# Deer Creek CSI Project Report

## Deer Creek
## St. Louis County, Missouri

## March 2021 – February 2022

Prepared for:

Missouri Department of Natural Resources
Division of Environmental Quality
Water Protection Program
Water Pollution Control Branch

Prepared by:

Missouri Department of Natural Resources
Division of Environmental Quality
Environmental Services Program
Water Quality Monitoring Section

## Table of Contents

## 1.0 Introduction

Throughout the years 2021 and 2022, Randy Sarver of the Department's Environmental Services Program (**ESP**), Water Quality Monitoring Section (**WQMS**) coordinated a Cooperative Stream Investigation (**CSI**) project to assist the Missouri Department of Natural Resources (**Department**), Water Protection Program (**WPP**) and the Missouri Botanical Garden, Deer Creek Watershed Alliance in collecting total nitrogen, total phosphorus, *E. coli*, chloride, and discharge data from Deer Creek, St. Louis County, Missouri.

## 2.0 Study Area

The Deer Creek CSI Project focused on the upper part of the Deer Creek watershed along a 0.9 mile Class C segment of the Water Body Identification (**WBID**) number 4078. In addition, two unnamed tributaries were also monitored.

Designated recreational uses for Deer Creek WBID 4078 are listed as Whole Body Contact – Class B (**WBC-B**) and Secondary Contact Recreation (**SCR**). The Missouri Water Quality Standard (**WQS**) *E. coli* criterion for WBC-B is 206/100ml Most Probable Number (**MPN**); and SCR is 1134/100 ml MPN. The WBC-B *E. coli* criterion is based on a geomean of at least five samples collected during the recreational season (April 1 – October 31). WBID 4078 is also designated for Protection of Aquatic Life.

The unnamed tributary where Site 4078/5.9/0.1 was located is not a classified stream in the Missouri Use Designation Dataset dataset. Since it is considered an unclassified stream, only general water quality criteria apply to this stream reach.

The unnamed tributary where Site 4078/6.4/0.1 was located is not a classified stream in the MUDD dataset. Since it is considered an unclassified stream, only general water quality criteria apply to this stream reach. It should also be noted that much of the tributary is currently dammed to form a lake.

### 2.1 Site Descriptions

Sampling was conducted at five locations in the upper Deer Creek watershed. See Figure 1 for a map of site locations.

Site 4078/5.9/0.1 is located on an unnamed tributary to Deer Creek, approximately 170 meters SW from the end of Mosley Road. The site was established with the goal of acting as a control site, since it is outside the southern edge of the DC-02 BMP implementation area. The DC-02-BMP is one of the best-management practice focal areas of the Deer Creek Alliance watershed project. It is identified by the red outline in Figure 1. GIS map derived UTM coordinates are: 723615 Easting and 4280881 Northing.

Site 4078/6.0 is located on Deer Creek (WBID 4078), approximately 150 meters SW from the end of Mosley Road. The site was established with the goal of evaluating pollutants leaving DC-

02. GIS map derived UTM coordinates are: 723624 Easting and 4280896 Northing.

Site 4078/6.4/0.1 is located on an unnamed tributary to Deer Creek, approximately 100 meters downstream from the Westchester Lake outfall. The site was established with the goal of evaluating pollutants contributed from Westchester Lake watershed. GIS map derived UTM coordinates are: 723203 Easting and 4281462 Northing.

Site 4078/6.5 is located on Deer Creek (WBID 4078), approximately 20 meters upstream from the mouth of the unnamed tributary draining from Westchester Lake. The site was established with the goal of evaluating pollutants from the mid-reach of Deer Creek in DC-02. GIS map derived UTM coordinates are: 723202 Easting and 4281473 Northing.

Site 4078/6.7 is located on Deer Creek (WBID 4078), approximately 75 meters upstream from Ladue Road. The site was established with the goal of evaluating pollutants from the upper-reach of Deer Creek in DC-02. GPS derived UTM coordinates are: 722998 Easting and 4281687 Northing; with 5.0 meter accuracy.

## 3.0 Methods

### 3.1 Sample Collection

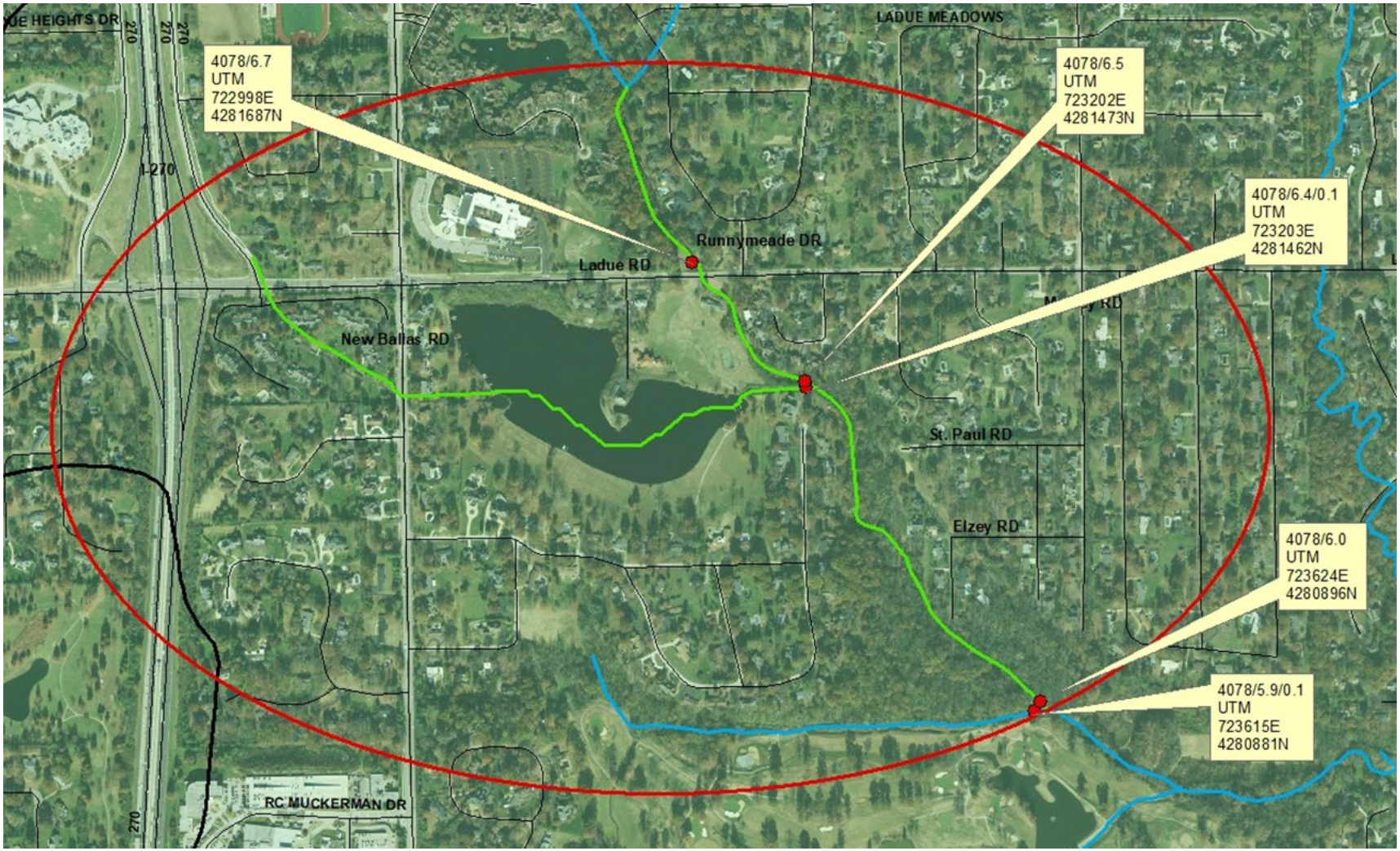
Ms. Stacy Arnold and Mr. Steve McCarthy carried out all sample collection and stream discharge measurements as detailed in the Deer Creek CSI Project Plan that was finalized in January 2021 (a copy of the project plan is available from the author of this report upon request). Ms. Arnold is a Stream Team, Level 3, Volunteer Water Quality Monitoring (**VWQM**) Program volunteer, a member of Stream Team's 2926 & 4149, serves on the Board of Stream Teams United, and works as the Rainscaping & Deer Creek Watershed Initiative Coordinator for the Missouri Botanical Garden. Mr. McCarthy is a Stream Team, Level 3, VWQM volunteer with Stream Team 5099.

