Crooked Creek and Lost Creek Watershed Watershed Protection Plan

(Waterbody Segments IL_O-25, IL_OJ-11, IL_OJBA, IL_OJF, IL_ROR) – DO, pH, and Simazine

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Acronyms and Abbreviations

AFO	animal feeding operations
BMP	best management practice
BOD	biochemical oxygen demand
CAFO	concentrated animal feeding operation
CALM	Consolidated Assessment and Listing Methodology
CWA	Clean Water Act
DO	dissolved oxygen
IEPA	Illinois Environmental Protection Agency
IDOA	Illinois Department of Agriculture
Ill. Adm. Code	Illinois Administrative Code
ILSAM	Illinois Streamflow Assessment Model
IPCB	Illinois Pollution Control Board
KWA	Kaskaskia Watershed Association
MCL	maximum contaminant level
NASS	National Agricultural Statistic Service
NLRS	Nutrient Loss Reduction Strategy
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PFPWS	public food processing and water supply
SOD	sediment oxygen demand
STEPL	Spreadsheet Tool for Estimating Pollutant Loads
STP	sewage treatment plant
SWCD	Soil and Water Conservation District
TMDL	total maximum daily load
TP	total phosphorus
U.S. EPA	United States Environmental Protection Agency
WQS	Water quality standards

Unit of Measure

mg/L	milligram per liter

Executive Summary

The Clean Water Act and U.S. Environmental Protection Agency regulations require that Total Maximum Daily Loads (TMDLs) be developed for waters that do not support their designated uses. In simple terms, a TMDL is a plan to attain and maintain water quality standards in waters that are not currently meeting them.

This study addresses approximately 563 square miles in the Crooked Creek and Lost Creek watershed located in central Illinois. Low dissolved oxygen impairs a segment of Crooked Creek and has previously impaired several other segments in the watershed. Low dissolved oxygen can be the result of nutrient eutrophication, biochemical oxygen demand, and sediment oxygen demand. The sources of nutrients and biochemical oxygen demand in the watershed include National Pollutant Discharge Elimination System permitted facilities, such as wastewater treatment facilities. In addition, nonpoint pollution resulting from several key sources including agricultural runoff, stormwater runoff, onsite wastewater treatment systems, and animal feeding operations. An implementation plan is provided that includes potential implementation activities to address sources of total phosphorus, which is a surrogate pollutant to represent nutrients that cause eutrophication that contributes to low dissolved oxygen levels.

The State of Illinois uses a three-stage approach to develop TMDLs:

Stage 1 – Watershed characterization, historical dataset evaluation, data analysis, methodology selection, data gap identification
Stage 2 – Data collection to fill in data gaps, if necessary
Stage 3 – Model calibration, TMDL scenarios, and implementation plan

This final protection plan represents a compilation of Stage 1 and a protection plan. The Stage 1 Report is presented in Appendix A. Stage 2 data that are included in this protection plan are presented in Appendix B. Stage 3 was not required as the impairments are recommended for delisting, recategorization, or were removed from Illinois's 2020/2022 Integrated Report. No TMDLs were developed.

1. Introduction

The project area for this study, referred to as the Crooked Creek and Lost Creek watershed, is approximately 563 square miles in central Illinois (Figure 1). This study addresses five segments on five separate waterbodies in the watershed that are listed as impaired in the Illinois 2020/2022 Integrated Report (Illinois Environmental Protection Agency [IEPA] 2022). Three segments are impaired for their aquatic life use due to low dissolved oxygen (DO), one segment is impaired for its public food processing and water supply (PFPWS) use due to simazine, and one lake is impaired for its aquatic life use due to high pH.

Concurrent with this study in the Crooked Creek and Lost Creek watershed, studies are being conducted in the Upper Kaskaskia and Lake Fork watershed, Middle and Lower Kaskaskia watersheds, and East Fork Kaskaskia and Farina Lake watershed.

The State of Illinois uses a three-stage approach to develop total maximum daily loads (TMDLs):

Stage 1 – Watershed characterization, historical dataset evaluation, data analysis, methodology selection, data gap identification
Stage 2 – Data collection to fill in data gaps, if necessary
Stage 3 – Model calibration, TMDL scenarios, and implementation plan

One segment each of Prairie Creek (IL_OJBA) and Raccoon Creek (IL_OJF) that listed as impaired for their aquatic life use by low DO are recommended for delisting. A segment of Crooked Creek (IL_OJ-11) listed as impaired for its aquatic life use by low DO is recommended for Consolidated Assessment and Listing Methodology (CALM) recategorization to Category 4C (impaired by a non-pollutant). As such, no TMDLs were developed to address low DO impairments.

One segment of the Kaskaskia River (IL_O-25) is listed as impaired for its PFPWS use by high simazine concentrations is recommended for delisting. No TMDL was developed to address simazine.

Salem Lake (IL_ROR) is listed as impaired for its aquatic life use by high pH and is recommended for recategorization to Category 4A (impaired with approved TMDL). The pH impairment of Salem Lake is the result of eutrophication. A total phosphorus (TP) TMDL was previously developed for Salem Lake, and that TMDL addresses eutrophication. Thus, that existing TMDL will address the pH impairment.

Additional segments in the Crooked Creek and Lost Creek watershed were listed as impaired in Illinois's 2016 303(d) list: Crooked Creek (IL_OJ-07, low DO; IL_OJ-08, iron), Grand Point Creek (IL_OJC-01, low DO), Kaskaskia River (IL_O-07, low DO; IL_O-25, low DO), and Lost Creek (IL_OJB-04, low DO). The Stage 1 Report was completed in 2019 (Appendix A). None of these six impairments was identified in Illinois's 2020/2022 303(d) list. No TMDLs were developed.

The full Stage 1 report is in Appendix A and includes a summary of the 2016 water quality impairments, watershed characterization, pollutant source summary, analysis of water quality data, and information on the approach taken to develop TMDLs. Relevant information from the Stage 1 Report has been included in this protection plan. As part of the Stage 2 development process, additional monitoring was gathered by Illinois State Water Survey on behalf of IEPA in 2019; Appendix B presents data collected as part of Stage 2. This watershed protection plan includes a brief summary of Stage 2 data collection efforts and the outcome of those efforts.

A protection plan is provided that includes potential implementation activities to addresses sources of TP that cause nutrient eutrophication that contributes to low DO impairment. Biochemical oxygen demand (BOD) and sediment oxygen demand (SOD) may also contribute to low DO impairment. IEPA will be working with stakeholders to improve water quality in the watershed. It should be noted that the controls for nonpoint sources (e.g., agricultural runoff) will be strictly voluntary.

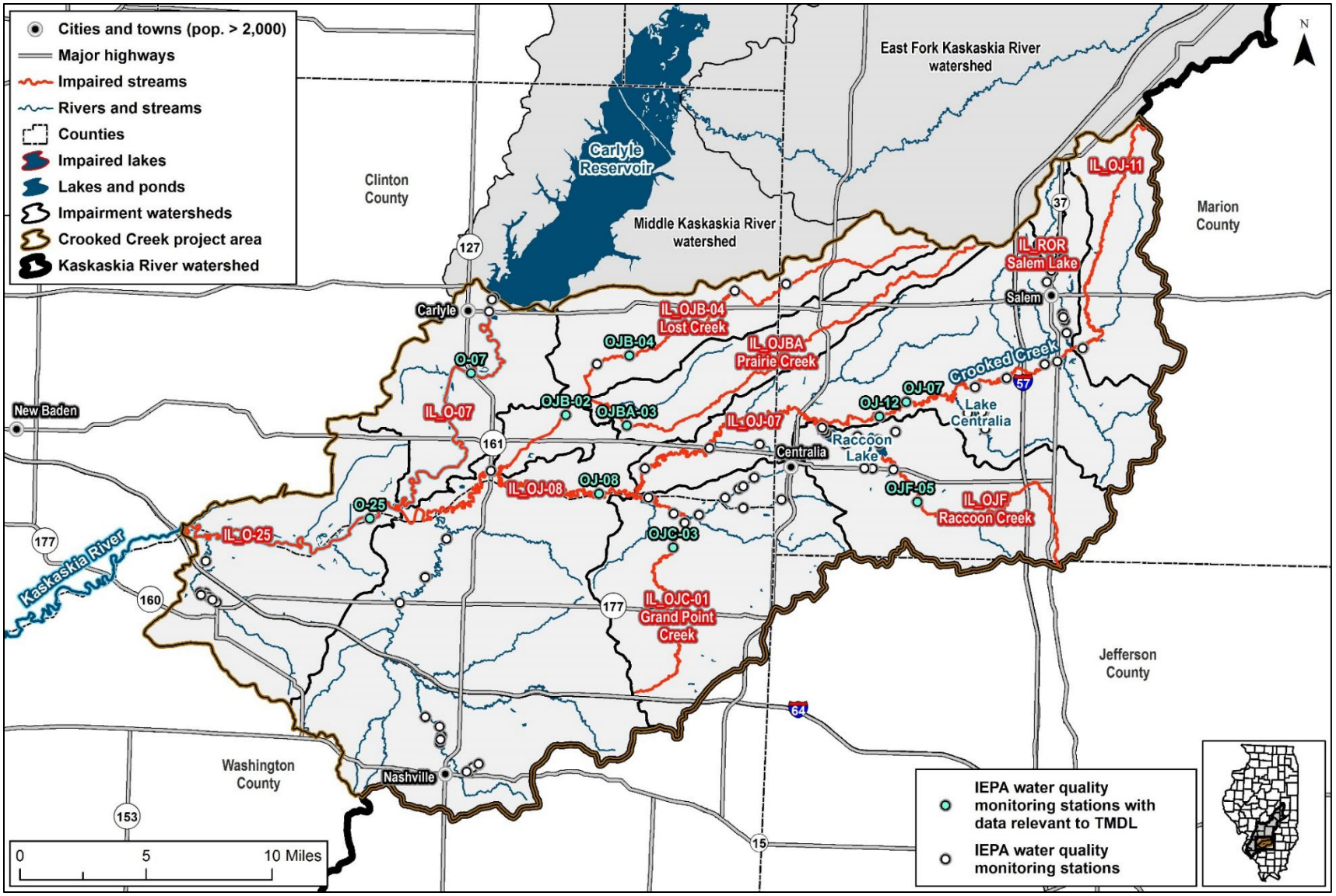


Figure 1. Crooked Creek watershed, TMDL project area.

Note: IL_O-07, IL_OJ-07, and IL_OJC-01, and are not addressed in this document. These impairments were delisted; see the text preceding this figure for more information.

The *Crooked Creek Watershed TMDL Report* (IEPA 2008) was approved by EPA on August 15, 2008. The 2008 TMDL study addressed atrazine, manganese, and TP impairments (Table 1). To support TMDL development, BATHTUB models were developed for four lakes.

Six stream segments impaired by low DO were evaluated using QUAL2K modeling. The results indicated that the complete elimination of ammonia and carbonaceous biochemical oxygen demand from point sources and natural background would still yield DO concentrations below standards.

Table 1. 2008 TMDL Study impaired waters

Name	Segment ID	Lake Area (Acres)	Designated Uses	TMDL Parameters
Centralia Lake	ROI	450	Aesthetic Quality	Total phosphorus
			PFPWS	Manganese
Raccoon Lake	ROK	925	Aesthetic Quality	Total phosphorus
			Aquatic Life	Atrazine
			PFPWS	Manganese
Nashville City Lake	ROO	42	Aesthetic Quality	Total phosphorus
Salem Lake	ROR	74.2	Aesthetic Quality	Total phosphorus
			PFPWS	Manganese

PFPWS – public and food processing water supply
TMDL - total maximum daily load

2. Water Quality Standards and Select Impairments

Water quality standards (WQS) are designed to protect beneficial uses. The authority to designate beneficial uses and adopt WQS is granted through Title 35 of the Illinois Administrative Code (Ill. Adm. Code). Designated uses to be protected in surface waters of the state are defined under Section 303, and WQS are designated under Section 302 (Water Quality Standards). Designated uses and WQS are discussed below.

2.1 Designated Uses

IEPA uses rules and regulations adopted by the Illinois Pollution Control Board (IPCB) to assess the designated use support for Illinois waterbodies. The following are the use support designations provided by the IPCB that apply to waterbodies in the Crooked Creek and Lost Creek watershed:

General Use Standards – These standards protect for aquatic life, wildlife, agricultural uses, primary contact (where physical configuration of the waterbody permits it, any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing), secondary contact (any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and recreational boating, and any limited contact incident to shoreline activity), and most industrial uses. These standards are also designed to ensure the aesthetic quality of the state's aquatic environment.

Public and food processing water supply standards—These standards are cumulative with the general use standards and apply to waters of the state at any point at which water is withdrawn for treatment and distribution as a potable supply to the public or for food processing.

2.2 Water Quality Standards

Environmental regulations for the State of Illinois are contained in the Title 35 of the Illinois Administrative Code. Specifically, 35 Ill. Adm. Code 302 contains water quality standards promulgated

by the IPCB. This section presents the standards applicable to DO and simazine in the study area (Table 2).

Table 2. Summary of water quality standards for the Crooked Creek and Lost Creek watershed

Parameter	Units	General Use Water Quality Standard
General Use		
Dissolved Oxygen [a]	mg/L	March-July > 5.0 min. and > 6.0- 7-day mean Aug-Feb > 3.5 min, > 4.0- 7-day mean and > 5.5- 30-day mean If less than 10 samples, not to exceed two violations of the standard. If greater than 10 samples, not to exceed one violation of the standard.
Public and Food Processing Water Supply		
Simazine	µg/L	Not to exceed Maximum Contaminant Level of 4 µg/L

mg/L - milligram per liter

µg/L - microgram per liter

a. Applies to the dissolved oxygen concentration in the main body of all streams, in the water above the thermocline of thermally stratified lakes and reservoirs, and in the entire water column of unstratified lakes and reservoirs.

2.2.1 General Use Standards

Aquatic life use assessments in streams are typically based on the interpretation of biological information, physicochemical water data and physical-habitat information from the Intensive Basin Survey, Ambient Water Quality Monitoring Network, or Facility-Related Stream Survey programs. The primary biological measures used are the fish Index of Biotic Integrity (Karr et al. 1986; Smogor 2000, 2005), the macroinvertebrate Index of Biotic Integrity (Tetra Tech 2004), and the Macroinvertebrate Biotic Index (IEPA 1994). Physical habitat information used in assessments includes quantitative or qualitative measures of stream bottom composition and qualitative descriptors of channel and riparian conditions. Physicochemical water data used include measures of conventional parameters (e.g., DO, pH, and temperature), priority pollutants, non-priority pollutants, and other pollutants (U.S. Environmental Protection Agency [U.S. EPA] 2002 and http://www.epa.gov/wqc). In a minority of streams for which biological information is unavailable, aquatic life use assessments are based primarily on physicochemical water data.

When a stream segment is determined to be Not Supporting aquatic life use, generally one exceedance or violation of an applicable Illinois WQS (related to the protection of aquatic life) results in identifying the parameter as a potential cause of impairment. Additional guidelines used to determine potential causes of impairment include site-specific standards (35 Ill. Adm. Code 303, Subpart C) or adjusted standards (published in the ICPB's Environmental Register at https://pcb.illinois.gov/documents/dsweb/Get/Document-12042/).

2.2.2 Public and Food Processing Water Supply Use Standards

Attainment of PFPWS use is assessed only in waters in which the use is currently occurring, as evidenced by the presence of an active public-water supply intake. The assessment of PFPWS use is based on conditions in both untreated and treated water. By incorporating data through programs related to both the federal Clean Water Act (CWA) and the federal Safe Drinking Water Act, IEPA believes that these guidelines provide a comprehensive assessment of the PFPWS use. Assessments of the PFPWS use recognize that characteristics and concentrations of substances in Illinois surface waters can vary and that a single assessment guideline may not protect sufficiently in all situations. Using multiple assessment guidelines helps improve the reliability of these assessments. When applying these assessment guidelines, IEPA also considers the water-quality substance, the level of treatment available for that substance, and the monitoring frequency of that substance in the untreated water. Table 3 includes the assessment guidelines for waters with PFPWS designated uses.

Table 3. Guidelines for assessing public water supply in waters of the State

Degree of Use Support	Guidelines
Fully Supporting	For each substance in untreated water[1], for the most-recent three years of readily available data or equivalent dataset, a) ≤ 10% of observations exceed an applicable Public and Food Processing Water Supply Standard[2]; and b) for which the concentration is not readily reducible by conventional treatment, i) no observation exceeds by at least fourfold the Maximum Contaminant Level threshold concentration[3] for that substance; and ii) no quarterly average concentration exceeds the Maximum Contaminant Level threshold concentration[3] for that substance; and [4], For each substance in treated water, no violation of an applicable Maximum Contaminant Level[3] occurs during the most recent four years of readily available data.
Not Supporting	For any single substance in untreated water[1],for the most-recent three years of readily available data or equivalent dataset, a) > 10% of observations exceed a Public and Food Processing Water Supply Standard[2]; or b) for which the concentration is not readily reducible by conventional treatment, i) at least one observation exceeds by at least fourfold the Maximum Contaminant Level threshold concentration[3] for that substance; or ii) the quarterly average concentration exceeds the Maximum Contaminant Level threshold concentration[3] for that substance; or, For any single substance in treated water, at least one violation of an applicable Maximum Contaminant Level[3] occurs during the most recent four years of readily available data. or, Closure to use as a drinking-water resource (cannot be treated to allow for use).

Source: IEPA 2021 (Table C-21).

[1]. Includes only the untreated-water results that were available in the primary computer database at the time data were compiled for these assessments

[2]. 35 I11. Adm. Code 302.304, 302.306 (https://pcb.illinois.gov/SLR/IPCBandIEPAEnvironmentalRegulationsTitle35).

[3]. 35 I11. Adm. Code 611.300, 611.301, 611.310, 611.311, 611.325.

[4]. Some waters were assessed as Fully Supporting based on treated-water data only.

One of the assessment guidelines for untreated water relies on a frequency-of-exceedance threshold (10 percent) because this threshold represents the true risk of impairment better than does a single exceedance of a water quality criterion. Assessment guidelines also recognize situations in which water treatment that consists only of "...coagulation, sedimentation, filtration, storage and chlorination, or other equivalent treatment processes" (35 Ill. Adm. Code 302.303; hereafter called "conventional treatment") may be insufficient for reducing potentially harmful levels of some substances. To determine if a Maximum Contaminant Level (MCL) violation in treated water would likely occur if treatment additional to conventional treatment were not applied (see 35 Ill. Adm. Code 302.305), the concentration of the potentially harmful substance in untreated water is examined and compared to the MCL threshold concentration. If the concentration in untreated water exceeds an MCL-related threshold concentration, then an MCL violation could reasonably be expected in the absence of additional treatment.

Compliance with an MCL for treated water is based on a running 4-quarter (i.e., annual) average, calculated quarterly, of samples collected at least once per quarter (Jan.–Mar., Apr.–Jun., Jul.–Sep., and Oct.–Dec.). However, for some untreated water intake locations, sampling occurs less frequently than once per quarter; therefore, statistics comparable to quarterly averages or running 4-quarter averages cannot be determined for untreated water. Rather, for substances not known to vary regularly in concentration in Illinois surface waters (untreated) throughout the year, a simple arithmetic average concentration of all available results is used to compare to the MCL threshold. For substances known to vary regularly in concentration in surface waters during a typical year (e.g., nitrate), average concentrations within the relevant sub-annual (e.g., quarterly) periods are used.

2.3 Water Quality Impairments

Three segments are listed as impaired for their aquatic life use due to low DO and are recommended for delisting or recategorization. One segment is listed as impaired for its PFPWS due to simazine and is recommended for delisting. Salem Lake (IL_ROR) is listed as impaired for its aquatic life use due to pH; the lake is recommended for recategorization.

For DO impairments, IEPA considers the critical conditions to be the seven-day low flow at a ten-year recurrence interval (i.e., 7Q10), which is the 7-day average (arithmetic mean) low flow that occurs approximately once every ten years. When the 7Q10 for a DO impairment is zero (i.e., the stream is dry), then lack of flow is the cause of impairment. In such cases, the listing should be recategorized to CALM Category 4C because lack of flow is a non-pollutant.

2.3.1 Crooked Creek (IL_OJ-11) - Recategorization Recommendation

Crooked Creek (IL_OJ-11) is listed as impaired for aquatic life due to low levels of DO in both Illinois's 2016 and 2022 303(d) lists (IEPA 2016, 2022). As discussed in the Stage 1 Report (Appendix A), no historic DO data were available for site OJ-11 to assess impairment.

DO and TP data were collected during the morning and afternoon on three separate days in September 2019. Continuously recording data sondes were used to collect DO measurements, and the data were averaged for each morning and afternoon (Table 4). Grab samples were evaluated for TP.

Table 4. Dissolved oxygen and total phosphorus data (Crooked Creek at site OJ-11)

Date	Time of Day	Dissolved Oxygen (mg/L)	Total Phosphorus (mg/L)
9/11/2019	AM	4.20	0.114
	PM	4.46	0.112
9/18/2019	AM	2.84	0.114
	PM	3.35	0.115
9/25/2019	AM	2.22	0.130
	PM	2.71	0.125

mg/L = milligram per liter

Four of the six DO measurements were less than the 3.5 milligram per liter (mg/L) instantaneous minimum standard for August through February. These four samples confirm impairment.

The potential causes and sources of low DO impairment were evaluated. No wastewater treatment facilities discharge to the impaired segment; as such, no wastewater treatment facilities contribute to the low DO in Crooked Creek.

Low in-stream DO can be the result of eutrophication due to high phosphorus concentrations. To determine if a relationship exists between DO and phosphorus, paired DO and TP data are plotted together, and a linear regression is developed. The 2019 paired DO and TP data were plotted together (Figure 2) and a linear relationship is evident ($R^2 = 0.65$). These data indicate that nutrient eutrophication may contribute to low DO, at certain times.

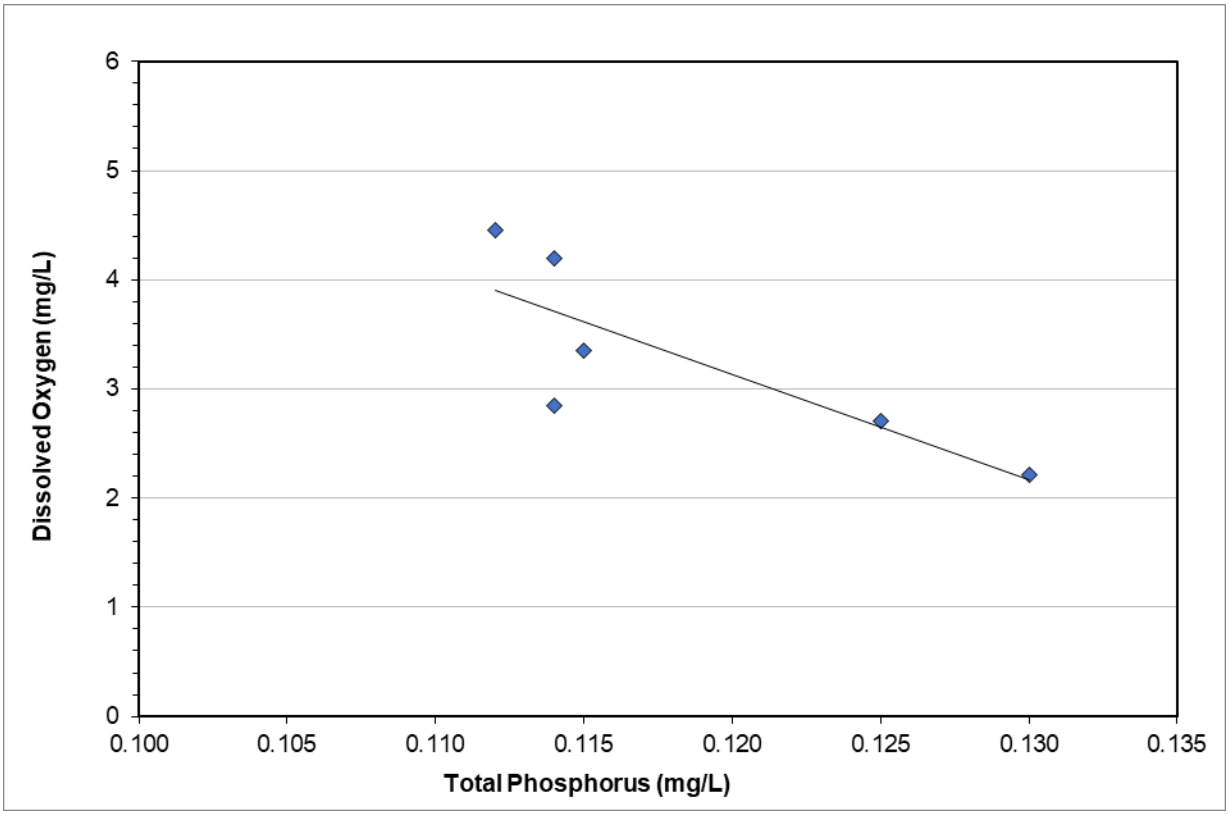


Figure 2. Total phosphorus versus dissolved oxygen—2019, Crooked Creek (IL_OJ-11).

The Illinois Streamflow Assessment Model (ILSAM; https://www.isws.illinois.edu/data/ilsam/) was used to evaluate flow conditions in Crooked Creek segment IL_OJ-11. ILSAM estimates statistics of flow quantity in Illinois streams that are representative of long-term climactic conditions. ILSAM estimated statistics of low flow conditions along Lost Creek, including the 7Q10, using equations specific to the Kaskaskia River watershed. ILSAM predicted the 7Q10 at river mile 65.8, which is on segment IL_OJ-11), to be zero. Similarly, ILSAM predicted the 75th, 85th, 90th, 95th, 98th, and 99th flow duration intervals to also be zero at river mile 65.8. Except for the 75th flow duration interval, which is predicted to be 0.1 cubic feet per second, the results are identical for river mile 60.1 that is the downstream terminus of segment IL_OJ-11 (just upstream of the confluence of Town Creek with Crooked Creek).

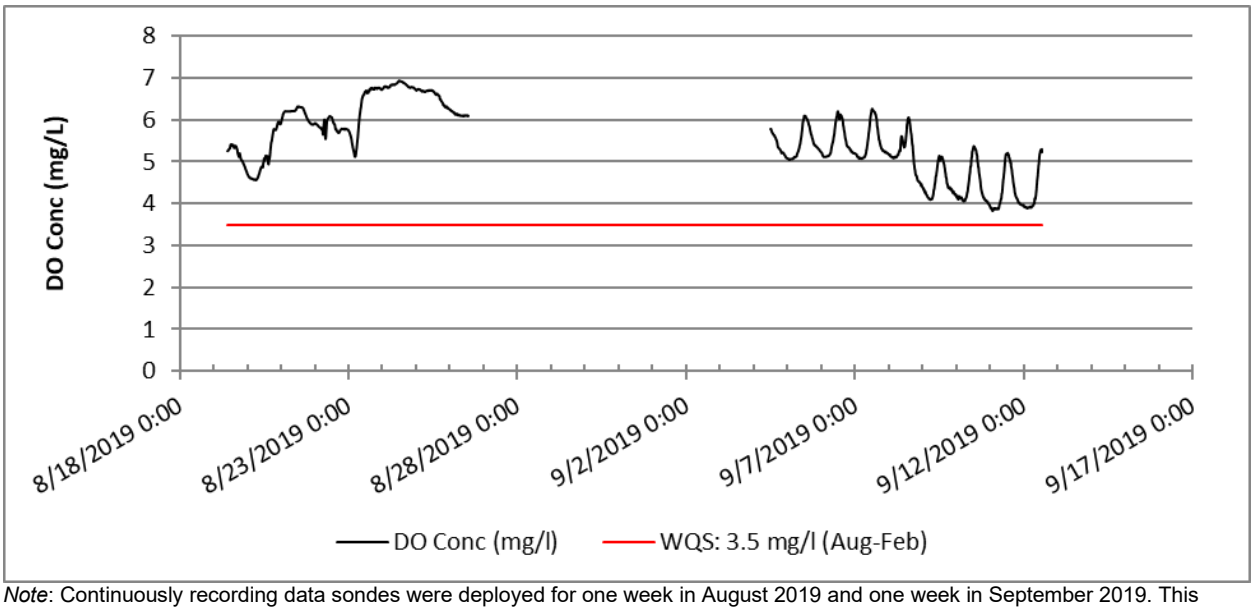
Although the impairment of Crooked Creek segment (IL_OJ-11) was verified, upon further evaluation, it was determined that the stream was impaired due to lack of flow in the stream. The 7Q10 flow condition is zero, and therefore there is insufficient flow to maintain aquatic life in this segment under critical low flow conditions. When there is sufficient flow in Crooked Creek segment IL_OJ-11, nutrient eutrophication may also contribute to low DO concentrations. Since low DO is the result of low flow, the low DO impairment for segment IL_OJ-11 is recommended to be recategorized as CALM Category 4C, impaired but not due to a pollutant.

2.3.2 Kaskaskia River (IL_O-25) - Delisting Recommendation

The Kaskaskia River (IL_O-25) is listed as impaired for PFPWS due to simazine. As discussed in the Stage 1 Report (Appendix A), the simazine impairment is based upon sampling at the Nashville intake, no simazine data are available for segment IL_O-25, and 75 simazine samples for upstream segment IL_O-07 from 2001-2016 do not indicate impairment. An additional sample was collected in July 2019, and simazine was not detected. As no simazine data exceed standards, the segment is recommended for delisting simazine.

2.3.3 Prairie Creek (IL_OJBA) - Delisting Recommendation

Prairie Creek (IL_OJBA) is listed as impaired for aquatic life due to low levels of DO. Three instantaneous samples from 2007 and 2012 were identified in the Stage 1 Report (Appendix A), and one sample from 2007 violated the standard. Additional DO data were collected in 2019. Continuously recording data sondes were used to collect DO measurements for a week in August 2019 and a week in September 2019 (Figure 3).



Note: Continuously recording data sondes were deployed for one week in August 2019 and one week in September 2019. This timeseries plot shows both weeks on the same figure.

Figure 3. Continuous dissolved oxygen—2019, Prairie Creek (IL_OJBA).

All the measurements were greater than the 3.5 mg/L instantaneous minimum standard for August through February. As 2012 and 2019 DO data do not exceed standards, segment IL_OJBA is recommended for delisting DO.

2.3.4 Raccoon Creek (IL_OJF) - Delisting Recommendation

Raccoon Creek (IL_OJF) is listed as impaired for aquatic life due to low levels of DO. Two instantaneous samples from 2012 were identified in the Stage 1 Report (Appendix A), and one sampled violated the standard. Additional DO data were collected during September 2019. Continuously recording data sondes were used to collect DO measurements in the morning and afternoon on each day of sampling. The data were averaged for each morning and each afternoon (Table 5).

Table 5. Dissolved oxygen data (Raccoon Creek at site OJF)

Date	Time of Day	Dissolved oxygen (mg/L)
9/11/2019	AM	3.42
	PM	4.64
9/18/2019	AM	3.64
	PM	3.97
9/25/2019	AM	3.82
	PM	3.88

mg/L = milligram per liter

Five of the six the measurements were greater than the 3.5 mg/L instantaneous minimum standard for August through February. As only one of the six 2019 samples showed excursion of the standard, the segment is recommended for delisting DO.

