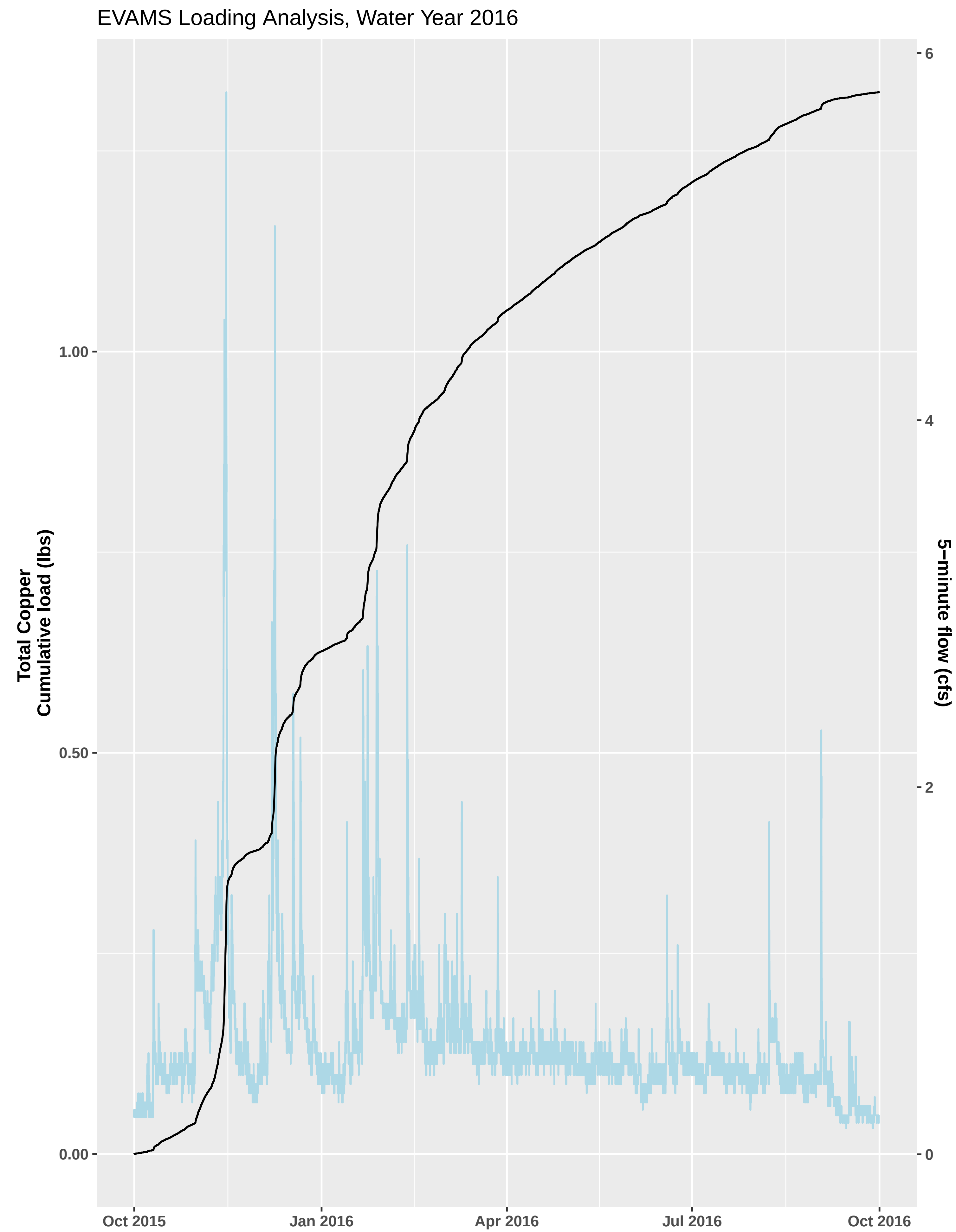
EVALSS Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
2,000
4,000
6,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


EVALSS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.160
0.120
0.080
0.040
2
3
instantaneous discharge (cfs)

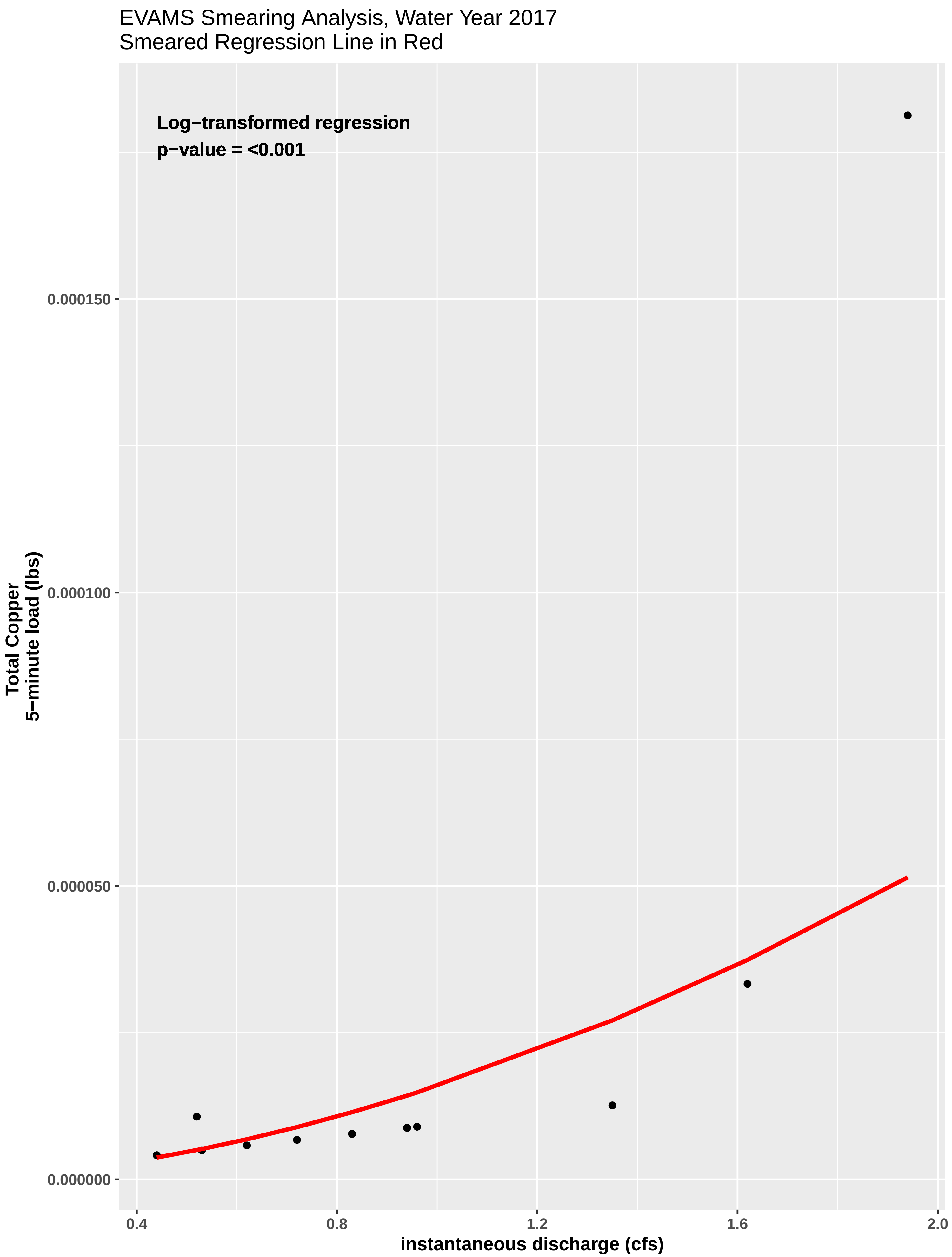

EVALSS Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
6,000
4,000
2,000
0
6
4
2
0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

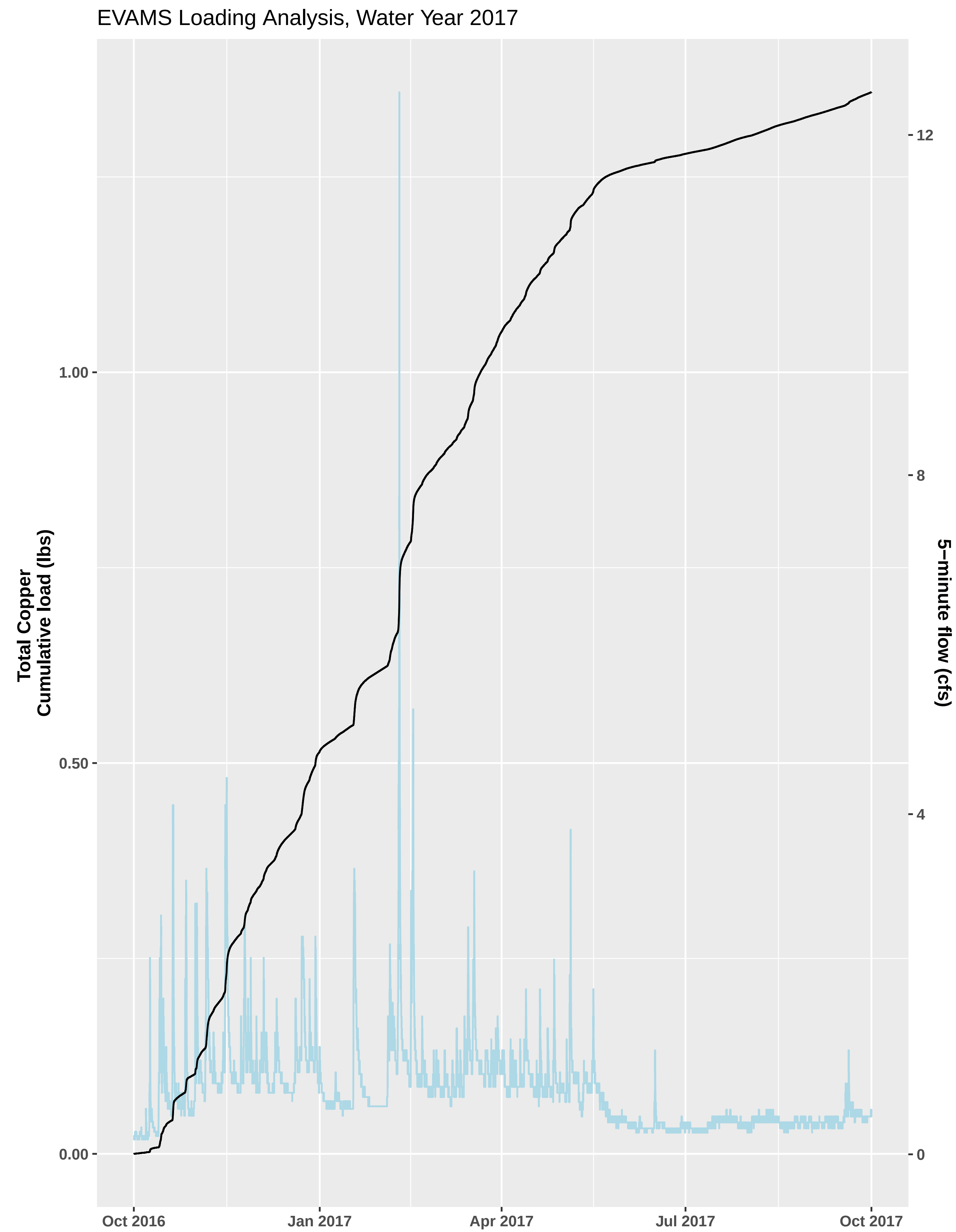


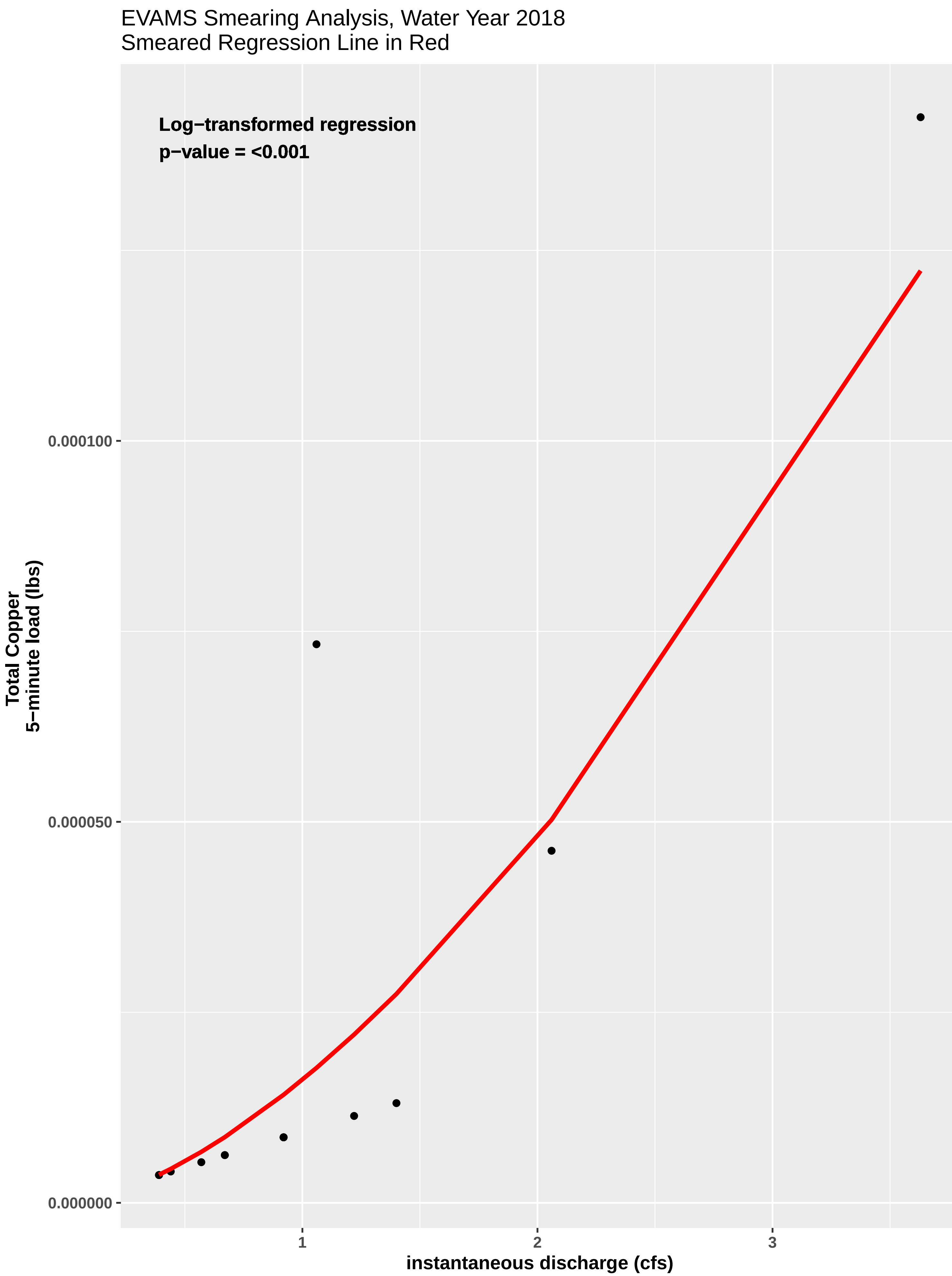
EVAMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000100
0.000050
0.000000
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

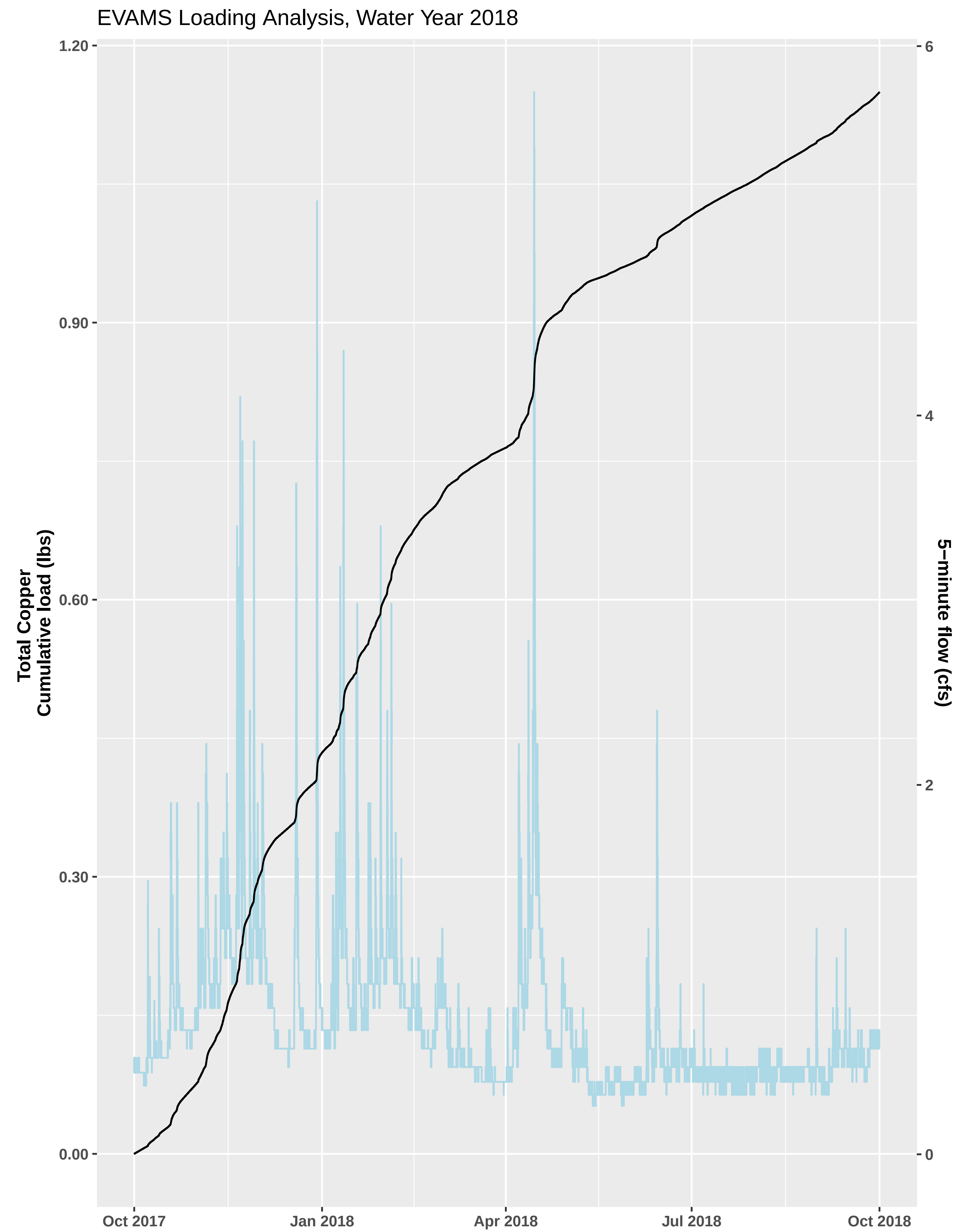


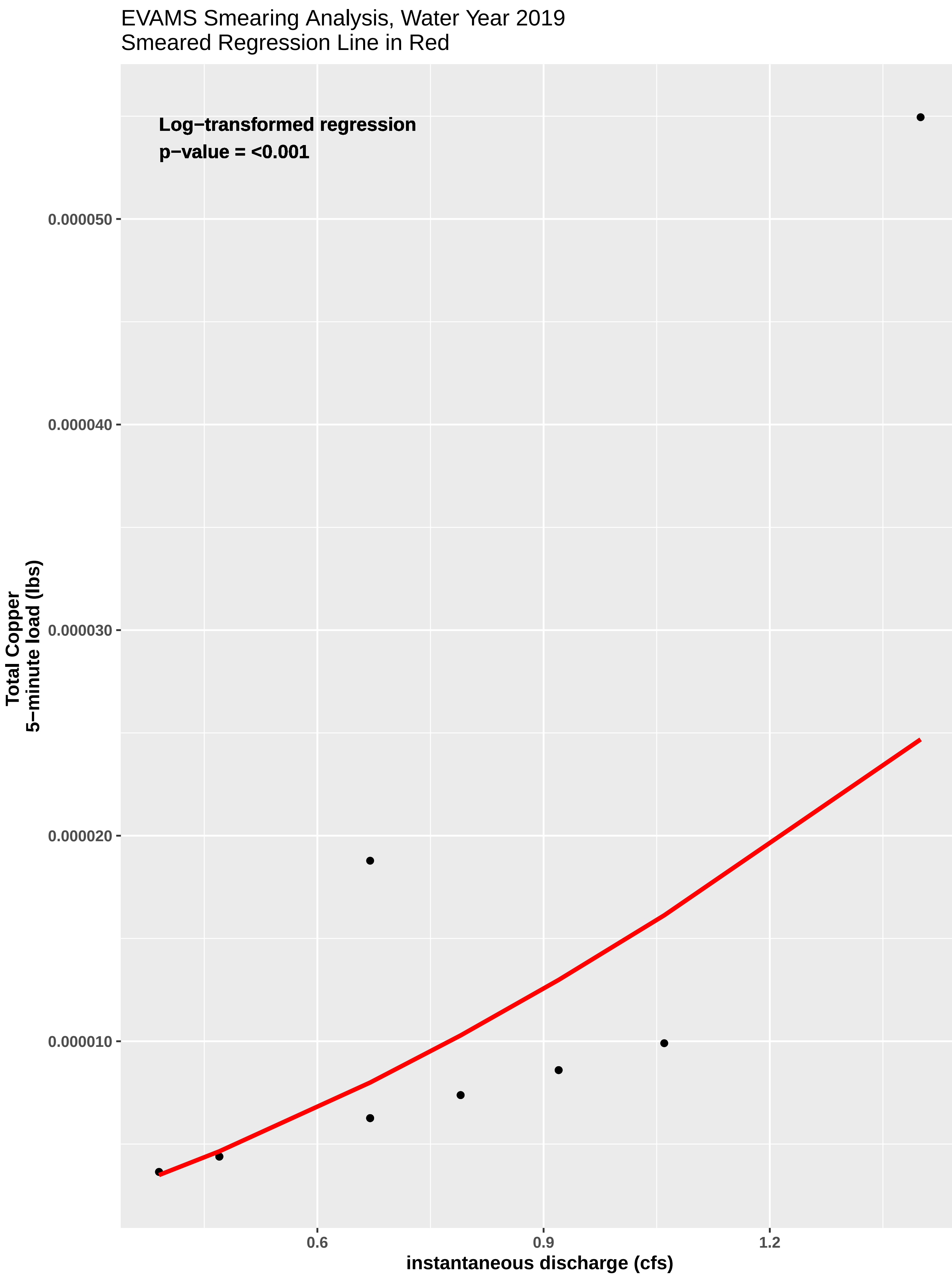
EVAMS Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
1.00
0.50
0.00
5−minute flow (cfs)
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

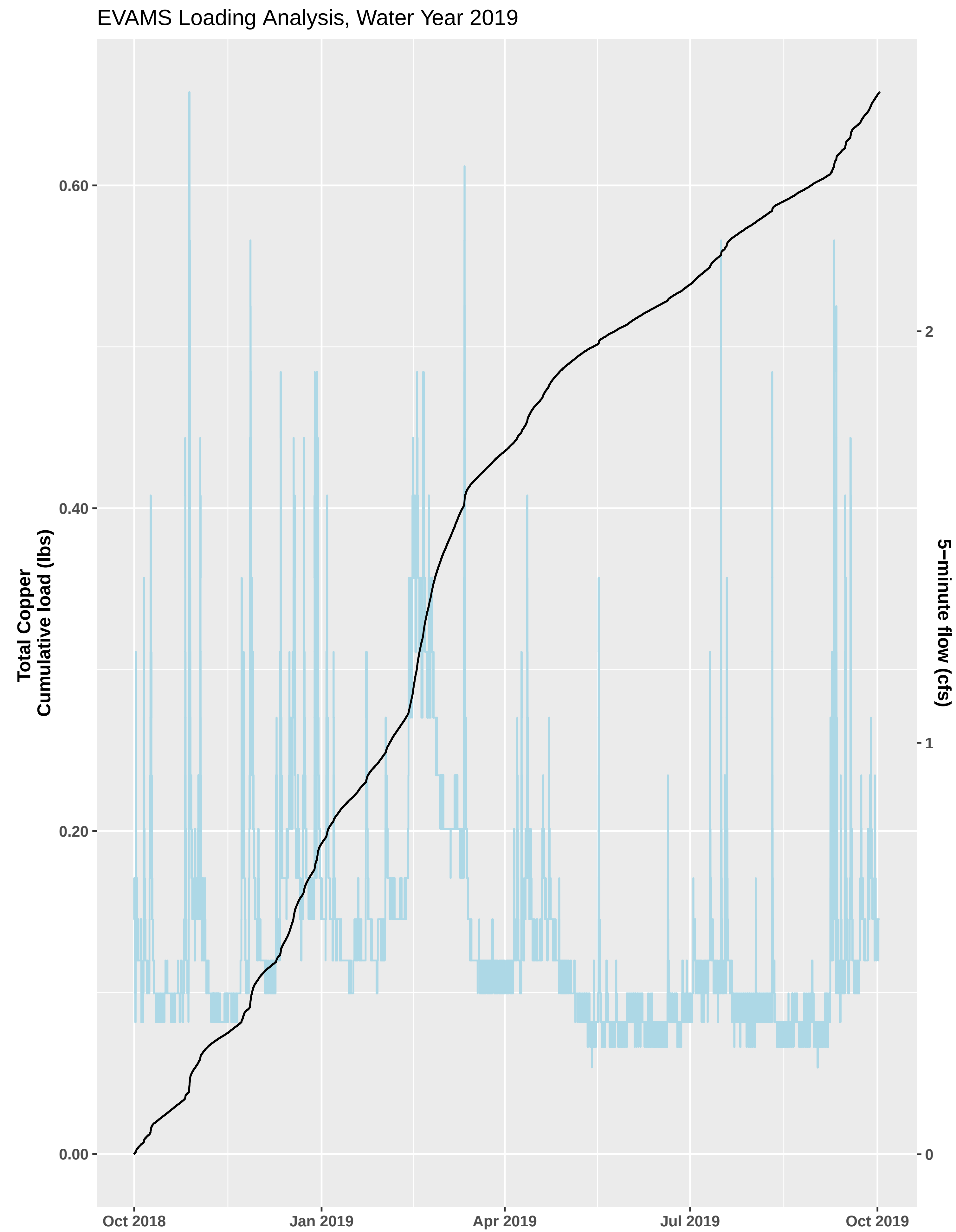

EVAMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000050
0.000100
0.000150
0.4
0.8
1.2
1.6
2.0
instantaneous discharge (cfs)

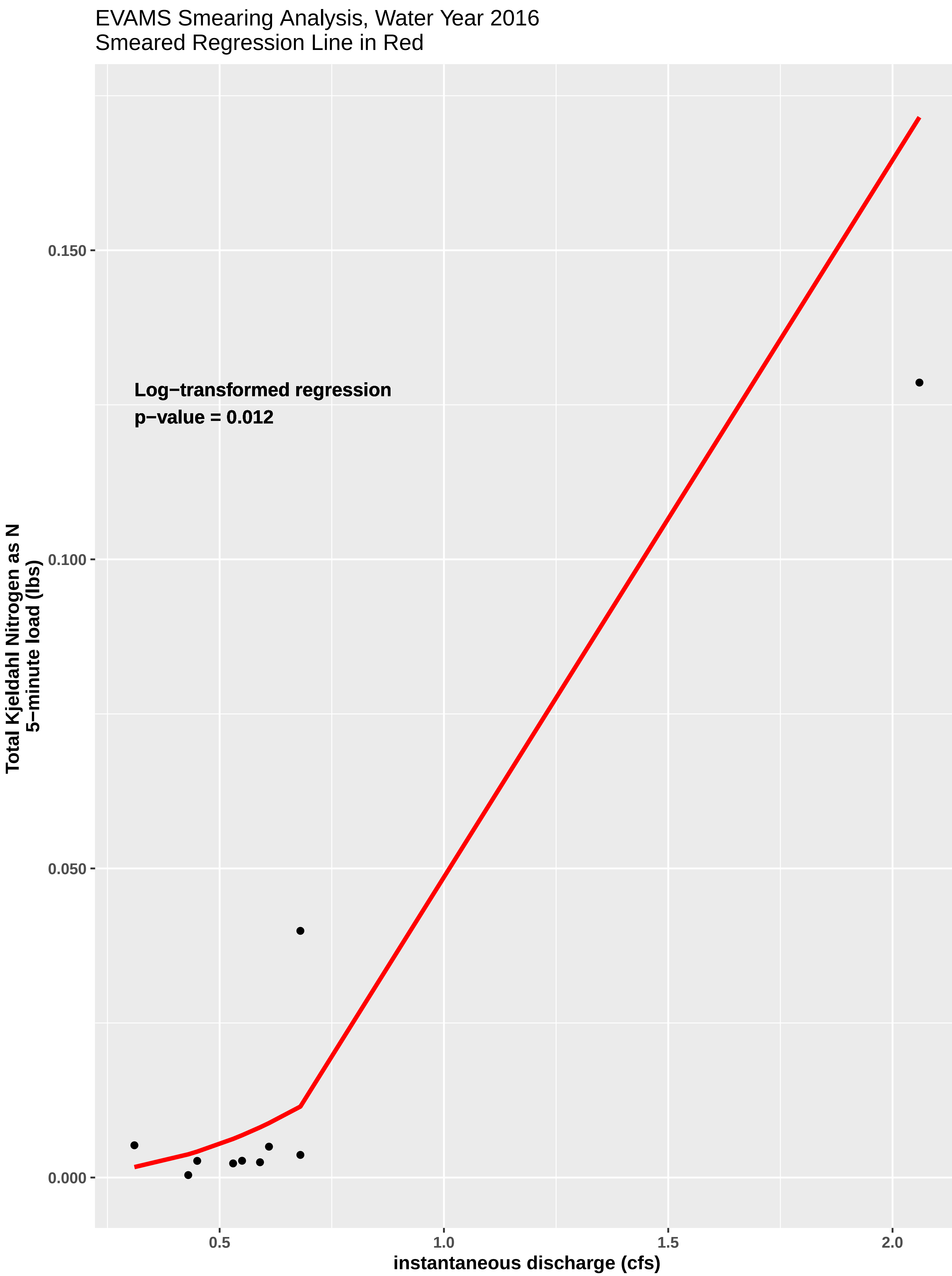

EVAMS Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
0.00
0.50
1.00
5−minute flow (cfs)
0
4
8
12
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

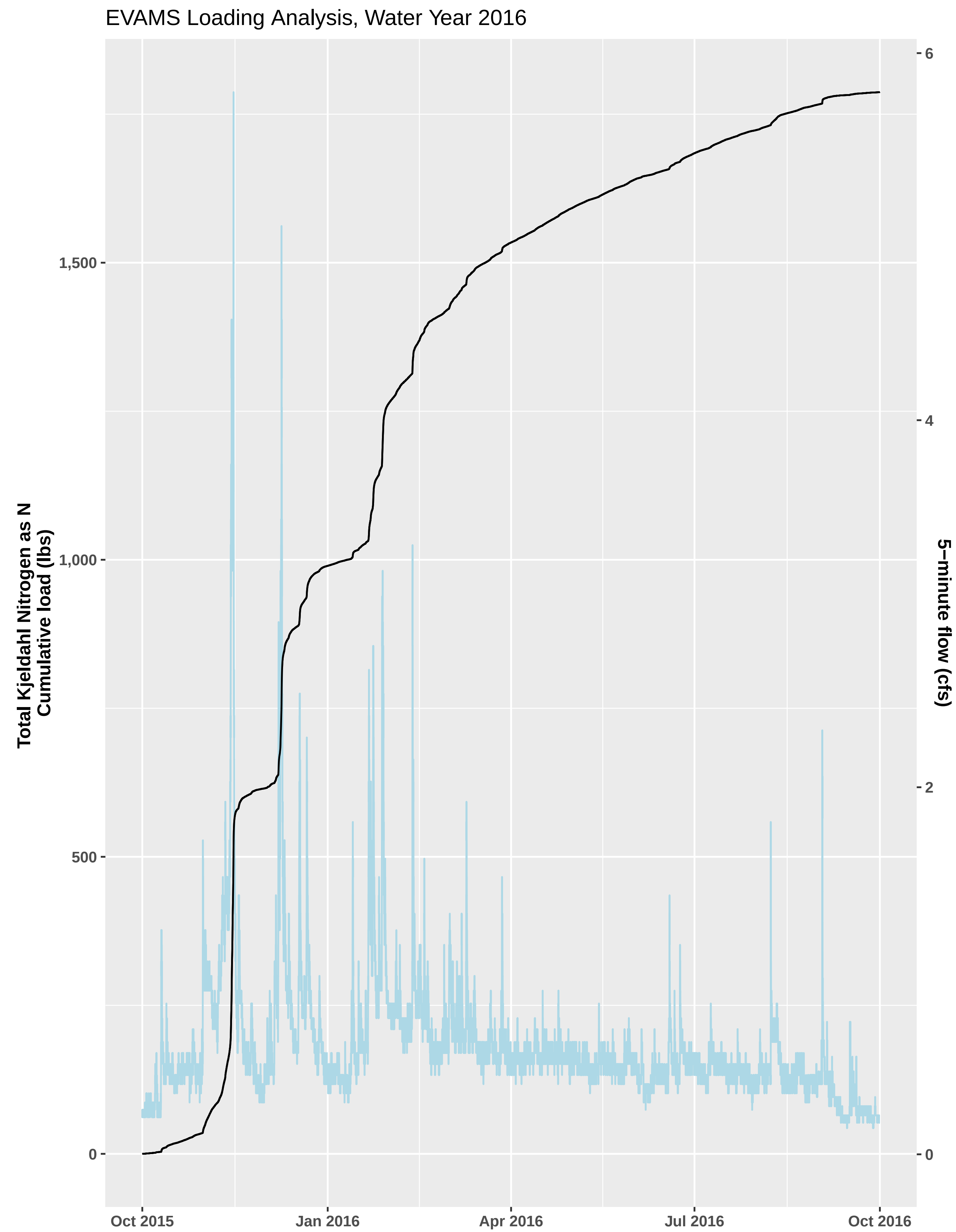

EVAMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000100
0.000050
0.000000
1
2
3
instantaneous discharge (cfs)

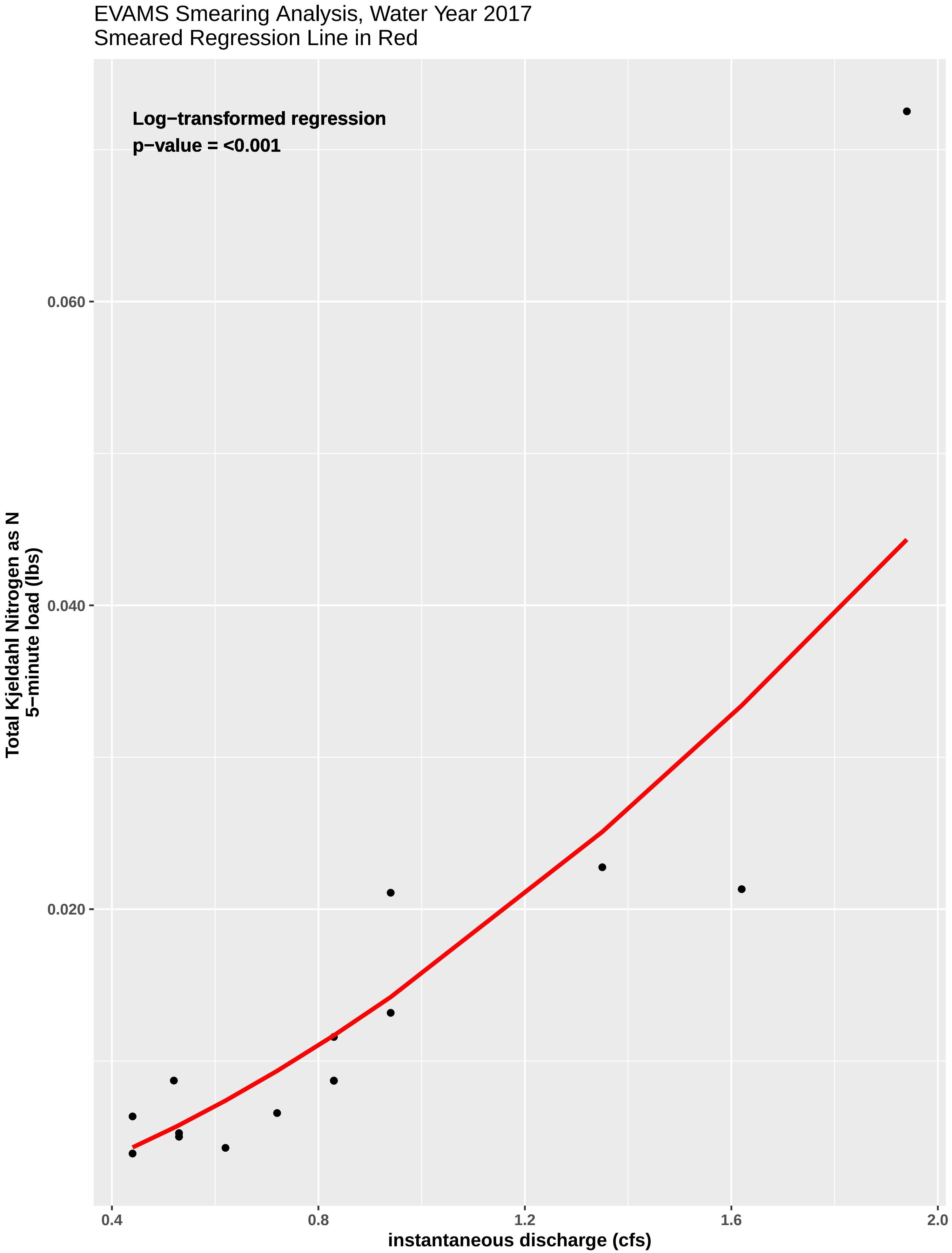

EVAMS Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
1.20
0.90
0.60
0.30
0.00
5−minute flow (cfs)
6
4
2
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

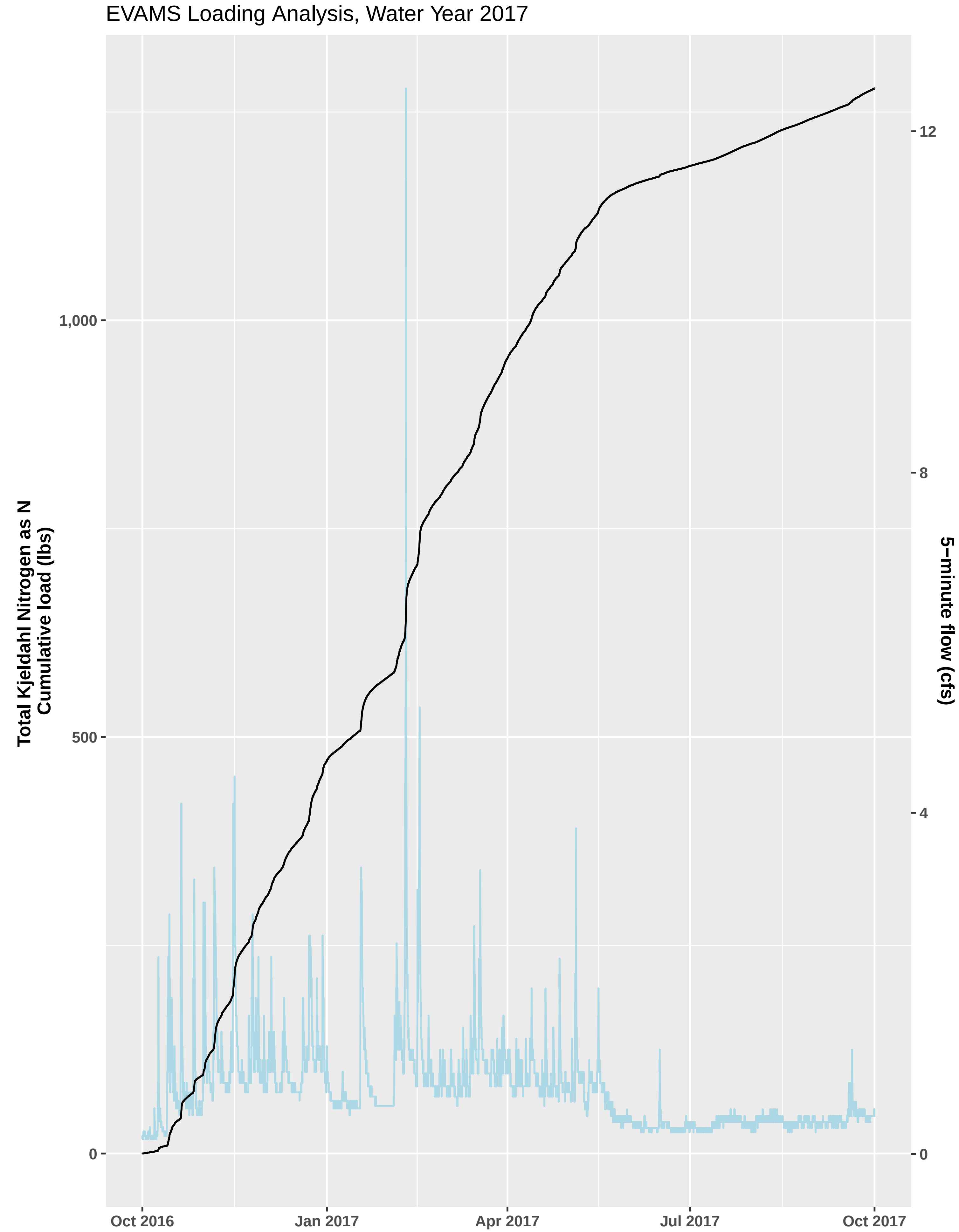

EVAMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000010
0.000020
0.000030
0.000040
0.000050
0.6
0.9
1.2
instantaneous discharge (cfs)

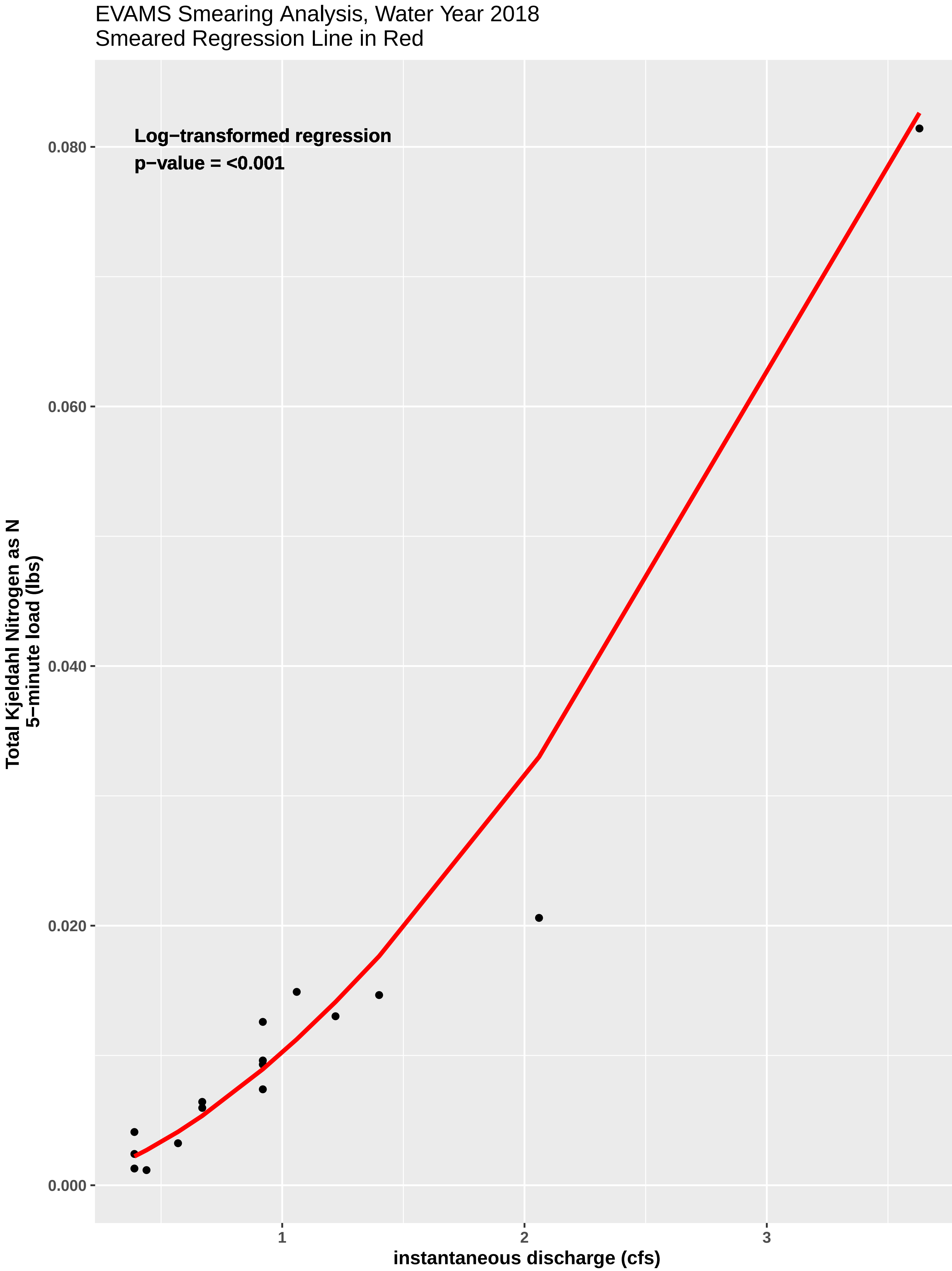

EVAMS Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.00
0.20
0.40
0.60
5−minute flow (cfs)
0
1
2
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

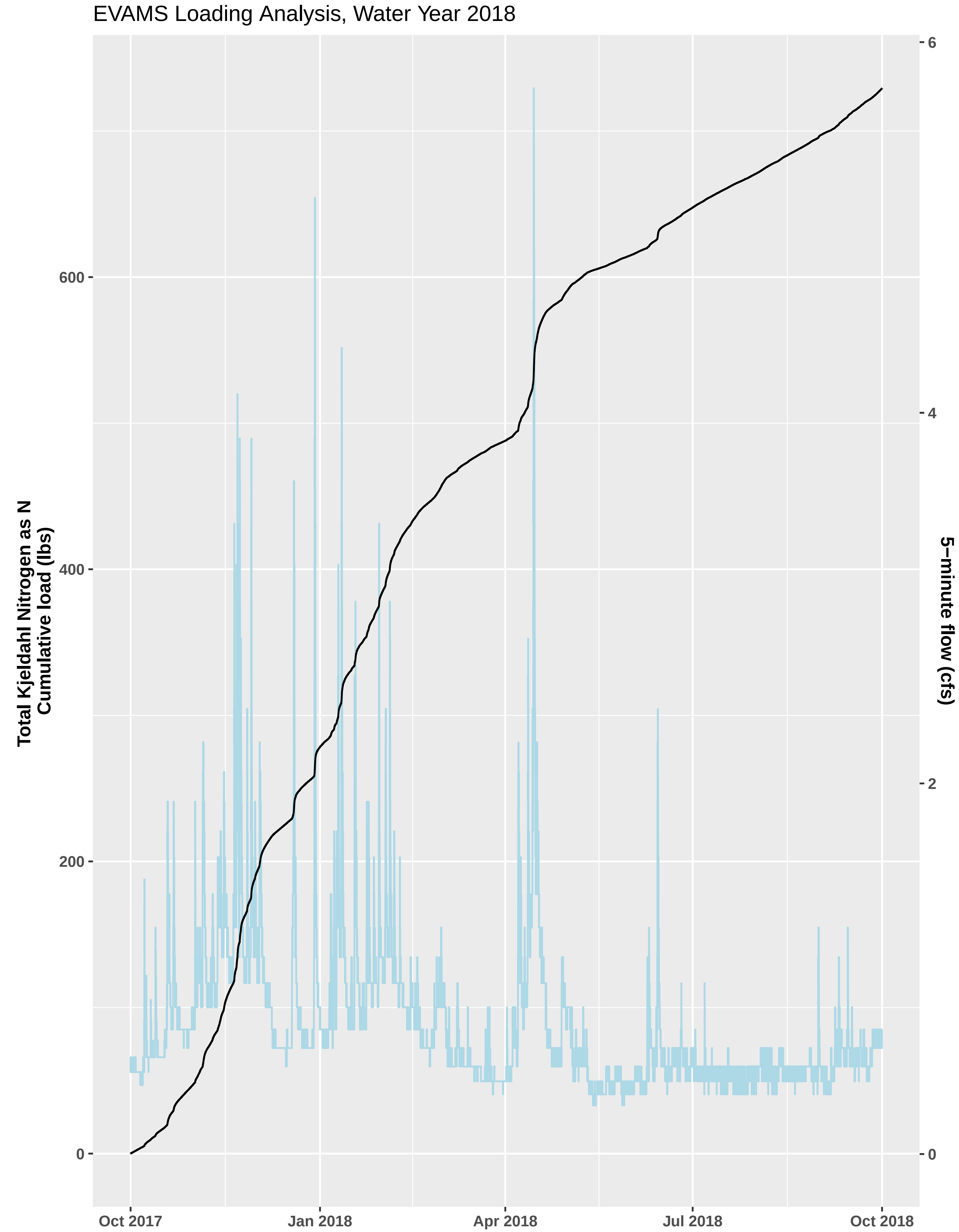

EVAMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.012
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

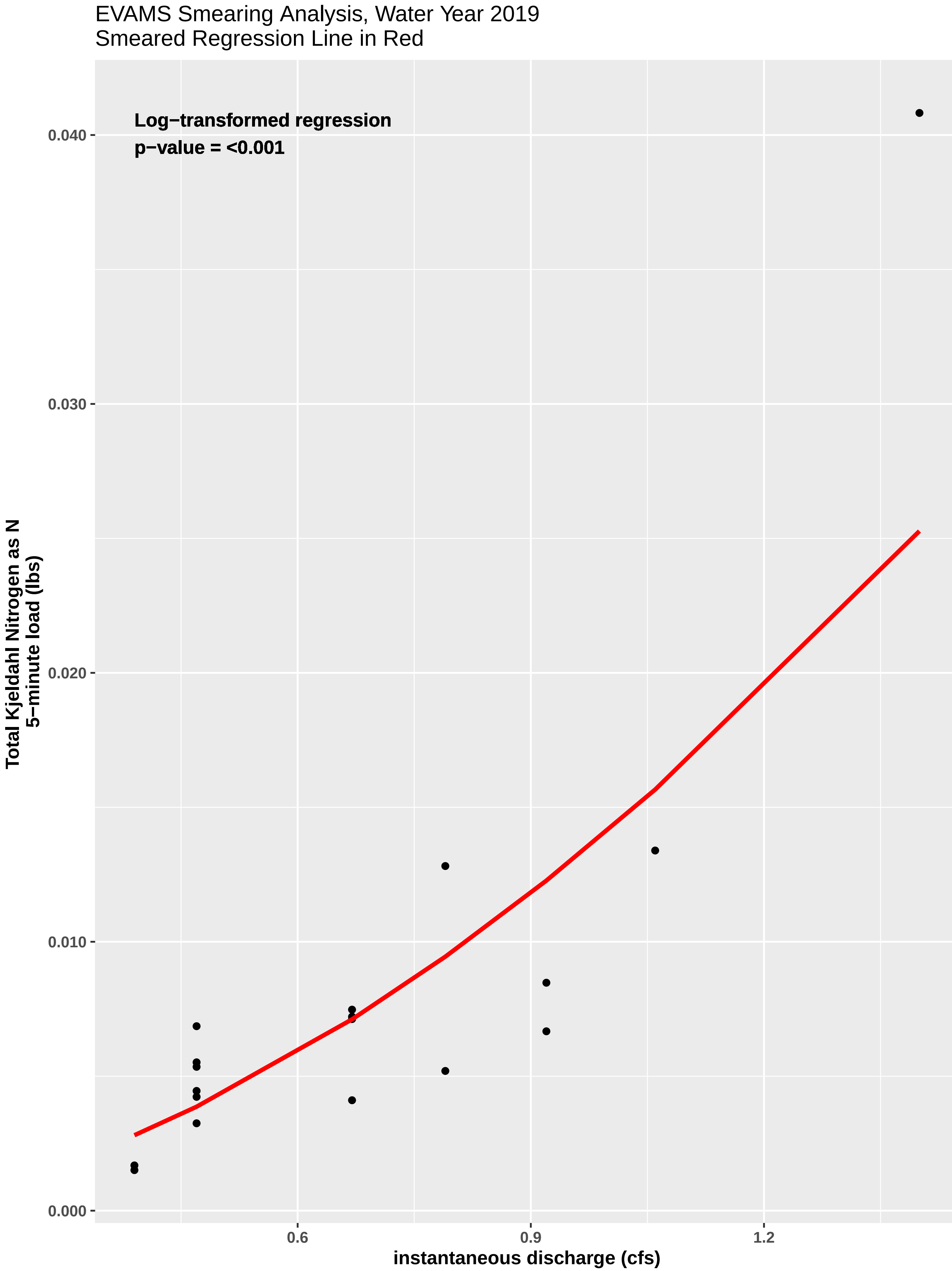

EVAMS Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
1,500
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


EVAMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.060
0.040
0.020
0.4
0.8
1.2
1.6
2.0
instantaneous discharge (cfs)

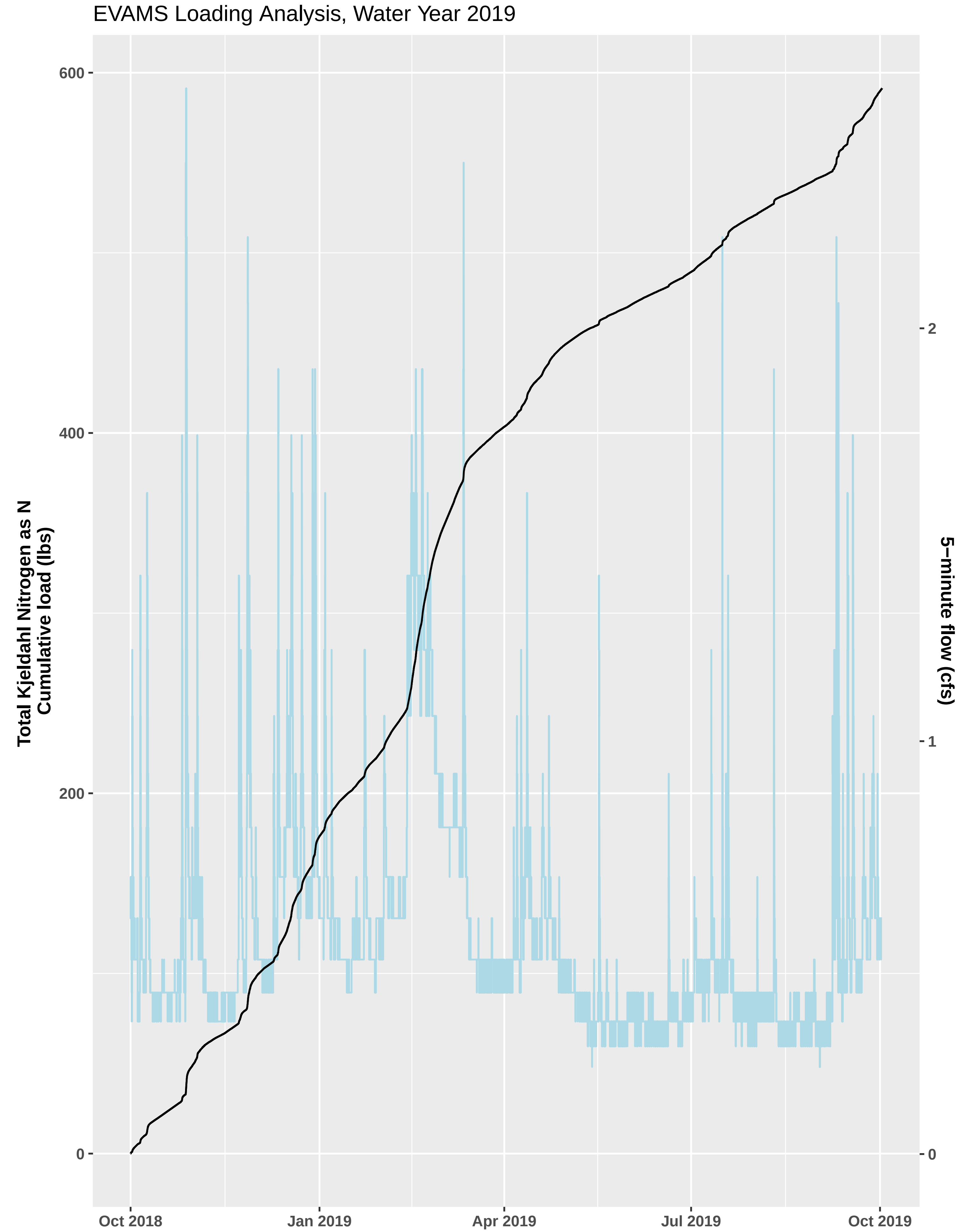

EVAMS Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
1,000
500
0
5−minute flow (cfs)
12
8
4
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


EVAMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.080
1
2
3
instantaneous discharge (cfs)

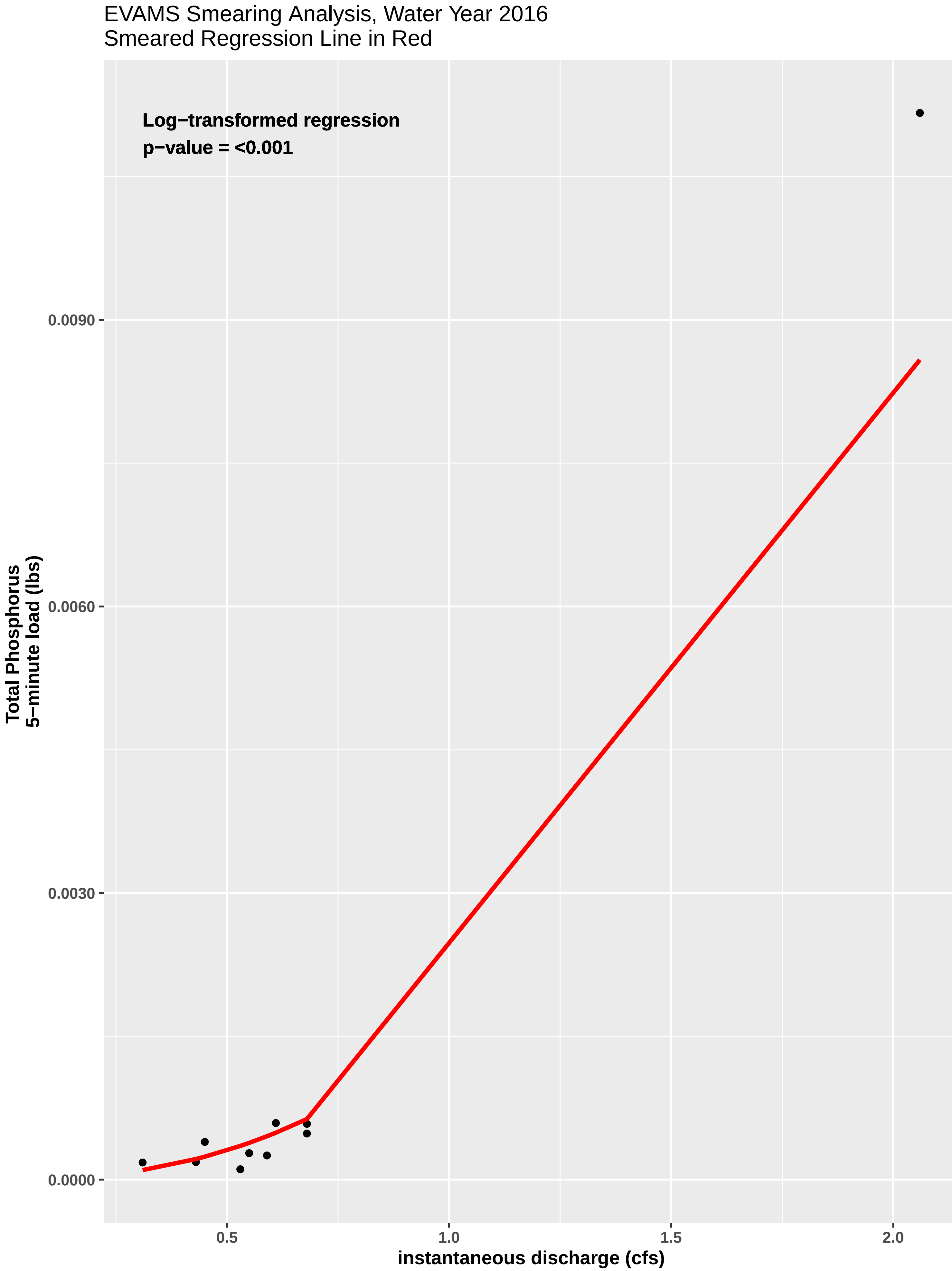

EVAMS Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

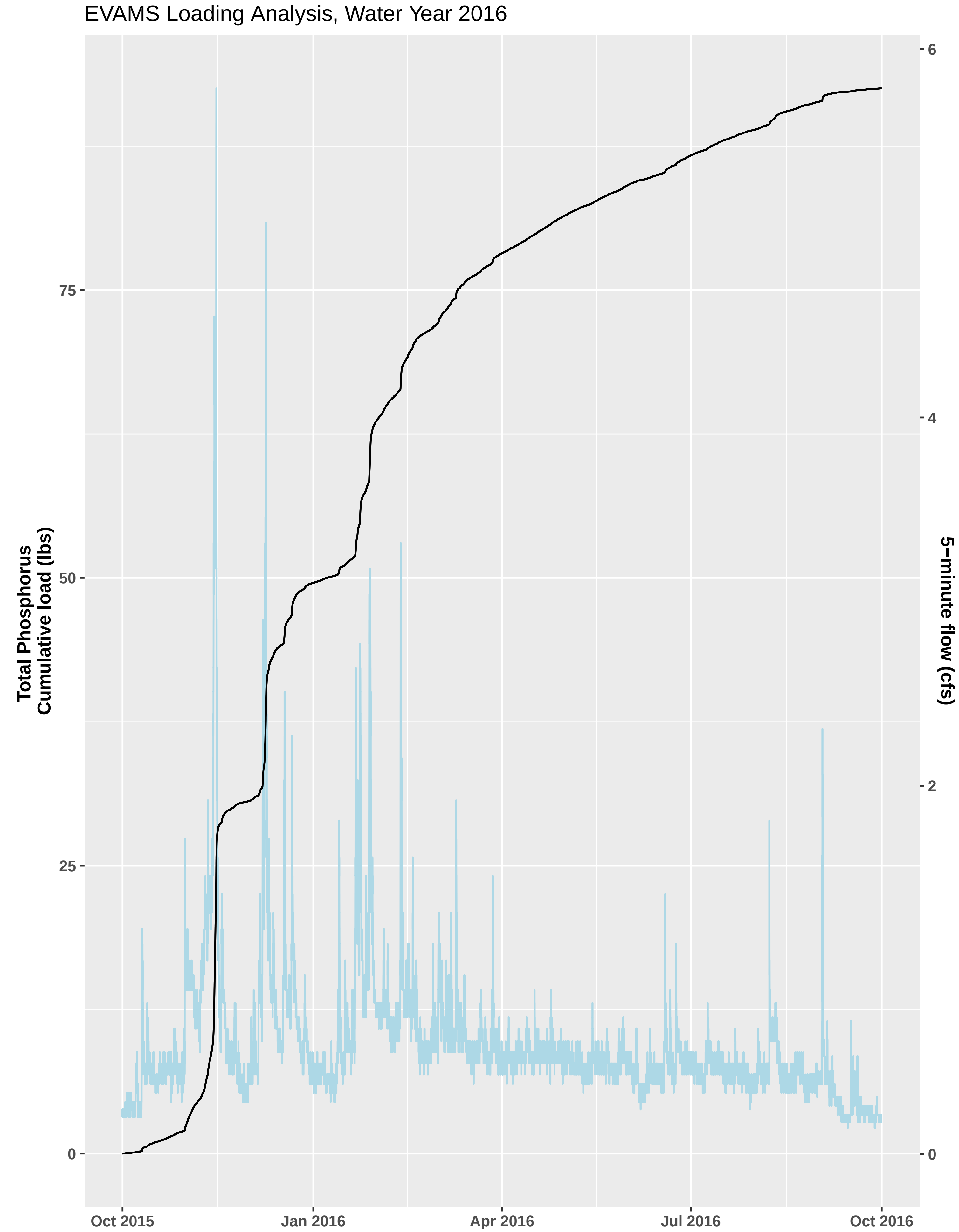


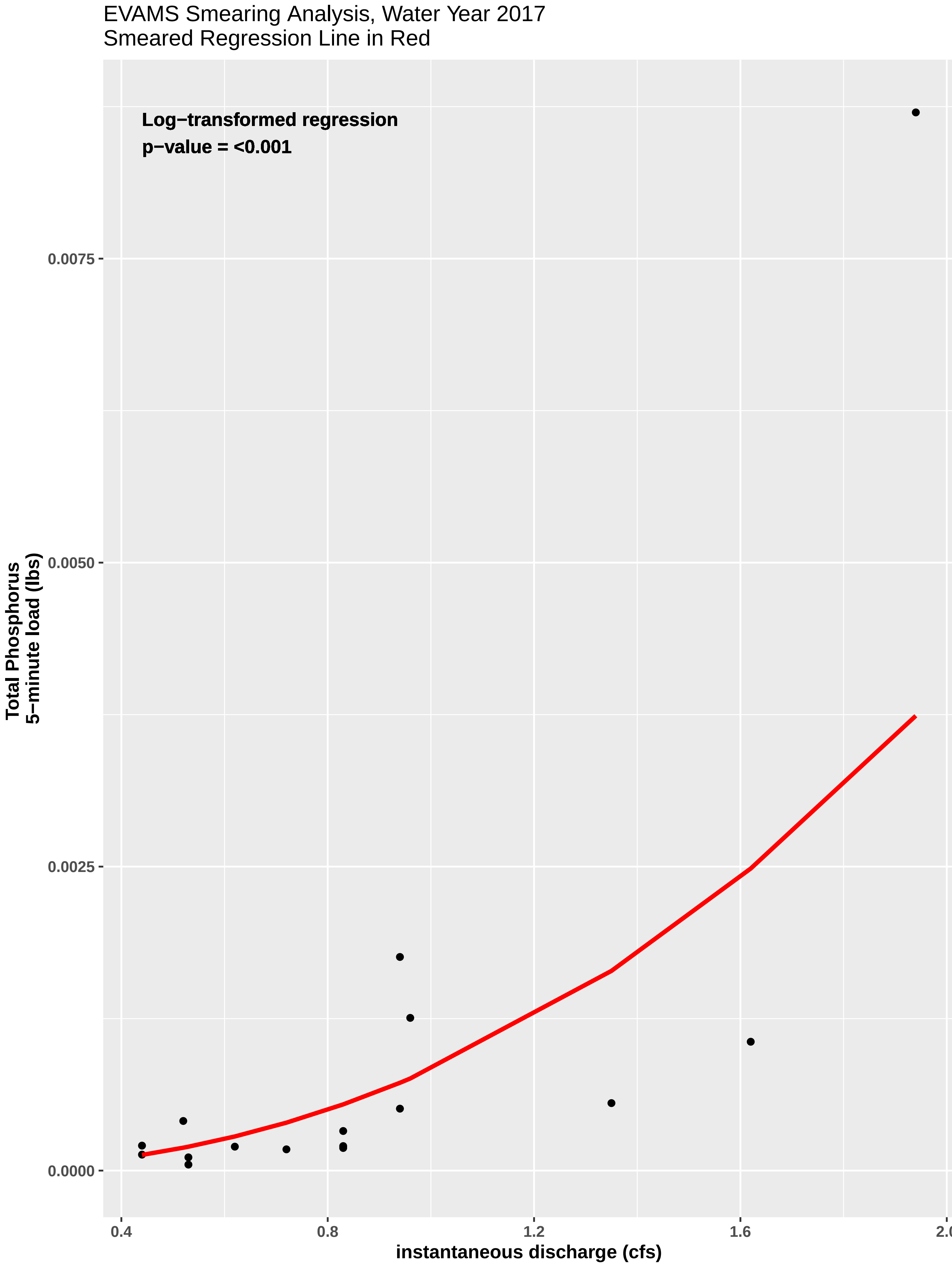
EVAMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000
0.010
0.020
0.030
0.040
0.6
0.9
1.2
instantaneous discharge (cfs)
Total Kjeldahl Nitrogen as N
5−minute load (lbs)

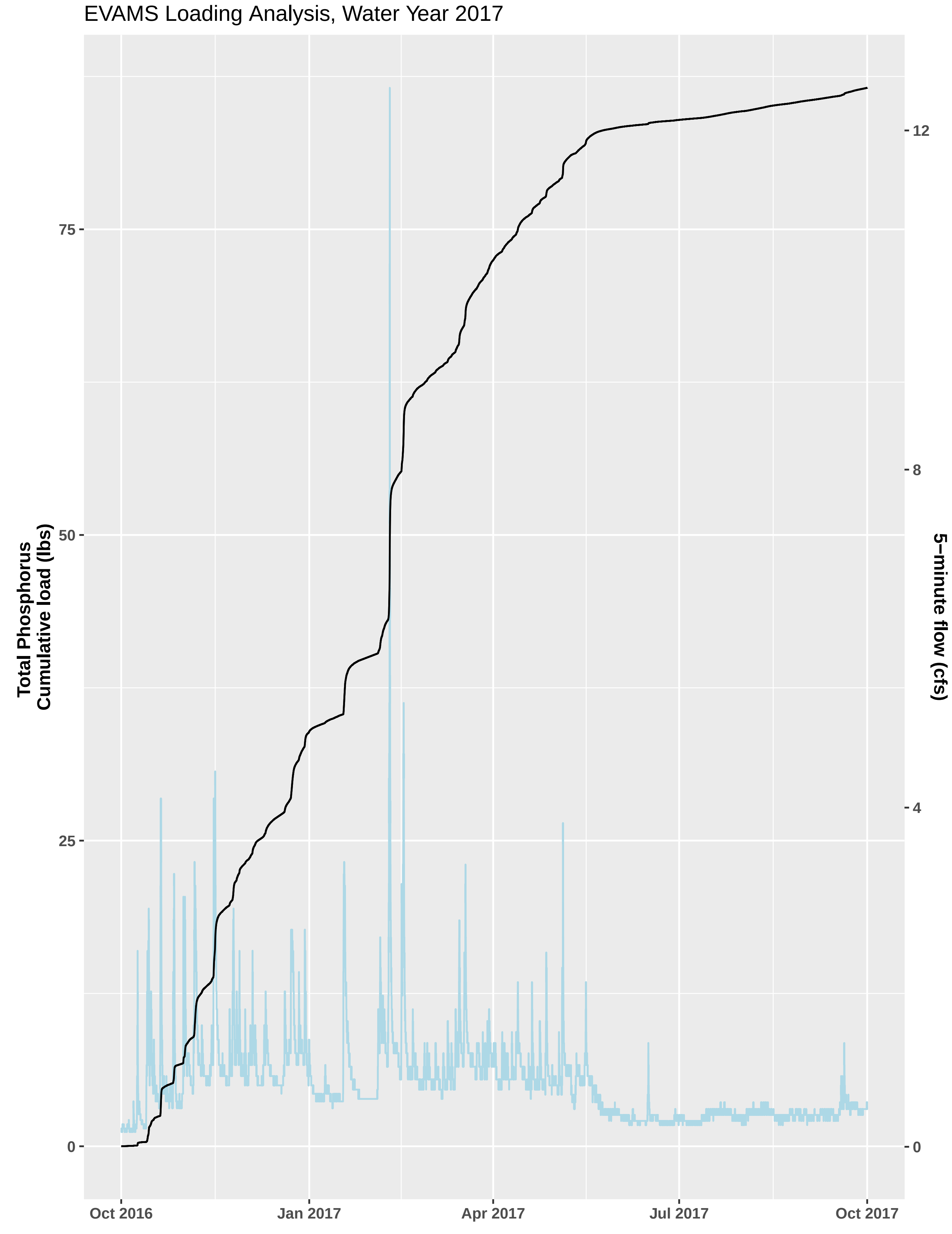


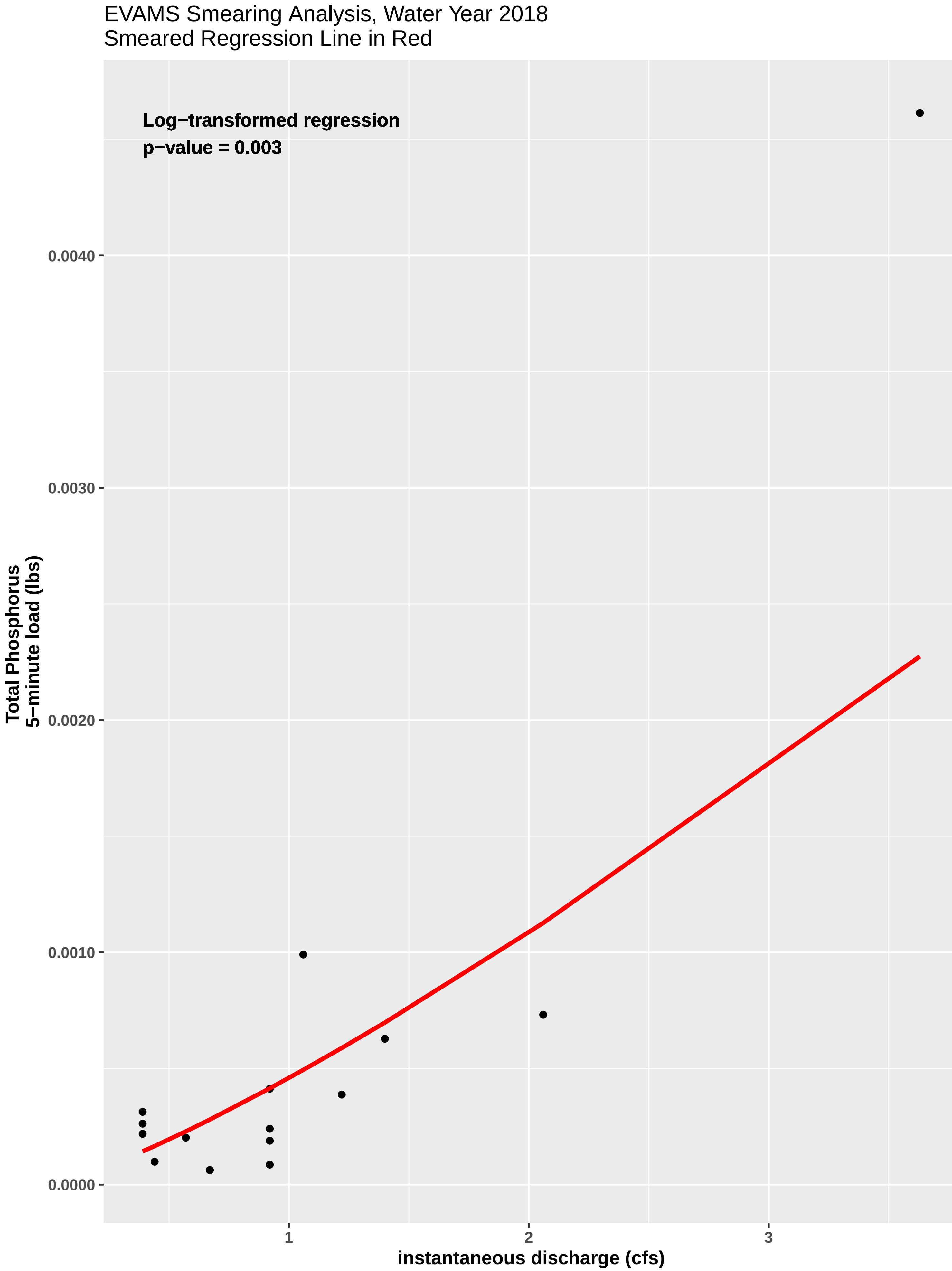
EVAMS Loading Analysis, Water Year 2019
0
200
400
600
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
0
1
2

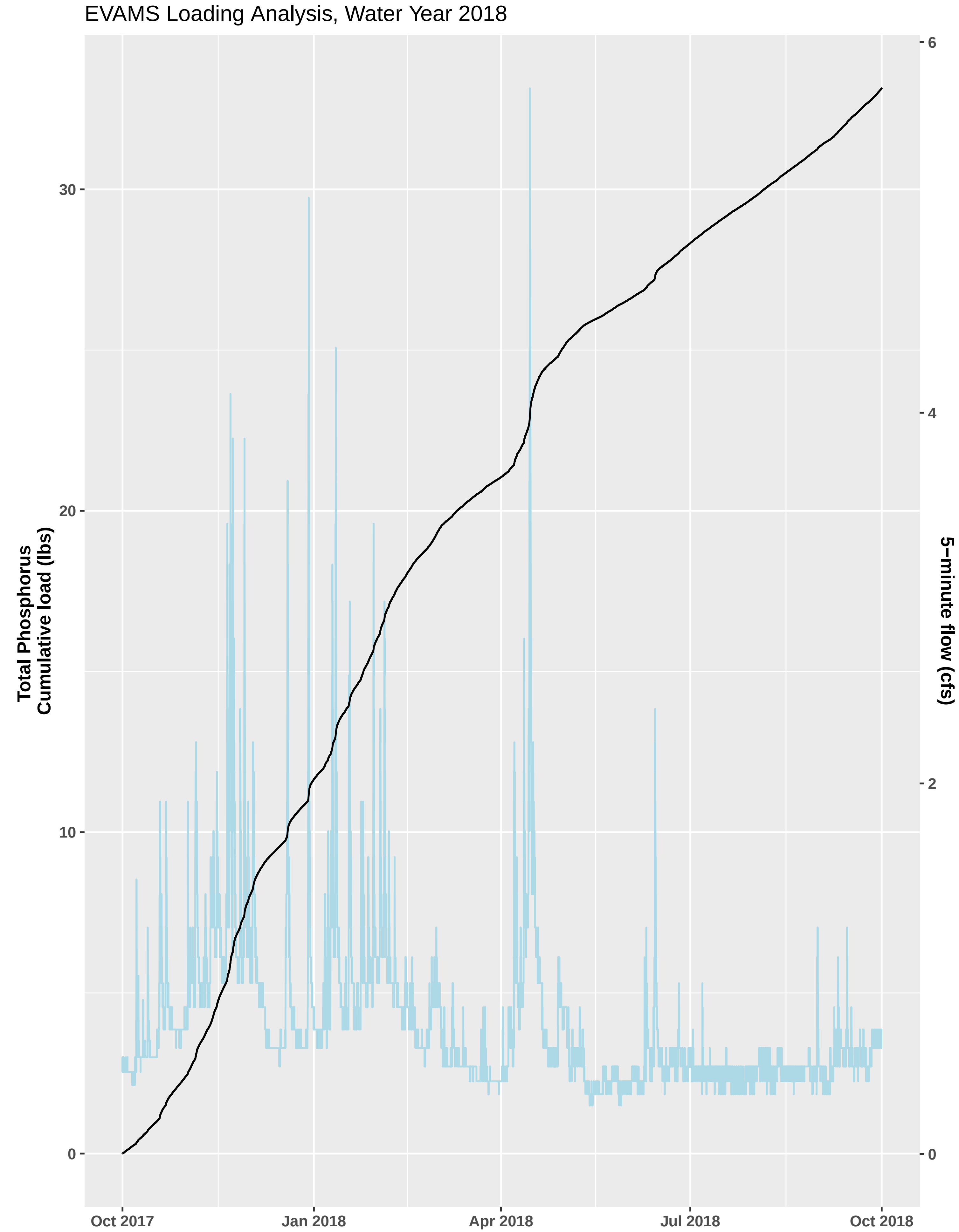

EVAMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0030
0.0060
0.0090
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

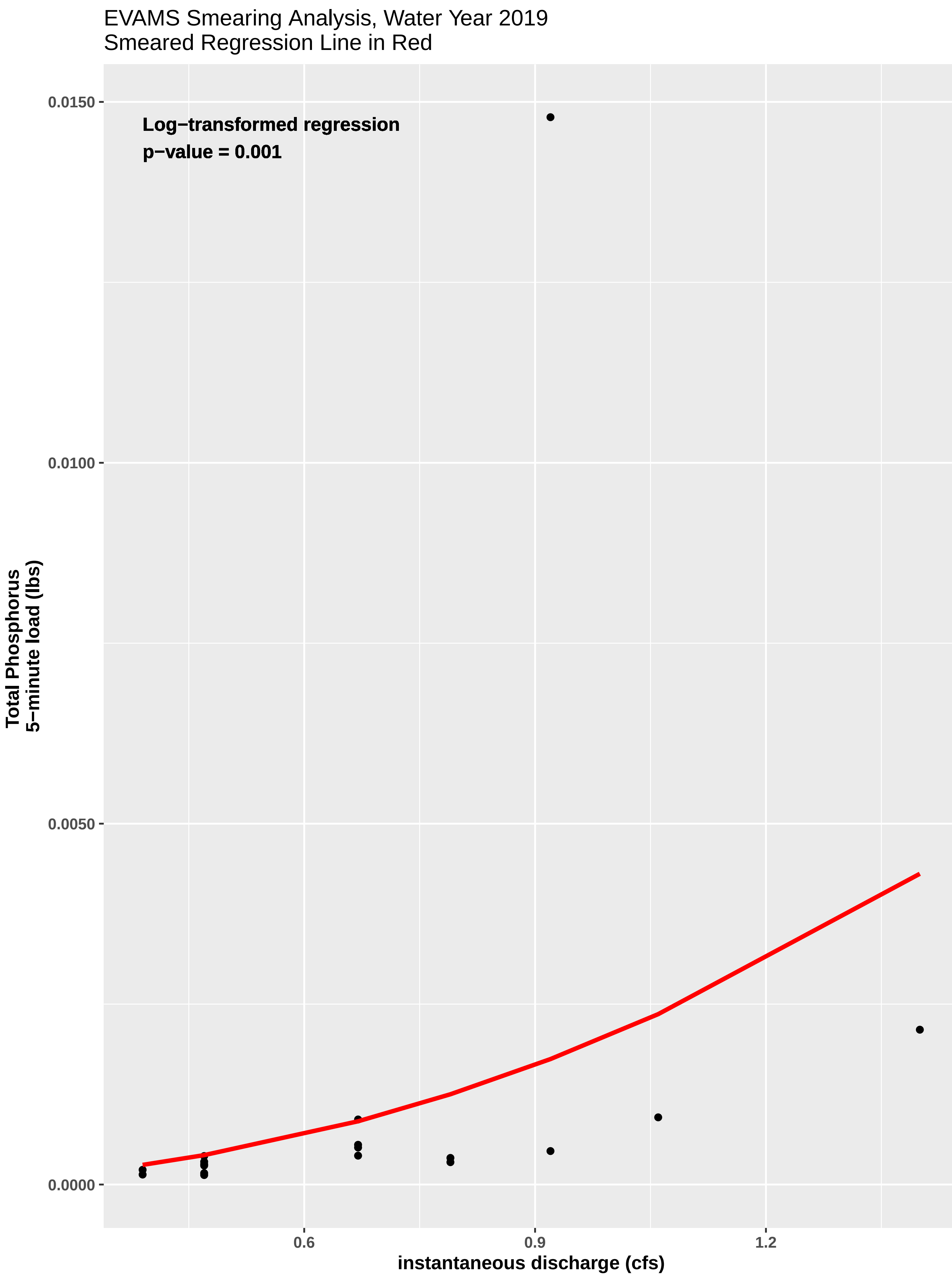

EVAMS Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


EVAMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0025
0.0050
0.0075
0.4
0.8
1.2
1.6
2.0
instantaneous discharge (cfs)

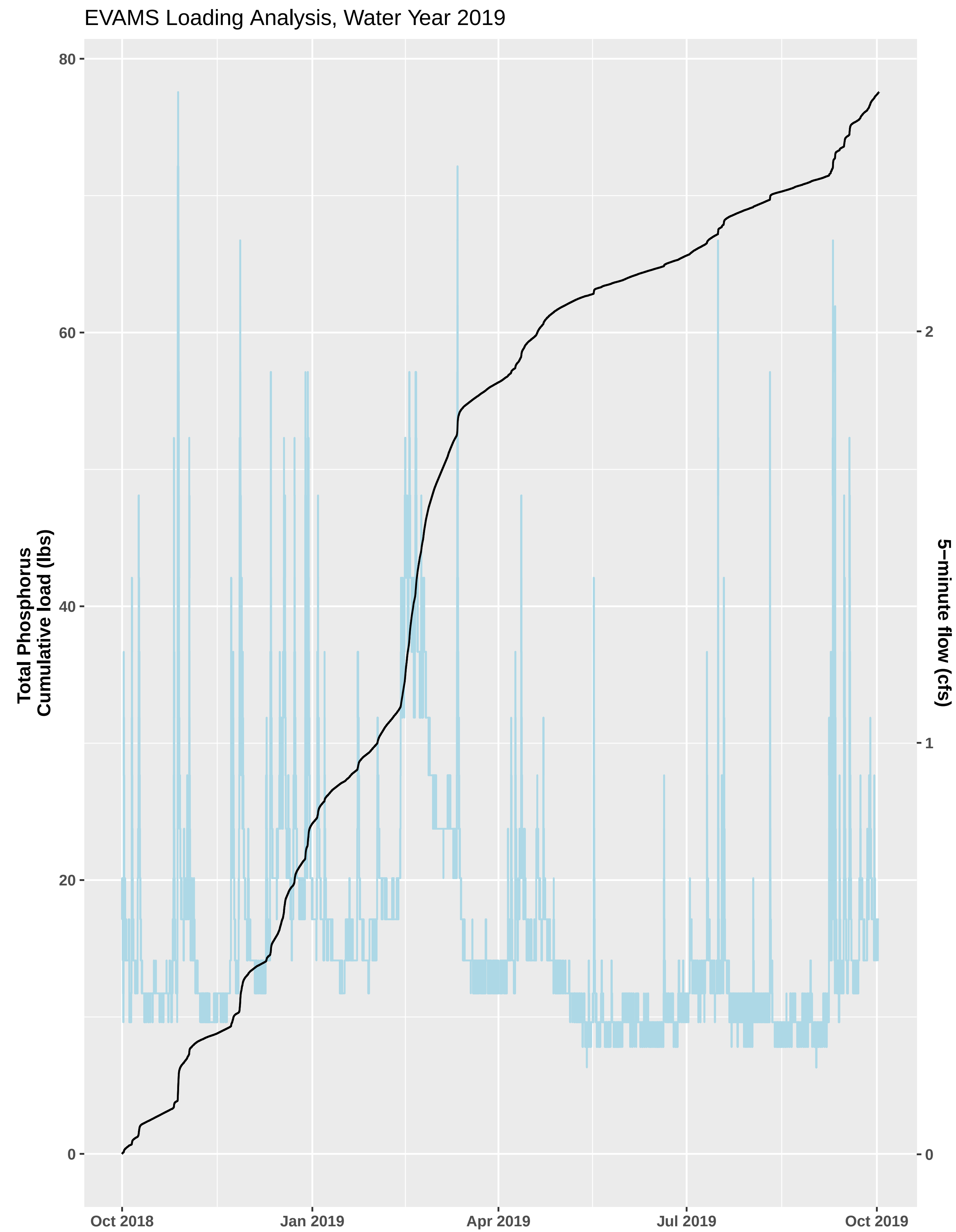

EVAMS Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
5−minute flow (cfs)
0
4
8
12
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


EVAMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.003
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0040
1
2
3
instantaneous discharge (cfs)

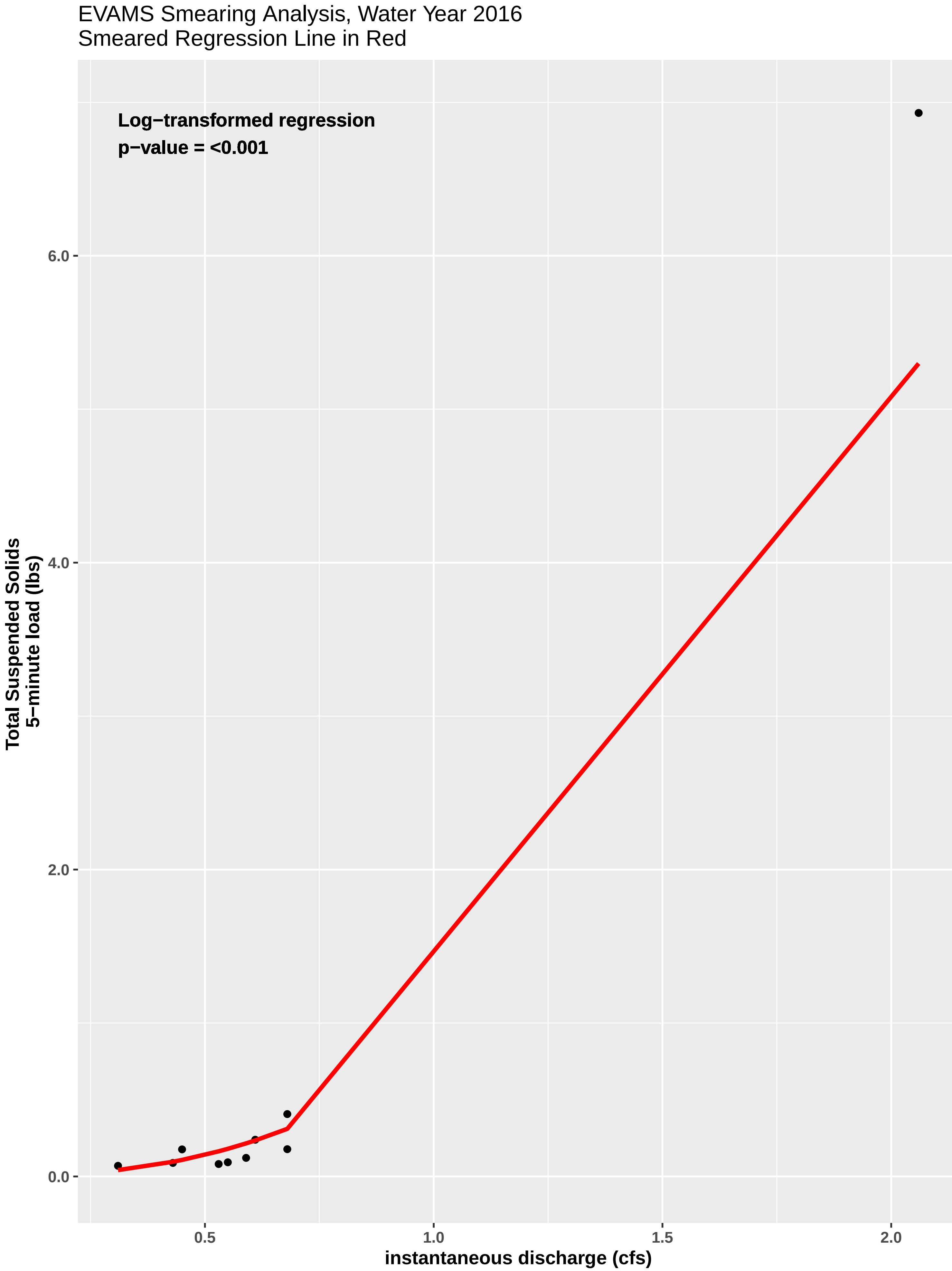

EVAMS Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
10
20
30
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

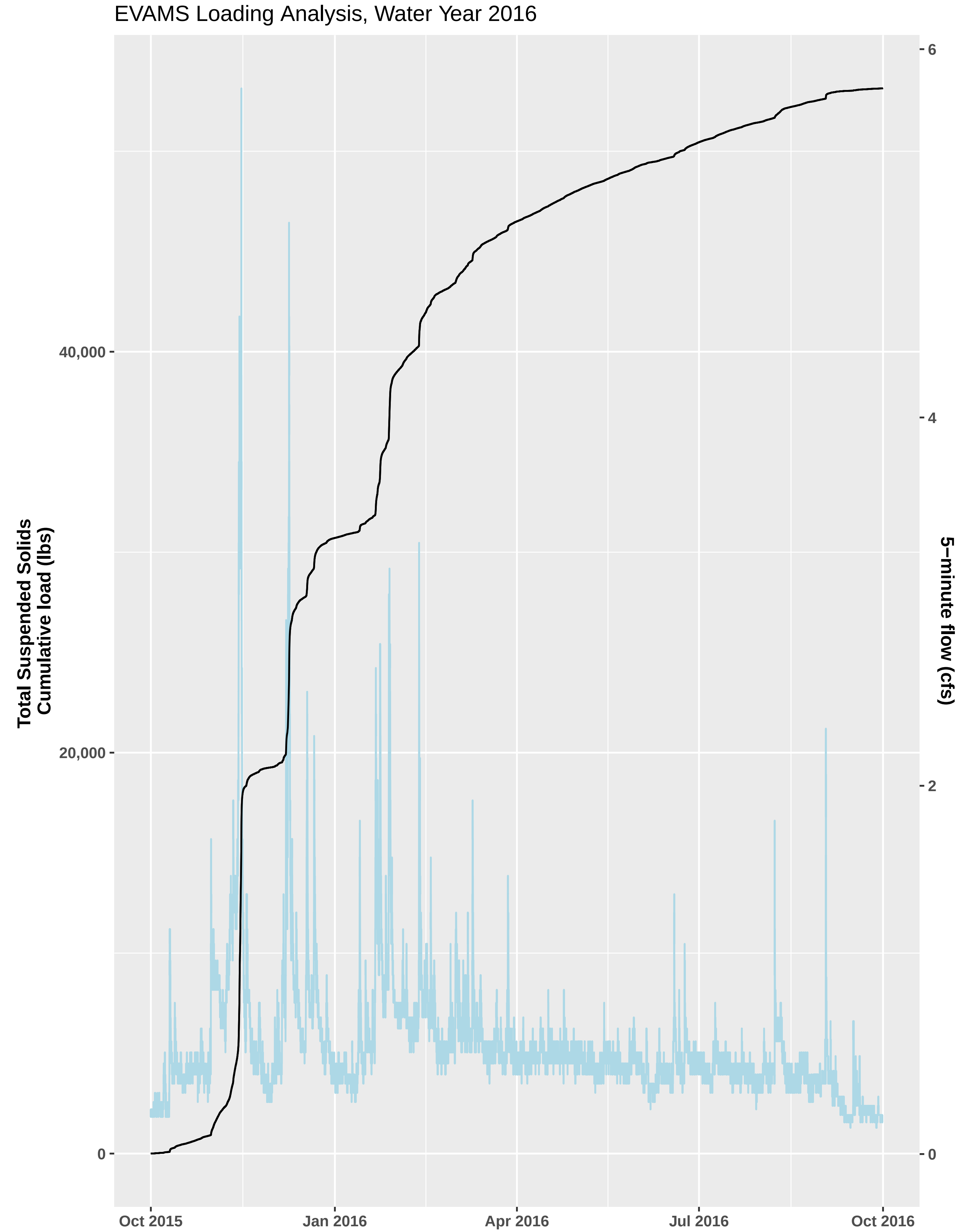


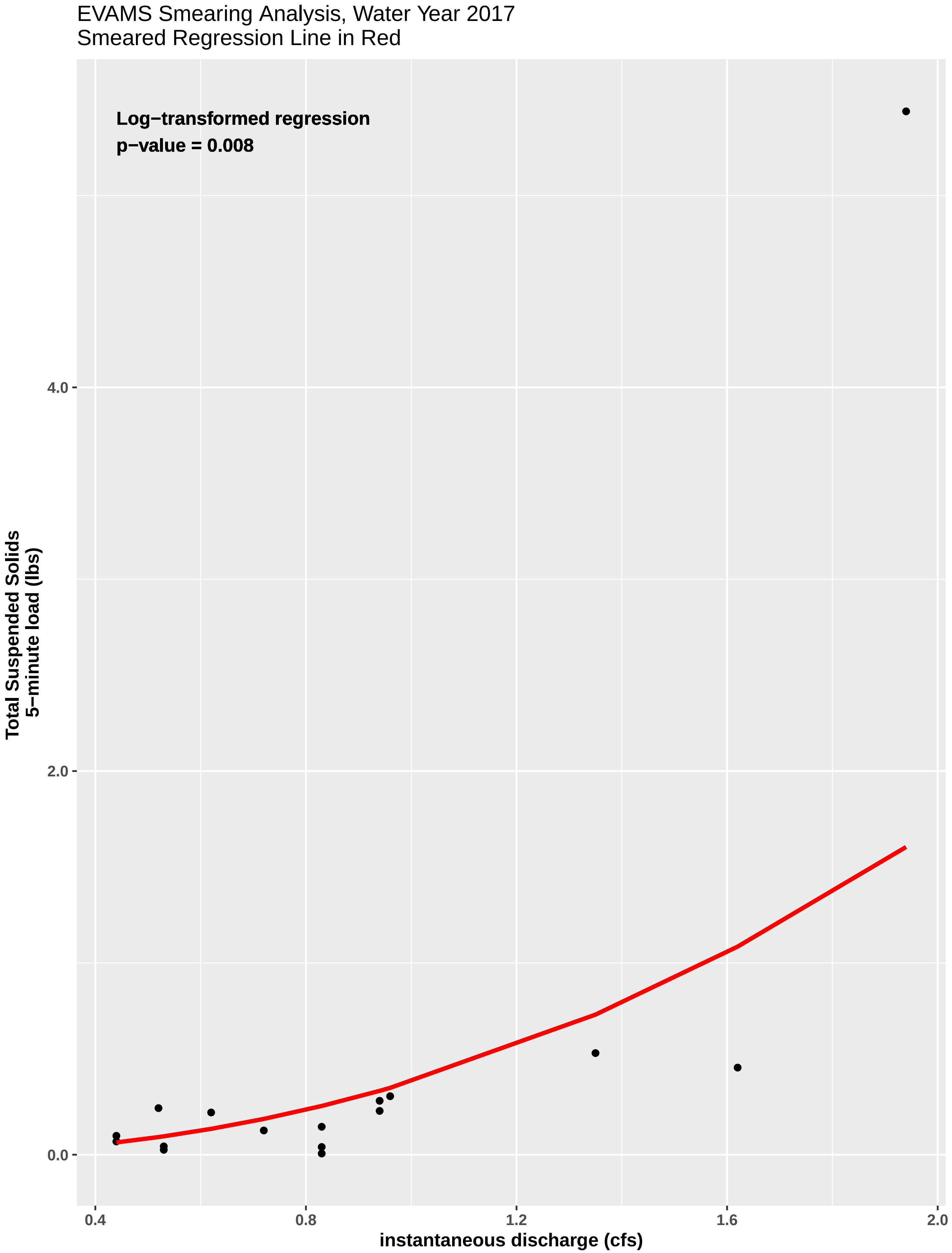
EVAMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Phosphorus
5−minute load (lbs)
0.0150
0.0100
0.0050
0.0000
0.6
0.9
1.2
instantaneous discharge (cfs)

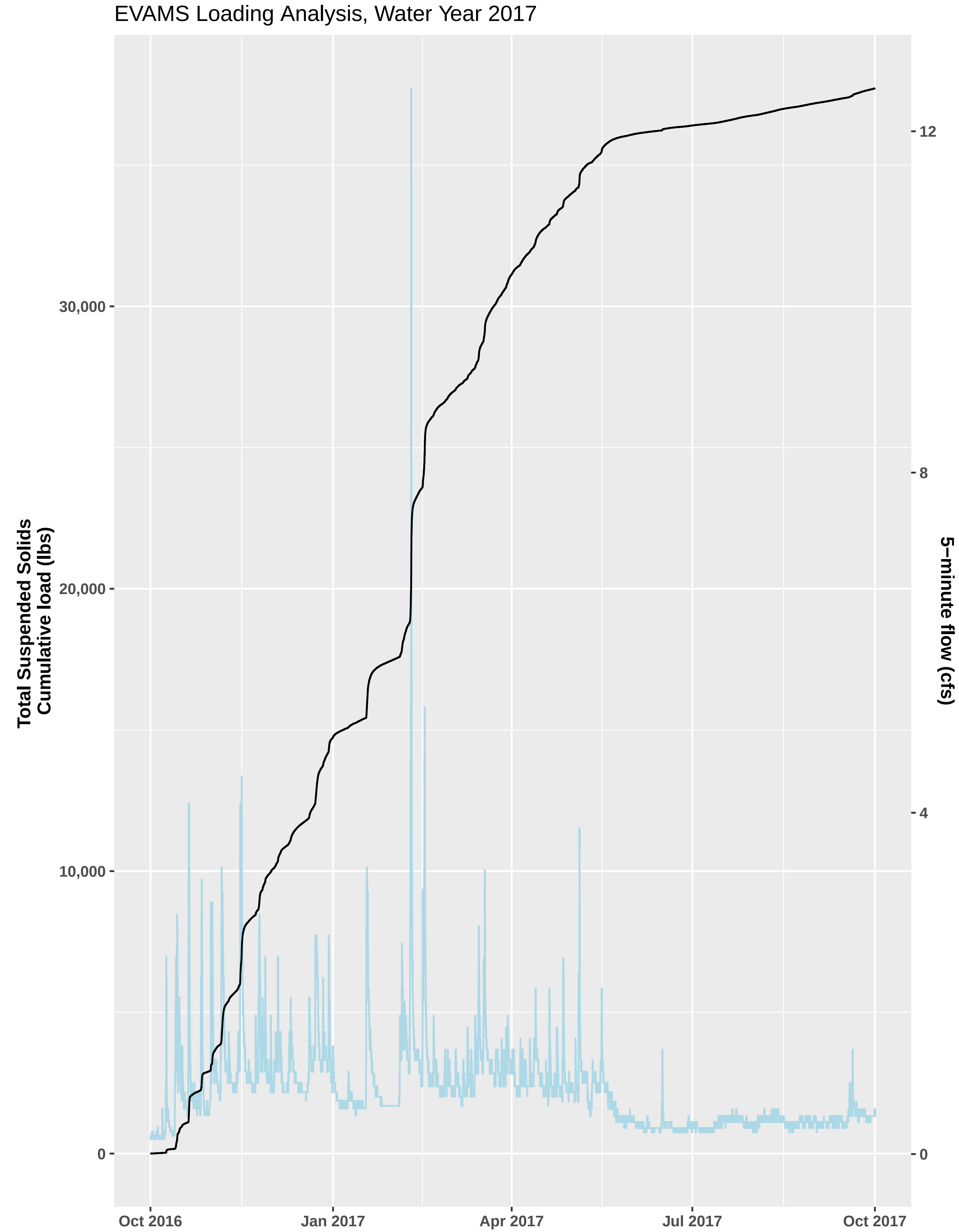


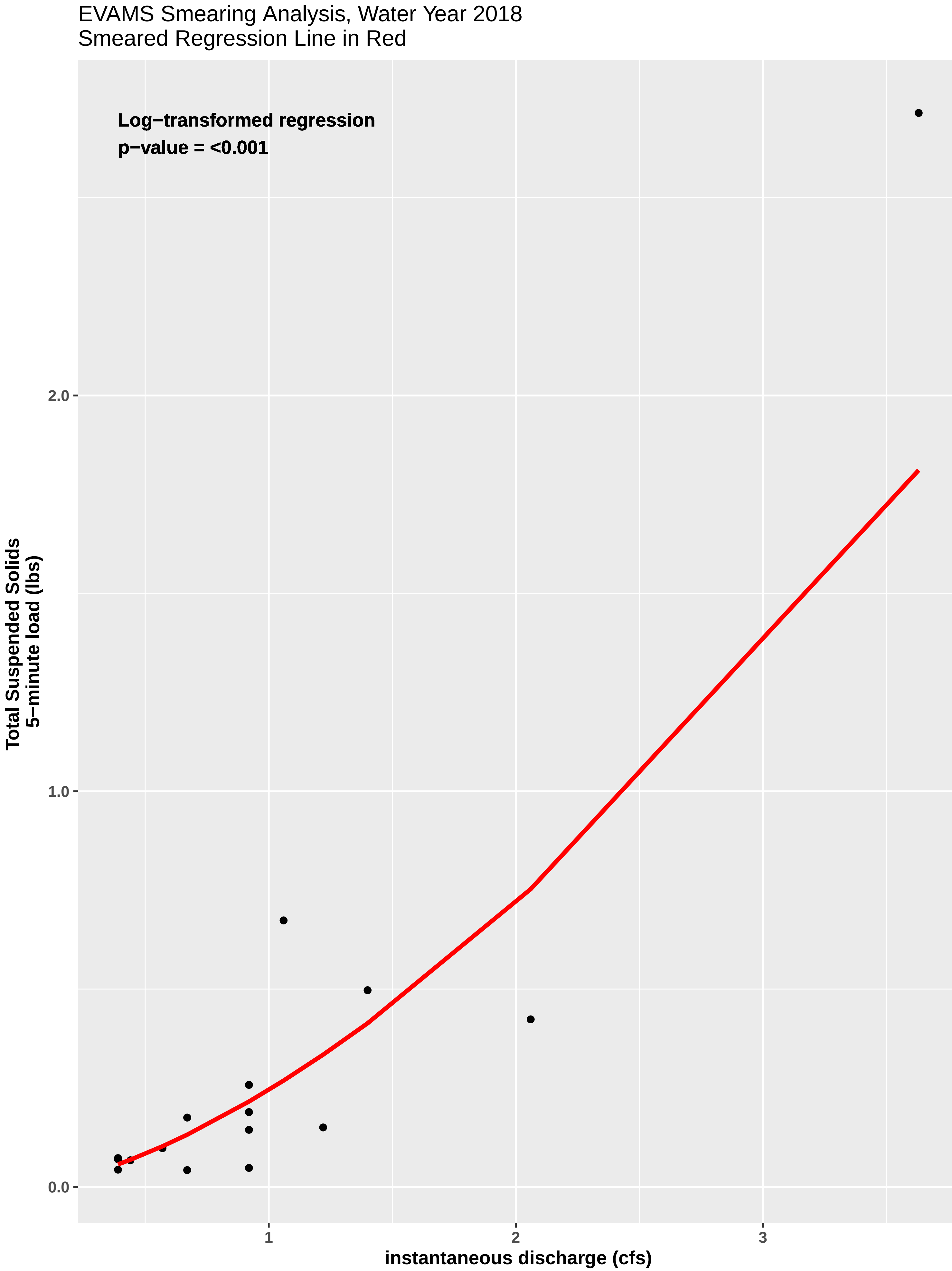
EVAMS Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
80
60
40
20
0
5−minute flow (cfs)
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

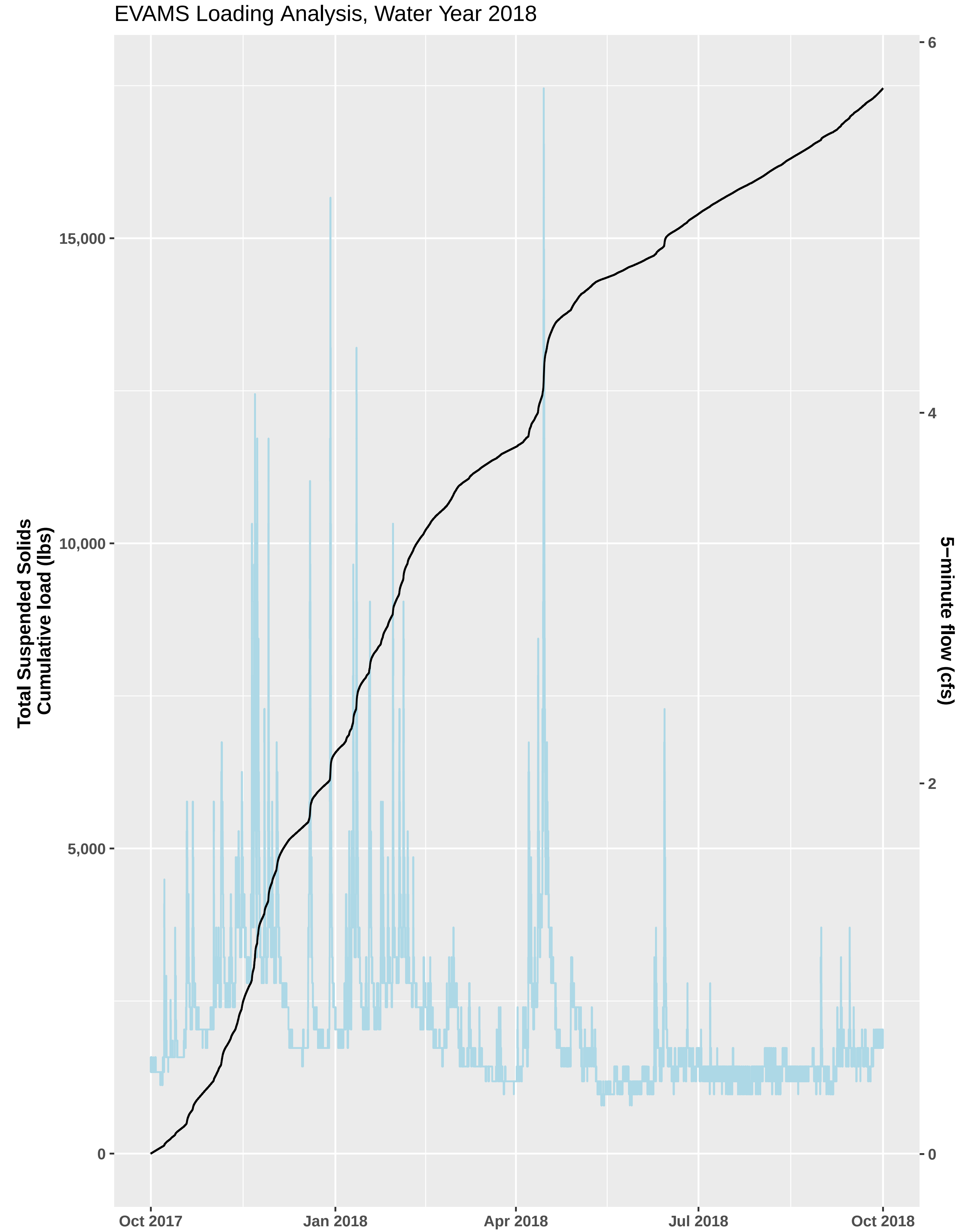

EVAMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
6.0
4.0
2.0
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

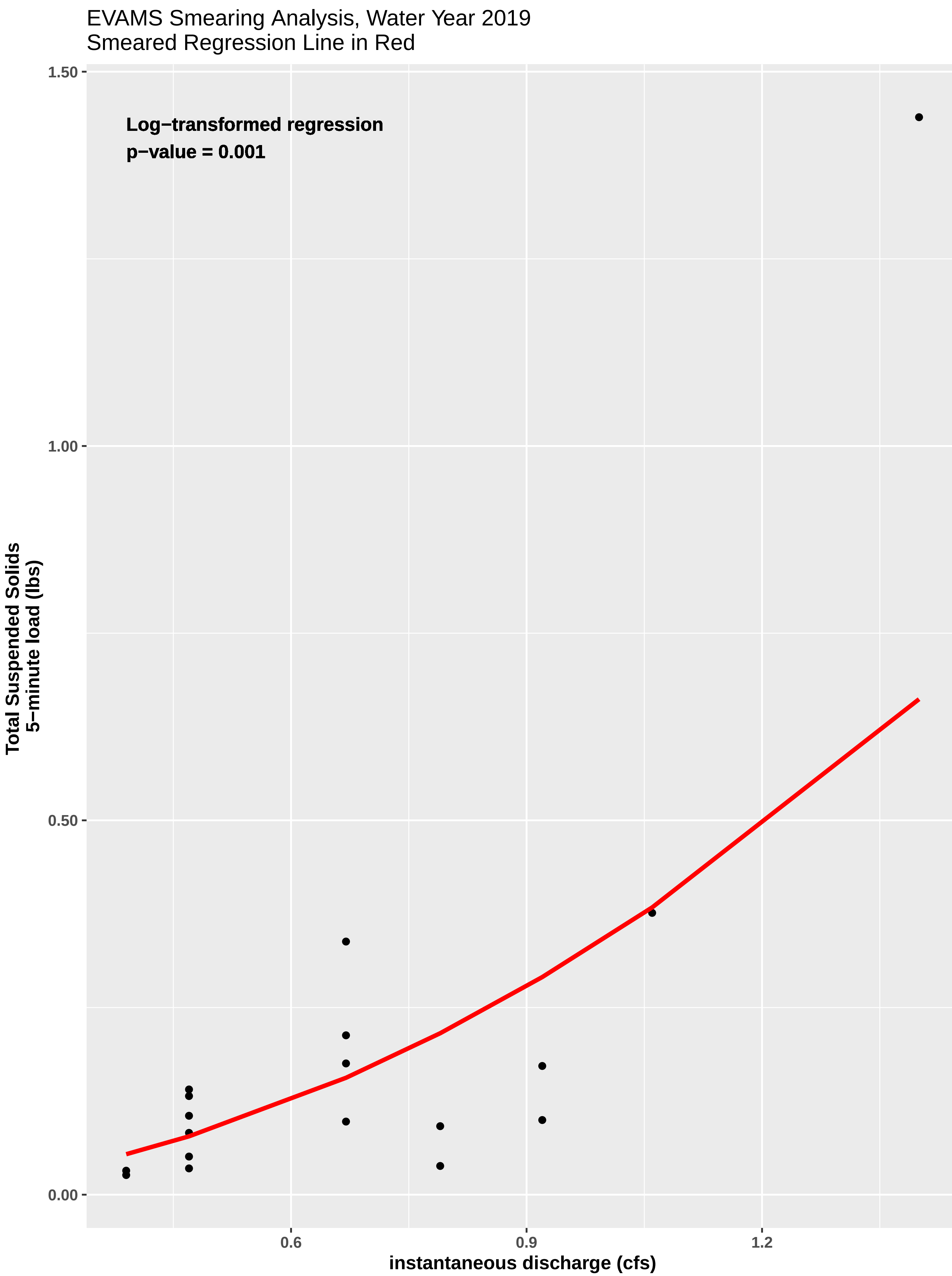

EVAMS Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
40,000
20,000
0
5−minute flow (cfs)
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


EVAMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.008
Total Suspended Solids
5−minute load (lbs)
4.0
2.0
0.0
0.4
0.8
1.2
1.6
2.0
instantaneous discharge (cfs)

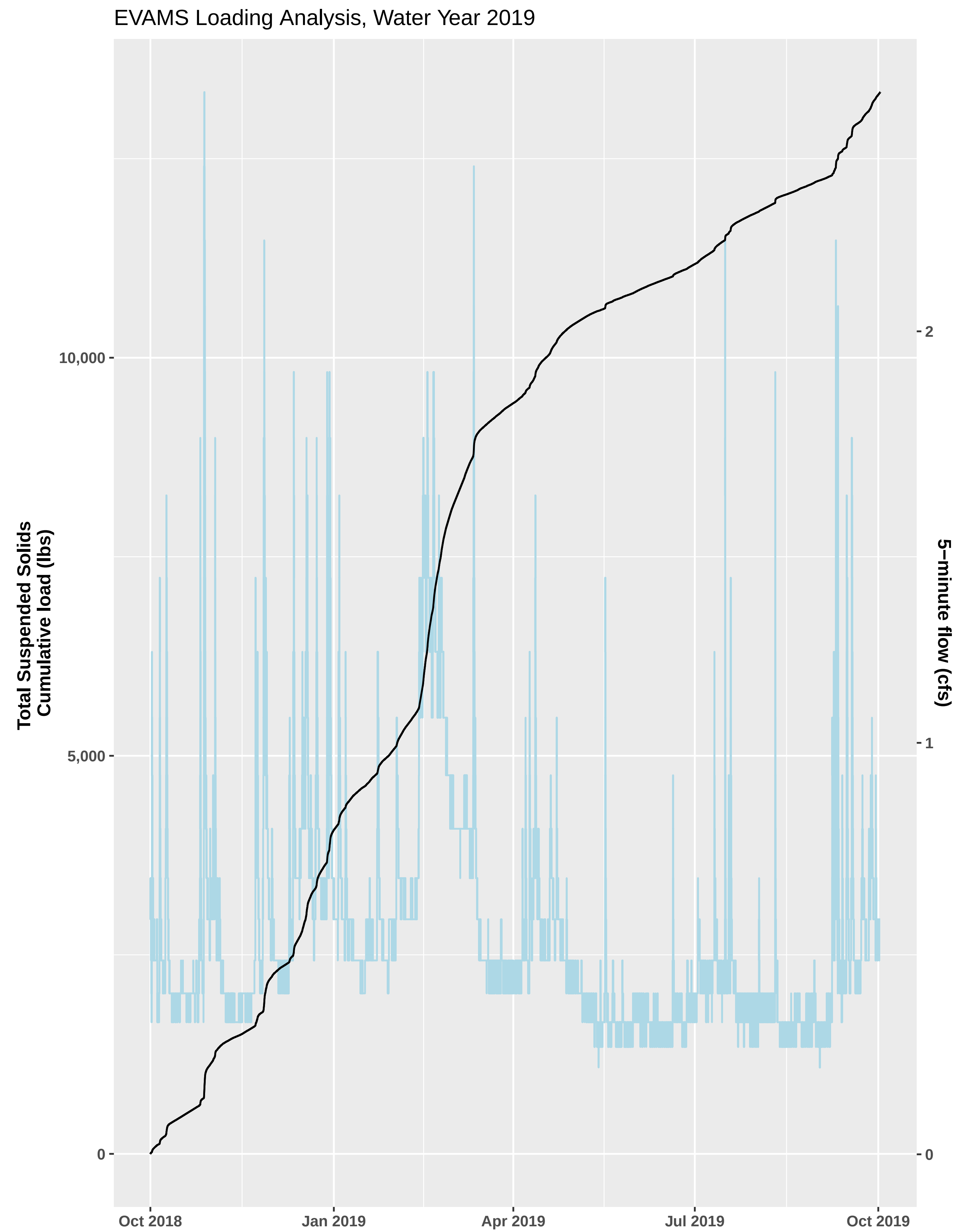

EVAMS Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
30,000
20,000
10,000
0
5−minute flow (cfs)
12
8
4
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


EVAMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
2.0
1.0
0.0
1
2
3
instantaneous discharge (cfs)

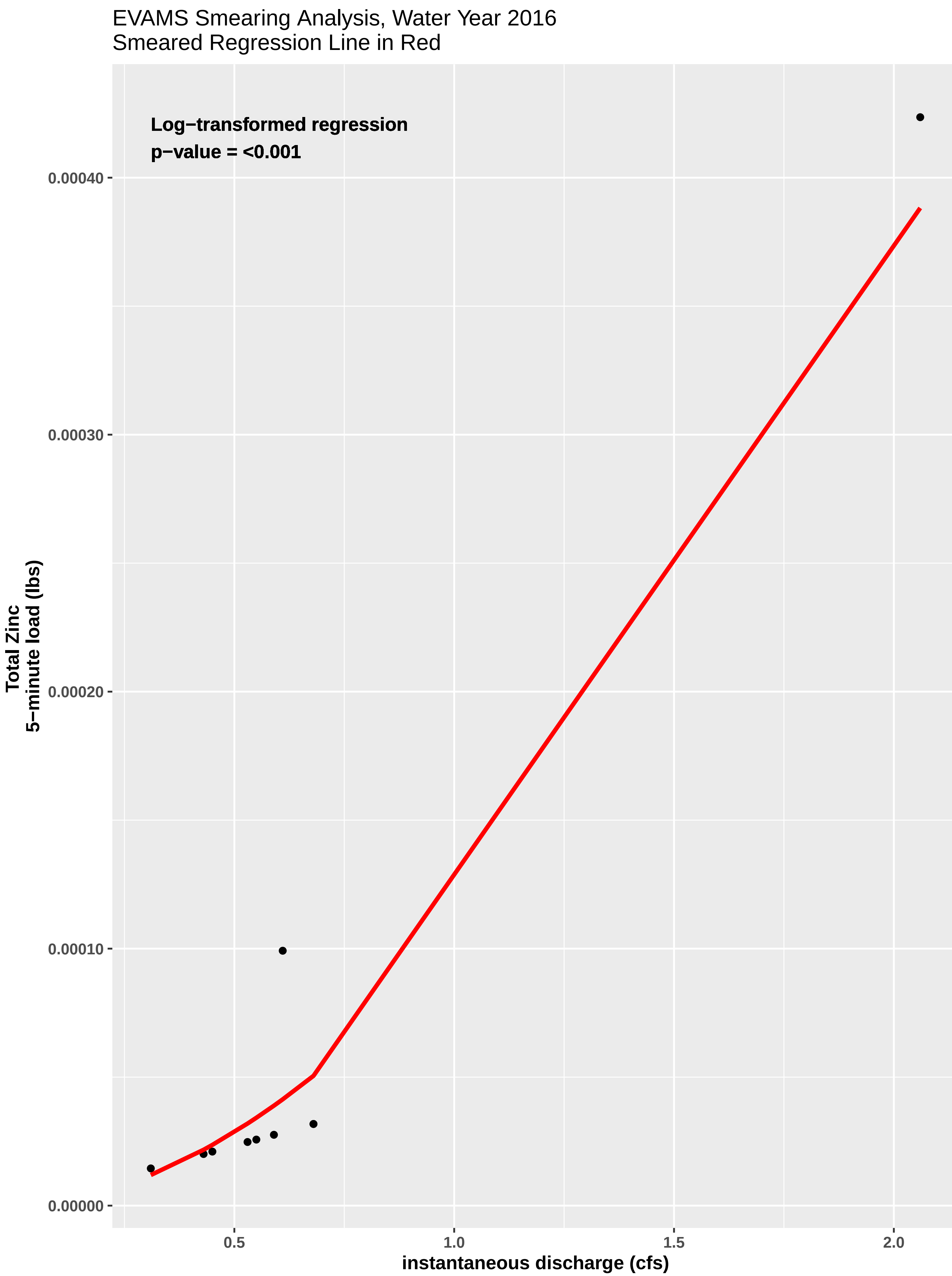

EVAMS Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
15,000
10,000
5,000
0
5−minute flow (cfs)
6
4
2
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

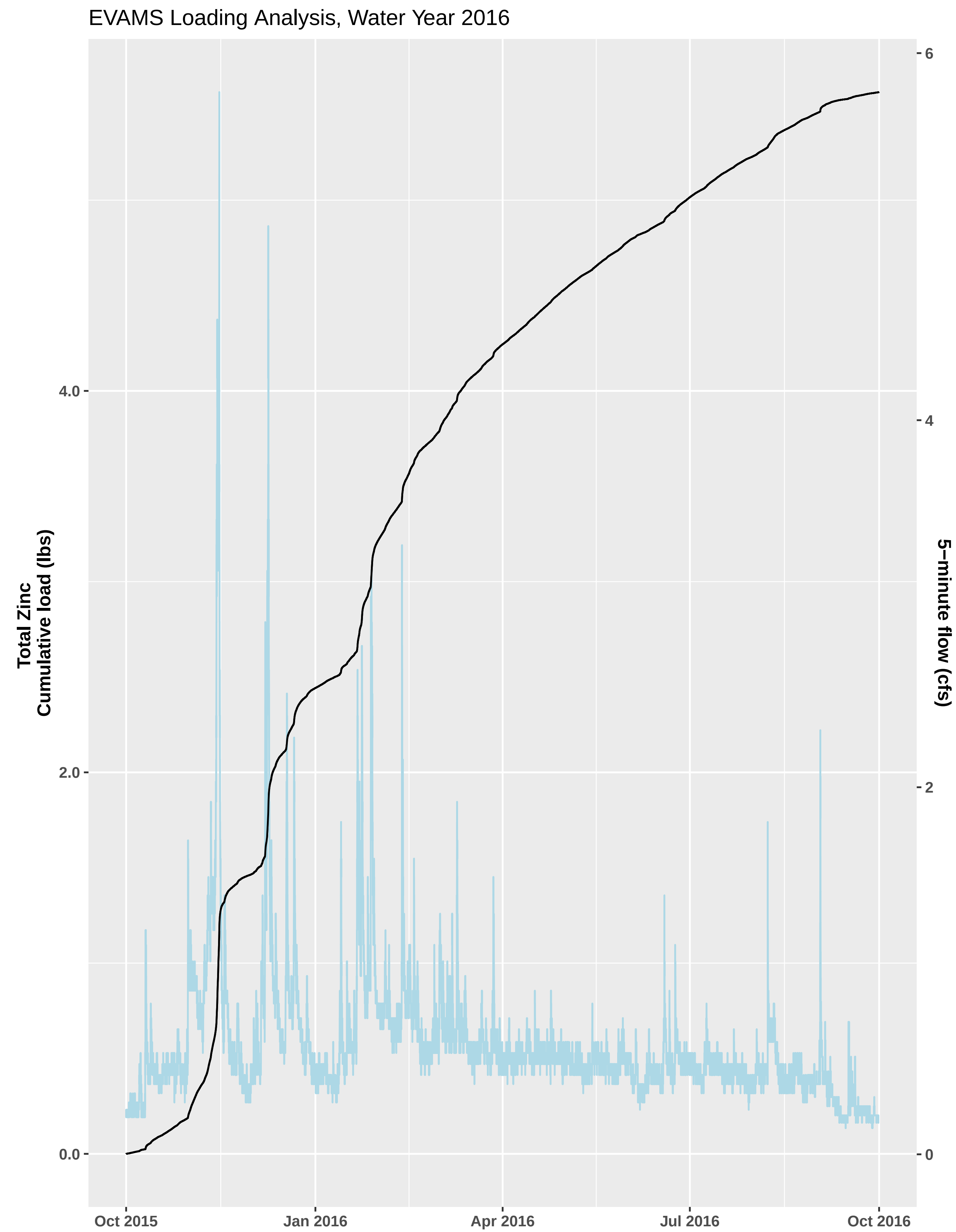


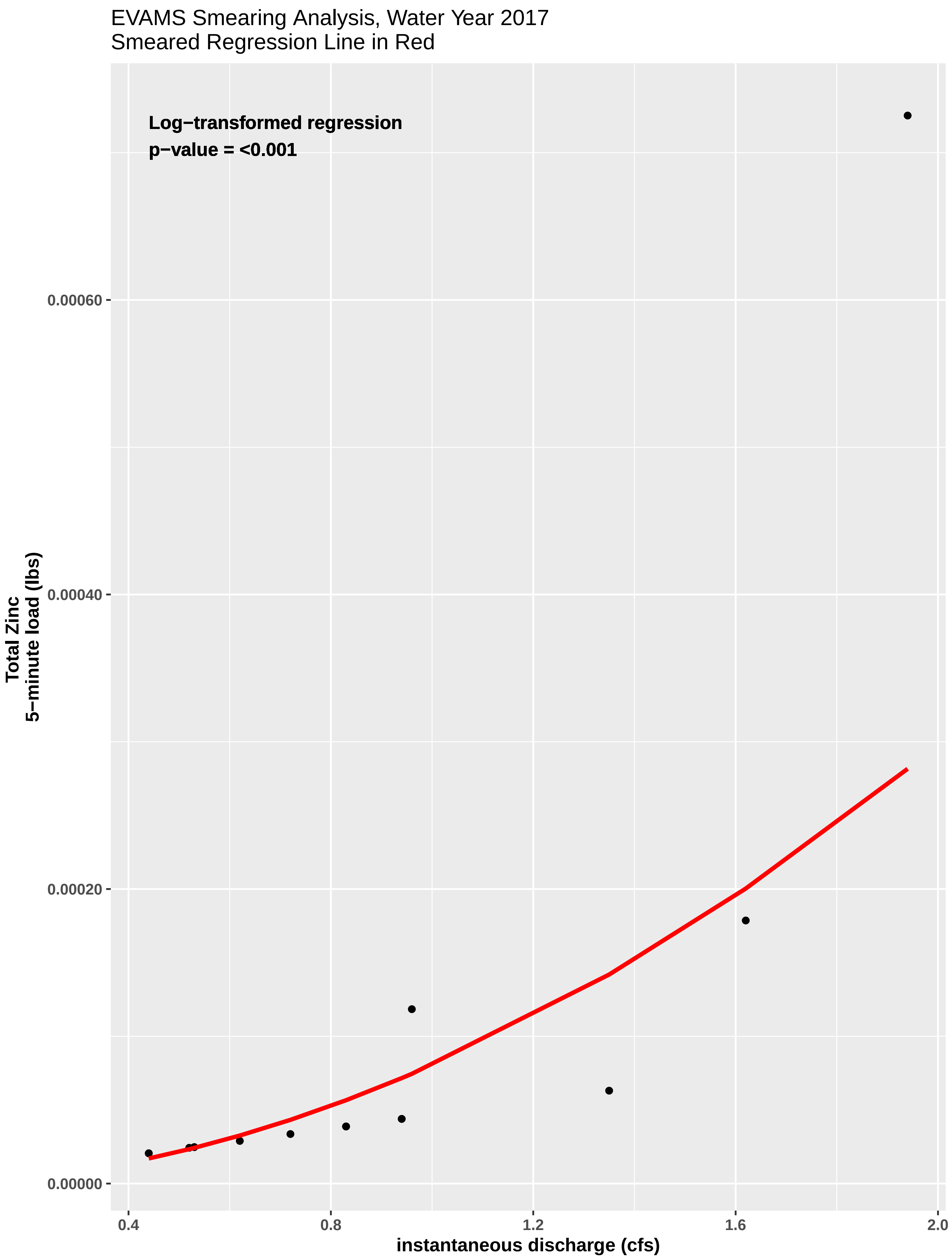
EVAMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Suspended Solids
5−minute load (lbs)
1.50
1.00
0.50
0.00
0.6
0.9
1.2
instantaneous discharge (cfs)

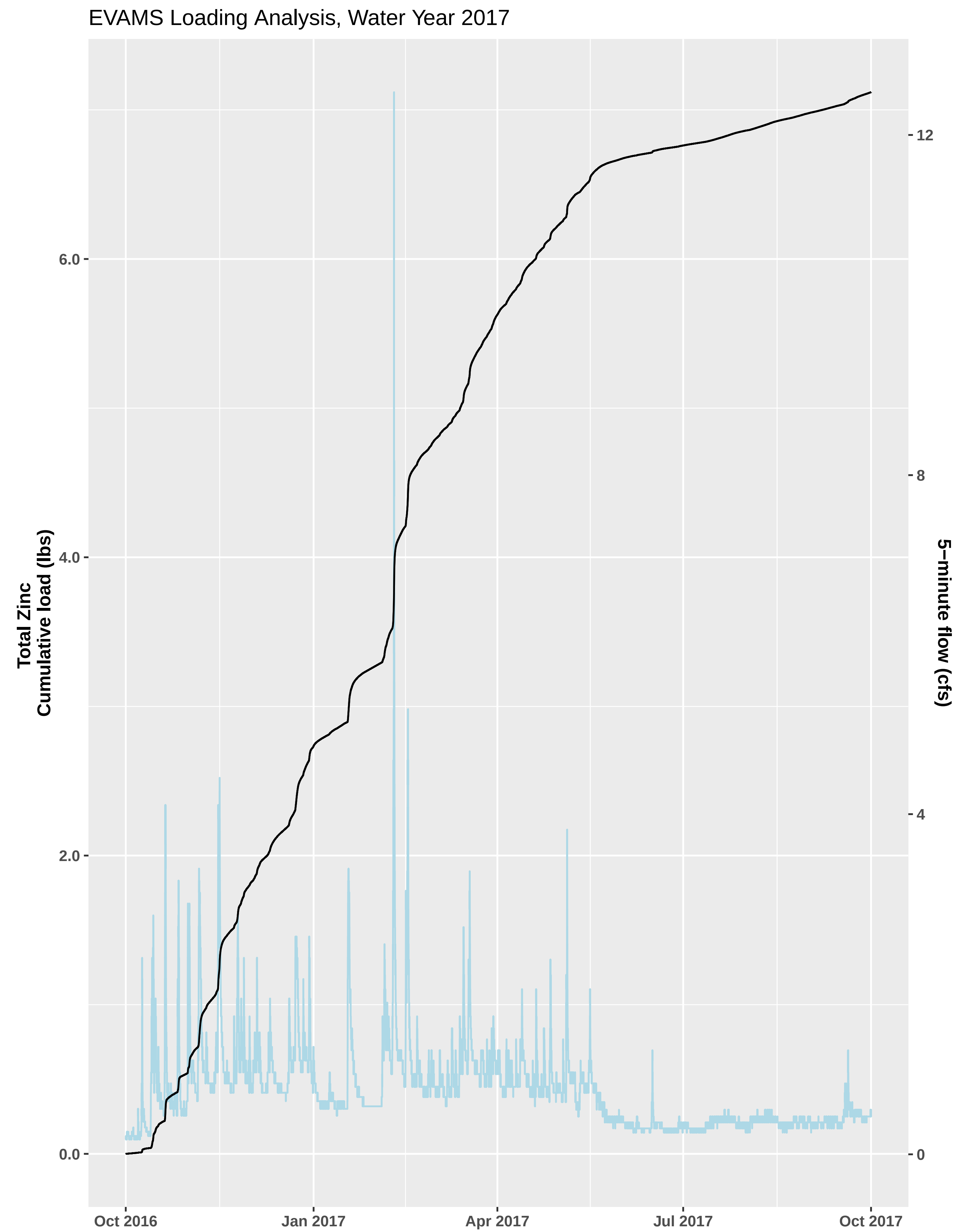


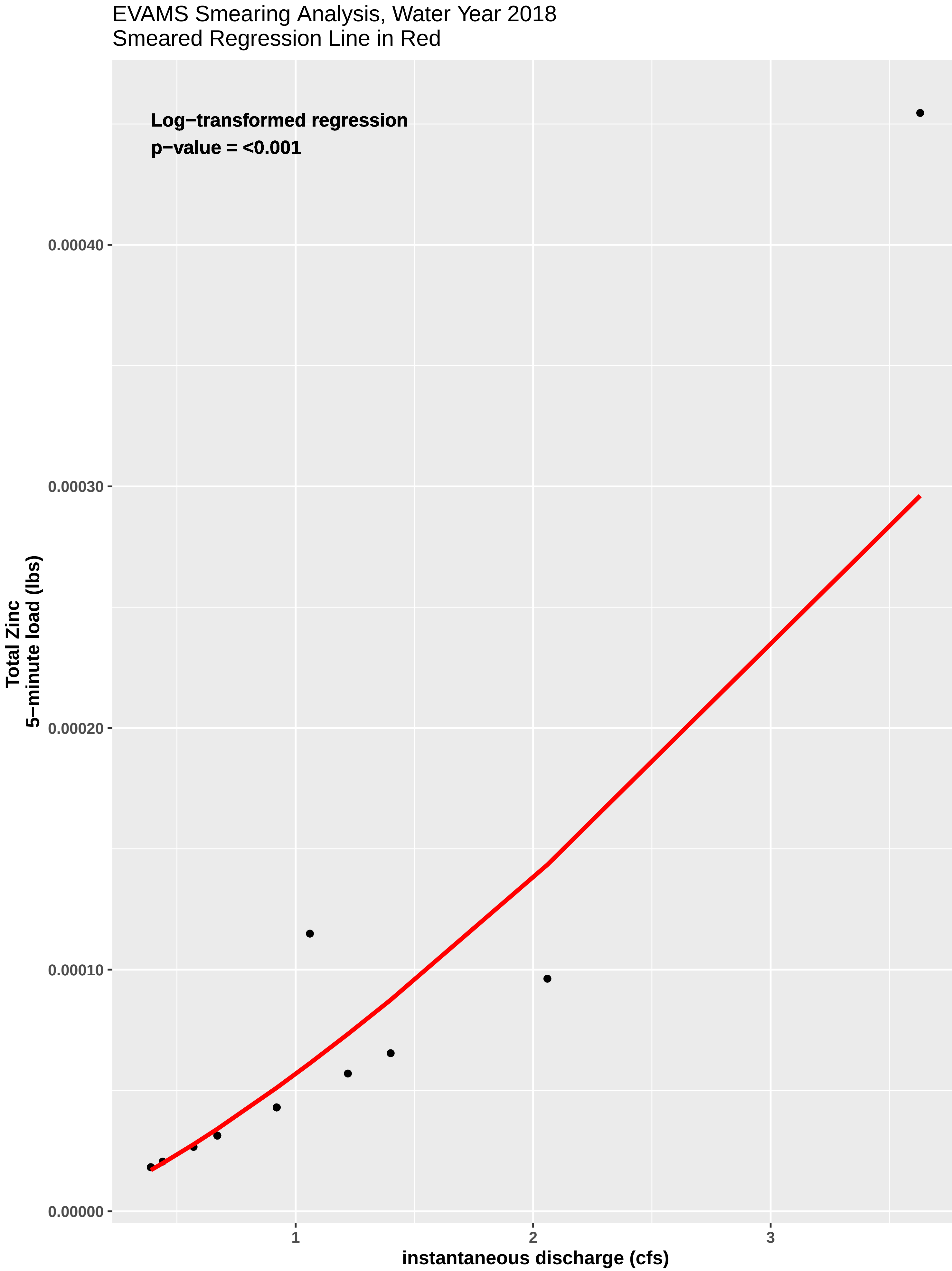
EVAMS Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
10,000
5,000
0
5−minute flow (cfs)
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


EVAMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.00040
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

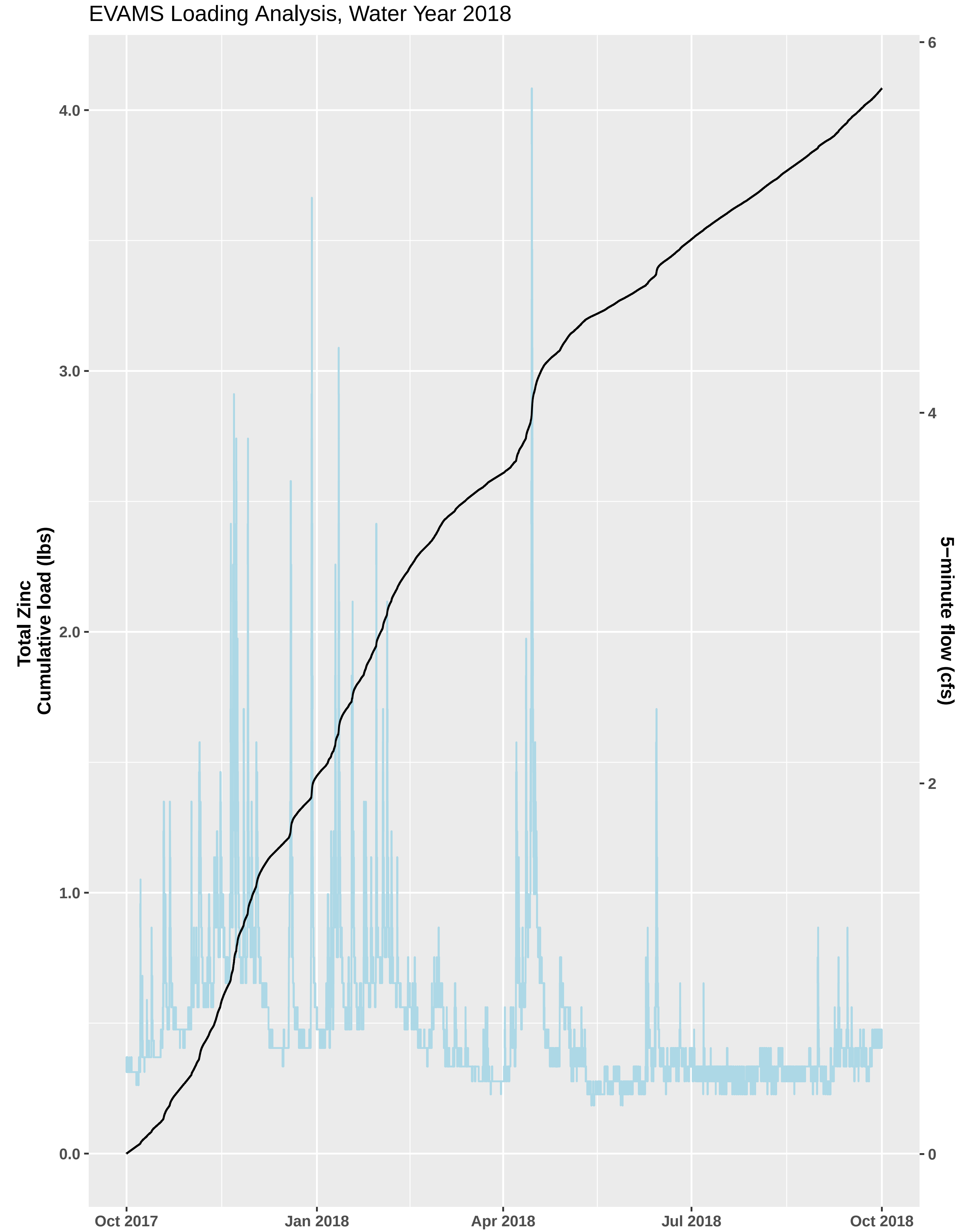

EVAMS Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0.0
2.0
4.0
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


EVAMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00060
0.00040
0.00020
0.00000
0.4
0.8
1.2
1.6
2.0
instantaneous discharge (cfs)

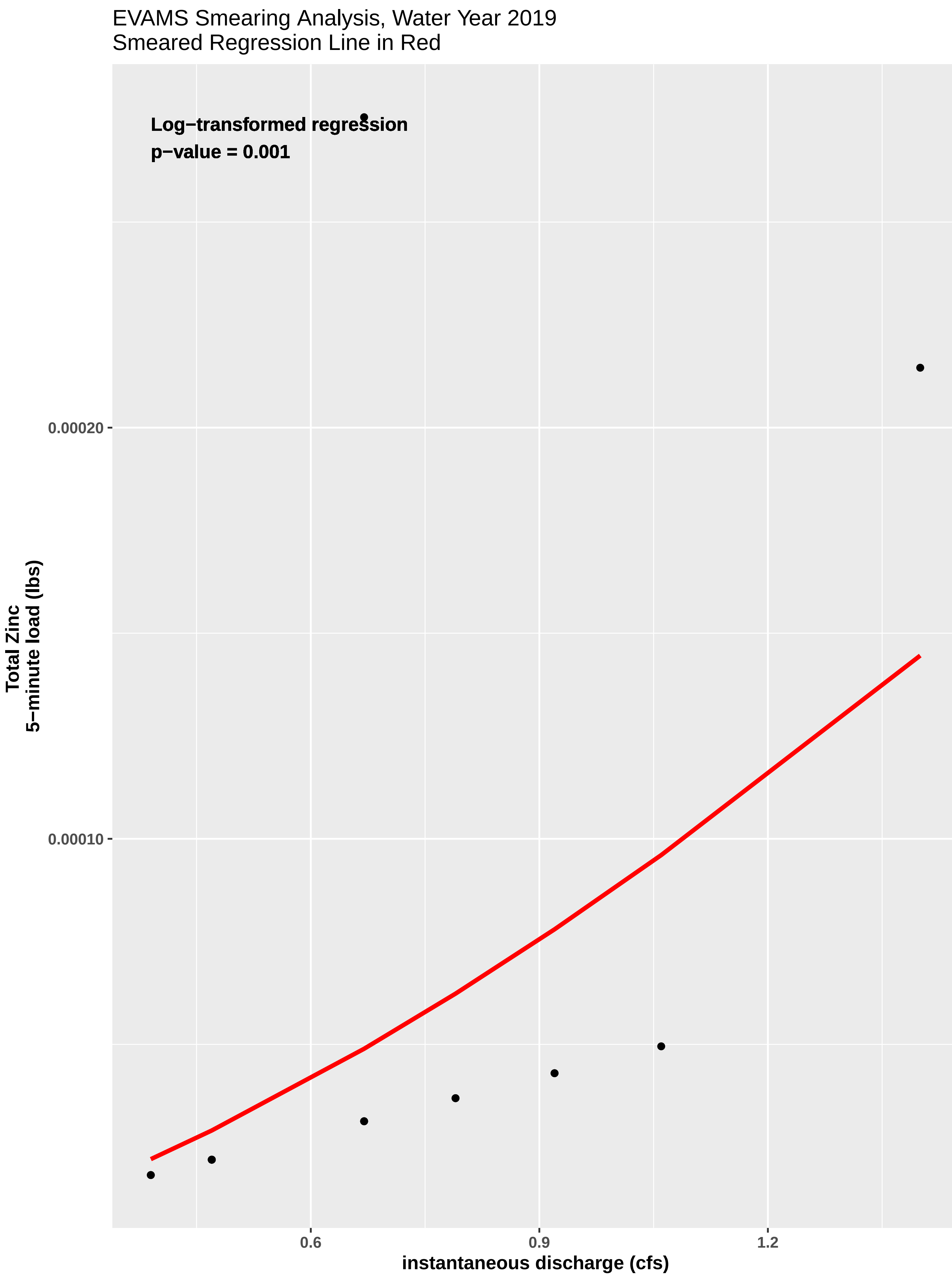

EVAMS Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
6.0
4.0
2.0
0.0
5−minute flow (cfs)
12
8
4
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

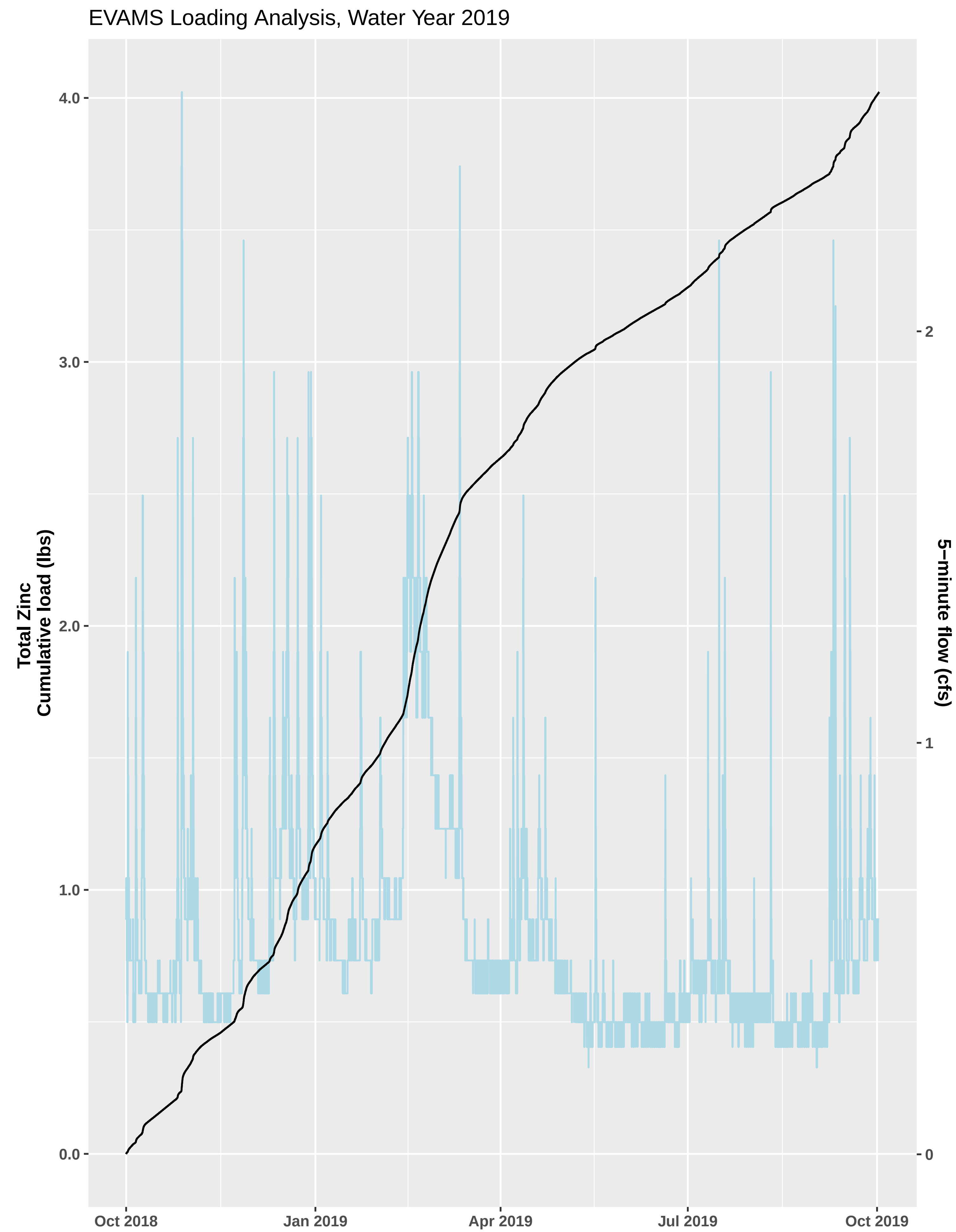


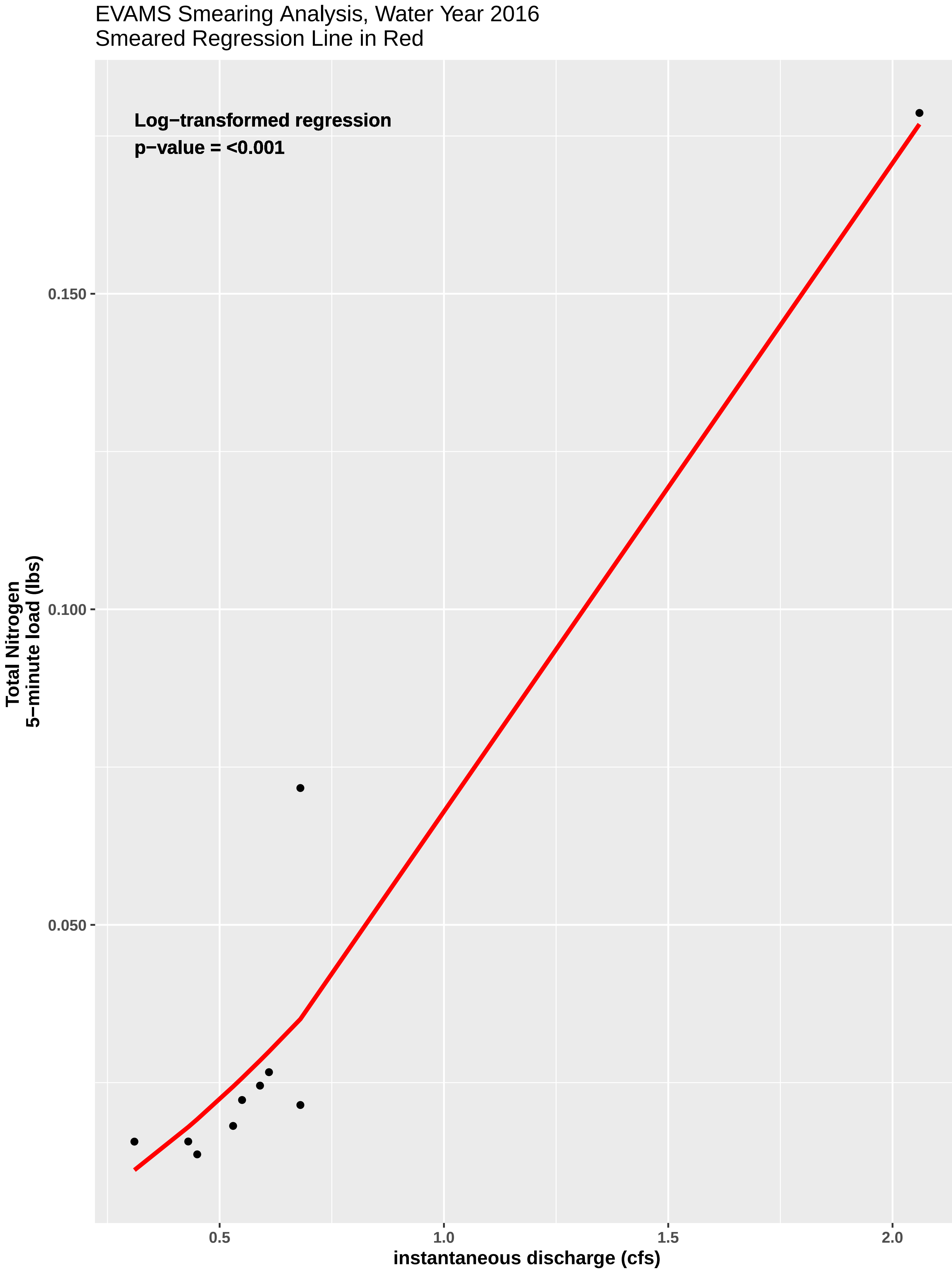
EVAMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.00040
1
2
3
instantaneous discharge (cfs)



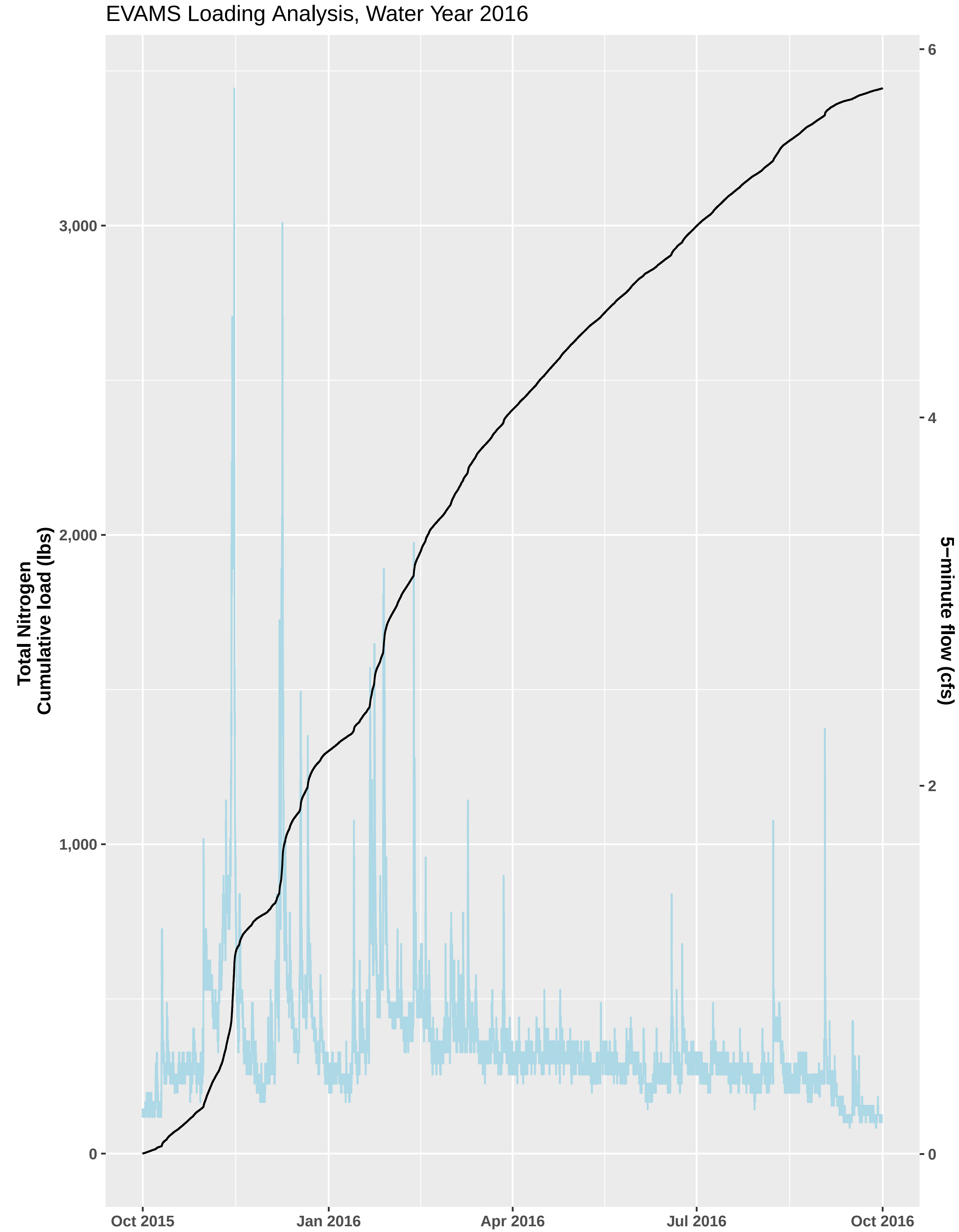
EVAMS Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0.0
1.0
2.0
3.0
4.0
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


EVAMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Zinc
5−minute load (lbs)
0.00020
0.00010
0.6
0.9
1.2
instantaneous discharge (cfs)

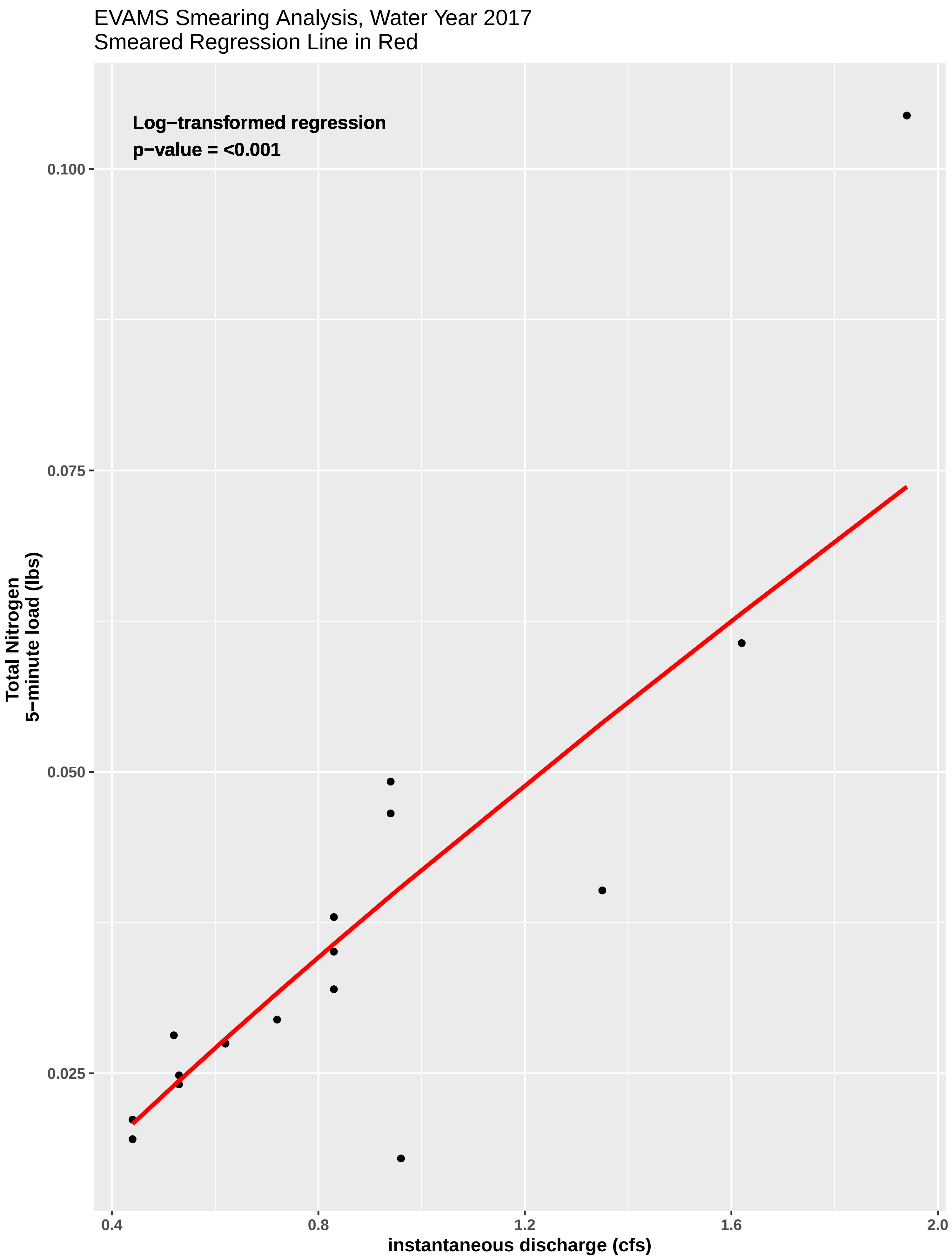

EVAMS Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
4.0
3.0
2.0
1.0
0.0
5−minute flow (cfs)
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

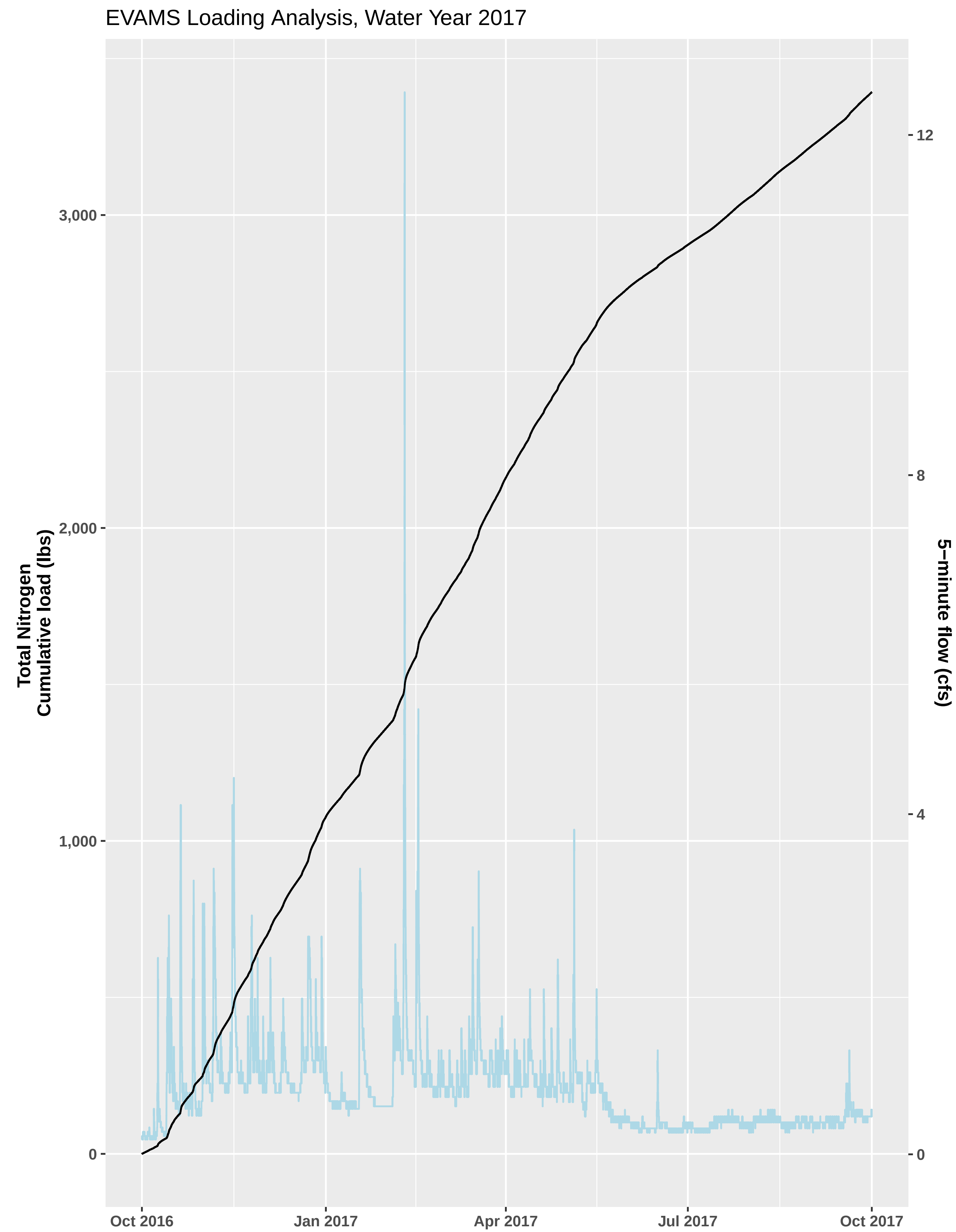


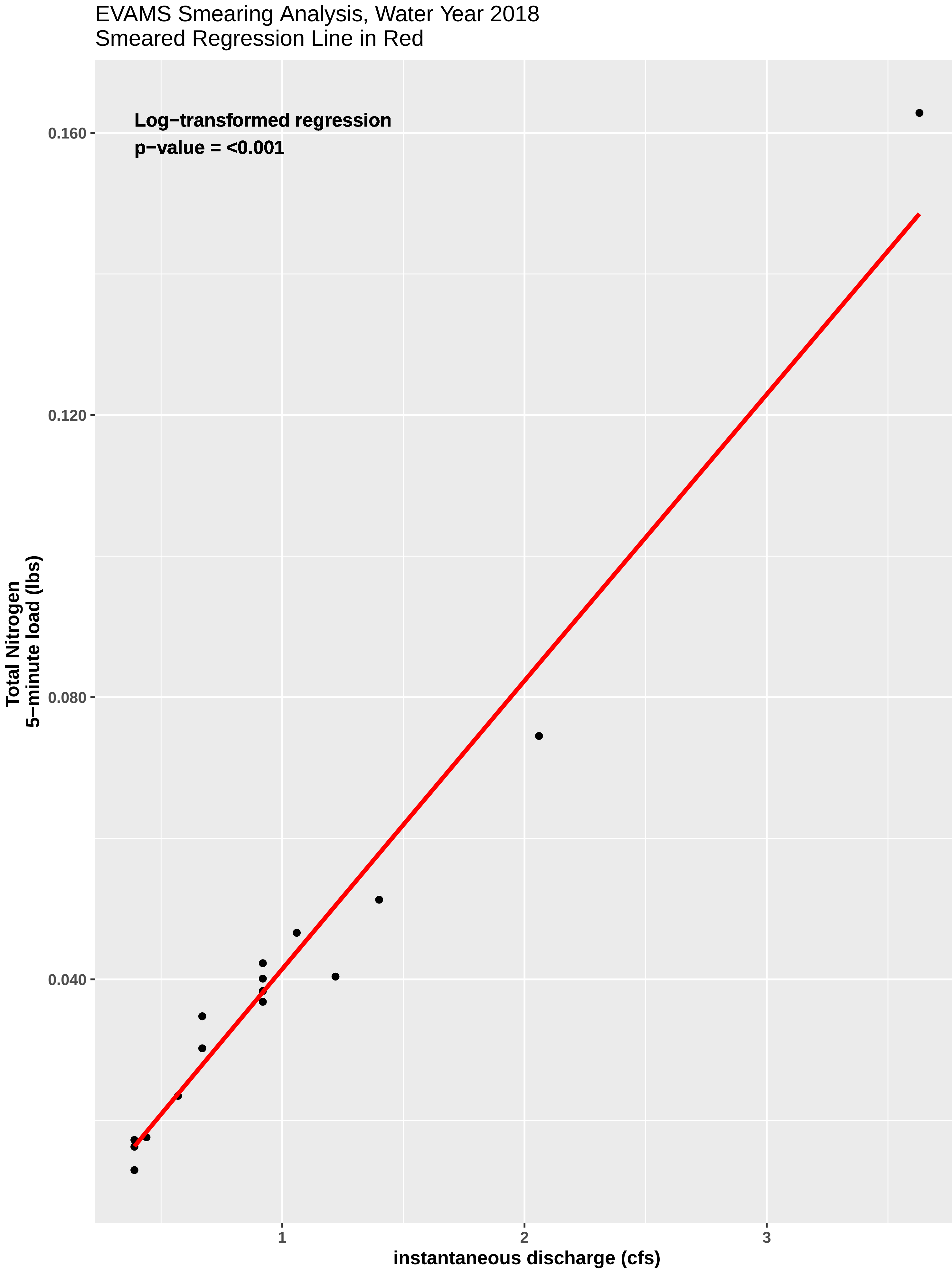
EVAMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.150
0.100
0.050
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)



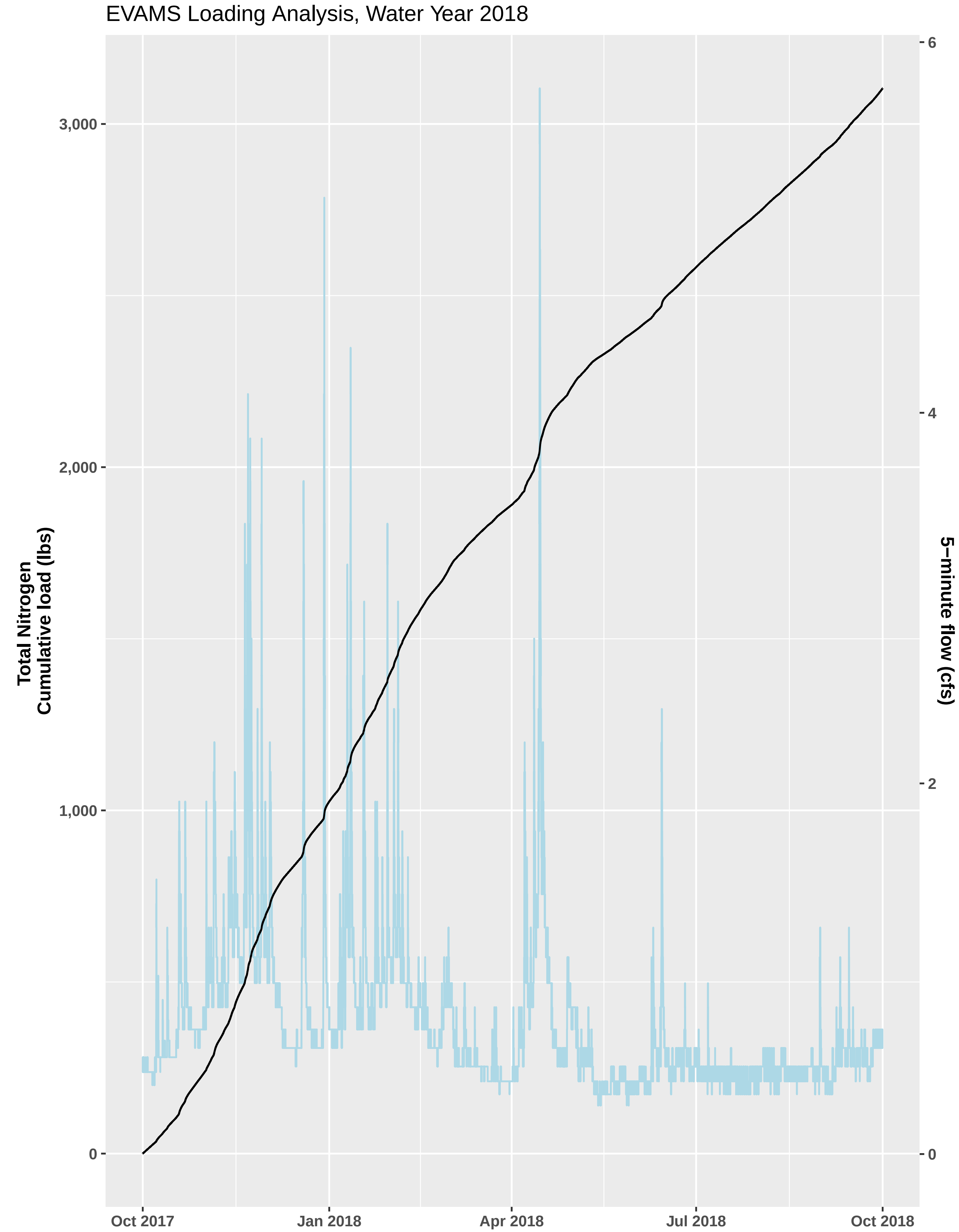
EVAMS Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
3,000
2,000
1,000
0
5−minute flow (cfs)
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


EVAMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.100
0.075
0.050
0.025
0.4
0.8
1.2
1.6
2.0
instantaneous discharge (cfs)

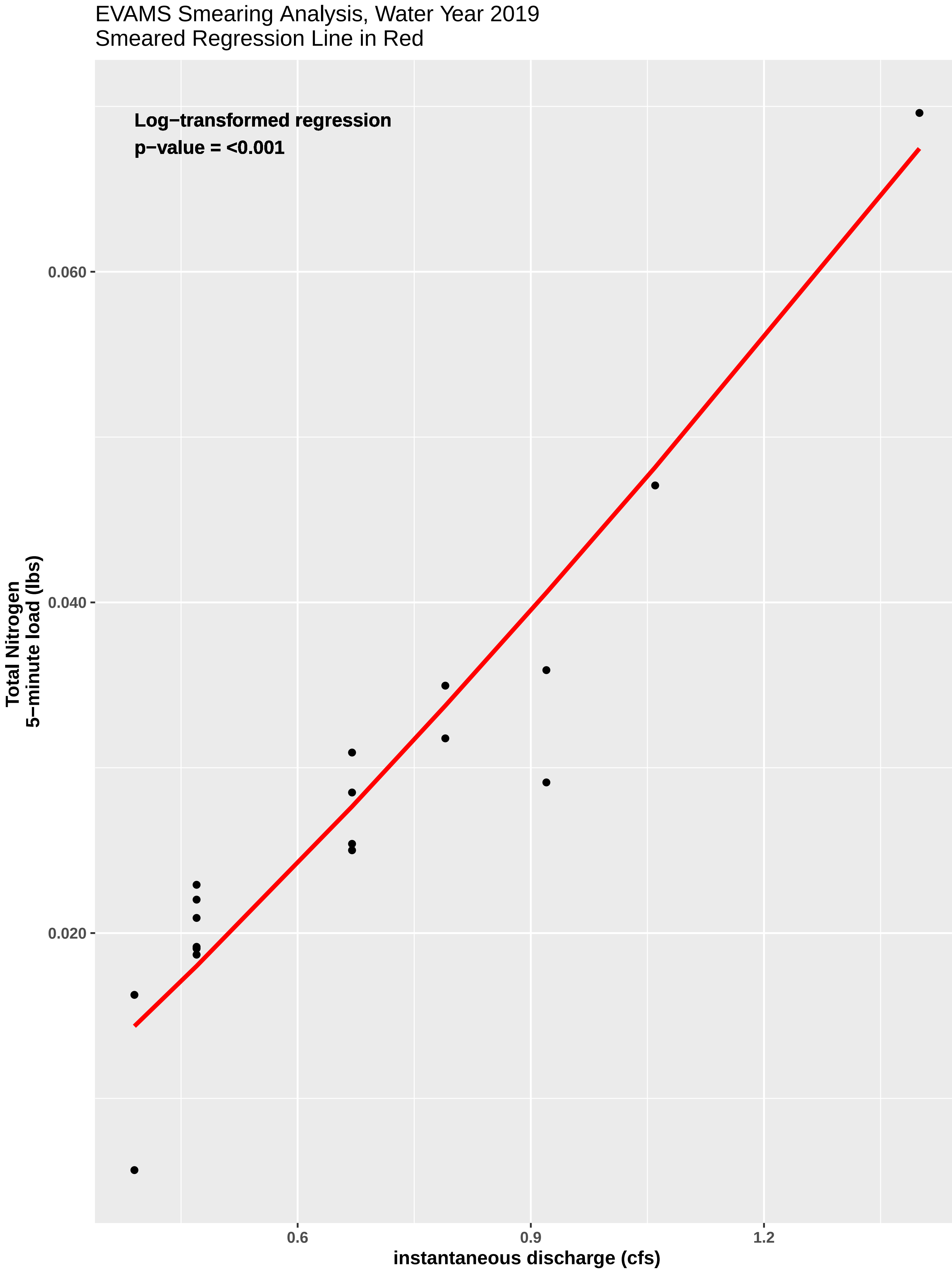

EVAMS Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
3,000
2,000
1,000
0
12
8
4
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



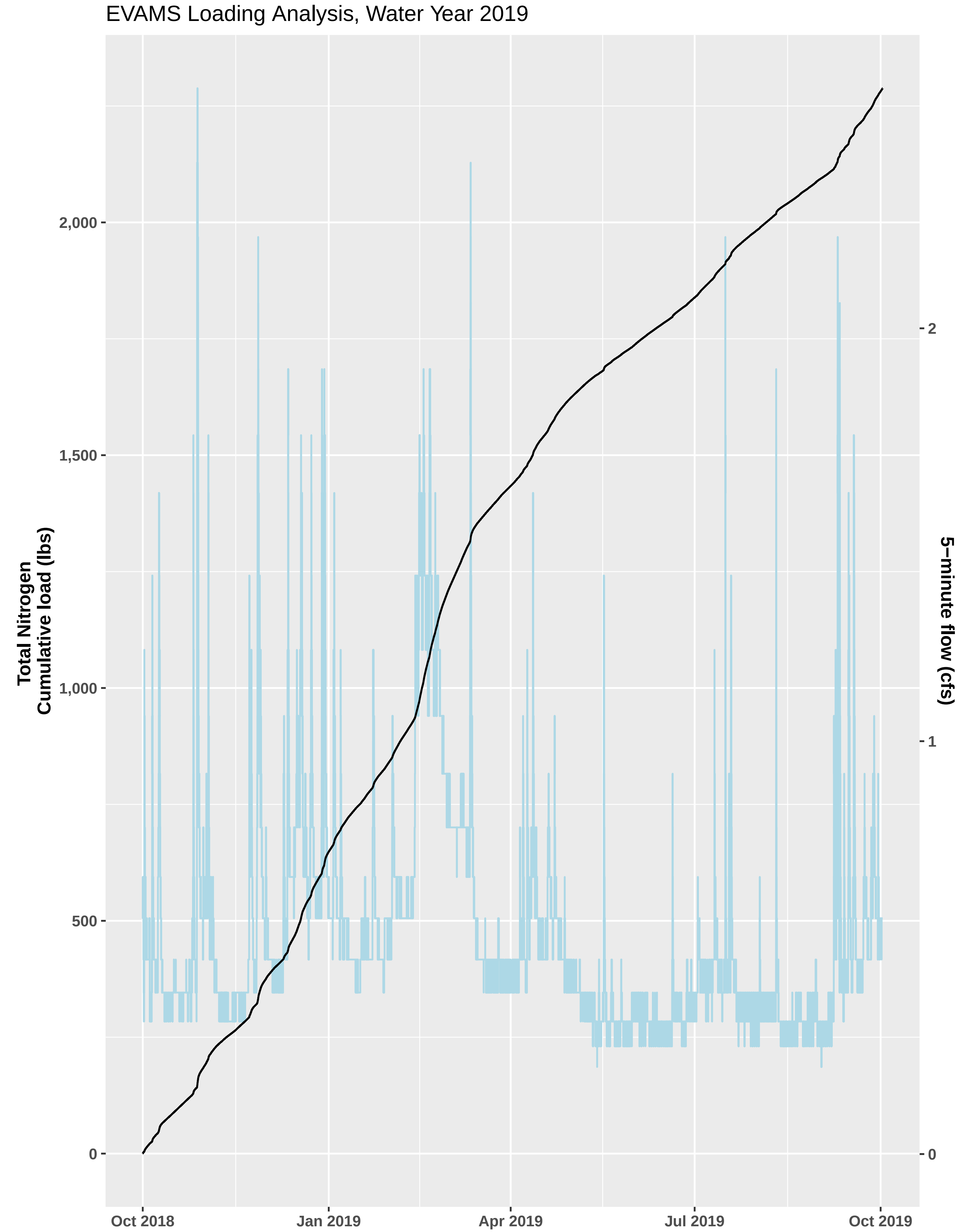
EVAMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.160
0.120
0.080
0.040
Total Nitrogen
5−minute load (lbs)
1
2
3
instantaneous discharge (cfs)



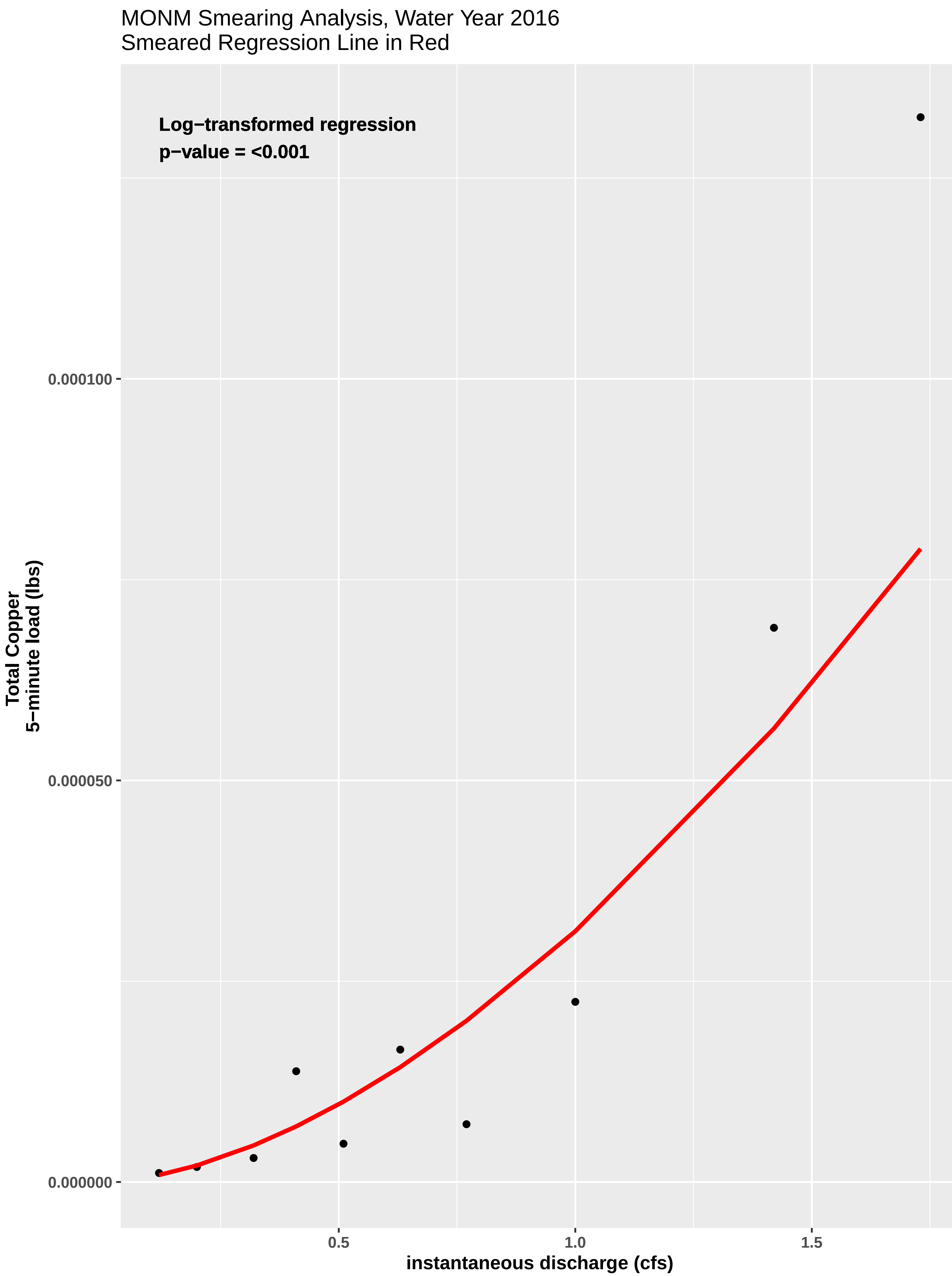
EVAMS Loading Analysis, Water Year 2018
3,000
2,000
1,000
0
Total Nitrogen
Cumulative load (lbs)
6
4
2
0
5−minute flow (cfs)
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

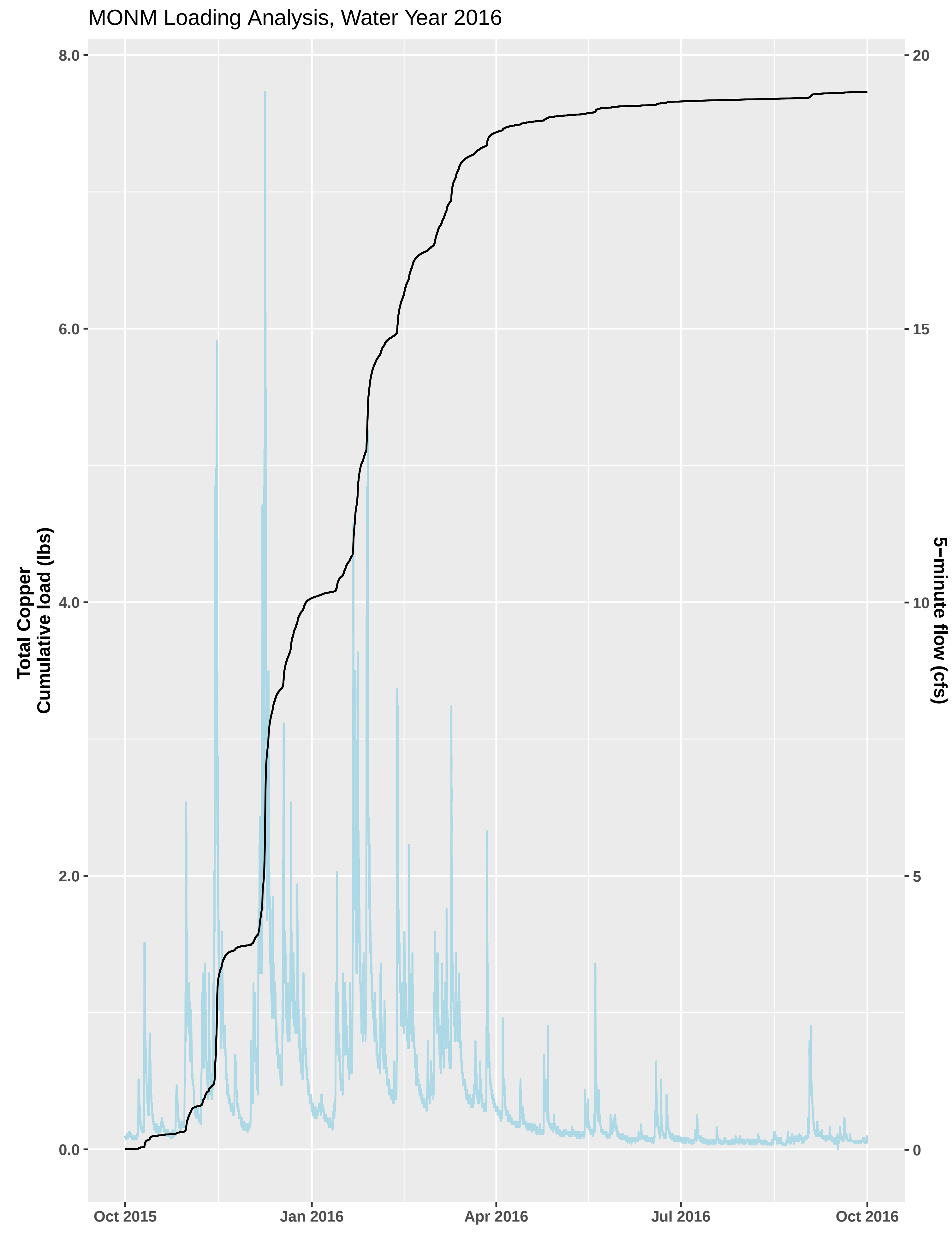


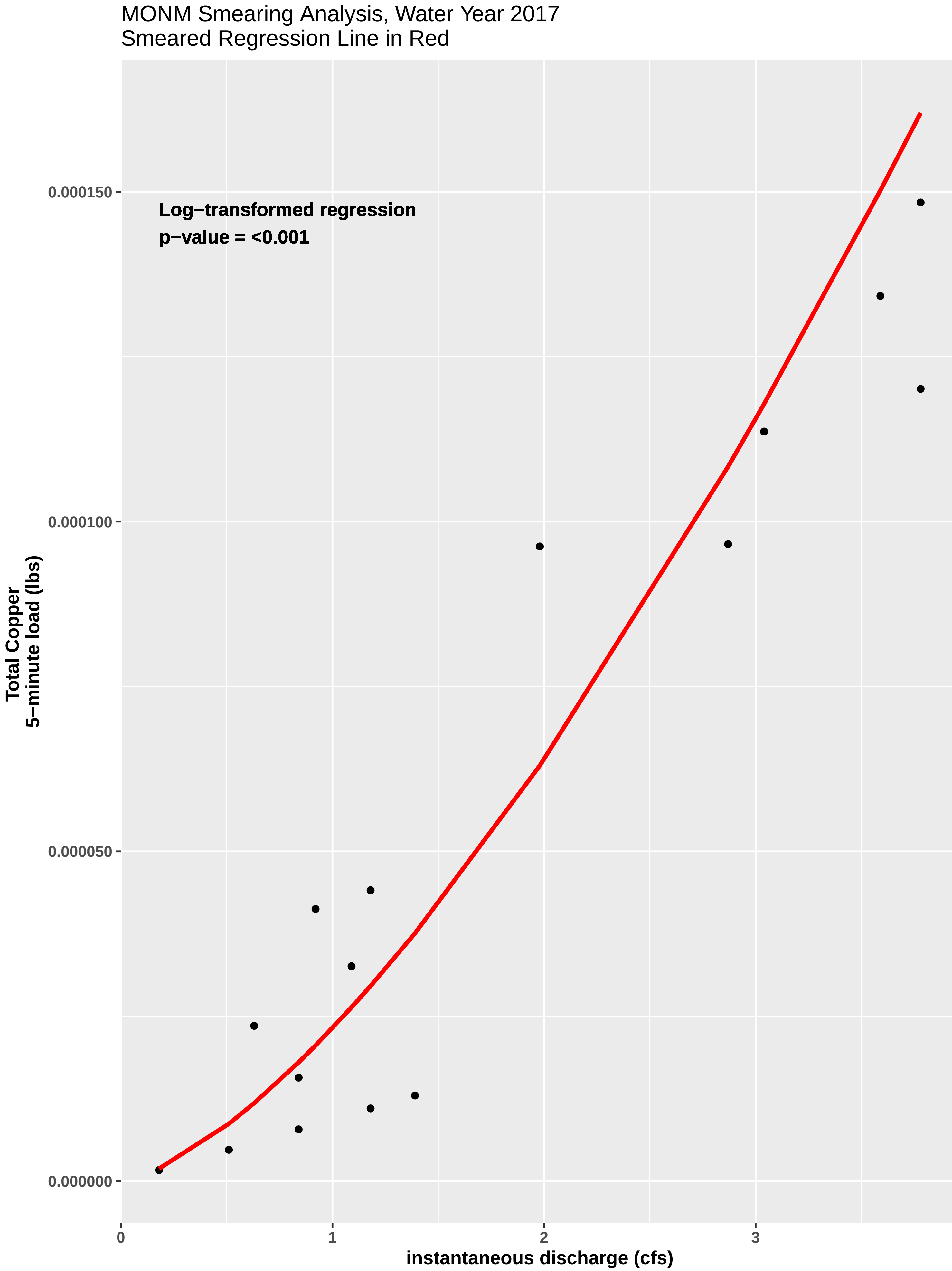
EVAMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.060
0.040
0.020
0.6
0.9
1.2
instantaneous discharge (cfs)



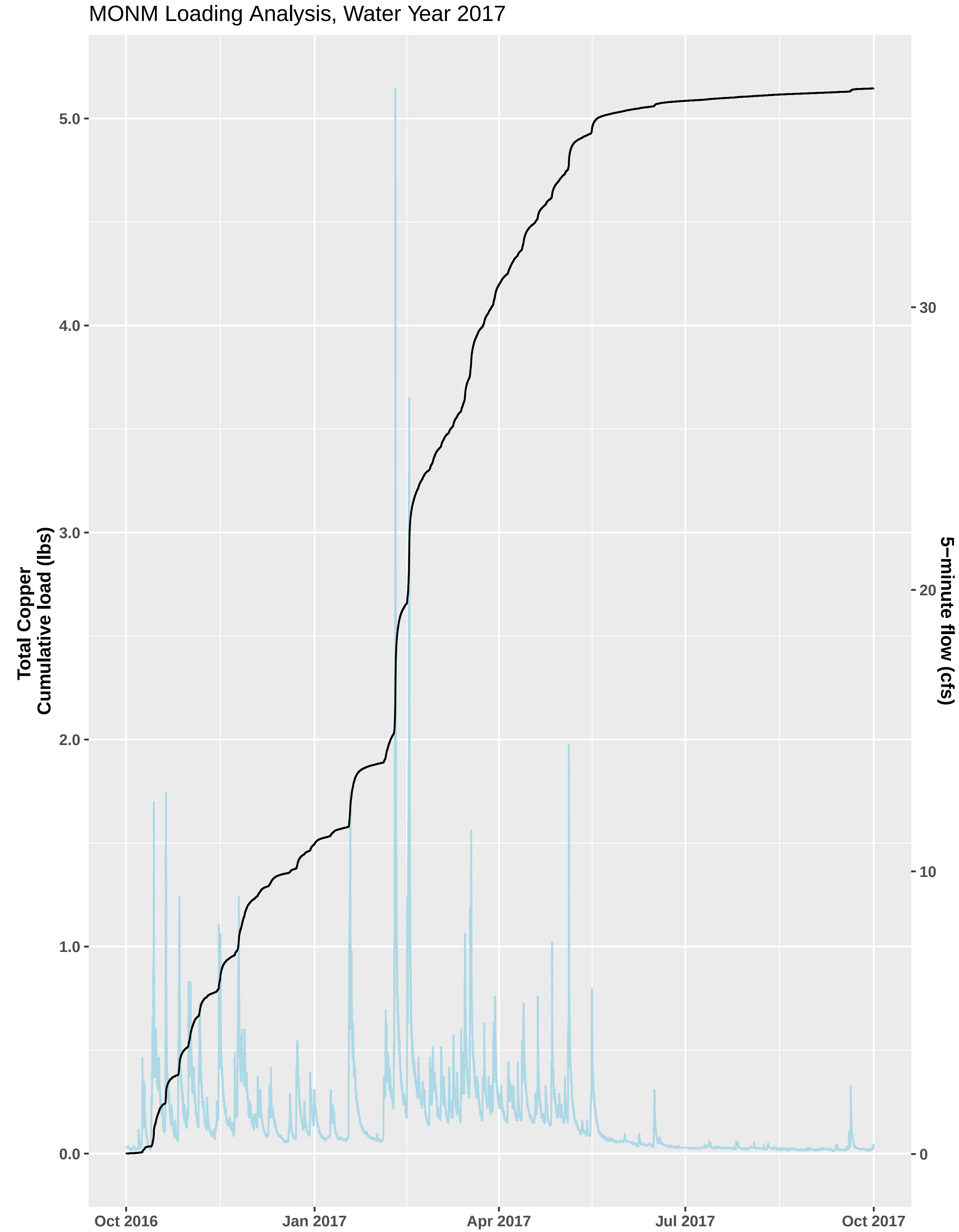
EVAMS Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
2,000
1,500
1,000
500
0
5−minute flow (cfs)
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000100
0.000050
0.000000
0.5
1.0
1.5
instantaneous discharge (cfs)

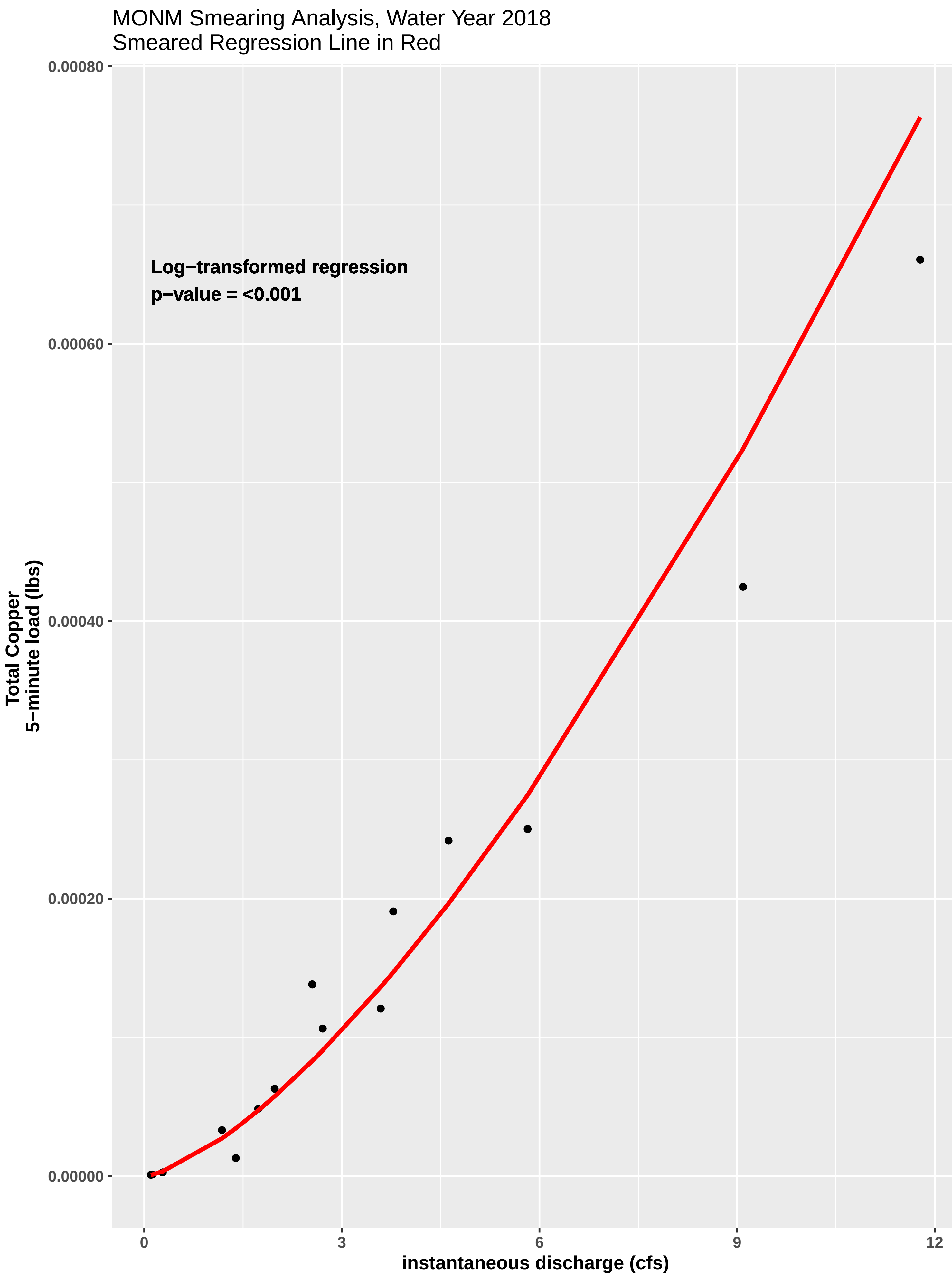

MONM Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
8.0
6.0
4.0
2.0
0.0
5−minute flow (cfs)
20
15
10
5
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016



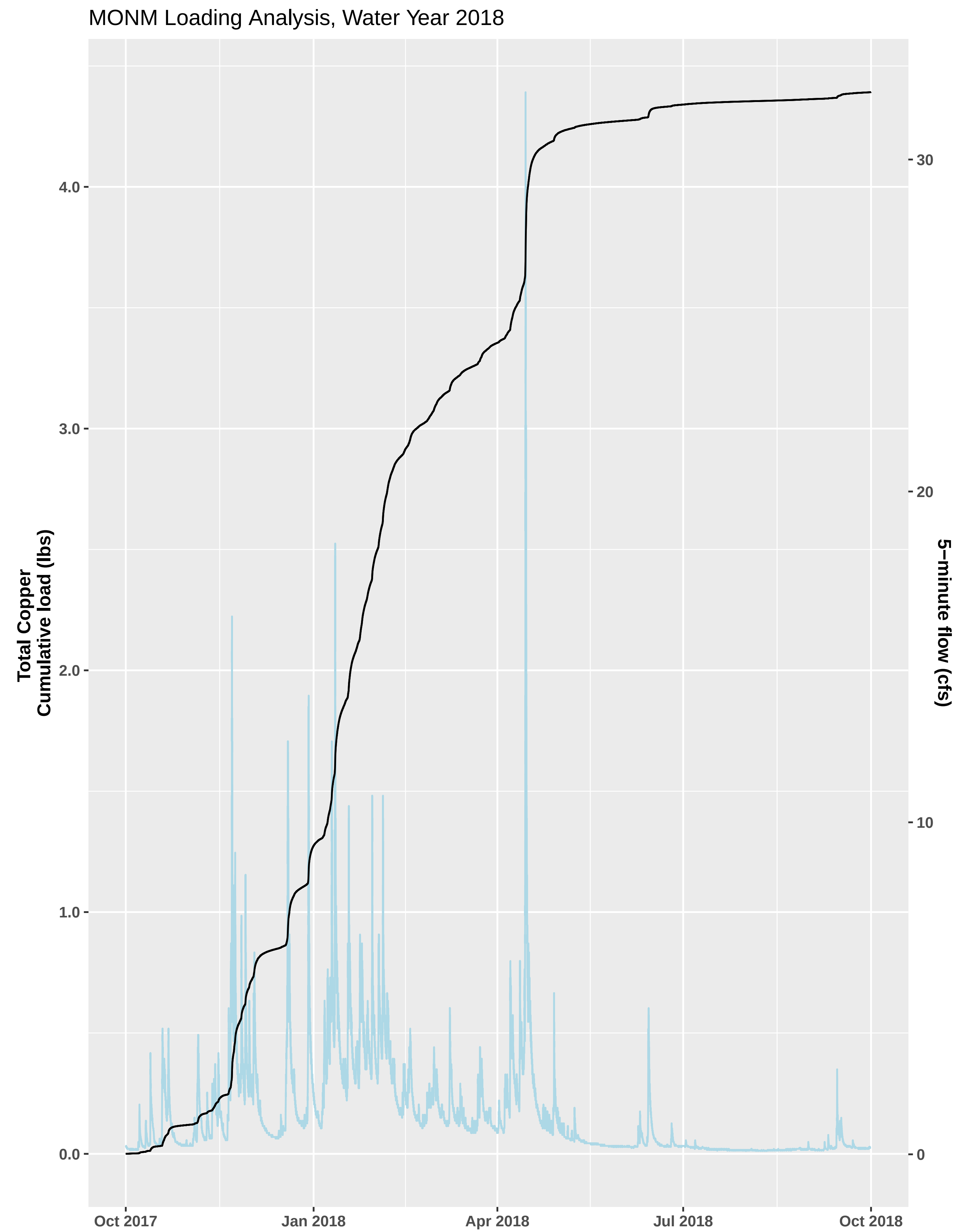
MONM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000150
0.000100
0.000050
0.000000
0
1
2
3
instantaneous discharge (cfs)



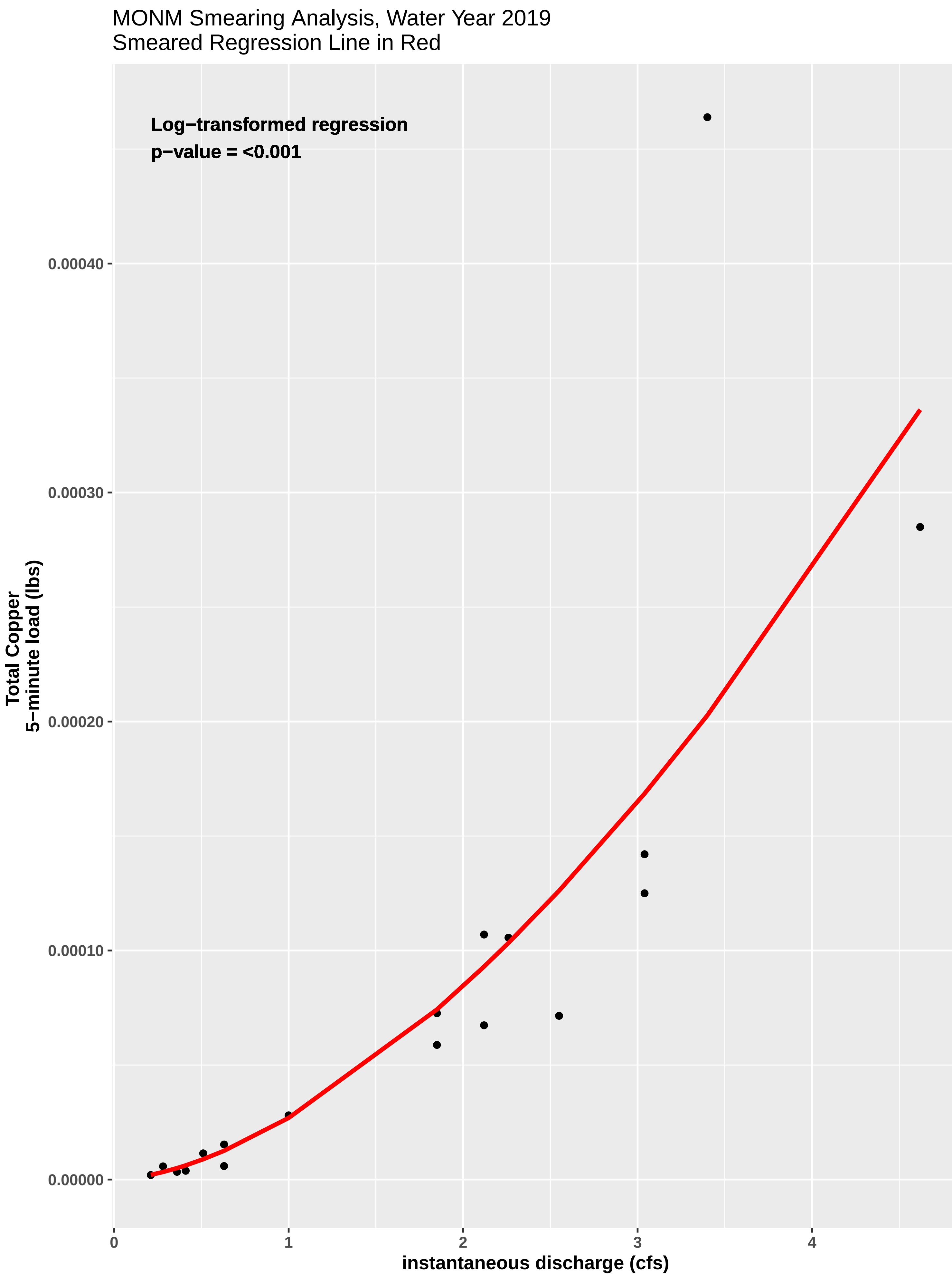
MONM Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
5.0
4.0
3.0
2.0
1.0
0.0
5−minute flow (cfs)
30
20
10
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

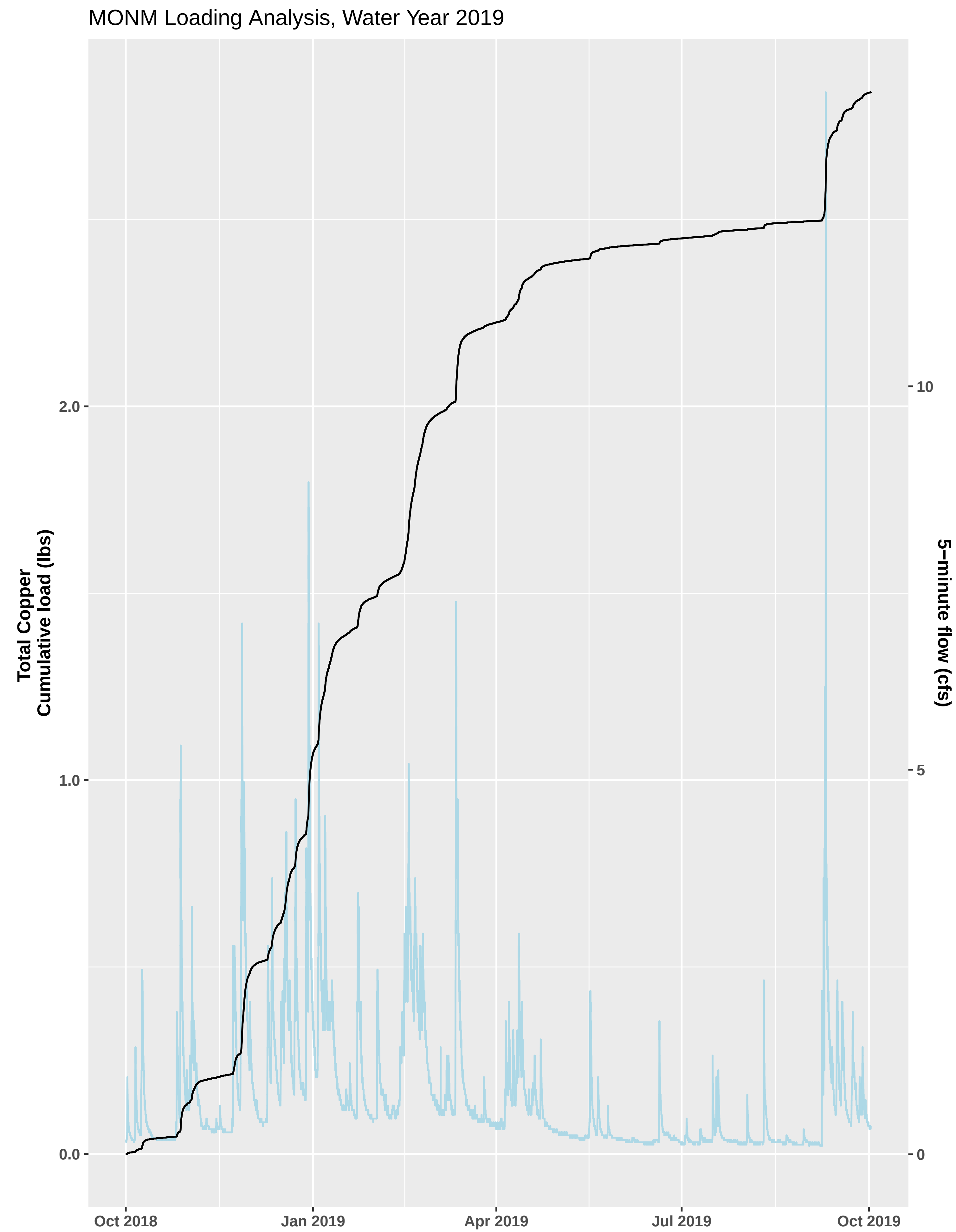


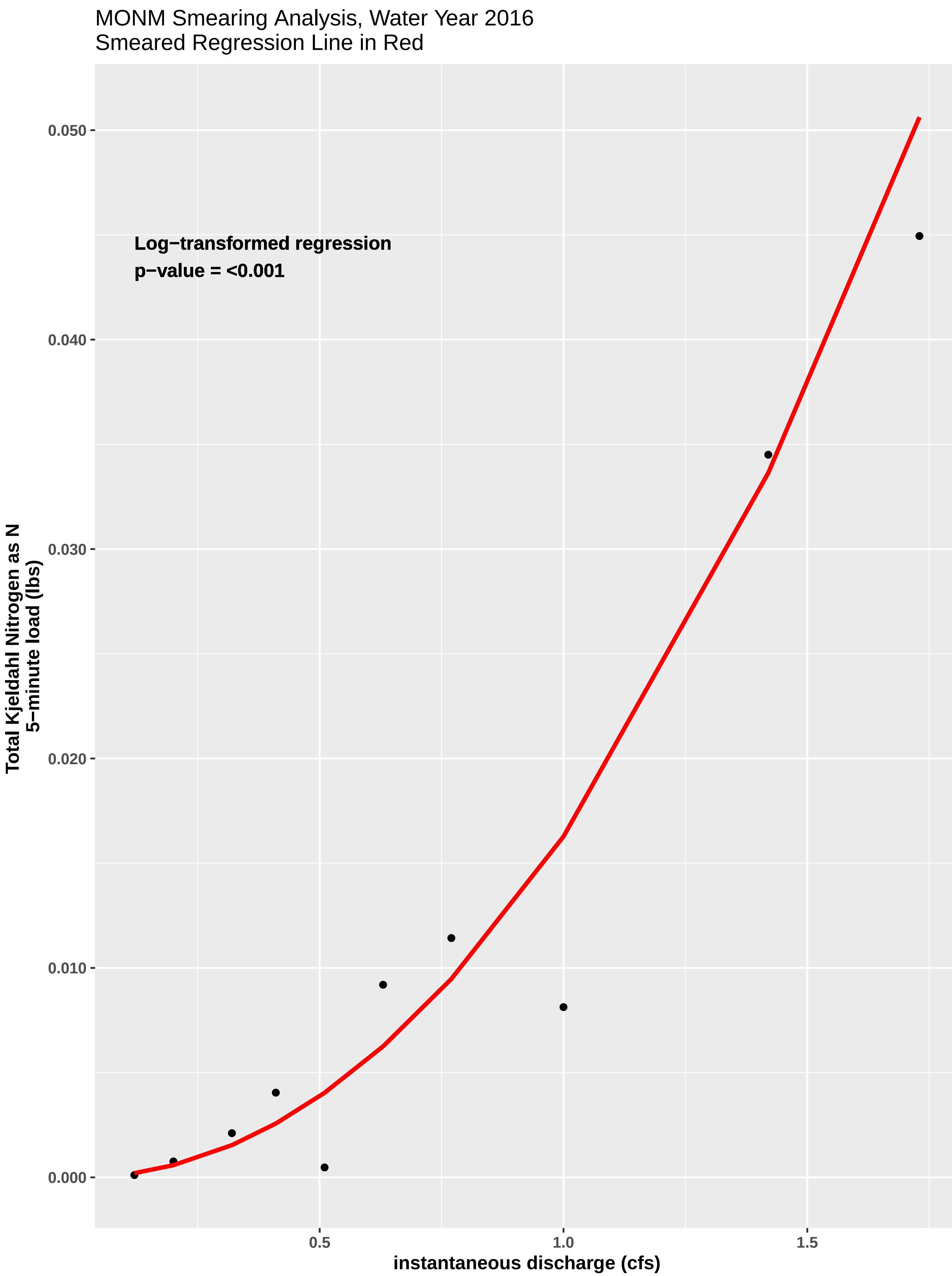
MONM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00080
0.00060
0.00040
0.00020
0.00000
0
3
6
9
12
instantaneous discharge (cfs)

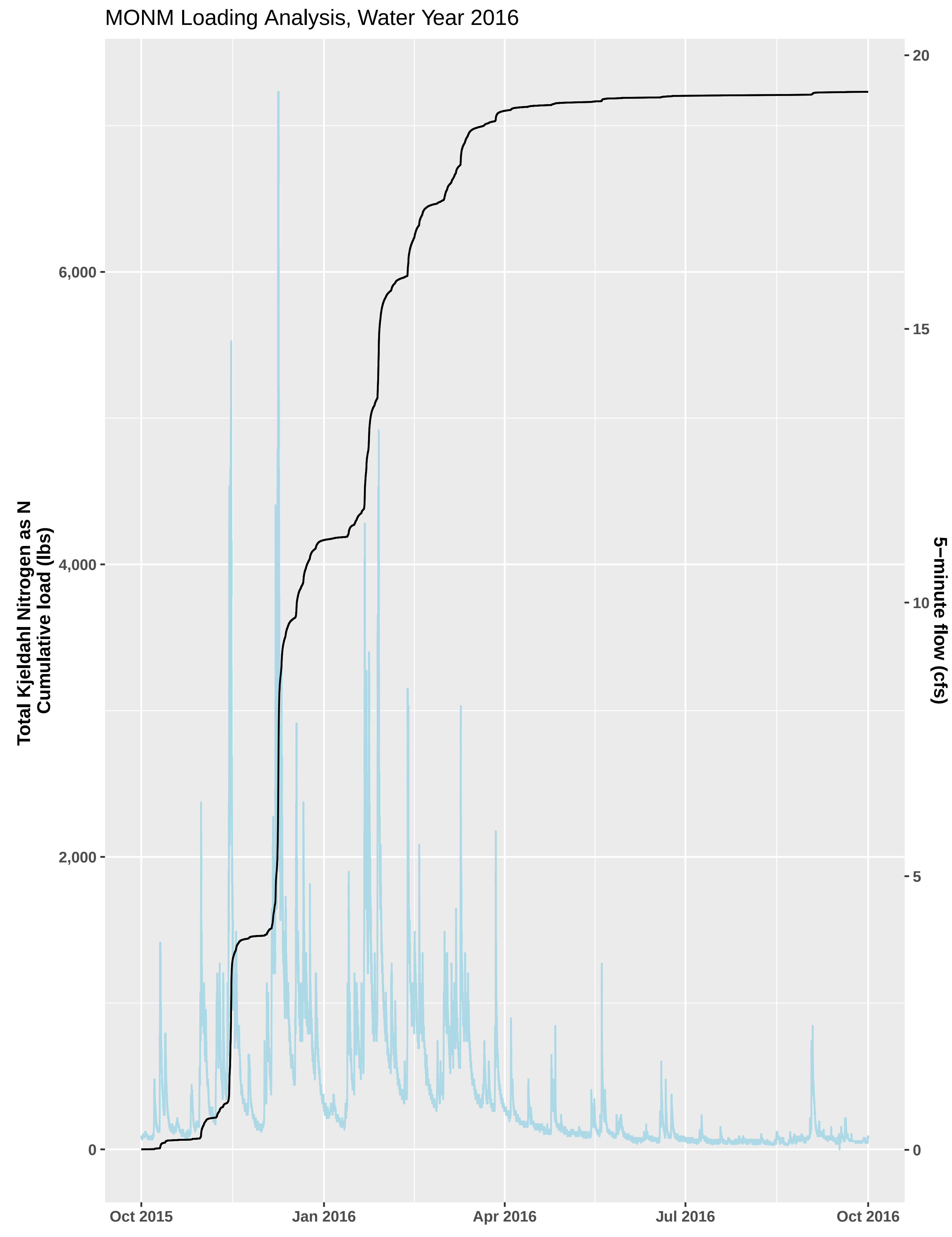


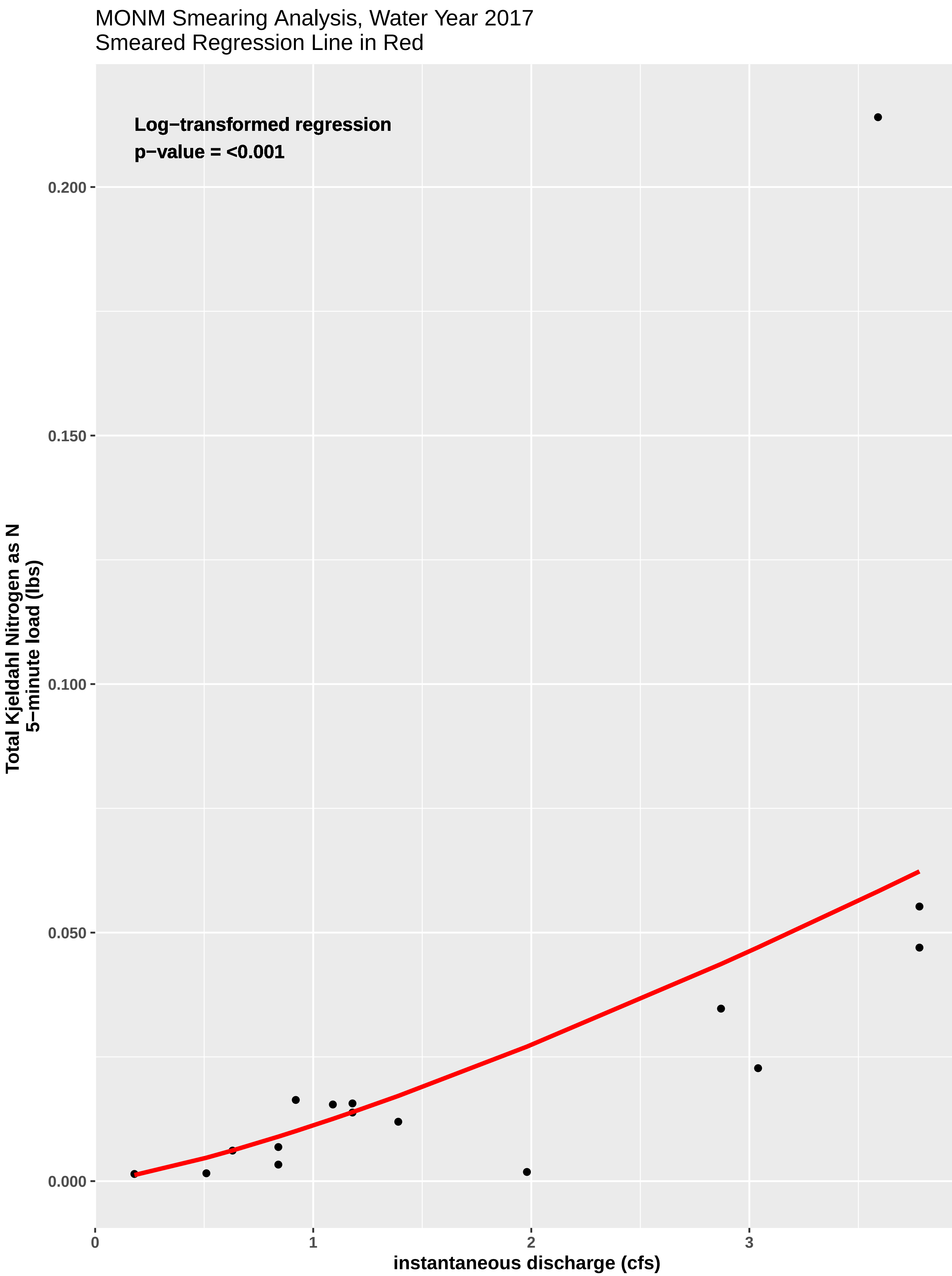
MONM Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
4.0
3.0
2.0
1.0
0.0
5−minute flow (cfs)
30
20
10
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


MONM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.00040
0
1
2
3
4
instantaneous discharge (cfs)

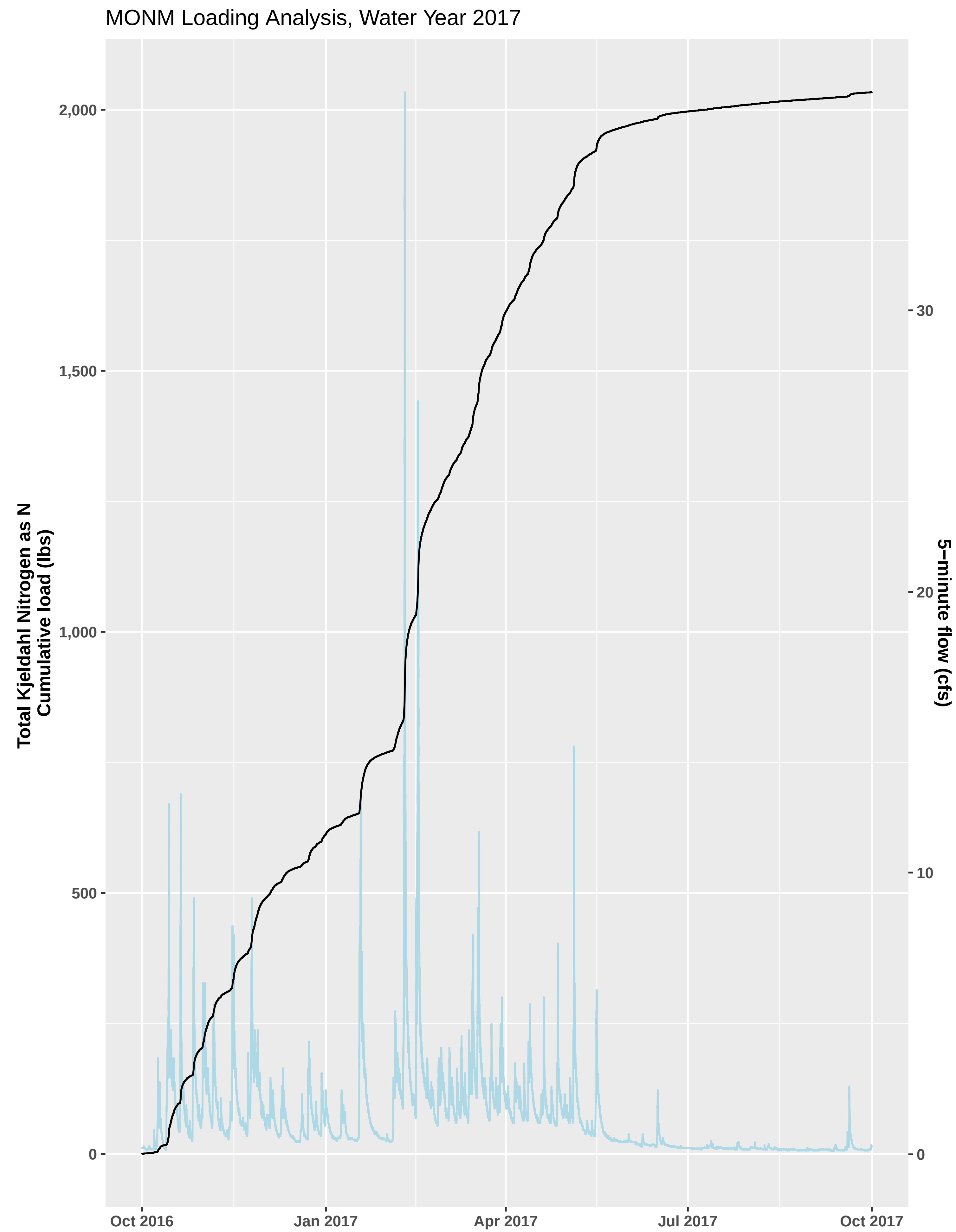

MONM Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.0
1.0
2.0
5−minute flow (cfs)
0
5
10
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.040
0.050
0.5
1.0
1.5
instantaneous discharge (cfs)

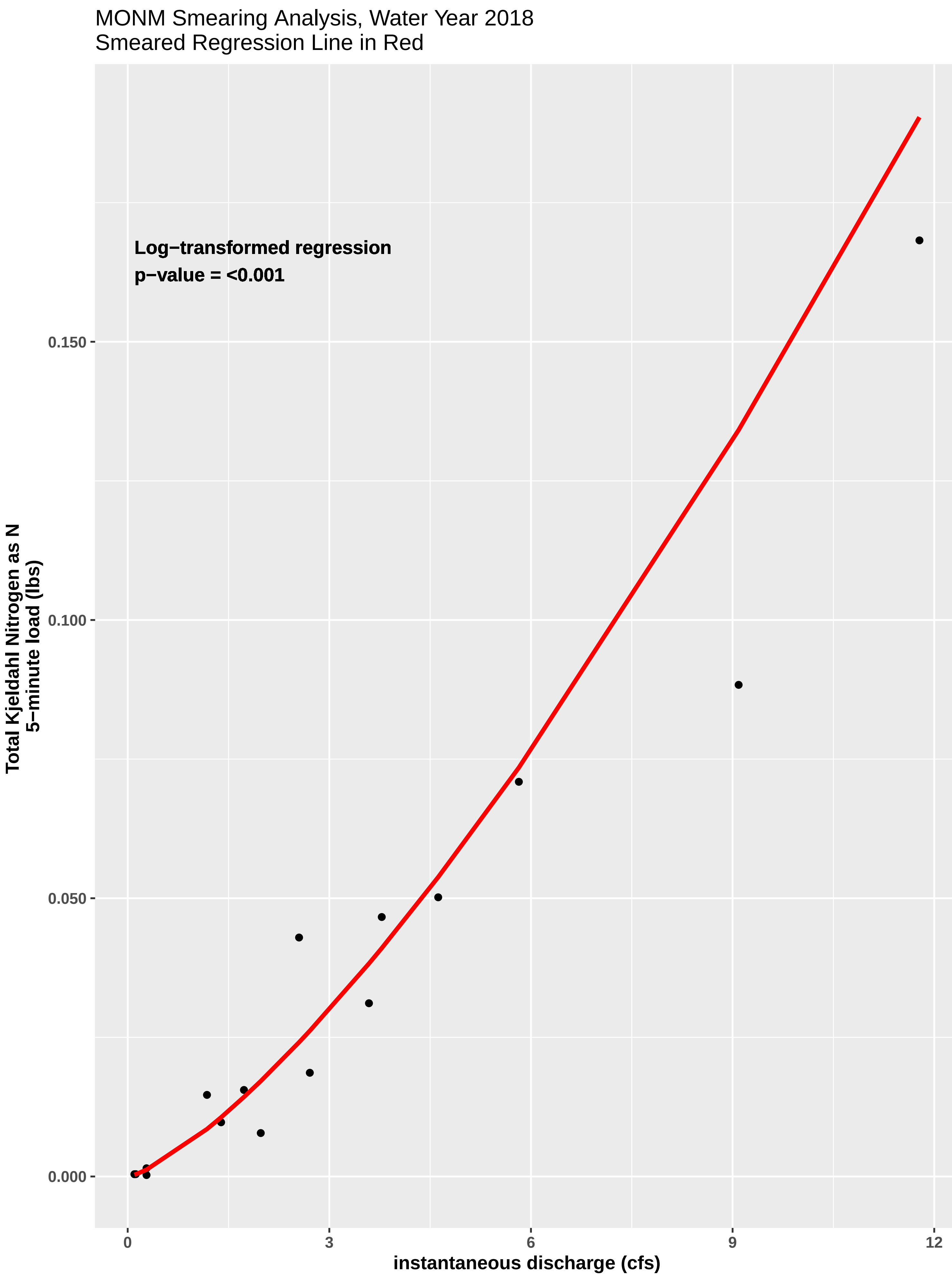

MONM Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
2,000
4,000
6,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

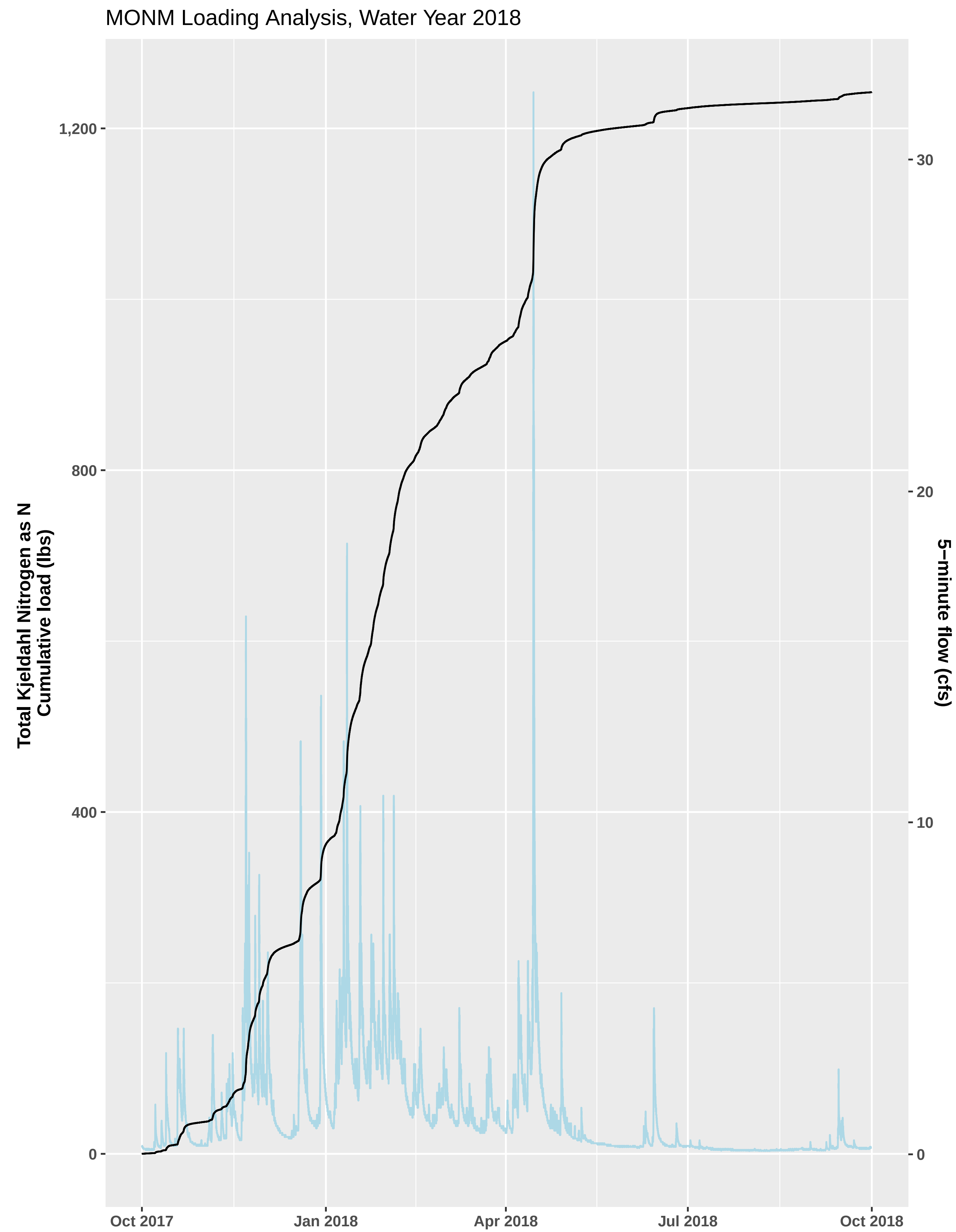


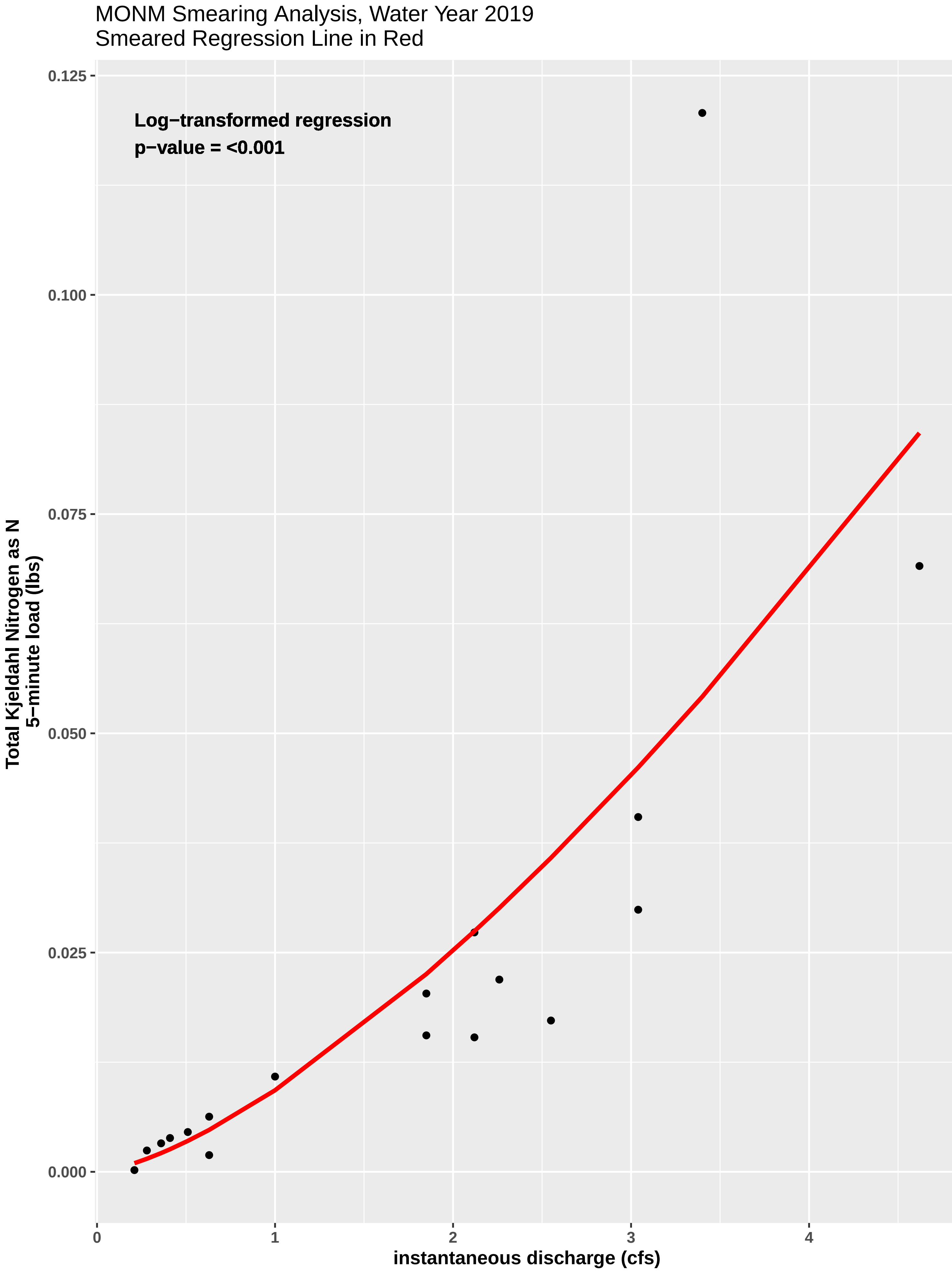
MONM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.200
0
1
2
3
instantaneous discharge (cfs)

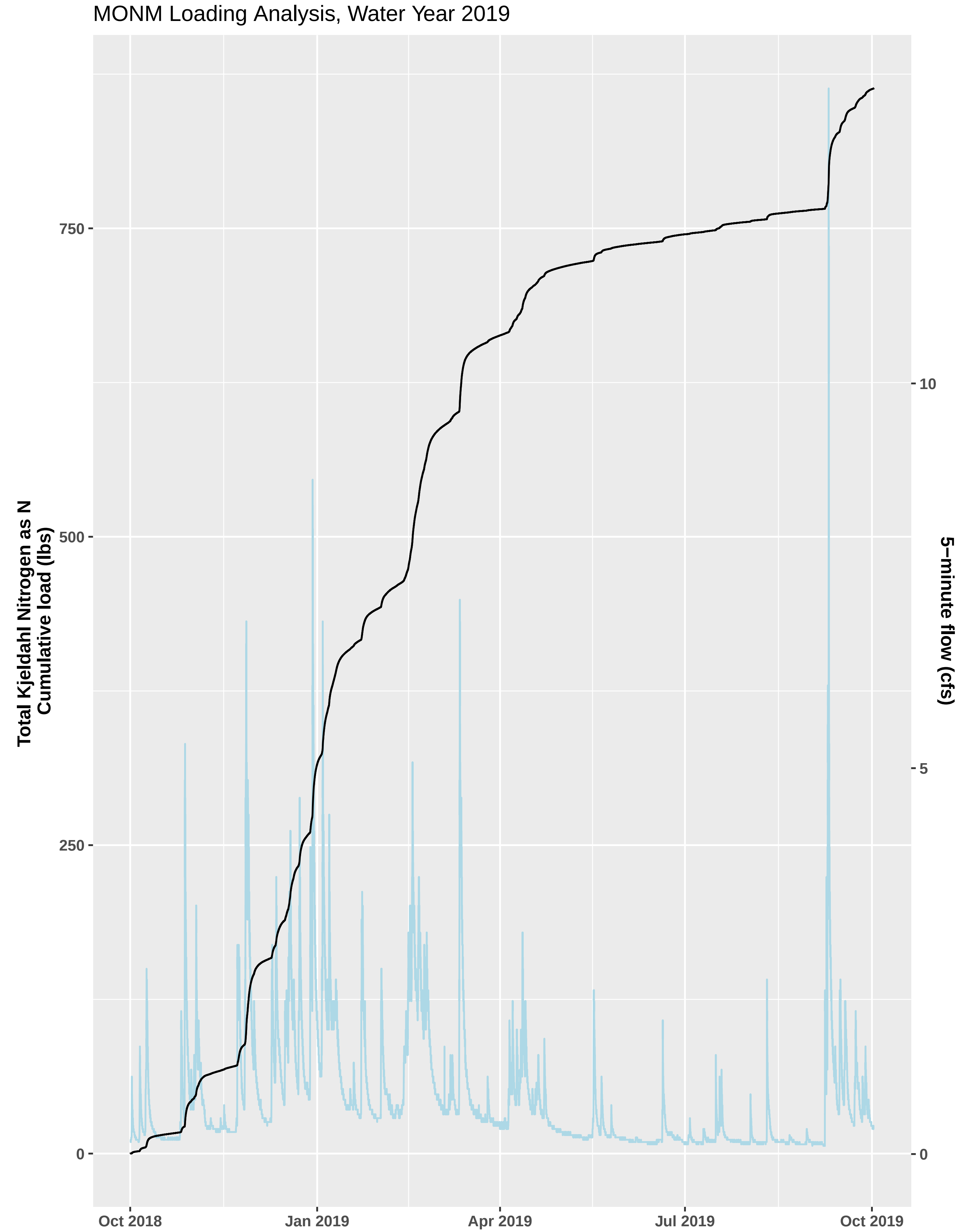


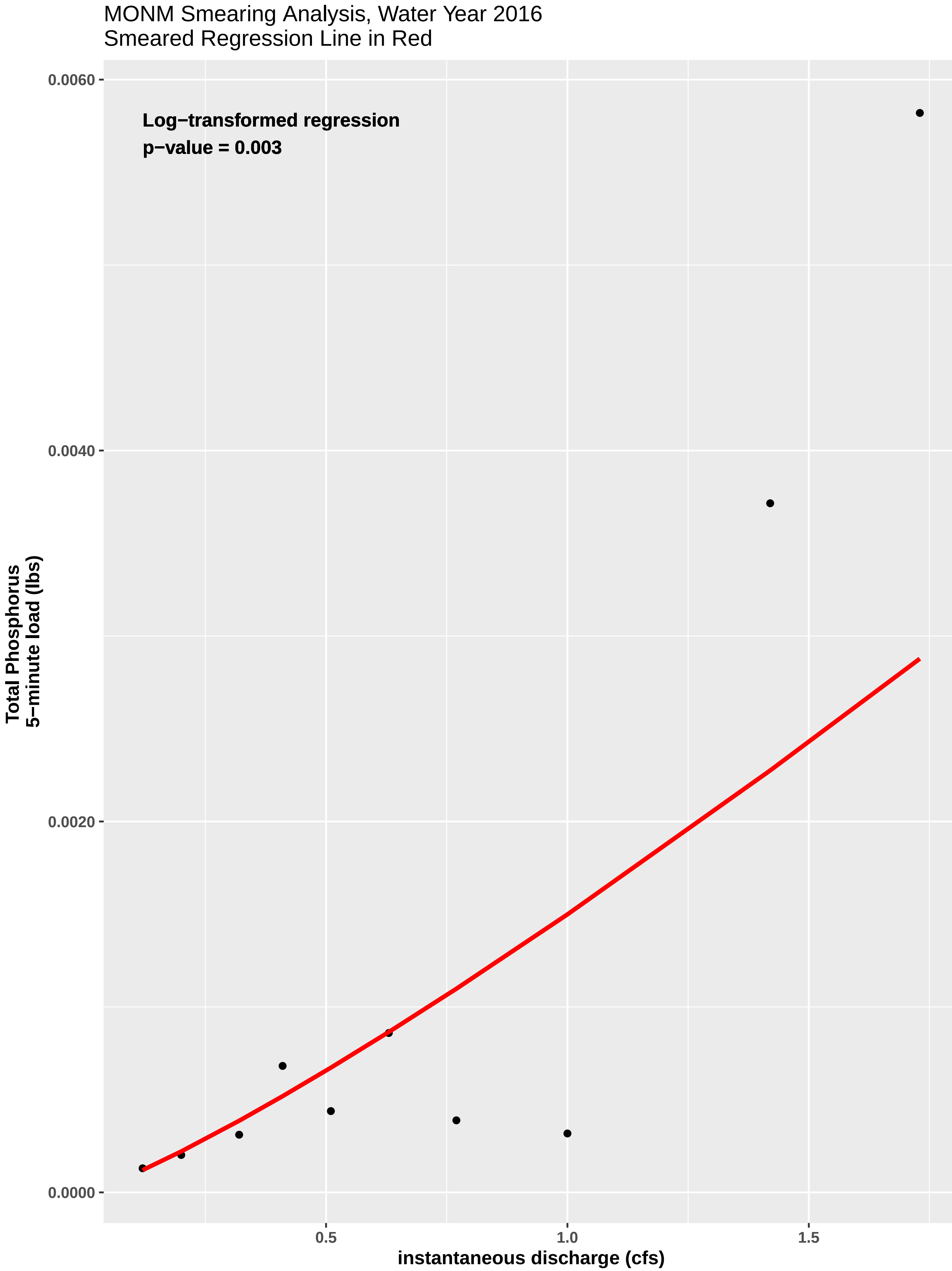
MONM Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
10
20
30
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

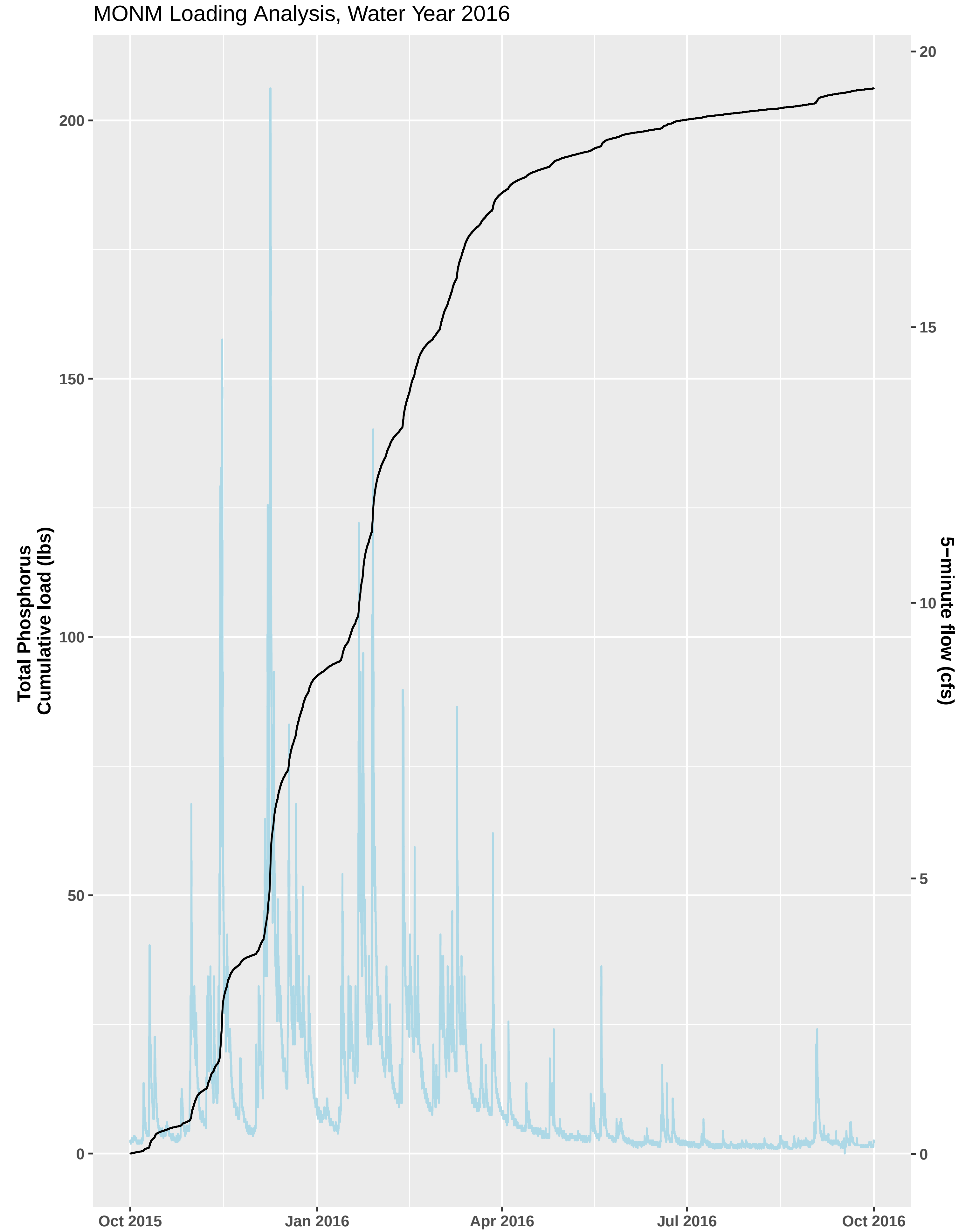

MONM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.050
0.100
0.150
0
3
6
9
12
instantaneous discharge (cfs)

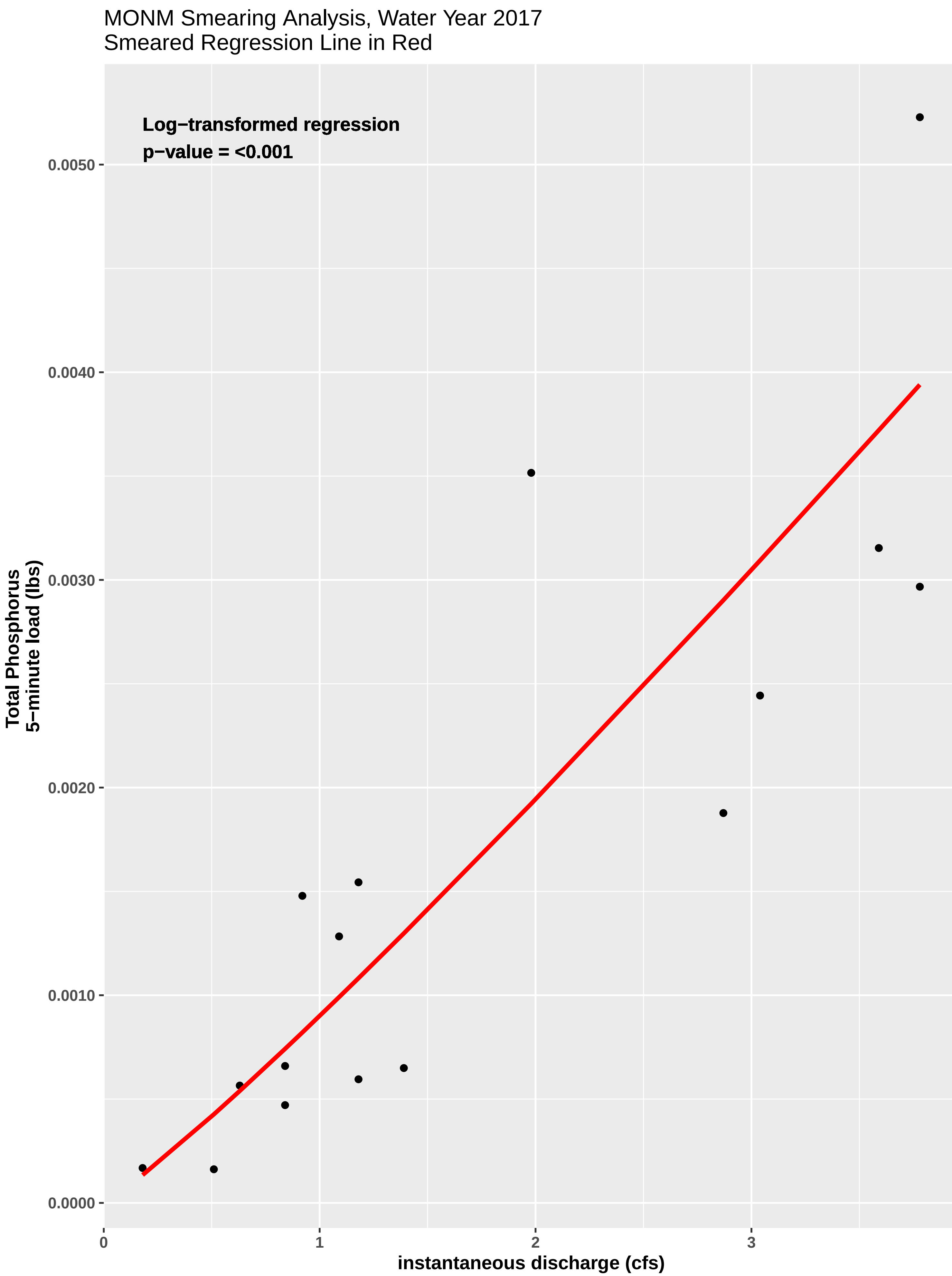

MONM Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
400
800
1,200
5−minute flow (cfs)
0
10
20
30
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

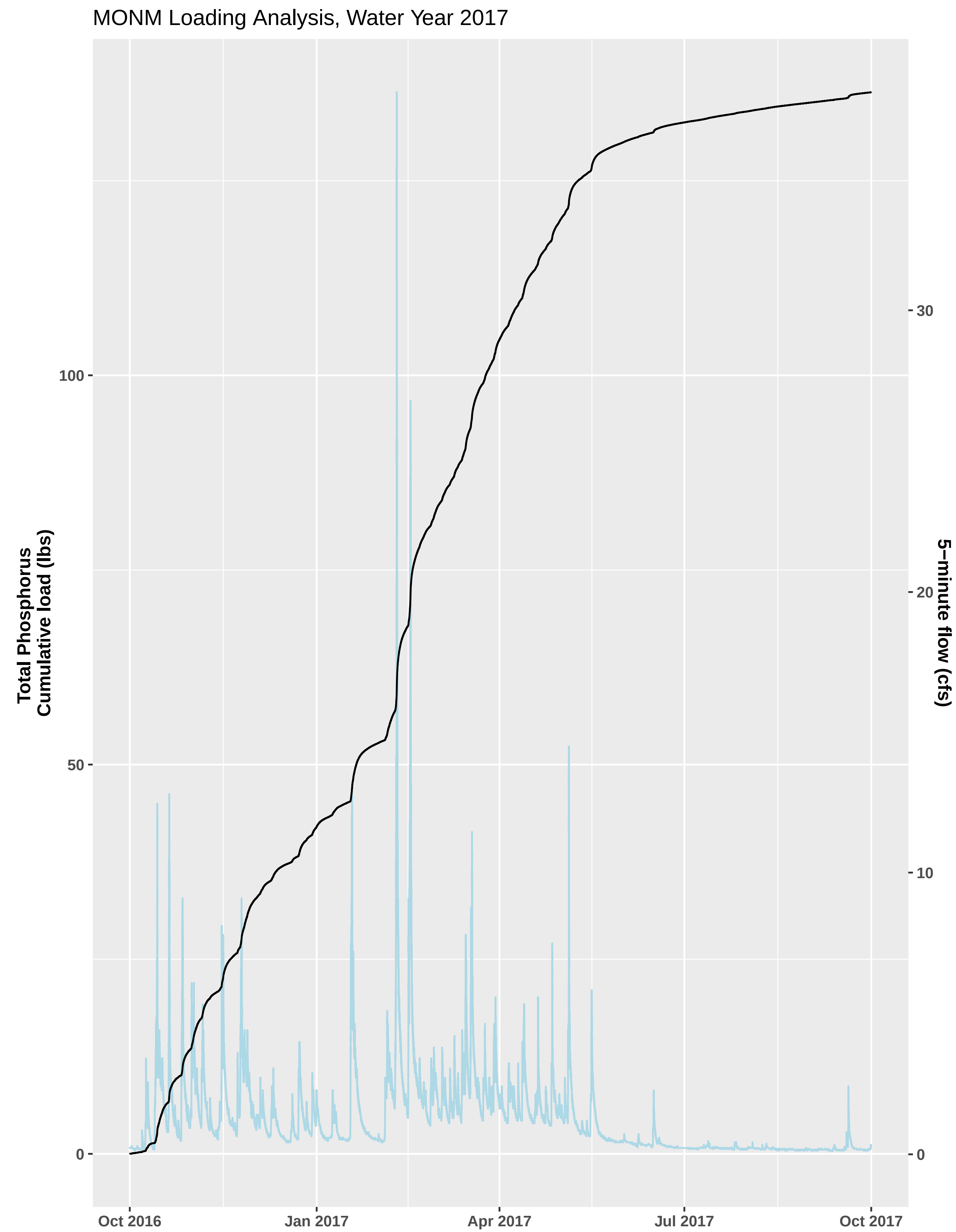

MONM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.025
0.050
0.075
0.100
0.125
0
1
2
3
4
instantaneous discharge (cfs)

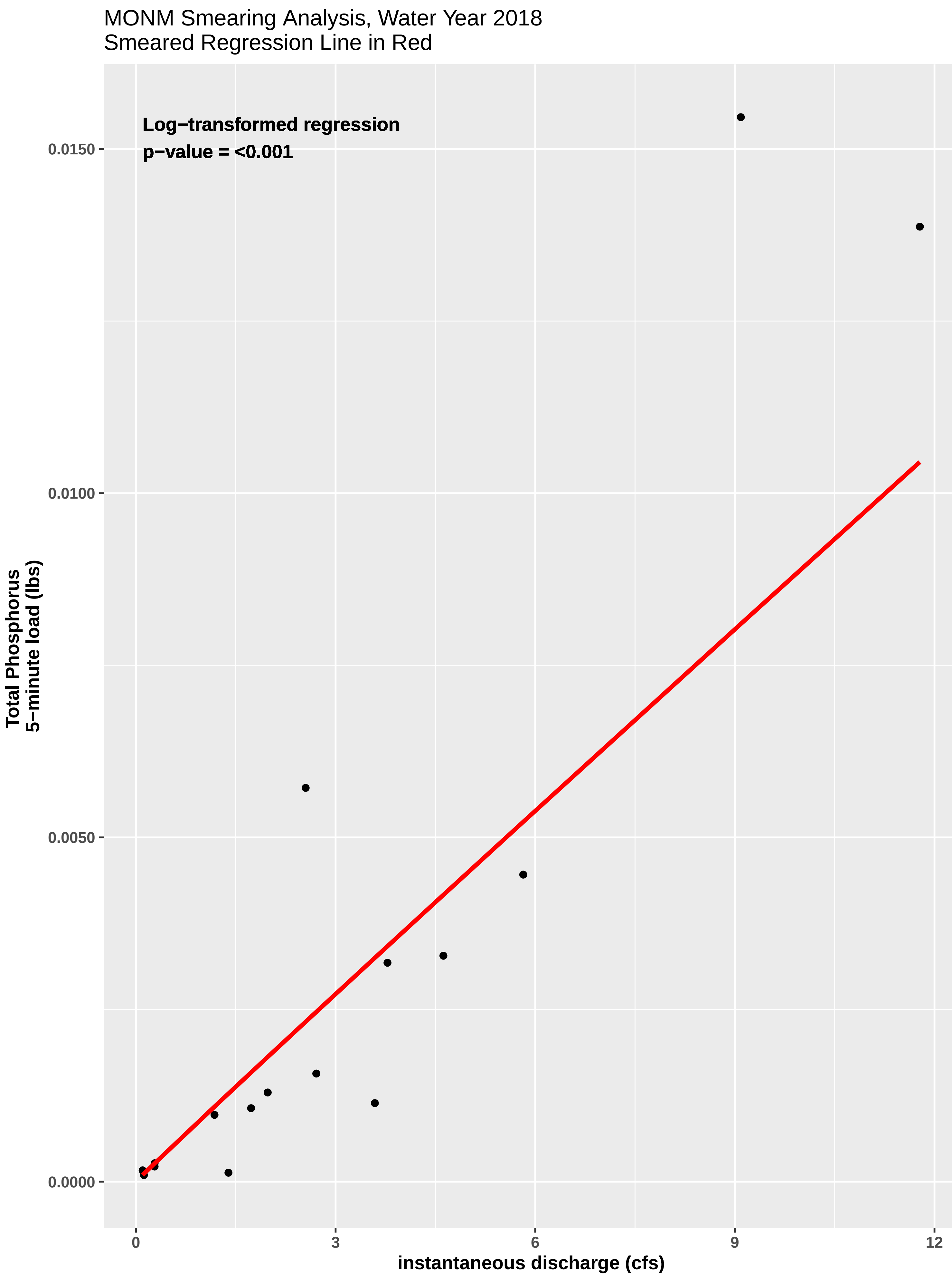

MONM Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
250
500
750
5−minute flow (cfs)
0
5
10
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.003
Total Phosphorus
5−minute load (lbs)
instantaneous discharge (cfs)
0.0000
0.0020
0.0040
0.0060
0.5
1.0
1.5

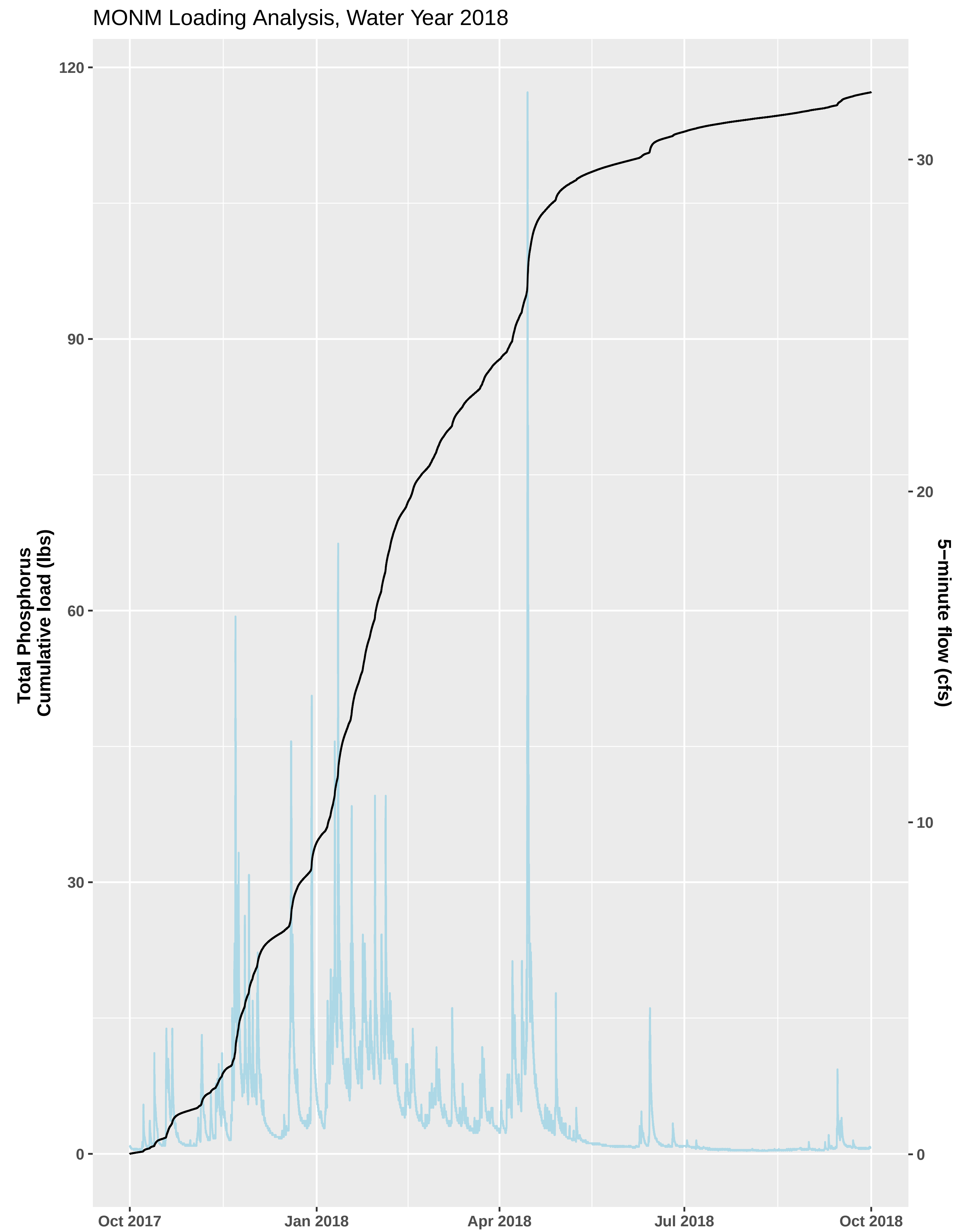

MONM Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
5−minute flow (cfs)
0
50
100
150
200
0
5
10
15
20
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


MONM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0040
0.0050
0
1
2
3
instantaneous discharge (cfs)

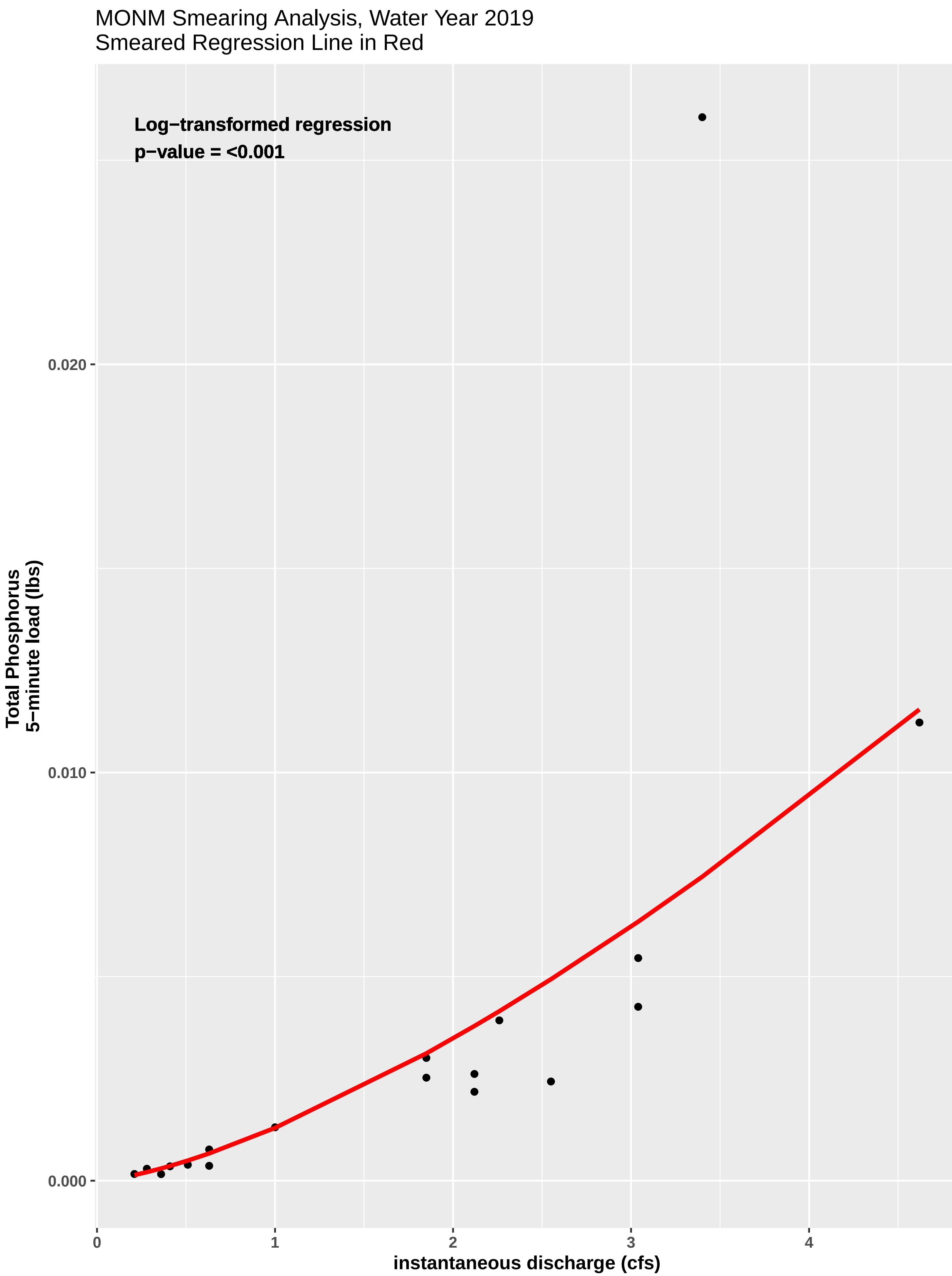

MONM Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
50
100
5−minute flow (cfs)
0
10
20
30
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

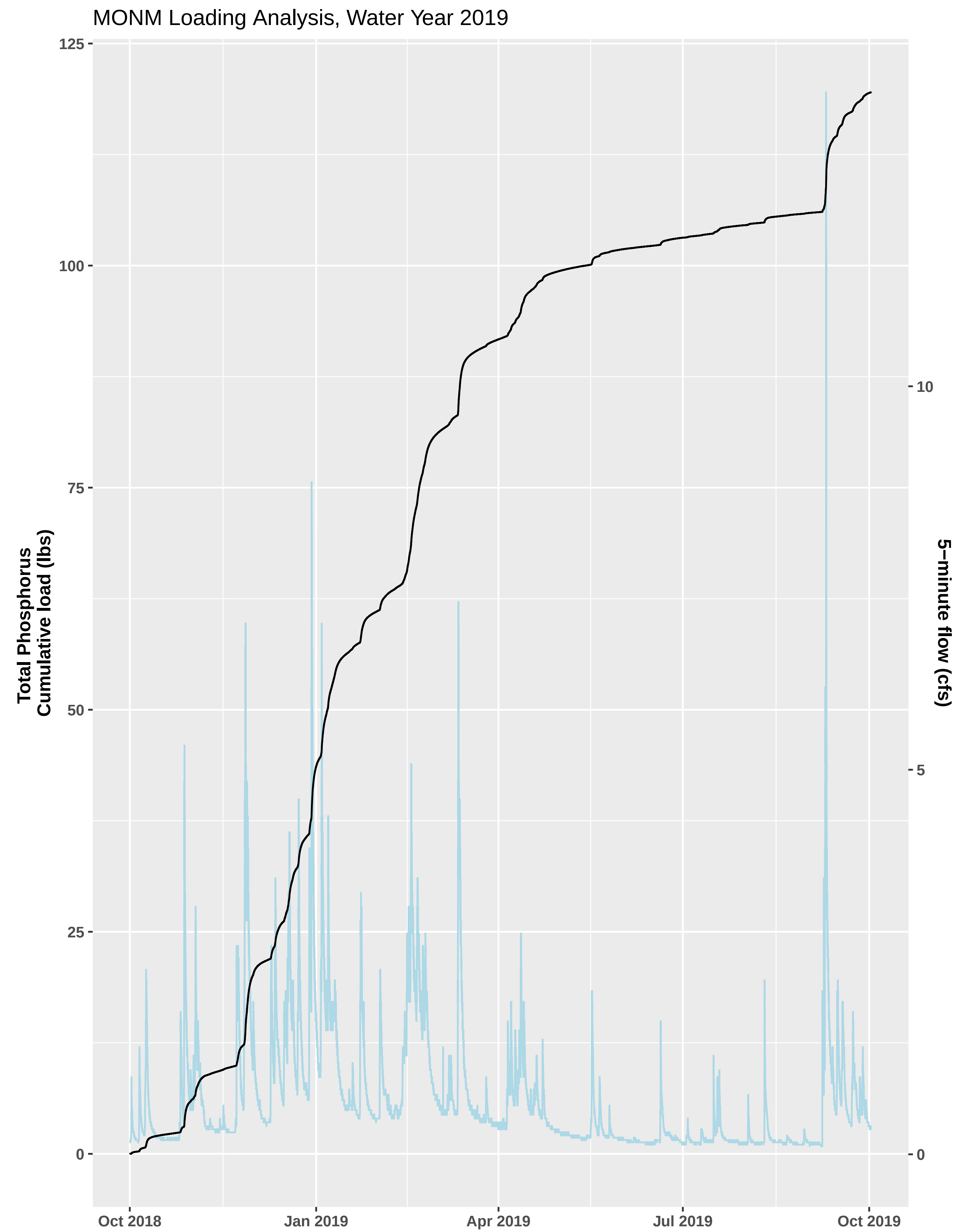


MONM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0
3
6
9
12
instantaneous discharge (cfs)

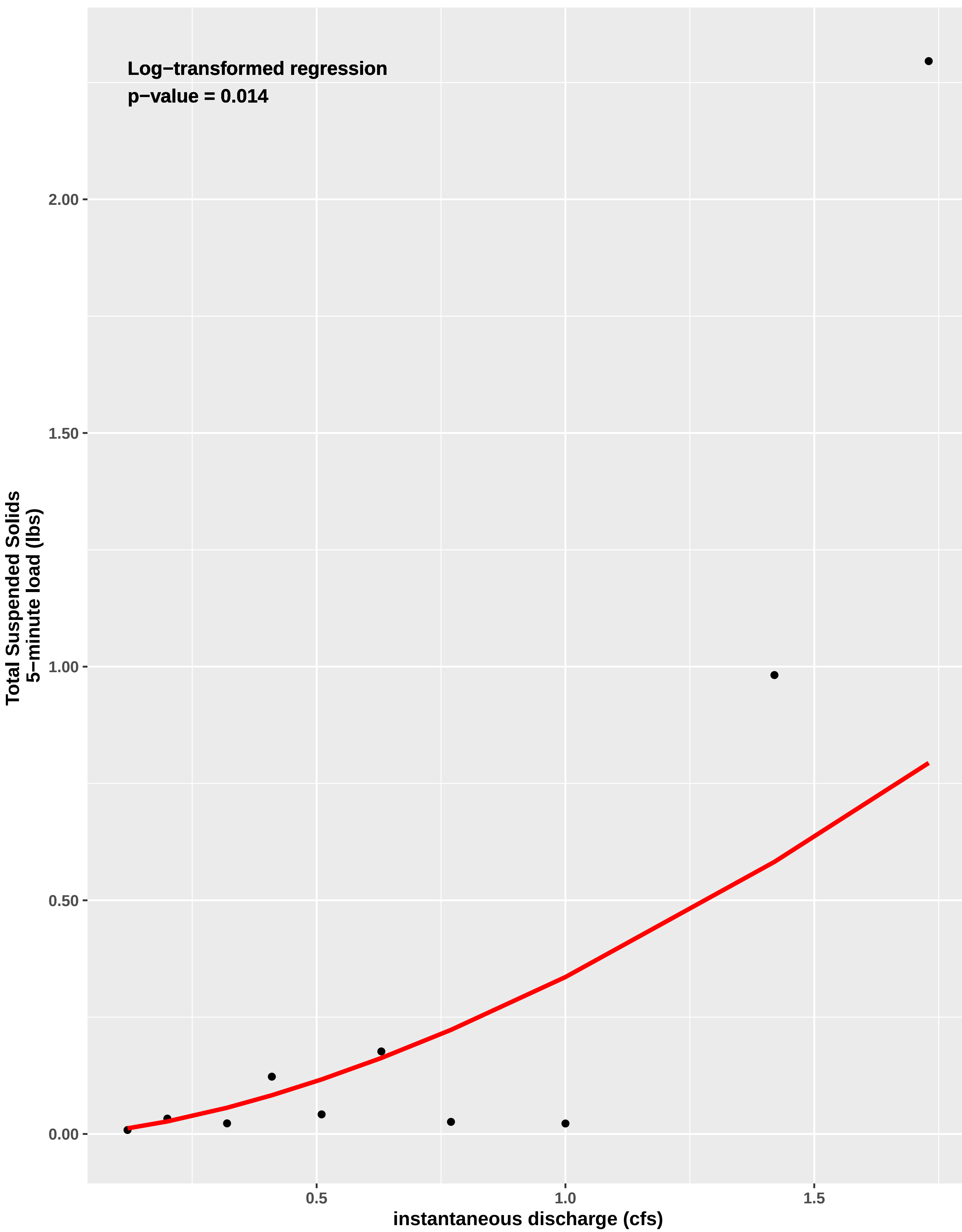


MONM Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
30
60
90
120
5−minute flow (cfs)
0
10
20
30
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

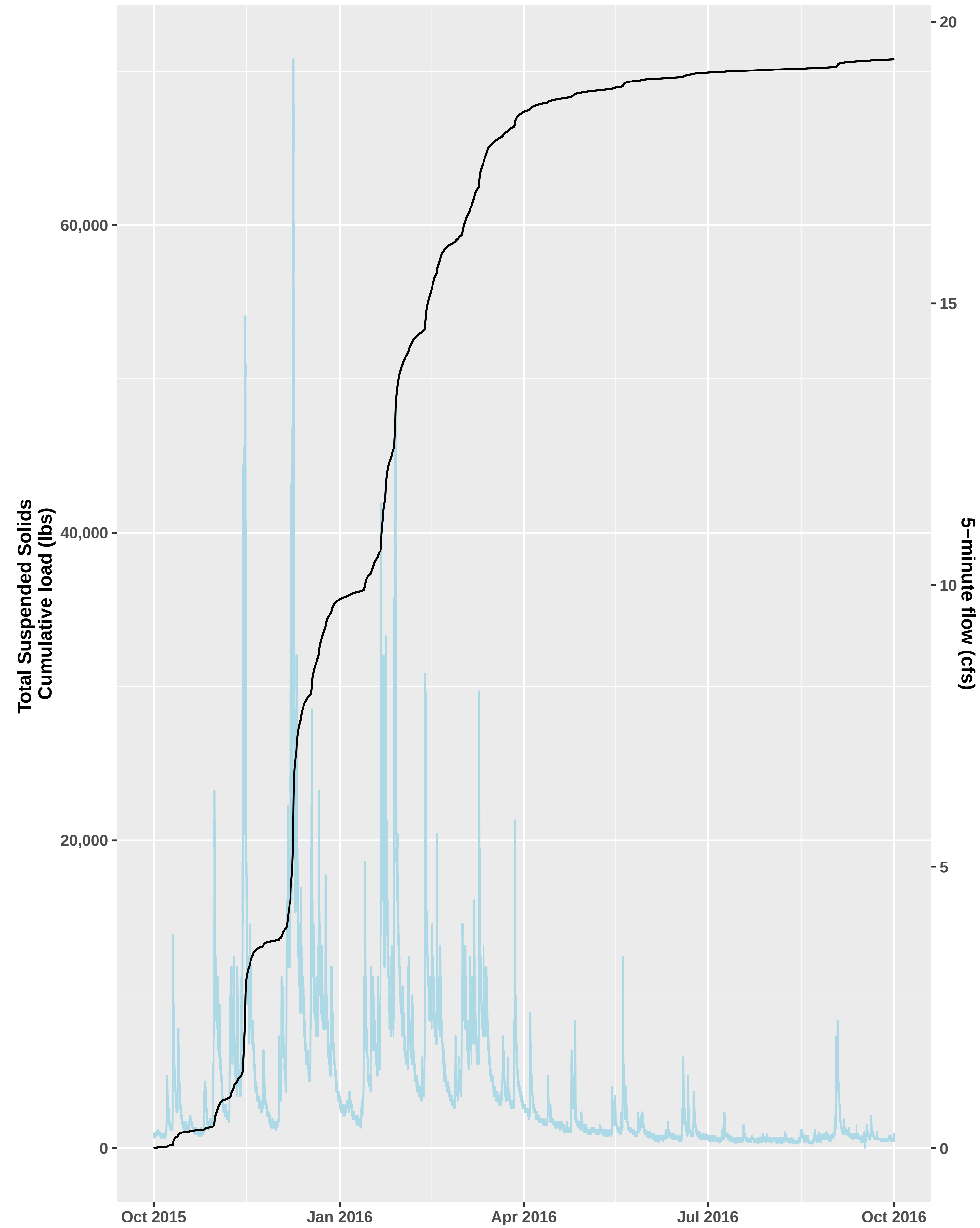

MONM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.000
0.010
0.020
0
1
2
3
4
instantaneous discharge (cfs)

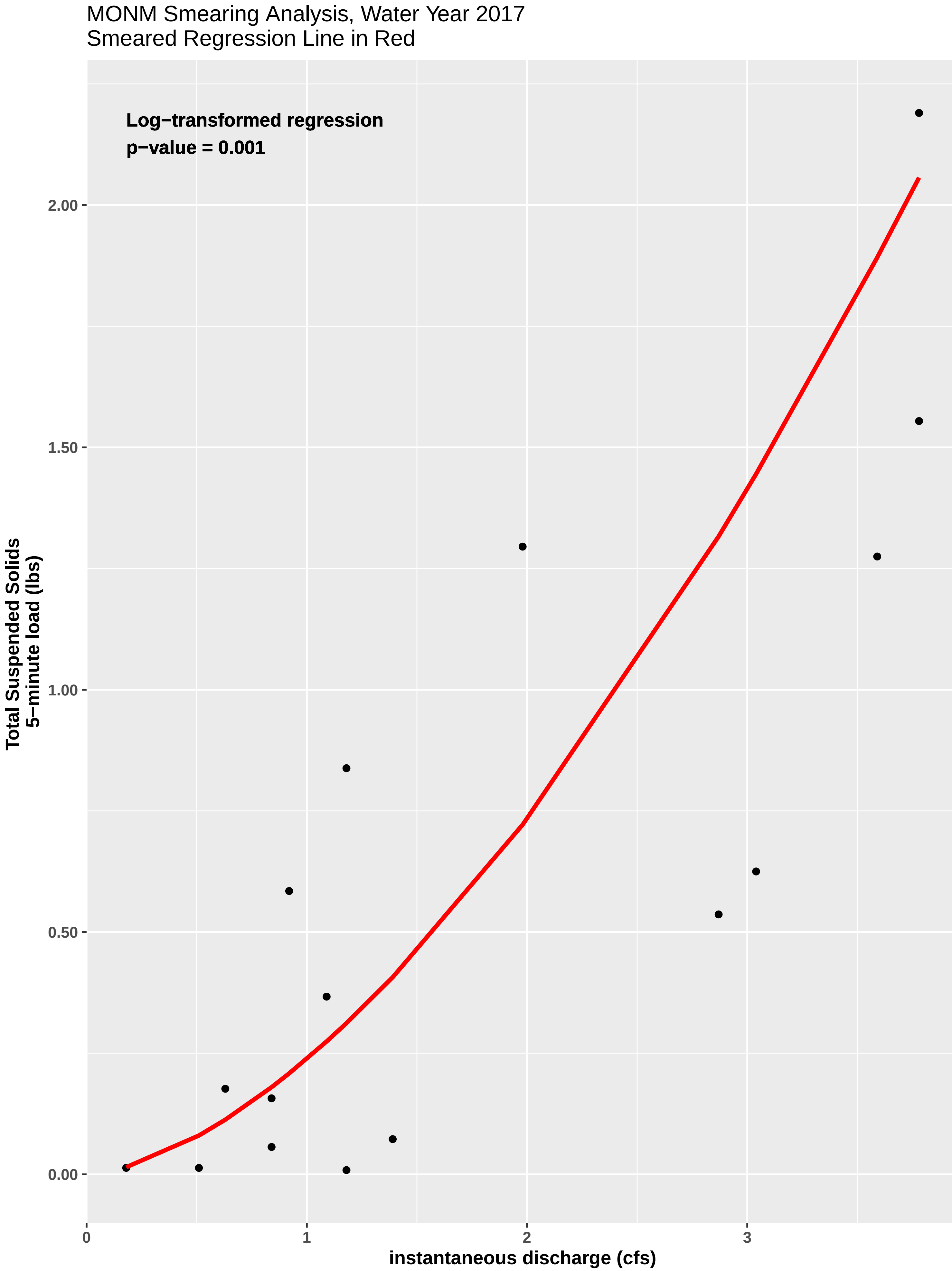

MONM Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
100
125
5−minute flow (cfs)
0
5
10
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

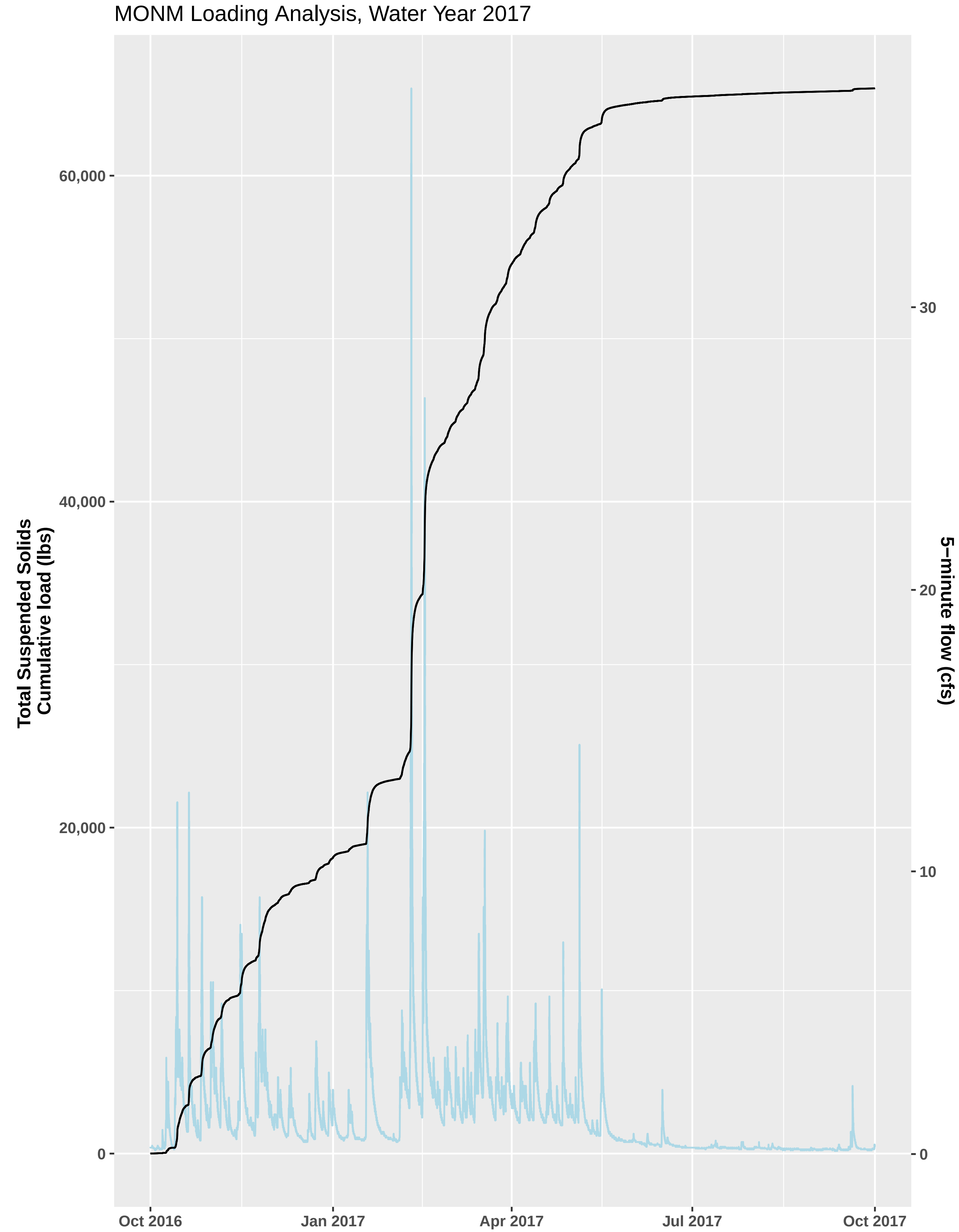
MONM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red

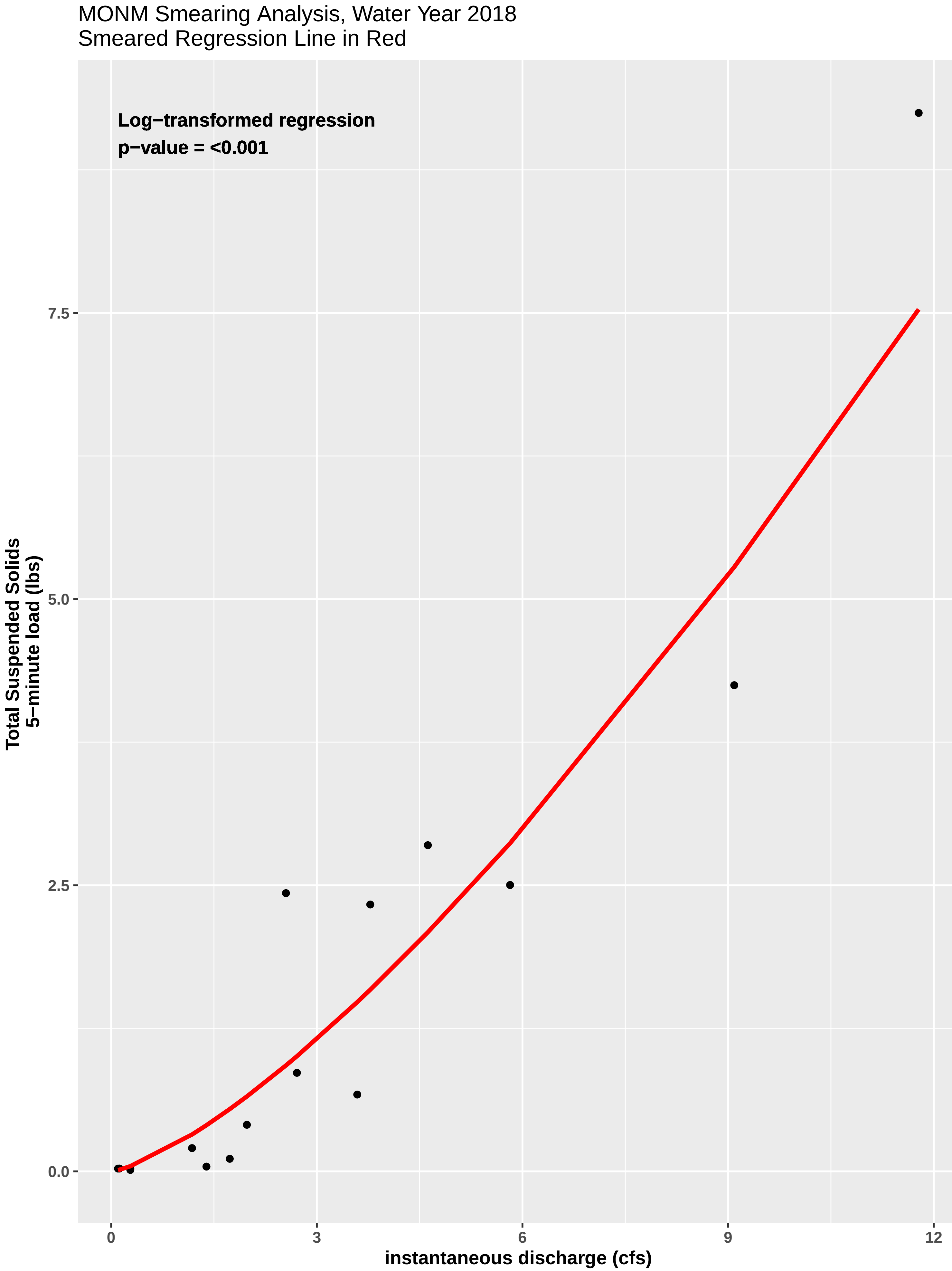


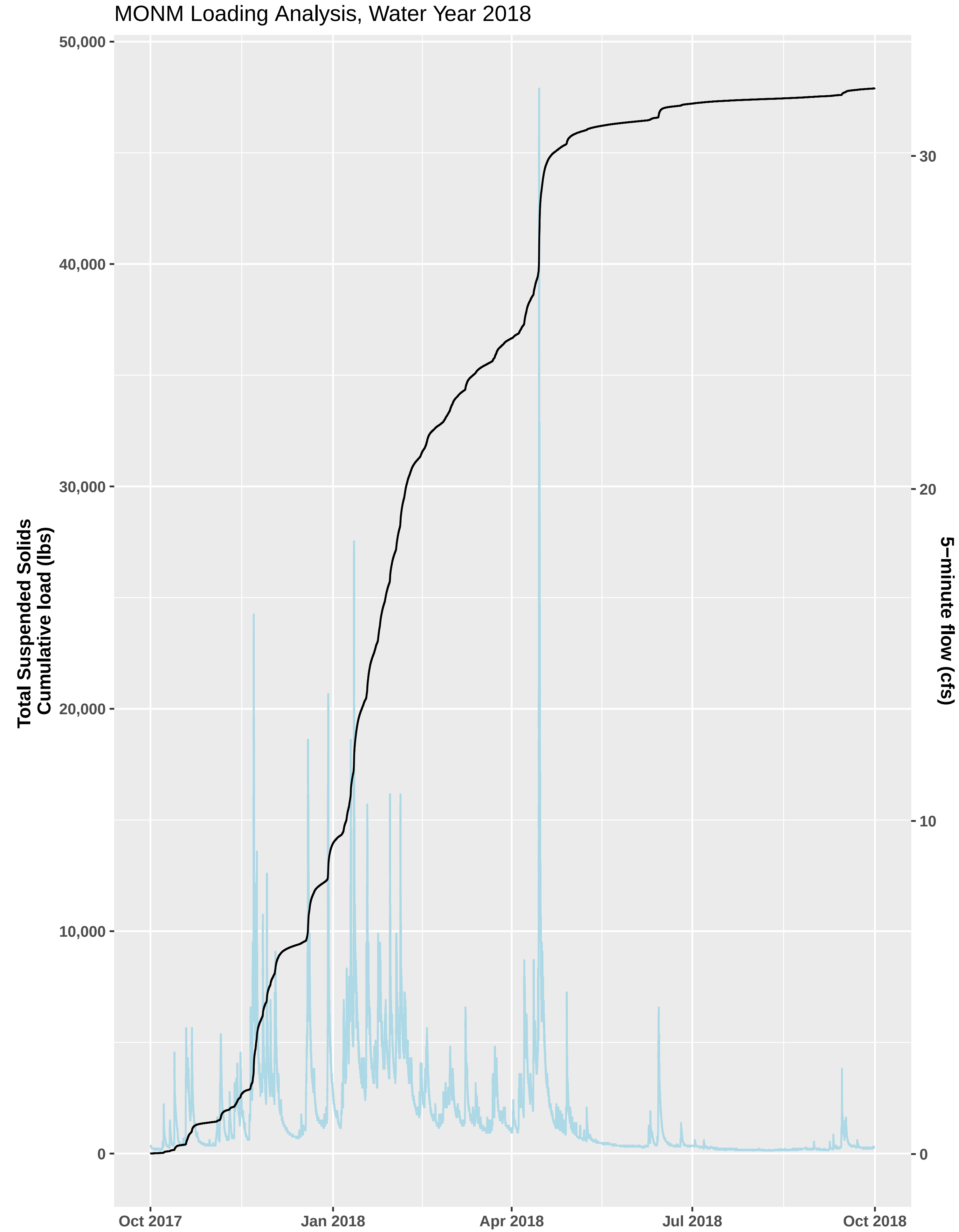
MONM Loading Analysis, Water Year 2016

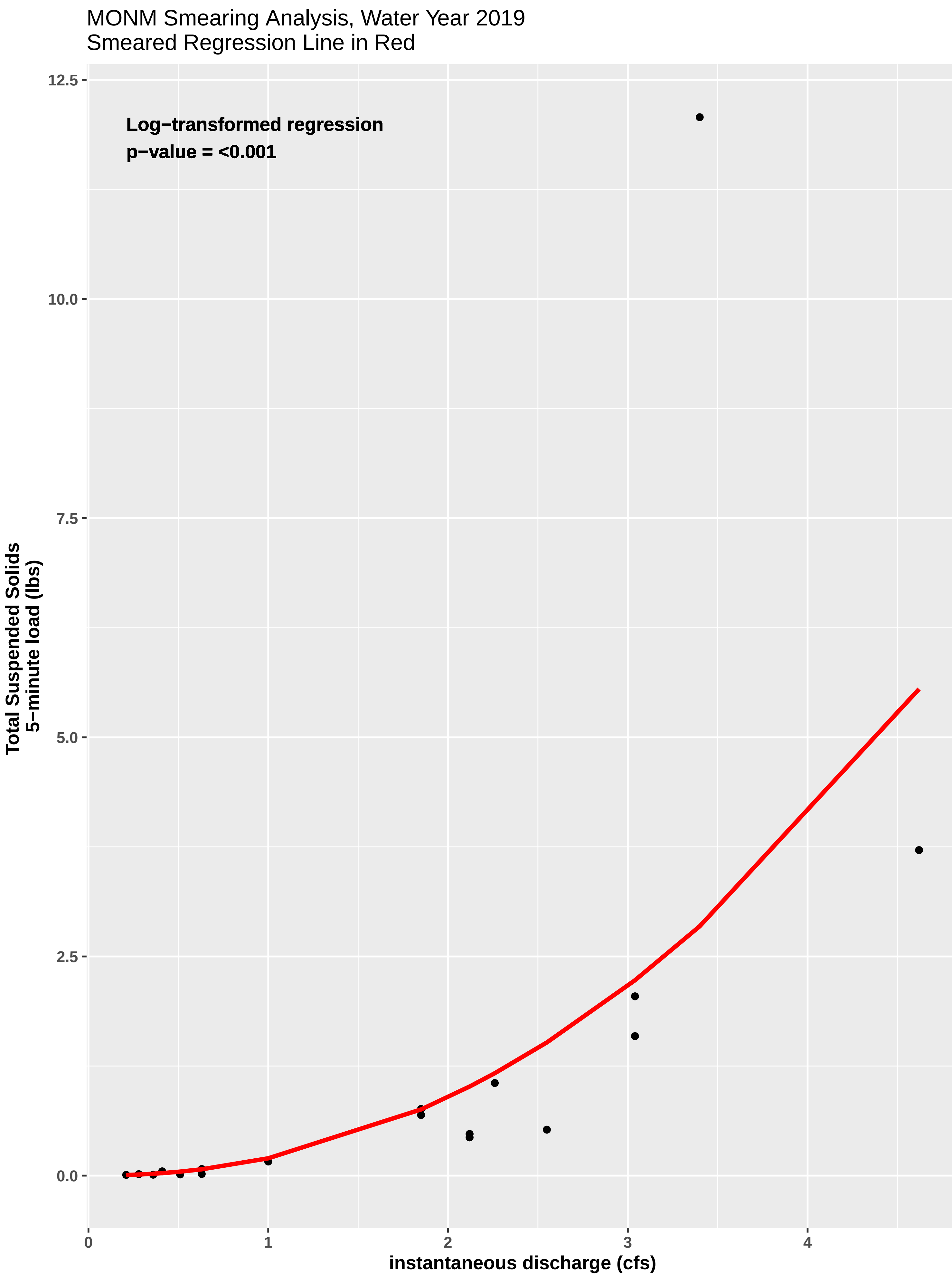


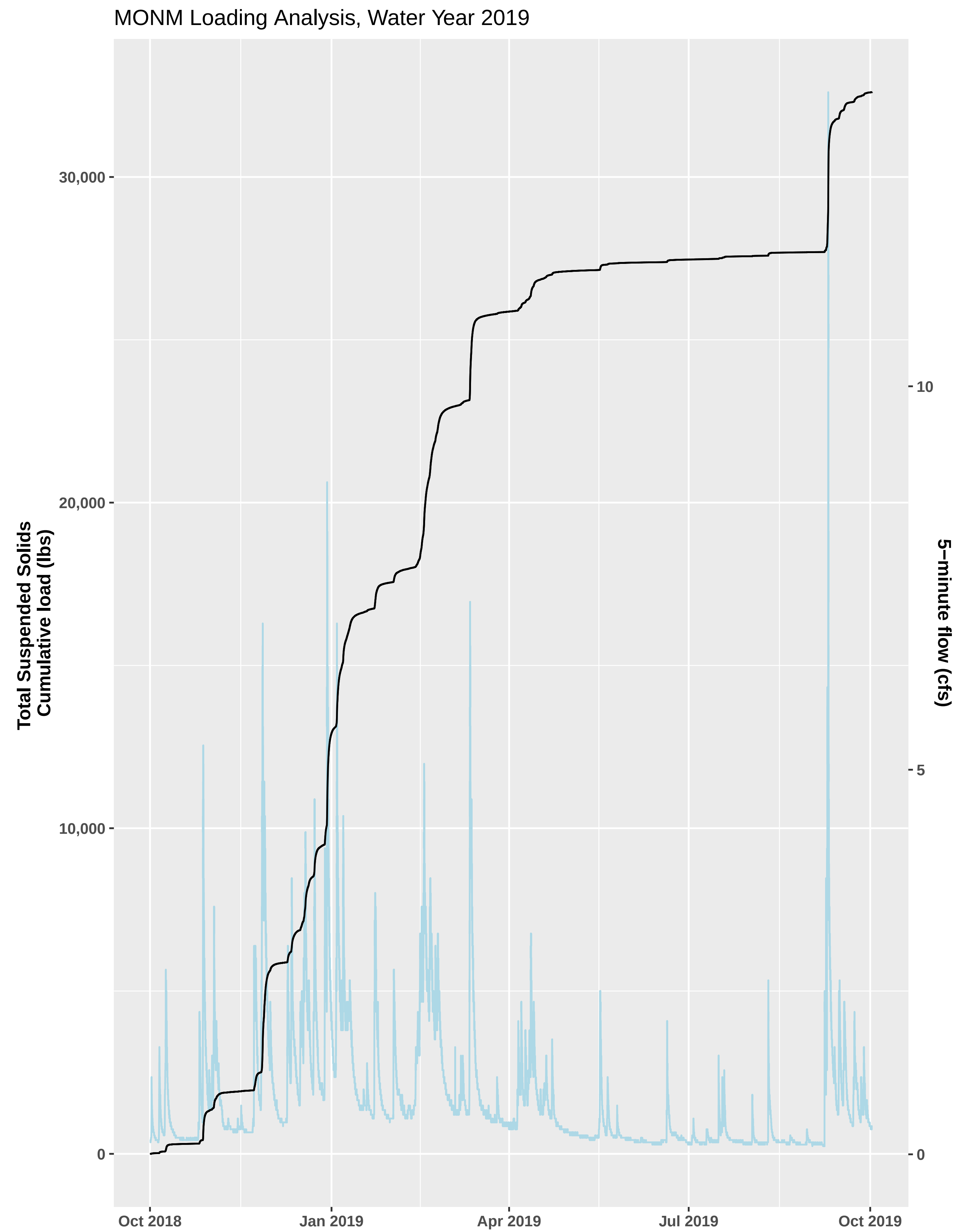

MONM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.50
1.00
1.50
2.00
0
1
2
3

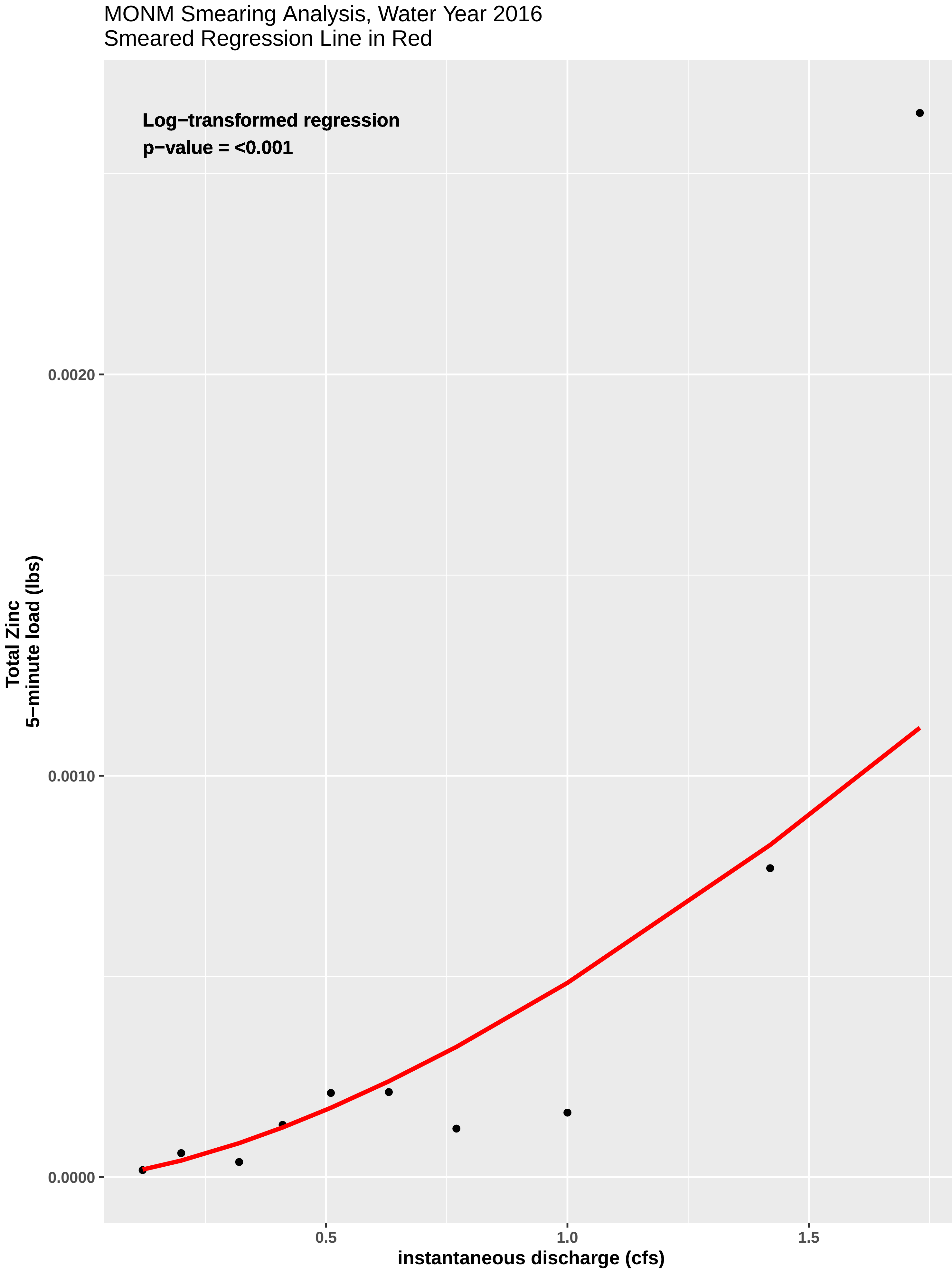

MONM Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
20,000
40,000
60,000
0
10
20
30
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

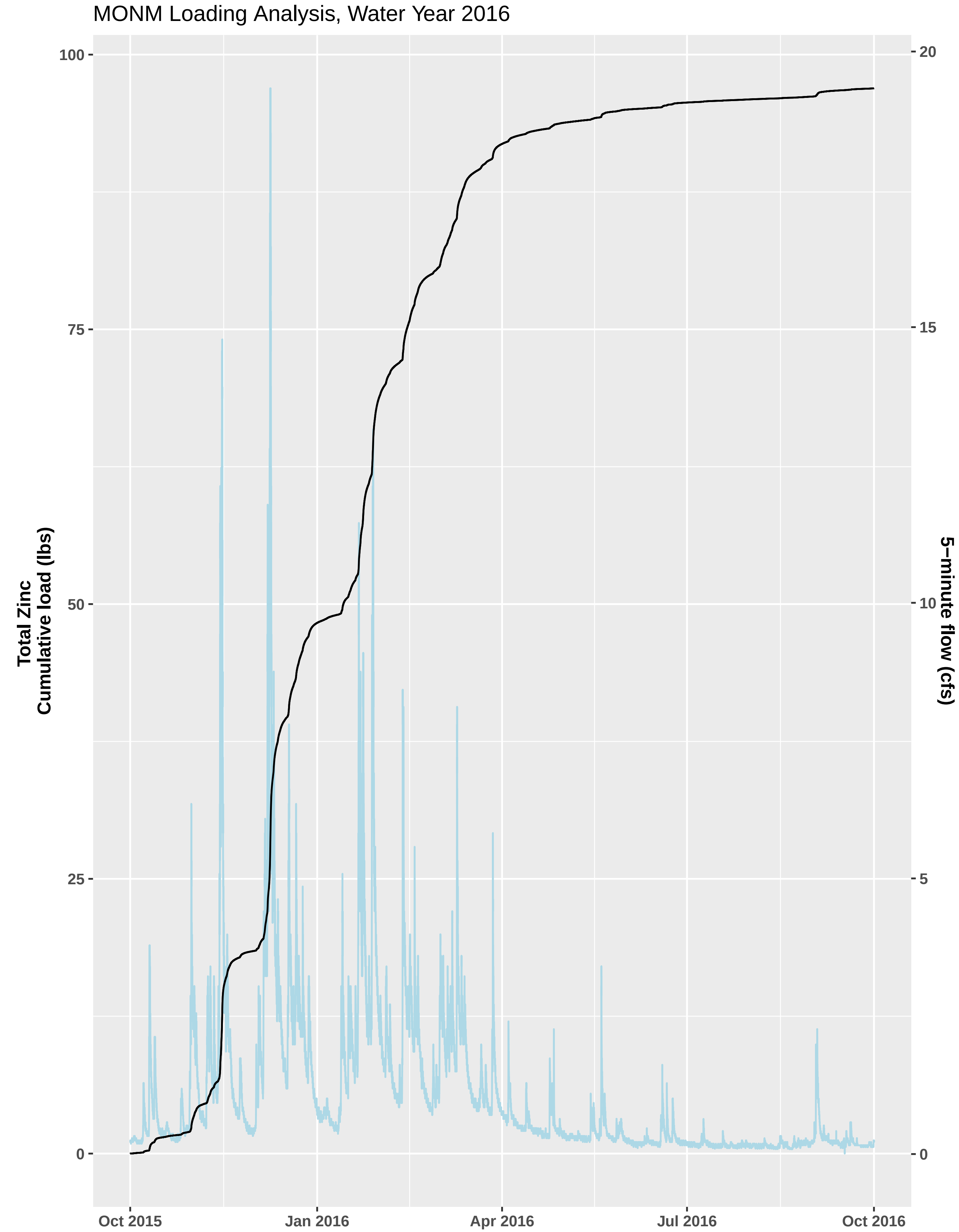

MONM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
2.5
5.0
7.5
0
3
6
9
12
instantaneous discharge (cfs)

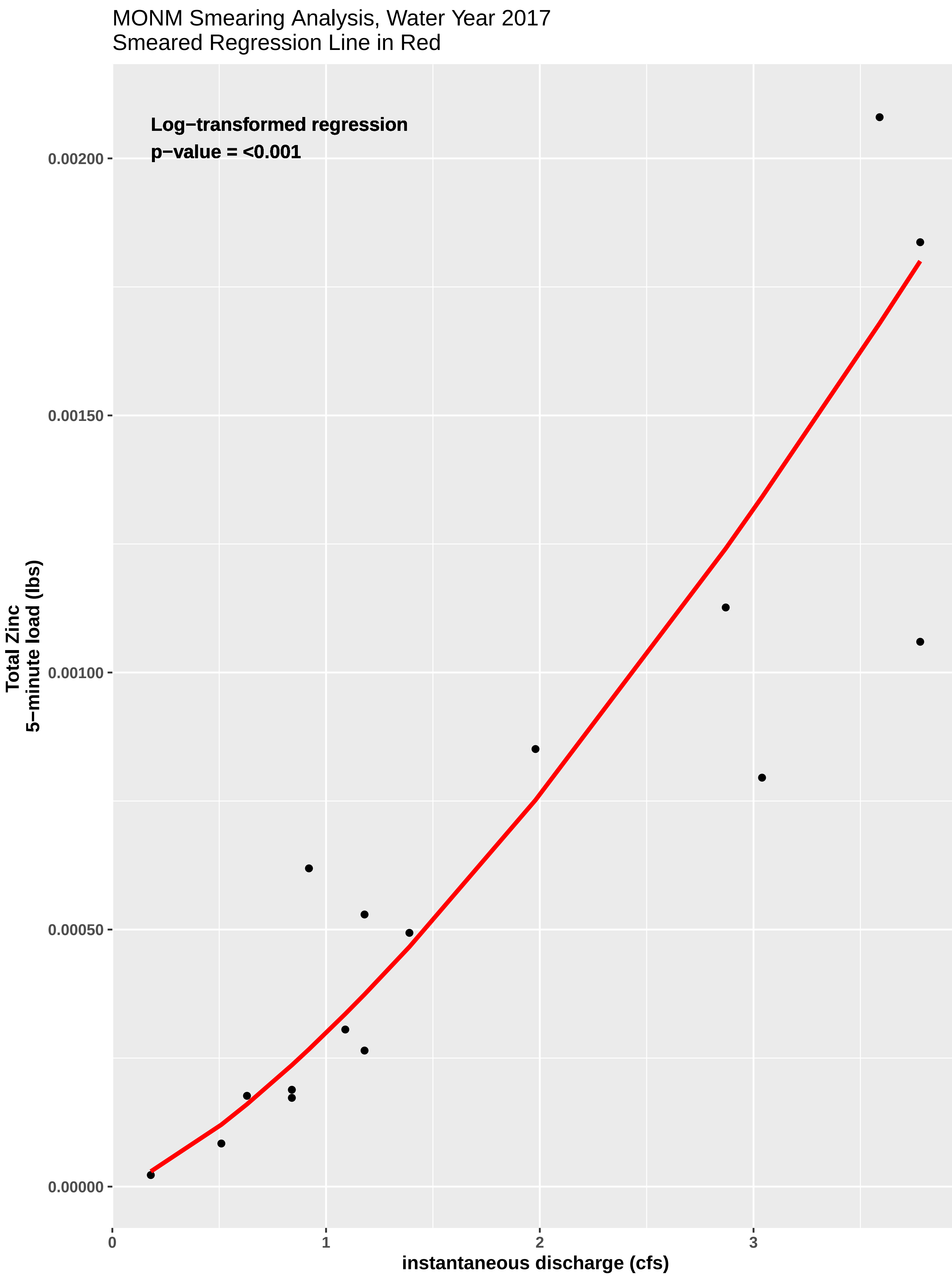

MONM Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
10,000
20,000
30,000
40,000
50,000
5−minute flow (cfs)
0
10
20
30
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

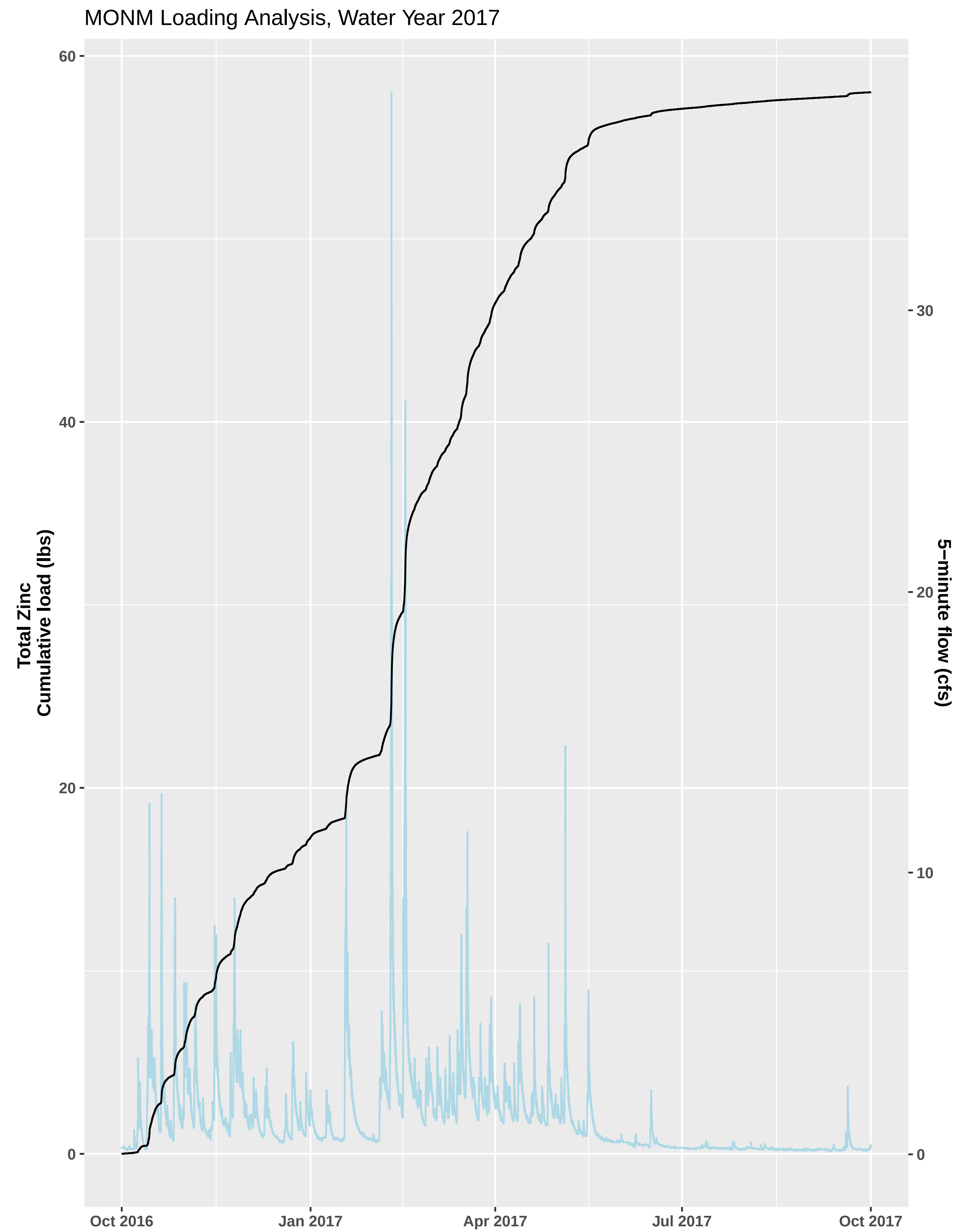

MONM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
12.5
10.0
7.5
5.0
2.5
0.0
0
1
2
3
4

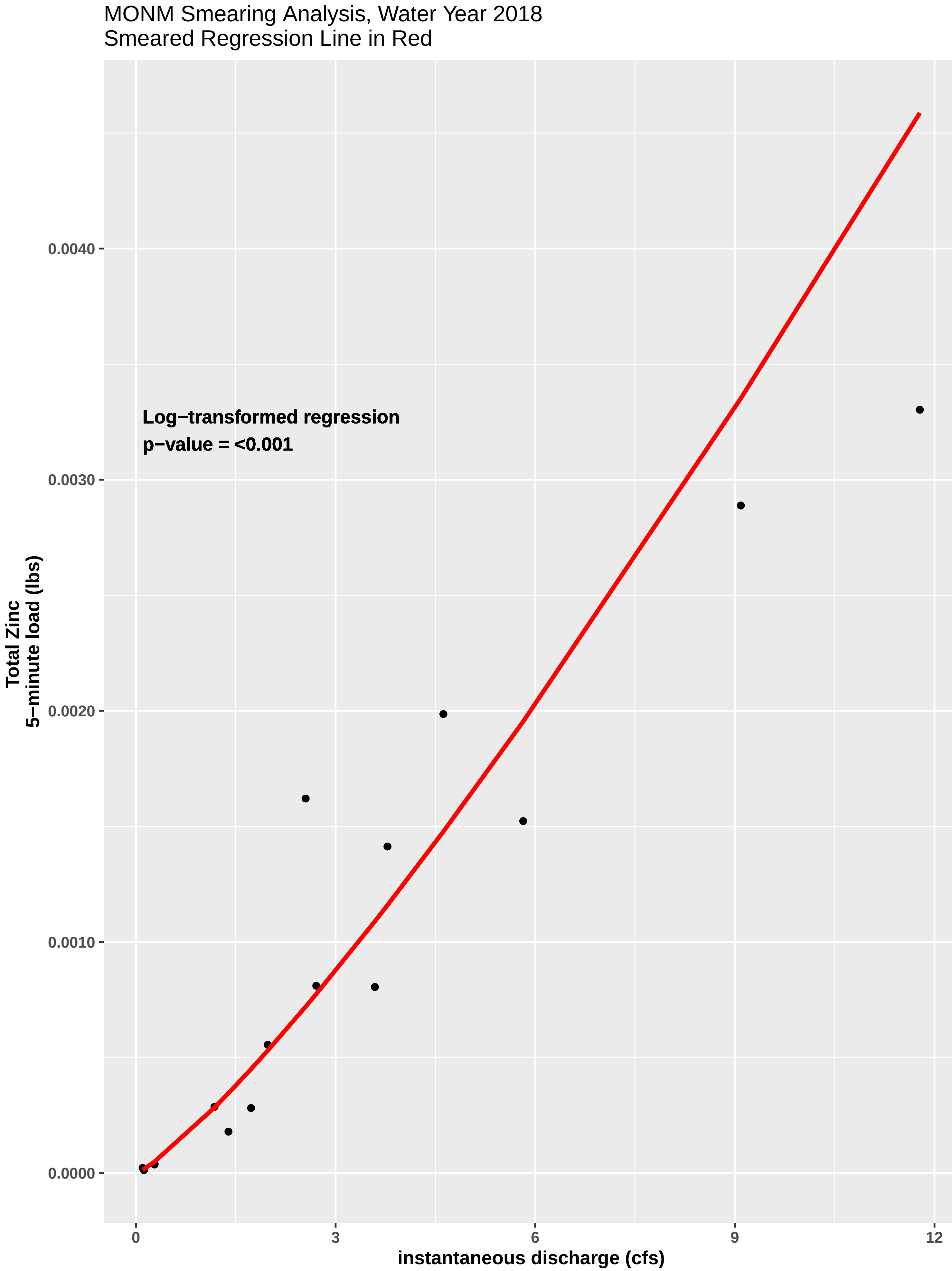

MONM Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
30,000
20,000
10,000
0
10
5
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

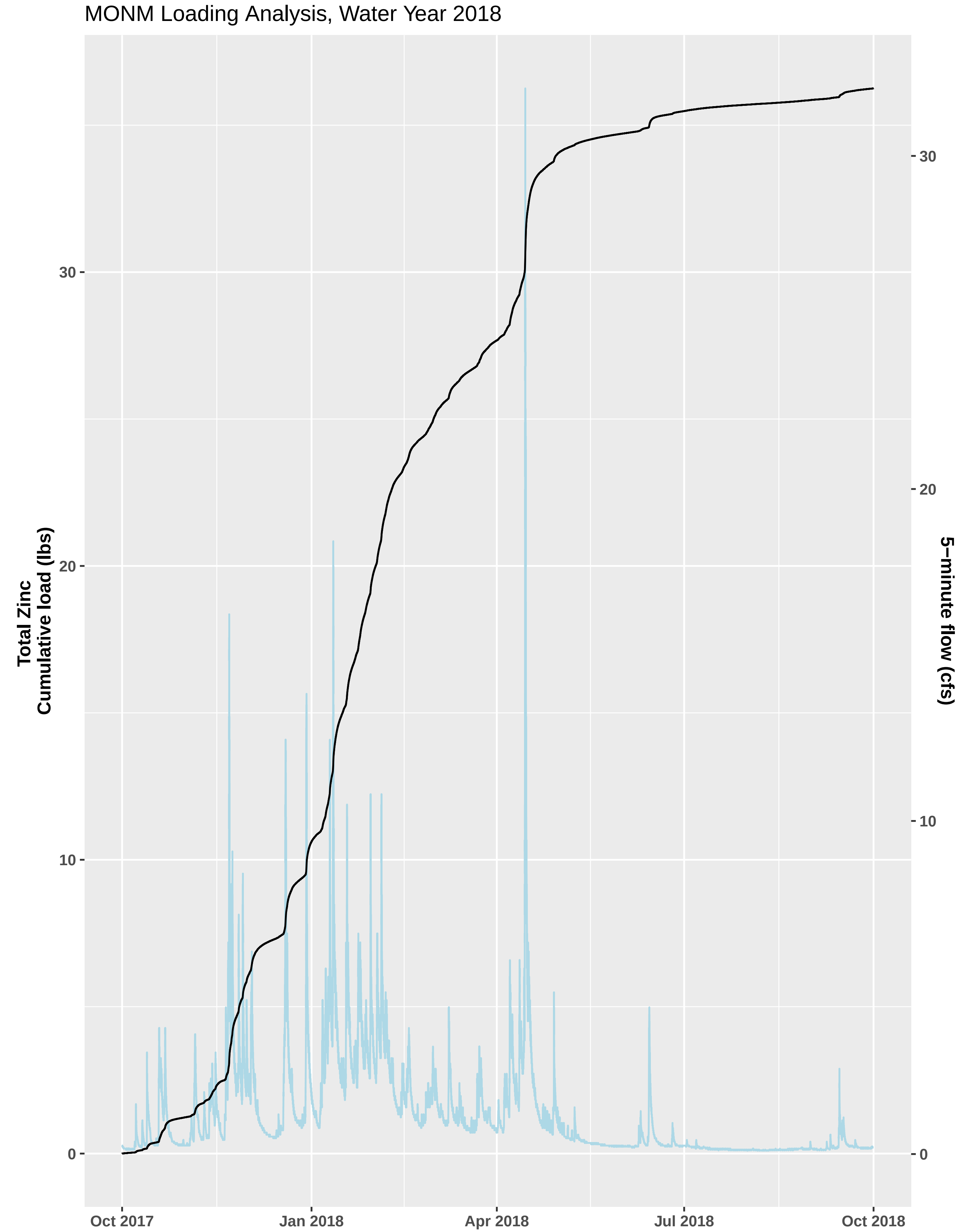

MONM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0010
0.0020
0.5
1.0
1.5
instantaneous discharge (cfs)

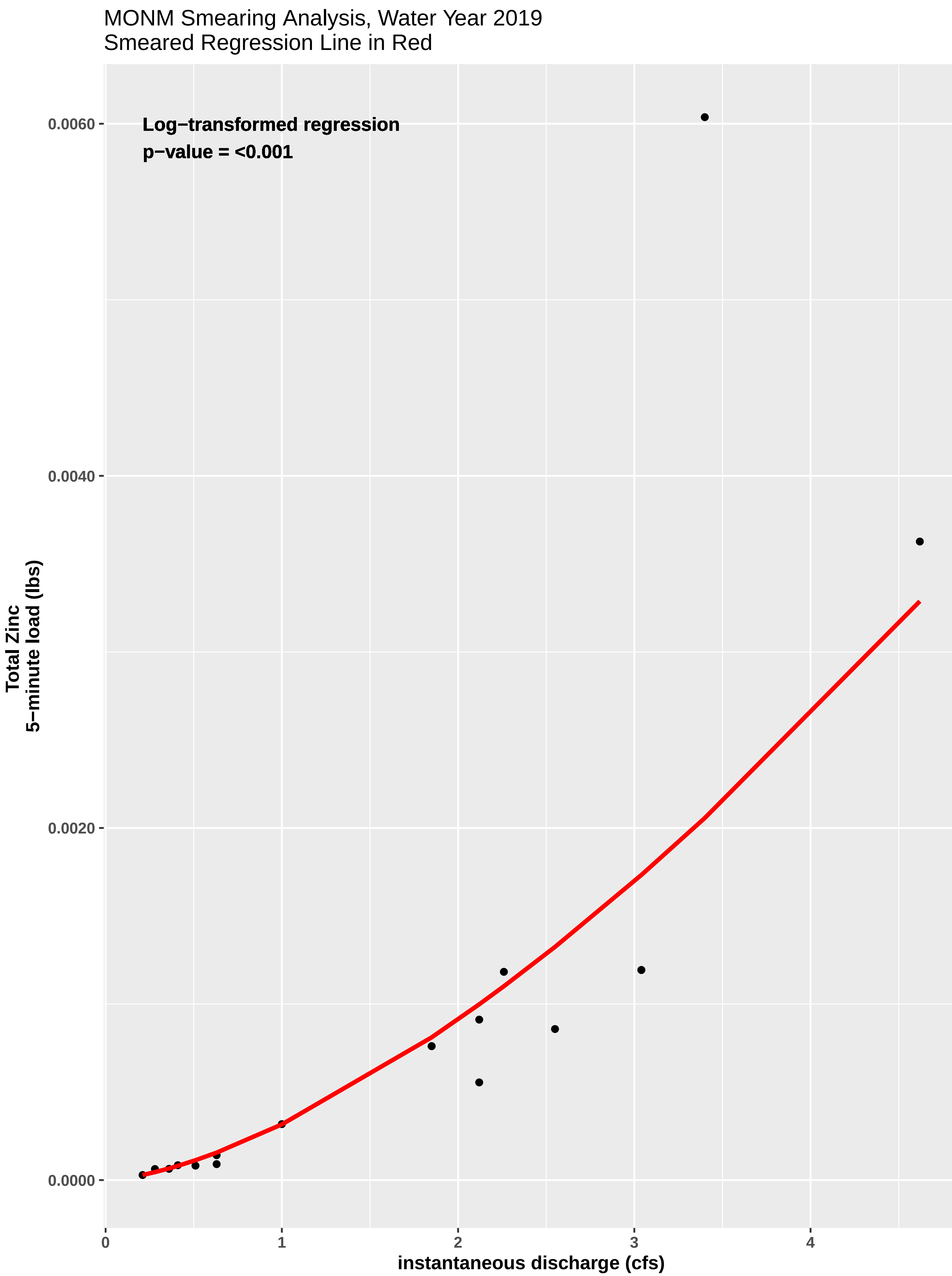

MONM Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0
25
50
75
100
5−minute flow (cfs)
0
5
10
15
20
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

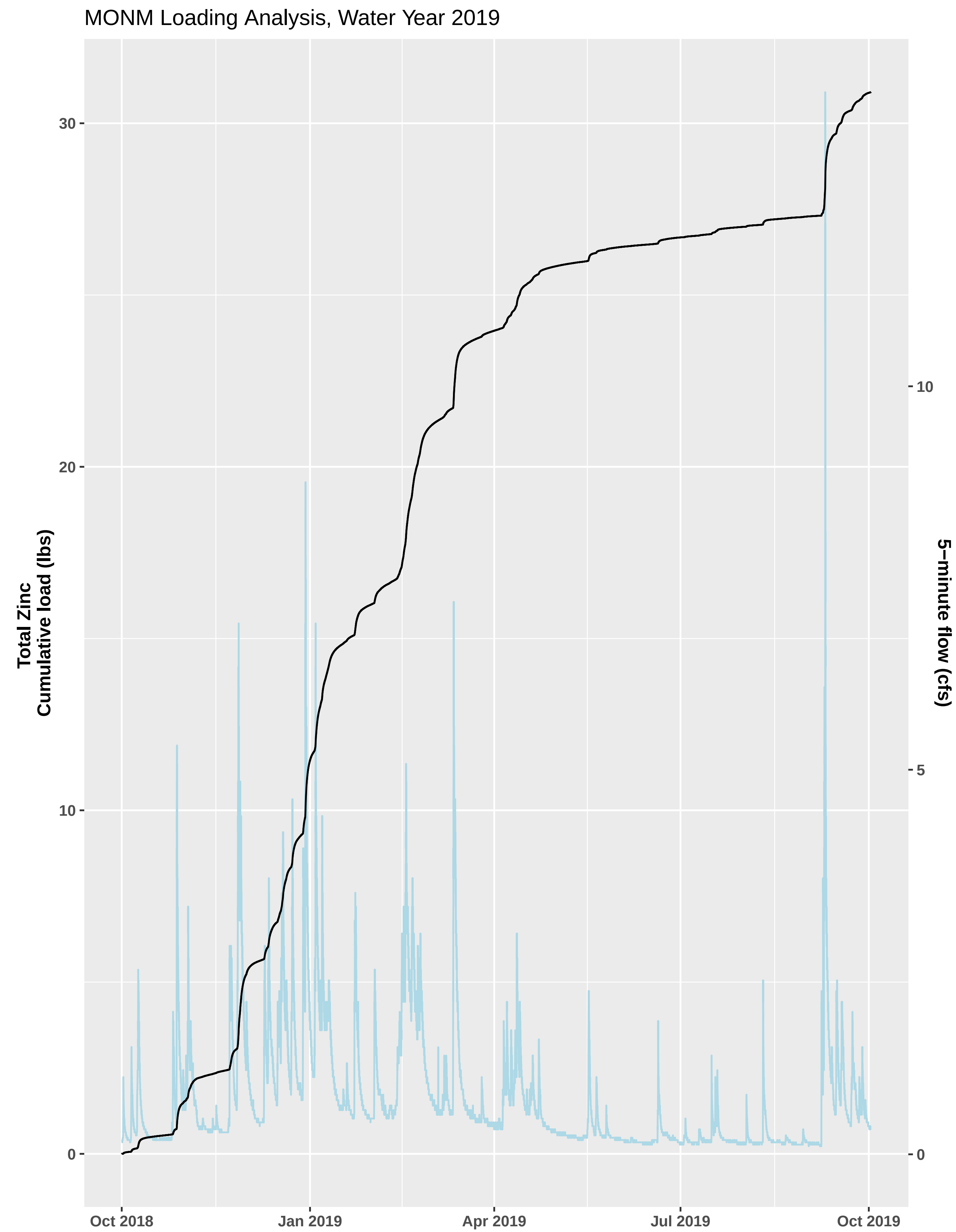

MONM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00050
0.00100
0.00150
0.00200
0
1
2
3
instantaneous discharge (cfs)

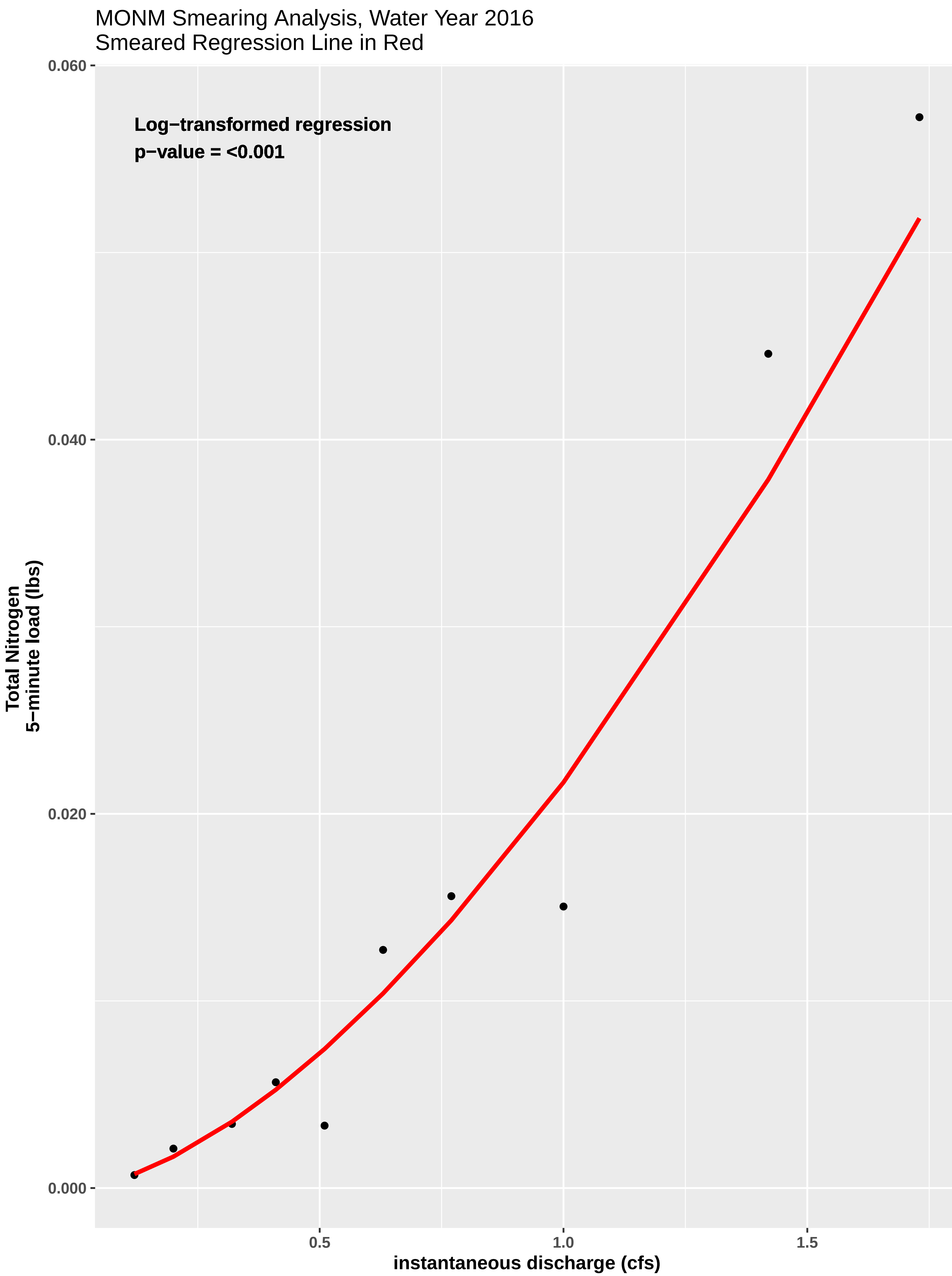

MONM Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0
10
20
30
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

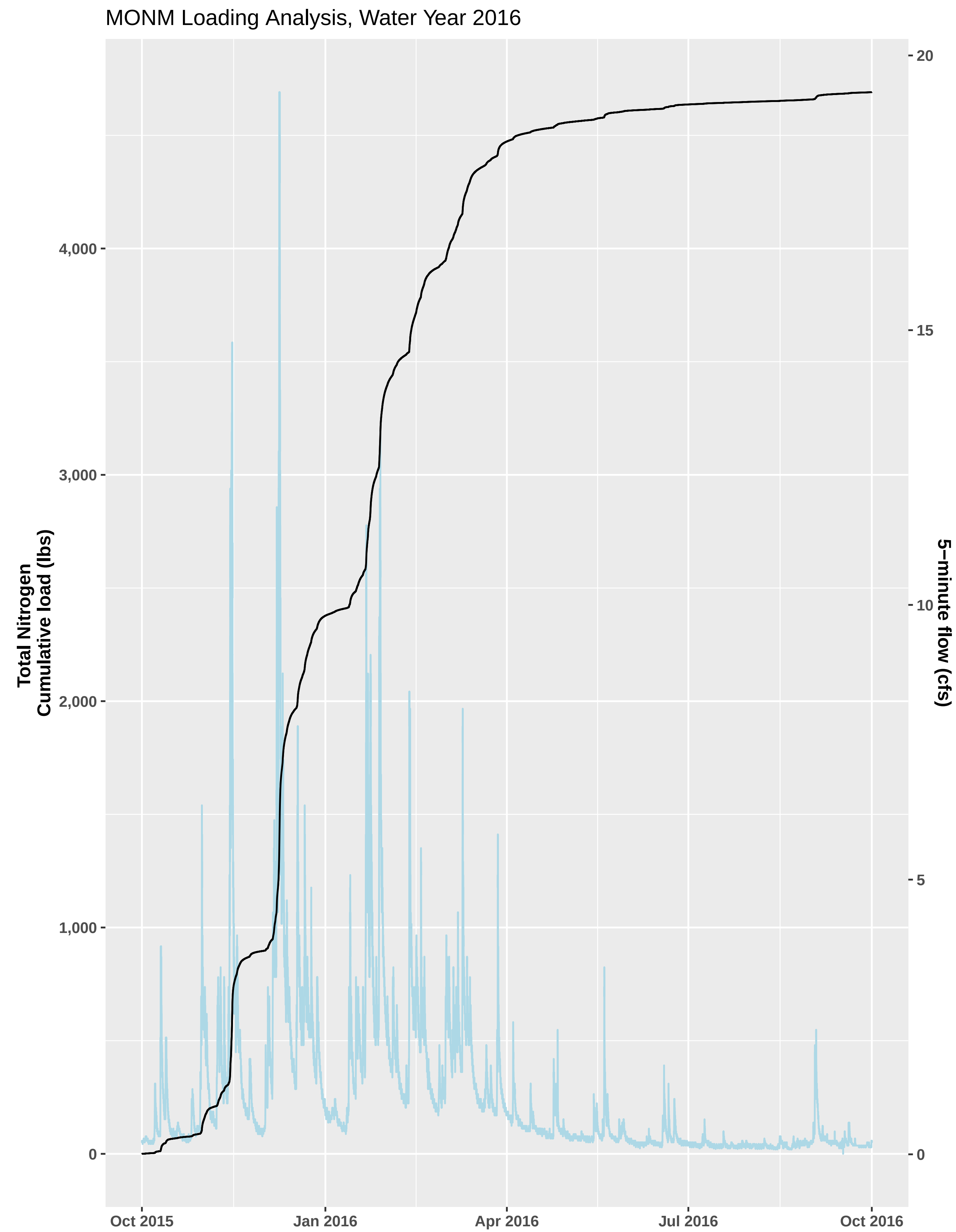

MONM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
instantaneous discharge (cfs)
0.0000
0.0010
0.0020
0.0030
0.0040
0
3
6
9
12

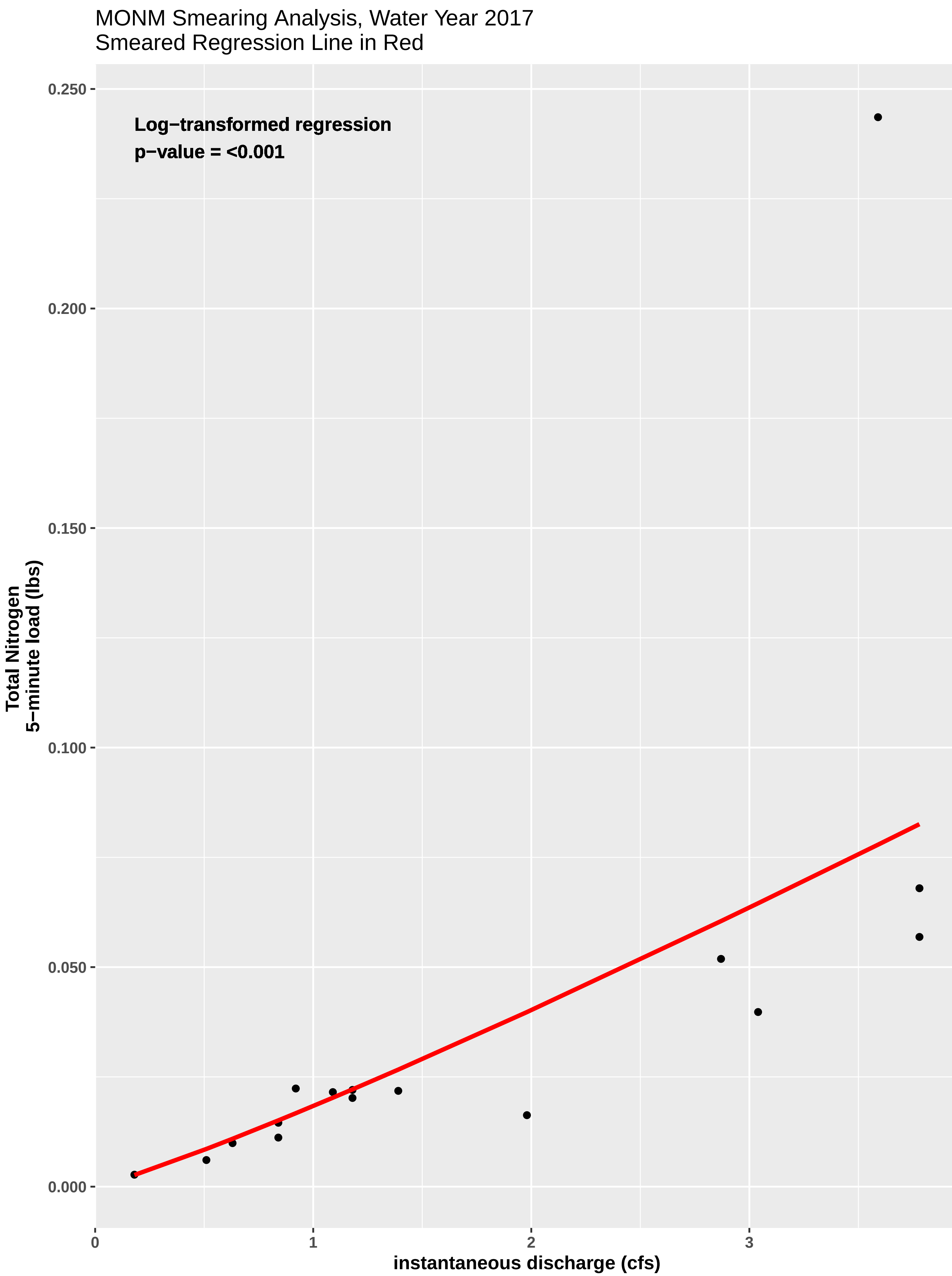

MONM Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
5−minute flow (cfs)
0
10
20
30
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

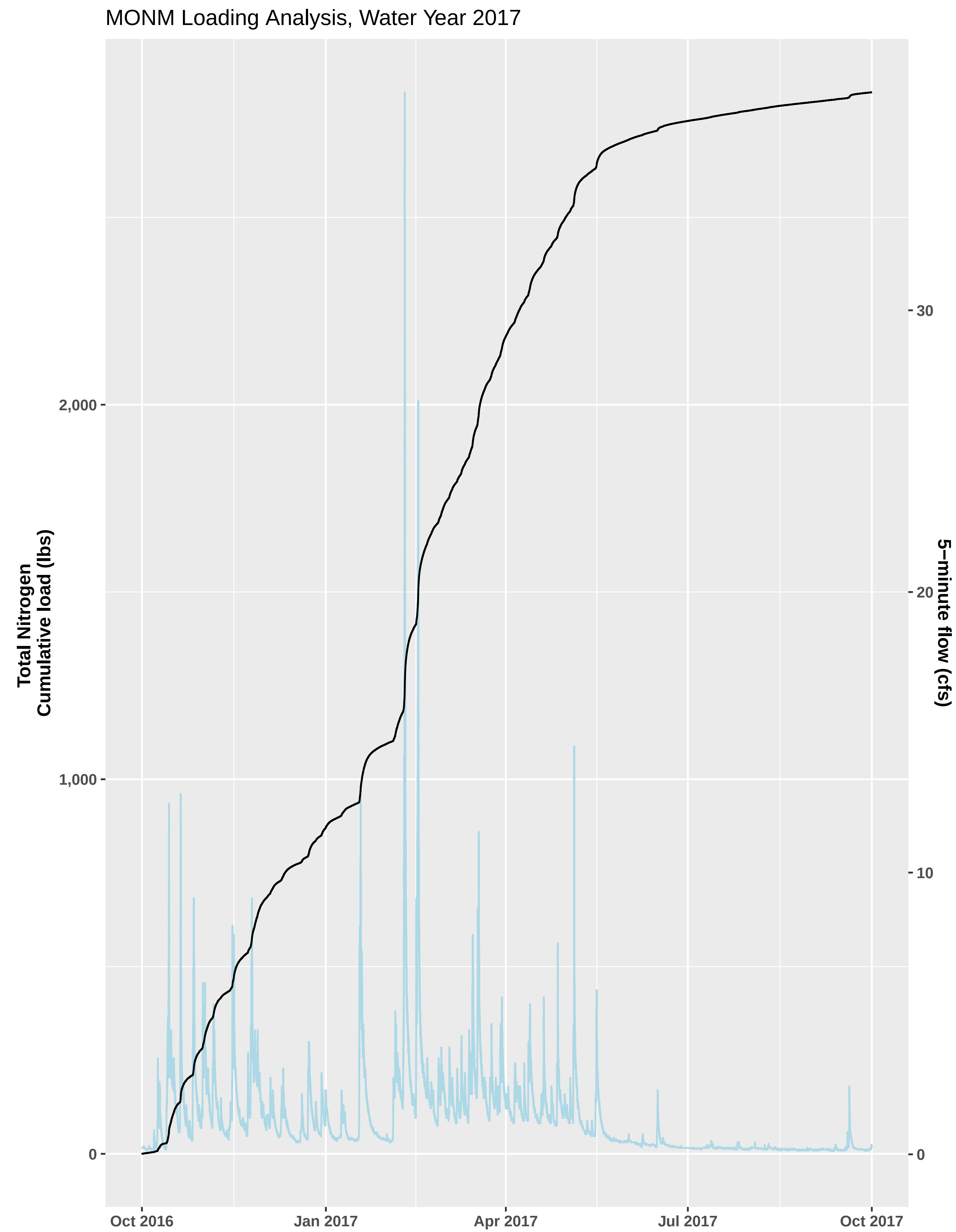

MONM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0
1
2
3
4
instantaneous discharge (cfs)

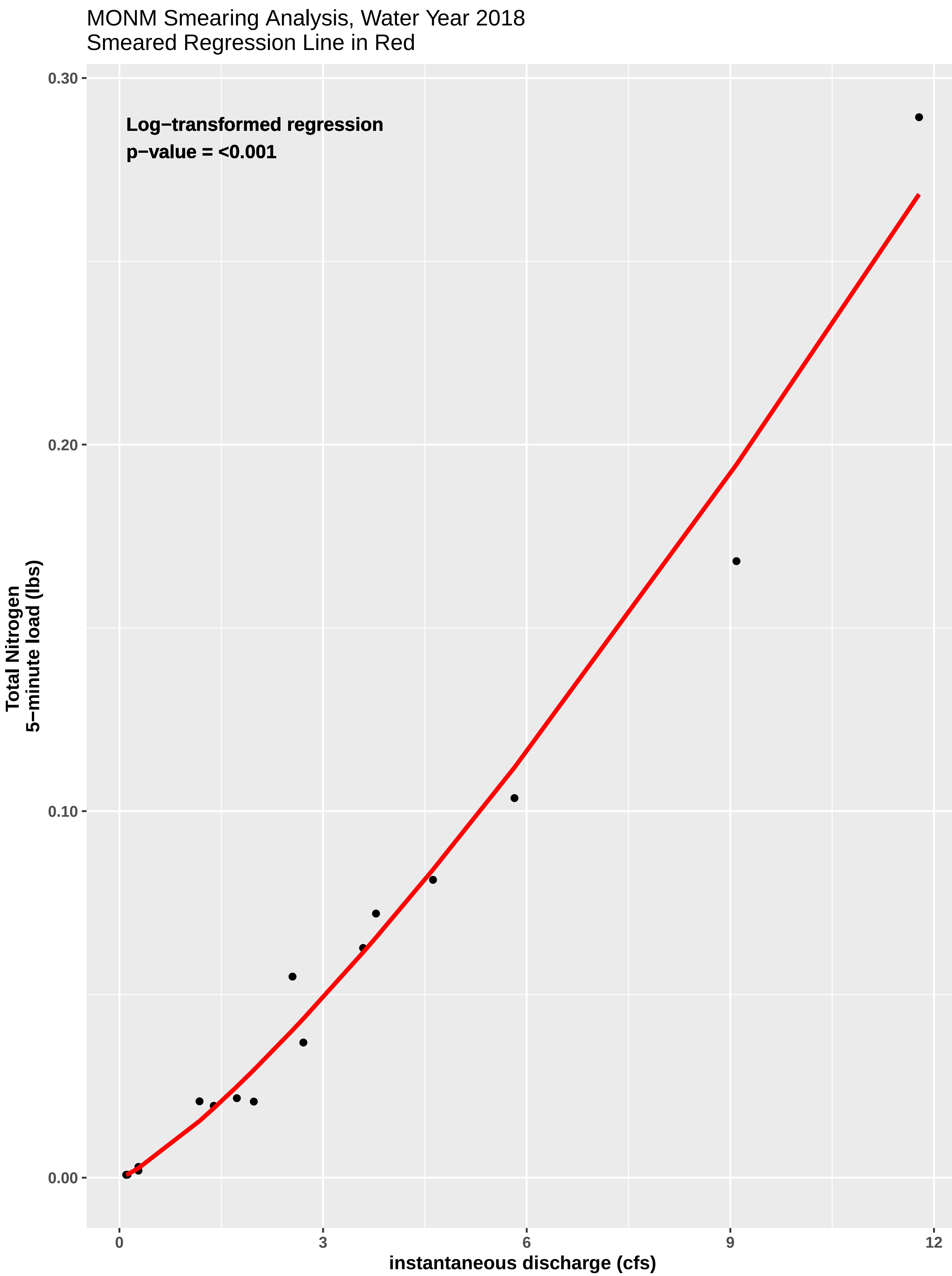

MONM Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0
10
20
30
5−minute flow (cfs)
0
5
10
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.060
0.040
0.020
0.000
0.5
1.0
1.5
instantaneous discharge (cfs)

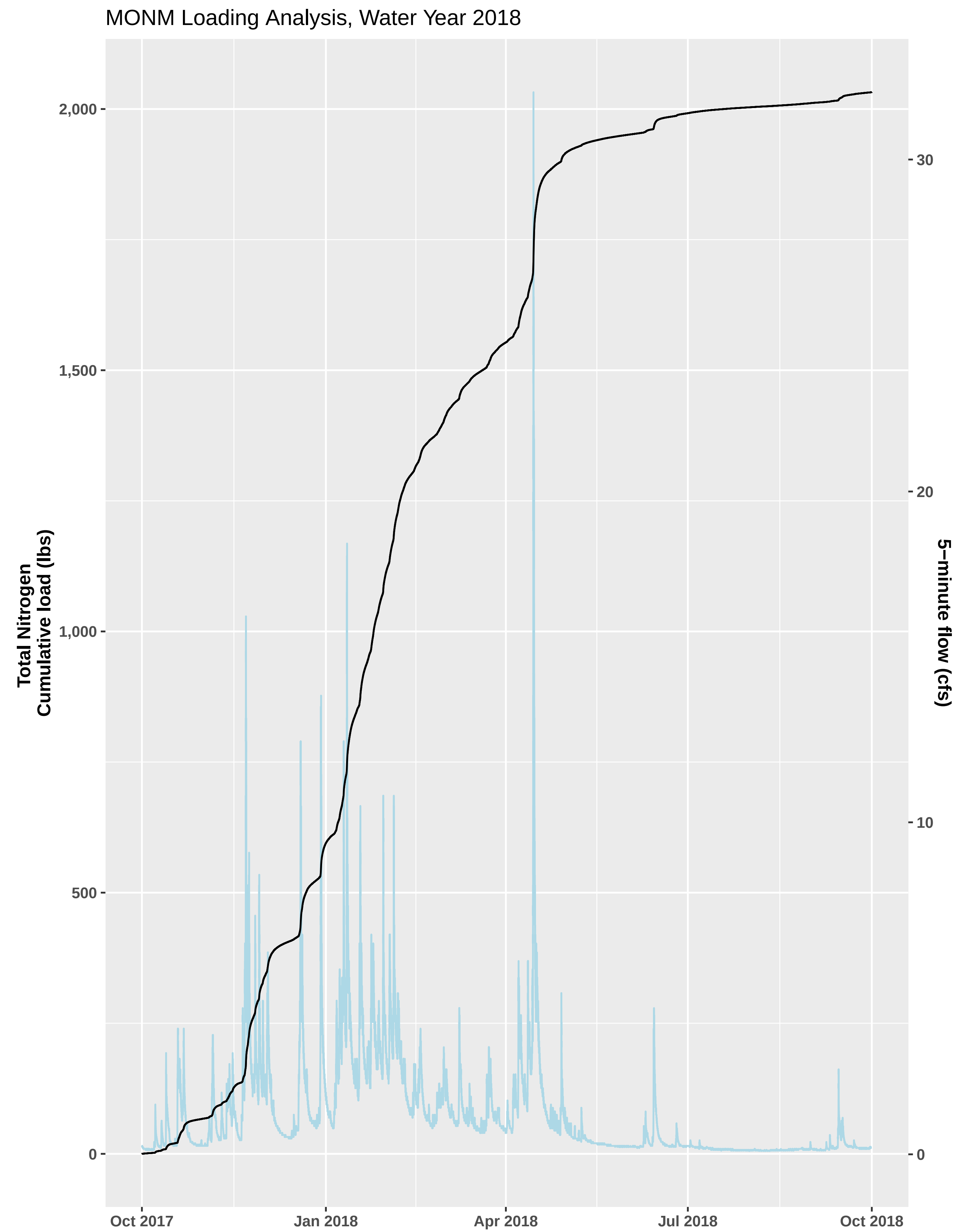

MONM Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
4,000
3,000
2,000
1,000
0
5−minute flow (cfs)
20
15
10
5
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


MONM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.000
0.050
0.100
0.150
0.200
0.250
0
1
2
3

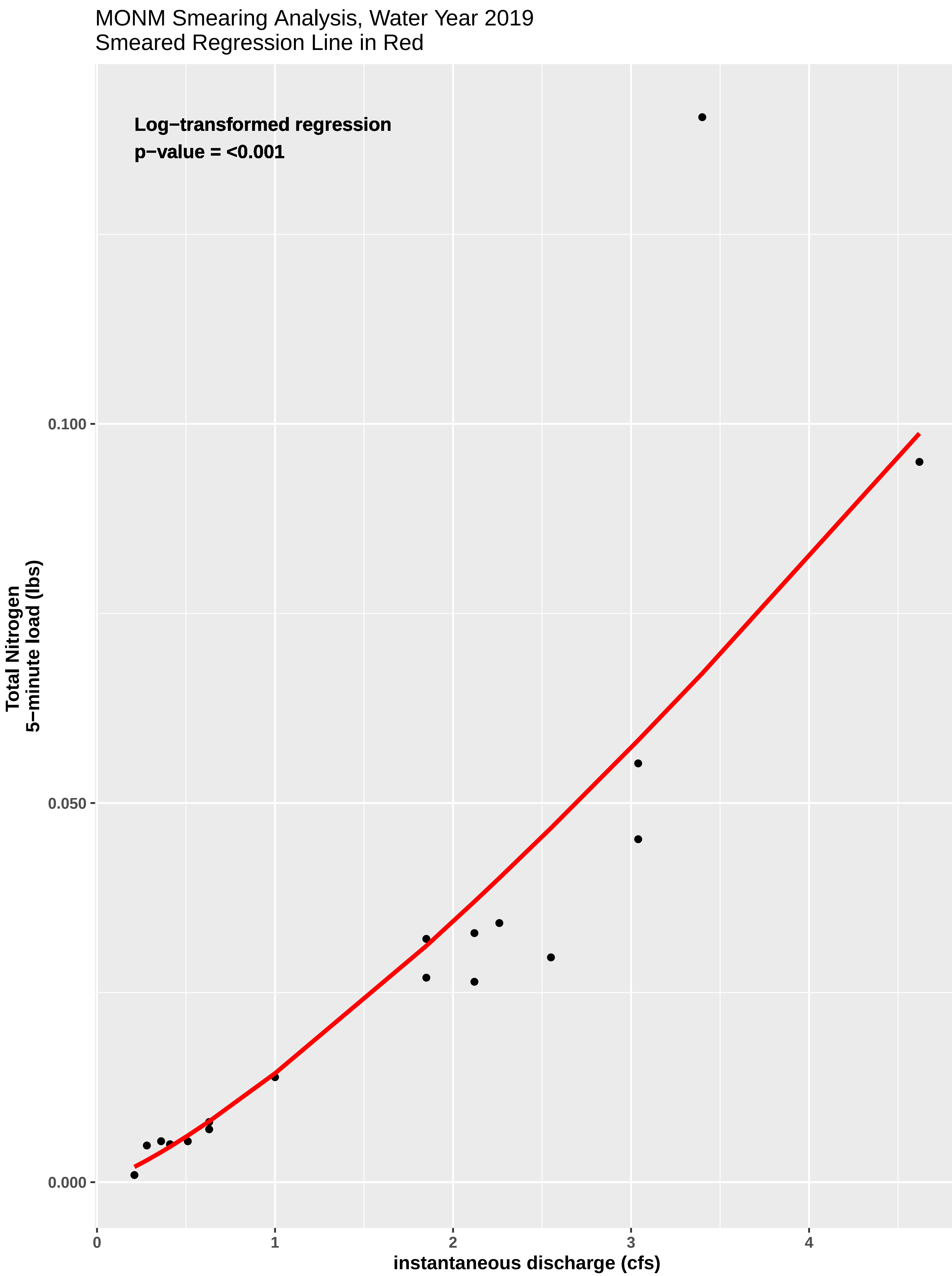

MONM Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
0
1,000
2,000
0
10
20
30
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

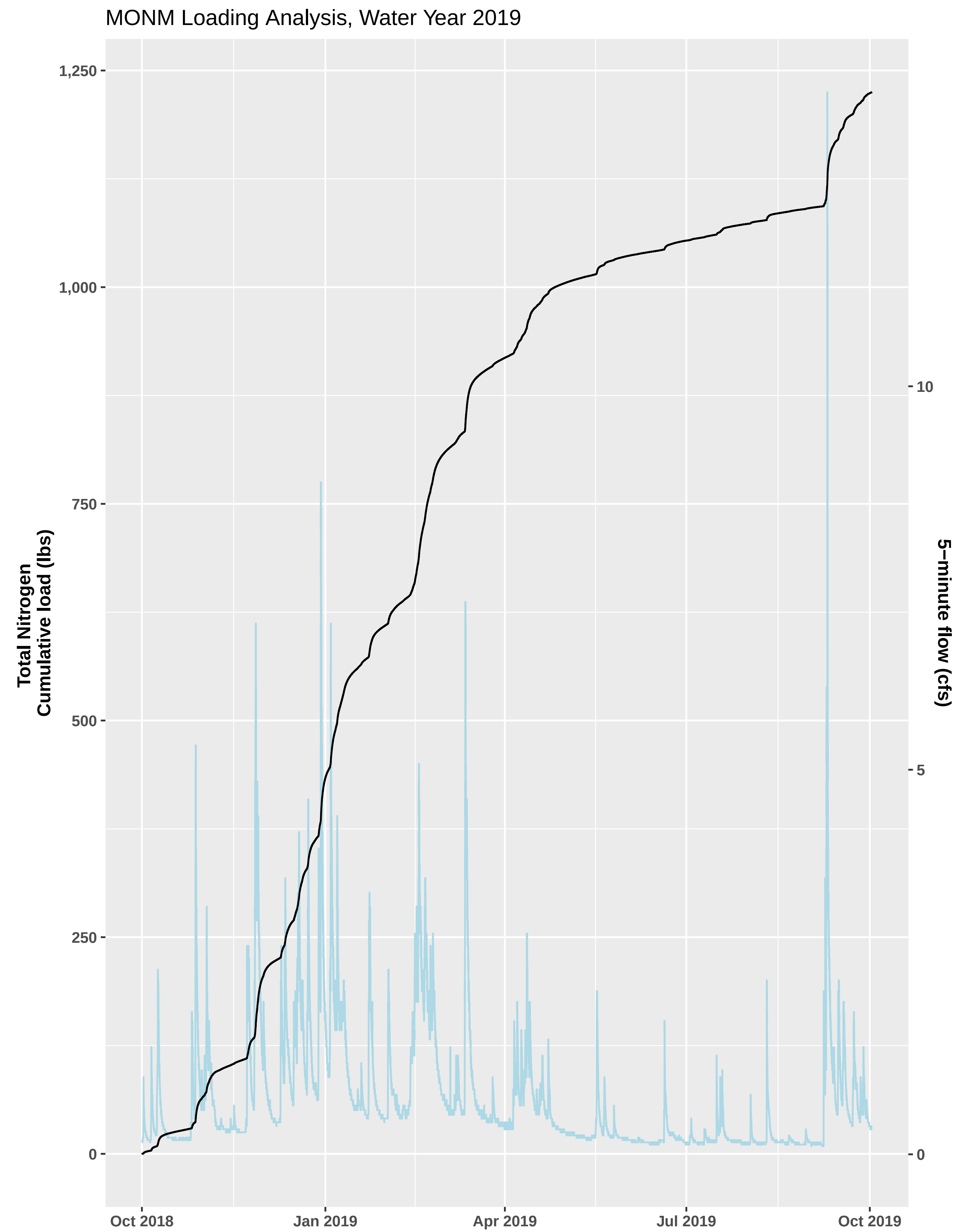


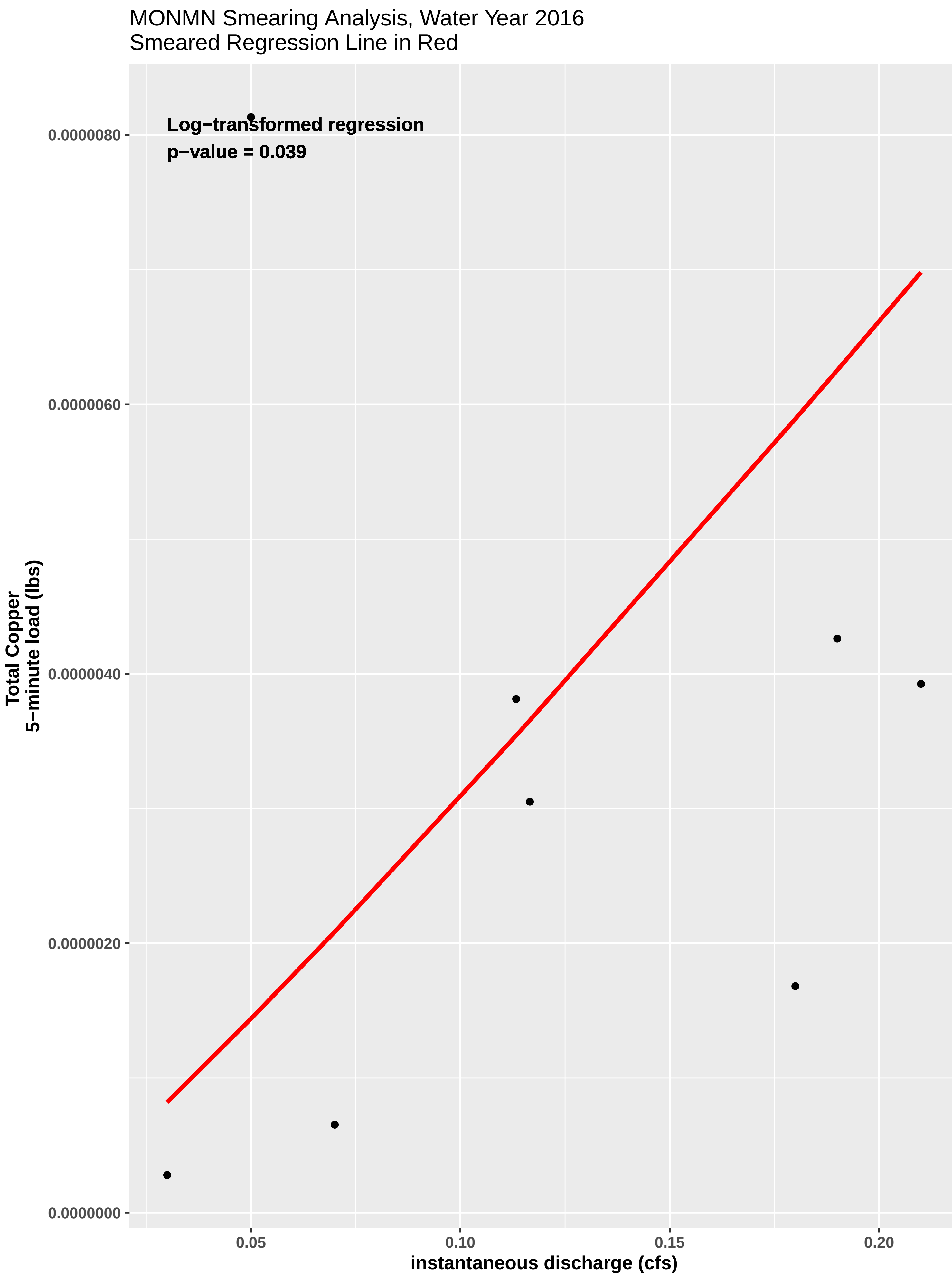
MONM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.30
0.20
0.10
0.00
0
3
6
9
12
instantaneous discharge (cfs)

