

# 2024 Annual Report

## Clear Creek / Standley Lake Watershed Agreement



*August 27, 2025*

# 2024 Clear Creek Watershed Annual Report

August 27, 2025

Submitted to the Water Quality Control Commission by:

Black Hawk/Central City Sanitation District  
Central Clear Creek Sanitation District  
Church Ditch Water Authority  
City of Arvada  
City of Black Hawk  
City of Golden  
City of Idaho Springs  
City of Northglenn  
City of Thornton  
City of Westminster  
Clear Creek County  
Clear Creek Skiing Corporation  
Climax Molybdenum Company/Henderson Operations  
Colorado Department of Transportation  
Farmers' High Line Canal and Reservoir Company  
Farmers' Reservoir and Irrigation Company  
Molson Coors Brewing Company  
Gilpin County  
Jefferson County  
St. Mary's Glacier Water and Sanitation District  
Town of Empire  
Town of Georgetown  
Town of Silver Plume  
Upper Clear Creek Watershed Association

*Report photographs contributed by the Cities of Westminster, Thornton, and Northglenn; and the Clear Creek Watershed Foundation.*

Prepared by:  
Hydros Consulting Inc.  
1628 Walnut Street  
Boulder, CO 80302



# 2024

## Highlights

- ***Nutrient loading from the watershed was similar, and Total Suspended Solids loading below average, relative to recent years.***
- ***Due to warm air temperatures, thermal stratification in the lake was less pronounced than is typical, with warmer bottom temperatures.***
- ***Average and maximum chlorophyll a concentrations were the lowest observed, and the average Secchi depth the second-highest observed, over the period 2002-2024***
- ***The chlorophyll a standard for Standley Lake was met in 2024, as it has been every year since the standard was adopted in 2009.***

## CONTENTS

<b>1. The 1993 Agreement .....</b>	<b>2</b>
<b>2. The Setting .....</b>	<b>3</b>
<b>3. Nutrient and TSS Loading .....</b>	<b>6</b>
A. The Upper Basin .....	6
B. The Canal Zone .....	8
C. Standley Lake .....	11
<b>4. Water-Quality Results .....</b>	<b>13</b>
A. The Upper Basin .....	13
B. The Canal Zone .....	14
C. Standley Lake .....	16
<b>5. Summary .....</b>	<b>25</b>
Supplemental Information.....	26
Acronyms .....	26



*Standley Lake Profiler*

## PURPOSE OF REPORT

This report summarizes water quality in Standley Lake and its watershed in 2024, including loading of nutrients and solids to Standley Lake and compliance with the chlorophyll a standard. This document fulfills the reporting requirements set forth in the 1993 Clear Creek Standley Lake Watershed Agreement. Additional information pertaining to the Agreement, monitoring plan, additional water-quality analyses, and monitoring data are included in the Supplemental Information sections.



*Clear Creek Sampling*

## 1. THE 1993 AGREEMENT

In 1993, the Clear Creek/Standley Lake Watershed Agreement (1993 Agreement) was signed by a contingent of governmental and private entities to address water-quality issues and concerns within the Clear Creek watershed, specifically as they affect the water quality in Standley Lake. The 1993 Agreement shaped the Watershed Monitoring Program and has resulted in a long term, robust data set that is used to both monitor the success of water-quality actions and to inform future projects. To continue efforts to protect Standley Lake water quality, a numeric chlorophyll a standard was implemented in 2009.

### ***Chlorophyll a Standard***

*In 2009, the Water Quality Control Commission adopted a numeric chlorophyll a standard for Standley Lake. A 4.0 µg/L chlorophyll a standard was established as a protective measure for this drinking water supply reservoir. The standard is evaluated on an annual basis using the average of the nine monthly averages of observed data for the period from March through November.*



*Standley Lake*

## 2. THE SETTING

### CLEAR CREEK WATERSHED AND THE UPPER BASIN

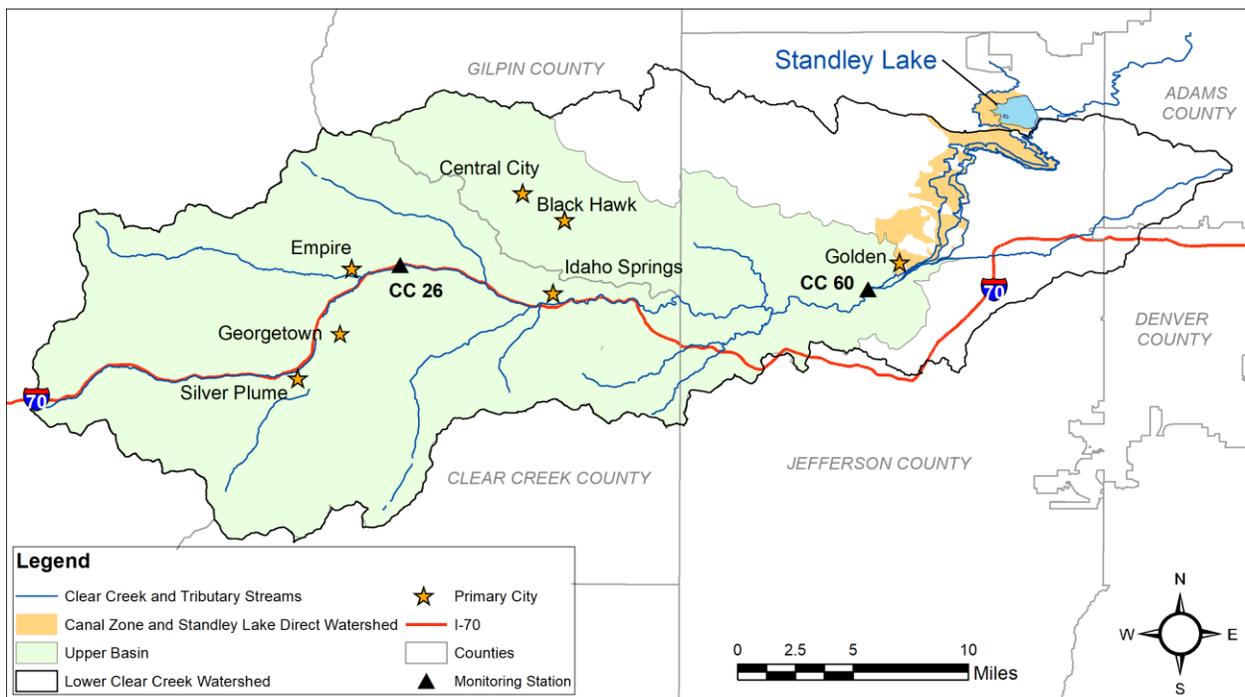


Figure 1. The Standley Lake Watershed: Upper Basin and Canal Zone



Clear Creek

The Upper Clear Creek Watershed covers 450 square miles and is located west of Denver, Colorado, with headwaters at the Continental Divide (Figure 1). The Upper Basin of the watershed is the portion above the headgates for the three canals supplying Standley Lake. It extends from the headwaters downstream to near the City of Golden. In addition to supplying drinking water for 350,000 residents in the watershed (including the Cities of Northglenn, Thornton and Westminster), Clear Creek provides water for recreational, agricultural, and industrial purposes.

## 2. THE SETTING

### CANAL ZONE

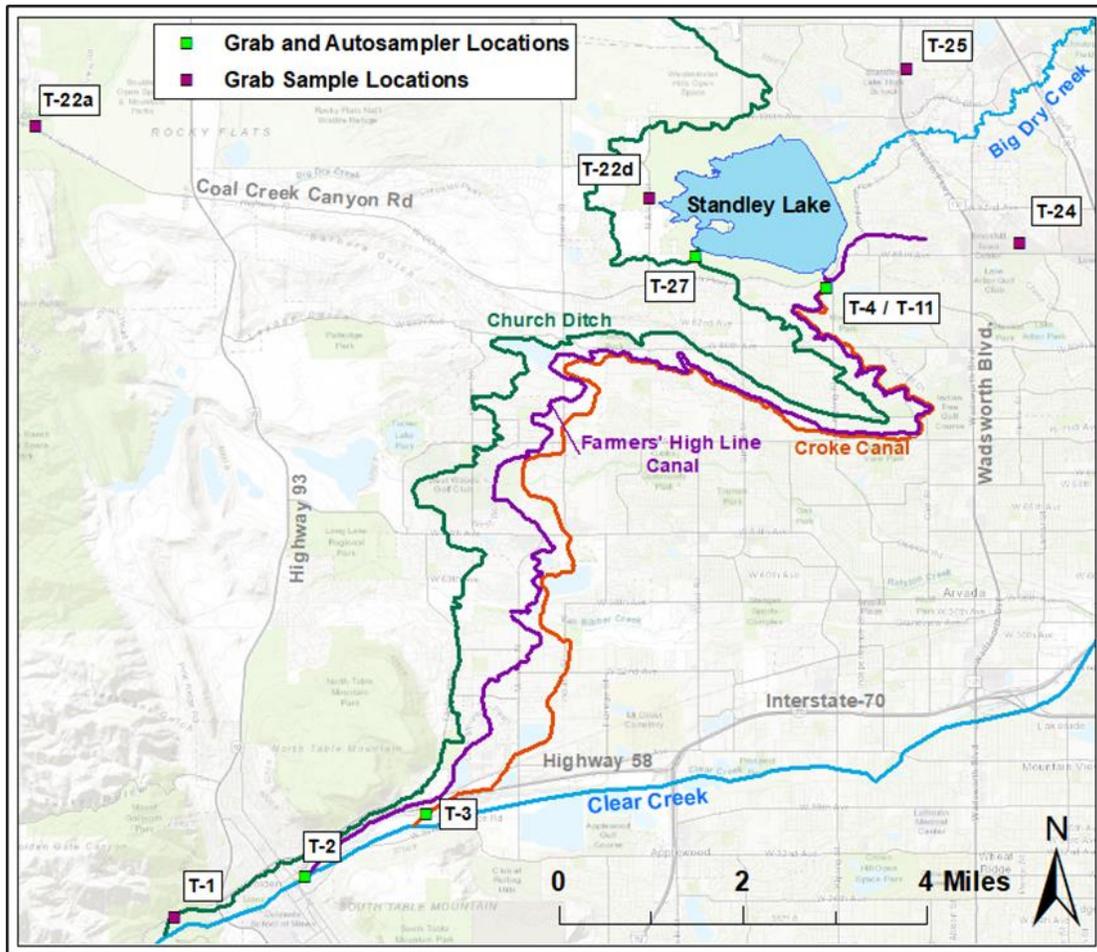


Figure 2. The Canal Zone Showing the Three Canals that Divert Water from Clear Creek to Standley Lake

The Canal Zone is the drainage area that includes three canals that divert water from Clear Creek into Standley Lake: Church Ditch (Church), Farmers' High Line Canal (FHL), and the Croke Canal (Croke) (Figure 2). The three canals are low-gradient, earthen, open, and unlined. In addition, they are subject to nonpoint-source loading from adjacent horse and cattle operations, other agricultural operations, and residential properties (some with on-site wastewater treatment systems, OWTS). To protect Standley Lake water quality, efforts have been made since the 1990s to reduce the majority of storm water inputs/runoff into the Clear Creek canals. As a result, ~80% of stormwater inputs have been hydrologically disconnected from the canals. The Kinnear Ditch Pipeline (KDPL), which provides flow from the Fraser River, South Boulder Creek, and Coal Creek, also contributes water to Standley Lake (< 6%).

## 2. THE SETTING



*Standley Lake*

### STANDLEY LAKE

Standley Lake is a municipal and agricultural reservoir located in Jefferson County, Colorado. Construction of the dam was completed in 1912 and in 1963, the City of Westminster expanded the reservoir to its present storage capacity of 43,000 acre-feet. The reservoir is a direct-use drinking water supply for over 300,000 consumers in Northglenn, Thornton, and Westminster. The reservoir also provides recreation opportunities as well as water to farms located in Adams and Weld counties. It is owned and operated by the Farmers' Reservoir and Irrigation Company (FRICO) and is the third largest reservoir in the Denver metropolitan area, covering approximately 1,200 acres. Standley Lake receives the majority of its inflows from the Clear Creek Watershed via three canals. Through the [Watershed Monitoring Program](#), the lake is monitored regularly during the ice-free period.



*Aerial image of Standley Lake*



*Bobcat and Sandhill Crane near Standley Lake*

### 3A. 2024 NUTRIENT AND TSS LOADING – THE UPPER BASIN

Loading of total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN) in the Upper Basin was quantified in 2024. Two sampling locations were included in this analysis: the upper station (CCAS26/CC26) and the lower station (CCAS59/CC60) (Figure 1). Ambient grab and autosampler data from the two stations were used to quantify nutrient loadings from upstream to downstream and provide an assessment of water quality in the upper watershed. The results are presented in Figures 3-5. TSS loads at the lower site were similar to the 2019-2023 average, but TSS loads at the upper site were notably lower (67%) than the 2019-2023 average. TP loads at both sites were approximately 20% greater than the 2019-2023 average, and TN loads at both sites were very similar (+/- 3%) to the 2019-2023 average.