2.3.5 Salem Lake (IL_ROR) - Recategorization Recommendation

Salem Lake (IL_ROR) is listed as impaired due to pH, which is considered a side effect of eutrophication. Excessive phosphorus loadings are believed to be exerting negative effects on the aquatic ecosystem by increasing algal and aquatic plant life production (Sharpley et al.1994). Under natural conditions, pH typically rises during the day as algae and aquatic plants use carbon dioxide during photosynthesis and pH lowers during the night while plants respire. The relationship between phosphorus, DO, and pH impairments are described in the *Crooked Creek Watershed TMDL Report* (IEPA 2008; Section 3.2):

> *Several of the lakes in the Crooked Creek watershed are listed as impaired for total phosphorus, dissolved oxygen, and pH. These listings are all assumed to be related because increasing the amount of phosphorus in a lake tends to cause an increase in algae and macrophyte production (assuming all other variables remain the same). Algae and macrophytes produce and consume oxygen in water. During daylight hours, oxygen is produced by photosynthesis. Plants and algae then consume oxygen from the water column at night (respiration). Oxygen depletion occurs when the balance between oxygen consumption and production is altered, either causing excessive oxygen consumption or reduced oxygen production. The dissolved oxygen concentration in a waterbody becomes too low, thereby threatening oxygen breathing aquatic life.*
>
> *Plants also utilize carbon dioxide during photosynthesis (removing it from the water) which causes alkaline carbonates and bicarbonates to predominate in the water and the pH to rise. The opposite occurs at night. In the case of heavy algae blooms, the pH of the water can fluctuate quite dramatically through a 24 hour period. While many large fish can survive these fluctuations, small fish can become quite stressed by rapid pH changes.*

IEPA believes that attaining the in-lake TP target of 0.05 mg/L will result in shifting algae production back to natural levels, which in turn will result in pH meeting the water quality standard. Thus, for Salem Lake, TP is a surrogate pollutant for the pH impairment. An approved phosphorus TMDL exists for Salem Lake (IEPA 2008), therefore no additional TMDLs are needed to address the pH impairment. As such, the Salem Lake (IL_ROR) pH impairment is recommended for recategorization to Category 4A (impaired with approved TMDL).

3. Watershed Characterization

The Crooked Creek and Lost Creek watershed is in southern Illinois (Figure 1); the headwaters begin just north of the city of Salem, Illinois. Crooked Creek joins the Kaskaskia River downstream of Carlyle Lake, and the Kaskaskia River eventually joins the Mississippi River south of St. Louis, Missouri. A TMDL was previously developed for the Crooked Creek watershed (IEPA 2008), and much of the information presented in that report is applicable to the Crooked Creek and Lost Creek watershed project area. There have been no known changes in the project area; therefore, the previous TMDL provides much of the basis for the watershed characterization and source assessment for the Crooked Creek and Lost Creek project area below.

The *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008) is published online: https://www2.illinois.gov/epa/Documents/iepa/water-quality/watershed-management/tmdls/reports/crooked-creek/crooked-creek.pdf

3.1 Jurisdictions and Population

Counties with land located in the watershed include Clinton, Jefferson, Marion, and Washington. Cities in the watershed include Centralia, Salem, Nashville, and Carlyle. Populations are area-weighted to the watershed in Table 6. The Clinton County and Jefferson County population numbers were adjusted to account for cities in each county that are outside of the watershed.

Table 6. Area weighted county populations in watershed

County	2000 Population	2010 Population	Percent Change
Clinton	6,674	7,072	6%
Jefferson	195	194	-1%
Marion	14,445	13,664	-5%
Washington	5,710	5,547	-3%
TOTAL	***27,024***	***26,477***	***-2%***

Source: U.S. Census Bureau

Additional information about land use and land cover can be found in Section 2.5 of the Stage 1 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008).

3.2 Climate

In general, the climate of the region is continental with hot, humid summers and cold winters. Relevant information on climate can be found in Section 2.6.1 of the Stage 1 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008). IEPA considers the climate summary from the 2008 TMDL report to be representative of current climactic conditions.

3.3 Land Use and Land Cover

Land use in the watershed is heavily influenced by agriculture (Figure 4). Urban areas are located primarily near the cities of Centralia, Salem, Nashville, Carlyle, and several small towns in the watershed. Land use in the watershed includes cultivated crops, pasture/hay, forest, and urban (Table 7). Corn and soybeans are the most common crops, with much smaller areas of winter wheat, alfalfa, and other crops.

Additional information about land use and land cover can be found in Figure 2-2 and Section 2.3 of the Stage 1 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008).

Table 7. Watershed land use summary

Land Use / Land Cover Category	Acres	Percentage
Cultivated Crops	186,079	51.7%
Hay/Pasture	63,947	17.8%
Deciduous Forest	51,749	14.4%
Developed, Open Space	22,739	6.3%
Developed, Low Intensity	13,191	3.7%
Woody Wetlands	12,497	3.5%
Developed, Medium Intensity	3,578	1.0%
Open Water	3,167	0.9%
Herbaceous	1,747	0.5%
Developed, High Intensity	1,175	0.3%
Emergent Herbaceous Wetlands	116	<0.1%
Evergreen Forest	51	<0.1%
Barren Land	19	<0.1%

Source: 2011 National Land Cover Database (MRLC 2015)

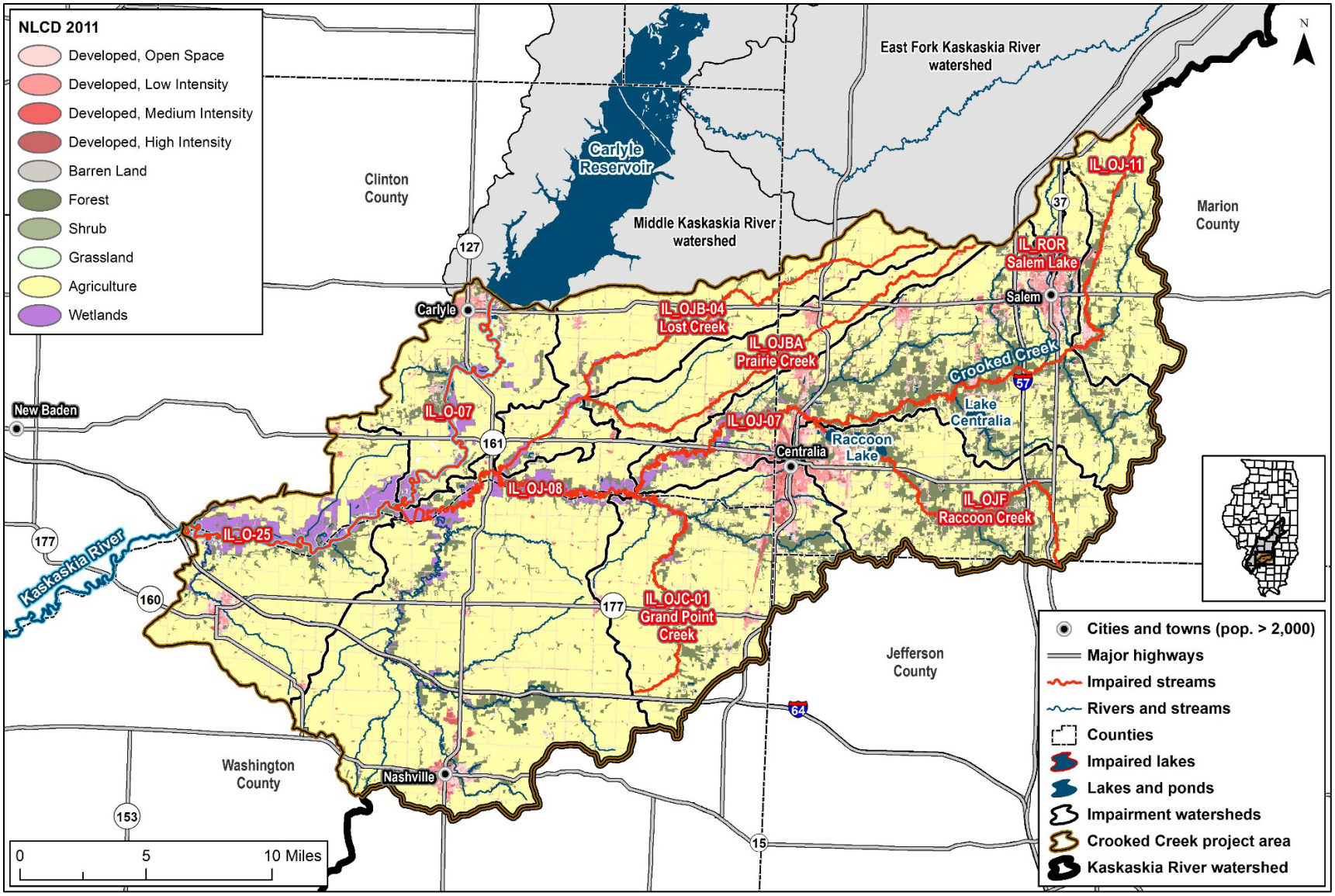


Figure 4. Crooked Creek and Lost Creek watershed land cover (2011 National Land Cover Database (MRLC 2015)).

Note: IL_O-07, IL_OJ-07, and IL_OJC-01, and are not addressed in this document. These impairments were delisted; see Section 1 for more information.

3.4 Topography

Relevant information on topography can be found in Figure 2-1 and Section 2.2 of the Stage 1 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008).

3.5 Soils

Relevant information on soils can be found in Figure 2-3 and Section 2.4 of the Stage 1 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008). Much of the watershed is made up of fine-grained, silt and clay soils.

3.6 Hydrology

Relevant information on hydrologic conditions can be found in Figure 2-4, Figure 2-5, and Section 2.6.2 of the Stage 1 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008). IEPA considers the hydrology summary from the 2008 TMDL report to be representative of current hydrologic conditions.

Active U.S. Geological Survey flow gage sites are located along Crooked Creek segment IL_OJ-08 (05593520) and on the IL_OJA-01 segment of Little Crooked Creek (05593575).

3.7 Watershed Studies and Information

This section describes several of the studies that have been completed in the watershed:

- **Crooked Creek Watershed Total Maximum Daily Load Report** (IEPA 2008)

  The completed *Crooked Creek Watershed TMDL Report* contains relevant information and data for this TMDL. Causes of impairments included DO, manganese, pH, TP, and atrazine.

- **Kaskaskia River Watershed, An Ecosystem Approach to Issues and Opportunities** (Southwestern Illinois RC&D, Inc. 2002)

  The plan encompasses the larger Kaskaskia River watershed from Champaign County to Randolph County in southwestern Illinois, covering over 10 percent of the state of Illinois. The purpose of the plan was to begin a coordinated restoration process in the Kaskaskia River watershed based on sound ecosystem principles. The plan made recommendations on sustainability, diversity, health, variety, connectivity, and the ecosystem's ability to thrive and reproduce in order to promote the sustainability of the ecosystem and strengthen the economic base and the quality of life of residents in the region.

4. Water Quality

Background information on water quality monitoring can be found in the completed *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008) and the Stage 1 Report (Appendix A). In the Crooked Creek and Lost Creek watershed, water quality data were found for numerous stations that are part of the IEPA Ambient Water Quality Monitoring Network.

As previously discussed in Section 1 and Section 2.3, several segments are or were impaired by low DO. All the low DO impairments were either delisted, are recommended for delisting, or are recommended for CALM recategorization. To protect aquatic life and prevent backsliding, this watershed protection plan includes a focus on sources of nutrients and sources of BOD that may have contributed to past low DO impairment. SOD can also contribute to low DO but may not be significant in this watershed.

As discussed in Section 2.3.1, low DO impairment in Crooked Creek (IL_OJ-11) is due to a lack of sufficient flow in the stream, and thus, the segment is recommended for recategorization. But the analysis

of DO and TP data under higher flow conditions indicates a linear relationship (refer to Figure 2 in Section 2.3.1); thus, under higher flow conditions, nutrient eutrophication may contribute to low DO.

Lost Creek segment IL_OJB-04 is very similar to Crooked Creek segment IL_OJ-11, except that while both segments were listed for low DO in Illinois's 2016 303(d) list (IEPA 2016), Lost Creek segment IL_OJB-04 was not listed in Illinois's 2020/2022 303(d) list (IEPA 2022). Refer to the Stage 1 Report (Appendix A) for a summary of 2002 and 2007 DO data.

Like Crooked Creek segment IL_OJ-11, Lost Creek segment IL_OJB-04 also runs dry during lower flow conditions. ILSAM predicts no flow (i.e., dry stream) for the Lost Creek 7Q10 at river miles 5.61 and 6.90 (i.e., the reach upstream of the Prairie Creek confluence). ILSAM also predicts that this reach of Lost Creek has zero flow during the 75th, 85th, 90th, 95th, 98th, and 99th flow duration intervals. As with Crooked Creek segment IL_OJ-11, the low DO in Lost Creek is during the summer critical condition is due to lack of flow.

The DO-TP regression analysis performed for Crooked Creek segment IL_OJ-11 (refer to Figure 2 in Section 2.3.1) was also performed for Lost Creek segment IL_OJB-04. Nine paired samples from 2002, 2007, and 2017 were available to evaluate the relationship between DO and TP, and a linear relationship is evident ($R^2 = 0.70$), based upon data collected in May through September (Figure 5).

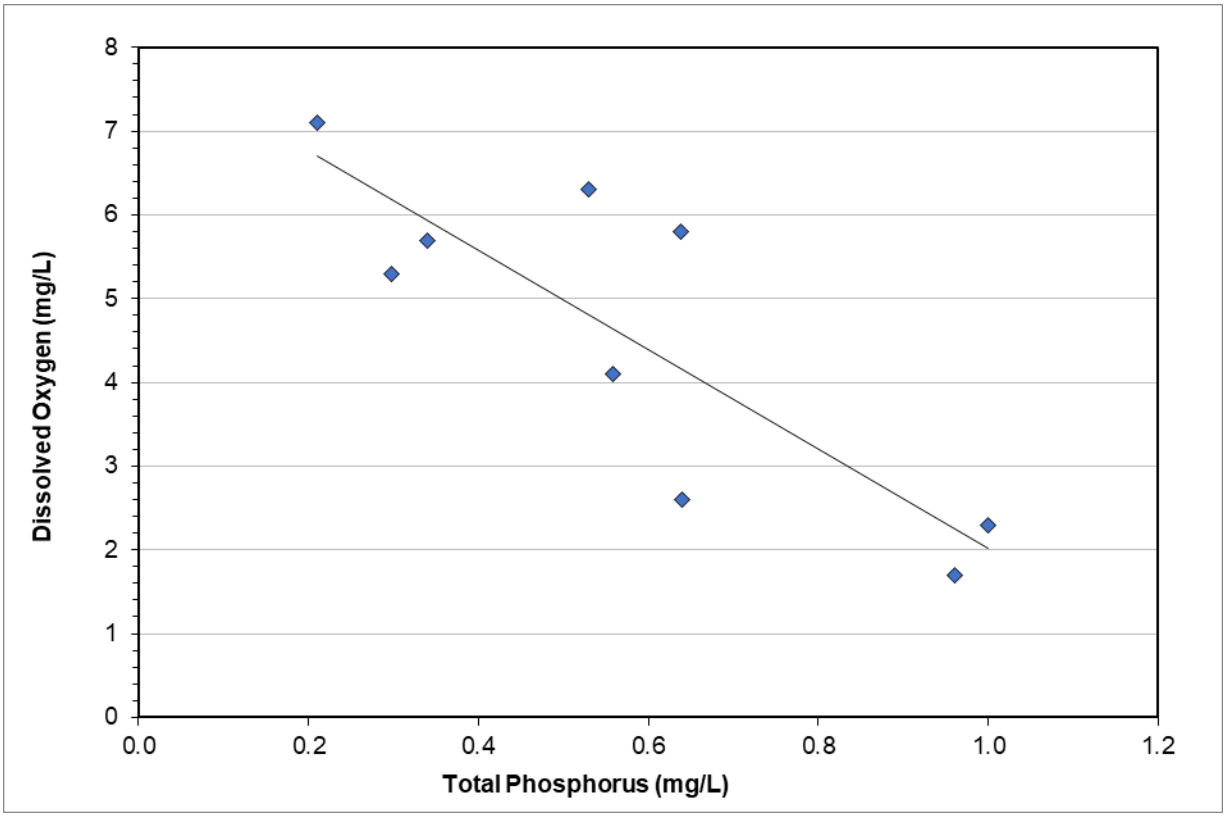


Figure 5. Total phosphorus versus dissolved oxygen—2002-2017, Lost Creek (IL_OJB-04).

As with Crooked Creek (IL_OJ-11), the previously observed low DO in Lost Creek (IL_OJB-04) is due to a lack of sufficient flow in the stream. However, again like Crooked Creek (IL_OJ-11), the analysis of DO and TP data under higher flow conditions in Lost Creek (IL_OJB-04) indicates a linear relationship; thus, under higher flow conditions, nutrient eutrophication may have contributed to previously observed low DO.

5. Watershed Source Assessment

Source assessments are an important component of water quality management plans. This section focuses on sources of phosphorus in the Crooked Creek and Lost Creek watershed, specifically in areas draining to Crooked Creek segment IL_OJ-11. Pollutants of concern evaluated in this source assessment include parameters influencing DO. DO in streams can be affected by BOD, phosphorus, ammonia, and SOD, in addition to non-pollutant causes such as a lack of reaeration. Eutrophication (high levels of algae) is also often linked directly to low DO conditions. These pollutants can originate from an array of sources including point and nonpoint sources. Point sources typically discharge at a specific location from pipes, outfalls, and conveyance channels. Nonpoint sources are diffuse sources that have multiple routes of entry into surface waters, particularly overland runoff.

5.1 Point Sources

Point source pollution is defined by the Federal CWA §502(14) as:

> any discernible, confined and discrete conveyance, including any ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation [CAFO], or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agriculture storm water discharges and return flow from irrigated agriculture.

Under the CWA, all point sources are regulated under the National Pollutant Discharge Elimination System (NPDES) program. A municipality, industry, or operation must apply for an NPDES permit if an activity at that facility discharges wastewater to surface water. Point sources can include facilities such as sewage treatment plants (STPs), industrial facilities, concentrated animal feeding operations (CAFOs), or regulated storm water including municipal separate storm sewer systems.

There are no permitted municipal separate storm sewers in the Crooked Creek and Lost Creek watershed.

5.1.1 NPDES Facilities (Non-CAFO or stormwater)

There are 19 NPDES permitted facilities in the Crooked Creek and Lost Creek watershed (Table 8). Design average and maximum flows and downstream impairments are included in the facility summaries. Nine facilities are covered by one of three general NPDES permits:

- ILG551 (non-publicly owned domestic lagoon system, serving a population of <2,500)
- ILG580 (publicly owned domestic lagoon system, serving a population of <2,500)
- ILG640 (public water supply)

Additional information on existing permitted sources can be found in Section 4.1 of the Stage 3 Report in the *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008).

STPs, domestic lagoon systems, and public water supplies can be sources of pollutants that can contribute to low DO impairment. STPs and domestic lagoons may contribute phosphorus and nitrogen species and BOD, while public water supplies may contribute phosphorus.

Table 8. NPDES permitted facilities discharging in the Crooked Creek and Lost Creek watershed

IL Permit ID	Facility Name	Type of Discharge	Receiving Water	Downstream Impairment(s)	Design Avg. Flow (MGD)	Design Max. Flow (MGD)
Individual NPDES Permits						
IL0000779	IL Central RR Centralia	Stormwater [a]	Fulton Creek	IL_OJC-01	0.023 [b]	–
IL0023264	Salem STP	STP	Town Creek	IL_OJ-07	2.508	7.023
IL0027901	Carlyle STP	STP	Kaskaskia River	IL_O-07, IL_O-25	0.709	1.30
IL0027979	Centralia STP	STP	Sewer Creek	IL_OJC-01	3.15	4.5
IL0030961	Sandoval STP	STP	Prairie Creek	IL_OJBA, IL_OJB-04	0.18	0.45
IL0049140	Addieville STP	STP	Plum Creek-	IL_O-25	0.033	0.083
IL0052981	Raccoon School District C-1	STP	UT to Raccoon Creek	IL_OJF, IL_OJ-07	0.0125	0.031
IL0053040	Foster's MHP	STP	UT to South Creek	IL_OJ-07	0.0024	0.006
IL0071242 [c]	United Parcel Service	Vehicle wash water	UT to Fulton Branch	I_OJC-01	0.0001 [b]	–
IL0075884	Huey STP	STP	UT to Lost Creek	IL_OJB-04	0.0289	0.1157
Domestic Lagoon Systems covered by General NPDES Permits (ILG551 or ILG580)						
ILG551030	Western Gardens MHP-Centralia	STP	UT Crooked Creek	IL_OJ-07	0.01875	0.048
ILG580144	Wamac STP	STP	Fulton Branch	IL_OJC-01	0.15	0.6
ILG580187	Odin STP	STP	Turkey Creek	IL_OJ-07	0.195	1.8
ILG580205	Hoffman STP	STP	Prairie Creek	IL_OJBA, IL_OJB-04	0.06	0.15
ILG580265	Central City STP	STP	UT to Raccoon Creek	IL_OJF, IL_OJ-07	0.304	1.267
ILG580268	Okawville WWTP	STP	UT to Plum Creek-North	IL_O-25	0.25	0.877
ILG580277	Junction City STP	STP	Prairie Creek	IL_OJBA, IL_OJB-04	0.06	0.15
Public Water Supplies covered by a General NPDES Permit (ILG640)						
ILG640031	Salem WTP	PWS	Town Creek	IL_OJ-07	0.253 [b]	–
ILG640247	Centralia WTP	PWS	Crooked Creek	IL_OJ-07	0.662 [b]	–

Avg. - average
Max. - maximum
MGD – million gallons per day
MHP – mobile home park
PWS – public water supply
RR - railroad
STP – sewage treatment plant
UT – unnamed tributary
WTP – water treatment plant
WWTP – wastewater treatment plant

[a] Stormwater from a maintenance shop, fueling area, and rail yard.
[b] Average design flow based on average reported flow from 2014–2016 discharge monitoring records.
[c] The individual permit IL0071242 was terminated in 2019.
-- No design flow available.
NPDES permits for some STPs refer to the facilities as wastewater treatment plants. The terms "sewage treatment plant" and "wastewater treatment plant" are interchangeable.

5.1.2 CAFOs

The area that produces manure, litter, or processed wastewater as the result of CAFOs is considered a point source that is regulated through the NPDES Program. In Illinois, the CAFO program is administered by the IEPA through general permit number ILA01. The federal regulations for all CAFOs can be found in 40 CFR Parts 9, 122, and 412. U.S. EPA requires that CAFOs receive a wasteload allocation (WLA) as part of the TMDL development process. The WLA is typically set at zero for all pollutants.

There is one CAFO in the Crooked Creek and Lost Creek watershed (ILA010075) near Plum Creek, a tributary to Kaskaskia River segment (IL_O-25).

5.2 Nonpoint Sources

The term nonpoint source pollution is defined as any source of pollution that does not meet the legal definition of point sources. Nonpoint source pollution typically results from overland stormwater runoff that is diffuse in origin, as well as background conditions. As part of the water resource assessment process, IEPA identified several sources as contributing to low DO Crooked Creek and Lost Creek watershed impairments: loss of riparian habitat, crop production (crop land or dry land), agriculture, and sources unknown. Some of these sources do not contribute pollutants but do affect the waterbody's ability to support biota such as loss of riparian habitat and impacts from flow regulation or modification.

The following subsections summarize categories of nonpoint sources that contribute to low DO in the Crooked Creek and Lost Creek watershed. Additional information on source assessment and loading estimates are presented in the implementation plan in Section 6.

5.2.1 Stormwater and Agricultural Runoff

During wet-weather events (snowmelt and rainfall), sediment and pollutants are incorporated into runoff and can be delivered to downstream waterbodies. The resultant pollutant loads are linked to the land uses and practices in the watershed. Agricultural and developed areas can have significant effects on water quality if proper best management practices (BMPs) are not in place. These areas contribute high BOD and nutrients that can affect the DO conditions in streams. Drain tiles also transport agricultural runoff directly to ditches and streams, whereas runoff flowing over the land surface may infiltrate to the subsurface and may flow through riparian areas. Pesticides applied to both agricultural and urban landscapes can also contribute to low DO conditions.

5.2.2 Animal Feeding Operations (AFOs)

Animal feeding operations that are not classified as CAFOs are known as animal feeding operations (AFOs) in Illinois. Non-CAFO AFOs are considered nonpoint sources by U.S. EPA. AFOs in Illinois do not have state permits. However, they are subject to state livestock waste regulations and may be inspected by the IEPA, either in response to complaints or as part of the agency's field inspection responsibilities to determine compliance by facilities subject to water pollution and livestock waste regulations. The animals raised in AFOs produce manure that is stored in pits, lagoons, tanks, and other storage devices. The manure is then applied to area fields as fertilizer. When stored and applied properly, this beneficial re-use of manure provides a natural source for crop nutrition. It also lessens the need for fuel and other natural resources that are used in the production of fertilizer. AFOs, however, can pose environmental concerns, including the following:

- Manure can leak or spill from storage pits, lagoons, tanks, etc.
- Improper application of manure can contaminate surface or ground water.
- Manure over application can adversely impact soil productivity.

Livestock are potential sources of nutrients and BOD to streams, particularly when direct access is not restricted and/or where feeding structures are located adjacent to riparian areas. Watershed specific data are not available for livestock populations. However, county-wide data available from the 2017 Census of Agriculture (National Agricultural Statistics Service [NASS] 2017) were downloaded and area-weighted to estimate the livestock population in the project area. An estimated 9,379 animals are in the project area.

5.2.3 Internal Loads

Internal loading of pollutants can occur in both streams and lakes, leading to impaired conditions. In streams, SOD takes up oxygen from the water column as a result of organic decomposition. Without SOD

data, it is not possible to determine if internal loading is contributing to the low DO. Generally, internal loading is assumed to contribute to low DO but is not considered a significant source of impairment.

5.2.4 Onsite Wastewater Treatment Systems

Onsite wastewater treatment systems (e.g., septic systems) that are properly designed and maintained should not serve as a source of contamination to surface waters. However, onsite systems do fail for a variety of reasons and can contribute to low DO conditions. Common soil-type limitations that contribute to failure include seasonally high water tables, compact glacial till, bedrock, and fragipan. When these septic systems fail hydraulically (surface breakouts) or hydrogeologically (inadequate soil filtration) there can be adverse effects to surface waters (Horsley and Witten 1996). Septic systems contain all the water discharged from homes and businesses and can be significant sources of pollutants.

Additional onsite wastewater treatment systems information be found in the completed *Crooked Creek Watershed Total Maximum Daily Load Report* (IEPA 2008). In addition, county health departments were contacted for information on septic systems and unsewered communities. In Jefferson County, 99 new systems or replacements were put in during 2017, and there are approximately 15 to 25 nuisance complaints each year. No new information was provided for the other counties.

6. Protection Plan

The following protection plan includes recommended activities that could be used to protect the streams in the watershed from low DO levels by reducing nutrient loading and BOD. Not only will these activities help to maintain DO levels above water quality standards, but these activities will also result in a cleaner, healthier watershed. This protection plan incorporates adaptive management to provide flexibility for watershed stakeholders to adjust the protection plan to align with their priorities. Adaptive management is also necessary because factors unique to specific localities may yield better or worse results for a certain BMP (or suite of BMPs) and the plan will need to be modified to account for such results.

6.1 Critical Areas for Implementation

Successful implementation begins with identifying and focusing resources in critical areas. Critical areas represent those locations where project funding will provide the greatest environmental benefit. Upon identification of critical areas, BMPs can be selected to address the needs of each area.

6.1.1 Estimate Relative Contributions

Estimating the relative pollutant contributions from sources can help to further prioritize areas to target for implementation. U.S. EPA (2018) states that estimates of relative contributions "…can range from narrative descriptors (e.g., high, medium, low) derived from aerial photo analysis or field inventories to quantitative values developed from desktop screening tools or models". The approach used to estimate the relative contribution of pollutants can vary depending on the size of the contributing area, type of pollutant, and amount of available information. Note that the following load analyses are for nonpoint sources of nutrients; permitted point sources also discharge nutrients and BOD in their effluent but are not discussed in this protection plan.

The primary nonpoint source of nutrient loading to the Crooked Creek and Lost Creek watershed is watershed loading from agricultural runoff, stormwater runoff, and AFOs. The relative contributions of phosphorus from different land cover types (including urban and agricultural areas) were estimated using the *Spreadsheet Tool for the Estimation of Pollutant Load* (STEPL) model, in addition to available literature and watershed characteristics. STEPL provides a simplified simulation of precipitation-driven runoff and nutrient delivery. STEPL has been used extensively in U.S. EPA Region 5 for watershed plan development and in support of watershed studies. Existing BMPs and point sources are not included in

the model setup. Discussion of near-channel sources including streambank erosion and channelization and onsite wastewater systems are provided following the STEPL modeling results.

Watershed Loading

Annual phosphorus loading rates are summarized for Crooked Creek segment IL_OJ-11 in Figure 6[1]. The STEPL model was also used to estimate yields (load divided by area) across the subwatersheds. Drainage areas were delineated within each subwatershed using U.S. Geological Survey topography and National Hydrology Dataset flowlines. Estimated sediment loading rates for each drainage area are provided in Figure 7.

Based upon STEPL estimates, the majority of watershed phosphorus loading to Crooked Creek (IL_OJ-11) is contributed by agricultural runoff from cropland. Stormwater runoff from urban areas may be providing moderate phosphorus contributions to the impaired segment. AFOs are likely contributing low levels of phosphorus loading. STEPL pastureland load results represented AFOs and were based in part upon livestock estimates using area-weighting of the 2017 Census of Agriculture (NASS 2017). An estimated 1,040 animals are present in the Crooked Creek (IL_OJ-11) impaired subwatershed.

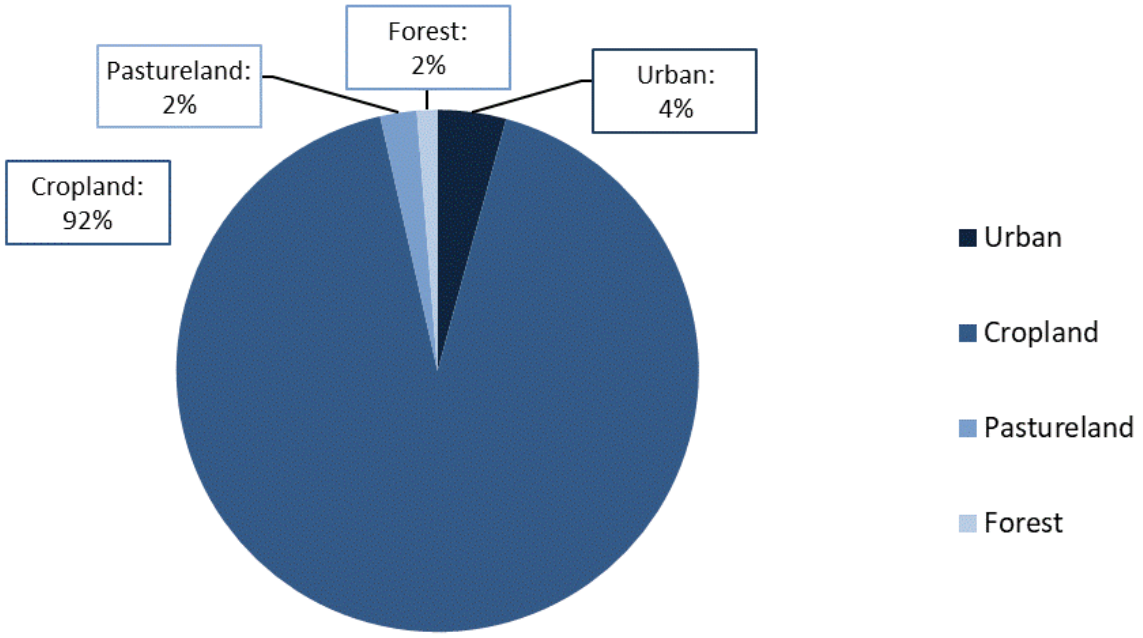


Figure 6. STEPL relative loading of total phosphorus by land cover type to Crooked Creek (IL_OJ-11) (%).

[1] The relative loadings of TP by land cover type to Lost Creek (IL_OJB-04), which was previously listed for DO, are 95% cropland, 1% pastureland, <1% forest, and 4% urban.

