NUTRIENT ASSESSMENT REDUCTION PLAN

November 2024

SALINE BRANCH DRAINAGE DITCH

URBANA AND CHAMPAIGN SANITARY DISTRICT

NORTHEAST WASTEWATER TREATMENT PLANT

NPDES Permit No. IL0031500

PREPARED BY: NORTHWATER CONSULTING AND DONOHUE AND ASSOCIATES

PREPARED FOR: URBANA AND CHAMPAIGN SANITARY DISTRICT

TABLE OF CONTENTS

Cover page: Saline Branch Drainage Ditch looking downstream at site NEPD2

LIST OF ACROYNMS

ADF	Average Daily Flow
CFS	Cubic Feet Per Second
CWA	Clean Water Act
DAF	Design Average Flow
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
ECHO	Enforcement and Compliance History Online
FOIA	Freedom of Information Act
HUC	Hydrologic Unit Code
INLRS	Illinois Nutrient Loss Reduction Strategy
MGD	Million Gallons per Day
NARP	Nutrient Assessment Reduction Plan
NEP	Northeast Wastewater Treatment Plant
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NPS	Nonpoint Source
NWS	National Weather Service
NH_3	Ammonia
NO_3^-	Nitrate
NPDES	National Pollution Discharge Elimination System
P	Phosphorus
STEPL	Spreadsheet Tool for Estimating Pollutant Loads
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
UCSD	Urbana and Champaign Sanitary District
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

The Urbana and Champaign Sanitary District (UCSD) Northeast Wastewater Treatment Plant (NEP) has a design average flow of 17.3 MGD and discharges treated effluent to the Saline Branch Drainage Ditch, part of the Salt Fork Vermilion River watershed. The plant is subject to a Nutrient Assessment and Reduction Plan (NARP) Special Condition in its National Pollutant Discharge Elimination System (NPDES) permit. The NARP was triggered by historical Illinois EPA data indicating a risk of eutrophication downstream on the Salt Fork Vermilion River. UCSD undertook a water quality monitoring program on the Saline Branch with continuous sensors and grab samples for 9 months during 2022 and 2023 to better understand risk of eutrophication conditions relevant to NARP requirements.

No conditions indicating a phosphorus-related impairment have been observed in the Saline Branch downstream from the plant outfall. Low dissolved oxygen (DO) conditions are common upstream from the outfall, indicating that nutrient loading from nonpoint sources (NPS) are important contributors to water quality. However, the addition of treated effluent effectively eliminates the low DO condition downstream on the Saline Branch, and the risk of eutrophication or future phosphorus-related impairment remains low.

Extensive monitoring indicates risk of eutrophication and potential for future phosphorus impairment is low. Results indicate that the wastewater treatment plant (WWTP) does contribute a significant phosphorus load. However, data shows that risk of eutrophication is limited on the Saline Branch.

The UCSD's major investments and activities toward decreasing phosphorus loads will further reduce the already low risk of eutrophication and the probability of a future impairment, satisfying the NARP special permit condition. The Northeast WWTP is planning an estimated $71,000,000 in improvement projects through 2033. The proposed improvements will decrease current effluent average phosphorus concentrations of 2.0 mg/L to meet an effluent limit of 0.5 mg/L (annual geometric mean), which represents a 75% reduction in potential phosphorus loading to the Saline Branch.

The demolition of the nitrification towers included in the improvement project is anticipated to reduce effluent pH from its current level near 7.9 to be closer to 7.0. These effluent chemistry improvements are expected to result in positive impacts on water quality and lower eutrophication risk in the Saline Branch. UCSD also supports NPS nutrient reductions through participation in and financial support of a local watershed group, and through ecosystem restoration as part of its capital improvements program.

Summary of Monitoring Program Results:

- Continuous monitoring and grab sampling occurred over two periods covering 9 months in 2022 and 2023.
- Monitoring took place at one site upstream from the WWTP outfall (NEP-U), and one site downstream (NEP-D).
- Continuous monitoring identified DO below the instantaneous water quality standard 31% of monitored days upstream of the plant and 2% downstream of the plant.
- The addition of treated effluent to the stream effectively eliminates the low DO issue downstream.

- Without addition of effluent, the Saline Branch would likely continue to experience the upstream water quality issues much further downstream.
- Continuous monitoring identified limited risk of eutrophication downstream of the plant (11% of monitored days), and no days upstream.
- Monitoring indicates risk of eutrophication and risk for future phosphorus-related impairment is extremely low on the Saline Branch.

Watershed Conditions and Phosphorus Loads

- The watershed consists primarily of agricultural and urban land uses and is comprised of three twelve-digit Hydrologic Unit Code (HUC-12) subwatersheds.
- Plant effluent monitoring and NPS modeling indicates the current annual loading of phosphorus to the watershed is approximately 97,878 lbs/yr.
    - The WWTP contributes 57,641 lbs/yr. (59% of Total).
    - Nonpoint sources contribute 40,237 lbs/yr. (41% of Total).
- The Saline Branch is highly channelized throughout its length and apart from headwater reaches has an adequate riparian buffer and canopy cover.
- Upstream impairments indicate a phosphorus issue unrelated to the WWTP.

UCSD NARP Actions:

- UCSD has consistently worked to optimize operations and achieve phosphorus reductions beyond those required in discharge permits. Since 2011 (the Illinois Nutrient Loss Reduction Strategy baseline year), the NEP has reduced P loadings by 50%.
- Proposed upgrades will allow the plant to meet a total phosphorus (TP) effluent limit of 0.5 mg/L by 2035, further reducing the load to the Saline Branch and resulting in downstream water quality improvements.
- After upgrades it is estimated that the annual effluent phosphorus load will be 13,872 lbs/yr, a 75% decrease from the 2020-2023 average load, and an 87% decrease from the 2011-2015 average before UCSD voluntarily and proactively optimized the plant's treatment process to achieve partial biological P removal.
    - Capital upgrades including full biological P removal meeting the new effluent limit will reduce the point source share of the watershed phosphorus load from the current 41% to 26%. Phosphorus from other sources will then account for 74% of the total loading.
- The UCSD actively participates in a local watershed group, which is exploring an application to Illinois EPA for a 604(b) watershed planning grant and a Section 319 watershed implementation grant focused on the Saline Branch Drainage Ditch. This effort, which UCSD will support, will reduce NPS nutrients and sediment.
- UCSD has recently applied for a 319 grant for a bank stabilization project for the portion of the Saline through the Northeast Plant.
- UCSD will continue to participate in stream restoration and stabilization efforts as part of its capital improvements program as opportunities arise.
    - For example, watershed remediation funds were directed toward stream restoration at Anita Purves Nature Center. Additional funds will be dedicated toward restoration projects. The Salt Fork Watershed Group is also working to do additional restoration.

- UCSD plans to continue monitoring of the Saline Branch upstream and downstream of the plant outfall periodically to observe water quality and risk of eutrophication changes as upgrades are brought online.
    - Monitoring will be targeted to periods before, during and after plant operational changes to confirm that effluent chemistry improvements are lessening the risk of eutrophication and potential for future phosphorus-related impairment.
    - Continuous monitoring during the growing season, similar to the monitoring program presented in this report will be prioritized.

Stakeholder Engagement and Involvement:

- UCSD staff and consultants have presented and requested feedback and discussed the NARP at multiple meetings of the Salt Fork Watershed Group. Below are highlights, with a full list of meetings in Appendix D:
    - 06 June 2022 – Presented general background on NARP requirements, proposed monitoring plan, requested feedback and discussion.
    - 03 March 2023 – Presented 2022 monitoring results, shared preliminary conclusions and an overview of continued monitoring. Requested feedback and discussion.
    - 07 March 2024 – Presented monitoring results from 2022 & 2023. Shared preliminary conclusions and the NARP strategy and actions. Requested feedback and discussion on results and activities toward NARP compliance.
- Staff and consultants of the UCSD have presented at the monthly Board of Trustees public meetings on numerous occasions. Highlights include:
    - 03 January 2023 – Presented 2022 monitoring data and preliminary findings from 6 months of monitoring. Presented an overview of next steps toward NARP compliance and a plan for continuing monitoring.
    - 05 March 2024 – Presented results of 2022 and 2023 monitoring data. Discussed key takeaways and presented a preliminary strategy toward NARP compliance activities.
    - 07 November 2024 – Presented a final NARP report to Board of Trustees at public meeting.
    - 05 December 2024 – Present final NARP report to Salt Fork Watershed Group at quarterly meeting.
- UCSD regularly updates a NARP section on its public website, www.u-csd.com/207/UCSD-Projects.

1. INTRODUCTION & BACKGROUND

In 2018, the Illinois EPA instituted nutrient reduction permit requirements applicable to WWTPs with effluent discharges greater than 1-million gallons per day (MGD). The nutrient reduction approach for WWTPs supports a pathway to establish site-specific permit limits for phosphorus at each facility that requires them, in lieu of instituting a statewide limit. The NARP requirement resulted from negotiations with environmental organizations, Illinois EPA, and the Illinois Association of Wastewater Agencies. A copy of the current NPDES Permit for the SWP is included in Appendix C.

A NARP Special Permit Condition is now included in a NPDES permit if a receiving stream segment or downstream segment is on the Illinois Clean Water Act (CWA) 303(d) list as impaired with phosphorus-related causes or if there is a "risk of eutrophication" as defined by meeting any of the three conditions outlined in Table 1. The NARP requirement is in the NEP NPDES permit due to the risk of eutrophication criterion.

Table 1 - Illinois EPA Risk of Eutrophication Criteria

Risk of Eutrophication if any of these Conditions Met:		
pH	**Median Sestonic Chlorophyll α**	**On any Two Days During Illinois EPA Monitoring Week, Daily Max**
> 9	> 26 µg/L	pH > 8.35 and DO saturation > 110%

Whether the NARP special permit condition is triggered by a CWA 303(d) impairment listing, or eutrophication risk criteria, the designation is based on limited data. For example, the risk of eutrophication justification for sites is based on only two non-consecutive weeks of continuous DO and pH data collection performed by the Illinois EPA. In some cases, the data is over 10 years old.

For sites where actual impairment has not been found, the NPDES permittee should undertake additional data collection and assessment, which can confirm or refute the NARP triggering conditions, or determine if the watershed does not have a phosphorus-related impairment or risk of eutrophication. If sufficient evidence indicates no impairment or risk of eutrophication, it is possible that phosphorus regulation and mitigation measures may not be necessary. The following actions have been proposed to comply with the NARP permit condition for UCSD's NEP:

- Examine if sufficient data exists to fully characterize a phosphorus-related impairment or assess risk of a future impairment in the receiving watershed.
    - If data is insufficient, create a water quality monitoring plan and collect data.
- If existing or new data indicates phosphorus-related impairment is present, potential steps include:
    - Undertake watershed characterization.
    - Model watershed and instream processes.
    - Establish defensible site-specific water quality criteria.
    - Define scenarios and strategies to achieve water quality targets.
    - Implement NARP recommended actions and engage stakeholders.

This report constitutes the NARP for the UCSD Northeast WWTP and provides details of the monitoring program implemented to support the NARP. Section 2 provides an overview of the NARP's water quality triggers. Section 3 describes the monitoring program, methods, and results with interpretation at the end of the section. Section 4 presents the NARP and a Work Plan following a watershed characterization.

1.1 TREATMENT PLANT BACKGROUND

UCSD owns and operates the Northeast WWTP with a design average flow (DAF) of 17.3 MGD located in the City of Urbana in Champaign County (NPDES Permit No. IL0031500). There has been some form of sewage treatment taking place at the site since the mid-1890s. The current facility went into service in 1924, with major expansions in the 1950s, from 1977 to 1982, and from 2002 through 2012. It serves a population of over 103,000 with notable users including the University of Illinois, a large food manufacturer, and a large automotive parts manufacturer. Treatment consists of excess flow treatment, screening, grit removal, primary clarifiers, trickling filtration, activated sludge, nitrification towers, secondary clarification, filtration, and disinfection. The WWTP discharges to the Saline Branch Drainage Ditch, a small to mid-size urban creek that is characterized with seven-day once in ten-year low flow (7Q10) of 2.4 cubic feet per second (CFS). The stream is tributary to Salt Fork Vermilion River which joins Middle Fork Vermilion River to form the Vermilion River at that point. The Northeast WWTP is subject to a NARP special permit condition with a deadline of December 31, 2024 (Appendix C).

2. NARP TRIGGERS & ACTIONS

The plant discharges to Saline Branch Drainage Ditch segment IL_BPJC-06. According to the 2020 NPDES permit renewal (attached in Appendix C), the NARP special condition was triggered by historical data indicating a risk of eutrophication on segment IL_BPJ-09 of the Salt Fork Vermilion River (Table 2), over 11 miles downstream from the outfall with a catchment of 238 mi^2 (Figure 1). This segment is after the confluence of the Saline Branch and Salt Fork Vermilion River and is also influenced by the discharge from the Rantoul WWTP. Data supporting the risk of eutrophication designation that triggered the NARP was limited and considered inadequate to fully understand the extent and magnitude of the risk of eutrophication or phosphorous related impairment. Illinois EPA data on IL_BPJC-06, the segment to which the NEP discharges, did not show risk of eutrophication, nor a phosphorus impairment. The available data is not conclusive in showing that the WWTP is the dominant contributor to the threshold exceedances, especially considering the size of the watershed at BPJ-09.

Table 2 – Illinois EPA Risk of Eutrophication Trigger Data

Site	Description	Continuous Monitoring Duration	Days Exceeding DO & pH Threshold	Days Exceeding 9.0 pH Standard	Sestonic Chlorophyll α Samples	Sestonic Chlorophyll α Median
BPJ-09	Salt Fork Vermilion River	2 weeks in 2011 2 weeks in 2016	2 days in 2011 0 in 2016	0	4 in 2011 3 in 2016	1.78

Data mining was undertaken using publicly available sources to compile any other informative and relevant nutrient, DO, pH or chlorophyll data. Three sites with potentially relevant data were identified in the study area; however, they were all downstream of the outfall and had only intermittent grab sampling not conducive to understanding the risk of eutrophication (Figure 2). With only limited data available, a water quality monitoring plan was created, presented to the Illinois EPA (Appendix A) and executed to further evaluate the risk of eutrophication and guide the NARP process.

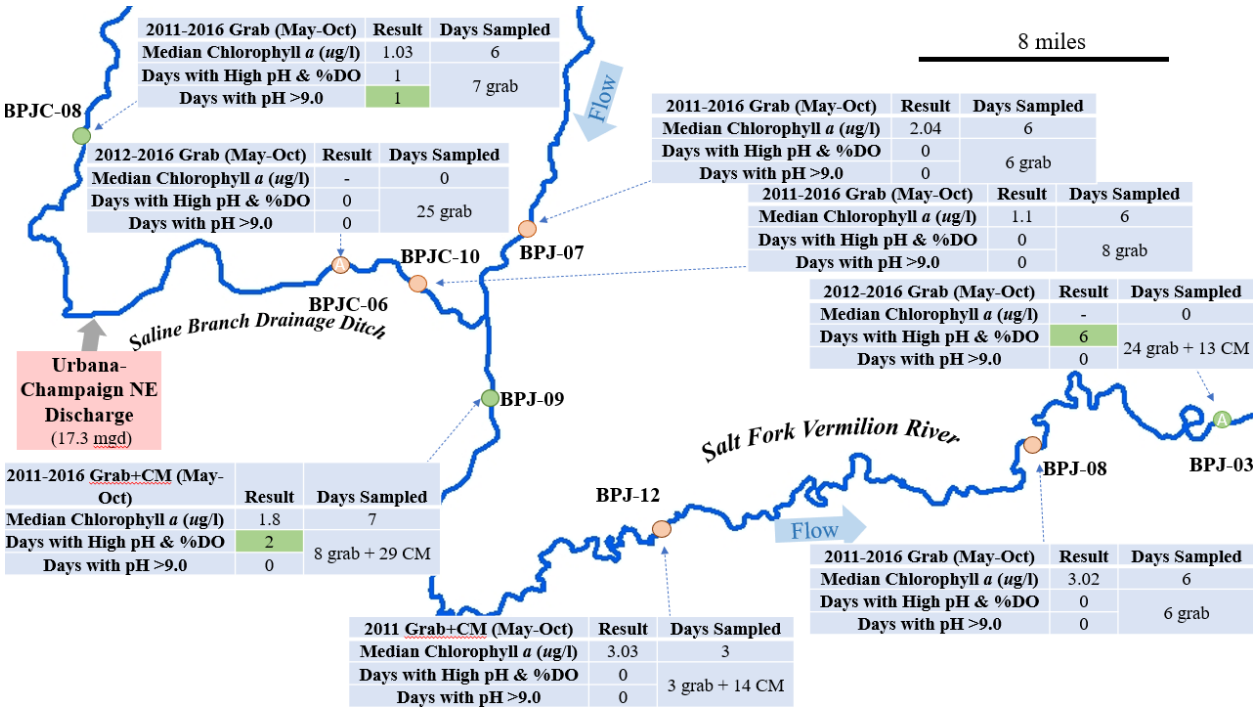


Figure 1 - Illinois EPA Risk of Eutrophication Map

Saline Branch looking downstream

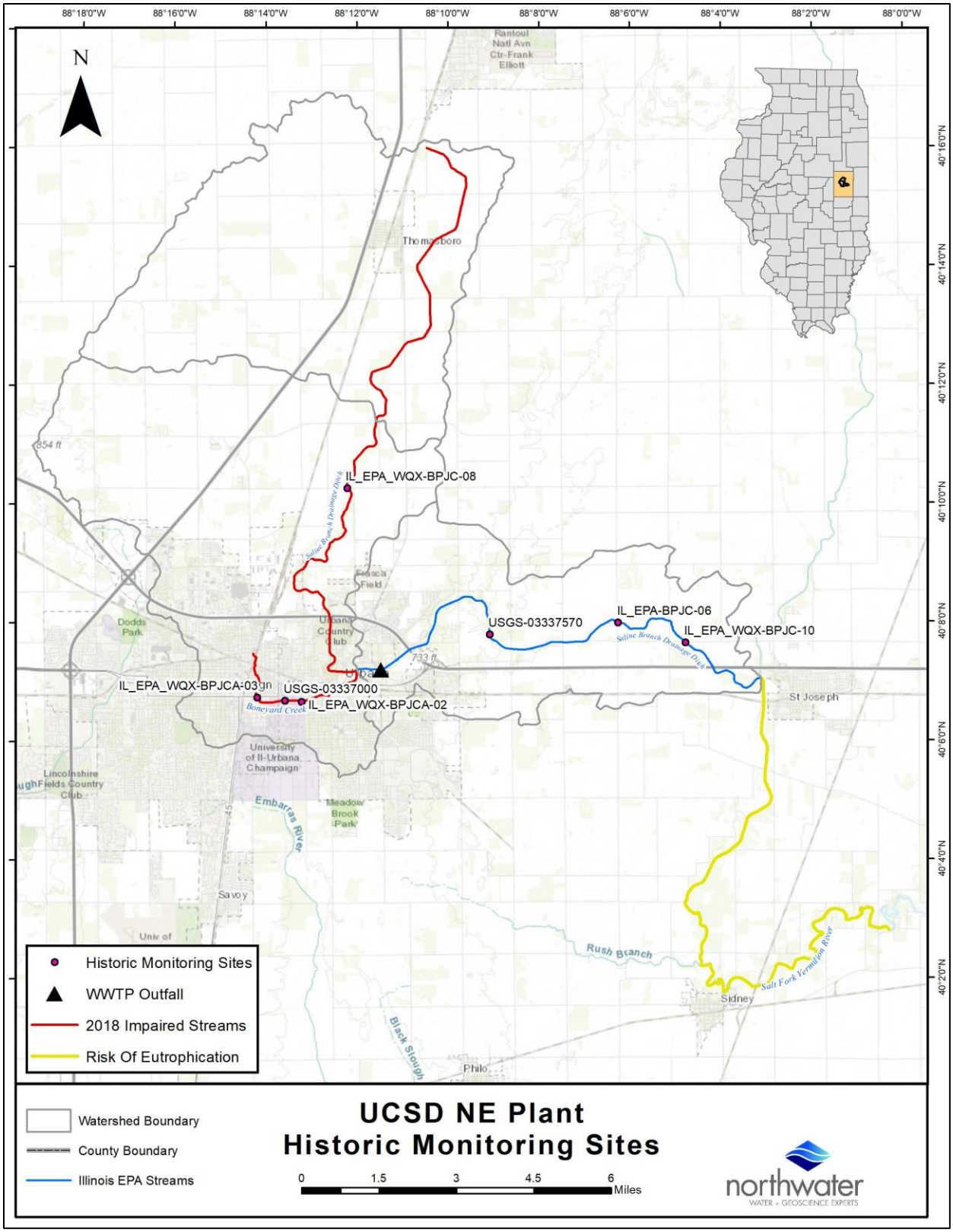


Figure 2 - Historic Monitoring Site Locations, Impaired Stream Segments and Risk of Eutrophication Segment

3. WATER QUALITY MONITORING PROGRAM & RESULTS

Based on the monitoring plan, the program was carried out with three main objectives:

1. Confirm or contest if there is significant ongoing risk of eutrophication that could lead to Illinois EPA determining there is a phosphorus-related impairment in the Saline Branch associated with the WWTP's discharge.
2. Improve understanding of nutrient dynamics and water quality to inform next steps of the NARP, including potential for establishment of site-specific phosphorus limits and/or phosphorus input reductions.
3. Provide data to guide equitable implementation of nutrient reduction measures among contributors if the NARP identifies such reductions are necessary to protect water quality and eliminate the risk of eutrophication conditions that could lead to Illinois EPA determining there was a phosphorus-related impairment.