All samples were collected in accordance with the Department's Standard Operating Procedures (**SOP**) MDNR-ESP-001 (Required/Recommended Containers, Volume, Preservatives, Holding Times, and Special Sampling Considerations) and SOP MDNR-ESP-005, (General Sampling Considerations Including the Collection of Grab, Composite, and Modified Composite Samples from Stream and Wastewater Flows).

### 3.2 Chain-of-Custody

In accordance with Department's SOP MDNR-ESP-002 (Field Sheet and Chain-of-Custody Record) all samples received a numbered label and were placed on ice in a cooler. The corresponding label number was entered onto a chain-of-custody form indicating the date, time and location of collection, discharge measurements, and parameter to be analyzed. The VWQM volunteer sample collector maintained sample custody until total nitrogen, total phosphorus, and chloride samples were delivered to the Missouri Department of Health courier shipping location,

**Figure 1 - Deer Creek CSI Project Sampling Locations and DC-02 BMP Focus Area (area outlined in red)**



or until *E. coli* samples were delivered to Ms. Elisa Edge at the Department's Route 66 State Park satellite office.

### 3.3 Discharge Measurements

When possible, stream discharge was measured at all locations using a Hach FH950 portable flow meter. Measurements were taken across the most practicable section of stream of the sampling stations. Discharge measurements followed Department SOP MDNR-ESP-113 (Flow Measurements in Open Channels).

### 3.4 Sample Analyses

Water samples collected for *E. coli* were analyzed by Ms. Elisa Edge, an Environmental Analyst with ESP, for MPN per 100 milliliter using the IDEXX Colilert method. Bacterial sample analysis followed Department SOP MDNR-ESP-109 (Analysis of *E. coli* and Total Coliforms Using IDEXX Colilert and Quanti-Tray Test Method, based on United States Environmental Protection Agency methods).

Water samples collected for Chloride were analyzed by the ESP, Chemical Analyses Section (CAS) using the standard analytical method: L 10-117-07-1-A; Mercuric Thiocyanate Flow Injection Analysis.

Water samples collected for Total Phosphorus were analyzed by the ESP CAS using the analytical method: NCASI TNTP-W10900 - Modified by ESP.

Water samples collected for Total Nitrogen were analyzed by the ESP CAS using the analytical method: USGS I-4650-03 - Modified by ESP.

### 3.5 Quality Assurance/Quality Control (QA/QC)

#### 3.5.1 QA/QC Methods

Sample collections, discharge measurements, and sample analyses were conducted in accordance with the applicable SOPs.

#### 3.5.2 QA/QC Results

The project plan included QA objectives of conducting one field audit during the project and QC objectives of collecting and analyzing duplicates for at least 10% of all samples, plus analyzing negative controls for each set of *E. coli* samples.

The field audit was conducted on August 18, 2021. The results of the field audit were satisfactory. A copy is available from the report author upon request.

Field duplicate samples were collected for 20% (6 duplicates of 30 samples) of the *E. coli* samples (see Appendix A). A precision criterion for duplicates was calculated based on the formula in Standard Method for Examination of Water and Wasterwater (22nd Edition), Microbial Examination, QA/QC, Section 9.0 (e). The criterion value for a fiscal year is based on 15 samples collected by ESP, WQMS personel. After each set of samples was analyzed, a |R| value was calculated for each pair of duplicate sample results for comparison to the criterion. The value |R| is an absolute value calculated by subtracting the *logrithm* of each duplicate sample from the *logrithm* of the original sample. No *E. coli* duplicate sample |R| values exceeded the calculated criterion (FY 2021 = 0.33; FY 2022 = 0.26) (also see Appendix A).

All *E. coli* negative controls achieved results of <1.0/100 ml MPN (also see Appendix A).

Field duplicate samples were collected for 20% (13 of 65 samples) of Total Nitrogen and Total Phosphorus samples (see Appendix C for Total Nitrogen and Appendix E for Total Phosphorus results). Total Nitrogen exceeded the 20% relative difference criterion on two occasions and Total Phosphorus on three occasions. Audits for all exceedances were performed and attributed to the ease of exceeding 20% relative difference between duplicates when concentrations are low.