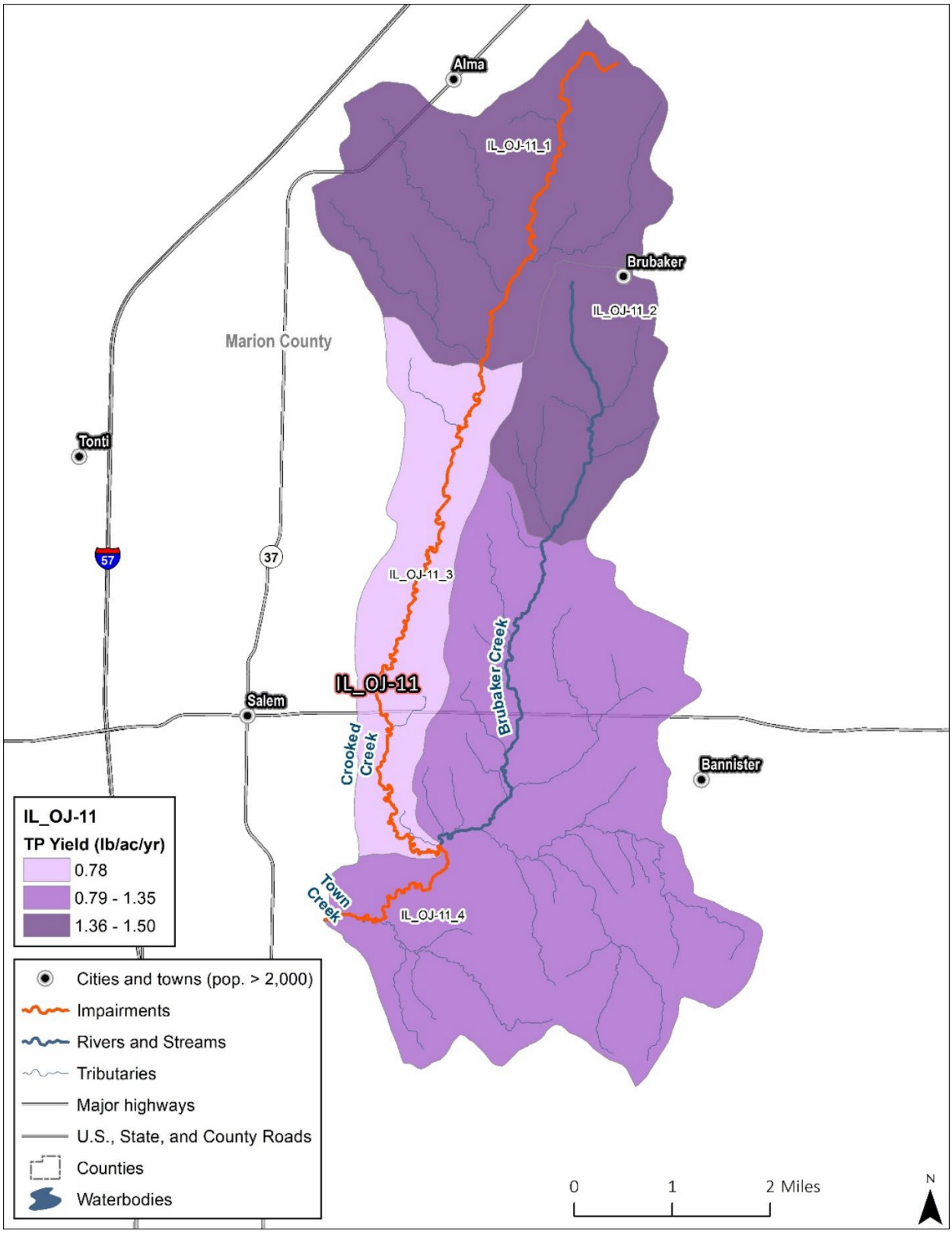


Figure 7. Phosphorus yield by drainage area in the Crooked Creek (IL_OJ-11) impaired subwatershed.

Near-Channel Sources

In-stream sources, including streambank erosion, are likely a moderate contributor of phosphorus to streams throughout the Crooked Creek and Lost Creek watershed. However, the effect of stream channel alterations may be having a larger effect on DO conditions. A planning-level assessment of stream channel conditions was conducted using aerial photo interpretation to determine the condition of the impaired segments. Stream channel alterations were observed on approximately 25% (3.97 miles) of Crooked Creek (IL_OJ-11; Figure 8)[2].

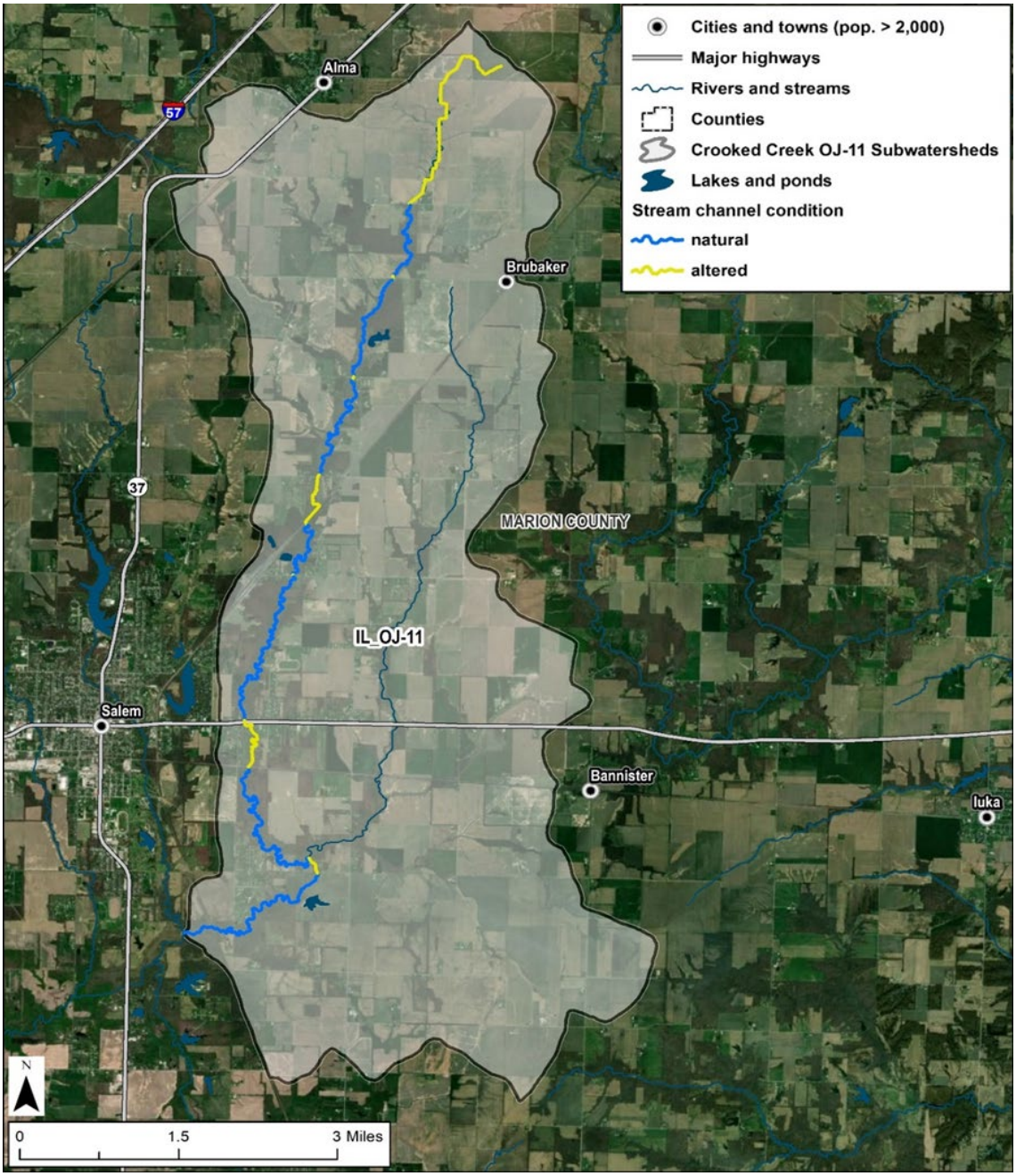


Figure 8. Assessed stream channel condition along Crooked Creek (IL_OJ-11).

[2] Stream channel alterations were observed on approximately 26% (6.6 miles) of Lost Creek (IL_OJB-04).

Onsite Wastewater Treatment Systems

Onsite wastewater treatment systems are likely providing low phosphorus contributions to streams throughout the Crooked Creek and Lost Creek watershed; failing onsite wastewater treatment systems are also often sources of BOD. Phosphorus loading from onsite wastewater treatment systems was approximated as a function of phosphorus load produced per capita, the population of the key subwatersheds, and assumptions related to system failure rate and the percentage of phosphorus loading that migrates to the stream based on system operation/failure. Based on these assumptions, approximately 3-4 failing or non-conforming systems are estimated to be in the subwatershed draining to Crooked Creek (IL_OJ-11) and 1-2 in the drainage area to Lost Creek (IL_OJB-04). The estimated phosphorus load from onsite wastewater treatment systems to these segments is 14 pounds per year.

6.1.2 Critical Source Areas

Critical source areas are considered by the U.S. EPA (2018) as areas that are 1) large sources of pollutants, 2) have the greatest pollutant transport potential, and 3) provide opportunity for improvements (i.e., areas disproportionately impacting impaired streams, areas with local support and participation). Sources and pathways of pollutants and their relative contributions were used to determine critical areas for the first five years of implementation. Critical area selection is an iterative process. When all information is not known or more information is needed, monitoring of plan implementation and use of an adaptive management approach will help to determine what areas to target for implementation.

In the Crooked Creek and Lost Creek watershed, watershed loading from cropland runoff is the most significant source of phosphorus loading. For Crooked Creek segment IL_OJ-11, critical areas are delineated as the drainage areas with the highest phosphorus yields. These critical areas for implementation are provided in Figure 9.

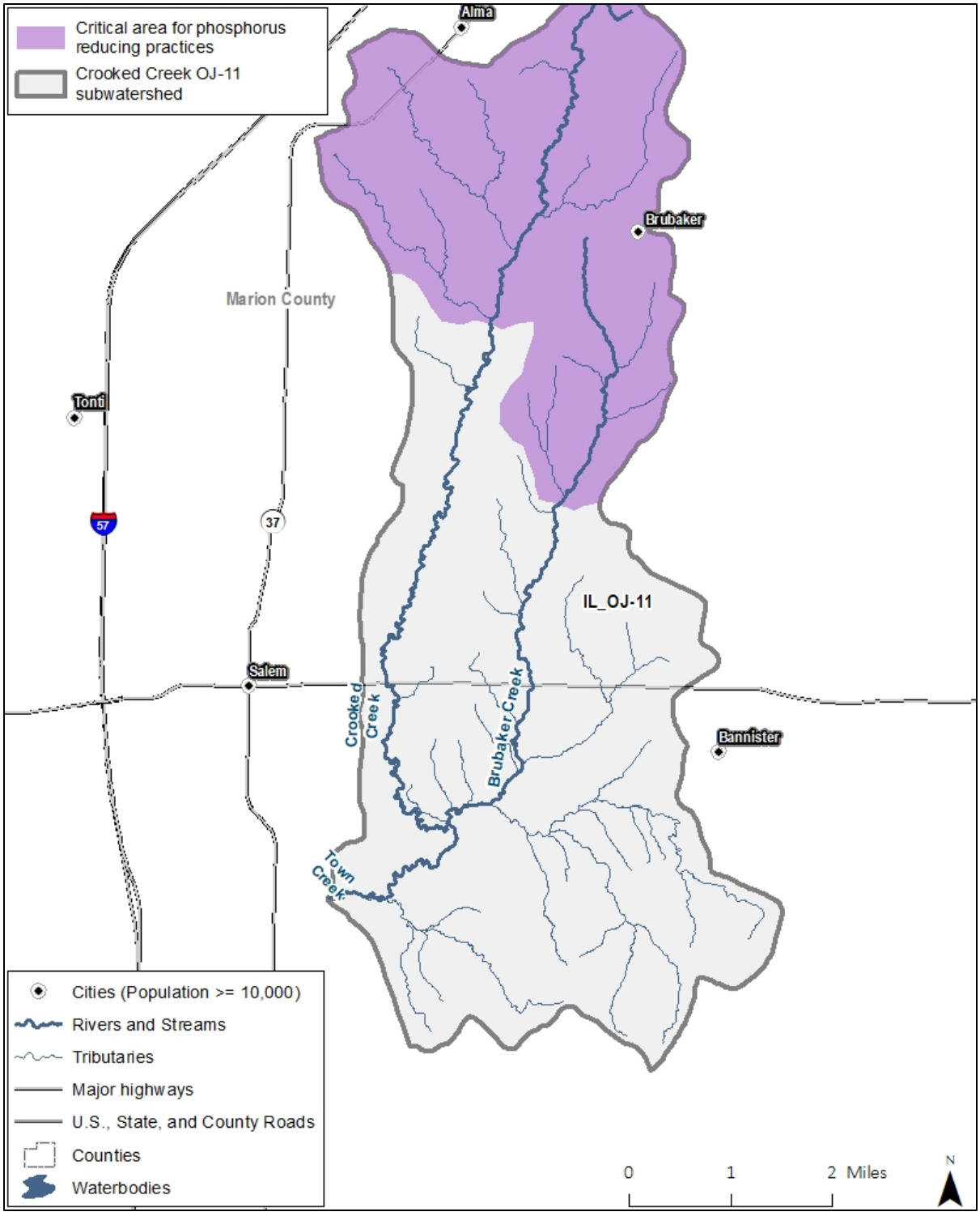


Figure 9. Critical areas in Crooked Creek (IL_OJ-11).

6.2 Best Management Practices

Low DO can be caused by nutrient eutrophication, BOD, and SOD. In the Crooked Creek and Lost Creek watershed, agricultural runoff from cropland is the primary source of phosphorus that can contribute to nutrient eutrophication. BMPs to address phosphorus are presented in this section, and Table 9 includes a suite of BMPs that could be used to address phosphorus levels in the watershed. Many BMPs that address phosphorus can also address nitrogen. Agricultural BMPs that prevent manure from entering waterbodies can reduce both nutrient loading and BOD. Descriptions of each BMP are provided in the following sections.

Table 9. Removal efficiencies for example agricultural runoff BMPs.

BMP	Phosphorus Removal Efficiency
Conservation tillage	50%
Cover crops	30%
Nutrient and fertilizer management	7%
Vegetated buffers and filter strips	40-85% [a]

Source: IEPA and Illinois Department of Agriculture 2015, except as noted.

a. Source: STEPL v4.4

6.2.1 Agricultural Runoff BMPs

Agricultural runoff from cropland is the primary source of phosphorus loading to streams in the Crooked Creek and Lost Creek watershed. Example BMPs to address cropland loading are presented in the following subsections and estimated reductions are summarized in Table 9. A subset of the management practices provided in the Illinois Nutrient Loss Reduction Strategy (NLRS) are included. The Illinois Council on Best Management Practices (http://illinoiscbmp.com/) and the previous Crooked Creek Watershed TMDL Implementation Plan (IEPA 2008) provide additional information on these and other BMPs. Many of these practices have the added benefit of improving soil health.

Conservation Tillage

The Illinois NLRS identifies reduced or conservation tillage as a primary BMP to control phosphorus loading to waters. The Illinois Agronomy Handbook defines conservation tillage as any tillage practice that results in at least 30% coverage of the soil surface by crop residuals after planting (University of Illinois Extension 2009). Several practices are commonly used to maintain the suggested 30% cover:

- **No-till** systems disturb only a small row of soil during planting, and typically use a drill or knife to plant seeds below the soil surface.
- **Strip till** operations leave the areas between rows undisturbed but remove residual cover above the seed to allow for proper moisture and temperature conditions for seed germination.
- **Ridge till** systems leave the soil undisturbed between harvest and planting: cultivation during the growing season is used to form ridges around growing plants. During or prior to the next planting, the top half to two inches of soil, residuals, and weed seeds are removed, leaving a relatively moist seed bed.
- **Mulch till** systems are practices that results in at least 30% residual surface cover, excluding no-till and ridge till systems.

Corn residues are more durable and capable of sustaining the required 30% cover required for conservation tillage. Soybeans generate less residue, the residue degrades more quickly, and supplemental measures or special care may be necessary to meet the 30% cover requirement. Based on 2018 satellite

imagery, less than half of the cropland acres in the Middle Kaskaskia River major watershed (hydrologic unit code 07140202; this larger watershed includes the Crooked Creek and Lost Creek watershed) had residue greater than 30% (Applied Geosolutions LLC et al. 2019).

Cover Crops

Winter cover crops are also identified in the NLRS as an important management practice (IEPA and Illinois Department of Agriculture [IDOA] 2015). According to the Natural Resources Conservation Service (NRCS), cover crops "have the potential to provide multiple benefits in a cropping system. They can prevent soil and wind erosion, improve soil's physical and biological properties, supply nutrients, suppress weeds, improve the availability of soil water, and break pest cycles along with various other benefits. The species of cover crop selected along with its management determine the benefits and returns" (NRCS 2020). There are many different types of crops being used for cover crops including various grasses and legumes. Based on 2018 satellite imagery, approximately 10% of the cropland acres in the Middle Kaskaskia River major watershed (hydrologic unit code 07140202; this larger watershed includes the Crooked Creek and Lost Creek watershed) were using winter cover crops (Applied Geosolutions LLC et al. 2019).

Nutrient and Fertilizer Management

Proper application of nutrients (both commercial/inorganic fertilizer and manure) on cropland can greatly reduce nutrient levels in agricultural runoff. In general, nutrient and fertilizer management aims to optimize application rates and improve storage and disposal of fertilizer to reduce pollution in runoff.

The Illinois Agronomy Handbook lists guidelines for nutrient application rates based on the inherent properties of the soil (typical regional soil phosphorus concentrations, root penetration, pH, etc.), the starting soil test phosphorus concentration for the field, and the crop type and expected yield. Limiting commercial application of fertilizers to only fields with soil test phosphorus levels below the recommended maintenance can reduce nutrient loading from excess fertilization. Application of fertilizer should address application rates, methods, and timing as described in the NLRS and according to the 4Rs – **R**ight Source, **R**ight Rate, at the **R**ight Time, and in the **R**ight Place. Application to frozen ground or snow cover should be strongly discouraged. Researchers studying loads from agricultural fields in east-central Illinois found that fertilizer application to frozen ground or snow followed by a rain event could transport 40% of the total annual phosphorus load (Gentry et al. 2007).

Fertilizer transport, storage, and disposal practices should also be monitored to reduce potential pollution in runoff. Commercial fertilizers should be stored at least 100 feet from nearby surface waters and should not be stored underground or in pits. Application equipment should be cleaned, inspected, and calibrated regularly, and excess fertilizer from wash water should be recovered for reuse. Disposal of commercialized fertilizers should follow manufacturer guidelines. Improvements to storage and disposal practices may require improvements to existing equipment or storage infrastructure to reduce potential leakages. Many of the transport, storage, and disposal BMPs for commercial/inorganic fertilizer are also applicable to manure.

Vegetated Buffers and Filter Strips

Vegetated buffers and filter strips provide many benefits and can effectively address water quality degradation. Riparian buffers that include perennial vegetation and trees can filter runoff from adjacent cropland and the root structure of the vegetation in a buffer enhances subsequent trapping of pollutants. However, buffers are only effective in this manner when the runoff enters the buffer as a slow moving, shallow "sheet"; concentrated flow in a ditch or gully and quickly passes through the buffer offering minimal opportunity for retention and uptake of pollutants. The Illinois NRCS electronic Field Office Technical Guide recommends the minimum width of a riparian buffer should be 2.5 times the width of the

stream (at bank-full elevation) or 35 feet for water bodies to achieve additional water quality improvements (NRCS 2017a).

Filter strips are a strip of permanent vegetation located between disturbed land (cropland or pasture) and environmentally sensitive areas that can effectively address water quality degradation from nutrient loading while also enhancing habitat (NRCS 2017b). Filter strips provide many of the same benefits as vegetated buffers but are also subject to the same design considerations. Determining adequate filter strip widths depends on the slope of the land. Table 10 summarizes the minimum and maximum flow lengths for filter strips according to Illinois NRCS standards.

Table 10. Minimum and maximum filter strip length for land slope (NRCS 2017b).

Slope (%)	0.5	1.0	2.0	3.0	4.0	5.0 or greater
Minimum (feet)	36	54	72	90	108	117
Maximum (feet)	72	108	144	180	216	234

6.2.2 Stormwater BMPs

Stormwater BMPs can be used to control phosphorus loading by reducing the quantity and pollutant concentration of stormwater runoff contributed from developed land covers. Structural stormwater BMPs can capture stormwater runoff and use infiltration or filtration processes to reduce pollution levels before stormwater enters local water bodies. The Illinois Urban Manual (http://www.aiswcd.org/illinois-urban-manual/) provides recommended design guidelines for many stormwater BMPs as well as removal efficiencies for certain pollutants.

According to STEPL v4.4, structural stormwater BMPs may provide 40-80% phosphorus removal, depending on site conditions. Common structural practices include:

- **Green infrastructure practices:**
  - Bioretention and rain gardens
  - Permeable pavement
  - Tree trenches
  - Infiltration basins
- **Stormwater ponds and detention basins:**
  - Wet ponds
  - Extended wet detention
  - Dry detention
- **Wetland creation and detention**

In addition to these structural stormwater BMPs, non-structural practices such as local water planning and ordinance adoption can enhance stormwater management. Local water planning and ordinance adoption can also be used to encourage green infrastructure as a method of meeting runoff, volume control, and stormwater detention requirements. This could include improvements to/incorporation of buffer requirements, stormwater quality treatment requirements, and/or stormwater volume control.

6.2.3 In-Stream BMPs

Eroding streambanks and beds are impacted by channelization, erosion, and streambank destabilization and have been identified as a source of phosphorus in the watershed. Restoration of eroding areas will minimize sediment loss and associated phosphorus loading. In addition, in-stream conditions that may be contributing to low DO conditions include stagnant water, lack of riffles, channelization, lack of shade,

and lack of adequate flow. Restoration of altered (channelized or ponded) stream segments can greatly enhance the stream function, habitat, and water quality (Yochum 2018).

- **Stream channel natural design methods** that establish meanders and natural flow complexity and connects the stream channel with the floodplain.
- **Engineering controls** include armoring with materials, deflection of the water course with rock or log structures, removal of debris to restore flows, and mitigating head cuts (e.g., grade control structures and head cut abatement structure).
- **Vegetative stabilization and restoration of riparian areas** can reduce flows from runoff areas and channel velocities. Using vegetative controls also enhances infiltration, which reduces high flows that cause erosion.

6.3 Partners and Assistance

This plan focuses on voluntary efforts. As a result, assistance is essential to successful implementation over time. This section identifies sources of funding and technical assistance to implement the recommended activities. This section also identifies the watershed partners who could play a role in implementation.

6.3.1 Financial Assistance Programs

There are many existing financial assistance programs which may assist with funding implementation activities. Many involve cost sharing, and some may allow the local contribution of materials, land, and in-kind services (such as construction and staff assistance) to cover a portion or the entire local share of the project. Several of these programs are presented in Table 11. In addition to these programs, partnerships between local governments can help to leverage funds. State and federal grant programs may also be available, depending on the nature of the implementation activity.

Table 11. Potential funding sources.

Funding Program	Type of Funding	Entity	Eligible Projects	Eligible Applicants	Available Funding	Website
Federal Programs						
Five Star Wetland and Urban Water Restoration Grant	Grant	U.S. EPA	On-the-ground wetland, riparian, in-stream and/or coastal habitat restoration, education and training activities through community outreach, participation and/or integration with K-12 environmental curriculum. Projects that provide benefits to the community through ecological and environmental efforts, and partnerships.	Non-profits, state government agencies, local and municipal governments, Indian tribes, and educational institutions	$10,000-$40,000 per project	http://www.nfwf.org/fivestar/Pages/home.aspx
Wetland Program Development Grants	Grant	U.S. EPA	Projects that promote the understanding of water pollution through review and refinements of wetland programs. Cause and effects, reduction and prevention, and elimination of water pollution.	States, tribes, local governments, interstate associations, and intertribal consortia (Regional grants) Nonprofits, interstate associations and intertribal consortia (National grants)	$20,000 to $600,000/fiscal year	https://www.epa.gov/wetlands/wetland-program-development-grants
North American Wetlands Conservation Act (standard grant)	Grant through the North American Wetlands Conservation Act	USFWS	Wetlands conservation projects in the United States, Canada, and Mexico. Projects must provide long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats.	Non-profits, state government agencies, local and municipal governments, Indian tribes, and educational institutions	Since 1995 1,025 projects have been funded with a combined total of over $850 million grant dollars. Requires a 1-1 partner contribution	https://www.fws.gov/service/north-american-wetlands-conservation-act-nawca-grants-us-standard
North American Wetlands Conservation Act (small grant)	Grant through the North American Wetlands Conservation Act	USFWS	Wetlands conservation projects in the United States, Canada, and Mexico. Grant requests must not exceed $100,000.	Non-profits, state government agencies, local and municipal governments, Indian tribes, and educational institutions	Since 1996, 750 projects have been funded with a combined total of $43.2 million grant dollars Requires a 1-1 partner contribution	https://www.fws.gov/service/north-american-wetlands-conservation-act-nawca-grants-us-small
Environmental Quality Incentive Program (EQIP)	Cost-share through contract (usually 3 years)	NRCS	Approved conservation practices that are constructed according to NRCS.	Farmers in livestock, agricultural, or forest production who utilize approved conservation practices	Up to 75% of project cost	https://www.nrcs.usda.gov/wps/portal/nrcs/il/programs/financial/eqip/
National and State Conservation Innovation Grants	EQIP funded grants	NRCS	Innovative problem-solving projects that boost production on farms, ranches, and private forests that improve water quality, soil health, and wildlife habitat.	Non-federal governmental or nongovernmental organizations, American Indian Tribes, or individuals. Producers involved in CIG funded projects must be EQIP eligible.	More than $22.6 million was awarded to 33 projects in 2017 Grantees much match funds	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/
Environmental Education Grants Program	Grant	U.S. EPA	Environmental education programs that promote environmental awareness and stewardship and help provide people with the skills to take responsible actions to protect the environment.	▪ Local education agencies ▪ State education or environmental agencies ▪ Colleges or universities ▪ Non-profit organizations 501(c)(3) ▪ Noncommercial educational broadcasting entities ▪ Tribal education agencies (including schools and community colleges controlled by an Indian tribe, band, or nation)	In 2015, 35 projects in the county were funded for a total of $3,306,594	https://www.epa.gov/education/environmental-education-ee-grants
State/Federal Partnerships						
Nonpoint Source Management Program (319)	Grant	U.S.EPA/ IEPA	Priority given to projects that implement cost-effective corrective and preventative BMPs on a watershed scale. Also available for BMPs on a non-watershed scale and the development of information/education nonpoint source pollution control programs. Projects that meet requirements of a NPDES permit are not eligible for 319 funding.	Units of government and other organizations	Approximately $3,000,000 is available per year, awarded amongst approximately 15 projects. Provides up to 60% project cost share	https://www2.illinois.gov/epa/topics/water-quality/watershed-management/nonpoint-sources/Pages/grants.aspx Supplemental guidance on 319 funding for urban BMPS: http://www.epa.state.il.us/water/watershed/publications/nps-pollution/urban-bmps-supplemental-guidance.pdf
Clean Water State Revolving Fund	Low interest loans, purchase of debt or refinance, subsidization	IEPA	Nonpoint source pollution control. Green infrastructure projects, construction of municipal wastewater facilities and decentralized wastewater treatment systems, watershed pilot projects, stormwater management, technical assistance (qualified nonprofit organizations only).	Corporations, partnerships, governmental entities, tribal governments, state infrastructure financing authorities	Varies	https://www.epa.gov/cwsrf

Funding Program	Type of Funding	Entity	Eligible Projects	Eligible Applicants	Available Funding	Website
Healthy Forest Reserve Program	Easements, 30-year contracts, 10-year contracts	USDA	Projects that restore, enhance, and protect forestland reserves on private land to measurably increase the recovery of threatened or endangered species, improve biological diversity, or increase carbon storage.	Private landowners	1. 10-year restoration cost-share agreement: up to 50% of average cost of approved conservation practices 2. 30-year easement: up to 75% of the easement value of the enrolled land plus 75% of the average cost of the approved conservation practices 3. 30-year contract on acreage owned by Indian Tribes 1. Permanent easements: up to 100% of the easement value of the enrolled land plus 100% of the average cost of the approved conservation practices	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/
Healthy Watersheds Consortium Grant	Grant	EPA, NRCS and U.S. Endowment for Forestry and Communities	▪ "Healthy watershed" program development projects that aim to preserve and protect natural areas, or local demonstration/trainings ▪ Conservation easements are *not* eligible ▪ Grants awarded are generally within three categories: 1. Short term funding to leverage larger financing for targeted watershed protection 2. Funds to help build the capacity of local organizations for sustainable, long term watershed protection 3. New replicable techniques or approaches that advance the state of practice for watershed protection.	Consortiums or "one entity who is linked with or in a collaborative partnership with other groups or organizations having similar healthy watersheds protection goals"	$50,000-150,000 per project	https://www.epa.gov/hwp/healthy-watersheds-consortium-grants-hwcg
Partners for Fish and Wildlife Program	Technical and financial support	USFWS	Collaborations and partnerships with private landowners to improve fish and wildlife habitat on their lands. Voluntary, community-based stewardship for fish and wildlife conservation.	Private landowners	Varies per project/partners	https://www.fws.gov/program/partners-fish-and-wildlife
State Programs						
Open Space Lands Acquisition and Development (OSLAD) Grant/Land and Water Conservation Fund Grant	Grant	IDNR	Acquisition and/or development of land for public parks and open space by Illinois governments. *Note: OSLAD program will not be available for Fiscal Year 2021 according to DNR website.*	Local governments	Up to $750,000 for acquisition projects and $400,000 for development/renovation projects. Funding up to 50% of project cost	https://www.dnr.illinois.gov/aeg/pages/openspacelandsaquisitiondevelopment-grant.aspx
Green Infrastructure Grant Opportunities	Grant	IEPA	Improvements to water quality through the construction of BMPs, especially to reduce stormwater runoff.	Units of government and organizations, colleges and universities, conservation/park districts	Reimbursement for a total of $5,000,000 annually starting in 2021.	https://www2.illinois.gov/epa/topics/grants-loans/water-financial-assistance/Pages/gigo.aspx
Unsewered Communities Planning and Construction Grant Programs	Grant	IEPA	Funding available through the Rebuild Illinois Capital Plan over five years for Construction Grants for wastewater collection and/or treatment facilities and for the next 4 years for Planning Grants to assist small and disadvantaged communities in developing a Project Plan that identifies a solution to their wastewater collection and treatment needs. A well-developed Project Plan would then allow communities to apply for the Construction Grant	Unsewered communities with inadequate wastewater systems such as individual septic systems	$ 1,000,000 for Planning Grants and $1, 000,000 for Construction Grants	https://www2.illinois.gov/epa/topics/grants-loans/unsewered-communities/Pages/default.aspx
Illinois Buffer Partnership	Cost share, on site assistance from Trees Forever (Iowa) staff, project signs and field days	Illinois Buffer Partnership	Eligible projects include: Installation of streamside buffer plantings on projects including riparian buffers, livestock buffers, streambank stabilization projects, wetland development, pollinator habitat, rain gardens, and agroforestry projects.	Landowners willing to implement projects on their lands which can serve as a demonstration site to showcase benefits of conservation buffers.	Reimbursed up to $2,000 for 50 percent of the expenses remaining after other grant programs are applied	http://www.treesforever.org/Illinois_Buffer_Partnership.

Note: BMP = best management practice; EQIP = Environmental Quality Incentive Program; IDNR = Illinois Department of Natural Resources; IEPA = Illinois Environmental Protection Agency; NRCS = Natural Resources Conservation Service; USDA = U.S. Department of Agriculture; U.S. EPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service.