The UCSD retained Donohue and Associates and Northwater Consulting to develop the monitoring plan and support implementation of the monitoring program. The NARP and Work Plan presented in Sections 4.2 and 4.3 are guided by the monitoring results and are the foundation of next steps in the NARP process.

3.1 NARP MONITORING STATIONS & INFRASTRUCTURE

Upstream of the outfall, Saline Branch Drainage Ditch is a small to mid-size stream with a watershed that is predominantly agricultural with a portion of high-density urban landuse. Throughout most of its length, it is a highly channelized drainageway with adequate, well-vegetated riparian areas and canopy cover except for upstream reaches where buffers are inadequate. The Salt Fork Vermilion River, below its confluence with the Saline Branch is similarly channelized, though the riparian buffer is diminished.

Monitoring was designed in an upstream/downstream configuration. The upstream site was established close to the outfall to capture the influence of as much of the watershed as possible before the addition of treated effluent. The downstream site was located far enough away to ensure that the immediate impacts to the Saline Branch from treated effluent were captured, while minimizing the amount of downstream watershed influence (Figure 3). The monitoring program focused on the Saline Branch Drainage Ditch and not the Salt Fork Vermilion River that Illinois EPA data indicated was at risk of eutrophication, as the Salt Fork has a large watershed of 238 mi^2 and receives effluent from the Village of Rantoul WWTP, approximately 20 miles upstream on a tributary separate from the Saline Branch that receives effluent from the NEP.

Data collection began May 2022 and continued through October 2022. (Table 3). Due to abnormally low flows and several short data gaps due to instrument malfunction and fouling from sediment, three additional months of monitoring were completed in July-September 2023.

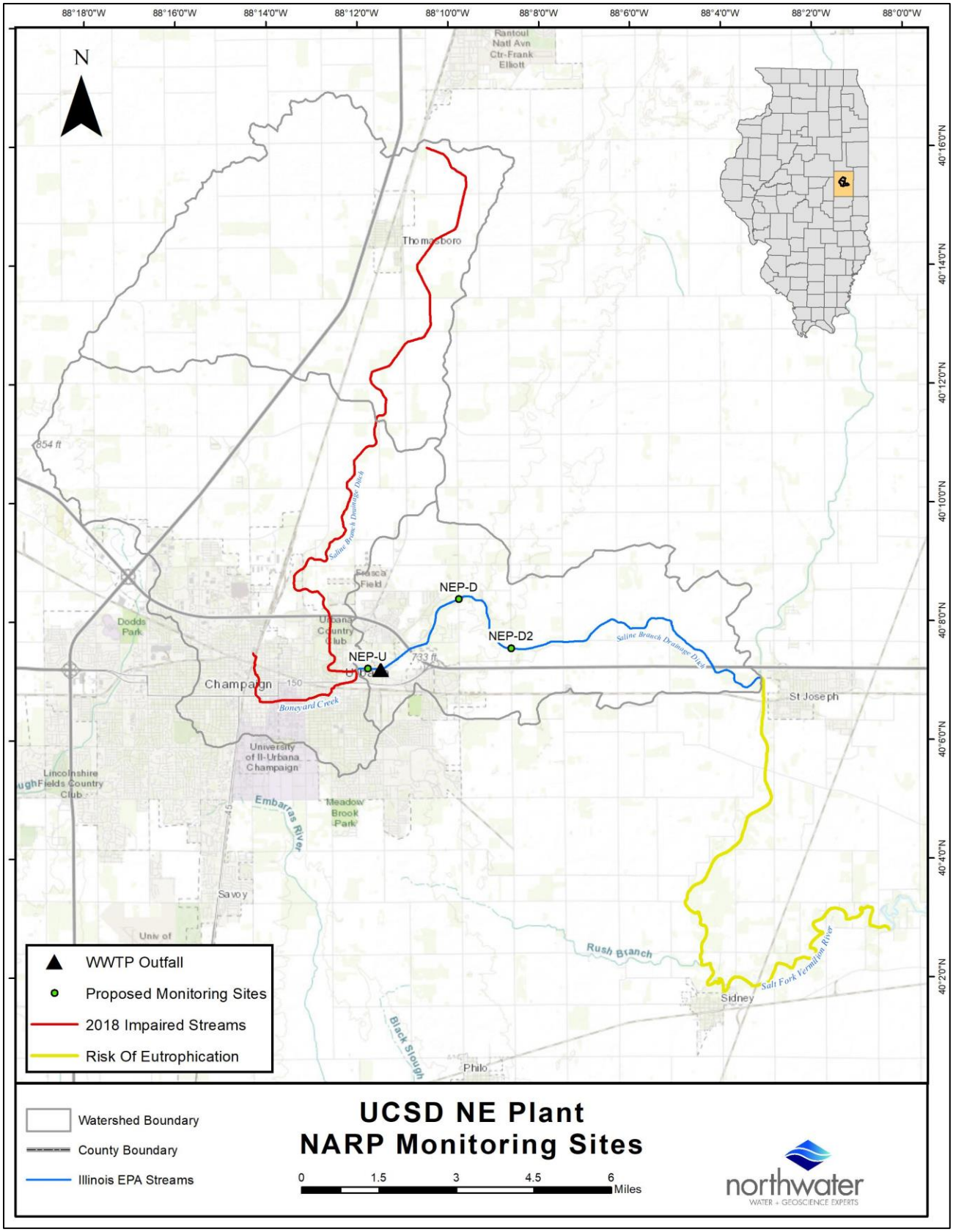


Figure 3 - NARP Monitoring Locations

Table 3 – NARP Monitoring Stations

Station ID	Name	Lat/Long (decimal degrees)	Approximate Distance from Outfall (mi)	Watershed area (mi^2)	Type of Sampling	Monitoring Periods
NEP-U	Saline Branch Drainage Ditch Upstream	40.125825, -88.143769	0.25 (upstream)	67.3	Continuous, Biweekly Grab	May - October 2022 & July - September 2023
NEP-D*	Saline Branch Drainage Ditch Downstream	40.31240, -88.11739	3.9 (downstream)	75.0	Continuous, Biweekly Grab	May - October 2022 & July - September 2023

*The original NEP-D site was discontinued in June 2022 due to loss of access and the site was moved downstream 1.7 miles (shown as "NEP-D2" in Figure 3). Analysis of concurrent monitoring showed that the two sites exhibited similar water quality conditions. Thus, the data from the original site and replacement site were combined into one record and are referred to as "NEP-D" throughout this report.

3.2 MONITORING PERIOD & METHODS

Sampling parameters were selected to be directly responsive to the NARP triggering criteria, with a combination of continuous monitoring, spot checks with handheld meters and grab samples submitted for lab analysis. Table 4 summarizes all parameters and other details including methods and sampling frequency. Continuous data collection stations included temporarily deployed infrastructure to facilitate use of water quality sondes. Sondes were placed in 3" perforated PVC pipes that extended from the bank as close as practical to the channel thalweg or were placed vertically in perforated PVC pipes affixed to a permanent structure. The sondes were positioned so that they were in flowing water and not influenced by stagnant or non-flowing backwater conditions.

Continuous Monitoring

- In-Situ Inc. AquaTroll 500 multiparameter continuous monitoring sondes with anti-fouling wiper, internal logging, and battery deployed at both stations.
    - Bi-weekly site visits to download data, calibrate and maintain the sensors and infrastructure. All instrument calibrations and maintenance followed manufacturer's recommended practices and calibration logs were saved.
- The sondes were equipped with pH, DO, temperature, conductivity, and chlorophyll α optical fluorescence sensors. The sondes also included pressure transducers to record water height/stage.
- Data collection frequency was every 15 minutes to enable the capture of daily maxima and minima of parameters such as pH and DO saturation and concentration, which is relevant to Illinois EPA eutrophication risk criteria.

- Chlorophyll α optical fluorescence data was collected to better understand its occurrence and variability through the monitoring period as it is a eutrophication risk criterion (median of 26 µg/L is the NARP threshold). The sensor data is considered a qualitative measurement and not reliable to make conclusive determinations of NARP triggers.

Spot Checks and Field Water Quality Data

- Water quality spot checks were performed bi-weekly for DO, pH, temperature, conductivity, and turbidity using calibrated handheld water meters (YSI ProQuatro and YSI ProDSS).
- Flow was measured bi-weekly at all sites using a measuring tape, top set wading rod and Hach FH-950 electromagnetic flowmeter. The United States Geological Survey (USGS) midsection method was applied to measure flows.
- The USGS also operates a stream gage that measures discharge on the Saline Branch near the downstream site.
- Spot checks, flow measurement, and instrument calibration were performed by Northwater Consulting.

Laboratory Analysis

- Nutrient grab samples were collected by WWTP staff on a bi-weekly schedule at all stations.
- Parameters included TP, orthophosphate, and chlorophyll α.
- Nitrogen analysis was added in 2023 and included total nitrogen (TN), ammonia (NH_3) and nitrate (NO_3^-) (Table 4).
    - Nitrogen analysis supports an improved understanding of in-steam chemistry processes.
- Laboratory analysis for nutrients was performed by WWTP staff in-house. Chlorophyll α was sent to an accredited contract laboratory (Pace Analytics, Peoria, IL) for analysis.

WWTP Effluent

Effluent data is collected as part of the Illinois EPA-required Discharge Monitoring Report (DMR). Parameters relevant to the NARP study include daily discharge and TP which is monitored twice weekly.

- The average effluent flow was 7.07 MGD during the 2022 monitoring period and 6.1 MGD in 2023.
- The average TP concentration in twice-weekly effluent samples was 1.9 mg/L during the 2022 monitoring period and 2.38 mg/L in 2023.

Table 4 - Water Quality Monitoring Parameters and Methods

Parameter	Collection Type	Frequency	Method	Method Identifier	Sonde Calibration Method
Dissolved Oxygen (saturation and concentration)	Continuous Probe	Continuous	Optical	YSI: ASTM D888-09	100% Air Saturation
	Handheld Meter	Weekly	Membrane Electrode	SM 4500-O G	-
pH	Continuous Probe	Continuous	Potentiometric	EPA 150.2	2 Point 7 & 10 pH

Parameter	Collection Type	Frequency	Method	Method Identifier	Sonde Calibration Method
	Handheld Meter	Weekly	Potentiometric	SM 4500 H^+ B	-
Water Temperature	Continuous Probe	Continuous	Thermistor	EPA 170.1	Factory Calibration
	Handheld Meter	Weekly	Thermistor	SM 2550	-
Chlorophyll-α	Grab	Weekly	Lab Spectrophotometric	SM 10200H	-
Total Phosphorus	Grab	Weekly	Colorimetry	SM 4500 P E	-
Orthophosphate	Grab	Weekly	Colorimetry	SM 4500 P E	-
Ammonia	Grab	Weekly	Ion Selective Electrode	SM 4500 NH_3 D	-
Nitrate	Grab	Weekly	Colorimetry	HACH 10206	-
Total Nitrogen	Calculated	-	-	-	-
Conductivity	Continuous Probe	Continuous	Resistor Network	EPA 120.1	1 Point 1,413 µS/cm
	Handheld Probe	Weekly	Resistor Network	SM 2510	-
Turbidity	Continuous Probe	Continuous	Optical	ASTM D7315-07a	3 point NTU
	Grab	Weekly	Optical	SM 2130	-

3.3 MONITORING RESULTS

This section presents results of the monitoring program and is organized based on site and relevant parameters.

STREAMFLOW & PRECIPITATION

Figure 4 presents a summary of flow at the USGS station on the Saline Branch Drainage Ditch during the monitoring period compared to the 2009-2023 monthly average. Every month during the monitoring period was below the long-term average, with June 2022 and 2023 being particularly dry at 29% and 20% of normal, respectively. Across the entire study, the hydrology and river flow were more significantly driven by WWTP effluent than is typical. These conditions likely had an impact on water quality.

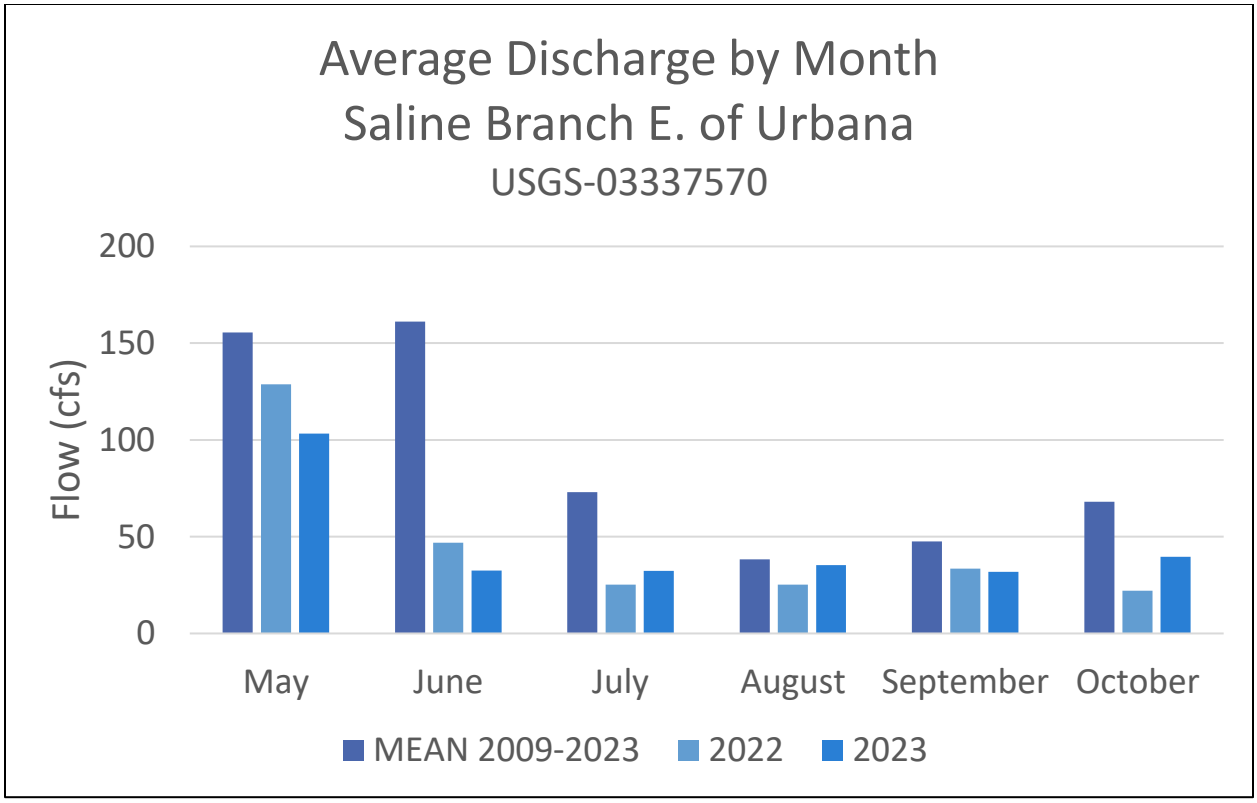


Figure 4 - Monthly Average Discharge at USGS-03337570, Saline Branch East of Urbana

SESTONIC CHLOROPHYLL A – UPSTREAM AND DOWNSTREAM SITES

Boxplots of chlorophyll α results are shown in Figure 5 and were typically low throughout the monitoring period at all sites (n=20). They are typically far below the median 26 µg/L risk of eutrophication threshold.

- The upstream site (NEP-U) has the highest median concentration and highest upper quartile range between the two monitoring sites, though results are similar at the two sites.
- There was one elevated result at the downstream site (NEP-D) on 31 August 2022 with a concentration of 28 µg/L.
- Overall, laboratory results are low with medians well below risk of eutrophication thresholds. This is expected in small to mid-size streams with perennial baseflow conditions and indicates that sestonic algae concentrations are not symptomatic of a phosphorus impairment or risk of eutrophication in the Saline Branch.

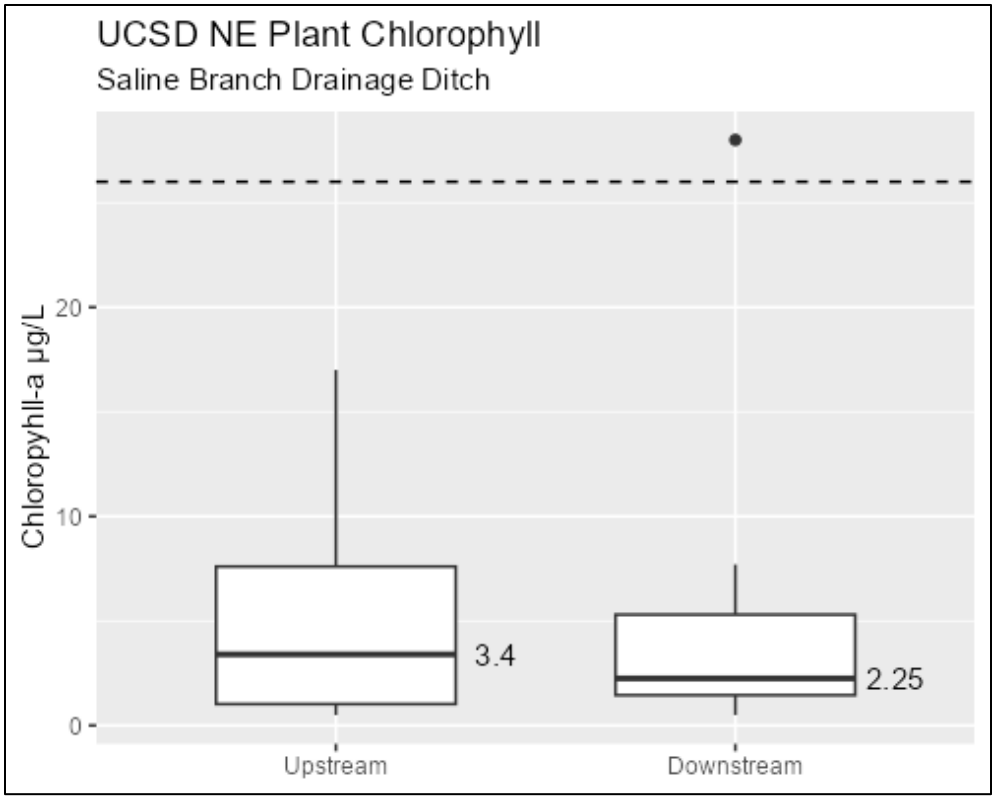


Figure 5 - Chlorophyll α Results (presented as box plots with sample medians annotated)

SALINE BRANCH UPSTREAM (NEP-U) – DO, pH, PHOSPHORUS

NEP-U Key Takeaways:

- This station is upstream and outside of influence from plant effluent.
- There were 241 days of continuous monitoring in 2022 and 2023.
- Dissolved oxygen concentration was recorded below the March - July 5.0 mg/L instantaneous water quality standard on 59 of 109 days monitored. It was below the August - February 3.5 mg/L standard on 15 of 132 days monitored, for a combined 31% of monitoring days below the standard.
- Eutrophication risk conditions were not observed based on the, DO + pH criteria, pH > 9 criteria, nor the sestonic chlorophyll α criteria of median >26 µg/L.
- Total phosphorus increases during high flow events.
- The DO concentration data indicates there are nutrient issues in the Saline Branch upstream of the WWTP outfall, and that NPS are a contributor of nutrient loads.