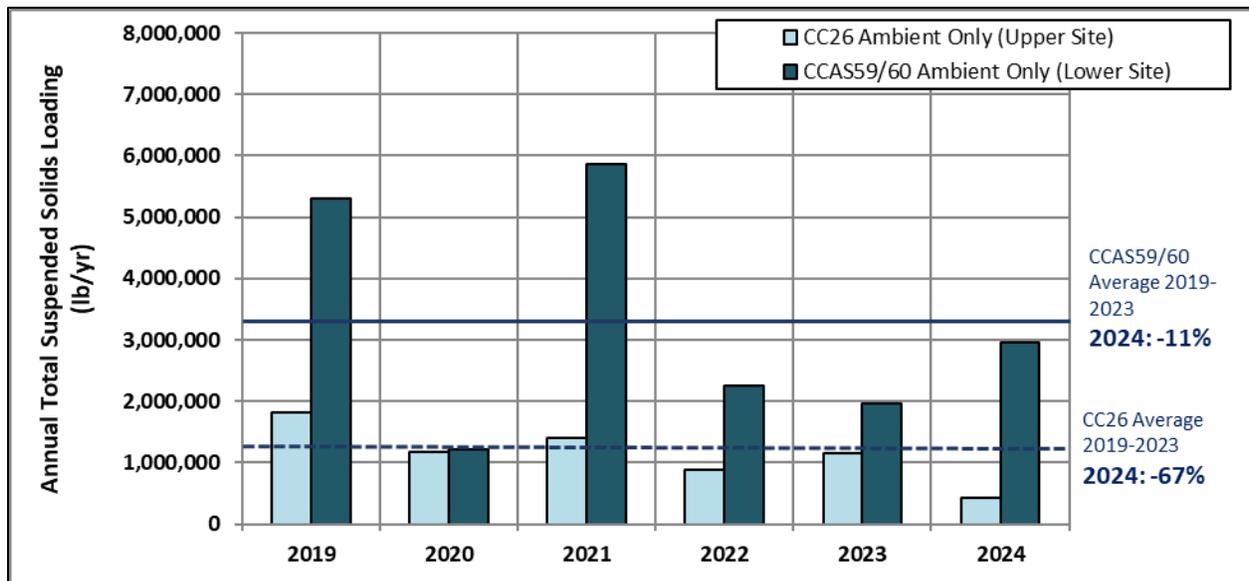


Figure 3. TSS Loads with Percent Change in 2024 for the Upper Station (CCAS26/CC26) and Lower Station (CCAS59/CC60)

### 3A. 2024 NUTRIENT AND TSS LOADING – THE UPPER BASIN

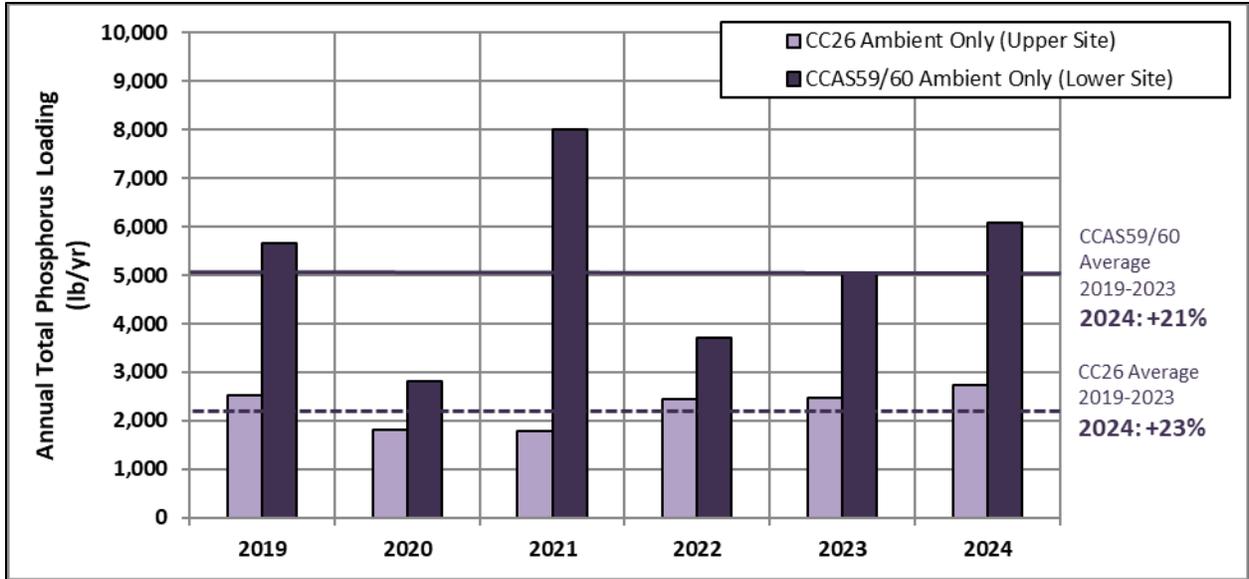


Figure 4. TP Loads with Percent Change in 2024 for the Upper Station (CCAS26/CC26) and Lower Station (CCAS59/CC60)

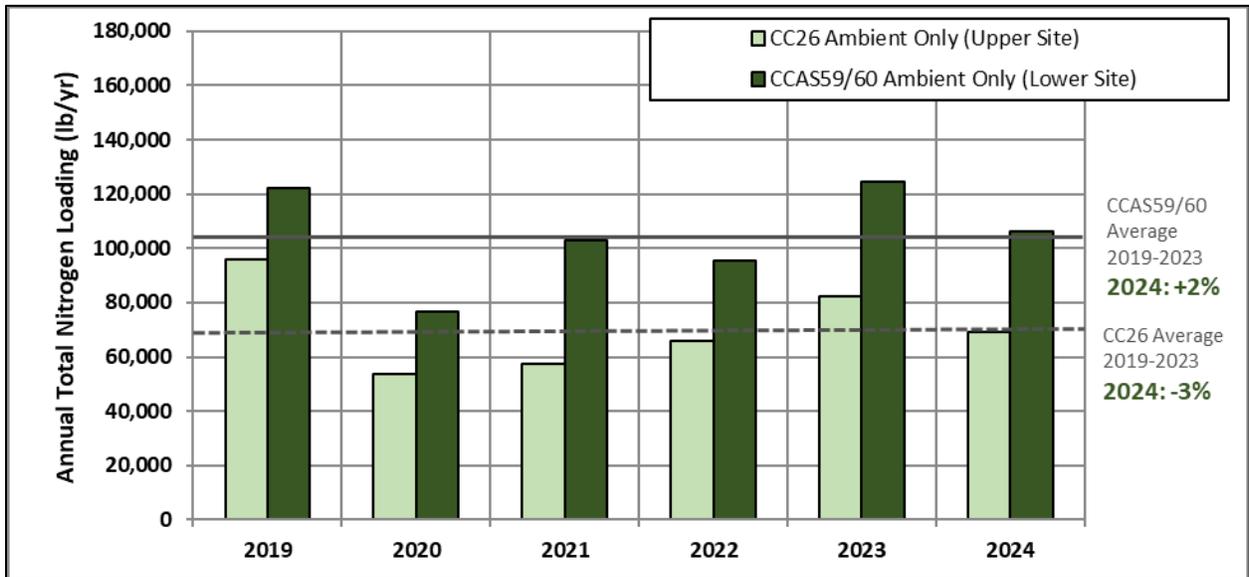


Figure 5. TN Loads with Percent Change in 2024 for the Upper Station (CCAS26/CC26) and Lower Station (CCAS59/CC60)

### 3B. 2024 NUTRIENT AND TSS LOADING – THE CANAL ZONE



*The Croke Canal and FHL Canal, Standley Lake's two largest flow contributors*

Loads for TSS, TP, and TN from the four sources entering Standley Lake are presented in Figures 6-8. Percentages of TSS, TP, and TN load contributions by source are compared to percentages of flow by source in Figure 9. The FHL contributed the largest fraction of the total annual loads to the reservoir for TSS, TP, and TN in 2024 (91%, 68%, and 58%, respectively). This is expected as it is the primary canal used during runoff in spring and it provided 63% of the total annual inflow to the reservoir. The Croke Canal was the second largest contributor of total annual TP and TN loads (23% and 35%, respectively). While the Croke Canal was also the second largest contributor of TSS, this contribution was relatively small (5% of the total).