6.3.2 Partners

Several watershed groups are already active in the watershed and have projects and on-going programming that will support implementation. A few relevant groups and projects are summarized below:

- **Kaskaskia Watershed Association:** The KWA partners across the watershed to protect the watershed and balance navigation, recreation, water supply, and conservation. Recent projects include the establishment of an Illinois conservation 2000 Ecosystem Partnership with the Illinois Department of Natural Resources for financial support on 88 projects within the major Kaskaskia River basin, as well as development of a comprehensive watershed management strategy. The KWA also hosts an Annual Summit where regional leaders and stakeholders share knowledge and information about ongoing and future water quality concerns.
- **Heartlands Conservancy:** Dedicated to protecting open spaces, farmland, and cultural assets in Southwestern Illinois, the Heartlands Conservancy provide consultation, support, funding, and outreach activities to local communities and partners. Their work involves a wide range of ongoing projects, including the purchase and preservation of conservation easements, targeted BMP implementation, regional watershed and ecological planning support, and a wide range of education and outreach activities for local communities. Heartlands also supports and partners with many local organizations and supports the KWA's annual conference.
- **The Kaskaskia Project:** An ongoing University of Illinois Urbana-Champaign project is currently researching the impact of existing and projected environmental and socio-cultural stressors on agro-ecosystem services in the major Kaskaskia River basin. More information on this project is available on their website (https://publish.illinois.edu/kaskaskia/).

In addition to KWA and the Heartlands Conservancy, there are many partners within the Crooked Creek and Lost Creek watershed that may provide technical or financial assistance to promote successful implementation and watershed management:

- County Forest Preserve Districts
- Farm Service Agency
- Illinois Certified Crop Adviser Program
- Illinois Department of Agriculture
- Illinois Department of Natural Resources
- IEPA
- Illinois Farm Bureau
- Illinois Rural Water Association
- Illinois State Water Survey
- Kaskaskia Regional Port District
- Kaskia-Kaw Rivers Conservancy
- Local & regional governments
- Local school districts
- Mid-Kaskaskia River Basin Coalition
- National Great Rivers Research and Education Center
- NRCS
- Original Kaskaskia Area Wilderness
- Southwestern Illinois RC&D, Inc.
- Soil and Water Conservation Districts (SWCDs)
- Upper Kaskaskia Watershed Ecosystem Partnership
- University of Illinois Extension
- U.S. Army Corps of Engineers
- U.S. EPA Region 5

6.3.3 Public Education and Outreach

Raising stakeholders' awareness about issues in the watershed and developing strategies to change stakeholders' behavior is essential to promoting voluntary participation. Successful implementation in the Crooked Creek and Lost Creek watershed will rely heavily on effective public education and outreach activities that will encourage participation and produce changes in behavior. This section presents recommendations related to developing and implementing coordinated watershed-wide education and outreach.

The first step to a successful information and education strategy is to identify target audiences and to determine how to best reach these audiences. Potential audiences in the Crooked Creek and Lost Creek watershed may include agricultural producers, Certified Crop Advisors, and local residents and landowners. Consideration should be given to the complexity of the water resource concerns of each of these groups. Whenever possible, stakeholder attitudes and preferences should be considered in the implementation of protection activities and should influence message development, selection of outreach platforms, and other aspects of information and education.

Engagement and outreach strategies should also be flexible to accommodate future changes in stakeholder awareness and behaviors. A pre- and post-implementation survey can be used to measure these changes, and the results of these surveys should be shared between local partners. These surveys can be used to measure changes in the level of stakeholder knowledge and involvement and will help watershed outreach campaign organizers to further develop tailored outreach messages. Other measures of change might include the number of producers signing up for cost-share programs or participating in field days or demonstration projects. Results from these outreach activities should be used to inform potential changes and adaptations to this implementation plan.

Potential targeted audiences, concerns, and communication channels are outlined in Table 12.

Table 12. Potential audience concerns and communication channels.

Key Target Audiences	Potential Audience Concerns	Potential Communication Channels
Agricultural producers	• Potential future regulation • Cost and programmatic requirements of funding programs • Water quality issues (safety, aesthetics) • Flooding	• University of Illinois Extension • Commodity groups • Agricultural associations • 4-H groups • SWCDs • Certified Crop Advisers • Local media • Watershed groups • Brochures and other handouts • Informational meetings
Certified Crop Advisors	• Areas and practices to target for implementation • Costs and programmatic requirements for funding programs • Updated information to pass along to agricultural producers	• Training sessions • Outreach and distributed information from research institutions • Informational meetings
Local residents/ landowners	• Surface water quality issues (safety, aesthetics) • Drinking water quality • Property values • Recreation	• Newspapers and local media • Social media • Local governments • SWCDs and watershed groups • Brochures and other handouts

Key Target Audiences	Potential Audience Concerns	Potential Communication Channels
Riparian landowners	• Streambank erosion • Surface water issues (safety, aesthetics) • Property values • Flooding • Drinking water quality • Recreation	• County and state health departments • Existing community, waterfront, and neighborhood associations

Resources exist which are relevant to several of these stakeholders. Training programs for effective communication channels between landowners, farmers, permitted entities, and neighboring areas can help support successful implementation of the implementation plan. Training and education programs for agricultural producers are also effective methods of increasing implementation and long-term maintenance of implemented BMPs.

The University of Illinois Extension Unit located in Clinton and Marion counties (https://web.extension.illinois.edu/bcjmw/) has extensive education and outreach programs in place that range in topic from commercial agriculture, horticulture, energy, and health that can provide meaningful resources to the information and education effort in the watershed.

6.4 Adaptive Management

Adaptive management is a strategy to address natural resource management that involves a temporal sequence of decisions (or implementation actions), in which the best action at each decision point depends on the state of the managed system. As a structured iterative implementation process, adaptive management offers the flexibility for responsible parties to monitor implementation actions, determine the success of such actions and ultimately, base management decisions upon the measured results of completed implementation actions and the current state of the system. This process, depicted in Figure 10, enhances the understanding and estimation of predicted outcomes and ensures refinement of necessary activities to better guarantee desirable results. In this way, understanding of the resource can be enhanced over time, and management can be improved.

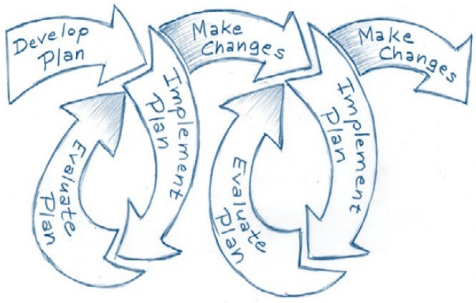


Figure 10. Adaptive management iterative process (U.S. EPA 2008).

6.5 Monitoring

The ultimate measure of success will be documented changes in water quality, showing improvement over time. In addition, long-term monitoring of the overall health and quality of the watershed is important. Monitoring will help determine whether actions have improved water quality and support future resource management decisions. In addition, monitoring will help determine the effectiveness of various BMPs and indicate when adaptive management should be initiated.

6.5.1 Water Quality Monitoring

DO levels and parameters associated with nutrient eutrophication will be determined through ambient monitoring by IEPA (i.e., Ambient Water Quality Monitoring Network). The state conducts routine water quality monitoring by evaluating watersheds on a rotating basis, collecting measurements of physical, chemical, and biological parameters. Water quality monitoring efforts may also be supported through volunteer citizen monitoring efforts that typically allow for more frequent monitoring at a lower cost.

In addition to ambient monitoring, additional monitoring in the watershed is recommended to further refine the sources and extent of impairment. DO levels should continue to be monitored using periods of continuous DO monitoring along with grab samples. Synoptic stream sampling can be used to better understand sources of pollutants and identify hot spots or additional critical areas. In addition, additional phosphorus sampling could further refine the relationship between phosphorus and DO and inform adaptive management.

Sampling during different flow regimes and seasons is also critical to understanding sources. Monitoring flow is recommended for each site when water quality samples are taken. The Illinois NLRS Biennial Report (IEPA and IDOA 2019) also recommends increasing the frequency of sampling practices, especially during high flow conditions. Low DO during lower flow conditions is due to lack of sufficient flow in the streams to support aquatic life. Available, but limited, paired TP and DO data collected during higher flow conditions indicates that nutrient eutrophication may contribute to low DO when more flow is in the stream.

6.5.2 BMP Effectiveness Monitoring

Multiple BMPs will be needed to address the water quality in the Crooked Creek and Lost Creek watershed. There are limited local data on the effectiveness of many BMPs; therefore, monitoring the results of programs and representative practices is critical. BMP monitoring can include quantitative monitoring of physical components (e.g., water quality and flow) qualitative (i.e., visual) monitoring of physical components (e.g., vegetation), and monitoring of behaviors. A monitoring program should be put in place as BMPs are implemented to 1) measure success and 2) identify changes that could be made to increase effectiveness.

7. Public Participation

A public meeting was held on December 12, 2018, at the Carlyle Lake Visitor Center in Carlyle, Illinois, to present the Stage 1 Report and findings. A public notice was placed on the IEPA website. There were many stakeholders present including representatives from the Army Corps of Engineers, the Kaskaskia Watershed Association (KWA), and the Original Kaskaskia Area Wilderness, Inc. The public comment period closed on January 12, 2019. No comments were received on the Stage 1 Report.

A second virtual public meeting was held on xxxxx to present this protection plan. A public notice was placed on the IEPA website. The public comment period closed on xxxxx. Comments and response to comments are provided in Appendix C.

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Appendix A—Stage 1 Report

Crooked Creek and Lost Creek Watershed Total Maximum Daily Load

Final Stage 1 Report

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Report Prepared by:

TETRA TECH

February 2019

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Acronyms and Abbreviations

AFO	animal feeding operation
AWQMN	Ambient Water Quality Monitoring Network
BOD	biochemical oxygen demand
CAFO	confined animal feeding operation
CBOD	carbonaceous biochemical oxygen demand
CWA	Clean Water Act
DMR	discharge monitoring record
DO	dissolved oxygen
Illinois EPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
ISU	Iowa State University
L	liter
mg	milligram
µg	microgram
MCL	Maximum Contaminant Level
MGD	millions of gallons per day
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
SOD	sediment oxygen demand
STEPL	Spreadsheet Tool for Estimating Pollutant Load
STP	sewage treatment plant
TMDL	total maximum daily load
TP	total phosphorus
TSS	total suspended solids
U.S. EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WQS	water quality standards
WWTP	wastewater treatment plant

1. Introduction

The Clean Water Act and U.S. Environmental Protection Agency (U.S. EPA) regulations require that Total Maximum Daily Loads (TMDLs) be developed for waters that do not support their designated uses. In simple terms, a TMDL is a plan to attain and maintain water quality standards in waters that are not currently meeting standards. This TMDL study addresses a portion of the Crooked Creek watershed in southern Illinois. The project area, referred to as the Crooked Creek watershed, is approximately 563 square miles (Figure 1). A previous TMDL study was completed in the Crooked Creek watershed, and relevant information from the study is included herein where applicable (Illinois EPA 2008).

1.1 TMDL Development Process

The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and instream conditions. This allowable loading represents the maximum quantity of the pollutant that the waterbody can receive without exceeding water quality standards. The TMDL also includes a margin of safety, which reflects uncertainty, as well as the effects of seasonal variation. By following the TMDL process, states can establish water quality-based controls to reduce pollution from both point and nonpoint sources, and restore and maintain the quality of their water resources (U.S. EPA 1991).

The Illinois EPA will be working with stakeholders to implement the necessary controls to improve water quality in the impaired waterbodies and meet water quality standards. It should be noted that the controls for nonpoint sources (e.g., agriculture) will be strictly voluntary.

1.2 Water Quality Impairments

Several waters in the Crooked Creek watershed have been placed on the State of Illinois §303(d) list (Table 1 and Figure 1). There are other segments listed on the §303(d) that are not addressed by this project. A previous TMDL (Illinois EPA 2008) addressed the dissolved oxygen (DO) impairment in segment OJ-07; however, a TMDL was not developed.

Table 1. Crooked Creek and Lost Creek watershed impairments and pollutants (2016 Illinois 303(d) Draft List)

Name	Segment ID	Segment Length (Miles)	Watershed Area (Sq. Miles)	Designated Uses	Cause of Impairment
Kaskaskia River	O-07	17.85	2,759	Aquatic Life	**Dissolved Oxygen**, Phosphorus (Total)
Kaskaskia River	O-25	14.65	3,283	Aquatic Life	**Dissolved Oxygen**
				Public and Food Processing Water Supply	**Simazine**
Crooked Creek	OJ-07	34.46	185	Aquatic Life	**Dissolved Oxygen,** Phosphorus (Total)
Crooked Creek	OJ-08	24.34	466	Aquatic Life	Iron [a], Phosphorus (Total), Total Suspended Solids (TSS)
Crooked Creek	OJ-11	15.72	31	Aquatic Life	**Dissolved Oxygen**
Lost Creek	OJB-04	25.75	78	Aquatic Life	**Dissolved Oxygen,** Phosphorus (Total), Sedimentation/Siltation
Prairie Creek	OJBA	21.8	31	Aquatic Life	**Dissolved Oxygen,** Phosphorus (Total)
Grand Point Creek	OJC-01	16.55	66	Aquatic Life	**Dissolved Oxygen**, Sedimentation/Siltation
Raccoon Creek	OJF	17.08	53	Aquatic Life	**Dissolved Oxygen**
Salem Lake	ROR	74 ac (surface area)	4	Aquatic Life	**pH**, Total Suspended Solids (TSS)
				Public and Food Processing Water Supply	Simazine [b]

BOLD – TMDLs are addressed in this Stage 1 report.
a. Based on evaluation of the last ten years of available iron data (2007–2016), it was determined that segment OJ-08 does not need an iron TMDL (see Appendix A).
b. This cause of impairment has been removed from the 2018 Draft 303(d) List. A TMDL has been previously developed to address this impairment.

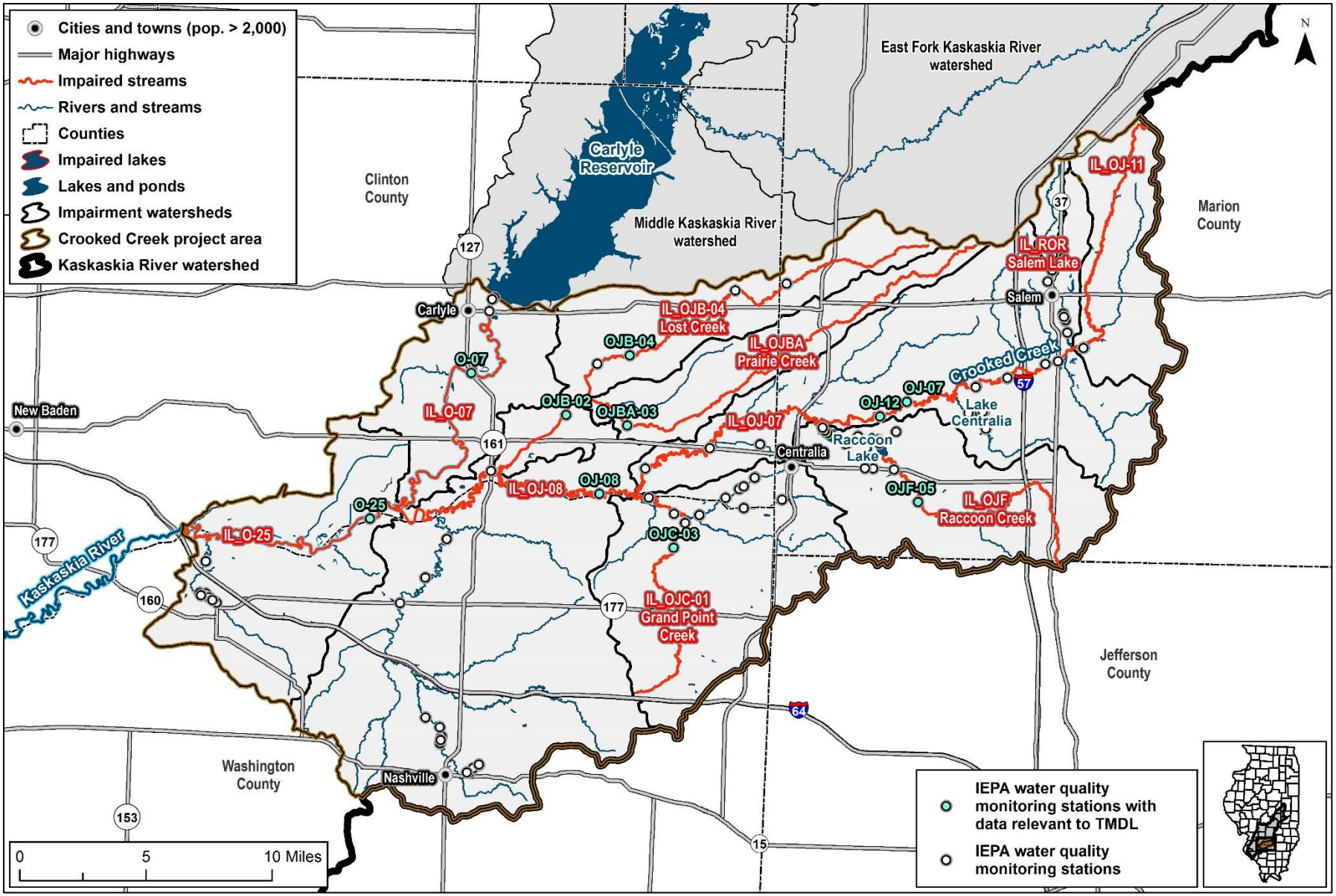

Figure 1. Crooked Creek watershed, TMDL project area.

1.3 TMDL Endpoints

This section presents information on the water quality standards (WQS) that are used for TMDL endpoints. WQS are designed to protect beneficial uses. The authority to designate beneficial uses and adopt WQS is granted through Title 35 of the Illinois Administrative Code. Designated uses to be protected in surface waters of the state are defined under Section 303, and WQS are designated under Section 302 (Water Quality Standards). Designated uses and WQS are discussed below.

1.3.1 Designated Uses

Illinois EPA uses rules and regulations adopted by the Illinois Pollution Control Board (IPCB) to assess the designated use support for Illinois waterbodies. The following are the use support designations provided by the IPCB that apply to waterbodies in the Crooked Creek watershed:

General Use Standards – These standards protect for aquatic life, wildlife, agricultural uses, primary contact (where physical configuration of the waterbody permits it, any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing), secondary contact (any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and recreational boating, and any limited contact incident to shoreline activity), and most industrial uses. These standards are also designed to ensure the aesthetic quality of the state's aquatic environment.

Public and food processing water supply standards – These standards are cumulative with the general use standards and apply to waters of the state at any point at which water is withdrawn for treatment and distribution as a potable supply to the public or for food processing.

1.3.2 Water Quality Standards and TMDL Endpoints

Environmental regulations for the State of Illinois are contained in the Illinois Administrative Code, Title 35. Specifically, Title 35, Part 302 contains water quality standards promulgated by the IPCB. This section presents the standards applicable to impairments in the study area. Water quality standards are the endpoints to be used for TMDL development in the Crooked Creek watershed (Table 2).

Table 2. Summary of water quality standards for the Crooked Creek watershed

Parameter	Units	General Use Water Quality Standard
Dissolved Oxygen [a]	mg/L	March-July > 5.0 min. and > 6.0- 7-day mean Aug-Feb > 3.5 min, > 4.0- 7-day mean and > 5.5- 30-day mean If less than 10 samples, not to exceed two violations of the standard. If greater than 10 samples, not to exceed one violation of the standard.
pH	s.u.	Within the range of 6.5–9.0 except for natural causes
Sizamine	µg/L	Not to exceed Maximum Contaminant Level of 4 µg/L
Iron, Dissolved	µg/L mg/L	Acute standard < 1,000 µg/L < 0.3 mg/L, and 1.0 mg/L Maximum Contaminant Level for waters supplies serving >/= 1,000 people or >/= 300 connections

a. Applies to the dissolved oxygen concentration in the main body of all streams, in the water above the thermocline of thermally stratified lakes and reservoirs, and in the entire water column of unstratified lakes and reservoirs.

General Use Standards

Aquatic life use assessments in streams are typically based on the interpretation of biological information, physicochemical water data and physical-habitat information from the Intensive Basin Survey, Ambient Water Quality Monitoring Network, or Facility-Related Stream Survey programs. The primary biological measures used are the fish Index of Biotic Integrity (Karr et al. 1986; Smogor 2000, 2005), the macroinvertebrate Index of Biotic Integrity (Tetra Tech 2004), and the Macroinvertebrate Biotic Index (Illinois EPA 1994). Physical habitat information used in assessments includes quantitative or qualitative measures of stream bottom composition and qualitative descriptors of channel and riparian conditions. Physicochemical water data used include measures of conventional parameters (e.g., dissolved oxygen, pH, and temperature), priority pollutants, non-priority pollutants, and other pollutants (U.S. EPA 2002 and www.epa.gov/wqc). In a minority of streams for which biological information is unavailable, aquatic life use assessments are based primarily on physicochemical water data.

When a stream segment is determined to be Not Supporting aquatic life use, generally one exceedance or violation of an applicable Illinois WQS (related to the protection of aquatic life) results in identifying the parameter as a potential cause of impairment. Additional guidelines used to determine potential causes of impairment include site-specific standards (35 Ill. Adm. Code 303, Subpart C) or adjusted standards (published in the ICPB's Environmental Register at https://pcb.illinois.gov/Resources/EnvironmentalRegister).

Public and Food Processing Water Supply Standards

Attainment of public and food processing water supply use is assessed only in waters in which the use is currently occurring, as evidenced by the presence of an active public-water supply intake. The assessment of public and food processing water supply use is based on conditions in both untreated and treated water. By incorporating data through programs related to both the federal Clean Water Act and the federal Safe Drinking Water Act, Illinois EPA believes that these guidelines provide a comprehensive assessment of public and food processing water supply use. Assessments of public and food processing water supply use recognize that characteristics and concentrations of substances in Illinois surface waters can vary and that a single assessment guideline may not protect sufficiently in all situations. Using multiple assessment guidelines helps improve the reliability of these assessments. When applying these assessment guidelines, Illinois EPA also considers the water-quality substance, the level of treatment available for that substance, and the monitoring frequency of that substance in the untreated water. Table 3 includes the assessment guidelines for waters with public and food processing water supply designated uses.

One of the assessment guidelines for untreated water relies on a frequency-of-exceedance threshold (10 percent) because this threshold represents the true risk of impairment better than does a single exceedance of a water quality criterion. Assessment guidelines also recognize situations in which water treatment that consists only of "*...coagulation, sedimentation, filtration, storage and chlorination, or other equivalent treatment processes*" (35 Ill. Adm. Code 302.303; hereafter called "conventional treatment") may be insufficient for reducing potentially harmful levels of some substances. To determine if a Maximum Contaminant Level (MCL) violation in treated water would likely occur if treatment additional to conventional treatment were not applied (see 35 Ill. Adm. Code 302.305), the concentration of the potentially harmful substance in untreated water is examined and compared to the MCL threshold concentration. If the concentration in untreated water exceeds an MCL-related threshold concentration, then an MCL violation could reasonably be expected in the absence of additional treatment.

Table 3. Guidelines for assessing public water supply in waters of the State (Illinois EPA 2016)

Degree of Use Support	Guidelines
Fully Supporting (Good)	For each substance in untreated water[a], for the most-recent three years of readily available data or equivalent dataset, a) < 10% of observations exceed an applicable Public and Food Processing Water Supply Standard[b]; and b) for which the concentration is not readily reducible by conventional treatment, i) no observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; and ii) no quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; and iii) no running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[d] for that substance; and[d] For each substance in treated water, no violation of an applicable Maximum Contaminant Level[c] occurs during the most recent three years of readily available data.
Not Supporting (Fair)	For any single substance in untreated water[a], for the most-recent three years of readily available data or equivalent dataset, a) > 10% of observations exceed a Public and Food Processing Water Supply Standard[b]; or b) for which the concentration is not readily reducible by conventional treatment, i) at least one observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; or ii) the quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; or iii) the running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[c] for that substance. or, For any single substance in treated water, at least one violation of an applicable Maximum Contaminant Level[3] occurs during the most recent three years of readily available data.
Not Supporting (Poor)	Closure to use as a drinking-water resource (cannot be treated to allow for use).

a. Includes only the untreated-water results that were available in the primary computer database at the time data were compiled for these assessments
b. 35 I11. Adm. Code 302.304, 302.306 (ftp://www.ilga.gov/jcar/admincode/035/03500302sections.html)
c. 35 I11. Adm. Code 611.300, 611.301, 611.310, 611.311, 611.325.
d. Some waters were assessed as Fully Supporting based on treated-water data only.

Compliance with an MCL for treated water is based on a running 4-quarter (i.e., annual) average, calculated quarterly, of samples collected at least once per quarter (Jan.–Mar., Apr.–Jun., Jul.–Sep., and Oct.–Dec.). However, for some untreated-water intake locations sampling occurs less frequently than once per quarter; therefore, statistics comparable to quarterly averages or running 4-quarter averages cannot be determined for untreated water. Rather, for substances not known to vary regularly in concentration in Illinois surface waters (untreated) throughout the year, a simple arithmetic average concentration of all available results is used to compare to the MCL threshold. For substances known to vary regularly in concentration in surface waters during a typical year (e.g., simazine), average concentrations in the relevant sub-annual (e.g., quarterly) periods are used.

2. Watershed Characterization

The Crooked Creek watershed is located in southern Illinois (Figure 1); the headwaters begin just north of the city of Salem, IL. Crooked Creek joins the Kaskaskia river upstream of Shelbyville Lake, and the Kaskaskia River eventually joins the Mississippi River south of St. Louis, Missouri. A TMDL has been developed for the Crooked Creek watershed (Illinois EPA 2008), and much of the information presented in that report is applicable to the Crooked Creek project area. There have been no known changes in the project area; therefore, the previous TMDL provides much of the basis for the watershed characterization and source assessment for the Crooked Creek project area below.

2.1 Jurisdictions and Population

Counties with land located in the watershed include Clinton, Jefferson, Marion, and Washington. Cities in the watershed include Centralia, Salem, Nashville, and Carlyle. Populations are area weighted to the watershed in Table 4. The Clinton County and Jefferson County population numbers were adjusted to account for cities in each county that are outside of the watershed.

Table 4. Area weighted county populations in watershed

County	2000 Population	2010 Population	Percent Change
Clinton	6,674	7,072	6%
Jefferson	195	194	-1%
Marion	14,445	13,664	-5%
Washington	5,710	5,547	-3%
TOTAL	***27,024***	***26,477***	***-2%***

Source: U.S. Census Bureau

2.2 Climate

In general, the climate of the region is continental with hot, humid summers and cold winters. Relevant information on climate can be found in the completed Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008).

2.3 Land Use and Land Cover

Land use in the watershed is heavily influenced by agriculture (Figure 2). Urban areas are located primarily near the cities of Centralia, Salem, Nashville, Carlyle, and several small towns in the watershed. Land use in the watershed includes cultivated crops, pasture/hay, forest, and urban (Table 5). Corn and soybeans are the most common crops, with much smaller areas of winter wheat, alfalfa, and other crops.

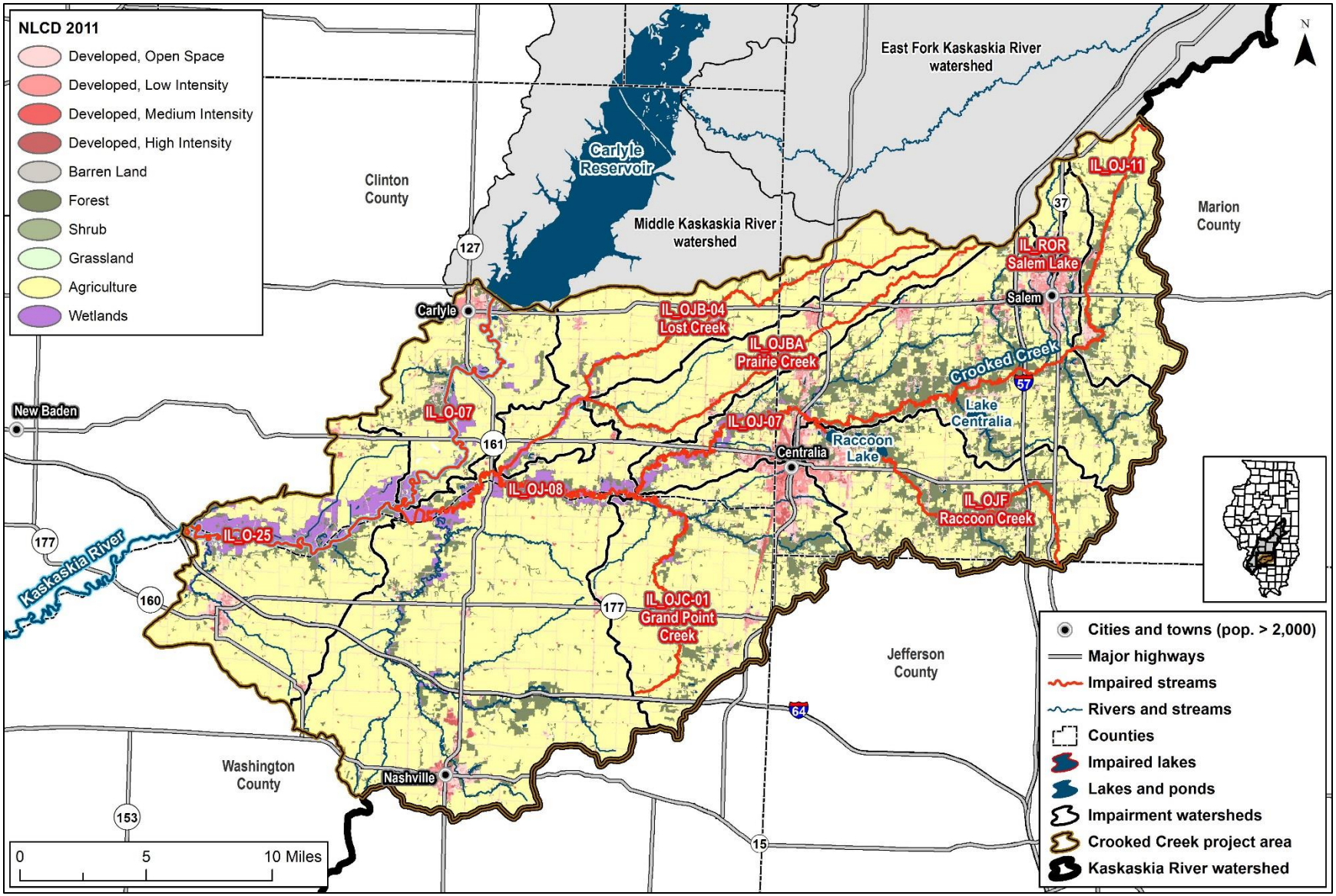

Figure 2. Crooked Creek watershed land cover (2011 National Land Cover Database)

Table 5. Watershed land use summary

Land Use / Land Cover Category	Acres	Percentage
Cultivated Crops	186,079	51.7%
Hay/Pasture	63,947	17.8%
Deciduous Forest	51,749	14.4%
Developed, Open Space	22,739	6.3%
Developed, Low Intensity	13,191	3.7%
Woody Wetlands	12,497	3.5%
Developed, Medium Intensity	3,578	1.0%
Open Water	3,167	0.9%
Herbaceous	1,747	0.5%
Developed, High Intensity	1,175	0.3%
Emergent Herbaceous Wetlands	116	<0.1%
Evergreen Forest	51	<0.1%
Barren Land	19	<0.1%

Source: 2011 National Land Cover Database (MLRC 2015)

2.4 Topography

Relevant information on topography can be found in the completed Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008).