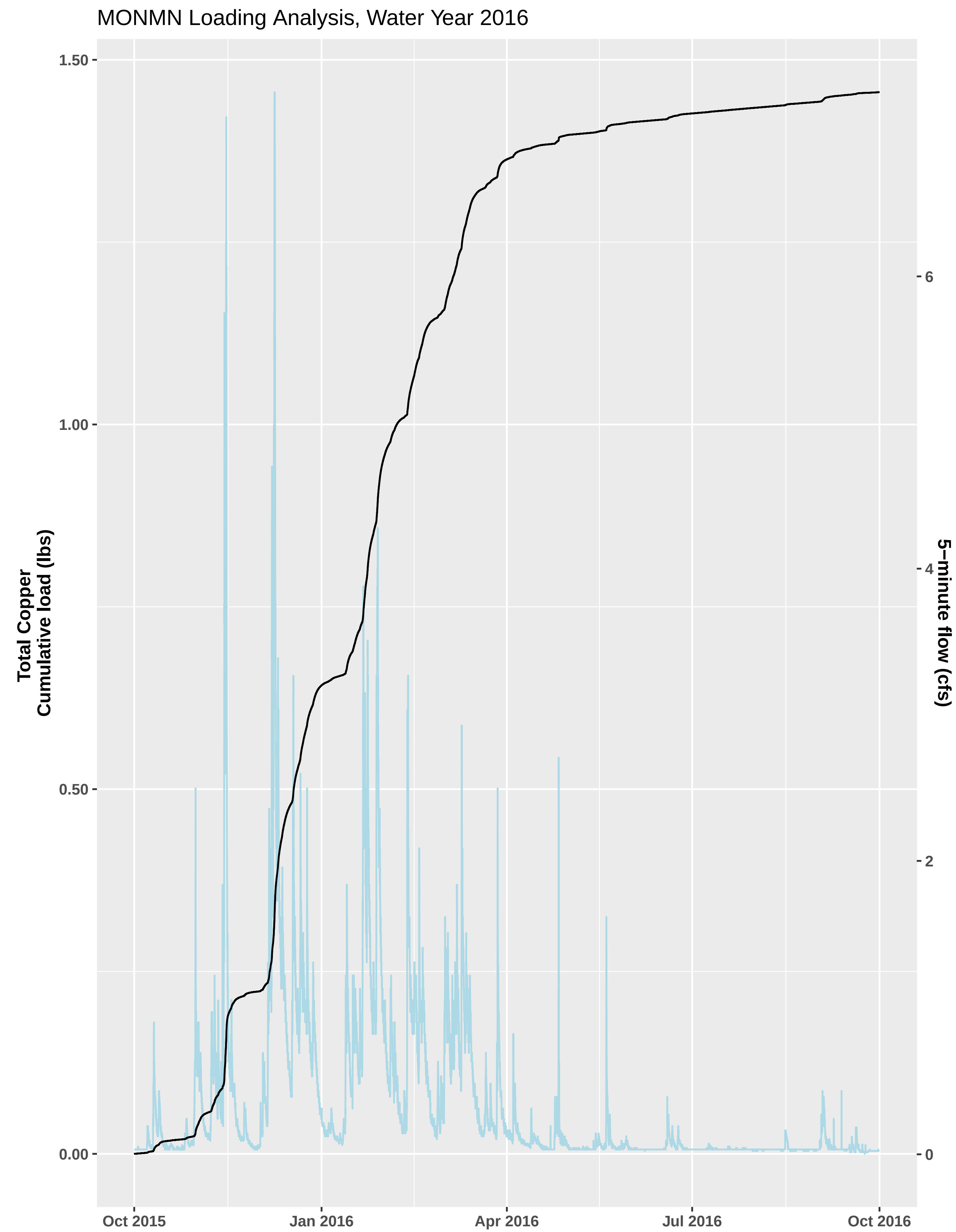


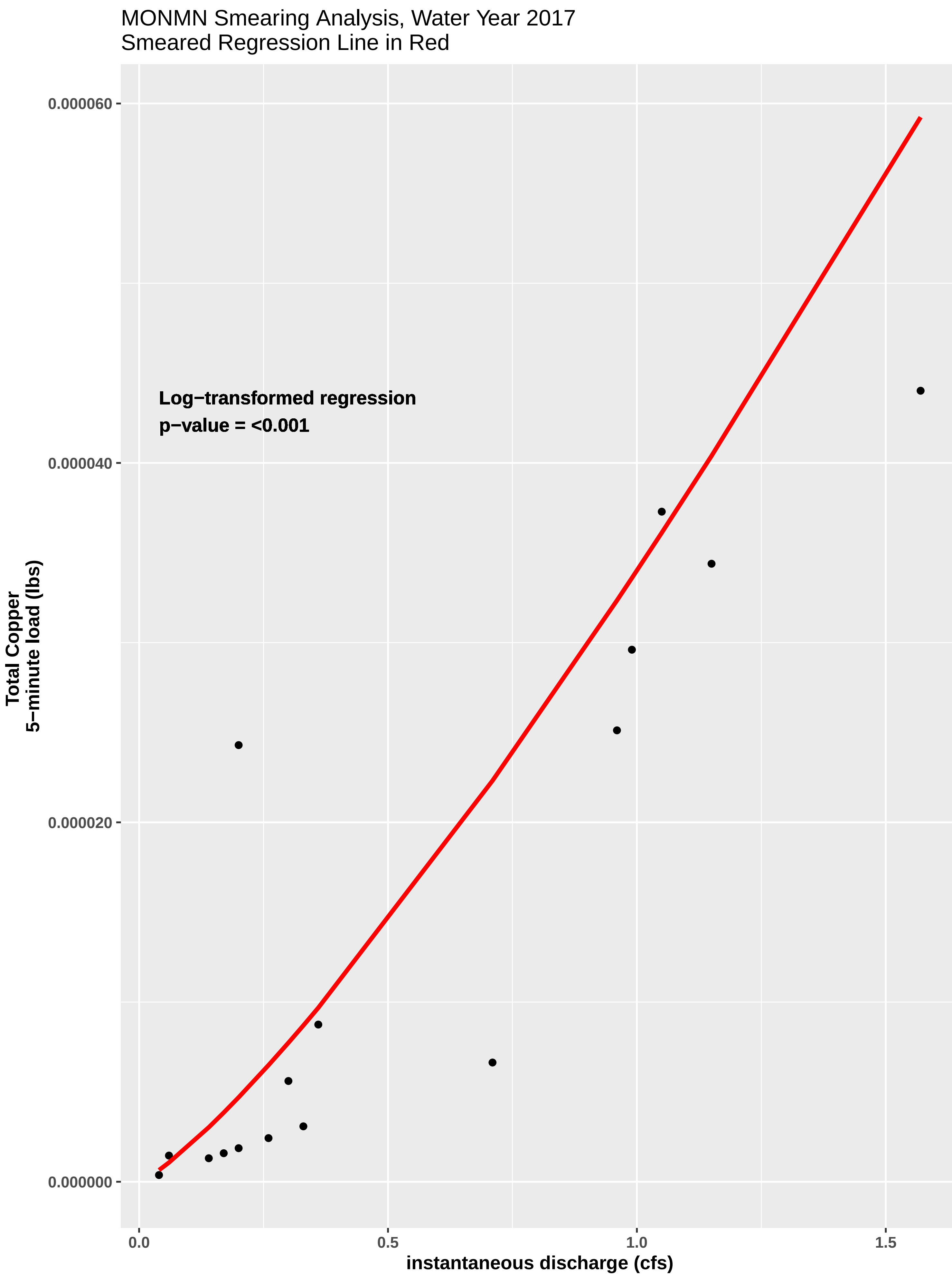
MONM Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
2,000
1,500
1,000
500
0
5−minute flow (cfs)
30
20
10
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

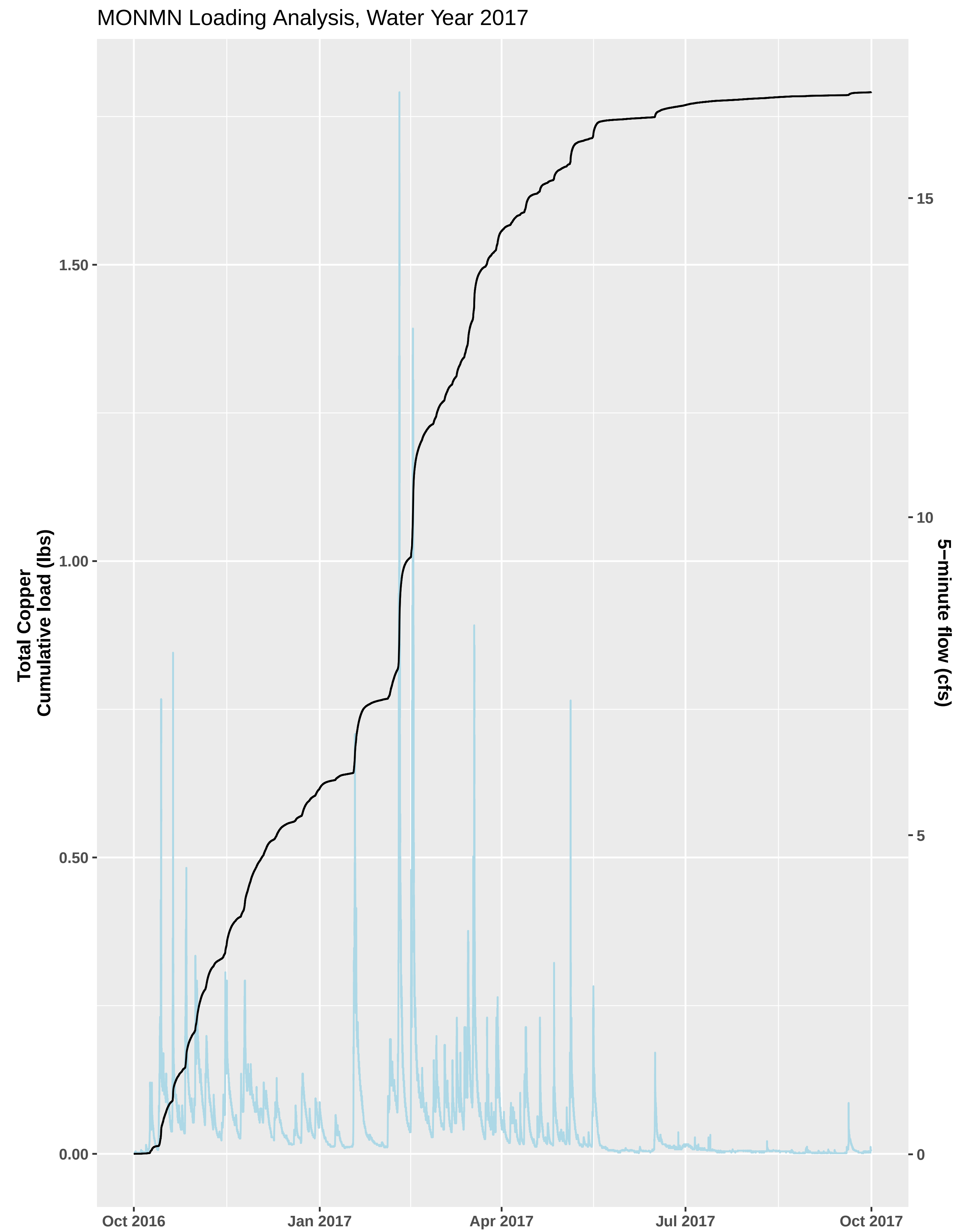

MONM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.100
0.050
0.000
0
1
2
3
4
instantaneous discharge (cfs)

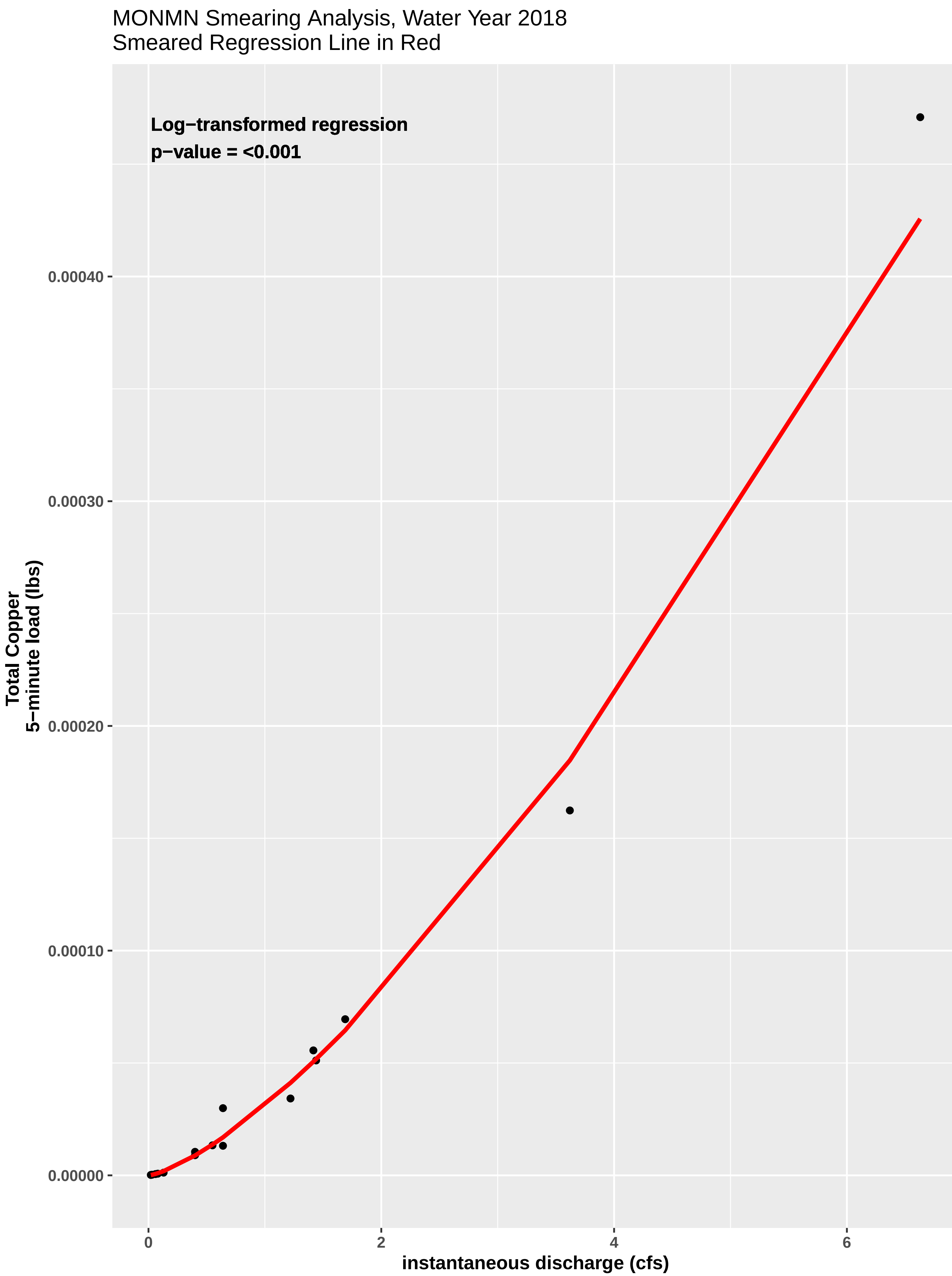

MONM Loading Analysis, Water Year 2019
1,250
1,000
750
500
250
0
Total Nitrogen
Cumulative load (lbs)
10
5
0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

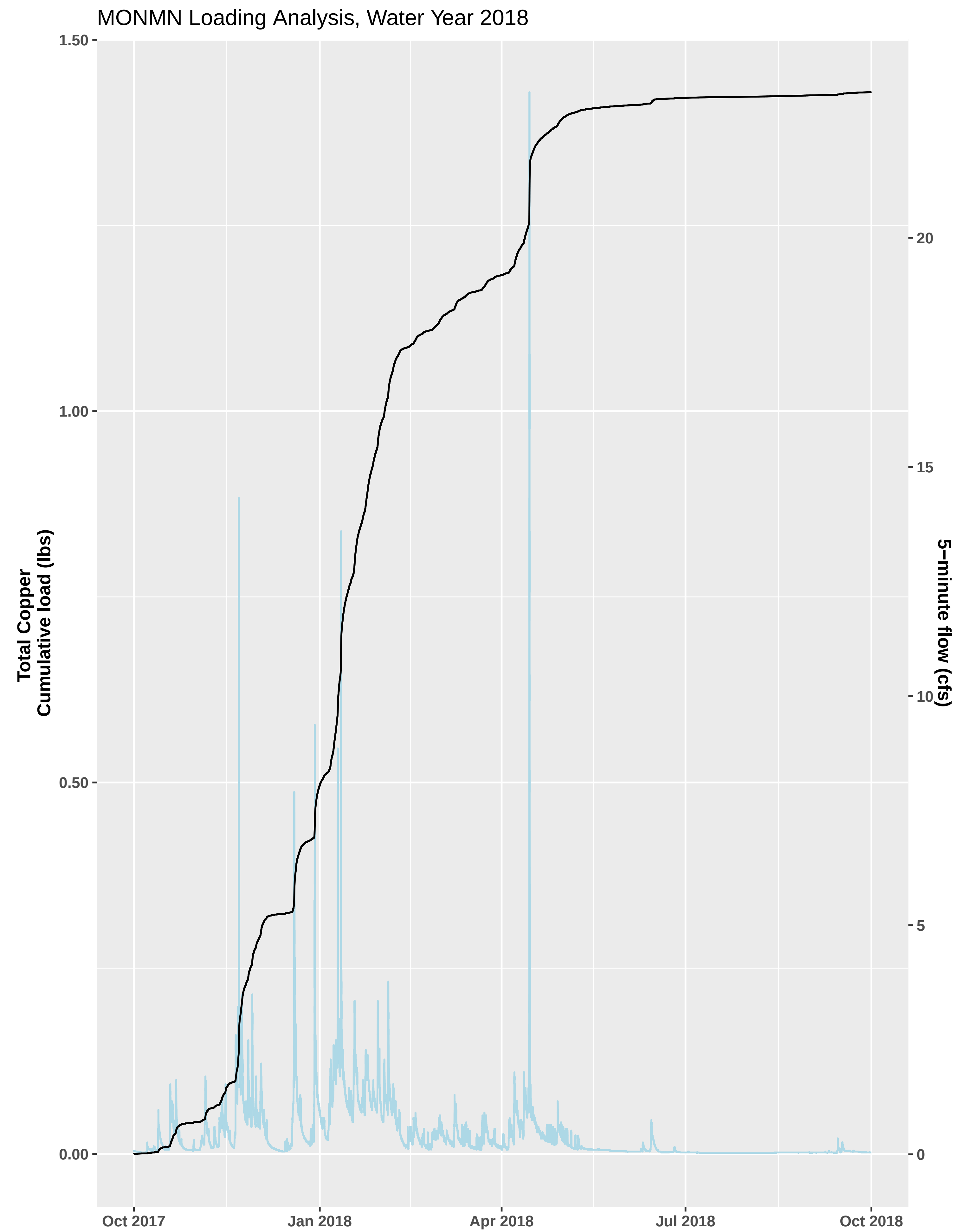

MONMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.039
Total Copper
5−minute load (lbs)
0.0000080
0.0000060
0.0000040
0.0000020
0.0000000
0.05
0.10
0.15
0.20
instantaneous discharge (cfs)

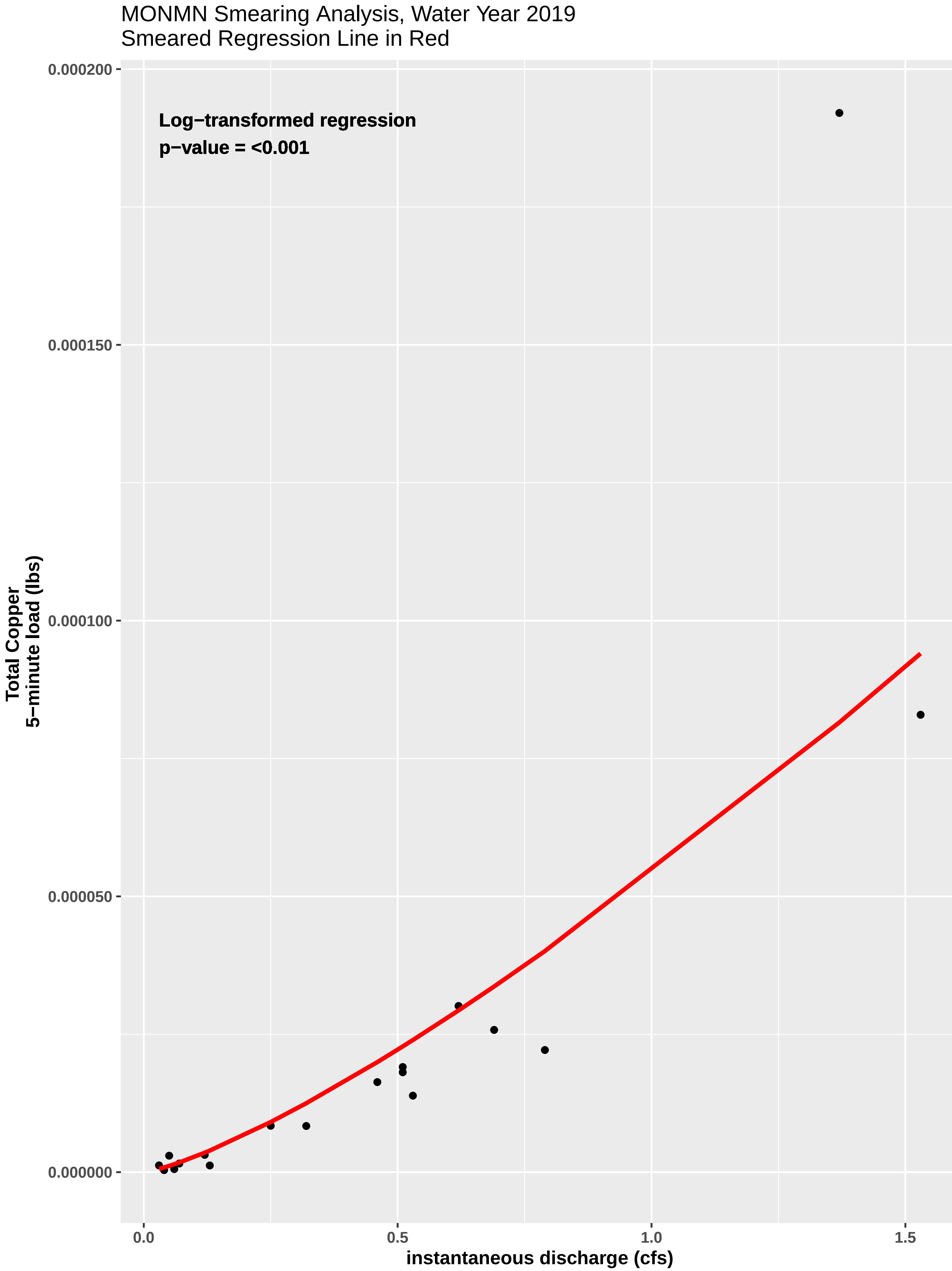

MONMN Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
1.50
1.00
0.50
0.00
5−minute flow (cfs)
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

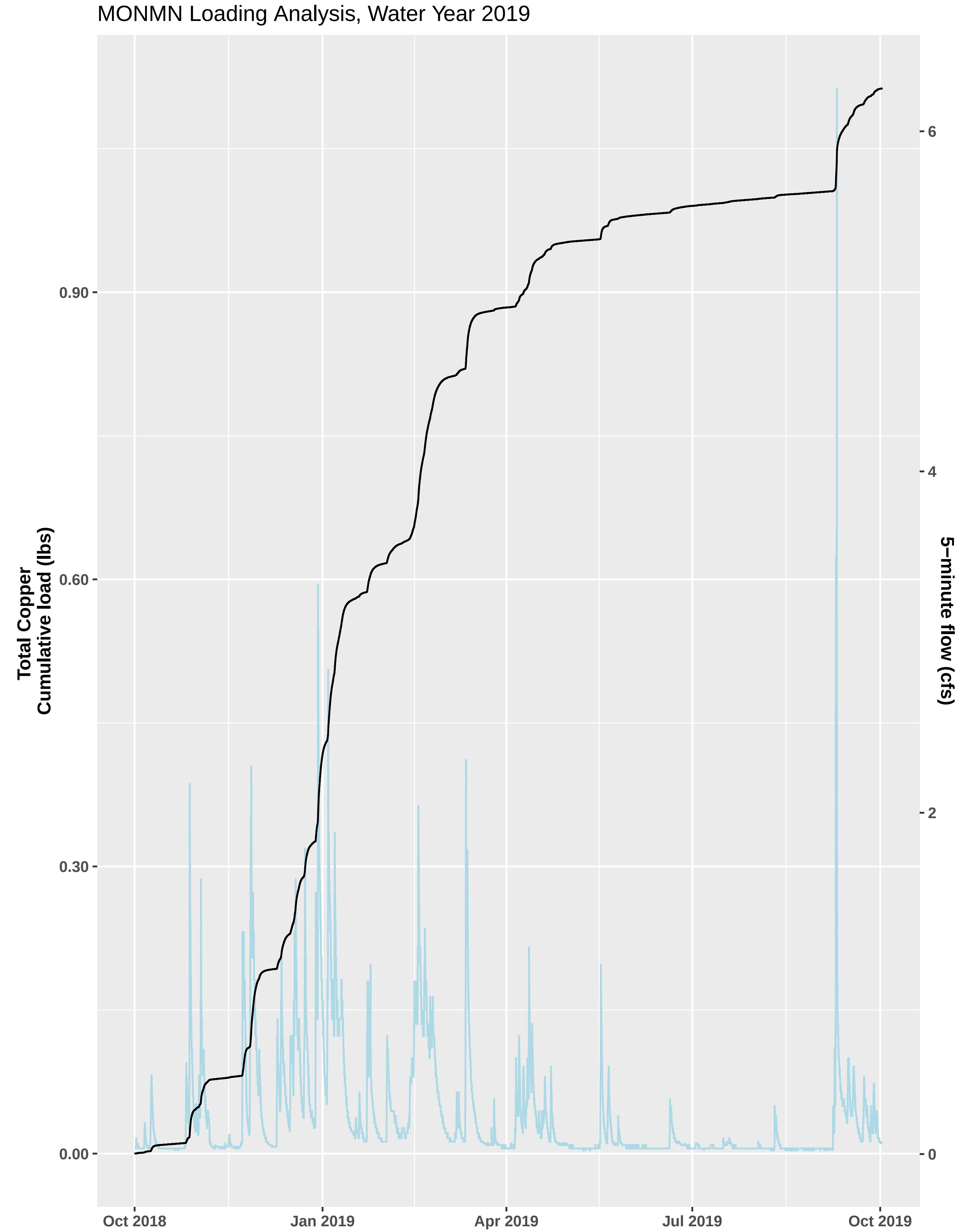

MONMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000060
0.000040
0.000020
0.000000
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

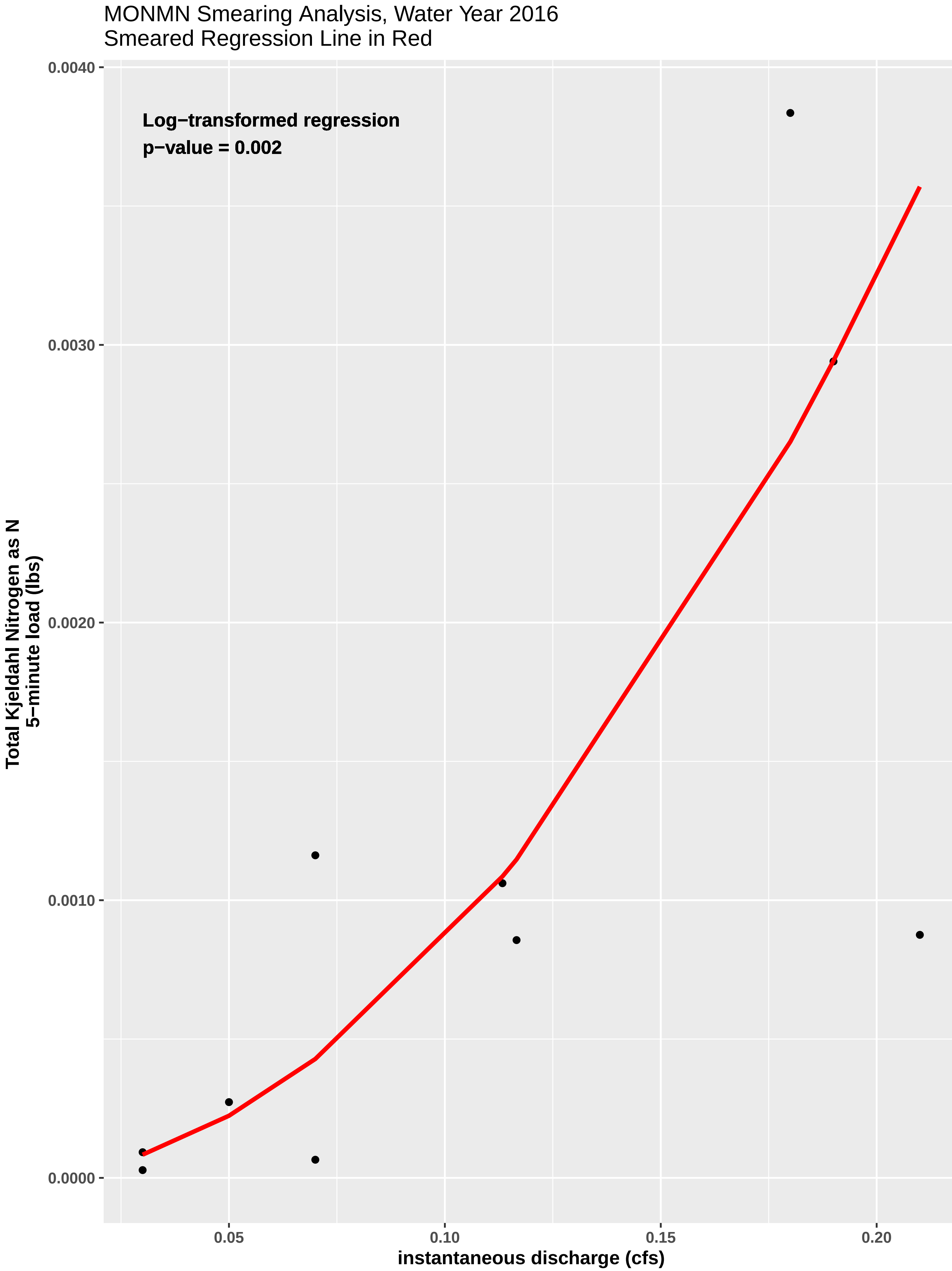

MONMN Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
1.50
1.00
0.50
0.00
5−minute flow (cfs)
15
10
5
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

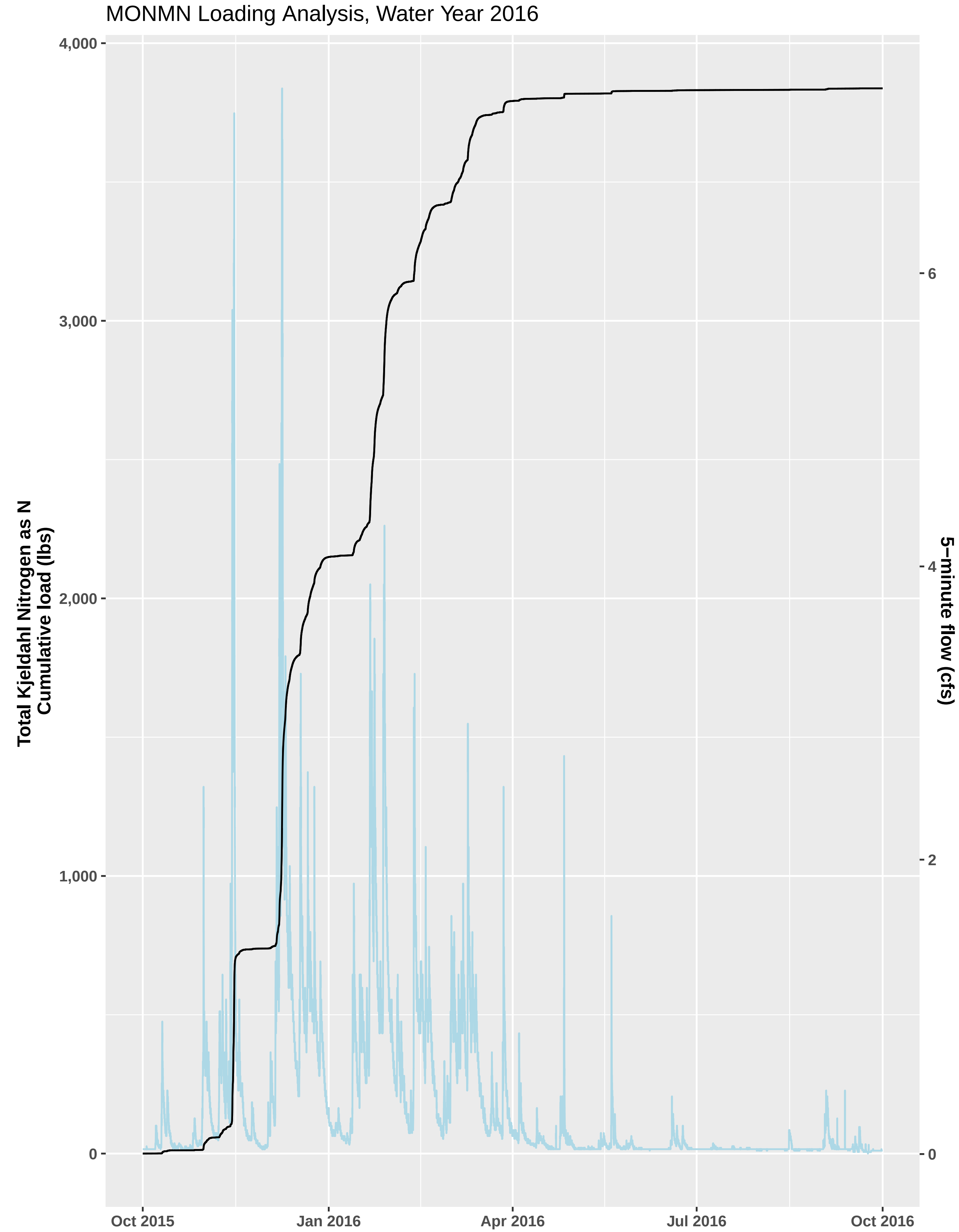

MONMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.00040
0
2
4
6
instantaneous discharge (cfs)

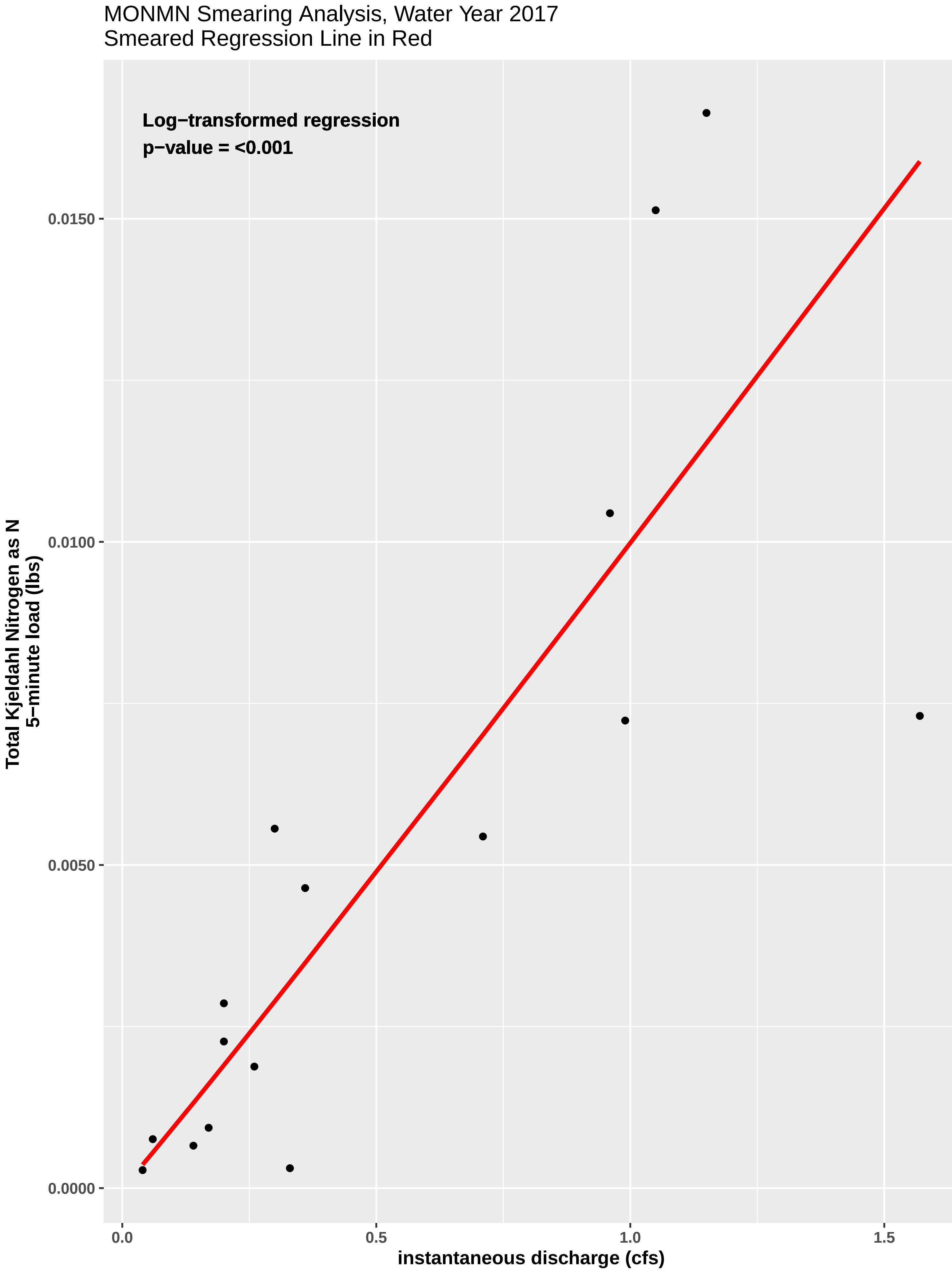

MONMN Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.00
0.50
1.00
1.50
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

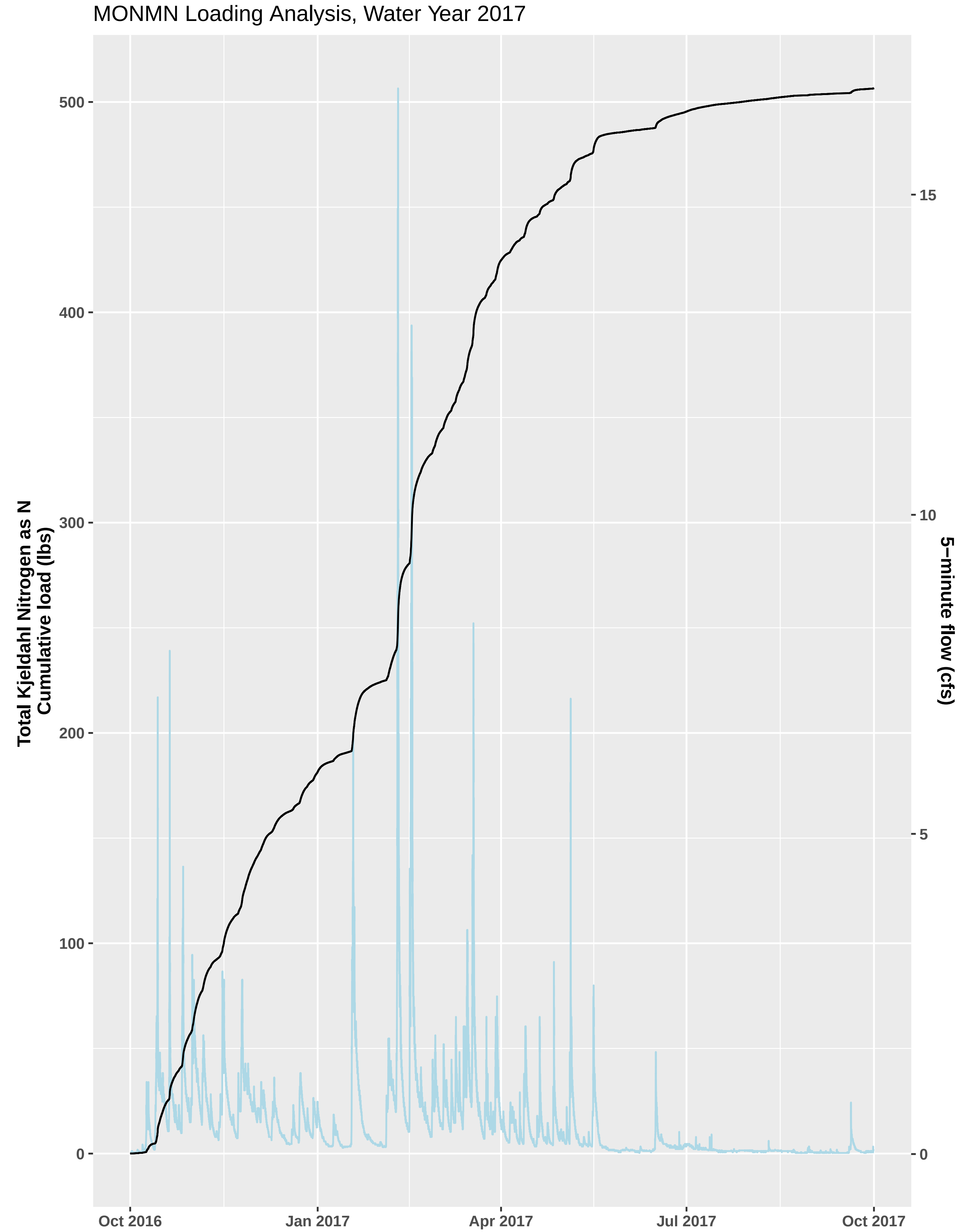

MONMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000200
0.000150
0.000100
0.000050
0.000000
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

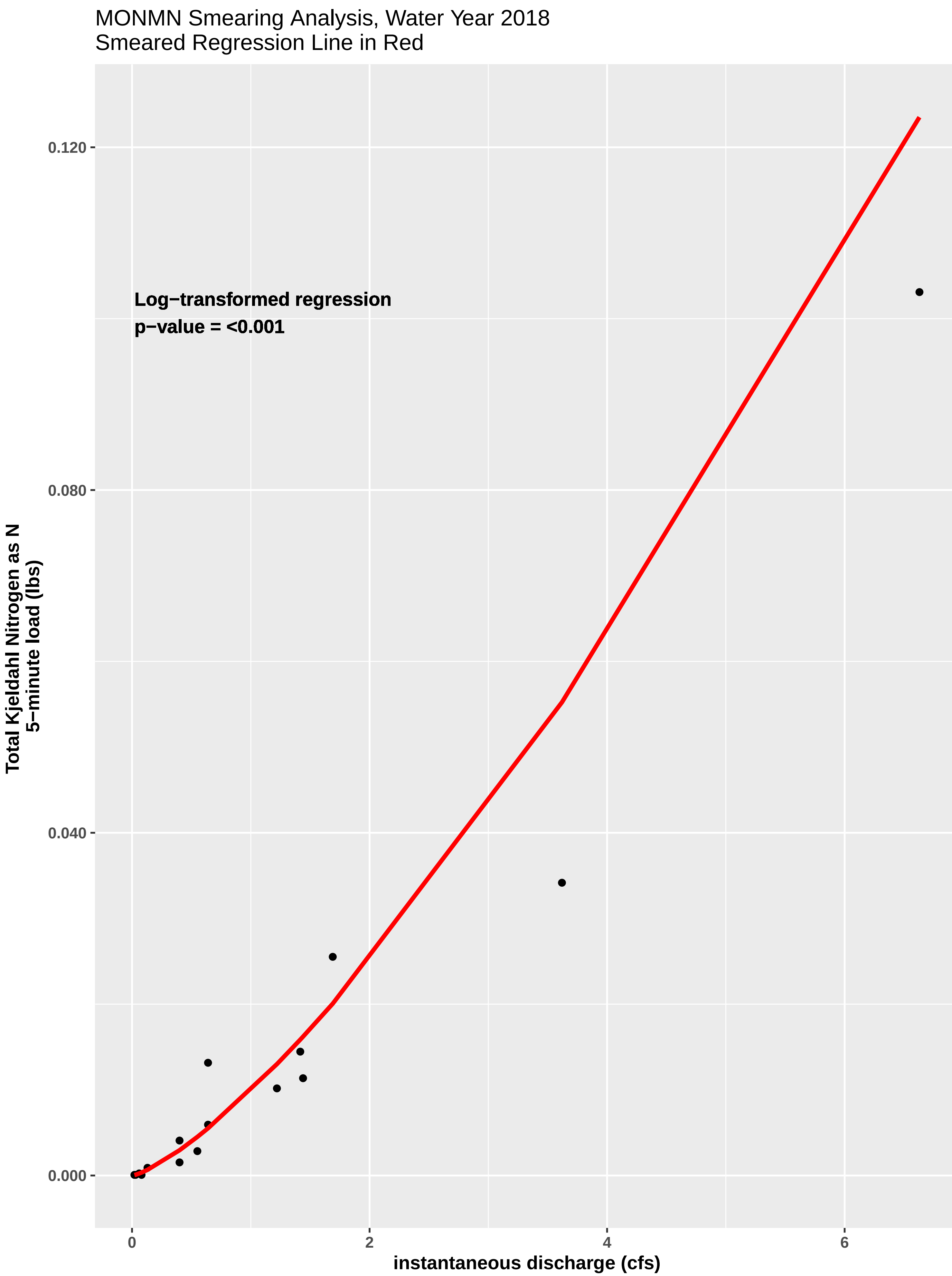

MONMN Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.90
0.60
0.30
0.00
5−minute flow (cfs)
6
4
2
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

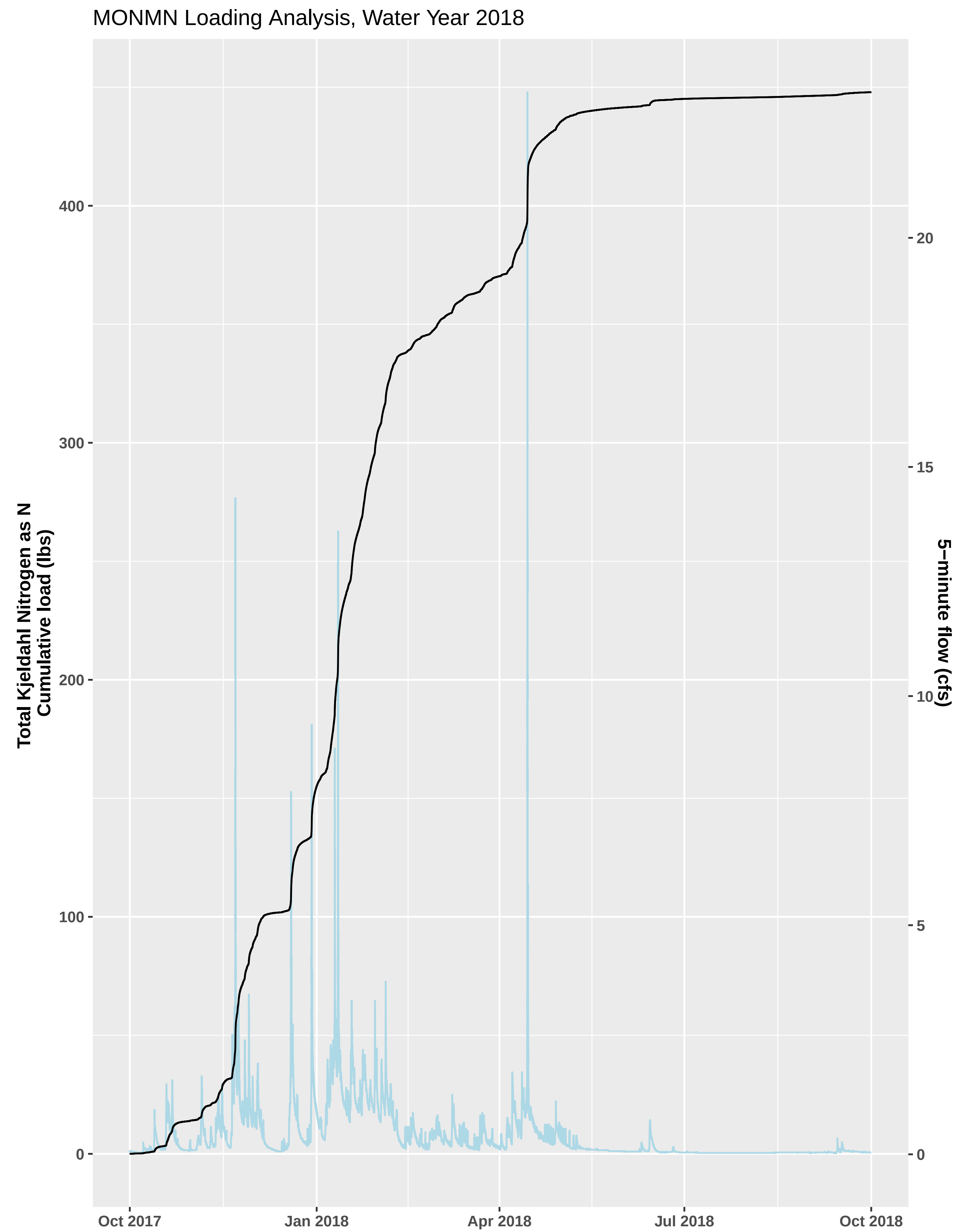

MONMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.0000
0.0010
0.0020
0.0030
0.0040
0.05
0.10
0.15
0.20

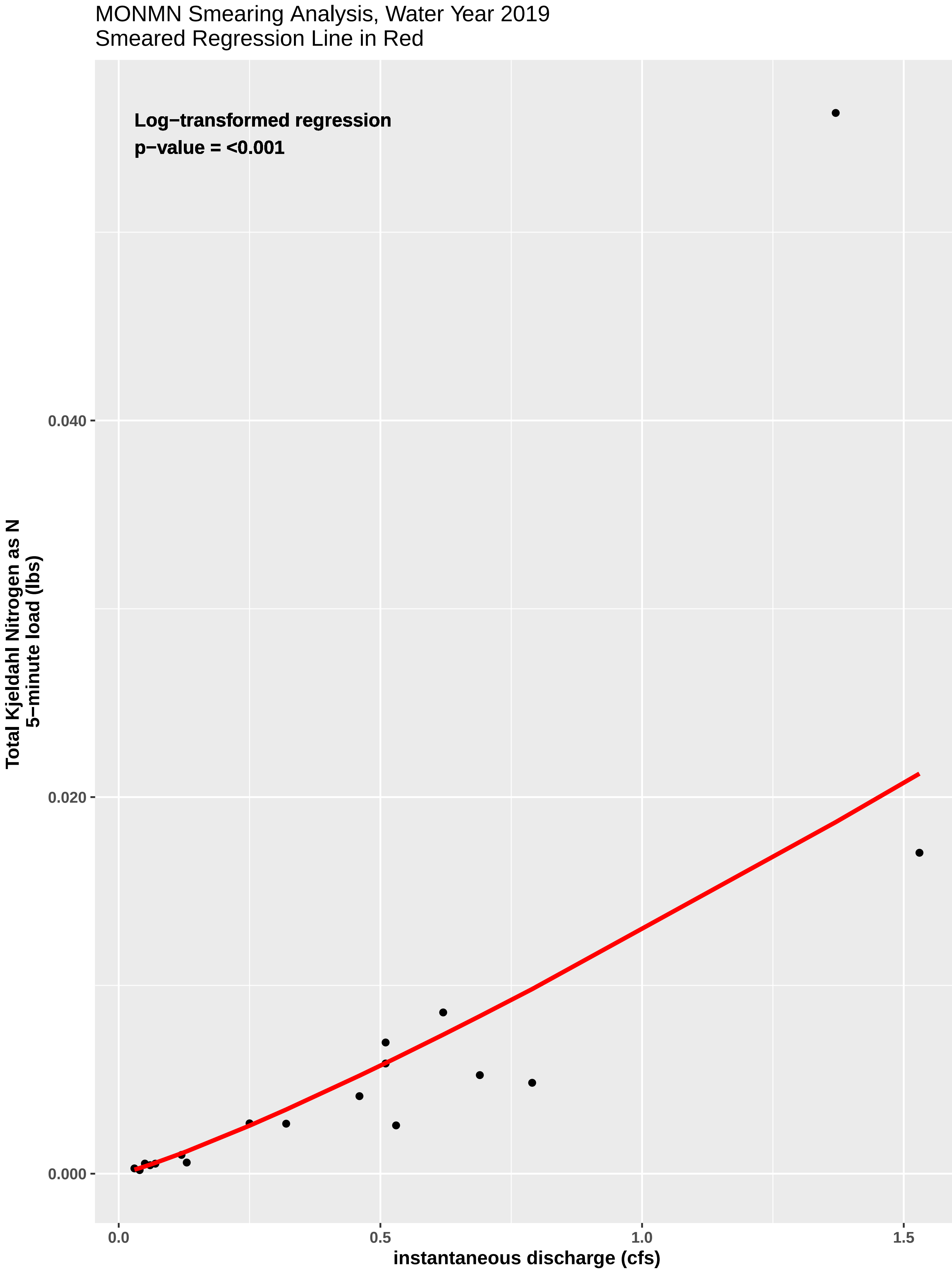

MONMN Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
0
1,000
2,000
3,000
4,000
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

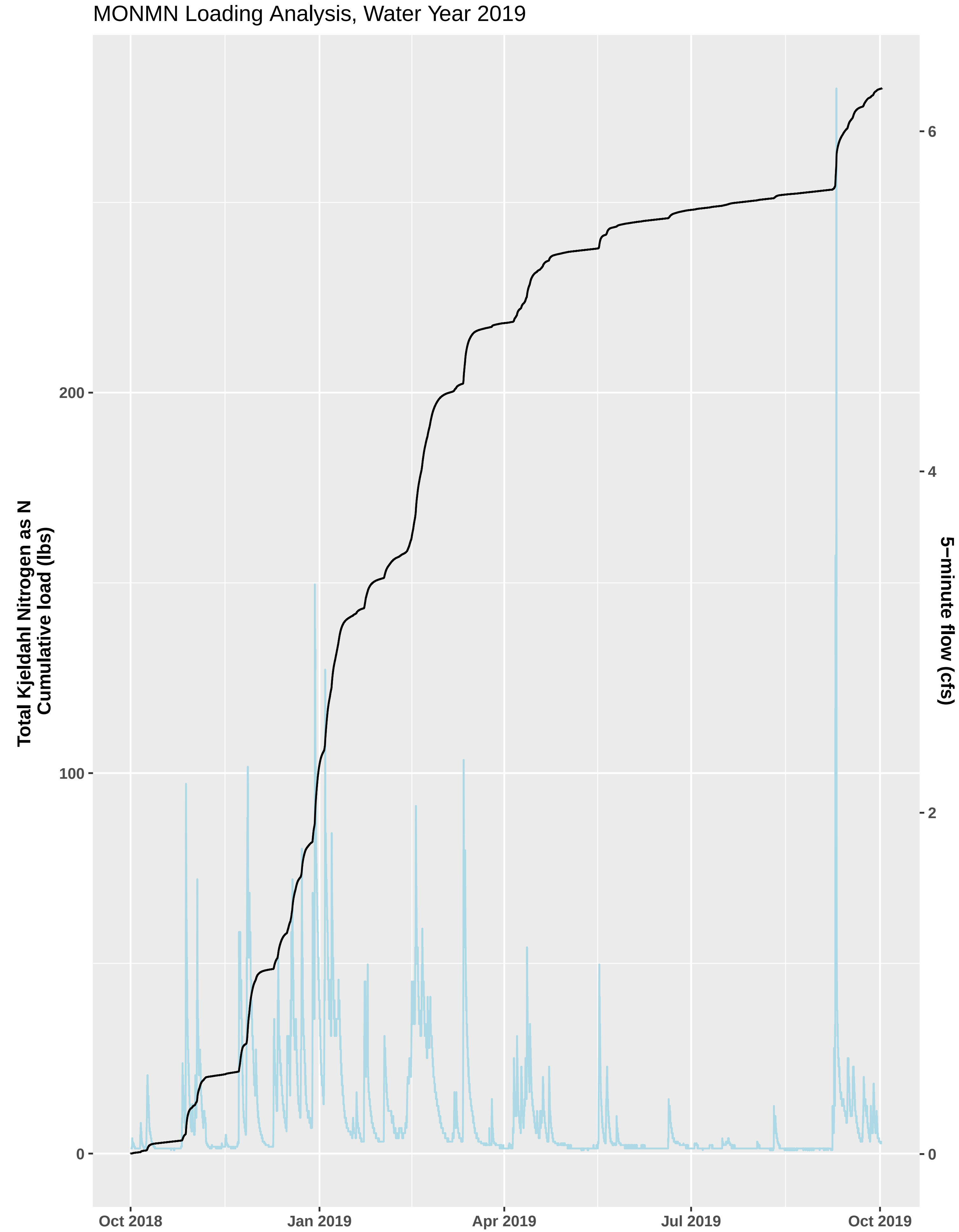

MONMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

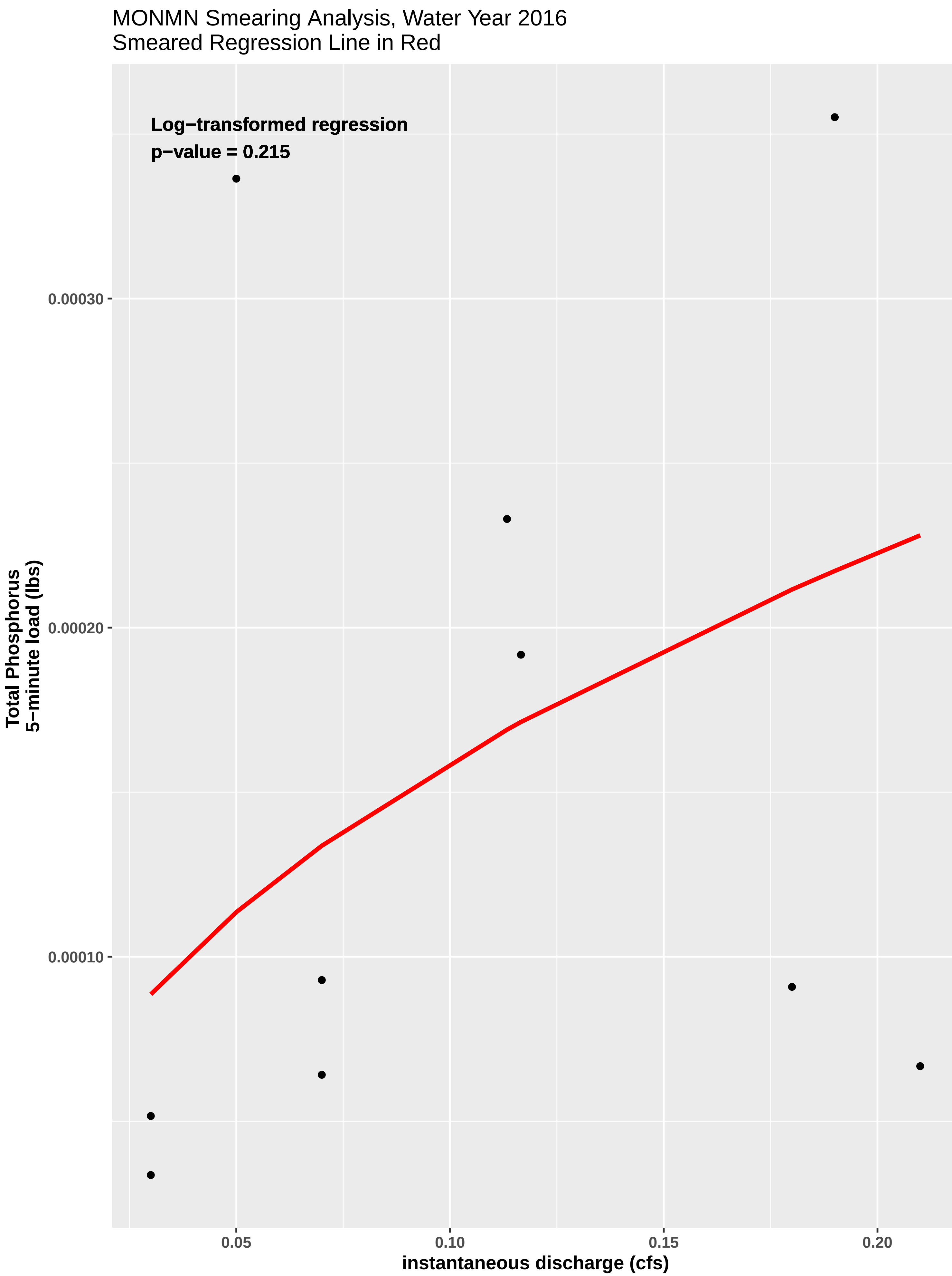

MONMN Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
300
400
500
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

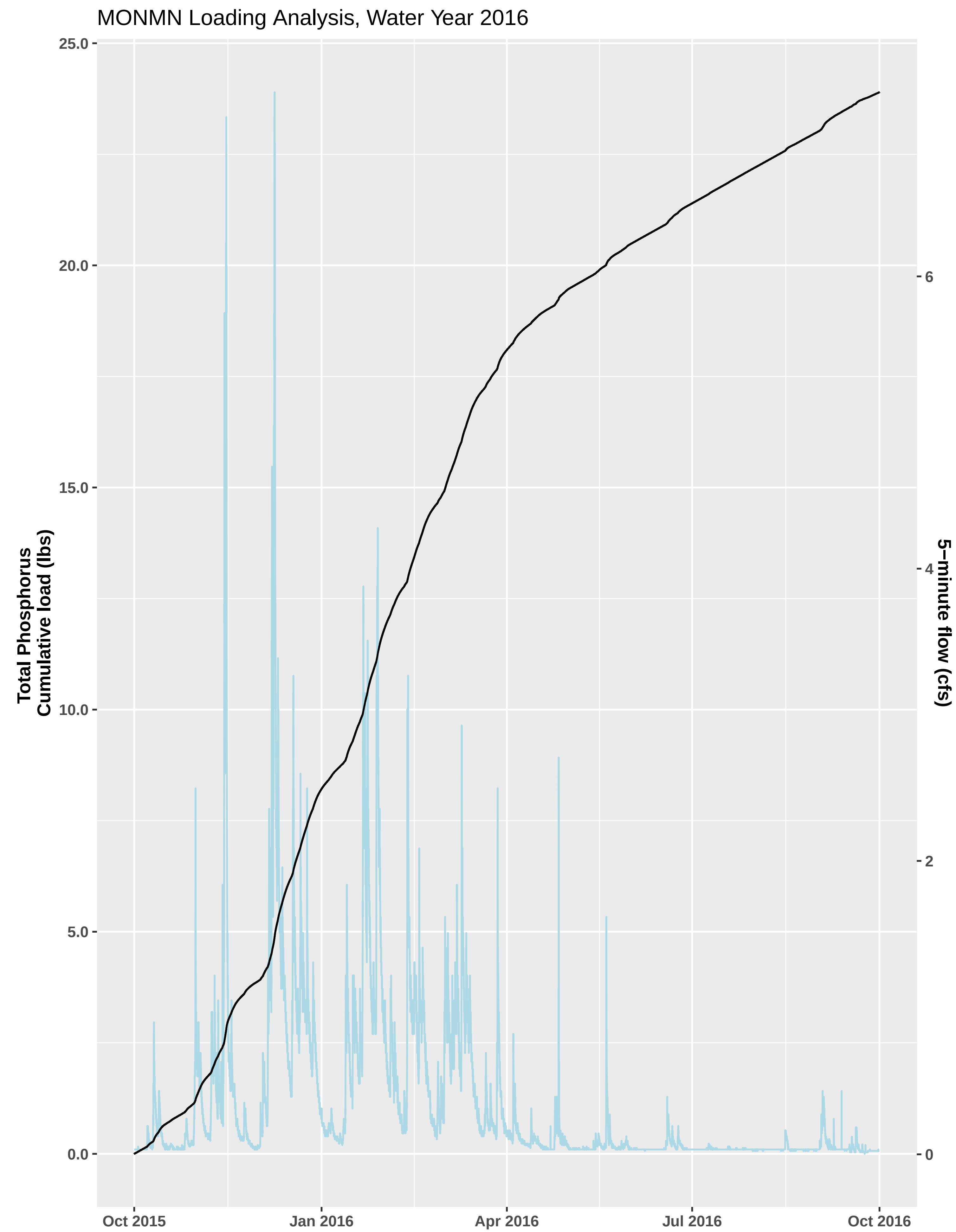

MONMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.120
0.080
0.040
0.000
0
2
4
6

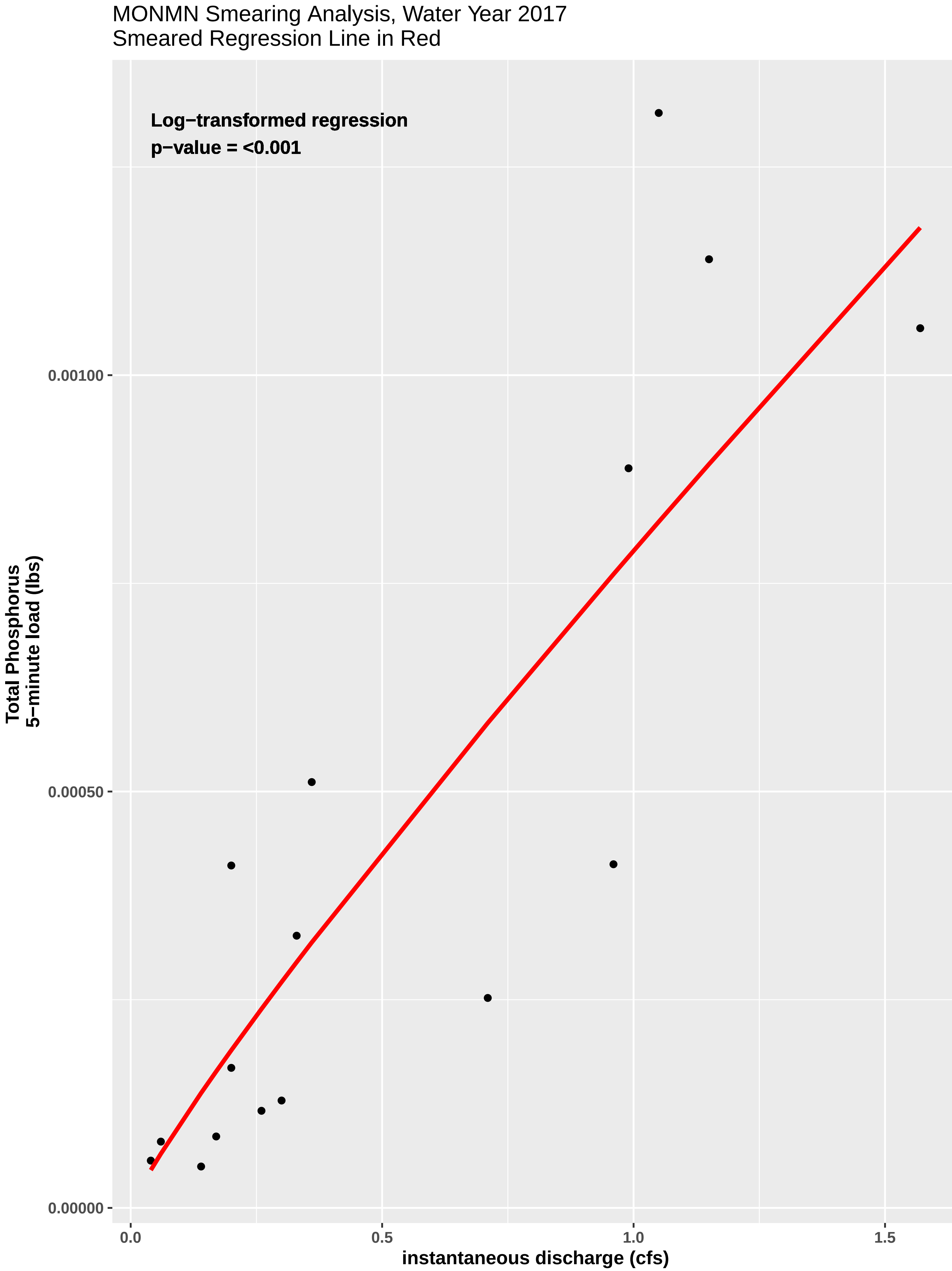

MONMN Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
400
300
200
100
0
20
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

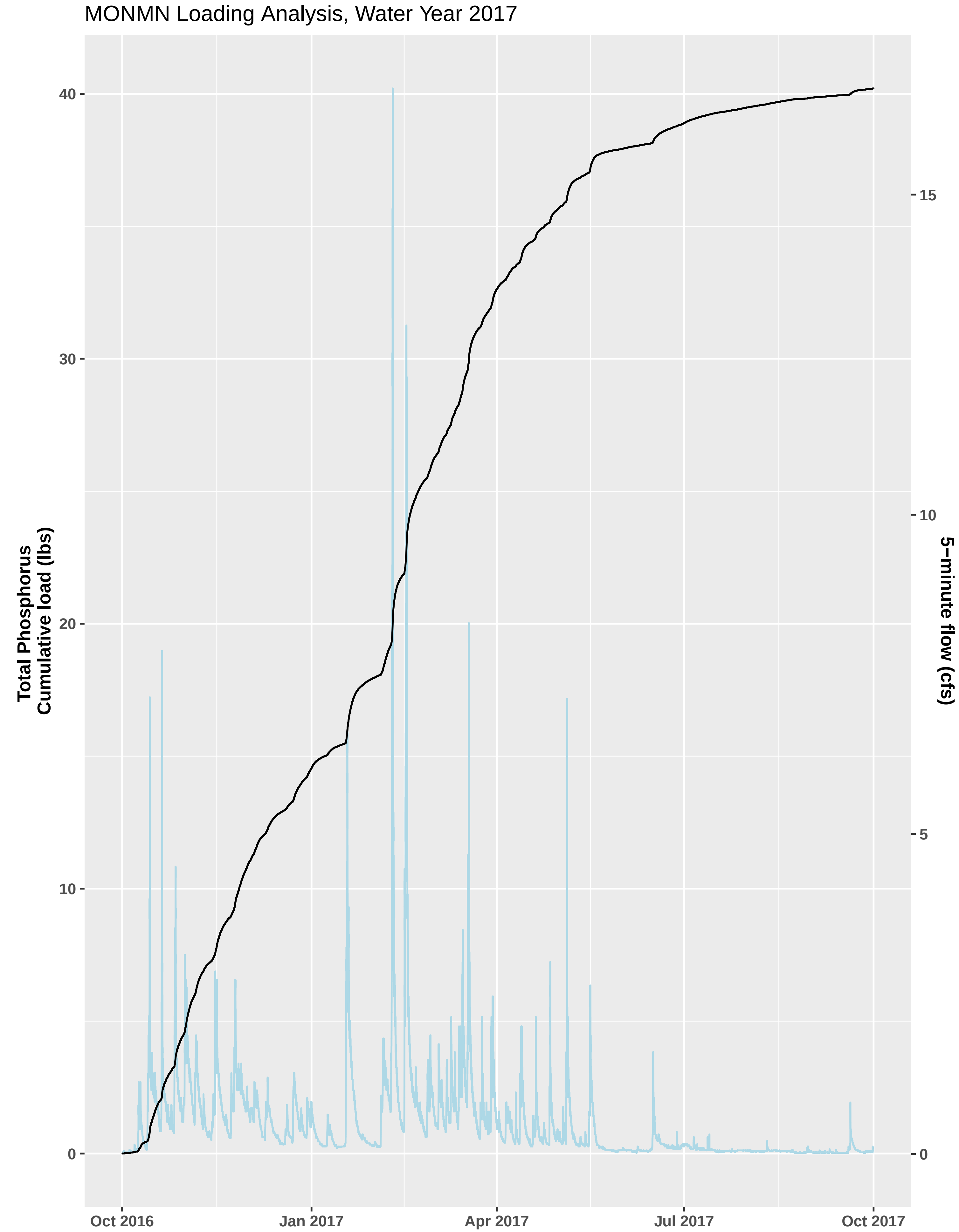

MONMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.040
0.020
0.000
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

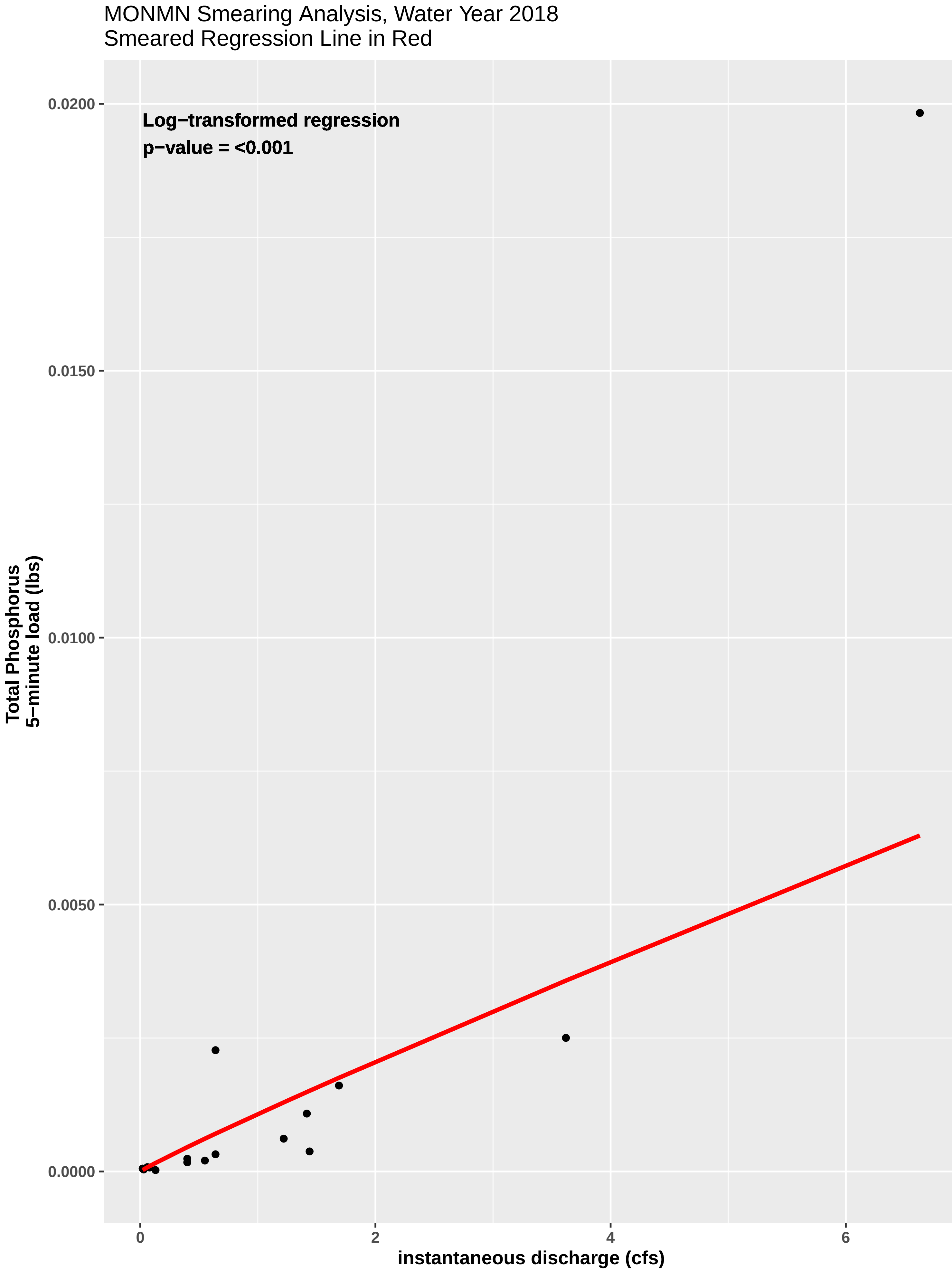

MONMN Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
200
100
0
5−minute flow (cfs)
6
4
2
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

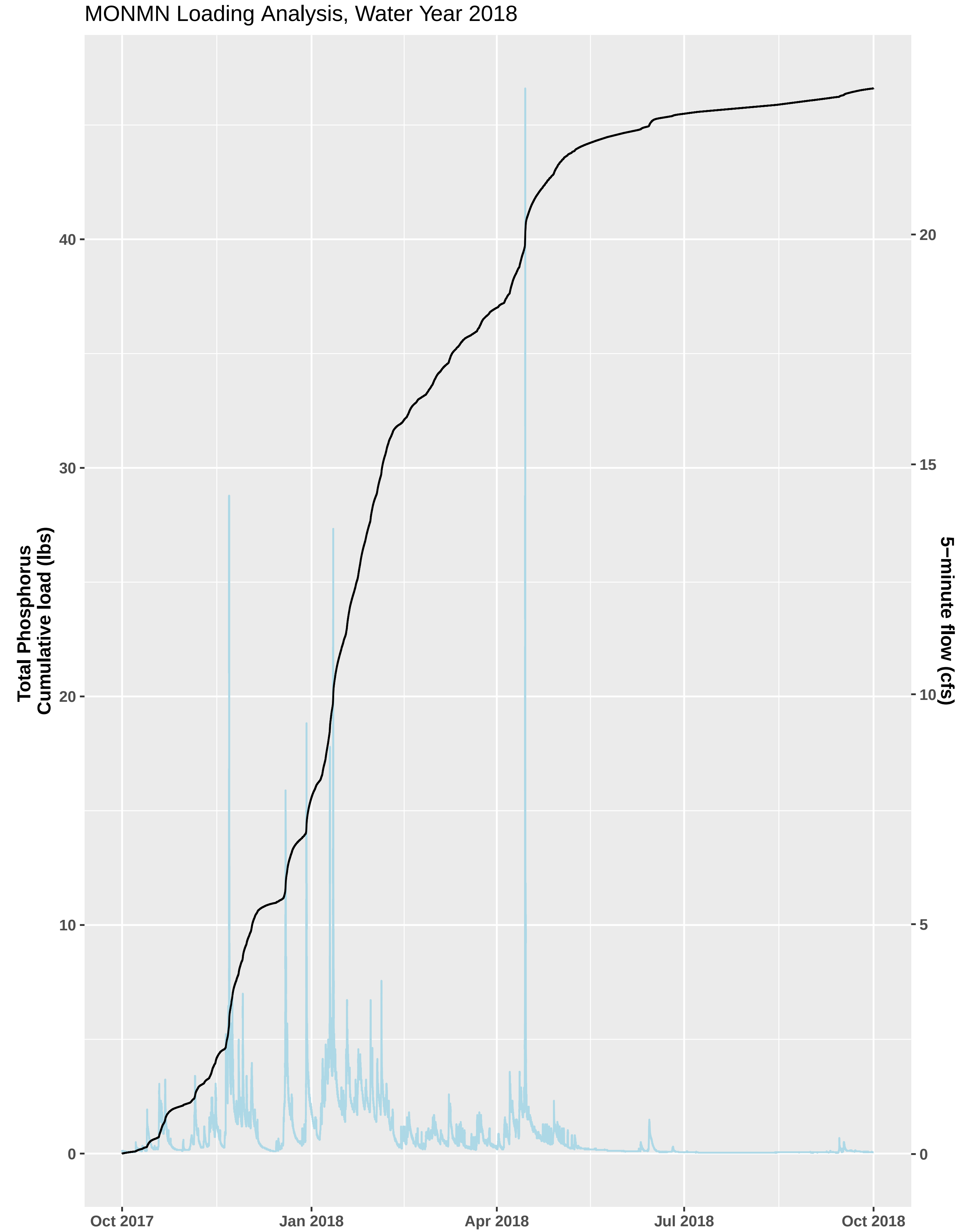

MONMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.215
Total Phosphorus
5−minute load (lbs)
0.00010
0.00020
0.00030
0.05
0.10
0.15
0.20
instantaneous discharge (cfs)

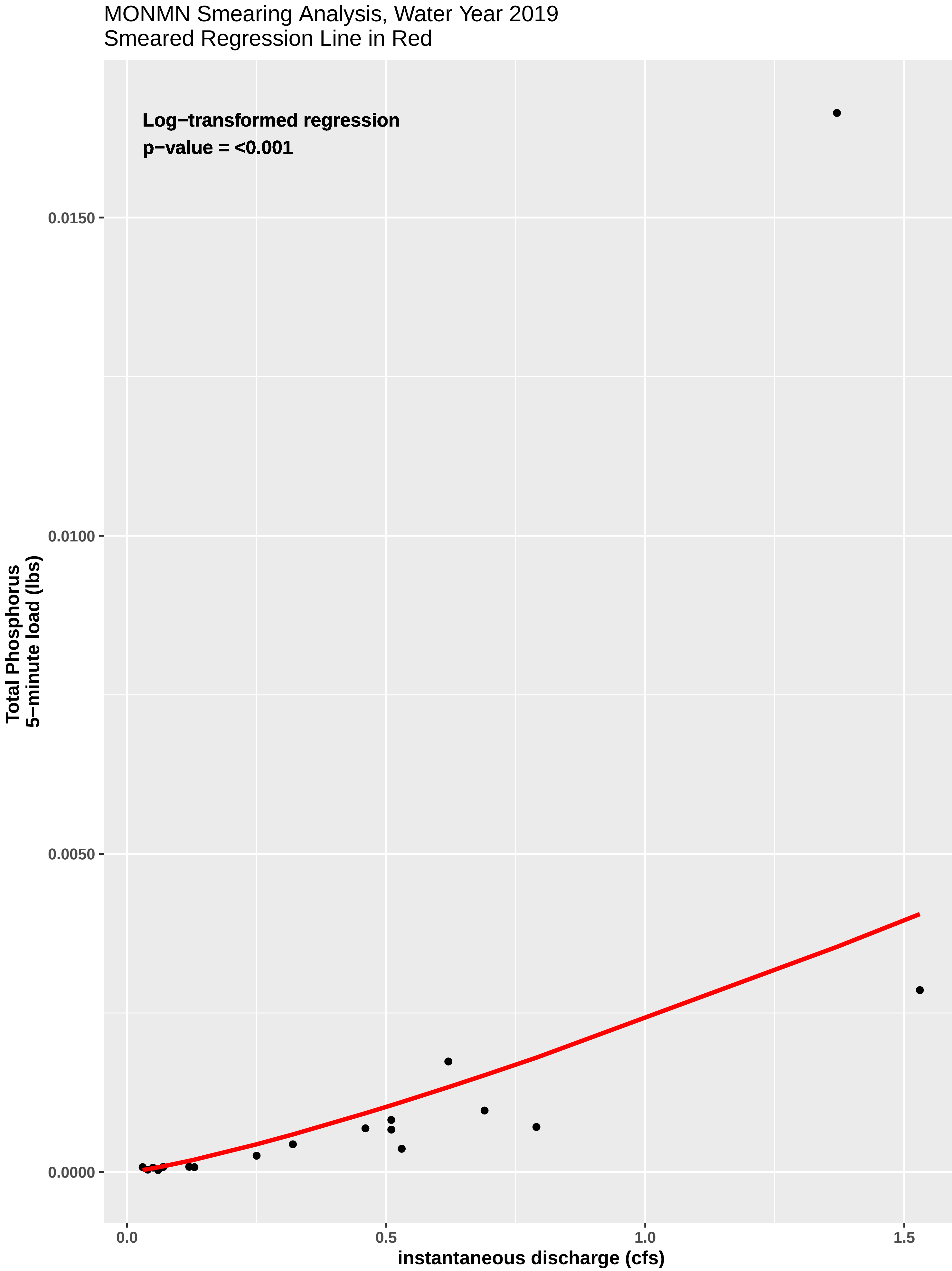

MONMN Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0.0
5.0
10.0
15.0
20.0
25.0
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

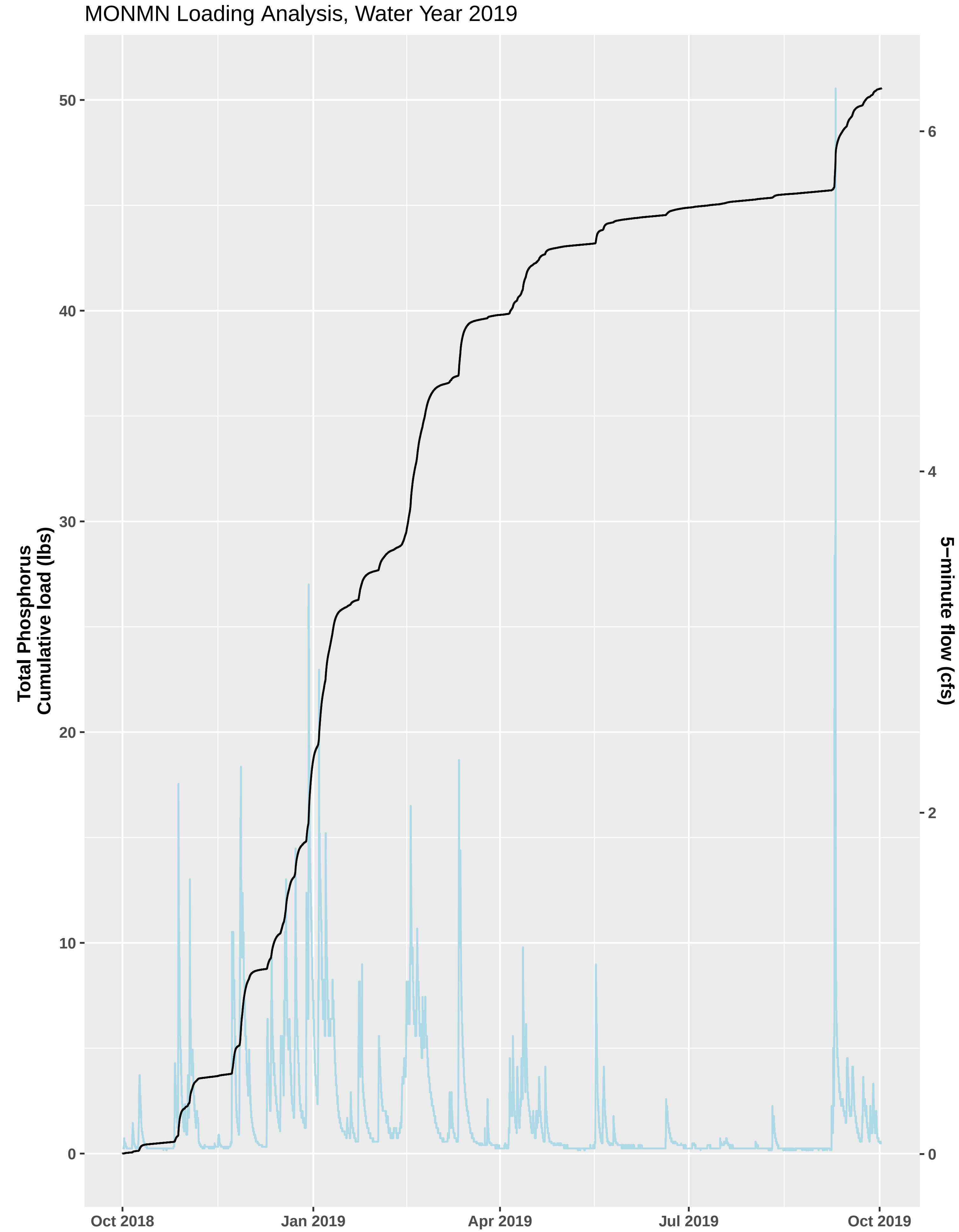

MONMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00050
0.00100
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

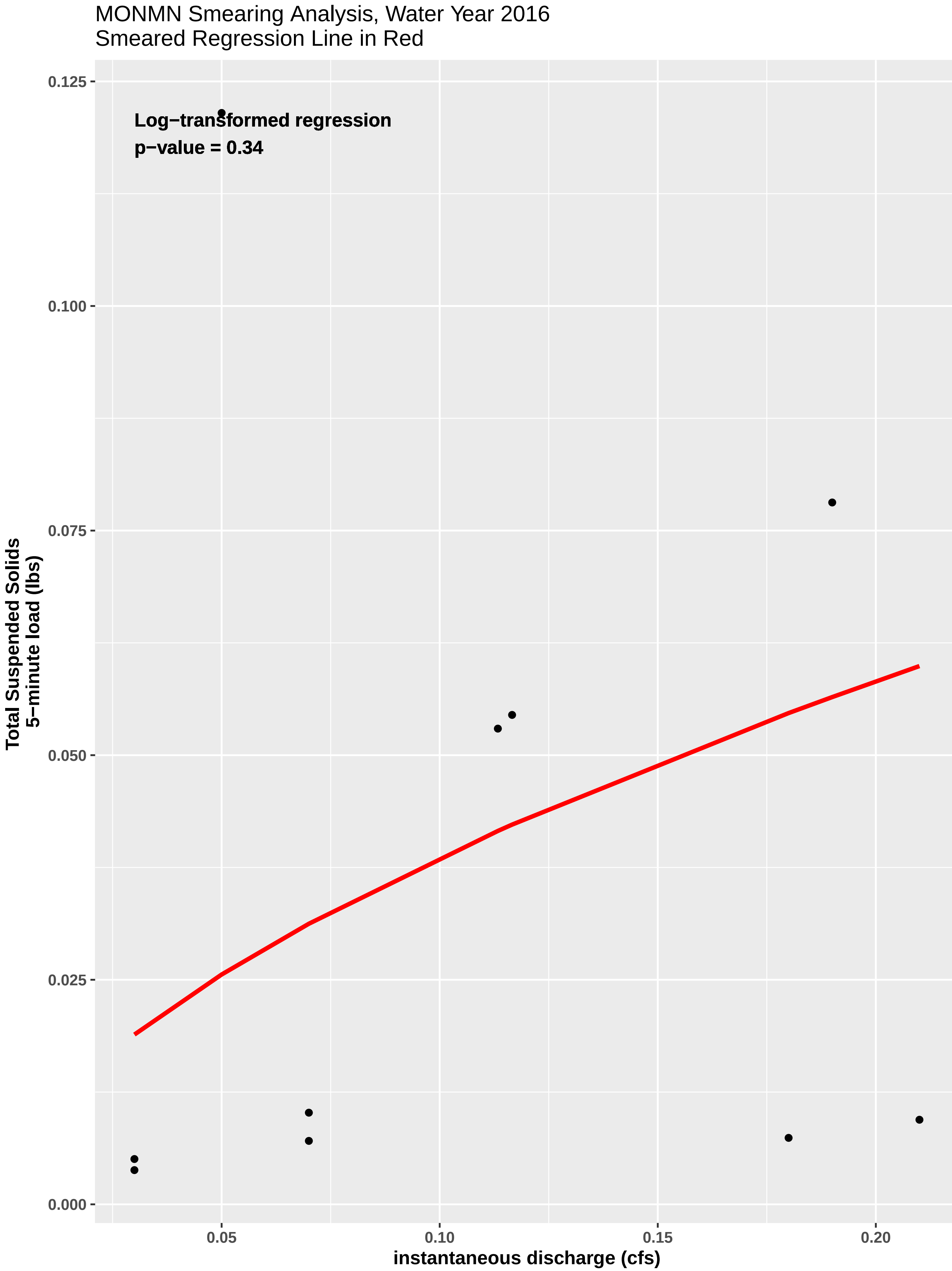

MONMN Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
5−minute flow (cfs)
0
10
20
30
40
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

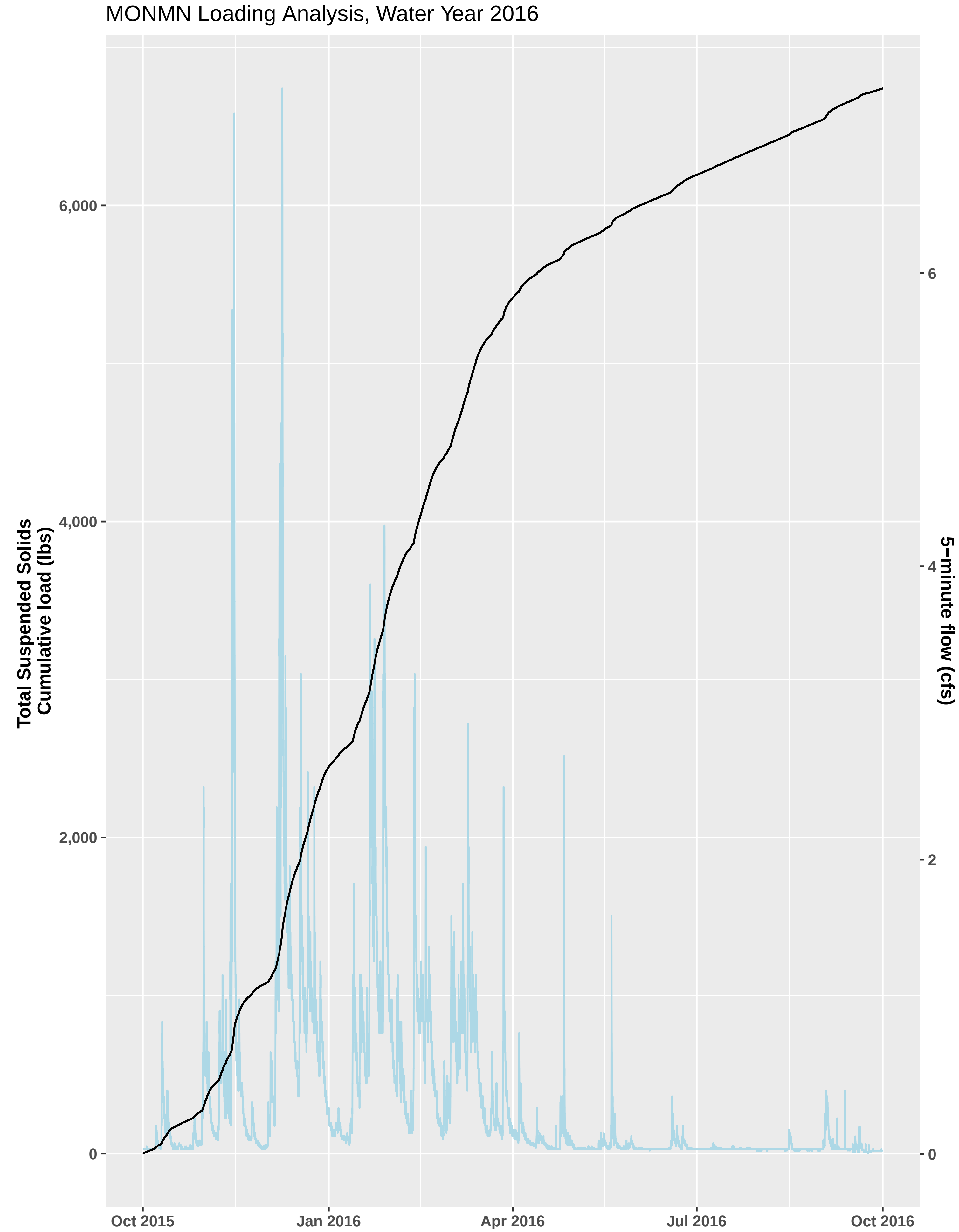

MONMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0200
0.0150
0.0100
0.0050
0.0000
0
2
4
6
instantaneous discharge (cfs)

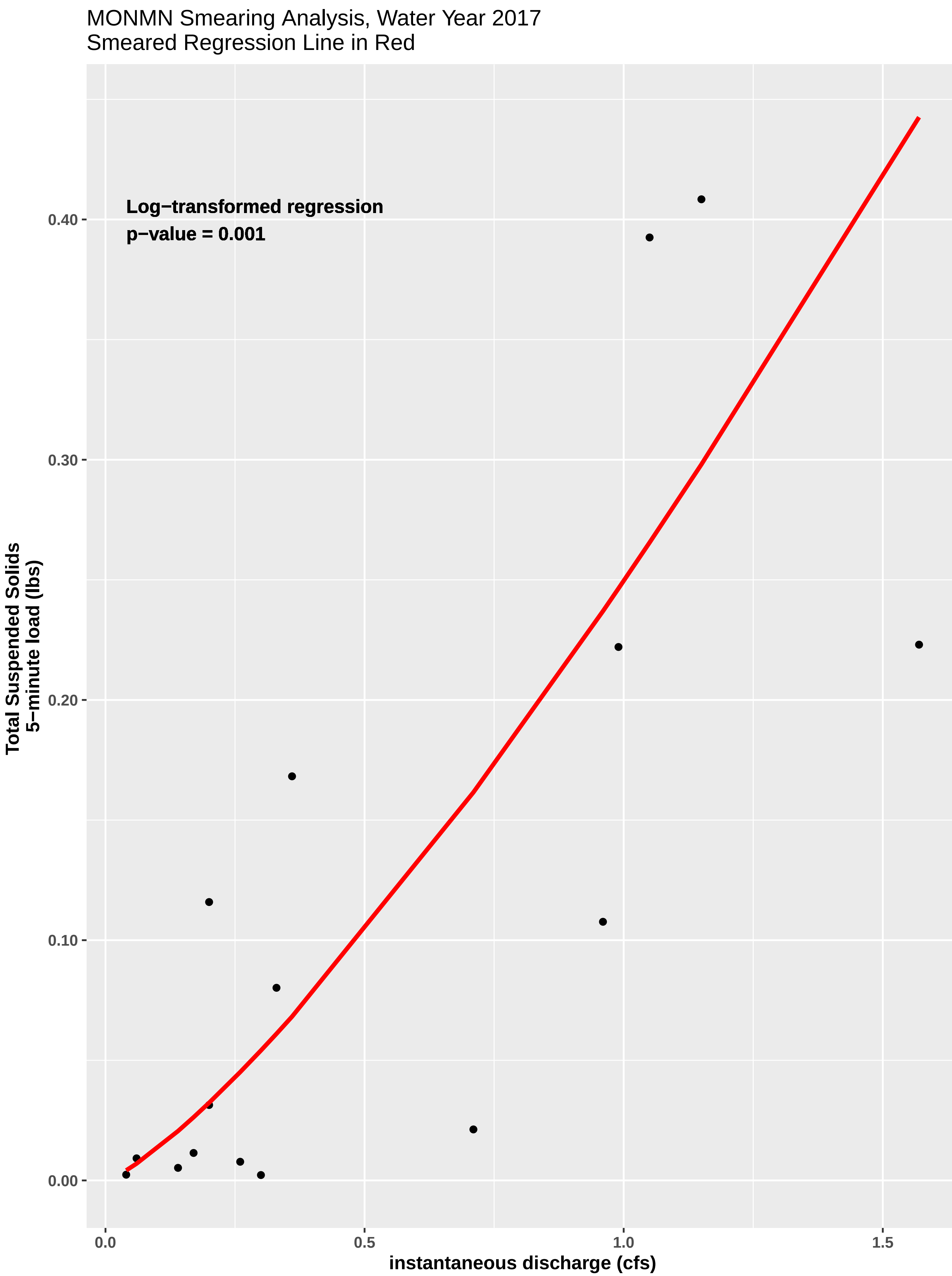

MONMN Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
40
30
20
10
0
5−minute flow (cfs)
20
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

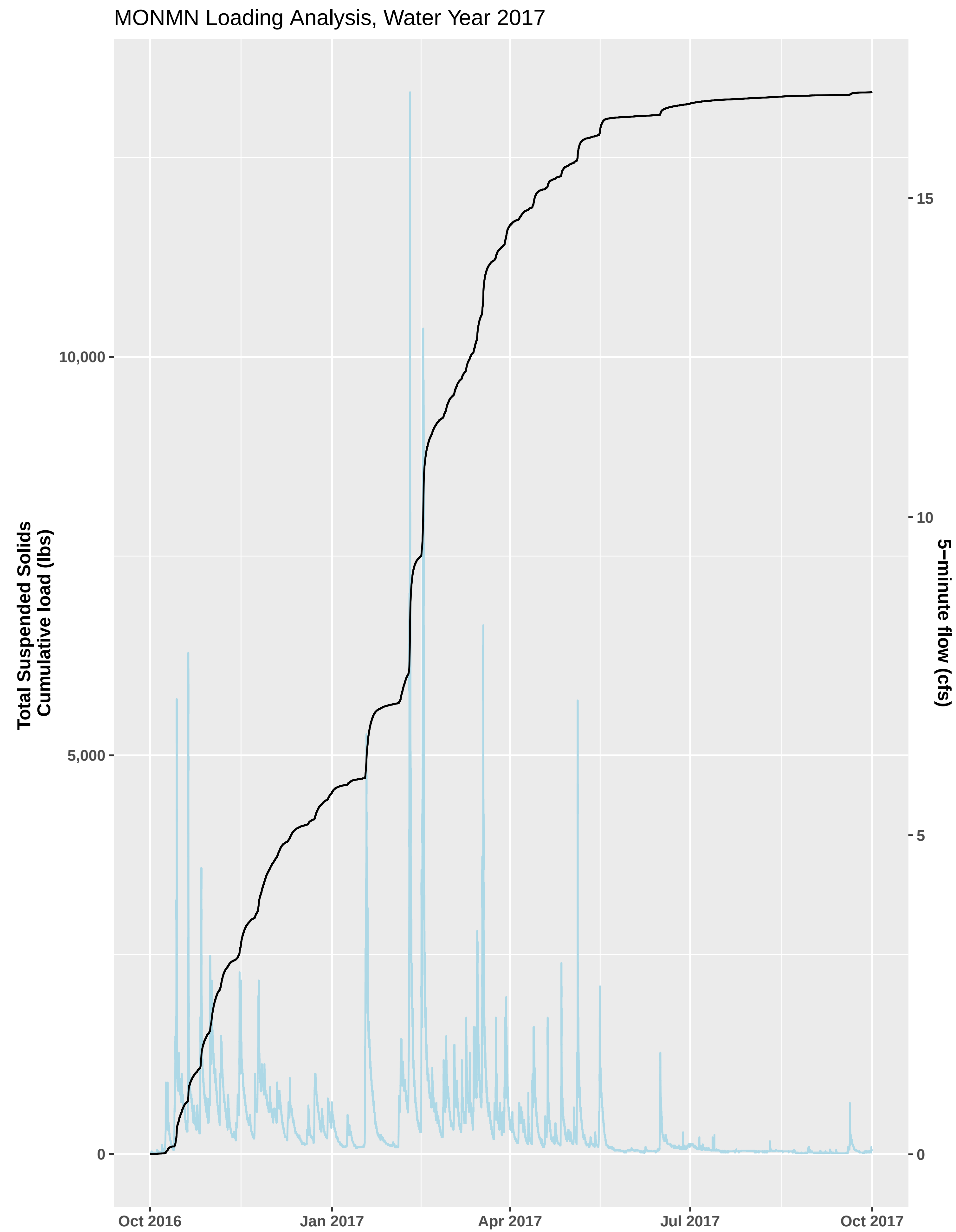

MONMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

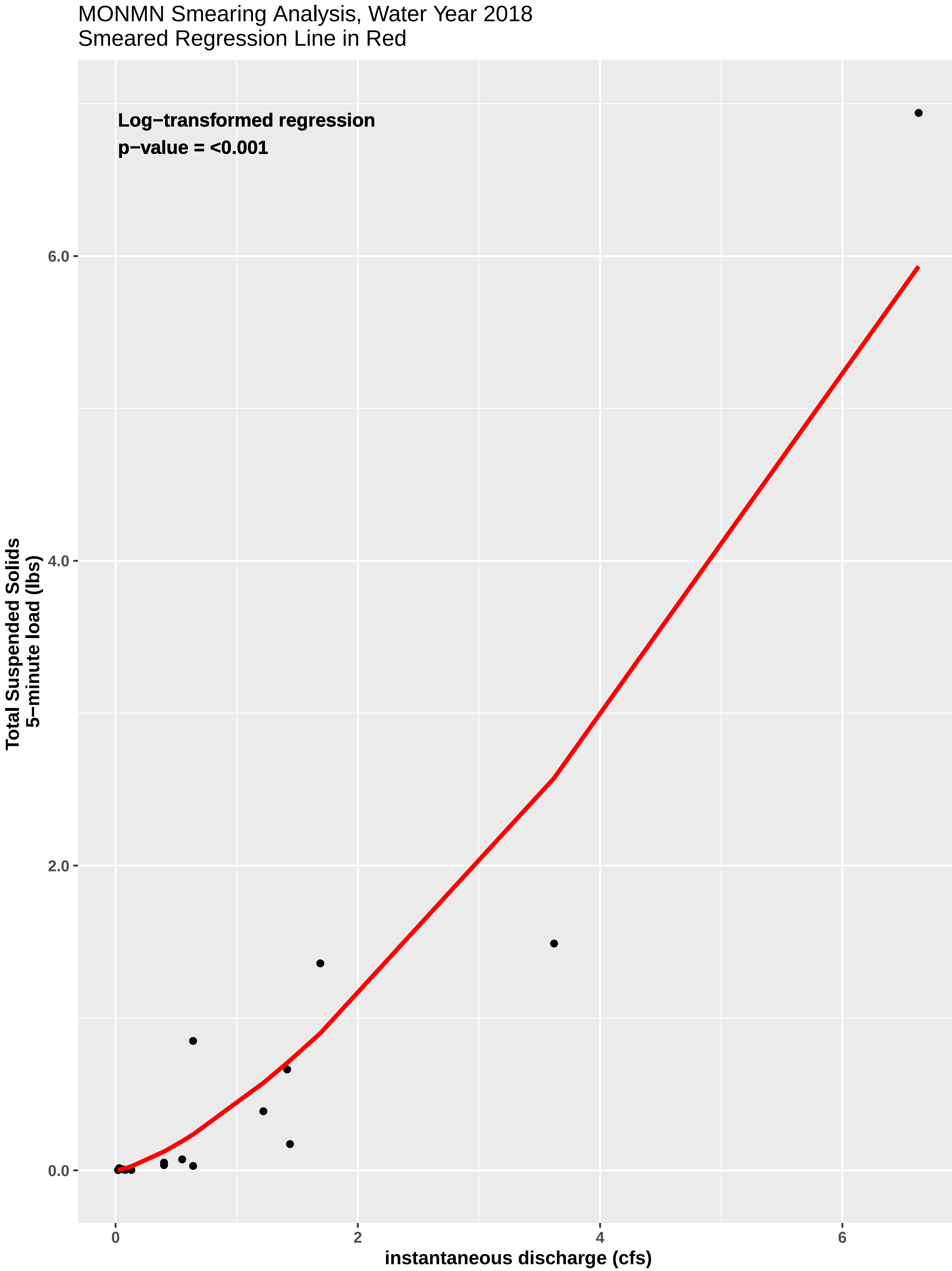

MONMN Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
10
20
30
40
50
5−minute flow (cfs)
0
2
4
6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

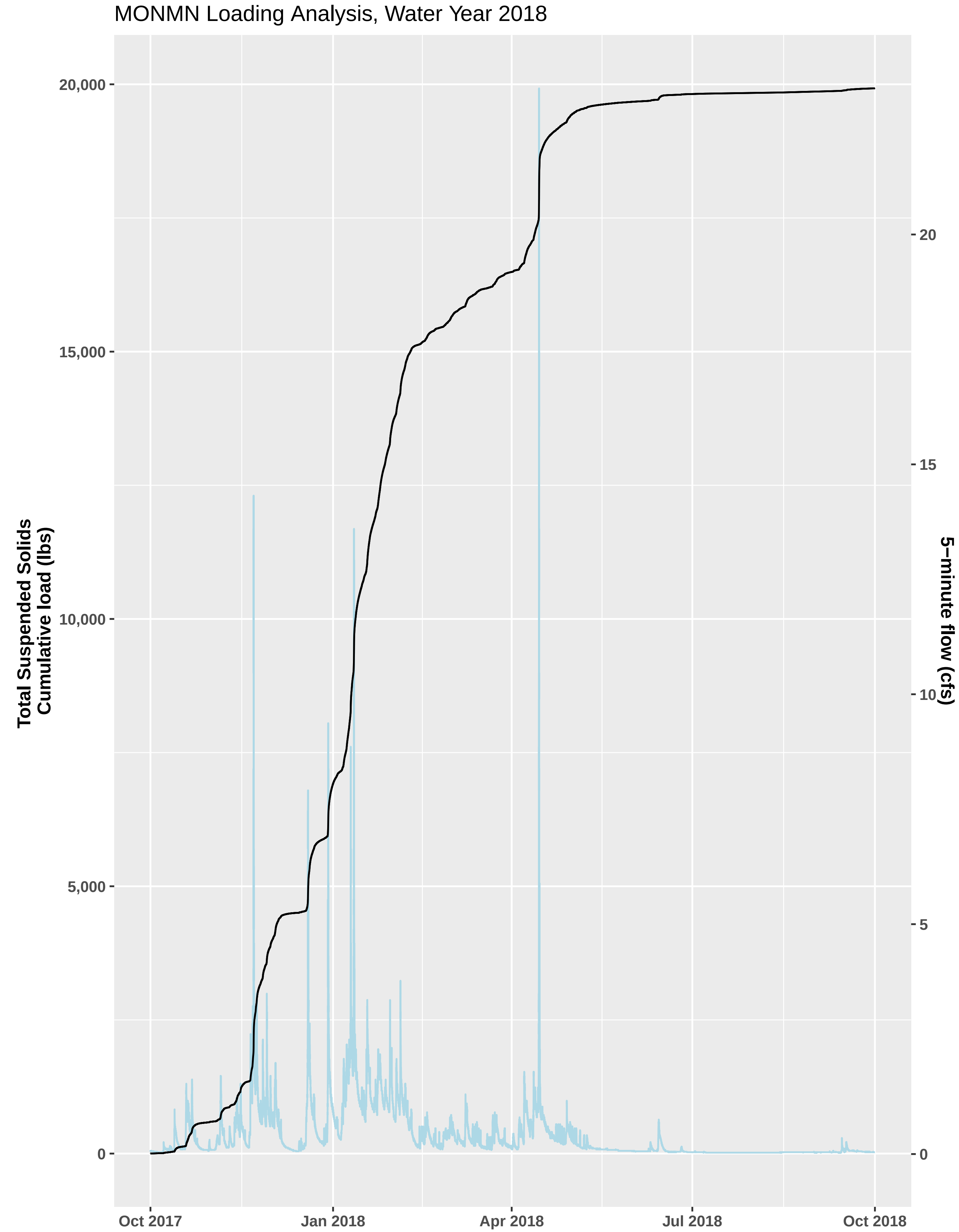

MONMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.34
Total Suspended Solids
5−minute load (lbs)
0.000
0.025
0.050
0.075
0.100
0.125
0.05
0.10
0.15
0.20
instantaneous discharge (cfs)


MONMN Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
0
2,000
4,000
6,000
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

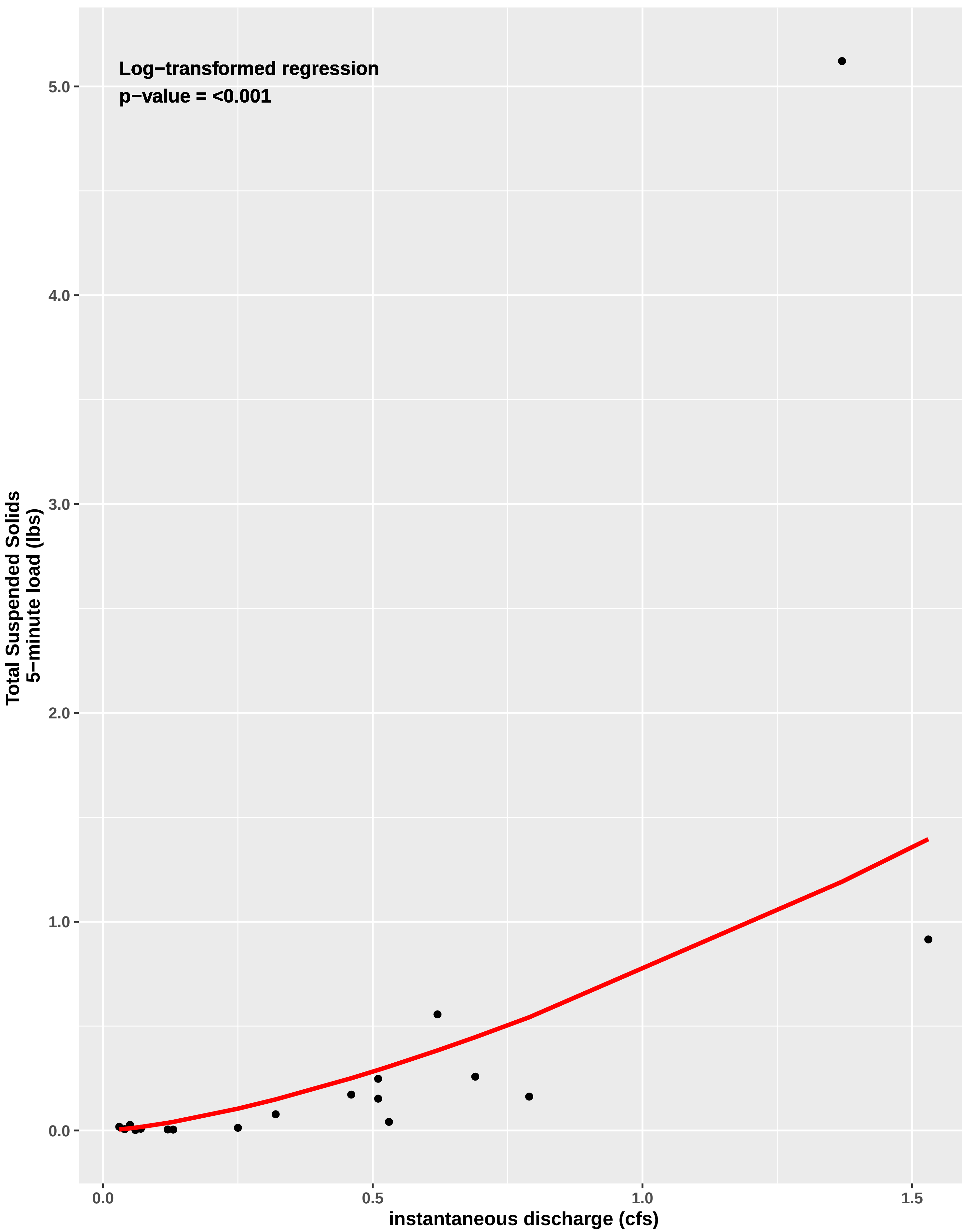

MONMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.10
0.20
0.30
0.40
0.0
0.5
1.0
1.5


MONMN Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
5,000
10,000
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

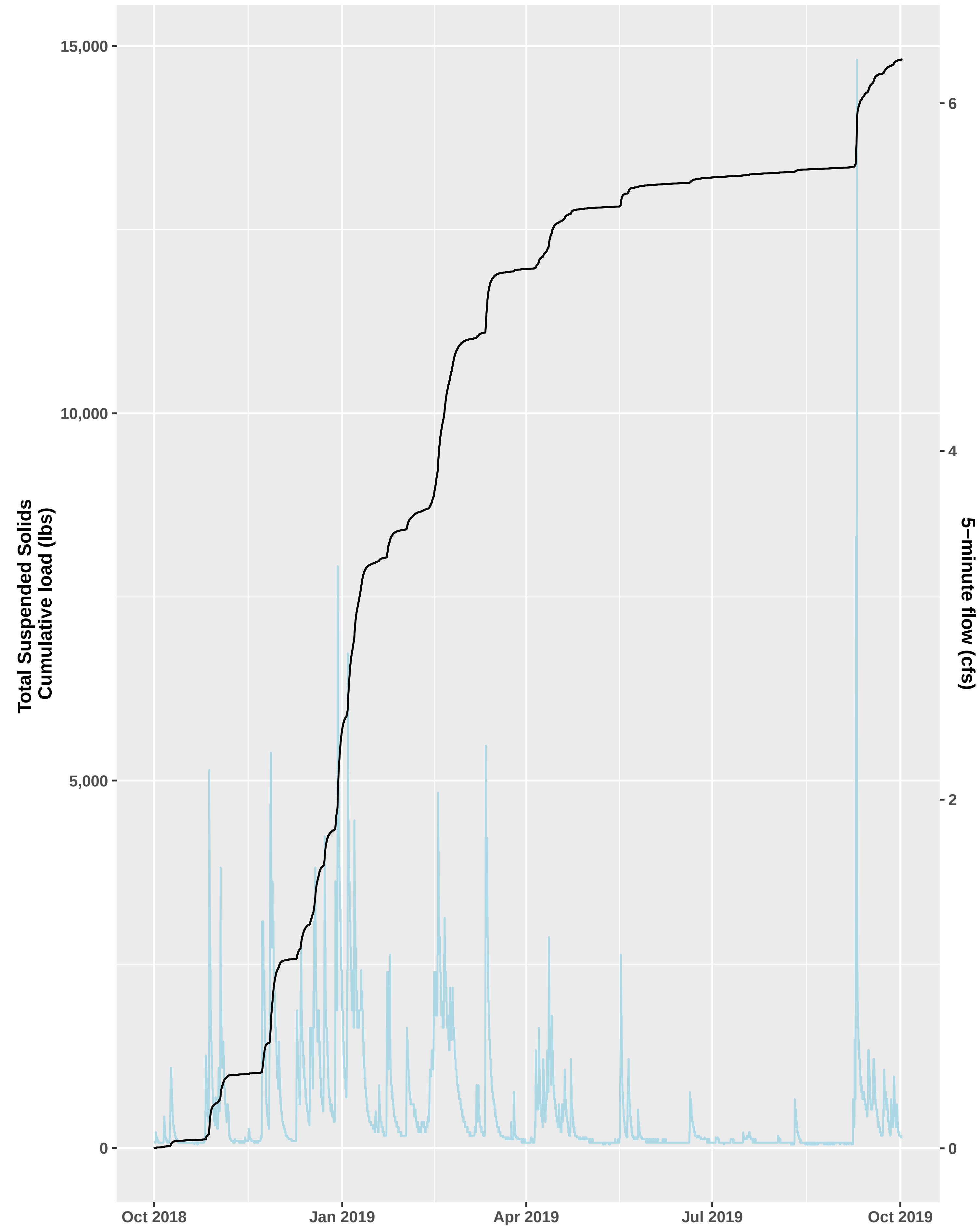

MONMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
2.0
4.0
6.0
0
2
4
6
instantaneous discharge (cfs)

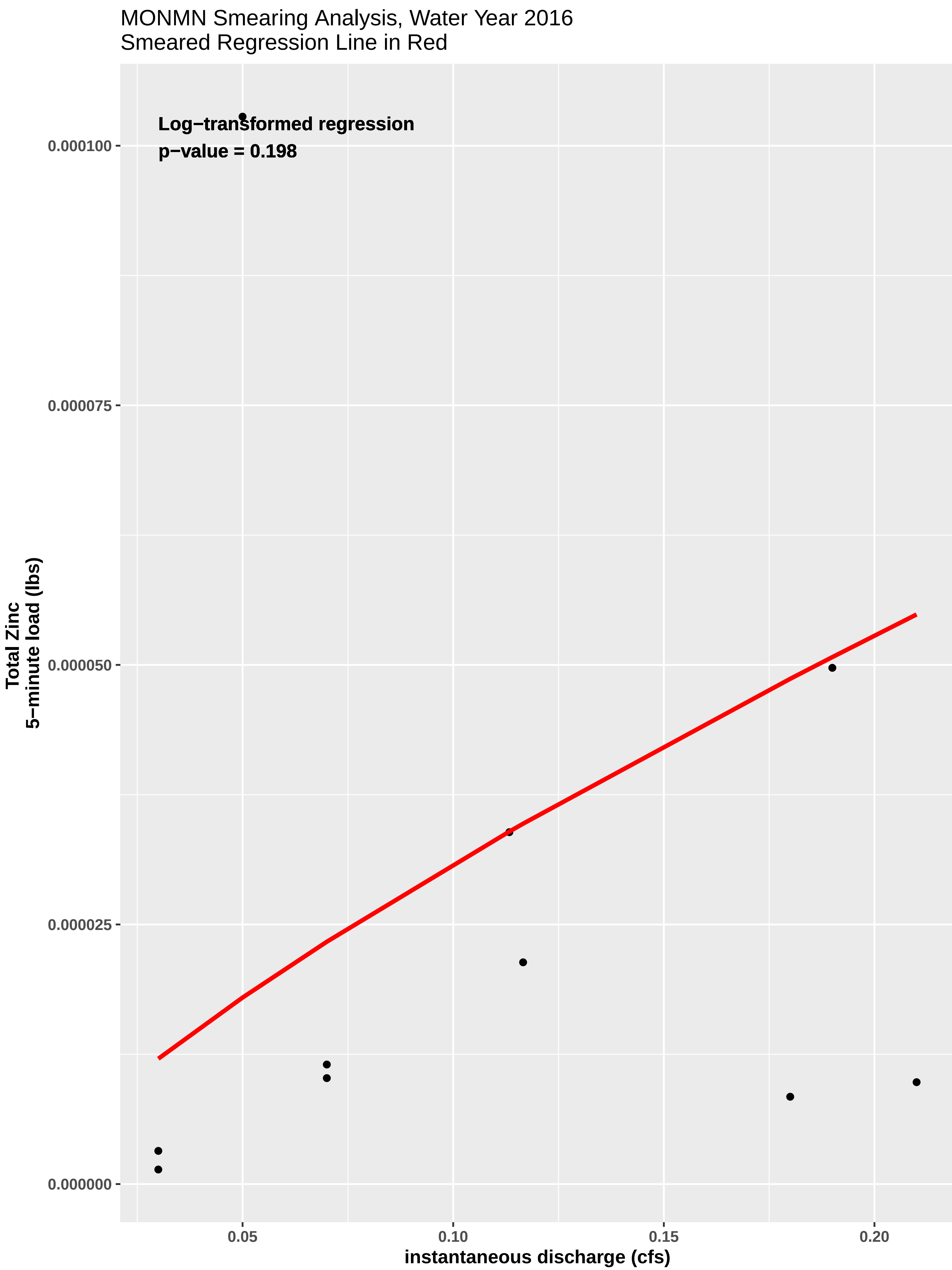

MONMN Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
5,000
10,000
15,000
20,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

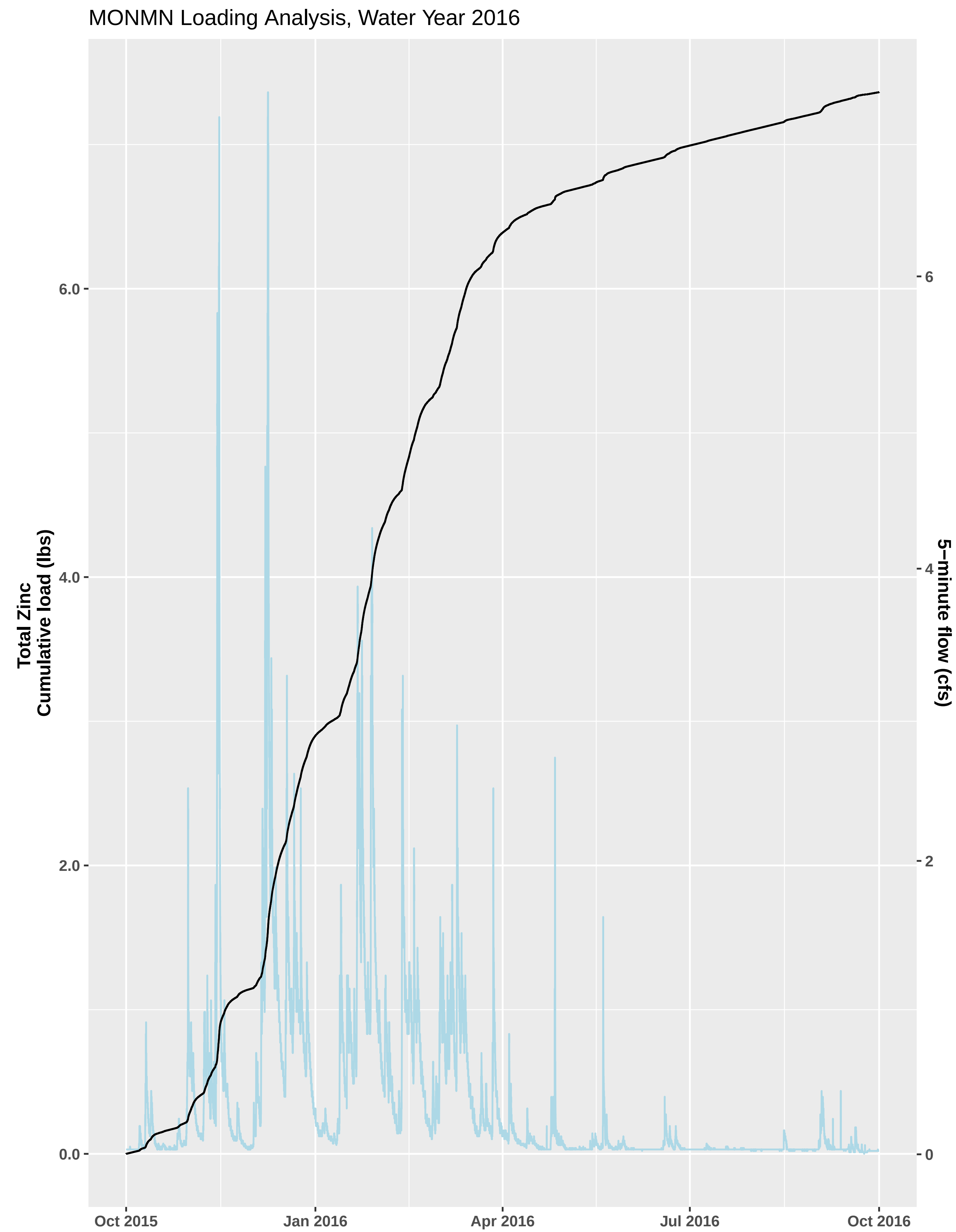
MONMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red

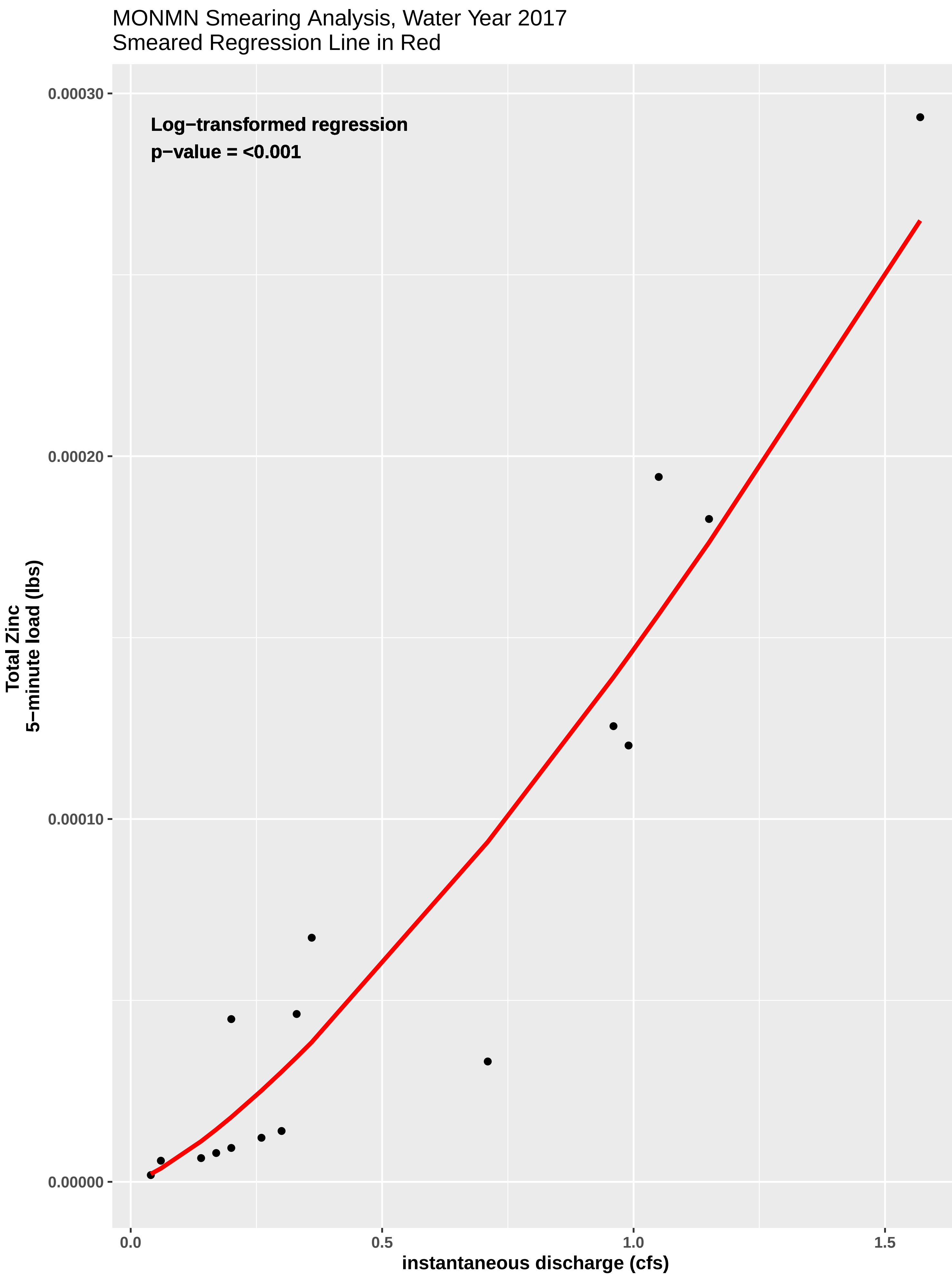


MONMN Loading Analysis, Water Year 2019

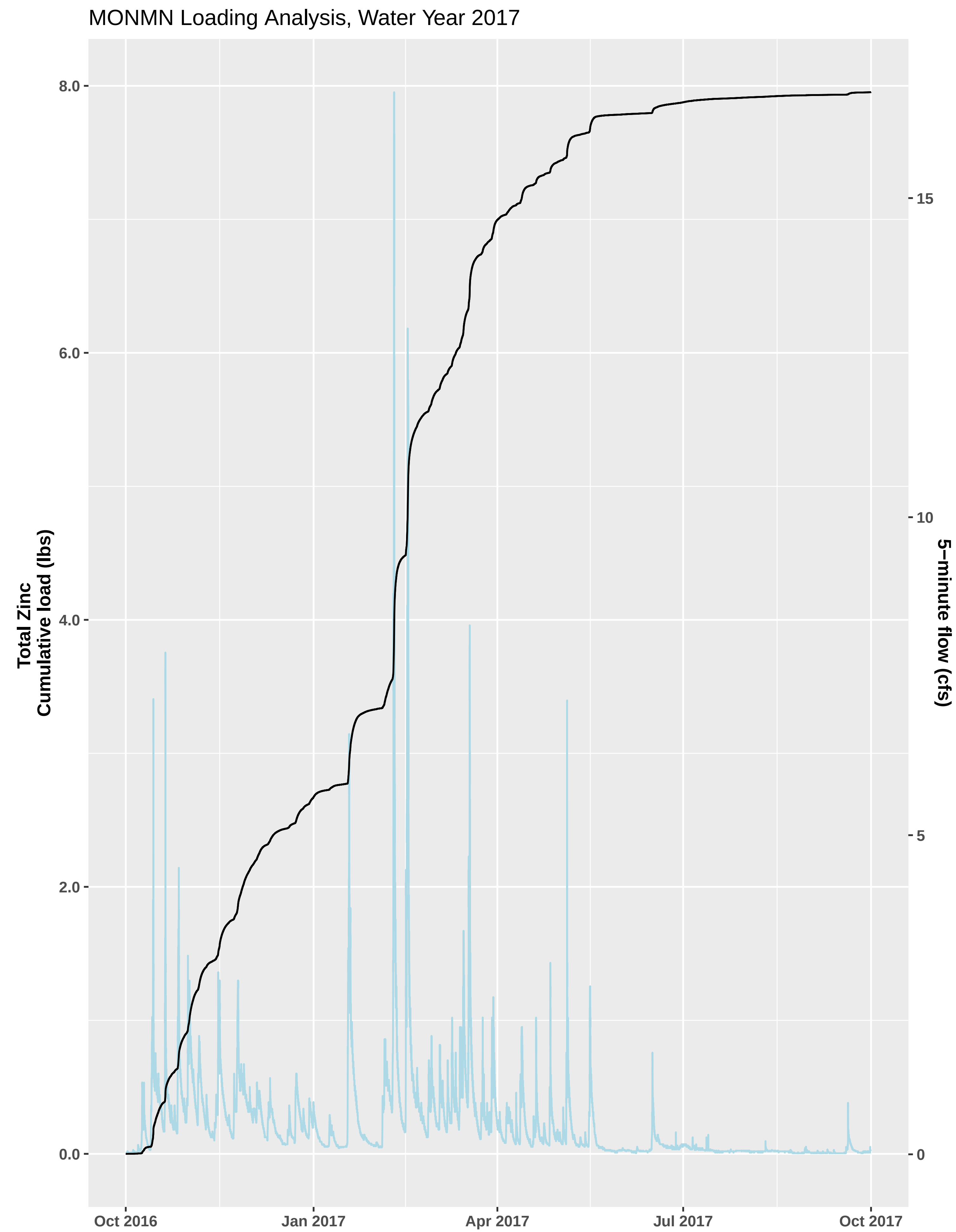



MONMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.198
Total Zinc
5−minute load (lbs)
0.000000
0.000025
0.000050
0.000075
0.000100
0.05
0.10
0.15
0.20
instantaneous discharge (cfs)

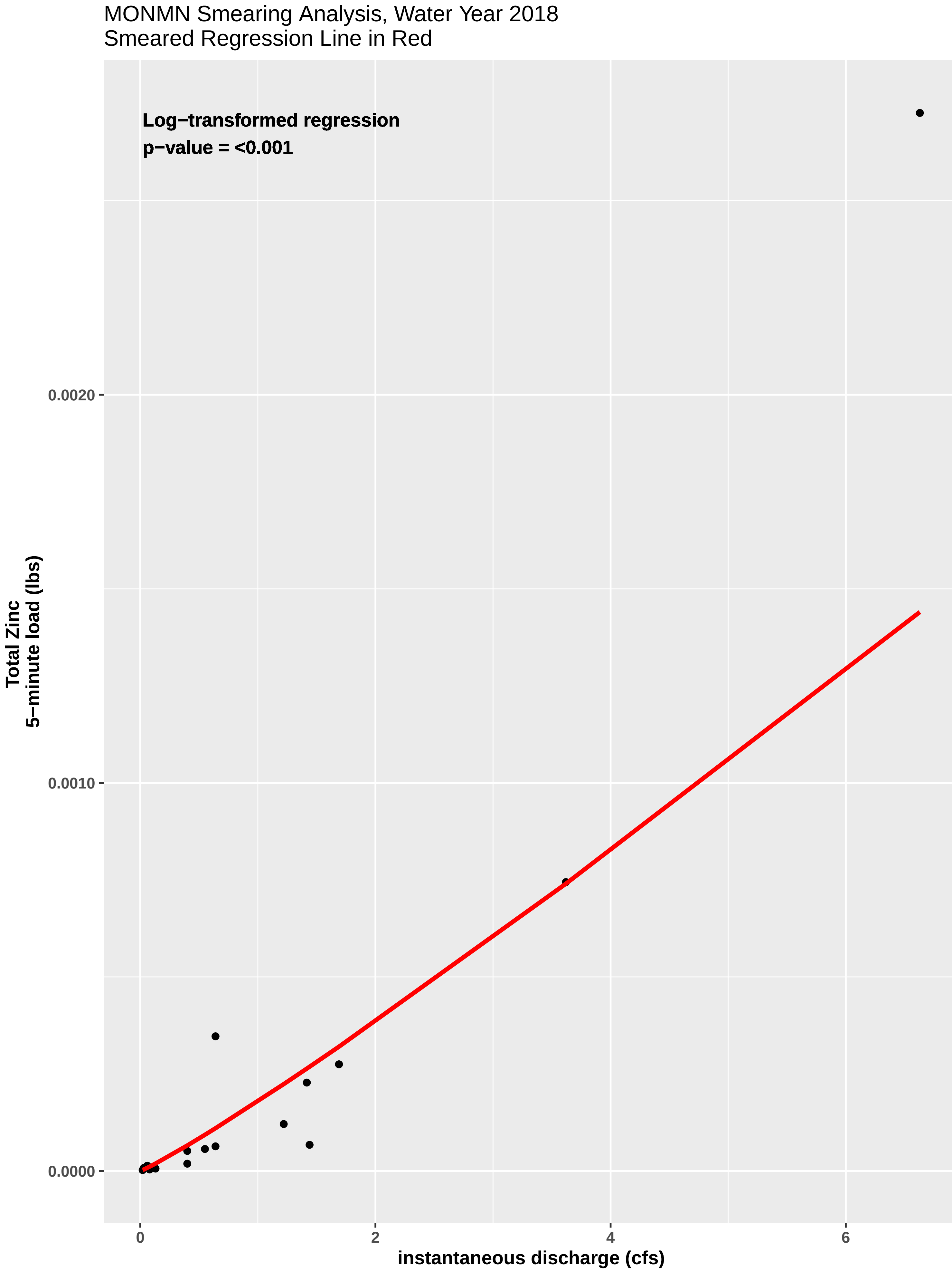

MONMN Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0.0
2.0
4.0
6.0
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

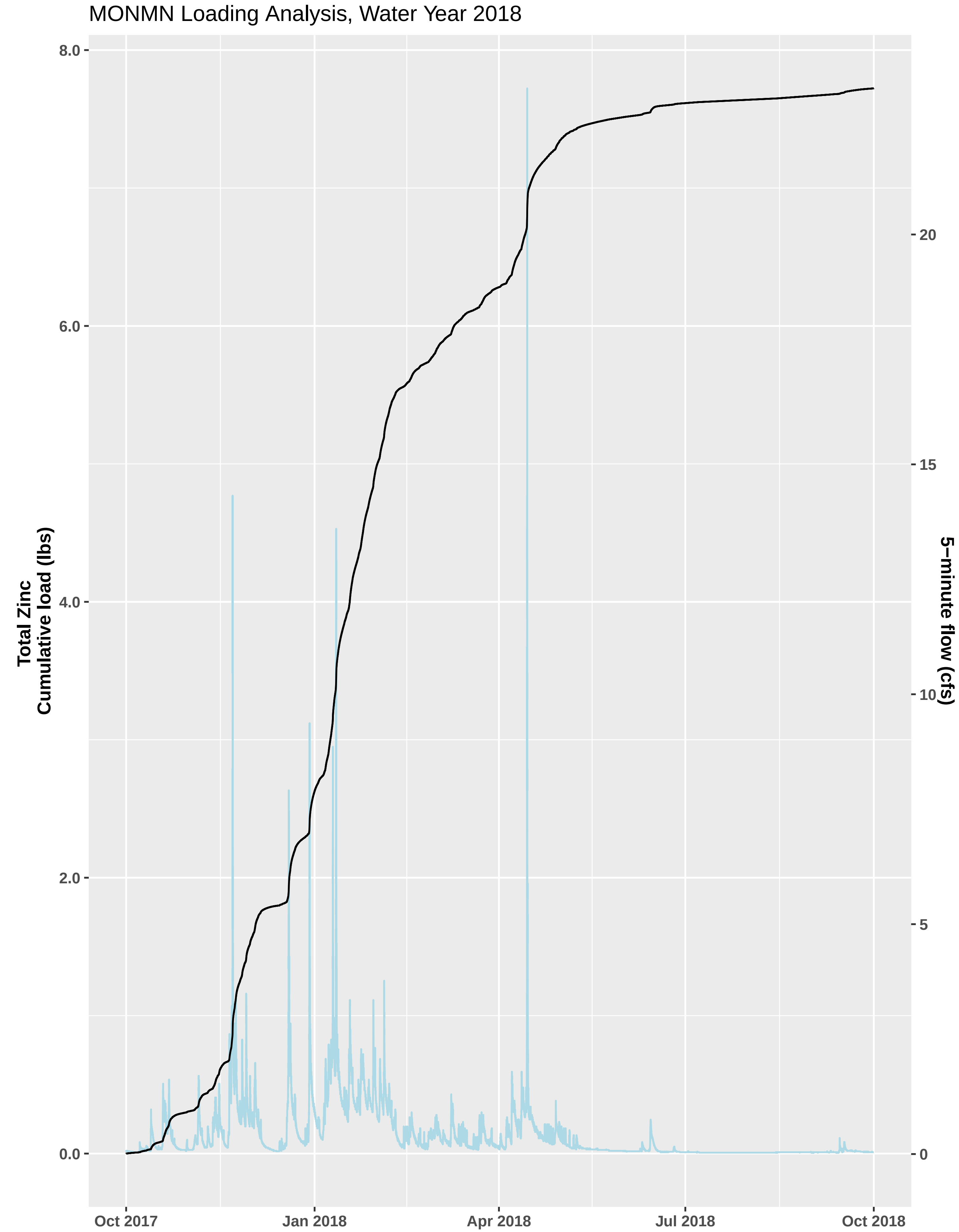


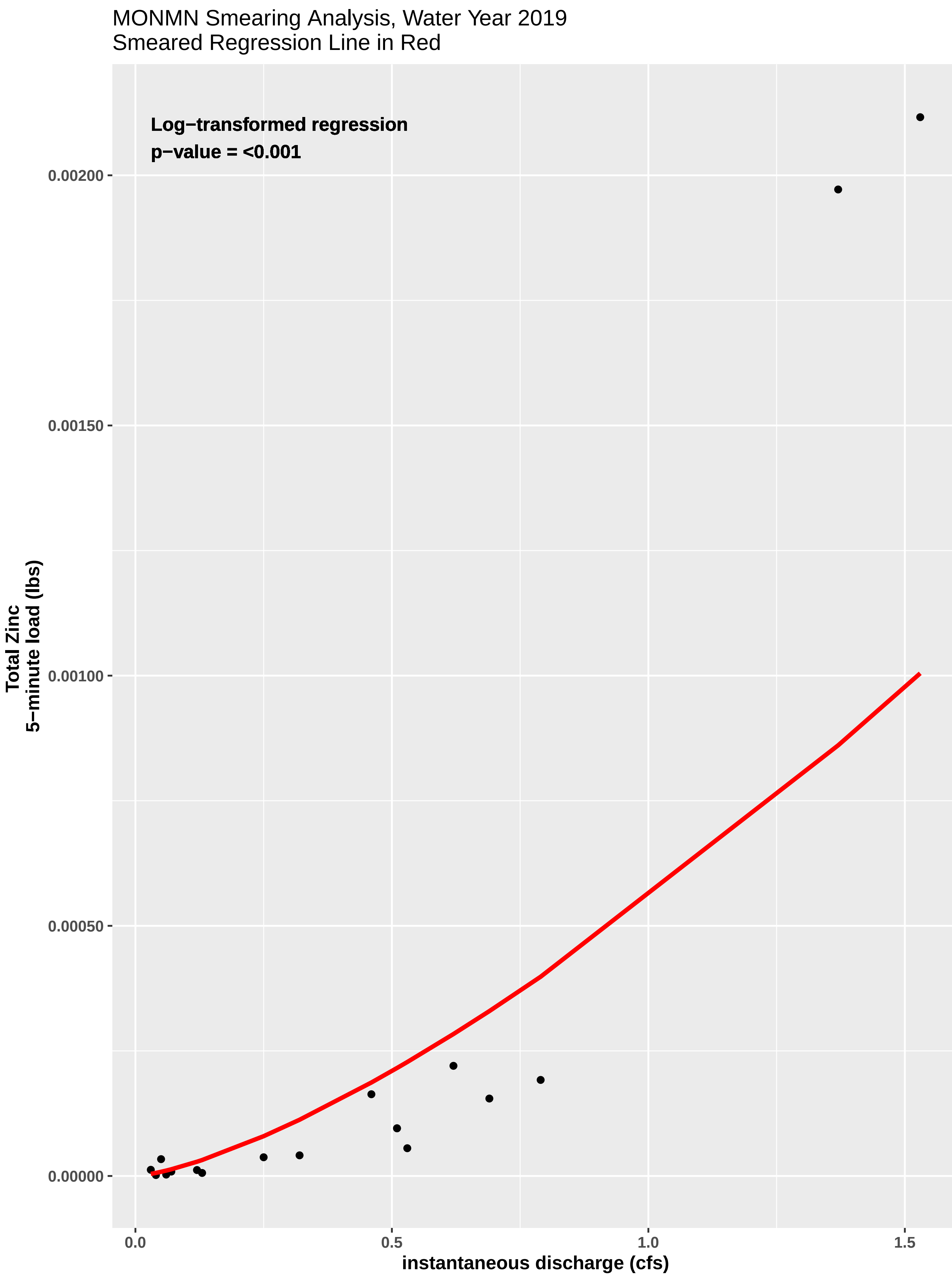
MONMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

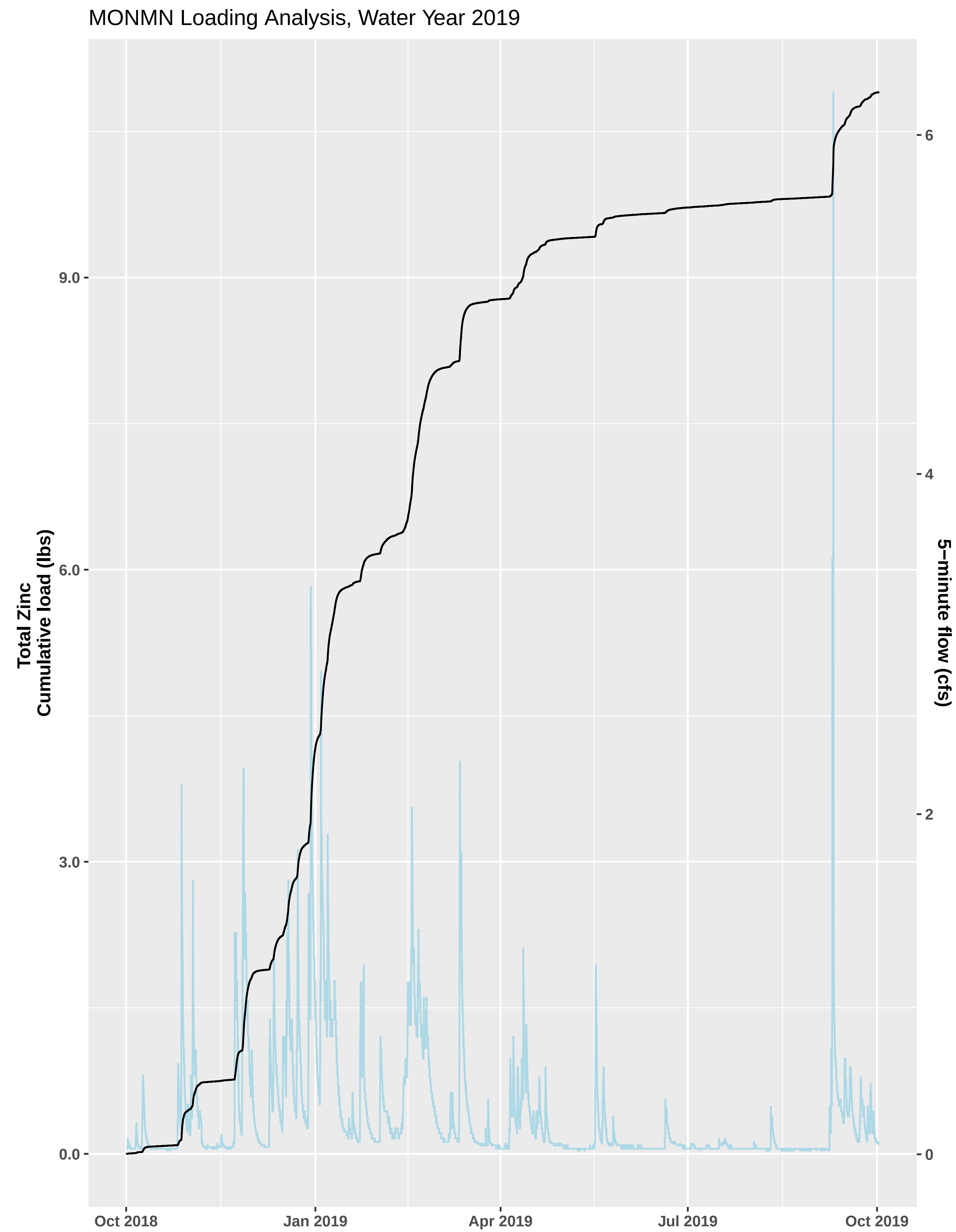


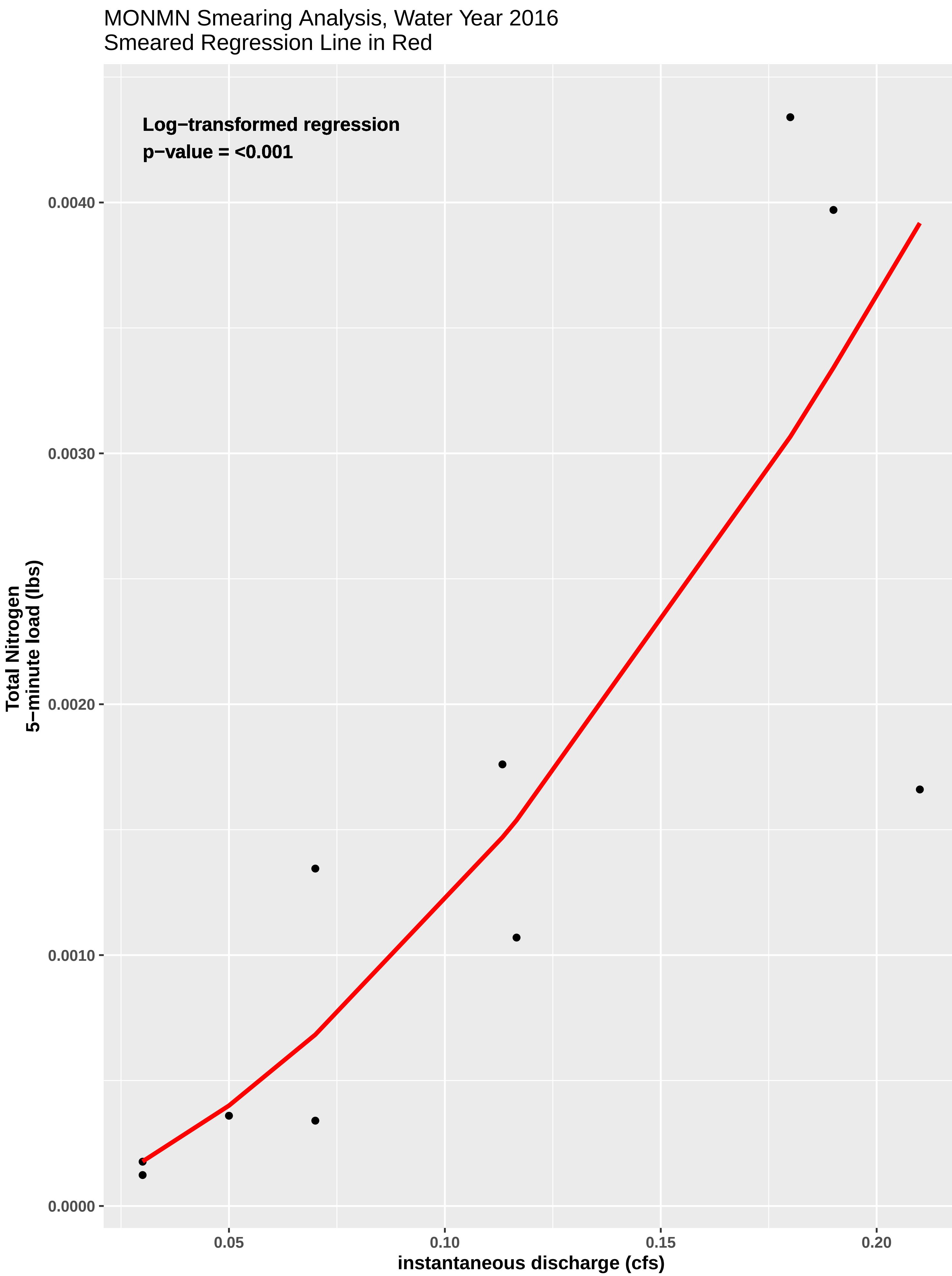
MONMN Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0.0
2.0
4.0
6.0
8.0
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


MONMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0010
0.0020
0
2
4
6
instantaneous discharge (cfs)

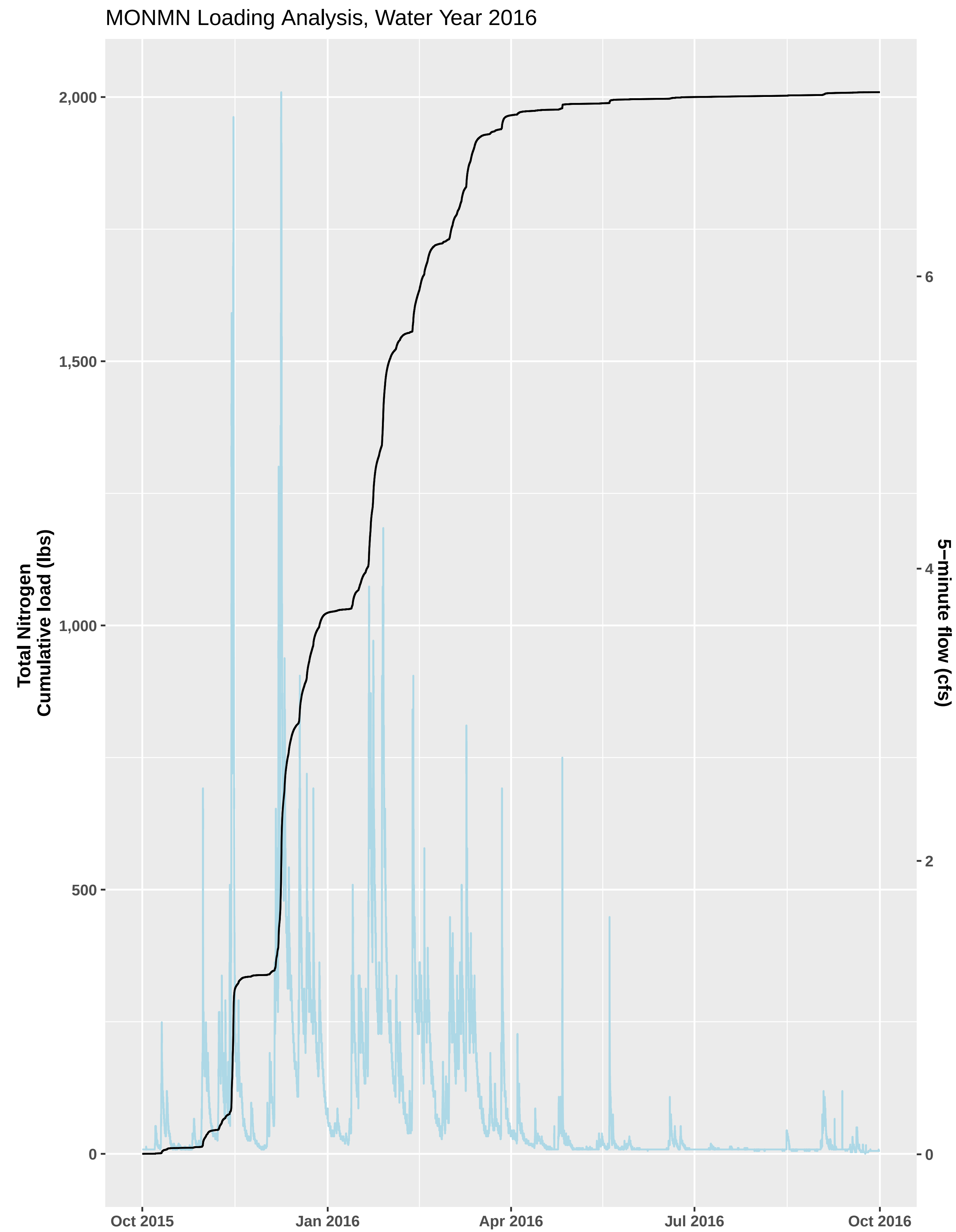

MONMN Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0.0
2.0
4.0
6.0
8.0
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


MONMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00050
0.00100
0.00150
0.00200
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

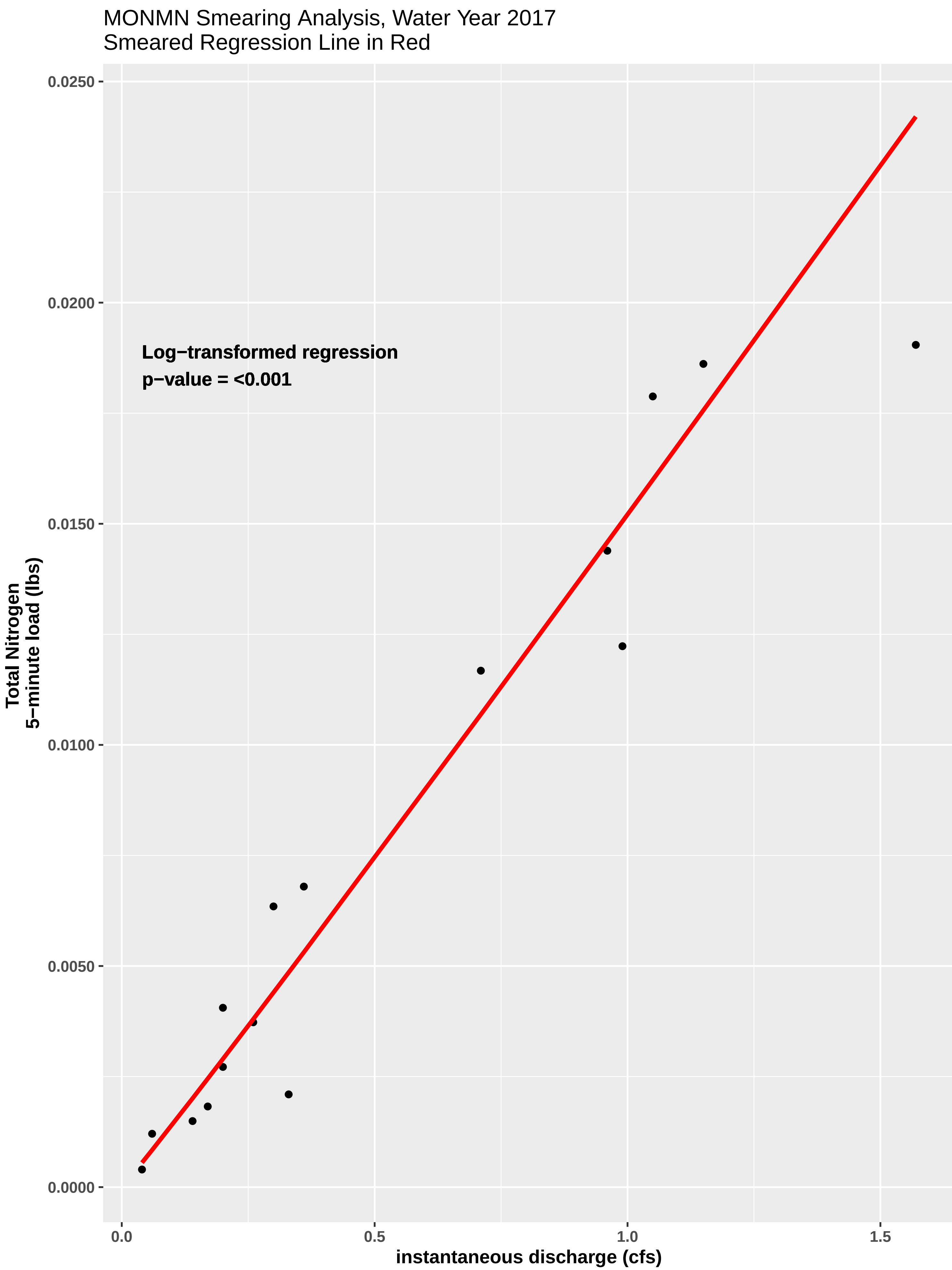

MONMN Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0.0
3.0
6.0
9.0
5−minute flow (cfs)
0
2
4
6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

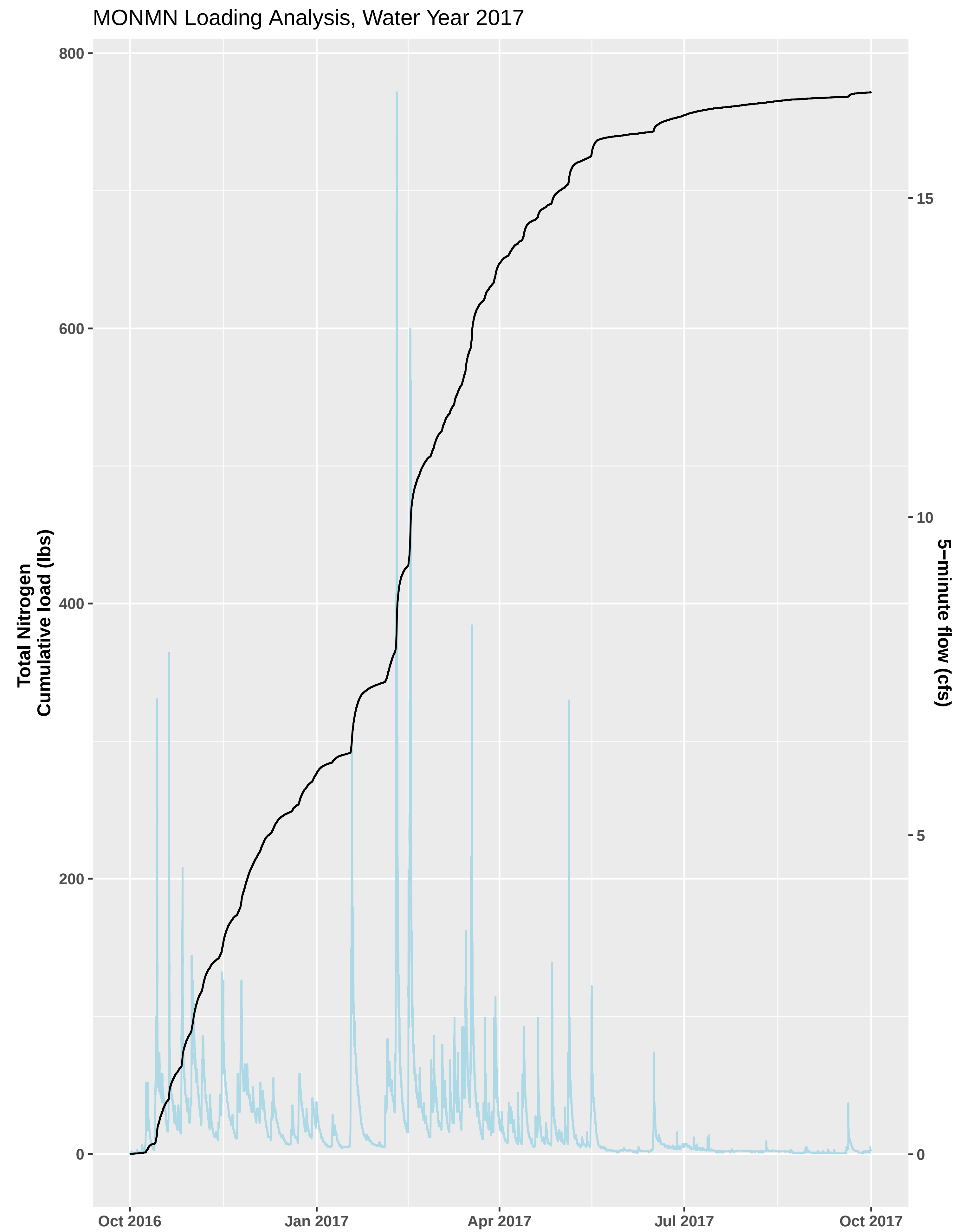


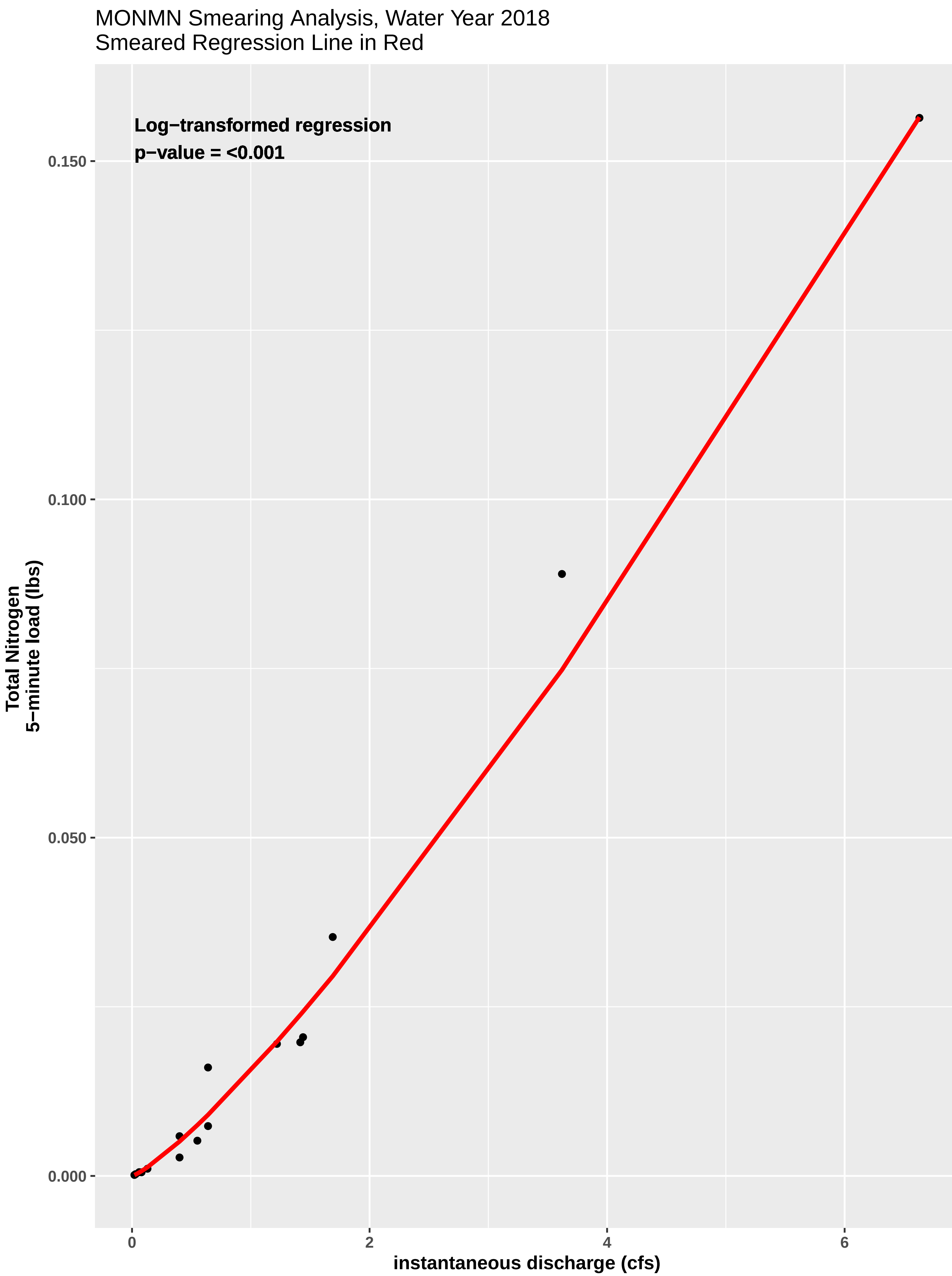
MONMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0040
0.05
0.10
0.15
0.20
instantaneous discharge (cfs)



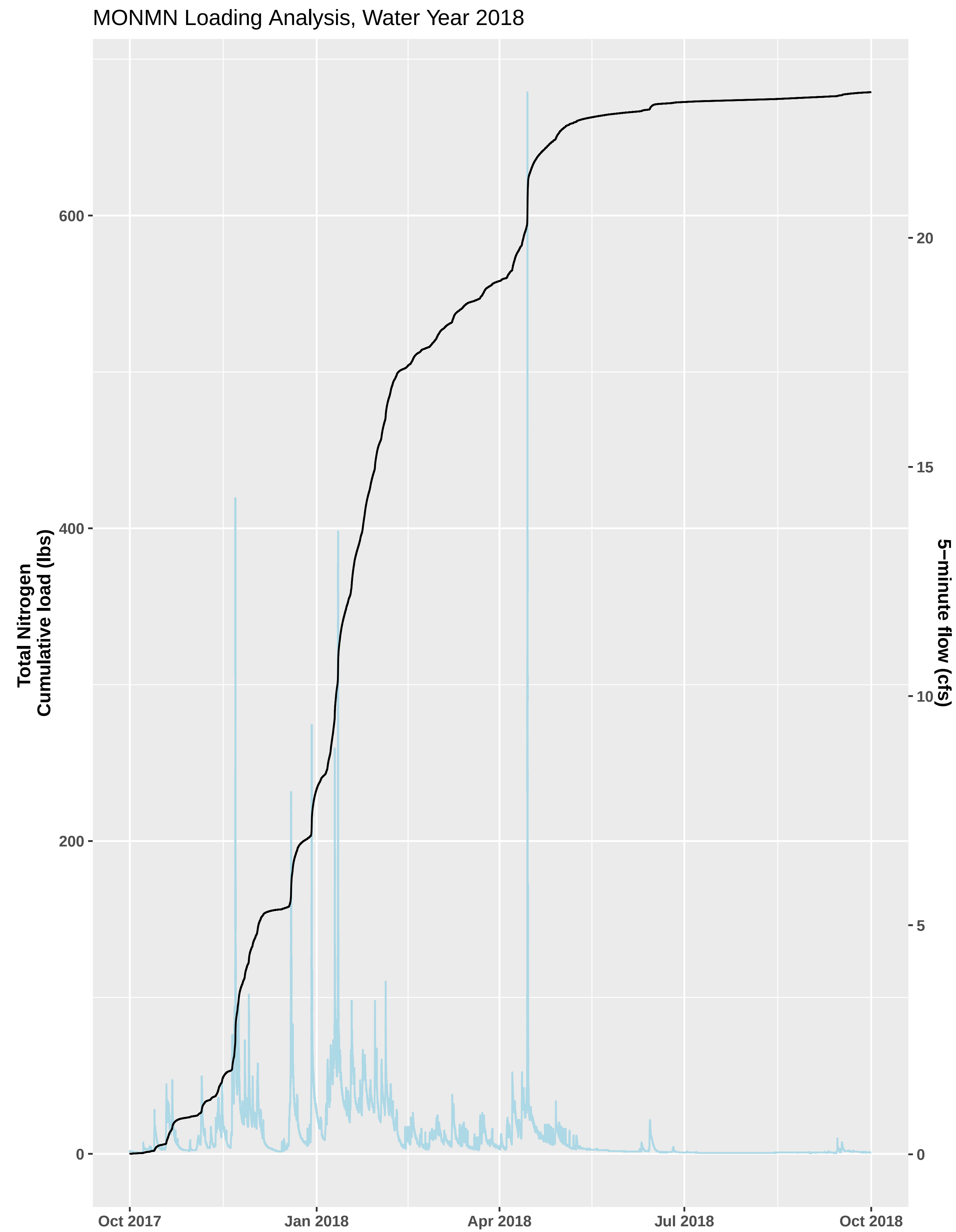
MONMN Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


MONMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.0000
0.0050
0.0100
0.0150
0.0200
0.0250
0.0
0.5
1.0
1.5

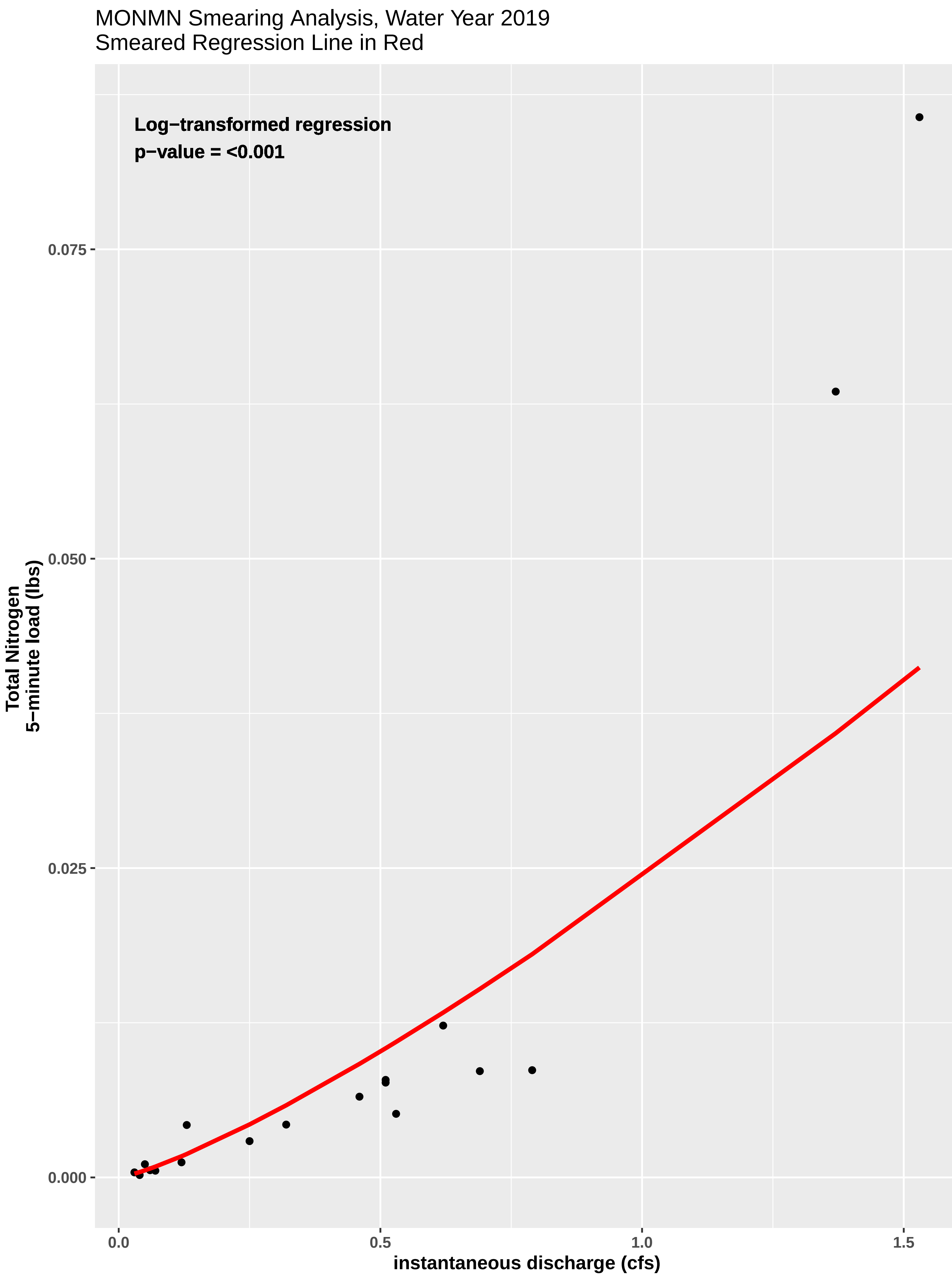

MONMN Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
0
200
400
600
800
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



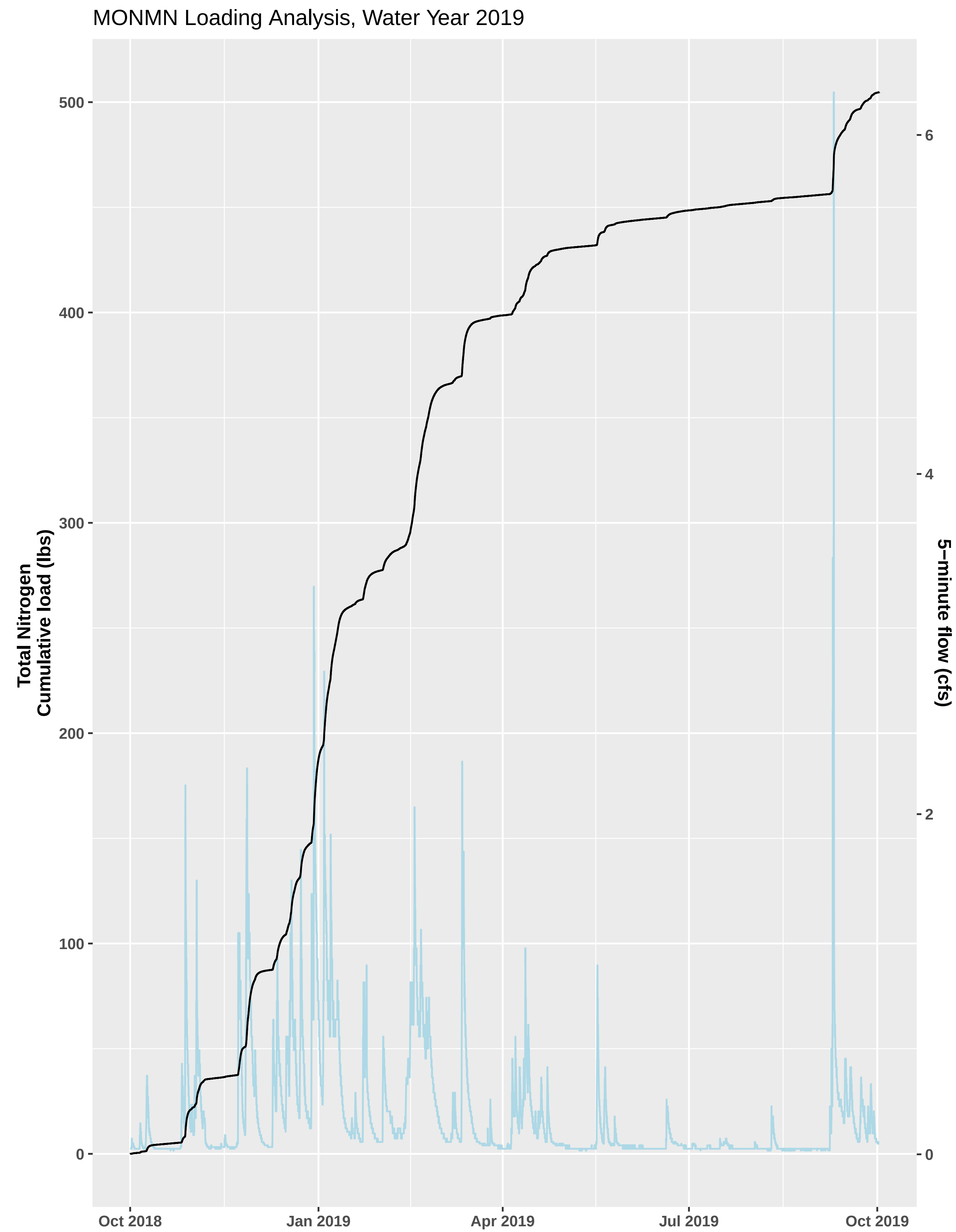
MONMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0
2
4
6
instantaneous discharge (cfs)



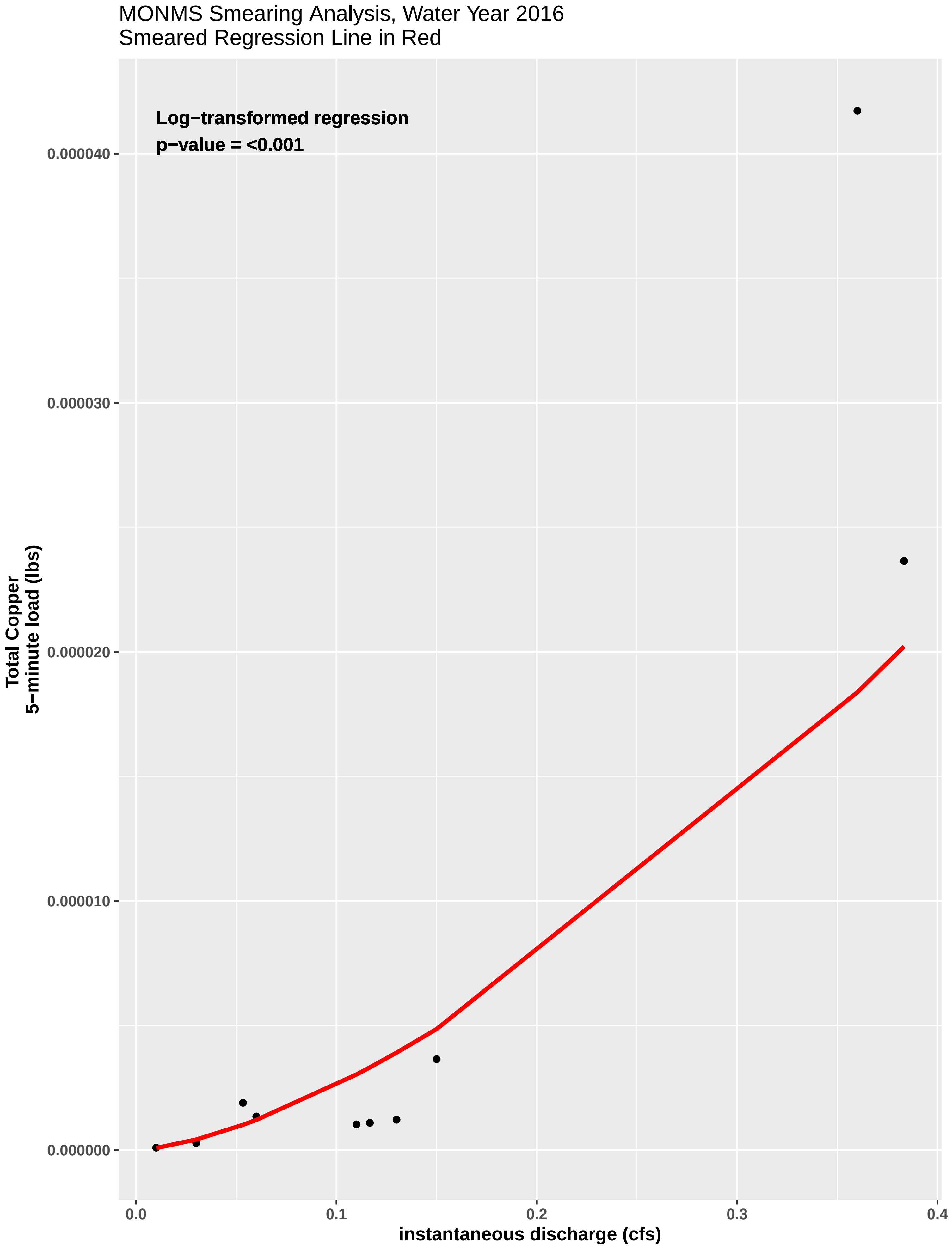
MONMN Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
5
10
15
20
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

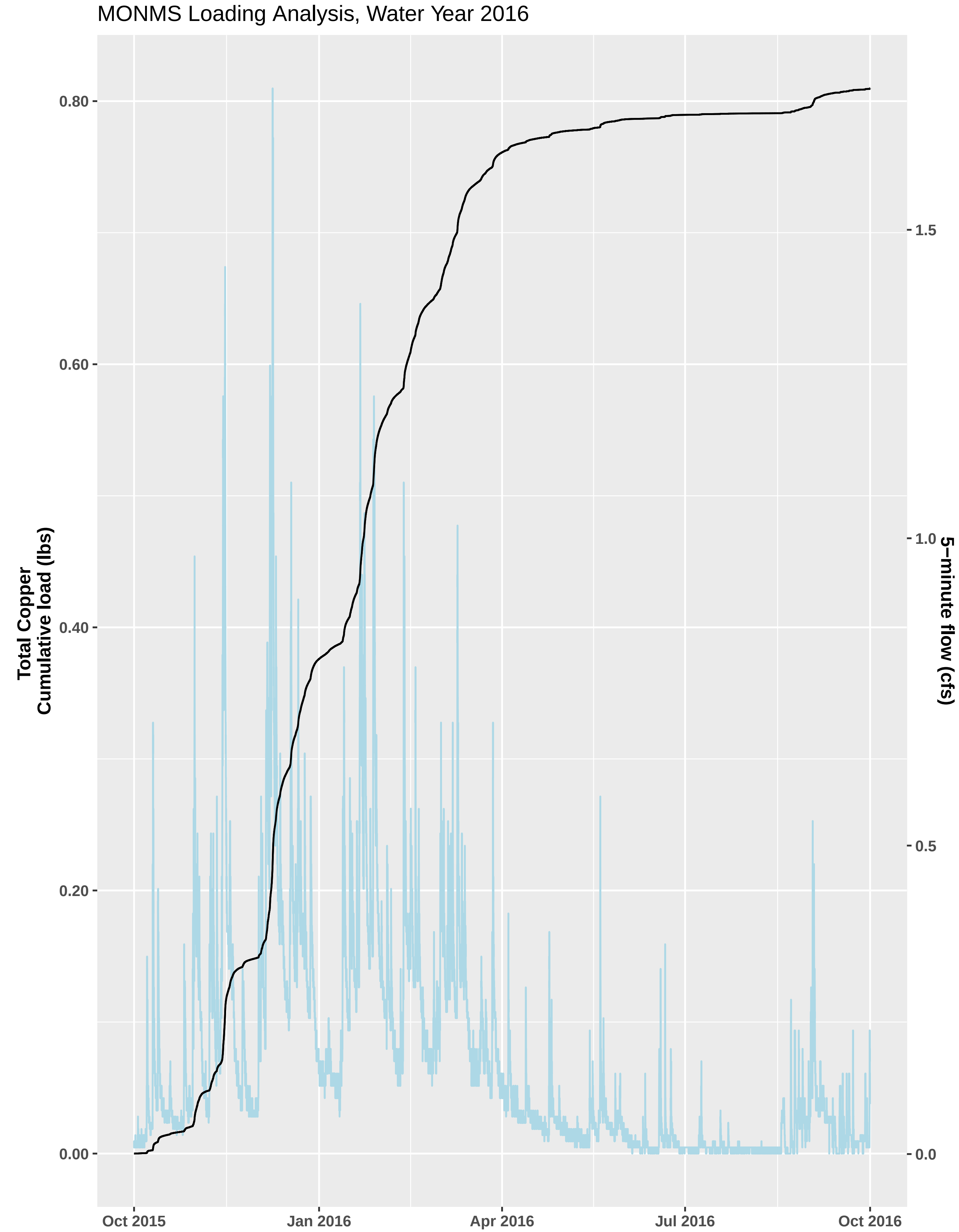


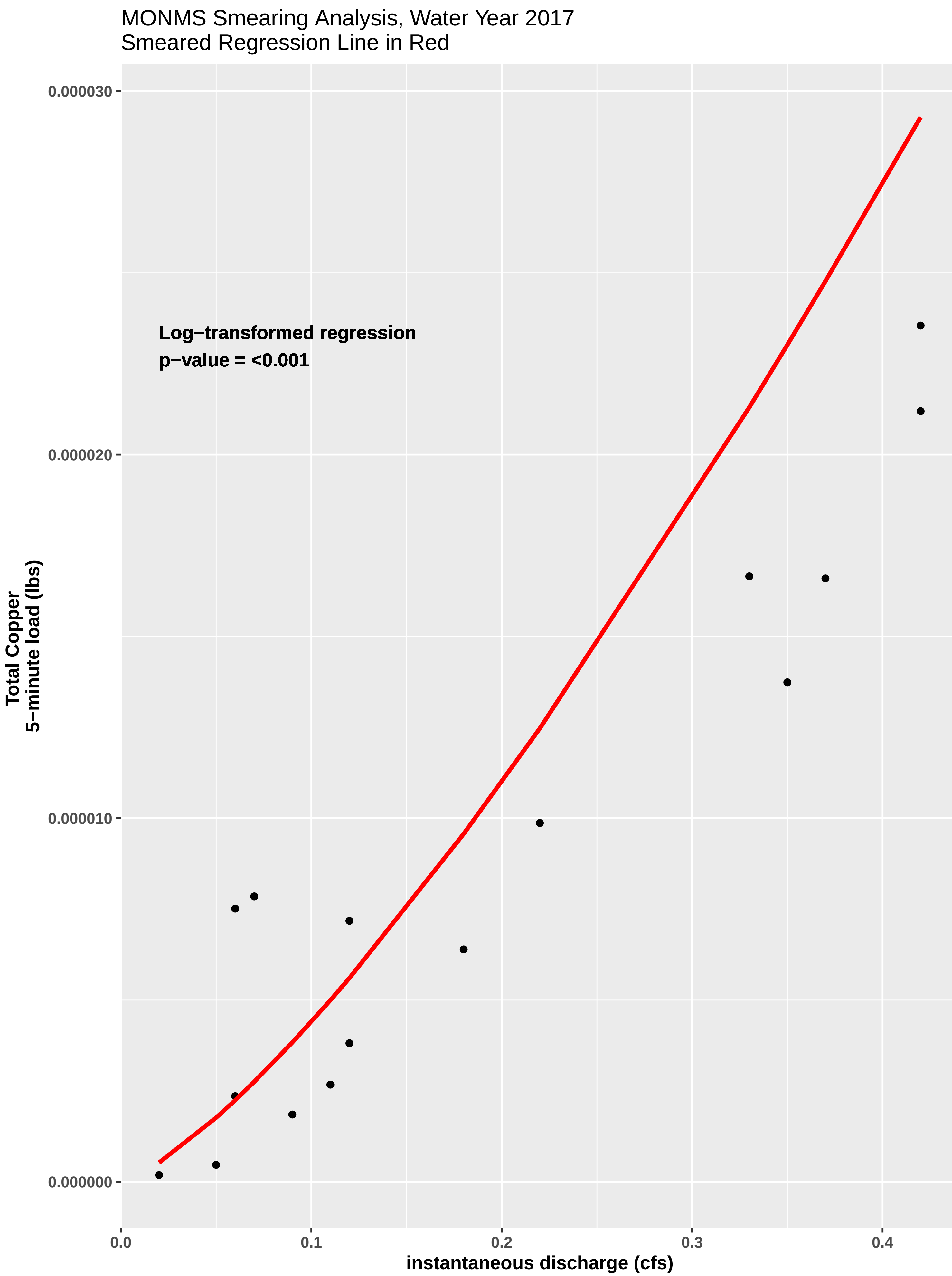
MONMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.025
0.050
0.075
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

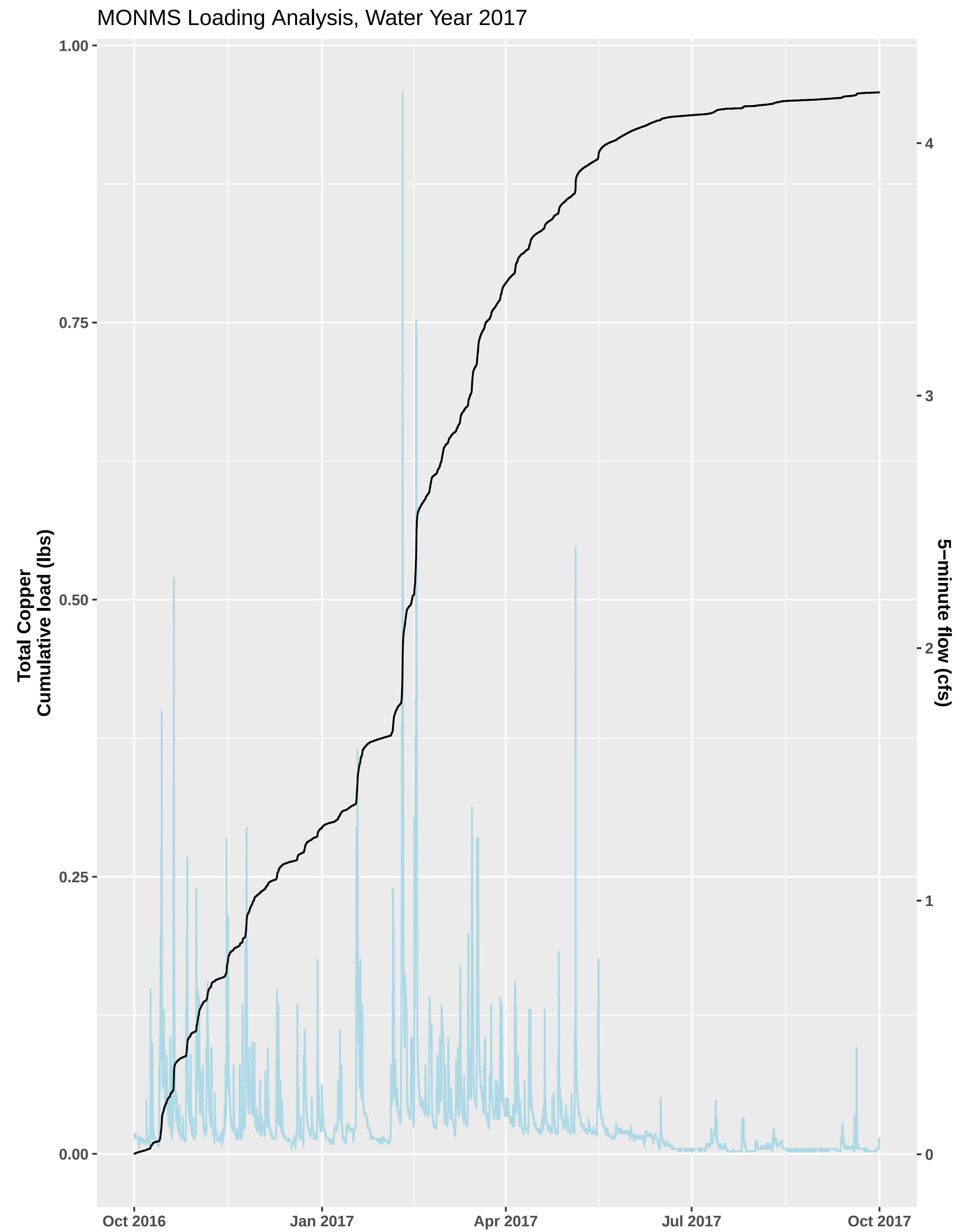


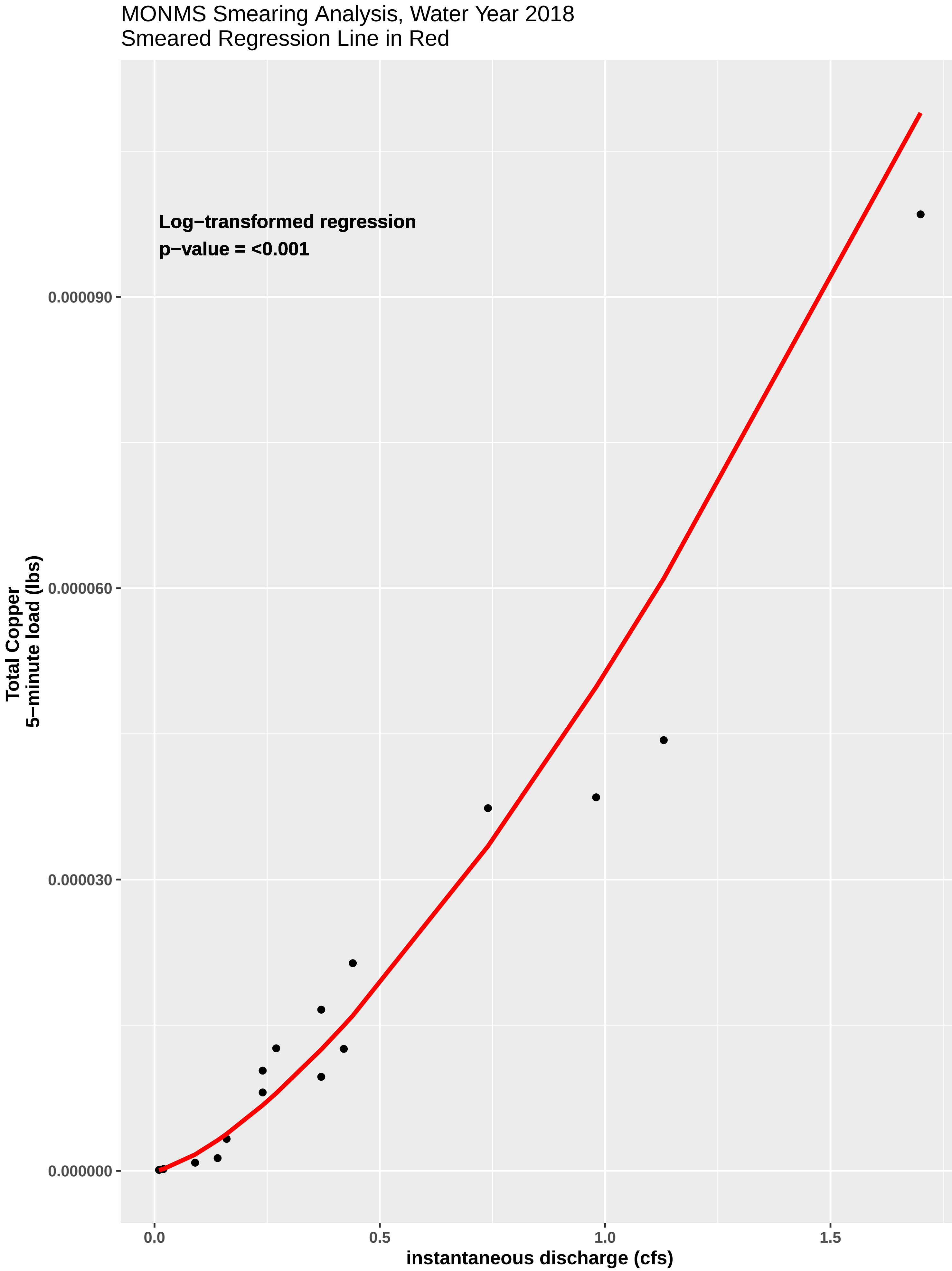
MONMN Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
100
200
300
400
500
5−minute flow (cfs)
0
2
4
6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000040
0.000030
0.000020
0.000010
0.000000
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

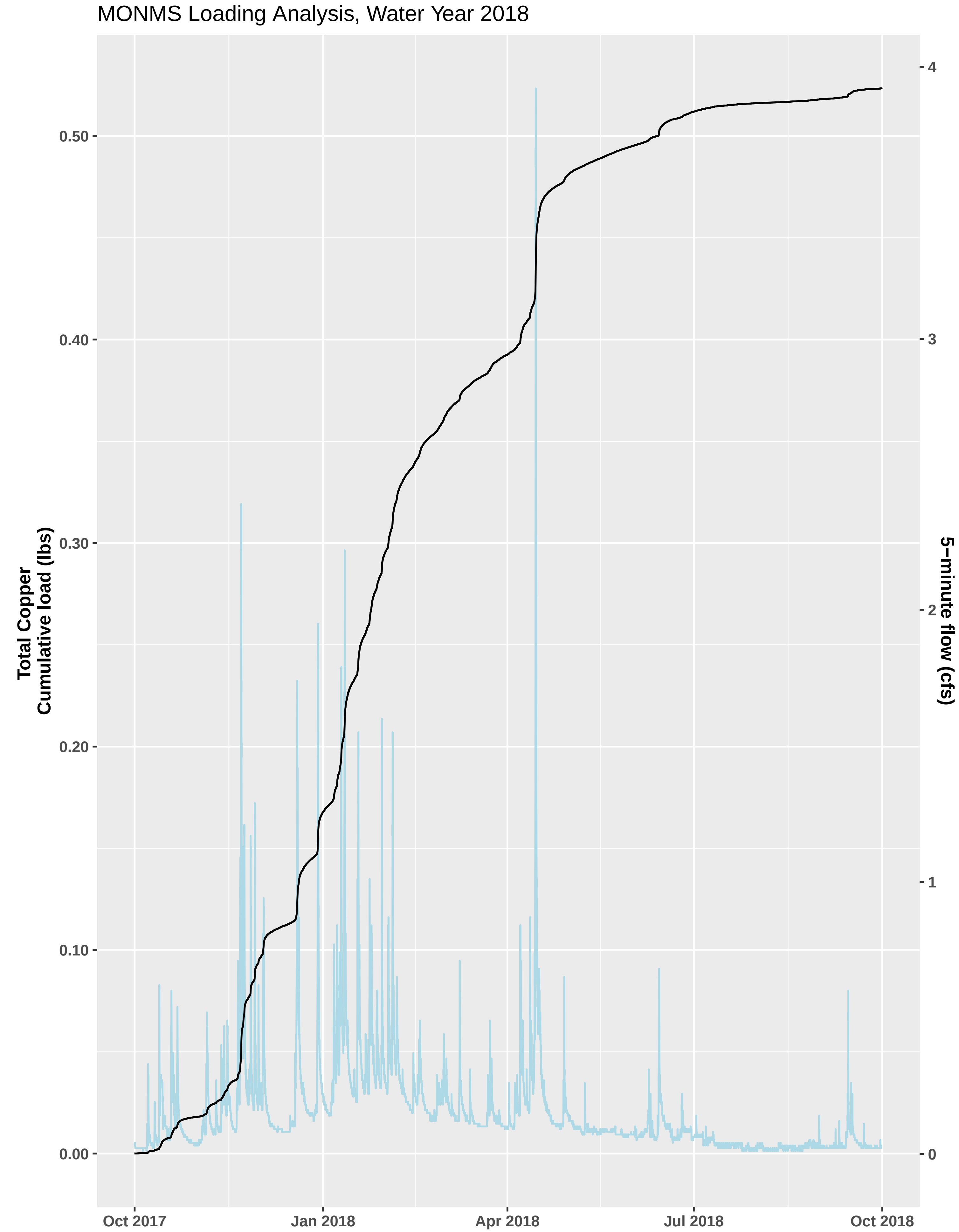

MONMS Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
0.80
0.60
0.40
0.20
0.00
5−minute flow (cfs)
1.5
1.0
0.5
0.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


MONMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000030
0.000020
0.000010
0.000000
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

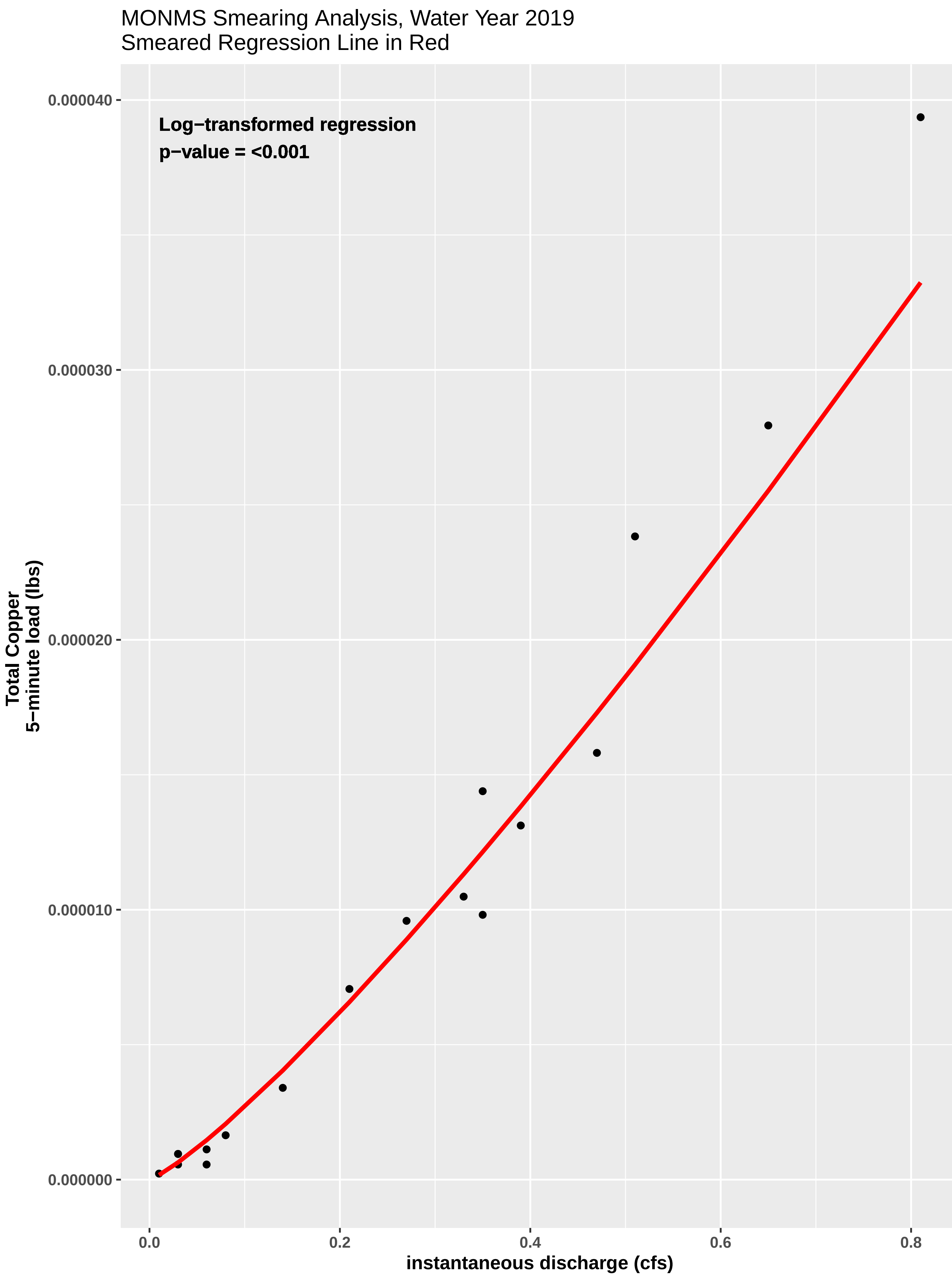

MONMS Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
1.00
0.75
0.50
0.25
0.00
5−minute flow (cfs)
4
3
2
1
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

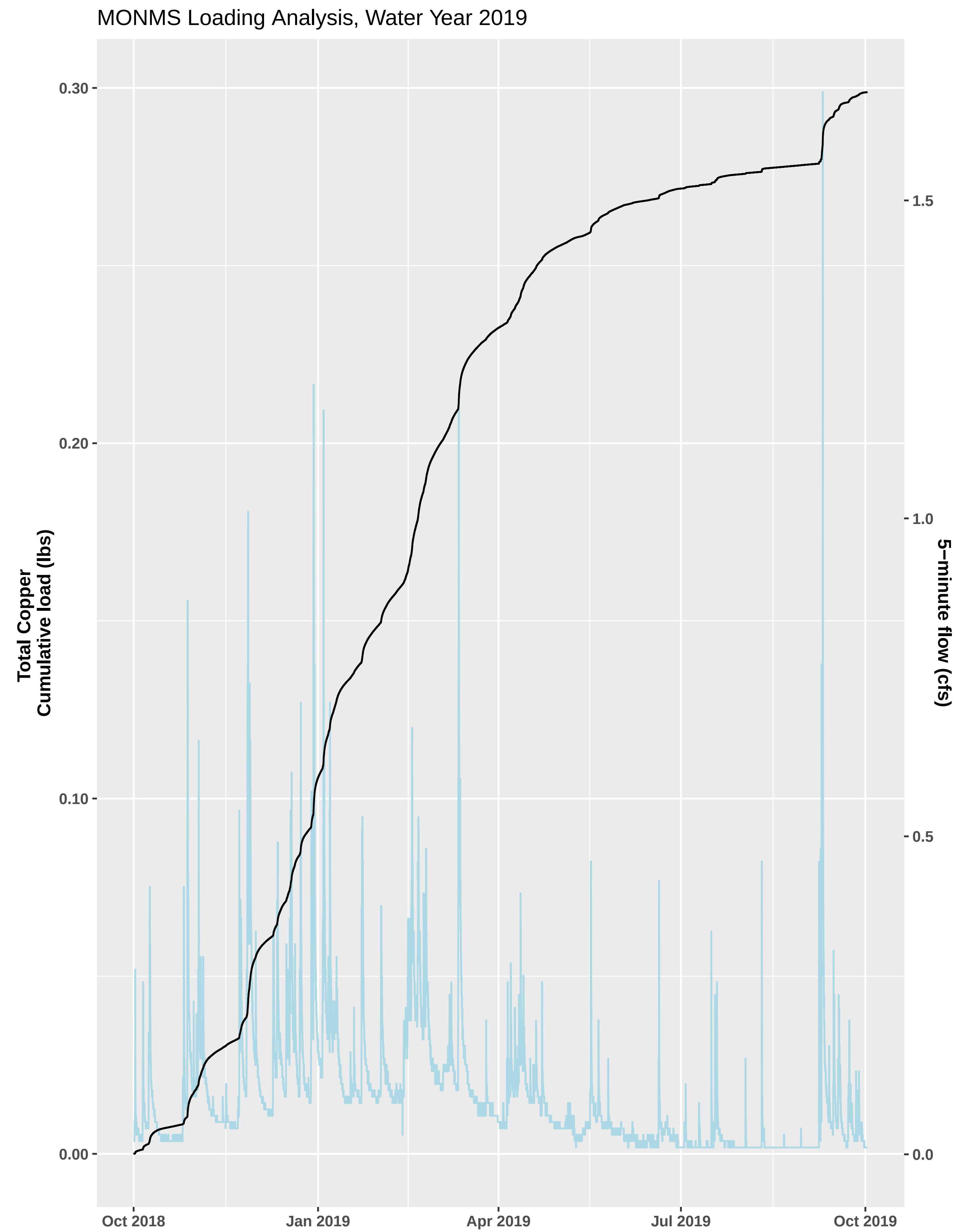


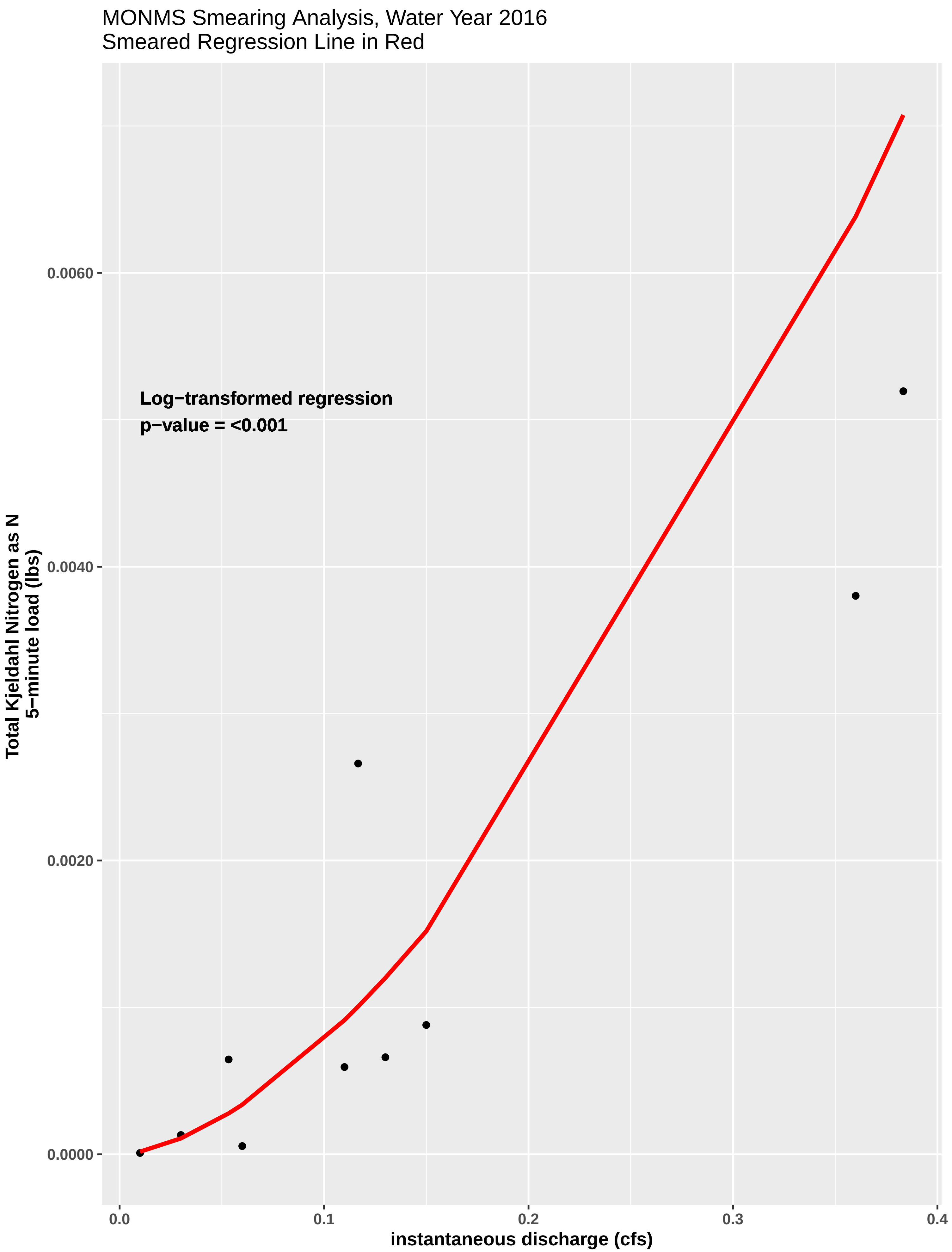
MONMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000030
0.000060
0.000090
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

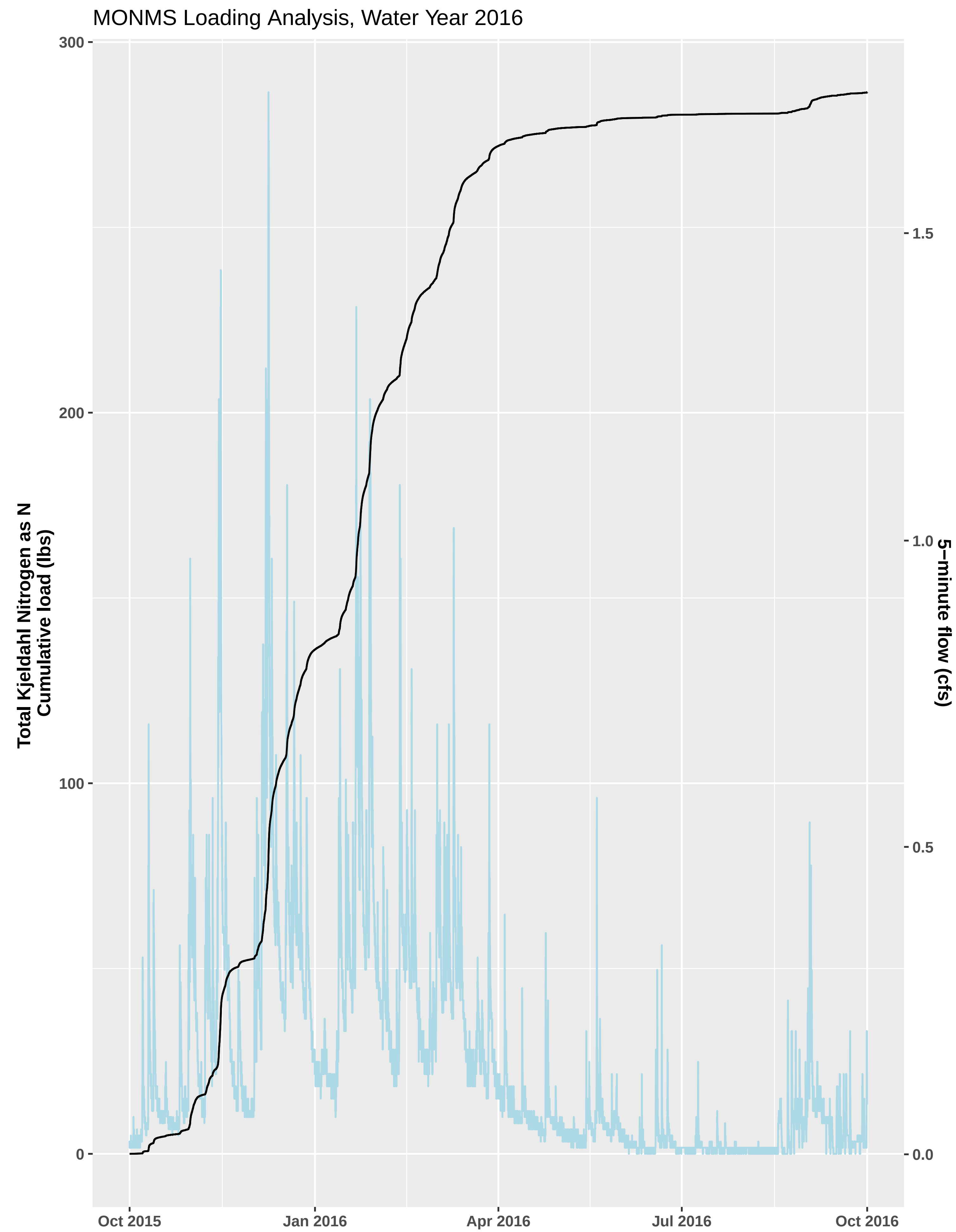


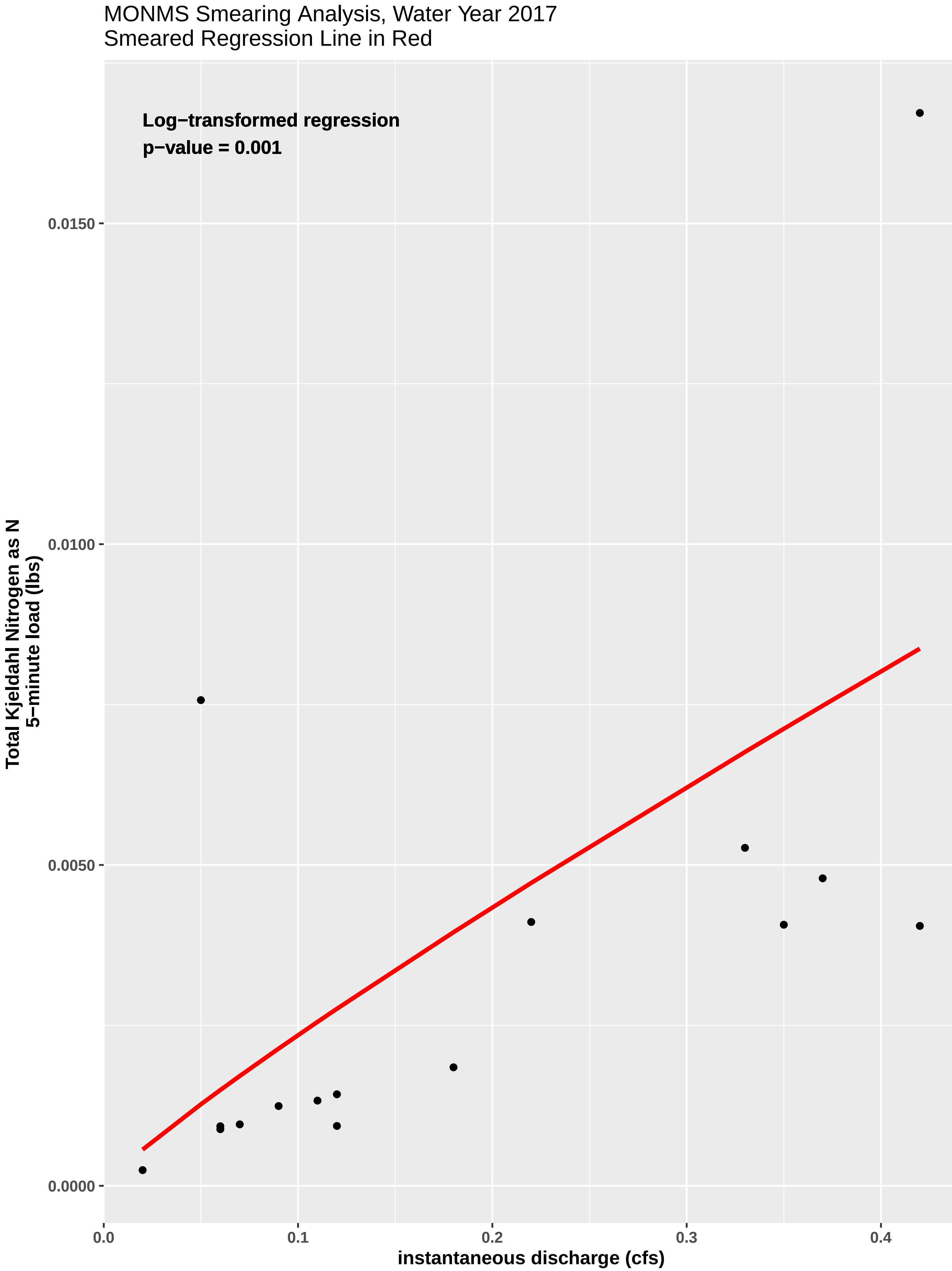
MONMS Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.00
0.10
0.20
0.30
0.40
0.50
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


MONMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000040
0.000030
0.000020
0.000010
0.000000
Total Copper
5−minute load (lbs)
0.0
0.2
0.4
0.6
0.8
instantaneous discharge (cfs)

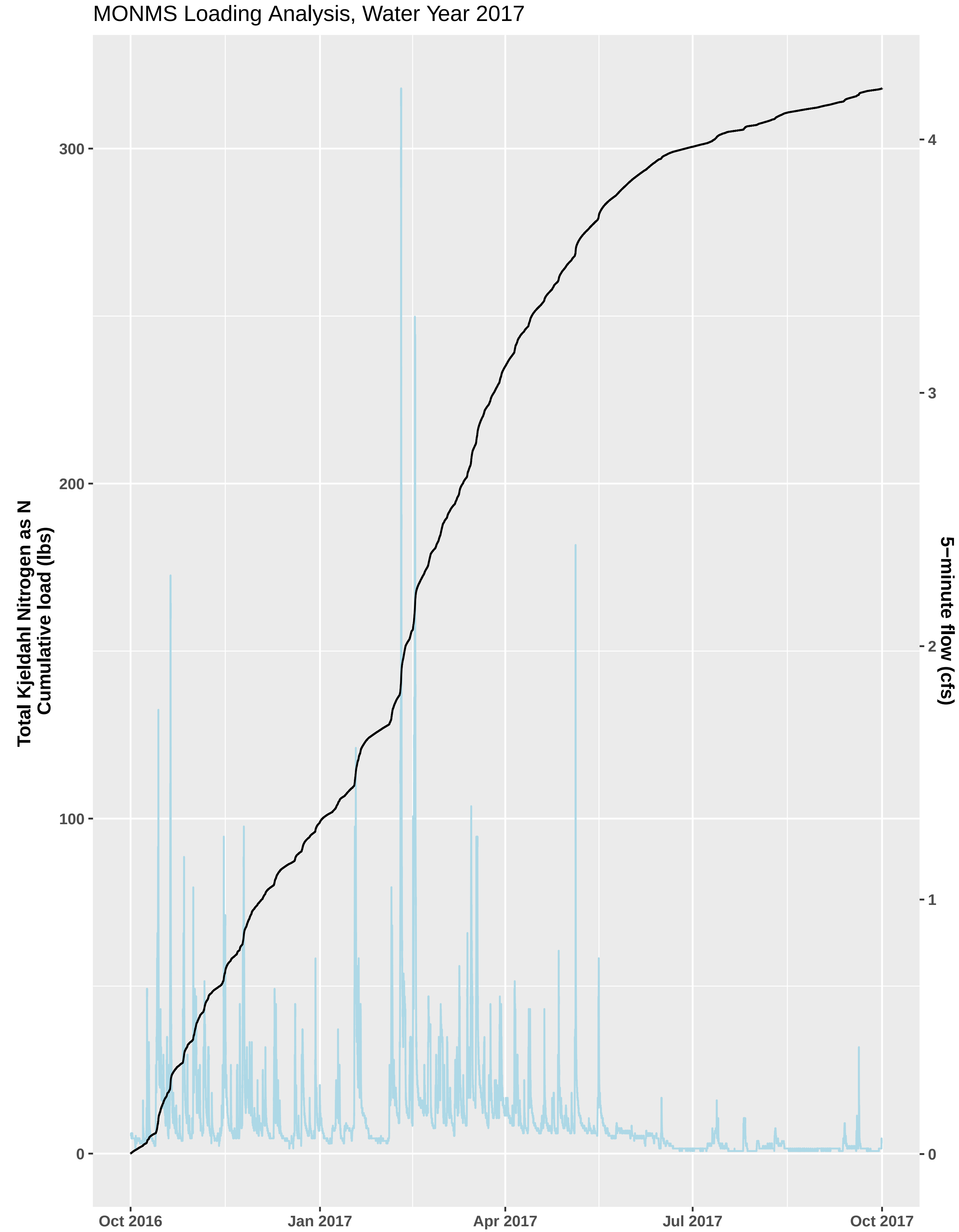

MONMS Loading Analysis, Water Year 2019
0.30
0.20
0.10
0.00
Total Copper
Cumulative load (lbs)
1.5
1.0
0.5
0.0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

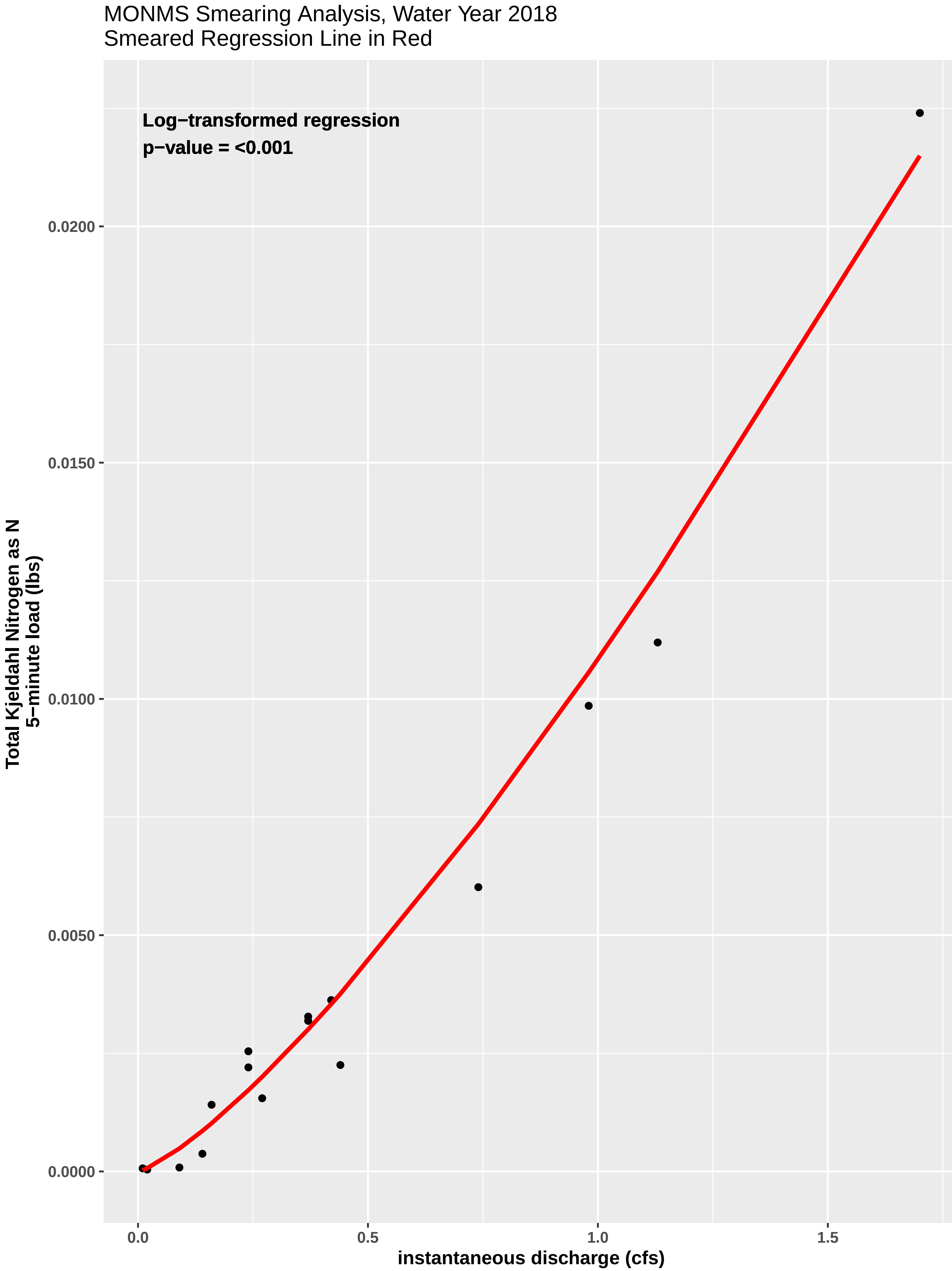

MONMS Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
300
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

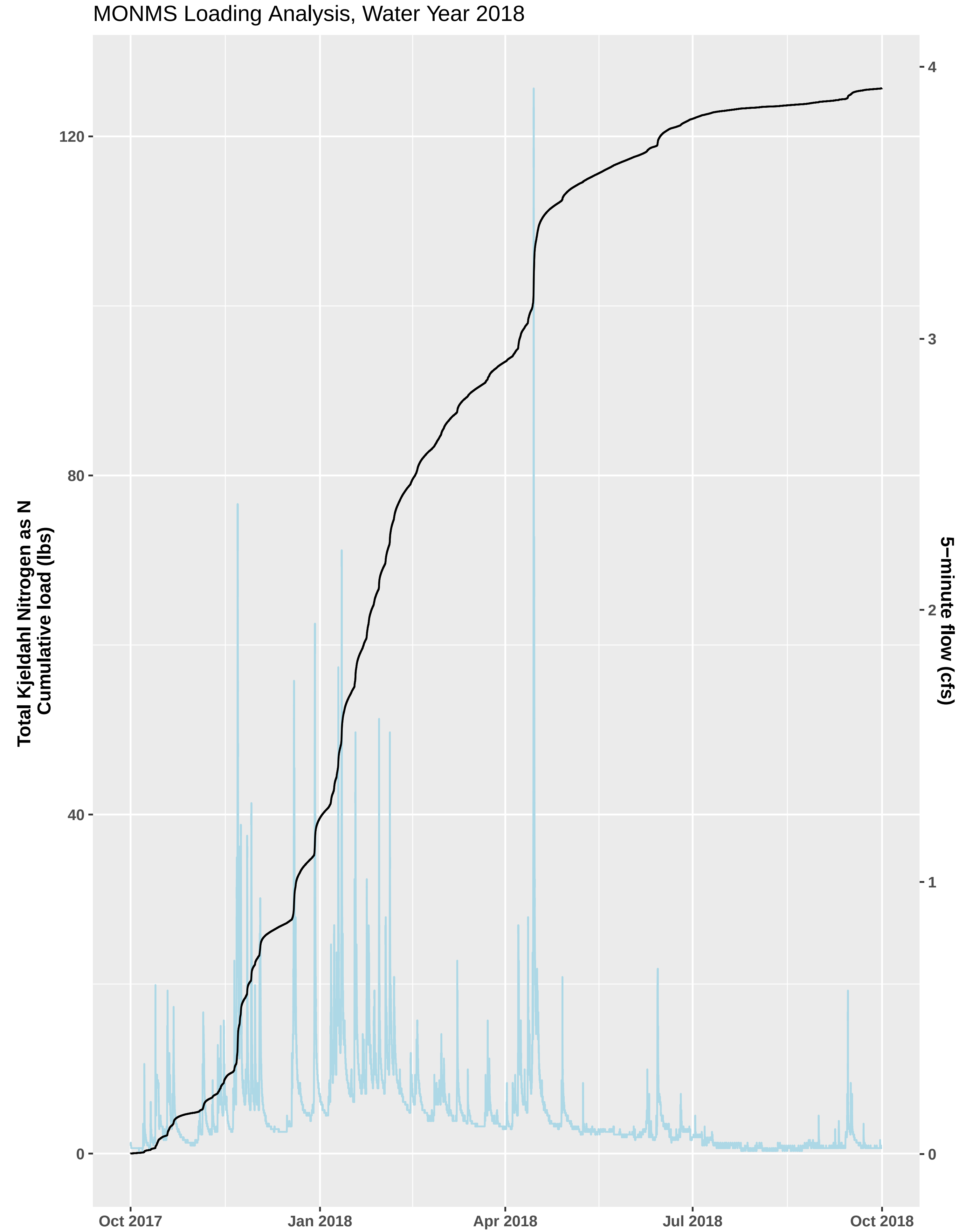


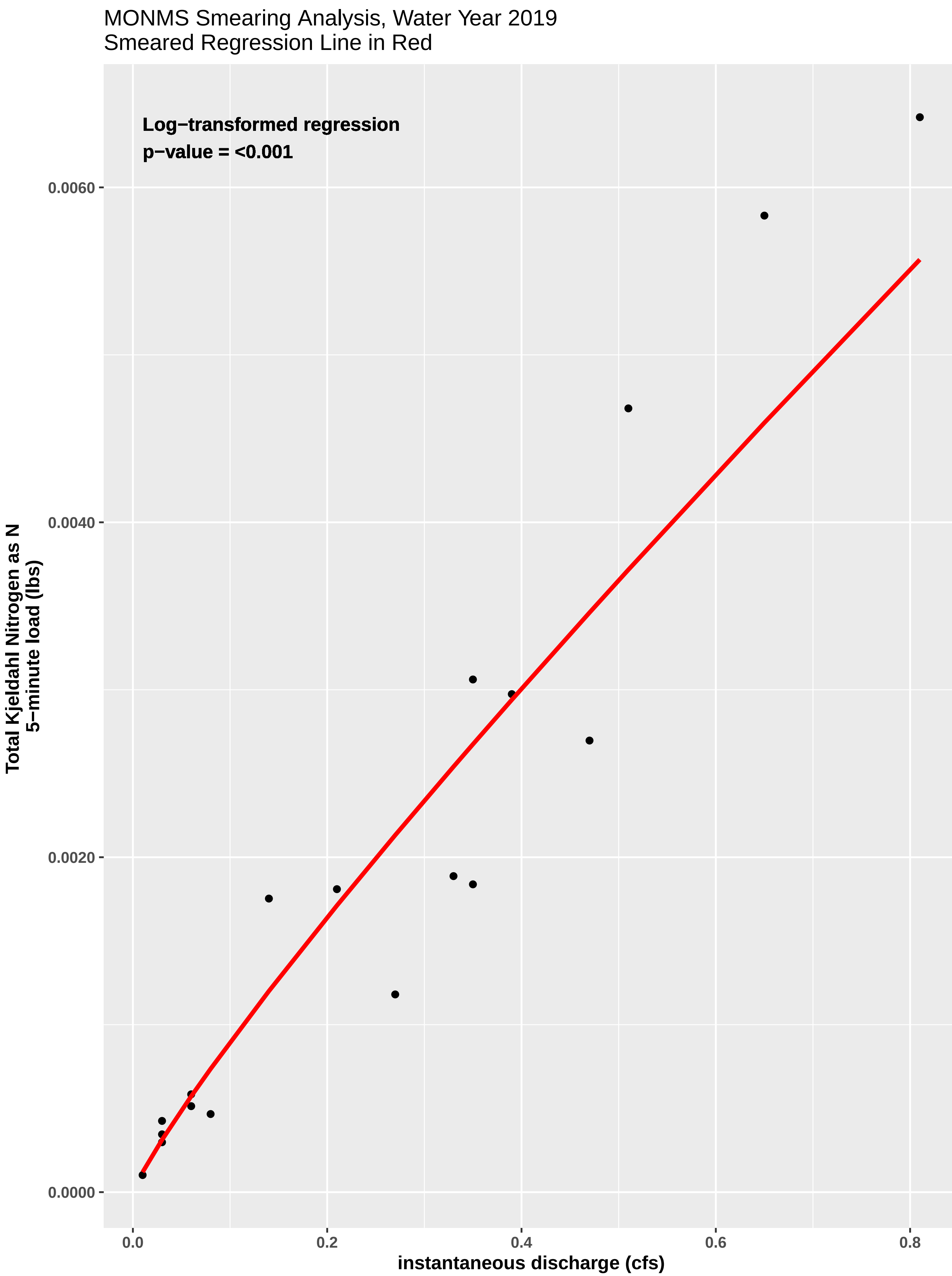
MONMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)



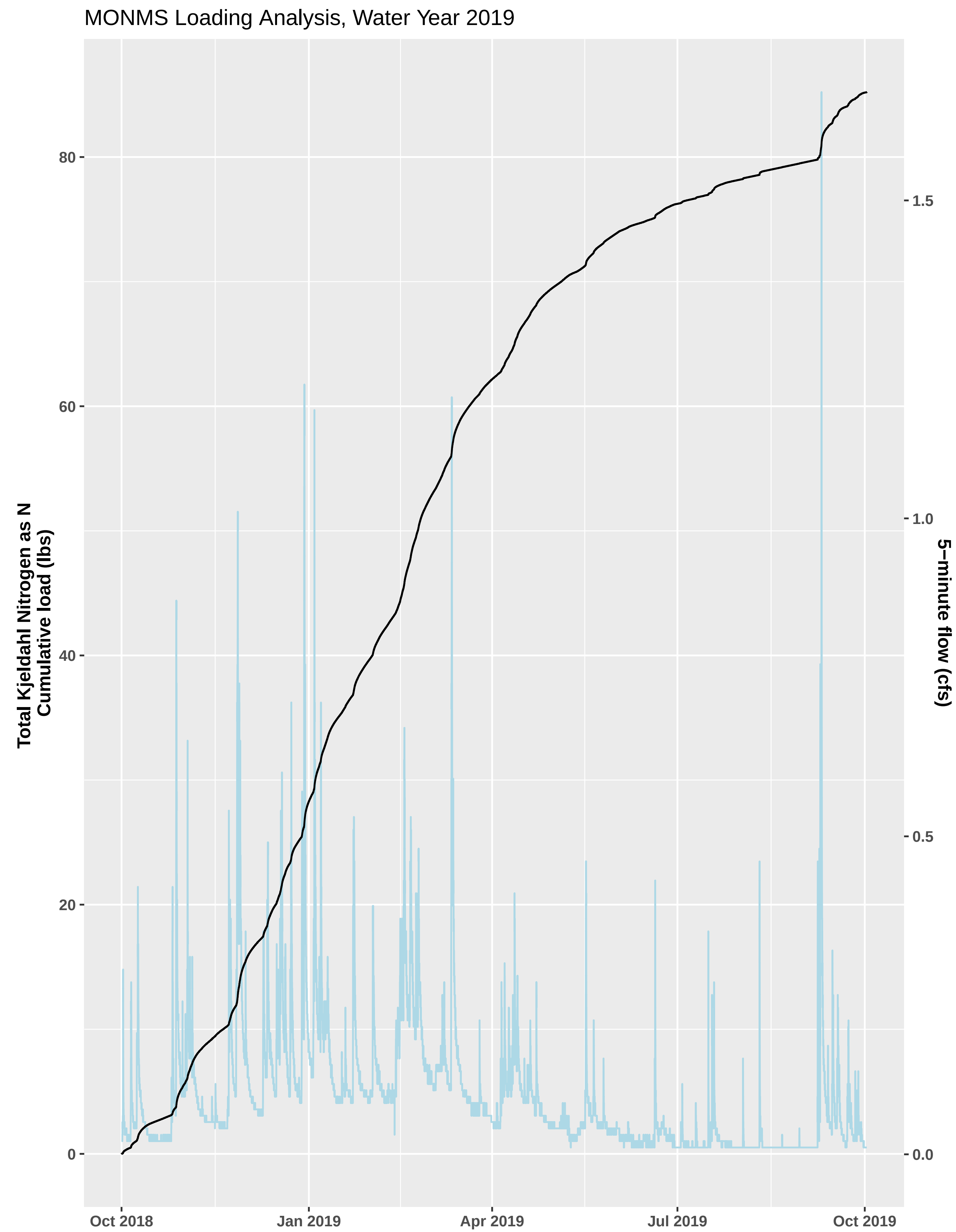
MONMS Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
300
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


MONMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

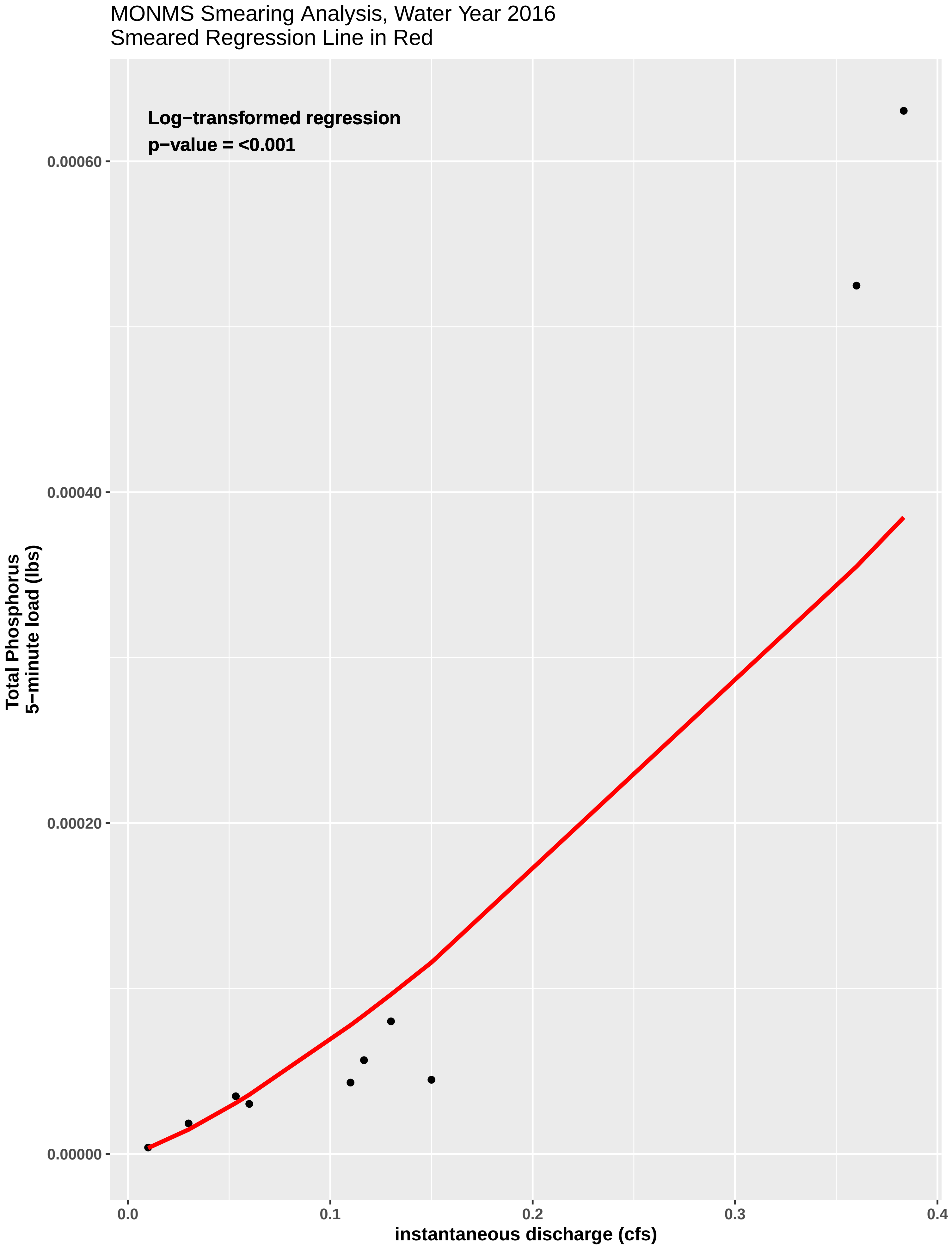

MONMS Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
40
80
120
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

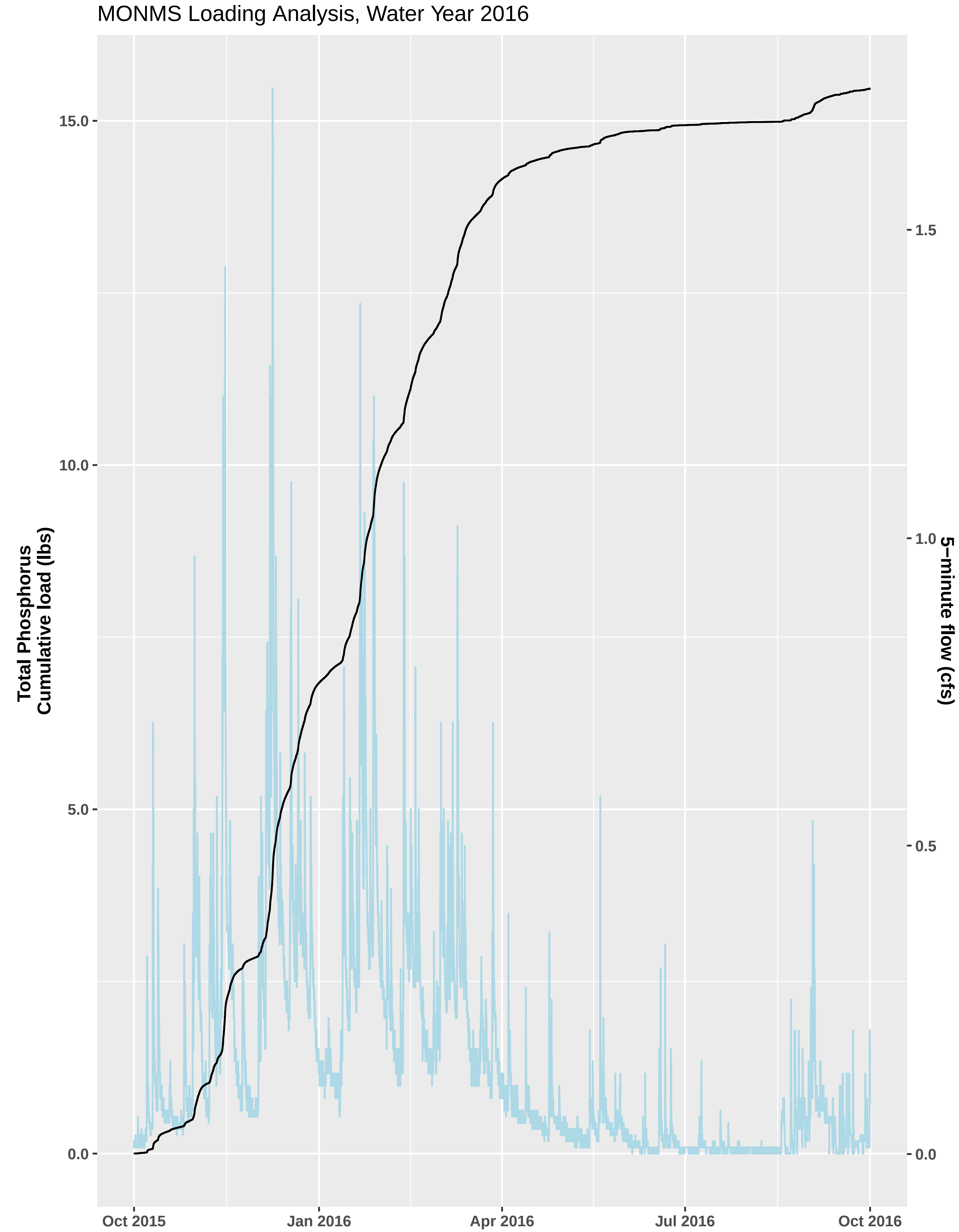


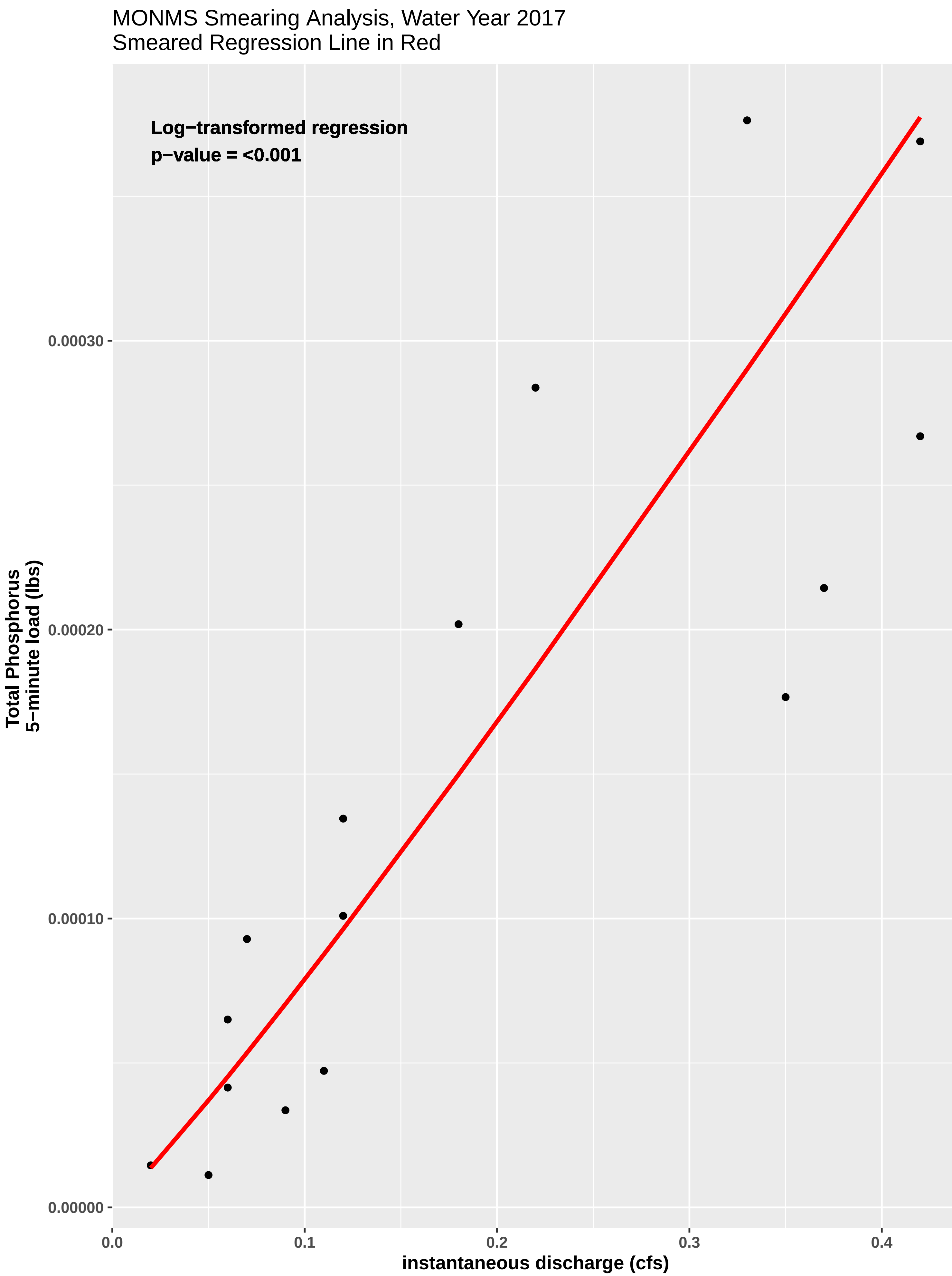
MONMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.0
0.2
0.4
0.6
0.8
instantaneous discharge (cfs)

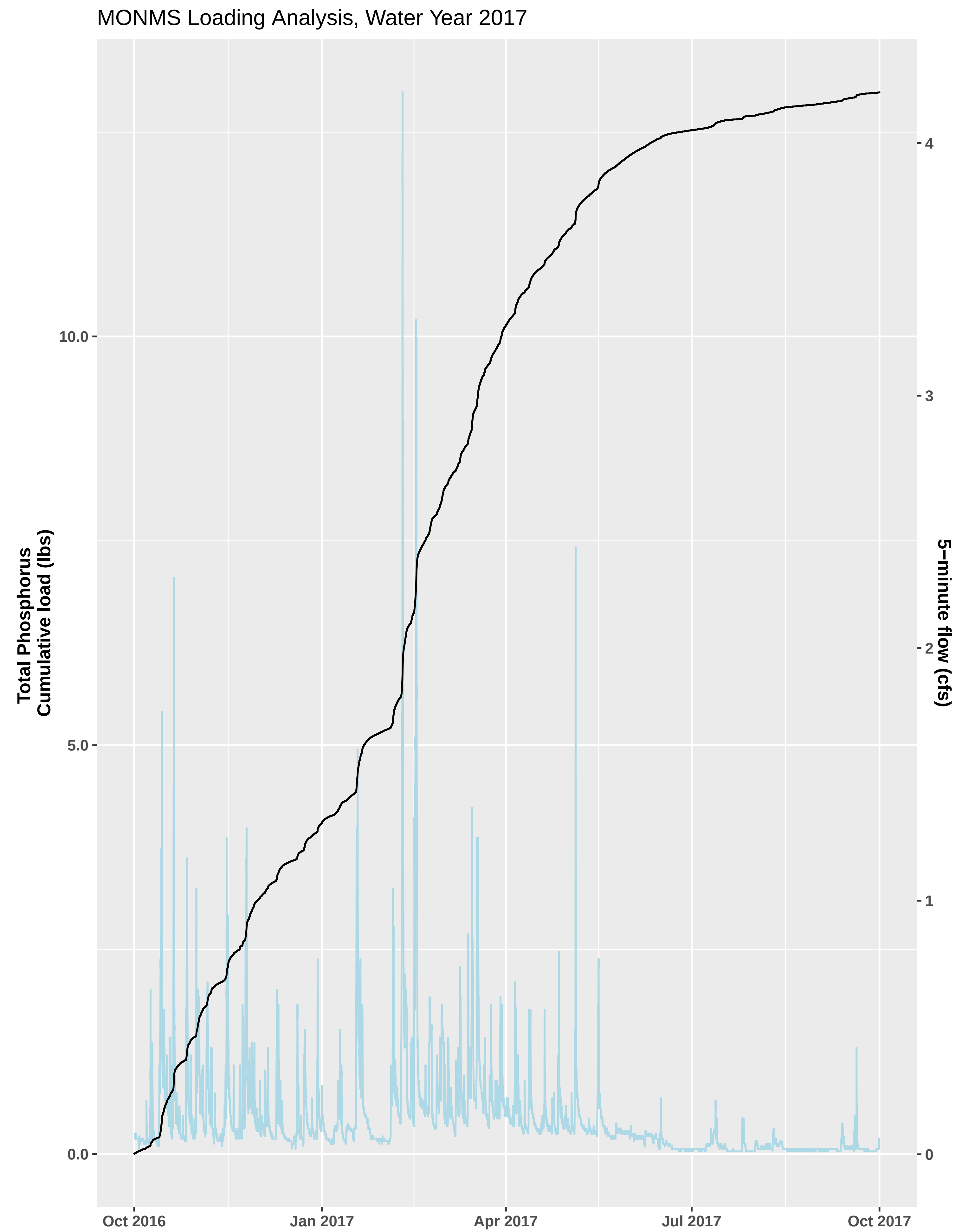


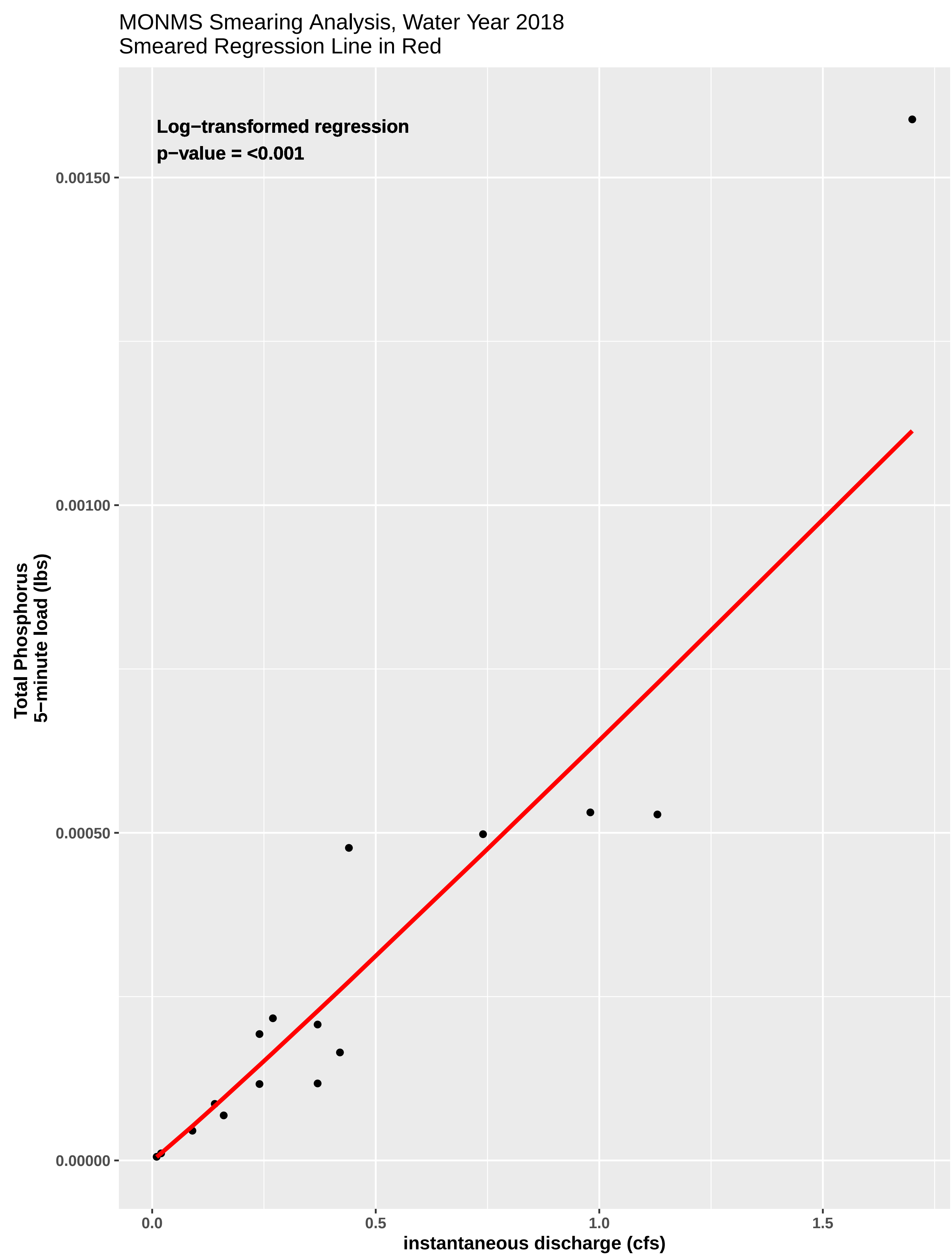
MONMS Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
20
40
60
80
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00020
0.00040
0.00060
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

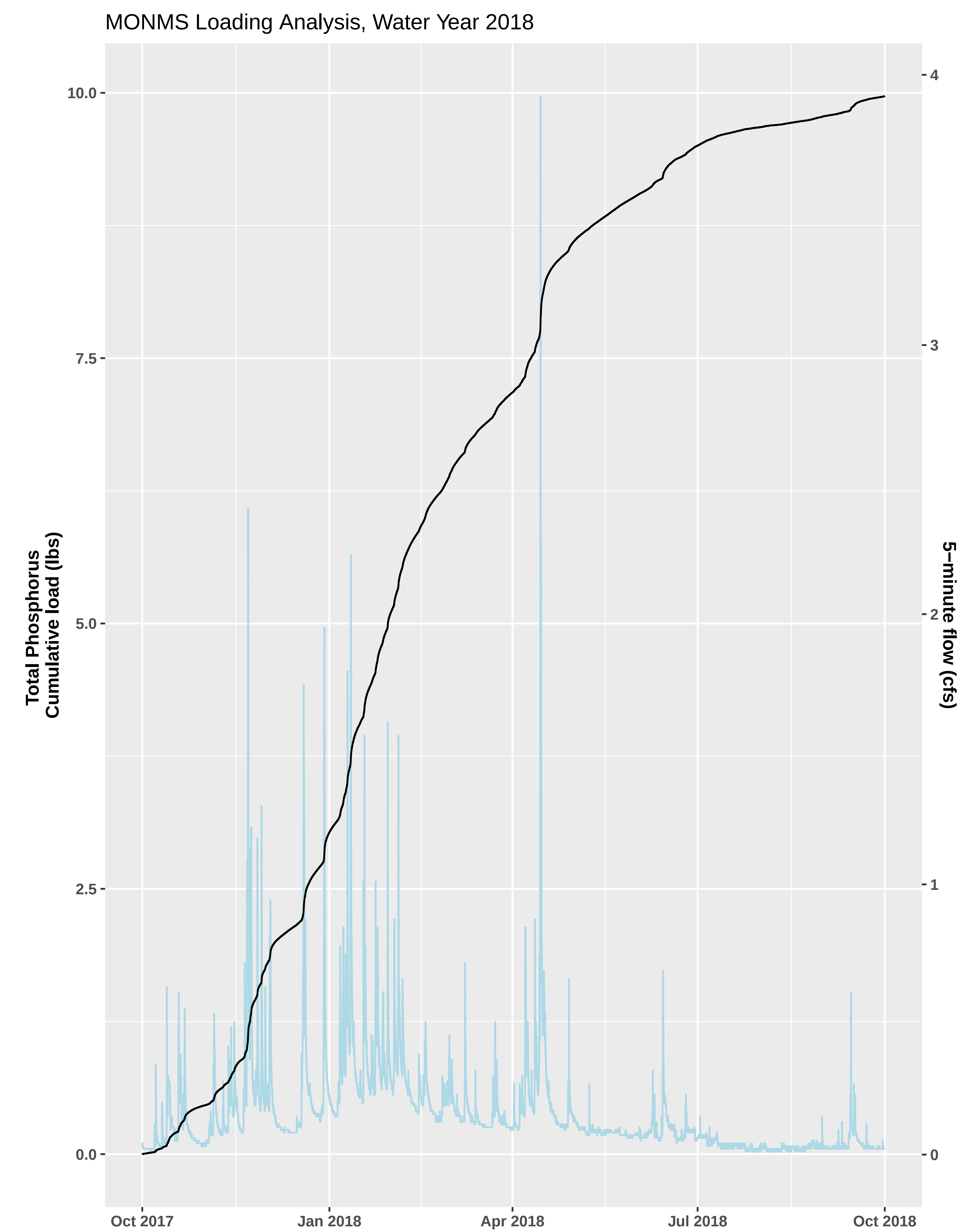

MONMS Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0.0
5.0
10.0
15.0
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


MONMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

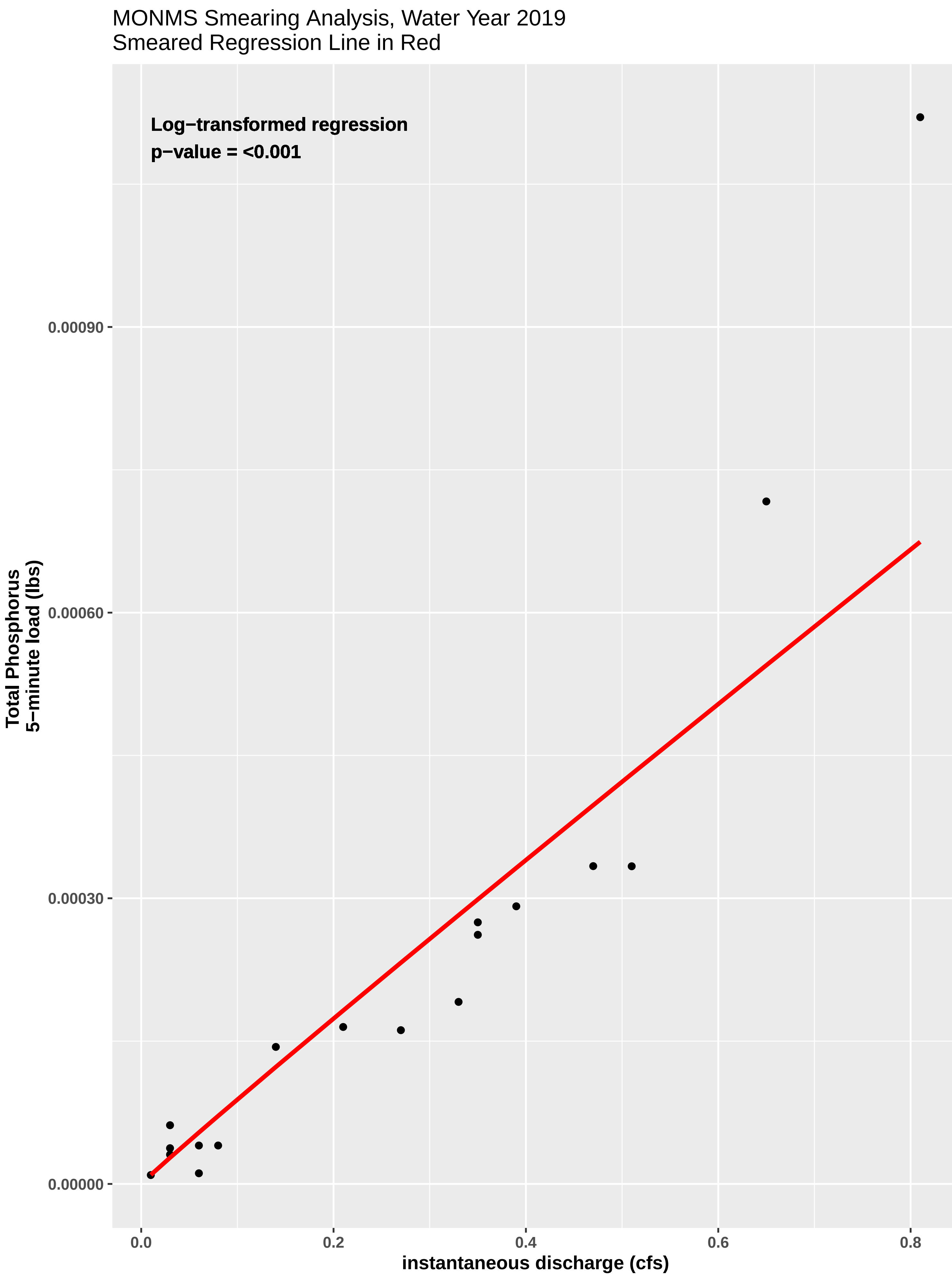

MONMS Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0.0
5.0
10.0
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



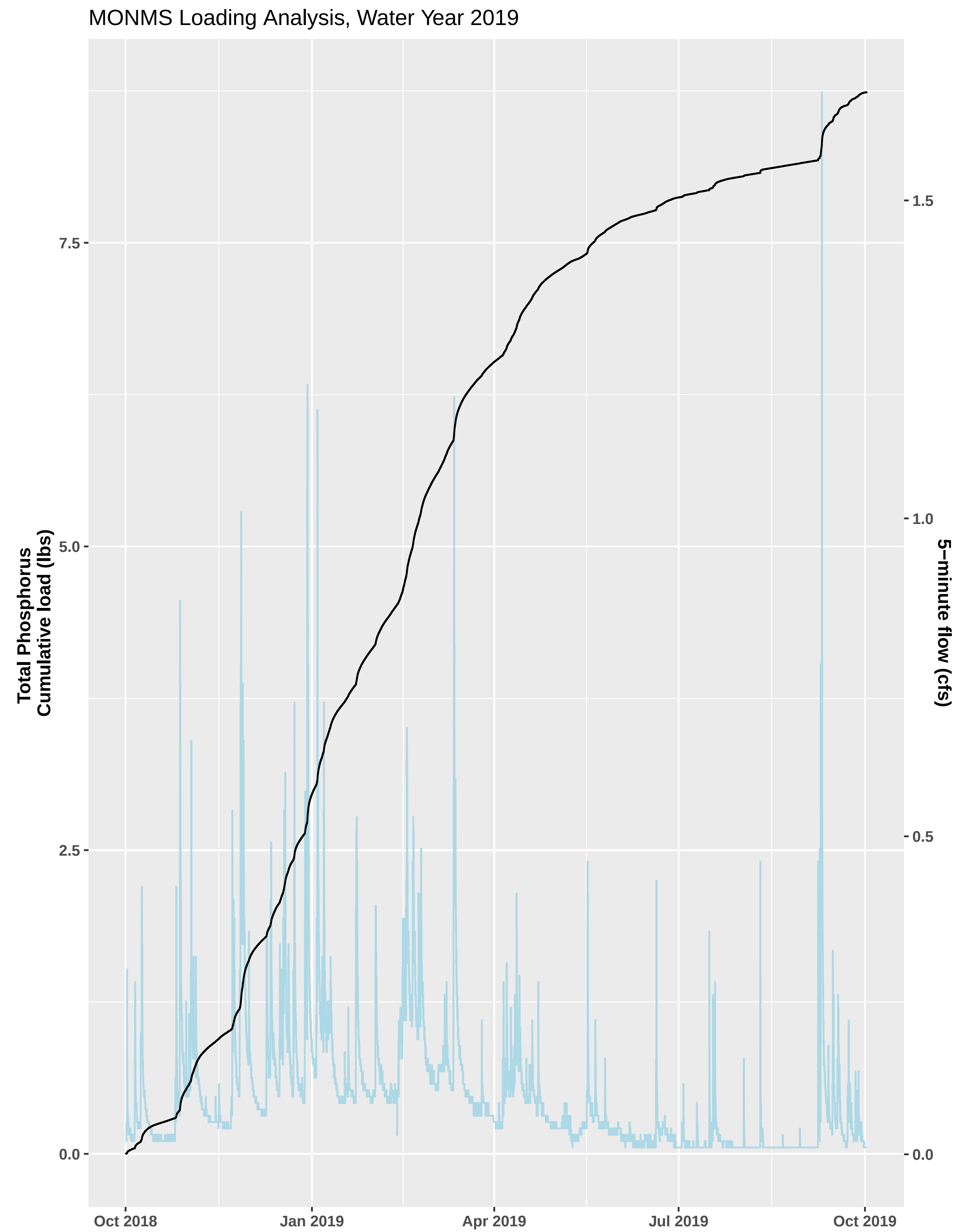
MONMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00150
0.00100
0.00050
0.00000
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)



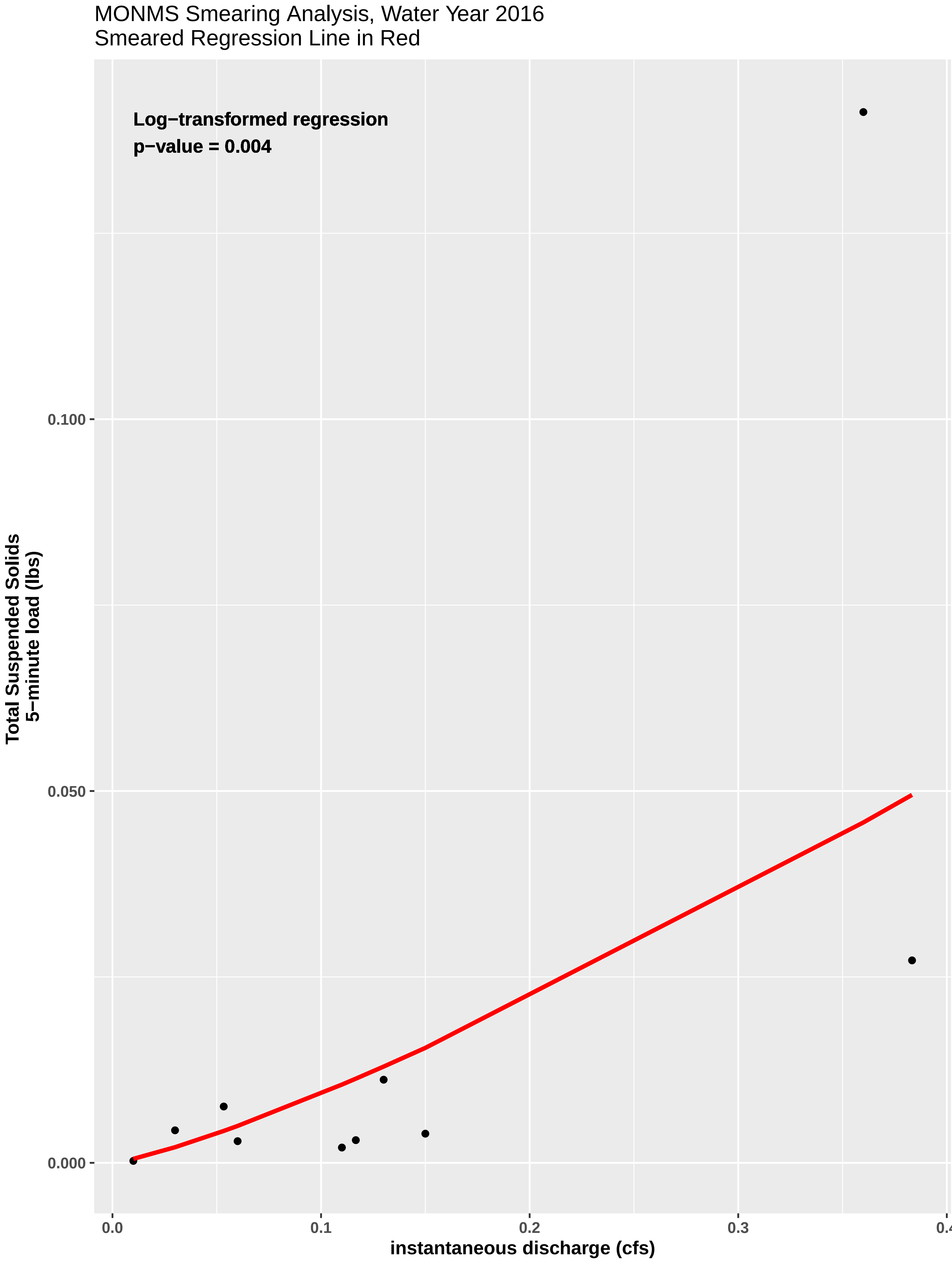
MONMS Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
10.0
7.5
5.0
2.5
0.0
5−minute flow (cfs)
4
3
2
1
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

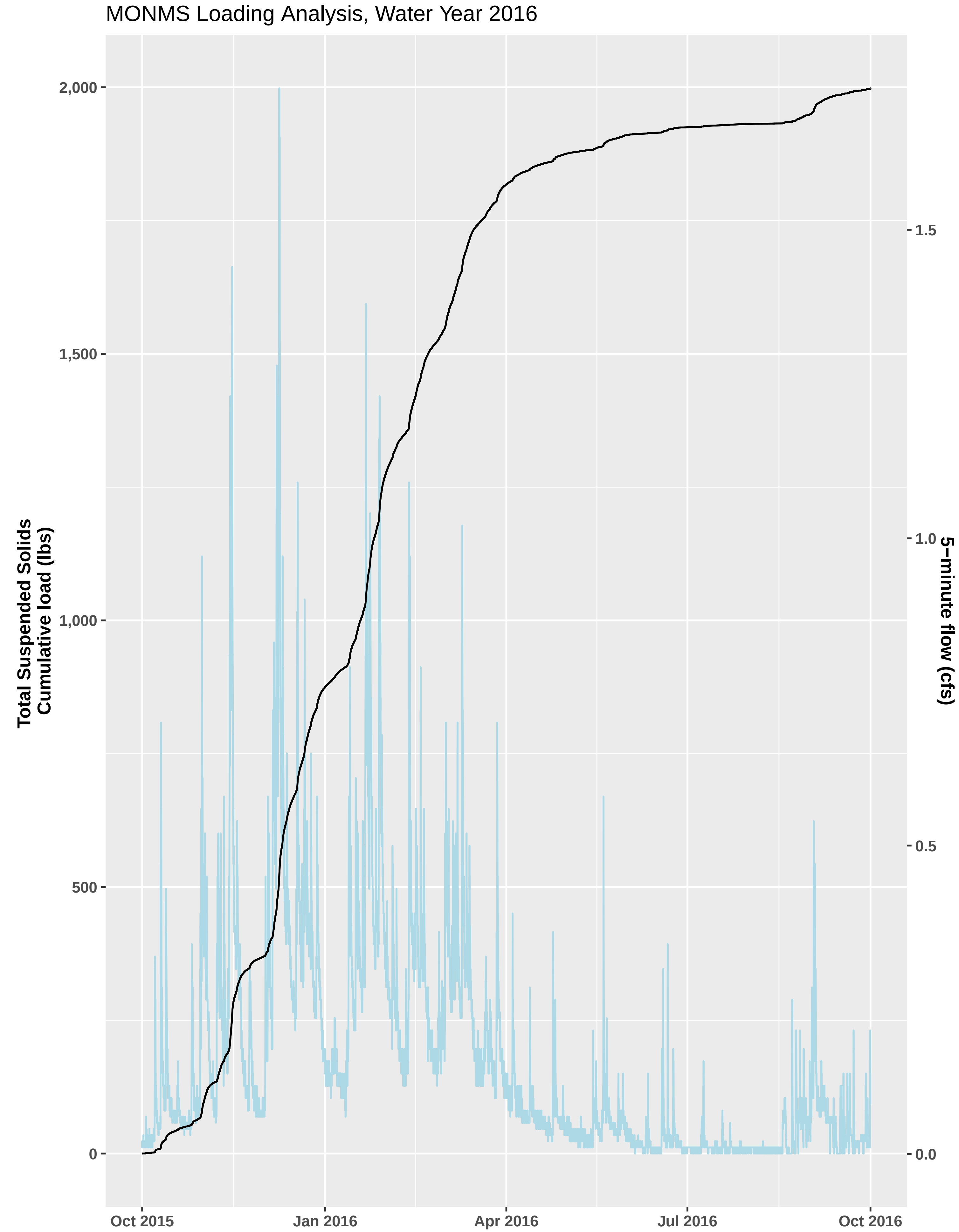


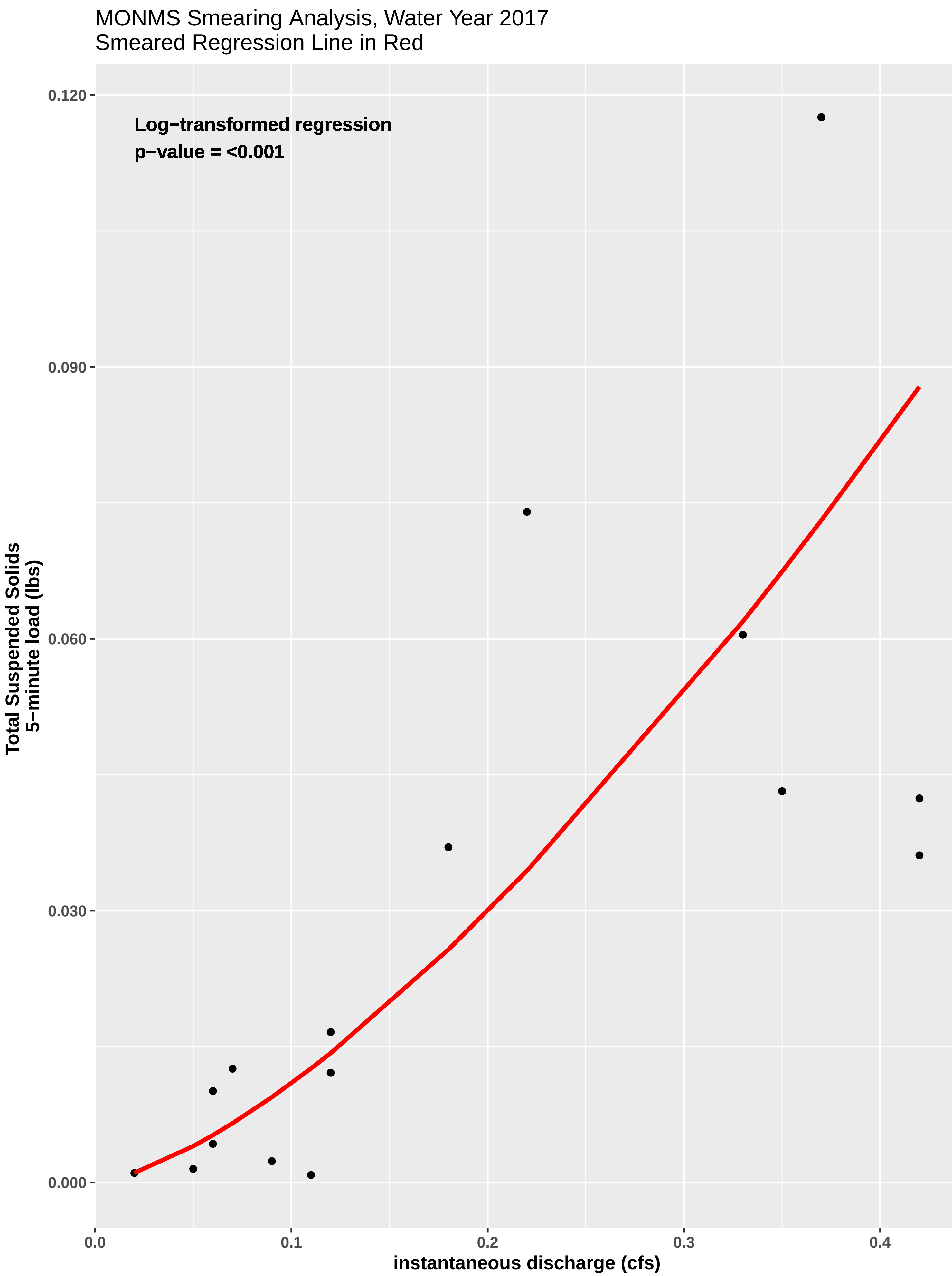
MONMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00030
0.00060
0.00090
0.0
0.2
0.4
0.6
0.8
instantaneous discharge (cfs)



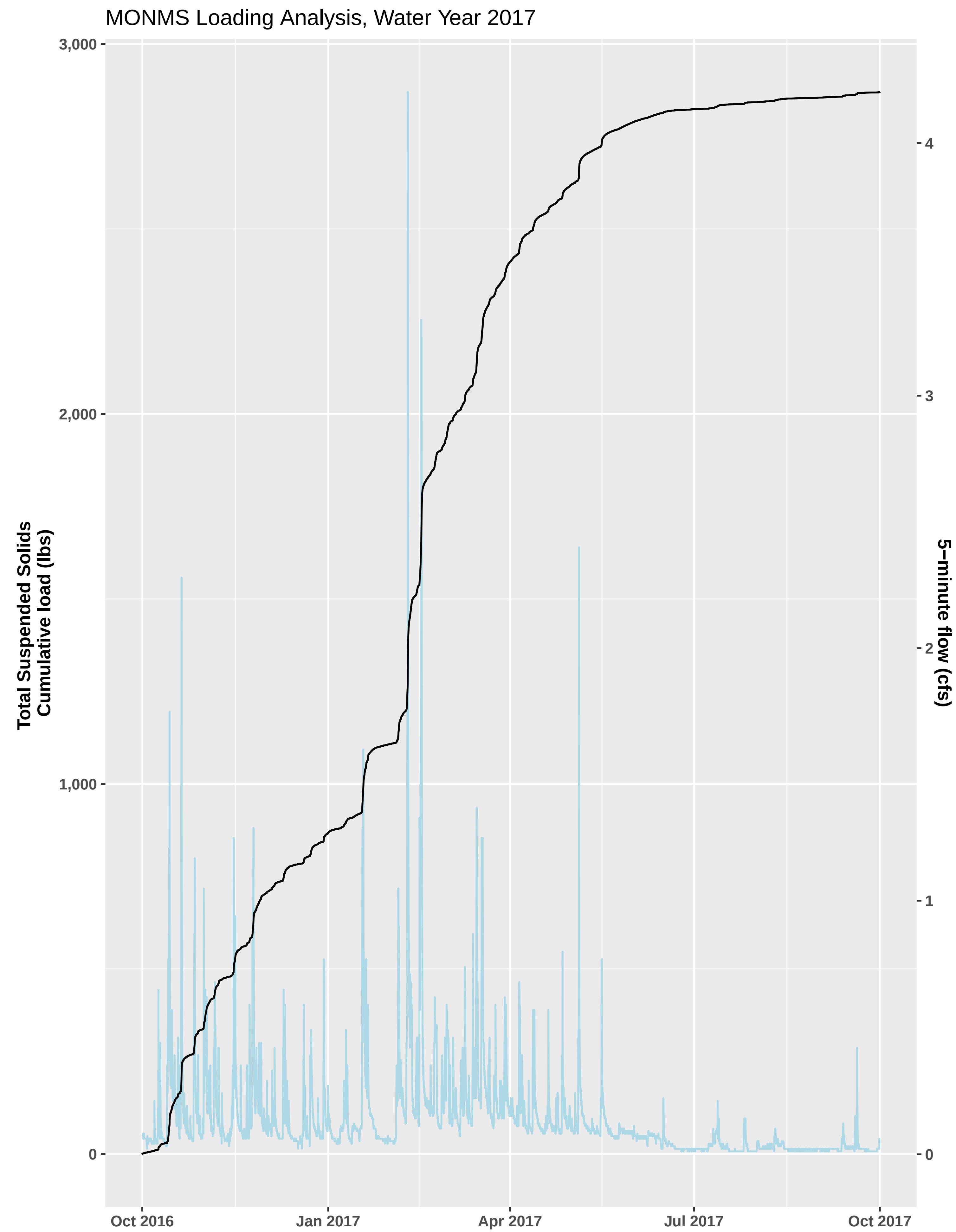
MONMS Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0.0
2.5
5.0
7.5
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.004
Total Suspended Solids
5−minute load (lbs)
0.000
0.050
0.100
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

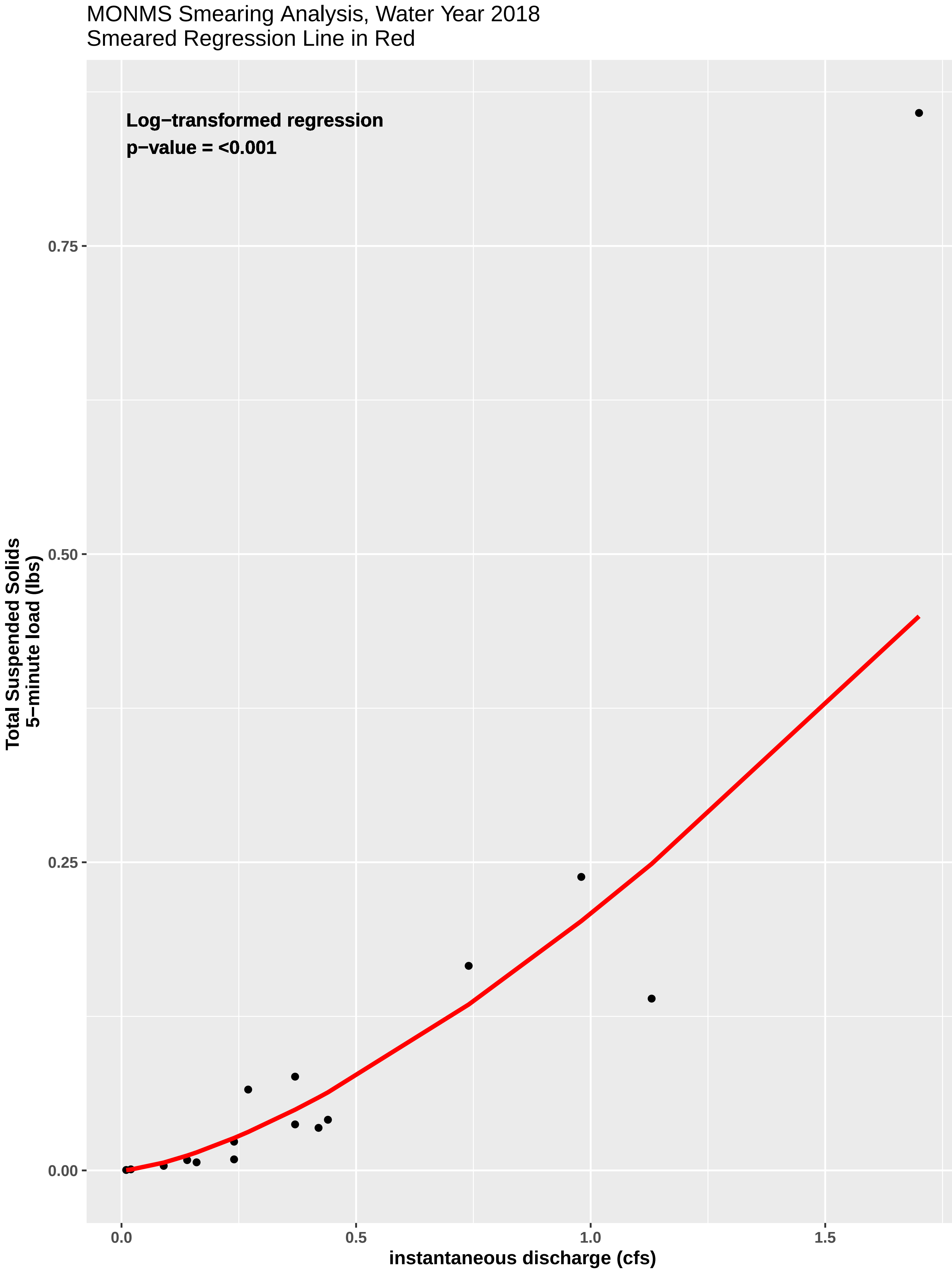

MONMS Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016



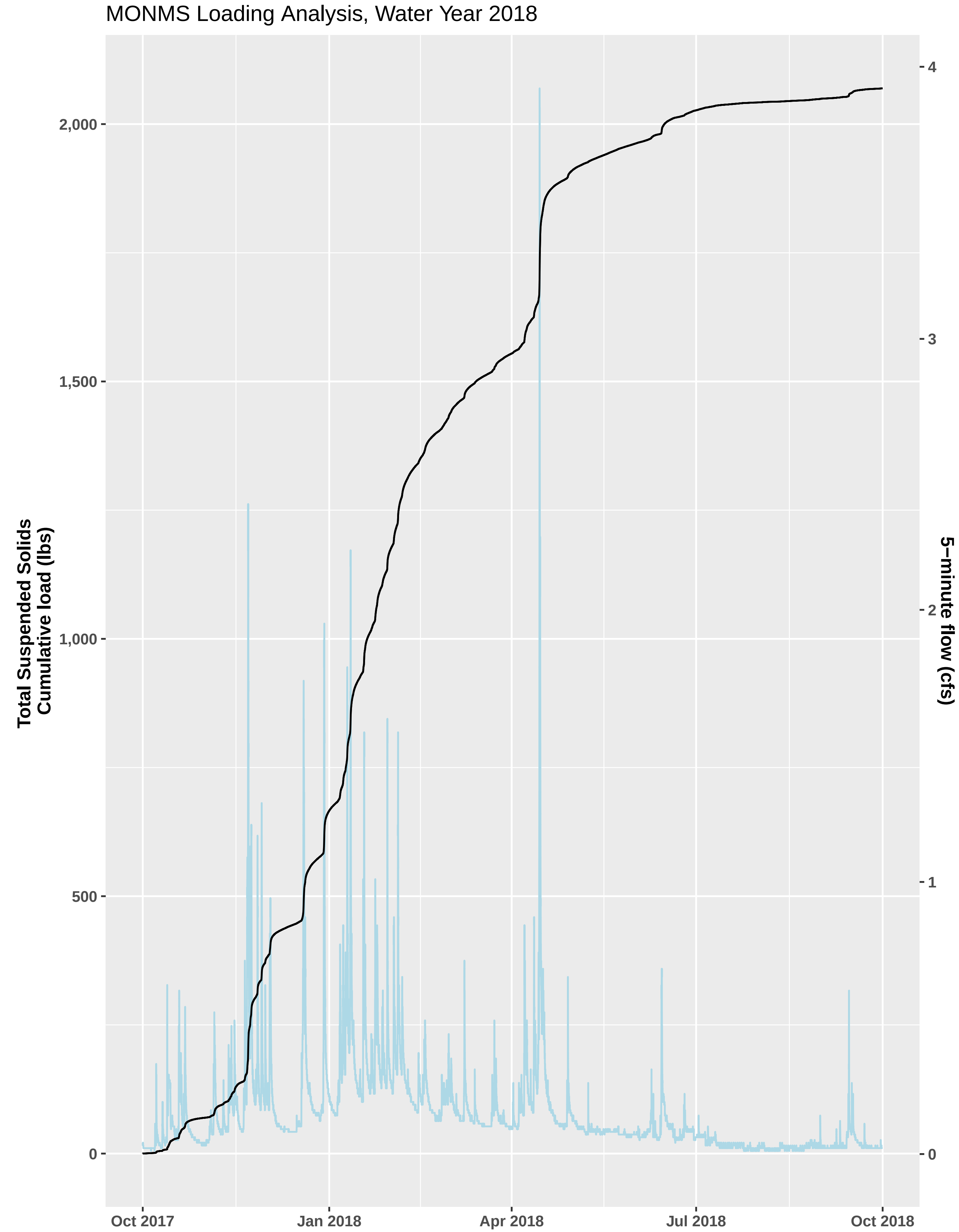
MONMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.000
0.030
0.060
0.090
0.120
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)



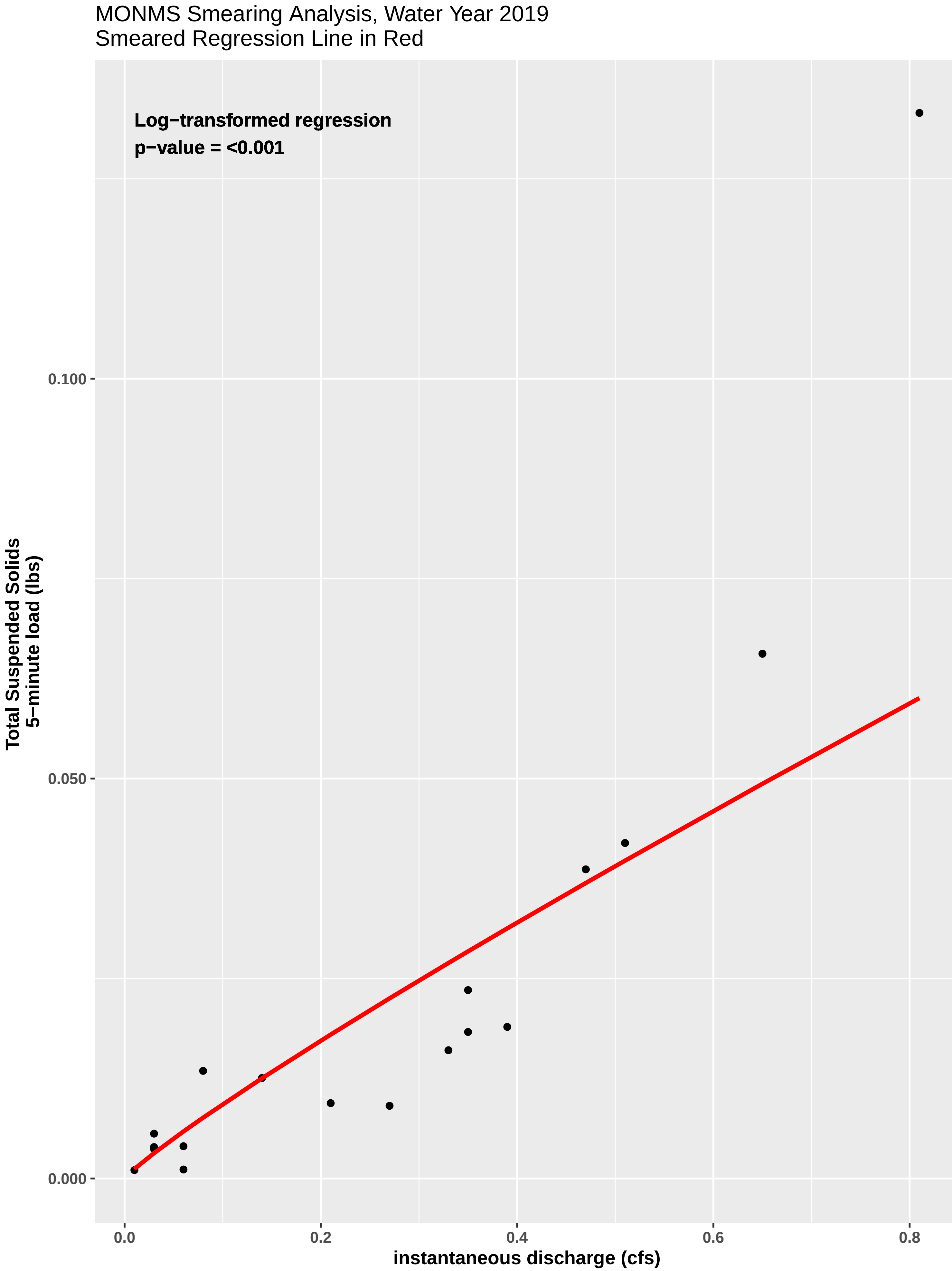
MONMS Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
0
1,000
2,000
3,000
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



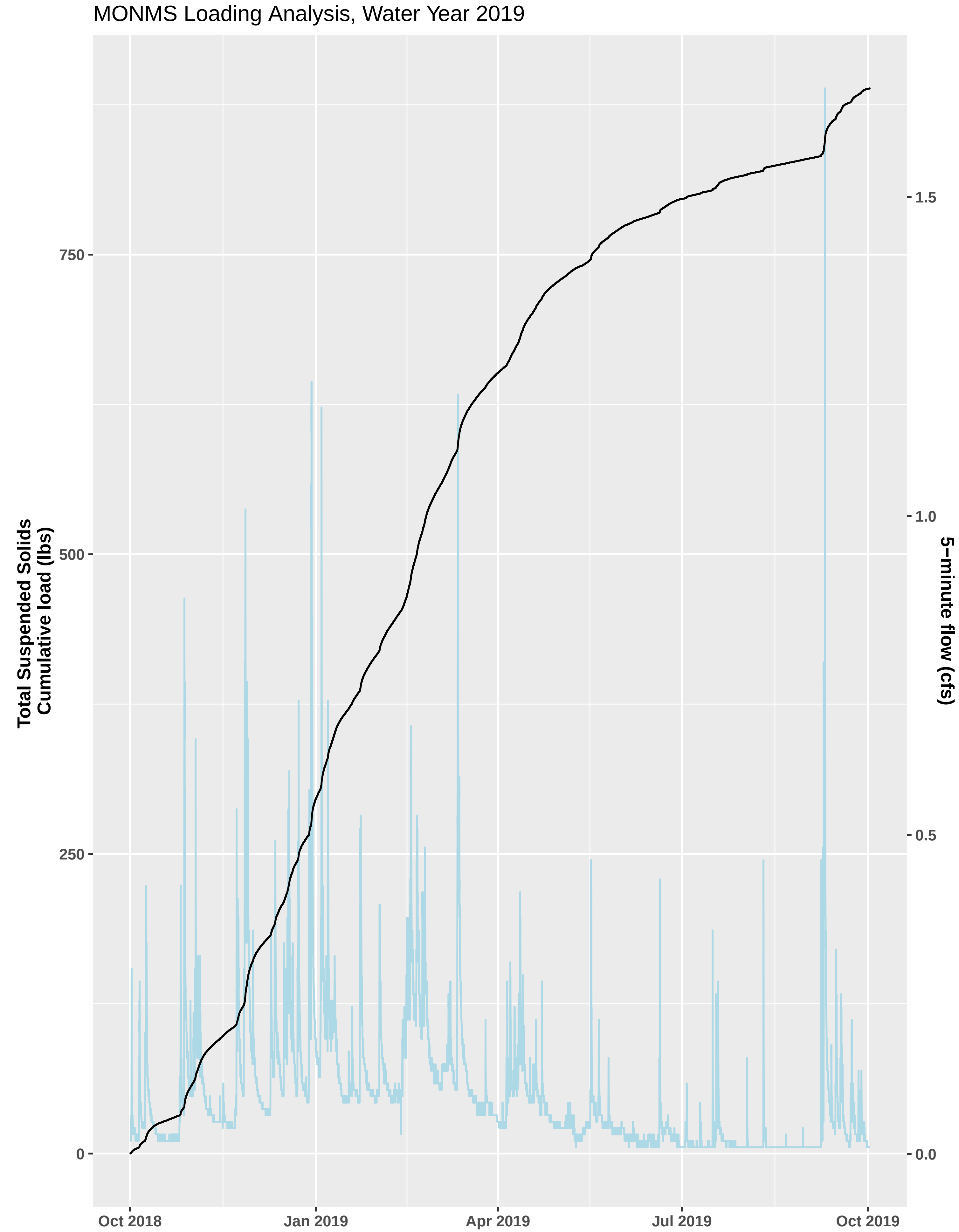
MONMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.00
0.25
0.50
0.75
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)



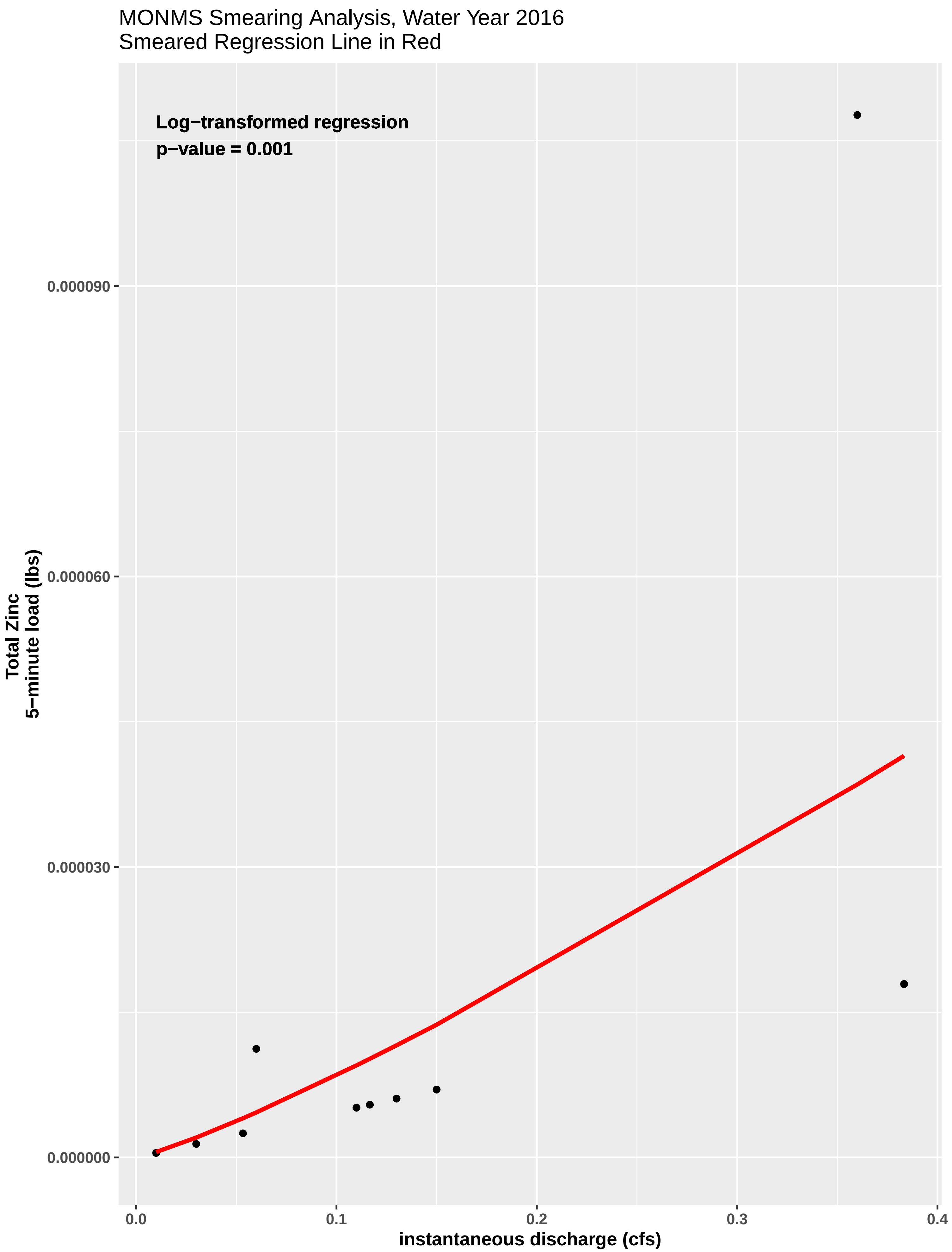
MONMS Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

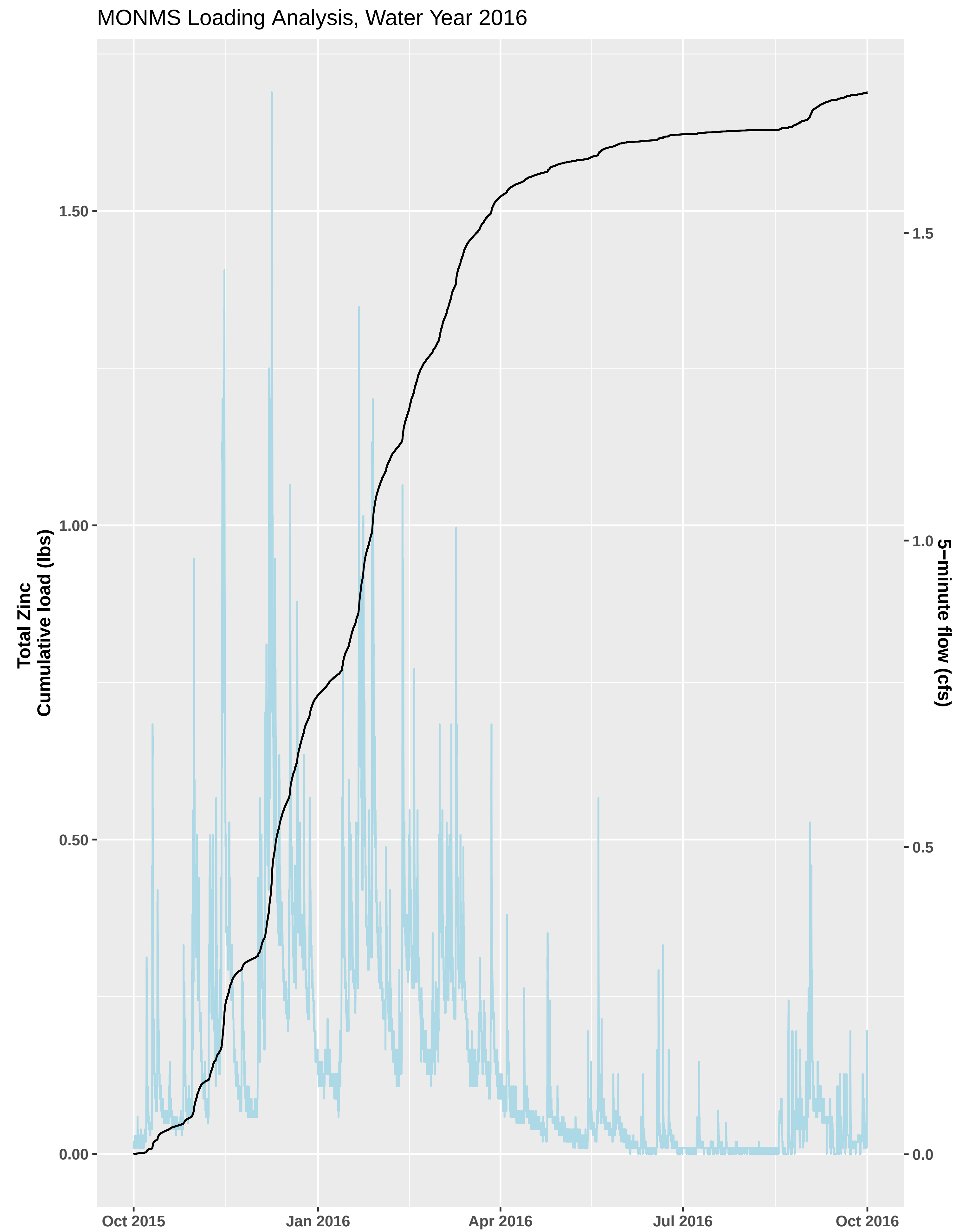


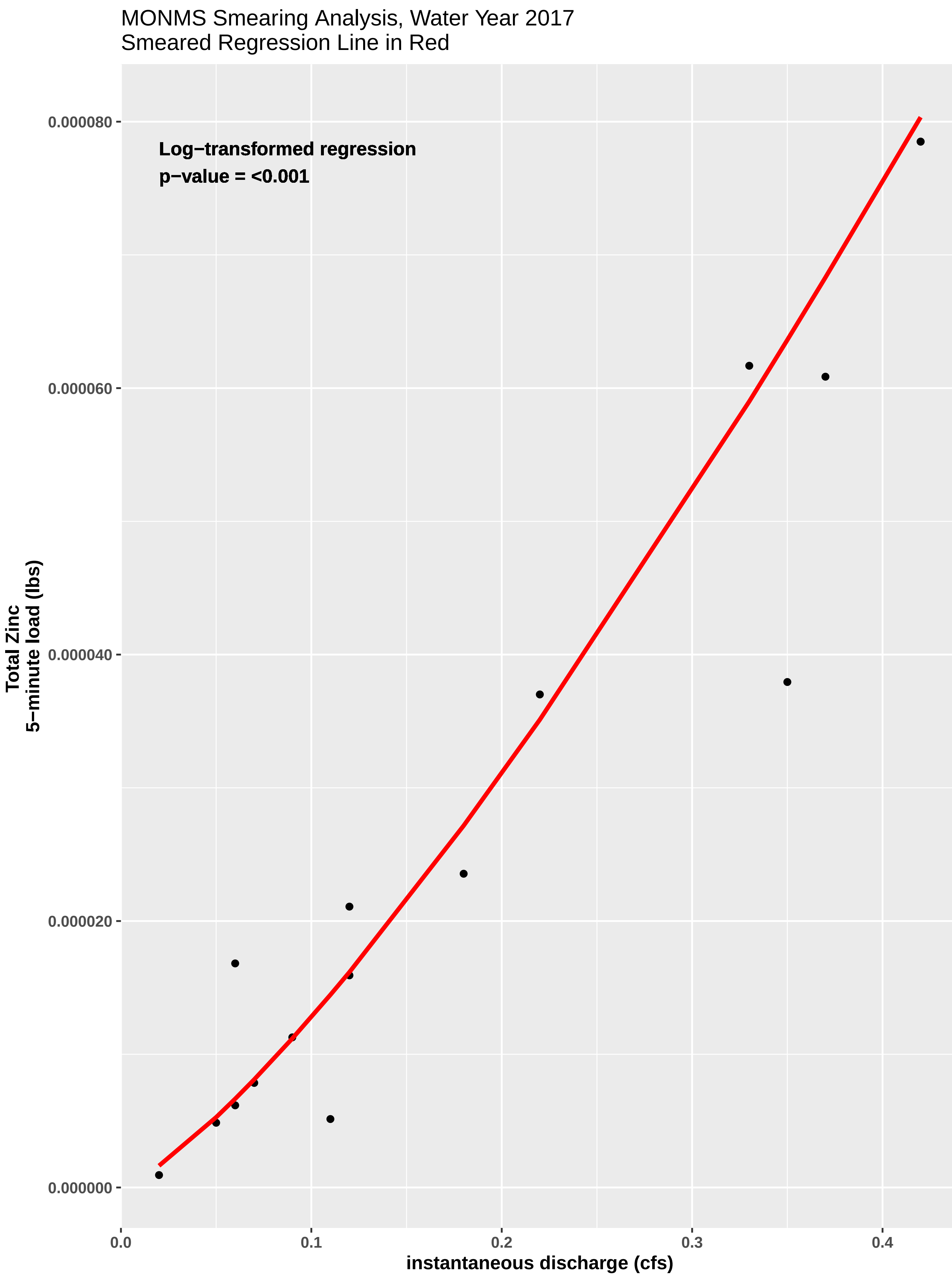
MONMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.100
0.050
0.000
0.0
0.2
0.4
0.6
0.8
instantaneous discharge (cfs)

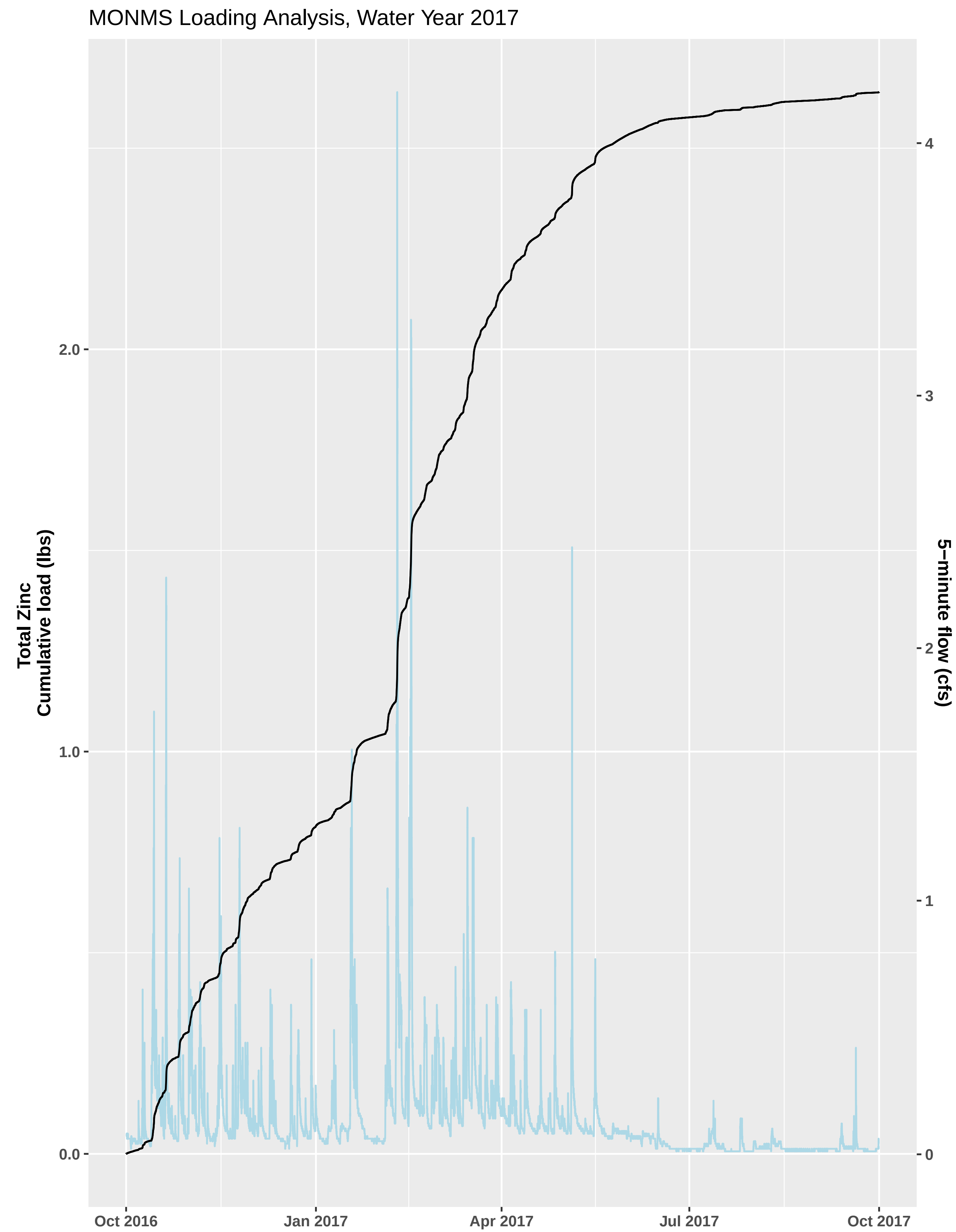


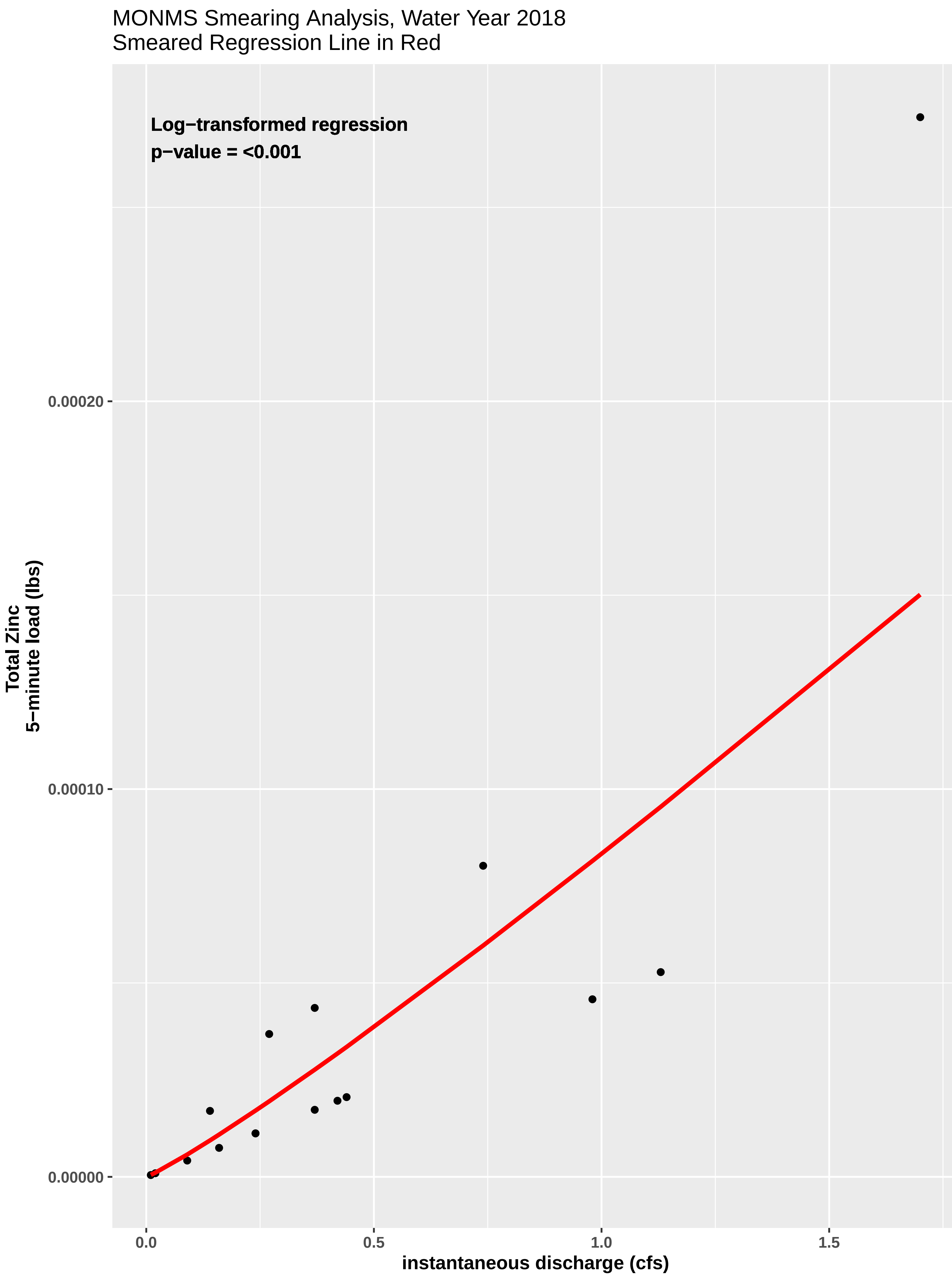
MONMS Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
750
500
250
0
5−minute flow (cfs)
1.5
1.0
0.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


MONMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
0.000090
0.000060
0.000030
0.000000
Total Zinc
5−minute load (lbs)
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

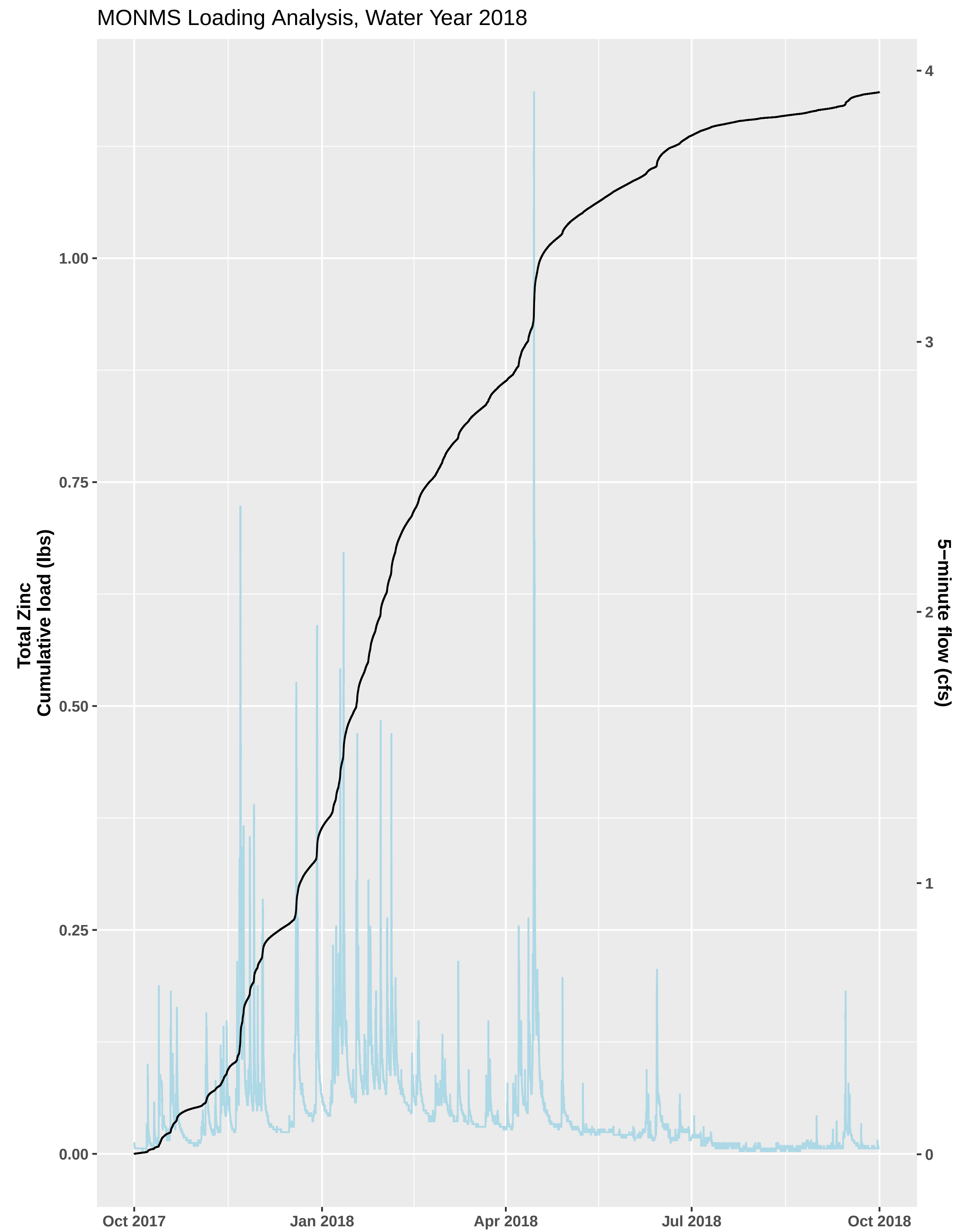

MONMS Loading Analysis, Water Year 2016
1.50
1.00
0.50
0.00
Total Zinc
Cumulative load (lbs)
1.5
1.0
0.5
0.0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


MONMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000080
0.000060
0.000040
0.000020
0.000000
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

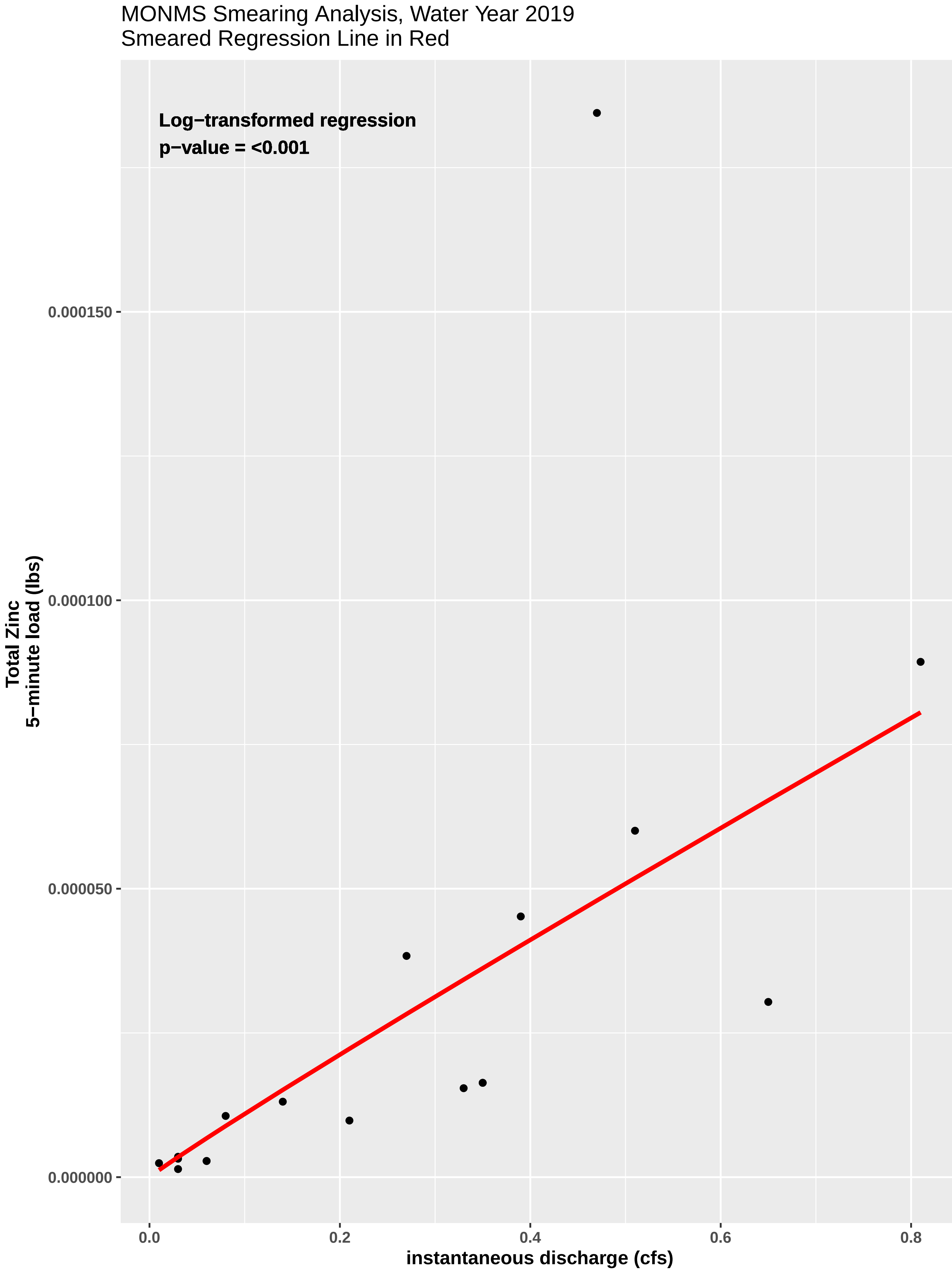

MONMS Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
2.0
1.0
0.0
5−minute flow (cfs)
4
3
2
1
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

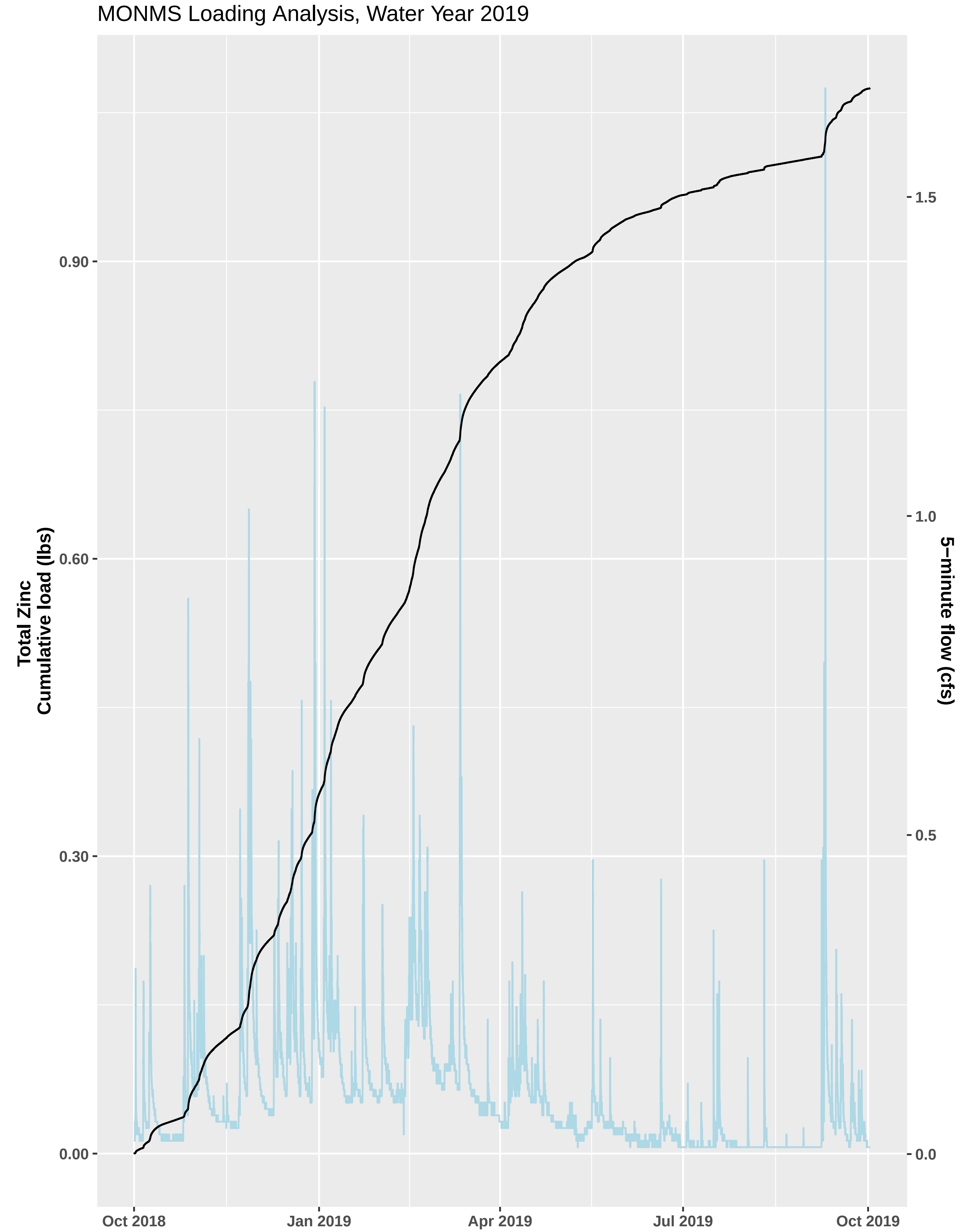


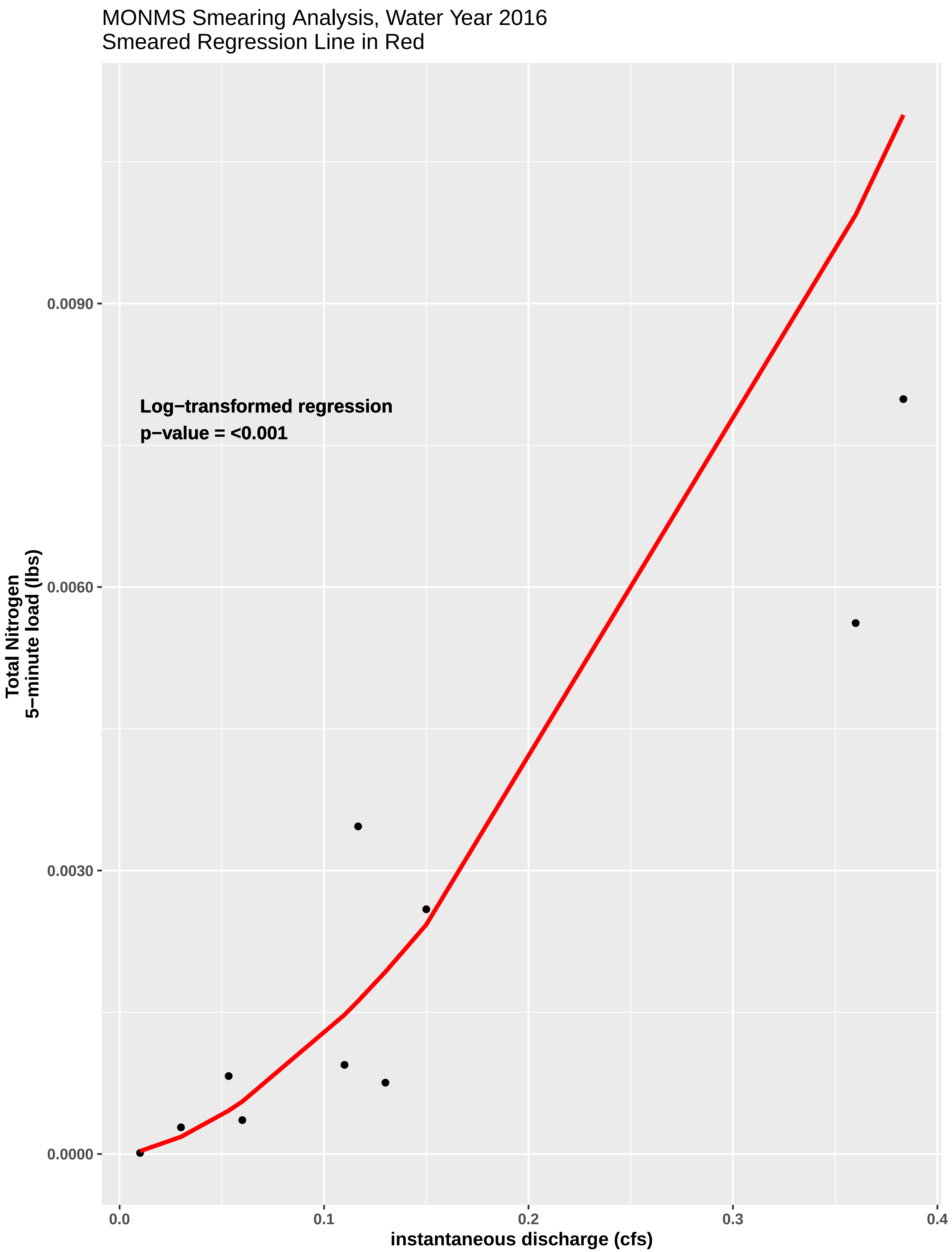
MONMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00020
0.00010
0.00000
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

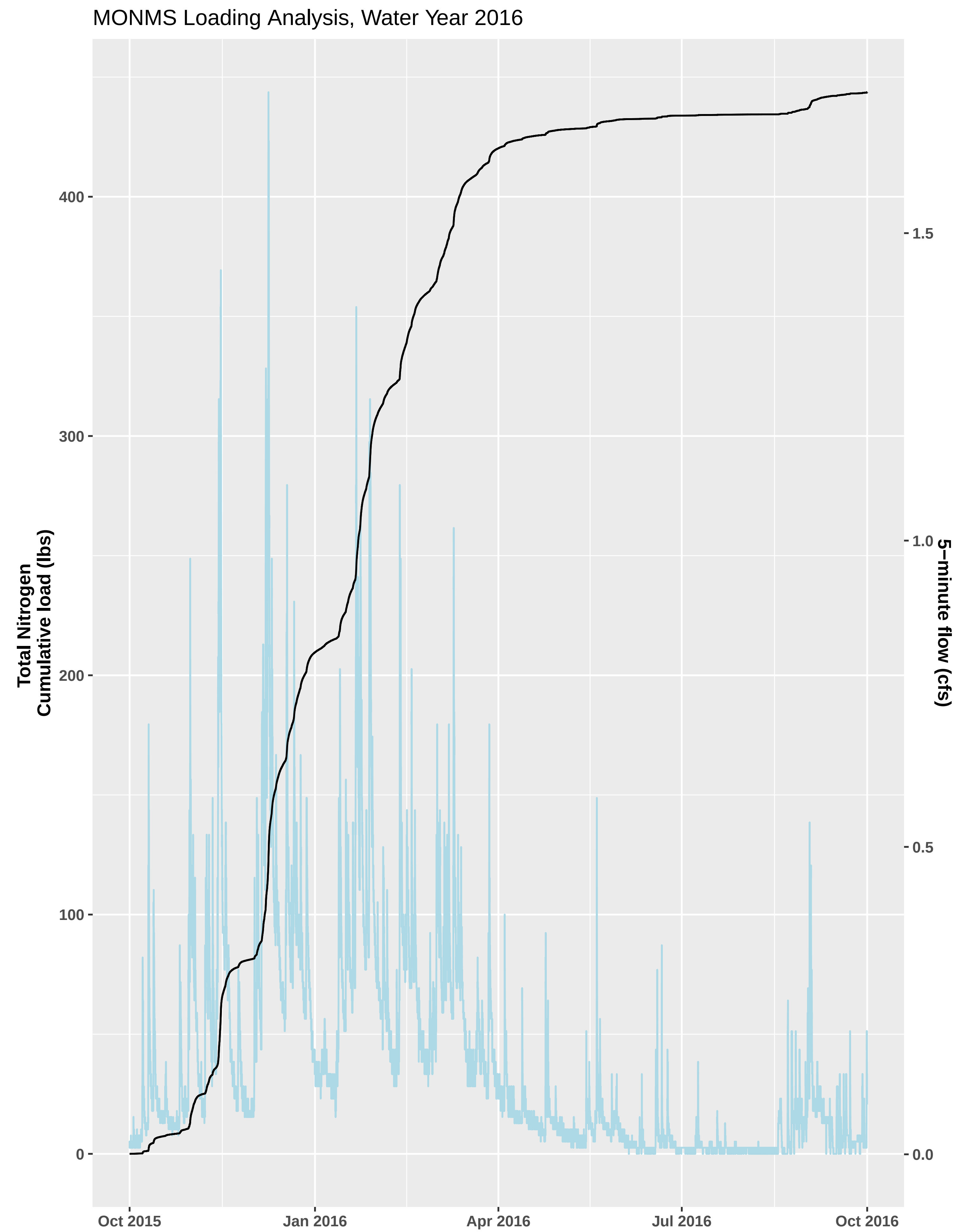


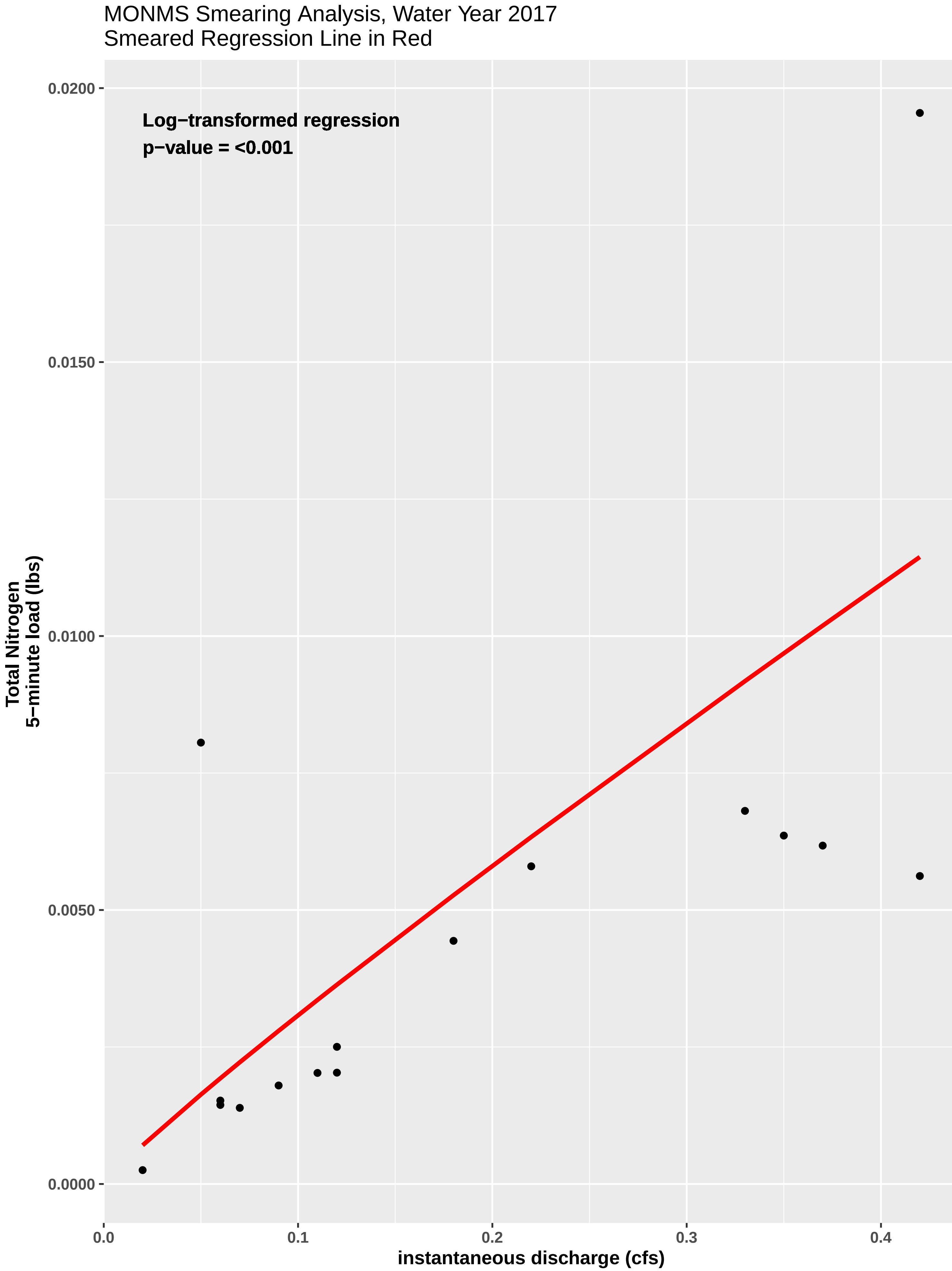
MONMS Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
1.00
0.75
0.50
0.25
0.00
5−minute flow (cfs)
4
3
2
1
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

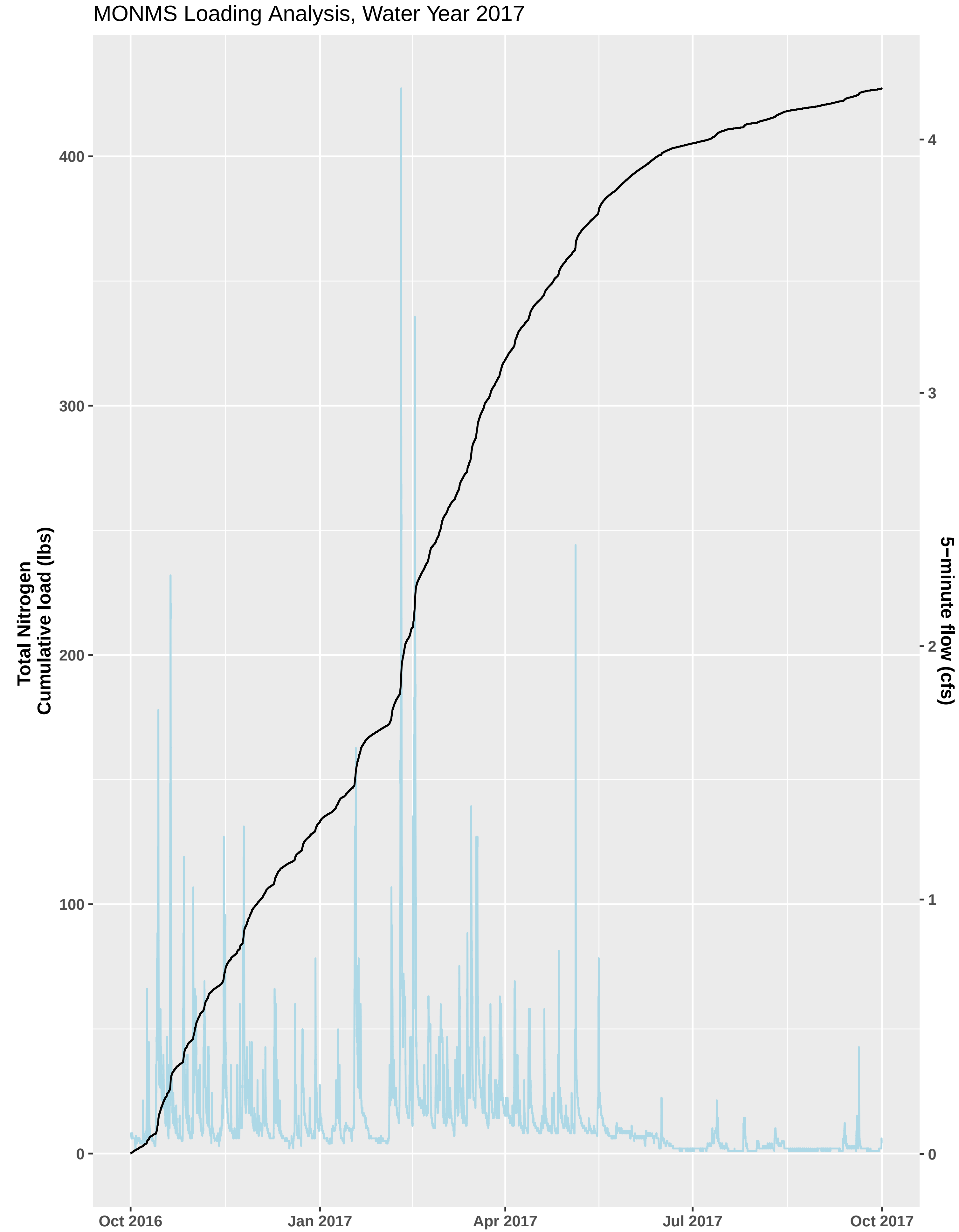

MONMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000000
0.000050
0.000100
0.000150
0.0
0.2
0.4
0.6
0.8
instantaneous discharge (cfs)

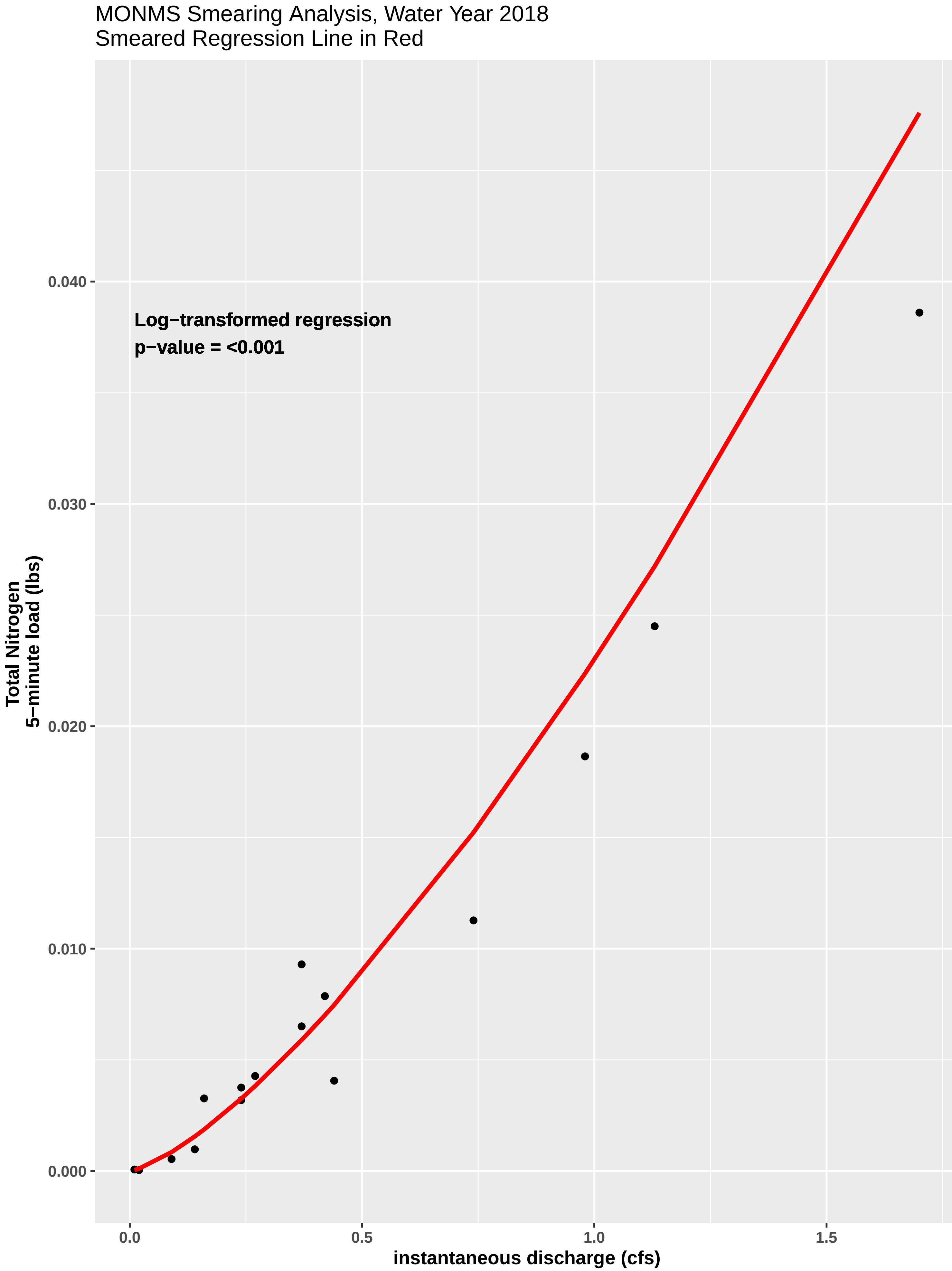

MONMS Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0.00
0.30
0.60
0.90
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

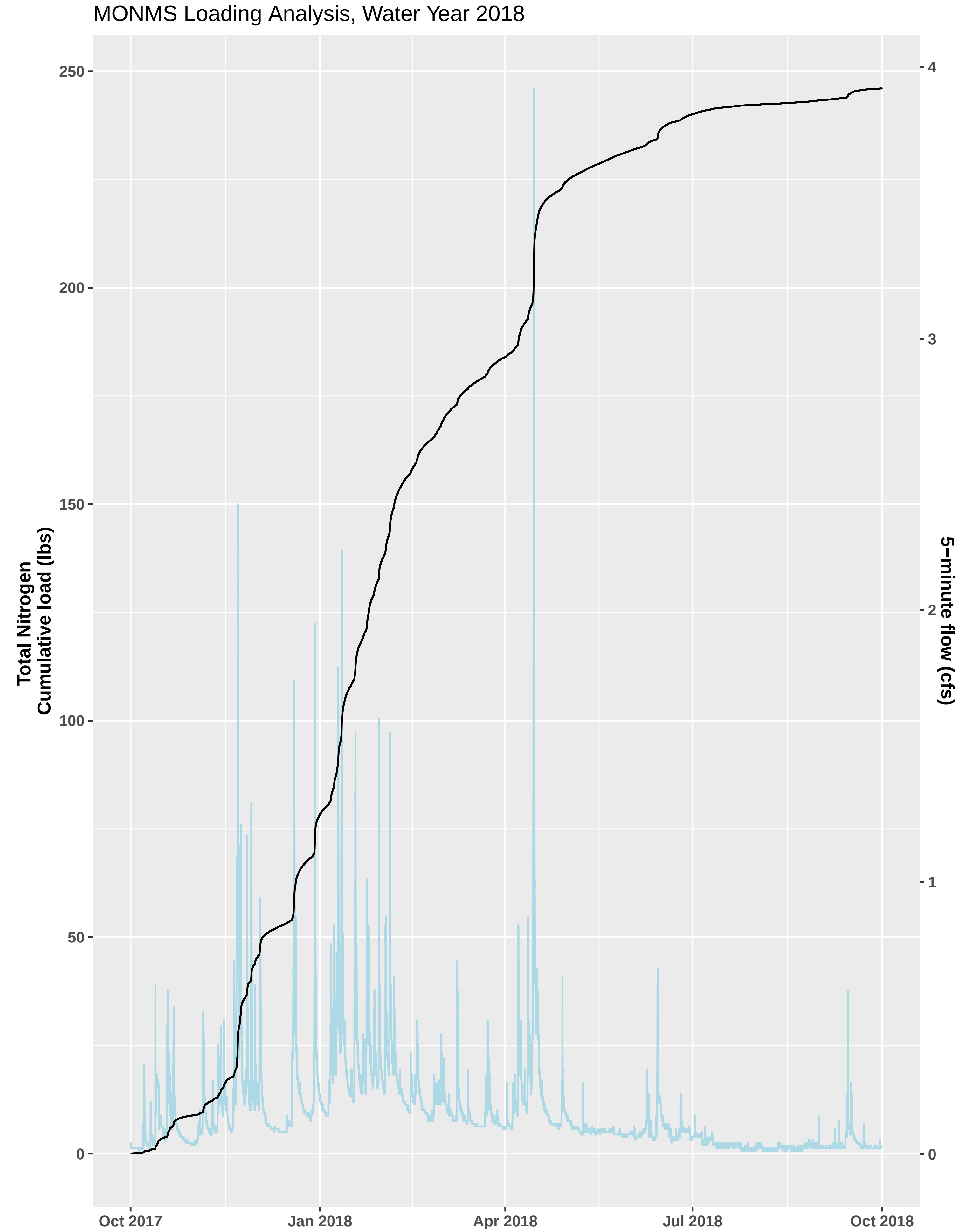

MONMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0030
0.0060
0.0090
0.0
0.1
0.2
0.3
0.4
instantaneous discharge (cfs)

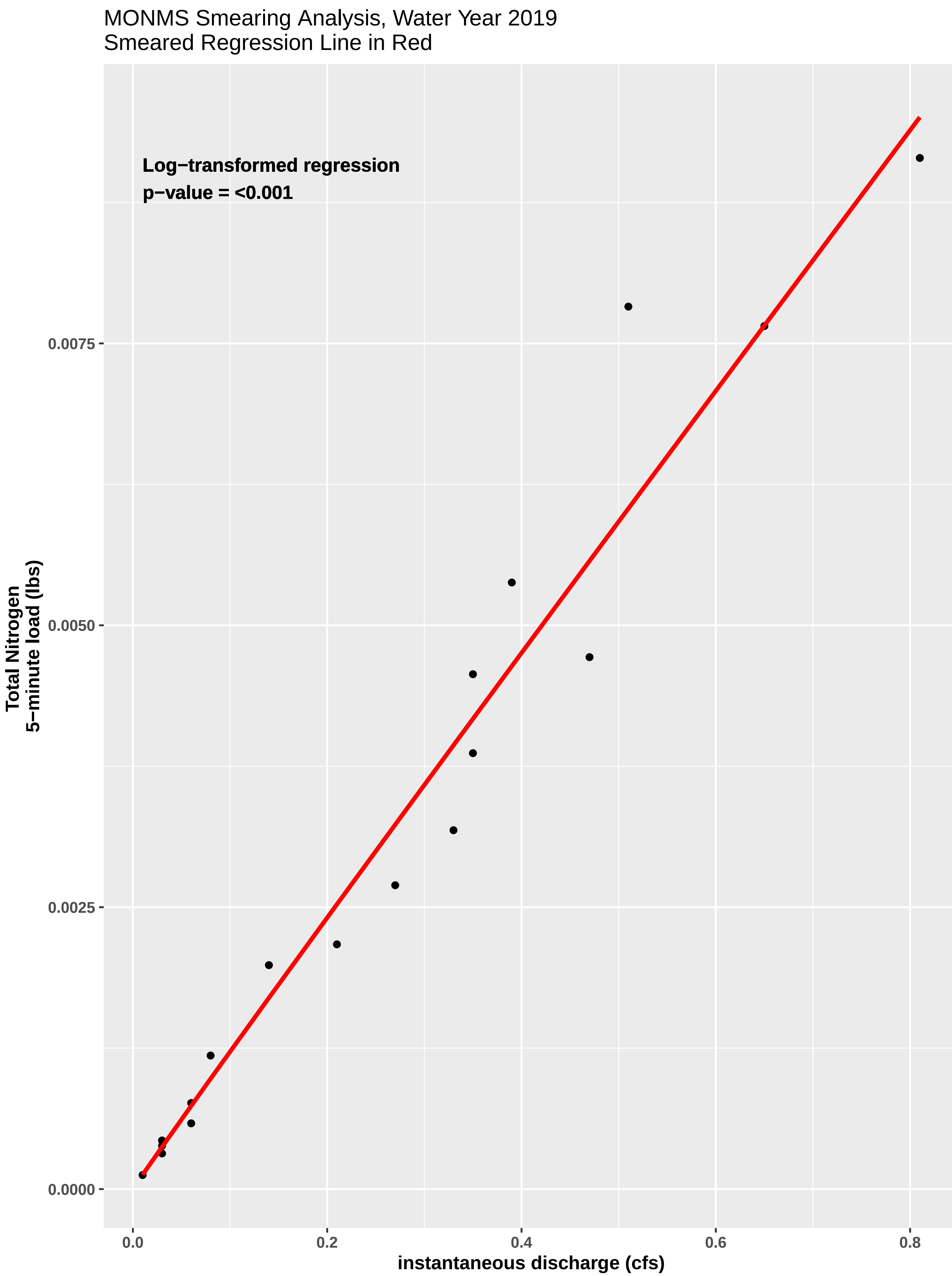

MONMS Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
100
200
300
400
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

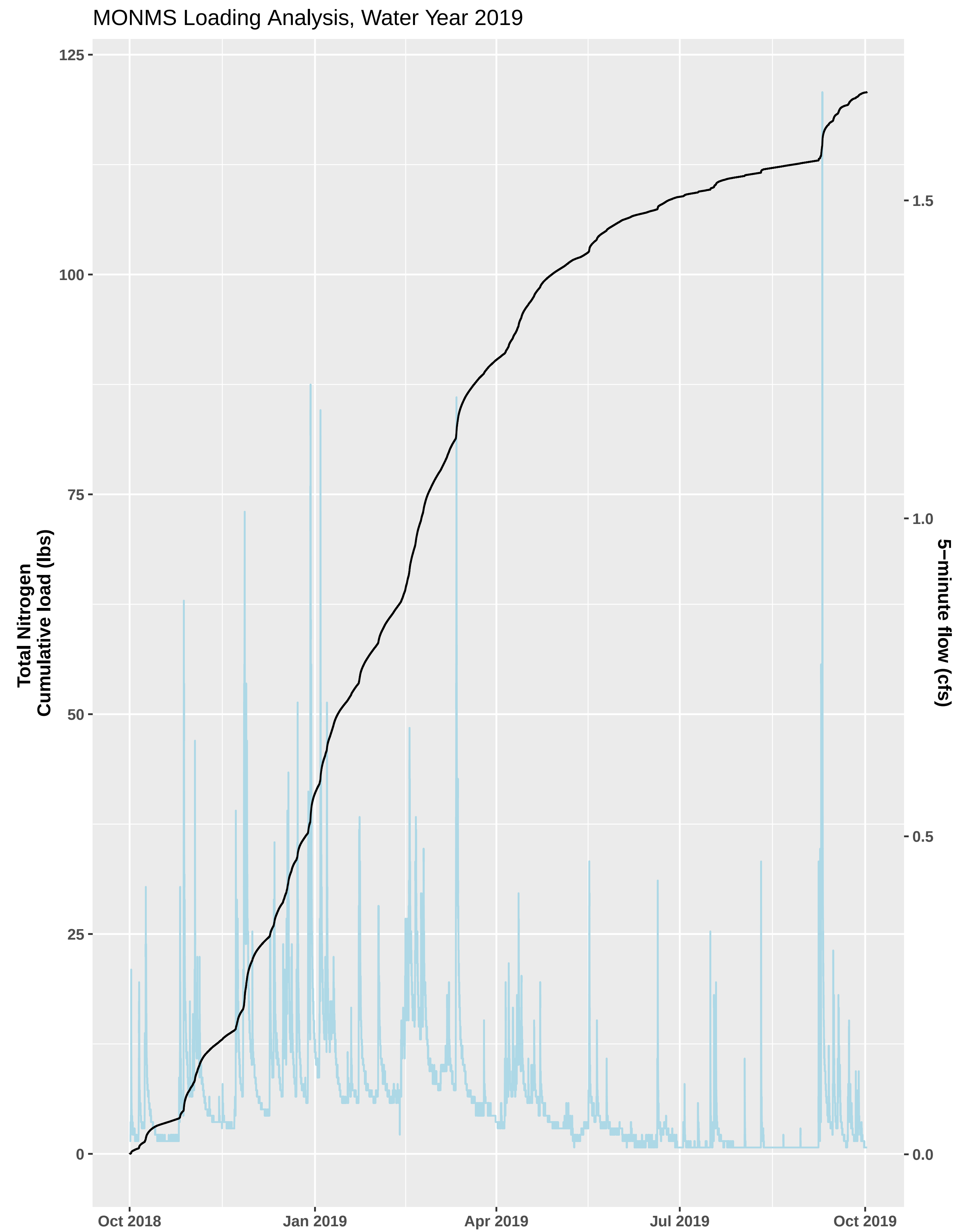

MONMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.0000
0.0050
0.0100
0.0150
0.0200
0.0
0.1
0.2
0.3
0.4

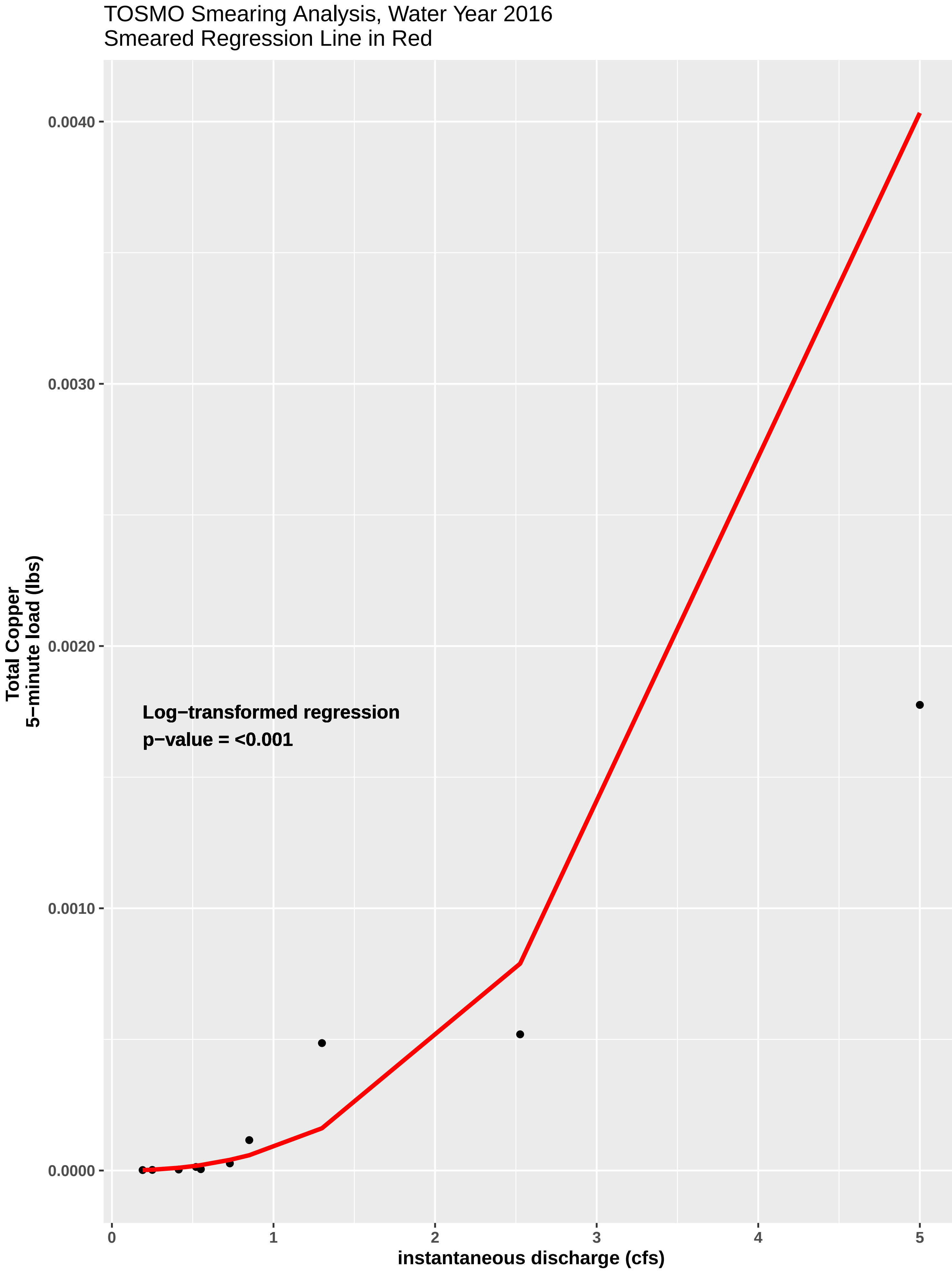

MONMS Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
0
100
200
300
400
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

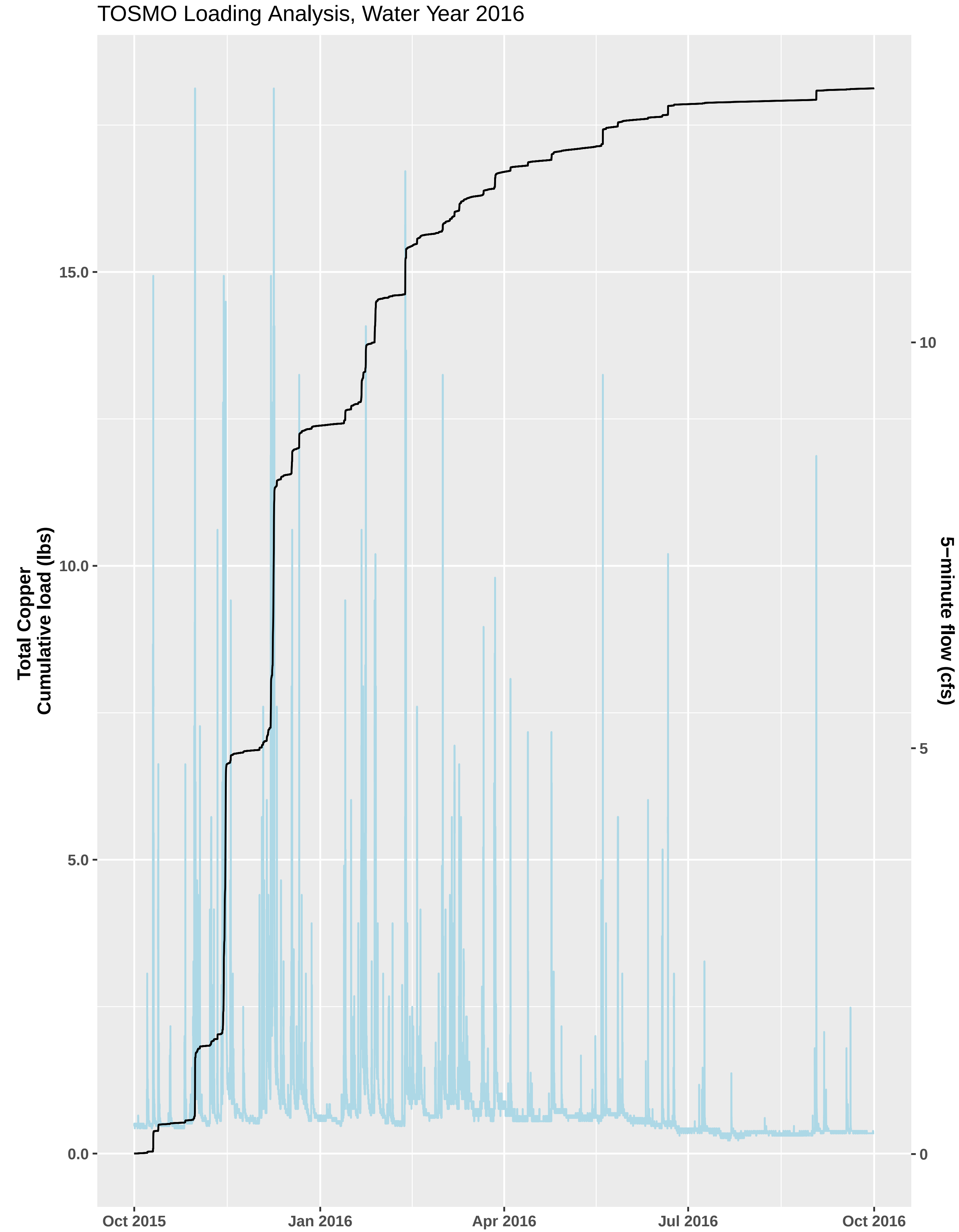

MONMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.000
0.010
0.020
0.030
0.040
0.0
0.5
1.0
1.5