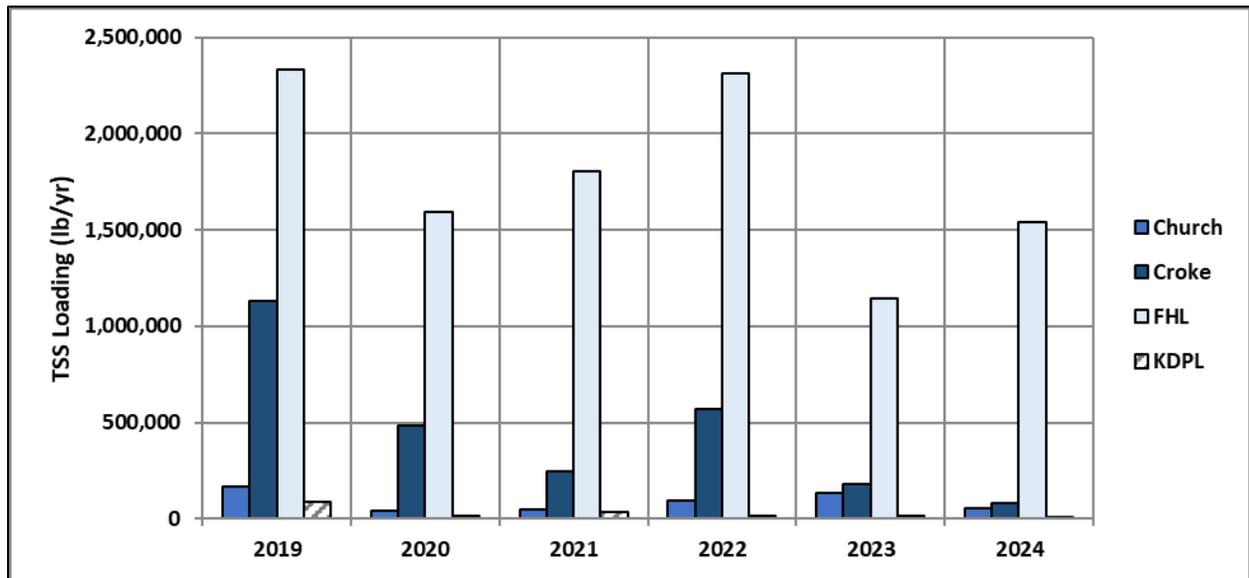


Figure 6. Total Suspended Solids Loading Into Standley Lake by Source, 2019-2024

### 3B. 2024 NUTRIENT AND TSS LOADING – THE CANAL ZONE

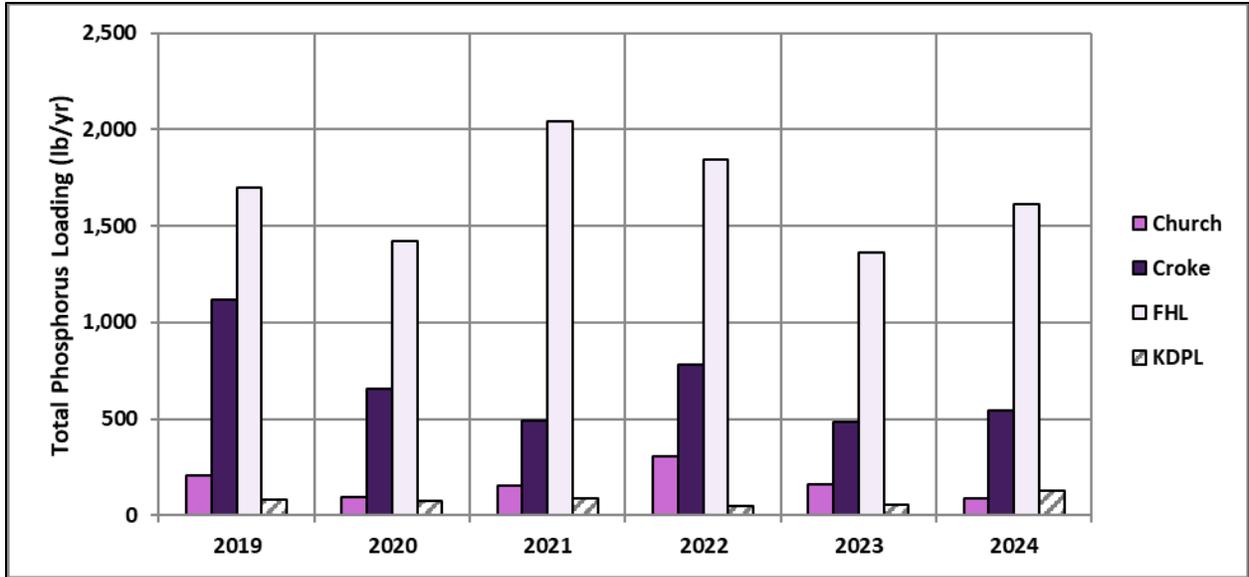


Figure 7. Total Phosphorus Loading Into Standley Lake by Source, 2019-2024

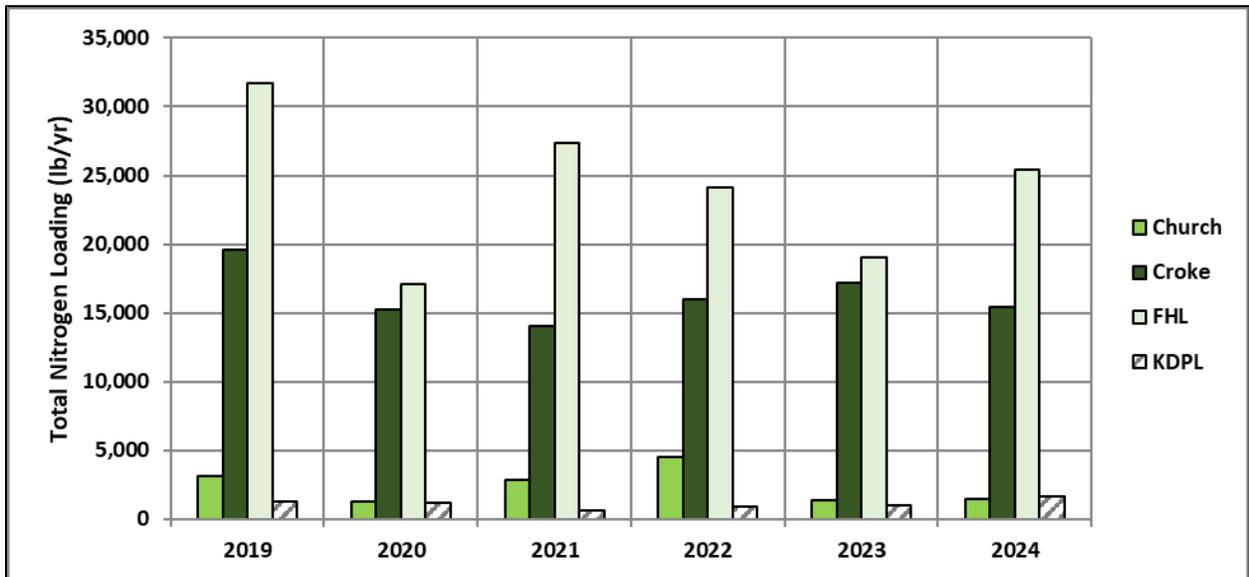


Figure 8. Total Nitrogen Loading Into Standley Lake by Source, 2019-2024

**3B. 2024 NUTRIENT AND TSS LOADING – THE CANAL ZONE**

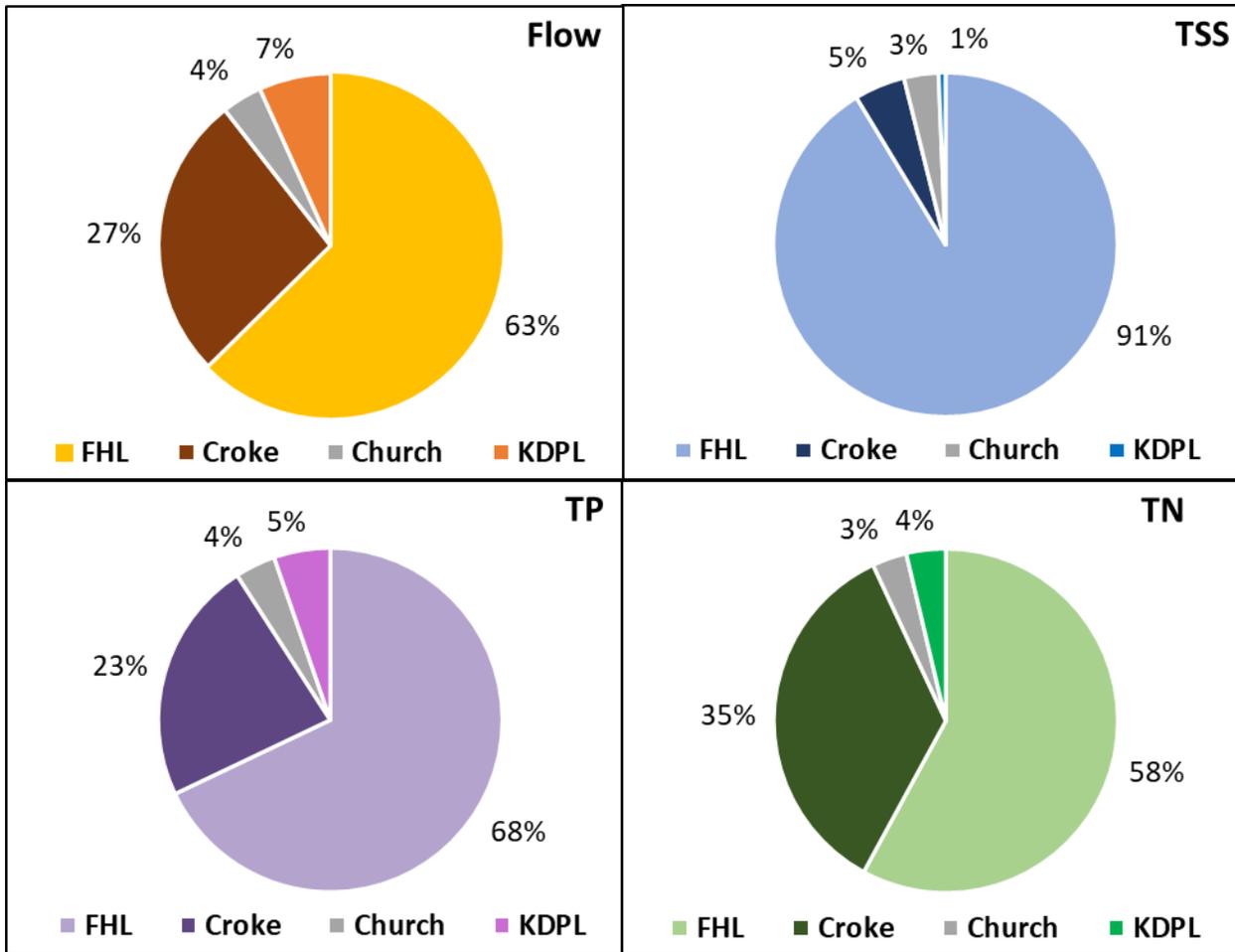


Figure 9. Annual Contributions of Flow, Total Suspended Solids (TSS), Total Phosphorus (TP), and Total Nitrogen (TN) by Each of the Four Sources Entering Standley Lake, 2024

### 3C. 2024 NUTRIENT AND TSS LOADING - STANDLEY LAKE

#### TOTAL SUSPENDED SOLIDS, PHOSPHORUS, AND NITROGEN LOADING INTO AND OUT OF STANDLEY LAKE

Estimated annual TSS TP and TN loads into Standley Lake are presented in Figures 10-12. Total inflow into the lake in 2024 was similar to the 2019-2023 average, but TSS and TP loads into the reservoir in 2024 were 32% and 10% lower than the 2019-2023 average, respectively, while TN loads into the reservoir were equal to the 2019-2023 average. Total outflow from the lake in 2024 was 13% greater than the 2019-2023 average, and TP and TN loads leaving the reservoir were both also greater than the 2019-2023 average (21% and 12% lower, respectively). TSS loads leaving the reservoir were similar to the 2019-2023 average. As expected, loadings of TSS, TP, and TN into the lake were greater than outflow, indicating some level of sediment and nutrient retention.

#### Nutrient Retention in Reservoirs

**Phosphorus** tends to be closely associated with **total suspended solids** through particle-associated transport and tends to be retained with sediment.

**Nitrogen** can be retained through biological uptake and deposition of particulate organic matter to the bottom sediment.

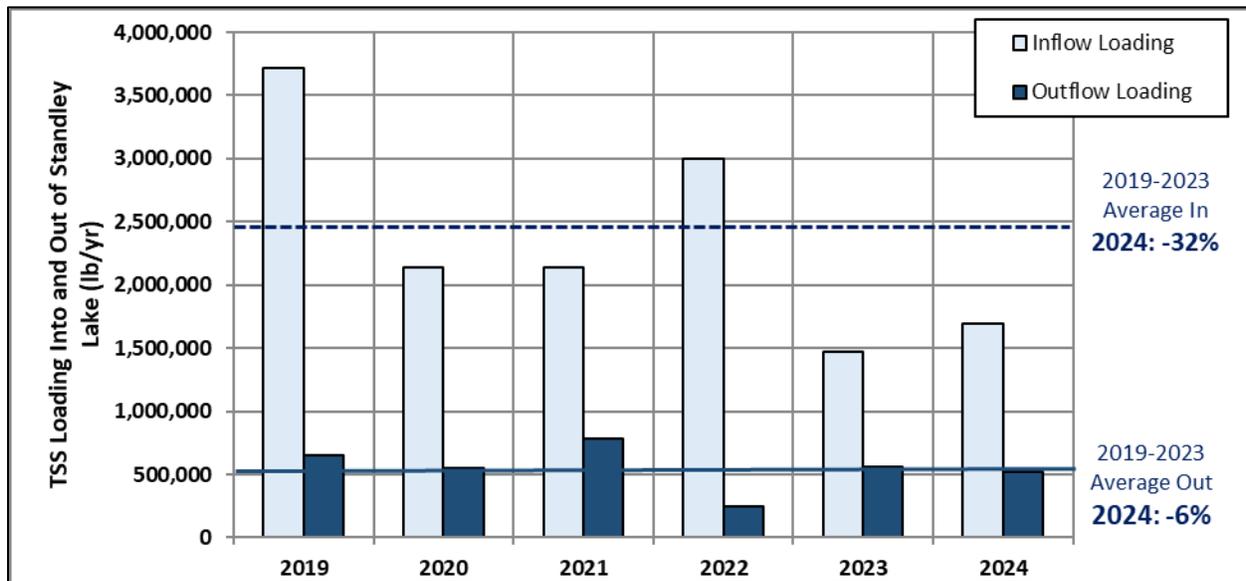


Figure 10. Total Suspended Solids Loading Into and Out of Standley Lake, 2019-2024