2.5 Soils

Relevant information on soils can be found in the recently completed Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008). Much of the watershed is made up of fine-grained, silt and clay soils.

2.6 Hydrology

Relevant information on hydrologic conditions can be found in the completed Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008). Active U.S. Geological Survey (USGS) flow gage sites are located along Crooked Creek segment OJ-08 (05593520) and on the OJA-01 segment of Little Crooked Creek (05593575).

2.7 Watershed Studies and Information

This section describes several of the studies that have been completed in the watershed:

- **Crooked Creek Watershed Total Maximum Daily Load Report** (Illinois EPA 2008)

  The completed Crooked Creek TMDL Report contains relevant information and data for this TMDL. Causes of impairments included dissolved oxygen, manganese, pH, total phosphorus, and atrazine.

- **Kaskaskia River Watershed, An Ecosystem Approach to Issues and Opportunities** (Southwestern Illinois RC&D, Inc. 2002)

The plan encompasses the larger Kaskaskia River watershed from Champaign County to Randolph County in southwestern Illinois, covering over 10 percent of the state of Illinois. The purpose of the plan was to begin a coordinated restoration process in the Kaskaskia River watershed based on sound ecosystem principles. The plan made recommendations on sustainability, diversity, health, variety, connectivity, and the ecosystem's ability to thrive and reproduce in order to promote the sustainability of the ecosystem and strengthen the economic base and the quality of life of residents in the region.

3. Watershed Source Assessment

Source assessments are an important component of water quality management plans and TMDL development. Point sources typically discharge at a specific location from pipes, outfalls, and conveyance channels. Nonpoint sources are diffuse sources that have multiple routes of entry into surface waters, particularly overland runoff. This section provides a summary of potential point and nonpoint sources that contribute to the impaired waterbodies.

3.1 Pollutants of Concern

Pollutants of concern evaluated in this source assessment include simazine, iron, and parameters influencing dissolved oxygen and pH. Dissolved oxygen in streams can be affected by biochemical oxygen demand, phosphorus, ammonia, and sediment oxygen demand in addition to non-pollutant causes such as a lack of reaeration. These pollutants can originate from an array of sources including point and nonpoint sources. Eutrophication (high levels of algae) is also often linked directly to low dissolved oxygen conditions and high pH, and therefore nutrients are also a pollutant of concern.

3.2 Point Sources

Point source pollution is defined by the Federal Clean Water Act (CWA) §502(14) as:

> *"any discernible, confined and discrete conveyance, including any ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation [CAFO], or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agriculture storm water discharges and return flow from irrigated agriculture."*

Under the CWA, all point sources are regulated under the National Pollutant Discharge Elimination System (NPDES) program. A municipality, industry, or operation must apply for an NPDES permit if an activity at that facility discharges wastewater to surface water. Point sources can include facilities such as sewage treatment plants (STPs), industrial facilities, concentrated animal feeding operations (CAFOs), or regulated storm water including municipal separate storm sewer systems (MS4s). There is one CAFO in the Crooked Creek watershed (Permit # ILA010075) near Plum Creek, a tributary to Kaskaskia River segment (O-25), which is impaired for simazine and dissolved oxygen. There are no permitted MS4s in the Crooked Creek watershed.

There are eighteen individual NPDES permitted facilities in the Crooked Creek project area (Table 6). Six facilities discharge directly to impaired segments. Average and maximum design flows and downstream impairments are included in the facility summaries. Additional information on existing permitted sources can be found in the Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008).

Table 6. Individual NPDES permitted facilities discharging to impaired segments

IL Permit ID	Facility Name	Type of Discharge	Receiving Water	Downstream Impairment(s)	Average Design Flow (MGD)	Maximum Design Flow (MGD)
IL0023264	*Salem STP*	*STP outfall*	*Tom Creek*	*OJ-07*	*2.508*	*7.023*
ILG580187	*Odin STP*	*STP outfall*	*Turkey Creek*	*OJ-07*	*0.195*	*1.8*
ILG640031	*Salem WTP*	*Public water supply*	*Town Creek*	*OJ-07*	*0.253* [a]	–
IL0075884	*Huey STP*	*STP outfall*	*Unnamed tributary to Lost Creek*	*OJB-04*	*0.0289*	*0.1157*
ILG580277	**Junction City STP**	**STP outfall**	**Prairie Creek**	**OJBA**, OJB-04	**0.06**	**0.15**
ILG580205	**Hoffman STP**	**STP outfall**	**Prairie Creek**	**OJBA,** OJB-04	**0.06**	**0.15**
IL0030961	**Sandoval STP**	**STP outfall**	**Prairie Creek**	**OJBA,** OJB-04	**0.18**	**0.45**
IL0053040	*Foster's MHP*	*Mobile home park-STP*	*Unnamed tributary to South Creek*	*OJ-07*	*0.0024*	*0.006*
ILG640247	**Centralia WTP**	**Public water supply**	**Crooked Creek**	**OJ-07**	**0.662**[a]	–
IL0027979	*Centralia STP*	*STP outfall*	*Sewer Creek*	*OJC-01*	*3.15*	*4.5*
ILG580144	*Wamac STP*	*STP outfall*	*Fulton Branch*	*OJC-01*	*0.15*	*0.6*
IL0000779	*IL Central RR Centralia*	*Maintenance shop and fueling area stormwater, yard stormwater*	*Fulton Creek*	*OJC-01*	*0.023* [a]	–
IL0071242	*United Parcel Service*	*Vehicle wash water*	*Unnamed tributary to Fulton Branch*	*OJC-01*	*0.0001* [a]	–
IL0052981	*Raccoon Consolidated School*	*STP outfall*	*Unnamed tributary to Raccoon Creek*	*OJF, OJ-07*	*0.0125*	*0.031*
ILG580265	*Central City STP*	*STP outfall*	*Unnamed tributary to Raccoon Creek*	*OJF, OJ-07*	*0.304*	*1.267*
IL0049140	*Addieville STP*	*STP outfall*	*Plum Creek-North*	*O-25*	*0.033*	*0.083*
ILG580268	*Okawville WWTP*	*STP outfall*	*Unnamed tributary to Plum Creek-North*	*O-25*	*0.25*	*0.877*
IL0027901	**Carlyle STP**	**STP outfall**	**Kaskaskia River**	**O-07,** O-25	**0.709**	**1.30**
ILG551030	Western Gardens MHP-Centralia	STP outfall	U-Trib Crooked Creek	OJ-07	0.01875	0.048

a. Average design flow based on average reported flow from 2014–2016 discharge monitoring records (DMRs)
-- No design flow available.
Italics – NPDES facility draining to unimpaired segment.
BOLD – NPDES facility draining to impaired segment.
STP – Sewage treatment plant
MGD – Million gallons per day

3.3 Nonpoint Sources

The term nonpoint source pollution is defined as any source of pollution that does not meet the legal definition of point sources. Nonpoint source pollution typically results from overland stormwater runoff that is diffuse in origin, as well as background conditions. As part of the water resource assessment process, Illinois EPA has identified several sources as contributing to the Crooked Creek watershed impairments (Table 7). Some of these sources do not contribute pollutants, but do affect the waterbody's ability to support biota such as loss of riparian habitat and impacts from flow regulation or modification.

Table 7. Potential sources in project area based on the Draft 2016 305(b) list

Name	Segment	Impairment	Sources
Kaskaskia River	O-25	Simazine	Crop production (crop land or dry land), agriculture, atmospheric deposition – toxics, and source unknown
Crooked Creek	OJ-07	Dissolved oxygen	Crop production (crop land or dry land) and agriculture
Crooked Creek	OJ-11	Dissolved oxygen	Source unknown
Lost Creek	OJB-04	Dissolved oxygen	Loss of riparian habitat, crop production (crop land or dry land), and agriculture
Prairie Creek	OJBA	Dissolved oxygen	Loss of riparian habitat, streambank modification/destabilization, livestock, (grazing or feeding operations), crop production (crop land or dry land), agriculture, pesticide application, and urban runoff/storm sewers
Grand Point Creek	OJC-01	Dissolved oxygen	Animal feeding operations (nonpoint source), loss of riparian habitat, livestock (grazing or feeding operations), crop production (crop land or dry land), and agriculture
Raccoon Creek	OJF	Dissolved oxygen	Impacts from hydrostructure flow regulation/modification and agriculture
Salem Lake	ROR	pH	Littoral/shore area modifications (non-riverine), waterfowl, crop production (crop land or dry land), urban runoff/storm sewers

3.3.1 Stormwater and Agricultural Runoff

During wet-weather events (snowmelt and rainfall), sediment and pollutants are incorporated into runoff and can be delivered to downstream waterbodies. The resultant pollutant loads are linked to the land uses and practices in the watershed. Agricultural and developed areas can have significant effects on water quality if proper best management practices are not in place. These areas contribute high biochemical oxygen demand and nutrients that can affect the dissolved oxygen conditions in streams and pH in lakes. Drain tiles also transport agricultural runoff directly to ditches and streams, whereas runoff flowing over the land surface may infiltrate to the subsurface and may flow through riparian areas. Pesticides applied to both agricultural and urban landscapes can also contribute to low dissolved oxygen conditions.

Simazine is an herbicide that is widely used in agricultural fields. All sources of simazine are assumed to be nonpoint sources resulting from application to cropland. The half-life of simazine in soil ranges from 36 to 234 days. Further, simazine readily dissolves in water and weakly bonds to soil particles, resulting in transmittal in environments with high runoff potential or persistence and transport to groundwater in soils with high water content (USDA 1990). It is also possible that simazine can be released from manufacturing, formulation, transport, and disposal.

3.3.2 Animal Feeding Operations (AFOs)

Animal feeding operations that are not classified as CAFOs are known as animal feeding operations (AFOs) in Illinois. Non-CAFO AFOs are considered nonpoint sources by U.S. EPA. AFOs in Illinois do not have state permits. However, they are subject to state livestock waste regulations and may be inspected by the Illinois EPA, either in response to complaints or as part of the agency's field inspection responsibilities to determine compliance by facilities subject to water pollution and livestock waste regulations. The animals raised in AFOs produce manure that is stored in pits, lagoons, tanks, and other storage devices. The manure is then applied to area fields as fertilizer. When stored and applied properly, this beneficial re-use of manure provides a natural source for crop nutrition. It also lessens the need for fuel and other natural resources that are used in the production of fertilizer. AFOs, however, can pose environmental concerns, including the following:

- Manure can leak or spill from storage pits, lagoons, tanks, etc.
- Improper application of manure can contaminate surface or ground water.
- Manure over application can adversely impact soil productivity.

Livestock are potential sources of bacteria and nutrients to streams, particularly when direct access is not restricted and/or where feeding structures are located adjacent to riparian areas. Watershed specific data are not available for livestock populations. However, county wide data available from the 2012 Census of Agriculture were downloaded and area weighted to estimate the animal population in the project area. An estimated 6,615 animals are in the project area.

3.3.3 Internal Loads

Internal loading of pollutants can occur in both streams and lakes, leading to impaired conditions. In streams, sediment oxygen demand takes up oxygen from the water column as a result of organic decomposition. In lakes, phosphorus is released from the lake bottom as a result of anoxic conditions or physical disturbances. This load of phosphorus, when added to external sources of nutrients to a lake, can result in algal blooms affecting the pH of a lake.

3.3.4 Onsite Wastewater Treatment Systems

Onsite wastewater treatment systems (e.g., septic systems) that are properly designed and maintained should not serve as a source of contamination to surface waters. However, onsite systems do fail for a variety of reasons and can contribute to low dissolved oxygen conditions and lake impairments. Common soil-type limitations that contribute to failure include seasonally high water tables, compact glacial till, bedrock, and fragipan. When these septic systems fail hydraulically (surface breakouts) or hydrogeologically (inadequate soil filtration) there can be adverse effects to surface waters (Horsley and Witten 1996). Septic systems contain all the water discharged from homes and businesses and can be significant sources of pollutants.

Relevant information for this section can be found in the completed Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008). In addition, county health departments were contacted for information on septic systems and unsewered communities. In Jefferson County, 99 new systems or replacements were put in during 2017, and there are approximately 15 to 25 nuisance complaints each year. No new information was provided for the other counties.

4. Water Quality

Background information on water quality monitoring can be found in the completed Crooked Creek Watershed Total Maximum Daily Load report (Illinois EPA 2008). In the Crooked Creek project area, water quality data were found for numerous stations that are part of the Illinois EPA Ambient Water Quality Monitoring Network (AWQMN). Monitoring stations with data relevant to the impaired segments are presented in Figure 1 and Table 8. Parameters sampled in the streams include field measurements (e.g., dissolved oxygen) as well as those that require lab analyses (e.g., iron).

The most recent 10 years of data collection, 2007–2016, were used to evaluate impairment status. Additional continuous dissolved oxygen data for 2012 and 2017 were provided by Illinois EPA and used to evaluate dissolved oxygen impairments where available. Data that are greater than 10 years old are not included. Each data point was reviewed to ensure the use of quality data in the analysis below. Data were obtained directly from Illinois EPA. No data were available to assess impairment for Kaskaskia River (O-25; simazine) and Crooked Creek (OJ-11; dissolved oxygen).

Table 8. Crooked Creek watershed water quality data

Waterbody	Impaired Segment	Pollutant	AWQMN Sites	Location	Period of Record
Kaskaskia River	O-07	Dissolved Oxygen	O-07	River mile 87.8, Route 127 Branch 3 miles South of Carlyle	2012[a], 2017[a]
	O-25	Dissolved Oxygen	O-25	River mile 74.8, 2.5 miles north of Covington	2012[a], 2017[a]
		Simazine	No available data		
Crooked Creek	OJ-07	Dissolved Oxygen	OJ-07, OJ-12	Odin Rd (500E) Branch, 0.7 miles north of Green St Rd and 3.5 mile south of Odin, 3 miles east of Central City	2007, 2012
	OJ-08	Iron	OJ-08	Hoffman Rd. Branch 2.5 miles southwest of Hoffman	2007-2016
	OJ-11	Dissolved Oxygen	No available data		
Lost Creek	OJB-04	Dissolved Oxygen	OJB-02, OJB-04	2 miles northwest of Hoffman, 3.5 miles northeast of Hoffman	2007, 2017[a]
Prairie Creek	OJBA	Dissolved Oxygen	OJBA-03	Creek Rd 0.6 miles northeast of Hoffman	2007
Grand Point Creek	OJC-01	Dissolved Oxygen	OJC-03	3.9 miles northwest of Irvington on Sycamore Rd.	2007, 2017[a]
Raccoon Creek	OJF	Dissolved Oxygen	OJF-05	Copple Rd Branch 2 miles north of Walnut Hill	2012
Salem Lake	ROR	pH	ROR-1, ROR-2 and ROR-3	Site 1, Site 2, and Site 3	2015

a. Continuous DO data were received from Illinois EPA for 2012 and 2017 and used to evaluate impairment status where available.

An important step in the TMDL development process is the review of water quality conditions, particularly data and information used to list segments. Examination of water quality monitoring data is a key part of defining the problem that the TMDL is intended to address. This section provides a brief review of available water quality information provided by the Illinois EPA.

4.1 Kaskaskia River (O-07)

Kaskaskia River segment O-07 is listed as impaired for aquatic life due to dissolved oxygen. One sample site (sample site O-07) has dissolved oxygen data along the segment. Continuous dissolved oxygen data were collected in July and September 2012 and June, July, and August 2017 (Figure 3). Greater than 10 percent of the samples and the 7-day mean in July 2012 violated the standard. No additional violations of the standard were observed. Aquatic life use impairment is verified along this segment.

Further review of available information was conducted to evaluate the potential causes of impairment. Carlyle STP (IL002791) discharges to the segment and may be contributing to impairment (Table 6). There are also upstream impairments that could potentially be related to the downstream dissolved oxygen impairment. O-07 is also listed as impaired due to phosphorus (see Table 1). Dissolved oxygen data were paired with phosphorus data to determine if eutrophication is potentially contributing to low dissolved oxygen conditions. Chlorophyll-*a* data are limited along the segment and are not included. Data older than 10 years were included in the analysis based on the assumption that conditions have not changed along the segment. Phosphorus versus dissolved oxygen data collected from 1999–2016 shows a negative correlation, indicating that eutrophication could be contributing to low dissolved oxygen conditions along the segment (Figure 4).

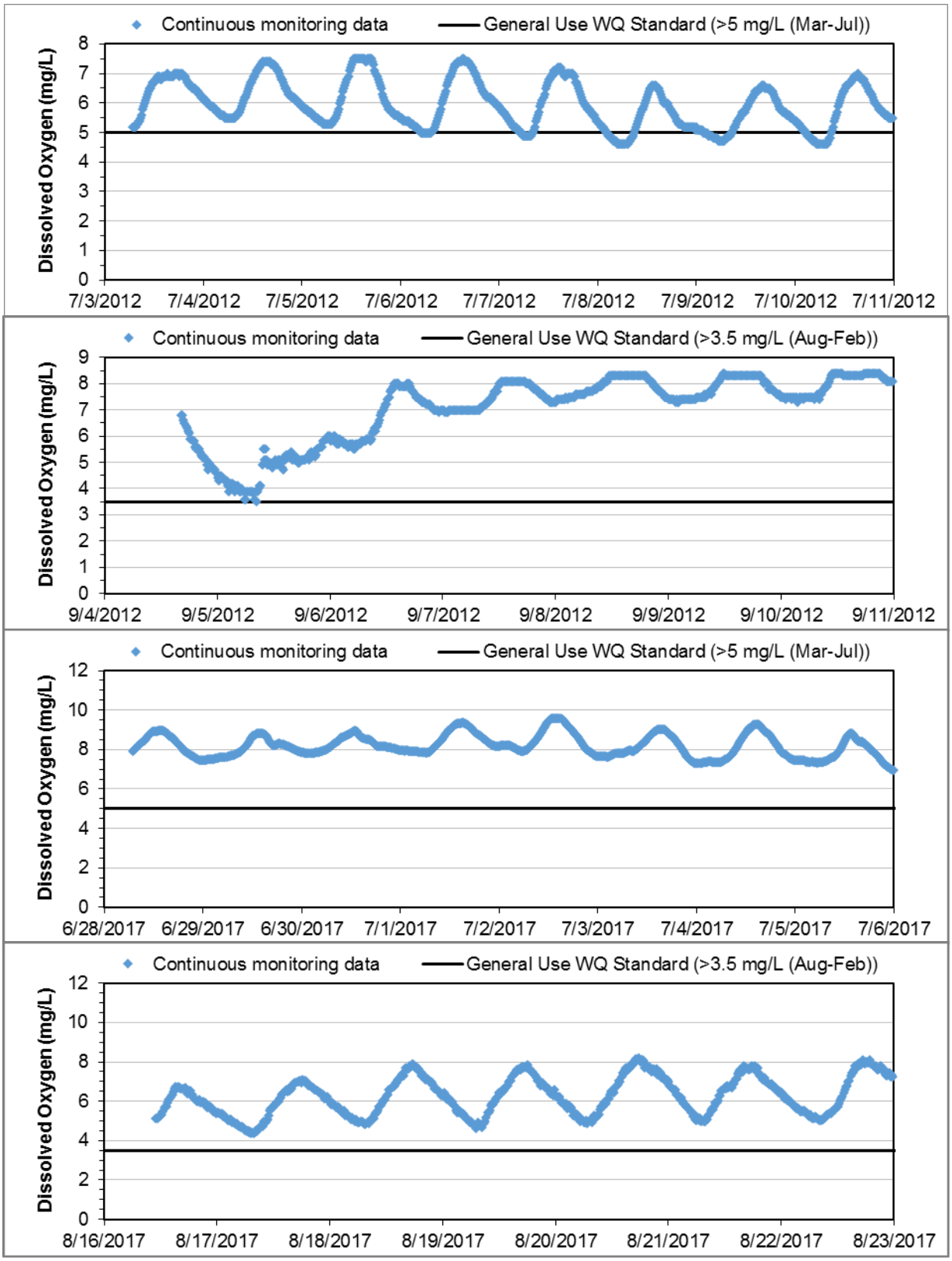

Figure 3. Continuous water quality time series for dissolved oxygen, Kaskaskia River O-07.

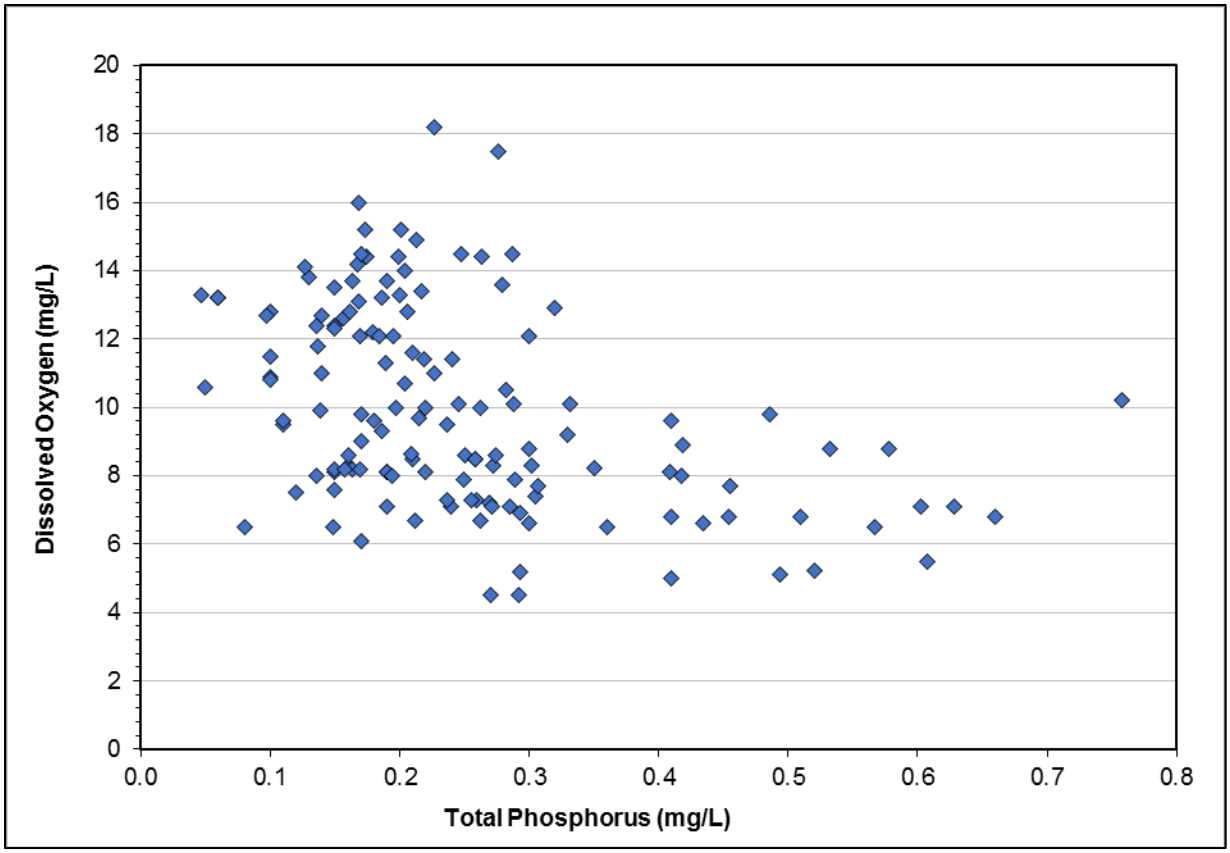

Figure 4. Total phosphorus versus dissolved oxygen—1999–2016, Kaskaskia River O-07.

4.2 Kaskaskia River (O-25)

The Kaskaskia River (O-25) is listed as impaired for public and food processing water supply due to simazine. There are no simazine data available on the impaired segment. One sample site (sample site O-07) on Kaskaskia River (O-07), located directly upstream of segment O-25, has simazine data. Of the 75 simazine samples collected on segment O-07 between 2007 and 2016, there were no exceedances of the general use water quality standard. The listing is based on Syngenta/USEPA simazine data collected from the Nashville intake (IN01357), which indicate a quarterly average greater than 4 µg/L.

Kaskaskia River segment O-25 is also listed as impaired for aquatic life due to dissolved oxygen. One sample site (sample site O-25) has dissolved oxygen data along the segment. Continuous dissolved oxygen data were collected in July and September 2012 and June, September, and October 2017 (Figure 5). Greater than 10 percent of the samples in July 2012 violated the standard. No additional violations of the standard were observed. Aquatic life use impairment is verified along this segment.

Further review of available information was conducted to evaluate the potential causes of impairment. No wastewater treatment facilities discharge to the segment. There are upstream impairments that could potentially be related to the downstream dissolved oxygen impairment. Paired dissolved oxygen and phosphorus data show a correlation indicating that eutrophication could be contributing to low dissolved oxygen conditions along the segment (Figure 6). A phosphorus target will be derived from the relationship presented in Figure 6 to develop a total phosphorus TMDL that will address the low dissolved oxygen conditions along O-25.

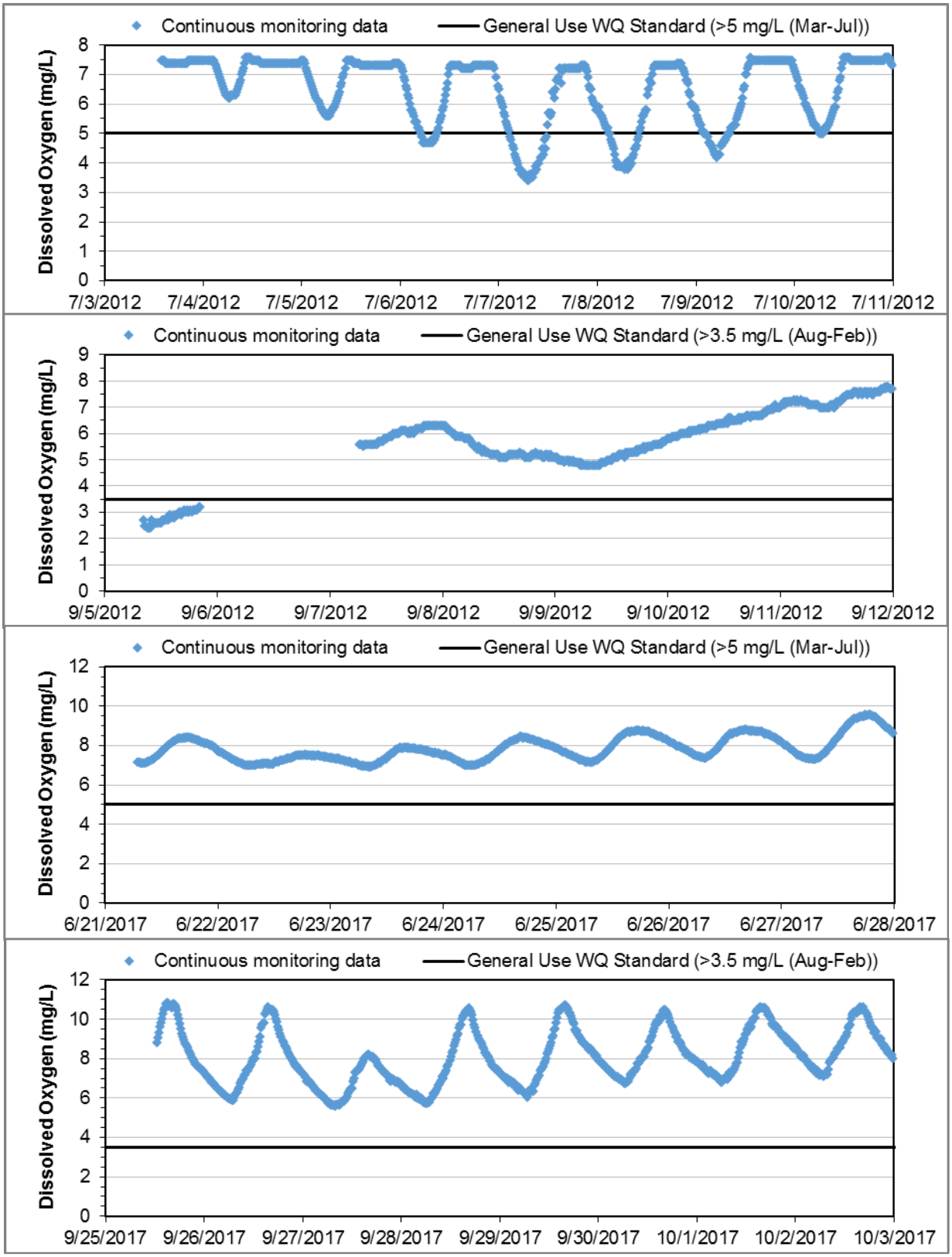

Figure 5. Continuous water quality time series for dissolved oxygen, Kaskaskia River O-25.

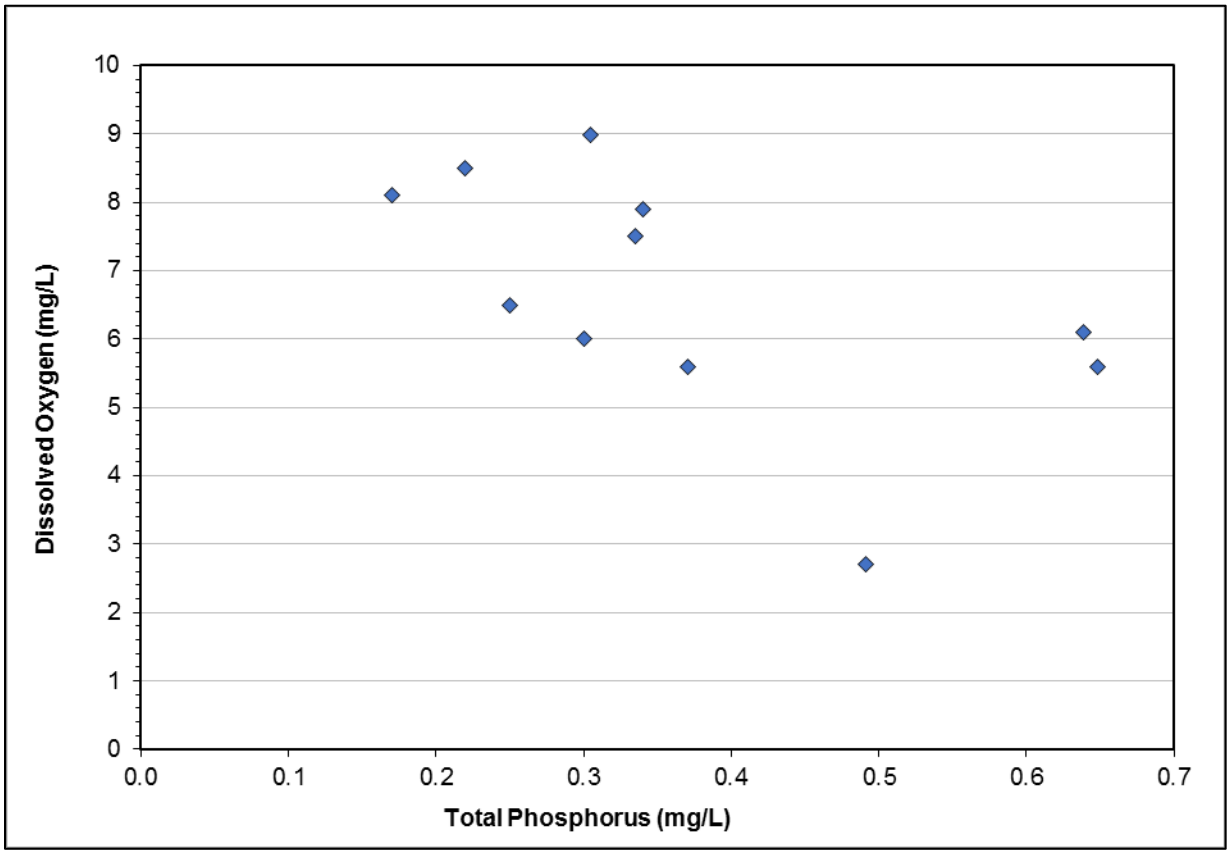

Figure 6. Total phosphorus versus dissolved oxygen—2002, 2007, and 2012, Kaskaskia River O-25.