The Saline Branch upstream of the plant was monitored with in-situ sensors from May-October 2022 and July-September 2023. There were 241 days with continuous DO and pH data. Grab samples for TP (n=22) and chlorophyll α (n=20) were collected approximately every two weeks. Phosphorus grab sample results and continuous monitoring of DO saturation, DO concentration and pH are illustrated in Figure 6. Flow at the downstream USGS gauge is included for reference. In 241 days of monitoring across 2022 and 2023, the stream experienced no exceedances of the DO >110% + pH >8.35 risk of eutrophication criteria (Table 5).

While monitoring data showed no eutrophication risk based on the DO + pH criteria, there is evidence that the stream experiences nutrient enrichment prior to the discharge of treated effluent from plant outfall. Dissolved oxygen fell below the instantaneous water quality standard of 5.0 mg/L from March through July on 59 of 109 days monitored, and below the standard of 3.0 mg/L from August through February on 15 of 132 days. The lowest concentration measured was 1.1 mg/L on 3 July 2023.

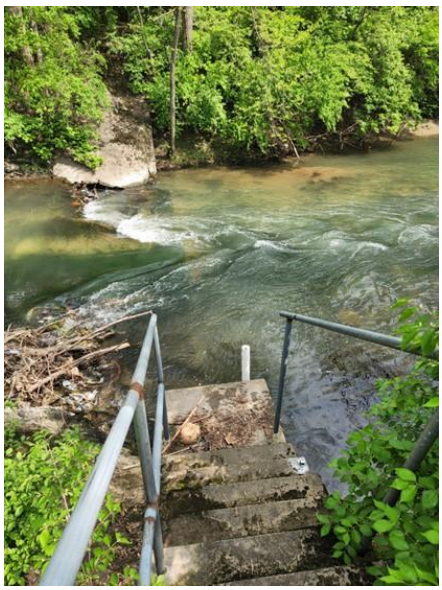
Table 5 - NEP-U Risk of Eutrophication Summary

Days with Continuous Monitoring	Median Daily Maximum	# of Days (%) Exceeding the Risk of Eutrophication Criteria (8.35 pH + 110% DO)	# Days (%) Exceeding the Minimum DO Water Quality Standard (5.0 Mar-July; 3.5 Aug-Feb)
241	94% (DO Saturation) 7.85 (pH)	0 (0%)	74 (31%)

As expected in a small stream with consistent baseflow, sestonic chlorophyll α levels are low relative to the median 26 µg/L threshold (Figure 5), with a median concentration (n=20) of 3.4 µg/L and a maximum of 17 µg/L. However, periphyton, or attached algae was frequently observed.

There is phosphorus available in the stream (Figure 6) from NPS, with a median concentration of 0.1 mg/L and a maximum of 0.26 mg/L (n=22). Samples collected during high discharge events showed elevated concentrations, indicating most of the load is delivered during runoff events. During high flow events, the diel DO and pH ranges are immediately reduced, then gradually return to a higher amplitude over a series of days. This pattern is an indication that high NPS nutrient loads are occurring during storms, and that algal biomass and respiration is increasing with time because of the additional nutrients. An example of this phenomenon was observed during storms in July 2023 as illustrated in Figure 6.

Nitrogen was analyzed to support future analysis. The median ammonia nitrogen concentration was 0.10 (n=7), median nitrate was 0.63 mg/L (n=7), and median total Kjeldahl nitrogen was 1.2 mg/L.



Site NEP-U during normal flow conditions.

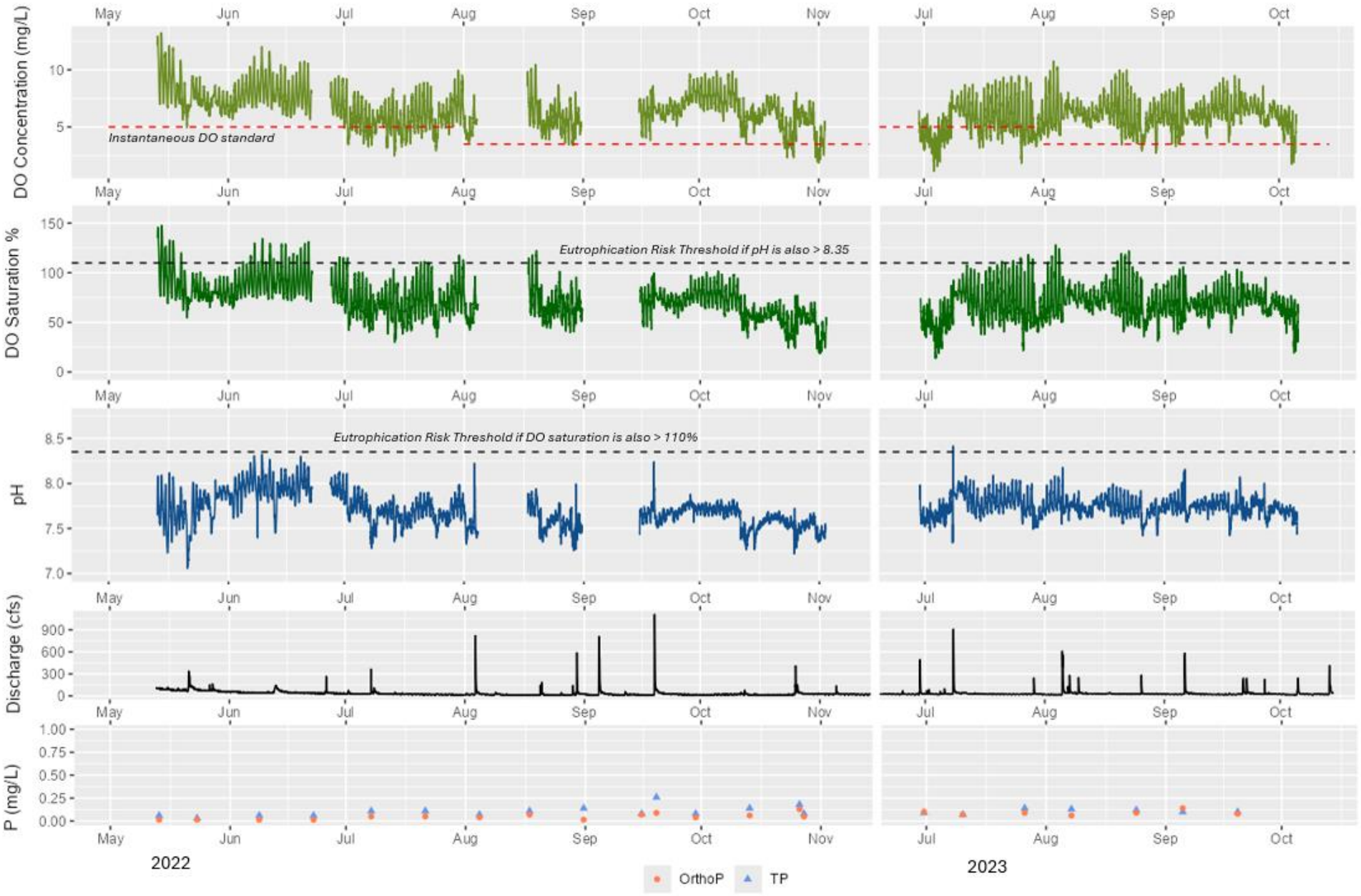


Figure 6 – NEP-U Grab Samples and Continuous Monitoring Results

SALINE BRANCH DOWNSTREAM (NEP-D) – DO, pH, PHOSPHORUS

NEP-D Key Takeaways:

- This station is 3.9 miles downstream of the outfall.
- There were 216 days of continuous monitoring in 2022 and 2023.
- Dissolved oxygen concentration was recorded below the March - July 5.0 mg/L instantaneous standard on 4 of 106 days monitored and below the August - February 3.5 mg/L standard on 0 of 110 days monitored (combined 2% of days).
- Eutrophication risk conditions were observed based on the, DO + pH criteria:
    - 24 of 216 days (11%).
- Eutrophication risk conditions were not observed based on the pH > 9 criteria, nor the sestonic chlorophyll α criteria of median >26 µg/L.
- Data indicates that the addition of treated effluent to the stream improves DO, nearly eliminating the low DO conditions observed upstream.

The Saline Branch 3.9 miles downstream of the plant was monitored with in-situ sensors from May - October 2022 and July - September 2023. There were 216 days with continuous DO and pH data. Grab samples for TP (n=22) and chlorophyll α (n=20) were collected approximately every two weeks. Phosphorus grab sample results and continuous monitoring of DO saturation, pH and flow are illustrated in Figure 7. In 216 days of monitoring across 2022 and 2023, the stream experienced 24 days (11%) where the maximum DO and pH exceeded the DO >110% + pH >8.35 risk of eutrophication criteria (Table 6).

Early in the monitoring period, on 22 June 2022, the NEP-D site was moved 1.7 miles downstream due to demolition and reconstruction of the bridge at the original monitoring site. Four samples over several weeks were collected to assess if there were systematic differences in water quality at the two locations. The average absolute difference in measured DO, pH and TP respectively at each site was 0.59 mg/L, 0.08 and 0.05 mg/L. The results did not vary up or down systematically, and the average difference in DO concentration was increased by one sample that showed a 1.5 mg/L variation. Physically, the sites were observed to be similar, with similar canopy cover, riparian buffer, and substrate. Based on these observations and samples, the data at the two sites were combined into a single record for analysis.

As expected in a small stream with consistent baseflow, sestonic chlorophyll α levels are low relative to the median 26 µg/L threshold (Figure 5), with a median concentration (n=20) of 2.25 µg/L and a maximum of 28 µg/L. Excessive periphyton growth, which is an indicator of eutrophication or phosphorus impairment in a stream of this size, was not observed in this downstream reach.

There is phosphorus available in the stream (Figure 7) from both point sources and NPS, with a median concentration of 0.85 mg/L and a maximum of 2.02 mg/L (n=32). Effluent contributes to increased phosphorus concentrations at this site. Phosphorus tends to be depressed during high flow events at NEP-D, indicating dilution from increased creek flows, however TP loads increase during runoff due to the higher volume of water.

Monitoring data showed limited eutrophication risk based on the DO + pH criteria, with only 10% of monitoring days exceeding the thresholds at this site. During only 4 of 216 monitoring days (2%) did the daily low DO measurement exceed the instantaneous standard. Each exceedance occurred during a runoff

event when NPS pollutants are expected to increase, indicating point source phosphorus is not the dominant contributor.

Nitrogen was analyzed to support future analysis if necessary. The median ammonia nitrogen concentration was 0.09 (n=7), median nitrate was 14.1 mg/L (n=7), and median total Kjeldahl nitrogen was 1.0 mg/L.

Table 6 – NEP-D Risk of Eutrophication Summary

Days with Continuous Monitoring	Median Daily Maximum	# of Days (%) Exceeding the Risk of Eutrophication Criteria (8.35 pH + 110% DO)	# Days (%) Exceeding the Minimum DO Water Quality Standard (5.0 Mar-July; 3.5 Aug-Feb)
216	102% (DO Saturation) 8.1 (pH)	24 (11%)	4 (2%)

Site NEP-D looking downstream.

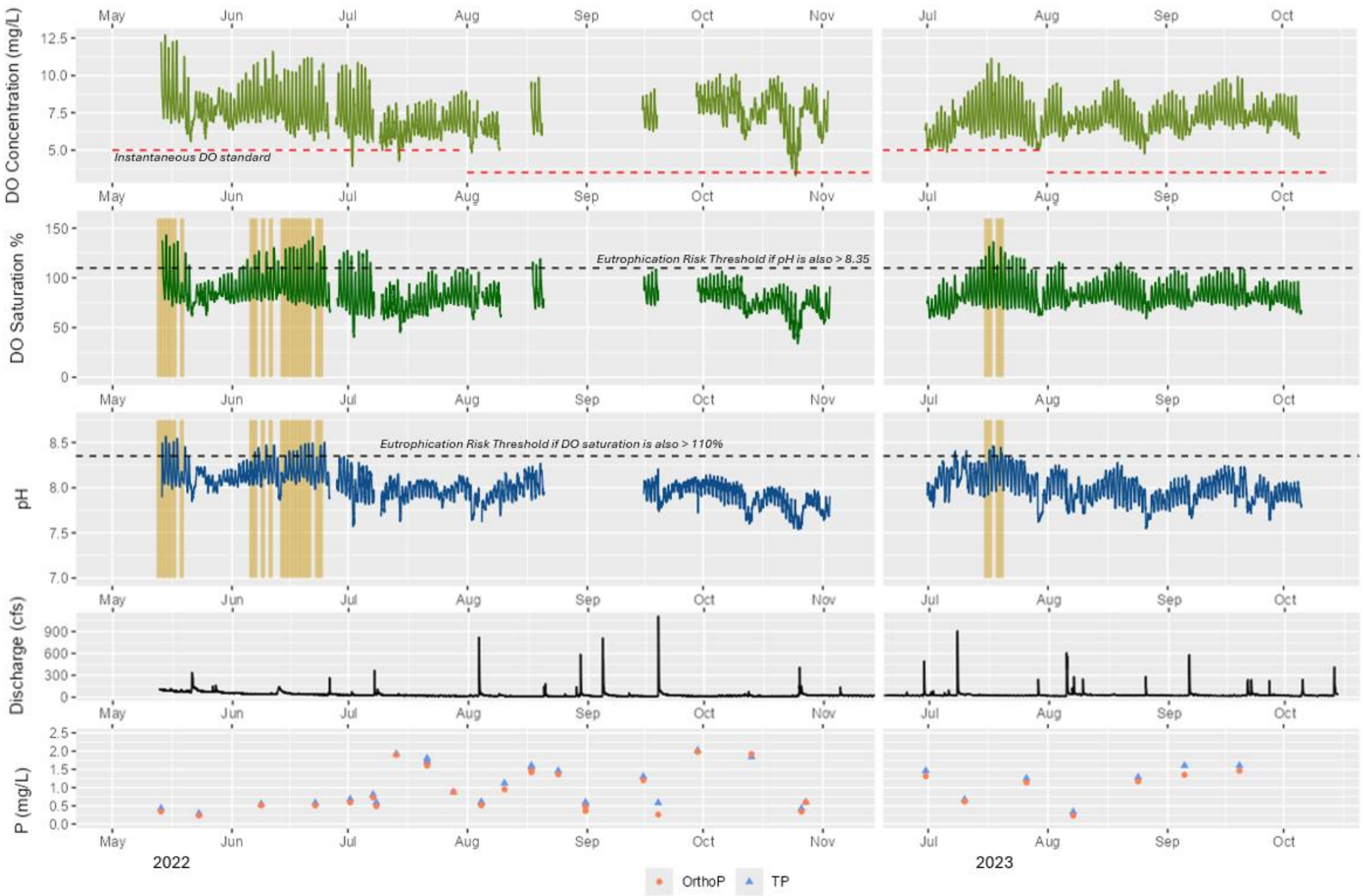


Figure 7 – NEP-D Grab Samples and Continuous Monitoring Results - yellow bars indicate days where risk of eutrophication threshold was exceeded

3.4 INTREPRETATION & ANALYSIS

The monitoring results identified no eutrophication risk criteria exceedances above the WWTP outfall, and very limited eutrophication risk criteria exceedances (11% of monitoring days) below. However, upstream of the outfall and outside the influence of treated effluent, the instantaneous water quality standard for DO was exceeded on 73 of 241 monitoring days (30%), indicating quality issues upstream that are not related to the NEP effluent. Below the outfall, only 4 of 216 monitoring days (2%) exceeded the instantaneous water quality standard (Table 7). Each of the 4 violations occurred during runoff events, which indicates oxygen-demanding NPS pollutants that are transported to the stream in stormwater are the likely cause of the lows, not effluent phosphorus.

Treated effluent is improving DO conditions in the Saline Branch by preventing the frequent lows seen upstream. Without plant effluent, conditions downstream would likely mirror those upstream, experiencing frequent violation of the DO standard.

There is biological evidence of improving stream conditions downstream, such as the recent return to the watershed of the state-threatened Bigeye Chub (Sherwood & Wylie, 2015), and the increasing species richness in the section of the Saline Branch downstream of Urbana to St. Joseph. The species richness was as low as 4 species present in 1963 but had increased to 40 species in a 2012 survey, the most recent data available in Sherwood et al., 2022. The increase was attributed to improved water quality due to improved wastewater treatment practices.

Table 7 - Risk of Eutrophication and DO Summary

Site	Days with Continuous Monitoring	Median Daily Maximum	# of Days (%) Exceeding the Risk of Eutrophication Criteria (8.35 pH + 110% DO)	# Days (%) Exceeding the Minimum DO Water Quality Standard (5.0 Mar-July; 3.5 Aug-Feb)
NEP-U	241	94% (DO Saturation) 7.85 (pH)	0 (0%)	74 (31%)
NEP-D	216	102% (DO Saturation) 8.1 (pH)	24 (11%)	4 (2%)

High flow events appear to increase TP loads upstream indicating NPS are important contributors in the Saline Branch. Additional evidence of NPS issues include historic DO, TP, and pH impairments on upstream reaches, and on Boneyard Creek, an upstream tributary. The plant outfall contributes a point source load which is evident from the phosphorus monitoring results. Despite the elevated phosphorous concentrations downstream of the plant, and lower than average stream flow during the monitoring period, the exceedances of the DO standard and the risk of eutrophication were minimal and superior to the rates observed upstream.

While the physical condition of the stream is highly channelized, there is a very good riparian area along the monitored reaches with abundant littoral vegetation and canopy cover. These habitat conditions buffer the impacts of both point and NPS nutrients and limit algal and macrophyte growth.

In summary, downstream of the WWTP, there is little risk of eutrophication nor is there risk of a phosphorus-related impairment. Considering observations and datasets showing that phosphorus is impacting the system upstream of the WWTP, it is clear that treated effluent and its associated elevated phosphorous concentration is not the sole driver of the limited eutrophication risks on the Saline Branch, nor downstream on the Salt Fork. Rather, without the addition of effluent it is highly likely that the low DO conditions observed upstream would persist downstream until the stream hydrogeomorphology improved or significant tributary flows joined the stream. With the addition of treated effluent flows, the DO conditions improve significantly, and risk of eutrophication remains low. It is unlikely that the WWTP is at risk of causing a phosphorus-related impairment on the Saline Branch. However, recognizing that the plant does contribute loading to the watershed, UCSD is committed to advancing phosphorus reductions that will benefit the stream by further reducing risk of eutrophication or risk of future phosphorous-related impairment.

4. NARP & WORK PLAN

Based on an understanding of the UCSD Northeast Plant NARP trigger, watershed dynamics and the results of the monitoring program, the NARP and Work Plan focuses on reducing phosphorus inputs to the Saline Branch and the associated 57,064-acre watershed. The focus area is comprised of three HUC-12 subwatersheds that make up the Saline Branch Drainage Ditch HUC-10 watershed (Figure 8 references the focus area). The watershed area is dominated by agricultural (72%) and urban/developed land (25%).