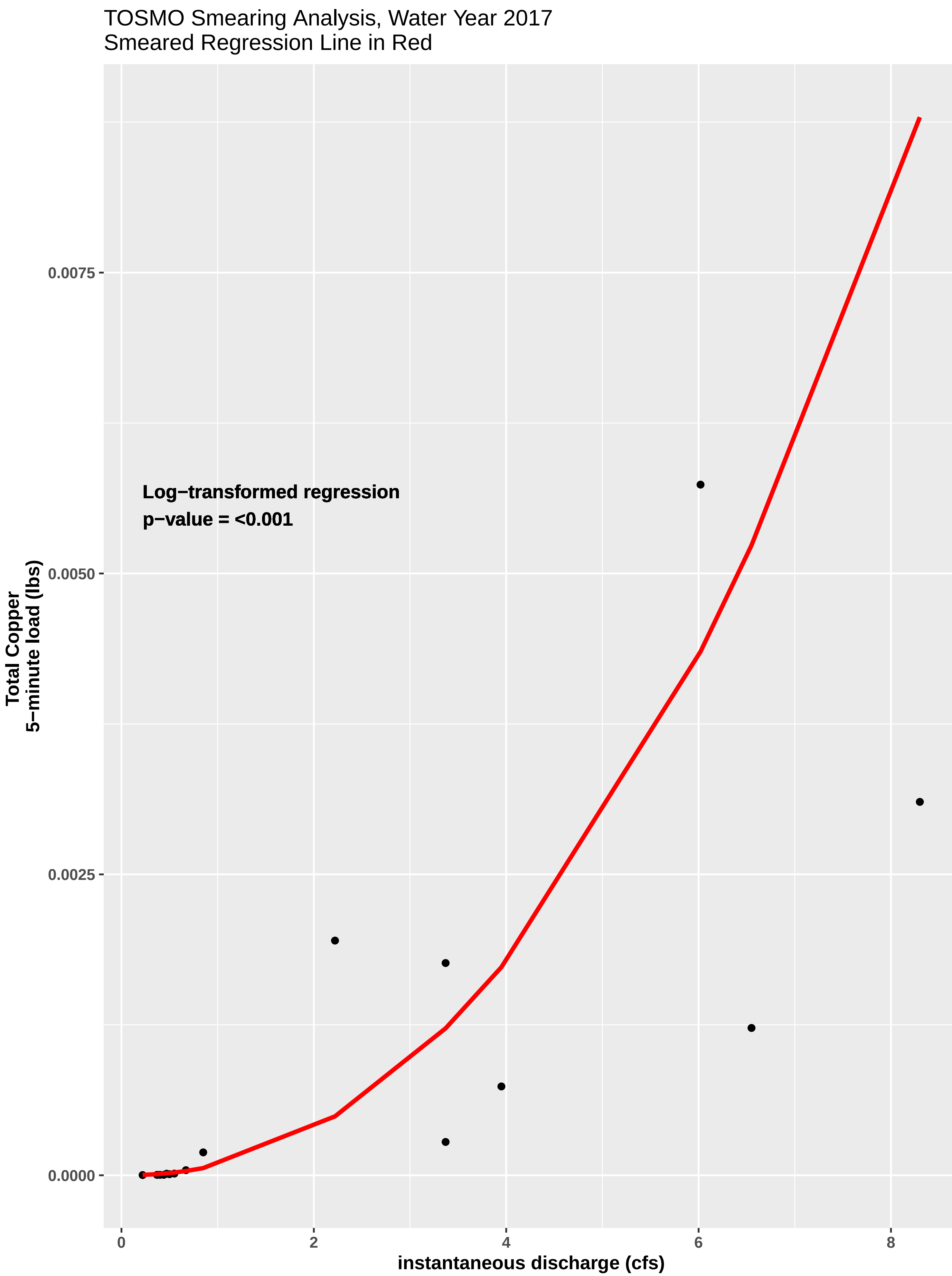

MONMS Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
0
50
100
150
200
250
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

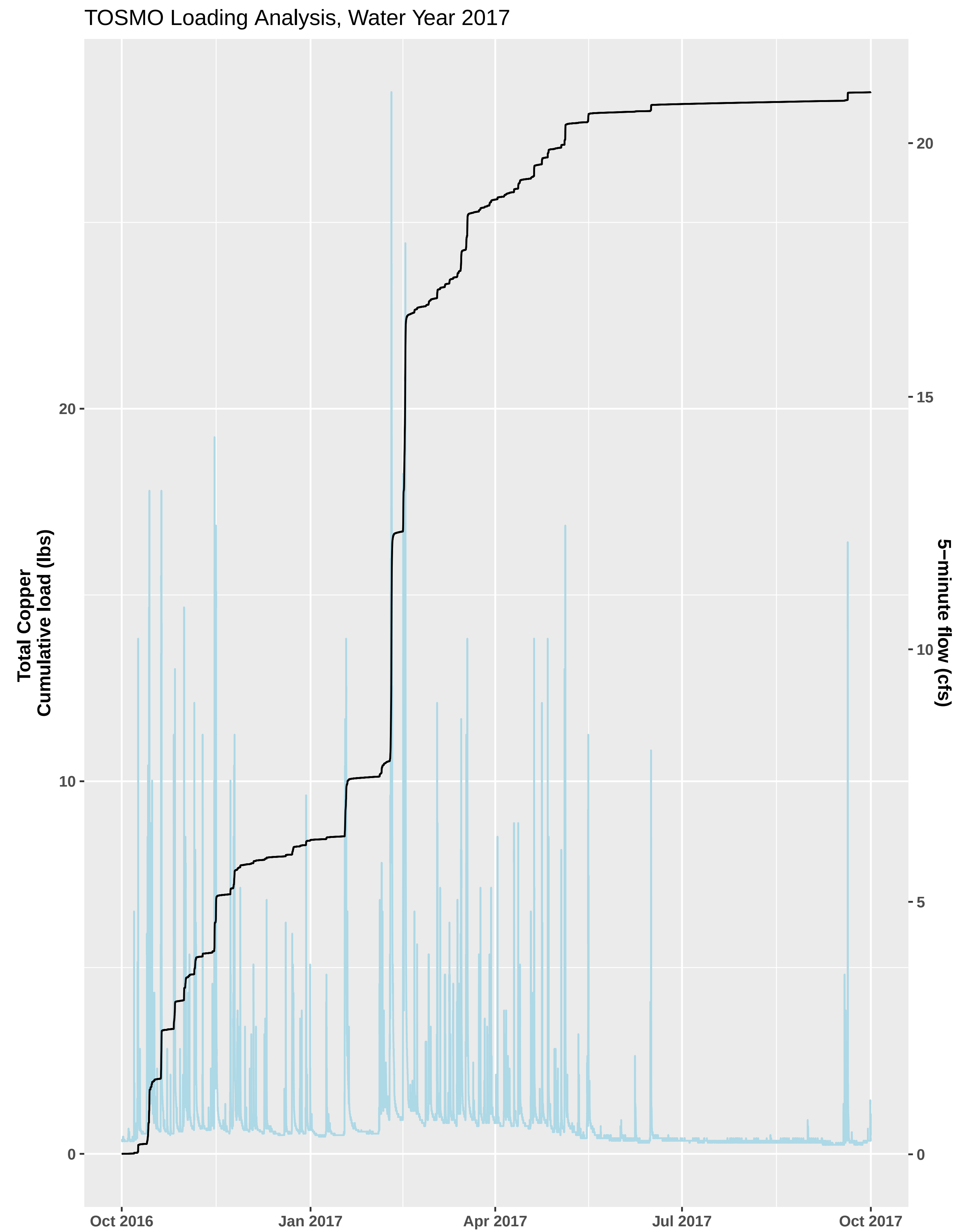

MONMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0025
0.0050
0.0075
0.0
0.2
0.4
0.6
0.8
instantaneous discharge (cfs)

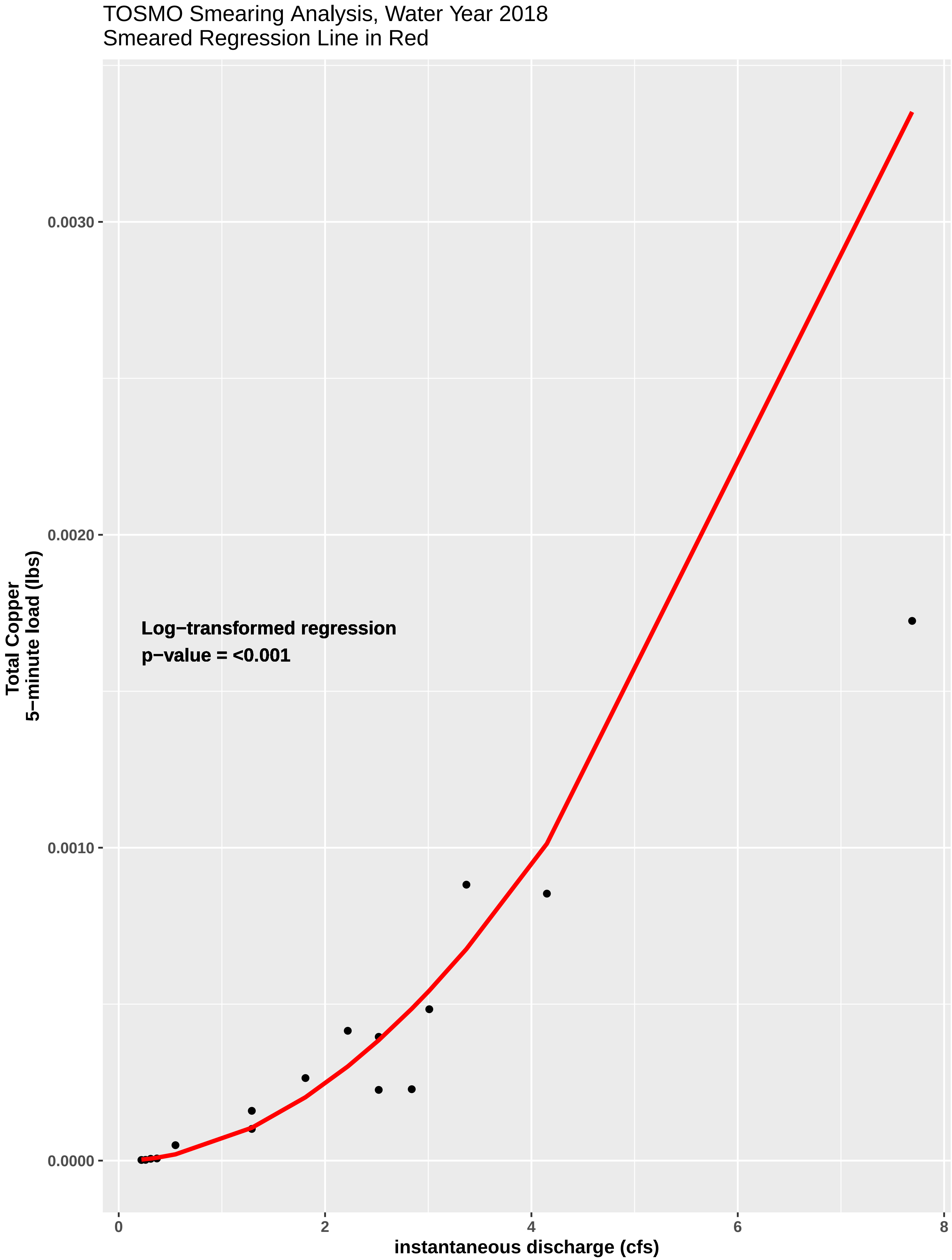

MONMS Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
25
50
75
100
125
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

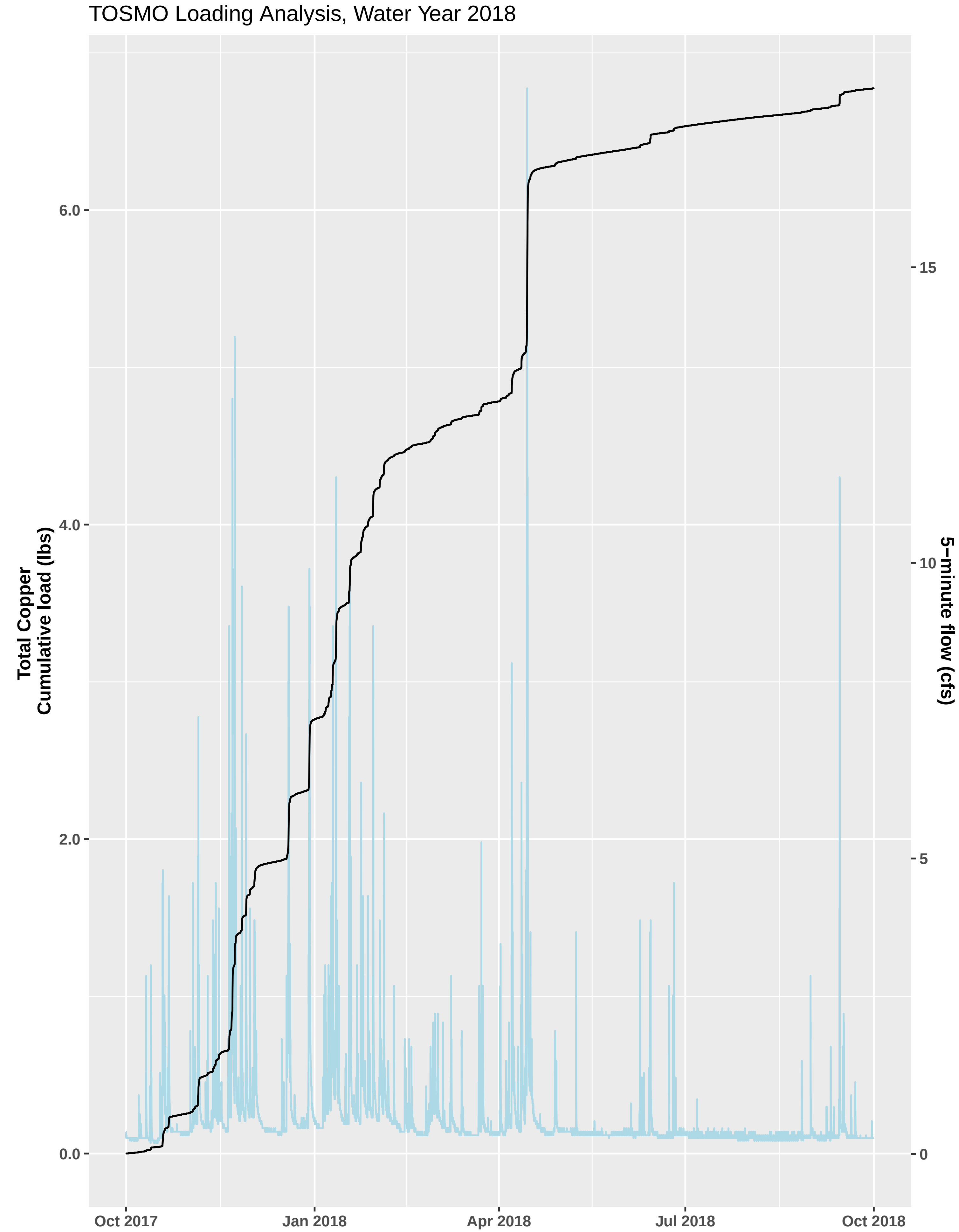

TOSMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0040
0
1
2
3
4
5
instantaneous discharge (cfs)

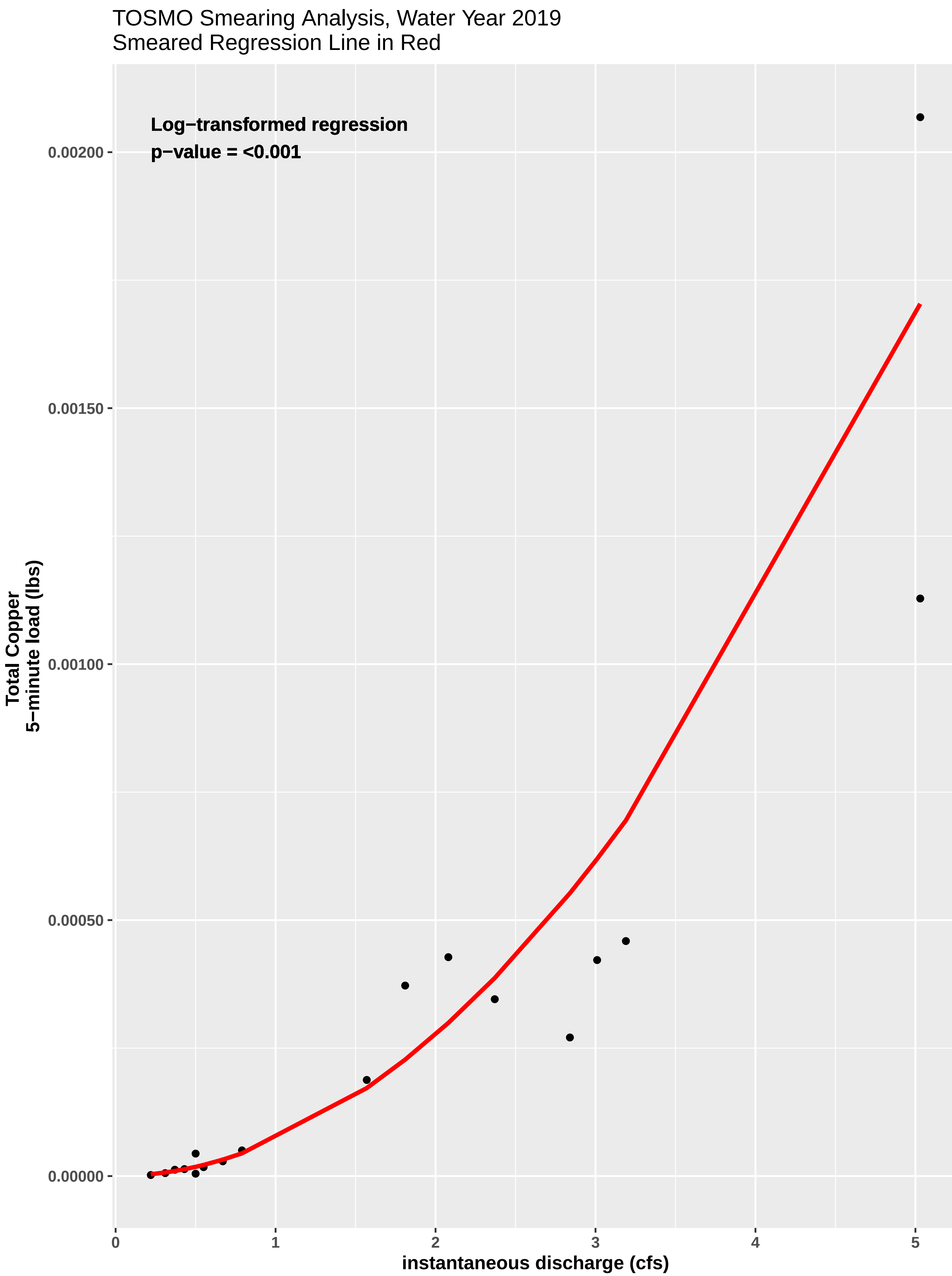

TOSMO Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
0.0
5.0
10.0
15.0
5−minute flow (cfs)
0
5
10
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

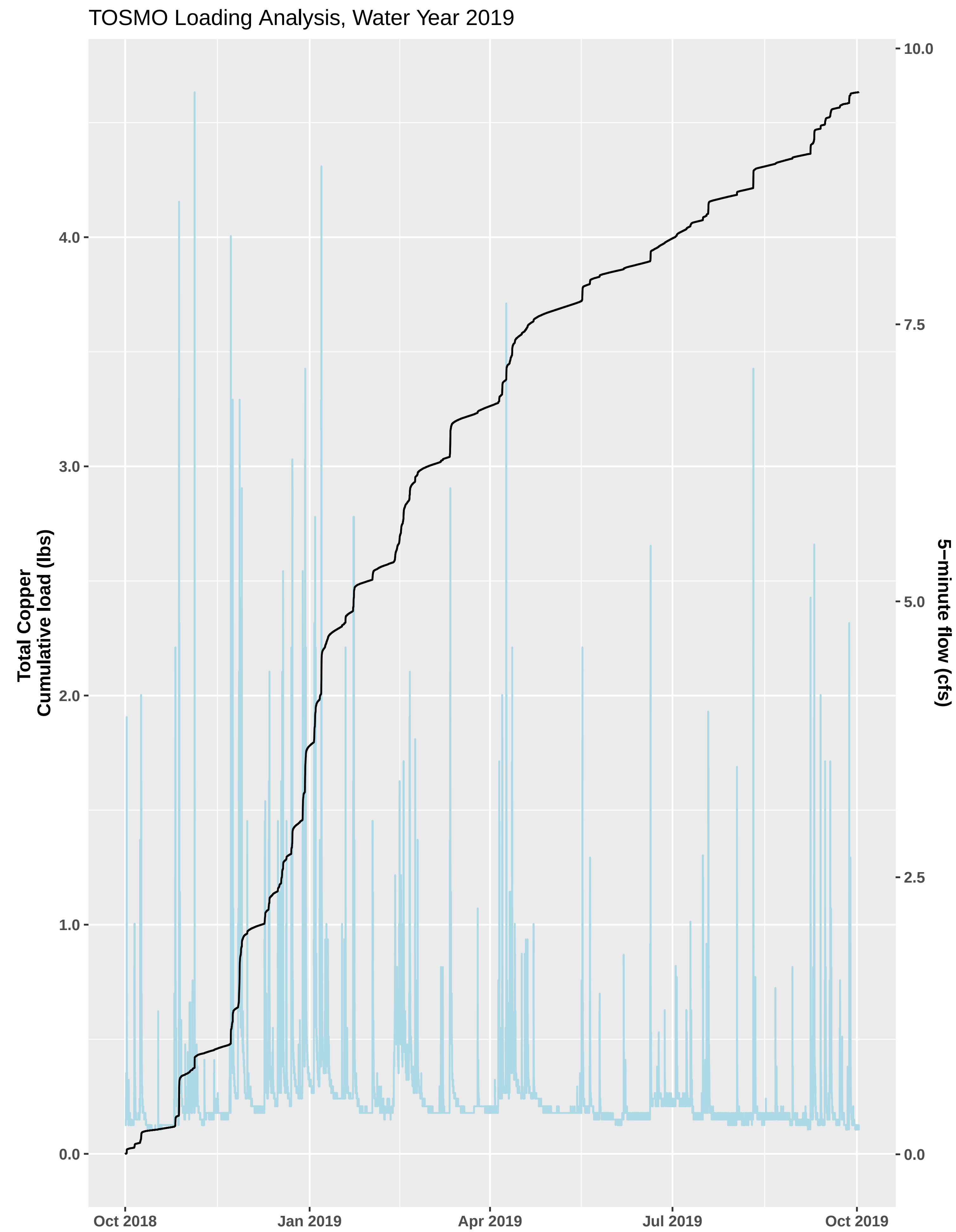

TOSMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.0075
0.0050
0.0025
0.0000
0
2
4
6
8
instantaneous discharge (cfs)

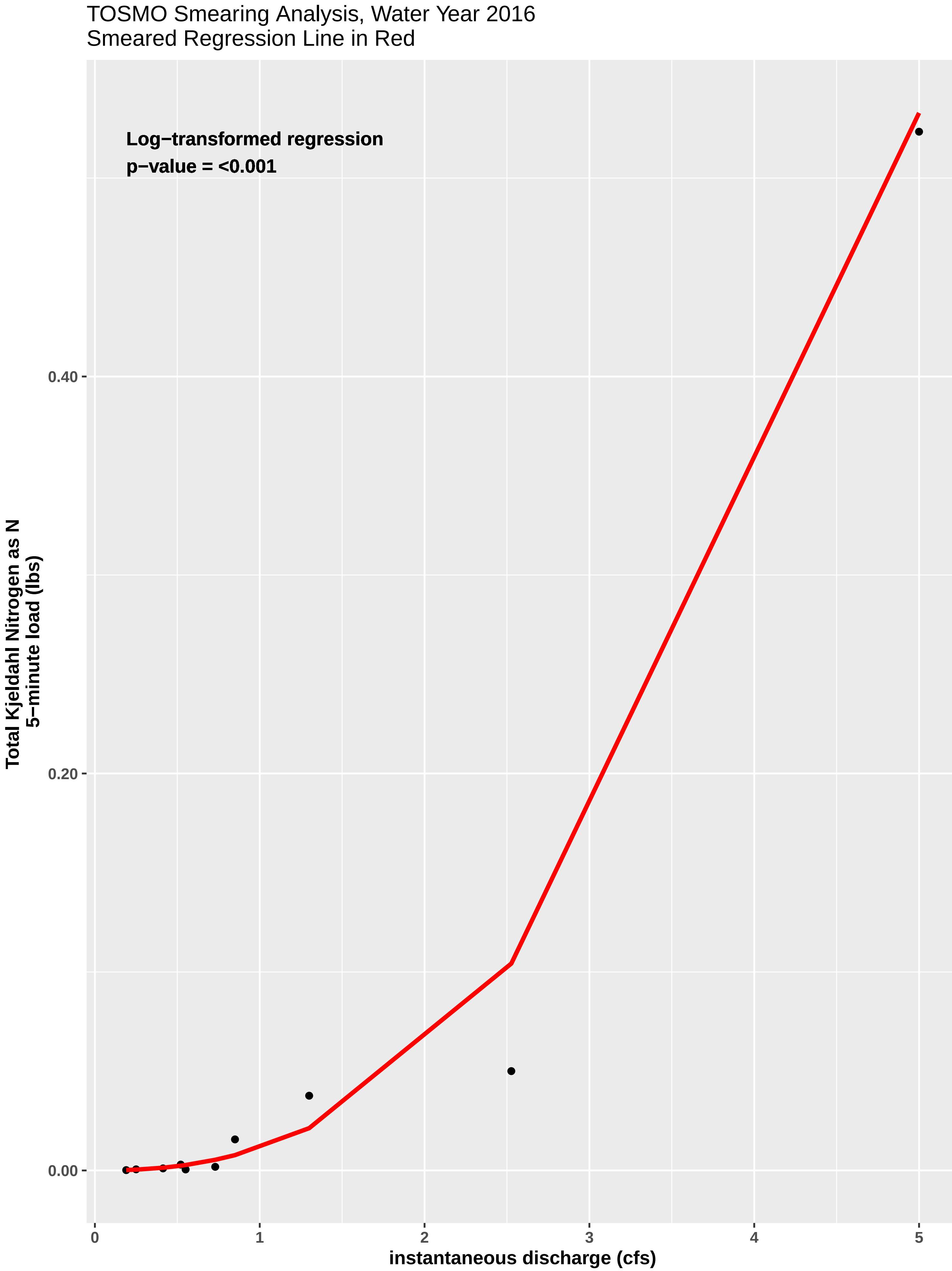

TOSMO Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
20
10
0
5−minute flow (cfs)
20
15
10
5
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TOSMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0
2
4
6
8
instantaneous discharge (cfs)

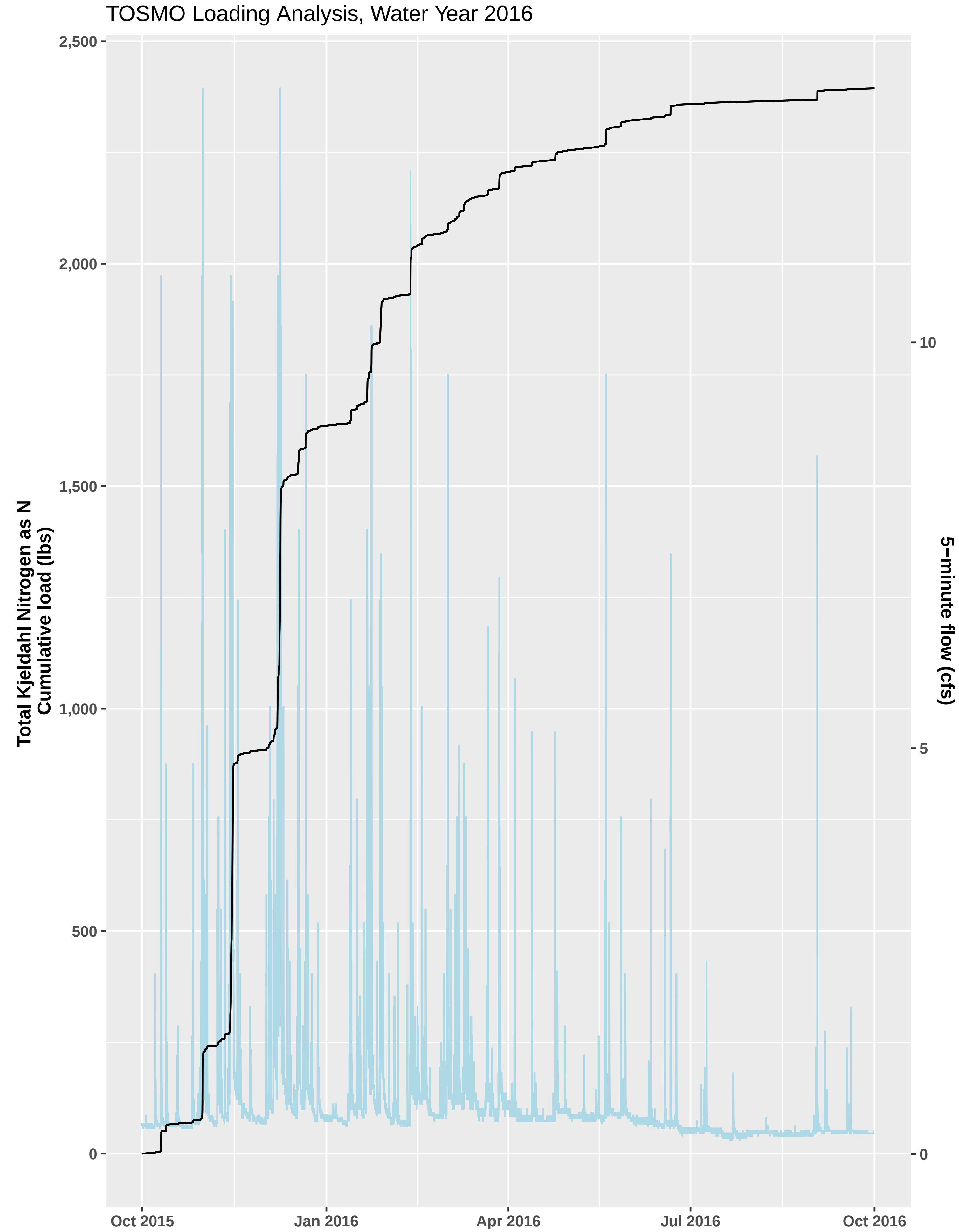

TOSMO Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.0
2.0
4.0
6.0
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TOSMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00050
0.00100
0.00150
0.00200
0
1
2
3
4
5
instantaneous discharge (cfs)

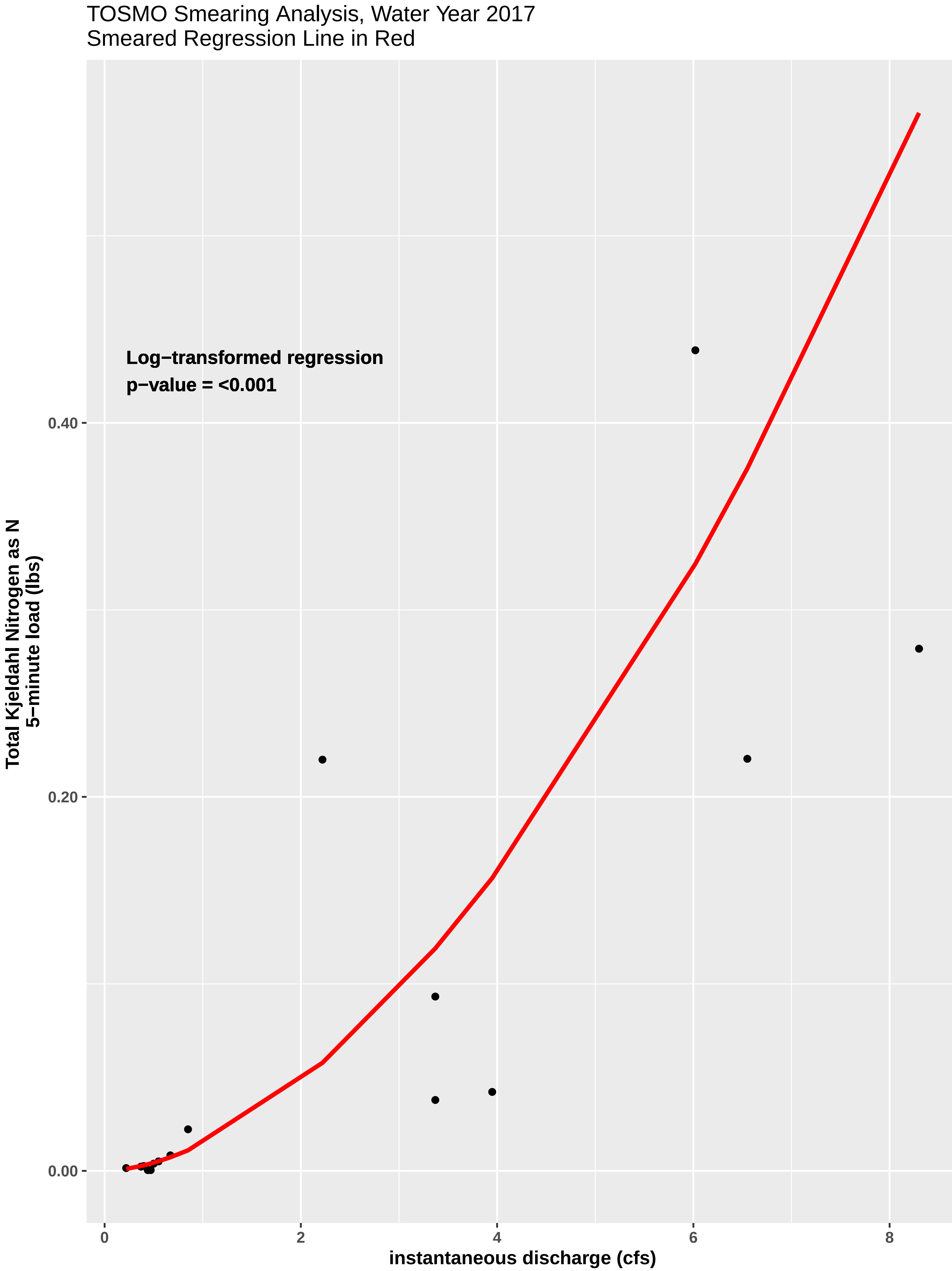

TOSMO Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.0
1.0
2.0
3.0
4.0
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

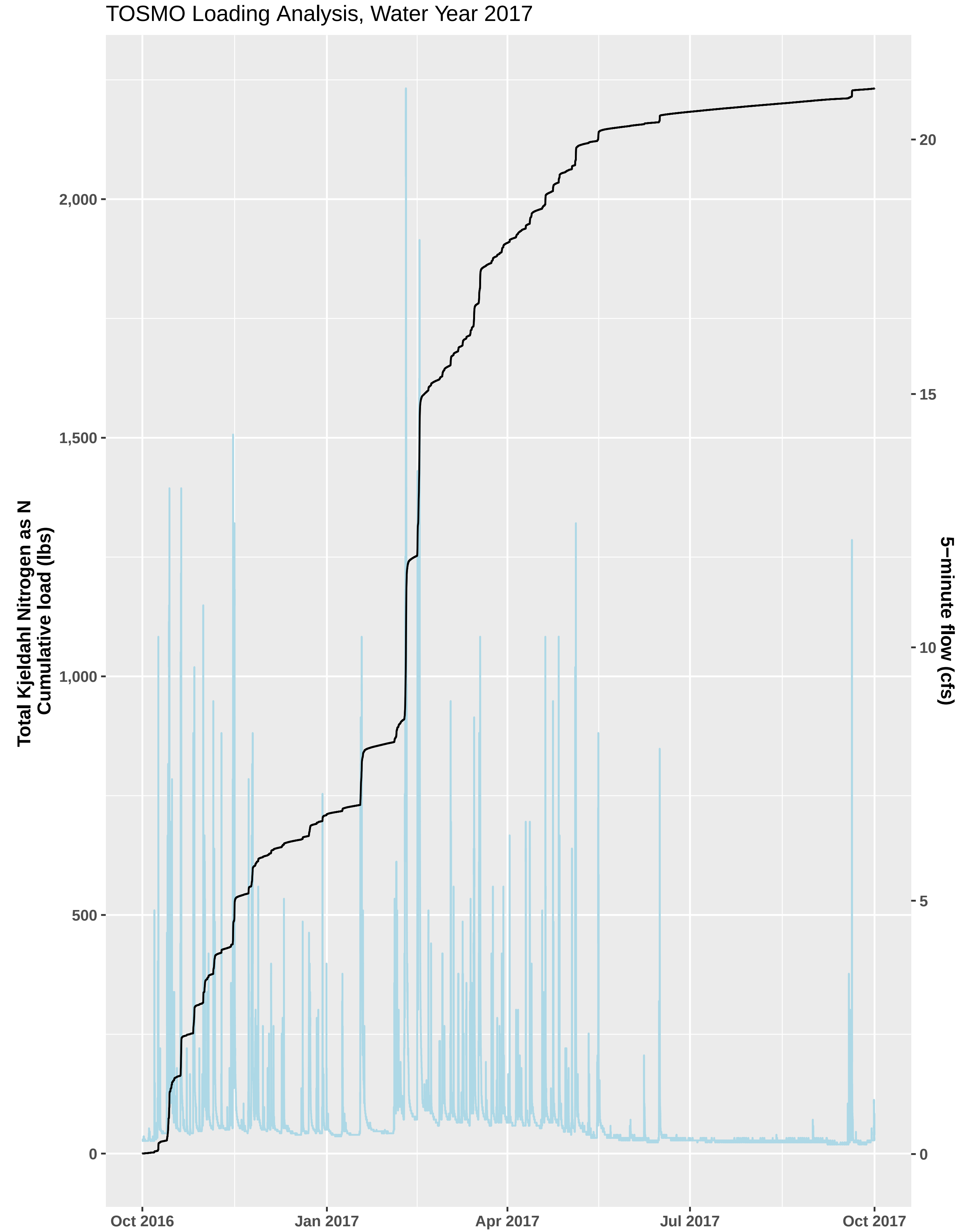


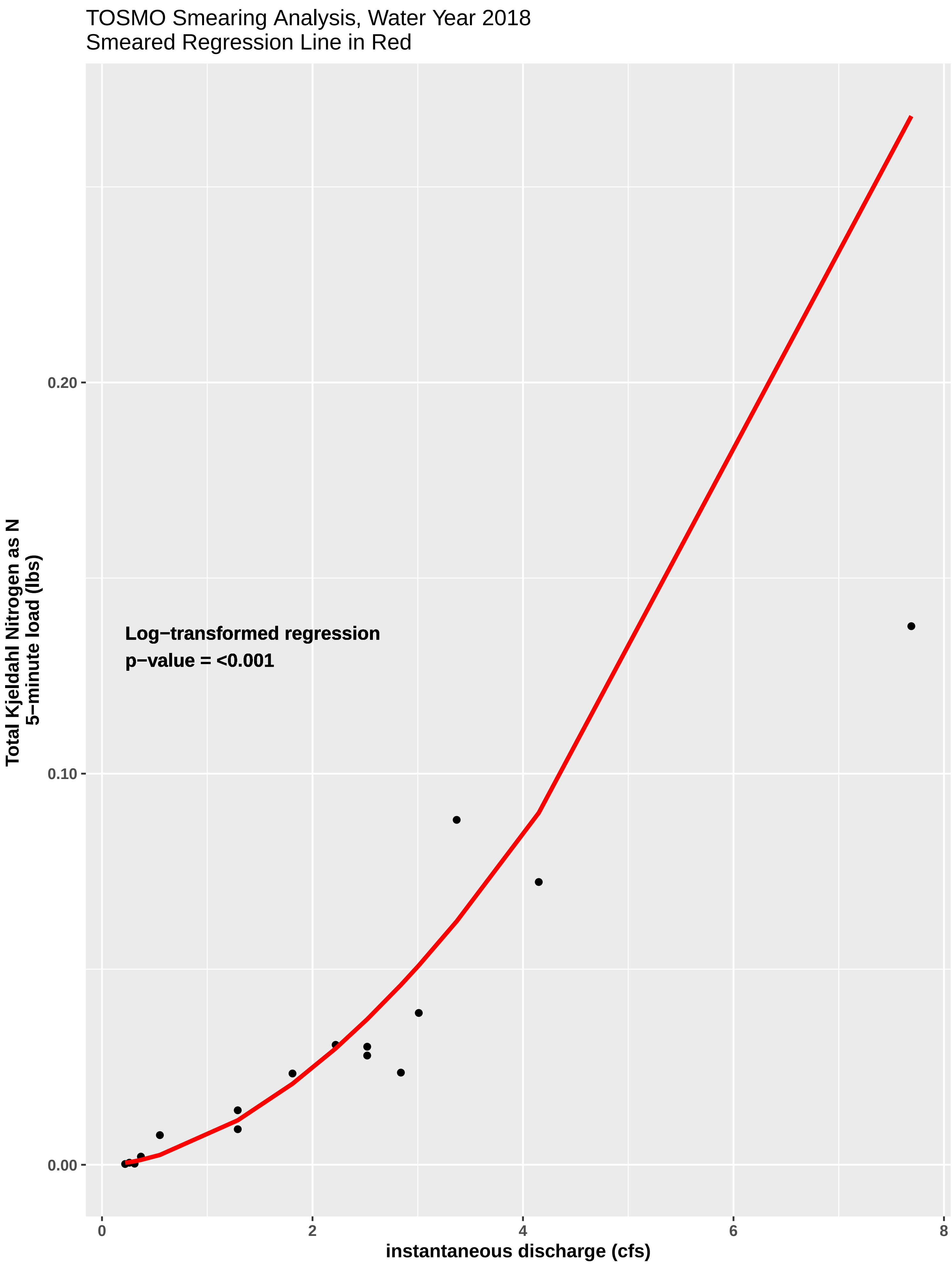
TOSMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.00
0.20
0.40
0
1
2
3
4
5
instantaneous discharge (cfs)

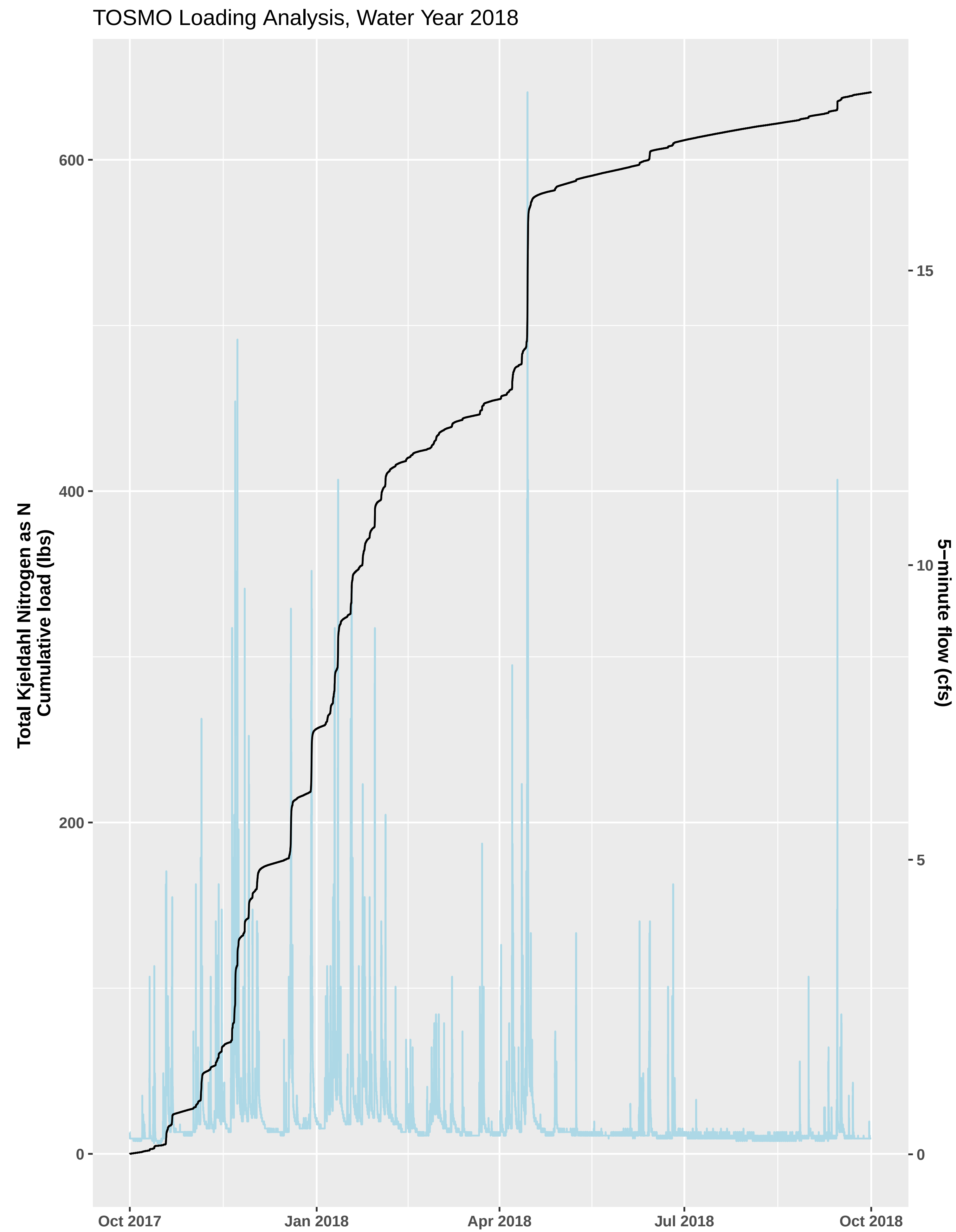


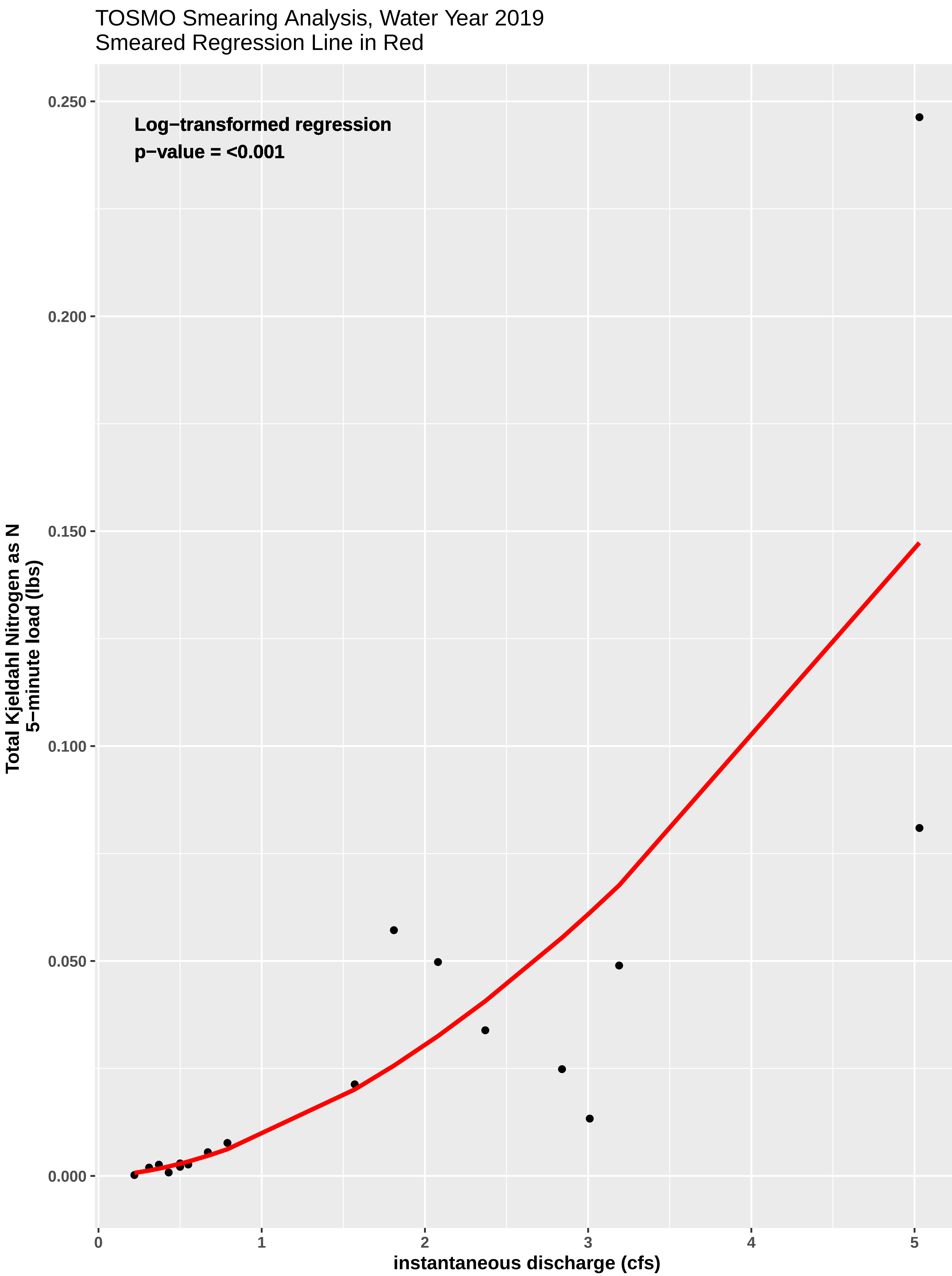
TOSMO Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
1,500
2,000
2,500
5−minute flow (cfs)
0
5
10
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

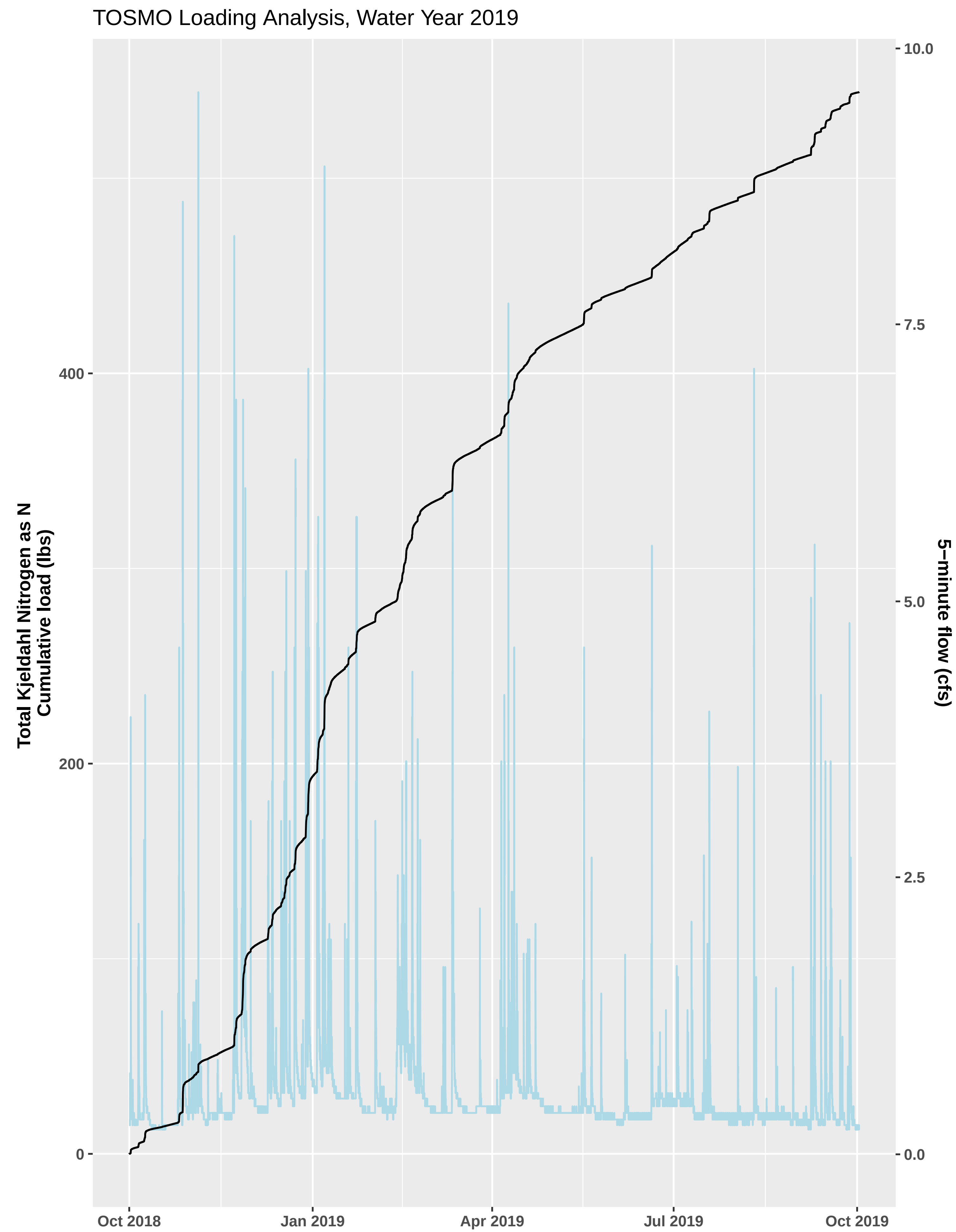

TOSMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.00
0.20
0.40
0
2
4
6
8
instantaneous discharge (cfs)

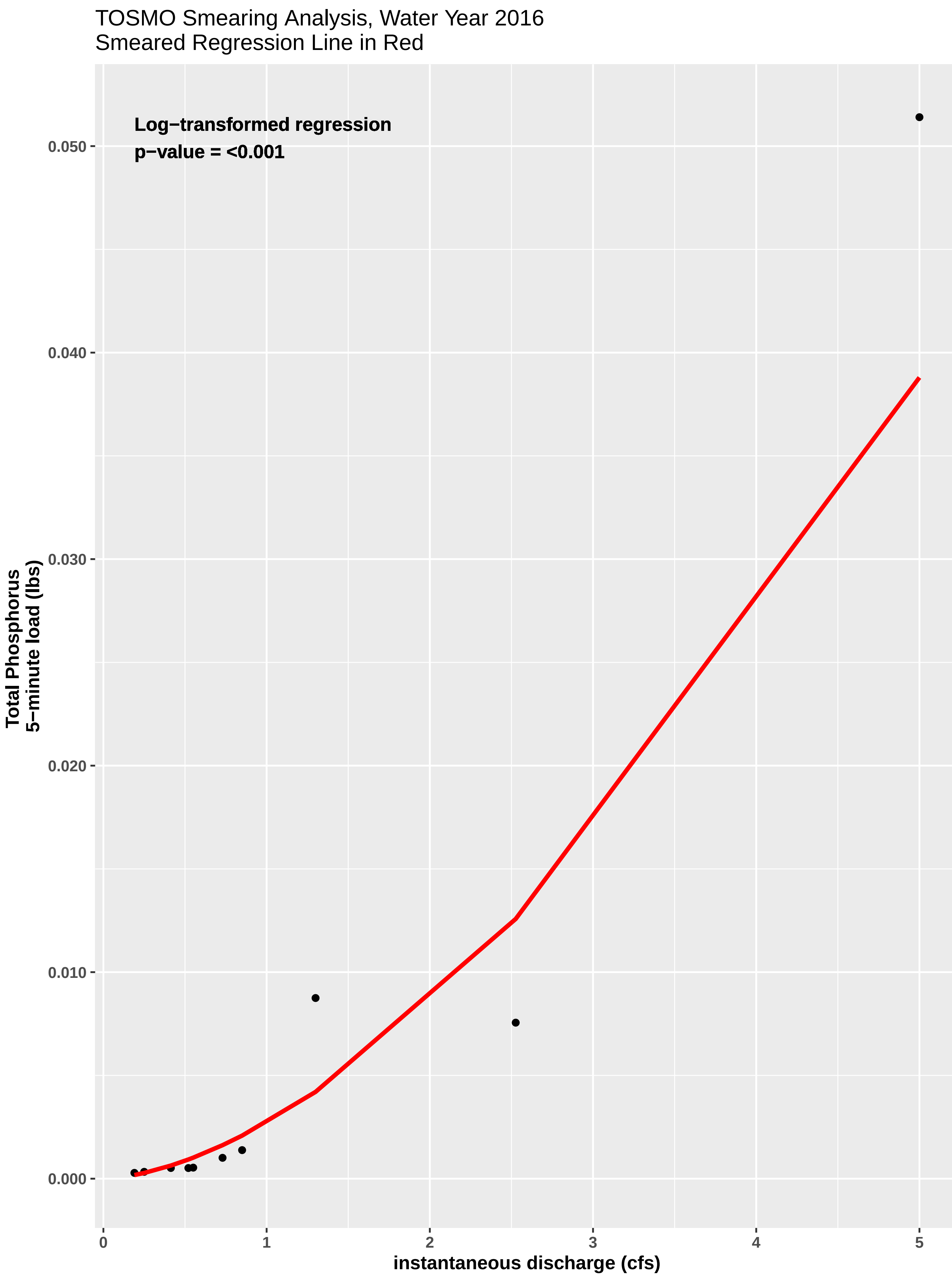

TOSMO Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

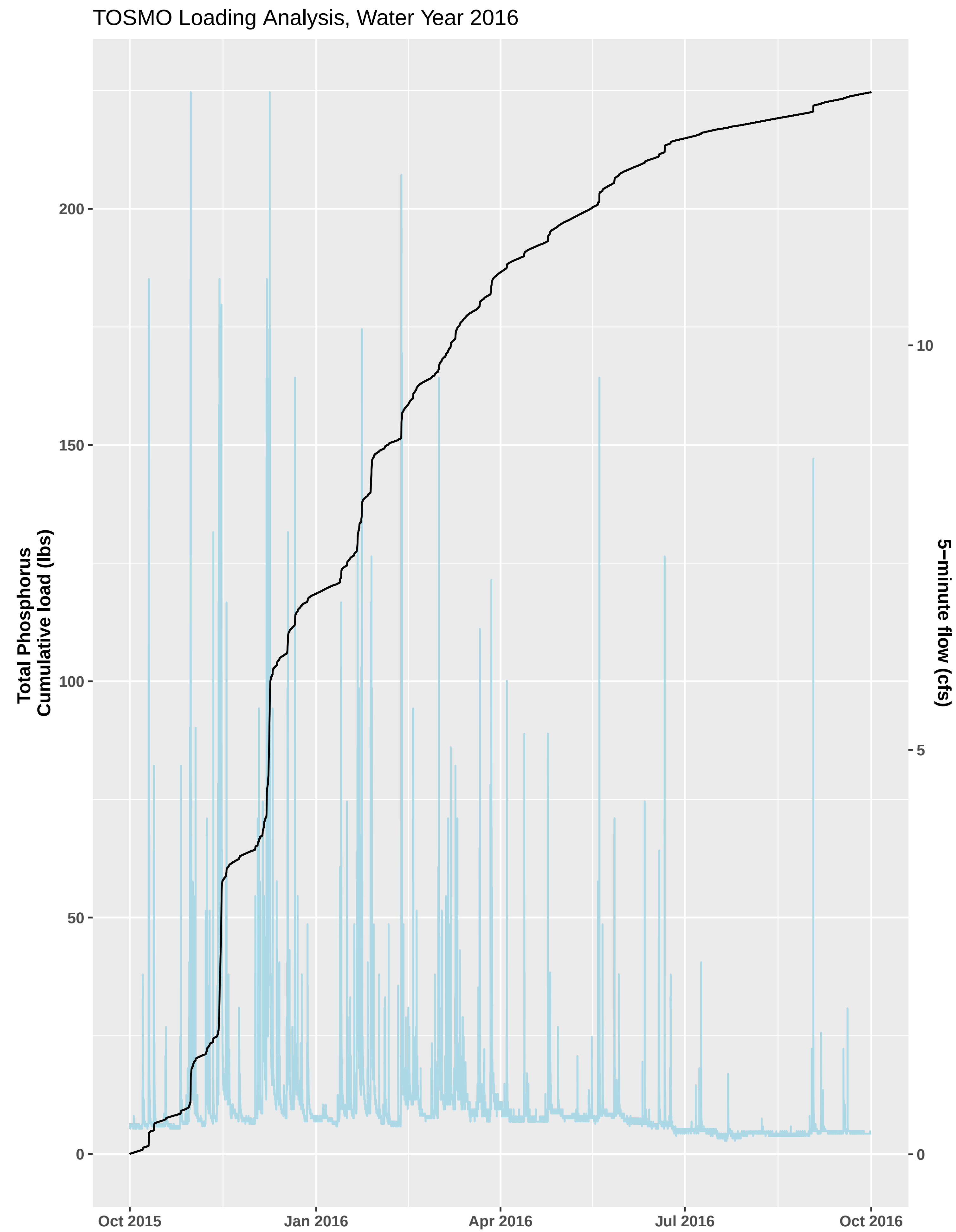

TOSMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.10
0.20
0
2
4
6
8

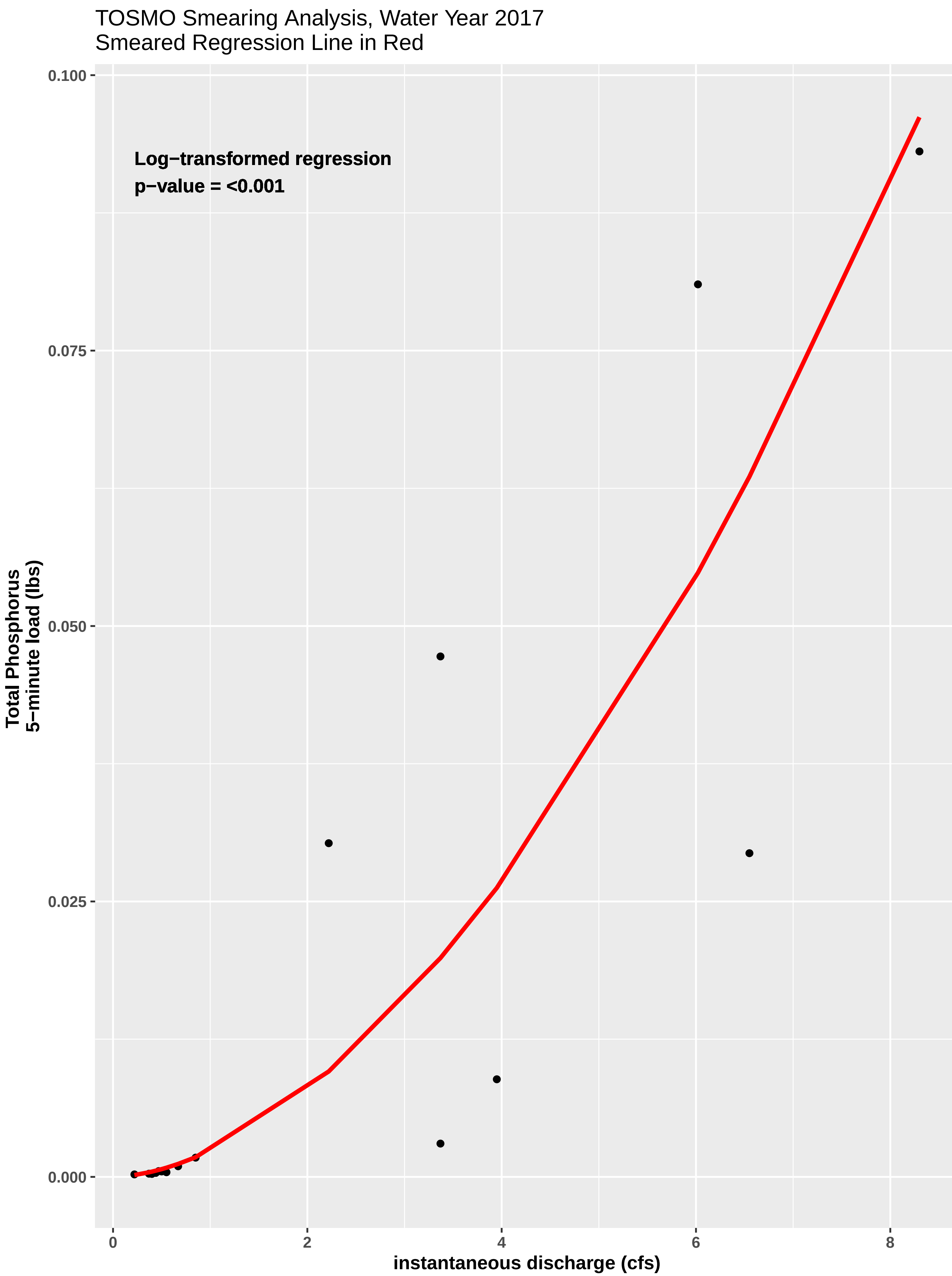

TOSMO Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
0
200
400
600
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

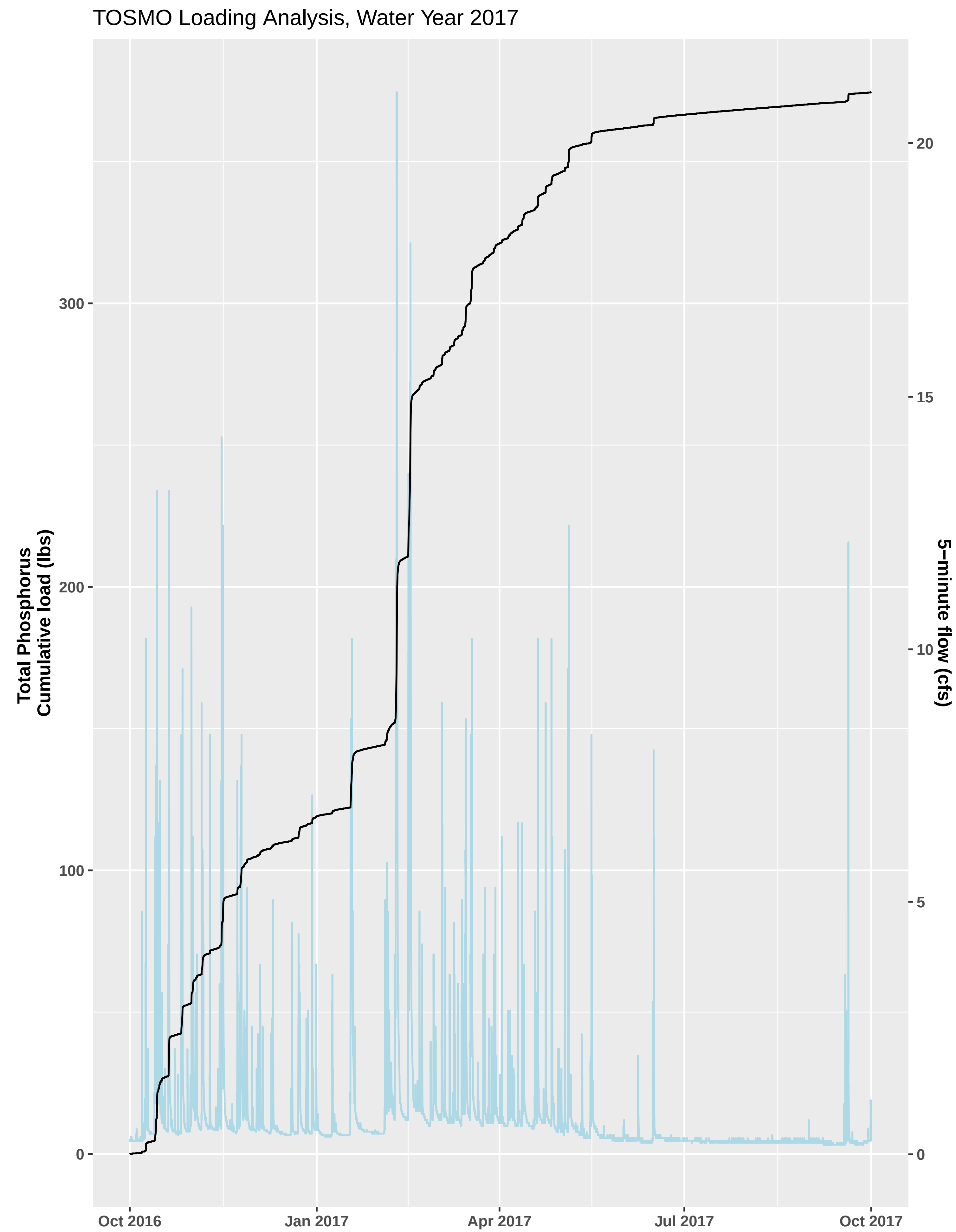

TOSMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.250
0.200
0.150
0.100
0.050
0.000
0
1
2
3
4
5
instantaneous discharge (cfs)

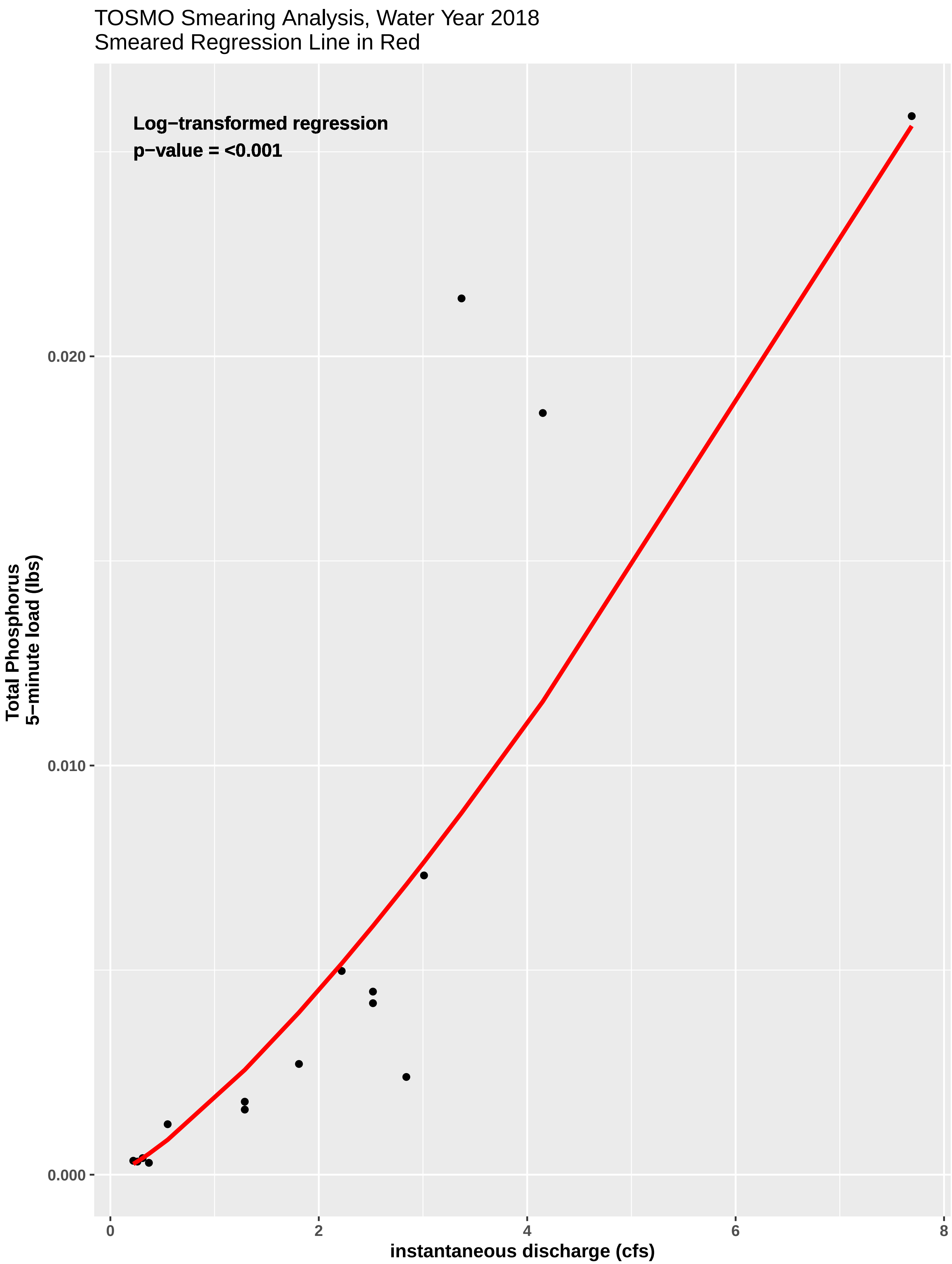

TOSMO Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
400
200
0
5−minute flow (cfs)
10.0
7.5
5.0
2.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TOSMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.040
0.050
0
1
2
3
4
5
instantaneous discharge (cfs)

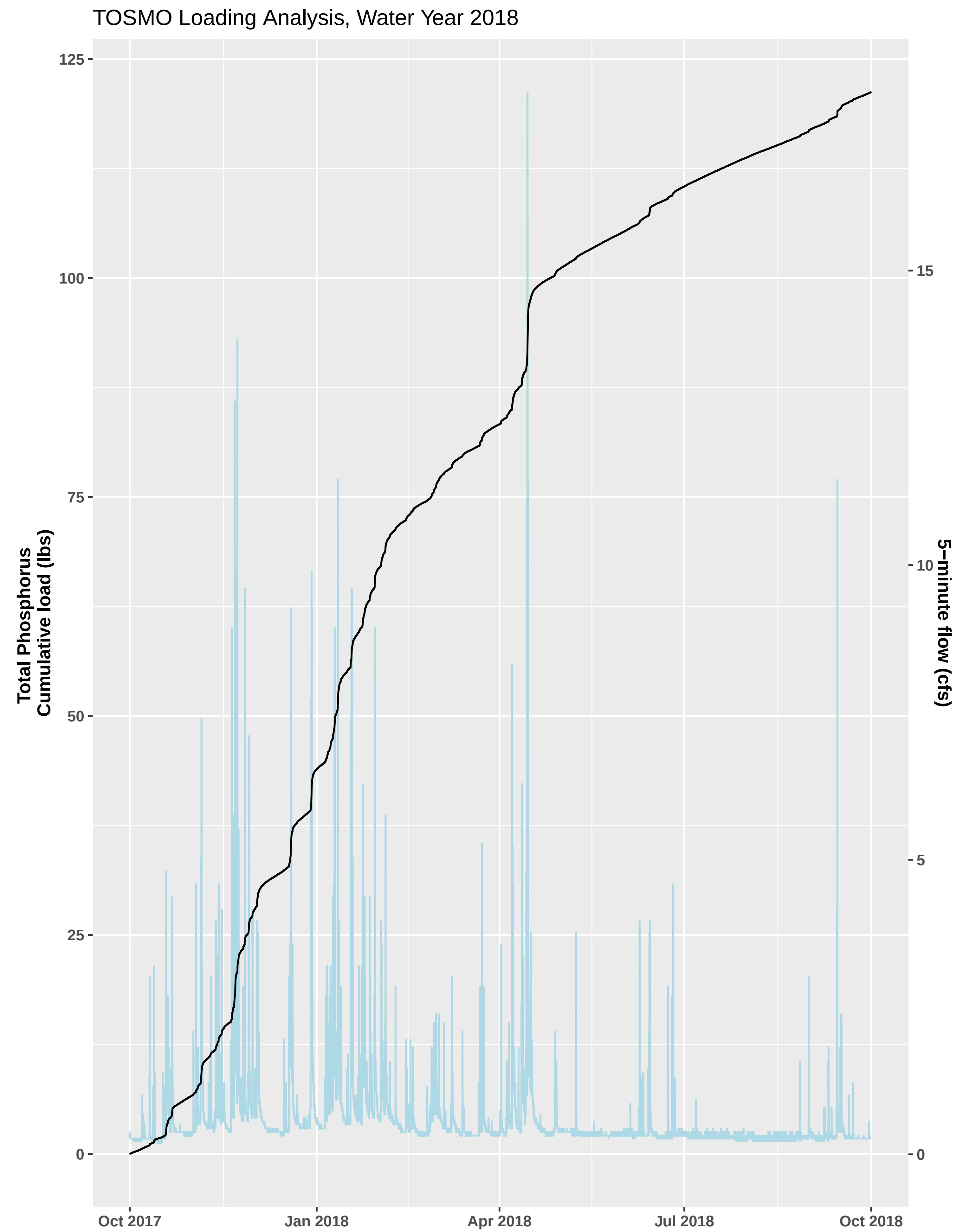

TOSMO Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0
50
100
150
200
5−minute flow (cfs)
0
5
10
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TOSMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.100
0.075
0.050
0.025
0.000
0
2
4
6
8
instantaneous discharge (cfs)

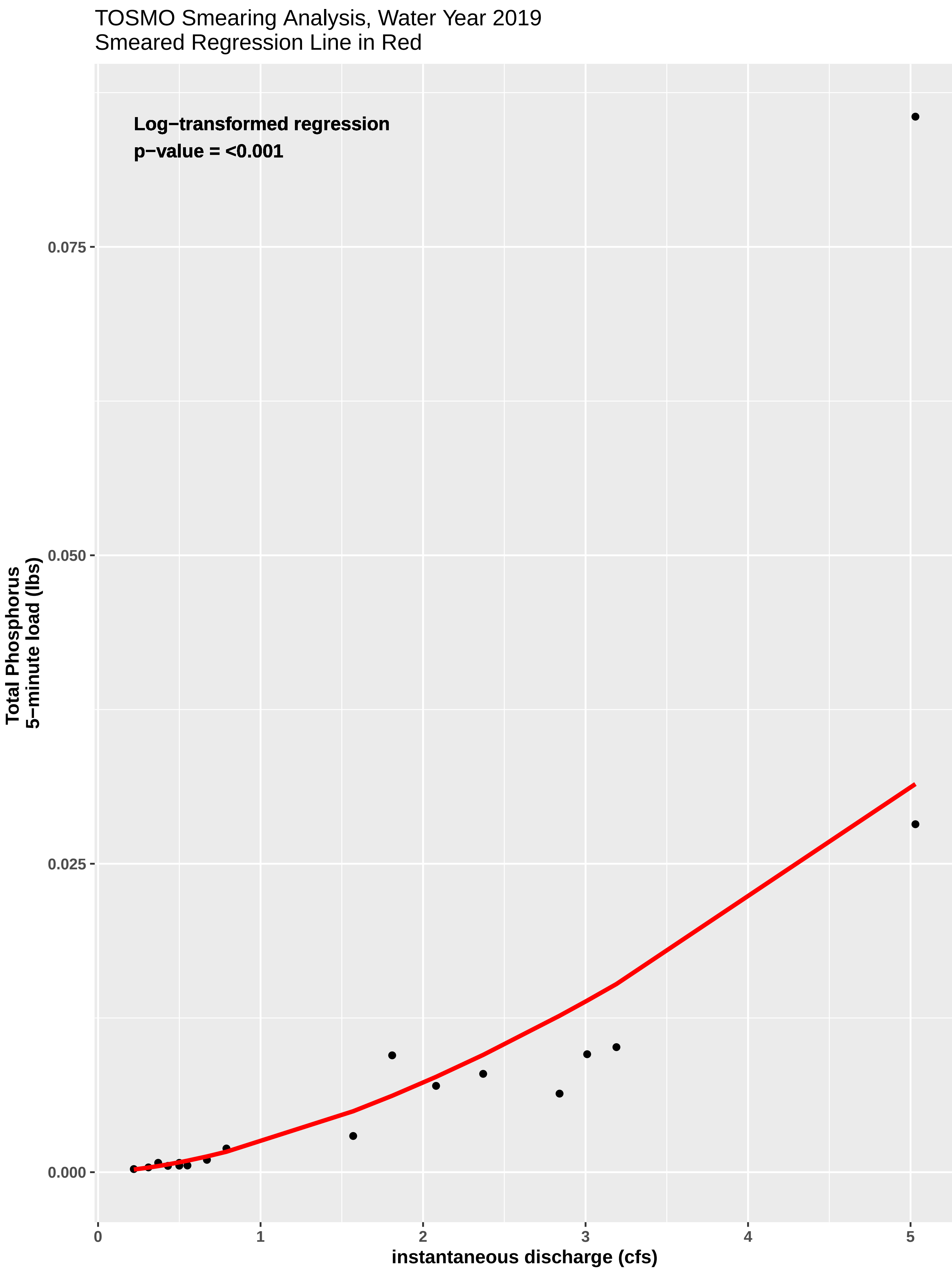

TOSMO Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
300
200
100
0
5−minute flow (cfs)
20
15
10
5
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

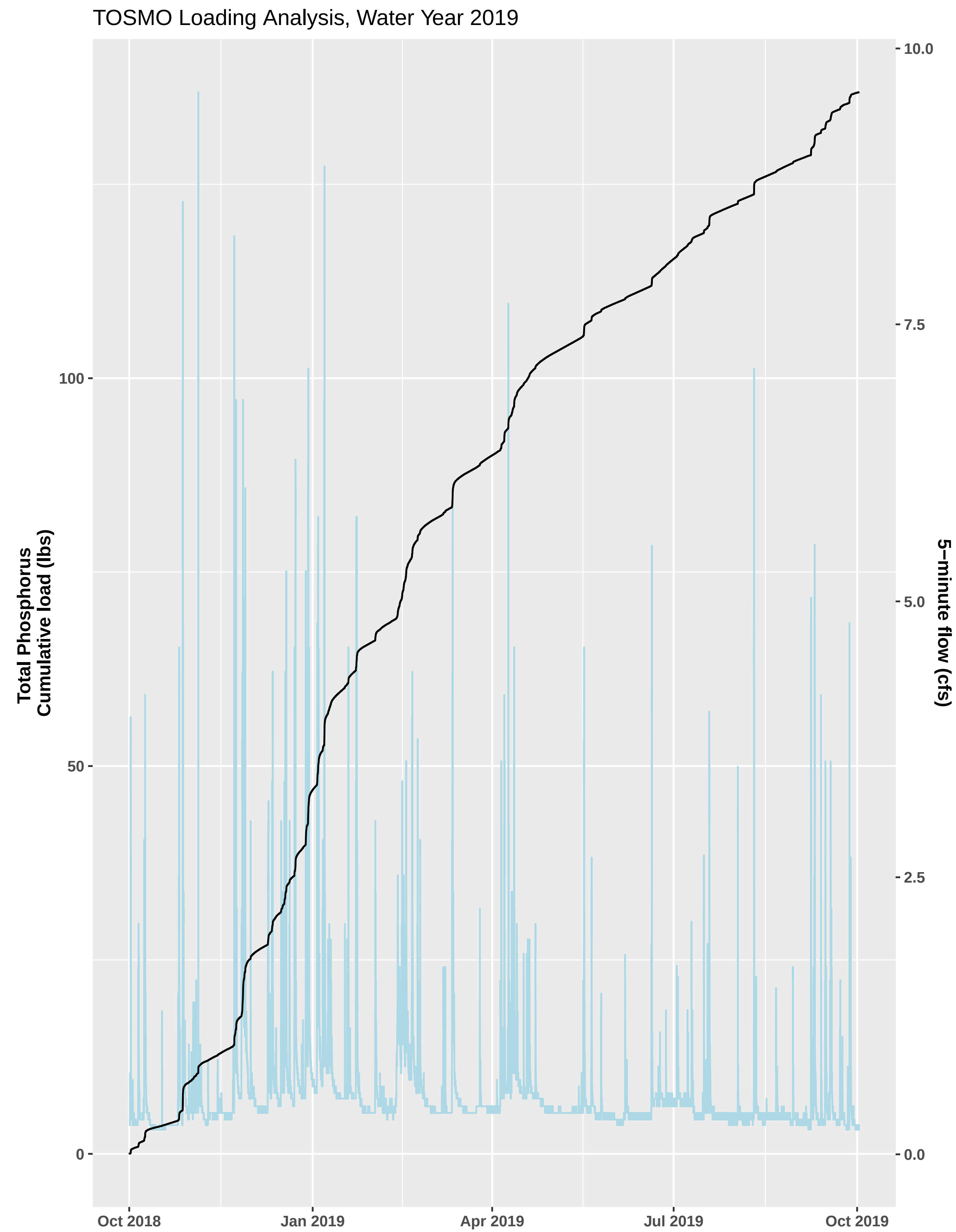


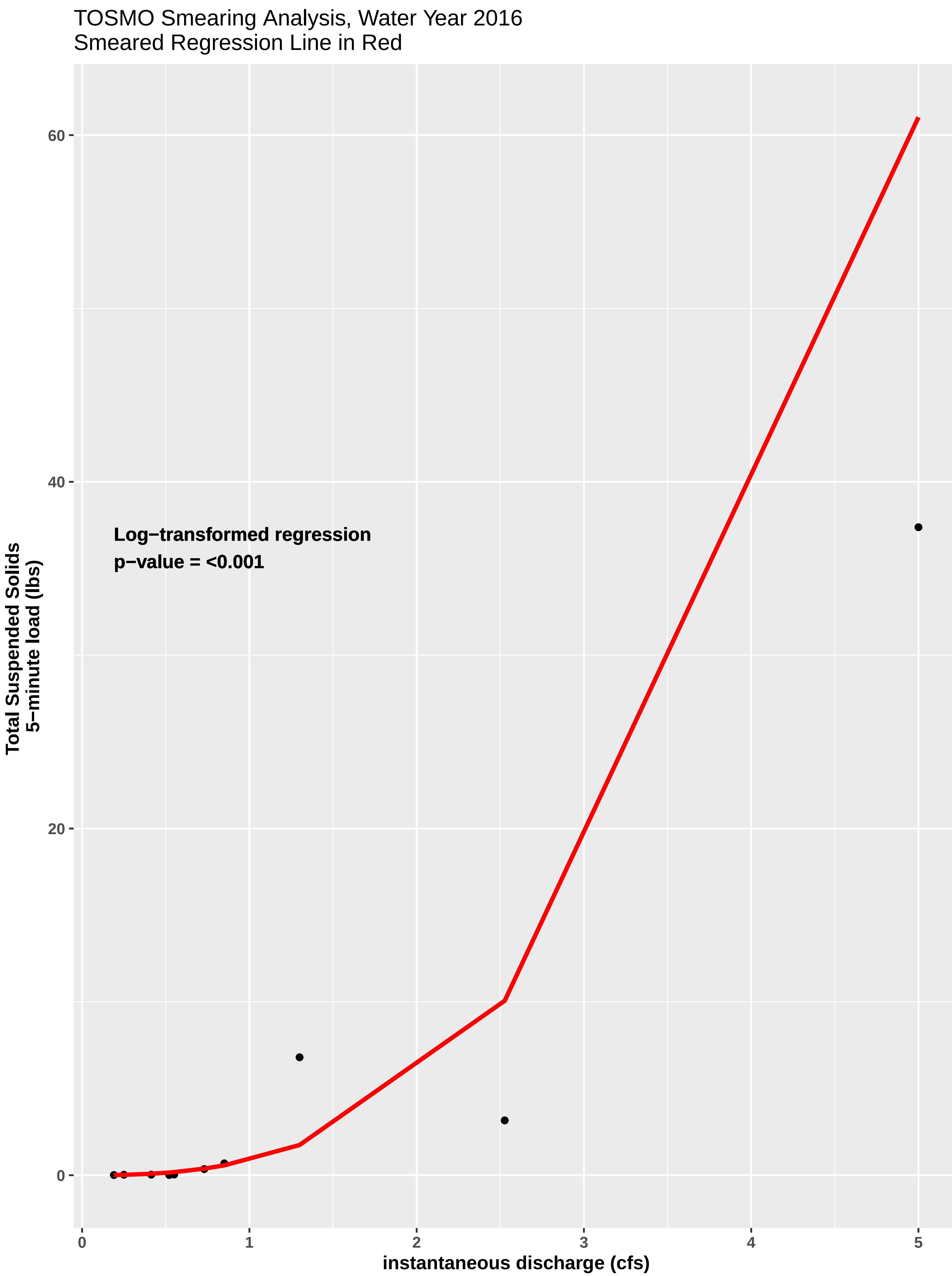
TOSMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.000
0.010
0.020
0
2
4
6
8
instantaneous discharge (cfs)



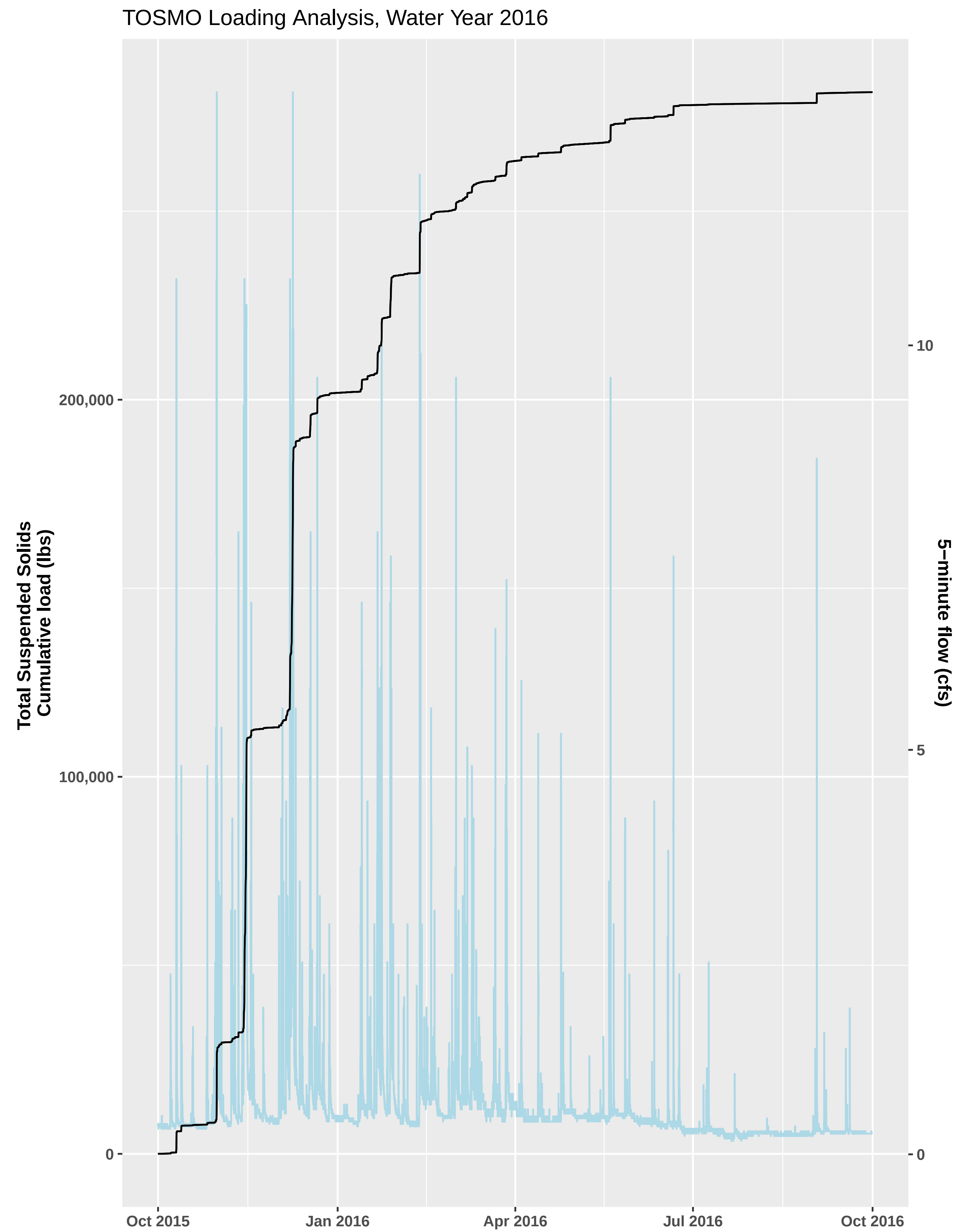
TOSMO Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
100
125
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TOSMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.000
0.025
0.050
0.075
0
1
2
3
4
5
instantaneous discharge (cfs)

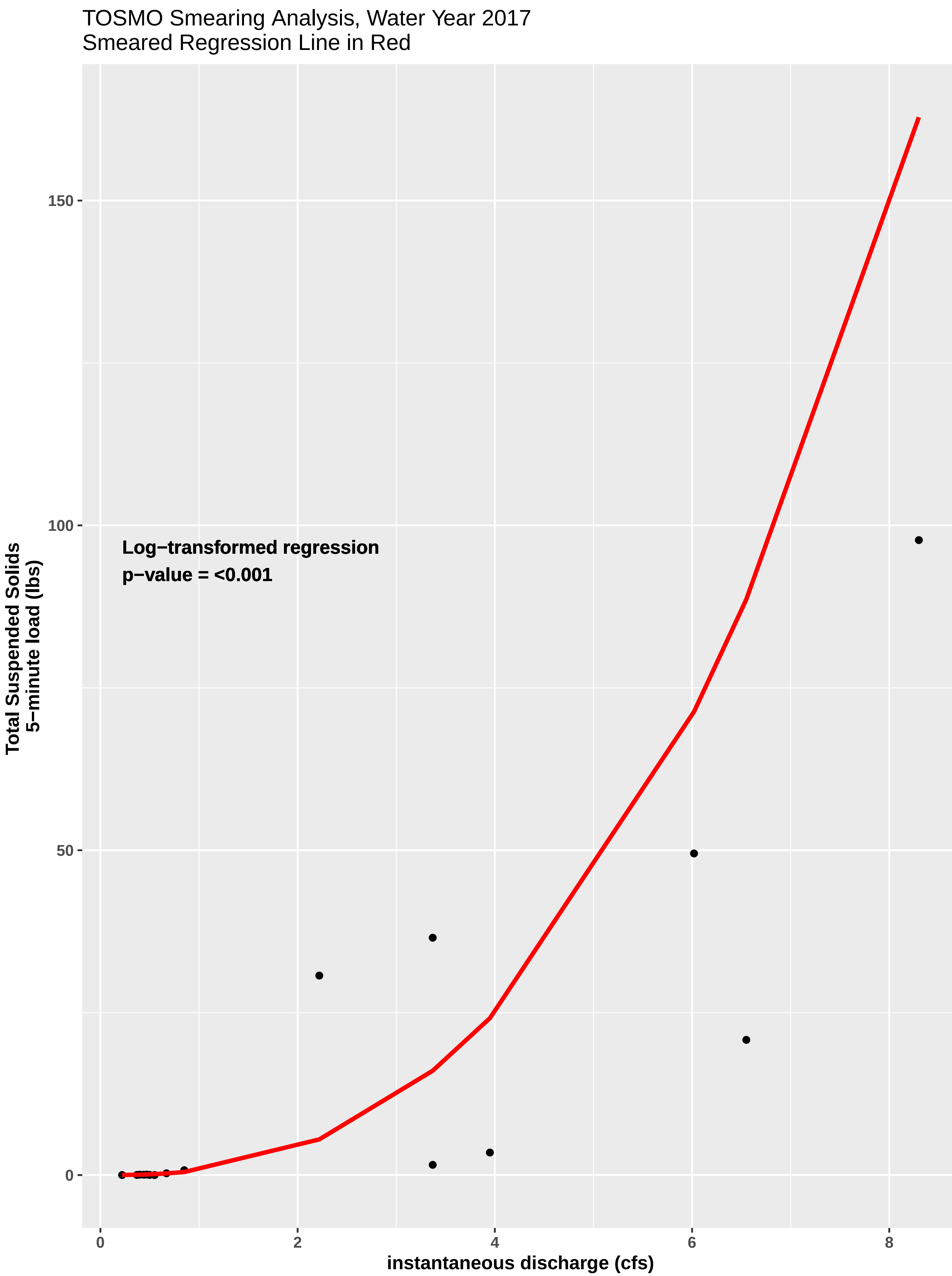

TOSMO Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
50
100
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

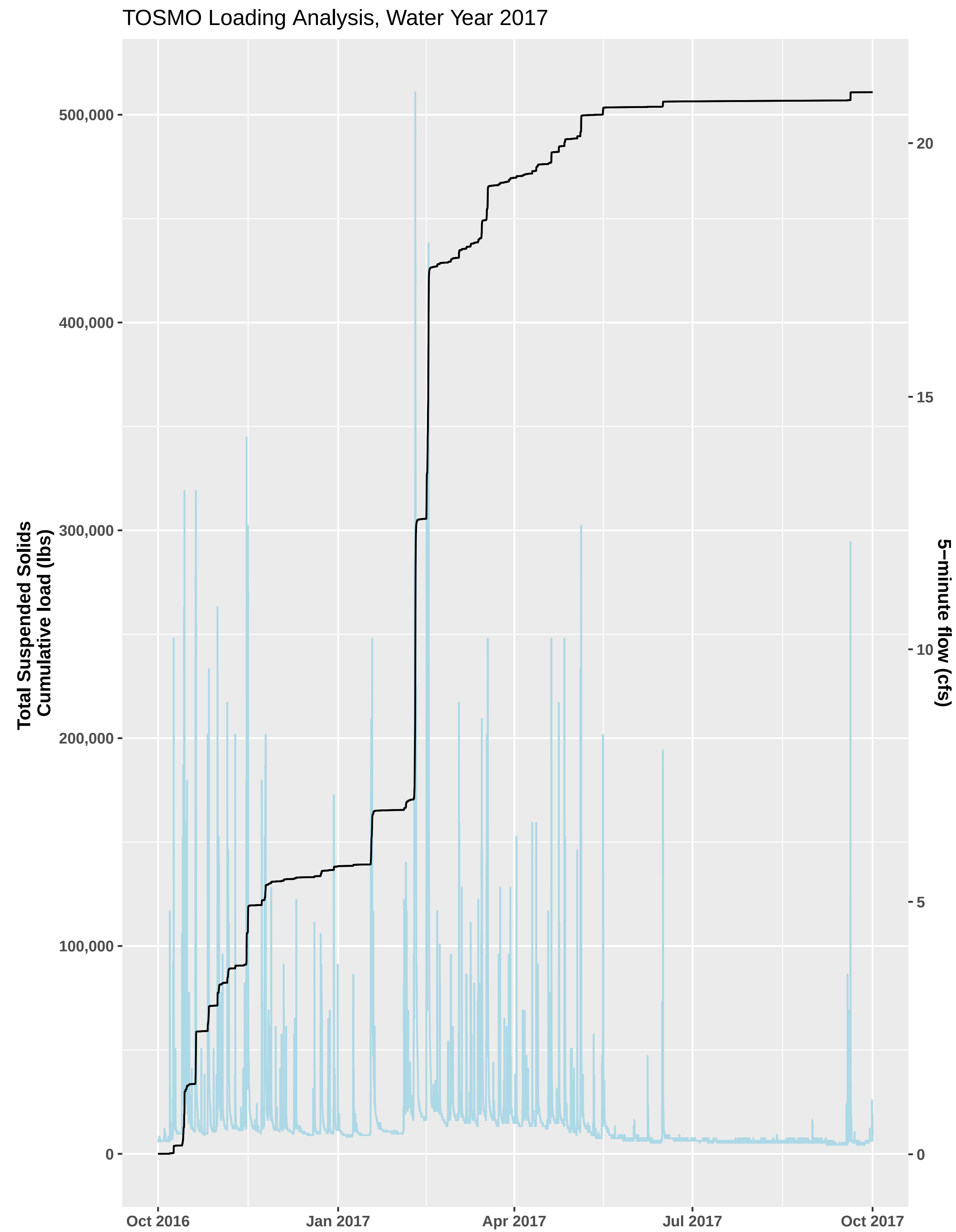


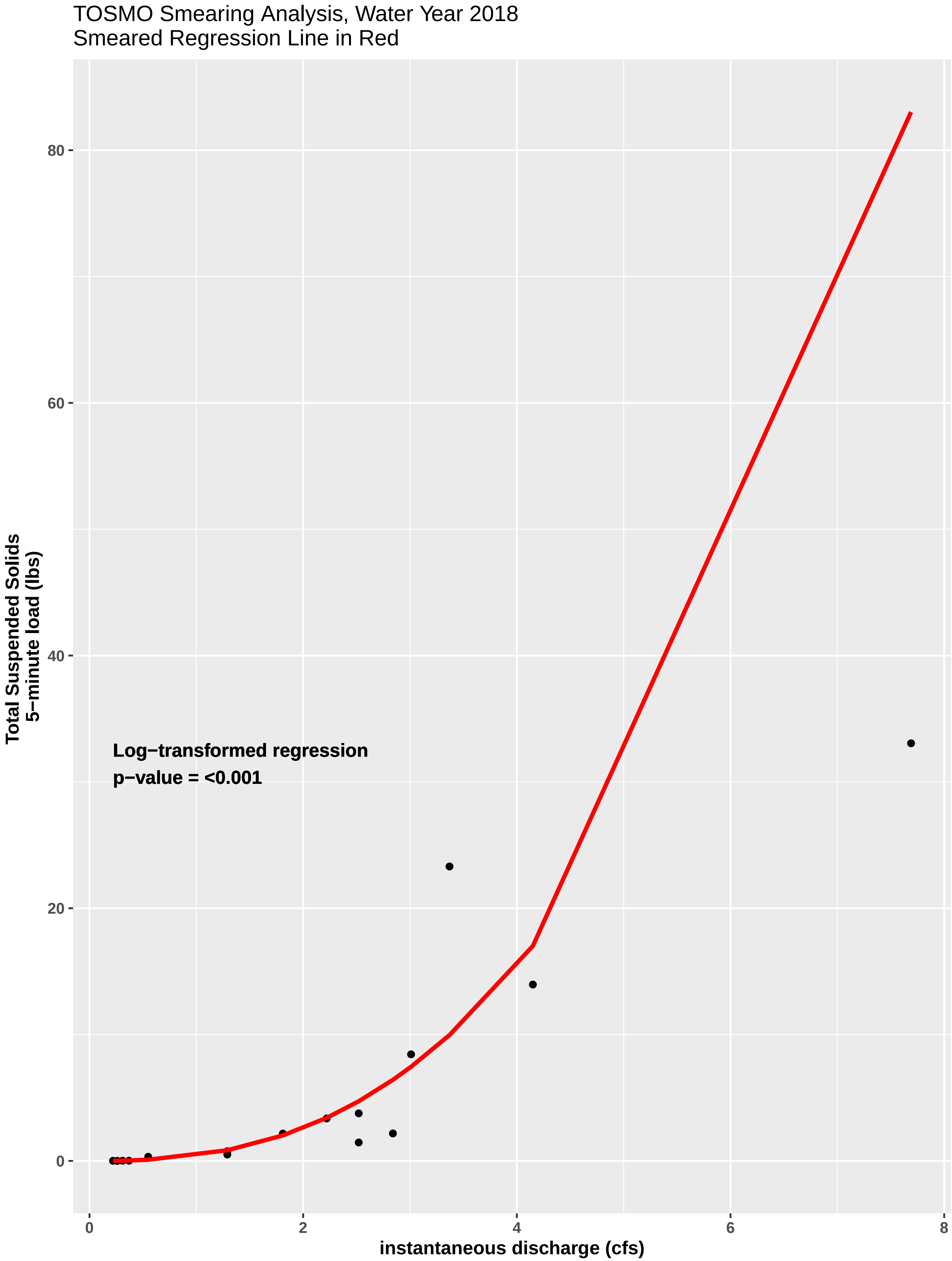
TOSMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0
20
40
60
0
1
2
3
4
5

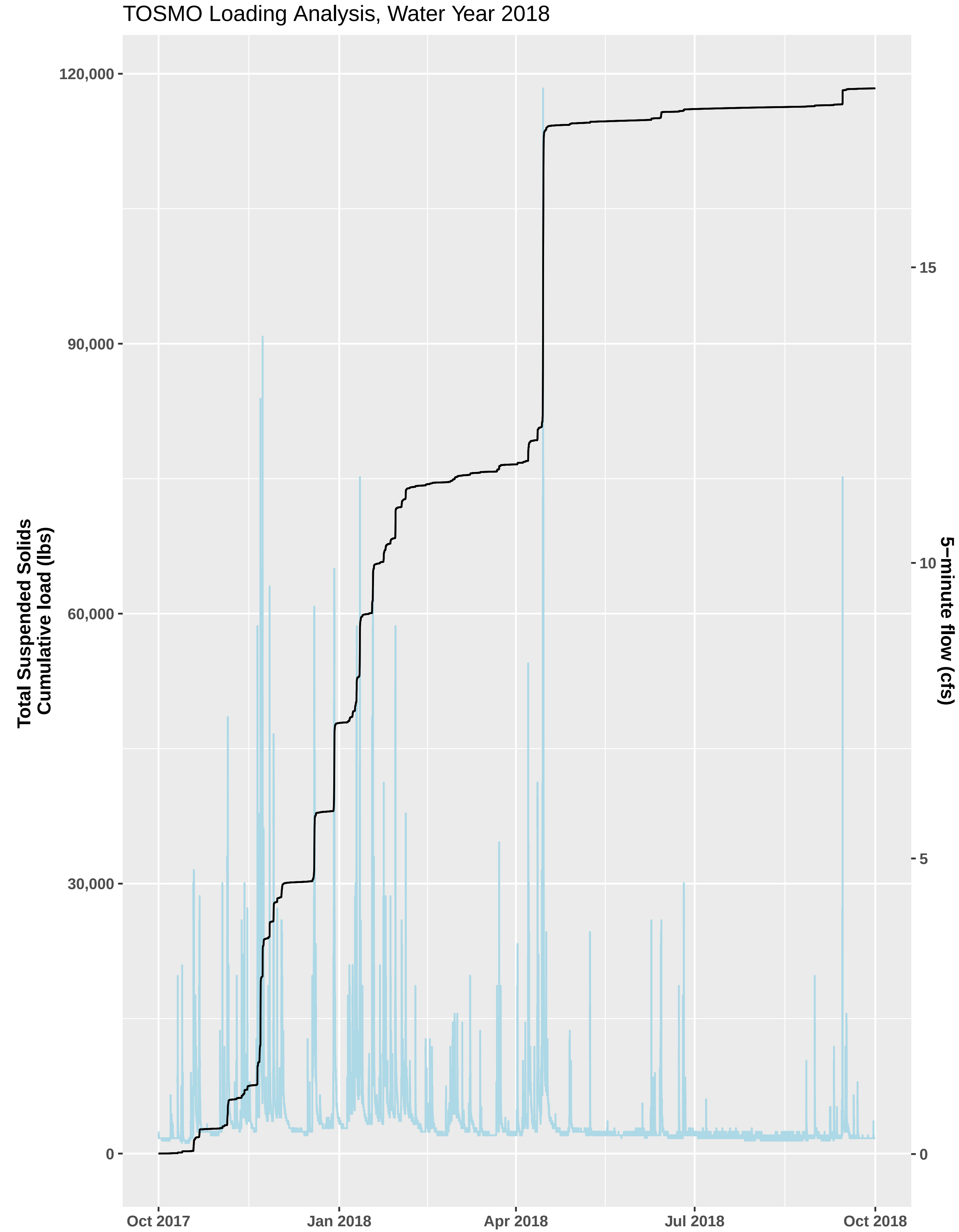


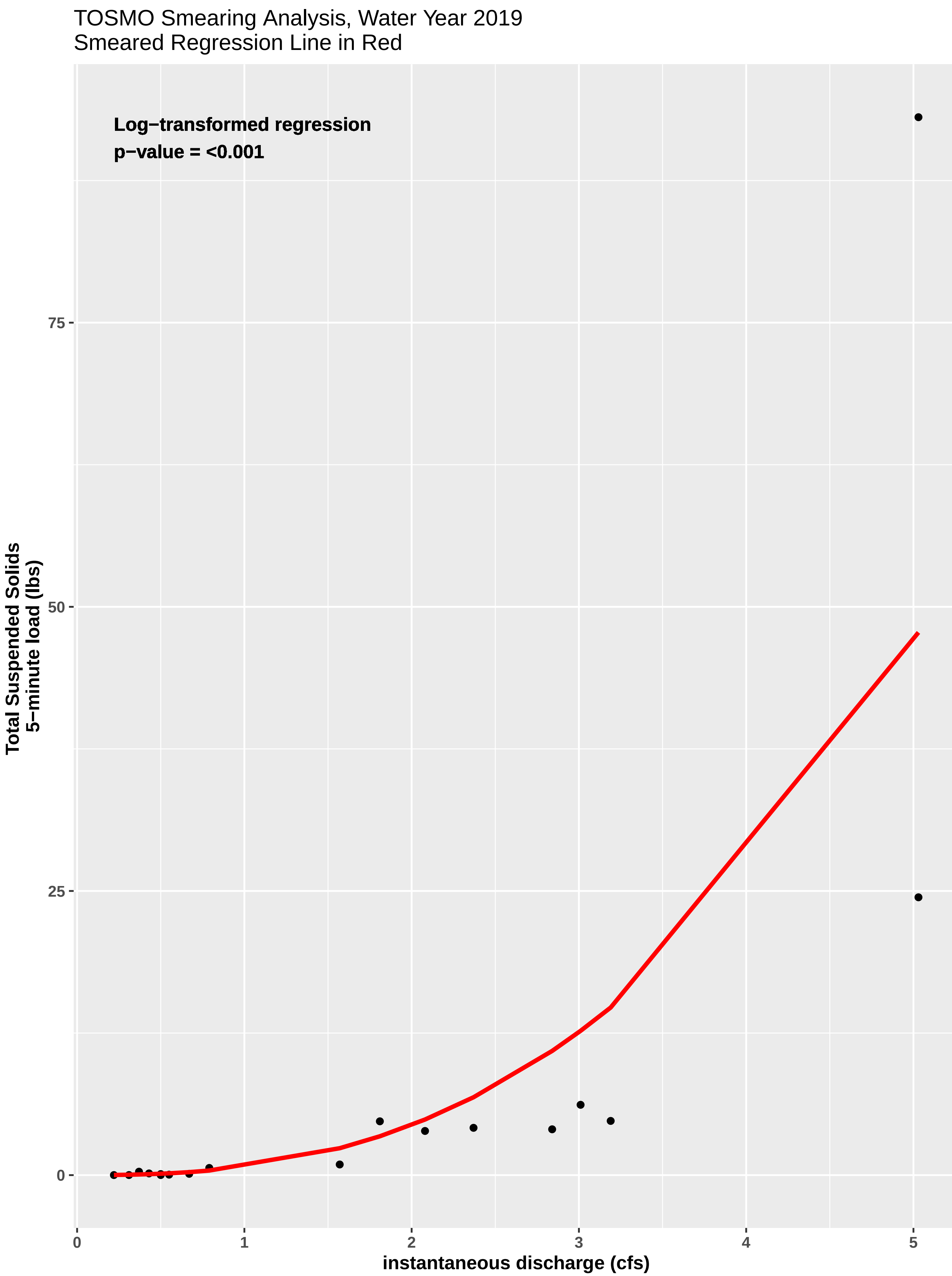
TOSMO Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
100,000
200,000
0
5
10
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

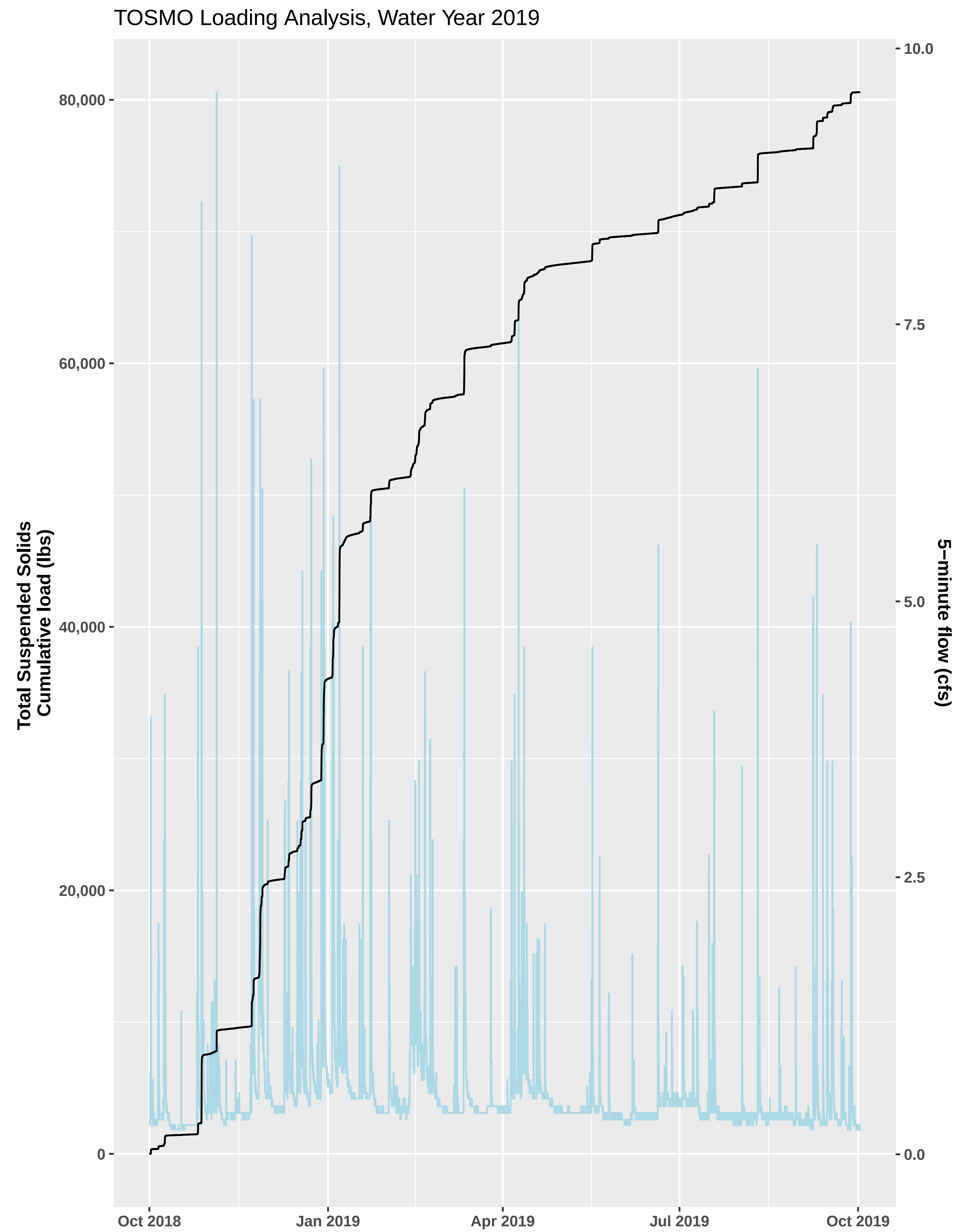

TOSMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0
50
100
150
0
2
4
6
8

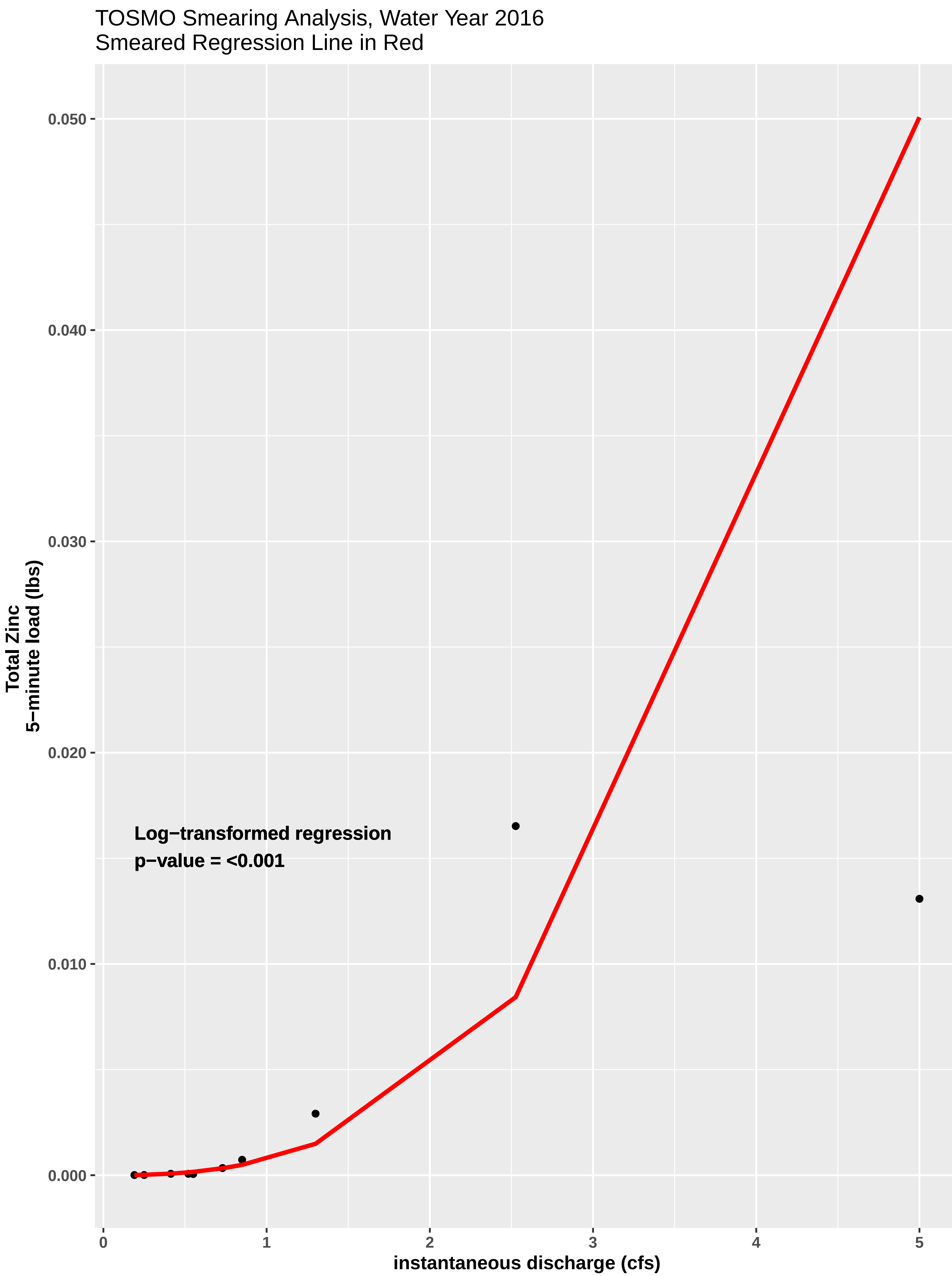

TOSMO Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
100,000
200,000
300,000
400,000
500,000
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

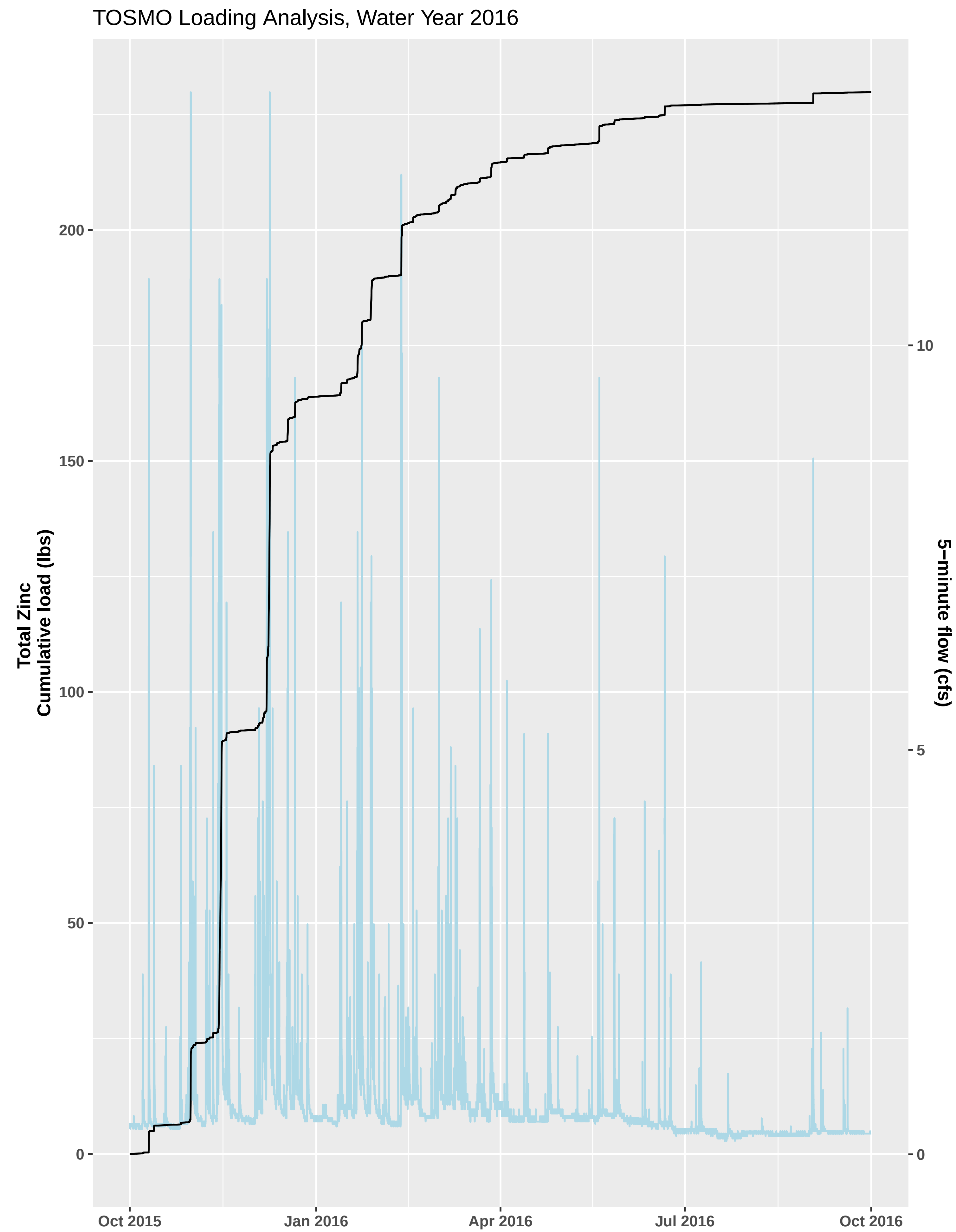

TOSMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Total Suspended Solids
5−minute load (lbs)
Log−transformed regression
p−value = <0.001
instantaneous discharge (cfs)
0
20
40
60
80
0
2
4
6
8

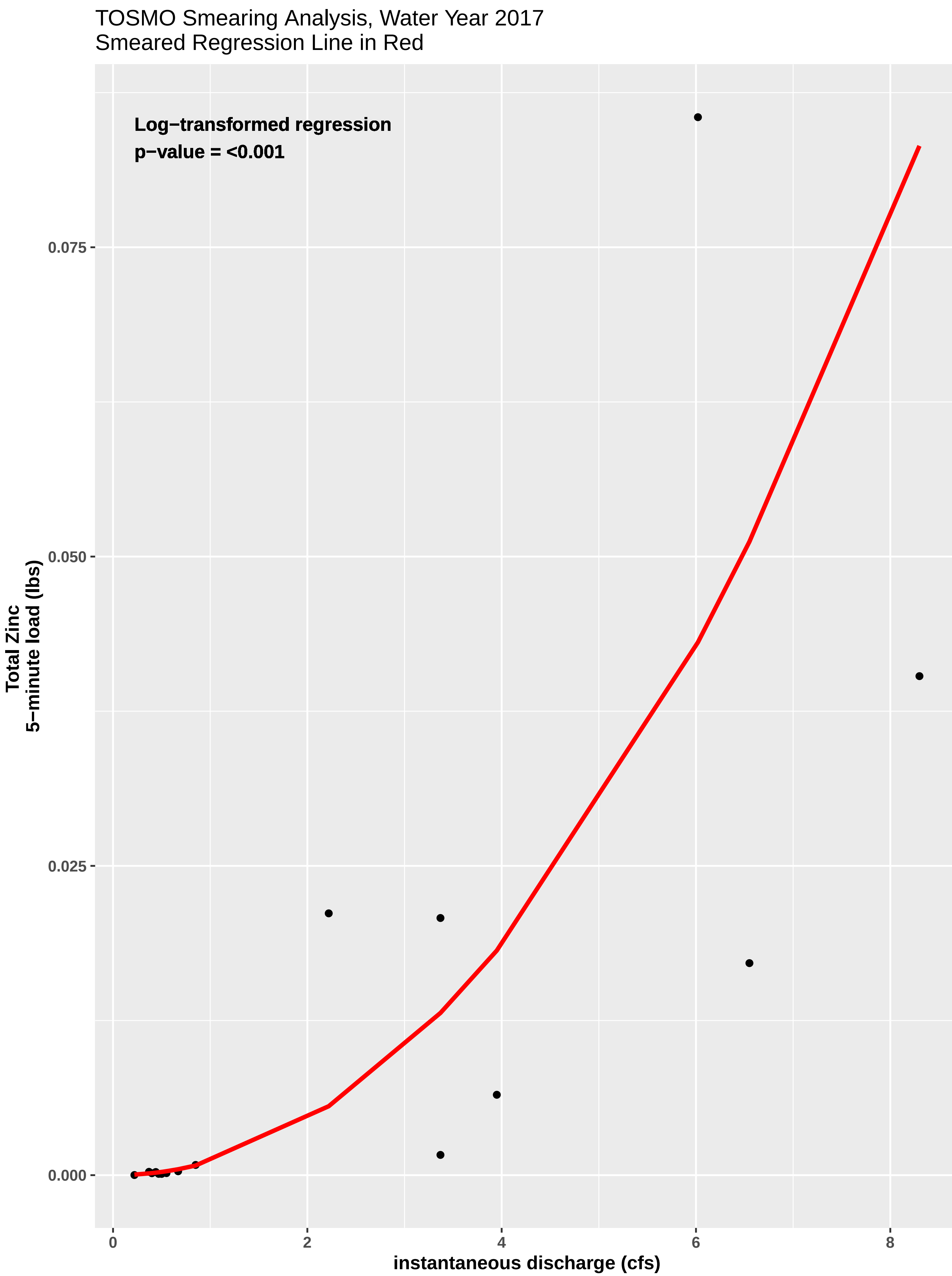

TOSMO Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
30,000
60,000
90,000
120,000
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

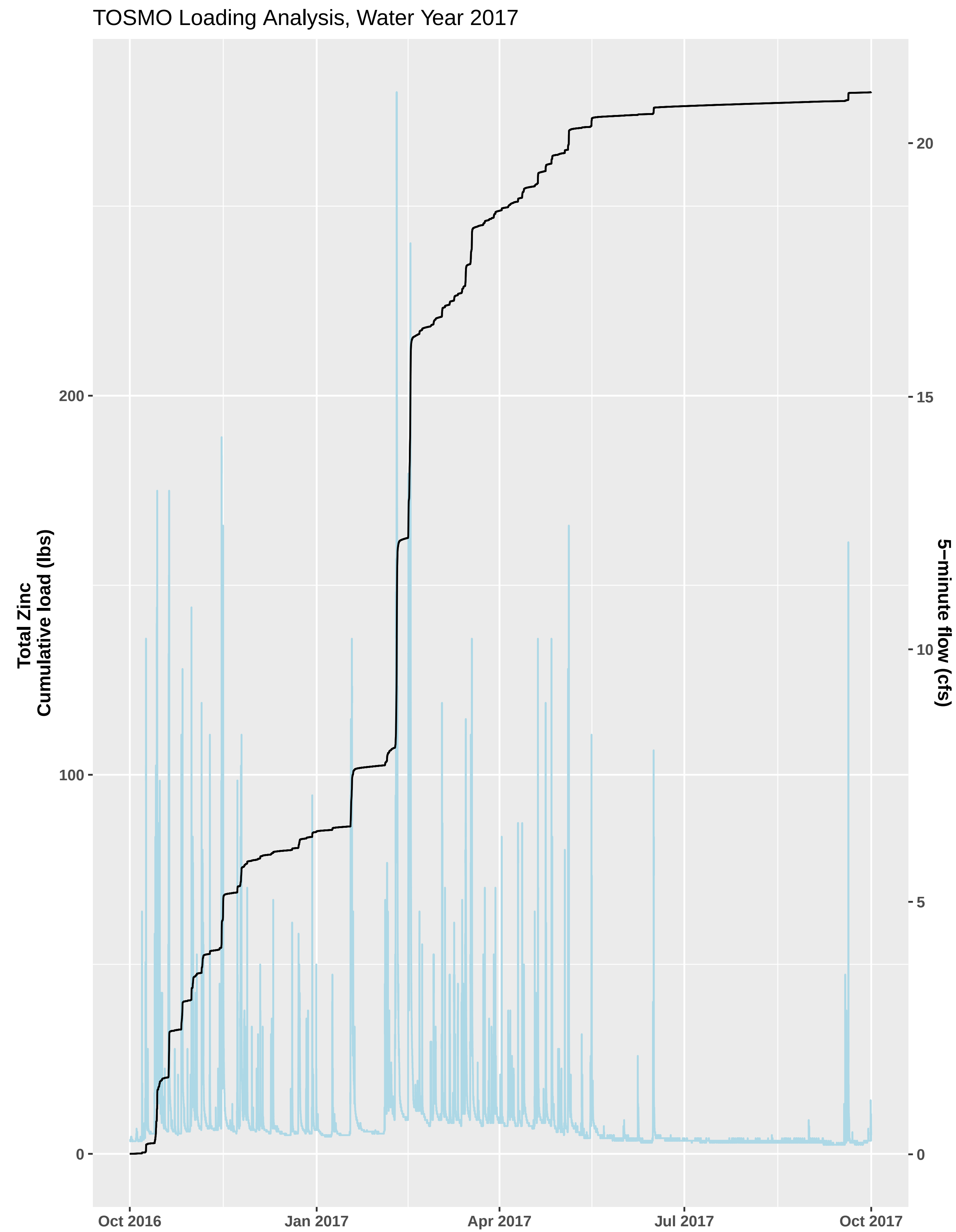

TOSMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0
25
50
75
0
1
2
3
4
5

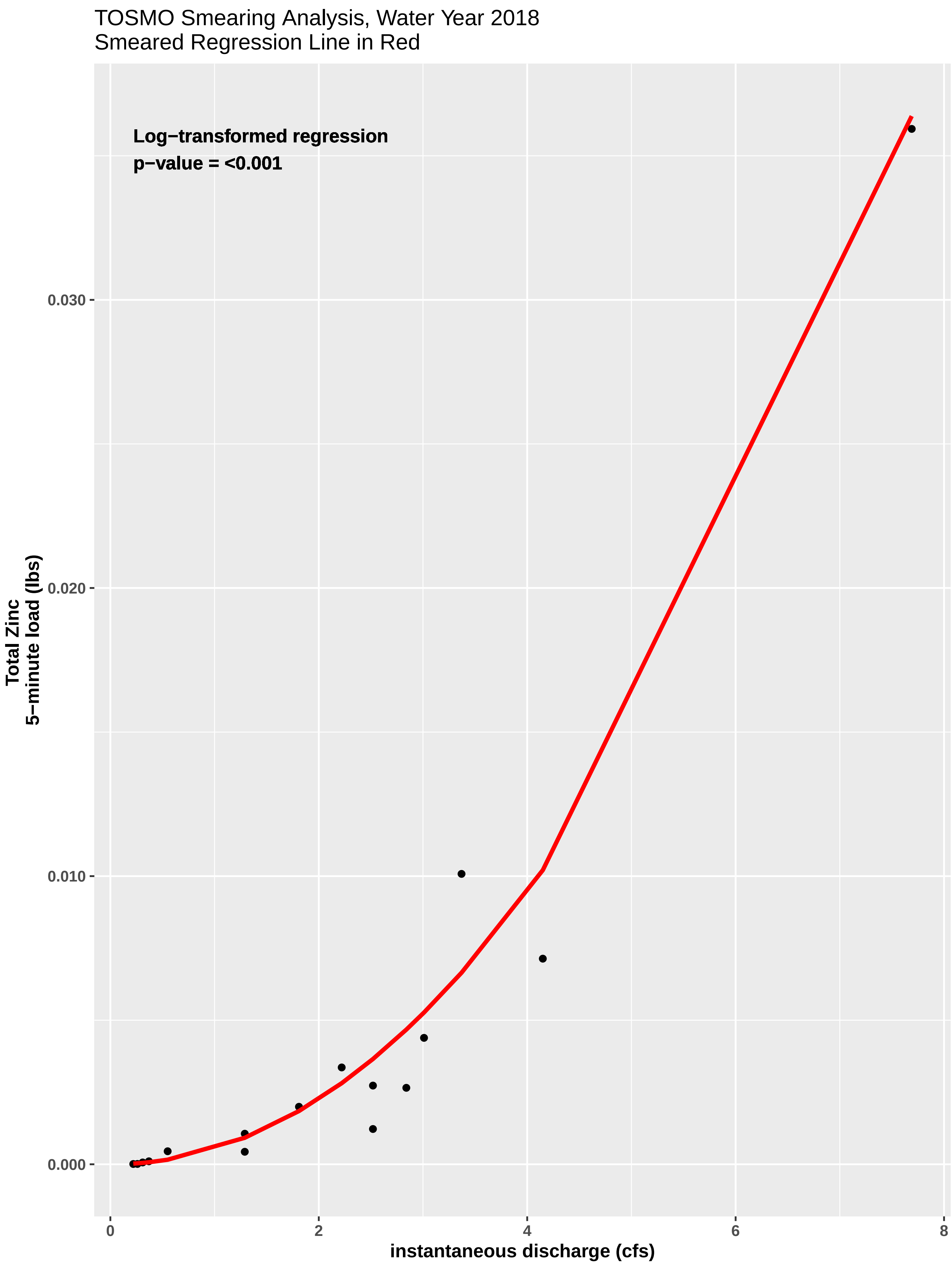

TOSMO Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
20,000
40,000
60,000
80,000
0.0
2.5
5.0
7.5
10.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

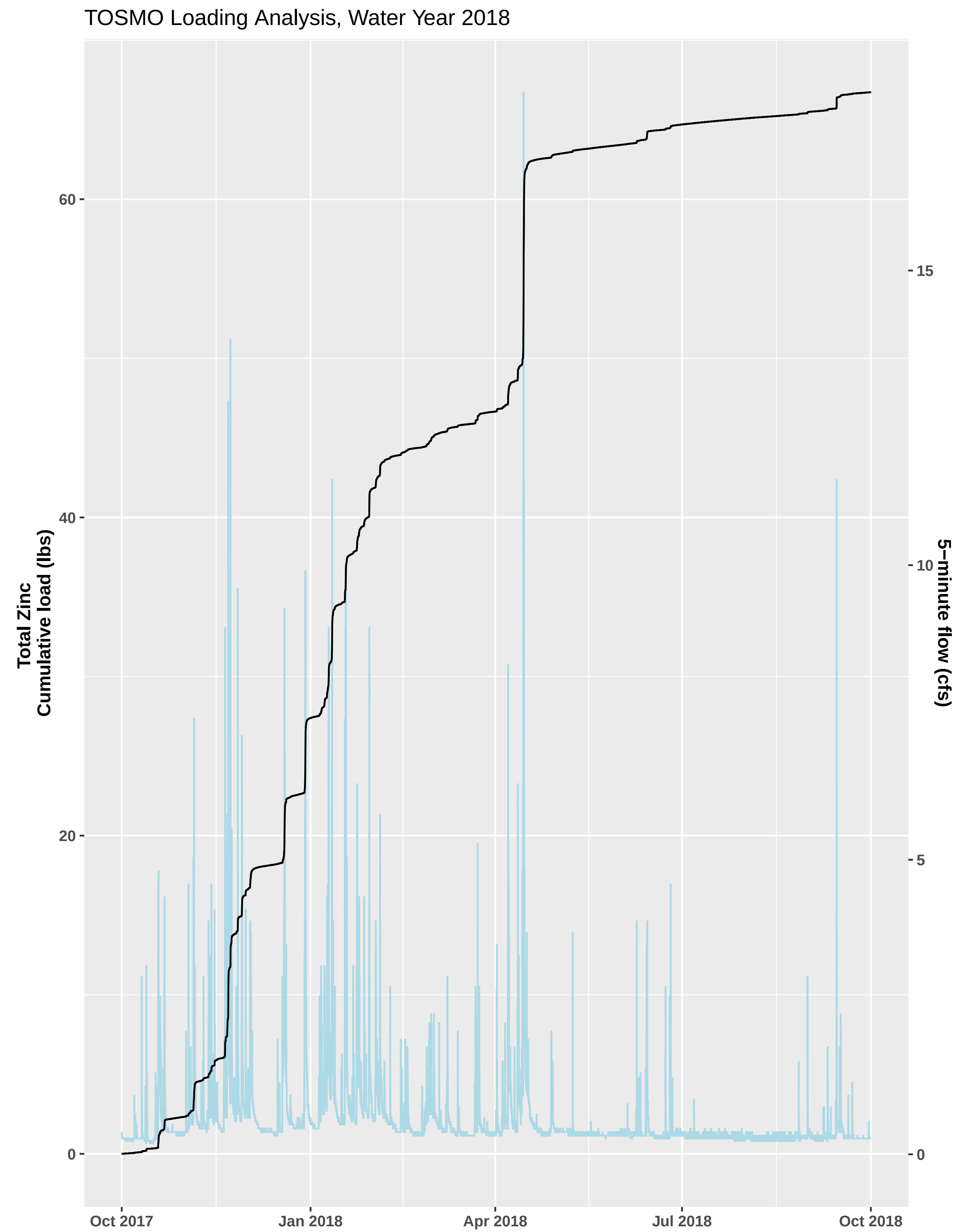

TOSMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Zinc
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.040
0.050
Log−transformed regression
p−value = <0.001
0
1
2
3
4
5
instantaneous discharge (cfs)

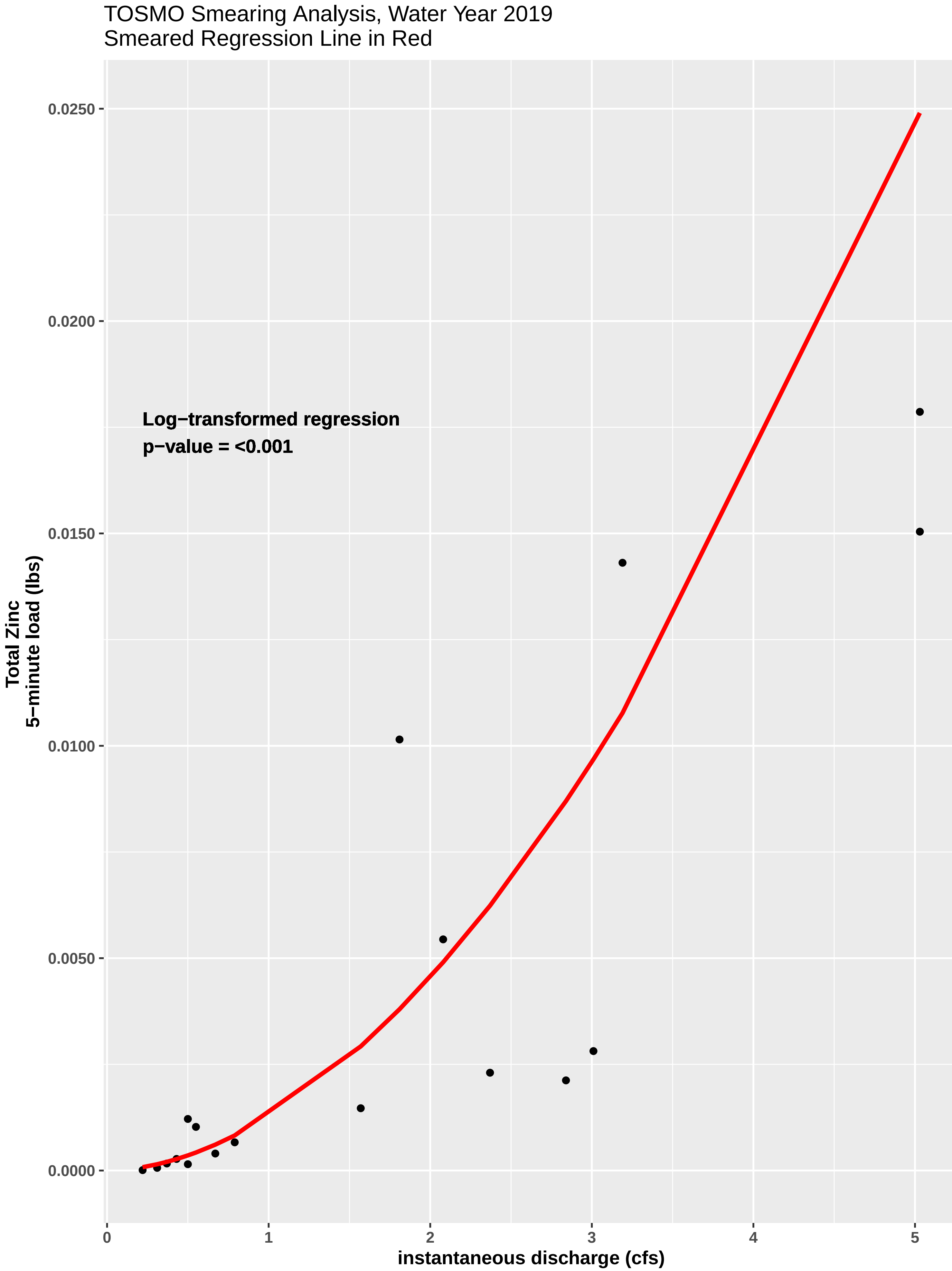

TOSMO Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0
50
100
150
200
5−minute flow (cfs)
0
5
10
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TOSMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000
0.025
0.050
0.075
0
2
4
6
8
instantaneous discharge (cfs)

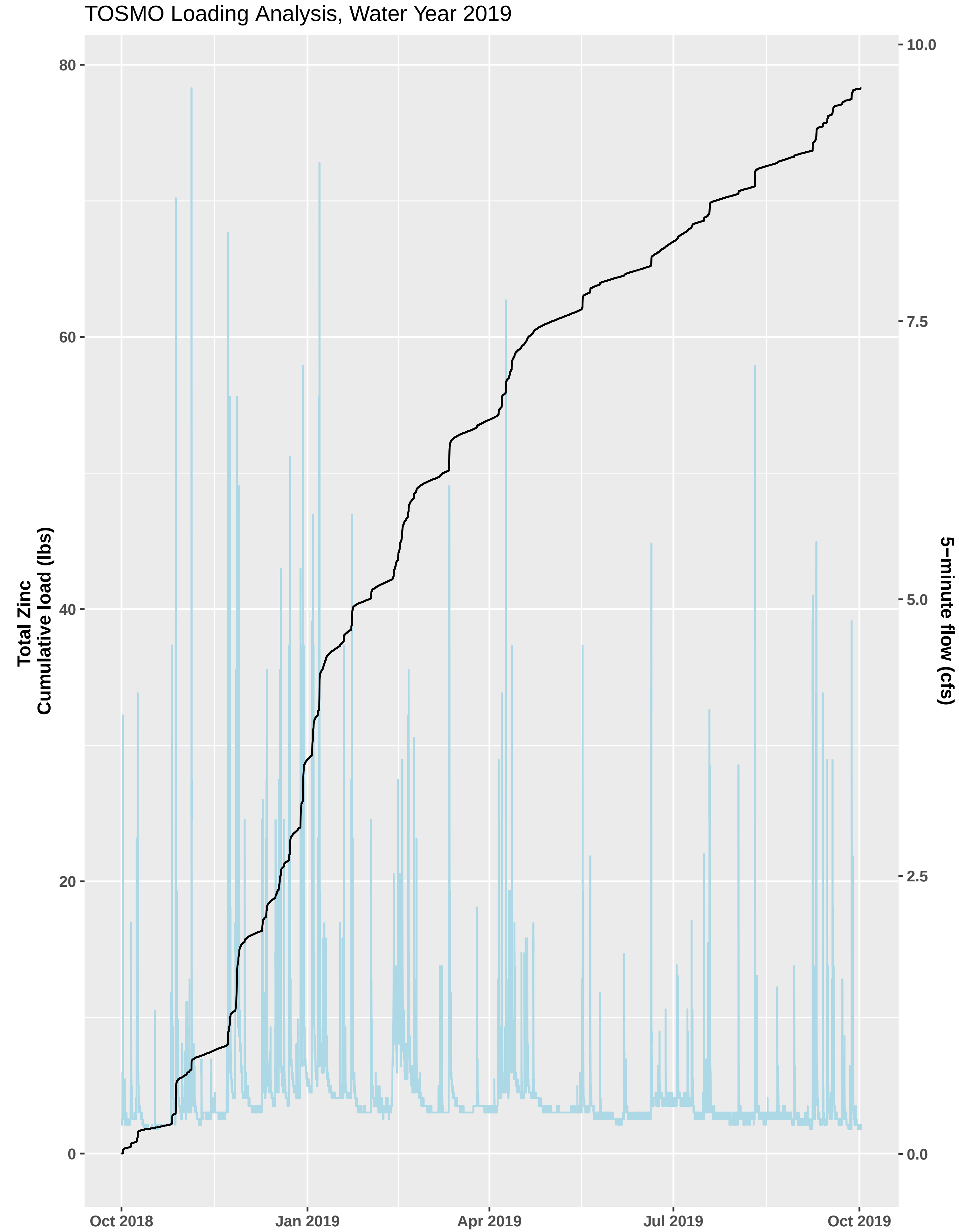

TOSMO Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0
100
200
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TOSMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000
0.010
0.020
0.030
0
2
4
6
8
instantaneous discharge (cfs)

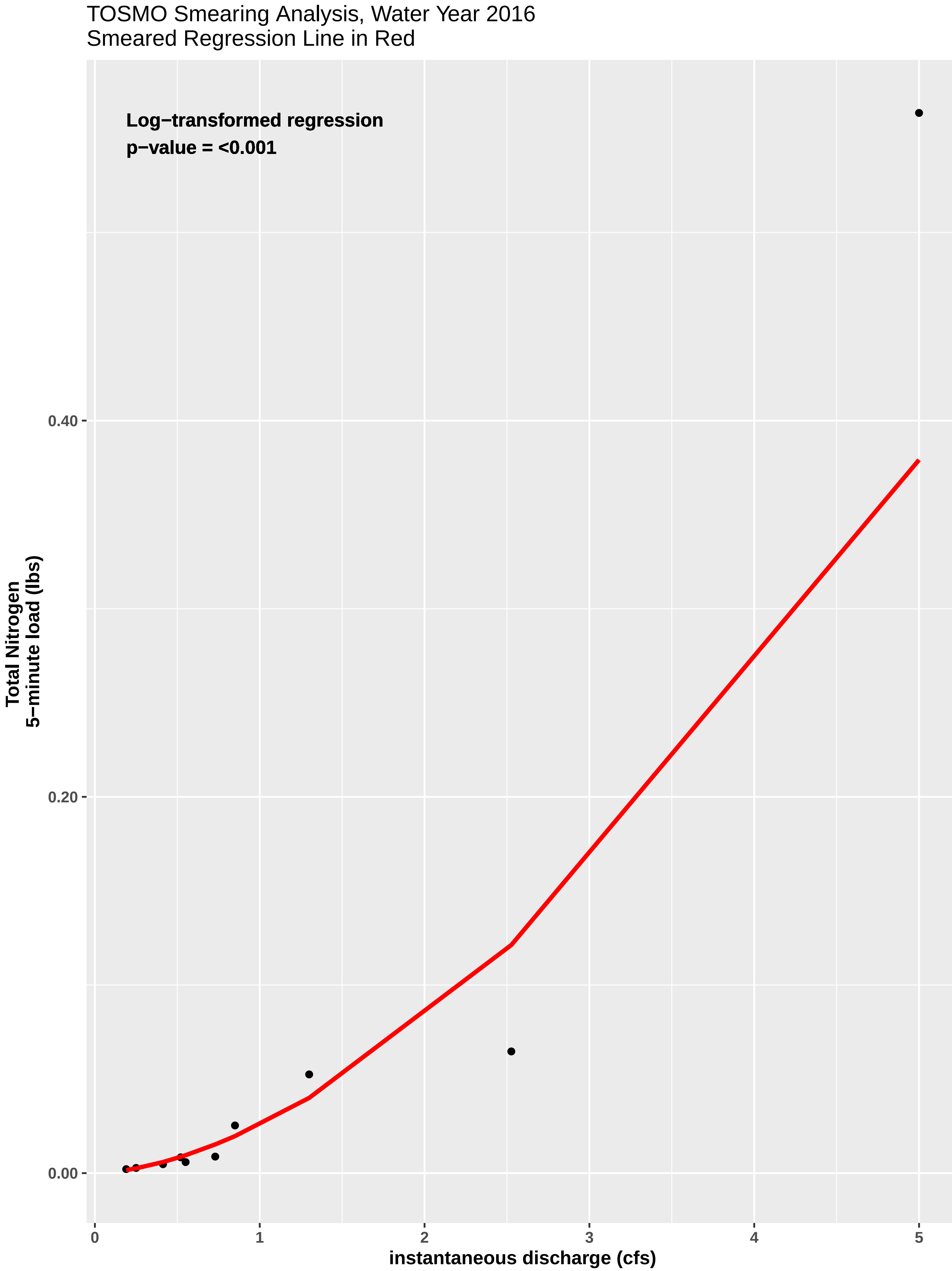

TOSMO Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



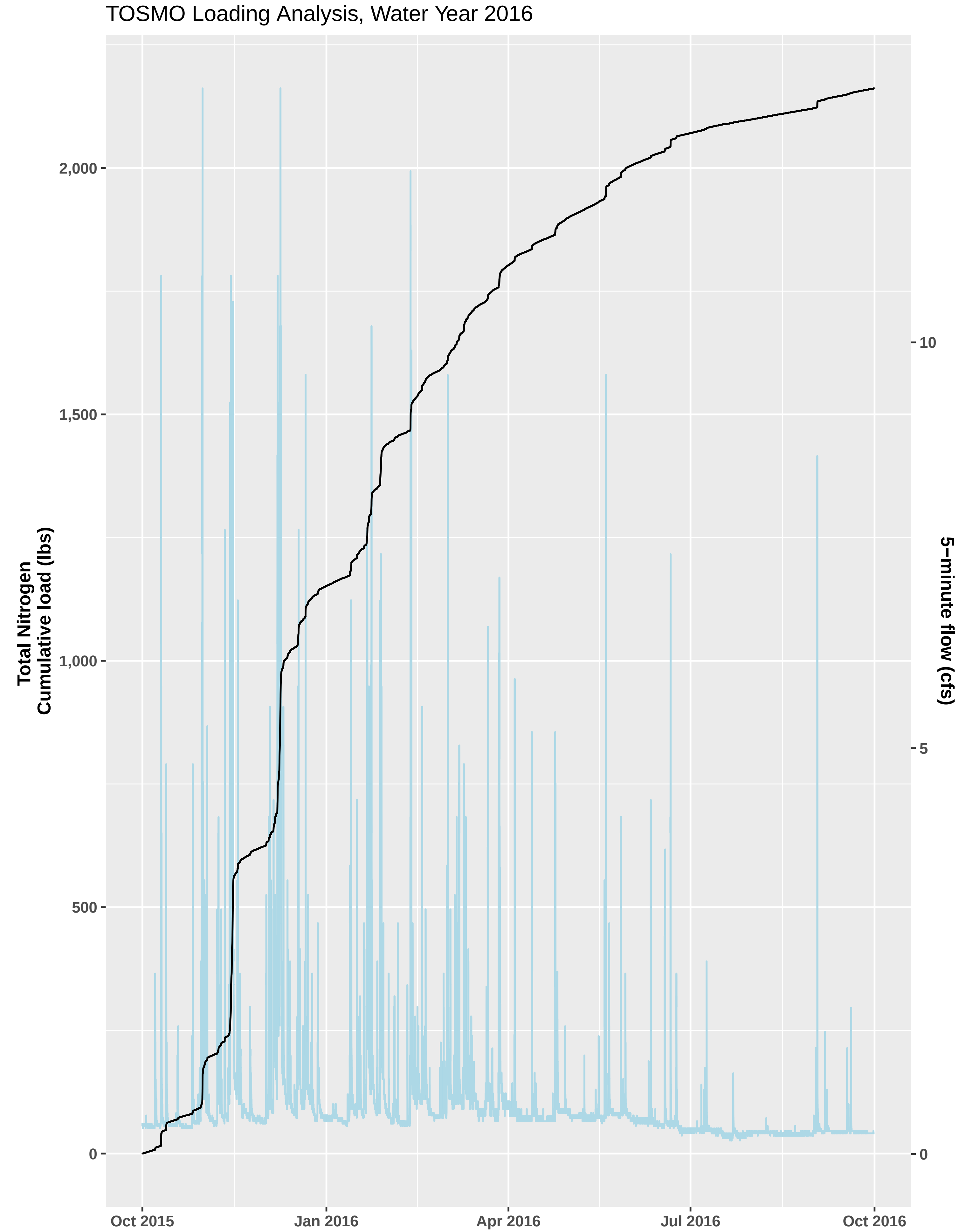
TOSMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0.0250
0
1
2
3
4
5
instantaneous discharge (cfs)



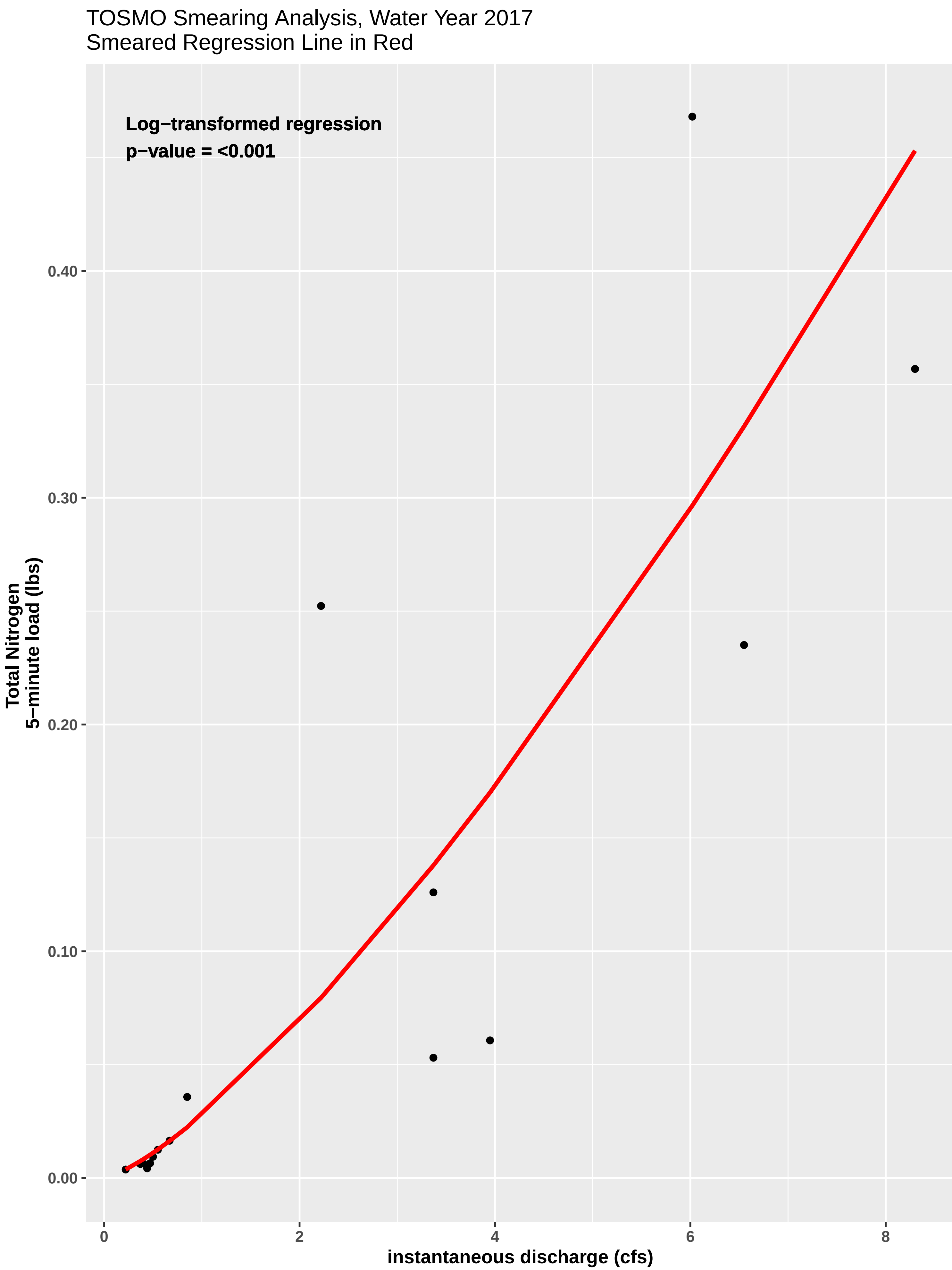
TOSMO Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0
20
40
60
80
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

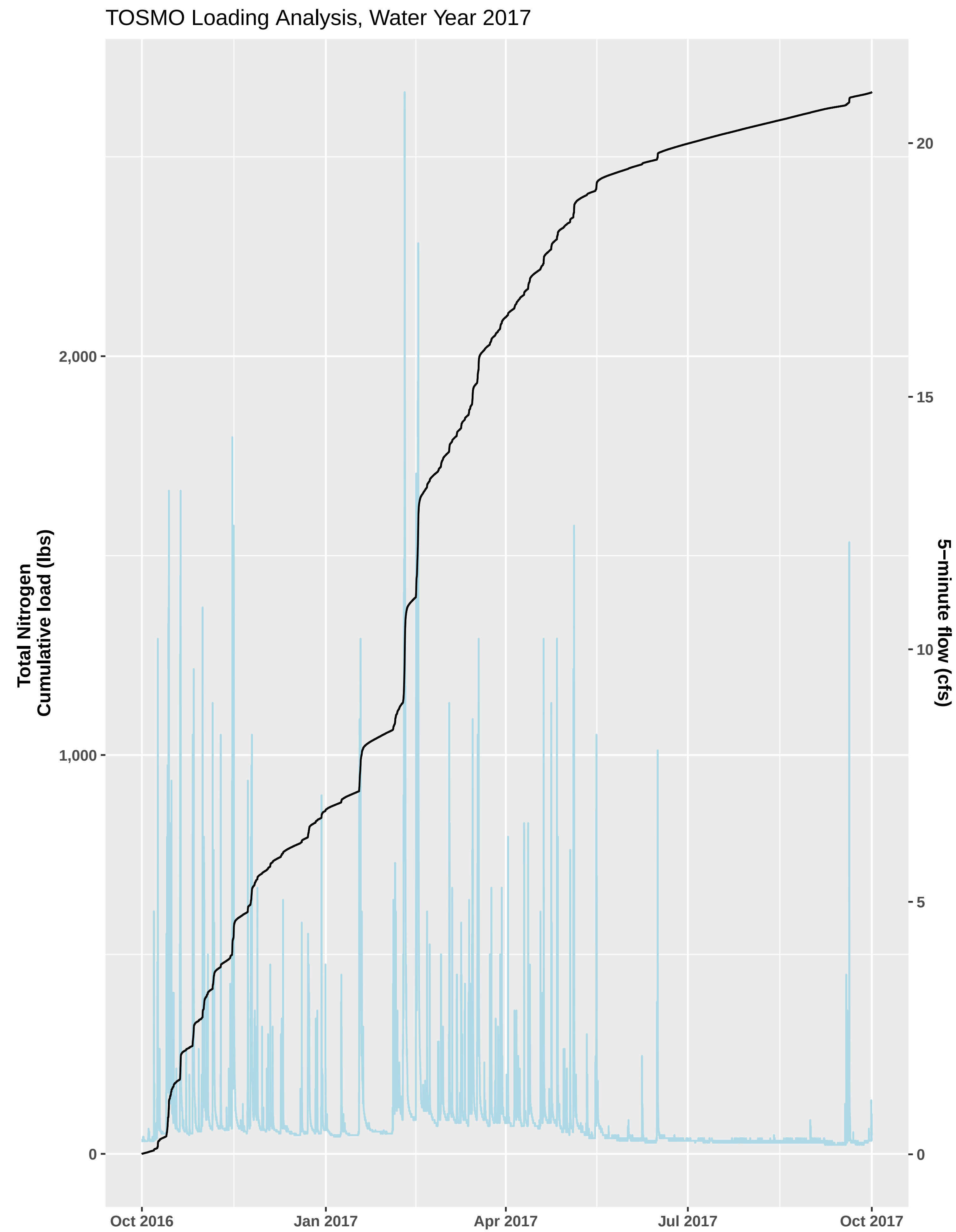


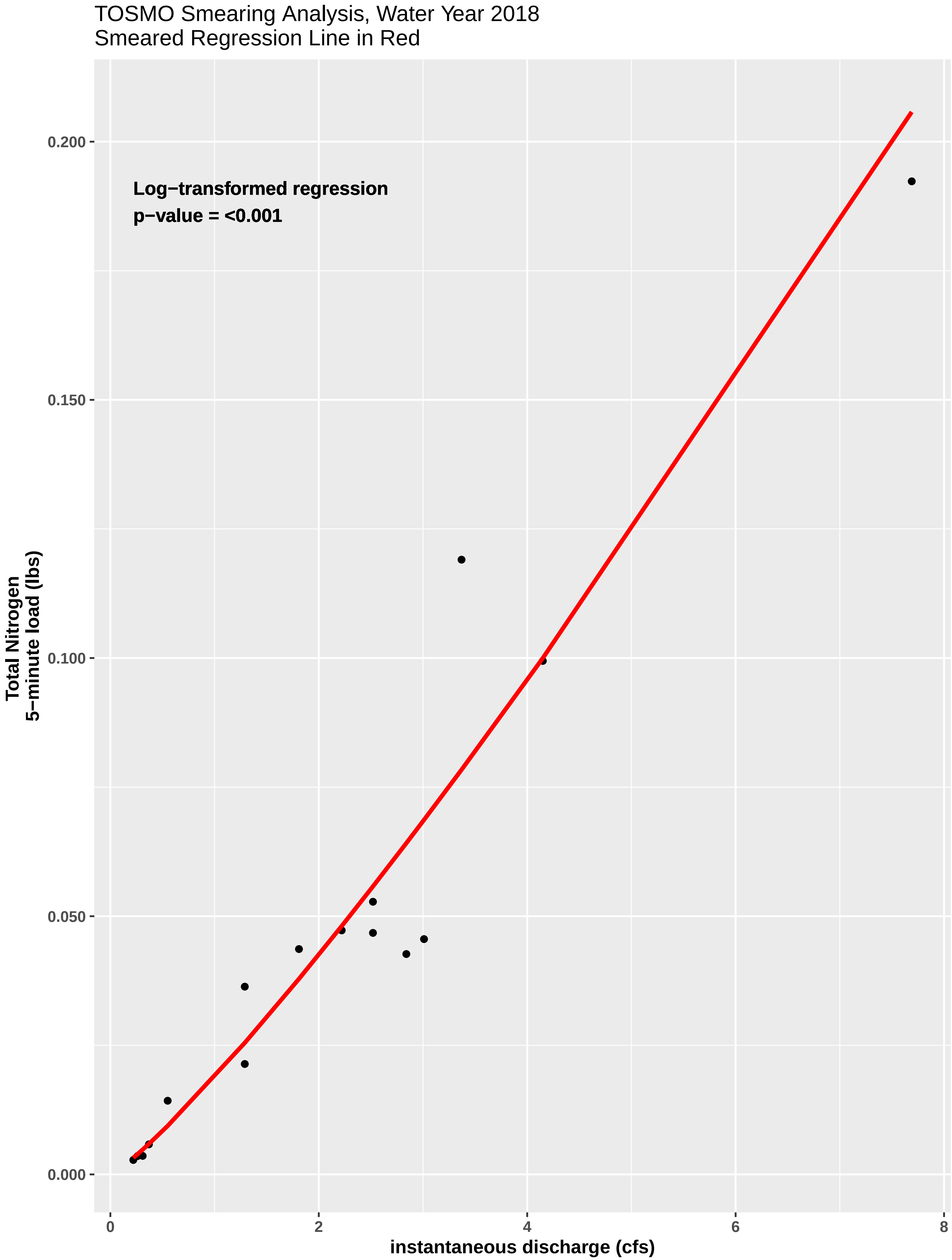
TOSMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.00
0.20
0.40
0
1
2
3
4
5
instantaneous discharge (cfs)

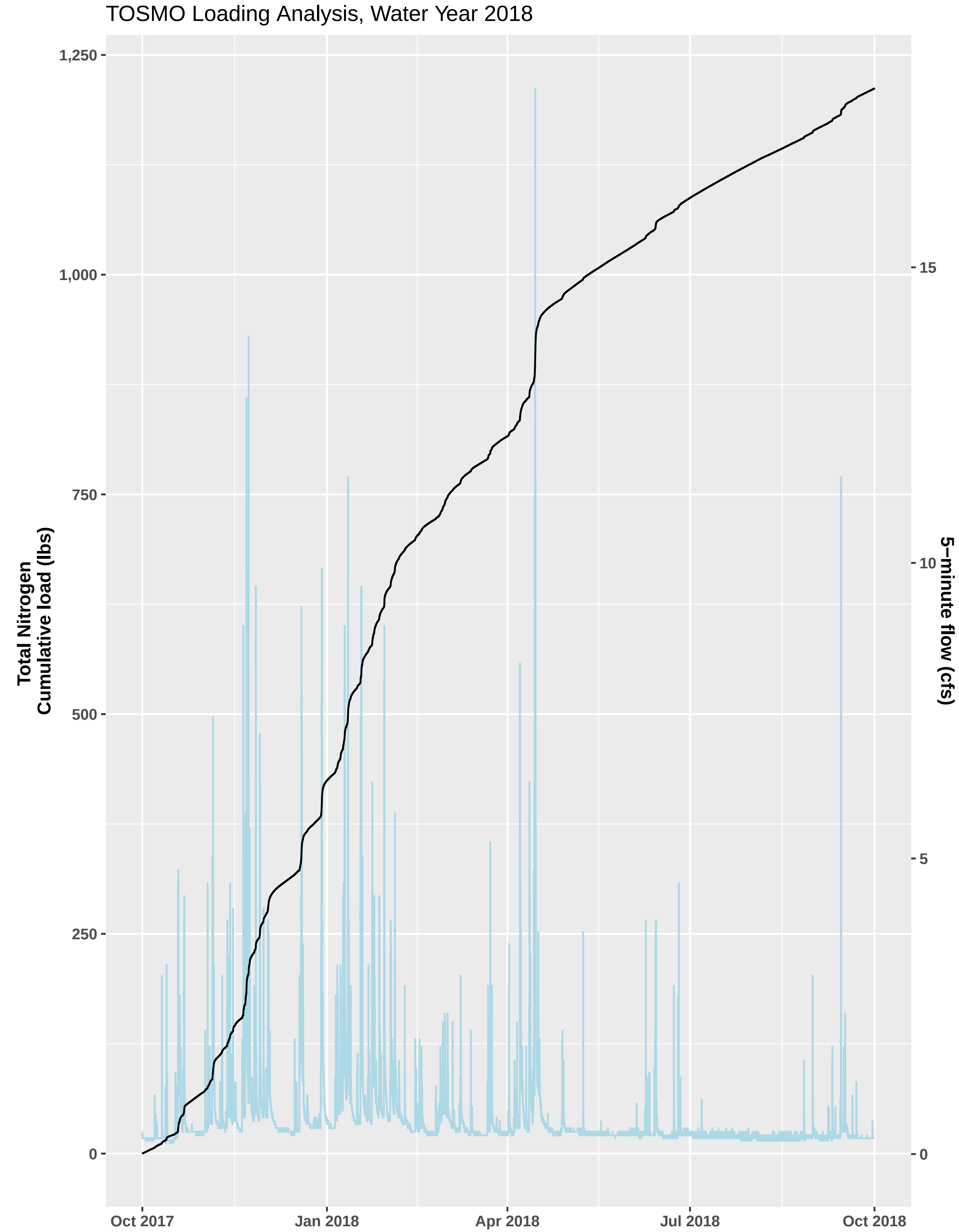


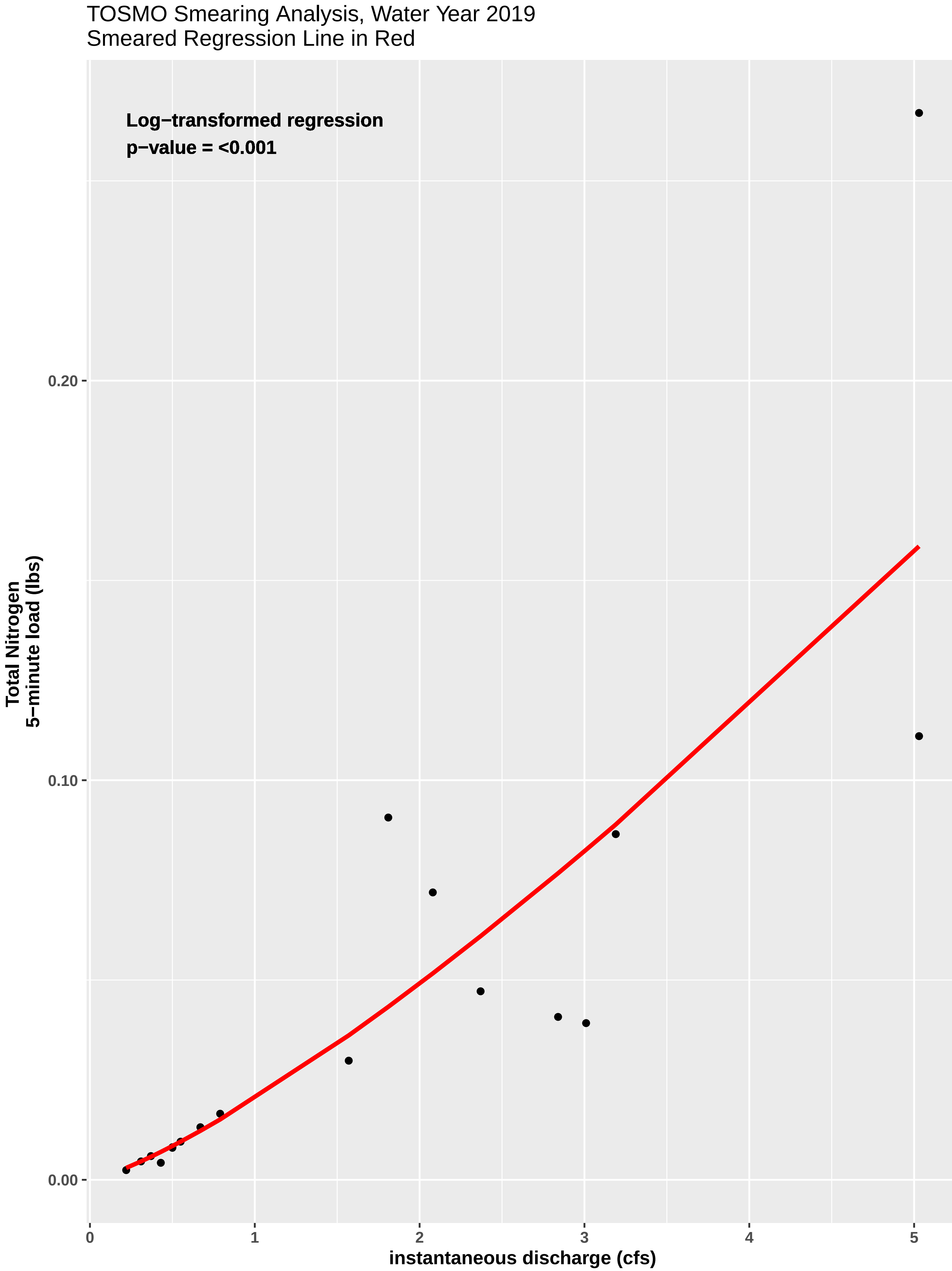
TOSMO Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
5
10
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

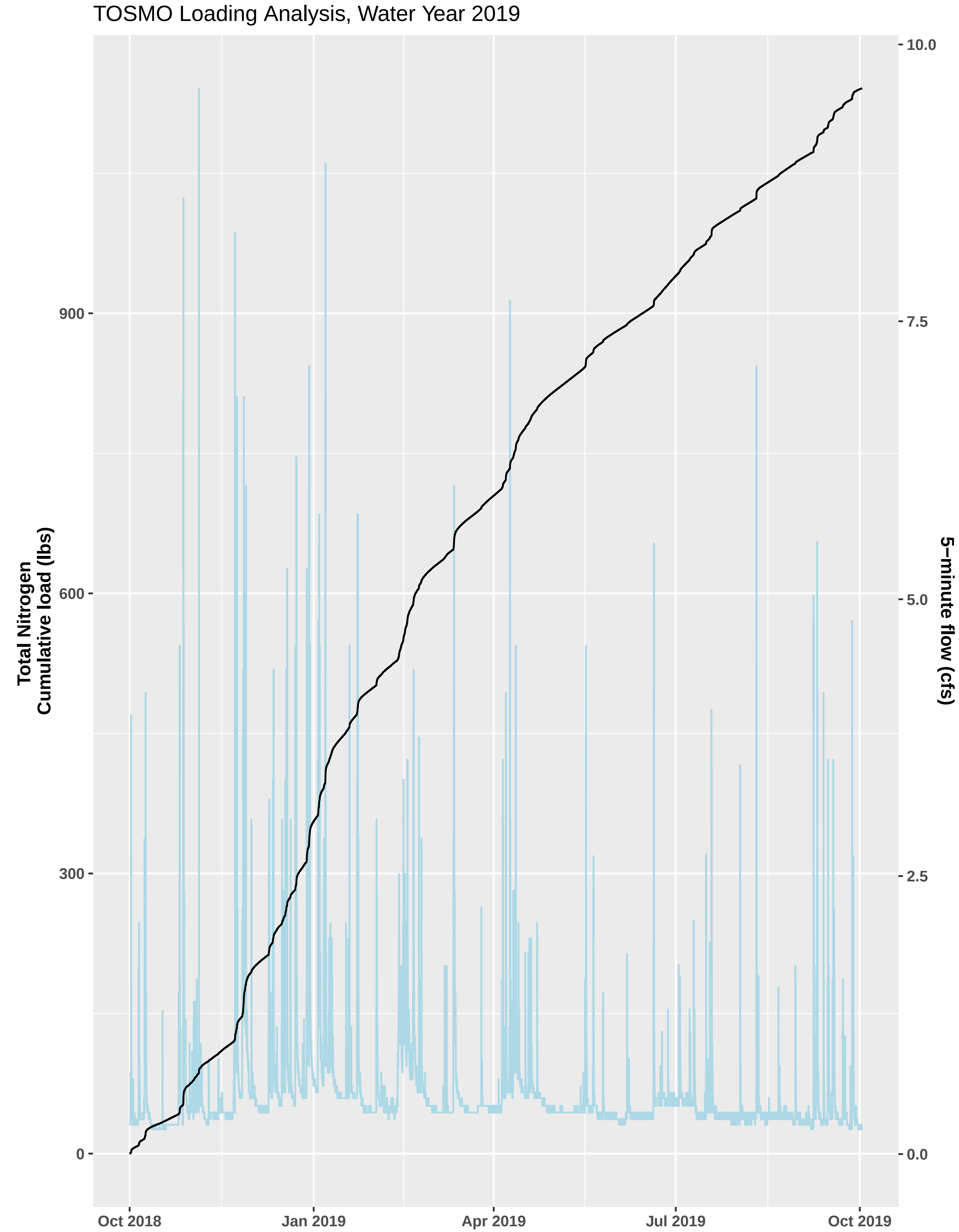

TOSMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.00
0.10
0.20
0.30
0.40
0
2
4
6
8
instantaneous discharge (cfs)

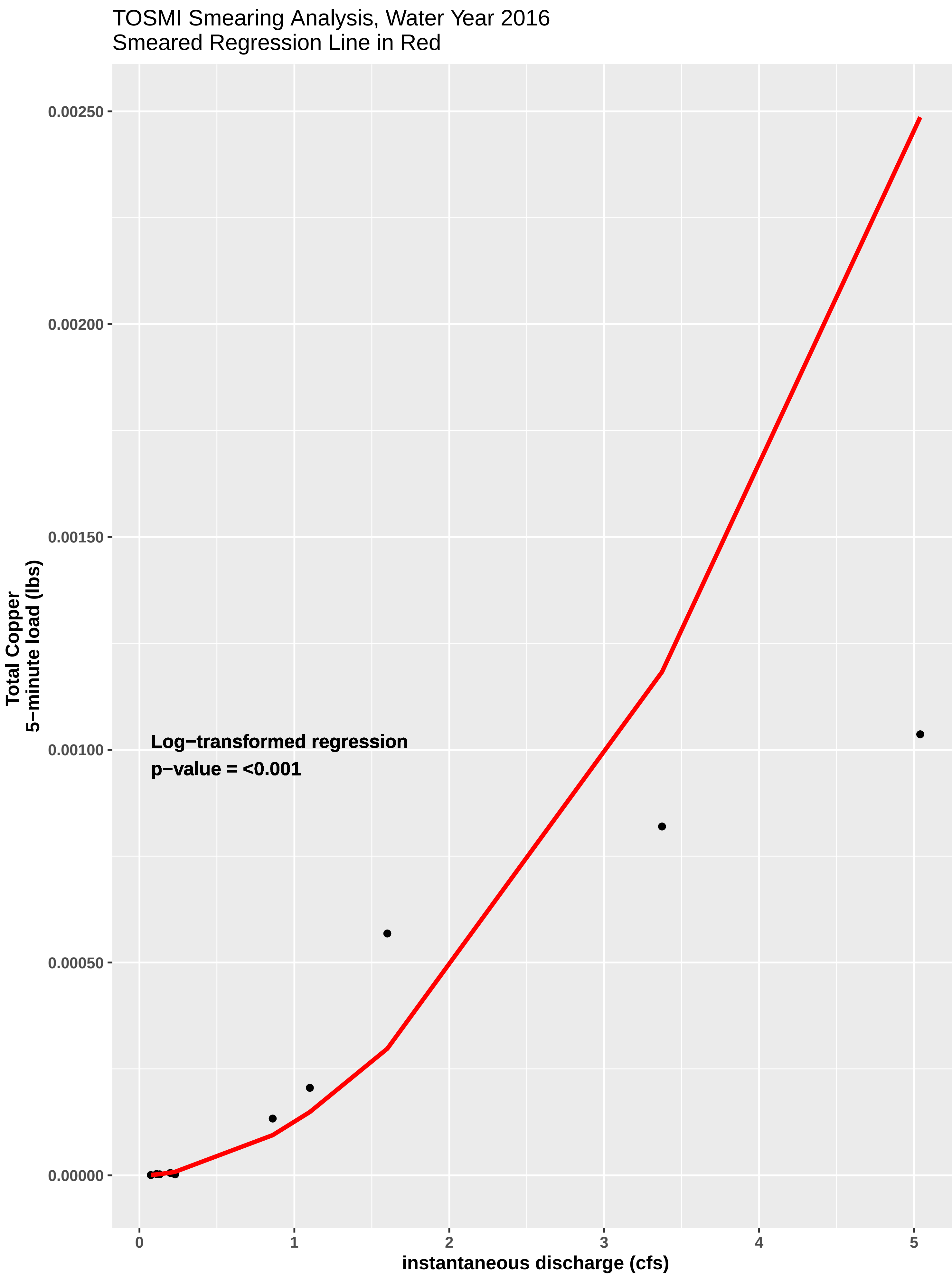

TOSMO Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
1,000
2,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TOSMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.200
0
2
4
6
8
instantaneous discharge (cfs)

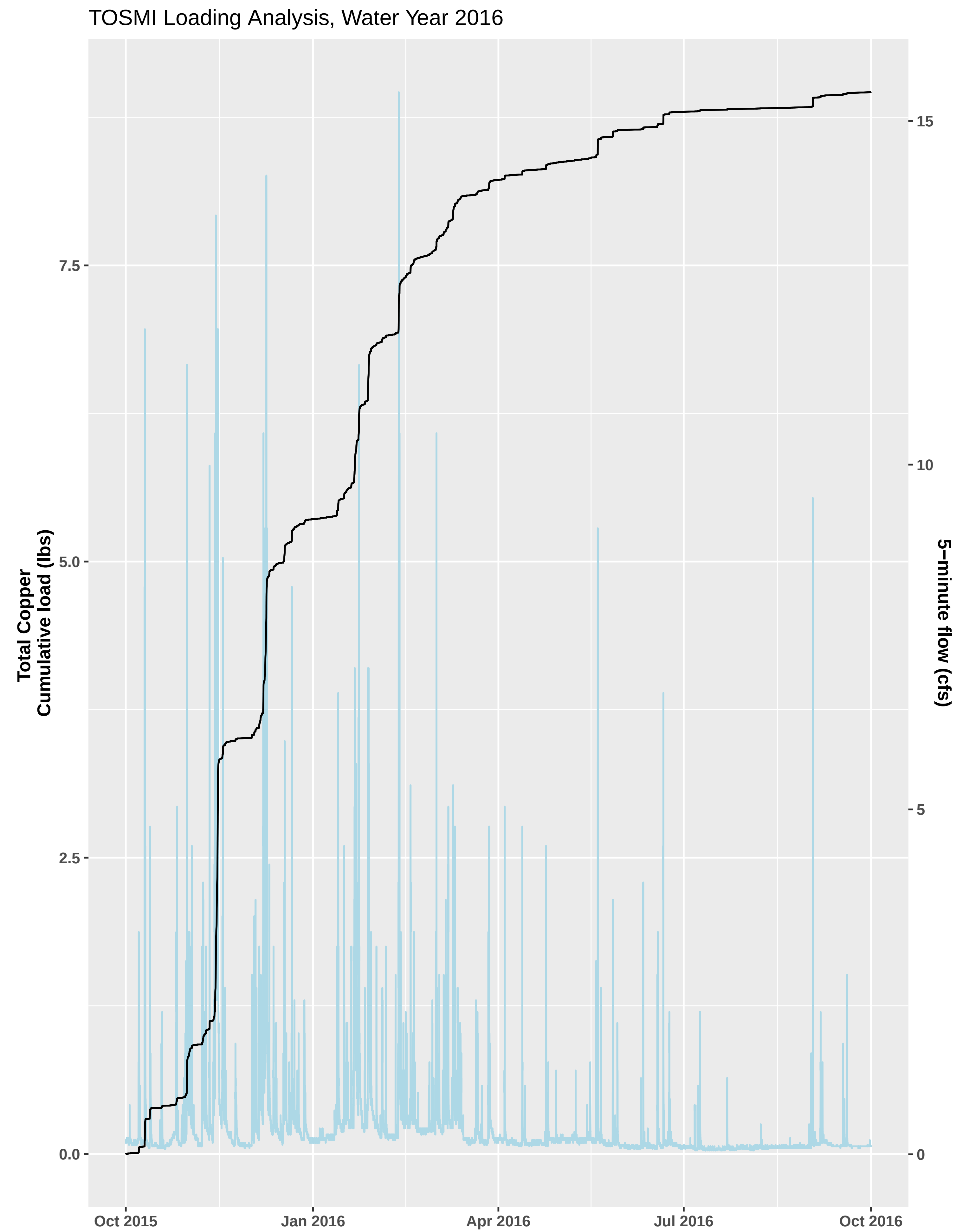

TOSMO Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
250
500
750
1,000
1,250
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TOSMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.00
0.10
0.20
0
1
2
3
4
5
instantaneous discharge (cfs)

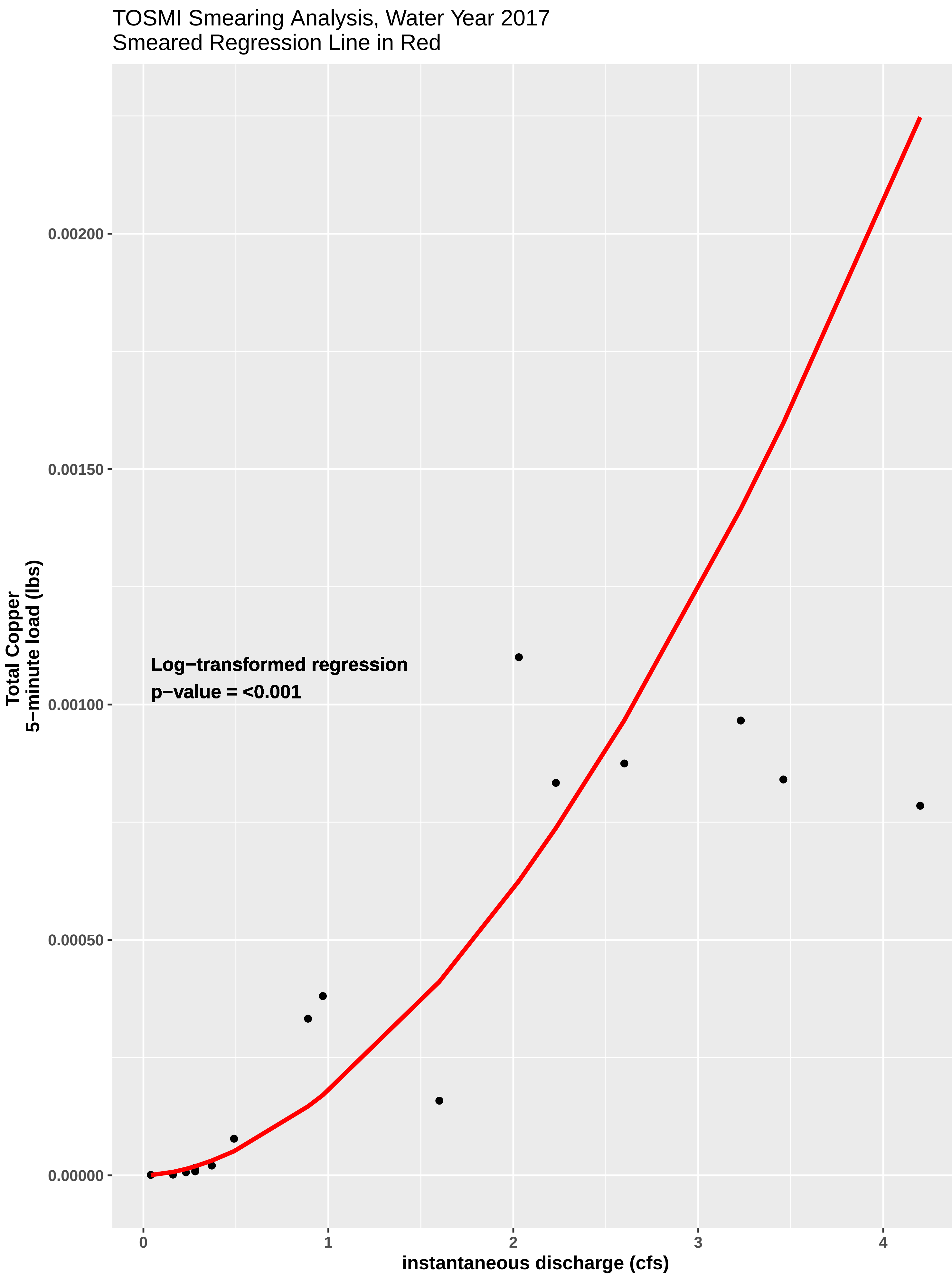

TOSMO Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
300
600
900
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

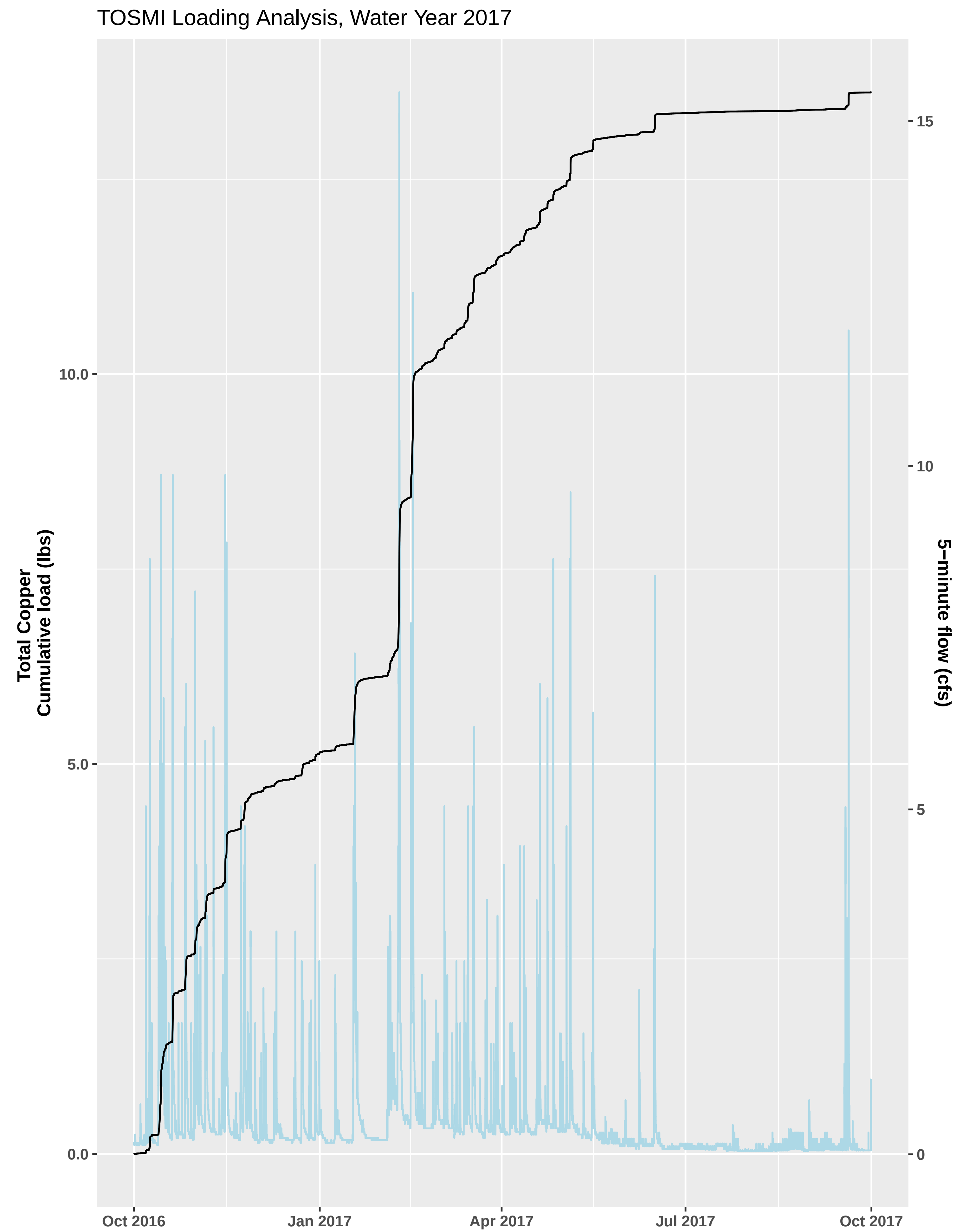


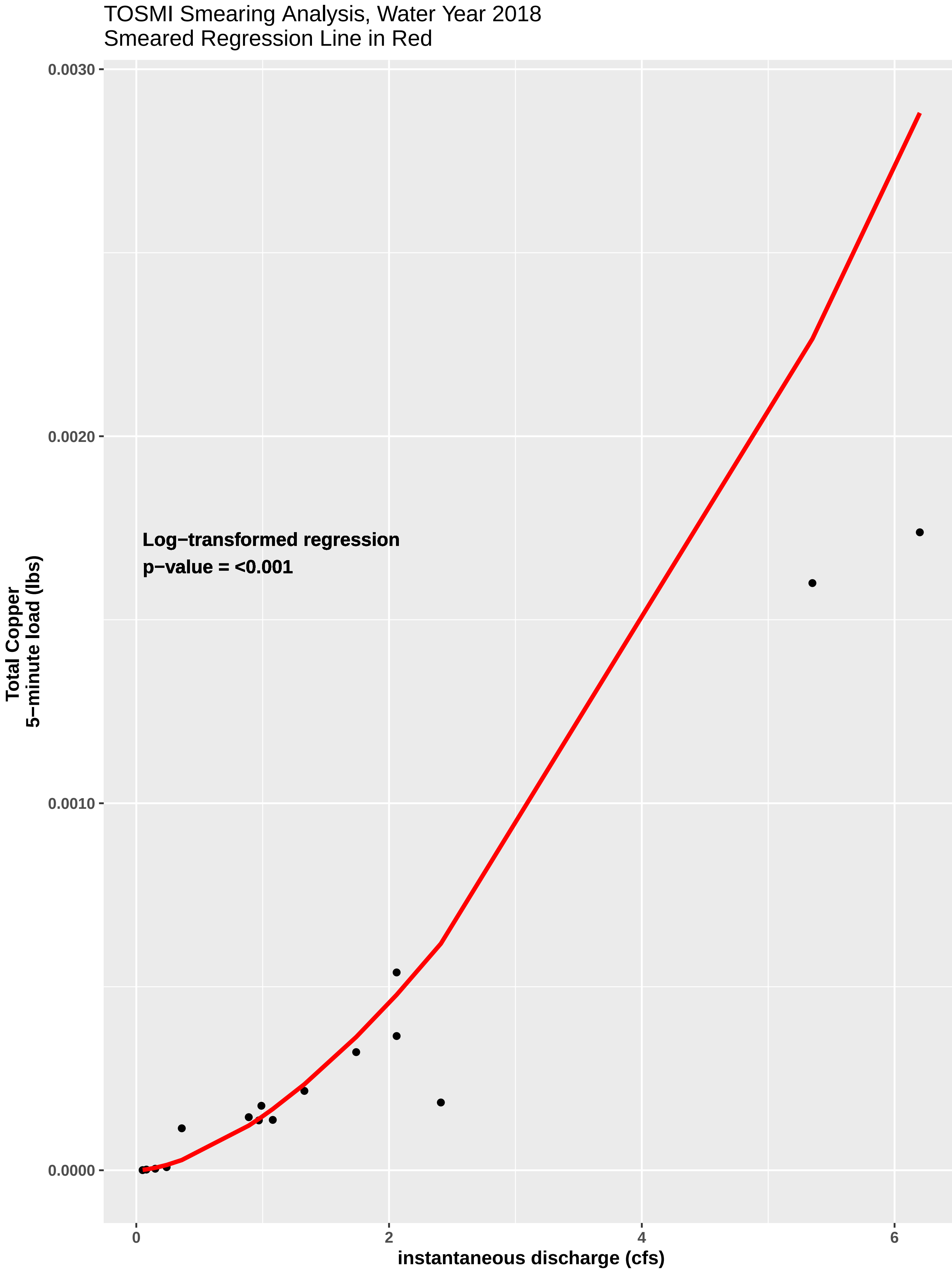
TOSMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Copper
5−minute load (lbs)
0.00250
0.00200
0.00150
0.00100
0.00050
0.00000
Log−transformed regression
p−value = <0.001
0
1
2
3
4
5
instantaneous discharge (cfs)

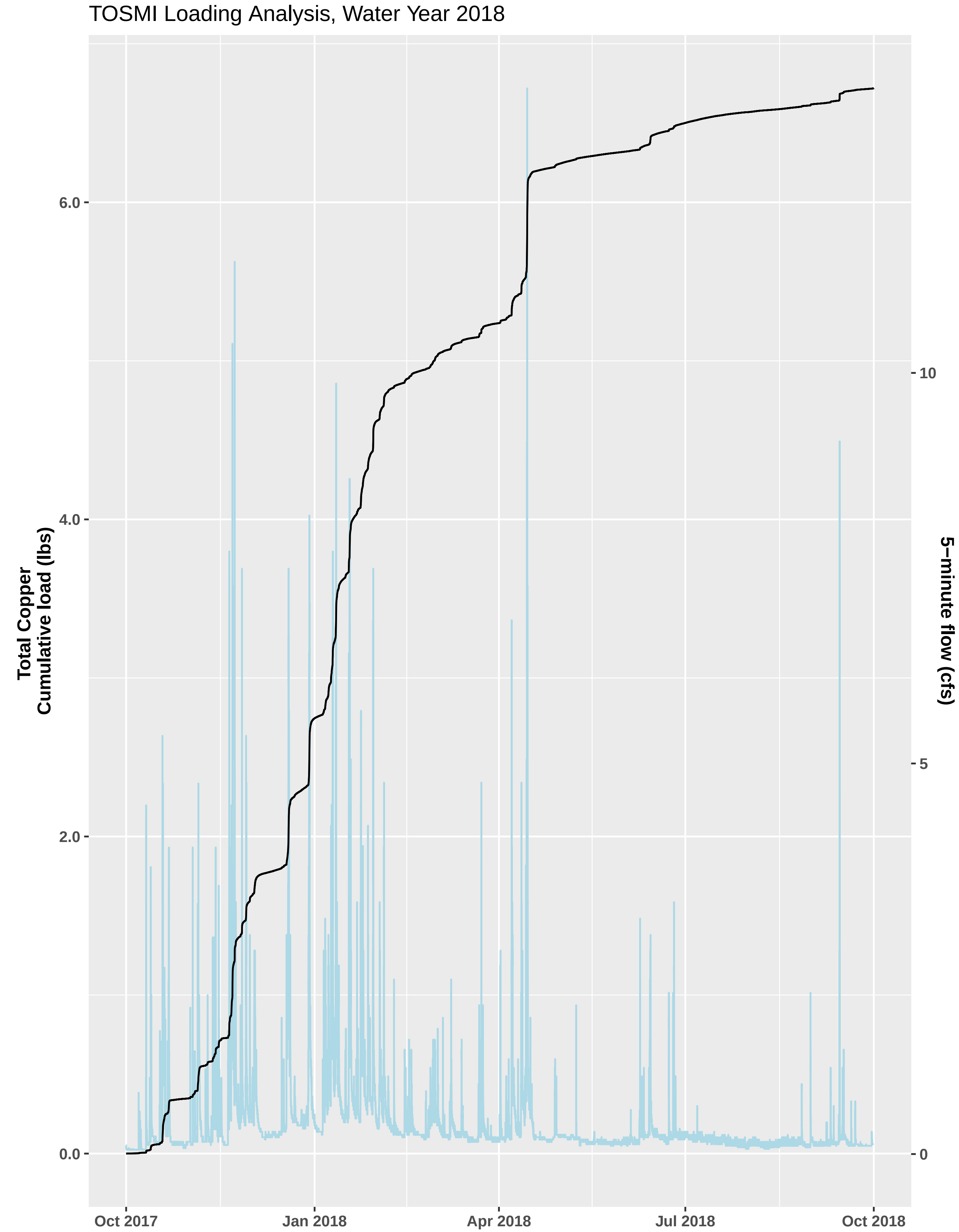


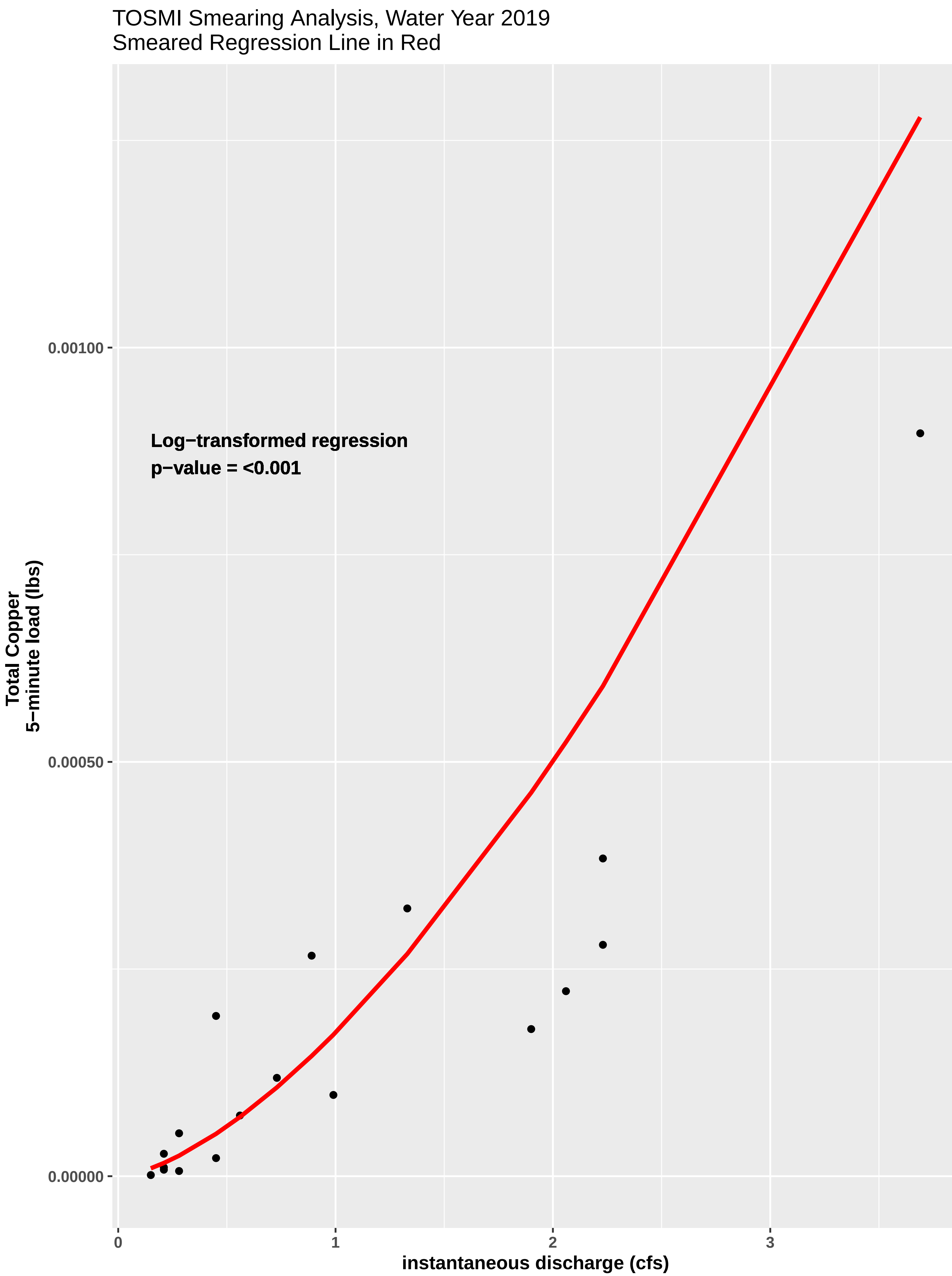
TOSMI Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
7.5
5.0
2.5
0.0
15
10
5
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

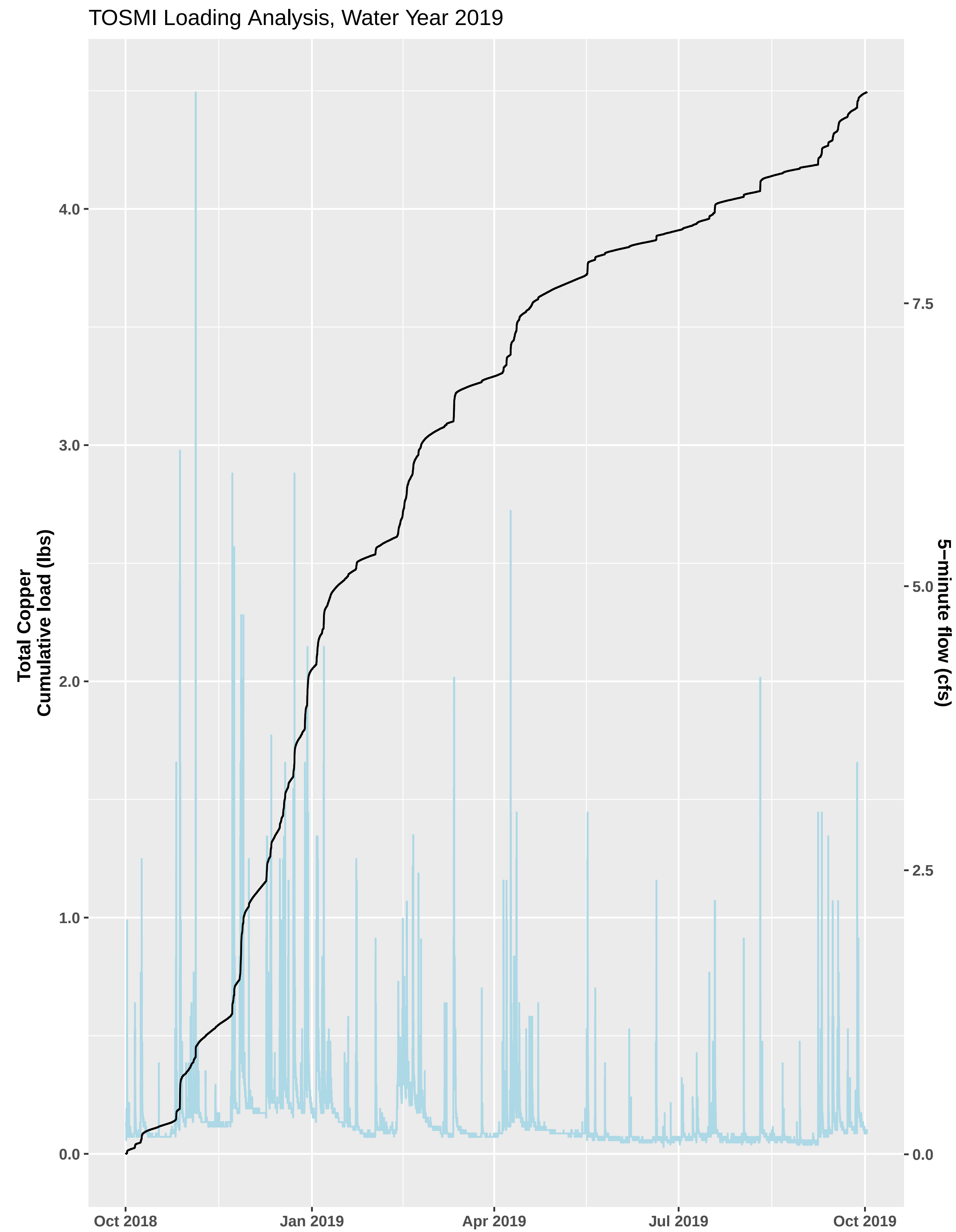

TOSMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Total Copper
5−minute load (lbs)
0.00200
0.00150
0.00100
0.00050
0.00000
Log−transformed regression
p−value = <0.001
0
1
2
3
4
instantaneous discharge (cfs)

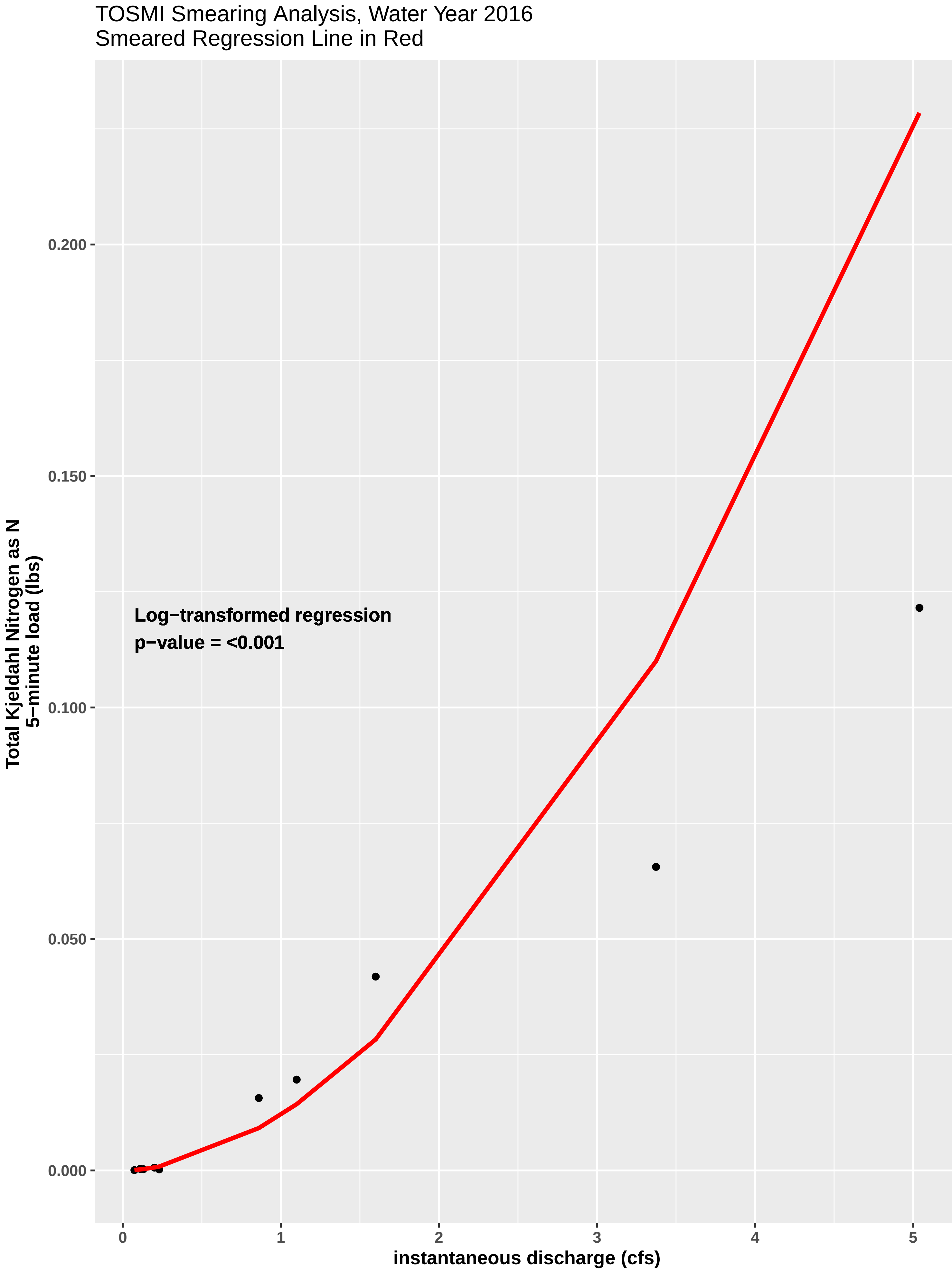

TOSMI Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
10.0
5.0
0.0
15
10
5
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

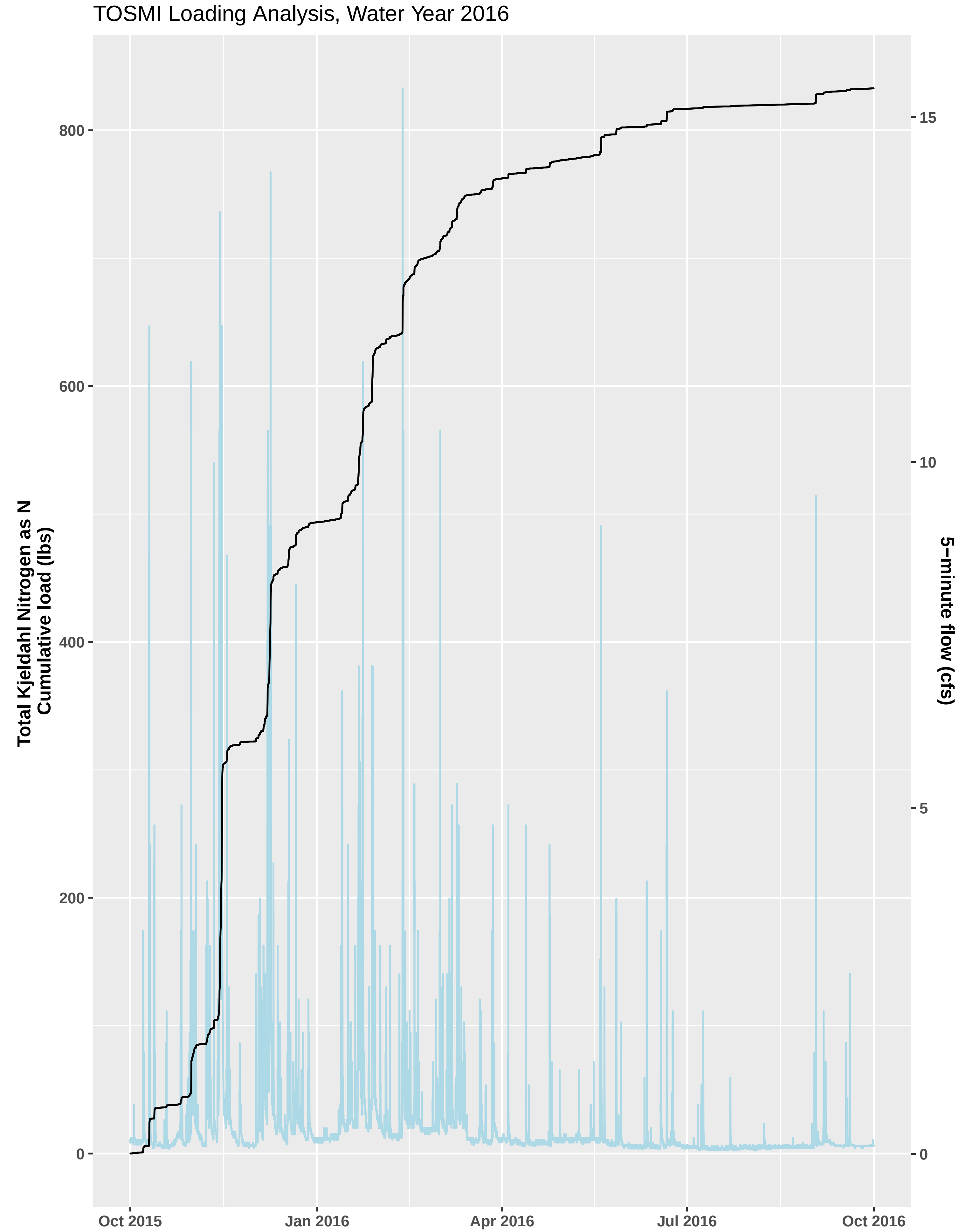

TOSMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
instantaneous discharge (cfs)
0.0030
0.0020
0.0010
0.0000
0
2
4
6

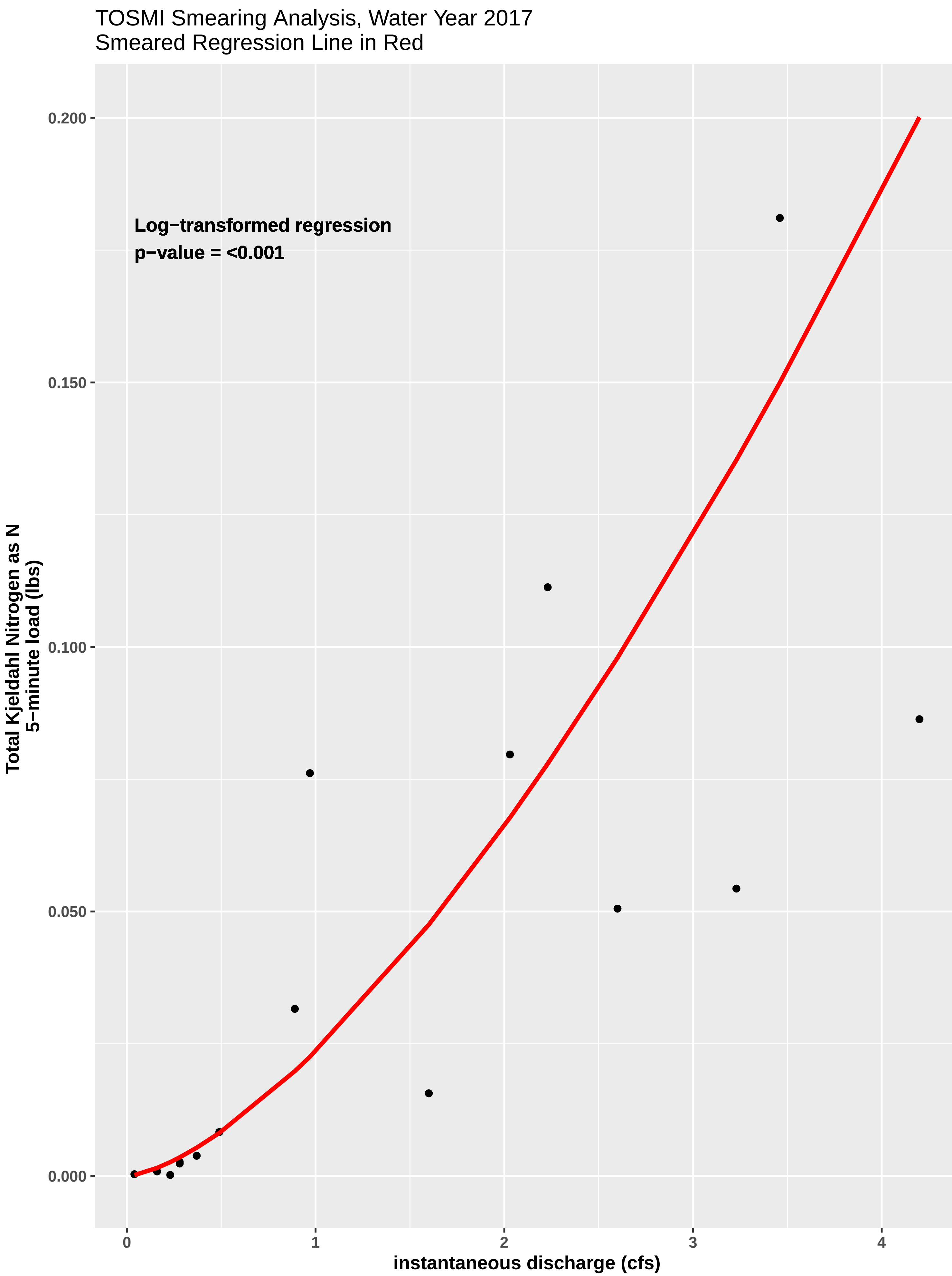

TOSMI Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
5−minute flow (cfs)
6.0
4.0
2.0
0.0
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

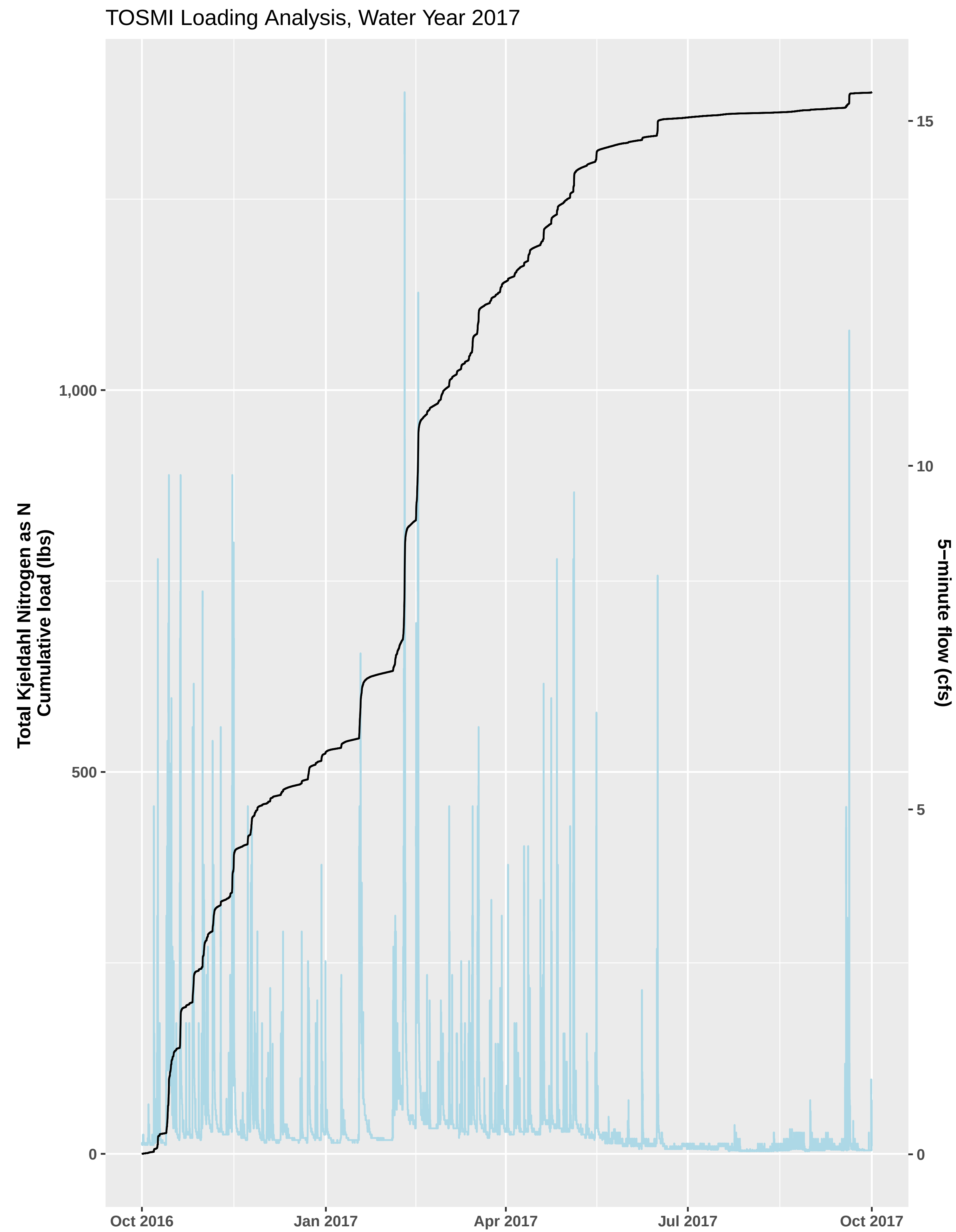

TOSMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00100
0.00050
0.00000
0
1
2
3
instantaneous discharge (cfs)

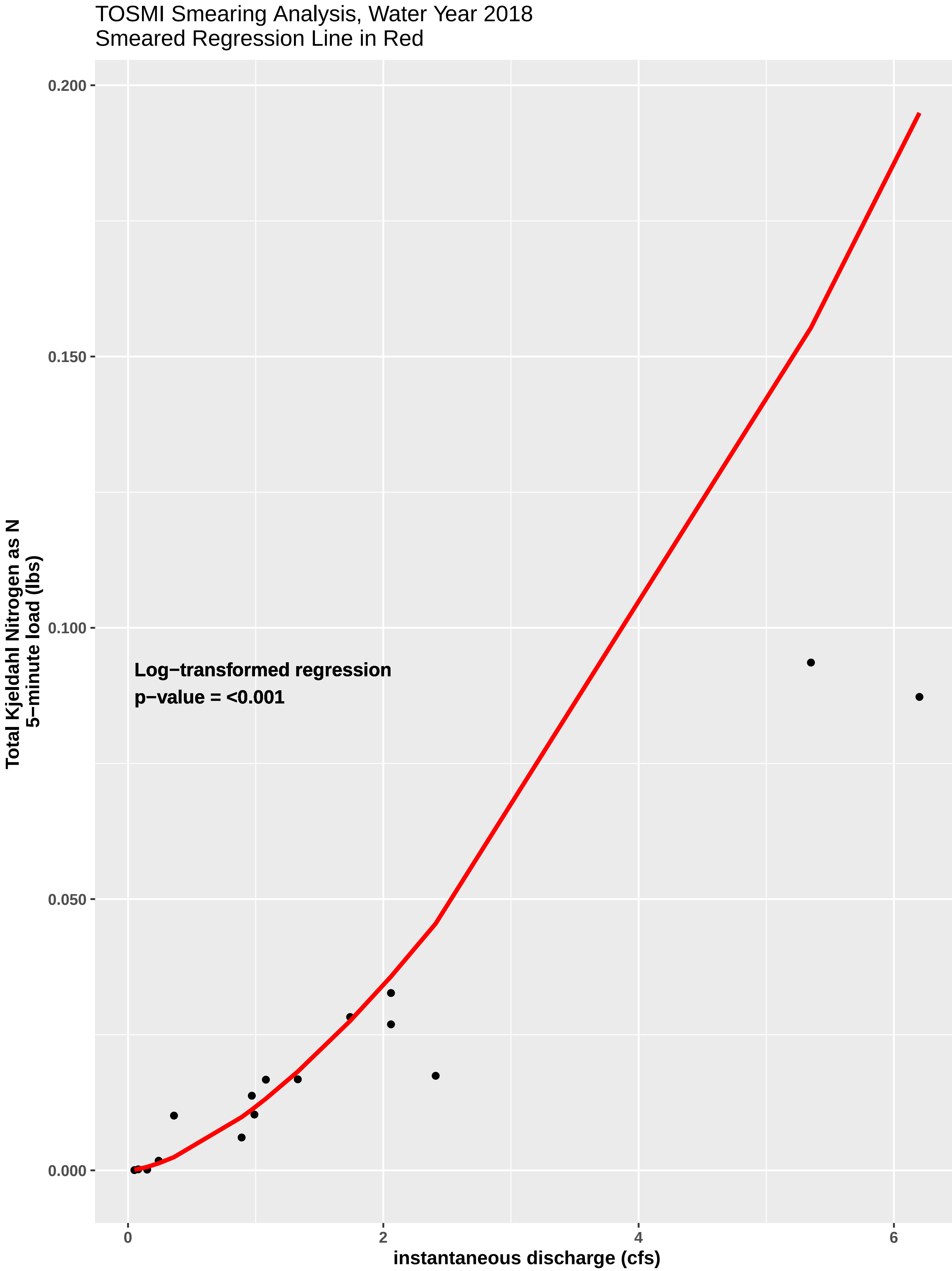

TOSMI Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
4.0
3.0
2.0
1.0
0.0
5−minute flow (cfs)
7.5
5.0
2.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TOSMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.200
0
1
2
3
4
5
instantaneous discharge (cfs)

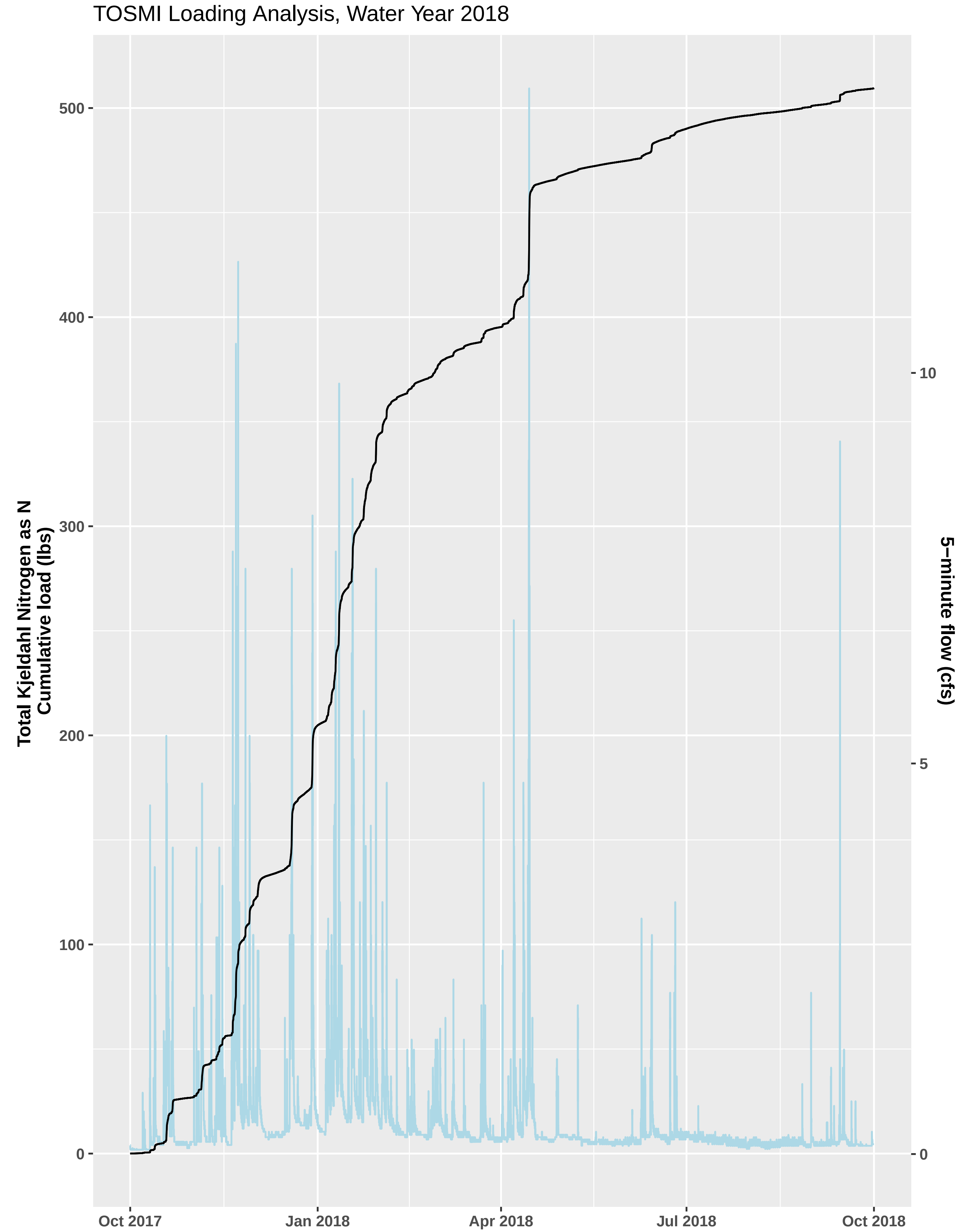

TOSMI Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
200
400
600
800
5−minute flow (cfs)
0
5
10
15
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TOSMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.200
0.150
0.100
0.050
0.000
0
1
2
3
4
instantaneous discharge (cfs)

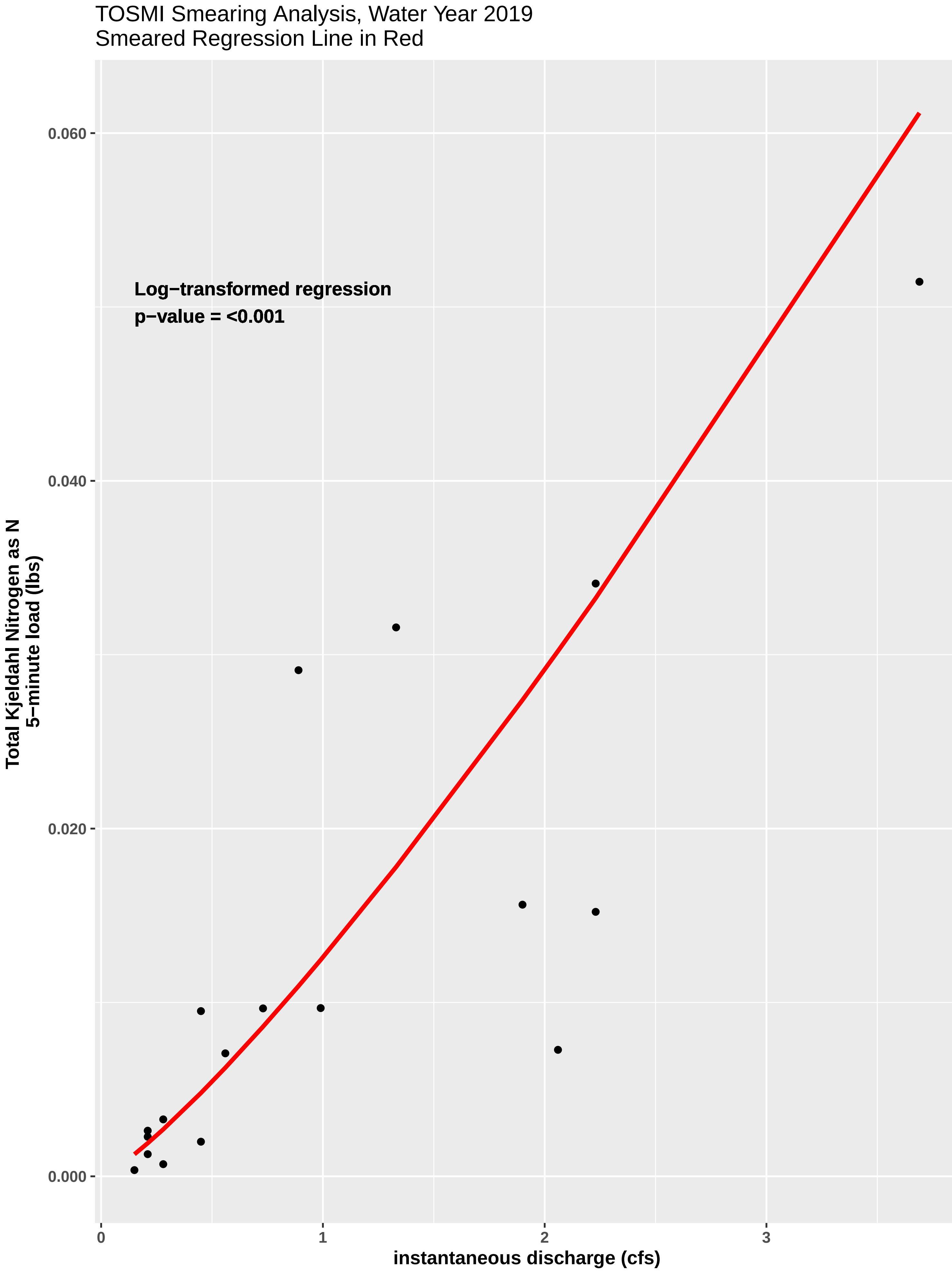

TOSMI Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
1,000
500
0
5−minute flow (cfs)
15
10
5
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

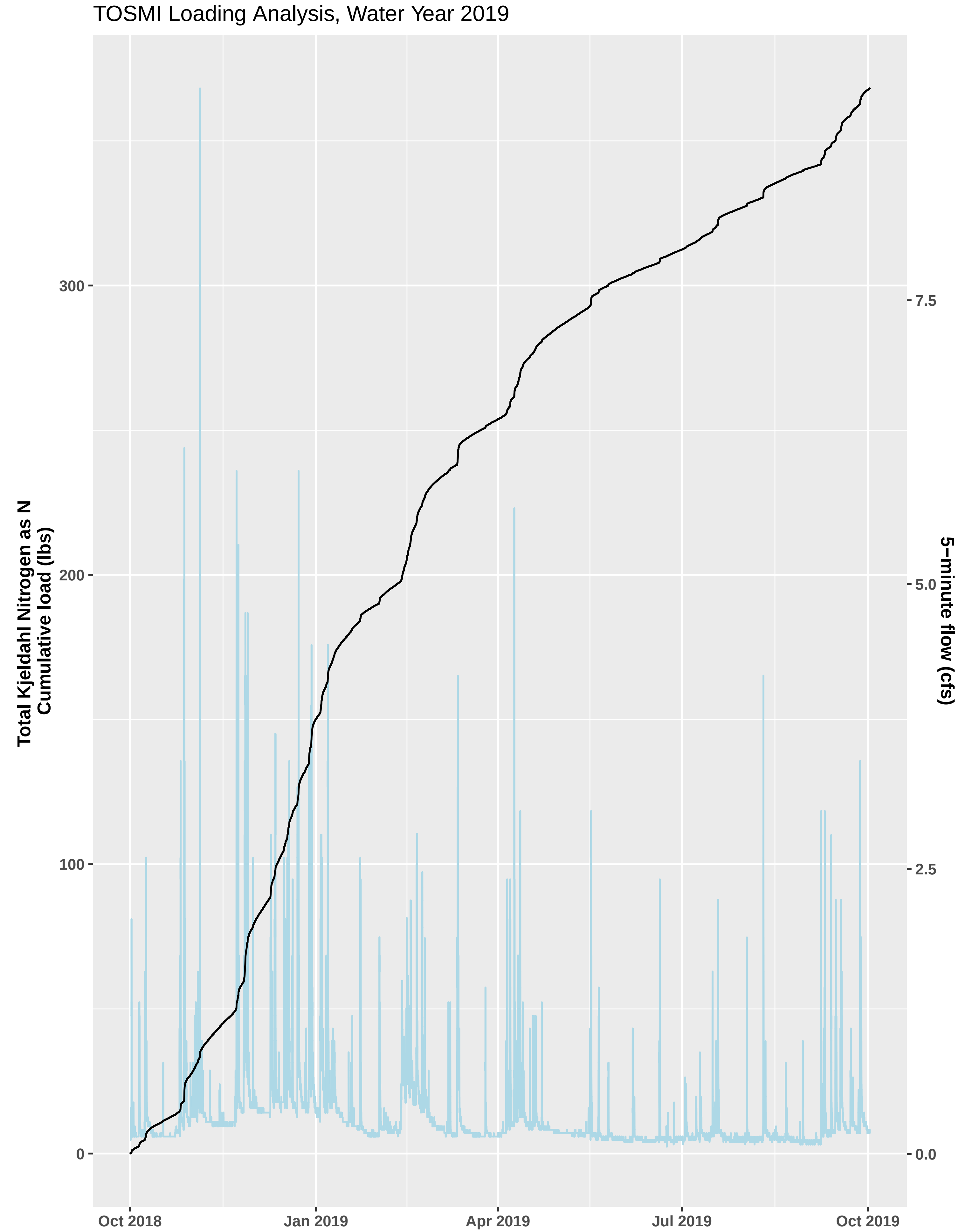


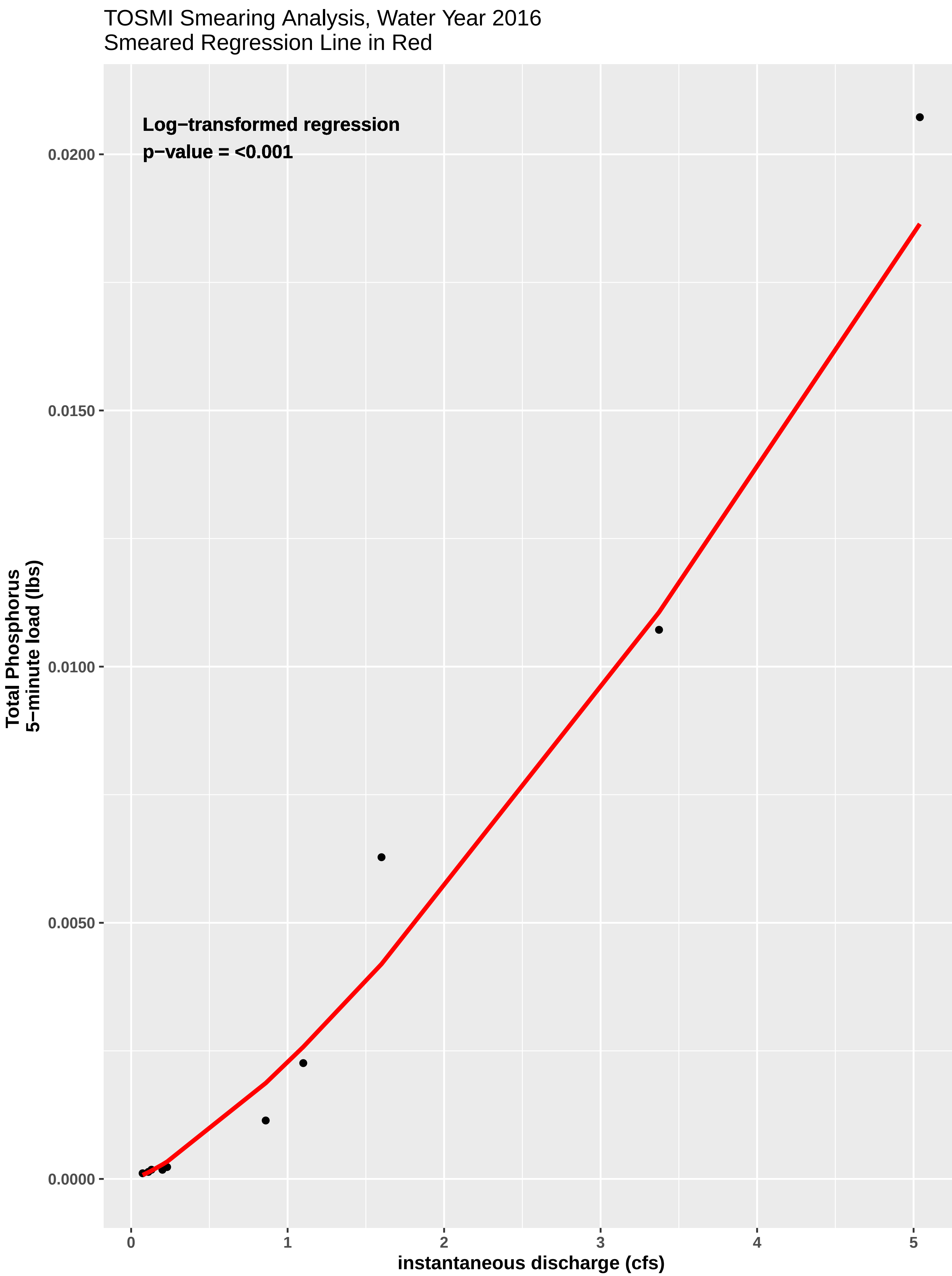
TOSMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.200
0.150
0.100
0.050
0.000
Log−transformed regression
p−value = <0.001
0
2
4
6
instantaneous discharge (cfs)

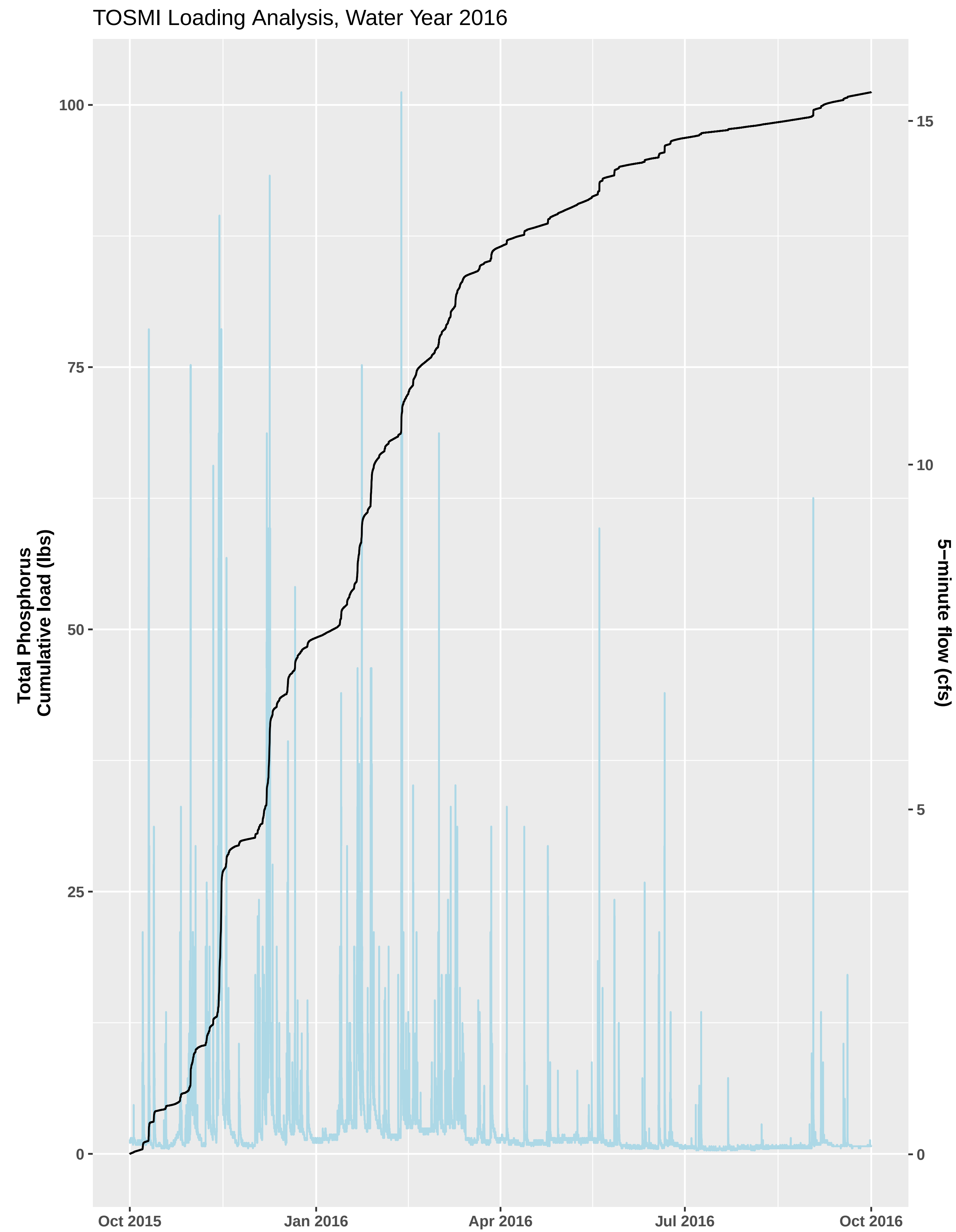


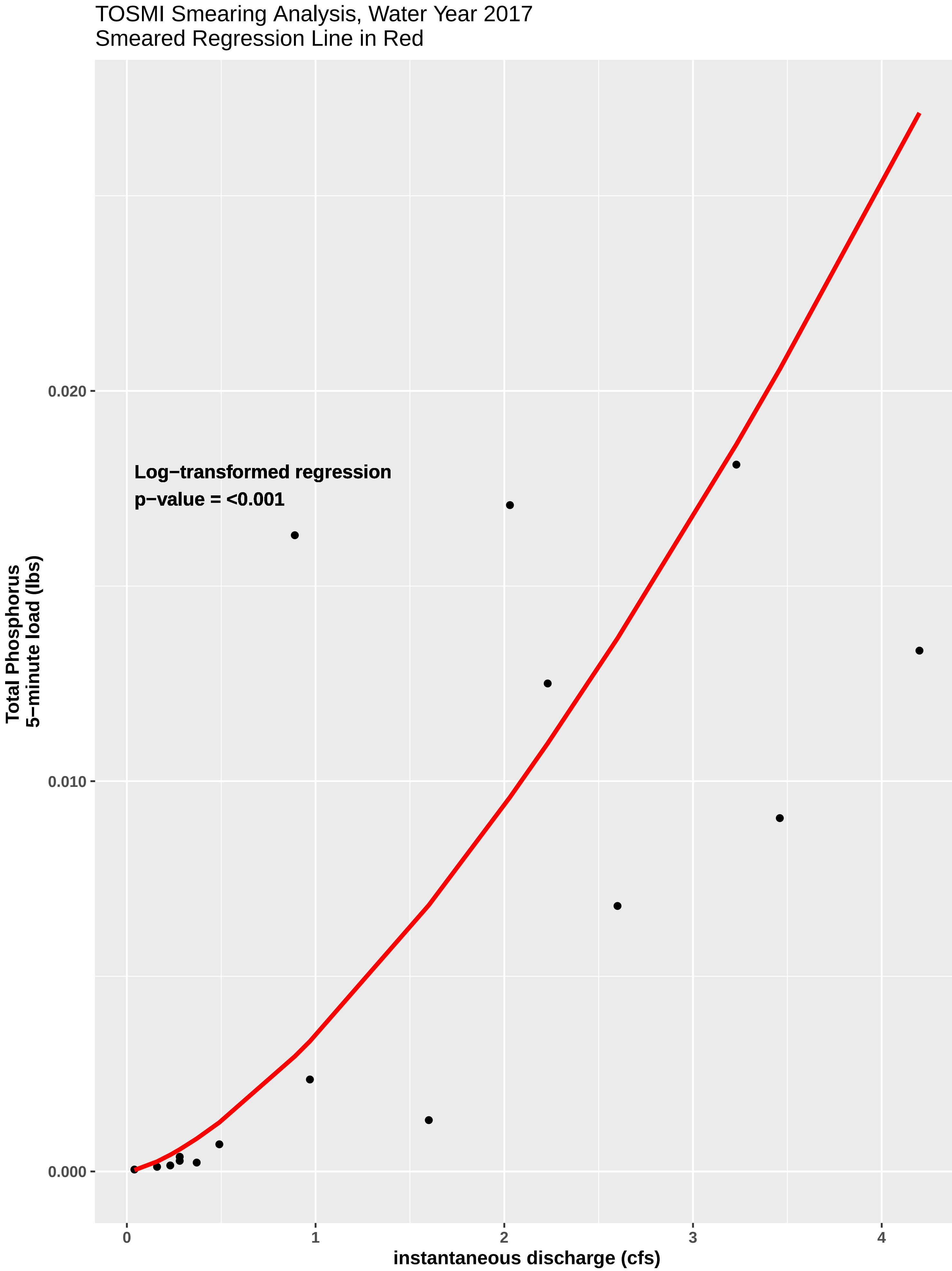
TOSMI Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
500
400
300
200
100
0
5−minute flow (cfs)
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TOSMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.060
0.040
0.020
0.000
0
1
2
3
instantaneous discharge (cfs)

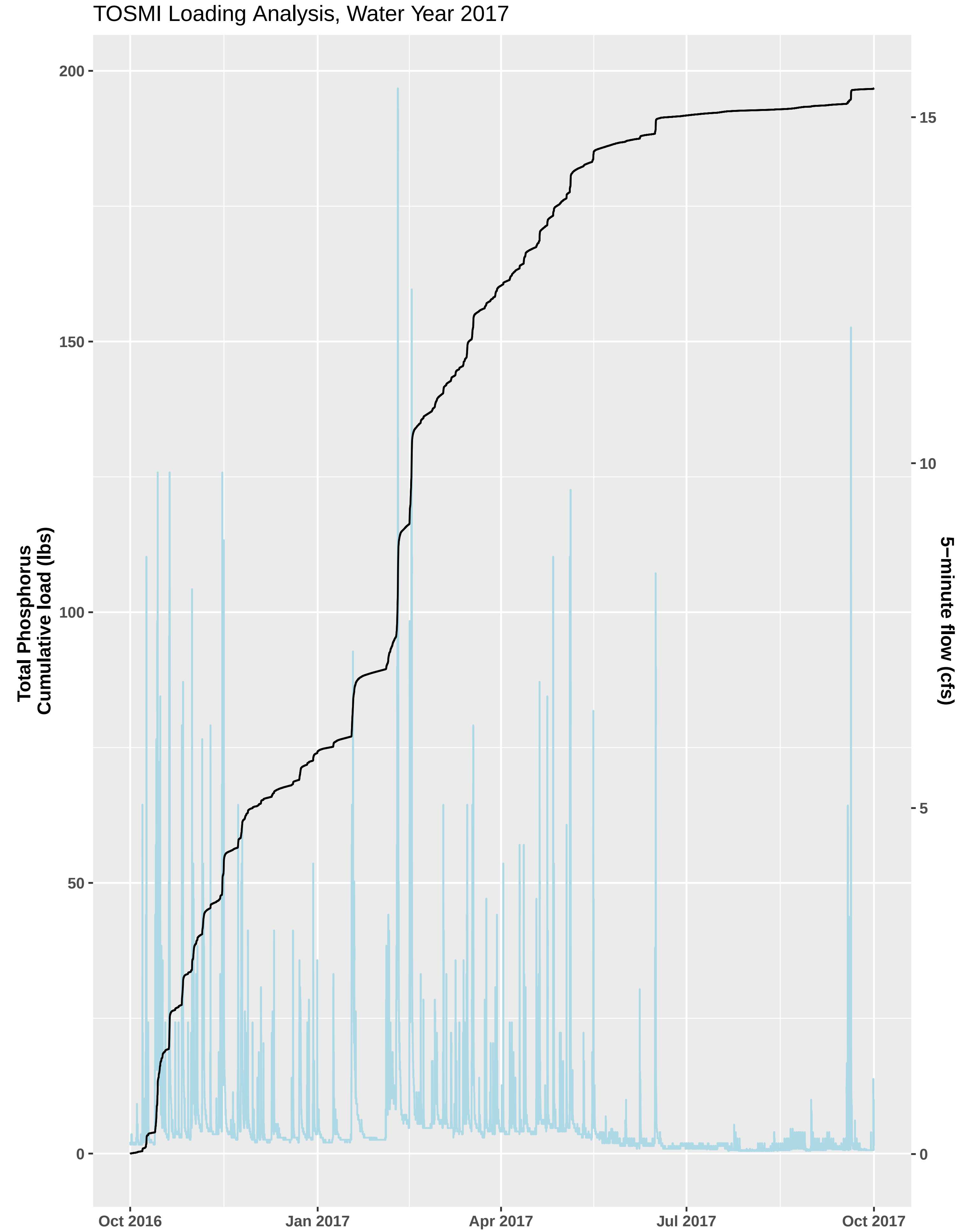

TOSMI Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
300
200
100
0
5−minute flow (cfs)
7.5
5.0
2.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TOSMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0
1
2
3
4
5
instantaneous discharge (cfs)


TOSMI Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
100
5−minute flow (cfs)
0
5
10
15
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

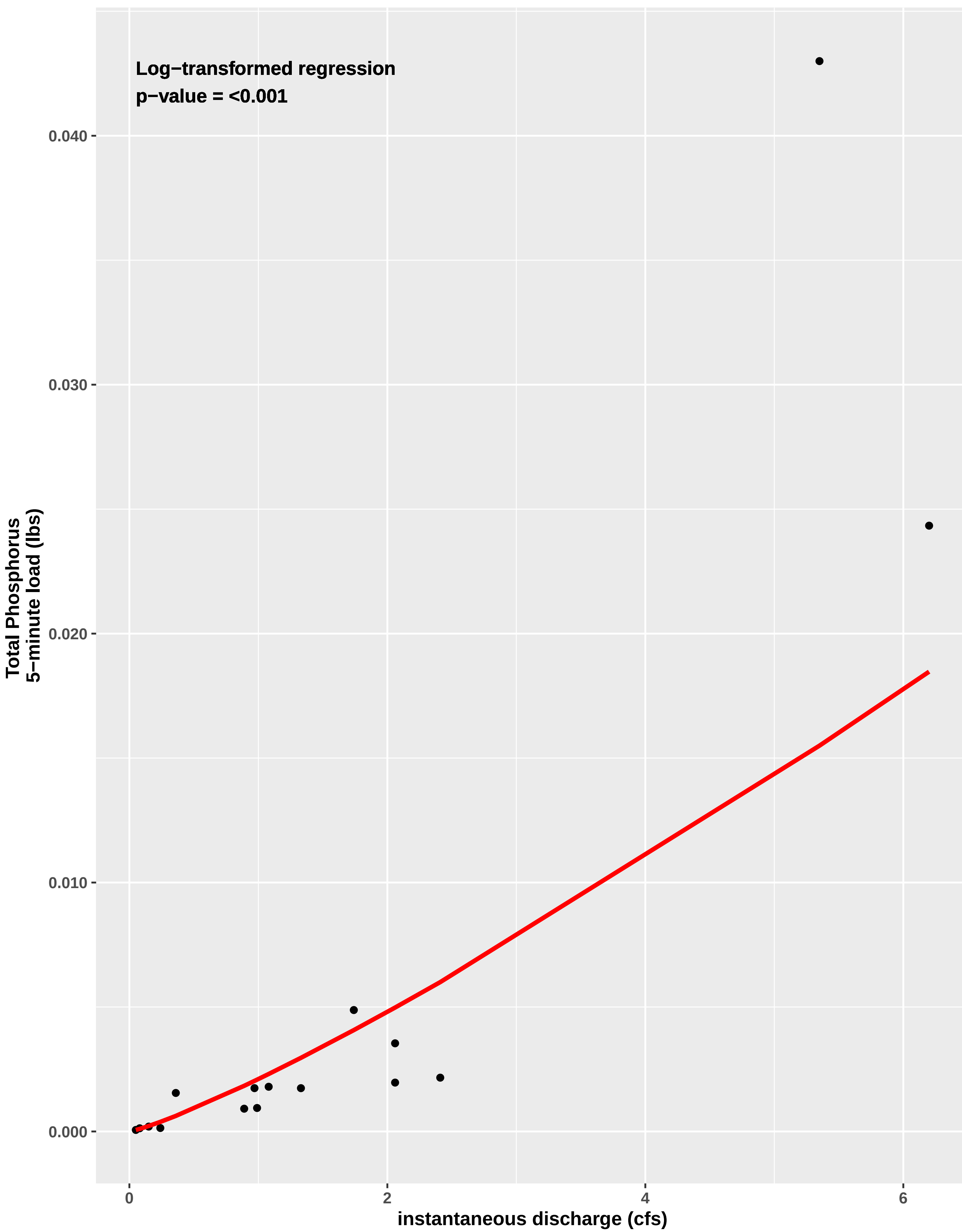


TOSMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.000
0.010
0.020
0
1
2
3
4
instantaneous discharge (cfs)

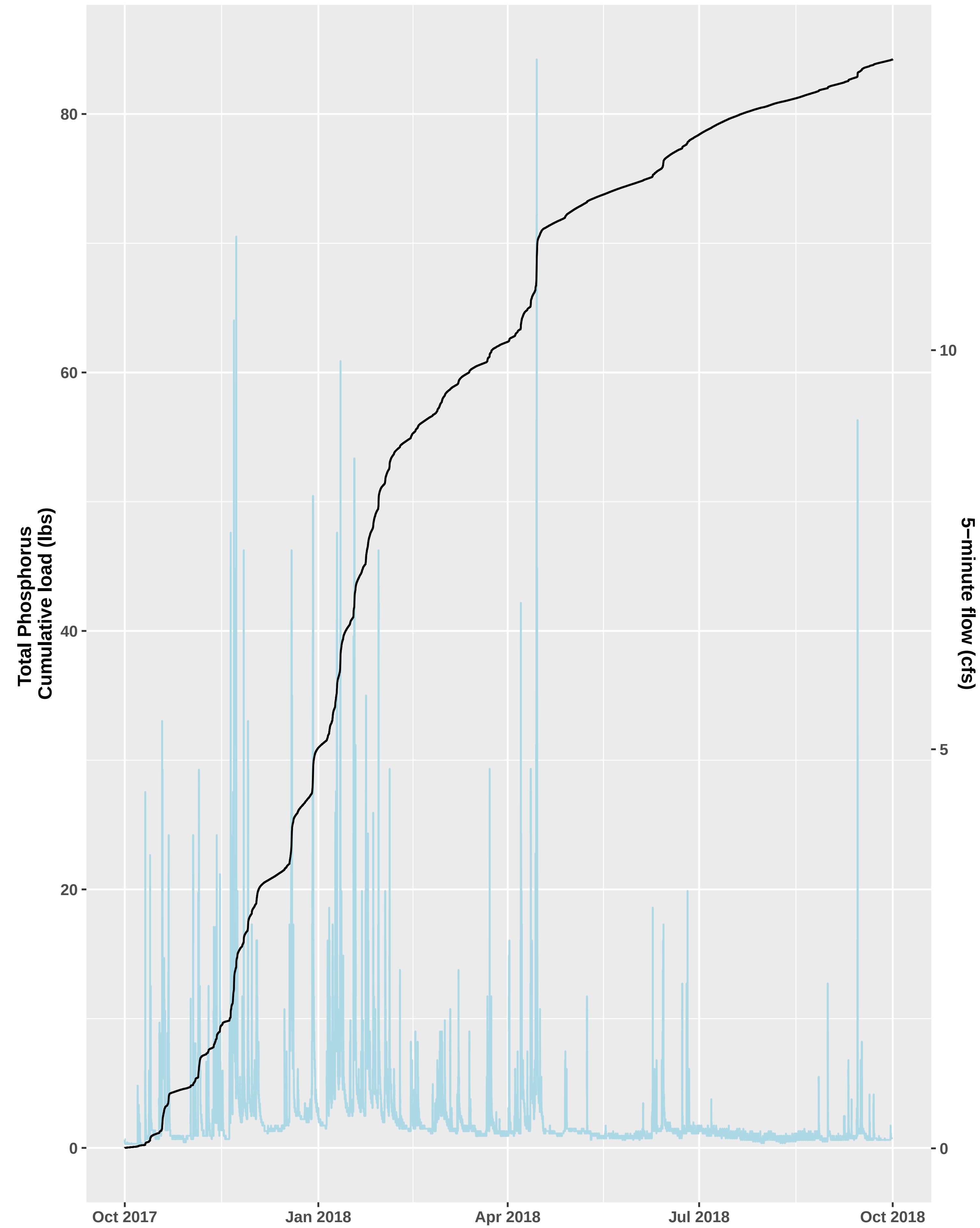


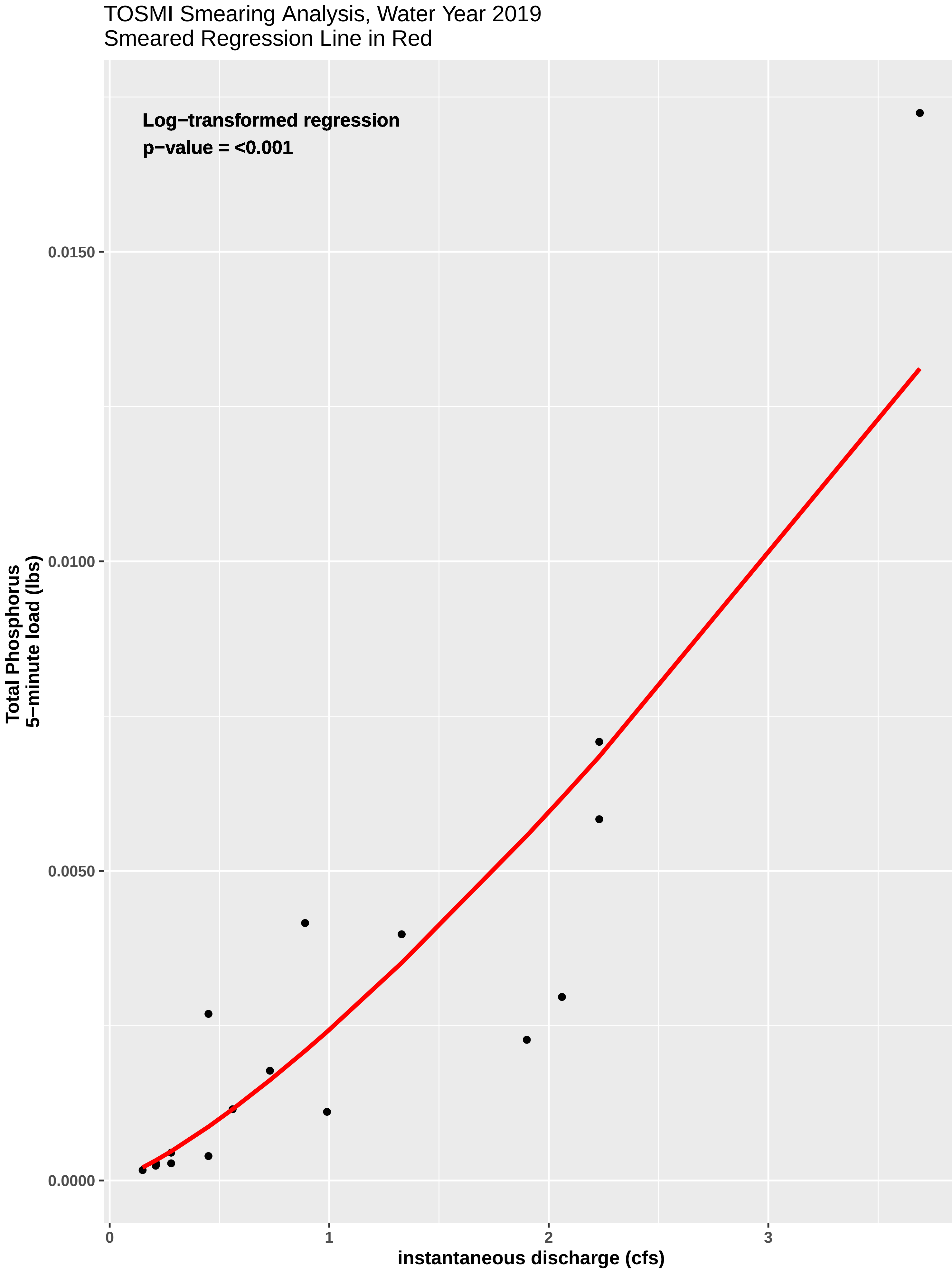
TOSMI Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
50
100
150
200
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

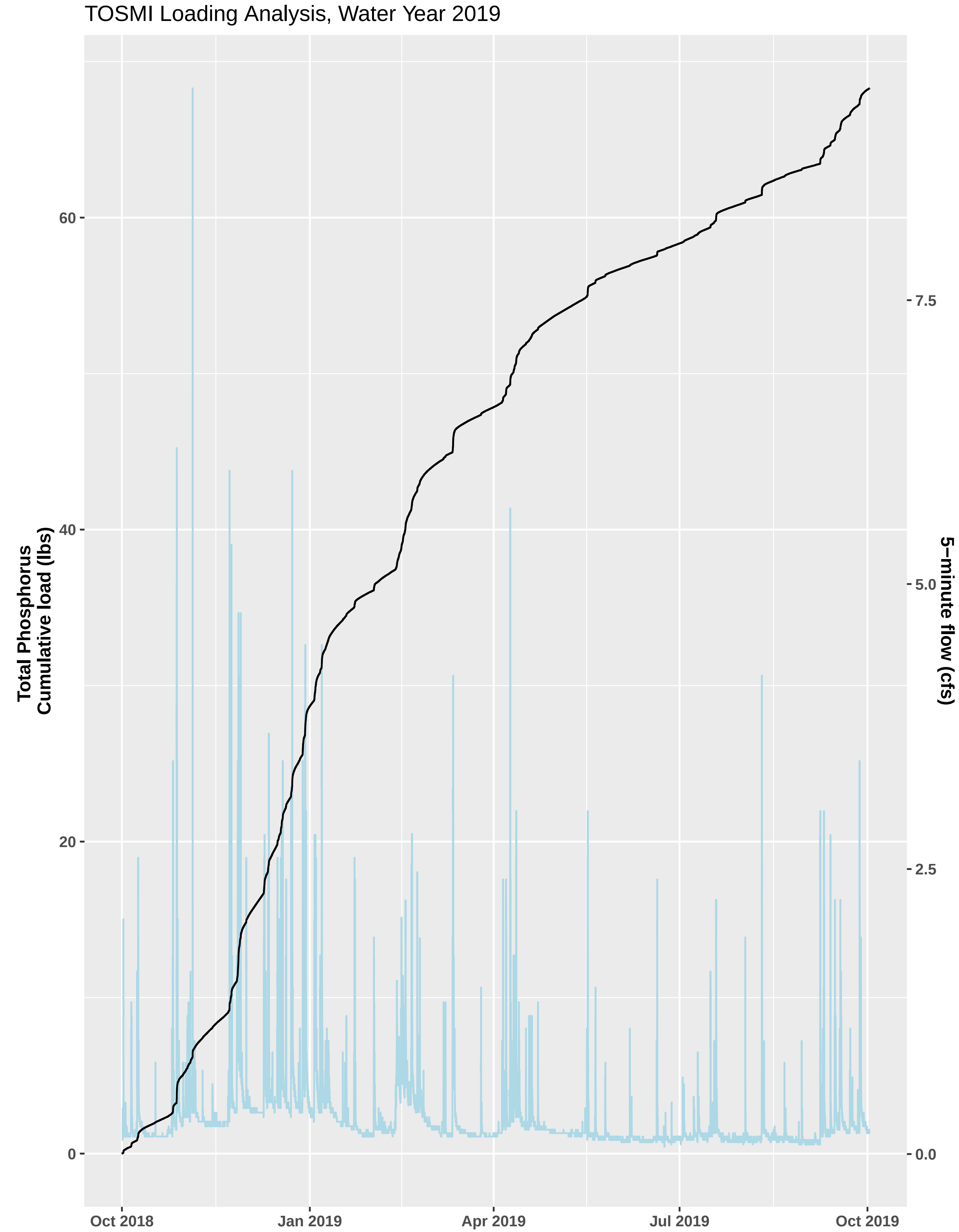
TOSMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red

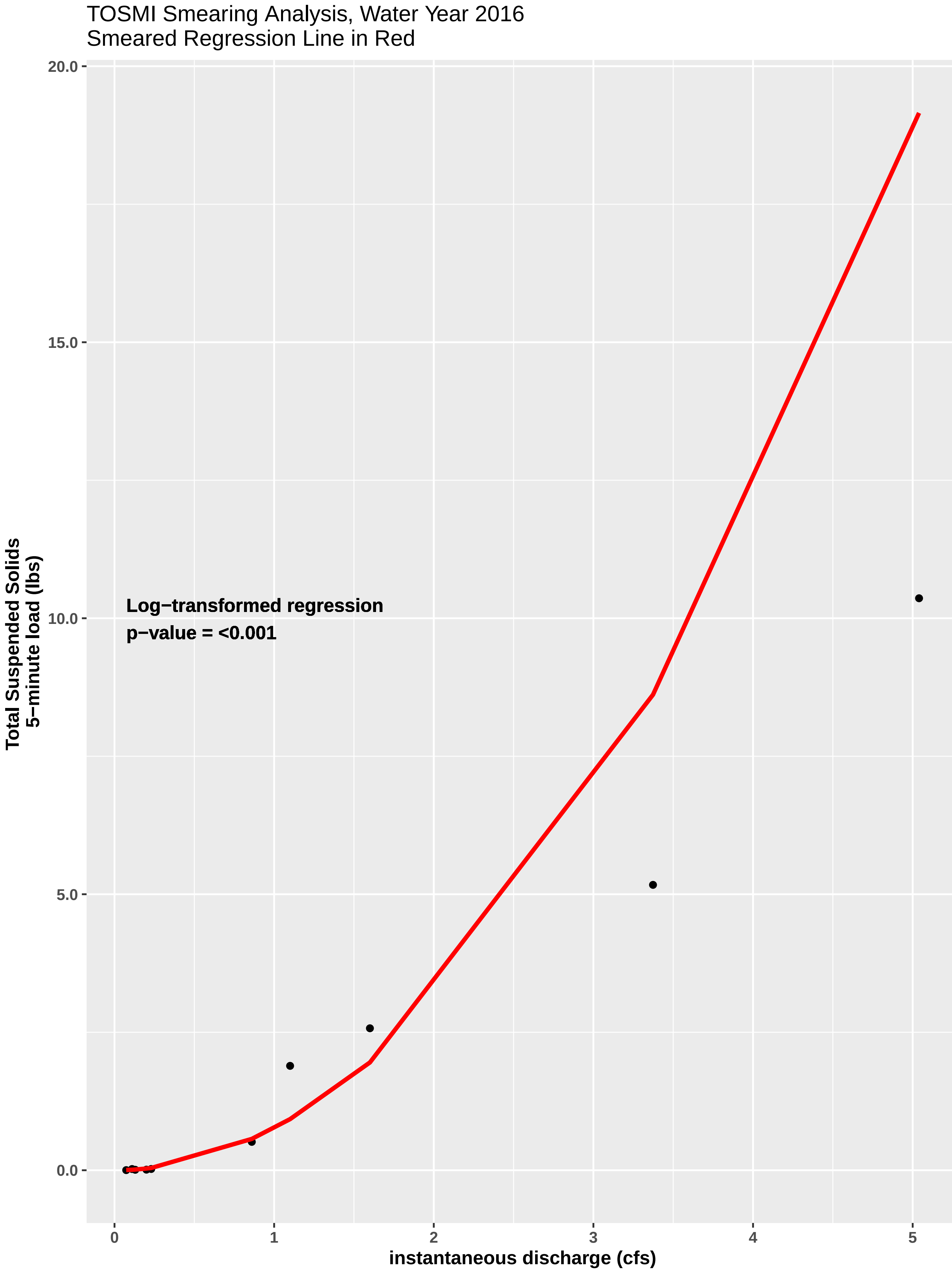


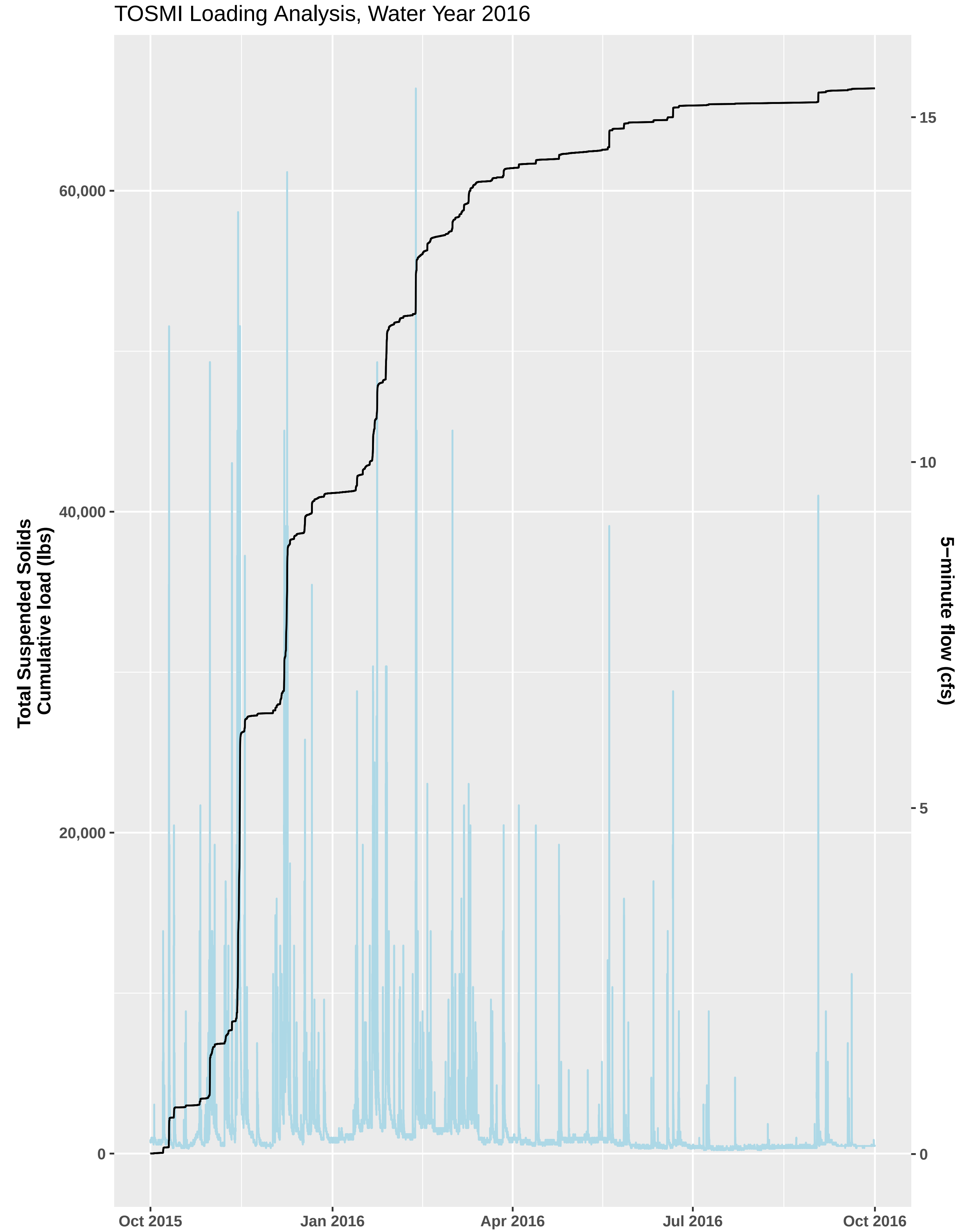
TOSMI Loading Analysis, Water Year 2018

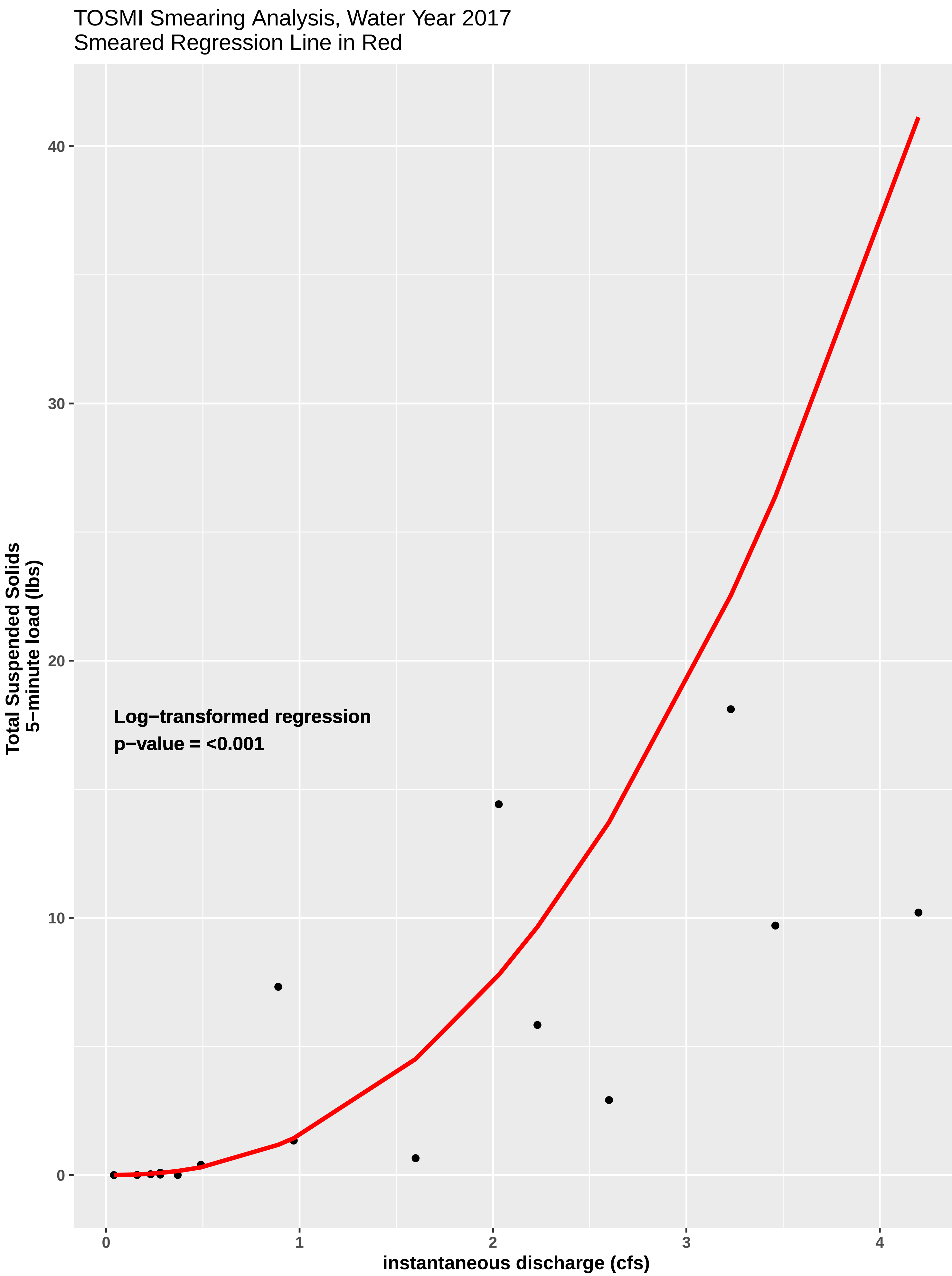



TOSMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0
1
2
3
instantaneous discharge (cfs)

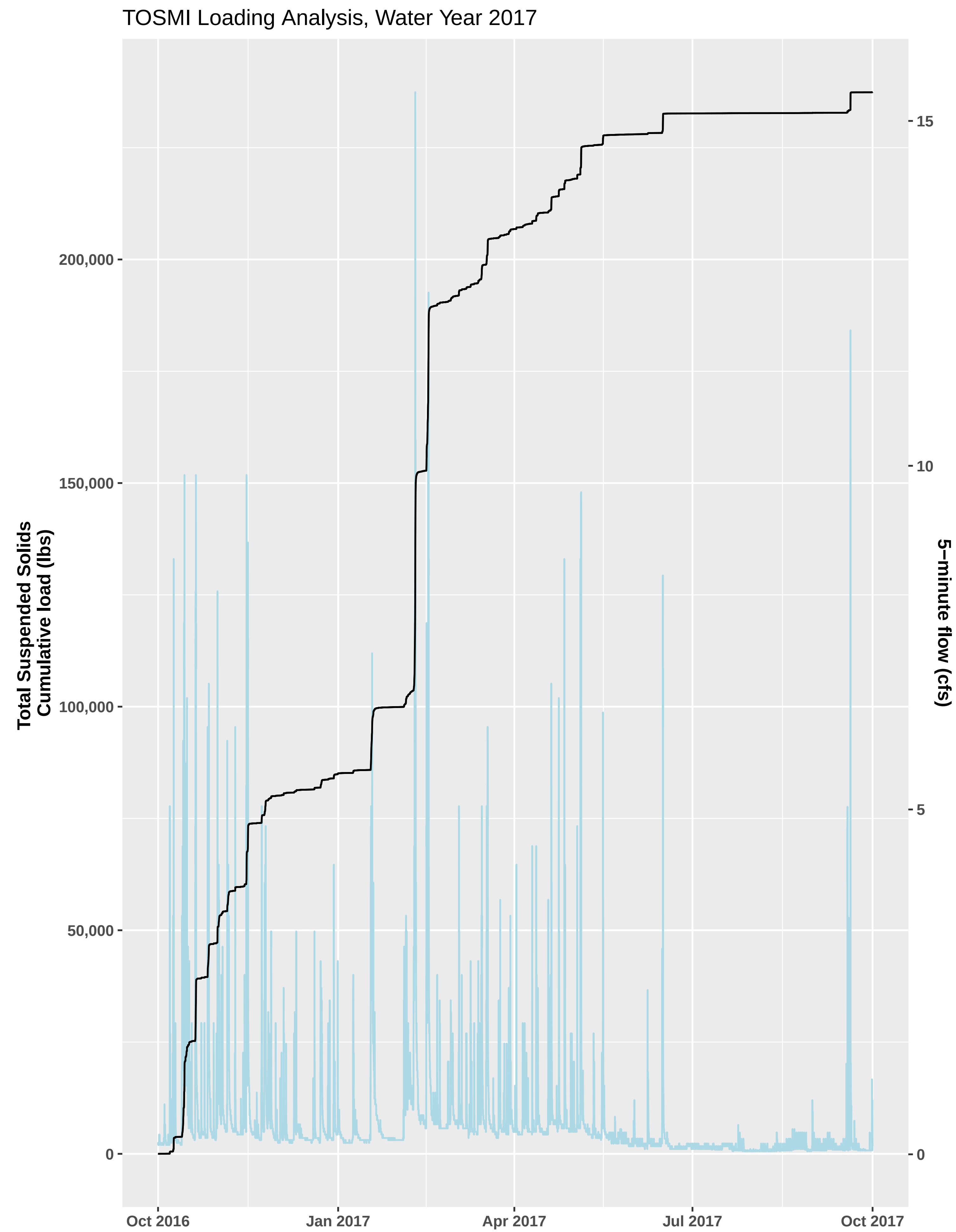

TOSMI Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0.0
2.5
5.0
7.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TOSMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
Log−transformed regression
p−value = <0.001
20.0
15.0
10.0
5.0
0.0
0
1
2
3
4
5

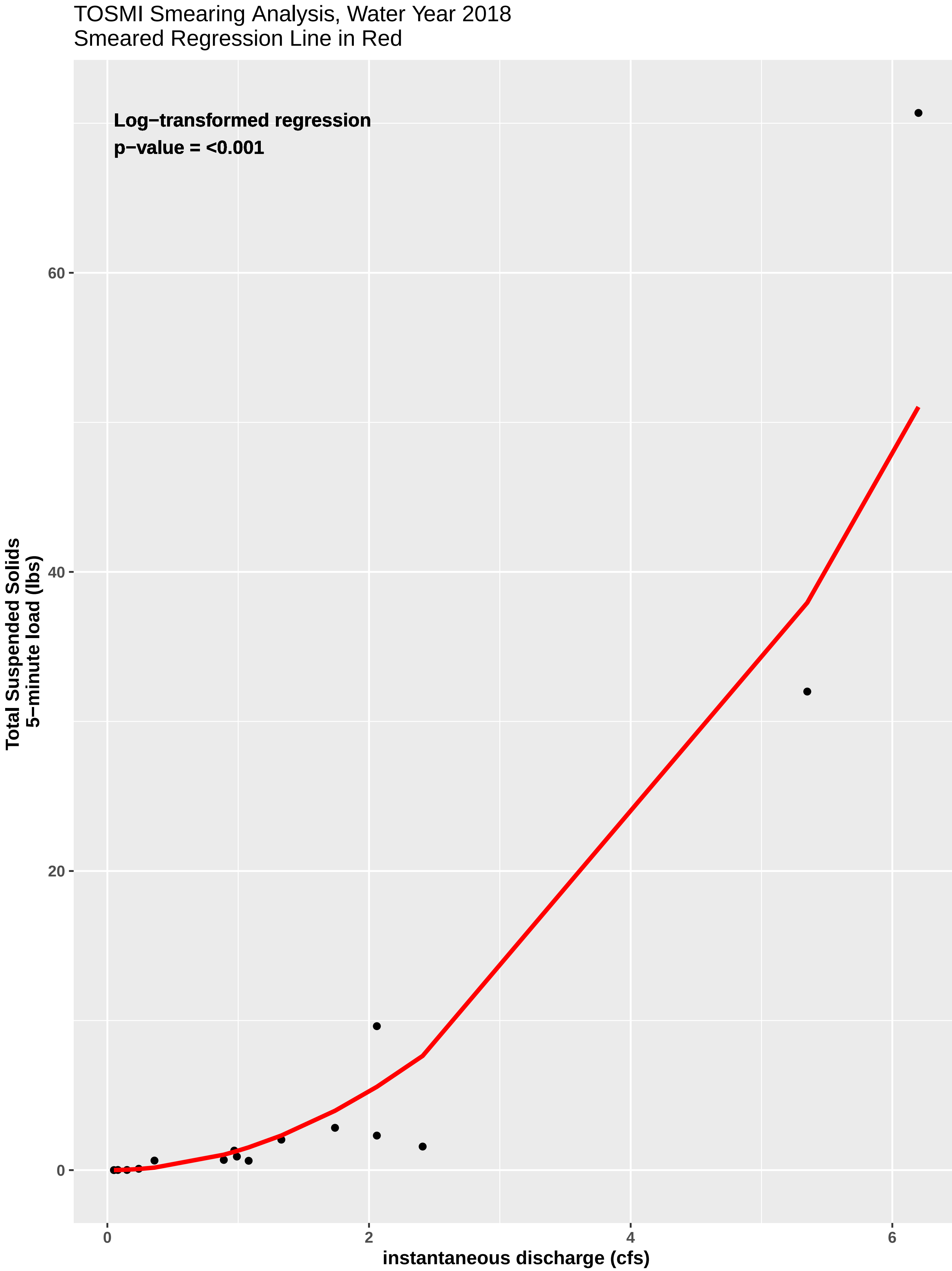

TOSMI Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
60,000
40,000
20,000
0
15
10
5
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016



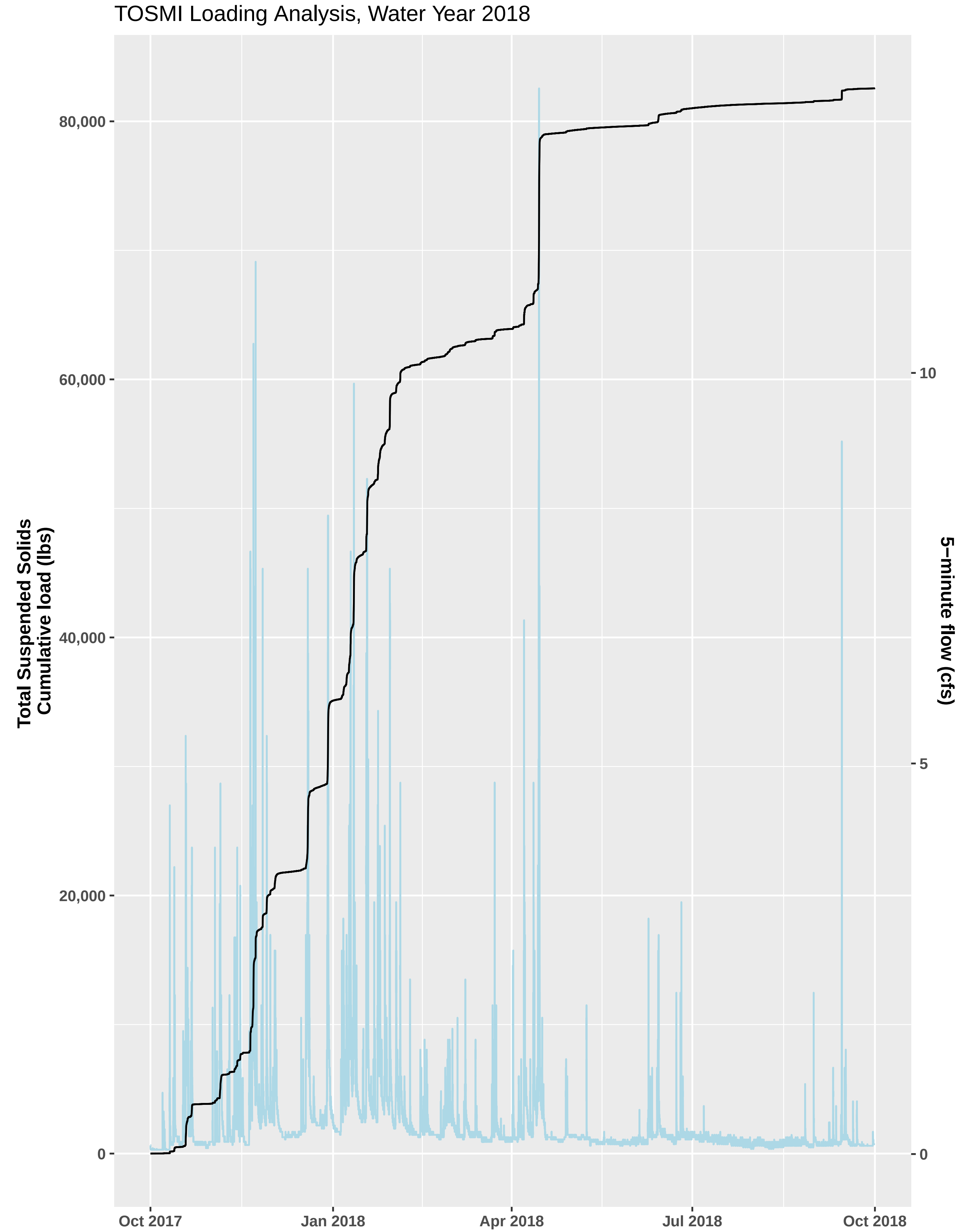
TOSMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0
10
20
30
40
0
1
2
3
4



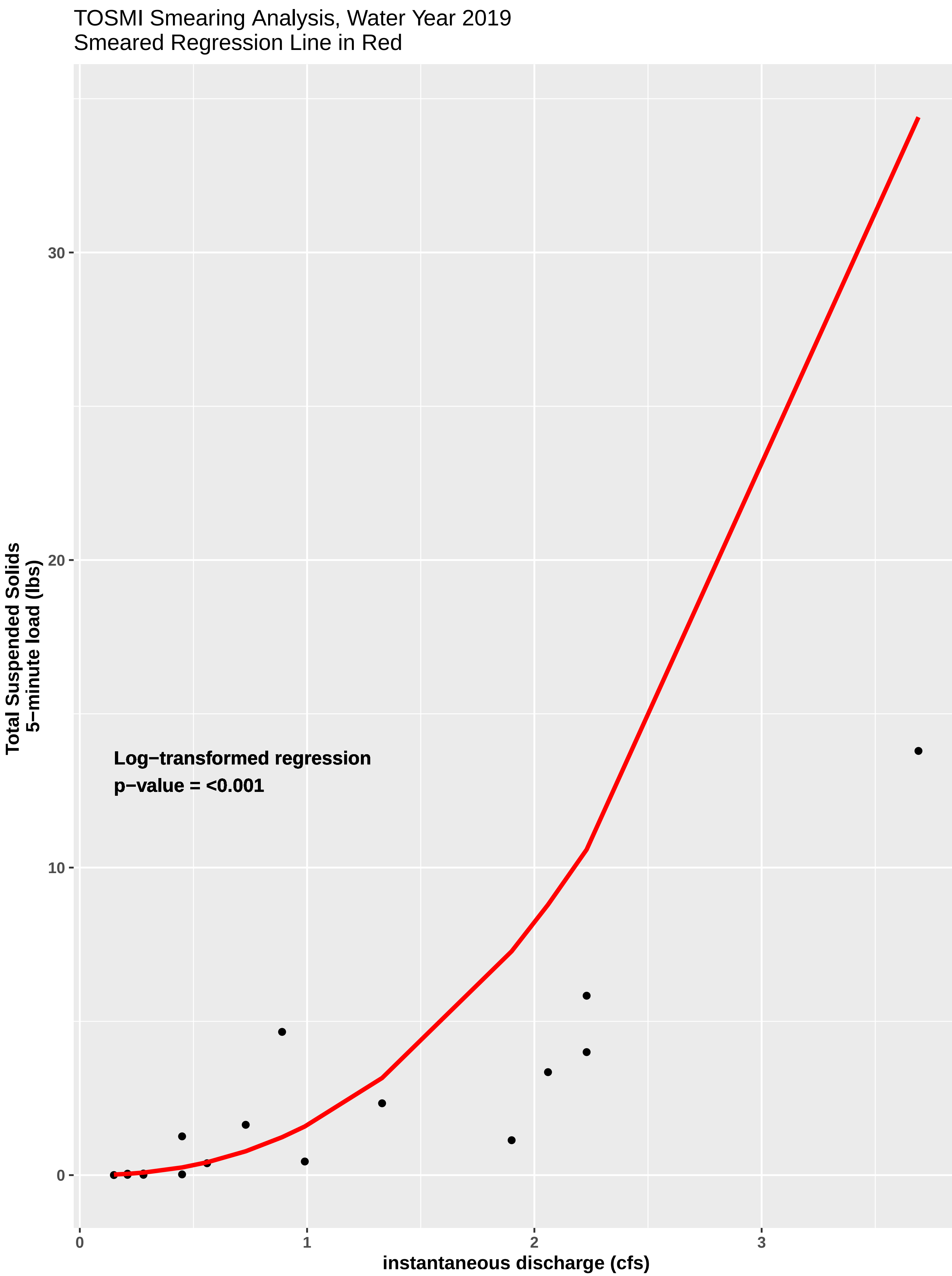
TOSMI Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
50,000
100,000
150,000
200,000
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

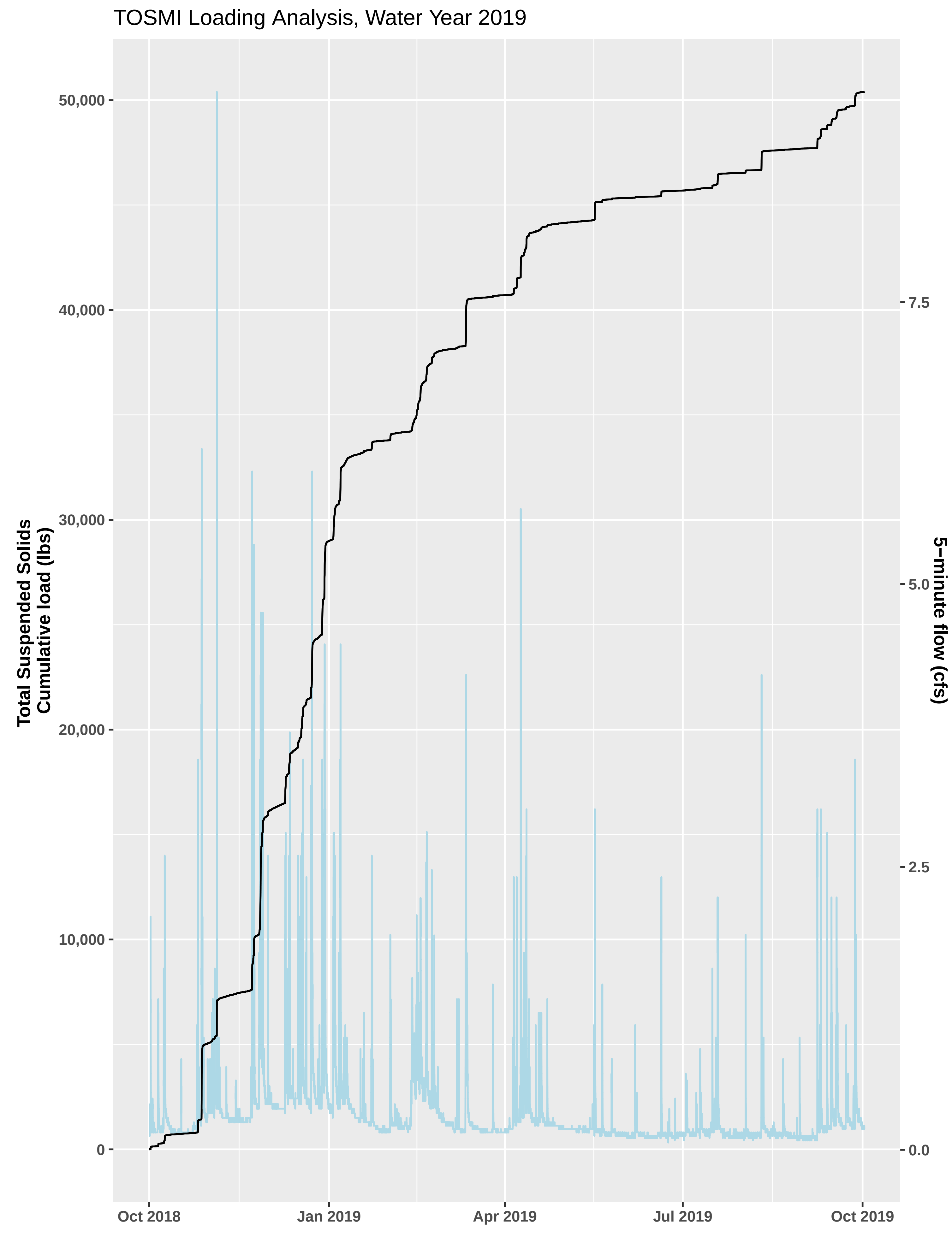


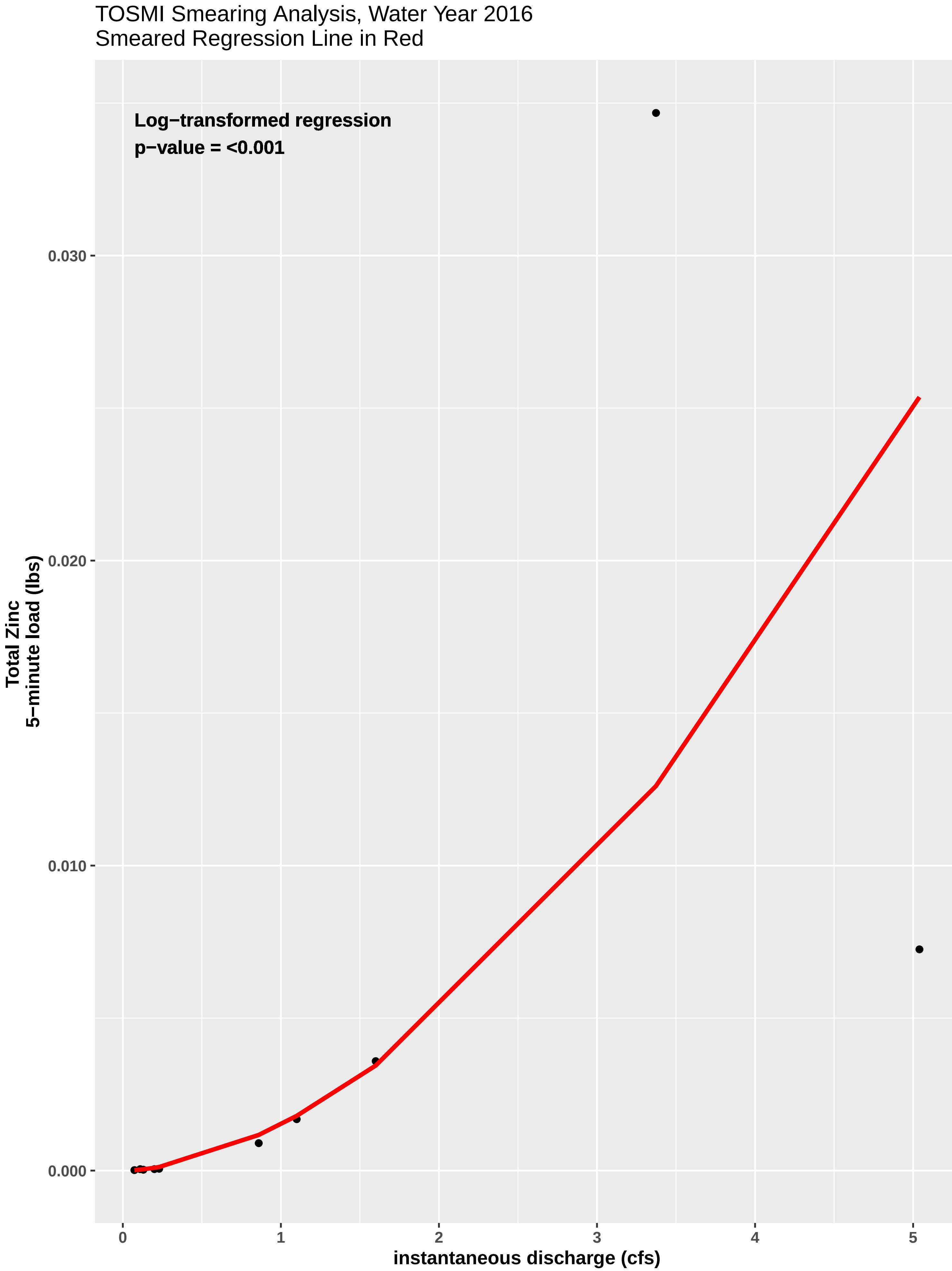
TOSMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0
20
40
60
0
2
4
6
instantaneous discharge (cfs)



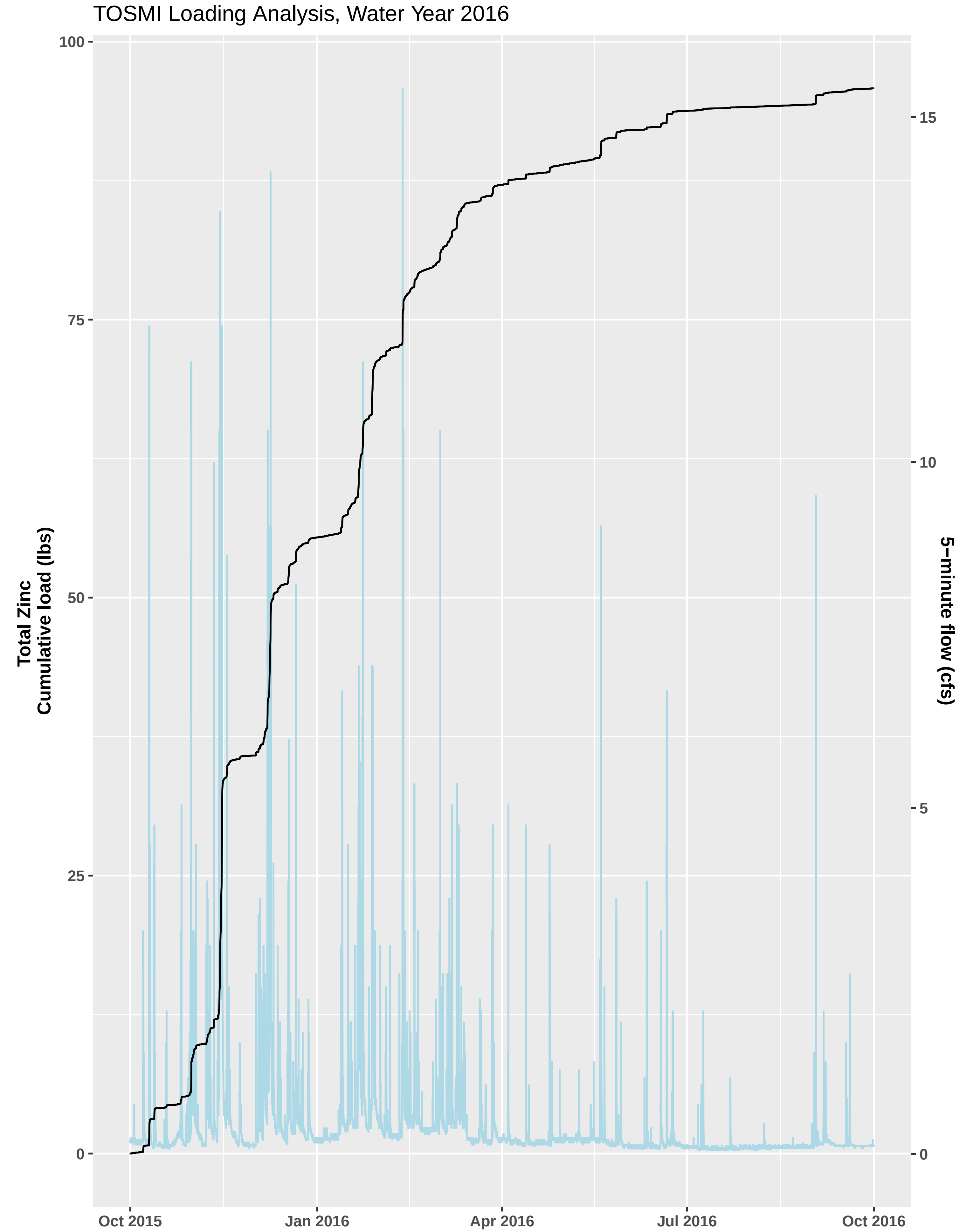
TOSMI Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
20,000
40,000
60,000
80,000
5−minute flow (cfs)
0
5
10
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TOSMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Total Suspended Solids
5−minute load (lbs)
Log−transformed regression
p−value = <0.001
instantaneous discharge (cfs)
0
10
20
30
0
1
2
3

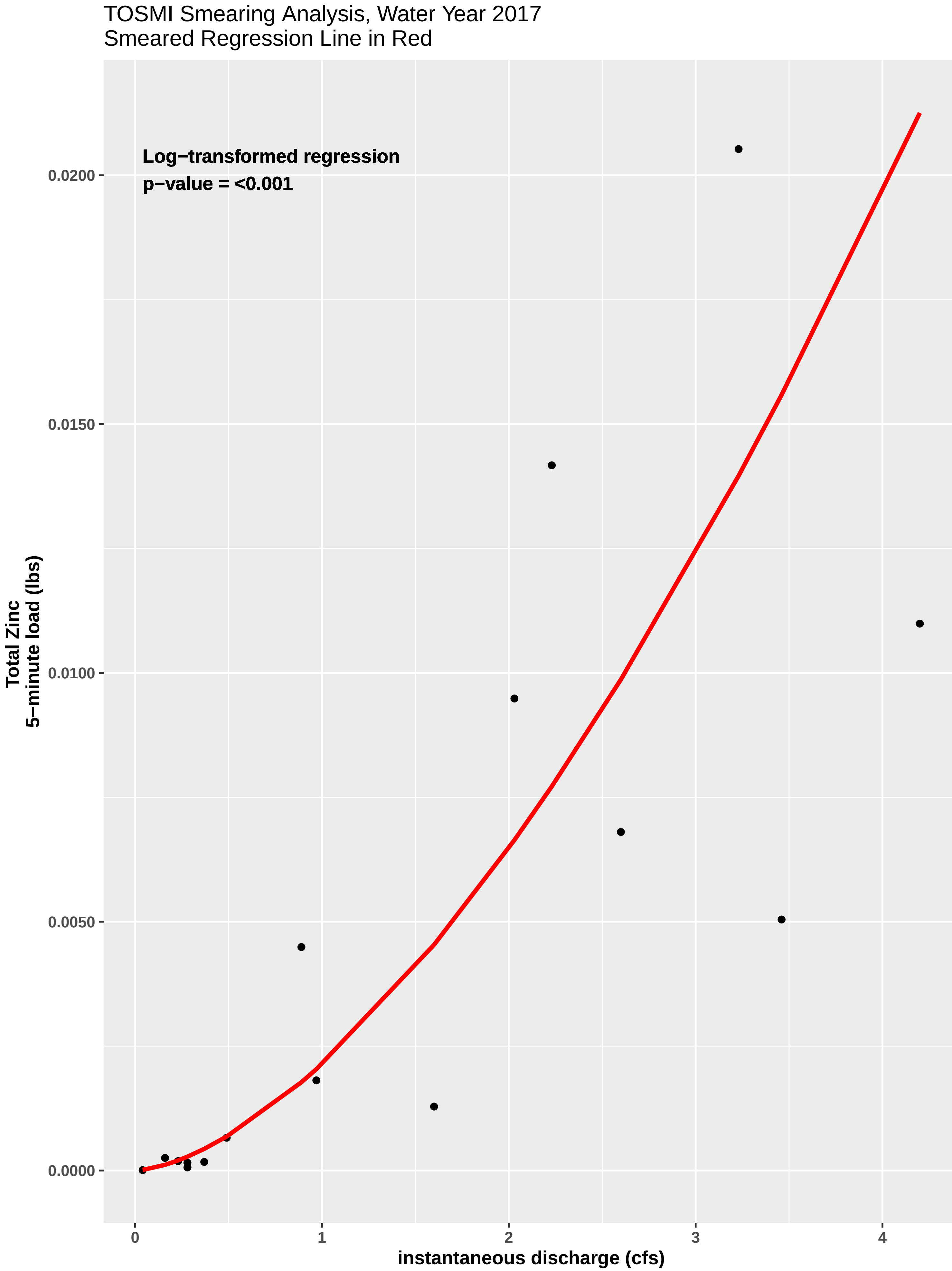

TOSMI Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
10,000
20,000
30,000
40,000
50,000
0.0
2.5
5.0
7.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

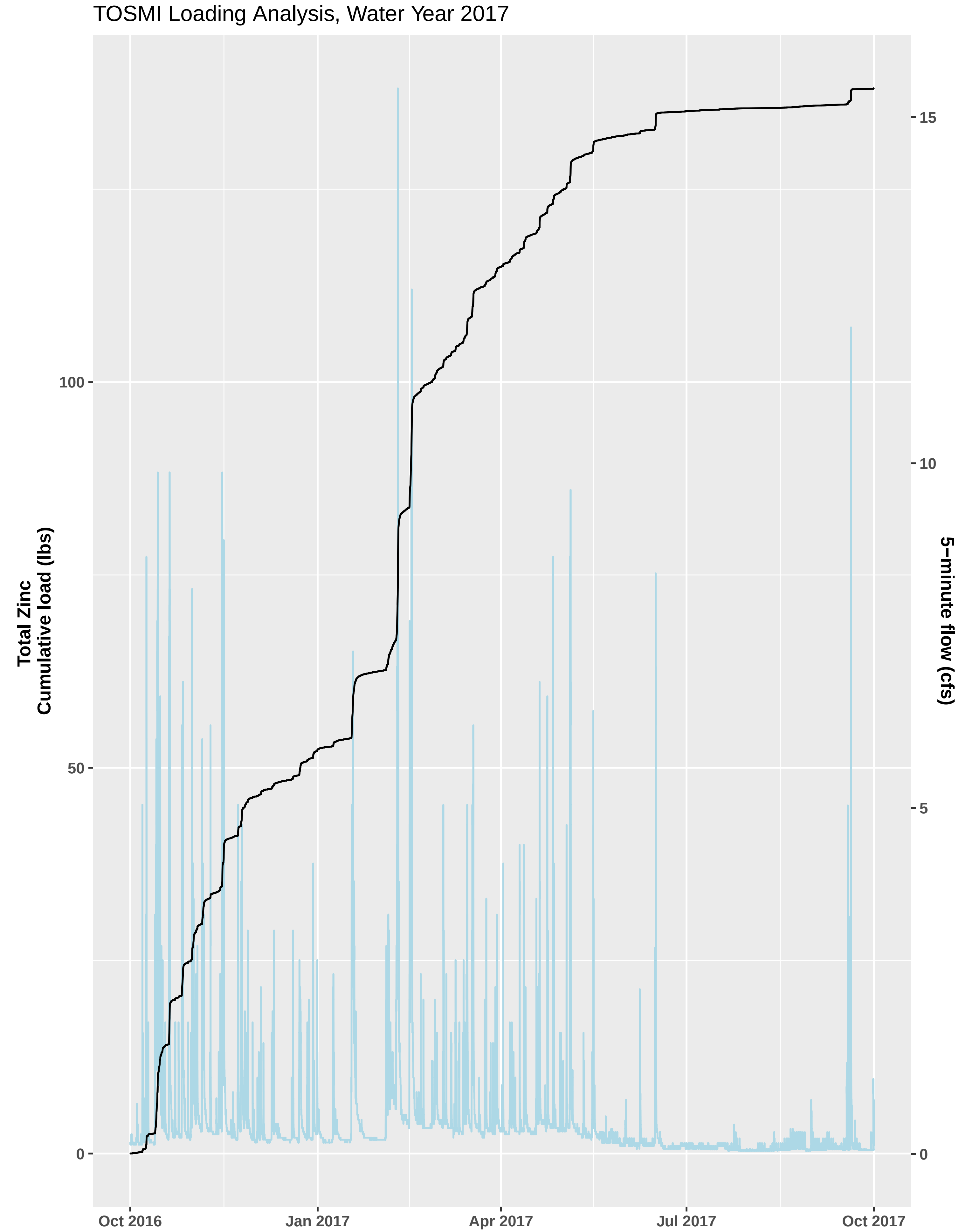


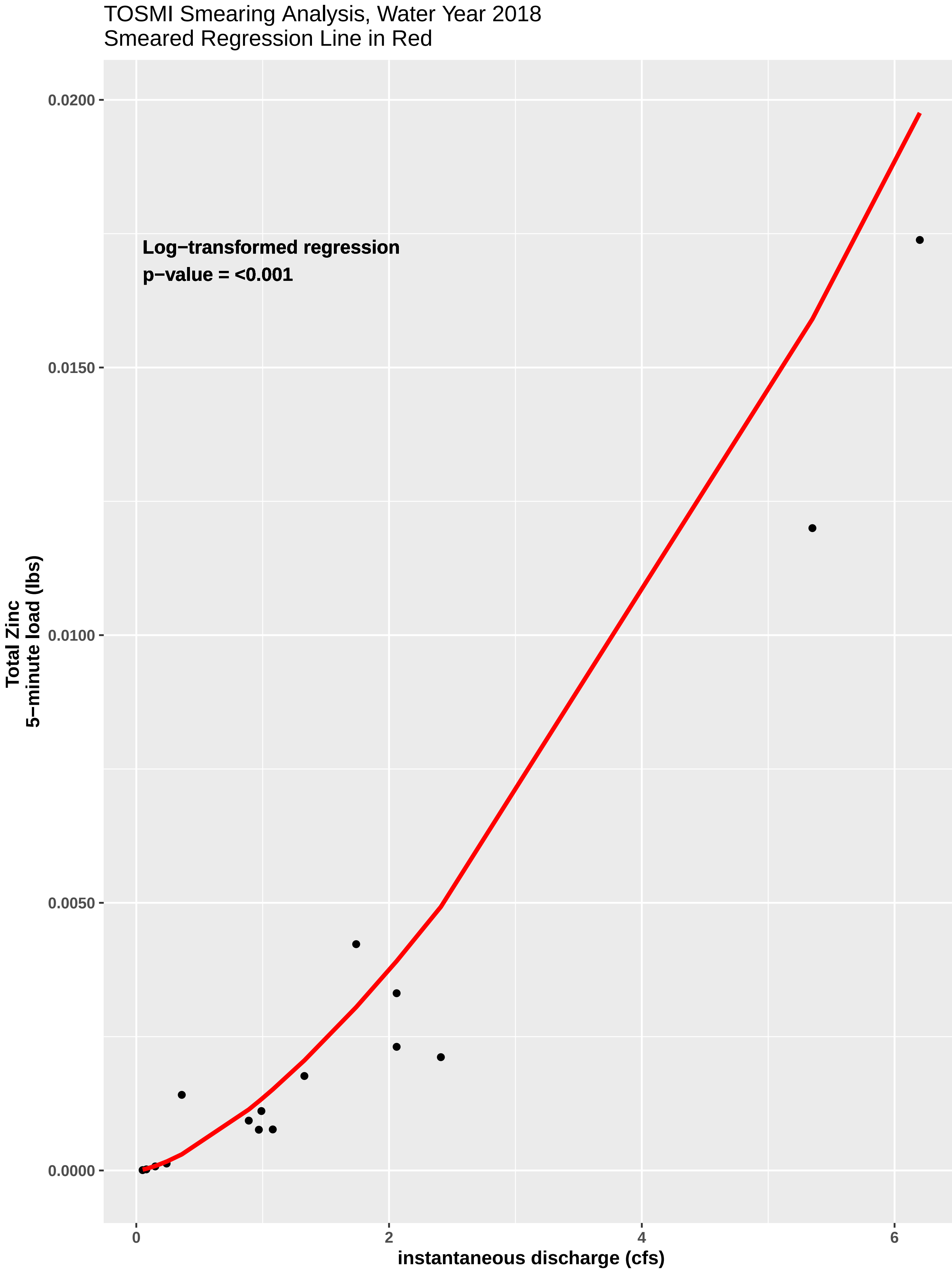
TOSMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000
0.010
0.020
0.030
0
1
2
3
4
5
instantaneous discharge (cfs)

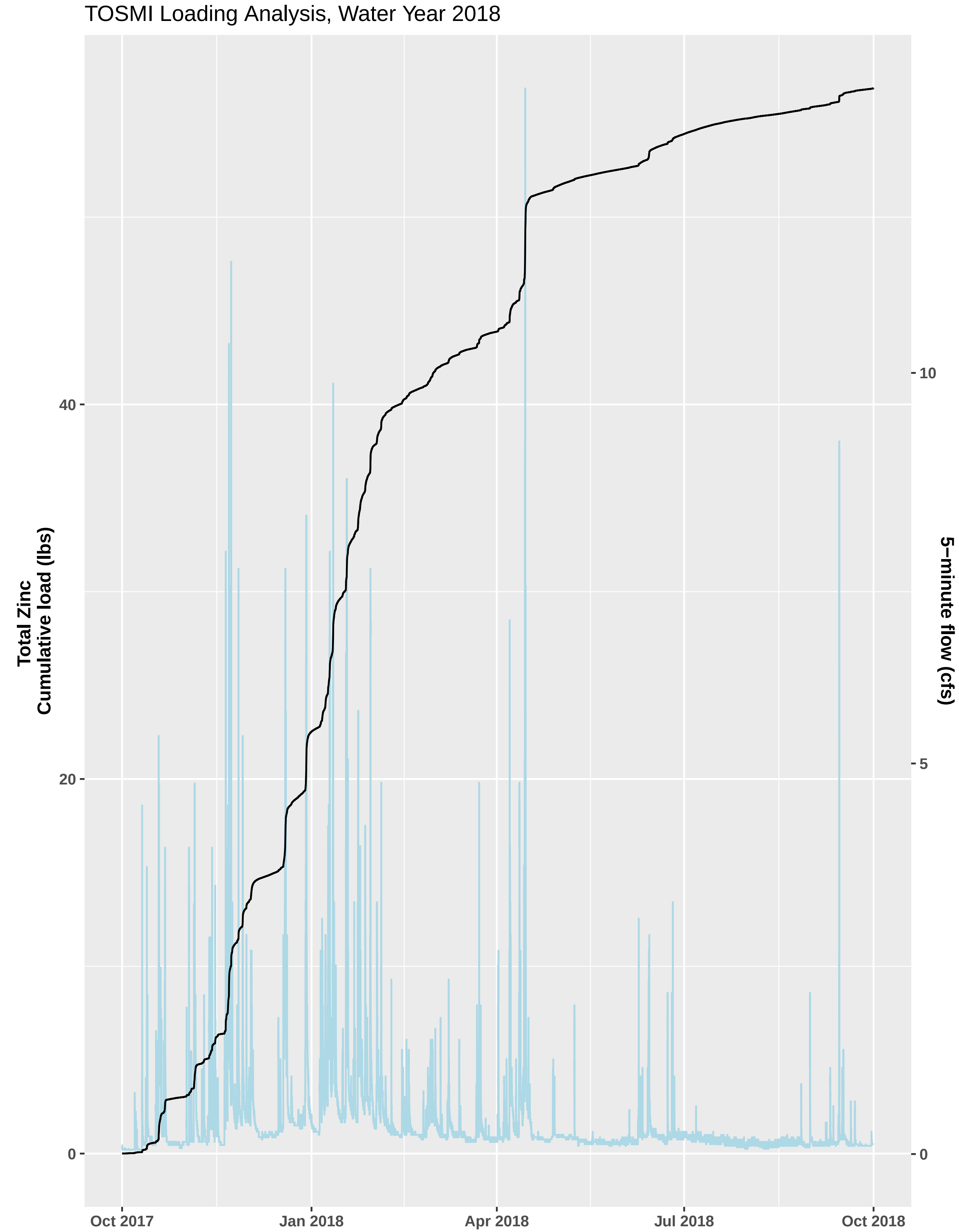


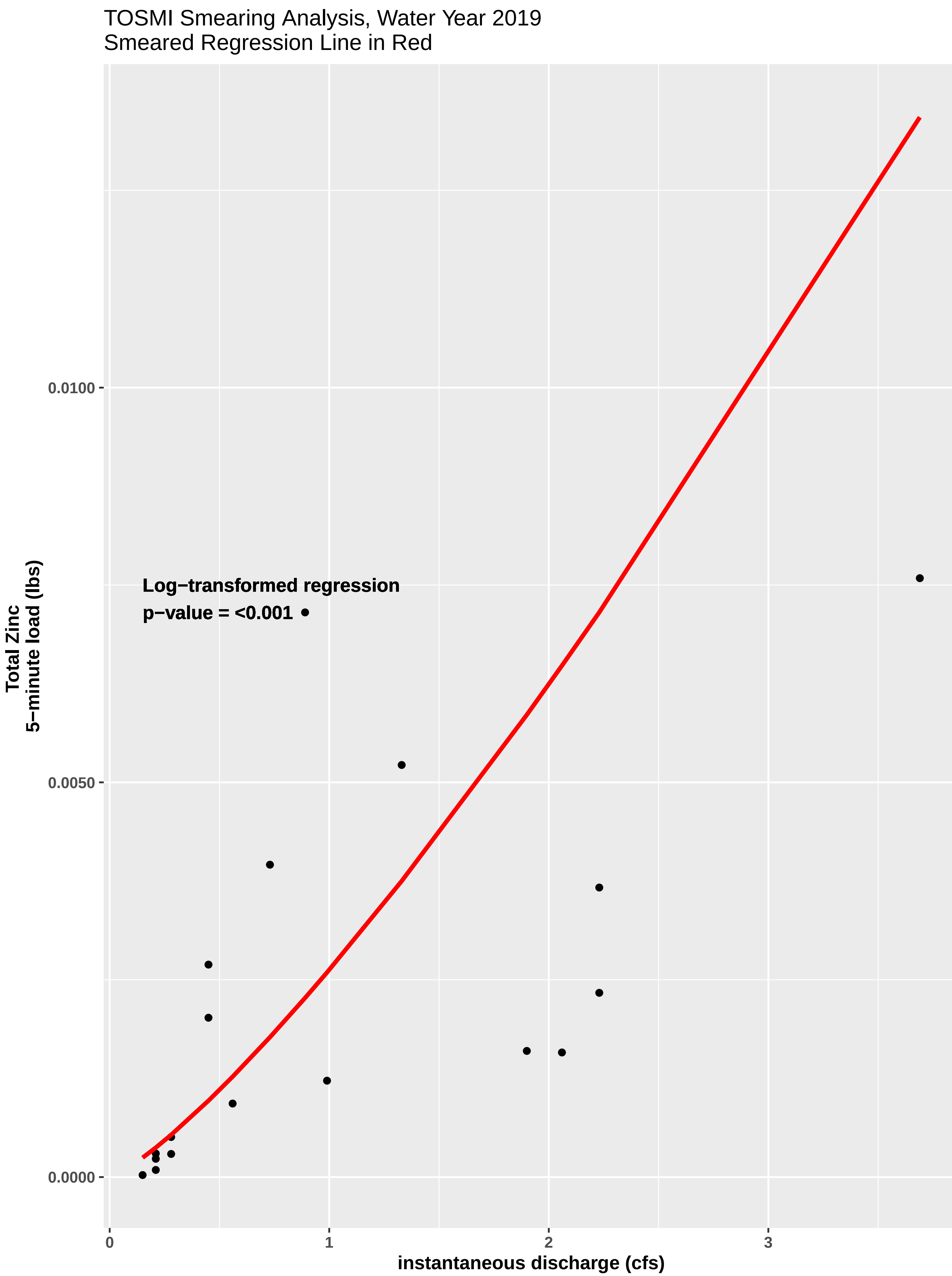
TOSMI Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0
25
50
75
100
5−minute flow (cfs)
0
5
10
15
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TOSMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0
1
2
3
4
instantaneous discharge (cfs)

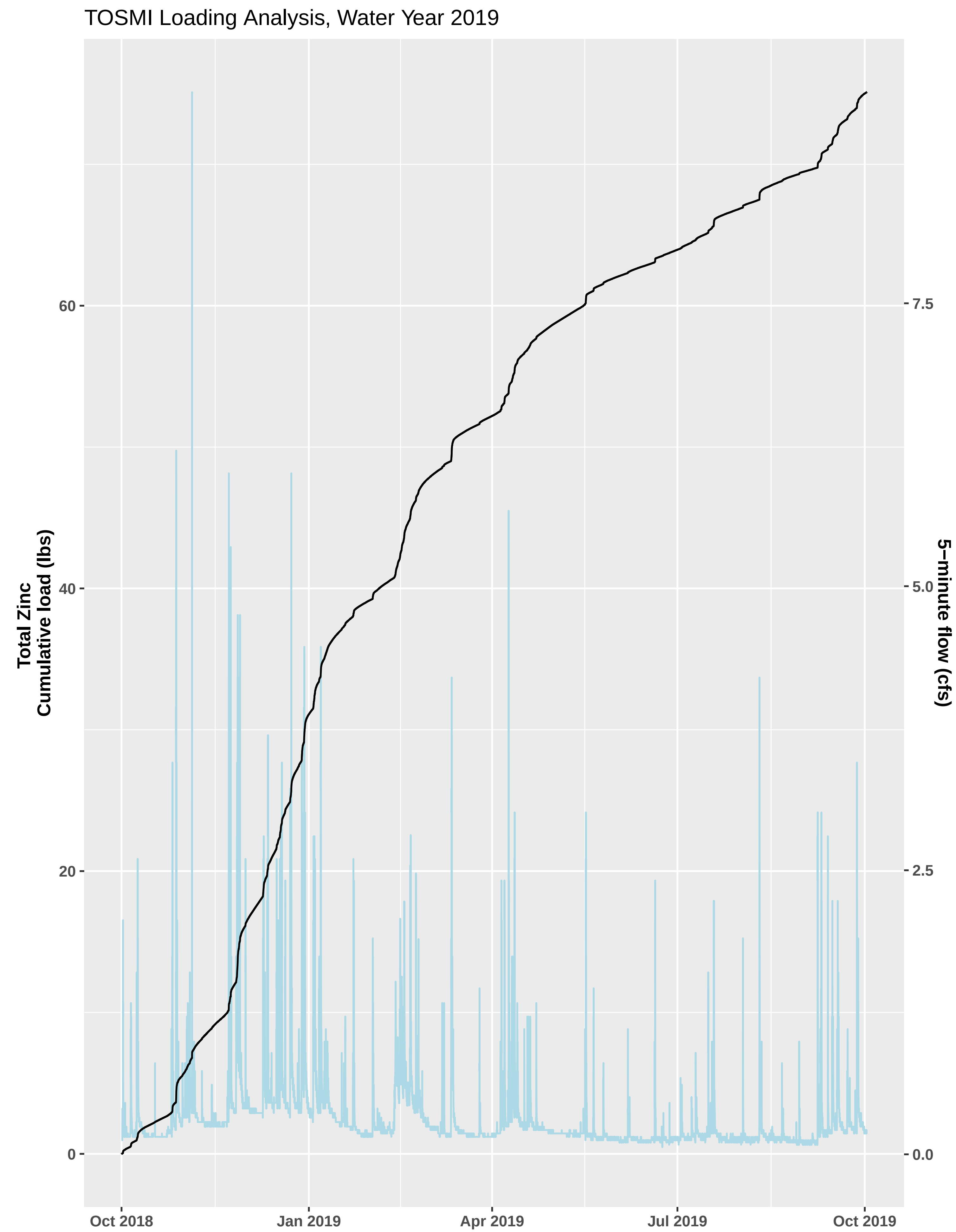

TOSMI Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0
50
100
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TOSMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0
2
4
6
instantaneous discharge (cfs)

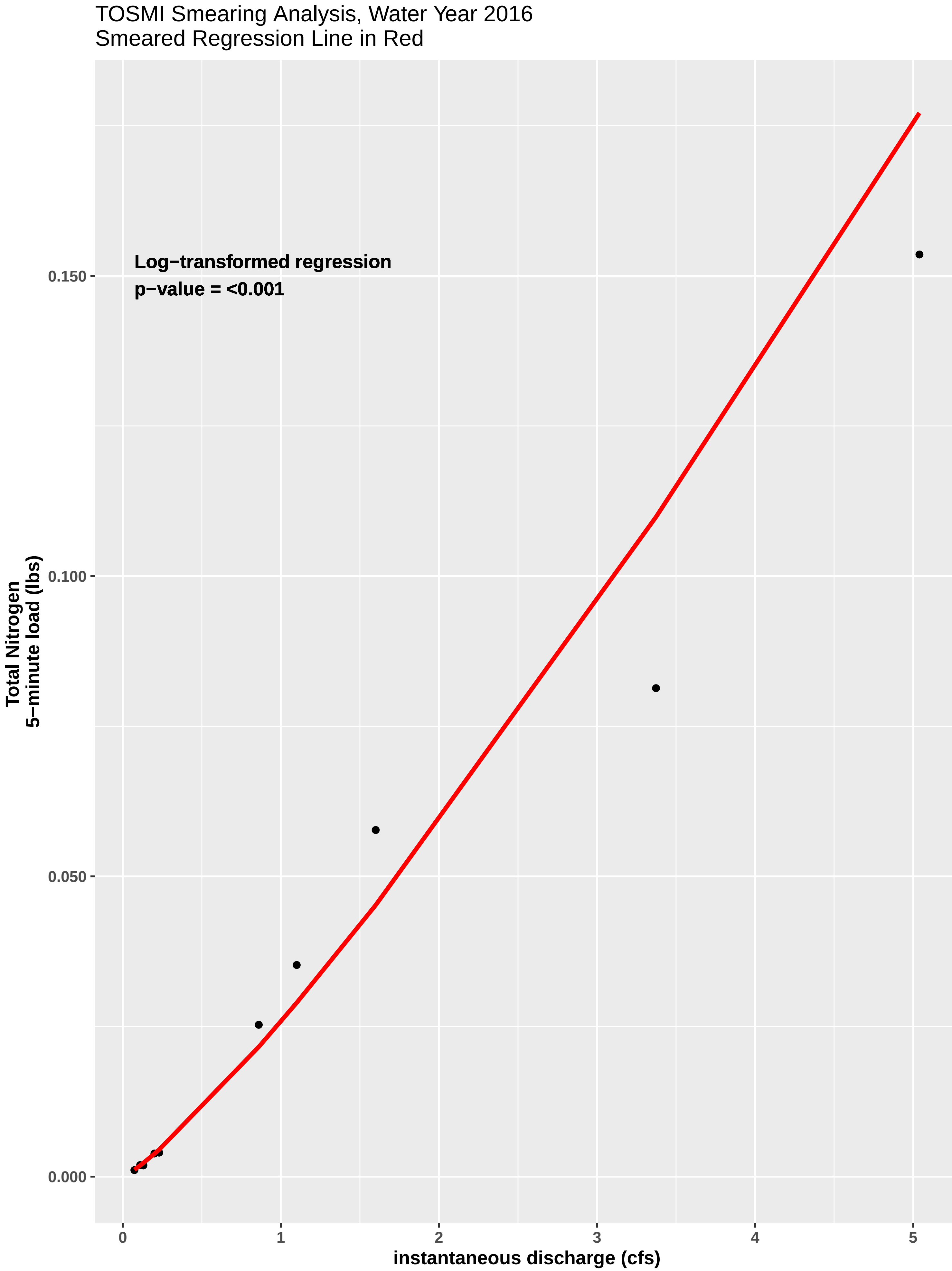

TOSMI Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0
20
40
5−minute flow (cfs)
0
5
10
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

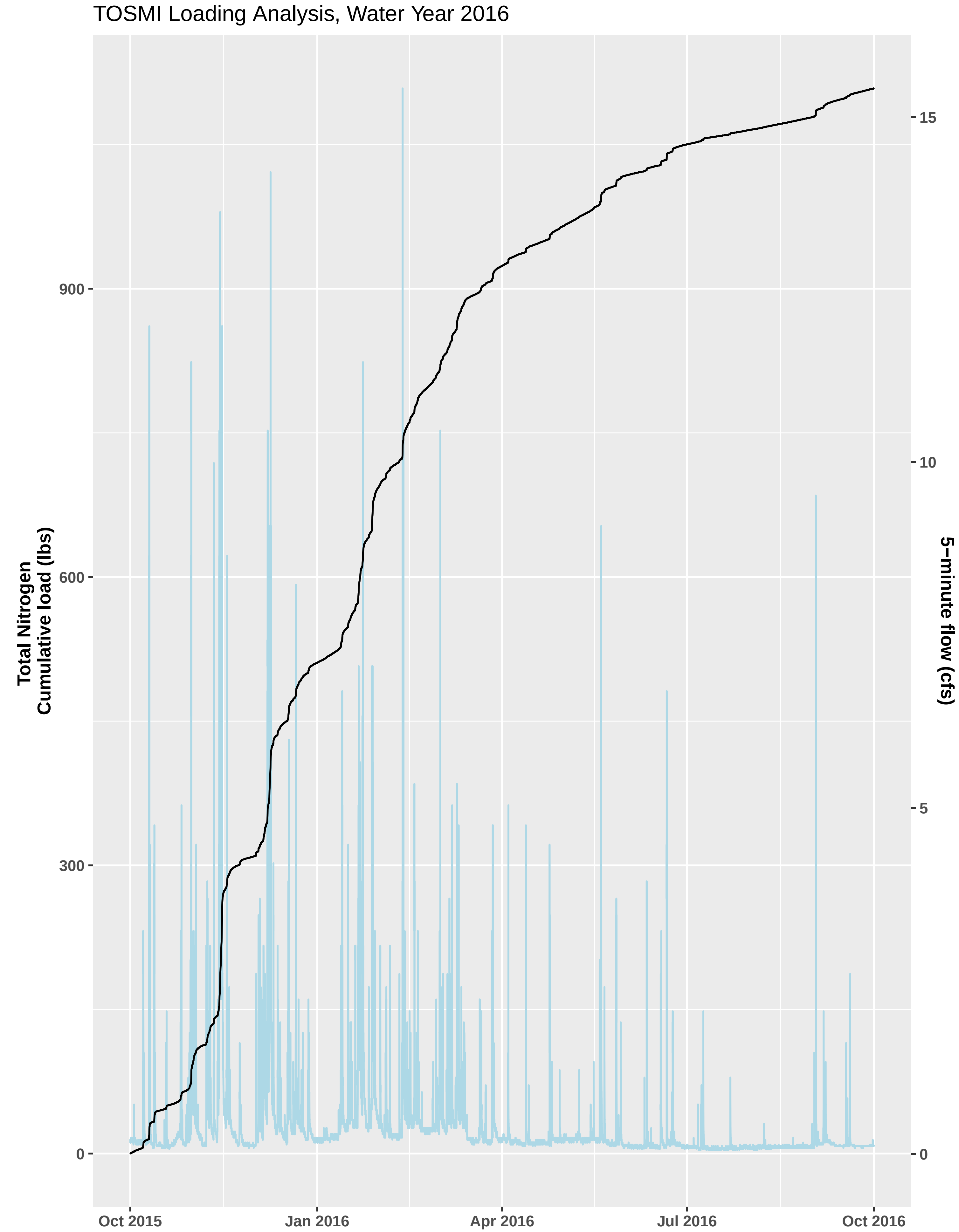


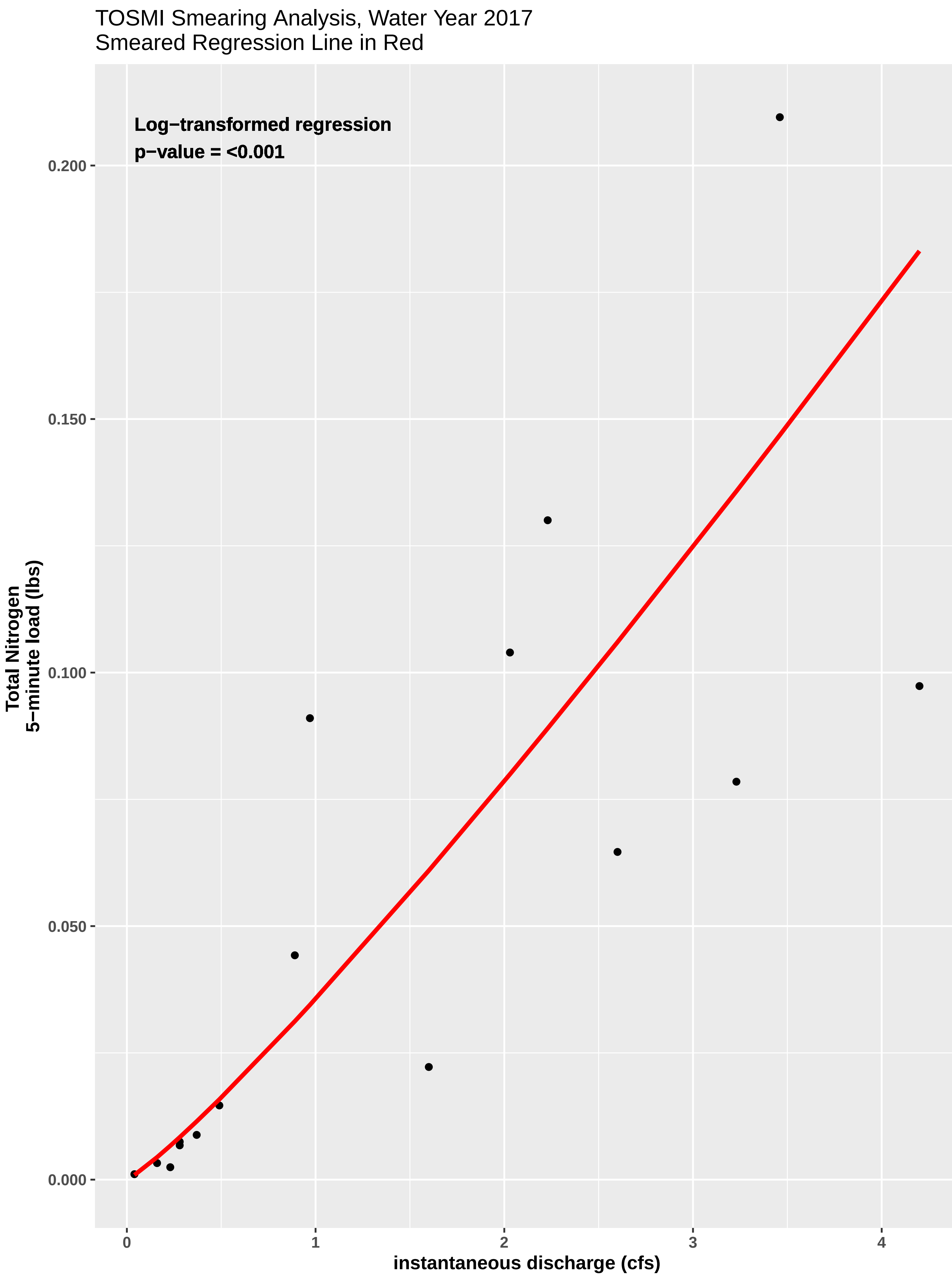
TOSMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0100
0.0050
0.0000
0
1
2
3
instantaneous discharge (cfs)

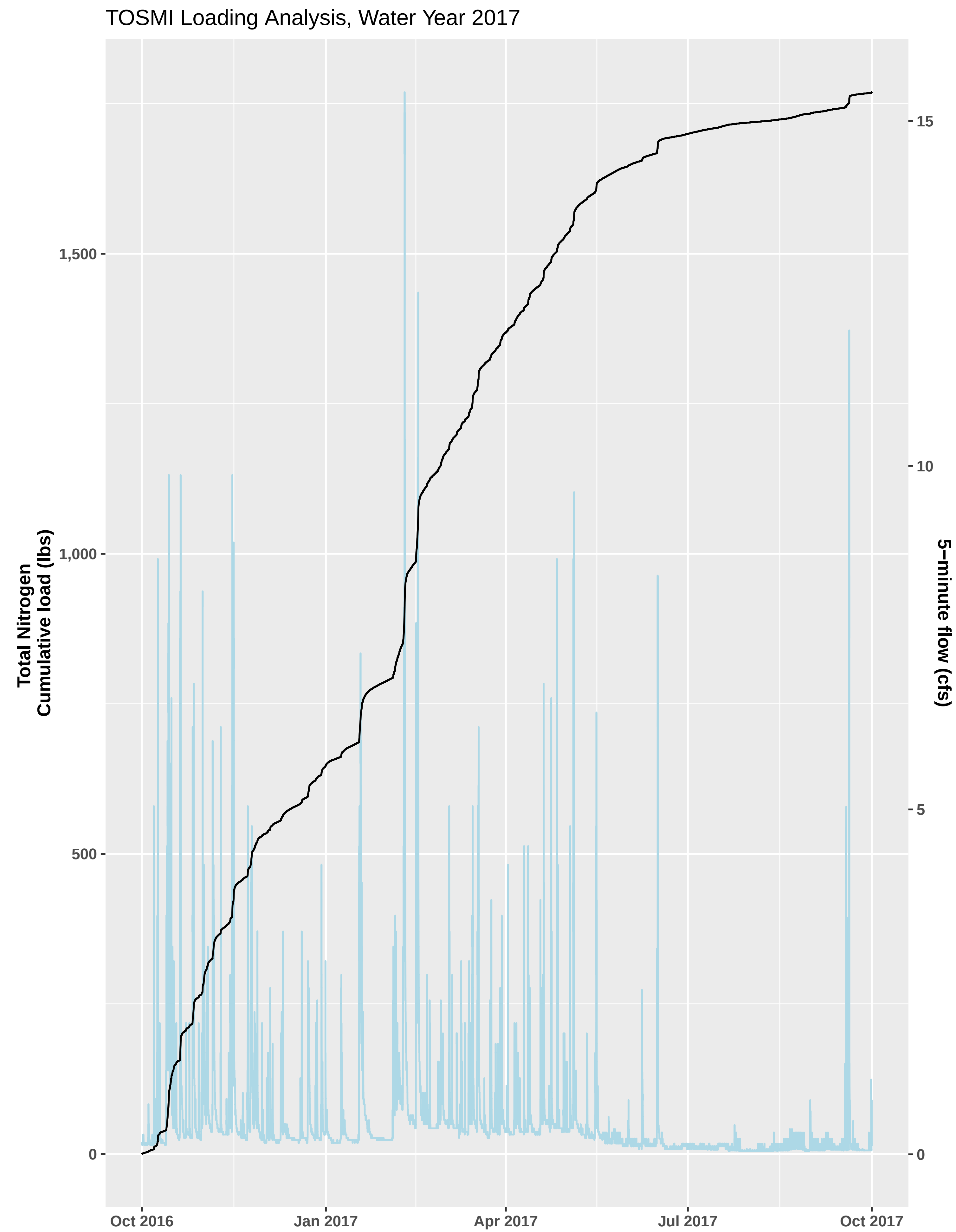


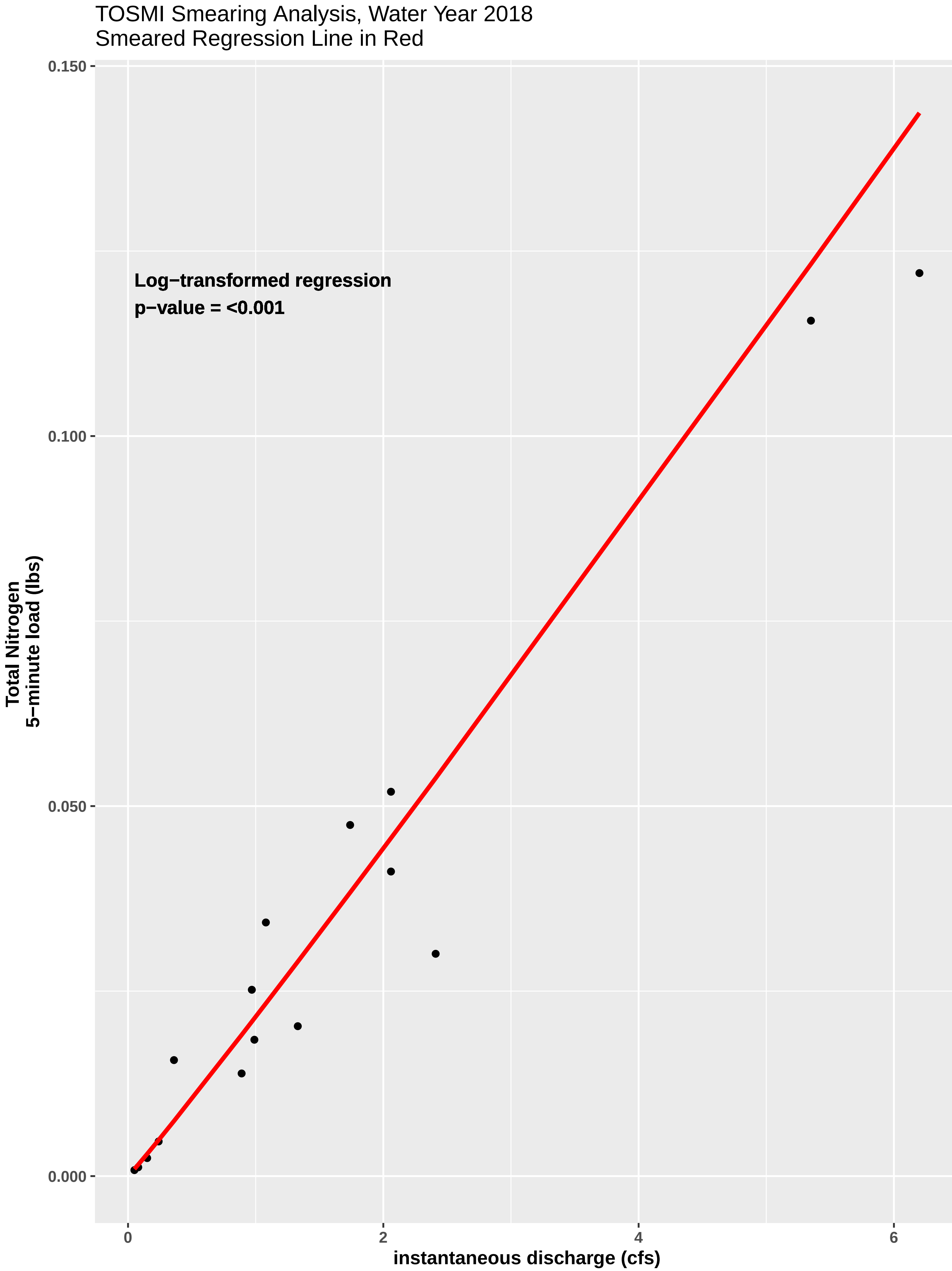
TOSMI Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
60
40
20
0
7.5
5.0
2.5
0.0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

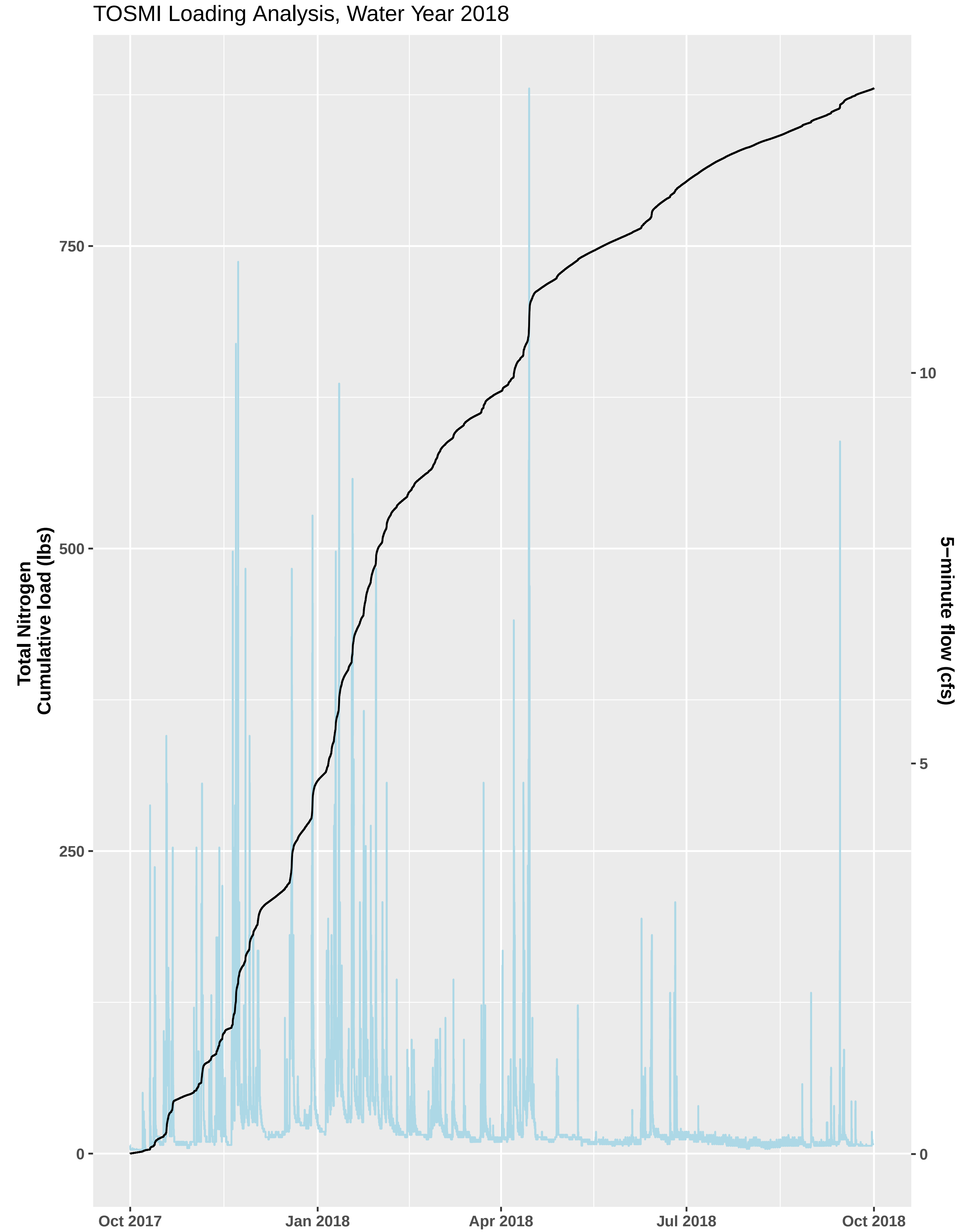

TOSMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0
1
2
3
4
5
instantaneous discharge (cfs)

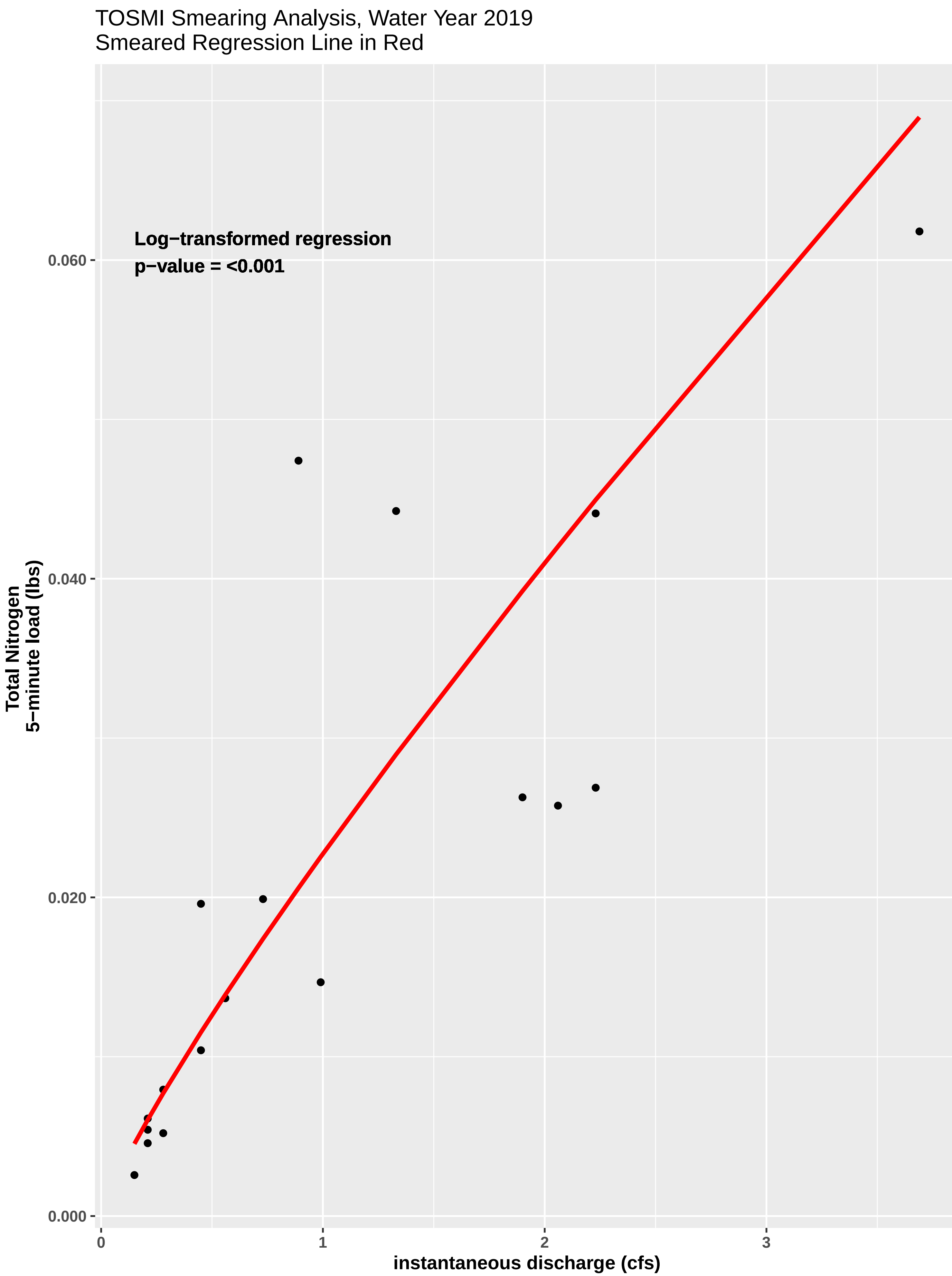

TOSMI Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
300
600
900
5−minute flow (cfs)
0
5
10
15
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

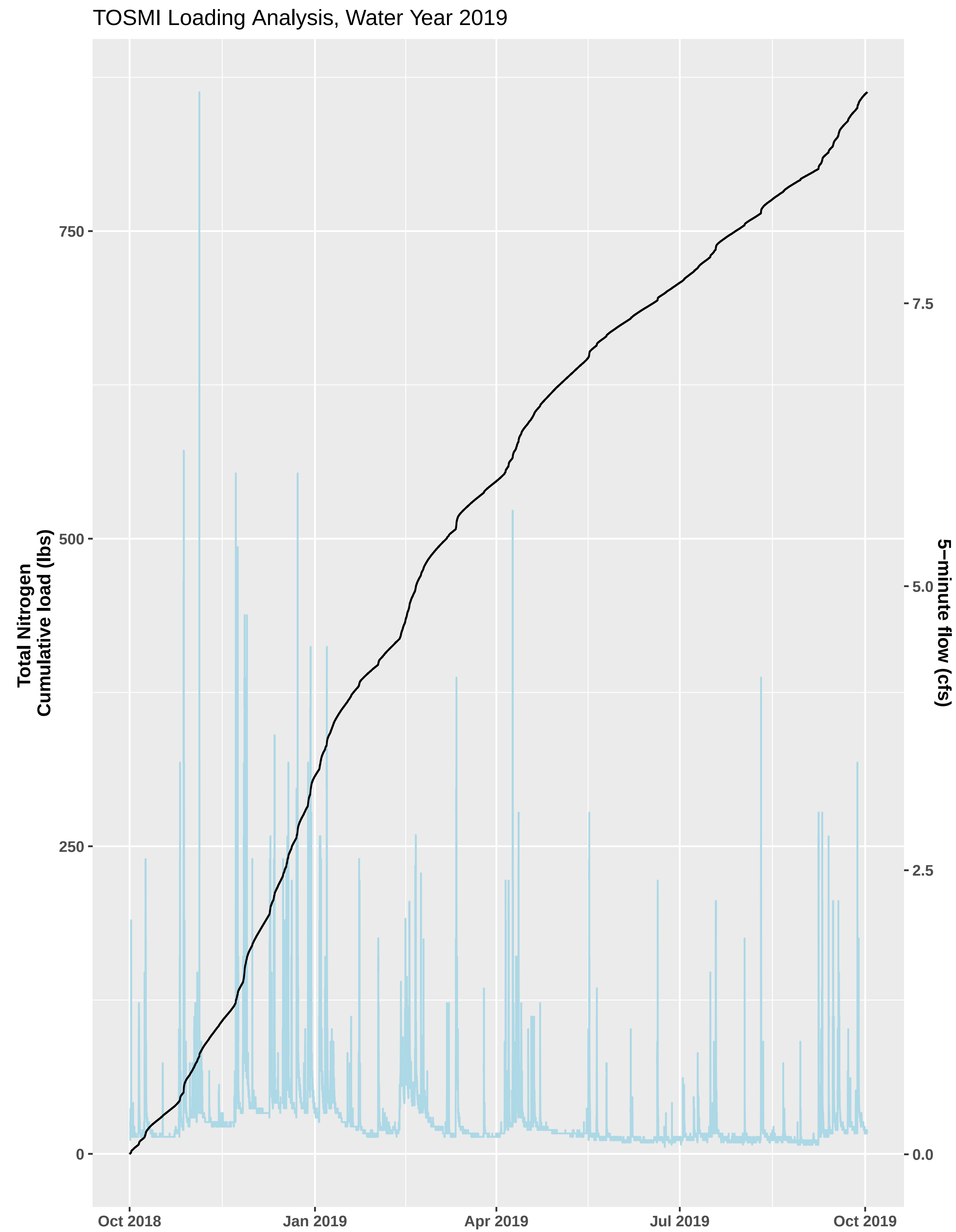

TOSMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.200
0
1
2
3
4
instantaneous discharge (cfs)

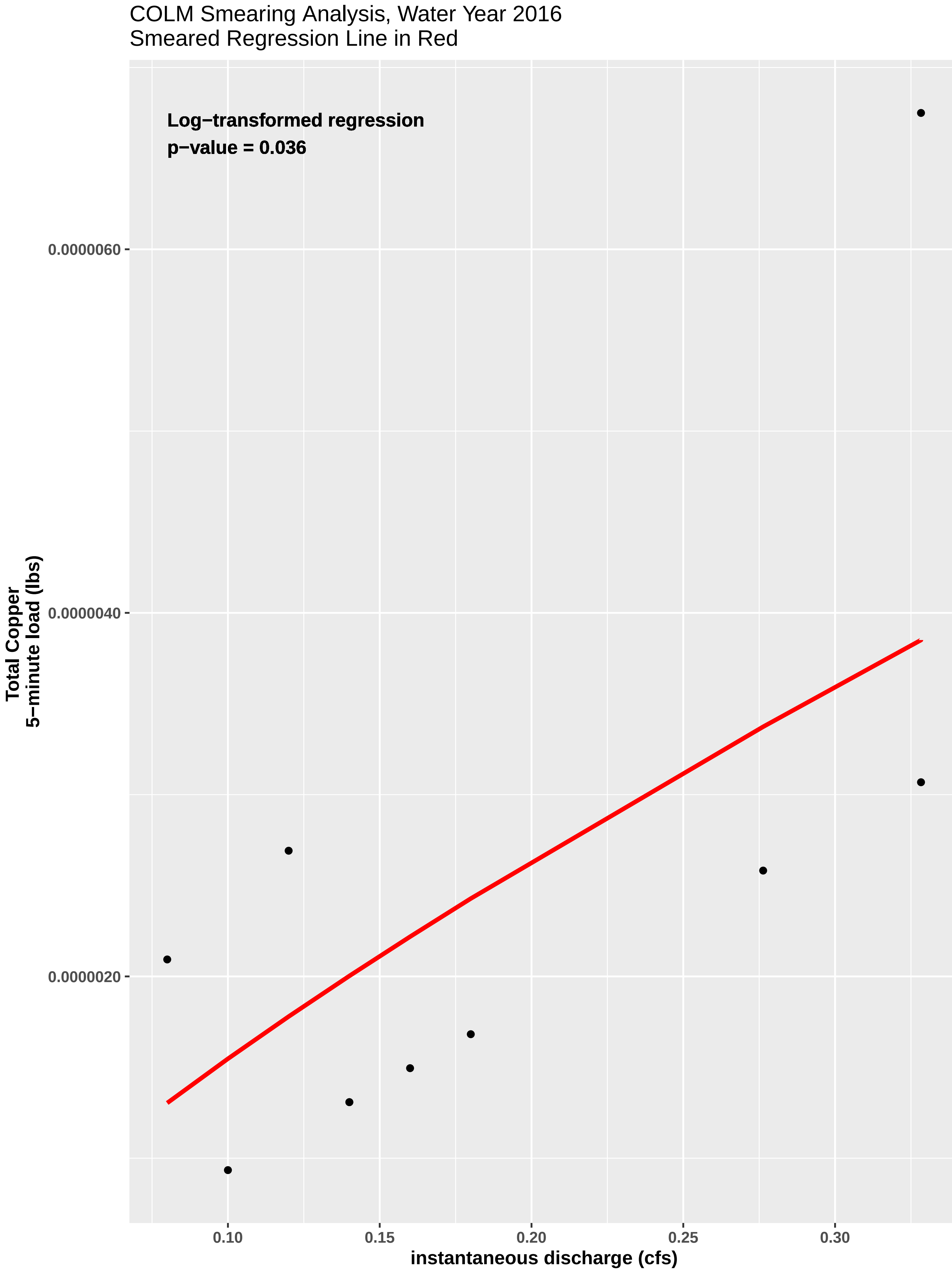

TOSMI Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

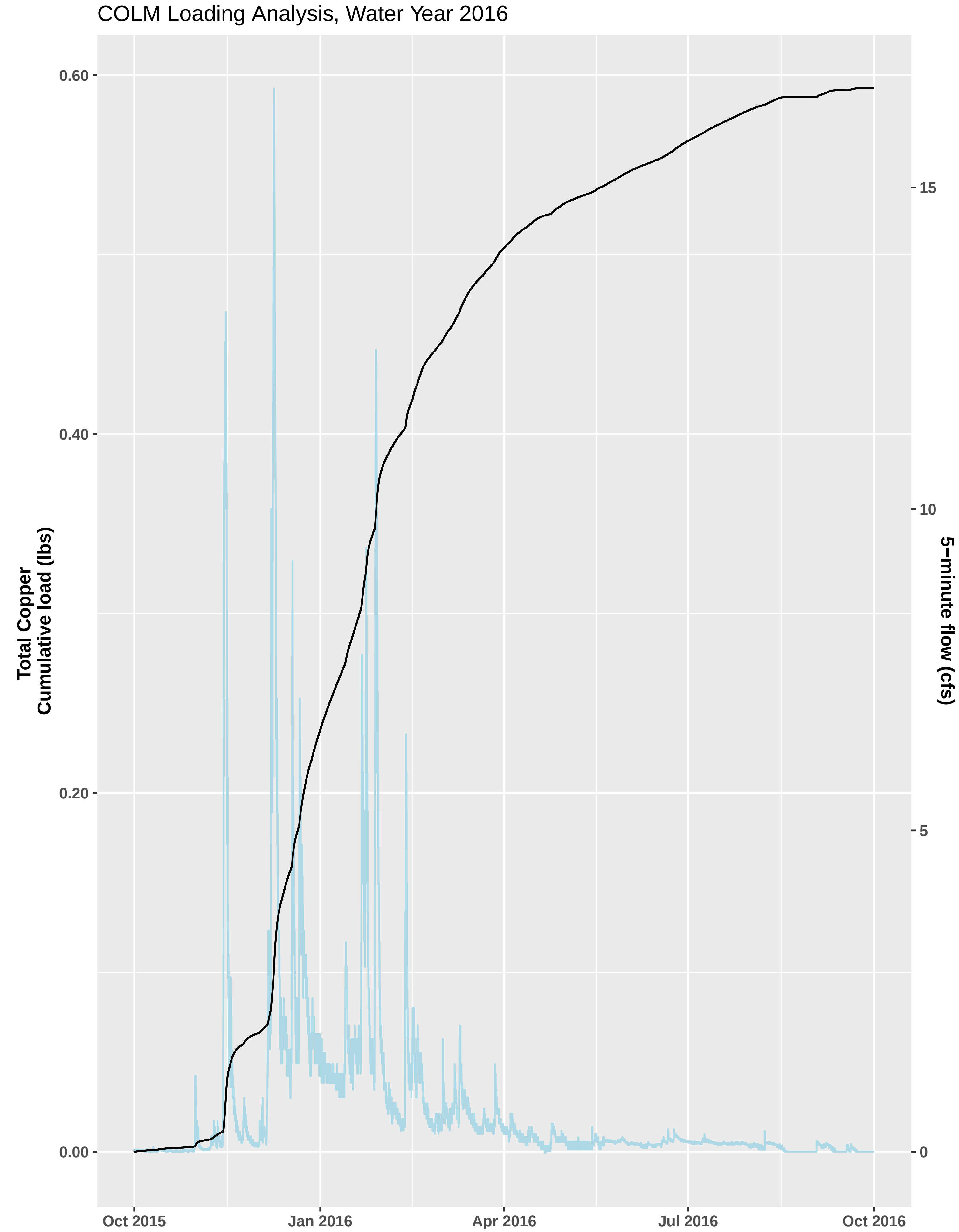

TOSMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.150
0.100
0.050
0.000
0
2
4
6

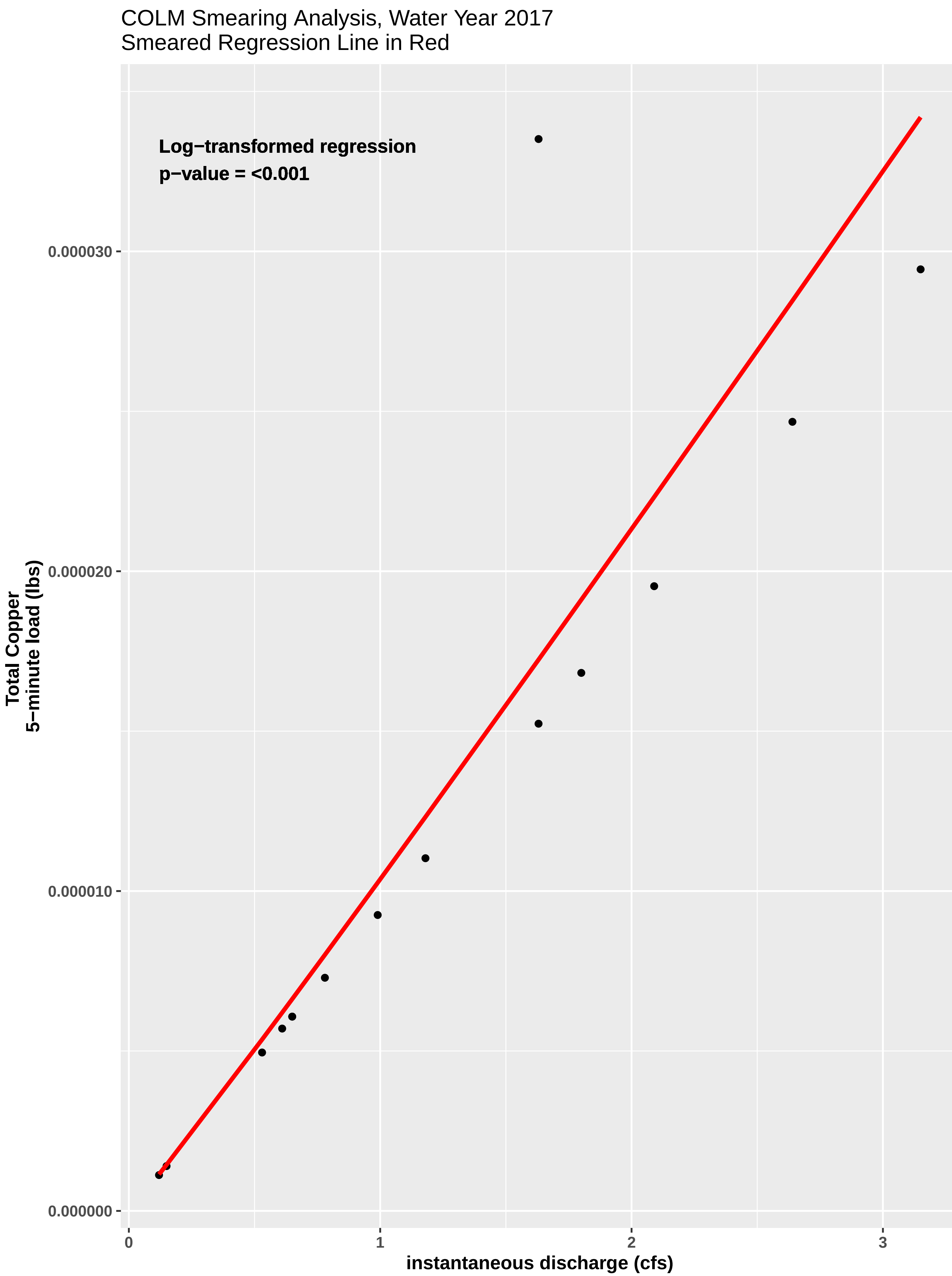

TOSMI Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
750
500
250
0
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