Field duplicate samples were also collected for 20% (6 of 30 samples) of the chloride samples (see Appendix H). No duplicate samples for chloride exceeded the 20% relative difference criterion.

## 4.0 Data Results

Please refer to Appendix A for *E. coli* results, Appendix C for Total Nitrogen results, Appendix E for Total Phosphorus results, Appendix G for chloride results, and Appendix I for discharge calculations.

## 5.0 Data Analysis

The major objectives of the Deer Creek CSI Project were to provide monitoring and baseline data in support of the Missouri Botanical Garden, Deer Creek Watershed Alliance project to install vegetative best management practices; and to develop source tracking information for all monitored water quality parameters.

Standard analysis for *E. coli* data is the calculation of the geometric mean (**geomean**) of samples taken from a WBID, with a minimum of five samples taken during the recreational season within a single year (see below and Appendix A). Additional data analysis of maximum and minimum *E. coli* values were performed to help visualize the variability of *E. coli* loading to the stream (see Appendix A and B).

The *E. coli* geomean of samples collected during this project were as follows:

- Site 4078/5.9/0.1 = 464.3/100 ml MPN (n=6)
- Site 4078/6.0 = 663.0/100 ml MPN (n=6)
- Site 4078/6.4/0.1 = 96.6/100 ml MPN (n=6)
- Site 4078/6.5 = 857.4/100 ml MPN (n=6)
- Site 4078/6.7 = 1358.3/100 ml MPN (n=6)
- Overall geomean for the (3) sites on WBID 4078 = 917.4/100 ml MPN (n=18)

Discharge data (see Appendix I) was also collected from all sampling stations (except January 2022) during sampling events to assist in estimating load calculations for Deer Creek.

Overall averages were also calculated for total nitrogen, total phosphorus, and chloride results from each station (see Appendix C for Total Nitrogen results; Appendix E for Total Phosphorus results; Appendix G for chloride results).

## 6.0 Discussion

The 2021 overall recreational season *E. coli* geomean result (917.4/100 ml MPN) for the main stem Deer Creek WBID 4078 exceeded the WBC-B *E. coli* criterion (206/100 ml MPN). Additionally, when individual main stem Deer Creek sampling station geomeans are compared there is an increasing trend of *E. coli* concentration in an upstream direction.

The unclassified stream segment where Site 4078/5.9/0.1 was located also had elevated *E. coli* results (geomean = 464.3/100 ml MPN). The unclassified tributary where Site 4078/6.4/0.1 was located did not have elevated *E. coli* results.

The results of Total Nitrogen sampling indicates that the highest concentrations came from the two tributaries where Site 4078/5.9/0.1 and Site 4078/6.4/0.1 were located. The lowest Total Nitrogen came from the main stem site 4078/6.5.

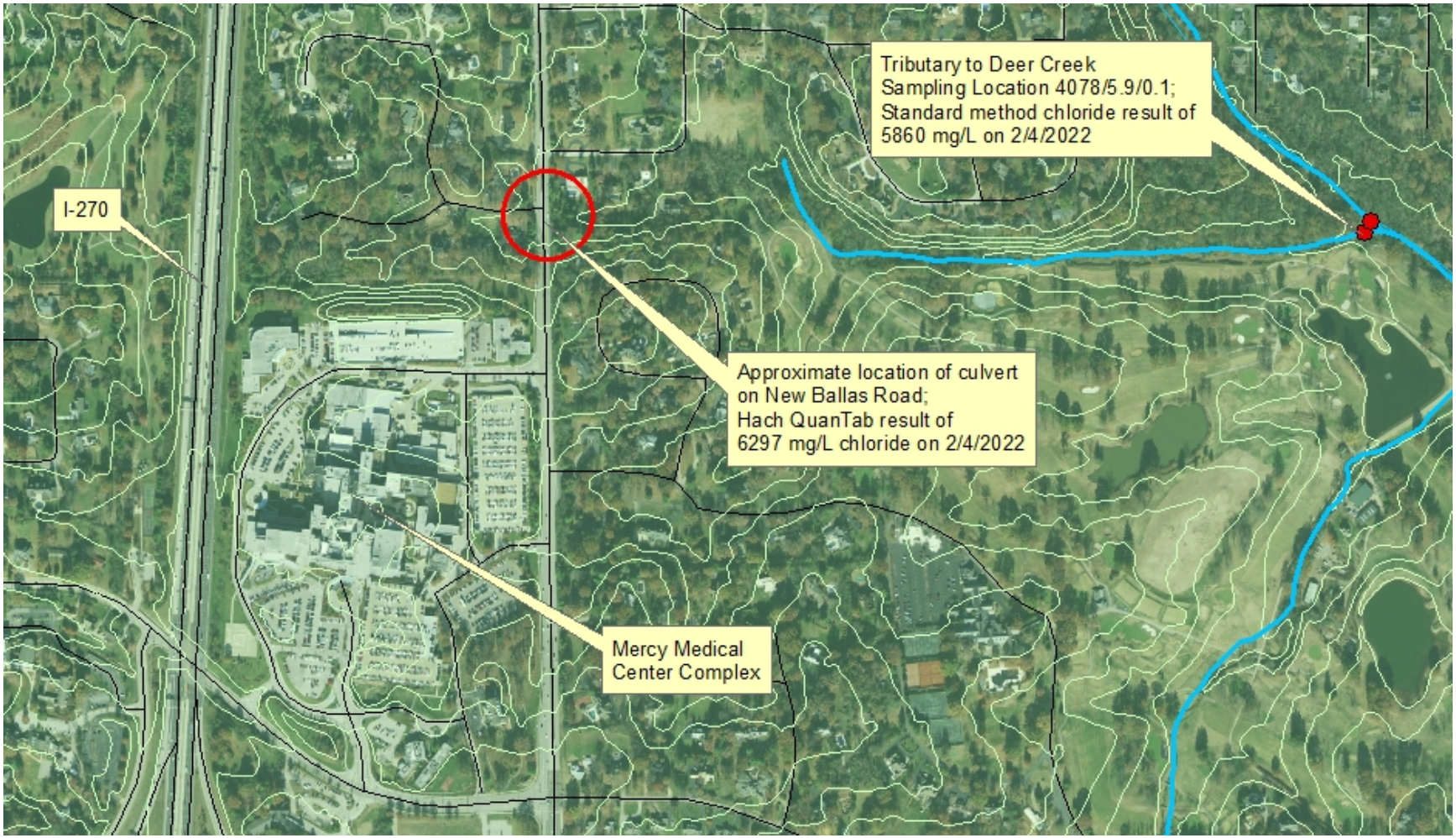
The results of Total Phosphorus sampling indicates that highest concentration came from the tributary where Site 4078/6.4/0.1 was located and the lowest concentrations came from the tributary where Site 4078/5.9/0.1 was located.