4.1 WATERSHED CHARACTERIZATION

A concise watershed characterization is presented and includes relevant information related to hydrology, landcover, climate, and demographics. Current and historical water quality impairments are summarized and estimates of phosphorus loading from NPS are presented from a map-based, planning-scale pollutant load model adapted for this NARP using formulas and methods derived from the United States EPA Spreadsheet Tool for Estimating Pollutant Loads (STEPL). This section also details historic watershed preservation and restoration activities undertaken by UCSD and links to relevant plans, efforts, and initiatives led by other groups.

HYDROLOGIC UNITS

The NARP focus area of the Saline Branch Drainage Ditch HUC-10 consists of three HUC-12 subwatersheds (Table 8) totaling 57,064 acres. This watershed lies in the east-central part of Illinois entirely in Champaign County. It is within the Vermilion River Basin, which drains to the Wabash River.

Table 8 – Saline Branch Drainage Ditch HUC 12 Subwatersheds

HUC Name	HUC12 ID	Area (acres)
Town of Thomasboro	051201090201	19,664
Crystal Lake-Saline Branch Drainage Ditch	051201090202	23,365
Saline Branch Drainage Ditch	051201090203	14,035
	Total:	**57,064**

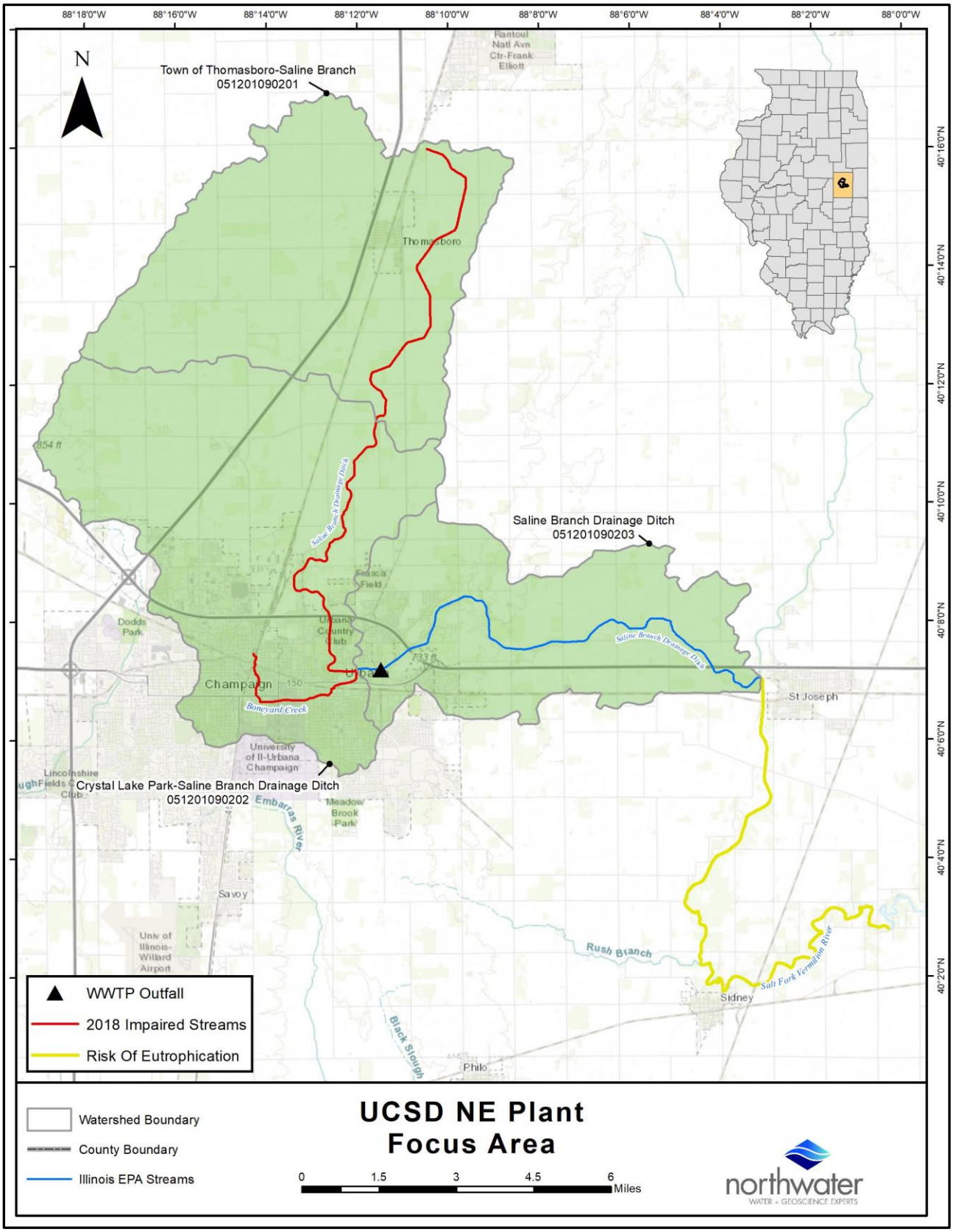


Figure 8 - NARP Focus Area with Subwatershed HUCs Labeled

STREAMS & LAKES

According to the National Hydrography Dataset (NHD) there are 84 miles of streams and rivers in the planning area, including artificial drainageways (Table 9). The Saline Branch Drainage Ditch is the longest named stream at 5.2 miles followed by Boneyard Creek (3.3 miles).

Table 9 – Relevant Stream Segments and Illinois EPA Assessment ID

Stream Name	Illinois EPA Assessment IDs	Length (Miles)
Unnamed Tributary/Drainage Way	N/A	76
Boneyard Creek	IL_BPJCA	3.3
Saline Branch Drainage Ditch	IL_BPJC-06, IL_BPJC-08	5.2
Total:	**-**	**84**

The NHD also identifies 200 acres of lakes, ponds and reservoirs. The largest lake is unnamed at 12 acres.

CLIMATE NORMALS

Based on climate normals published by the National Oceanic and Atmospheric Administration for a weather station in Urbana, for the period of 1991 – 2020 (NOAA NCEI, 2024), the area experiences an average of 40.9 inches of precipitation per year (3.4 inches/month). June is typically the wettest month, with an average of 4.8 inches of rain.

The region experienced approximately 20% less precipitation than average during the two periods of monitoring. The data supporting this NARP is from a climatic and hydrological period that is drier than average conditions.

LANDCOVER

Table 10 and Figure 9 present the landcover. The two predominant categories are (i) 72% agriculture comprising 41,175 acres of cultivated crops, and (ii) 25% developed/urban areas or 14,402 acres according to the National Land Cover Database (NLCD) (Dewitz, J., 2021). The Crystal Lake Park-Saline Branch Drainage Ditch, Saline Branch Drainage Ditch, and Town of Thomasboro-Saline Branch HUC basins have 57%, 69%, and 93% agriculture/cultivated crops respectively.

Table 10 – Sugar Creek NARP Watershed Landcover

Landcover	Area (acres)	% of Watershed Area
Cultivated Crops	41,175	72%
Developed	14,402	25%
Forest	823	1.4%
Grasslands/Hay/Pasture	342	0.6%
Wetlands	175	0.3%
Open Water	97	0.2%
Barren Land	48	0.1%
Total:	**57,061**	**100%**

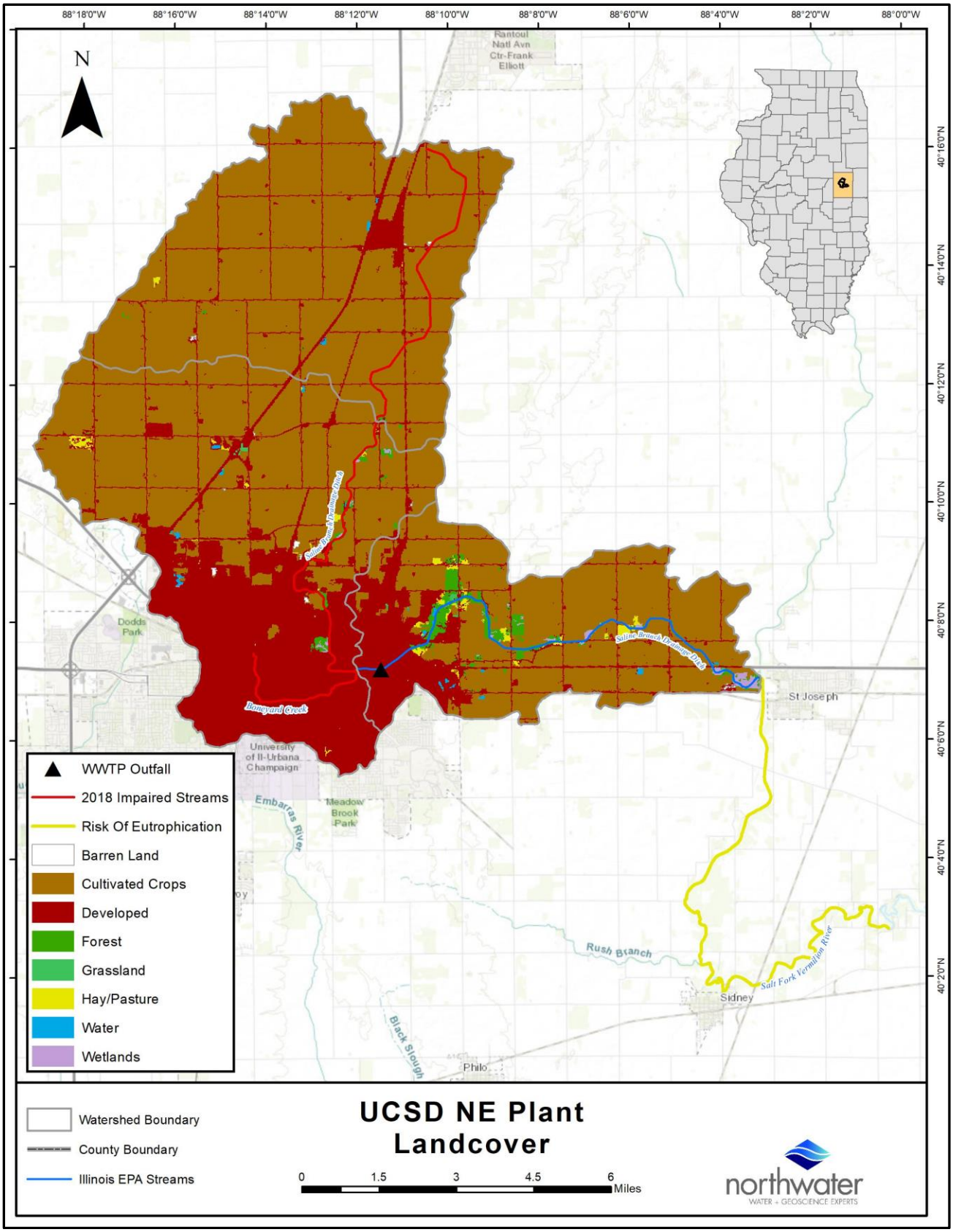


Figure 9 - NARP Landcover

DEMOGRAPHICS & ECONOMY

Approximately one-third of the Champaign – Urbana metro area is located within the watershed. Champaign has a population of 89,189, as of 2022, an increase of 10% since 2010, while Urbana has a population of 38,209, as of 2022 a decrease of 9% since 2010 according to the US Census Bureau.

Median household income (2018 – 2022) is $58,273 in Champaign and $41,115 in Urbana, compared to $78,433 for Illinois and the national average of $75,149.

WATER QUALITY IMPAIRMENTS

The Saline Branch Drainage Ditch stream segment IL_BPJC-06, which is the receiving segment of treated effluent from the WWTP, was on the 2020/2022 303(d) list as impaired for primary contact use with fecal coliform as the cause. Review of effluent monitoring data and stream samples indicates diffuse sources, not effluent, are causing the impairment. Upstream segment IL_BPJC-08 on the Saline Branch was on the 2014, 2016, and 2018 303(d) lists as impaired for aquatic life with cause of pH. The upstream tributary, Boneyard Creek segment IL_BPJCA, has been listed as impaired for aquatic life with causes of DO and TP since at least 2012. The upstream impairments reinforce the assertion that nutrients are an issue in the watershed even before the addition of treated effluent to the Saline Branch.

RELATIONSHIP TO OTHER PLANS & WATERSHED EFFORTS

The most recent watershed plan that includes the Saline Branch Drainage Ditch was completed in 2007. This plan, titled "*Watershed Implementation Plan for the Upper Salt Fork of the Vermilion River*," encompasses a total of 361 mi^2 and includes goals of decreasing nutrient and sediment loading, as well as increasing wildlife habitat. This plan indicated that NPS makes up the vast majority of the annual phosphorus and it outlines generalized strategies and activities to reduce loading.

More recently, due to a 303(d)-impairment listing for aquatic life with causes of pH, TP and DO, the Total Maximum Daily Load (TMDL) process began for the upper reach of the Saline Branch and for Boneyard Creek upstream of the WWTP outfall. After Stage I data review, the DO and pH impairments were removed and the TMDL was discontinued as newly collected data, though extremely limited in scope, did not exceed water quality standards. Instead, a generalized watershed management outline was produced suggesting practices should focus on reducing NPS nutrients.

The Illinois Nutrient Loss Reduction Strategy (INLRS) is a state-wide strategy for nutrient reduction, with an interim goal of a 25% reduction in phosphorus loads and 15% reduction in nitrogen loads to Illinois waters by 2025 and a long-term goal of 45% reduction in both nutrients from a 2011 baseline. As described fully in section 4.2, optimizing WWTP operations has already decreased the point source load by 50% from the 2011 baseline, and further upgrades will also have a direct positive impact on achieving nutrient reduction targets listed in the INLRS.

The Salt Fork Watershed Implementation Group, of which UCSD is an active member, is currently exploring an Illinois EPA 604(b) watershed planning grant. If this is successful, the plan will focus on nutrient reductions with an emphasis on NPS pollution. This planning effort will be directly relevant to advancing the goals of the NARP.

WATERSHED RESTORATION & PROTECTION EFFORTS

Despite limited jurisdiction over most of the watershed, the UCSD is committed to protection and restoration in the Saline Branch Drainage Ditch. Several examples that UCSD and other governmental agencies have participated in include:

- Saline Branch Stream Improvements at Crystal Lake Park, completed in 2022:
    - Cooperative effort with the Illinois Department of Natural Resources, Urbana Park District, United States Fish and Wildlife Service, and the University of Illinois utilizing fine proceeds from an ammonia release settlement.
    - This $265,000 project included streambank and channel restoration, native plantings, pool and riffle construction, and erosion control measures. It resulted in improved stream habitat diversity and complexity while decreasing nutrient loads from erosion and improving water quality.
- Perkins Road Site Wetland Restoration:
    - Cooperative project between UCSD and the Urbana Park District.
    - This $1,067,000 project, completed in 2022, restored a former sanitary sludge lagoon site into native ecosystems including wet prairie, savannahs and wetlands. Erosion control was implemented.
    - This wetland restoration resulted in reduced NPS pollution.
- Judge Weber Park Creek Interceptor Crossing:
    - This $339,800 project stabilized a portion of buried sewer interceptor that had become exposed when an unnamed tributary to the Saline Branch upstream of the plant experienced channel migration and erosion following heavy rains.
    - The project stabilized eroding banks and restored the channel cross-section, constructed pool and riffles, and included practices to prevent future erosion, including planting of native vegetation. It resulted in improved stream habitat diversity and complexity while decreasing nutrient loads from erosion and improving water quality.
- Rebecca Drive Creek Protection:
    - This $408,000 project, completed in December 2023 is another example of UCSD protecting infrastructure while simultaneously improving the creek ecosystem.
    - Unnatural streambank erosion left the sewer interceptor exposed above ground and susceptible to damage in two locations along an unnamed tributary to the Saline Branch.
    - UCSD completed several stream restoration practices including erosion control, streambank stabilization, and pool and riffle construction. The project resulted in improved habitat diversity and complexity while decreasing nutrient loads from erosion and improving water quality.

Boneyard Creek Improvements Segment #3:

- The City of Urbana completed $9,800,000 of improvements in 2014 to the Boneyard Creek between Griggs Street and Broadway Avenue.
- The project included a lineal park and shared use pathway along the Creek.
- The project also included erosion control, streambank stabilization, pool and riffle construction, tree plantings, native vegetation plantings, and hydrogeomorphologic modifications to the channel alignment. This resulted in improved stream habitat diversity and complexity while decreasing nutrient loads from erosion and improving water quality.

Boneyard Creek Improvements Phase 2:

- The City of Champaign completed $15,000,000 of improvements in 2011 to Boneyard Creek between University Avenue and Springfield Healy Street.
- The project included a lineal park and shared use pathway along the Creek along with stormwater detention for flood control.
- The project also included erosion control, streambank stabilization, pool and riffle construction, tree plantings, and native vegetation plantings. This resulted in improved stream habitat diversity and complexity while decreasing nutrient loads from erosion and improving water quality.

Saint Joesph Wetland Restoration:

- The St. Joseph Wetland project is located on both sides of US 150 on the west edge of the Village of Saint Joseph. In 1999 the property owners were approached to determine if they would be interested in selling their property to the Champaign County Soil and Water Conservation District (CCSWCD) to have it restored. They agreed and an application was made to the Illinois Department of Natural Resources through the C2000 program to obtain funding to make the purchase. The process moved slowly, and the final purchase was on February 16th, 2005. The land (67 acres) is now owned by the CCSWCD.
- The area on the north side of the road was developed with several scrapes and 2 ponds that contain control structures to manage the water level in the ponds. This provides an area for wet prairie plants.
- On the southern 27 acres, a variety of trees and shrubs (oak, hickory, cypress, dogwood, winterberry, buttonbush, and elderberry) were planted in the winter of 2018 to restore the area back to a forested wetland. An additional 100 trees were replanted during the fall of 2022.
- This wetland restoration resulted in reduced NPS pollution to the Salt Fork.

POINT & NONPOINT SOURCE LOADING

Point source pollution is defined by the United States EPA as “any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack” (Hill, 1997). The NPDES, a provision of the Clean Water Act, prohibits point source discharge of pollutants into waters of the United States unless a permit is issued by the USEPA or a state or tribal government. Individual permits are specific to individual facilities (e.g., water or wastewater treatment facilities), and general permits are for a group of facilities in a geographical area. Permits describe the allowed discharge of pollutant

concentrations (mg/L) and loads (lbs/day). The WWTP does not have an effluent phosphorus limit in its current permit, though there is a schedule outlining a deferred limit of 0.5 mg/L.

Nonpoint source pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. The term "nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source." Unlike pollution from point sources like industrial and sewage treatment plants, NPS pollution comes from many diffuse sources and is caused by rainfall or snowmelt moving over and through the ground. The runoff picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters (USEPA, 2018).

Annual point source phosphorus load from the WWTP in recent years is provided in Table 11. Based on USEPA-required DMR data retrieved from USEPA ECHO (Enforcement and Compliance History Online), and from internal WWTP data, average annual loading from 2020 through 2023 was 57,641 lbs with an average effluent discharge of 9.16 MGD. Average effluent TP concentration during the same period was 2.08 mg/L.

Table 11 - Annual Phosphorus Load – UCSD Northeast WWTP (Data Source: UCSD and USEPA ECHO)

WWTP	2020	2021	2022	2023	Annual Average
UCSD Northeast	66,386	58,697	54,913	50,595	**57,641 lbs**

To date there has not been an effluent phosphorus concentration limit for the WWTP. Despite this, UCSD has taken significant steps to reduce effluent concentrations and load to the Saline Branch. For instance, during the second half of 2016 a trial was conducted to see if the plant would perform well in a modified biological phosphorus removal mode. The activated sludge basins have a volume of 1.6 MG and a design average flow (DAF) capacity of 13 MGD. The average daily flow (ADF) into the plant during the experiment was 12.77 MGD. Primary effluent flow was split between 70% to activated sludge and 30% to the trickling filter. This resulted in an ADF of 7.7 MGD to the activated sludge system and an average of 1 hour of detention time in the anoxic zones and 1.8 hours of detention time in the aerobic zones. Aeration volume was split between 40% to the anoxic zones and 60% to the aerobic zones. Return activated sludge and primary clarifier effluent were combined at the beginning of the plug flow system upstream of the anoxic zones. The fine bubble membranes provided mixing with the DO being controlled to be less than 0.1 ppm in the anoxic zones. The DO was then increased to between 1 and 2.5 ppm in the aerobic zones.