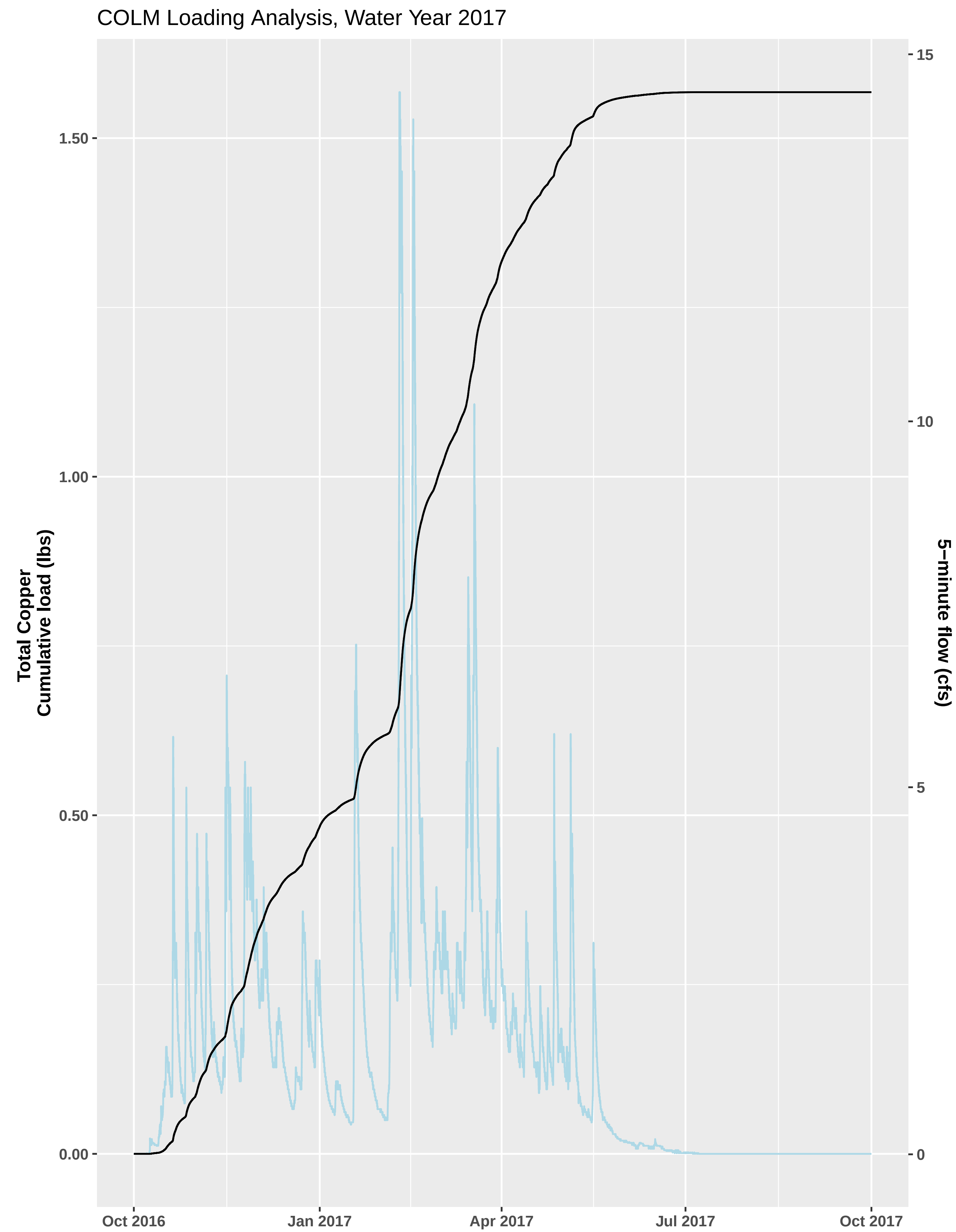

TOSMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0
1
2
3
instantaneous discharge (cfs)

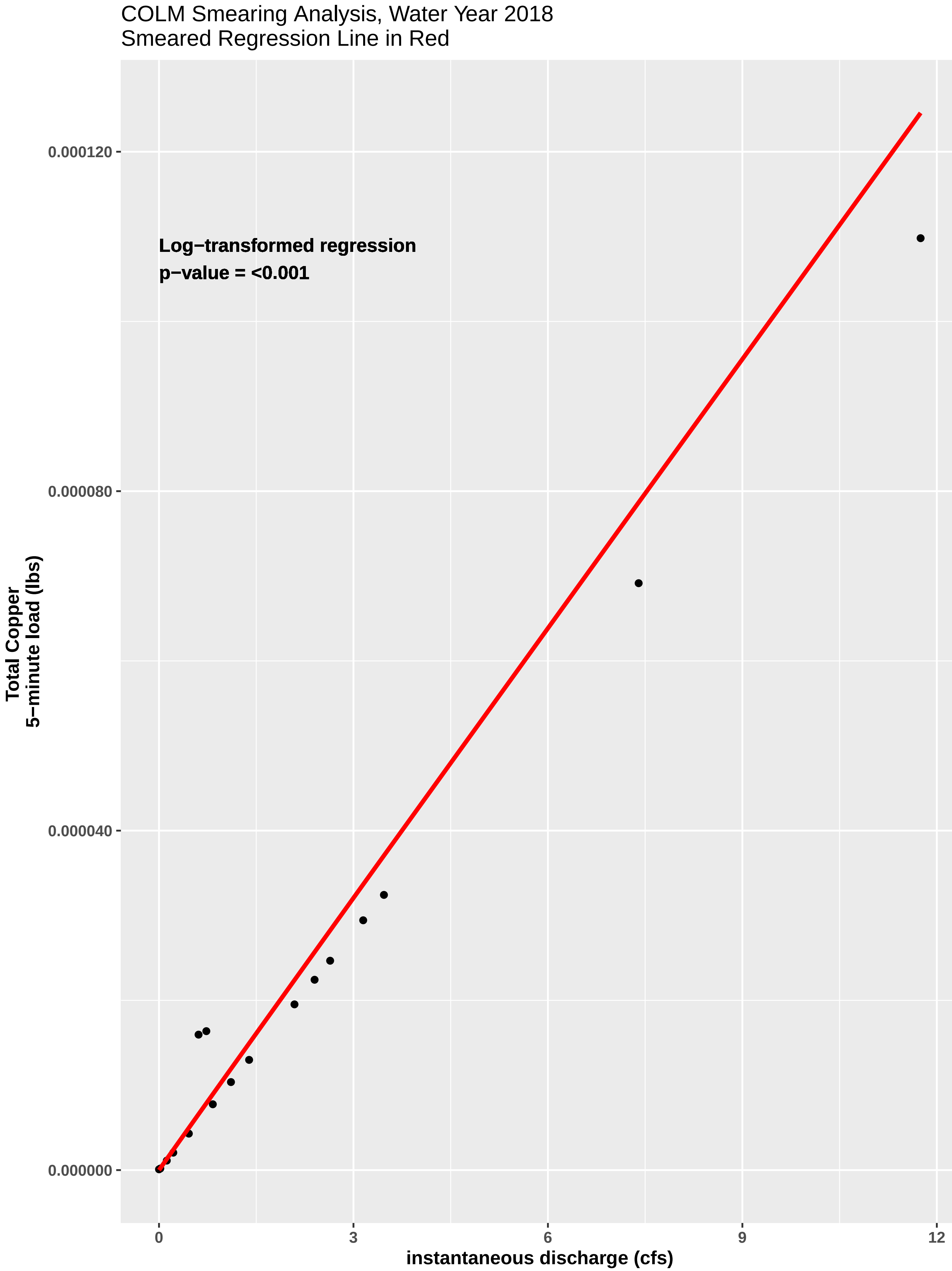

TOSMI Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
250
500
750
5−minute flow (cfs)
0.0
2.5
5.0
7.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

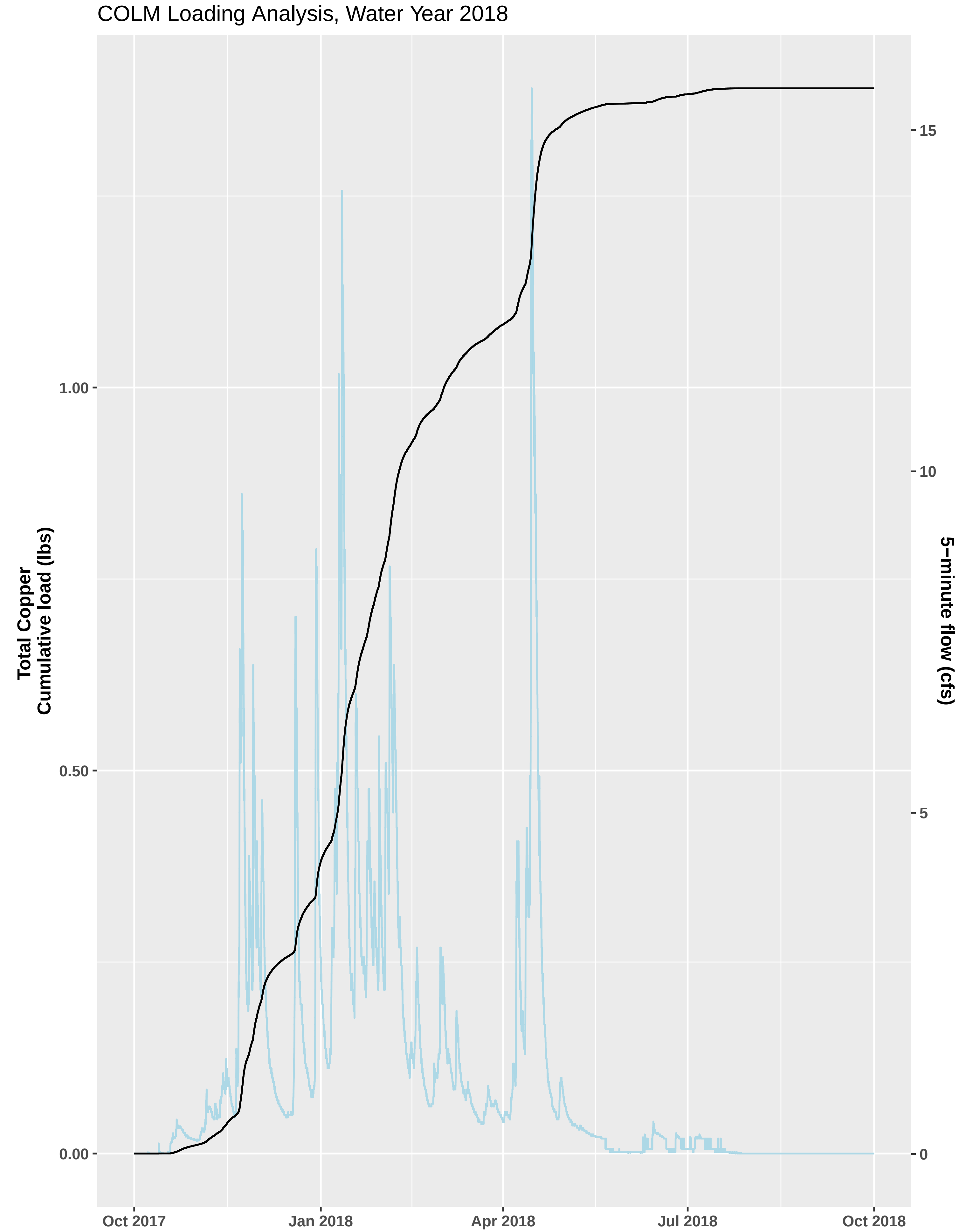

COLM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.036
Total Copper
5−minute load (lbs)
0.0000020
0.0000040
0.0000060
0.10
0.15
0.20
0.25
0.30
instantaneous discharge (cfs)

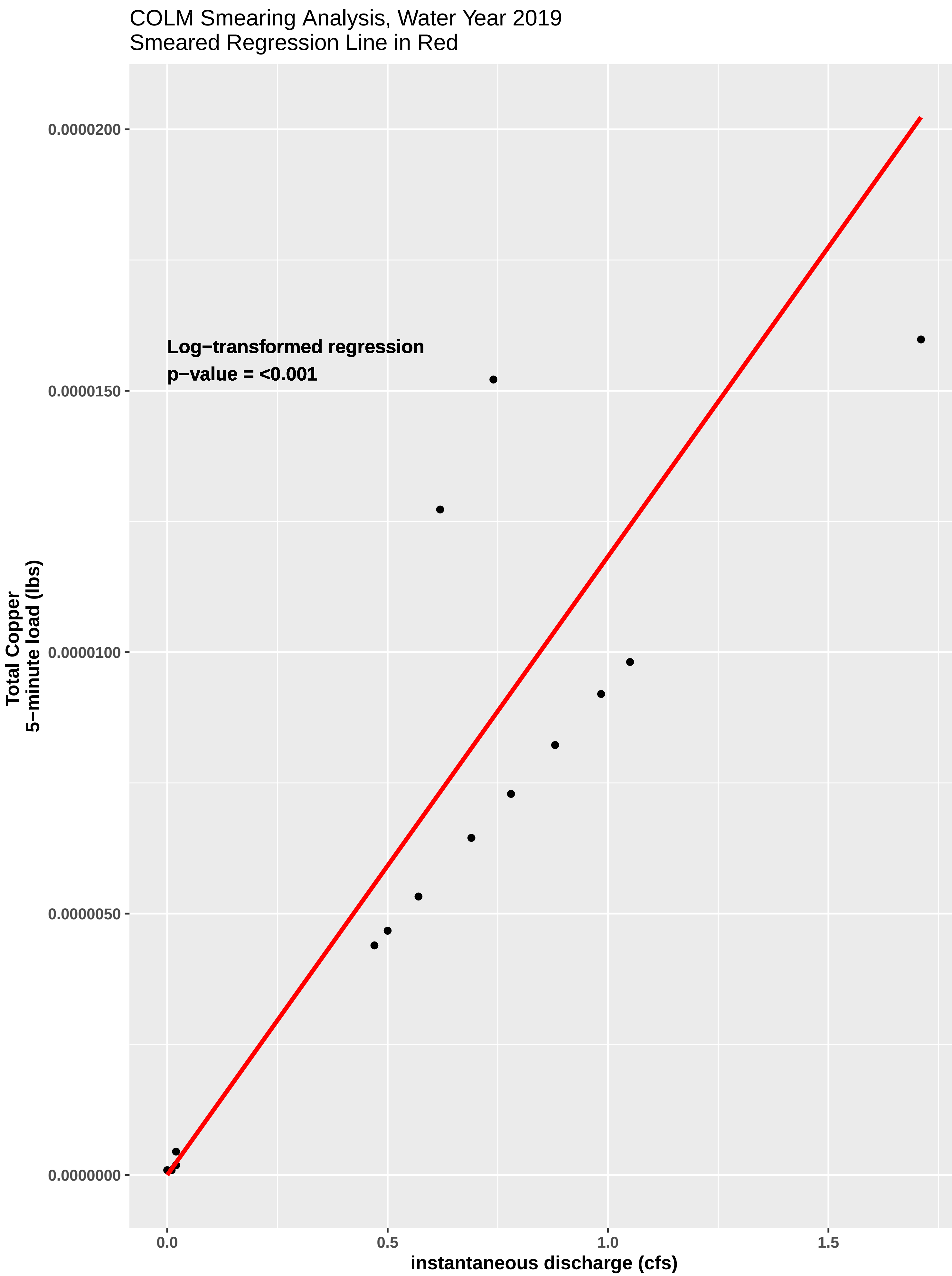

COLM Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
0.00
0.20
0.40
0.60
5−minute flow (cfs)
0
5
10
15
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

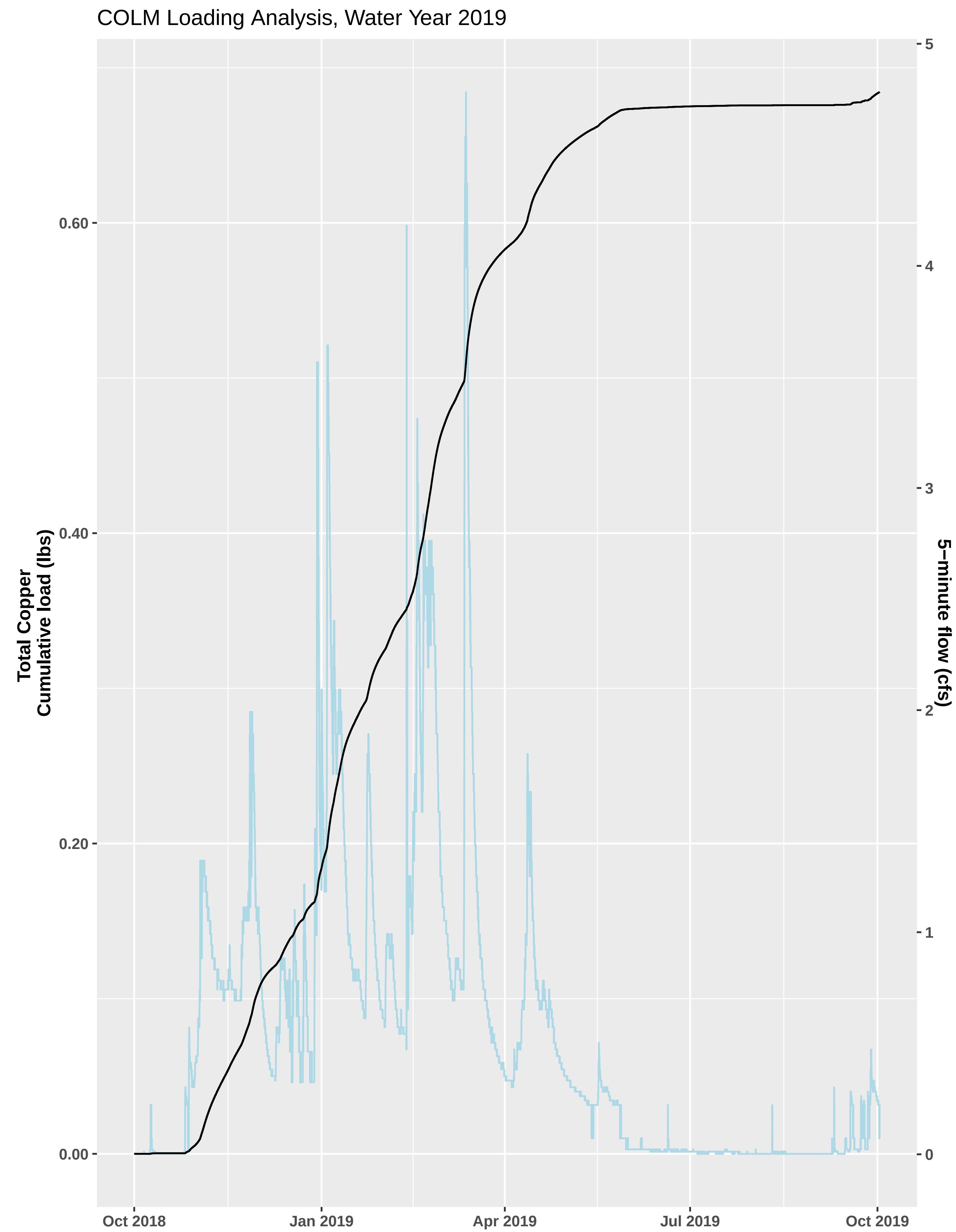

COLM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000010
0.000020
0.000030
0
1
2
3
instantaneous discharge (cfs)

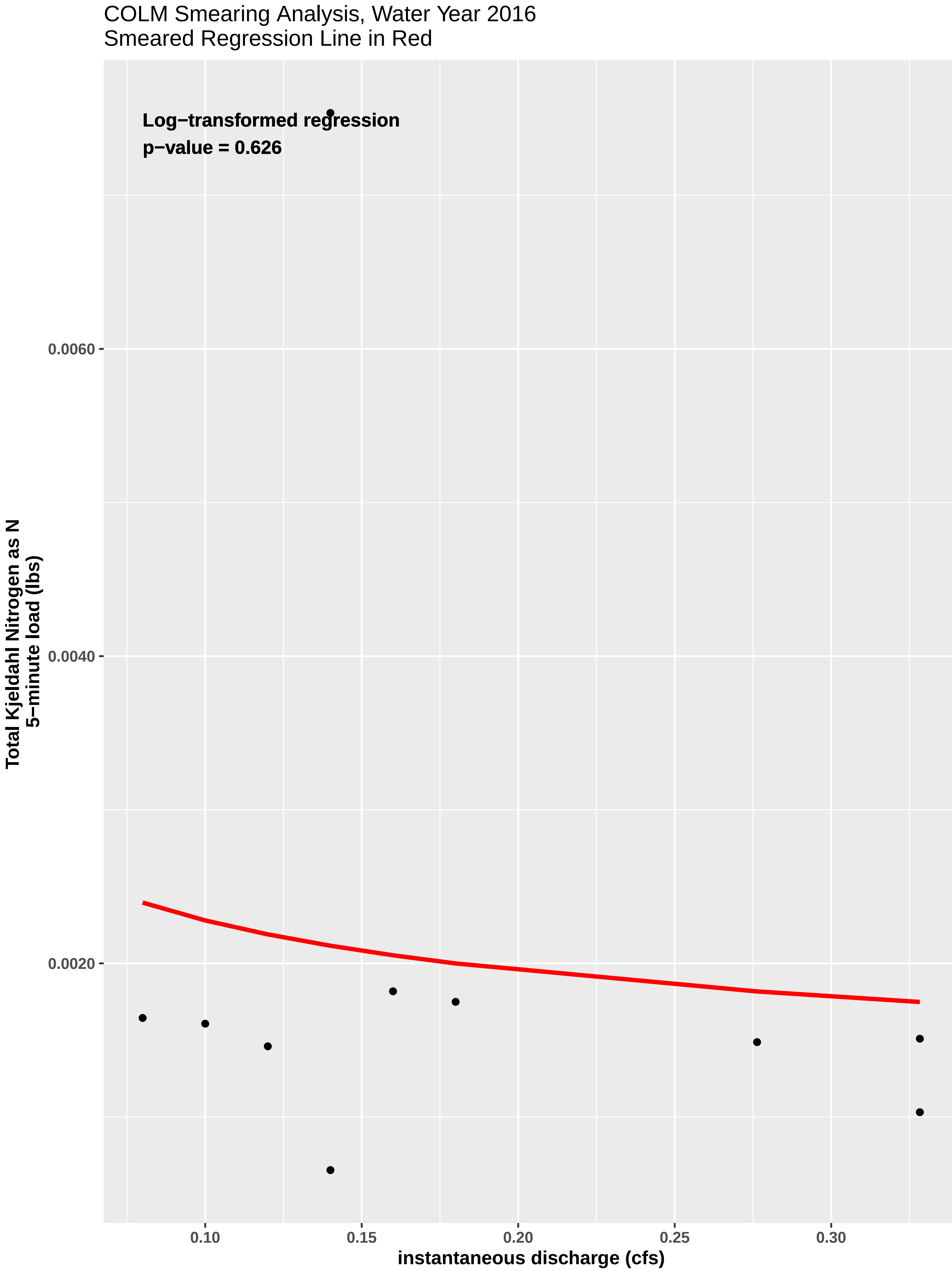

COLM Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
0.00
0.50
1.00
1.50
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


COLM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000120
0.000080
0.000040
0.000000
0
3
6
9
12
instantaneous discharge (cfs)

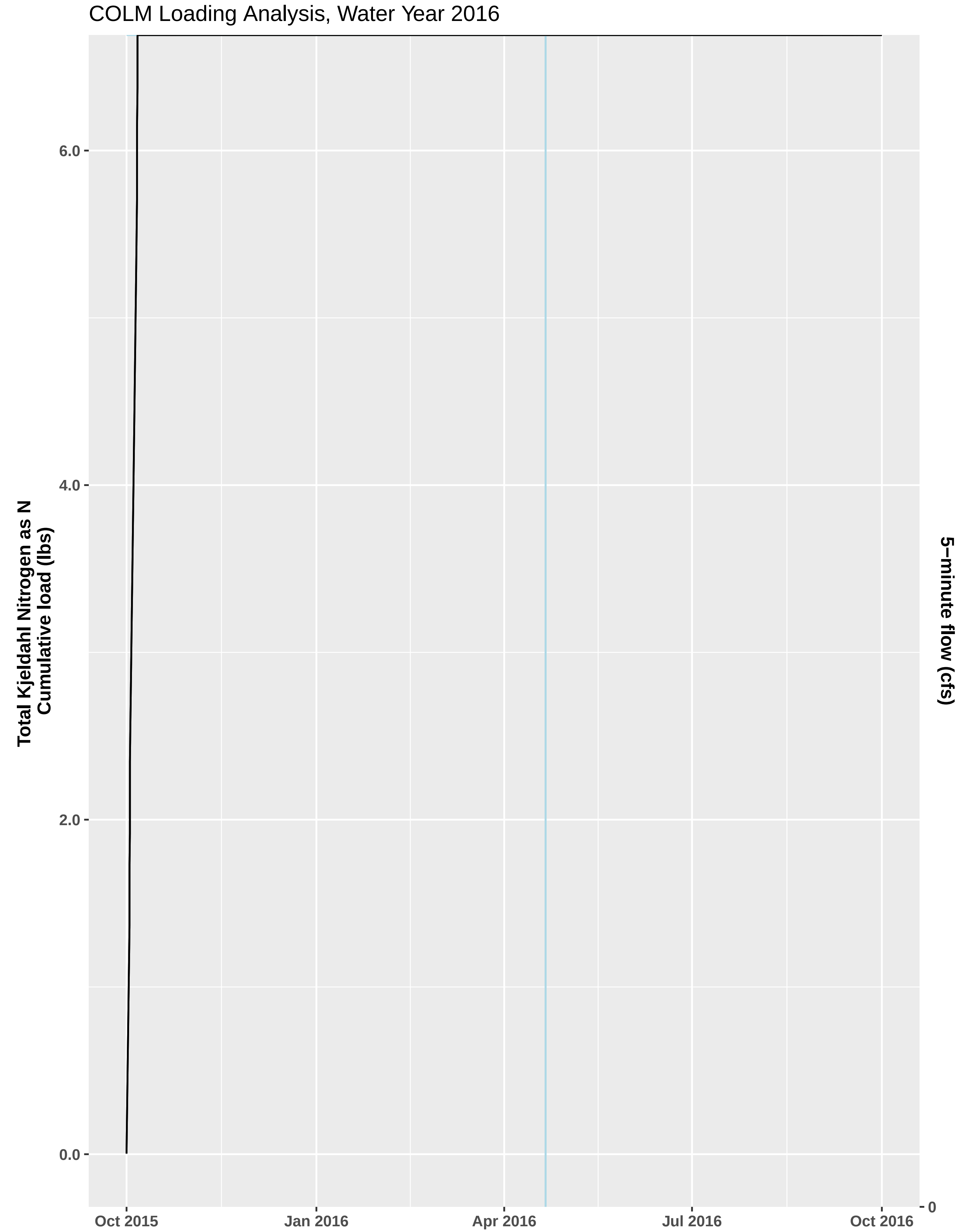

COLM Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
1.00
0.50
0.00
15
10
5
0
5−minute flow (cfs)
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


COLM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.0000200
0.0000150
0.0000100
0.0000050
0.0000000
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

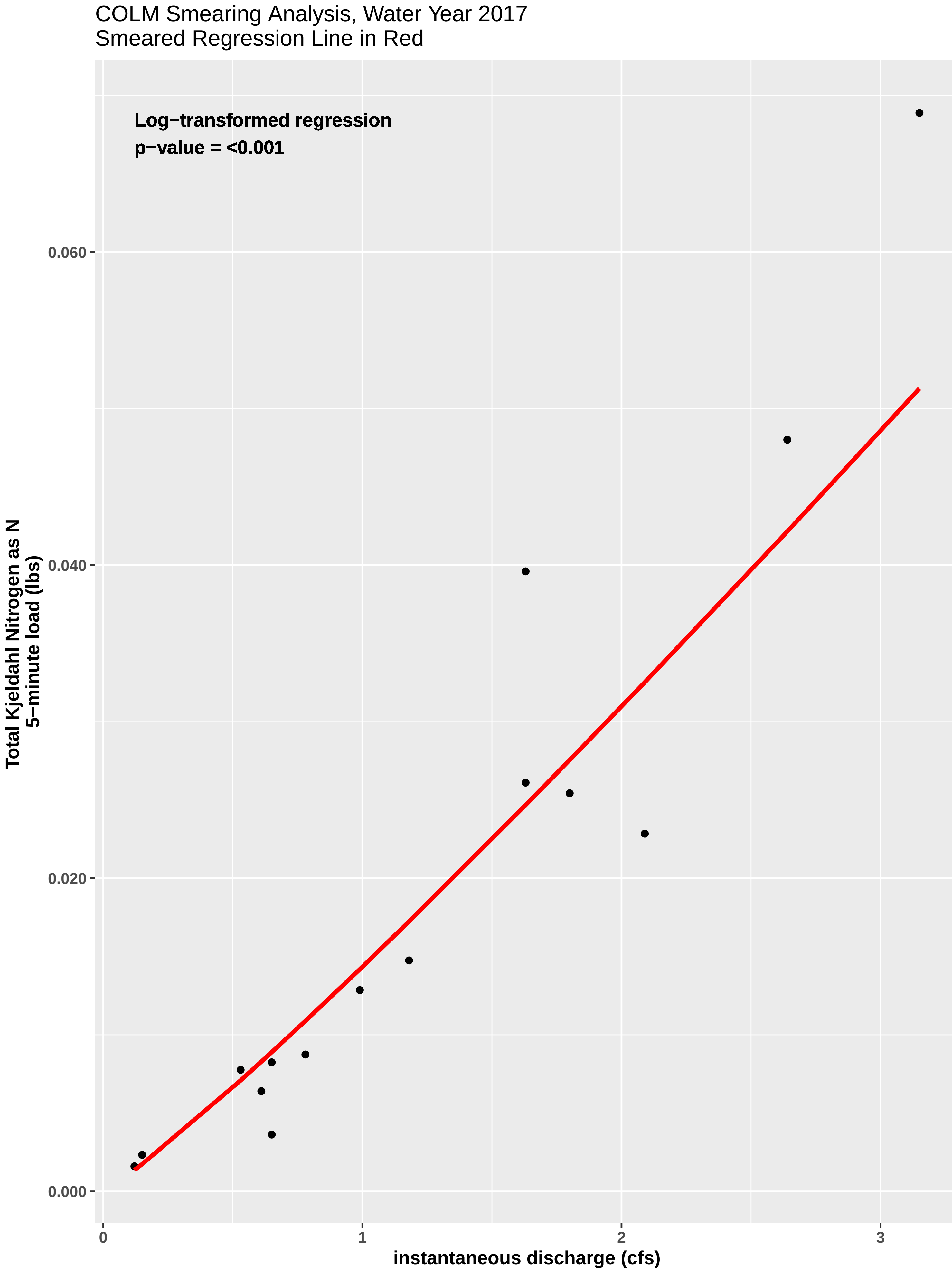

COLM Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.60
0.40
0.20
0.00
5−minute flow (cfs)
5
4
3
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

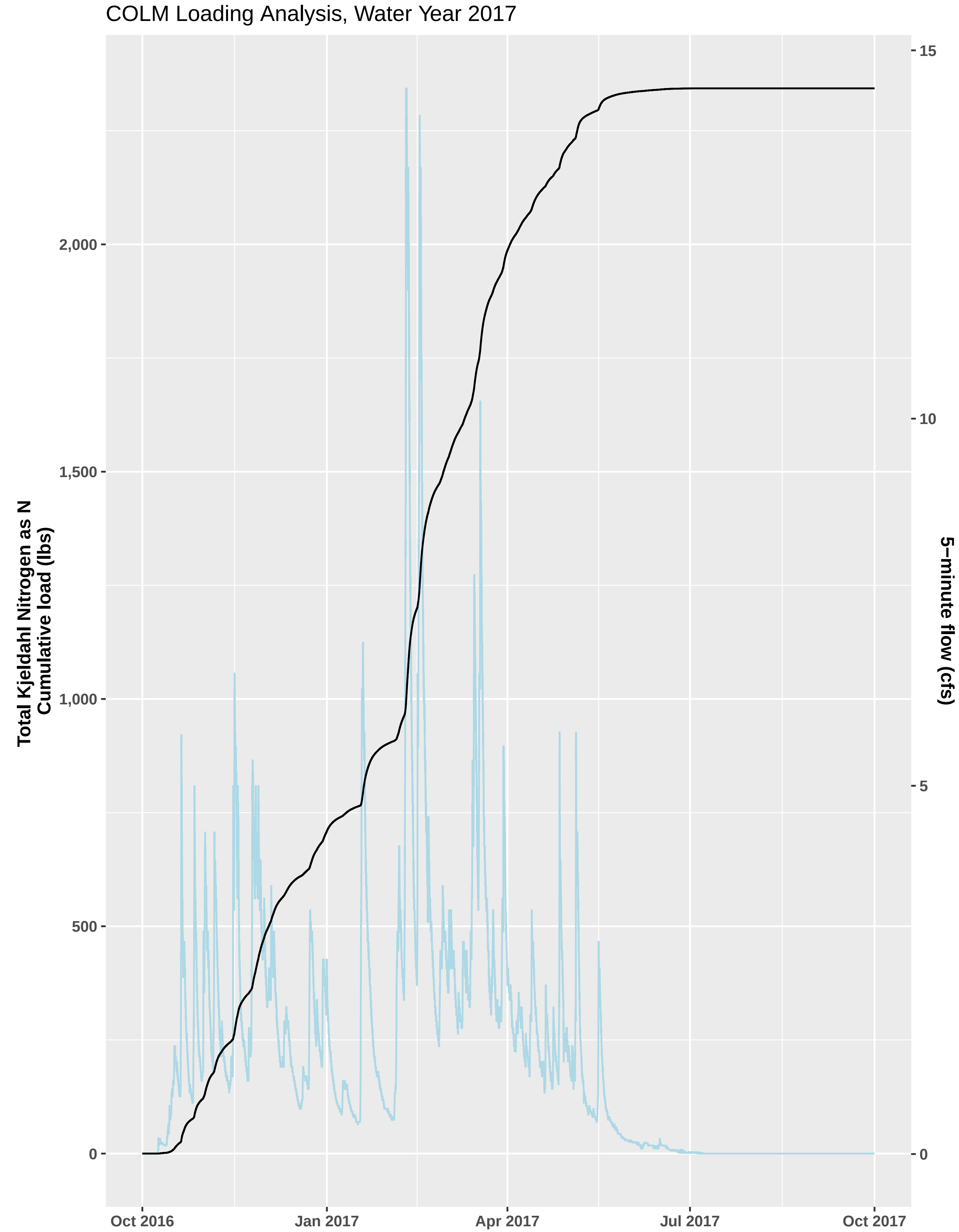


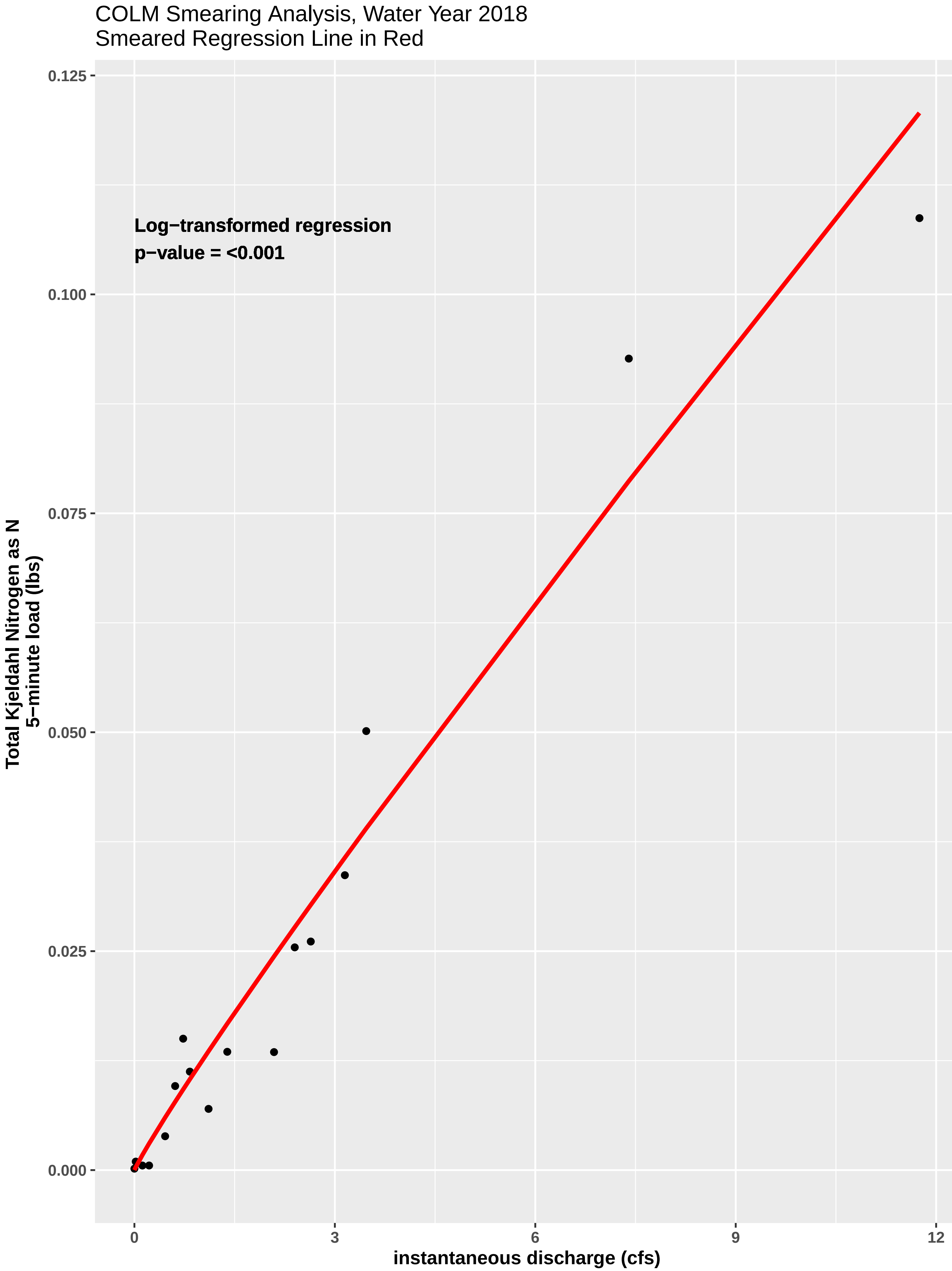
COLM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.626
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0060
0.0040
0.0020
0.10
0.15
0.20
0.25
0.30
instantaneous discharge (cfs)

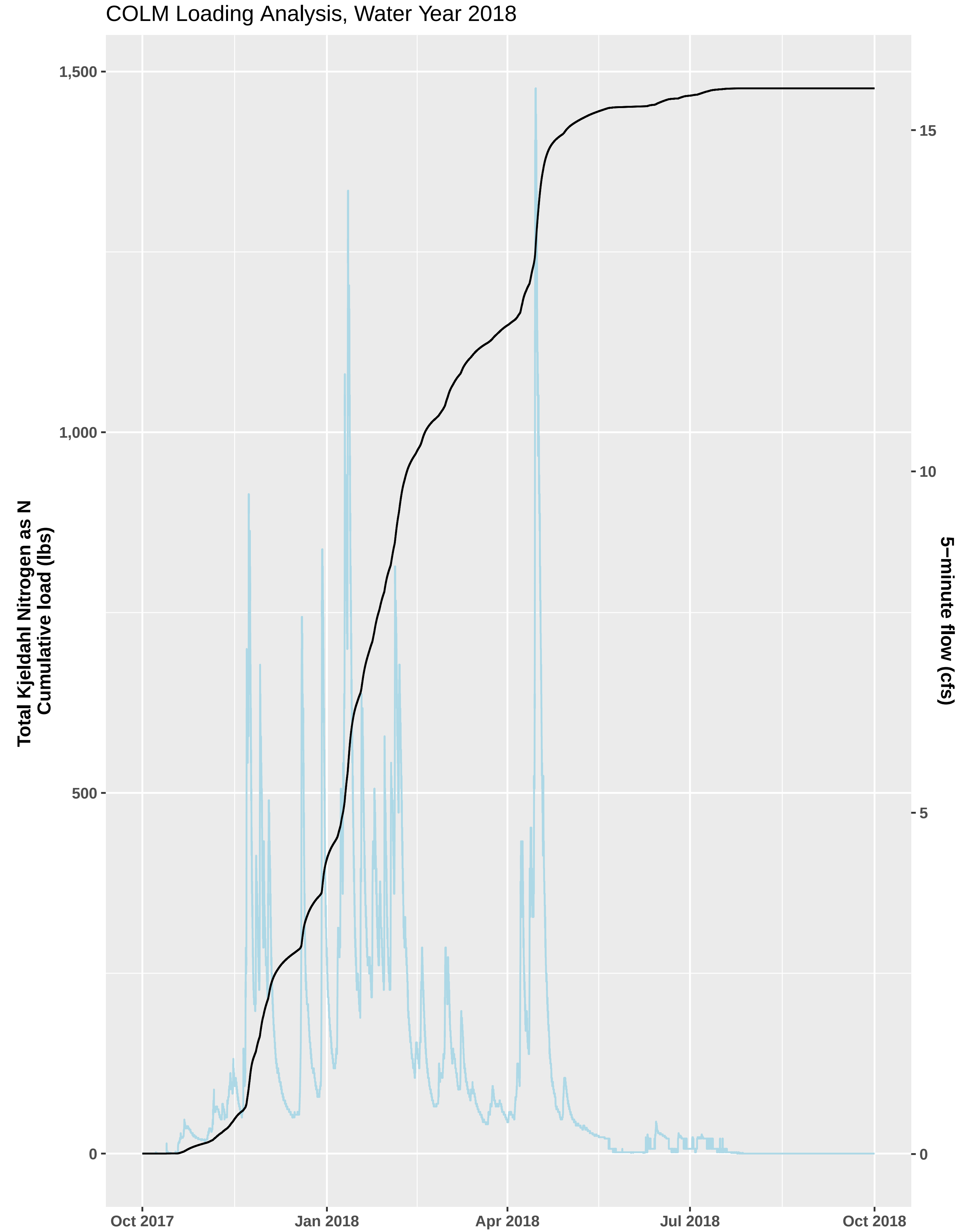


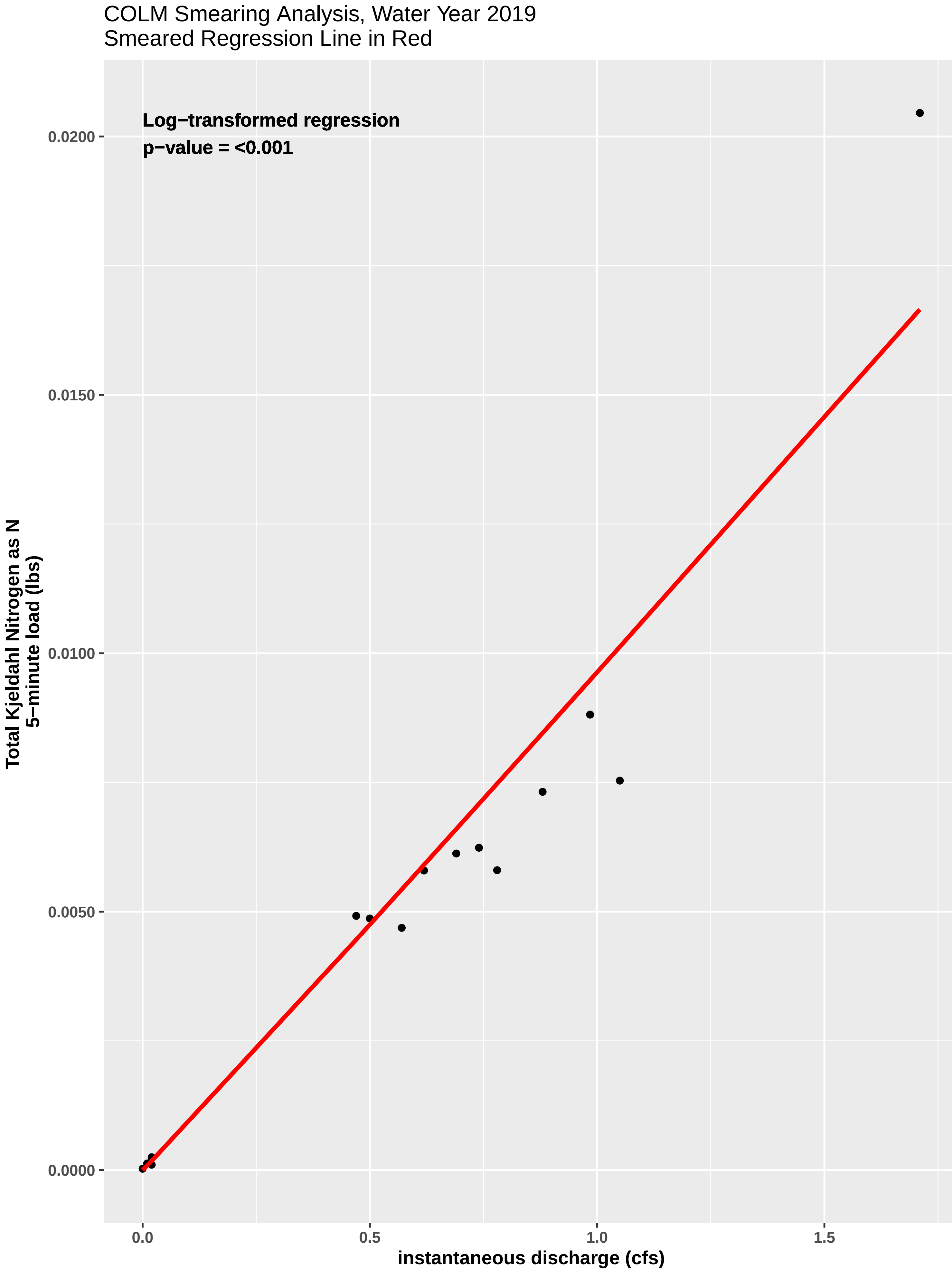
COLM Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
6.0
4.0
2.0
0.0
5−minute flow (cfs)
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

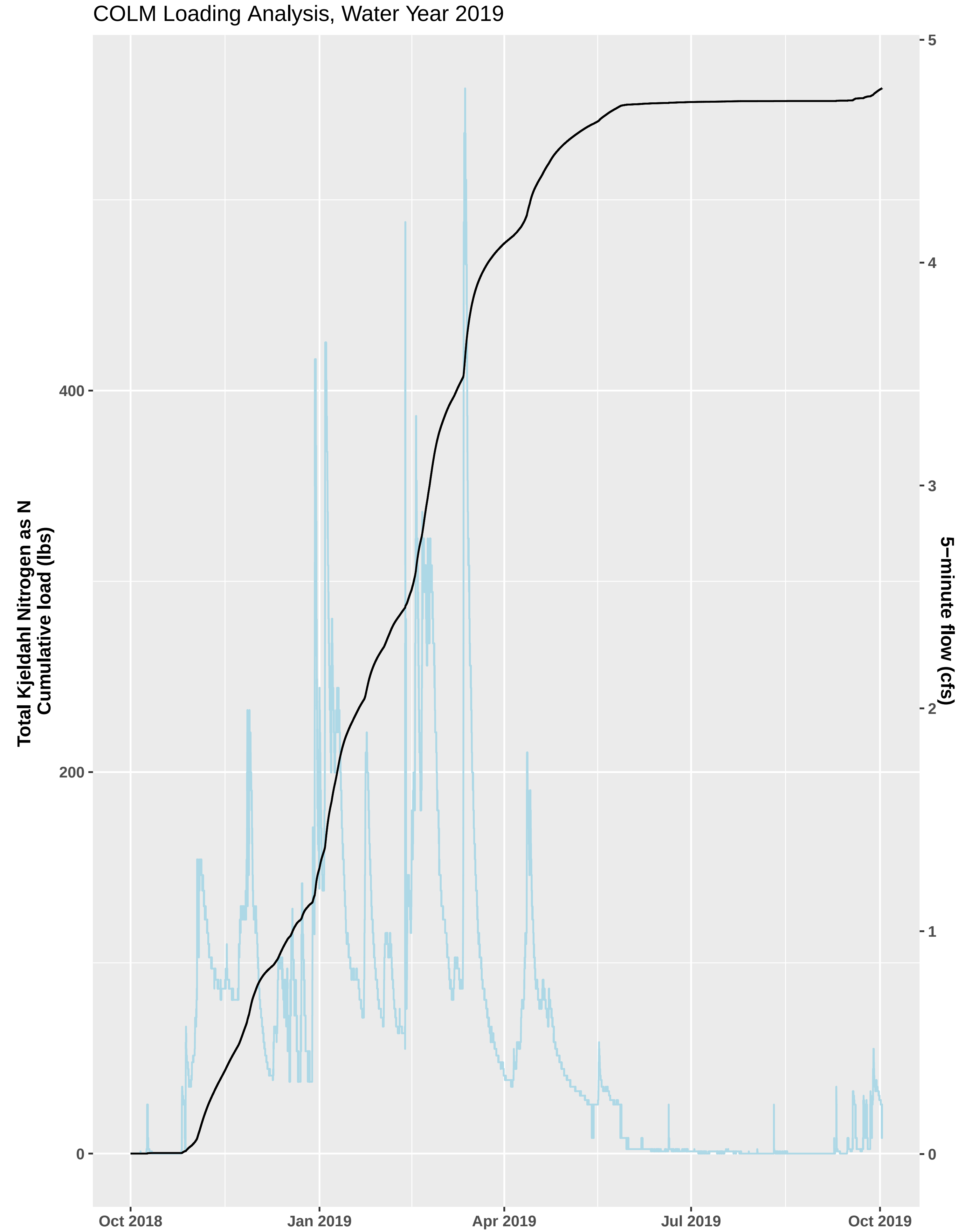

COLM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.020
0.040
0.060
0
1
2
3
instantaneous discharge (cfs)

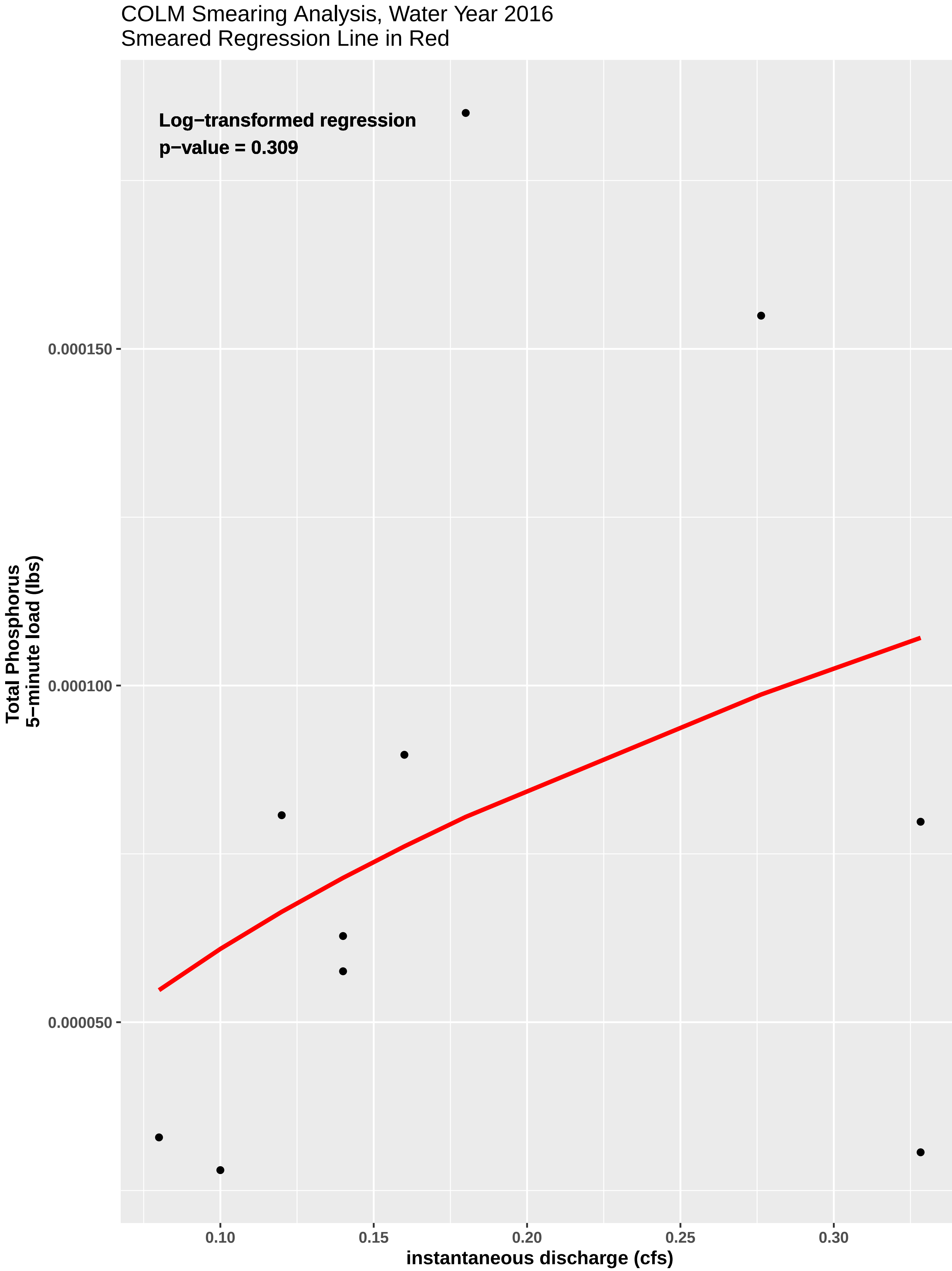

COLM Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

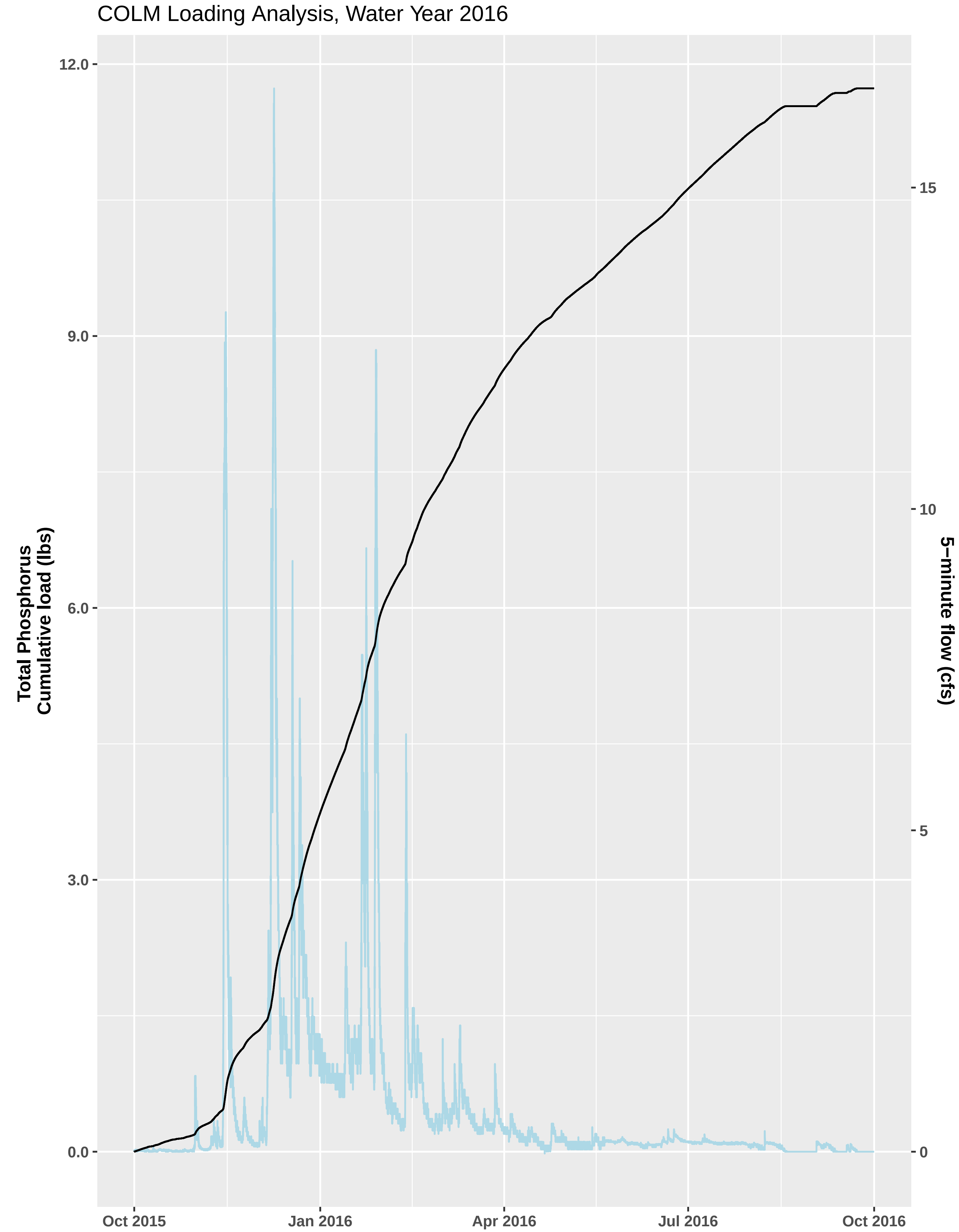

COLM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.125
0.100
0.075
0.050
0.025
0.000
0
3
6
9
12
instantaneous discharge (cfs)

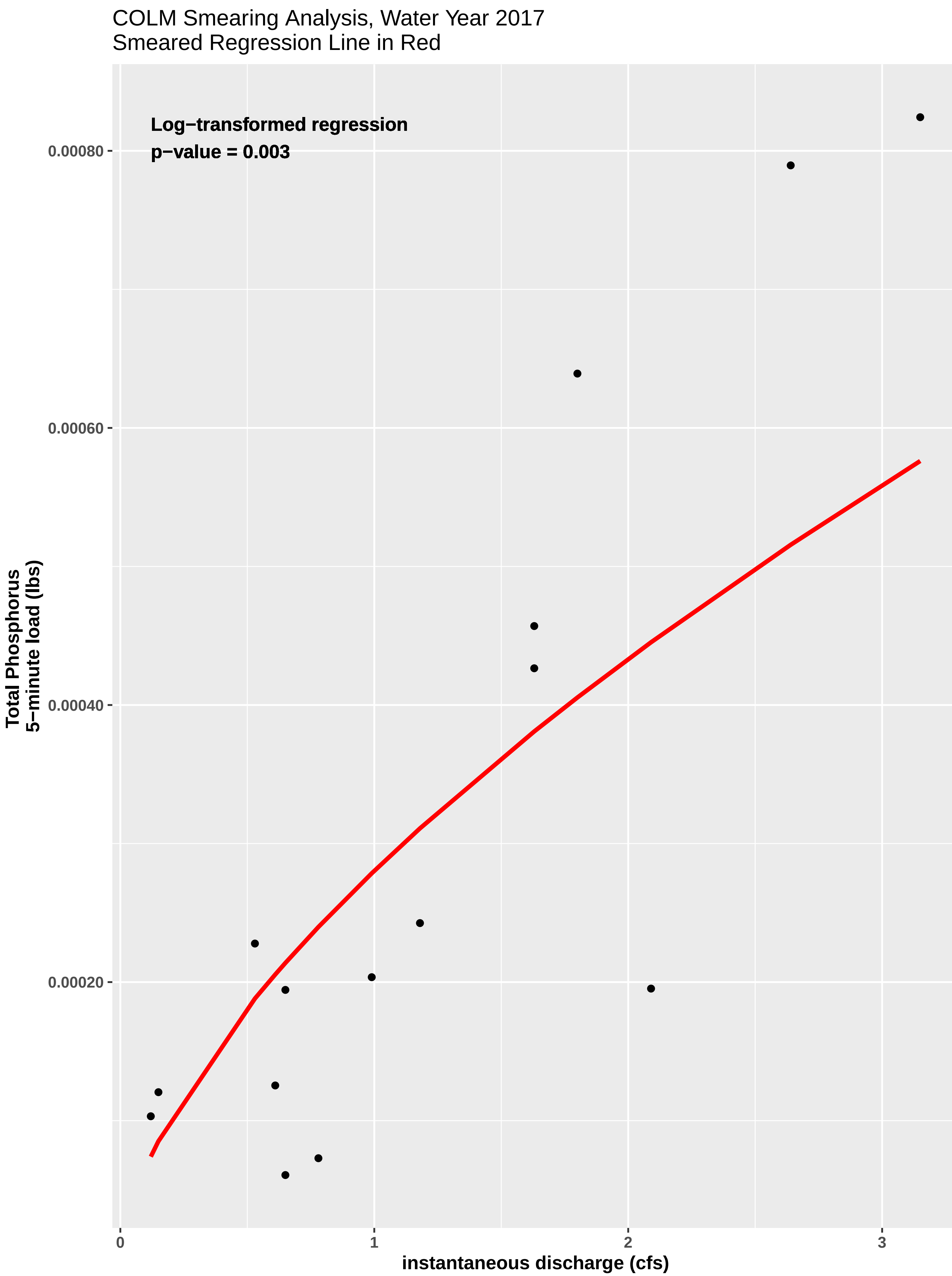

COLM Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
1,500
1,000
500
0
5−minute flow (cfs)
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


COLM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

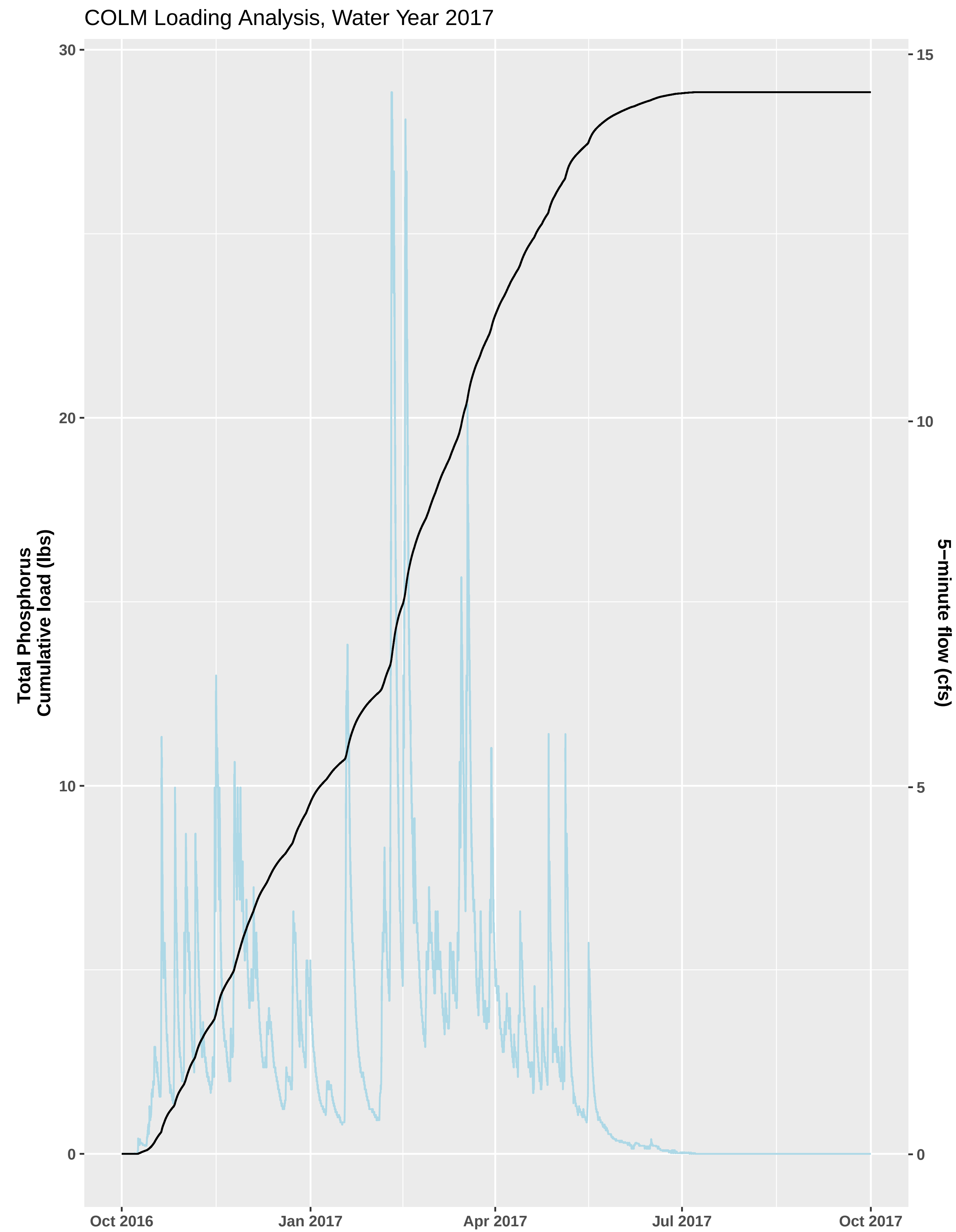

COLM Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
200
400
5−minute flow (cfs)
0
1
2
3
4
5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COLM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.309
Total Phosphorus
5−minute load (lbs)
0.000150
0.000100
0.000050
0.10
0.15
0.20
0.25
0.30
instantaneous discharge (cfs)


COLM Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
12.0
9.0
6.0
3.0
0.0
5−minute flow (cfs)
15
10
5
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

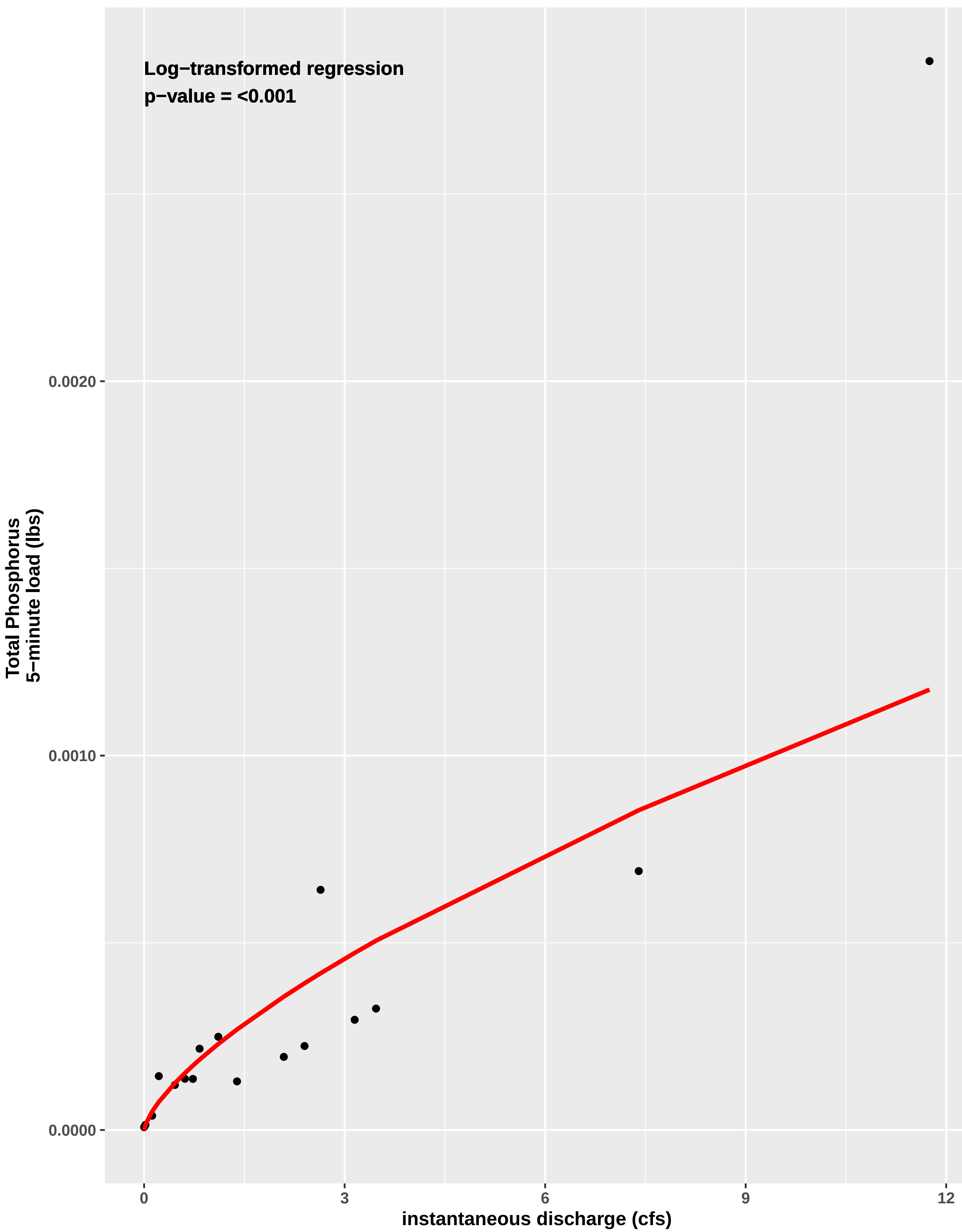


COLM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.003
0.00080
0.00060
0.00040
0.00020
Total Phosphorus
5−minute load (lbs)
0
1
2
3
instantaneous discharge (cfs)

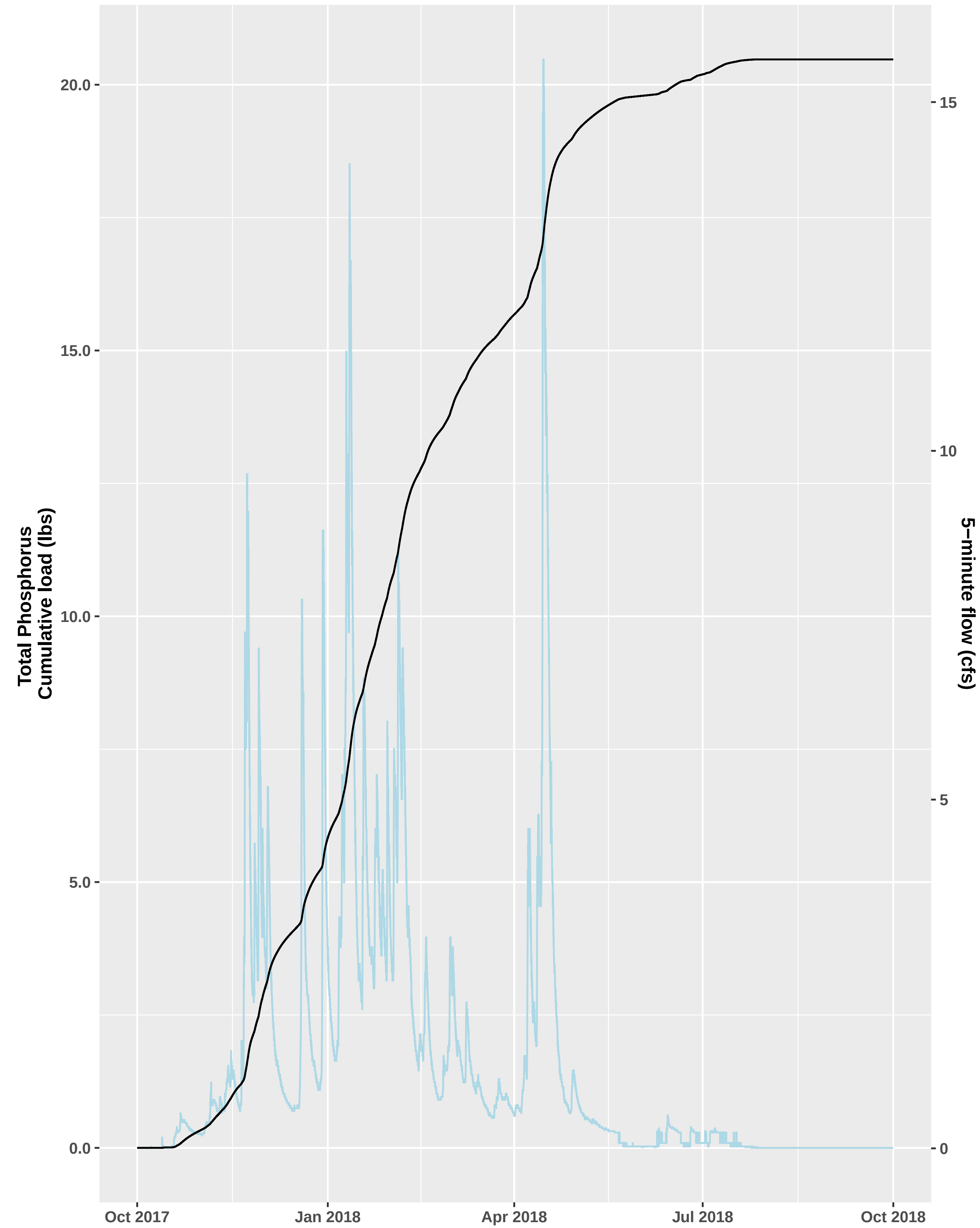


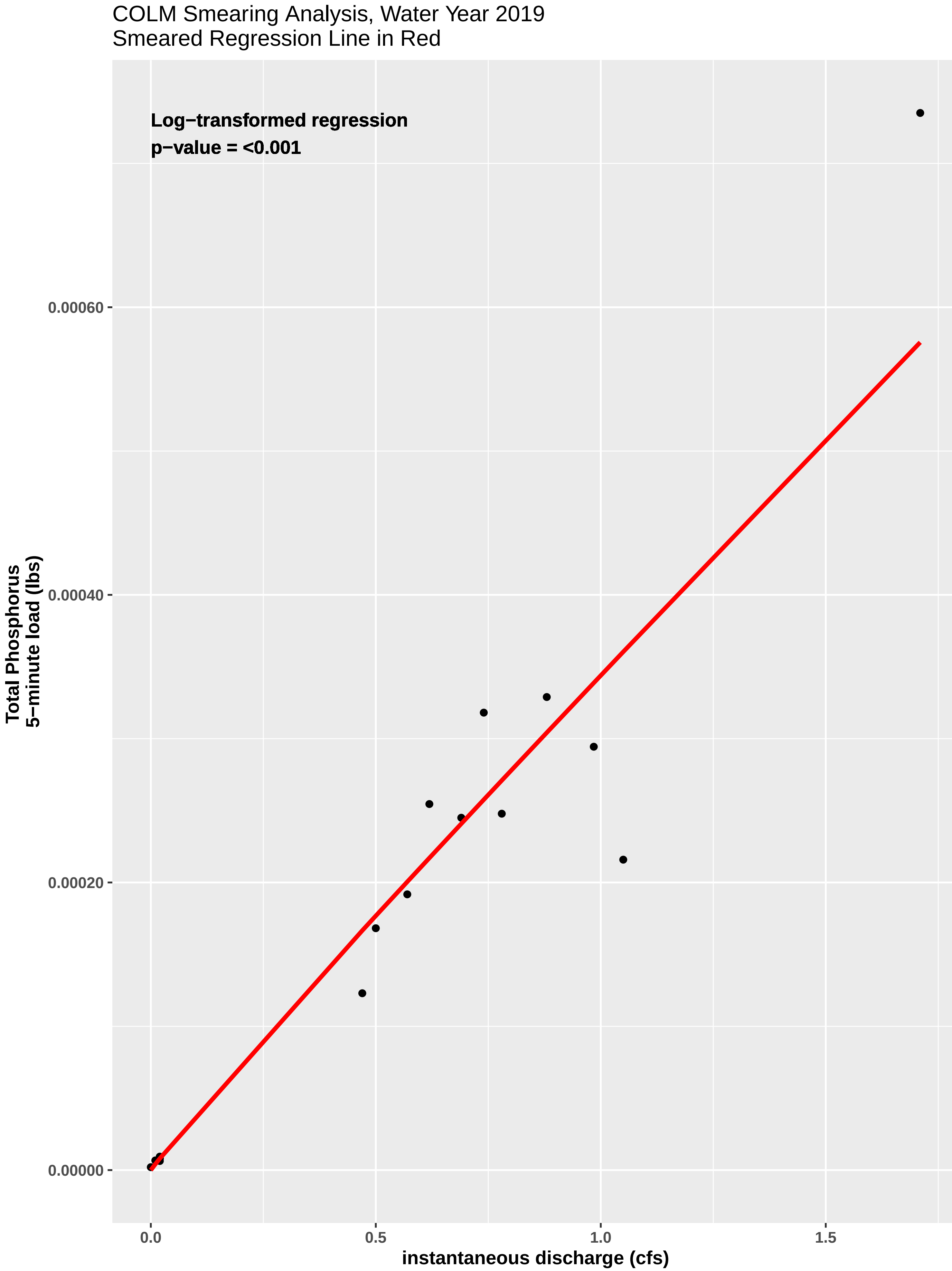
COLM Loading Analysis, Water Year 2017
30
20
10
0
Total Phosphorus
Cumulative load (lbs)
15
10
5
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

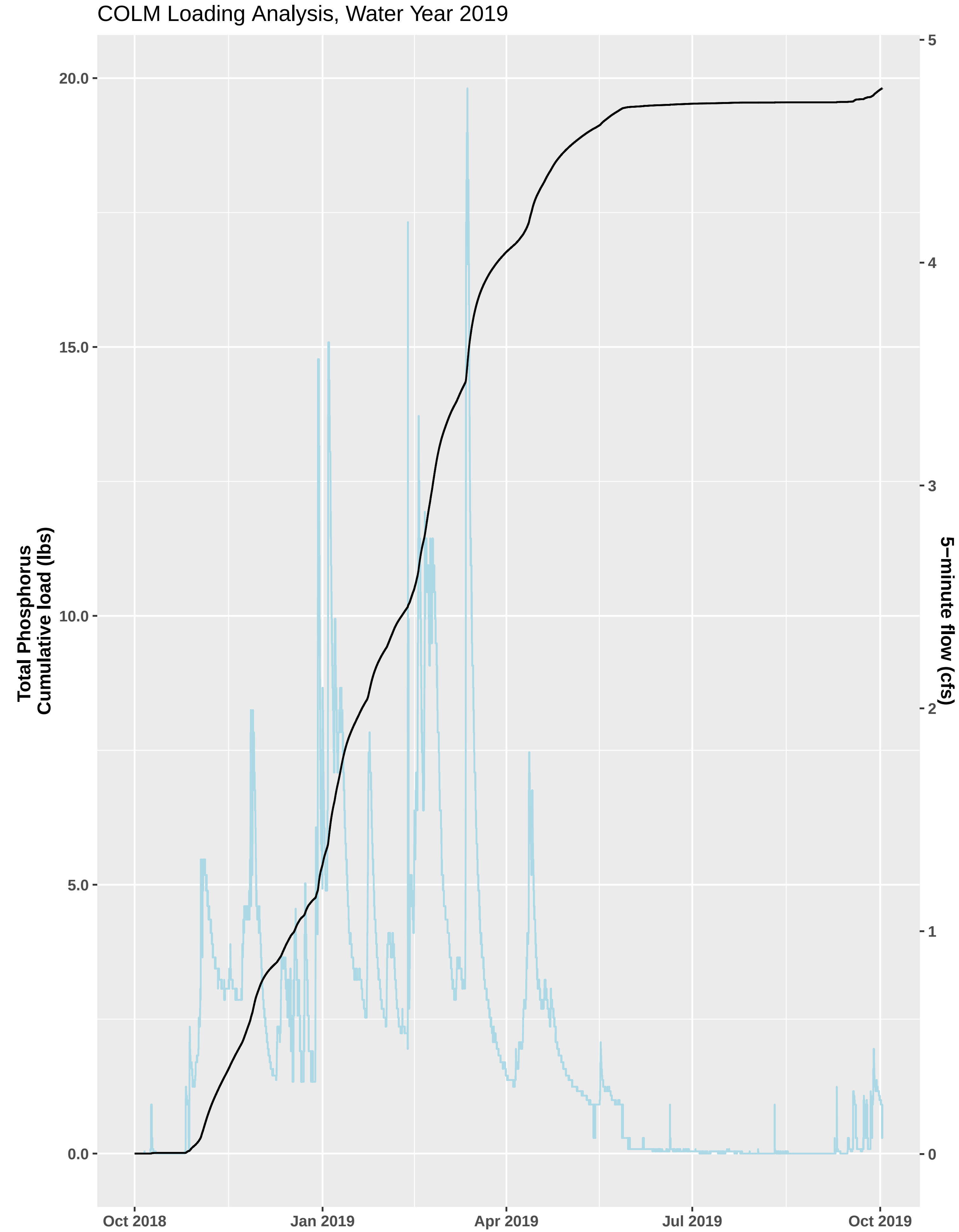
COLM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red

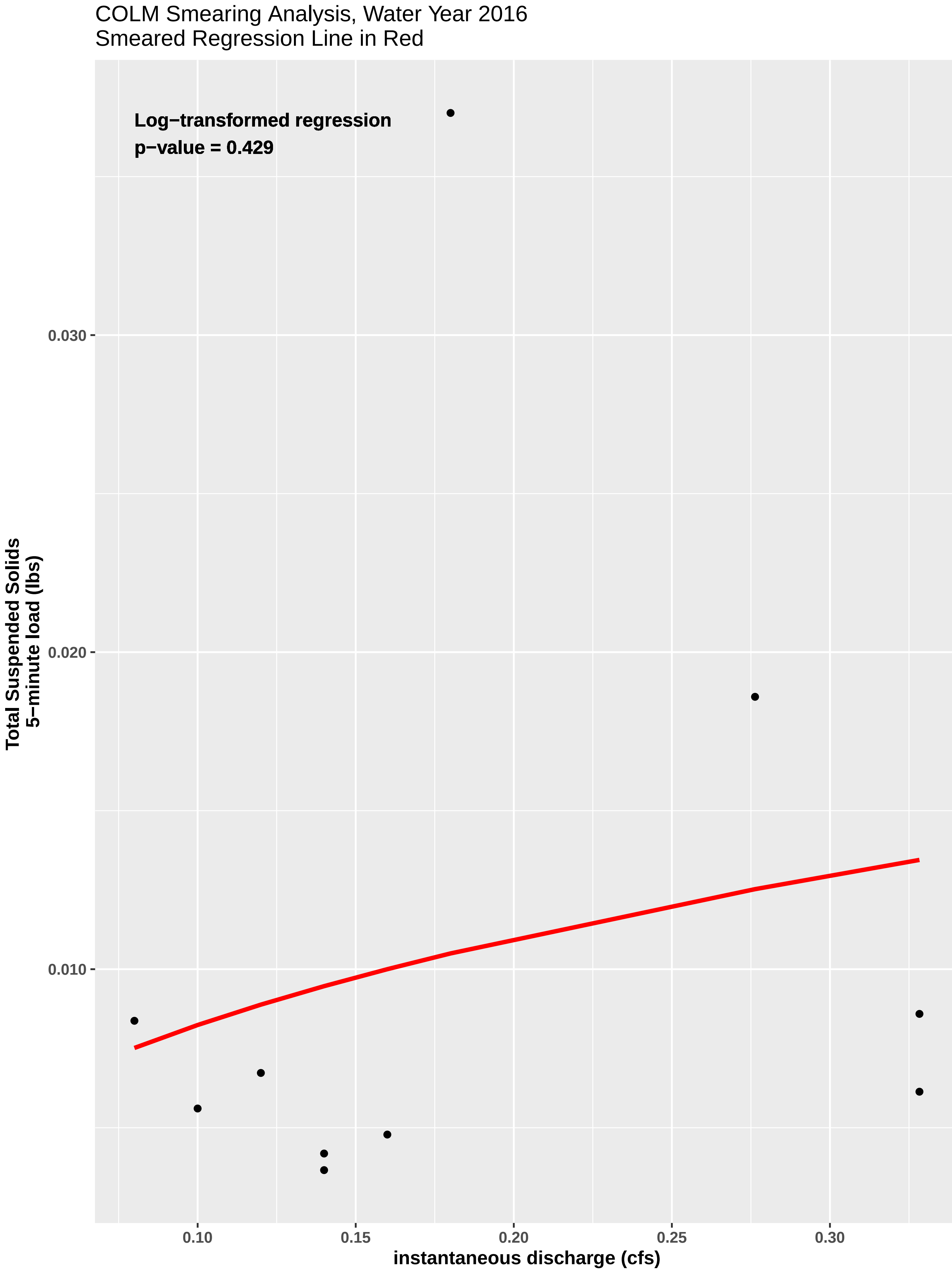


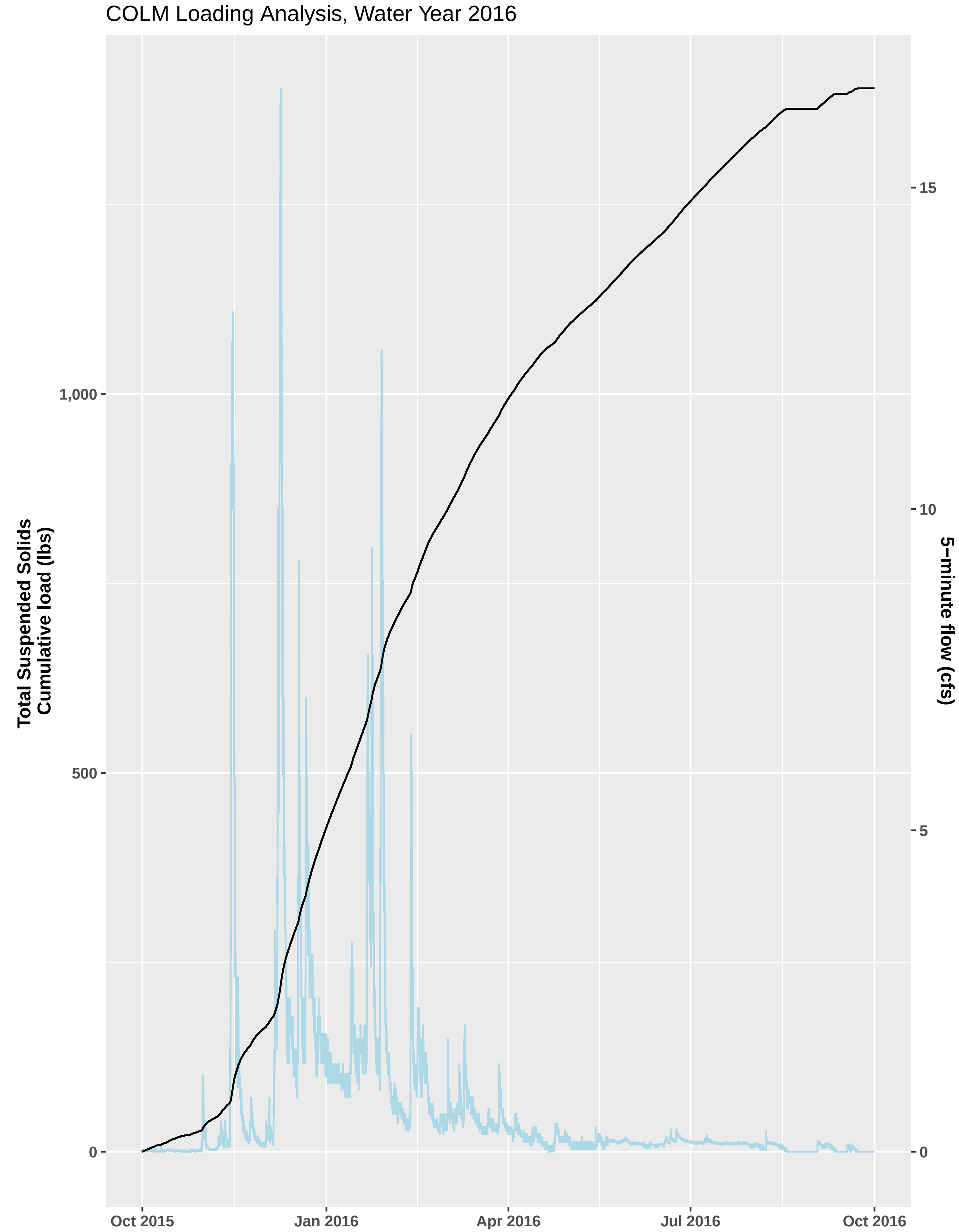
COLM Loading Analysis, Water Year 2018

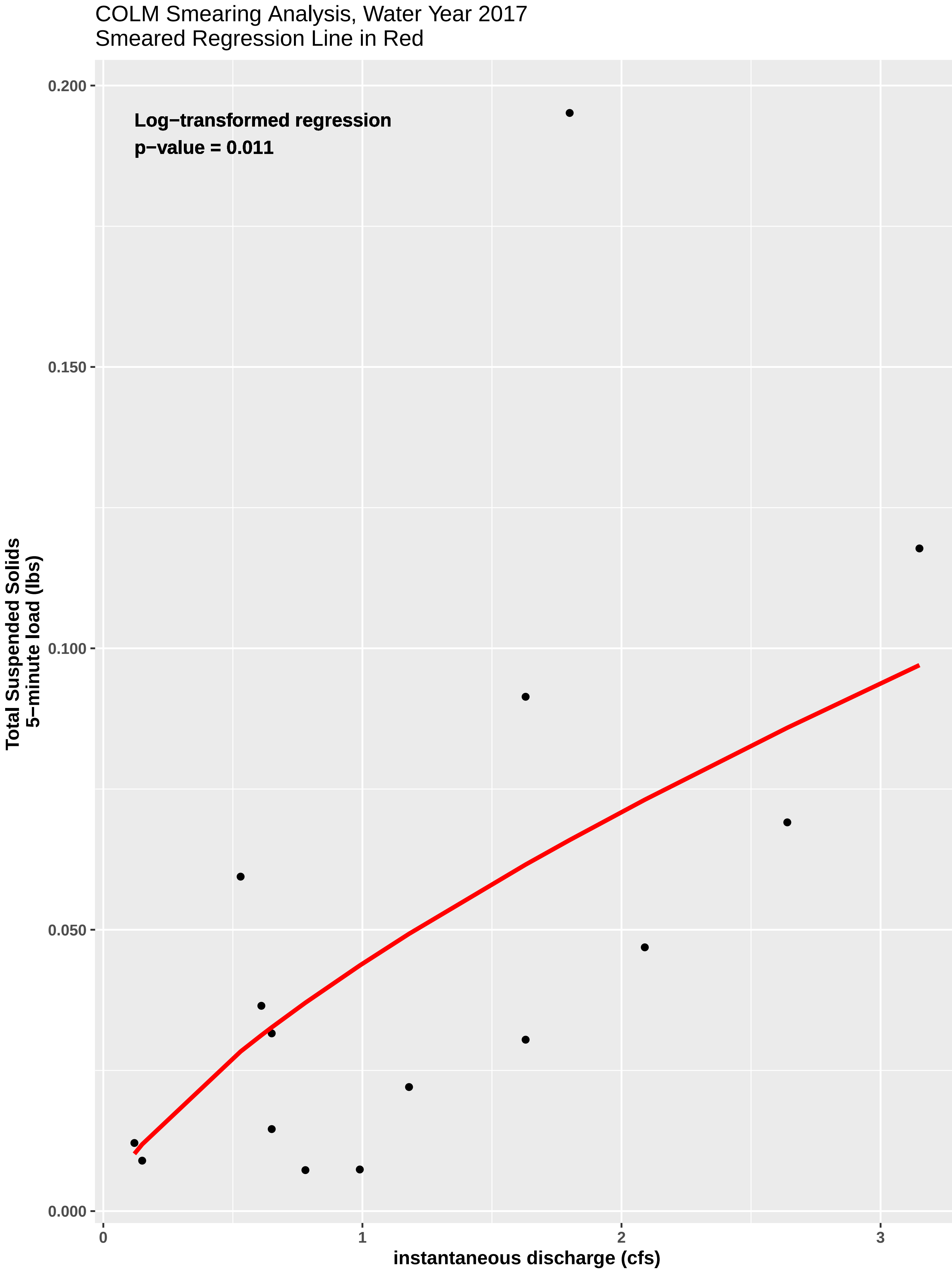



COLM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00020
0.00040
0.00060
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

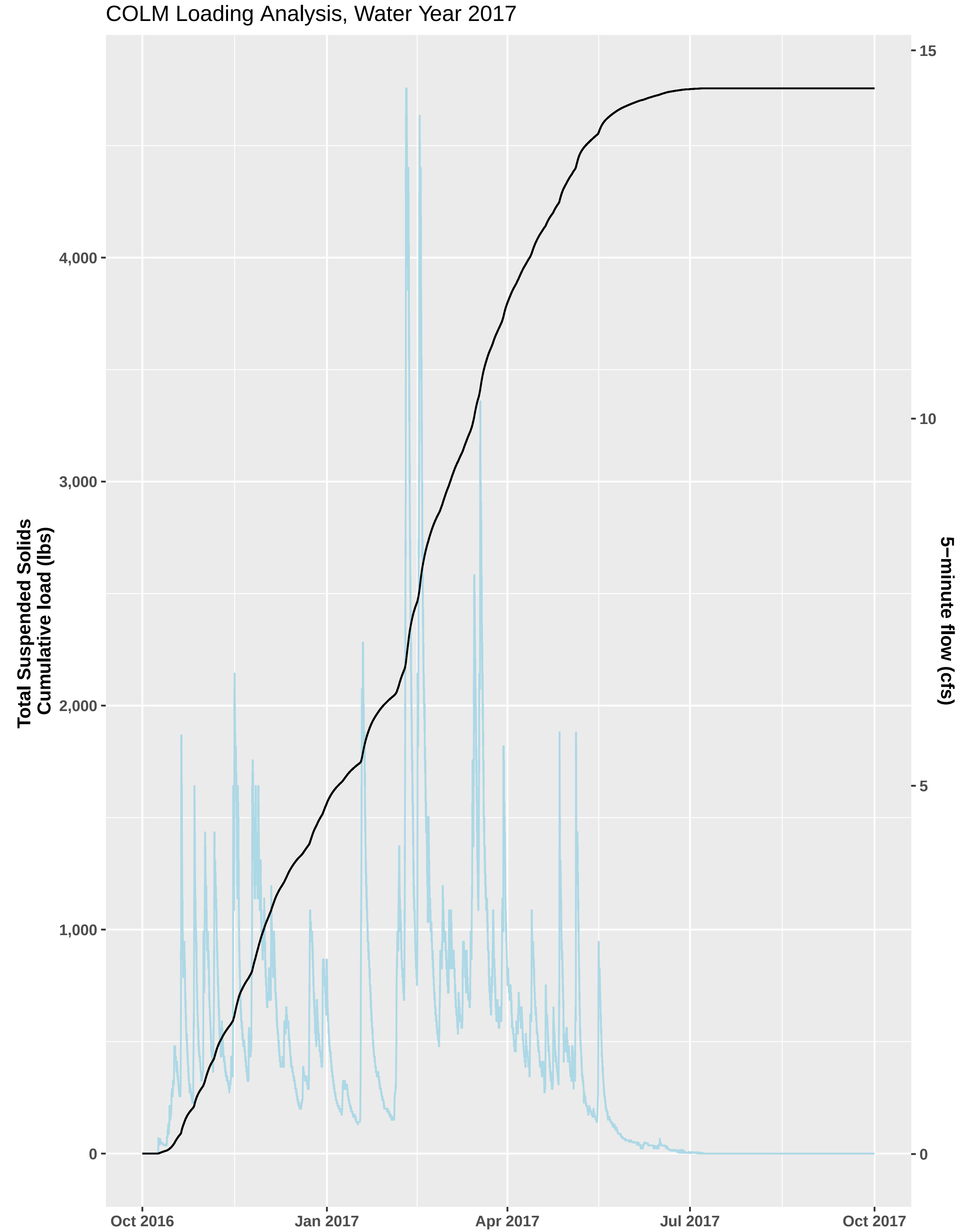

COLM Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0.0
5.0
10.0
15.0
20.0
5−minute flow (cfs)
0
1
2
3
4
5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COLM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.429
Total Suspended Solids
5−minute load (lbs)
0.030
0.020
0.010
0.10
0.15
0.20
0.25
0.30
instantaneous discharge (cfs)

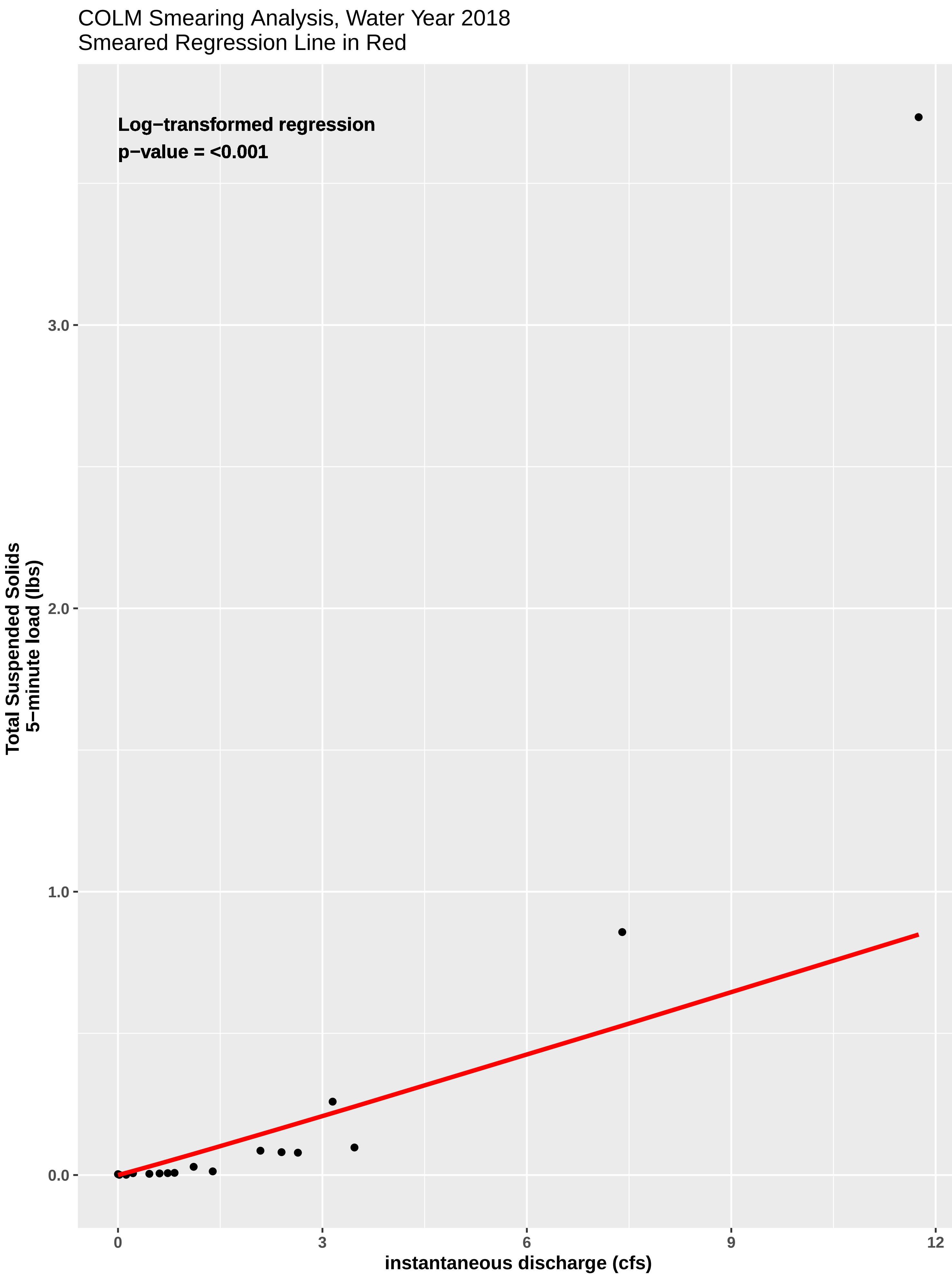

COLM Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
1,000
500
0
15
10
5
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

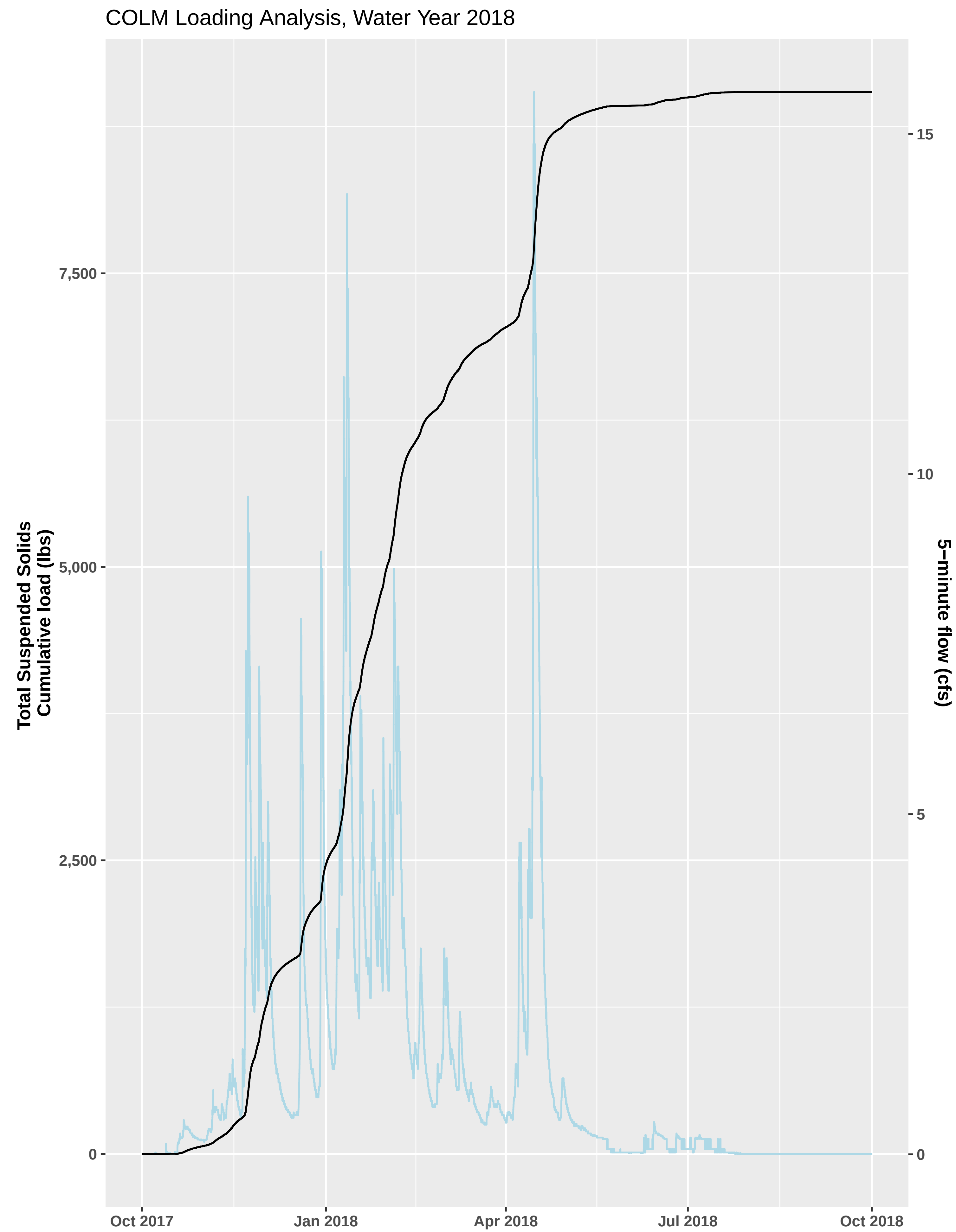


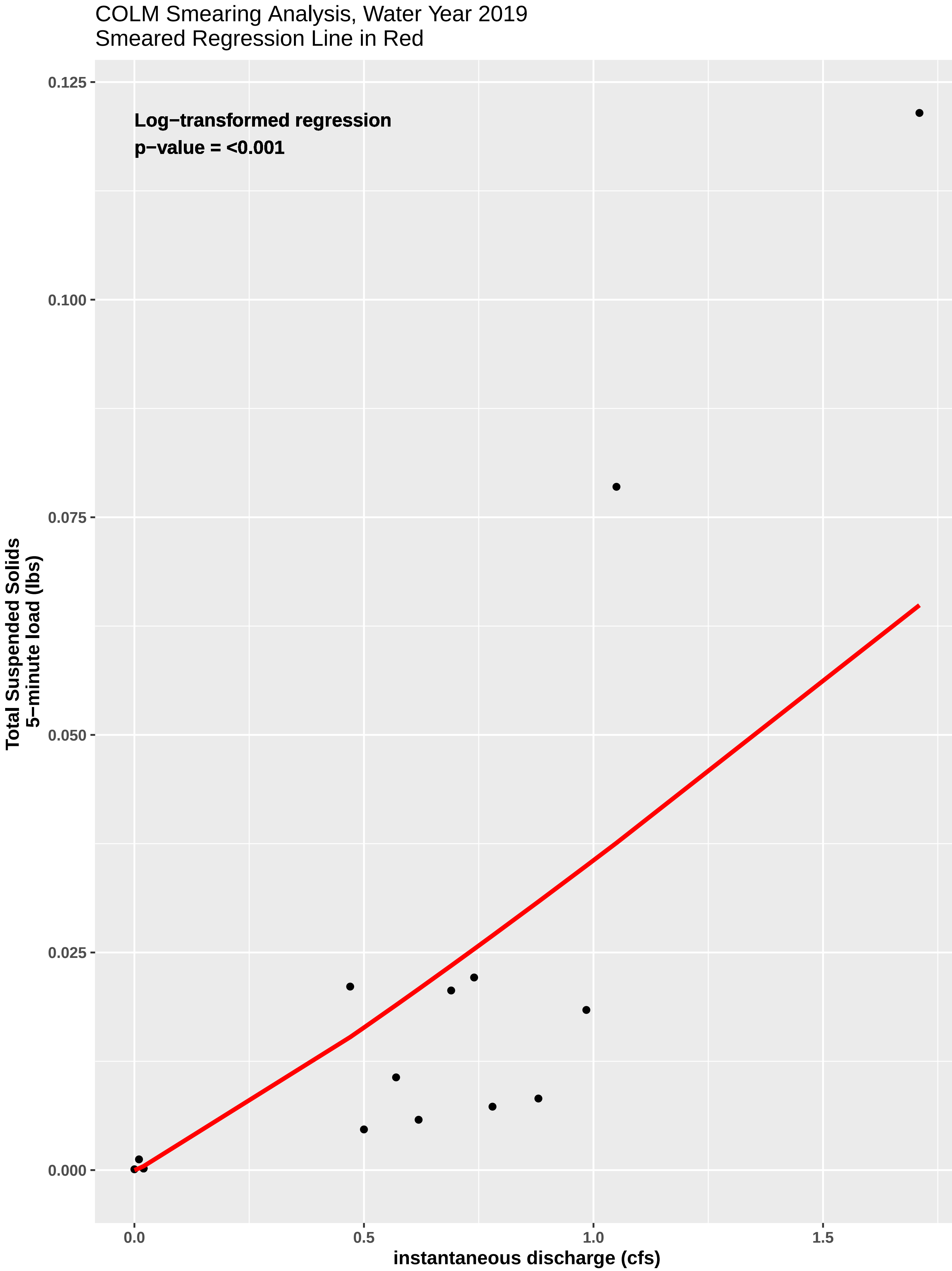
COLM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.011
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.000
0.050
0.100
0.150
0.200
0
1
2
3



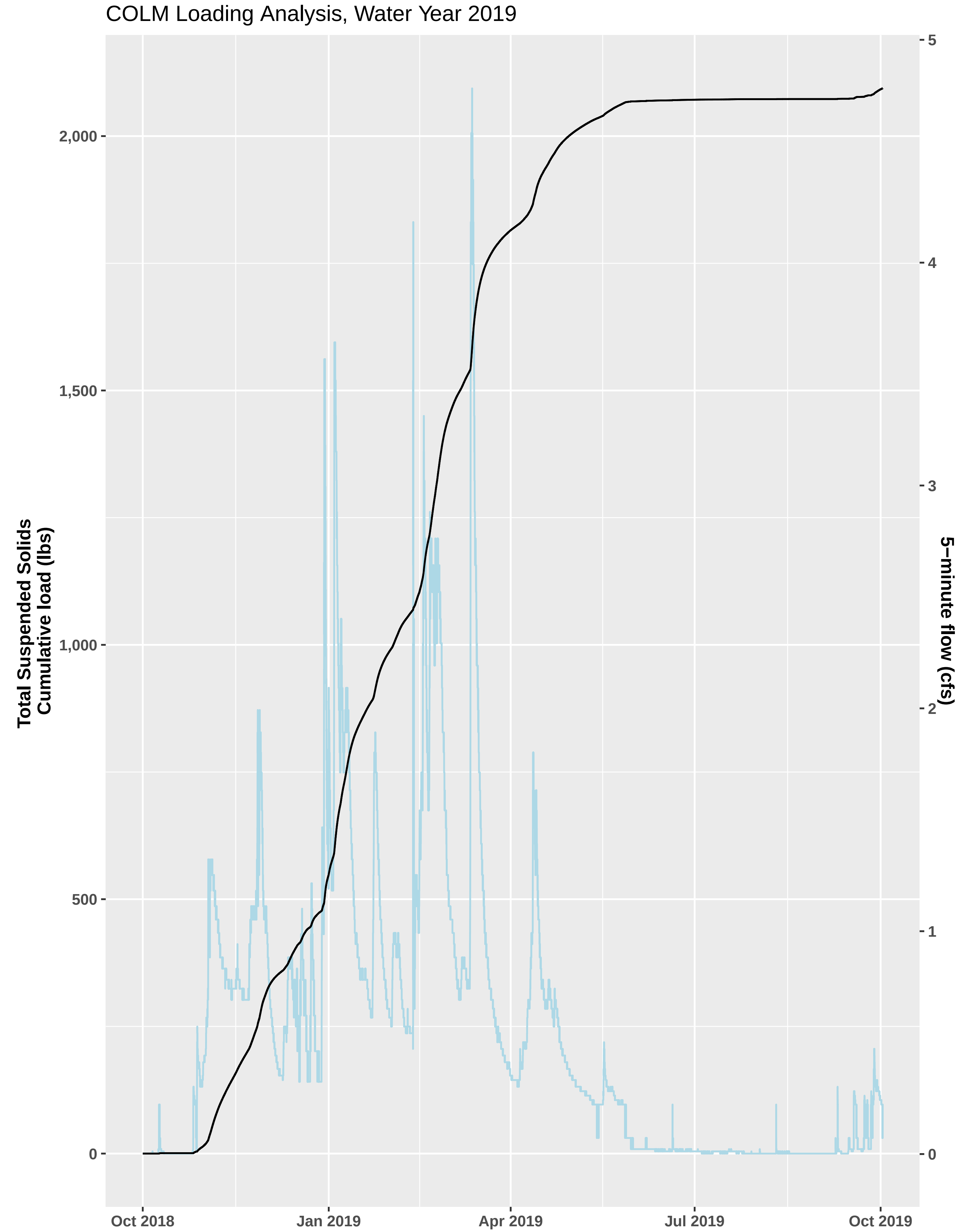
COLM Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
1,000
2,000
3,000
4,000
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


COLM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
1.0
2.0
3.0
0
3
6
9
12
instantaneous discharge (cfs)

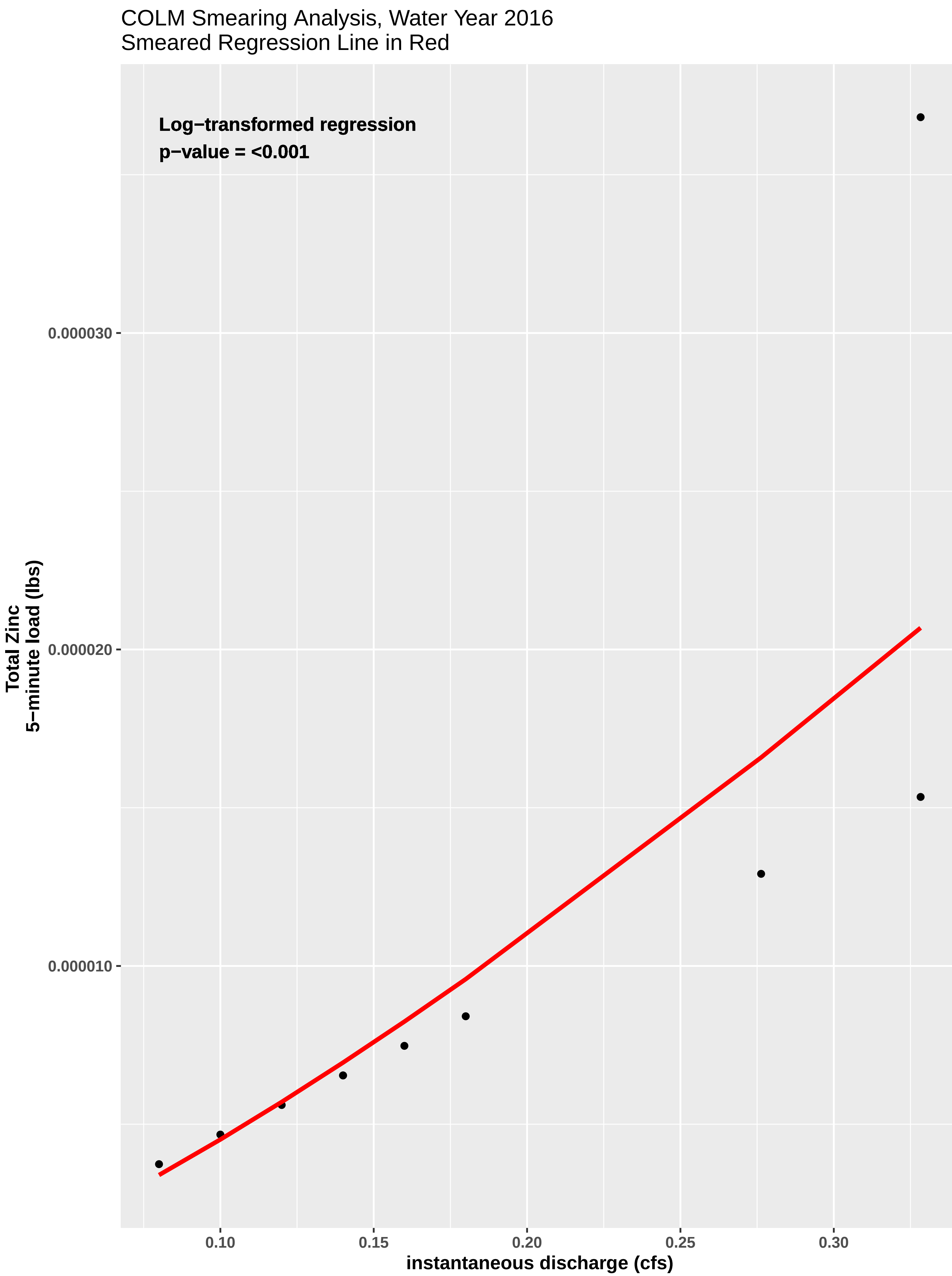

COLM Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
2,500
5,000
7,500
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



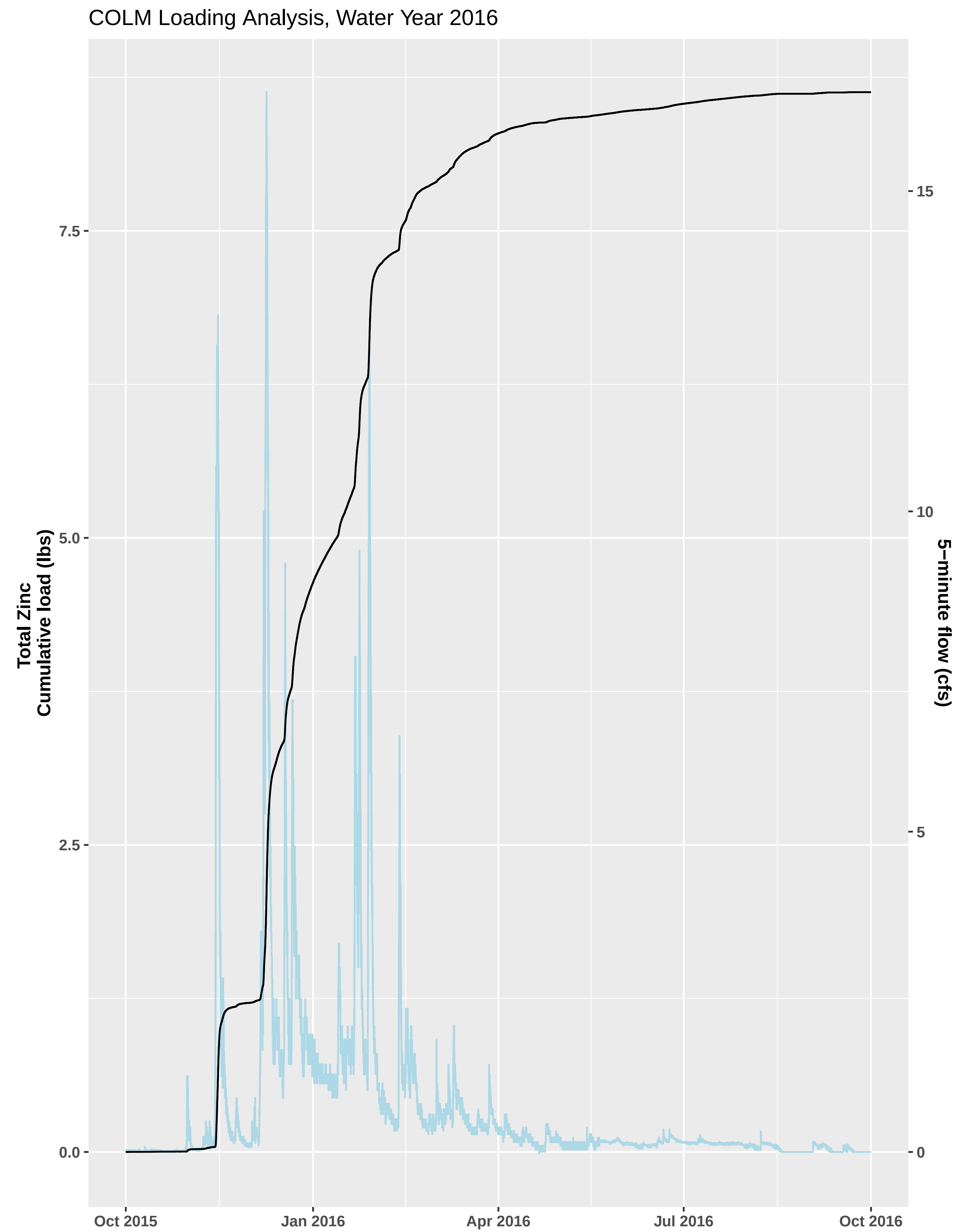
COLM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.125
0.100
0.075
0.050
0.025
0.000
0.0
0.5
1.0
1.5



COLM Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
2,000
1,500
1,000
500
0
5
4
3
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

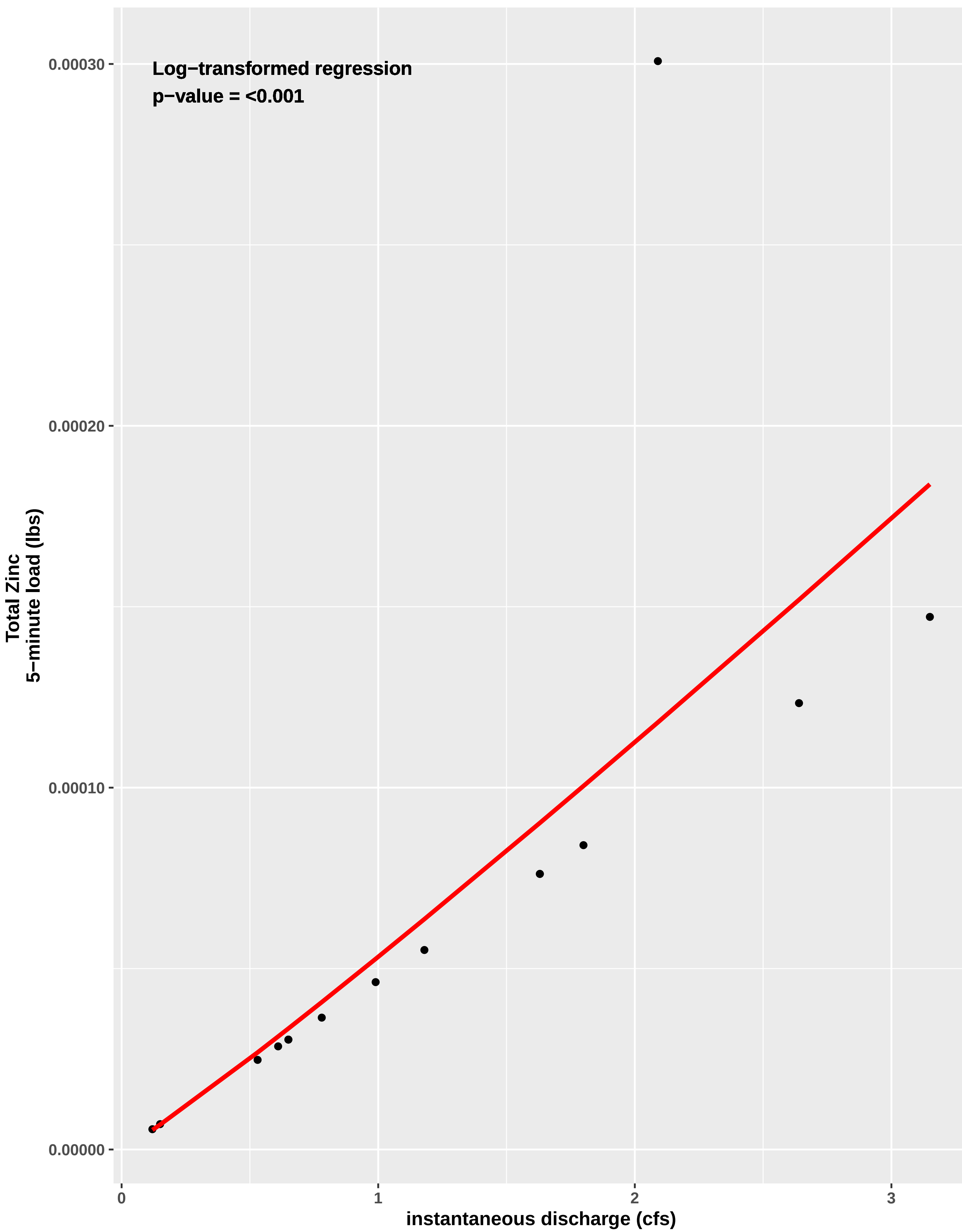


COLM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000010
0.000020
0.000030
0.10
0.15
0.20
0.25
0.30
instantaneous discharge (cfs)

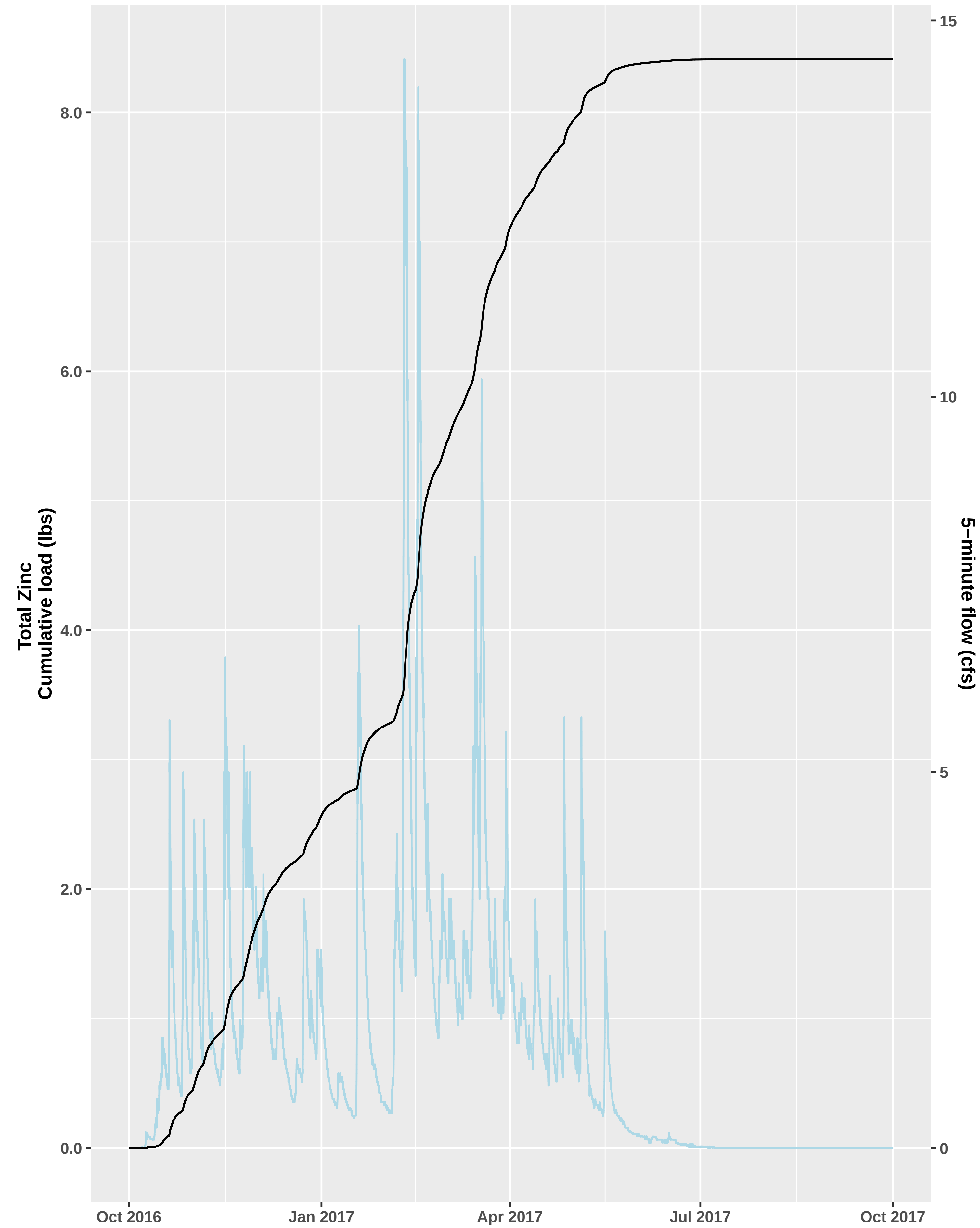


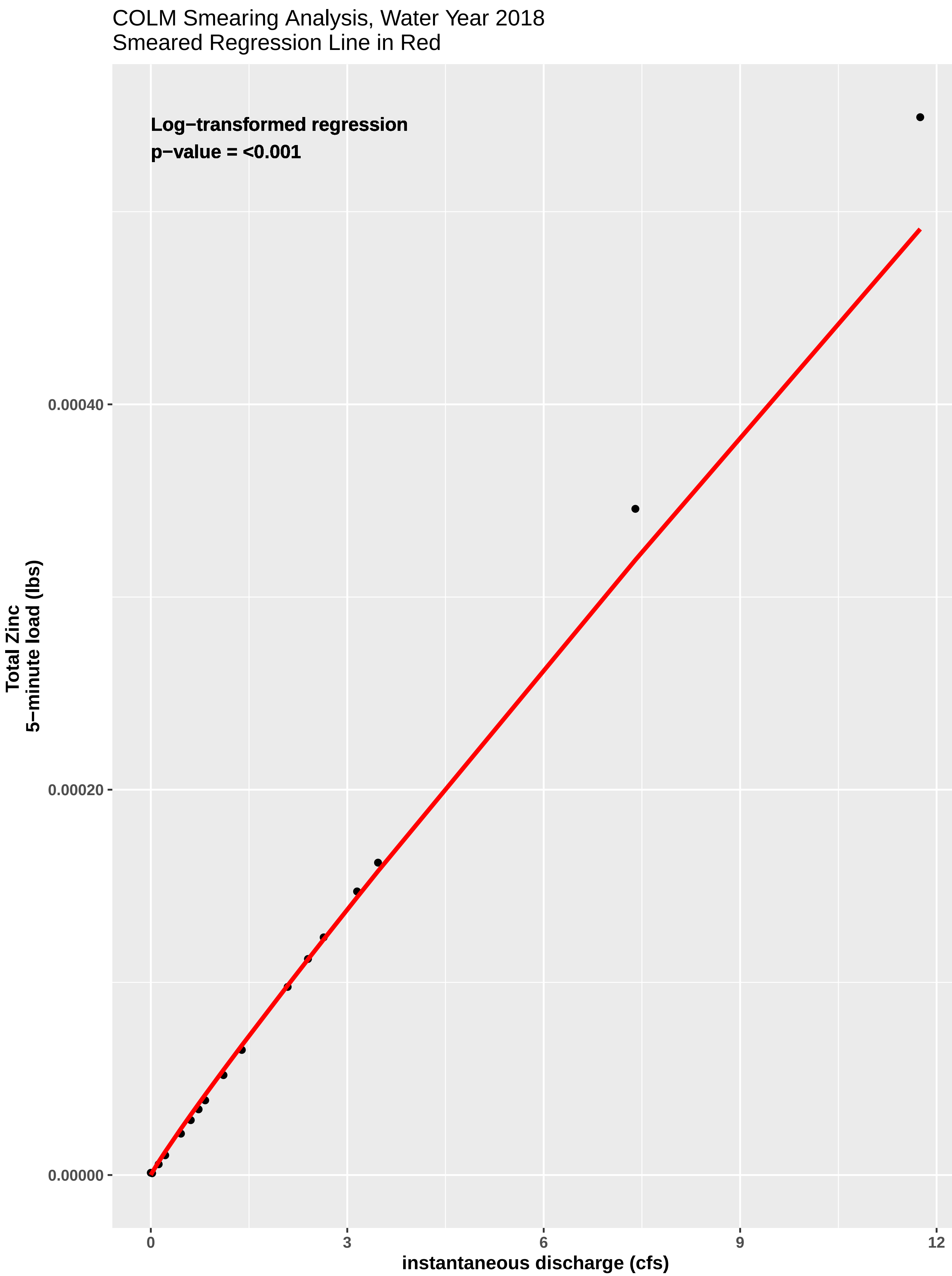
COLM Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0.0
2.5
5.0
7.5
5−minute flow (cfs)
0
5
10
15
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

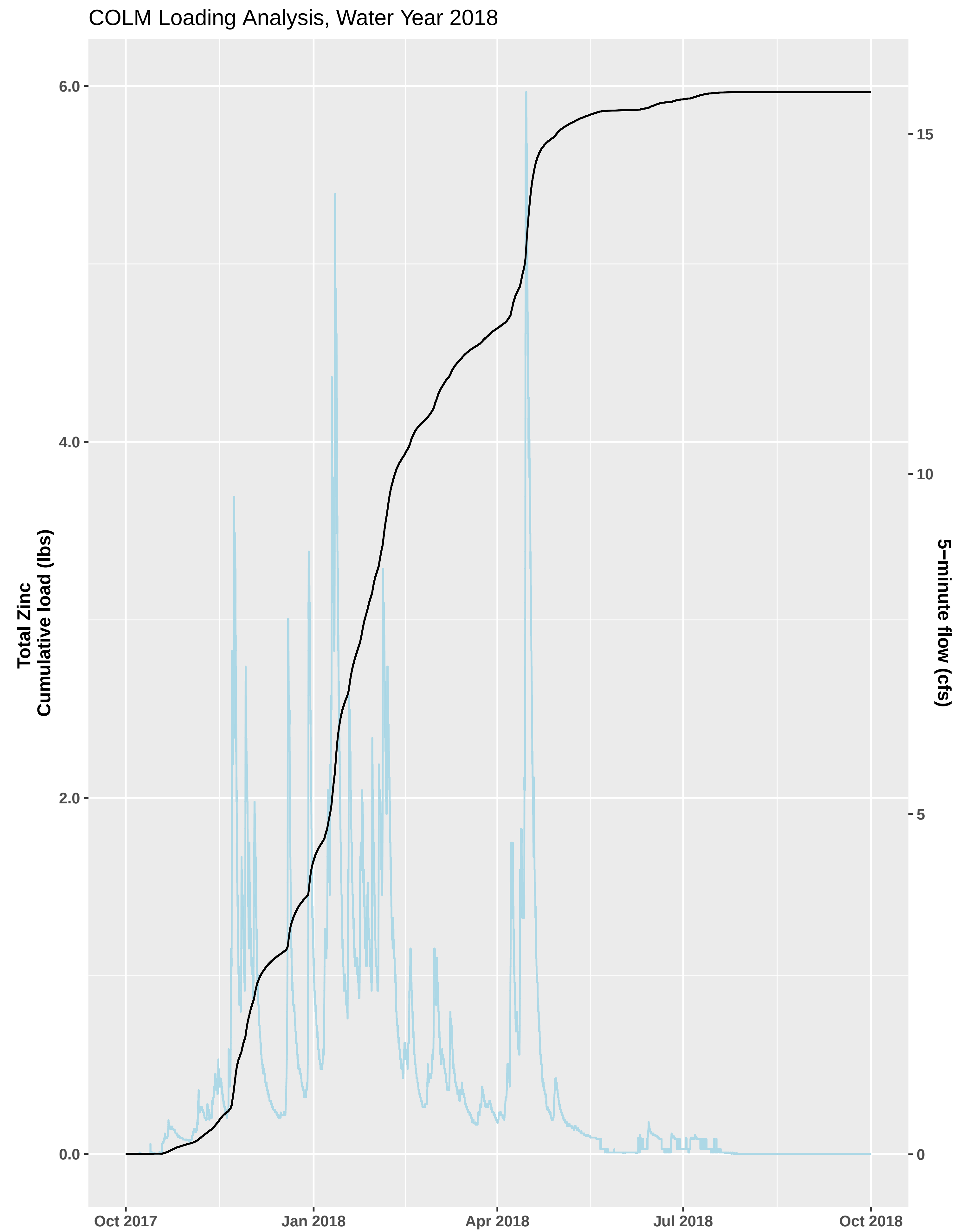
COLM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red

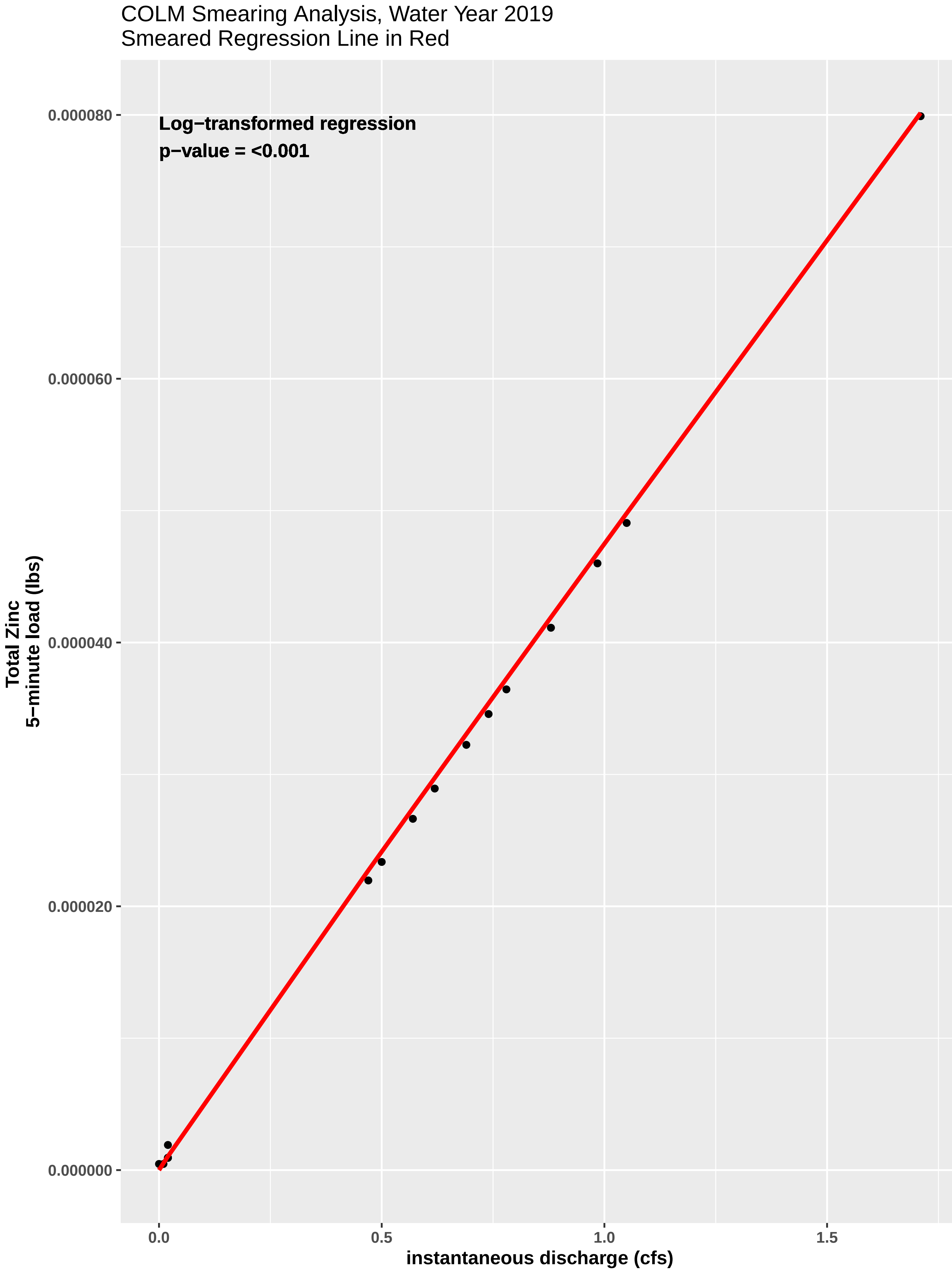


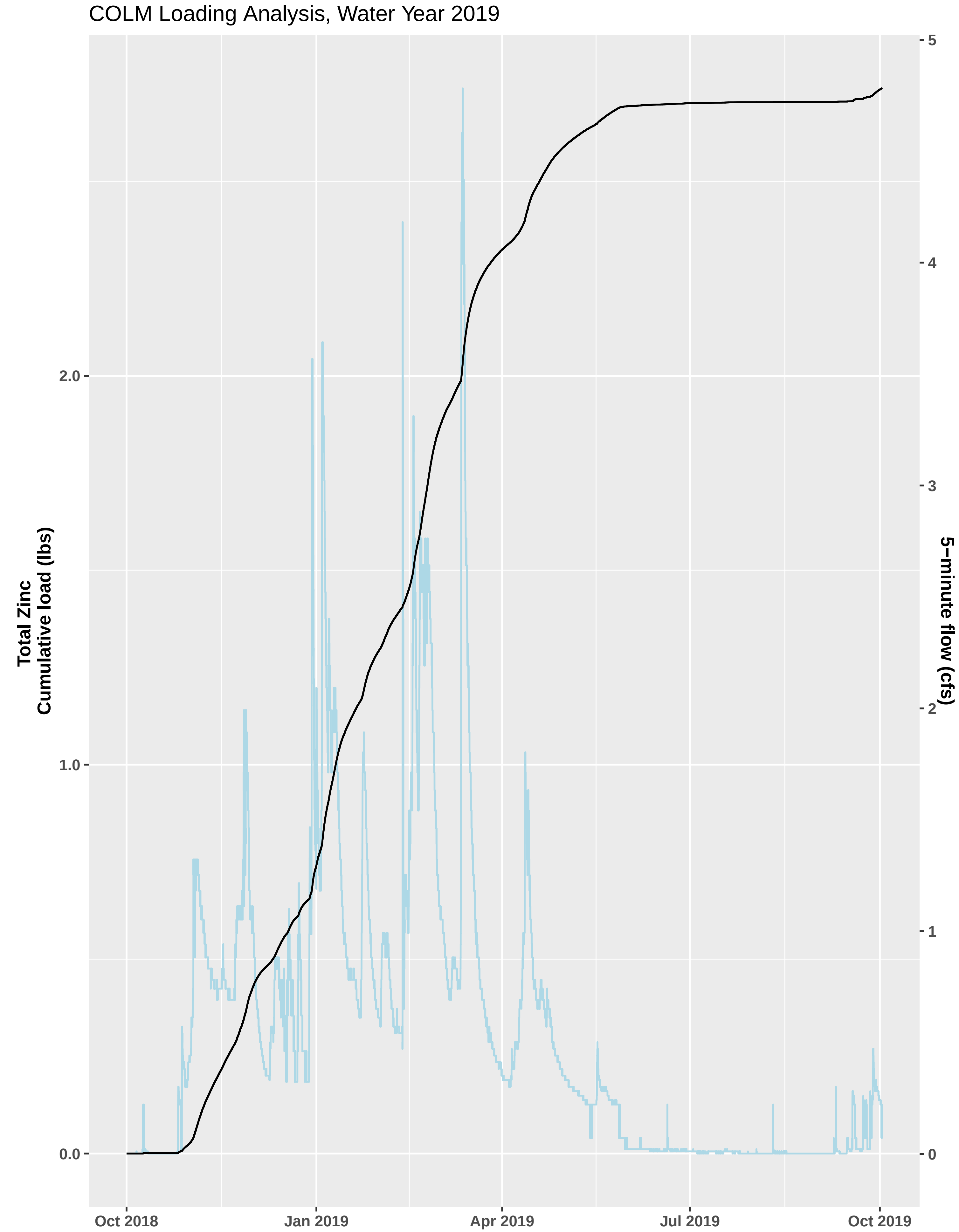
COLM Loading Analysis, Water Year 2017

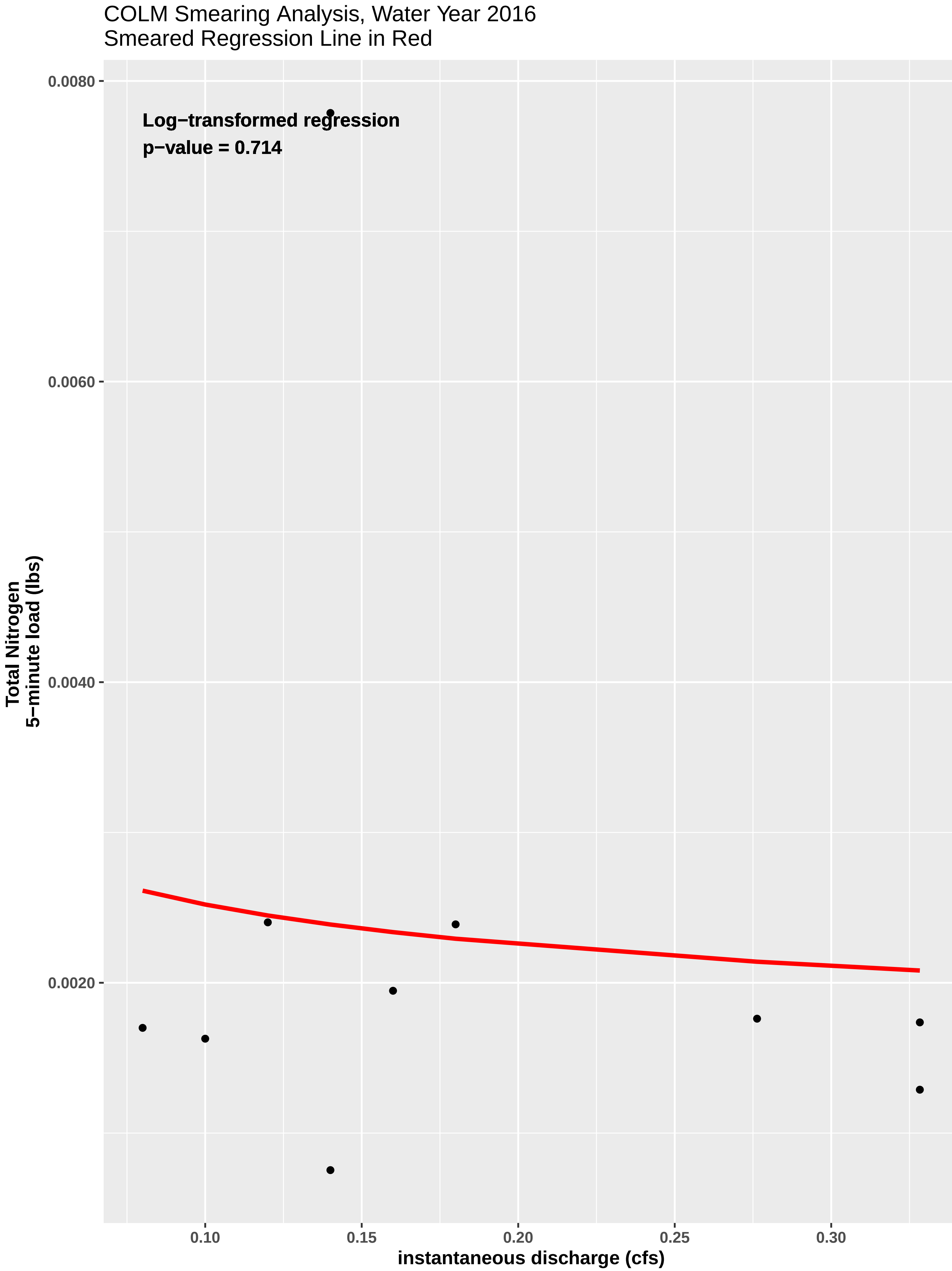



COLM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00040
0.00020
0.00000
0
3
6
9
12
instantaneous discharge (cfs)

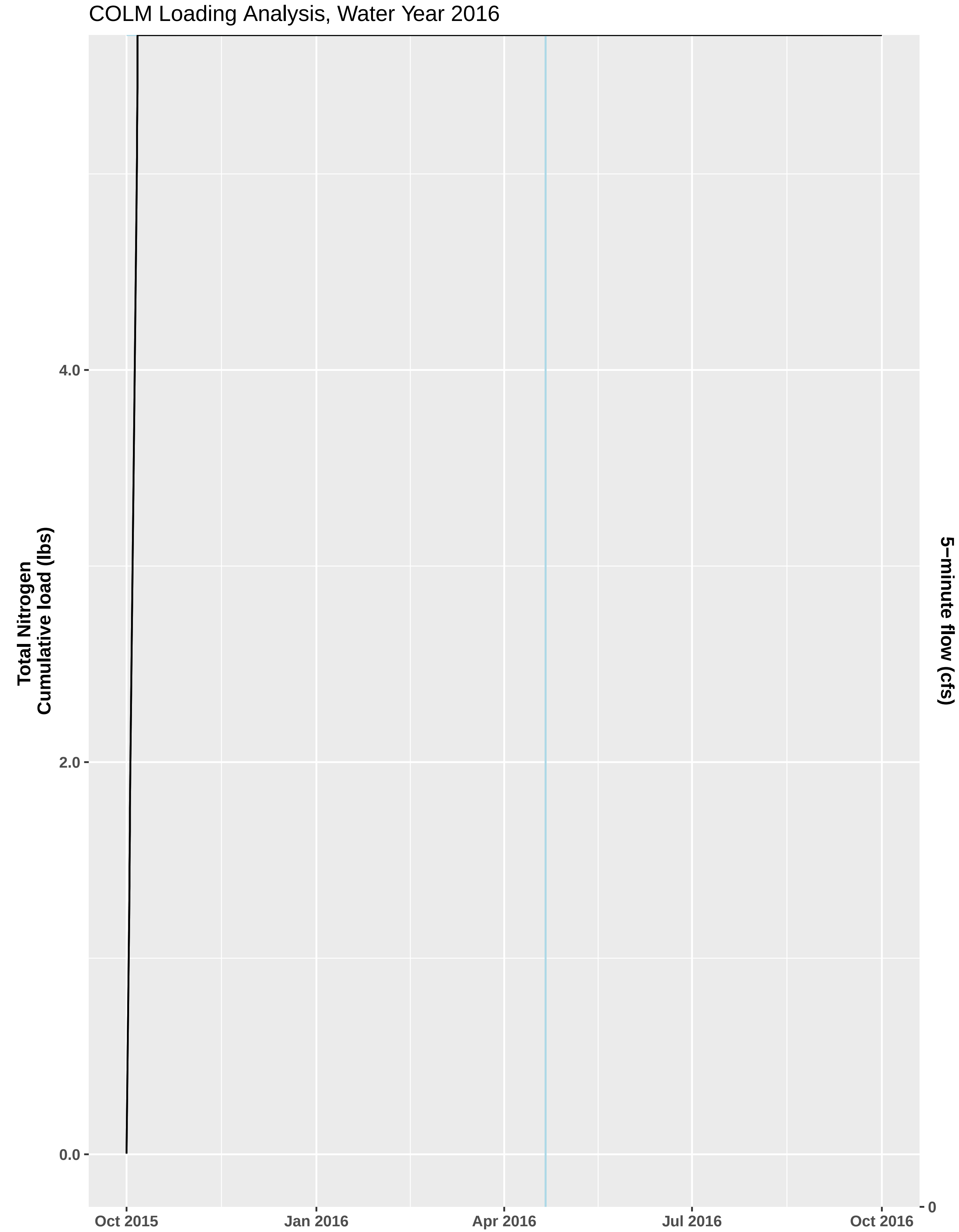

COLM Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
6.0
4.0
2.0
0.0
15
10
5
0
5−minute flow (cfs)
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


COLM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000000
0.000020
0.000040
0.000060
0.000080
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)

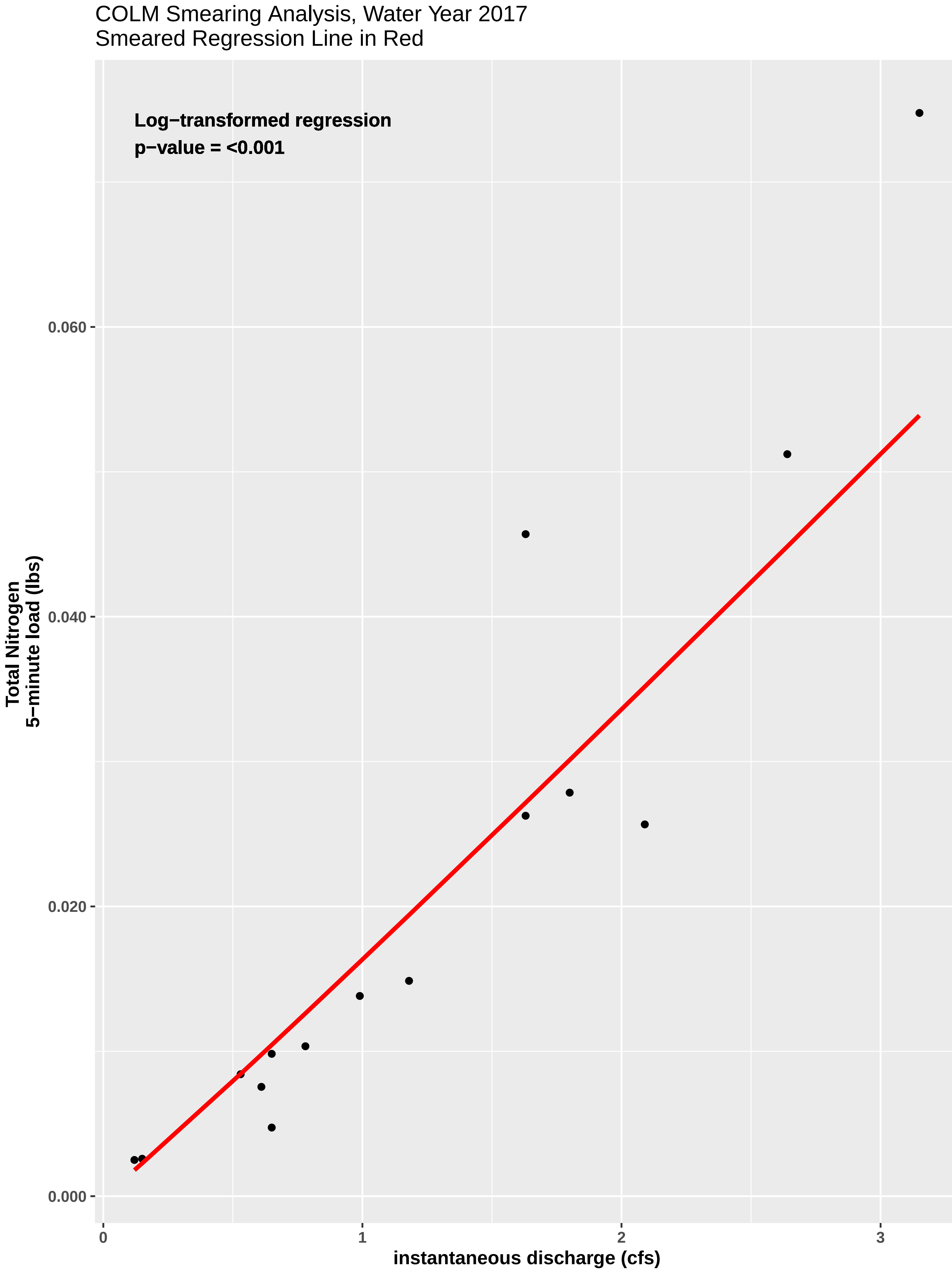

COLM Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0.0
1.0
2.0
5−minute flow (cfs)
0
1
2
3
4
5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

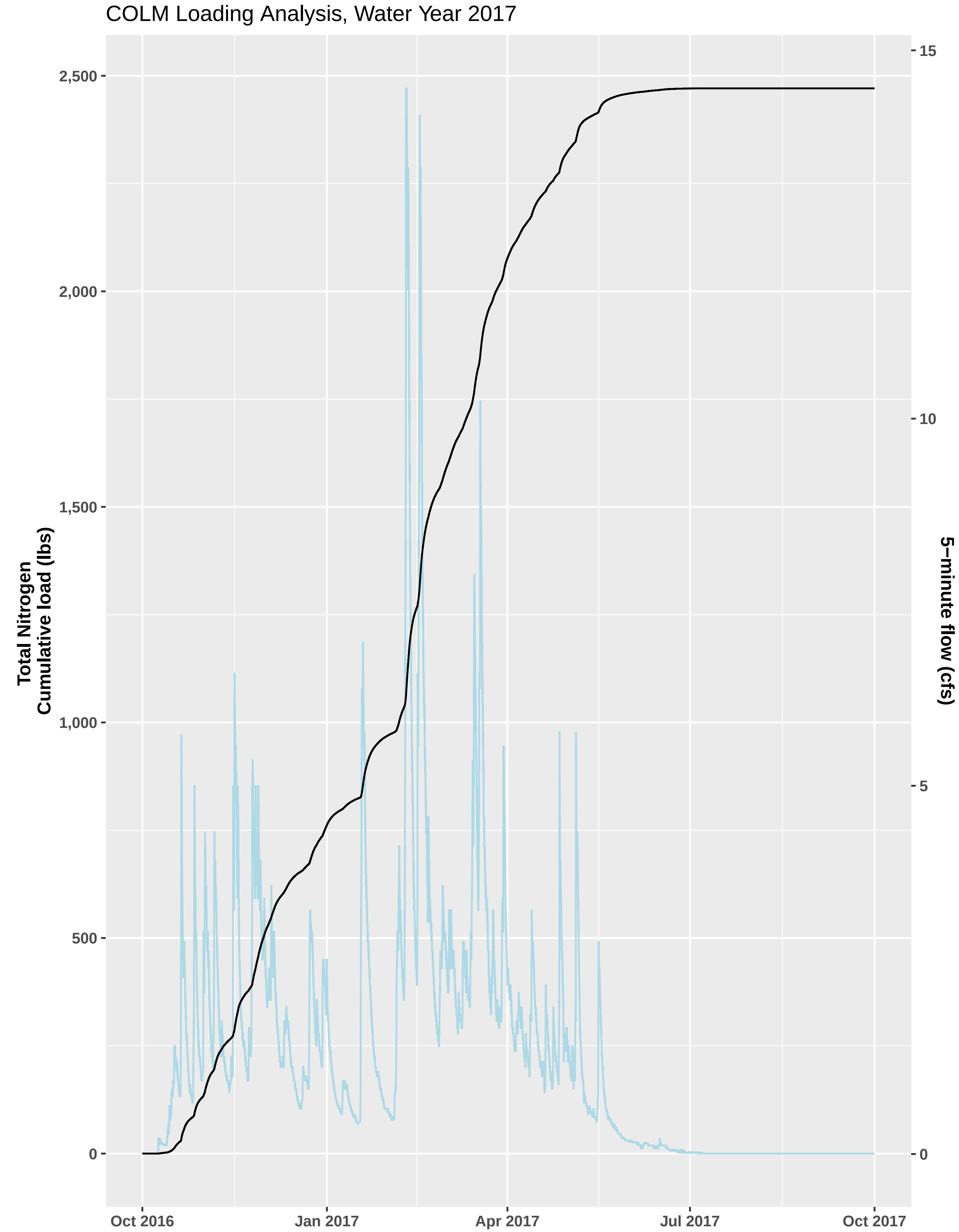


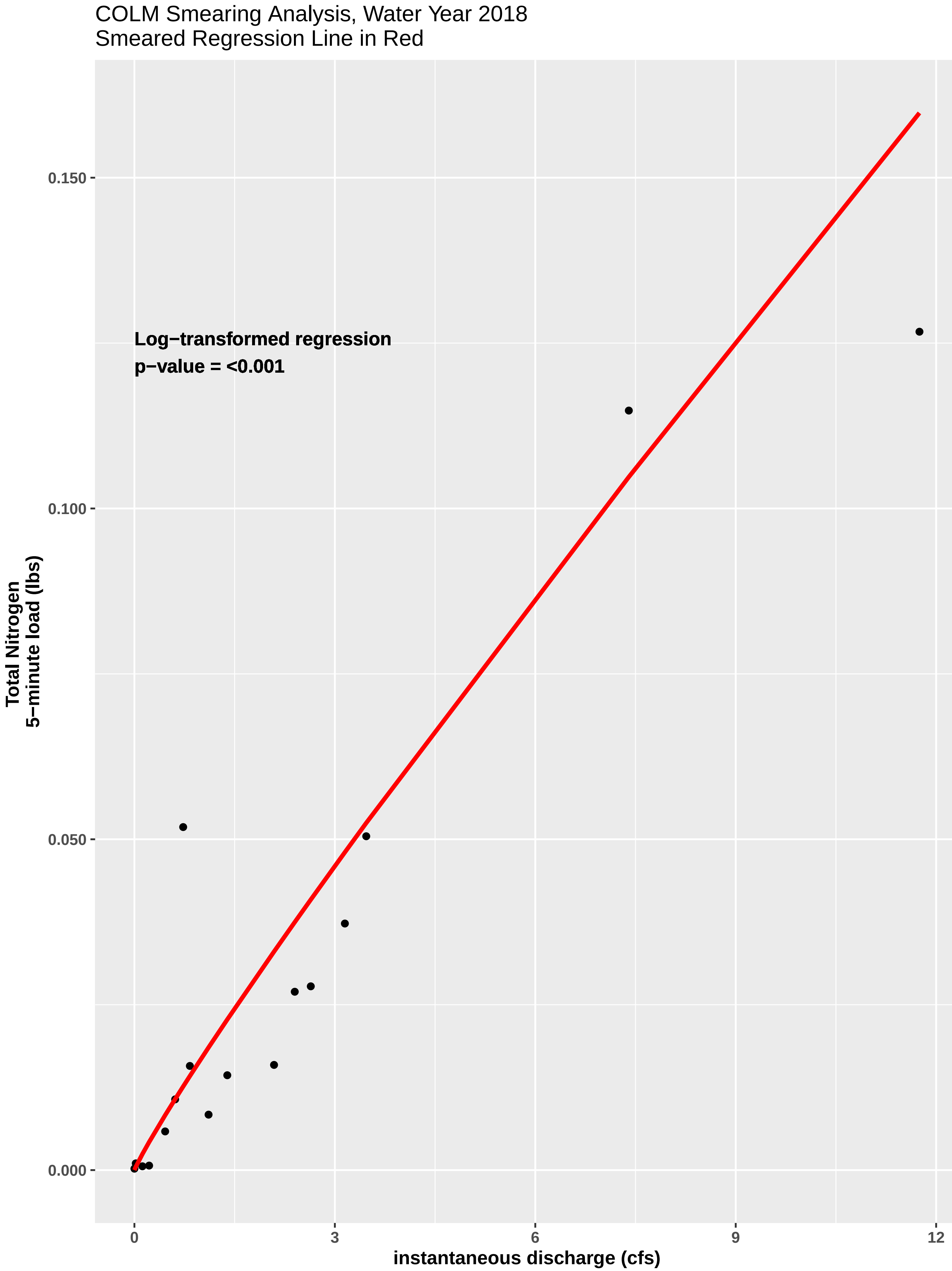
COLM Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.714
Total Nitrogen
5−minute load (lbs)
0.0080
0.0060
0.0040
0.0020
0.10
0.15
0.20
0.25
0.30
instantaneous discharge (cfs)

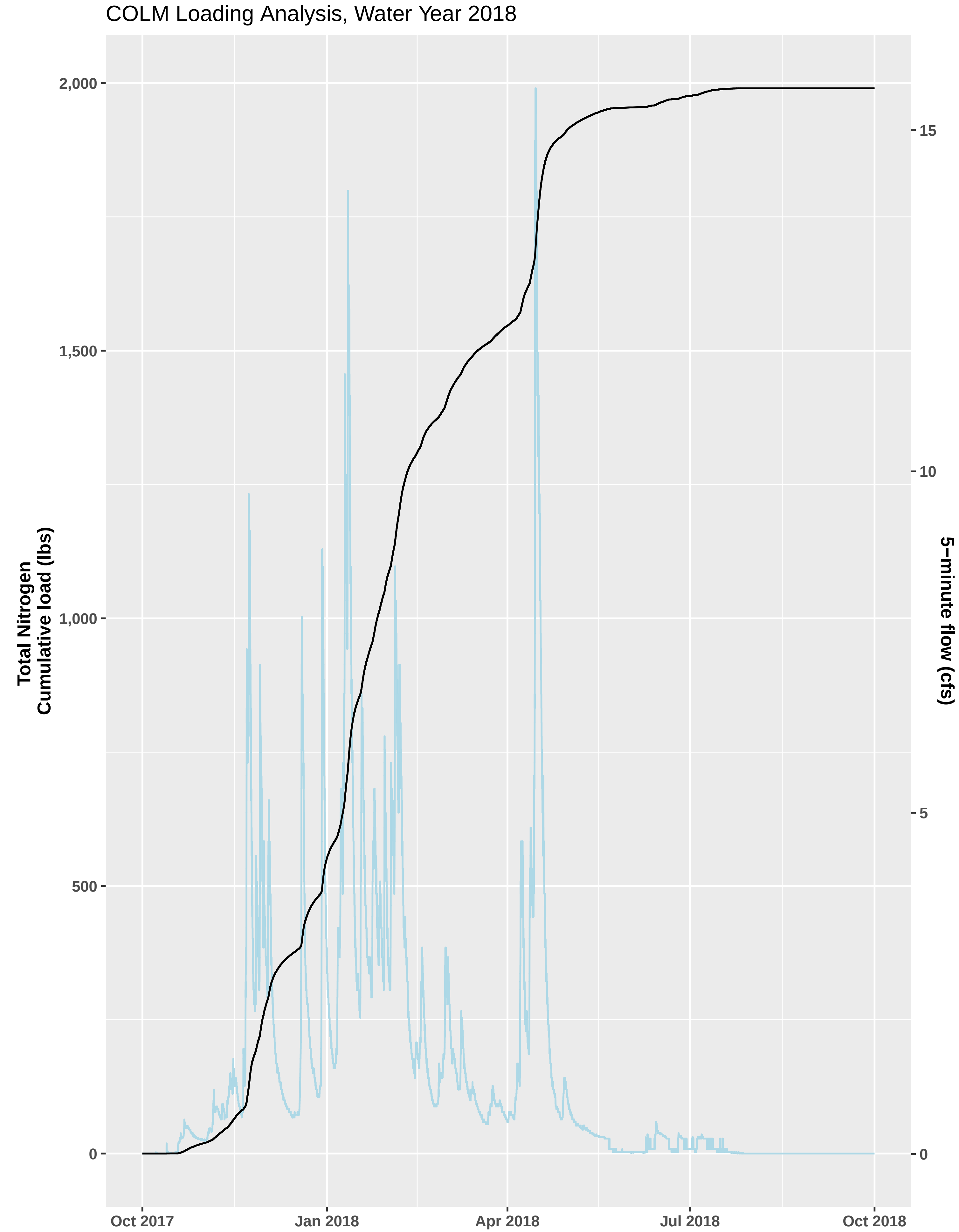


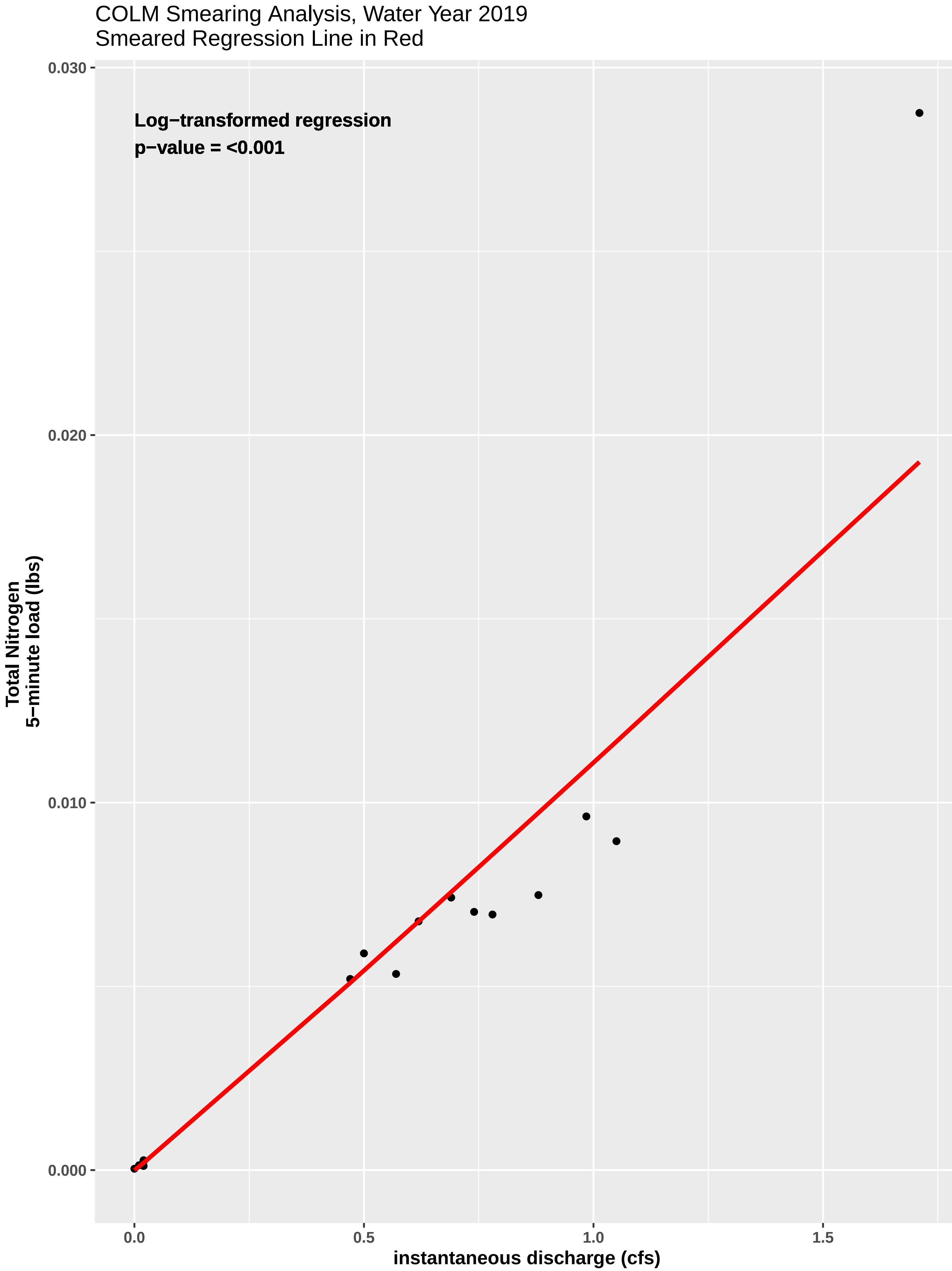
COLM Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
4.0
2.0
0.0
5−minute flow (cfs)
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


COLM Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0
1
2
3
instantaneous discharge (cfs)

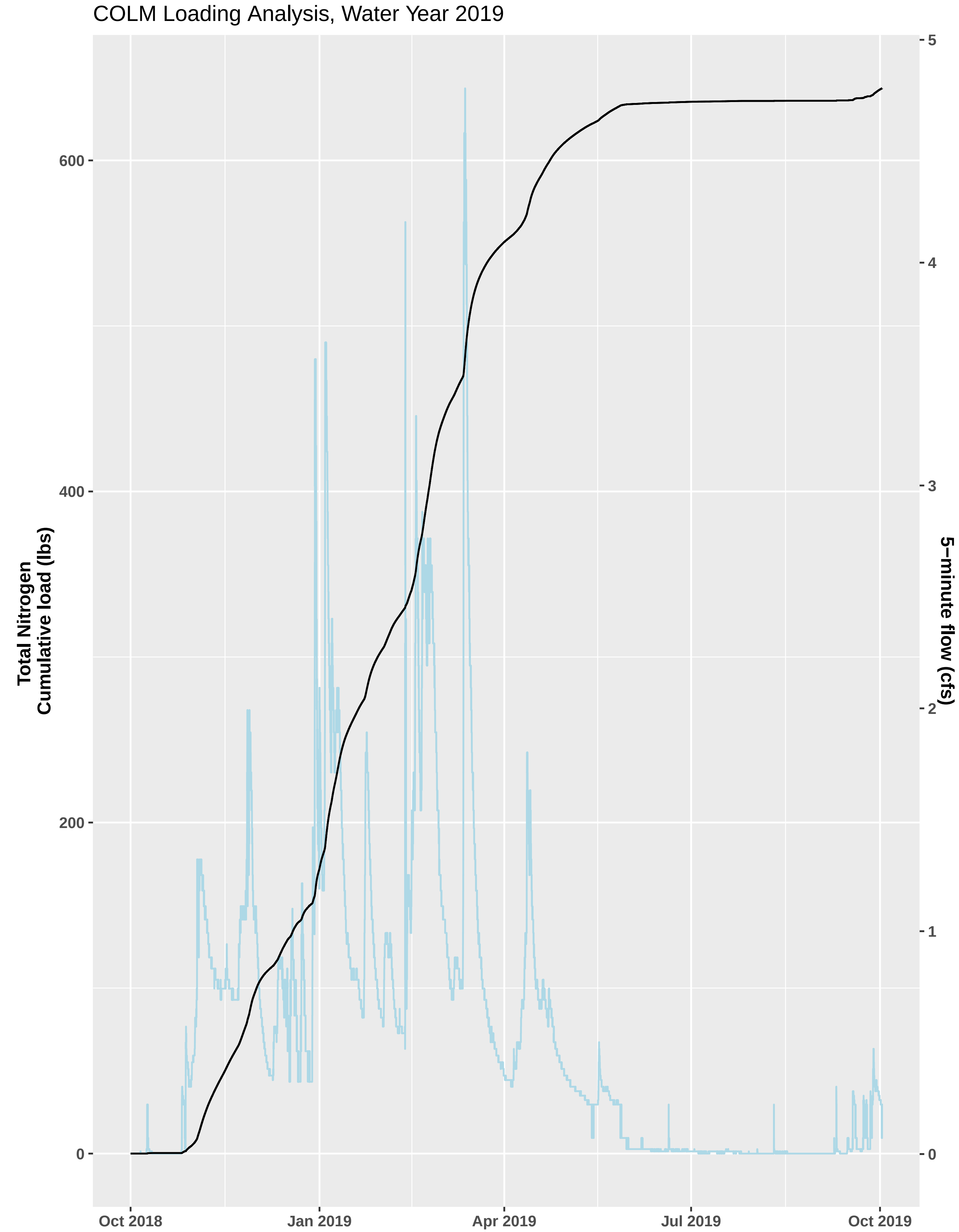

COLM Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
2,000
2,500
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


COLM Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0
3
6
9
12
instantaneous discharge (cfs)

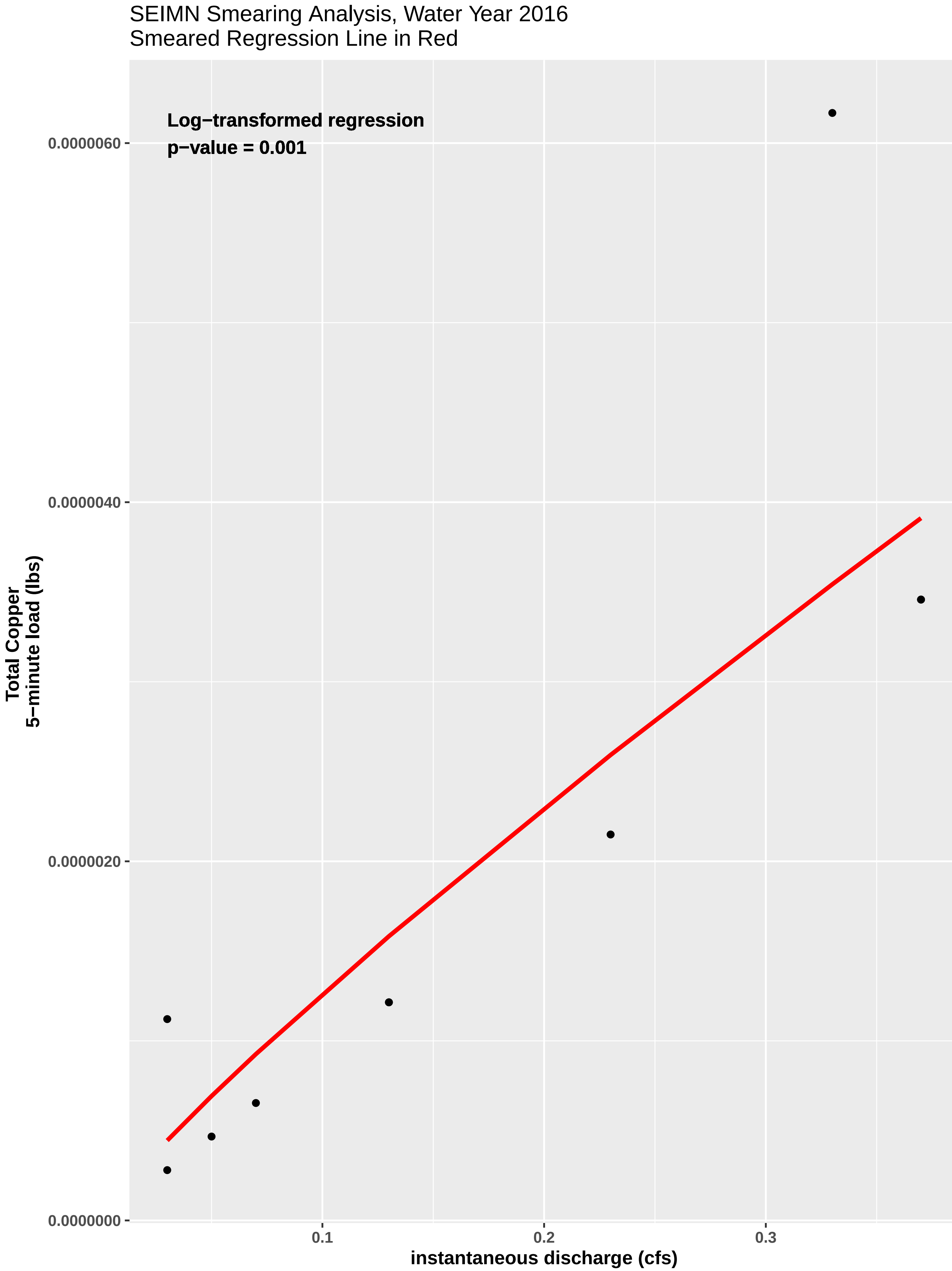

COLM Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

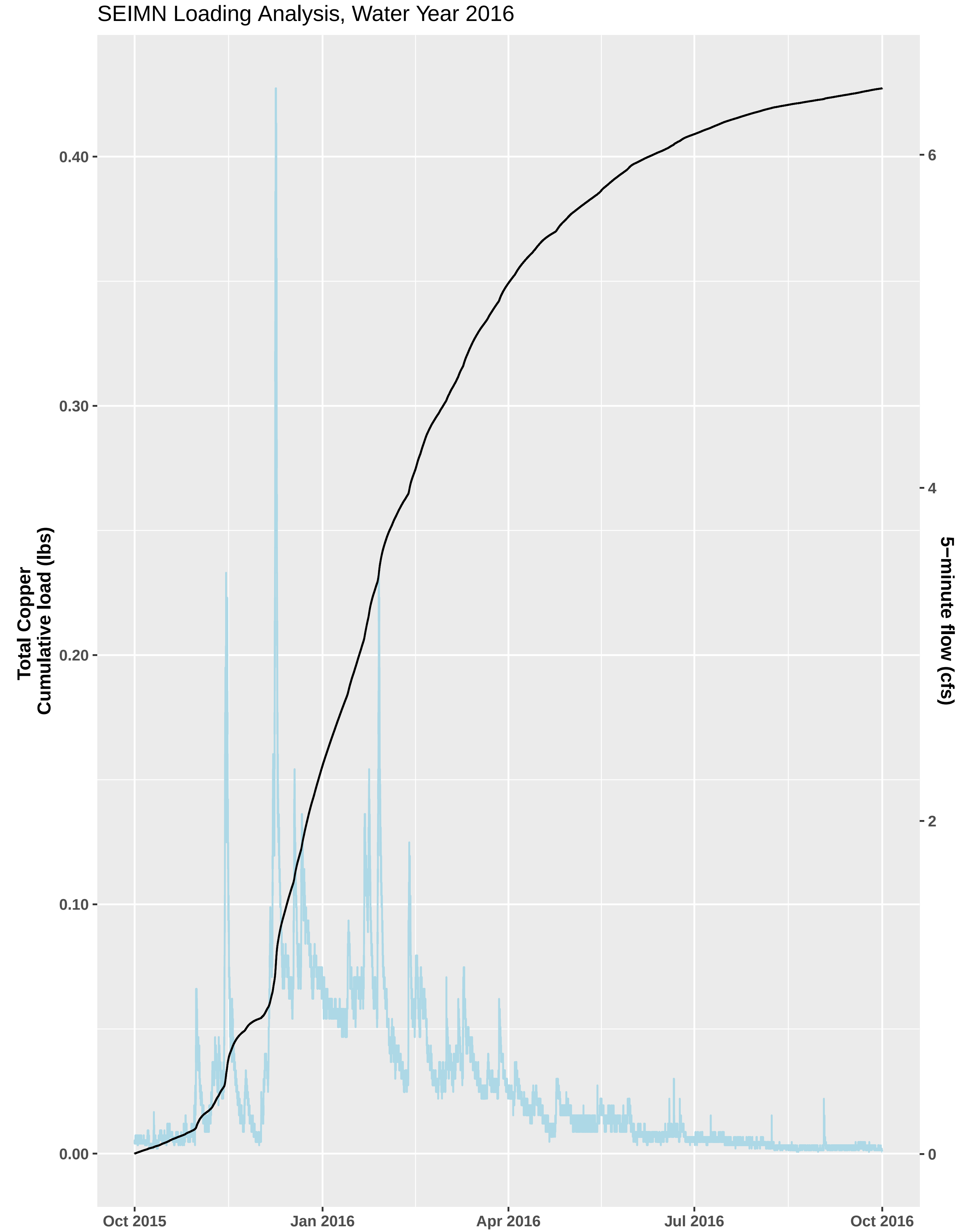


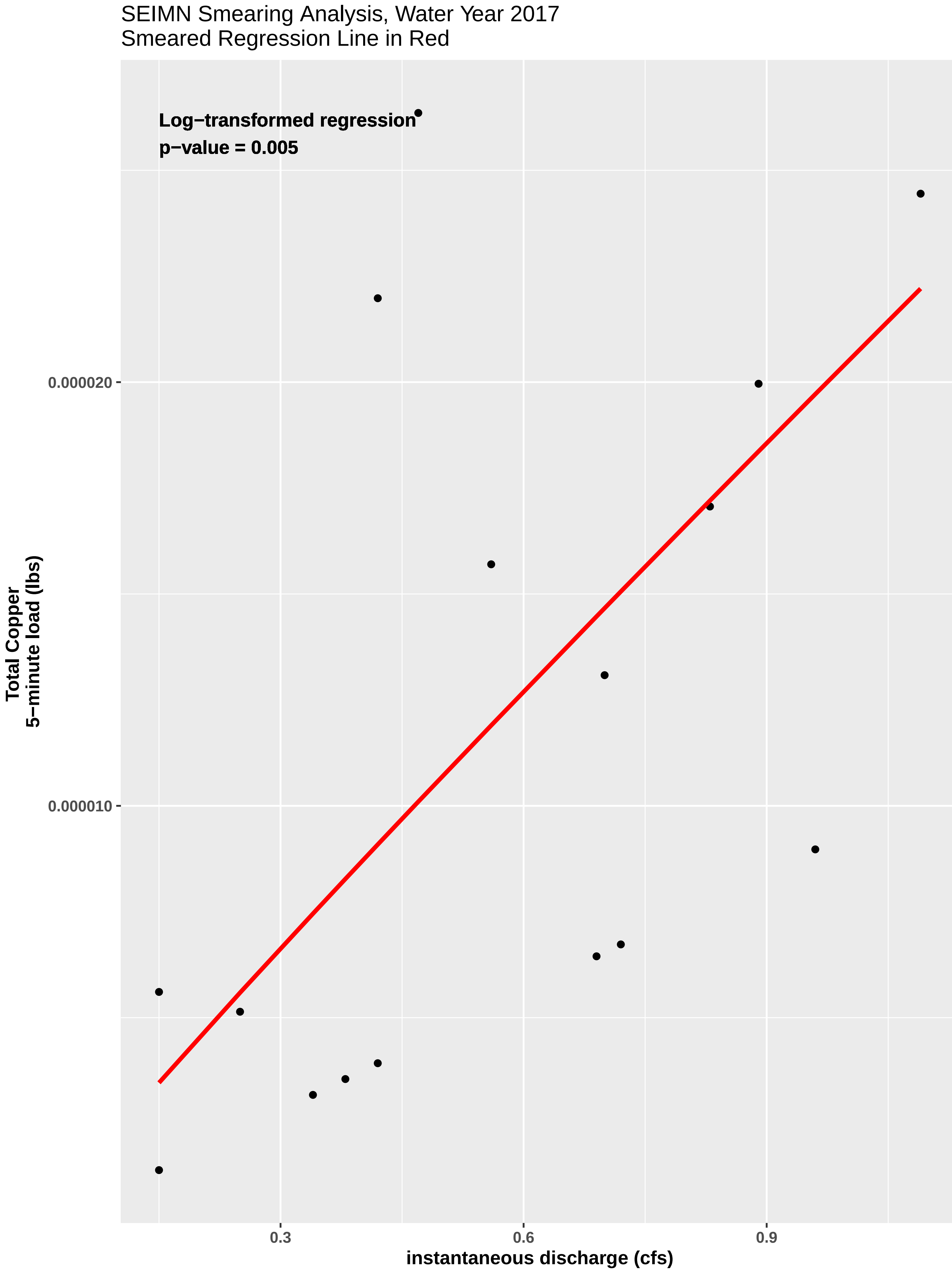
COLM Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.0
0.5
1.0
1.5
instantaneous discharge (cfs)



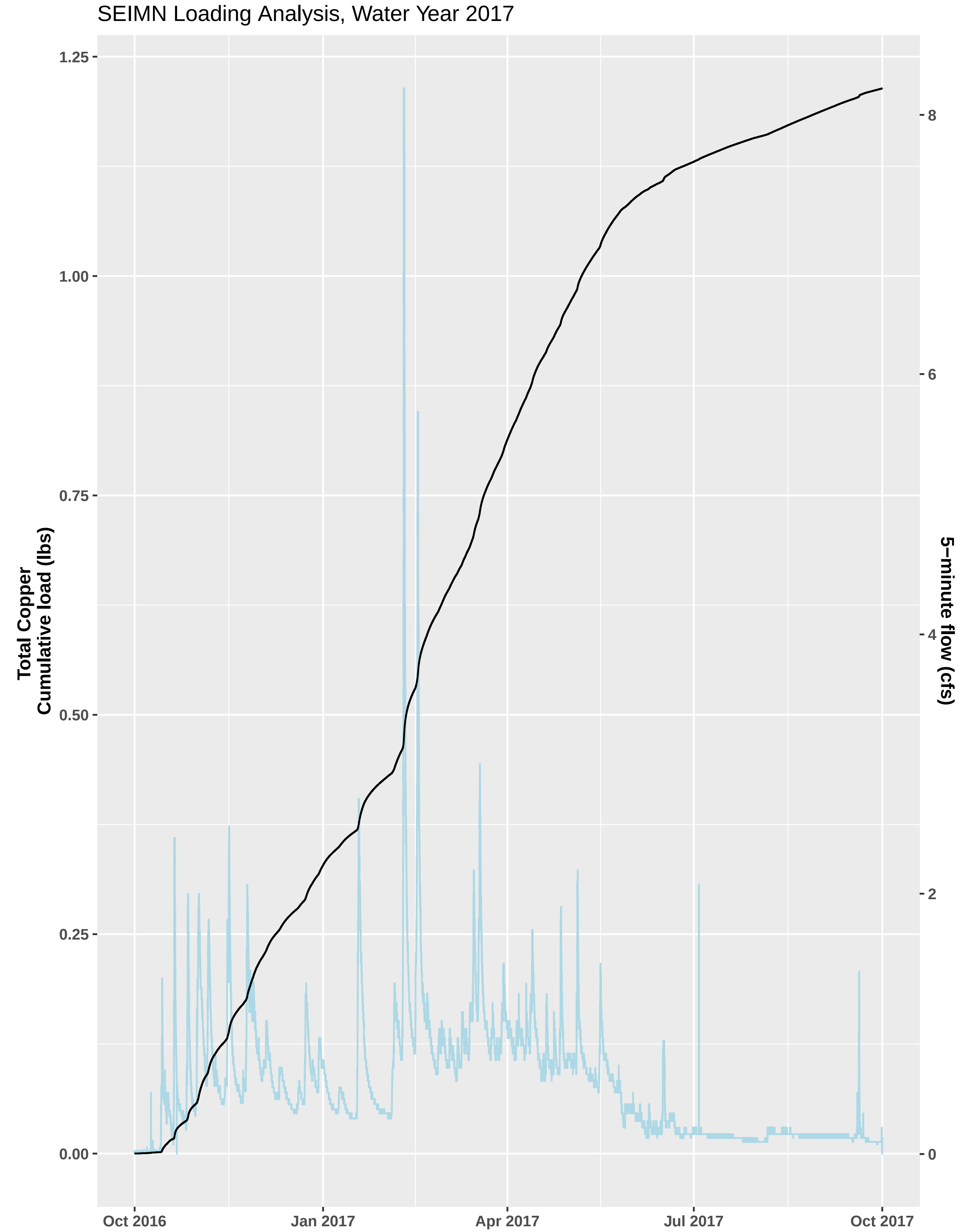
COLM Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
1
2
3
4
5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


SEIMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
0.0000060
0.0000040
0.0000020
0.0000000
Total Copper
5−minute load (lbs)
0.1
0.2
0.3
instantaneous discharge (cfs)

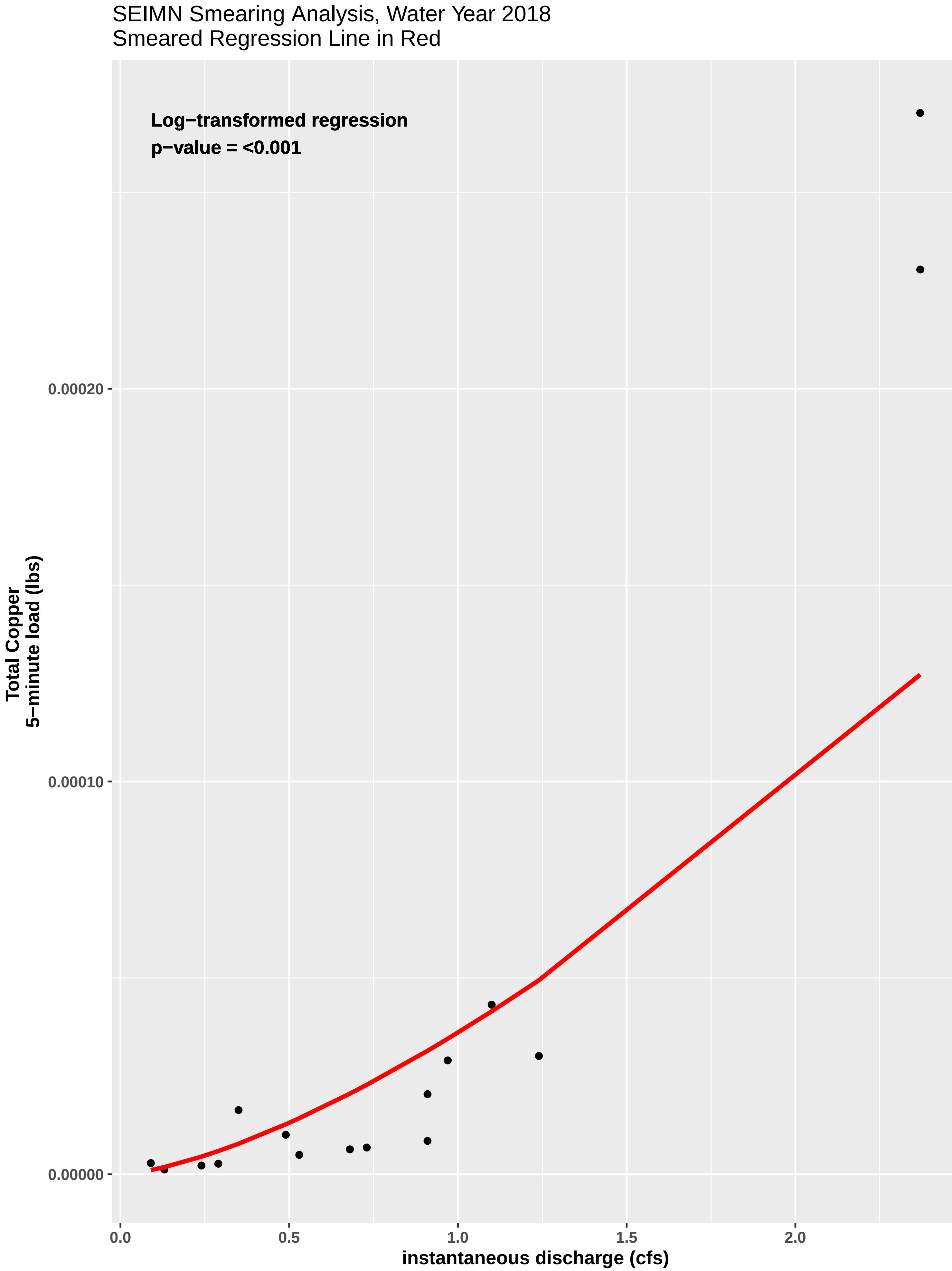

SEIMN Loading Analysis, Water Year 2016
0.40
0.30
0.20
0.10
0.00
Total Copper
Cumulative load (lbs)
6
4
2
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

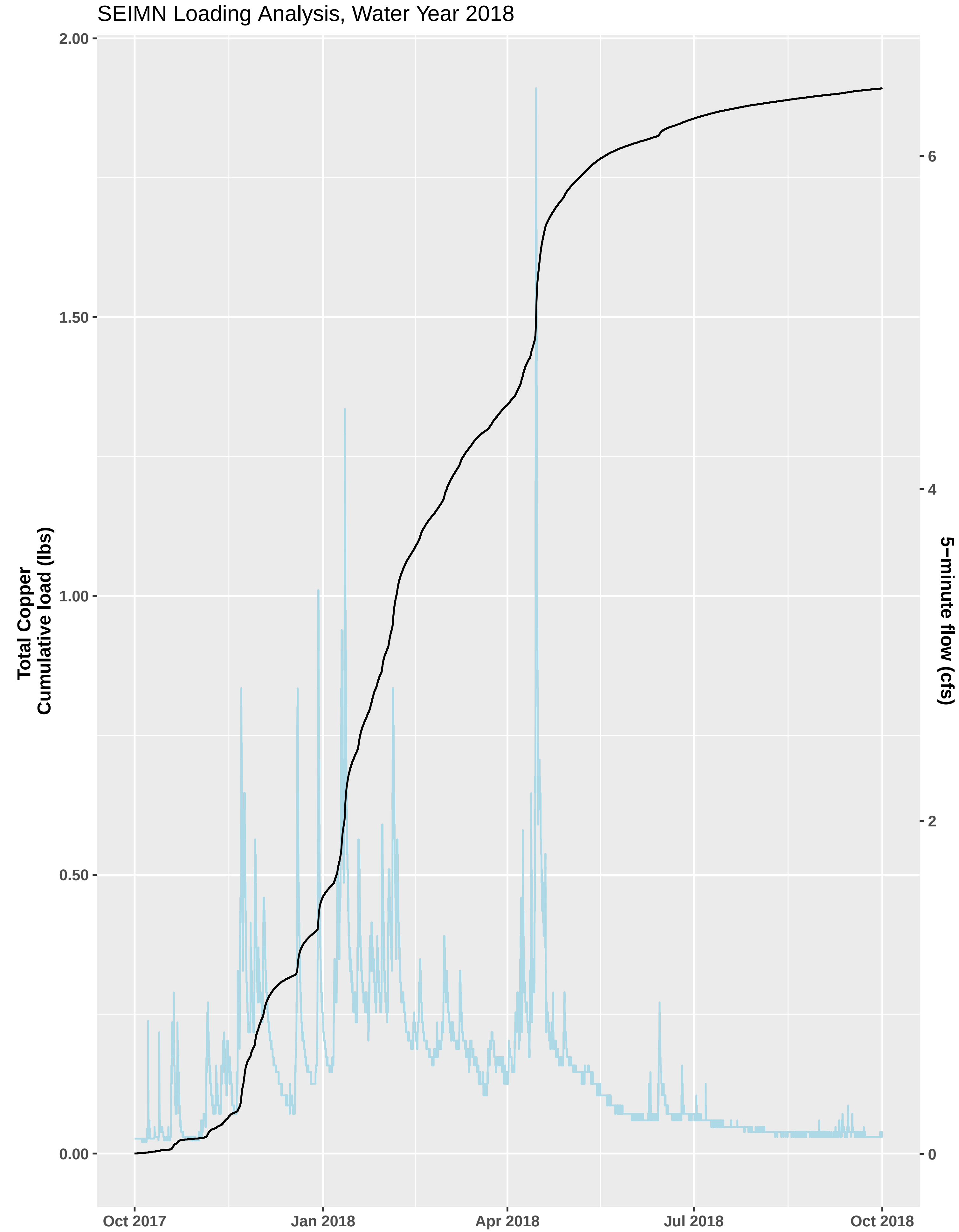


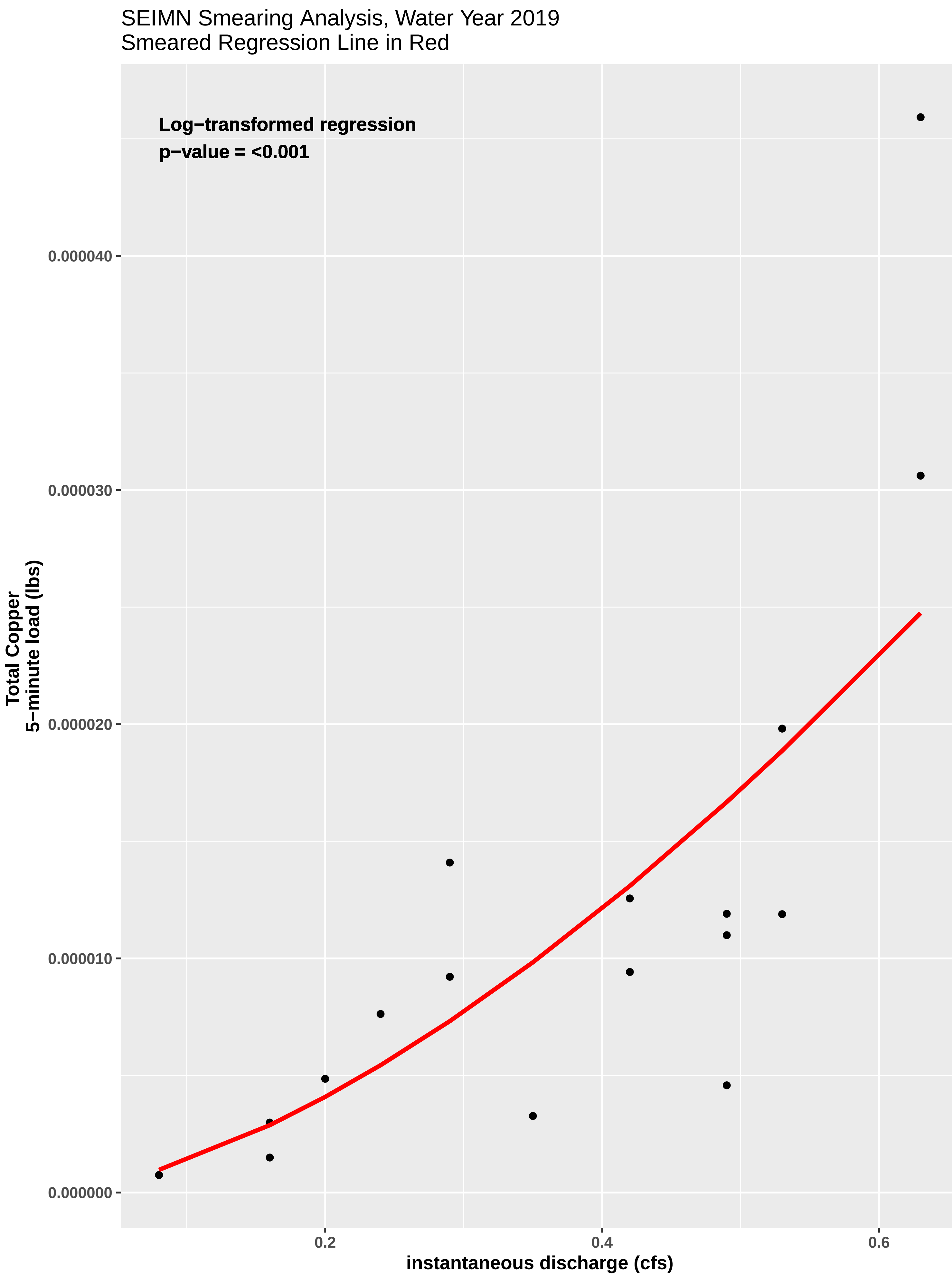
SEIMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.005
Total Copper
5−minute load (lbs)
0.000020
0.000010
0.3
0.6
0.9
instantaneous discharge (cfs)



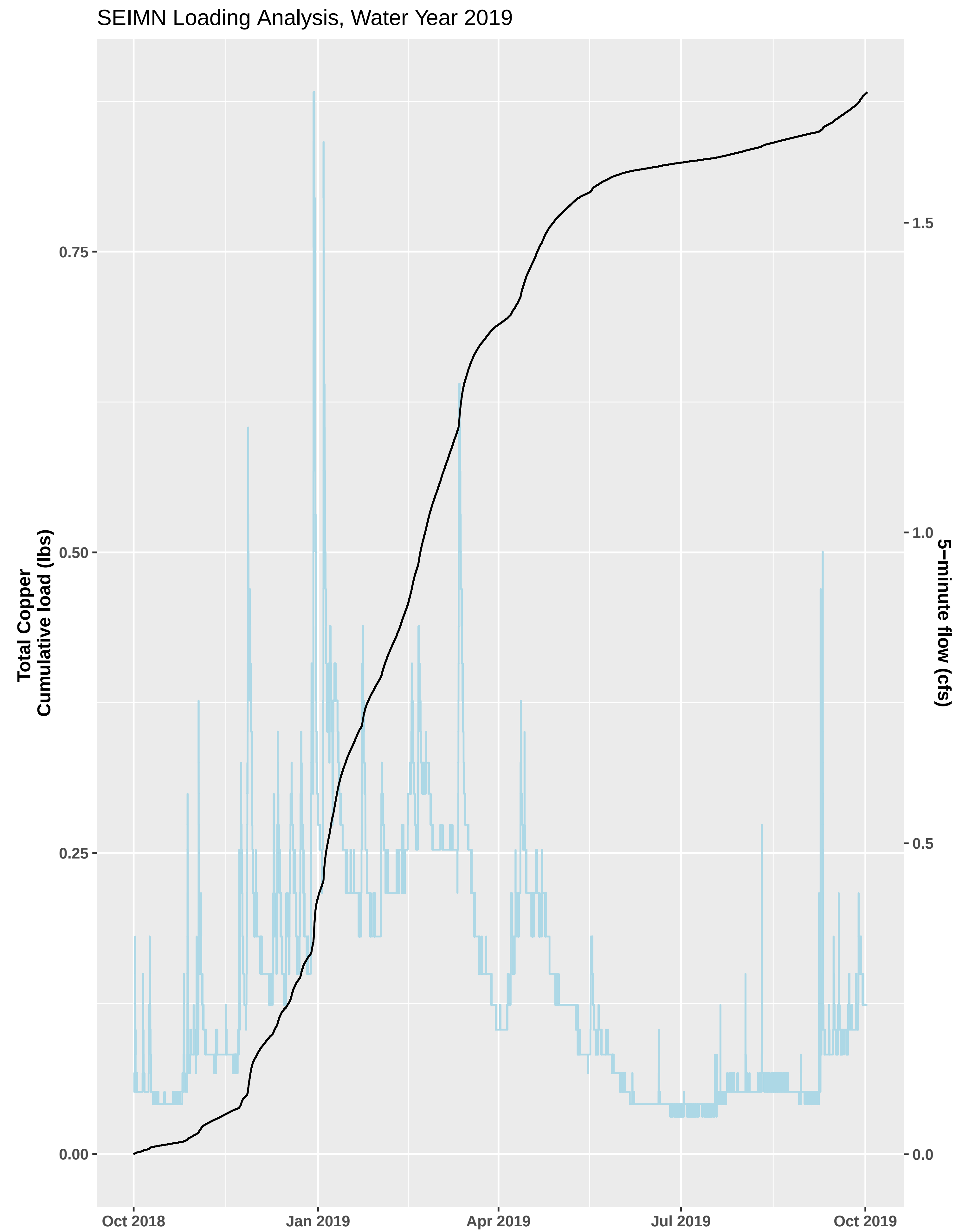
SEIMN Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
1.25
1.00
0.75
0.50
0.25
0.00
5−minute flow (cfs)
8
6
4
2
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


SEIMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00010
0.00020
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

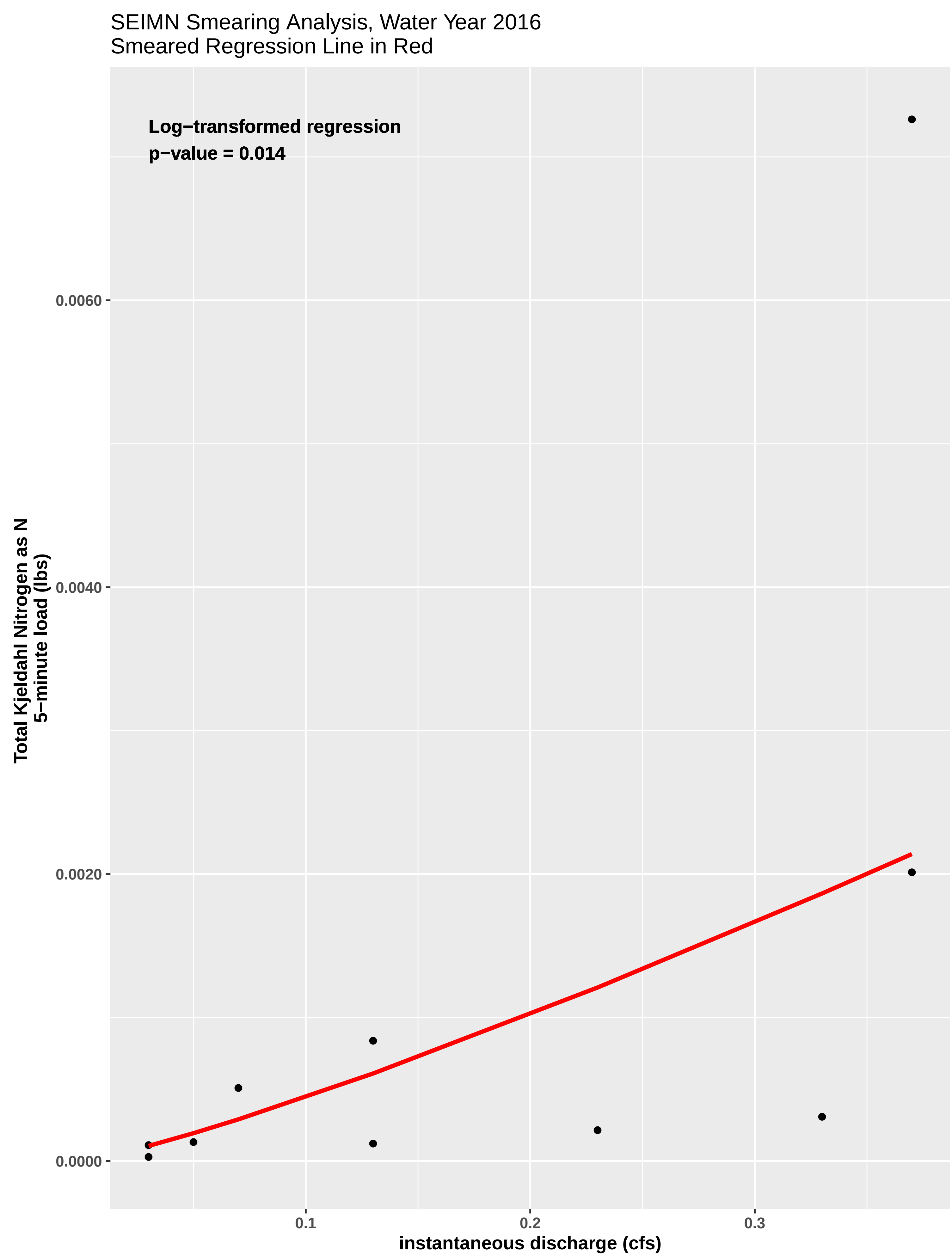

SEIMN Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.00
0.50
1.00
1.50
2.00
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

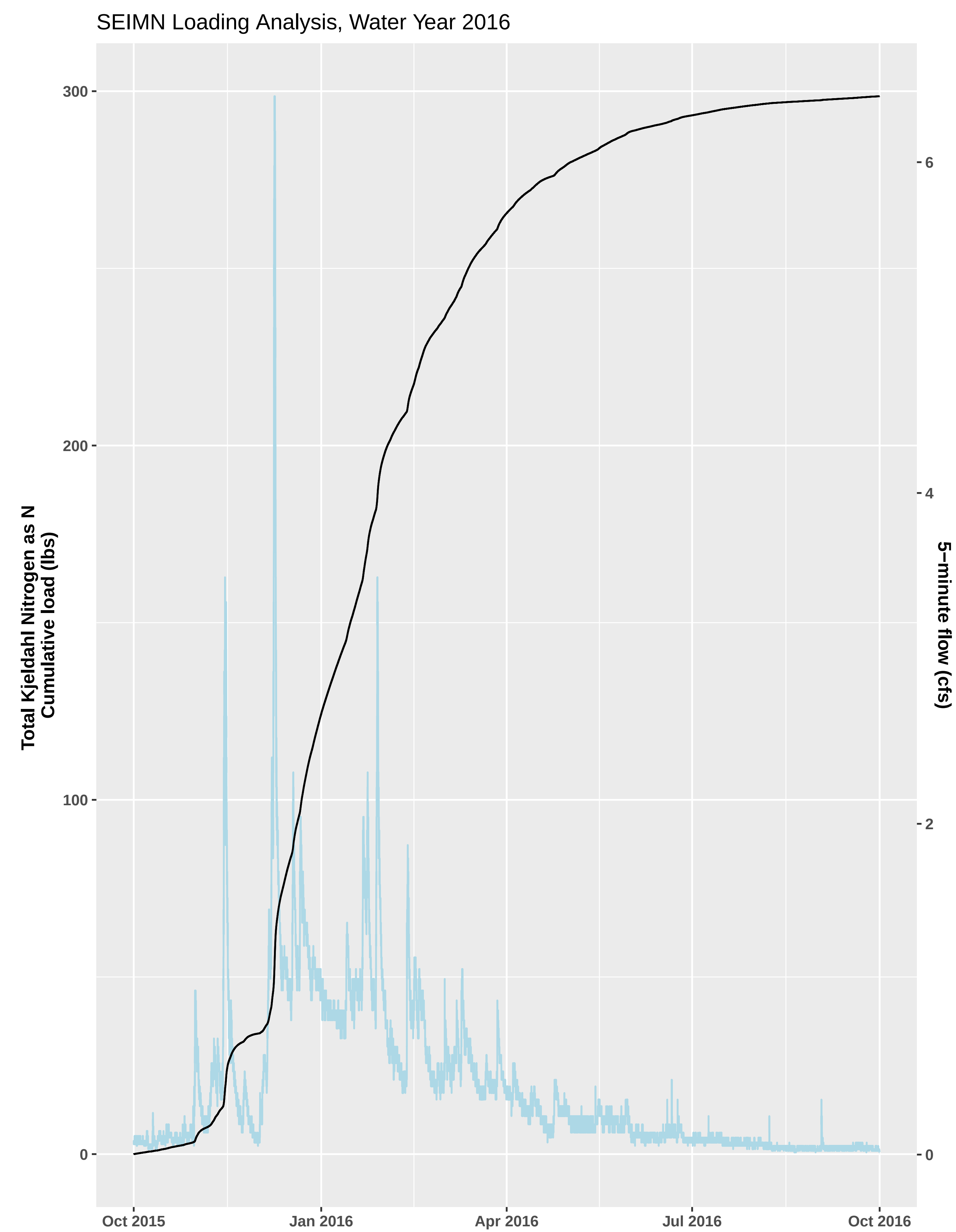


SEIMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000010
0.000020
0.000030
0.000040
0.2
0.4
0.6
instantaneous discharge (cfs)

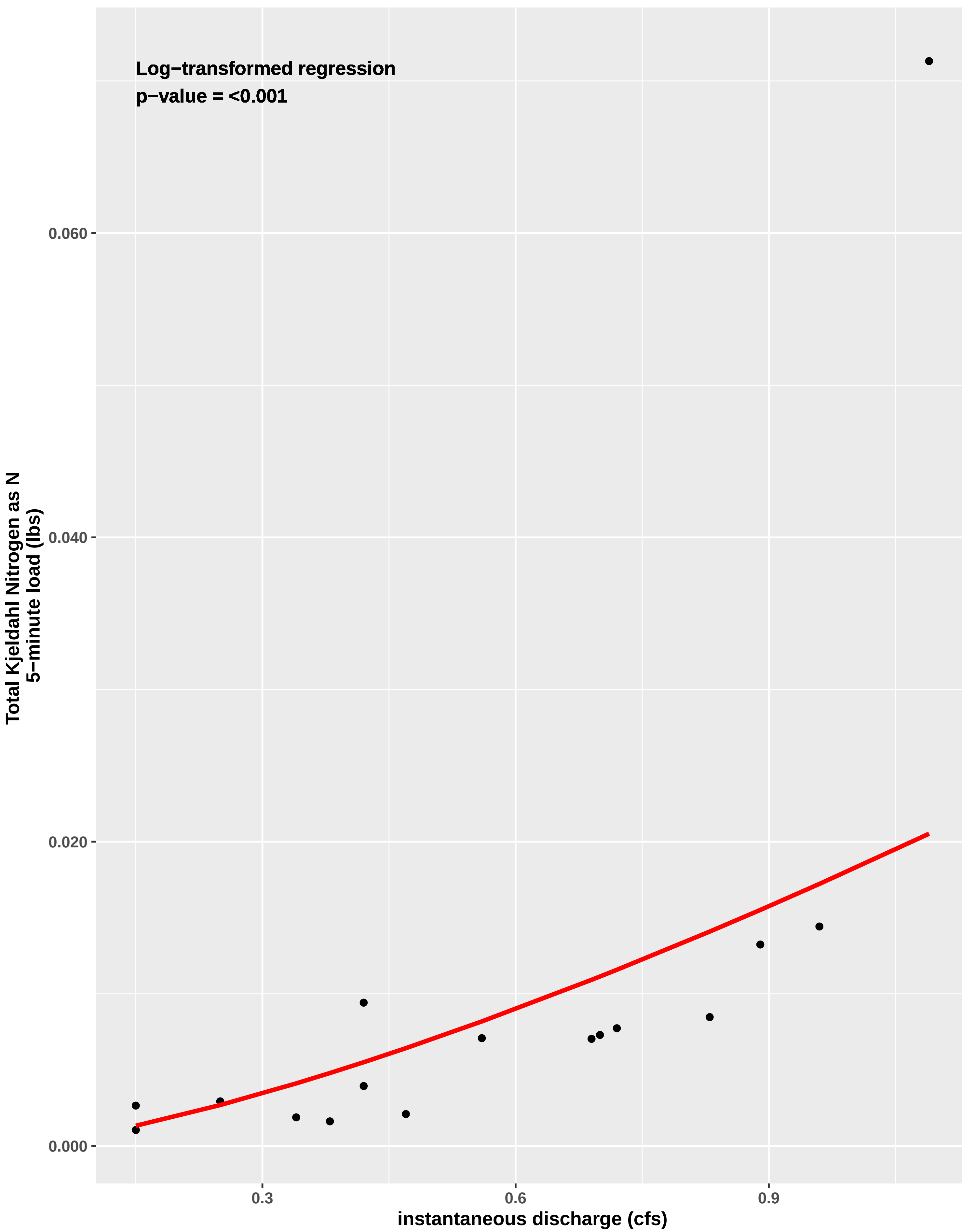


SEIMN Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.00
0.25
0.50
0.75
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

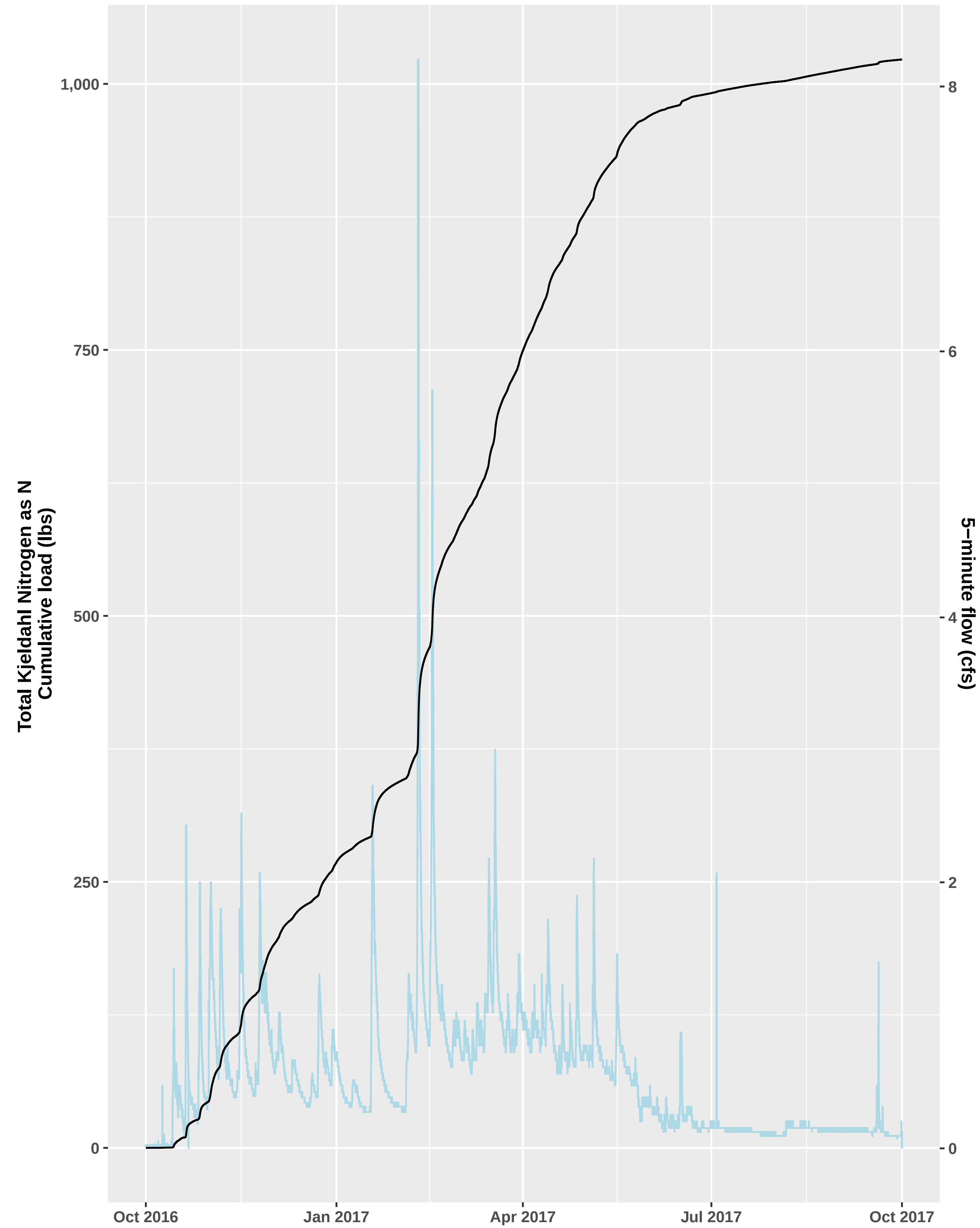

SEIMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.014
0.0060
0.0040
0.0020
0.0000
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.1
0.2
0.3
instantaneous discharge (cfs)

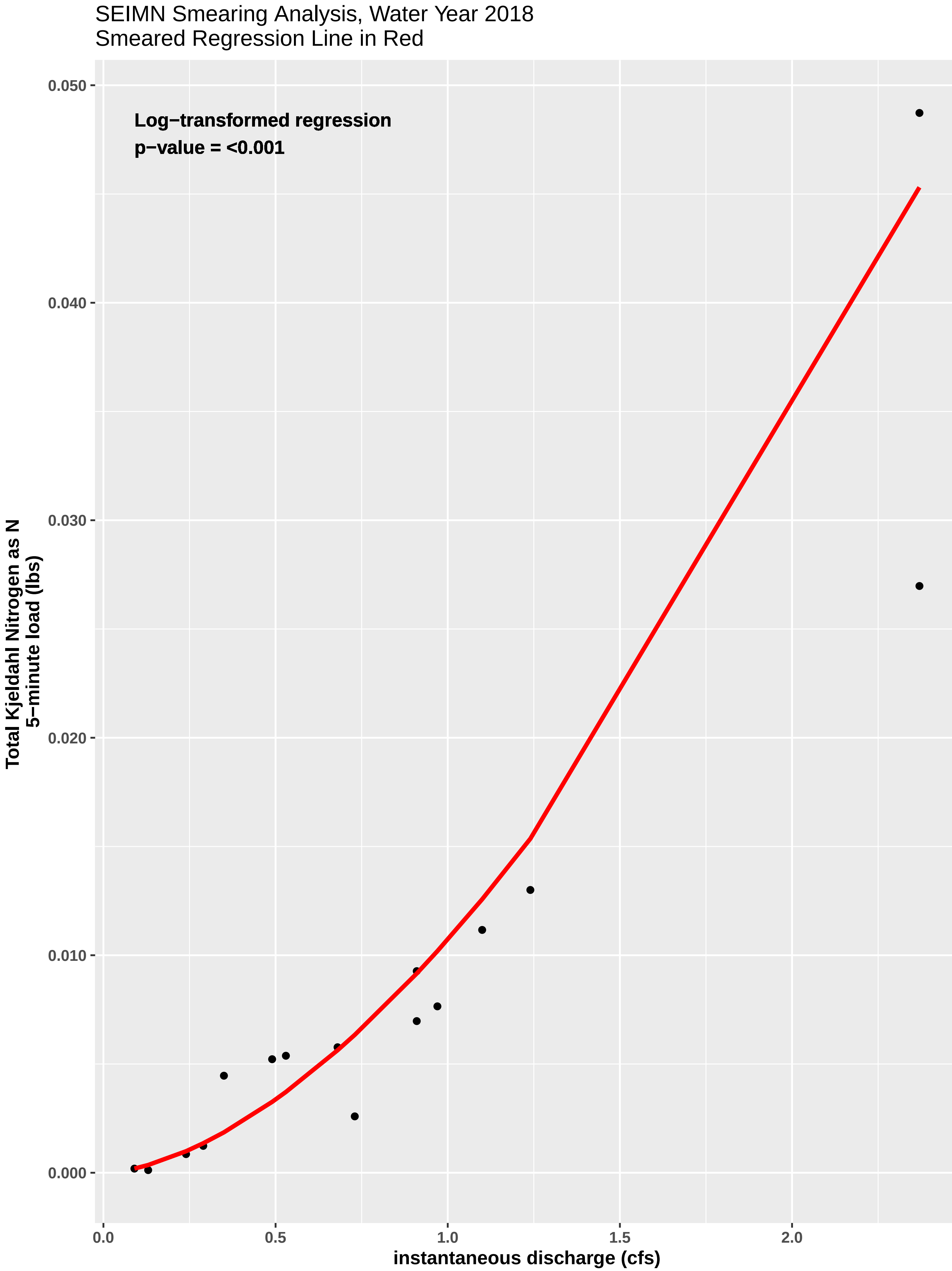

SEIMN Loading Analysis, Water Year 2016
300
200
100
0
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
6
4
2
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

SEIMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red

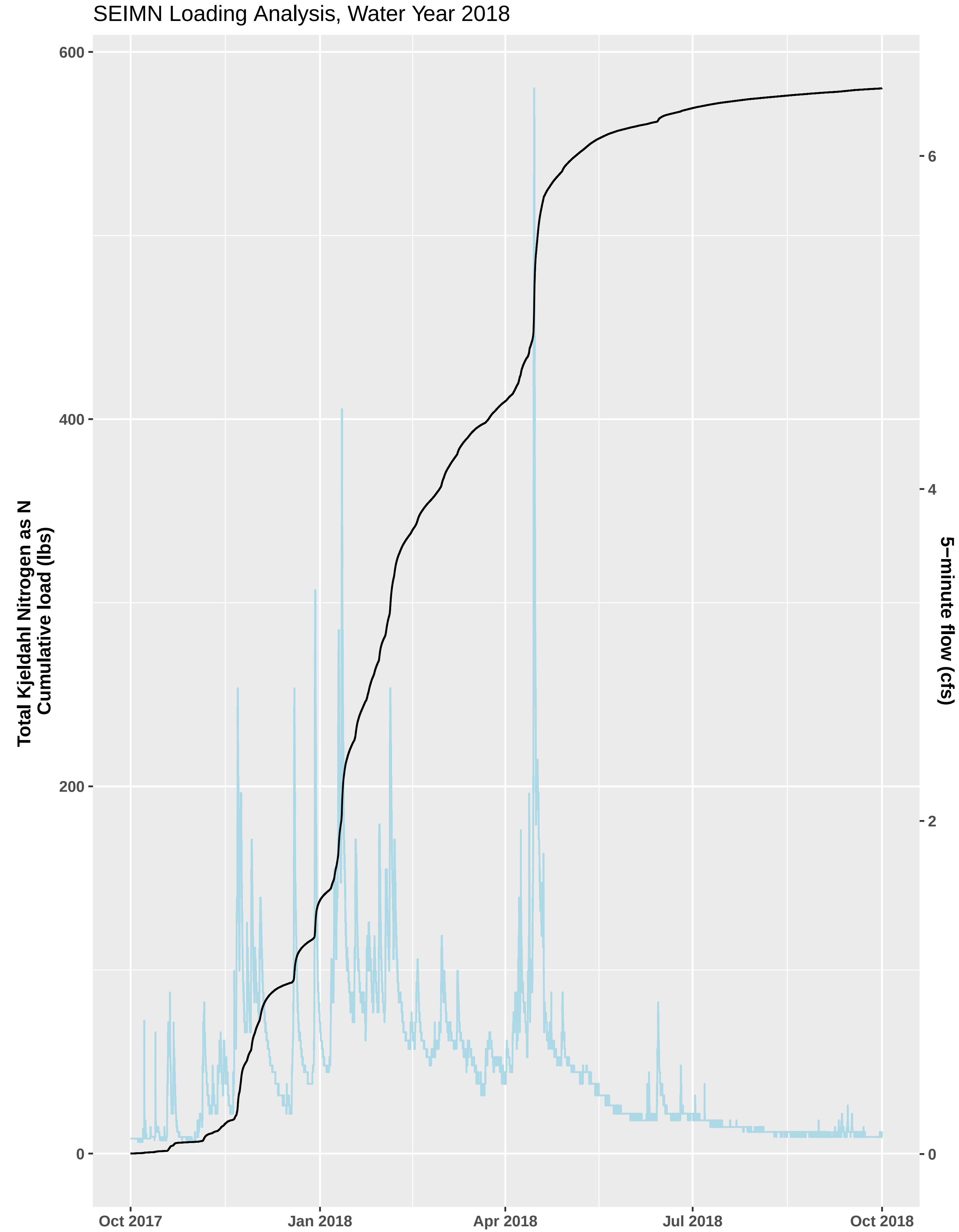


SEIMN Loading Analysis, Water Year 2017

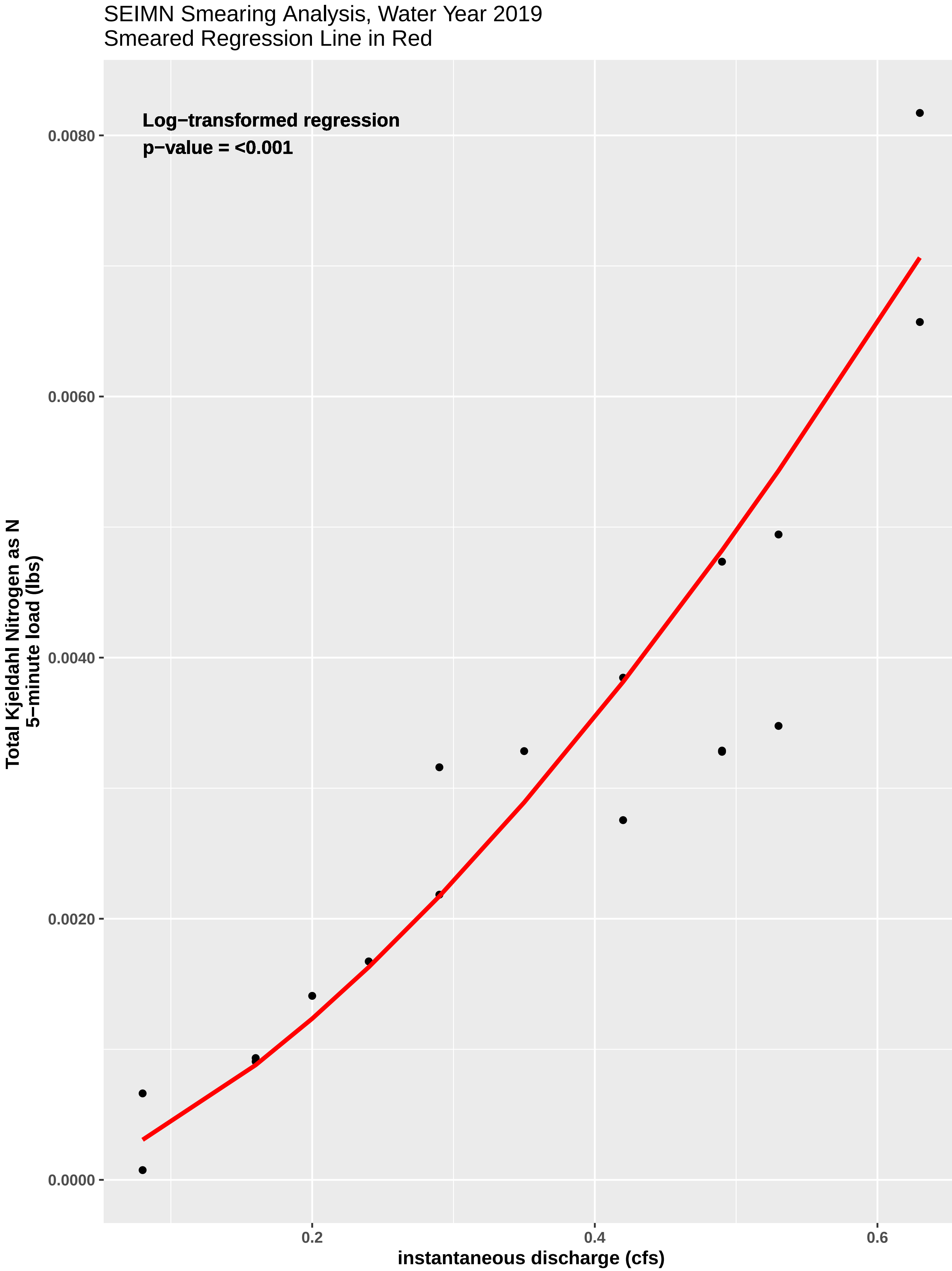




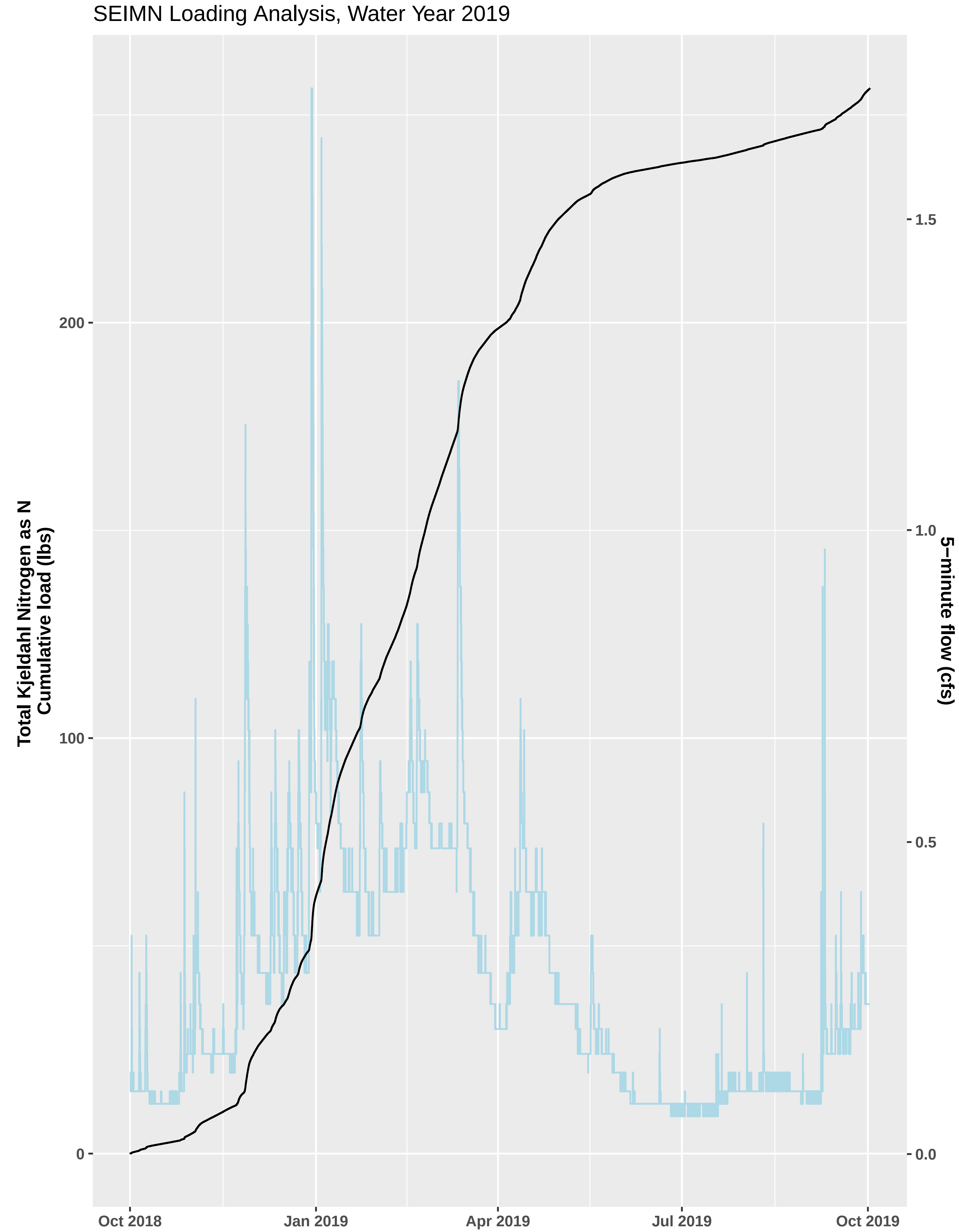
SEIMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.000
0.010
0.020
0.030
0.040
0.050
0.0
0.5
1.0
1.5
2.0



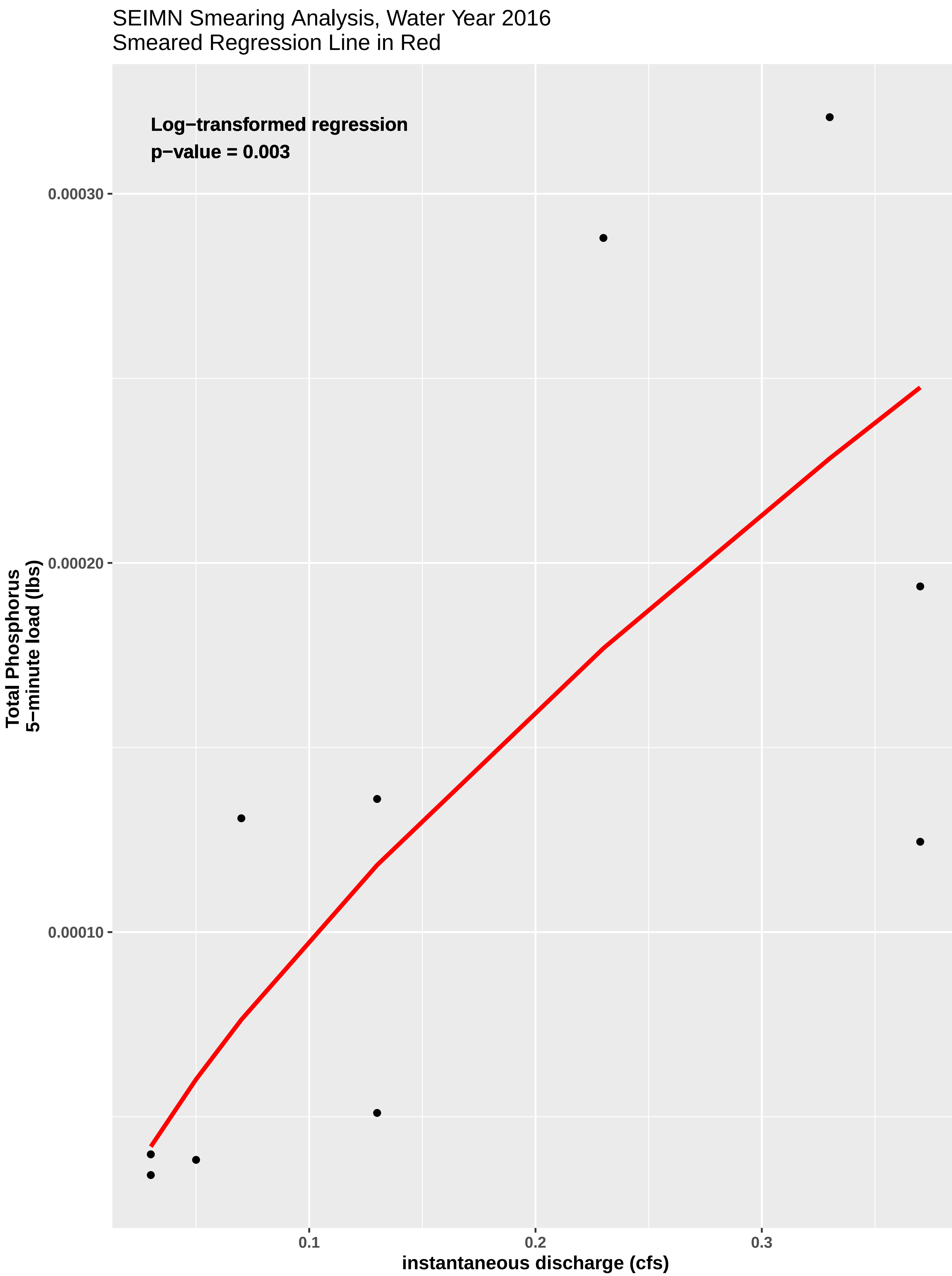
SEIMN Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
0
200
400
600
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

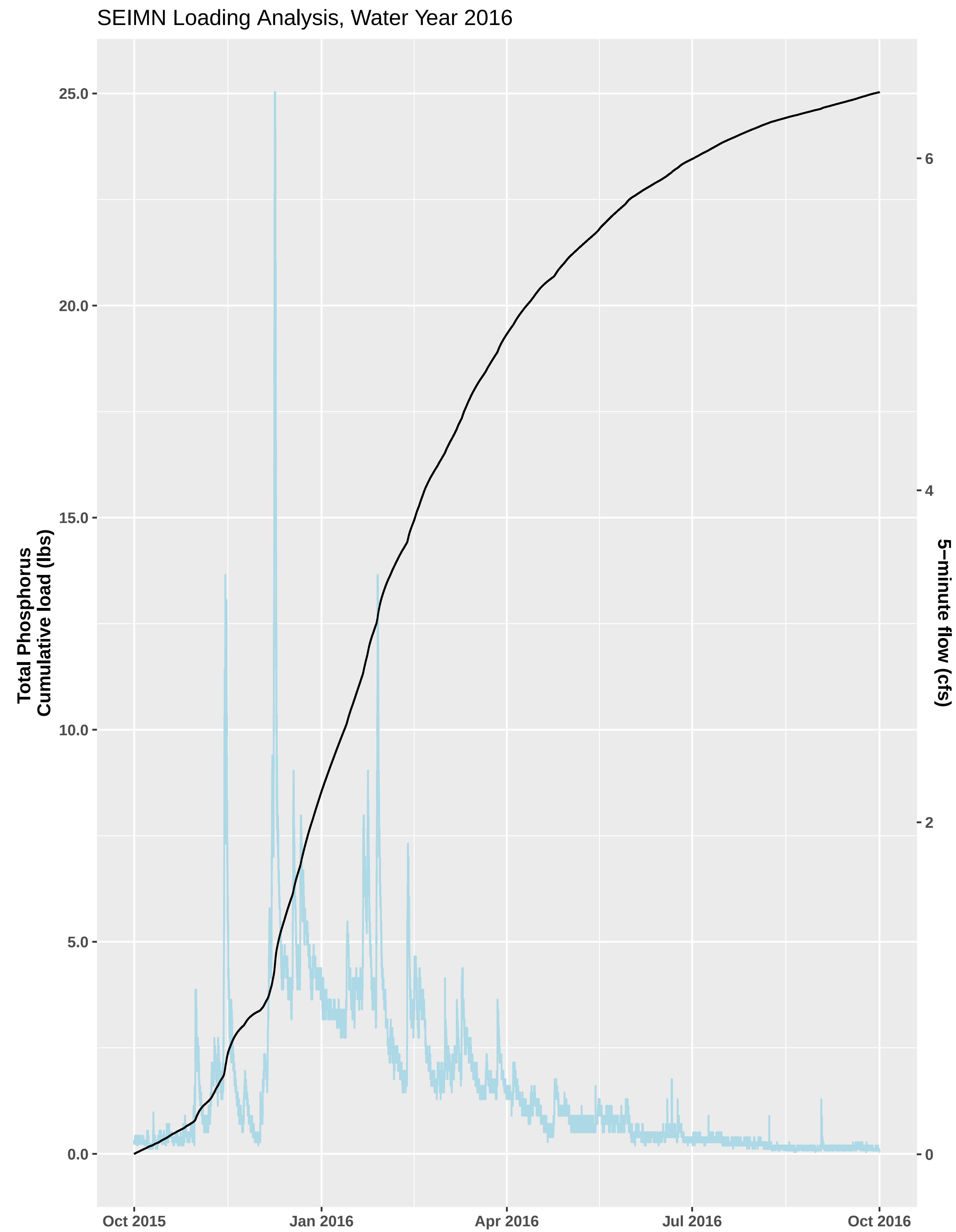


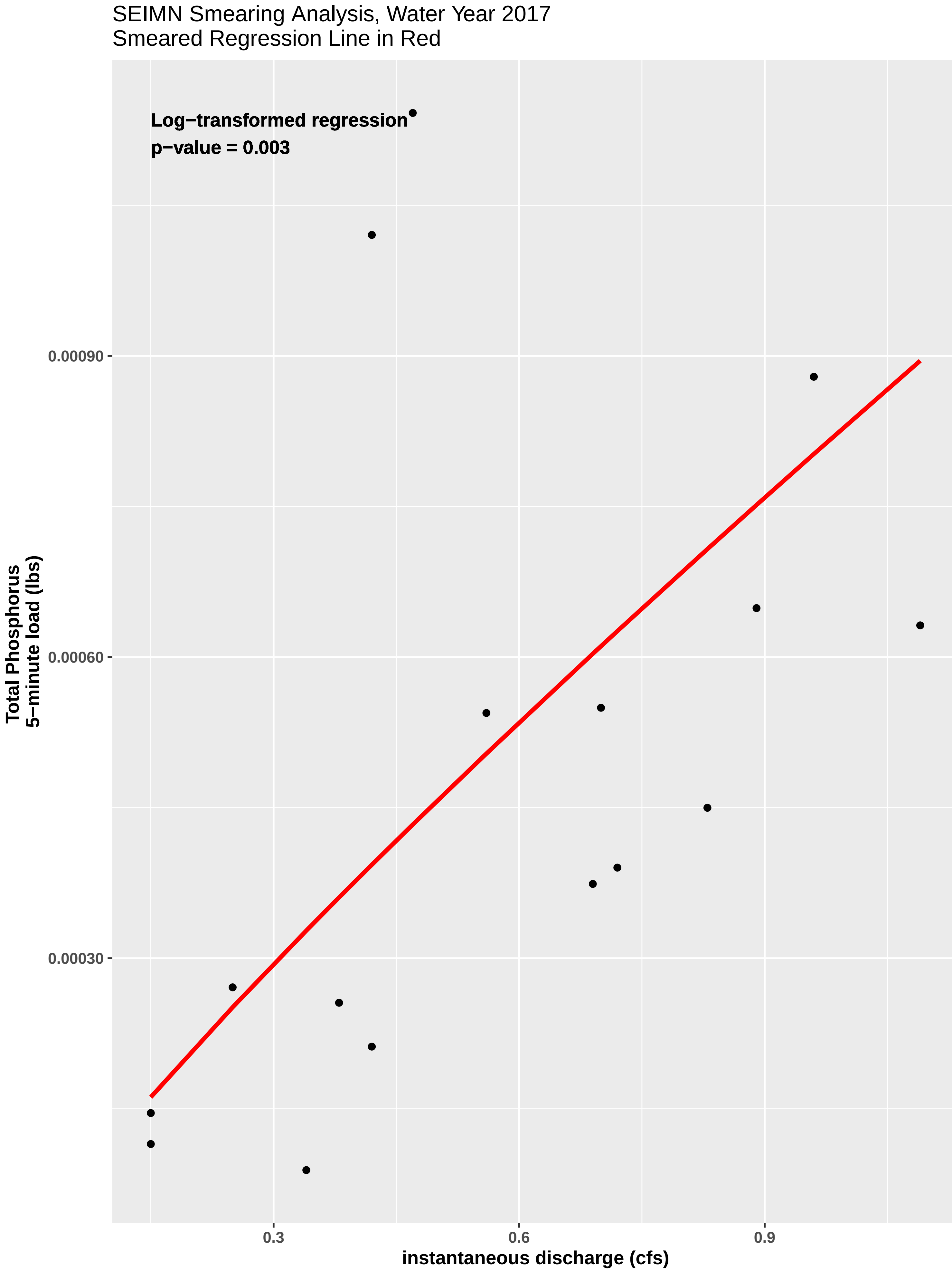
SEIMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.0080
0.2
0.4
0.6
instantaneous discharge (cfs)

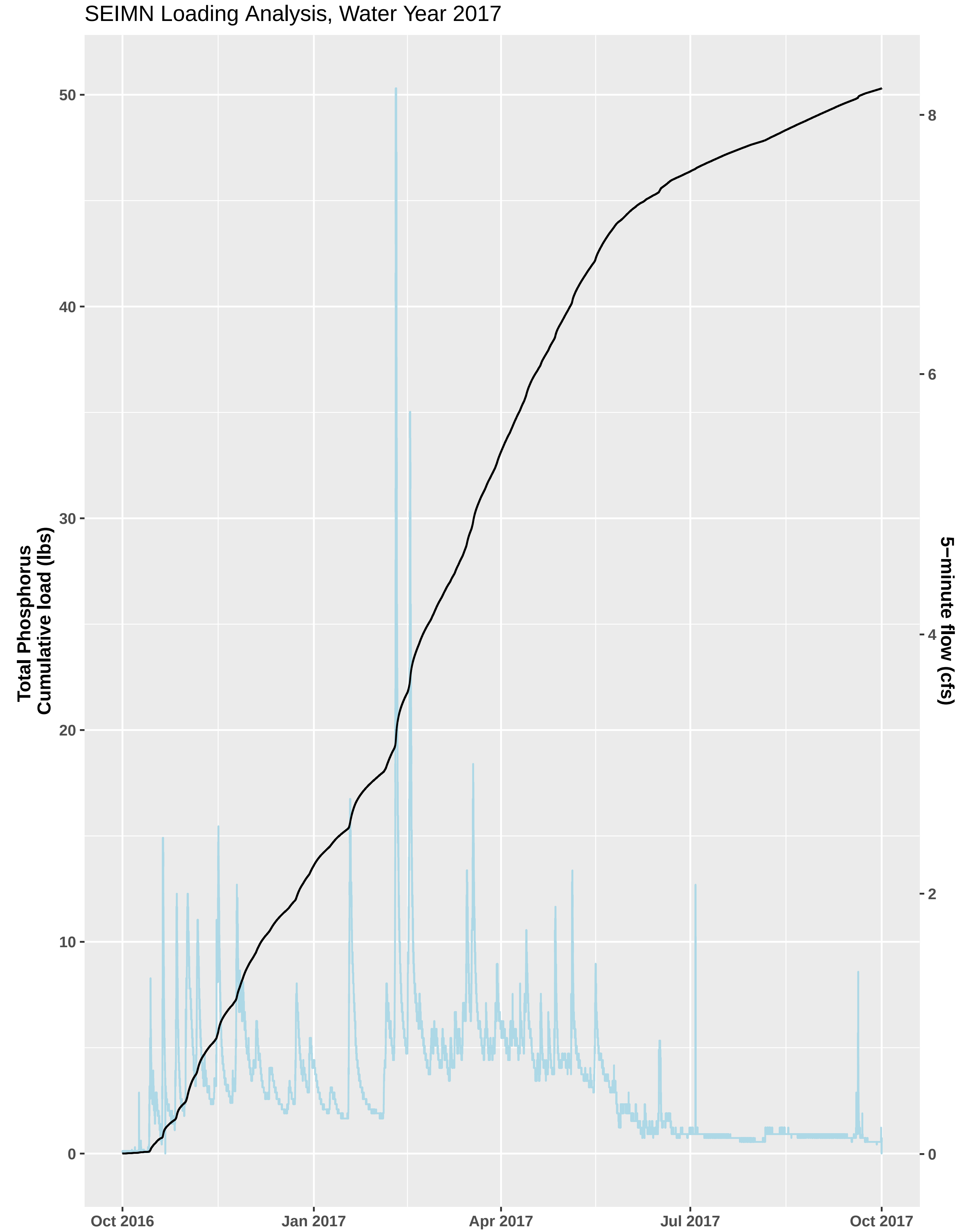


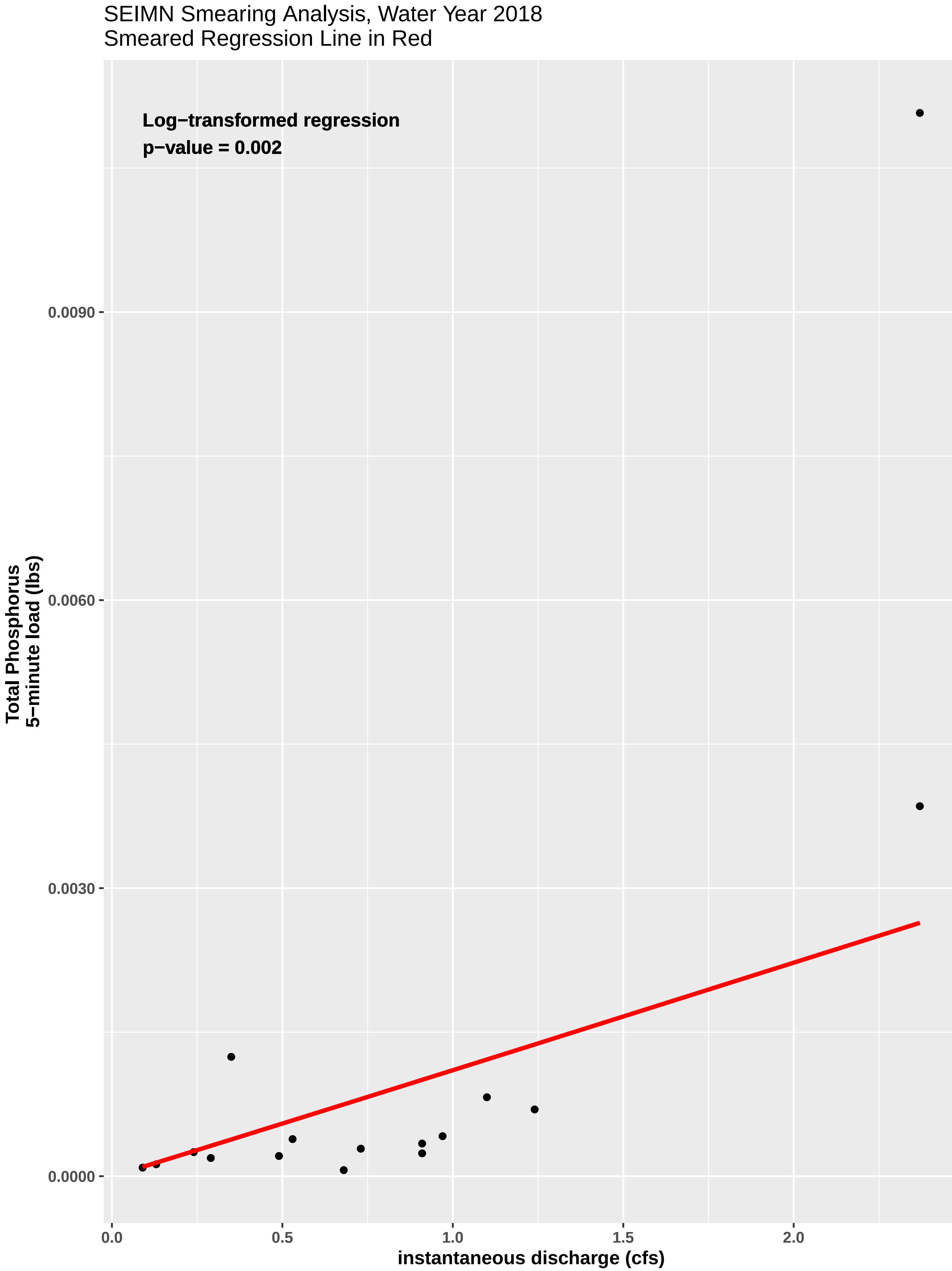
SEIMN Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


SEIMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.003
Total Phosphorus
5−minute load (lbs)
0.00030
0.00020
0.00010
0.1
0.2
0.3
instantaneous discharge (cfs)

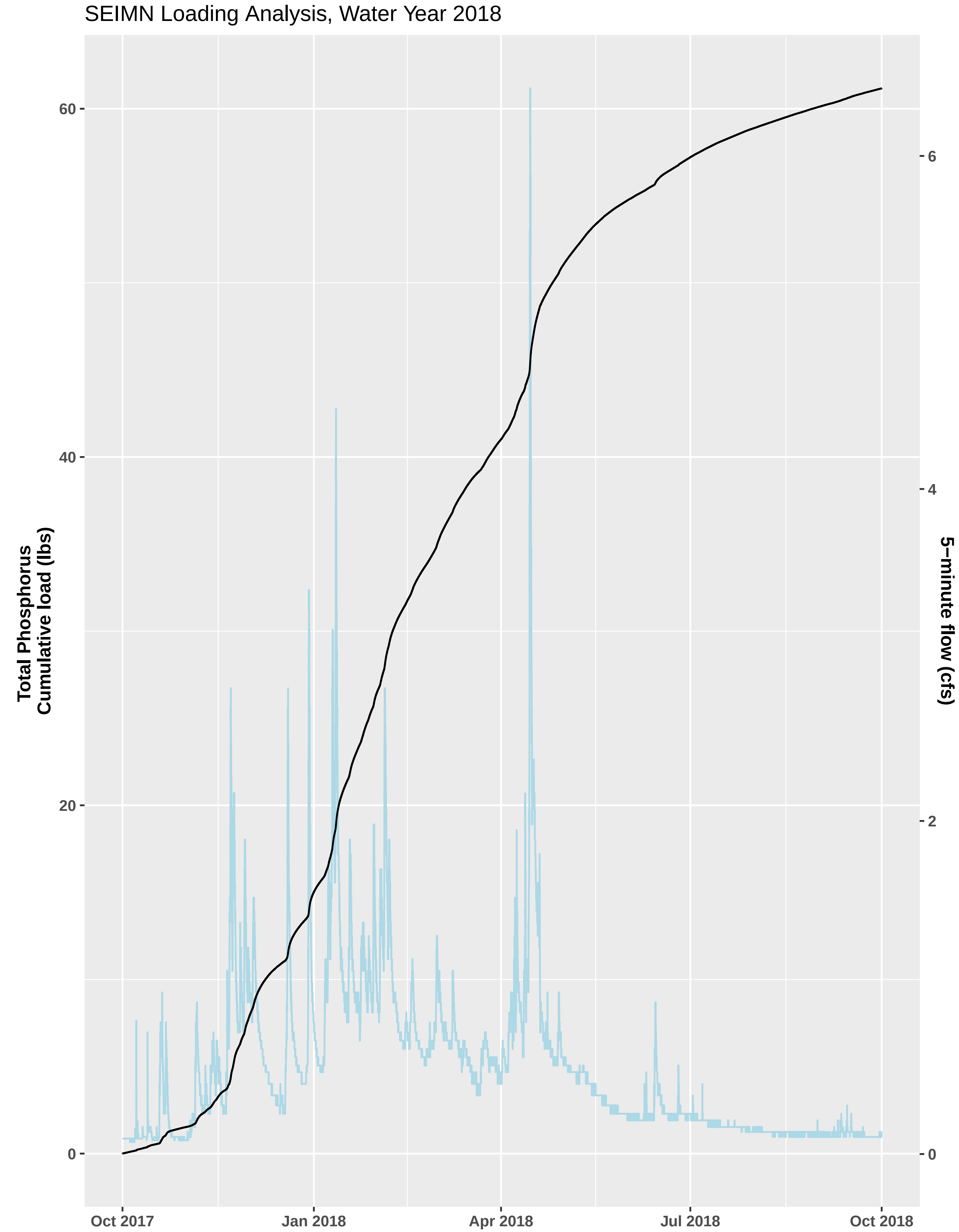

SEIMN Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
25.0
20.0
15.0
10.0
5.0
0.0
5−minute flow (cfs)
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


SEIMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.003
0.00090
0.00060
0.00030
Total Phosphorus
5−minute load (lbs)
0.3
0.6
0.9
instantaneous discharge (cfs)

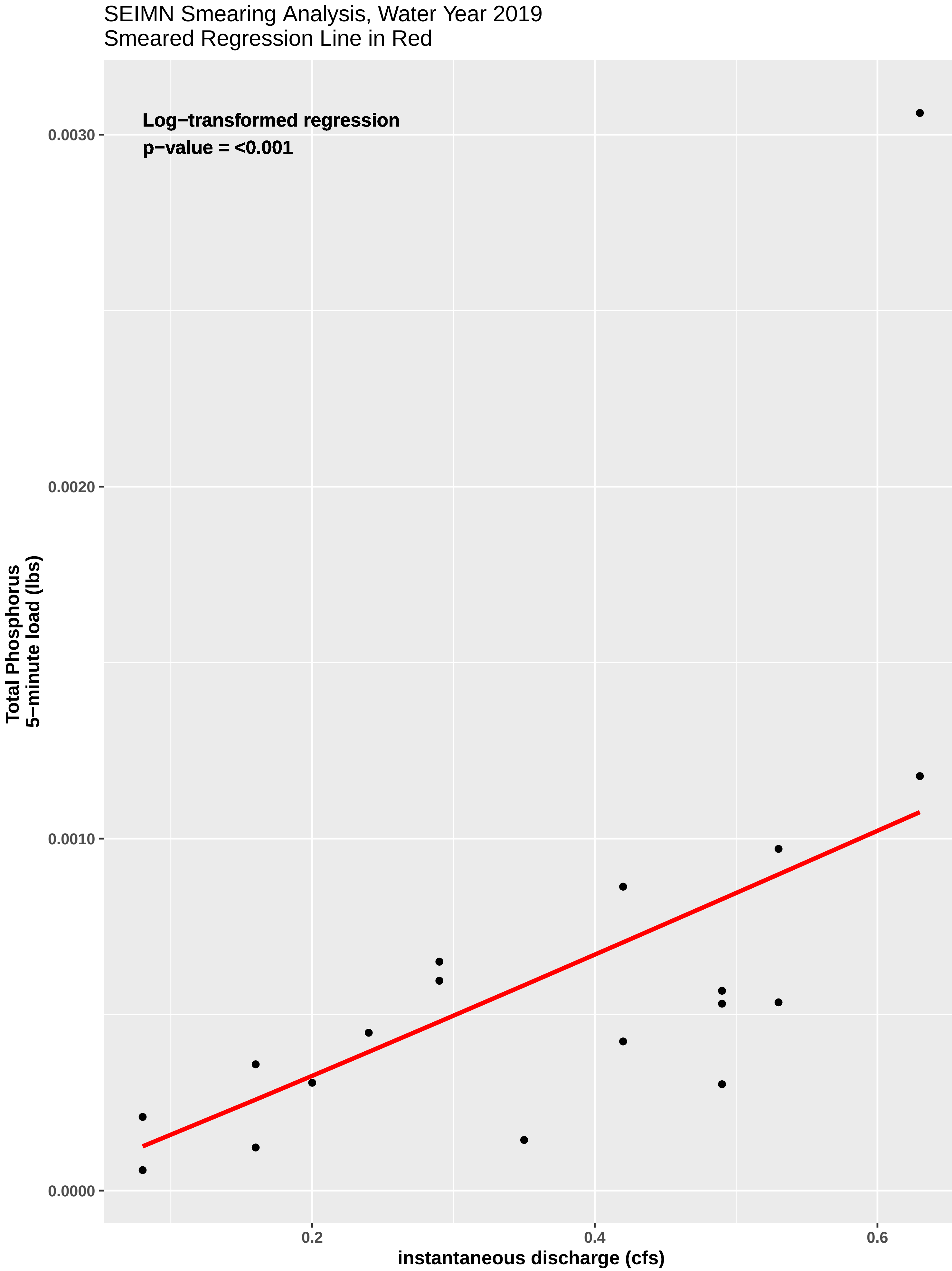

SEIMN Loading Analysis, Water Year 2017
50
40
30
20
10
0
Total Phosphorus
Cumulative load (lbs)
8
6
4
2
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

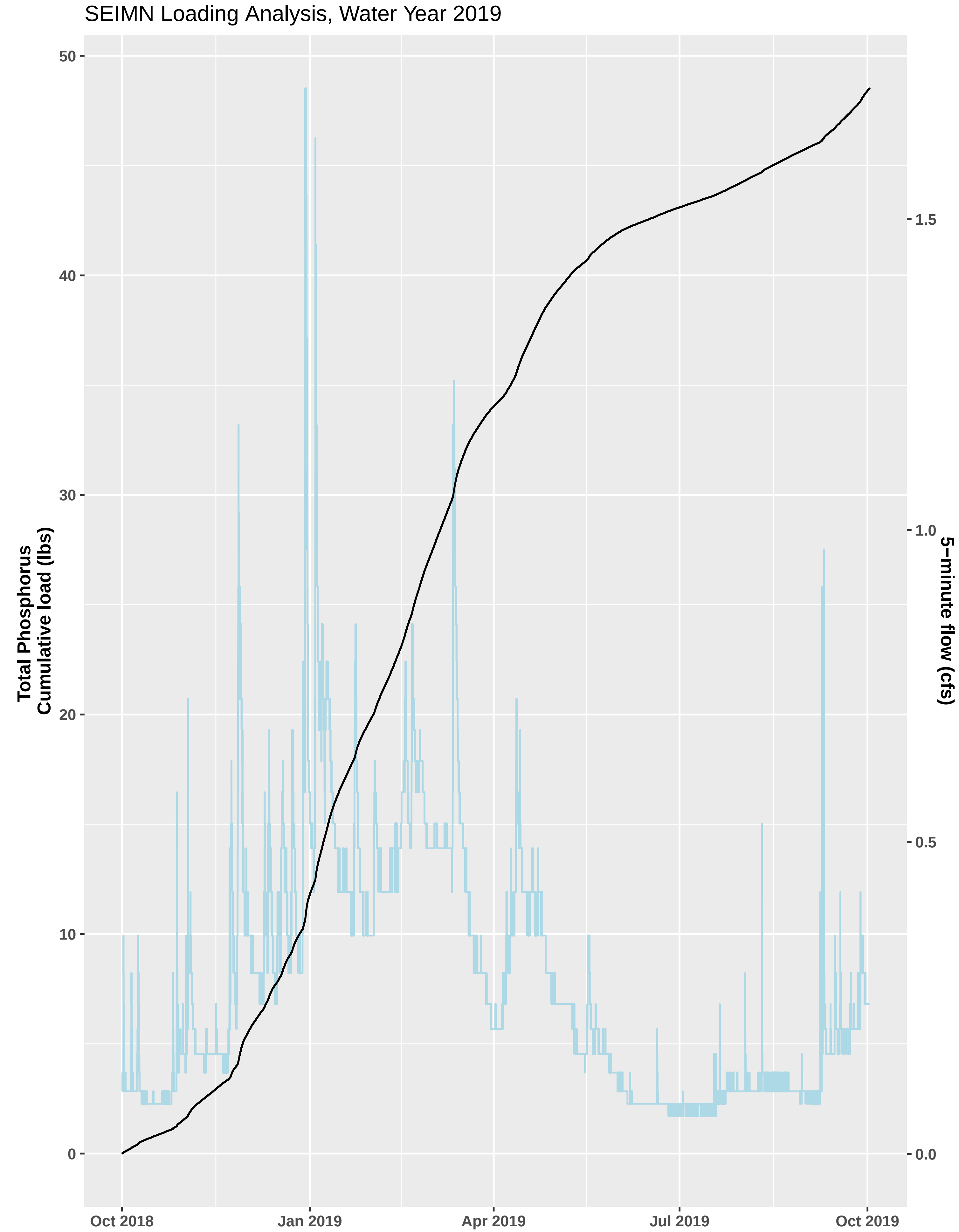


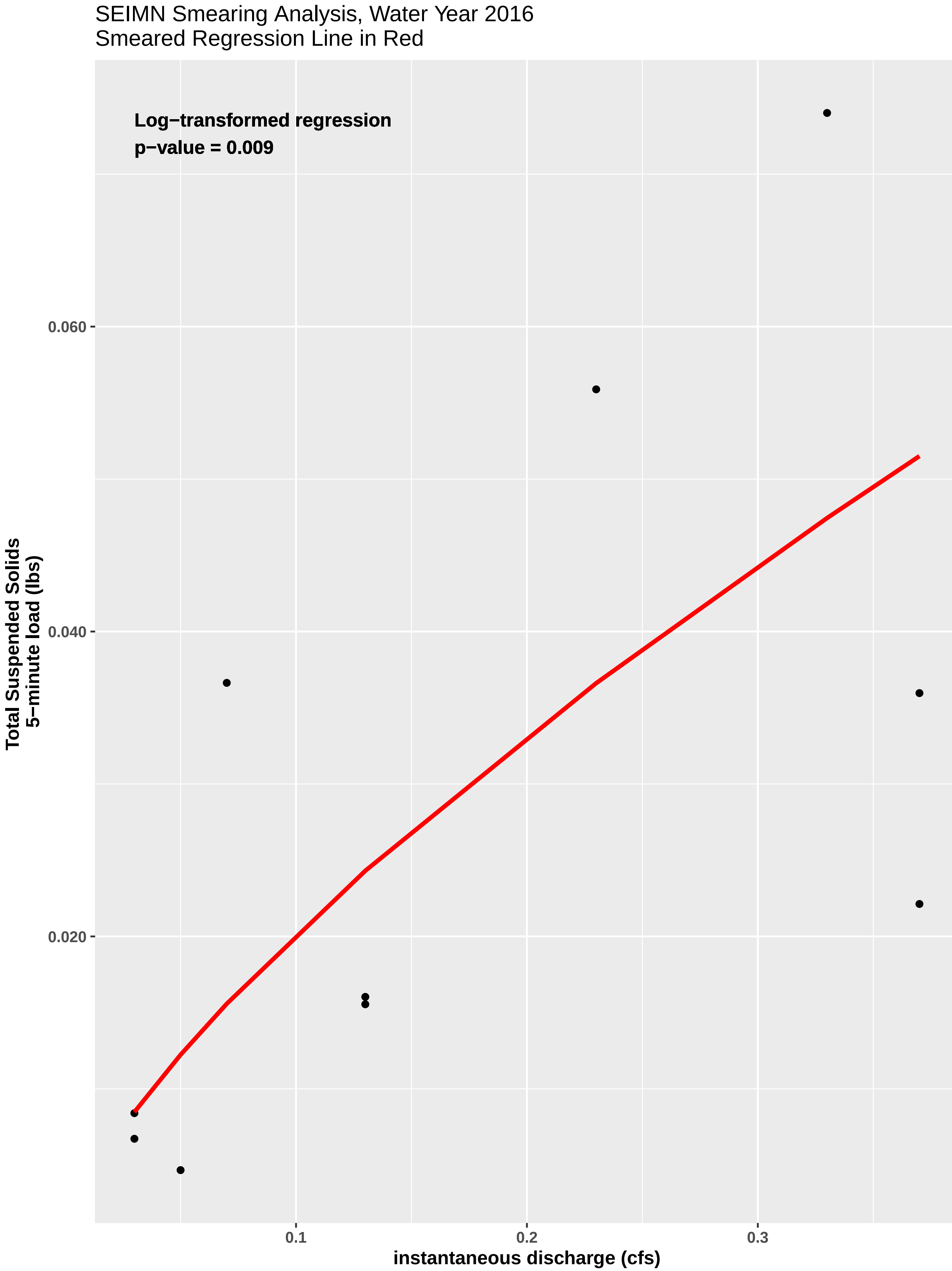
SEIMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Phosphorus
5−minute load (lbs)
0.0000
0.0030
0.0060
0.0090
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

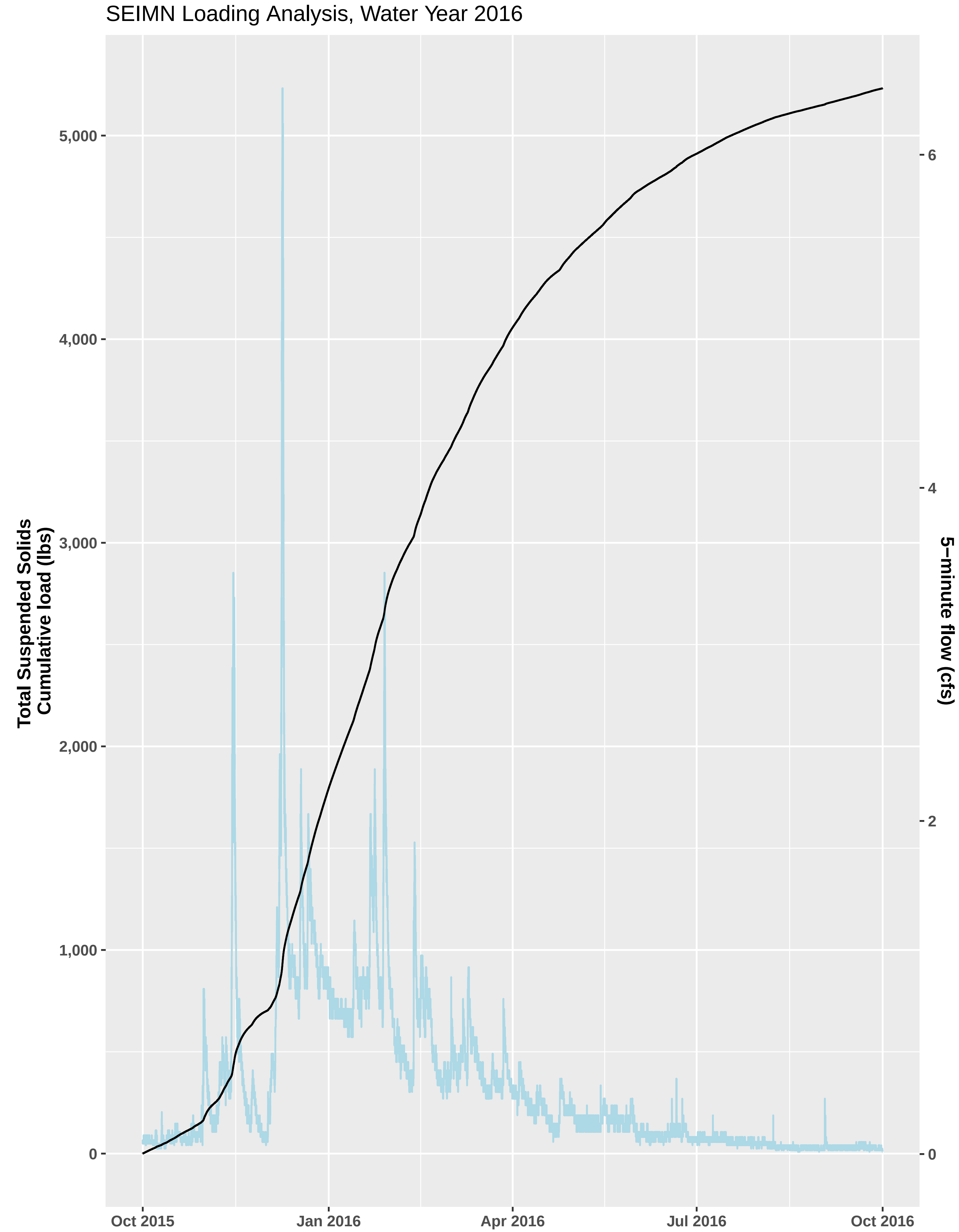


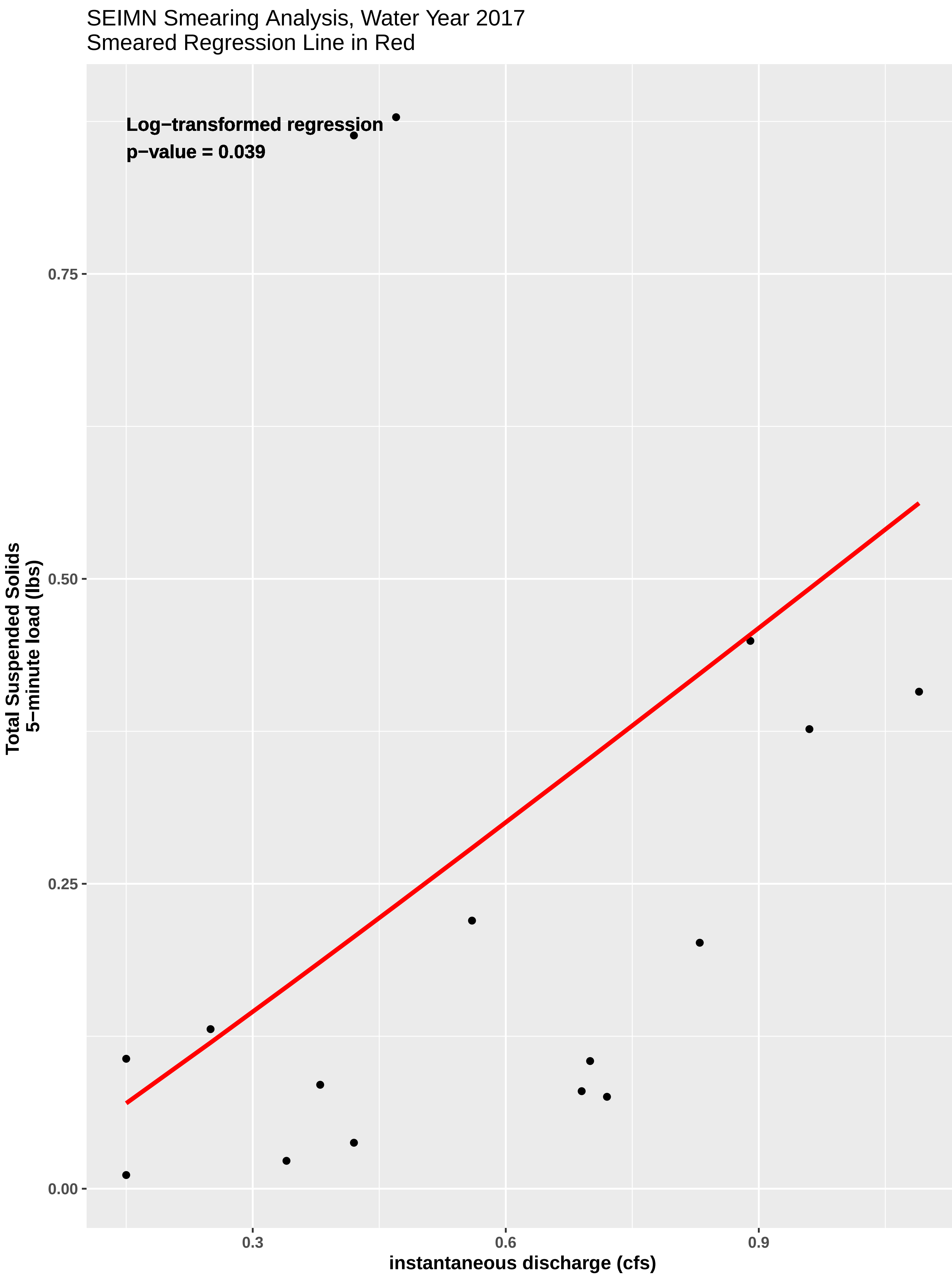
SEIMN Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


SEIMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.2
0.4
0.6
instantaneous discharge (cfs)

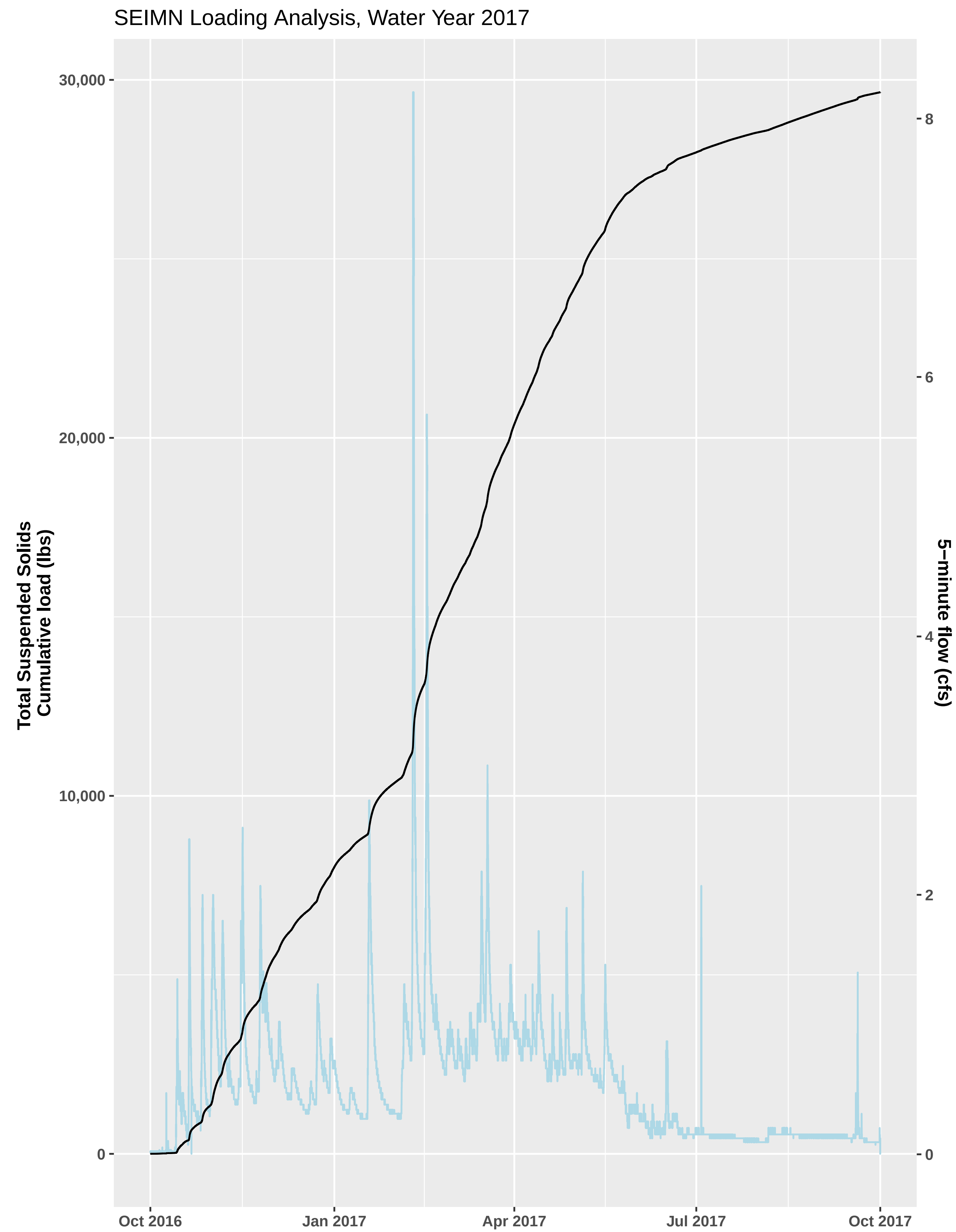

SEIMN Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
10
20
30
40
50
5−minute flow (cfs)
0.0
0.5
1.0
1.5
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


SEIMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.009
0.060
0.040
0.020
0.1
0.2
0.3
instantaneous discharge (cfs)
Total Suspended Solids
5−minute load (lbs)

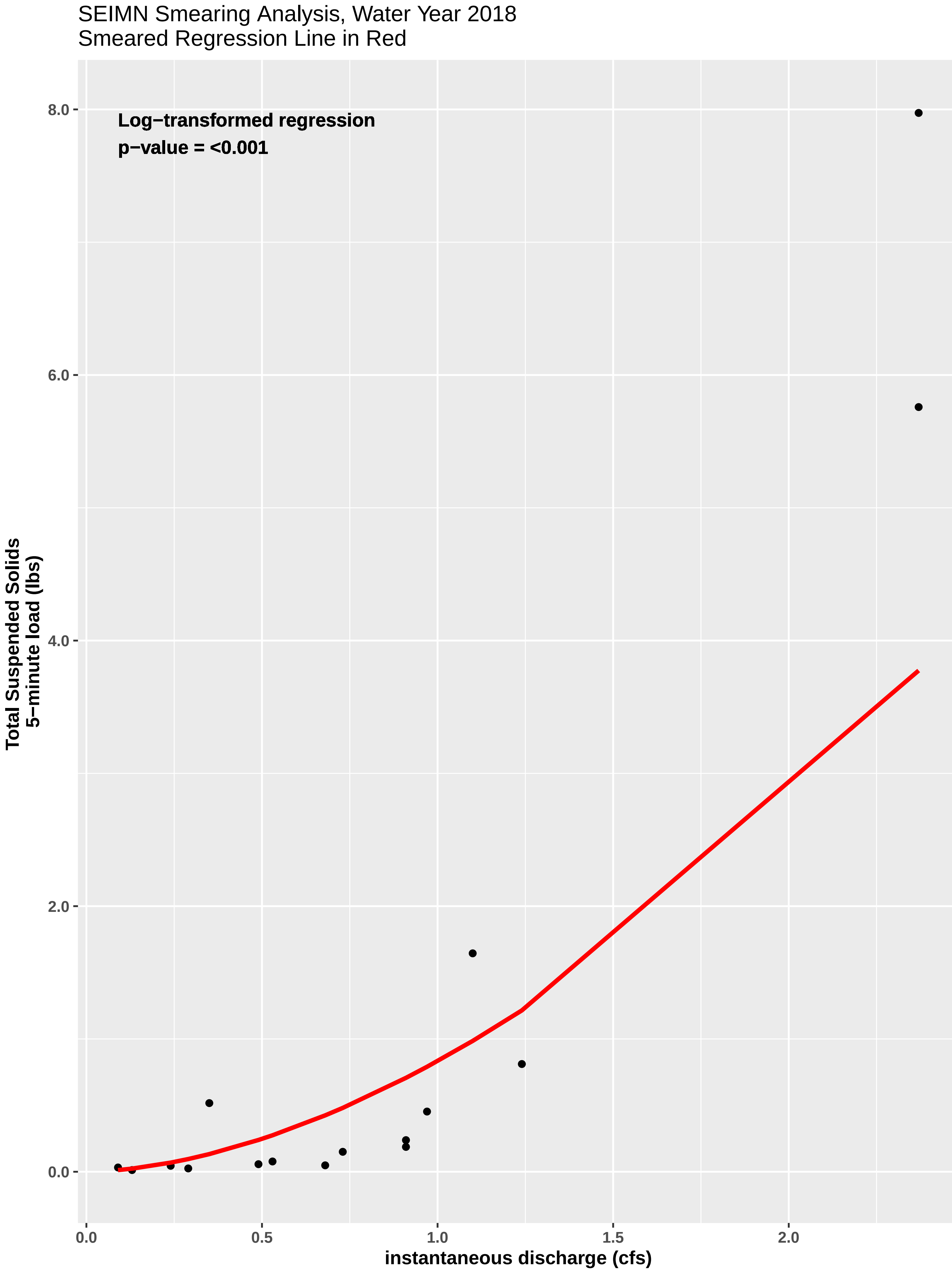

SEIMN Loading Analysis, Water Year 2016
5,000
4,000
3,000
2,000
1,000
0
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)

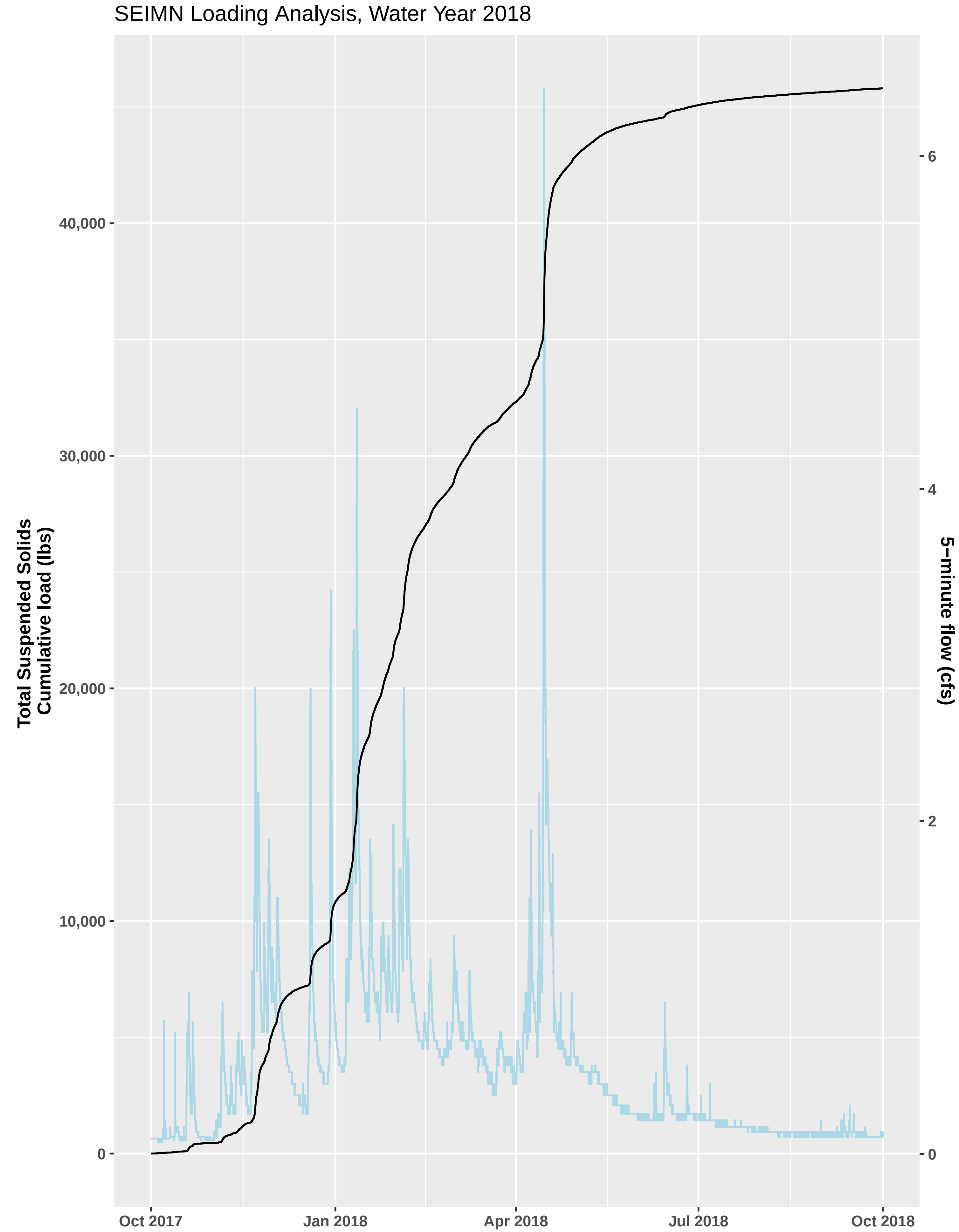


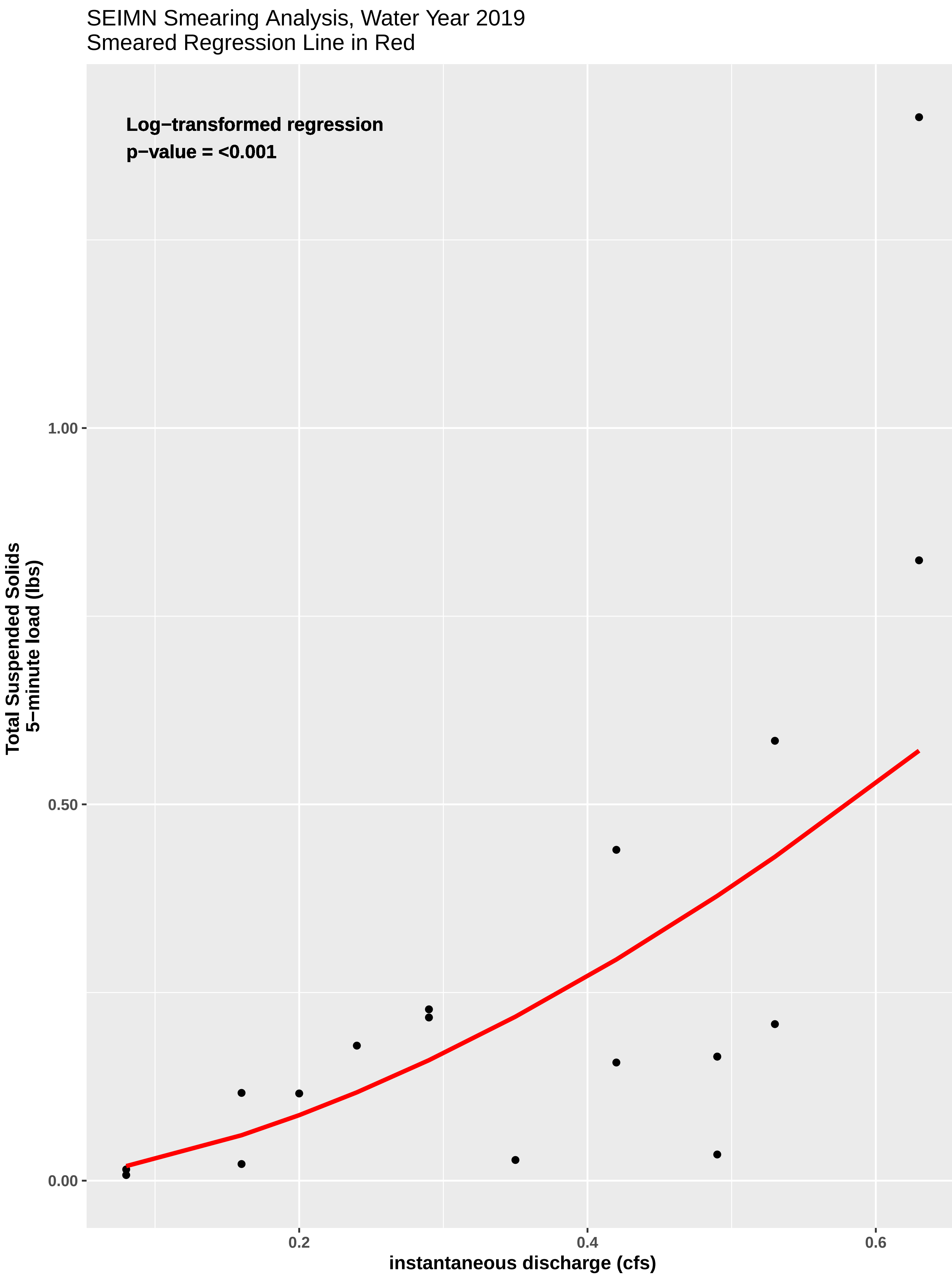
SEIMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.039
Total Suspended Solids
5−minute load (lbs)
0.00
0.25
0.50
0.75
0.3
0.6
0.9
instantaneous discharge (cfs)



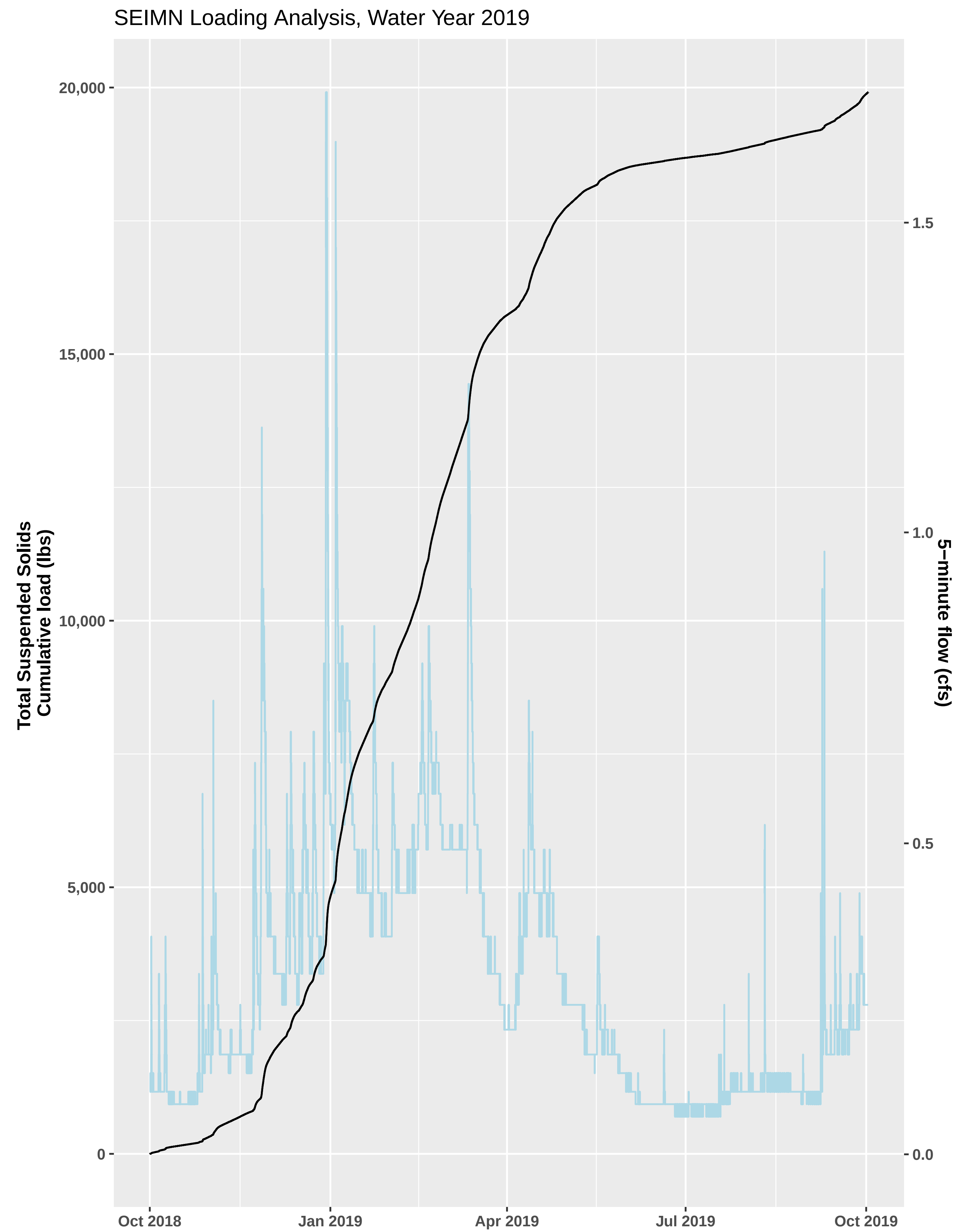
SEIMN Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
0
10,000
20,000
30,000
5−minute flow (cfs)
0
2
4
6
8
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


SEIMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
2.0
4.0
6.0
8.0
0.0
0.5
1.0
1.5
2.0

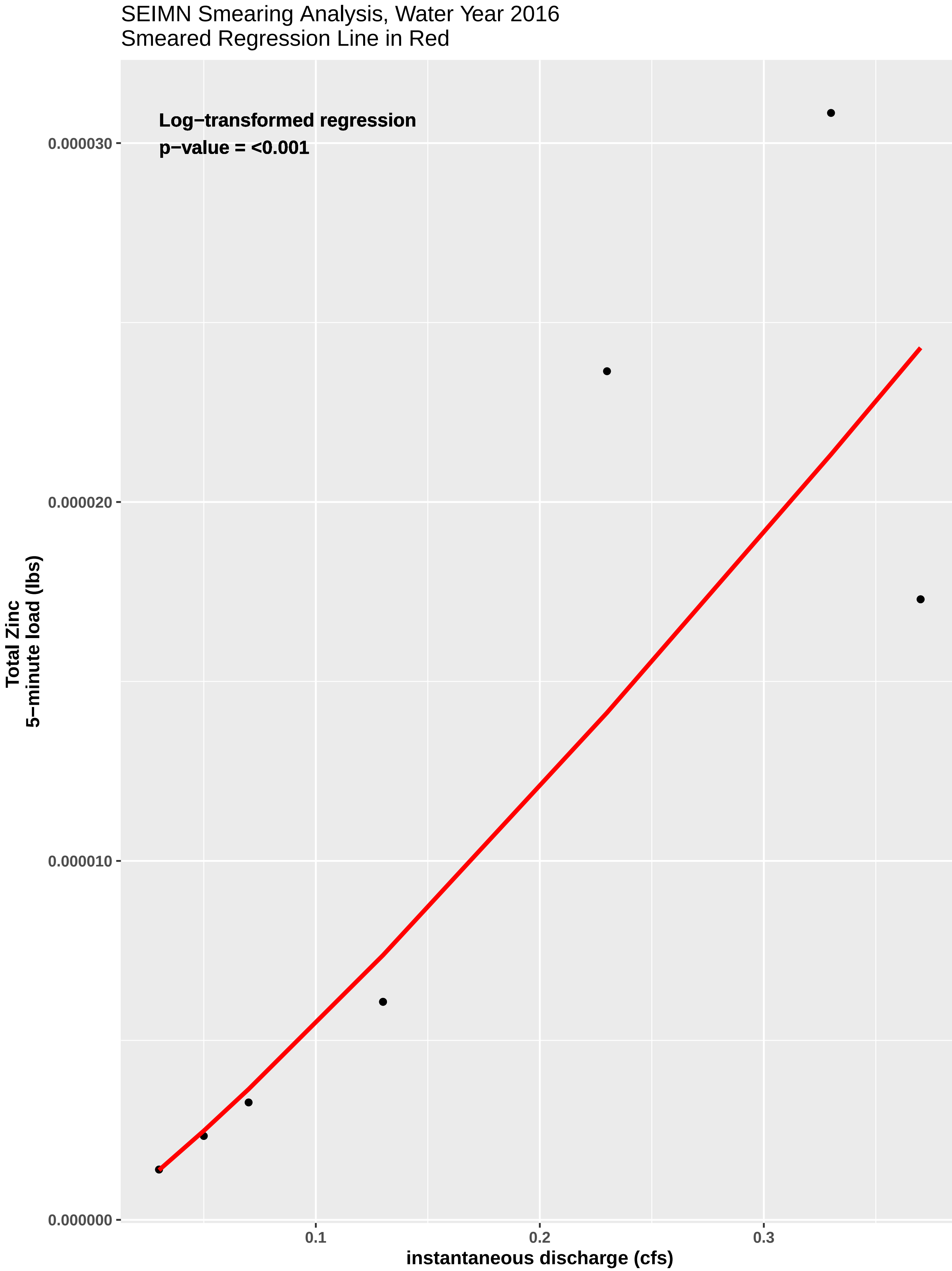

SEIMN Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
10,000
20,000
30,000
40,000
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

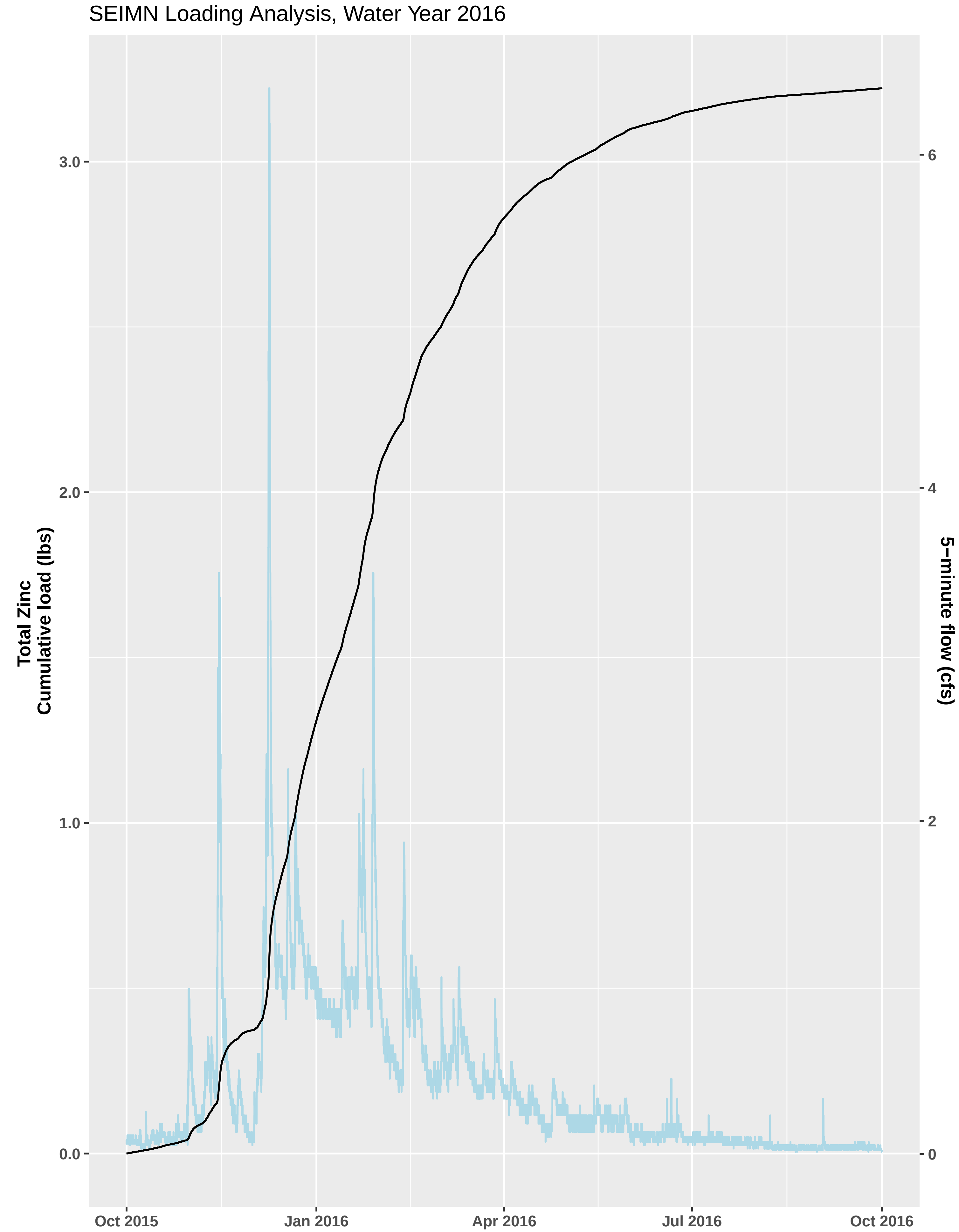


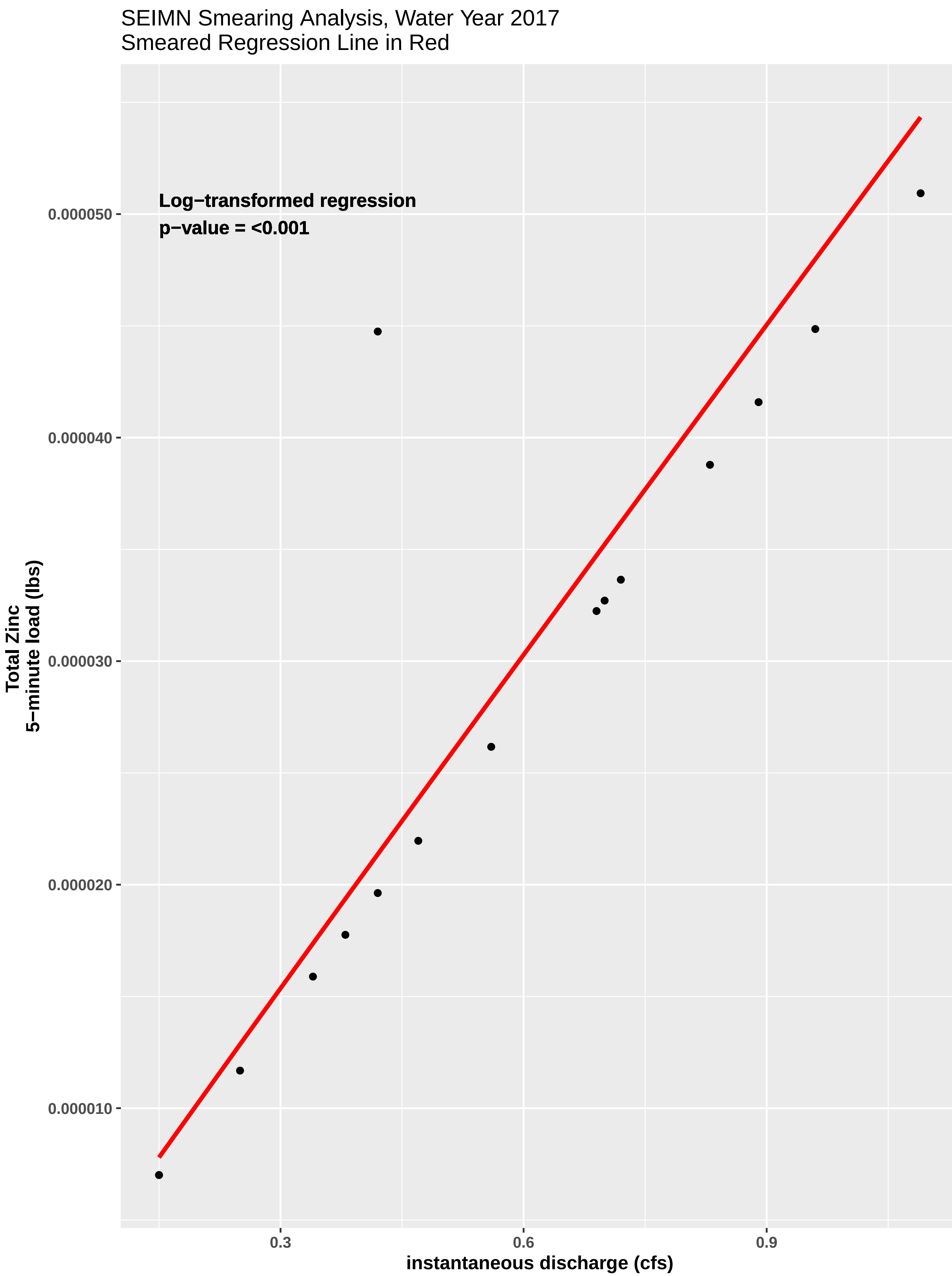
SEIMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
1.00
0.50
0.00
0.2
0.4
0.6
instantaneous discharge (cfs)

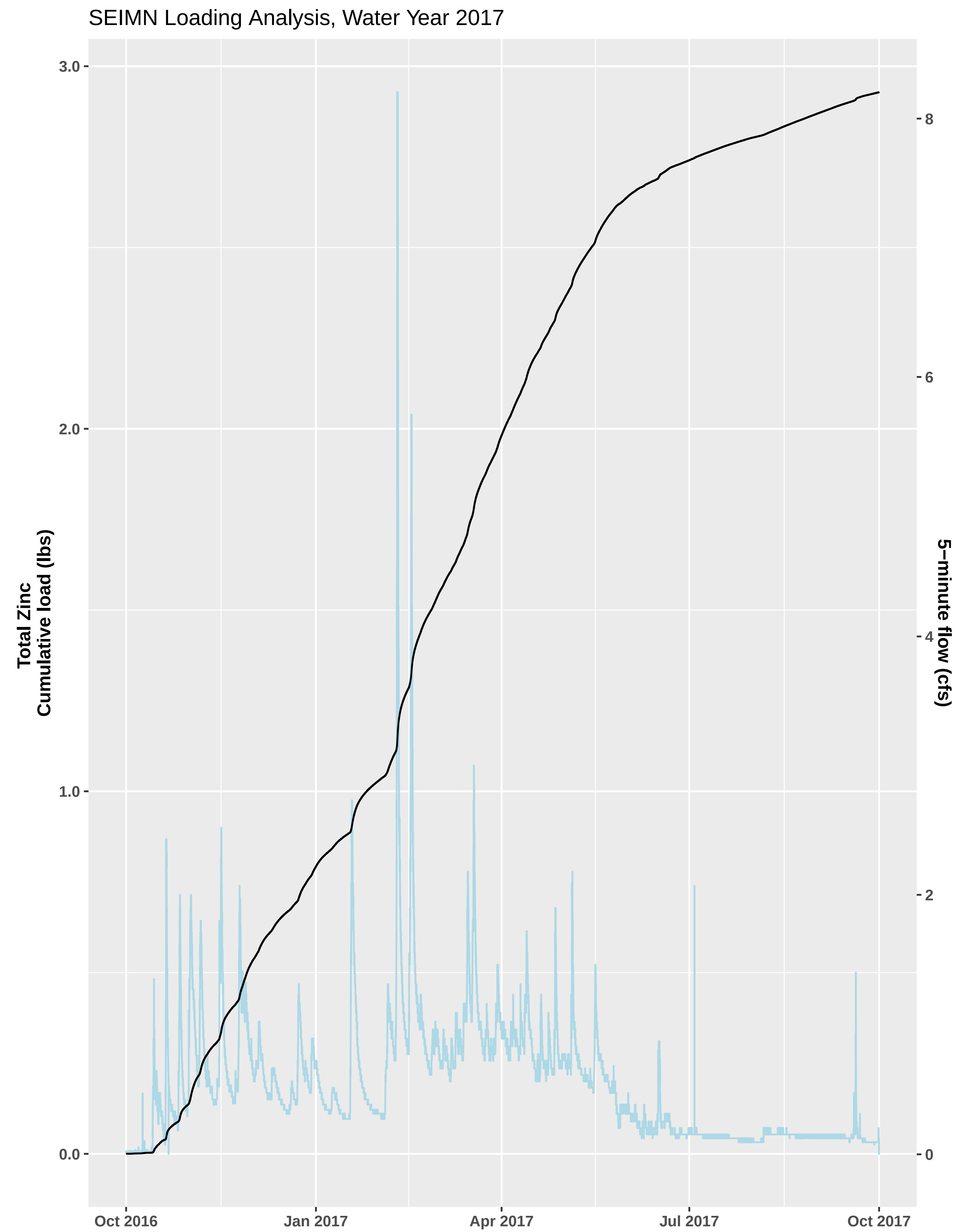


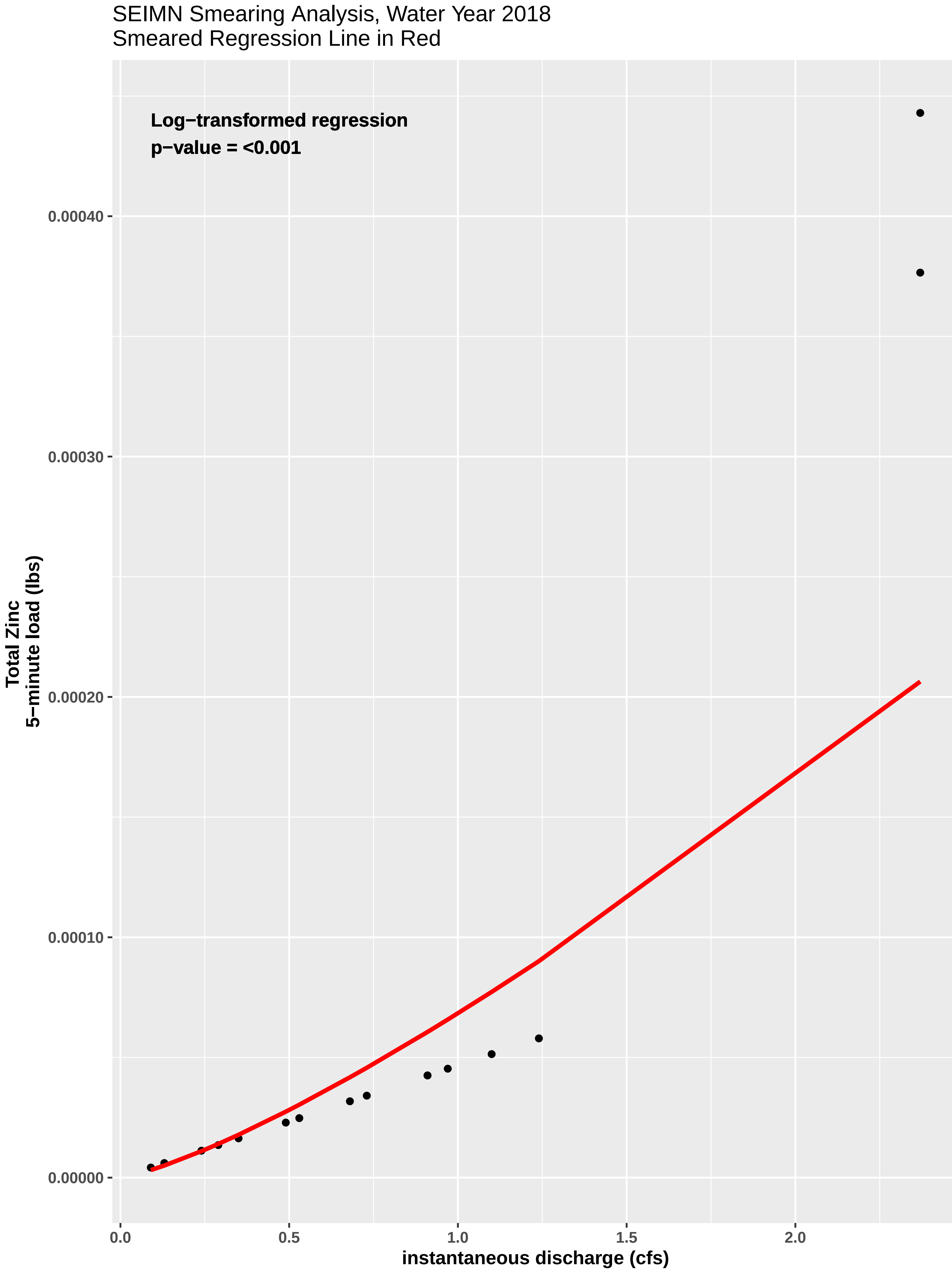
SEIMN Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
20,000
15,000
10,000
5,000
0
5−minute flow (cfs)
1.5
1.0
0.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


SEIMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000000
0.000010
0.000020
0.000030
0.1
0.2
0.3
instantaneous discharge (cfs)

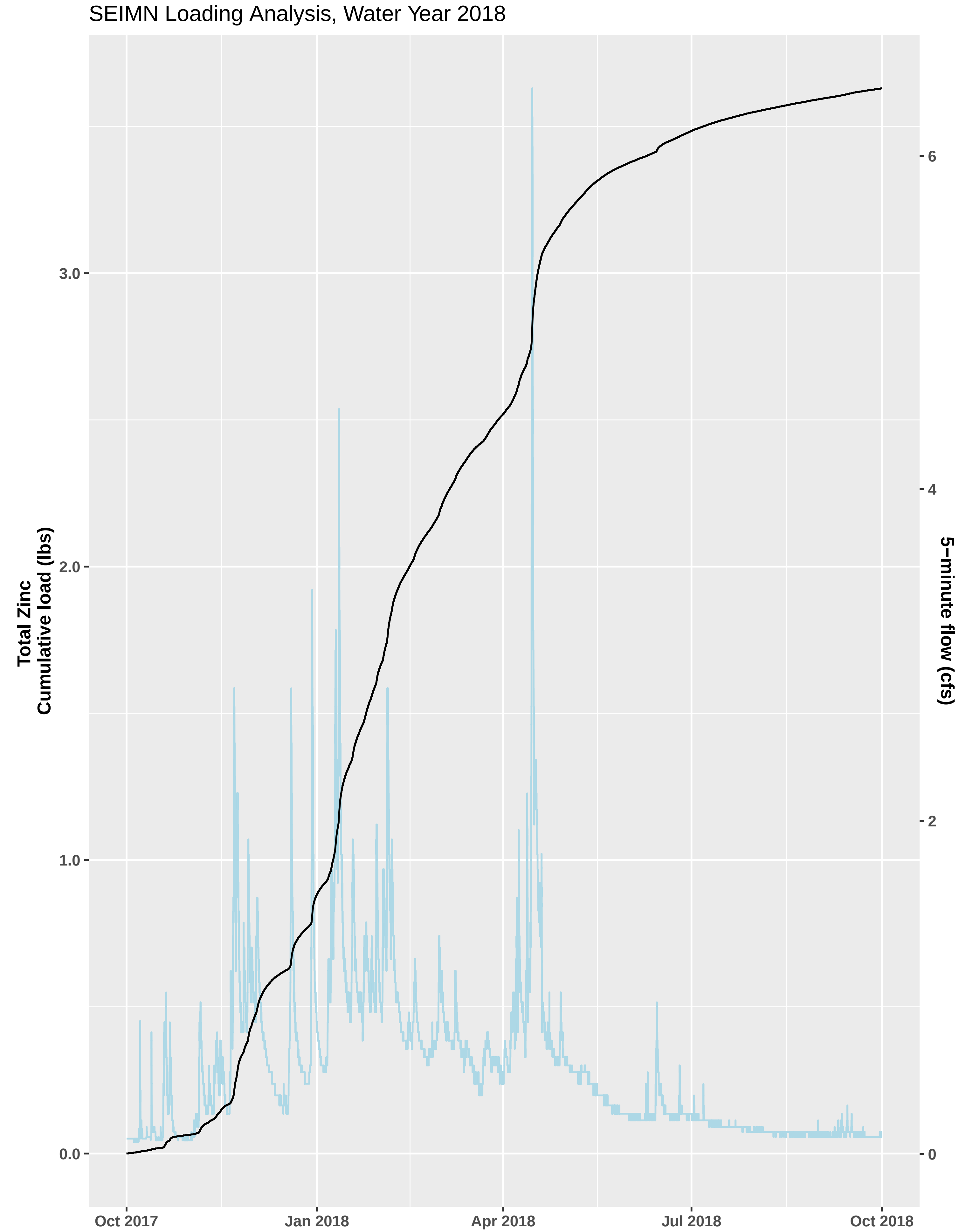

SEIMN Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0.0
1.0
2.0
3.0
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


SEIMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000010
0.000020
0.000030
0.000040
0.000050
0.3
0.6
0.9
instantaneous discharge (cfs)

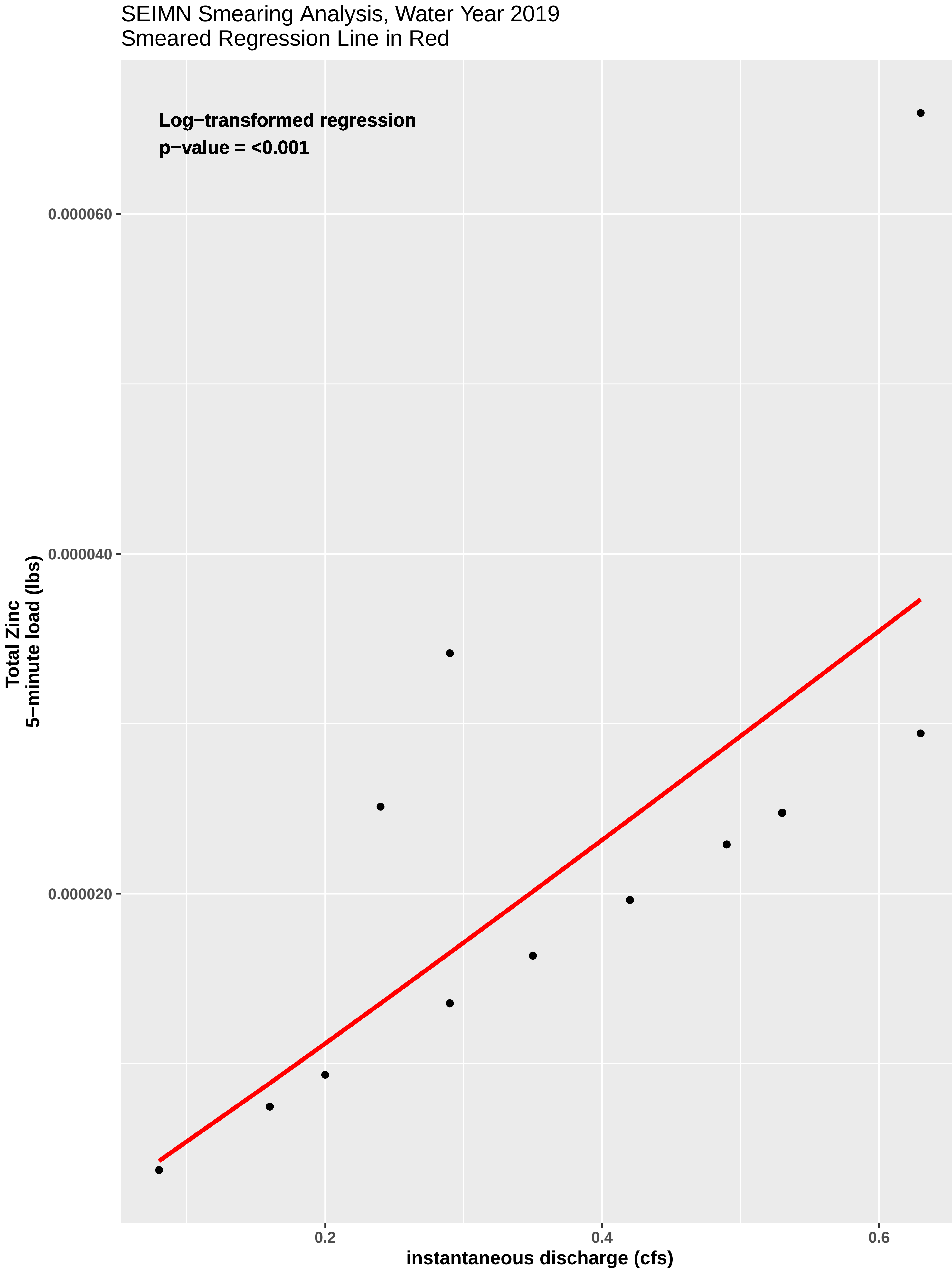

SEIMN Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0.0
1.0
2.0
3.0
5−minute flow (cfs)
0
2
4
6
8
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



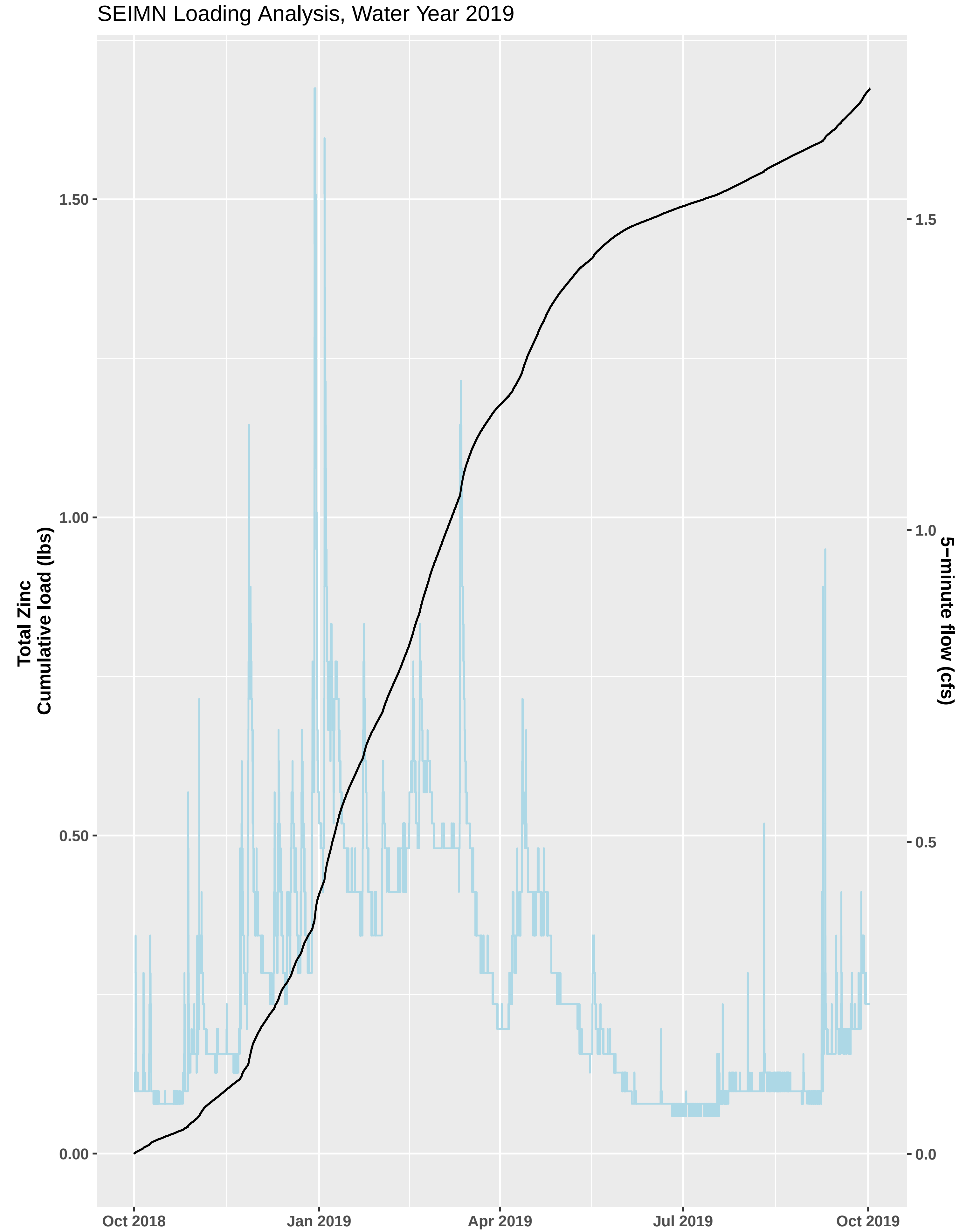
SEIMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00040
0.00030
0.00020
0.00010
0.00000
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)



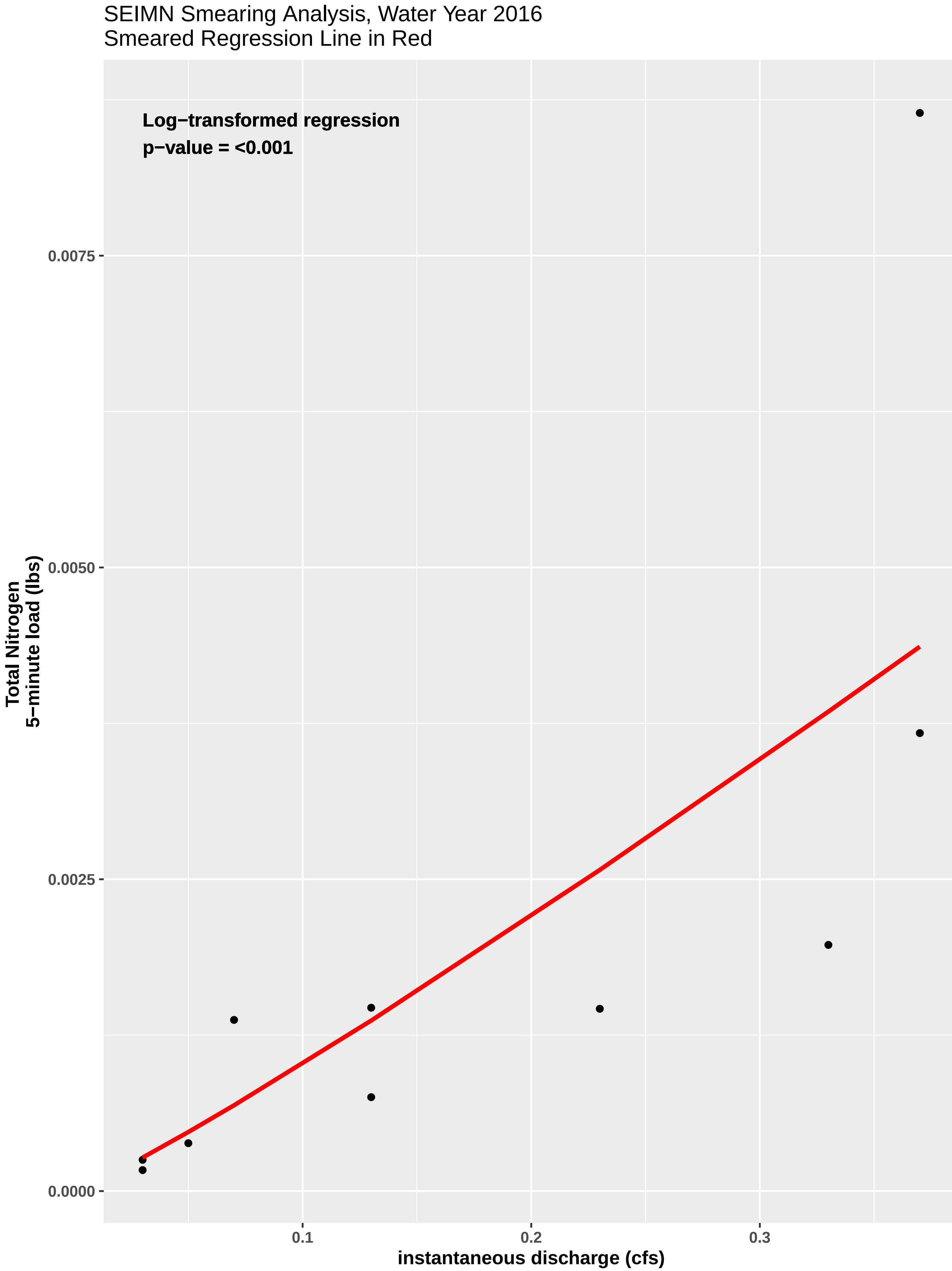
SEIMN Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
3.0
2.0
1.0
0.0
5−minute flow (cfs)
6
4
2
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

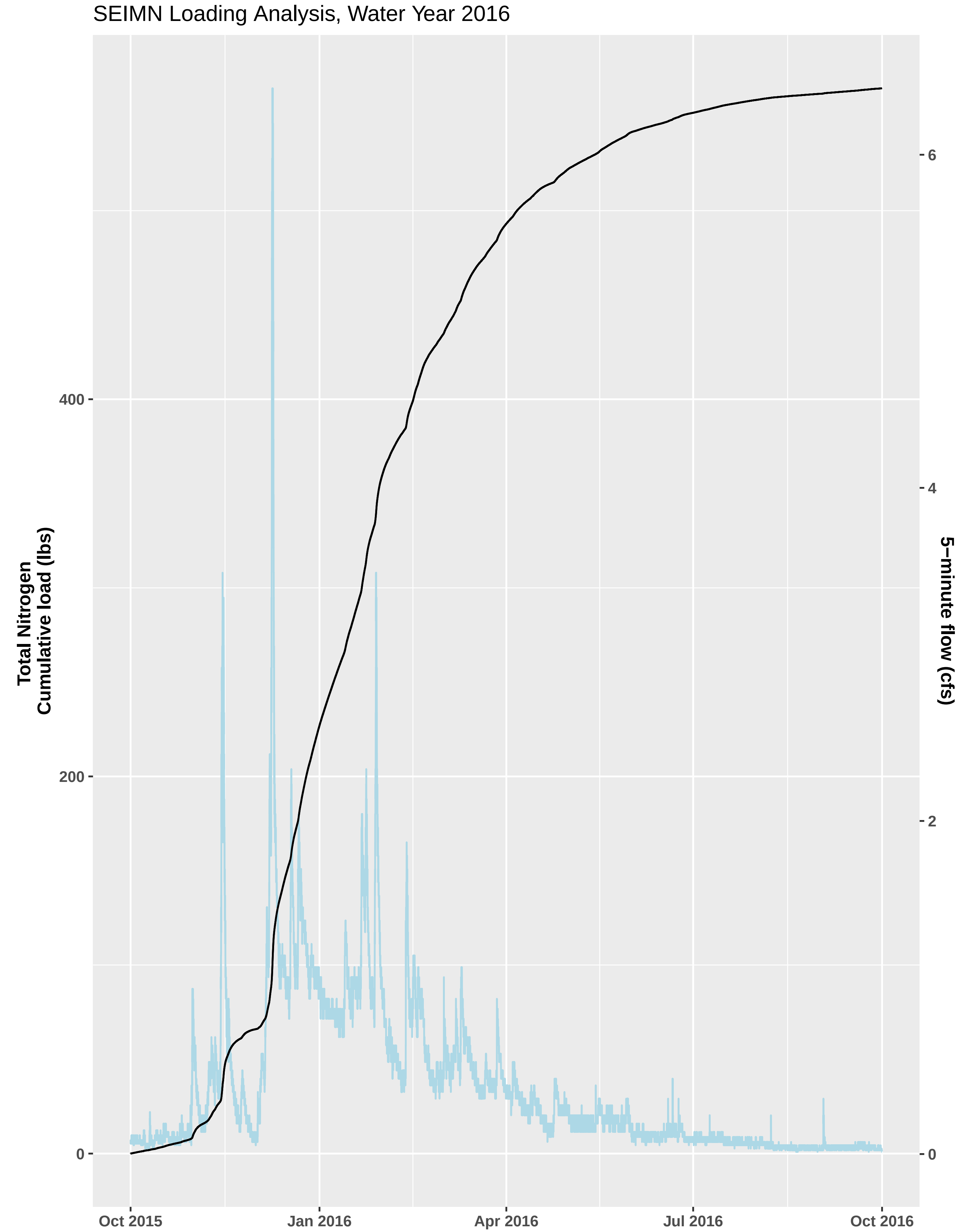


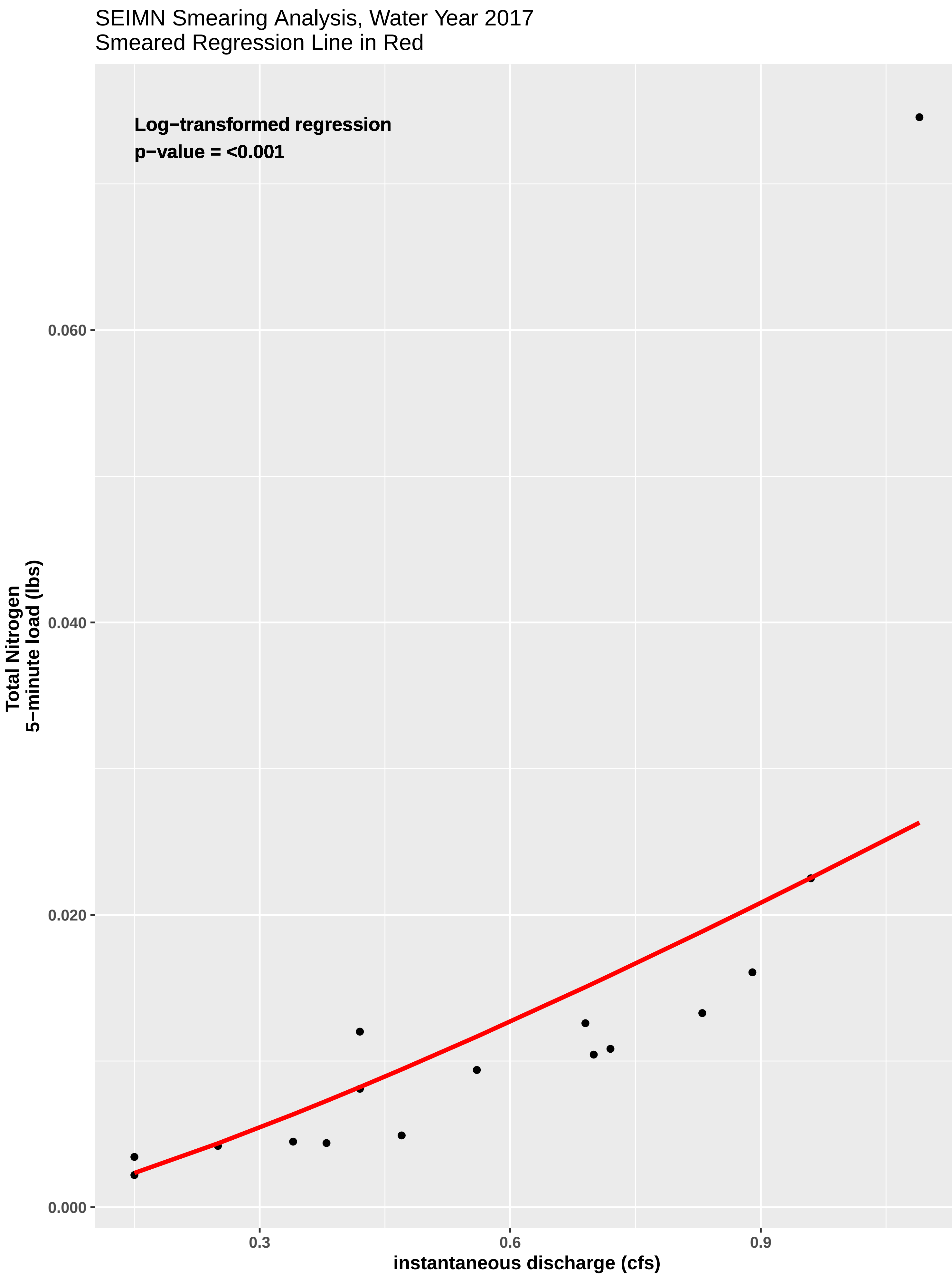
SEIMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000060
0.000040
0.000020
Total Zinc
5−minute load (lbs)
0.2
0.4
0.6
instantaneous discharge (cfs)



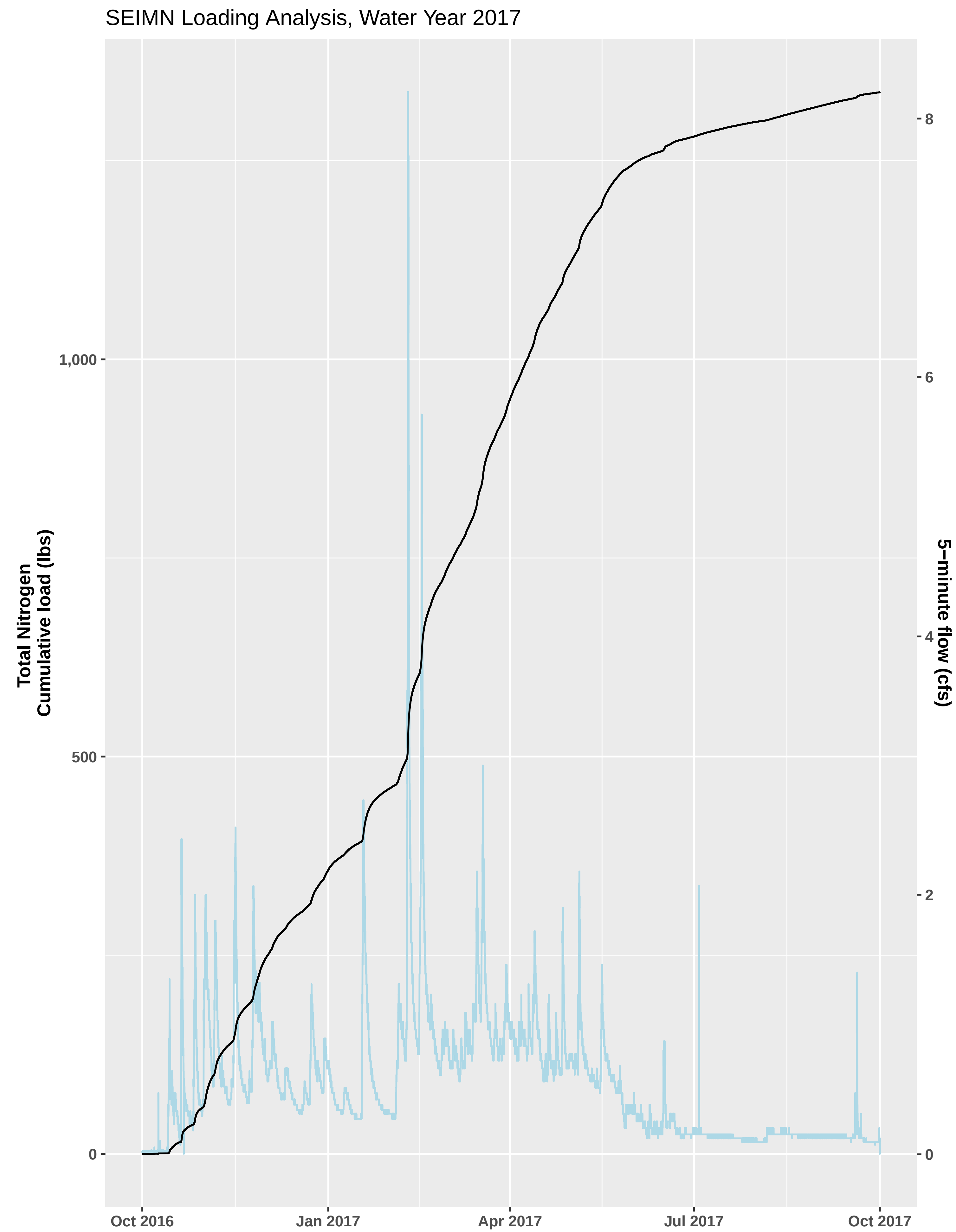
SEIMN Loading Analysis, Water Year 2019
1.50
1.00
0.50
0.00
Total Zinc
Cumulative load (lbs)
1.5
1.0
0.5
0.0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


SEIMN Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0025
0.0050
0.0075
0.1
0.2
0.3
instantaneous discharge (cfs)

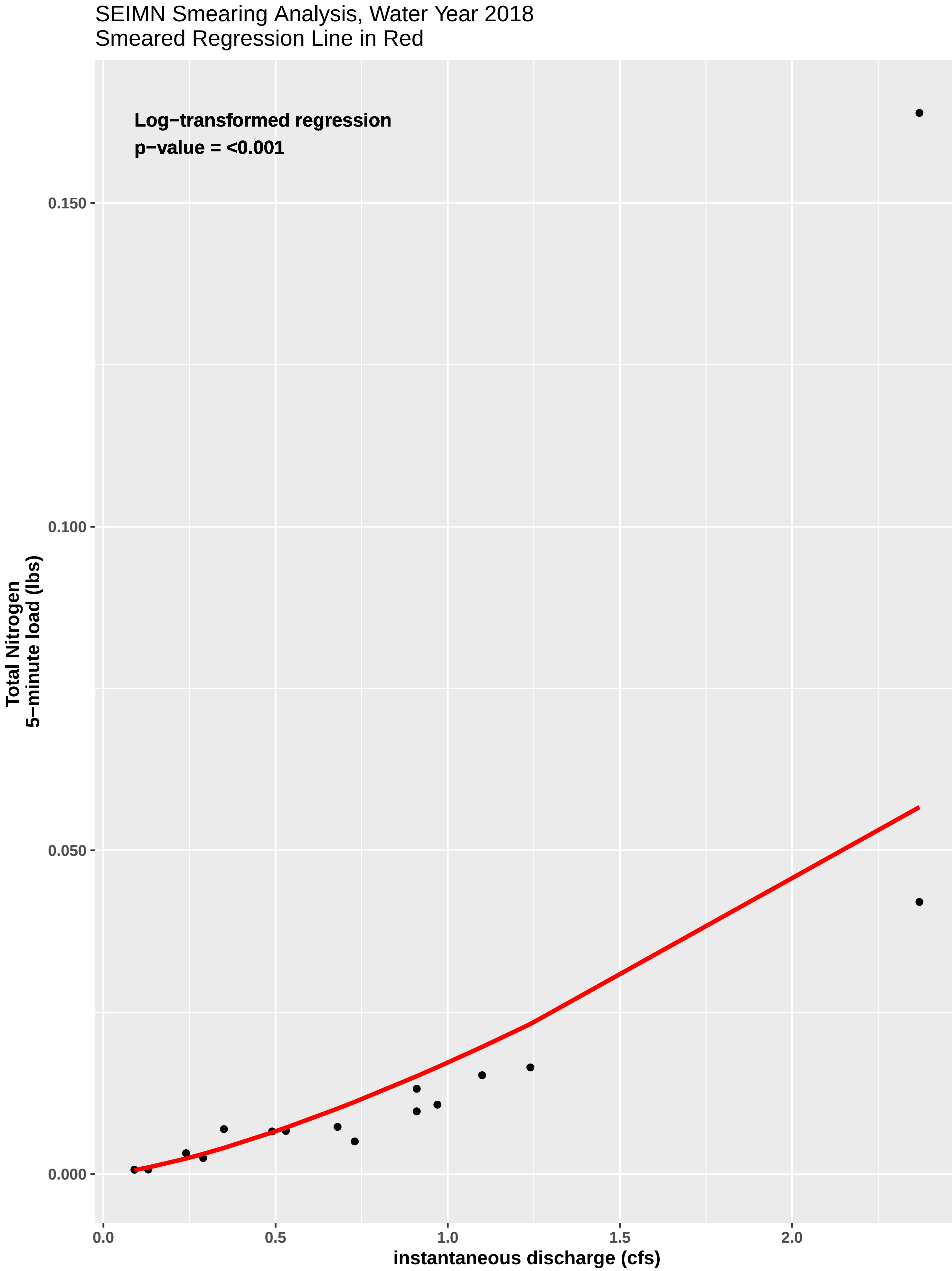

SEIMN Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
200
400
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

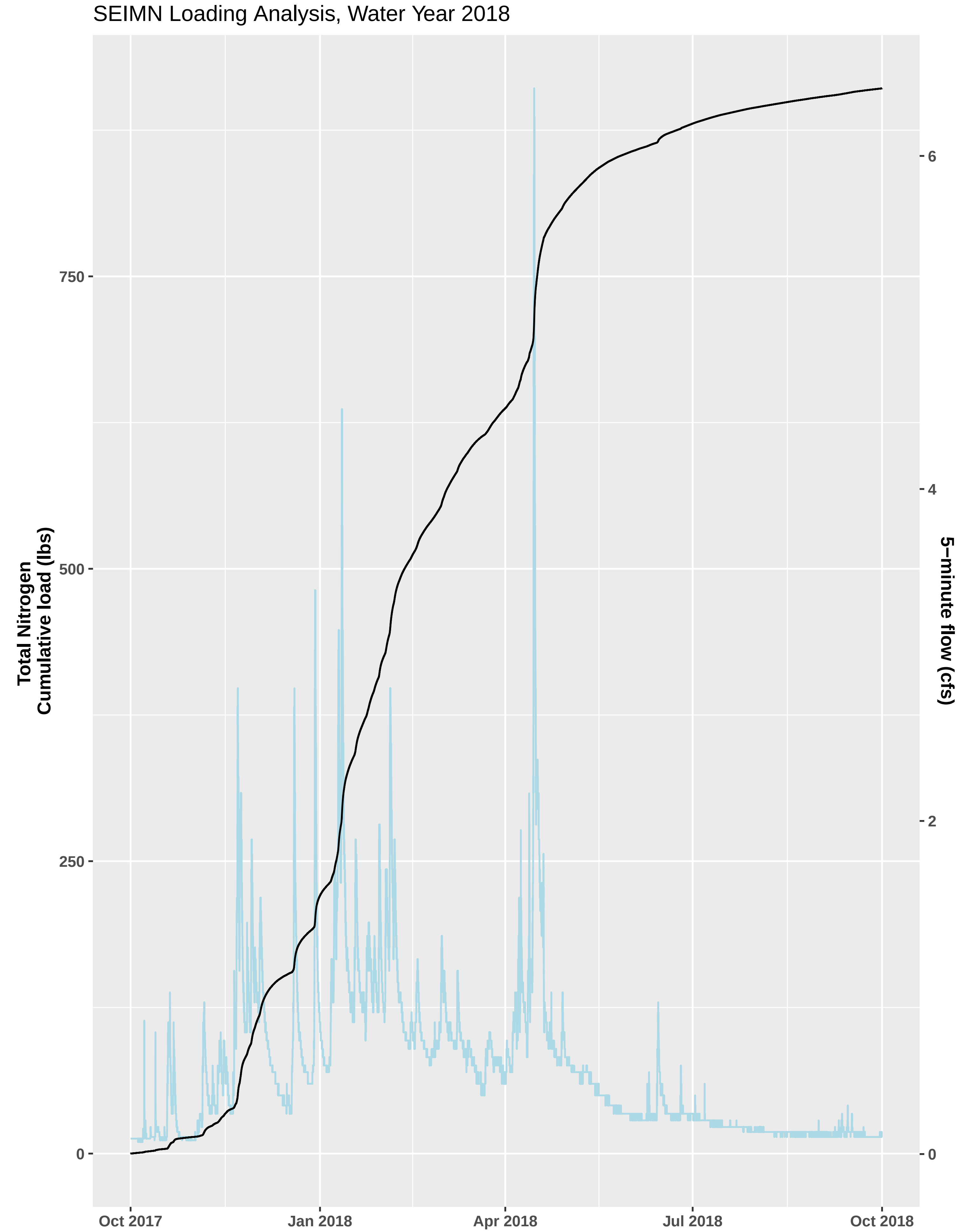


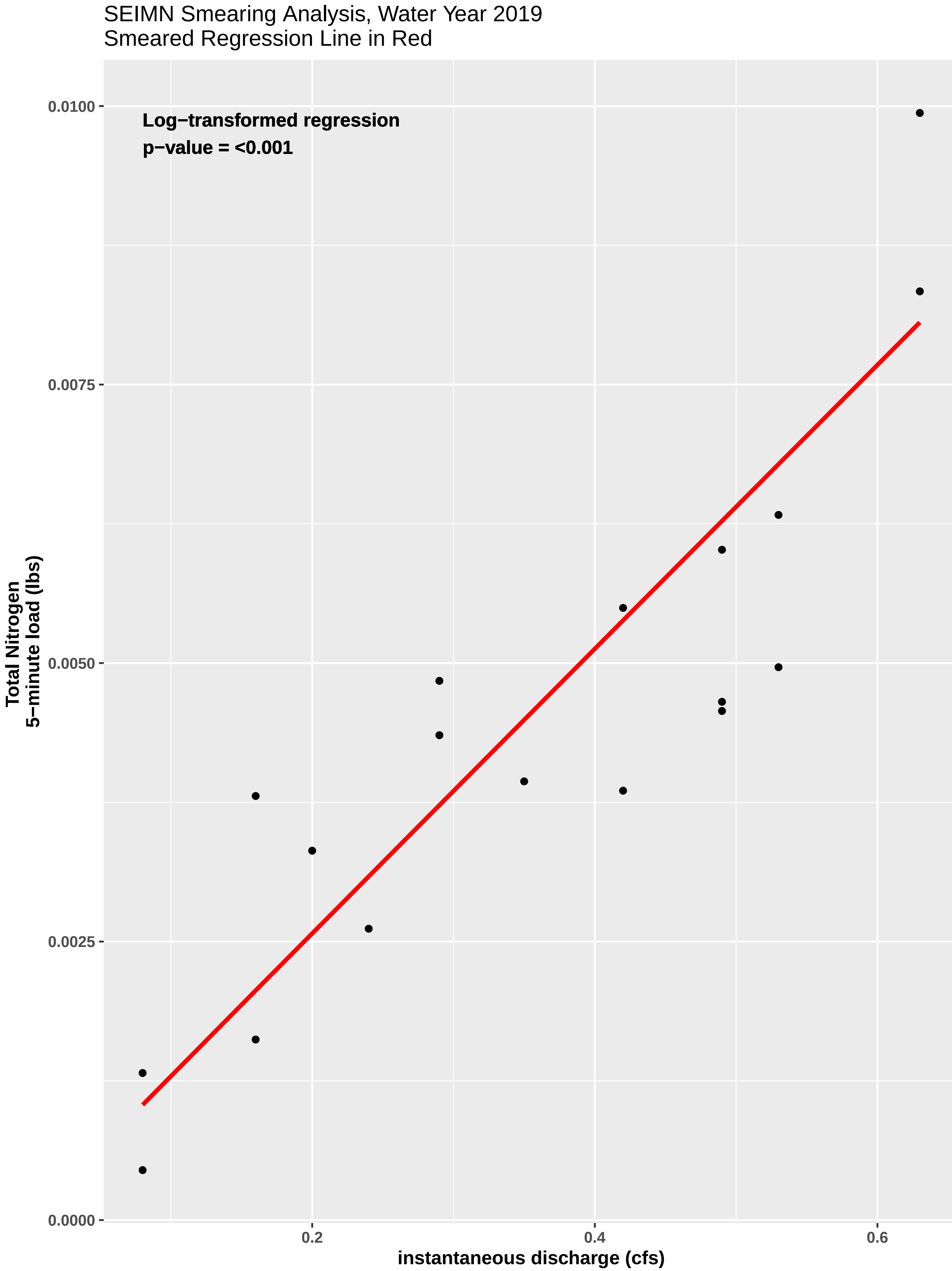
SEIMN Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.3
0.6
0.9
instantaneous discharge (cfs)



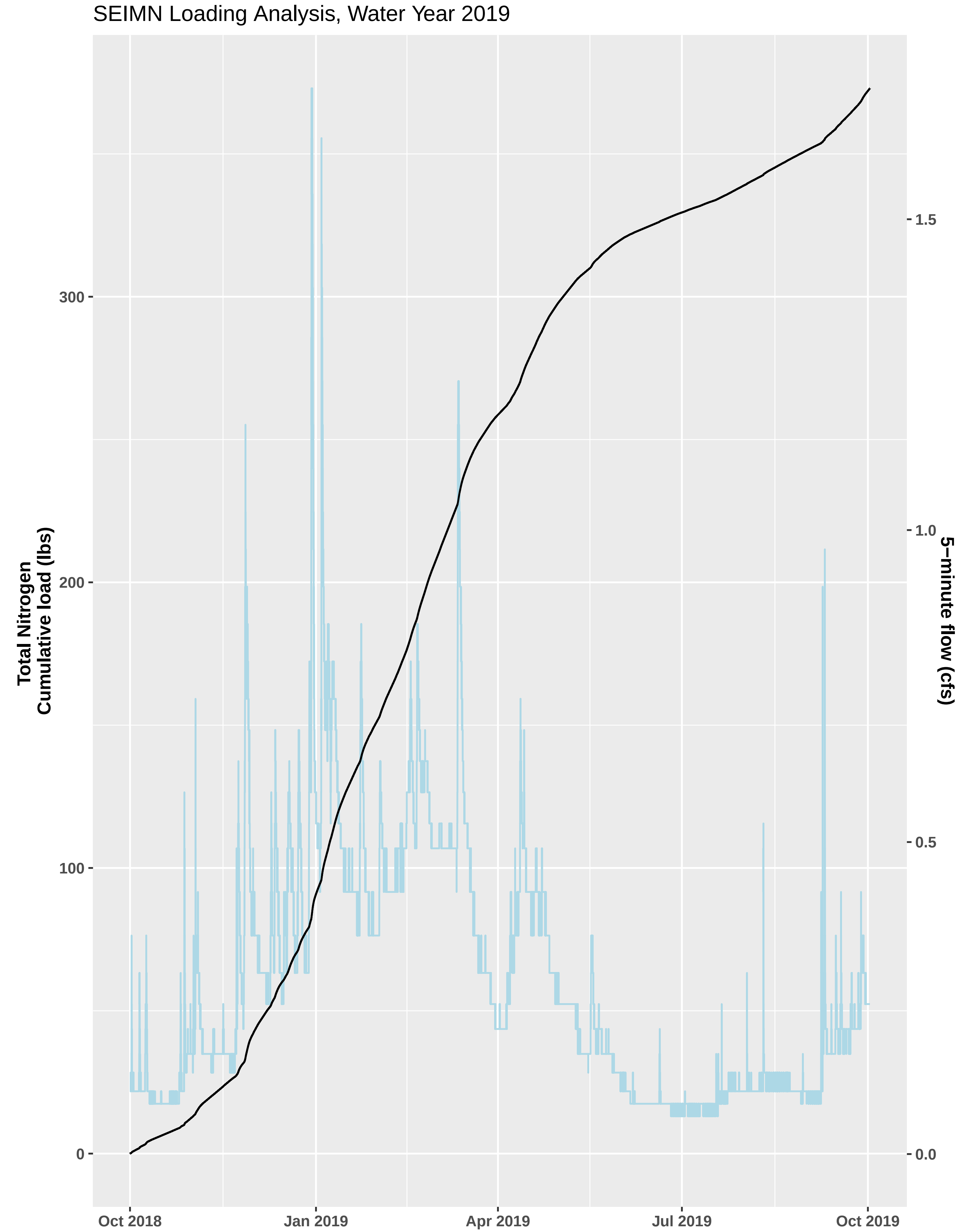
SEIMN Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
5−minute flow (cfs)
0
2
4
6
8
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


SEIMN Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

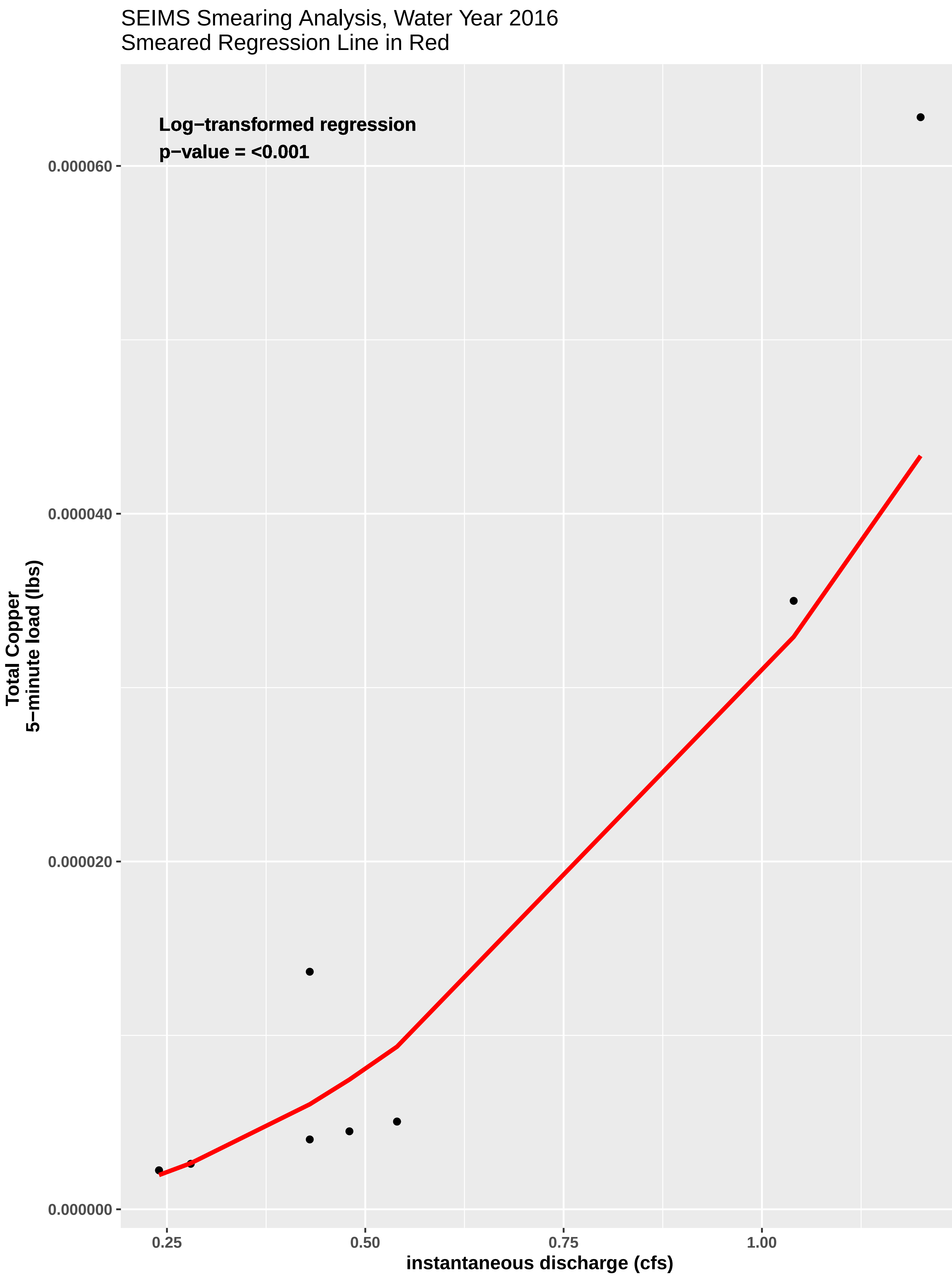

SEIMN Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
250
500
750
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



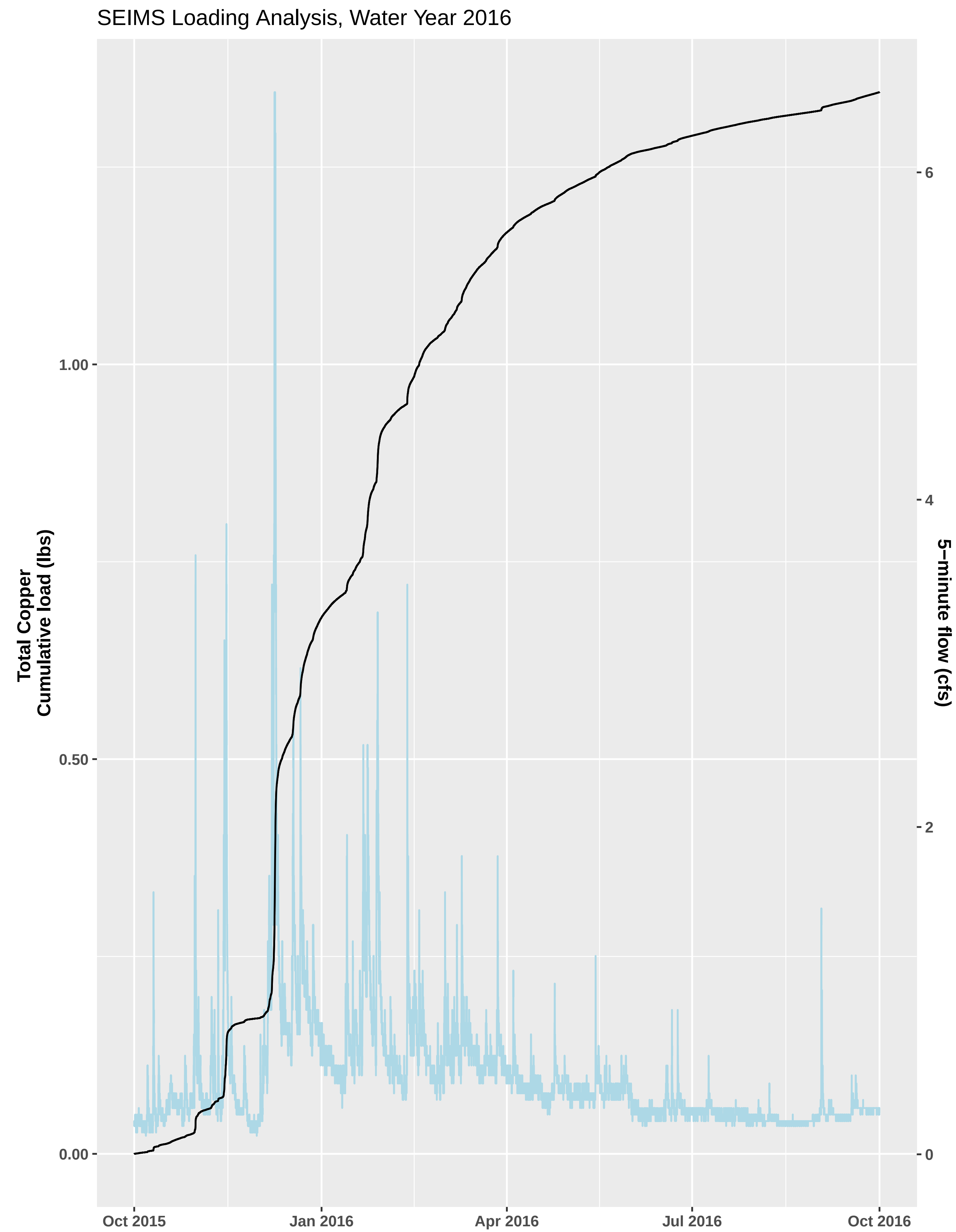
SEIMN Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0100
0.0075
0.0050
0.0025
0.0000
0.2
0.4
0.6
instantaneous discharge (cfs)



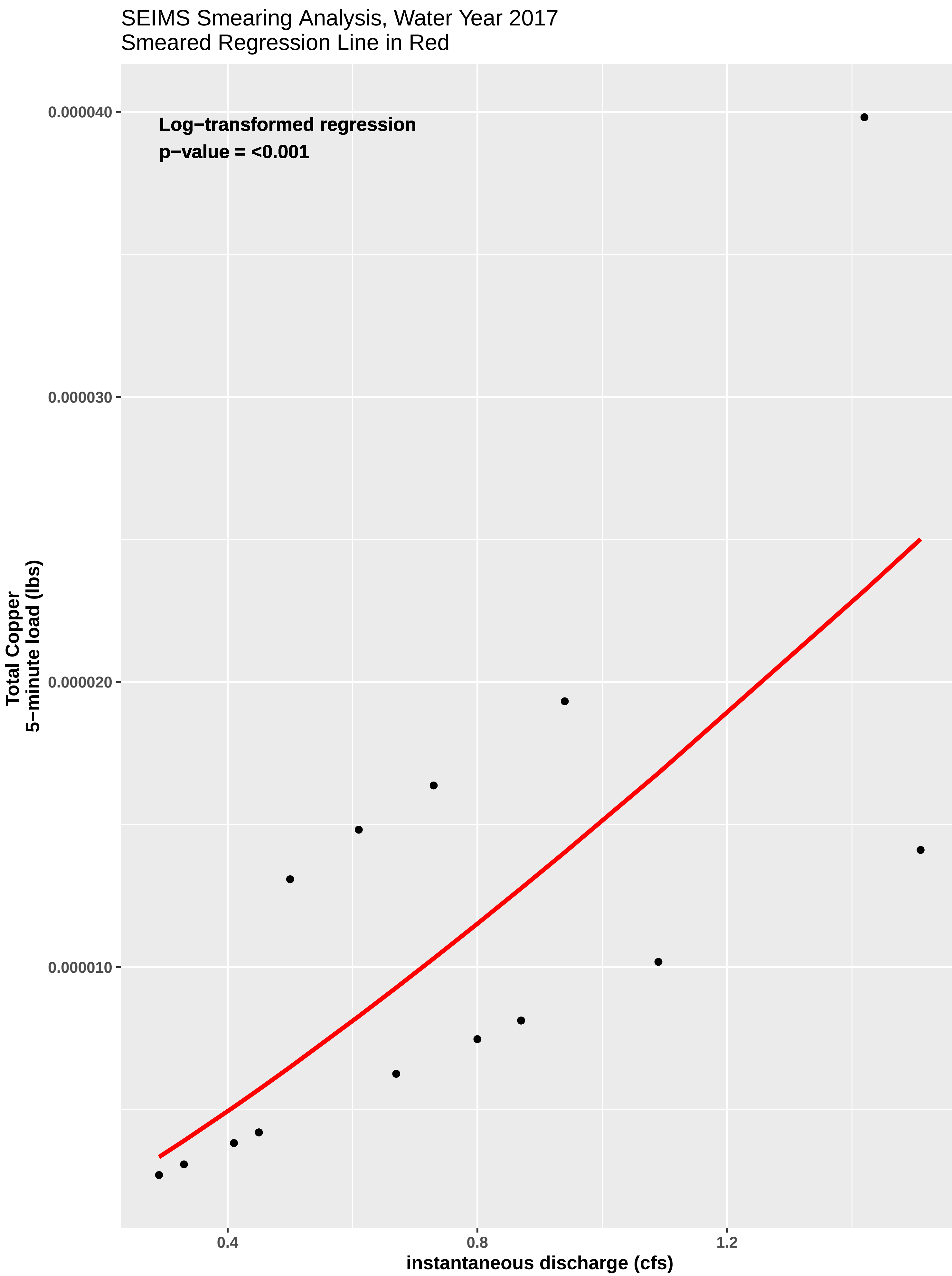
SEIMN Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
300
200
100
0
5−minute flow (cfs)
1.5
1.0
0.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