The acute toxicity WQS criterion for chloride (860 mg/L) was exceeded in WBID 4078 on February 4, 2022 and February 23, 2022. The chronic toxicity WQS criterion for chloride (230 mg/L) was additionally exceeded in WBID 4078 on January 9, 2022, and January 27, 2022.

Of special note are the results (see Appendix H) from the unclassified stream segment where Site 4078/5.9/0.1 was located. Chloride concentrations exceeded 860 mg/L on January 9, 2022, February 4, 2022, and February 23, 2022; concentrations reached extreme levels of 5860.0 mg/L on February 4, 2022.

On February 4, 2022, Mr. McCarthy tested additional locations using high range Hach Quantab chloride strips. Hach chloride QuanTab strips are used by the VWQM Program for screening surface water chloride from de-icing activities. At the New Ballas Road culvert, the unclassified stream segment mentioned in the previous paragraph had chloride concentrations of approximately 6297 mg/L. The unclassified stream watershed drains urban neighborhoods; a golf course; I-270; and the grounds of the Mercy Medical Center. However, the New Ballas Road culvert is in the upper part of the unclassified stream watershed, and predominantly drains a small residential area, I-270 and the Mercy Medical Center (see Figure 2).

Figure 2 - Unclassified stream watershed with contour markings, location of Sampling Site 4078/5.9/0.1, and New Ballas Road culvert



Submitted by: Randy Sarver

Randy Sarver
Environmental Scientist
Water Quality Monitoring Unit
Environmental Services Program

Date: June 21, 2022

Approved by: Scott Robinett

Scott Robinett
Water Quality Monitoring Section Chief
Environmental Services Program

SR:rsh

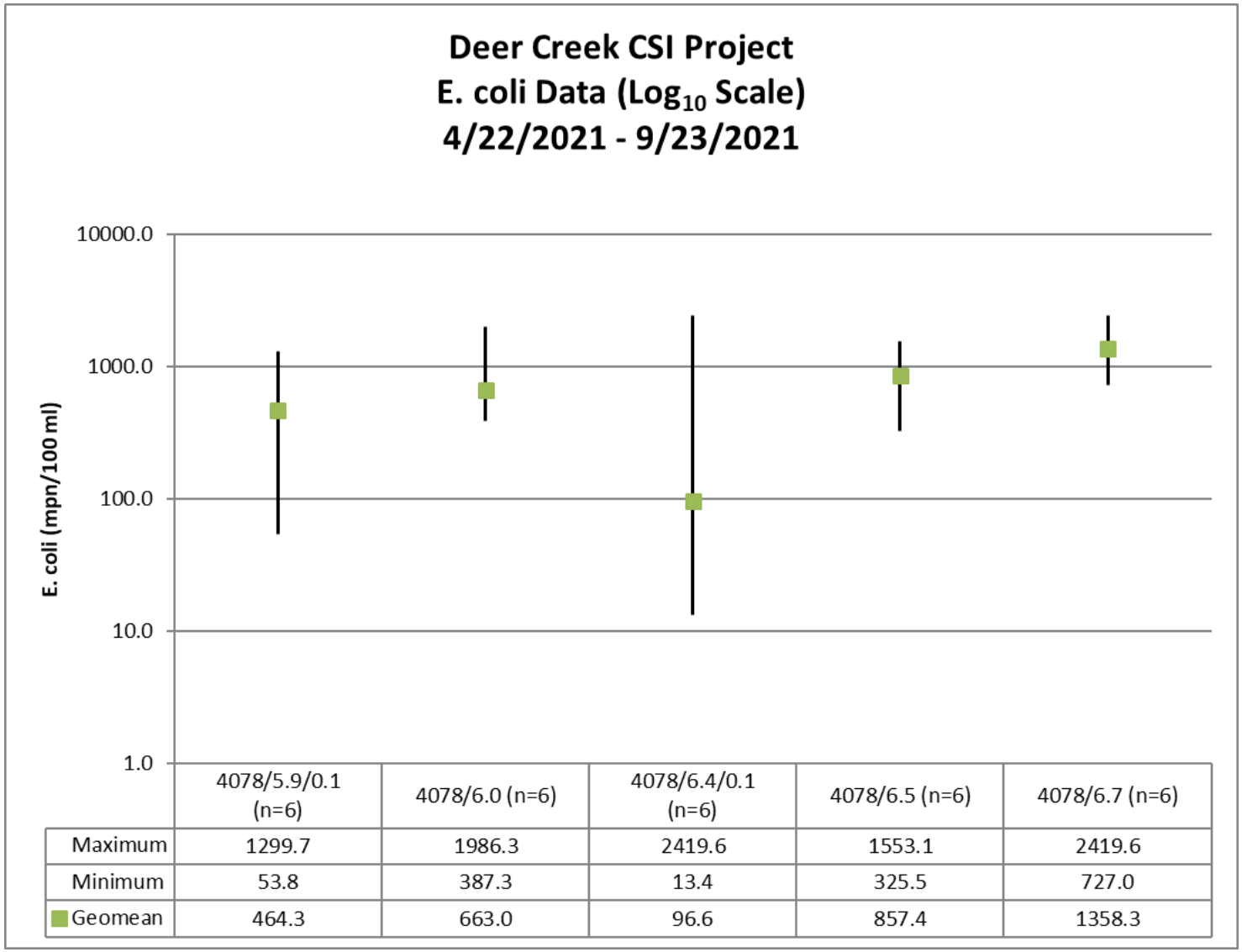
c: Robert Voss, Water Protection Program
Mike Kruse, Water Protection Program
Dorothy Franklin, Saint Louis Regional Office