At the end of 2016, results were encouraging, and the plant has been maintained in the Bio-P mode since 2017. An anaerobic zone was established in the first of four aerations tanks by throttling the membrane diffuser air supply valves. The anaerobic zone varied with the flow and loading but was usually between 25 and 40% of the total detention time of the activated sludge system. However, due to limited detention time, not all the influent flow can be treated in the activated sludge system. Approximately 30% of the influent flow is treated through the trickling filter which cannot be modified to enhance phosphorus removal.

The UCSD is committed to operating the modified Bio P mode in the activated sludge system until the full biological phosphorus removal improvements are completed between 2033 and 2035. Data for the modified Bio P process has shown a significant phosphorus removal since 2016. Average effluent concentrations from 2010-2015 were 3.1 mg/L. After implementation during 2016, the average

concentration has decreased 35% to 2.0 mg/L, representing a 50% decrease in annual TP load from the plant (Figure 10). Additional loading reductions have been observed as effluent flow has also decreased during recent years due to redirecting some influent flow to the UCSD Southwest Plant.

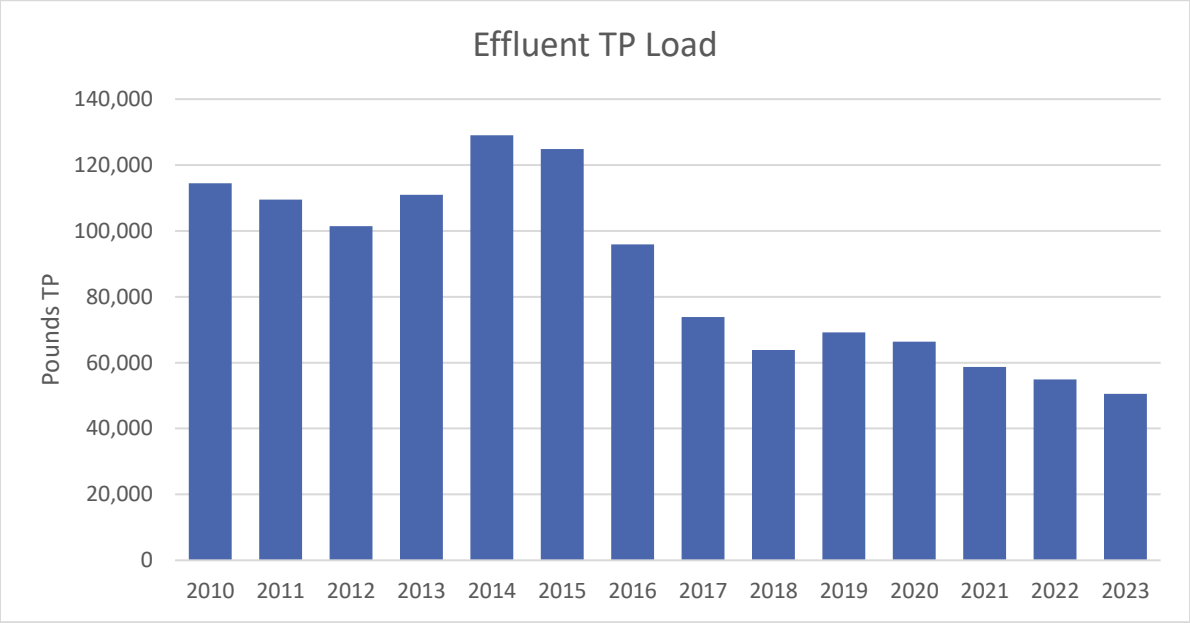


Figure 10 - Effluent TP Load Since 2010

Nonpoint source loading was estimated using a customized planning scale map-based STEPL model. Outputs were adjusted to ensure results were in the correct range by using another calibrated model created by Northwater Consulting for the nearby Wildcat Creek watershed, with similar landcover, soils and precipitation characteristics. Results indicate an average annual phosphorus load of 40,237 lbs/yr for the 57,064-acre watershed. Total average annual loading from all sources is estimated at 97,878 lbs/yr with the WWTP accounting for 59% and NPS for 41% (Figure 11).

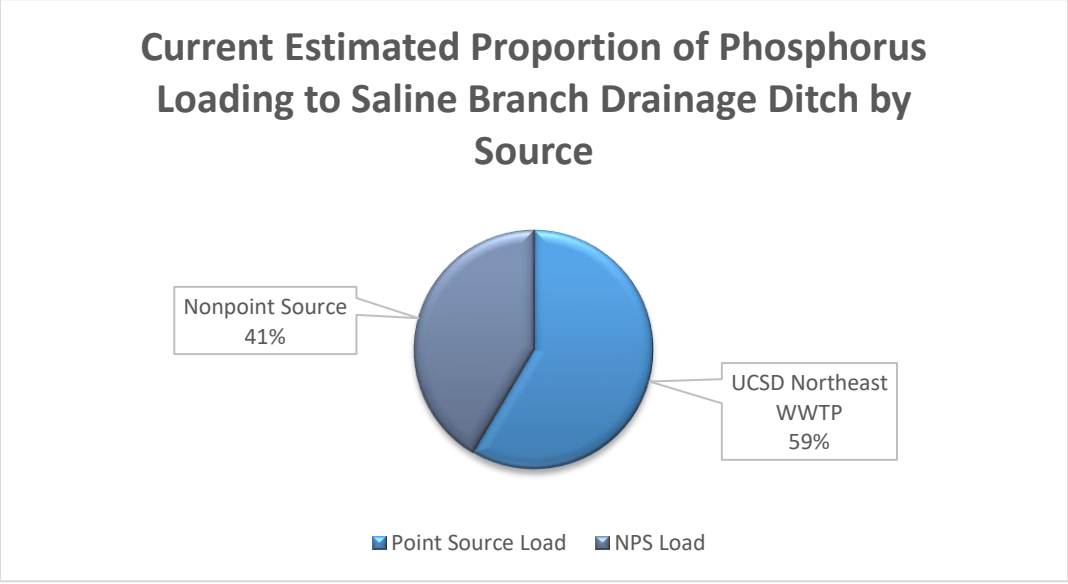


Figure 11 - Proportion of Annual Phosphorus Load by Source

4.2 NARP

The NARP focuses on the 57,064-acre Saline Branch Drainage Ditch watershed. Though the NARP was triggered by data indicating a risk of eutrophication downstream on the Salt Fork Vermilion River, this location has a large watershed area of 238 mi^2, and receives effluent from the Village of Rantoul WWTP, which is also subject to a NARP. Focusing on the smaller receiving watershed of the NEP, rather than the expansive Salt Fork Vermilion River allows for a more manageable and effective NARP. The 2022 and 2023 monitoring demonstrated that risk of eutrophication conditions are rare on the Saline Branch Drainage Ditch. However, low DO occurs above the WWTP outfall and is likely related to nutrient enrichment from NPS. The addition of treated effluent to the stream from the NEP outfall effectively eliminates the low DO issues, improving stream water quality conditions. Without this treated effluent contribution, low DO conditions that exist upstream would persist downstream until a significant change in stream physical conditions such as improved hydrogeomorphology or the addition of a significant tributary.

Based on an analysis of landcover, watershed nutrient load estimates and monitoring data, NPS pollution is a major contributor to water quality issues. The WWTP currently contributes approximately 59% of the average annual phosphorus loading to the Saline Branch watershed, with NPS contributing the remainder (Figure 11). The availability of phosphorus in the stream is systemic due to the agricultural and urban land uses that dominate. The stream is highly channelized throughout its length, though downstream of the outfall riparian conditions and canopy cover improve versus the open drainage ditch configuration in the uppermost reaches.

UCSD recognizes the plant is a contributor of phosphorus, and this input is part of complex and dynamic processes that affect the conditions in the stream and watershed. The UCSD, however, does not have jurisdiction over land management practices and NPS phosphorus, which are significant factors contributing to the low DO conditions observed upstream and the eutrophication risk occurrences. The UCSD supports NPS reduction, but practice implementation to reduce NPS is strictly voluntary and must be completed by the relevant landowner or manager.

Though eutrophication risk is rare, and there is low risk for future downstream phosphorus-related impairment, UCSD's Saline Branch NARP is focused on improving water quality in four ways:

1. **WWTP Plant Upgrades** –Upgrades will allow the plant to meet an effluent phosphorus concentration limit of 0.5 mg/L by 2035 in accordance with NPDES permit special condition 20.B.1:
    a. WWTP phosphorus contribution to the Saline Branch watershed will be reduced by approximately 76% or better with upgrades to meet a 0.5 mg/L effluent limit. Annual TP loading will be reduced to approximately 13,872 lbs/yr from 57,641 lbs/yr, estimated from the 2020-2023 average effluent concentration being reduced to the 0.5 mg/L level with similar effluent flow.
    b. Plant Upgrades to meet 0.5 mg/L will result in the point source portion of annual watershed phosphorus loading being reduced from **59% to approximately 26%.** Figure 12 illustrates the proportion after plant upgrades.
    c. Plant upgrades and associated phosphorus load reductions will have a positive effect on water quality and eutrophication risk conditions downstream of the plant.
    d. Demolition of the existing nitrification towers will result in improved effluent pH which will decrease the risk of eutrophication.

2. **Collaborate on NPS Reduction** – UCSD will continue to collaborate with stakeholders and support future watershed planning and implementation efforts that address NPS loading. For instance, UCSD is an active participant in the local watershed group currently exploring a series of Illinois EPA grant applications. The UCSD has presented NARP data and drafts of this plan to the watershed group on multiple occasions in 2022 and 2023.
3. **Continue to Emphasize Ecosystem Restoration** – UCSD emphasizes ecosystem restoration in its infrastructure maintenance and capital improvements, as evidenced by the restoration activities outlined in Section 4.1. When feasible and reasonable UCSD will continue to prioritize restoration and enhancement of the streams in the watershed including current planning for stabilization and restoration of the Saline Branch banks adjacent to the WWTP property. Stabilizing and restoring streambanks and other habitat enhancement activities prevents erosion and decreases phosphorus loading.
4. **Periodic Monitoring on the Saline Branch to Track Progress –** UCSD proposes to periodically monitor the Saline Branch upstream and downstream of the outfall using continuous monitoring equipment and discrete sampling to track water quality indicators such as DO, pH and TP, similar to the monitoring program completed for this NARP assessment. Monitoring will coincide with plant upgrades coming online and will provide before and after data to confirm that effluent chemistry changes are having the desired impact on stream water quality of reducing the chances for phosphorus impairment on the Saline Branch.

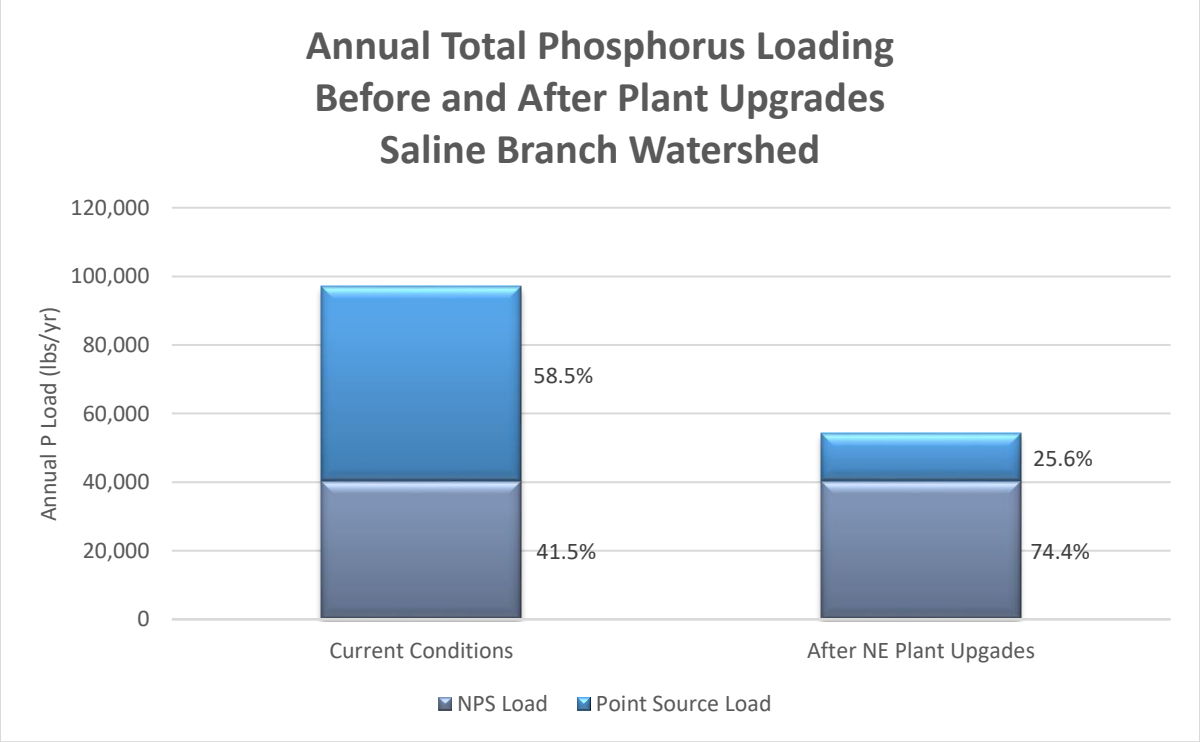


Figure 12 - Phosphorus Loads from Point and NPS and Percent of Total Load Before and After Plant Upgrades

Plant upgrade plans were revised and submitted to Illinois EPA in 2023. The plans encompass three phases including the implementation of biological phosphorus removal. It is anticipated that by 2035 the new system will achieve a 75% reduction in effluent phosphorus loading from the 2020-2023 average. The reductions are even more substantial (~87%) if using the 2011 baseline loads before the UCSD voluntarily

implemented the modified biological phosphorus removal program. Assuming that watershed NPS phosphorus has experienced negligible change in annual loading from the 2011 baseline, as is indicated in the 2023 Illinois NLRS Science Assessment Update, plant upgrades alone will allow the Saline Branch portion of the Vermilion River watershed (area referenced in Figure 8) to meet INLRS goals. Upgrades will reduce annual phosphorus loading in the watershed from 97,878 lbs/yr to 54,110 lbs/yr (Figure 12). Reductions from NPS will further improve watershed loads.

The UCSD is committed to reducing nutrients discharged to the watershed. Planned upgrades will have a positive effect on water quality and reduce risk of eutrophication conditions downstream of the plant. Planning and best management practice implementation, led by the watershed group with support from UCSD, will achieve additional benefits throughout the watershed.

Throughout the NARP process, UCSD has actively sought stakeholder feedback and support through various avenues.

- UCSD is a regular and participant in the Salt Fork Watershed Implementation Group, which meets 3-4 times per year. Representatives from state, regional and local agencies, environmental non-profits, academia, businesses and individual citizens all participate in the group regularly. The Saline Branch NARP has been discussed regularly since 2019 at these meetings. Selected meeting summaries are below, and full meeting minutes are available upon request. A list of regular participants' affiliations and a full list of meetings where the NARP was discussed are in Appendix D.
    - 06 June 2022 – Presented general background on NARP requirements, proposed monitoring plan, requested feedback and discussion.
    - 03 March 2023 – Presented monitoring results from 2022 monitoring program, shared preliminary conclusions and overview of continued monitoring. Requested feedback and discussion.
    - 07 March 2024 – Presented monitoring results from 2022 - 2023 monitoring program. Shared preliminary conclusions and NARP strategy and actions. Requested feedback and discussion on results and activities toward NARP compliance.
- Staff and consultants of the UCSD have presented at the monthly UCSD Board of Trustees public meetings on numerous occasions. Minutes are available on the UCSD website. Highlights include:
    - 03 January 2023 – Presented 2022 monitoring data and preliminary findings from six months of monitoring. Presented overview of next steps toward NARP compliance and plan for continuing monitoring
    - 05 March 2024 – Presented results of 2022 to 2023 monitoring data. Discussed implications of results and presented preliminary strategy toward NARP compliance activities.
    - 05 November 2024 – Presented final NARP report to Board of Trustees at public meeting.
- The UCSD regularly updates a NARP section on its public website, www.u-csd.com/207/UCSD-Projects

4.3 NARP WORK PLAN

The Work Plan includes a schedule and cost estimate for NARP activities moving forward. The UCSD is committed to a series of key activities that will significantly reduce phosphorus, as well as contribute to reductions needed to meet targets in the INLRS. Furthermore, UCSD will continue to work with area stakeholders to further limit NPS loading through collaborative efforts outside of its jurisdiction. Actions include plant upgrades, watershed group involvement, and an emphasis on stream restoration when reasonable.

ACTIONS & SCHEDULE

An estimated schedule of activities is presented in Table 12. Significant plant upgrades are currently in progress, with three phases of construction estimated to be completed by approximately 2035, which will allow the plant to meet the deferred 0.5 mg/L phosphorus effluent limit. The UCSD will continue to participate in the watershed group, will support funding applications for watershed planning, will contribute meaningfully to plan development, and continue its commitment to restoring and enhancing the Saline Branch when opportunities arise. In addition, UCSD will a monitoring program on the Saline Branch to track progress.

Table 12 - NARP Actions and Estimated Schedule

NARP Action	Anticipated Start Date	Estimated End Date	Notes
Plant upgrades	In Progress	2035	Plant upgrades to meet the 0.5 mg/L phosphorus effluent limit with biological nutrient removal are in progress. This extensive capital project, estimated at over $71,000,000, is detailed in the Facility Plan that was submitted to Illinois EPA in 2023. The upgrades will overhaul the treatment process and result in long-term compliance with effluent limits and as well as improved operations, maintenance and resilience. Phase I of improvements were advertised for bid on July 8, 2024. The Phase II design is underway and anticipated to be completed in April 2025. Phase II is anticipated to be bid out in July 2026. Design on the Phase III improvements is anticipated to begin on May 1, 2027.
Watershed Group / Watershed Planning	In Progress	Ongoing	Actively participate in and support the Watershed Group's activities such as the preparation of a request for a 604(b) planning or Section 319 implementation grants.
Stream Restoration and Stabilization	In Progress	Ongoing	UCSD will continue to emphasize stream restoration and protection as part of its capital projects program.

NARP Action	Anticipated Start Date	Estimated End Date	Notes
Ongoing Monitoring	2026	Ongoing	UCSD will periodically monitor the Saline Branch upstream and downstream of the outfall using continuous monitoring equipment, similar to the program completed for the NARP assessment. Monitoring will coincide with plant upgrades and will provide before and after data to confirm that effluent chemistry changes are having the desired impact on stream water quality and reducing the chances for phosphorus impairment.

BUDGET & COST ESTIMATES

The WWTP capital improvements and plant upgrades are estimated at over $71,000,000 with the in-progress Phase I project estimated to cost $8.8 million. Participation in the watershed group is estimated at $36,000 per year, with additional support likely for the proposed watershed plan under consideration. The cost of other NPS reduction measures and potential stream restoration activities is unknown currently. Continuous monitoring of the Saline Branch is estimated at $40,000 per season monitored.

REFERENCES

Dewitz, J. (2021). National Land Cover Database (NLCD) 2019 Products [Data set]. U.S. Geological Survey. https://doi.org/10.5066/P9KZCM54

Hill M.S. (1997). Understanding Environmental Pollution. Cambridge, UK: Cambridge University Press. 316 pp.