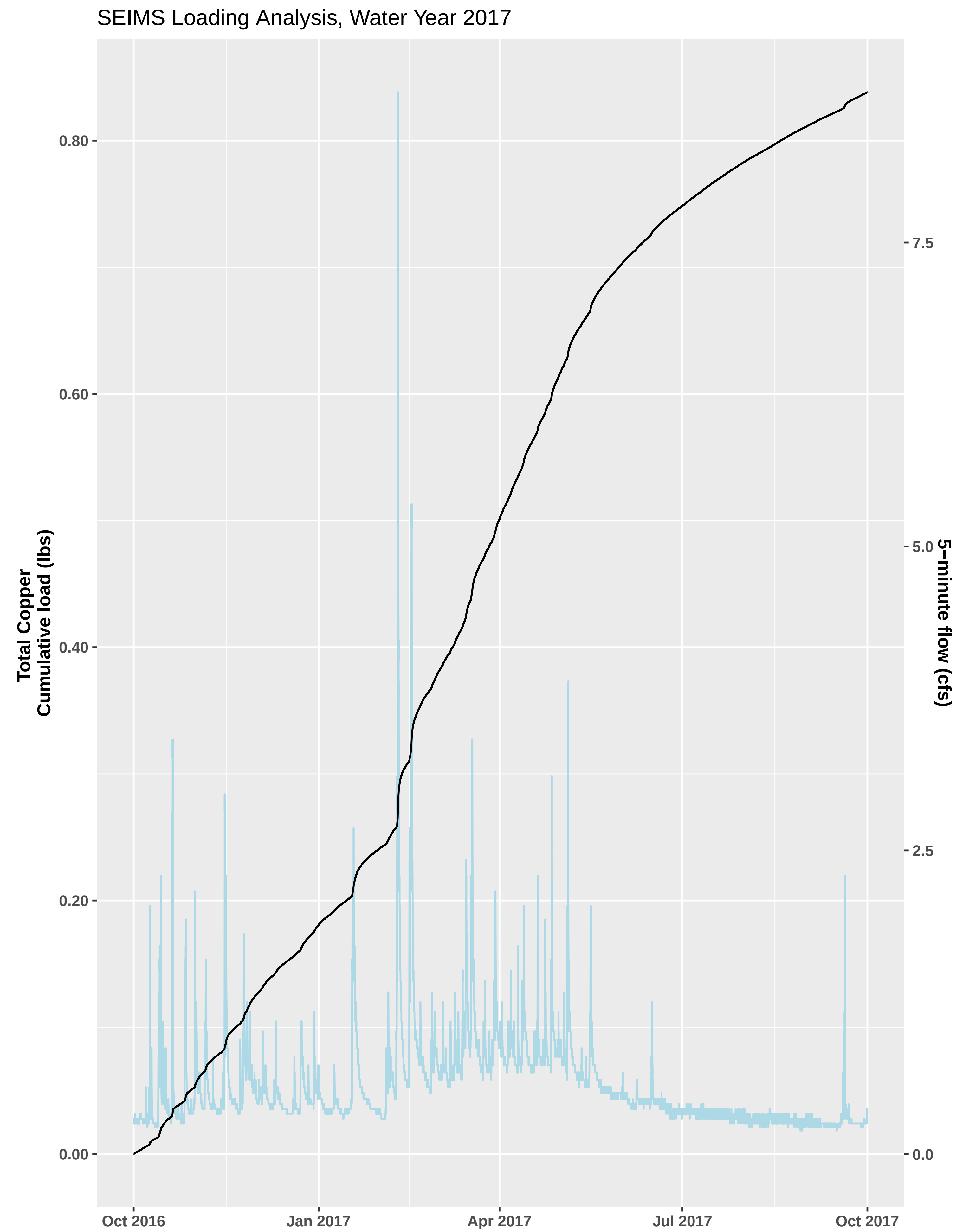


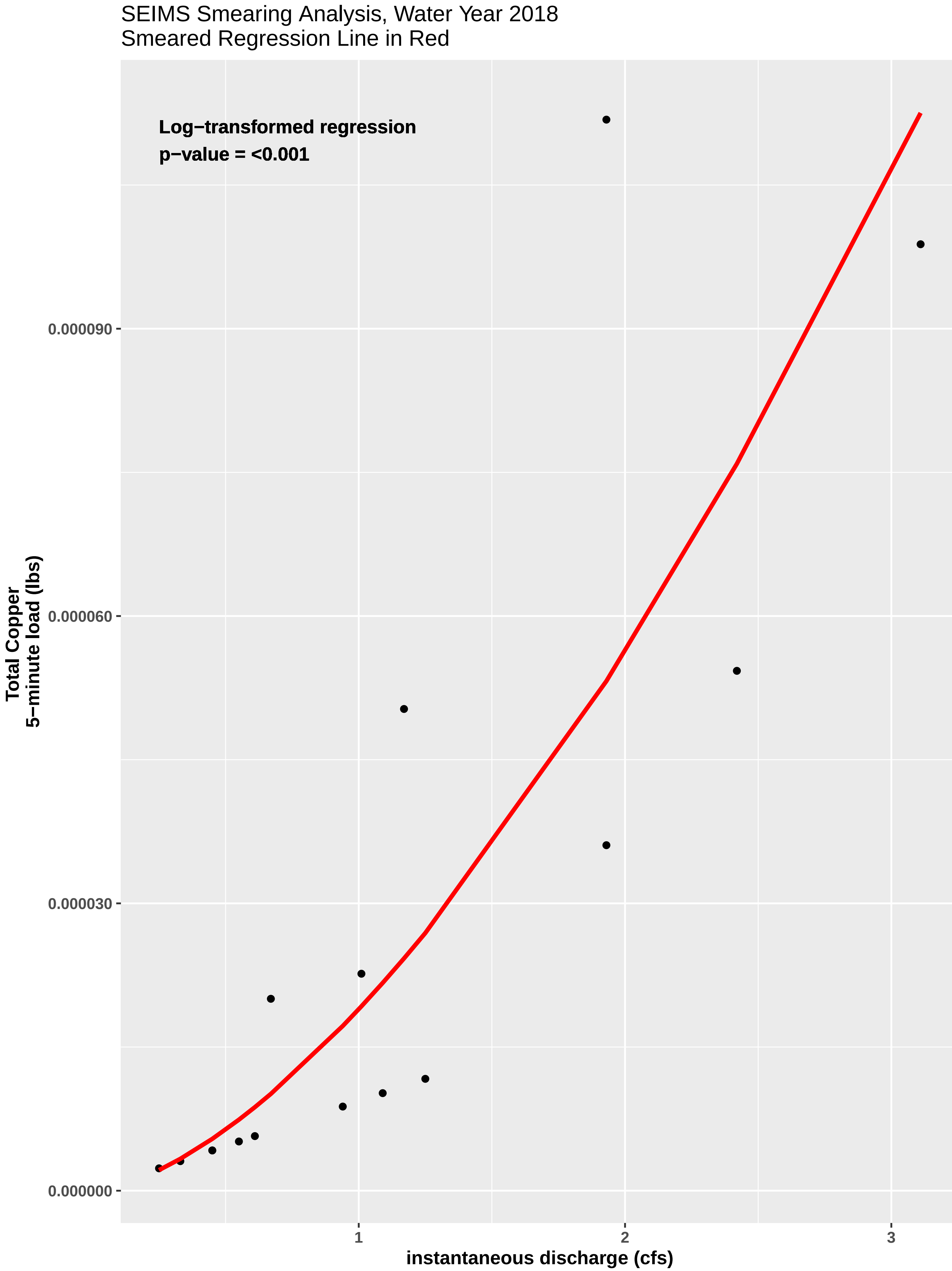
SEIMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000060
0.000040
0.000020
0.000000
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)



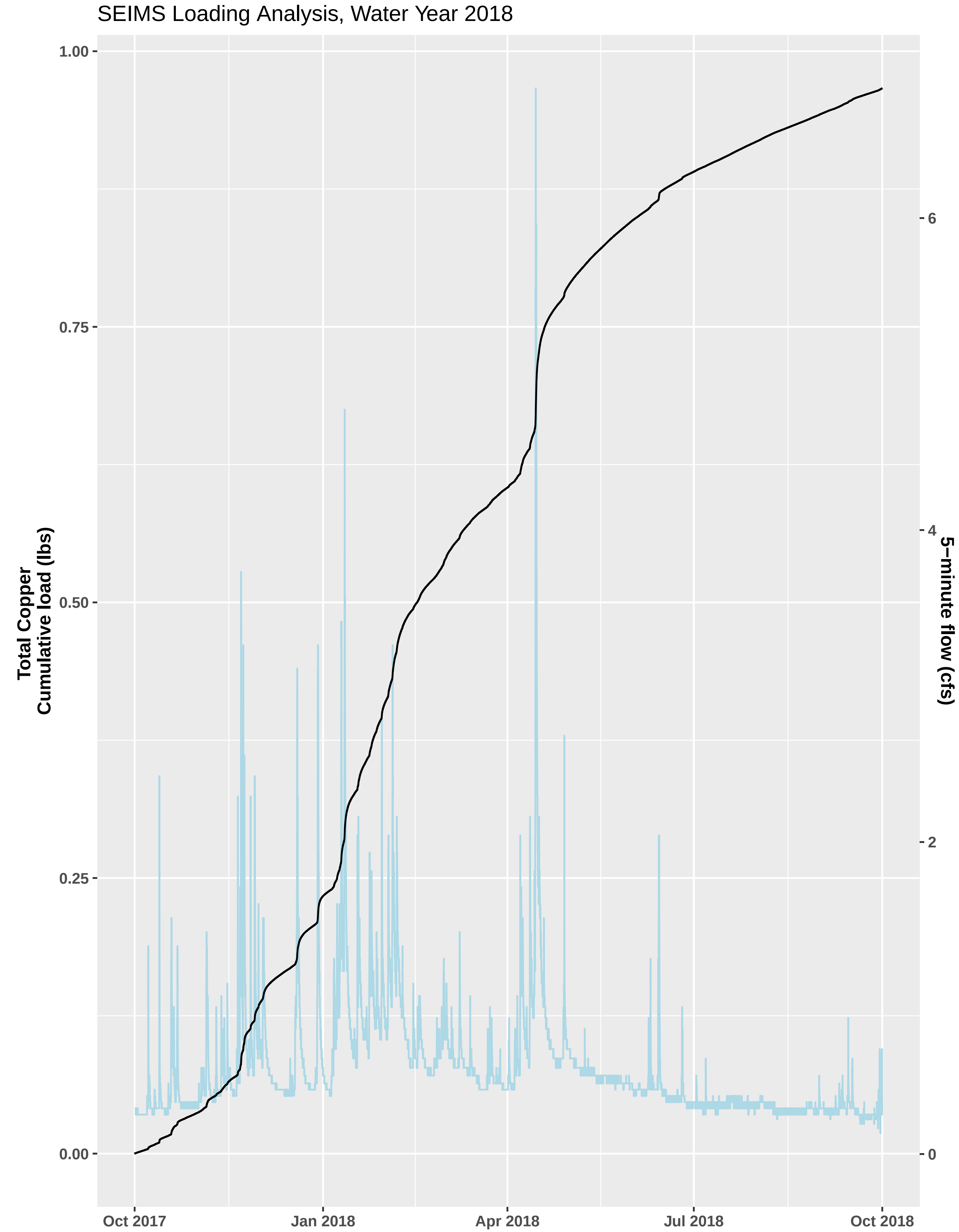
SEIMS Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
1.00
0.50
0.00
5−minute flow (cfs)
6
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


SEIMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000040
0.000030
0.000020
0.000010
0.4
0.8
1.2
instantaneous discharge (cfs)

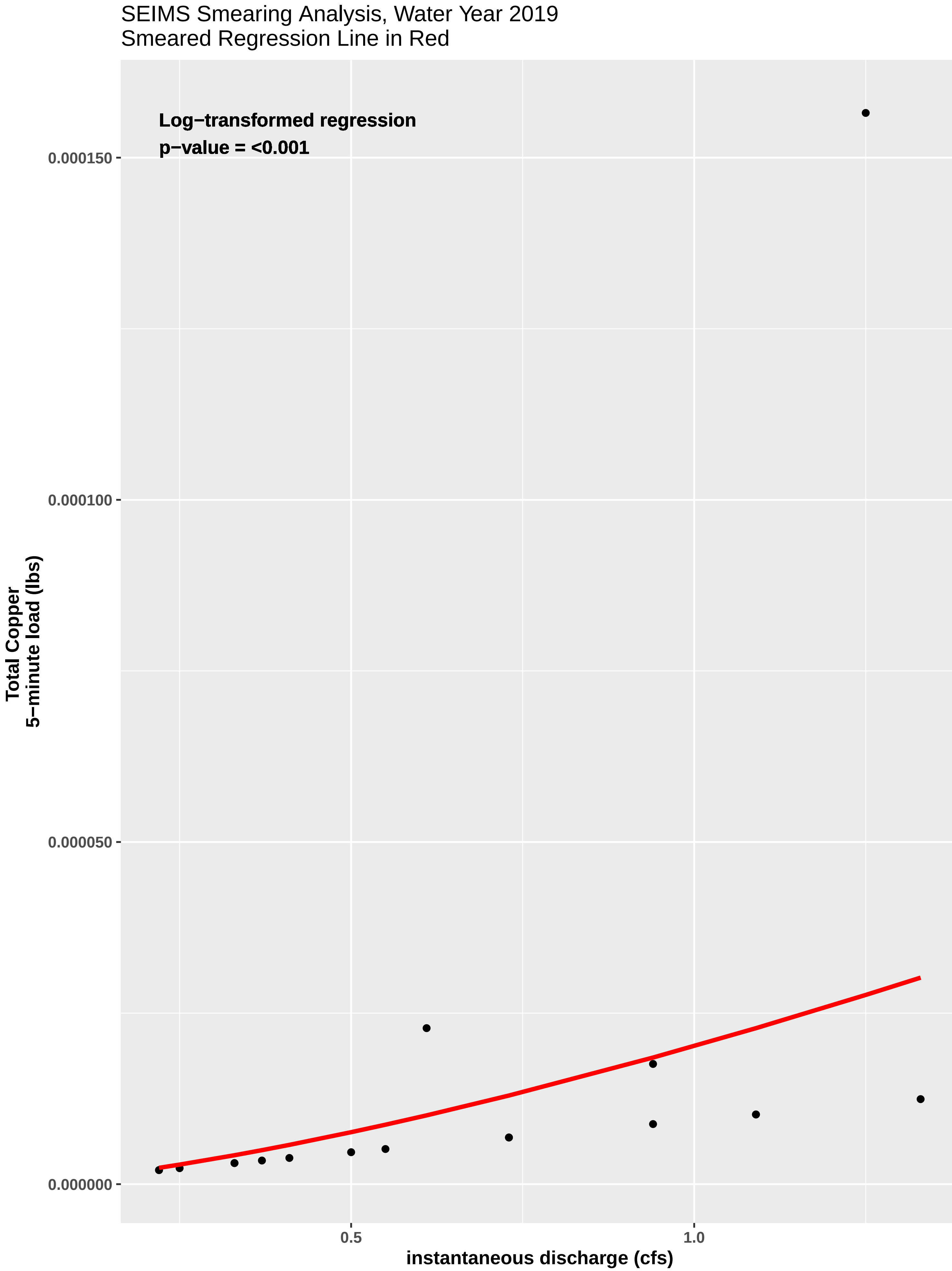

SEIMS Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
0.80
0.60
0.40
0.20
0.00
5−minute flow (cfs)
7.5
5.0
2.5
0.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



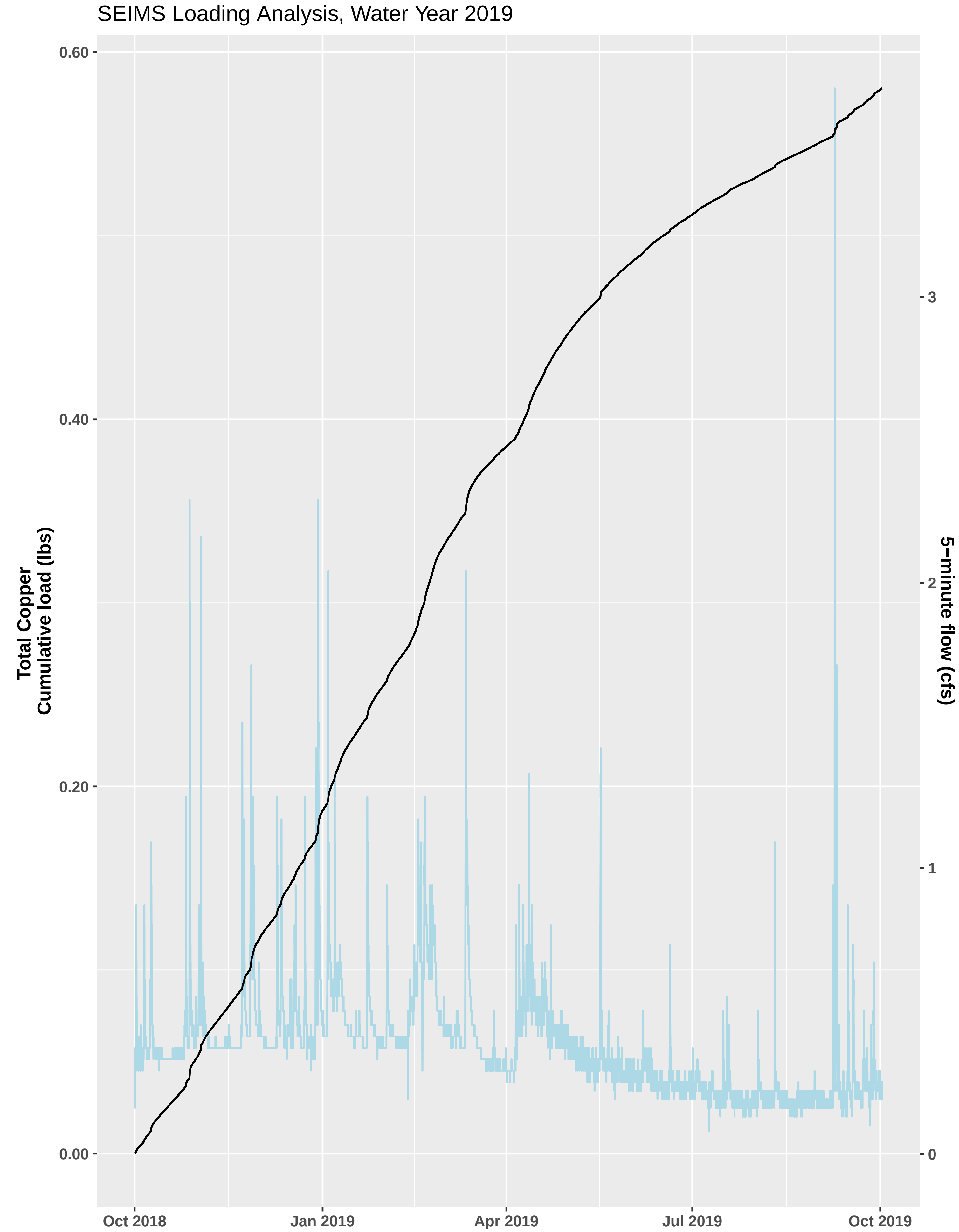
SEIMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000030
0.000060
0.000090
1
2
3
instantaneous discharge (cfs)



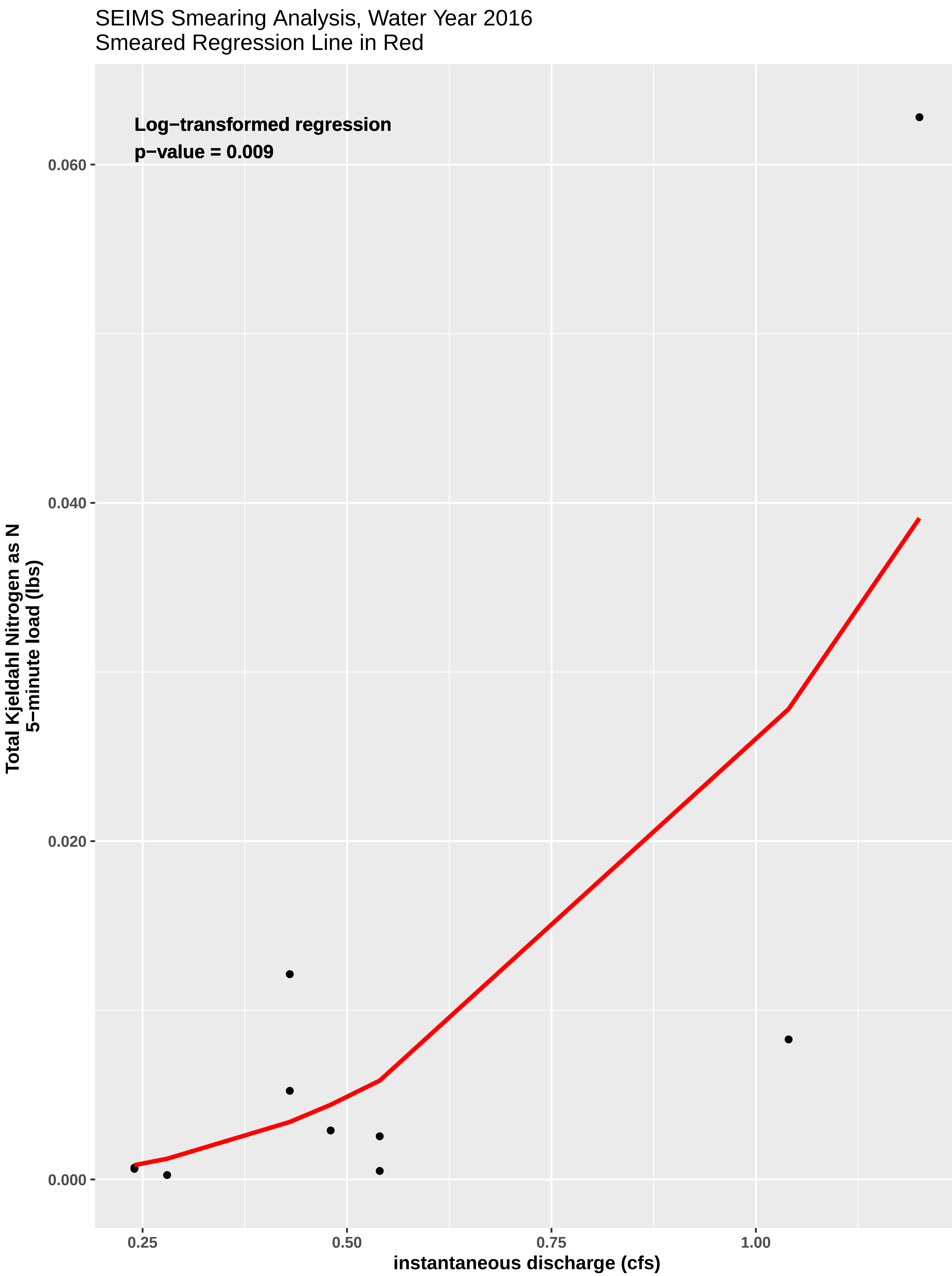
SEIMS Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.00
0.25
0.50
0.75
1.00
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



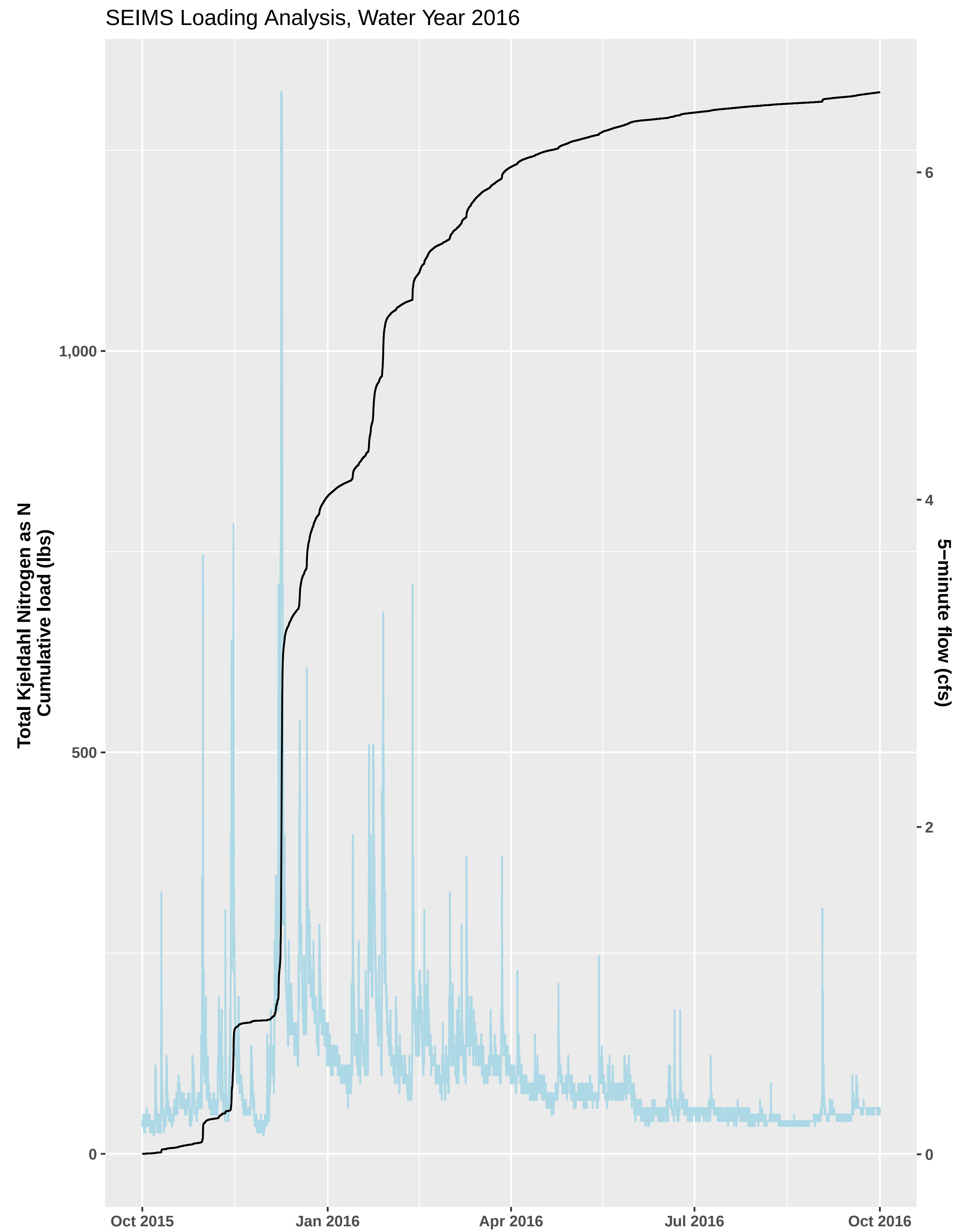
SEIMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000150
0.000100
0.000050
0.000000
Total Copper
5−minute load (lbs)
0.5
1.0
instantaneous discharge (cfs)



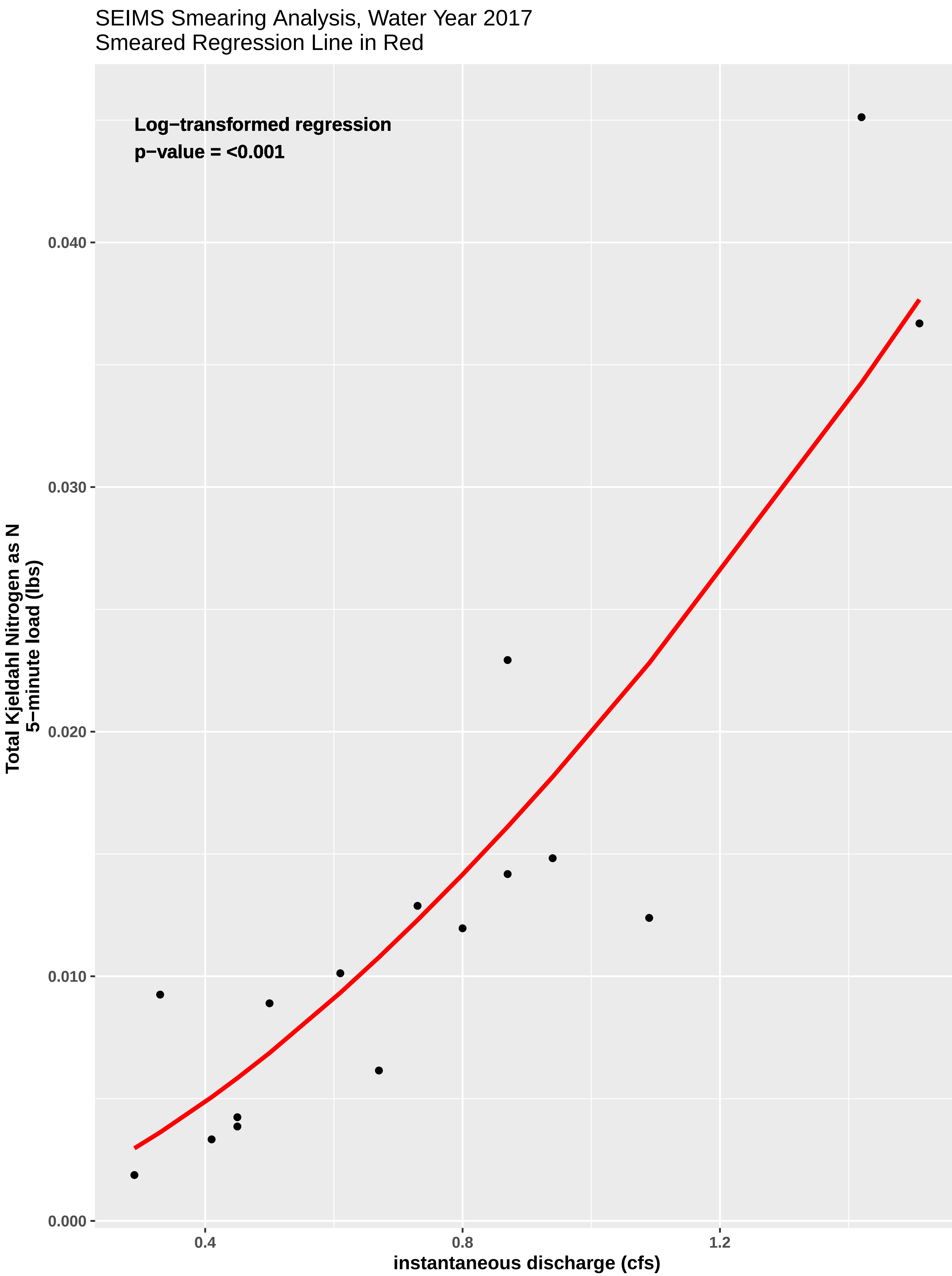
SEIMS Loading Analysis, Water Year 2019
0.60
0.40
0.20
0.00
Total Copper
Cumulative load (lbs)
3
2
1
0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019



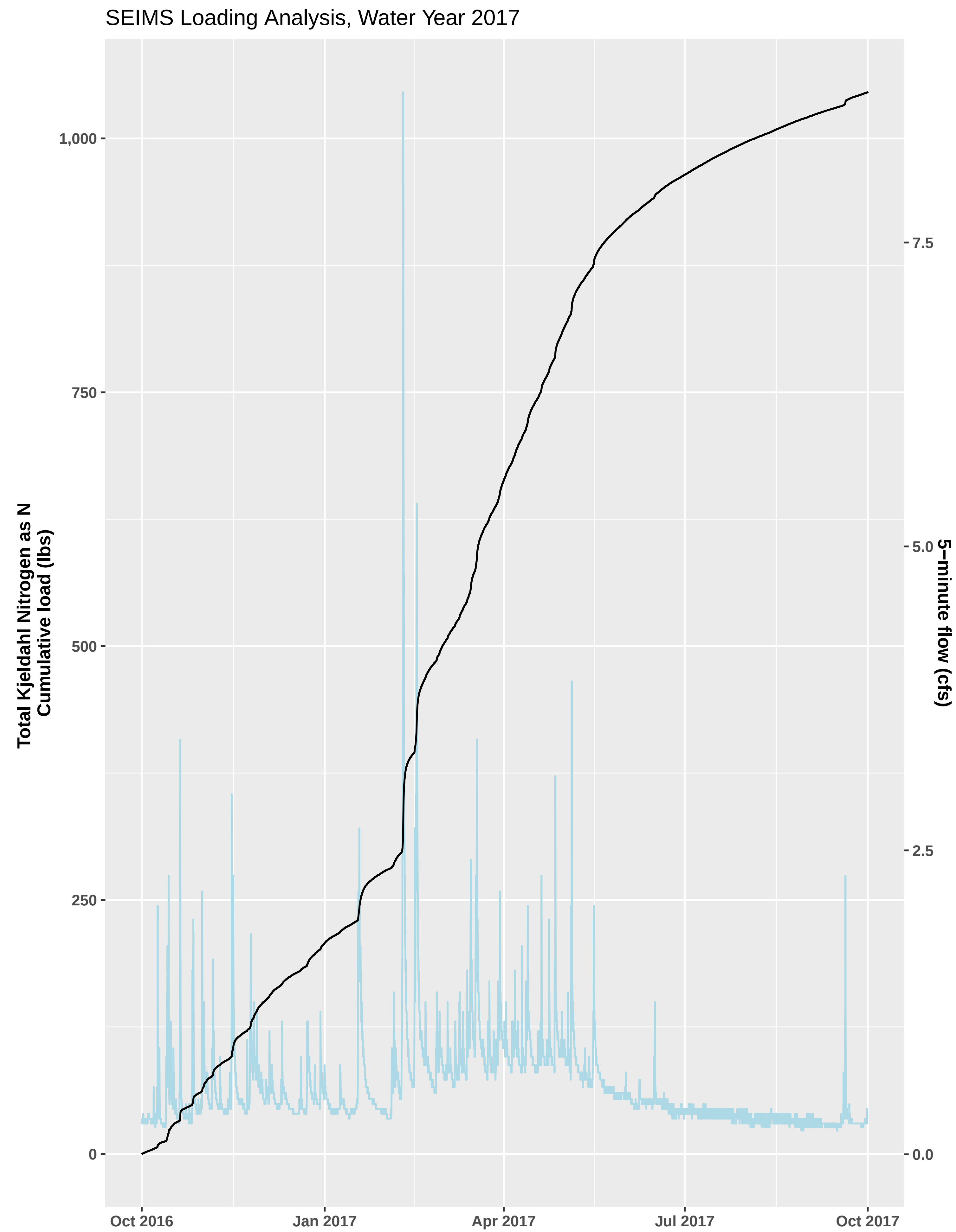
SEIMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.009
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)



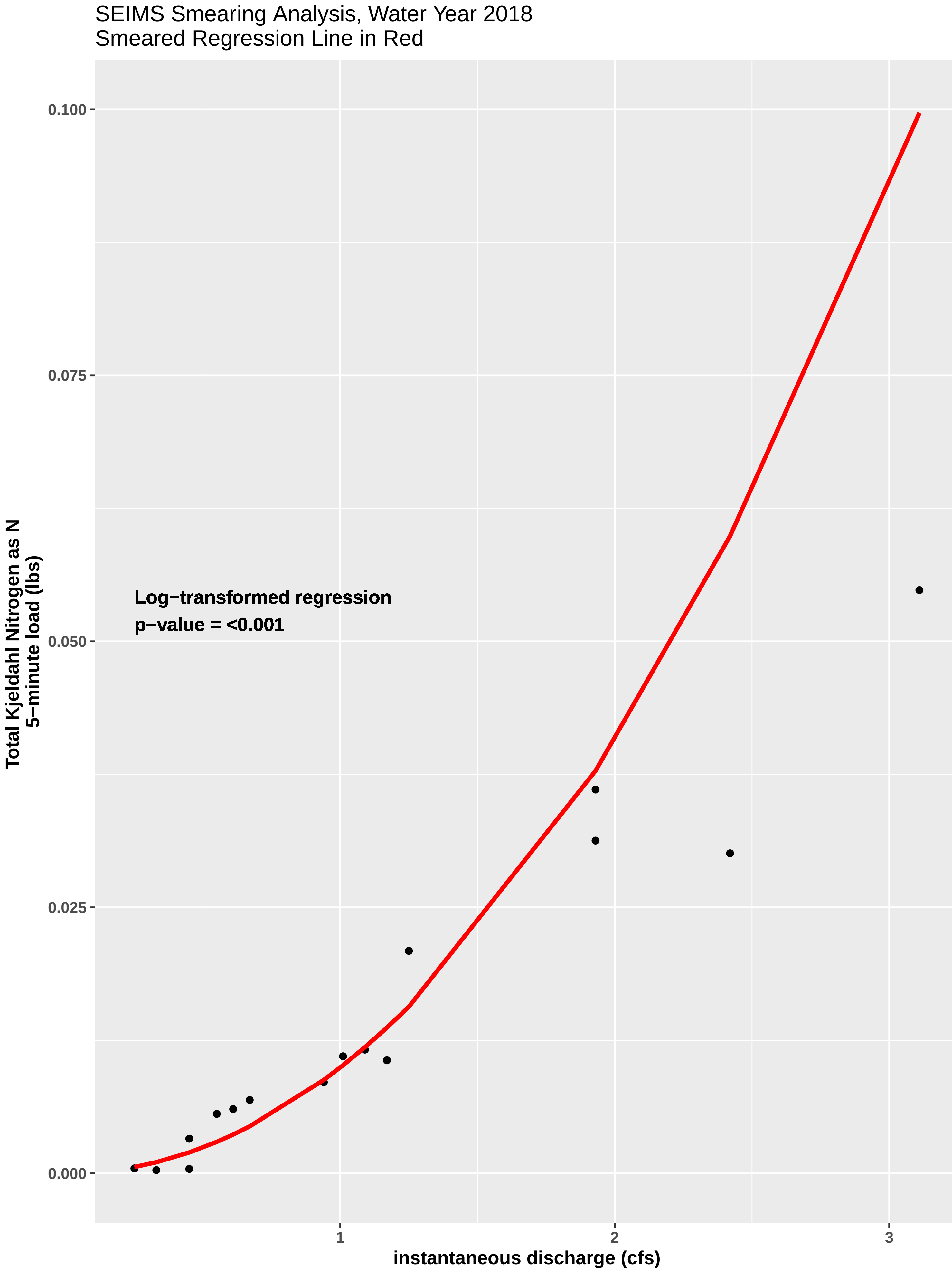
SEIMS Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

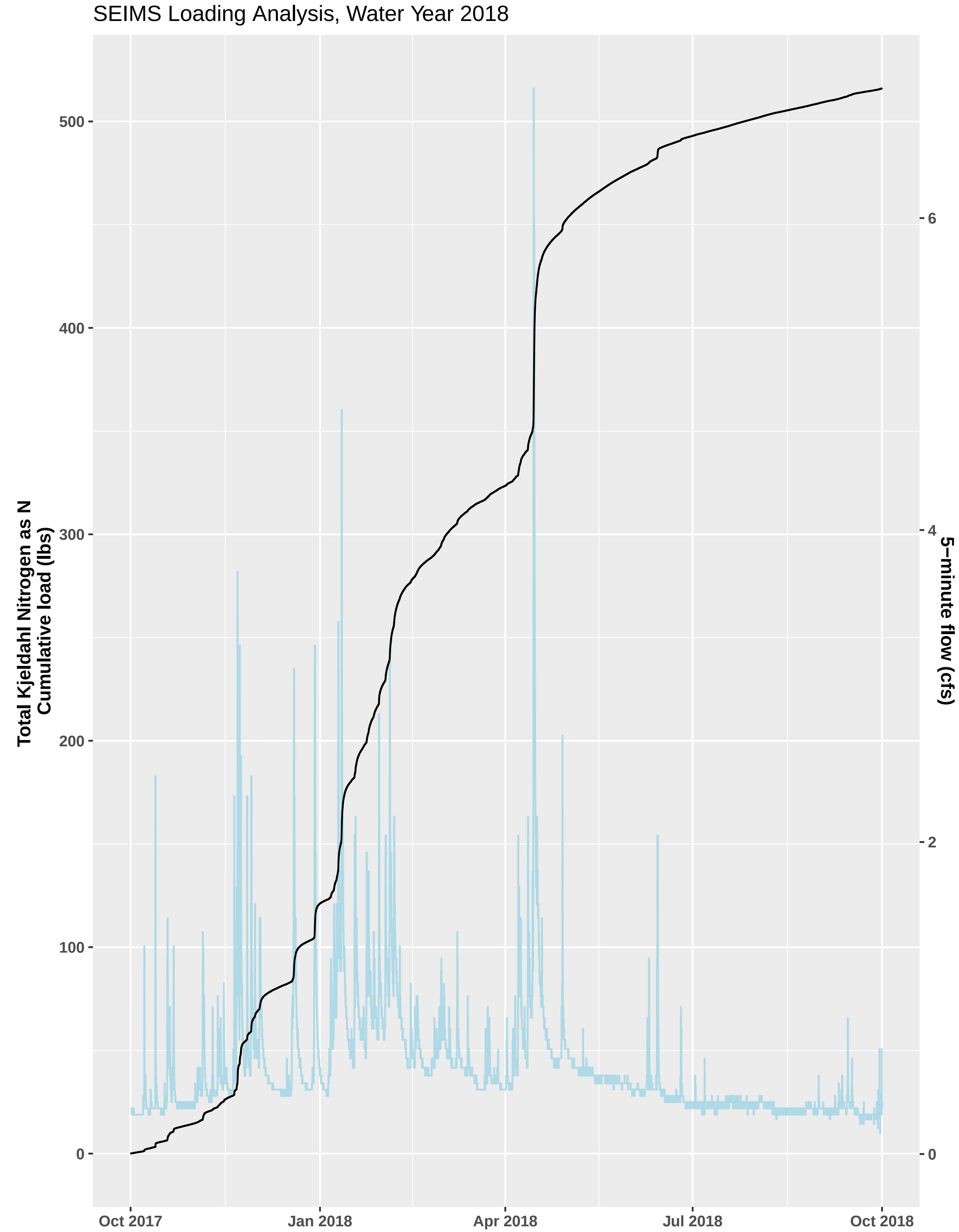


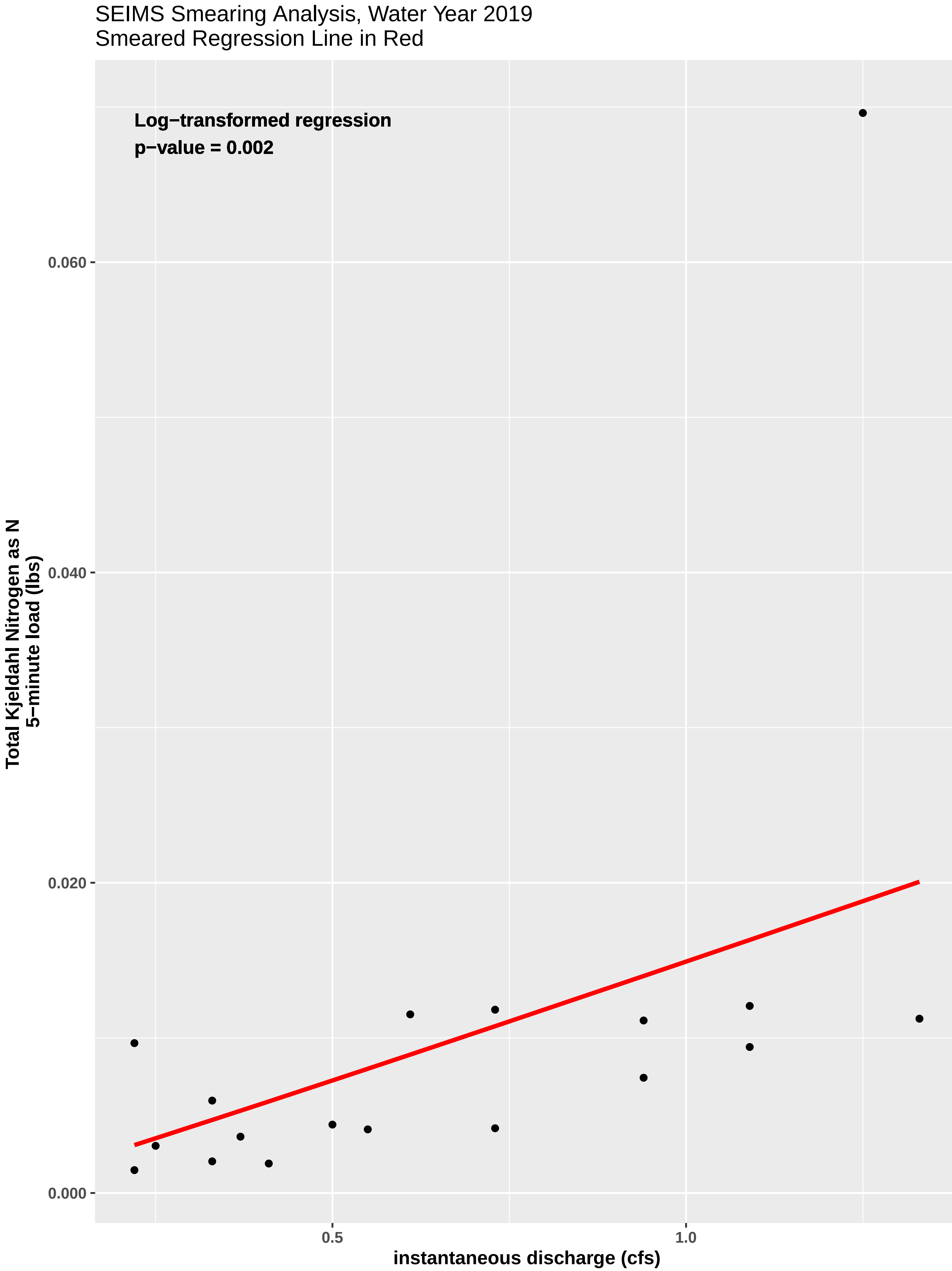
SEIMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.040
0.4
0.8
1.2
instantaneous discharge (cfs)

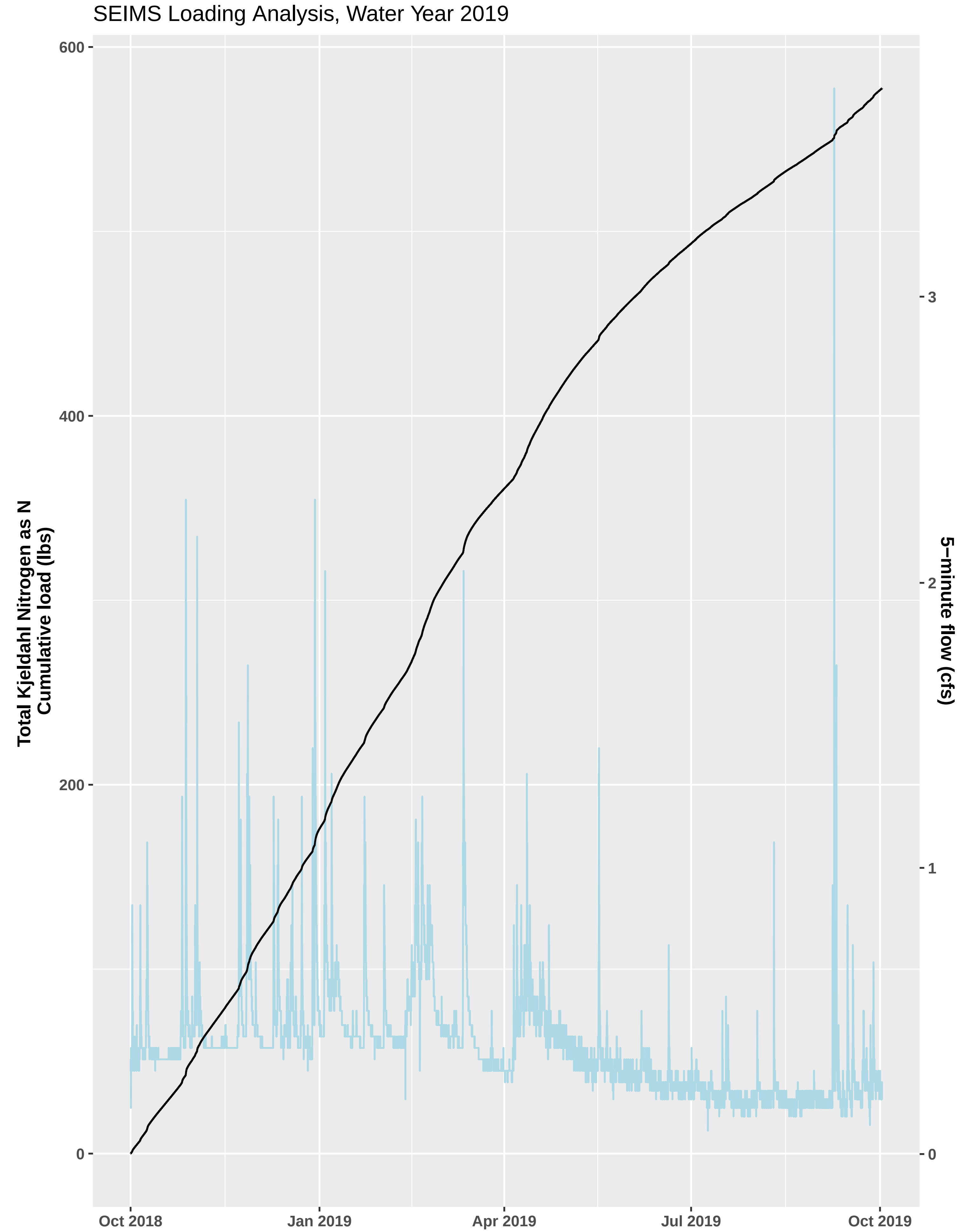


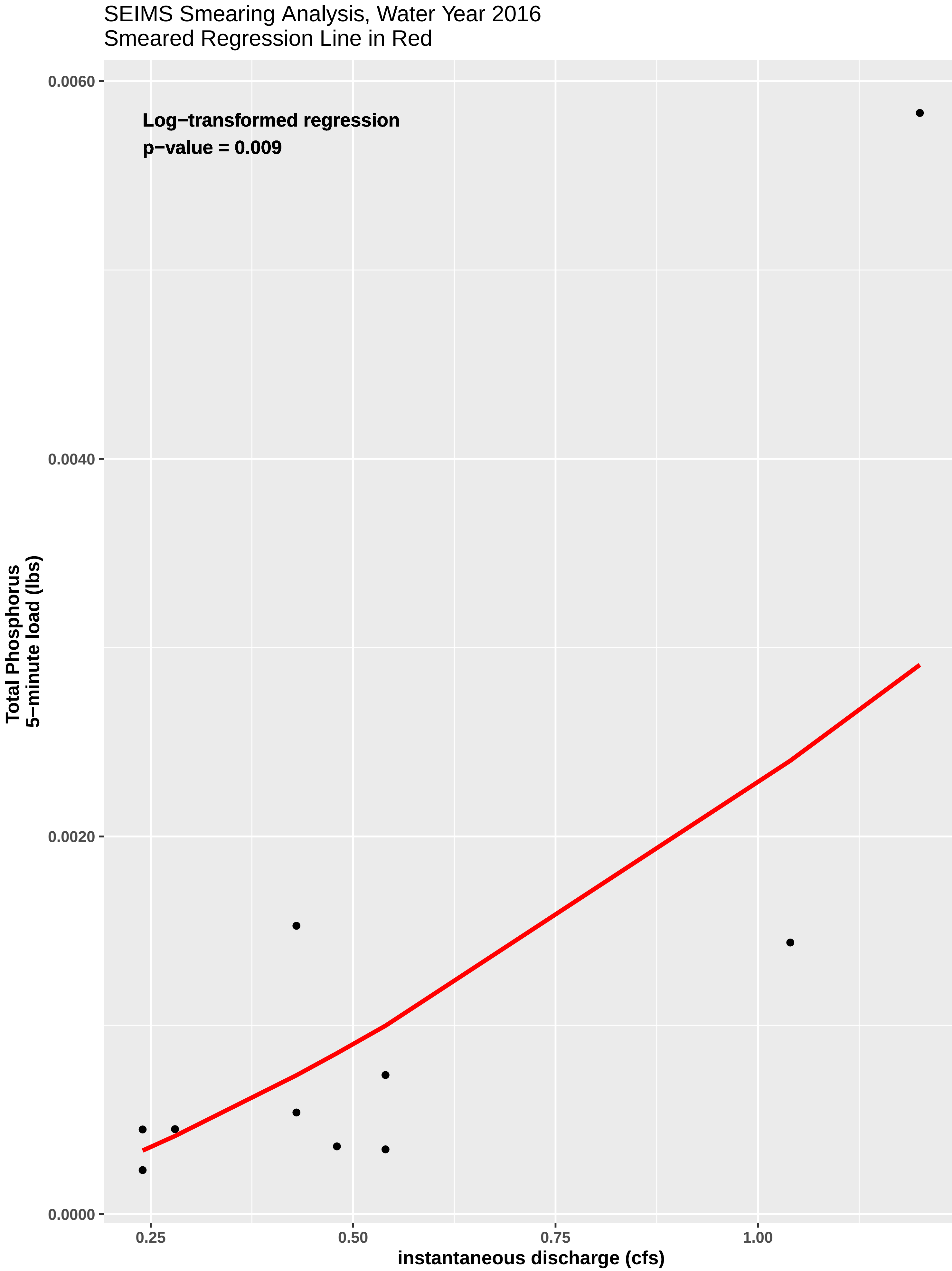
SEIMS Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
250
500
750
1,000
5−minute flow (cfs)
0.0
2.5
5.0
7.5
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


SEIMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.100
0.075
0.050
0.025
0.000
1
2
3

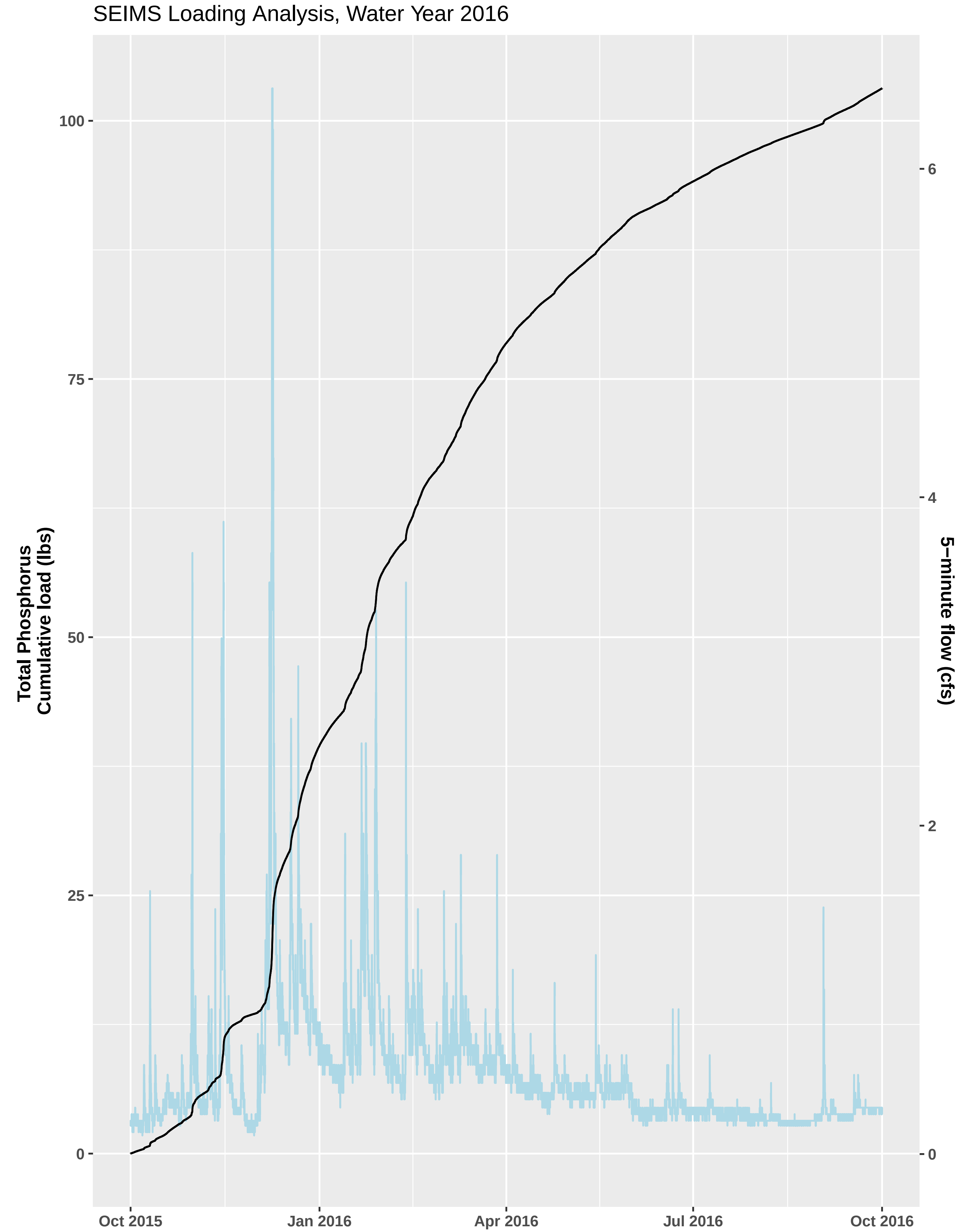

SEIMS Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
500
400
300
200
100
0
6
4
2
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


SEIMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.5
1.0
instantaneous discharge (cfs)

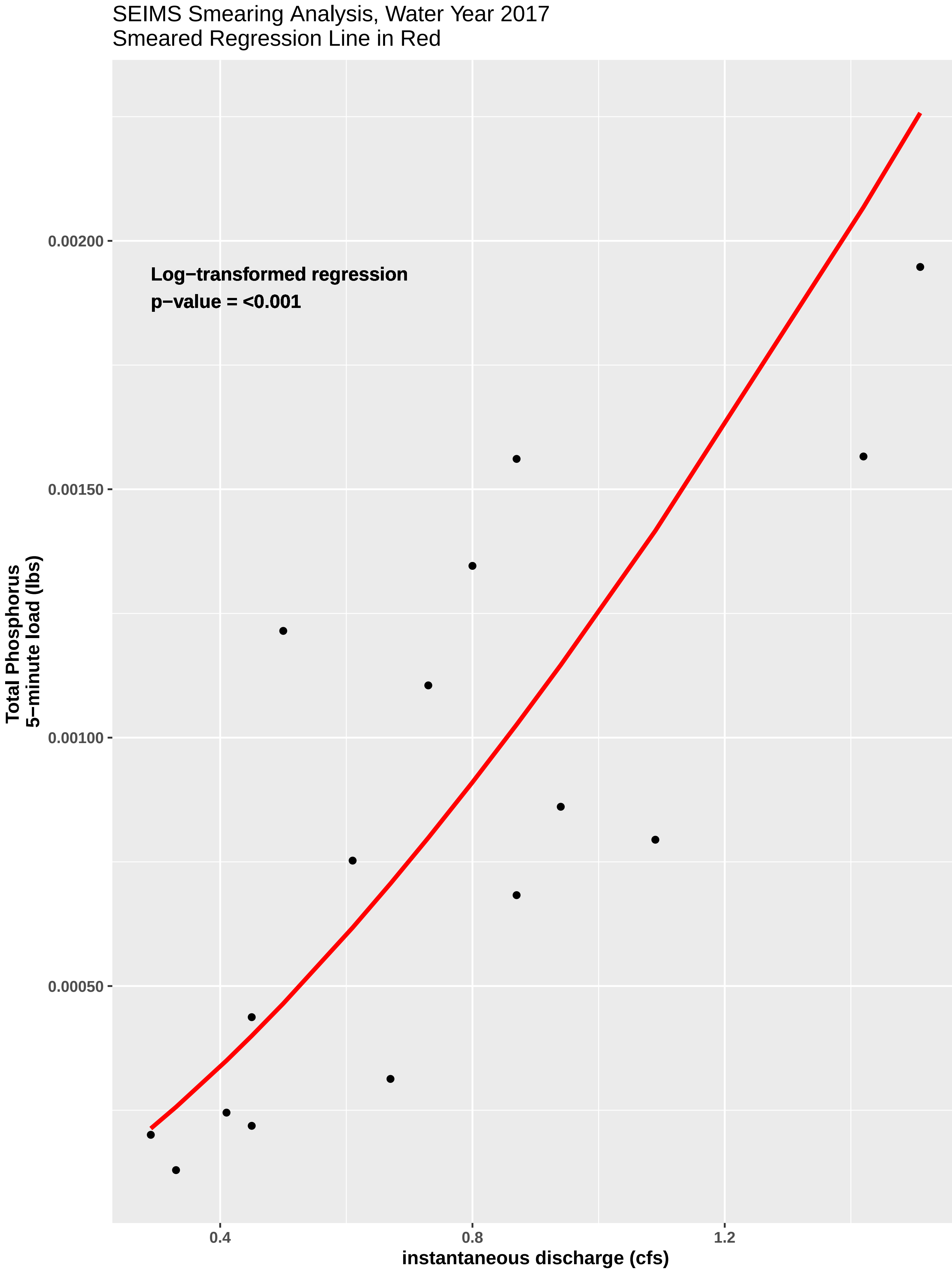

SEIMS Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
1
2
3
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

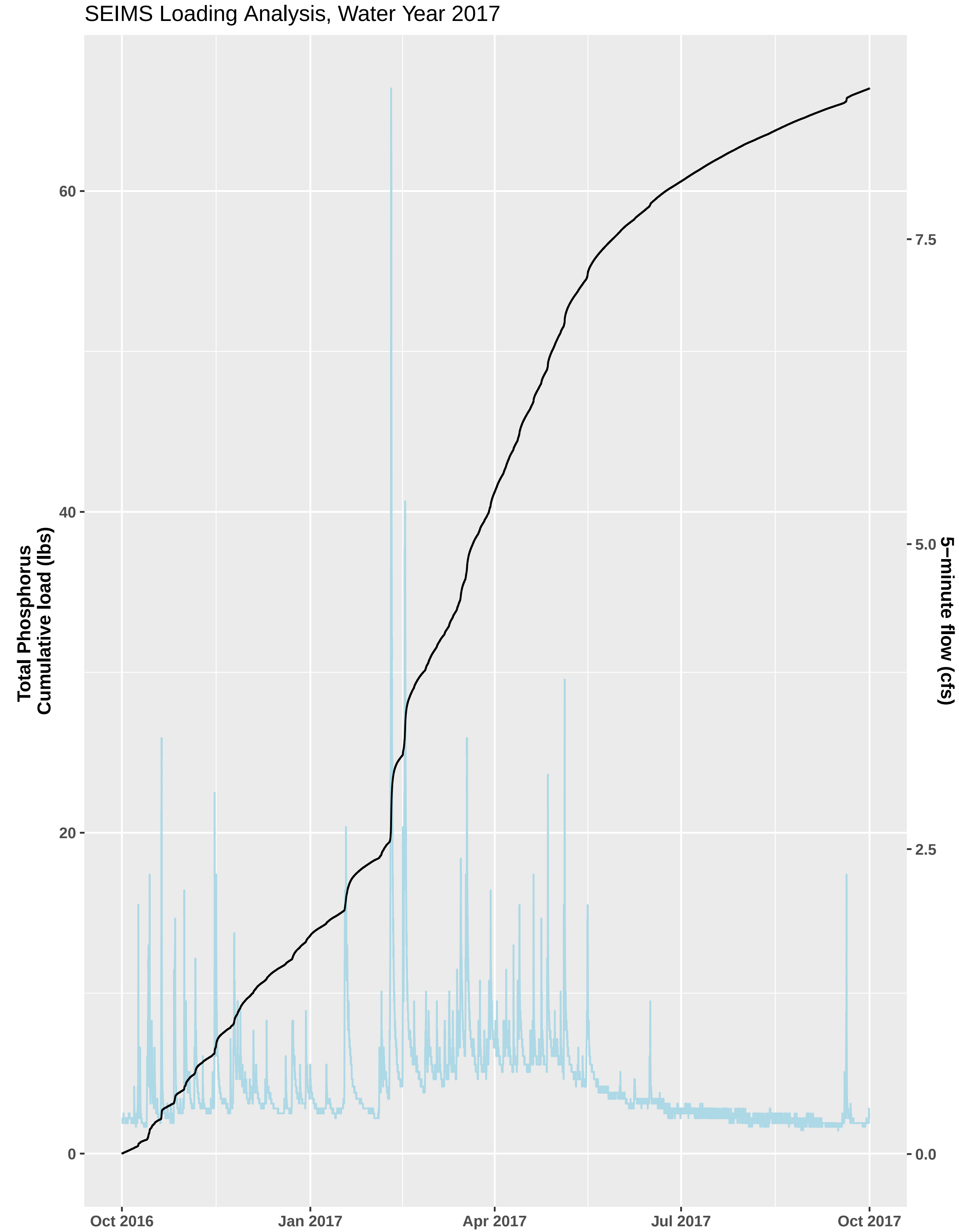


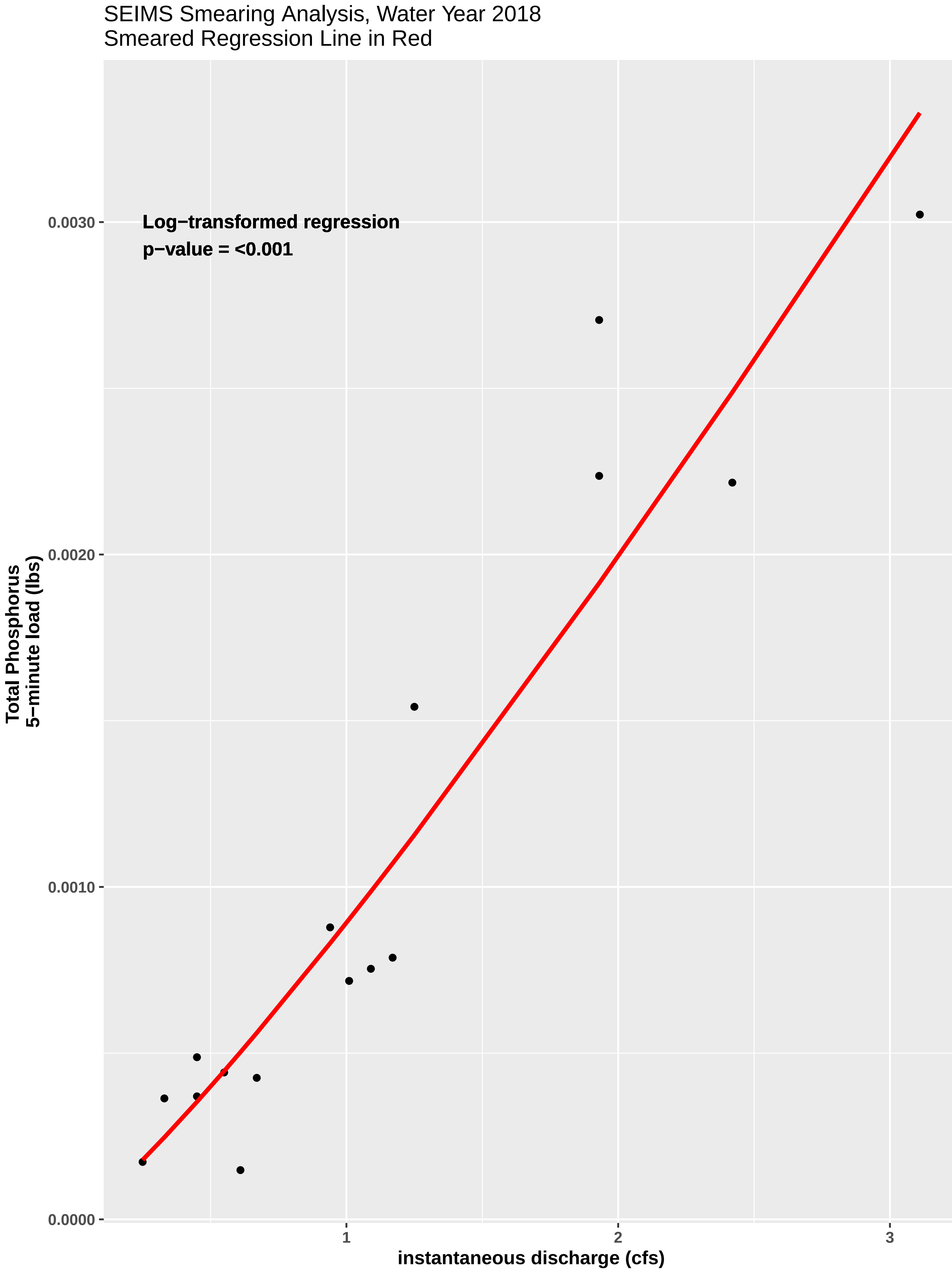
SEIMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.009
Total Phosphorus
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

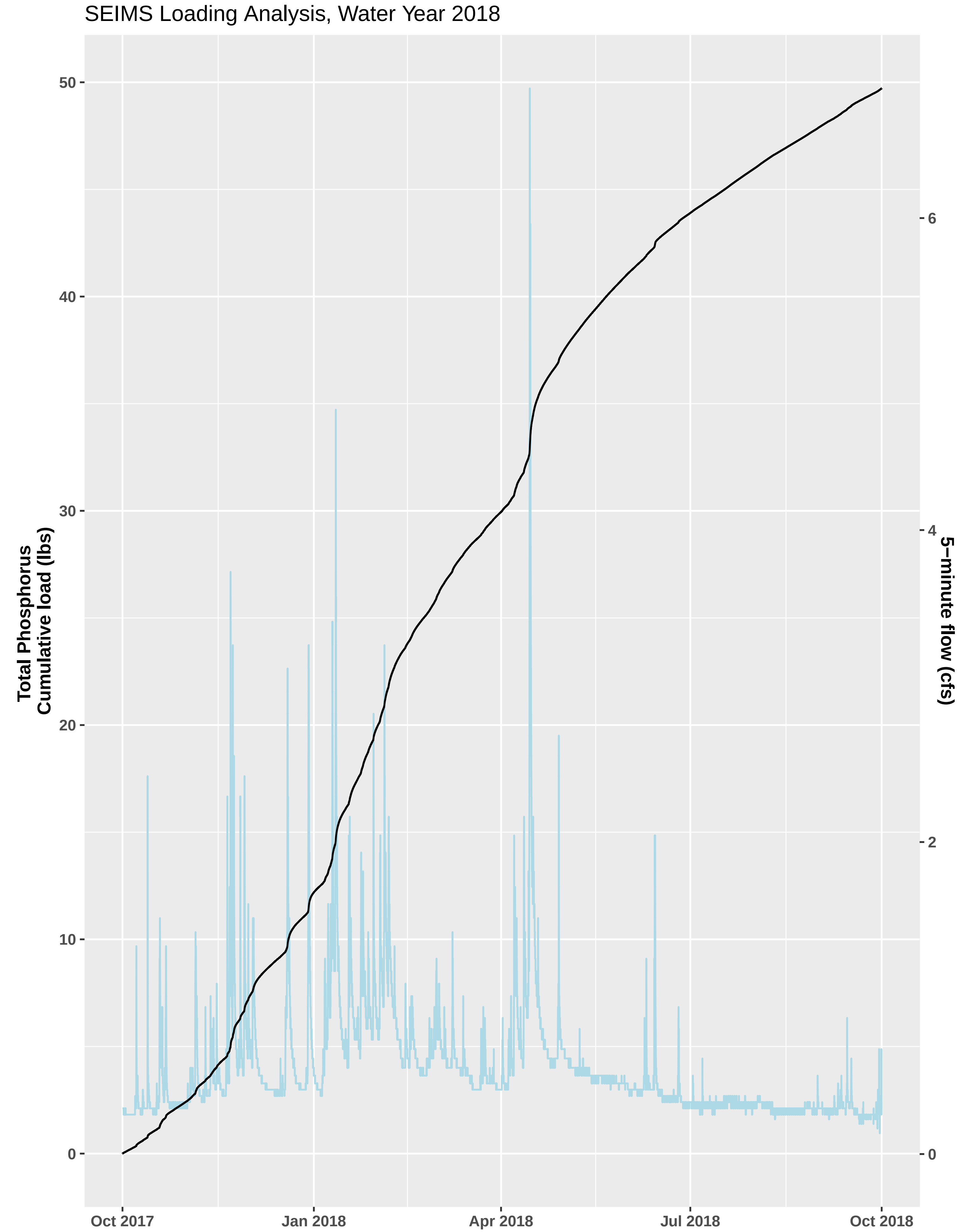


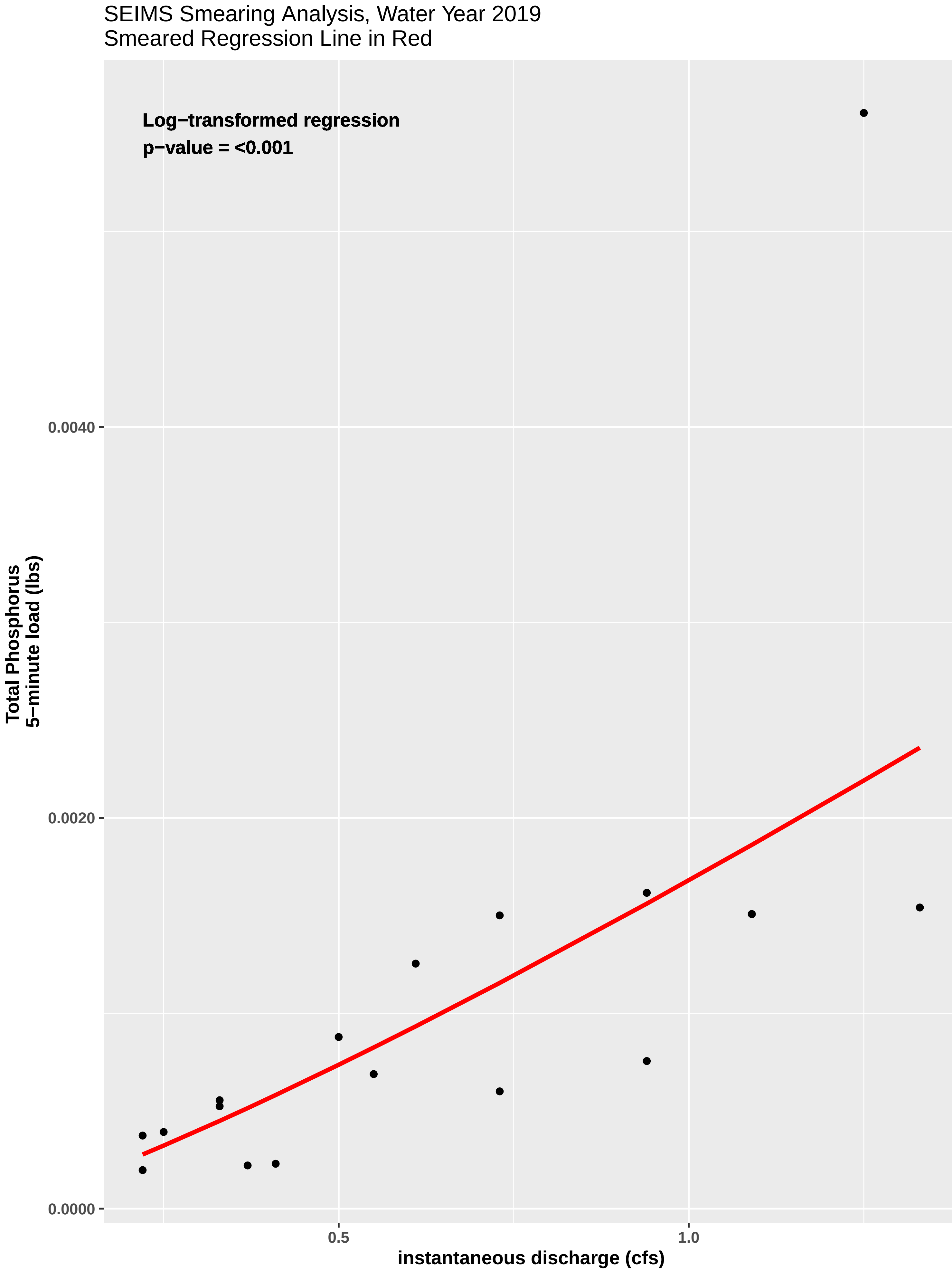
SEIMS Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
100
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


SEIMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00050
0.00100
0.00150
0.00200
0.4
0.8
1.2
instantaneous discharge (cfs)

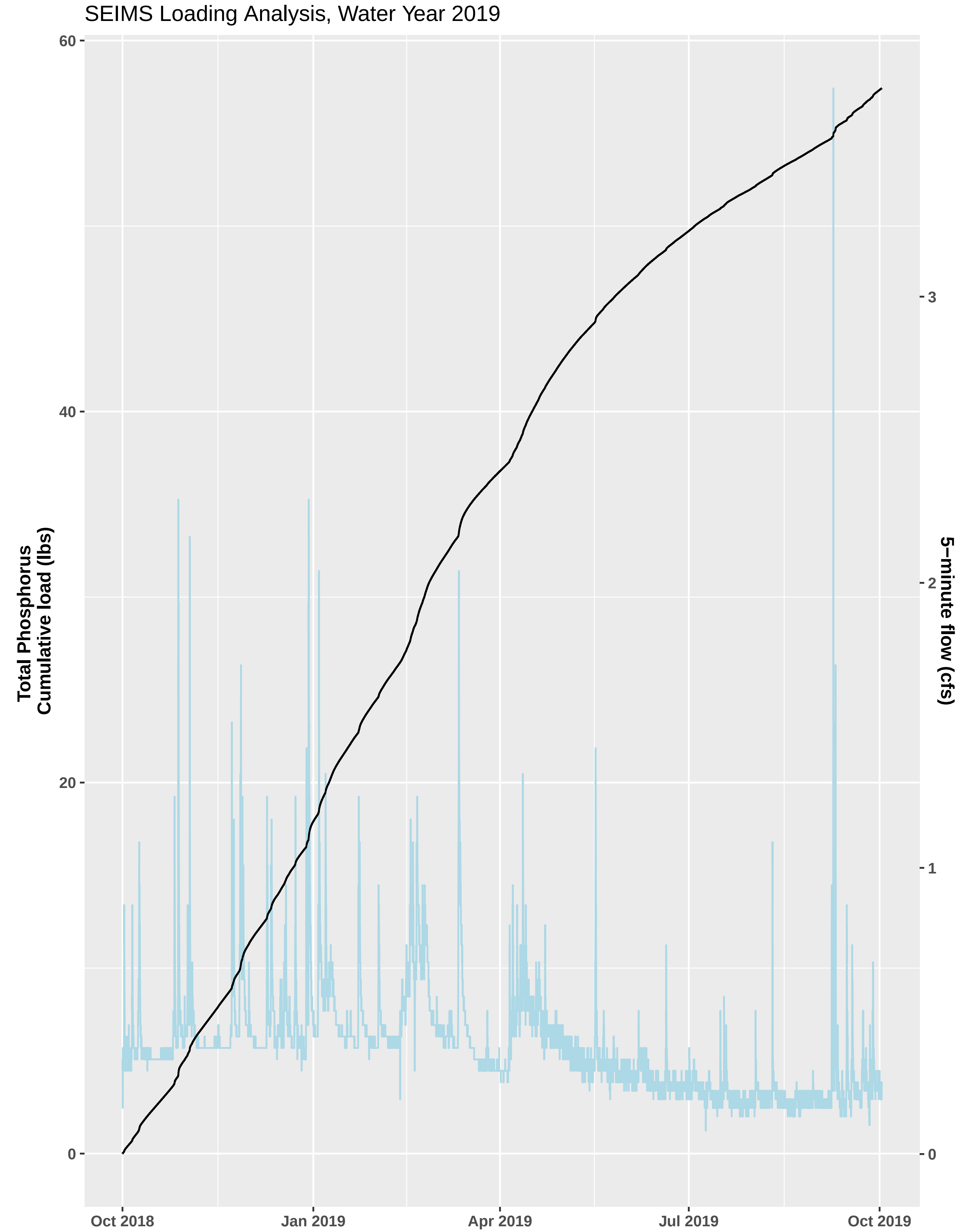

SEIMS Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0.0
2.5
5.0
7.5
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


SEIMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
1
2
3
instantaneous discharge (cfs)

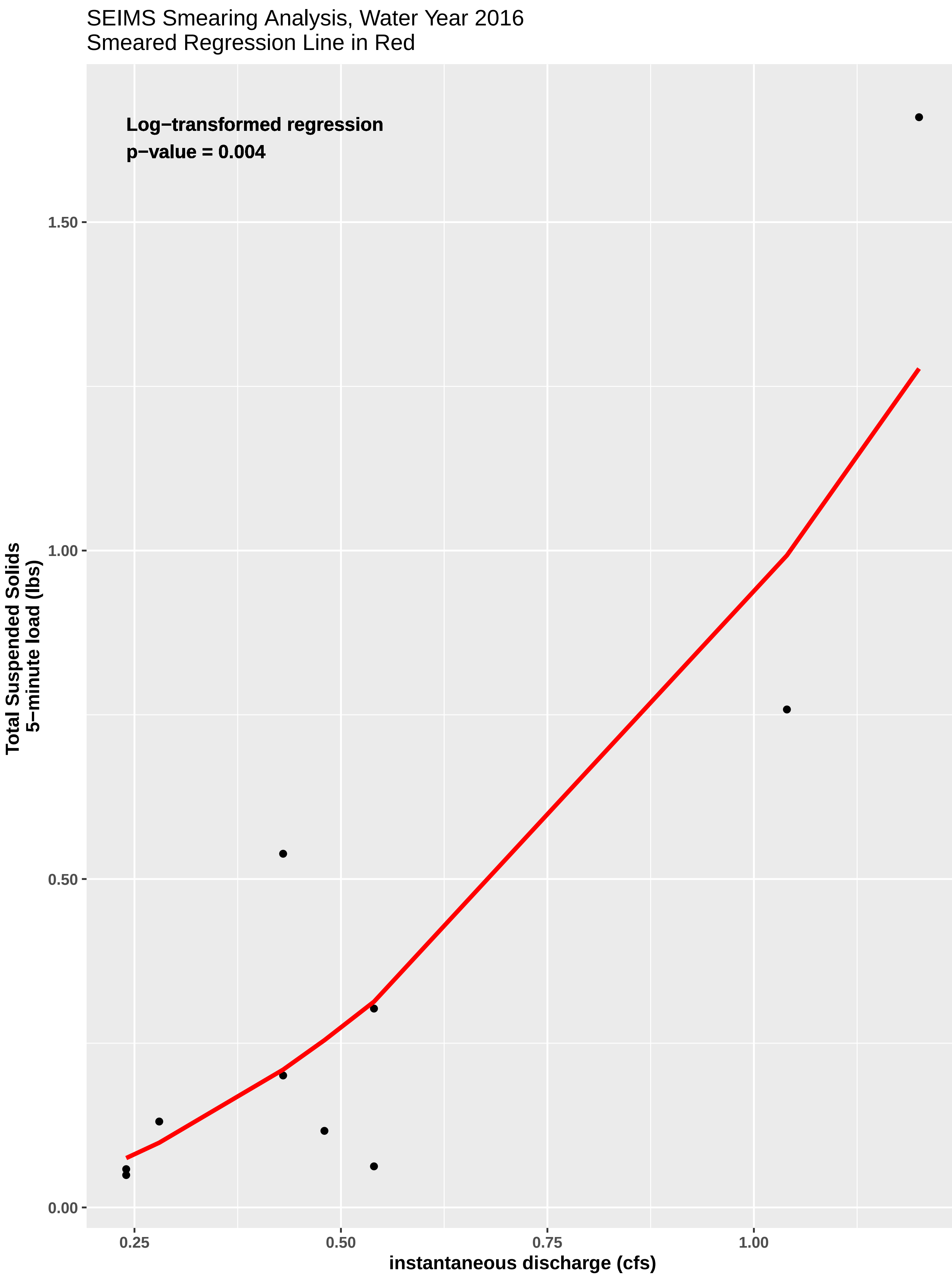

SEIMS Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
10
20
30
40
50
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

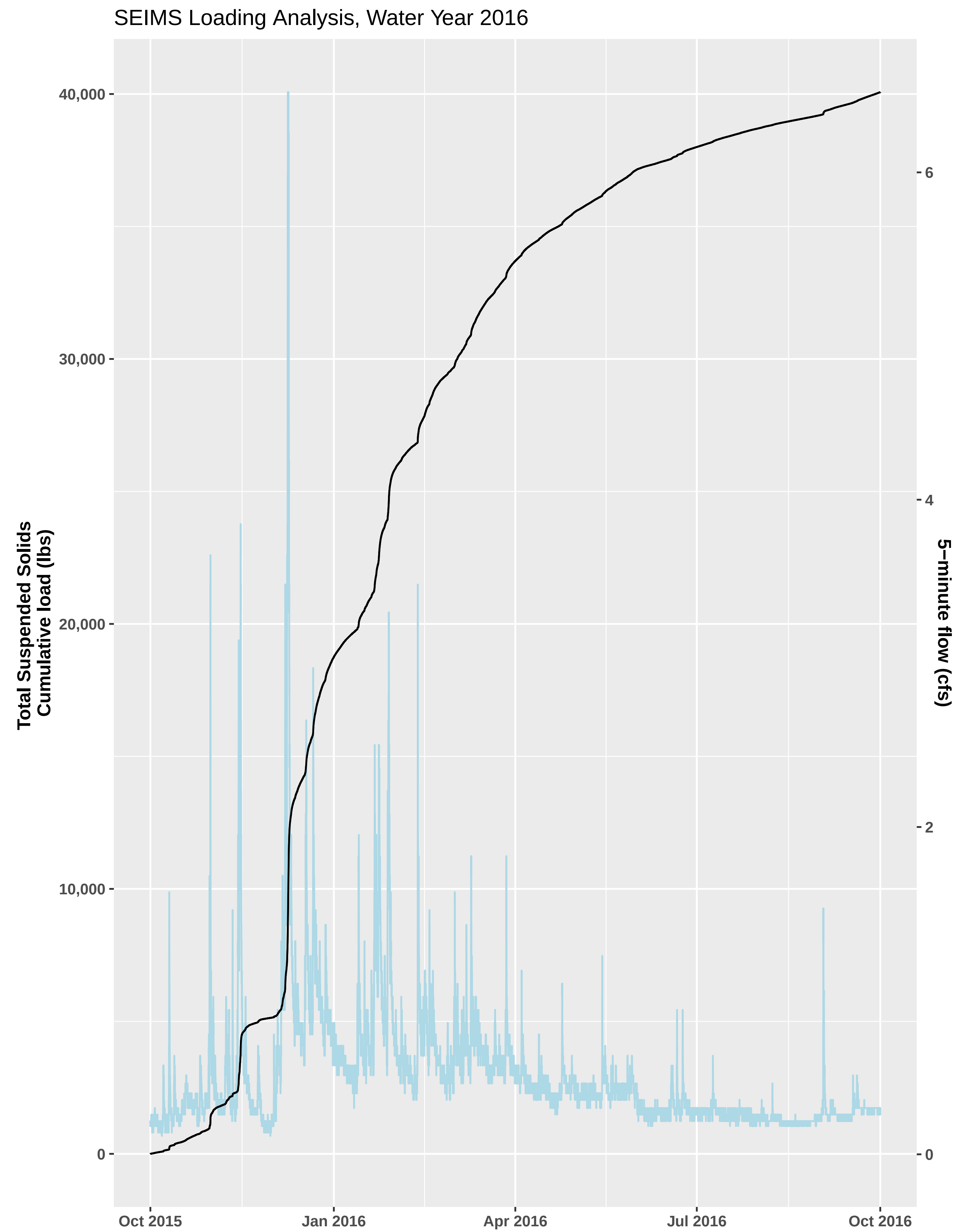


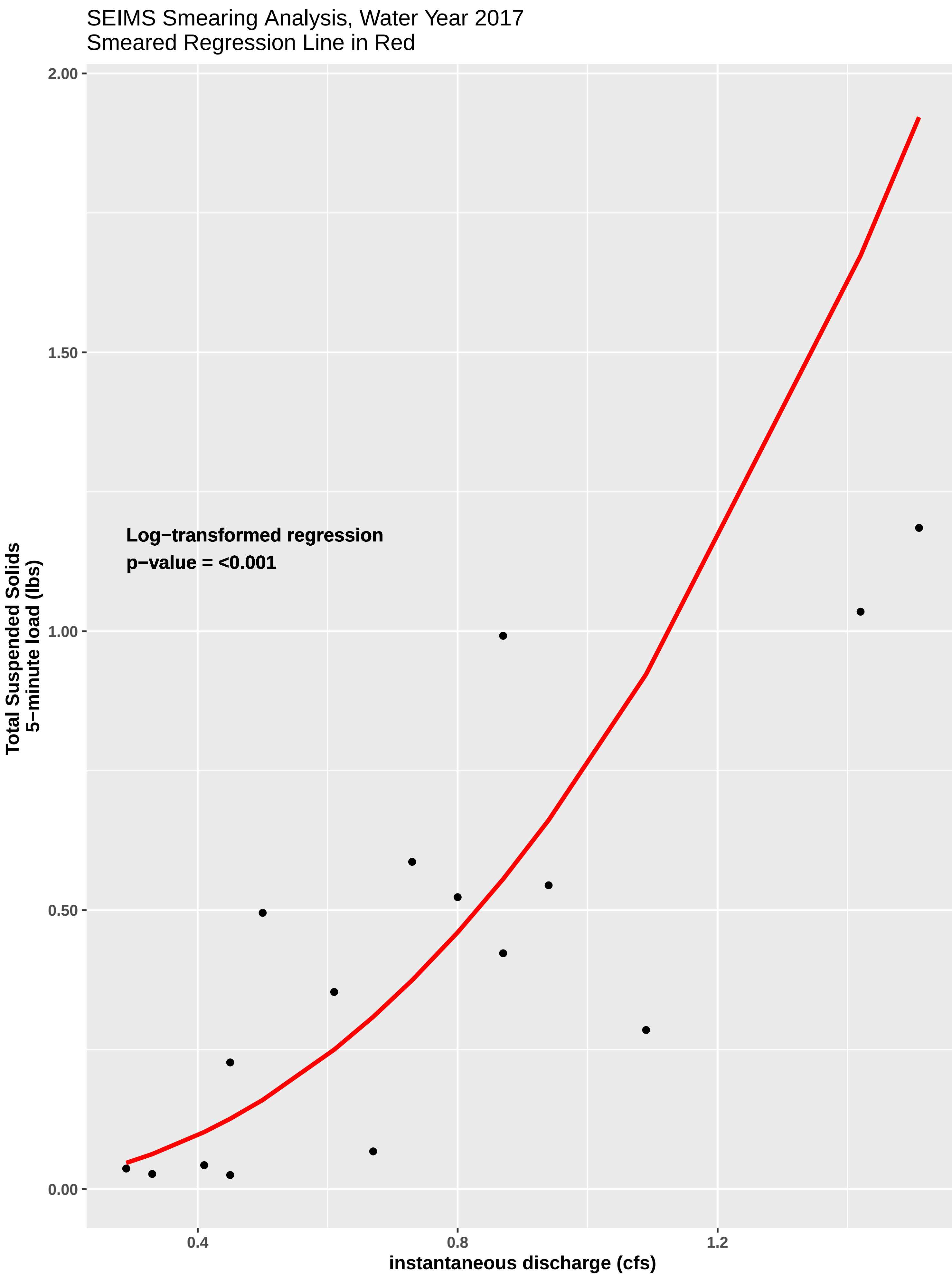
SEIMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0020
0.0040
0.5
1.0
instantaneous discharge (cfs)

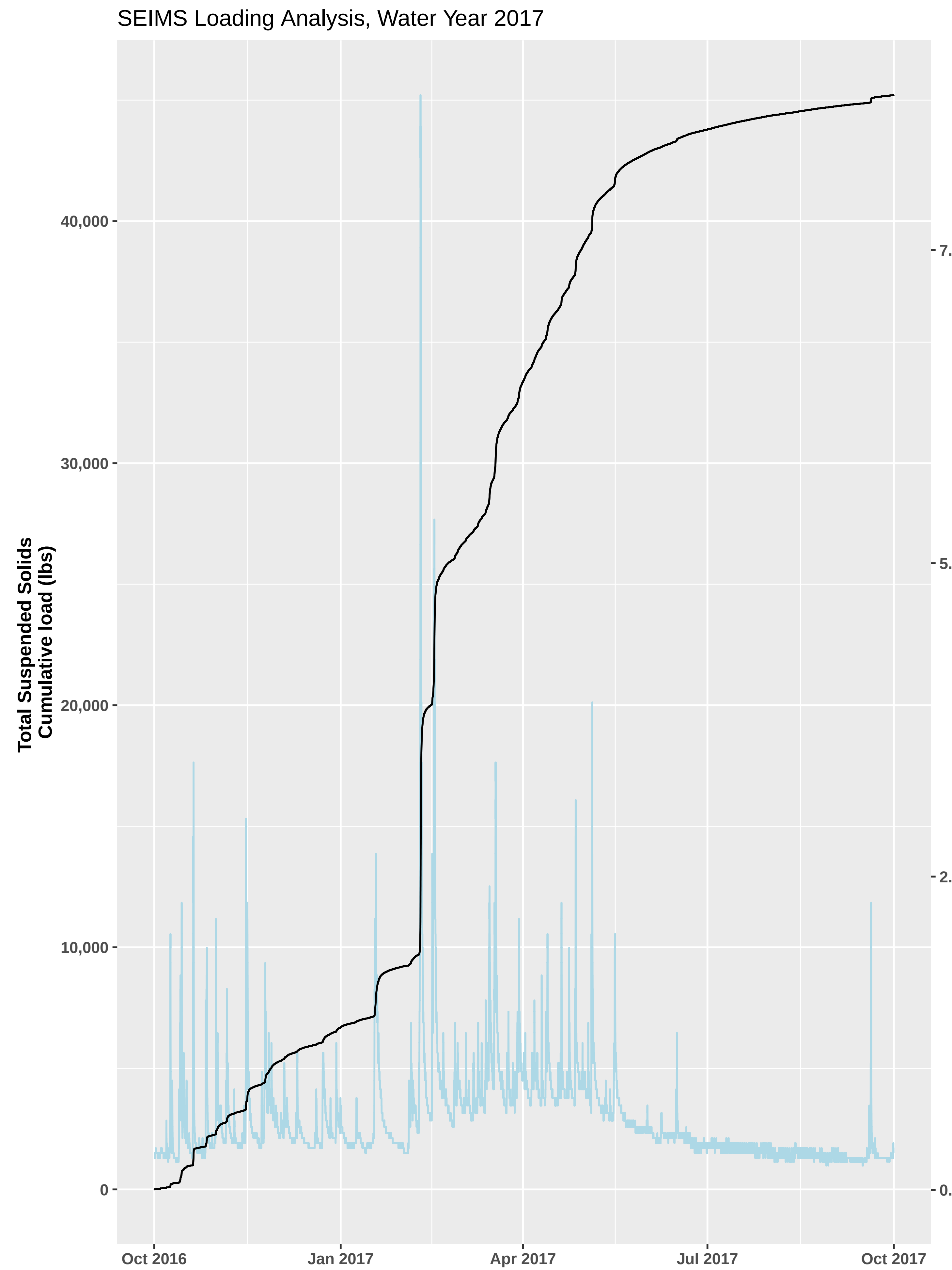


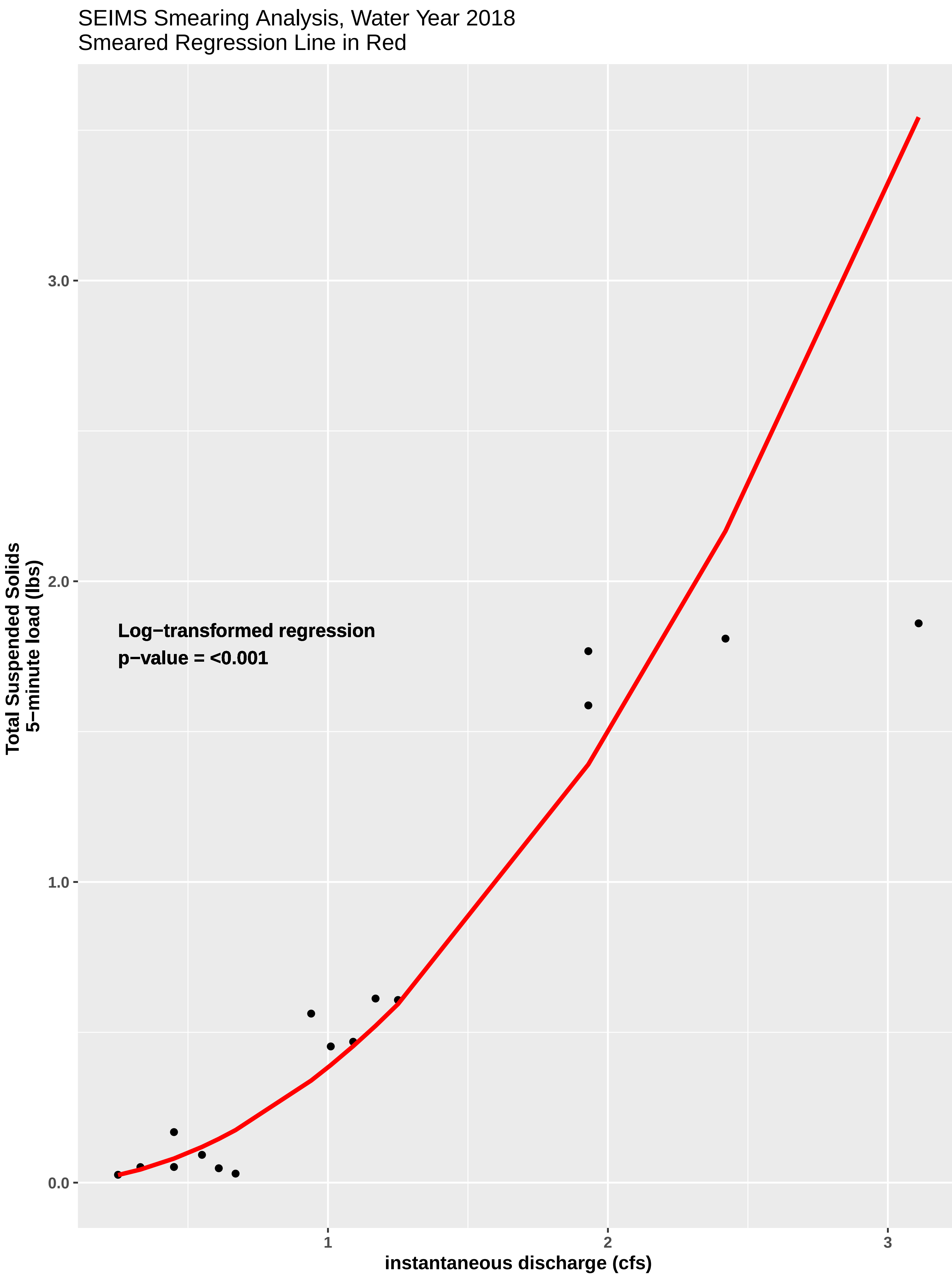
SEIMS Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0
1
2
3
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

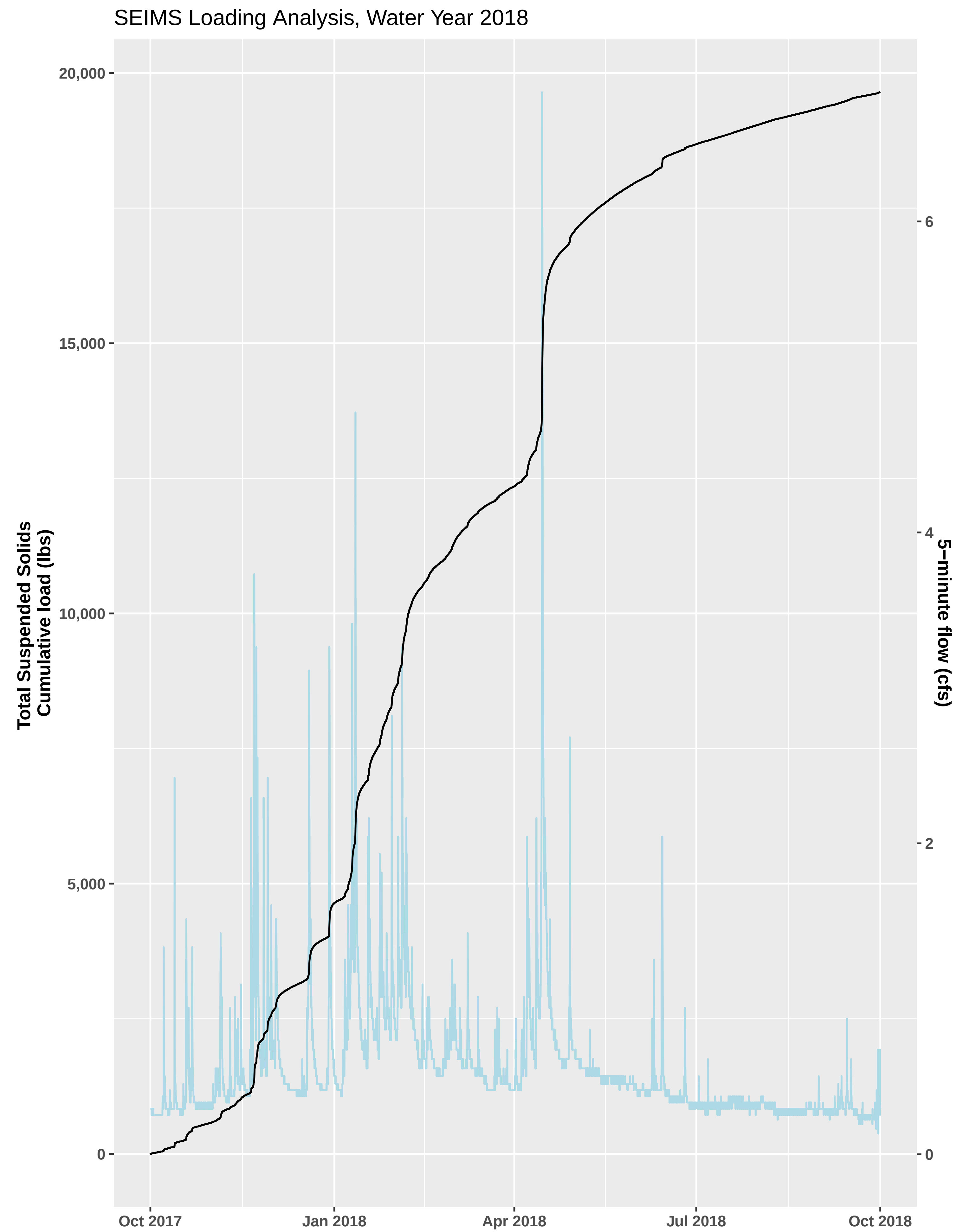

SEIMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.004
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.50
1.00
1.50
0.25
0.50
0.75
1.00

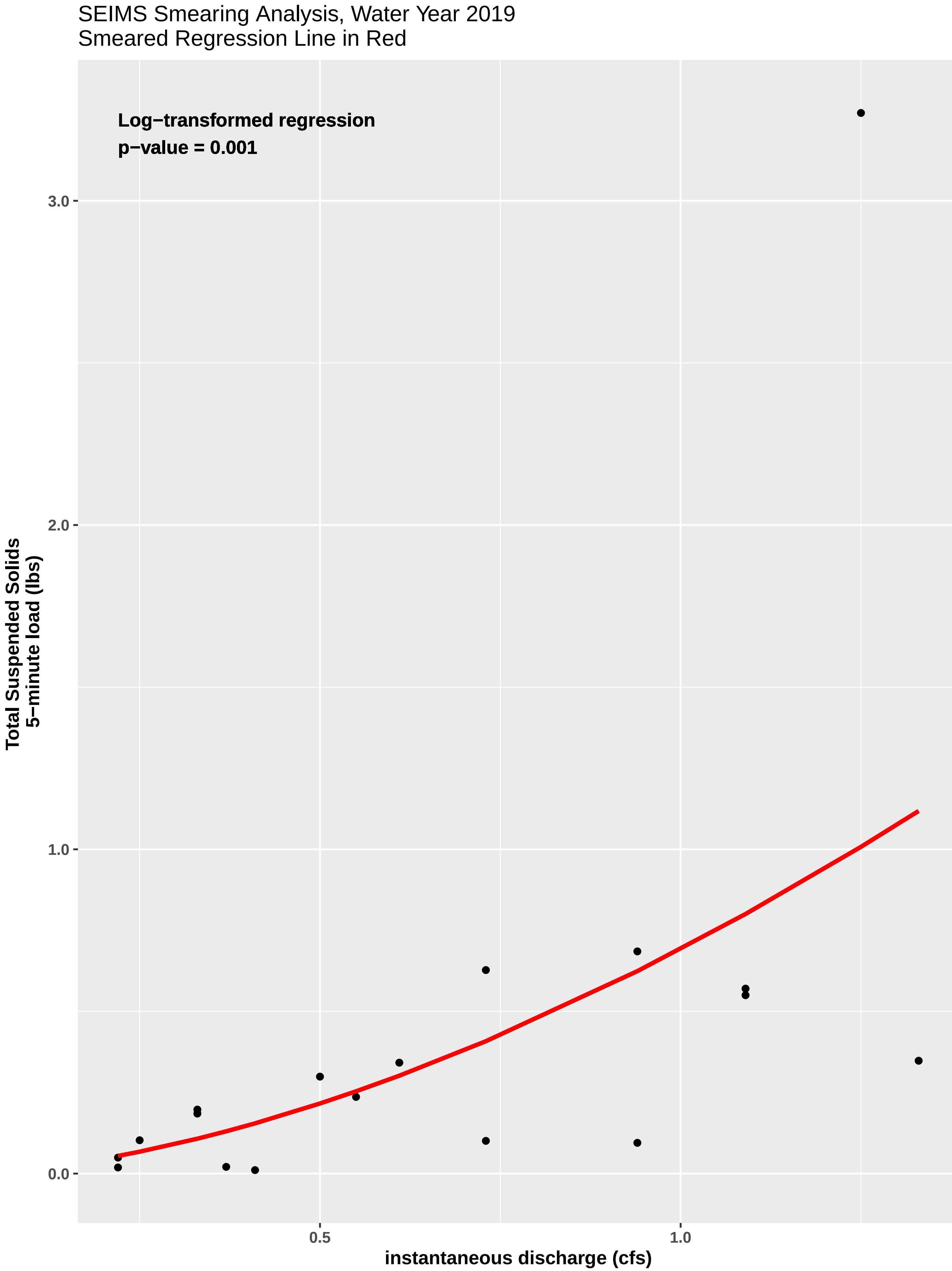

SEIMS Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
10,000
20,000
30,000
40,000
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

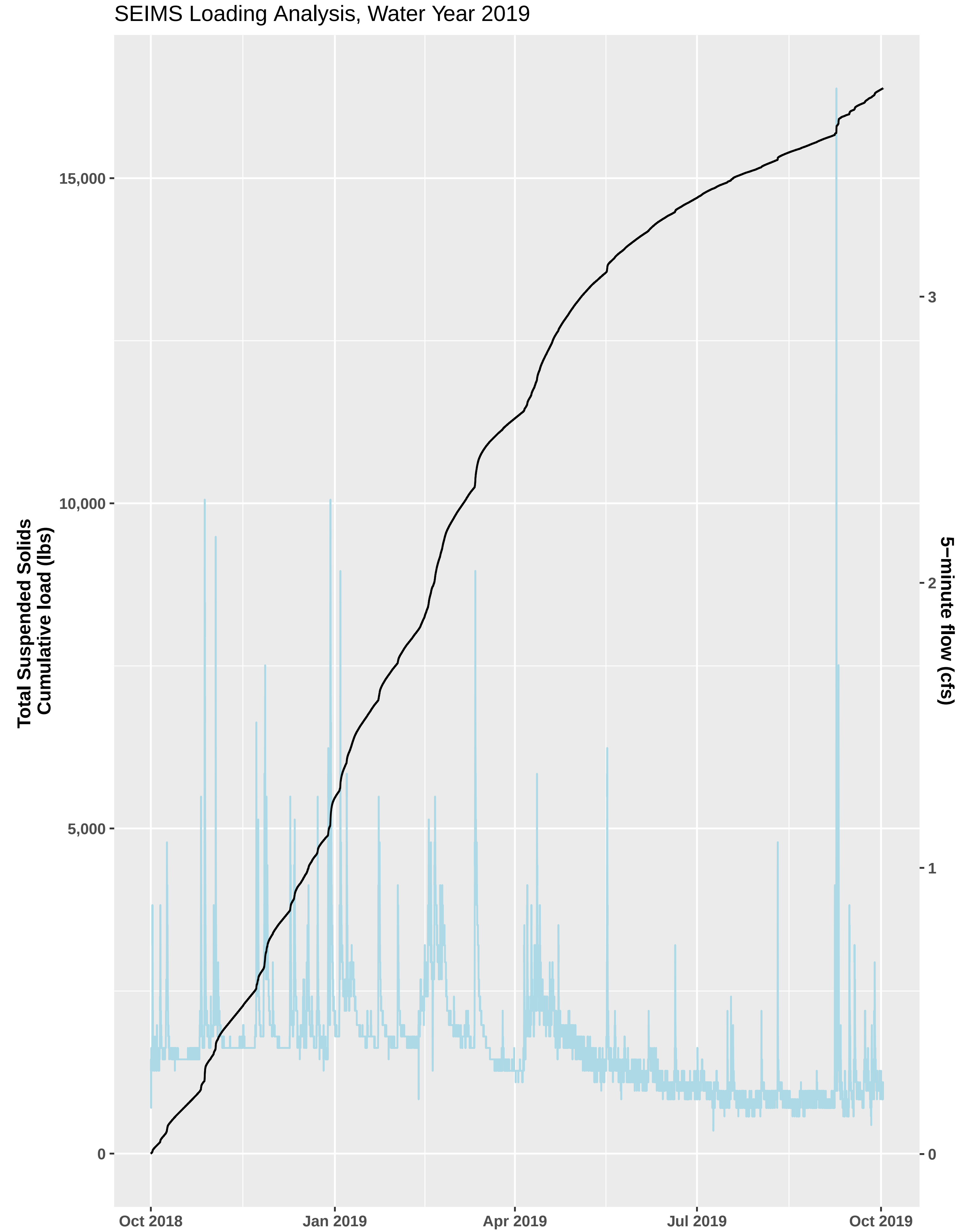

SEIMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.50
1.00
1.50
2.00
0.4
0.8
1.2

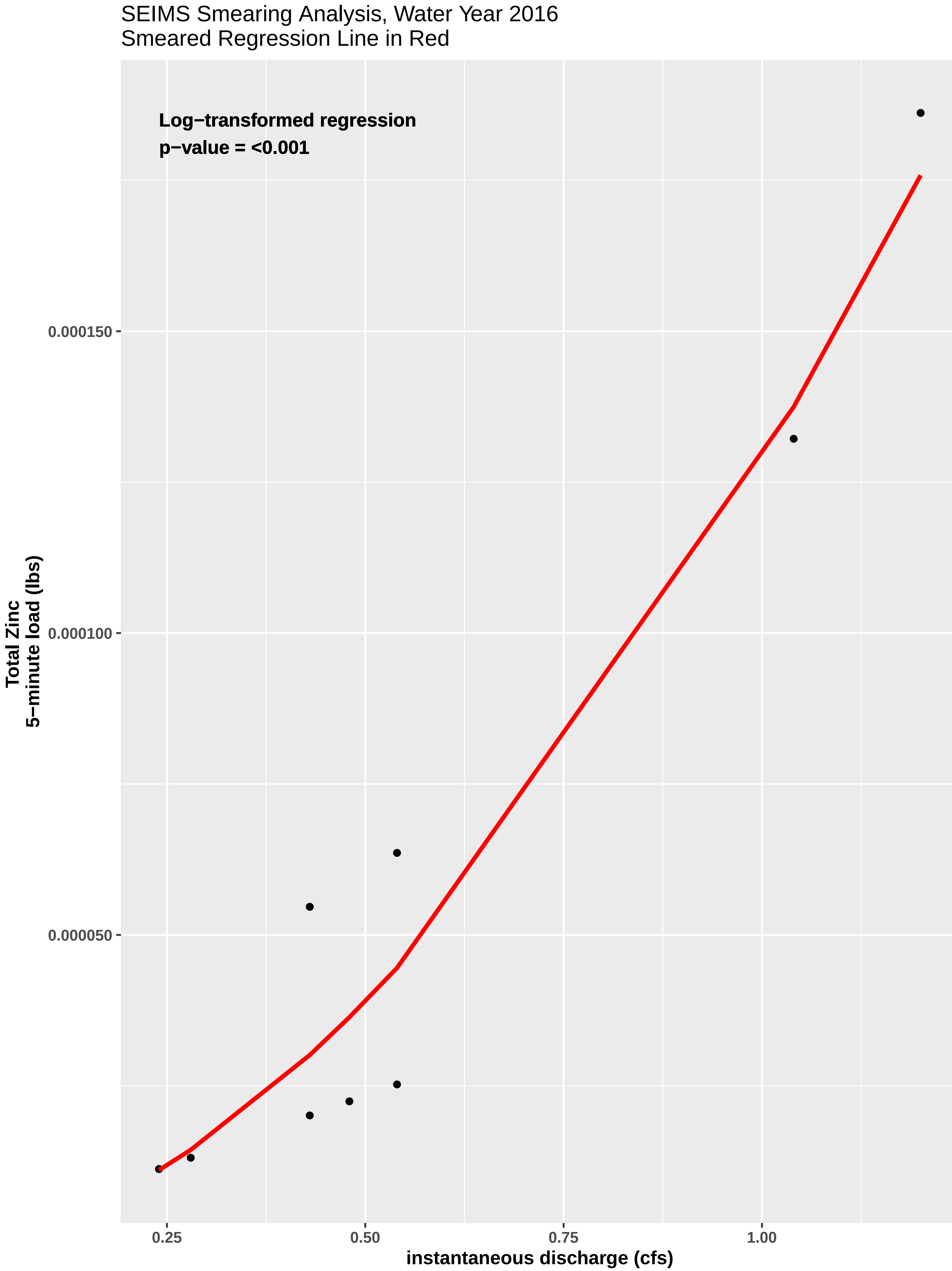

SEIMS Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
10,000
20,000
30,000
40,000
0.0
2.5
5.0
7.5
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

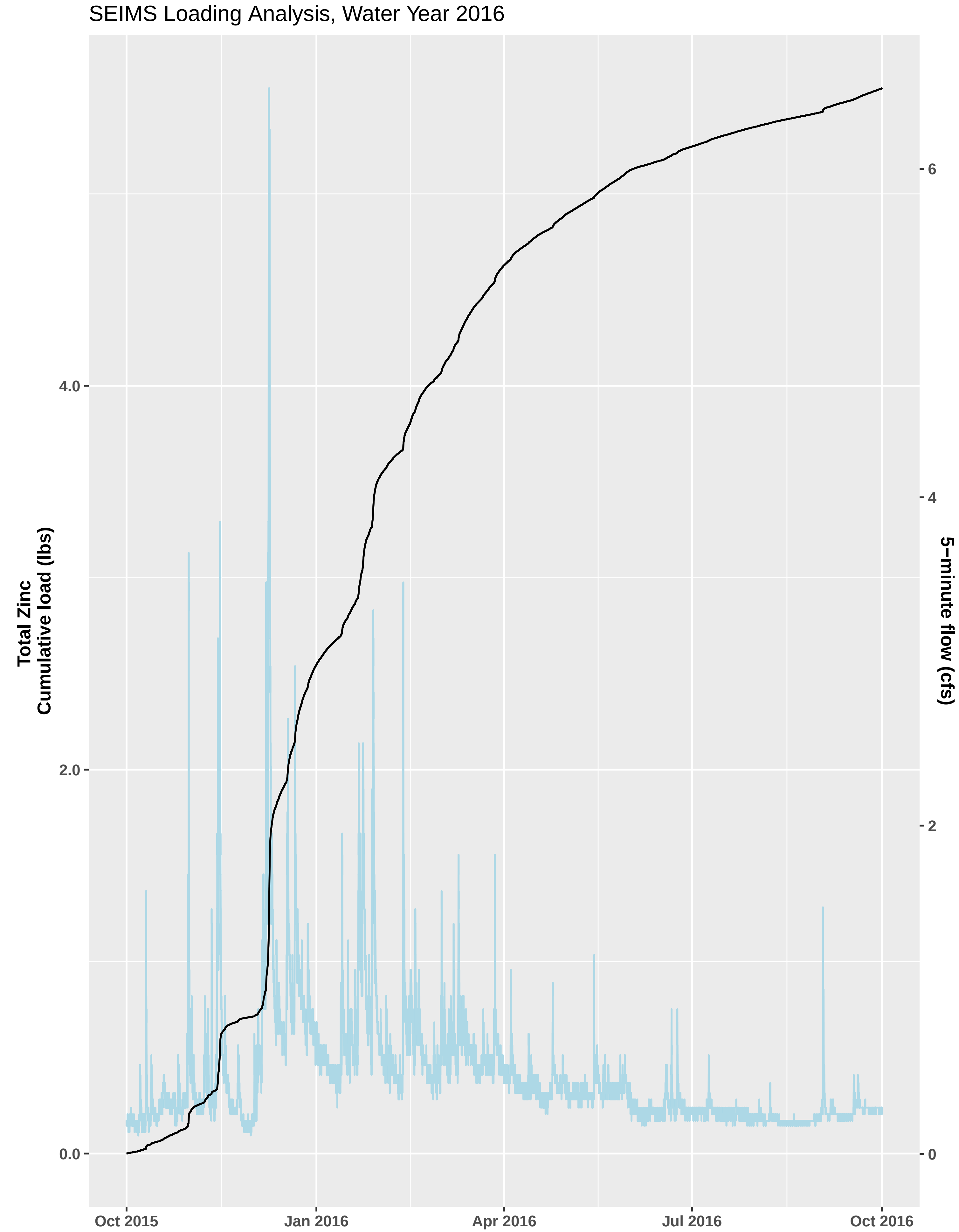

SEIMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Total Suspended Solids
5−minute load (lbs)
Log−transformed regression
p−value = <0.001
instantaneous discharge (cfs)
0.0
1.0
2.0
3.0
1
2
3

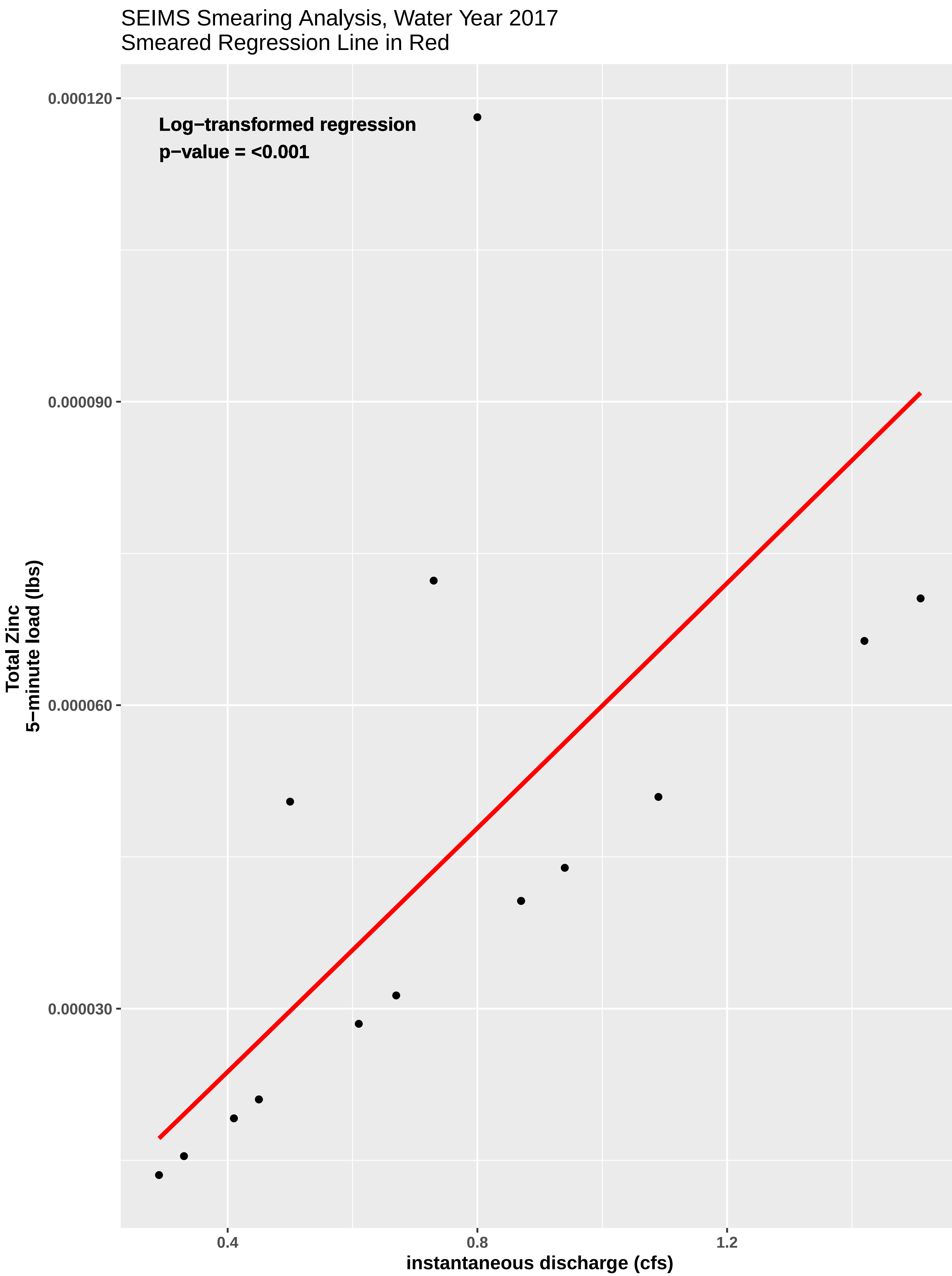

SEIMS Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
5,000
10,000
15,000
20,000
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

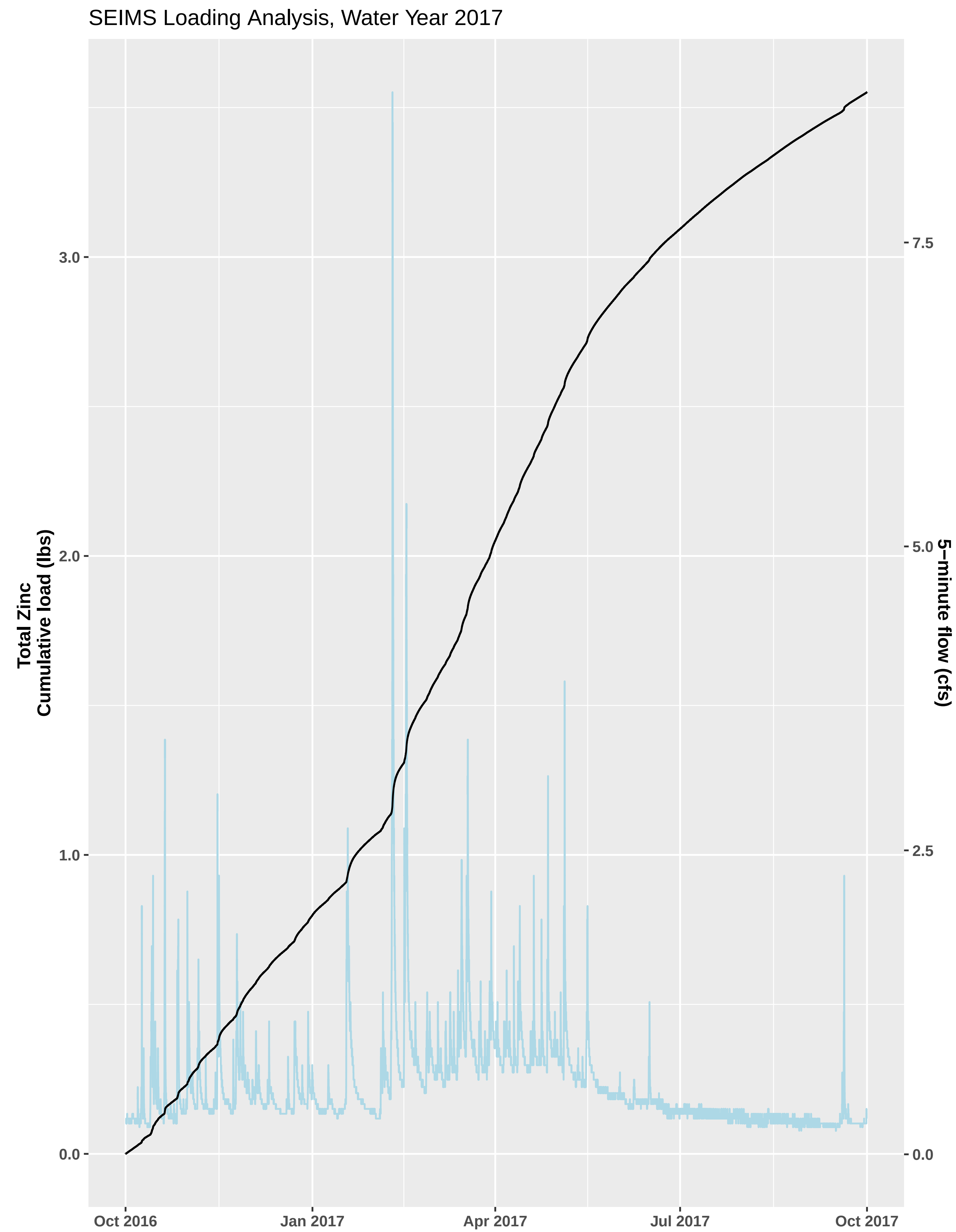

SEIMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Suspended Solids
5−minute load (lbs)
3.0
2.0
1.0
0.0
0.5
1.0
instantaneous discharge (cfs)

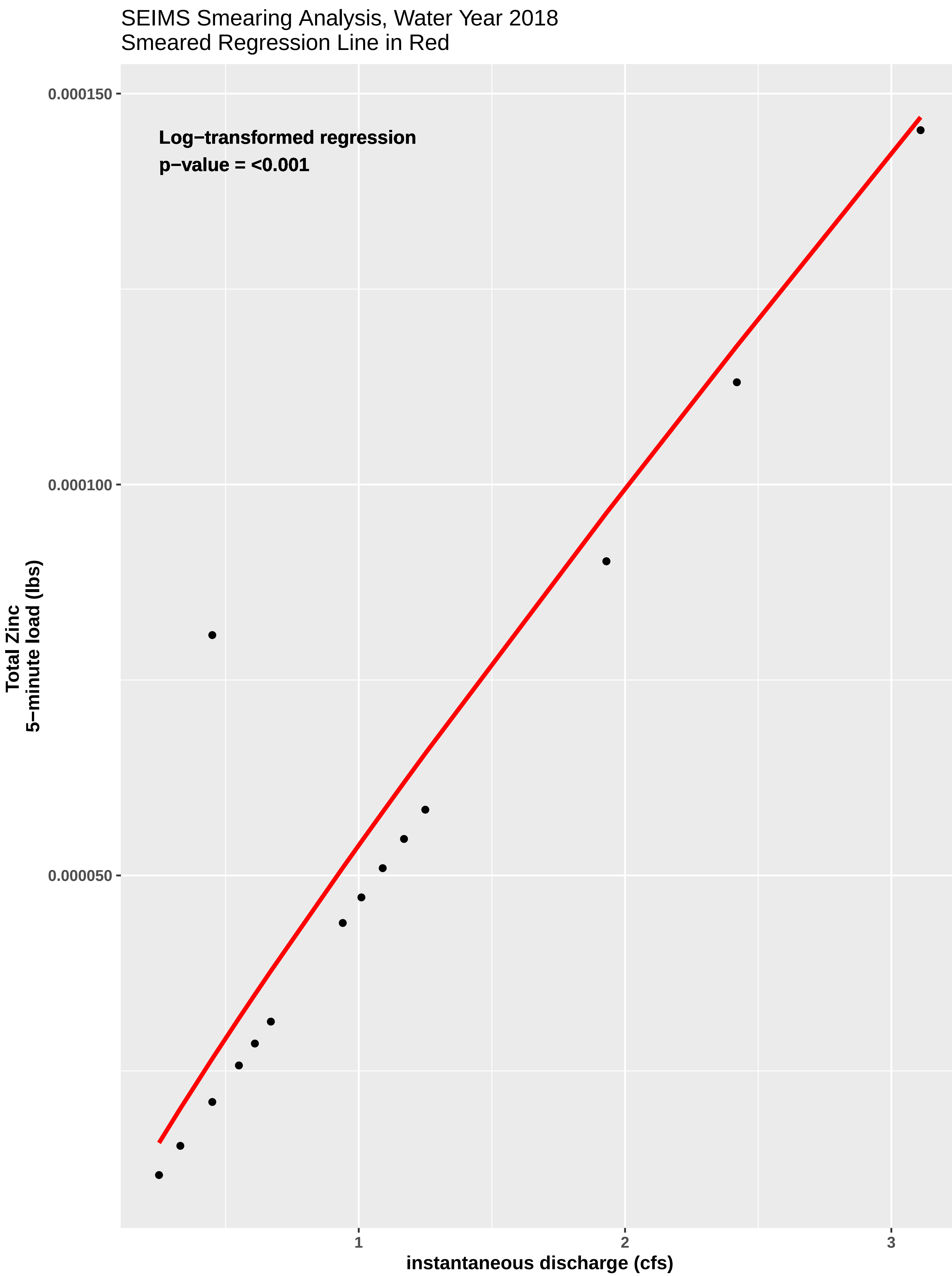

SEIMS Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
15,000
10,000
5,000
0
5−minute flow (cfs)
3
2
1
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


SEIMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000150
0.000100
0.000050
Total Zinc
5−minute load (lbs)
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

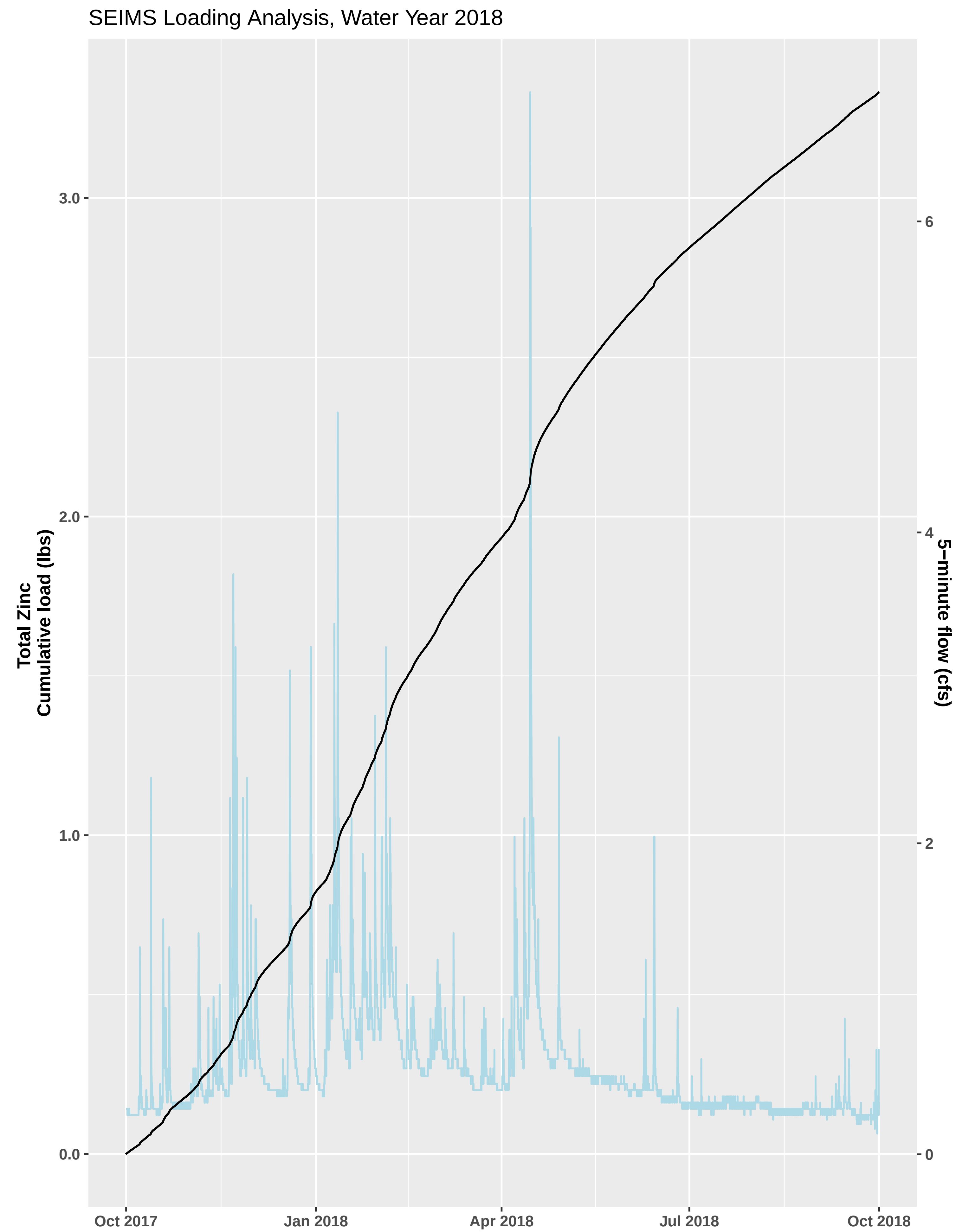

SEIMS Loading Analysis, Water Year 2016
4.0
2.0
0.0
Total Zinc
Cumulative load (lbs)
6
4
2
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


SEIMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000120
0.000090
0.000060
0.000030
Total Zinc
5−minute load (lbs)
0.4
0.8
1.2
instantaneous discharge (cfs)

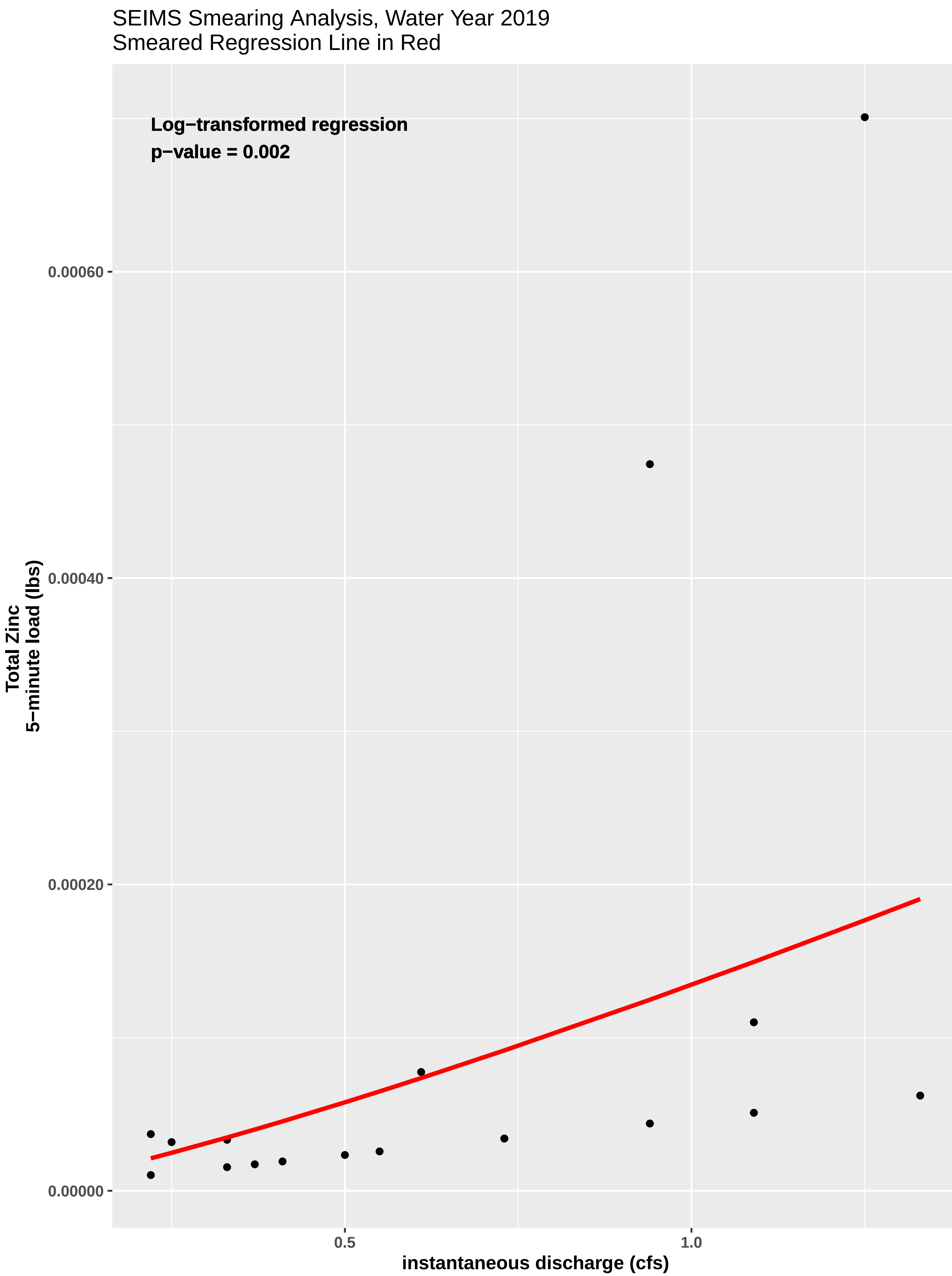

SEIMS Loading Analysis, Water Year 2017
3.0
2.0
1.0
0.0
Total Zinc
Cumulative load (lbs)
7.5
5.0
2.5
0.0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

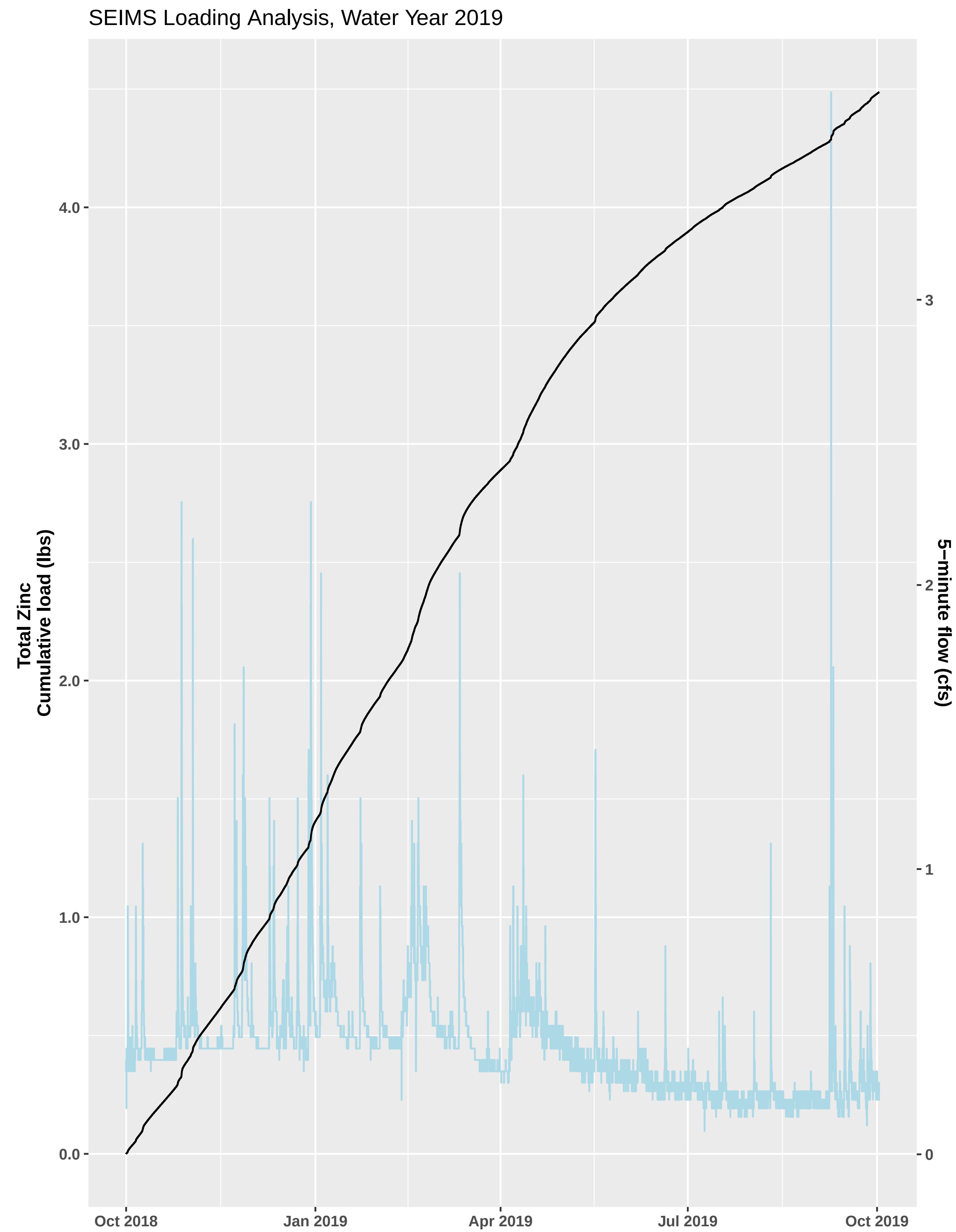


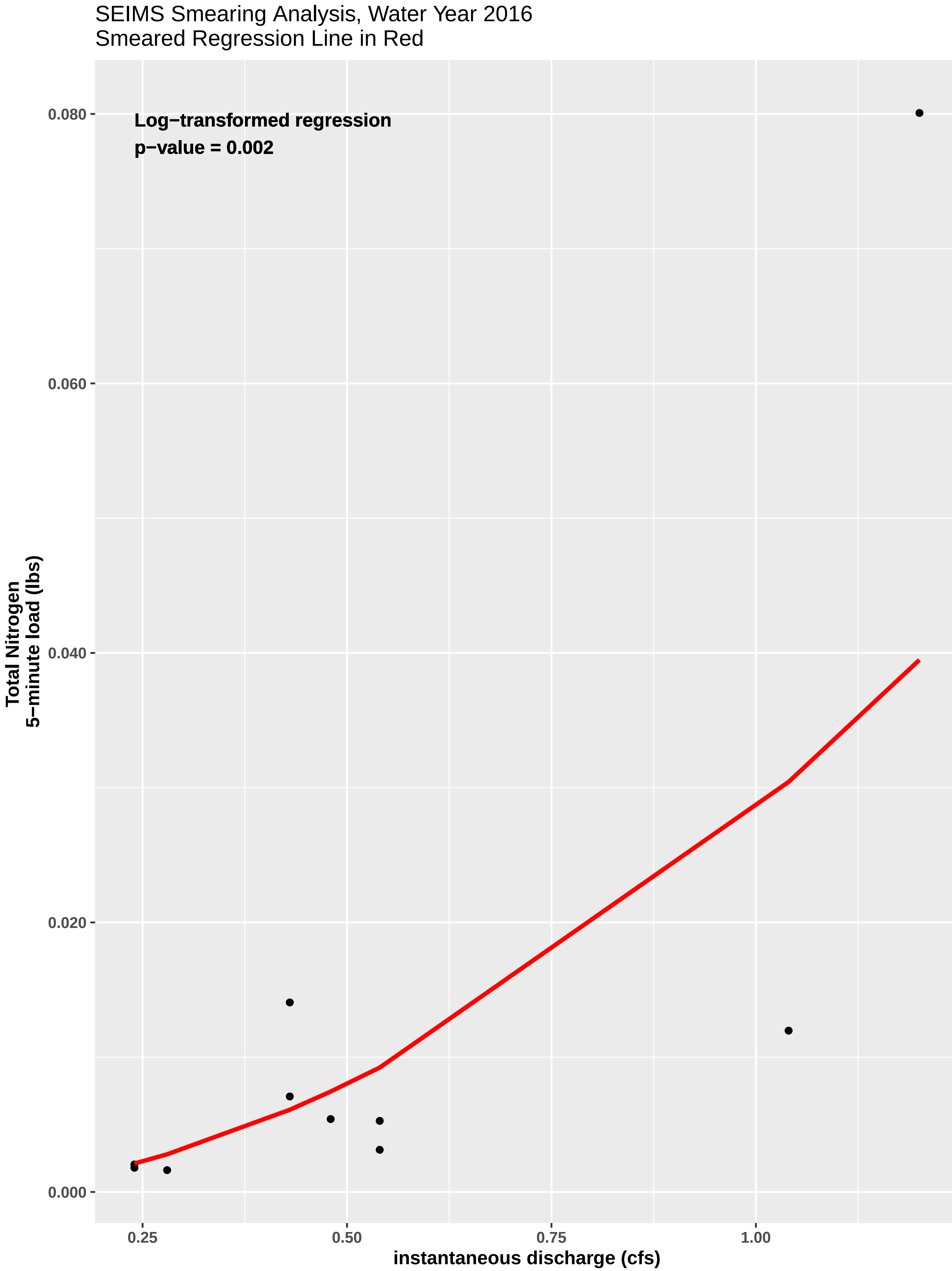
SEIMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.000150
0.000100
0.000050
Total Zinc
5−minute load (lbs)
1
2
3
instantaneous discharge (cfs)

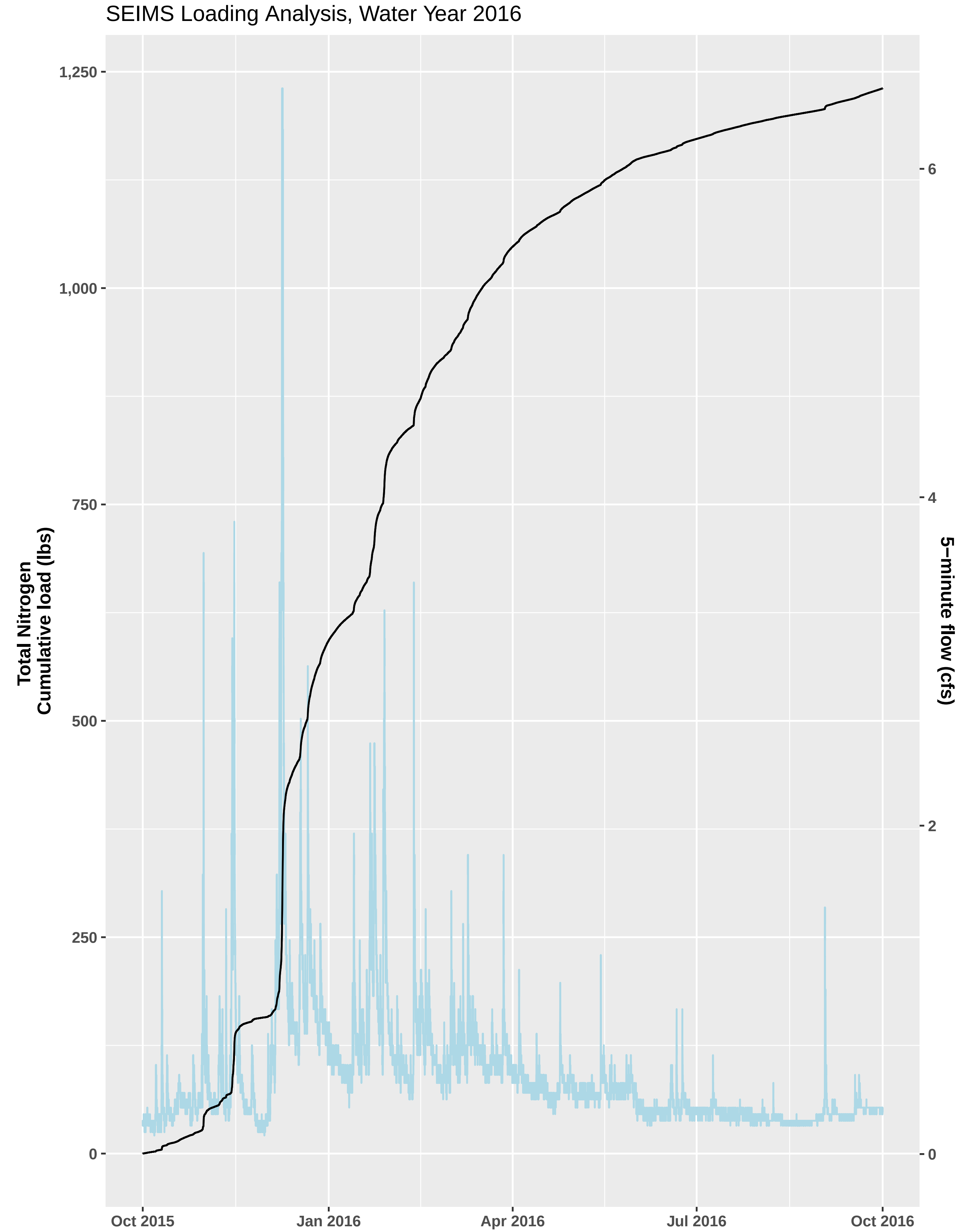


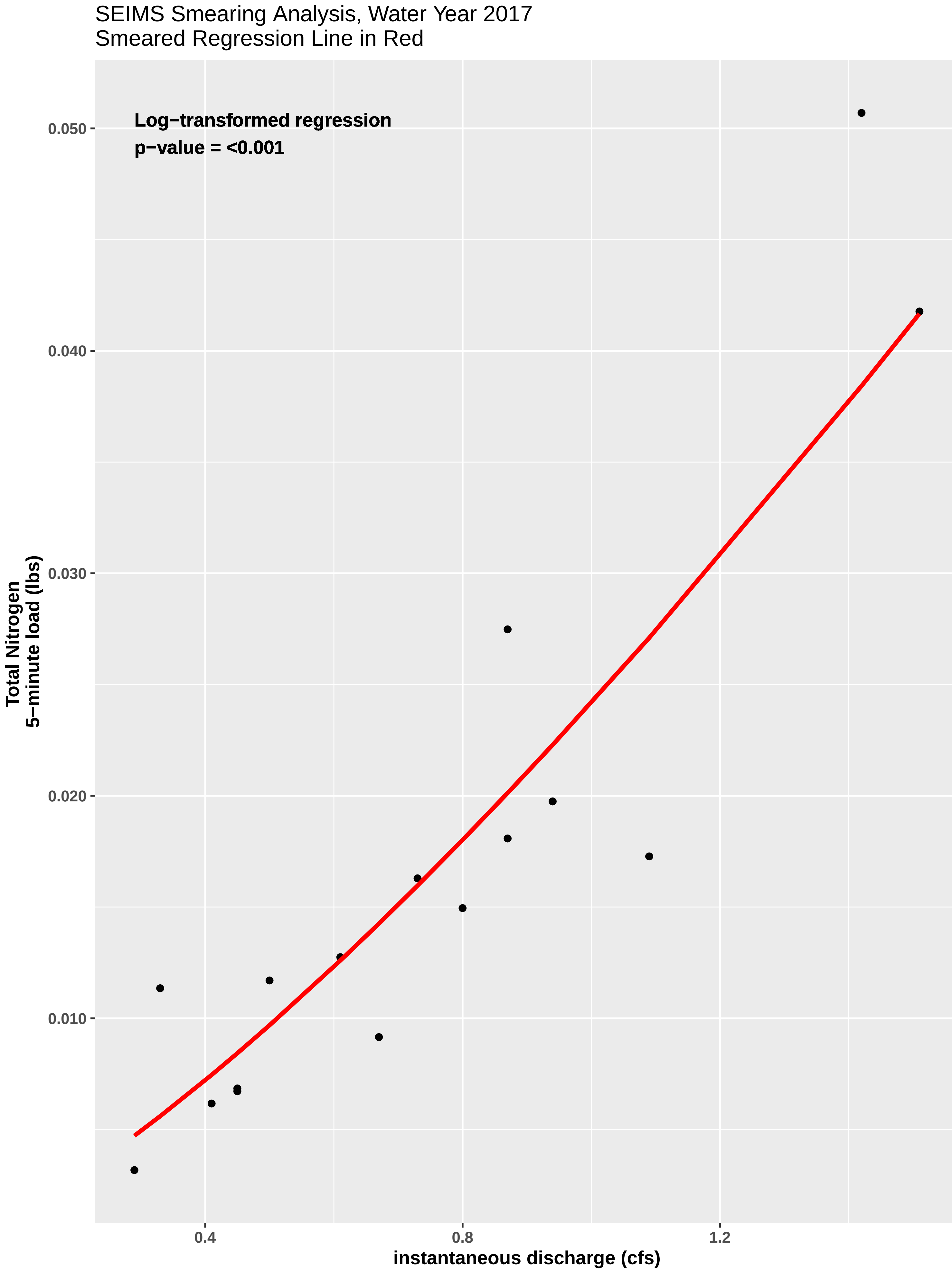
SEIMS Loading Analysis, Water Year 2018
3.0
2.0
1.0
0.0
Total Zinc
Cumulative load (lbs)
6
4
2
0
5−minute flow (cfs)
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

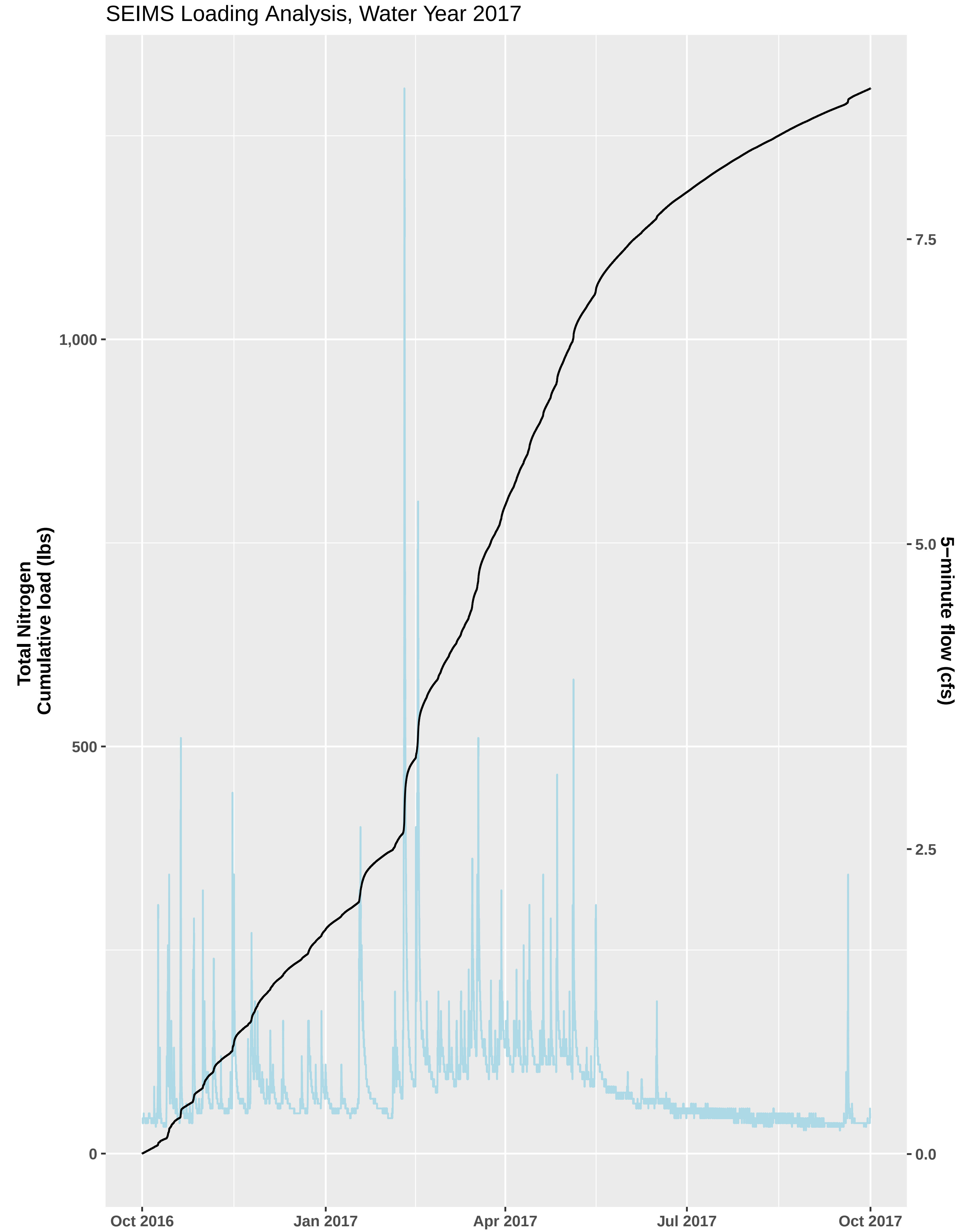

SEIMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Zinc
5−minute load (lbs)
0.00000
0.00020
0.00040
0.00060
0.5
1.0
instantaneous discharge (cfs)

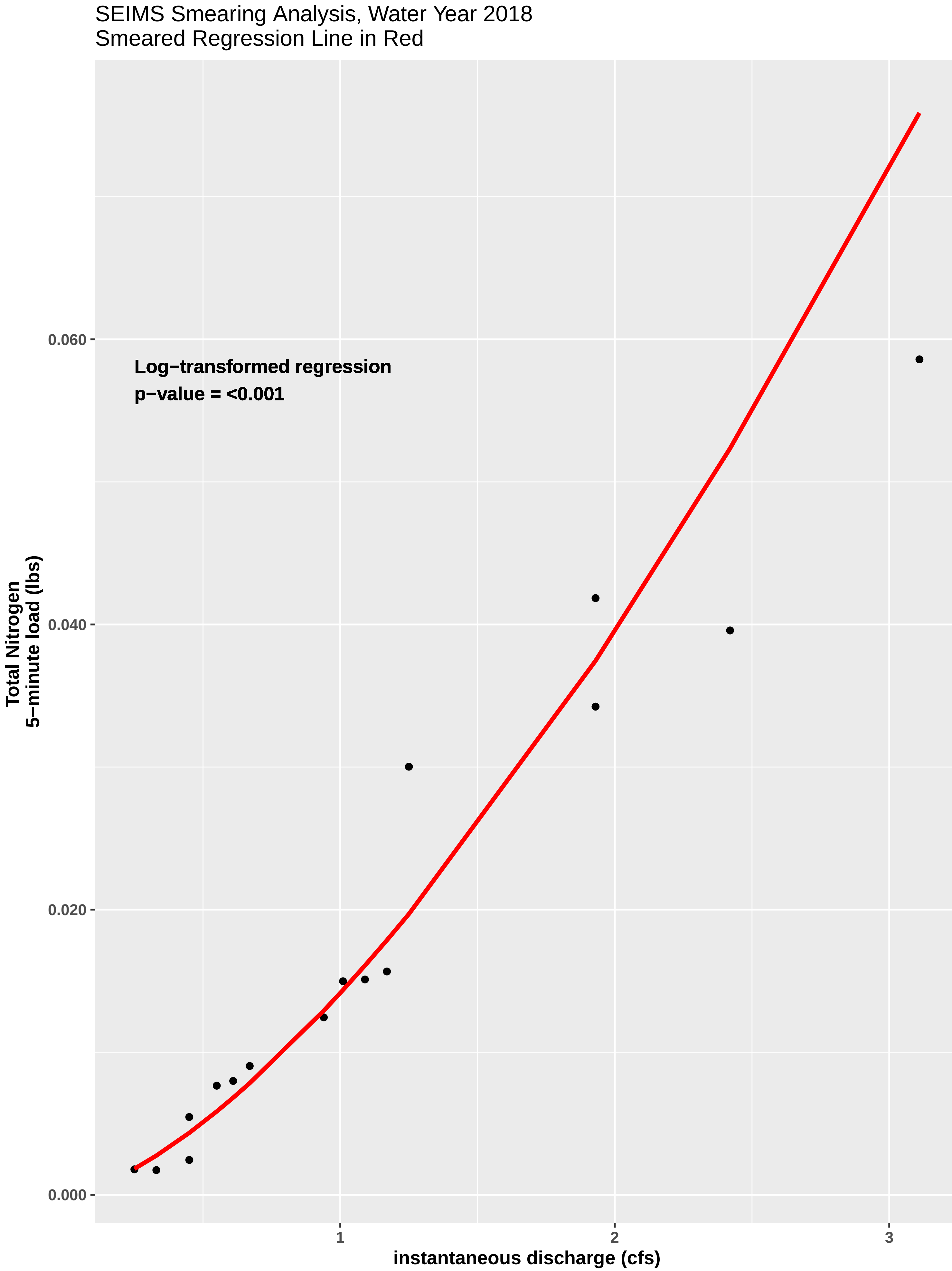

SEIMS Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0.0
1.0
2.0
3.0
4.0
5−minute flow (cfs)
0
1
2
3
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

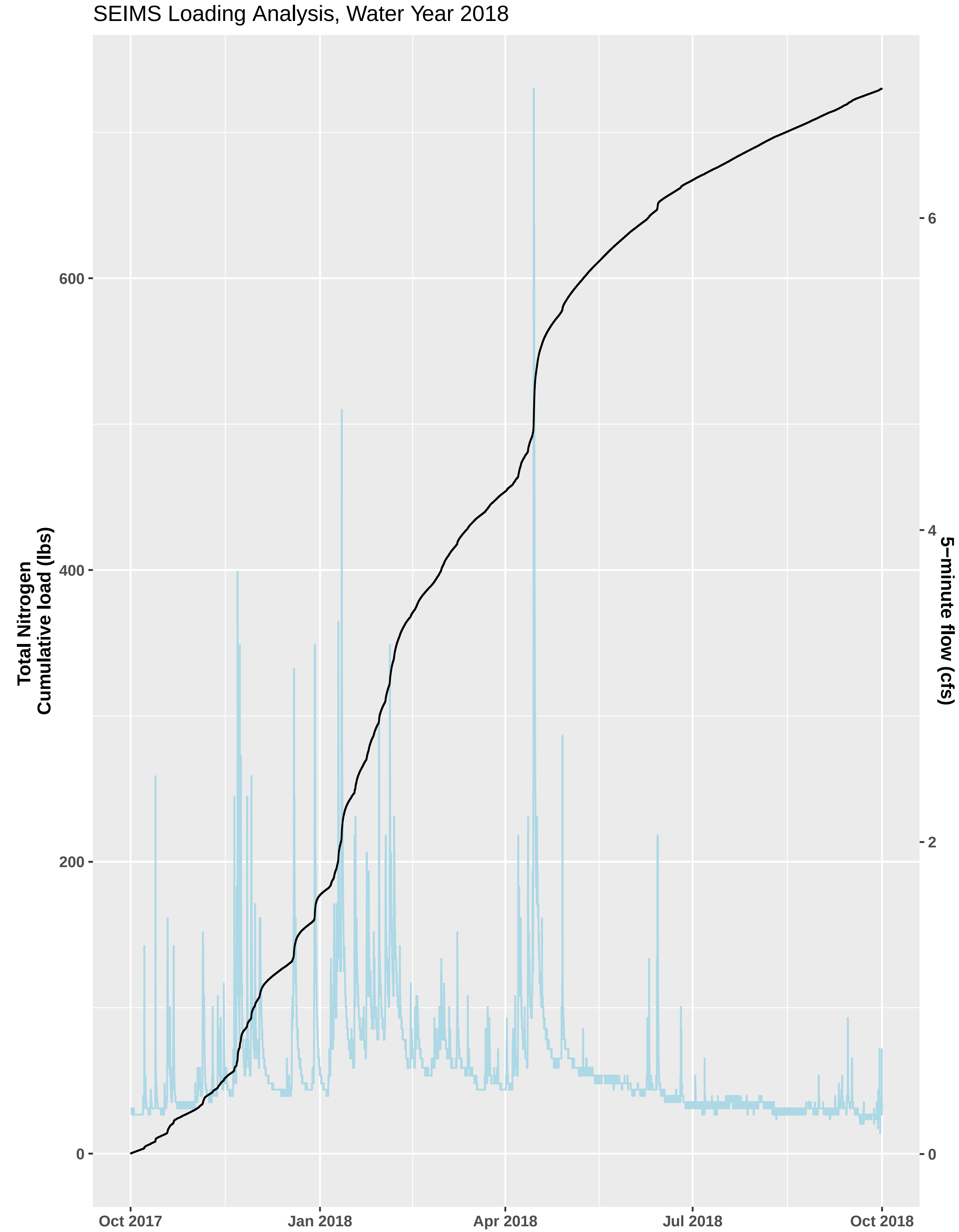

SEIMS Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.080
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

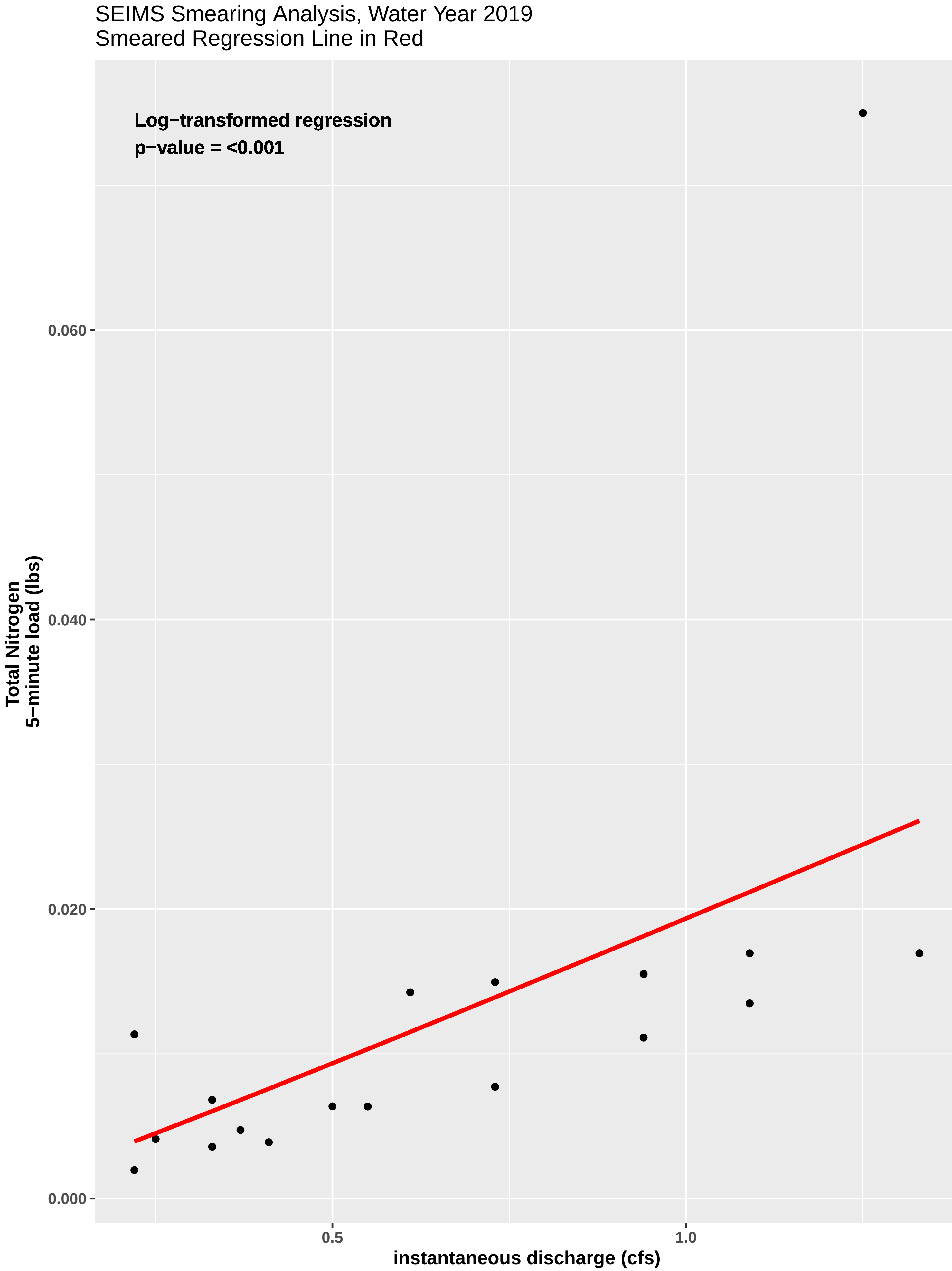

SEIMS Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
250
500
750
1,000
1,250
5−minute flow (cfs)
0
2
4
6
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

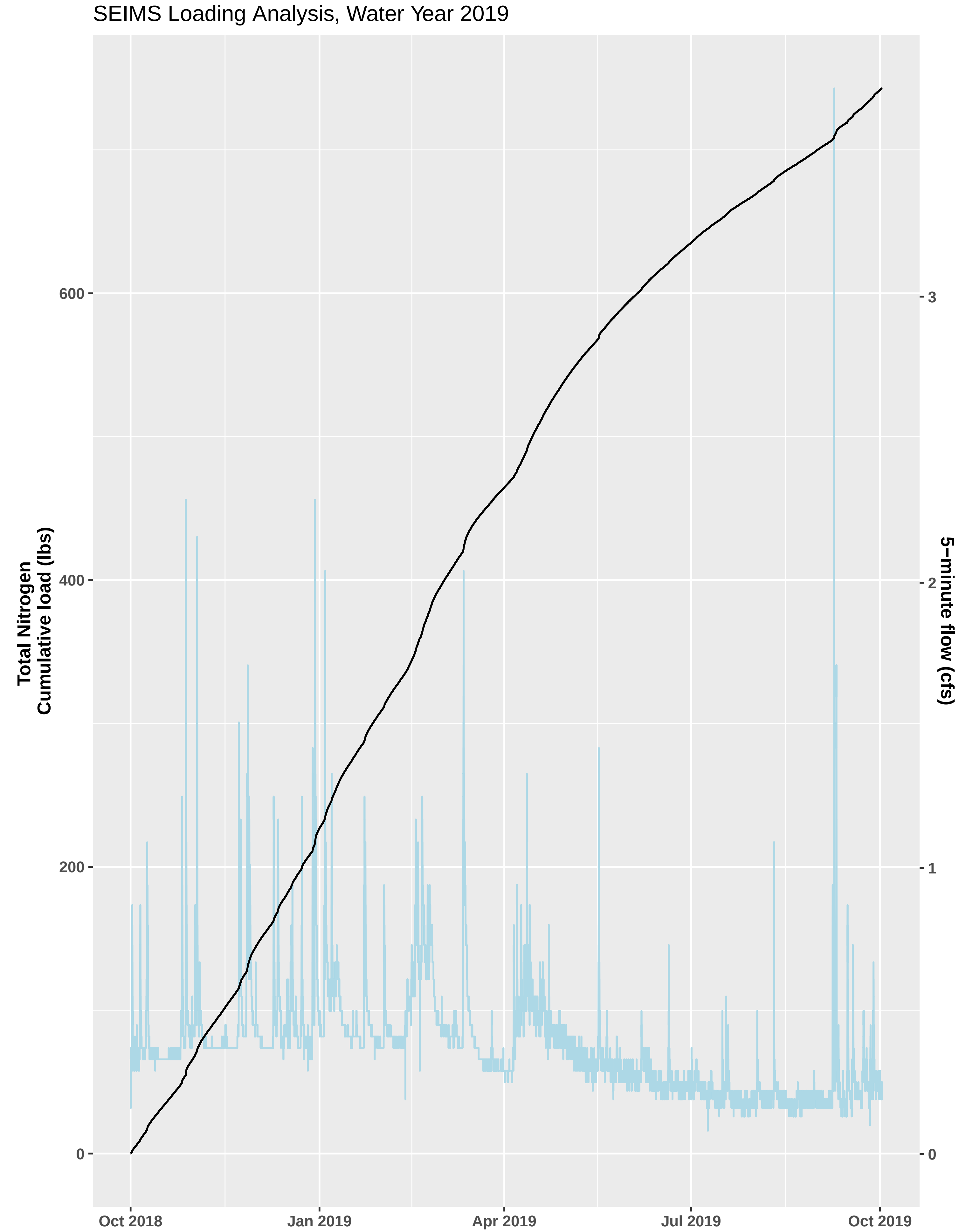

SEIMS Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.050
0.040
0.030
0.020
0.010
0.4
0.8
1.2
instantaneous discharge (cfs)

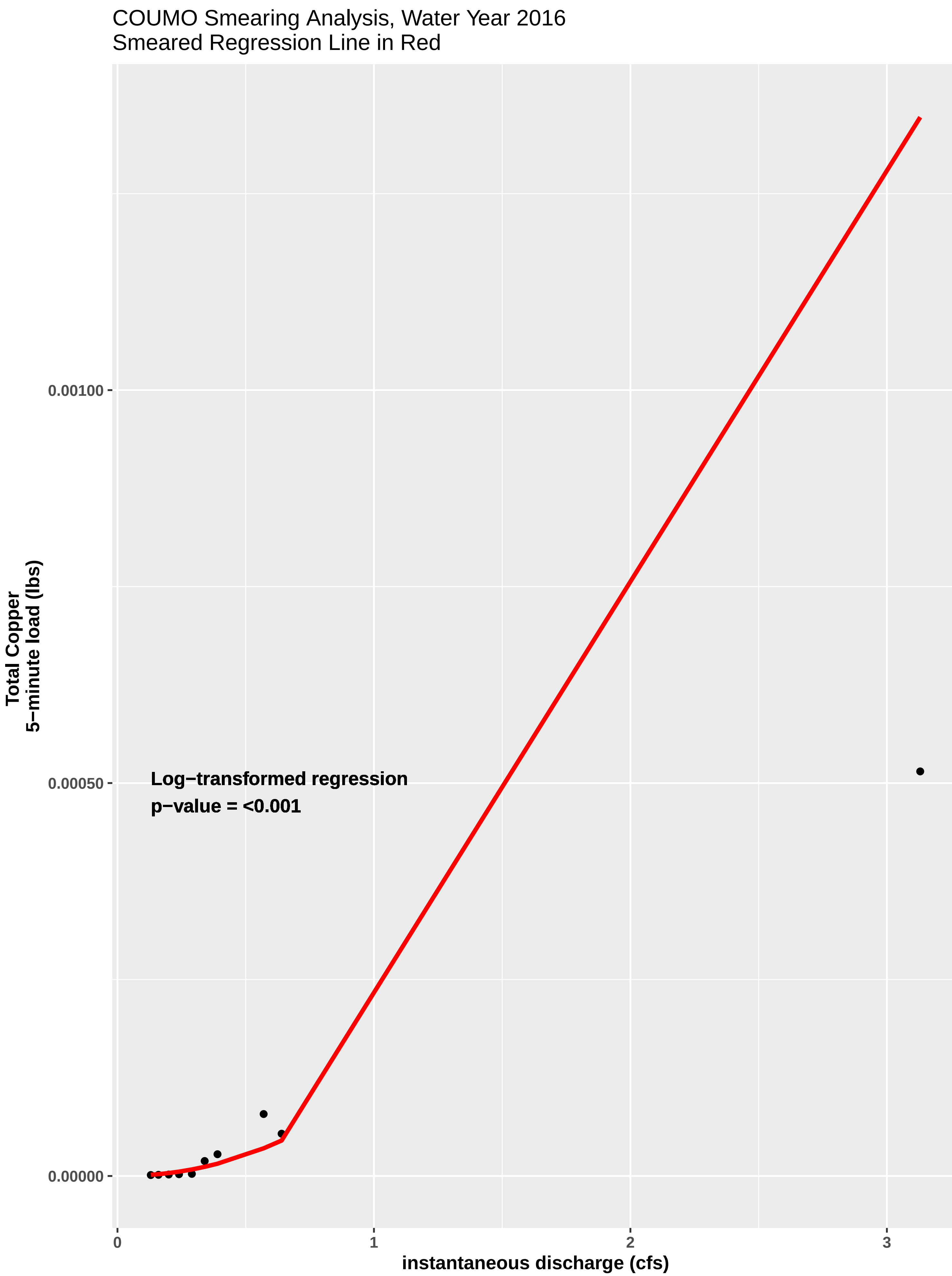

SEIMS Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
1,000
500
0
7.5
5.0
2.5
0.0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


SEIMS Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
1
2
3
instantaneous discharge (cfs)

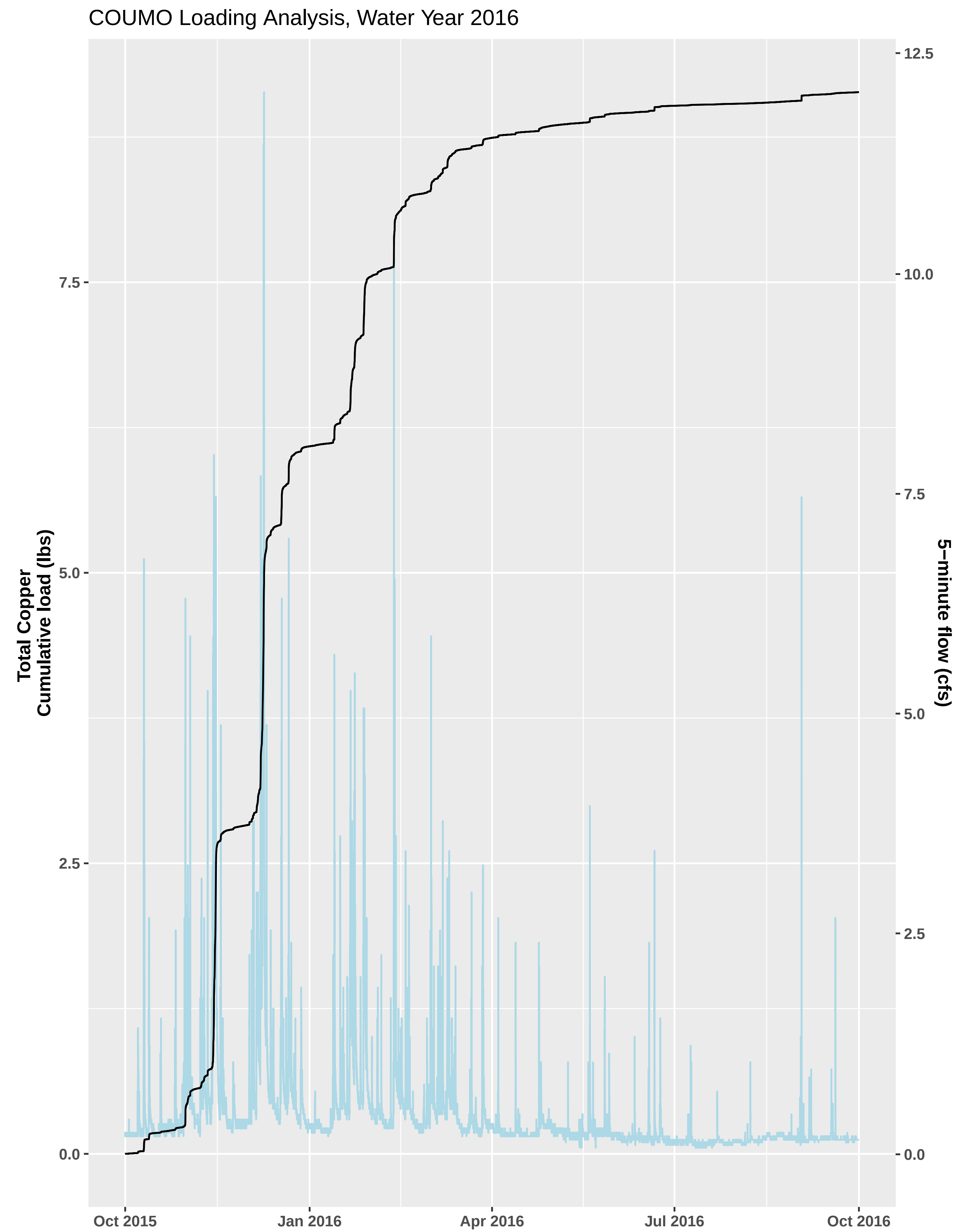

SEIMS Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


SEIMS Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.5
1.0
instantaneous discharge (cfs)

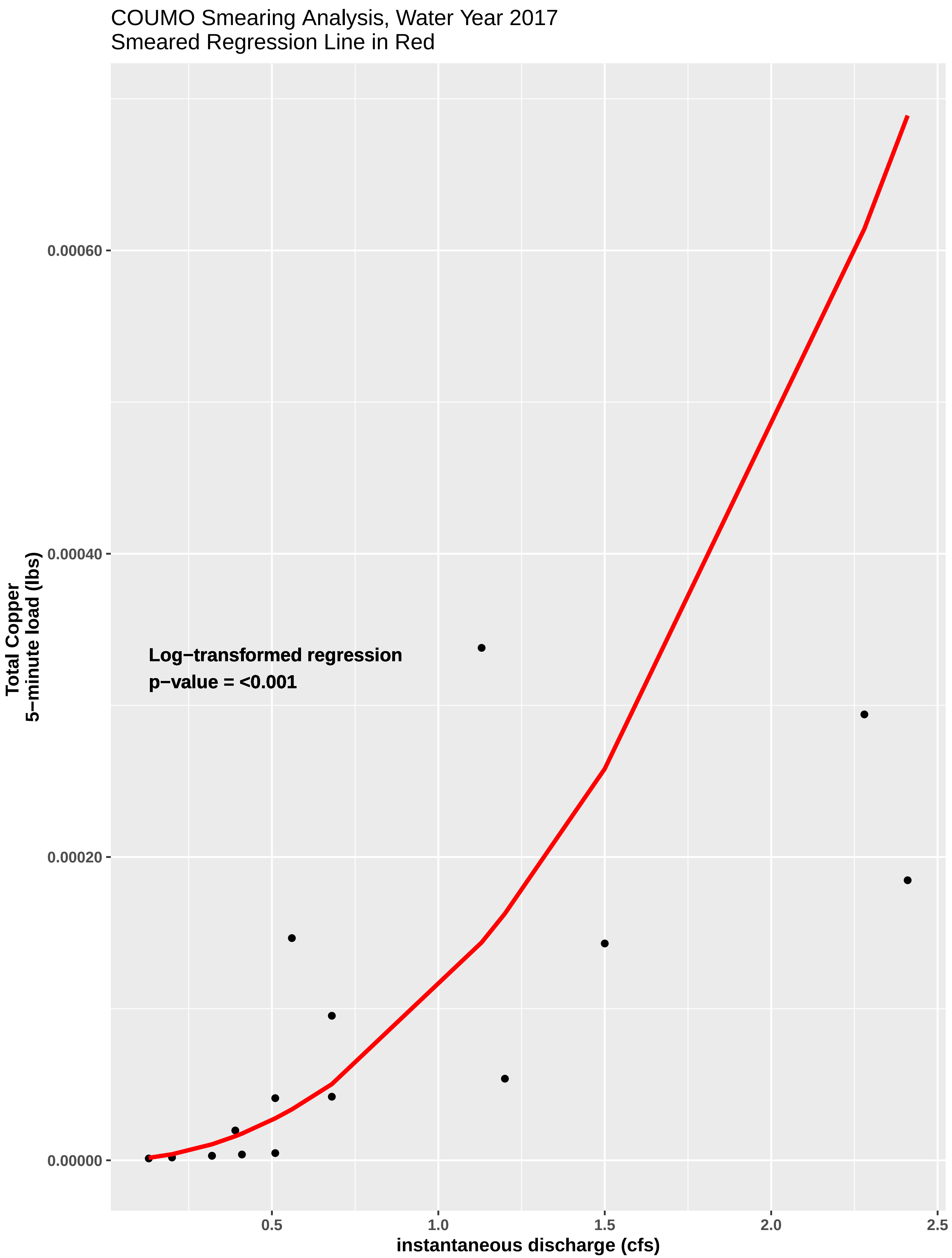

SEIMS Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
1
2
3
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

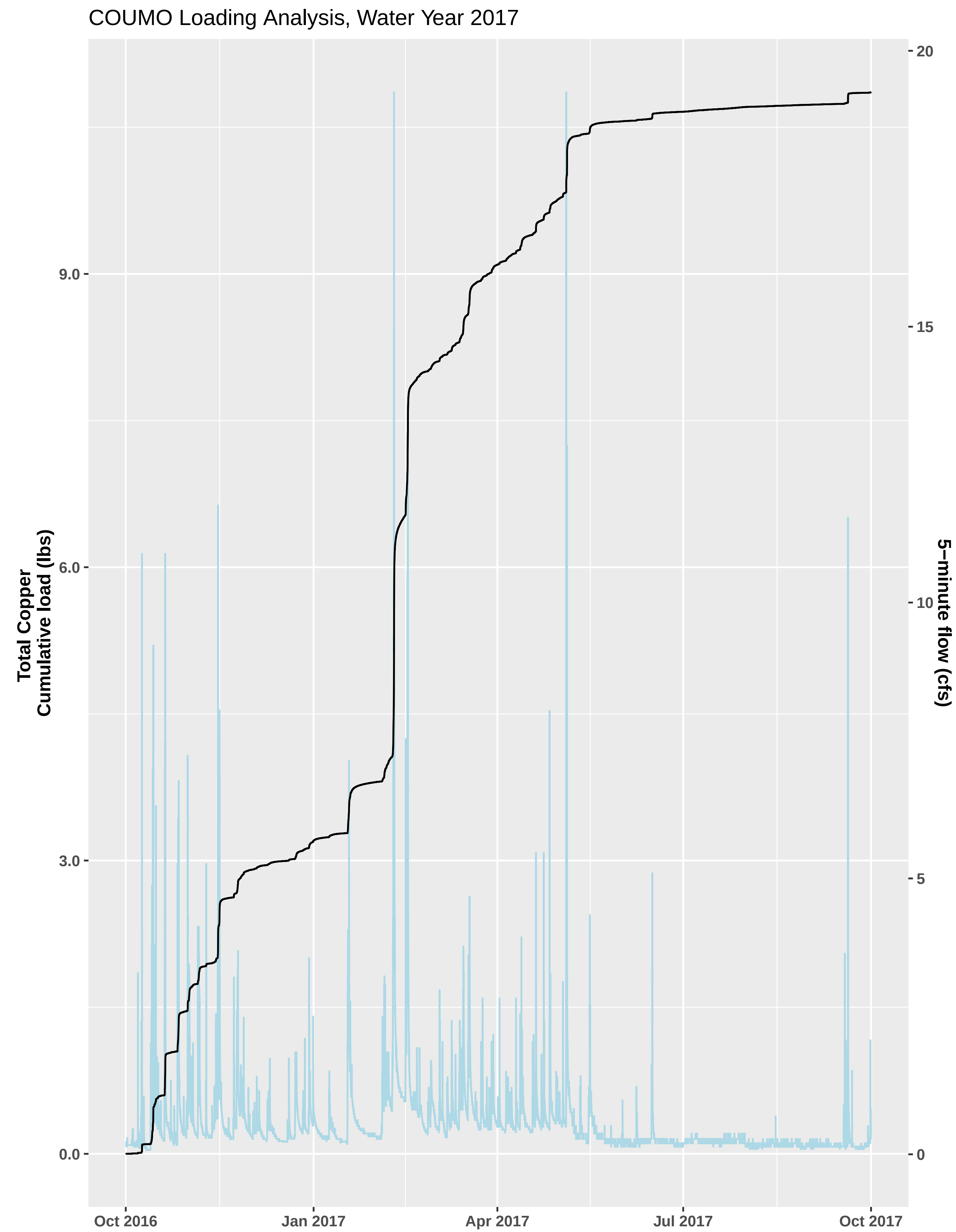


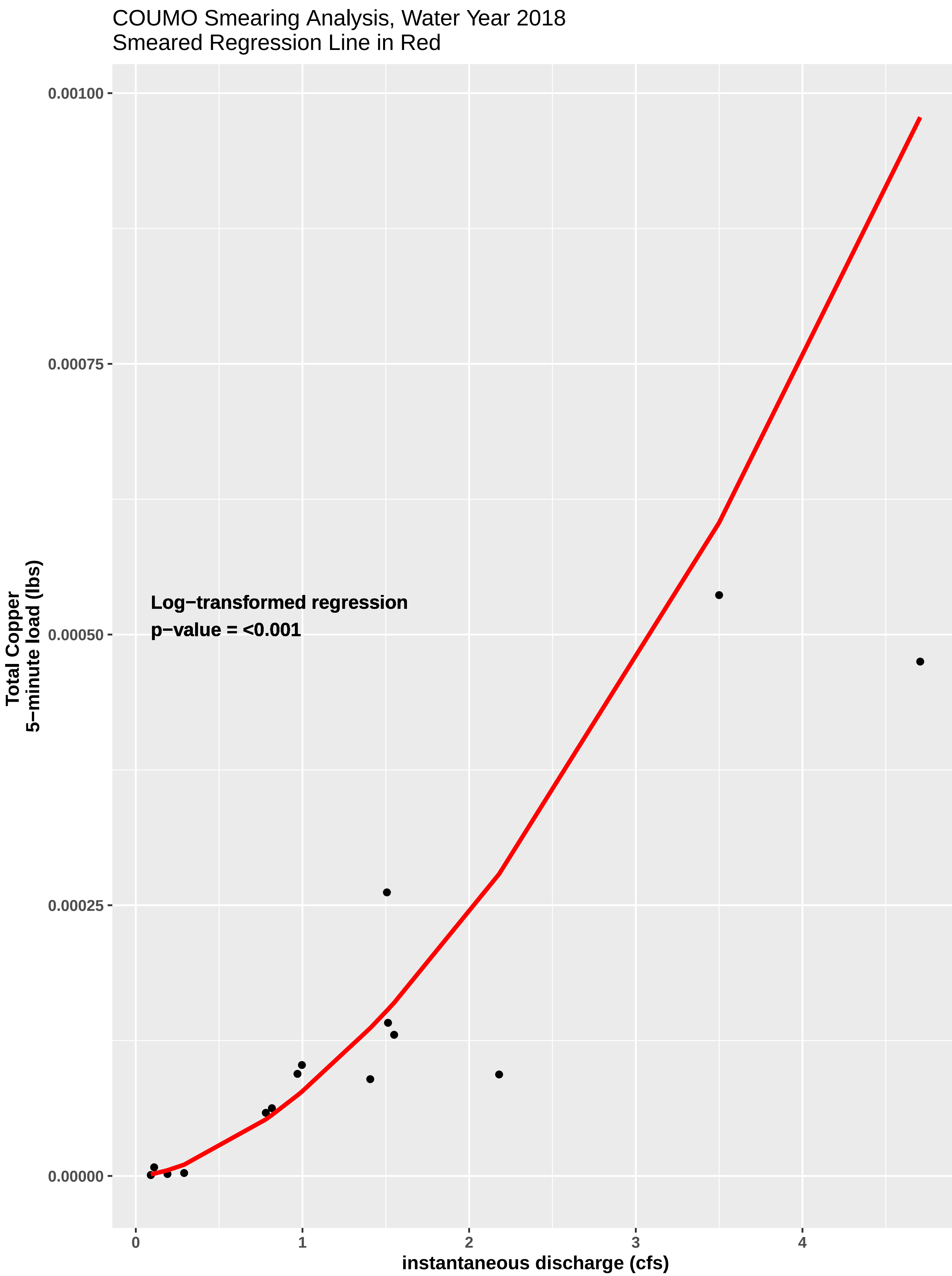
COUMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Copper
5−minute load (lbs)
0.00100
0.00050
0.00000
Log−transformed regression
p−value = <0.001
0
1
2
3
instantaneous discharge (cfs)

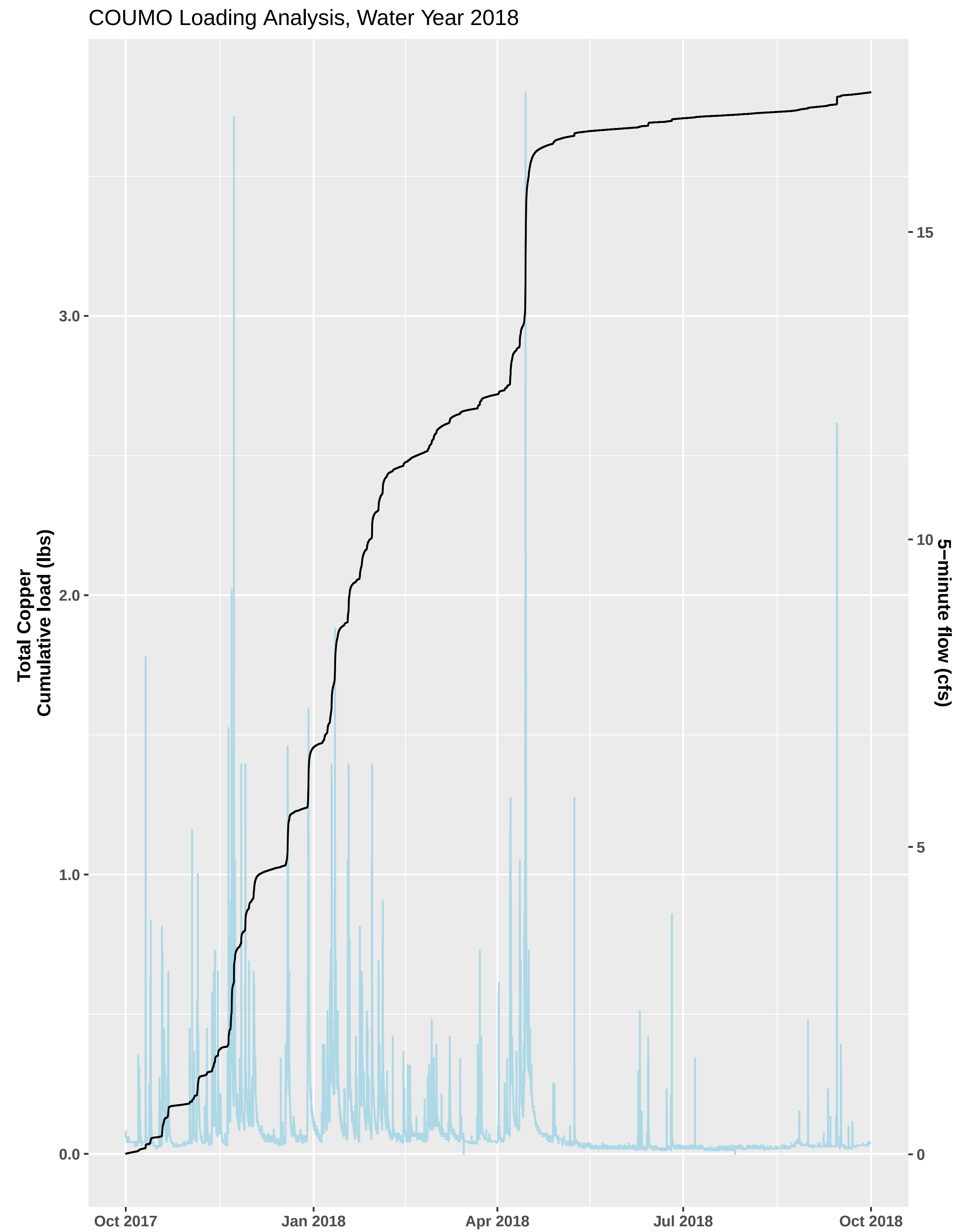


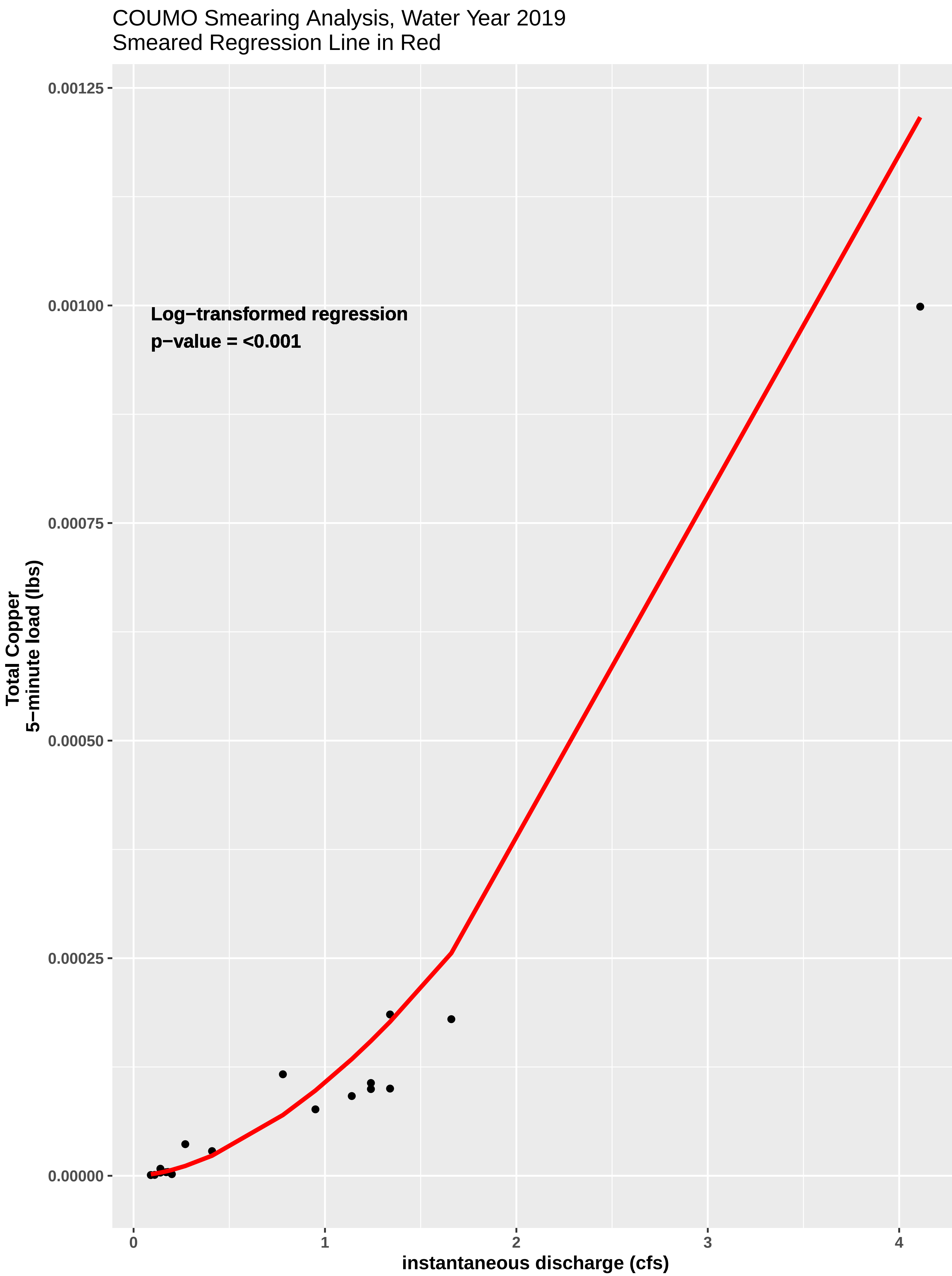
COUMO Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
7.5
5.0
2.5
0.0
5−minute flow (cfs)
12.5
10.0
7.5
5.0
2.5
0.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


COUMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Total Copper
5−minute load (lbs)
0.00000
0.00020
0.00040
0.00060
Log−transformed regression
p−value = <0.001
0.5
1.0
1.5
2.0
2.5
instantaneous discharge (cfs)

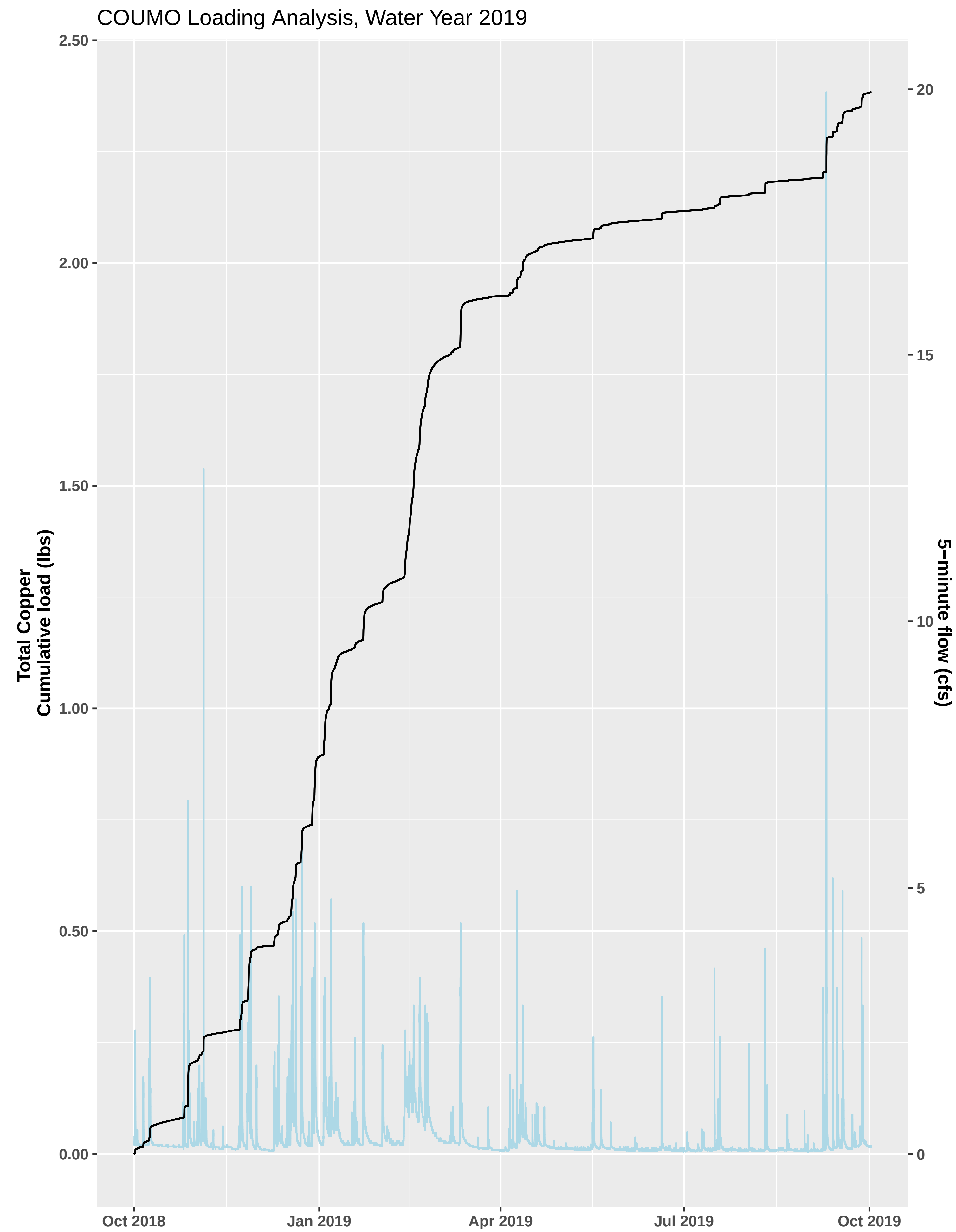

COUMO Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
0.0
3.0
6.0
9.0
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


COUMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
instantaneous discharge (cfs)
0.00100
0.00075
0.00050
0.00025
0.00000
0
1
2
3
4

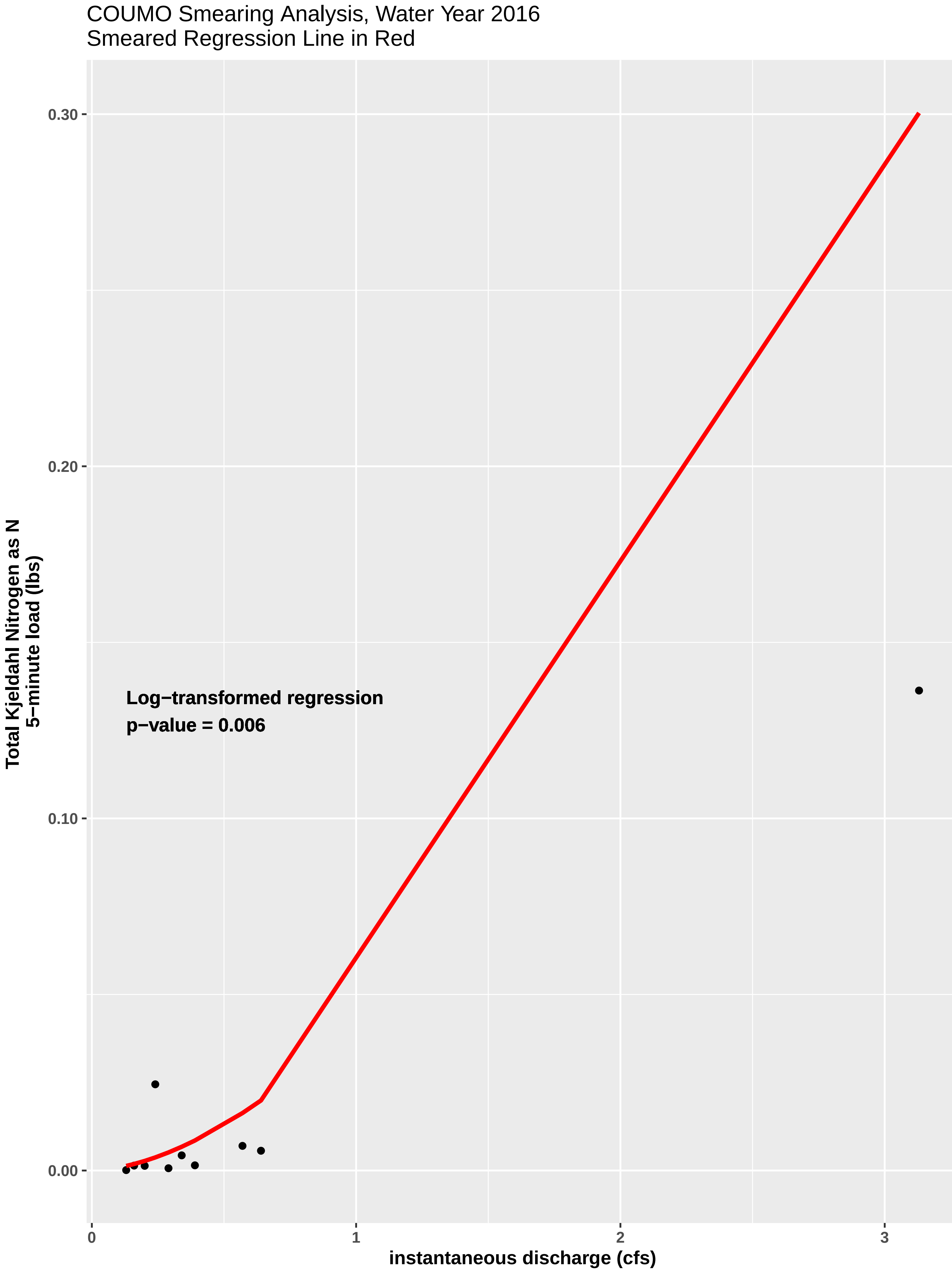

COUMO Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
5−minute flow (cfs)
3.0
2.0
1.0
0.0
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

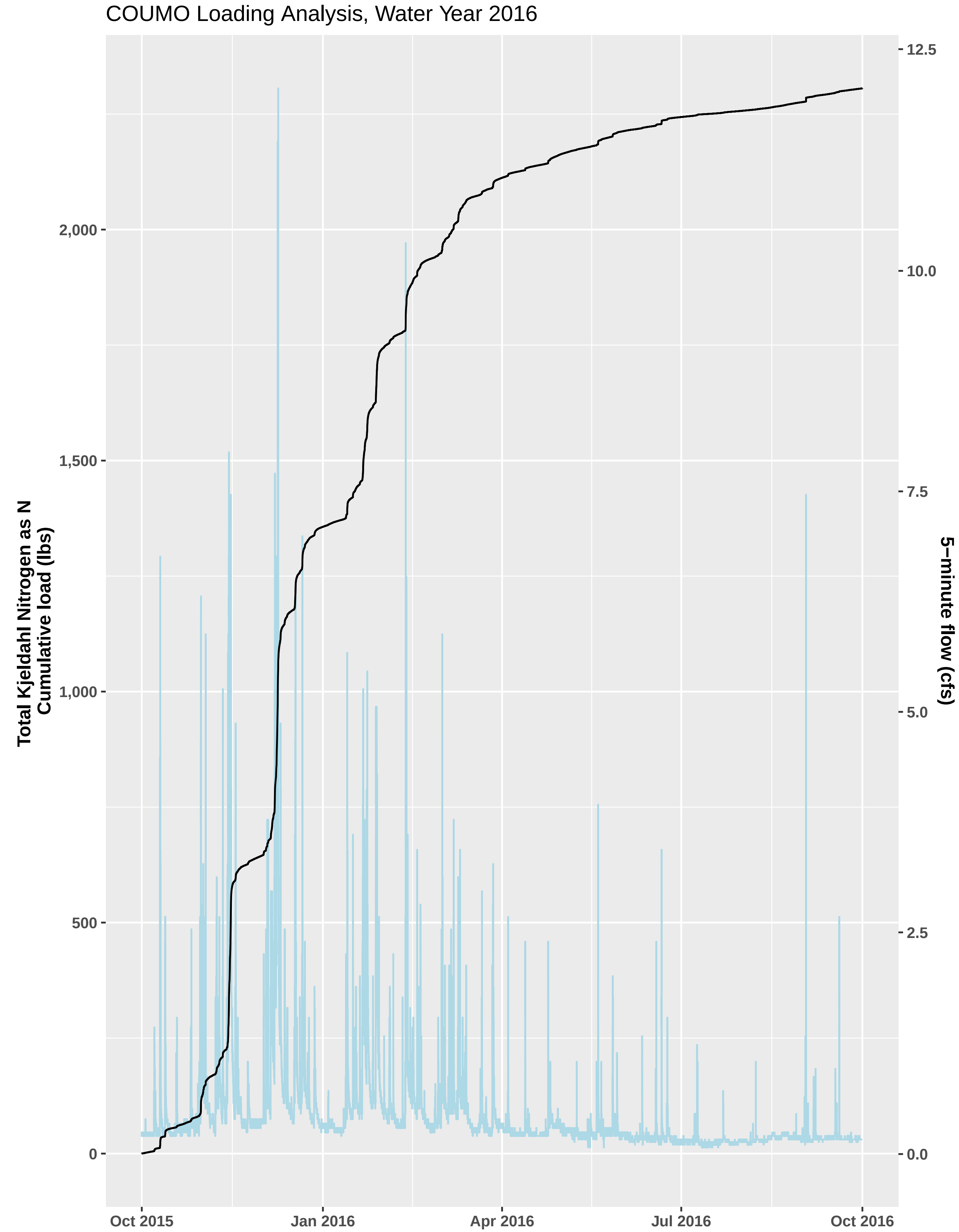


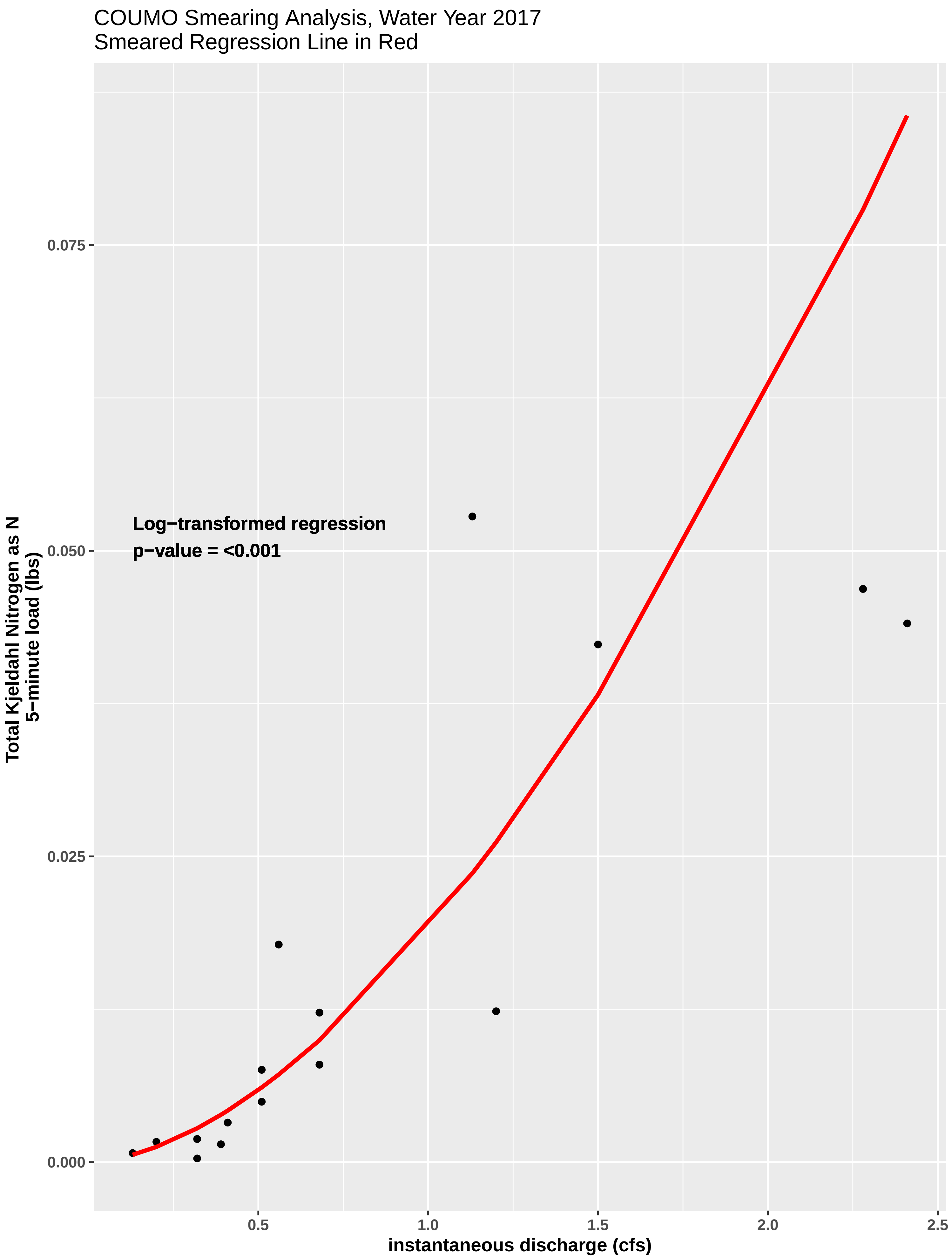
COUMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00125
0.00100
0.00075
0.00050
0.00025
0.00000
0
1
2
3
4
instantaneous discharge (cfs)



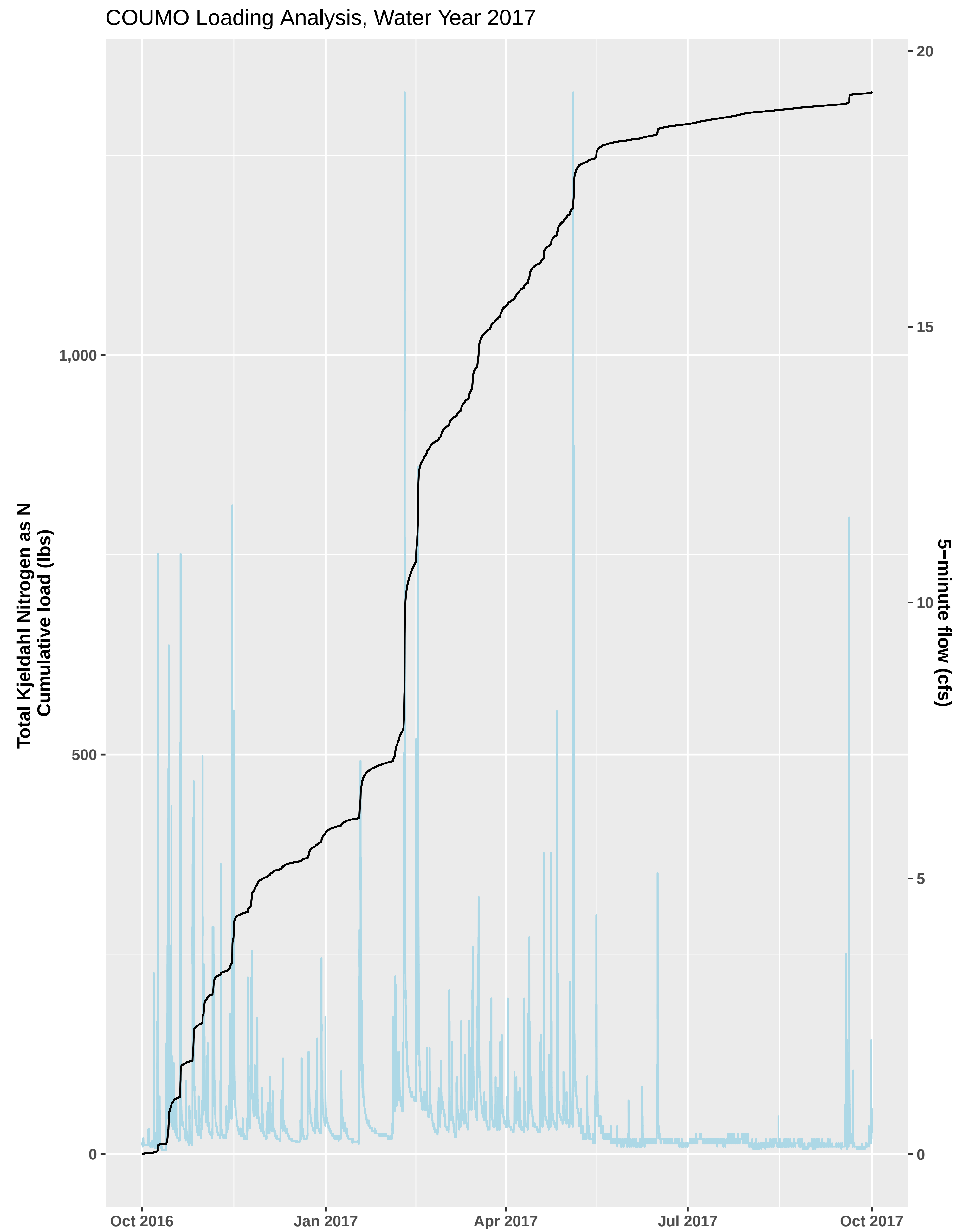
COUMO Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
2.50
2.00
1.50
1.00
0.50
0.00
5−minute flow (cfs)
20
15
10
5
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COUMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.30
0.20
0.10
0.00
Log−transformed regression
p−value = 0.006
0
1
2
3
instantaneous discharge (cfs)

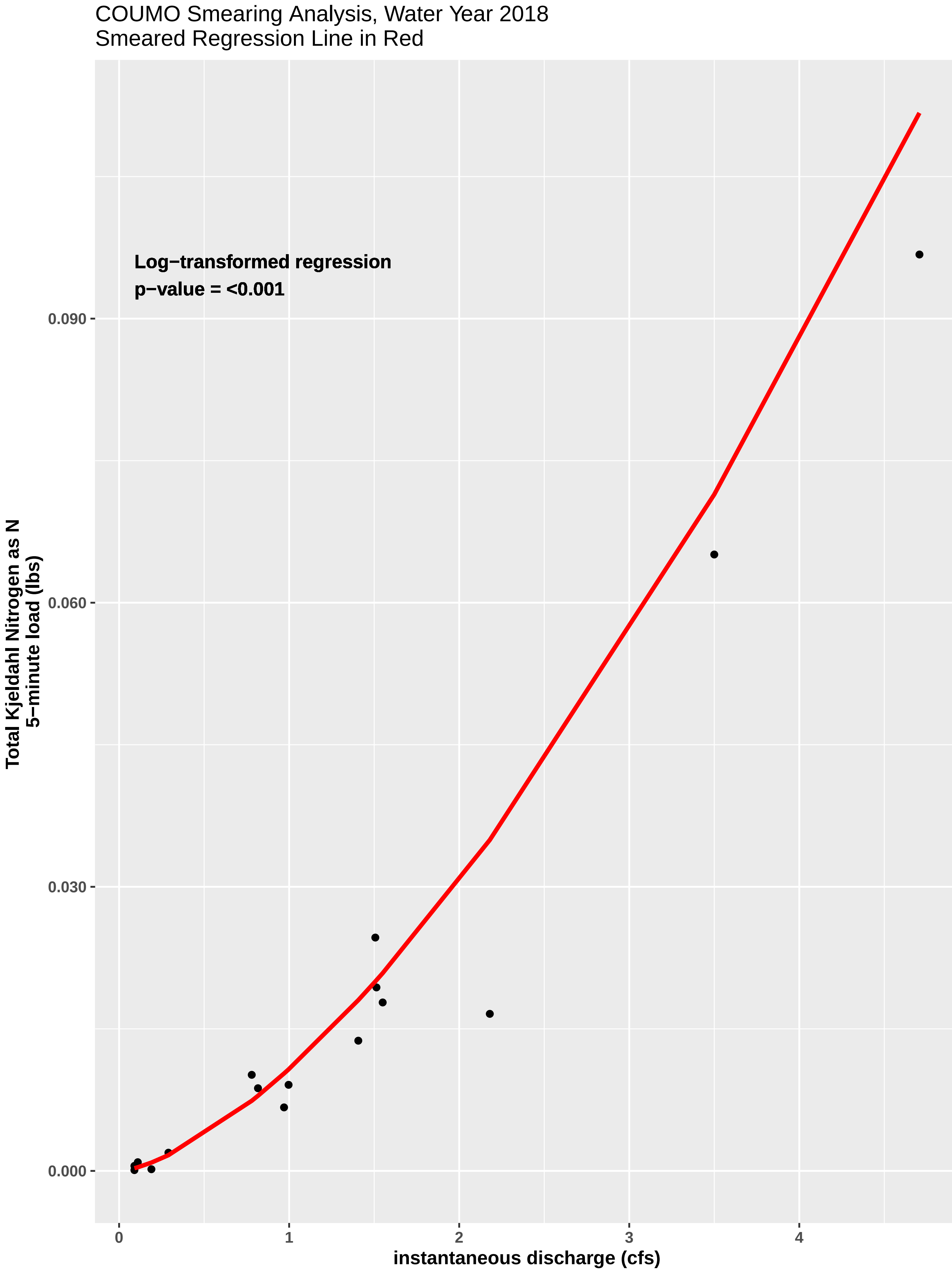

COUMO Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
2,000
1,500
1,000
500
0
5−minute flow (cfs)
12.5
10.0
7.5
5.0
2.5
0.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016



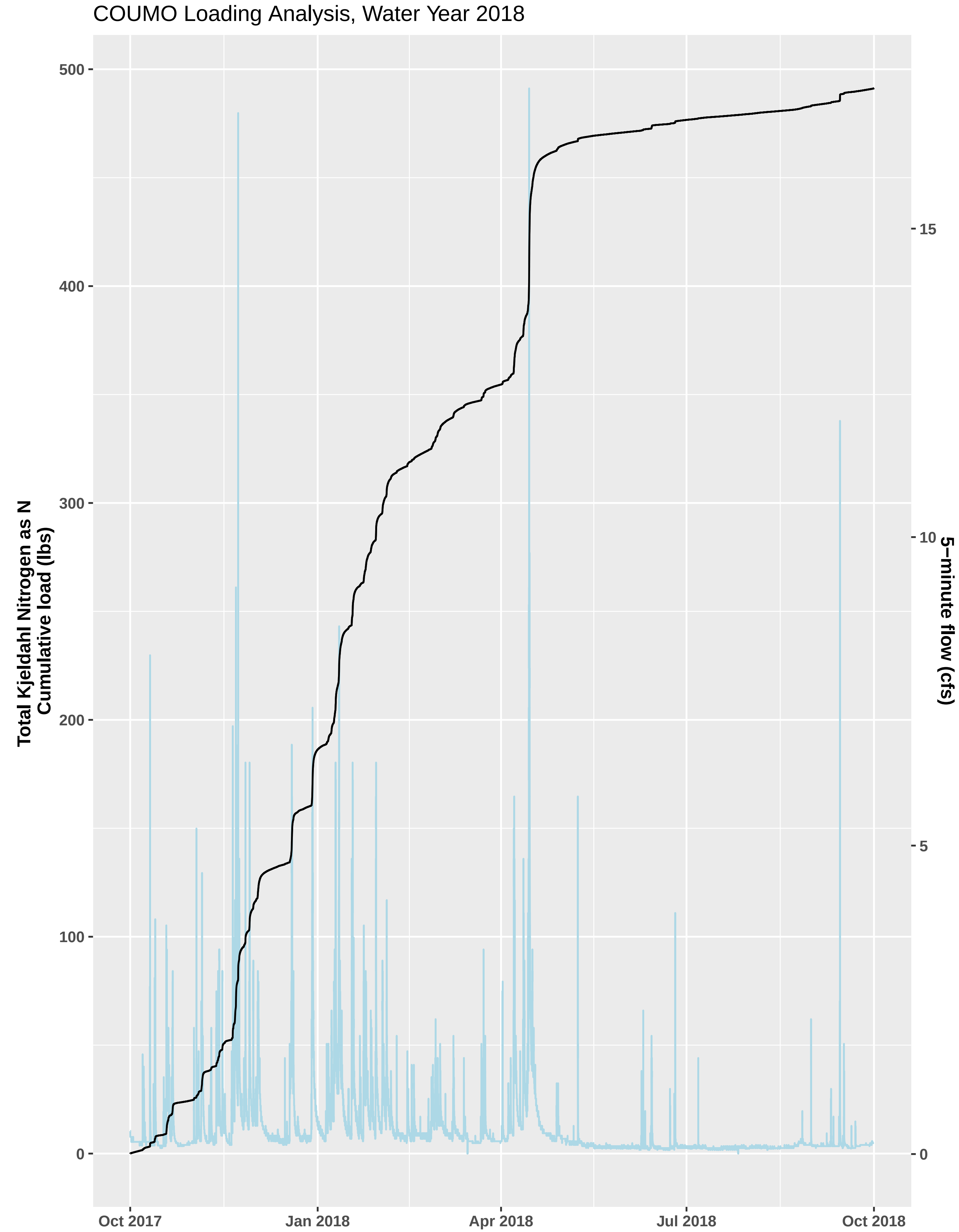
COUMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.025
0.050
0.075
0.5
1.0
1.5
2.0
2.5
instantaneous discharge (cfs)



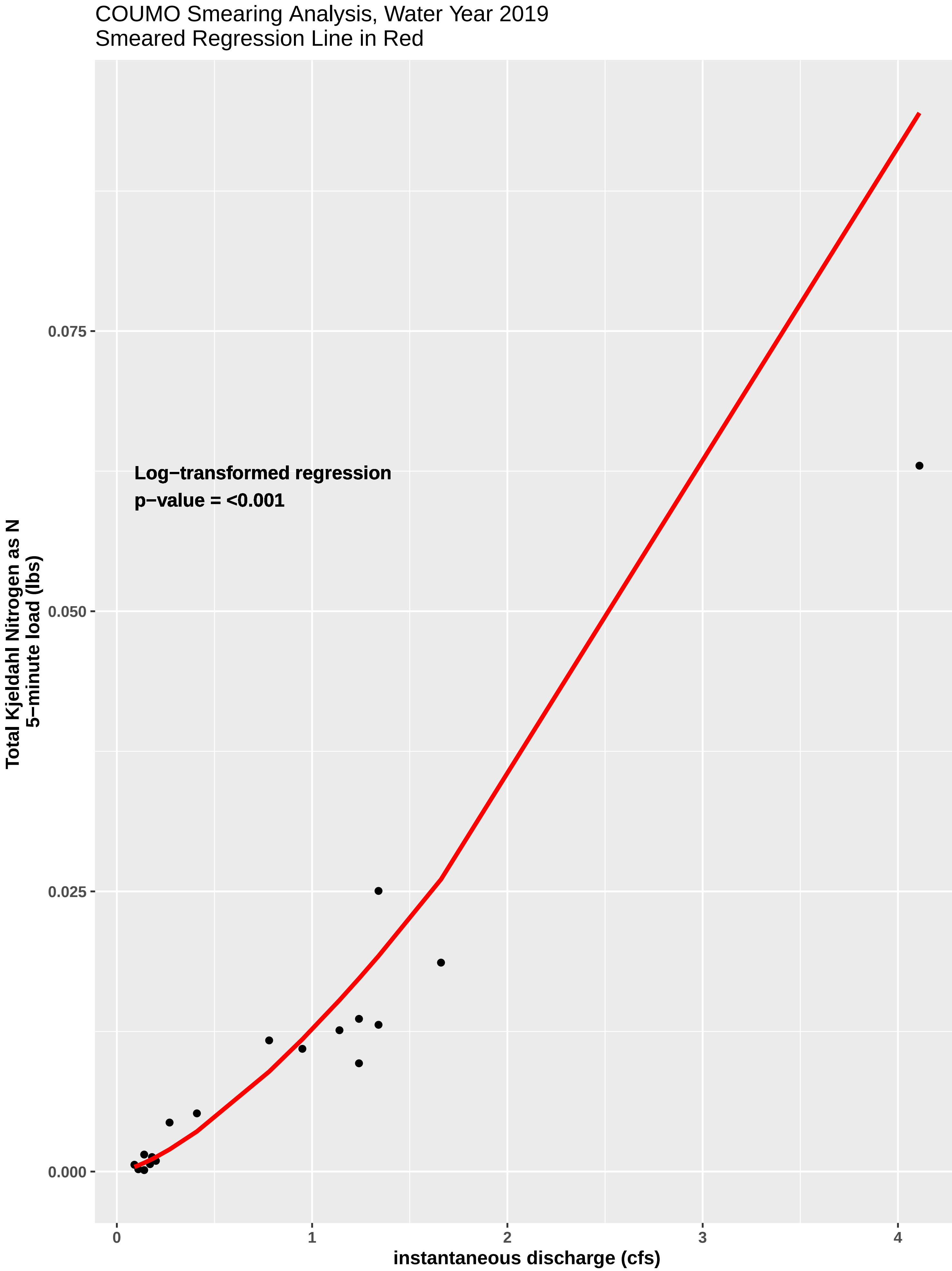
COUMO Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
500
1,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

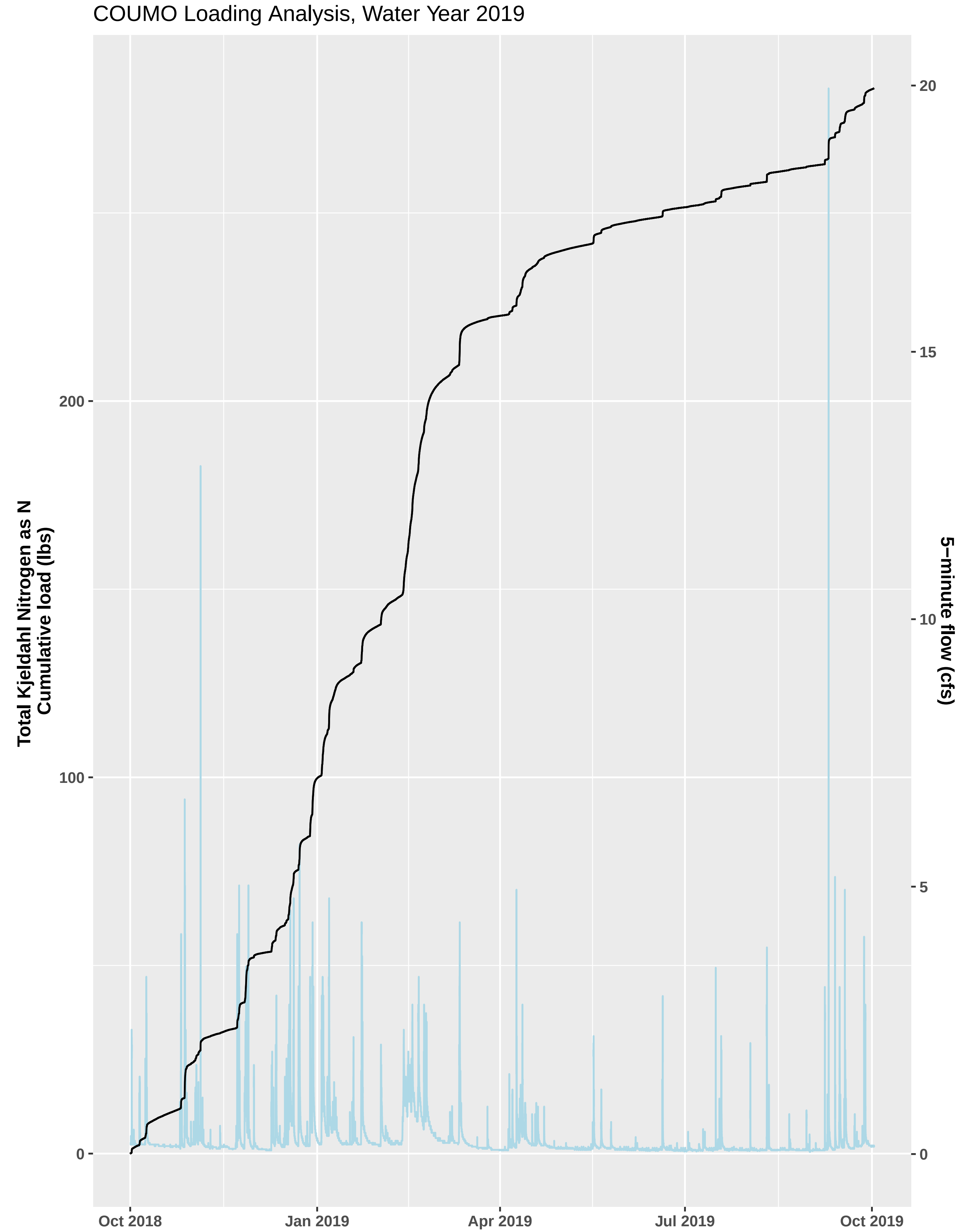


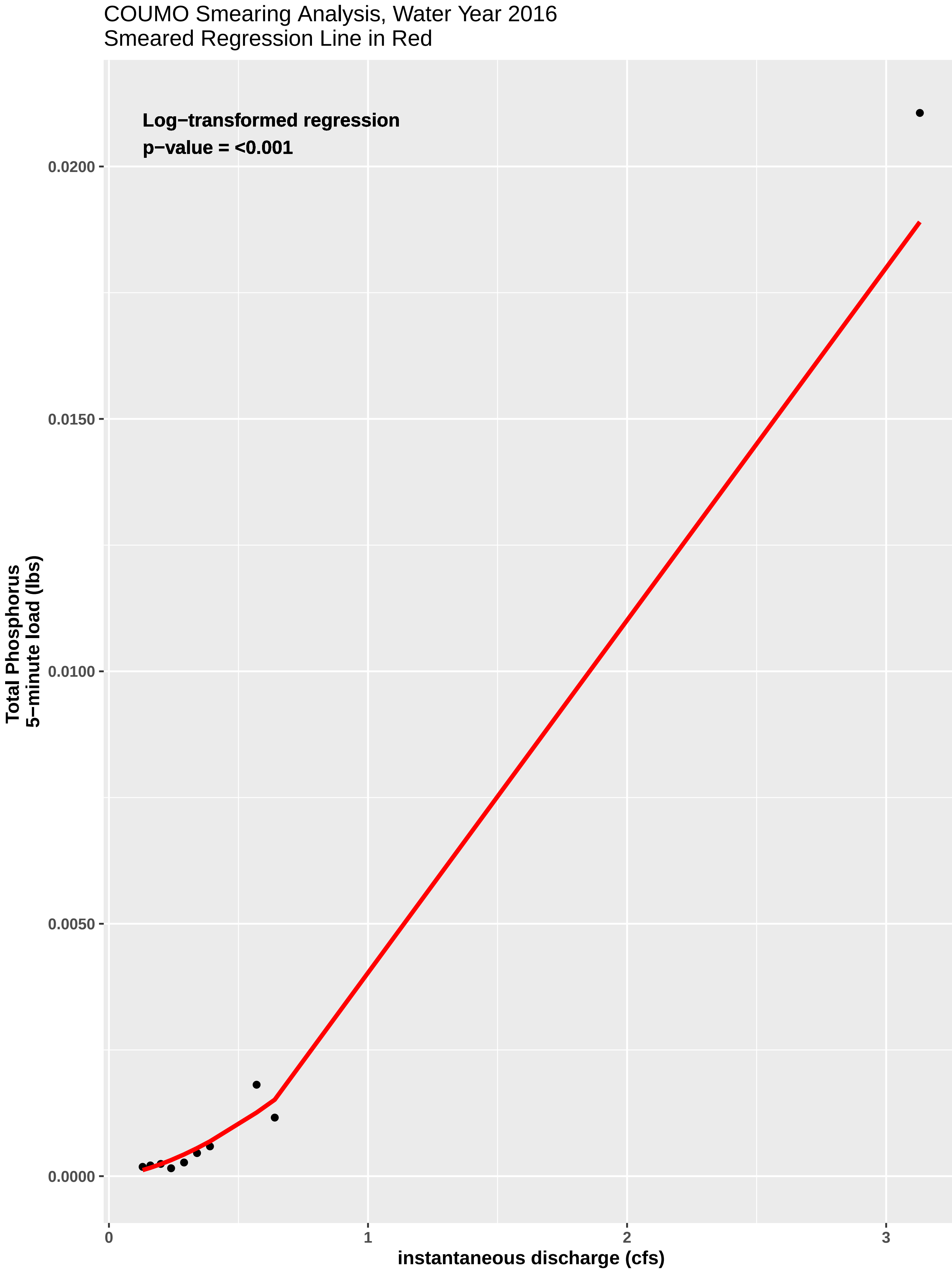
COUMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.030
0.060
0.090
0
1
2
3
4
instantaneous discharge (cfs)

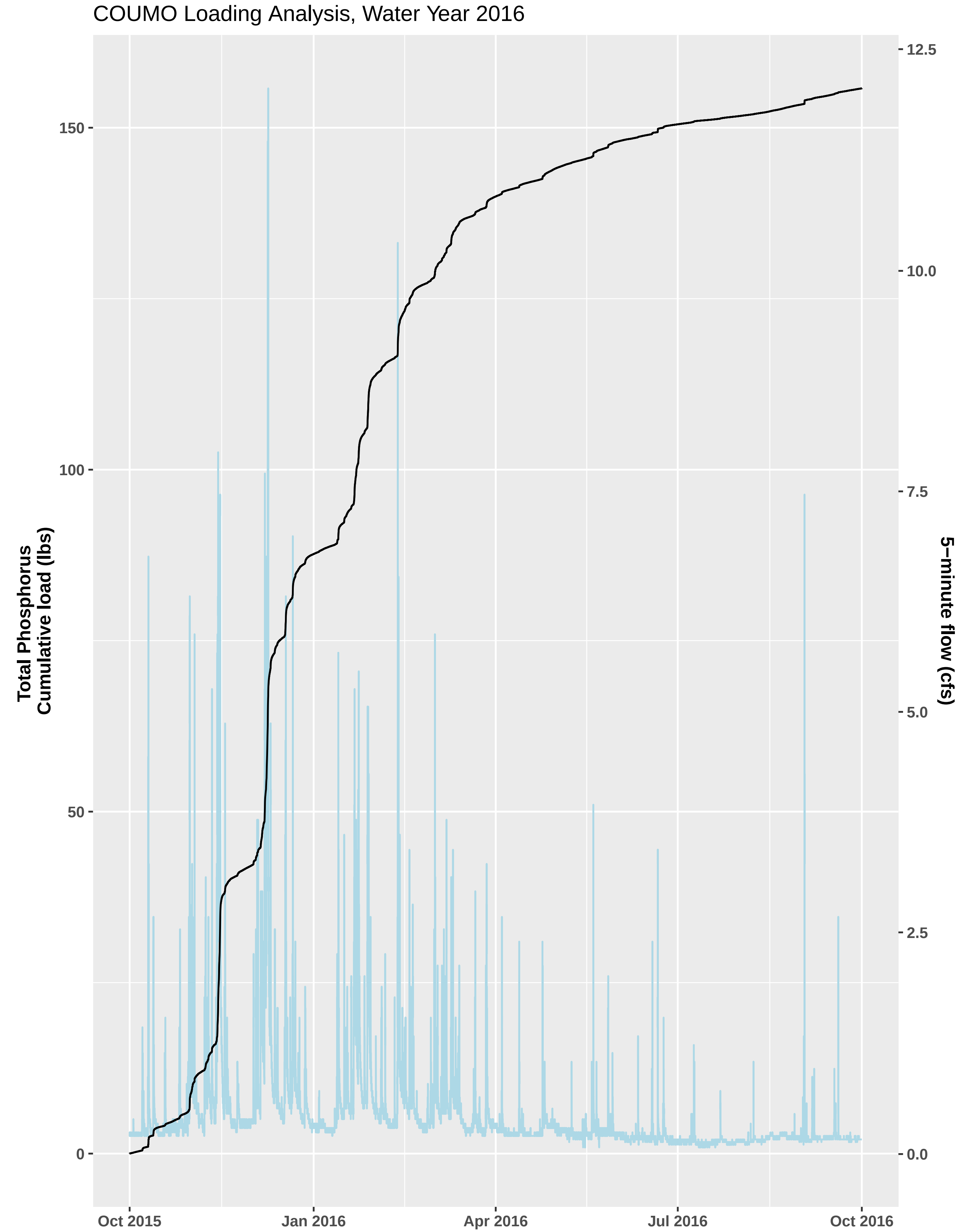


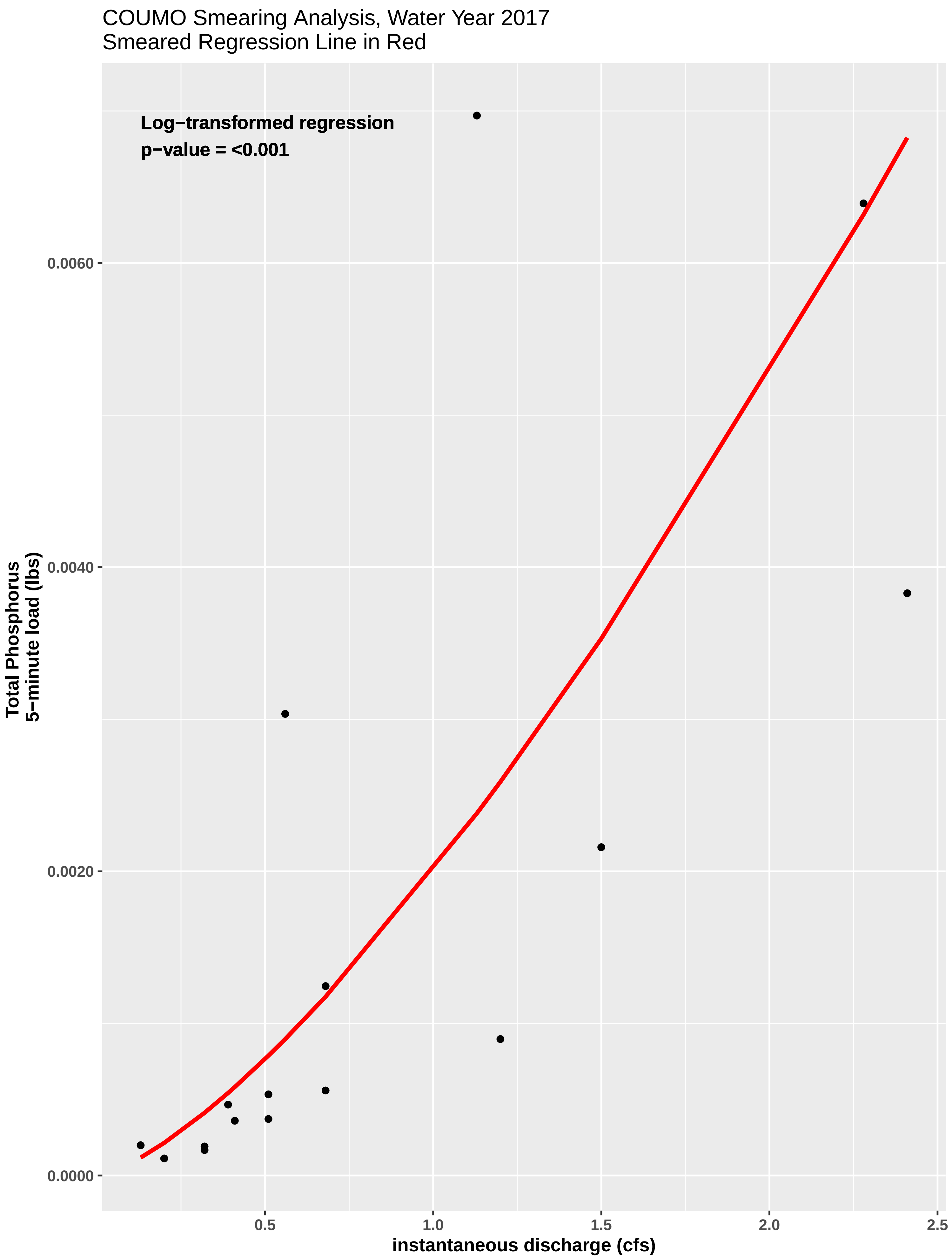
COUMO Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
300
400
500
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


COUMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.025
0.050
0.075
0
1
2
3
4
instantaneous discharge (cfs)

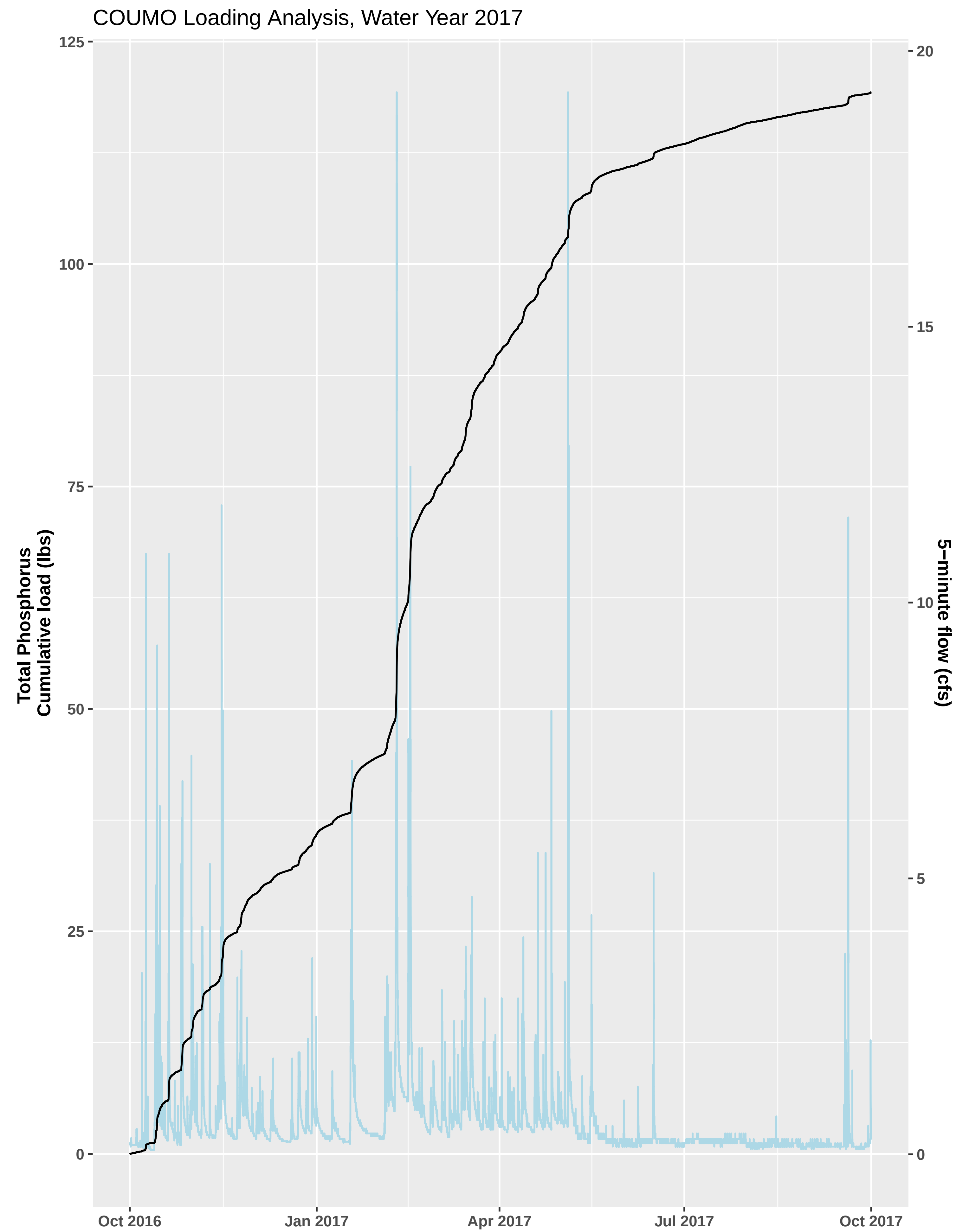

COUMO Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
5−minute flow (cfs)
0
5
10
15
20
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COUMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0
1
2
3
instantaneous discharge (cfs)

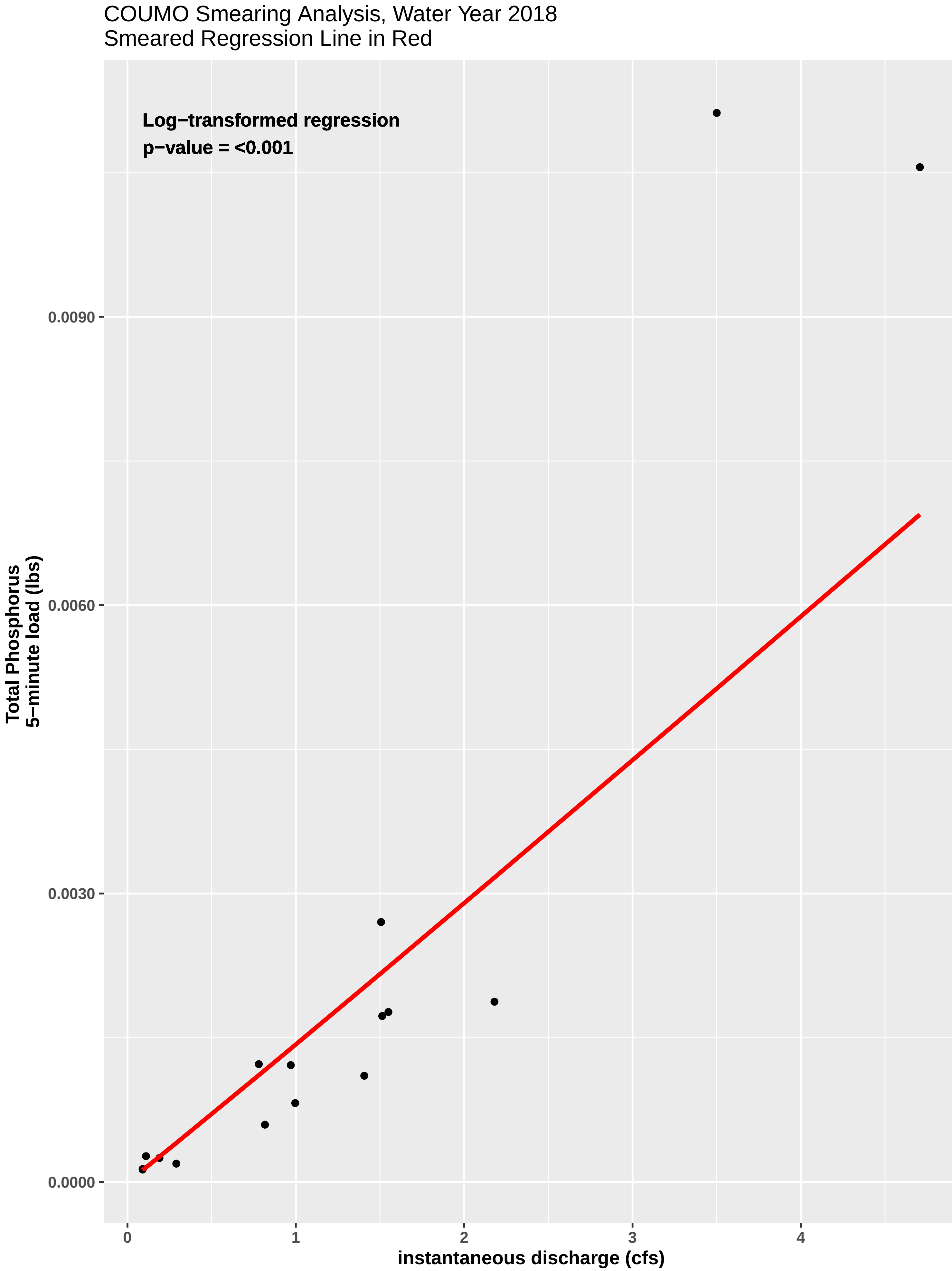

COUMO Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0
50
100
150
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
12.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

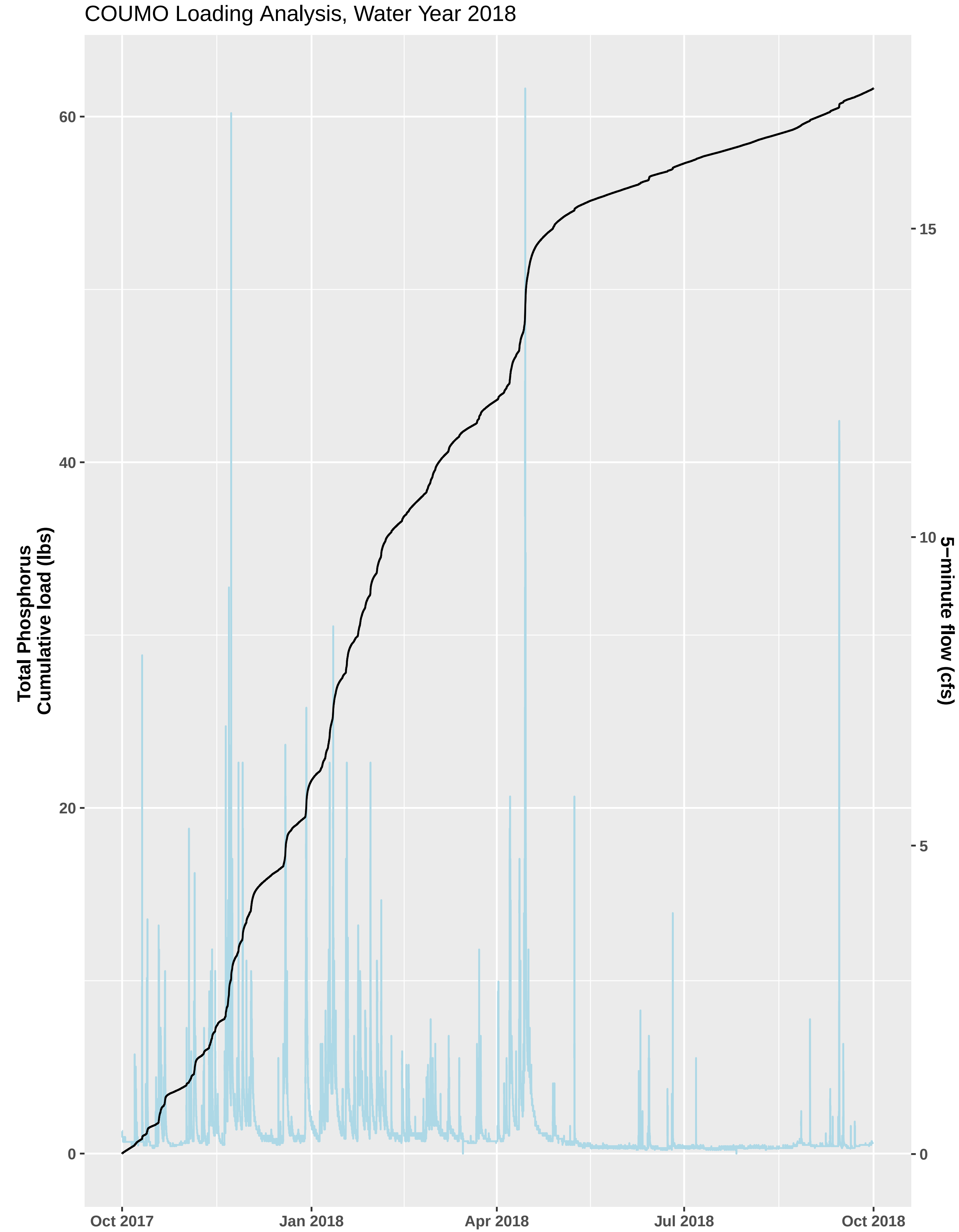


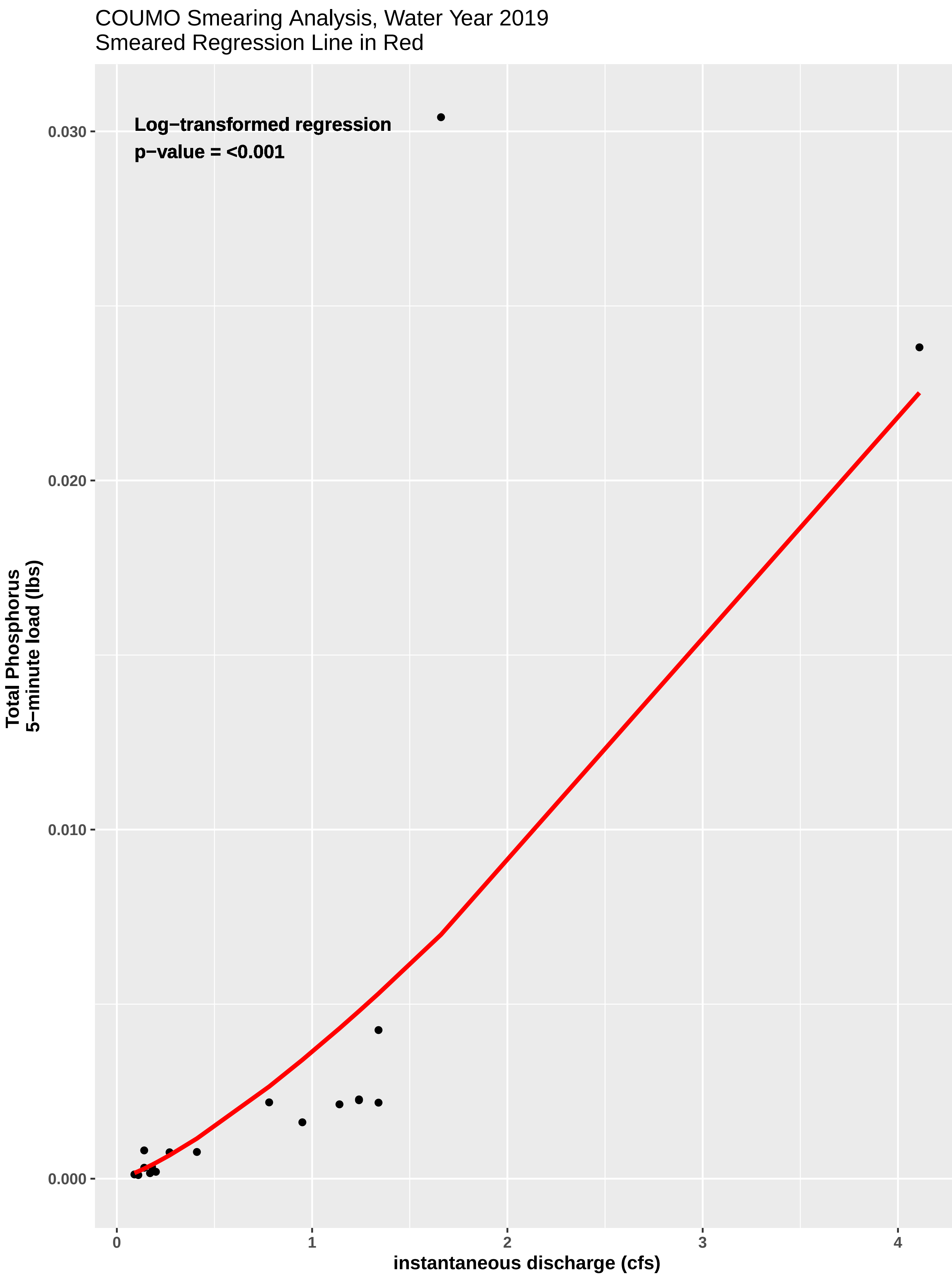
COUMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.5
1.0
1.5
2.0
2.5
instantaneous discharge (cfs)

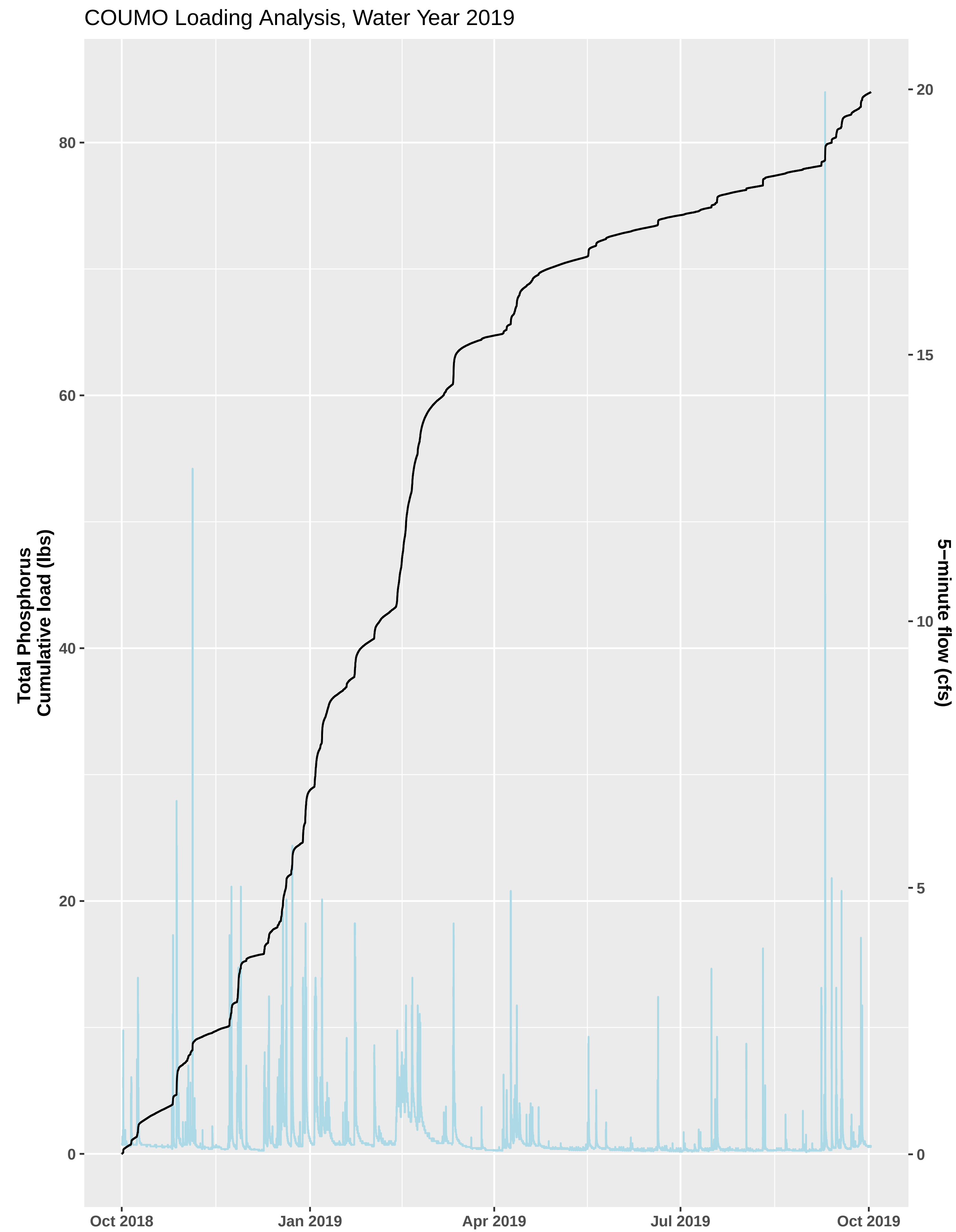


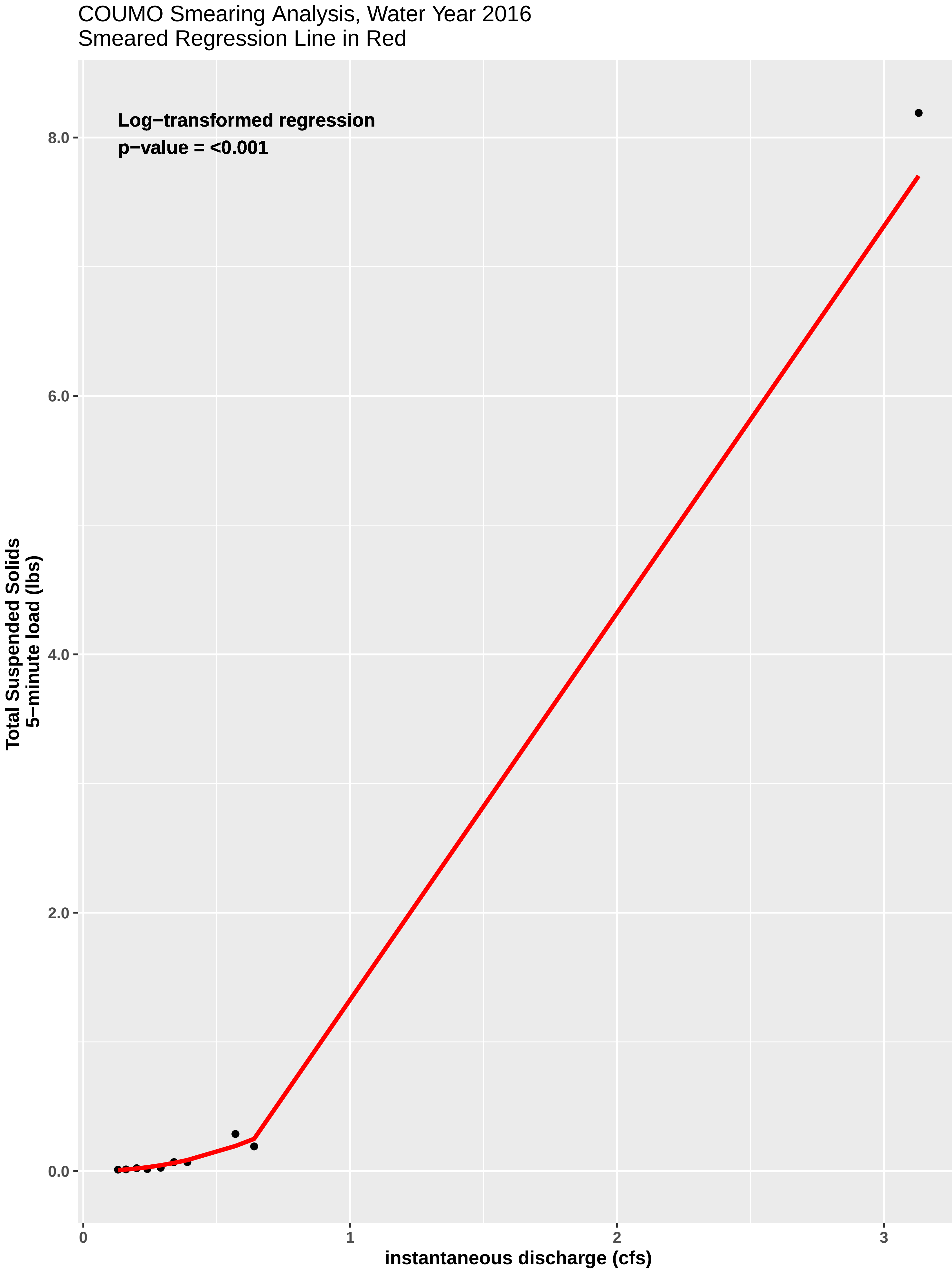
COUMO Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
100
125
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

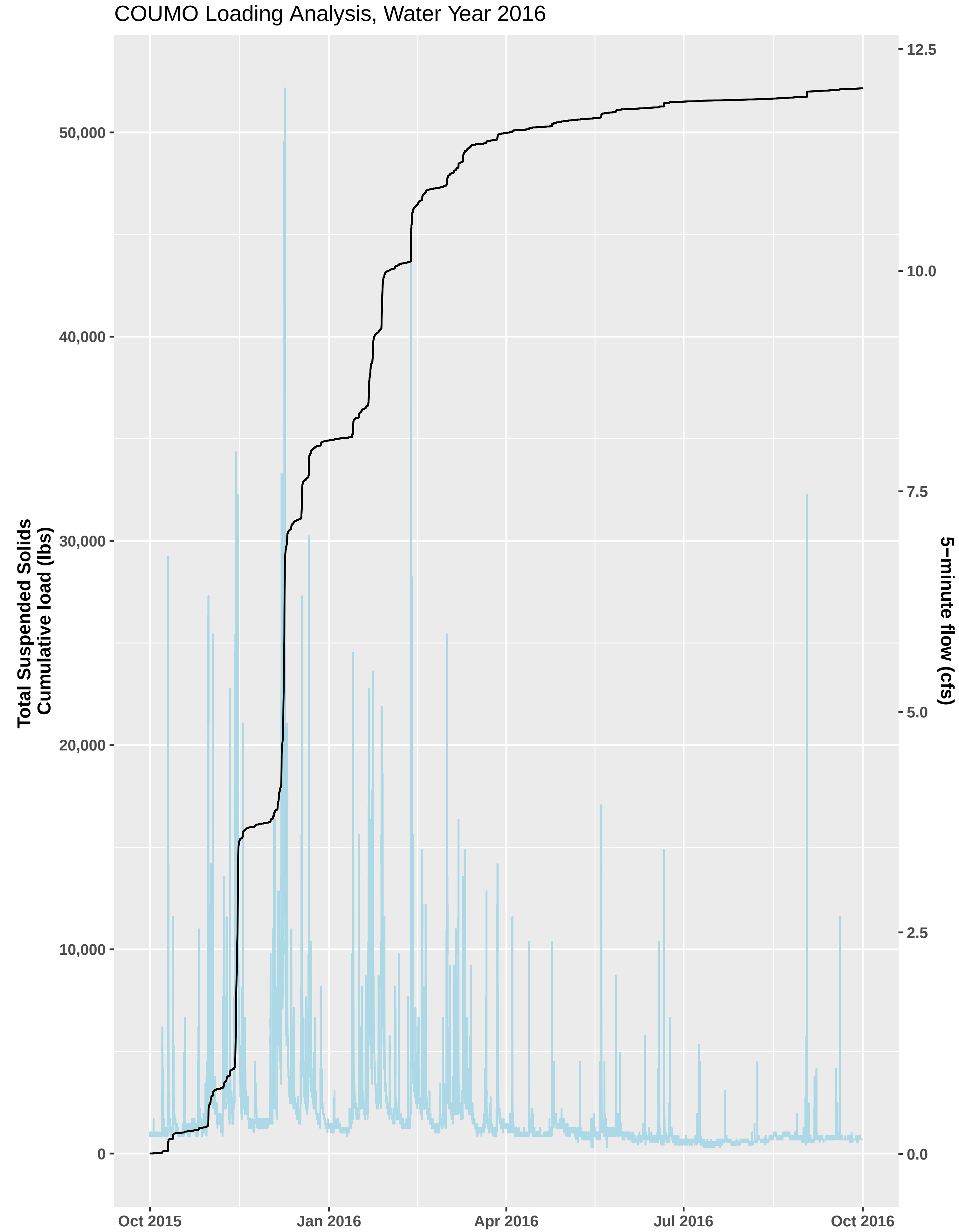

COUMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0030
0.0060
0.0090
0
1
2
3
4
instantaneous discharge (cfs)

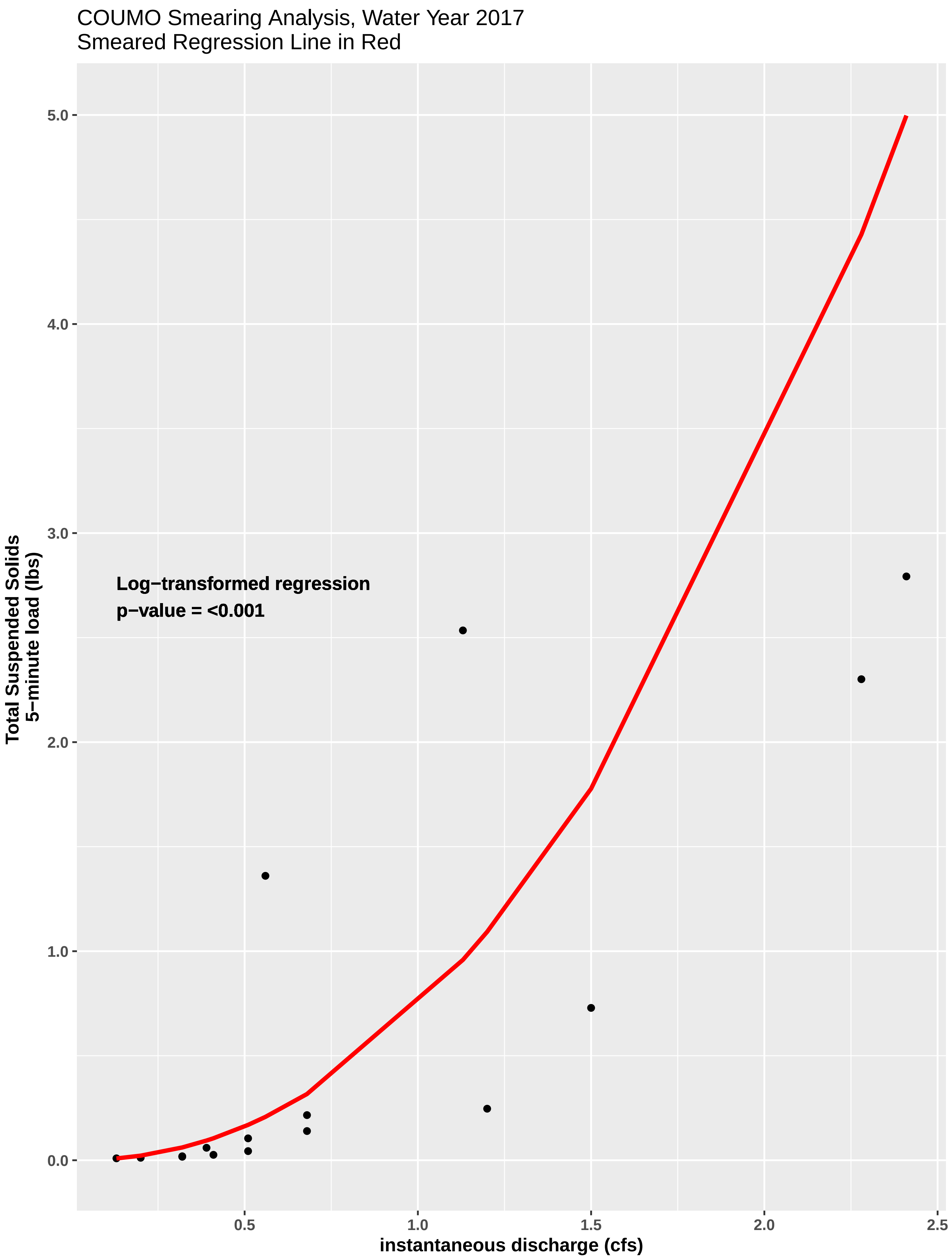

COUMO Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


COUMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.000
0.010
0.020
0.030
0
1
2
3
4
instantaneous discharge (cfs)

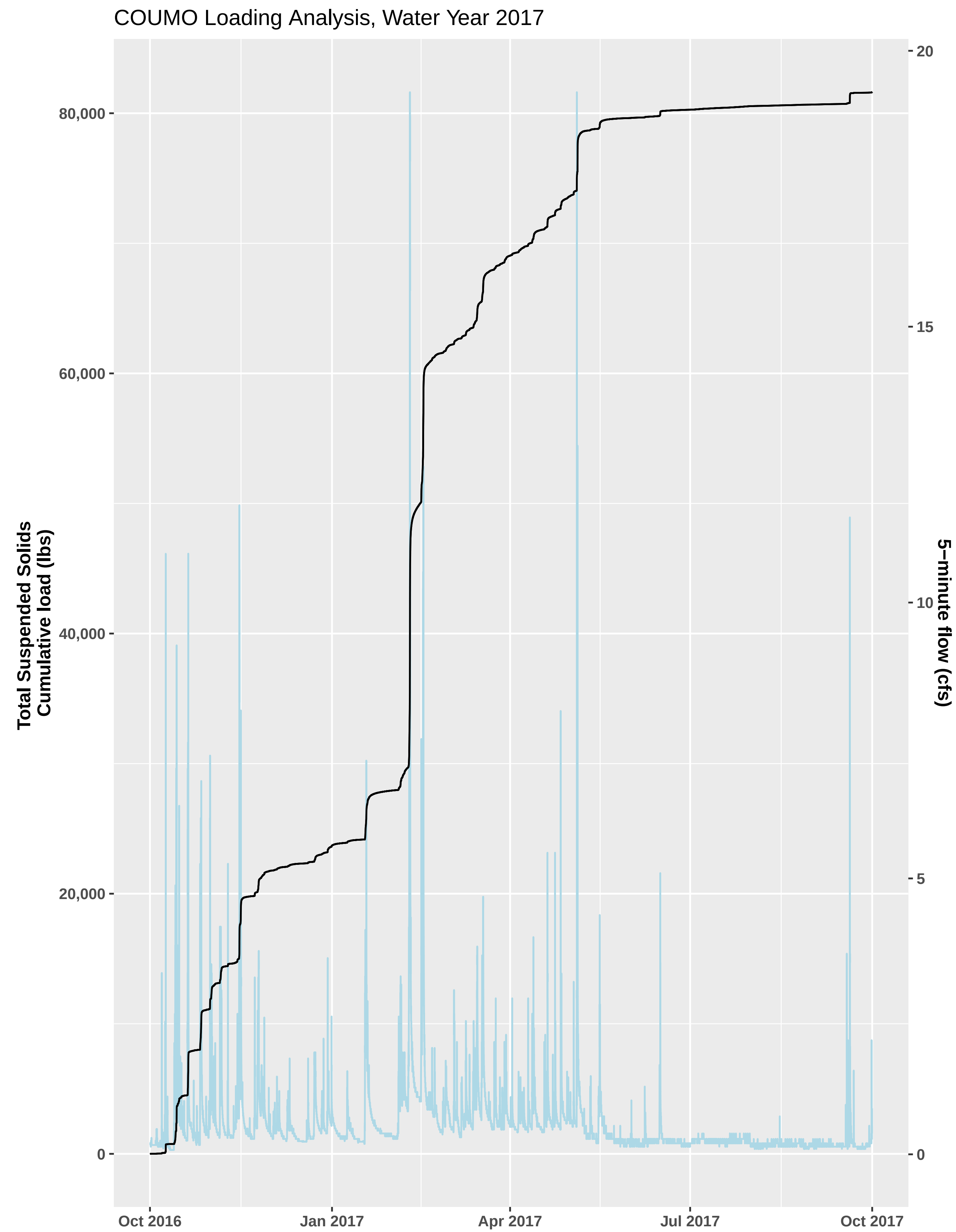

COUMO Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
80
5−minute flow (cfs)
0
5
10
15
20
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COUMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
2.0
4.0
6.0
8.0
0
1
2
3

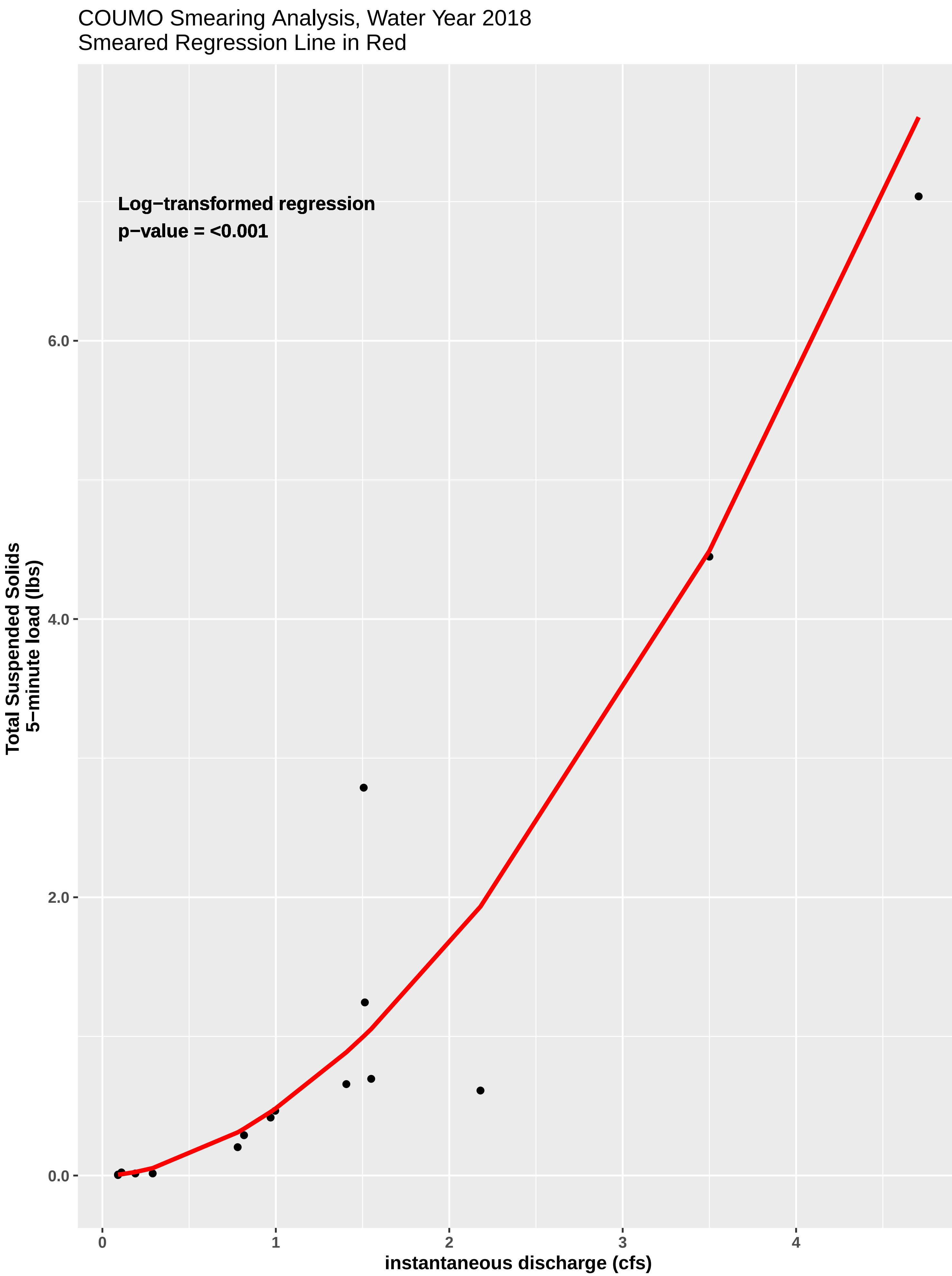

COUMO Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
10,000
20,000
30,000
40,000
50,000
0.0
2.5
5.0
7.5
10.0
12.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

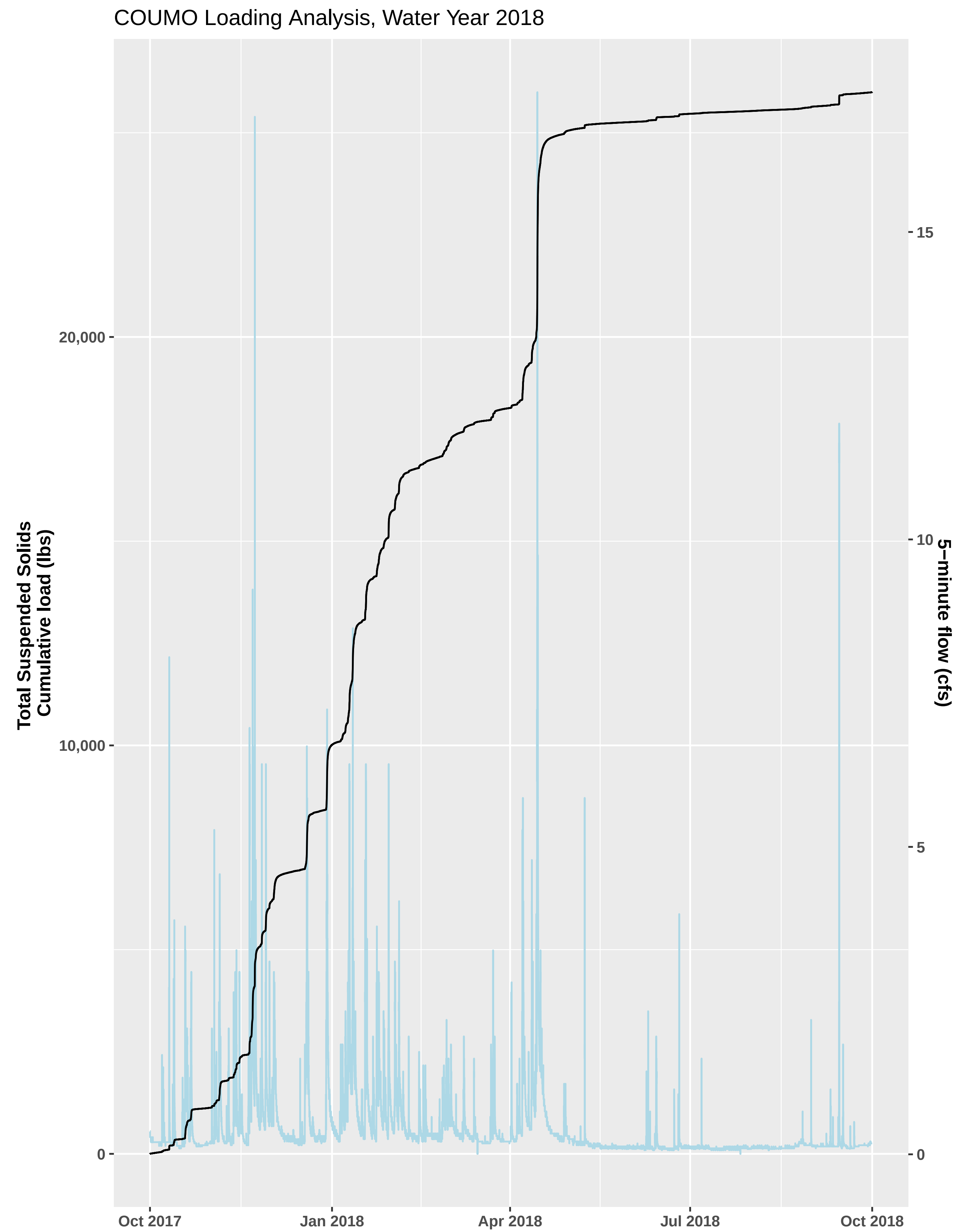


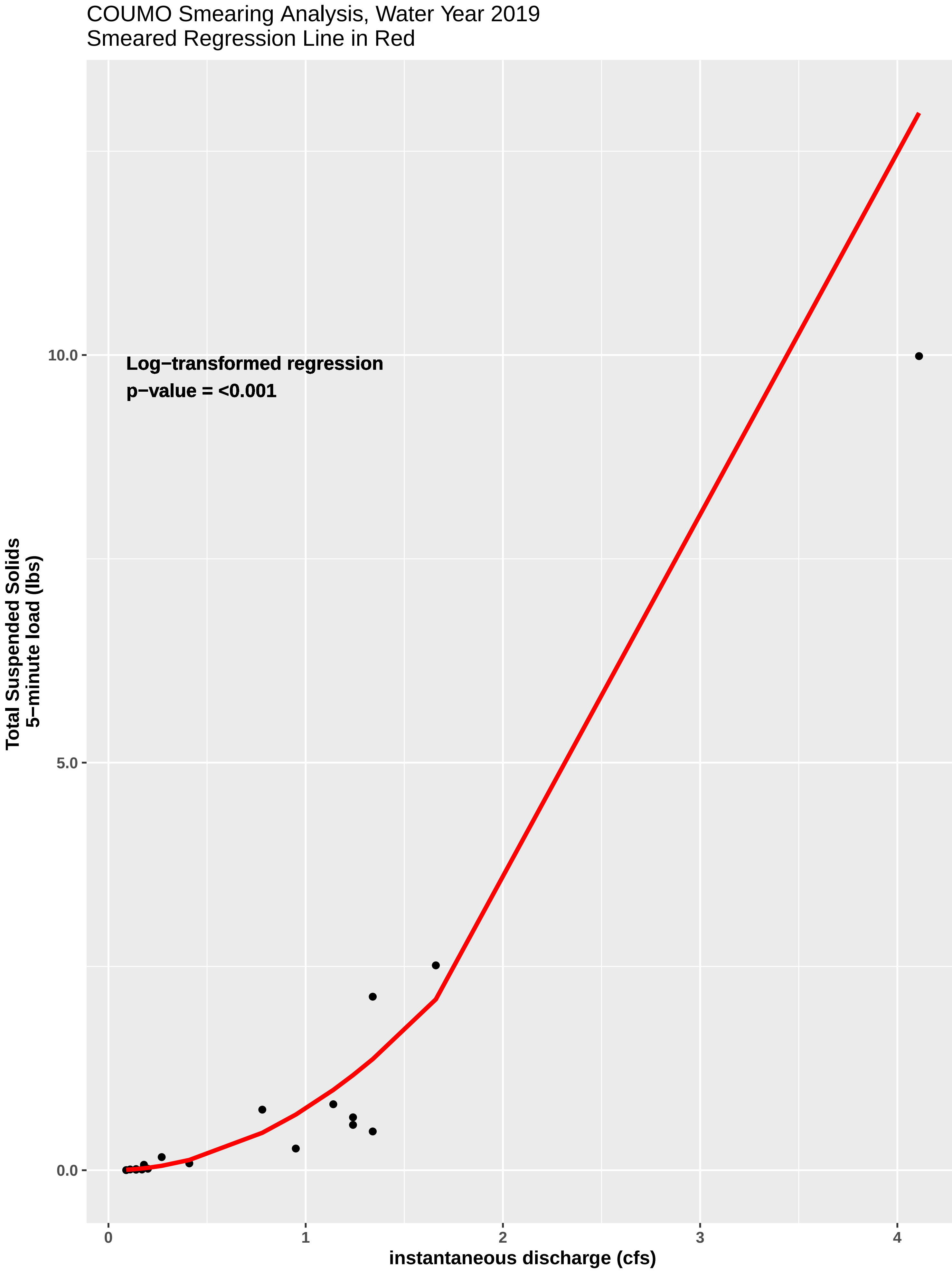
COUMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
1.0
2.0
3.0
4.0
5.0
0.5
1.0
1.5
2.0
2.5
instantaneous discharge (cfs)

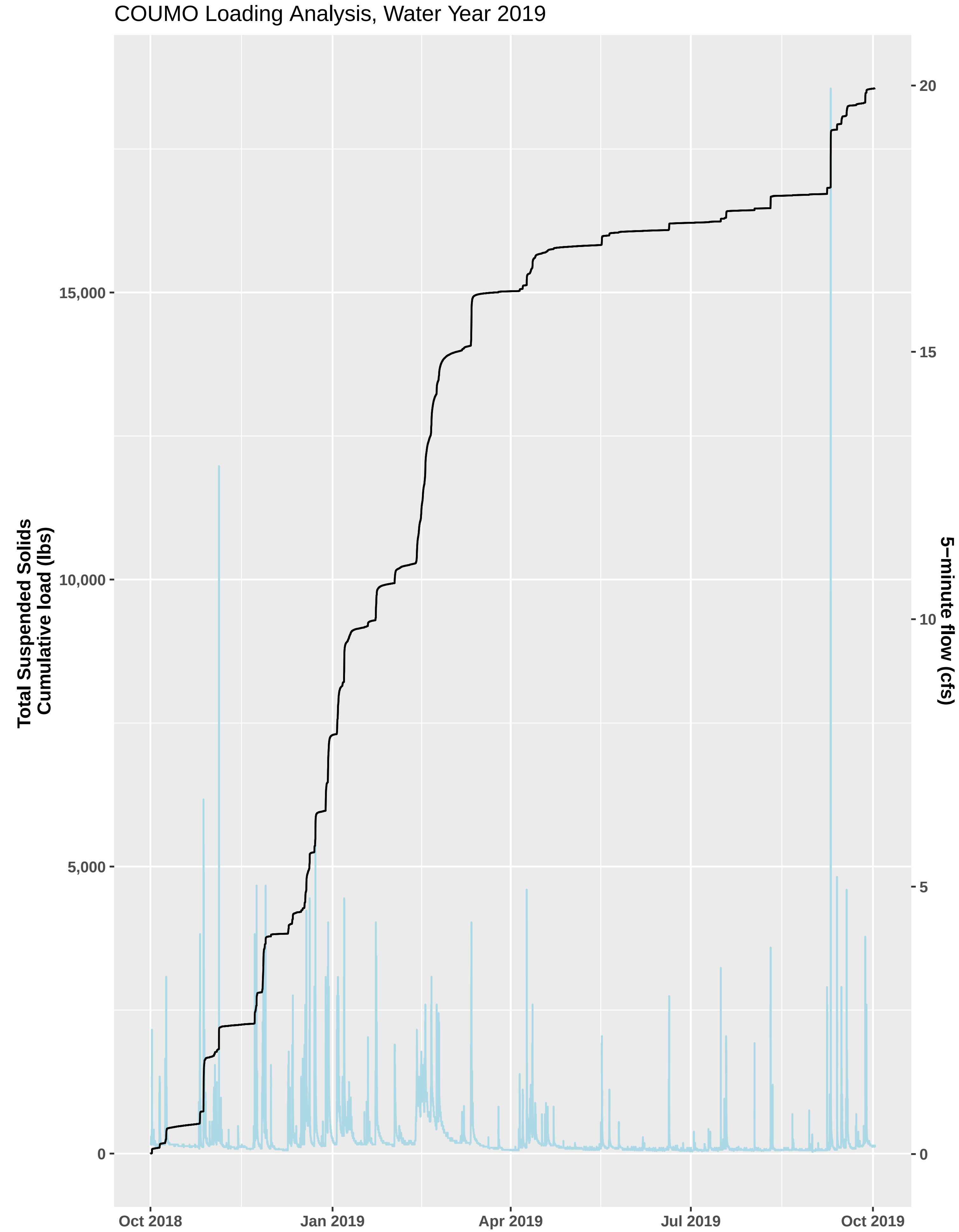


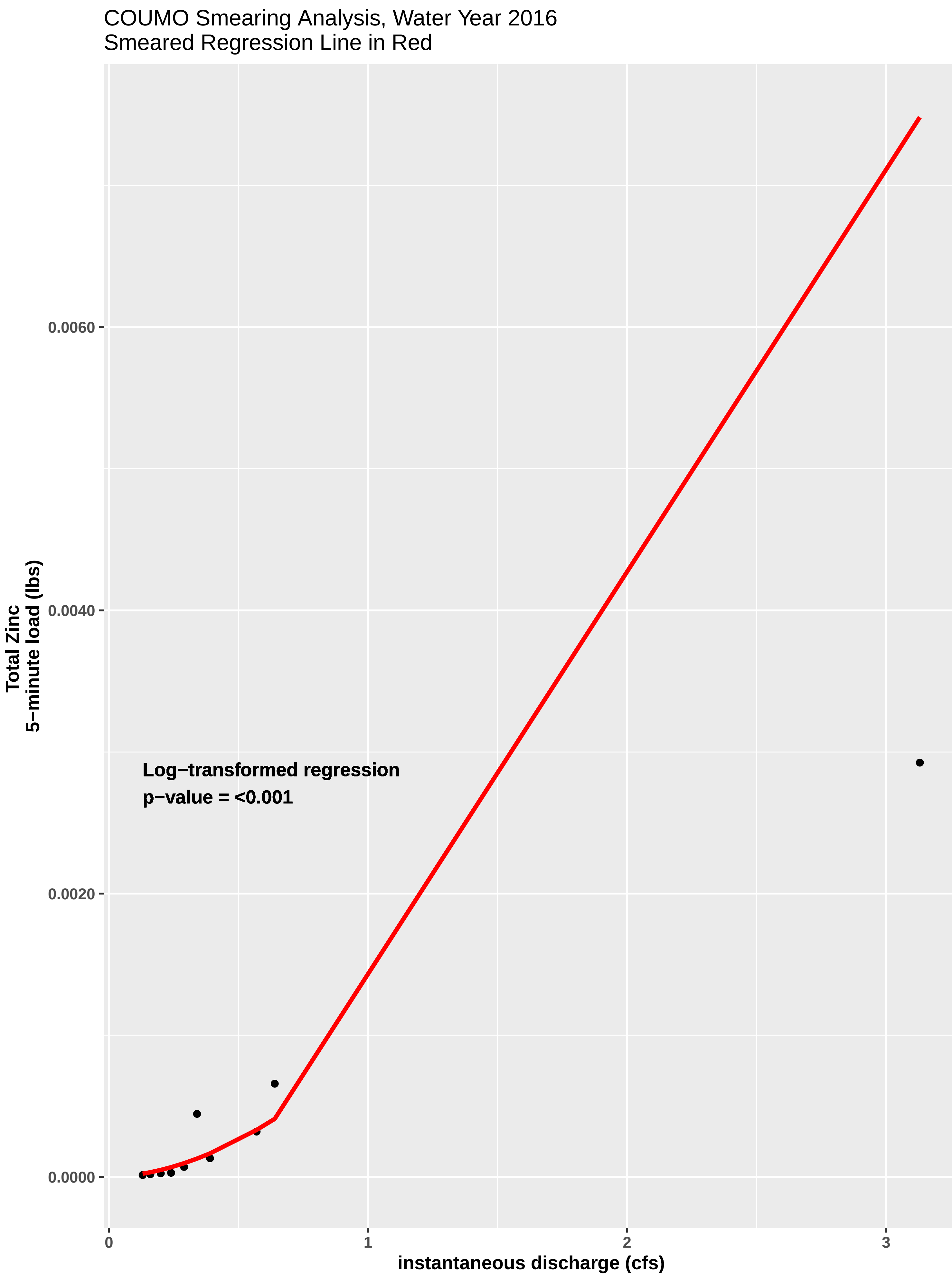
COUMO Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
0
20,000
40,000
60,000
80,000
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

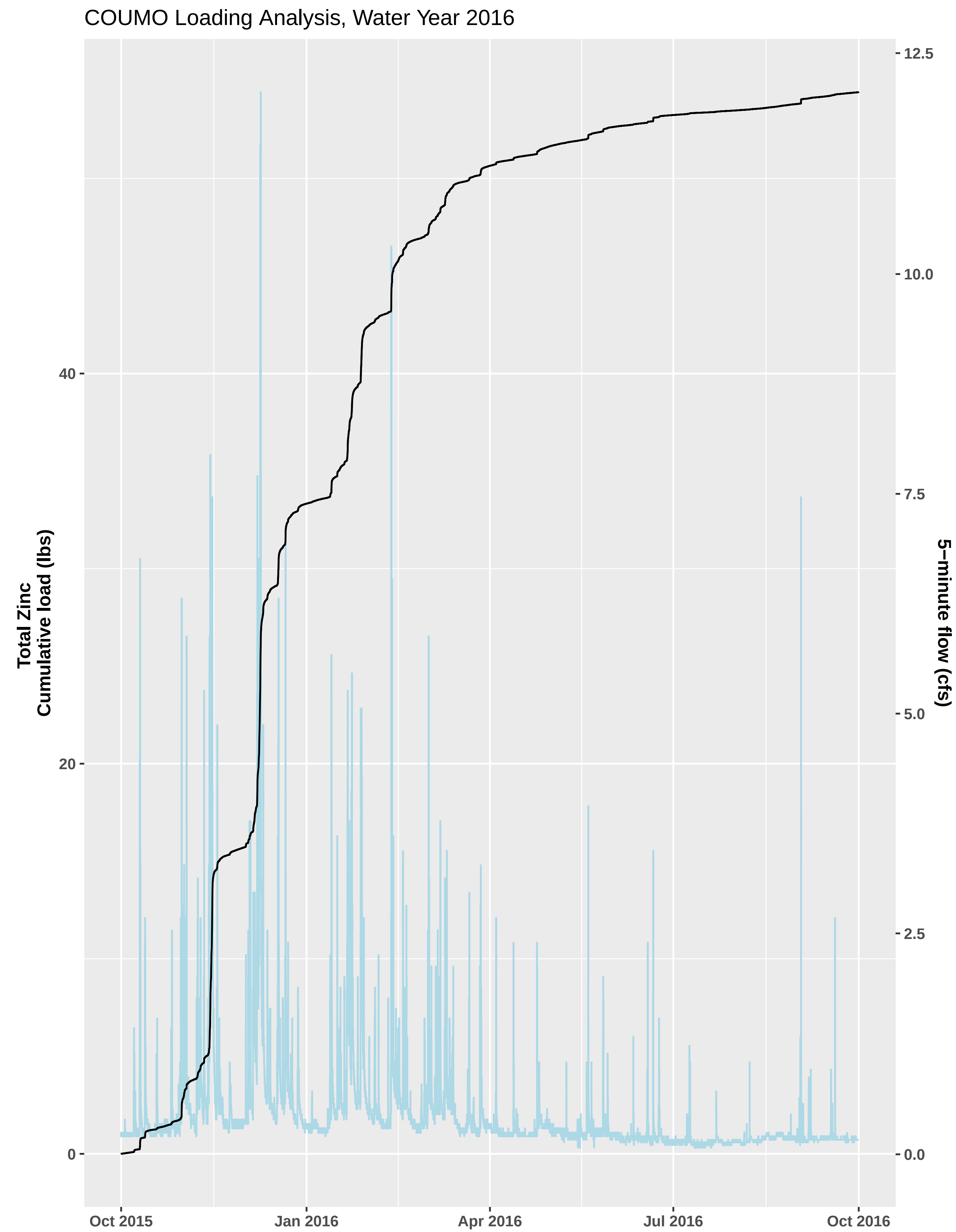

COUMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
2.0
4.0
6.0
0
1
2
3
4
instantaneous discharge (cfs)

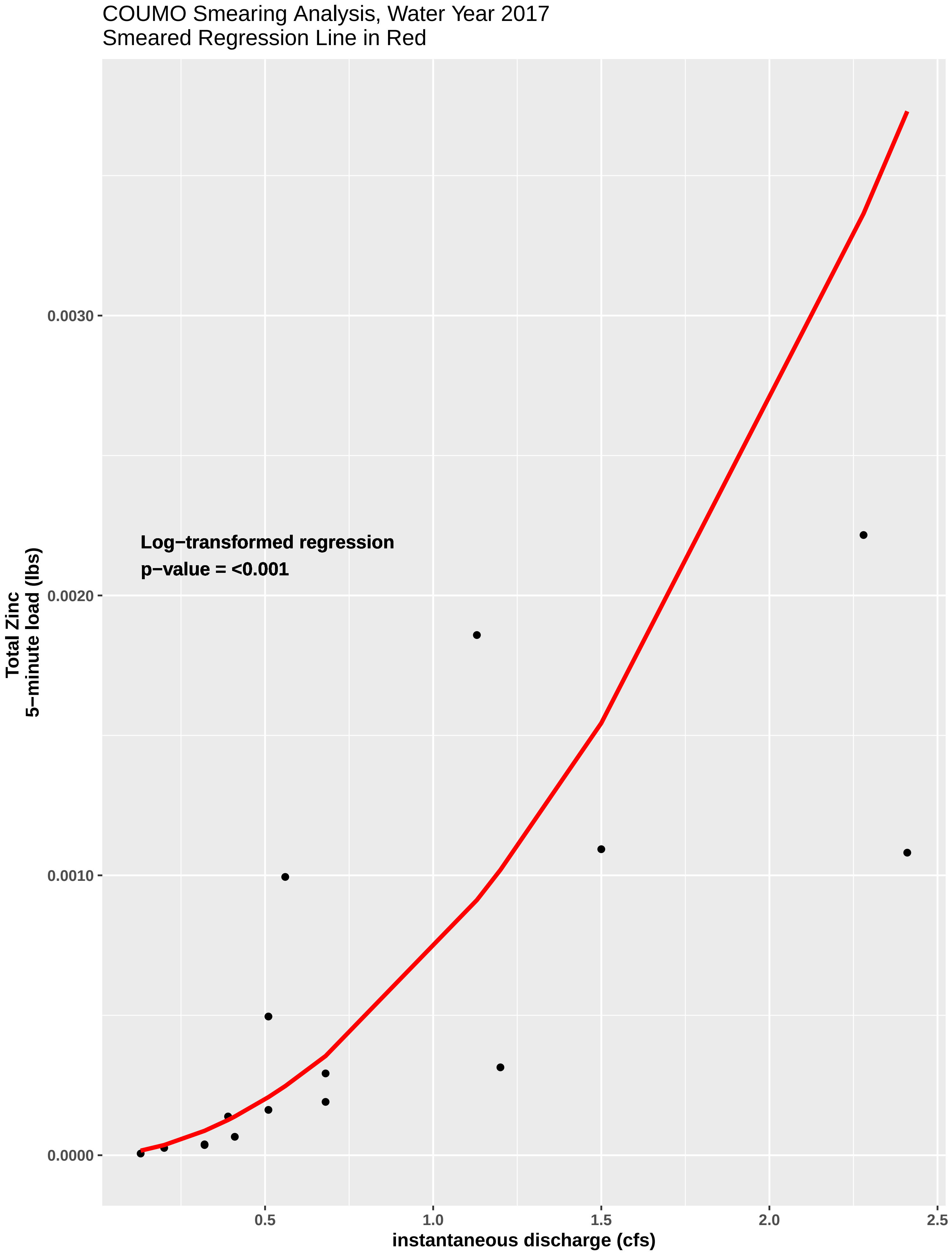

COUMO Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
0
10,000
20,000
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

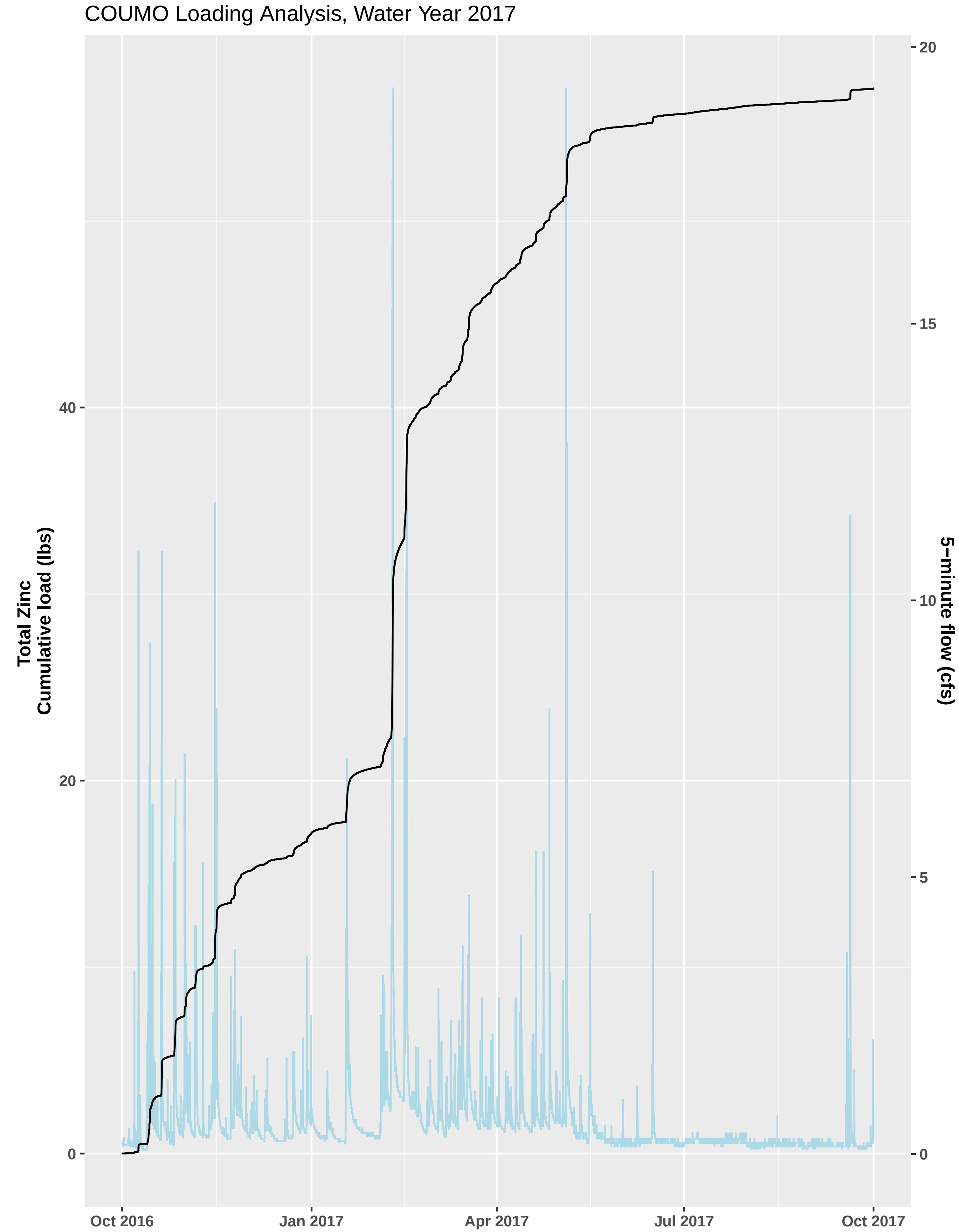

COUMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
5.0
10.0
0
1
2
3
4

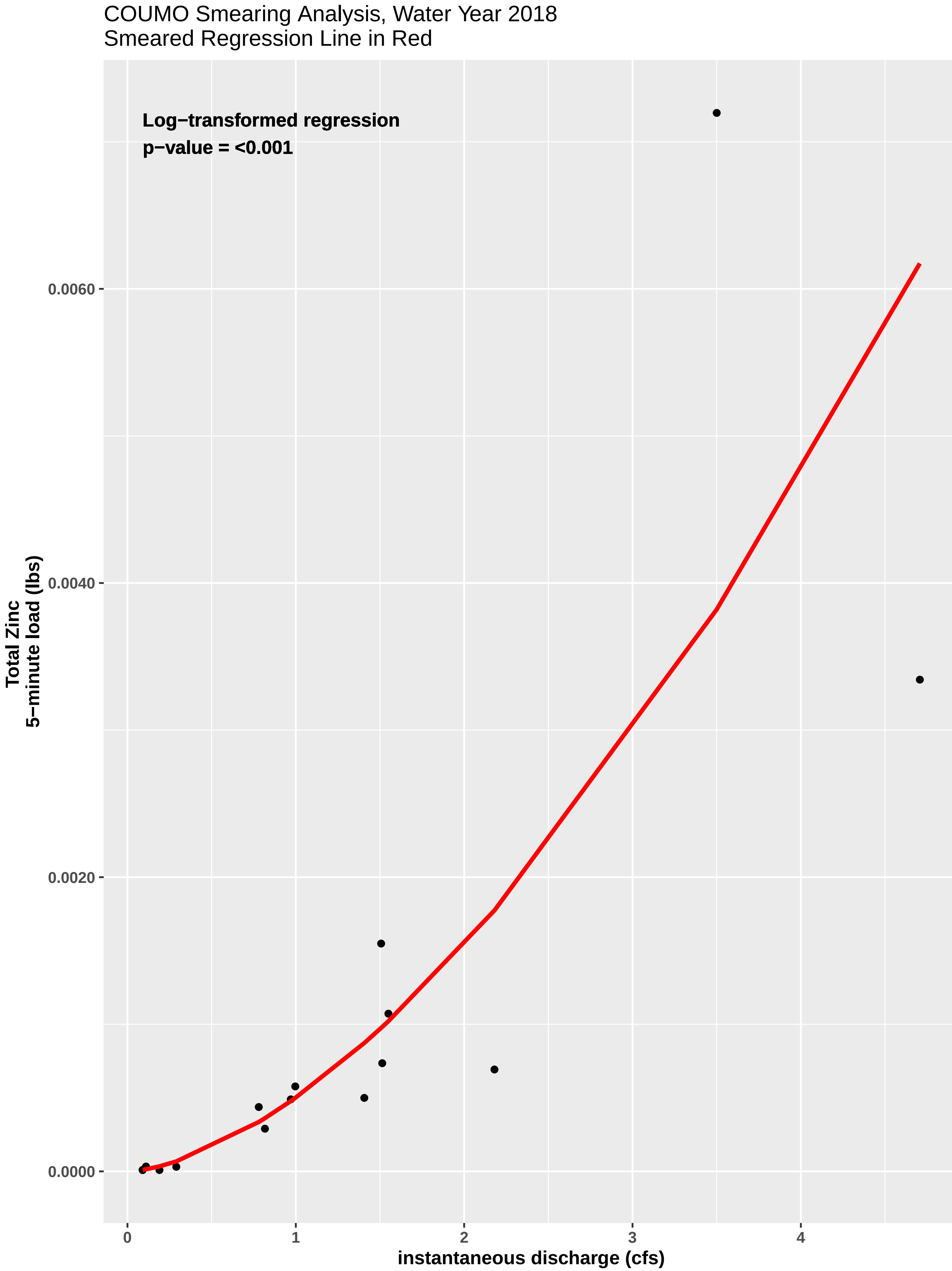

COUMO Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
5,000
10,000
15,000
0
5
10
15
20
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

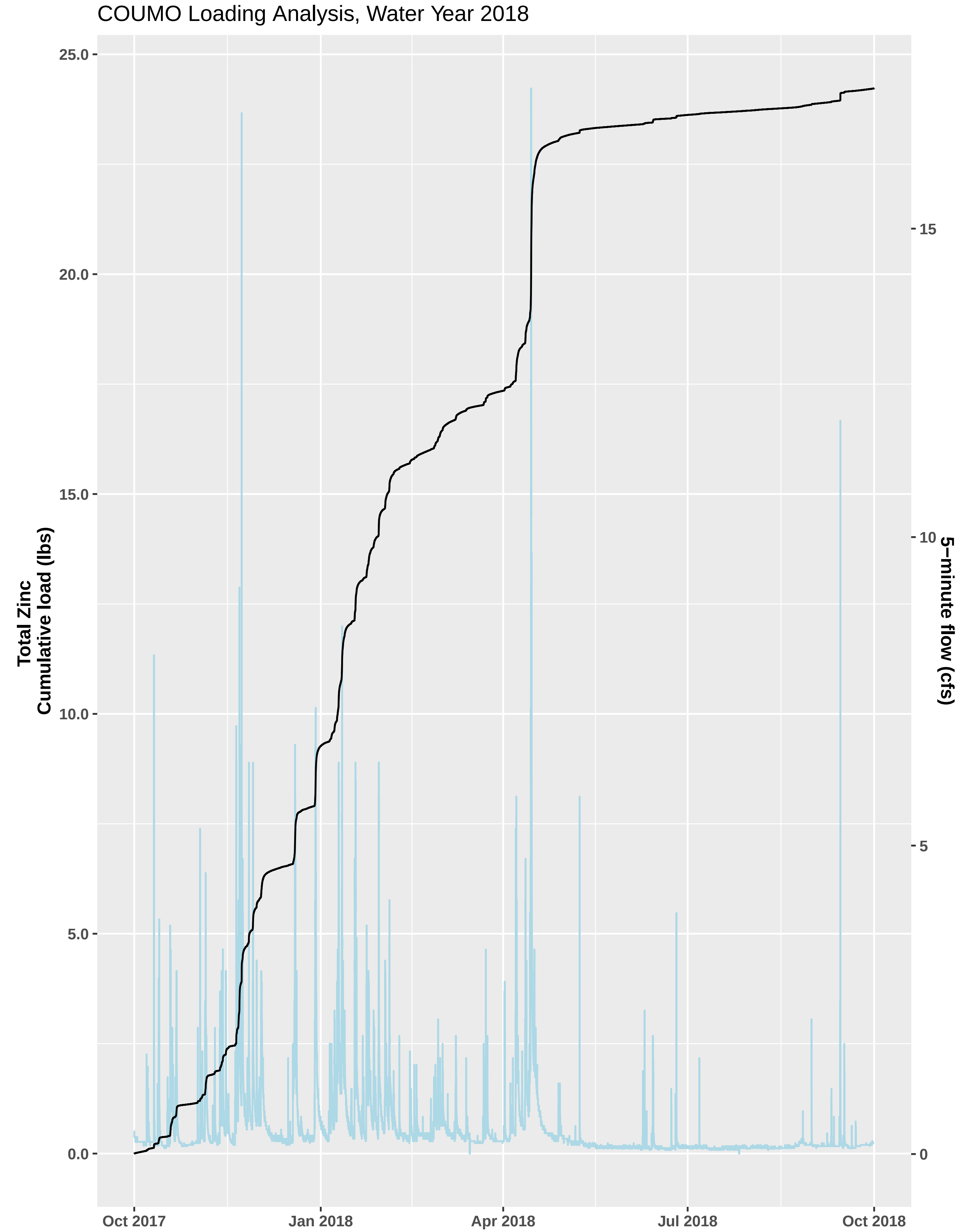

COUMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0
1
2
3
instantaneous discharge (cfs)

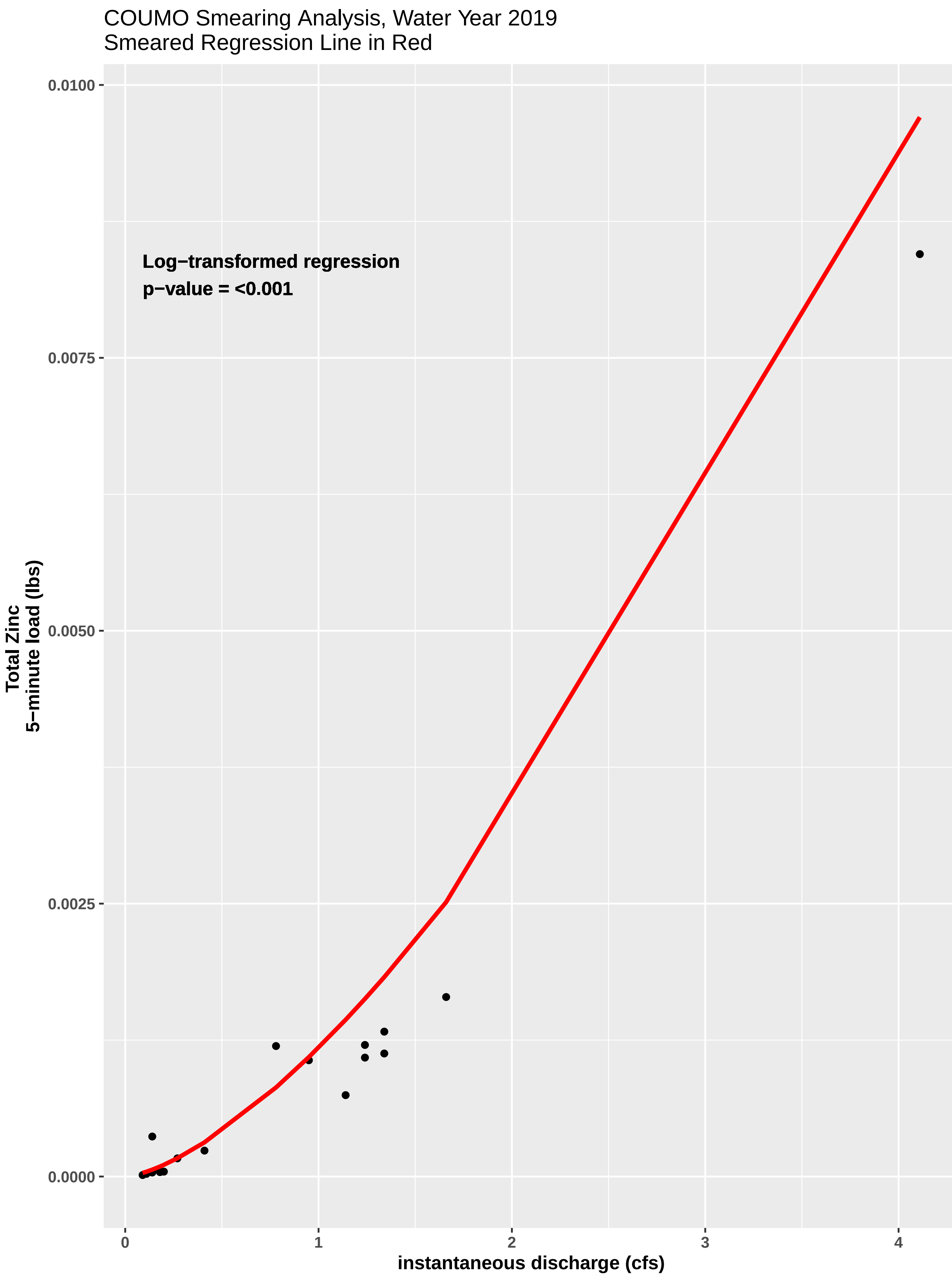

COUMO Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0
20
40
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
12.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


COUMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.5
1.0
1.5
2.0
2.5
instantaneous discharge (cfs)

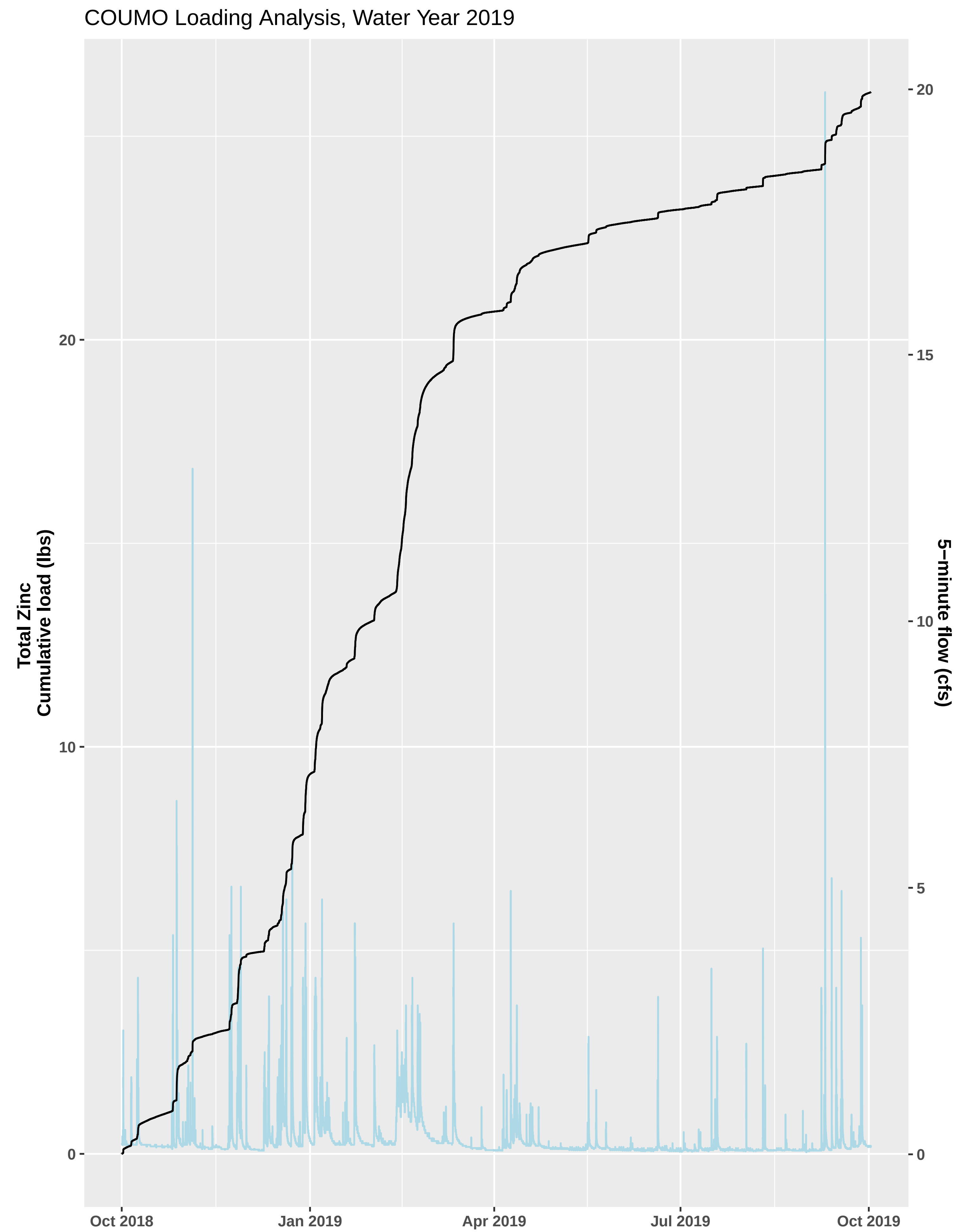

COUMO Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0
20
40
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


COUMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0
1
2
3
4
instantaneous discharge (cfs)

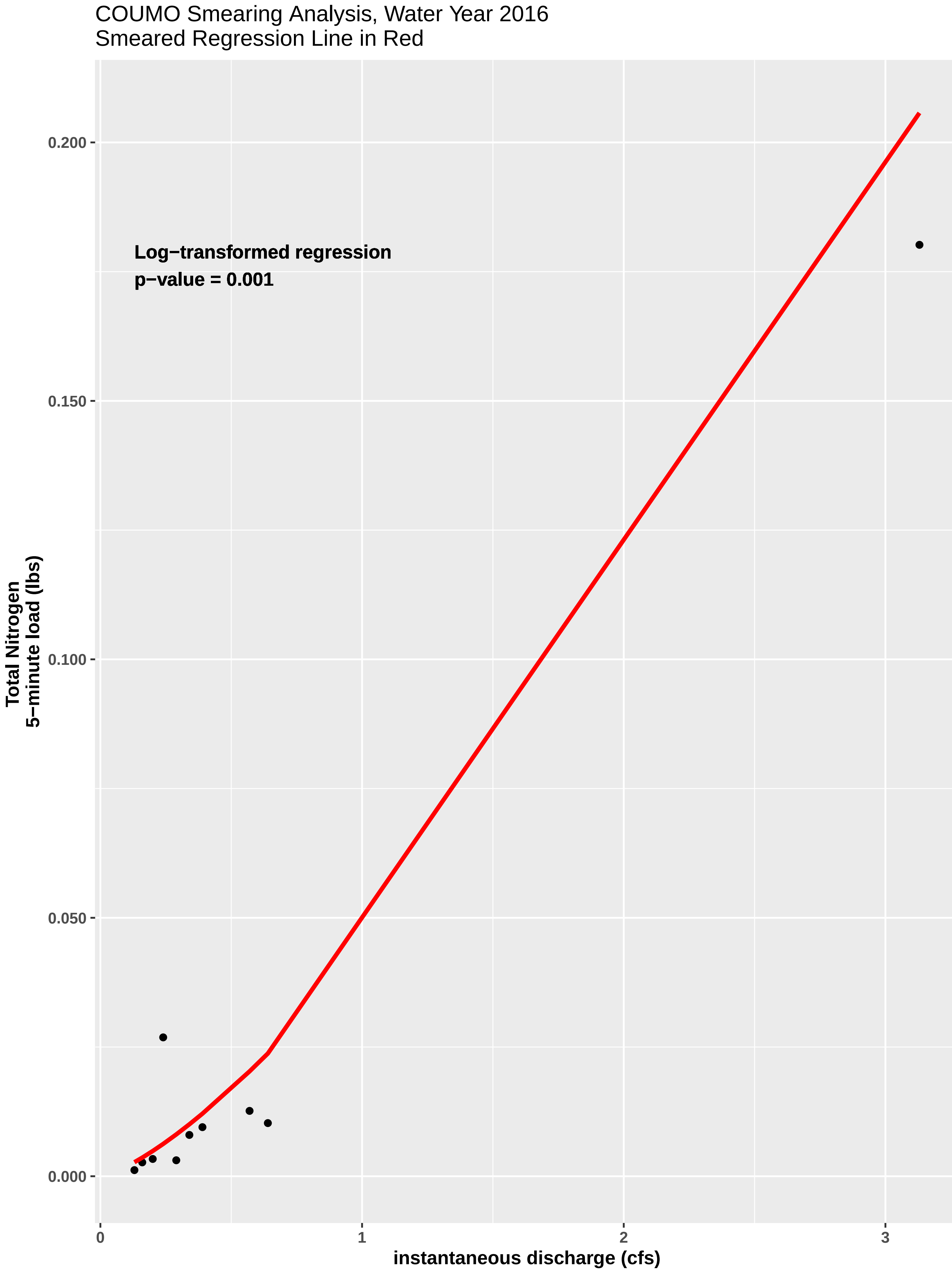

COUMO Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0.0
5.0
10.0
15.0
20.0
25.0
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

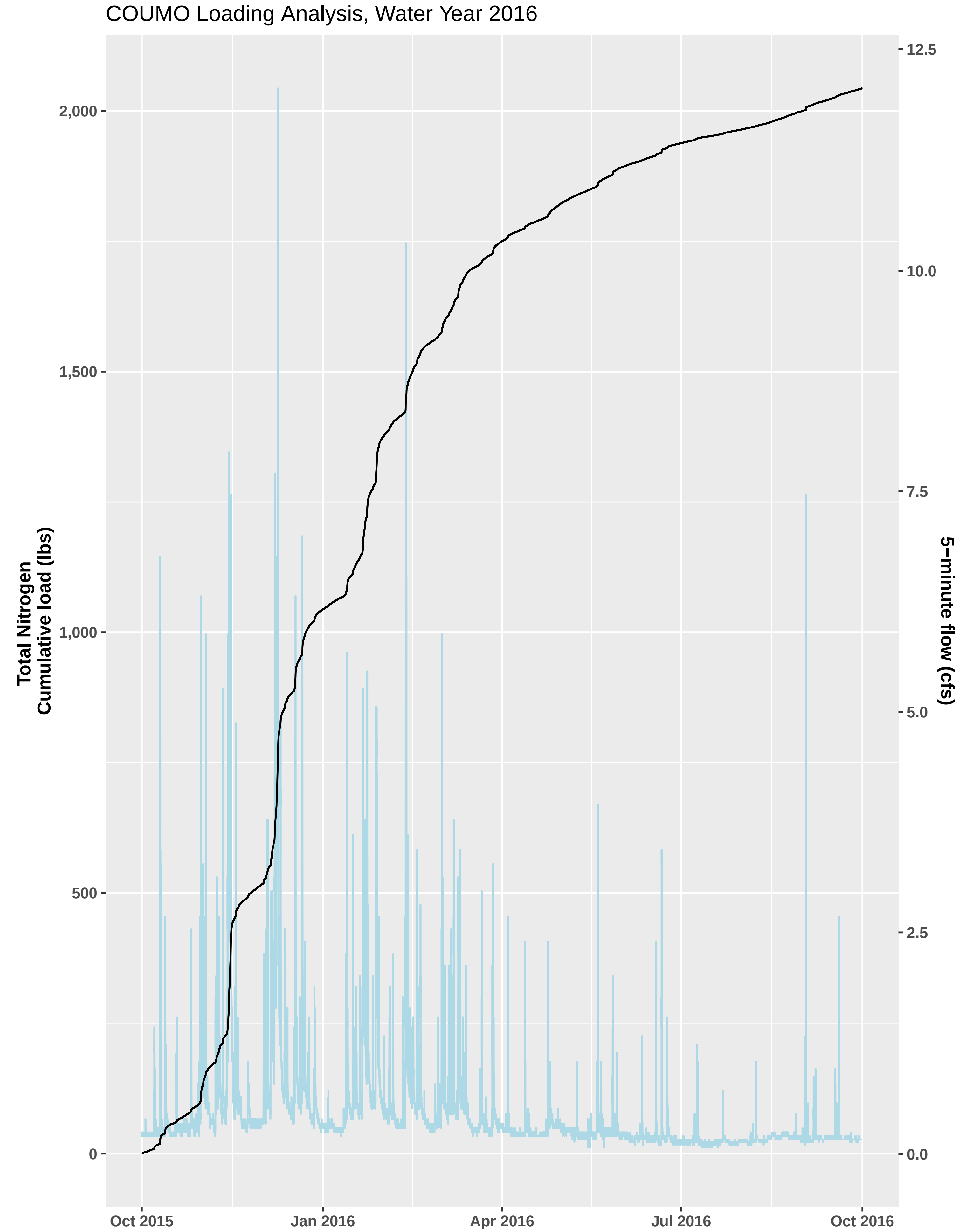


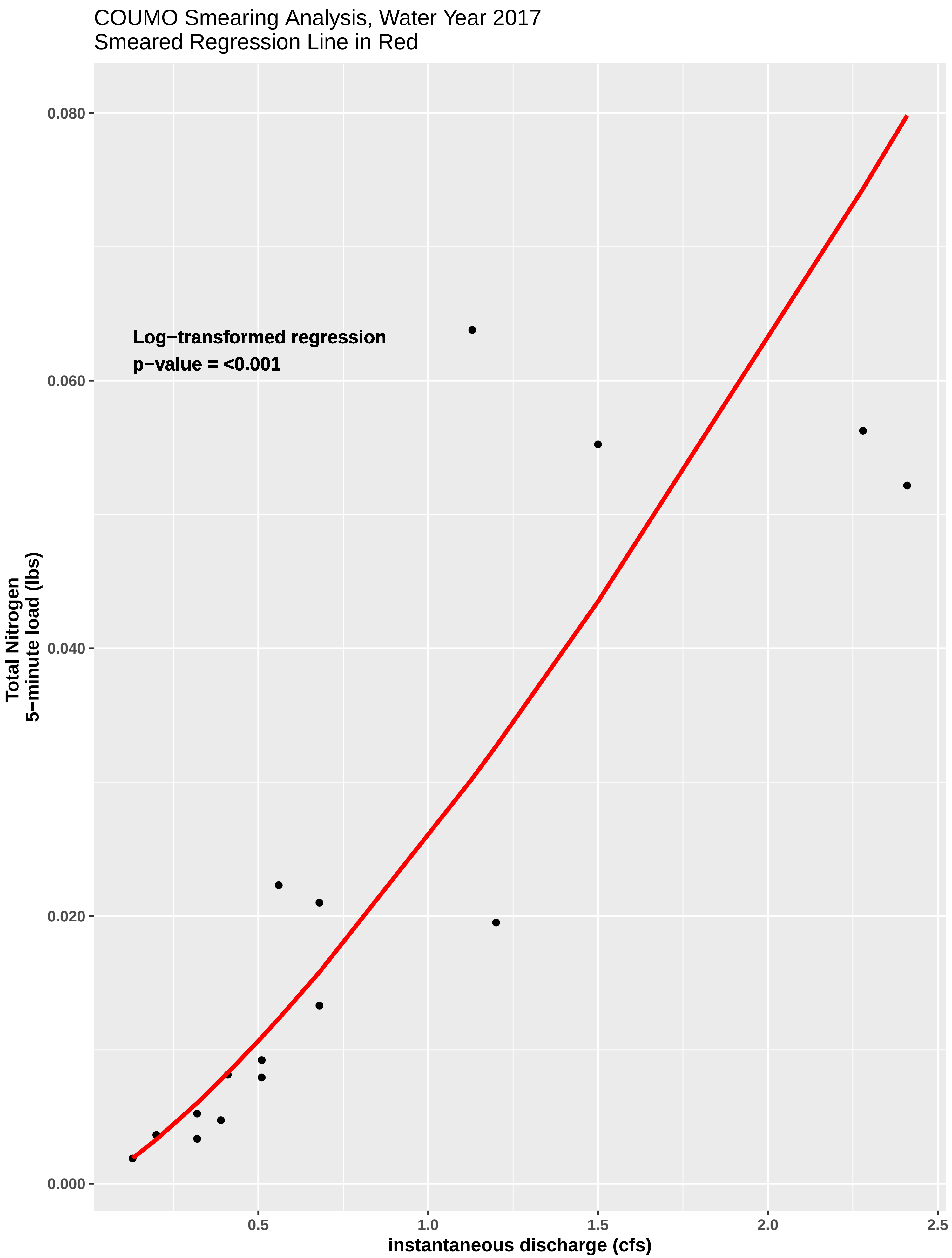
COUMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0100
0.0075
0.0050
0.0025
0.0000
0
1
2
3
4
instantaneous discharge (cfs)



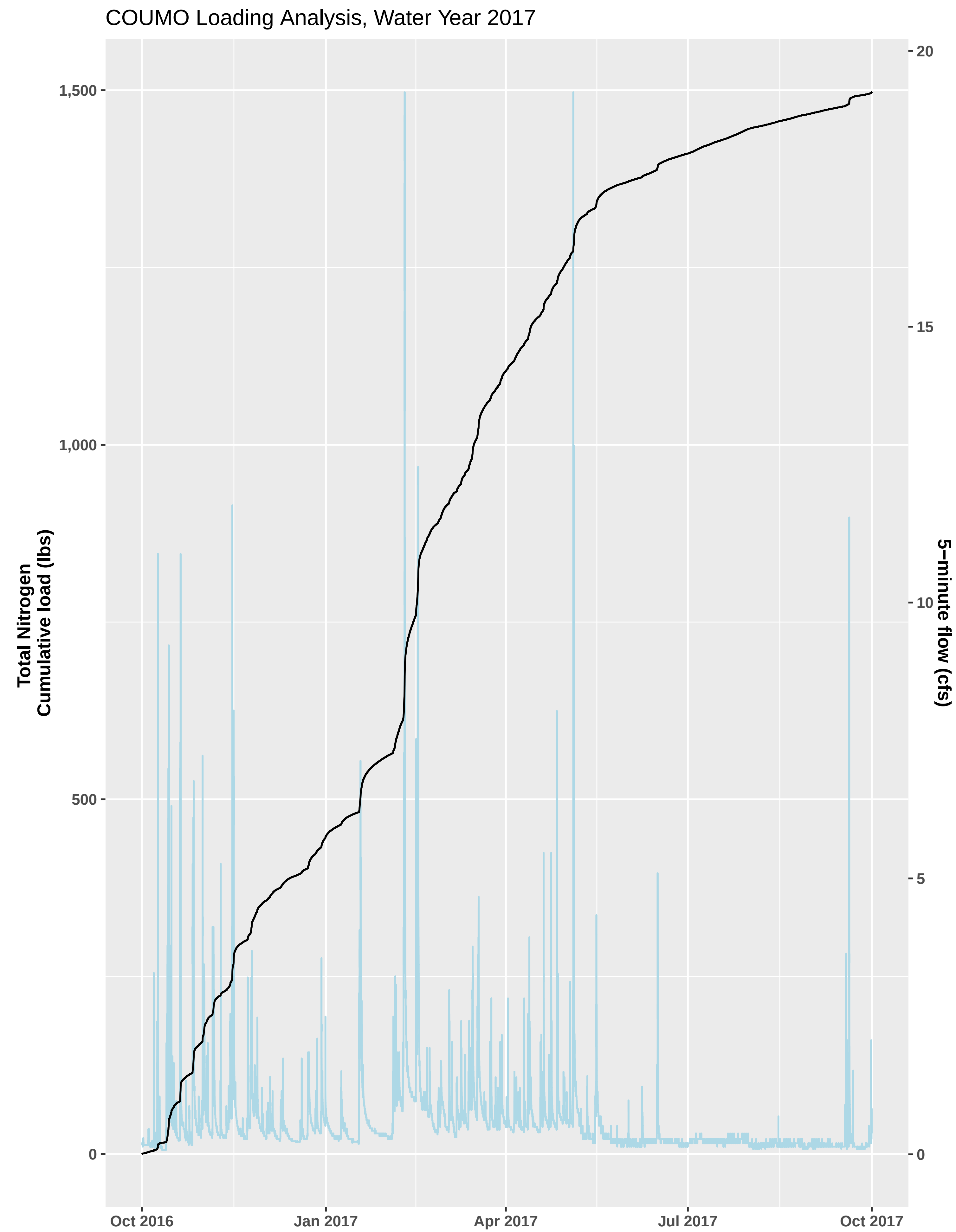
COUMO Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
20
10
0
5−minute flow (cfs)
20
15
10
5
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COUMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.050
0.100
0.150
0.200
0
1
2
3
instantaneous discharge (cfs)

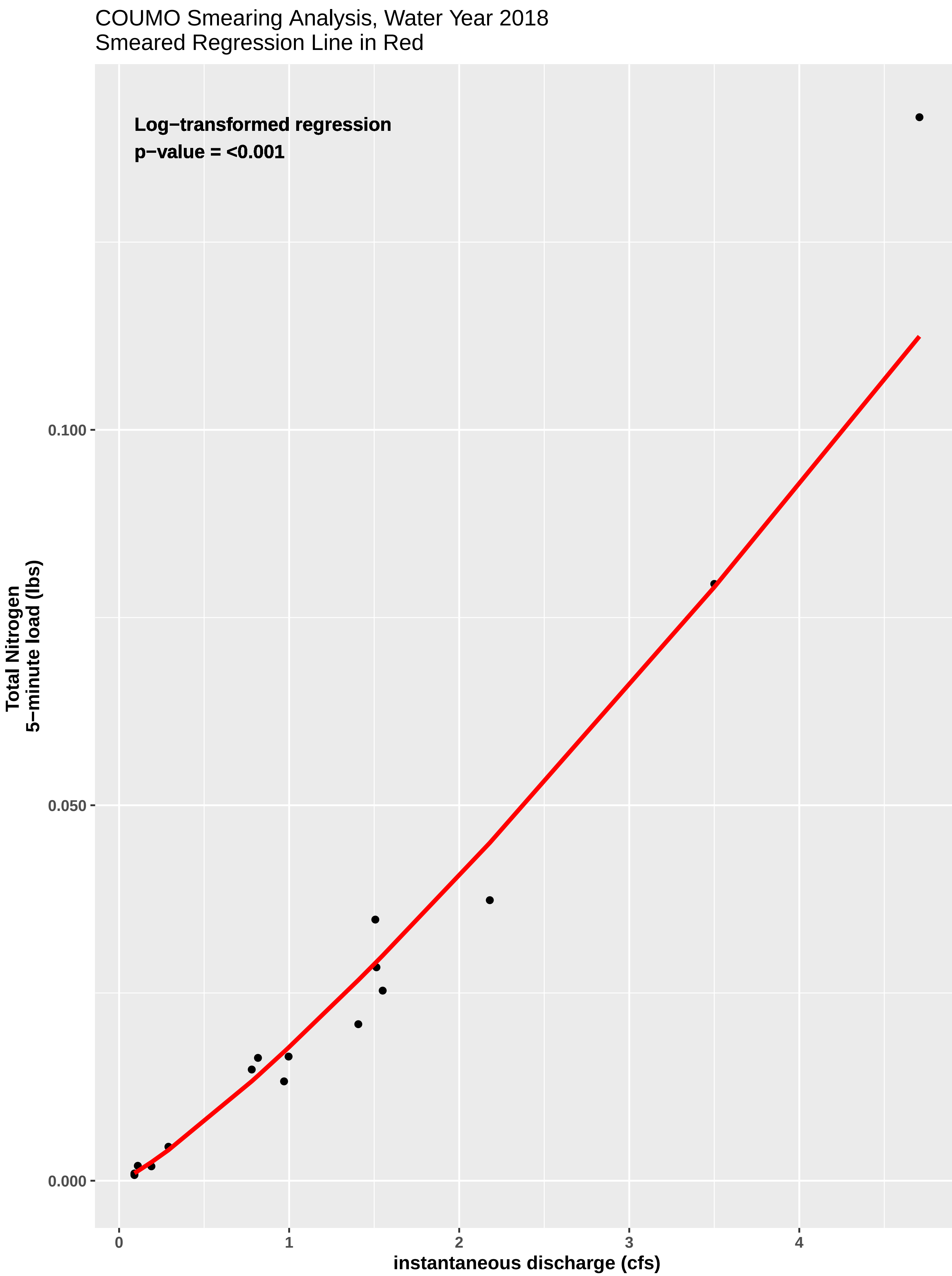

COUMO Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
2,000
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
12.5
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

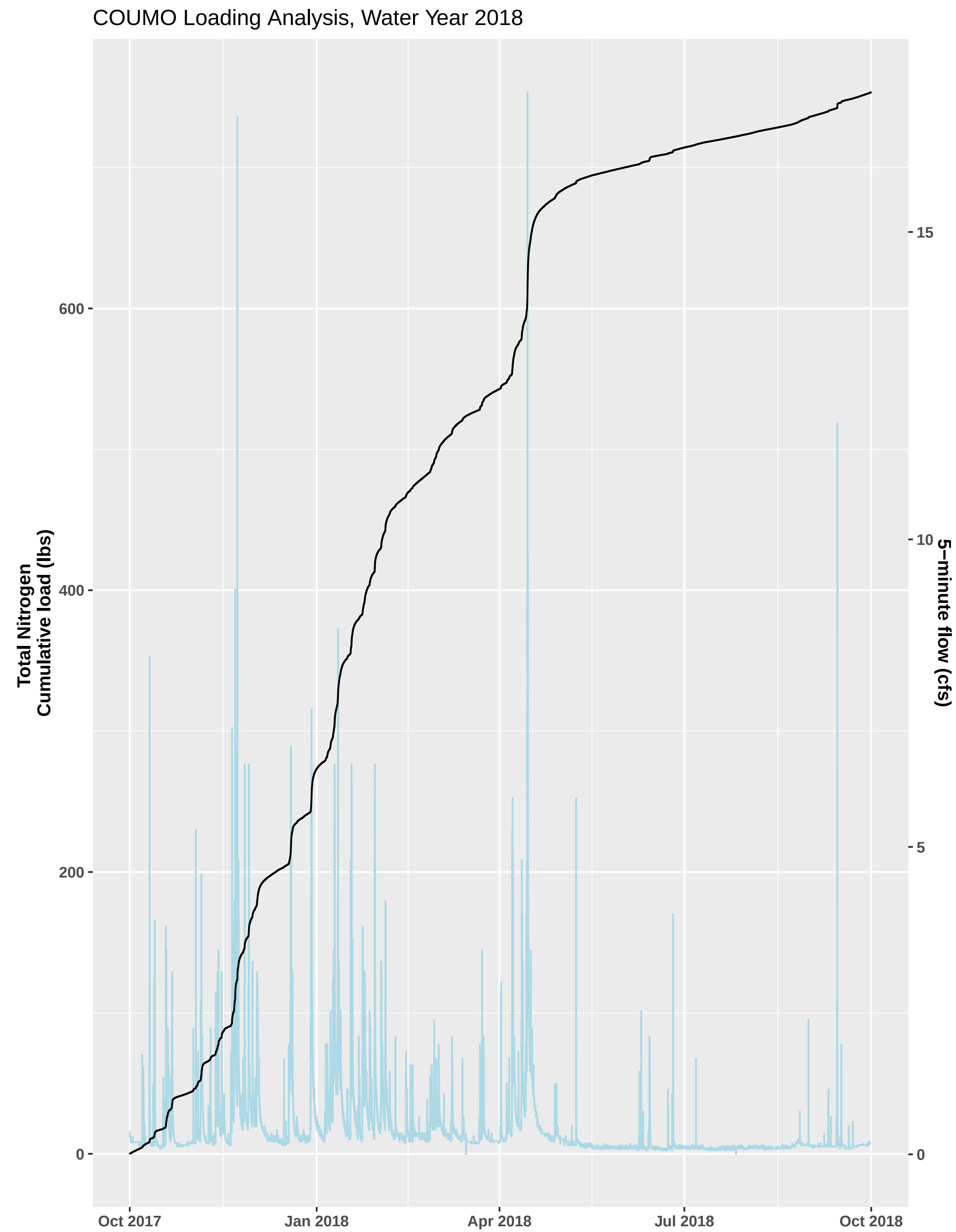


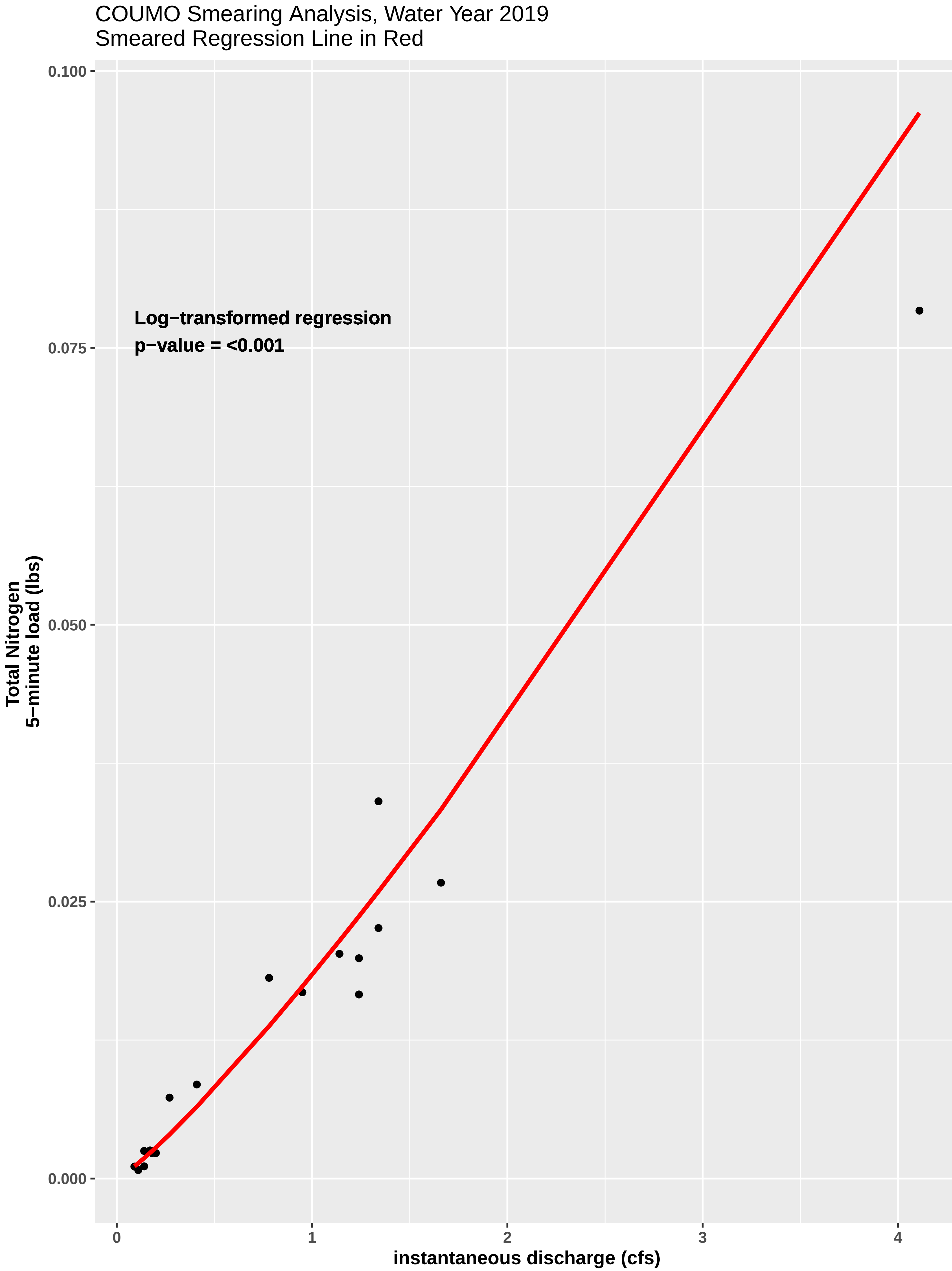
COUMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.080
0.5
1.0
1.5
2.0
2.5
instantaneous discharge (cfs)

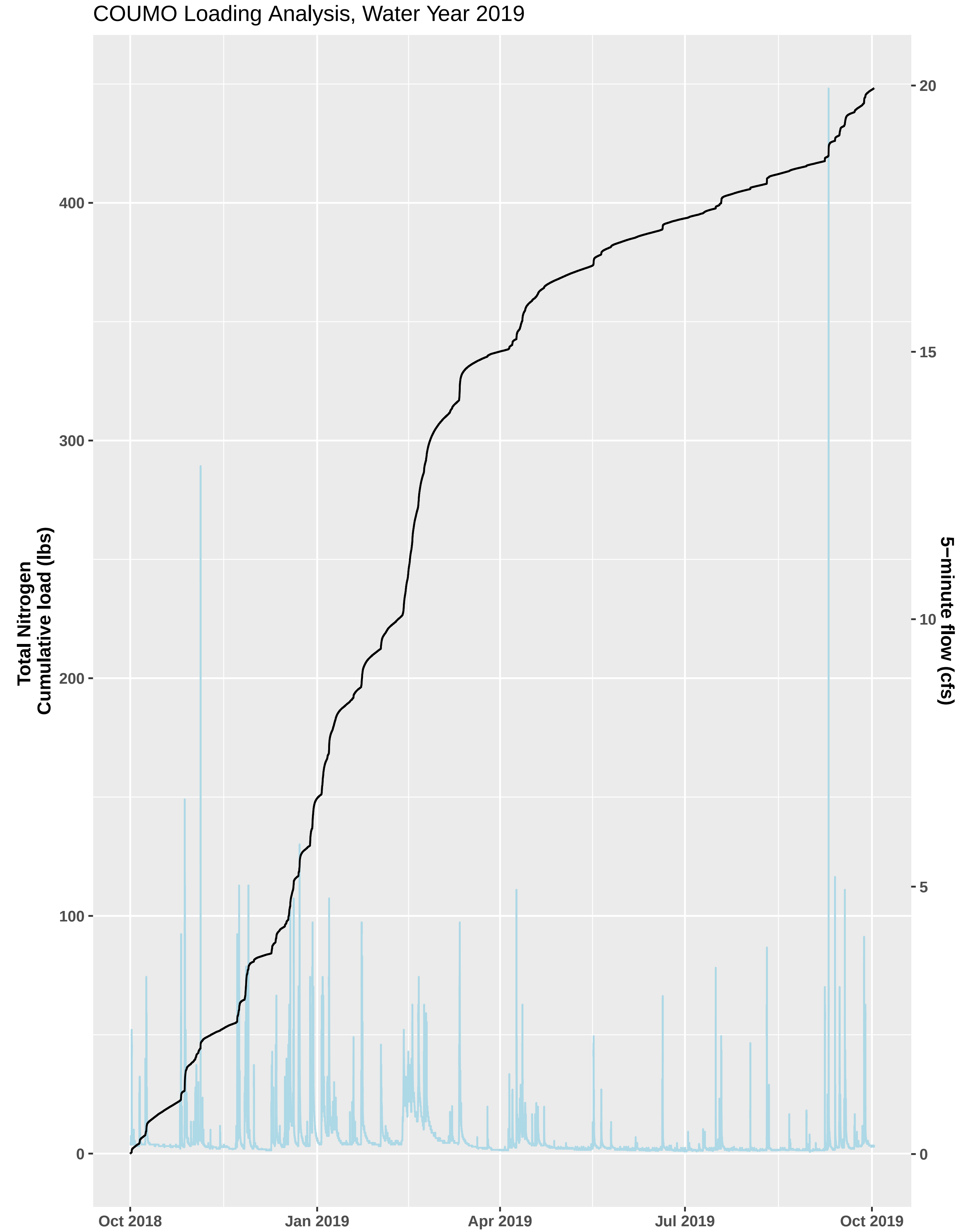


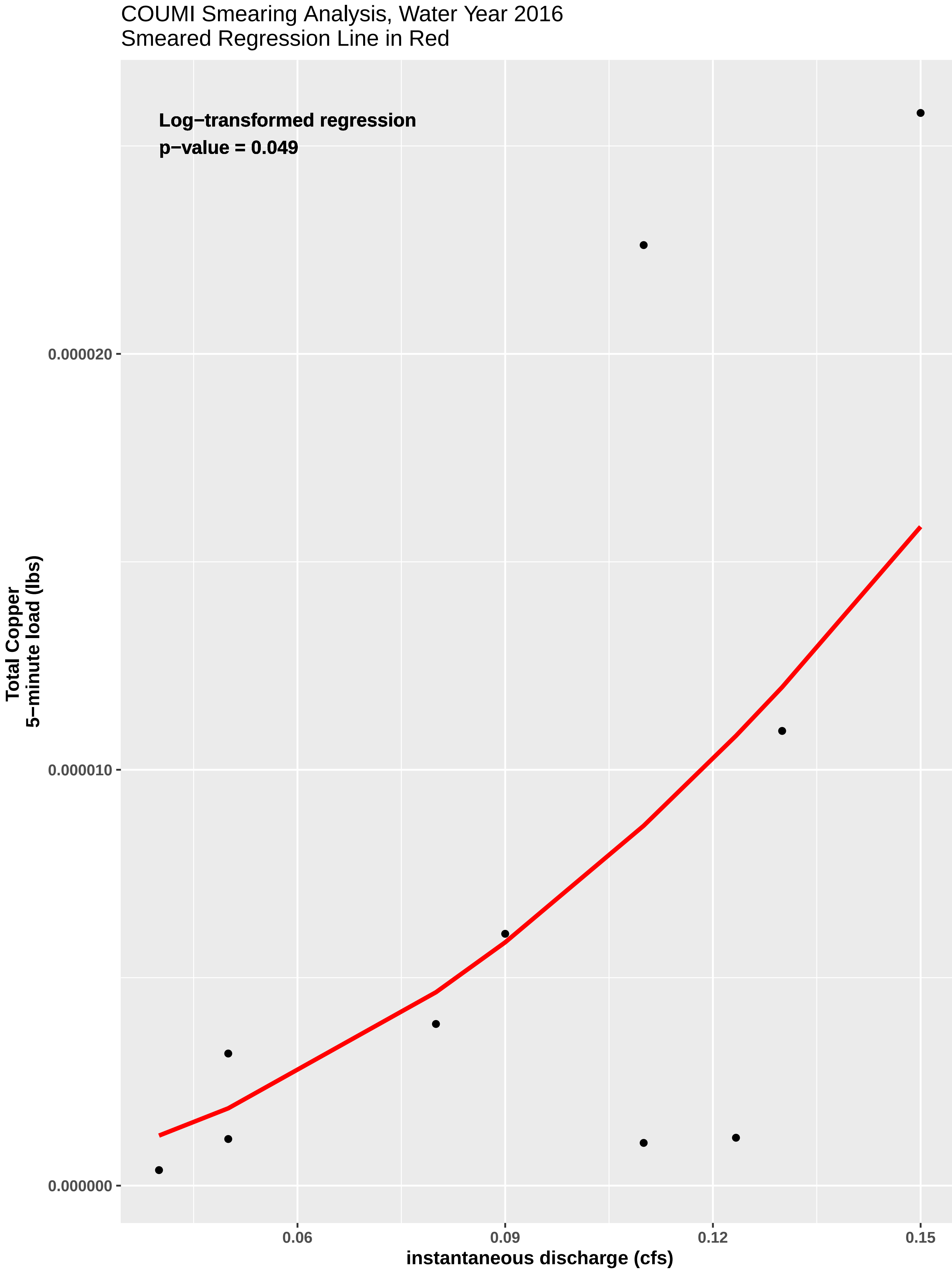
COUMO Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
500
1,000
1,500
5−minute flow (cfs)
0
5
10
15
20
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

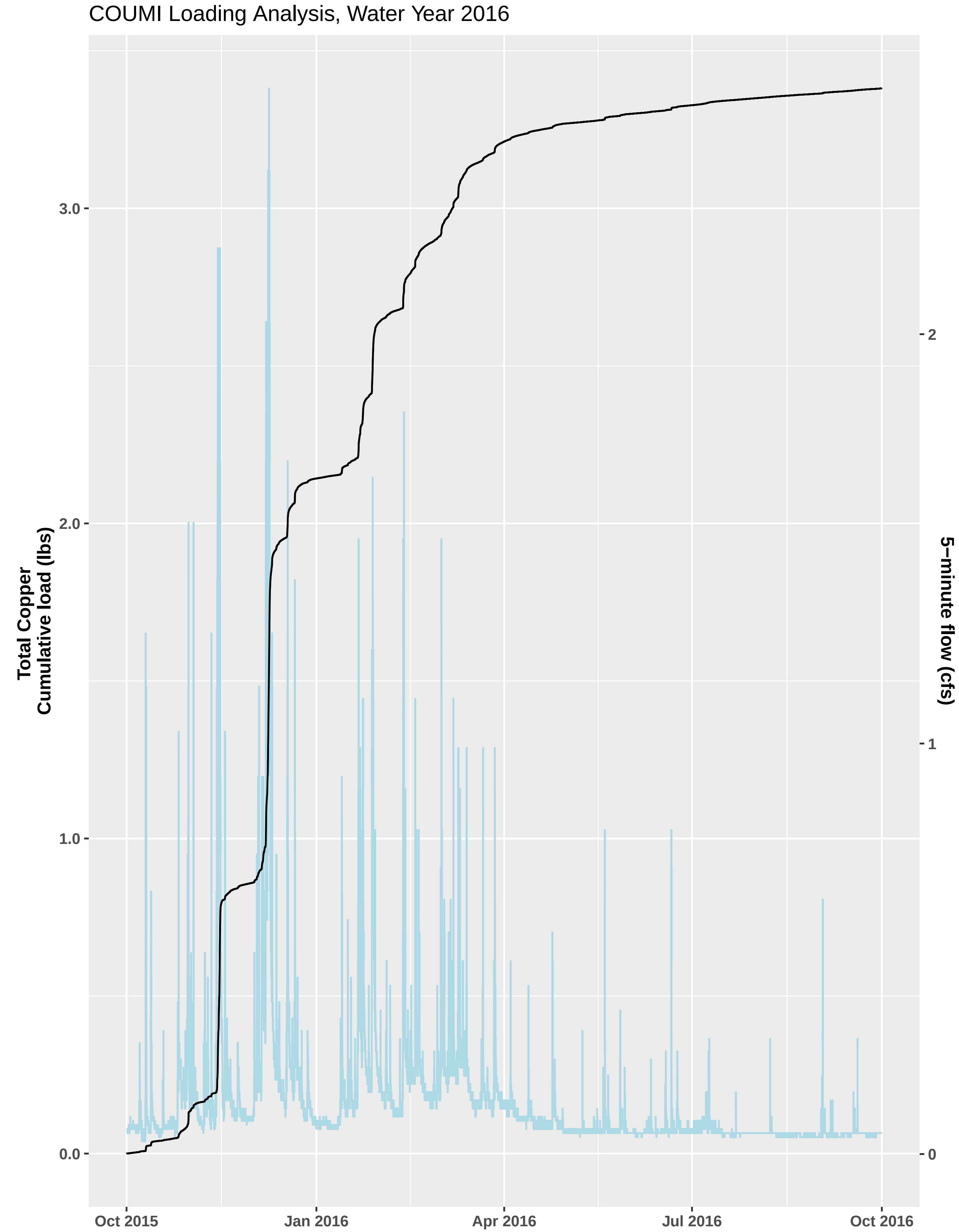

COUMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.100
0.050
0.000
0
1
2
3
4
instantaneous discharge (cfs)

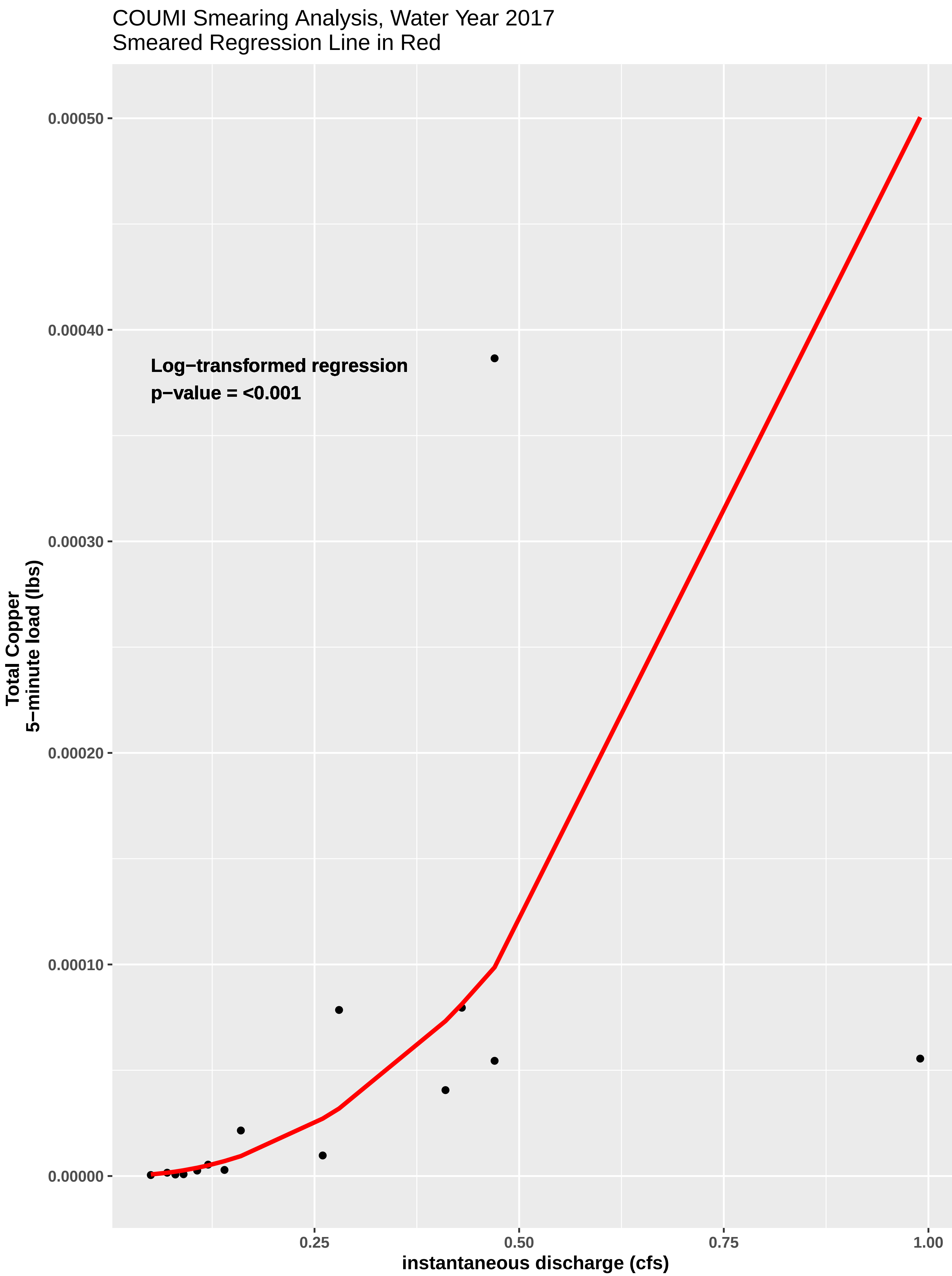

COUMO Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
600
400
200
0
5−minute flow (cfs)
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