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
December 2018 – October 2019
Appendix A – Deer Creek *E. coli* Data

| Sampling Date | Site 4078/5.9/0.1 *E. coli* Results (MPN/100 ml) | Site 4078/6.0 *E. coli* Results (MPN/100 ml) | Site 4078/6.4/0.1 *E. coli* Results (MPN/100 ml | Site 4078/6.5 *E. coli* Results (MPN/100 ml) | Site 4078/6.7 *E. coli* Results (MPN/100 ml) | Duplicate Sample Result | Duplicate Sample Site | *Duplicate Average | Negative Control Results | \|R\| for Duplicate Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22/2021 | 53.8 | 727.0 | **21.6** | 1203.3 | 727.0 | **25.3** | 4078/6.4/0.1 | 23.5 | <1.0 | 0.07 |
| 5/20/2021 | 201.4 | **1553.1** | 248.1 | 1413.6 | 1732.9 | **1986.3** | 4078/6.0 | 1769.7 | <1.0 | 0.11 |
| 6/24/2021 | **1046.2** | 517.2 | 2419.6 | 365.4 | 1203.3 | **1203.3** | 4078/5.9/0.1 | 1124.8 | <1.0 | 0.06 |
| 7/29/2021 | 920.8 | 488.4 | 156.5 | **325.5** | 1203.3 | **461.1** | 4078/6.5 | 393.3 | <1.0 | 0.15 |
| 8/18/2021 | 686.7 | 387.3 | 13.4 | 1046.2 | **1553.1** | **2419.6** | 4078/6.7 | 1986.4 | <1.0 | 0.19 |
| 9/23/2021 | 1299.7 | **579.4** | 27.5 | 1553.1 | 1732.9 | **770.1** | 4078/6.0 | 674.8 | <1.0 | 0.12 |
| Maximum | 1299.7 | 1986.3 | 2419.6 | 1553.1 | 2419.6 | | | | | |
| Minimum | 53.8 | 387.3 | 13.4 | 325.5 | 727.0 | | | | | |
| Geomean | 464.3 | 663.0 | 96.6 | 857.4 | 1358.3 | | | | | |
| n | 6 | 6 | 6 | 6 | 6 | | | | | |

**Bold** = duplicate sample values
*Duplicate Average used to calculate geomean

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix B – Deer Creek *E. coli* Graph of Data



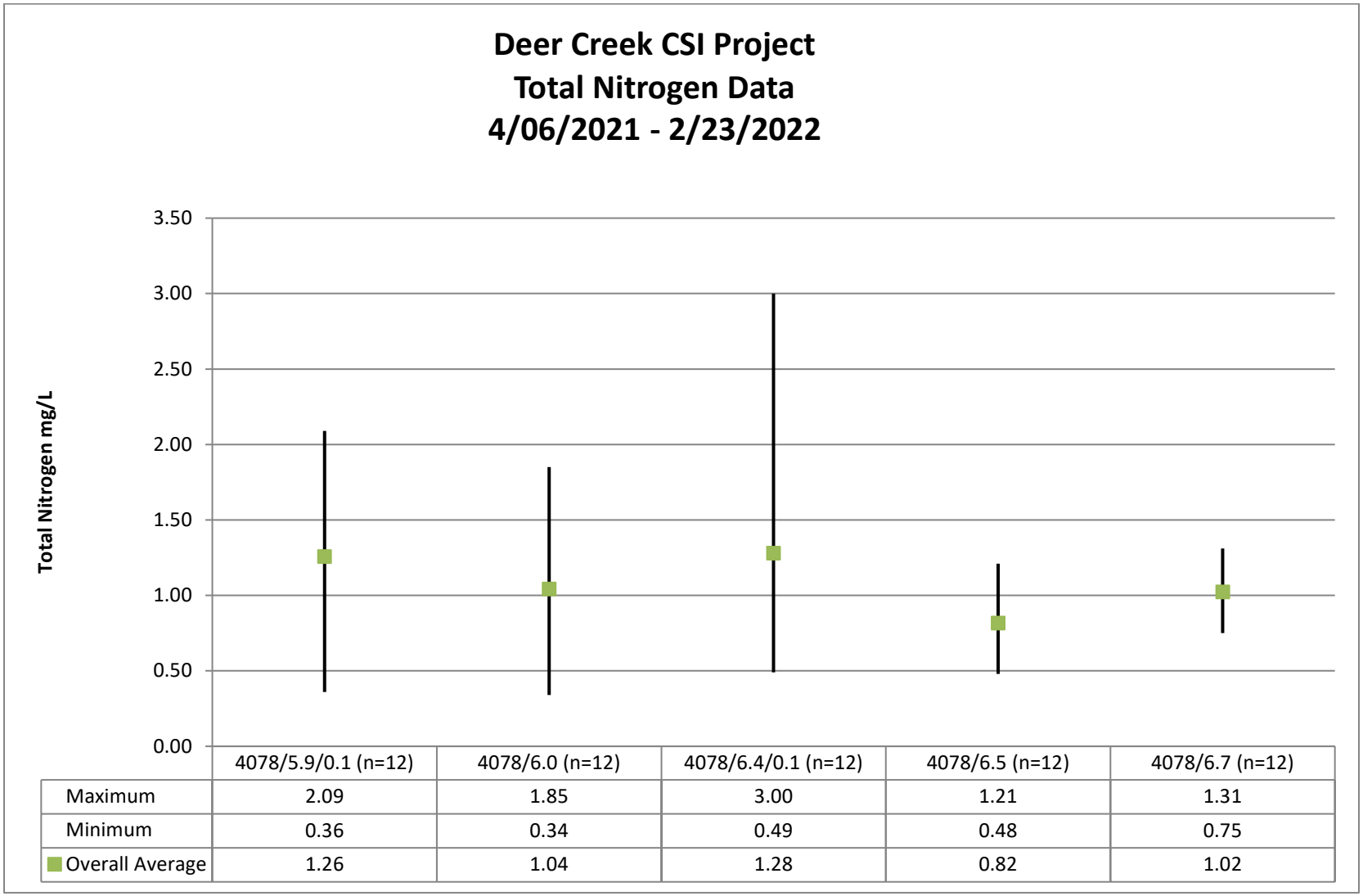

| | 4078/5.9/0.1 (n=6) | 4078/6.0 (n=6) | 4078/6.4/0.1 (n=6) | 4078/6.5 (n=6) | 4078/6.7 (n=6) |
|---|---|---|---|---|---|
| Maximum | 1299.7 | 1986.3 | 2419.6 | 1553.1 | 2419.6 |
| Minimum | 53.8 | 387.3 | 13.4 | 325.5 | 727.0 |
| Geomean | 464.3 | 663.0 | 96.6 | 857.4 | 1358.3 |