### 3C. 2024 NUTRIENT AND TSS LOADING - STANDLEY LAKE

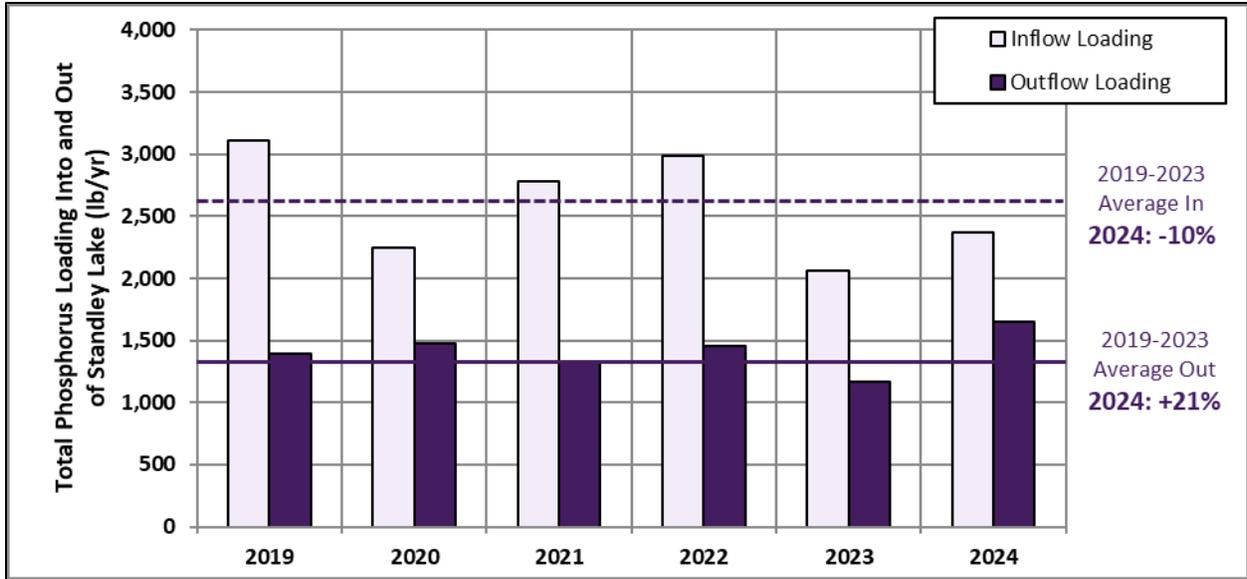


Figure 11. Total Phosphorus Loading Into and Out of Standley Lake, 2019-2024

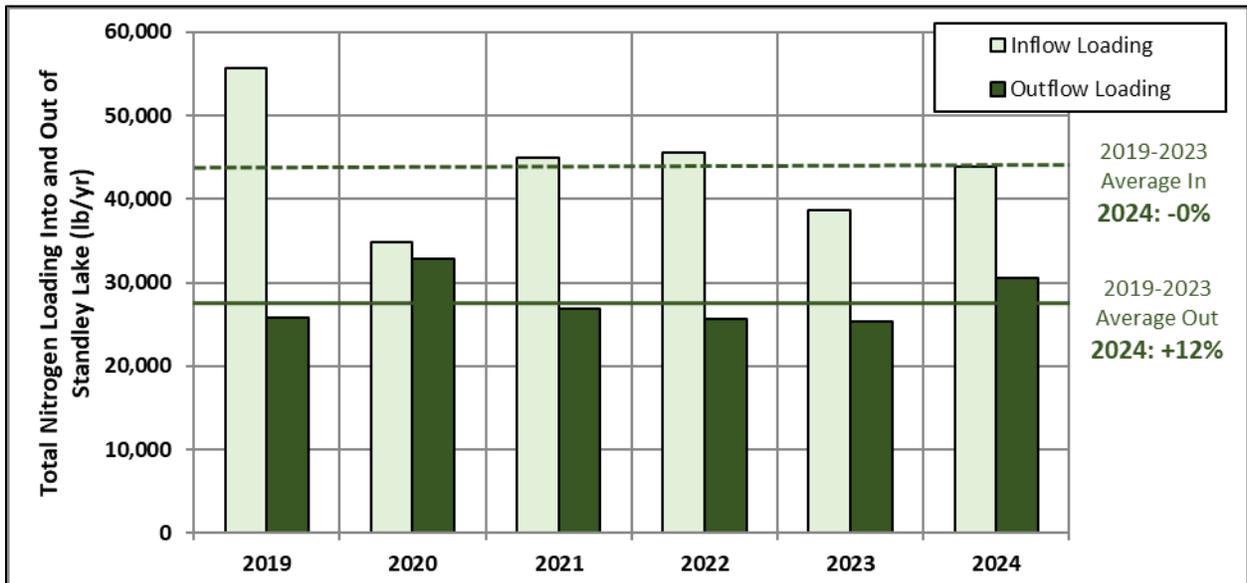


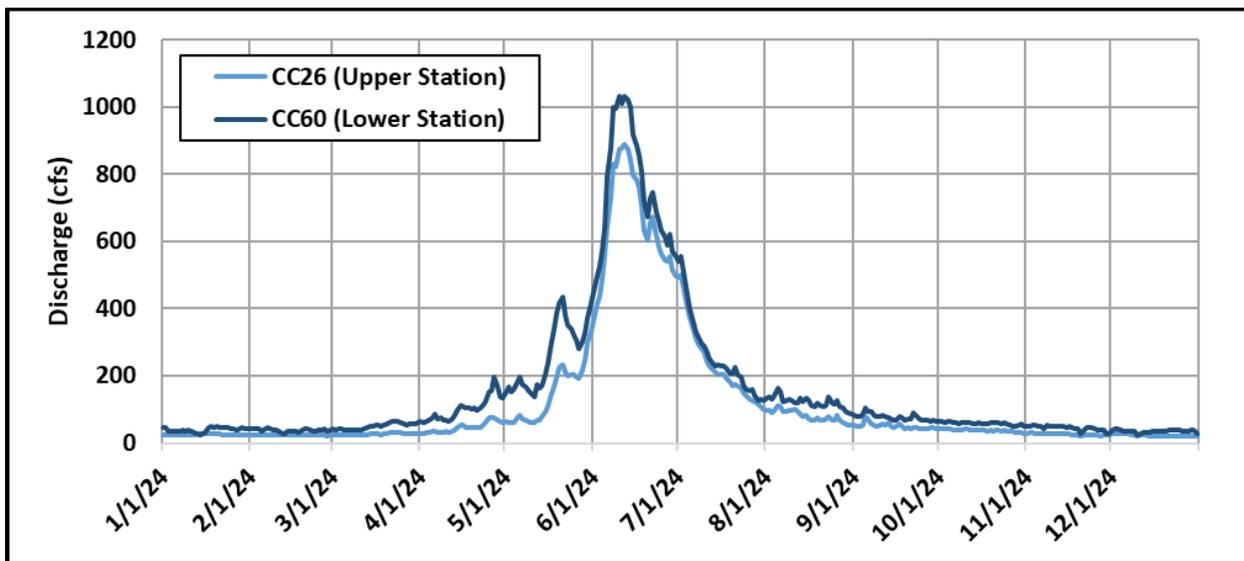
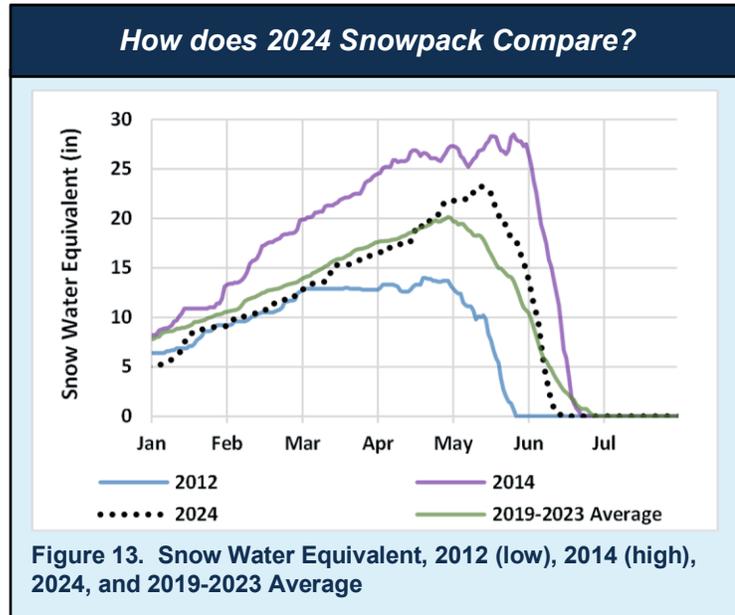
Figure 12. Total Nitrogen Loading Into and Out of Standley Lake, 2019-2024

## 4A. 2024 WATER-QUALITY RESULTS – THE UPPER BASIN

### FLOWS

Snowpack<sup>1</sup> accumulation and melt in 2024 is shown in Figure 13. Peak snowpack in 2024 (23.2 in. Snow Water Equivalent [SWE]) was greater than the 2019-2023 average, and was the highest amount recorded since 2019. Peak snowpack also occurred later than the 2019-2023 average, but the melting period was relatively brief, with snowpack reaching zero on June 15<sup>th</sup>.

Hydrographs from Upper Basin locations CC26 (Clear Creek at Lawson Gage) and CC60 (Clear Creek upstream of the Church headgate, Golden, CO) are shown in Figure 14. Peak runoff occurred on June 10<sup>th</sup>, consistent with the timing of peak runoff in 2020-2022, but earlier than 2019 and 2023 (Supplemental Information – 3). Total annual flow at both the upper and lower stations was very similar to the average of the previous five years (2% and 1% lower, respectively).



<sup>1</sup> Snowpack data from Natural Resources Conservation Service (NRCS) SNOTEL site 602: Loveland Basin (<https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=602>)

## 4A. 2024 WATER-QUALITY RESULTS – THE UPPER BASIN

### CONCENTRATIONS

Upper Basin TP concentrations in 2024 followed typical patterns with higher concentrations during spring runoff. This same pattern was observed for TSS at CCAS59/CC60, but as noted in Section 3A, TSS concentrations were unusually low for the entire year at CC26. Conversely, TN concentrations decreased during peak runoff in June due to the dilution of sources during the higher flow periods and remained lower through the summer. With the exception of TSS at CC26, the annual pattern and range of concentrations for all constituents in 2024 was similar to the previous five years. Volume-weighted average concentrations at both the upper and lower sites were below the 2019-2023 average for TN, near average for TSS, and above average for TP. Measured concentrations and annual volume-weighted concentrations are provided in [Supplemental Information – 3](#).

## 4B. 2024 WATER-QUALITY RESULTS – THE CANAL ZONE

### CANAL ZONE TSS, TP, AND TN CONCENTRATIONS

Results of water-quality analyses for the Canal Zone are highlighted in this section. Constituents for the Farmers' High Line and Croke Canals are the focus because they are the largest contributors of flow to Standley Lake (63% and 27% in 2024, respectively).

In the FHL Canal, TSS and TP increased between the headgate and the entry point to the lake, as is typical (Figure 15 and Figure 16). TSS concentrations in the FHL were similar to 2022 and 2023, and lower than 2019-2021. TP concentrations in the FHL at Standley Lake were greater than 2020-2023, but similar to 2019. TN concentrations did not change substantially through the canal zone, consistent with previous years (Figure 17).

TSS concentrations in the Croke Canal typically increase substantially between the headgate and entry point to the lake (approximately 500% on average from 2019 to 2023). Concentrations did increase between the sites in 2024, but much less than in previous years (Figure 15). Yet, TP concentrations in this reach increased similarly to previous years, which is surprising because patterns in TSS and TP concentrations are typically correlated in the Croke (Figure 15 and Figure 16). Because the majority of TSS loading to Standley Lake arrives via the FHL during the spring and summer months, the unusually low TSS concentrations in the Croke Canal in 2024 did not have a large impact on total annual TSS loading to the lake (Figure 10). TN concentrations decreased slightly between the headgate and the lake, and TN concentrations entering the lake were slightly lower than the previous five years (Figure 17).

## 4B. 2024 WATER-QUALITY RESULTS – THE CANAL ZONE

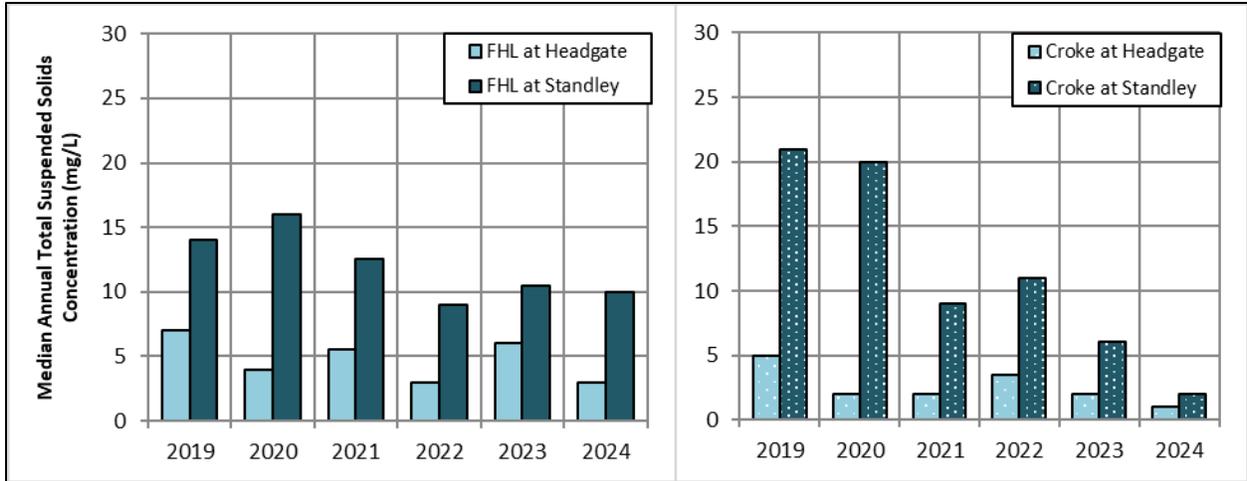


Figure 15. Median Total Suspended Solids Concentrations in FHL (left) and Croke (right) Canals

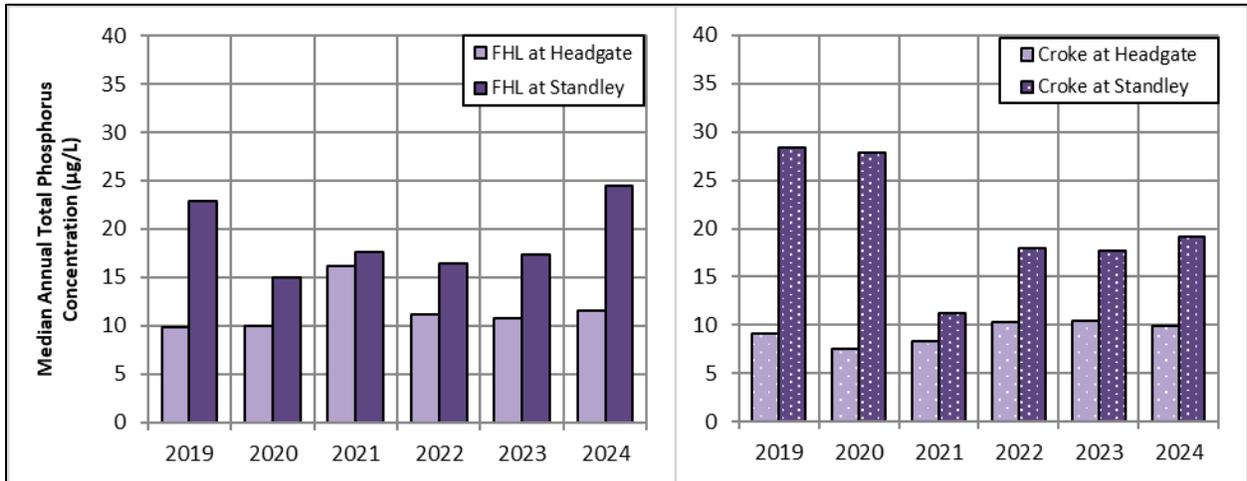


Figure 16. Median Total Phosphorus Concentrations in FHL (left) and Croke (right) Canals

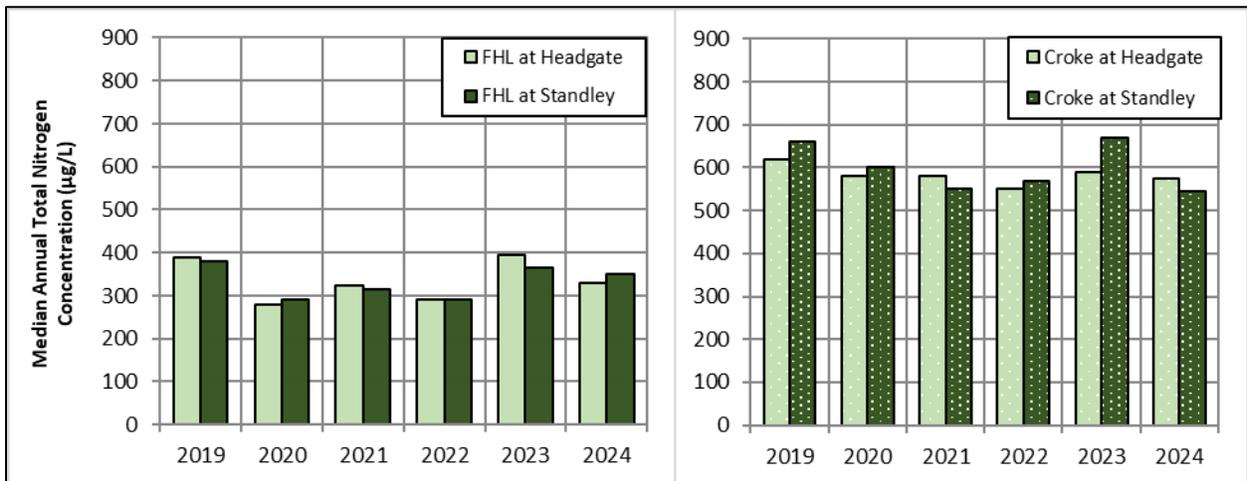


Figure 17. Median Total Nitrogen Concentrations in FHL (left) and Croke (right) Canals

## 4C. 2024 WATER-QUALITY RESULTS – STANDLEY LAKE

### LAKE CONTENTS

Standley Lake began 2024 with above-average water levels and quickly filled to capacity by the end of April (Figure 18). The reservoir remained at capacity until early July, when demand began to exceed supply. The duration of full pool conditions was similar to the previous 5 years (except 2023), though the occurrence of these conditions was shifted to earlier in the year (similar to 2020). The reservoir ended the year with below-average water levels.