Illinois Environmental Protection Agency. (2023). Illinois Nutrient Loss Reduction Strategy Biennial Report 2023. Available online at https://epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy.html

Sherwood, J.L. and Wylie, D.B. (2015). Current Status and Historic Range of One of Illinois' Rarest Fish. Transactions of the Illinois State Academy of Science, 108.

Sherwood, J.L., Tiemann, J.S., and Stein, J.A. (2022) Fishes of Champaign County Illinois: as affected by 120 years of stream changes. Illinois Natural History Survey Bulletin, 43.

United States Environmental Protection Agency. 2018. Polluted runoff: nonpoint source (nps), basic information about nonpoint source (nps) pollution. Available online at: https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution

University of Illinois (UofI), Illinois State Climatologist. Illinois precipitation normals, accessed 12/5/2023 and available online at https://stateclimatologist.web.illinois.edu/data/climate-data/.

APPENDIX A: DATA MINING AND MONITORING PLAN

Village of Rantoul & Urbana-Champaign Sanitary District

Nutrient Assessment Reduction Plan Data Mining and Proposed Monitoring Plan

April 2022

Prepared for: Urbana-Champaign Sanitary District
Village of Rantoul
Prepared by: Northwater Consulting & Donohue and Associates

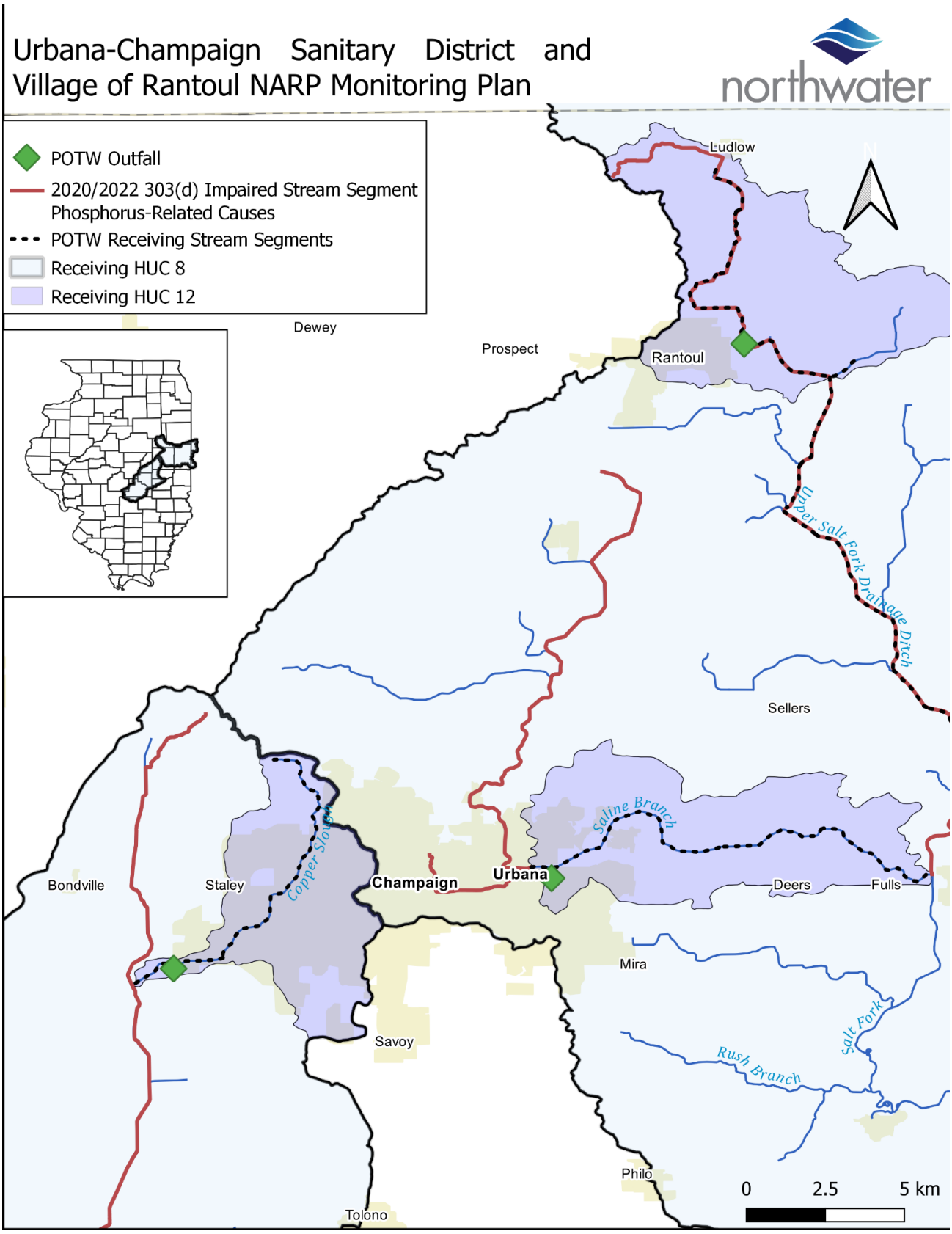


Figure 1. Project Area

DONOHUE

northwater
WATER + GEOSCIENCE EXPERTS

Contents

1 Introduction

1.1 NARP Process & Requirements

In 2018, the Illinois EPA (IEPA) instituted a new process for NPDES permitting of POTW discharges that would allow for consideration of site-specific conditions for phosphorus limits. The Nutrient Assessment Reduction Plan (NARP) process resulted from negotiations with environmental organizations, IEPA, and the Illinois Association of Wastewater Agencies. A NARP is required if a receiving stream segment or downstream segment is on the Illinois Clean Water Act 303(d) list as impaired with phosphorus-related causes. A NARP is also required if there is a "risk of eutrophication" as defined by meeting any of the conditions outlined in Table 1.

Table 1. IEPA Risk of Eutrophication Criteria

Risk of eutrophication if any of these conditions met		
pH	Median sestonic chlorophyll *a*	On any two days during IEPA monitoring week, daily max
>9	>26 u/l	pH>8.35 and DO sat >110%

The Village of Rantoul operates one treatment plant and the Urbana-Champaign Sanitary District (UCSD) operates two that are required to undertake the NARP process as part of their National Pollution Discharge Elimination System (NPDES) permits. However, in this process, it may be determined through assessment of relevant data that the watershed does not have a phosphorus-related impairment. In this case, phosphorus input reductions and other measures may not be necessary. Donohue & Associates and Northwater Consulting were retained by the Village of Rantoul and UCSD to assess if a NARP is required for these facilities, and if so, develop a strategy for development of a full NARP. This process has several components which include:

- Examining if there is sufficient water quality data to determine if NARP requirements apply.
    - If data insufficient, a create a water quality monitoring plan and collect data.
- Undertake watershed characterization and determine if a full NARP is required.
- If a NARP is required:
    - Engage stakeholders throughout the process.
    - Model watershed and instream processes.
    - Establish defensible site-specific water quality criteria.
    - Define scenarios and strategies to achieve water quality targets.
    - Implement the recommendations of the NARP.

1.2 Data for NARP Determination

To make a NARP determination, sufficient dissolved oxygen (DO), pH and sestonic chlorophyll *a* data must be available between May 1 and October 31 to assess if any of the eutrophication risk criteria are met. Based on mining and analysis of existing datasets for the three outfalls and associated stream

segments, it was determined that additional water quality data collection is necessary to evaluate impairments and eutrophication risks according to NARP criteria.

This plan outlines the recommended monitoring and data collection actions necessary to assess NARP requirements for each treatment plant. The data will also support focused recommendations and a strategy to develop additional NARP components for each, if required. The plan is intended to guide the Urbana-Champaign Sanitary District (UCSD) and Village of Rantoul through the data collection and assessment phase. More detailed results of the process and plan are presented herein.

2 Data Mining Results

The three receiving streams were cross referenced with the 2020/2022 Illinois EPA (IEPA) Clean Water Act Section 303(d) list[1] of impaired waters. Details of phosphorus-related impairments are summarized for each treatment plant. The only stream segment currently impaired for phosphorus is associated with the Village of Rantoul, which has been on the 303(d) list since 2010. The two UCSD treatment plants receiving stream segments have not been listed as impaired with P-related causes since 2010.

A search was completed for existing water quality data over the past 10 years from the USEPA Water Quality Portal.[2] Each facility also provided data available from effluent and receiving stream water quality monitoring. Existing datasets were examined to determine if eutrophication risk determinations could be made using DO, pH, chlorophyll-*a* and water temperature data. Data collected during the last 5 years was prioritized over older data. A summary of the data mining and analysis results for each treatment plant is presented below.

2.1 Village of Rantoul Wastewater Treatment Plant

The effluent-receiving stream Upper Salt Fork Drainage Ditch (IL_BPJG-01) is impaired with P-related causes (Table 2). The next downstream segment (IL_BPJG-07) is also impaired for DO.

Table 2. Village of Rantoul Wastewater Plant

Village of Rantoul Receiving Stream Segment				
Receiving Stream	HUC12 Watershed	Illinois Assessment Unit	303(d) Impairments	Causes Related to P & Years on List
Upper Salt Fork Drainage Ditch	051201090301	IL_BPJG-01	Aesthetic Value; Aquatic Life	DO: '20/22, '18, '16, '14 pH: '20/22, '18, '16, '14 TP: '20/22, '18, '16, '14, '12

Receiving Major Watershed	POTW Design Average Flow	POTW Design Maximum Flow
Vermilion River-Wabash River	4.33 MGD	8.65 MGD

[1] https://www2.illinois.gov/epa/topics/water-quality/watershed-management/tmdls/Pages/303d-list.aspx
[2] www.waterqualitydata.us

Few usable monitoring sites sourced from publicly available data were found for the Upper Salt Fork Drainage Ditch. Of the three potential sites identified, one is upstream, and two downstream of the outfall. At all three, data was only available for a single collection event in 2016. There are additional IEPA monitoring stations with 2016 data much further downstream in the assessment unit, with pH increasing with distance from the outfall. However, these sites are significantly influenced by tributaries and their associated point and nonpoint sources and thus are less appropriate for determining if NARP thresholds are met. Additional data was provided by the Village and included upstream and downstream sampling approximately two days per month during portions of 2020 and 2021. Parameters include temperature, DO and pH. Chlorophyll *a* data was not collected during this monitoring period.

From this limited data set it appears that pH and DO do not meet the threshold criteria that trigger a NARP (8.35 with 110% saturation). However, because the facility discharges into a stream that is impaired with likely causes related to phosphorus, the facility would be required to complete a full NARP. Additional data collection and analysis will help to better assess the contributions of the treatment plant to the receiving stream water quality and allow for an informed decision on the necessity of undertaking a full NARP that includes watershed characterization, development of site-specific water quality targets, and implementing management actions.

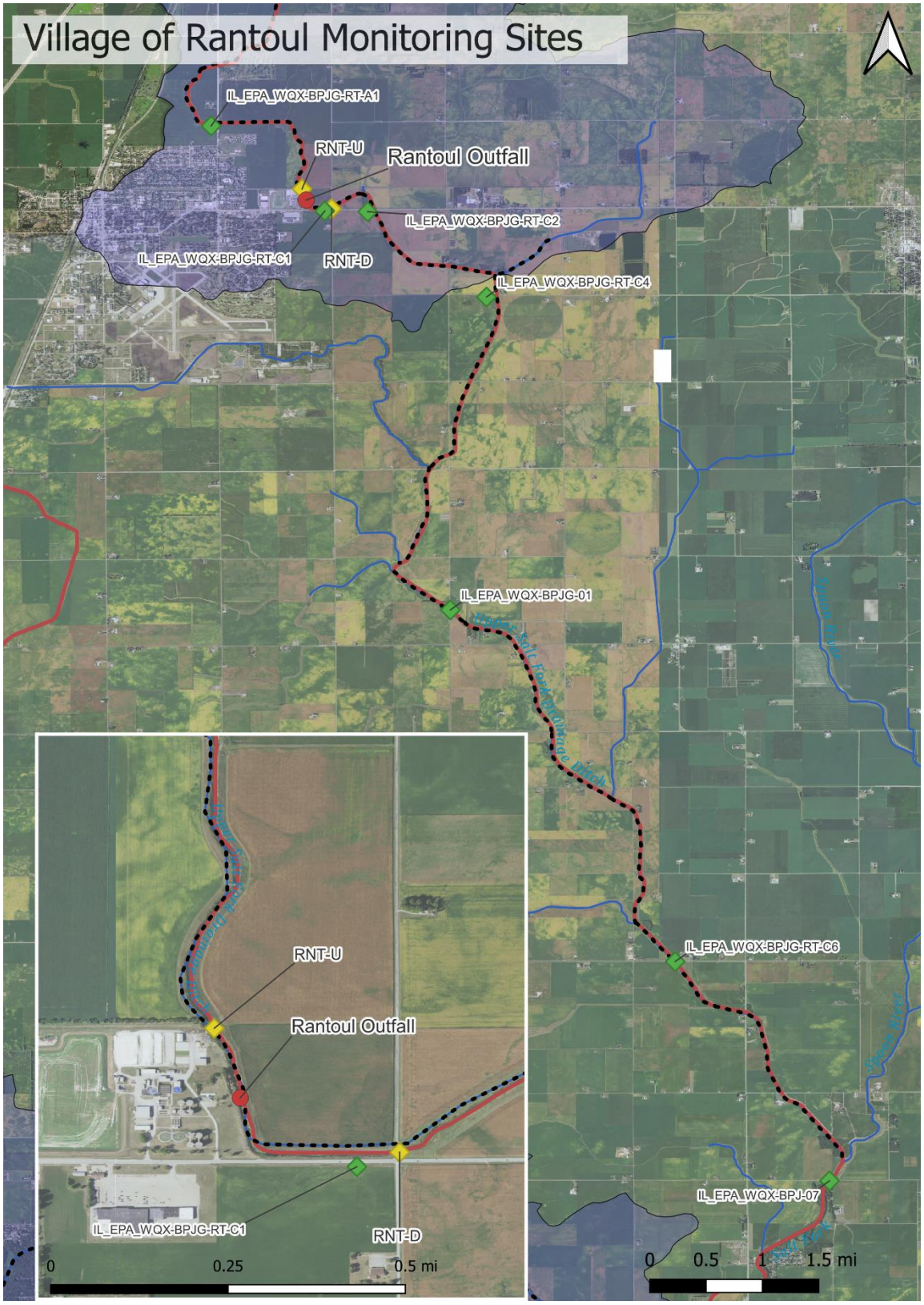


Figure 2. Village of Rantoul Detail

2.2 UCSD Northeast Wastewater Treatment Plant

The effluent-receiving stream segment, Saline Branch (IL_BPJC-06), fully supports its designated uses. Two stream segments above the receiving segment are impaired with P-related causes. Boneyard Creek (IL_BPJA) for DO and total phosphorus (TP), and Saline Branch Drainage Ditch (IL_BPJC-08) for pH and DO. The next several segments downstream have no P-related impairments. Upstream of the confluence, the Upper Salt Fork Drainage Ditch is impaired for DO.

Table 3. UCSD Northeast Wastewater Treatment Plant Receiving Stream Information

UCSD Northeast Plant Receiving Stream Segment				
Receiving Stream	HUC12 Watershed	Illinois Assessment Unit	303(d) Impairments	Causes Related to P & Years on List
Saline Branch	051201090203	IL_BPJC-06	None – Fully Supports Designated Uses	N/A

Receiving Major Watershed	POTW Design Average Flow	POTW Design Maximum Flow
Vermilion River - Wabash River	17.3 MGD	34.6 MGD

There are three monitoring sites with publicly available data in the receiving watershed, all of which are downstream of the outfall. The IEPA Ambient Network monitoring site (IL_BPJC-06) includes approximately 8 samples per year in years data was collected for relevant parameters. USGS monitoring station 03337700 is co-located here and has data collected during 2019 and 2020. These sampling locations, though in the same assessment unit, are greater than 5 miles downstream of the plant outfall, which allows instream processes to alter the effects of the effluent on stream water quality and introduces potential for pollutant additions from nonpoint sources and tributaries. The IEPA ambient site has one sample out of 25 in the last 5 years with values for pH and DO saturation meeting the upper threshold of NARP criteria of 8.35 pH with 110% DO saturation. (02/20/2017 sample was 8.54 pH and 153.5% DO). Five samples of 53 older than five years meet the threshold, however emphasis is placed on the most recent sampling efforts. Chlorophyll *a* data is not available. The USGS site has 15 pH and DO samples, none of which meet the NARP threshold.

The UCSD provided additional data from the receiving stream above and below the plant outfall, though the majority of that data is greater than 5 years old and is not current enough to determine if the NARP thresholds are being met. Because of limited current water quality monitoring data and past indicators of eutrophication risk, additional monitoring is recommended up and downstream of the treatment plant.

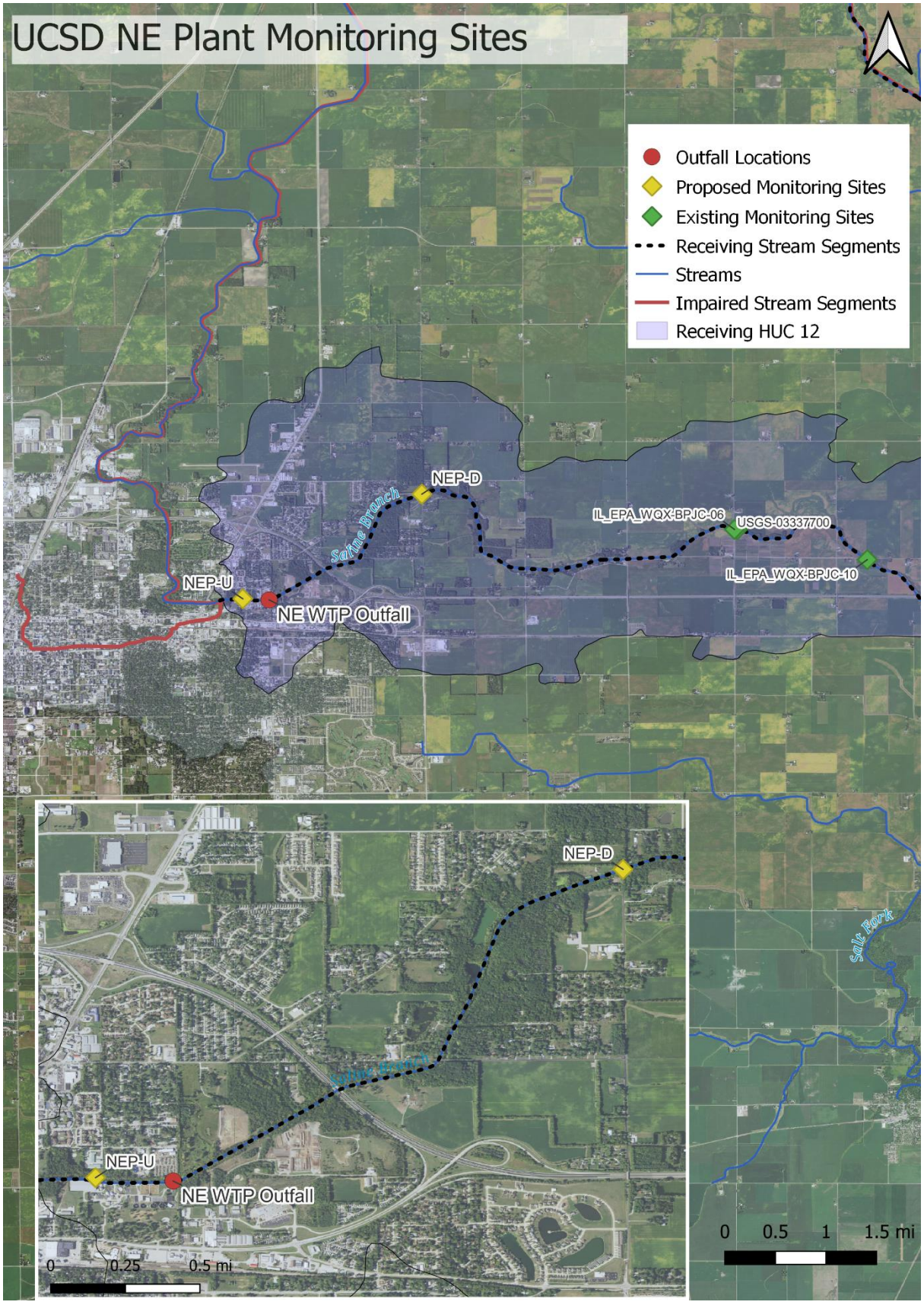

UCSD NE Plant Monitoring Sites
Outfall Locations
Proposed Monitoring Sites
Existing Monitoring Sites
Receiving Stream Segments
Streams
Impaired Stream Segments
Receiving HUC 12
NEP-D
NEP-U
NE WTP Outfall
Saline Branch
IL_EPA_WQX-BPJC-06
USGS-03337700
IL_EPA_WQX-BPJC-10
Salt Fork
0 0.5 1 1.5 mi
0 0.25 0.5 mi

Figure 3. UCSD Northeast Plant Detail

2.3 UCSD Southwest Wastewater Treatment Plant

The effluent-receiving stream, Copper Slough, fully supports its designated uses. However, it empties into the Kaskaskia River (segment IL_O-35) which is impaired for DO and pH, and the segment upstream from the confluence (IL_O-37) is impaired for DO.