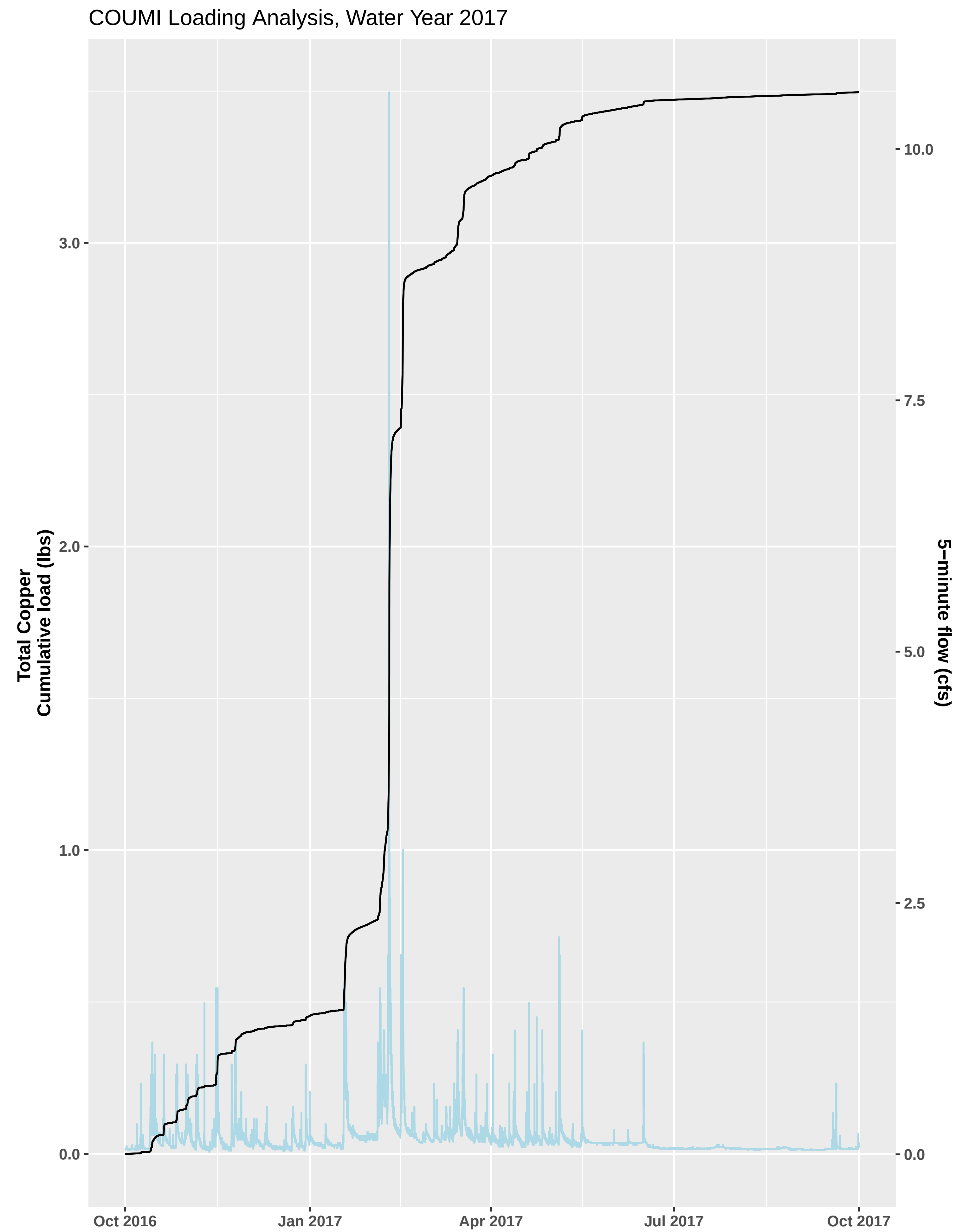

COUMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.100
0.075
0.050
0.025
0.000
0
1
2
3
4

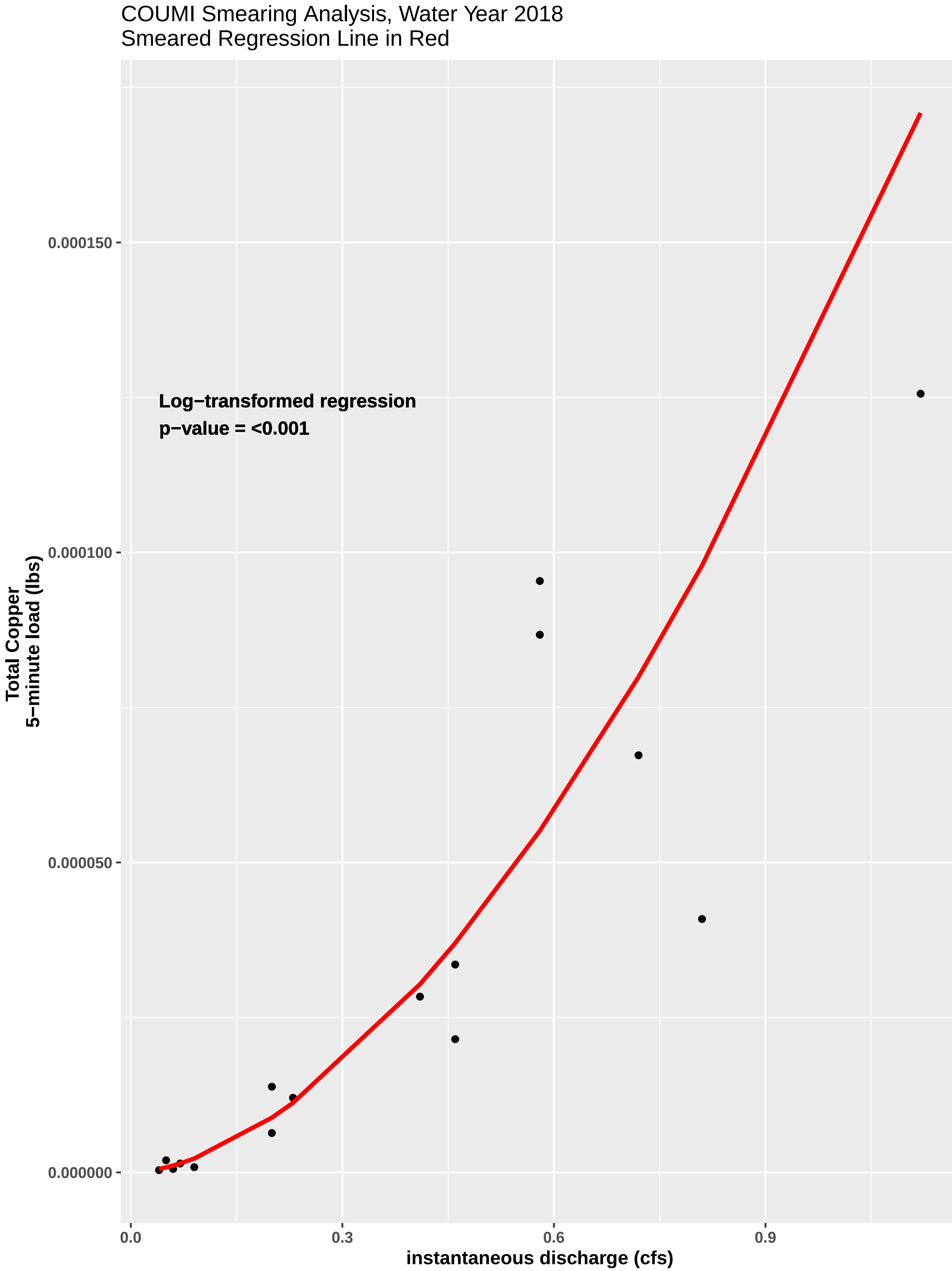

COUMO Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
400
300
200
100
0
20
15
10
5
0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COUMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.049
Total Copper
5−minute load (lbs)
0.000020
0.000010
0.000000
0.06
0.09
0.12
0.15
instantaneous discharge (cfs)

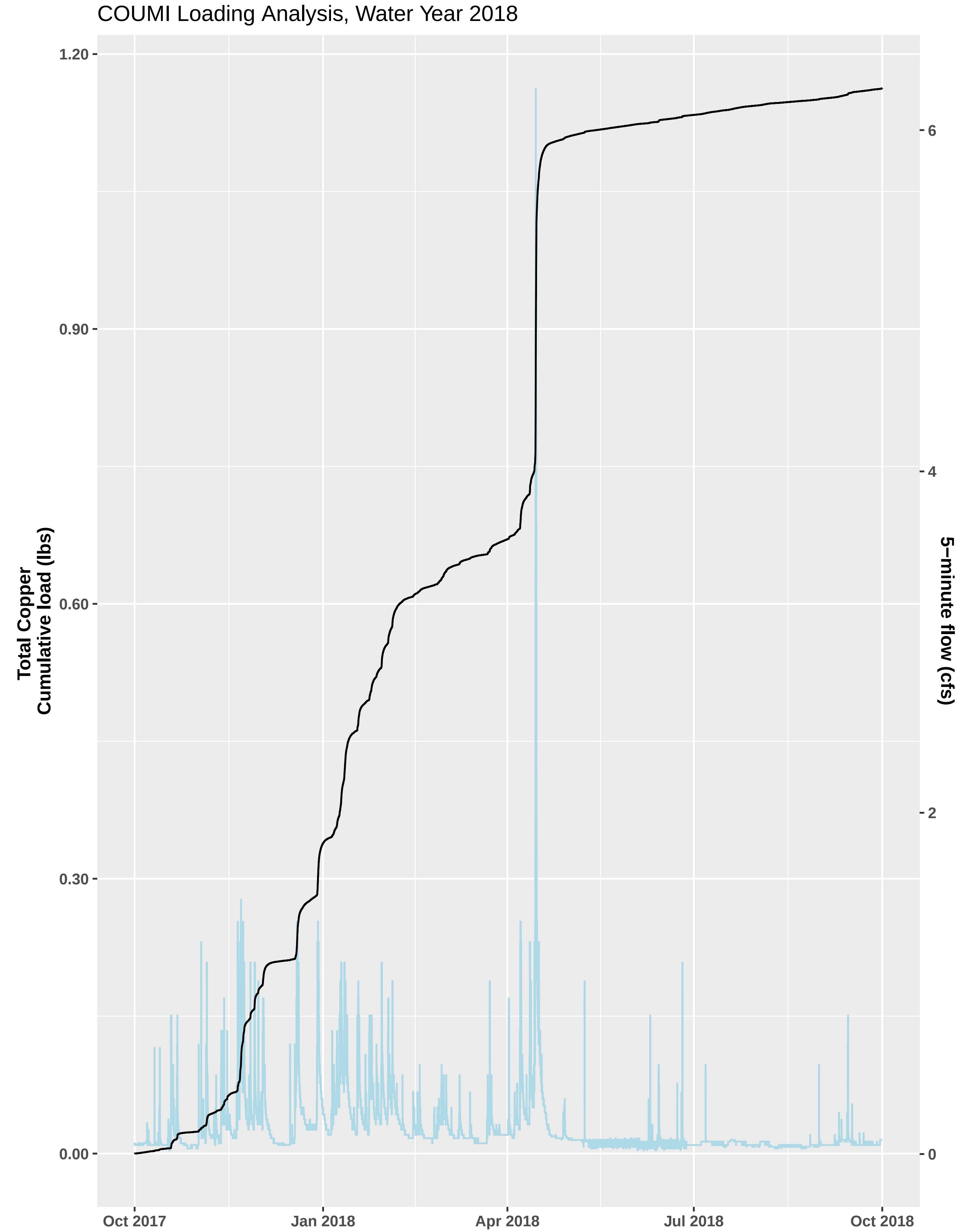

COUMI Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
3.0
2.0
1.0
0.0
5−minute flow (cfs)
2
1
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


COUMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00050
0.00040
0.00030
0.00020
0.00010
0.00000
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

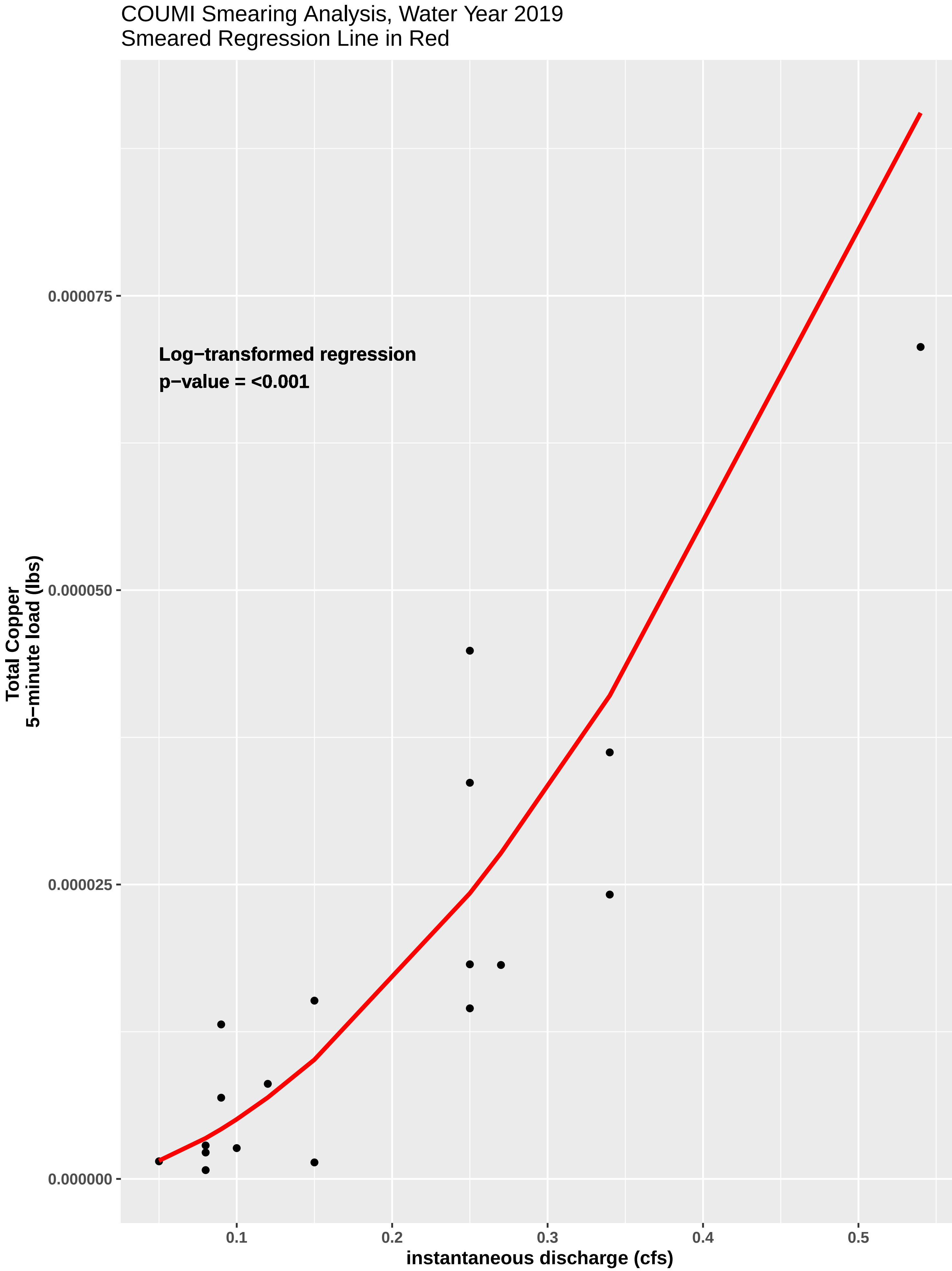

COUMI Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
3.0
2.0
1.0
0.0
5−minute flow (cfs)
10.0
7.5
5.0
2.5
0.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

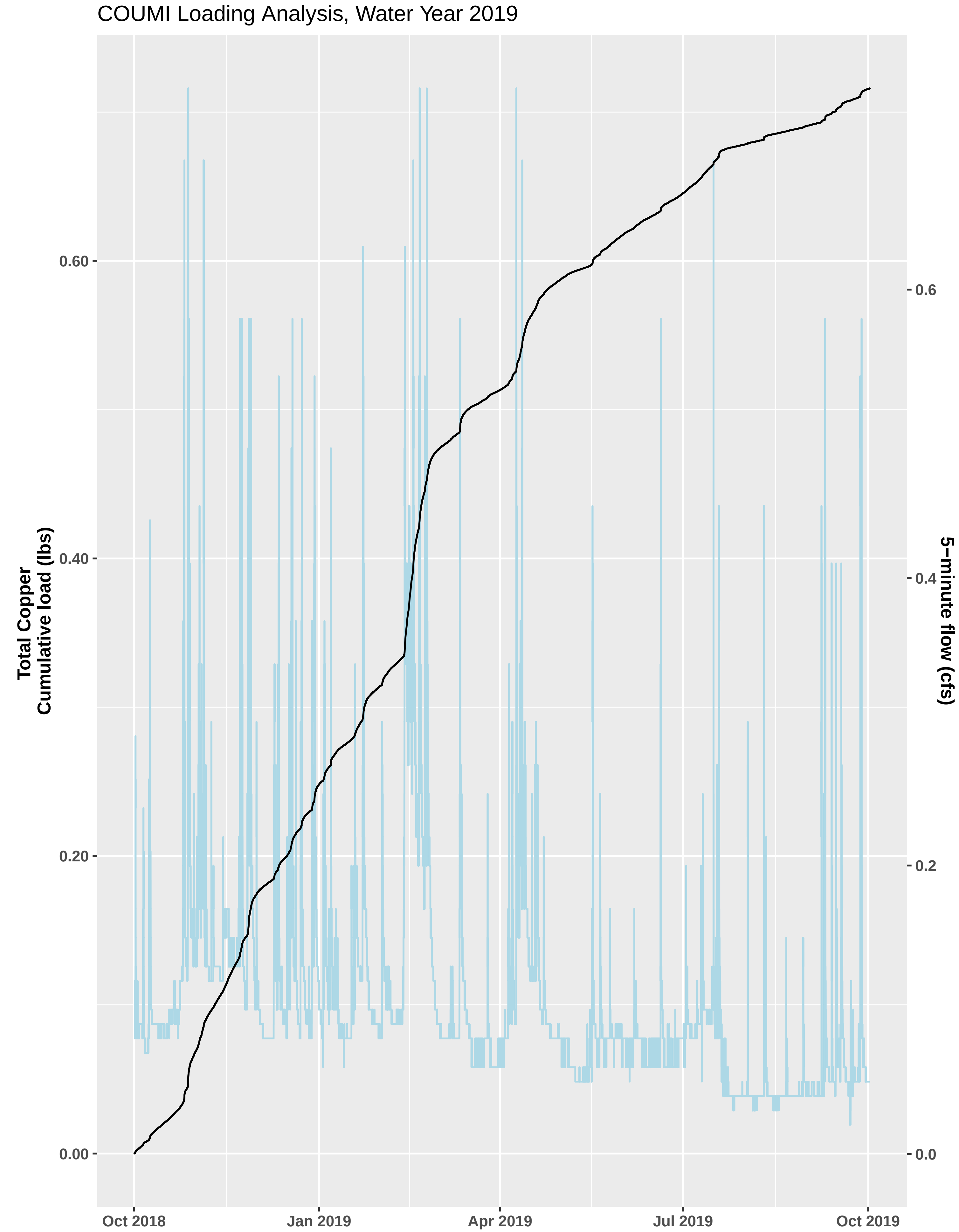


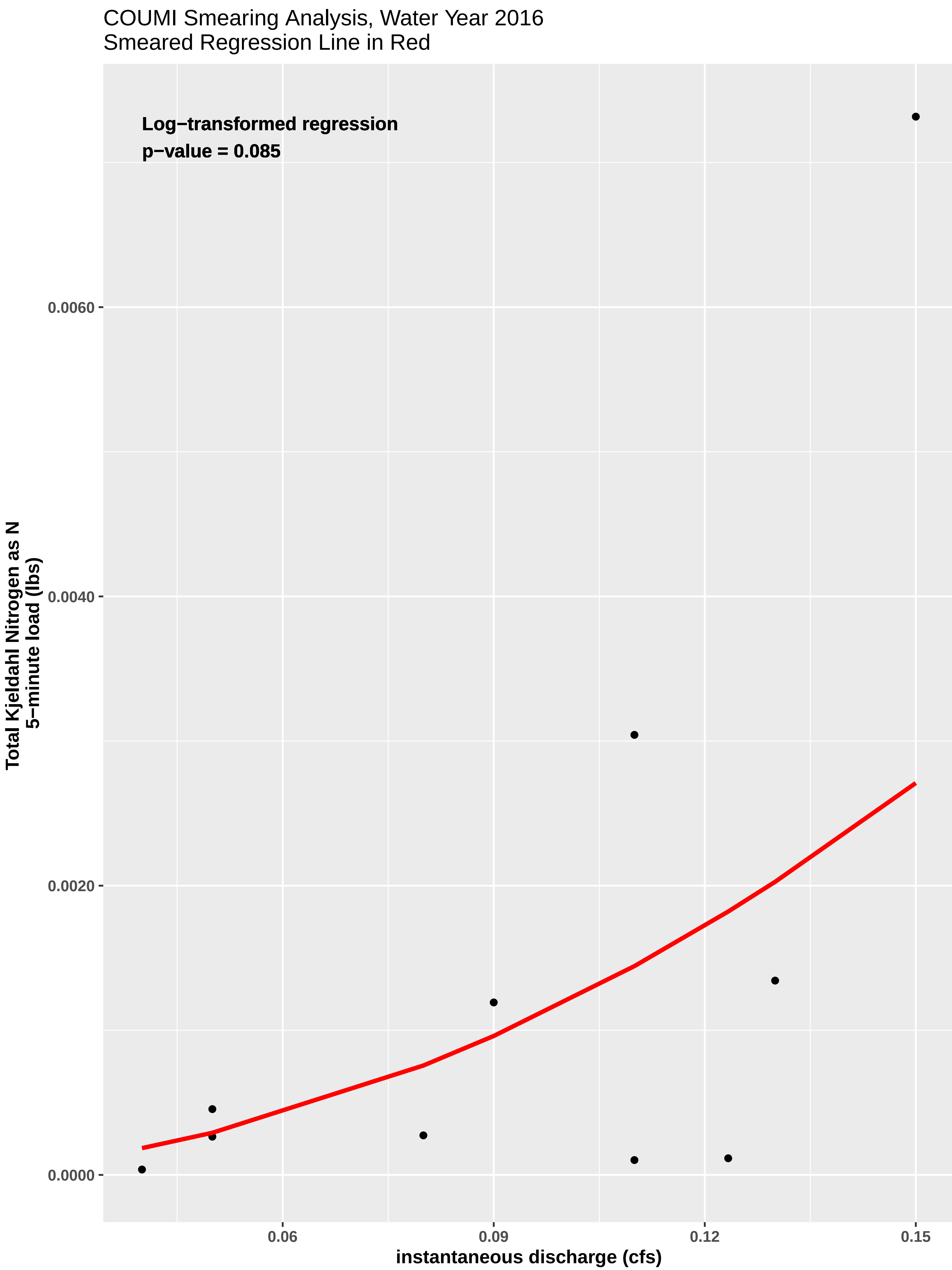
COUMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000050
0.000100
0.000150
0.0
0.3
0.6
0.9
instantaneous discharge (cfs)

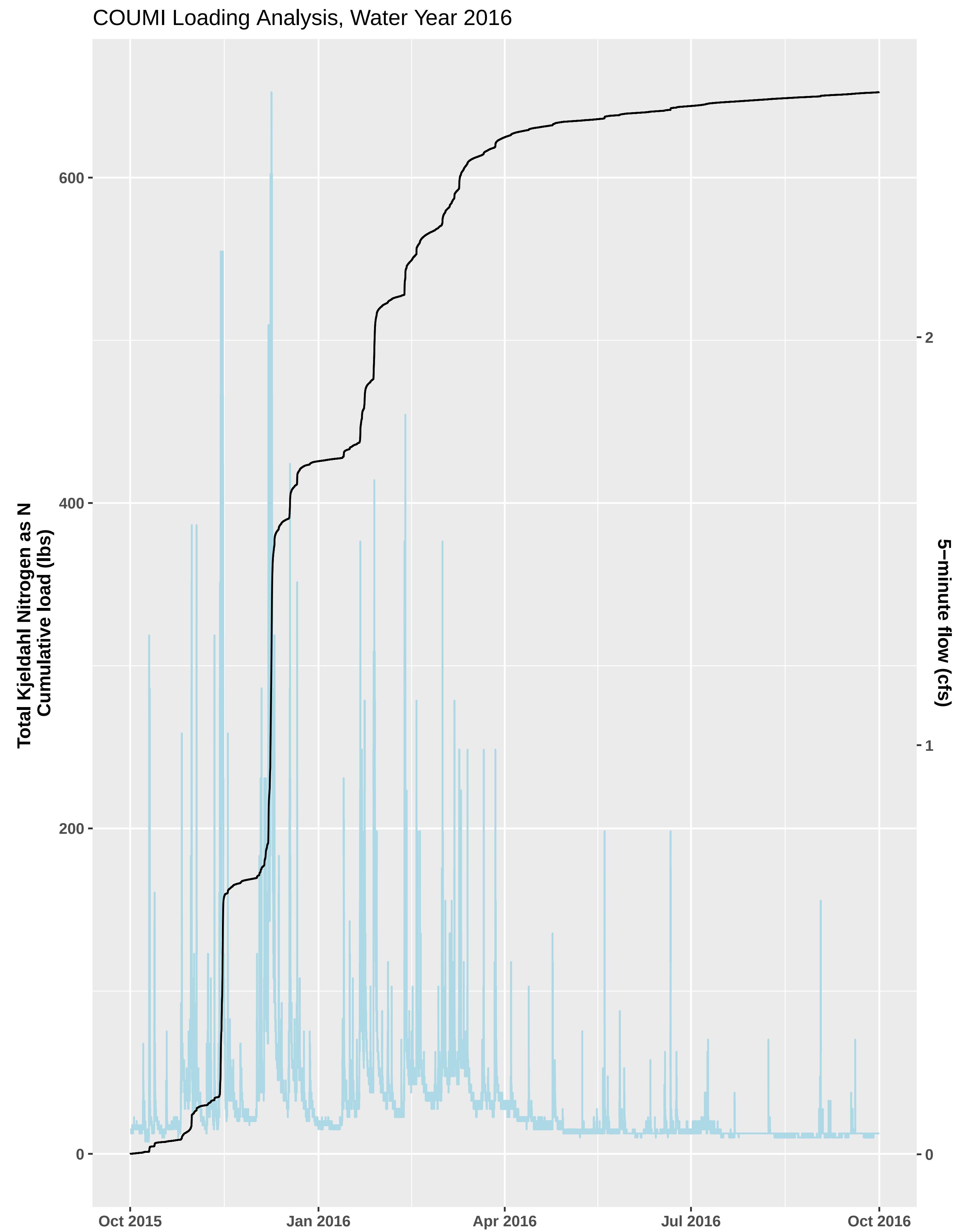


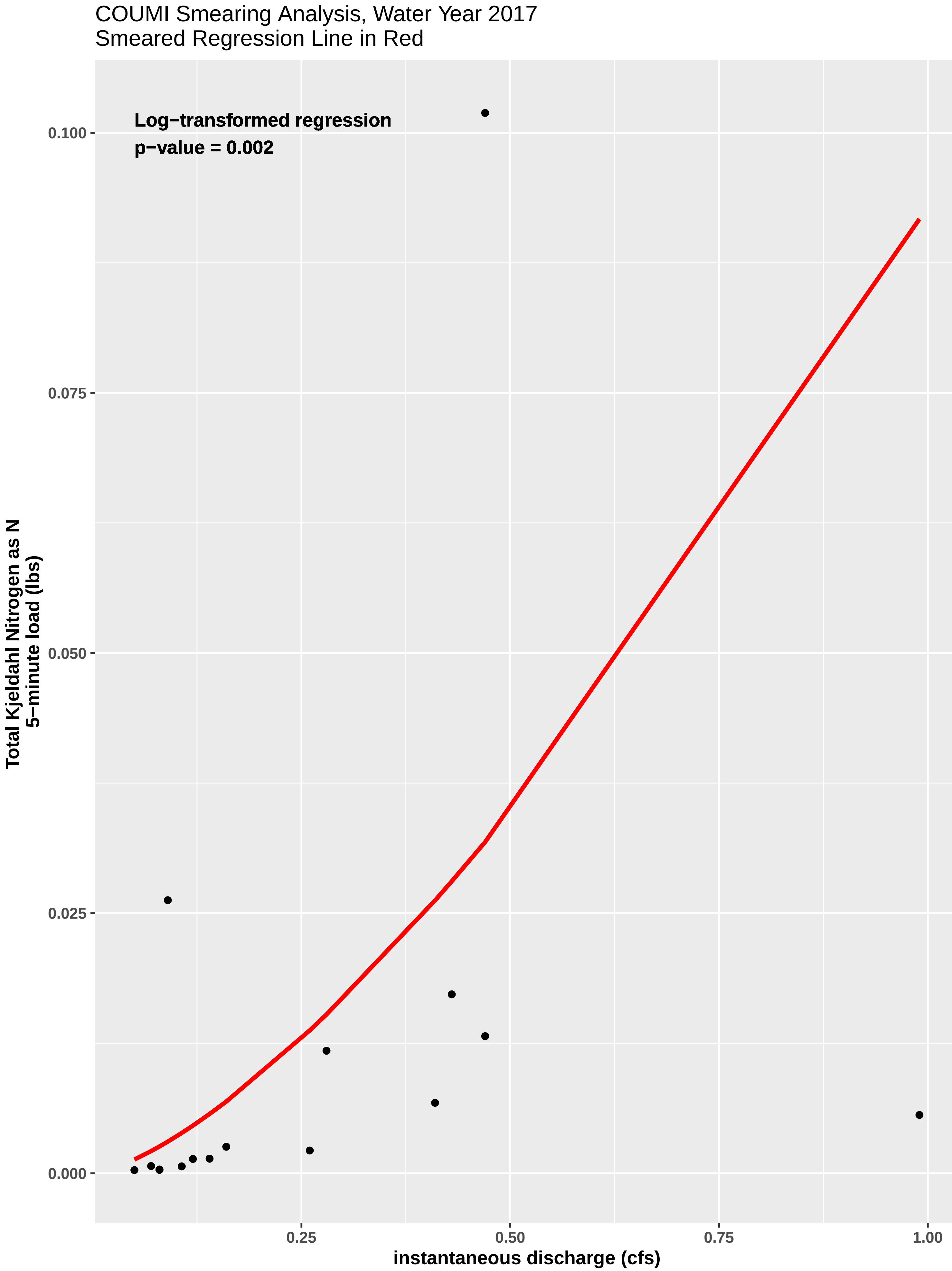
COUMI Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.00
0.30
0.60
0.90
1.20
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

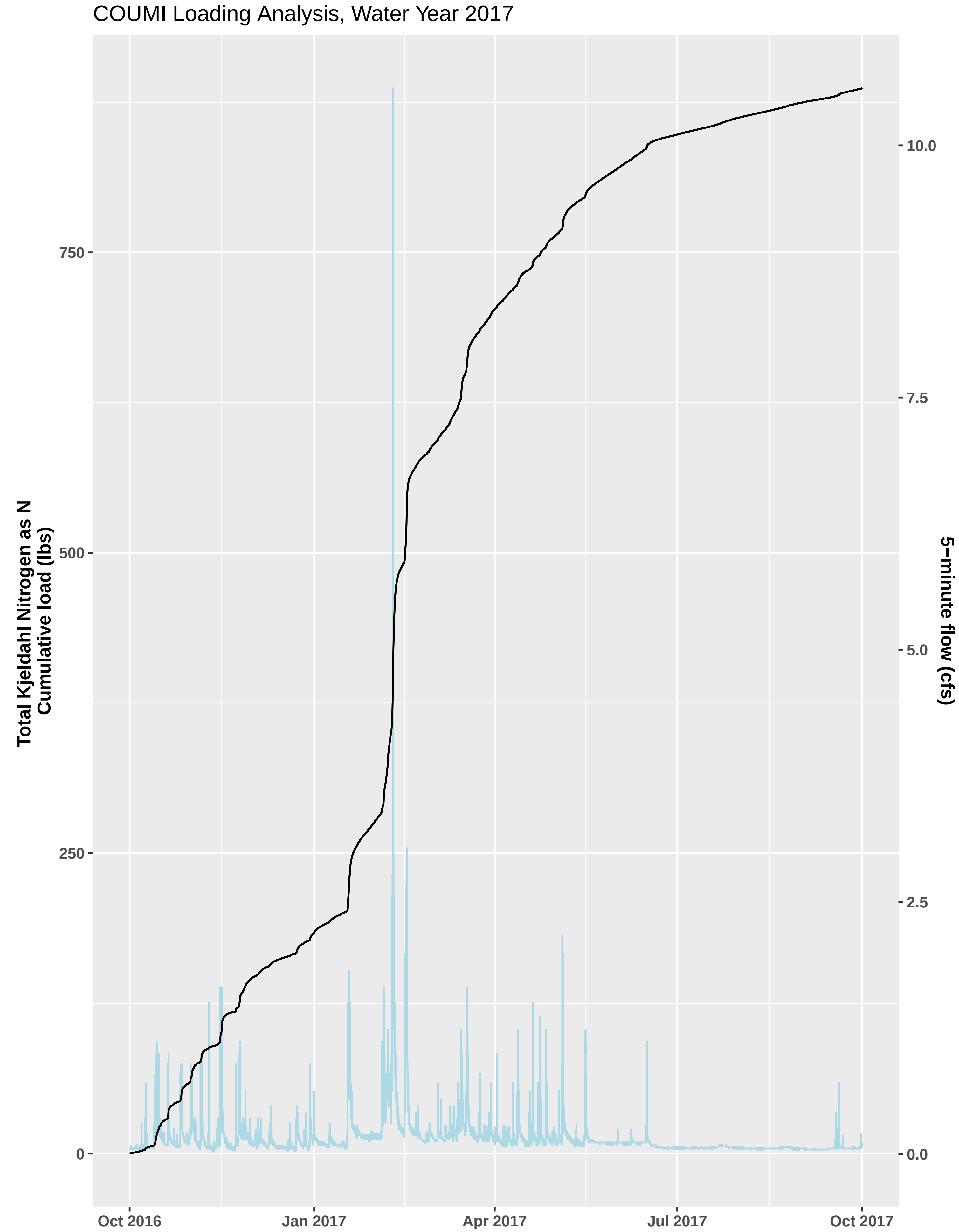

COUMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000075
0.000050
0.000025
0.000000
0.1
0.2
0.3
0.4
0.5
instantaneous discharge (cfs)

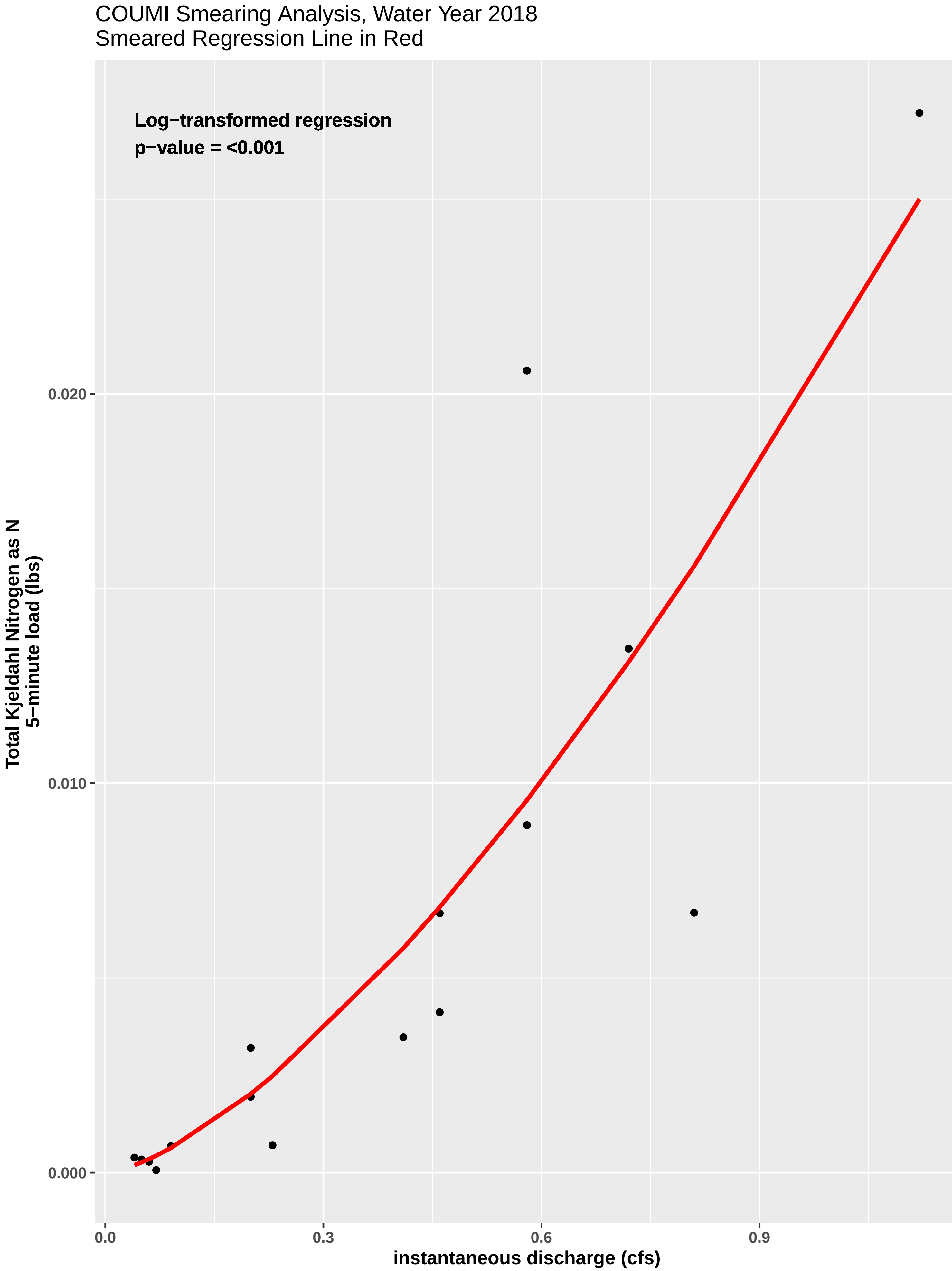

COUMI Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
0.60
0.40
0.20
0.00
5−minute flow (cfs)
0.6
0.4
0.2
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


COUMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.085
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.06
0.09
0.12
0.15
instantaneous discharge (cfs)

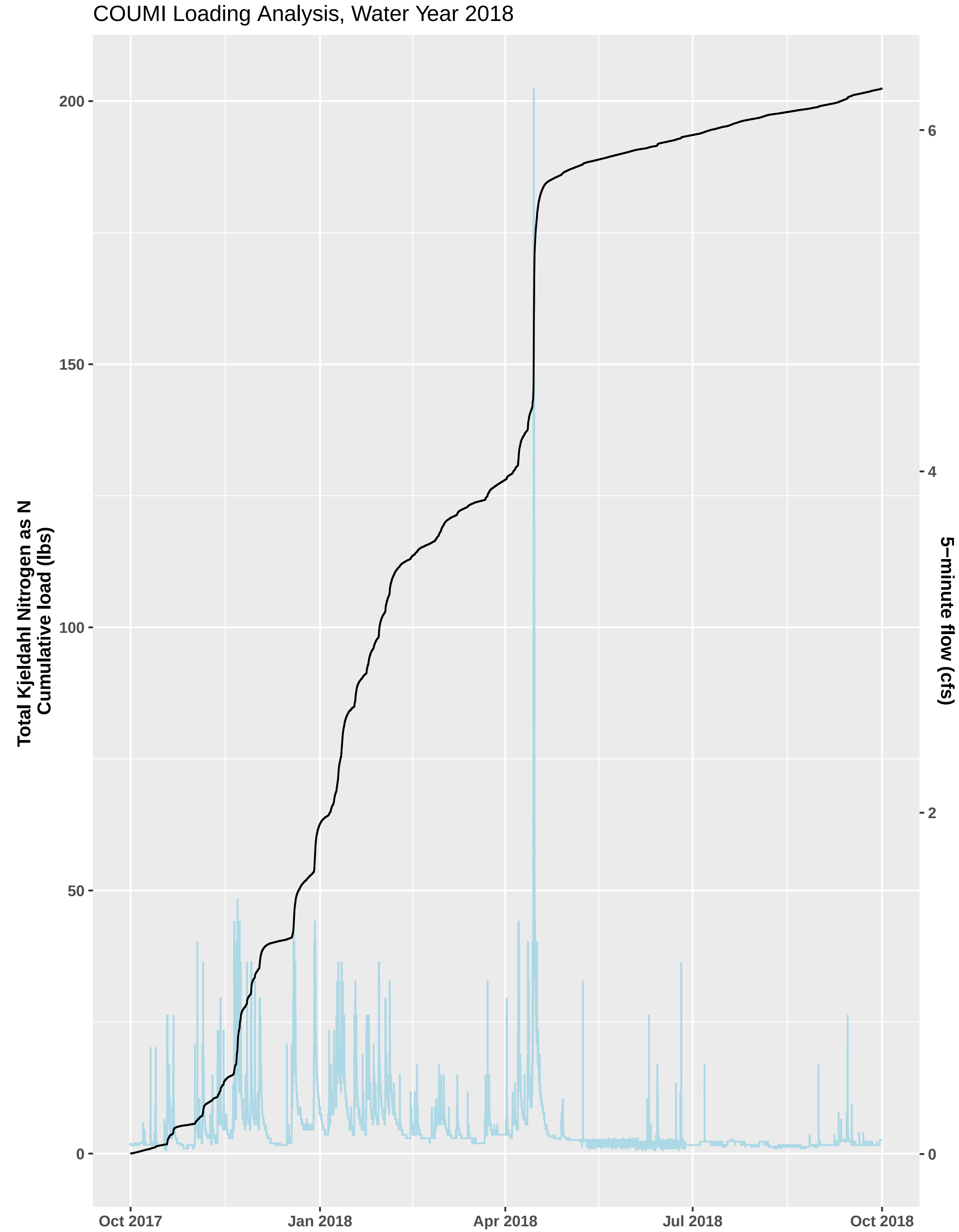

COUMI Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
200
400
600
5−minute flow (cfs)
0
1
2
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


COUMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.025
0.050
0.075
0.100
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

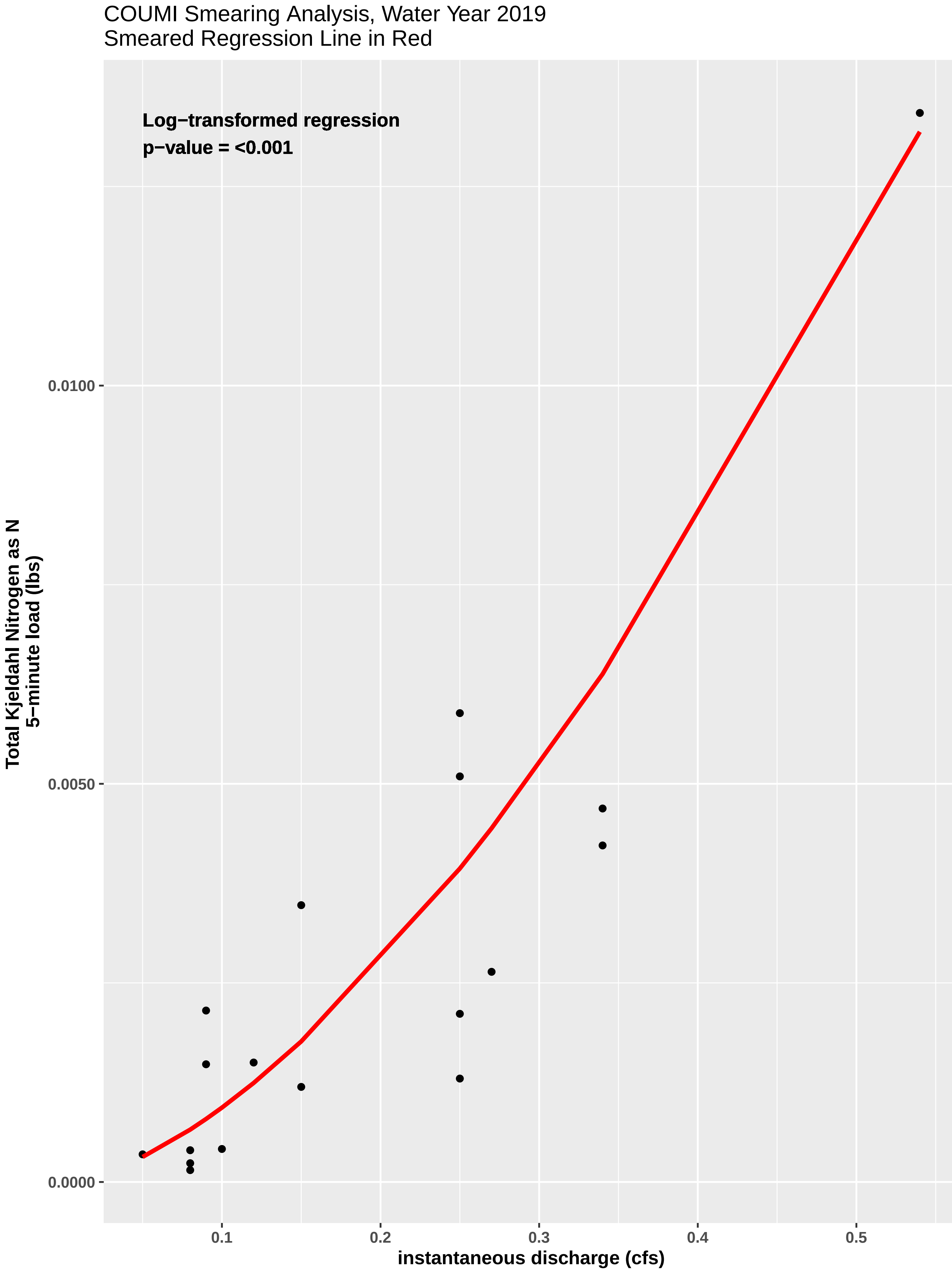

COUMI Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
250
500
750
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



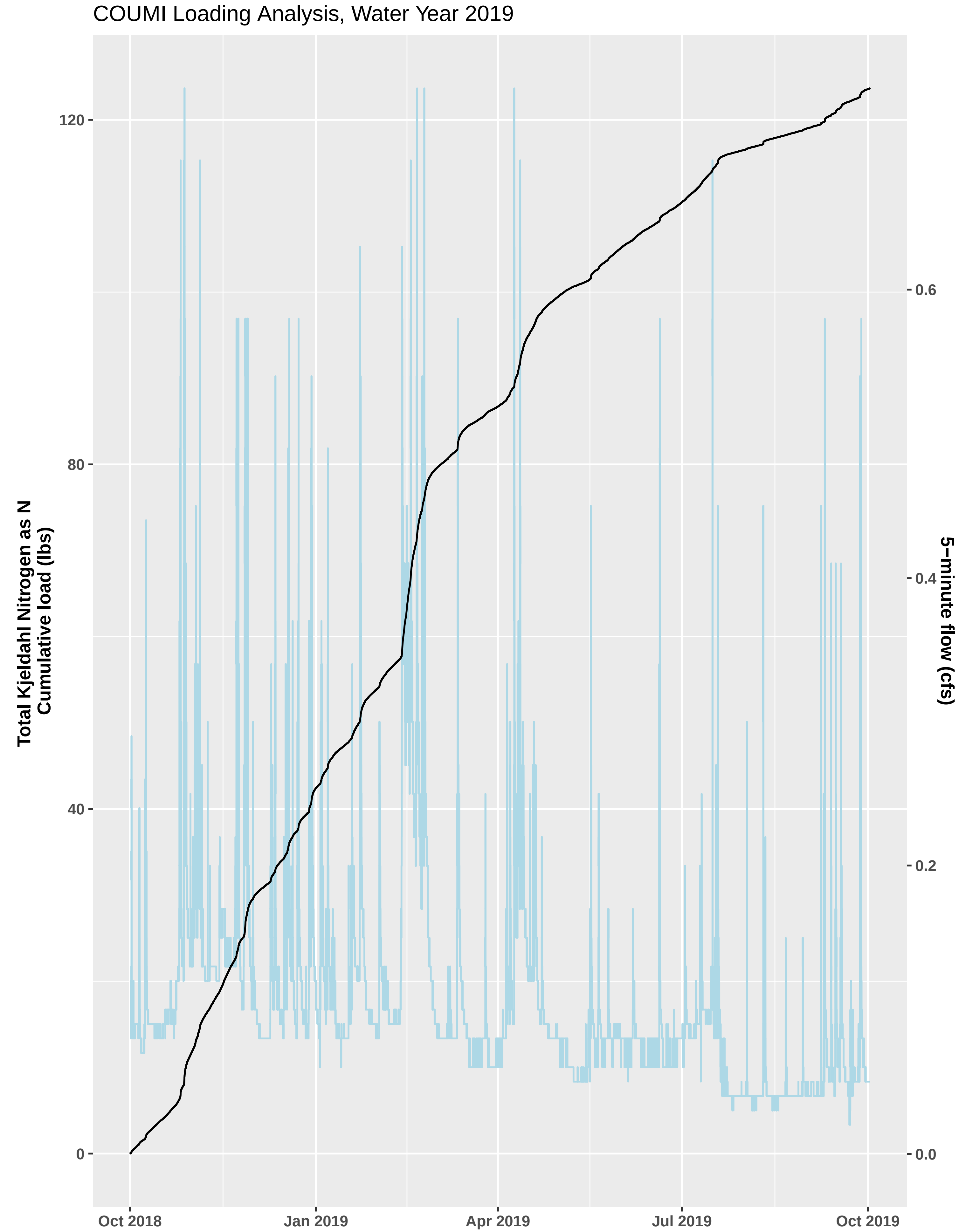
COUMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.010
0.020
0.0
0.3
0.6
0.9
instantaneous discharge (cfs)



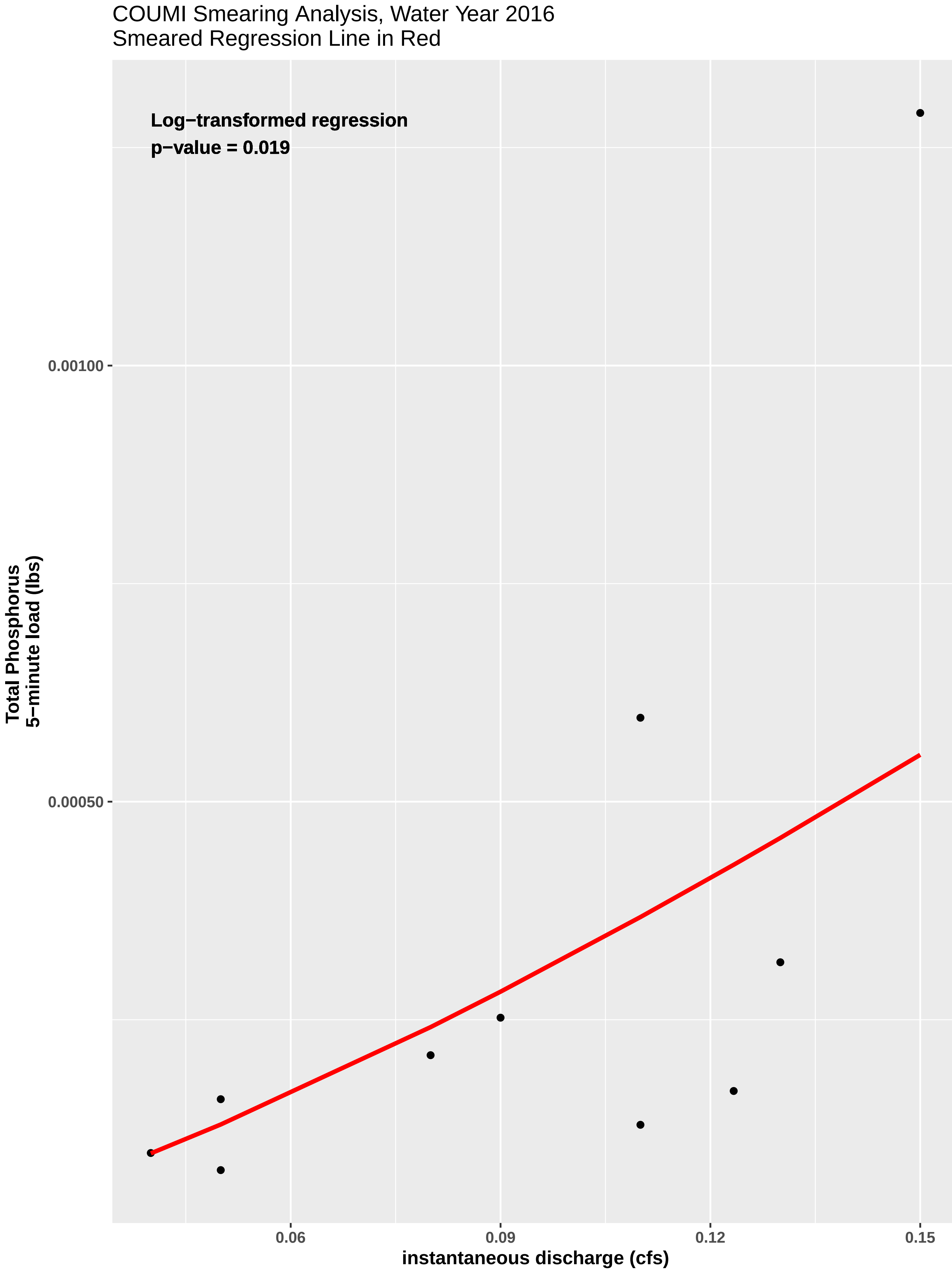
COUMI Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
50
100
150
200
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



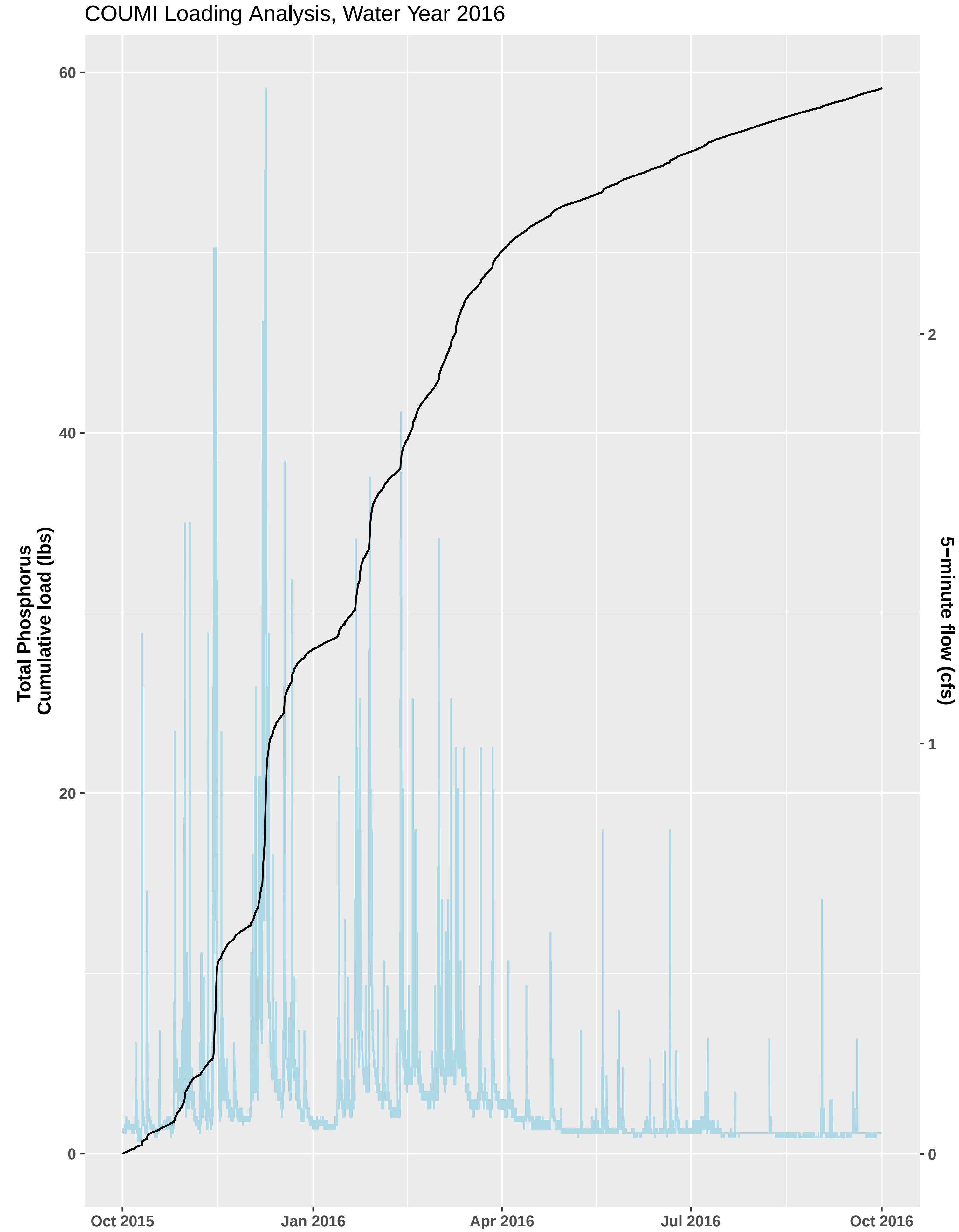
COUMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0050
0.0100
0.1
0.2
0.3
0.4
0.5
instantaneous discharge (cfs)



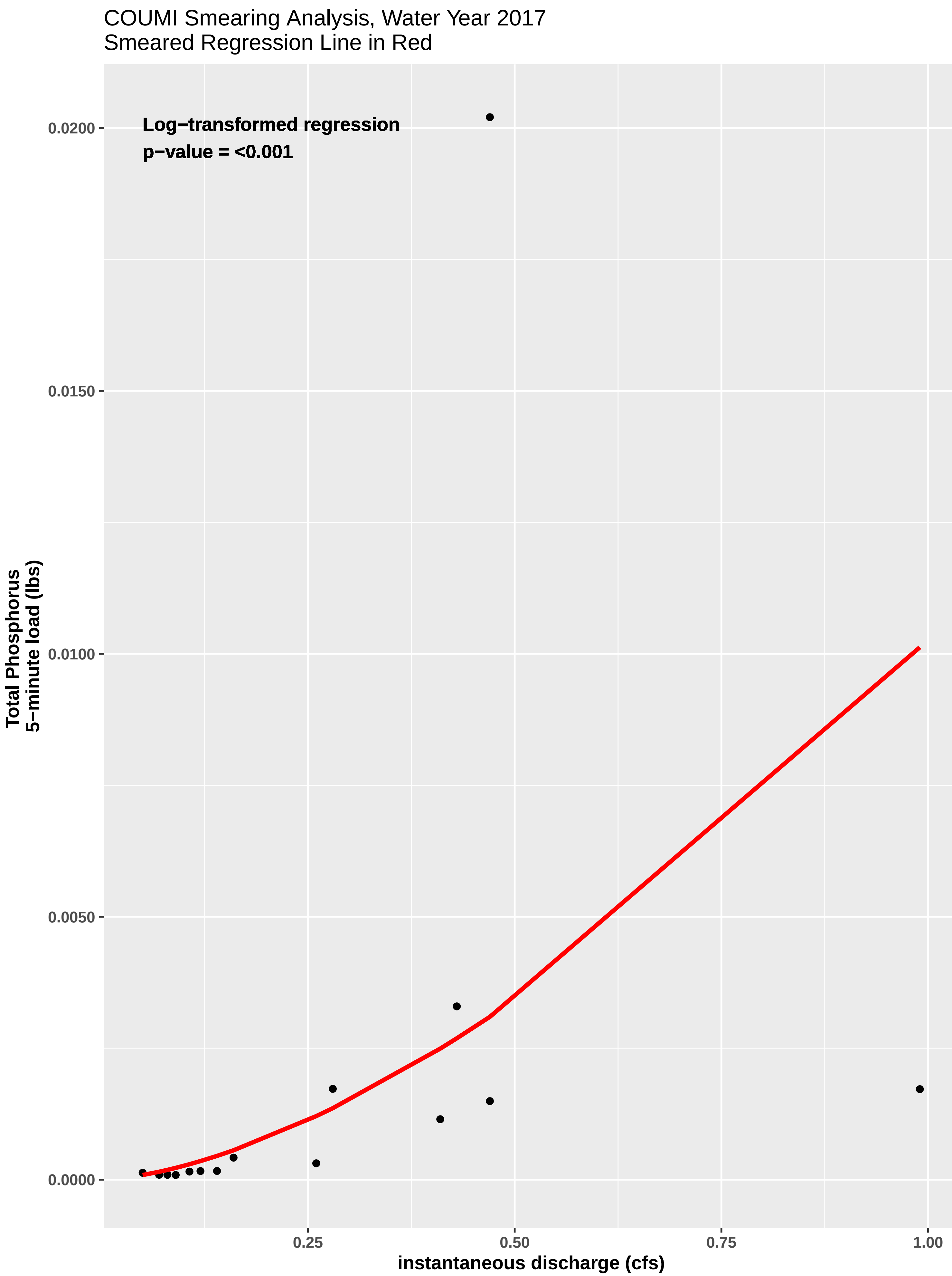
COUMI Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
40
80
120
5−minute flow (cfs)
0.0
0.2
0.4
0.6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

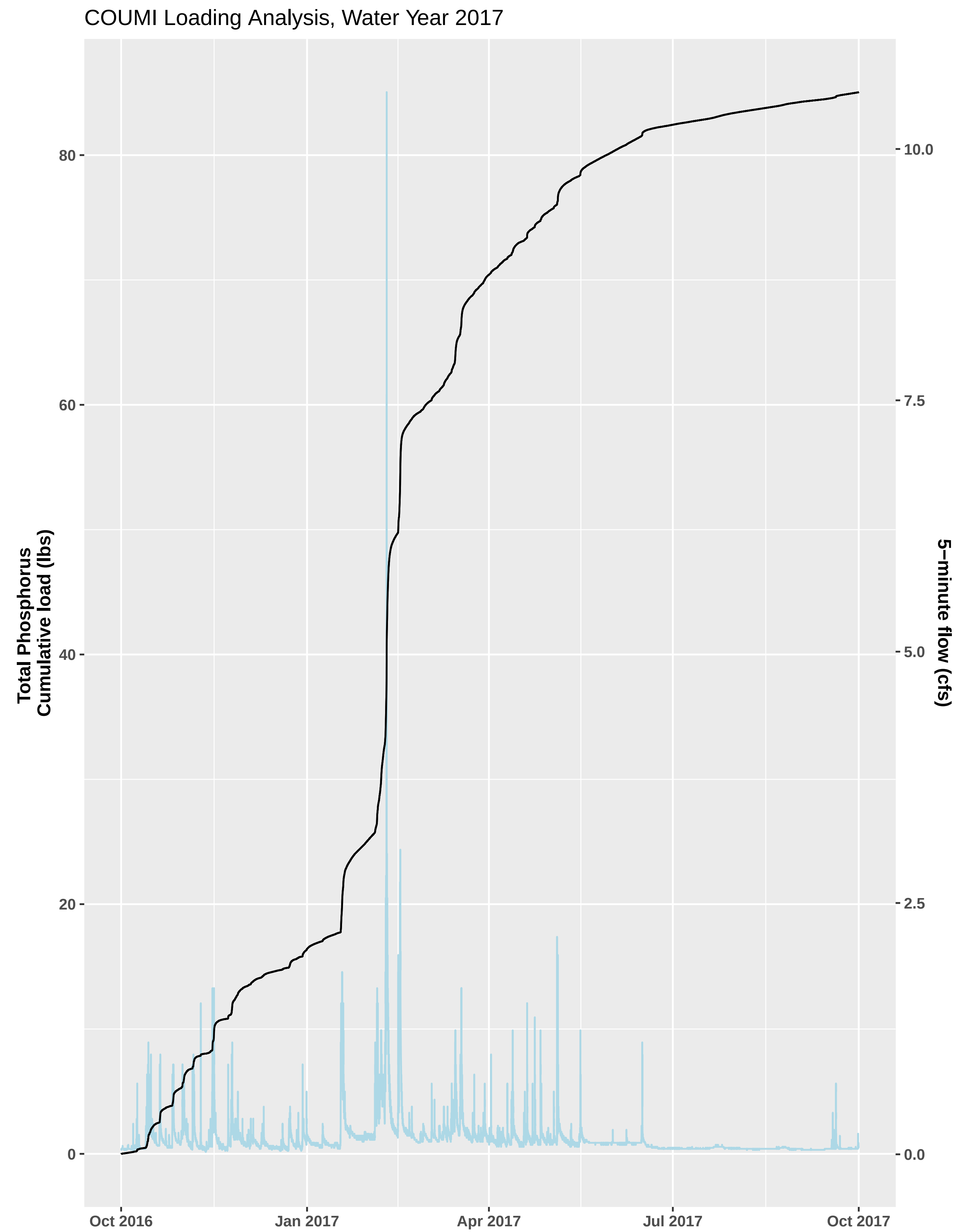


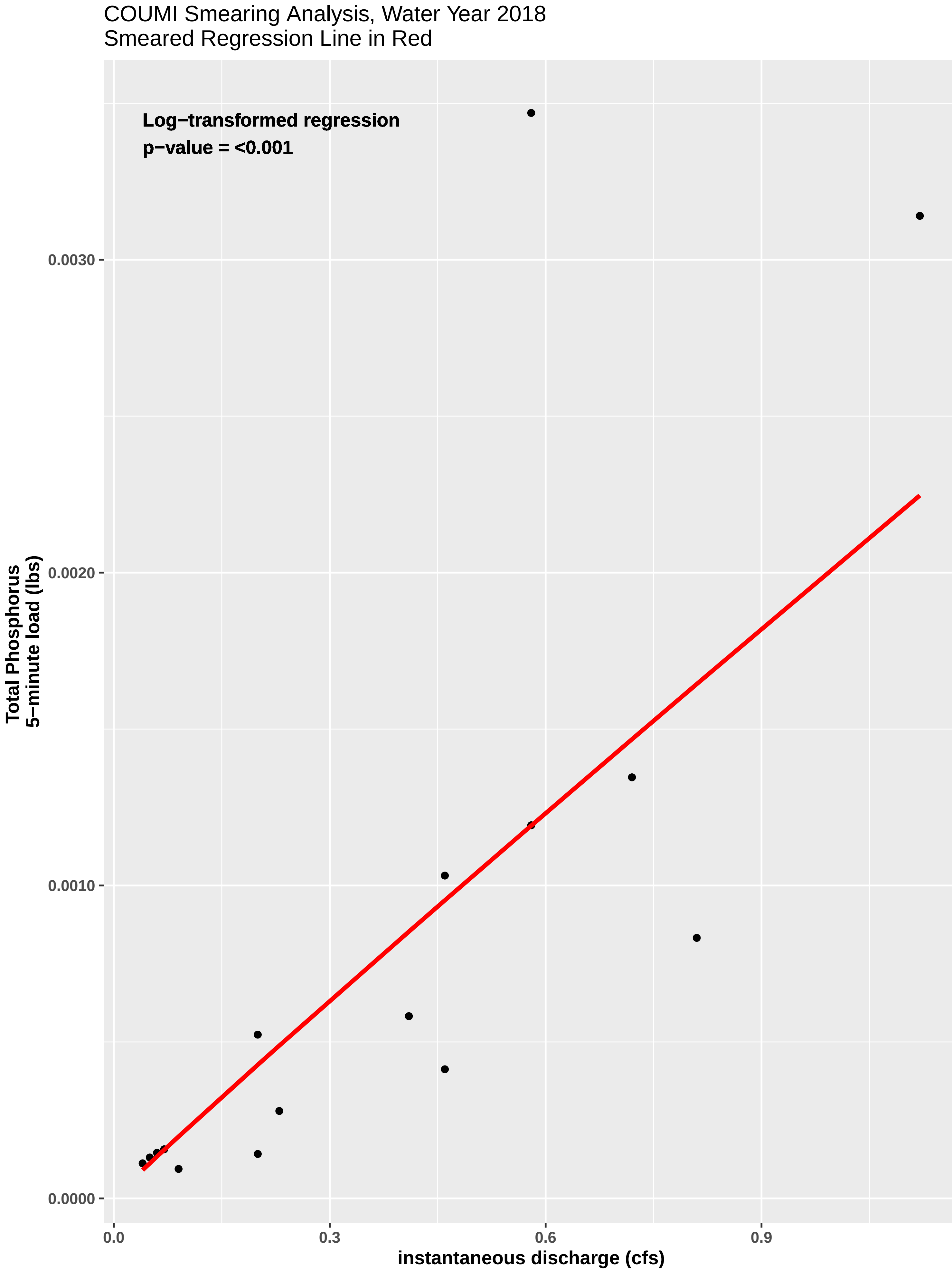
COUMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.019
Total Phosphorus
5−minute load (lbs)
0.00100
0.00050
0.06
0.09
0.12
0.15
instantaneous discharge (cfs)



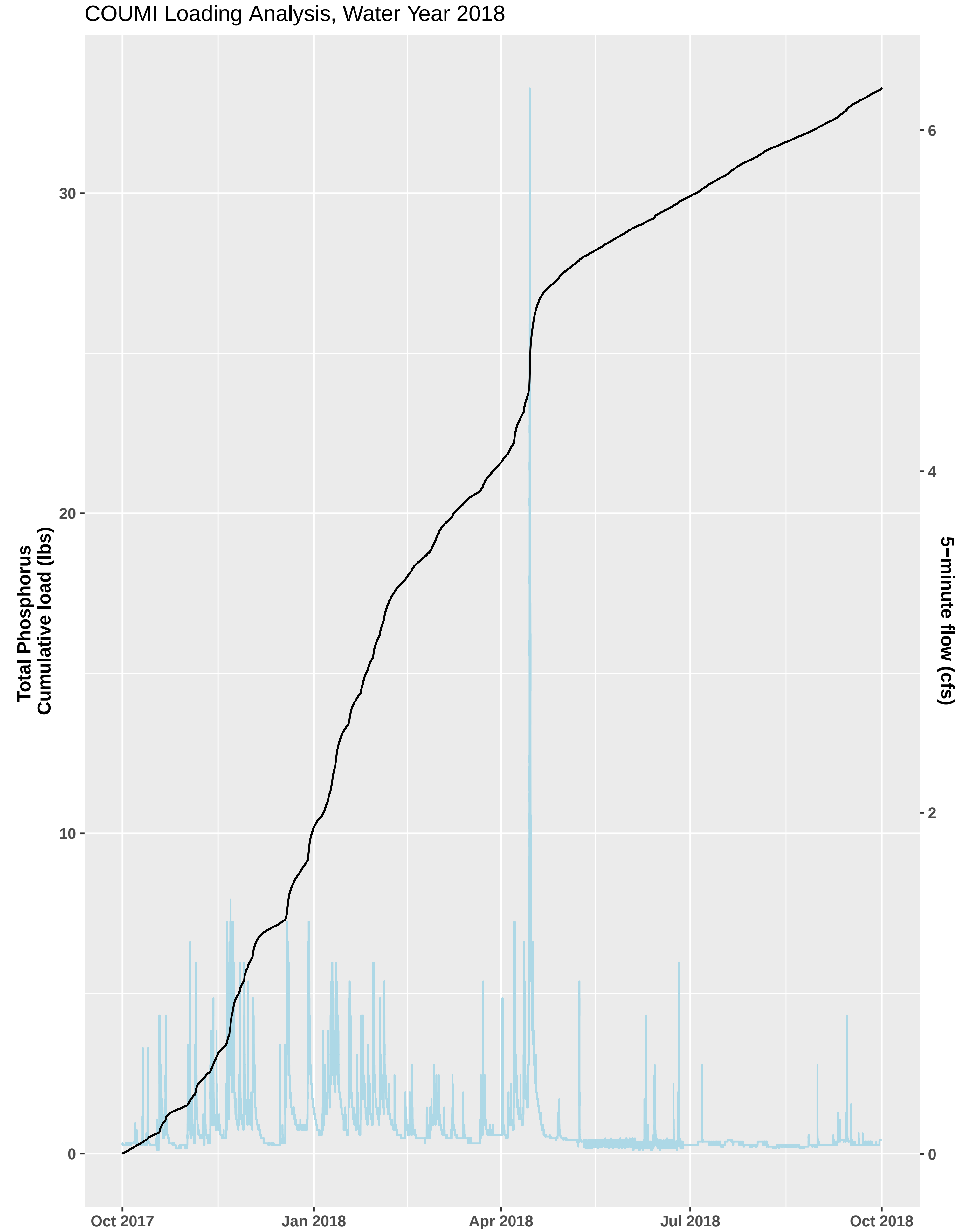
COUMI Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
60
40
20
0
5−minute flow (cfs)
2
1
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


COUMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0200
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

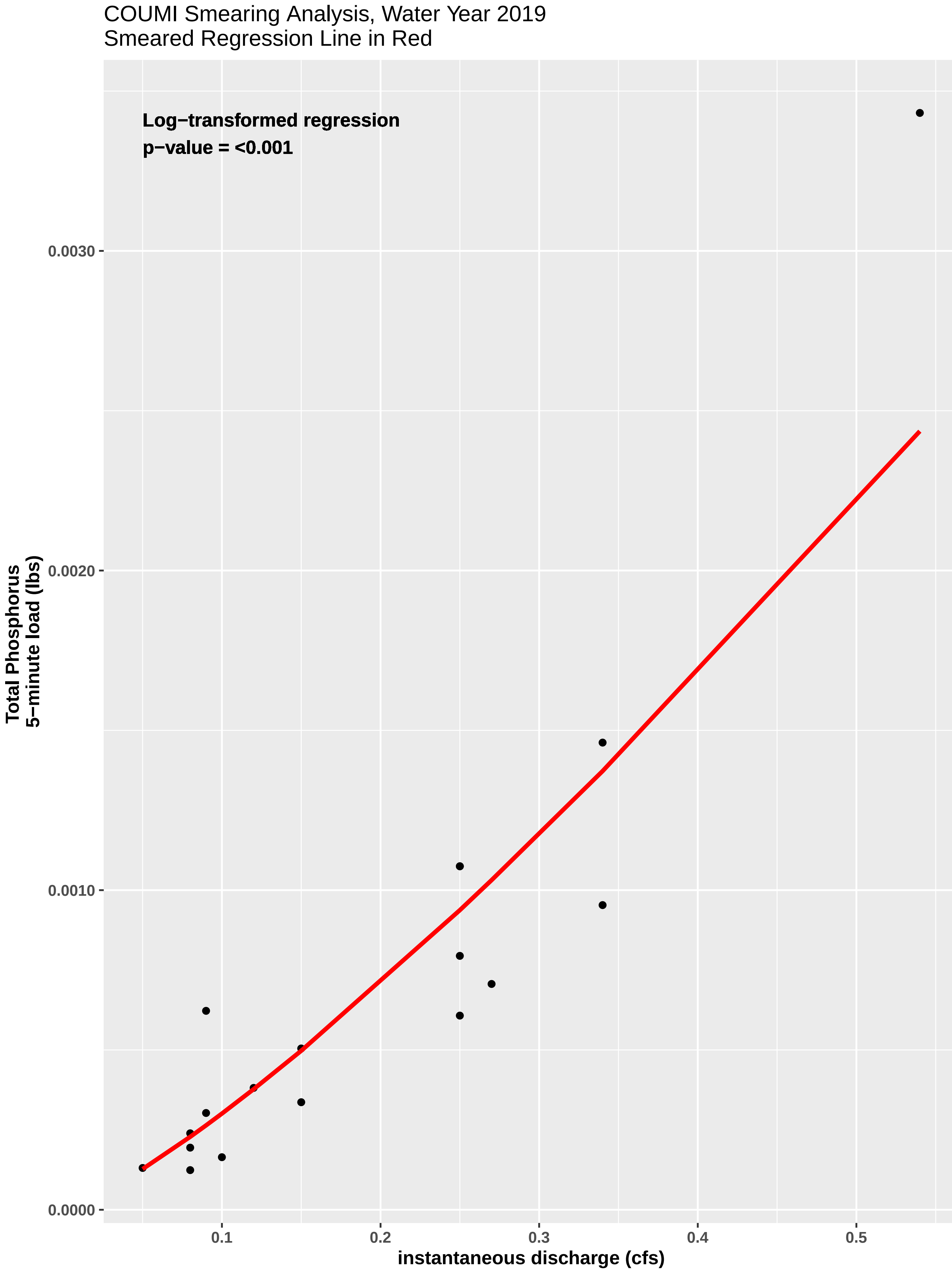

COUMI Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
80
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



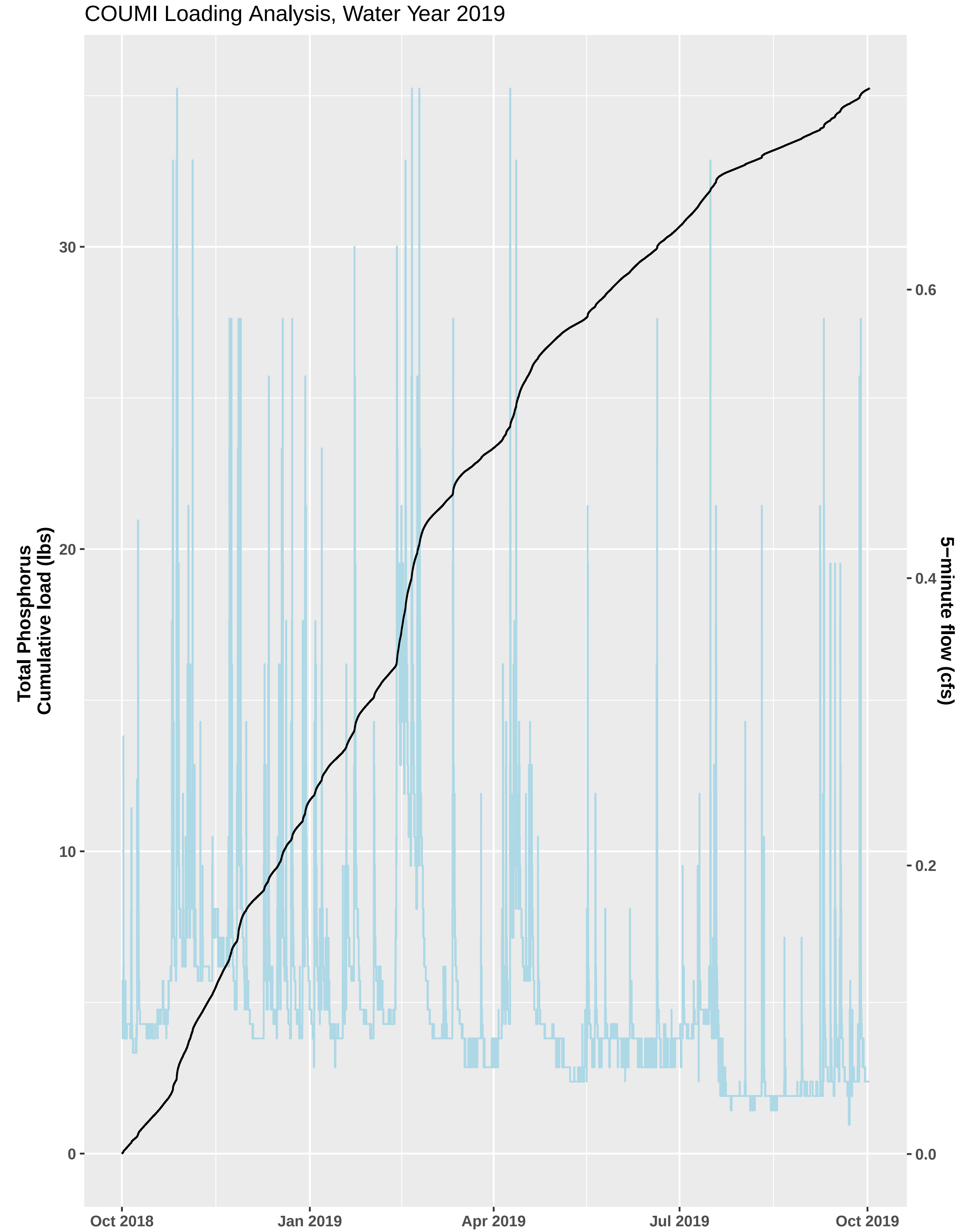
COUMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0
0.3
0.6
0.9
instantaneous discharge (cfs)



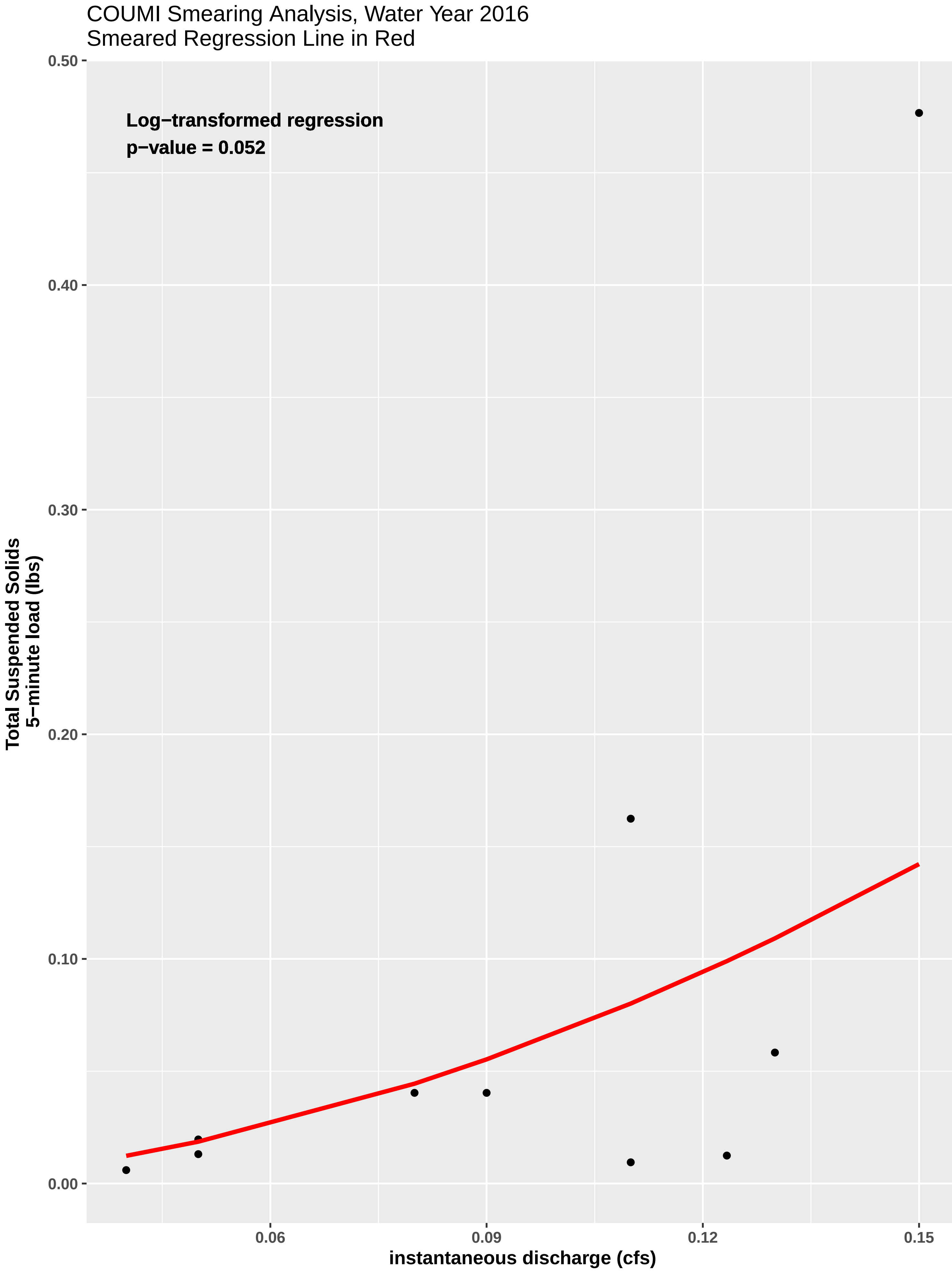
COUMI Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
10
20
30
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

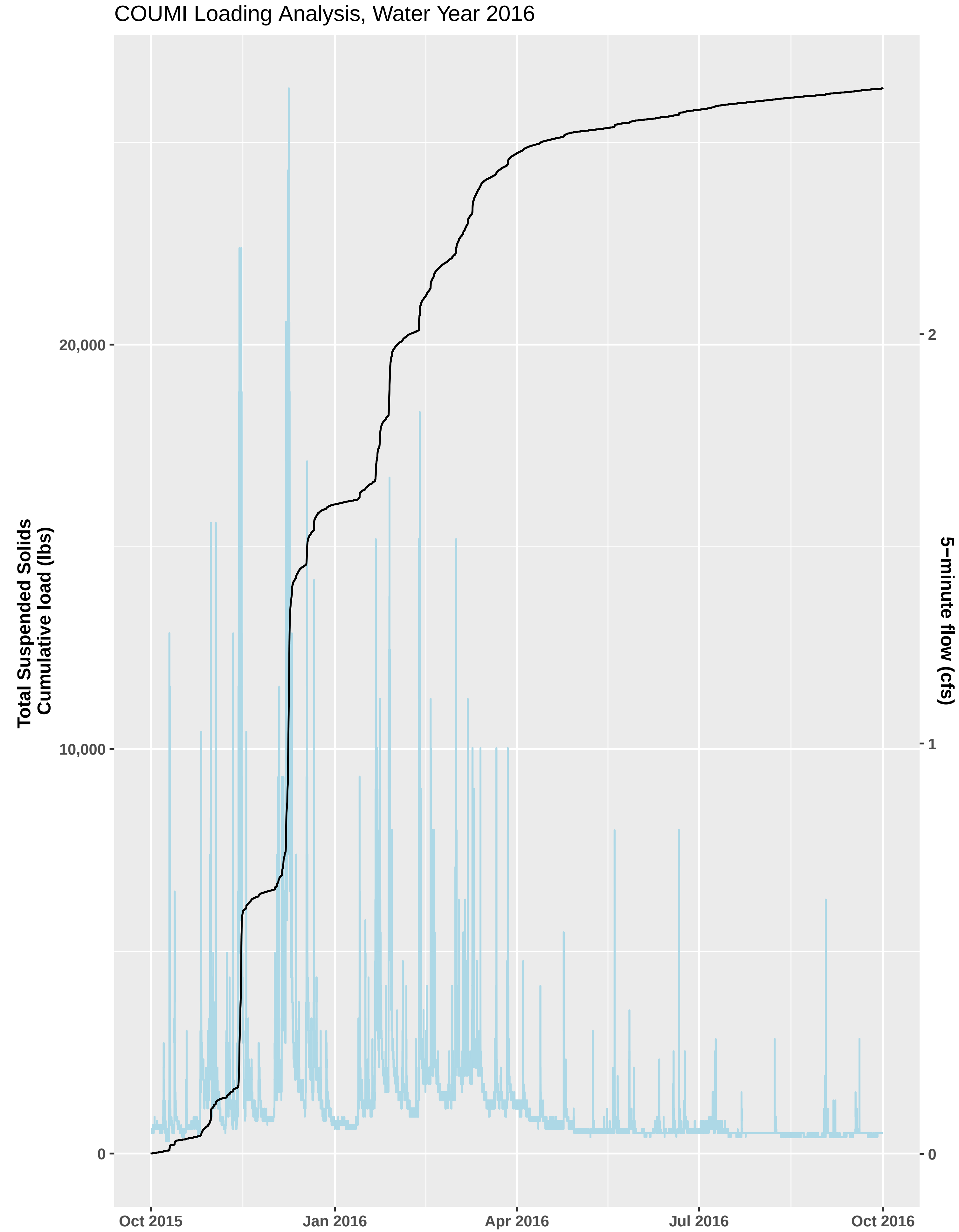


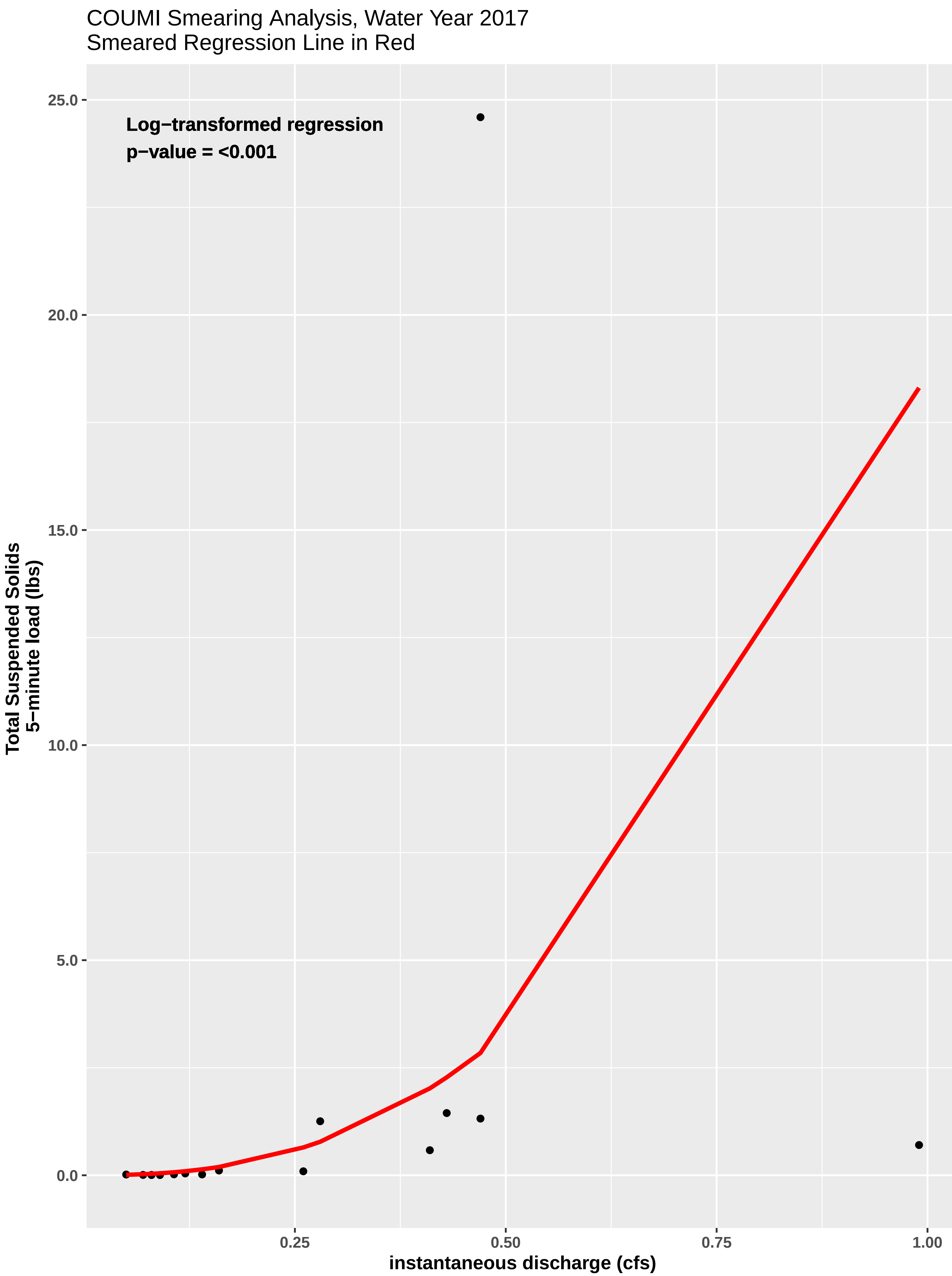
COUMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.1
0.2
0.3
0.4
0.5
instantaneous discharge (cfs)

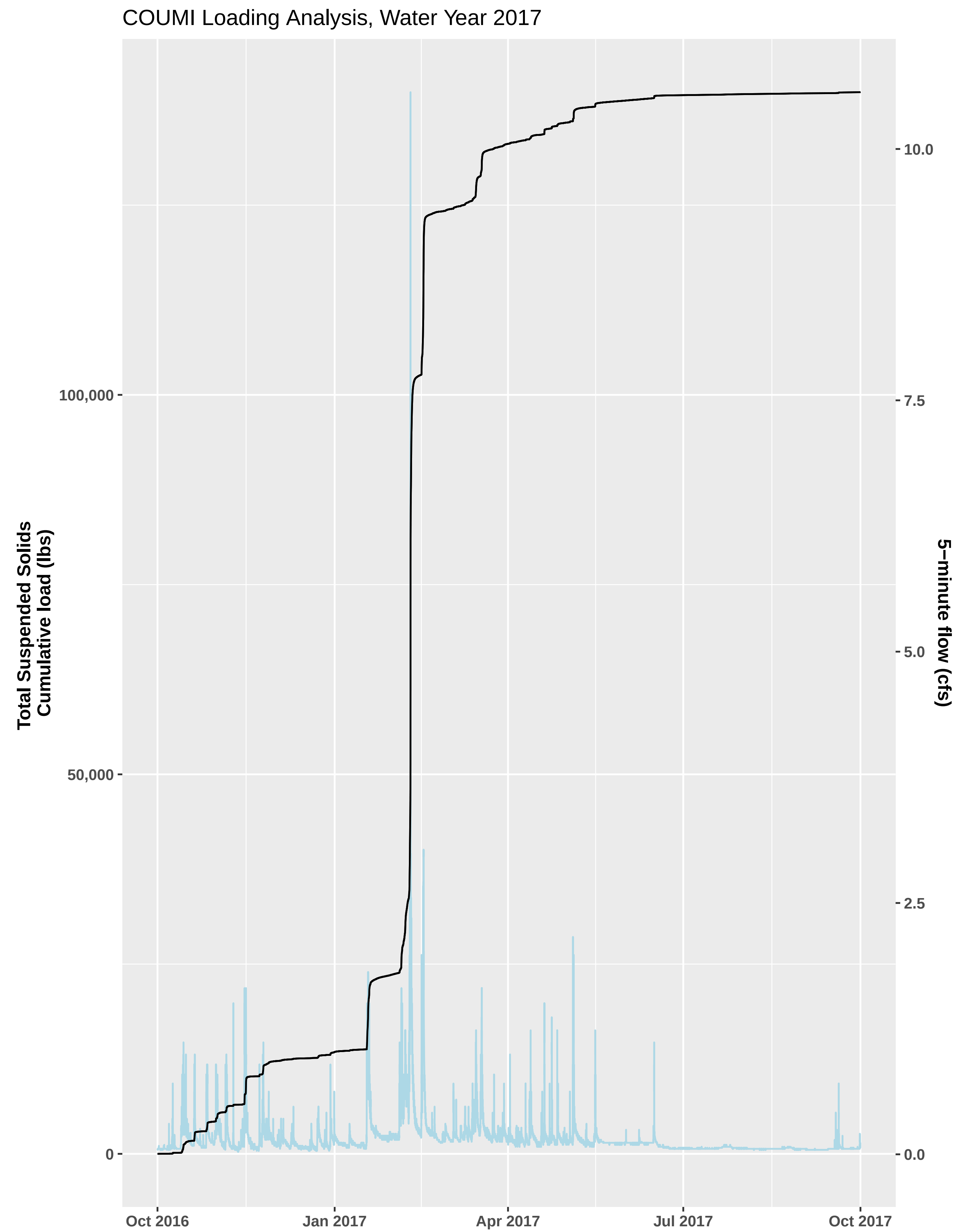


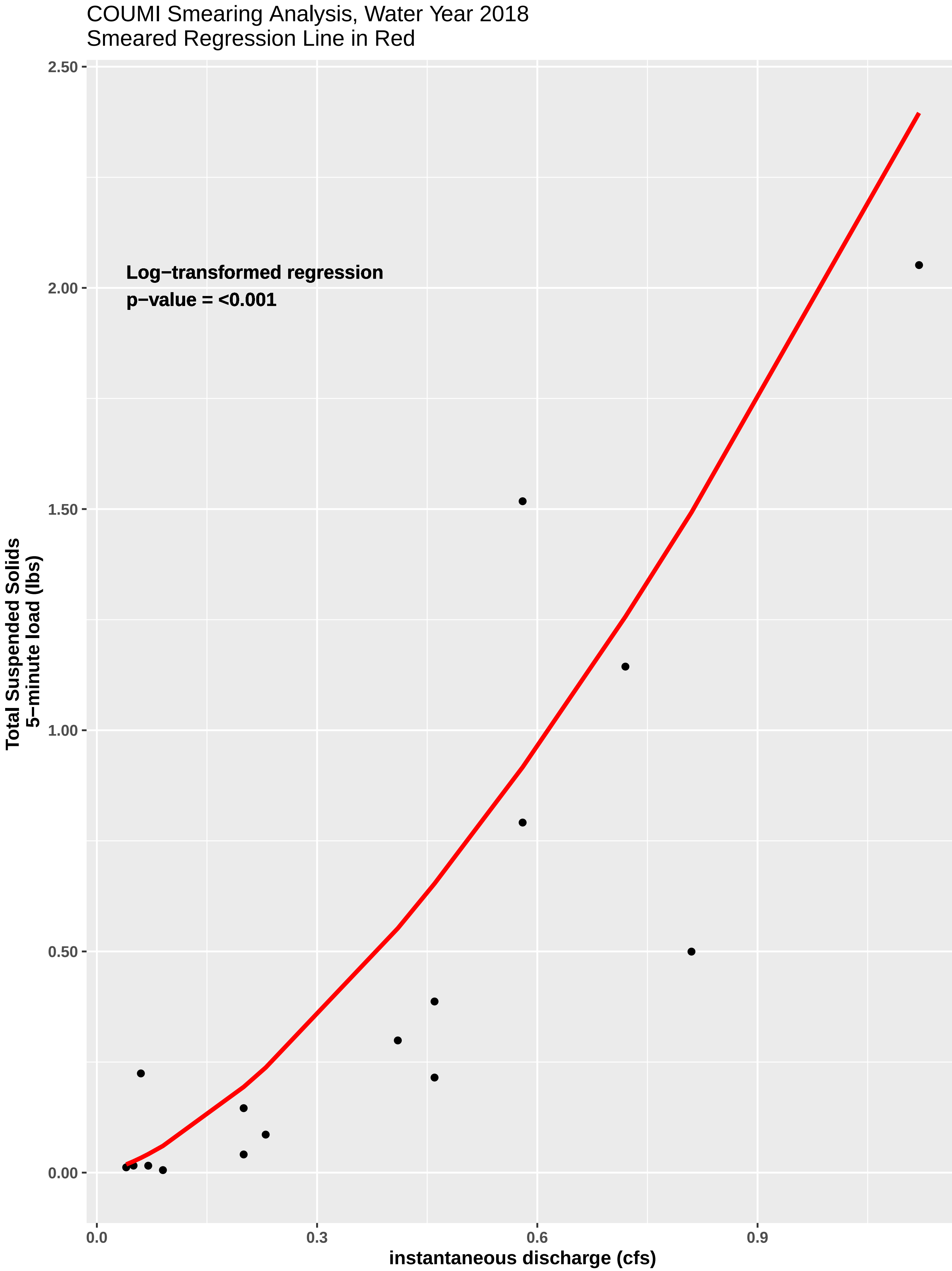
COUMI Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
10
20
30
5−minute flow (cfs)
0.0
0.2
0.4
0.6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

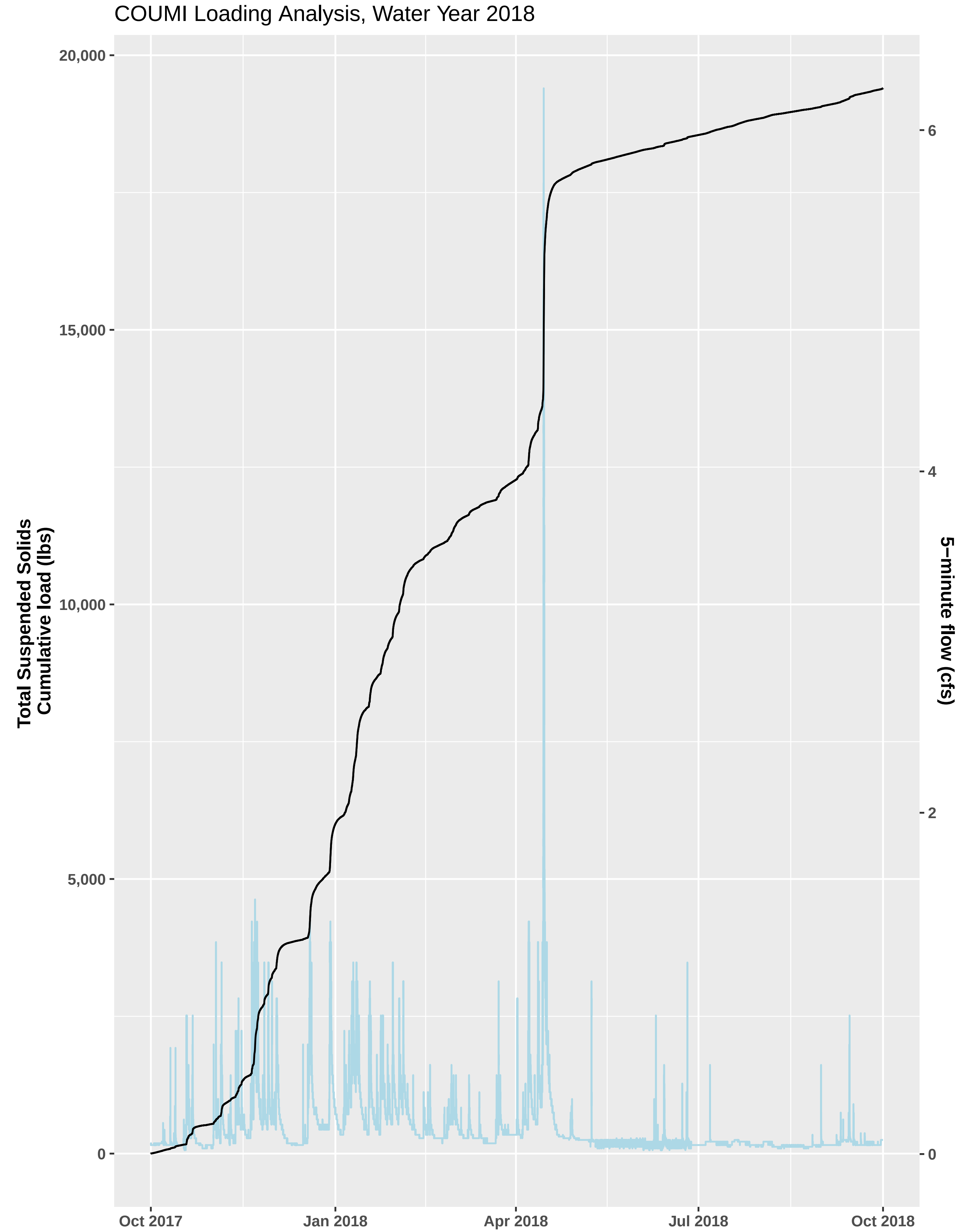

COUMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.052
Total Suspended Solids
5−minute load (lbs)
0.00
0.10
0.20
0.30
0.40
0.50
0.06
0.09
0.12
0.15
instantaneous discharge (cfs)

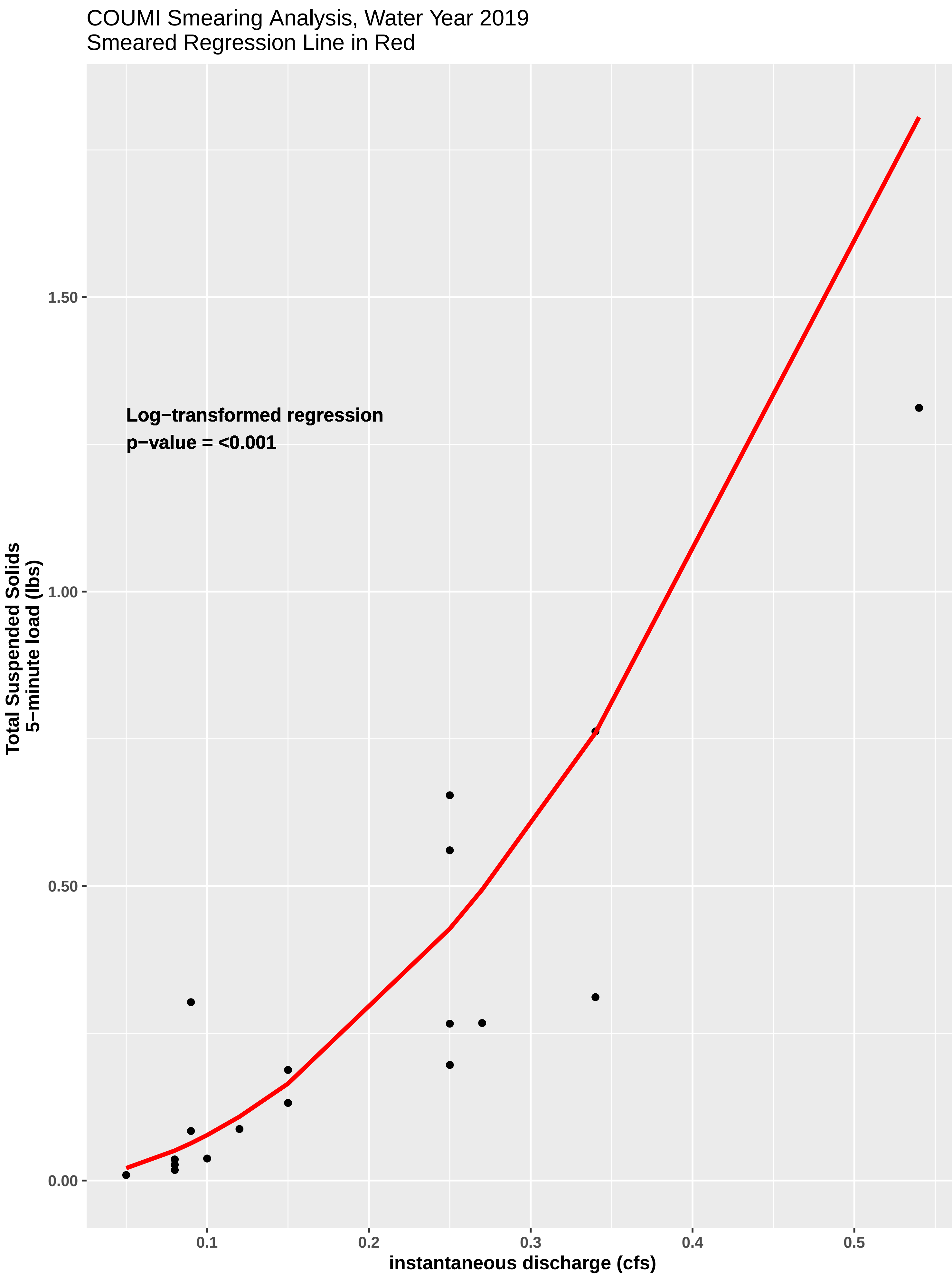

COUMI Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
0
10,000
20,000
5−minute flow (cfs)
0
1
2
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

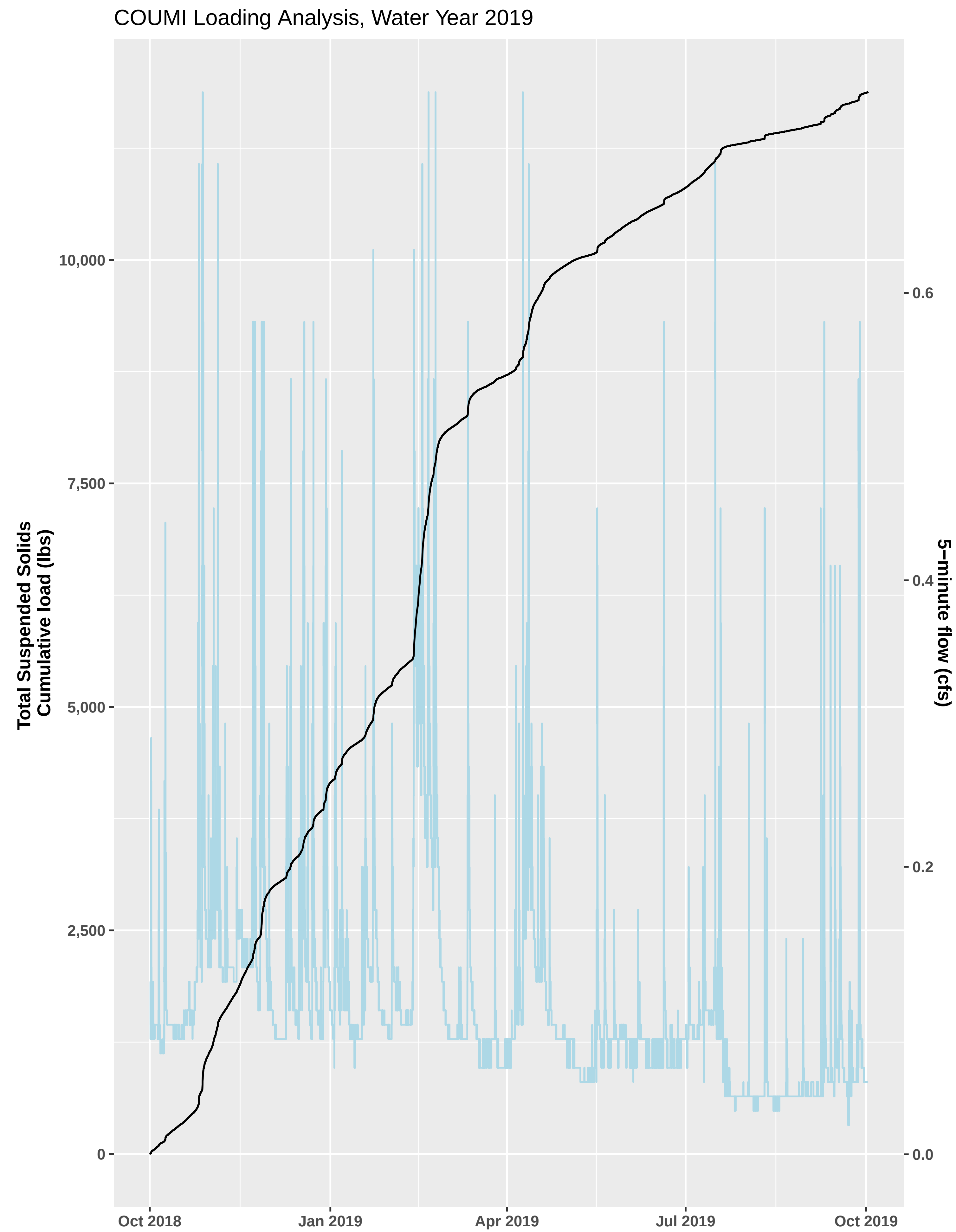

COUMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
5.0
10.0
15.0
20.0
25.0
0.25
0.50
0.75
1.00


COUMI Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
50,000
100,000
0.0
2.5
5.0
7.5
10.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

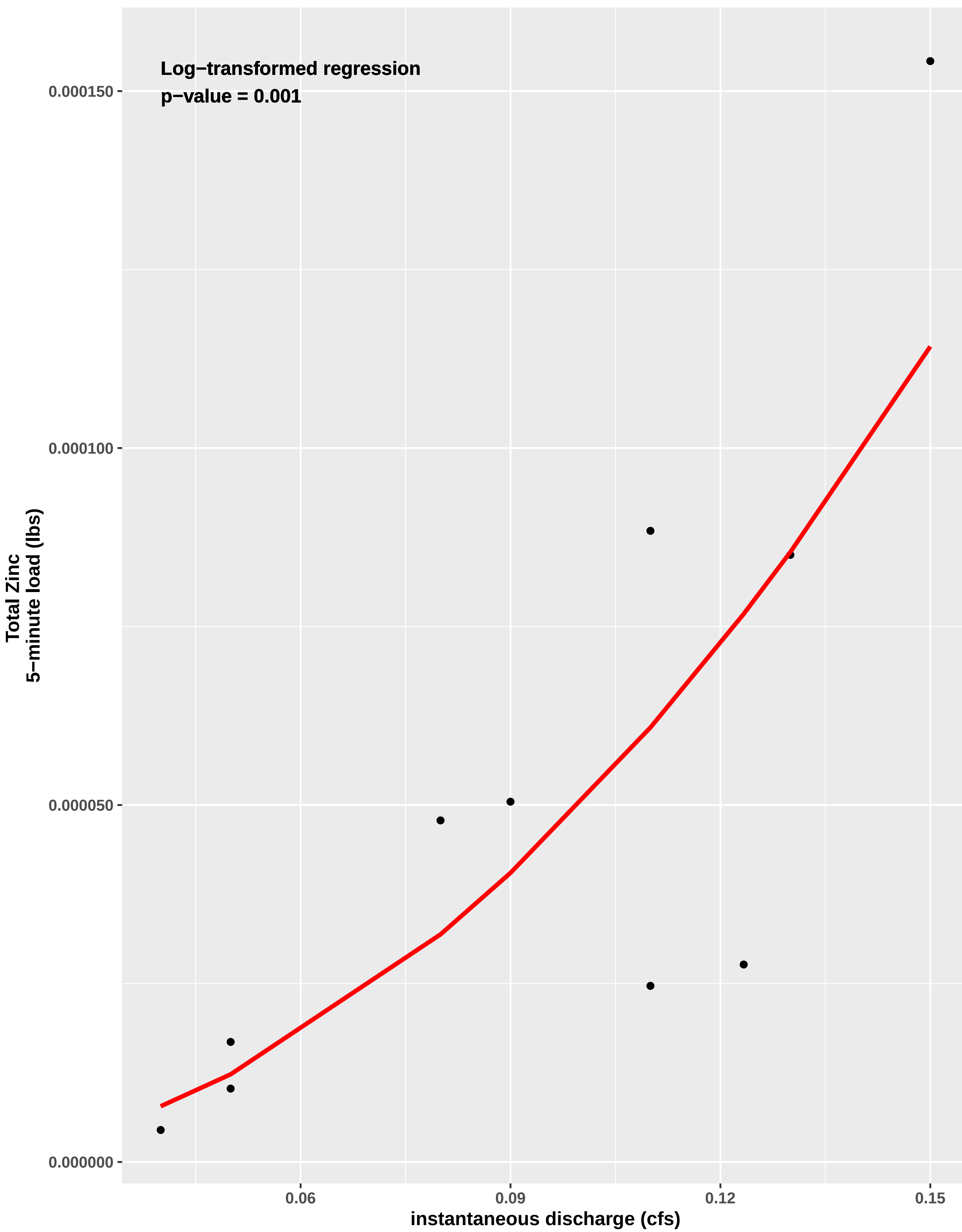

COUMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
2.50
2.00
1.50
1.00
0.50
0.00
0.0
0.3
0.6
0.9


COUMI Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
20,000
15,000
10,000
5,000
0
6
4
2
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

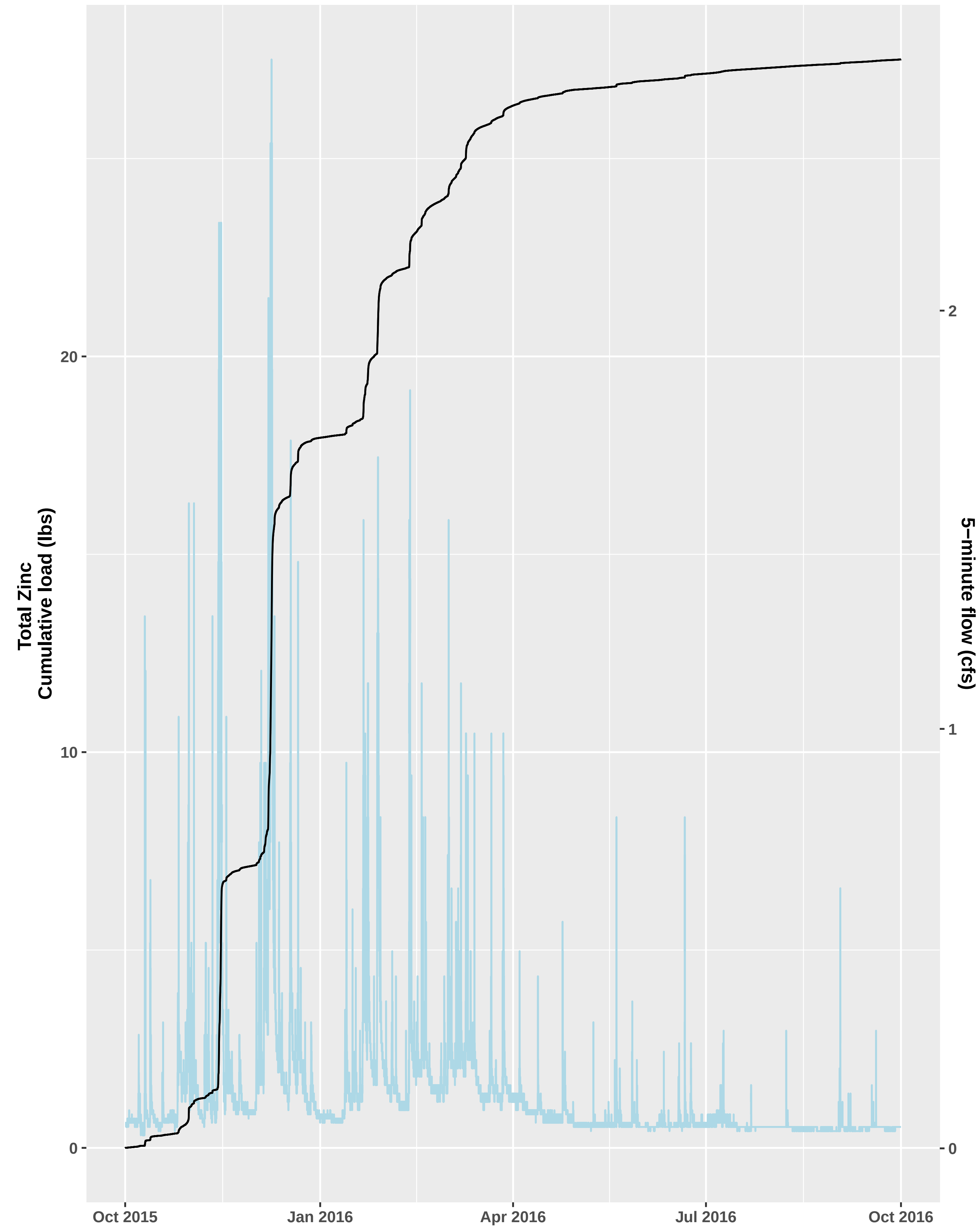

COUMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.00
0.50
1.00
1.50
0.1
0.2
0.3
0.4
0.5
instantaneous discharge (cfs)

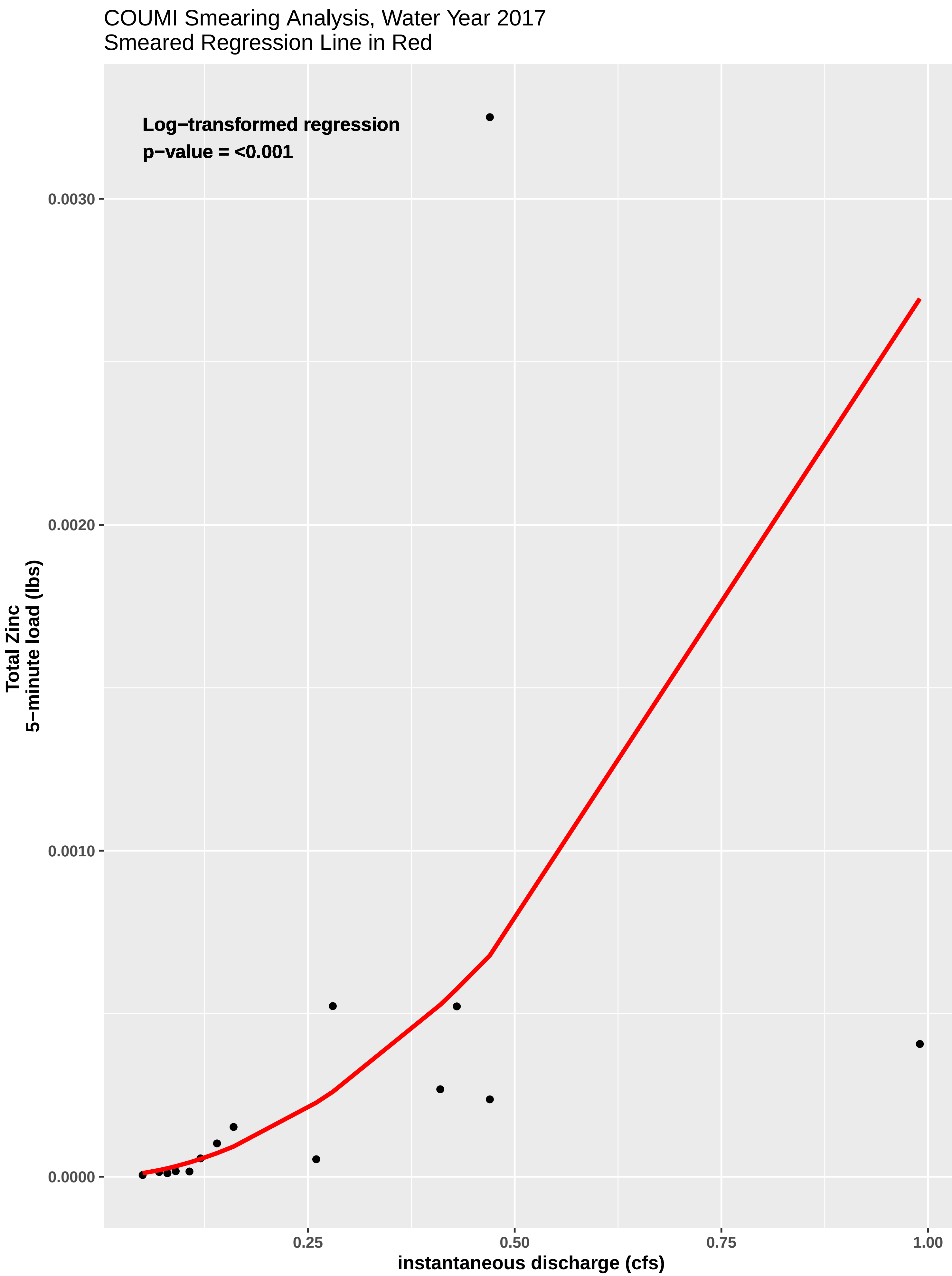

COUMI Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
0
2,500
5,000
7,500
10,000
5−minute flow (cfs)
0.0
0.2
0.4
0.6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

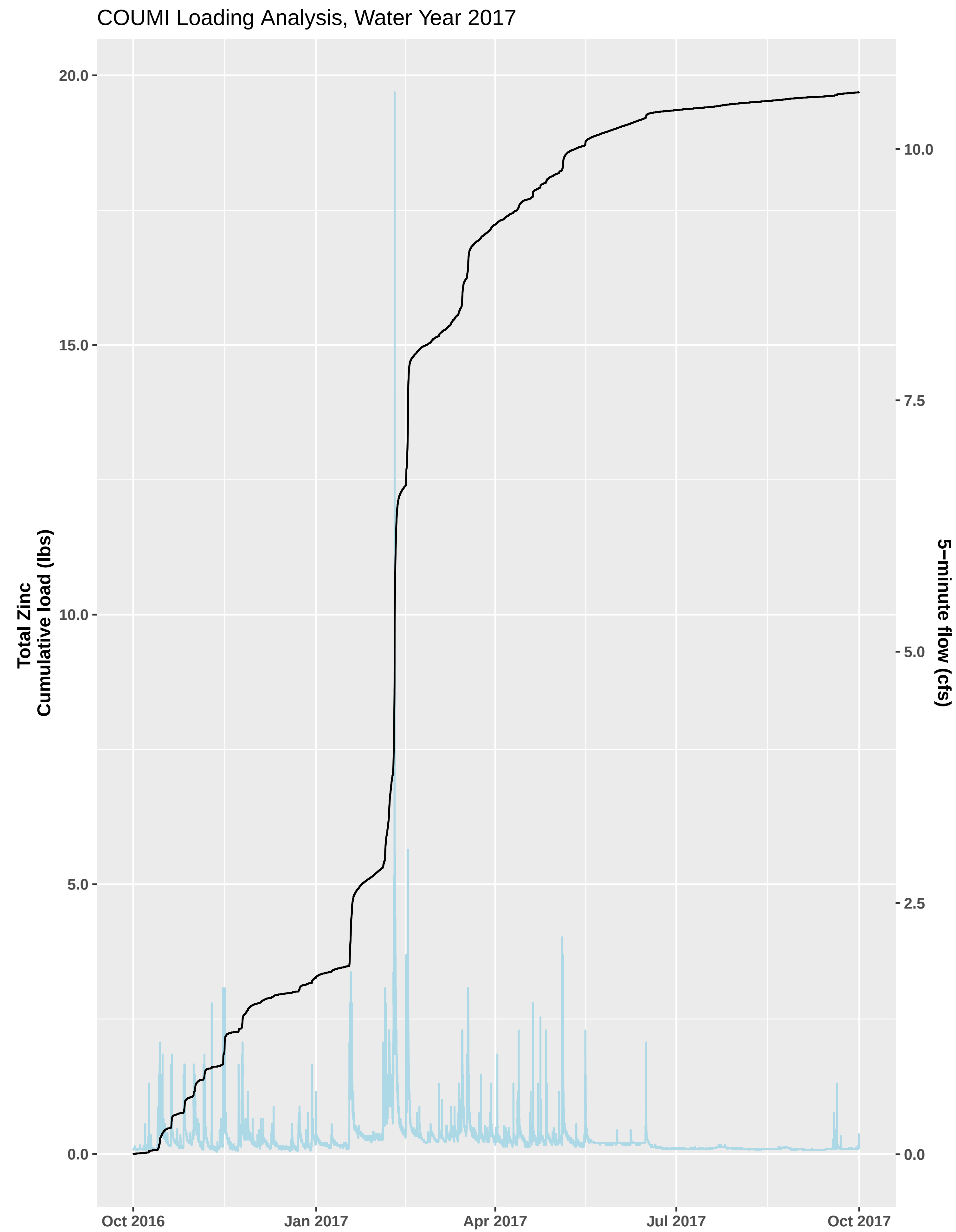
COUMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red

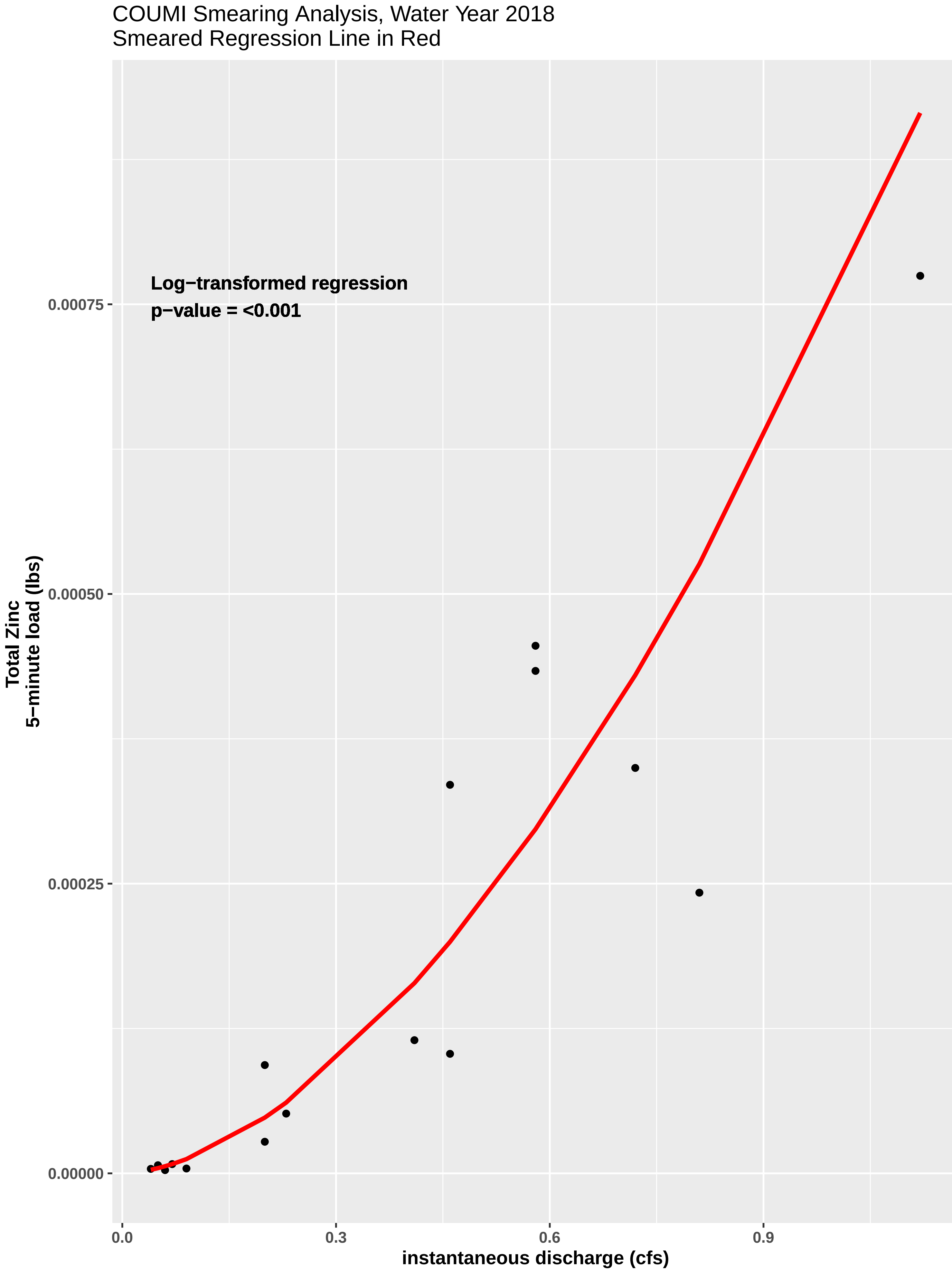


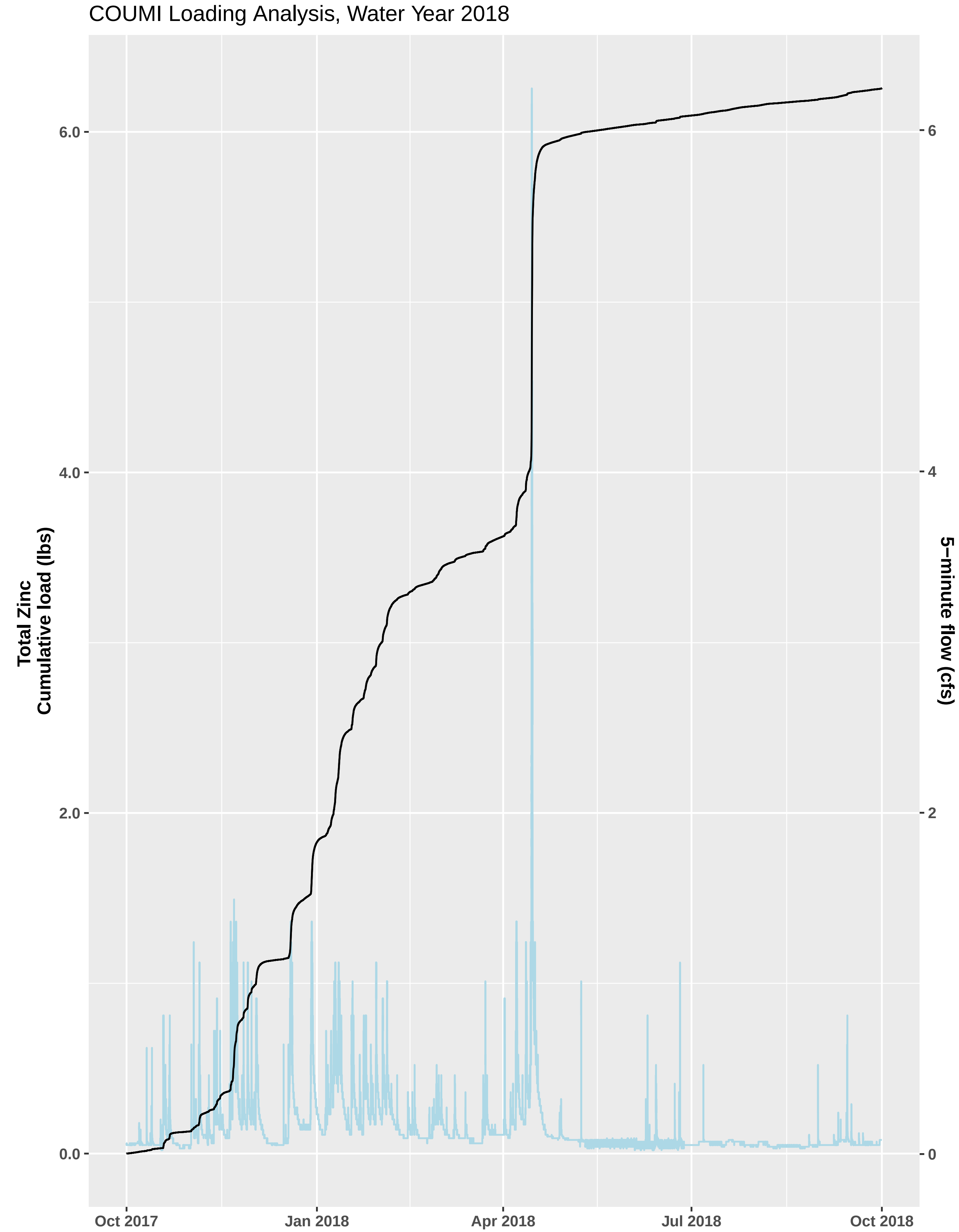
COUMI Loading Analysis, Water Year 2016

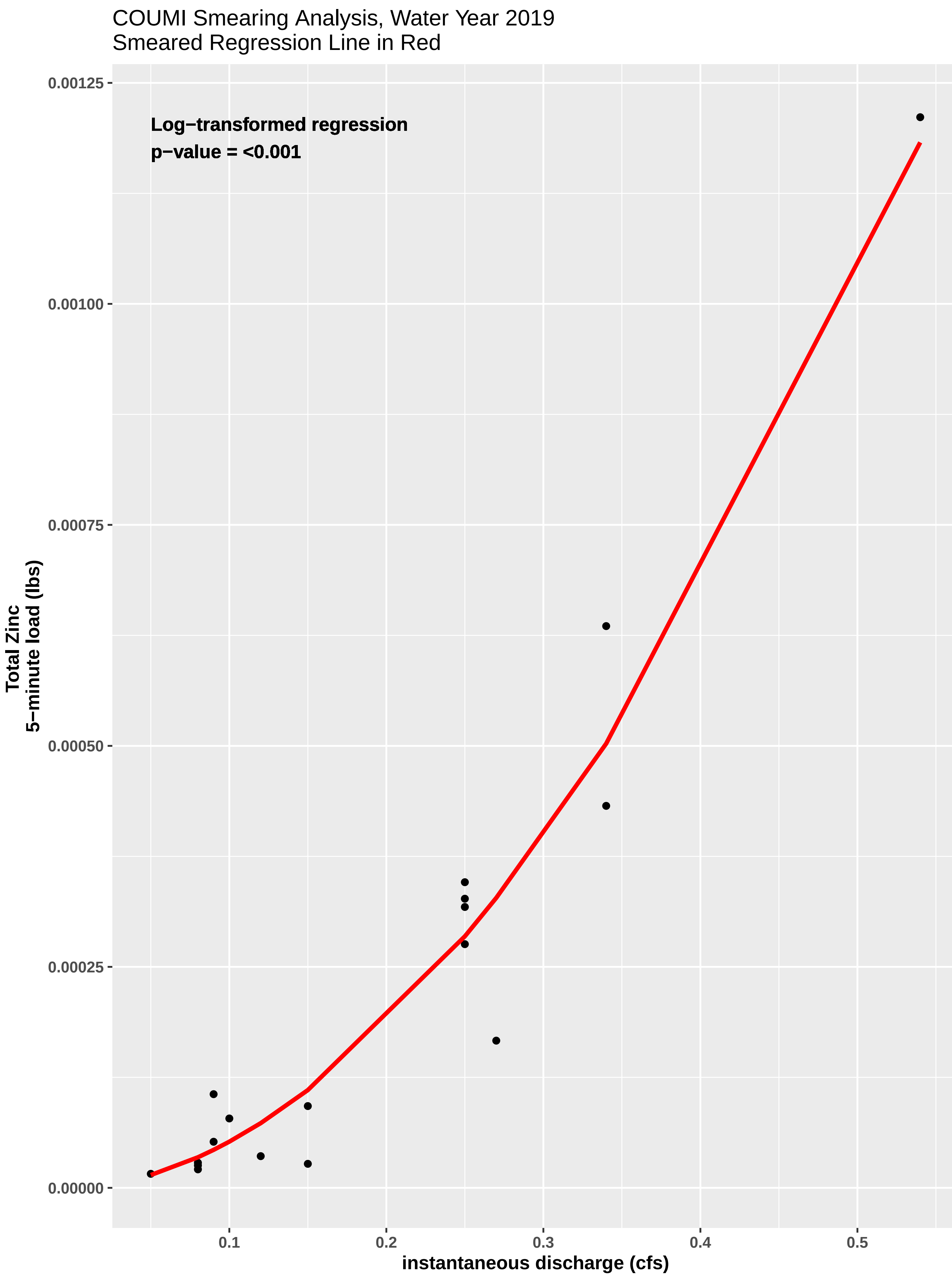


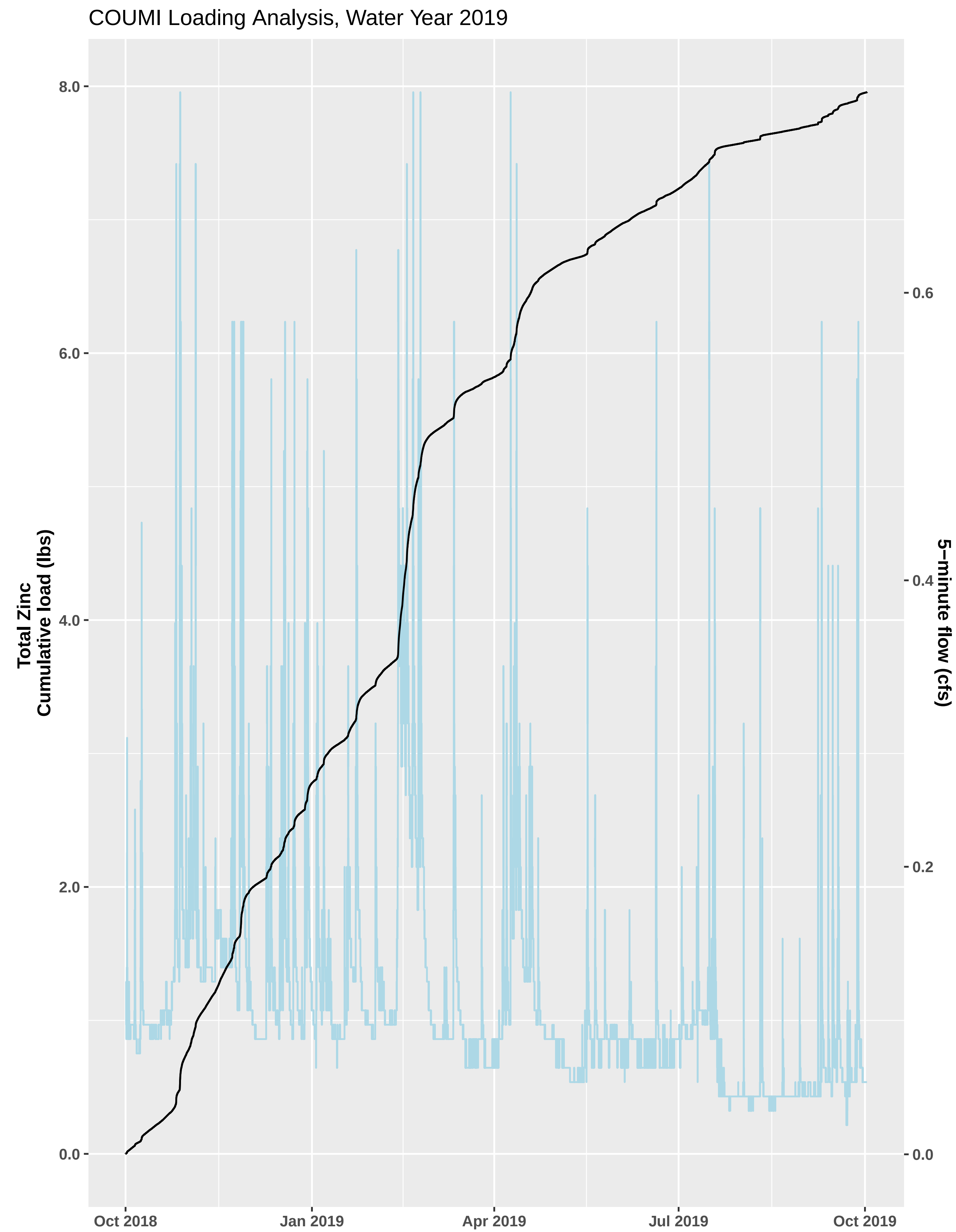

COUMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

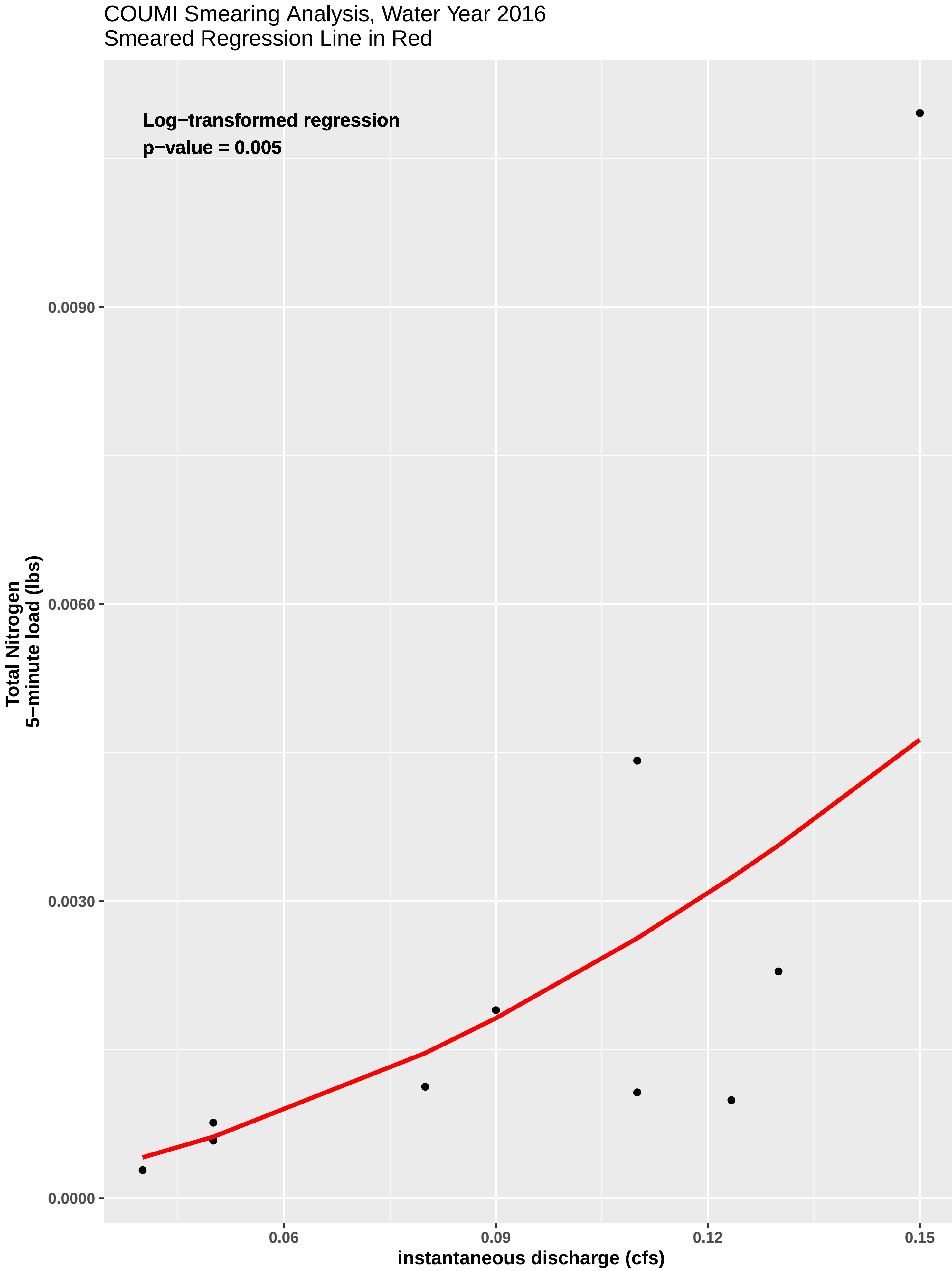

COUMI Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
0.0
5.0
10.0
15.0
20.0
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

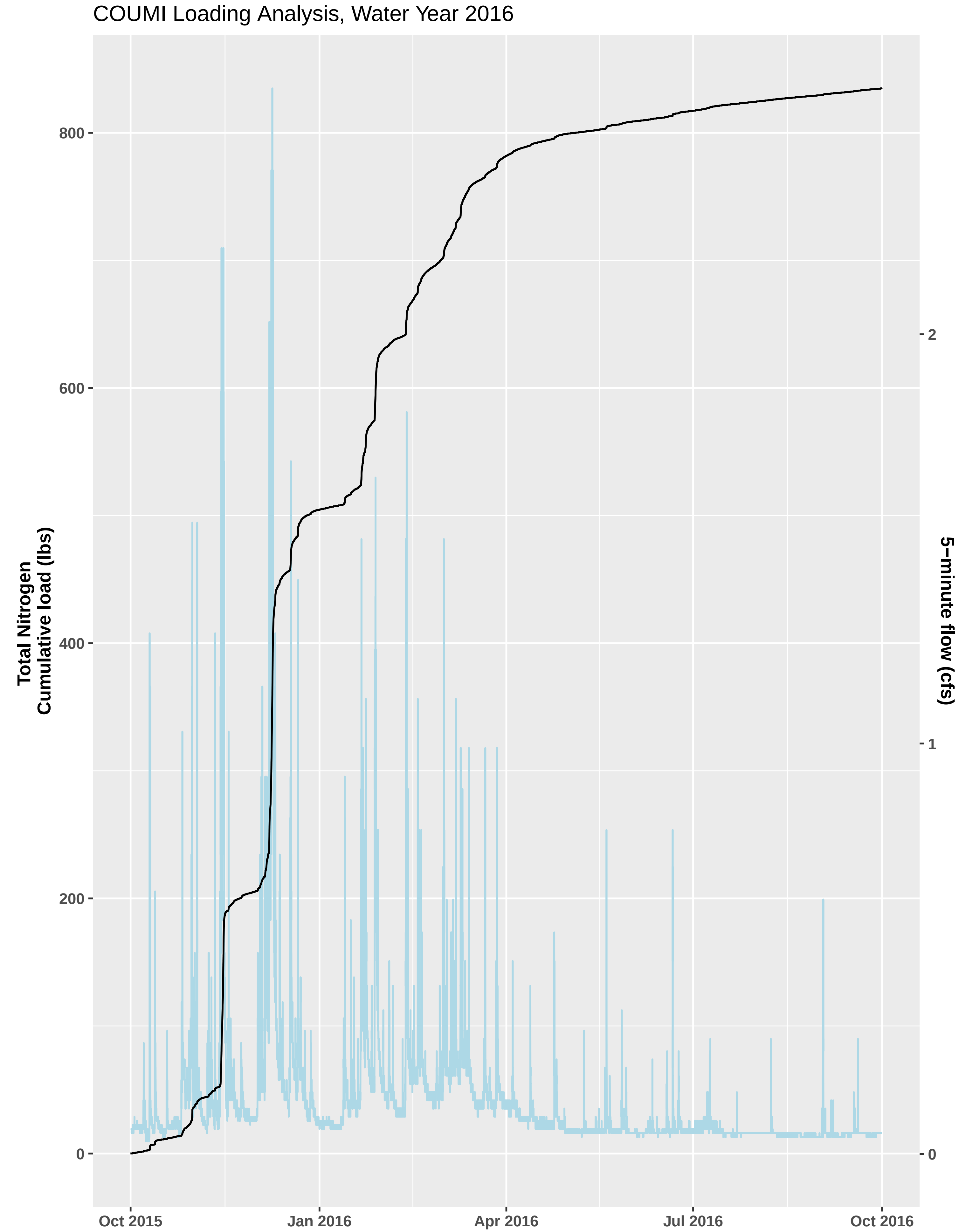

COUMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00025
0.00050
0.00075
0.0
0.3
0.6
0.9
instantaneous discharge (cfs)

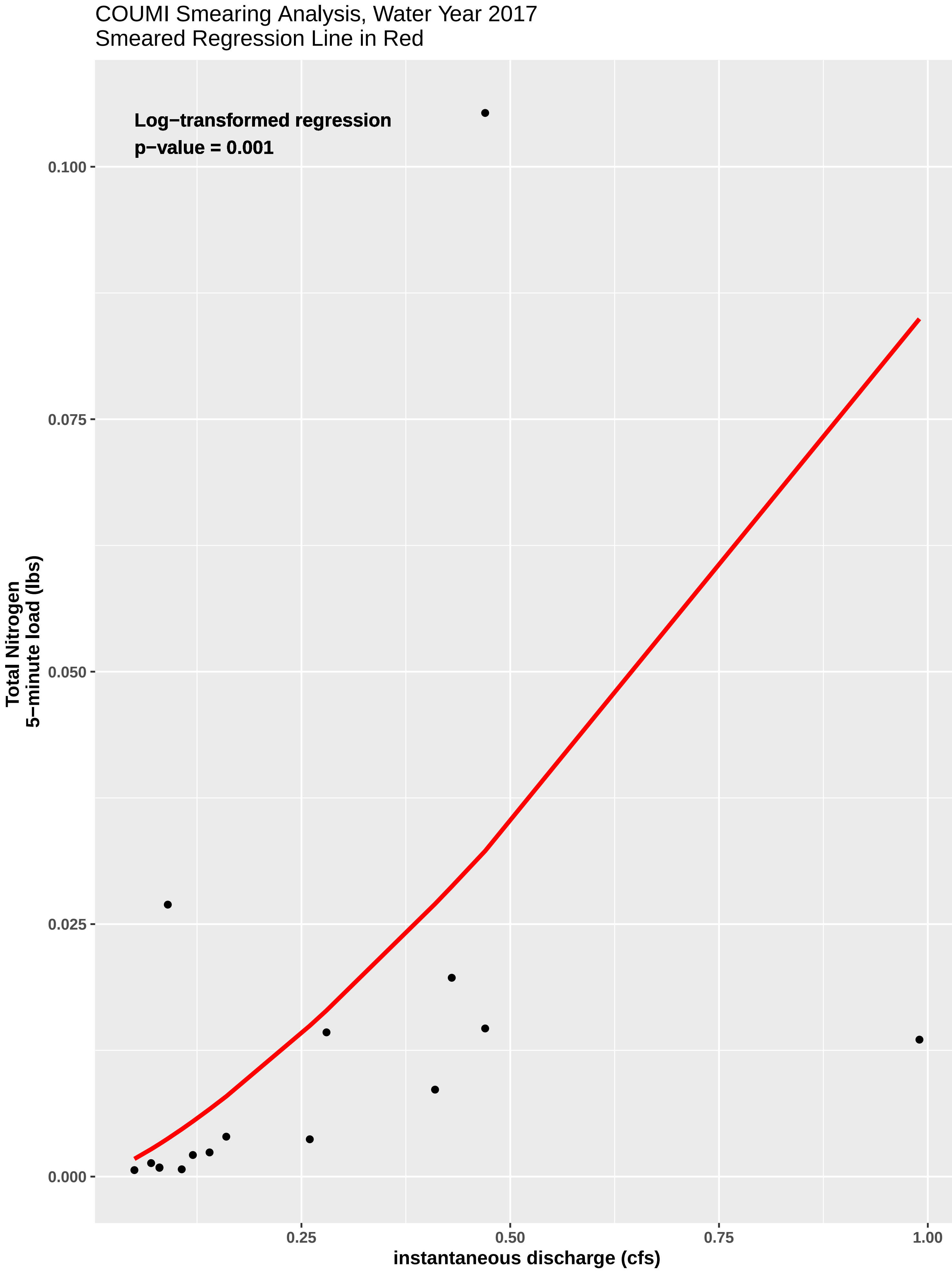

COUMI Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0.0
2.0
4.0
6.0
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

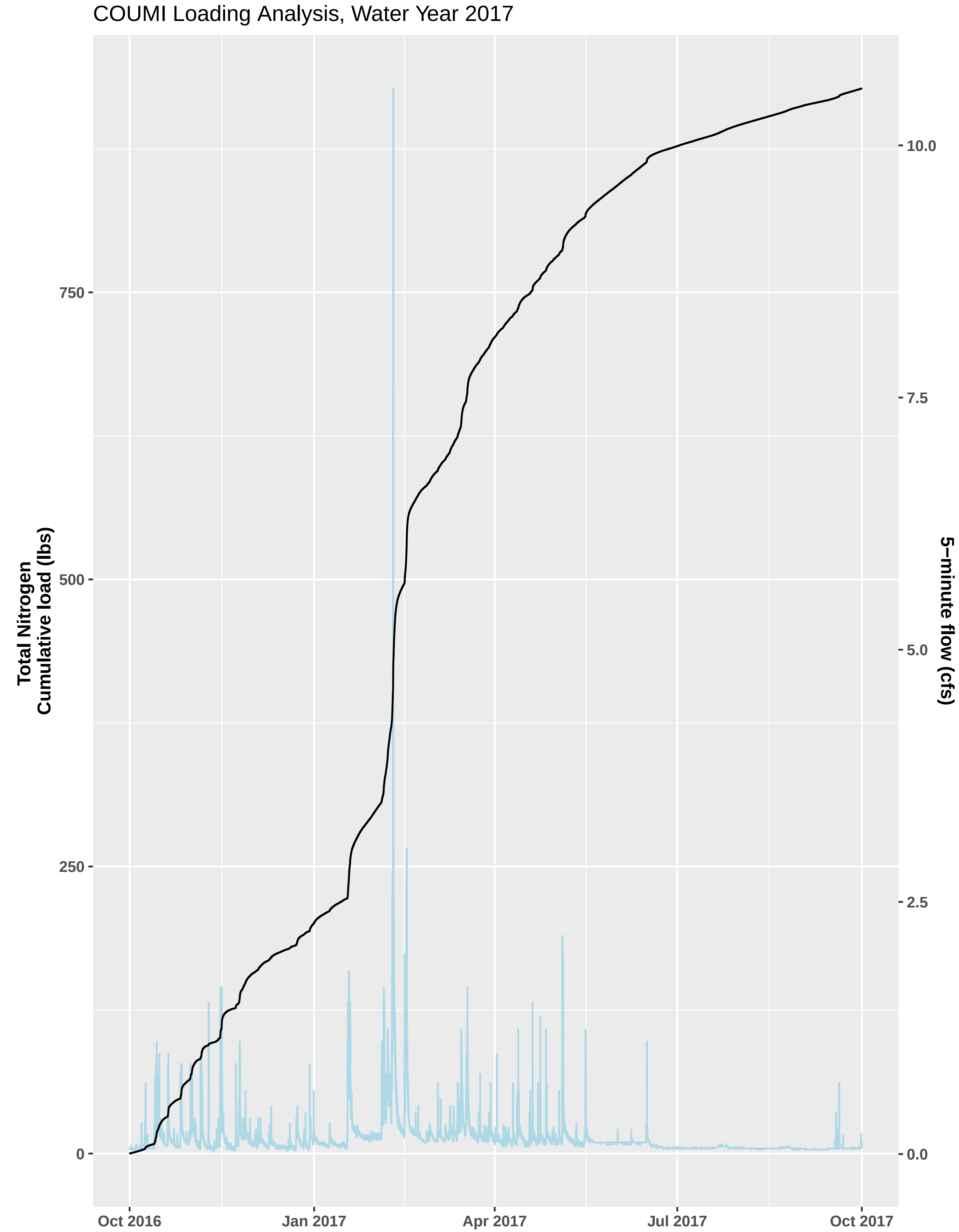

COUMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00125
0.00100
0.00075
0.00050
0.00025
0.00000
0.1
0.2
0.3
0.4
0.5
instantaneous discharge (cfs)

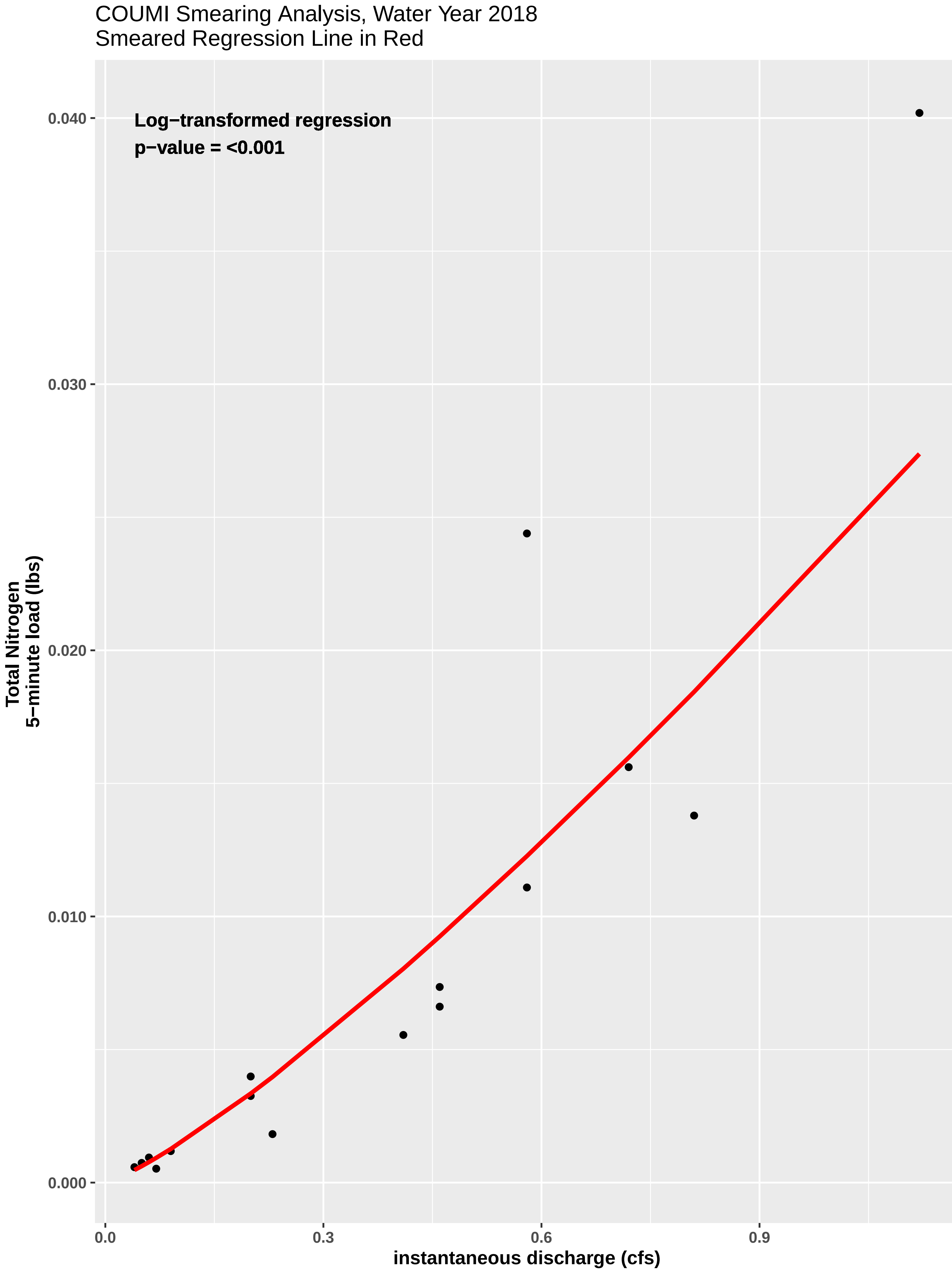

COUMI Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
8.0
6.0
4.0
2.0
0.0
5−minute flow (cfs)
0.6
0.4
0.2
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

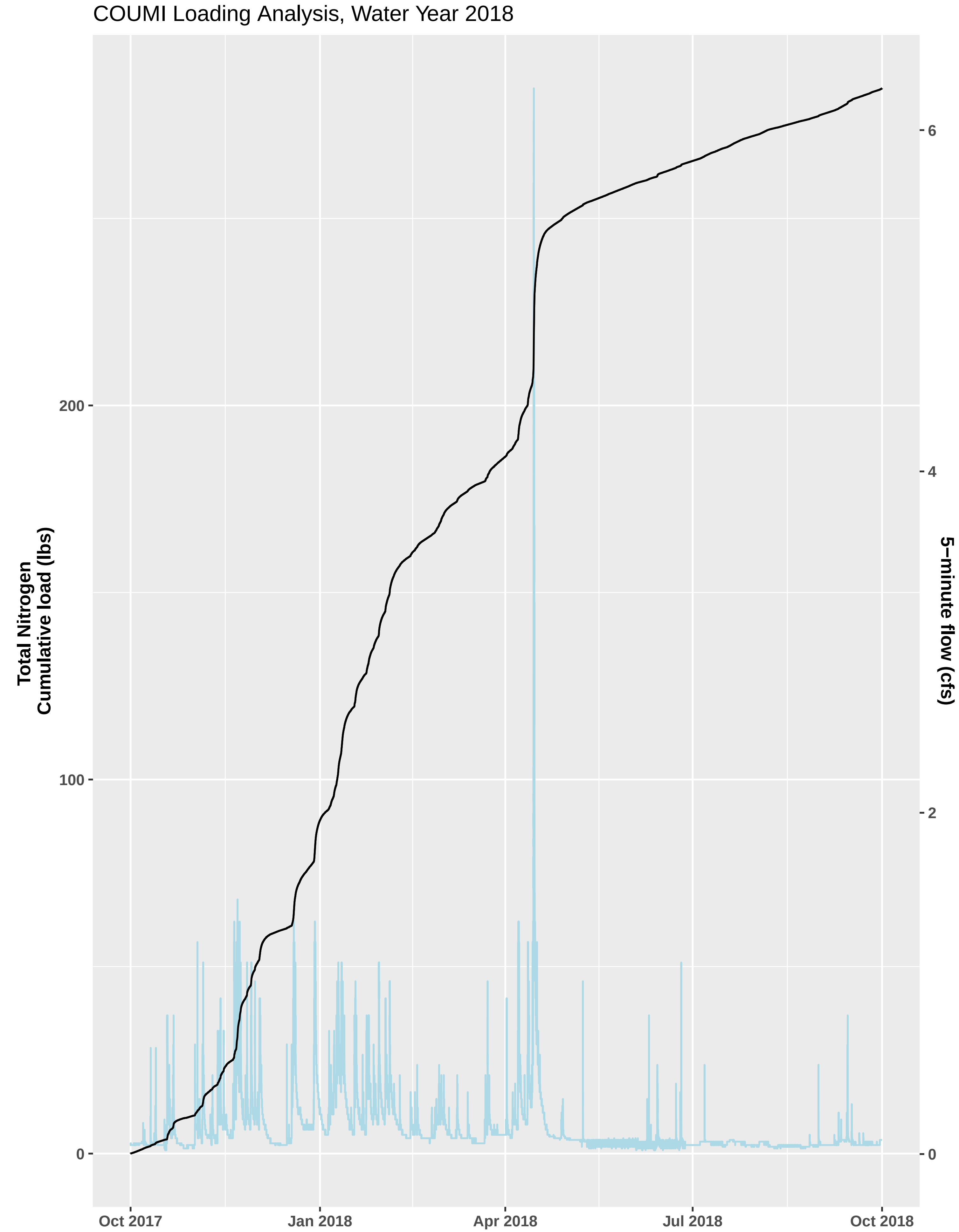

COUMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.005
Total Nitrogen
5−minute load (lbs)
0.0000
0.0030
0.0060
0.0090
0.06
0.09
0.12
0.15
instantaneous discharge (cfs)

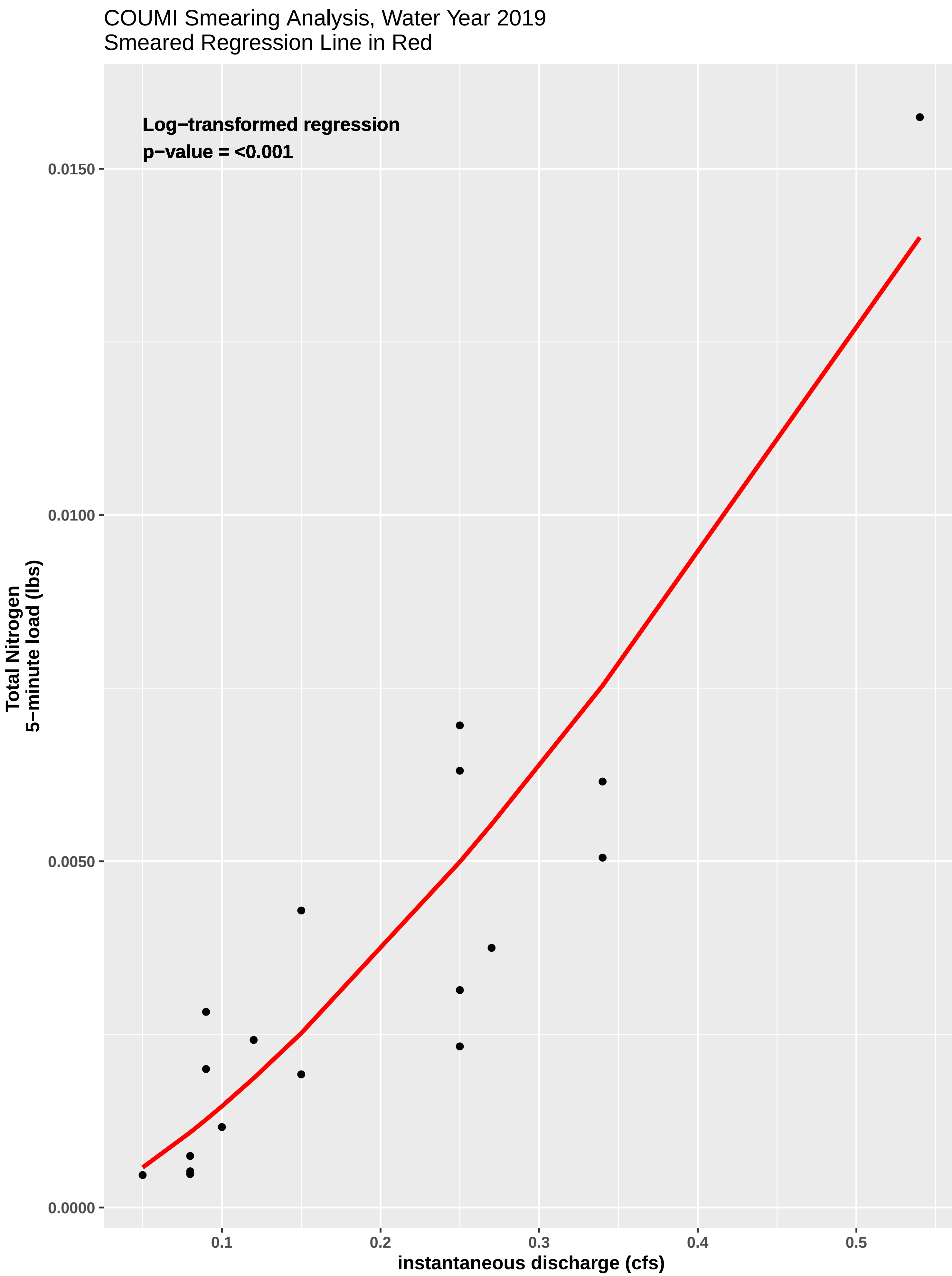

COUMI Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
200
400
600
800
5−minute flow (cfs)
0
1
2
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

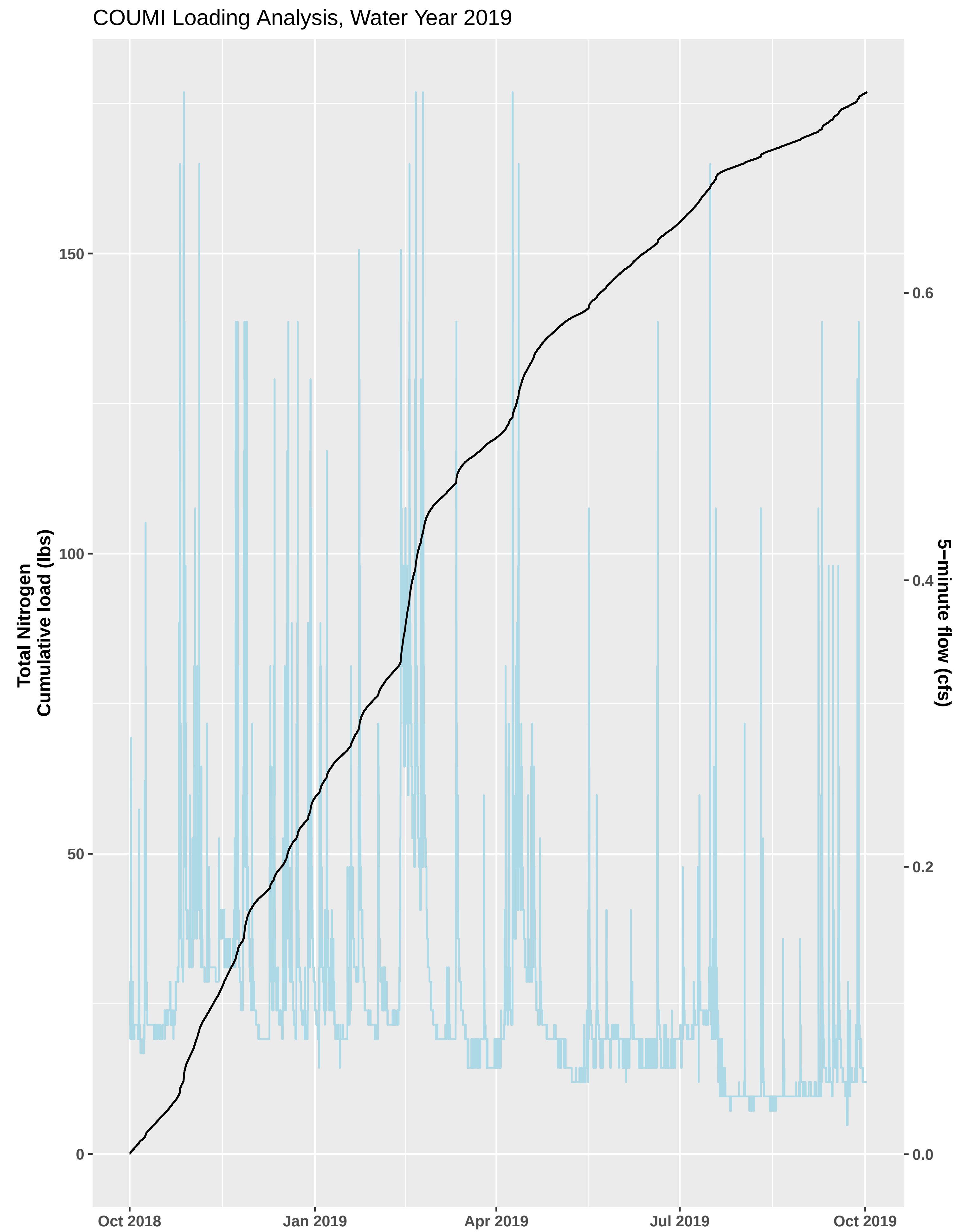

COUMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
Total Nitrogen
5−minute load (lbs)
0.100
0.075
0.050
0.025
0.000
0.25
0.50
0.75
1.00
instantaneous discharge (cfs)

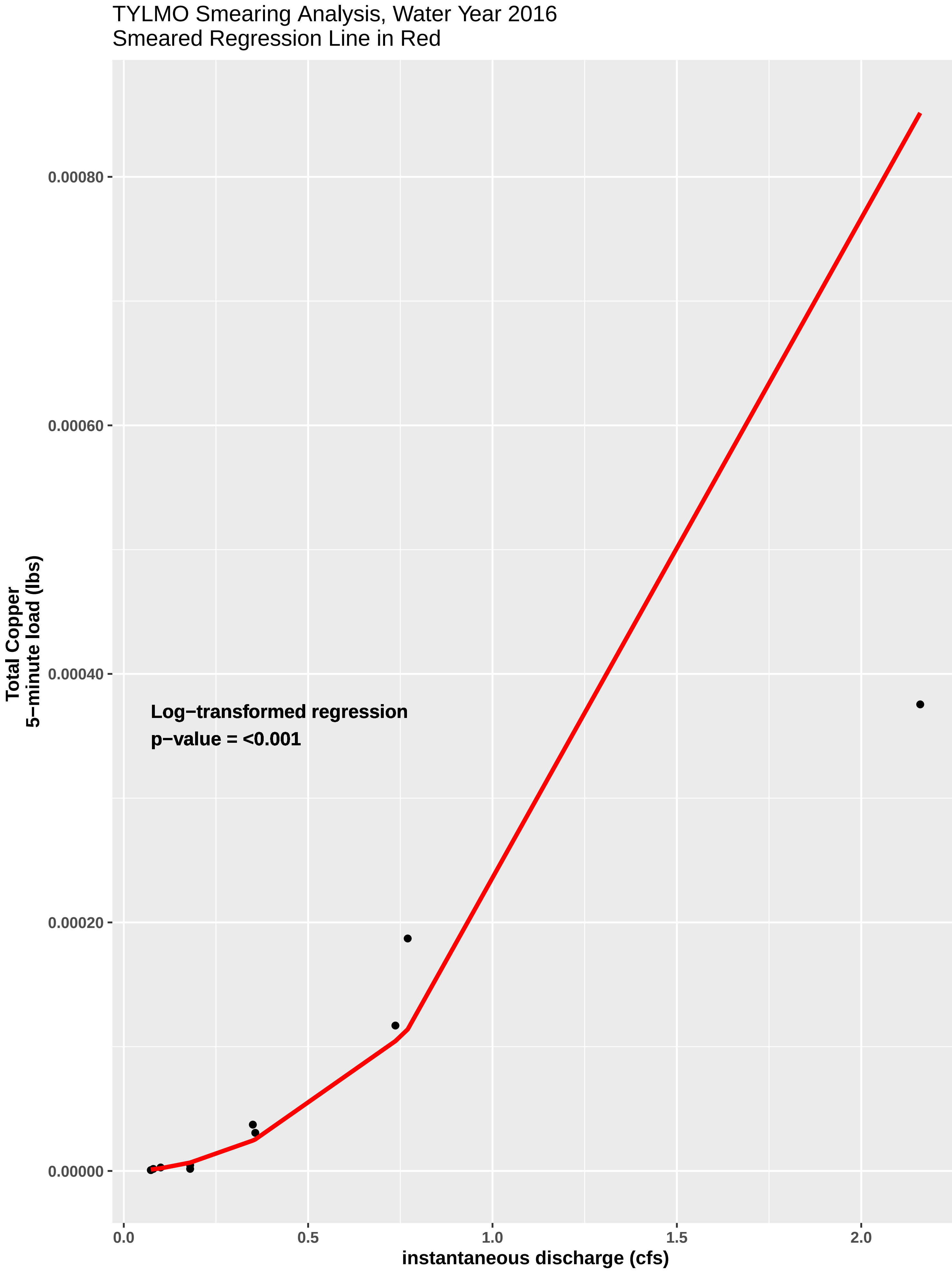

COUMI Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
750
500
250
0
5−minute flow (cfs)
10.0
7.5
5.0
2.5
0.0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

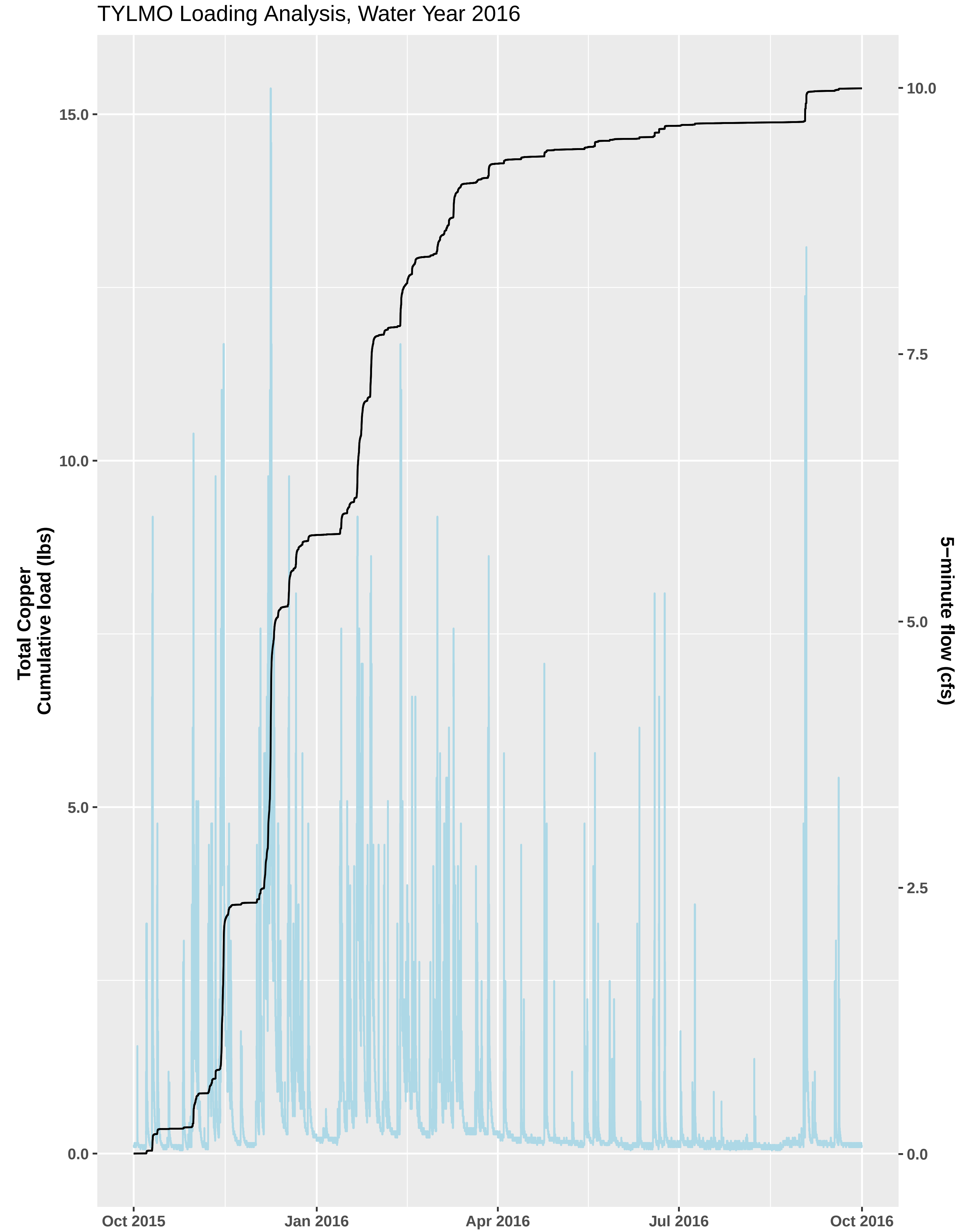

COUMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.040
0.0
0.3
0.6
0.9
instantaneous discharge (cfs)

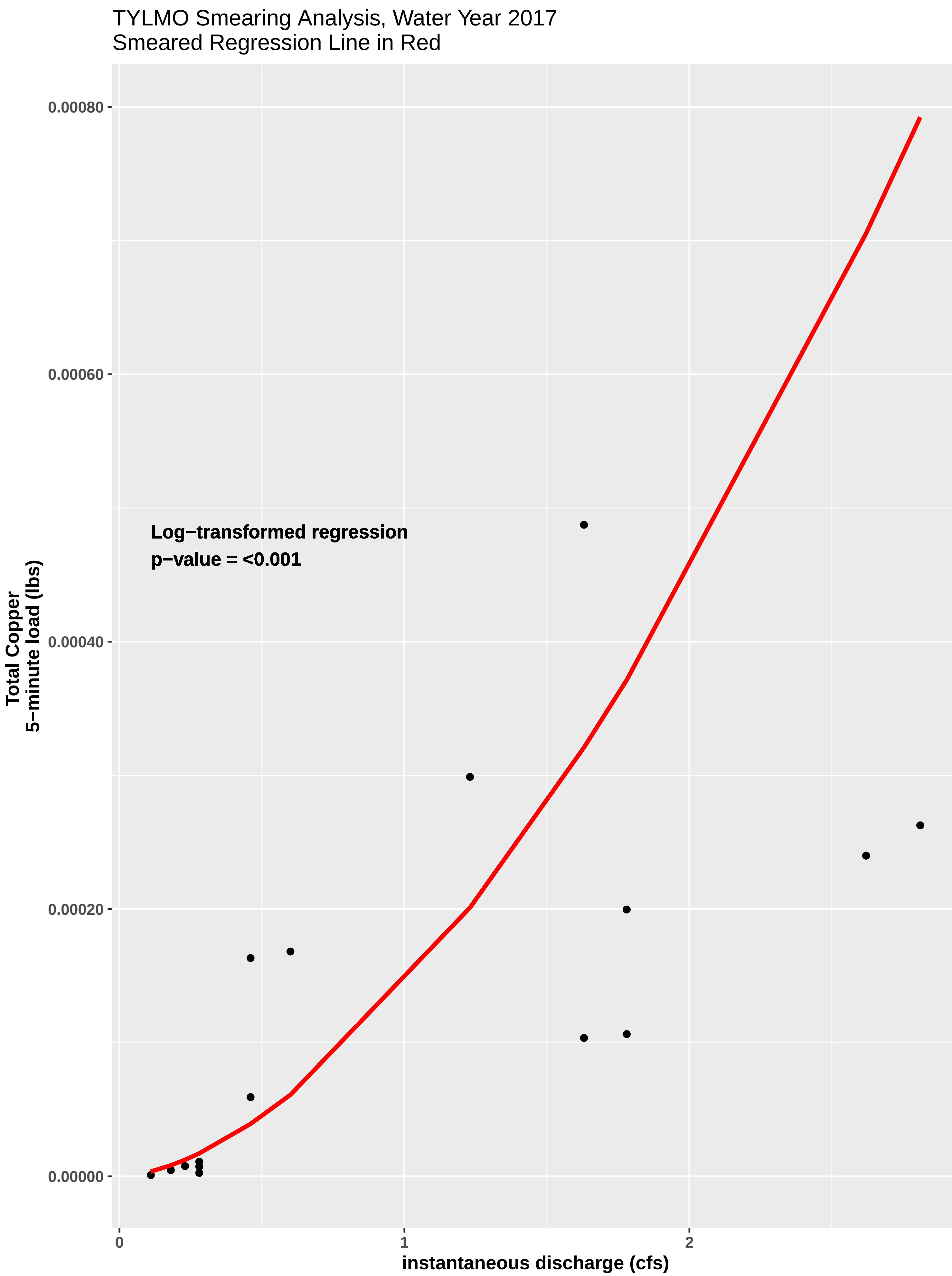

COUMI Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
100
200
5−minute flow (cfs)
0
2
4
6
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


COUMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.1
0.2
0.3
0.4
0.5
instantaneous discharge (cfs)

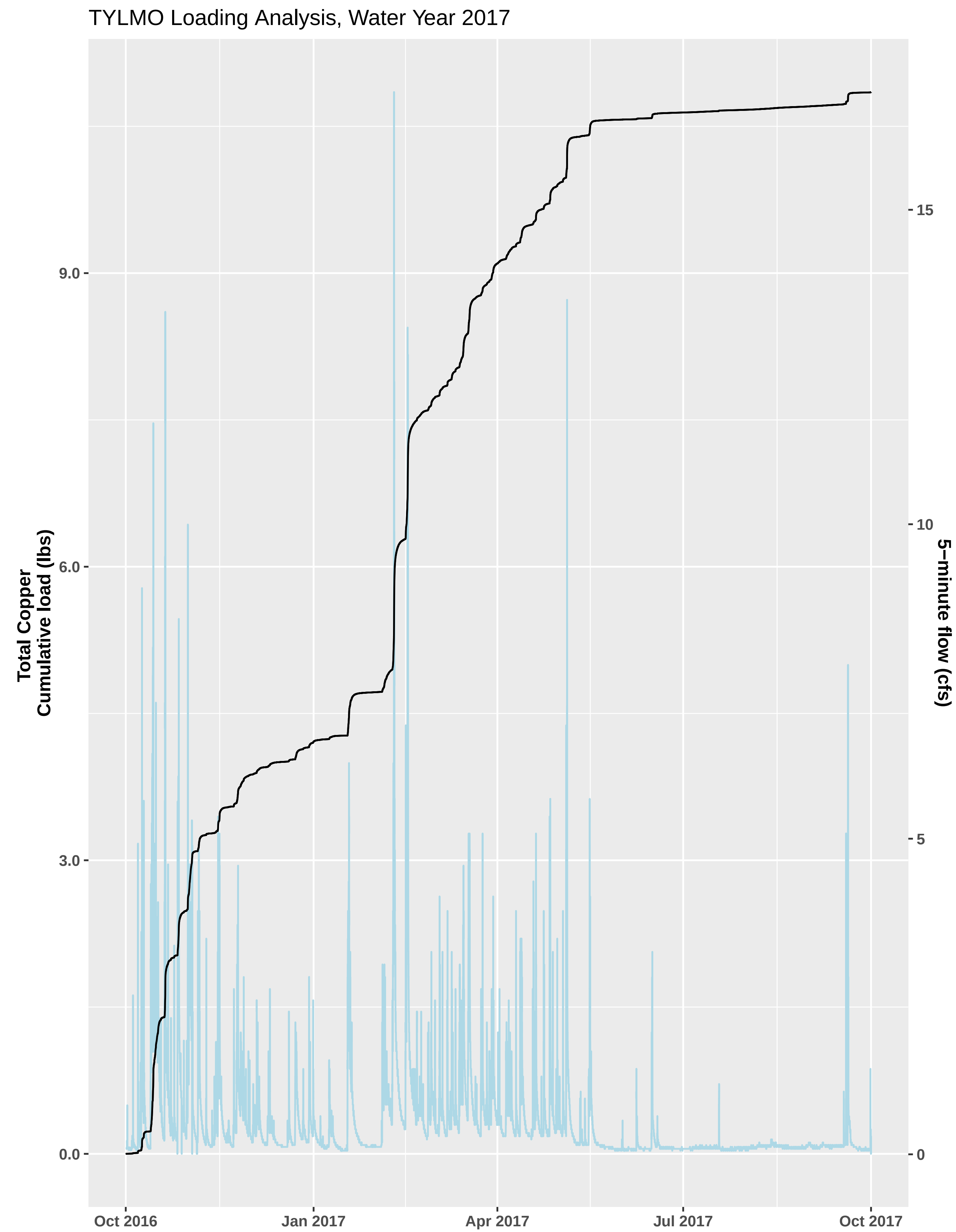

COUMI Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
50
100
150
5−minute flow (cfs)
0.0
0.2
0.4
0.6
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TYLMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Copper
5−minute load (lbs)
0.00080
0.00060
0.00040
0.00020
0.00000
Log−transformed regression
p−value = <0.001
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

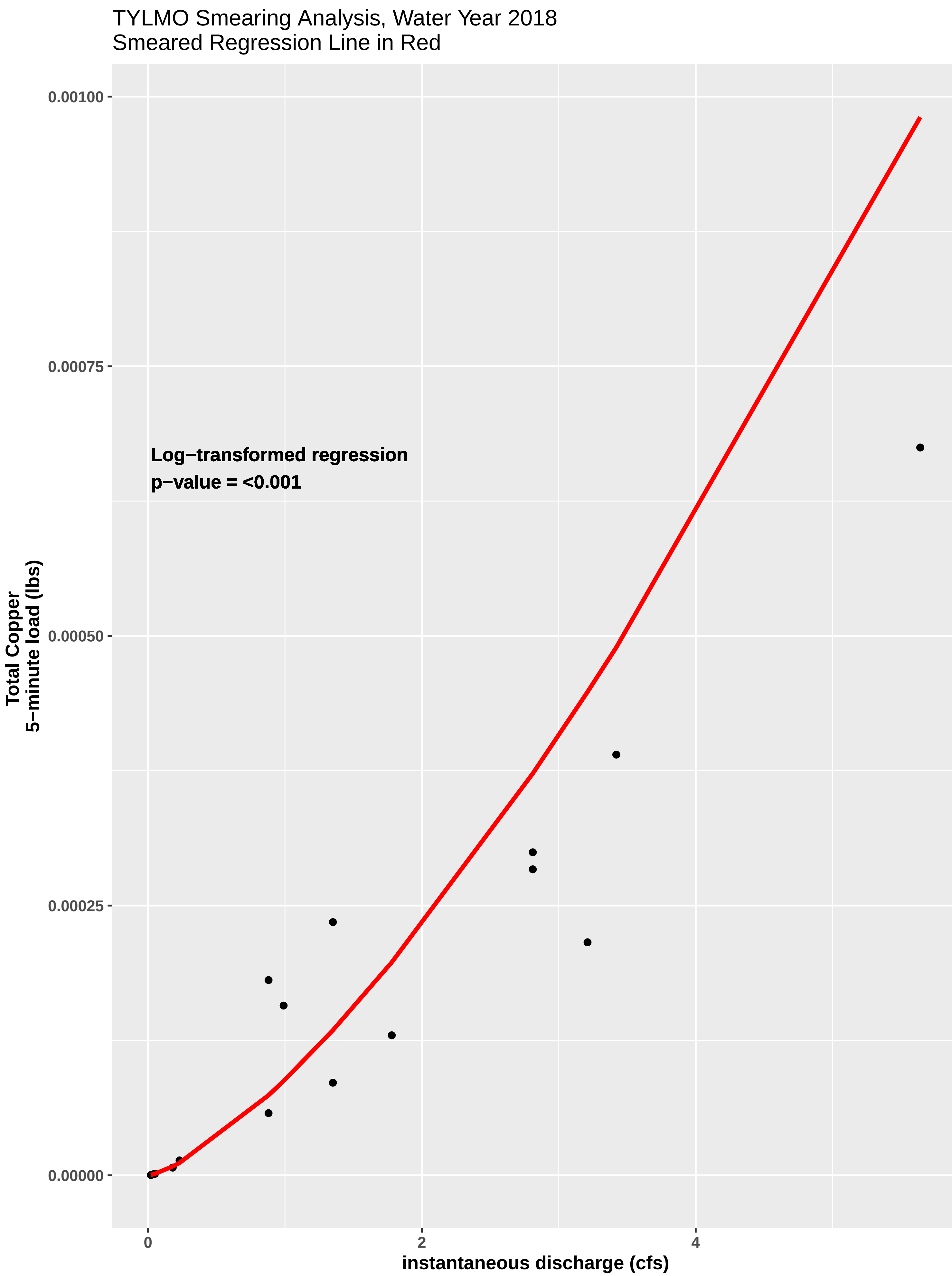

TYLMO Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
15.0
10.0
5.0
0.0
5−minute flow (cfs)
10.0
7.5
5.0
2.5
0.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

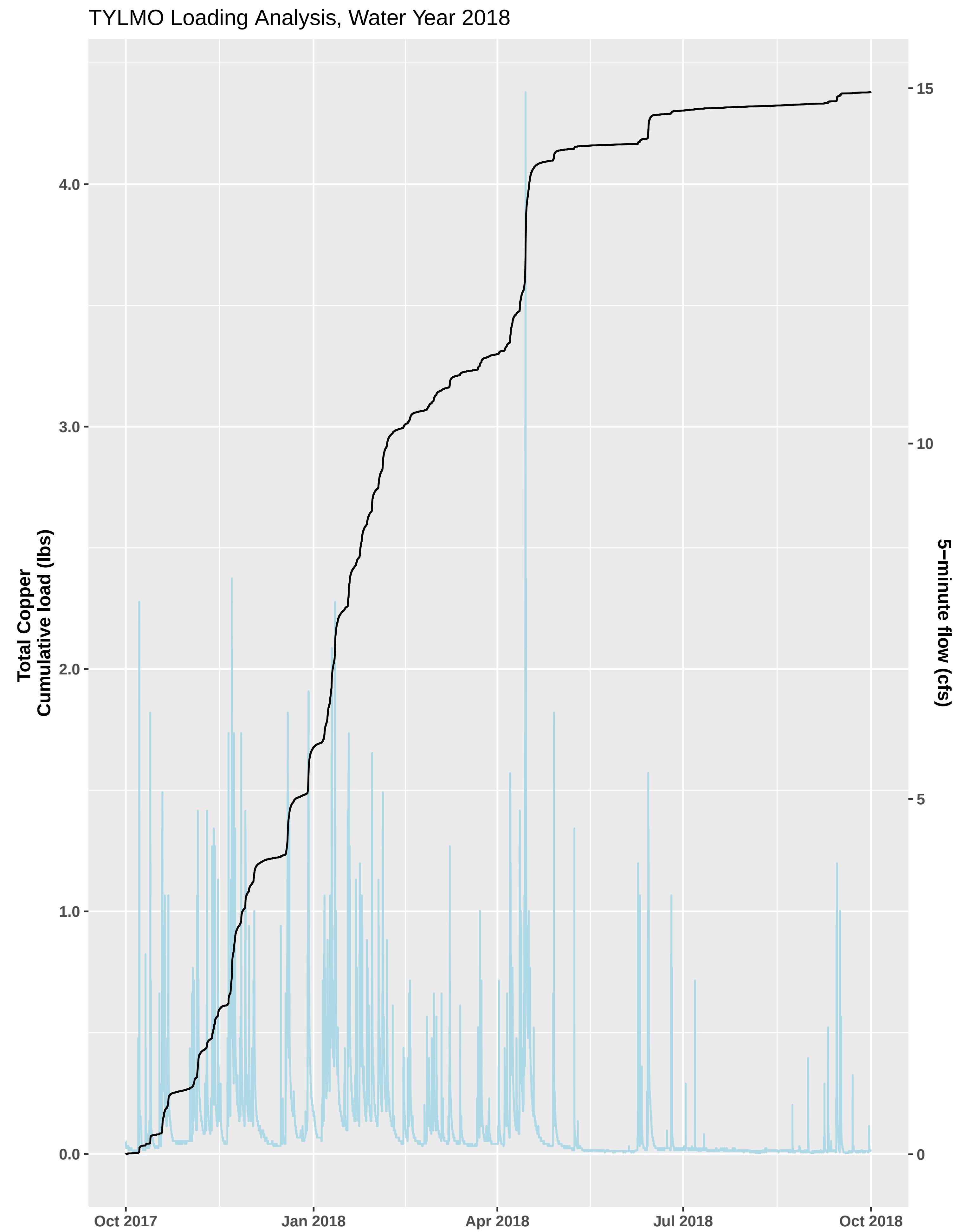


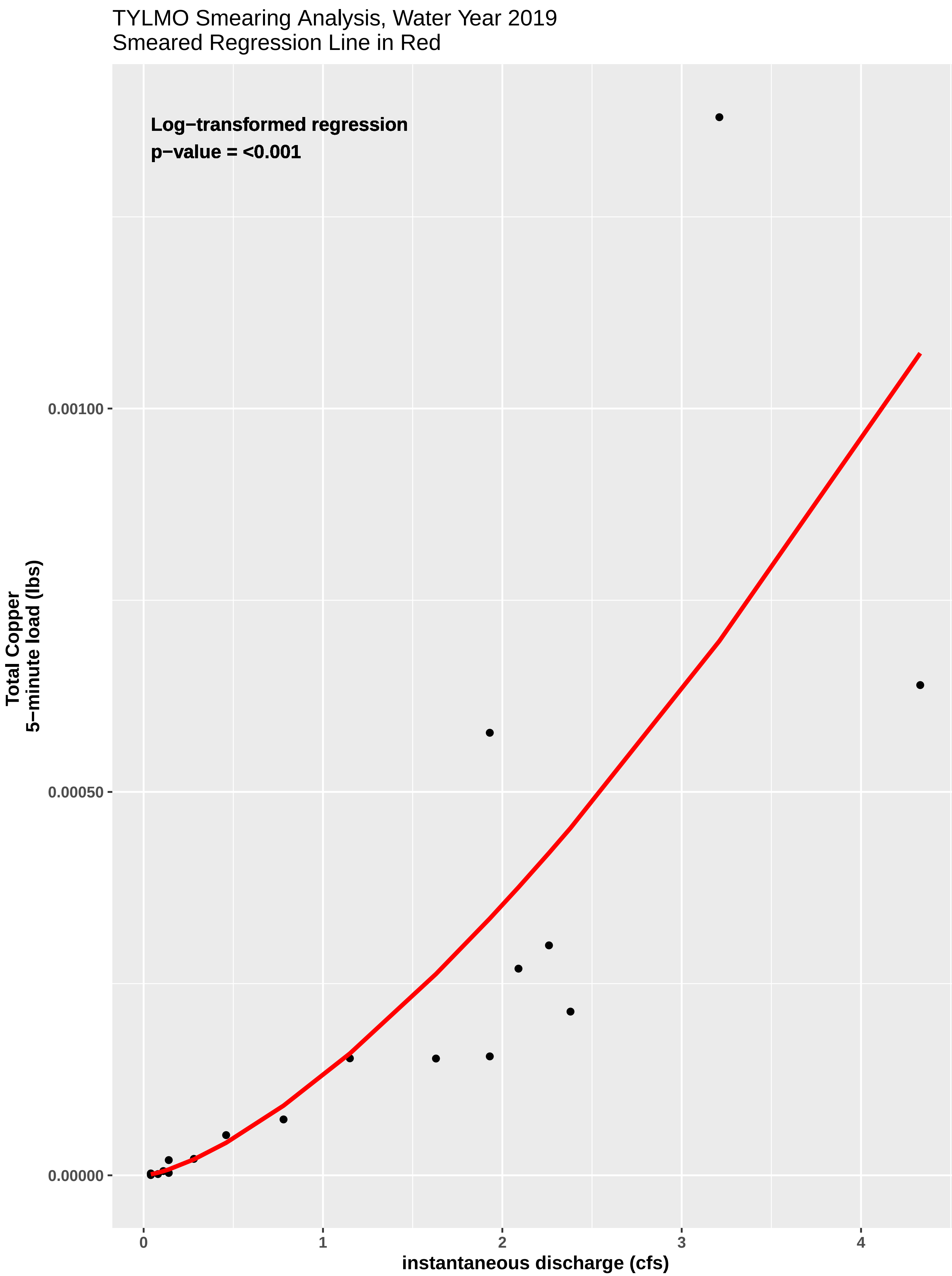
TYLMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00080
0.00060
0.00040
0.00020
0.00000
0
1
2
instantaneous discharge (cfs)



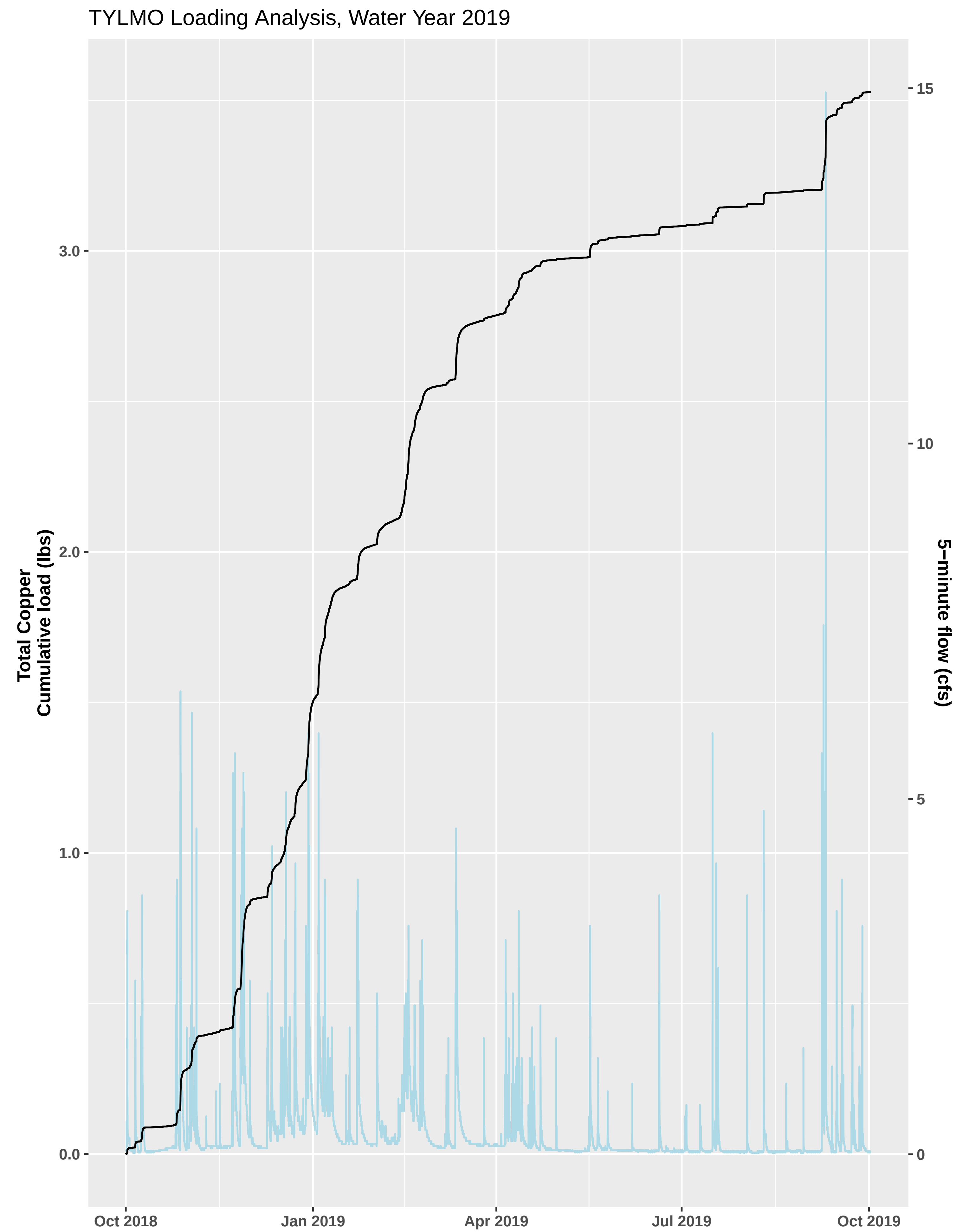
TYLMO Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
9.0
6.0
3.0
0.0
15
10
5
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
instantaneous discharge (cfs)
0.00000
0.00025
0.00050
0.00075
0.00100
0
2
4

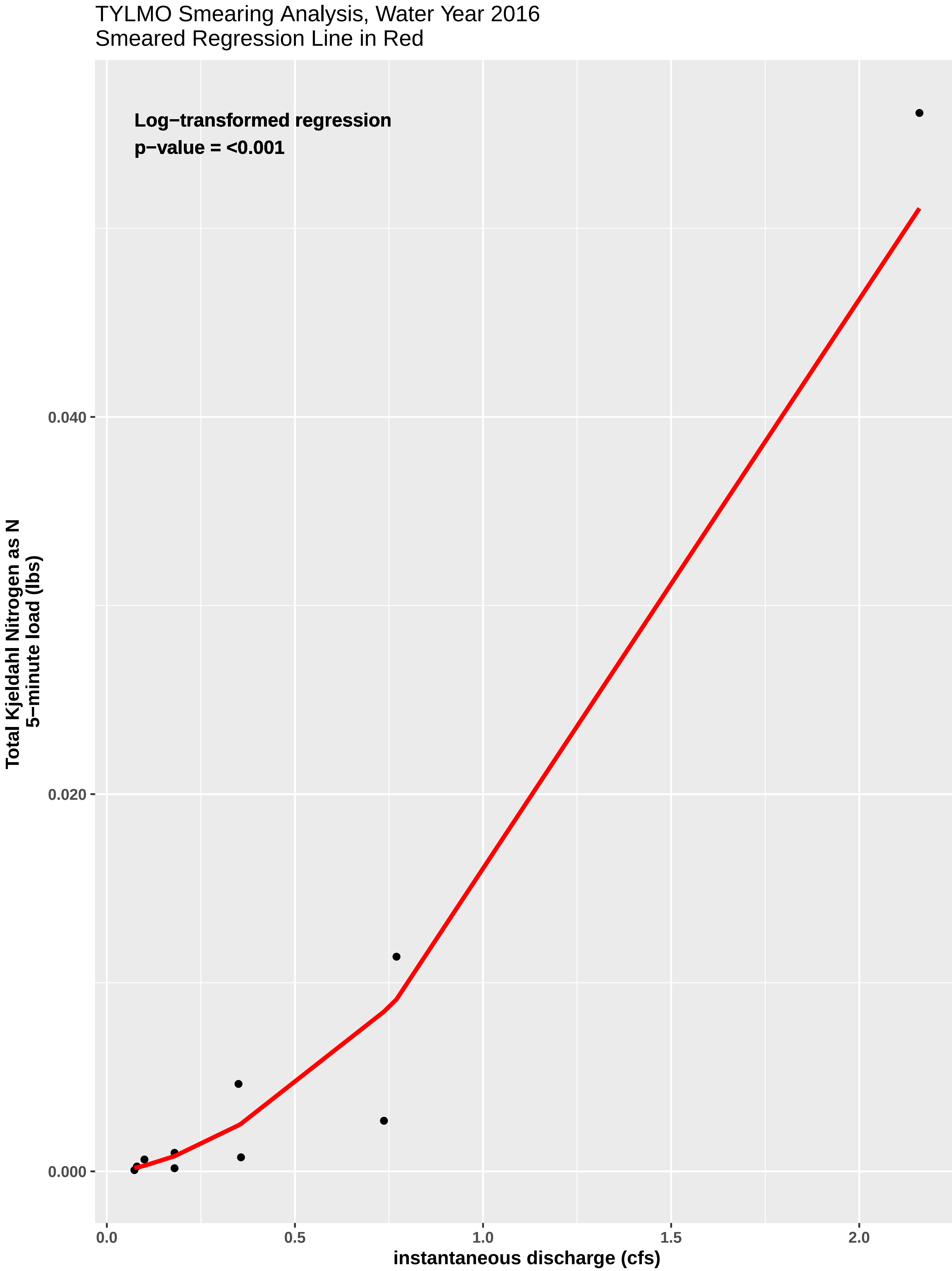

TYLMO Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
5−minute flow (cfs)
0.0
1.0
2.0
3.0
4.0
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

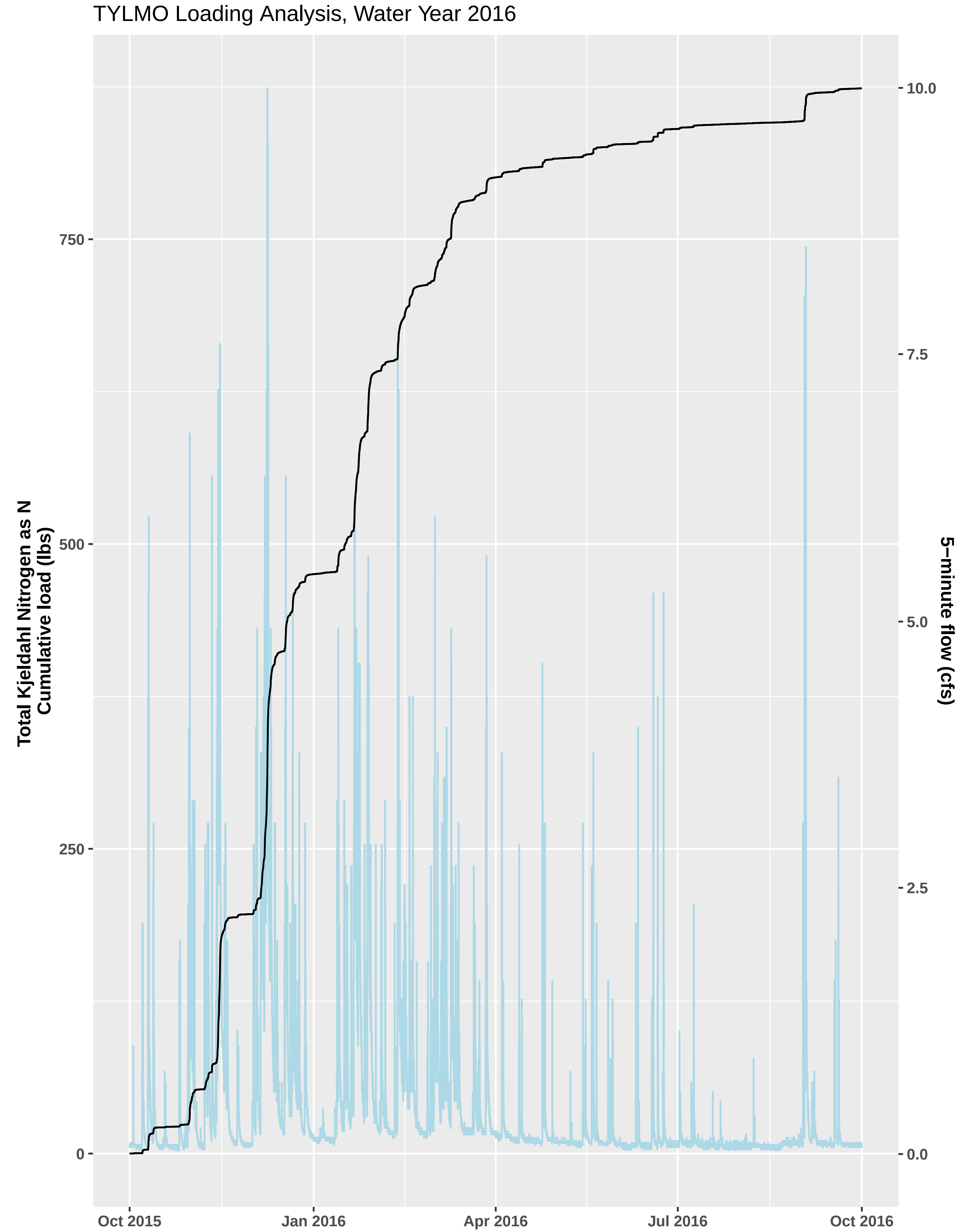


TYLMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00100
0.00050
0.00000
0
1
2
3
4
instantaneous discharge (cfs)

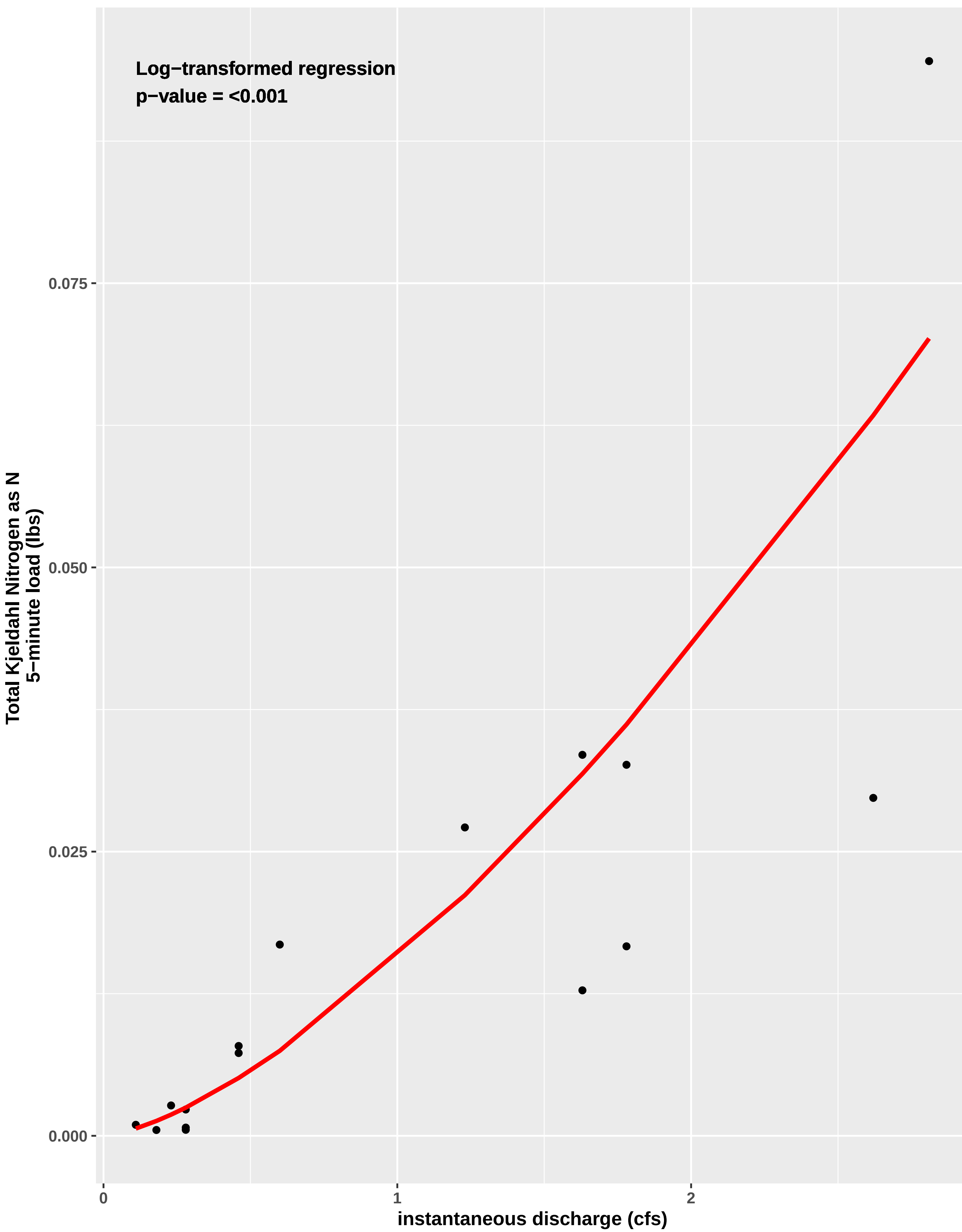


TYLMO Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
3.0
2.0
1.0
0.0
15
10
5
0
5−minute flow (cfs)
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

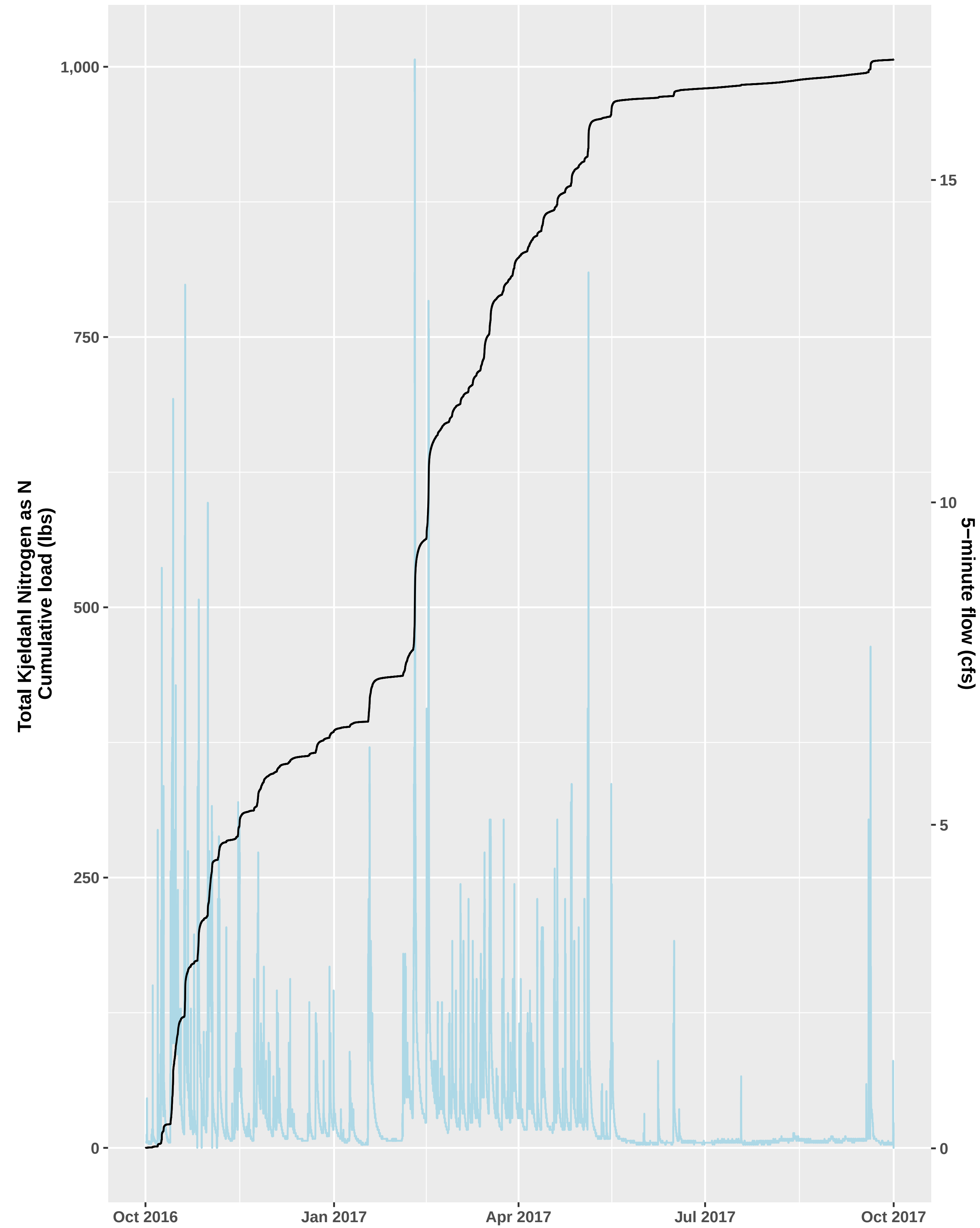

TYLMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.040
0.020
0.000
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

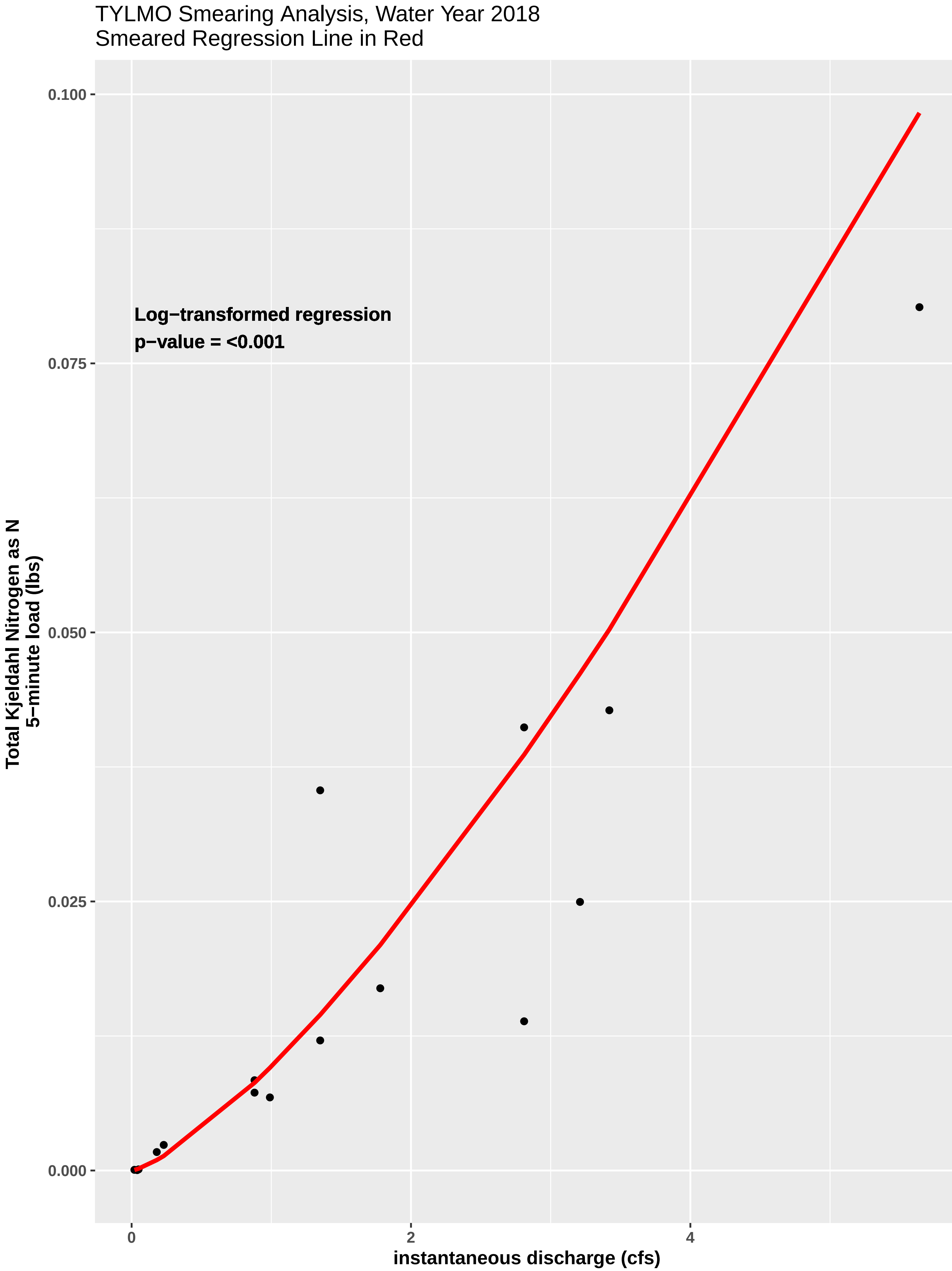

TYLMO Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
750
500
250
0
5−minute flow (cfs)
10.0
7.5
5.0
2.5
0.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

TYLMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red

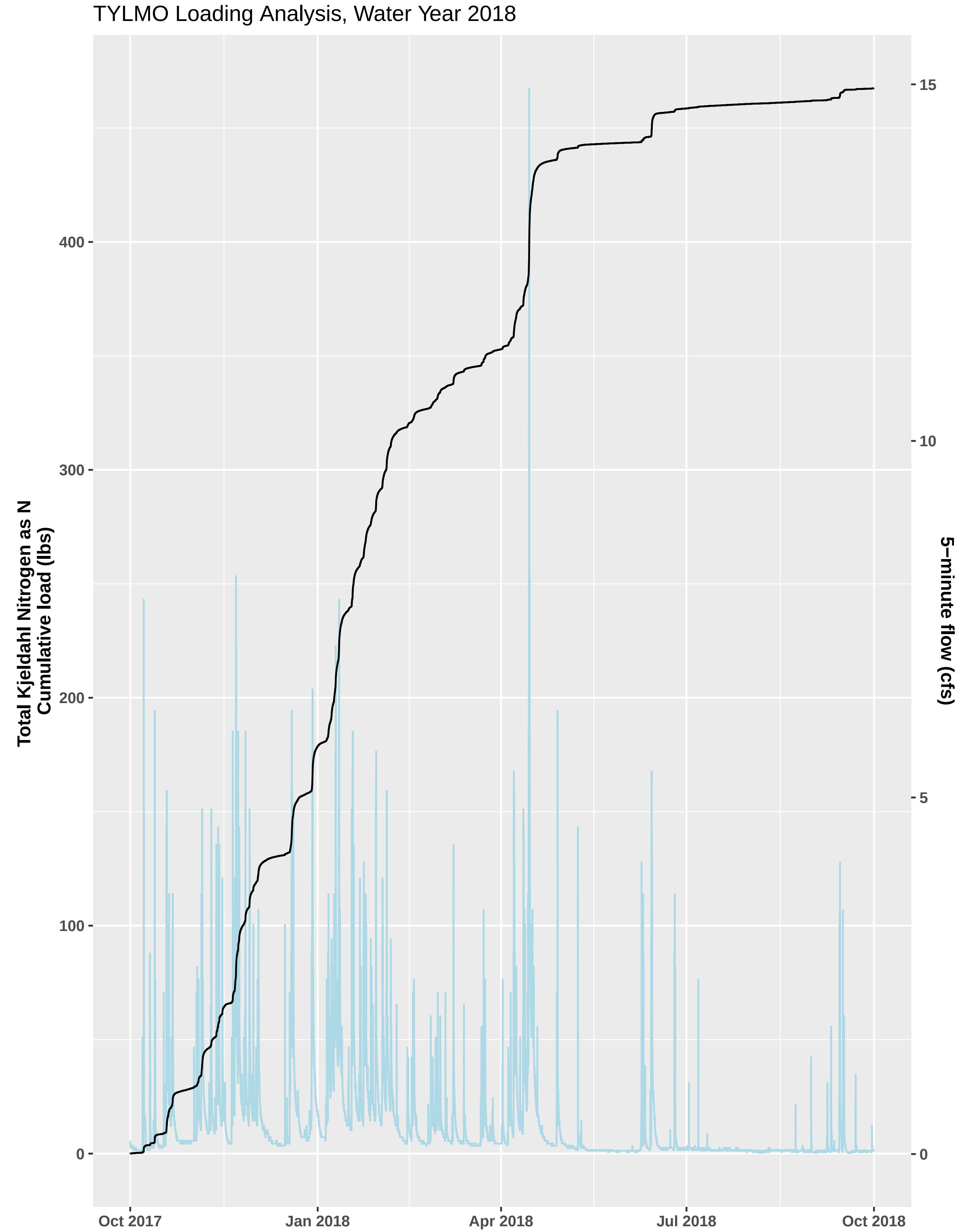


TYLMO Loading Analysis, Water Year 2017

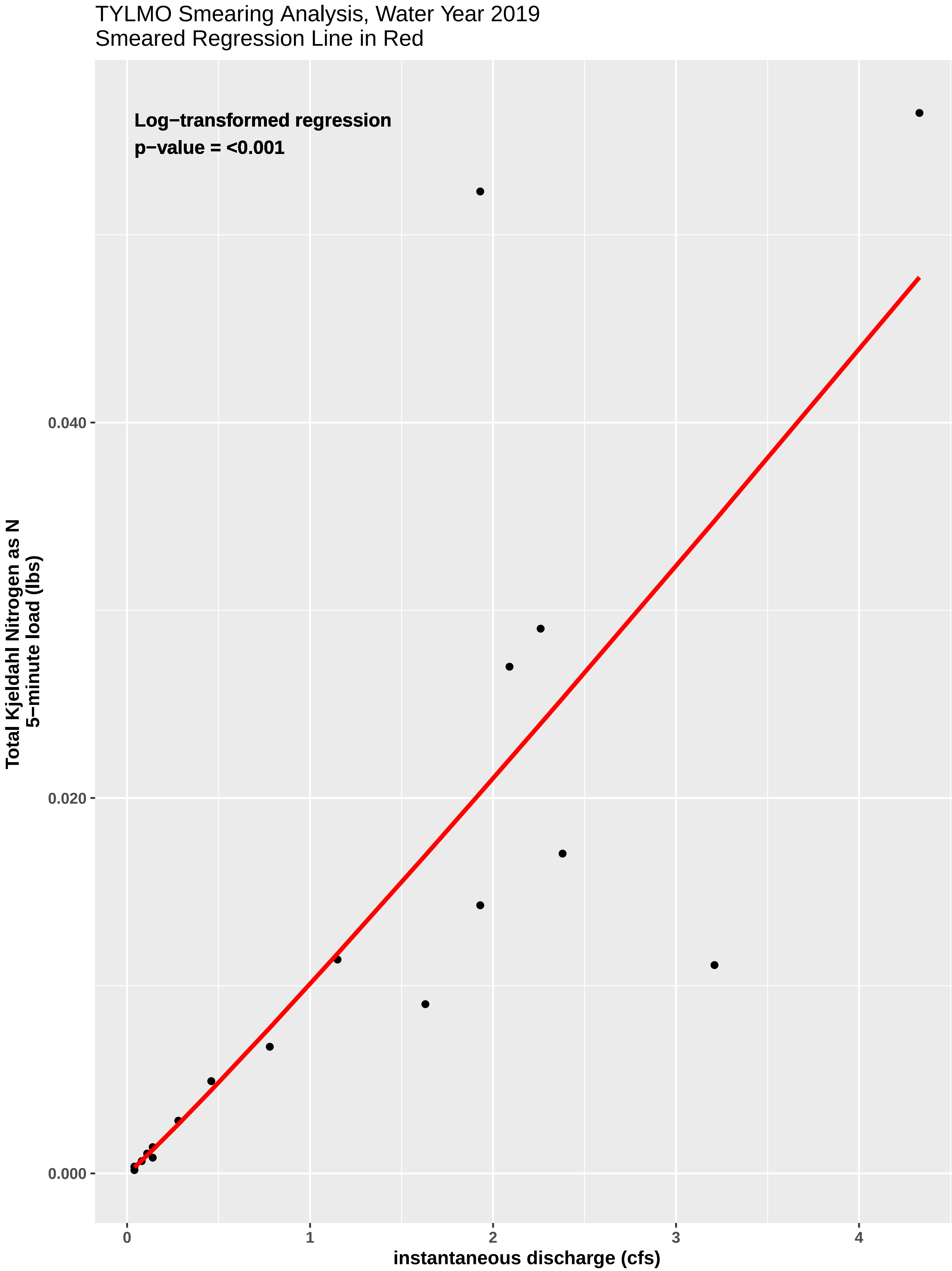




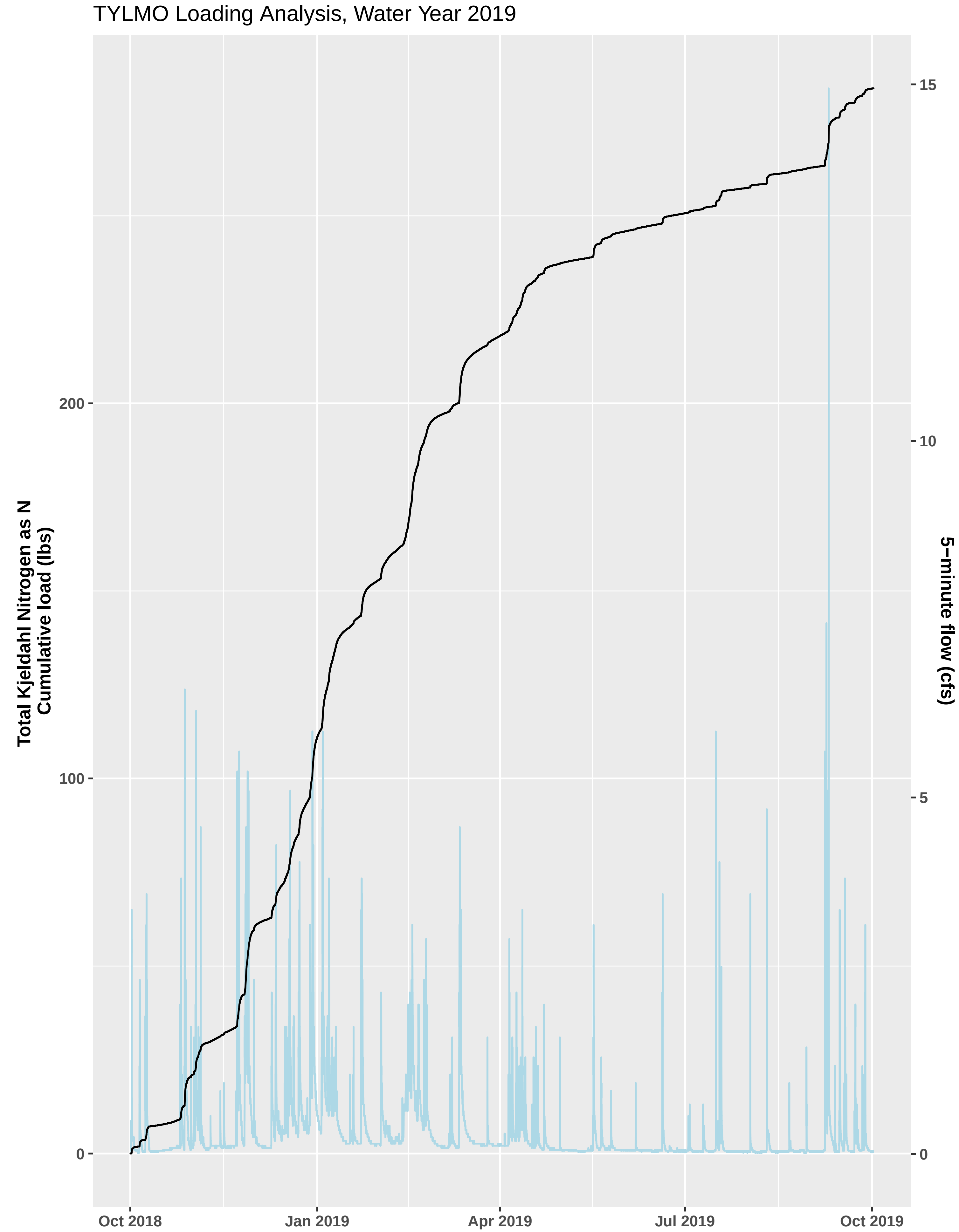
TYLMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
instantaneous discharge (cfs)
0.100
0.075
0.050
0.025
0.000
0
2
4



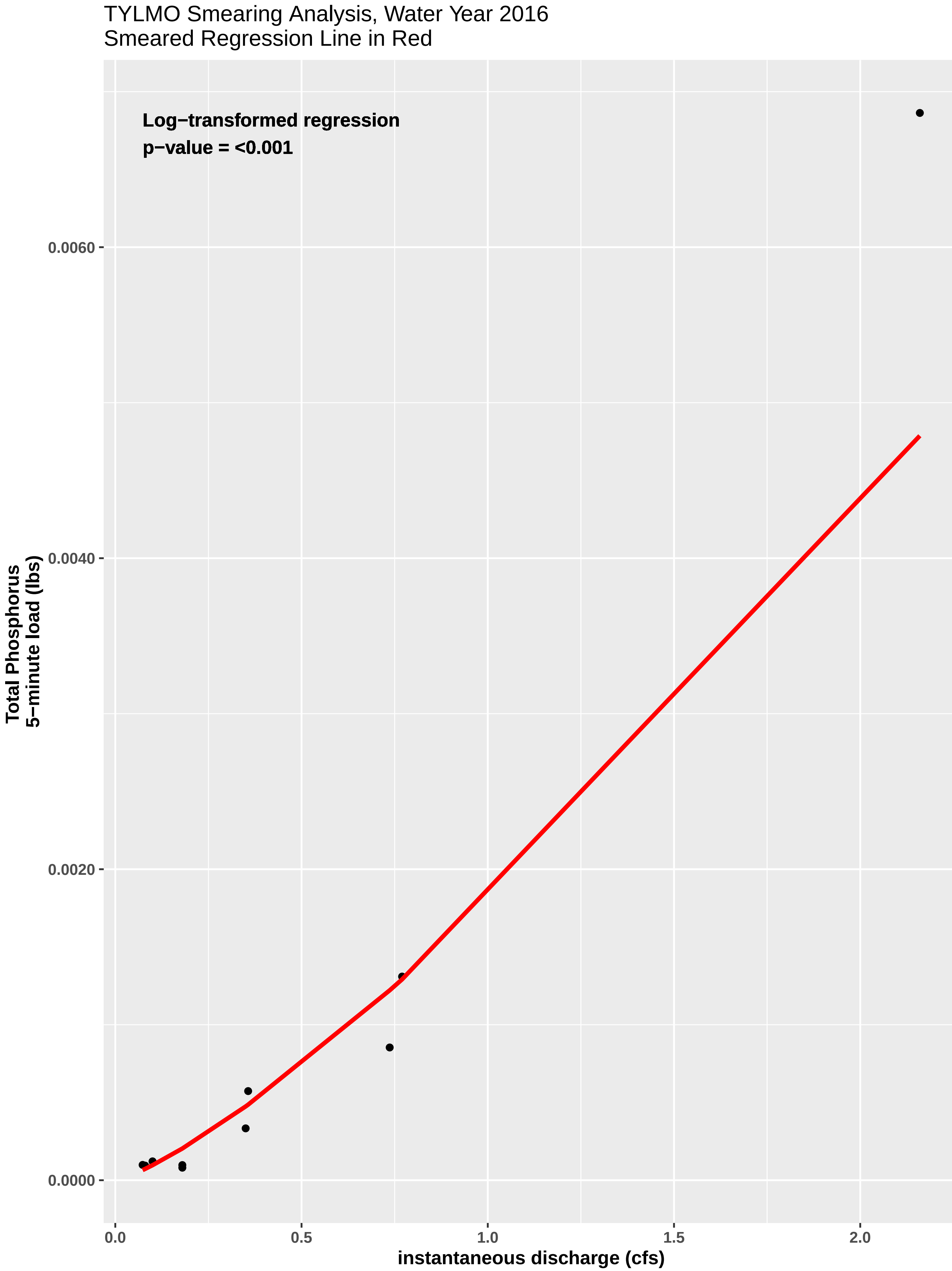
TYLMO Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
5−minute flow (cfs)
400
300
200
100
0
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



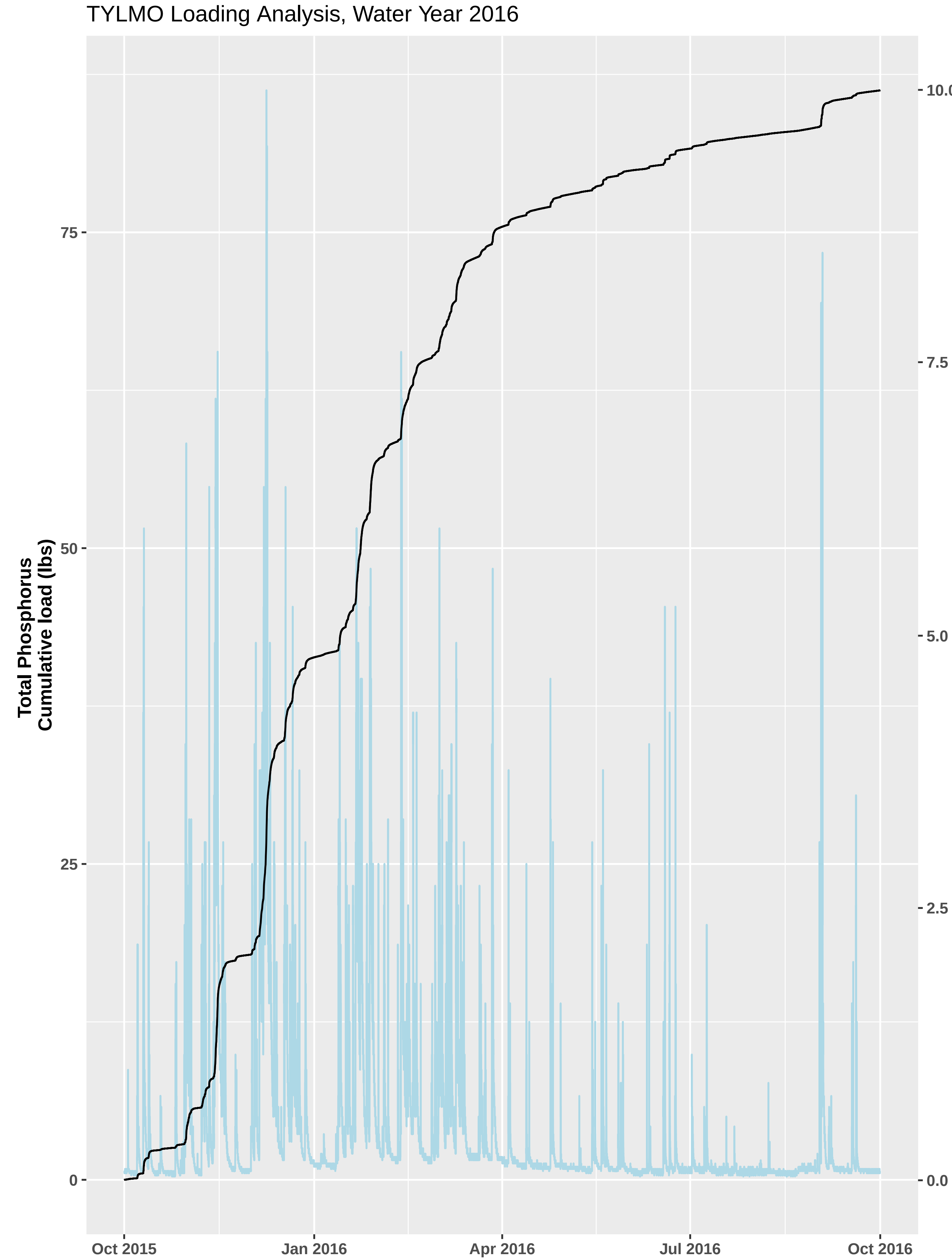
TYLMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.020
0.040
0
1
2
3
4
instantaneous discharge (cfs)



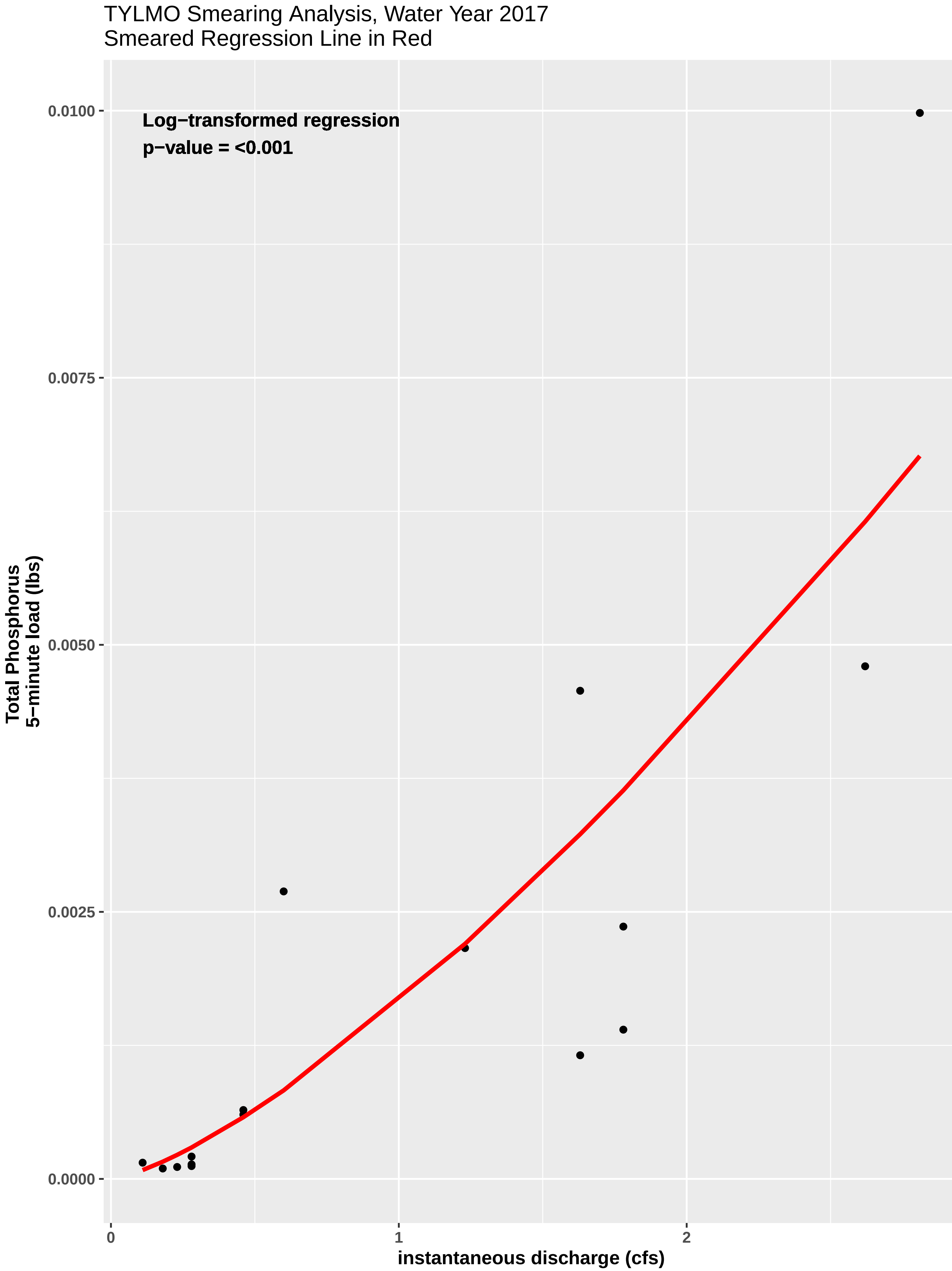
TYLMO Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
5−minute flow (cfs)
0
5
10
15
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019



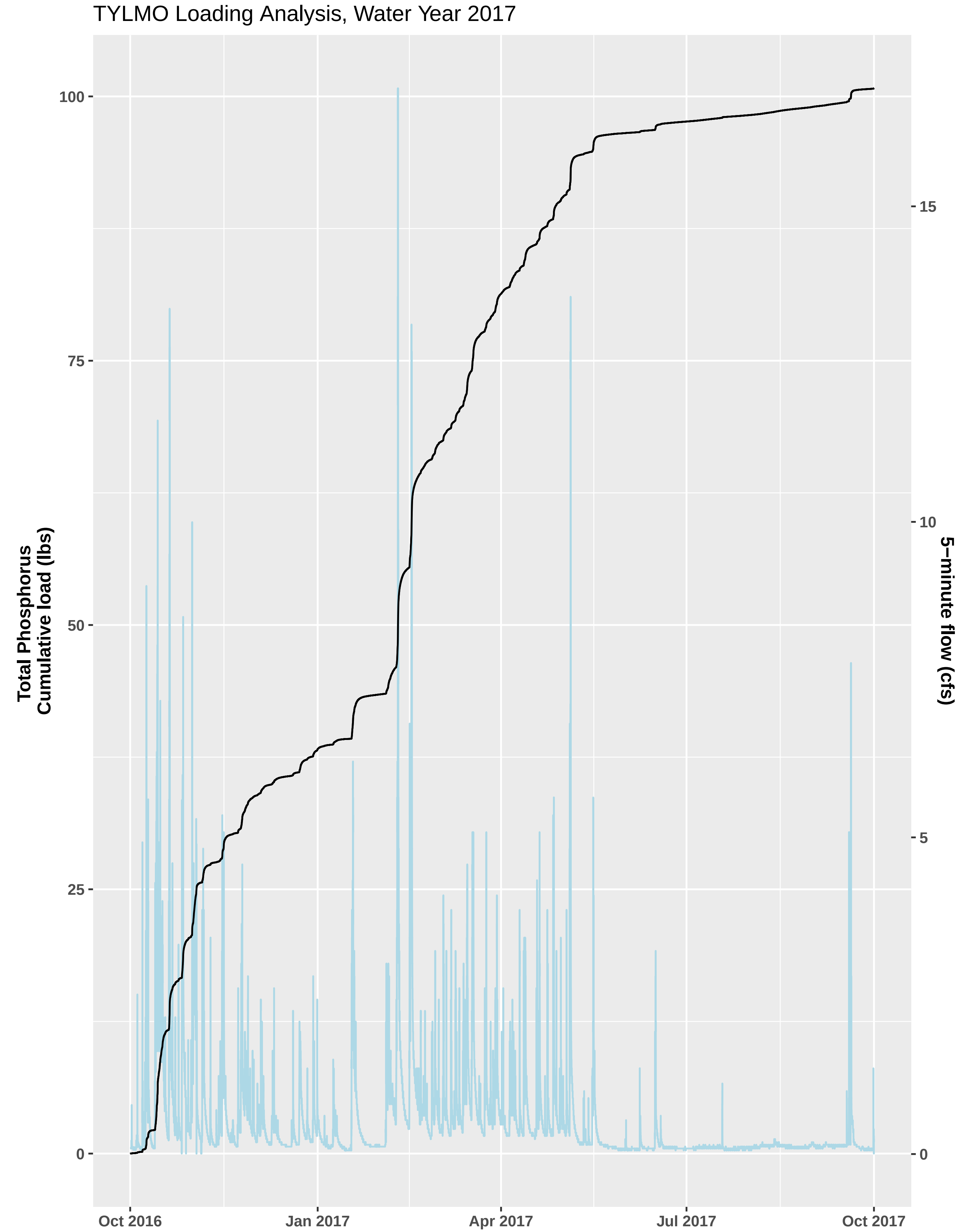
TYLMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0020
0.0040
0.0060
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)



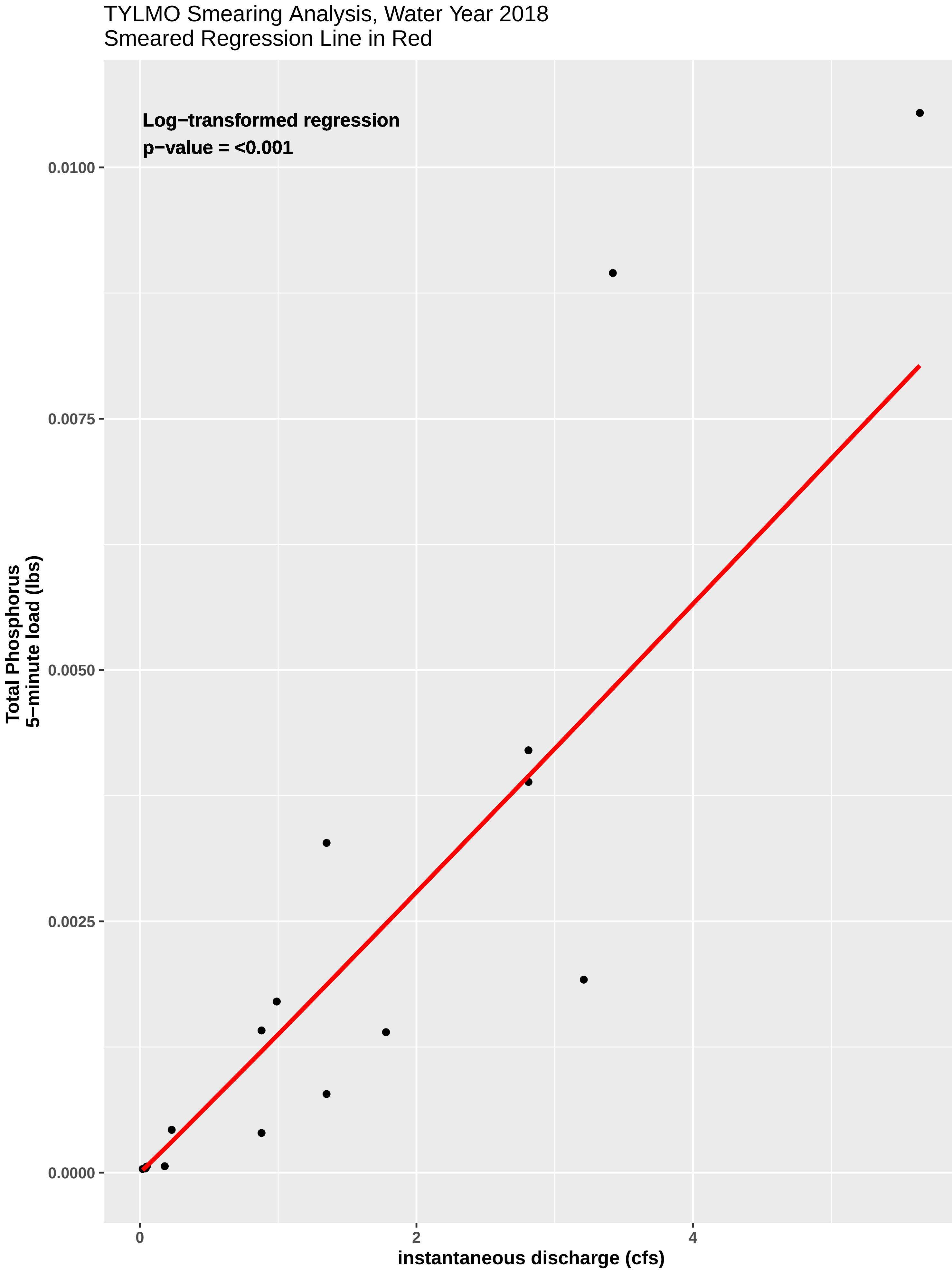
TYLMO Loading Analysis, Water Year 2016
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

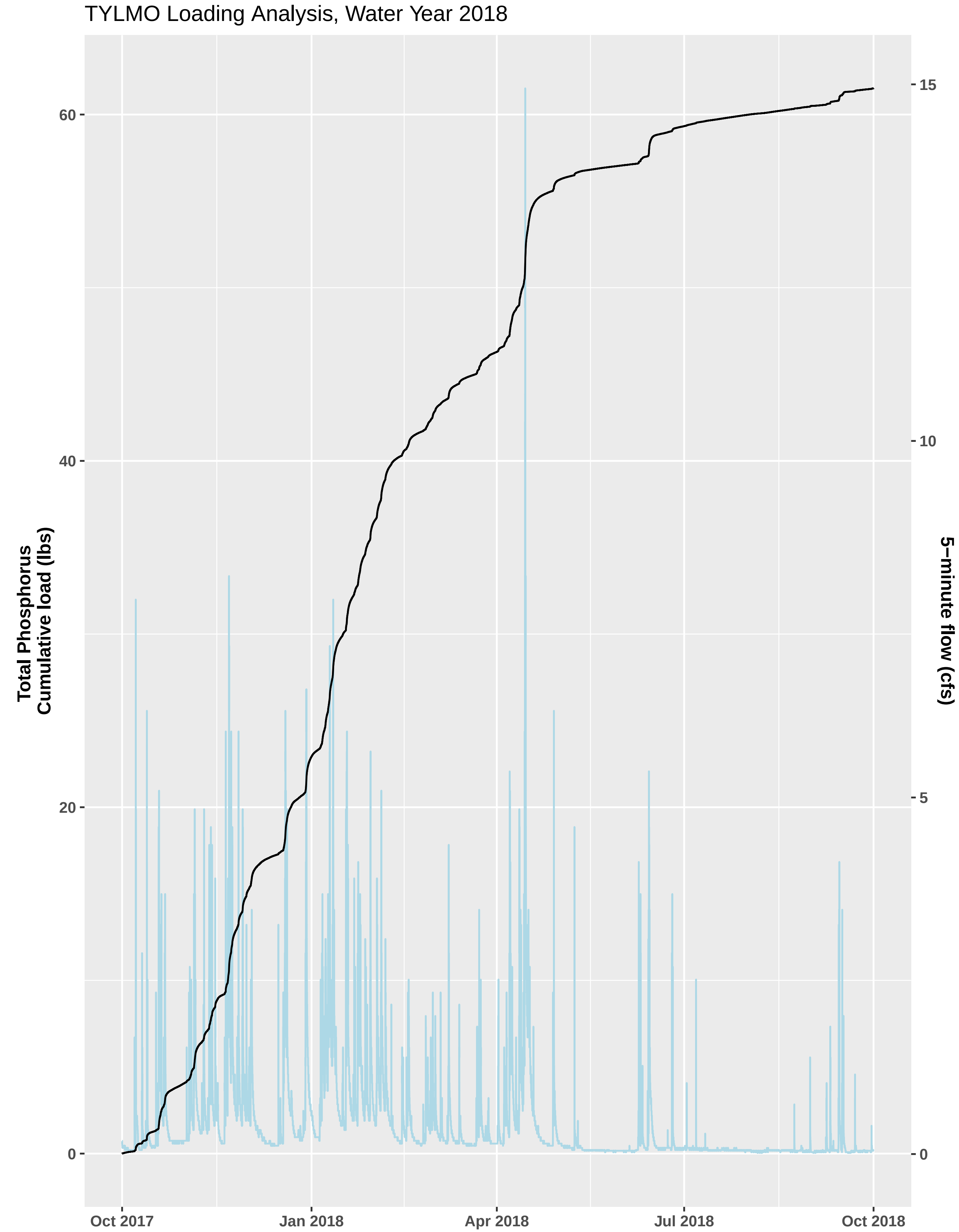


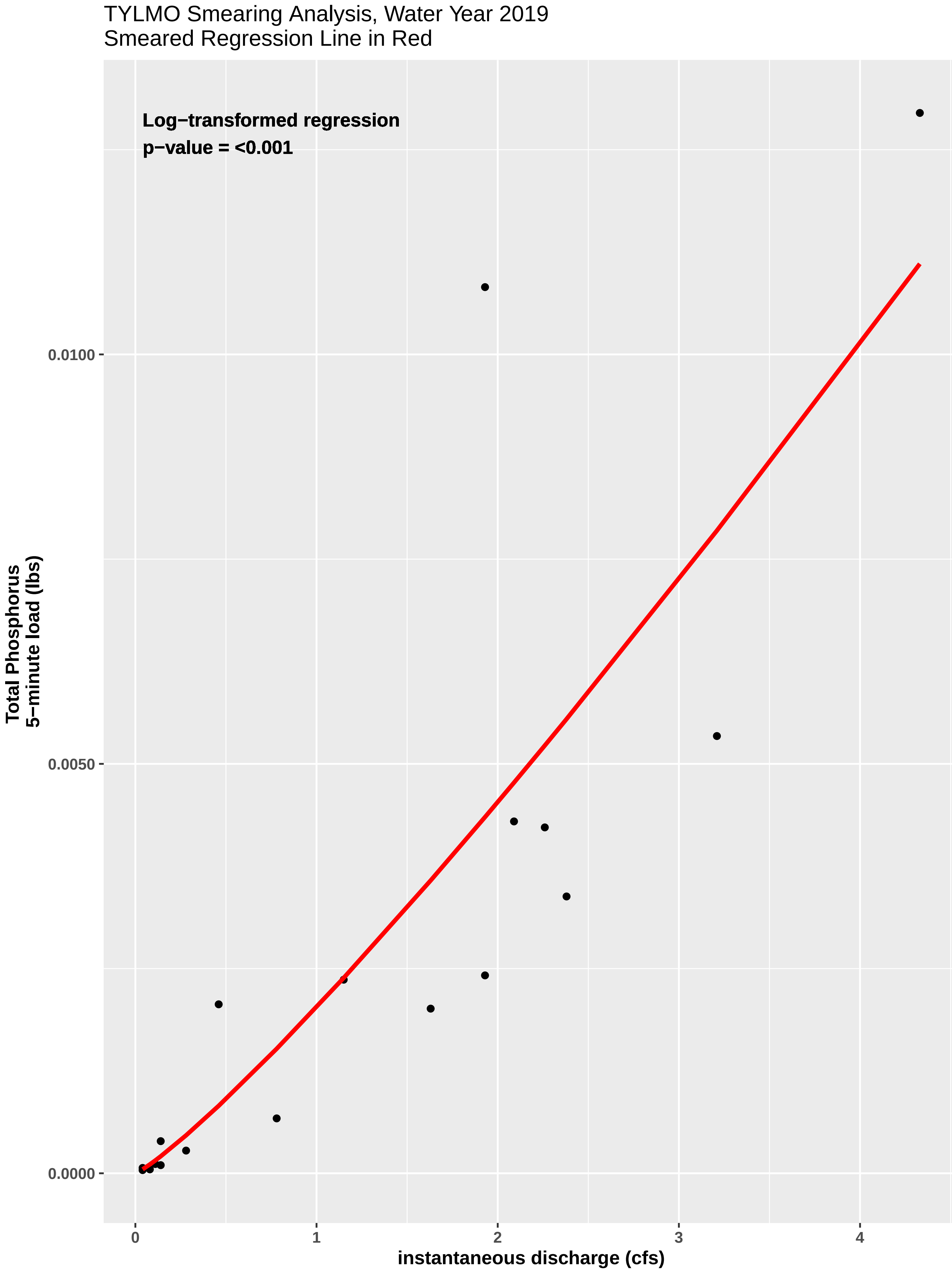
TYLMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0025
0.0050
0.0075
0.0100
0
1
2
instantaneous discharge (cfs)



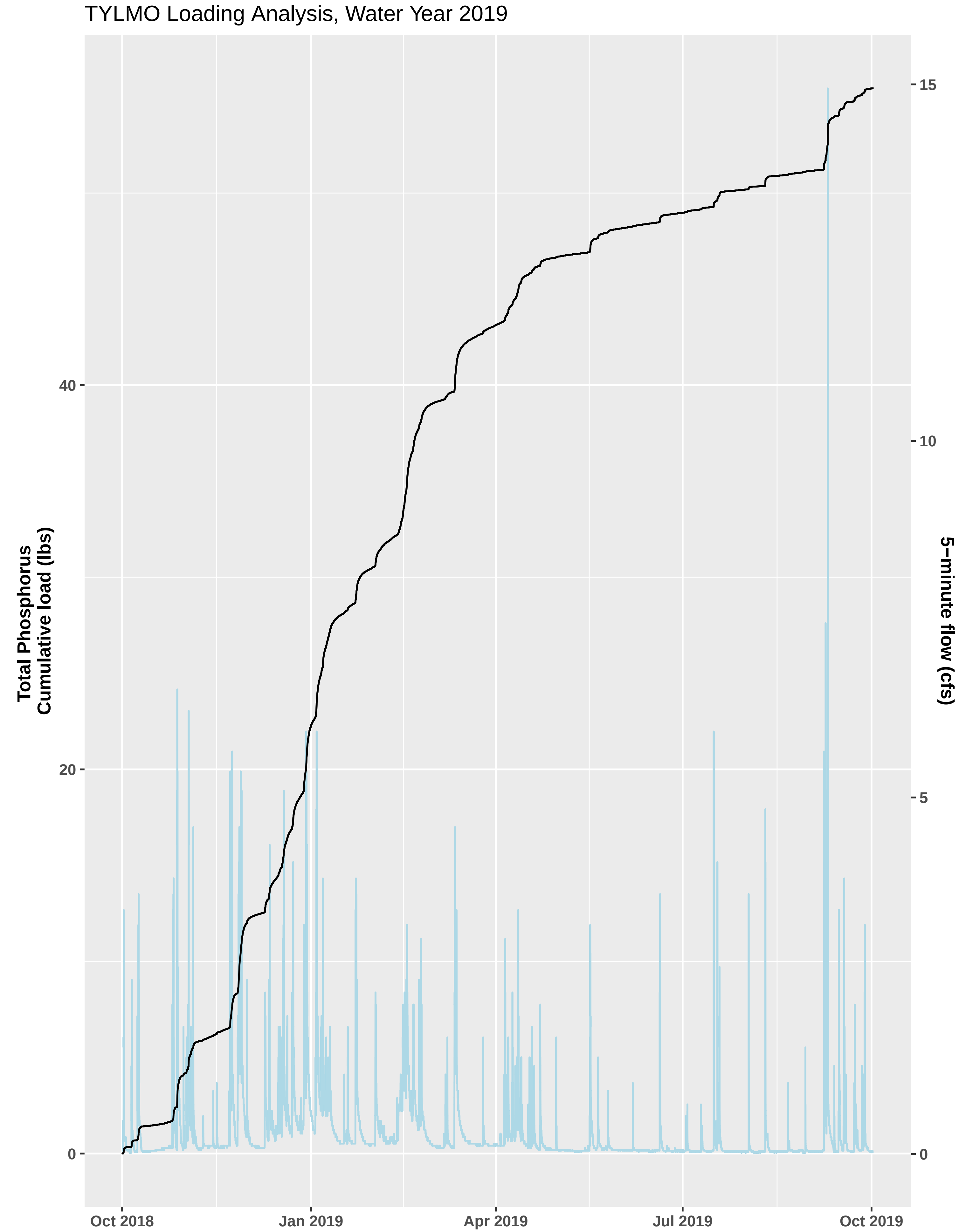
TYLMO Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0
25
50
75
100
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0025
0.0050
0.0075
0.0100
0
2
4
instantaneous discharge (cfs)

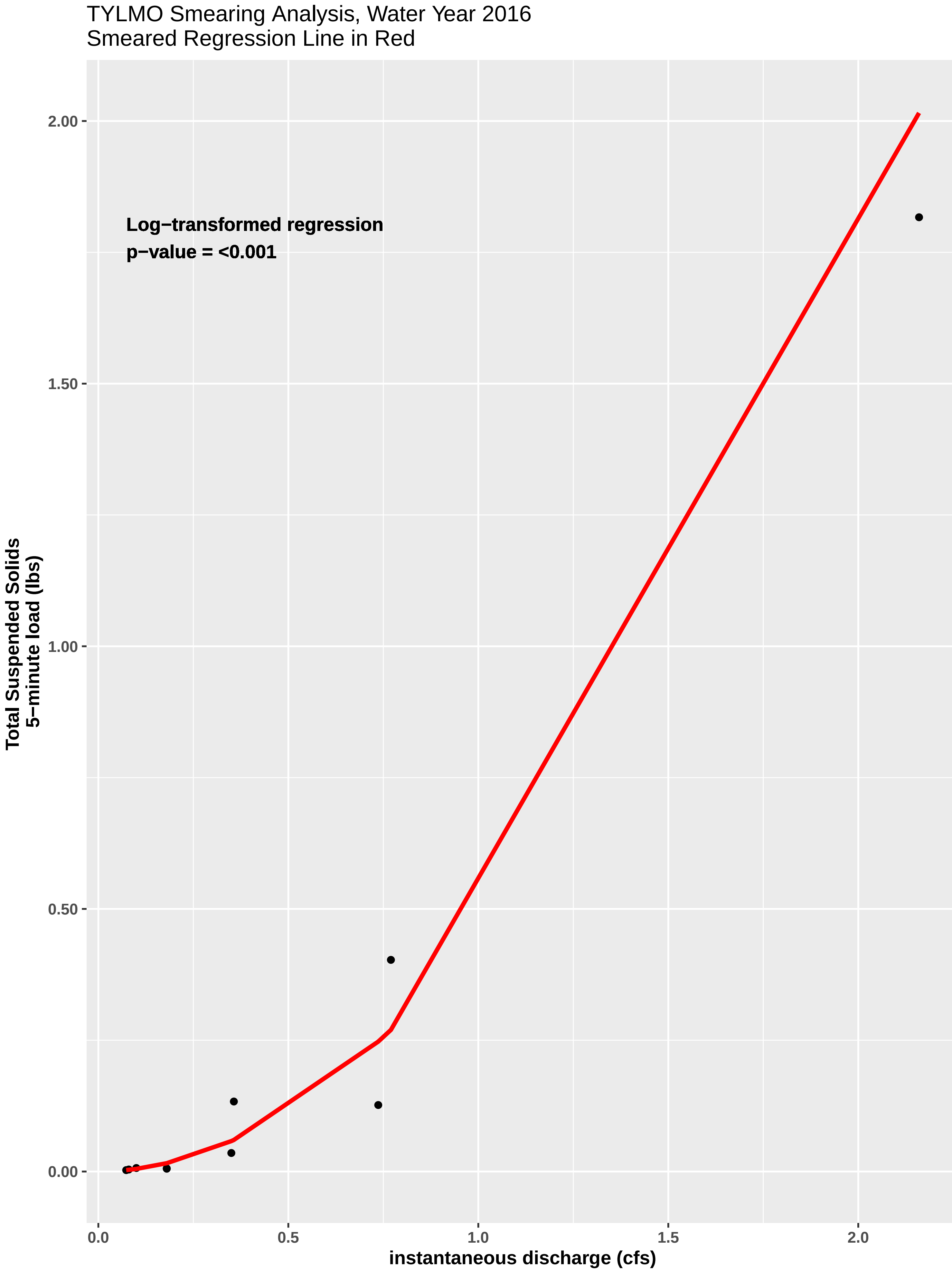

TYLMO Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0
20
40
60
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

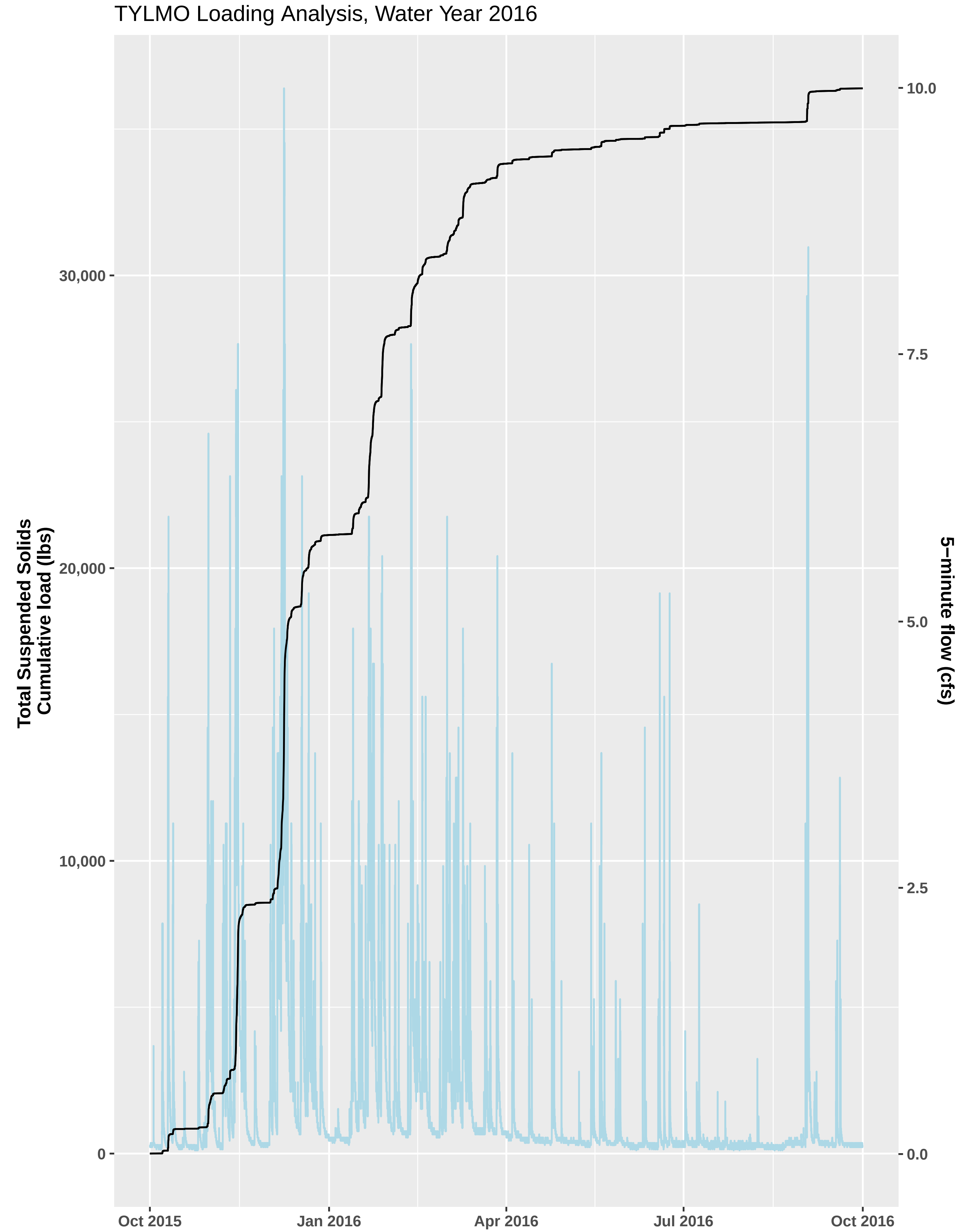


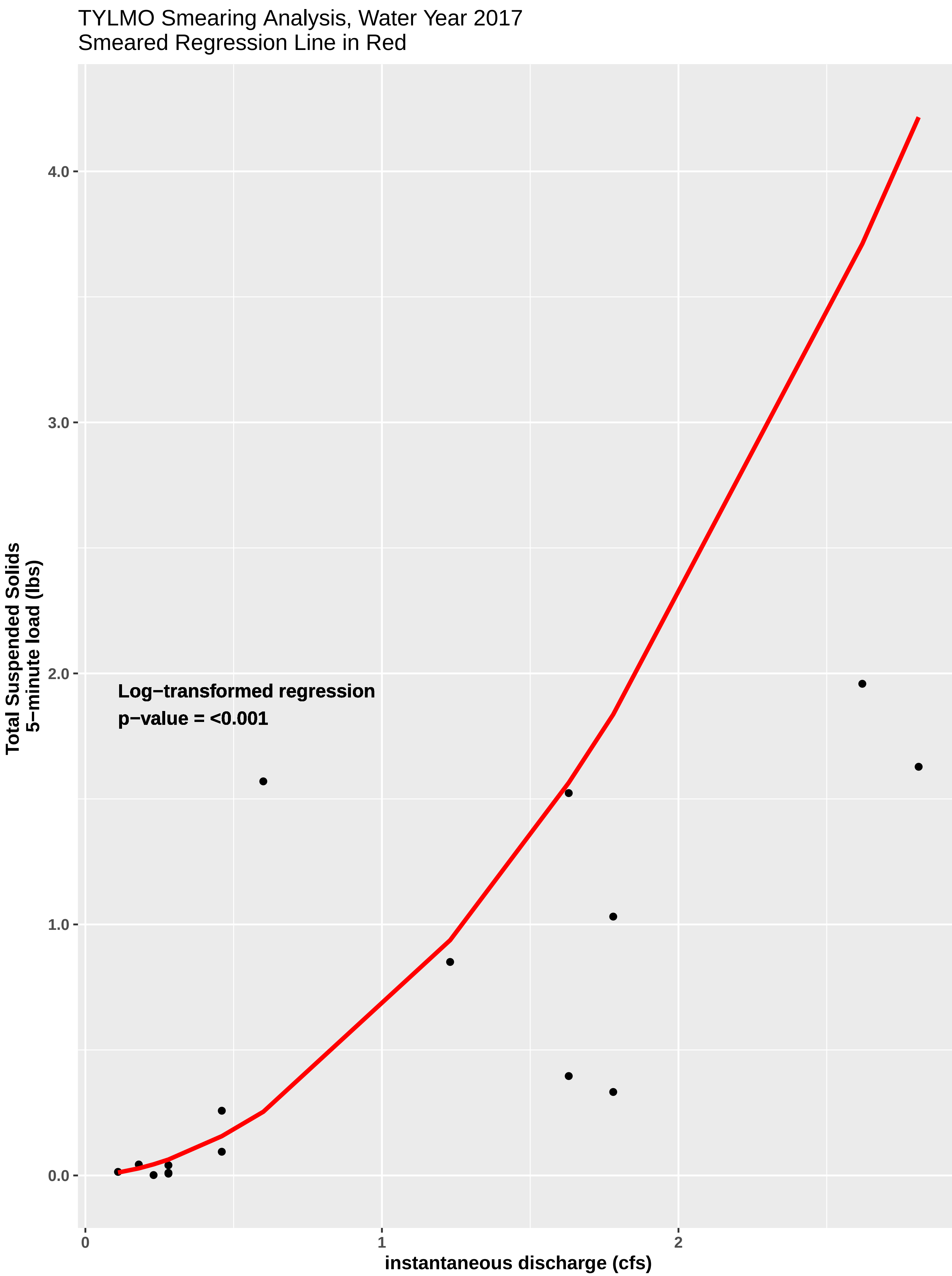
TYLMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0050
0.0100
0
1
2
3
4
instantaneous discharge (cfs)

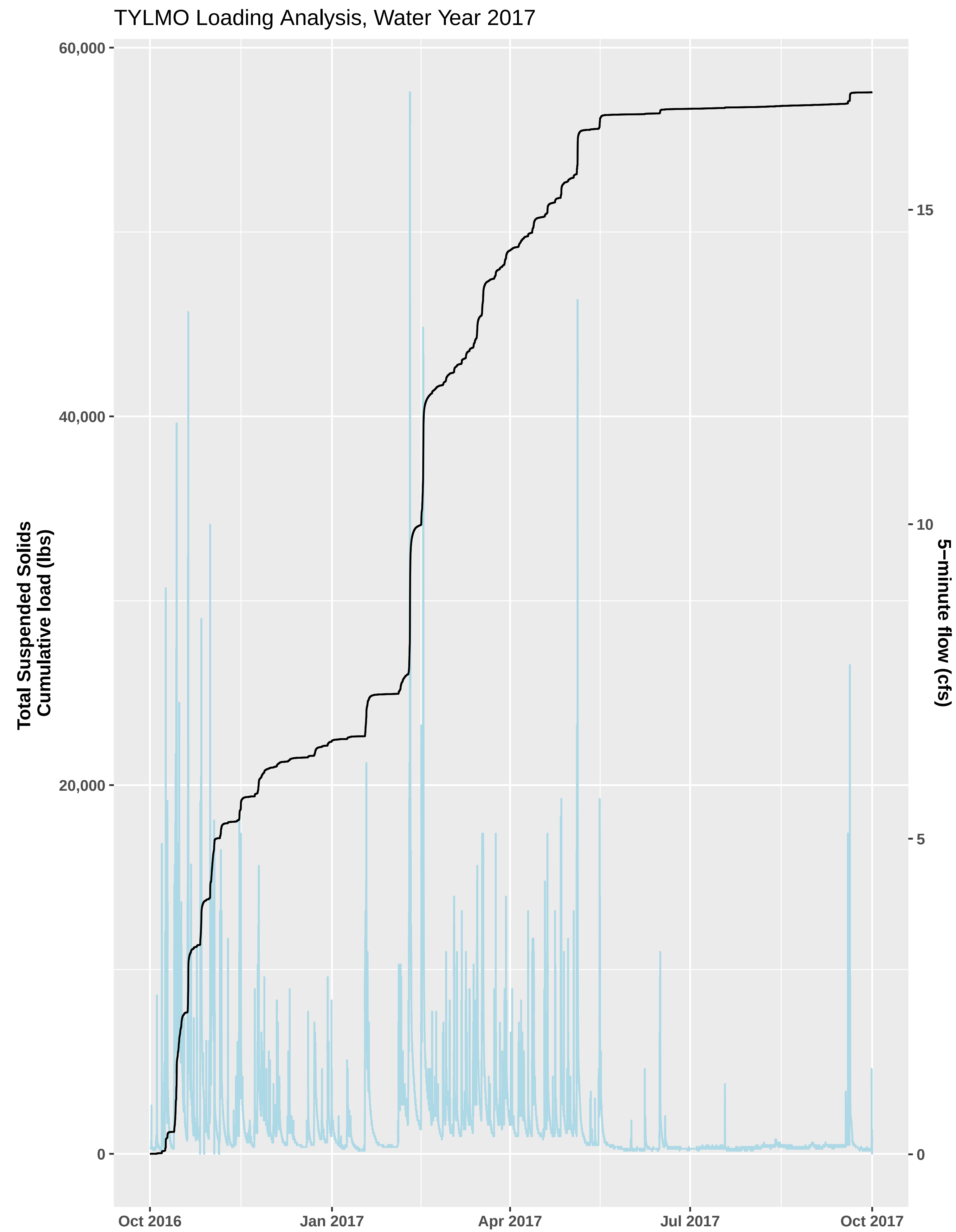


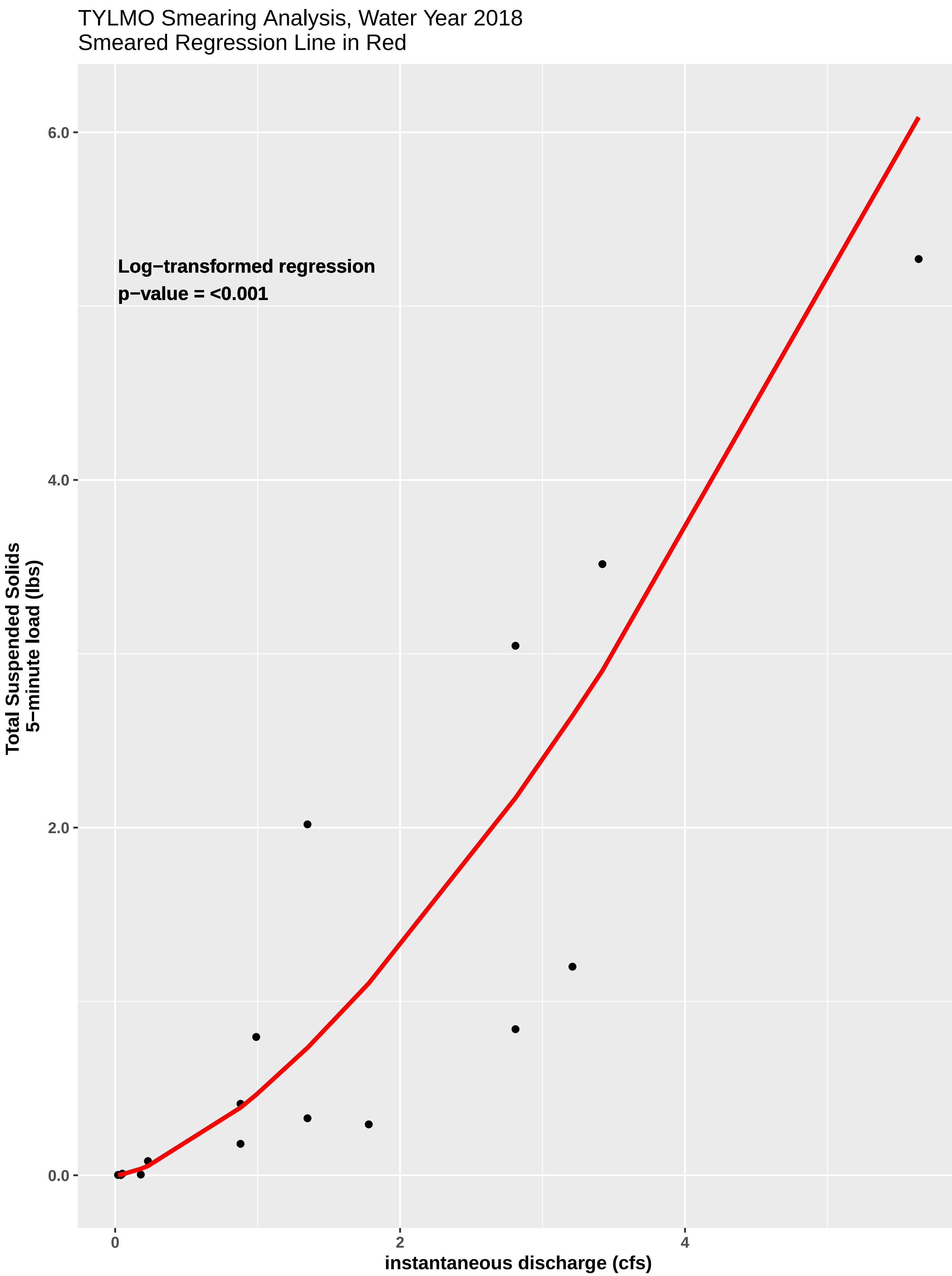
TYLMO Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
20
40
5−minute flow (cfs)
0
5
10
15
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

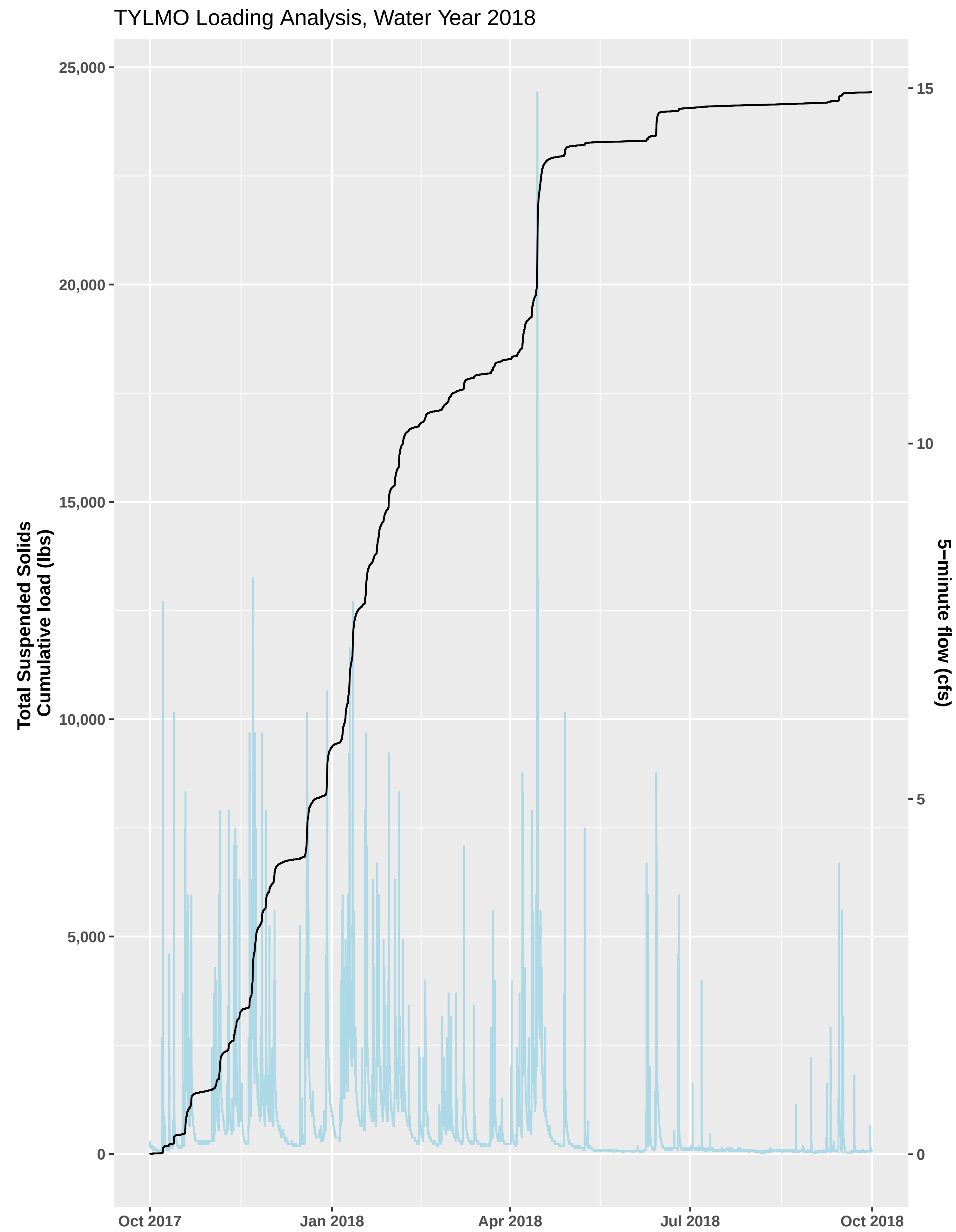

TYLMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.00
0.50
1.00
1.50
2.00
0.0
0.5
1.0
1.5
2.0

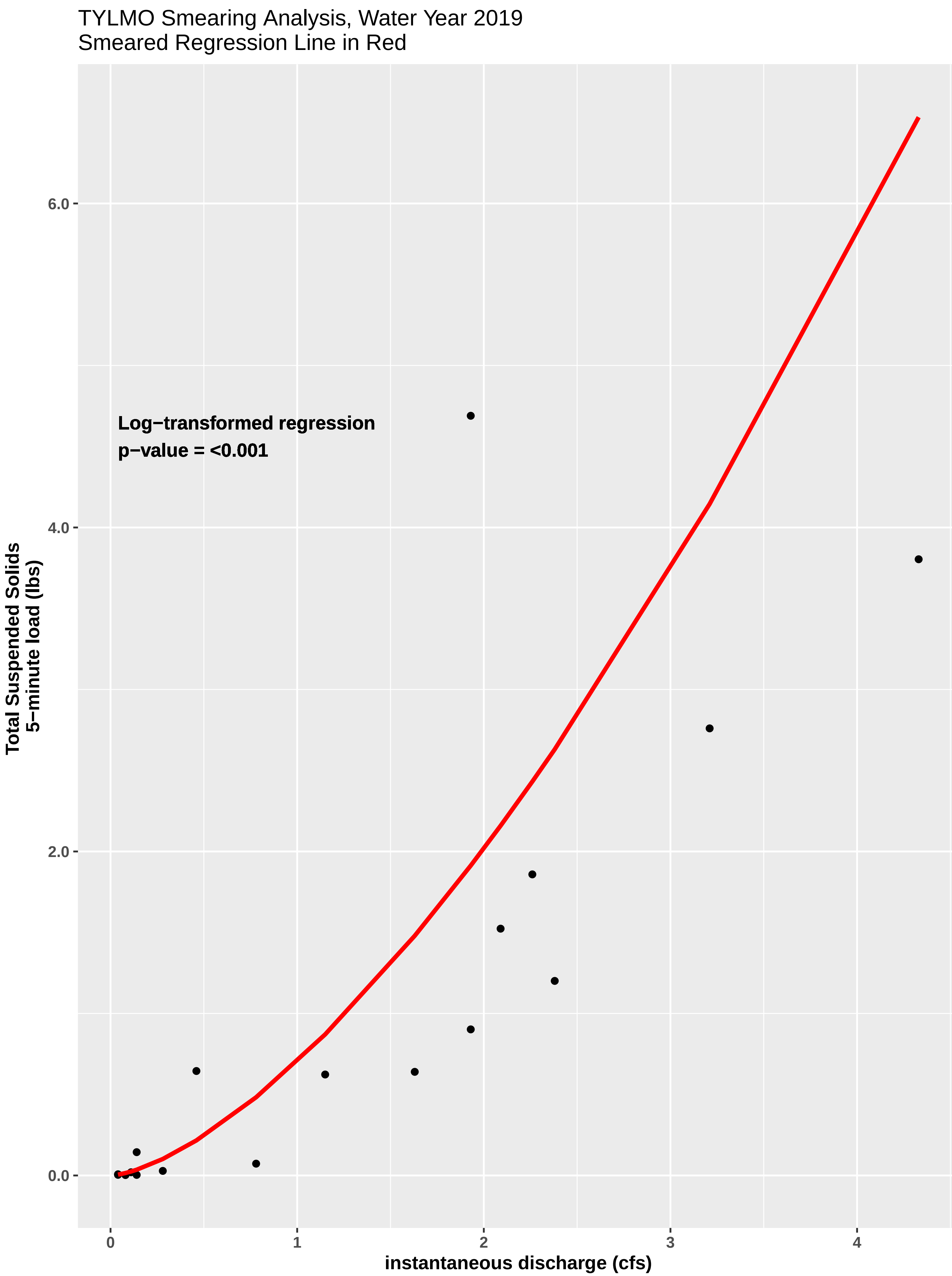

TYLMO Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
10,000
20,000
30,000
0.0
2.5
5.0
7.5
10.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

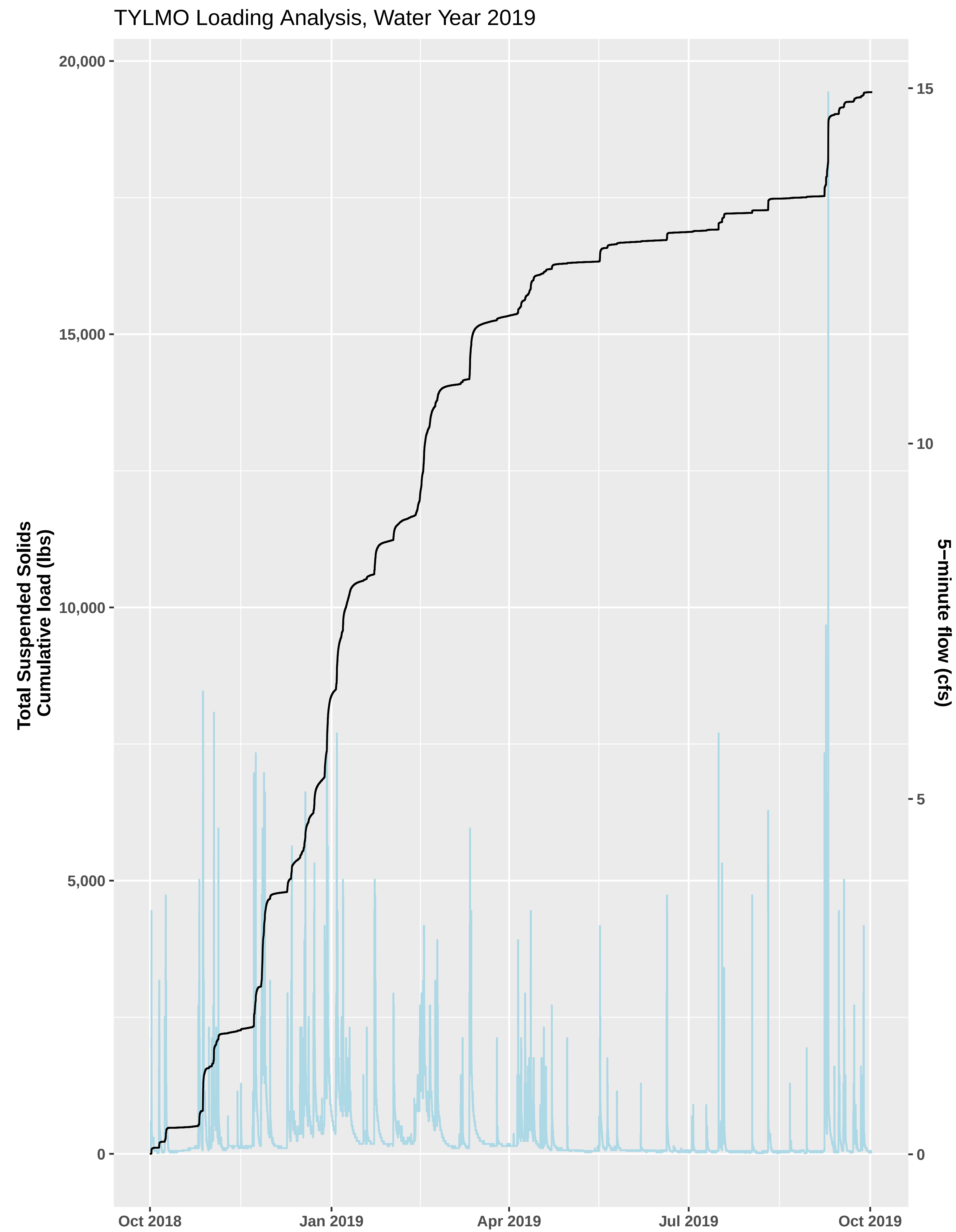

TYLMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
Log−transformed regression
p−value = <0.001
0.0
1.0
2.0
3.0
4.0
0
1
2

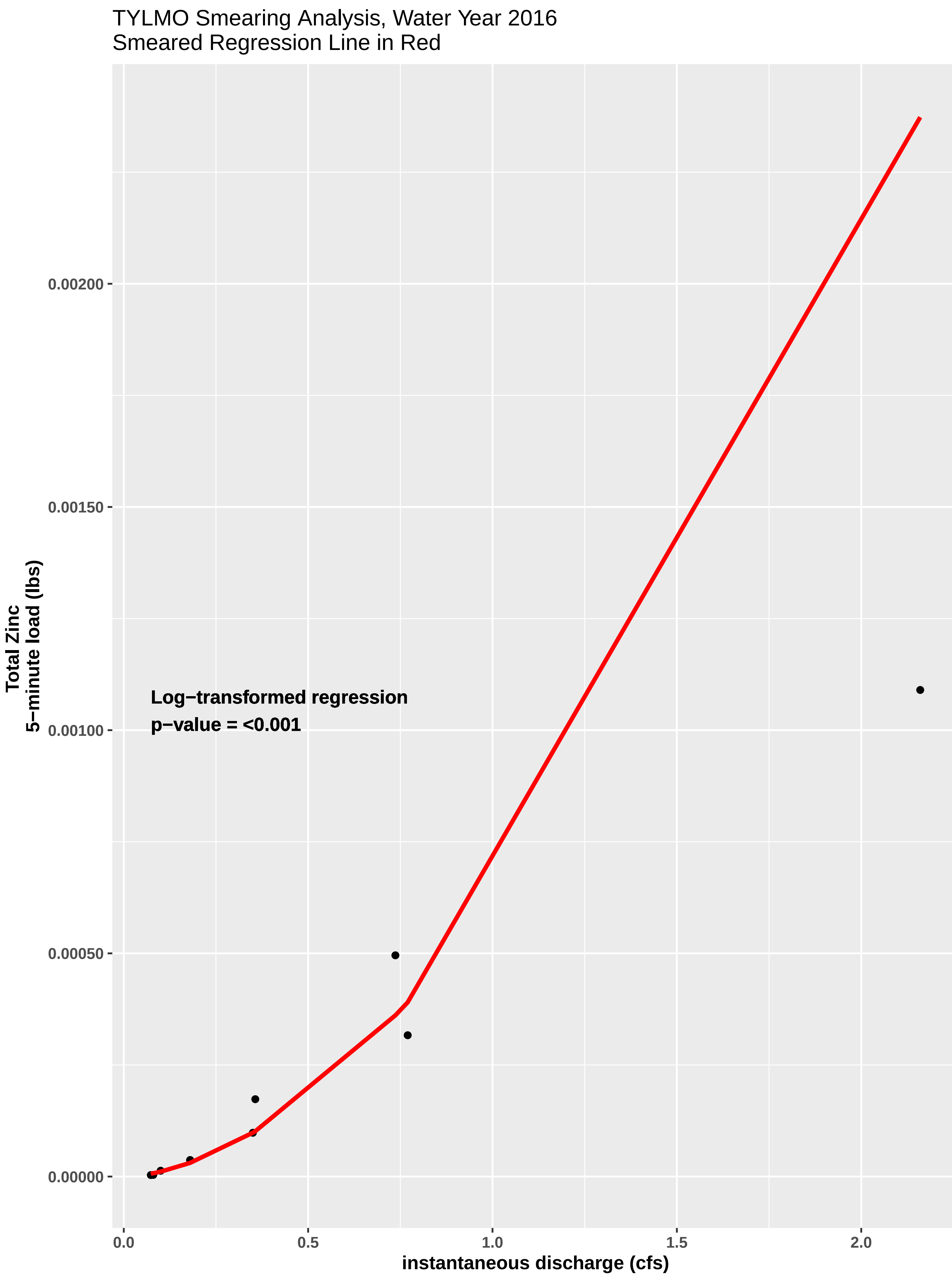

TYLMO Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
20,000
40,000
60,000
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017

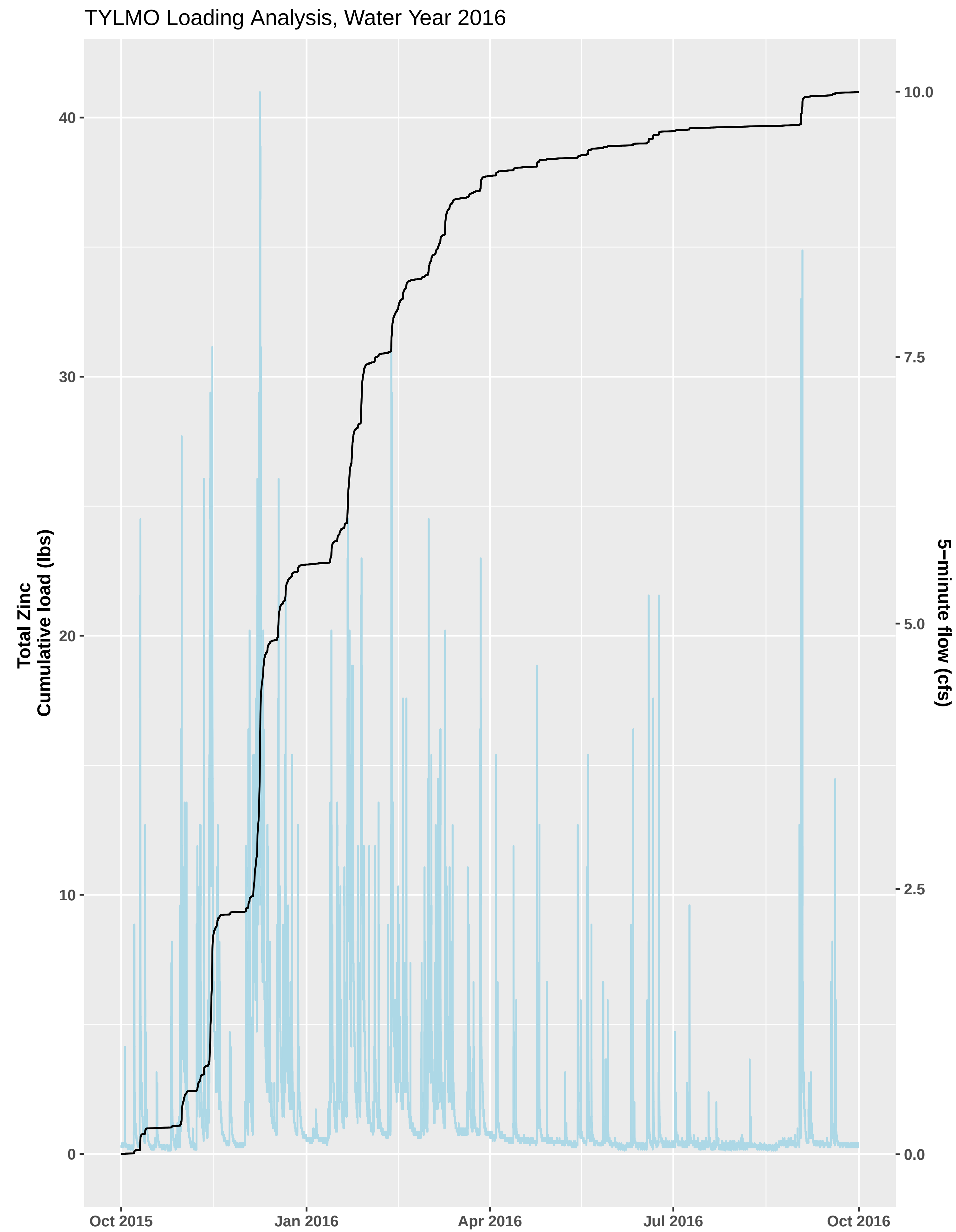

TYLMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
2.0
4.0
6.0
0
2
4

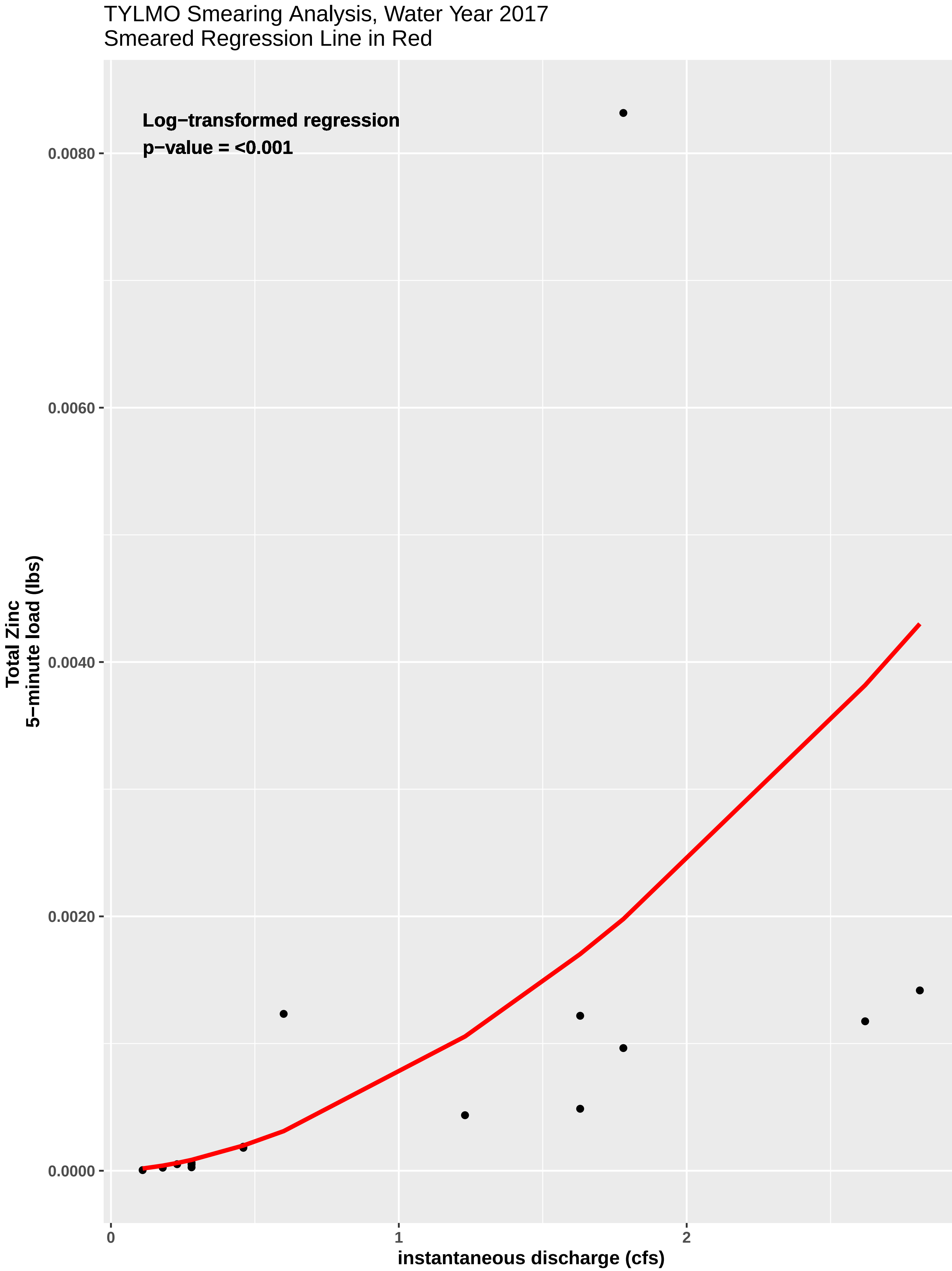

TYLMO Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
5,000
10,000
15,000
20,000
25,000
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

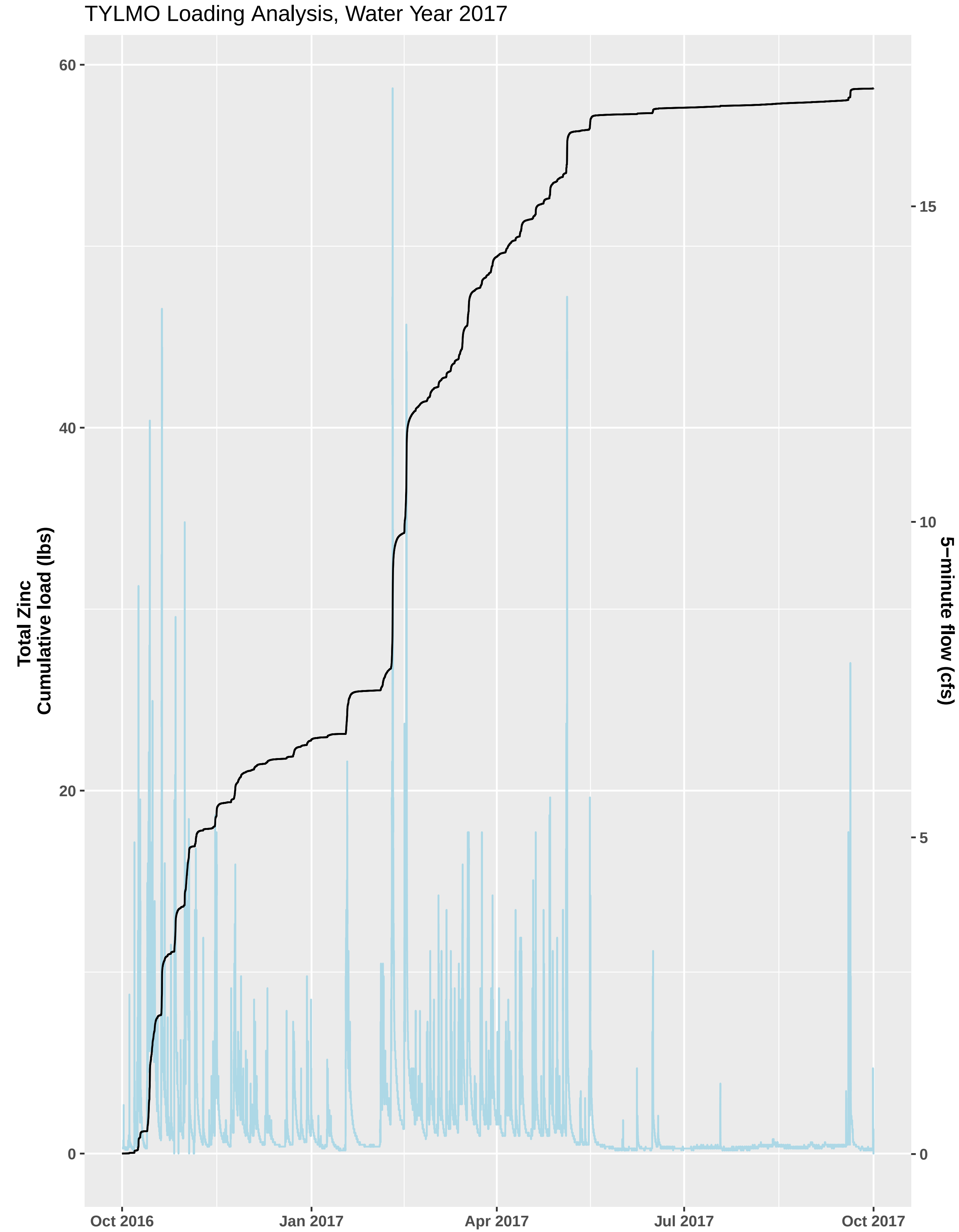

TYLMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.0
2.0
4.0
6.0
0
1
2
3
4
instantaneous discharge (cfs)

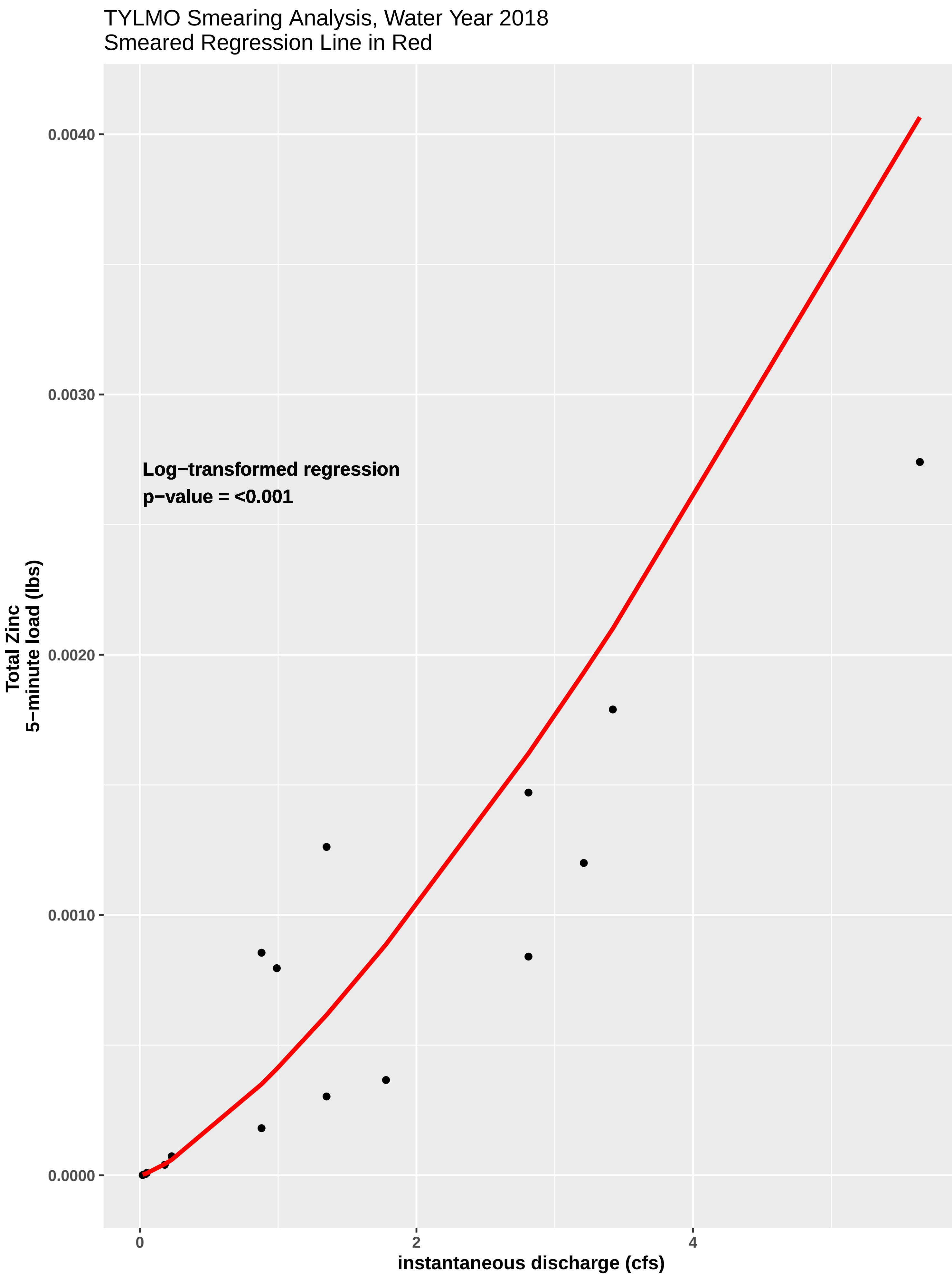

TYLMO Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
0
5,000
10,000
15,000
20,000
5−minute flow (cfs)
0
5
10
15
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TYLMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Total Zinc
5−minute load (lbs)
0.00000
0.00050
0.00100
0.00150
0.00200
Log−transformed regression
p−value = <0.001
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

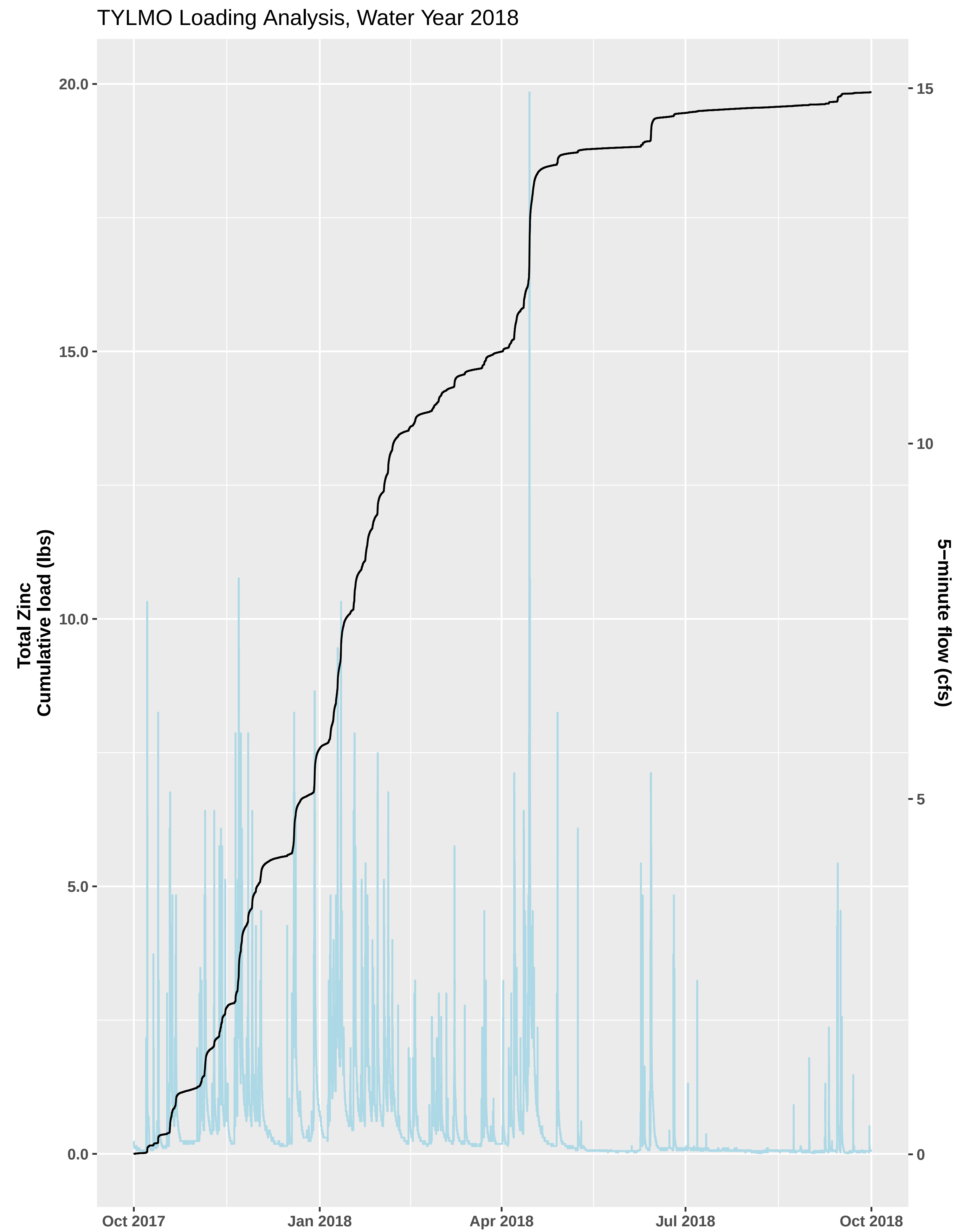

TYLMO Loading Analysis, Water Year 2016
Total Zinc
Cumulative load (lbs)
0
10
20
30
40
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TYLMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0080
0.0060
0.0040
0.0020
0.0000
0
1
2
instantaneous discharge (cfs)

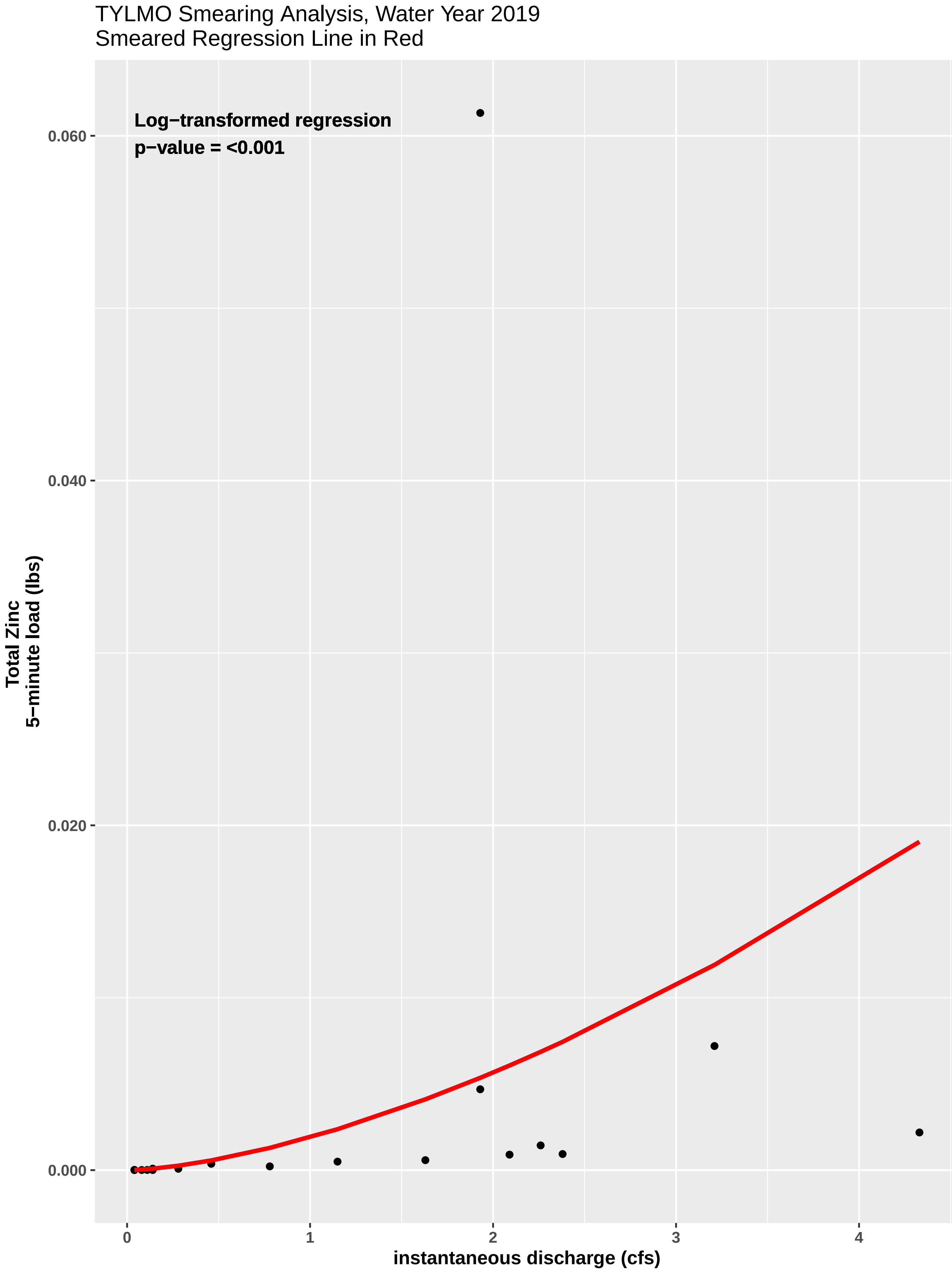

TYLMO Loading Analysis, Water Year 2017
Total Zinc
Cumulative load (lbs)
60
40
20
0
15
10
5
0
5−minute flow (cfs)
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



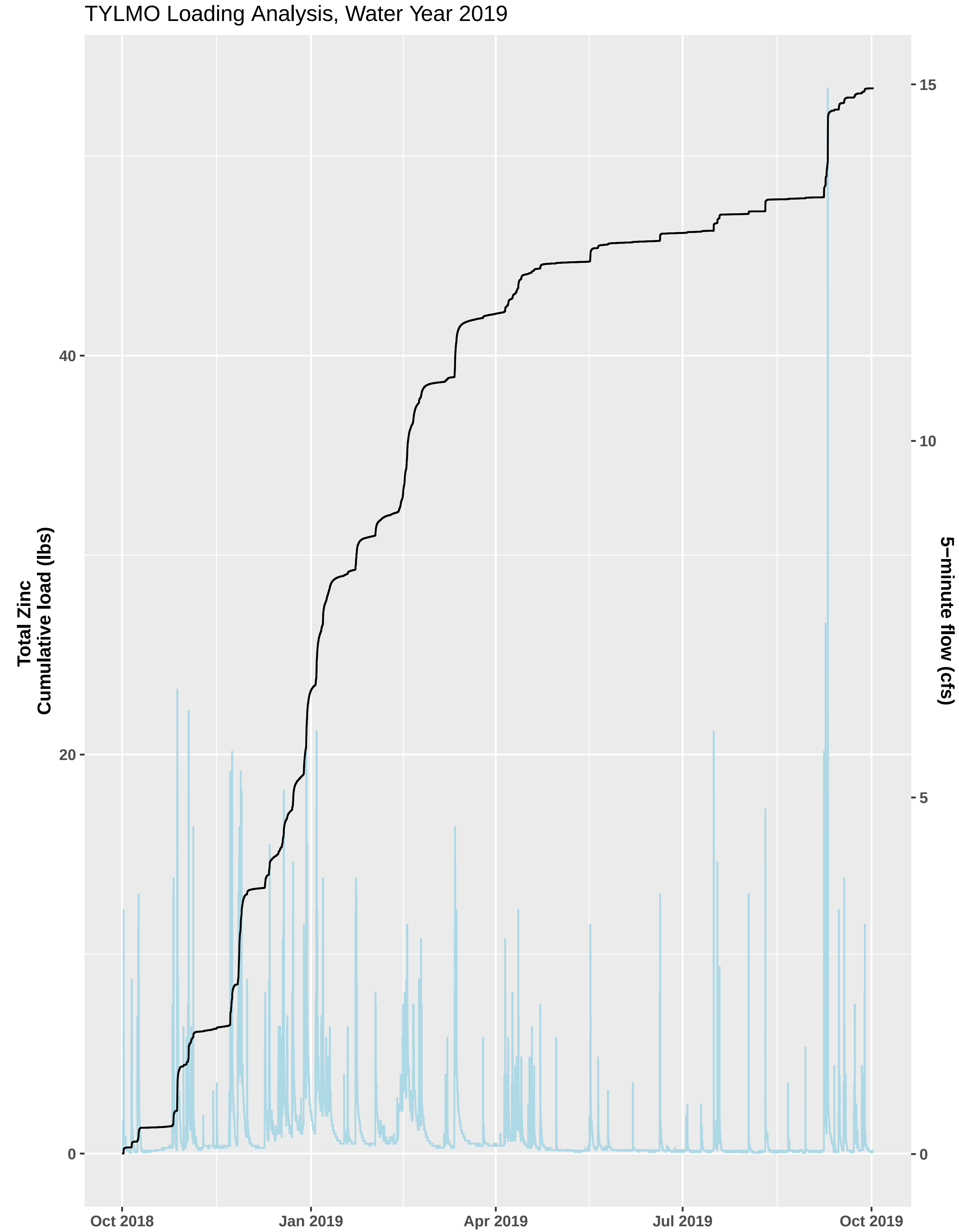
TYLMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0040
0
2
4
instantaneous discharge (cfs)



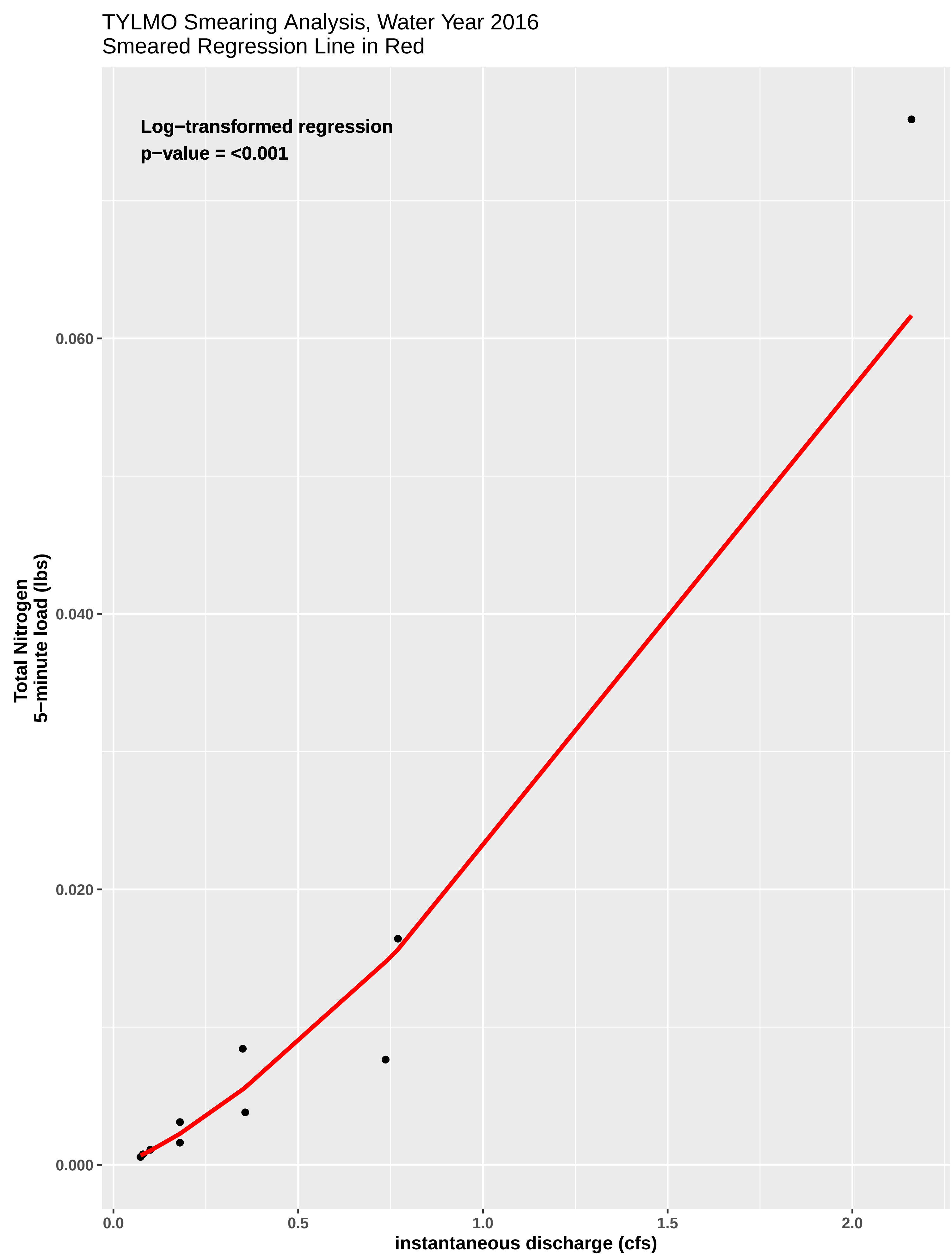
TYLMO Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
0.0
5.0
10.0
15.0
20.0
5−minute flow (cfs)
0
5
10
15
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

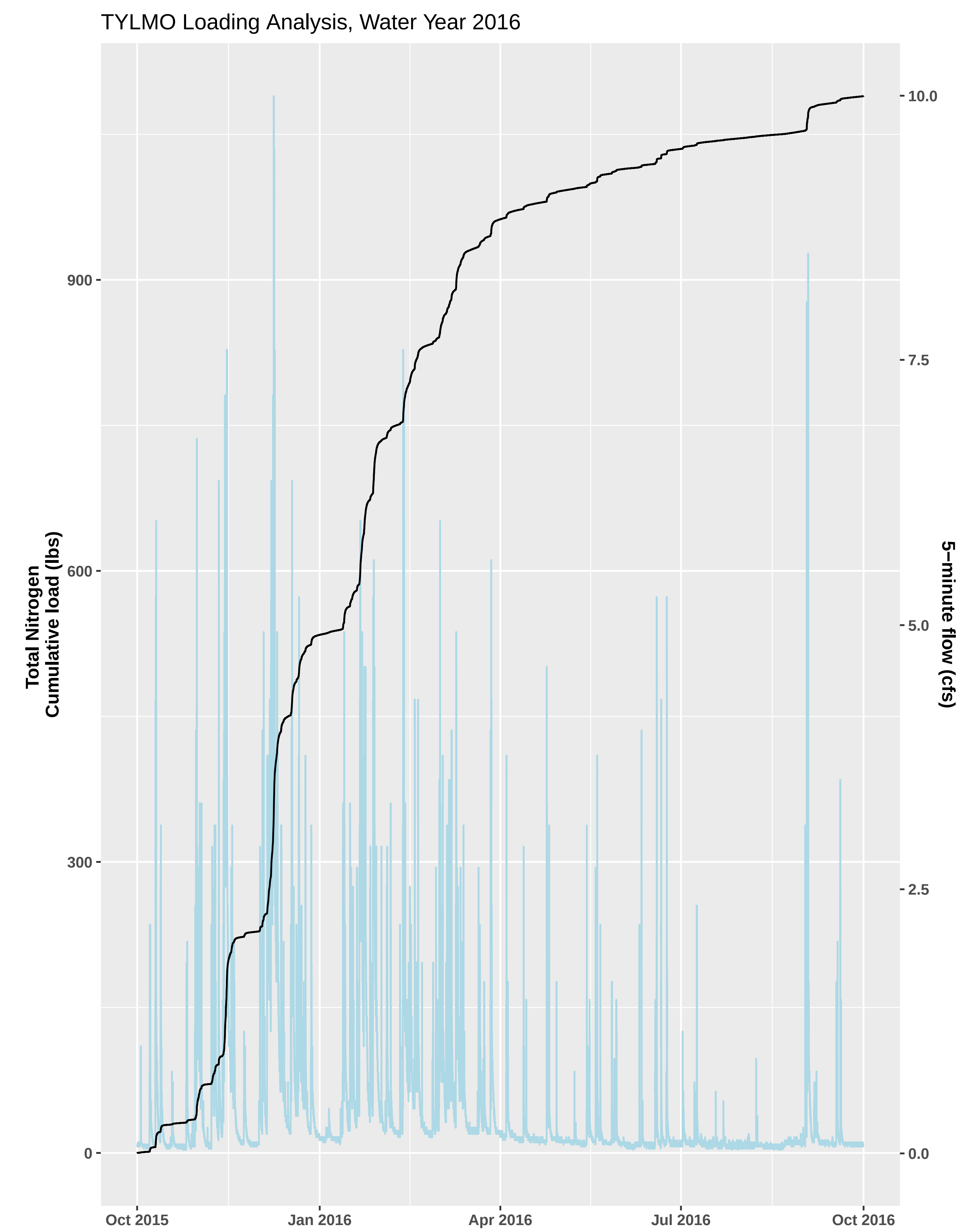


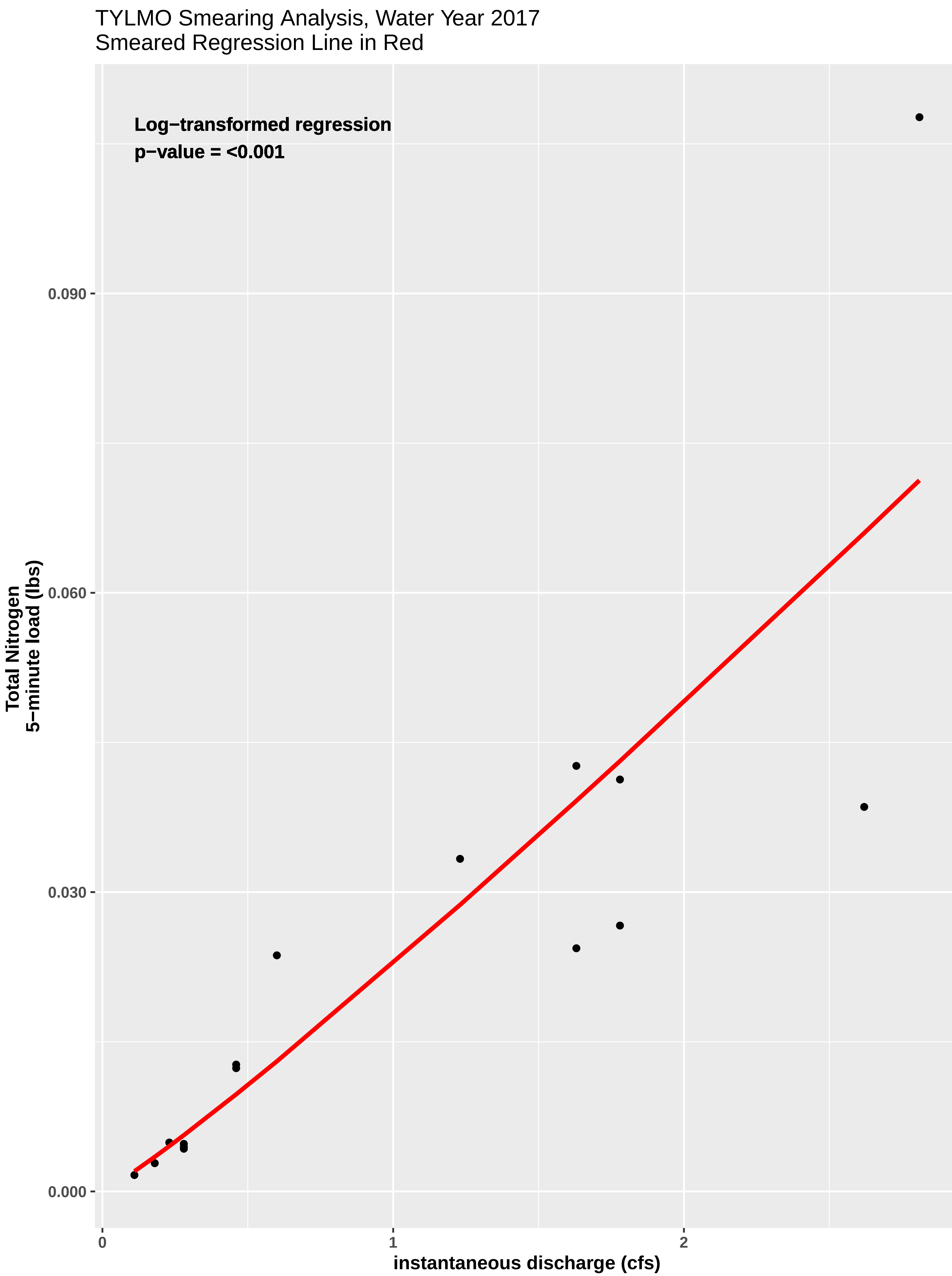
TYLMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.000
0.020
0.040
0.060
0
1
2
3
4
instantaneous discharge (cfs)

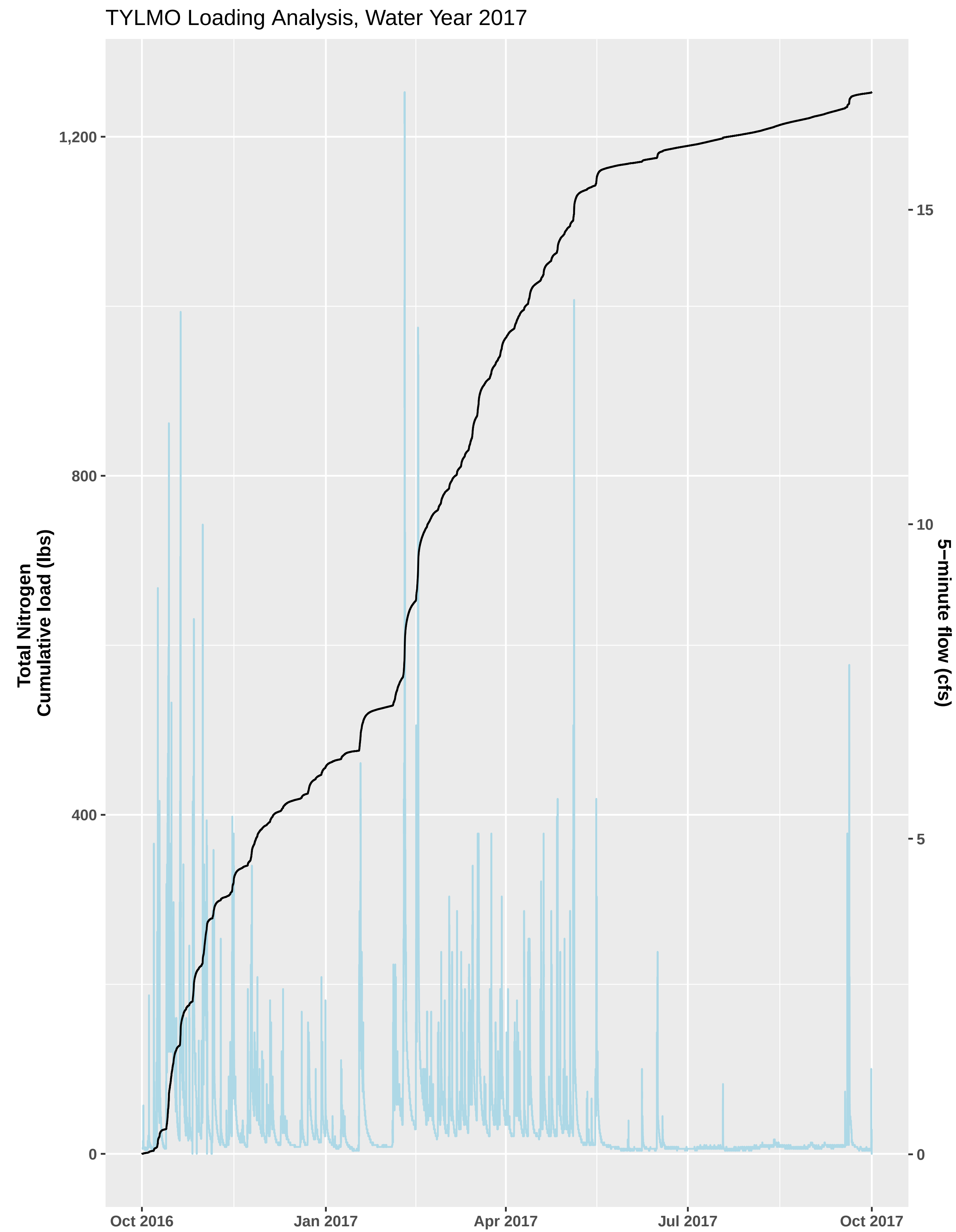


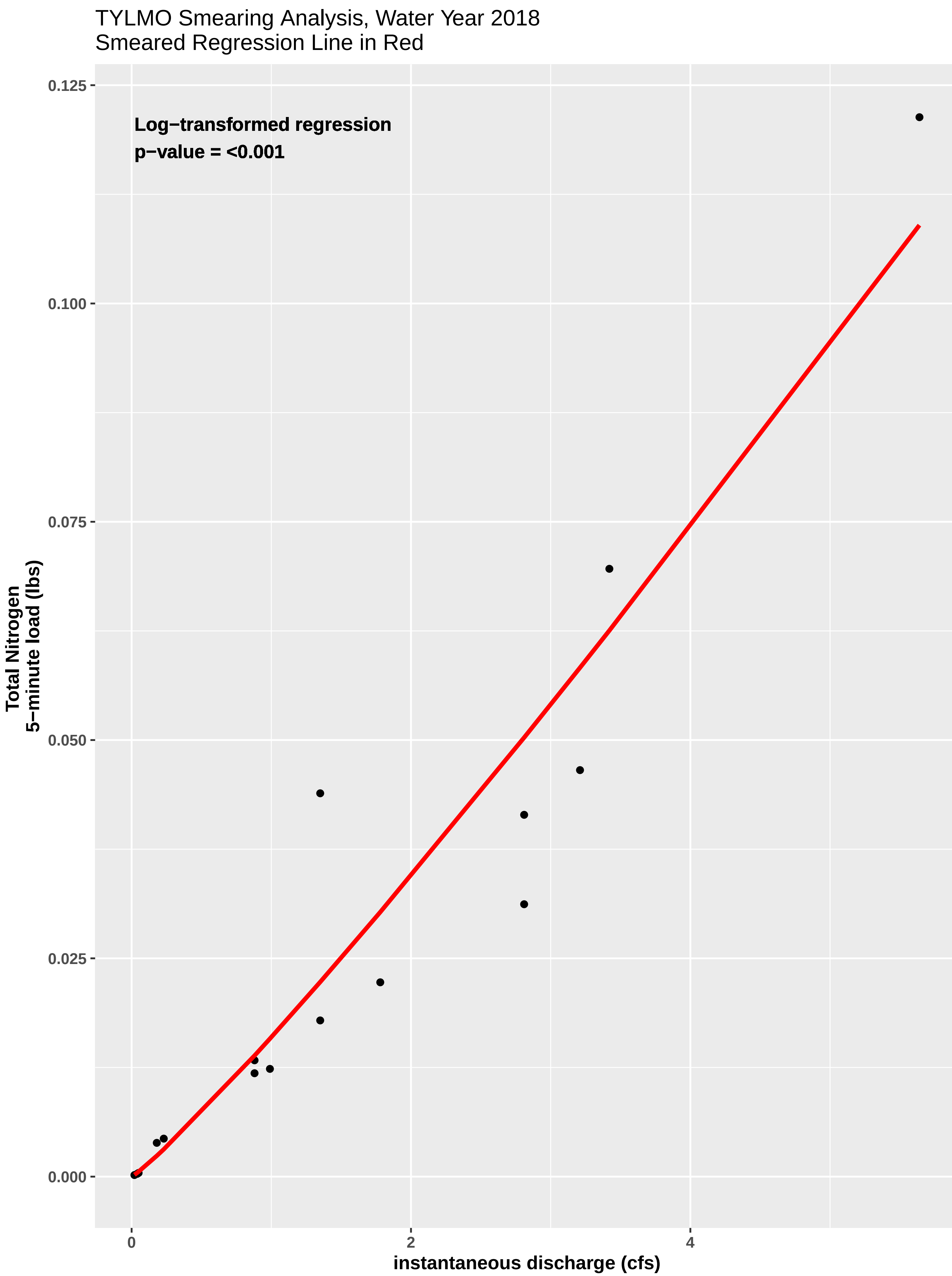
TYLMO Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0
20
40
5−minute flow (cfs)
0
5
10
15
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

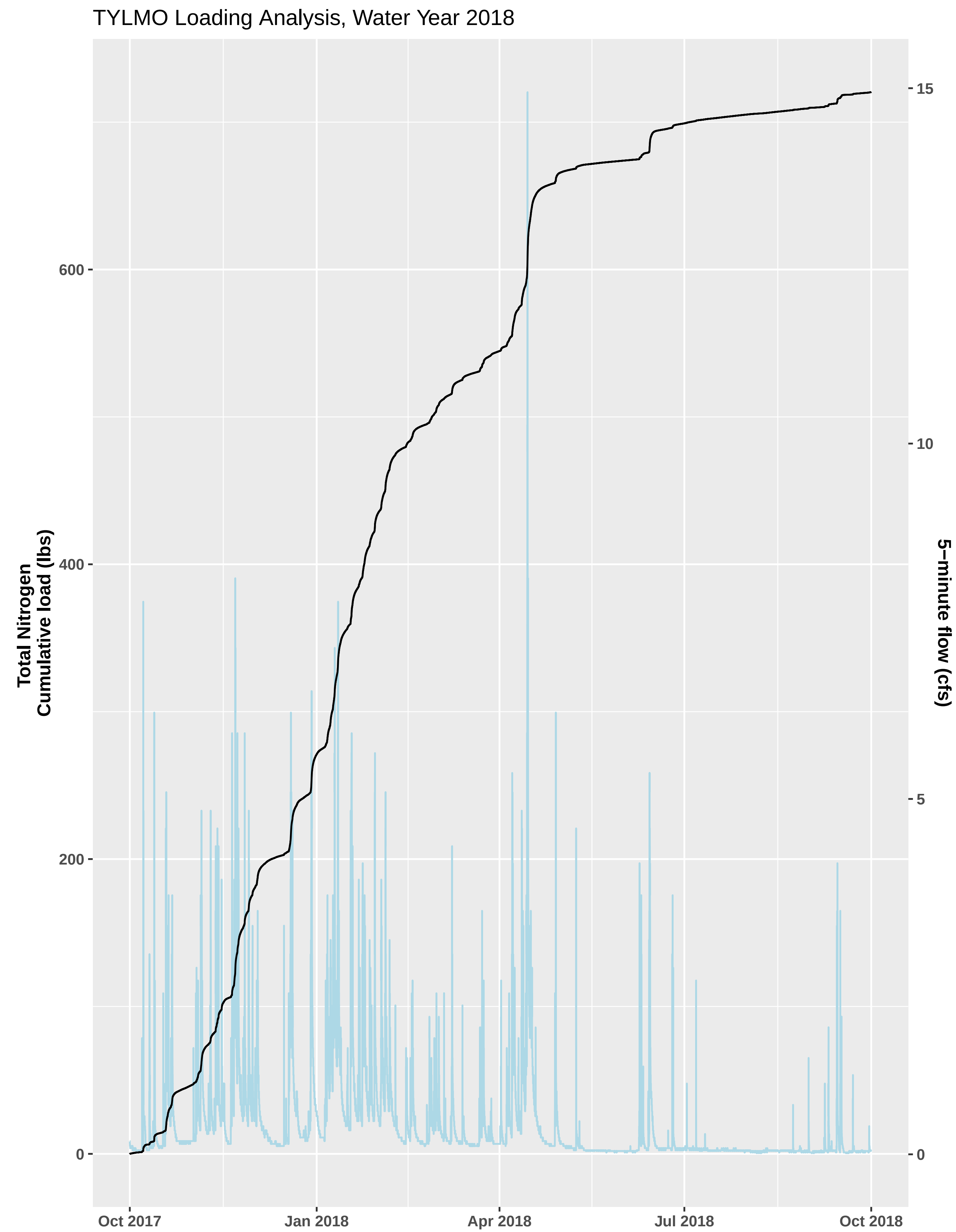

TYLMO Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.060
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

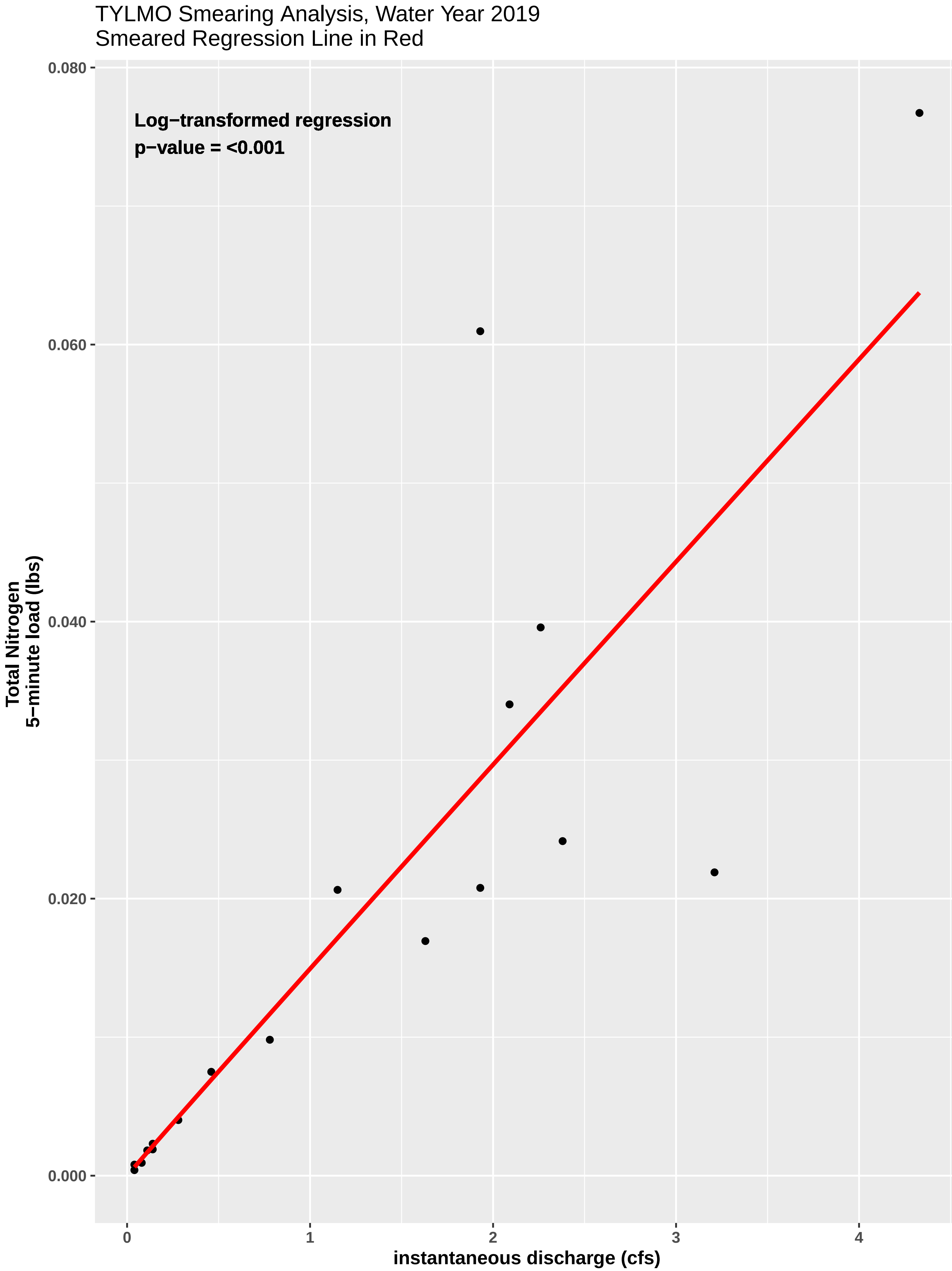

TYLMO Loading Analysis, Water Year 2016
Total Nitrogen
Cumulative load (lbs)
0
300
600
900
5−minute flow (cfs)
0.0
2.5
5.0
7.5
10.0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TYLMO Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.030
0.060
0.090
0
1
2
instantaneous discharge (cfs)

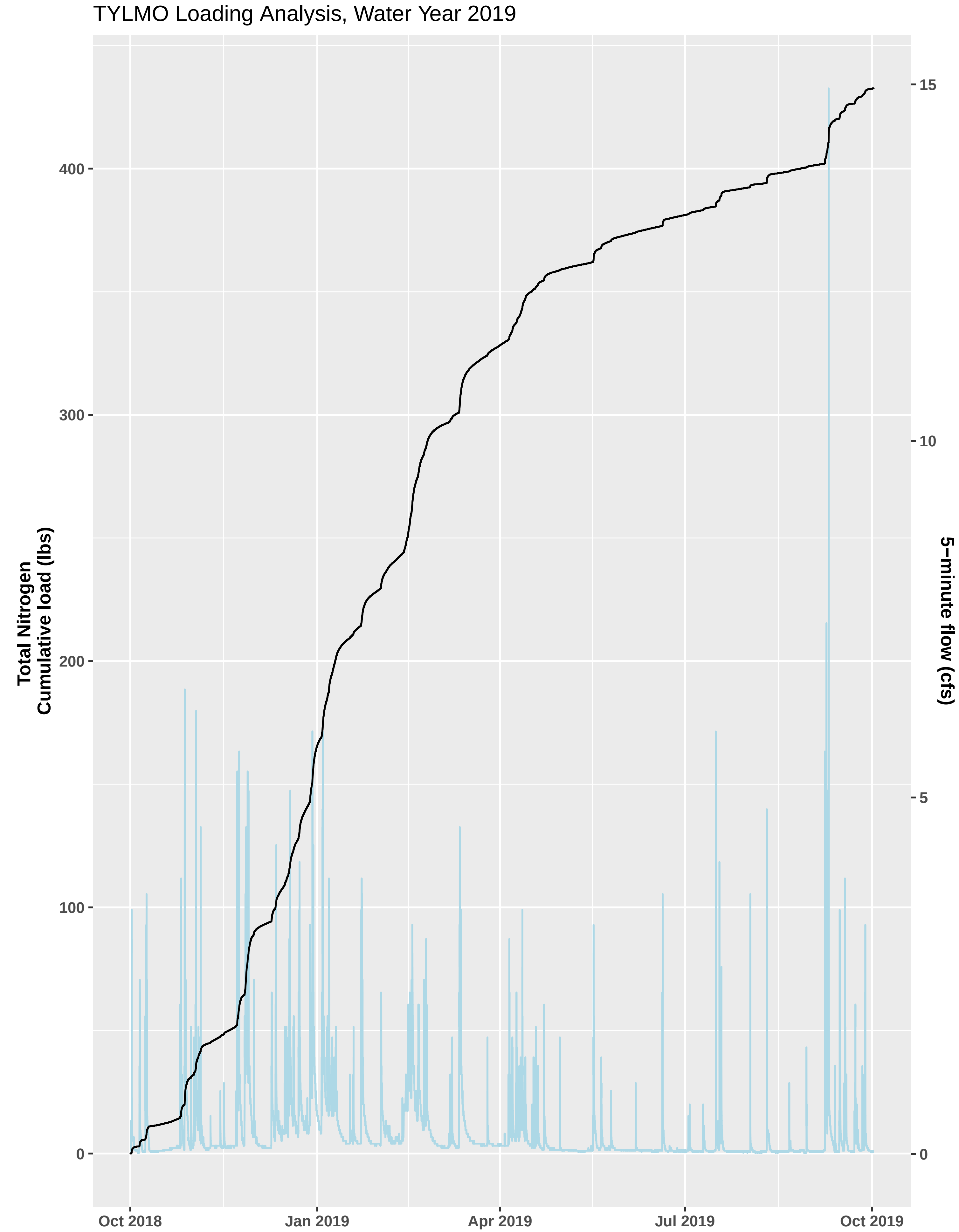

TYLMO Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
400
800
1,200
5−minute flow (cfs)
0
5
10
15
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMO Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.125
0.100
0.075
0.050
0.025
0.000
0
2
4

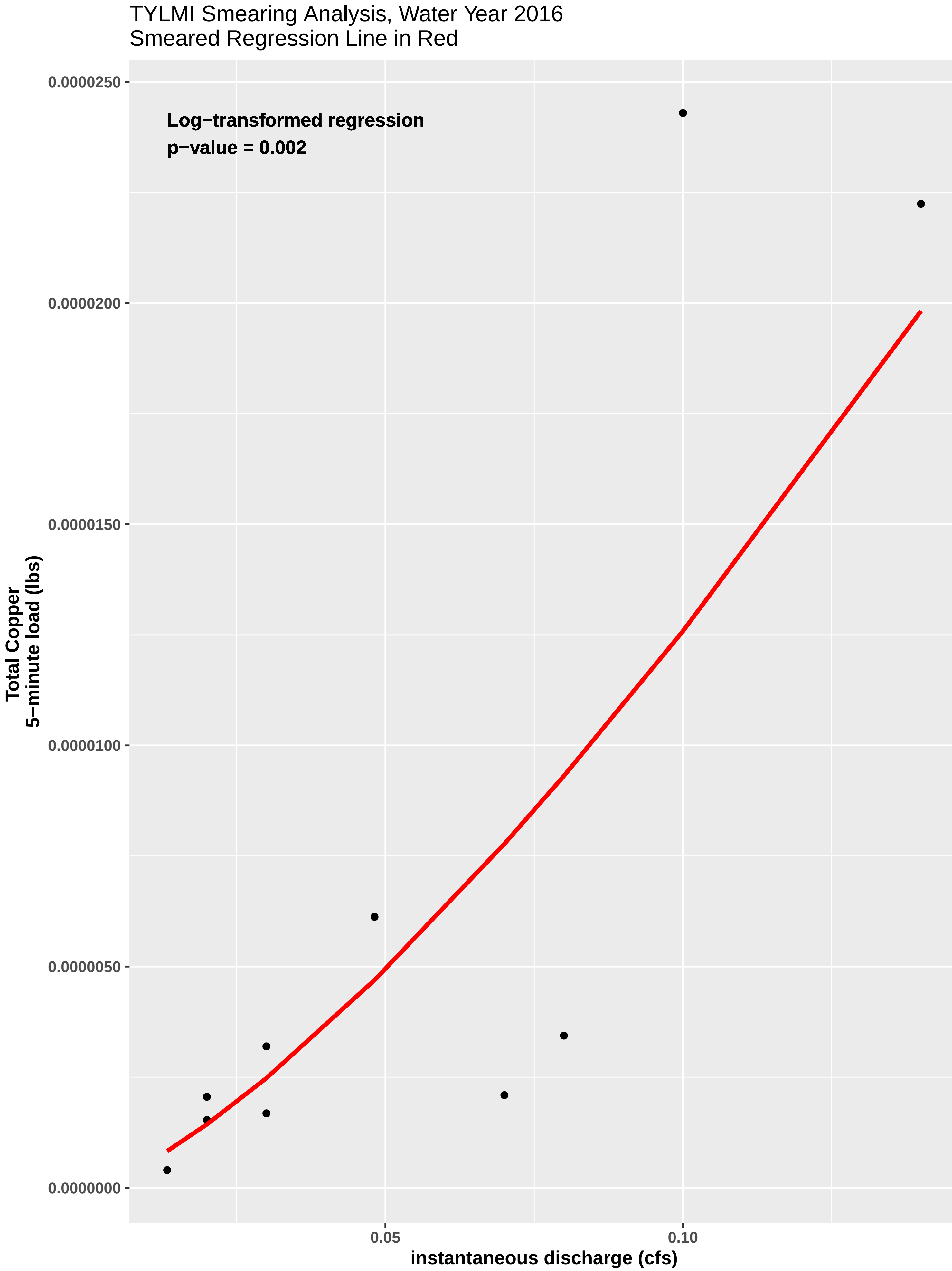

TYLMO Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
600
400
200
0
15
10
5
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

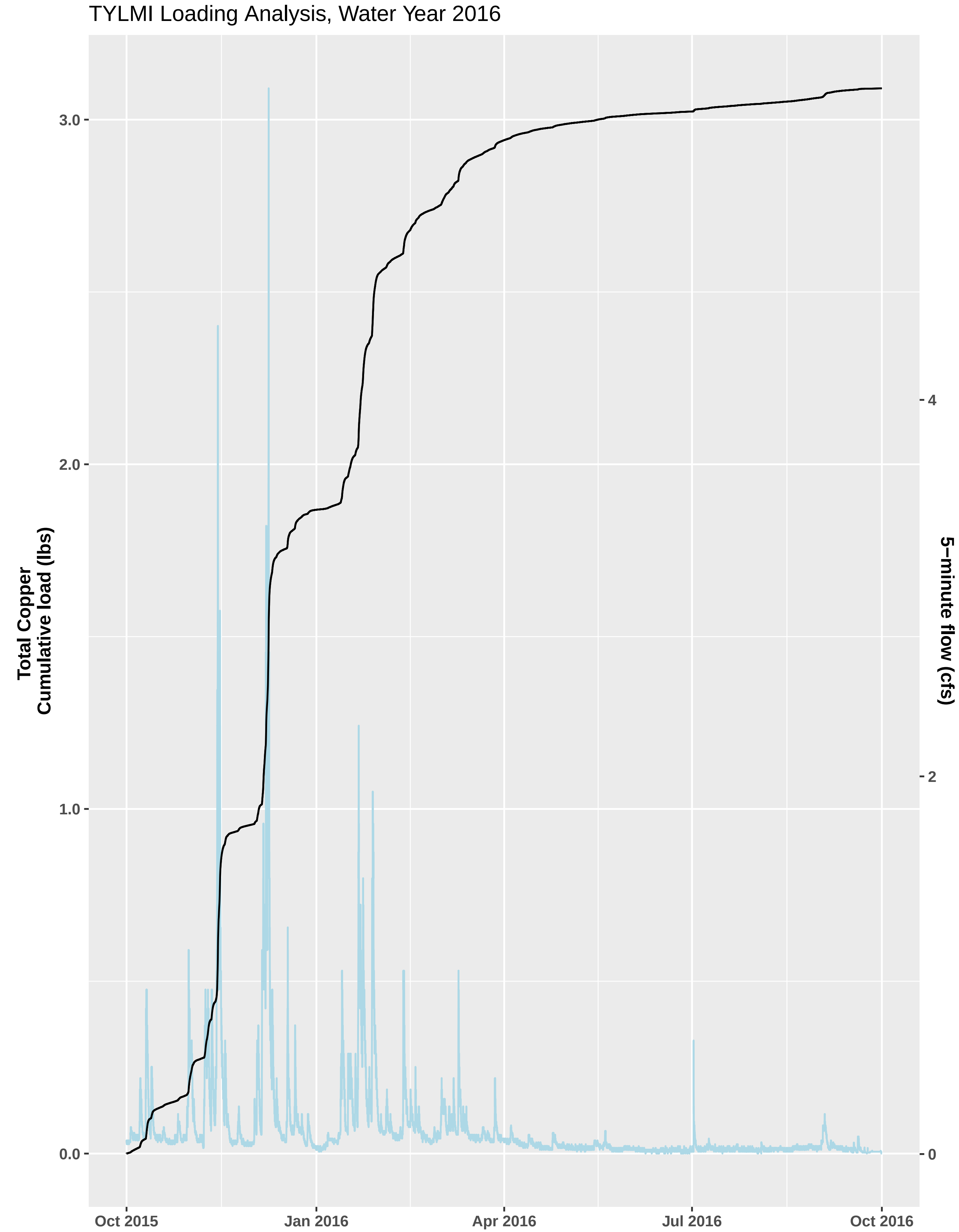


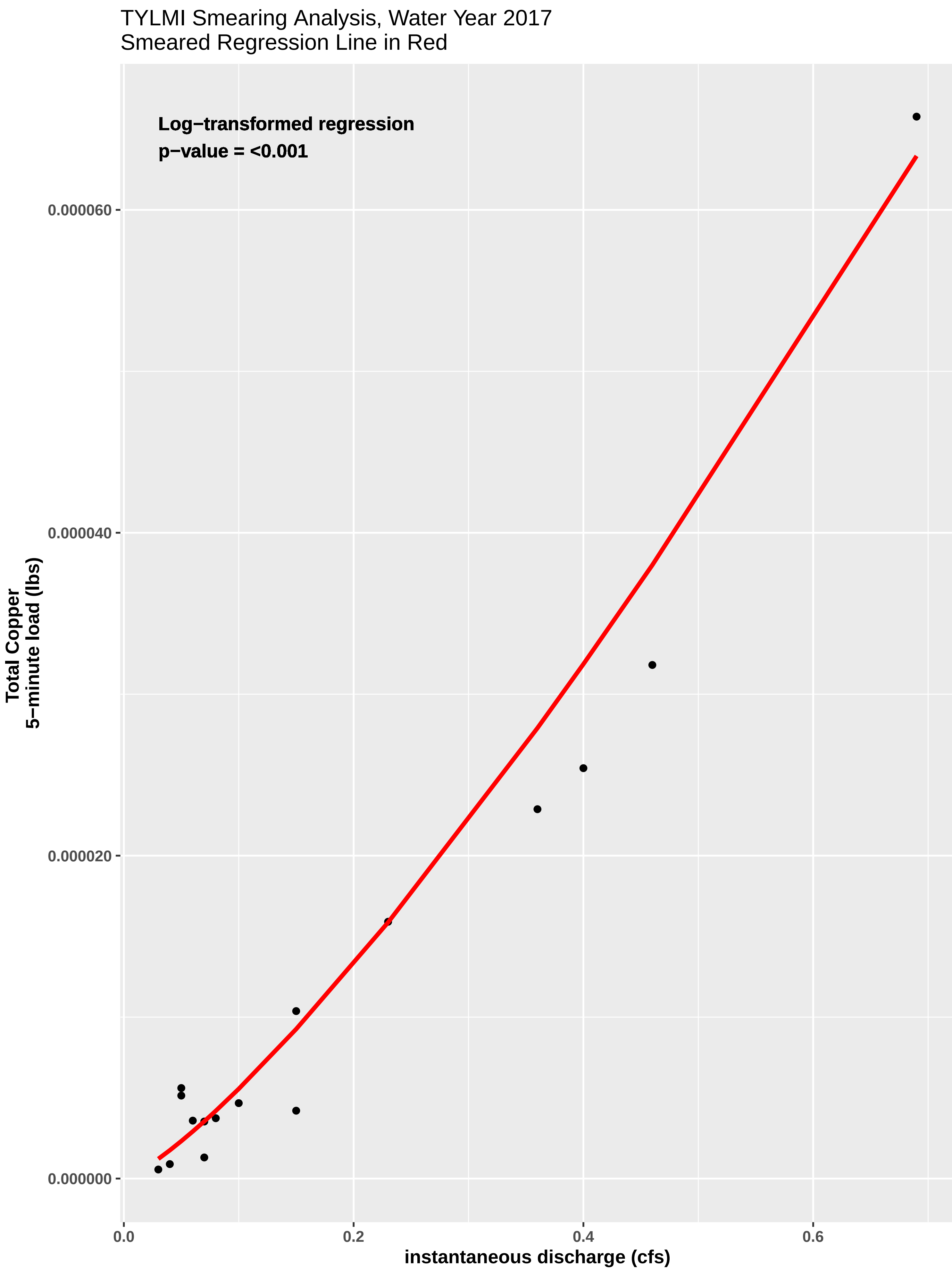
TYLMO Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
instantaneous discharge (cfs)
0.000
0.020
0.040
0.060
0.080
0
1
2
3
4