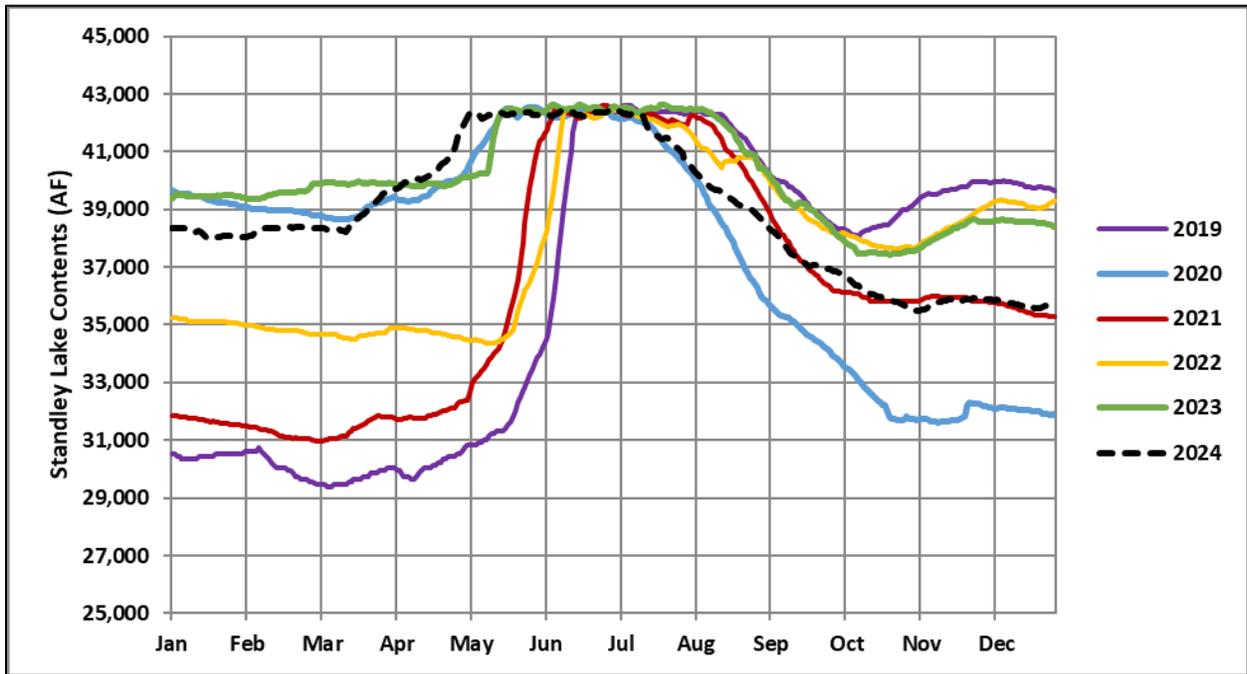


Figure 18. Standley Lake Contents, 2019-2024



Field Sampling and Profiler Maintenance on Standley Lake

## 4C. 2024 WATER-QUALITY RESULTS – STANDLEY LAKE

### TEMPERATURE

Temperature and thermal stratification are important, given their direct impact on habitat quality and biological processes, and their indirect impact on oxygen availability and redox conditions at the sediment-water interface. Standley Lake stratified less strongly than it typically does in 2024, with a deeper and less well-defined thermocline. This is largely the result of very warm air temperatures; 2024 was the second-warmest summer on record, after 2012<sup>2</sup> (similar temperature patterns were observed in Standley Lake in 2012 – see [Supplemental Information 3](#)). The thermocline developed in early June and eroded to a depth of greater than 15 m prior to fall overturn on October 21. As a result of the more well-mixed water column during stratification, bottom temperatures were greater than in recent years, averaging 13.4 °C during the stratified period. Surface temperatures peaked at 24.5 °C on July 31.

Previous reports have noted the influence of operations on the thermal structure of Standley Lake. Operations in 2024 were similar to operations in 2023, with all outflow occurring via the lower outlet (20 m below full pool) until July 3, when the upper outlet (10 m below full pool) was opened 10%. On July 30 (eight days earlier than in 2023) both outlets were opened to 100%.

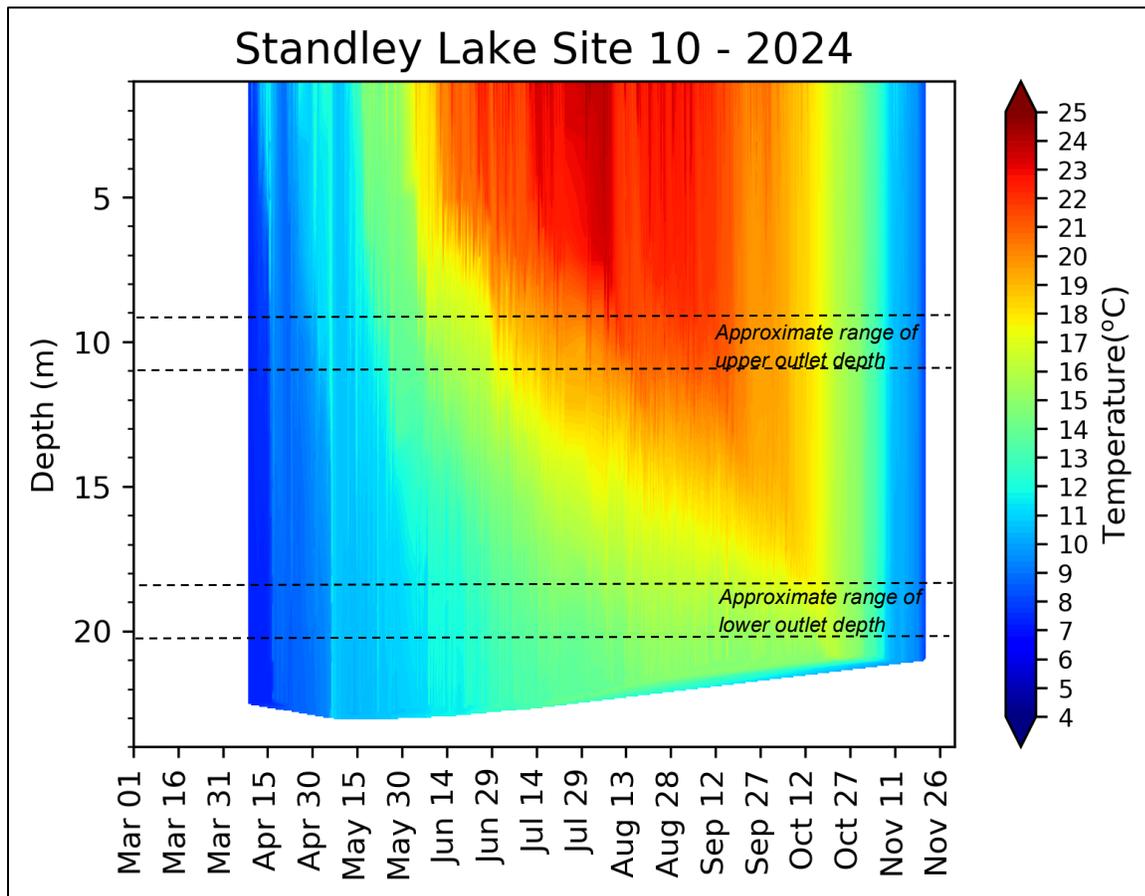


Figure 19. Contour Plot of Temperature in Standley Lake in 2024

<sup>2</sup> June through August, 1872-Present (<https://www.weather.gov/bou/DenverSummerHeat>).

DISSOLVED OXYGEN

Dissolved oxygen (DO) concentrations in 2024 are shown in Figure 20. Data from 2024 show a typical pattern of decreasing oxygen concentrations in the hypolimnion with the onset of stratification in mid-May, and uniform concentrations throughout the water column post-turnover. While algal photosynthesis typically results in the formation of a metalimnetic oxygen maximum in Standley Lake during late spring and early summer, this did not occur in 2024.

Hypoxic conditions began on July 3 and turnover occurred on October 21. These dates are both consistent with the 2019-2023 averages (July 4 and October 19, respectively), and the duration of hypoxia (110 days) was also very near the 2019-2023 average (108 days) (Figure 21). The duration of hypoxia is an important factor controlling internal loading of nutrients.

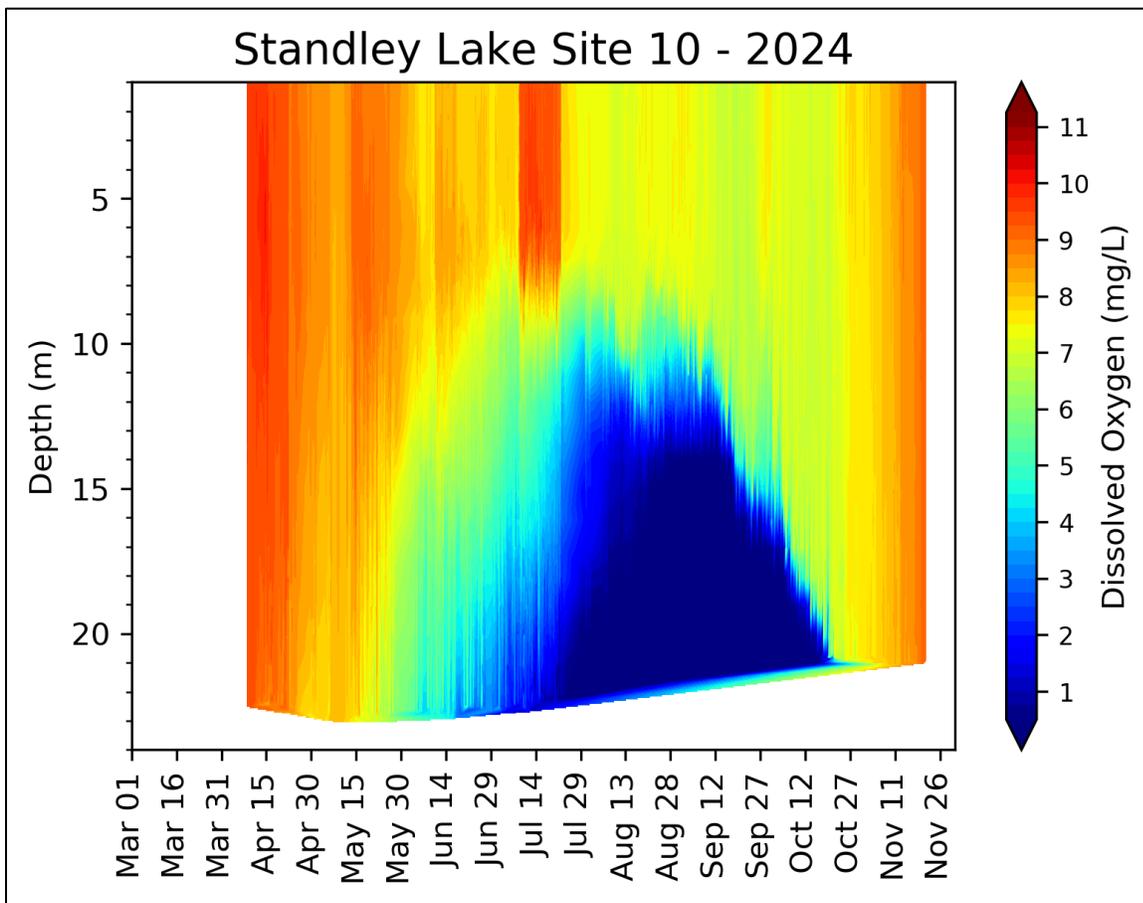


Figure 20. Contour Plot of Dissolved Oxygen in Standley Lake in 2024

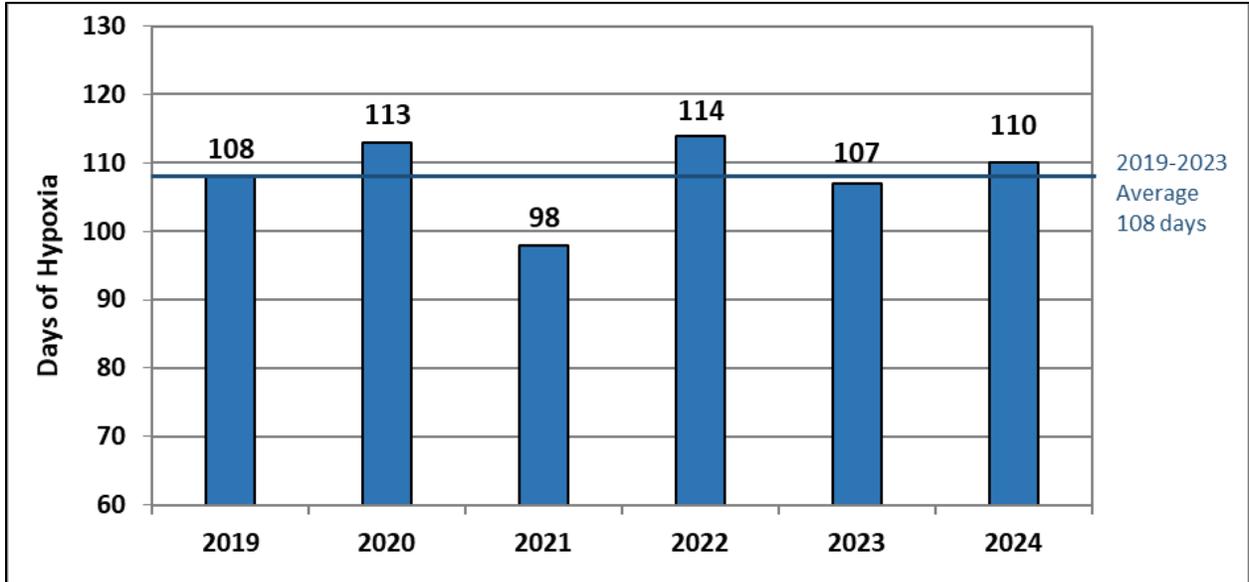


Figure 21. Days of Hypoxia (DO < 2.0 mg/L), 2019-2024

## NUTRIENTS

### Total Phosphorus

TP measurements are made approximately biweekly in the photic zone and at the bottom of Standley Lake (Figure 22). 2024 Photic zone TP concentrations were low (July-September average = 10.5 µg/L), with a maximum value of 16.1 µg/L measured on July 8 (a similarly high concentration of 15.9 µg/L occurred on October 7, following a mixing event). Bottom monitoring occurred weekly during the summer; these results provide insight to the pattern of nutrient release during the hypoxic period. Bottom concentrations were similar to those at the surface until mid-August, at which point they began increasing. Bottom TP concentrations peaked at 148 µg/L on October 14, and were similar to surface concentrations again on October 21 (immediately following turnover).