4.3 Crooked Creek (OJ-07)

Crooked Creek is listed as impaired for aquatic life due to dissolved oxygen along segment OJ-07. Two sample sites (sample sites OJ-7 and OJ-12) have dissolved oxygen data along the segment (Table 9 and Figure 7). One violation of the general use water quality standard for dissolved oxygen was observed in August 2012; however, to verify impairment on segments with fewer than ten samples, two or more violations of the general use water quality standard are needed. Therefore, additional data are needed to verify impairment.

Table 9. Data summary, Crooked Creek OJ-07

Sample Site	No. of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of violations of general use water quality standard (>5 mg/L (Mar-Jul) and >3.5 mg/L (Aug-Feb))
Dissolved oxygen					
OJ-07	2	5.4	8.6	11.8	0
OJ-12	2	3.1	5.8	8.4	1

Further review of available information was conducted to evaluate the potential causes of impairment. No wastewater treatment facilities discharge to the impaired segment; Western Gardens MHP–Centralia (ILG551030) discharges to a tributary in close proximity to segment OJ-07. There are upstream impairments that could potentially be related to the downstream dissolved oxygen impairment.

OJ-07 is also listed as impaired due to phosphorus (see Table 1). There is no clear relationship between paired dissolved oxygen and phosphorus data (Figure 8). Note that samples older than 10 years are plotted on Figure 8; it is assumed that the relationship between phosphorus and dissolved oxygen has not changed significantly over time.

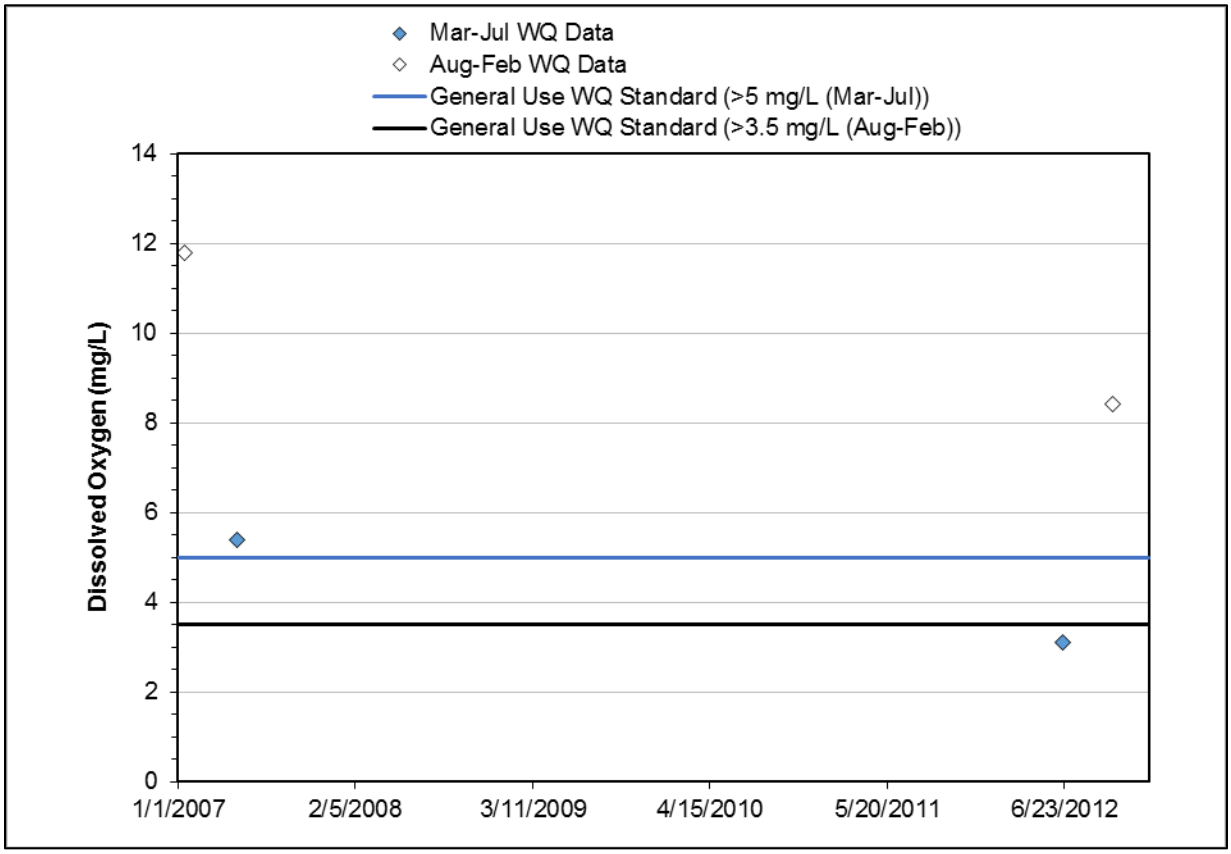

Figure 7. Dissolved oxygen water quality time series, Crooked Creek OJ-07.

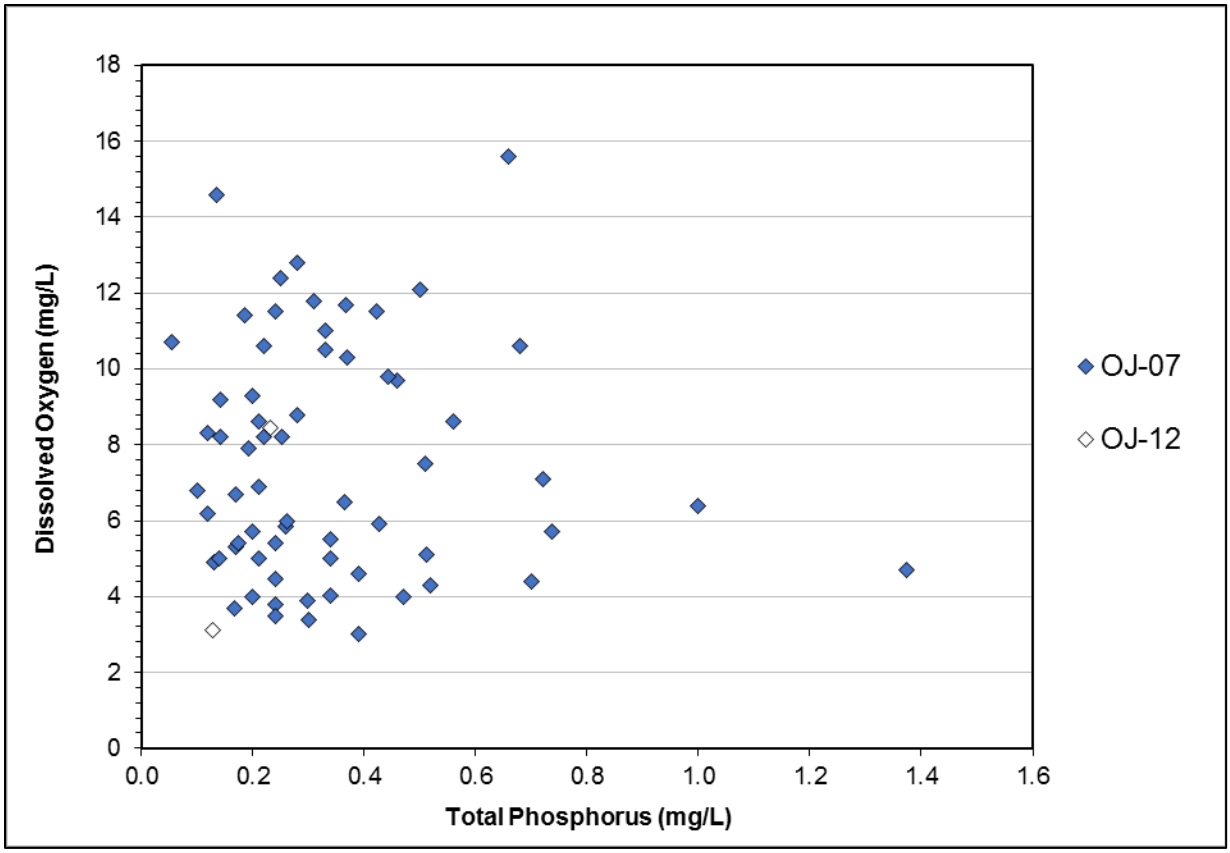

Figure 8. Total phosphorus versus dissolved oxygen—1999–2012, Crooked Creek OJ-07.

4.4 Crooked Creek (OJ-11)

Crooked Creek is listed as impaired for aquatic life due to dissolved oxygen along segment OJ-11. There were no dissolved oxygen data collected on OJ-11; additional data collection is needed to verify the dissolved oxygen impairment on segment OJ-11. No wastewater treatment facilities discharge to the segment.

4.5 Lost Creek (OJB-04)

Lost Creek is listed as impaired for aquatic life due to dissolved oxygen along segment OJB-04. There are two Illinois EPA sampling sites located on segment OJB-04 with dissolved oxygen data. Three dissolved oxygen grab samples were collected between 2007 and 2012 (Table 10 and Figure 9). Two violations of the general use water quality standard for dissolved oxygen were observed in August and September 2007. Continuous dissolved oxygen data were collected in July and August 2017 (Figure 10). Greater than 10 percent of the samples and the 7-day mean during both time periods violated the standard. Aquatic life use impairment is verified along this segment.

Table 10. Data Summary, Lost Creek OJB-04

Sample Site	No. of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of violations of general use water quality standard (>5 mg/L (Mar-Jul) and >3.5 mg/L (Aug-Feb))
Dissolved oxygen					
OJB-04	1	7.1	7.1	7.1	0
OJB-02	2	1.7	2.0	2.3	2

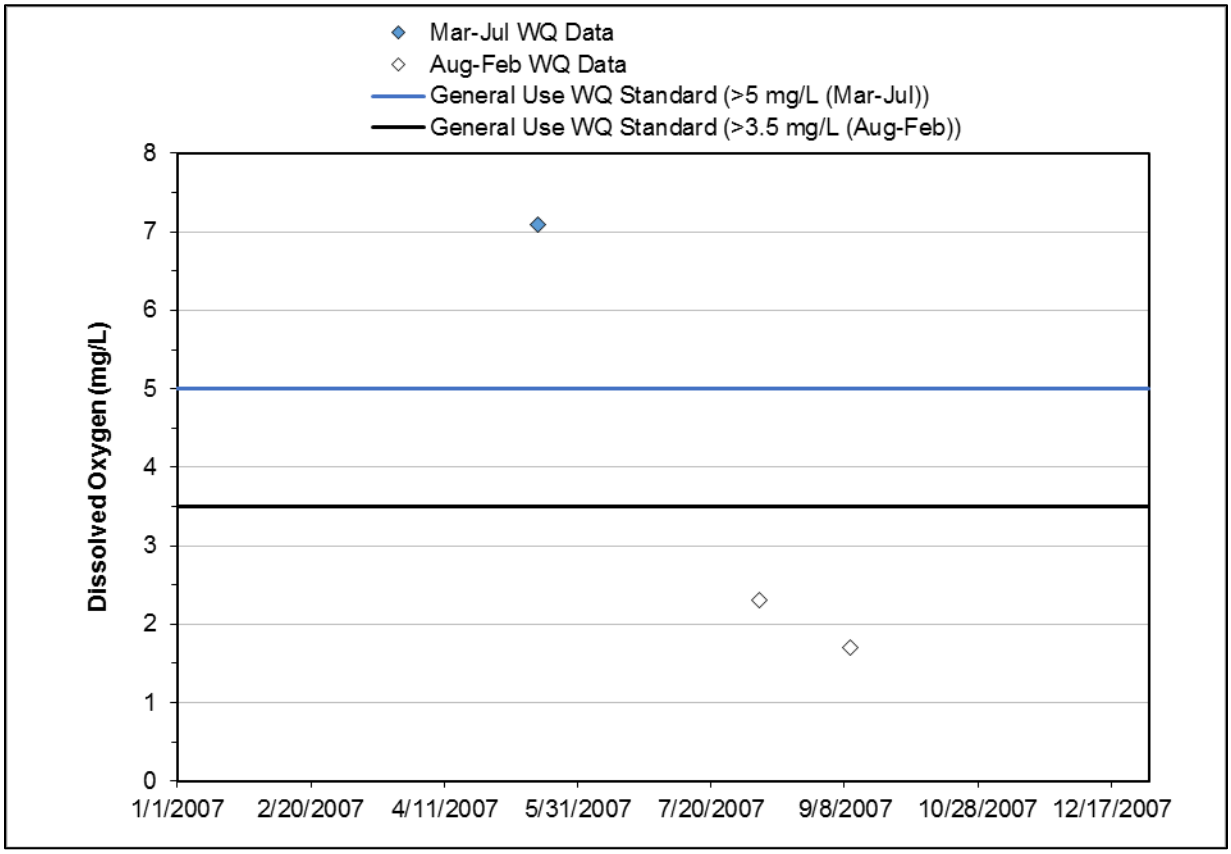

Figure 9. Dissolved oxygen water quality time series, Lost Creek OJB-04.

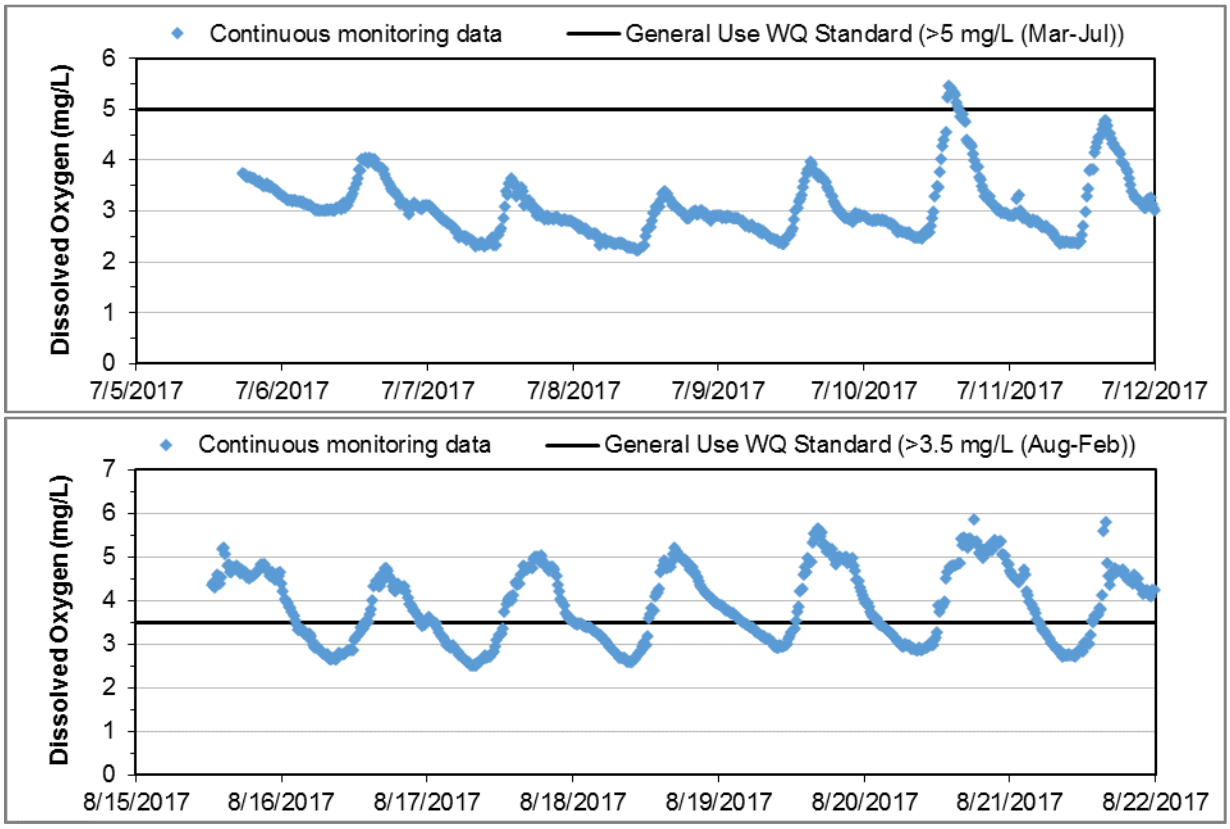

Figure 10. Continuous water quality time series for dissolved oxygen, Lost Creek OJB-04.

Further review of available information was conducted to evaluate the potential causes of impairment. No wastewater treatment facilities discharge to the segment. There are upstream impairments that could potentially be related to the downstream dissolved oxygen impairment.

OJB-04 is also listed as impaired due to phosphorus (see Table 1). Dissolved oxygen data were paired with phosphorus data to determine if eutrophication is potentially contributing to low dissolved oxygen conditions. Data older than 10 years were included in the analysis based on the assumption that conditions have not changed along the segment. Phosphorus versus dissolved oxygen data collected from 2002–2007 indicate that phosphorus levels may negatively impact dissolved oxygen (Figure 11).

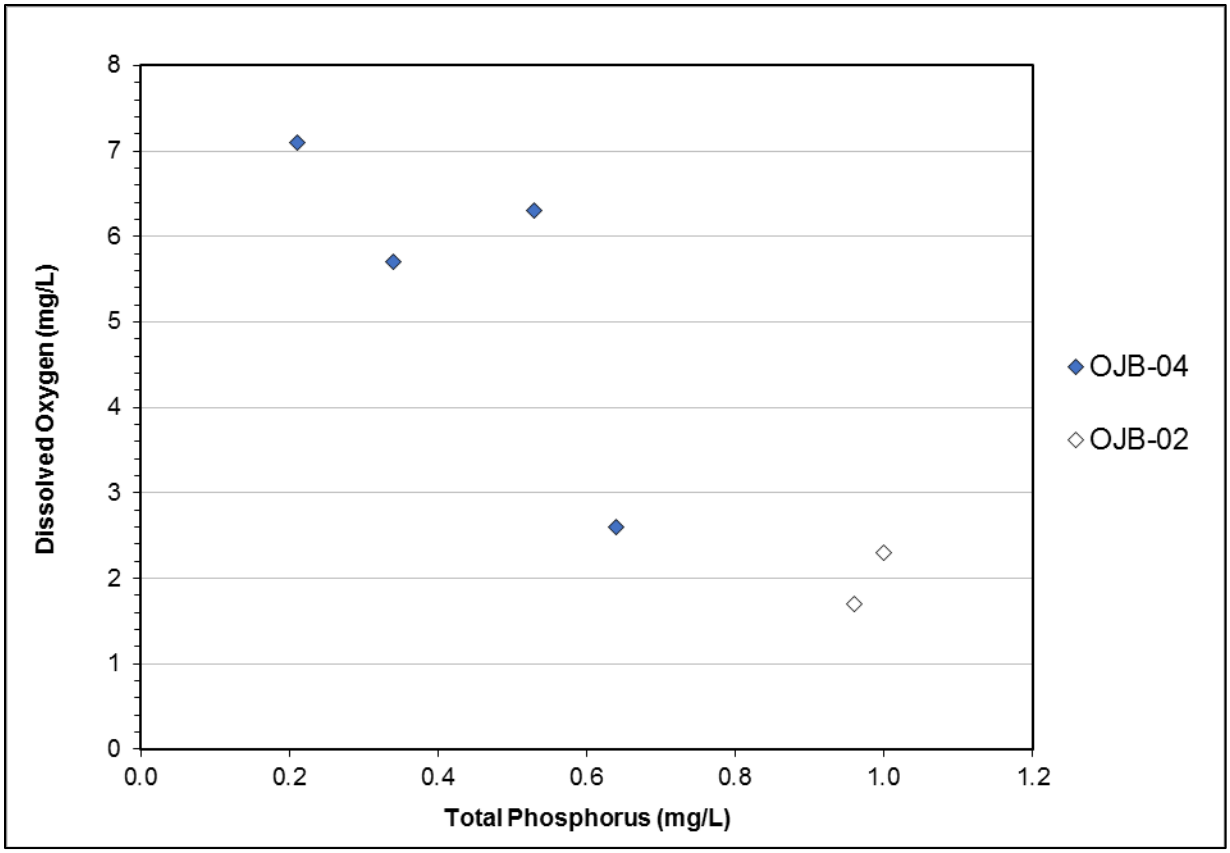

Figure 11. Total phosphorus versus dissolved oxygen—2002 and 2007, Lost Creek OJB-04.

4.6 Prairie Creek (OJBA)

Prairie Creek is listed as impaired for aquatic life due to dissolved oxygen along segment OJBA. There is one Illinois EPA sampling site located on segment OJBA. Three dissolved oxygen samples were collected on OJBA between 2007 and 2012 (Table 11 and Figure 12). One violation of the general use water quality standard for dissolved oxygen was observed in May 2007. However, to verify impairment on segments with fewer than ten samples, two or more violations of the general use water quality standard are needed. Therefore, additional data are needed to confirm impairment.

Table 11. Data Summary, Prairie Creek OJBA

Sample Site	No. of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of violations of general use water quality standard (>5 mg/L (Mar-Jul) and >3.5 mg/L (Aug-Feb)
Dissolved oxygen					
OJBA-03	3	4.2	5.1	5.7	1

Further review of available information was conducted to evaluate the potential causes of impairment. There are several wastewater treatment facilities discharging to the segment that may be contributing to impairment (Table 6). OJBA is also listed as impaired due to phosphorus (see Table 1). Three paired dissolved oxygen and phosphorus data points do not show a correlation. However, the data are too limited to draw conclusions.

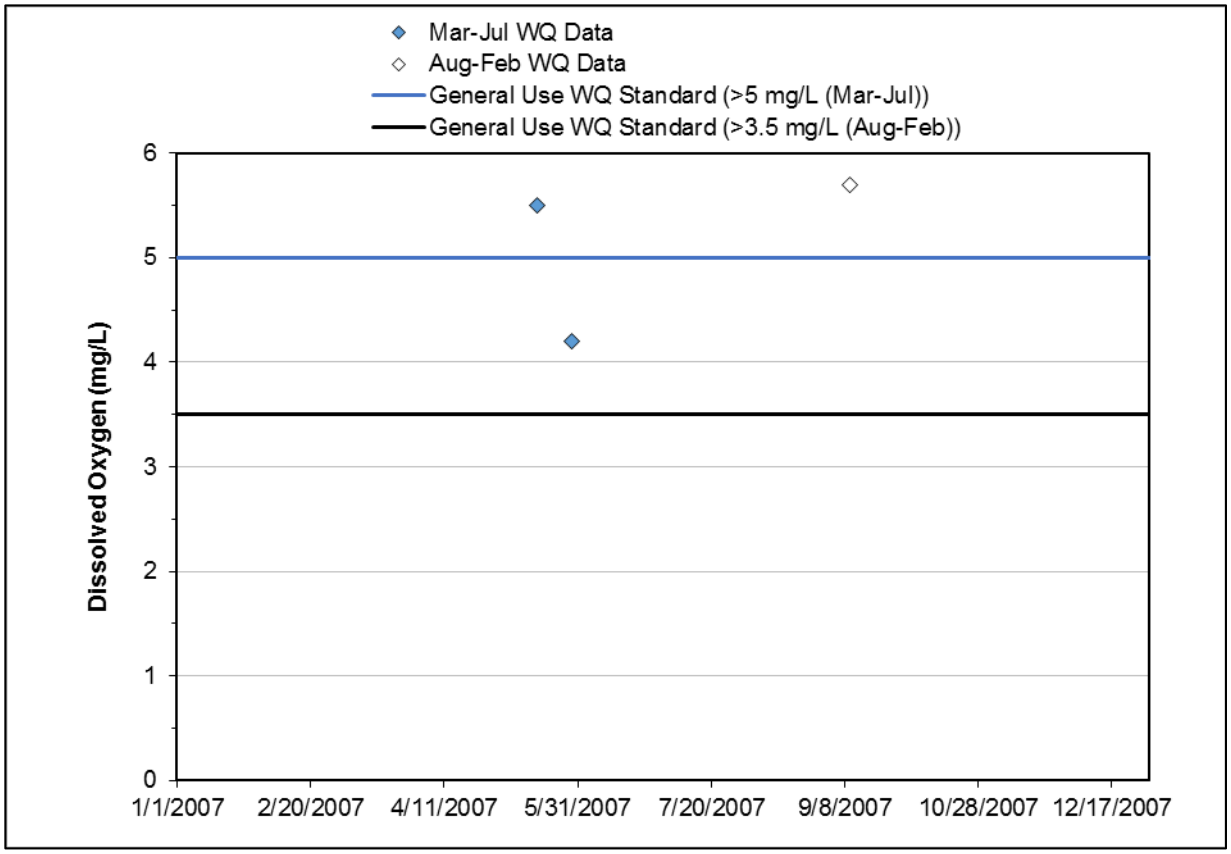

Figure 12. Dissolved oxygen water quality time series, Prairie Creek OJBA.

4.7 Grand Point Creek (OJC-01)

Grand Point Creek is listed as impaired for aquatic life due to dissolved oxygen along segment OJC-01. Three dissolved oxygen samples were collected on OJC-01 at sampling site OJC-03 (Table 12 and Figure 13). Two violations of the general use water quality standard for dissolved oxygen were observed in May and October 2007. Continuous dissolved oxygen data were collected in July and August 2017 (Figure 14). Greater than 10 percent of the samples and the 7-day mean during July 2017 violated the standard. Aquatic life use impairment is verified along this segment.

Table 12. Data summary, Grand Point Creek OJC-01

Sample Site	No. of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of violations of general use water quality standard (>5 mg/L (Mar-Jul) and >3.5 mg/L (Aug-Feb))
Dissolved oxygen					
OJC-03	3	1.6	4.4	8.1	2

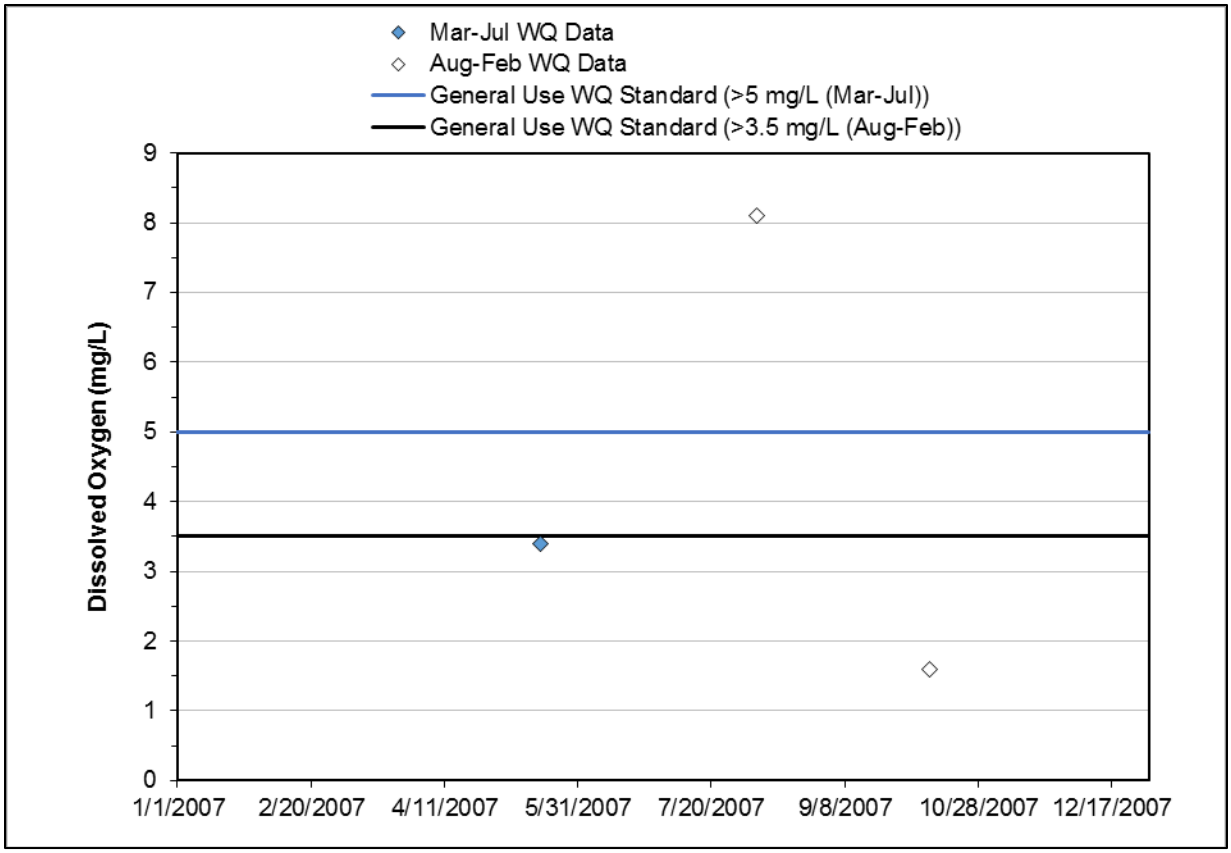

Figure 13. Dissolved oxygen water quality time series, Grand Point Creek OJC-01.

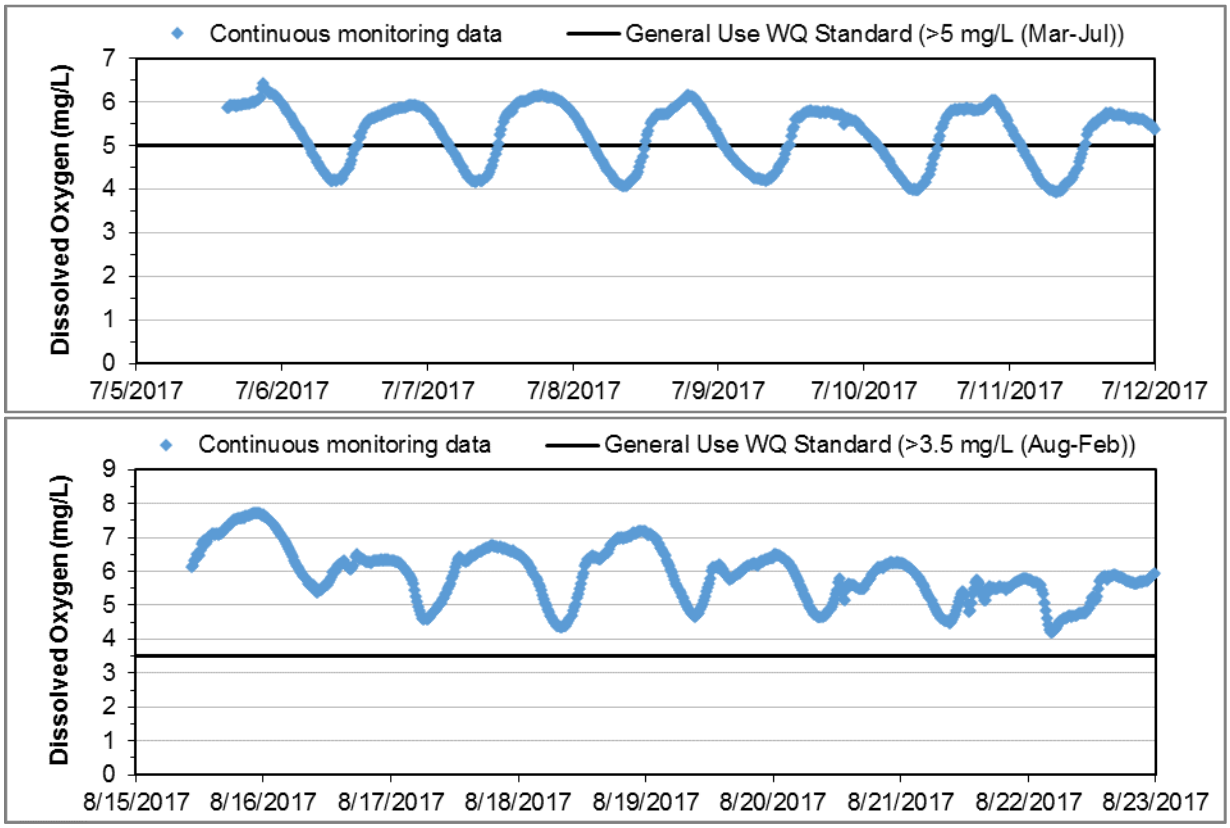

Figure 14. Continuous water quality time series for dissolved oxygen, Grand Point Creek OJC-01.