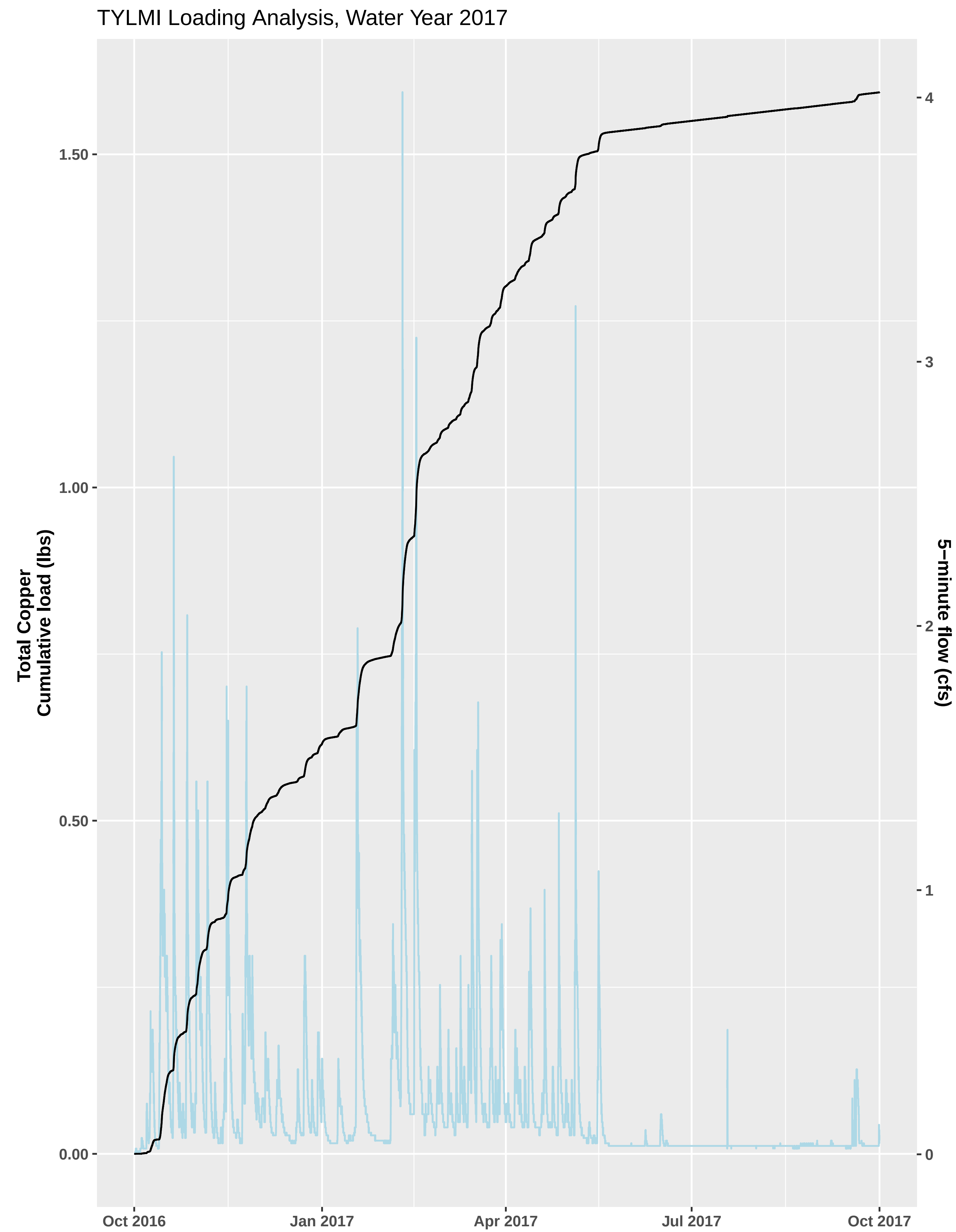


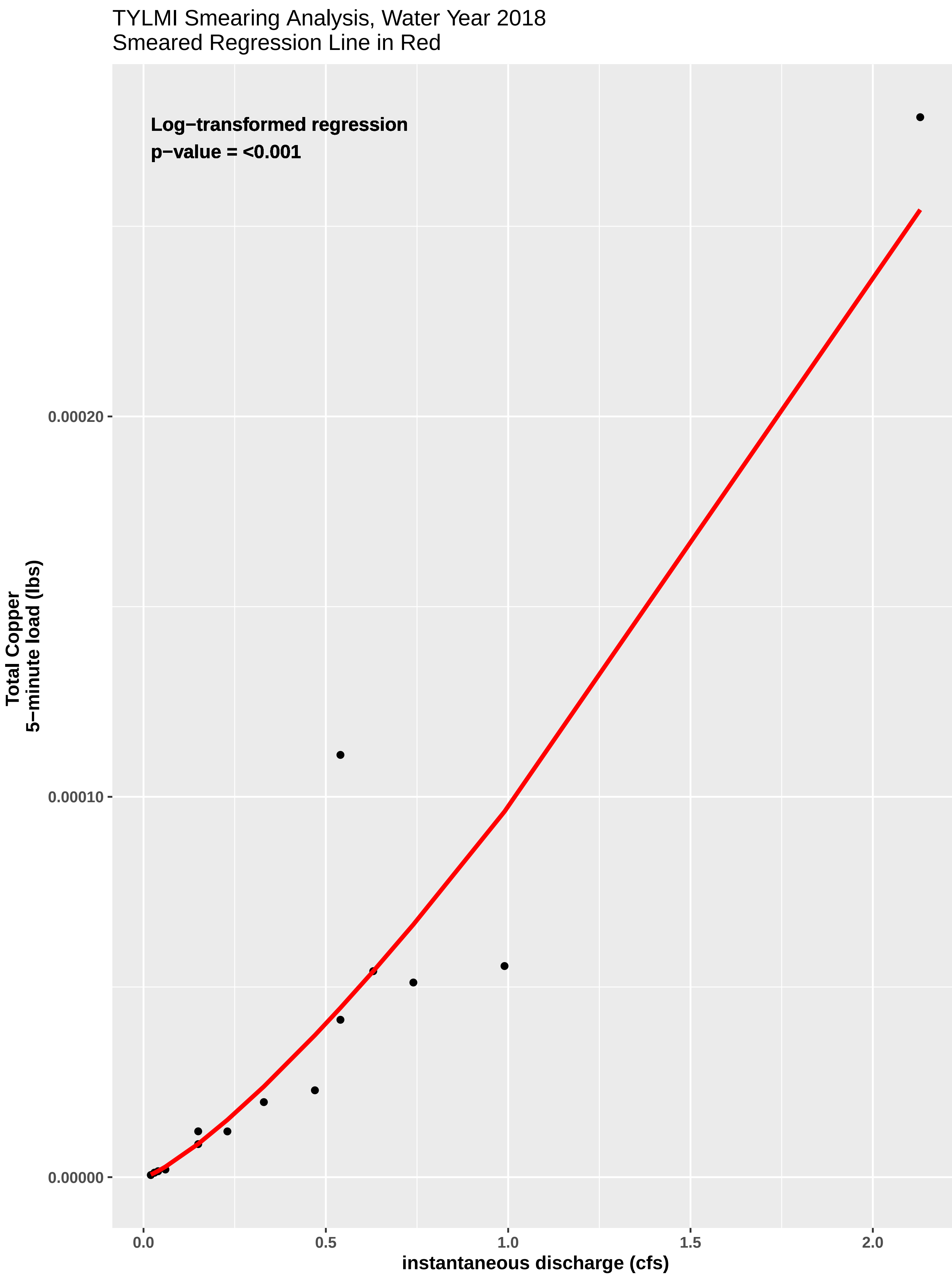
TYLMO Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
5−minute flow (cfs)
0
100
200
300
400
0
5
10
15
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

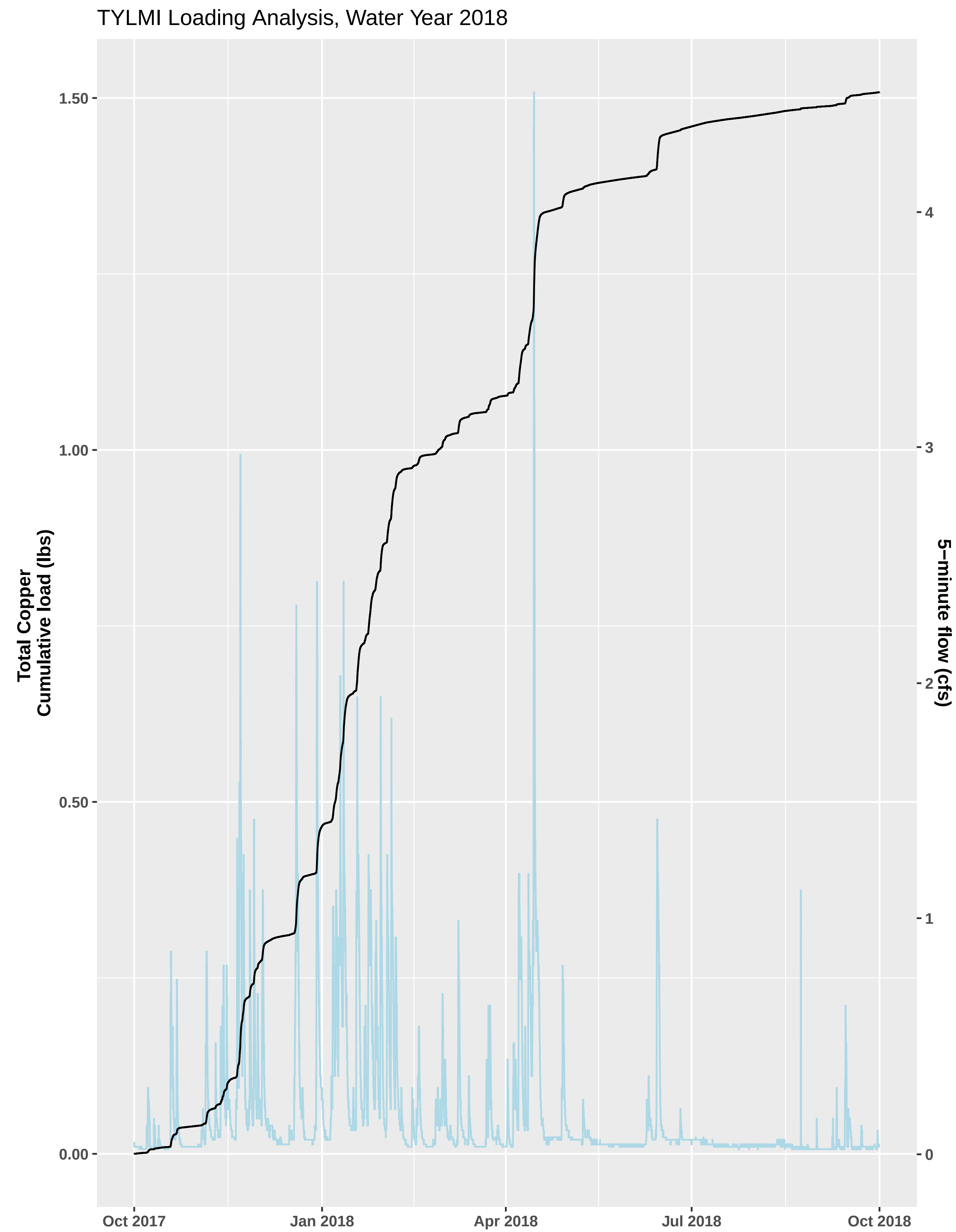

TYLMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Copper
5−minute load (lbs)
0.0000250
0.0000200
0.0000150
0.0000100
0.0000050
0.0000000
0.05
0.10
instantaneous discharge (cfs)

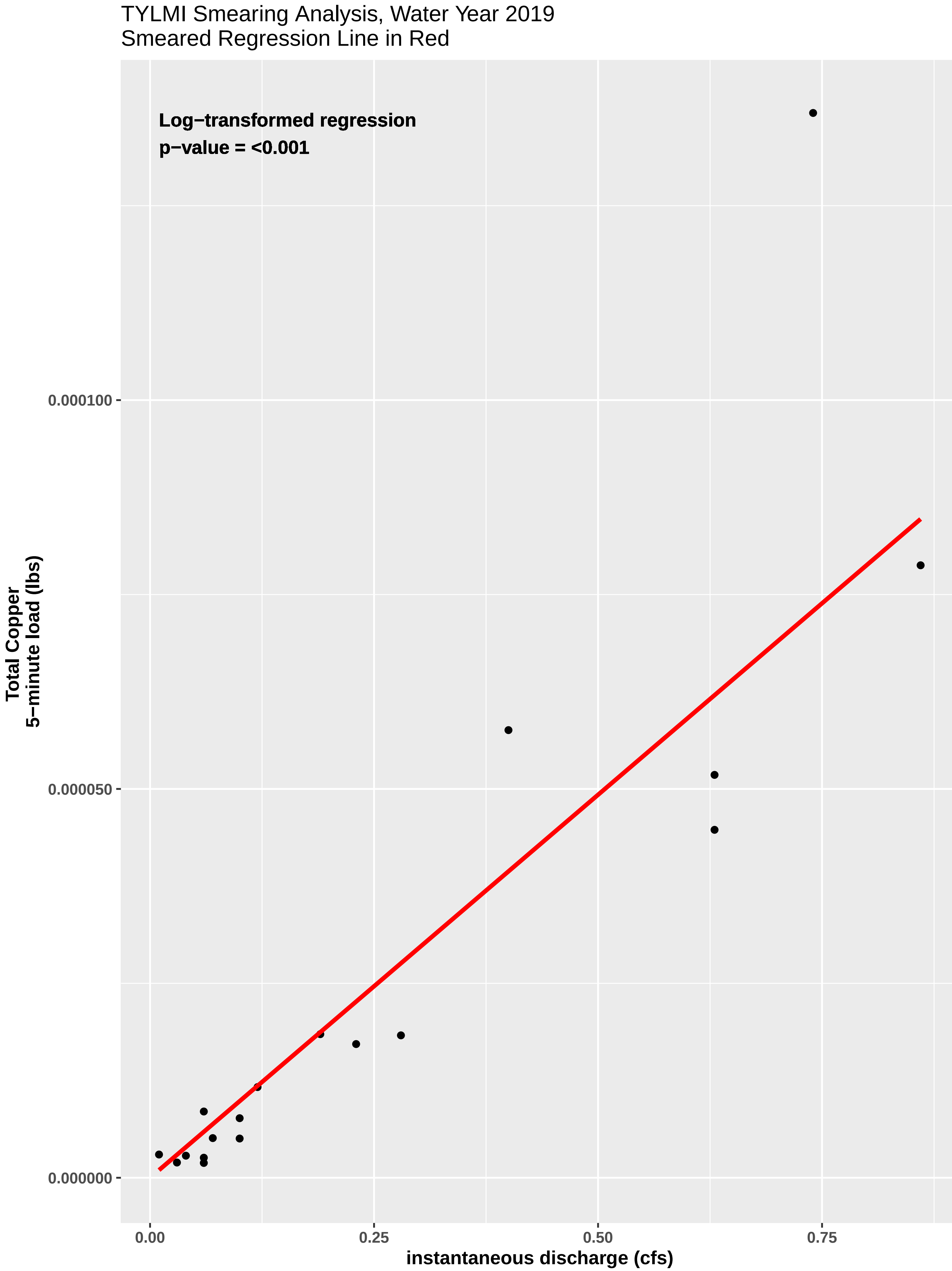

TYLMI Loading Analysis, Water Year 2016
Total Copper
Cumulative load (lbs)
3.0
2.0
1.0
0.0
5−minute flow (cfs)
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

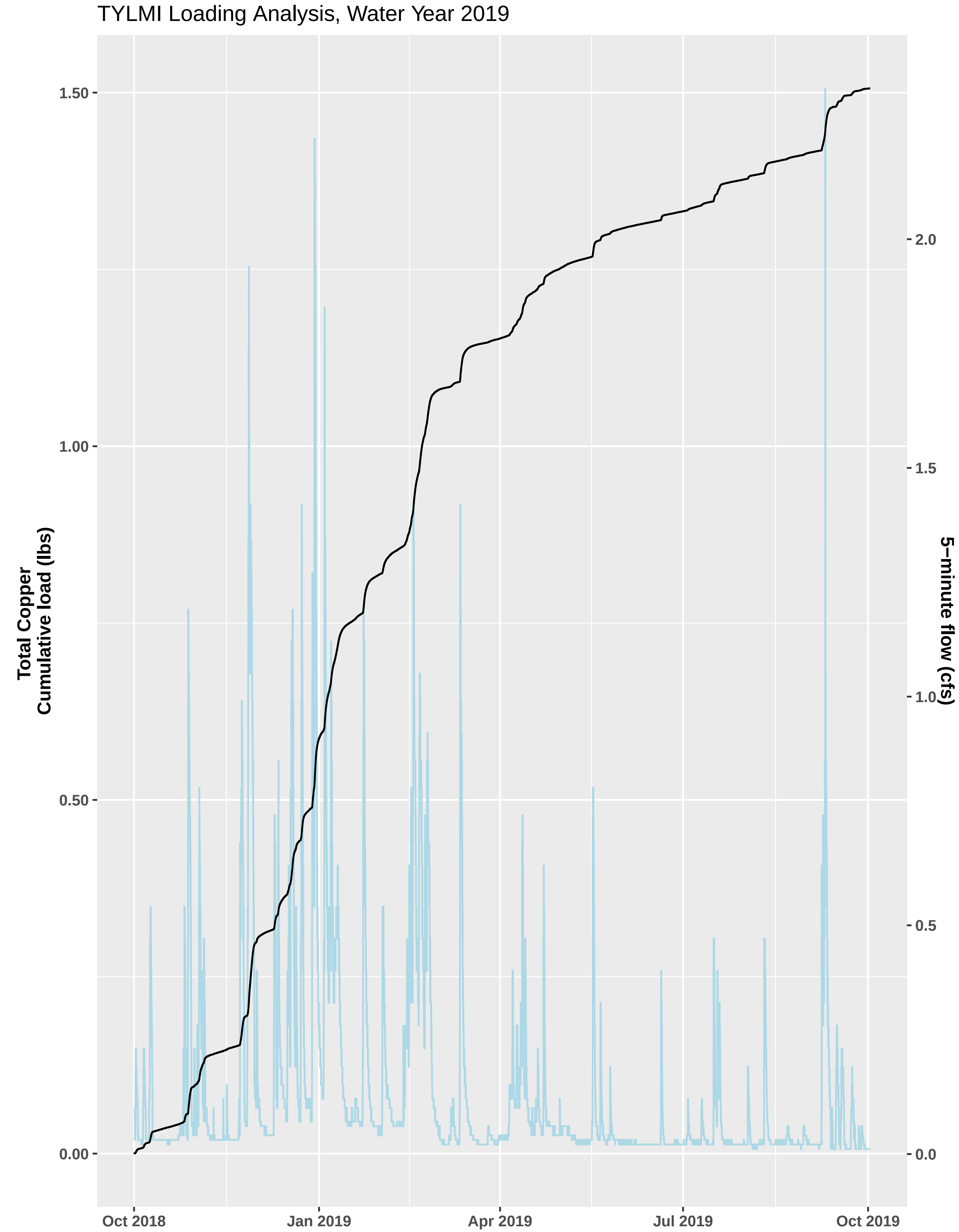

TYLMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000000
0.000020
0.000040
0.000060
0.0
0.2
0.4
0.6
instantaneous discharge (cfs)

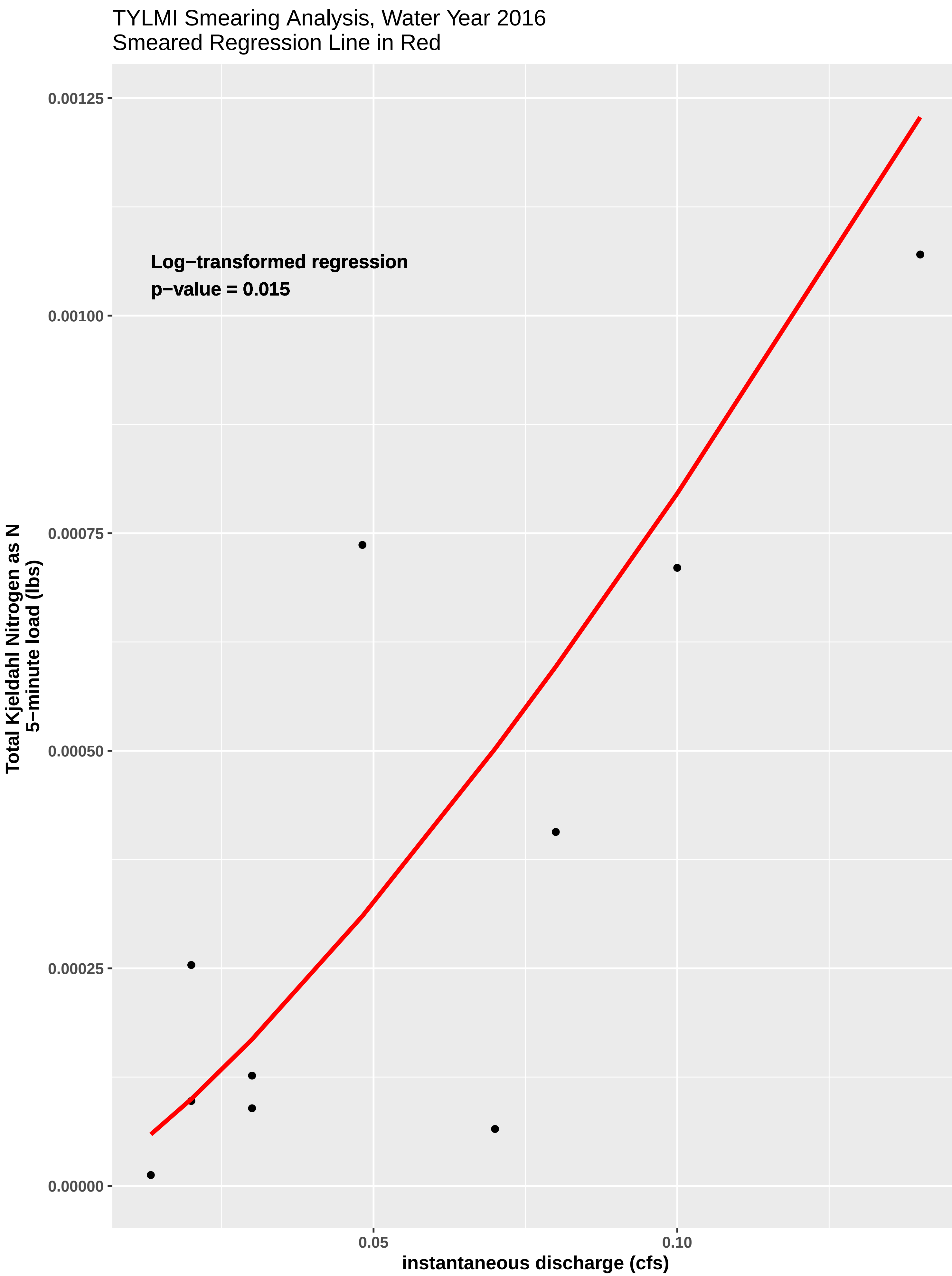

TYLMI Loading Analysis, Water Year 2017
Total Copper
Cumulative load (lbs)
0.00
0.50
1.00
1.50
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.00000
0.00010
0.00020
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

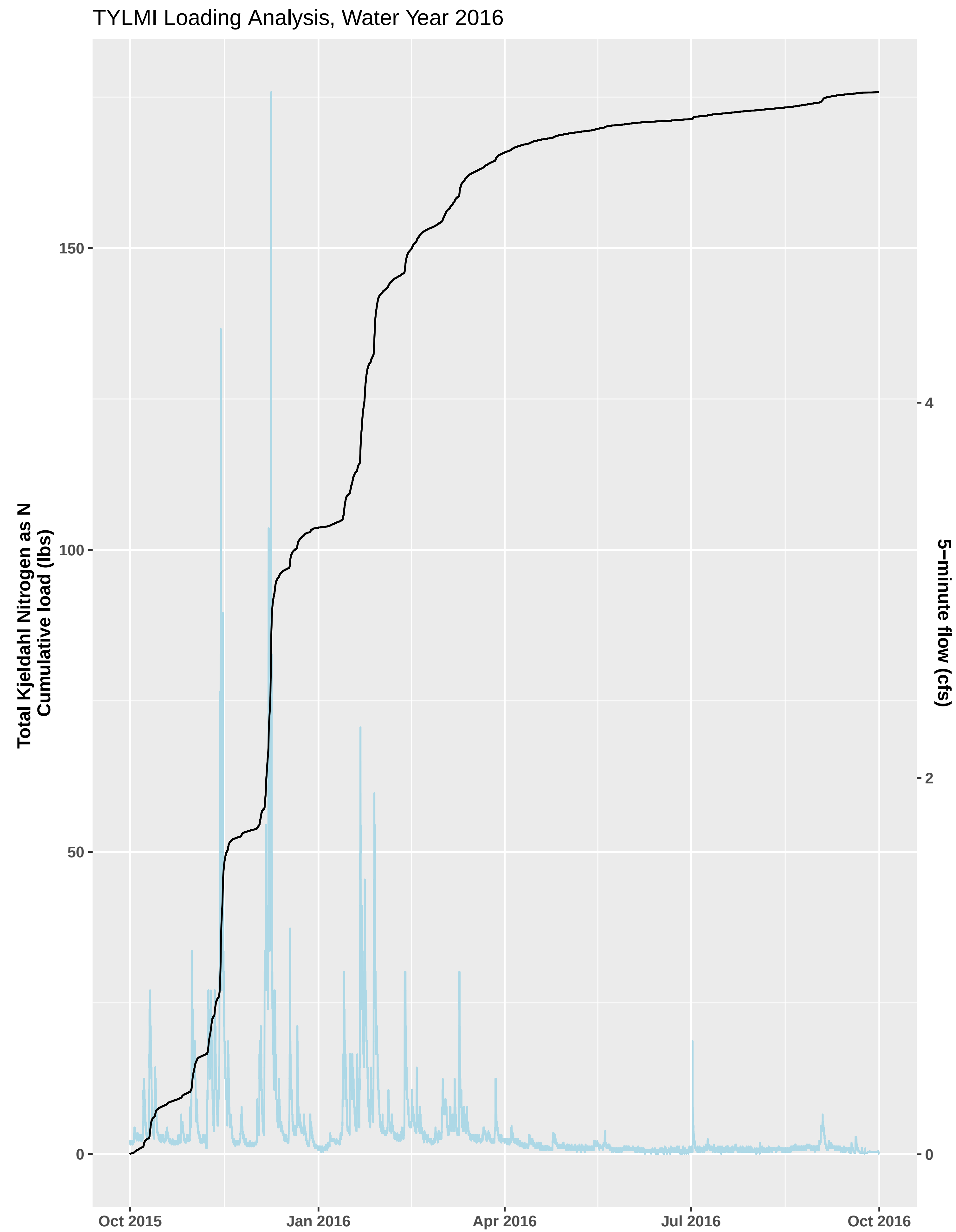

TYLMI Loading Analysis, Water Year 2018
Total Copper
Cumulative load (lbs)
0.00
0.50
1.00
1.50
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TYLMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Copper
5−minute load (lbs)
0.000100
0.000050
0.000000
0.00
0.25
0.50
0.75
instantaneous discharge (cfs)

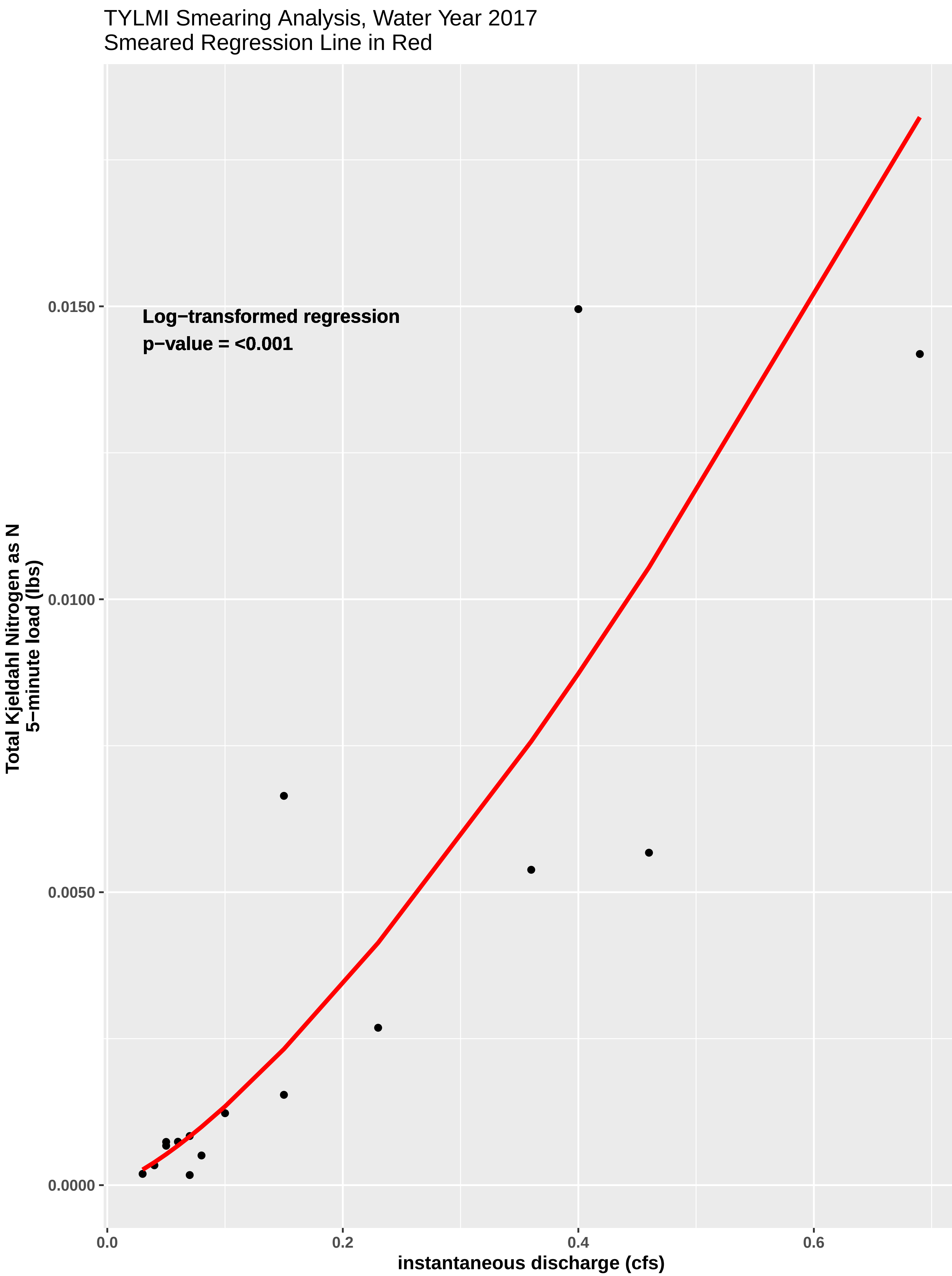

TYLMI Loading Analysis, Water Year 2019
Total Copper
Cumulative load (lbs)
1.50
1.00
0.50
0.00
5−minute flow (cfs)
2.0
1.5
1.0
0.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

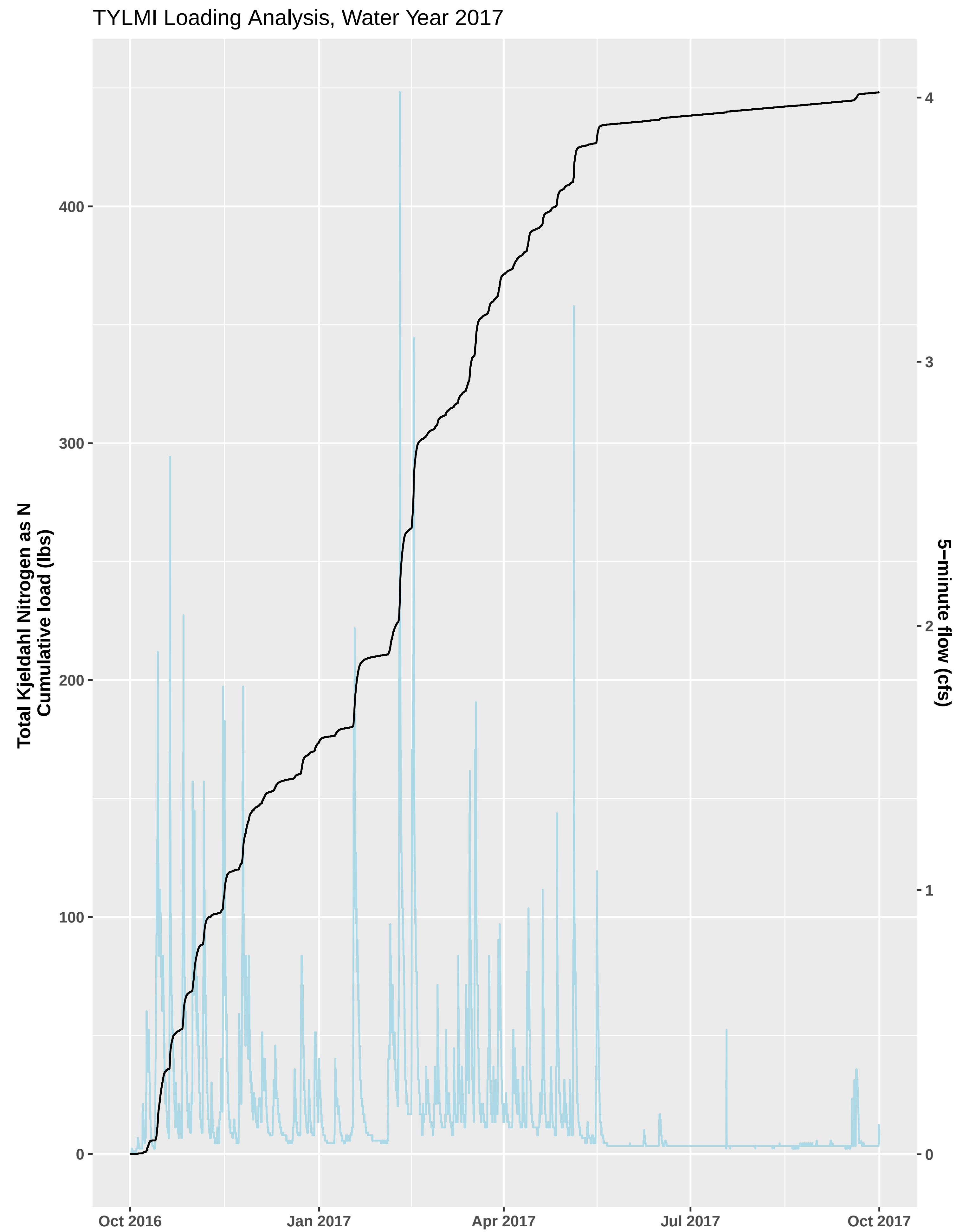


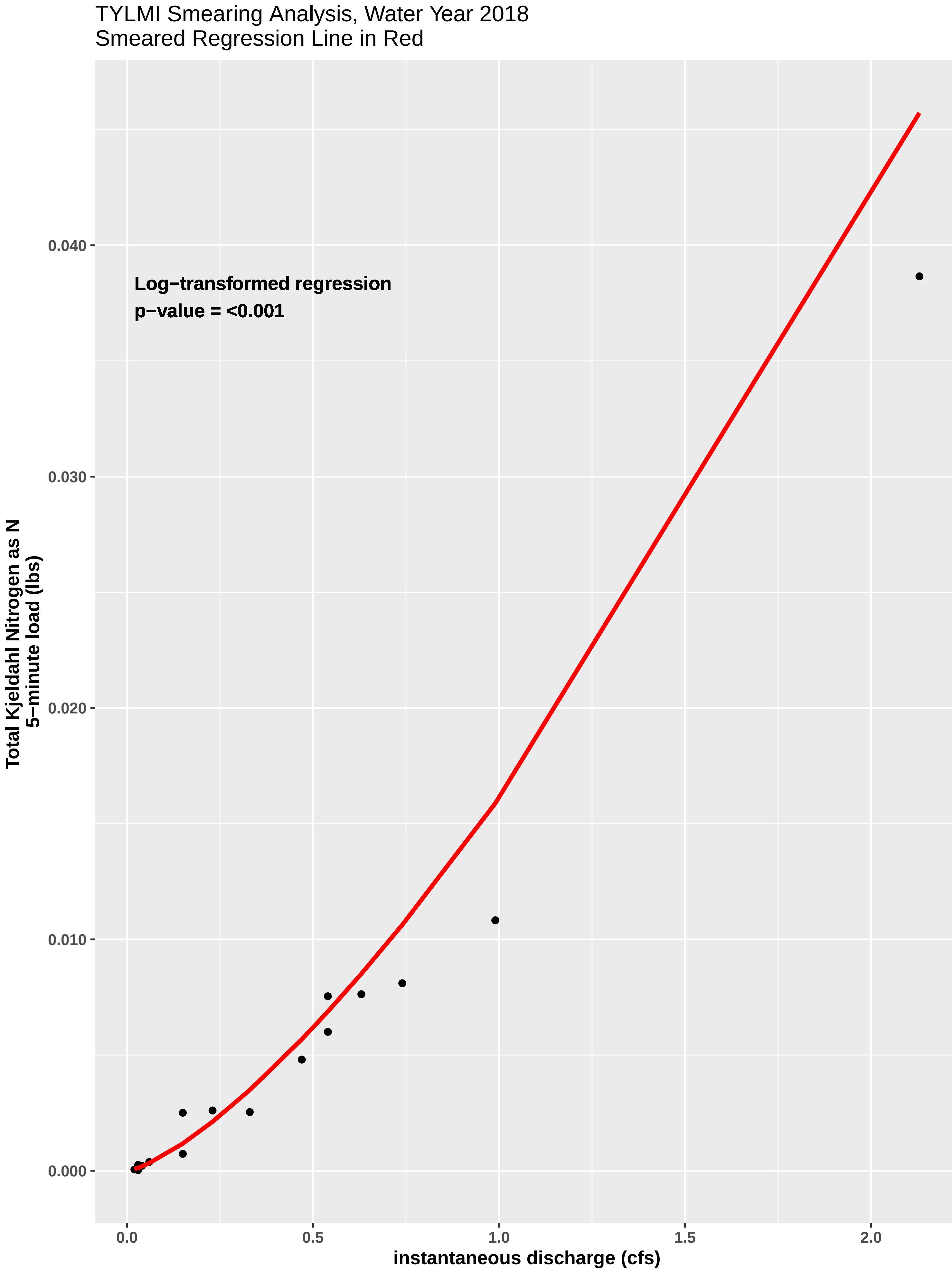
TYLMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.015
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.00125
0.00100
0.00075
0.00050
0.00025
0.00000
0.05
0.10
instantaneous discharge (cfs)

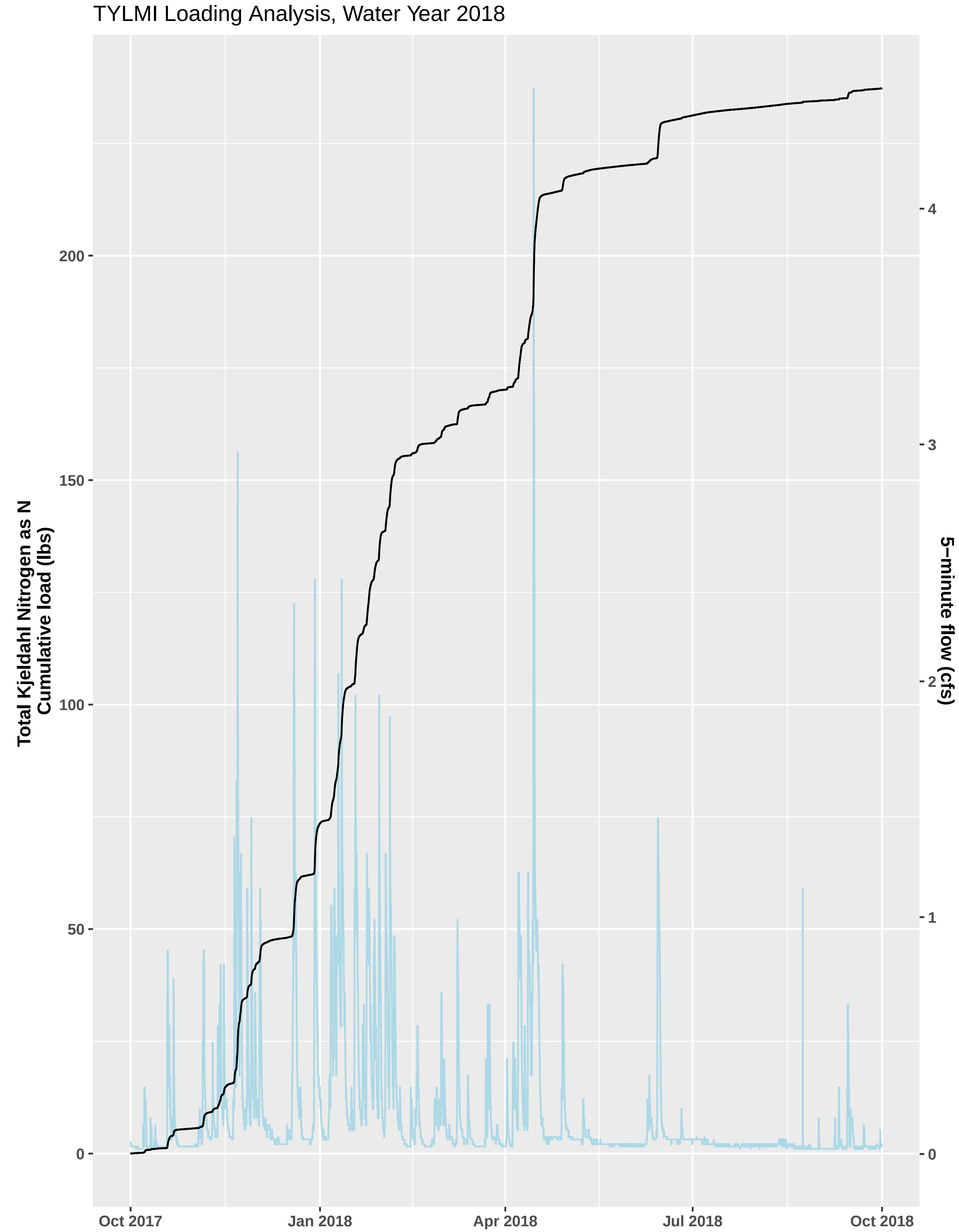


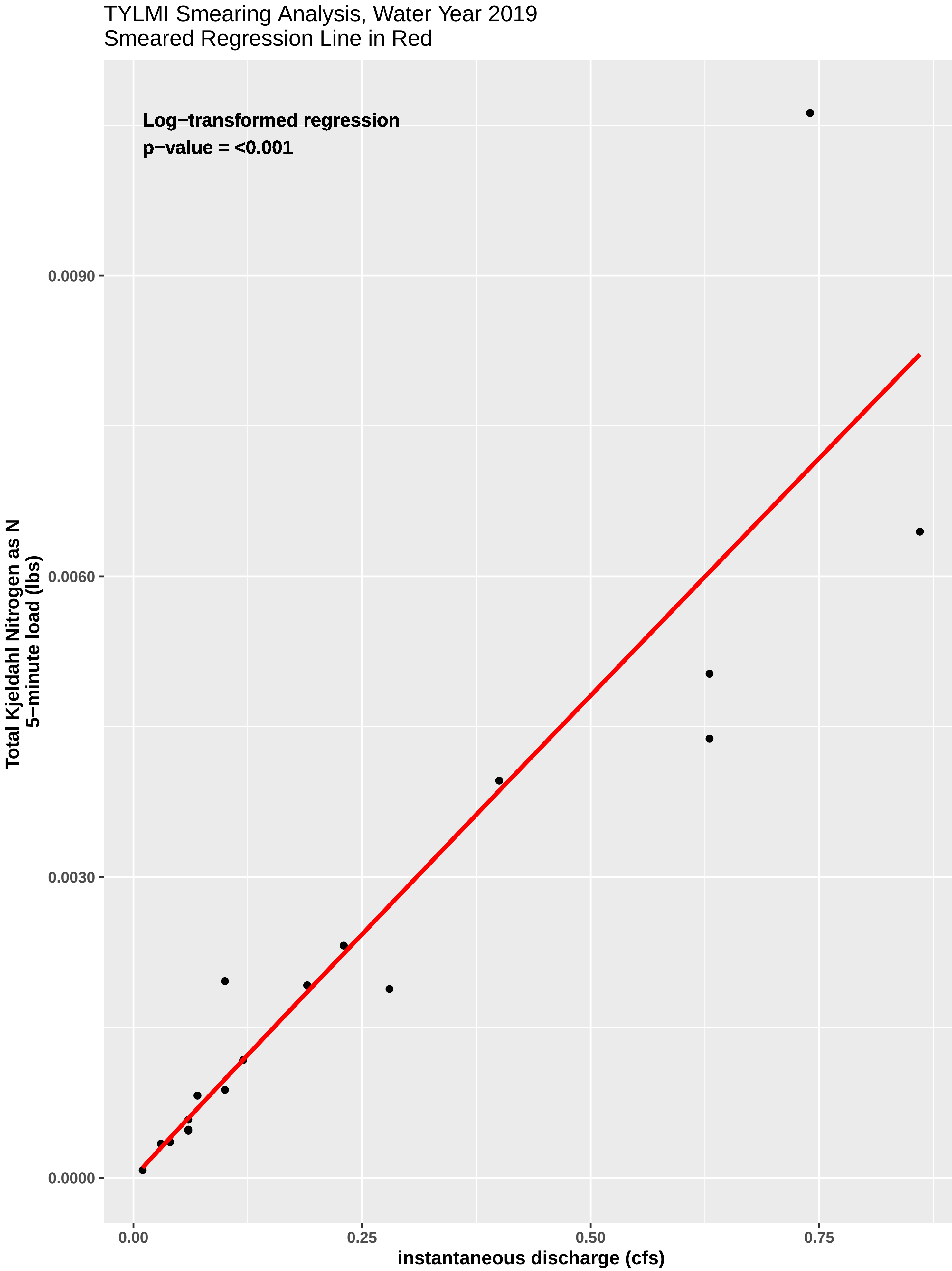
TYLMI Loading Analysis, Water Year 2016
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
150
100
50
0
5−minute flow (cfs)
4
2
0
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TYLMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0
0.2
0.4
0.6
instantaneous discharge (cfs)

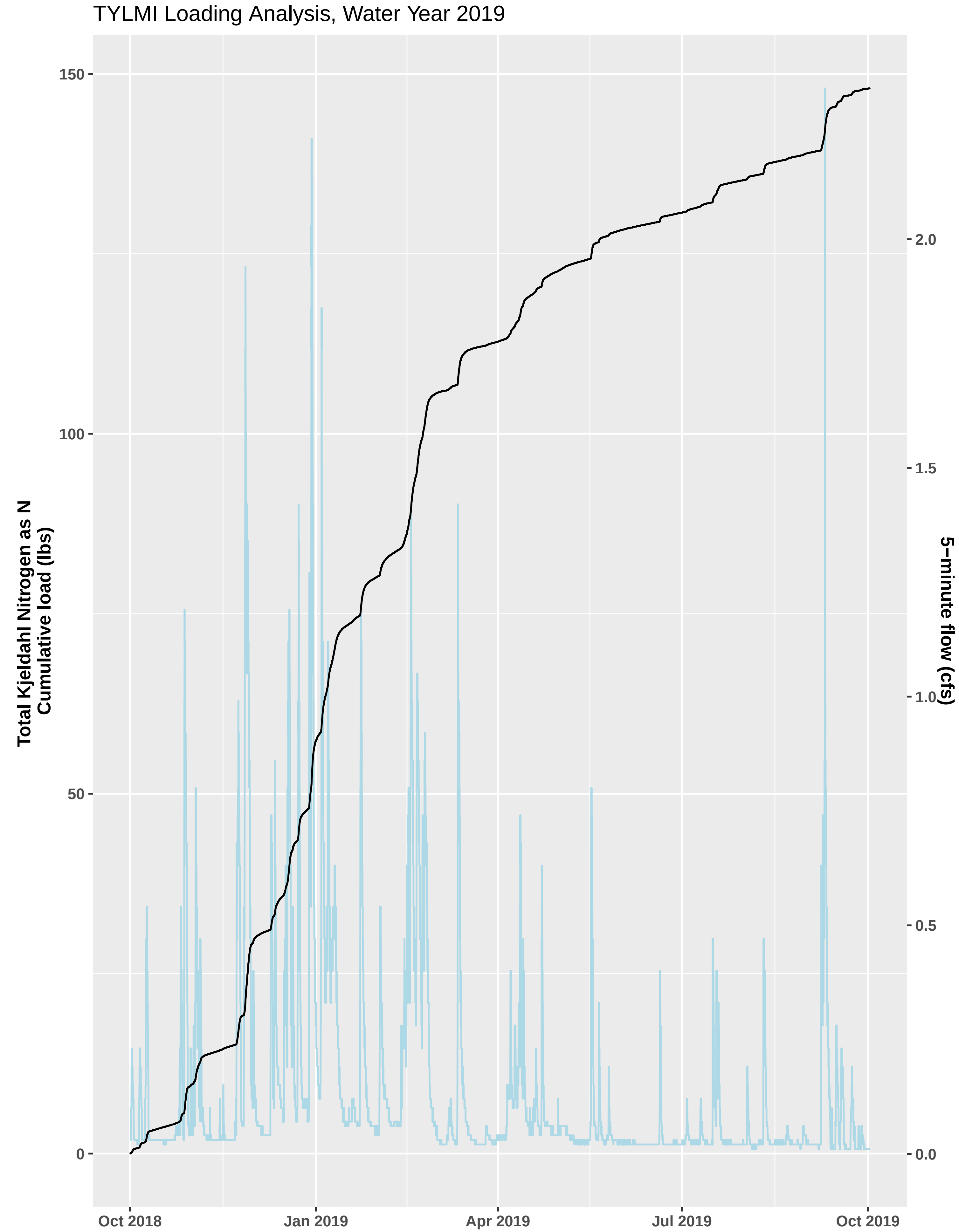

TYLMI Loading Analysis, Water Year 2017
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
100
200
300
400
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.000
0.010
0.020
0.030
0.040
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)

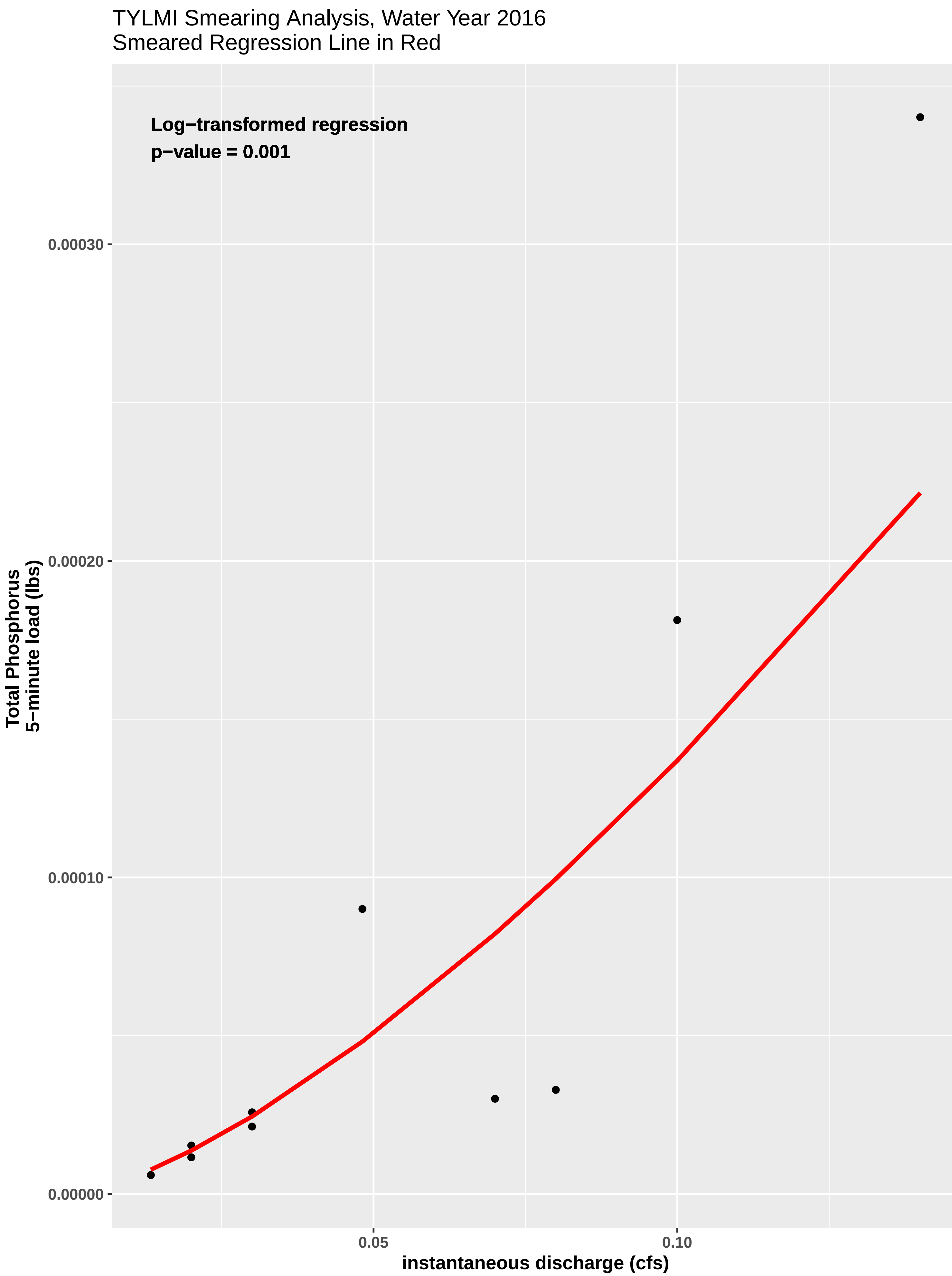

TYLMI Loading Analysis, Water Year 2018
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
0
50
100
150
200
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

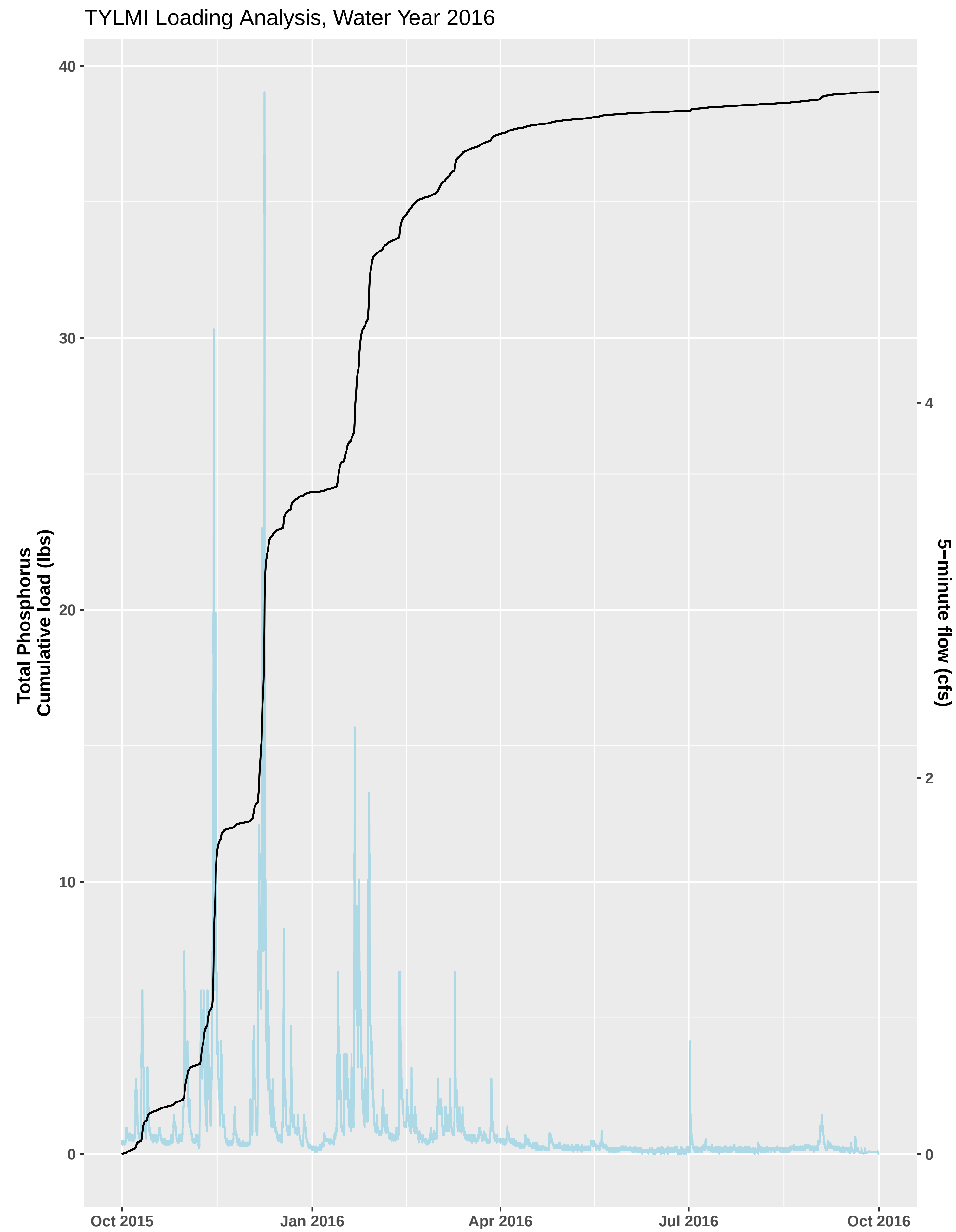


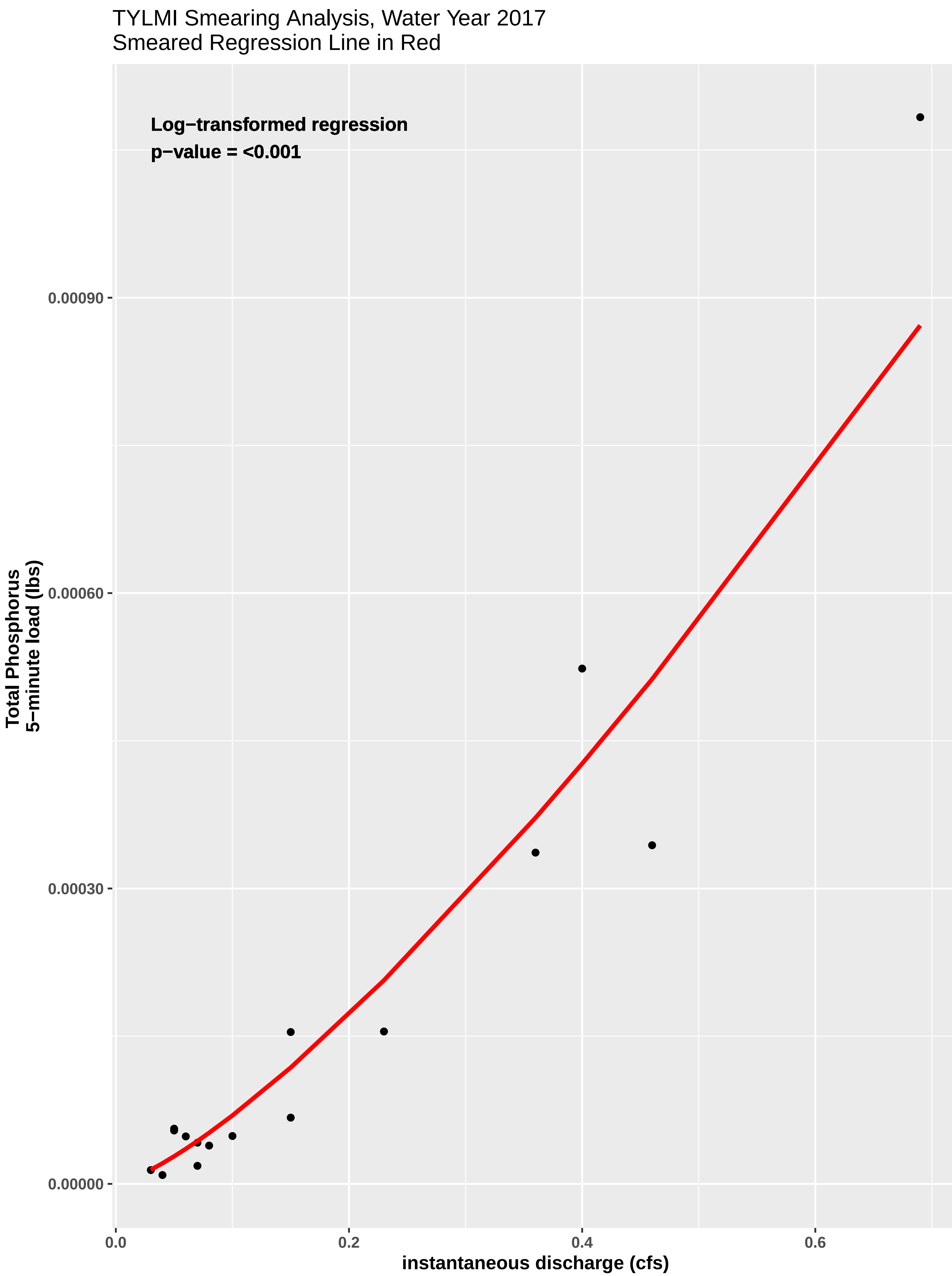
TYLMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Kjeldahl Nitrogen as N
5−minute load (lbs)
0.0090
0.0060
0.0030
0.0000
0.00
0.25
0.50
0.75
instantaneous discharge (cfs)

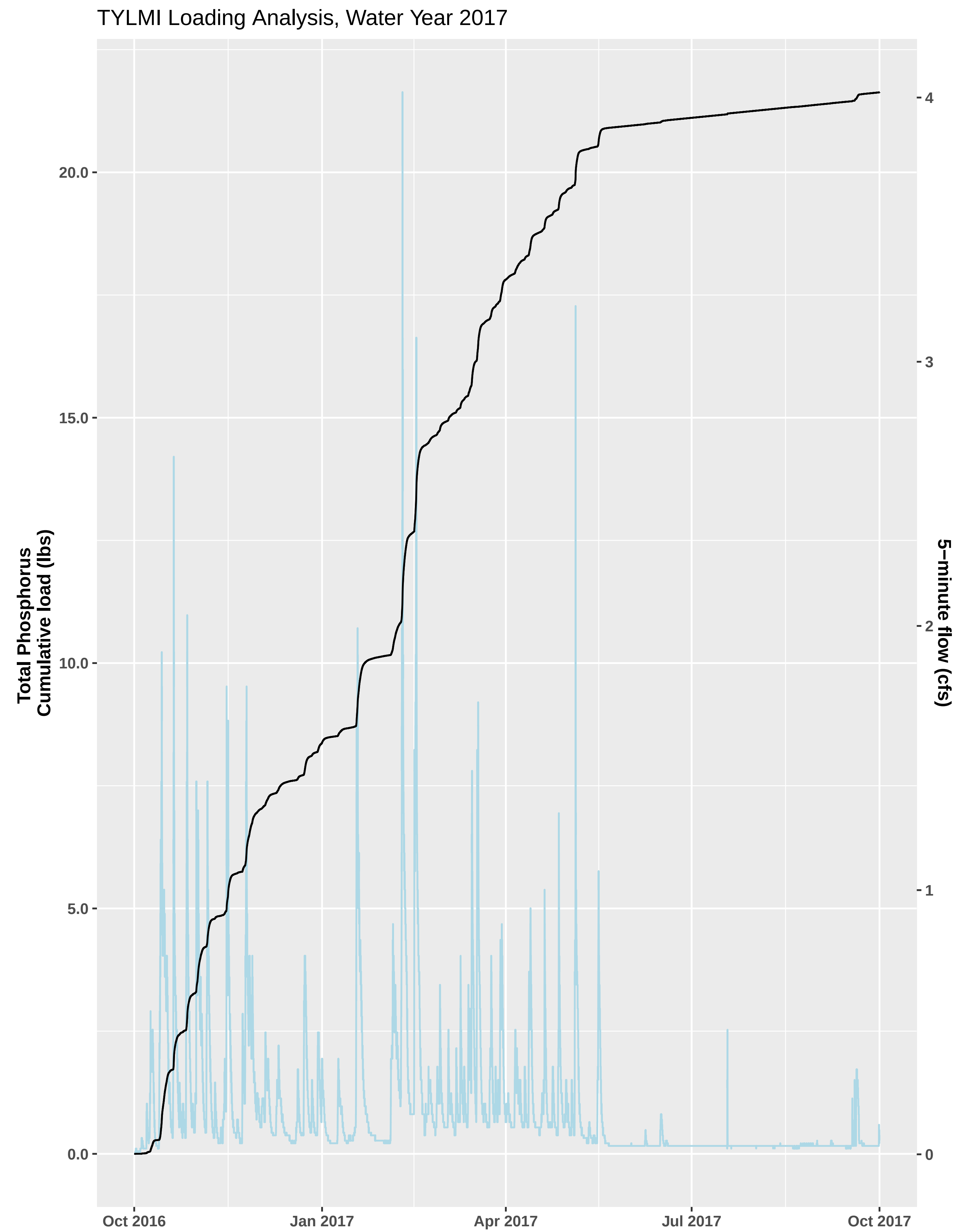


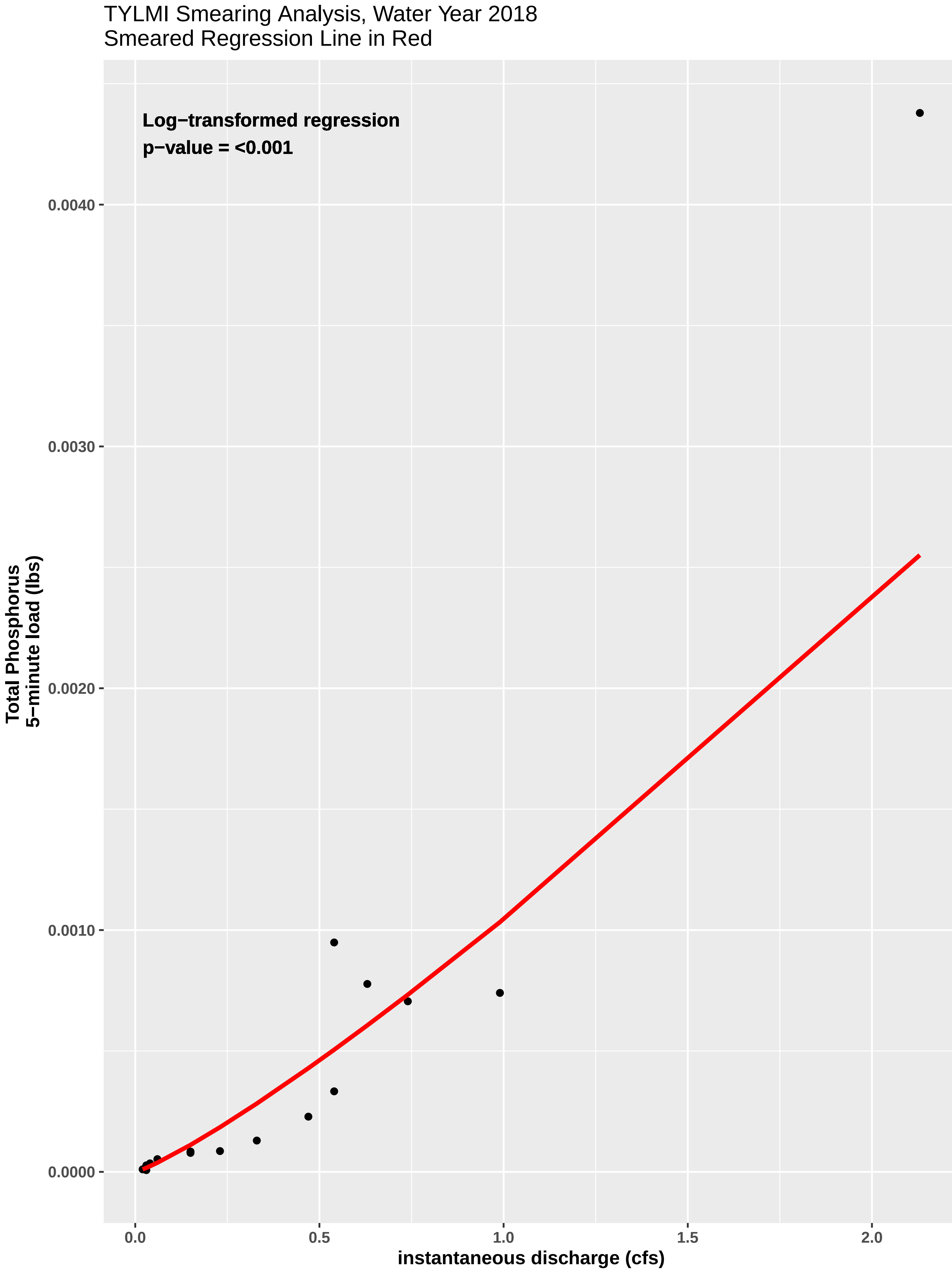
TYLMI Loading Analysis, Water Year 2019
Total Kjeldahl Nitrogen as N
Cumulative load (lbs)
150
100
50
0
5−minute flow (cfs)
2.0
1.5
1.0
0.5
0.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019


TYLMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.001
0.00030
0.00020
0.00010
0.00000
Total Phosphorus
5−minute load (lbs)
0.05
0.10
instantaneous discharge (cfs)

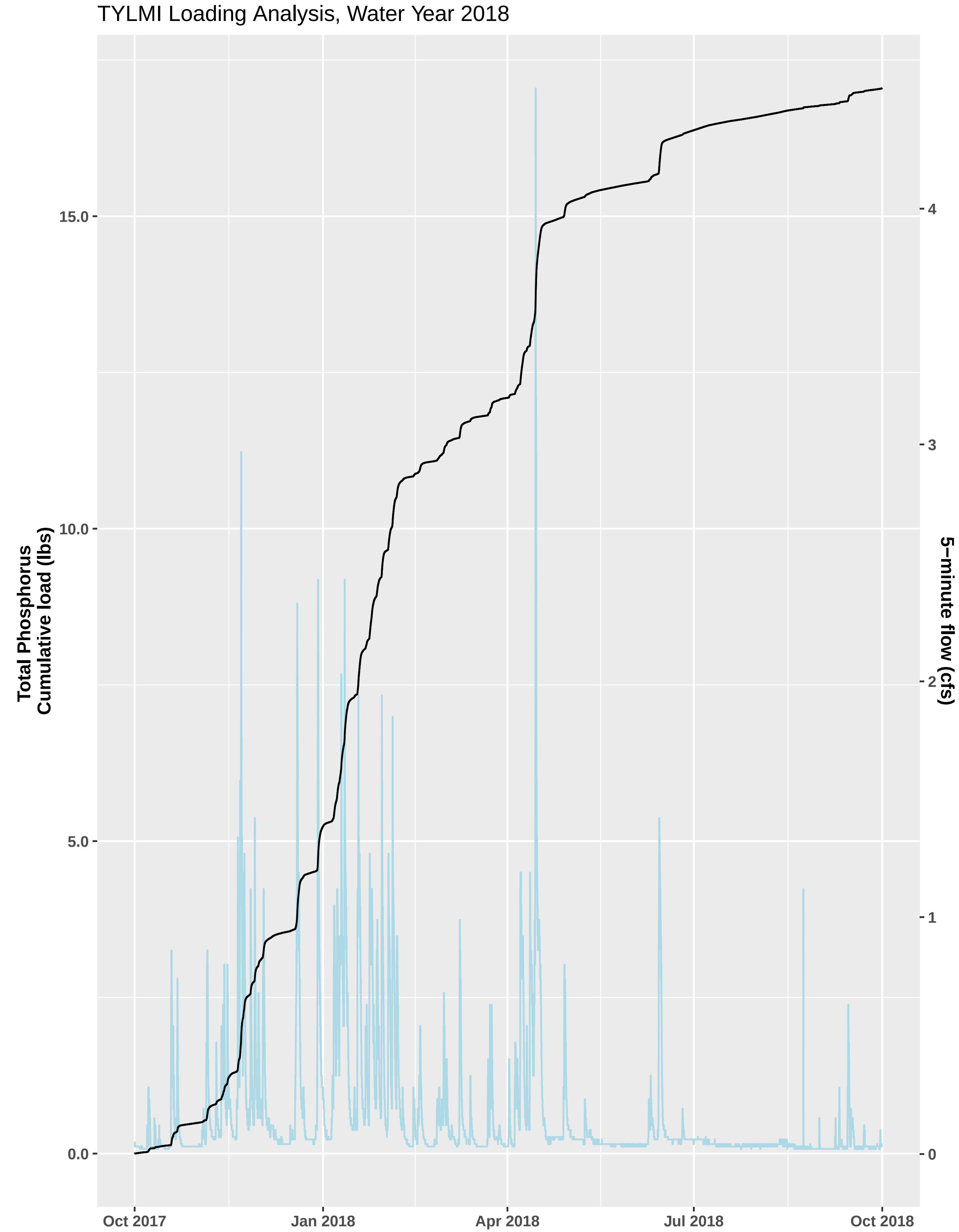

TYLMI Loading Analysis, Water Year 2016
40
30
20
10
0
Total Phosphorus
Cumulative load (lbs)
4
2
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TYLMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00030
0.00060
0.00090
0.0
0.2
0.4
0.6
instantaneous discharge (cfs)

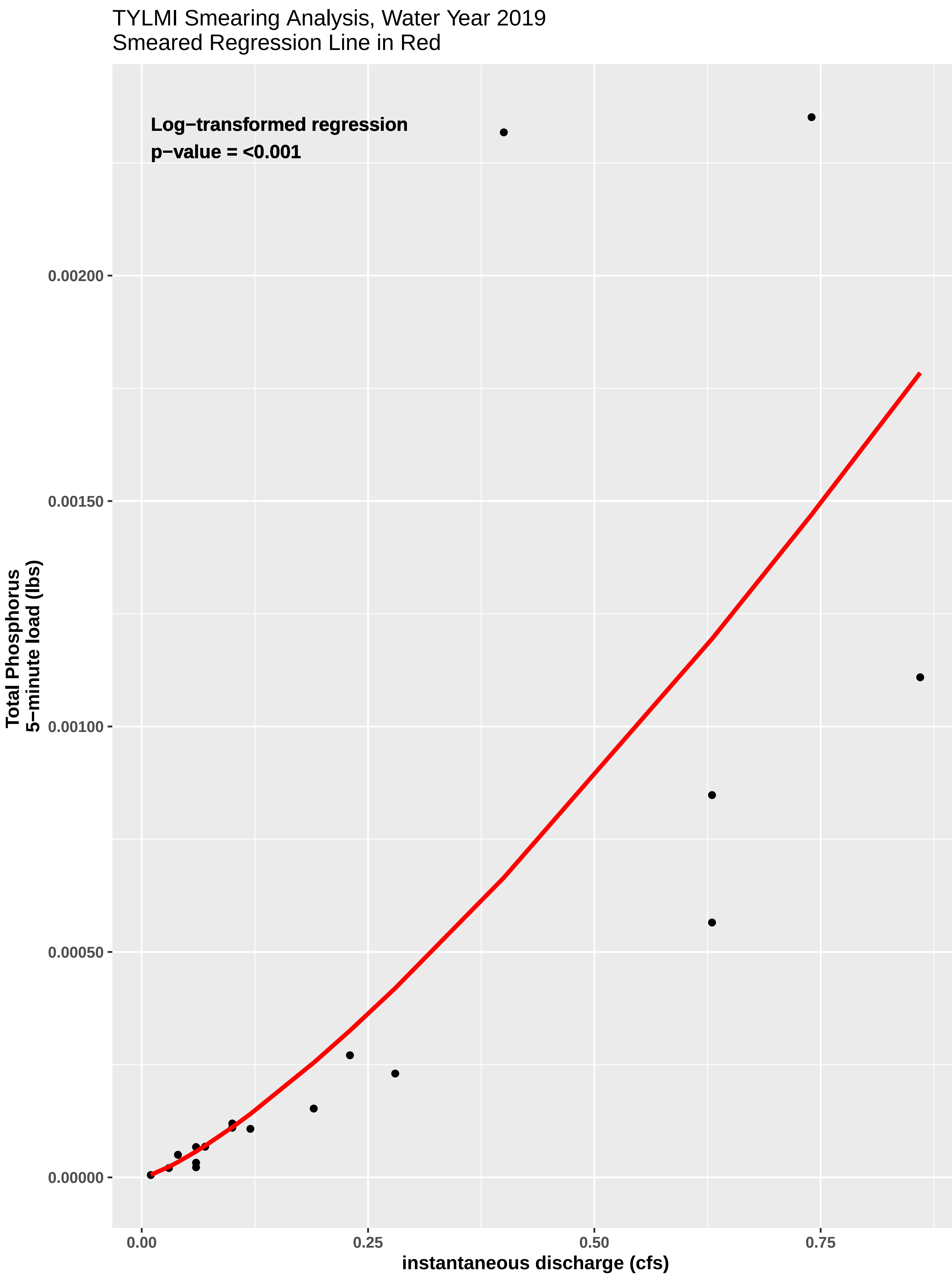

TYLMI Loading Analysis, Water Year 2017
Total Phosphorus
Cumulative load (lbs)
0.0
5.0
10.0
15.0
20.0
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017



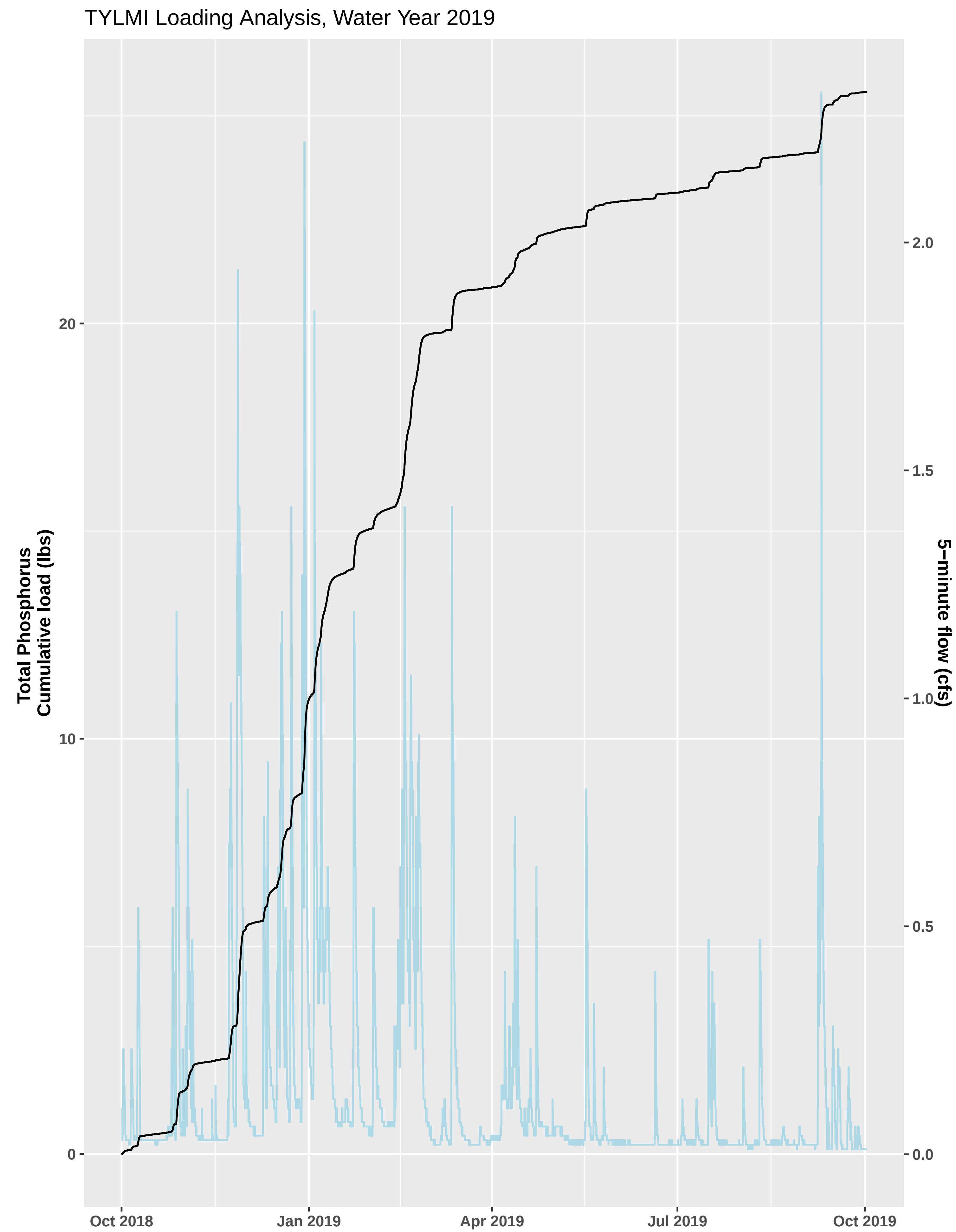
TYLMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.0000
0.0010
0.0020
0.0030
0.0040
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)



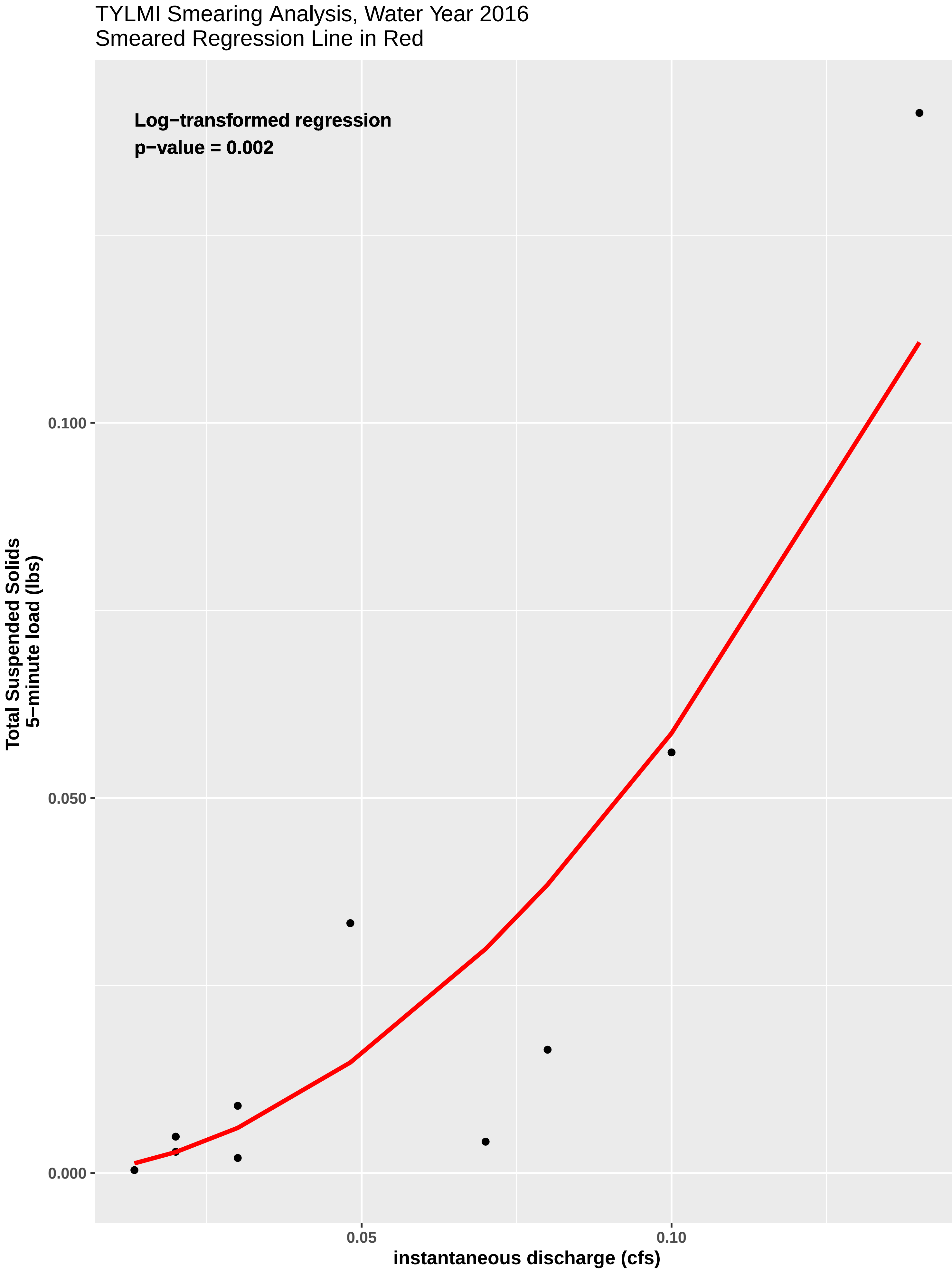
TYLMI Loading Analysis, Water Year 2018
Total Phosphorus
Cumulative load (lbs)
0.0
5.0
10.0
15.0
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

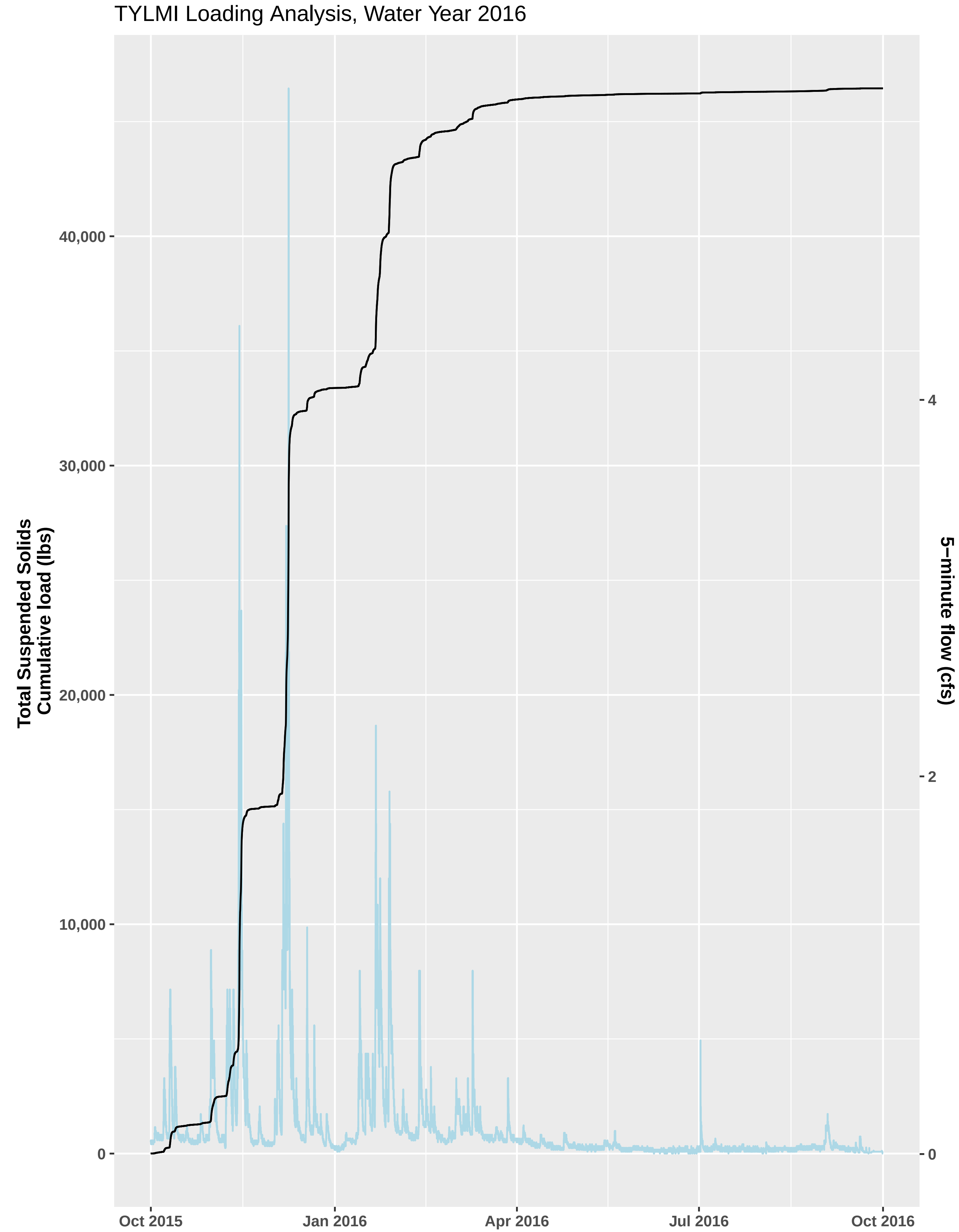


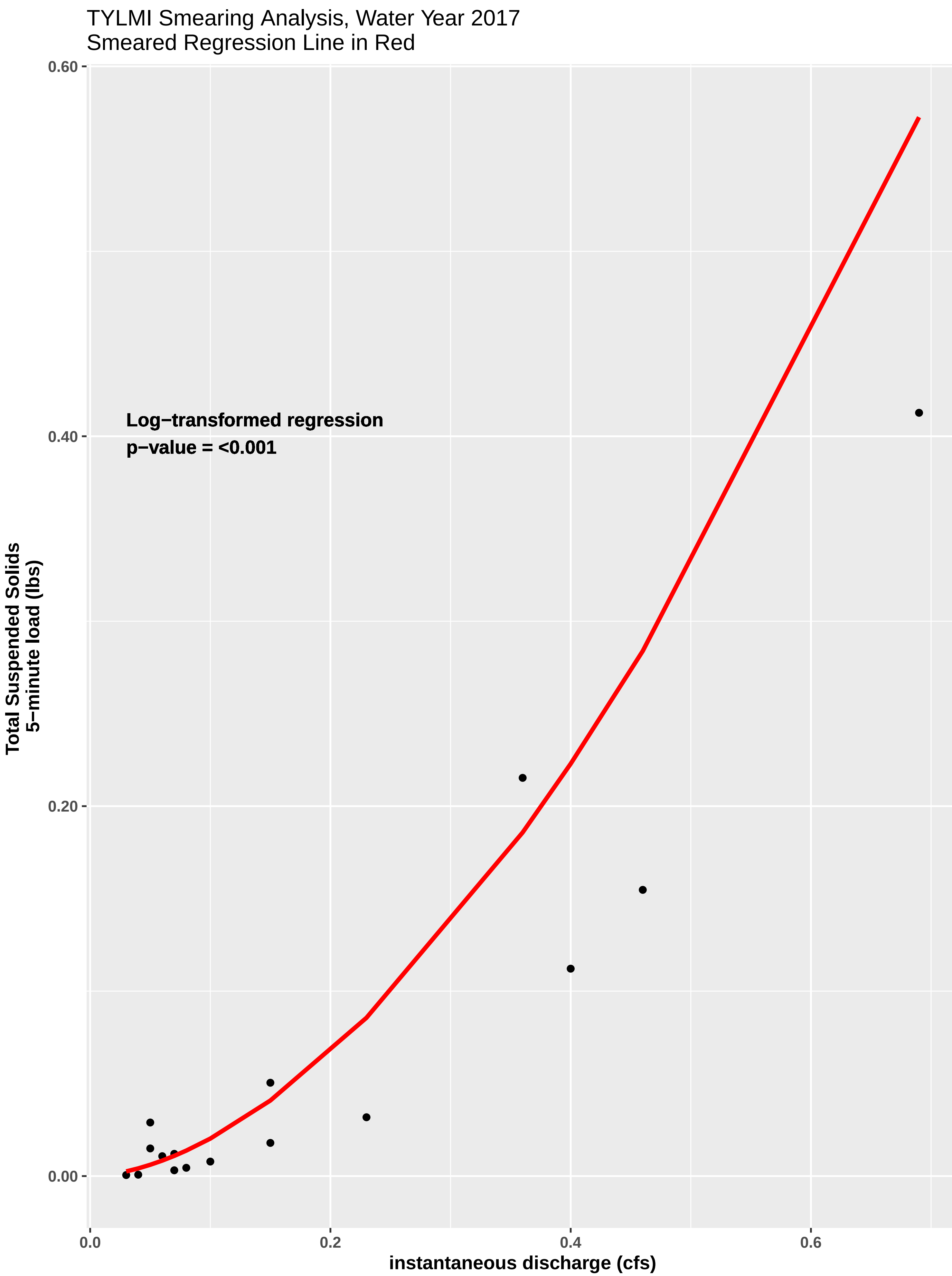
TYLMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Phosphorus
5−minute load (lbs)
0.00000
0.00050
0.00100
0.00150
0.00200
0.00
0.25
0.50
0.75
instantaneous discharge (cfs)

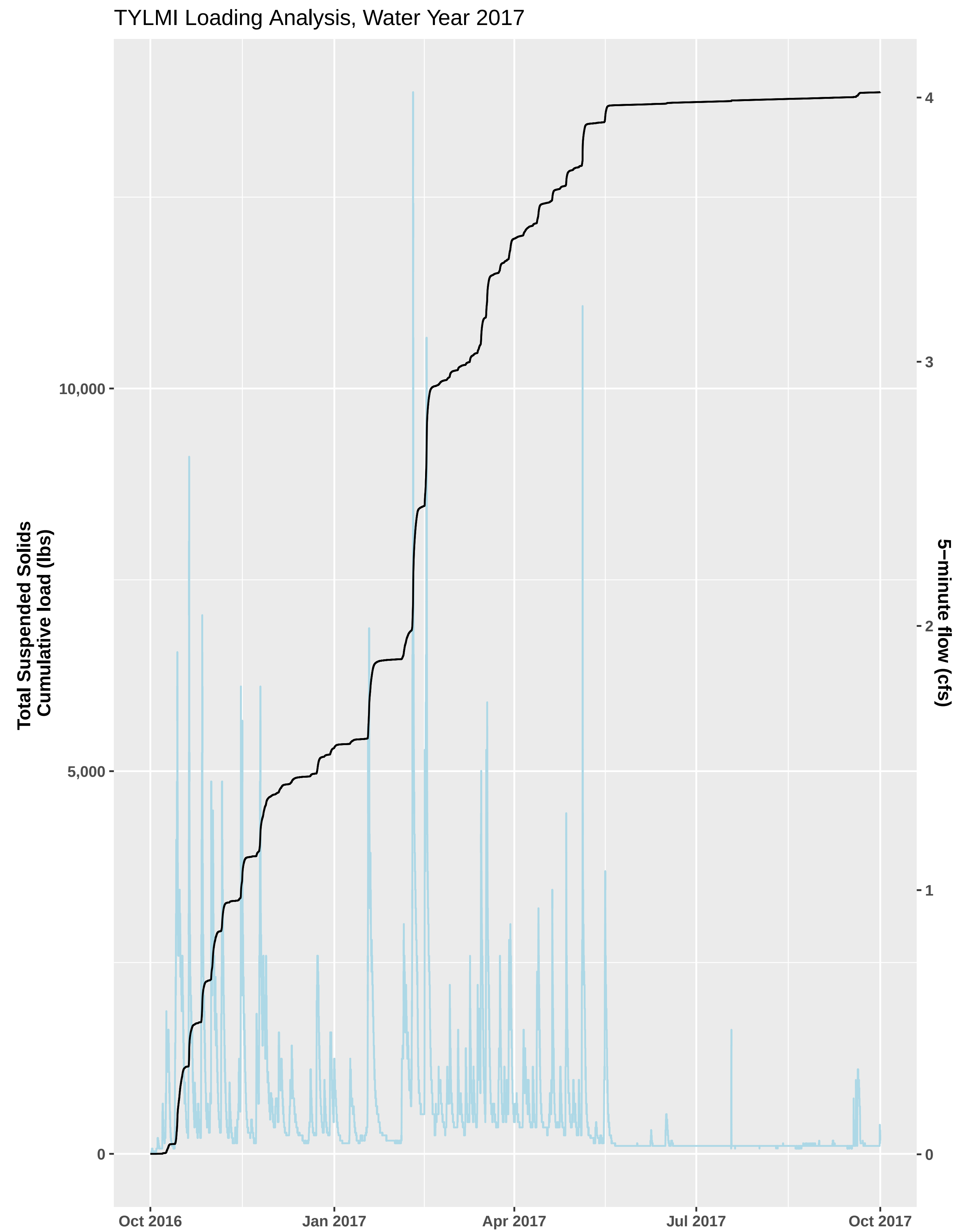


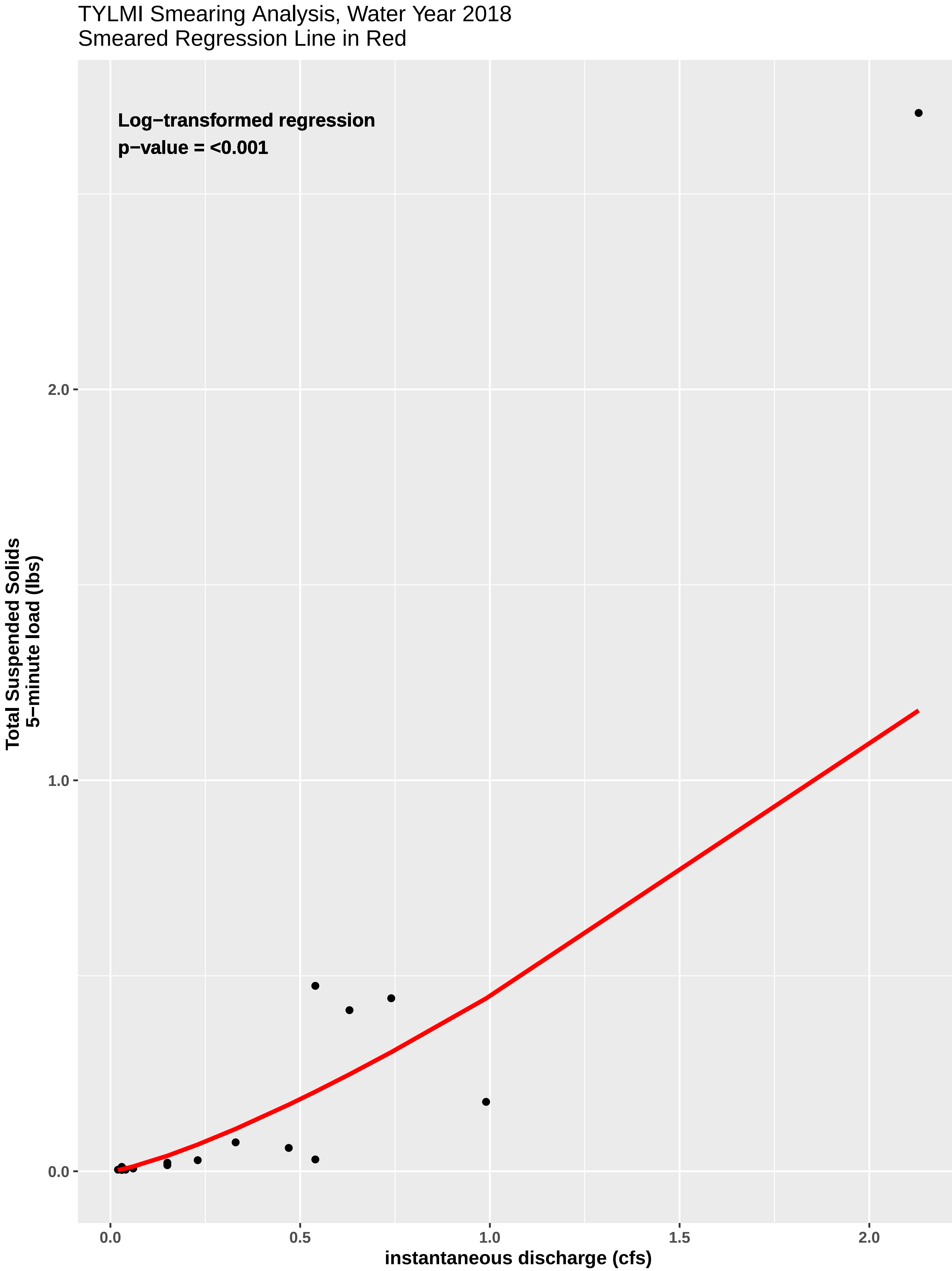
TYLMI Loading Analysis, Water Year 2019
Total Phosphorus
Cumulative load (lbs)
0
10
20
5−minute flow (cfs)
0.0
0.5
1.0
1.5
2.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

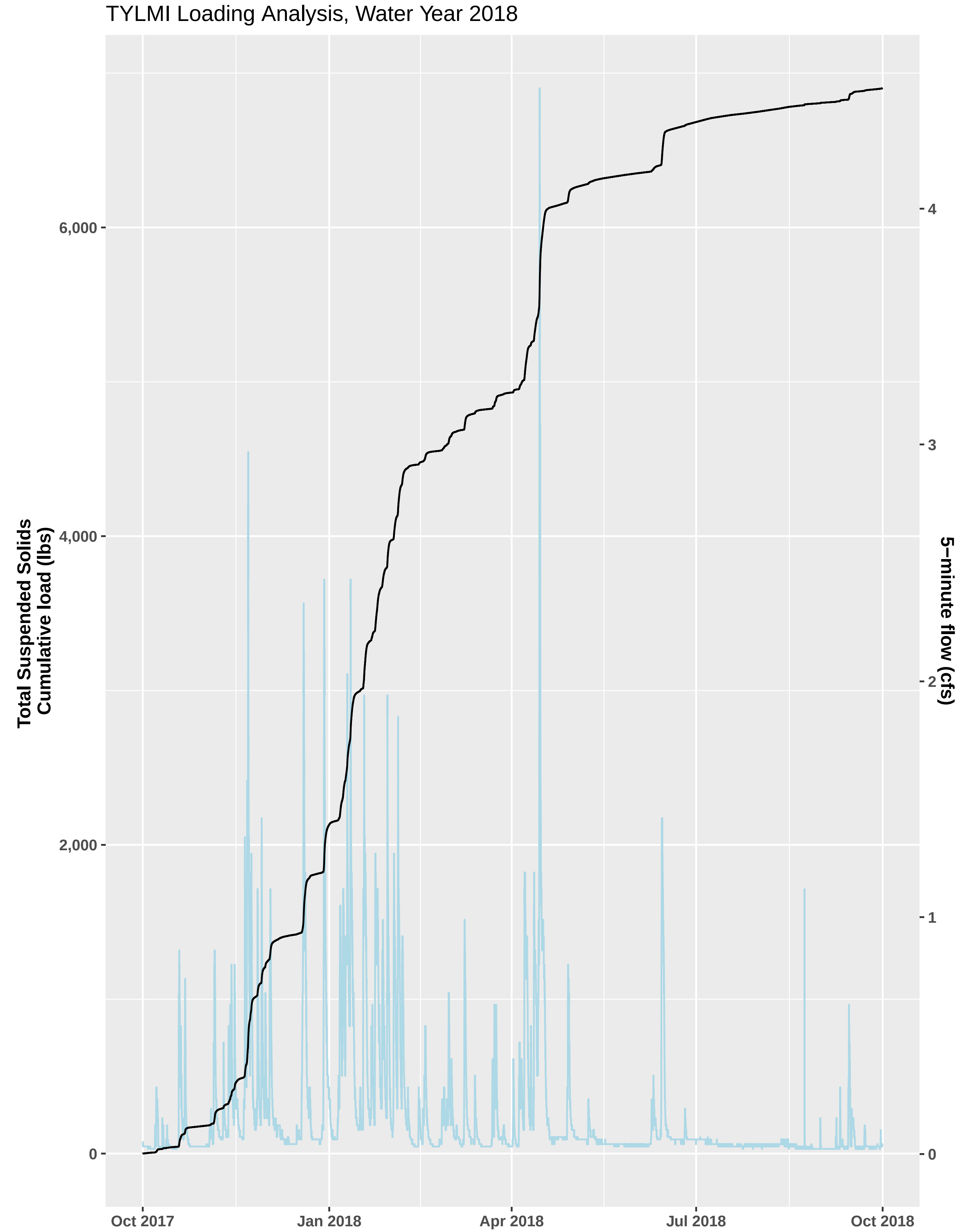

TYLMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.002
Total Suspended Solids
5−minute load (lbs)
0.000
0.050
0.100
0.05
0.10
instantaneous discharge (cfs)

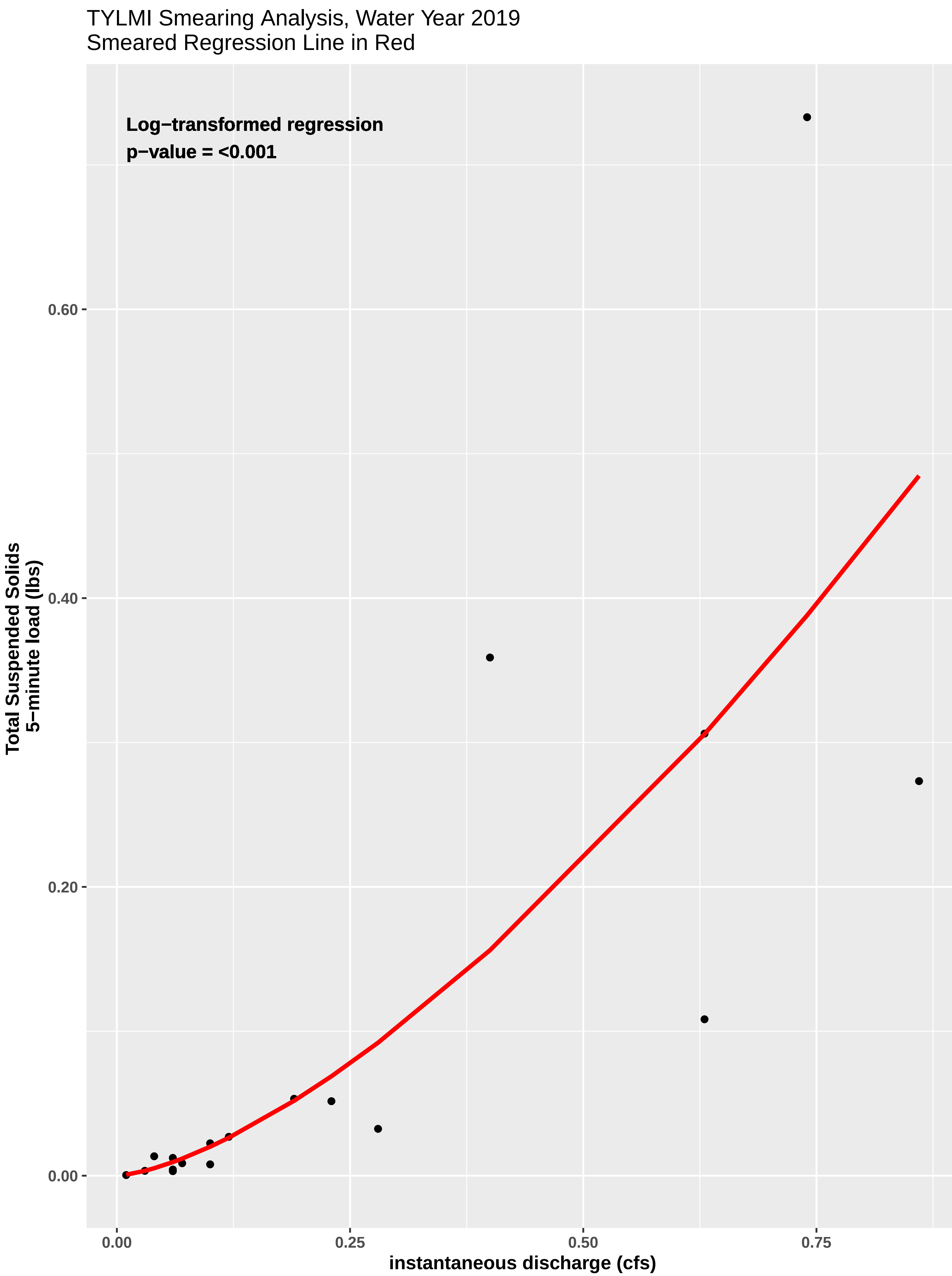

TYLMI Loading Analysis, Water Year 2016
Total Suspended Solids
Cumulative load (lbs)
0
10,000
20,000
30,000
40,000
5−minute flow (cfs)
0
2
4
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

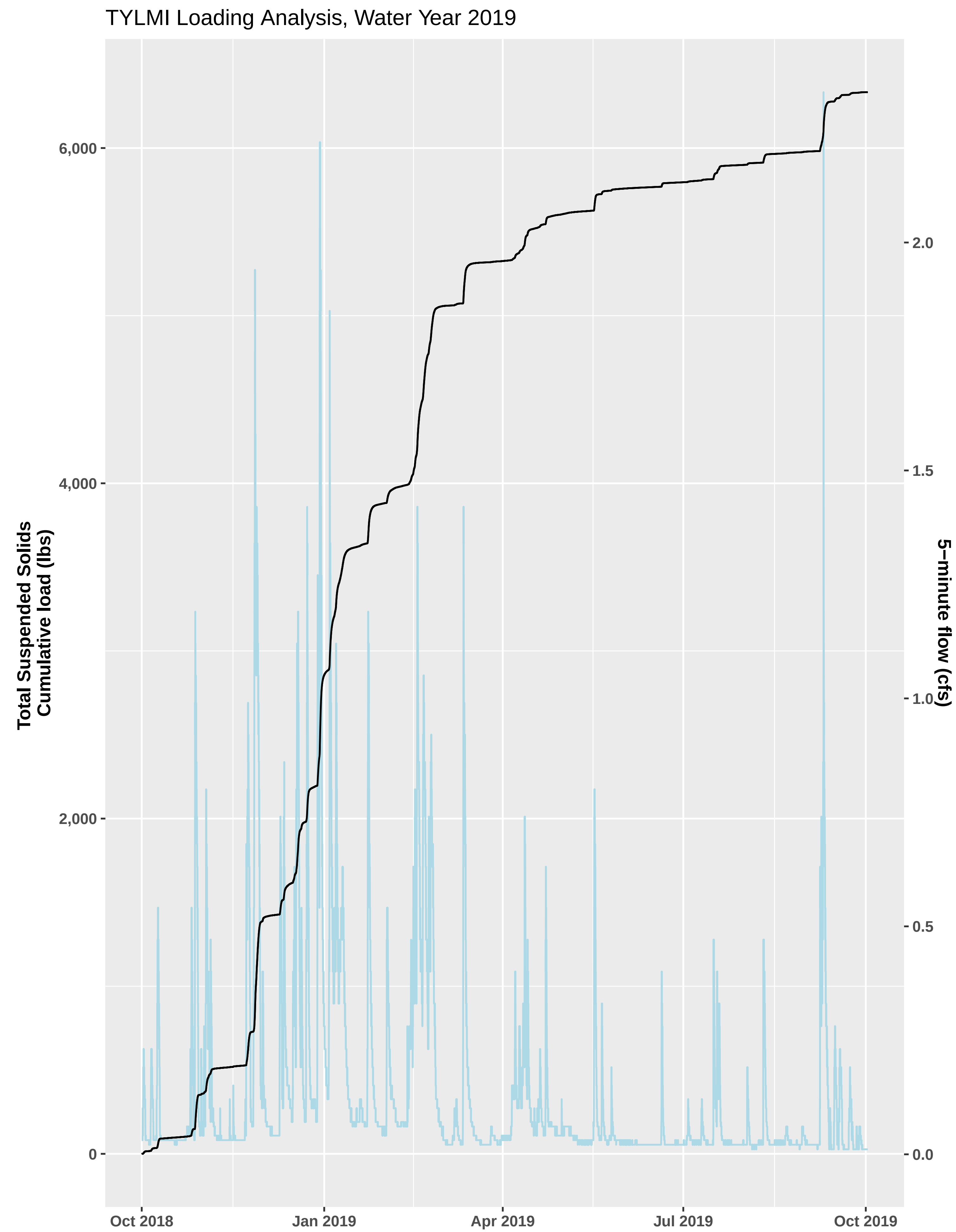

TYLMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.60
0.40
0.20
0.00
0.0
0.2
0.4
0.6
instantaneous discharge (cfs)

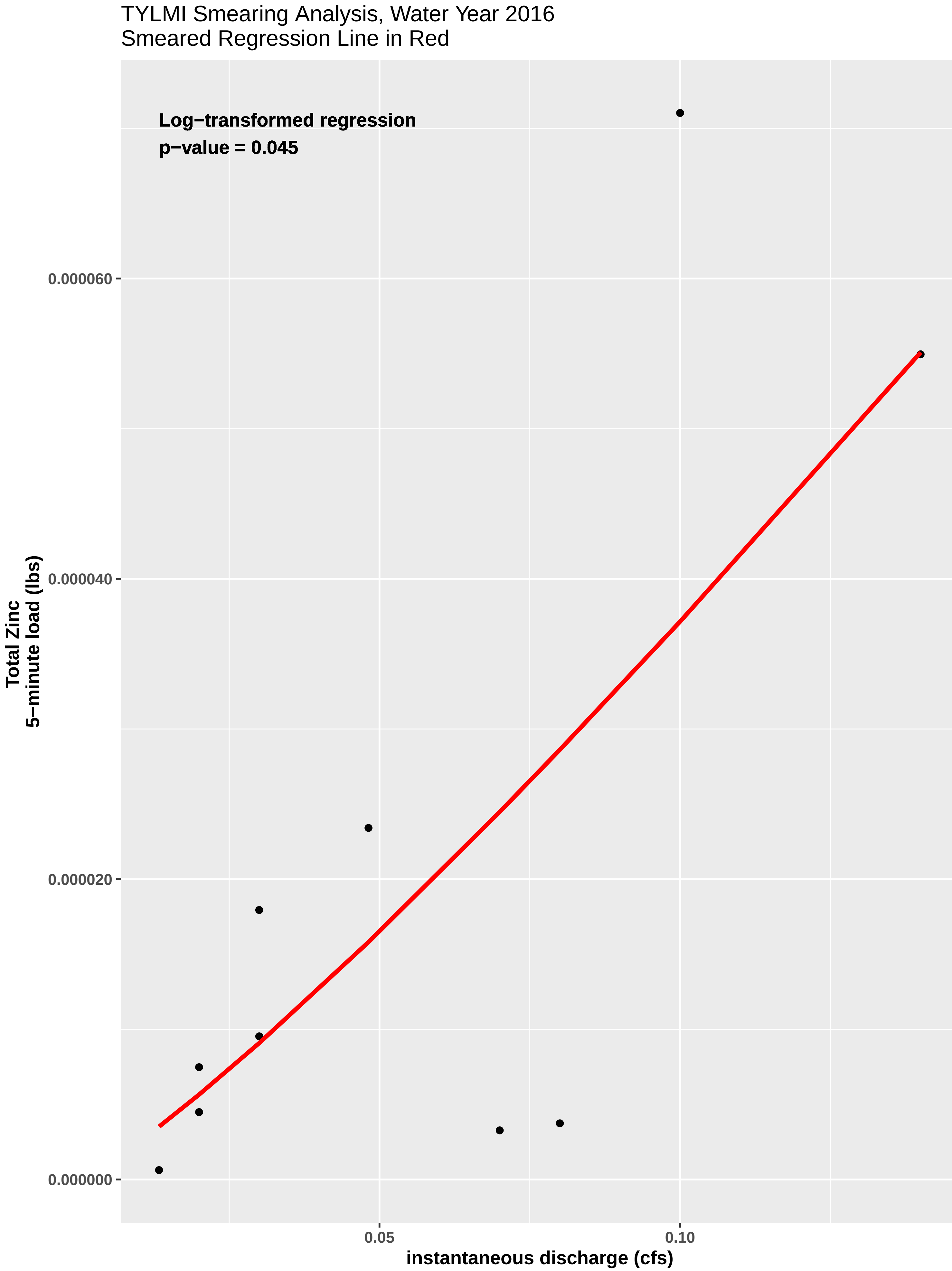

TYLMI Loading Analysis, Water Year 2017
Total Suspended Solids
Cumulative load (lbs)
10,000
5,000
0
5−minute flow (cfs)
4
3
2
1
0
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
instantaneous discharge (cfs)
0.0
1.0
2.0
0.0
0.5
1.0
1.5
2.0

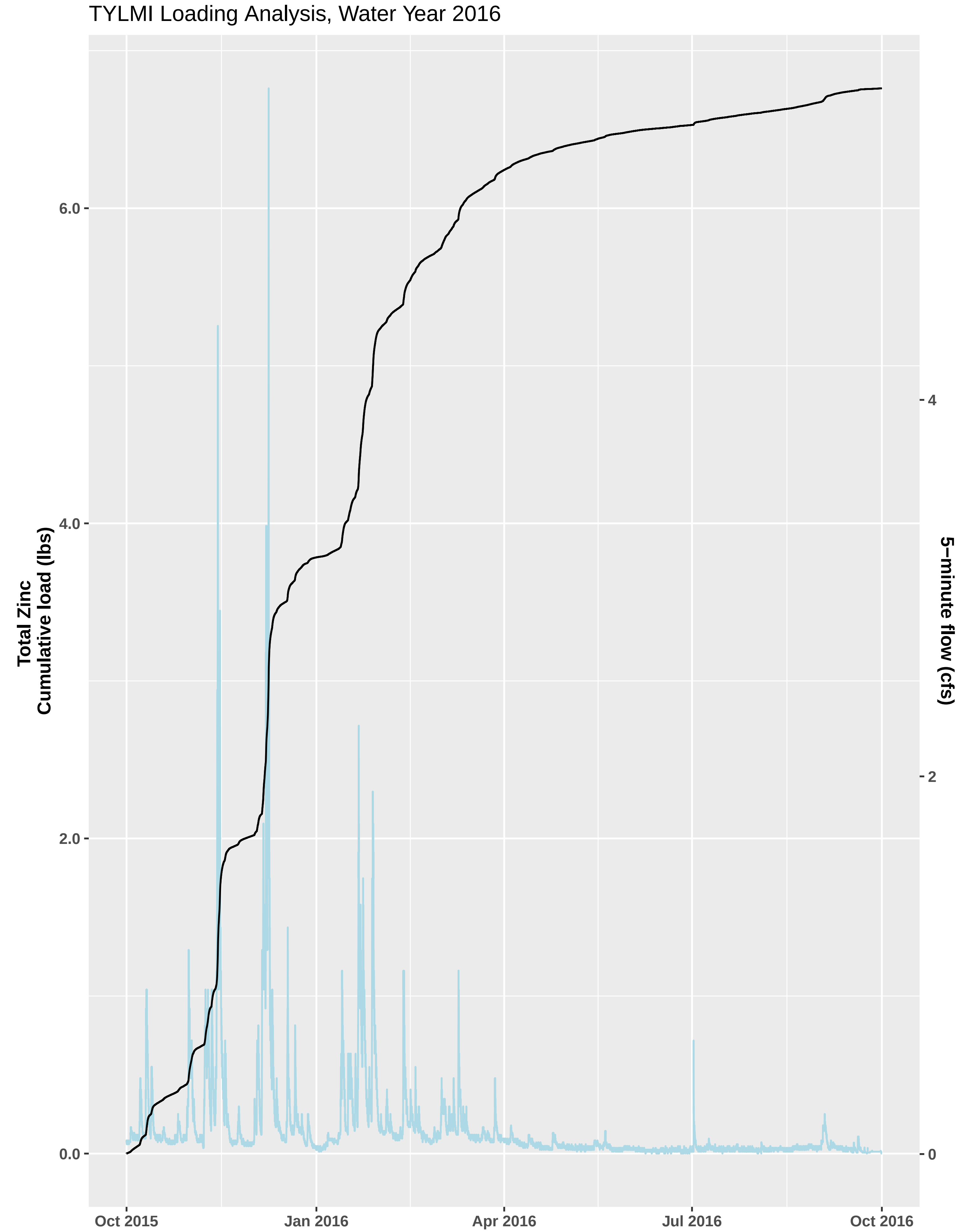

TYLMI Loading Analysis, Water Year 2018
Total Suspended Solids
Cumulative load (lbs)
5−minute flow (cfs)
0
2,000
4,000
6,000
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018


TYLMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Suspended Solids
5−minute load (lbs)
0.00
0.20
0.40
0.60
0.00
0.25
0.50
0.75
instantaneous discharge (cfs)


TYLMI Loading Analysis, Water Year 2019
Total Suspended Solids
Cumulative load (lbs)
0
2,000
4,000
6,000
5−minute flow (cfs)
0.0
0.5
1.0
1.5
2.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

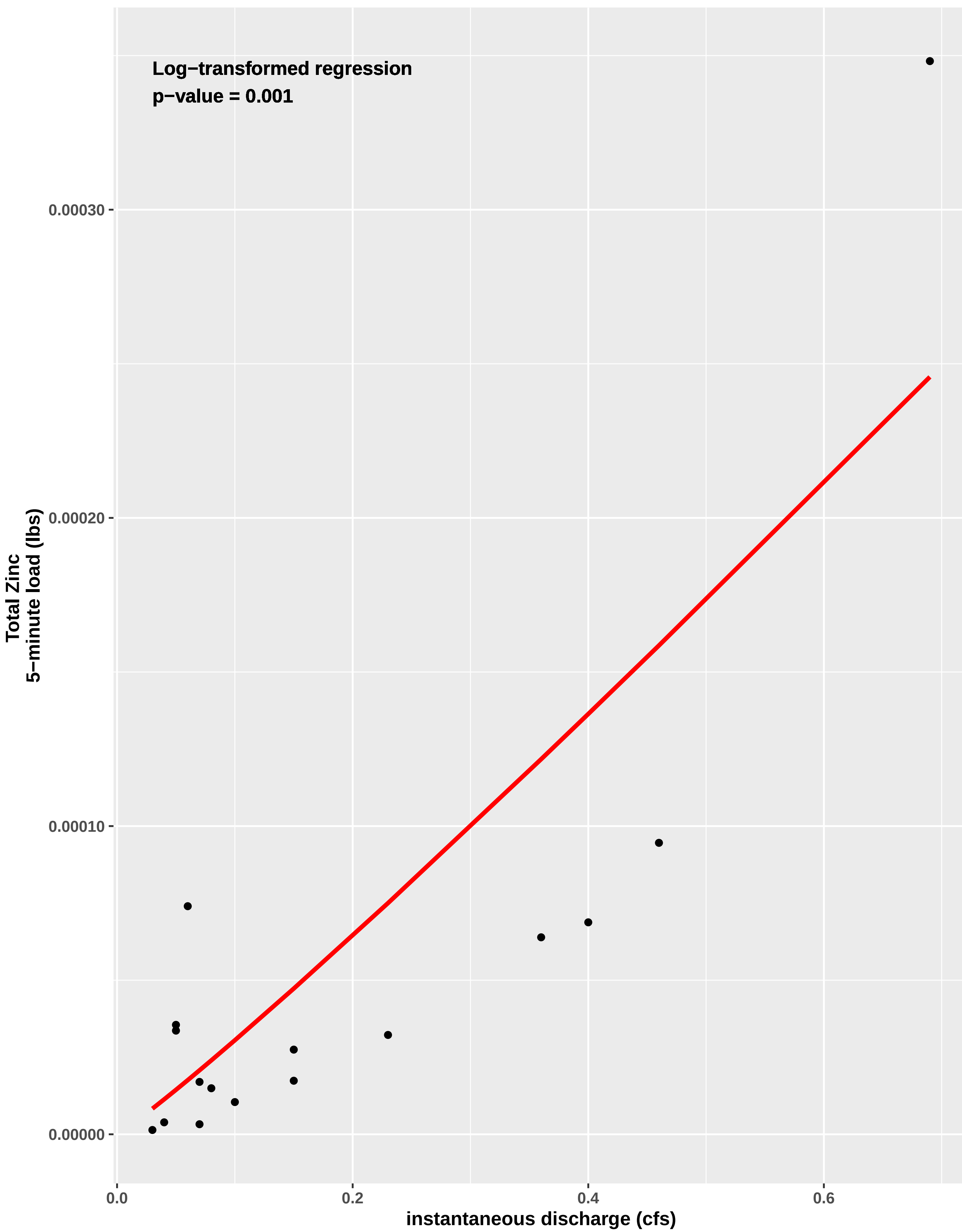


TYLMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = 0.045
0.000060
0.000040
0.000020
0.000000
Total Zinc
5−minute load (lbs)
0.05
0.10
instantaneous discharge (cfs)

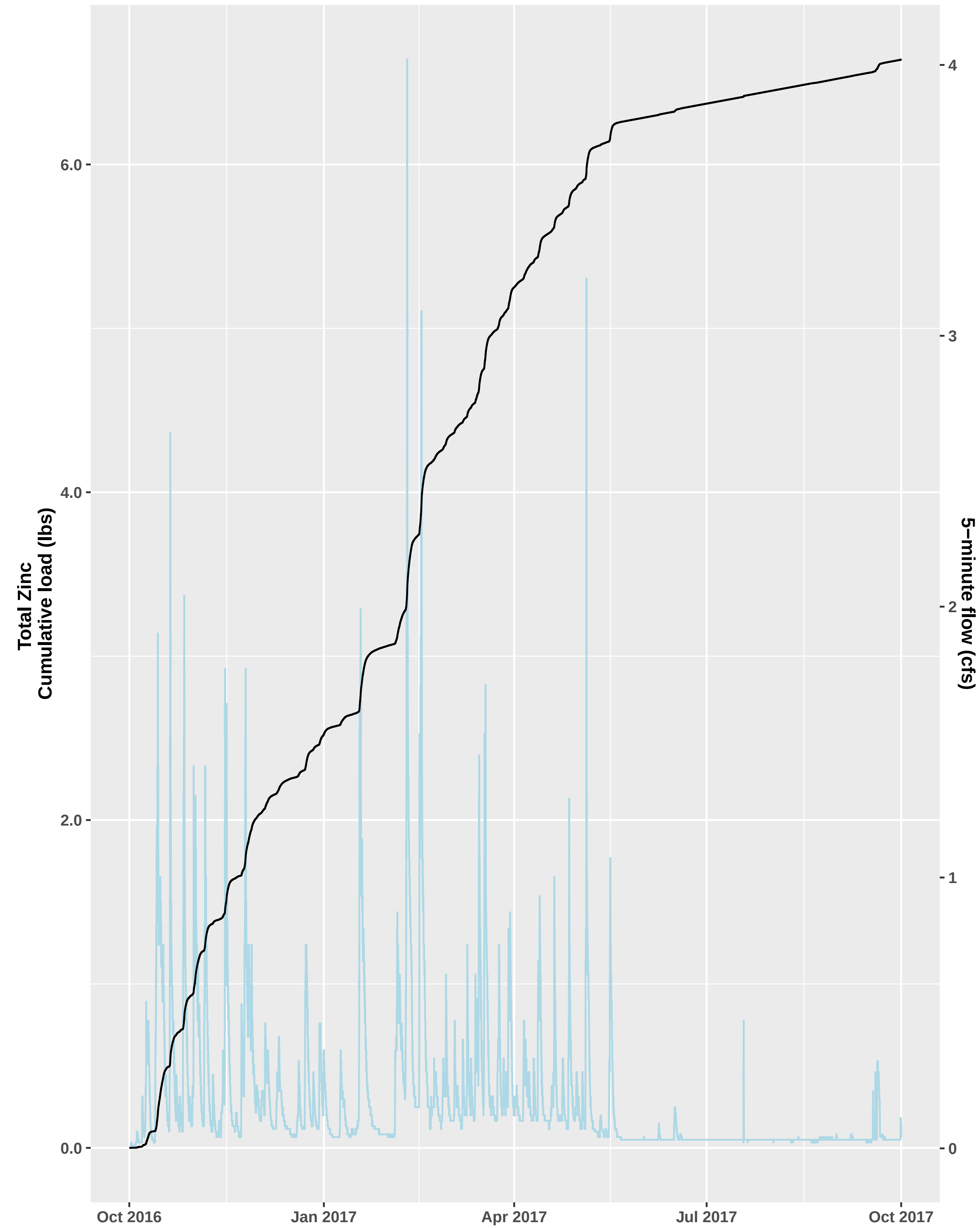


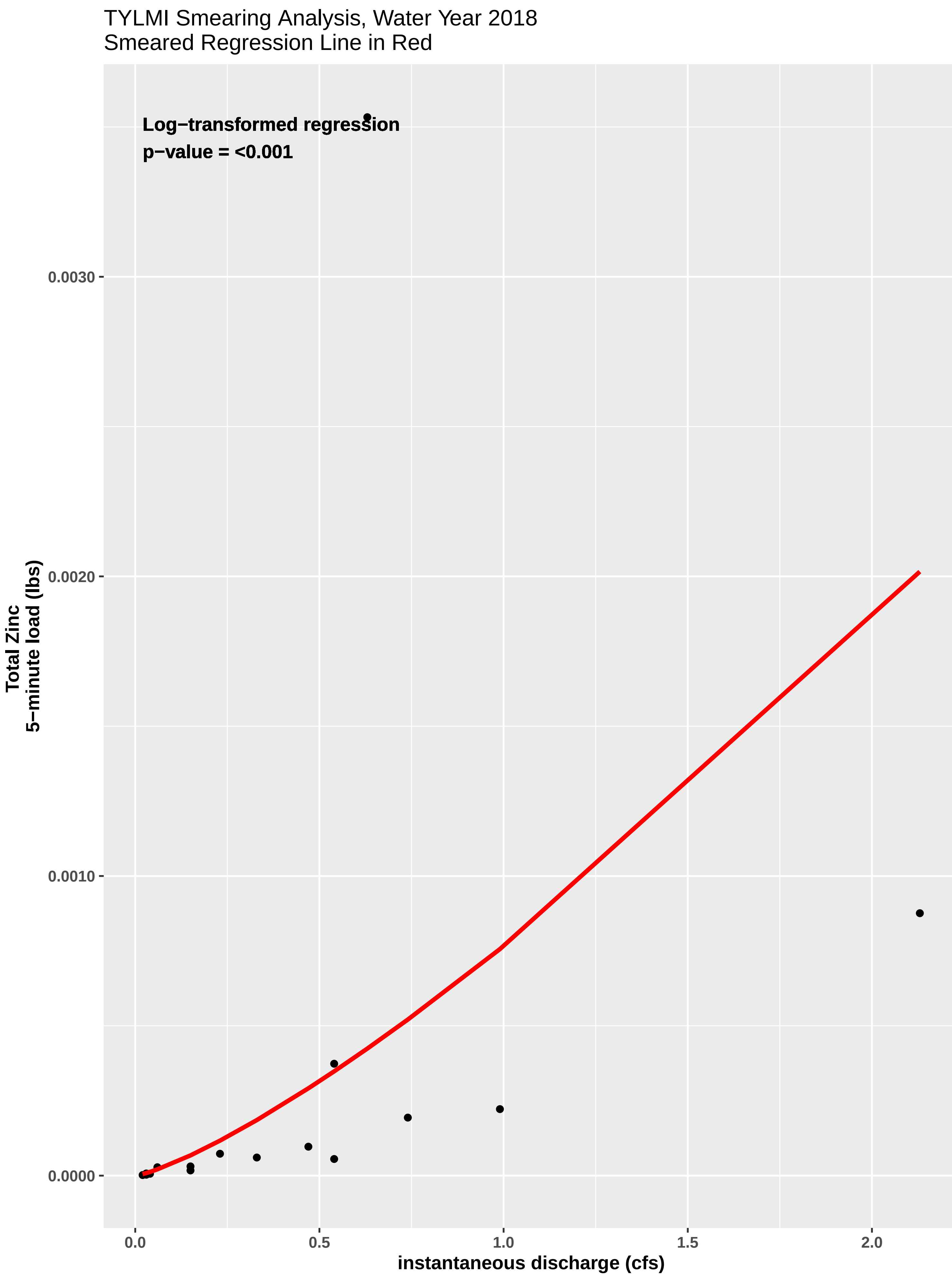
TYLMI Loading Analysis, Water Year 2016
6.0
4.0
2.0
0.0
Total Zinc
Cumulative load (lbs)
4
2
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016

TYLMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red

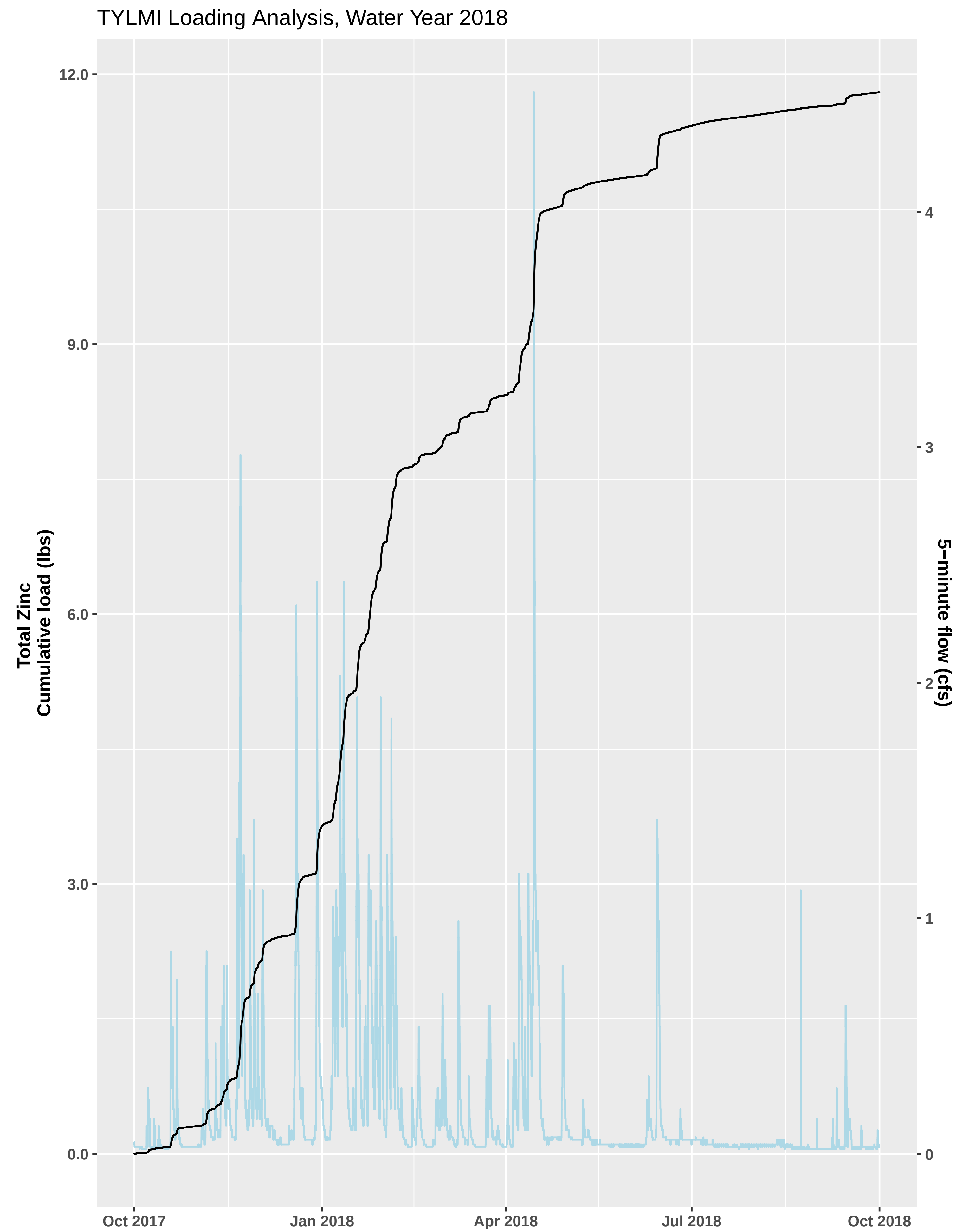


TYLMI Loading Analysis, Water Year 2017

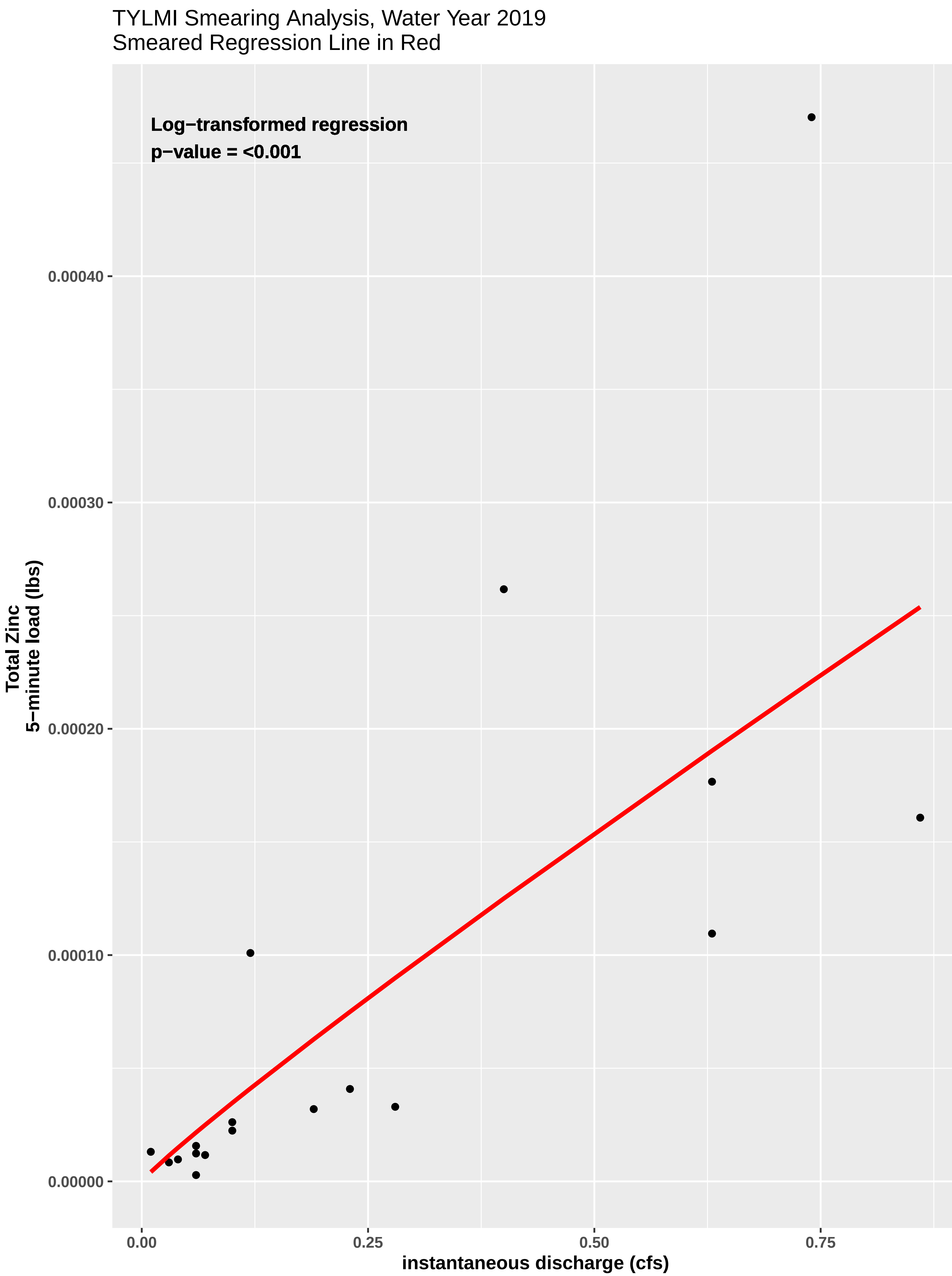




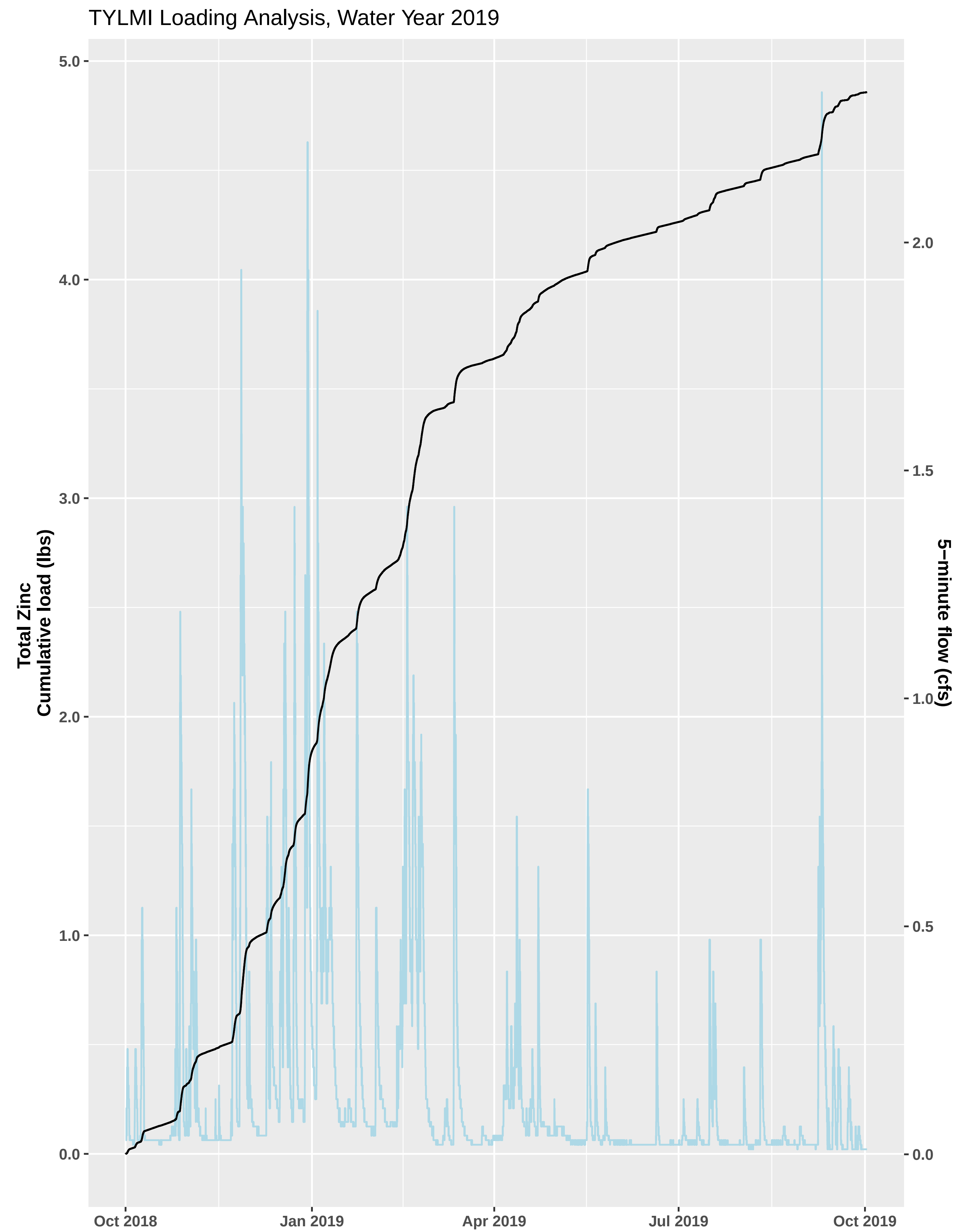
TYLMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.0030
0.0020
0.0010
0.0000
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)



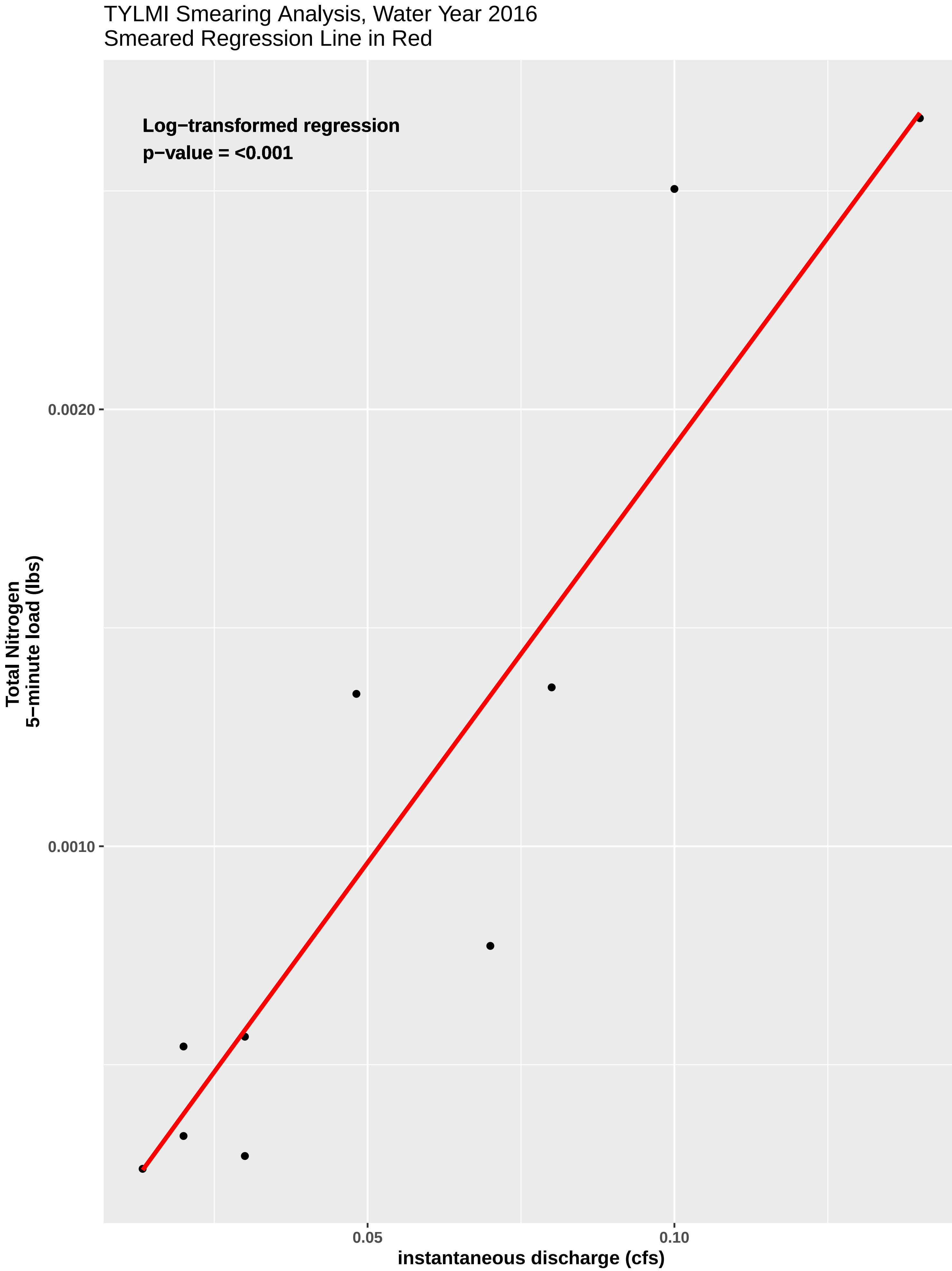
TYLMI Loading Analysis, Water Year 2018
Total Zinc
Cumulative load (lbs)
12.0
9.0
6.0
3.0
0.0
5−minute flow (cfs)
4
3
2
1
0
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018

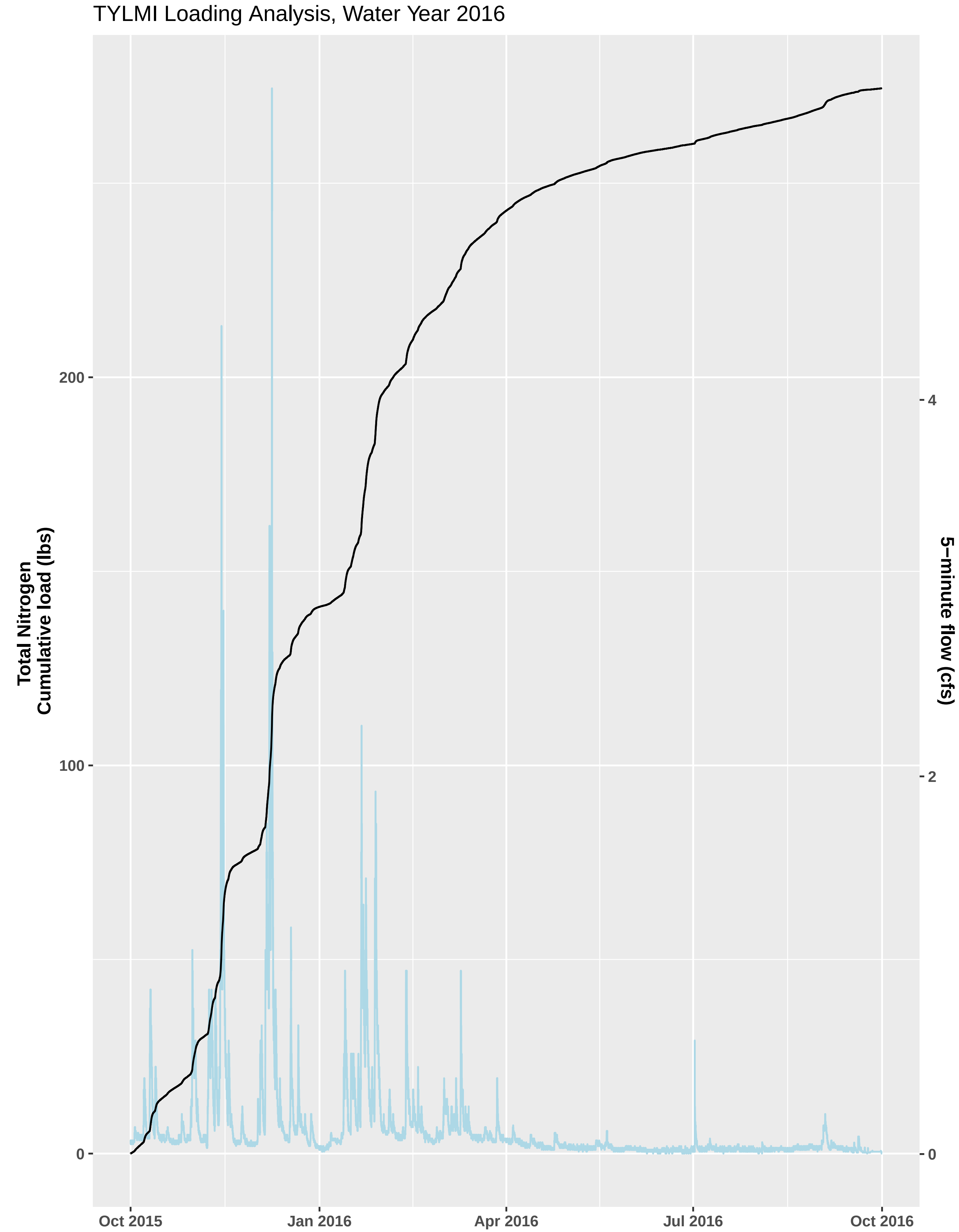


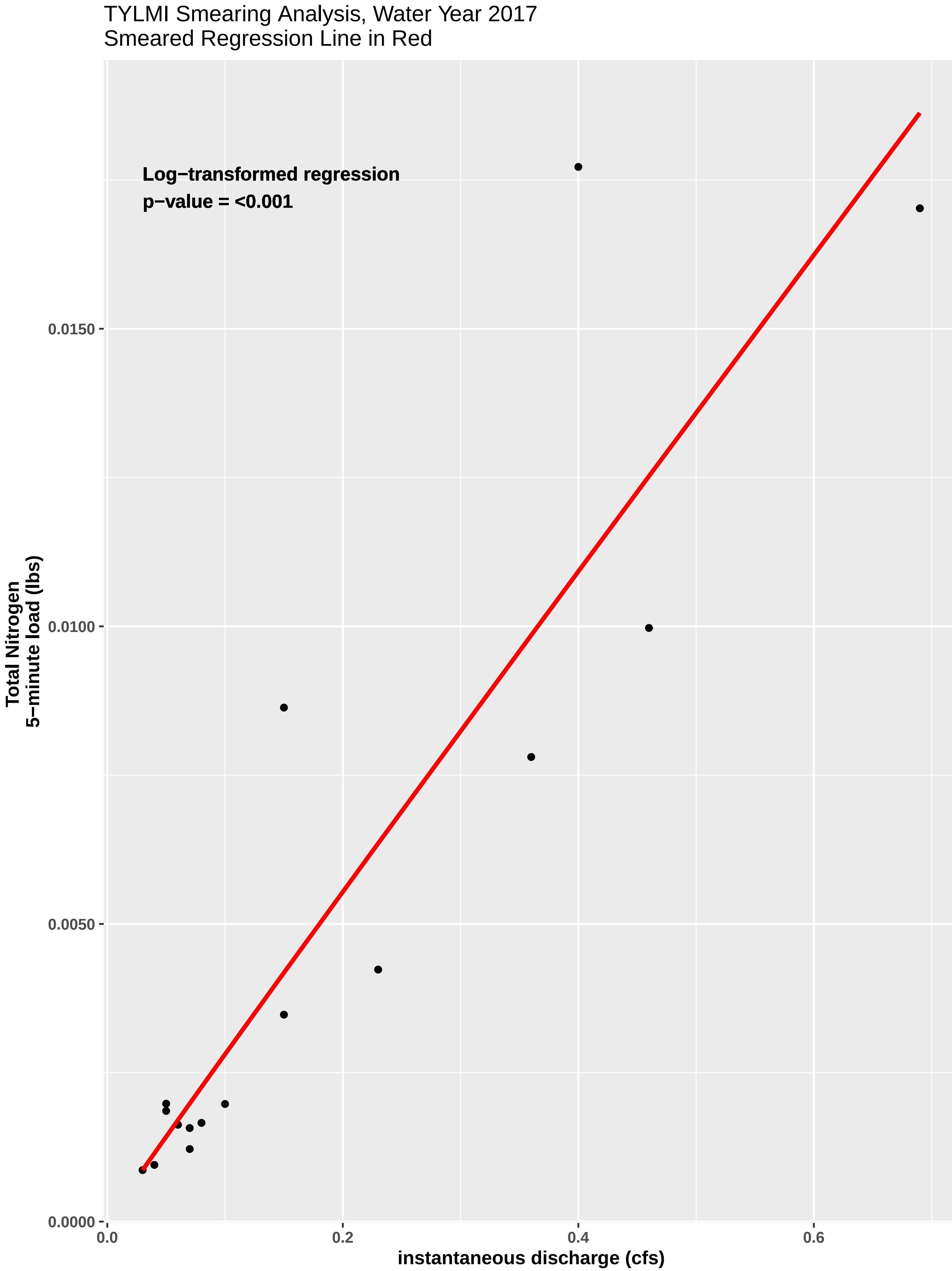
TYLMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Zinc
5−minute load (lbs)
0.00000
0.00010
0.00020
0.00030
0.00040
0.00
0.25
0.50
0.75
instantaneous discharge (cfs)

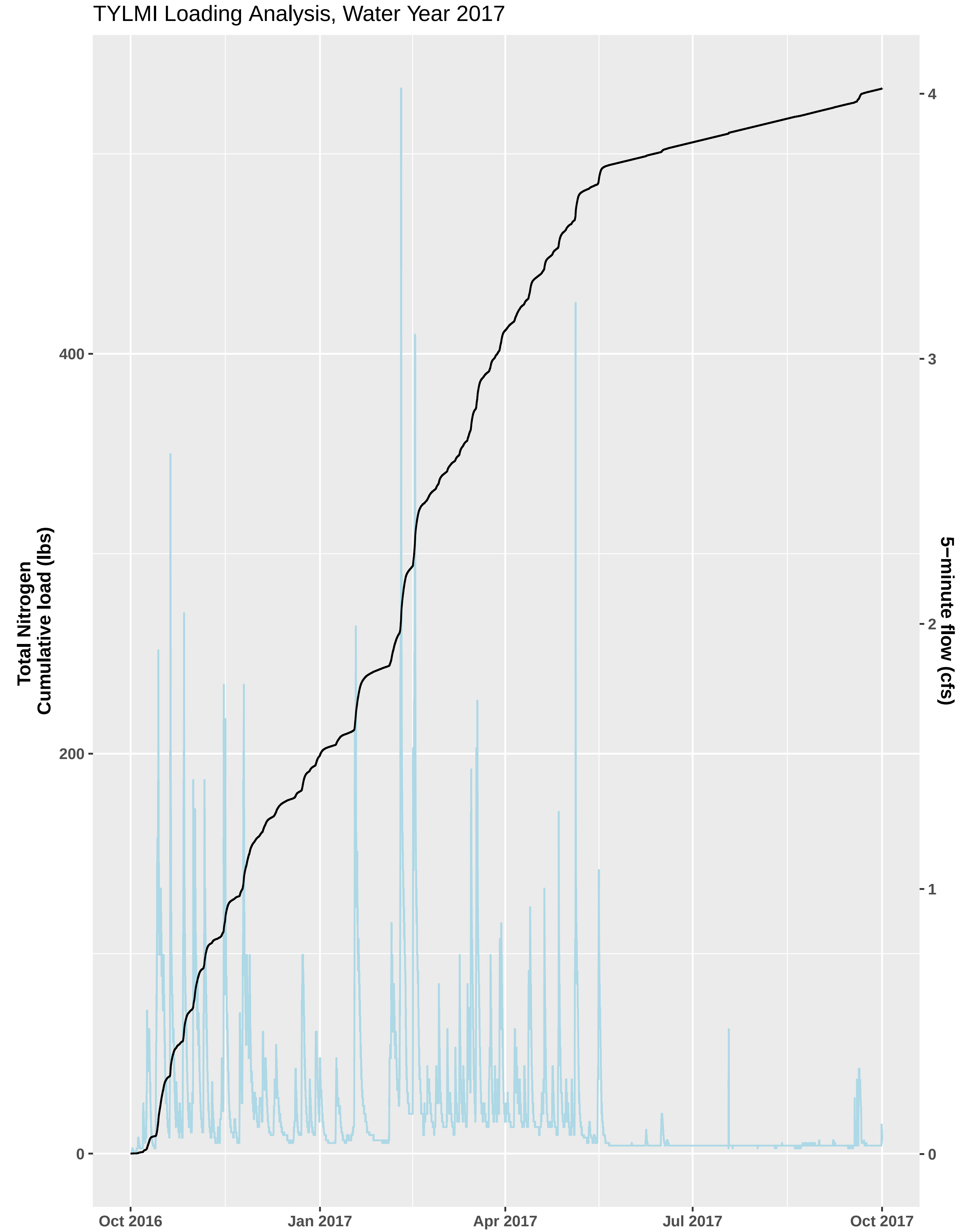


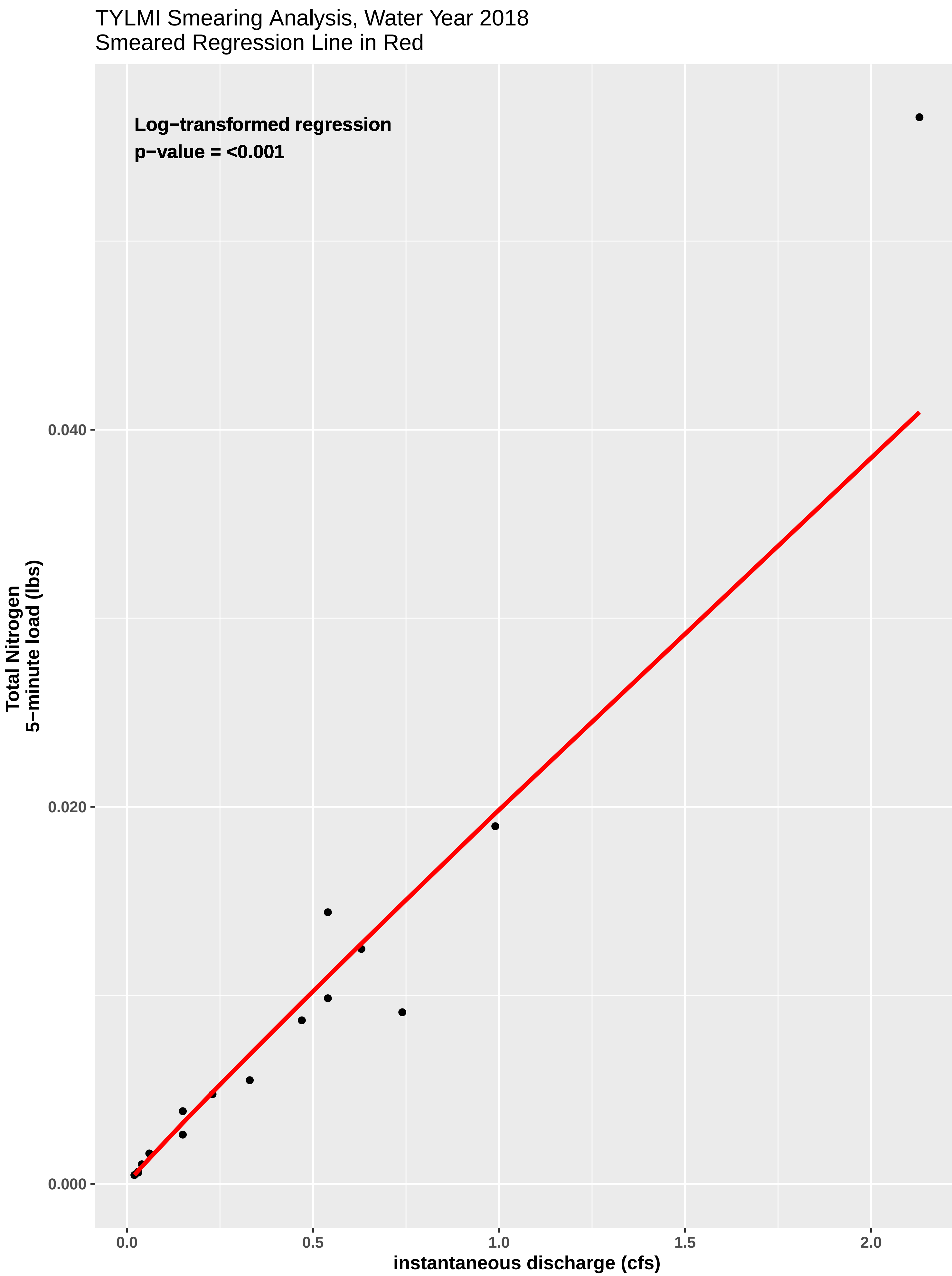
TYLMI Loading Analysis, Water Year 2019
Total Zinc
Cumulative load (lbs)
0.0
1.0
2.0
3.0
4.0
5.0
5−minute flow (cfs)
0.0
0.5
1.0
1.5
2.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

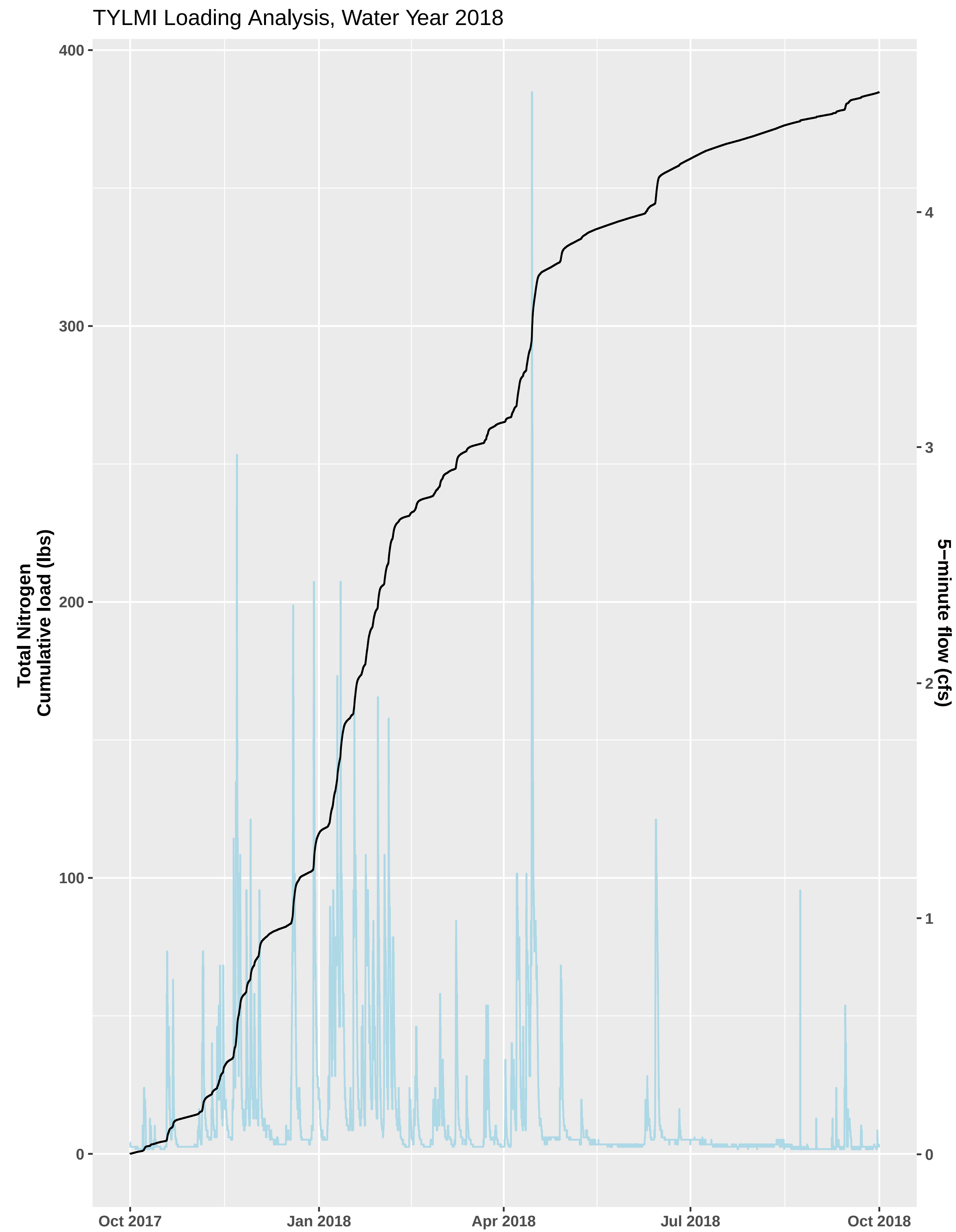

TYLMI Smearing Analysis, Water Year 2016
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
0.0020
0.0010
Total Nitrogen
5−minute load (lbs)
0.05
0.10
instantaneous discharge (cfs)

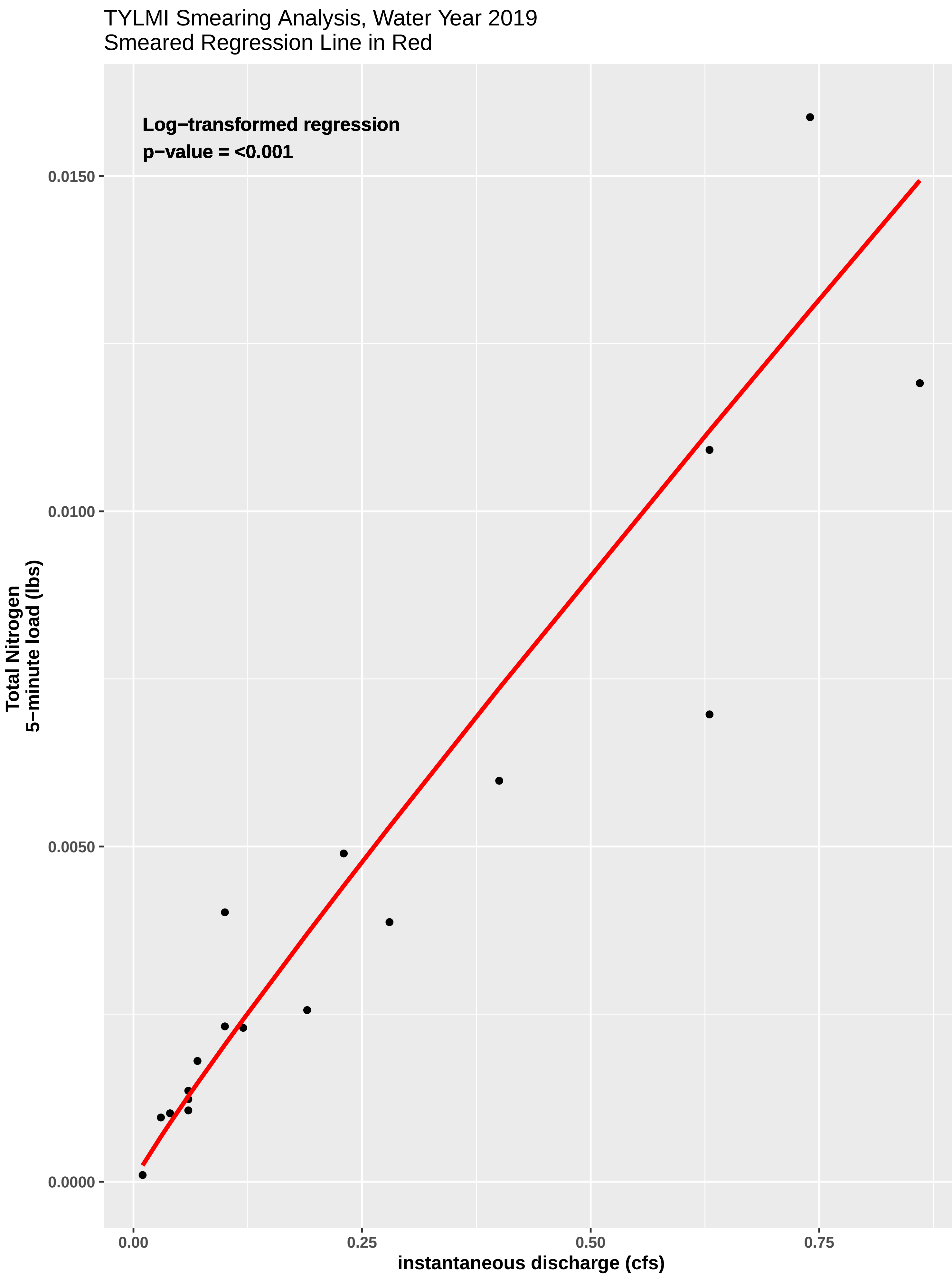

TYLMI Loading Analysis, Water Year 2016
200
100
0
Total Nitrogen
Cumulative load (lbs)
4
2
0
5−minute flow (cfs)
Oct 2015
Jan 2016
Apr 2016
Jul 2016
Oct 2016


TYLMI Smearing Analysis, Water Year 2017
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.0
0.2
0.4
0.6
instantaneous discharge (cfs)

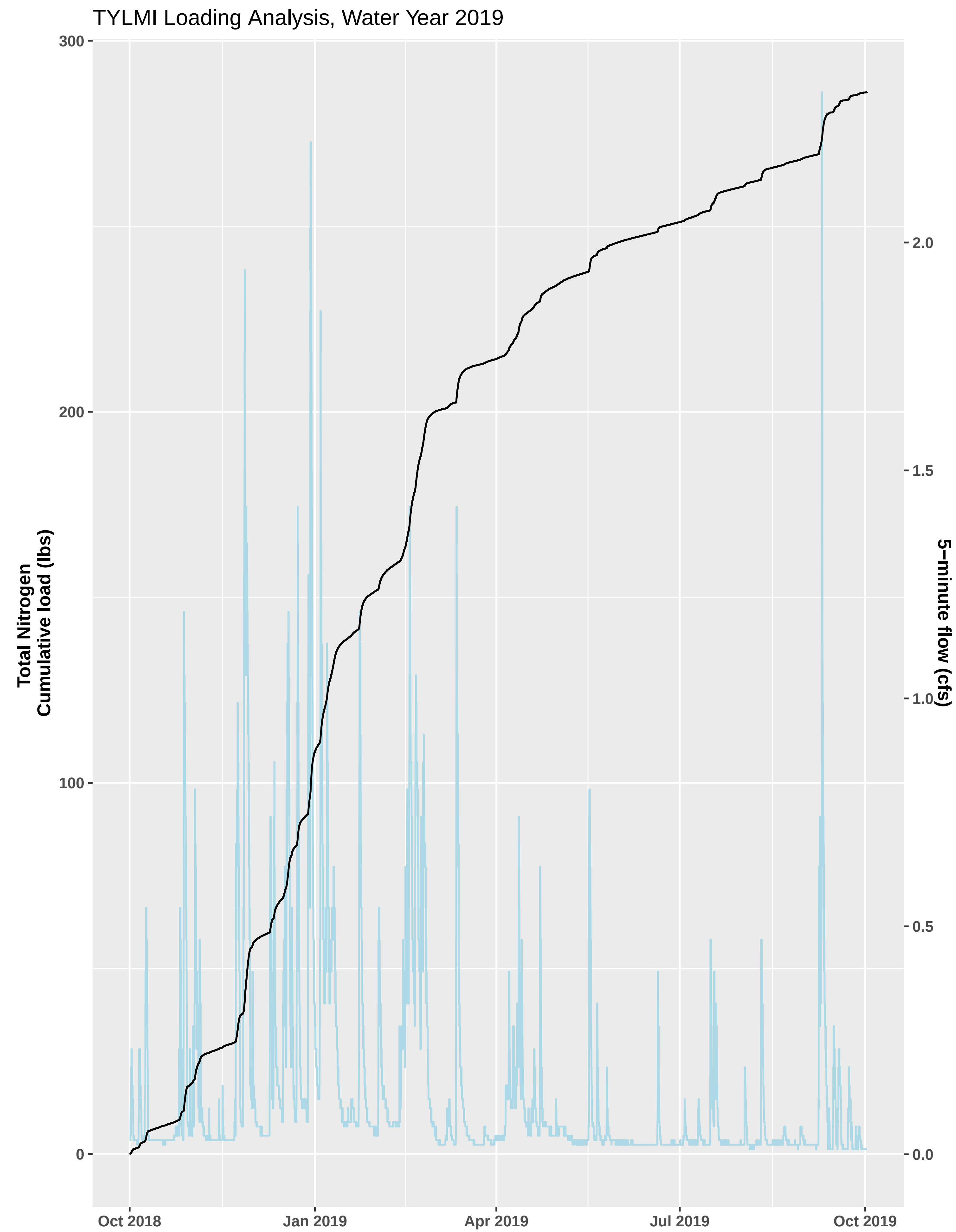

TYLMI Loading Analysis, Water Year 2017
Total Nitrogen
Cumulative load (lbs)
0
200
400
5−minute flow (cfs)
0
1
2
3
4
Oct 2016
Jan 2017
Apr 2017
Jul 2017
Oct 2017


TYLMI Smearing Analysis, Water Year 2018
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.000
0.020
0.040
0.0
0.5
1.0
1.5
2.0
instantaneous discharge (cfs)


TYLMI Loading Analysis, Water Year 2018
Total Nitrogen
Cumulative load (lbs)
0
100
200
300
400
5−minute flow (cfs)
0
1
2
3
4
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018



TYLMI Smearing Analysis, Water Year 2019
Smeared Regression Line in Red
Log−transformed regression
p−value = <0.001
Total Nitrogen
5−minute load (lbs)
0.0000
0.0050
0.0100
0.0150
0.00
0.25
0.50
0.75
instantaneous discharge (cfs)



TYLMI Loading Analysis, Water Year 2019
Total Nitrogen
Cumulative load (lbs)
0
100
200
300
5−minute flow (cfs)
0.0
0.5
1.0
1.5
2.0
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019

APPENDIX I

Results from Seasonal Kendall Analysis on Continuous Temperature and Conductivity Data

Detailed Season, All Seasons, Kendall's Tau Results: Mean Monthly Temperature

Station	Season	Tau	P-value
EVALSS	Winter	-0.09	0.35
EVALSS	Spring	-0.05	0.41
EVALSS	Summer	0.15	1.00
EVALSS	Fall	-0.24	0.12
EVALSS	All Seasons	-0.07	0.25
EVAMS	Winter	-0.18	0.23
EVAMS	Spring	0.12	1.00
EVAMS	Summer	0.06	1.00
EVAMS	Fall	-0.24	0.15
EVAMS	All Seasons	-0.06	0.30
MONM	Winter	-0.18	0.23
MONM	Spring	0.00	1.00
MONM	Summer	0.12	1.00
MONM	Fall	-0.24	0.15
MONM	All Seasons	-0.08	0.26
MONMN	Winter	-0.12	0.32
MONMN	Spring	0.06	1.00
MONMN	Summer	0.24	1.00
MONMN	Fall	-0.21	0.19
MONMN	All Seasons	-0.01	0.49
MONMS	Winter	-0.15	0.27
MONMS	Spring	0.12	1.00
MONMS	Summer	-0.06	0.42
MONMS	Fall	-0.21	0.19
MONMS	All Seasons	-0.08	0.26
TOSMO	Winter	-0.24	0.15
TOSMO	Spring	0.12	1.00
TOSMO	Summer	0.15	1.00
TOSMO	Fall	-0.24	0.15
TOSMO	All Seasons	-0.05	0.33
TOSMI	Winter	-0.24	0.15
TOSMI	Spring	0.09	1.00
TOSMI	Summer	0.09	1.00
TOSMI	Fall	-0.24	0.15
TOSMI	All Seasons	-0.08	0.26
COLM	Winter	0.27	1.00
COLM	Spring	-0.10	0.33
COLM	Summer	0.14	1.00
COLM	Fall	-0.24	0.15
COLM	All Seasons	-0.01	0.49
SEIMN	Winter	-0.27	0.12
SEIMN	Spring	0.09	1.00
SEIMN	Summer	0.18	1.00
SEIMN	Fall	-0.27	0.12
SEIMN	All Seasons	-0.07	0.28

Station	Season	Tau	P-value
EVALSS	Winter	0.09	1.00
EVALSS	Spring	-0.13	0.27
EVALSS	Summer	-0.04	0.45
EVALSS	Fall	-0.28	0.08
EVALSS	All Seasons	-0.09	0.18
EVAMS	Winter	0.06	1.00
EVAMS	Spring	-0.06	0.42
EVAMS	Summer	-0.05	0.45
EVAMS	Fall	-0.30	0.10
EVAMS	All Seasons	-0.09	0.23
MONM	Winter	0.00	1.00
MONM	Spring	0.15	1.00
MONM	Summer	-0.08	0.39
MONM	Fall	-0.30	0.10
MONM	All Seasons	-0.06	0.32
MONMN	Winter	-0.03	0.47
MONMN	Spring	-0.15	0.27
MONMN	Summer	-0.18	0.23
MONMN	Fall	-0.36	0.06
MONMN	All Seasons	-0.18	0.05
MONMS	Winter	-0.03	0.47
MONMS	Spring	-0.09	0.37
MONMS	Summer	-0.30	0.10
MONMS	Fall	-0.21	0.19
MONMS	All Seasons	-0.16	0.08
TOSMO	Winter	0.02	1.00
TOSMO	Spring	-0.05	0.45
TOSMO	Summer	0.29	1.00
TOSMO	Fall	-0.27	0.12
TOSMO	All Seasons	0.00	0.50
TOSMI	Winter	0.06	1.00
TOSMI	Spring	0.00	1.00
TOSMI	Summer	0.27	1.00
TOSMI	Fall	-0.24	0.15
TOSMI	All Seasons	0.02	1.00
COLM	Winter	0.30	1.00
COLM	Spring	0.08	1.00
COLM	Summer	-0.07	0.45
COLM	Fall	-0.23	0.17
COLM	All Seasons	0.04	1.00
SEIMN	Winter	0.00	1.00
SEIMN	Spring	0.18	1.00
SEIMN	Summer	0.15	1.00
SEIMN	Fall	-0.35	0.07
SEIMN	All Seasons	0.00	0.50

Detailed Season, All Seasons, Kendall's Tau Results: Mean Monthly Temperature

SEIMS	Winter	-0.21	0.19	SEIMS	Winter	0.12	1.00
SEIMS	Spring	0.30	1.00	SEIMS	Spring	0.15	1.00
SEIMS	Summer	0.09	1.00	SEIMS	Summer	0.21	1.00
SEIMS	Fall	-0.24	0.15	SEIMS	Fall	-0.30	0.10
SEIMS	All Seasons	-0.02	0.46	SEIMS	All Seasons	0.05	1.00
COUMO	Winter	-0.27	0.12	COUMO	Winter	0.00	1.00
COUMO	Spring	0.09	1.00	COUMO	Spring	0.00	1.00
COUMO	Summer	-0.03	0.47	COUMO	Summer	0.31	1.00
COUMO	Fall	-0.30	0.10	COUMO	Fall	-0.18	0.23
COUMO	All Seasons	-0.13	0.13	COUMO	All Seasons	0.03	1.00
COUMI	Winter	-0.24	0.15	COUMI	Winter	-0.03	0.47
COUMI	Spring	0.12	1.00	COUMI	Spring	0.00	1.00
COUMI	Summer	0.06	1.00	COUMI	Summer	0.26	1.00
COUMI	Fall	-0.27	0.12	COUMI	Fall	-0.21	0.19
COUMI	All Seasons	-0.08	0.24	COUMI	All Seasons	0.00	1.00
TYLMO	Winter	-0.15	0.27	TYLMO	Winter	0.02	1.00
TYLMO	Spring	0.00	1.00	TYLMO	Spring	0.02	1.00
TYLMO	Summer	0.18	1.00	TYLMO	Summer	0.30	1.00
TYLMO	Fall	-0.30	0.10	TYLMO	Fall	-0.18	0.23
TYLMO	All Seasons	-0.07	0.28	TYLMO	All Seasons	0.04	1.00
TYLMI	Winter	-0.15	0.27	TYLMI	Winter	0.06	1.00
TYLMI	Spring	0.09	1.00	TYLMI	Spring	0.09	1.00
TYLMI	Summer	0.06	1.00	TYLMI	Summer	0.00	1.00
TYLMI	Fall	-0.24	0.15	TYLMI	Fall	-0.33	0.07
TYLMI	All Seasons	-0.06	0.30	TYLMI	All Seasons	-0.05	0.35

Detailed Season, All Seasons, Kendall's Tau Results: Mean Monthly Temperature

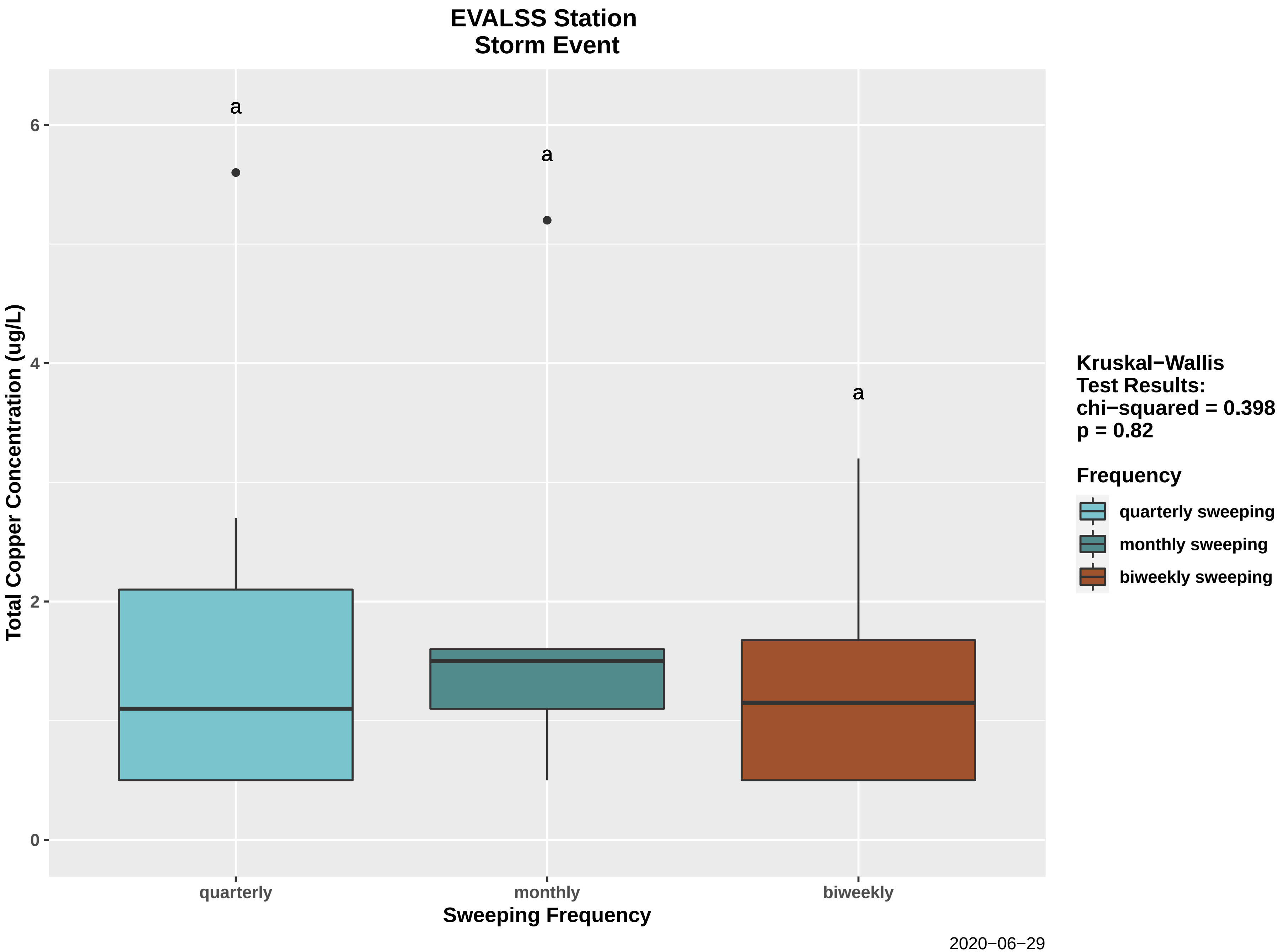
Station	**Season**	**Tau**	**P-value**	**Station**	**Season**	**Tau**	**P-value**
EVALSS	Winter	0.52	1.00	EVALSS	Winter	0.52	1.00
EVALSS	Spring	0.27	1.00	EVALSS	Spring	0.02	1.00
EVALSS	Summer	0.33	1.00	EVALSS	Summer	0.02	1.00
EVALSS	Fall	0.33	1.00	EVALSS	Fall	-0.20	0.20
EVALSS	All Seasons	0.36	1.00	EVALSS	All Seasons	0.08	1.00
EVAMS	Winter	0.39	1.00	EVAMS	Winter	0.23	1.00
EVAMS	Spring	0.18	1.00	EVAMS	Spring	0.03	1.00
EVAMS	Summer	-0.36	0.06	EVAMS	Summer	-0.23	0.17
EVAMS	Fall	0.31	1.00	EVAMS	Fall	0.05	1.00
EVAMS	All Seasons	0.14	1.00	EVAMS	All Seasons	0.02	1.00
MONM	Winter	0.52	1.00	MONM	Winter	0.55	1.00
MONM	Spring	0.60	1.00	MONM	Spring	0.58	1.00
MONM	Summer	0.33	1.00	MONM	Summer	-0.08	0.39
MONM	Fall	0.26	1.00	MONM	Fall	-0.05	0.43
MONM	All Seasons	0.40	1.00	MONM	All Seasons	0.21	1.00
MONMS	Winter	0.52	1.00	MONMS	Winter	0.36	1.00
MONMS	Spring	0.30	1.00	MONMS	Spring	0.30	1.00
MONMS	Summer	0.18	1.00	MONMS	Summer	0.44	1.00

Detailed Season, All Seasons, Kendall's Tau Results: Mean Monthly Temperature

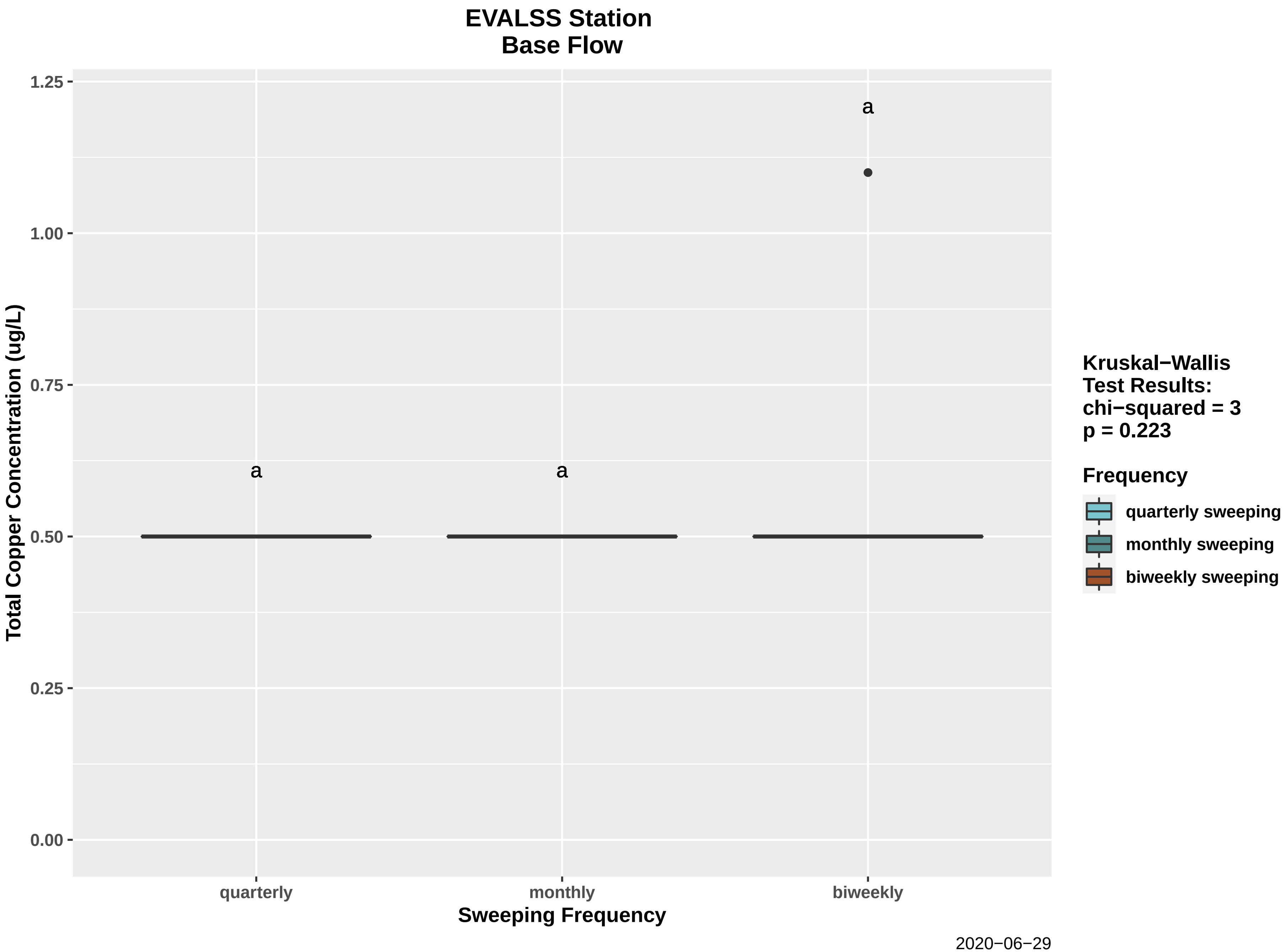
MONMS	Fall	0.31	1.00	MONMS	Fall	-0.32	0.07
MONMS	All Seasons	0.33	1.00	MONMS	All Seasons	0.17	1.00
TOSMO	Winter	0.55	1.00	TOSMO	Winter	0.46	1.00
TOSMO	Spring	0.36	1.00	TOSMO	Spring	0.09	1.00
TOSMO	Summer	-0.27	0.12	TOSMO	Summer	-0.20	0.20
TOSMO	Fall	0.42	1.00	TOSMO	Fall	0.04	1.00
TOSMO	All Seasons	0.25	1.00	TOSMO	All Seasons	0.10	1.00
SEIMN	Winter	-0.03	0.47	SEIMN	Winter	-0.11	0.34
SEIMN	Spring	0.27	1.00	SEIMN	Spring	0.12	1.00
SEIMN	Summer	0.12	1.00	SEIMN	Summer	-0.08	0.39
SEIMN	Fall	0.05	1.00	SEIMN	Fall	-0.18	0.21
SEIMN	All Seasons	0.10	1.00	SEIMN	All Seasons	-0.07	0.29
SEIMS	Winter	0.33	1.00	SEIMS	Winter	0.20	1.00
SEIMS	Spring	0.73	1.00	SEIMS	Spring	1.00	1.00
SEIMS	Summer	0.07	1.00	SEIMS	Summer	0.47	1.00
SEIMS	Fall	0.43	1.00	SEIMS	Fall	0.00	1.00
SEIMS	All Seasons	0.39	1.00	SEIMS	All Seasons	0.38	1.00
COUMO	Winter	0.16	1.00	COUMO	Winter	0.24	1.00
COUMO	Spring	0.03	1.00	COUMO	Spring	0.18	1.00
COUMO	Summer	-0.36	0.06	COUMO	Summer	0.23	1.00
COUMO	Fall	0.11	1.00	COUMO	Fall	0.07	1.00
COUMO	All Seasons	-0.05	0.36	COUMO	All Seasons	0.18	1.00
TYLMO	Winter	0.33	1.00	TYLMO	Winter	0.11	1.00
TYLMO	Spring	0.50	1.00	TYLMO	Spring	0.54	1.00
TYLMO	Summer	-0.61	0.01	TYLMO	Summer	-0.39	0.09
TYLMO	Fall	0.51	1.00	TYLMO	Fall	0.18	1.00
TYLMO	All Seasons	0.20	1.00	TYLMO	All Seasons	0.11	1.00

APPENDIX J

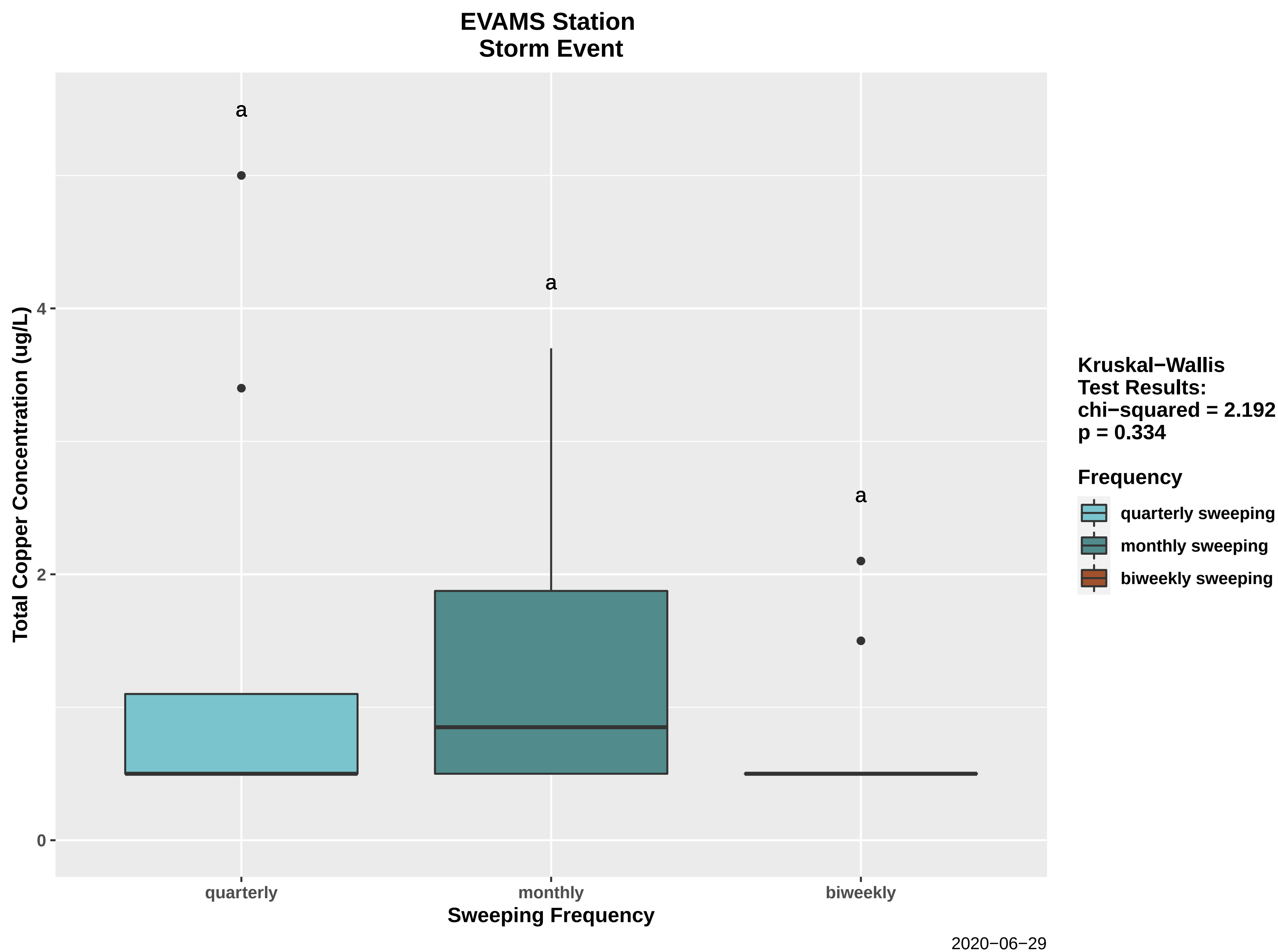
Kruskal–Wallis Test Results

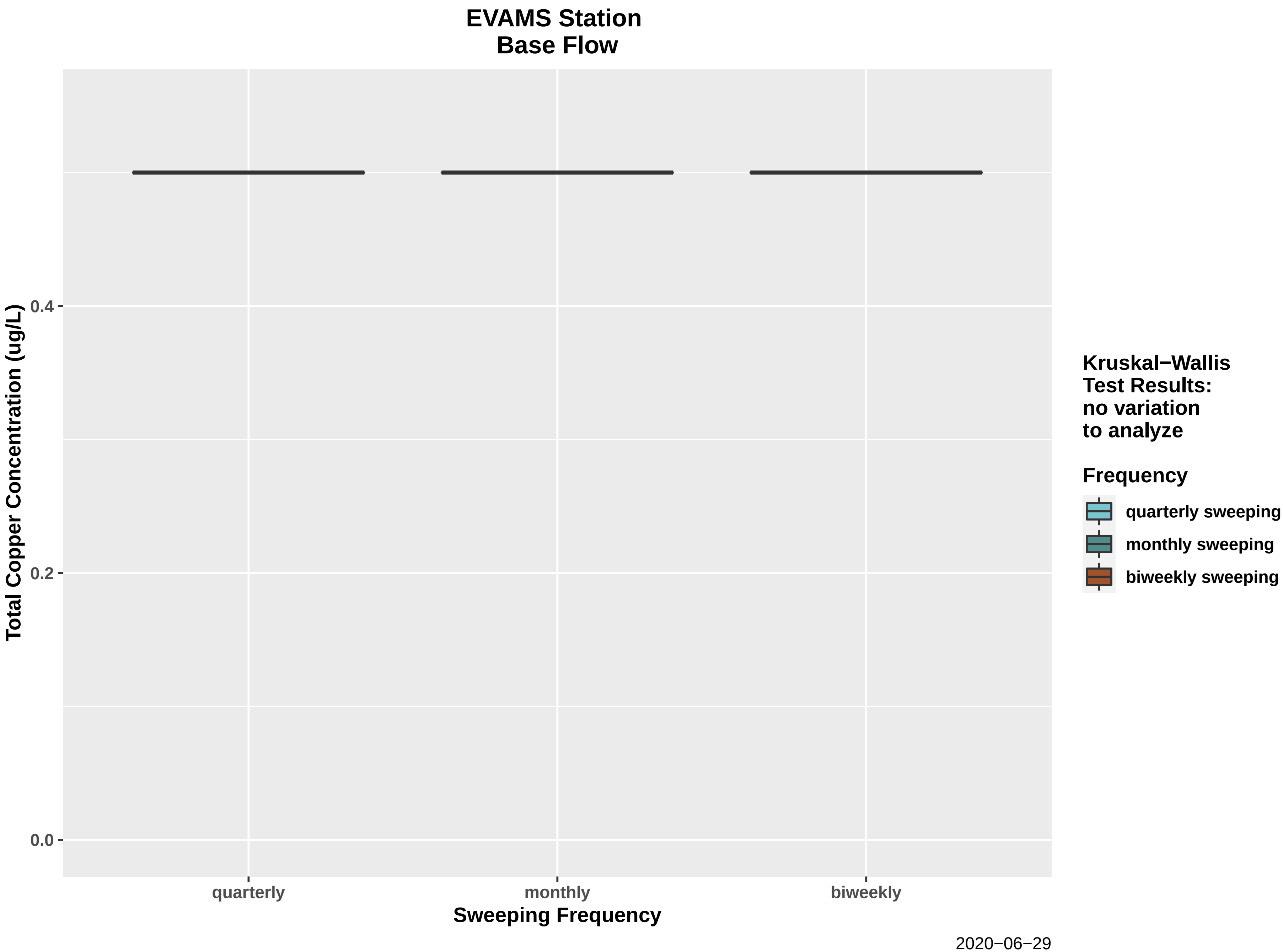


EVALSS Station
Storm Event
Total Copper Concentration (ug/L)
0
2
4
6
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 0.398
p = 0.82
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

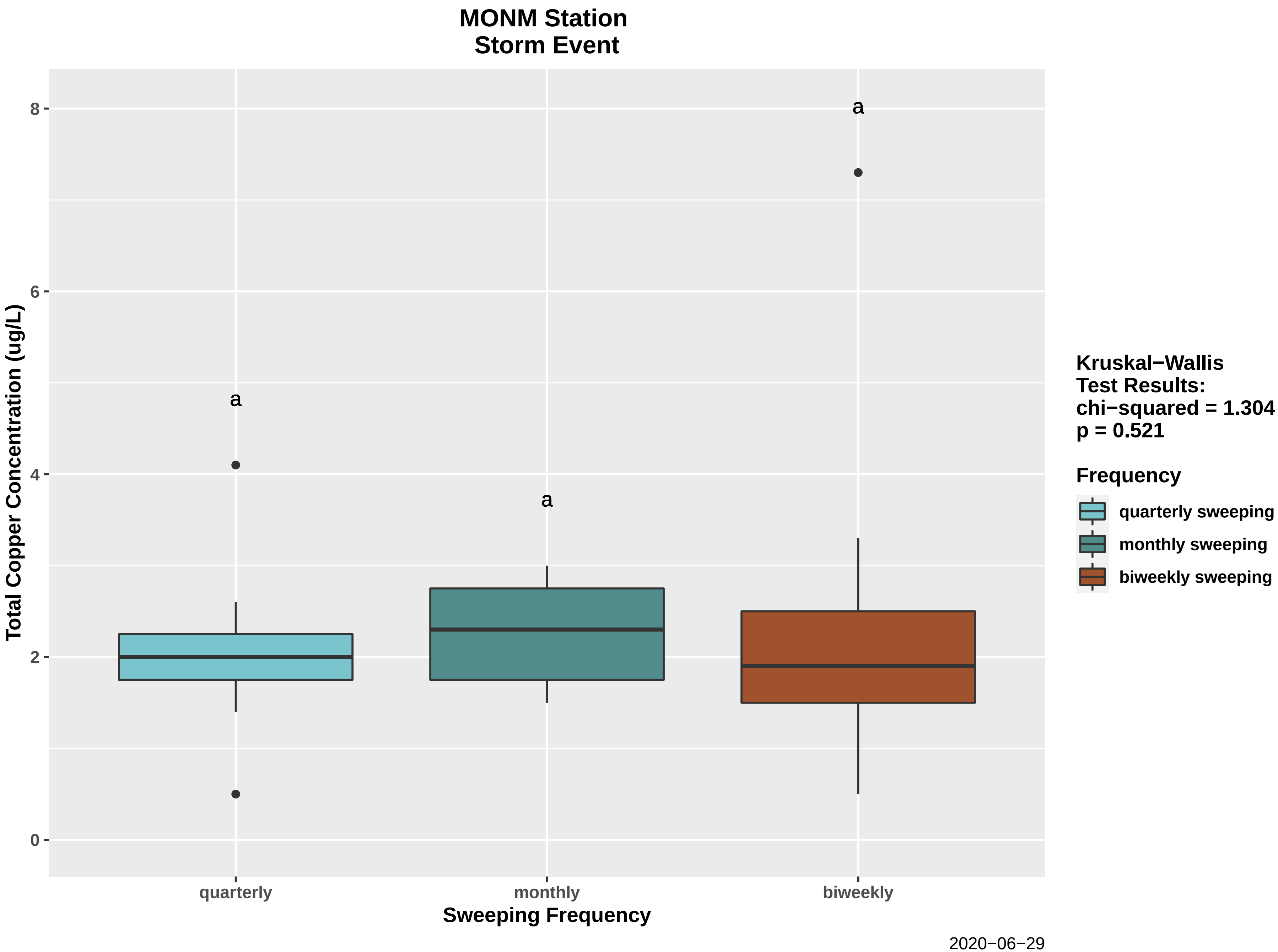


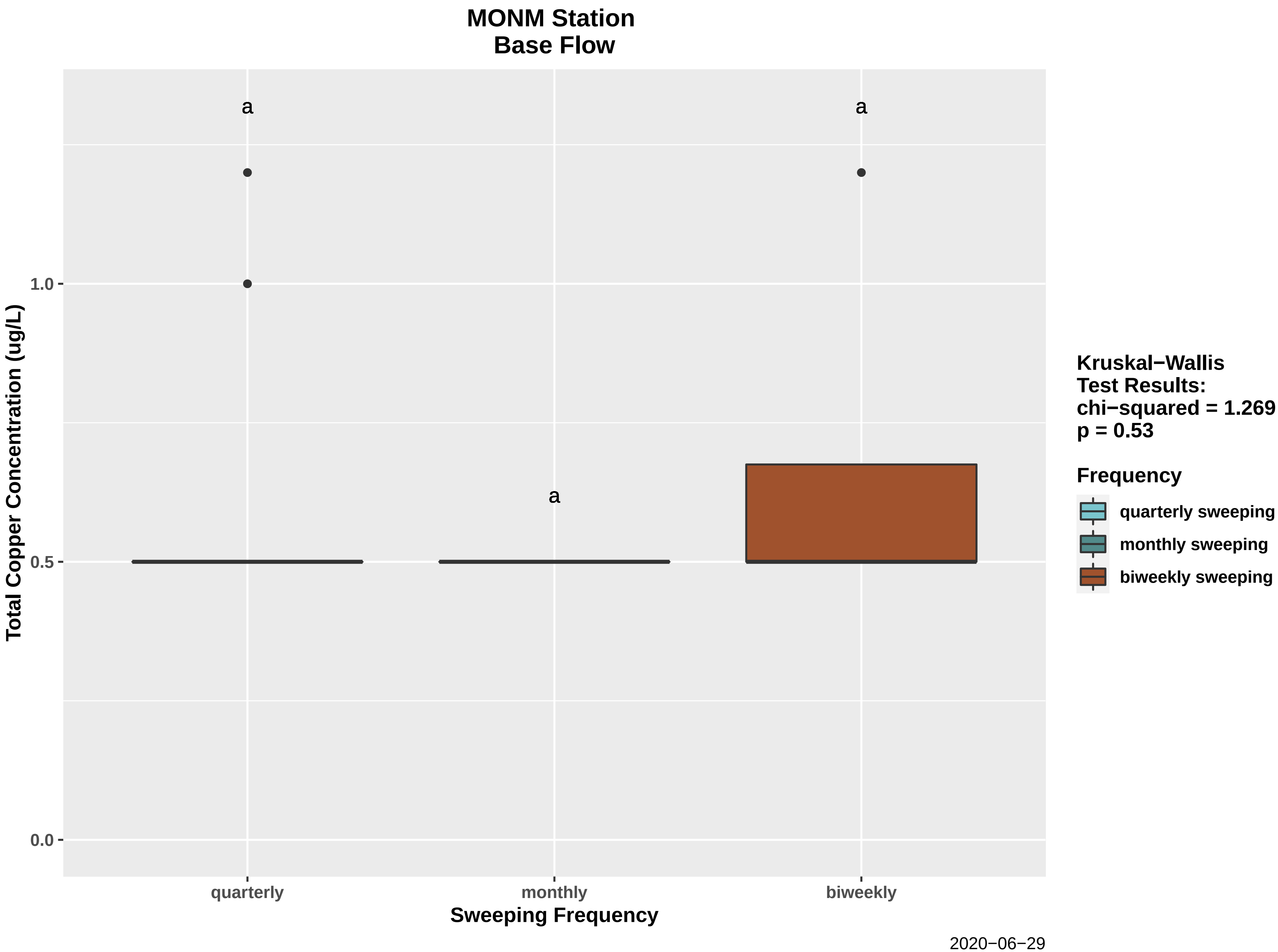
EVALSS Station
Base Flow
Total Copper Concentration (ug/L)
1.25
1.00
0.75
0.50
0.25
0.00
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3
p = 0.223
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

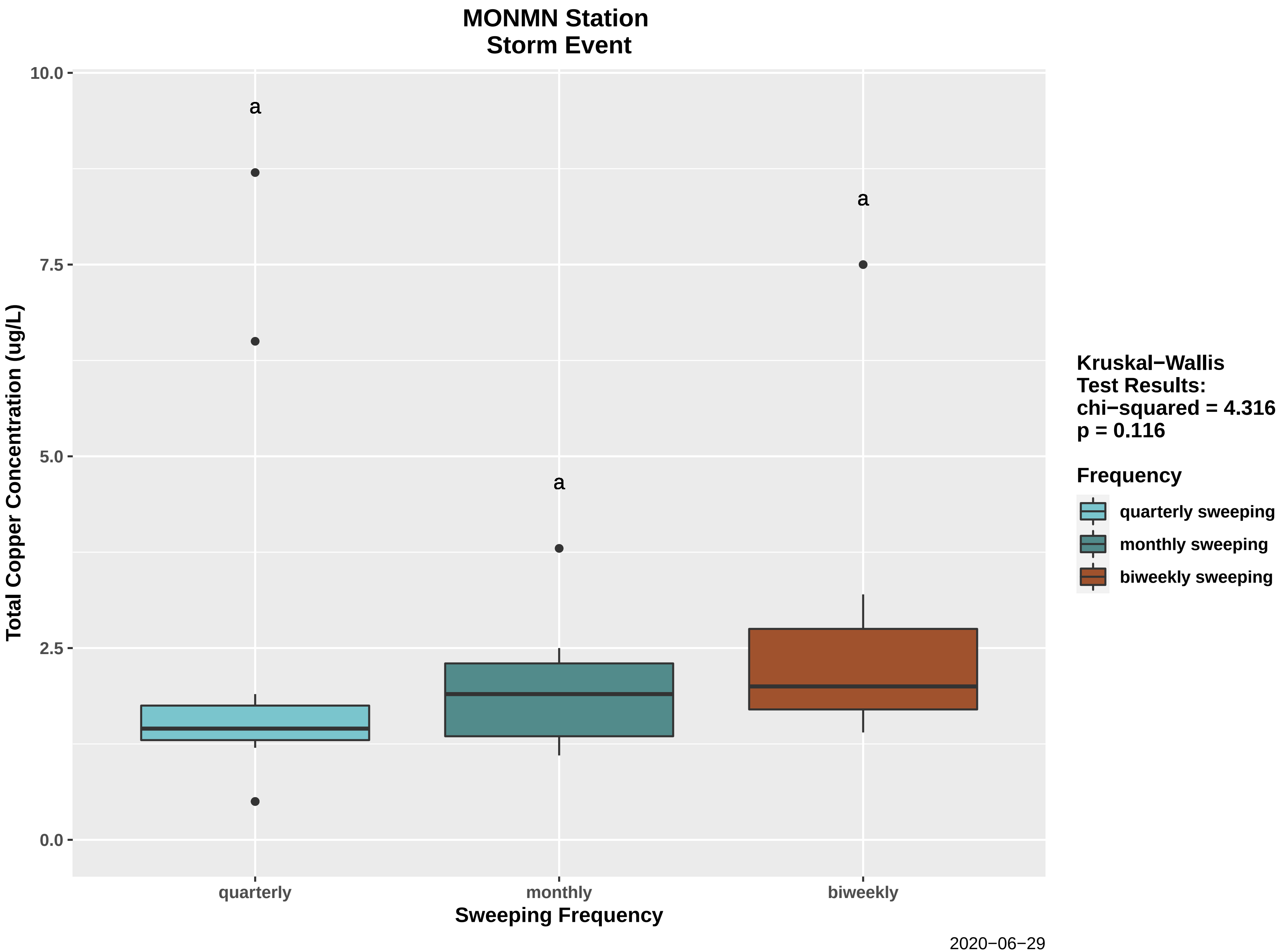

EVAMS Station
Storm Event
Total Copper Concentration (ug/L)
0
2
4
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.192
p = 0.334
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

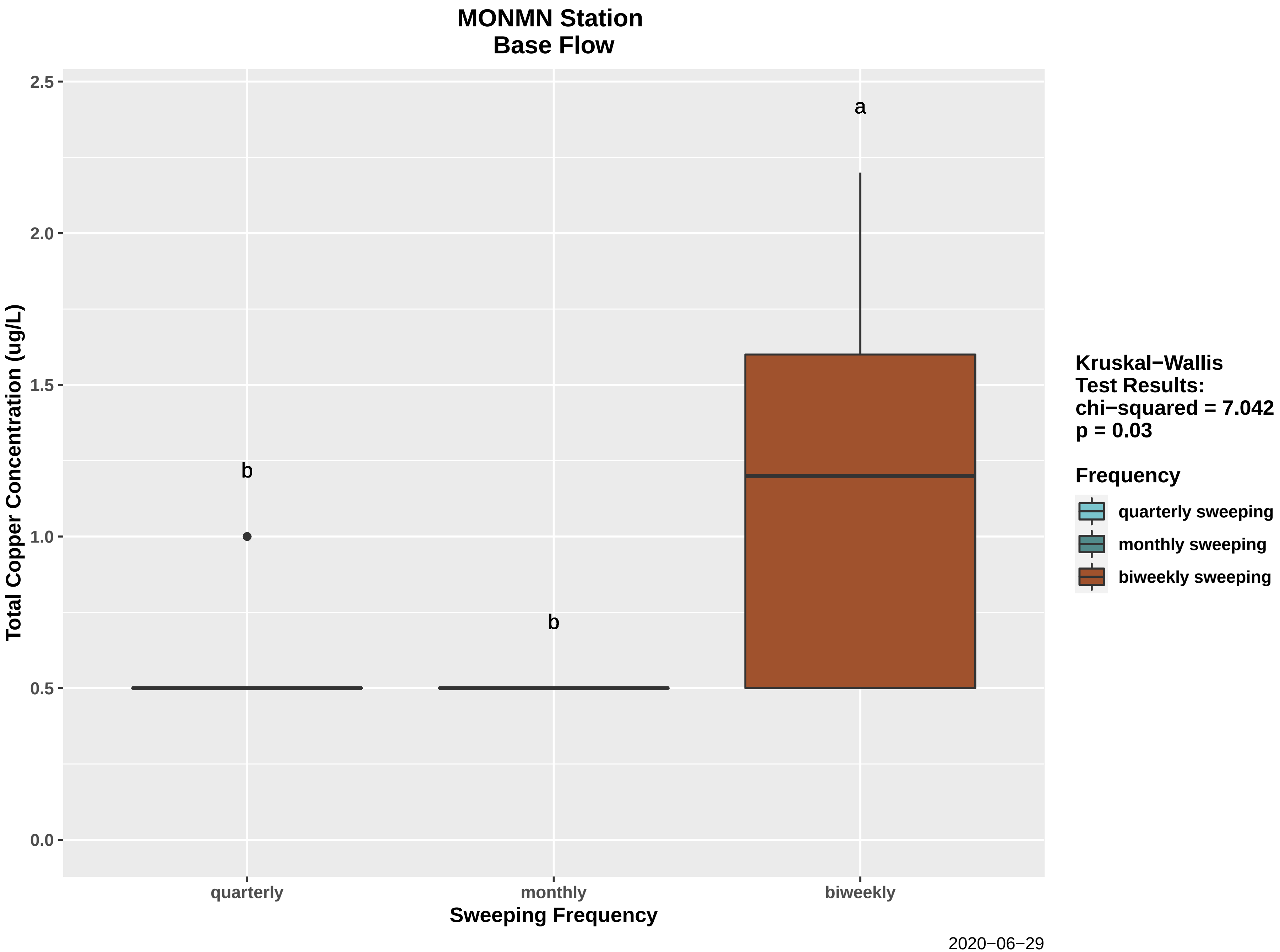


EVAMS Station
Base Flow
Total Copper Concentration (ug/L)
0.4
0.2
0.0
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
no variation
to analyze
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

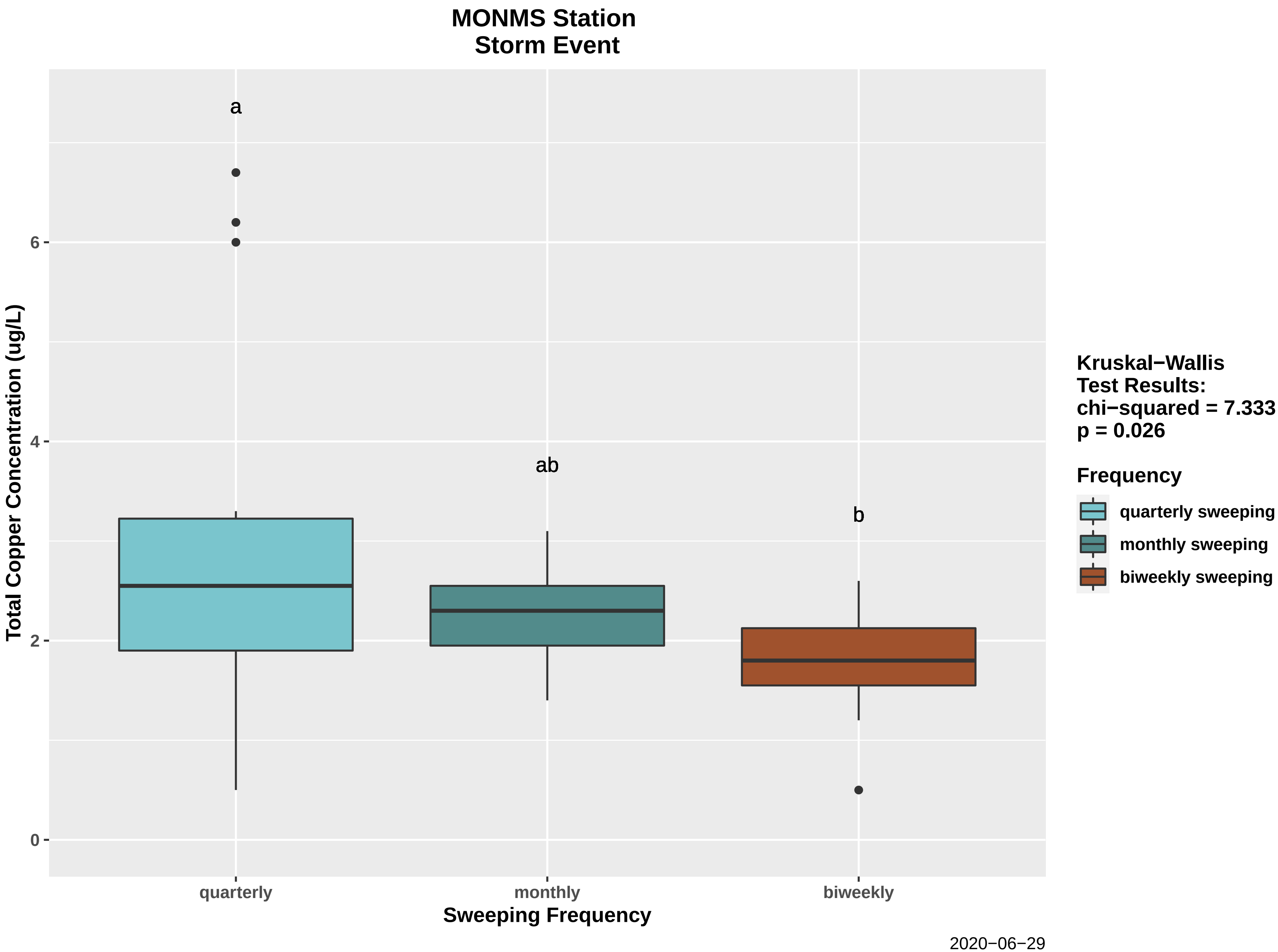

MONM Station
Storm Event
Total Copper Concentration (ug/L)
8
6
4
2
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.304
p = 0.521
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

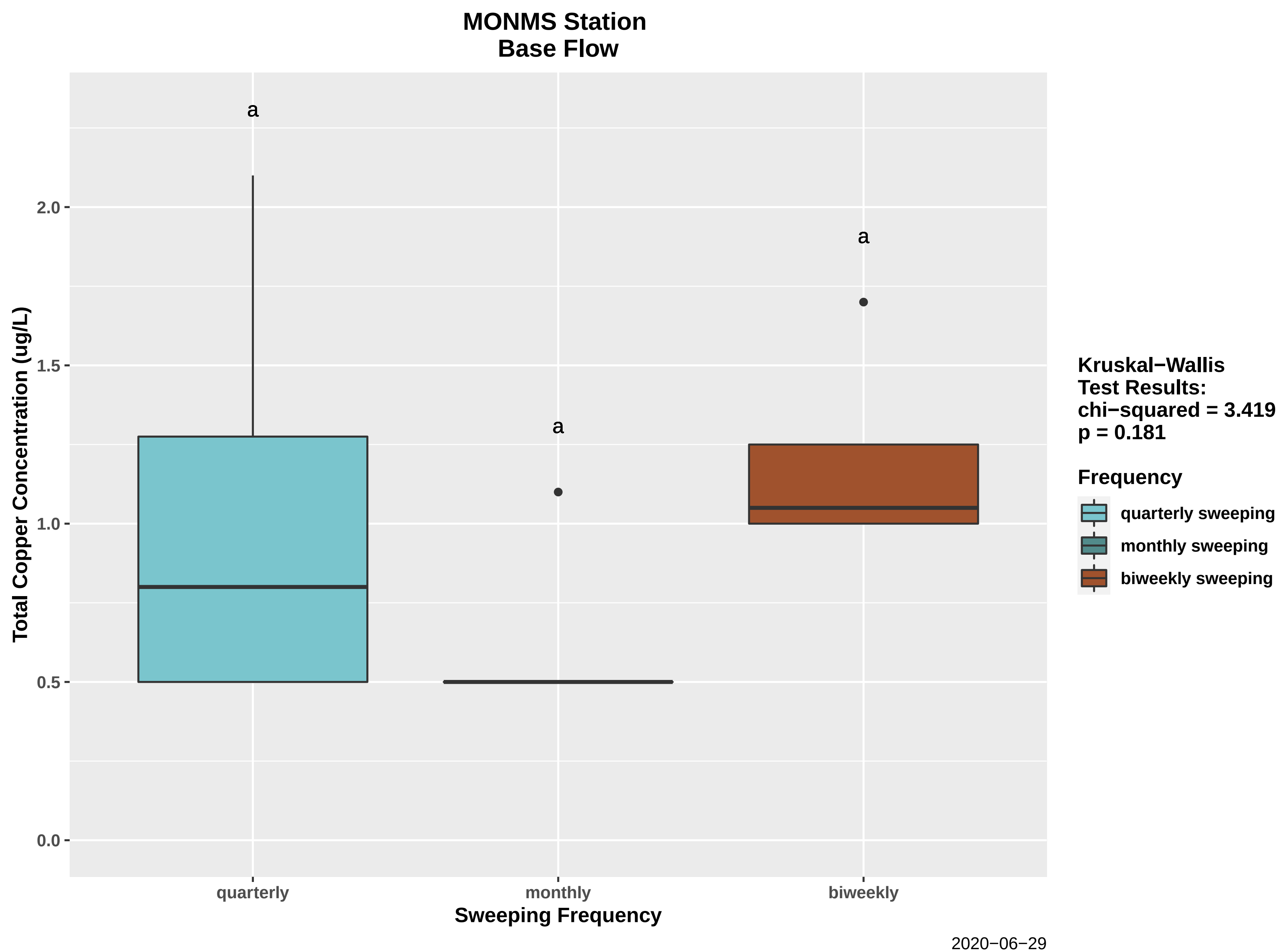

MONM Station
Base Flow
a
a
a
1.0
0.5
0.0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.269
p = 0.53
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

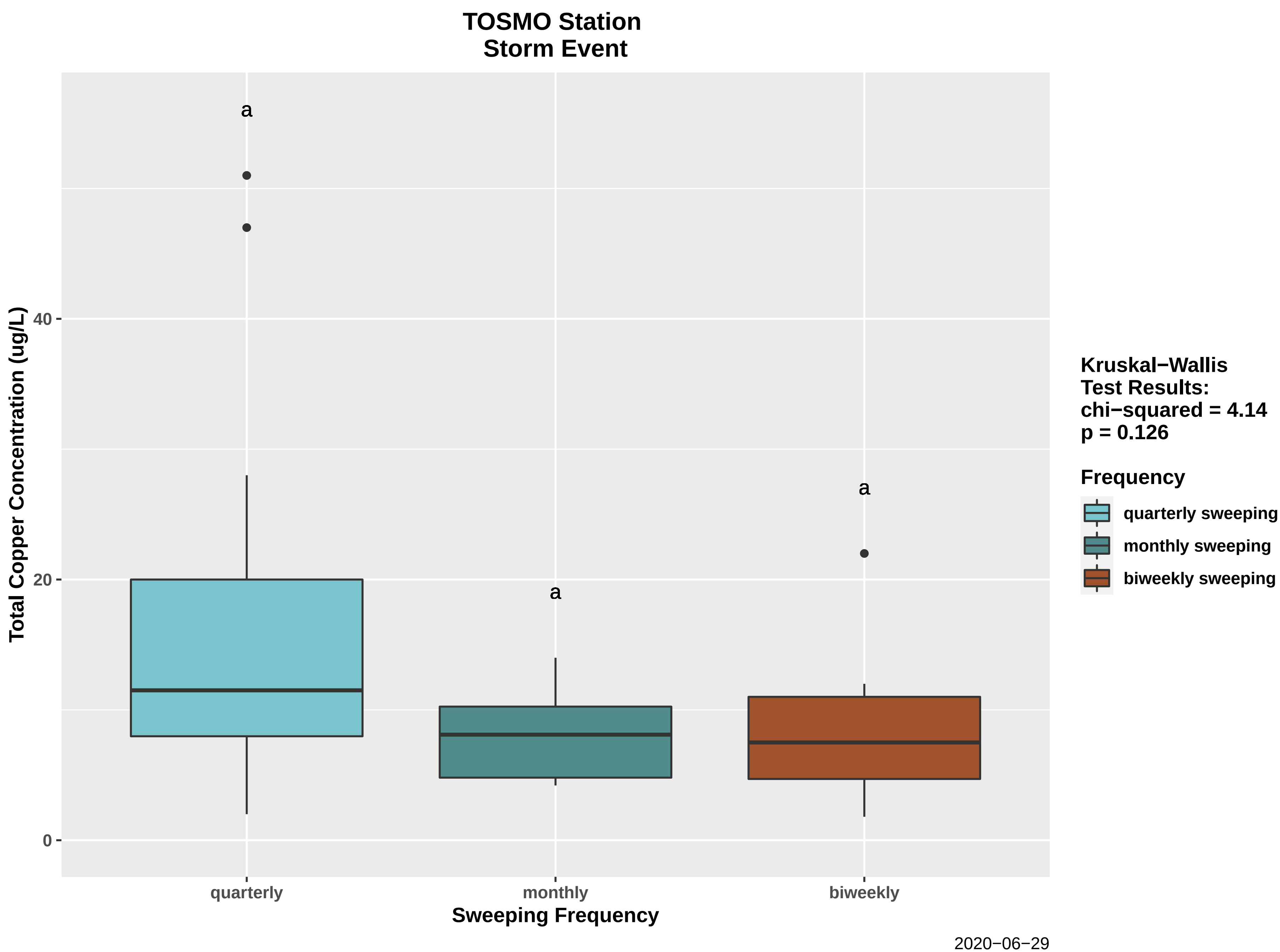

MONMN Station
Storm Event
Total Copper Concentration (ug/L)
10.0
7.5
5.0
2.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.316
p = 0.116
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

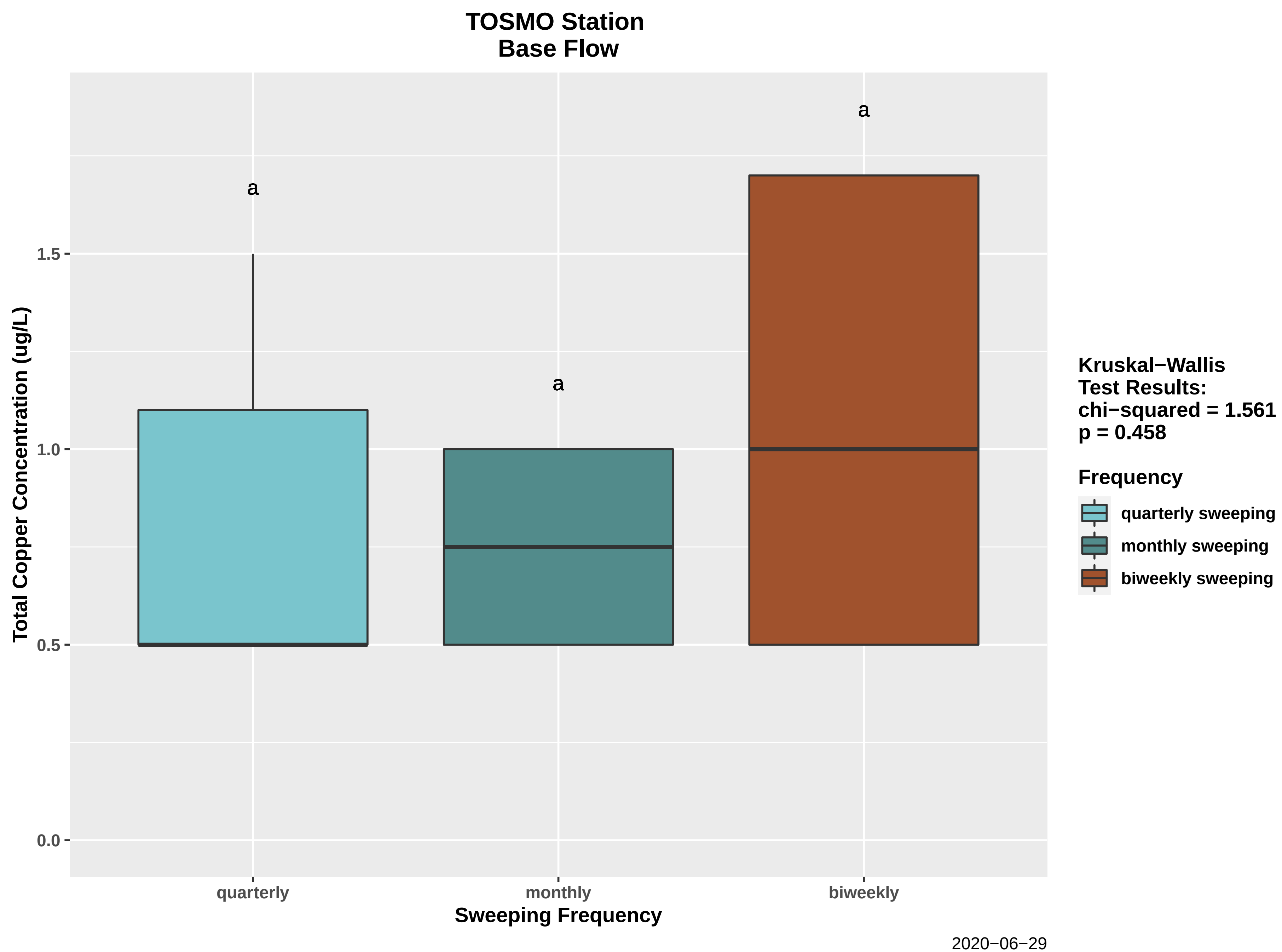


MONMN Station
Base Flow
Total Copper Concentration (ug/L)
2.5
2.0
1.5
1.0
0.5
0.0
a
b
b
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 7.042
p = 0.03
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

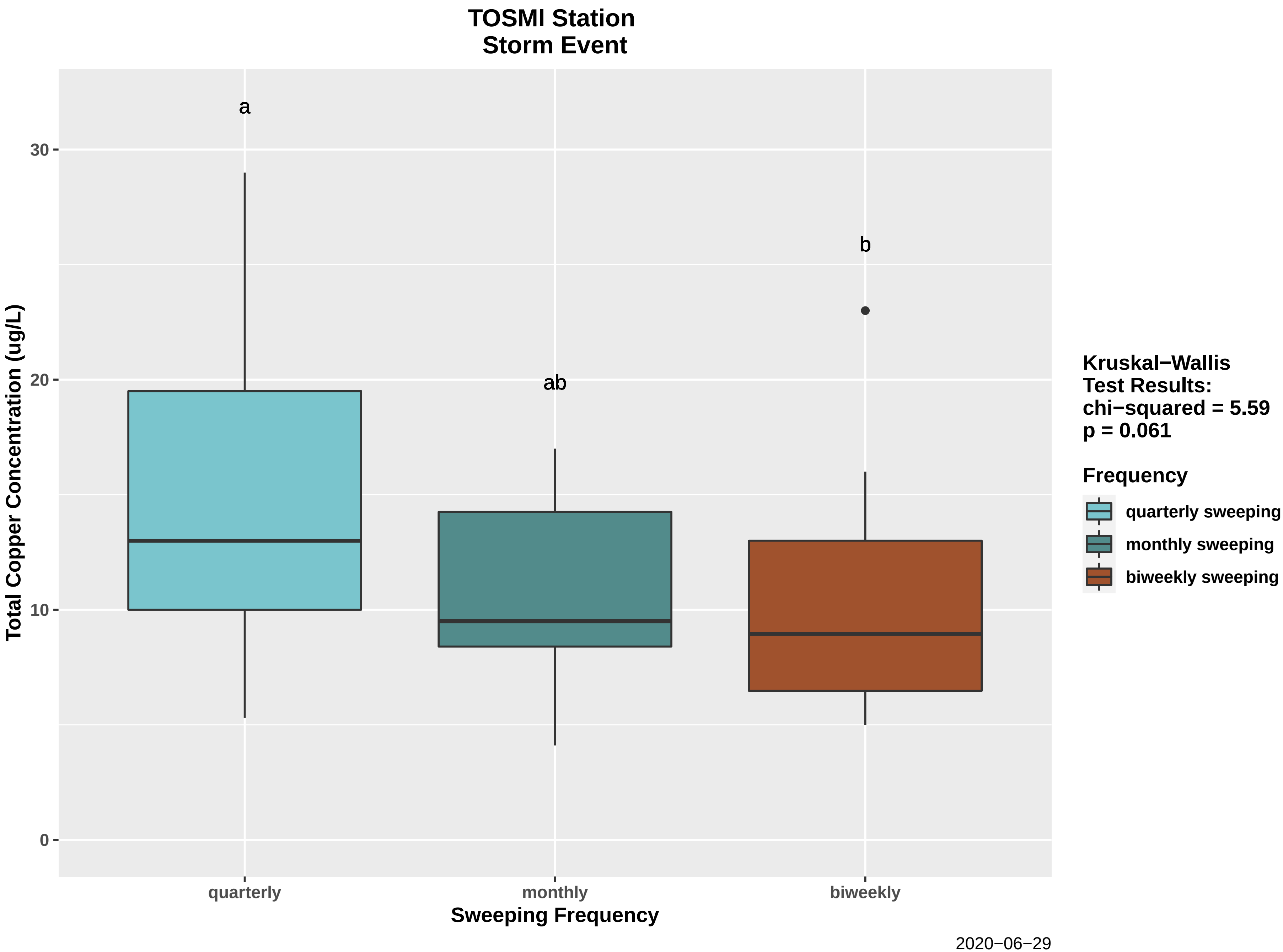

MONMS Station
Storm Event
a
ab
b
Total Copper Concentration (ug/L)
0
2
4
6
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 7.333
p = 0.026
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

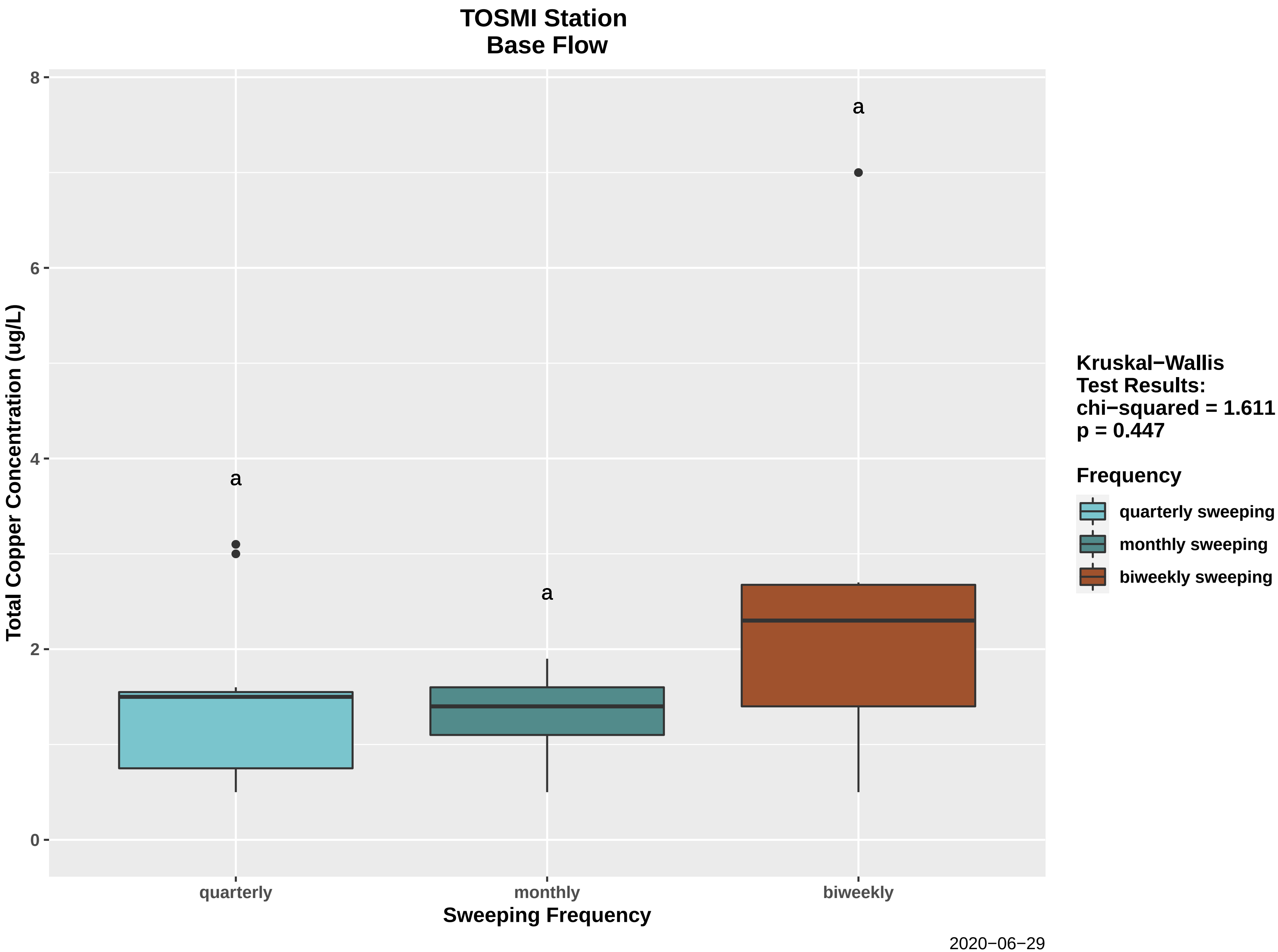

MONMS Station
Base Flow
Total Copper Concentration (ug/L)
0.0
0.5
1.0
1.5
2.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.419
p = 0.181
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

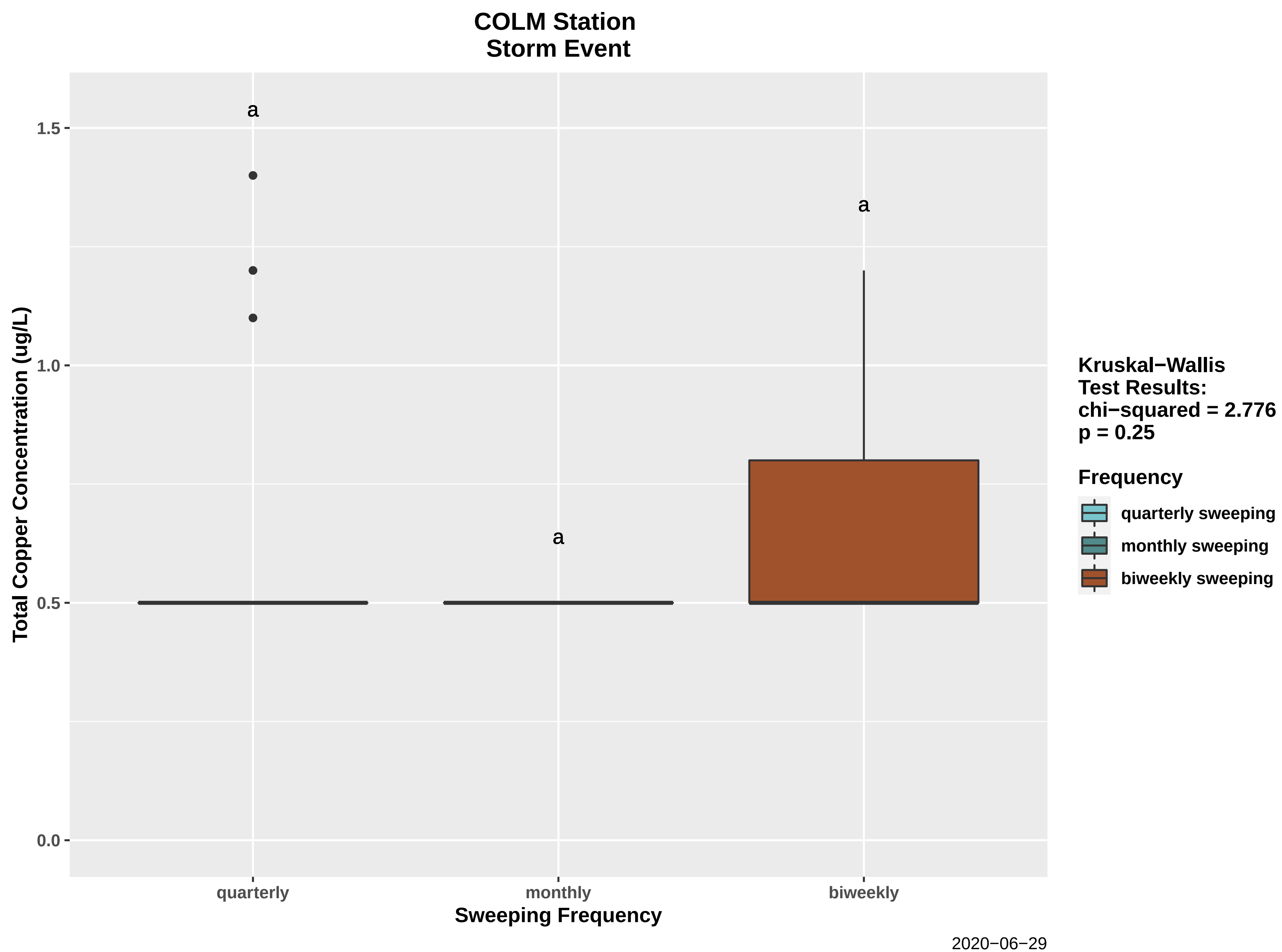

TOSMO Station
Storm Event
a
a
a
40
20
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.14
p = 0.126
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

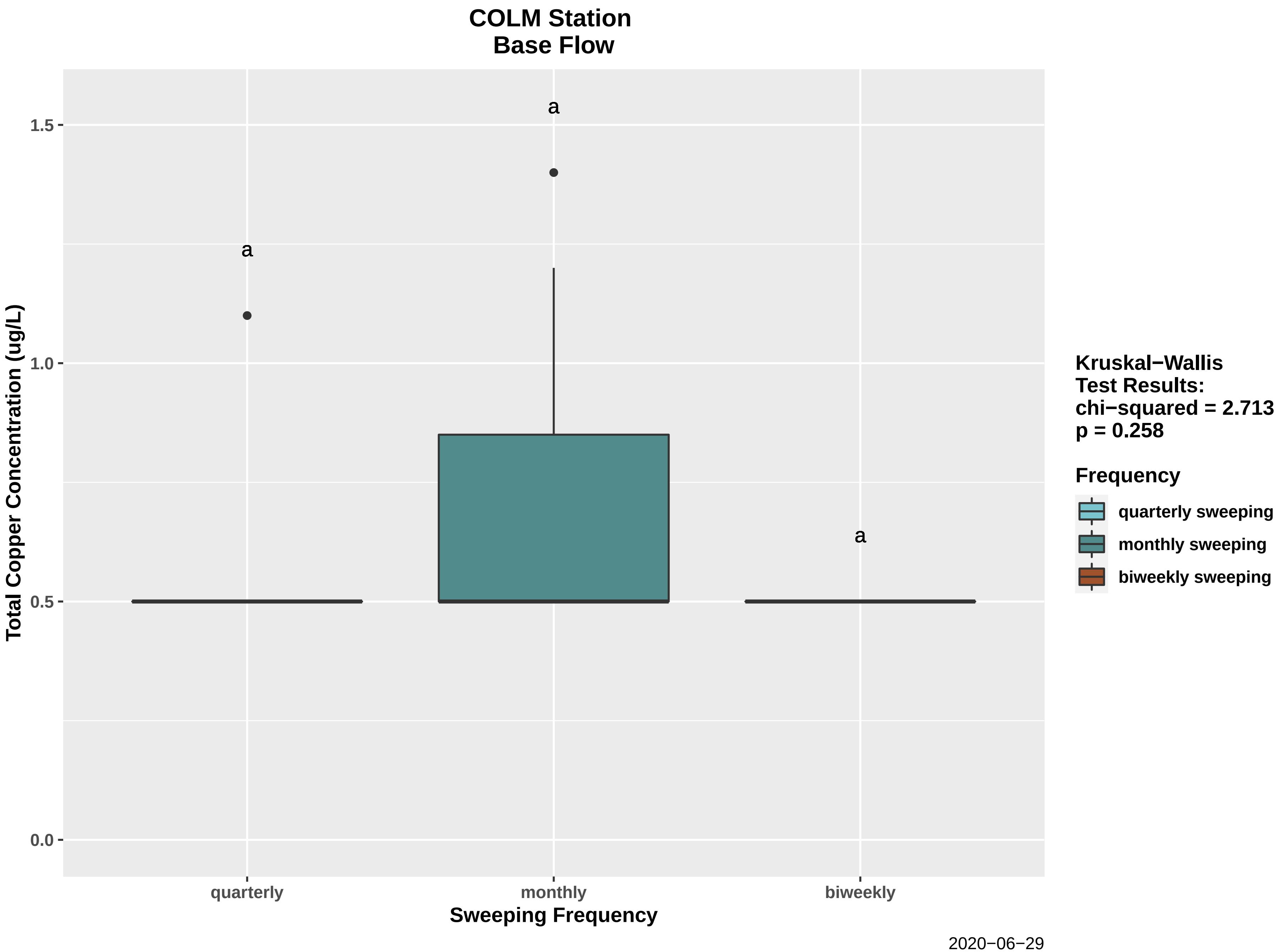


TOSMO Station
Base Flow
a
a
a
1.5
1.0
0.5
0.0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.561
p = 0.458
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

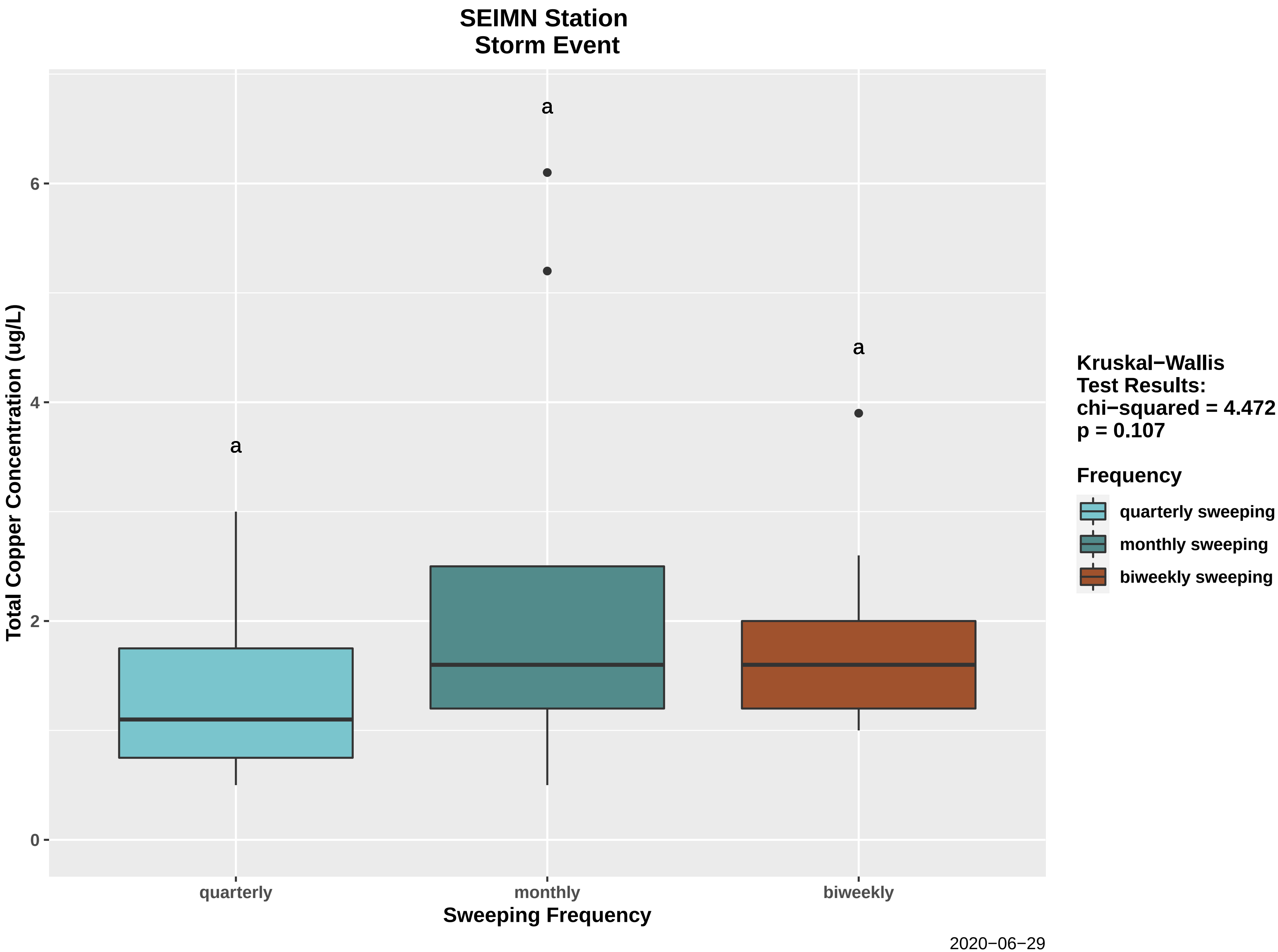

TOSMI Station
Storm Event
a
ab
b
30
20
10
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 5.59
p = 0.061
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

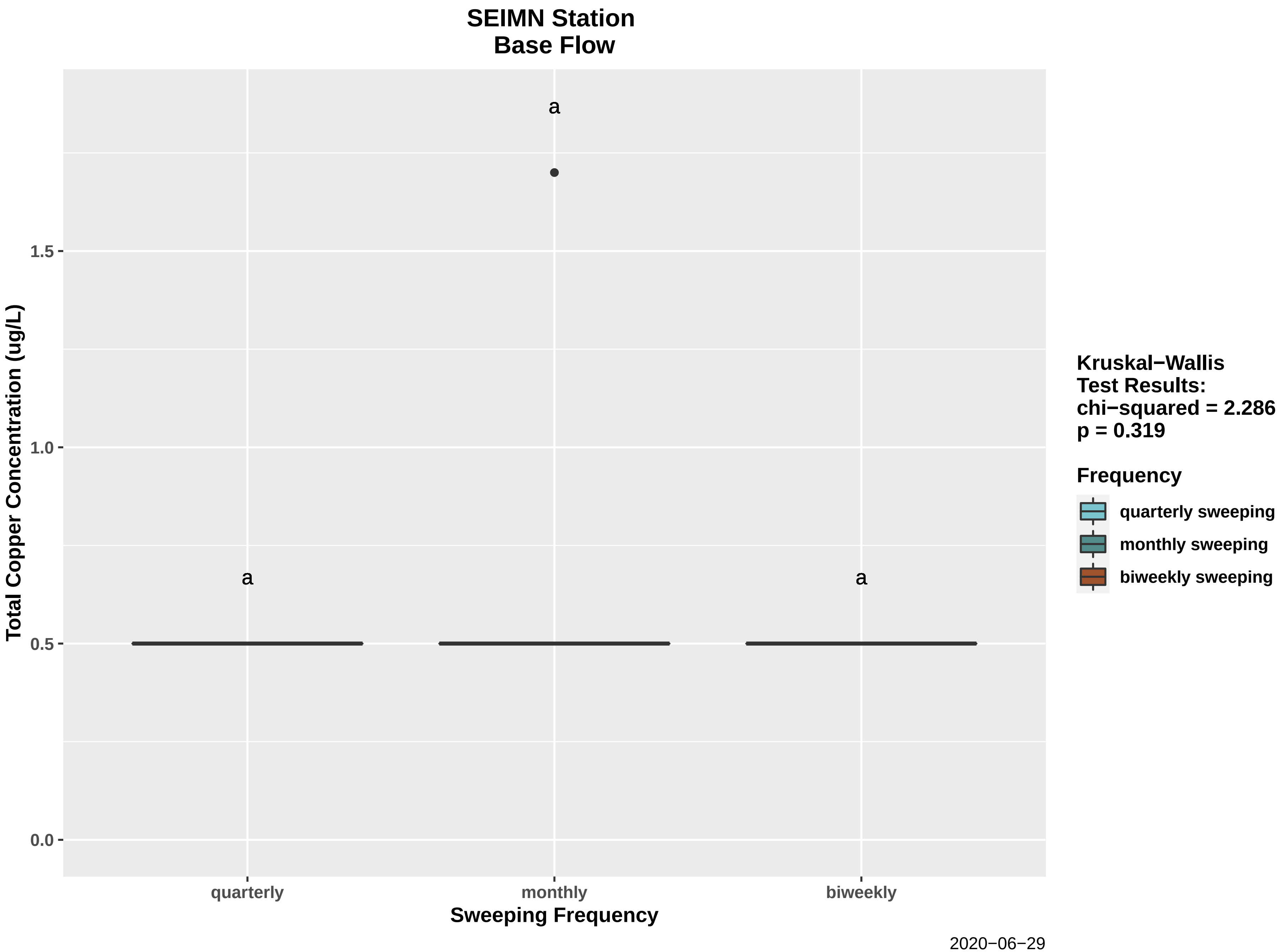

TOSMI Station
Base Flow
Total Copper Concentration (ug/L)
8
6
4
2
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.611
p = 0.447
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

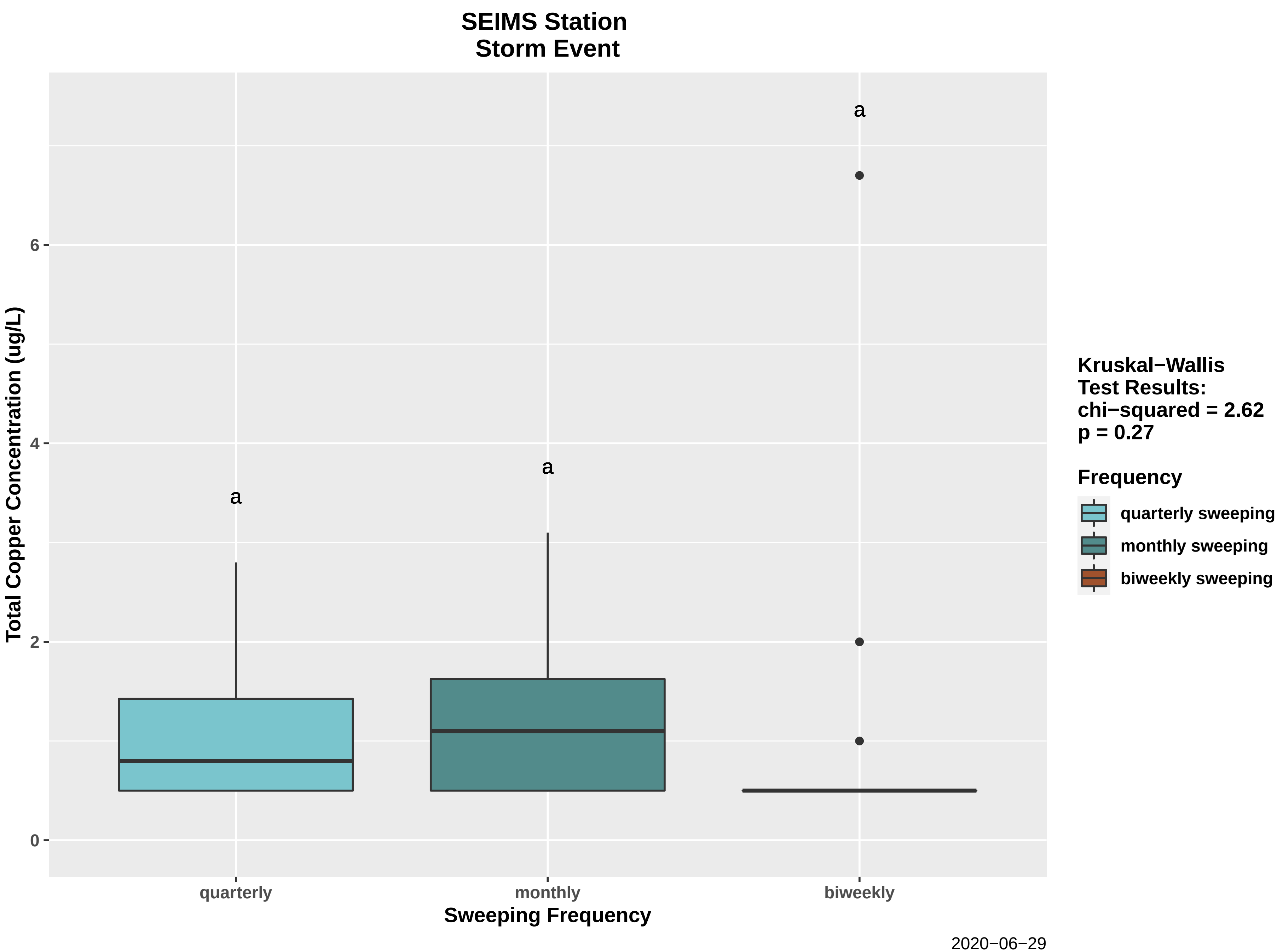

COLM Station
Storm Event
a
a
a
1.5
1.0
0.5
0.0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 2.776
p = 0.25
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

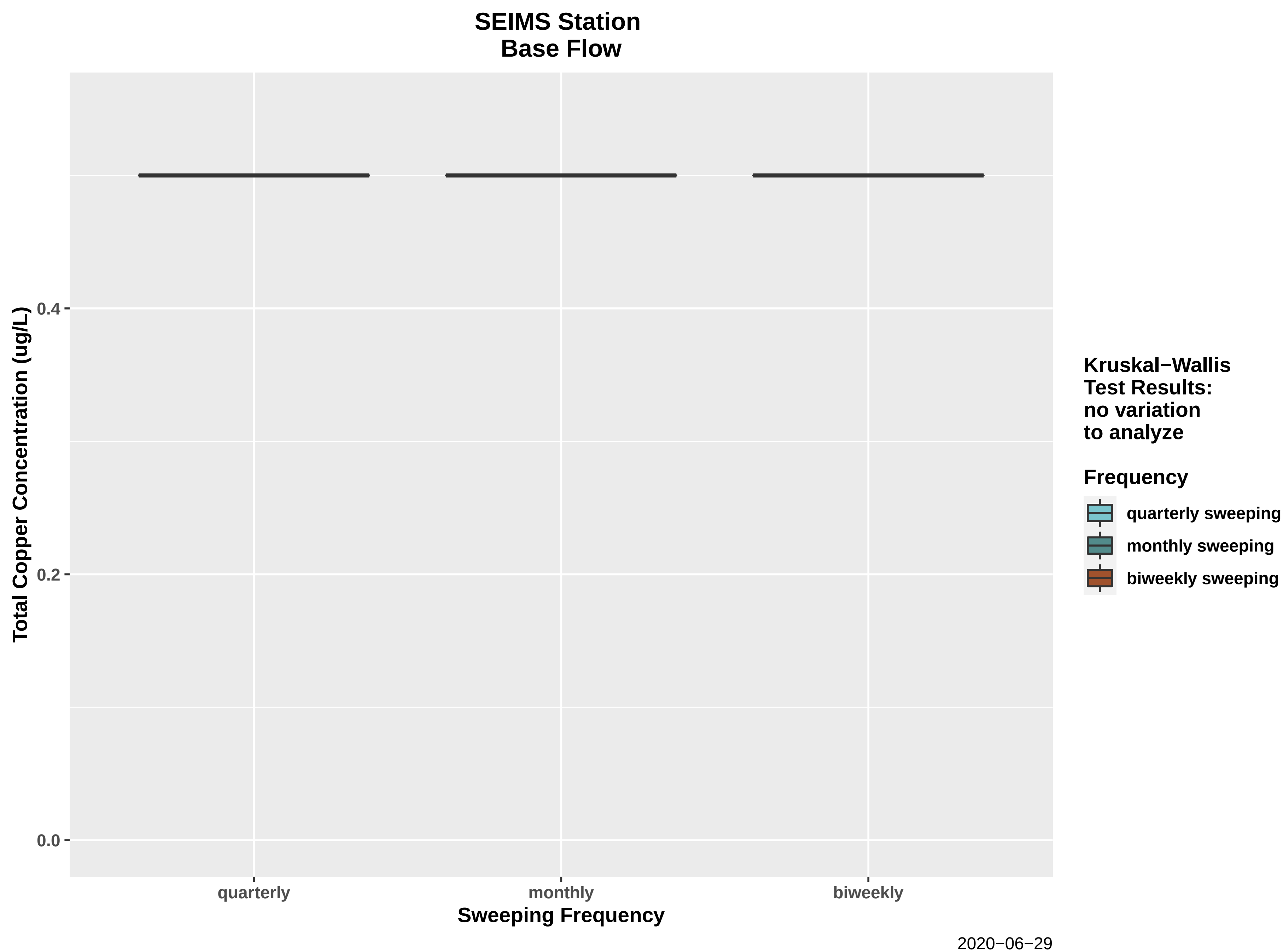


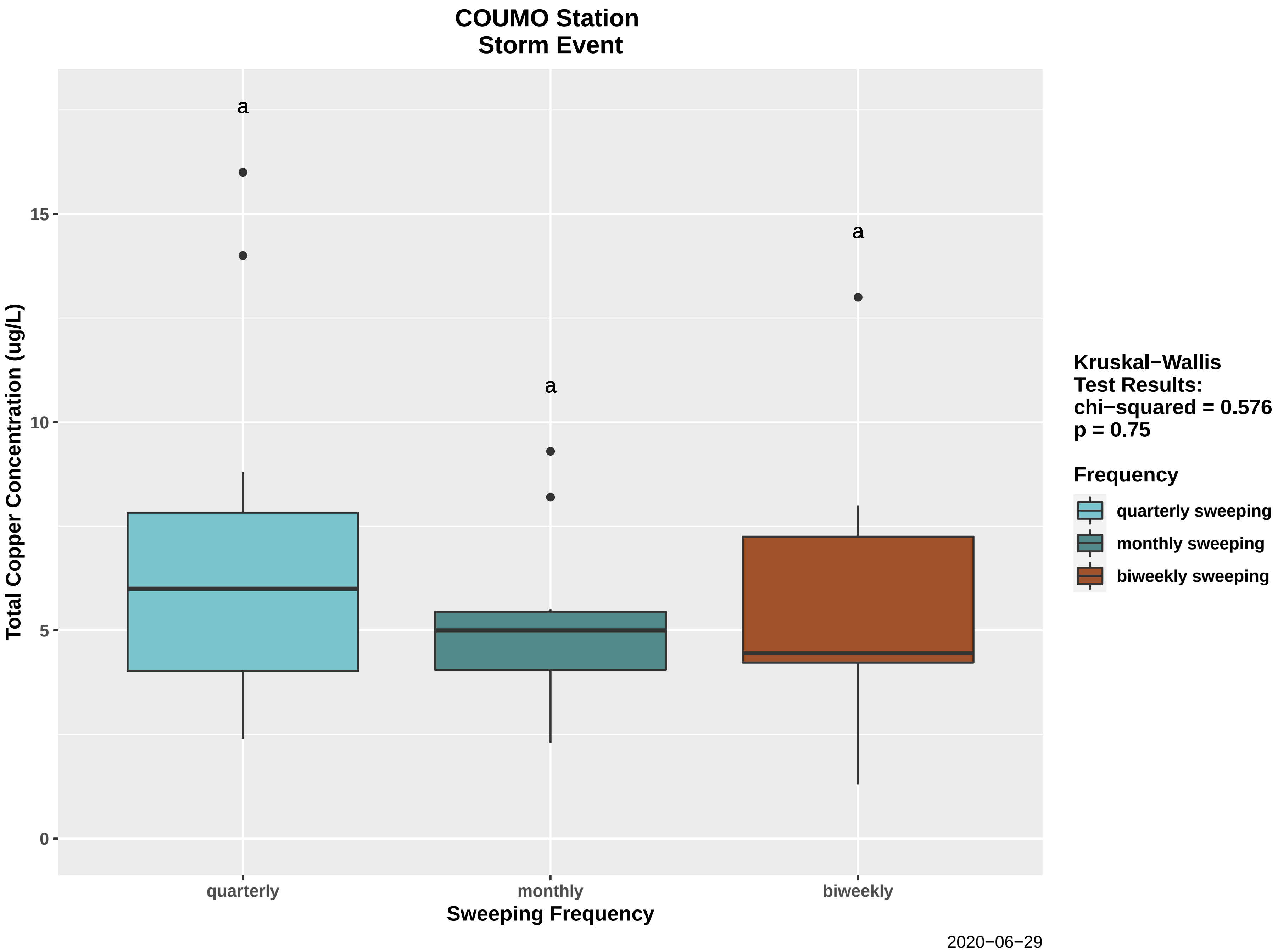
COLM Station
Base Flow
Total Copper Concentration (ug/L)
1.5
1.0
0.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 2.713
p = 0.258
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

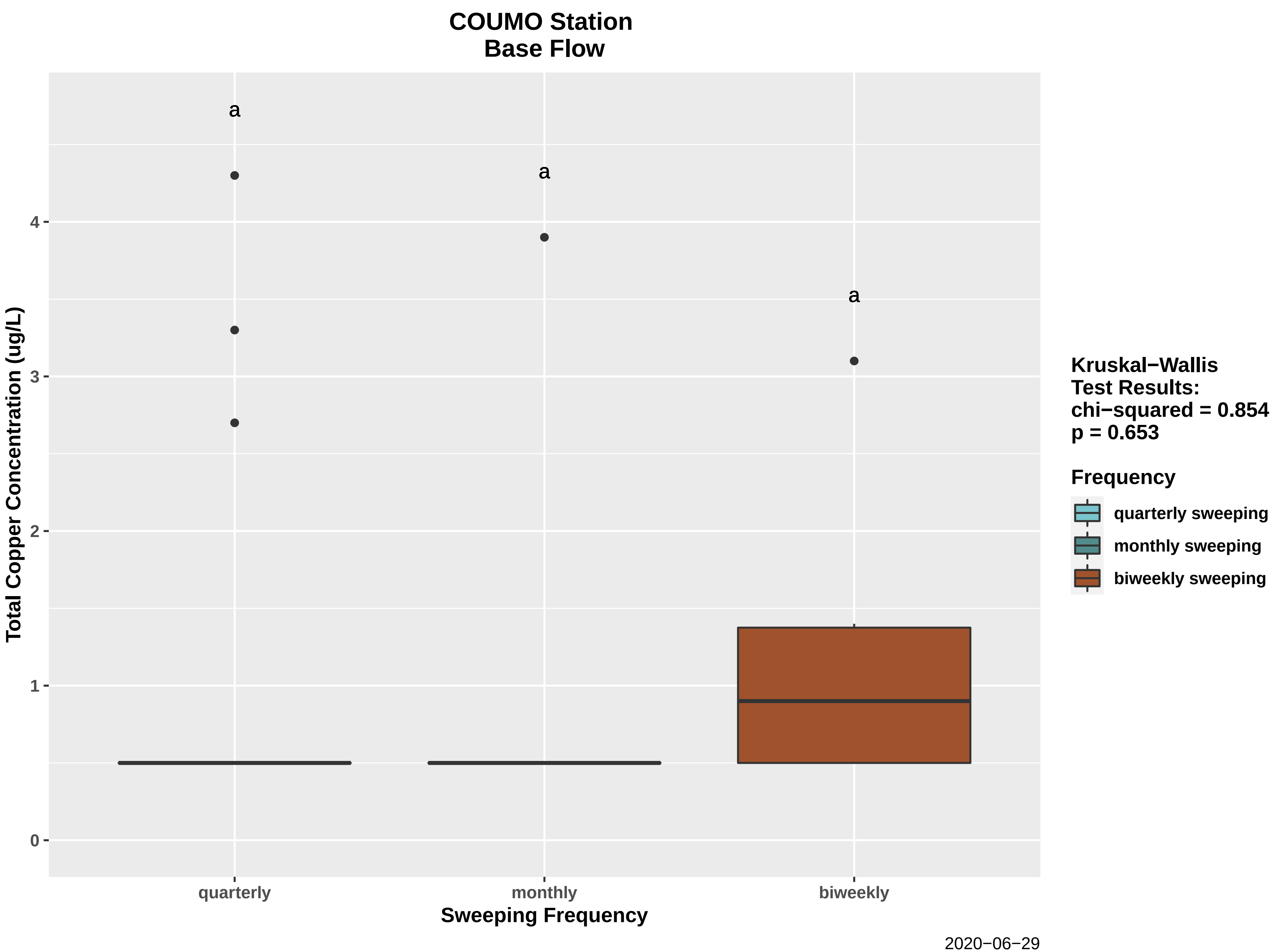

SEIMN Station
Storm Event
Total Copper Concentration (ug/L)
0
2
4
6
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 4.472
p = 0.107
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

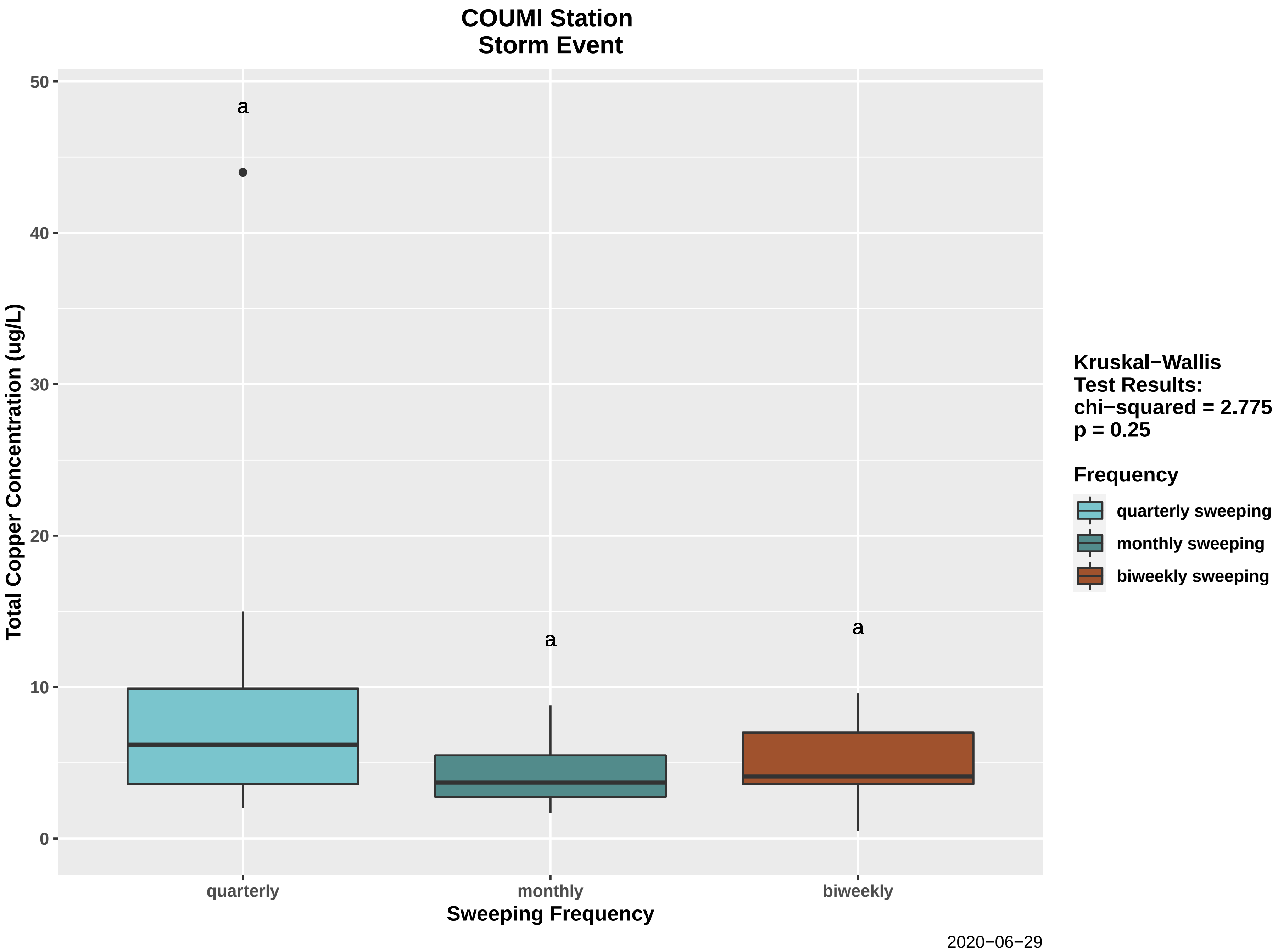

SEIMN Station
Base Flow
a
a
a
1.5
1.0
0.5
0.0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.286
p = 0.319
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


SEIMS Station
Storm Event
a
a
a
Total Copper Concentration (ug/L)
0
2
4
6
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 2.62
p = 0.27
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

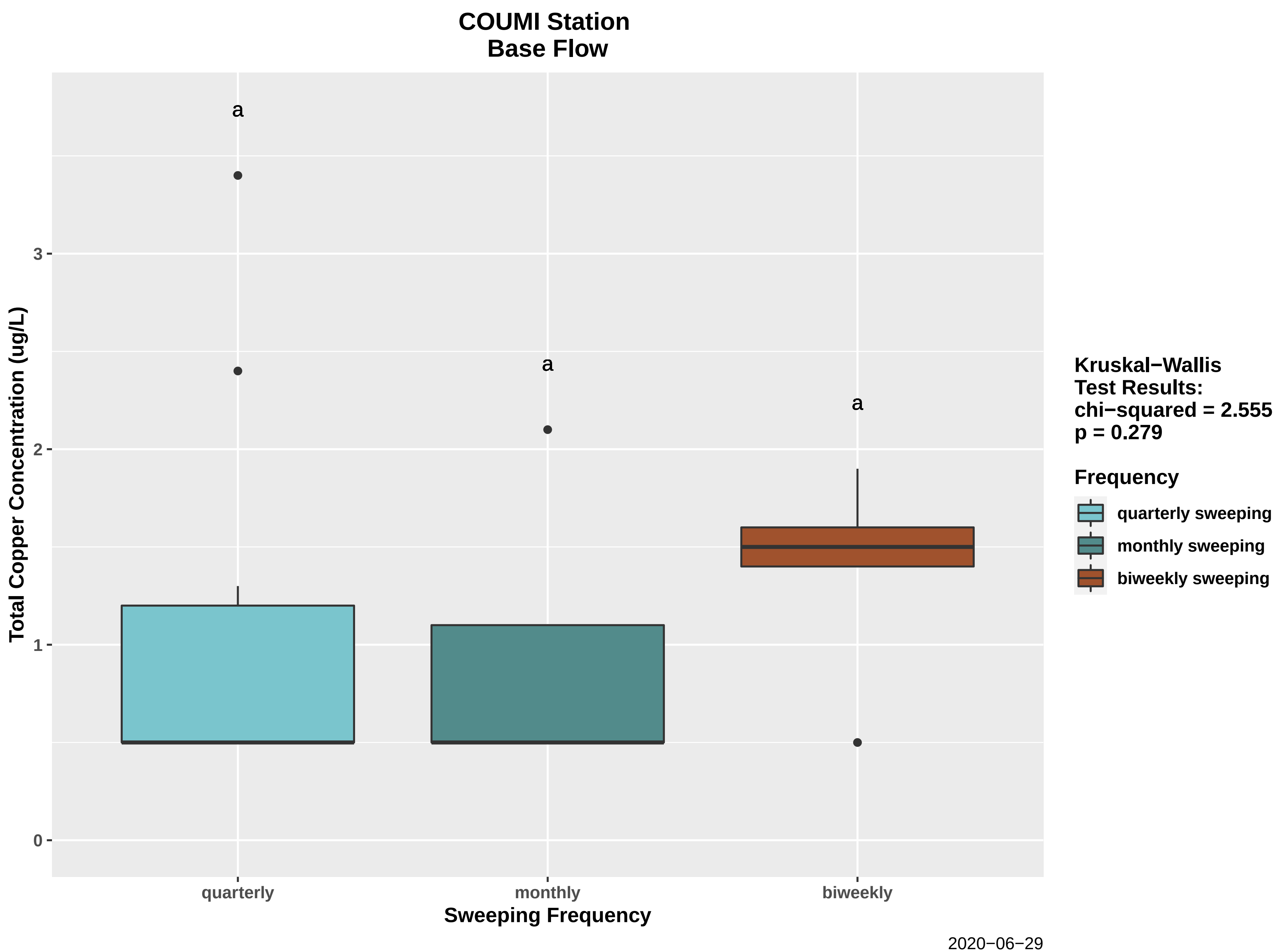

SEIMS Station
Base Flow
Total Copper Concentration (ug/L)
0.4
0.2
0.0
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
no variation
to analyze
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

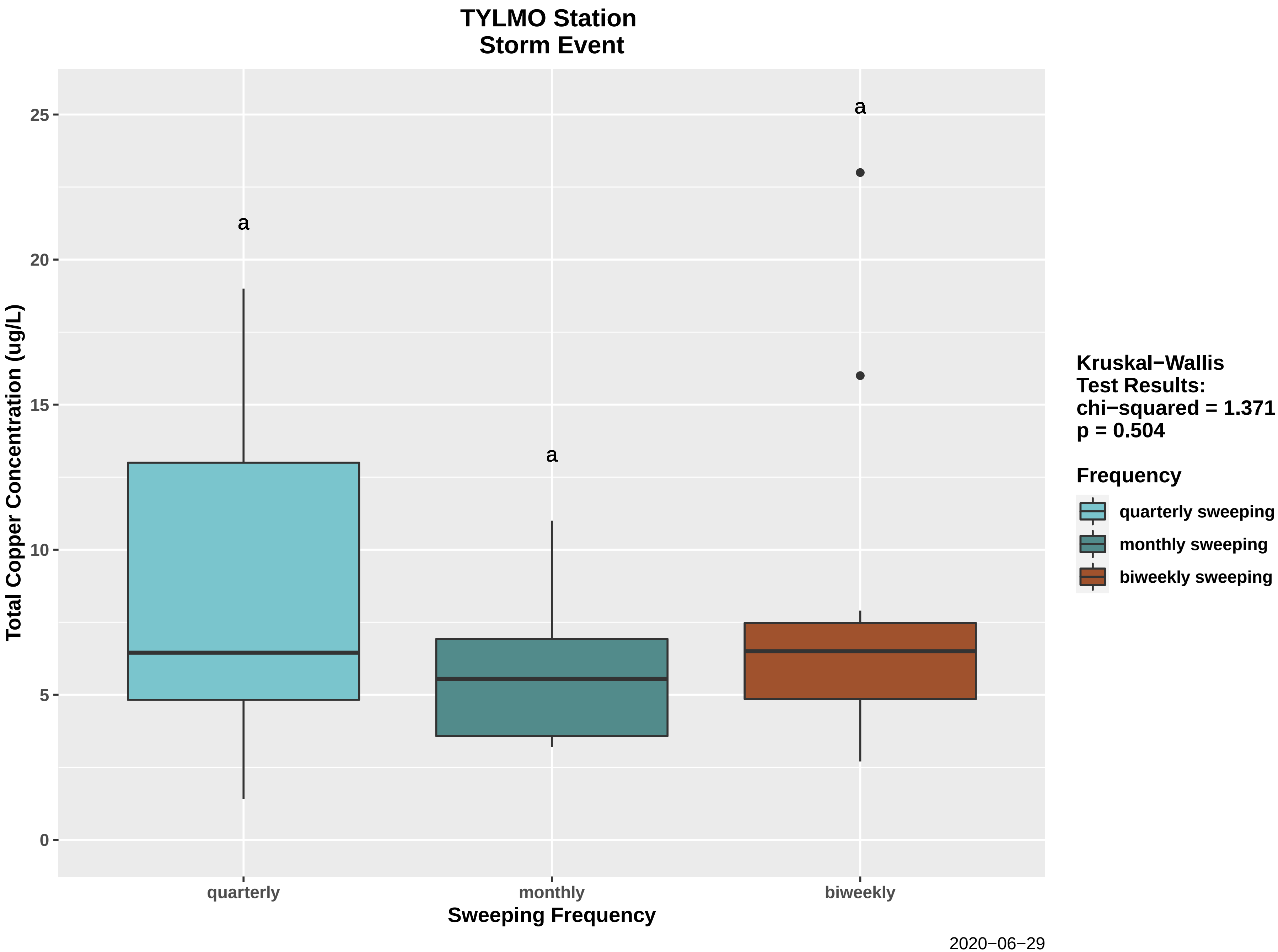

COUMO Station
Storm Event
a
a
a
15
10
5
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.576
p = 0.75
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


COUMO Station
Base Flow
a
a
a
4
3
2
1
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.854
p = 0.653
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

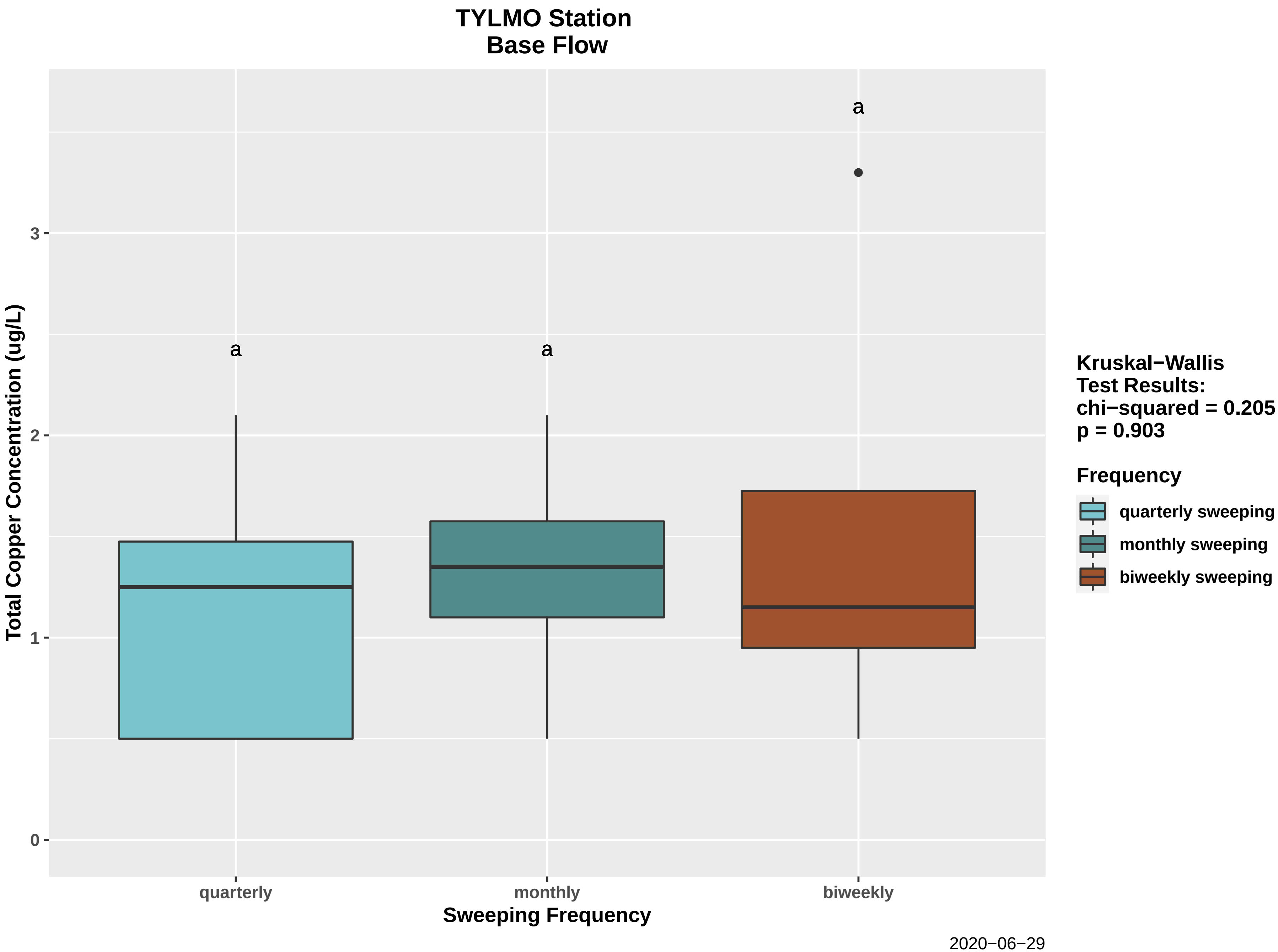


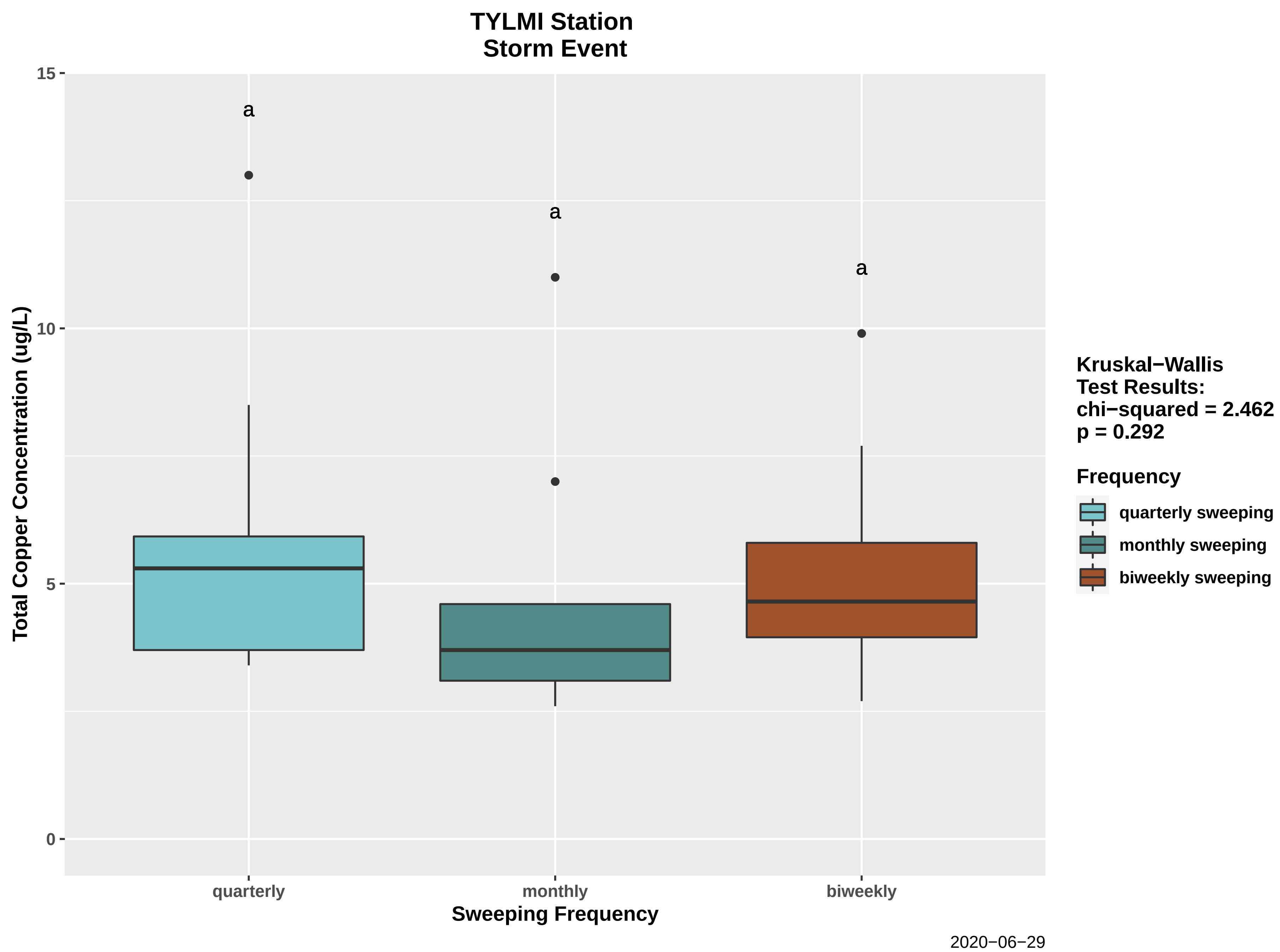
COUMI Station
Storm Event
Total Copper Concentration (ug/L)
50
40
30
20
10
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.775
p = 0.25
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

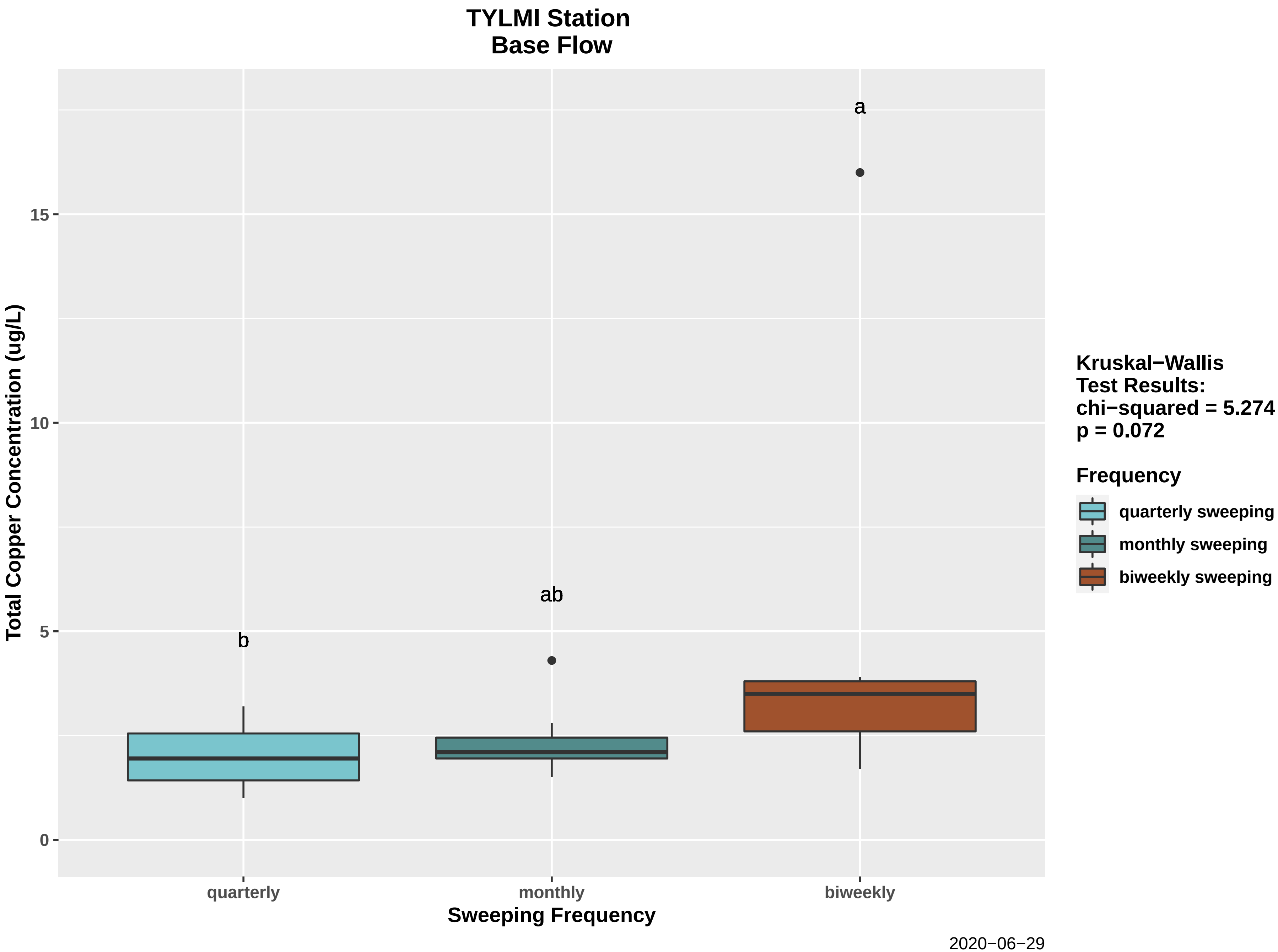

COUMI Station
Base Flow
a
a
a
3
2
1
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.555
p = 0.279
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

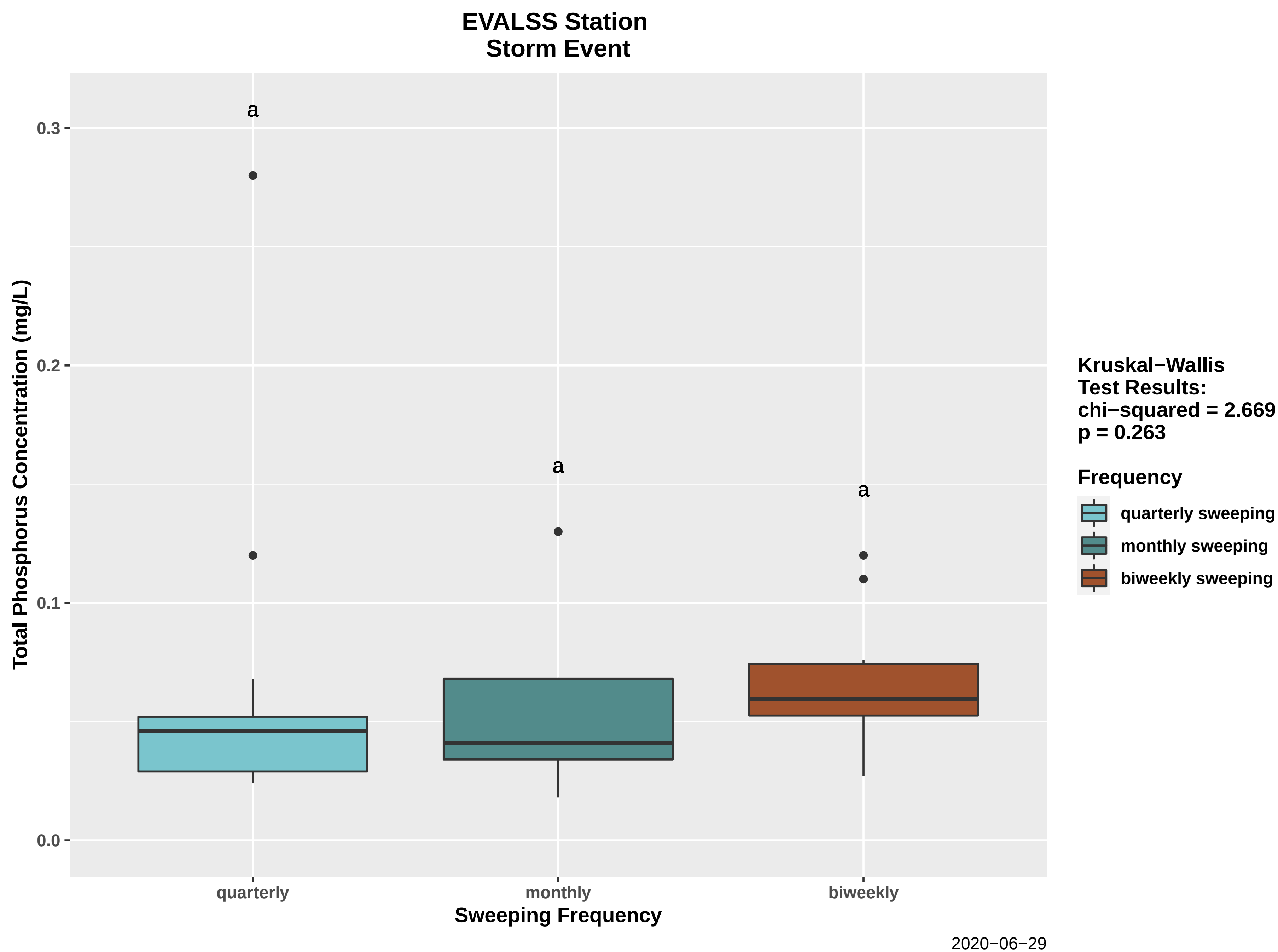


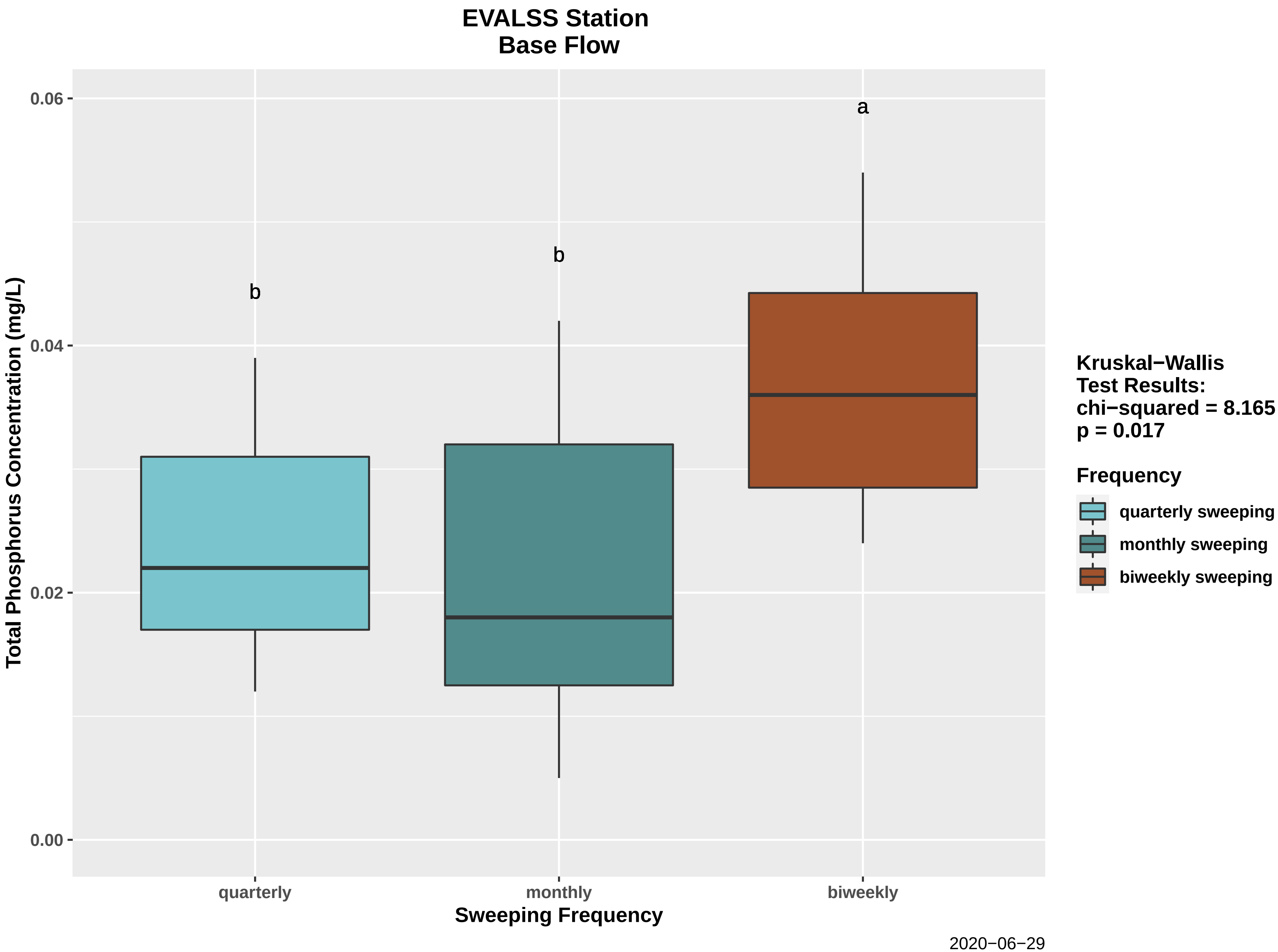
TYLMO Station
Storm Event
a
a
a
25
20
15
10
5
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.371
p = 0.504
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

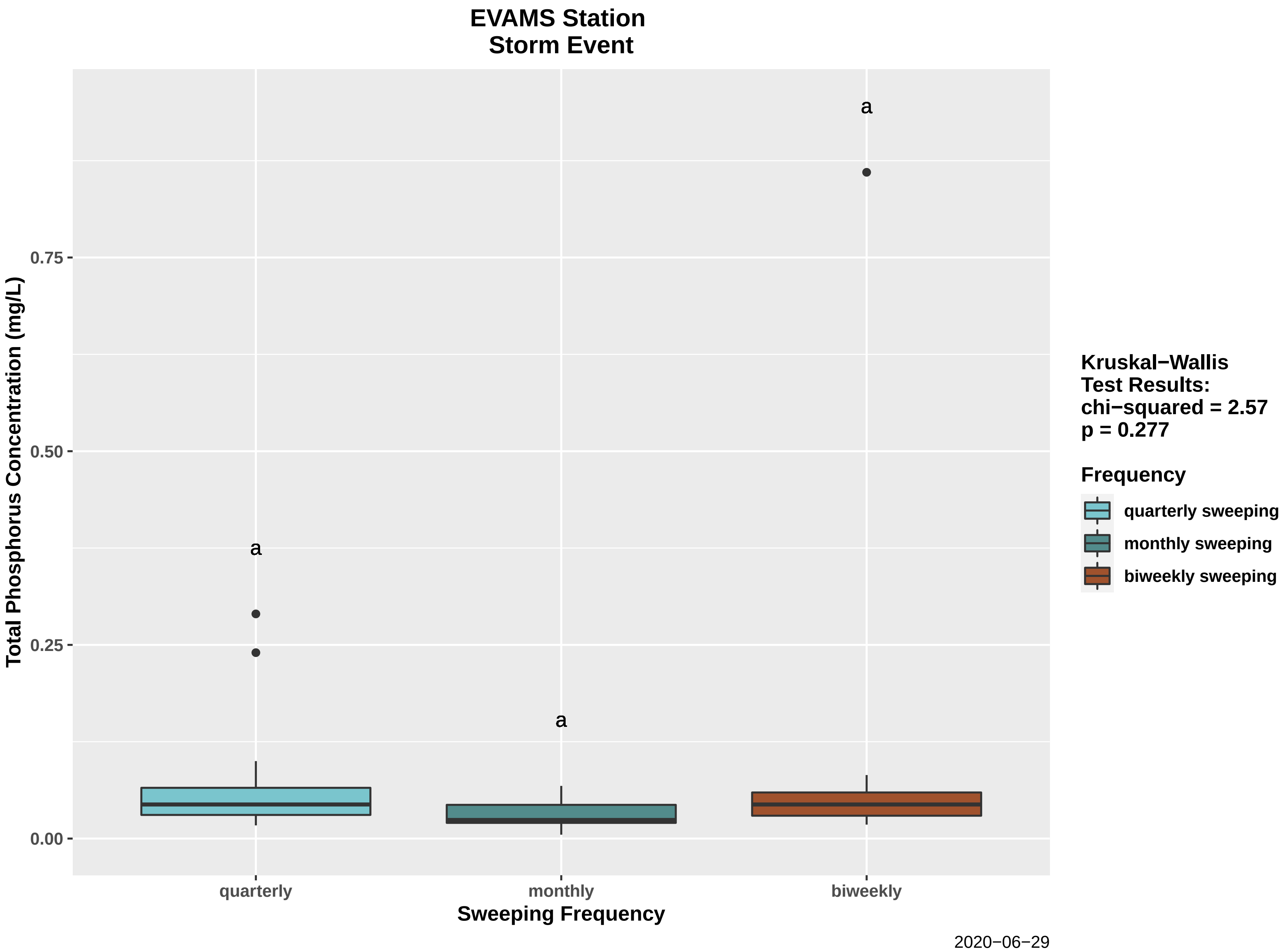

TYLMO Station
Base Flow
a
a
a
3
2
1
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.205
p = 0.903
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

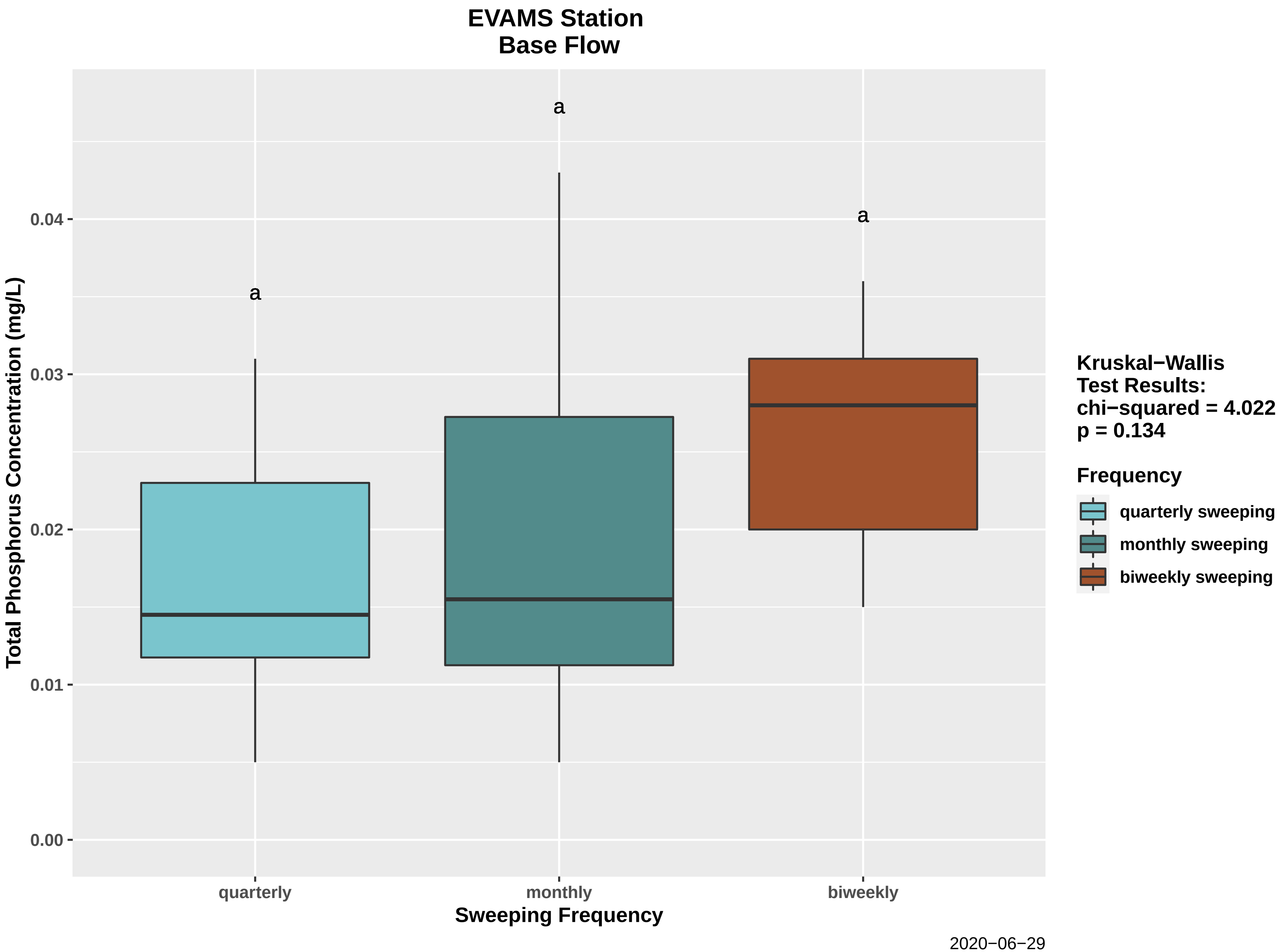

TYLMI Station
Storm Event
a
a
a
15
10
5
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.462
p = 0.292
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

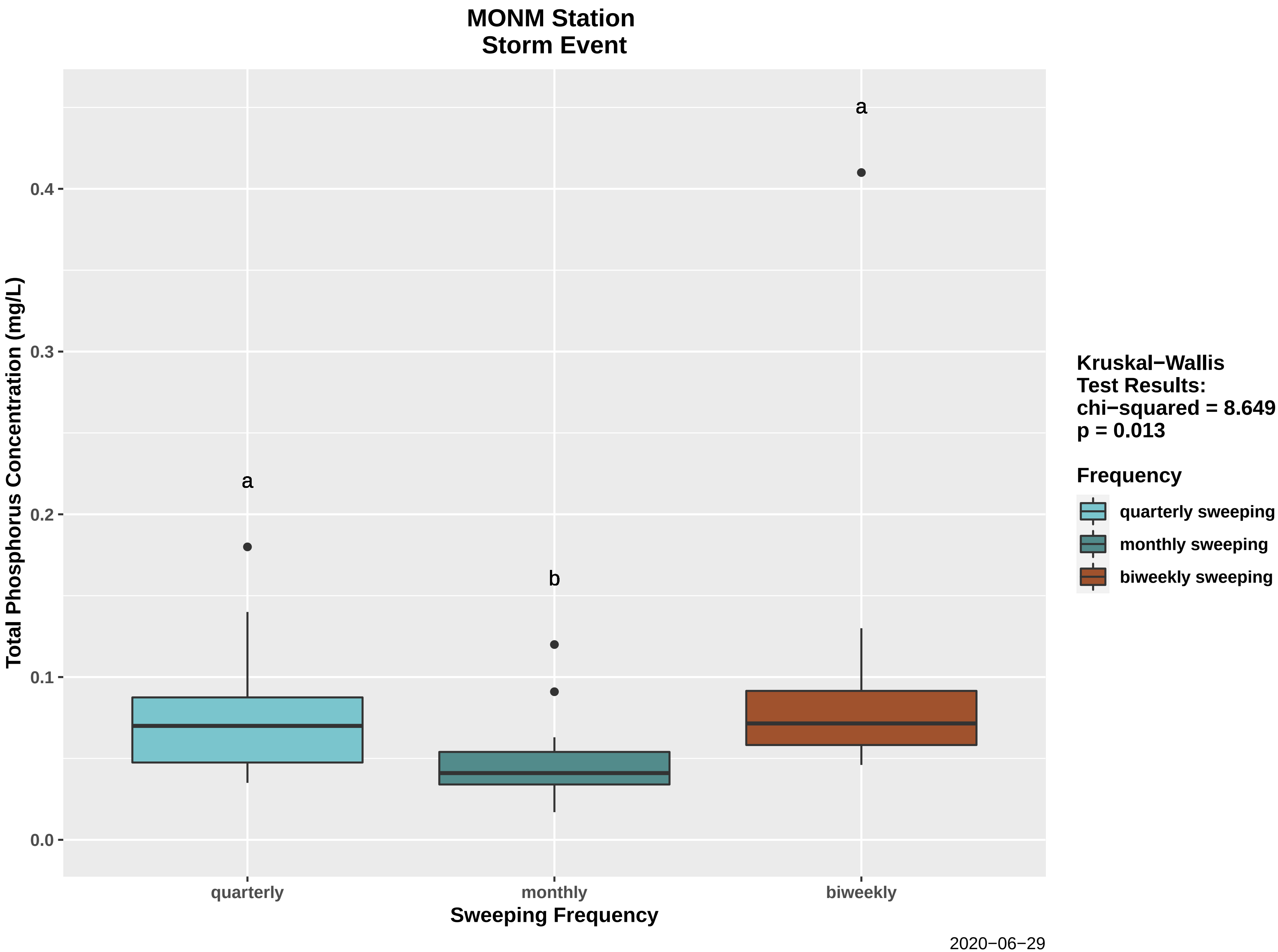

TYLMI Station
Base Flow
a
ab
b
15
10
5
0
Total Copper Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.274
p = 0.072
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

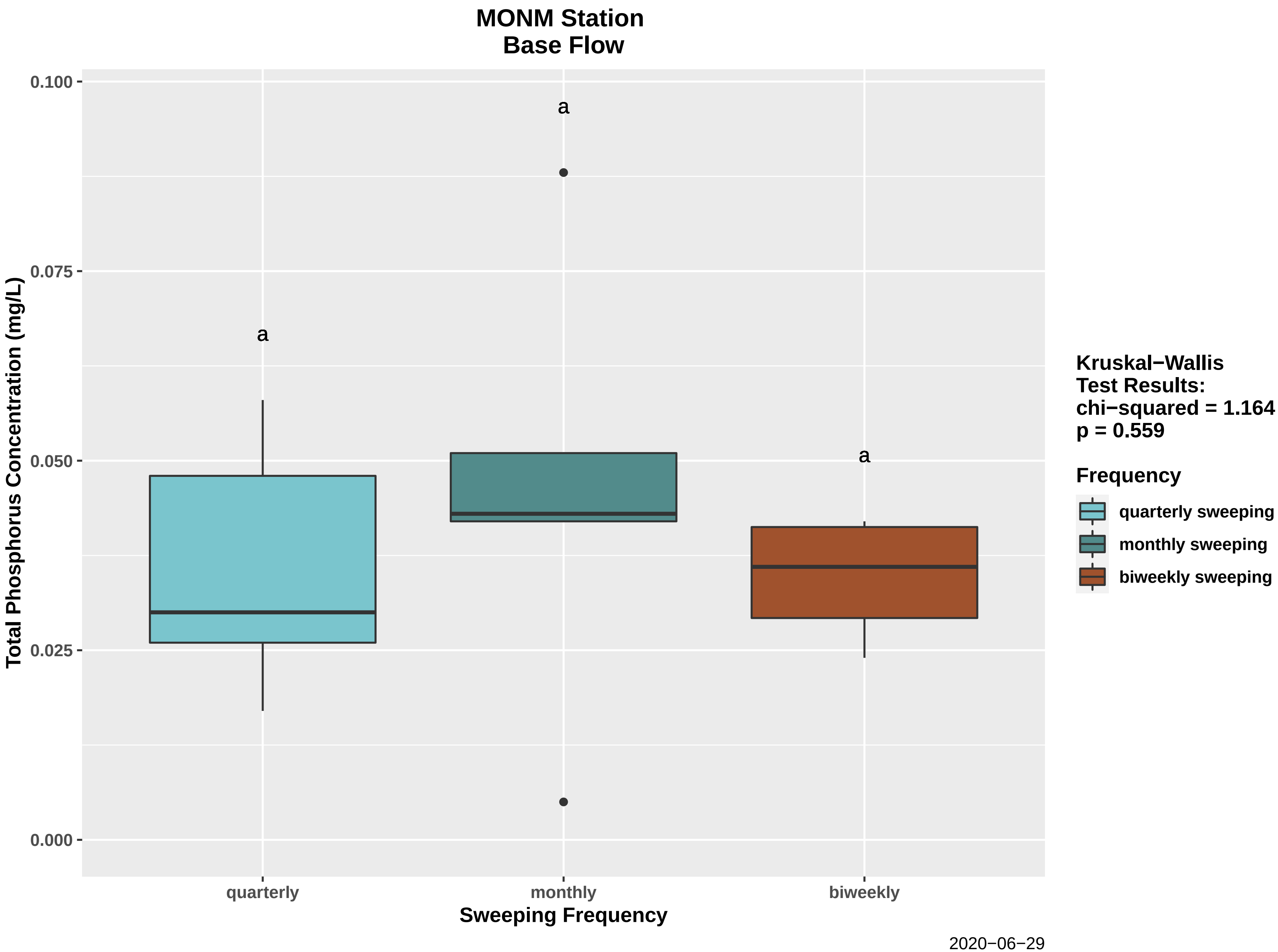

EVALSS Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.3
0.2
0.1
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 2.669
p = 0.263
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29


EVALSS Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.06
0.04
0.02
0.00
a
b
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 8.165
p = 0.017
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

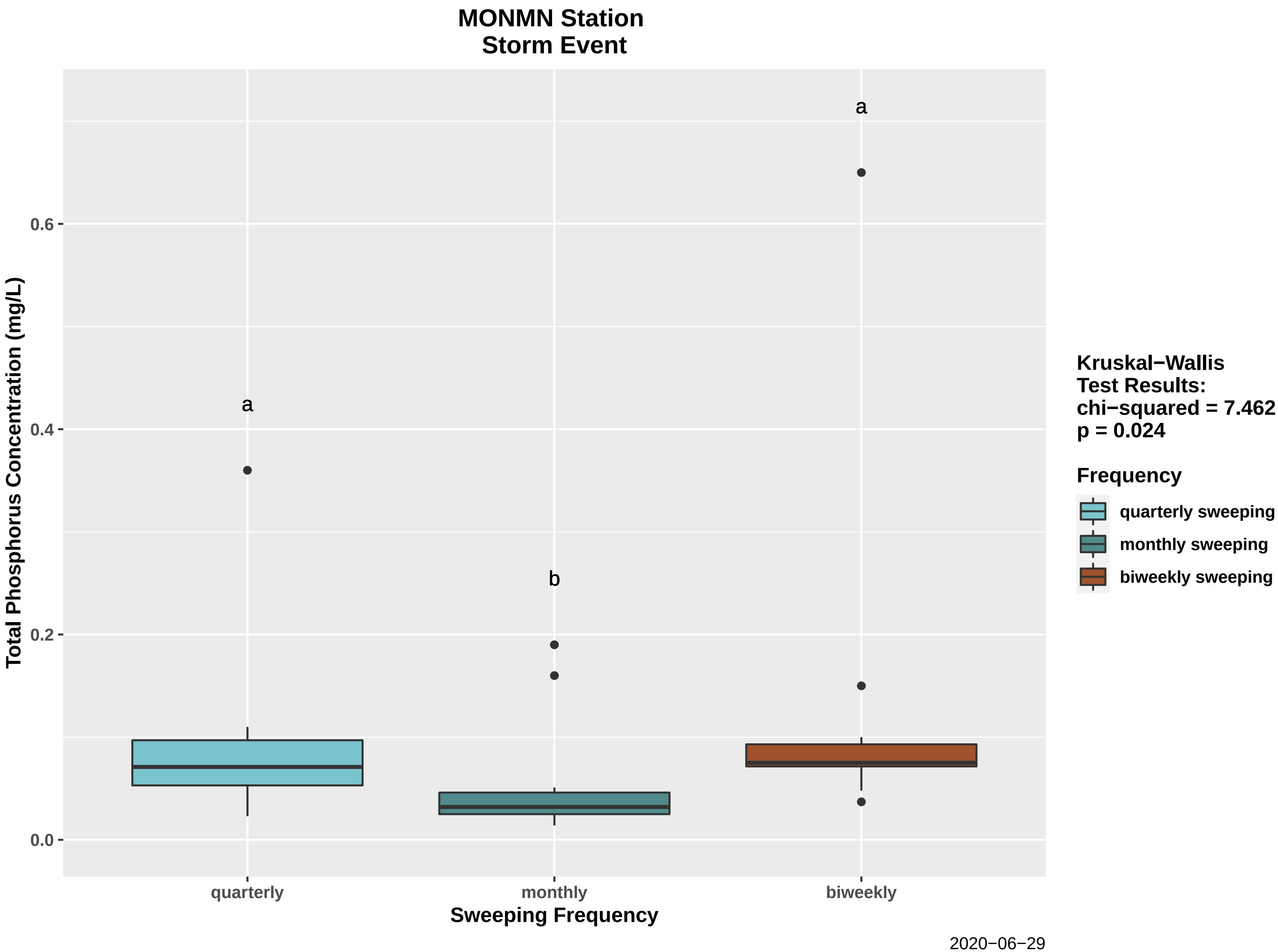

EVAMS Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.75
0.50
0.25
0.00
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.57
p = 0.277
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


EVAMS Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.00
0.01
0.02
0.03
0.04
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.022
p = 0.134
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

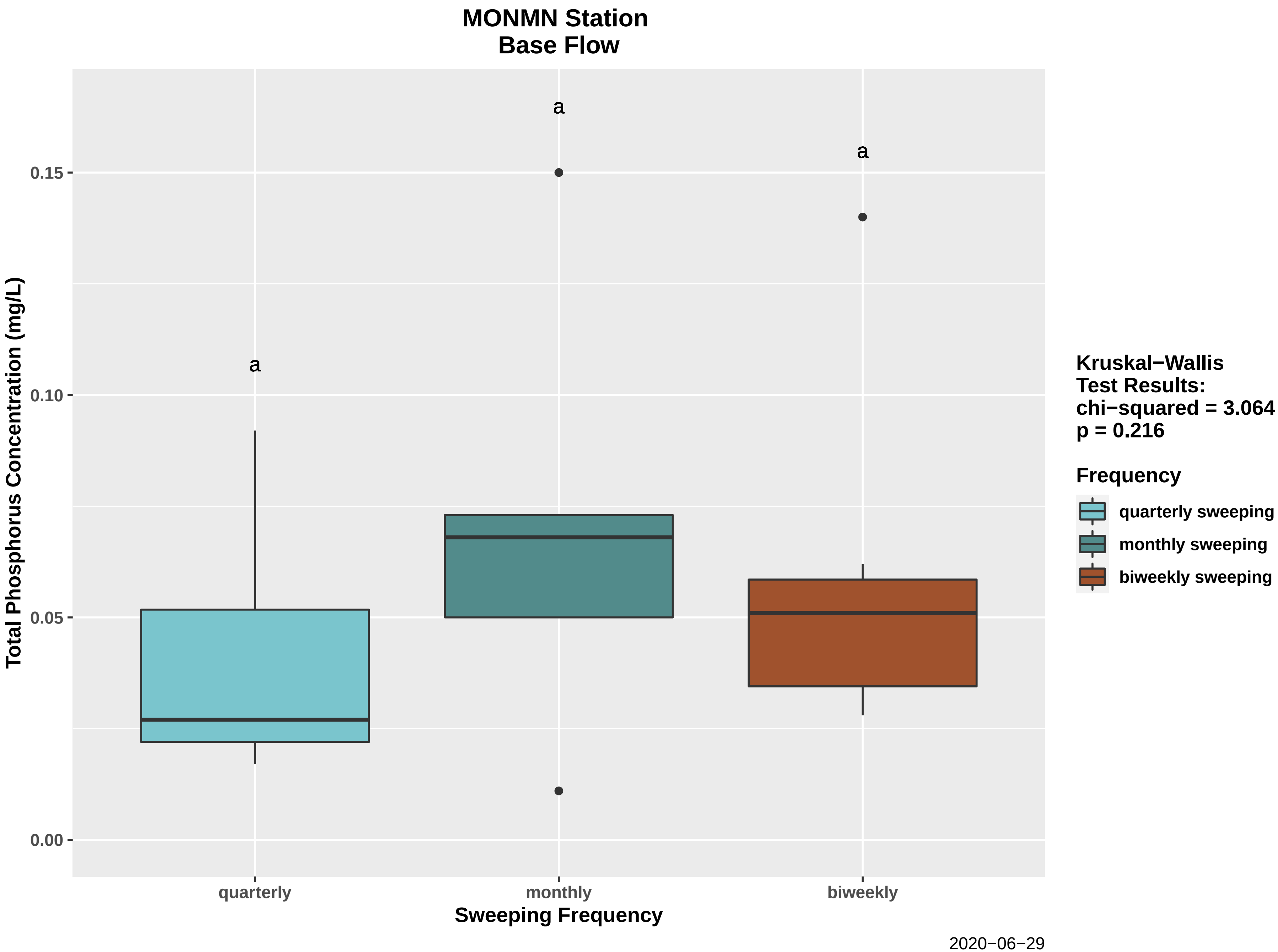

MONM Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.0
0.1
0.2
0.3
0.4
a
a
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 8.649
p = 0.013
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

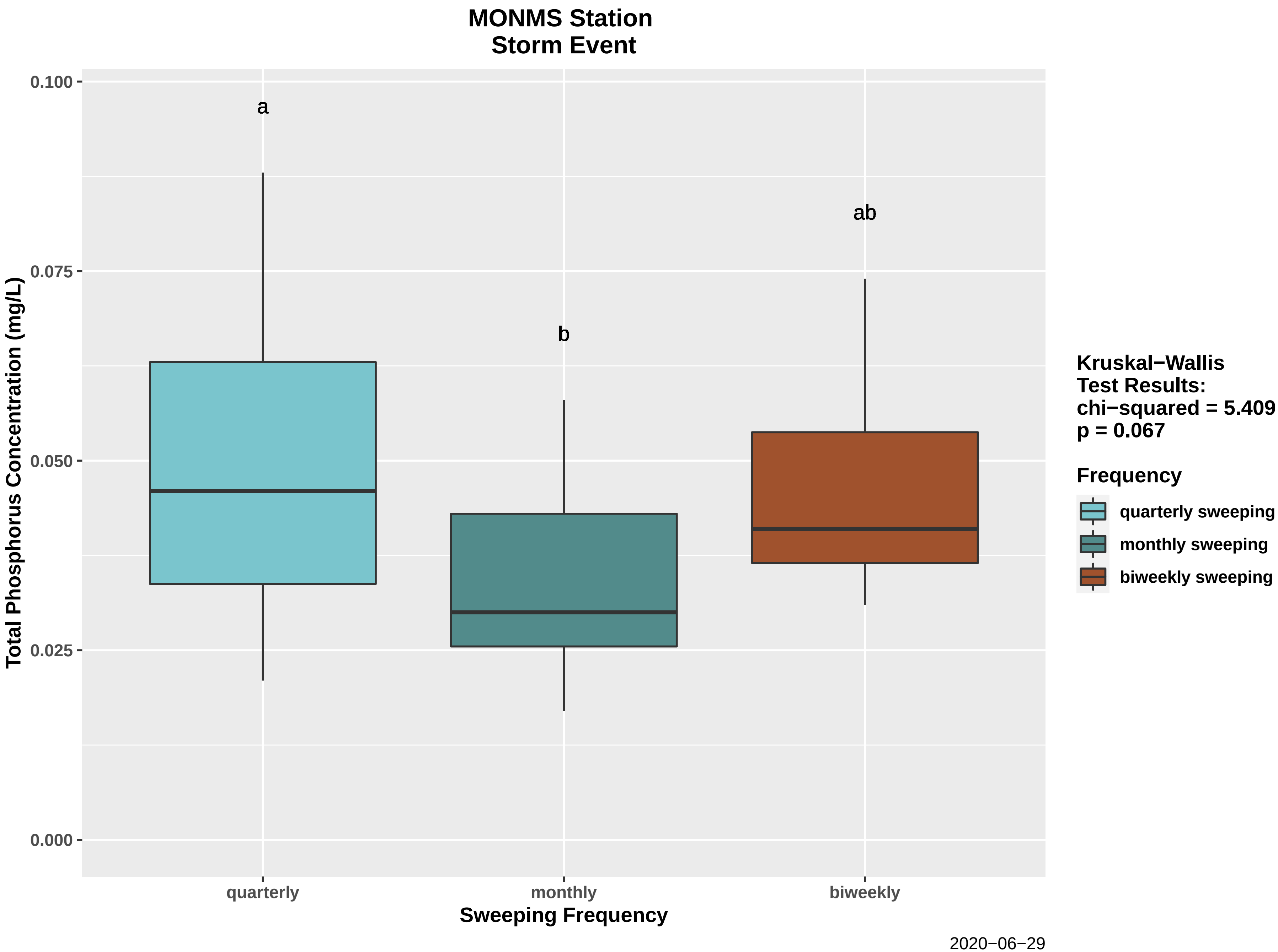


MONM Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.100
0.075
0.050
0.025
0.000
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.164
p = 0.559
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

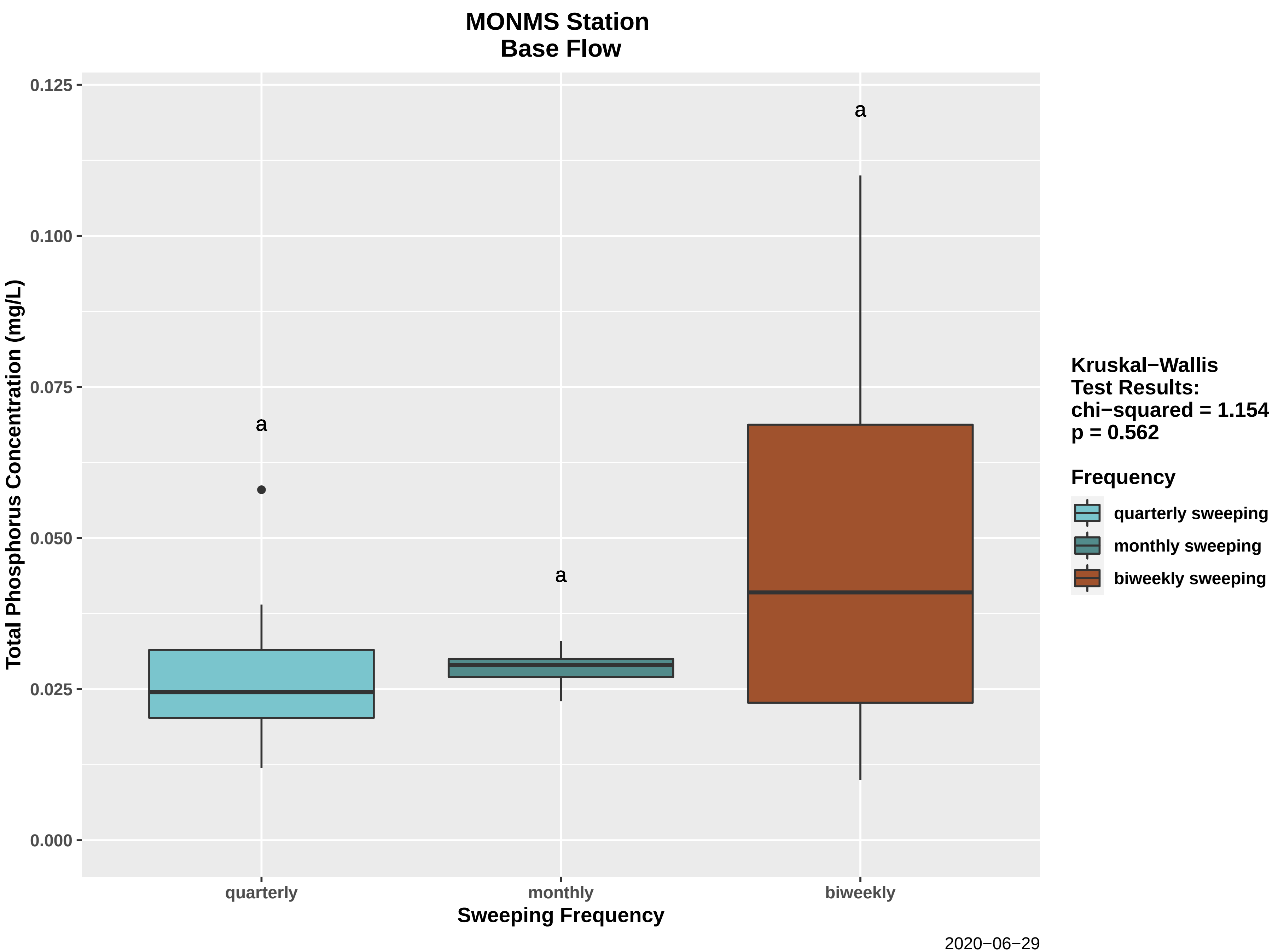


MONMN Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.0
0.2
0.4
0.6
a
b
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 7.462
p = 0.024
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

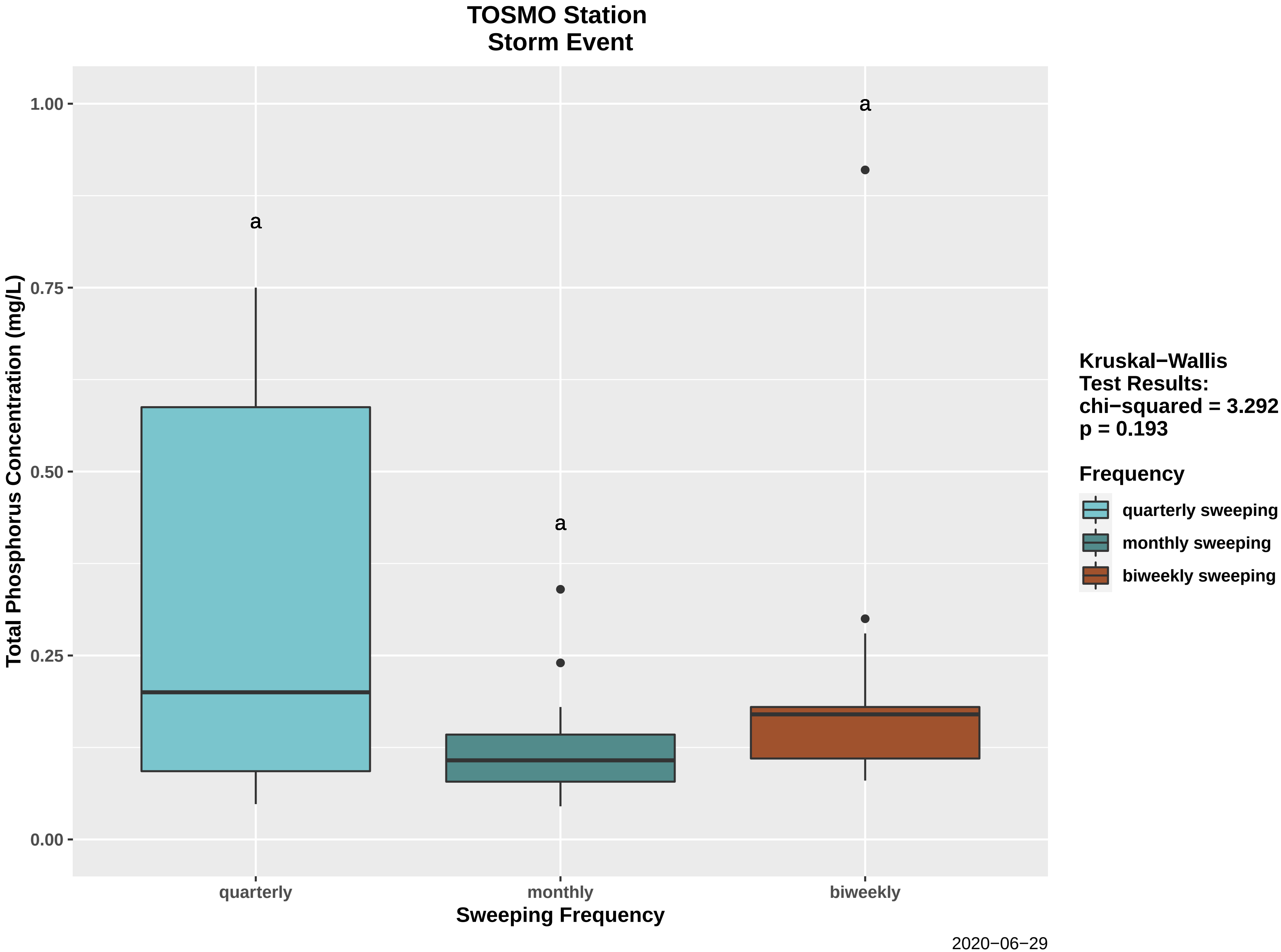

MONMN Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.00
0.05
0.10
0.15
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.064
p = 0.216
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping



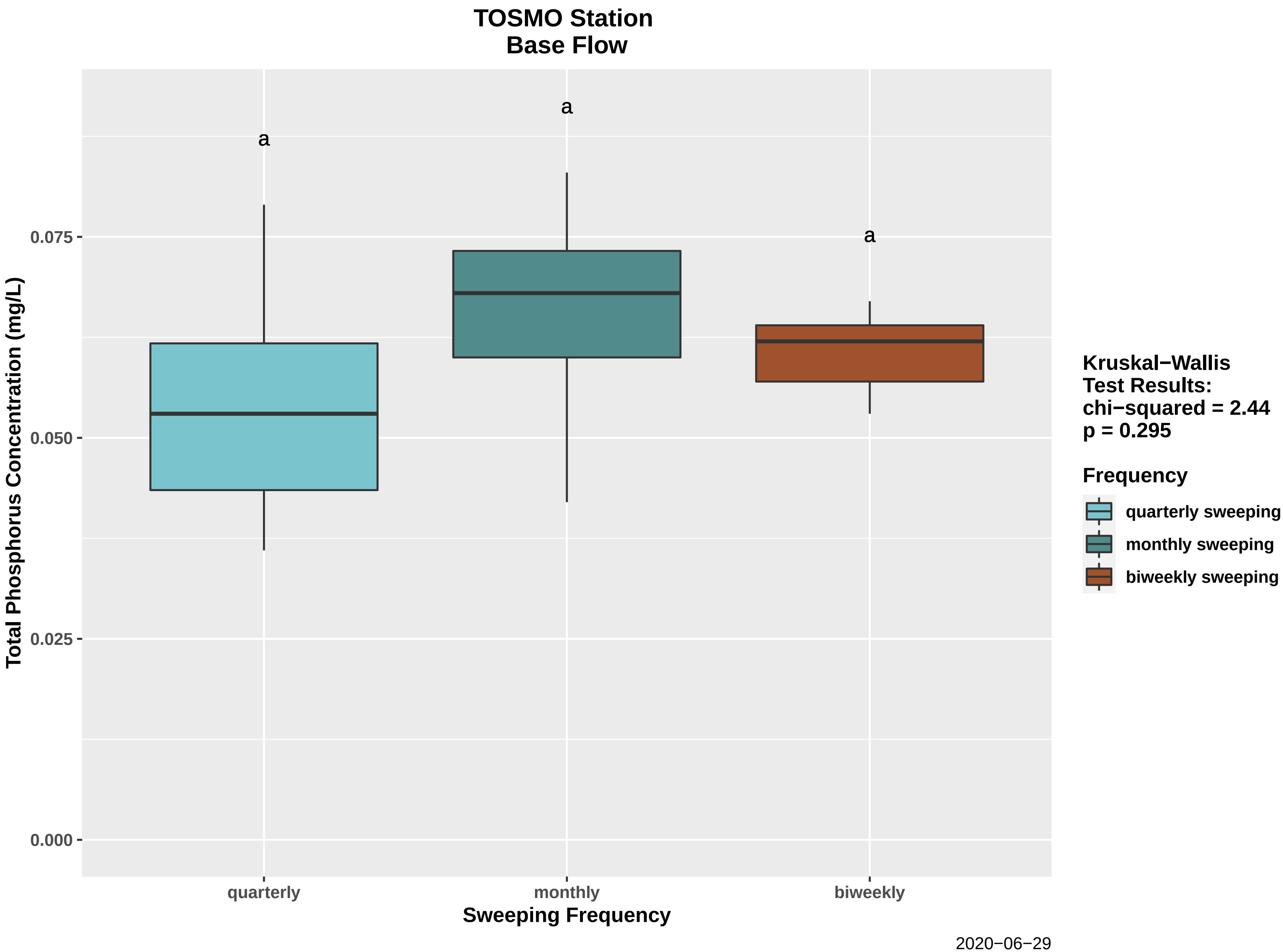
MONMS Station
Storm Event
0.100
0.075
0.050
0.025
0.000
Total Phosphorus Concentration (mg/L)
a
b
ab
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.409
p = 0.067
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

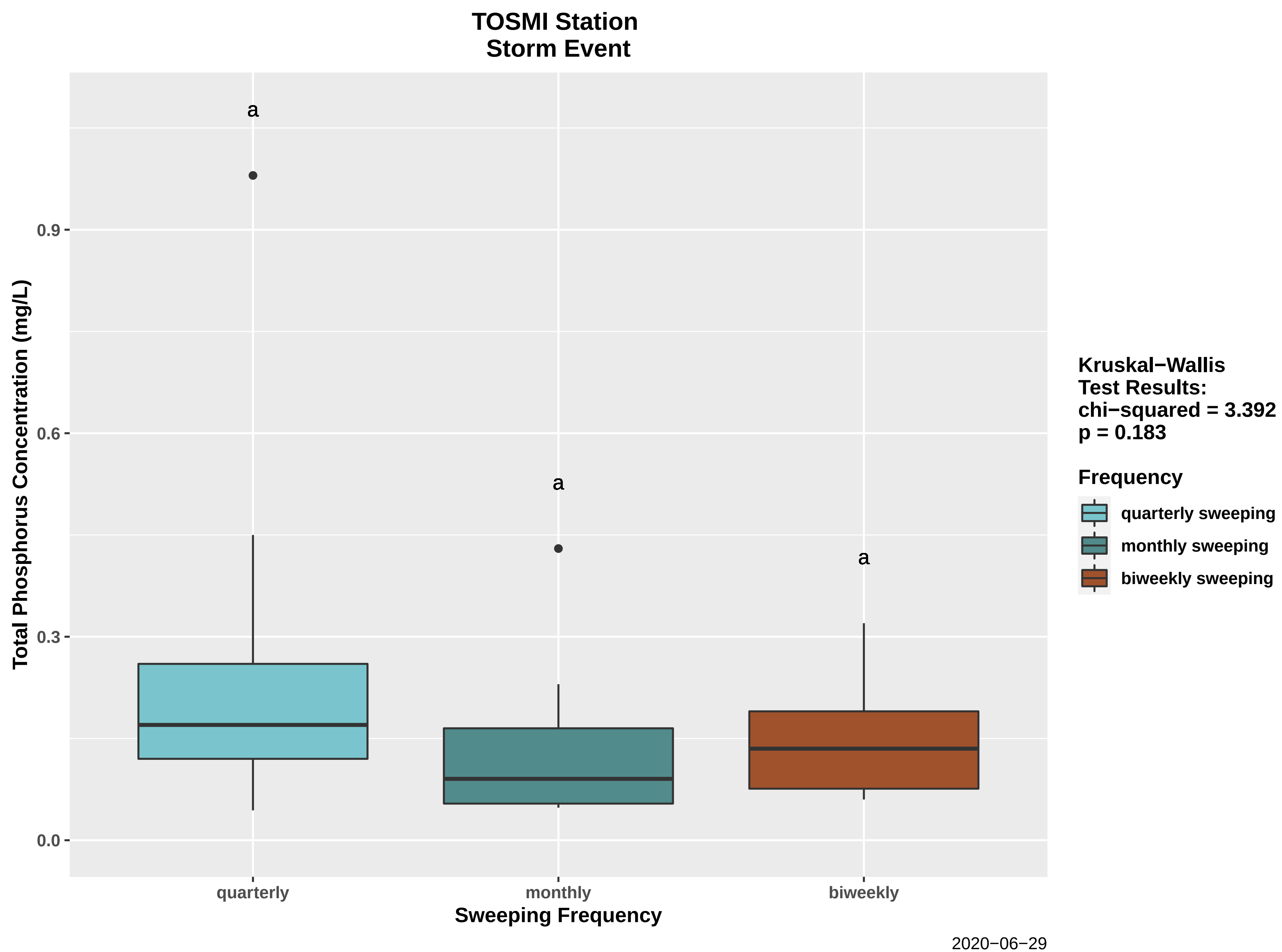


MONMS Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.125
0.100
0.075
0.050
0.025
0.000
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.154
p = 0.562
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

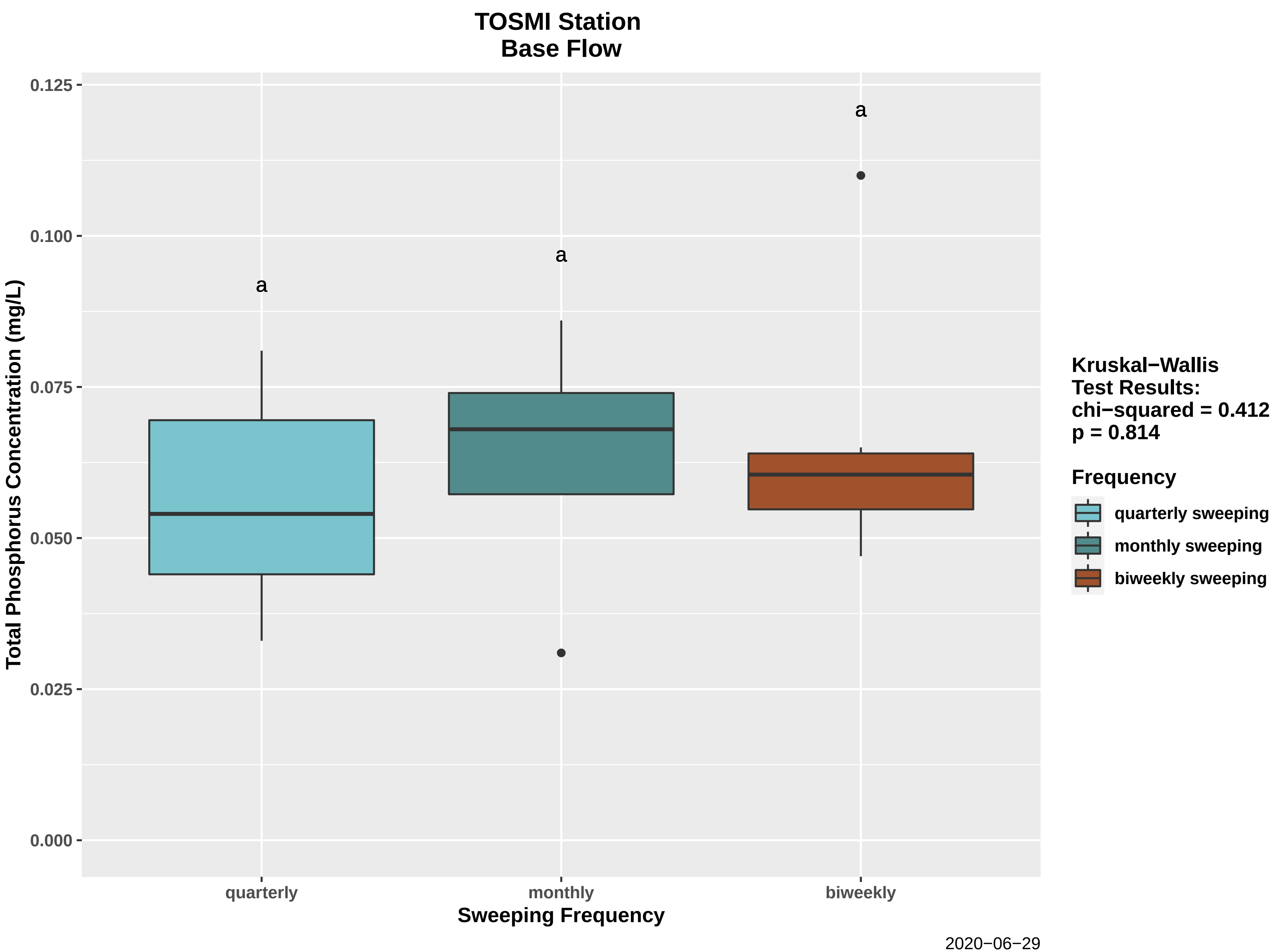


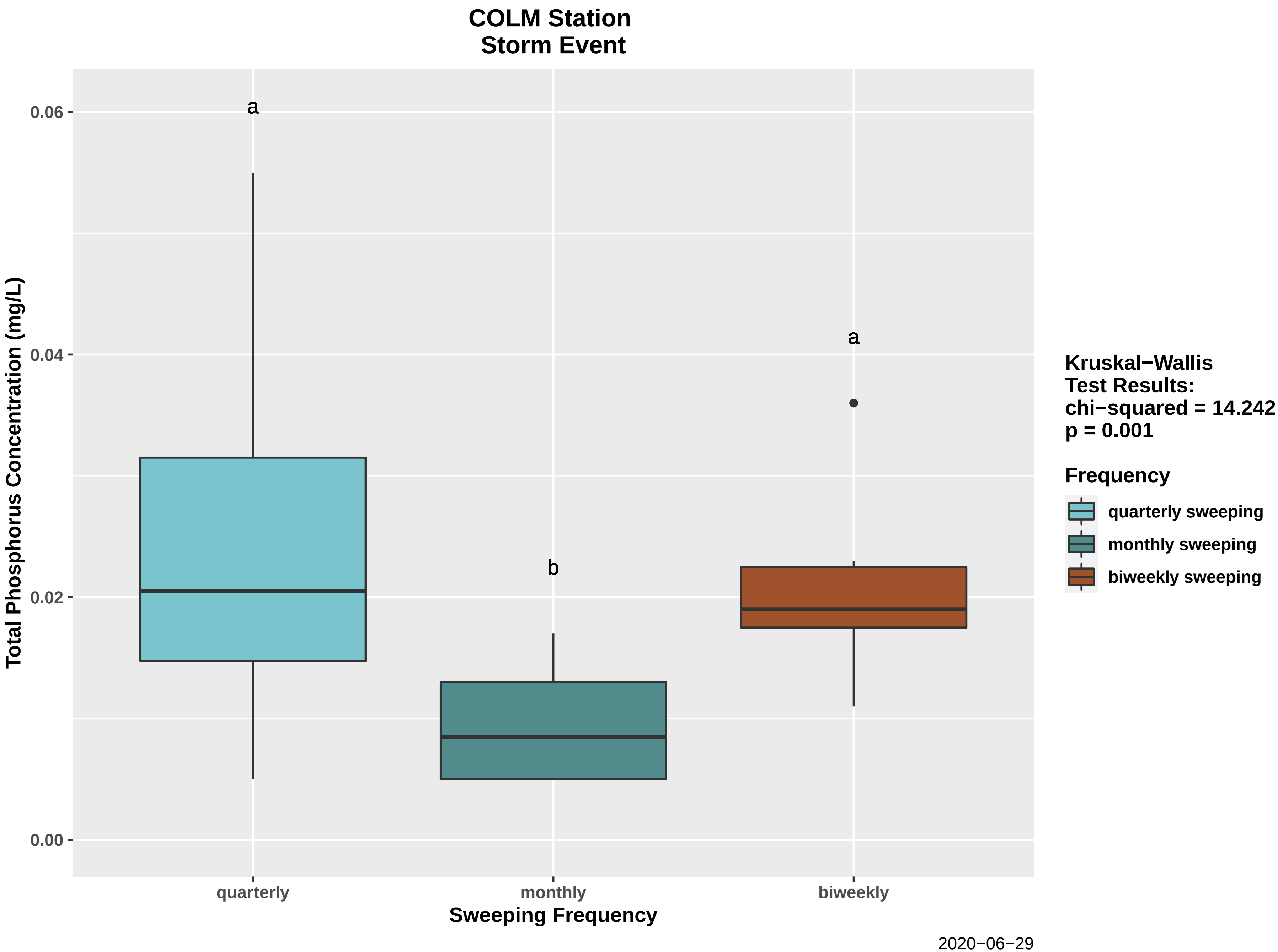
TOSMO Station
Storm Event
Total Phosphorus Concentration (mg/L)
1.00
0.75
0.50
0.25
0.00
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.292
p = 0.193
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


TOSMO Station
Base Flow
a
a
a
0.075
0.050
0.025
0.000
Total Phosphorus Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.44
p = 0.295
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

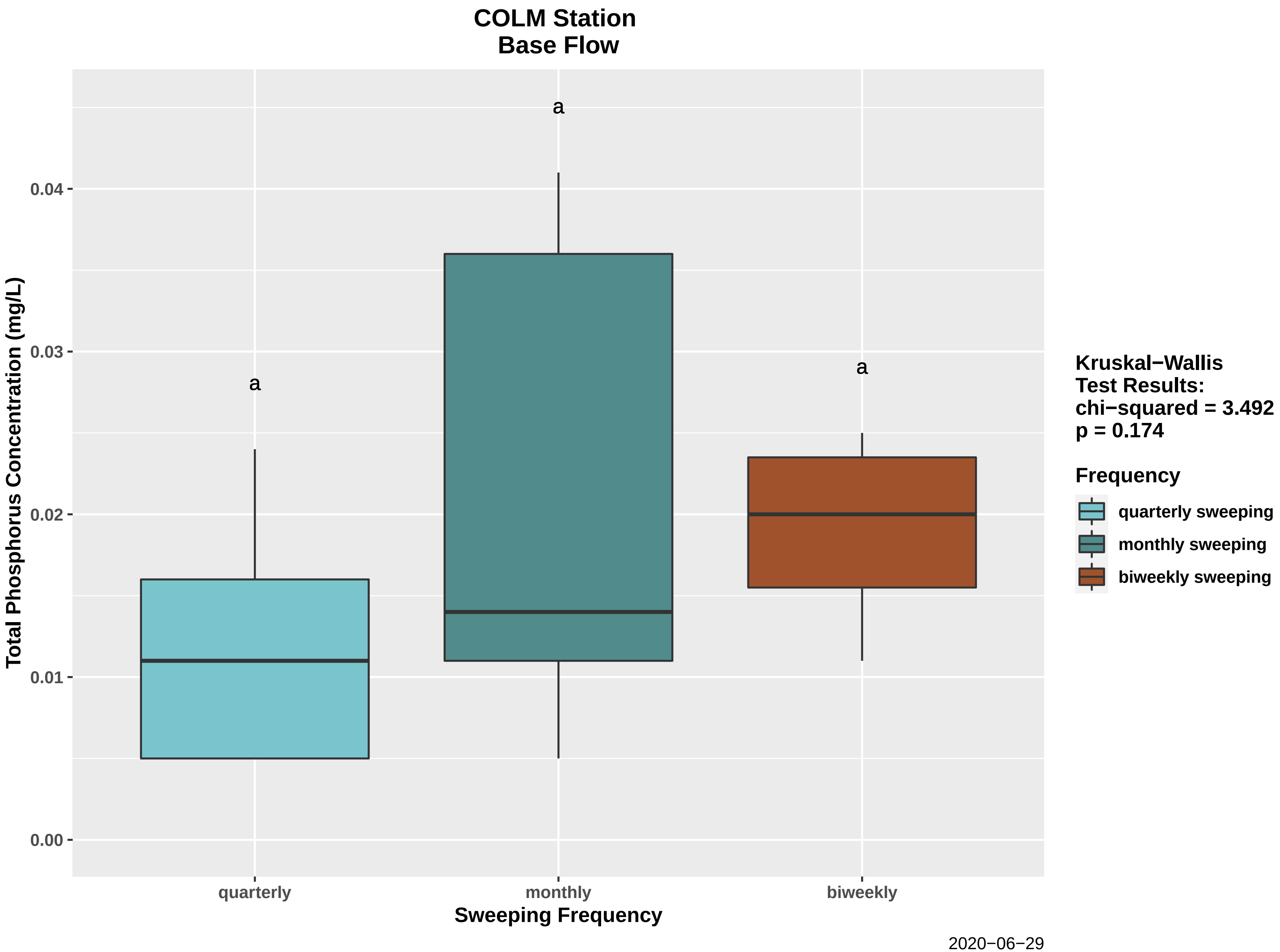


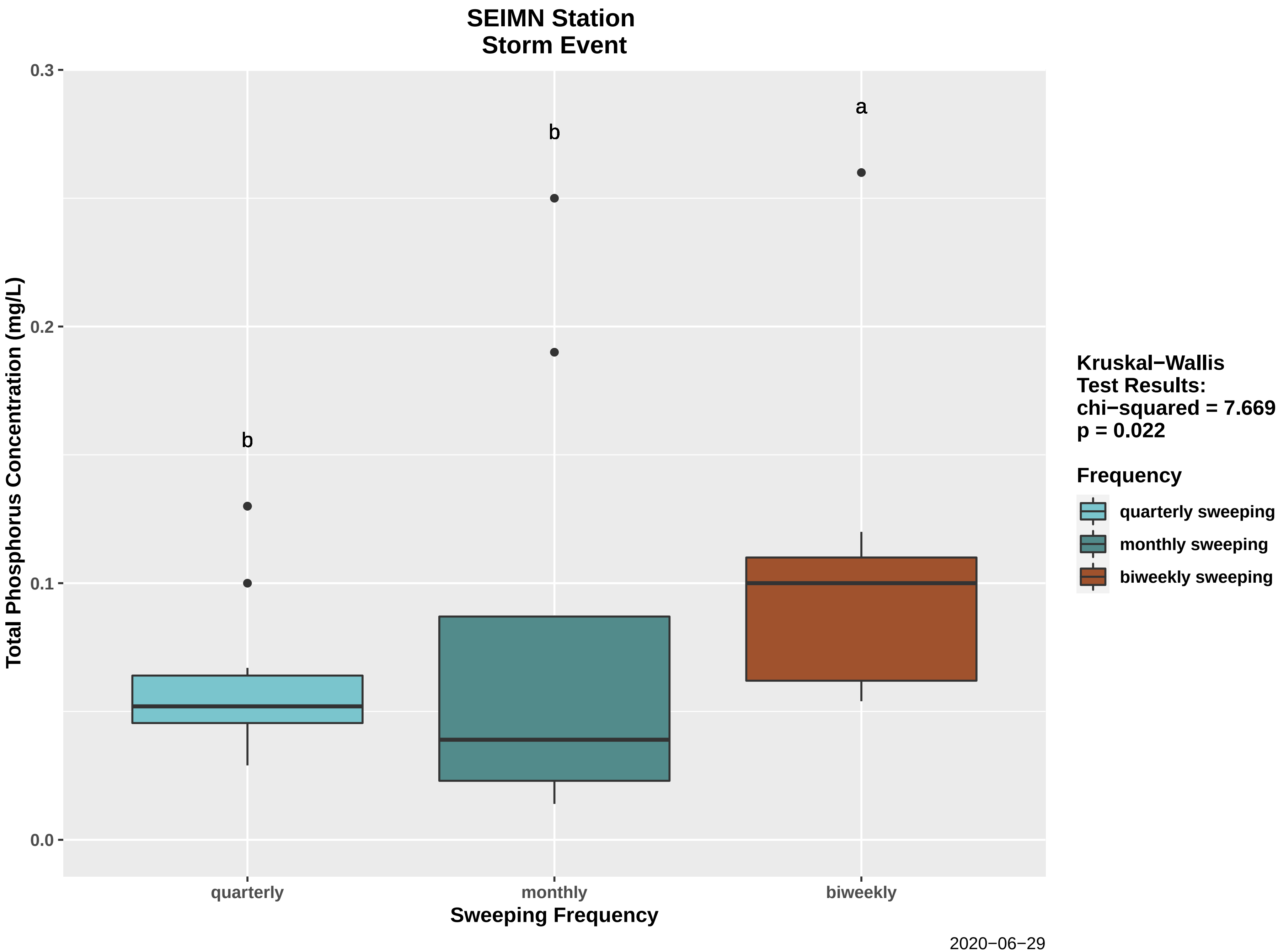
TOSMI Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.0
0.3
0.6
0.9
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.392
p = 0.183
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


TOSMI Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.125
0.100
0.075
0.050
0.025
0.000
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.412
p = 0.814
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

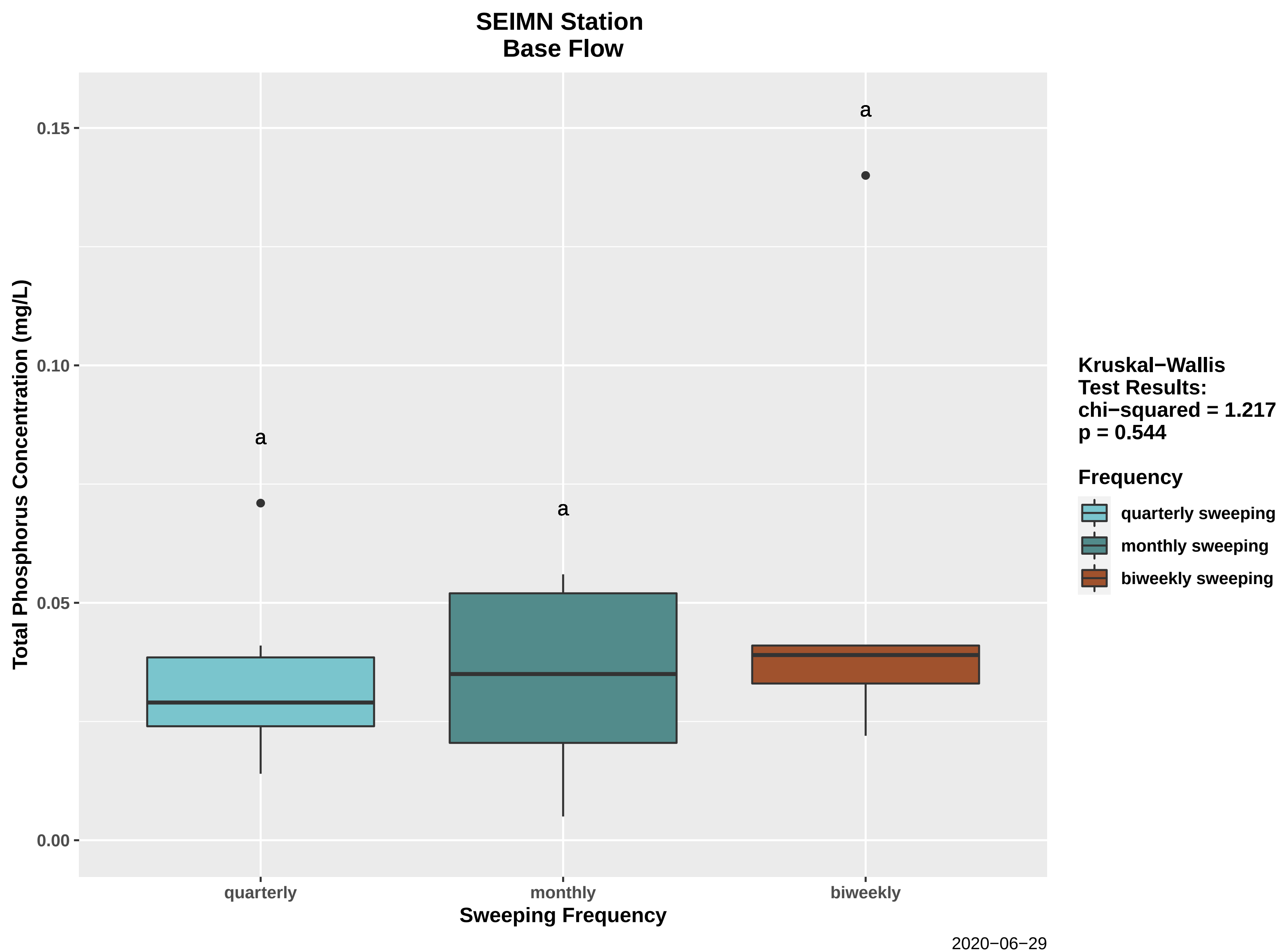


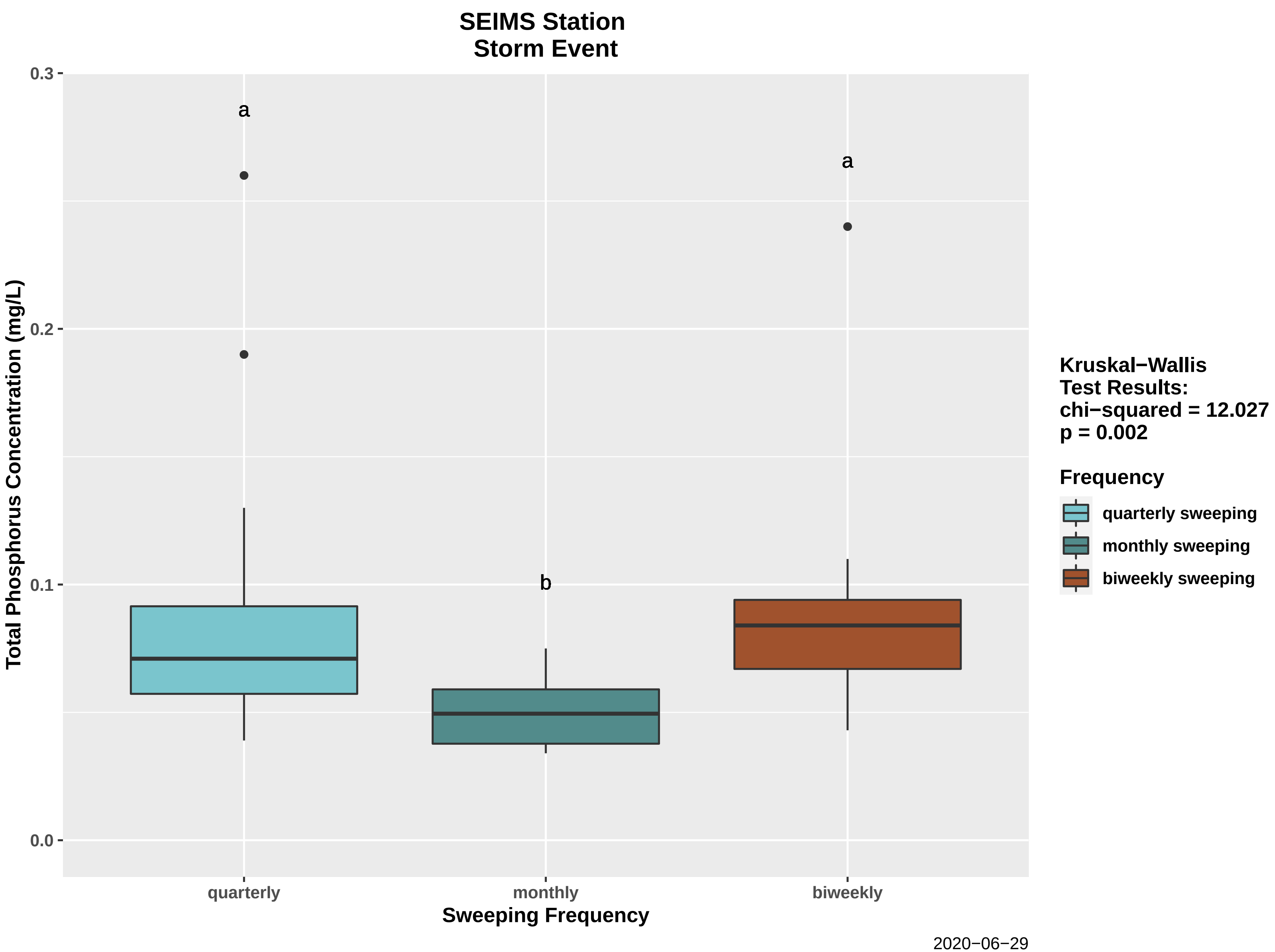
COLM Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.06
0.04
0.02
0.00
a
b
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 14.242
p = 0.001
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

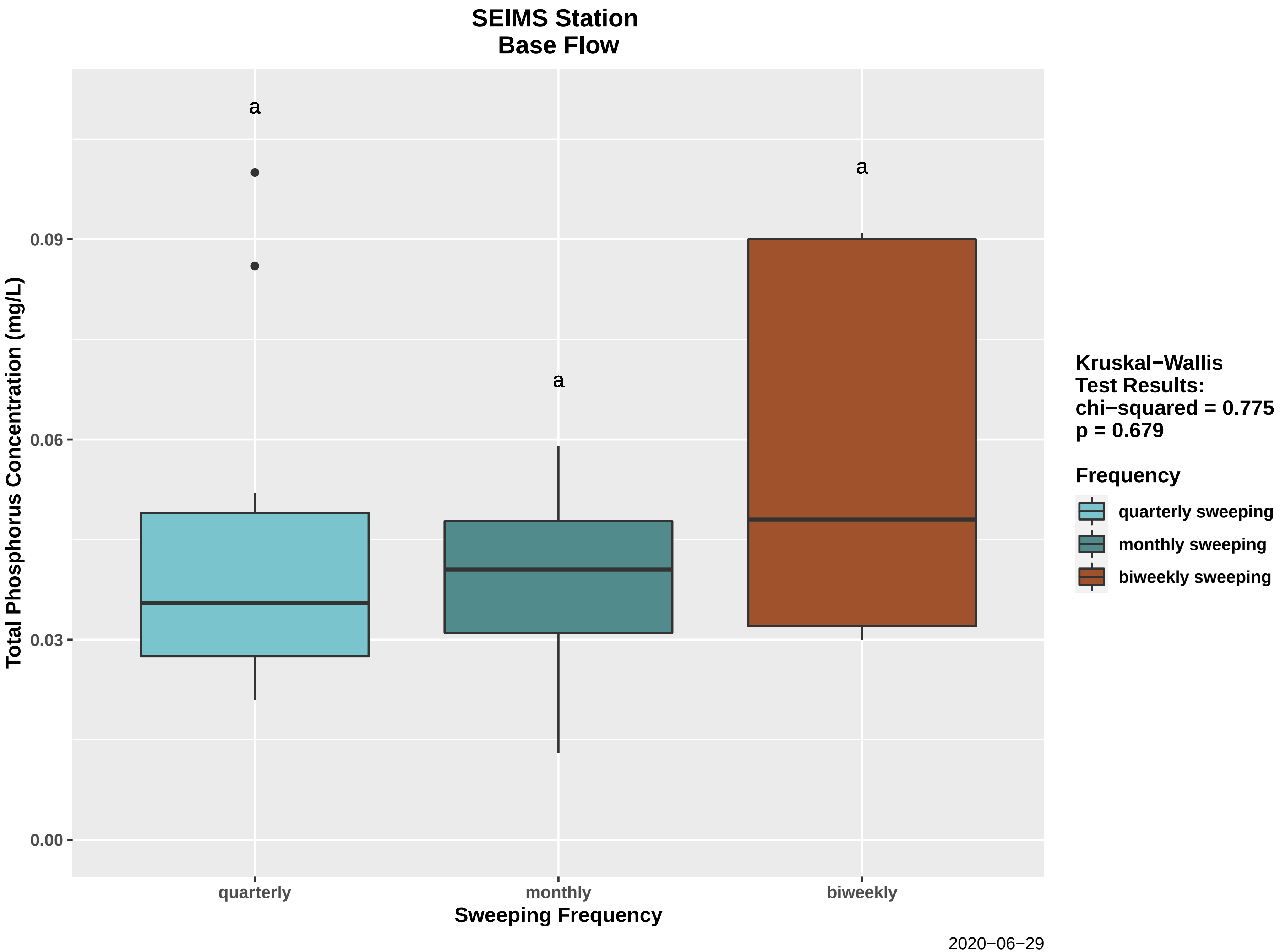

COLM Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.04
0.03
0.02
0.01
0.00
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.492
p = 0.174
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