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix C – Deer Creek Total Nitrogen Data

| Sampling Date | Site 4078/5.9/0.1 Total Nitrogen Results (mg/L) | Site 4078/6.0 Total Nitrogen Results (mg/L) | Site 4078/6.4/0.1 Total Nitrogen Results (mg/L) | Site 4078/6.5 Total Nitrogen Results (mg/L) | Site 4078/6.7 Total Nitrogen Results (mg/L) | Duplicate Value | *Duplicate Average | Duplicate Site |
|---|---|---|---|---|---|---|---|---|
| 4/6/2021 | 0.36 | 0.34 | 0.99 | 0.48 | **0.85** | **0.78** | 0.82 | 4078/6.7 |
| 4/22/2021 | 2.09 | 0.53 | **0.65** | 0.57 | 0.75 | **0.68** | 0.67 | 4078/6.4/0.1 |
| 5/20/2021 | 1.22 | **0.78** | 0.49 | 1.21 | 1.16 | **0.79** | 0.79 | 4078/6.0 |
| 6/24/2021 | **1.20** | 1.37 | 2.02 | 1.04 | 1.31 | **1.57** | 1.39 | 4078/5.9/0.1 |
| 7/29/2021 | 0.96 | 0.67 | 0.76 | **0.79** | 0.98 | **0.79** | 0.79 | 4078/6.5 |
| 8/18/2021 | 0.89 | 1.09 | 1.17 | 0.84 | **0.99** | **1.02** | 1.01 | 4078/6.7 |
| 9/23/2021 | 1.38 | **1.42** | 3.00 | 1.01 | 1.14 | **1.40** | 1.41 | 4078/6.0 |
| 11/10/2021 | 1.64 | 1.85 | 2.17 | **0.63** | 1.19 | **0.65** | 0.64 | 4078/6.5 |
| 11/23/2021 | 0.91 | 1.28 | 2.16 | 0.65 | **1.08** | **1.09** | 1.09 | 4078/6.7 |
| 12/22/2021 | 1.02 | 0.83 | **1.30** | 1.28 | 1.01 | **0.87** | 1.09 | 4078/6.4/0.1 |
| 1/27/2022 | 1.05 | **1.22** | 1.18 | 1.54 | 1.72 | **1.22** | 1.22 | 4078/6.0 |
| 2/23/2022 | 0.93 | 0.97 | 1.11 | **0.95** | 1.16 | **0.96** | 0.96 | 4078/6.5 |
| Maximum | 2.09 | 1.85 | 3.00 | 1.21 | 1.31 | | | |
| Minimum | 0.36 | 0.34 | 0.49 | 0.48 | 0.75 | | | |
| Overall Average | 1.26 | 1.04 | 1.28 | 0.82 | 1.02 | | | |
| n | 12 | 12 | 12 | 12 | 12 | | | |

**Bold** = duplicate sample values

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix D – Deer Creek Total Nitrogen Graph of Data