Further review of available information was conducted to determine the potential cause of impairment. No wastewater treatment facilities discharge to the segment. Sewer Creek (OJCB-19) is impaired for aquatic life due to phosphorus and sediment and is located upstream of impaired segment OJC-01; however, OJCB-19 discharges to an unimpaired segment prior to the confluence of Sewer Creek with Grand Point Creek. Dissolved oxygen data were paired with phosphorus data to determine if eutrophication is contributing to low dissolved oxygen conditions. There are only three paired dissolved oxygen and phosphorus data points, and based on this information it does not appear that eutrophication is influencing dissolved oxygen conditions. However, the data are too limited to draw conclusions.

4.8 Raccoon Creek (OJF)

Raccoon Creek is listed as impaired for aquatic life due to dissolved oxygen along segment OJF. There is one Illinois EPA sampling site located on segment OJF with dissolved oxygen data. Two dissolved oxygen samples were collected on OJF (Table 13). One violation of the general use water quality standard for dissolved oxygen was observed in June 2012 on the impaired segment OJF; however, to verify impairment on segments with fewer than ten samples, two or more violations of the general use water quality standard are needed. Therefore, additional data are needed to verify impairment.

Table 13. Data Summary, Raccoon Creek OJF

Sample Site	No. of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of violations of general use water quality standard (>5 mg/L (Mar-Jul) and >3.5 mg/L (Aug-Feb))
Dissolved oxygen					
OJF-05	2	4.9	6.3	7.7	1

Further review of available information was conducted to determine the potential cause of impairment. No wastewater treatment facilities discharge to the segment. There are two sampling dates with both dissolved oxygen and phosphorus; the data are insufficient to determine if eutrophication is contributing to low dissolved oxygen conditions. No data were available for chlorophyll-*a*. Raccoon Creek segment OJF extends both downstream and upstream of Raccoon Lake, a reservoir created by damming Raccoon Creek. This hydromodification may also contribute to low dissolved oxygen levels.

4.9 Salem Lake (ROR)

Salem Lake is listed as impaired for aquatic life due to pH. There are three Illinois EPA sampling sites located on Salem Lake with pH data. 69 pH measurements were taken at the three sampling sites in 2015 (Table 14 and Figure 15). Six violations of the general use water quality standard for pH were observed in June and July 2015 at ROR-1. Aquatic life use impairment is verified for Salem Lake.

Available phosphorus data suggest that the lake is hypereutrophic, which can lead to high pH. Town Creek segment OJK-02, which begins north of Salem Lake (ROR) and ends just south of the lake, is impaired for aquatic life due to sediment. Segment OJK-03 of Town Creek, which is located just downstream of segment OJK-02, is impaired due to phosphorus.

Table 14. Data summary, Salem Lake ROR

Sample Site	No. of samples	Minimum (s.u.)	Average (s.u.)	Maximum (s.u.)	Number of samples outside the range of the general use water quality standard (6.5 – 9.0 s.u.)
pH					
ROR-1	42	6.4	7.0	8.0	6
ROR-2	19	6.5	7.4	8.3	0
ROR-3	8	6.7	7.6	8.2	0

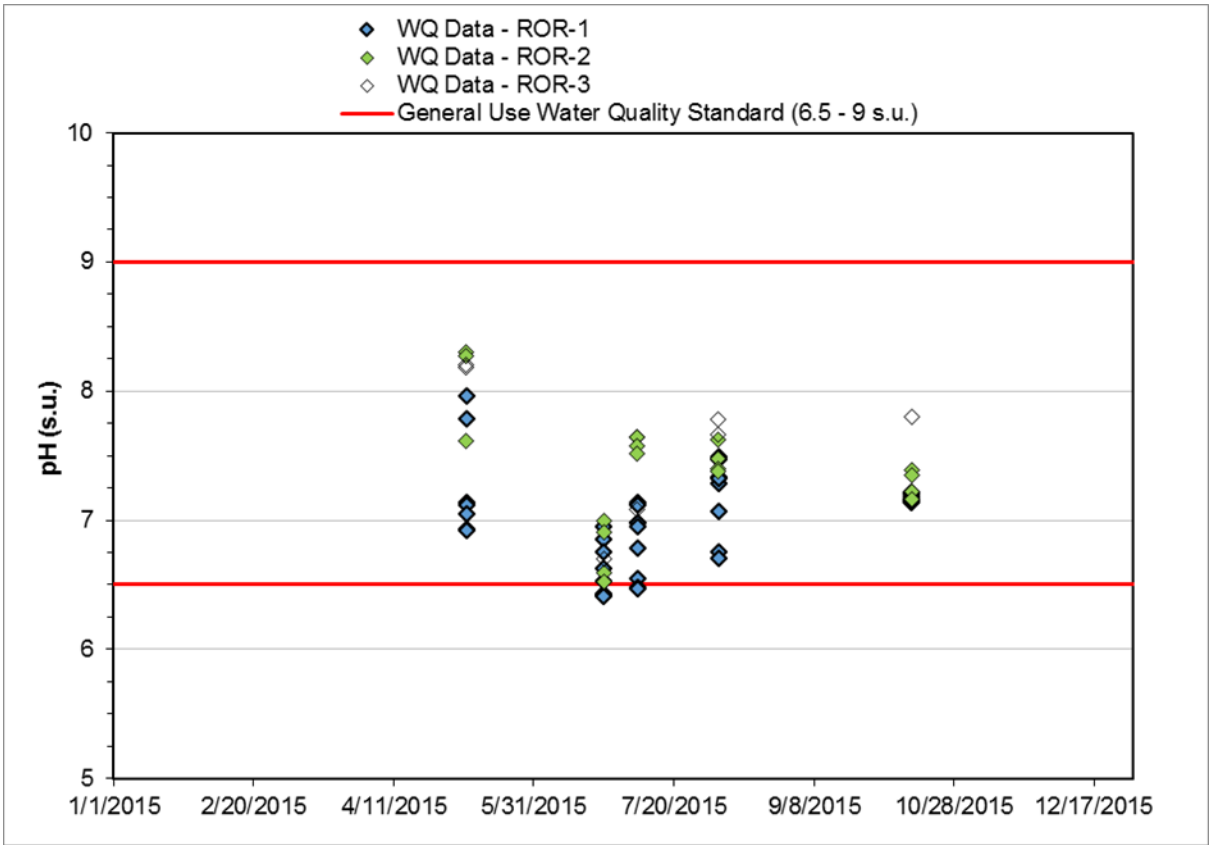

Figure 15. pH water quality time series, Salem Lake ROR.
Note: There are several overlapping points that are below the water quality standard of 6.5 s.u.

5. TMDL Methods and Data Needs

The first stage of this project assesses available data followed by evaluation of their credibility. The types of data available, their quantity and quality, and their spatial and temporal coverage relative to impaired segments or watersheds drive the approaches used for TMDL model selection and analysis. Credible data are those that meet specified levels of data quality, with acceptance criteria defined by measurement quality objectives—specifically their precision, accuracy, bias, representativeness, completeness, and reliability. The following sections describe the methods that will be used to derive TMDLs and the additional data needed to develop credible TMDLs.

TMDLs are proposed for segments with verified impairments and known pollutants (Table 15). A duration curve approach is suggested to evaluate the relationships between hydrology and water quality and to calculate the TMDL for the simazine impairment in O-25, if impairment is verified.

The Qual2K model is proposed to evaluate the confirmed low dissolved oxygen impairments where point sources are present. If point sources are not present and if there is a correlation with eutrophication (i.e., phosphorus concentration or high levels of algae and/or plant growth), a duration curve approach is suggested to develop a phosphorus TMDL. The phosphorus target will be derived from the relationship between phosphorus and dissolved oxygen in the impaired stream. TMDLs are not proposed for dissolved oxygen impairments that are not affected by point sources and do not show a correlation with eutrophication. In these cases, it is assumed that the cause of impairment is non-pollutant based (e.g., the effect of lack of re-aeration in low-gradient streams or the effect of hydromodification).

The Bathtub model is proposed to address the pH impairment in Salem Lake (ROR). pH is assumed to be linked to phosphorus concentrations in the lake.

Table 15. Proposed Model Summary

Name	Segment ID	Designated Uses	TMDL Parameter(s)	Proposed Model	Proposed Pollutant(s)
Kaskaskia River	O-07	Aquatic life	Dissolved Oxygen	Load duration curve [a]	Phosphorus
	O-25	Public and Food Processing Water Supply	Simazine	Load duration curve, pending impairment verification	Simazine
		Aquatic life	Dissolved Oxygen	Load duration curve [a]	Phosphorus
Crooked Creek	OJ-07	Aquatic life	Dissolved Oxygen	QUAL2K, pending impairment verification (see section 5.4)	Biochemical oxygen demand, ammonia, and phosphorus
Crooked Creek	OJ-11	Aquatic life	Dissolved Oxygen	Load duration curve or 4C classification, pending impairment verification (see section 5.4)	Phosphorus or non-pollutant
Lost Creek	OJB-04	Aquatic Life	Dissolved Oxygen	Load duration curve	Phosphorus
Prairie Creek	OJBA	Aquatic life	Dissolved Oxygen	Qual2K, pending impairment verification (see section 5.4)	Biochemical oxygen demand, ammonia, and phosphorus
Grand Point Creek	OJC-01	Aquatic life	Dissolved Oxygen	Load duration curve or 4C classification	Phosphorus or non-pollutant
Raccoon Creek	OJF	Aquatic life	Dissolved Oxygen	Load duration curve or 4C classification, pending impairment verification (see section 5.4)	Phosphorus or non-pollutant
Salem Lake	ROR	Aquatic life	pH	Bathtub	Total phosphorus [b]

a. See section 5.1 for justification on the approach.
b. Available phosphorus data suggest that the lake is hypereutrophic, which can lead to violations of the pH standard. The proposed approach assumes that meeting the total phosphorus water quality standard for lakes of 0.05 mg/L will address the pH impairment.

5.1 Load Duration Curve Approach

The primary benefit of duration curves in TMDL development is to provide insight regarding patterns associated with hydrology and water quality concerns. The duration curve approach is particularly applicable because water quality is often a function of stream flow. For instance, sediment concentrations typically increase with rising flows as a result of factors such as channel scour from higher velocities. Other parameters, such as iron, may be more concentrated at low flows and more diluted by increased water volumes at higher flows. The use of duration curves in water quality assessment creates a framework that enables data to be characterized by flow conditions. The method provides a visual display of the relationship between stream flow and water quality.

Allowable pollutant loads have been determined through the use of load duration curves. Discussions of load duration curves are presented in *An Approach for Using Load Duration Curves in the Development of TMDLs* (U.S. EPA 2007). This approach involves calculating the allowable loadings over the range of flow conditions expected to occur in the impaired stream by taking the following steps:

1. A flow duration curve for the stream is developed by generating a flow frequency table and plotting the data points to form a curve. The data reflect a range of natural occurrences from extremely high flows to extremely low flows.

2. The flow curve is translated into a load duration (or TMDL) curve by multiplying each flow value (in cubic feet per second) by the water quality standard/target for a contaminant (mg/L), then multiplying by conversion factors to yield results in the proper unit (e.g., pounds per day). The resulting points are plotted to create a load duration curve.

3. Each water quality sample is converted to a load by multiplying the water quality sample concentration by the average daily flow on the day the sample was collected. Then, the individual loads are plotted as points on the TMDL graph and can be compared to the water quality standard/target, or load duration curve.

4. Points plotting above the curve represent deviations from the water quality standard/target and the daily allowable load. Those plotting below the curve represent compliance with standards and the daily allowable load. Further, it can be determined which locations contribute loads above or below the water quality standard/target.

5. The area beneath the TMDL curve is interpreted as the loading capacity of the stream. The difference between this area and the area representing the current loading conditions is the load that must be reduced to meet water quality standards/targets.

6. The final step is to determine where reductions need to occur. Exceedances at the right side of the graph occur during low flow conditions and may be derived from sources such as illicit sewer connections. Exceedances on the left side of the graph occur during higher flow events and may be derived from sources such as runoff. Using the load duration curve approach allows Illinois EPA to determine which implementation practices are most effective for reducing loads on the basis of flow regime.

Water quality duration curves are created using the same steps as those used for load duration curves except that concentrations, rather than loads, are plotted on the vertical axis. Flows are categorized into the following five hydrologic zones (U.S. EPA 2007):

- High flow zone: stream flows that plot in the 0 to 10-percentile range, related to flood flows
- Moist zone: flows in the 10 to 40-percentile range, related to wet weather conditions
- Mid-range zone: flows in the 40 to 60-percentile range, median stream flow conditions
- Dry zone: flows in the 60 to 90-percentile range, related to dry weather flows
- Low flow zone: flows in the 90 to 100-percentile range, related to drought conditions

The duration curve approach helps to identify the issues surrounding the impairment and to roughly differentiate among sources. Table 16 summarizes the general relationship between the five hydrologic zones and potentially contributing source areas (the table is not specific to any individual pollutant). For example, the table indicates that impacts from point sources are usually most pronounced during dry and low flow zones because there is less water in the stream to dilute their loads. In contrast, impacts from

stormwater are most pronounced during moist and high flow zones due to increased overland flow from stormwater source areas during rainfall events.

Table 16. Relationship between duration curve zones and contributing sources

Contributing source area	Duration Curve Zone				
	High	Moist	Mid-range	Dry	Low
Point source				M	H
Livestock direct access to streams				M	H
Onsite wastewater systems	M	M-H	H	H	H
Stormwater: Impervious		H	H	H	
Stormwater: Upland	H	H	M		
Field drainage: Natural condition	H	M			
Field drainage: Tile system	H	H	M-H	L-M	

Note: Potential relative importance of source area to contribute loads under given hydrologic condition (H: High; M: Medium; L: Low).

The load reduction approach also considers critical conditions and seasonal variation in the TMDL development as required by the Clean Water Act and U.S. EPA's implementing regulations. Because the approach establishes loads on the basis of a representative flow regime, it inherently considers seasonal variations and critical conditions attributed to flow conditions. An underlying premise of the duration curve approach is correlation of water quality impairments to flow conditions. The duration curve alone does not consider specific fate and transport mechanisms, which may vary depending on watershed or pollutant characteristics.

Phosphorus TMDLs will be developed with the load duration curve approach for the dissolved oxygen impairments on Kaskaskia River segments O-07 and O-25. In both segments, there is a relationship between phosphorus and DO (Figure 4 and Figure 6), suggesting that eutrophication is an issue on the segments. The relationship can be used to derive a phosphorus target for the dissolved oxygen impairments. Although there is a point source (Carlyle STP–IL0027901) that discharges to segment O-07, the flow and phosphorus load from the point source are minimal compared to the flow and load in the Kaskaskia River. Additionally, a phosphorus TMDL is being developed for Carlyle Reservoir, which is directly upstream of segment O-07, and substantial P reductions will be needed to meet the Carlyle Reservoir phosphorus TMDL.

5.2 Qual2K

Qual2K is a steady-state water quality model that simulates eutrophication kinetics and conventional water quality parameters and is maintained by U.S. EPA. Qual2K simulates up to 15 water quality constituents in branching stream systems. A stream reach is divided into a number of computational elements, and for each computational element a hydrologic balance in terms of stream flow (e.g., m^3/s), a heat balance in terms of temperature (e.g., degrees C), and a material balance in terms of concentration (e.g., mg/l) are written. Both advective and dispersive transport processes are considered in the material balance. Mass is gained or lost from the computational element by transport processes, wastewater discharges, and withdrawals. Mass can also be gained or lost by internal processes such as release of mass from benthic sources or biological transformations.

The program simulates changes in flow conditions along the stream by computing a series of steady-state water surface profiles. The calculated stream-flow rate, velocity, cross-sectional area, and water depth serve as a basis for determining the heat and mass fluxes into and out of each computational element due to flow. Mass balance determines the concentrations of constituents at each computational element. In

addition to material fluxes, major processes included in the mass balance are transformation of nutrients, algal production, benthic and carbonaceous oxygen demand, atmospheric reaeration, and the effect of these processes on the dissolved oxygen balance. The nitrogen cycle is divided into four compartments: organic nitrogen, ammonia nitrogen, nitrite nitrogen, and nitrate nitrogen. The primary internal sink of dissolved oxygen in the model is biochemical oxygen demand (BOD). The major sources of dissolved oxygen are algal photosynthesis and atmospheric reaeration.

The model is applicable to dendritic streams that are well mixed. It assumes that the major transport mechanisms, advection and dispersion, are significant only along the main direction of flow (the longitudinal axis of the stream). It allows for multiple waste discharges, withdrawals, tributary flows, and incremental inflow and outflow.

Hydraulically, Qual2K is limited to the simulation of time periods during which both the stream flow in river basins and input waste loads are essentially constant. Qual2K can operate as either a steady-state or a quasi-dynamic model, making it a very helpful water quality planning tool. When operated as a steady-state model, it can be used to study the impact of waste loads (magnitude, quality, and location) on instream water quality. By operating the model dynamically, the user can study the effects of diurnal variations in meteorological data on water quality (primarily dissolved oxygen and temperature) and also can study diurnal dissolved oxygen variations due to algal growth and respiration. However, the effects of dynamic forcing functions, such as headwater flows or point loads, cannot be modeled in Qual2K. A steady-state model is proposed for all segments.

Qual2K is an appropriate choice for organic enrichment TMDLs that can be implemented at a moderate level of effort. Use of the Qual2K models in TMDLs is most appropriate when (1) full vertical mixing can be assumed, and (2) water quality excursions are associated with identifiable critical flow conditions. Because these models do not simulate dynamically varying flows, their use is limited to evaluating responses to one or more specific flow conditions. The selected flow condition should reflect critical conditions, which for dissolved oxygen occurs when flows are low and the ambient air temperature is warm, typically in July or August.

5.3 Bathtub

The Bathtub model is proposed to support TMDL development for Salem Lake. Bathtub is a steady state model that predicts eutrophication response in lakes based on empirical formulas developed for nutrient balance calculations and algal response (Walker 1987). The model was developed and is maintained by the U.S. Army Corps of Engineers. The model requires nutrient loading inputs from the watershed and atmospheric deposition, lake morphometric data, and estimates of mixing depth and nonalgal turbidity.

Due to a lack of available inflow monitoring data, watershed inputs will be derived from *Spreadsheet Tool for the Estimation of Pollutant Load* (STEPL). STEPL provides a simplified simulation of precipitation-driven runoff and sediment and nutrient delivery. STEPL can estimate loads from land uses, as well as from other sources such as stream bank erosion and failing septic systems. STEPL simulates runoff and stream flow using summary information on precipitation and rain days for the nearest weather station. STEPL has been used extensively in Region 5 for watershed plan development and in support of watershed studies. STEPL is an appropriate model to evaluate the relative contribution of various sources of pollutants and allows for the identification of the priority sources of pollutants for evaluation during implementation planning. STEPL also provides the level of detail needed for external watershed loading to Salem Lake that is required for Bathtub input.

Similar to most modeling applications, the Bathtub model is first calibrated to available data and then used to determine the load reductions that are needed to meet water quality standards. In this case, it is assumed that meeting the Illinois lake water quality standard for total phosphorus will result in bringing the lake's pH into compliance.

5.4 Additional Data Needs

Data satisfy two key objectives for Illinois EPA, enabling the agency to make informed decisions about the resource. These objectives include developing information necessary to:

- Determine if the impaired areas meet applicable water quality standards for their respective designated use(s)
- Support modeling and assessment activities required to allocate pollutant loadings for all impaired areas where water quality standards are not being met

Additional data may be needed to verify impairment, understand probable sources, calculate reductions, develop calibrated water quality models, and develop effective implementation plans. Table 17 summarizes the additional data needed for each impaired segment.

Table 17. Additional water quality data needs

Name	Segment ID	Designated Uses	TMDL Parameters	Additional Data Needs
Kaskaskia River	O-07	Aquatic Life	Dissolved Oxygen	Potentially, to confirm relationship with eutrophication
	O-25	Public and Food Processing Water Supply	Simazine	Yes, to confirm impairment
		Aquatic Life	Dissolved Oxygen	Potentially, to confirm relationship with eutrophication
Crooked Creek	OJ-07	Aquatic Life	Dissolved Oxygen	Yes, to confirm impairment and to support Qual2K model
Crooked Creek	OJ-11	Aquatic Life	Dissolved Oxygen	Yes, to confirm impairment and to determine relationship with eutrophication
Lost Creek	OJB-04	Aquatic Life	Dissolved Oxygen	None
Prairie Creek	OJBA	Aquatic Life	Dissolved Oxygen	Yes, to confirm impairment and to support Qual2K model
Grand Point Creek	OJC-01	Aquatic Life	Dissolved Oxygen	Yes, to determine relationship with eutrophication
Raccoon Creek	OJF	Aquatic Life	Dissolved Oxygen	Yes, to confirm impairment and to determine relationship with eutrophication
Salem Lake	ROR	Aquatic Life	pH	None

Specific data needs include:

Confirm Simazine Impairment on O-25—Simazine sampling is recommended during spring 2019 to confirm impairment. Three to five samples should be collected at O-25 during April, May, and June to provide a spring quarterly average that can be compared against the target. Simazine is typically applied as early as 30 days prior to planting, and after planting but before the crop reaches 5 inches in height (ISU Extension 2005).

Confirm Relationship with Eutrophication on O-07 and O-25—If additional data are necessary to confirm the relationship between phosphorus and dissolved oxygen, collect DO, chlorophyll-*a*, and TP grab samples at stations O-07 and O-25; two samples per day (one per day in the early morning) on three separate sampling days, during the warm summer months and during low flows.

Confirm Dissolved Oxygen Impairment and Support Qual2K Model Development on OJ-07— A minimum of two monitoring stations are needed on the impaired segment, in addition to monitoring stations at substantial tributaries. The following sites are recommended: 1) OJ-01, 2) OJ-13, and 3) a new site on Turkey Creek where it crosses US Highway 51 near the outlet. Ideally, there would be two separate data collection periods, each time period lasting roughly one week during critical conditions (low flow, warm conditions). Although these locations are a minimum, adding more locations along the reach of interest will help determine how heterogeneous the system is and what dynamics are occurring along the reach. Monitoring stations can be located downstream of key tributaries, at road crossings, etc. as deemed necessary.

Recommended monitoring to support Qual2K development includes various types of data:

- Continuous dissolved oxygen, stream temperature, conductivity, and pH monitoring during warm, low flow critical conditions; monitoring should take place over approximately two weeks at a minimum of two locations.
- Flow measurements (depth and velocity) during dissolved oxygen monitoring at least twice at two locations; the number of measurements will be dependent on weather and stream conditions.
- Multiple samples of organic nitrogen, ammonia nitrogen, nitrate nitrogen, organic phosphorus, soluble reactive phosphorus, total inorganic carbon, carbonaceous biochemical oxygen demand (5-day and 20-day if possible), inorganic solids, chlorophyll-*a*, and alkalinity. Depending on the monitoring station, grab samples could be collected twice per day during the first and last days of sonde deployment or throughout the week.
- Macrophyte and attached algae survey, survey of groundwater and tributary contributions, if any.
- Channel geometry, shade/vegetative survey, cloud cover, and channel substrate and bottom material, both upstream and downstream of the monitoring stations(s).
- A longitudinal/synoptic survey of DO concentrations along the entire reach (hand-sampling by probe on foot or from a row-boat periodically along the entire reach extent).
- Funding permitted: *in-situ* measurements of stream reaeration (via diffusion dome technique) and *in-situ* measurements of sediment oxygen demand (via chambers deployed on the streambed). Sediment bed surveys can be conducted potentially in lieu of sediment oxygen demand (SOD) sampling (sediment total organic carbon sampling for instance could be a rough proxy for SOD if needed).
- Photo documentation of the system.

Confirm Dissolved Oxygen Impairment(s) and Determine Relationship with Eutrophication on OJ-11 and OJF (no wastewater treatment facilities discharging to segments)—Collect DO, chlorophyll-*a*, and TP grab samples at stations OJ-11 and OJF; two samples per day (one per day in the early morning) on three separate sampling days, during the warm summer months and during low flows.

Determine Relationship with Eutrophication on OJC-01—Collect DO, chlorophyll-*a*, and TP grab samples at station OJC-03; two samples per day (one per day in the early morning) on three separate sampling days, during the warm summer months and during low flows.

Confirm Dissolved Oxygen Impairment and Support Qual2K Model Development on OJBA—A minimum of two monitoring stations are needed on the impaired segment. Ideally, there would be two

separate data collection periods, each time period lasting roughly one week during critical conditions (low flow, warm conditions). Although two monitoring locations are a minimum, adding more locations along the reach of interest will help determine how heterogeneous the system is and what dynamics are occurring along the reach. Monitoring stations can be located downstream of key tributaries, at road crossings, etc. as deemed necessary.

Recommended monitoring to support Qual2K development includes various types of data:

- Continuous dissolved oxygen, stream temperature, conductivity, and pH monitoring during warm, low flow critical conditions; monitoring should take place over approximately two weeks at a minimum of two locations.
- Flow measurements (depth and velocity) during dissolved oxygen monitoring at least twice at two locations; the number of measurements will be dependent on weather and stream conditions.
- Multiple samples of organic nitrogen, ammonia nitrogen, nitrate nitrogen, organic phosphorus, soluble reactive phosphorus, total inorganic carbon, carbonaceous biochemical oxygen demand (5-day and 20-day if possible), inorganic solids, chlorophyll-*a*, and alkalinity. Depending on the monitoring station, grab samples could be collected twice per day during the first and last days of sonde deployment or throughout the week.
- Macrophyte and attached algae survey, survey of groundwater and tributary contributions, if any.
- Channel geometry, shade/vegetative survey, cloud cover, and channel substrate and bottom material, both upstream and downstream of the monitoring stations(s).
- A longitudinal/synoptic survey of DO concentrations along the entire reach (hand-sampling by probe on foot or from a row-boat periodically along the entire reach extent).
- Funding permitted: *in-situ* measurements of stream reaeration (via diffusion dome technique) and *in-situ* measurements of sediment oxygen demand (via chambers deployed on the streambed). Sediment bed surveys can be conducted potentially in lieu of sediment oxygen demand (SOD) sampling (sediment total organic carbon sampling for instance could be a rough proxy for SOD if needed).
- Photo documentation of the system.

Implementation Plan Development—Further in-field assessment may be needed to better determine the source of impairments in order to develop an effective TMDL implementation plan. Additional monitoring includes:

- Synoptic sampling in additional upstream impairments to determine impacts to impairments in this TMDL
- Wind shield surveys
- Streambank surveys
- Stream assessments
- Farmer/landowner surveys
- Word of mouth and in-person conversations with local stakeholders and landowners

6. Public Participation

A public meeting was held on December 12, 2018 at the Carlyle Lake Visitor Center in Carlyle, IL to present the Stage 1 report and findings. A public notice was placed on the Illinois EPA website. There were many stakeholders present, including representatives from the US Army Corps of Engineers, the Kaskaskia Watershed Association, Original Kaskaskia Area Wilderness, Inc., and others. The public comment period closed on January 12, 2019. No written comments were provided on the draft Stage 1 report.

7. References

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Appendix A – Unimpaired Stream Data Analysis

Crooked Creek (OJ-08)

Crooked Creek is listed as impaired for aquatic life due to iron along segment OJ-08. There were 72 iron samples collected on OJ-08 during the period of record (Table 18 and Figure 16). One exceedance of the general use water quality standard for iron was observed in August 2011. No wastewater treatment facilities discharge to the segment. Because only one exceedance was observed, a TMDL is not being developed.

Table 18. Data summary, Crooked Creek OJ-08

Sample Site	No. of samples	Minimum (mg/L)	Average (mg/L)	Maximum (mg/L)	Number of exceedances of general use water quality standard (1,000 µg/L)
Iron					
OJ-08	72	13	158	1,050	1

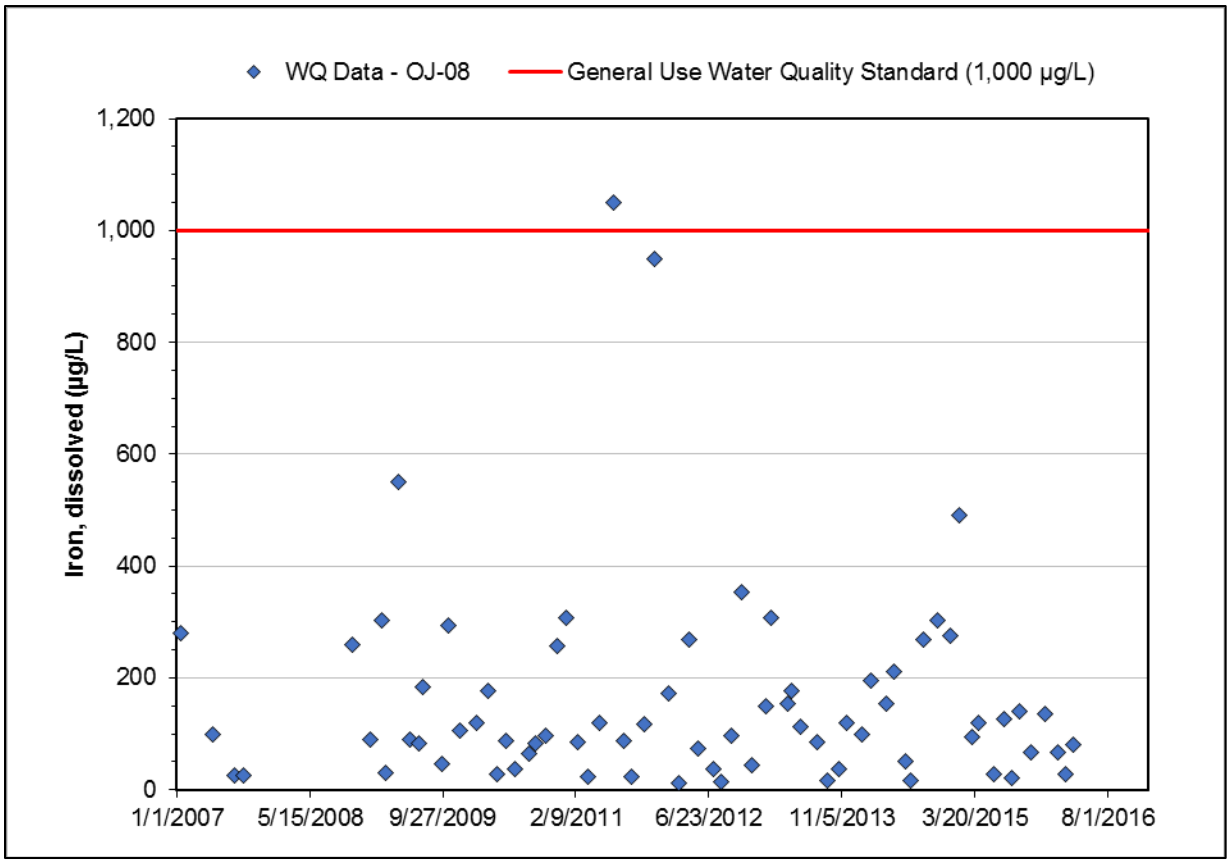

Figure 16. Dissolved iron water quality time series, Crooked Creek OJ-08.