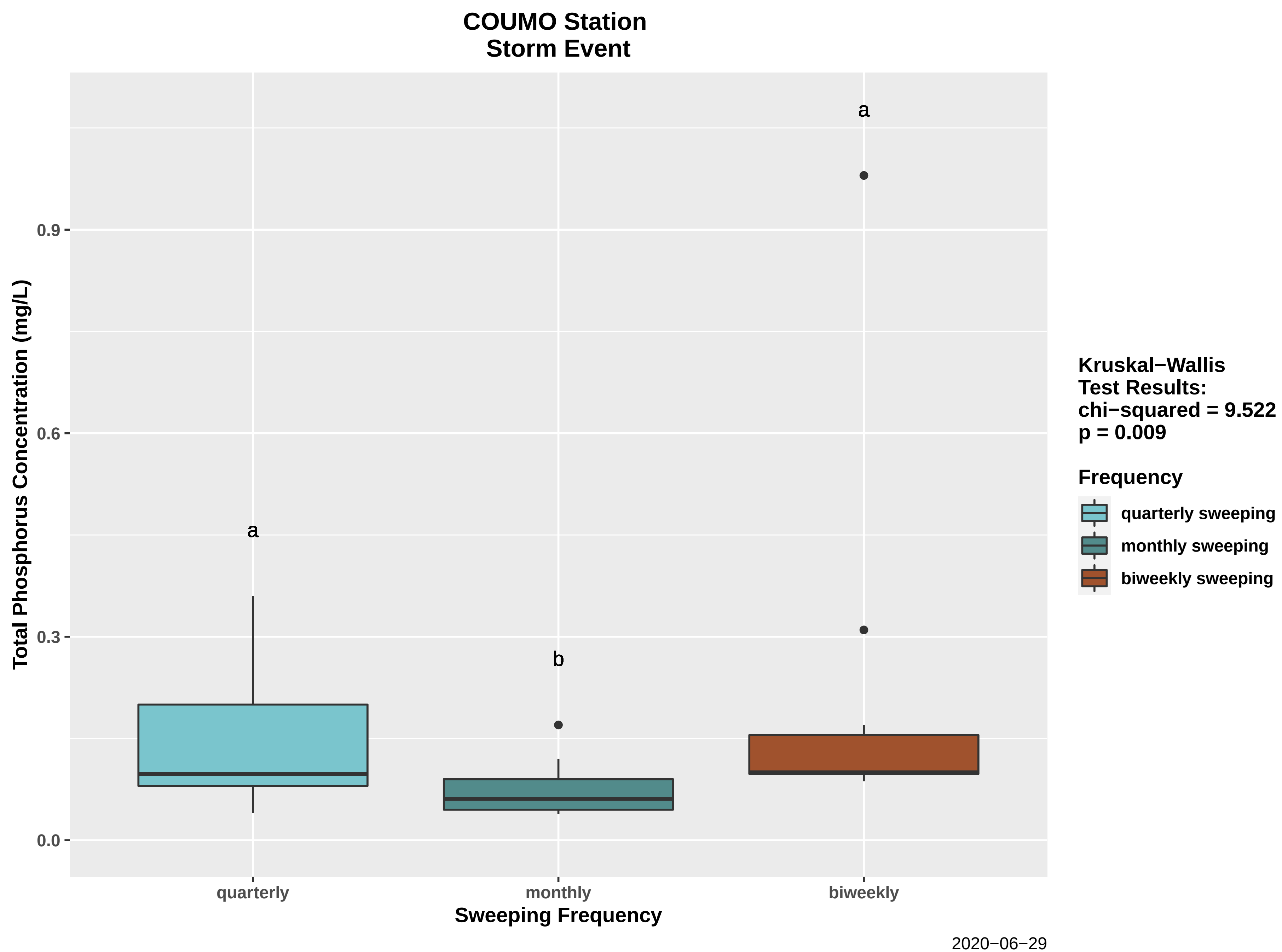


SEIMN Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.3
0.2
0.1
0.0
b
b
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 7.669
p = 0.022
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

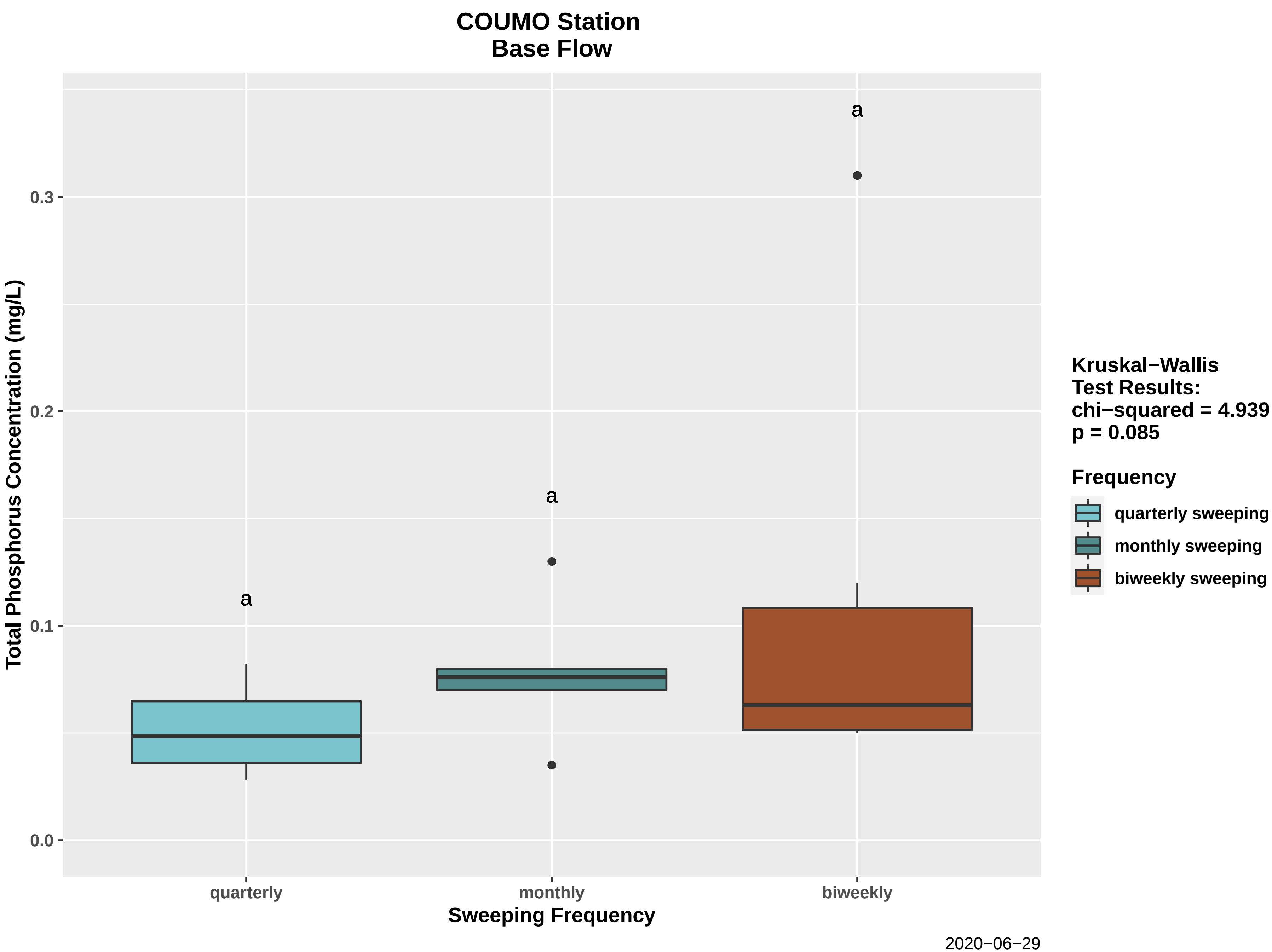

SEIMN Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.15
0.10
0.05
0.00
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.217
p = 0.544
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

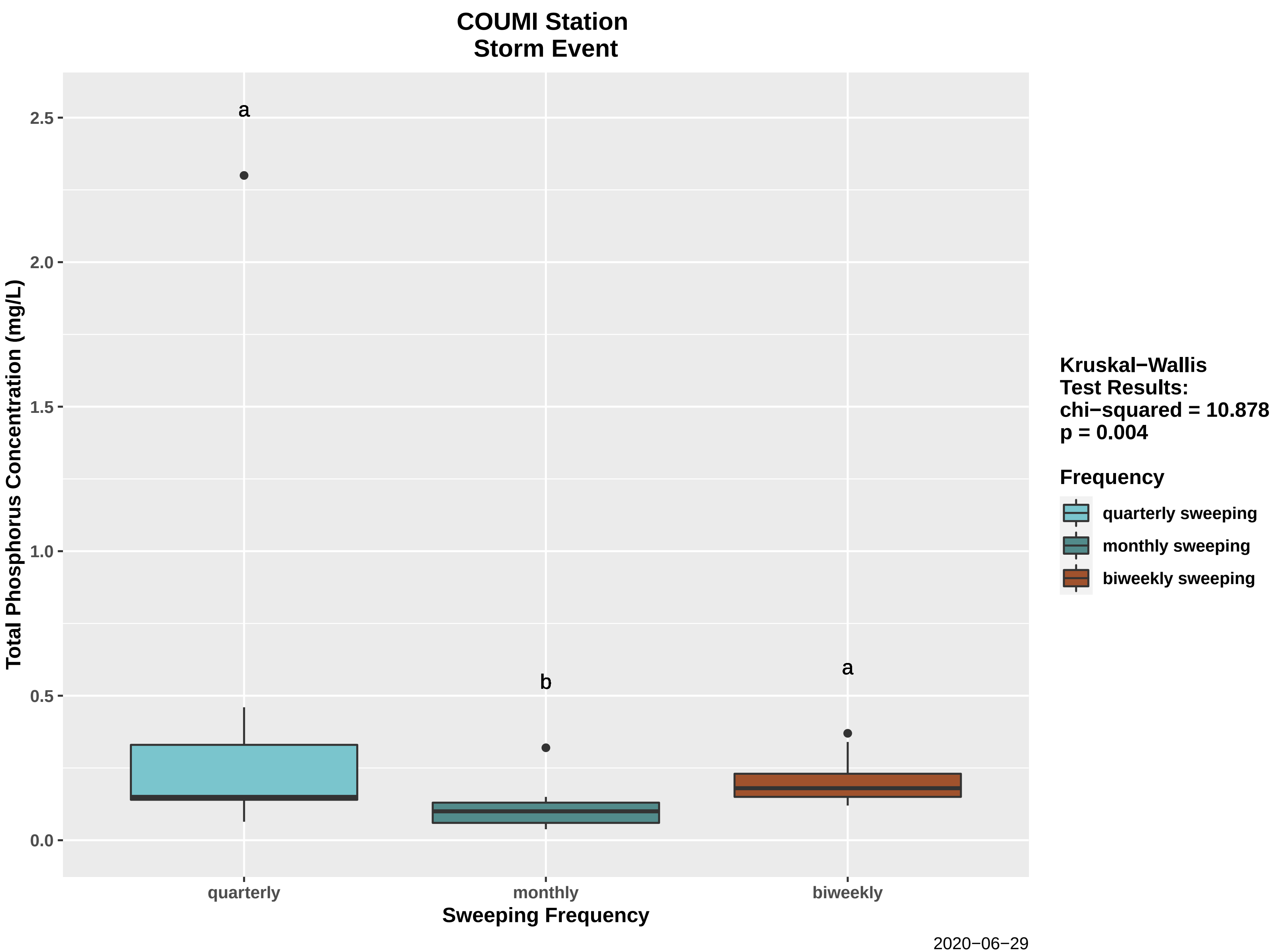

SEIMS Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.3
0.2
0.1
0.0
a
a
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 12.027
p = 0.002
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

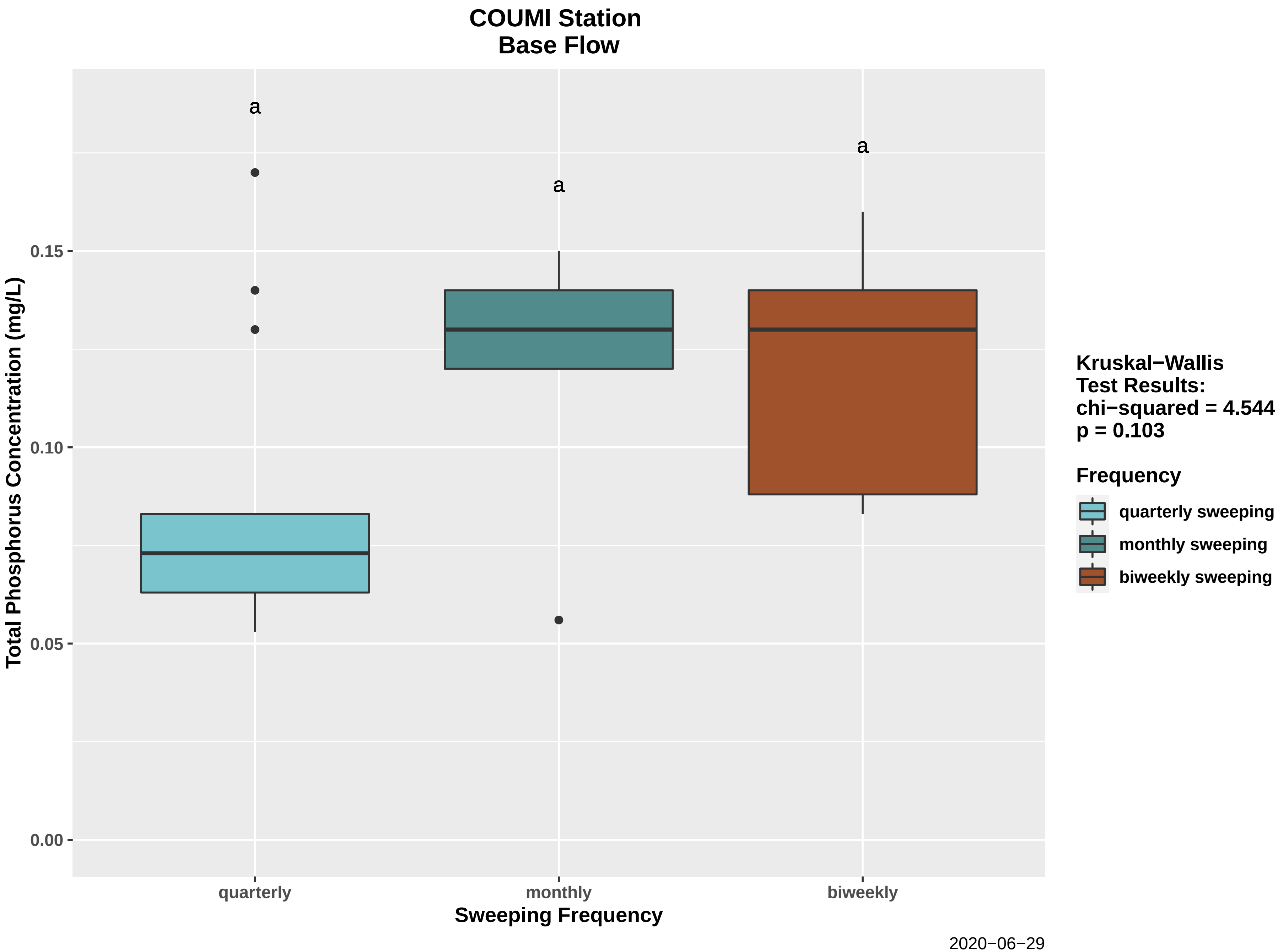

SEIMS Station
Base Flow
a
a
a
0.09
0.06
0.03
0.00
Total Phosphorus Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.775
p = 0.679
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

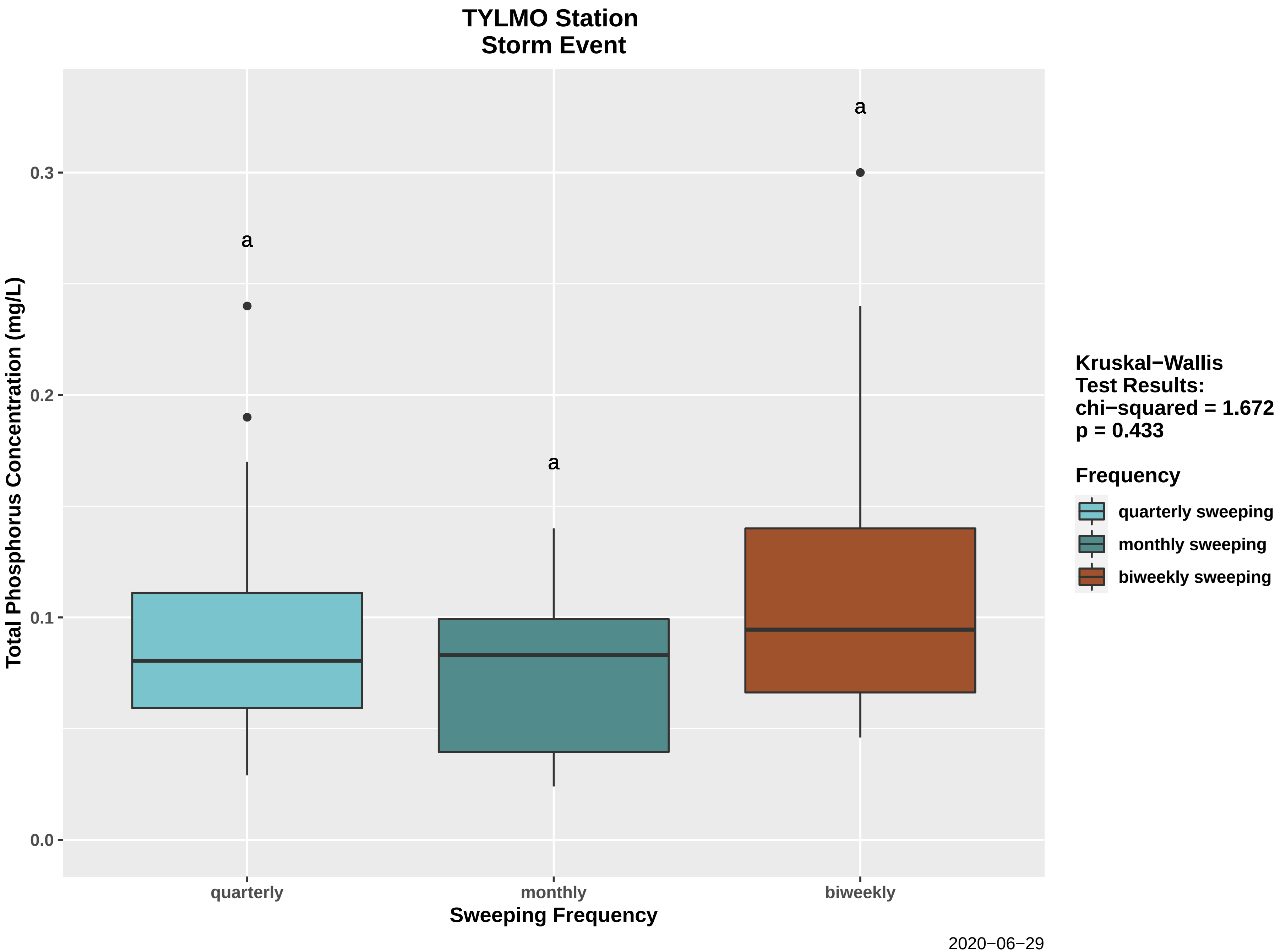


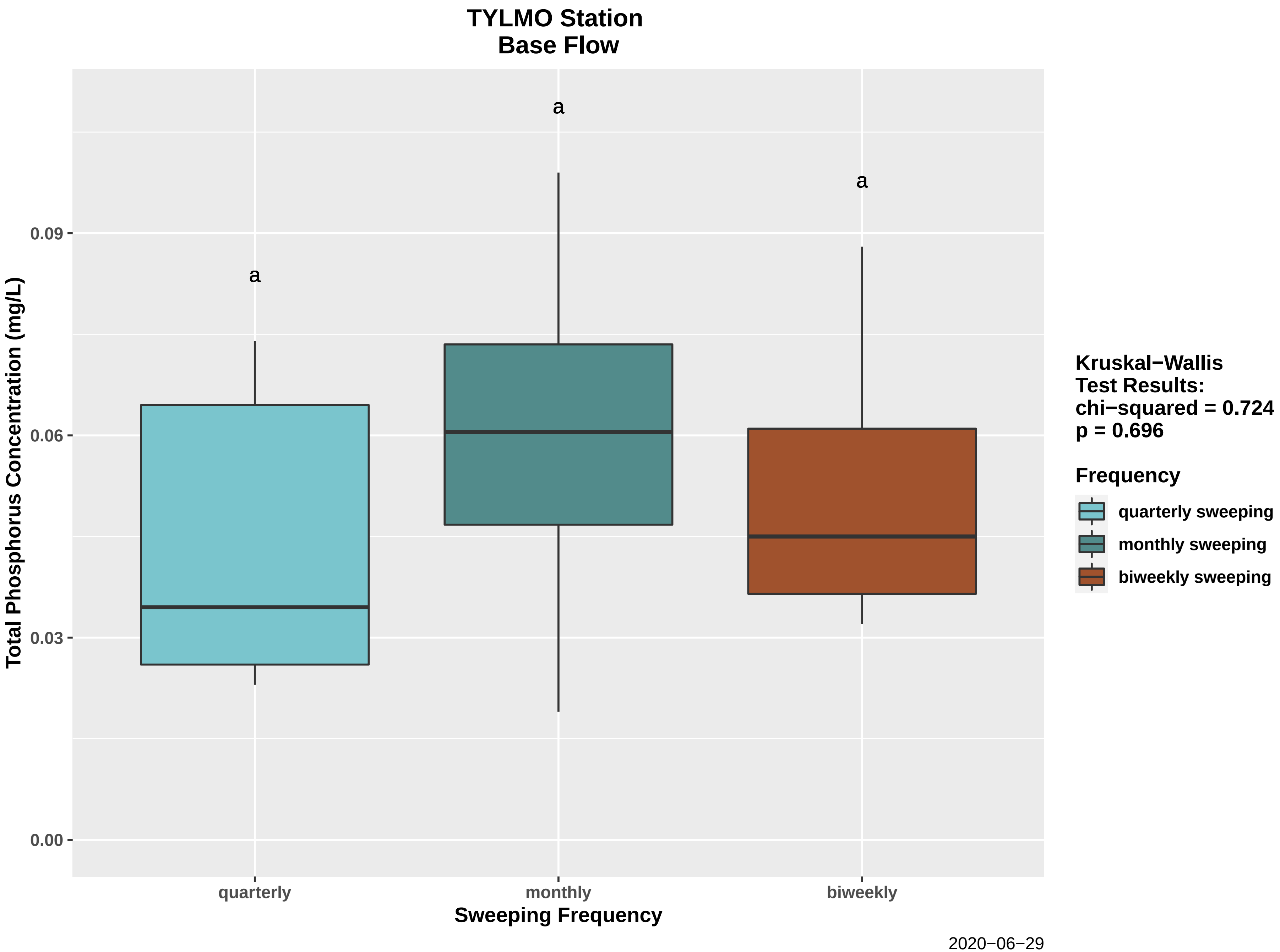
COUMO Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.9
0.6
0.3
0.0
a
a
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 9.522
p = 0.009
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

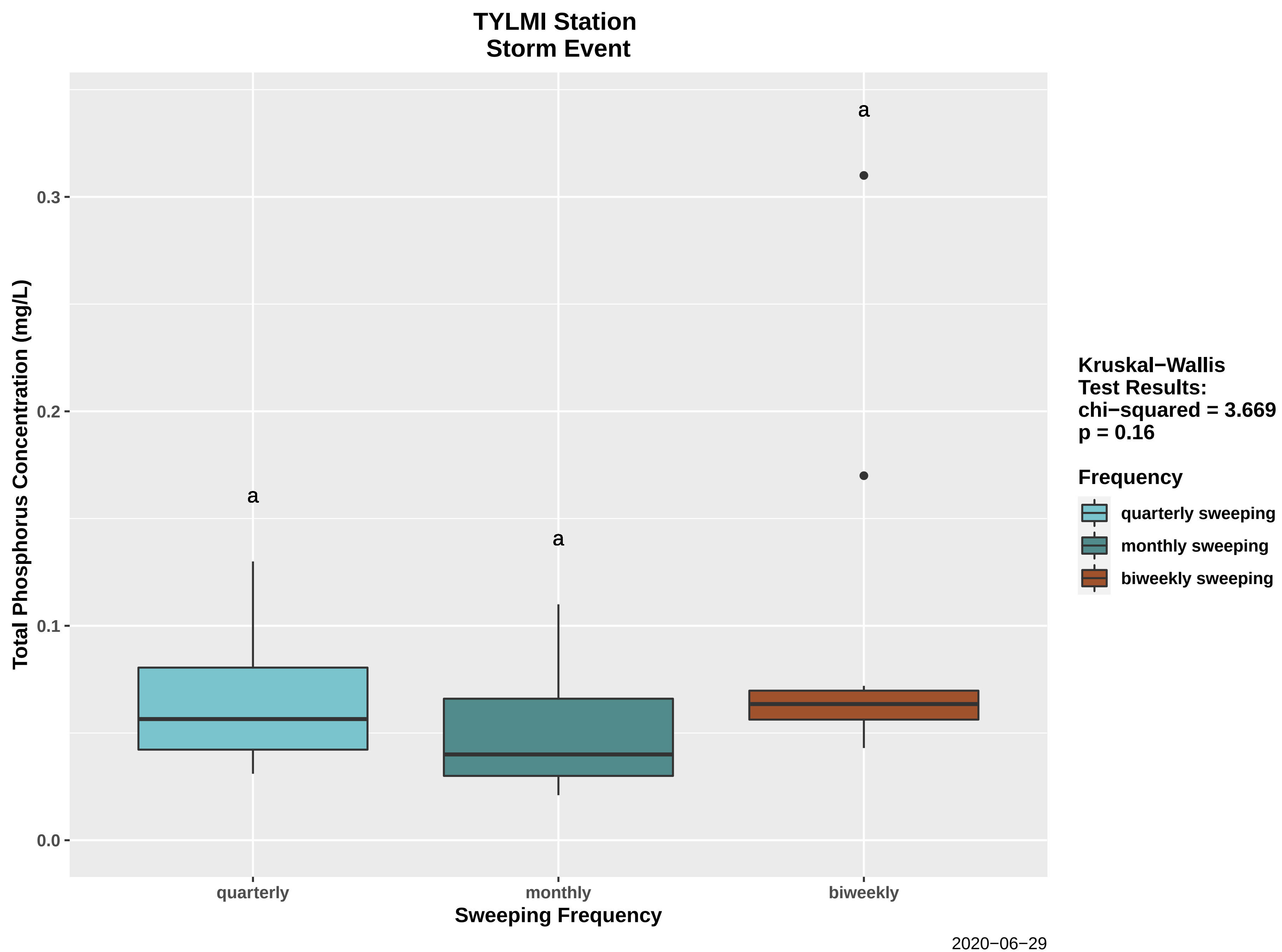

COUMO Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.0
0.1
0.2
0.3
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 4.939
p = 0.085
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

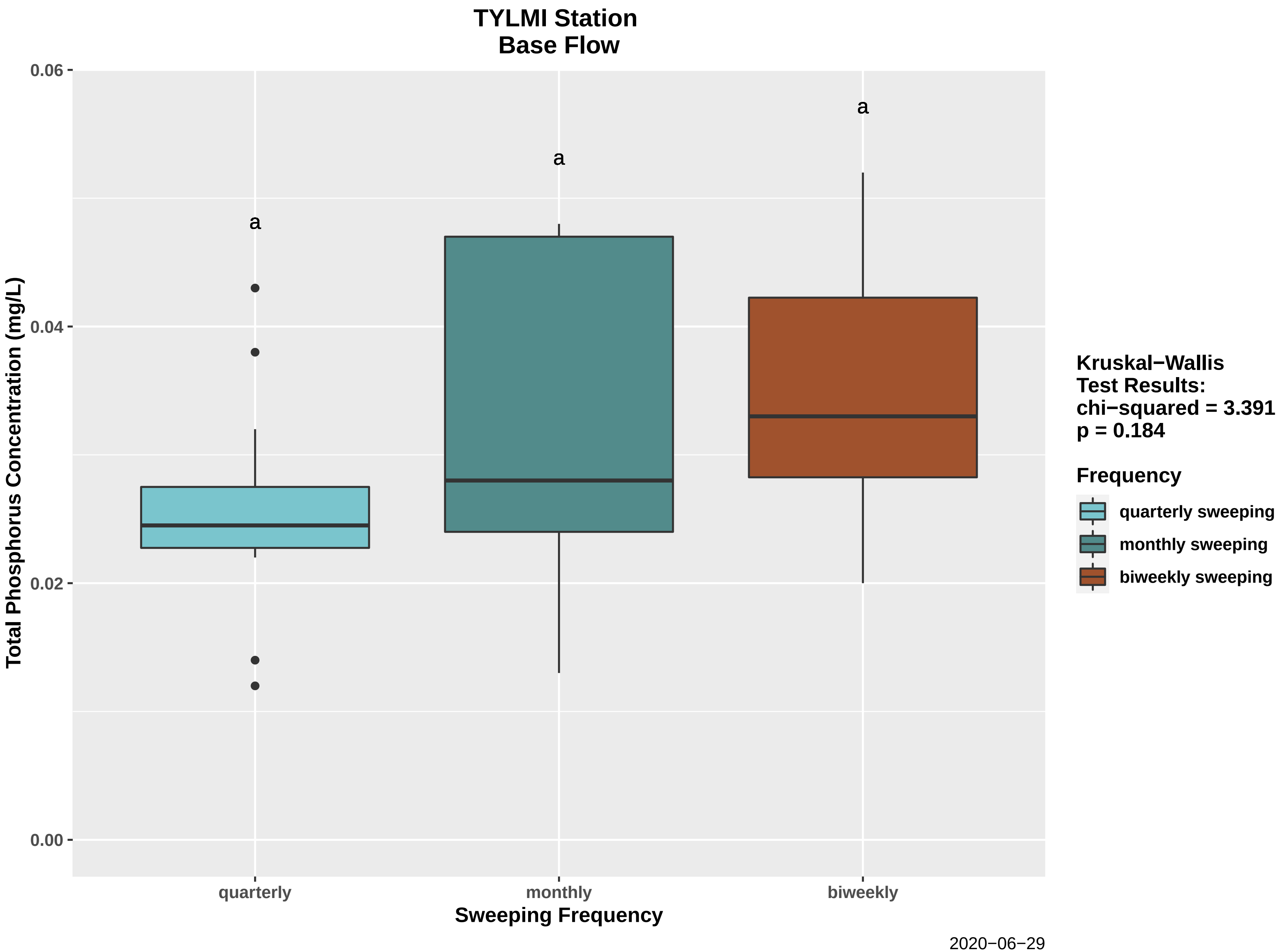

COUMI Station
Storm Event
Total Phosphorus Concentration (mg/L)
2.5
2.0
1.5
1.0
0.5
0.0
a
b
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 10.878
p = 0.004
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

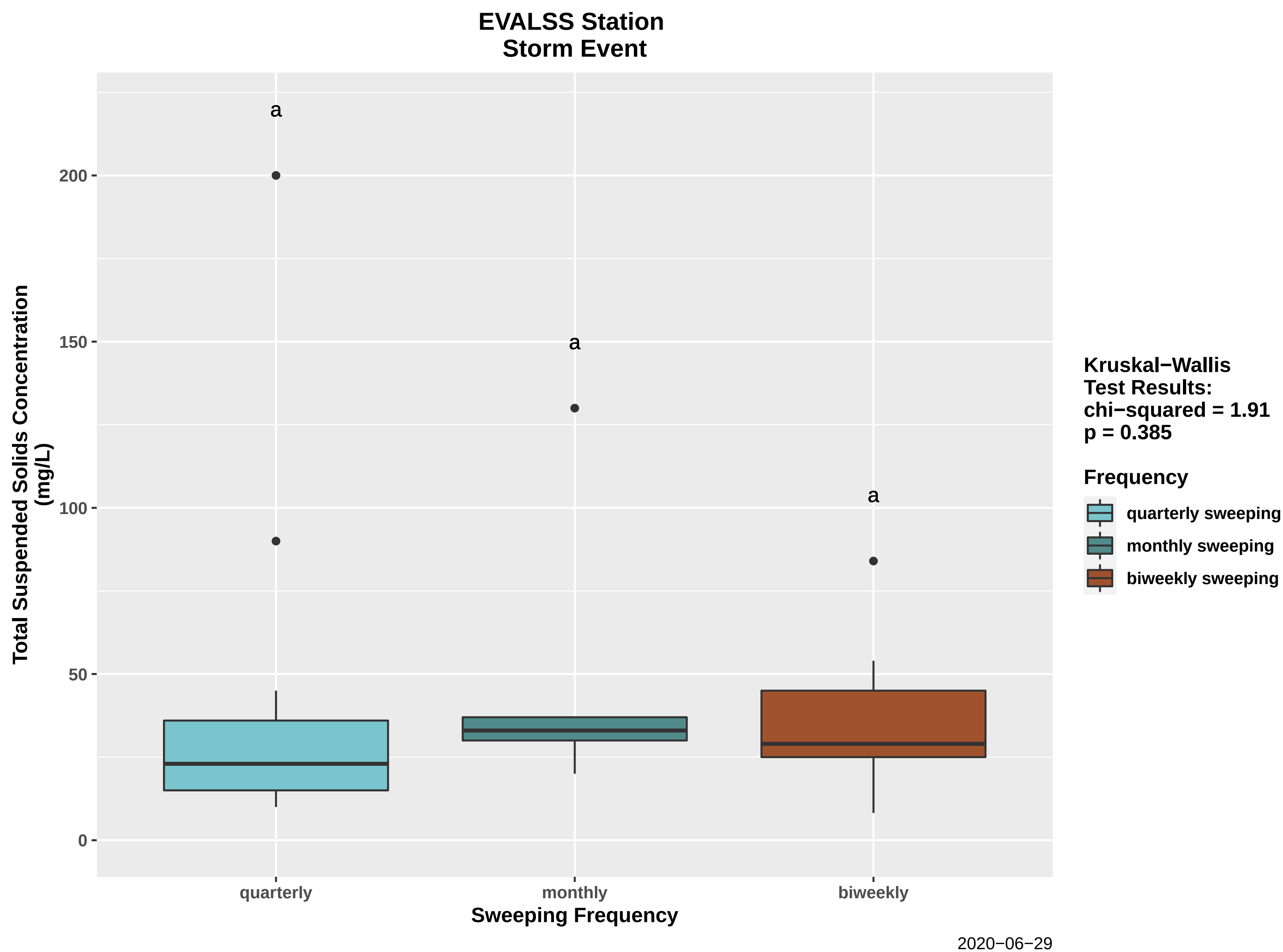

COUMI Station
Base Flow
a
a
a
0.15
0.10
0.05
0.00
Total Phosphorus Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.544
p = 0.103
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

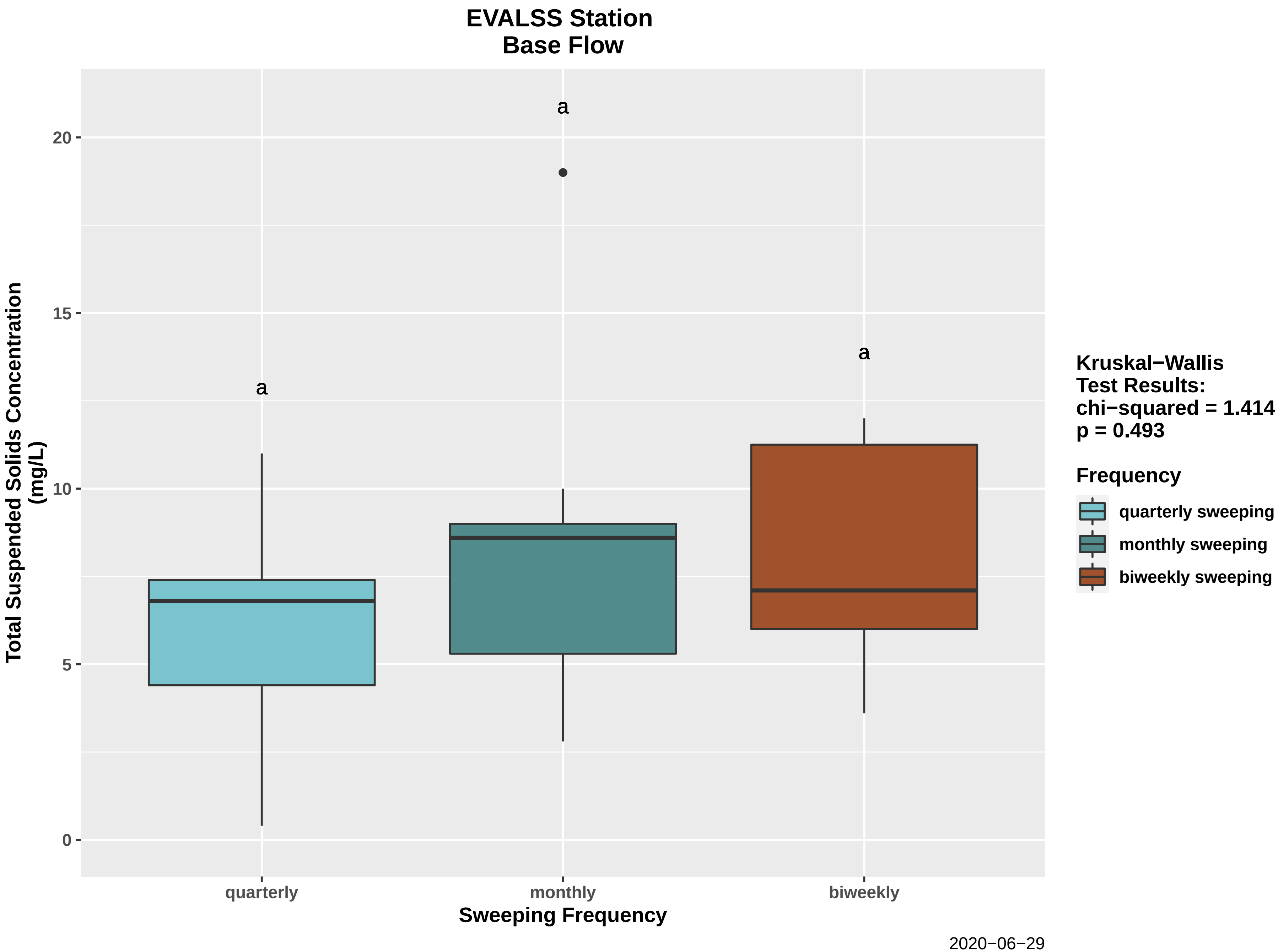

TYLMO Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.0
0.1
0.2
0.3
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.672
p = 0.433
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

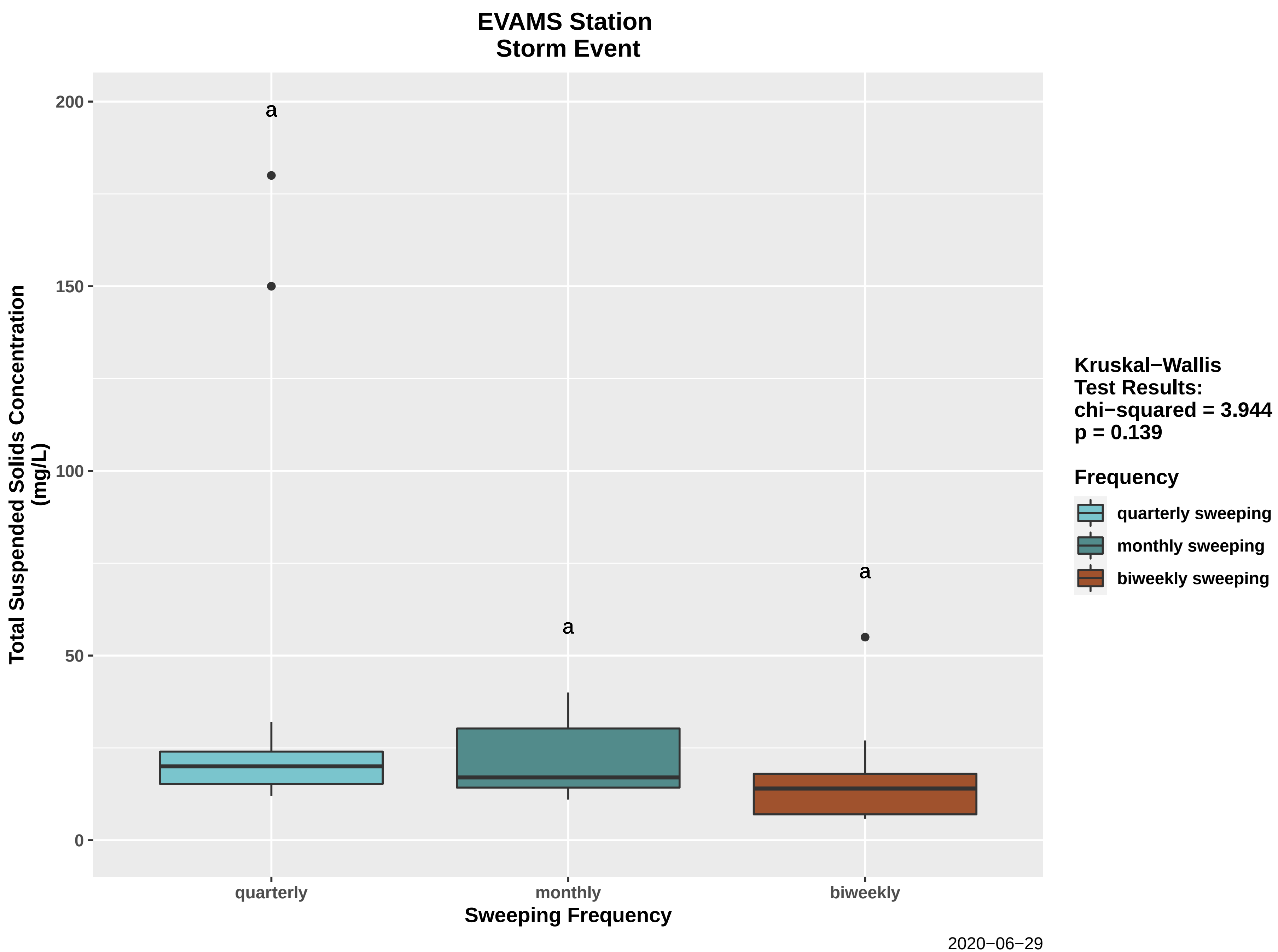

TYLMO Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.00
0.03
0.06
0.09
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.724
p = 0.696
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

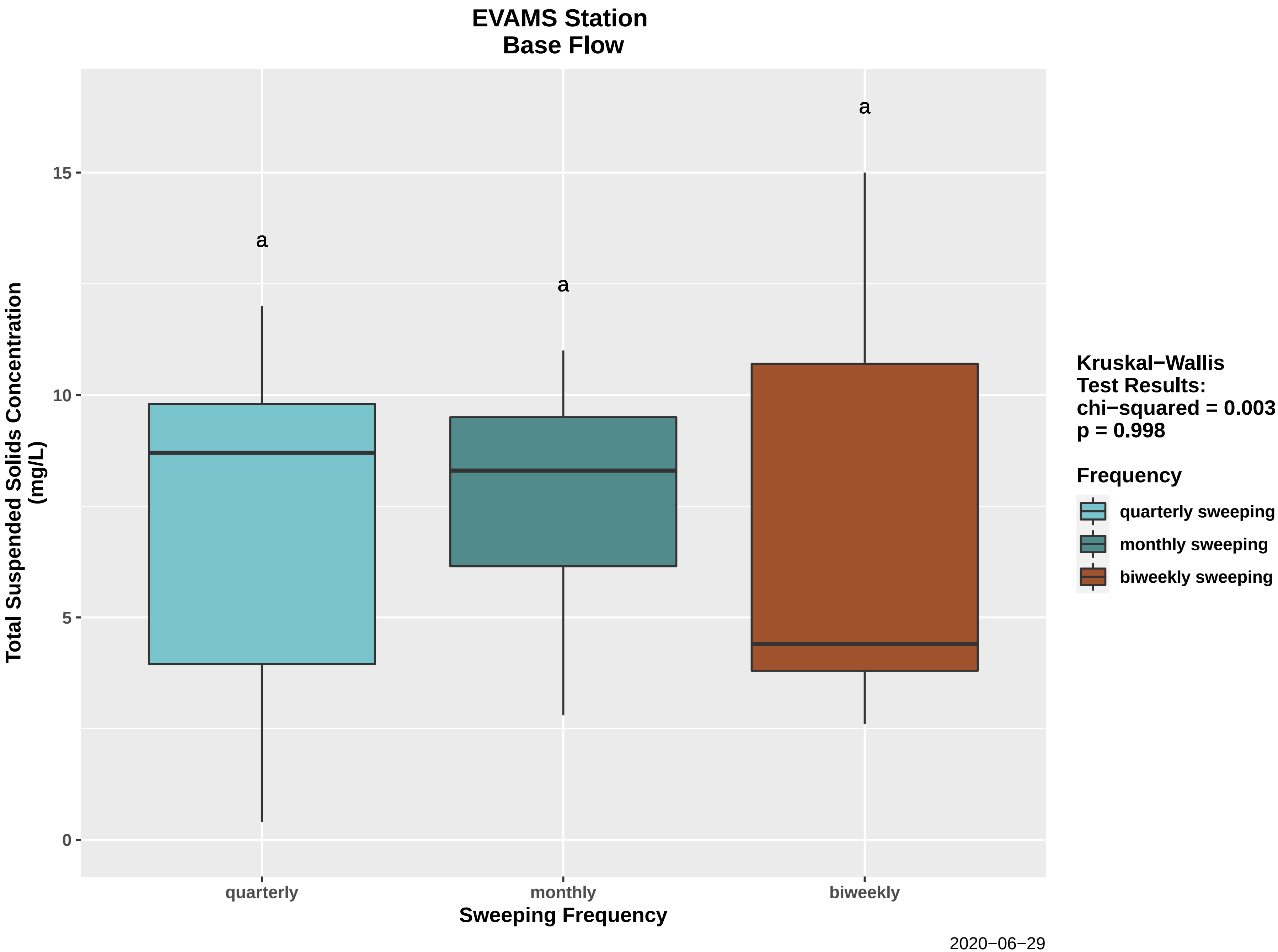

TYLMI Station
Storm Event
Total Phosphorus Concentration (mg/L)
0.3
0.2
0.1
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.669
p = 0.16
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

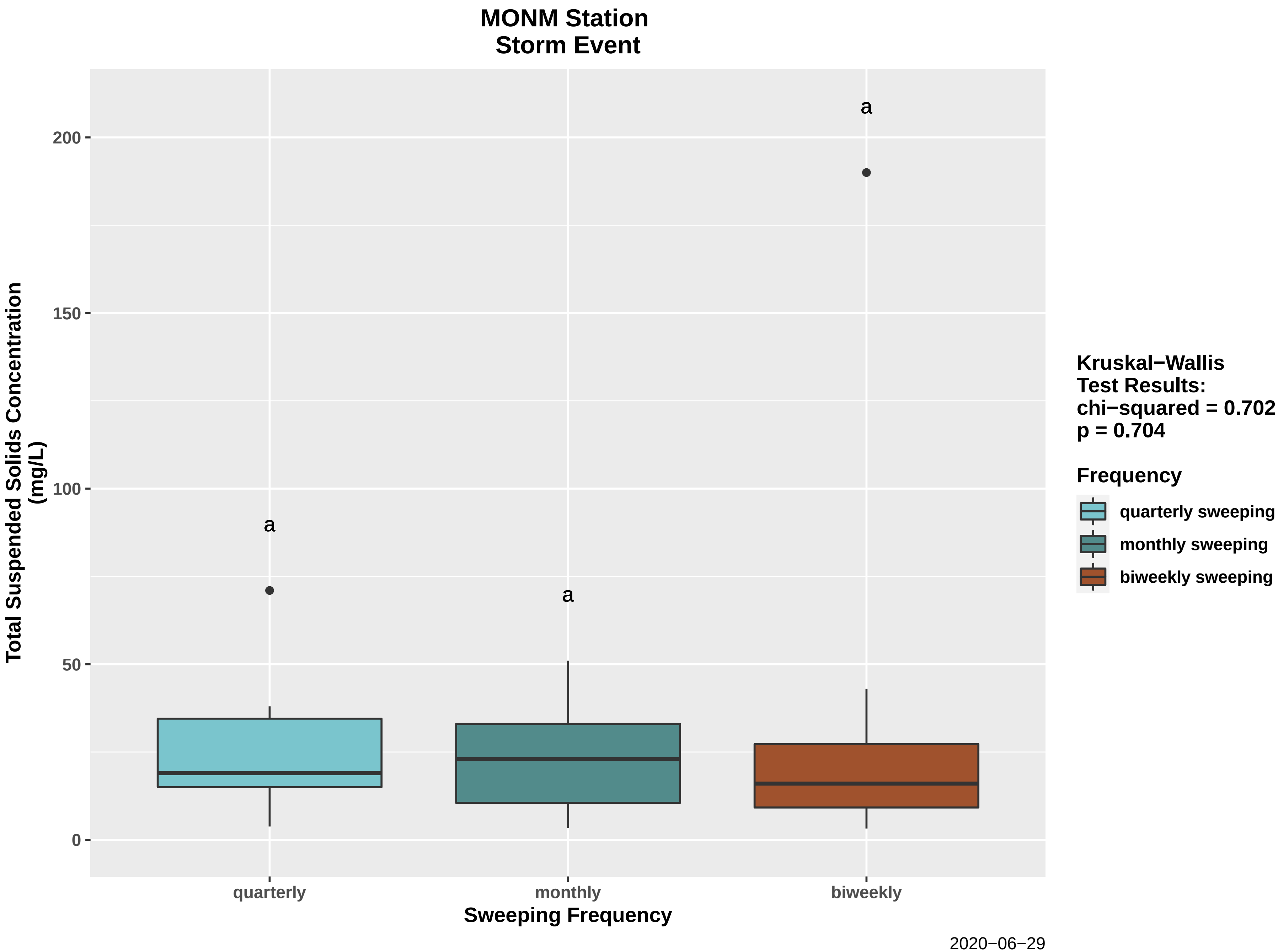

TYLMI Station
Base Flow
Total Phosphorus Concentration (mg/L)
0.06
0.04
0.02
0.00
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.391
p = 0.184
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


EVALSS Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
0
50
100
150
200
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 1.91
p = 0.385
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

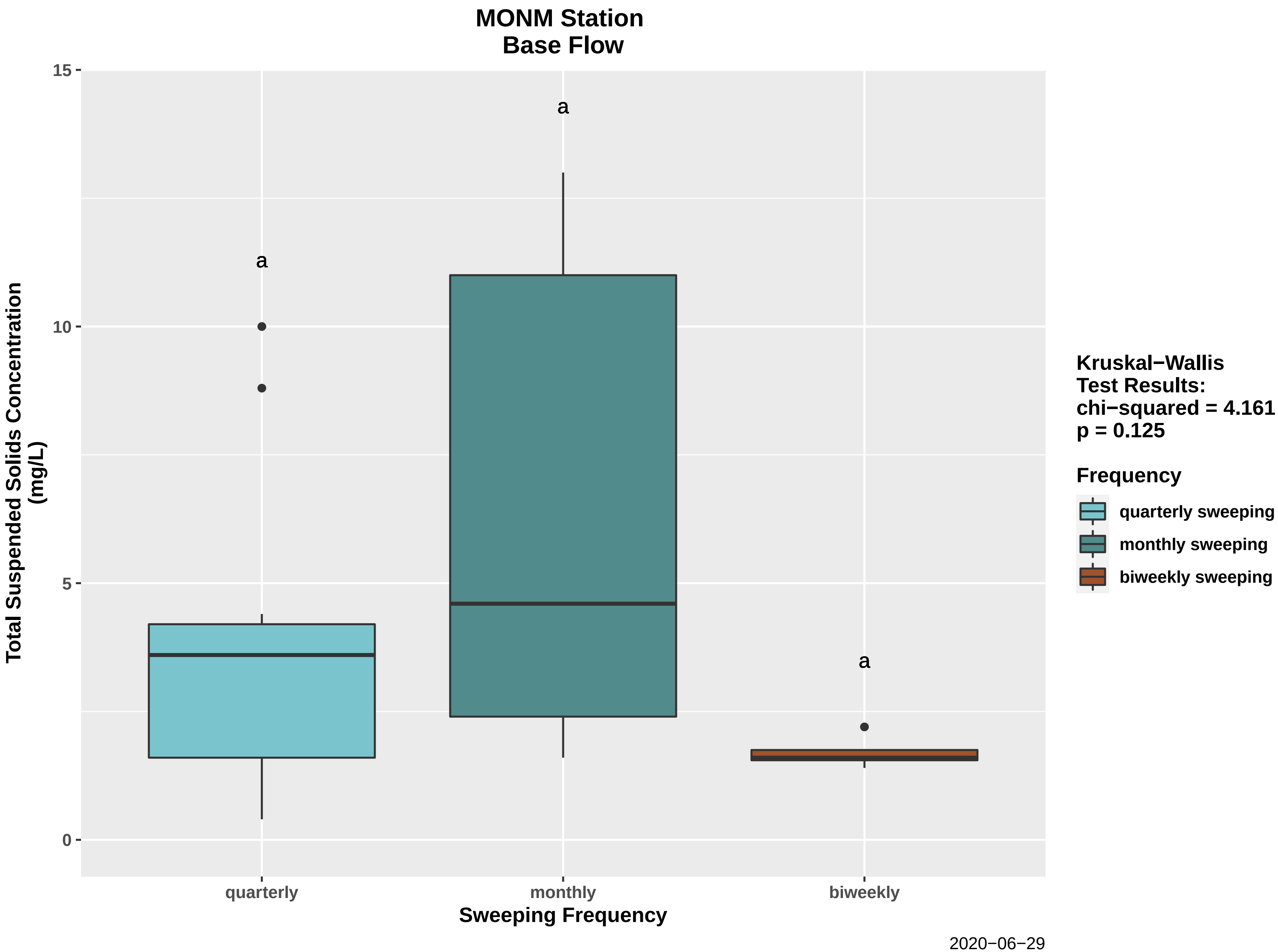

EVALSS Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
20
15
10
5
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 1.414
p = 0.493
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29


EVAMS Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
200
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.944
p = 0.139
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

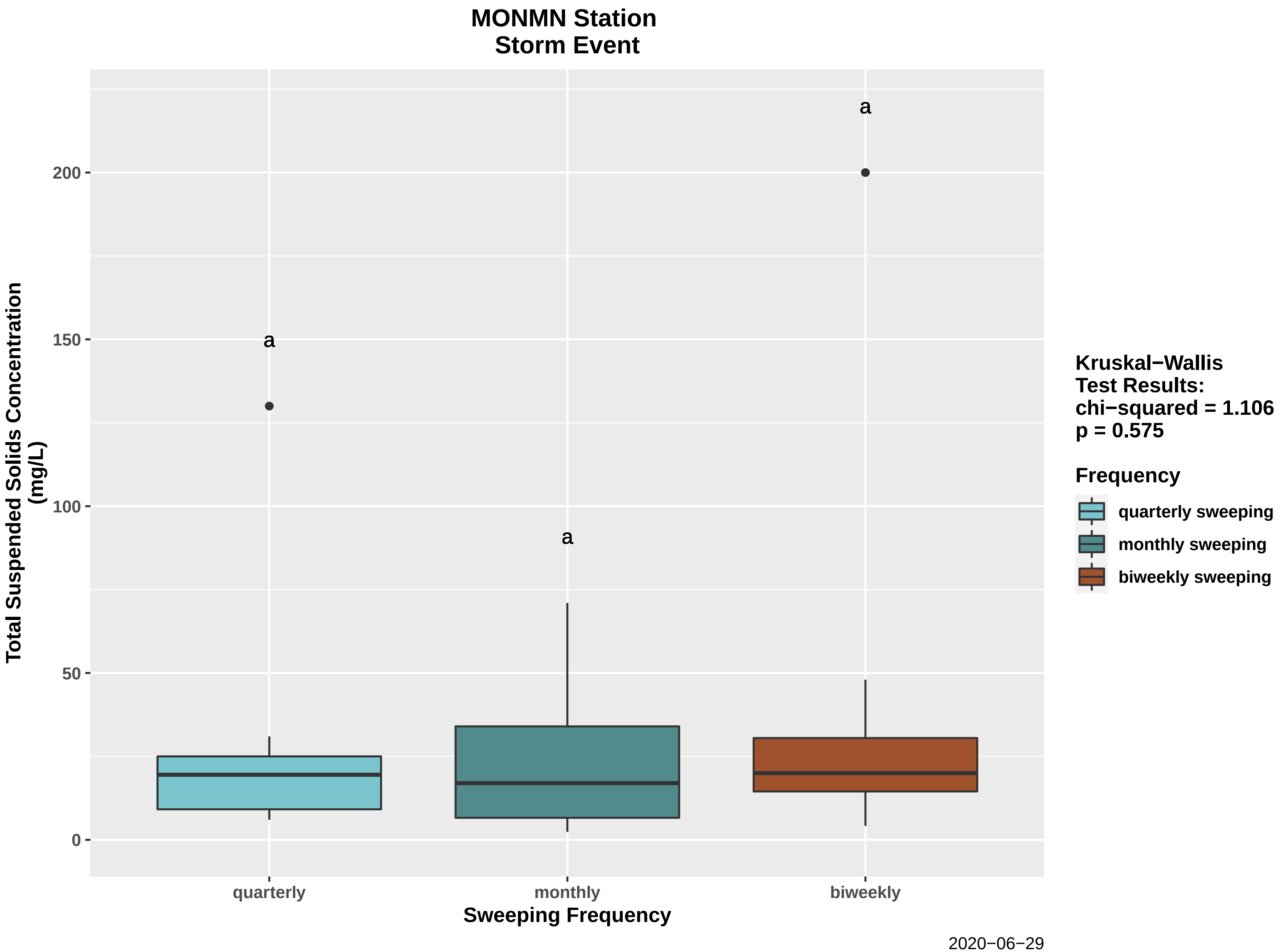

EVAMS Station
Base Flow
15
10
5
0
a
a
a
Total Suspended Solids Concentration
(mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.003
p = 0.998
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

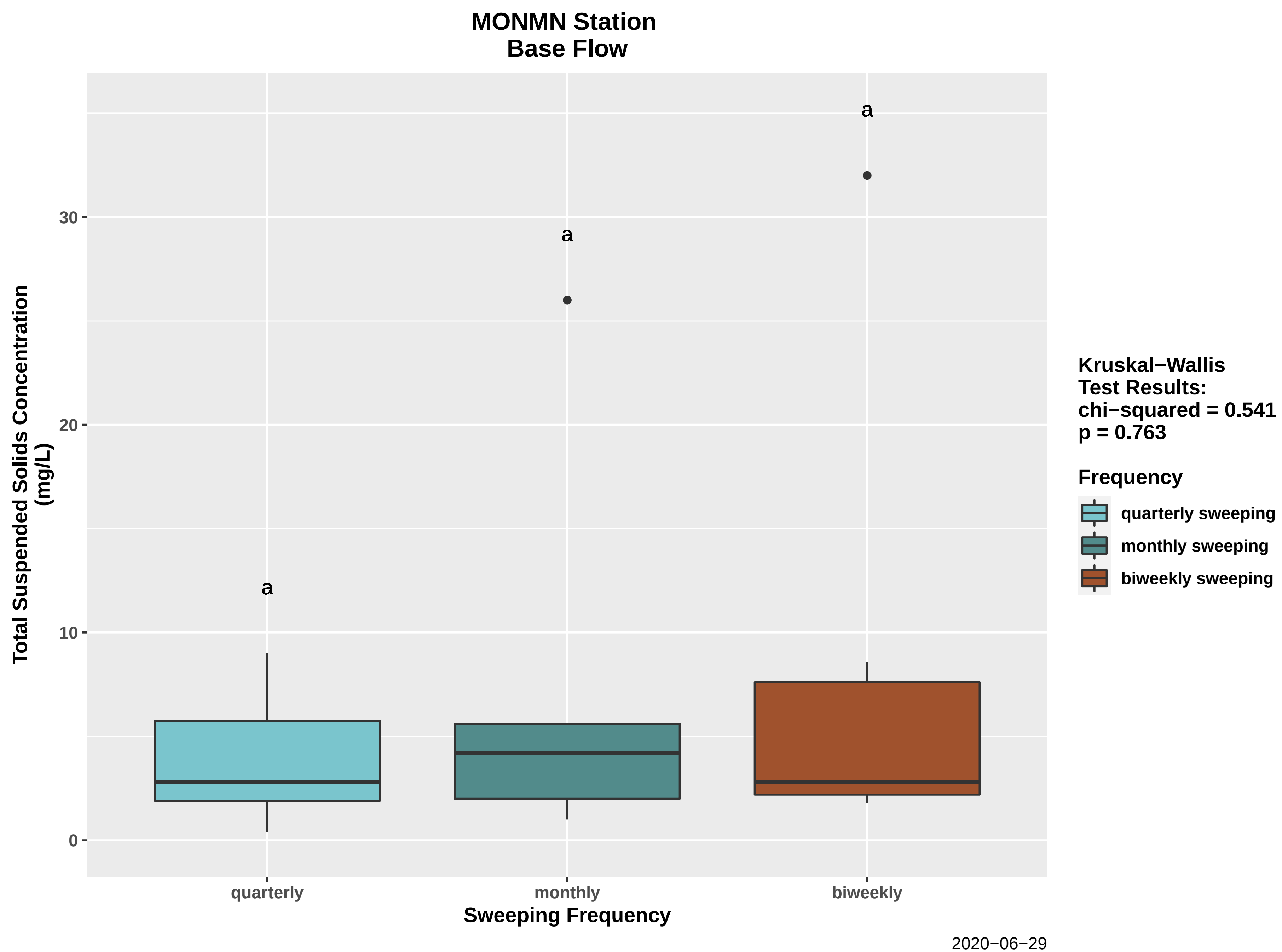


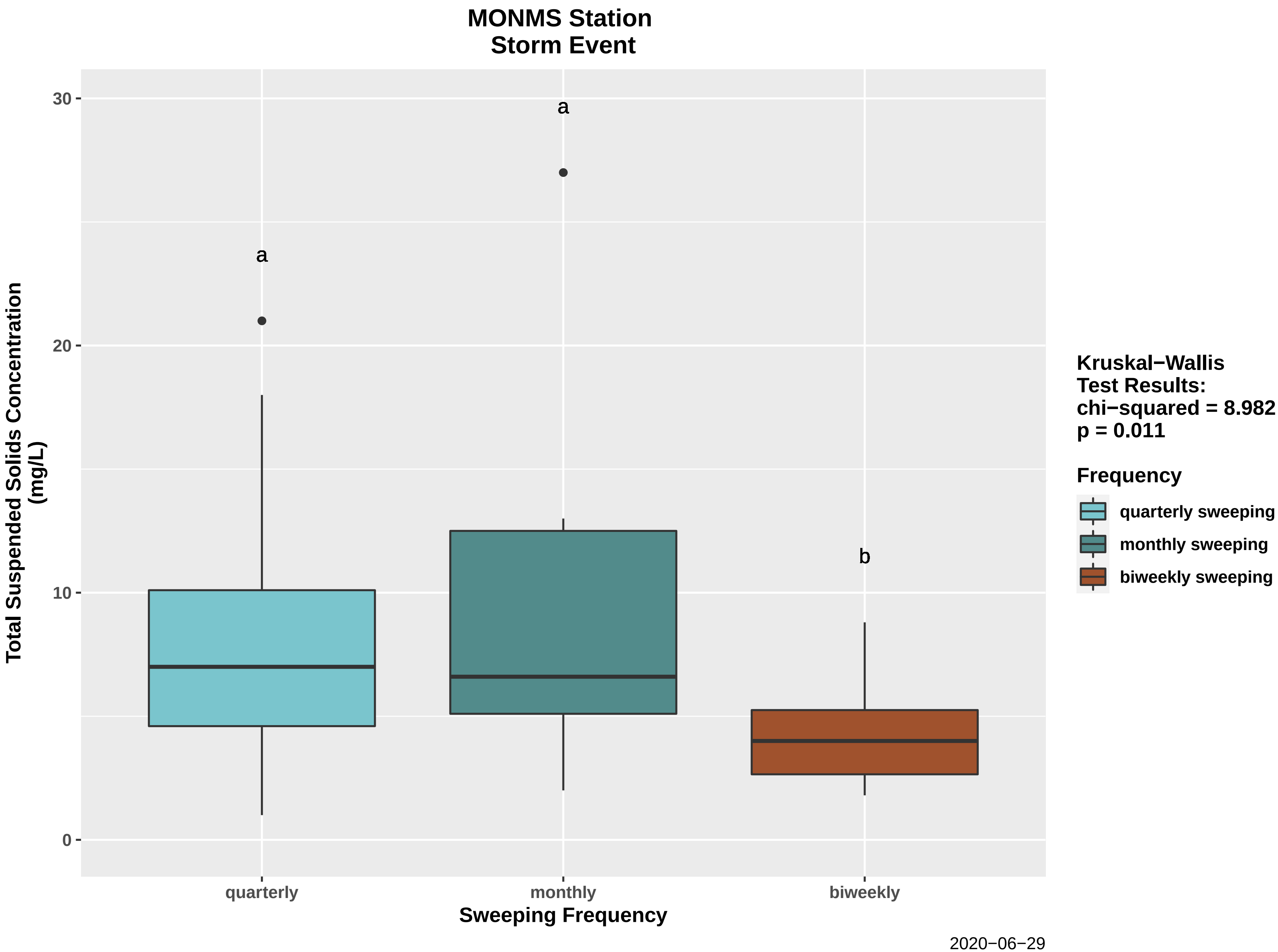
MONM Station
Storm Event
Total Suspended Solids Concentration (mg/L)
200
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.702
p = 0.704
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

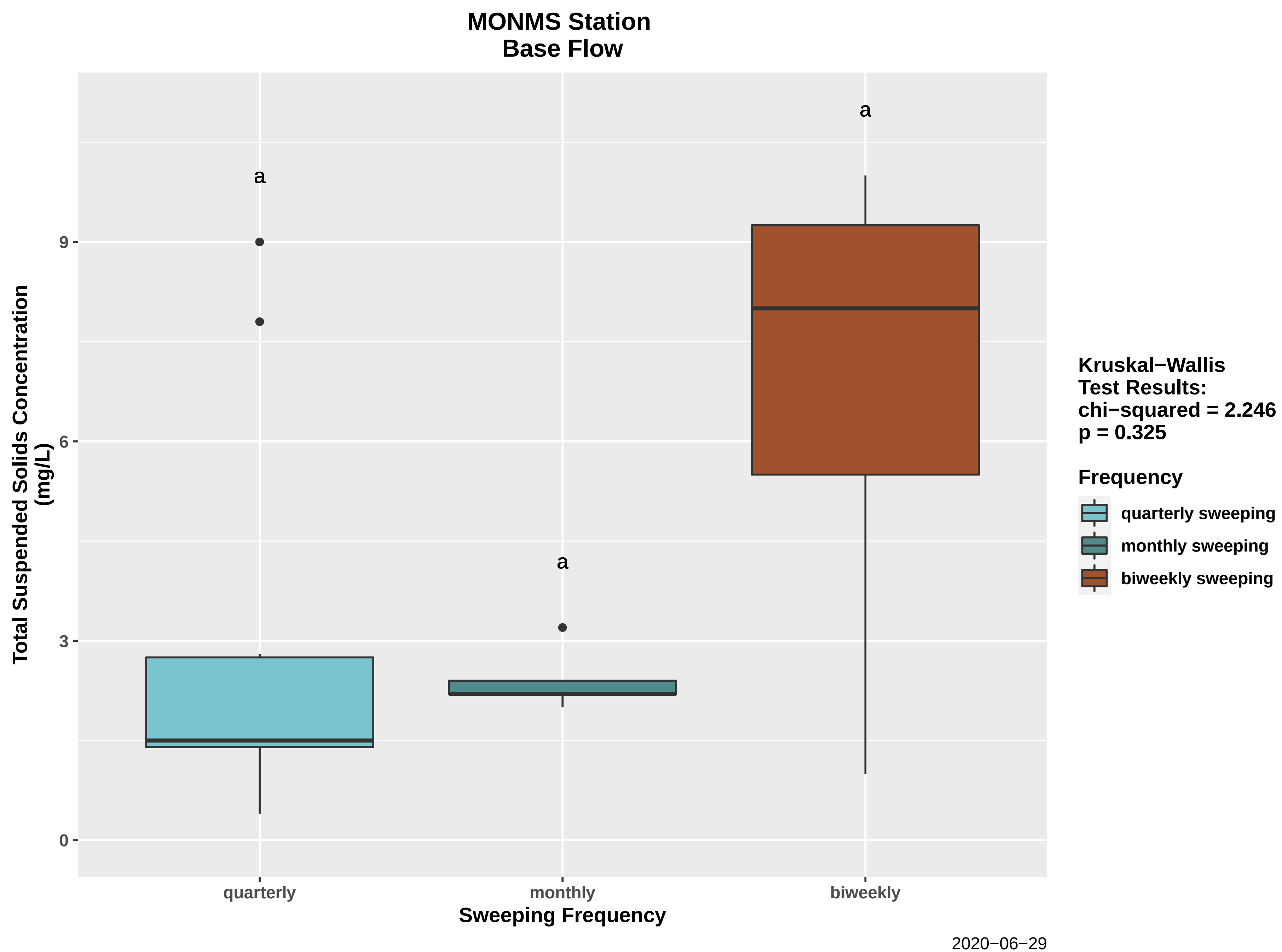


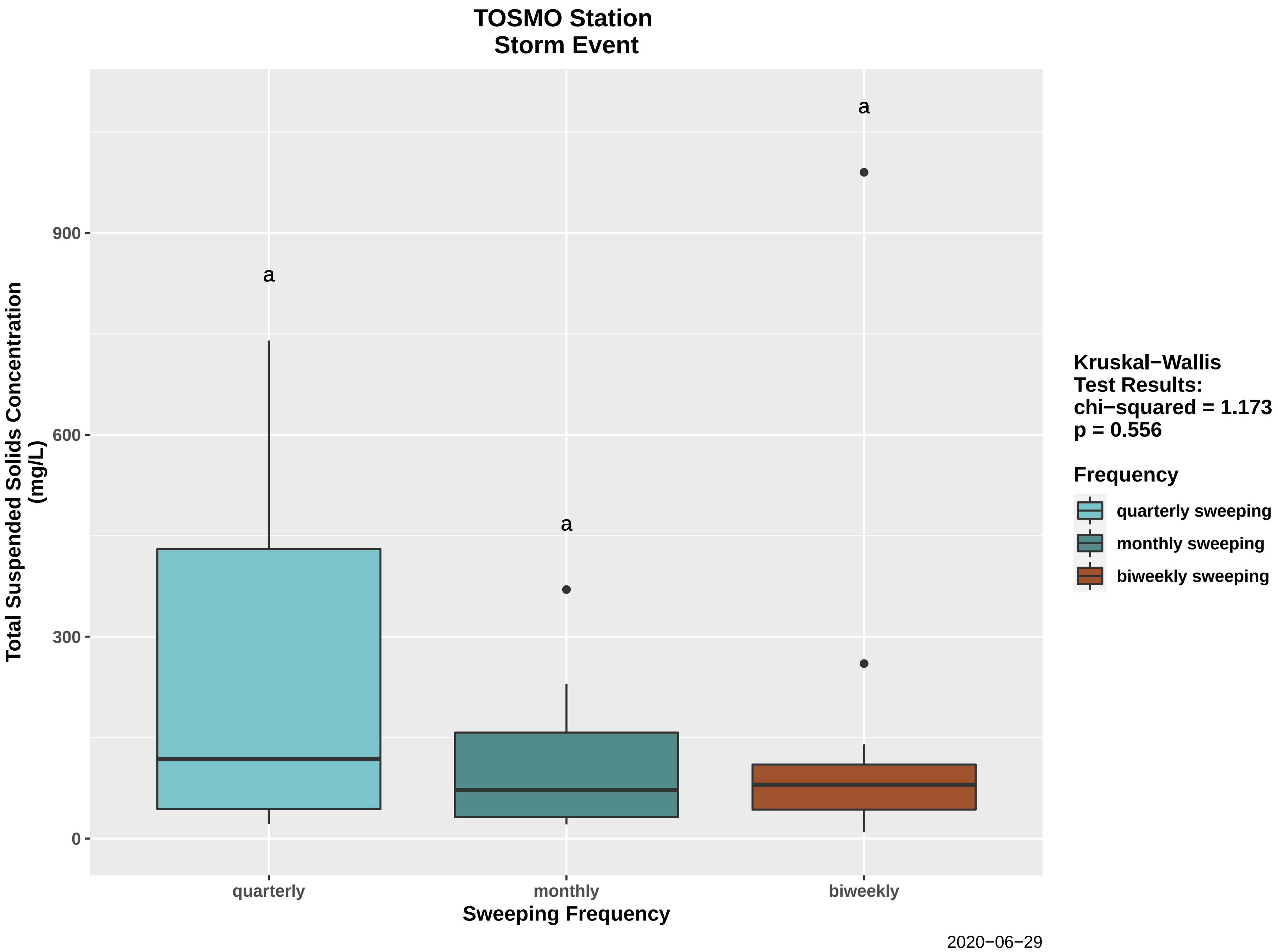
MONM Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
15
10
5
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 4.161
p = 0.125
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

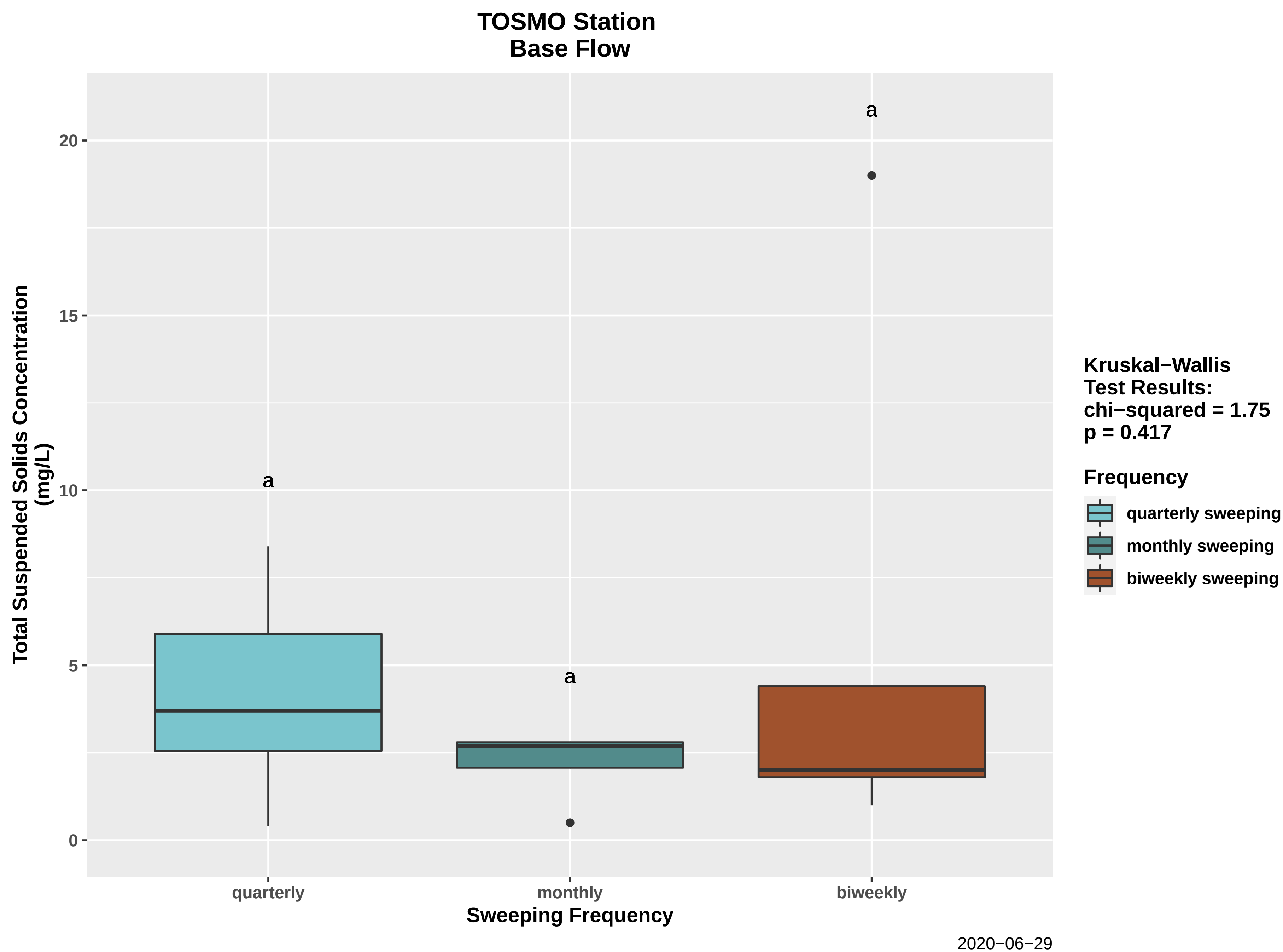

MONMN Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
200
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.106
p = 0.575
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


MONMN Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
30
20
10
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.541
p = 0.763
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

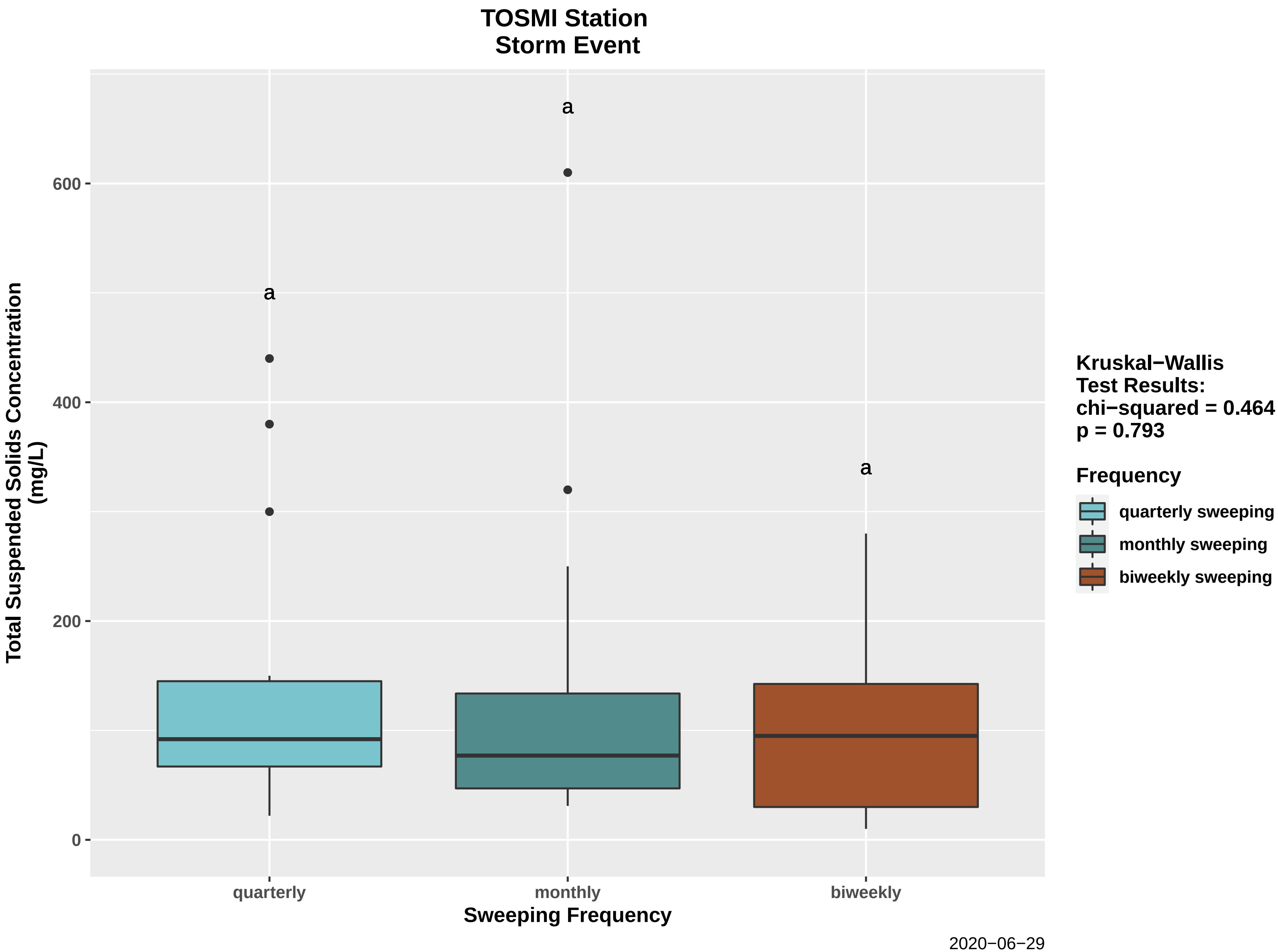

MONMS Station
Storm Event
Total Suspended Solids Concentration (mg/L)
30
20
10
0
a
a
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 8.982
p = 0.011
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

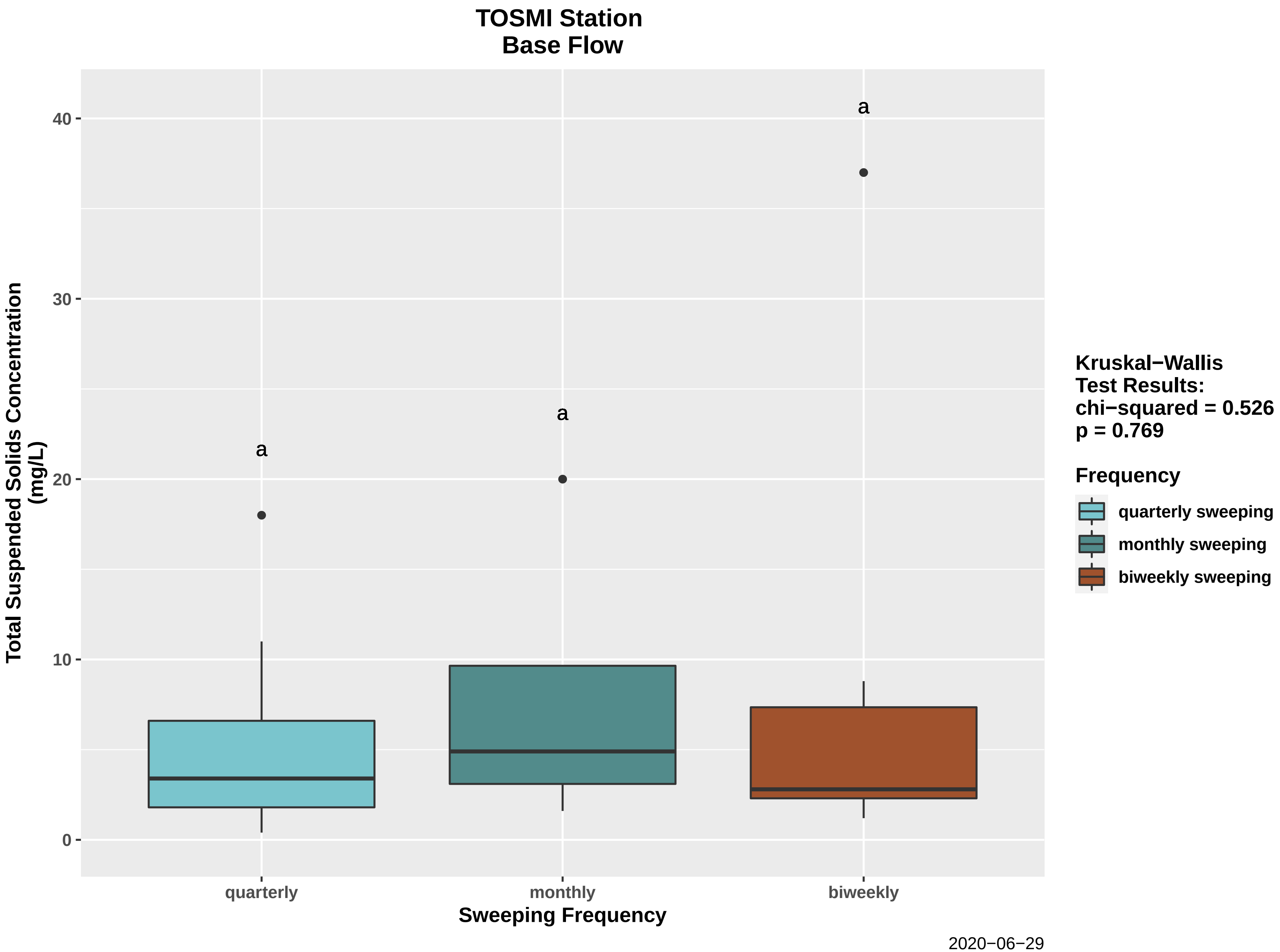

MONMS Station
Base Flow
Total Suspended Solids Concentration (mg/L)
0
3
6
9
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.246
p = 0.325
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


TOSMO Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
900
600
300
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.173
p = 0.556
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

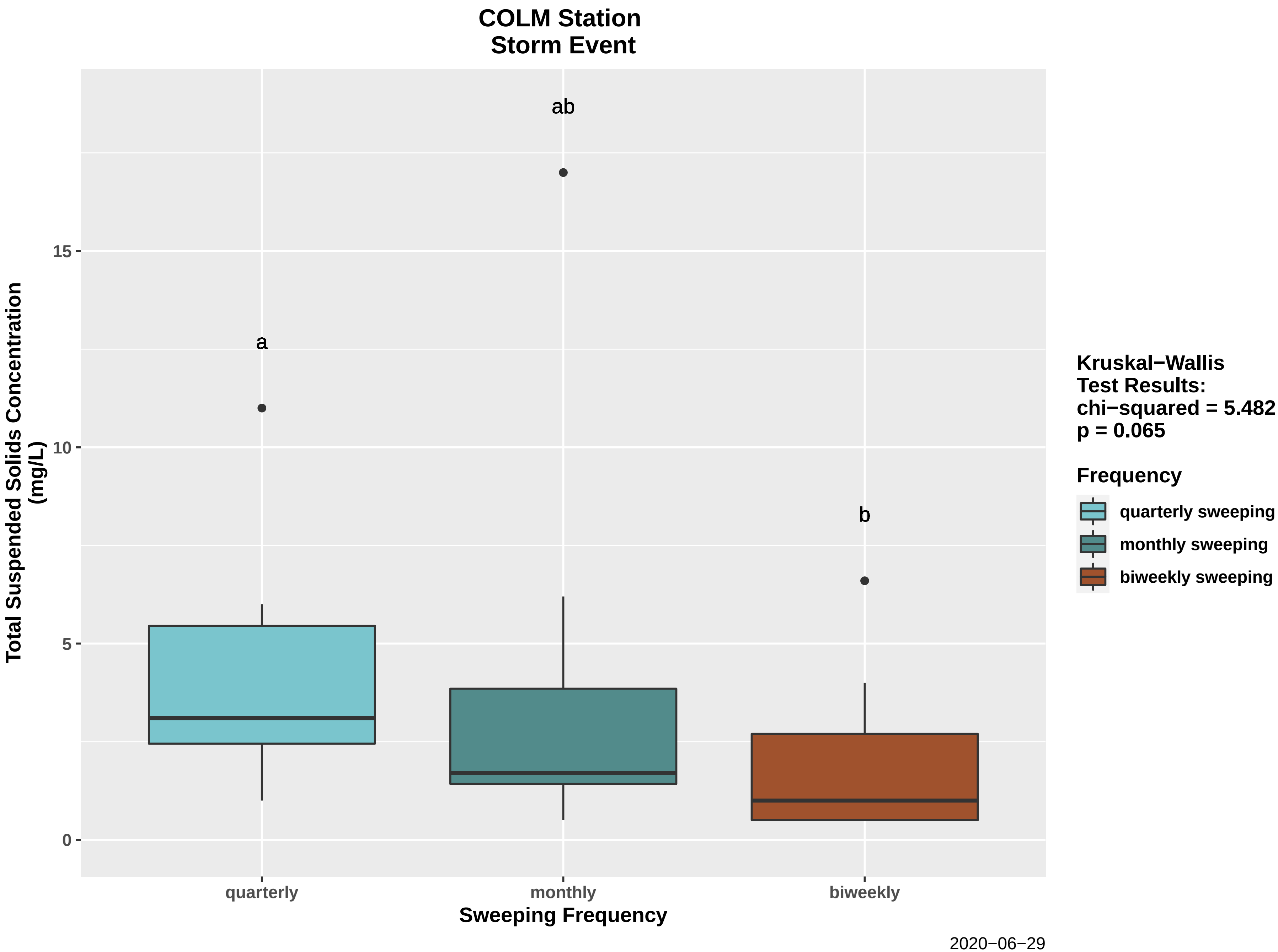


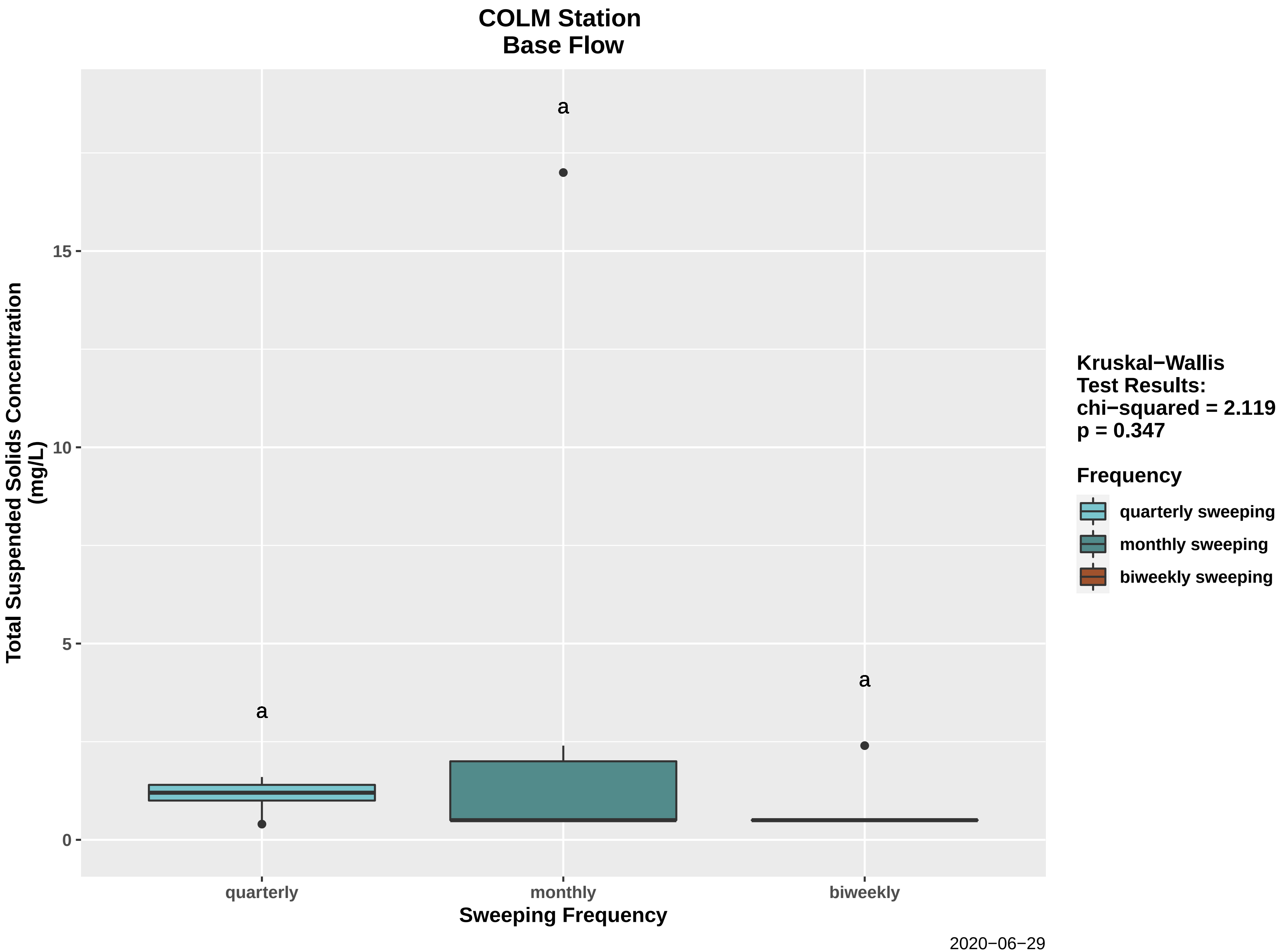
TOSMO Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
0
5
10
15
20
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.75
p = 0.417
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

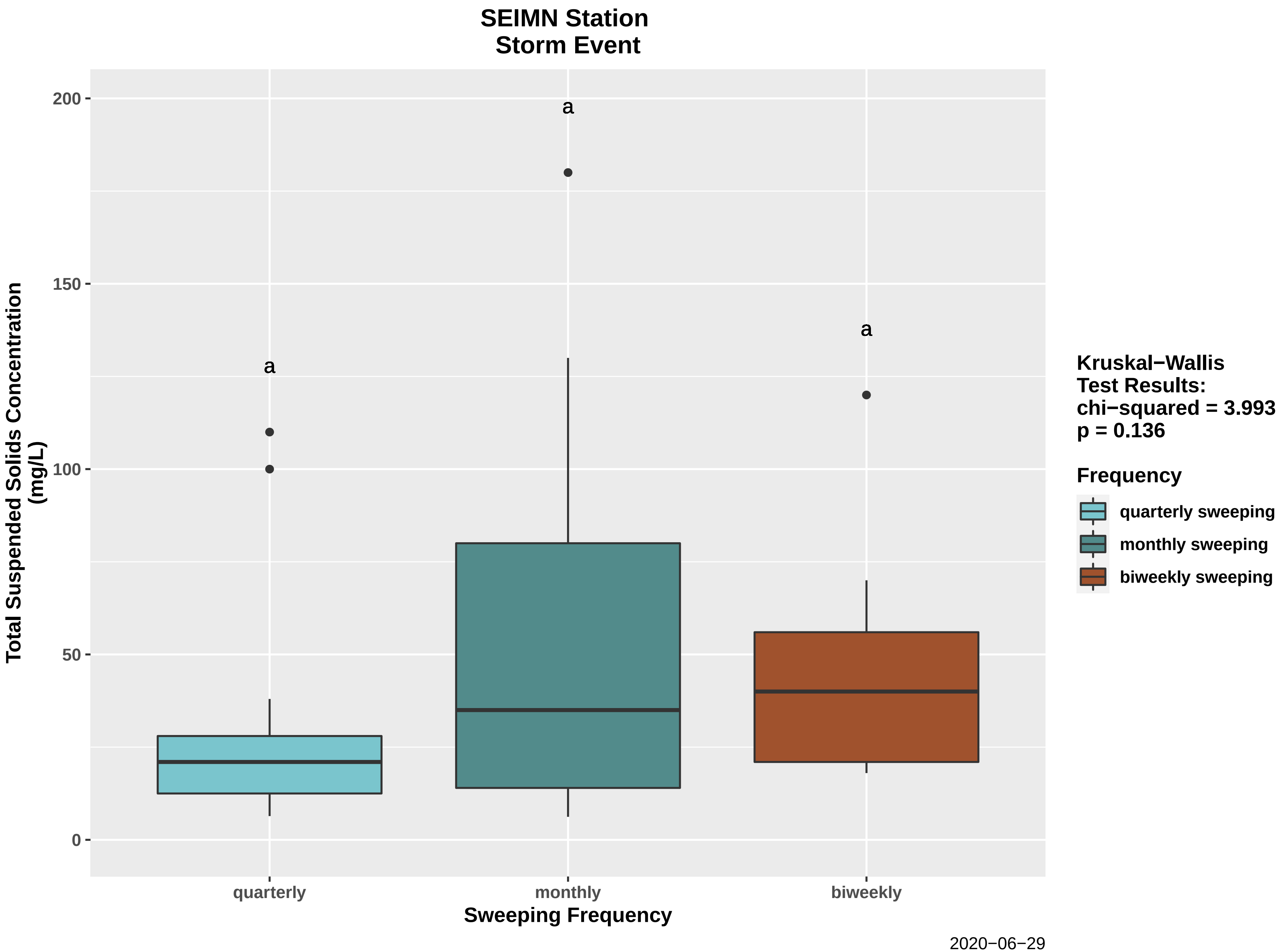

TOSMI Station
Storm Event
Total Suspended Solids Concentration (mg/L)
600
400
200
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 0.464
p = 0.793
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

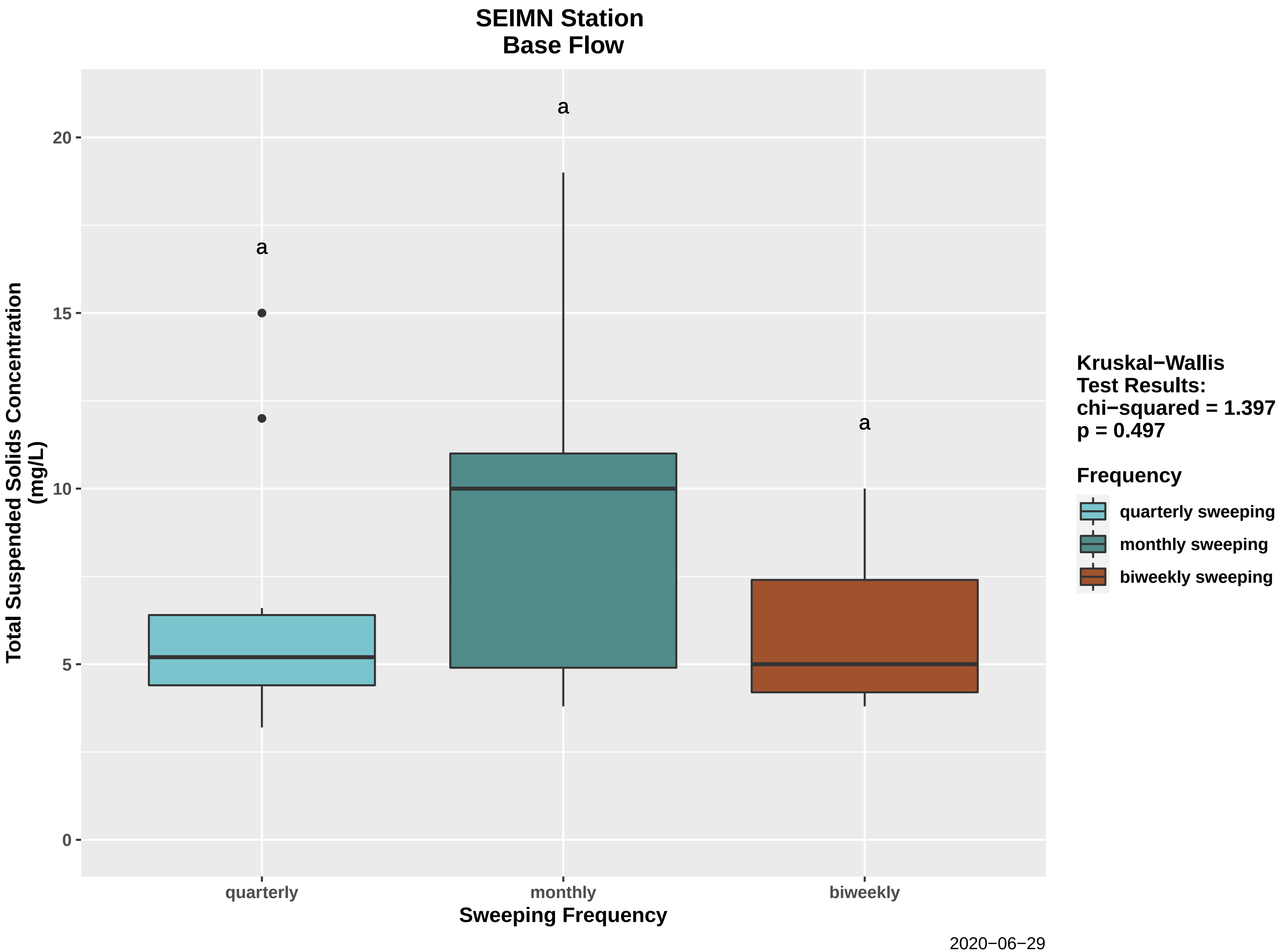


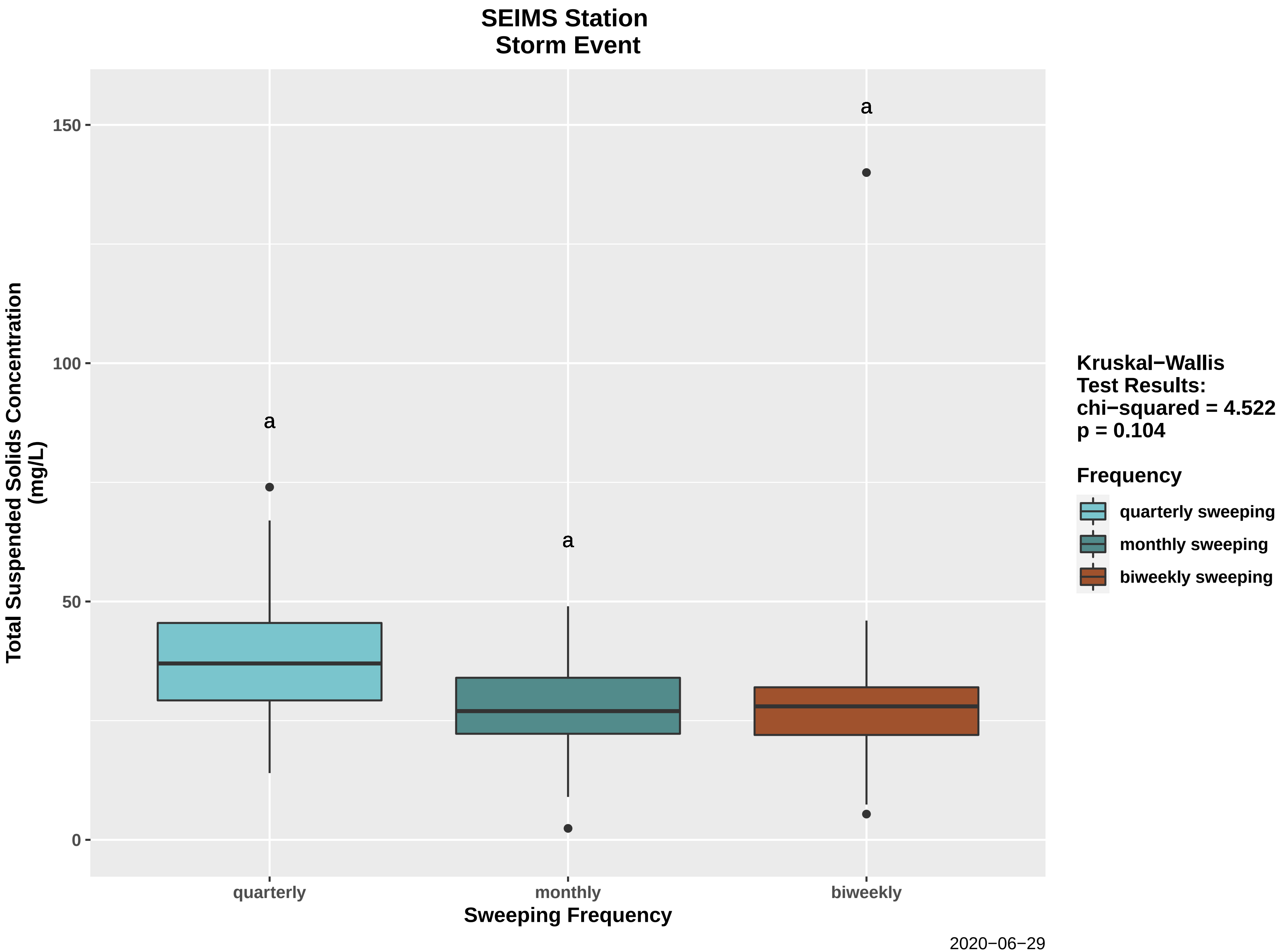
TOSMI Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
40
30
20
10
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.526
p = 0.769
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

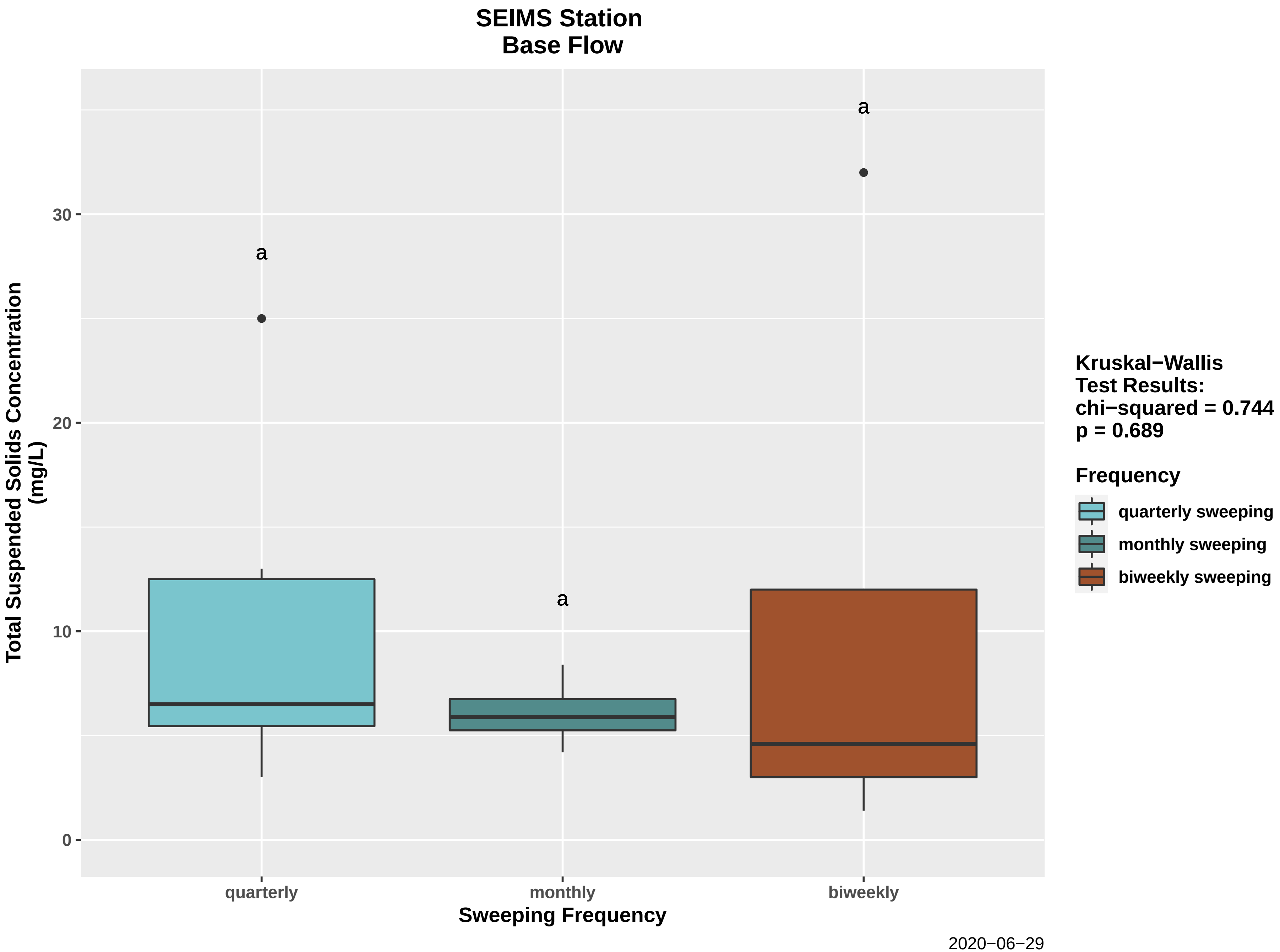

COLM Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
0
5
10
15
a
ab
b
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 5.482
p = 0.065
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

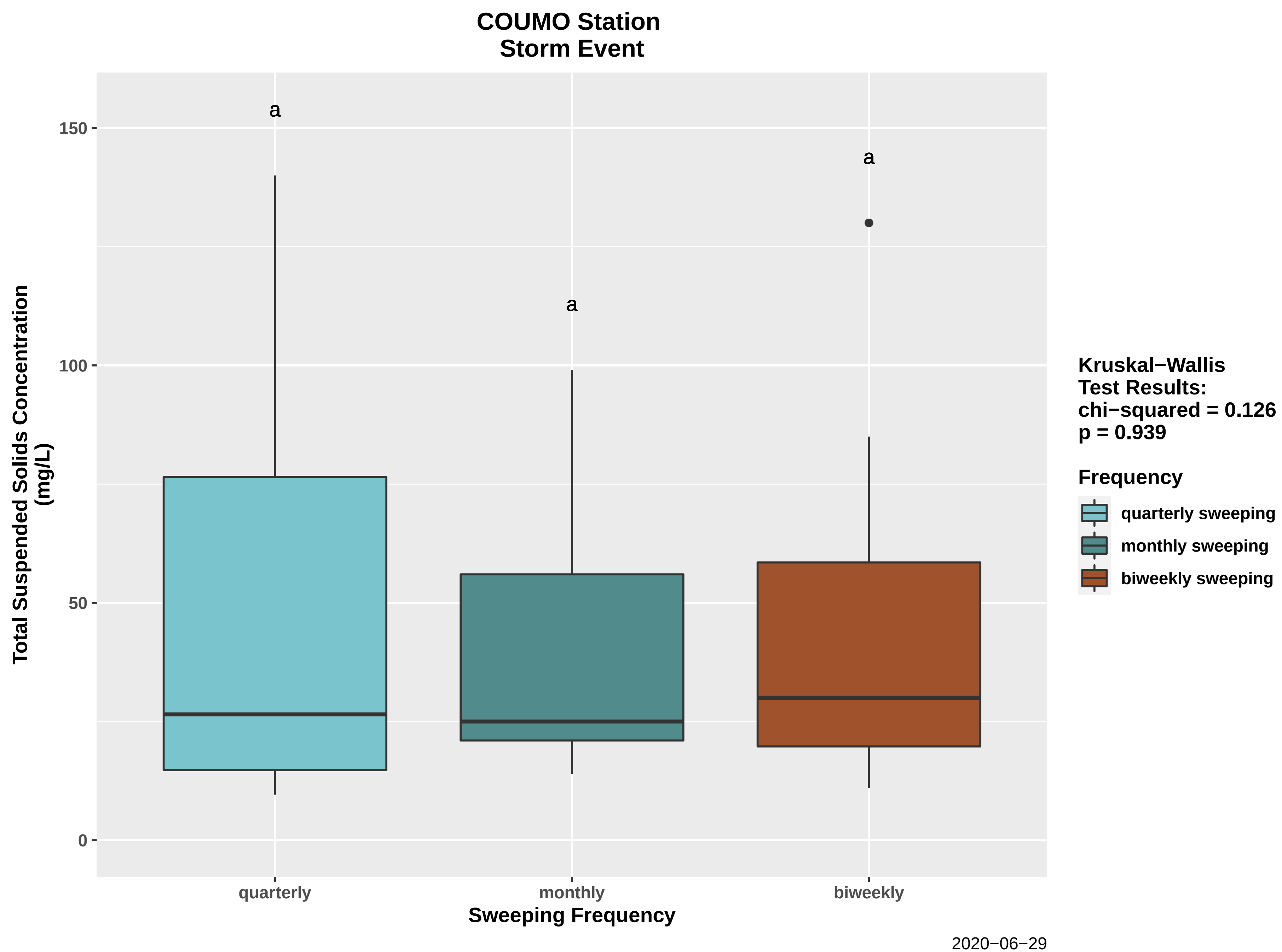

COLM Station
Base Flow
a
a
a
0
5
10
15
Total Suspended Solids Concentration
(mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.119
p = 0.347
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

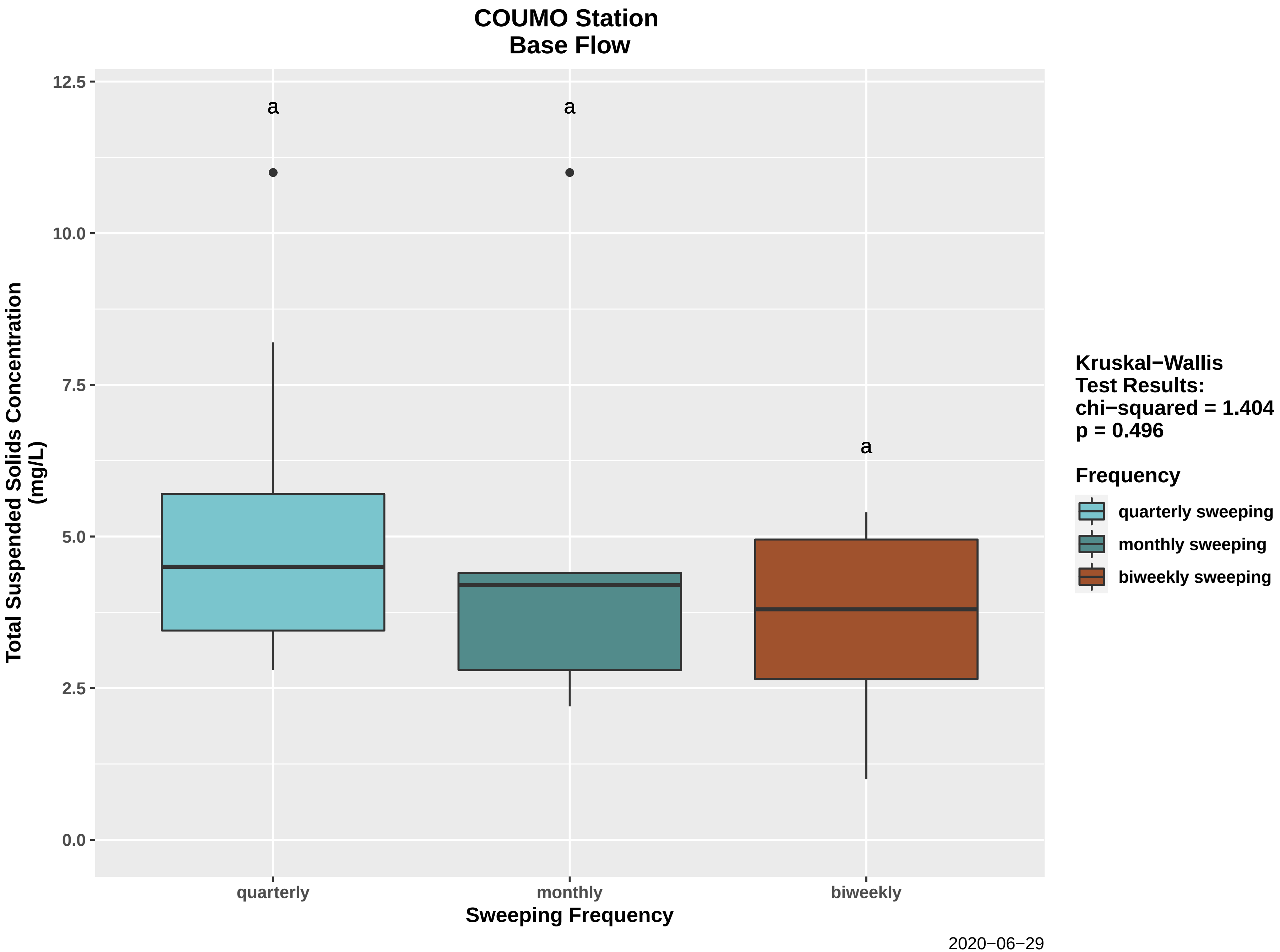

SEIMN Station
Storm Event
Total Suspended Solids Concentration (mg/L)
200
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 3.993
p = 0.136
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

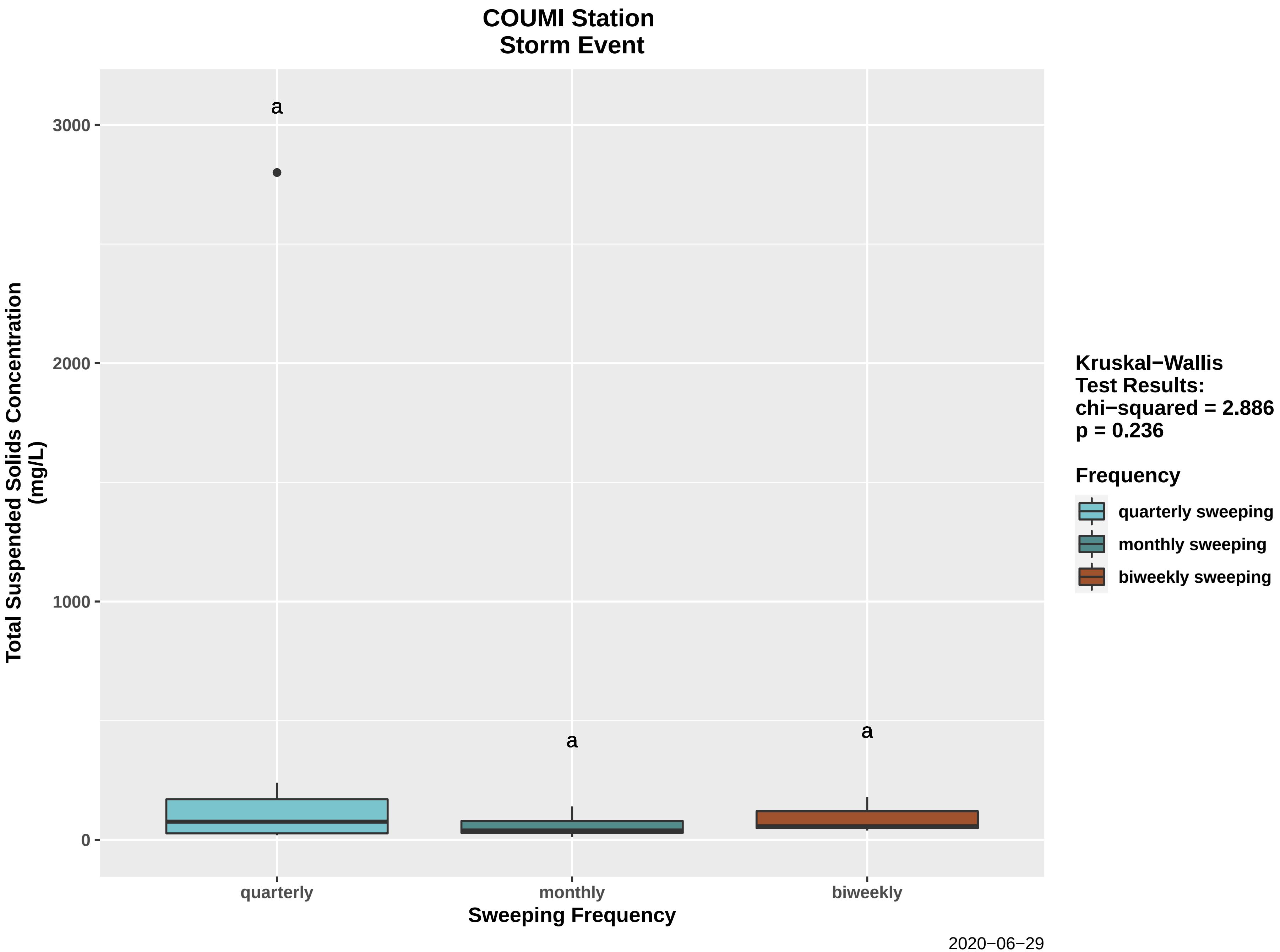

SEIMN Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
0
5
10
15
20
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.397
p = 0.497
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

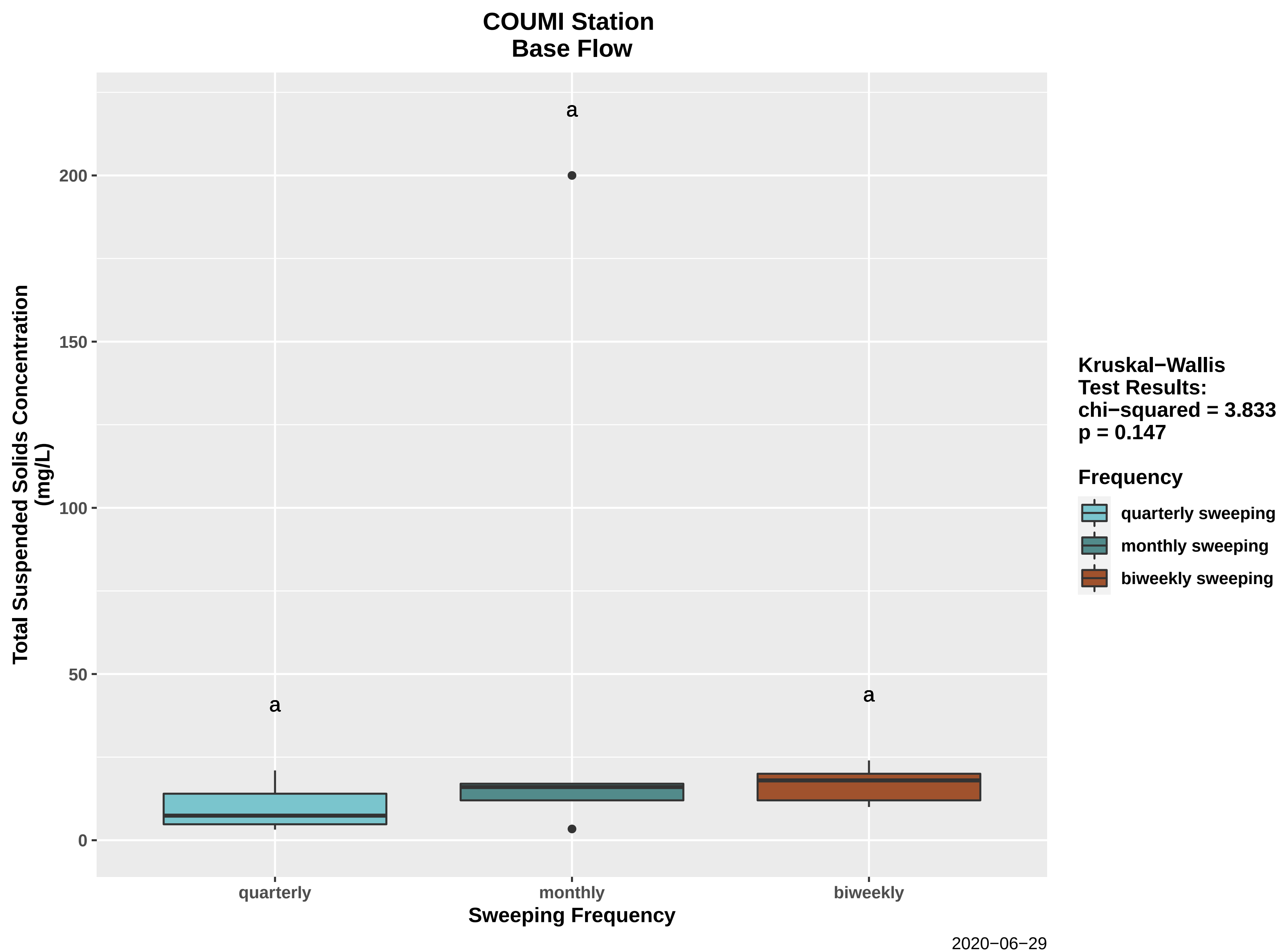

SEIMS Station
Storm Event
Total Suspended Solids Concentration (mg/L)
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 4.522
p = 0.104
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29


SEIMS Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
30
20
10
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.744
p = 0.689
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

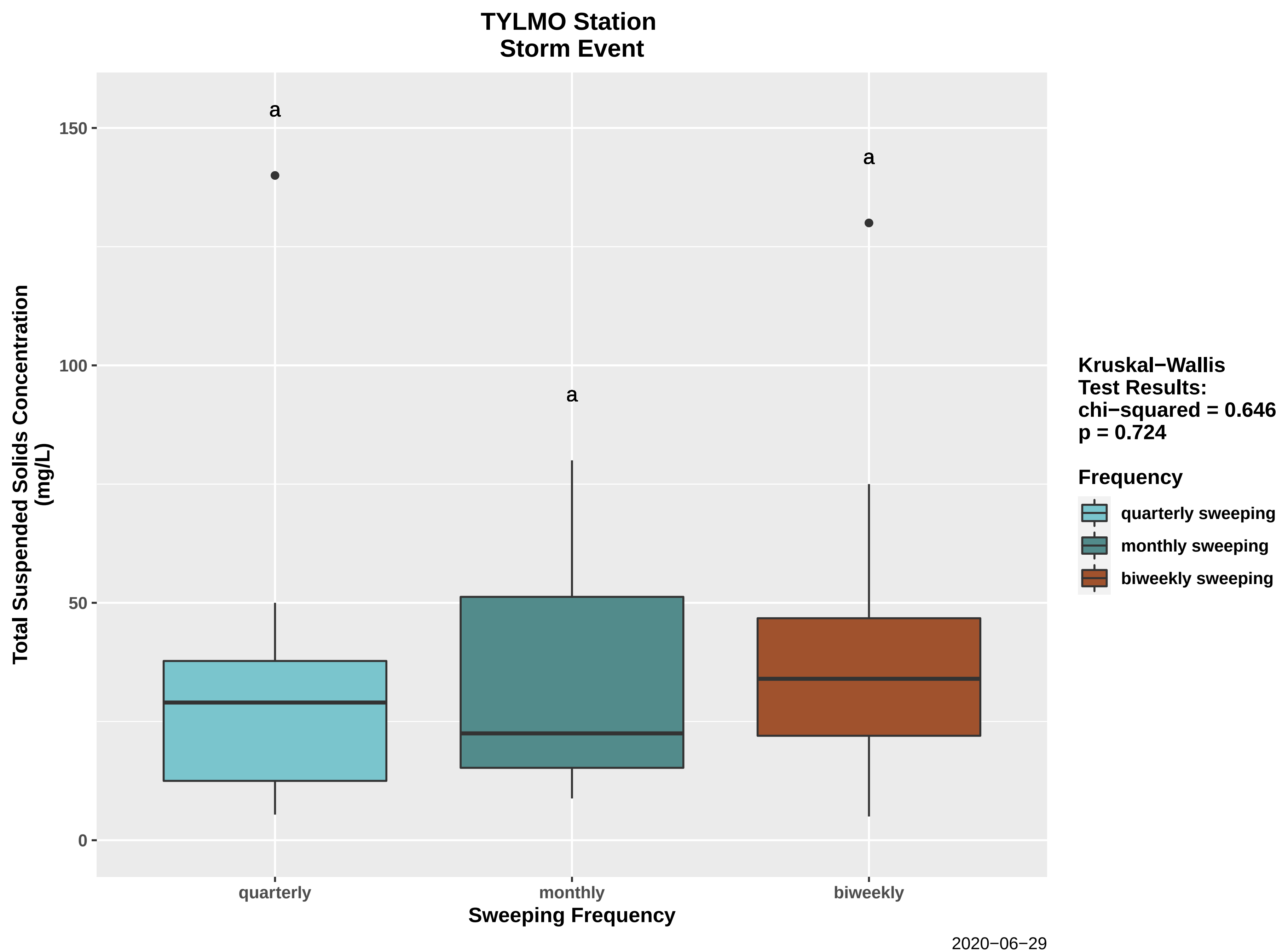

COUMO Station
Storm Event
Total Suspended Solids Concentration (mg/L)
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 0.126
p = 0.939
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

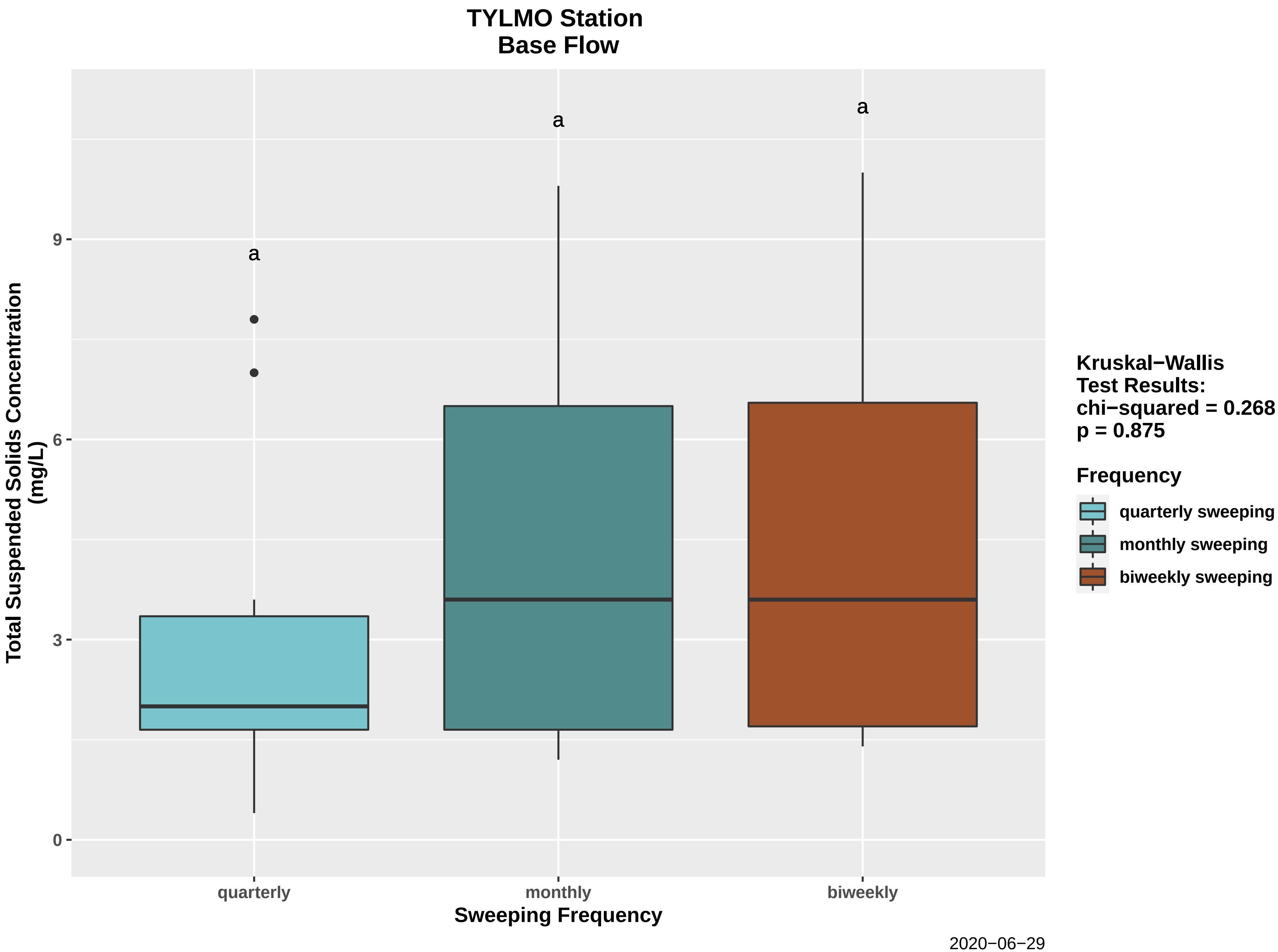

COUMO Station
Base Flow
Total Suspended Solids Concentration
(mg/L)
12.5
10.0
7.5
5.0
2.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.404
p = 0.496
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

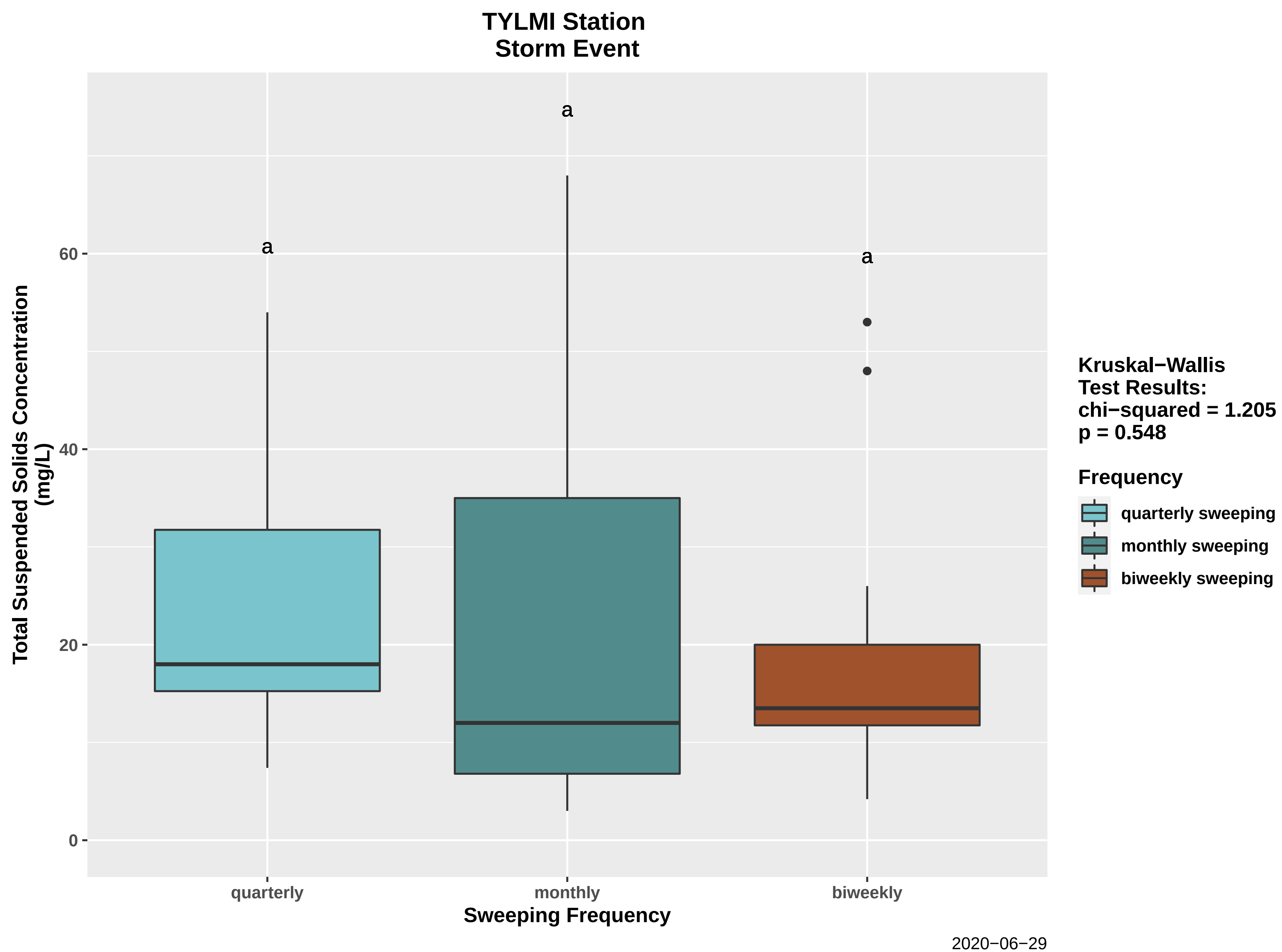

COUMI Station
Storm Event
a
a
a
3000
2000
1000
0
Total Suspended Solids Concentration
(mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.886
p = 0.236
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping



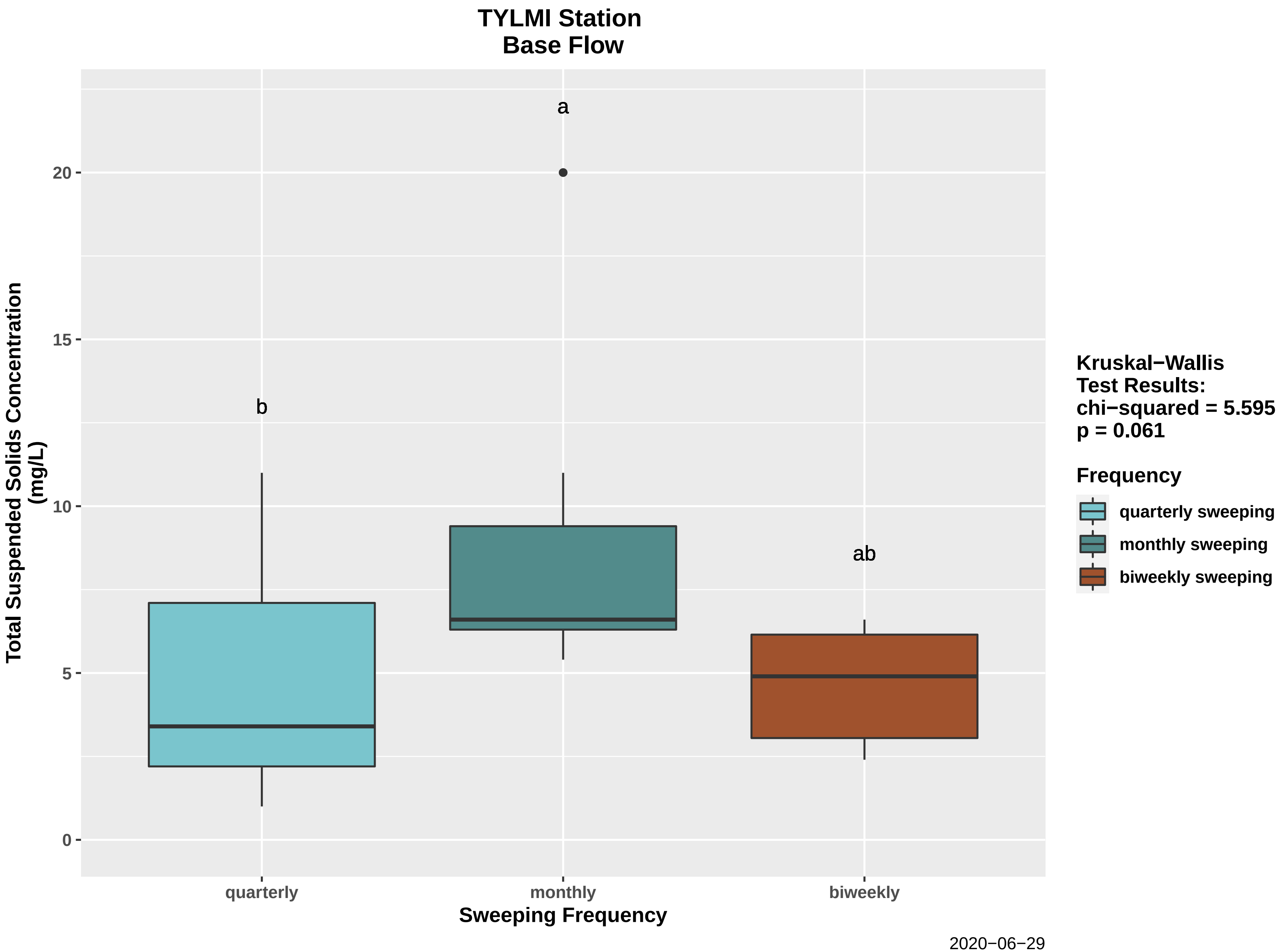
COUMI Station
Base Flow
a
a
a
200
150
100
50
0
Total Suspended Solids Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis Test Results:
chi−squared = 3.833
p = 0.147
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

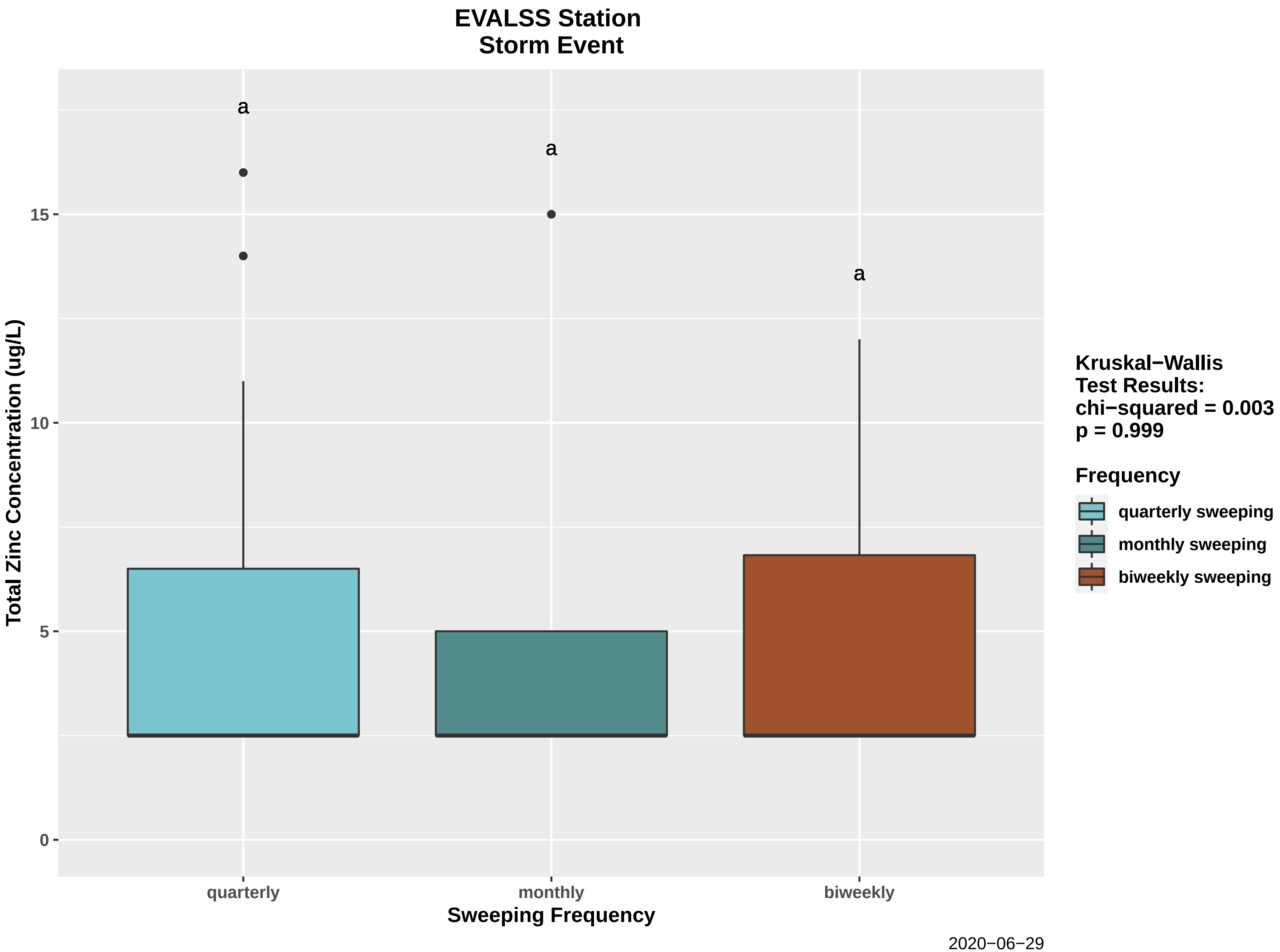

TYLMO Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
150
100
50
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.646
p = 0.724
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

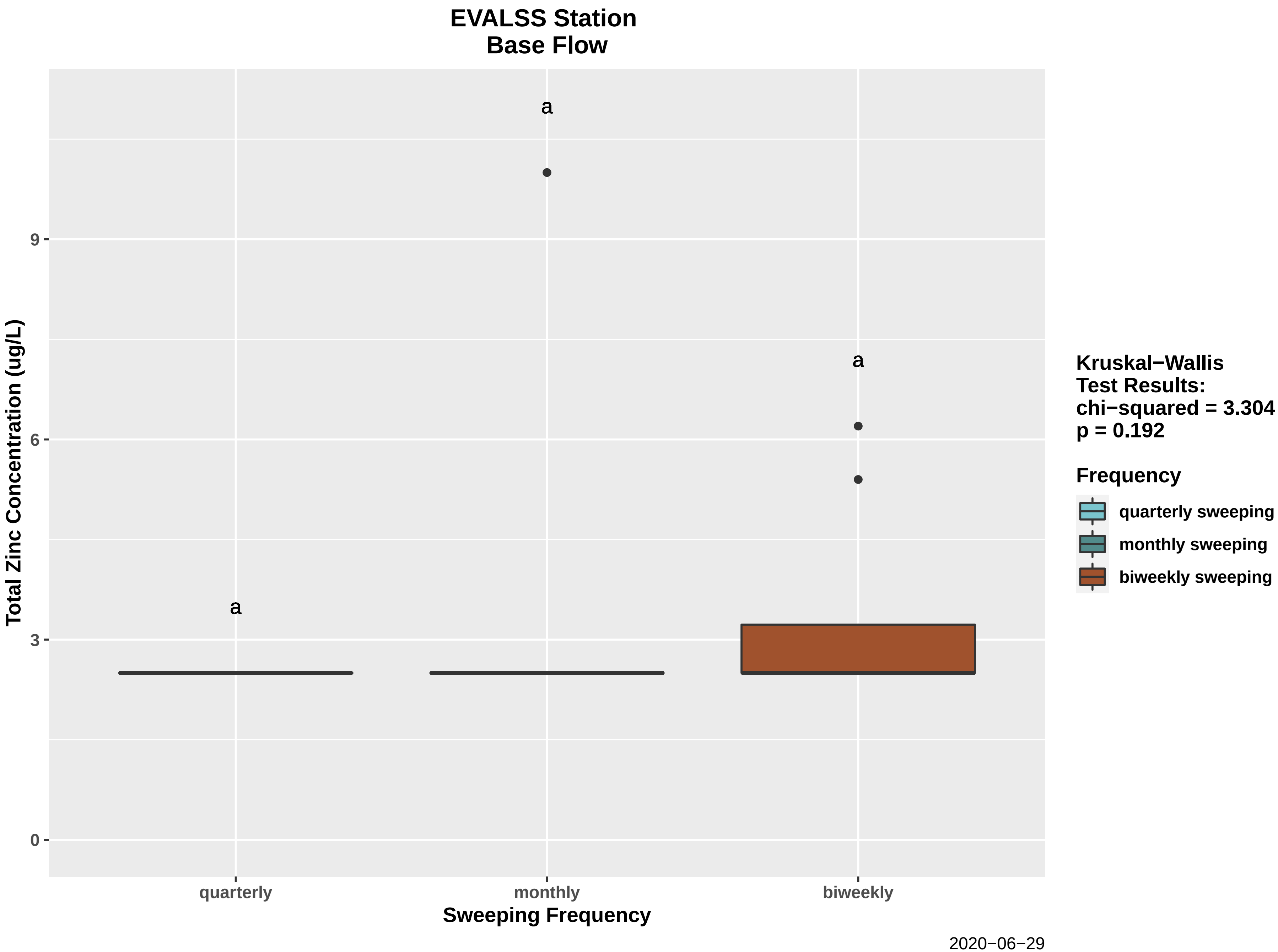

TYLMO Station
Base Flow
a
a
a
9
6
3
0
Total Suspended Solids Concentration
(mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.268
p = 0.875
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

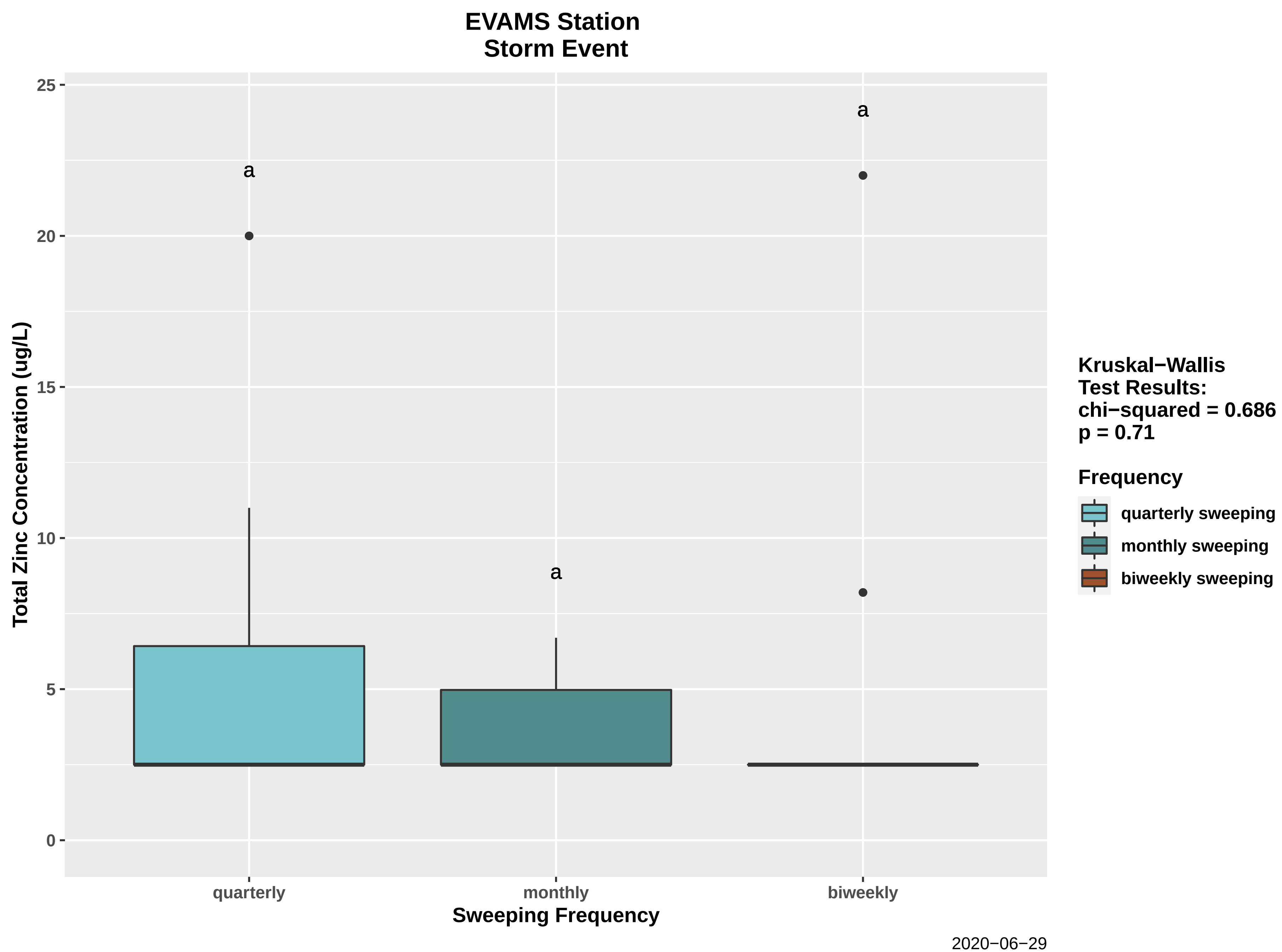


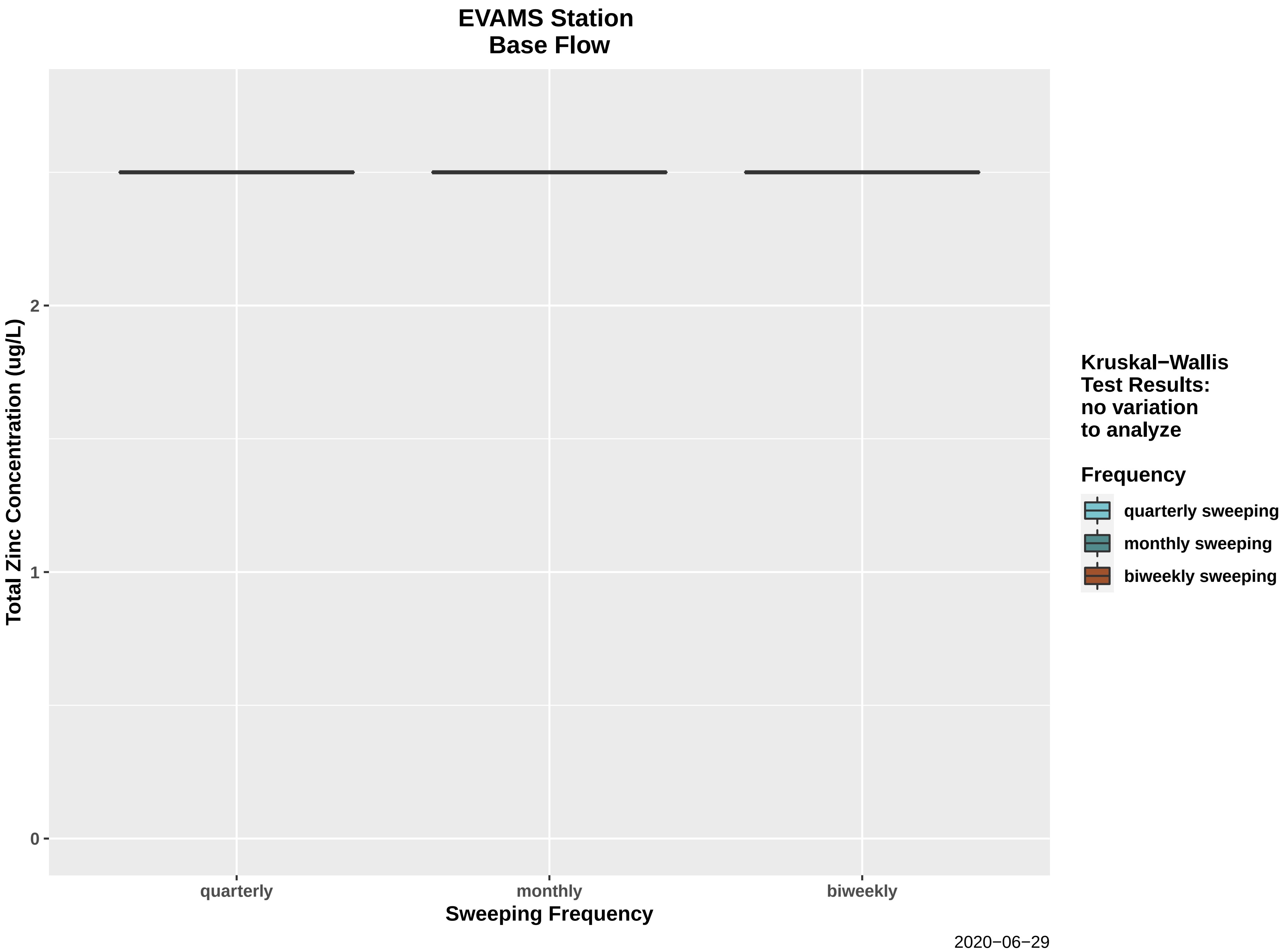
TYLMI Station
Storm Event
Total Suspended Solids Concentration
(mg/L)
0
20
40
60
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 1.205
p = 0.548
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

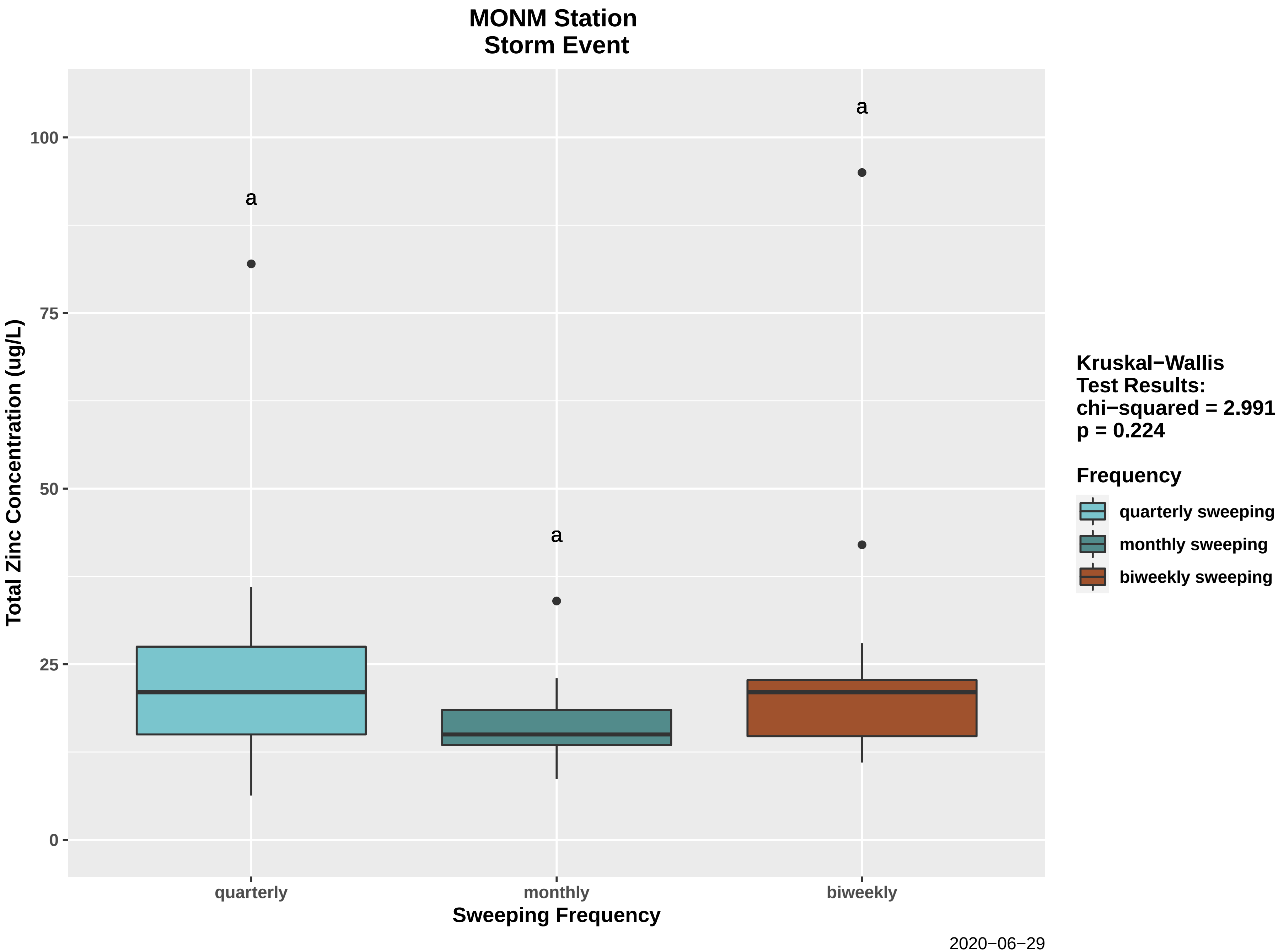

TYLMI Station
Base Flow
a
b
ab
20
15
10
5
0
Total Suspended Solids Concentration
(mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.595
p = 0.061
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


EVALSS Station
Storm Event
Total Zinc Concentration (ug/L)
0
5
10
15
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.003
p = 0.999
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

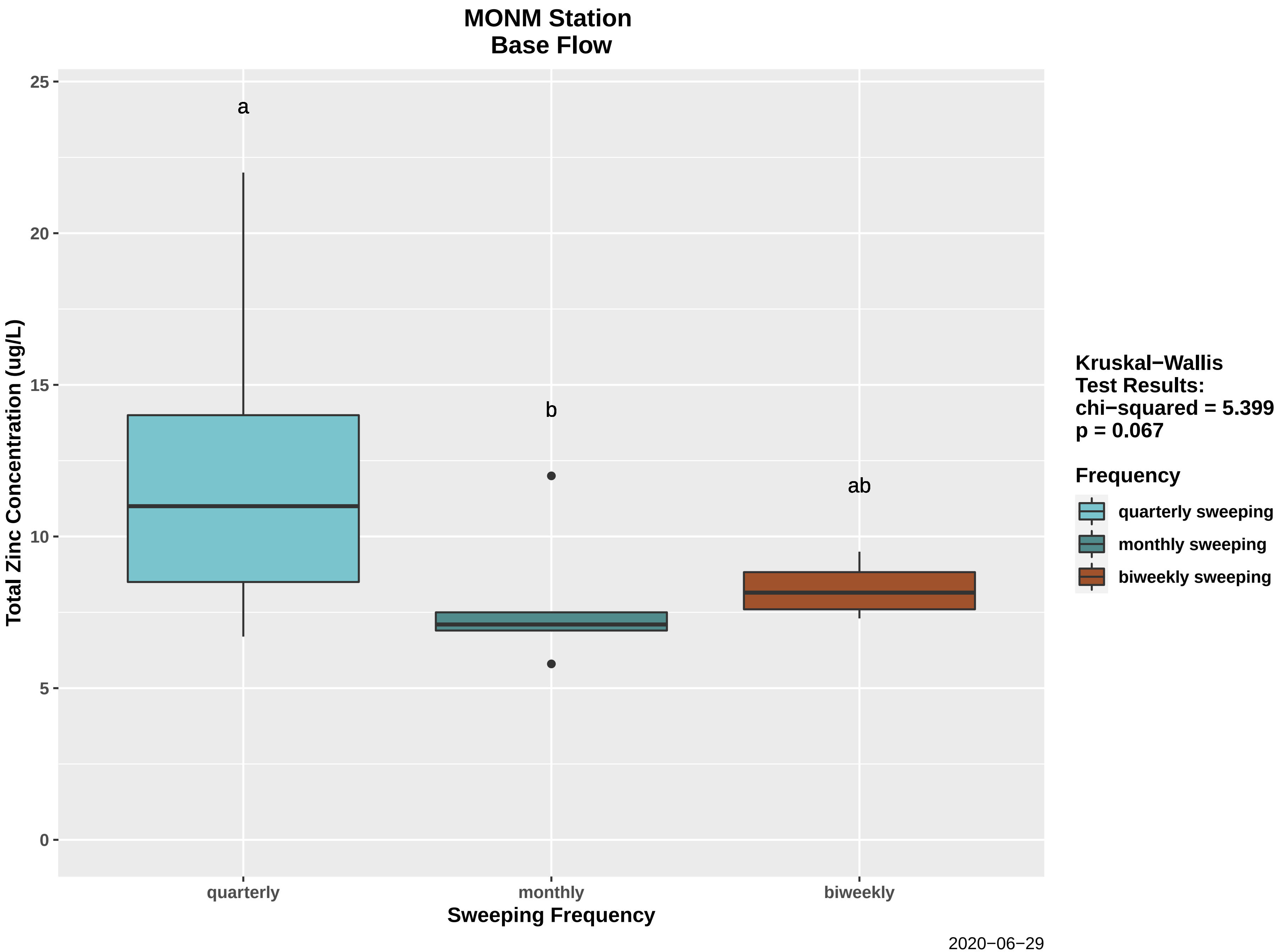

EVALSS Station
Base Flow
Total Zinc Concentration (ug/L)
0
3
6
9
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.304
p = 0.192
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

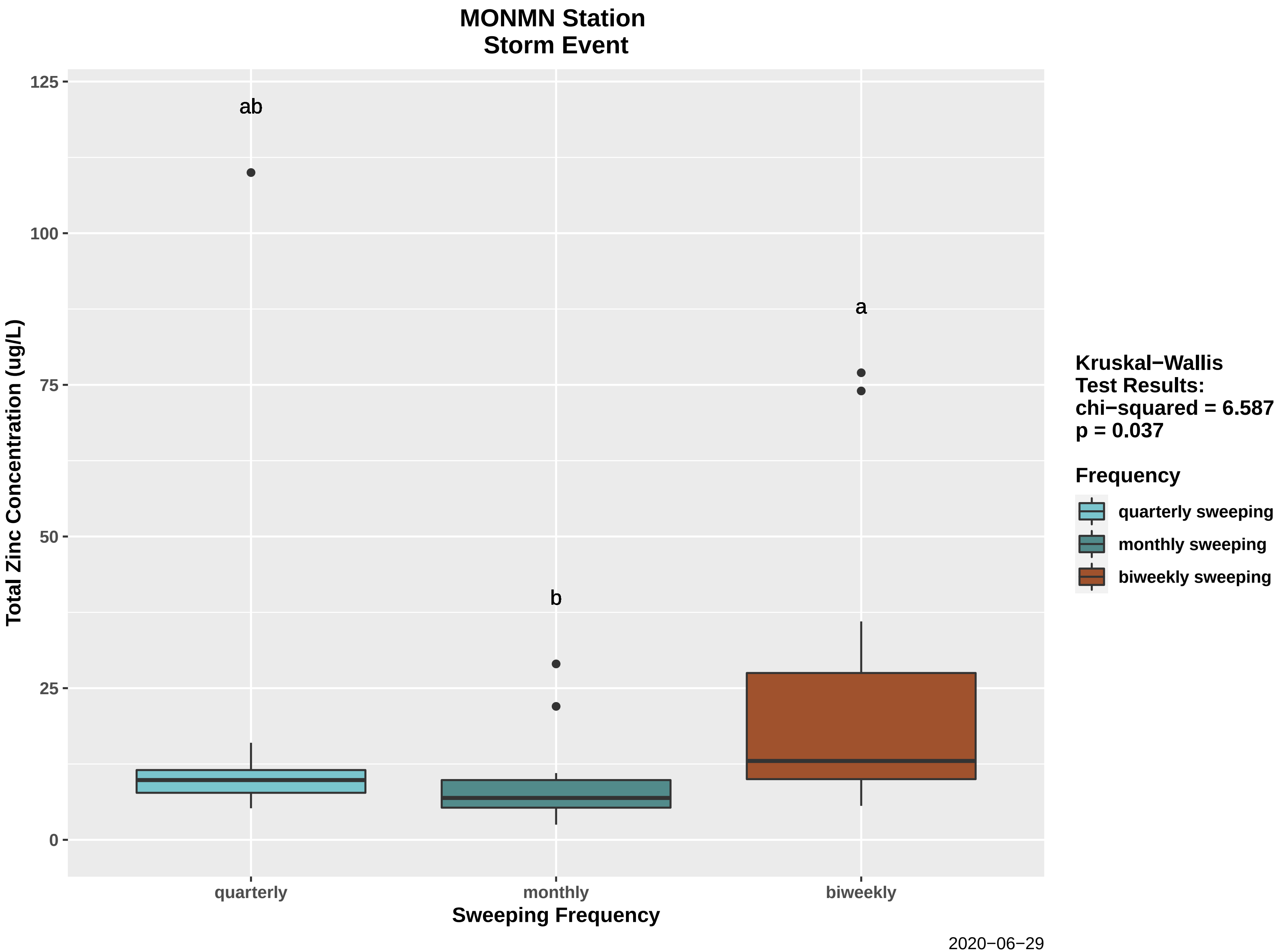

EVAMS Station
Storm Event
Total Zinc Concentration (ug/L)
25
20
15
10
5
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.686
p = 0.71
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

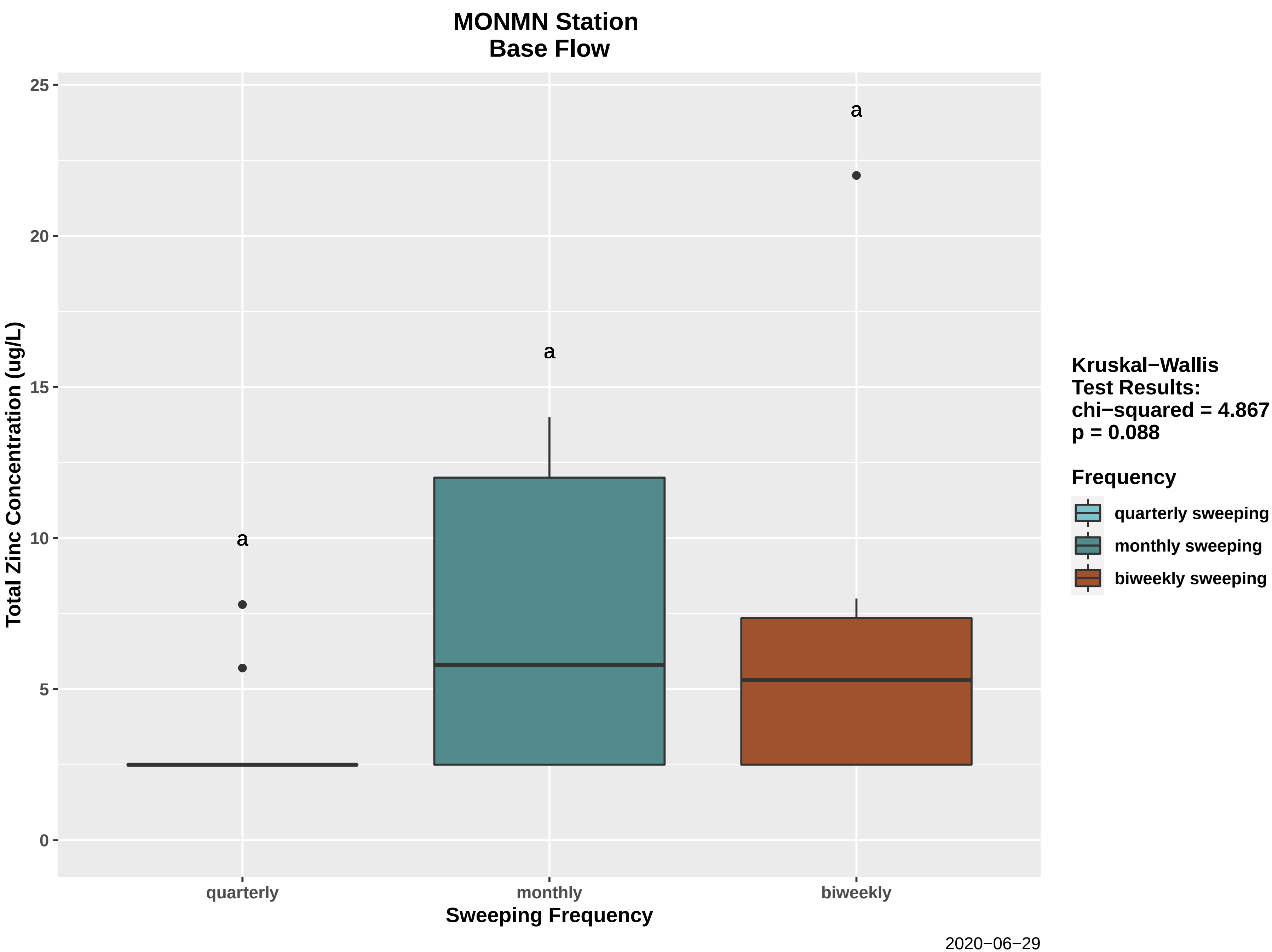

EVAMS Station
Base Flow
Total Zinc Concentration (ug/L)
0
1
2
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
no variation
to analyze
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

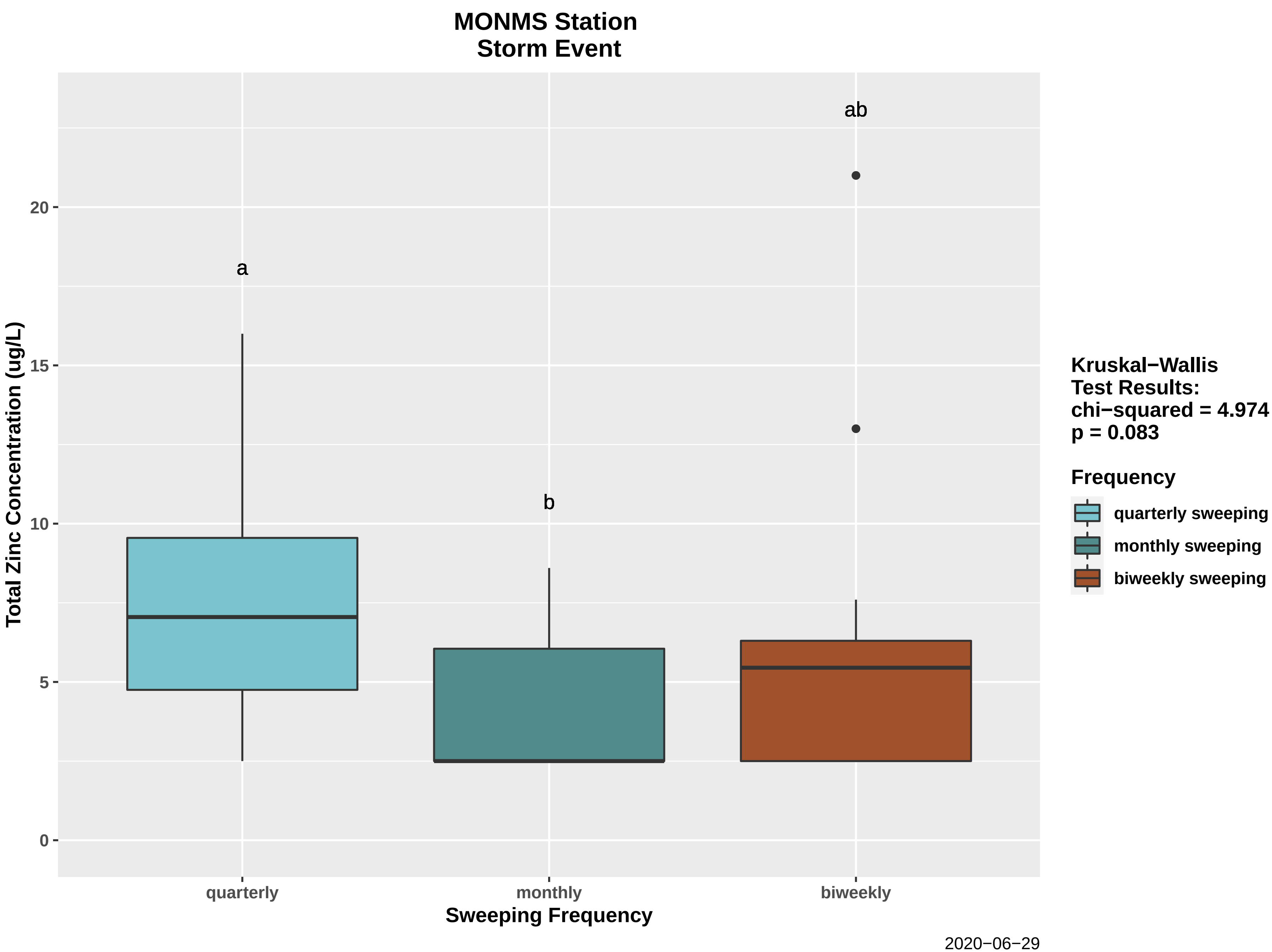


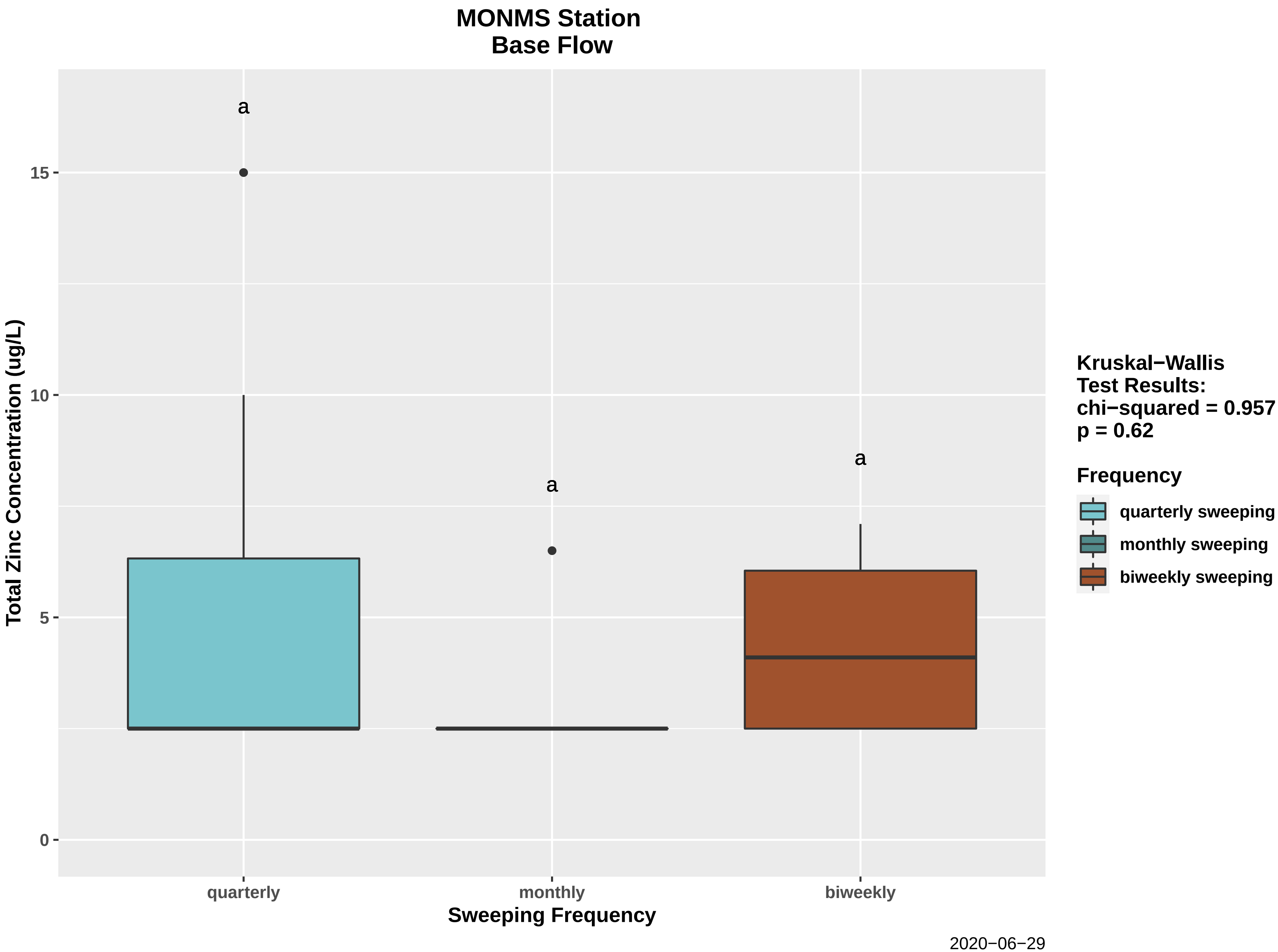
MONM Station
Storm Event
Total Zinc Concentration (ug/L)
100
75
50
25
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.991
p = 0.224
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

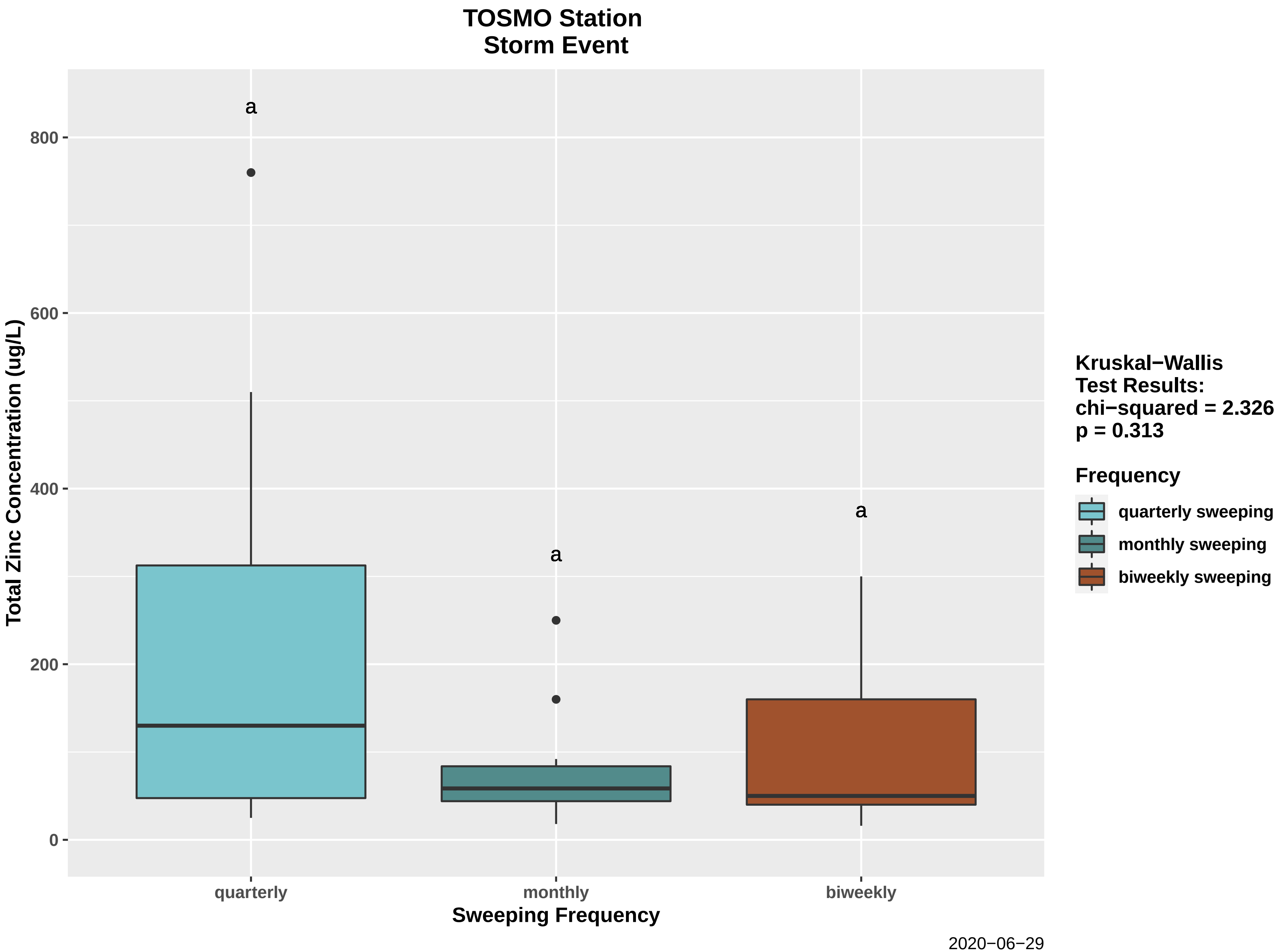

MONM Station
Base Flow
Total Zinc Concentration (ug/L)
25
20
15
10
5
0
a
b
ab
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.399
p = 0.067
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


MONMN Station
Storm Event
Total Zinc Concentration (ug/L)
125
100
75
50
25
0
ab
a
b
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 6.587
p = 0.037
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

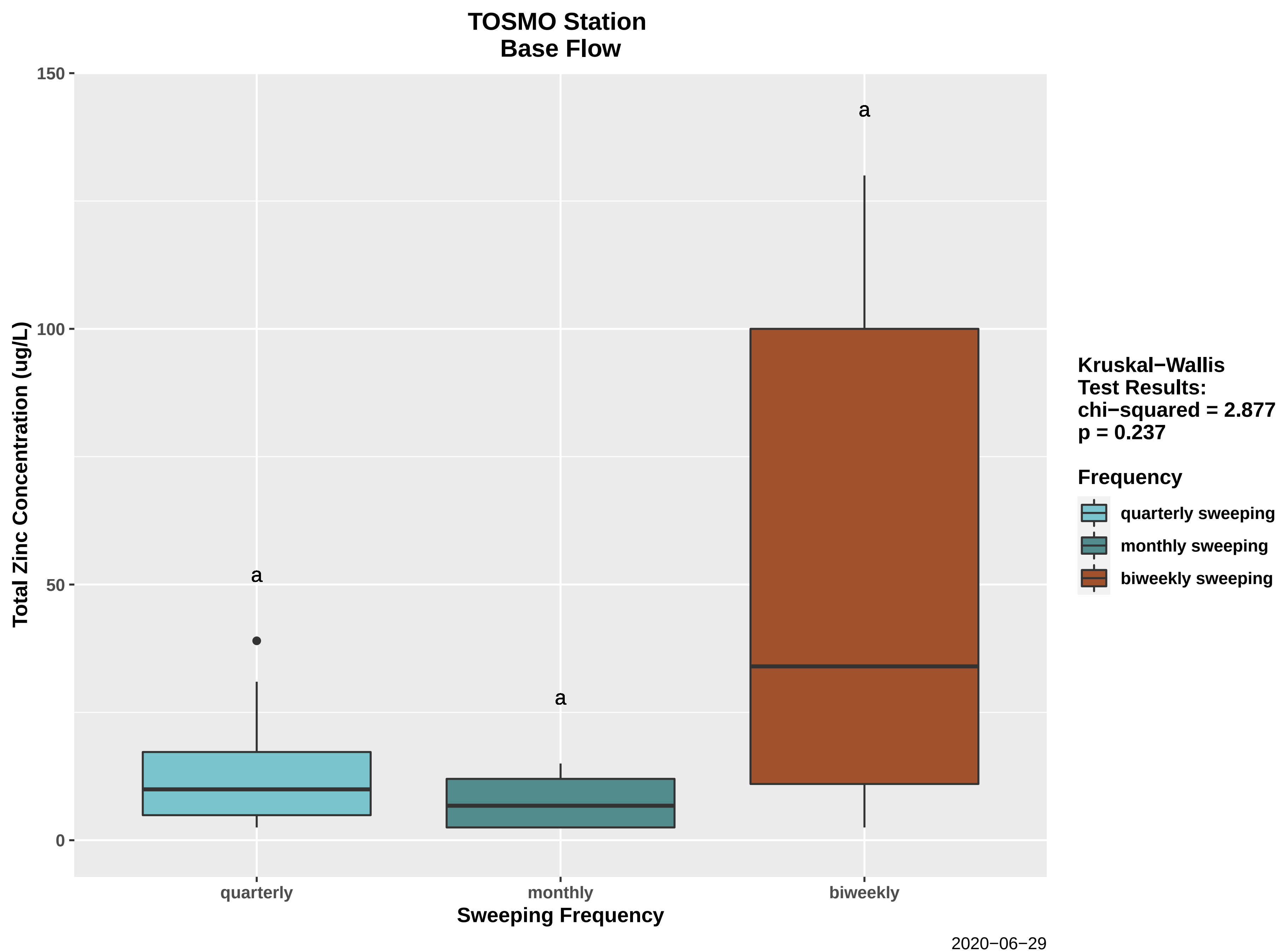

MONMN Station
Base Flow
Total Zinc Concentration (ug/L)
25
20
15
10
5
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.867
p = 0.088
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

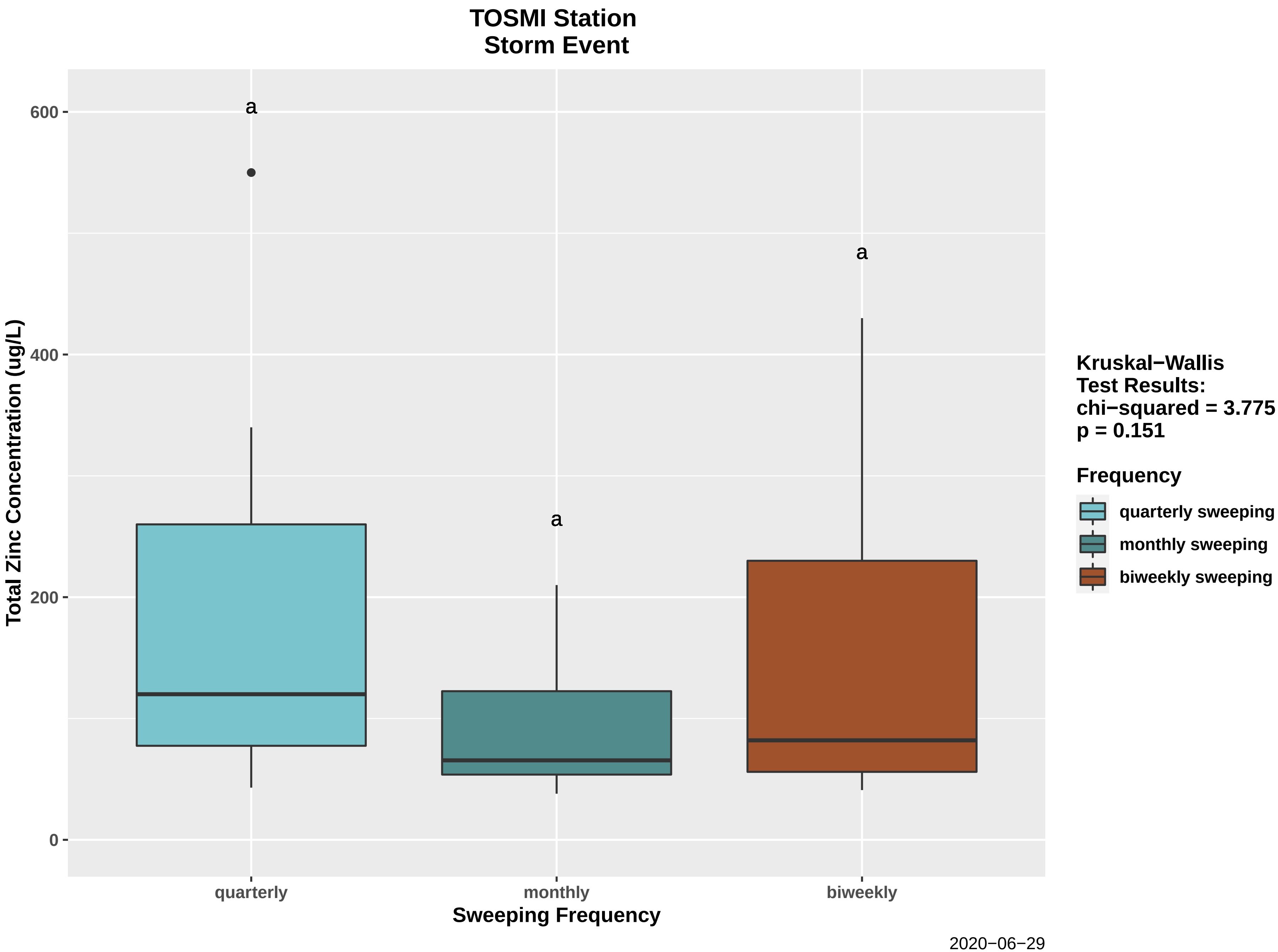

MONMS Station
Storm Event
Total Zinc Concentration (ug/L)
0
5
10
15
20
a
b
ab
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.974
p = 0.083
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

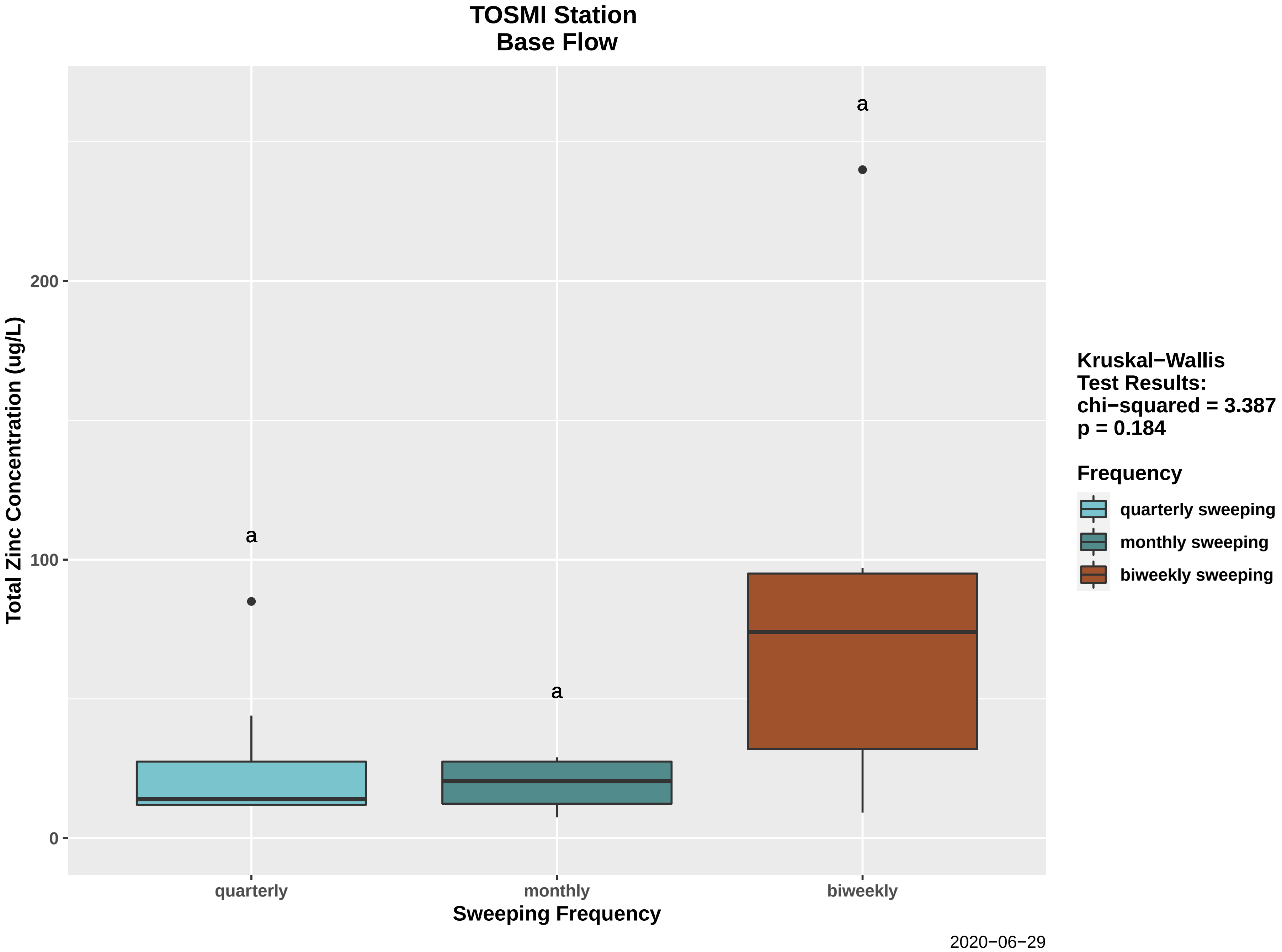

MONMS Station
Base Flow
Total Zinc Concentration (ug/L)
15
10
5
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 0.957
p = 0.62
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29



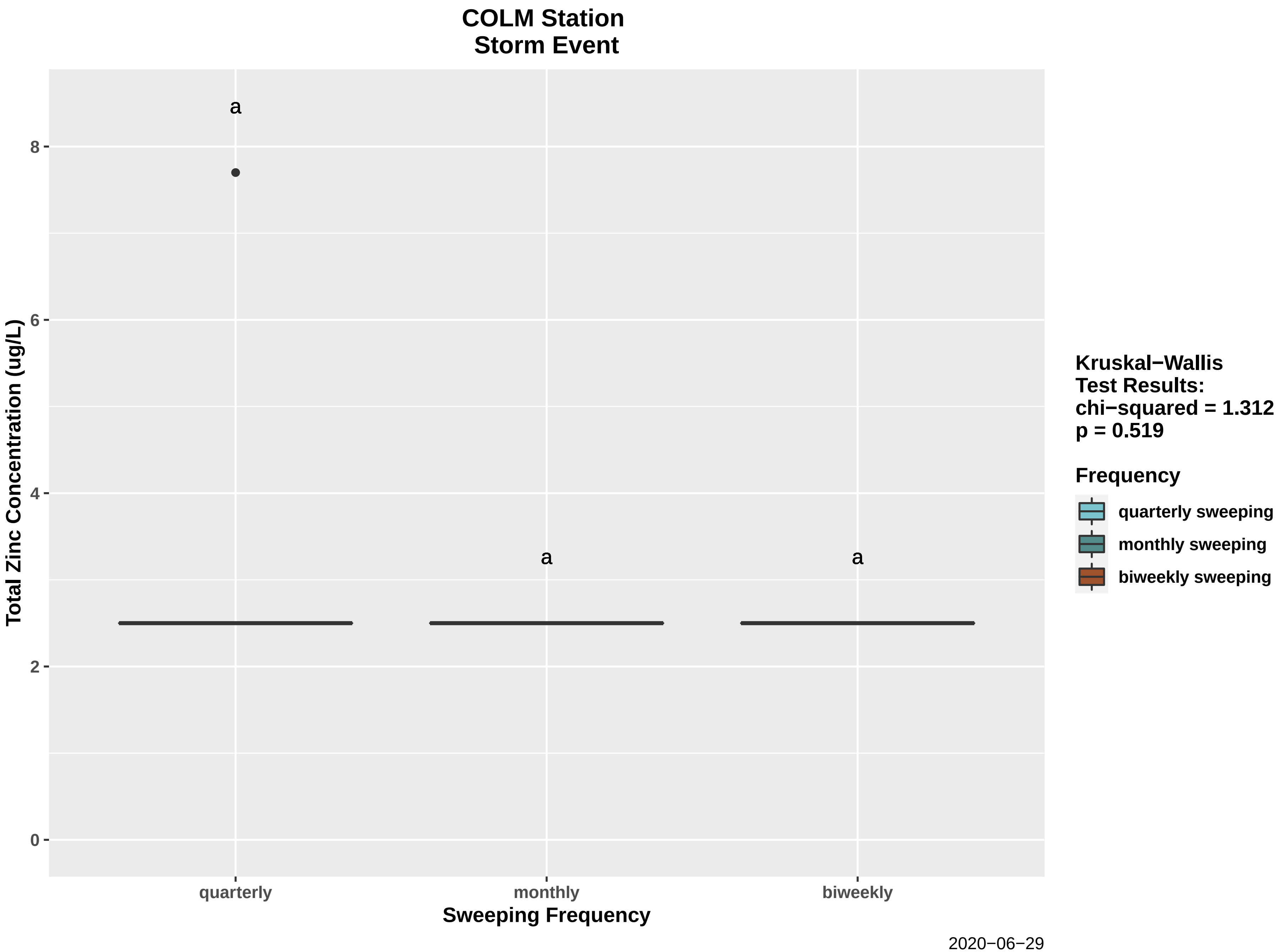
TOSMO Station
Storm Event
Total Zinc Concentration (ug/L)
800
600
400
200
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.326
p = 0.313
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

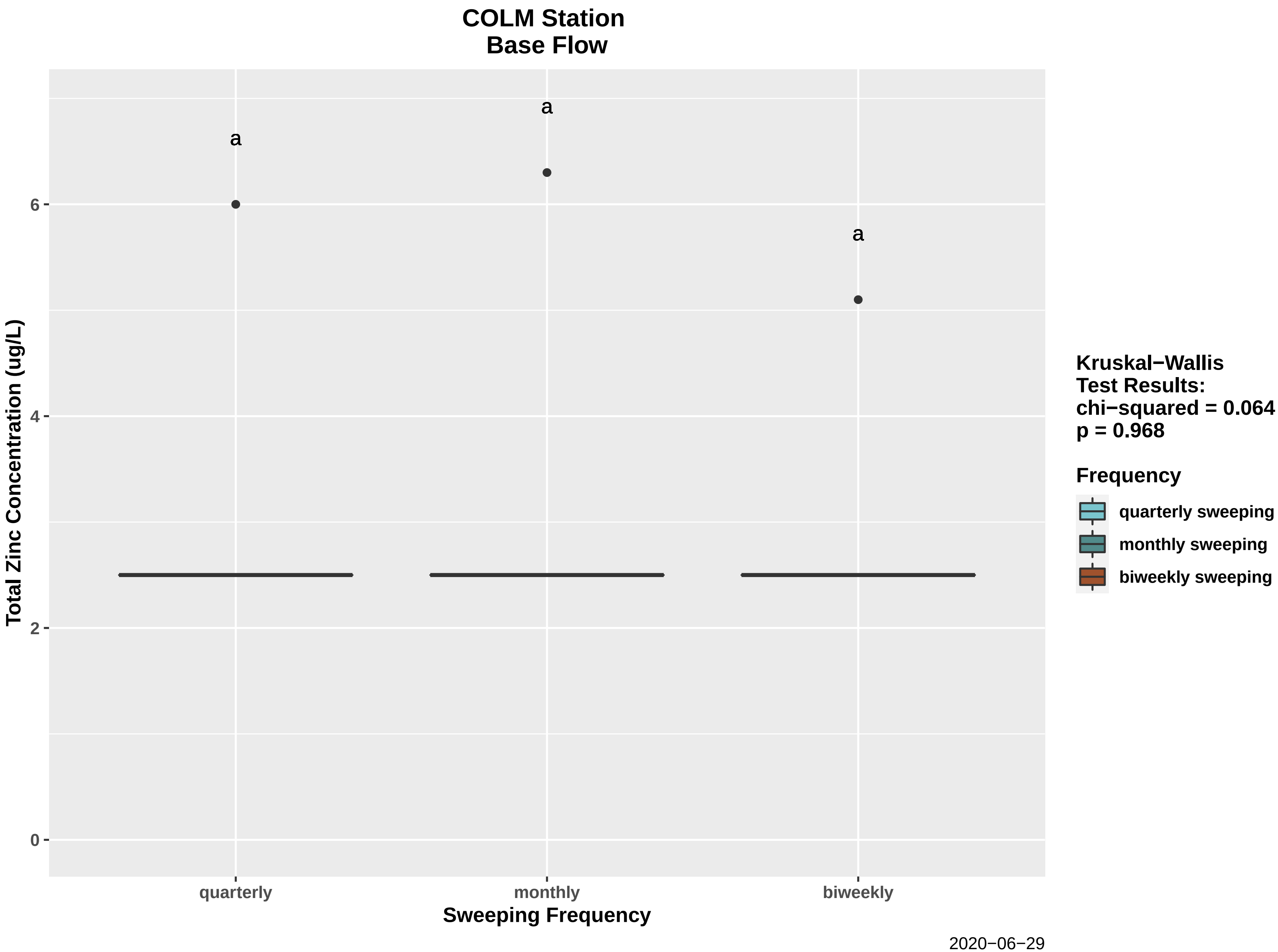

TOSMO Station
Base Flow
150
100
50
0
Total Zinc Concentration (ug/L)
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.877
p = 0.237
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

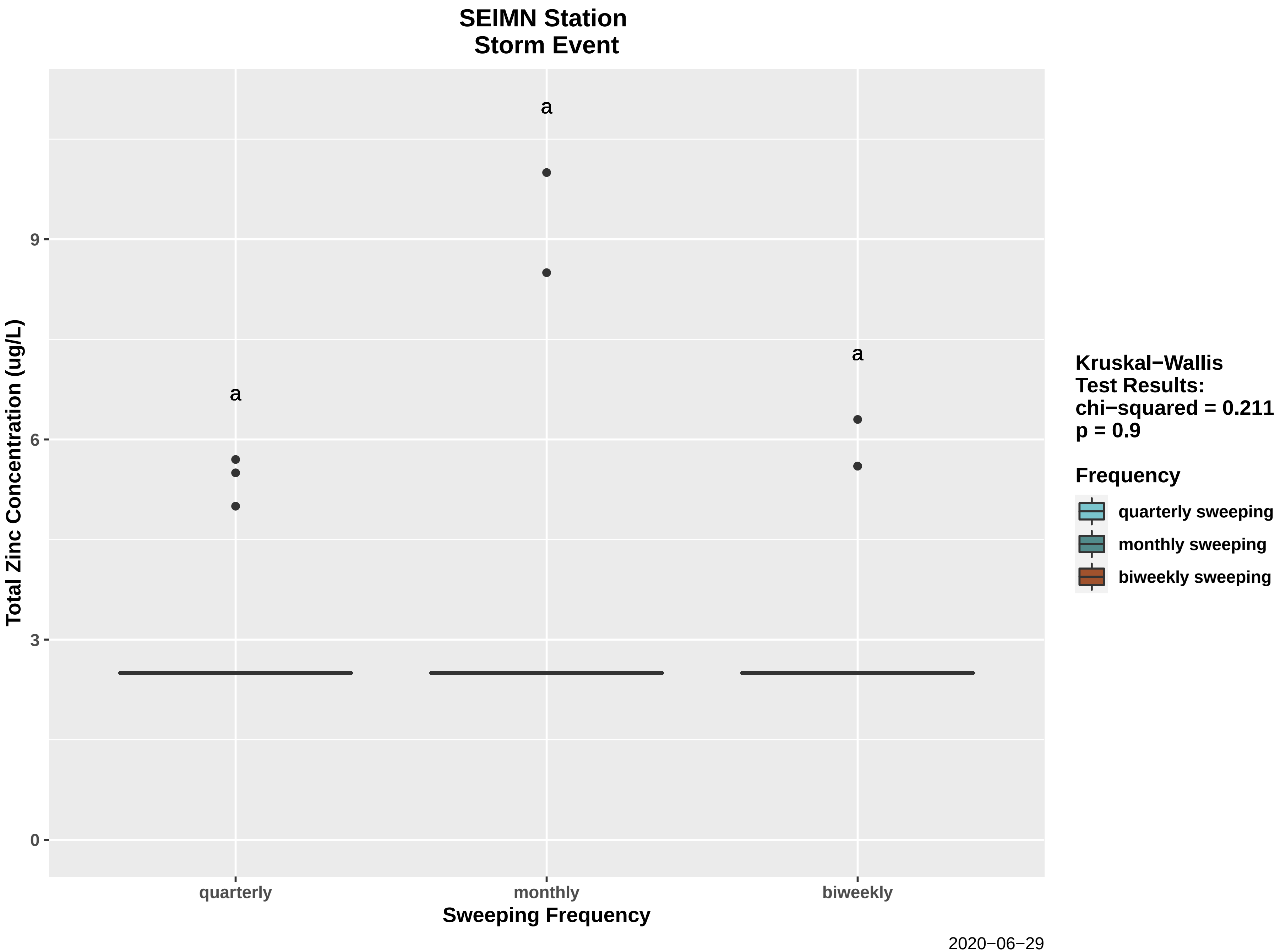

TOSMI Station
Storm Event
a
a
a
600
400
200
0
Total Zinc Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.775
p = 0.151
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

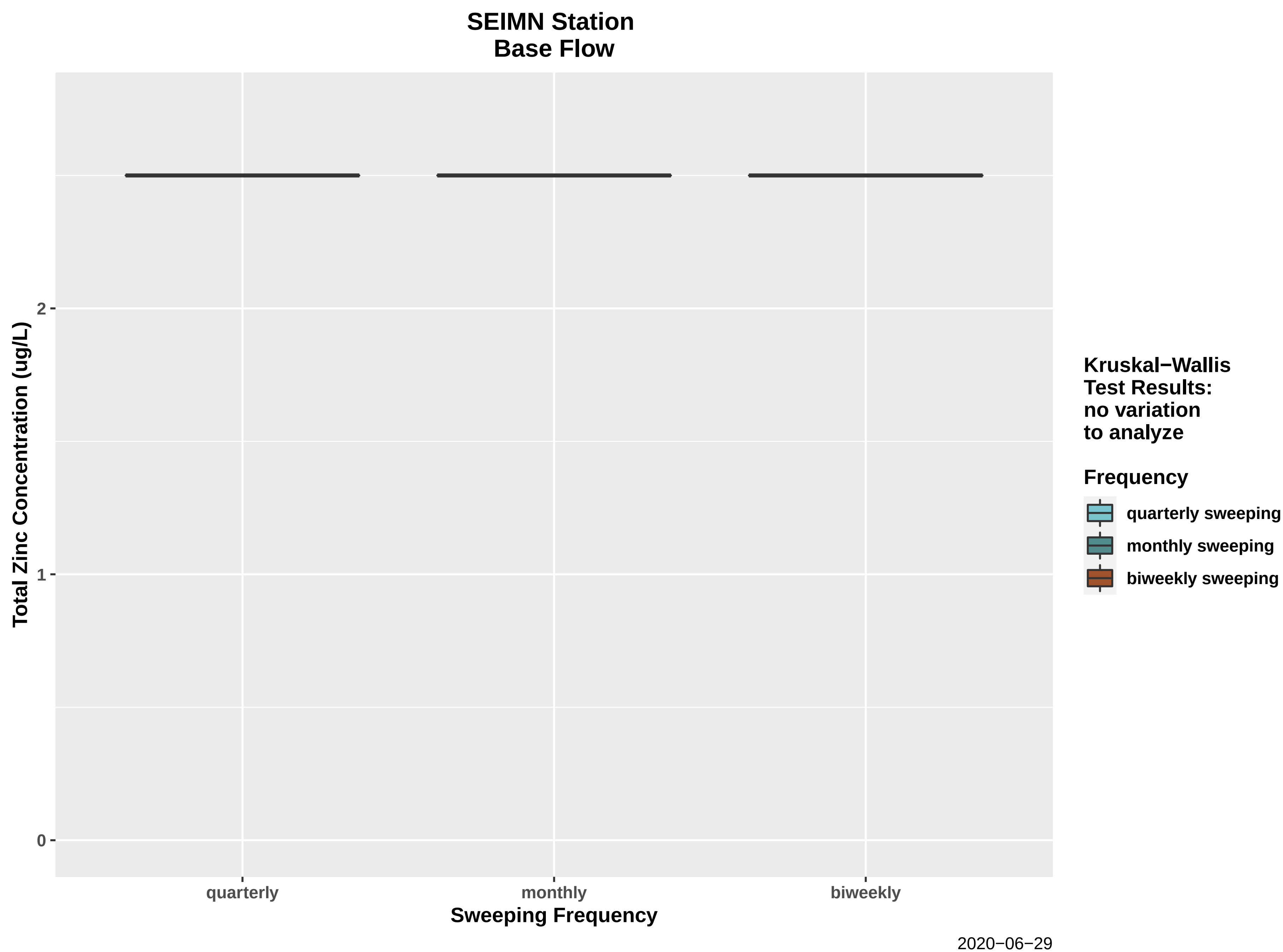


TOSMI Station
Base Flow
Total Zinc Concentration (ug/L)
200
100
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 3.387
p = 0.184
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

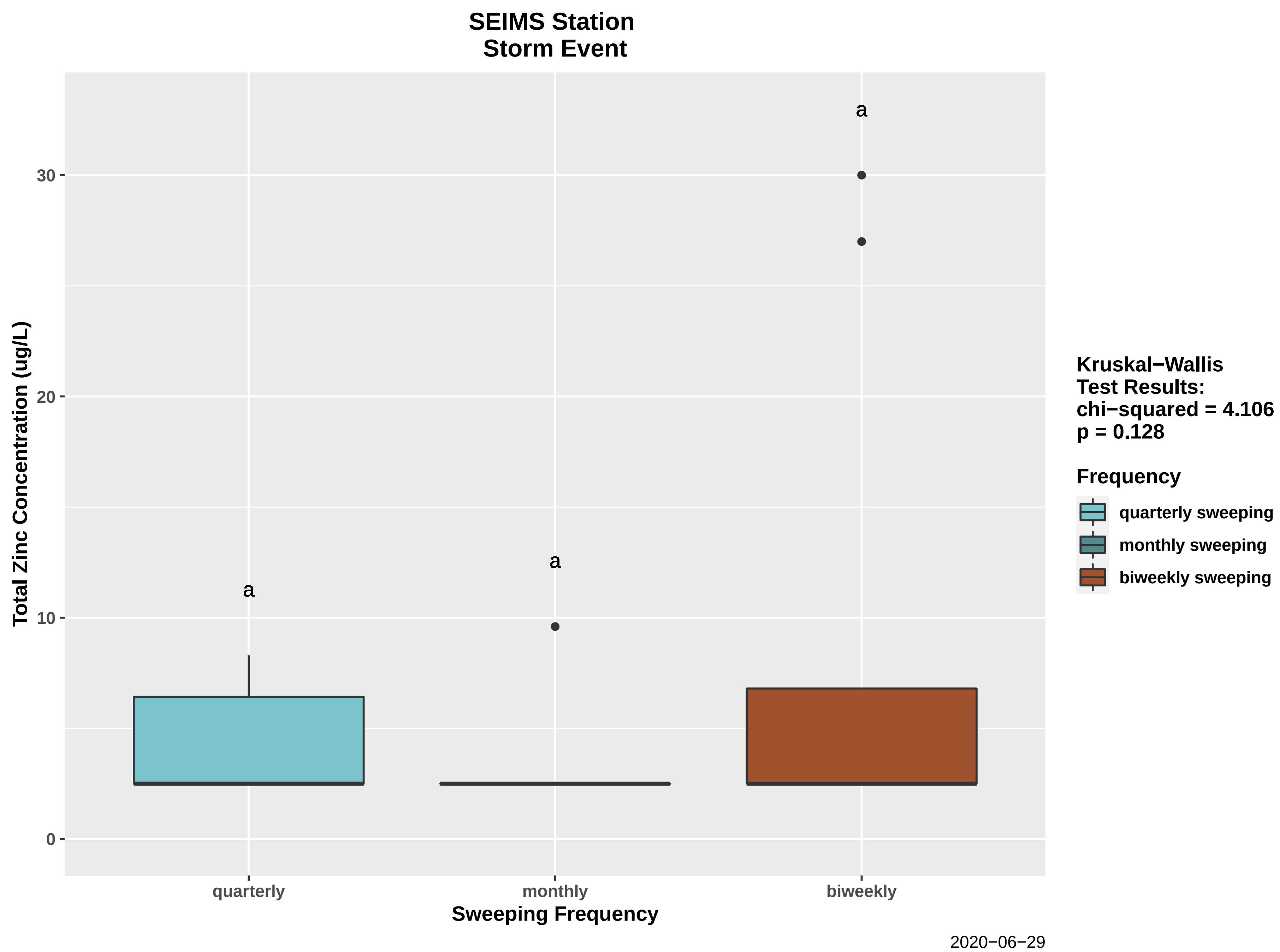

COLM Station
Storm Event
a
a
a
8
6
4
2
0
Total Zinc Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 1.312
p = 0.519
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

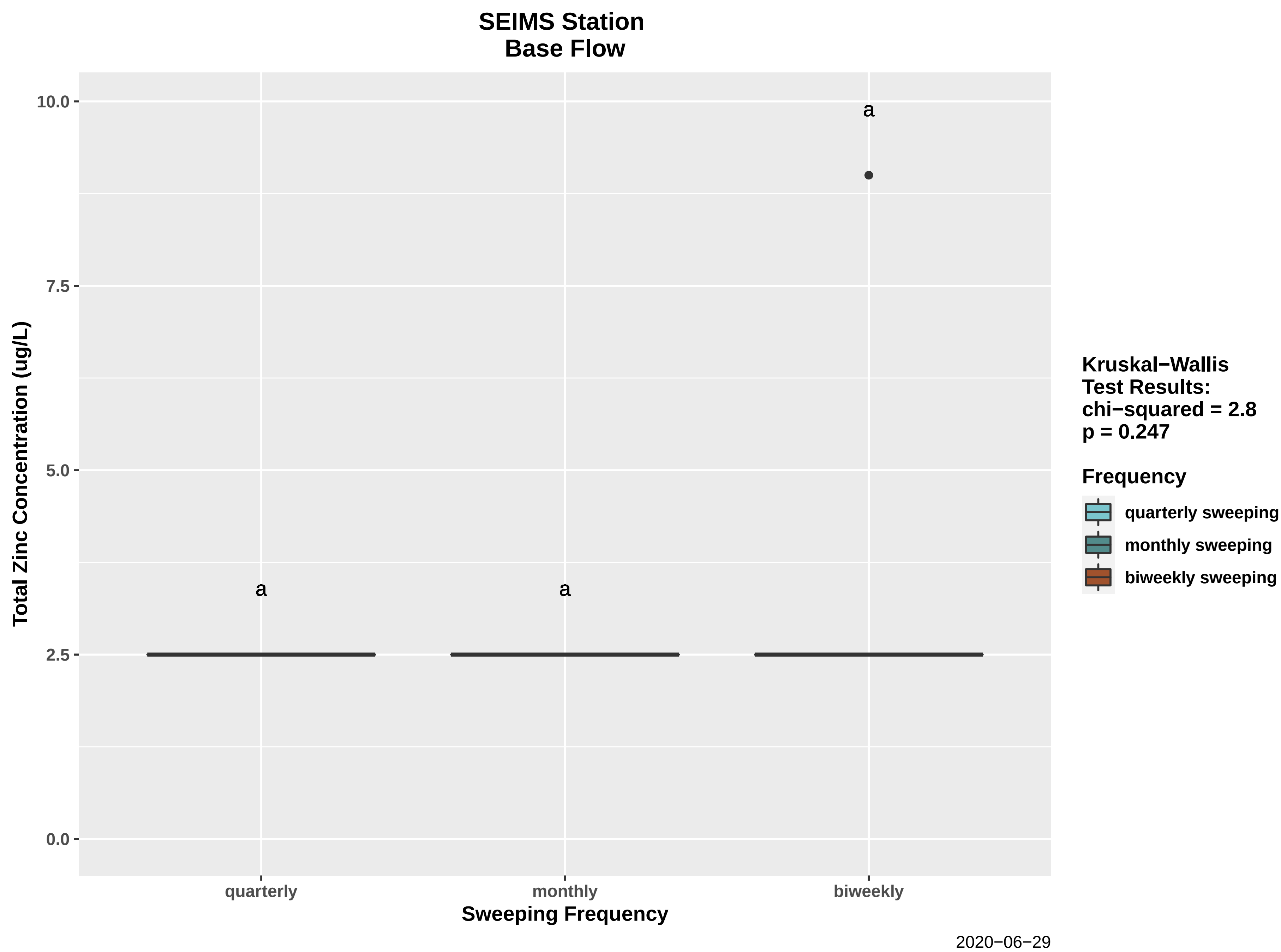

COLM Station
Base Flow
a
a
a
6
4
2
0
Total Zinc Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.064
p = 0.968
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


SEIMN Station
Storm Event
a
a
a
9
6
3
0
Total Zinc Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.211
p = 0.9
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

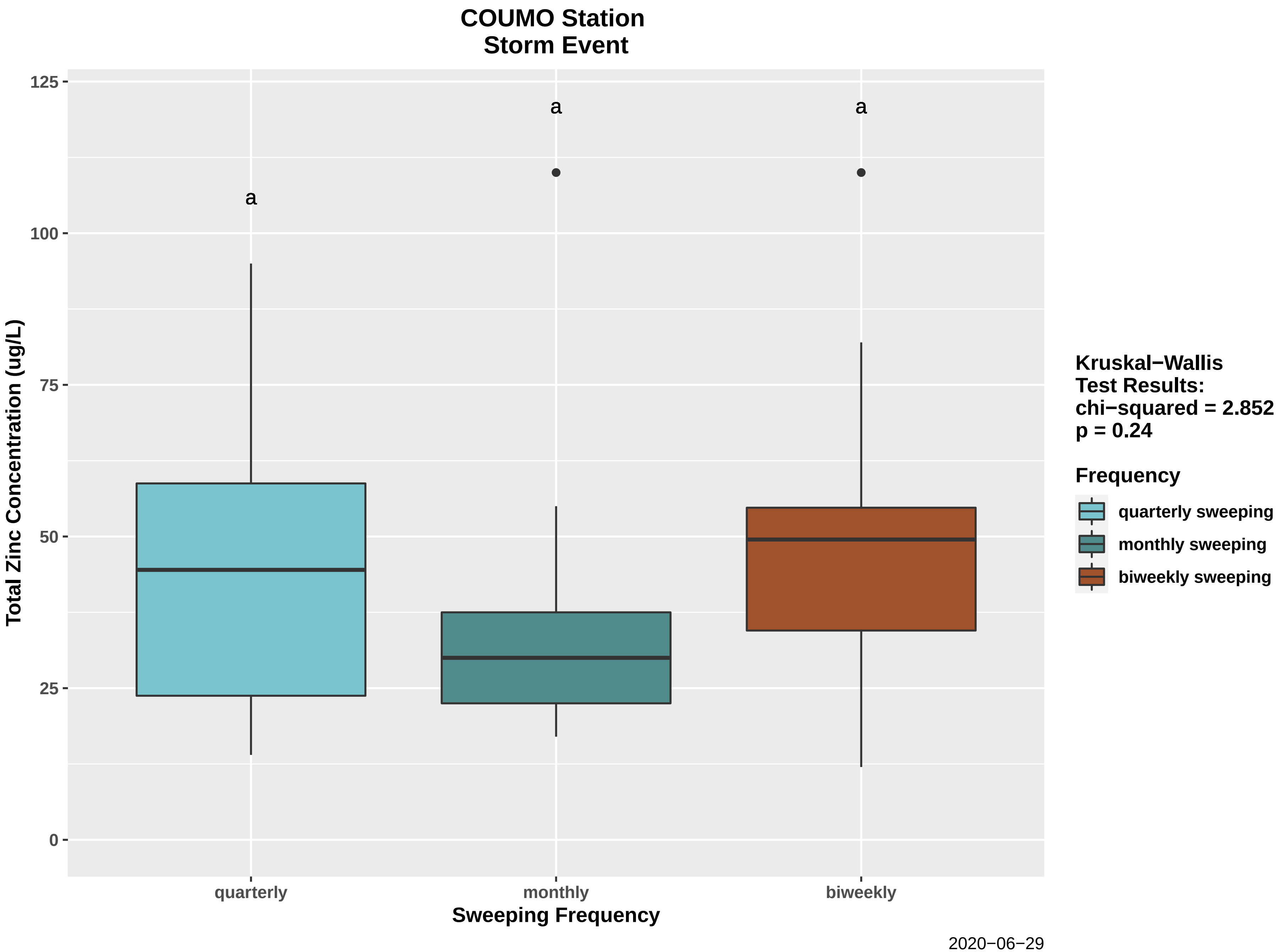


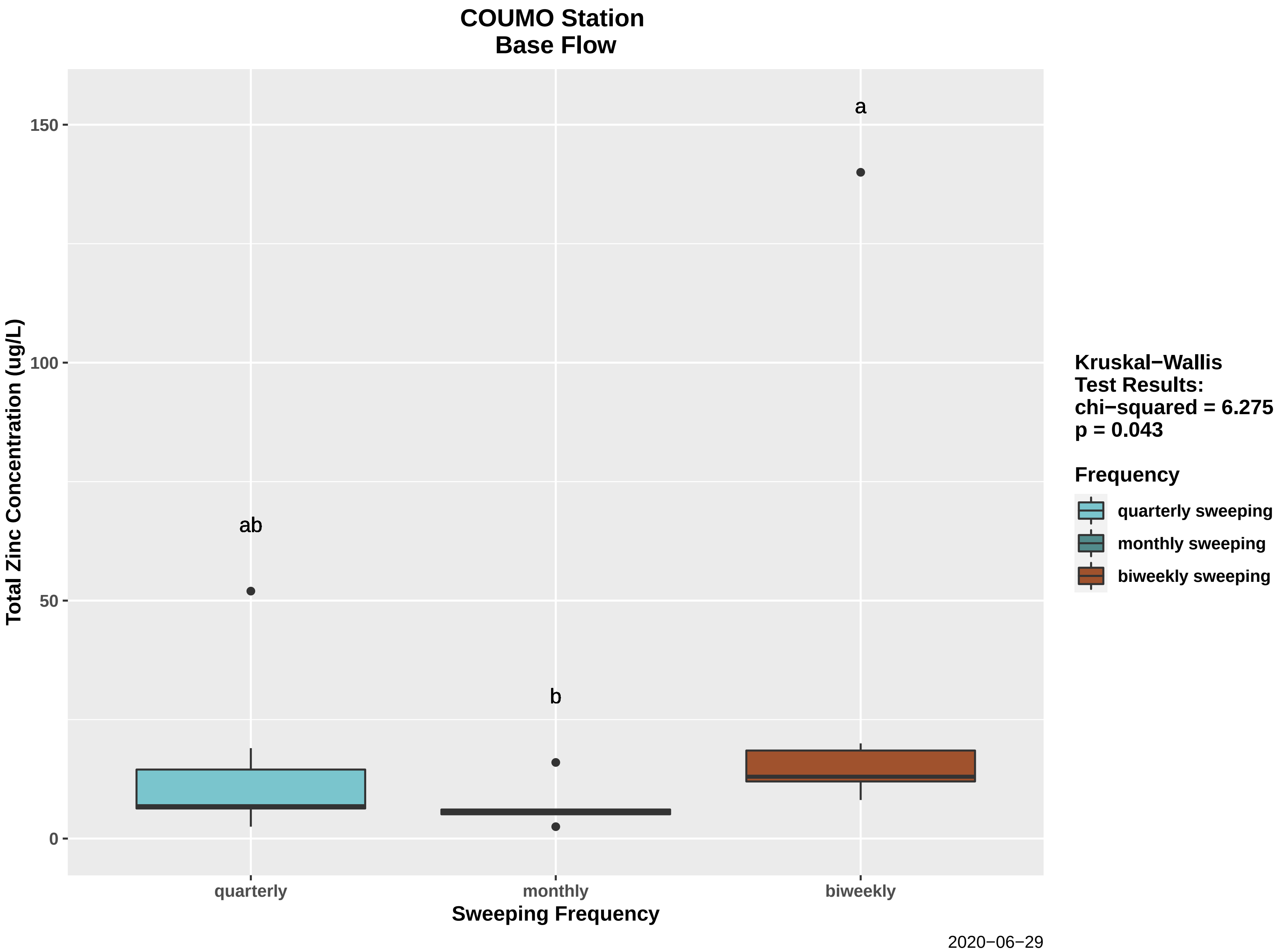
SEIMN Station
Base Flow
Total Zinc Concentration (ug/L)
0
1
2
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
no variation
to analyze
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

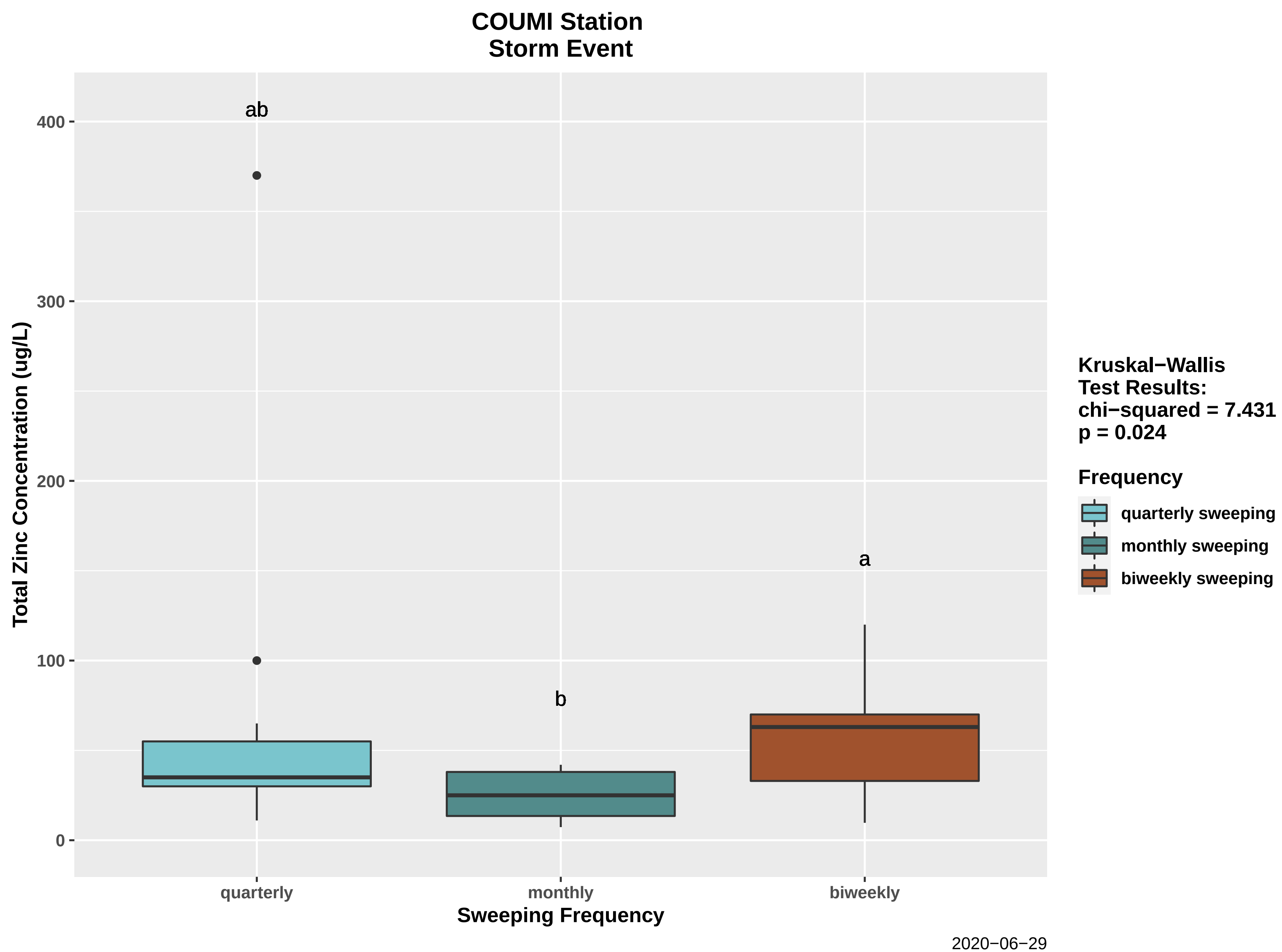

SEIMS Station
Storm Event
Total Zinc Concentration (ug/L)
30
20
10
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.106
p = 0.128
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

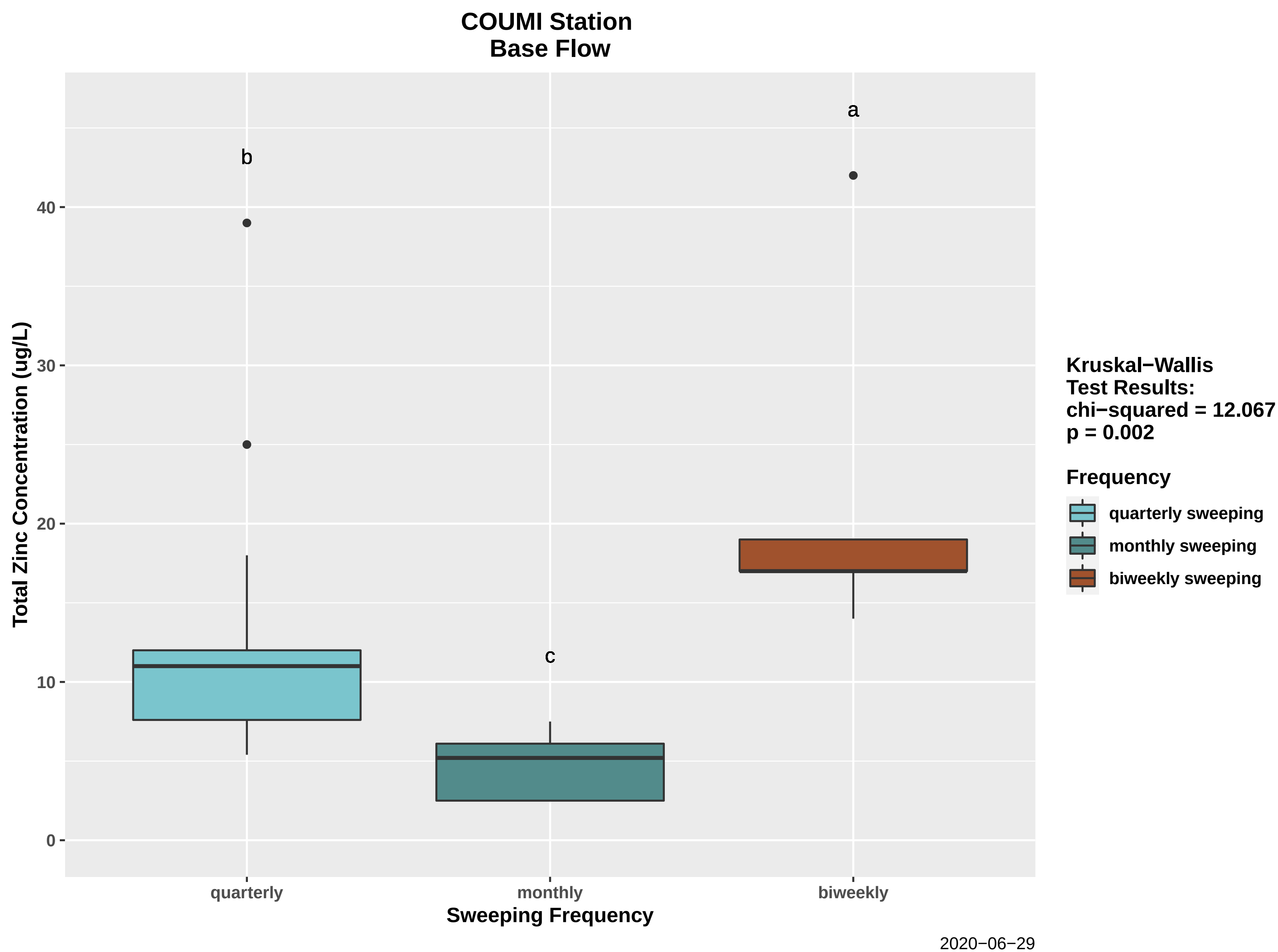


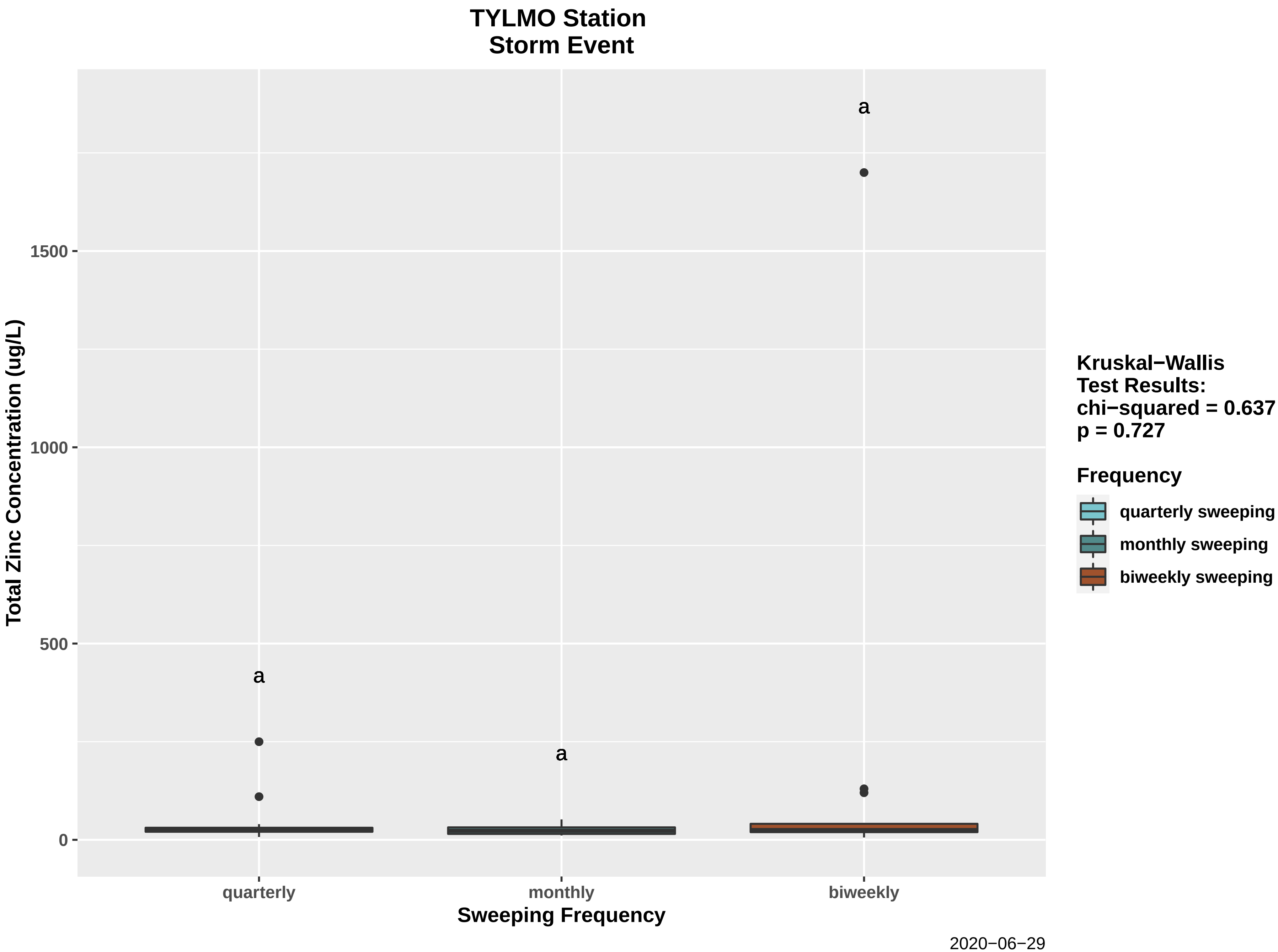
SEIMS Station
Base Flow
Total Zinc Concentration (ug/L)
10.0
7.5
5.0
2.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 2.8
p = 0.247
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

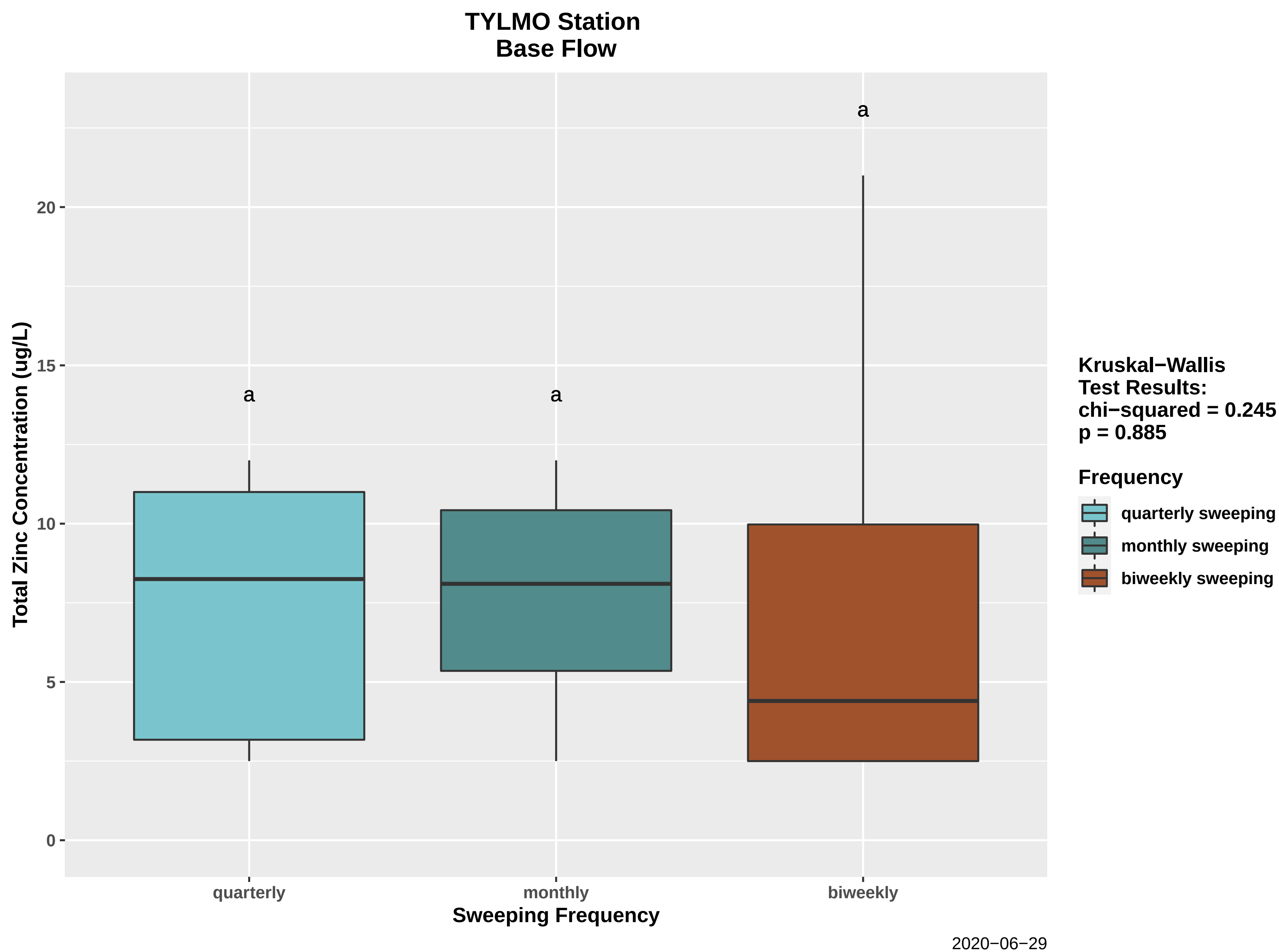

COUMO Station
Storm Event
Total Zinc Concentration (ug/L)
125
100
75
50
25
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.852
p = 0.24
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

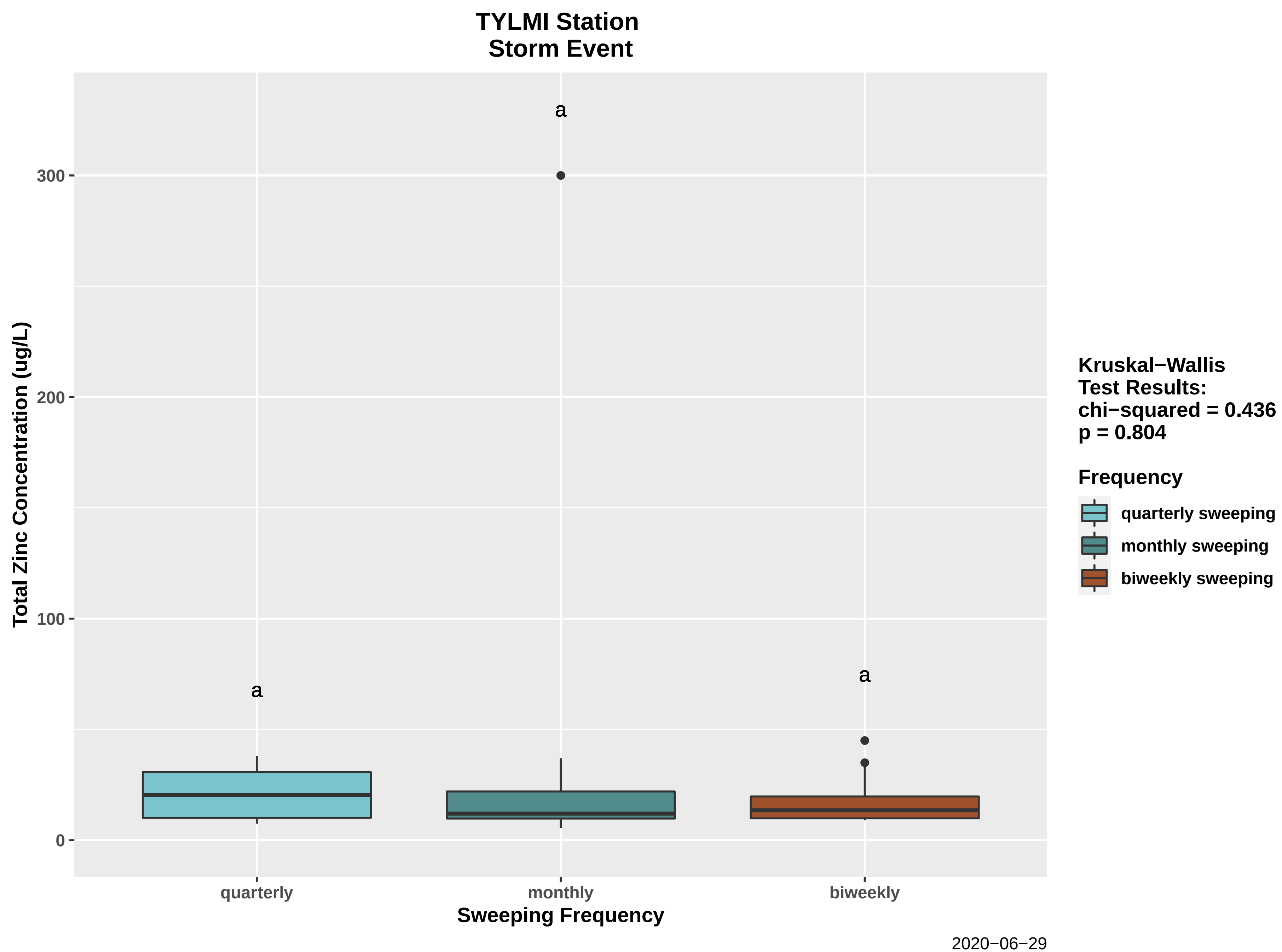

COUMO Station
Base Flow
Total Zinc Concentration (ug/L)
150
100
50
0
a
ab
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 6.275
p = 0.043
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

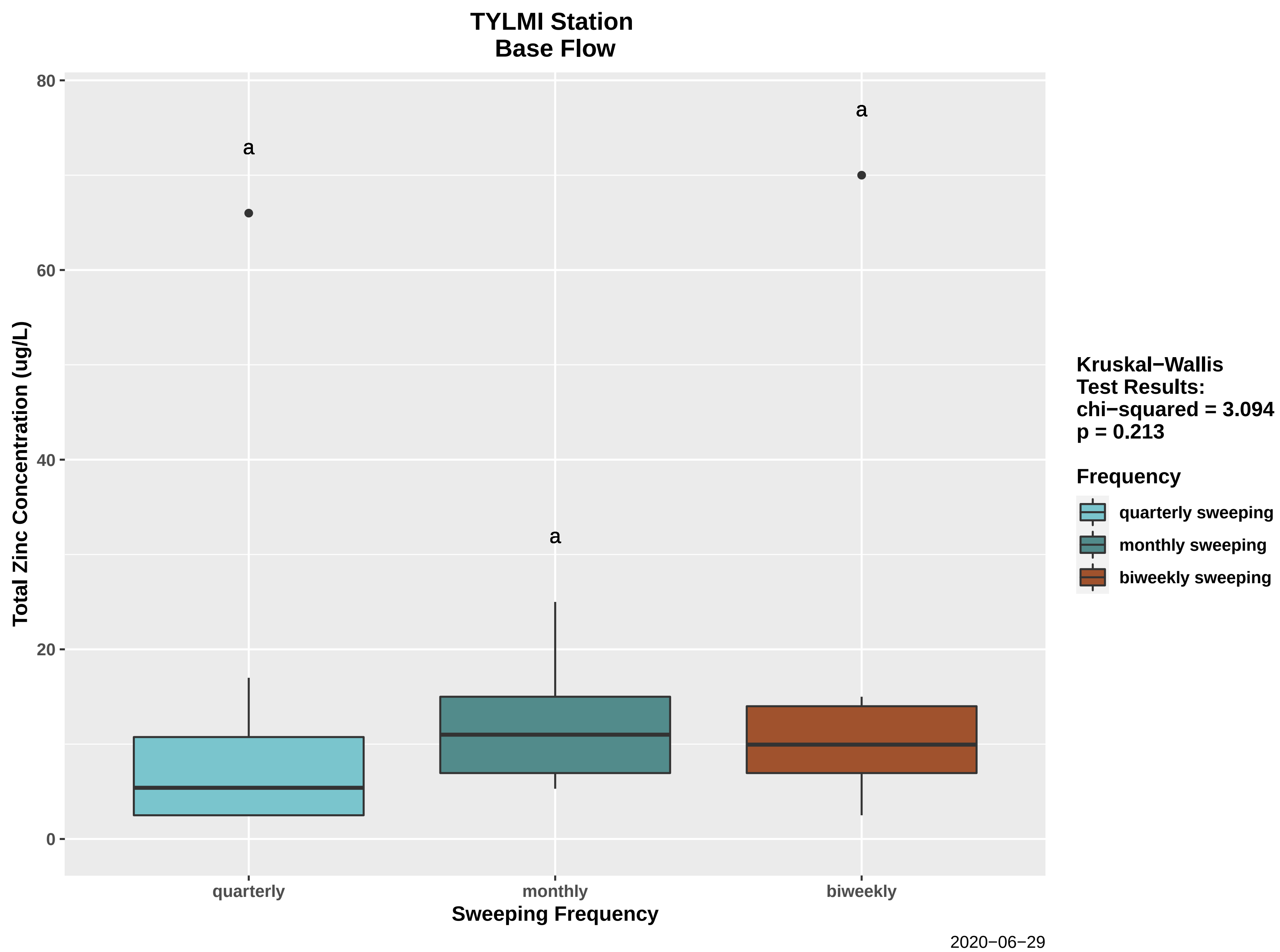

COUMI Station
Storm Event
ab
b
a
400
300
200
100
0
Total Zinc Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 7.431
p = 0.024
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

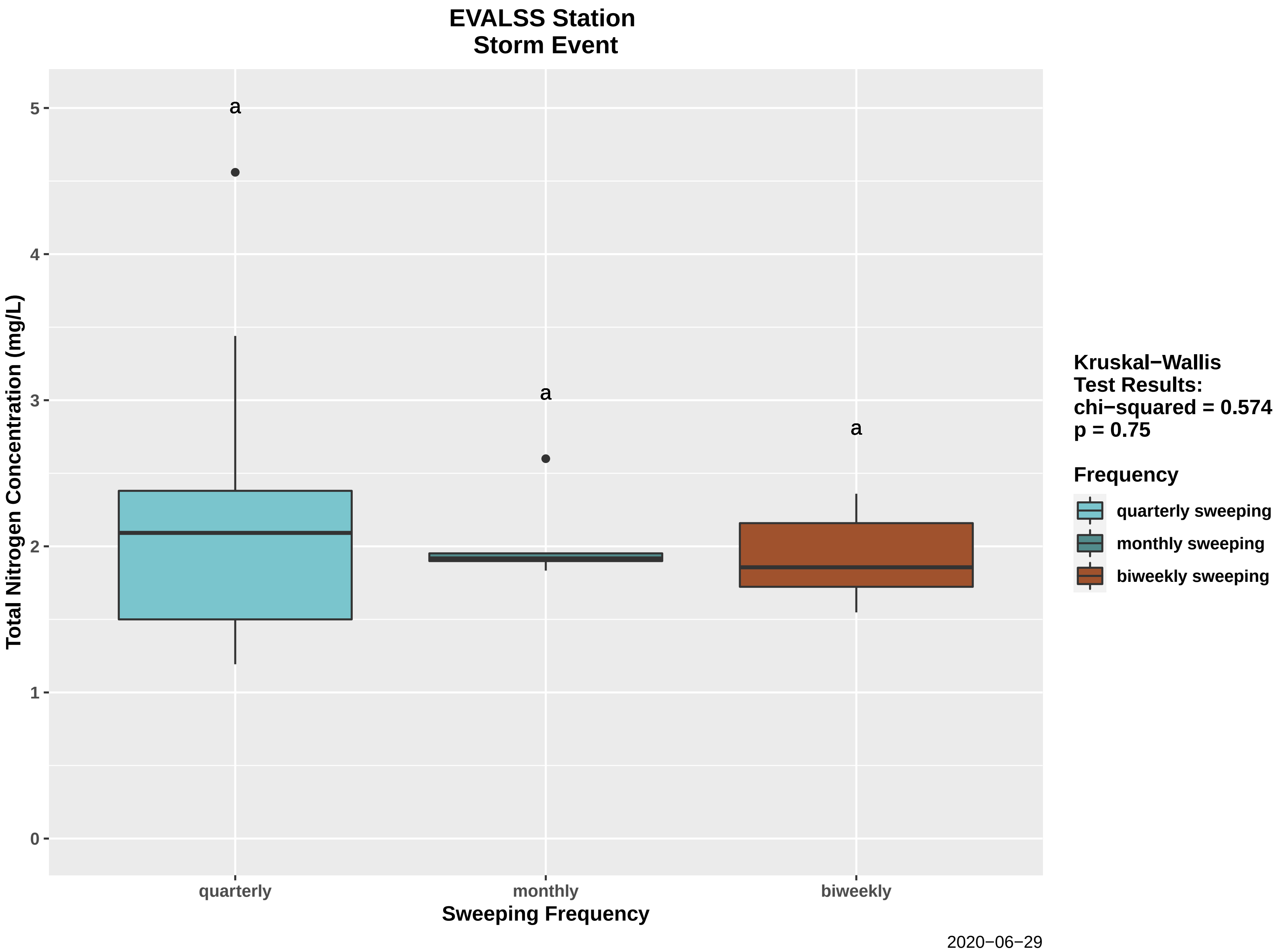

COUMI Station
Base Flow
Total Zinc Concentration (ug/L)
0
10
20
30
40
b
a
c
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 12.067
p = 0.002
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

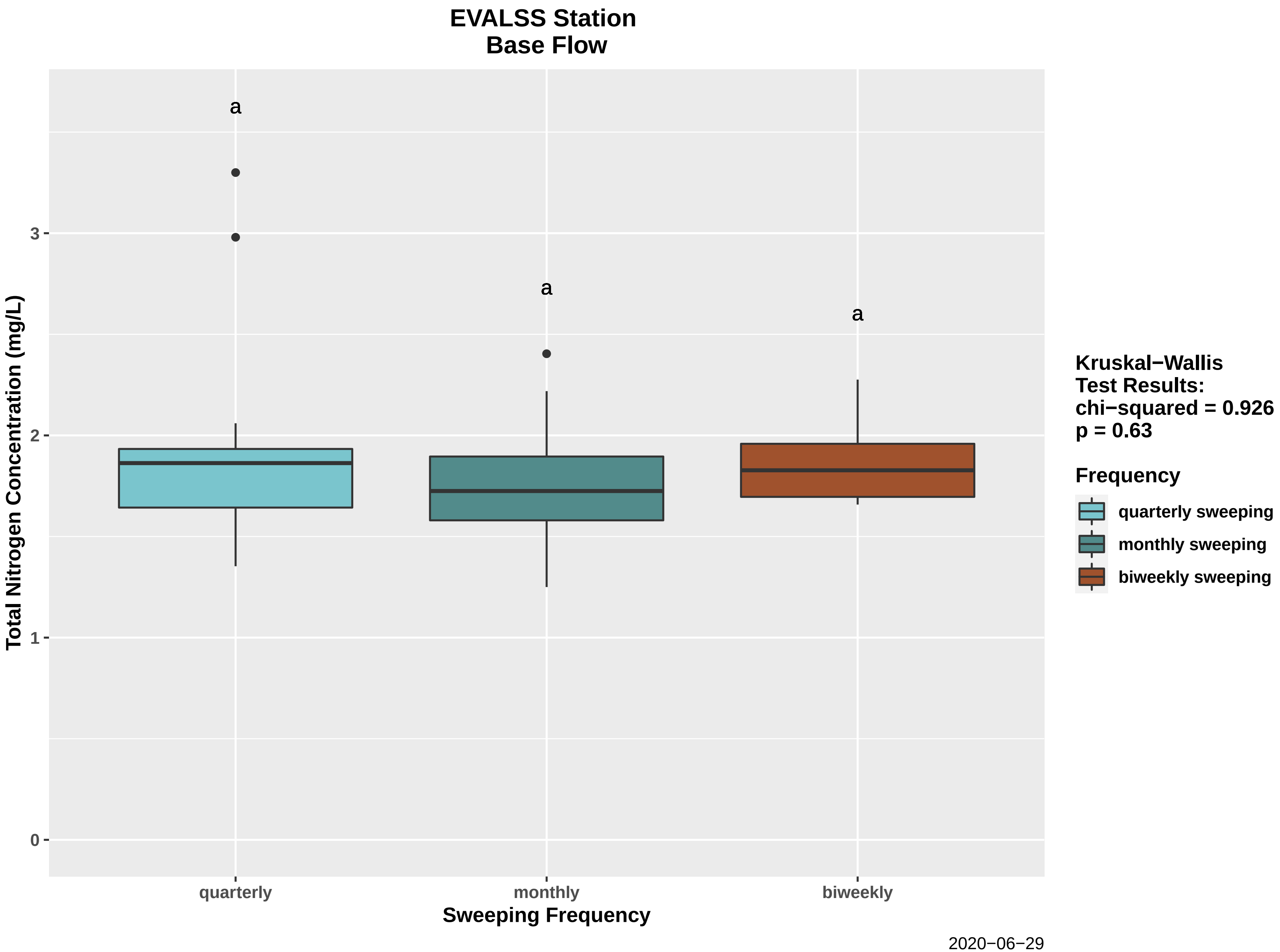

TYLMO Station
Storm Event
Total Zinc Concentration (ug/L)
1500
1000
500
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.637
p = 0.727
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

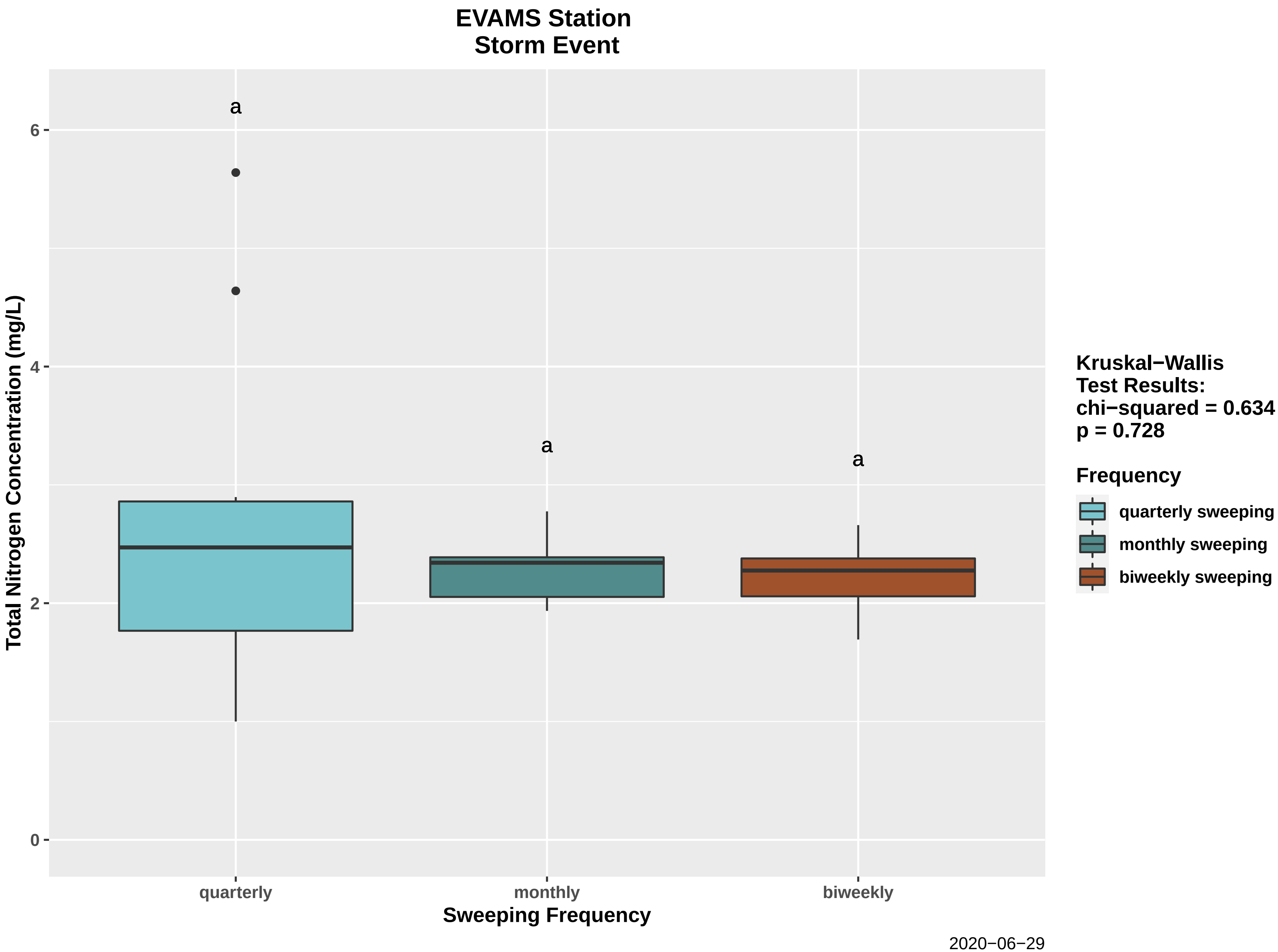

TYLMO Station
Base Flow
a
a
a
20
15
10
5
0
Total Zinc Concentration (ug/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.245
p = 0.885
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

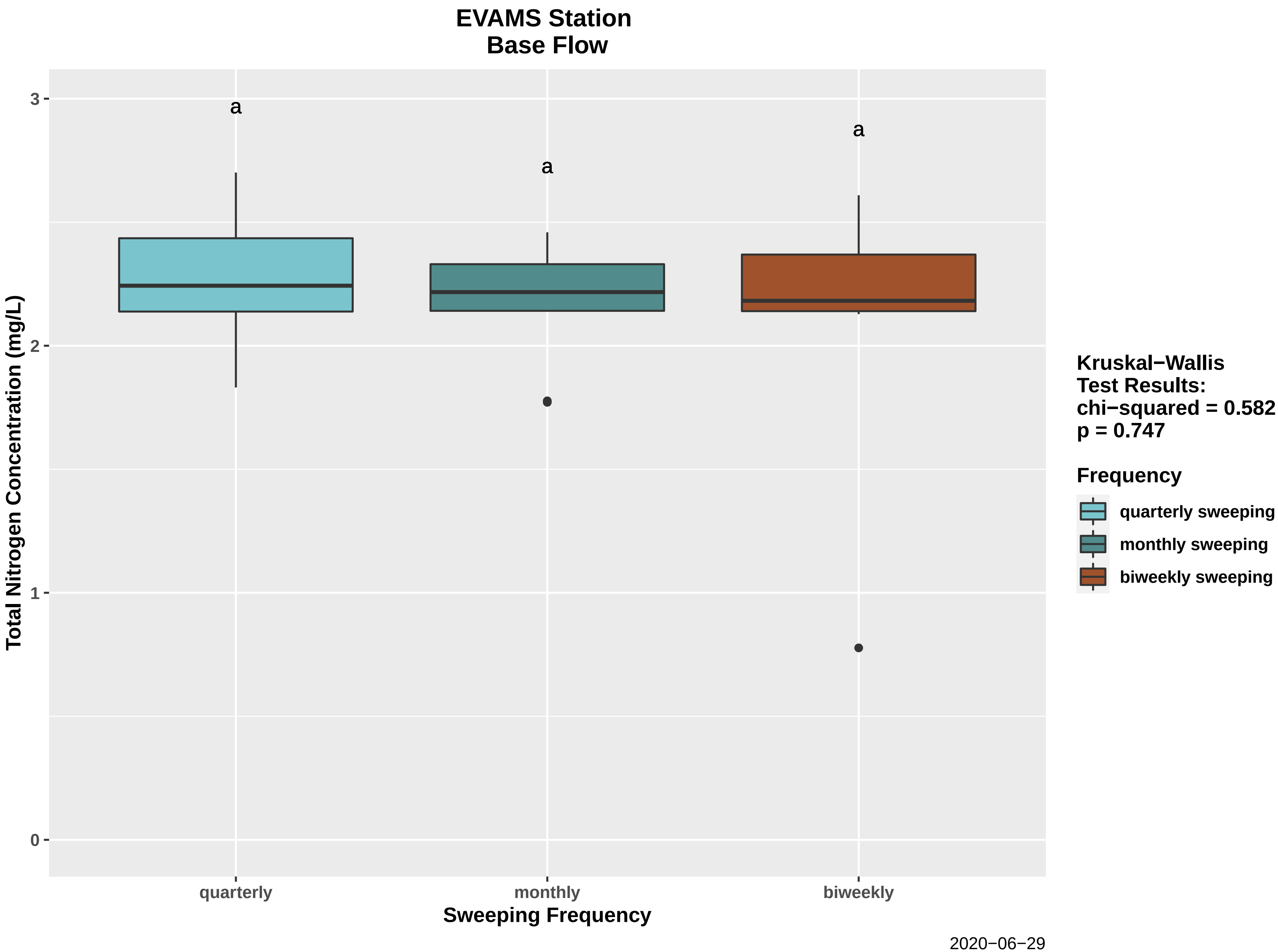

TYLMI Station
Storm Event
Total Zinc Concentration (ug/L)
300
200
100
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.436
p = 0.804
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

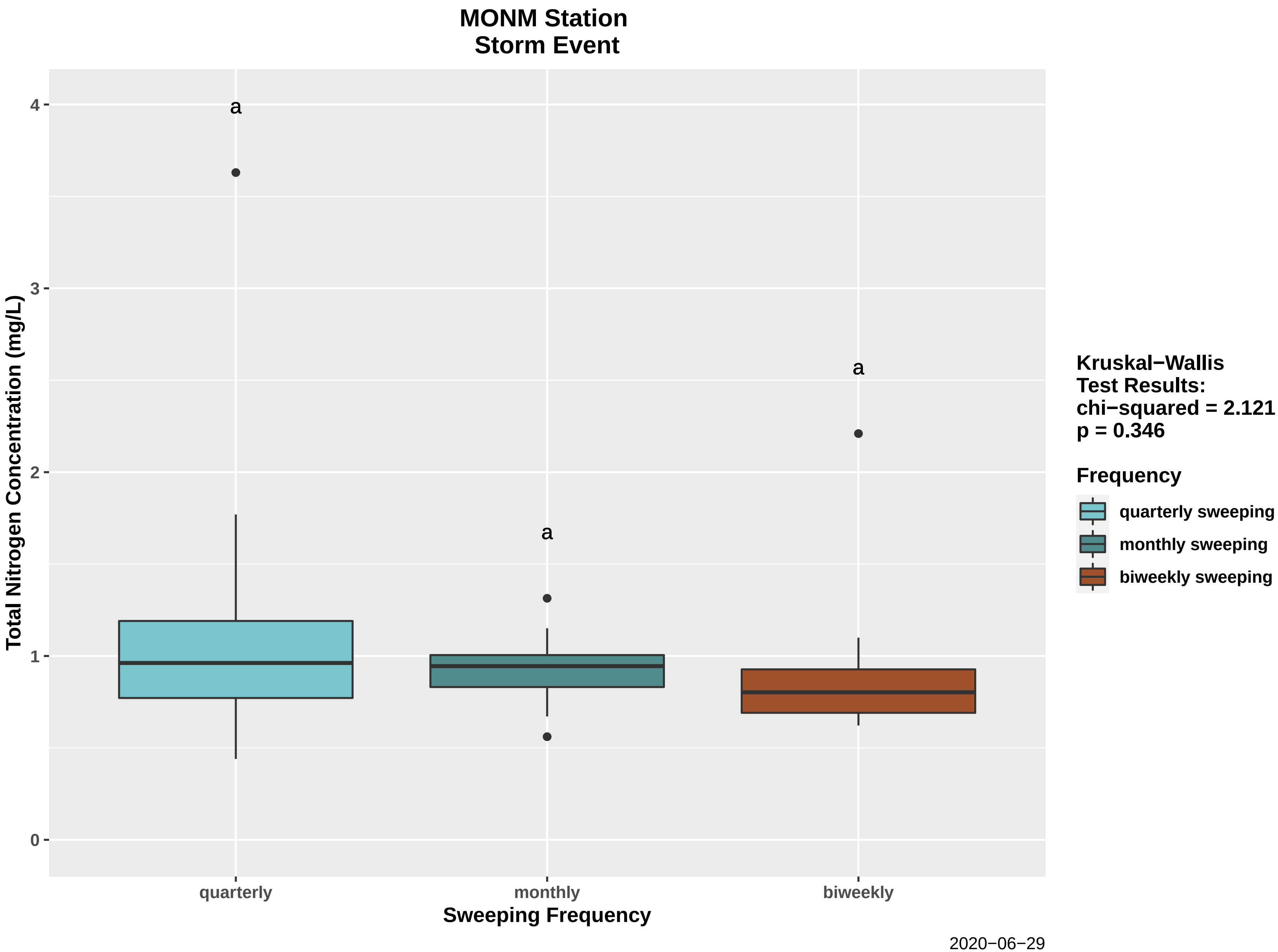

TYLMI Station
Base Flow
Total Zinc Concentration (ug/L)
80
60
40
20
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 3.094
p = 0.213
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29


EVALSS Station
Storm Event
Total Nitrogen Concentration (mg/L)
5
4
3
2
1
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.574
p = 0.75
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

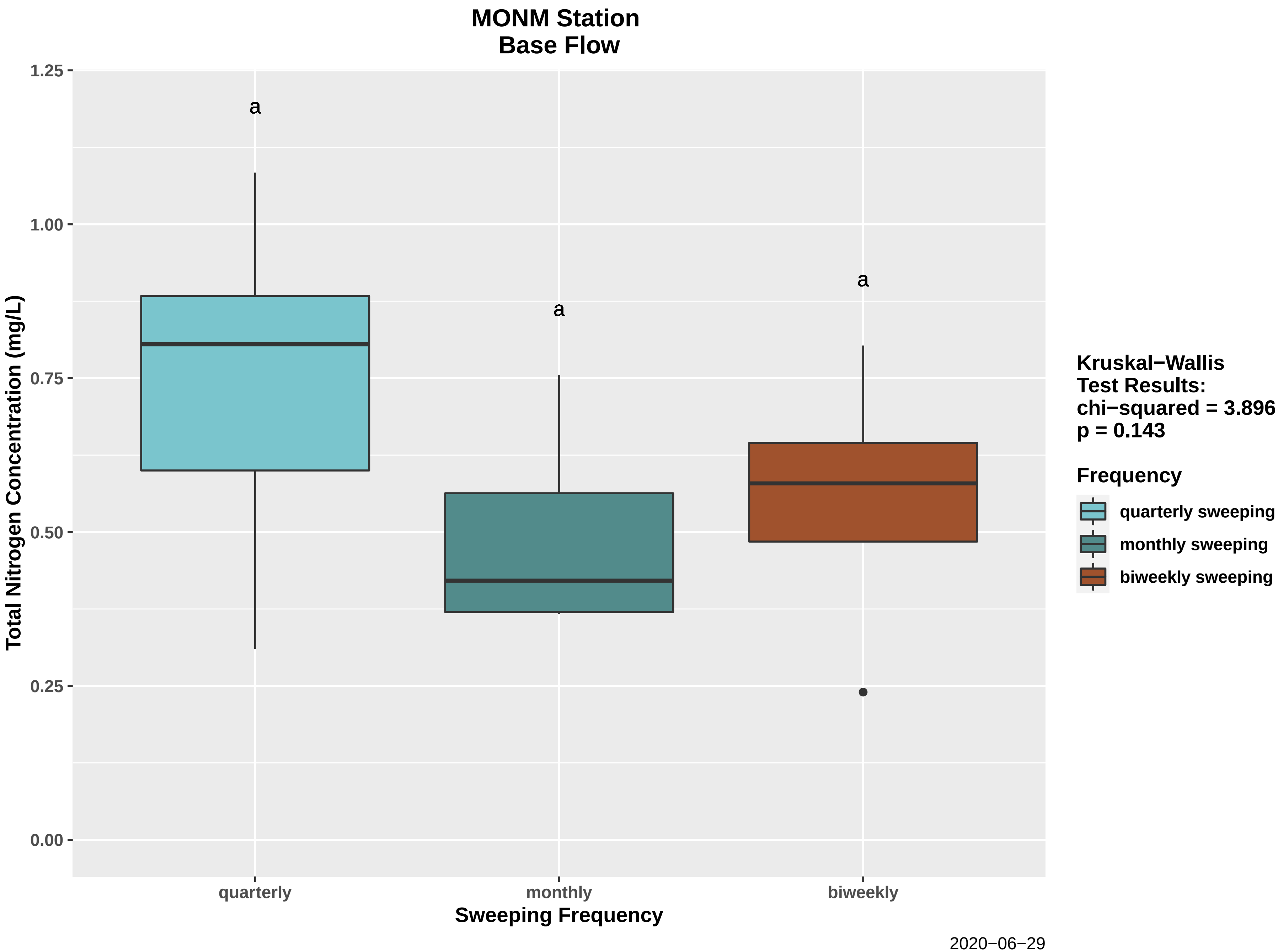

EVALSS Station
Base Flow
a
a
a
3
2
1
0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.926
p = 0.63
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

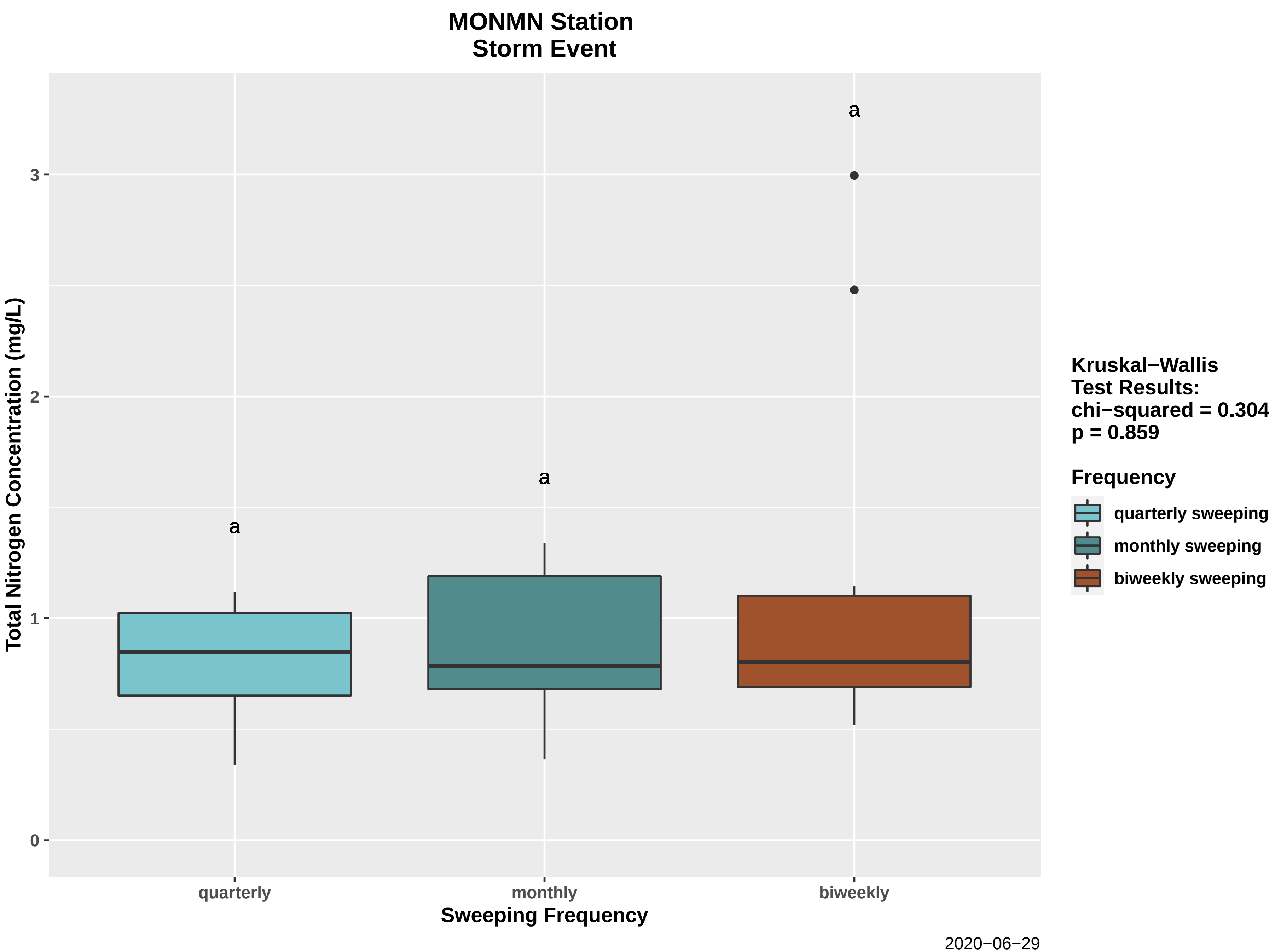

EVAMS Station
Storm Event
a
a
a
6
4
2
0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.634
p = 0.728
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

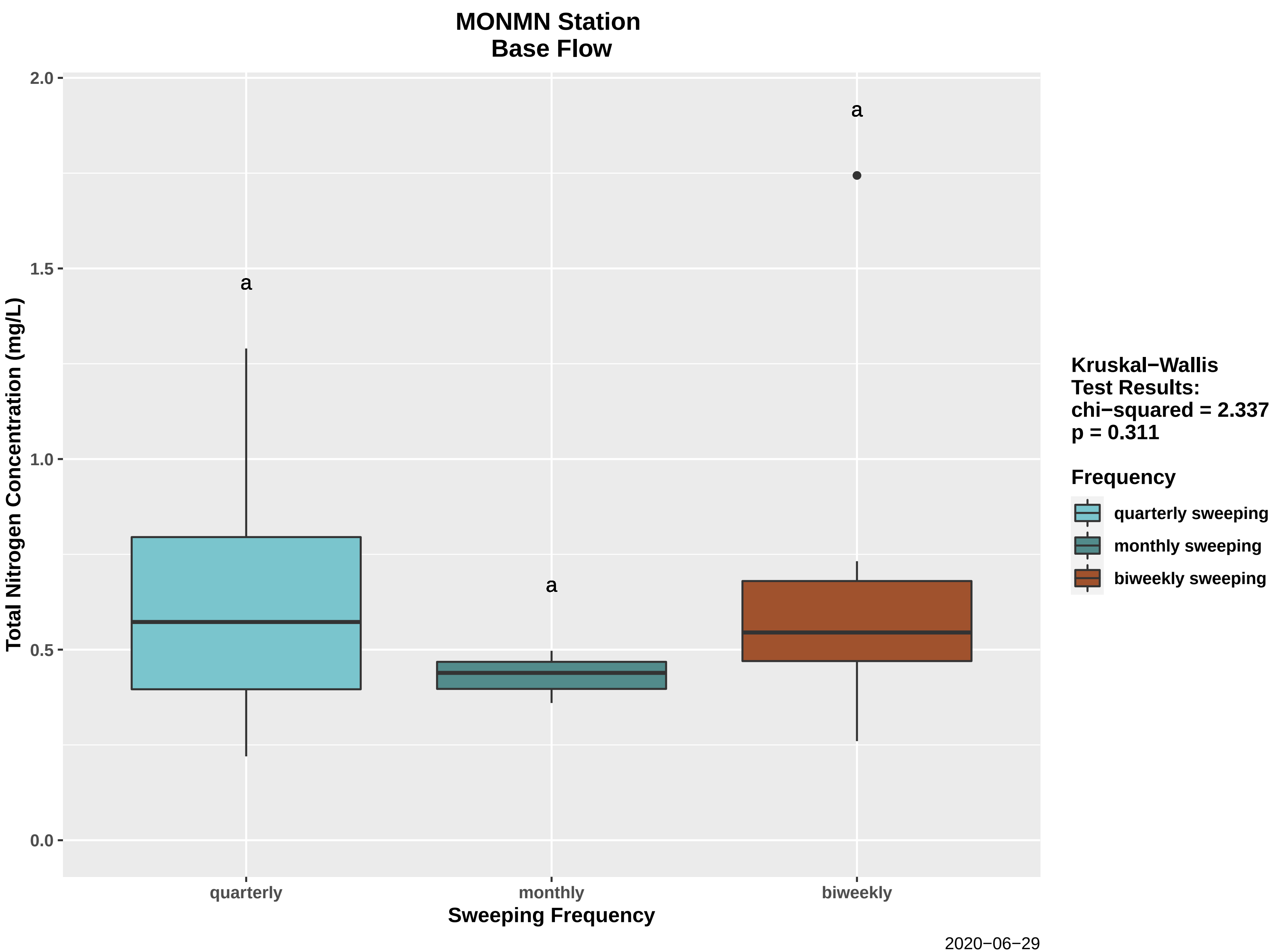

EVAMS Station
Base Flow
Total Nitrogen Concentration (mg/L)
3
2
1
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.582
p = 0.747
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping



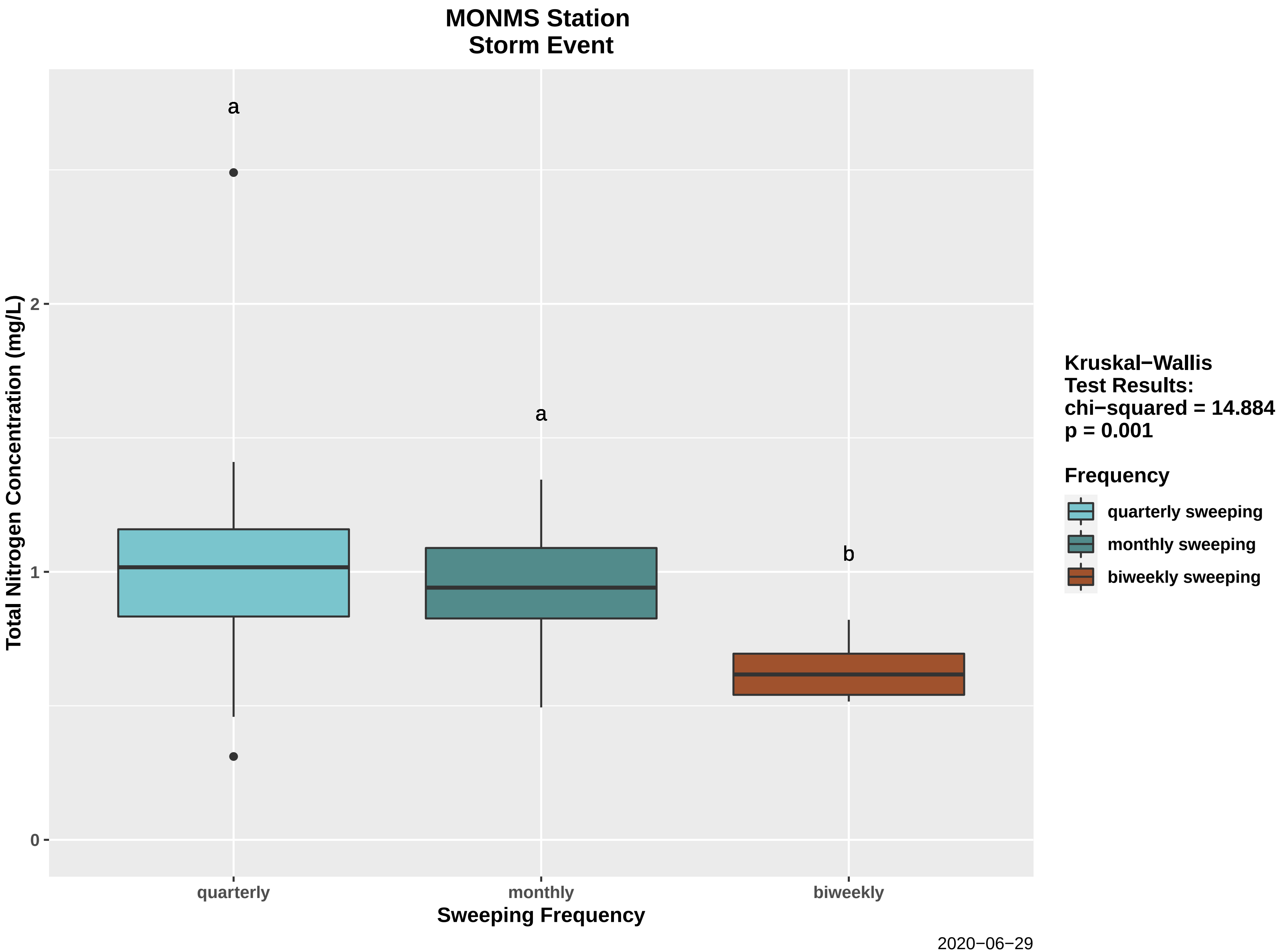
MONM Station
Storm Event
Total Nitrogen Concentration (mg/L)
0
1
2
3
4
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.121
p = 0.346
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

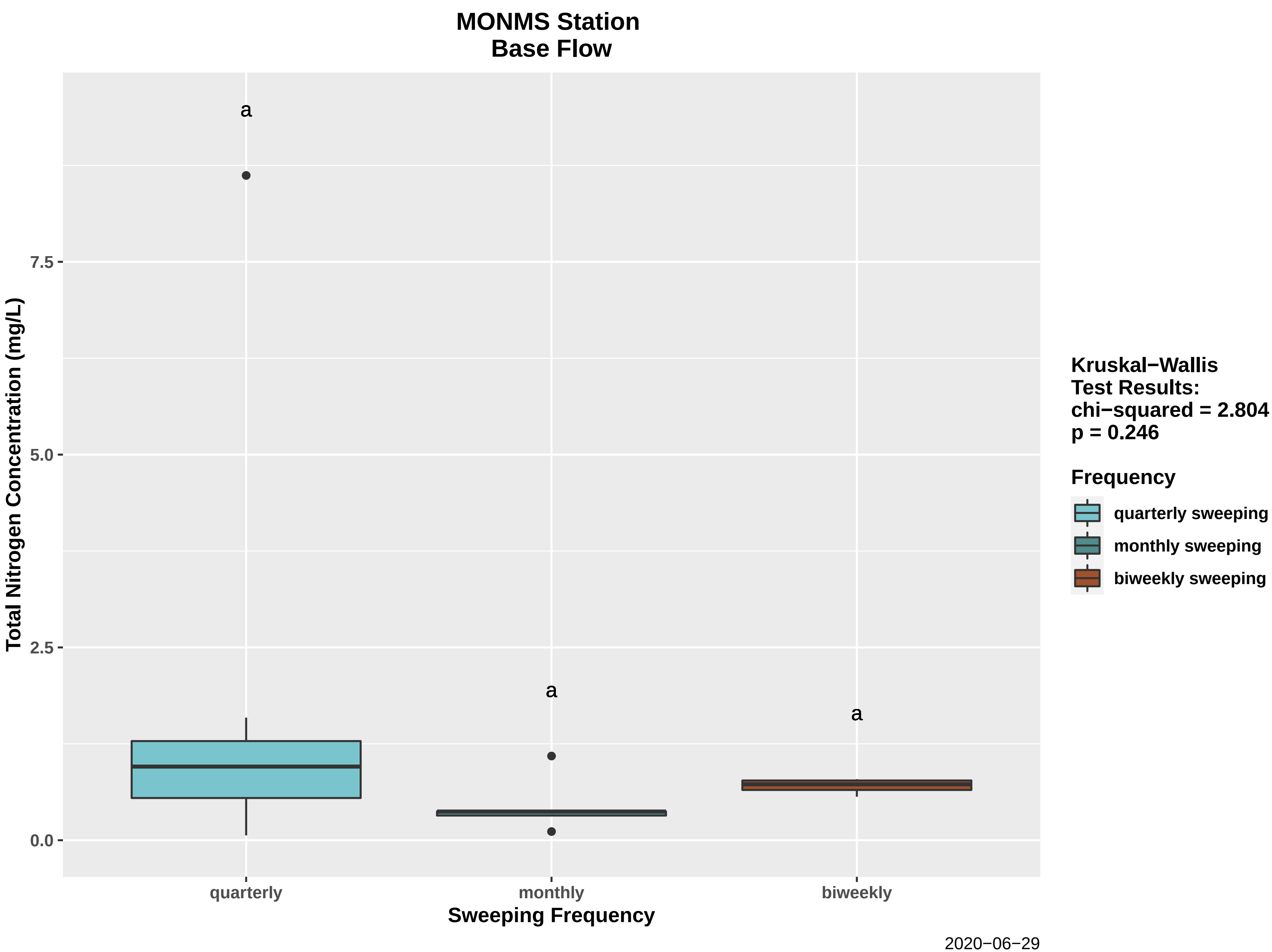

MONM Station
Base Flow
1.25
1.00
0.75
0.50
0.25
0.00
Total Nitrogen Concentration (mg/L)
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.896
p = 0.143
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

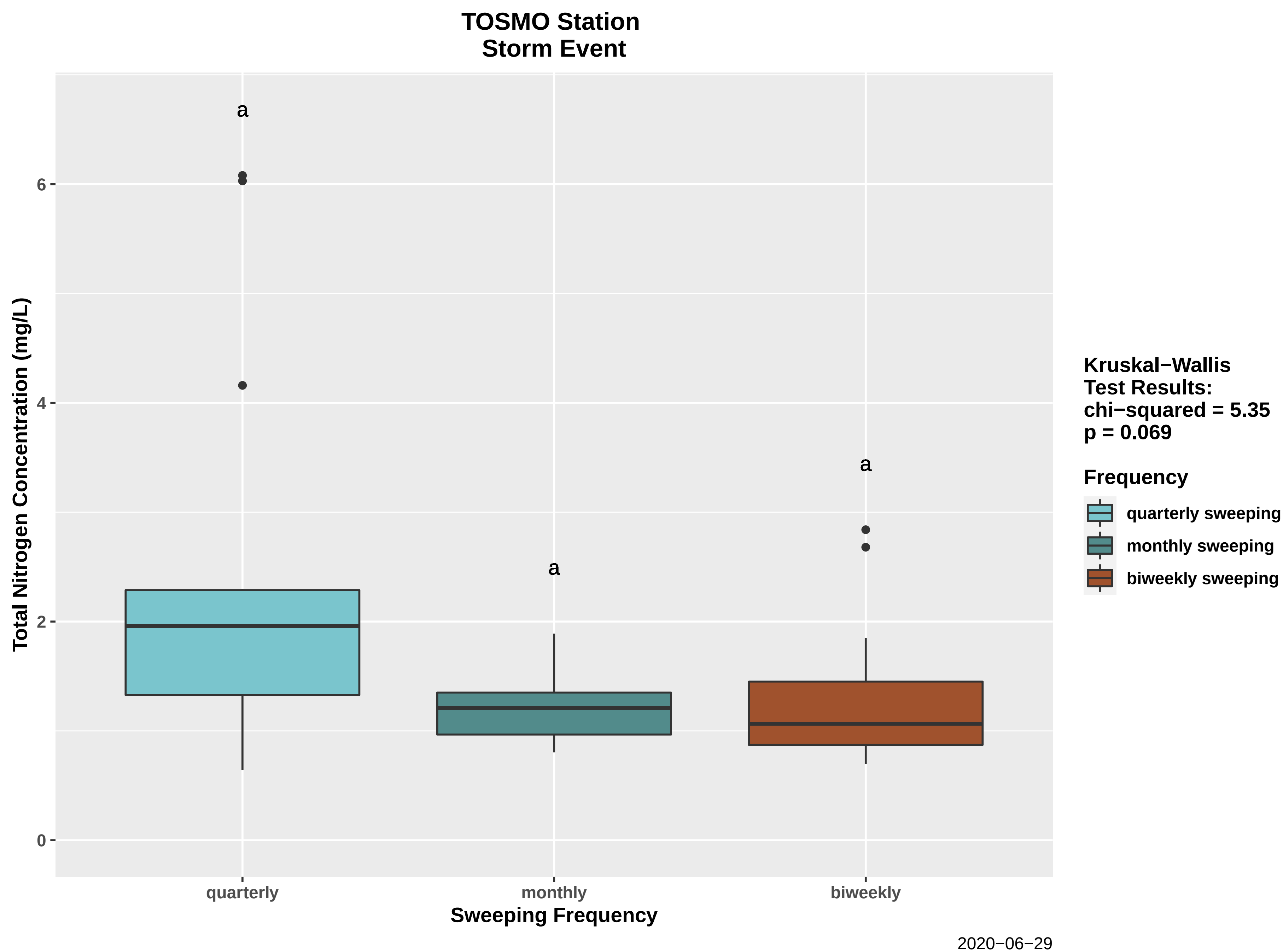

MONMN Station
Storm Event
Total Nitrogen Concentration (mg/L)
0
1
2
3
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 0.304
p = 0.859
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

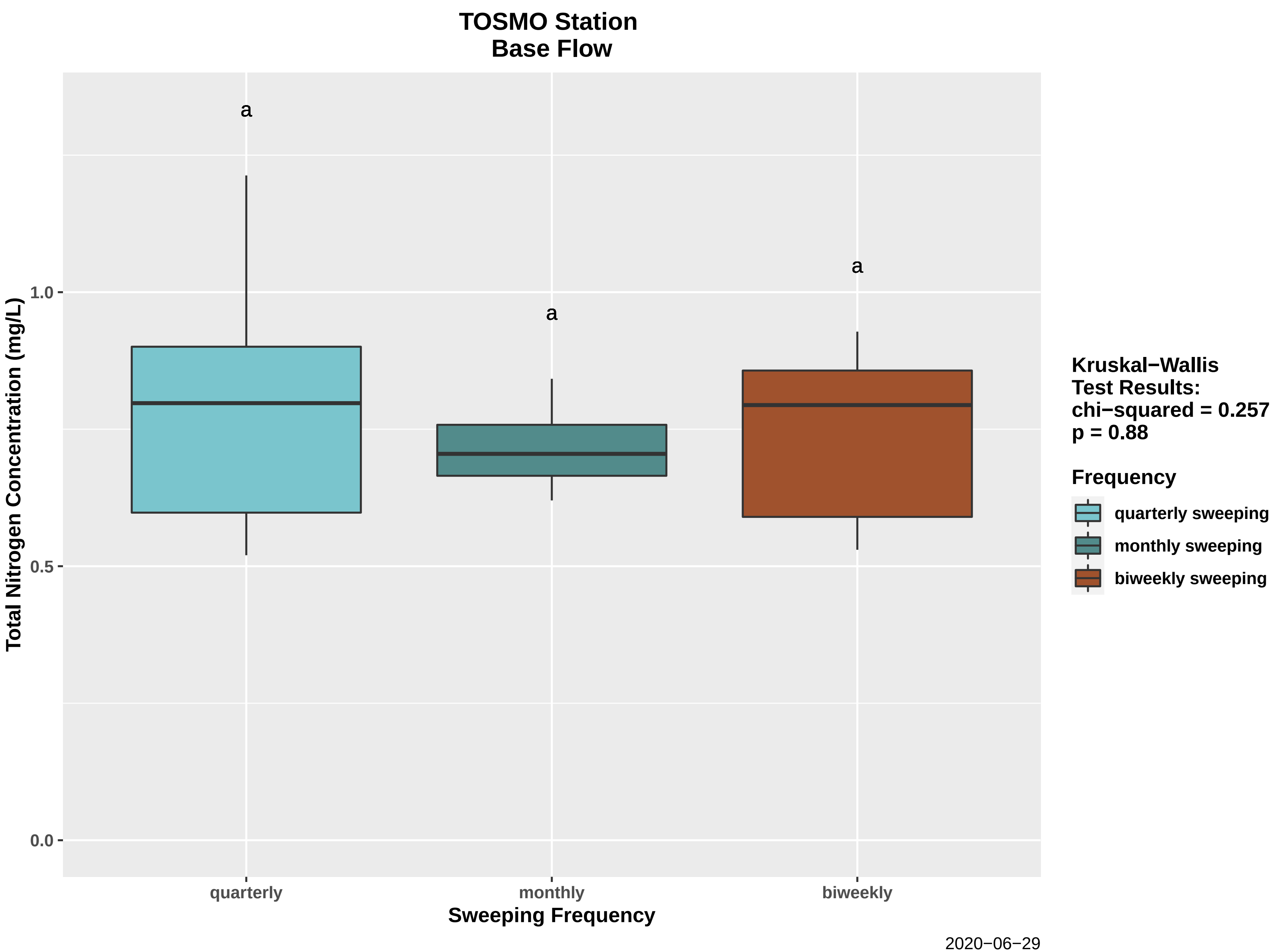


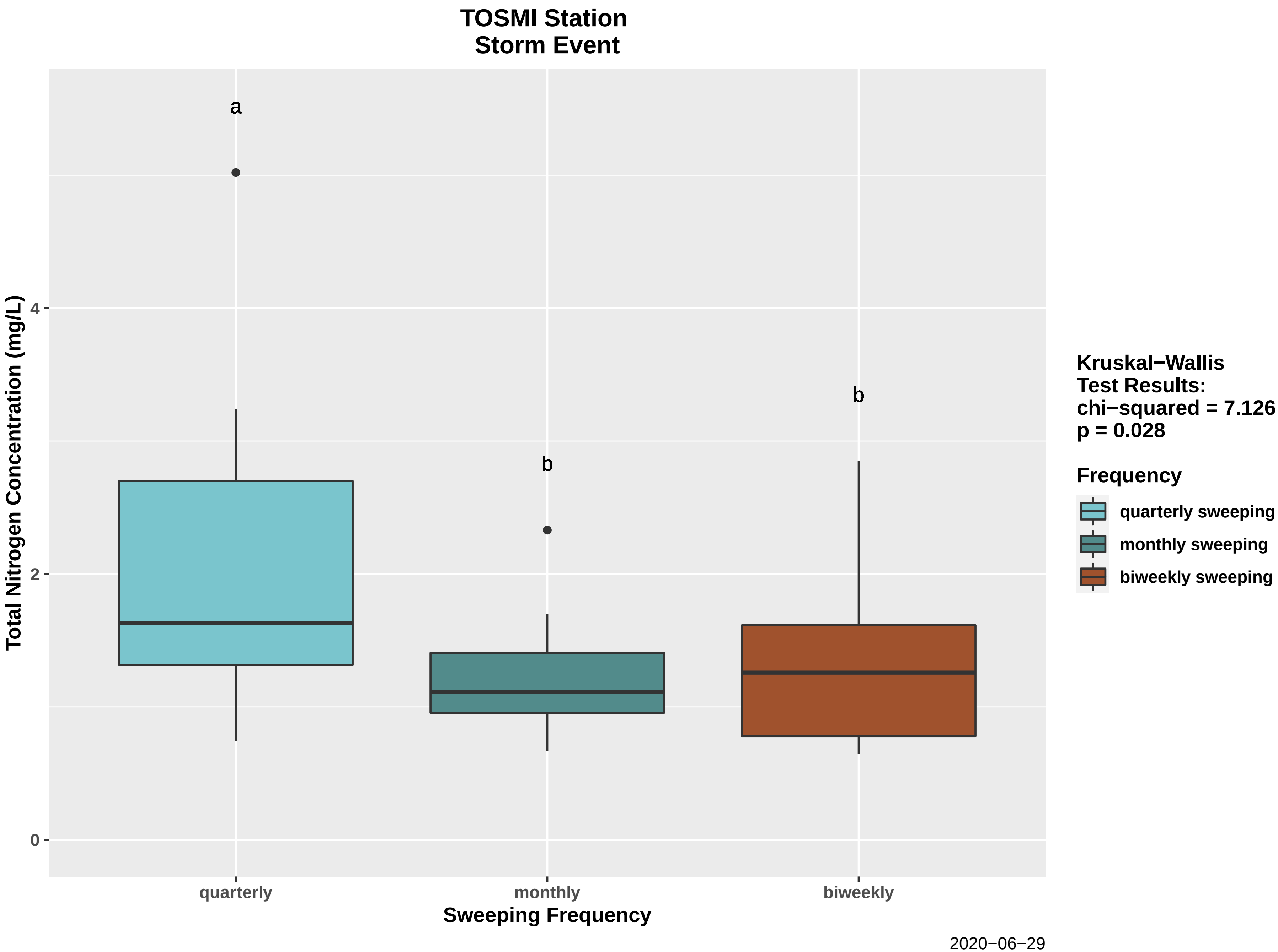
MONMN Station
Base Flow
Total Nitrogen Concentration (mg/L)
2.0
1.5
1.0
0.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.337
p = 0.311
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

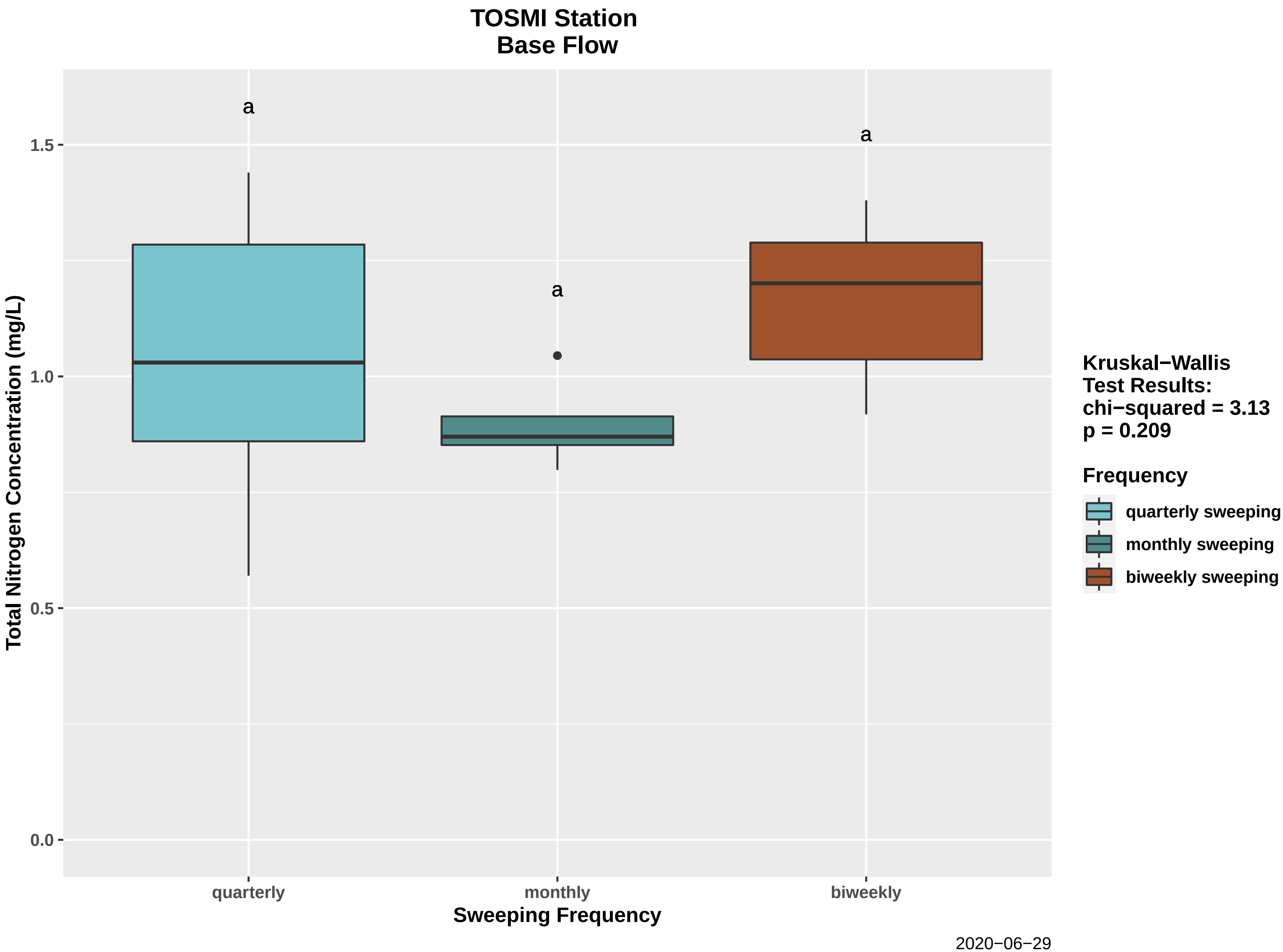

MONMS Station
Storm Event
a
a
b
Total Nitrogen Concentration (mg/L)
0
1
2
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 14.884
p = 0.001
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

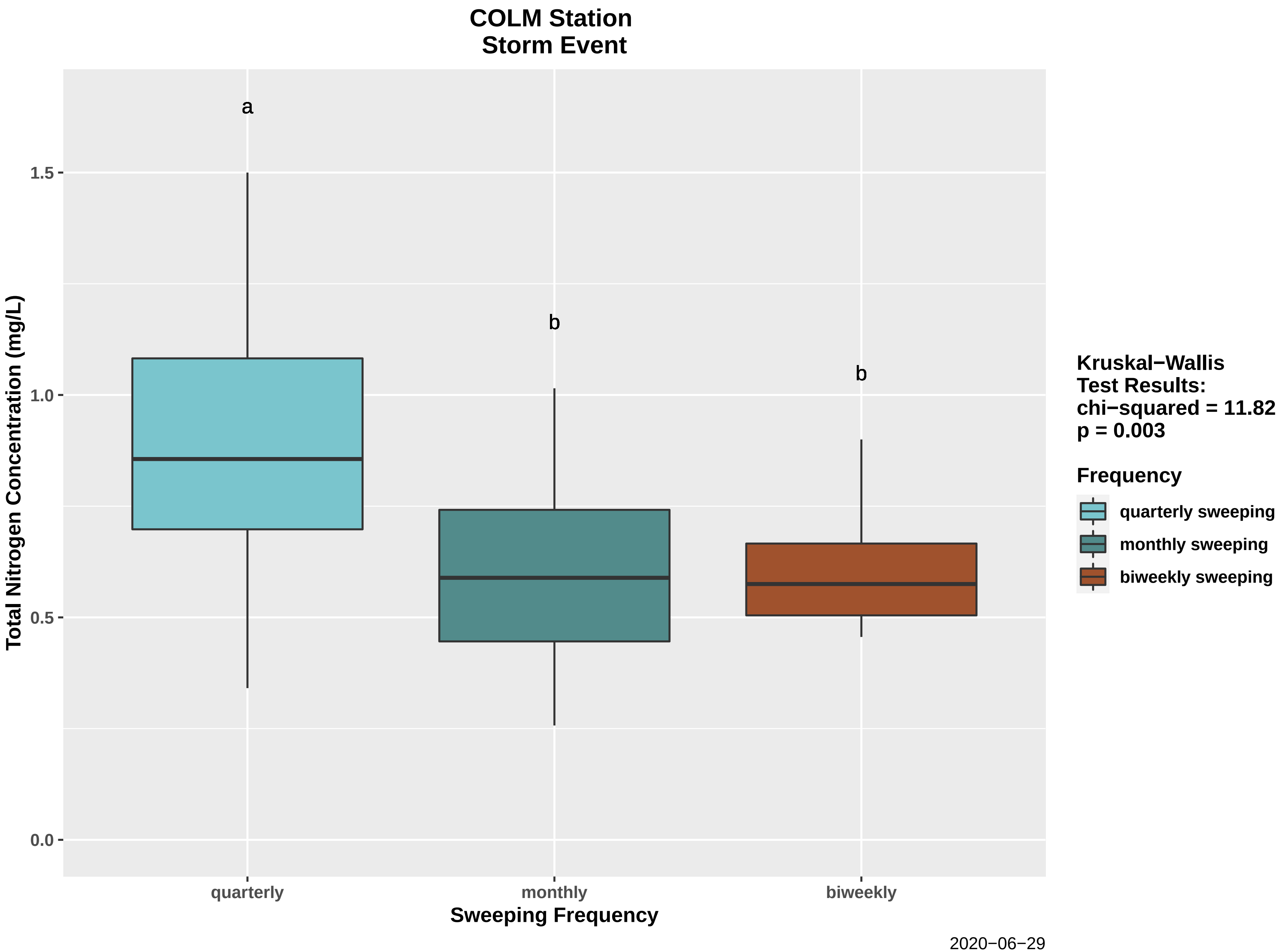

MONMS Station
Base Flow
Total Nitrogen Concentration (mg/L)
7.5
5.0
2.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.804
p = 0.246
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

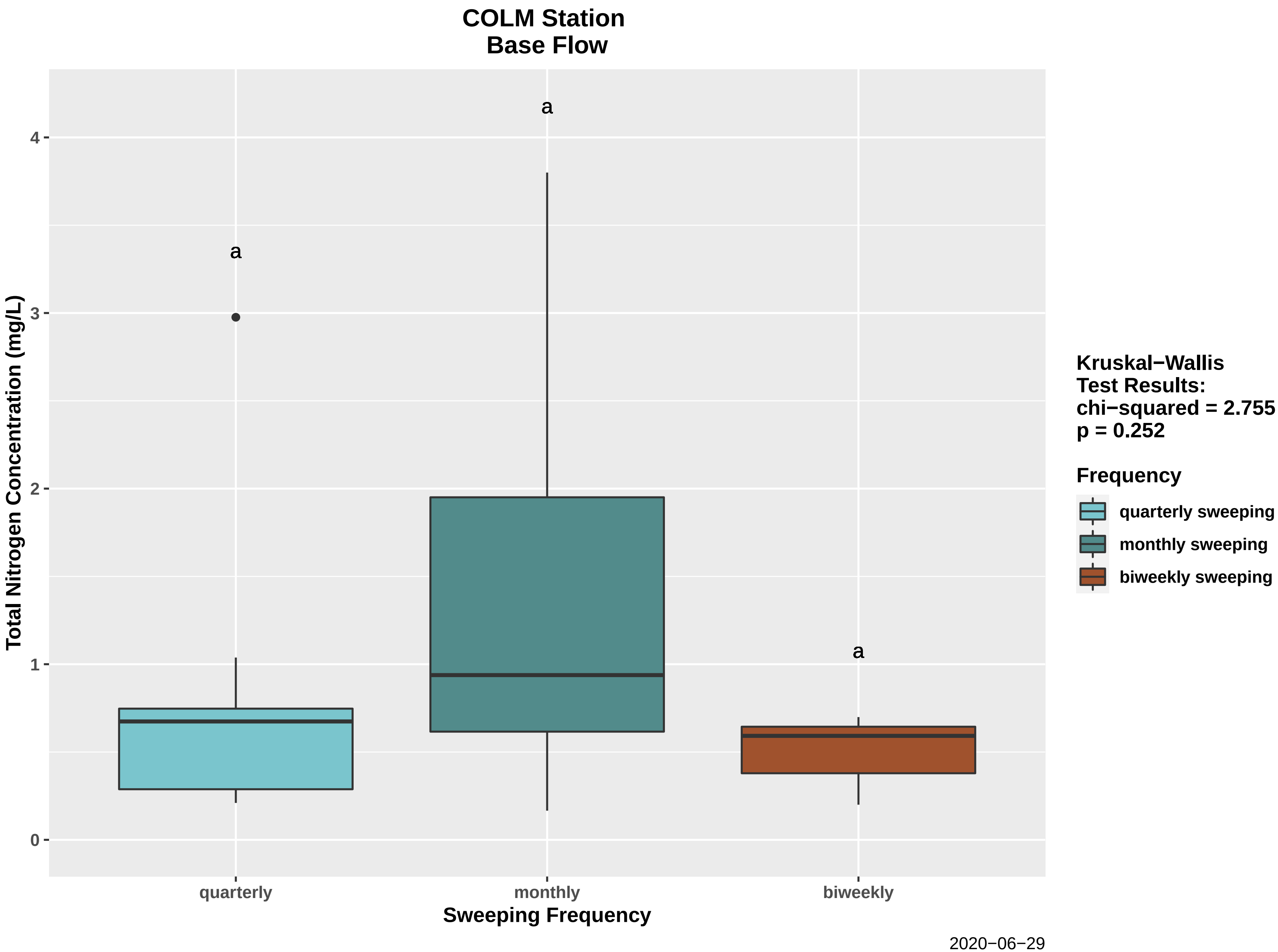

TOSMO Station
Storm Event
Total Nitrogen Concentration (mg/L)
0
2
4
6
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.35
p = 0.069
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

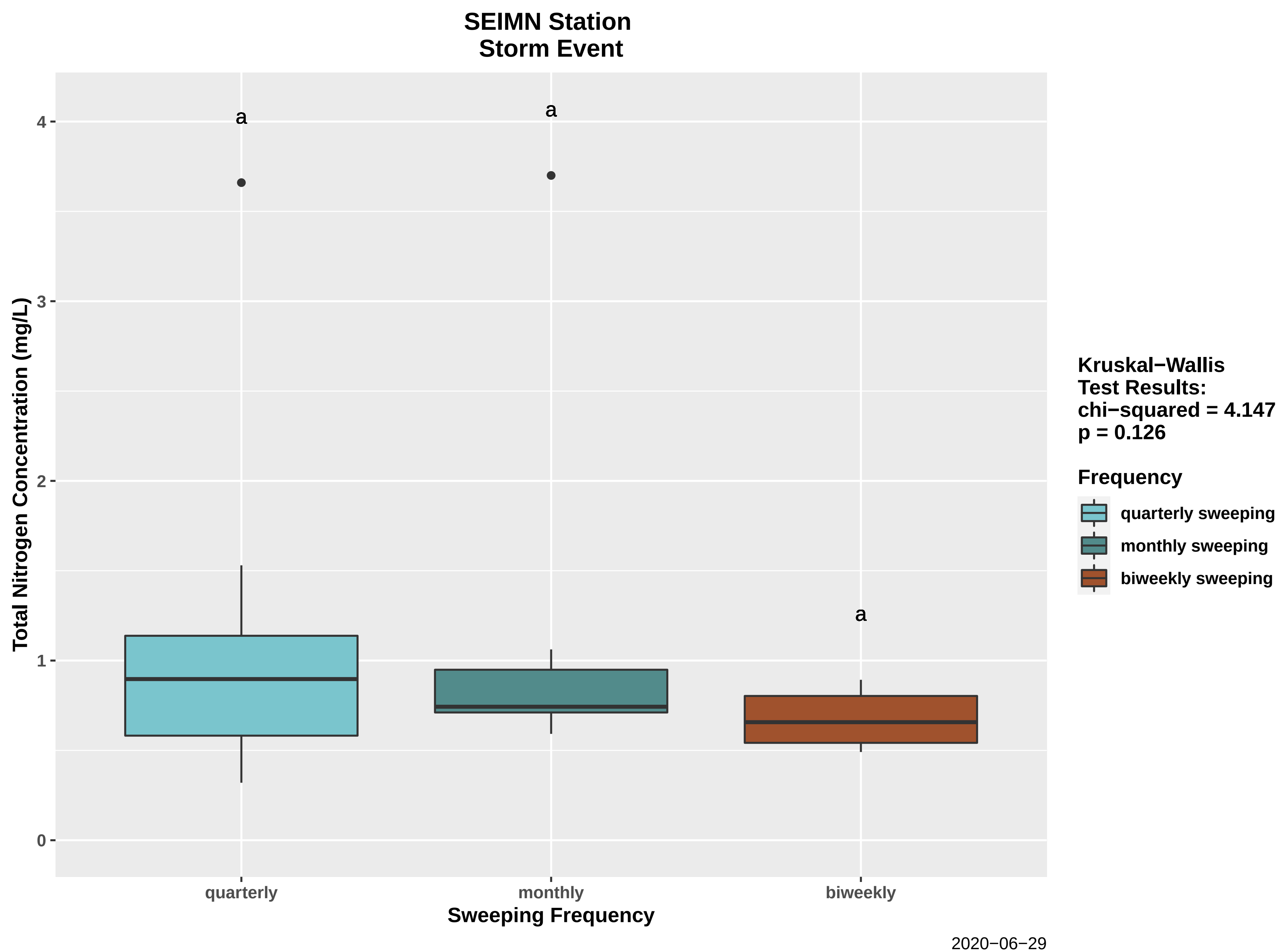

TOSMO Station
Base Flow
Total Nitrogen Concentration (mg/L)
1.0
0.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.257
p = 0.88
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

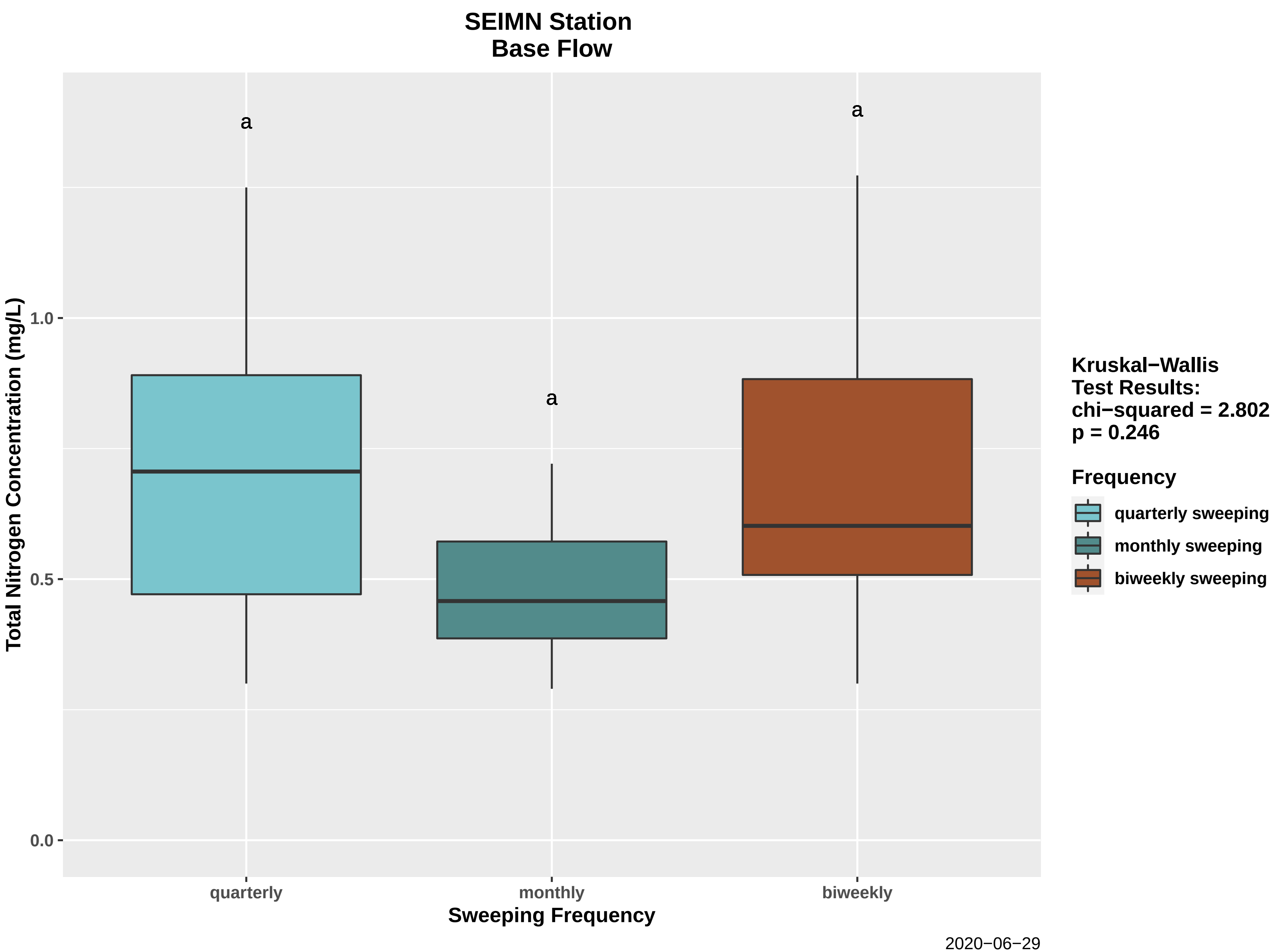

TOSMI Station
Storm Event
a
b
b
0
2
4
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 7.126
p = 0.028
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


TOSMI Station
Base Flow
Total Nitrogen Concentration (mg/L)
1.5
1.0
0.5
0.0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.13
p = 0.209
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

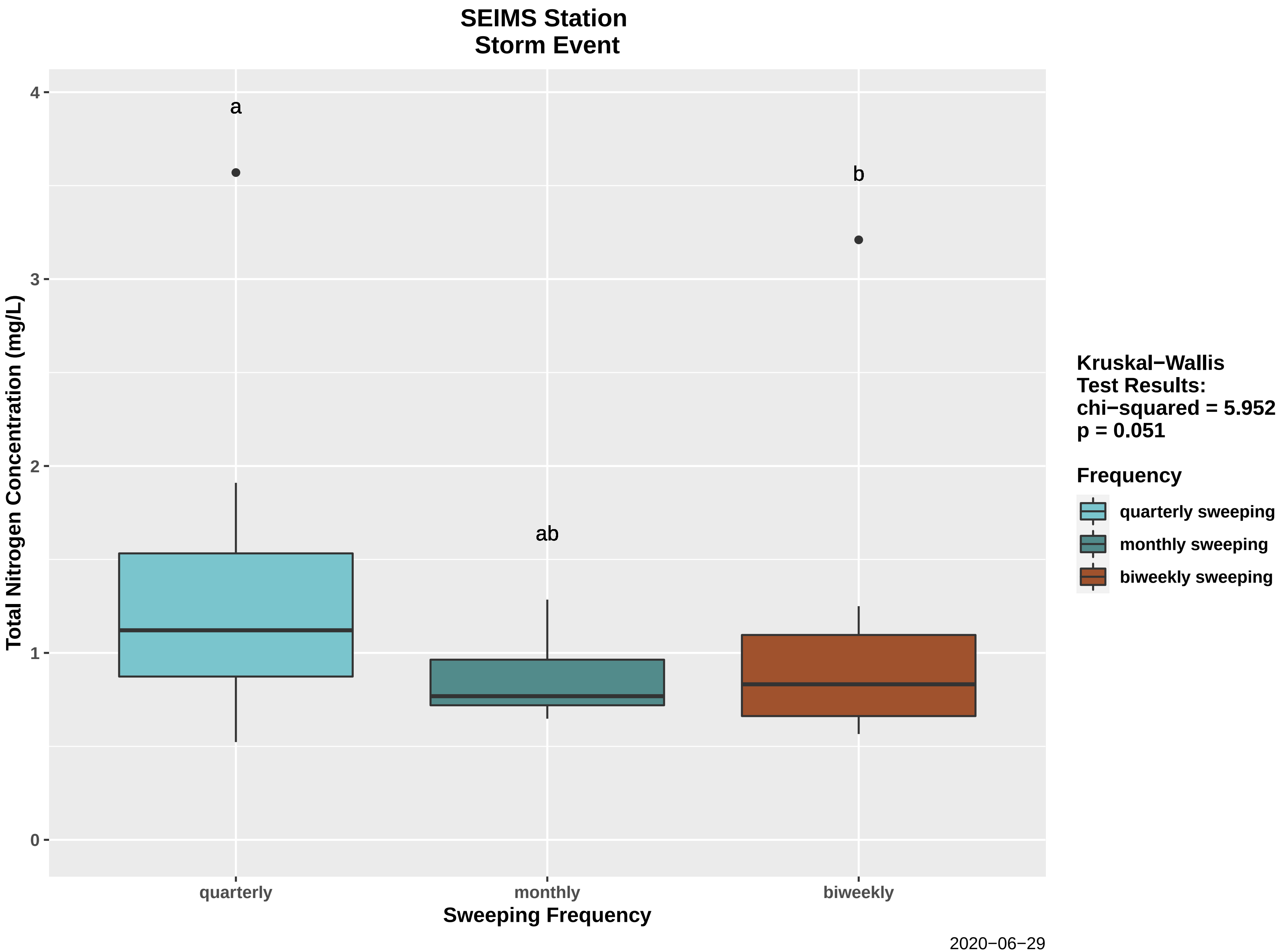

COLM Station
Storm Event
a
b
b
1.5
1.0
0.5
0.0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 11.82
p = 0.003
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

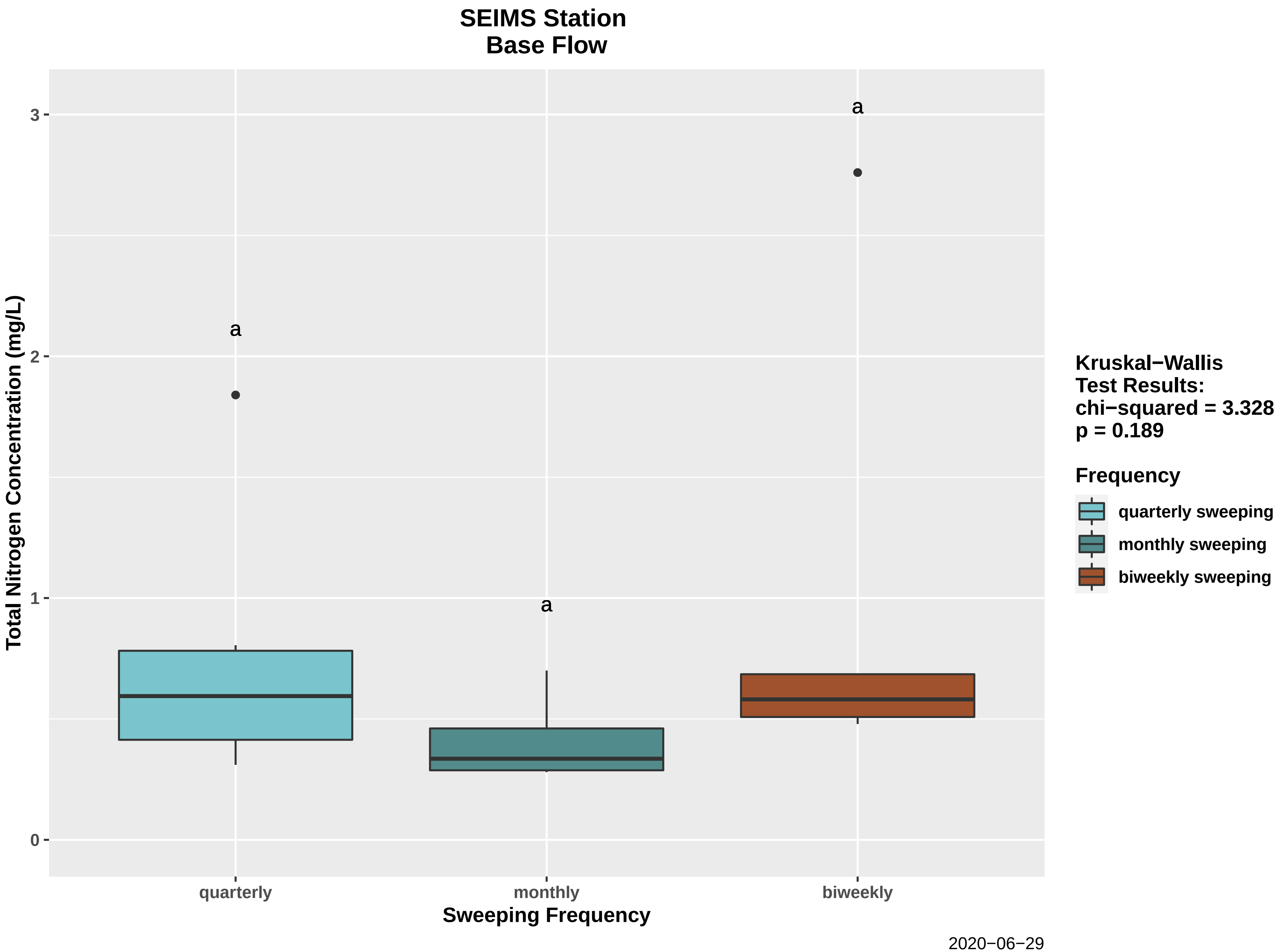

COLM Station
Base Flow
Total Nitrogen Concentration (mg/L)
0
1
2
3
4
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 2.755
p = 0.252
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29

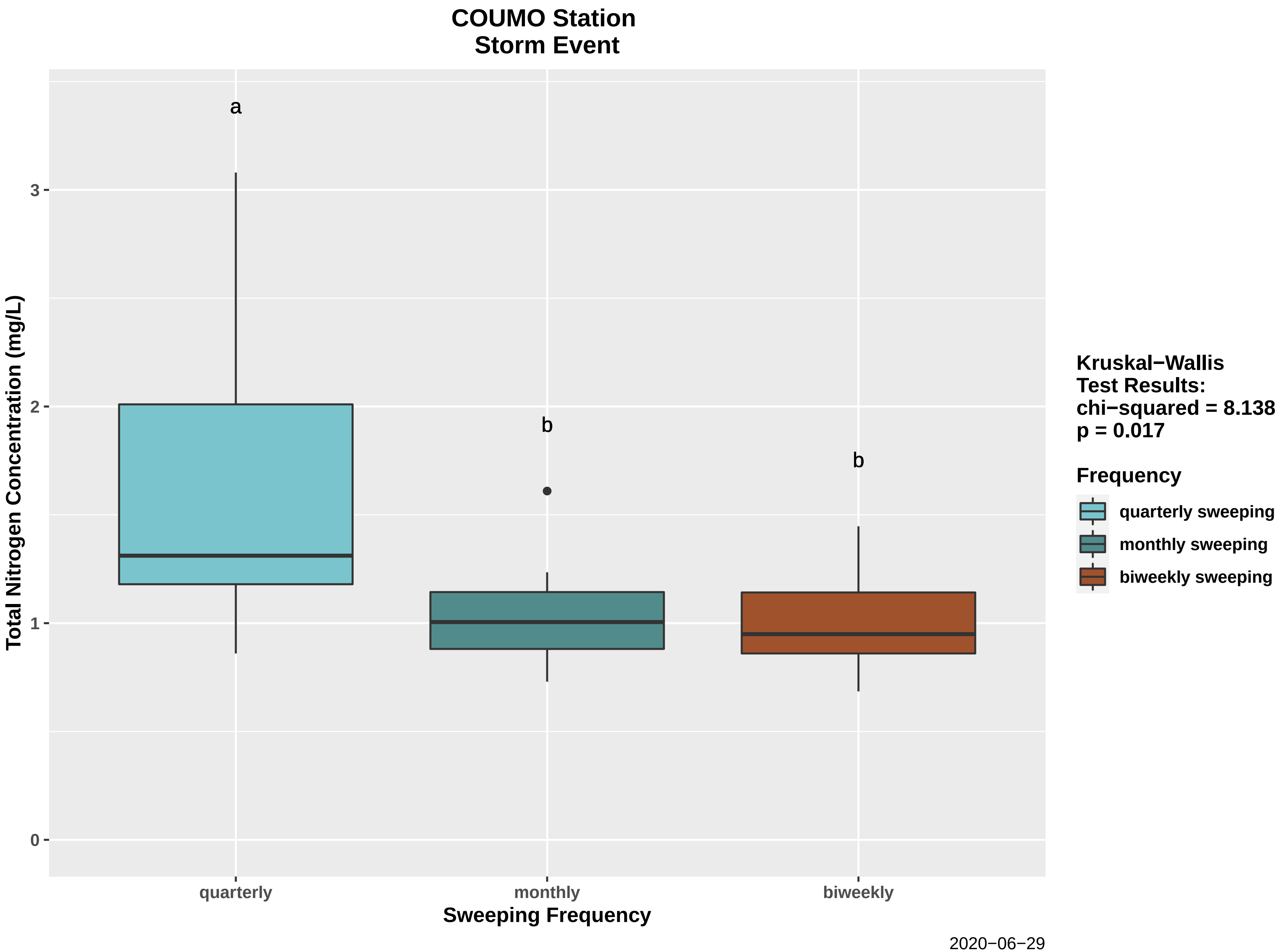

SEIMN Station
Storm Event
a
a
a
4
3
2
1
0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.147
p = 0.126
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

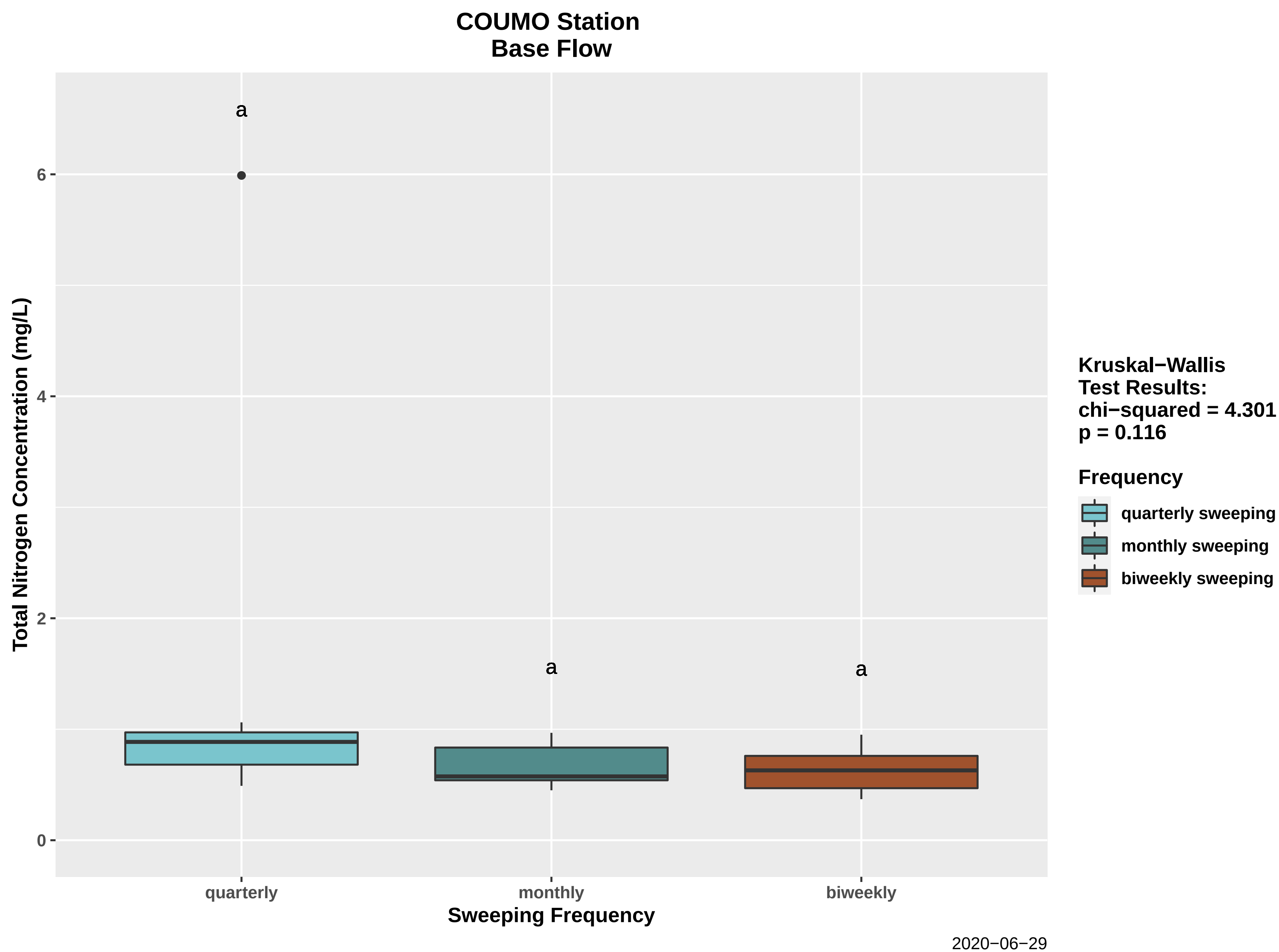


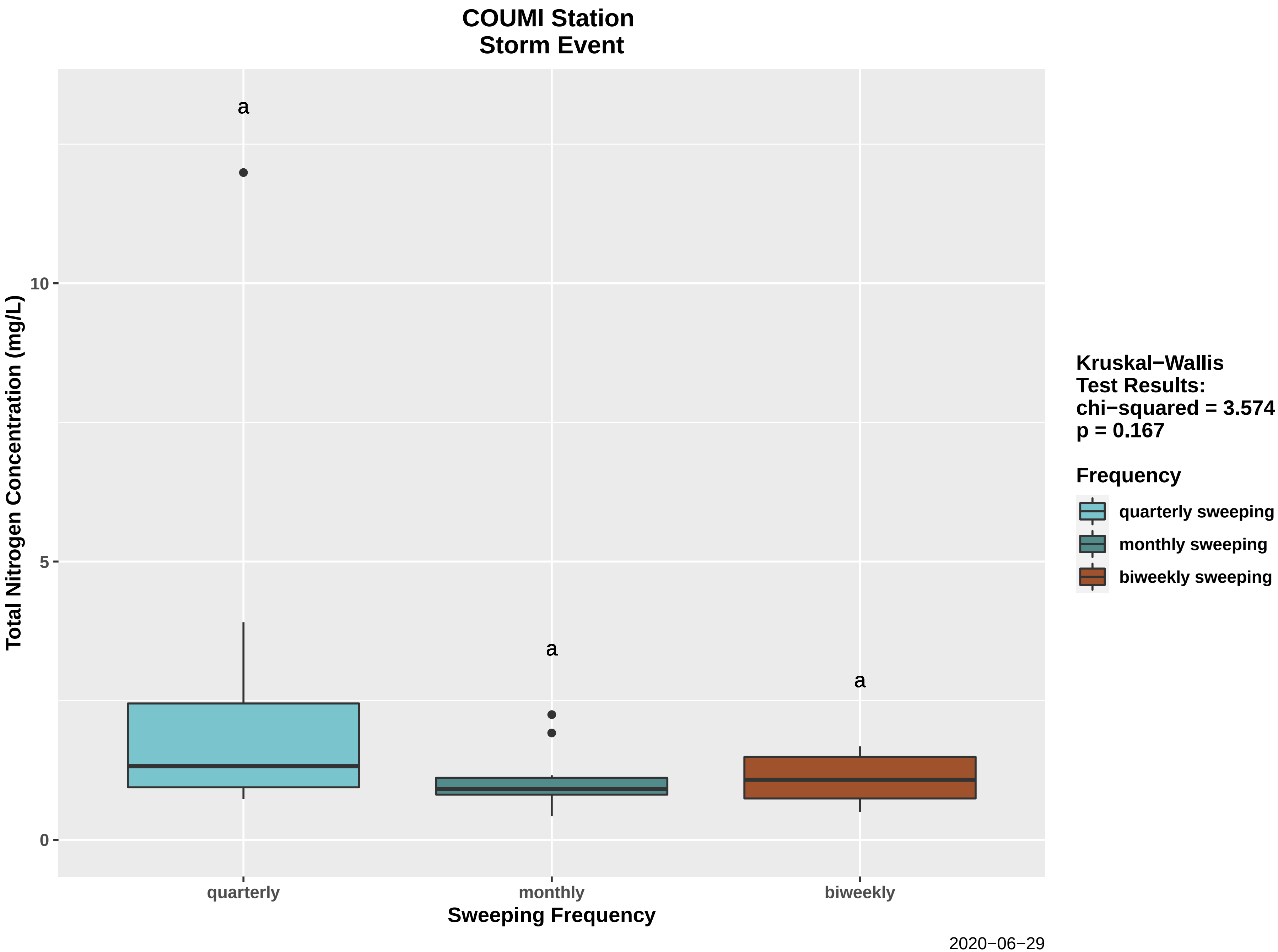
SEIMN Station
Base Flow
a
a
a
1.0
0.5
0.0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 2.802
p = 0.246
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

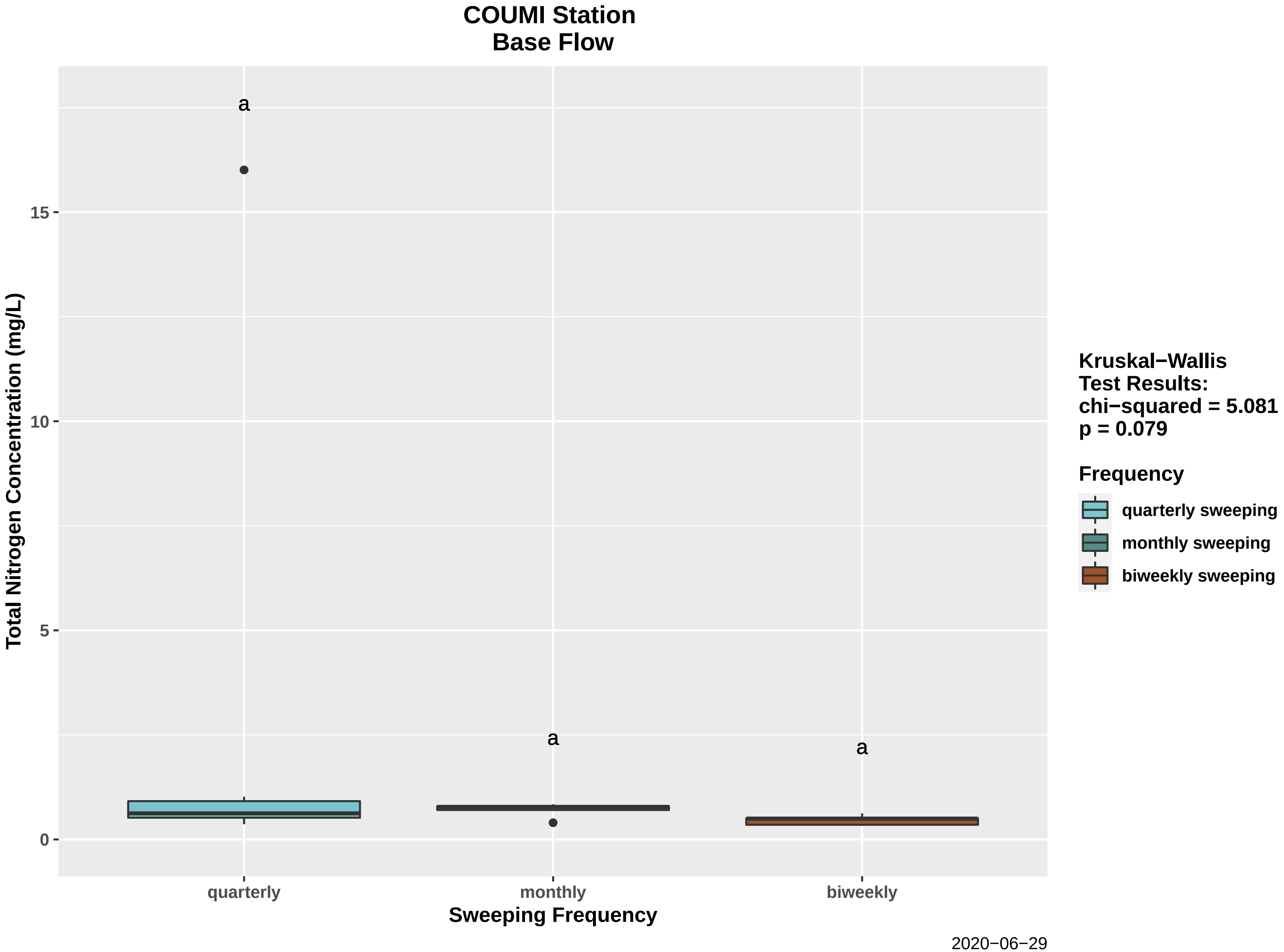

SEIMS Station
Storm Event
Total Nitrogen Concentration (mg/L)
4
3
2
1
0
a
ab
b
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.952
p = 0.051
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping


SEIMS Station
Base Flow
Total Nitrogen Concentration (mg/L)
3
2
1
0
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.328
p = 0.189
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

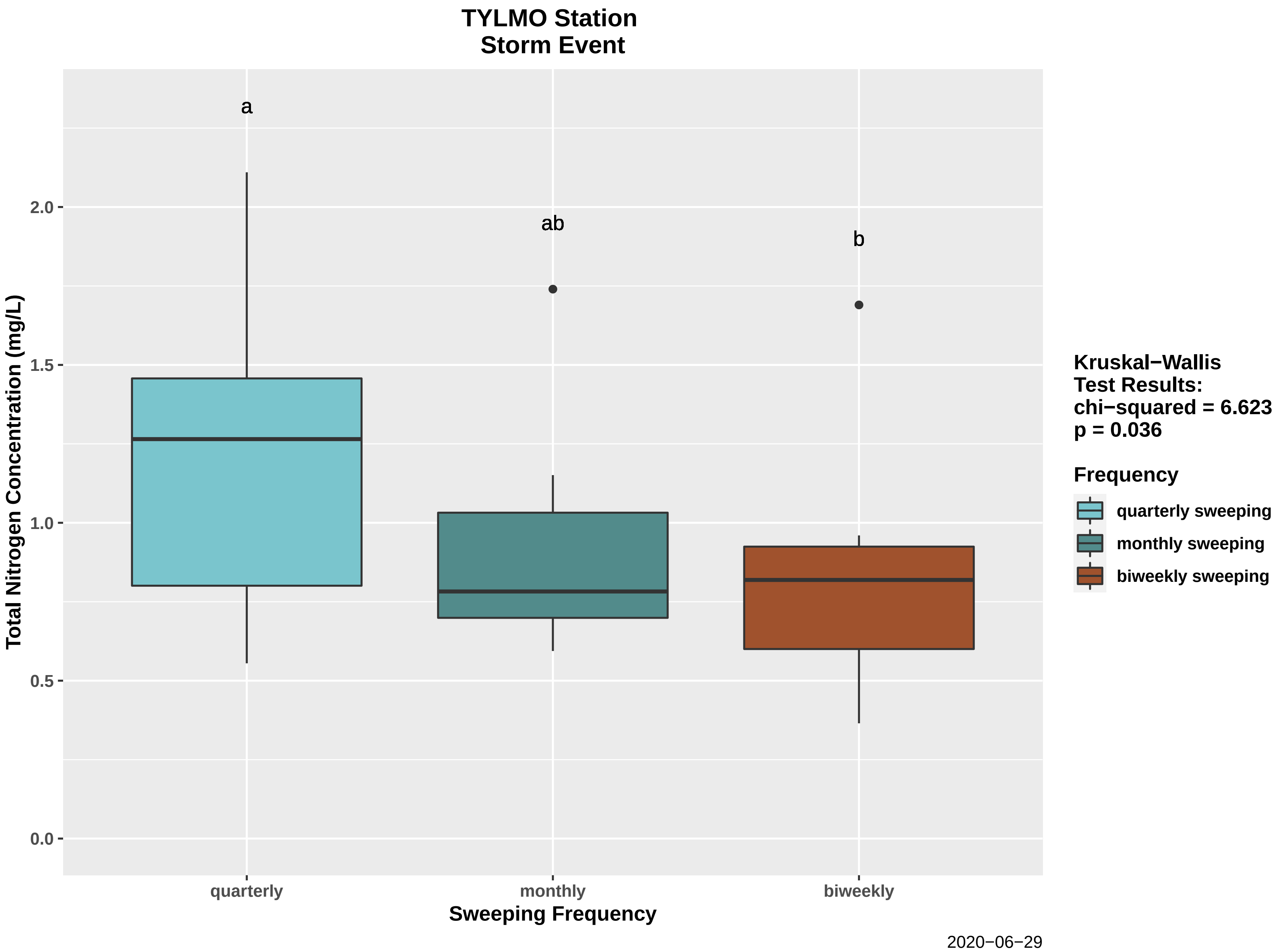

COUMO Station
Storm Event
a
b
b
3
2
1
0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 8.138
p = 0.017
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

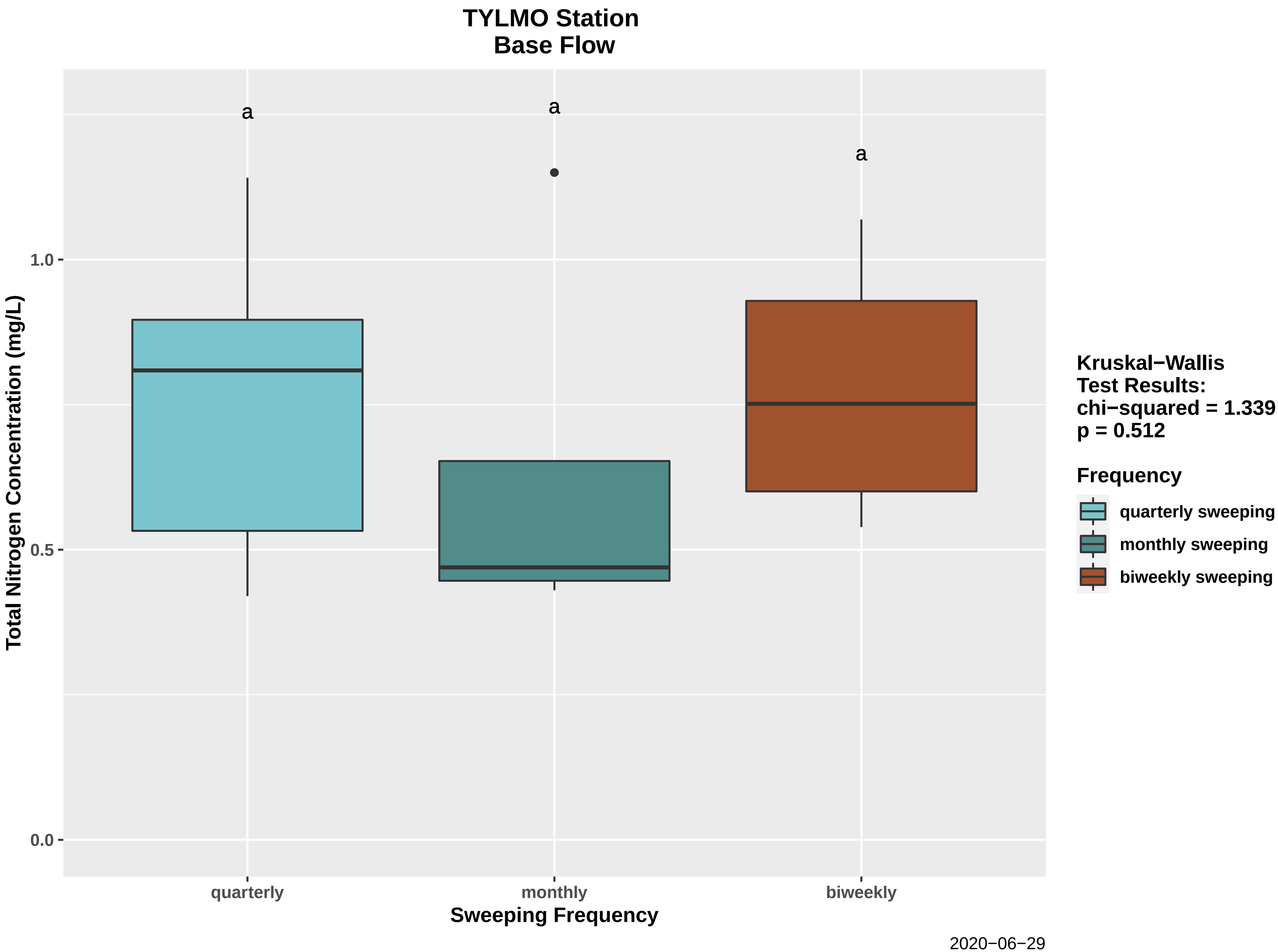

COUMO Station
Base Flow
Total Nitrogen Concentration (mg/L)
0
2
4
6
a
a
a
quarterly
monthly
biweekly
Sweeping Frequency
Kruskal−Wallis
Test Results:
chi−squared = 4.301
p = 0.116
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping
2020−06−29


COUMI Station
Storm Event
a
a
a
10
5
0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 3.574
p = 0.167
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

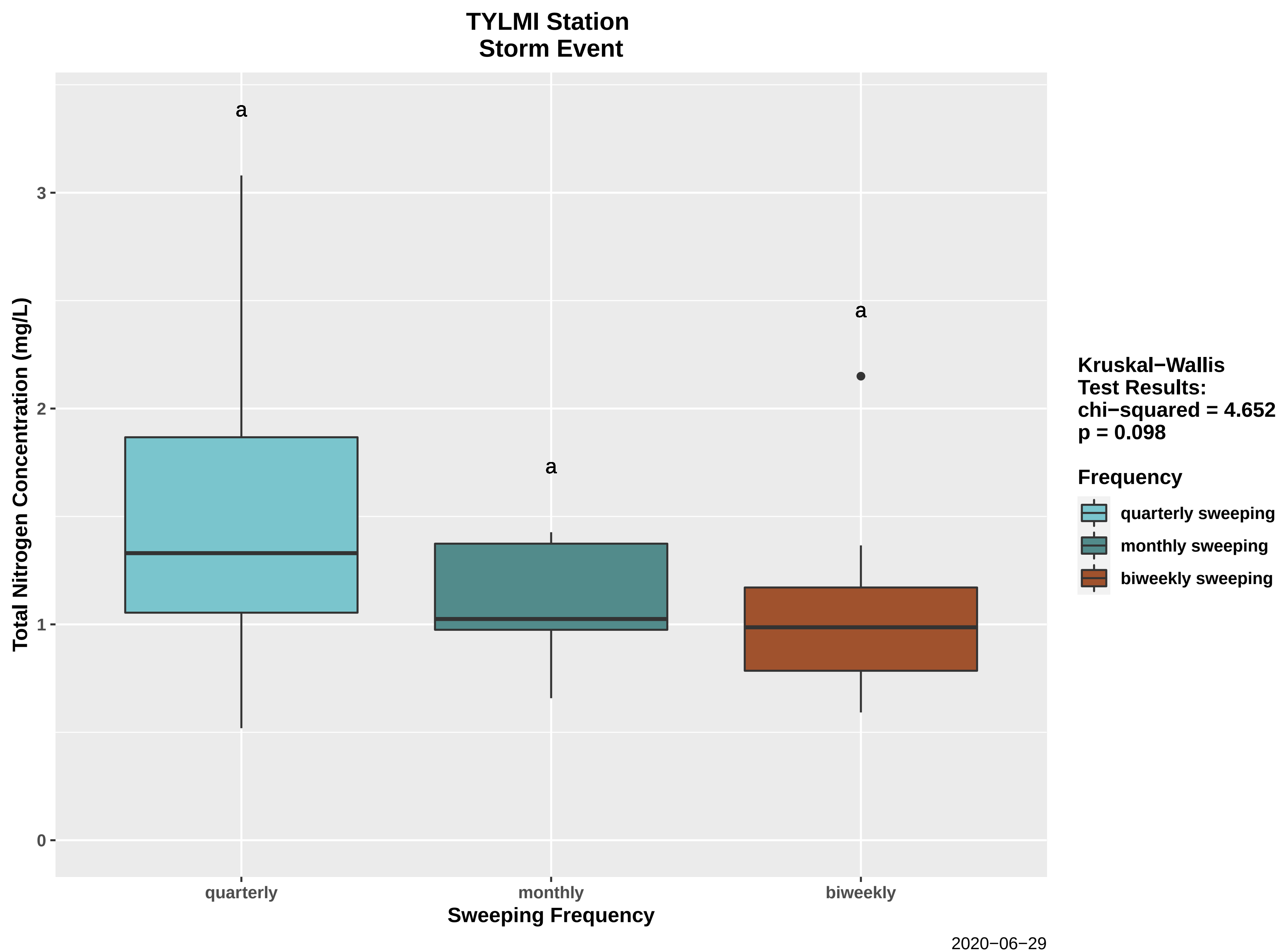


COUMI Station
Base Flow
a
a
a
15
10
5
0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 5.081
p = 0.079
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

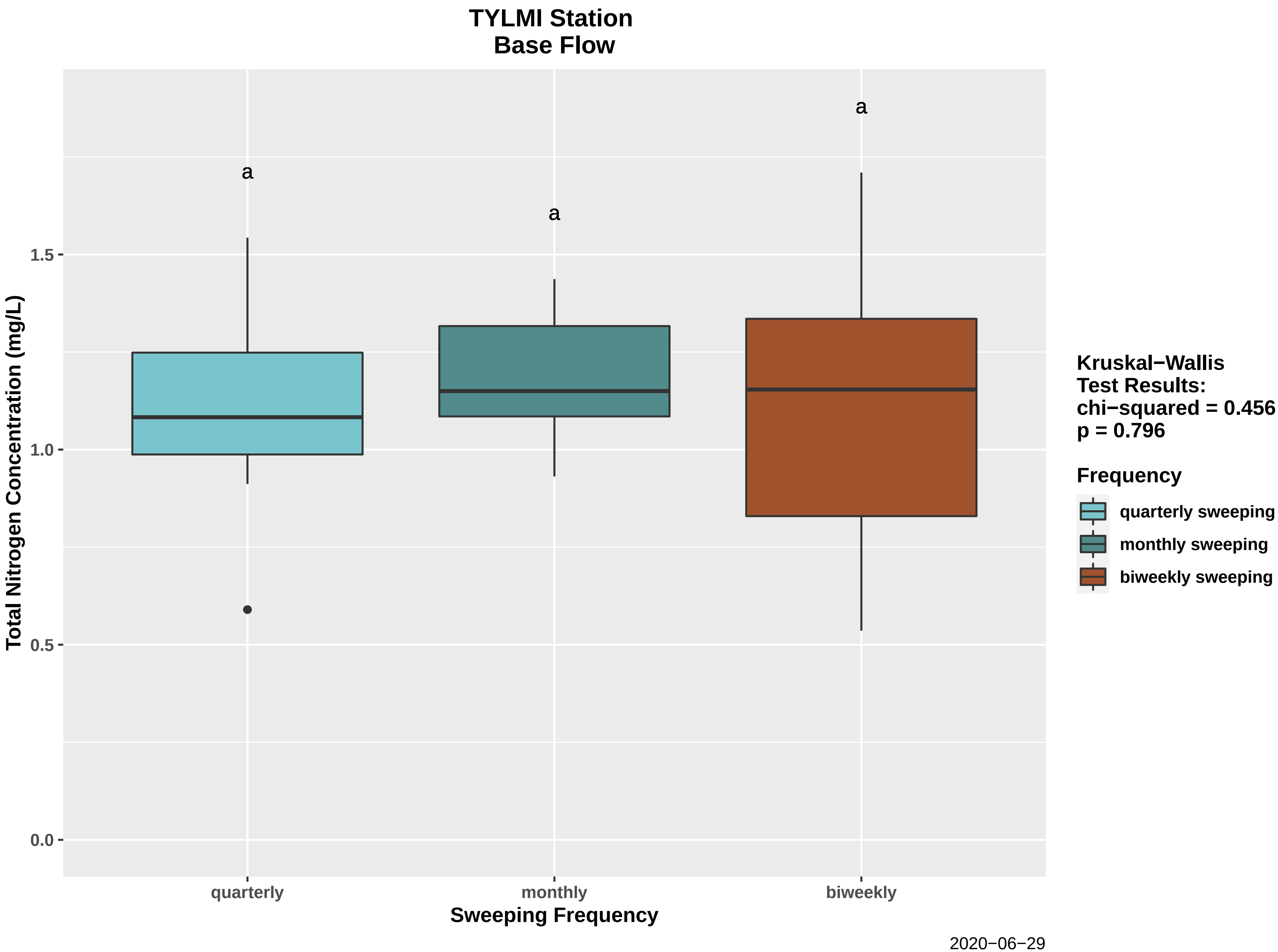

TYLMO Station
Storm Event
a
ab
b
Total Nitrogen Concentration (mg/L)
2.0
1.5
1.0
0.5
0.0
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 6.623
p = 0.036
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping



TYLMO Station
Base Flow
a
a
a
1.0
0.5
0.0
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 1.339
p = 0.512
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping



TYLMI Station
Storm Event
a
a
a
0
1
2
3
Total Nitrogen Concentration (mg/L)
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 4.652
p = 0.098
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping



TYLMI Station
Base Flow
a
a
a
Total Nitrogen Concentration (mg/L)
1.5
1.0
0.5
0.0
quarterly
monthly
biweekly
Sweeping Frequency
2020−06−29
Kruskal−Wallis
Test Results:
chi−squared = 0.456
p = 0.796
Frequency
quarterly sweeping
monthly sweeping
biweekly sweeping

APPENDIX K

Correlation Matrix of Potential Regression Model Variables

Table K-1. **Correlation Matrix Of Potential Regression Model Variables.**

		Taxa Richness Metrics										Percent Land Cover														
	Overall B-IBI Score	Total	Mayfly	Stonefly	Caddisfly	Clinger	Long-Lived	Intolerant	% Dominant	% Predator	% Tolerant	Imp	Canopy	Comm	Res	Ag	Forest	Shrub	Riparian Canopy	Urban Area	% Soils Class C	% Soils Class D	% Soils Class C/D	% Slow Draining Soils	Elev	Slope	Stream Crossings
Overall B-IBI Score	1.00	0.75	0.74	0.76	0.67	0.79	0.77	0.72	0.52	0.56	0.42	-0.16	0.08	-0.13	-0.09	0.09	0.09	0.04	0.14	-0.09	0.10	-0.13	0.03	0.05	0.15	-0.20	-0.08
Total	0.75	1.00	0.63	0.45	0.51	0.69	0.42	0.37	0.54	0.17	0.30	0.03	-0.09	0.03	0.05	0.06	-0.05	-0.03	-0.07	0.05	0.08	-0.15	0.03	0.08	0.11	-0.15	0.15
Mayfly	0.74	0.63	1.00	0.43	0.37	0.61	0.42	0.60	0.38	0.37	0.23	-0.18	0.14	-0.06	-0.17	0.05	0.16	-0.02	0.16	-0.17	0.01	-0.12	-0.03	-0.03	0.17	-0.20	-0.08
Stonefly	0.76	0.45	0.43	1.00	0.50	0.54	0.71	0.55	0.19	0.43	0.24	-0.15	0.10	-0.10	-0.07	-0.04	0.08	0.01	0.20	-0.07	-0.04	-0.09	-0.12	-0.06	0.22	-0.15	-0.22
Caddisfly	0.67	0.51	0.37	0.50	1.00	0.64	0.38	0.53	0.33	0.17	0.09	-0.03	0.02	0.09	0.00	-0.14	0.01	-0.02	0.12	0.01	-0.03	-0.10	-0.10	-0.03	0.10	-0.28	0.10
Clinger	0.79	0.69	0.61	0.54	0.64	1.00	0.59	0.56	0.42	0.16	0.15	-0.12	0.07	-0.07	0.02	0.05	0.01	-0.22	0.04	0.02	-0.05	-0.06	-0.09	0.04	0.13	-0.26	0.30
Long-Lived	0.77	0.42	0.42	0.71	0.38	0.59	1.00	0.61	0.21	0.54	0.18	-0.19	0.14	-0.21	-0.09	0.11	0.13	-0.05	0.20	-0.10	0.16	-0.14	0.09	0.07	0.10	-0.03	-0.24
Intolerant	0.72	0.37	0.60	0.55	0.53	0.56	0.61	1.00	0.16	0.37	0.15	-0.36	0.29	-0.21	-0.28	0.05	0.27	0.08	0.31	-0.28	0.14	-0.09	0.08	0.05	0.11	-0.15	-0.21
% Dominant	0.52	0.54	0.38	0.19	0.33	0.42	0.21	0.16	1.00	0.11	0.16	0.01	-0.10	-0.10	0.07	0.14	-0.06	0.05	-0.20	0.07	0.23	-0.09	0.20	0.25	-0.20	-0.20	0.31
% Predator	0.56	0.17	0.37	0.43	0.17	0.16	0.54	0.37	0.11	1.00	0.25	-0.09	0.06	-0.12	-0.12	0.11	0.11	0.11	0.16	-0.12	0.11	-0.19	0.04	-0.08	0.08	0.02	-0.38
% Tolerant	0.42	0.30	0.23	0.24	0.09	0.15	0.18	0.15	0.16	0.25	1.00	-0.06	-0.08	-0.11	-0.03	0.17	-0.03	0.33	0.02	-0.03	0.06	0.16	0.06	0.07	0.18	0.05	-0.18
Imp	-0.16	0.03	-0.18	-0.15	-0.03	-0.12	-0.19	-0.36	0.01	-0.09	-0.06	1.00	-0.88	0.45	0.93	-0.03	-0.88	-0.31	-0.75	0.93	-0.08	-0.20	-0.09	-0.13	-0.37	-0.09	-0.03
Canopy	0.08	-0.09	0.14	0.10	0.02	0.07	0.14	0.29	-0.10	0.06	-0.08	-0.88	1.00	-0.41	-0.92	-0.31	0.97	-0.05	0.90	-0.93	-0.21	0.18	-0.24	-0.21	0.33	0.02	0.00
Comm	-0.13	0.03	-0.06	-0.10	0.09	-0.07	-0.21	-0.21	-0.10	-0.12	-0.11	0.45	-0.41	1.00	0.31	-0.15	-0.38	-0.04	-0.34	0.33	0.10	-0.20	0.07	0.22	0.08	-0.08	0.19
Res	-0.09	0.05	-0.17	-0.07	0.00	0.02	-0.09	-0.28	0.07	-0.12	-0.03	0.93	-0.92	0.31	1.00	0.15	-0.97	-0.26	-0.83	1.00	-0.01	-0.13	0.02	-0.01	-0.40	-0.10	0.03
Ag	0.09	0.06	0.05	-0.04	-0.14	0.05	0.11	0.05	0.14	0.11	0.17	-0.03	-0.31	-0.15	0.15	1.00	-0.28	0.41	-0.40	0.15	0.51	-0.12	0.68	0.55	-0.13	0.01	-0.07
Forest	0.09	-0.05	0.16	0.08	0.01	0.01	0.13	0.27	-0.06	0.11	-0.03	-0.88	0.97	-0.38	-0.97	-0.28	1.00	0.06	0.88	-0.97	-0.11	0.16	-0.15	-0.13	0.33	0.05	-0.04
Shrub	0.04	-0.03	-0.02	0.01	-0.02	-0.22	-0.05	0.08	0.05	0.11	0.33	-0.31	-0.05	-0.04	-0.26	0.41	0.06	1.00	-0.02	-0.26	0.57	-0.10	0.58	0.54	0.24	0.26	-0.07
Riparian Canopy	0.14	-0.07	0.16	0.20	0.12	0.04	0.20	0.31	-0.20	0.16	0.02	-0.75	0.90	-0.34	-0.83	-0.40	0.88	-0.02	1.00	-0.83	-0.32	0.16	-0.36	-0.36	0.40	0.07	-0.09
Urban Area	-0.09	0.05	-0.17	-0.07	0.01	0.02	-0.10	-0.28	0.07	-0.12	-0.03	0.93	-0.93	0.33	1.00	0.15	-0.97	-0.26	-0.83	1.00	-0.01	-0.14	0.02	-0.01	-0.40	-0.10	0.03
% Soils Class C	0.10	0.08	0.01	-0.04	-0.03	-0.05	0.16	0.14	0.23	0.11	0.06	-0.08	-0.21	0.10	-0.01	0.51	-0.11	0.57	-0.32	-0.01	1.00	-0.05	0.95	0.91	-0.14	0.22	-0.04
% Soils Class D	-0.13	-0.15	-0.12	-0.09	-0.10	-0.06	-0.14	-0.09	-0.09	-0.19	0.16	-0.20	0.18	-0.20	-0.13	-0.12	0.16	-0.10	0.16	-0.14	-0.05	1.00	-0.07	-0.01	0.13	0.09	0.05
% Soils Class C/D	0.03	0.03	-0.03	-0.12	-0.10	-0.09	0.09	0.08	0.20	0.04	0.06	-0.09	-0.24	0.07	0.02	0.68	-0.15	0.58	-0.36	0.02	0.95	-0.07	1.00	0.92	-0.13	0.21	-0.01
% Slow Draining Soils	0.05	0.08	-0.03	-0.06	-0.03	0.04	0.07	0.05	0.25	-0.08	0.07	-0.13	-0.21	0.22	-0.01	0.55	-0.13	0.54	-0.36	-0.01	0.91	-0.01	0.92	1.00	-0.06	0.17	0.17
Elevation	0.15	0.11	0.17	0.22	0.10	0.13	0.10	0.11	-0.20	0.08	0.18	-0.37	0.33	0.08	-0.40	-0.13	0.33	0.24	0.40	-0.40	-0.14	0.13	-0.13	-0.06	1.00	0.49	0.13
Slope	-0.20	-0.15	-0.20	-0.15	-0.28	-0.26	-0.03	-0.15	-0.20	0.02	0.05	-0.09	0.02	-0.08	-0.10	0.01	0.05	0.26	0.07	-0.10	0.22	0.09	0.21	0.17	0.49	1.00	-0.18
Stream Crossings	-0.08	0.15	-0.08	-0.22	0.10	0.30	-0.24	-0.21	0.31	-0.38	-0.18	-0.03	0.00	0.19	0.03	-0.07	-0.04	-0.07	-0.09	0.03	-0.04	0.05	-0.01	0.17	0.13	-0.18	1.00

Values in red are significantly correlated ($\alpha = 0.10$)