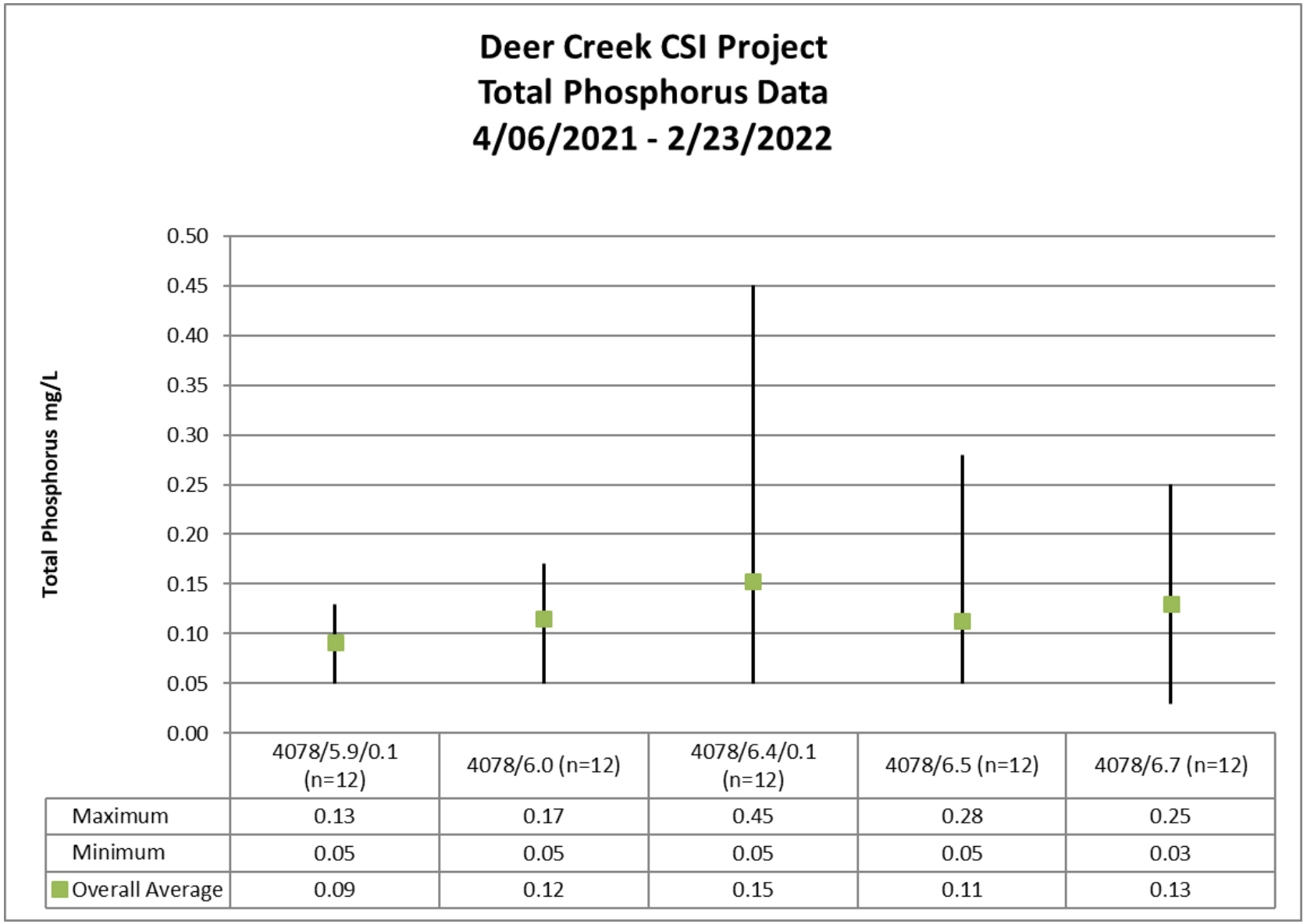

| | 4078/5.9/0.1 (n=12) | 4078/6.0 (n=12) | 4078/6.4/0.1 (n=12) | 4078/6.5 (n=12) | 4078/6.7 (n=12) |
|---|---|---|---|---|---|
| Maximum | 2.09 | 1.85 | 3.00 | 1.21 | 1.31 |
| Minimum | 0.36 | 0.34 | 0.49 | 0.48 | 0.75 |
| Overall Average | 1.26 | 1.04 | 1.28 | 0.82 | 1.02 |

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix E – Deer Creek Total Phosphorus Data

| Sampling Date | Site 4078/5.9/0.1 Total Phosphorus Results (mg/L) | Site 4078/6.0 Total Phosphorus Results (mg/L) | Site 4078/6.4/0.1 Total Phosphorus Results (mg/L) | Site 4078/6.5 Total Phosphorus Results (mg/L) | Site 4078/6.7 Total Phosphorus Results (mg/L) | Duplicate Value | *Duplicate Average | Duplicate Site |
|---|---|---|---|---|---|---|---|---|
| 4/6/2021 | <0.01 | <0.01 | 0.11 | <0.01 | **0.03** | **<0.01** | NA | 4078/6.7 |
| 4/22/2021 | 0.05 | 0.06 | **0.05** | 0.05 | 0.06 | **0.06** | 0.06 | 4078/6.4/0.1 |
| 5/20/2021 | 0.09 | **0.09** | 0.08 | 0.13 | 0.12 | **0.09** | 0.09 | 4078/6.0 |
| 6/24/2021 | **0.08** | 0.11 | 0.45 | 0.13 | 0.19 | **0.13** | 0.11 | 4078/5.9/0.1 |
| 7/29/2021 | 0.08 | 0.11 | 0.08 | **0.06** | 0.07 | **0.10** | 0.08 | 4078/6.5 |
| 8/18/2021 | 0.11 | 0.15 | 0.15 | 0.15 | **0.16** | **0.16** | 0.16 | 4078/6.7 |
| 9/23/2021 | 0.09 | **0.17** | 0.31 | 0.28 | 0.25 | **0.17** | 0.17 | 4078/6.0 |
| 11/10/2021 | 0.10 | 0.15 | 0.16 | **0.07** | 0.10 | **0.09** | 0.08 | 4078/6.5 |
| 11/23/2021 | 0.09 | 0.10 | 0.09 | 0.10 | **0.16** | **0.16** | 0.16 | 4078/6.7 |
| 12/22/2021 | 0.05 | 0.07 | **0.07** | 0.05 | 0.11 | **0.08** | 0.08 | 4078/6.4/0.1 |
| 1/27/2022 | 0.03 | **0.04** | 0.07 | 0.07 | 0.07 | **0.05** | 0.05 | 4078/6.0 |
| 2/23/2022 | 0.07 | 0.07 | <0.01 | **0.07** | 0.09 | **0.07** | 0.07 | 4078/6.5 |
| Maximum | 0.13 | 0.17 | 0.45 | 0.28 | 0.25 | | | |
| Minimum | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 | | | |
| Overall Average | 0.09 | 0.12 | 0.15 | 0.11 | 0.13 | | | |
| n | 12 | 12 | 12 | 12 | 12 | | | |

**Bold** = duplicate sample values

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix F – Deer Creek Total Phosphorus Graph of Data