Table 4. UCSD Southwest Wastewater Treatment Plant Receiving Stream Information

UCSD Southwest Plant Design Flow & Receiving Stream				
Receiving Stream	HUC12 Watershed	Illinois Assessment Unit	303(d) Impairments	Causes Related to P & Years on List
Copper Slough	071402010201	IL_OZYA	None – Fully Supports Designated Uses	N/A
Receiving Major Watershed		POTW Design Average Flow		POTW Design Maximum Flow
Kaskaskia River		7.98		17.25

Based on data mining, IEPA data was only available at one location in the assessment unit, approximately 0.25 miles downstream of the Southwest Wastewater Treatment Plant outfall. The data included three measurements of DO, pH and chlorophyll *a* from 2017, thus these data are of limited utility.

UCSD performed a study in the summer and early fall of 2020 at locations above and below the outfall on Copper Slough. Continuous monitoring equipment was used to measure DO and pH, as well as other ancillary parameters. Chlorophyll *a* was not monitored. However, issues with sensors and data quality were reported by staff. As a result of inconclusive water quality data results, additional monitoring is recommended.

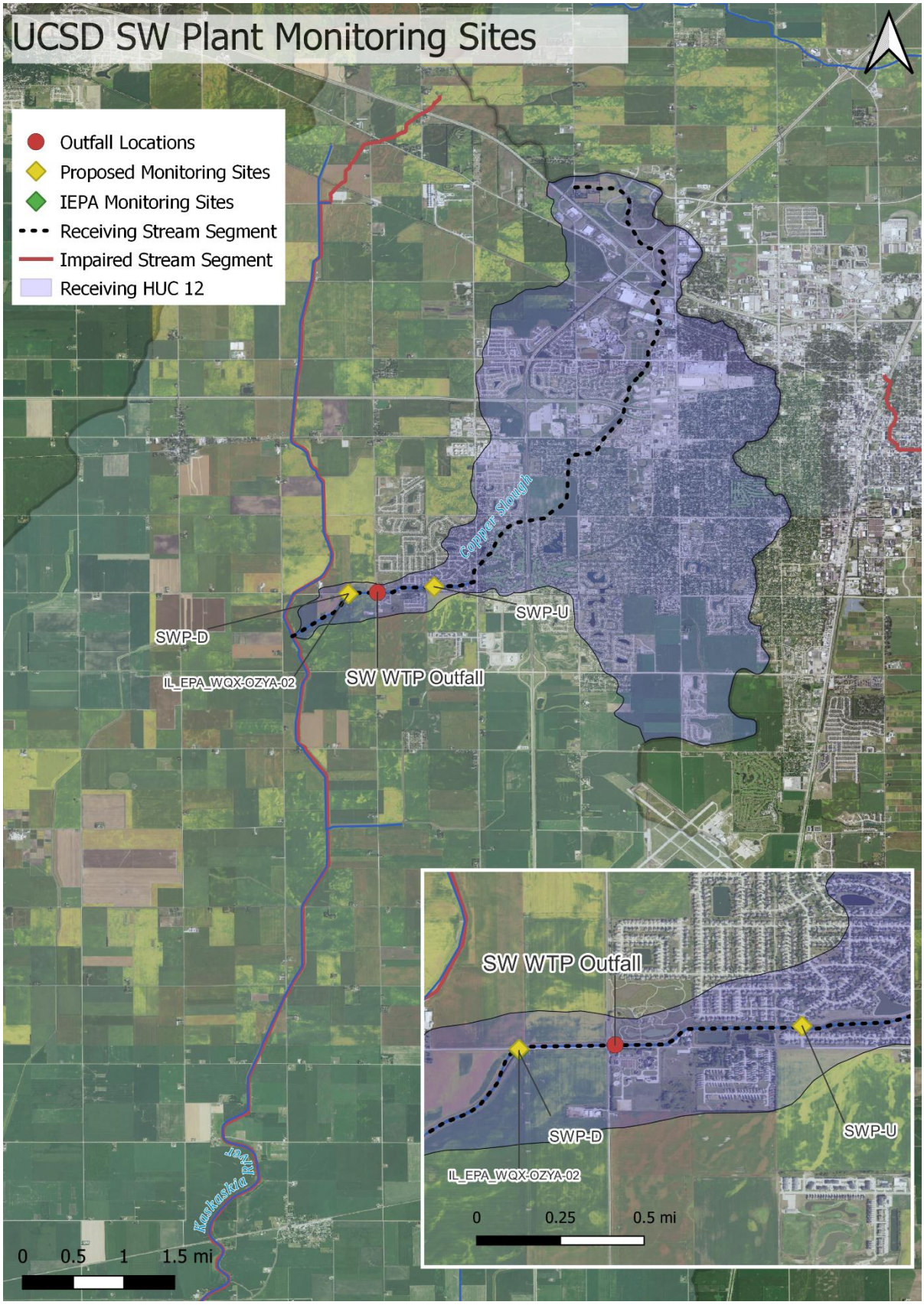


Figure 4. UCSD Southwest Plant Detail

3 Monitoring Plan Overview

Considering the effort and investment necessary for NARP development, and the lack of data available to make "at risk" determinations, stream monitoring is recommended at all three treatment plants. The water quality data will facilitate the assessment of the risk of eutrophication and guide further NARP development if required.

The proposed in-stream water quality monitoring expands upon past data collection efforts at each treatment plant. The monitoring program will be organized by Northwater Consulting and Donohue & Associates, in partnership with UCSD and the Village of Rantoul. To augment existing records, data collection is prioritized to locations with previous monitoring. The goal of this plan is to collect adequate data during the critical period between May and October when NARP triggering conditions are most likely to occur. Monitoring will determine if each receiving stream is at risk of eutrophication and will guide future stages of the NARP such as watershed characterization, assessing impairment causes/sources, and water quality model development. Further, the contribution of each treatment plant to the stream impairment or risk of eutrophication can be evaluated.

Recommended monitoring elements include:

1. Retrofit existing stations to monitor upstream and downstream of each outfall (6 total stations)
2. Installation of water quality sonde and sensors from Mid-May through October
    a. Hydrological Parameters: Stream stage
    b. Water Quality Parameters: pH, sestonic chlorophyll *a*, water temp, DO, conductivity
3. Bi-weekly storm monitoring
    a. Stream discharge/flow
    b. In-situ analysis of pH, conductivity, oxidation reduction potential, temperature, dissolved oxygen and turbidity
    c. Grab samples for laboratory analysis of orthophosphate, total phosphorus, chlorophyll *a*

These recommended parameters capture data critical for making the NARP determination. While there are myriad sampling methods that could be employed and characteristics available to measure, such as periphyton (attached algae chlorophyll) and nitrogen, this limited sampling scheme is designed to adhere closely to Illinois EPA NARP guidance.

4 Stream Monitoring

4.1 General Schedule

Data collection will commence for the UCSD Northeast Plant and Village of Rantoul Plant as soon as possible, on or around May 1, 2022 and will continue through October 31. This period captures the time of year when water quality issues are most likely to occur in these streams. The UCSD Southwest Plant is scheduled to have upgrades and operating changes designed to improve its effluent pH throughout 2022. Additionally, a stream restoration project in its receiving stream, Copper Slough, is scheduled to be installed. To capture the impacts of these changes relevant to NARP determination, data collection for the Southwest Plant will take place in summer 2023.

4.2 Stations

Three pairs of stations are recommended to be monitored one in each receiving stream. Stations will be located up and downstream of each outfall (Figures 5-7 and Table 5). This approach will characterize conditions and the effluent's effect on water quality. The additional water quality monitoring will provide sufficient data for NARP determination and next stages of NARP development, if necessary. The six stations are located at bridge crossings or preestablished access points. All have been monitored to some degree. Upstream sites are close enough to the outfall to capture as much upstream watershed as possible without the influence of effluent. Downstream sites are located at an ideal distance to allow for sufficient mixing of effluent and streamflow and to determine the immediate impacts of nutrients from the treatment plant. Station selections also eliminate the influence of other point and nonpoint sources that contribute to algal growth and are technically infeasible to isolate from plant effluent. Data collected using this approach can then be used to develop a predictive model estimating the potential impacts to downstream water quality.

Table 5 – Proposed Water Quality Monitoring Stations

Station ID	Name	Lat/Long	Station ID and organization which previously collected data at this site	Approximate distance from outfall	Year Monitoring Begins
SWP-U*	Copper Slough Southwest Plant Upstream – Mullikin Dr	40.085482, -88.332208	UCSD SW Upstream	0.5 mi	2023
SWP-D*	Copper Slough Southwest Plant Downstream – Windsor Road	40.084077, -88.33800	UCSD SW Downstream	0.4 mi	2023
NEP-U	Saline Branch Northeast Plant Upstream Plant Grounds	40.139727, -88.162975	UCSD NE Stream Point 1	0.25 mi	2022
NEP-D	Saline Branch Northeast Plant Downstream High Cross Road	40.139694, -88.162941	UCSD NE Stream Point 2	2.2 mi	2022
RNT-U	Salt Creek Ditch Rantoul Upstream Plant Grounds	40.31571, -88.12234	Rantoul WWTP Upstream	0.15 mi	2022
RNT-D	Salt Creek Ditch Rantoul Downstream Township 178E	40.31240, -88.11739	Rantoul WWTP Downstream	0.30 mi	2022
*Proposed Copper Slough monitoring site locations may change after stream restoration project completed.					

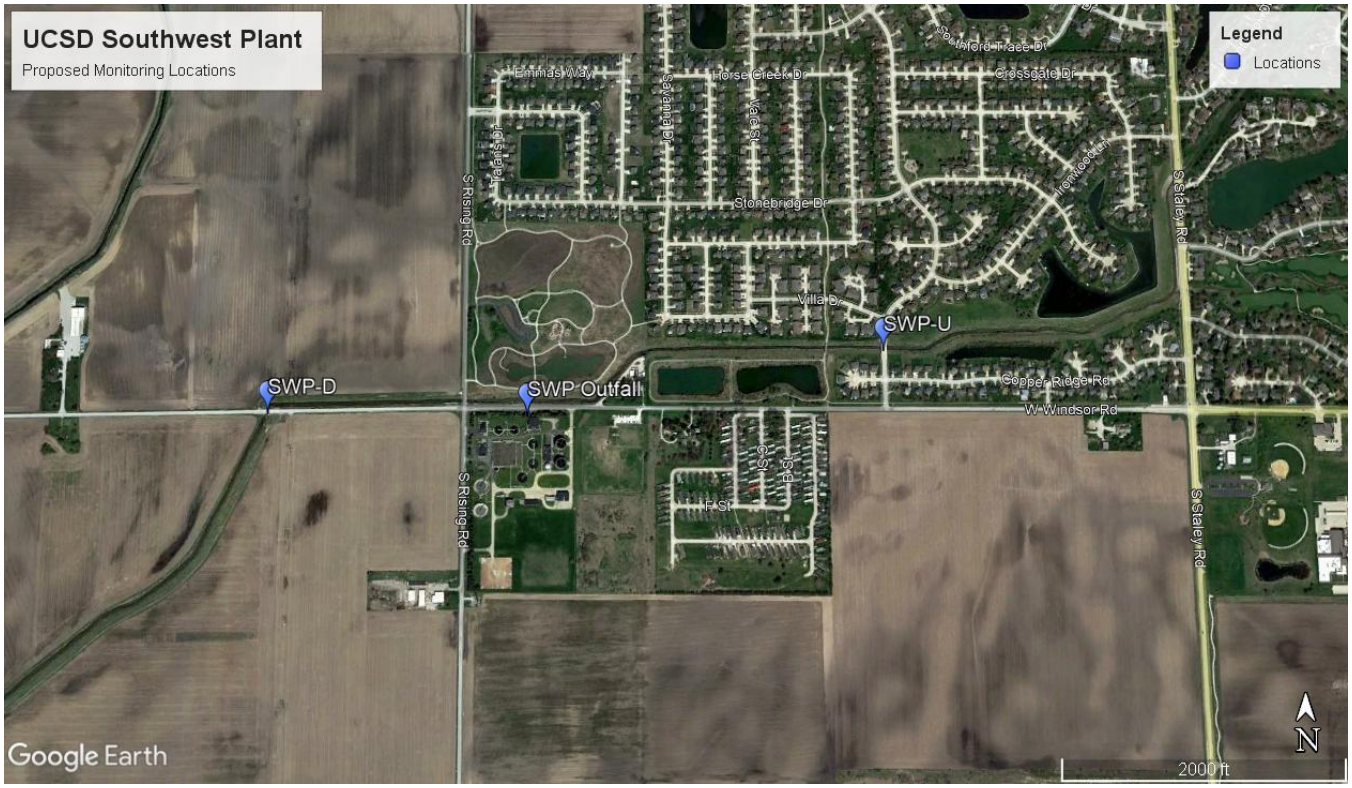


Figure 5. UCSD Southwest Plant Monitoring Locations

4.2.1 UCSD Southwest Plant Monitoring Location Information

Monitoring will begin in summer 2023 after changes in plant operations and a stream restoration project are in place. The proposed sites may be modified based on outcomes of construction. The upstream site is about 0.5 miles from the outfall with no significant point or nonpoint sources between. The downstream monitoring site on Copper Slough is approximately 0.4 miles from the outfall, which enters the stream from the bank and travels over a series of rocks to agitate the water to increase mixing. There is a bend in the river that also enhances mixing. Between the proposed site and where Copper Slough joins the Kaskaskia River stream access is not possible. This site represents the best chance of capturing the initial impact of the effluent on Copper Slough, as water quality at potential sites further downstream will have significant influence from another watershed and its point and nonpoint sources, therefore it will not be feasible to determine where the population of algae got its nutrients. However, the data collected at this site can be used in a predictive model to estimate the potential impact to downstream water quality.

Figure 6. UCSD Northeast Plant Monitoring Locations

4.2.2 UCSD Northeast Plant Monitoring Location Information

Monitoring in the Saline Branch will begin in May 2022. The upstream site is located on plant property, approximately 0.25 miles from the outfall, which enters the stream from the side and passes over rocks and concrete to agitate the water and enhance mixing. The stream channel has some sinuosity and traverses multiple bends before reaching the downstream sample site approximately 2.2 miles downstream. UCSD has historically monitored at this site. The proposed site represents an ideal location for capturing the impact of the effluent on water quality in the Saline Branch. Data from this site can be used in a predictive model to estimate the impact on downstream water quality.

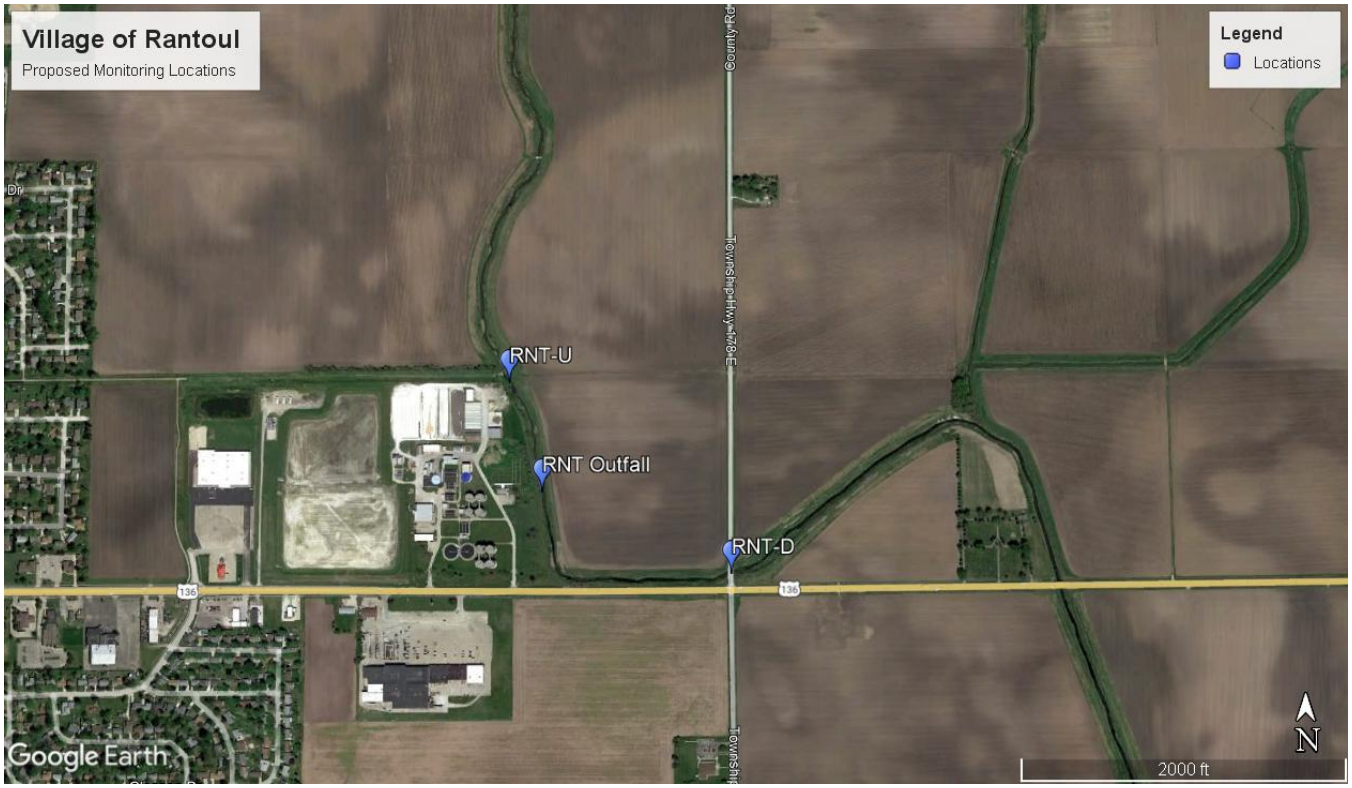


Figure 7. Village of Rantoul Monitoring Locations

4.2.3 Village of Rantoul Plant Monitoring Location Information

Monitoring on the Salt Fork Drainage Ditch will begin in May 2022 and continue through October. The upstream site is located approximately 0.15 miles from the outfall, which enters the stream from the side and is agitated by passing over rock. The downstream site is approximately 0.3 miles away from the outfall and traverses a significant bend in the stream and follows a somewhat sinuous channel. Streamflow and effluent at the sampling location will be fairly well mixed. This location represents the best chance of capturing the initial impact on water quality, as it avoids impacts from downstream tributaries and point and nonpoint sources, yet it is far enough away from the outfall to observe impacts on the aquatic community in the stream. Because there is no technically feasible method of determining from what source a far downstream algal population's nutrients came, a predictive model incorporating data from this site can be developed to estimate impacts on the aquatic community.