Appendix B – Stage 2 Data

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 10/02/19 11:00 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190930INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT/MFS
Lab Sample ID: **19J0103-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/30/19 14:25
Sample Fraction: Total
Chlorophyll volume filtered (ml): 150
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/07/19 14:15
Units: ug/L
Analyzed: 10/10/19 10:23

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**28.5**		0.50	
Chlorophyll-A (unco)	**35.1**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**1.88**		0.50	
Pheophytin-A	**8.90**		0.50	

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Reported:
10/16/19 14:35

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received :	10/02/19 11:00 by Amber Royster
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190930INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/16/19 14:35

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 10/02/19 11:00 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190930INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19J0112-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/30/19 11:18
Sample Fraction: Total
Chlorophyll volume filtered (ml): 150
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/07/19 14:15
Units: ug/L
Analyzed: 10/10/19 10:23

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**24.9**		0.50	
Chlorophyll-A (unco)	**32.1**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	**9.97**		0.50	

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Reported:
10/16/19 14:34

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07 Received : 10/02/19 11:00 by Amber Royster

Waterbody Name: KASKASKIA RIVER County: CLINTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190930INHS Visit Number: 001 Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/16/19 14:34

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 10/08/19 16:20 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20191007INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19J0362-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 10/07/19 14:05
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/16/19 08:09
Units: ug/L
Analyzed: 10/17/19 10:18

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**33.4**		0.50	
Chlorophyll-A (unco)	**38.3**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**3.50**		0.50	
Pheophytin-A	**5.87**		0.50	

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Reported:
10/29/19 14:55

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received : 10/08/19 16:20	by Amber Royster
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20191007INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:55

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 10/08/19 16:20 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20191007INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19J0363-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 10/07/19 11:10
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/16/19 08:09
Units: ug/L
Analyzed: 10/17/19 10:18

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**33.4**		0.50	
Chlorophyll-A (unco)	**42.8**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**2.08**		0.50	
Pheophytin-A	**13.4**		0.50	

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Reported:
10/29/19 14:55

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received : 10/08/19 16:20	by Amber Royster
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20191007INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

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Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:55

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25
Received : 07/02/19 14:57 by ADAM LUCCHESI
Waterbody Name: KASKASKIA RIVER
County: WASHINGTON
Temperature C: 6.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190702TMDL
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MARK WEBER
Lab Sample ID: **19G0056-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 07/02/19 11:10
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Pesticides by NPD

Method: 8141
Prepared: 07/05/19 13:33
Units: ug/L
Analyzed: 07/16/19 02:24

Analyte	Result	Qualifier	Reporting Limit	MDL
EPTC *	ND		0.50	0.054
Butylate *	ND		0.20	0.055
Phorate	ND		0.25	0.016
Terbufos	ND		0.10	0.014
Diazinon	ND		0.050	0.0087
Atrazine	**0.17**		0.10	0.057
Simazine	ND		0.10	0.069
Fonofos	ND		0.10	0.0074
Methyl parathion	ND		0.10	0.021
Chlorpyrifos	ND		0.10	0.010
Malathion	ND		0.15	0.032
Ethyl parathion	ND		0.10	0.0088

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Reported:
07/23/19 15:52

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-25			Received : 07/02/19 14:57	by ADAM LUCCHESI
Waterbody Name:	KASKASKIA RIVER	County:	WASHINGTON	Temperature C:	6.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190702TMDL	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
07/23/19 15:52

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 08/20/19 15:42 by Scott Clark
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190819INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19H0808-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 08/19/19 9:20
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/03/19 11:16
Units: ug/L
Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received : 08/20/19 15:42	by Scott Clark
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 08/20/19 15:42 by Scott Clark
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190819INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19H0810-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 08/19/19 13:36
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/03/19 11:16
Units: ug/L
Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	ND		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**2.45**		0.50	
Pheophytin-A	ND		0.50	

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received : 08/20/19 15:42	by Scott Clark
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08 Received : 08/20/19 15:42 by Scott Clark

Waterbody Name: CROOKED CREEK County: WASHINGTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190819INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: MFS Lab Sample ID: **19H0812-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/19/19 10:30

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**1.10**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**0.68**		0.50	
Pheophytin-A	ND		0.50	

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-08			Received :	08/20/19 15:42 by Scott Clark
Waterbody Name:	CROOKED CREEK	County:	WASHINGTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08 Received : 08/20/19 15:42 by Scott Clark

Waterbody Name: CROOKED CREEK County: WASHINGTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190819INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: VIT Lab Sample ID: **19H0814-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/19/19 14:37

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**0.59**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-08			Received :	08/20/19 15:42 by Scott Clark
Waterbody Name:	CROOKED CREEK	County:	WASHINGTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 08/20/19 15:42 by Scott Clark
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190819INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By:
Lab Sample ID: **19H0816-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 08/20/19 7:25
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/03/19 11:16
Units: ug/L
Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**2.67**		0.50	
Chlorophyll-A (unco)	**1.62**		0.50	
Chlorophyll-B	**1.16**		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 08/20/19 15:42	by Scott Clark
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01 Received : 08/20/19 15:42 by Scott Clark

Waterbody Name: CROOKED CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190819INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: MFS Lab Sample ID: **19H0818-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/20/19 12:00

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**2.67**		0.50	
Chlorophyll-A (unco)	**3.32**		0.50	
Chlorophyll-B	**1.26**		0.50	
Chlorophyll-C	**0.81**		0.50	
Pheophytin-A	**1.07**		0.50	

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 08/20/19 15:42	by Scott Clark
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:29

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJC-03 Received : 08/23/19 10:30 by LAUREN AIELLO

Waterbody Name: GRAND POINT CREEK County: WASHINGTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190821INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: MFS Lab Sample ID: **19H0956-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/21/19 14:10

Sample Fraction: Total Chlorophyll volume filtered (ml): 100 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**107**		0.50	
Chlorophyll-A (unco)	**121**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**8.37**		0.50	
Pheophytin-A	**16.6**		0.50	

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJC-03			Received : 08/23/19 10:30	by LAUREN AIELLO
Waterbody Name:	GRAND POINT CREEK	County:	WASHINGTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190821INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJC-03
Received : 08/23/19 10:30 by LAUREN AIELLO
Waterbody Name: GRAND POINT CREEK
County: WASHINGTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190821INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By:
Lab Sample ID: **19H0957-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 08/21/19 9:40
Sample Fraction: Total
Chlorophyll volume filtered (ml): 100
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/03/19 11:16
Units: ug/L
Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**150**		0.50	
Chlorophyll-A (unco)	**185**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**12.9**		0.50	
Pheophytin-A	**48.6**		0.50	

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJC-03			Received : 08/23/19 10:30	by LAUREN AIELLO
Waterbody Name:	GRAND POINT CREEK	County:	WASHINGTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190821INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
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Laboratory Manager

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25 Received : 08/23/19 10:30 by LAUREN AIELLO

Waterbody Name: KASKASKIA RIVER County: WASHINGTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190821INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: MFS Lab Sample ID: **19H0958-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/21/19 13:20

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**26.7**		0.50	
Chlorophyll-A (unco)	**29.7**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**3.82**		0.50	
Pheophytin-A	**3.20**		0.50	

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25
Received : 08/23/19 10:30 by LAUREN AIELLO
Waterbody Name: KASKASKIA RIVER
County: WASHINGTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190821INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25 Received : 08/23/19 10:30 by LAUREN AIELLO

Waterbody Name: KASKASKIA RIVER County: WASHINGTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190821INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: Lab Sample ID: **19H0959-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/21/19 10:48

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**33.4**		0.50	
Chlorophyll-A (unco)	**38.9**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**1.35**		0.50	
Pheophytin-A	**6.81**		0.50	

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25
Received : 08/23/19 10:30 by LAUREN AIELLO
Waterbody Name: KASKASKIA RIVER
County: WASHINGTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190821INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:28

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01 Received : 08/23/19 10:30 by LAUREN AIELLO

Waterbody Name: CROOKED CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190819INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: VIT Lab Sample ID: **19H0960-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 08/20/19 12:00

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/03/19 11:16

Units: ug/L Analyzed: 09/05/19 10:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**4.00**		0.50	
Chlorophyll-A (unco)	**2.88**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
09/12/19 14:27

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 08/23/19 10:30	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190819INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
09/12/19 14:27

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0151-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 14:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**131**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/06/19 13:49
Units: mg/L
Analyzed: 09/11/19 08:37

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND	J5	2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/09/19 13:45
Units: mg/L
Analyzed: 09/09/19 14:39

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.894**		0.100	0.0247

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0151-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 14:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/09/19 15:09
Units: mg/L
Analyzed: 09/12/19 14:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.07**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 09/25/19 08:00
Units: mg/L
Analyzed: 09/25/19 17:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.48**	J	0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/27/19 09:00
Units: mg/L
Analyzed: 09/27/19 16:24

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.752**		0.0050	0.0042

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0151-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 14:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/09/19 08:09
Units: mg/L
Analyzed: 09/09/19 08:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**15**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/09/19 08:10
Units: mg/L
Analyzed: 09/09/19 08:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-08			Received :	09/06/19 10:50 by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	WASHINGTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J5	Blank spike failed high, result was less than the reporting limit - impact on data may be minimal.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0152-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 7:44
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**129**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/06/19 13:49
Units: mg/L
Analyzed: 09/11/19 08:37

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND	J5	2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/09/19 13:45
Units: mg/L
Analyzed: 09/09/19 14:40

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.930**		0.100	0.0247

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0152-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 7:44
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/09/19 15:09
Units: mg/L
Analyzed: 09/12/19 14:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.07**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 09/25/19 08:00
Units: mg/L
Analyzed: 09/25/19 17:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.62**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/27/19 09:00
Units: mg/L
Analyzed: 09/27/19 16:24

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.719**		0.0050	0.0042

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-08
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0152-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 7:44
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/09/19 08:09
Units: mg/L
Analyzed: 09/09/19 08:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**37**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/09/19 08:10
Units: mg/L
Analyzed: 09/09/19 08:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	**5**		4	

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-08			Received :	09/06/19 10:50 by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	WASHINGTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J5	Blank spike failed high, result was less than the reporting limit - impact on data may be minimal.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0153-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 15:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**143**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/06/19 13:49
Units: mg/L
Analyzed: 09/11/19 08:37

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND	J5	2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/09/19 13:45
Units: mg/L
Analyzed: 09/09/19 14:41

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.655**		0.100	0.0247

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0153-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 15:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/09/19 08:27
Units: mg/L
Analyzed: 09/09/19 15:11

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.09**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 09/24/19 09:00
Units: mg/L
Analyzed: 09/25/19 11:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.54**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/25/19 10:00
Units: mg/L
Analyzed: 09/27/19 11:24

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.374**		0.0050	0.0042

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0153-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 15:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/09/19 08:09
Units: mg/L
Analyzed: 09/09/19 08:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**19**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/09/19 08:10
Units: mg/L
Analyzed: 09/09/19 08:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received :	09/06/19 10:50 by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J5	Blank spike failed high, result was less than the reporting limit - impact on data may be minimal.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:06

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0154-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 11:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**142**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/06/19 13:49
Units: mg/L
Analyzed: 09/11/19 08:37

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND	J5, Q	2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/09/19 13:45
Units: mg/L
Analyzed: 09/09/19 14:43

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.689**		0.100	0.0247

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0154-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 11:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/09/19 08:27
Units: mg/L
Analyzed: 09/09/19 15:11

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	ND		0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 09/24/19 09:00
Units: mg/L
Analyzed: 09/25/19 11:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.61**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/25/19 10:00
Units: mg/L
Analyzed: 09/27/19 11:25

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.396**		0.0050	0.0042

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0154-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 11:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/09/19 08:09
Units: mg/L
Analyzed: 09/09/19 08:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**12**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/09/19 08:10
Units: mg/L
Analyzed: 09/09/19 08:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received : 09/06/19 10:50	by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

Q	Maximum holding time exceeded.
J5	Blank spike failed high, result was less than the reporting limit - impact on data may be minimal.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0155-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 12:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**175**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/06/19 13:49
Units: mg/L
Analyzed: 09/11/19 08:37

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND	J5	2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/09/19 13:45
Units: mg/L
Analyzed: 09/09/19 14:44

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**3.46**		0.100	0.0247

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Test results meet all requirements of NELAC (accredited by Florida DOH #E37645). If you have any questions about this report, please contact Tom Weiss, Laboratory Manager, at 217.782.9780.

Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0155-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 12:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/09/19 15:09
Units: mg/L
Analyzed: 09/12/19 14:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.07**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 09/25/19 08:00
Units: mg/L
Analyzed: 09/25/19 17:11

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.57**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/27/19 09:00
Units: mg/L
Analyzed: 09/27/19 16:25

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.265**		0.0050	0.0042

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0155-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 12:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/09/19 08:09
Units: mg/L
Analyzed: 09/09/19 08:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**10**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/09/19 08:10
Units: mg/L
Analyzed: 09/09/19 08:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 09/06/19 10:50	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J5	Blank spike failed high, result was less than the reporting limit - impact on data may be minimal.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0156-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 9:26
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**175**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/06/19 13:49
Units: mg/L
Analyzed: 09/11/19 08:37

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND	J5	2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/09/19 13:45
Units: mg/L
Analyzed: 09/09/19 14:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**3.44**		0.100	0.0247

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0156-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 9:26
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/09/19 15:09
Units: mg/L
Analyzed: 09/12/19 14:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.08**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 09/25/19 08:00
Units: mg/L
Analyzed: 09/25/19 17:12

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.68**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/27/19 09:00
Units: mg/L
Analyzed: 09/27/19 16:25

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.260**		0.0050	0.0042

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0156-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/05/19 9:26
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/09/19 08:09
Units: mg/L
Analyzed: 09/09/19 08:09

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**12**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/09/19 08:10
Units: mg/L
Analyzed: 09/09/19 08:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 09/06/19 10:50	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J5	Blank spike failed high, result was less than the reporting limit - impact on data may be minimal.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJC-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: GRAND POINT CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0157-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 13:55
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/25/19 10:00
Units: mg/L
Analyzed: 09/27/19 11:25

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.325**		0.0050	0.0042

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJC-03			Received :	09/06/19 10:50 by LAUREN AIELLO
Waterbody Name:	GRAND POINT CREEK	County:	WASHINGTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJC-03
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: GRAND POINT CREEK
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0159-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 9:57
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/25/19 10:00
Units: mg/L
Analyzed: 09/27/19 11:26

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.440**		0.0050	0.0042

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJC-03			Received :	09/06/19 10:50 by LAUREN AIELLO
Waterbody Name:	GRAND POINT CREEK	County:	WASHINGTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: KASKASKIA RIVER
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0160-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 14:40
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/25/19 10:00
Units: mg/L
Analyzed: 09/27/19 11:27

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.384**		0.0050	0.0042

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-25			Received : 09/06/19 10:50	by LAUREN AIELLO
Waterbody Name:	KASKASKIA RIVER	County:	WASHINGTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-25
Received : 09/06/19 10:50 by LAUREN AIELLO
Waterbody Name: KASKASKIA RIVER
County: WASHINGTON
Temperature C: 5.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190904INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0162-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/04/19 10:35
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 09/25/19 10:00
Units: mg/L
Analyzed: 09/27/19 11:29

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.375**		0.0050	0.0042

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-25			Received : 09/06/19 10:50	by LAUREN AIELLO
Waterbody Name:	KASKASKIA RIVER	County:	WASHINGTON	Temperature C:	5.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190904INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0532-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 9:25
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**171**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/13/19 14:14
Units: mg/L
Analyzed: 09/18/19 10:15

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND		2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/18/19 15:24
Units: mg/L
Analyzed: 09/18/19 16:28

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**5.13**		0.100	0.0247

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0532-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 9:25
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/26/19 15:20
Units: mg/L
Analyzed: 09/30/19 13:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.15**		0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 10/07/19 08:00
Units: mg/L
Analyzed: 10/08/19 14:07

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.74**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 10:00
Units: mg/L
Analyzed: 10/09/19 15:26

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.303**		0.0050	0.0042

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0532-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 9:25
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/17/19 07:45
Units: mg/L
Analyzed: 09/17/19 07:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**8**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/17/19 07:46
Units: mg/L
Analyzed: 09/17/19 07:46

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:05

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: CROOKED CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190911INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: VIT Lab Sample ID: **19I0533-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/12/19 9:25

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/19/19 09:09

Units: ug/L Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**2.67**		0.50	
Chlorophyll-A (unco)	**2.89**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0534-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 12:10
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**168**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/13/19 14:14
Units: mg/L
Analyzed: 09/18/19 10:15

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND		2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/18/19 15:24
Units: mg/L
Analyzed: 09/18/19 16:29

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**5.08**		0.100	0.0247

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0534-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 12:10
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/26/19 15:20
Units: mg/L
Analyzed: 09/30/19 13:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.07**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 10/07/19 08:00
Units: mg/L
Analyzed: 10/08/19 14:11

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.77**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 10:00
Units: mg/L
Analyzed: 10/09/19 15:27

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.311**		0.0050	0.0042

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0534-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 12:10
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/17/19 07:45
Units: mg/L
Analyzed: 09/17/19 07:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**9**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/17/19 07:46
Units: mg/L
Analyzed: 09/17/19 07:46

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-01			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190912INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I0535-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 12:10
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/19/19 09:09
Units: ug/L
Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**2.67**		0.50	
Chlorophyll-A (unco)	**3.40**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	**1.07**		0.50	

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-01 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: CROOKED CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190912INHS Visit Number: 001 Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0536-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 8:05
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**166**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/13/19 14:14
Units: mg/L
Analyzed: 09/18/19 10:15

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND		2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/18/19 15:24
Units: mg/L
Analyzed: 09/18/19 16:30

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.452**		0.100	0.0247

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL Collected By: VIT
Lab Sample ID: **19I0536-01**
Sample Medium: Water PWS Intake:
Date/Time Collected: 09/12/19 8:05
Sample Fraction: Total Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/26/19 15:20
Units: mg/L
Analyzed: 09/30/19 13:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	ND		0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 10/07/19 08:00
Units: mg/L
Analyzed: 10/08/19 14:12

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.58**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 10:00
Units: mg/L
Analyzed: 10/09/19 15:28

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.330**		0.0050	0.0042

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0536-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 8:05
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/17/19 07:45
Units: mg/L
Analyzed: 09/17/19 07:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	ND		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/17/19 07:46
Units: mg/L
Analyzed: 09/17/19 07:46

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
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LABORATORY RESULTS

Station Code:	OJBA-03			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I0537-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 8:05
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/19/19 09:09
Units: ug/L
Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**0.59**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0538-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 13:15
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 09/12/19 14:32
Units: mg/L
Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**165**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B
Prepared: 09/13/19 14:14
Units: mg/L
Analyzed: 09/18/19 10:15

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND		2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 09/18/19 15:24
Units: mg/L
Analyzed: 09/18/19 16:31

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.450**		0.100	0.0247

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL Collected By: VIT Lab Sample ID: **19I0538-01**
Sample Medium: Water PWS Intake: Date/Time Collected: 09/12/19 13:15
Sample Fraction: Total Chlorophyll volume filtered (ml): Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/26/19 15:20
Units: mg/L
Analyzed: 09/30/19 13:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.08**	J	0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 10/07/19 08:00
Units: mg/L
Analyzed: 10/08/19 14:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.55**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 10:00
Units: mg/L
Analyzed: 10/09/19 15:28

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.345**		0.0050	0.0042

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0538-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 13:15
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/17/19 07:45
Units: mg/L
Analyzed: 09/17/19 07:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	ND		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/17/19 07:46
Units: mg/L
Analyzed: 09/17/19 07:46

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	ND		4	

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received :	09/13/19 11:20 by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190912INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:04

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: PRAIRIE CREEK County: CLINTON Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190912INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: VIT Lab Sample ID: **19I0539-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/12/19 13:15

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/19/19 09:09

Units: ug/L Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**1.10**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**0.68**		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190912INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: PRAIRIE CREEK County: CLINTON Temperature C: 3.00

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190912INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: TOTAL Collected By: MFS Lab Sample ID: **19I0540-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/12/19 13:20

Sample Fraction: Total Chlorophyll volume filtered (ml): Sample Depth:

Alkalinity by Standard Method 310.2

Method: 310.2 Prepared: 09/12/19 14:32

Units: mg/L Analyzed: 09/13/19 14:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**103**		10.0	7.48

Carbonaceous BOD, 5 day, by Standard Method 5210B

Method: 5210B Prepared: 09/13/19 14:14

Units: mg/L Analyzed: 09/18/19 10:15

Analyte	Result	Qualifier	Reporting Limit	MDL
CBOD, 5 day	ND		2.00	

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2 Prepared: 09/18/19 15:24

Units: mg/L Analyzed: 09/18/19 16:33

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**0.753**		0.100	0.0247

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Reported:
10/29/19 15:03

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL Collected By: MFS
Lab Sample ID: **19I0540-01**
Sample Medium: Water PWS Intake:
Date/Time Collected: 09/12/19 13:20
Sample Fraction: Total Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 09/26/19 15:20
Units: mg/L
Analyzed: 09/30/19 13:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.36**		0.10	0.06

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 10/07/19 08:00
Units: mg/L
Analyzed: 10/08/19 14:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.68**		0.50	0.37

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 10:00
Units: mg/L
Analyzed: 10/09/19 15:29

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.149**		0.0050	0.0042

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Reported:
10/29/19 15:03

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0540-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 13:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 09/17/19 07:45
Units: mg/L
Analyzed: 09/17/19 07:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**132**		4	

Volatile Suspended Solids by Standard Method 2540E

Method: SM 2540E
Prepared: 09/17/19 07:46
Units: mg/L
Analyzed: 09/17/19 07:46

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	**9**		4	

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Reported:
10/29/19 15:03

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received :	09/13/19 11:20 by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190912INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:03

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJBA-03
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: PRAIRIE CREEK
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190912INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19I0541-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/12/19 13:20
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/19/19 09:09
Units: ug/L
Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**0.59**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJBA-03			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	PRAIRIE CREEK	County:	CLINTON	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190912INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Test results meet all requirements of NELAC (accredited by Florida DOH #E37645). If you have any questions about this report, please contact Tom Weiss, Laboratory Manager, at 217.782.9780.

Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0542-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/11/19 10:53
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 09:00
Units: mg/L
Analyzed: 10/09/19 16:40

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.0950**		0.0050	0.0042

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Reported:
10/15/19 11:24

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received :	09/13/19 11:20 by LAUREN AIELLO
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:24

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: RACCOON CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190911INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: MFS Lab Sample ID: **19I0543-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/11/19 10:53

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/19/19 09:09

Units: ug/L Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0544-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/11/19 14:08
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 09:00
Units: mg/L
Analyzed: 10/09/19 16:40

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.0940**		0.0050	0.0042

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received :	09/13/19 11:20 by LAUREN AIELLO
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I0545-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/11/19 14:08
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/19/19 09:09
Units: ug/L
Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**0.51**		0.50	
Chlorophyll-B	**0.51**		0.50	
Chlorophyll-C	**1.99**		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0546-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/11/19 11:29
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 09:00
Units: mg/L
Analyzed: 10/09/19 16:42

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.114**		0.0050	0.0042

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received :	09/13/19 11:20 by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: CROOKED CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190911INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: MFS Lab Sample ID: **19I0547-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/11/19 11:29

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/19/19 09:09

Units: ug/L Analyzed: 09/26/19 09:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**0.59**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**1.14**		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/13/19 11:20 by LAUREN AIELLO
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190911INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0548-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/11/19 14:41
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/09/19 09:00
Units: mg/L
Analyzed: 10/09/19 16:43

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.112**		0.0050	0.0042

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received :	09/13/19 11:20 by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11 Received : 09/13/19 11:20 by LAUREN AIELLO

Waterbody Name: CROOKED CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190911INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: VIT Lab Sample ID: **19I0549-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/11/19 14:41

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 09/26/19 13:00

Units: ug/L Analyzed: 09/30/19 13:45

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	ND		0.50	
Chlorophyll-A (unco)	**0.59**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	**0.93**		0.50	

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/13/19 11:20	by LAUREN AIELLO
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190911INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/04/19 09:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C: 6.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0826-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 14:49
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/15/19 10:00
Units: mg/L
Analyzed: 10/15/19 17:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.0960**		0.0050	0.0042

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Reported:
10/29/19 15:02

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received :	09/19/19 16:00 by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	6.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190918INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:02

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19I0829-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 14:49
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/30/19 12:01
Units: ug/L
Analyzed: 10/03/19 10:31

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received :	09/19/19 16:00 by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190918INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:23

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C: 6.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0830-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 11:25
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/15/19 10:00
Units: mg/L
Analyzed: 10/15/19 17:12

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.0960**		0.0050	0.0042

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Reported:
10/29/19 15:02

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received :	09/19/19 16:00 by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	6.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190918INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:02

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 6.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I0831-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 15:25
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/15/19 10:00
Units: mg/L
Analyzed: 10/15/19 17:12

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.115**		0.0050	0.0042

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Test results meet all requirements of NELAC (accredited by Florida DOH #E37645). If you have any questions about this report, please contact Tom Weiss, Laboratory Manager, at 217.782.9780.

Reported:
10/29/19 15:02

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received :	09/19/19 16:00 by Amber Royster
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	6.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190918INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:02

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 6.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0832-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 11:52
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/15/19 10:00
Units: mg/L
Analyzed: 10/15/19 17:13

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.114**		0.0050	0.0042

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Reported:
10/29/19 15:01

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/19/19 16:00	by Amber Royster
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	6.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190918INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:01

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I0837-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 11:25
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/30/19 12:01
Units: ug/L
Analyzed: 10/03/19 10:31

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	ND		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:22

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received : 09/19/19 16:00	by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190918INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:22

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19I0838-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 15:25
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/30/19 12:01
Units: ug/L
Analyzed: 10/03/19 10:31

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:22

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:22

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I0839-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/18/19 11:52
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 09/30/19 12:01
Units: ug/L
Analyzed: 10/03/19 10:31

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:22

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/19/19 16:00 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190918INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:22

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 09/25/19 08:45 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190923INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0961-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/23/19 14:09
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/21/19 10:00
Units: mg/L
Analyzed: 10/22/19 10:11

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.474**	Q	0.0050	0.0042

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Reported:
10/29/19 15:01

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received :	09/25/19 08:45 by Amber Royster
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190923INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

Q	Maximum holding time exceeded.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:01

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 09/25/19 08:45 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C: 3.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190923INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I0962-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/23/19 10:50
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/21/19 10:00
Units: mg/L
Analyzed: 10/22/19 10:12

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.475**	Q	0.0050	0.0042

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Reported:
10/29/19 15:01

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received :	09/25/19 08:45 by Amber Royster
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	3.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190923INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

Q	Maximum holding time exceeded.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 15:01

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 09/25/19 08:45 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190923INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I1000-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/23/19 10:50
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/02/19 14:30
Units: ug/L
Analyzed: 10/04/19 11:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**22.7**		0.50	
Chlorophyll-A (unco)	**27.9**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	**1.62**		0.50	
Pheophytin-A	**7.21**		0.50	

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Reported:
10/15/19 11:20

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 09/25/19 08:45 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190923INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:20

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 09/25/19 08:45 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190923INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: VIT
Lab Sample ID: **19I1002-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/23/19 14:09
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/02/19 14:30
Units: ug/L
Analyzed: 10/04/19 11:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**13.4**		0.50	
Chlorophyll-A (unco)	**14.7**		0.50	
Chlorophyll-B	**1.61**		0.50	
Chlorophyll-C	**1.76**		0.50	
Pheophytin-A	**1.60**		0.50	

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 09/25/19 08:45 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190923INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I1104-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 12:32
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/22/19 09:00
Units: mg/L
Analyzed: 10/22/19 16:53

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.130**		0.0050	0.0042

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Reported:
10/29/19 14:58

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/26/19 16:21	by Amber Royster
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:58

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19I1105-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 12:32
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/02/19 14:30
Units: ug/L
Analyzed: 10/04/19 11:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	**1.18**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/26/19 16:21	by Amber Royster
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I1106-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 15:15
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/22/19 09:00
Units: mg/L
Analyzed: 10/22/19 16:53

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.125**		0.0050	0.0042

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Reported:
10/29/19 14:58

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/26/19 16:21	by Amber Royster
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:58

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJ-11
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: CROOKED CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19I1107-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 15:15
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/02/19 14:30
Units: ug/L
Analyzed: 10/04/19 11:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**1.34**		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJ-11			Received : 09/26/19 16:21	by Amber Royster
Waterbody Name:	CROOKED CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: MFS
Lab Sample ID: **19I1108-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 11:54
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/22/19 09:00
Units: mg/L
Analyzed: 10/22/19 16:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.104**		0.0050	0.0042

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Reported:
10/29/19 14:58

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received : 09/26/19 16:21	by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:58

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL
Collected By: MFS
Lab Sample ID: **19I1109-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 11:54
Sample Fraction: Total
Chlorophyll volume filtered (ml): 200
Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H
Prepared: 10/02/19 14:30
Units: ug/L
Analyzed: 10/04/19 11:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	ND		0.50	
Chlorophyll-A (unco)	ND		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C:
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Notes and Definitions

ND Analyte NOT DETECTED at or above the method detection limit

* Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:19

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05
Received : 09/26/19 16:21 by Amber Royster
Waterbody Name: RACCOON CREEK
County: MARION
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190925INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19I1110-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/25/19 15:20
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/22/19 09:00
Units: mg/L
Analyzed: 10/22/19 16:54

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.101**		0.0050	0.0042

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Reported:
10/29/19 14:57

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received :	09/26/19 16:21 by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:57

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: OJF-05 Received : 09/26/19 16:21 by Amber Royster

Waterbody Name: RACCOON CREEK County: MARION Temperature C:

Funding Code: WP06 Monitoring Unit: TMDL

Trip ID: 20190925INHS Visit Number: 001 Monitoring Program: TMDL

Client Sample ID: CHLOROPHYLL Collected By: VIT Lab Sample ID: **19I1111-01**

Sample Medium: Water PWS Intake: Date/Time Collected: 09/25/19 15:20

Sample Fraction: Total Chlorophyll volume filtered (ml): 200 Sample Depth:

Chlorophyll by Standard Method 10200 H

Method: 10200 H Prepared: 10/02/19 14:30

Units: ug/L Analyzed: 10/04/19 11:14

Analyte	Result	Qualifier	Reporting Limit	MDL
Chlorophyll-A (corr)	**2.67**		0.50	
Chlorophyll-A (unco)	**0.59**		0.50	
Chlorophyll-B	ND		0.50	
Chlorophyll-C	ND		0.50	
Pheophytin-A	ND		0.50	

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Reported:
10/15/19 11:18

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	OJF-05			Received : 09/26/19 16:21	by Amber Royster
Waterbody Name:	RACCOON CREEK	County:	MARION	Temperature C:	
Funding Code:	WP06			Monitoring Unit: TMDL	
Trip ID:	20190925INHS	Visit Number:	001	Monitoring Program: TMDL	

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/15/19 11:18

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 10/02/19 11:00 by Amber Royster
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190930INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT
Lab Sample ID: **19J0087-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/30/19 11:18
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/22/19 09:00
Units: mg/L
Analyzed: 10/22/19 17:16

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.373**		0.0050	0.0042

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Reported:
10/29/19 14:57

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received :	10/02/19 11:00 by Amber Royster
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190930INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:57

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: O-07
Received : 10/02/19 11:00 by Scott Clark
Waterbody Name: KASKASKIA RIVER
County: CLINTON
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: TMDL
Trip ID: 20190930INHS
Visit Number: 001
Monitoring Program: TMDL

Client Sample ID: TOTAL
Collected By: VIT/MFS
Lab Sample ID: **19J0088-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 09/30/19 14:25
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 10/22/19 09:00
Units: mg/L
Analyzed: 10/22/19 17:18

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.377**		0.0050	0.0042

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Reported:
10/29/19 14:57

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	O-07			Received :	10/02/19 11:00 by Scott Clark
Waterbody Name:	KASKASKIA RIVER	County:	CLINTON	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	TMDL
Trip ID:	20190930INHS	Visit Number:	001	Monitoring Program:	TMDL

Notes and Definitions

ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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Reported:
10/29/19 14:57

Appendix C – Protection Plan Comments and Responses

< to be added following public meeting >