An increase in TP concentrations in the fall is typical and indicative of sediment release of nutrients as a result of hypoxia in the hypolimnion. The long-term record of phosphorus observations at the bottom is shown in Figure 23 and provides perspective on this year's observations. The overall magnitude of internal loading in 2024 appears similar to the previous five years. The peak TP concentration in the bottom of Standley Lake was below the 2019-2023 average (166 µg/L), but that average is influenced by high concentrations in 2022. The 2024 TP peak concentration is closer to the 2019-2023 median value (153 µg/L).

# 2024 STANDLEY LAKE WATER QUALITY

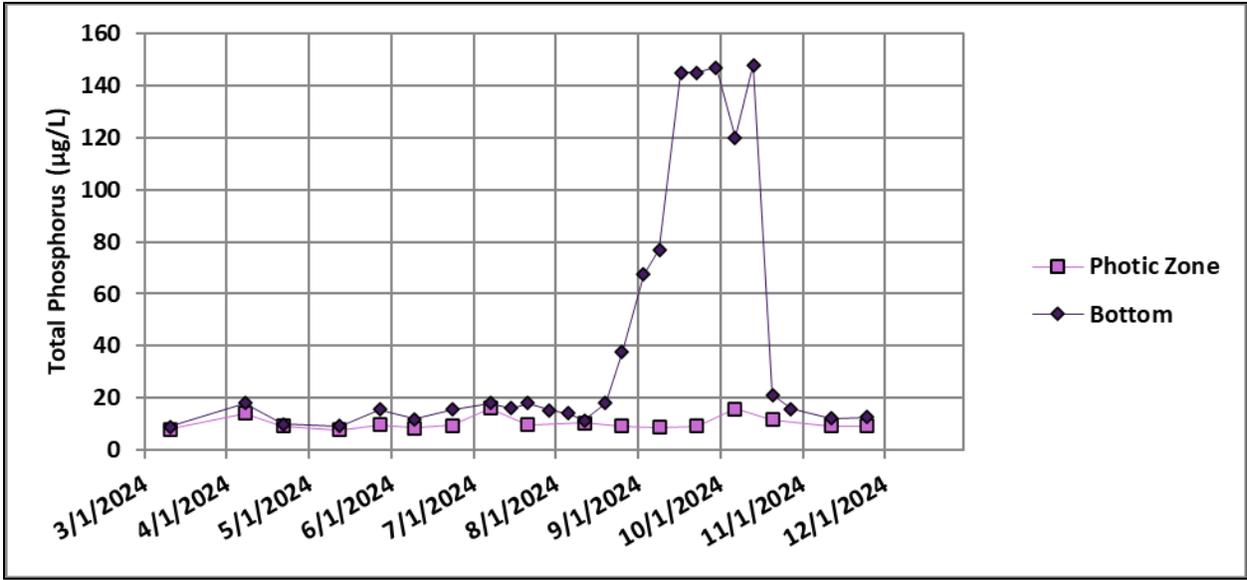


Figure 22. Total Phosphorus Concentrations in Standley Lake, 2024

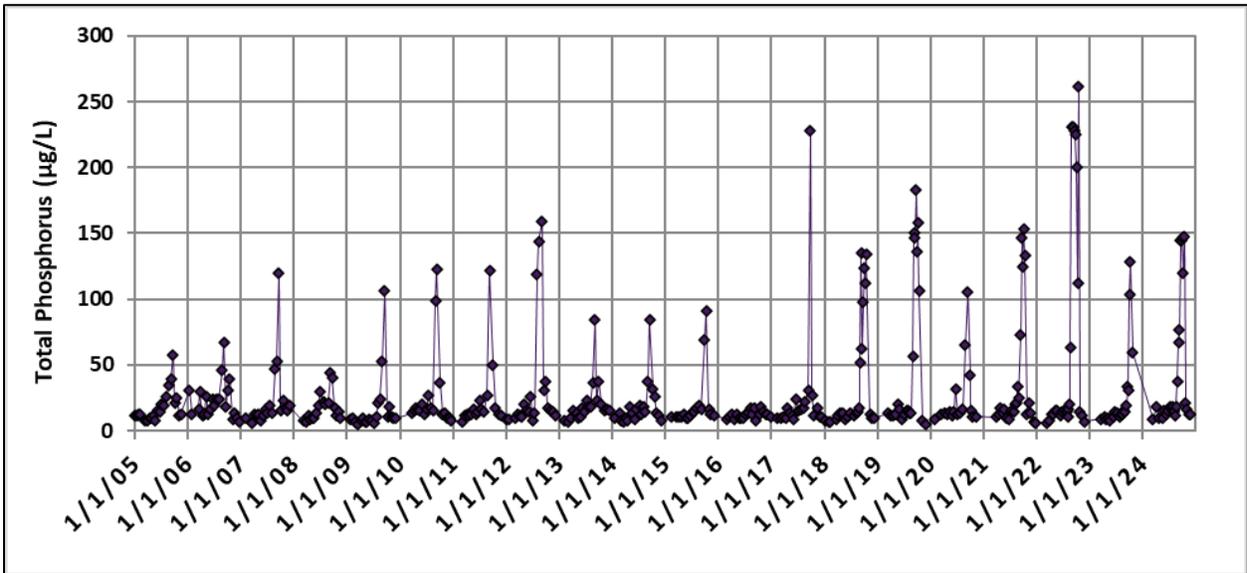


Figure 23. Total Phosphorus Concentrations at the Bottom of Standley Lake, 2005-2024

## 2024 STANDLEY LAKE WATER QUALITY

### Total Nitrogen

2024 TN concentrations in Standley Lake are displayed in Figure 24. TN concentrations at the bottom of the lake exhibited a peak concentration of 730  $\mu\text{g/L}$  on October 14. Surface concentrations were lower (July-September average = 203  $\mu\text{g/L}$ ) and relatively stable throughout the year. The rapid increase in TN concentration near the bottom in the fall, corresponding to the timing of TP release (Figure 22), provides evidence of nitrogen release from the sediment. Overall TN concentrations and seasonal patterns were similar to recent years.

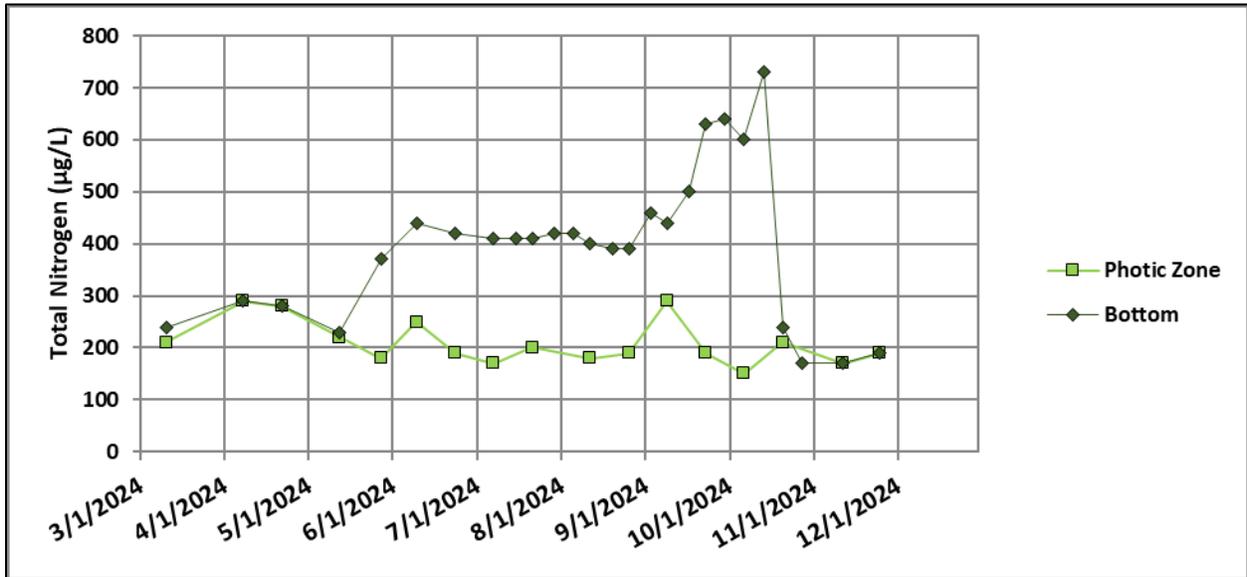


Figure 24. Total Nitrogen Concentrations in Standley Lake, 2024

CHLOROPHYLL *a*

Chlorophyll *a* concentrations measured in the photic zone are shown in Figure 25. March through November (the range of the horizontal axis) is the relevant period for standards assessment. Chlorophyll *a* concentrations were low in 2024, with no notable peaks occurring. A spring peak typically occurs in Standley Lake in May/June, and a fall peak often occurs in October/November, but neither of these are observed in the 2024 data. The maximum concentration measured in 2024 was 3.7 µg/L on both October 21 (the date of turnover) and November 12. This is the lowest maximum concentration recorded for the period 2001 to 2024.

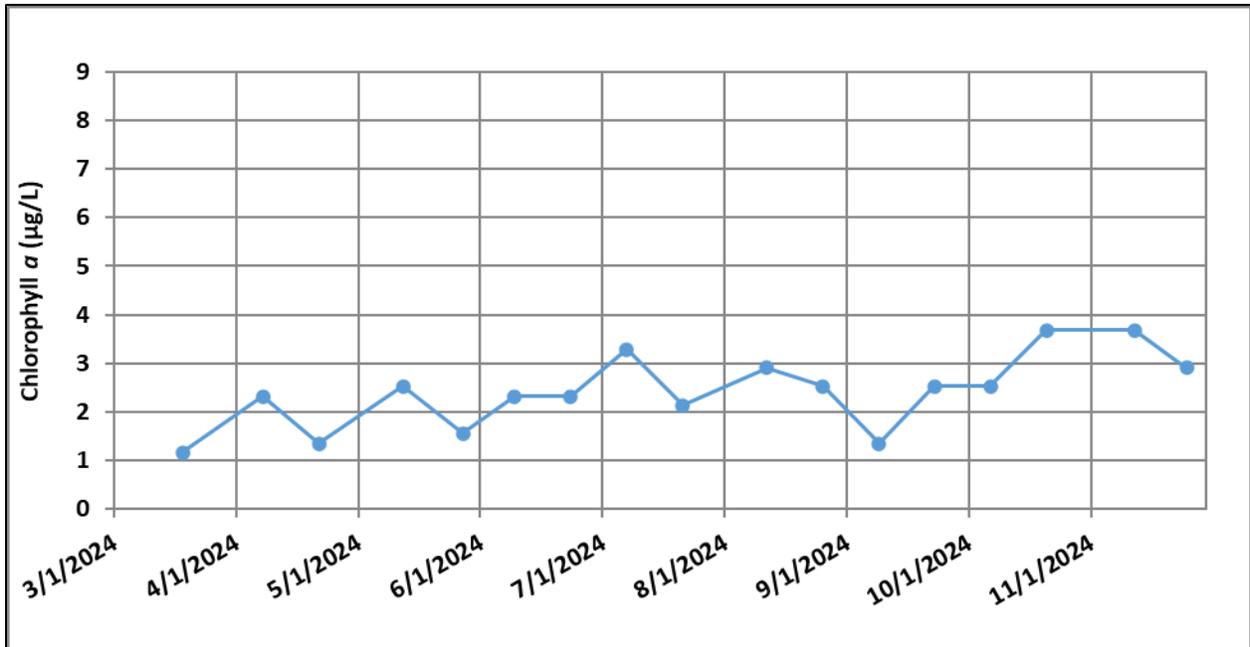


Figure 25. Chlorophyll *a* Concentrations in Standley Lake, 2024

The algal community was dominated by diatom species, as is typical. During spring (March – May), *Asterionella* was dominant, while in the summer and fall *Fragillaria* was dominant. The chrysophyte *Dinobryon* comprised a notable fraction of the total algal biovolume in spring, while the diatoms *Asterionella* and *Aulacoseria* made notable concentrations in the fall, post-turnover. The diatom *Stephanodiscus*, which dominated the algal community in 2022 and 2023, were present only in small numbers throughout 2024.