4.3 Sampling and Analyses

Sampling will be identical at each site unless circumstances arise that require a modification in protocol. Industry standard and manufacturer protocols for calibration, maintenance, data collection, and analysis will be followed and documented.

4.3.1 Hydrology Data

Stream stage and discharge data will be collected at each site (Table 6). If a sufficient range of flows is captured with monitoring, a rating curve can support estimates of watershed loading which could support watershed characterization and NARP development.

Table 6. Hydrology Parameters

Parameter	Collection Type	Frequency	Instrument/Method
Stream Stage	Continuous Probe	Continuous	Vented Pressure Transducer
Discharge	Manual	Bi-weekly, with additional storm samples	Digital Electromagnetic Flow Meter + wading staff or ADCP

4.3.2 Water Quality Data

Multiparameter sondes with integrated sensor wipers to reduce biofouling will be installed at each site and will collect data (Table 7) at a continuous 15-minute interval. Sondes will be left in place for multi-week deployments and will be serviced and/or calibrated no less frequently than every 30 days using manufacturer protocols. Multiparameter sondes manufactured by In-Situ instruments and YSI will be deployed for the water quality sampling. Grab samples and in-situ water quality measurements will be collected to augment the sonde monitoring data and will support quality assurance of sensor data and provide additional parameters useful for the NARP assessment. Grab samples will be collected on a bi-weekly frequency (Table 7) and 40 CFR Part 136 procedures will be followed and will include using laboratory-provided bottles with appropriate preservative, adherence to recommended holding times and conditions for samples, and daily duplicates for quality control. Where appropriate, a depth integrated, isokinetic sampler will be used for collection. Grab samples will be analyzed in-house at USCD and Rantoul laboratories, with chlorophyll *a* samples being sent to an accredited environmental laboratory.

Table 7. Water Quality Parameters

Parameter	Collection Type	Frequency	Method	Method Identifier
Dissolved Oxygen	Continuous Probe	Continuous	Optical	InSitu: EPA approved method YSI: ASTM D888-09
	Handheld Meter	Bi-weekly, Storm	Optical	ASTM D888-09
pH	Continuous Probe	Continuous	Potentiometric	EPA 150.2
	Handheld Meter	Bi-weekly, Storm	Potentiometric	EPA 150.2
Water Temperature	Continuous Probe	Continuous	Thermistor	EPA 170.1
	Handheld Meter	Bi-weekly, Storm	Thermistor	EPA 170.1
Chlorophyll-a	Continuous Probe	Continuous	In-situ Optical Fluorescence	Instrument Manufacturer Optical Method
	Grab	Bi-weekly, Storm	Lab Spectrophotometric	EPA 445.0
Total Phosphorus	Grab	Bi-weekly, Storm	Colorimetry	EPA 365.1 / EPA 365.3
Orthophosphate	Grab	Bi-weekly, Storm	Colorimetry	EPA 365.1 / EPA 365.3
Conductivity	Continuous Probe	Continuous	Resistor Network	EPA 120.1
	Handheld Probe	Bi-weekly, Storm	Resistor Network	EPA 120.1

5 Data Management & Quality Control

Data will be downloaded from each logger at each site visit and will be maintained in a relational Microsoft Access database or Microsoft Excel spreadsheet. Continuous data will be corrected for drift using the statistical software R, package driftR[3] using a standard procedure based on instrument calibration.

[3] https://rdocumentation.org/packages/driftR/versions/1.1.0

APPENDIX B: WATER QUALITY DATA

NEP NARP DATA

Upstream

Sample Date	5/13/2022	5/23/2022	6/8/2022	6/22/2022	7/7/2022	7/21/2022	8/4/2022	8/17/2022	8/31/2022	9/15/2022	9/19/2022 (Storm Event)	9/29/2022	10/13/2022	10/26/2022 (Storm Event)	10/27/2022
Sample Time	14:30	10:25	12:55	14:20	12:35	12:53	13:35	12:50	13:15	13:15	9:10	13:15	12:49	10:23	14:15
Dissolved Oxygen, mg/L	11.8	9.3	9.05	9.34	7.54	8.73	7.03	9.28	7.29	7.93	7.47	9.64	7.51		8.38
pH	7.64	7.31	7.39	7.70	7.66	7.30	7.49	7.78	7.64	7.31	7.41	7.67	6.77		7.54
Temperature °C	23.0	16.0	19.3	25.4	25.1	25.7	24.6	23.7	23.9	22.9	21.4	16.4	13.6		12.4
Chlorophyll-a, mg/m3	8.3	3.4	3.3	5.4	9.6	4.6	7.4	11	17	< 1.0	NA	3.4	1.5		8.2
T-PO4-P, mg/L	0.06	0.03	0.06	0.06	0.11	0.11	0.07	0.11	0.14	0.08	0.26	0.08	0.14	0.18	0.08
o-PO4-P, mg/L	< 0.03	< 0.03	< 0.03	< 0.03	0.05	0.05	0.04	0.07	< 0.03	0.07	0.09	0.04	0.06	0.13	0.05
Chloride, mg/L	59	54	55	50	65	103	64	117	71	102		113	67		68
Conductivity, µS/cm	-	720	810	660	720	870	480	930	530	820	270	920	570		560

Downstream Highcross Road

Sample Date	5/13/2022	5/23/2022	6/8/2022	6/22/2022	7/1/2022	7/8/2022	7/13/2022	7/21/2022	7/28/2022	8/4/2022	8/10/2022	8/17/2022	8/24/2022	8/31/2022	B	B	B	B	B	B
Sample Time	14:50	10:45	13:26	13:50	14:08	9:00	12:52	12:33	8:25	13:25	13:00	12:38	11:24	12:45	R	R	R	R	R	R
															I	I	I	I	I	I
Dissolved Oxygen, mg/L	11.4	9.8	9.74	9.15	9.96	6.99	8.76	7.51	7.85	7.39	9.09	8.17	8.36	7.98	D	D	D	D	D	D
															G	G	G	G	G	G
pH	7.98	7.67	8.07	8.08	8.04	7.41	7.94	8.02	7.80	7.95	8.12	8.01	7.73	7.94	E	E	E	E	E	E
Temperature °C	21.8	15.1	20.2	25.0	25.3	22.2	23.1	25.8	22.4	25.7	22.4	22.8	21.9	23.0						
															O	O	O	O	O	O
Chlorophyll-a, mg/m3	7.7	3.7	1.6	6.4	NA										U	U	U	U	U	U
															T	T	T	T	T	T
T-PO4-P, mg/L	0.43	0.29	0.55	0.58	0.68	0.59	1.92	1.7	0.88	0.60	1.12	1.56	1.46	0.60						
o-PO4-P, mg/L	0.34	0.23	0.51	0.51	0.59	0.49	1.9	1.6	0.88	0.52	0.95	1.46	1.36	0.48						
Chloride, mg/L	70	63	74	74																
Conductivity, µS/cm	-	710	810	830																
						Rain														

Downstream Cottonwood

Sample Date	7/7/2022	7/21/2022	8/4/2022	8/17/2022	8/31/2022	9/15/2022	9/19/2022	9/29/2022	10/13/2022	10/26/2022	10/27/2022
Sample Time	12:20	12:20	13:10	12:25	13:00	12:05	8:50	13:39	12:35	10:36	13:42
Dissolved Oxygen, mg/L	8.12	8.37	7.38	9.66	7.97	8.57	7.76	9.91	8.71		9.12
pH	7.68	8.07	7.86	8.18	7.96	7.58	7.74	7.97	7.75		7.71
Temperature °C	24.7	26.9	25.4	24.2	24.4	22.5	21.7	18.6	14.8		13.4
Chlorophyll-a, mg/m3	6.2	2.3	6.3	5.0	28	1.0	NA	2.2	1.7		4.3
T-PO4-P, mg/L	0.81	1.8	0.60	1.60	0.55	1.3	0.58	2.02	1.84	0.42	0.60
o-PO4-P, mg/L	0.73	1.7	0.52	1.42	0.36	1.2	0.26	1.98	1.92	0.34	0.60
Chloride, mg/L	122	159	61	124	85	113		111	83		77
Conductivity, µS/cm	1020	1130	510	1010	620	930	240	930	730		640

UCSD 2023

NEP NARP DATA

Upstream Former USGS Station

Sample Date	6/30/2023	7/10/2023	7/26/2023	8/7/2023	8/24/2023	9/5/2023	9/19/2023
Sample Time	8:45 AM	10:15 AM	10:40	1:05 PM	8:25 AM	8:55 AM	2:17 PM
Dissolved Oxygen, mg/L	5.83	7.55	6.47	7.68	6.14	6.84	9.96
pH	7.37	7.69	7.61	6.96	7.50	7.46	7.85
Temperature ^{o}C	20.9	22.6	24.2	21.8	24.0	22.3	20.2
Chlorophyll-a, mg/m3	< 1.0	< 1.0	2.0	3.5	< 1.0	1.2	< 1.0
T-PO4-P, mg/L	0.09/0.09* *Rerun	0.07	0.14	0.13	0.12	0.10	0.10
o-PO4-P, mg/L	0.10	0.07	0.09	0.06	0.09	0.14	0.08
Ammonia, mg/L	0.12	0.15	0.17	0.06	0.08	0.10	0.06
TKN, mg/L	1.3	1.3	1.3	1.0	1.1	1.2	0.7
Nitrate, mg/L	0.82	2.20	0.71	0.56	0.56	0.45	0.63
Conductivity, µS/cm	510	650	830	310	860	880	900

Downstream Cottonwood Rd.

Sample Date	6/30/2023	7/10/2023	7/26/2023	8/7/2023	8/24/2023	9/5/2023	9/19/2023
Sample Time	8:23 AM	10:00 AM	10:25 AM	12:50 PM	8:05 AM	8:40 AM	1:50 PM
Dissolved Oxygen, mg/L	6.18	7.69	7.62	7.83	6.45	6.83	10.34
pH	7.54	7.80	7.94	7.57	7.72	7.69	7.94
Temperature ^{o}C	20.9	22.1	25.2	21.9	25.4	23.4	20.9
Chlorophyll-a, mg/m3	< 1.0	< 1.0	1.6	4.1	< 1.0	1.8	< 1.0
T-PO4-P, mg/L	1.46	0.67	1.25	0.33	1.28	1.60	1.60
o-PO4-P, mg/L	1.31	0.62	1.14	0.23	1.17	1.35	1.46
Ammonia, mg/L	0.12	0.15	0.09	0.06	0.15	0.06	0.06
TKN, mg/L	1.1	0.9	1.1	1.0	2.1	0.7	1.0
Nitrate, mg/L	6.5	6.0	14.1	2.28	14.6	19.5	18.0
Conductivity, µS/cm	560	690	990	330	900	870	810

APPENDIX C: NARP SPECIAL PERMIT CONDITION

SPECIAL CONDITION 21. The Agency has determined that the Permittee's treatment plant effluent is located upstream of a waterbody or stream segment that has been determined to be at risk of eutrophication. This determination was made upon reviewing available information concerning the characteristics of the relevant waterbody/segment and the relevant facility (such as quantity of discharge flow and nutrient load relative to the stream flow).

A waterbody or segment is at risk of eutrophication if there is available information that plant, algal or cyanobacterial growth is causing or will cause violation of a water quality standard.

The Permittee shall develop, or be a part of a watershed group that develops, a Nutrient Assessment Reduction Plan (NARP) that will meet the following requirements:

A. The NARP shall be developed and submitted to the Agency by December 31, 2024 with progress report submitted semi-annually. This requirement can be accomplished by the Permittee, by participation in an existing watershed group or by creating a new group. The NARP shall be supported by data and sound scientific rationale. Annual Progress Reports shall be submitted to the Agency starting 12 months from the effective date of the permit and every 12 months thereafter until completion of the NARP.

B. The Permittee shall cooperate with and work with other stakeholders in the watershed to determine the most cost-effective means to address the phosphorus related impairment. If other stakeholders in the watershed will not cooperate in developing the NARP, the Permittee shall develop its own NARP for submittal to the Agency to comply with this condition.

C. In determining the target levels of various parameters necessary to address the phosphorus related impairment, the NARP shall either utilize the recommendations by the Nutrient Science Advisory Committee or develop its own watershed-specific target levels.

D. The NARP shall identify phosphorus input reductions by point source discharges and non-point source discharges in addition to other measures necessary to remove phosphorus related impairments in the watershed. The NARP may determine, based on an assessment of relevant data, that the watershed does not have an impairment related to phosphorus, in which case phosphorus input reductions or other measures would not be necessary. Alternatively, the NARP could determine that phosphorus input reductions from point sources are not necessary, or that phosphorus input reductions from both point and nonpoint sources are necessary, or that phosphorus input reductions are not necessary and that other measures, besides phosphorus input reductions, are necessary.

E. The NARP shall include a schedule for the implementation of the phosphorus input reductions by point sources, non-point sources and other measures necessary to remove phosphorus related impairments. The NARP schedule shall be implemented as soon as possible, and shall identify specific timelines applicable to the Permittee.

F. The NARP can include provisions for water quality trading to address the phosphorus related impairments in the watershed. Phosphorus/Nutrient trading cannot result in violations of water quality standards or applicable antidegradation requirements.

G. The Permittee shall request modification of the permit within 90 days after the NARP has been completed to include necessary phosphorus input reductions identified within the NARP. The Agency will modify the NPDES permit, if necessary.

H. If the Permittee does not develop or assist in developing the NARP, and such a NARP is developed for the watershed, the Permittee will become subject to effluent limitations necessary to address the phosphorus related impairments. The Agency shall calculate these effluent limits by using the NARP and any applicable data. If no NARP has been developed, the effluent limits shall be determined for the Permittee on a case-by-case basis, so as to ensure that the Permittee's discharge will not cause or contribute to violations of the dissolved oxygen or narrative water quality standards.

SPECIAL CONDITION 21 – DETAILS OF COMPLIANCE WITH PERMIT REQUIREMENTS

Below is a summary of responsiveness to each subpart of the NARP special condition.

A. Progress reports have been submitted semi-annually to date. The UCSD participates in the existing Salt Fork watershed group. Progress reports will continue to be submitted annually as required. Extensive monitoring, watershed modeling and scientific analysis performed to support NARP activities as detailed in this report.
B. UCSD has worked with Salt Fork watershed group throughout. There is no phosphorus-related impairment on the Saline Branch.
C. There is no phosphorus-related impairment on the Saline Branch as indicated by any recent 303(d) list and supported by monitoring. Input reductions planned will reduce the risk of eutrophication and potential for a TP-related impairment.
D. There is no phosphorus-related impairment on the Saline Branch. However, UCSD has committed to point-source reductions at the Northeast WWTP and has pledged to actively support NPS phosphorus reductions in the watershed.
E. A timeline is provided in Section 4.3 of this report.
F. Trading is not proposed.
G. Permit modification is not necessary, as input reduction requirements of 0.5 mg/L TP effluent limit are already in place.
H. Submitted NARP satisfies this condition.

APPENDIX D: STAKEHOLDER ENGAGEMENT

SALT FORK WATERSHED GROUP MEETINGS

Meeting minutes are available upon request

- 2019 December 12:
  - Discussed NARP requirements and that the UCSD NE Plant will likely be subject to Special Condition
- 2020 March 05:
  - Discussed NARP triggers and the reasons for NARP parameters of interest. Reminded group that UCSD will likely be required to complete a NARP for the Saline Branch and that public participation is a key element of the process.
- 2020 June 06:
  - Confirmed NARP was in UCSD NE Plant NPDES permit and discussed public participation and the watershed group's involvement.
- 2020 September 03:
  - Discussed NARP elements and its potential implementation.
  - **Formally requested the Salt Fork watershed group to be partners/stakeholders in NARP development.**
- 2020 December 12:
  - Discussed plans for the NARP study. Again, reminded the group that stakeholder involvement is important and that UCSD has asked for involvement from the Salt Fork group.
- 2021 June 03:
  - UCSD Gave update and overview of NARP requirements.
- 2021 September 02:
  - UCSD on agenda to discuss NARP – meeting cancelled.
- 2021 December 02:
  - Discussion of NARP requirements, request to watershed group with regards to being involved in the NARP.
  - Discussed UCSD's proactive approach of improving effluent chemistry to help stream ecosystems.
- 2022 March 03:
  - UCSD gave a detailed overview of NARP requirements for new group members.
  - Discussed first steps toward NARP compliance, including a study on risk of eutrophication in the Saline Branch.
  - Committee members agreed that the watershed group will engage and provide input.
- 2022 June 02:
  - **Provided overview of the NARP process and the UCSD NE Plant NARP monitoring plan to determine the extent of risk of eutrophication or impairment in the Saline Branch and how to proceed with TP reductions if necessary.**
  - **UCSD asked watershed group for feedback and input on the goals of the monitoring plan and the proposed steps toward compliance with the NARP NPDES special condition.**

- 2022 September 01:
    - Gave update on NARP study progress, noted that results would be shared soon.
    - Discussed data collection and QA/QC measures in place for the study.
- 2022 December 01:
    - Gave brief update on NARP study.
- 2023 March 13:
    - **Gave comprehensive update and results of 2022 program for UCSD Northeast Plant (Saline Branch) and Village of Rantoul (Salt Fork Drainage Ditch).**
    - **Requested feedback and discussion occurred with participants.**
    - **Discussed plans for additional monitoring in 2023.**
    - **Slide presentation including data was distributed to participants.**
- 2023 June 01:
    - Provided update that 2023 supplementary monitoring would be beginning in July 2023.
- 2023 September 07:
    - Provided general NARP update for UCSD NE Plant data collection.
- 2023 December 07:
    - Provided general NARP update for UCSD NE Plant data collection.
- 2024 March 07:
    - **Provided comprehensive presentation on monitoring results.**
    - **Requested feedback on NARP monitoring results.**
    - **Provided preliminary NARP conclusions including proposed NARP actions such as proceeding with effluent phosphorus reductions and encouraging additional watershed planning.**
- 2024 June 06
    - Provided update on NARP report progress.
- 05 December 2024
    - Present final NARP report to Salt Fork Watershed Group at quarterly meeting.

SALT FORK WATERSHED GROUP PARTICIPANT LIST AS OF MARCH 2023

Names have been redacted for privacy. The individuals on this list receive quarterly meeting announcements and other correspondence. Other individuals not on this list frequently participate in meetings.

1. City of Champaign
2. Illinois DNR
3. UCSD
4. City of Urbana
5. Illinois DNR
6. Prairie Rivers Network
7. Danville Sanitary District
8. Resident
9. Urbana Park District
10. Village of Rantoul
11. Prairie Rivers Network
12. Farnsworth Group
13. University of Illinois
14. Resident
15. NRCS
16. Village of Rantoul
17. Illinois EPA
18. Krukewitt Farms
19. Resident, Farmer
20. Vermilion County SWCD
21. Resident, Farmer
22. University of Illinois
23. Champaign County Forest Preserve District
24. Sierra Club
25. Vermilion County SWCD
26. Danville Sanitary District
27. City of Champaign
28. USGS
29. UCSD
30. Resident
31. Audubon Society
32. Illinois DNR
33. Illinois EPA
34. UCSD
35. Champaign County SWCD

UCSD BOARD OF TRUSTEES PUBLIC MEETINGS

- Staff and consultants of the UCSD have presented at the monthly Board of Trustees public meetings on numerous occasions. Highlights include:
    - 03 January 2023 – Presented 2022 monitoring data and preliminary findings from six months of monitoring. Presented an overview of next steps toward NARP compliance and a plan for continuing monitoring.
    - 05 March 2024 – Presented results of 2022 and 2023 monitoring data. Discussed key takeaways and presented a preliminary strategy toward NARP compliance activities.
    - 07 November 2024 – Presented a final NARP report to Board of Trustees at public meeting.
- The UCSD regularly updates a NARP section on its public website, www.u-csd.com/207/UCSD-Projects.