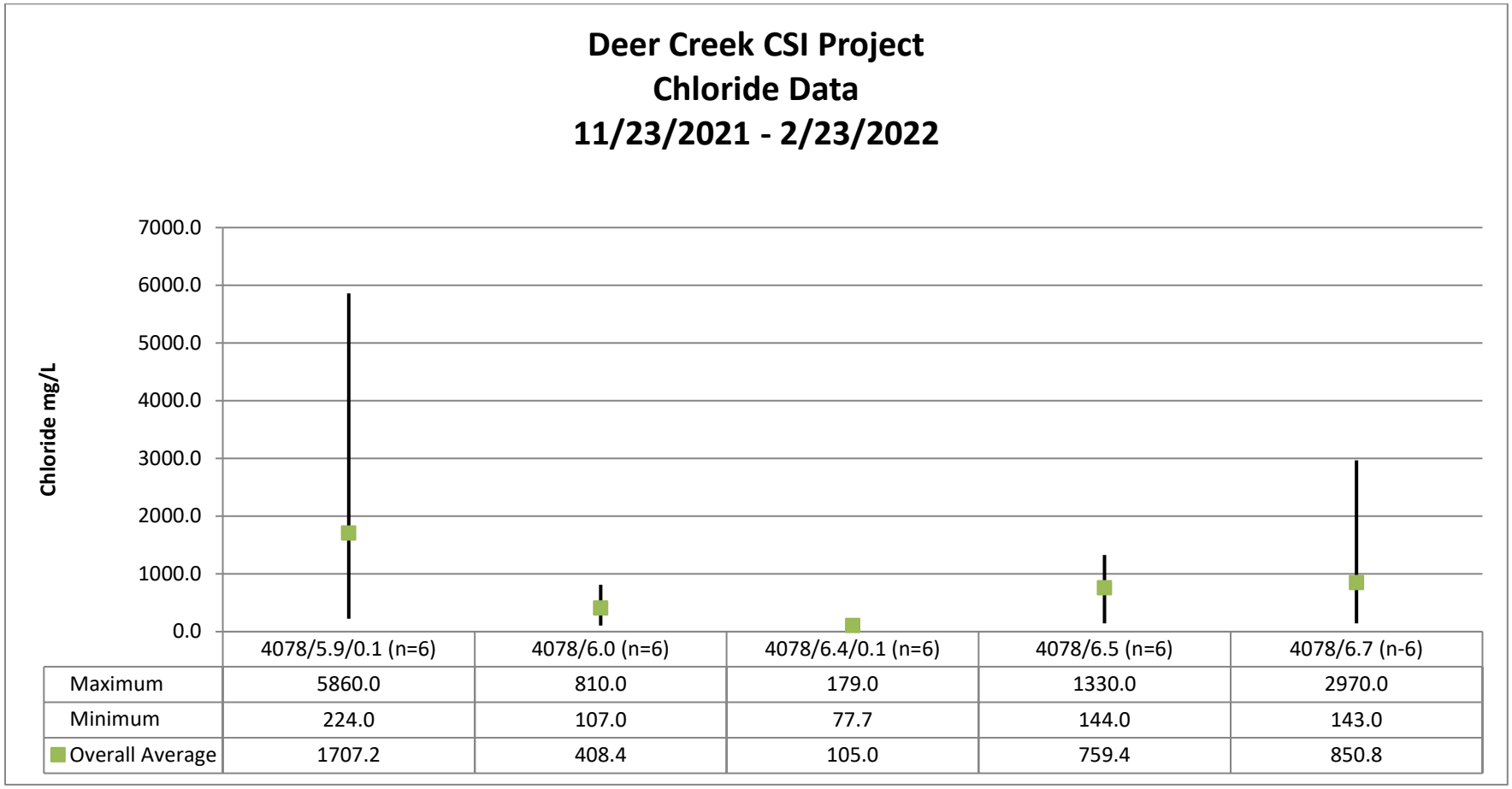

| | 4078/5.9/0.1 (n=12) | 4078/6.0 (n=12) | 4078/6.4/0.1 (n=12) | 4078/6.5 (n=12) | 4078/6.7 (n=12) |
|---|---|---|---|---|---|
| Maximum | 0.13 | 0.17 | 0.45 | 0.28 | 0.25 |
| Minimum | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 |
| Overall Average | 0.09 | 0.12 | 0.15 | 0.11 | 0.13 |

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix H – Deer Creek Chloride Graph of Data

| Sampling Date | Site 4078/5.9/0.1 Chloride Results (mg/L) | Site 4078/6.0 Chloride Results (mg/L) | Site 4078/6.4/0.1 Chloride Results (mg/L) | Site 4078/6.5 Chloride Results (mg/L) | Site 4078/6.7 Chloride Results (mg/L) | Duplicate Value | *Duplicate Average | Duplicate Site |
|---|---|---|---|---|---|---|---|---|
| 11/23/2021 | 224.0 | 107.0 | 91.2 | 180.0 | **177.0** | **182.0** | 179.5 | 4078/6.7 |
| 12/22/2021 | 451.0 | 109.0 | **89.2** | 144.0 | 143.0 | **90.1** | 89.7 | 4078/6.4/0.1 |
| 1/9/2022 | 1800.0 | 770.0 | 77.7 | 846.0 | **830.0** | **822.0** | 826.0 | 4078/6.7 |
| 1/27/2022 | 668.0 | **294.0** | 106.0 | 336.0 | 362.0 | **297.0** | 295.5 | 4078/6.0 |
| 2/4/2022 | 5860.0 | **452.0** | 102.0 | 1220.0 | 2970.0 | **428.0** | 440.0 | 4078/6.0 |
| 2/23/2022 | 1240.0 | 810.0 | 179.0 | **1330.0** | 1320.0 | **1260.0** | 1295.0 | 4078/6.5 |
| Maximum | 5860.0 | 810.0 | 179.0 | 1330.0 | 2970.0 | | | |
| Minimum | 224.0 | 107.0 | 77.7 | 144.0 | 143.0 | | | |
| Overall Average | 1707.2 | 408.4 | 105.0 | 759.4 | 850.8 | | | |
| n | 6 | 6 | 6 | 6 | 6 | | | |

**Bold** = duplicate sample values
*Duplicate Average used to calculate overall average

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix H – Deer Creek Chloride Graph of Data




| | 4078/5.9/0.1 (n=6) | 4078/6.0 (n=6) | 4078/6.4/0.1 (n=6) | 4078/6.5 (n=6) | 4078/6.7 (n-6) |
|---|---|---|---|---|---|
| Maximum | 5860.0 | 810.0 | 179.0 | 1330.0 | 2970.0 |
| Minimum | 224.0 | 107.0 | 77.7 | 144.0 | 143.0 |
| Overall Average | 1707.2 | 408.4 | 105.0 | 759.4 | 850.8 |

Deer Creek CSI Project Report
Deer Creek, St. Louis County, Missouri
March 2021 – March 2022
Appendix I – Deer Creek Discharge Data

| Sampling Date | Site 4078/5.9/0.1 Discharge Results (cfs) | Site 4078/6.0 Discharge Results (cfs) | Site 4078/6.4/0.1 Discharge Results (cfs | Site 4078/6.5 Discharge Results (cfs) | Site 4078/6.7 Discharge Results (cfs) |
|---|---|---|---|---|---|
| 4/6/2021 | 0.14 | 0.20 | 0.01 | 0.30 | 0.10 |
| 4/22/2021 | 0.28 | 0.47 | 0.08 | 0.28 | 0.18 |
| 5/20/2021 | 0.17 | 0.84 | 0.34 | 0.25 | 0.25 |
| 6/24/2021 | 0.06 | 0.11 | 0.00 | 0.11 | 0.10 |
| 7/29/2021 | 0.11 | 0.32 | 0.23 | 0.18 | 0.12 |
| 8/18/2021 | 0.09 | 0.37 | 0.17 | 0.18 | 0.14 |
| 9/23/2219 | 0.15 | 1.07 | 0.57 | 0.29 | 0.23 |
| 11/10/2021 | 0.10 | 0.97 | 0.52 | 0.09 | 0.12 |
| 11/23/2021 | 0.08 | 0.30 | 0.14 | 0.06 | 0.15 |
| 12/22/2021 | 0.04 | 0.21 | 0.06 | 0.08 | 0.09 |
| 1/9/2022 | NA | NA | NA | NA | NA |
| 1/27/2022 | NA | NA | NA | NA | 0.18 |
| 2/23/2022 | 0.33 | 0.80 | 0.44 | 0.29 | 0.32 |