## 2024 STANDLEY LAKE WATER QUALITY

A chlorophyll *a* standard of 4.0 µg/L was established in 2009 for Standley Lake. This standard is evaluated on an annual basis using the average of the nine monthly averages of observed data for the period from March through November. To account for the natural variability in chlorophyll *a* concentrations, the standard is assessed using a concentration of 4.4 µg/L. For 2024, the value of the assessment metric was 2.3 µg/L (Figure 26), which is the lowest value recorded since the standard was adopted (the previous record was 2.4 µg/L, set in 2023). For the 5-year period 2020-2024, the value of the assessment metric has ranged from 2.3 to 4.2 µg/L.

### Did we meet the chlorophyll *a* standard?

**Yes, the standard for chlorophyll *a* in Standley Lake was met in 2024. The 2024 average is compliant with both the 4.0 µg/L standard and 4.4 µg/L assessment threshold. The standard is met when four out of the five most recent years have a March-through-November average concentration below 4.4 µg/L. Every year in the five-year period from 2020 to 2024 has had a March-November average concentration below 4.4 µg/L.**

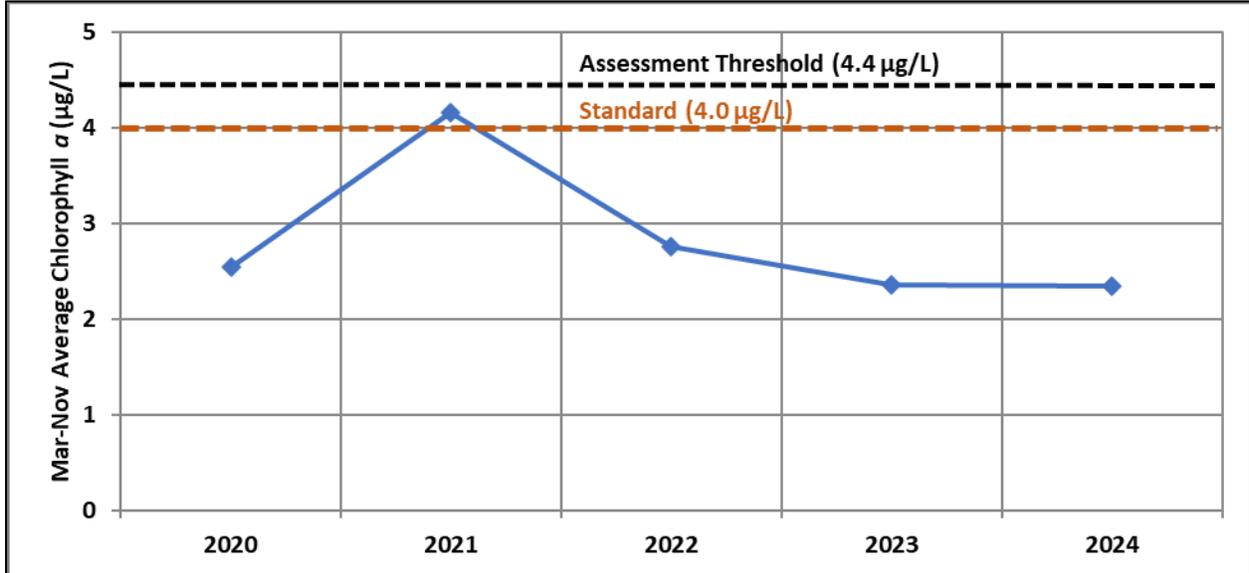


Figure 26. March-November Average Chlorophyll *a* Concentrations, 2020-2024

SECCHI DEPTH

The average Secchi depth in Standley Lake was 5.5 m in 2024. This is the second-highest annual average Secchi depth recorded for the period 2022 – 2024, second only to 2023 (Figure 27). This indicates relatively high water clarity, and is consistent with the low chlorophyll *a* concentrations measured in 2024. The increasing trend in Secchi depth observed in recent years is a continuation of a longer-term trend in water clarity: the annual average Secchi depth has increased by approximately 67% over the 23-year period from 2022 to 2024.

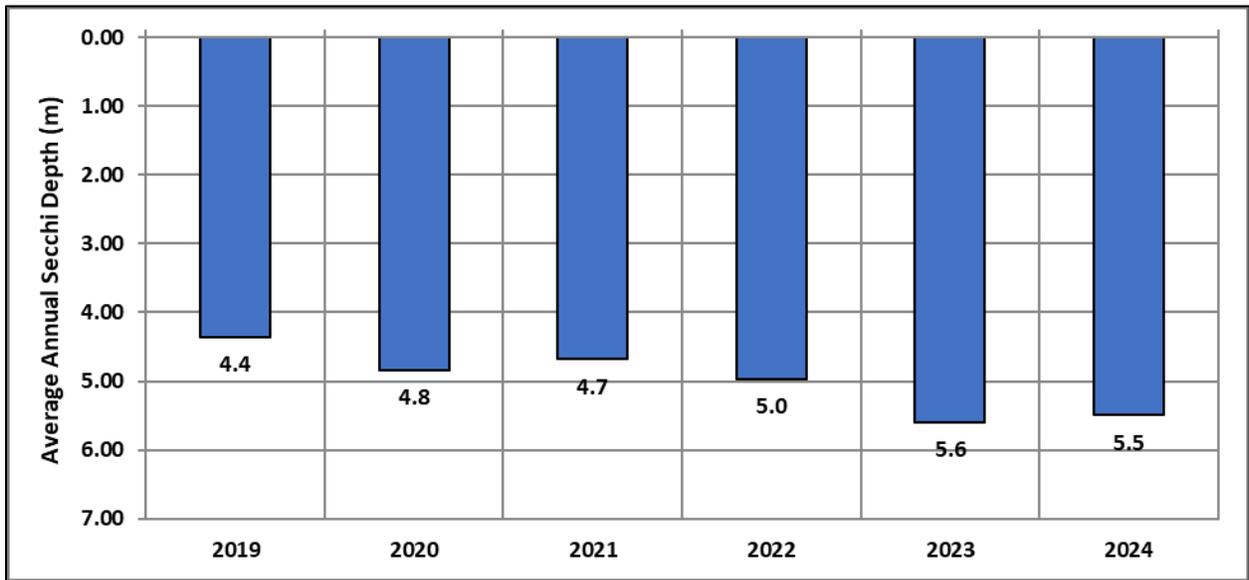


Figure 27. Average Annual Secchi Depth in Standley Lake, 2019-2024

## 5. SUMMARY

Collaborative efforts made by UCCWA members, the Standley Lake Cities, and other parties to the 1993 Agreement continue to be successful in enhancing, protecting, and improving water quality in Standley Lake and Clear Creek. This success is evident based on consistent reservoir and watershed monitoring. Wastewater treatment plant upgrades, canal improvements, illicit discharge responses, public outreach events, and a wide host of other BMPs are all ways that the parties to The Agreement continue to contribute to water quality protection and enhancement.

The Clear Creek Watershed had acceptable water quality in 2024 and showed no signs of degradation from the previous five years for the constituents evaluated. The timing and magnitude of spring runoff was typical. At the upper station (CC26), TSS loads were notably below average, TP loads were above average, and TN loads were below average. At the lower station (CCAS59/CC60), TSS loads were below average, TP loads were above average, and TN loads were average. Loads in 2024 were consistent with the ranges observed in the previous five years.

Water-quality measurements in the Canal Zone indicate that nonpoint sources provide additional TSS and TP to the canals between Clear Creek and Standley Lake. While concentrations of TSS and TP typically increase by a relatively greater amount in the Croke Canal, this was not the case in 2024 (these constituents increased by a relatively greater amount in the FHL). TN concentrations show little change through the Canal Zone. Because inflows from the FHL primarily occur during the spring and summer, it provides the majority of flow and TSS/nutrient loading to Standley Lake.

Standley Lake water quality in 2024 was better than average when compared with the previous five years. Water levels in the lake were above average through July, and below average for the remainder of the year. As usual, Standley Lake exhibited a period of stratification and hypoxia in the hypolimnion, though stratification was less pronounced in 2024 than is typical (less well-defined thermocline, warmer bottom temperatures) due to high summer air temperatures in 2024. Nonetheless, the timing of stratification and turnover and the duration of hypoxia in the hypolimnion were consistent with recent years. Peak nutrient concentrations in the hypolimnion were also consistent with recent years. Summer surface concentrations of TN and TP remained low.

Chlorophyll *a* concentrations in 2024 were low, and clarity was high. The March-November average chlorophyll *a* concentration (assessment metric) in the photic zone was 2.3 µg/L, which is the lowest observed value since the standard was adopted in 2009. The average annual Secchi depth was 5.5 m, which is the second-highest value observed (2002-present). Standley Lake continues to meet the chlorophyll *a* standard, with all of the past five years falling below the assessment threshold of 4.4 µg/L. These data demonstrate the effectiveness of the efforts to manage, enhance, and protect water quality made by collaborating entities. Additional 2024 water-quality monitoring results are presented in [Supplemental Information 3](#).

---

### SUPPLEMENTAL INFORMATION

---

Supplemental Information 1 - Clear Creek / Standley Lake Watershed Agreement

Supplemental Information 2 - Upper Clear Creek / Standley Lake Watershed Water Quality Monitoring Plan

Supplemental Information 3 – Graphical Display of Select Clear Creek / Standley Lake Data - 2024

Supplemental Information 4 - Clear Creek, Canal, and Standley Lake Water Quality Monitoring Data - 2024

---

### ACRONYMS

---

AF - Acre Feet

CC26 - Clear Creek Sampling Station: Clear Creek at Lawson Gage

CCAS26 - Clear Creek Autosampler Station: Clear Creek at Lawson Gage

CC59 - Clear Creek Autosampler Station: Clear Creek 2 Miles West of Highway 58/US6 in Golden. Storm Location Operated by City of Golden

CCAS59 - Clear Creek Autosampler Station: Clear Creek 2 Miles West of Highway 58/US6 in Golden

CC60 - Clear Creek Sampling Station: Clear Creek upstream of the Church Ditch Headgate

Church - Church Ditch

Croke - Croke Canal

FHL - Farmers' High Line Canal

FRICO - Farmers' Reservoir and Irrigation Company

KDPL - Kinnear Ditch Pipeline

TN - Total Nitrogen

TP - Total Phosphorus

TSS - Total Suspended Solids

UCCWA - Upper Clear Creek Watershed Association



# SUPPLEMENTAL INFORMATION – 1

## CLEAR CREEK / STANDLEY LAKE WATERSHED AGREEMENT

# **Clear Creek / Standley Lake Watershed Agreement**

# AGREEMENT

The undersigned parties hereto agree as follows:

## I. Preamble.

This Agreement seeks to address certain water quality issues and concerns within the Clear Creek Basin of Colorado, and specifically, such issues as they affect the water quality of Standley Reservoir, an agricultural and municipal water supply reservoir located in Jefferson County Colorado, which is supplied with water primarily from Clear Creek. For purposes of this Agreement, the Clear Creek Basin is divided into three (3) areas of segments: the Upper Clear Creek Basin (“Upper Basin”), consisting of Clear Creek and its tributaries from its source to and including the headgate of the Croke Canal in Golden, Colorado; the Standley Lake Tributary Basin (“Tributary Basin”), consisting of the lands directly tributary to Standley Lake, the Church Ditch, the Farmers High Line Canal, the Croke Canal, and lands directly tributary to these Canals; and Standley Lake (“Standley Lake”), consisting of the Lake itself.

The parties to this Agreement are governmental agencies and private corporations having land use, water supply, and/or wastewater treatment responsibilities within the Clear Creek Basin. The parties are: (1) UCCBA; (2) City of Golden; (3) City of Arvada; (4) Jefferson County; (5) Jefferson Center Metropolitan District; (6) City of Westminster; (7) City of Northglenn; (8) City of Thornton; (9) City of Idaho Springs; (10) Clear Creek County; (11) Gilpin County; (12) Black Hawk/Central City Sanitation District; (13) Town of Empire; (14) City of Black Hawk; (15) City of Central; (16) Town of Georgetown; (17) Town of Silverplume; (18) Central Clear Creek Sanitation District; (19) Alice/St. Mary’s Metropolitan District; (20) Clear Creek Skiing Corporation; (21) Henderson Mine; (22) Coors Brewing Company; (23) Church Ditch Company; (24) Farmers High Line Canal and Reservoir Company; and (25) Farmers Reservoir and Irrigation Company. For purposes of this Agreement, the parties can be divided into four (4) functional groups, as follows: The Upper Basin Entities (“Upper Basin Users” or “UCCBA”), consisting of the members of the Upper Clear Creek Basin Association (generally representing entities with jurisdiction over land use and wastewater treatment activities in the Upper Basin that can affect water quality in the Upper Basin); the Tributary Basin Entities (“Tributary Basin Entities”), consisting of the Cities of Golden, Arvada, and Westminster, and the County of Jefferson and the Jefferson Center Metropolitan District (generally representing entities with jurisdiction over land use activities that can affect water quality in the Tributary Basin); the Standley Lake Cities (“Standley Lake Cities”), consisting of the Cities of Westminster, Northglenn, and Thornton, (representing the municipal water users from Standley Lake); and the three canal companies (the “Canal Companies”), consisting of the Church Ditch Company, the Farmers High Line Canal and Reservoir Company, and the Farmers Reservoir and Irrigation Company (representing the entities that own and operate canals through which water is conveyed to Standley Lake for municipal and agricultural use).

In accordance with the geographical and functional divisions, this Agreement generally

sets out rights and obligations with respect to certain water quality matters within the Clear Creek Basin (as above defined) by area or segment and by functional group.

## II. Agreement.

1. The parties will submit a joint alternative proposal to the Water Quality Control Commission (“WQCC”) in the matter captioned “For Consideration of Revisions to the Water Quality Classifications and Standards, Including Adoption of a Narrative Standard, for Segment 2, Standley Lake, of Big Dry Creek, in the South Platte Basin, and Adoption of a Standley Lake Control Regulation” on or before December 23, 1993. Said alternative proposal shall contain the following points:
  - a. Request the WQCC to adopt a narrative standard only for Standley Lake at this time, with further consideration of any control regulation or numeric criteria for implementation of the standard at or after the triennial review of the South Platte River to be held in 1997. The narrative standard shall require maintenance of Standley Lake in a mesotrophic state, as measured by a combination of relevant indicators, as recommended by the parties’ consultants prior to December 23, 1993.
  - b. Request language in the Rule and in the Statement of Basis and Purpose for the regulation explaining that during the next triennium ending in 1997 (“triennium”) the parties hereto will be conducting additional testing and monitoring, as well as implementing certain best management practices and controls on a voluntary basis, the results of which will be reported to the WQCC on an annual basis, and that point-source discharge permits written during the triennium shall not include any new or more stringent nutrient effluent limitations or wasteload allocations to meet the narrative standard. The proposed language will also refer to the intention of the parties and the Commission that should the narrative standard not be met at the end of the triennium, and substantial progress has not been made in reducing the nutrient loads to Standley Lake, additional measures may be required, including numeric standards or effluent limitations for phosphorous and/or nitrogen in the Upper Basin, and for additional best management controls in Standley Lake to be considered.
2. Should the WQCC fail to approve and adopt the substance of the proposed alternative described in paragraphs 1.a. and 1.b. above, this agreement shall automatically terminate and the parties shall be released from all other obligations and rights hereunder.
3. At or after the triennial review in 1997, the UCCBA and Standley Lake Cities agree that if substantial progress has not been made by the UCCBA in reducing its portion of nutrient loading and in developing controls to maintain appropriate reductions in nutrient loads to Standley Lake sufficient to maintain the narrative standard, they

will jointly petition the Commission to adopt a control regulation for Standley Lake containing the following points:

- a. Total Phosphorous effluent limitation of 1.0 mg/l as P as a thirty (30) day average at the Upper Clear Creek Wastewater Treatment Plants, or such other numeric standard(s) or effluent limitations (s) for phosphorous or nitrogen, or in combination, with opportunity for point to point source and nonpoint source to point source trading among the entities that operate the UCCBA treatment plants, as has been determined will be effective in achieving and maintaining the narrative standard for Standley lake. Such numeric standard(s) or effluent limitation(s) shall be implemented over a three year period to allow time for the affected entities to fund, design and construct improvements necessary to meet the standards.
  - b. In-lake treatment to reduce internal phosphorous loading by 50% from the 1989-90 measured loadings in the 1993 USGS report by Mueller and Ruddy, or such other standards for reduction of internal phosphorous and nitrogen loading as has been determined will be effective in achieving and maintaining the narrative standard for Standley Lake, within three (3) years.
4. The UCCBA, in consultation with the Standley Lake Cities and Tributary Basin Entities will prepare a Best Management Practices Manual by December 31, 1994 for nonpoint sources that will cover disturbed areas of 1 acre or more and use its best efforts to have it approved and adopted for implementation by all jurisdictions within the Upper Basin by July 1, 1995. This Manual will be prepared to deal with the geologic, topographic and weather conditions existing within the Upper Basin to facilitate the reduction of nutrient loading from the various activities of the Upper Basin. This Manual will be coordinated with the Standley Lake Cities and Tributary Basin entities. The plan will include a program for monitoring representative results, to be included in the overall basin monitoring plan. For purposes of development of BMPs, Jeffco will not be considered to be part of the UCCBA.
5. The UCCBA, in consultation with the Standley Lake Cities and the Tributary Basin Entities, will examine the costs and effects of nutrient removal at UCCBA wastewater treatment plants, including operational controls or modifications which would decrease nutrient loads. Recommendations of such review shall be furnished to all the parties hereto by June 30, 1994. The UCCBA will use its best efforts to have its members implement operational modifications which can be implemented without significant capital improvements as quickly as reasonably practical.
6. The Standley Lake Cities, in consultation with the other parties, will develop a Standley Lake Management Plan by December 31, 1994 which will address in-lake nutrient loading and potential nutrient loading from lake activities, water supply operations, recreational activities, and activities in the watershed. The Standley Lake Cities will use their best efforts to implement the Lake Management Plan by

June, 1995. It is understood that the water rights implications of the plan must be considered.

7. The parties will jointly design, implement, and fund in such allocations as they shall agree a monitoring program to evaluate (1) nutrient loadings from point sources; (2) nutrient loadings from non-point sources in the Upper Basin; (3) nutrient loadings from non-point sources in the Tributary Basin; (4) internal Lake loading; and (5) the effect of nutrient reduction measures implemented by the various parties on the trophic status of Standley Lake. The results of the monitoring program will be provided to the Water Quality Control Commission for informational purposes annually. A description of the monitoring program will be included with the Annual Reports.
8. The Tributary Basin Entities and the Standley Lake Cities, in consultation with the other parties, will develop Best Management Practices (BMPs) for each of their jurisdictions by December 31, 1994, and shall use their best efforts to have them adopted as regulations by July, 1995. The BMPs will be designed to remove pollutants to the maximum extent practical considering the costs and benefits of possible measures; provided, however that no retro-fitting of existing construction or development will be required.
9. The Tributary Basin Entities, the Standley Lake Cities and the Canal Companies will develop a Management Plan for the Tributary Basin, addressing stormwater quality and quantity, hazardous substance spills, canal flushing, crossing permits, the Canal Companies' stormwater concerns, and the water rights implications of the above by December, 1994, and use their best efforts to achieve adoption of the portions of the Plan under the control of each entity by July, 1995. If not all affected parties adopt the agreed measures, then the parties that have adopted such measures will determine whether or not to implement the Plan despite such non-adoption by one or more parties.
10. Each functional group (The UCCBA, The Tributary Entities, The Standley Lake Cities, and the Canal Companies) shall provide each other group with semi-annual reports detailing the progress made on the implementation of its responsibilities herein, including development of any BMPs, nutrient reduction programs or controls, or other items required by this agreement, beginning in June, 1994. The parties shall also meet periodically after each report is completed to discuss progress by the parties. It is anticipated that the various functional groups may assign or appoint task groups or committees to address specific tasks or areas of concern (e.g. BMPs; ISDS; Wastewater Plant operational changes; monitoring, etc). If so, then the task groups shall provide the appropriate reports and participate in follow-up meetings.
11. This agreement may be enforced as a contract according to the laws of the State of Colorado; however, this agreement shall not create any right to claim or recover monetary damages for a breach thereof.

12. It is anticipated that other regional agencies with land use and/or water quality responsibilities or impacts within the Clear Creek Basin (as above defined) may join in the parties' monitoring and other efforts pursuant to this Agreement.

13. This Agreement may be executed in counterparts.



## SUPPLEMENTAL INFORMATION – 2

UPPER CLEAR CREEK / STANDLEY LAKE WATERSHED  
WATER QUALITY MONITORING PLAN

# Upper Clear Creek/Standley Lake Watershed

## Water Quality Monitoring Plan



*Standley Lake, photo courtesy of Eric Scott*

**April 18, 2024**

## TABLE OF CONTENTS

<b>Abbreviations and Acronyms</b> .....	iii
<b>MONITORING PROGRAMS OVERVIEW</b> .....	4
<i>Introduction</i> .....	4
<i>Safety Considerations</i> .....	5
<b>UPPER CLEAR CREEK MONITORING PROGRAM</b> .....	6
<b><i>UCC – AMBIENT GRAB SAMPLES</i></b> .....	6
<i>Locations and Sample Schedule</i> .....	7
<i>Analytical Parameters for Creek samples – includes parameters for both Short and Long Schedules</i> .....	8
<i>Flow Monitoring</i> .....	8
<i>Program Coordination and Sampling Team - Short Schedule: Thornton</i> .....	9
<i>Sample Bottle Kit Prep- Short Schedule</i> .....	9
<i>Sampling Locations Directions and Narrative Descriptions - Short Schedule</i> .....	10
<i>Program Coordination and Sampling Teams - Long Schedule: Thornton</i> .....	11
<i>Sample Bottle Kit Prep- Long Schedule</i> .....	11
<i>Sampling Locations Directions and Narrative Descriptions - Long Schedule</i> .....	13
<i>Sampling Locations Directions and Narrative Descriptions - Long Schedule</i> .....	14
<i>QA/QC Program - Long Schedule Only</i> .....	15
<b><i>UCC AUTOSAMPLER 24-HOUR AMBIENT SAMPLES</i></b> .....	17
<i>Sample Locations</i> .....	18
<i>Flow Monitoring</i> .....	<b>Error! Bookmark not defined.</b>
<i>Analytical Parameters</i> .....	18
<i>Field Equipment</i> .....	<b>Error! Bookmark not defined.</b>
<i>Autosampler Operation</i> .....	<b>Error! Bookmark not defined.</b>
<i>Sample Compositing</i> .....	<b>Error! Bookmark not defined.</b>
<b><i>UCC AUTOSAMPLERS – EVENT SAMPLES</i></b> .....	19
<i>Sample Locations</i> .....	19
<i>Flow Monitoring</i> .....	19
<i>Analytical Parameters</i> .....	19
<i>Program Coordination (Westminster and Golden)</i> .....	20
<i>Field Equipment</i> .....	20
<i>Autosampler Operation</i> .....	20
<i>Sample Compositing</i> .....	20
<b>TRIBUTARY BASIN MONITORING PROGRAM</b> .....	21
<b><i>TRIB AMBIENT GRAB SAMPLES</i></b> .....	22
<i>Locations and Sample Schedule</i> .....	21
<i>Analytical Parameters and Analytical Scheme</i> .....	22
<i>Program Coordination and Sampling Team (Northglenn)</i> .....	23
<i>Sample Bottle Kit – Tribs Monthly and Quarterly</i> .....	23
<i>Sample Collection</i> .....	23
<i>Sampling Locations Directions and Narrative Descriptions</i> .....	25
<b><i>TRIB CONTINUOUS MONITORING</i></b> .....	26
<i>Program Coordination and Sampling Team (Westminster)</i> .....	26
<i>Sample Locations</i> .....	26
<b><i>TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES</i></b> .....	26
<i>Sample Locations</i> .....	27
<i>Flow Monitoring</i> .....	27

<i>Analytical Parameters</i> .....	27
<i>Field Equipment</i> .....	28
<b>TRIB AUTOSAMPLER EVENT SAMPLES</b> .....	31
<i>Program Coordination and Sampling Team (Westminster)</i> .....	31
<i>Sample Locations</i> .....	31
<i>Flow Monitoring</i> .....	31
<i>Analytical Parameters</i> .....	32
<i>Field Equipment</i> .....	32
<i>Autosampler Operation</i> .....	32
<i>Sample Compositing</i> .....	32
<b>STANDLEY LAKE MONITORING PROGRAM</b> .....	33
<b>SL – DAILY LAKE PROFILES</b> .....	33
<i>Program Coordination (Westminster)</i> .....	33
<i>Analytical Parameters</i> .....	34
<b>SL – BIMONTHLY GRAB SAMPLES</b> .....	34
<i>Locations</i> .....	34
<i>Analytical Parameters</i> .....	35
<i>Analytical Scheme</i> .....	36
<i>Program Coordination (Westminster)</i> .....	39
<i>SL Sample bottle kit</i> .....	39
<i>Sample Collection</i> .....	39
<b>SL – AQUATIC INVASIVE SPECIES MANAGEMENT</b> .....	42
<i>Eurasian Watermilfoil</i> .....	42
<i>Zebra and Quagga Mussels</i> .....	42
<b>DATA MANAGEMENT AND REPORTING</b> .....	43

## APPENDICES

- A Monitoring Program Rationale
- B Watershed Maps
- C Sampling Instructions and Forms
- D Sampling Location Photographs and GPS Coordinates
- E Travel times along Clear Creek and FHL Canal
- F Program Participants Contact Information
- G Changes from the Previous Version of the Plan

## Abbreviations and Acronyms

BH/CC	Blackhawk/Central City
°C	Degrees Centigrade
CC	Clear Creek
cfs	cubic feet per second
COC	chain of custody
CWQCC	Colorado Water Quality Control Commission
DI	Deionized Water
DO	Dissolved Oxygen
DRP	Dissolved Reactive Phosphorus (ortho-Phosphate-P)
EPA	U.S. Environmental Protection Agency
FHL	Farmers Highline Canal
FRICO	Farmers Reservoir and Irrigation Company
HCl	Hydrochloric acid
KDPL	Kinnear Ditch Pipe Line
LDMS	Laboratory Data Management System
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter
m	meter
mgd	million gallons per day
mg/L	milligrams per liter
MSCC	Mainstem Clear Creek
mv	millivolt
N	Nitrogen
NFCC	North Fork Clear Creek
NG	City of Northglenn
NPS	Nonpoint Source
NTU	Nephelometric Turbidity Units
fDOM	Fluorescent Dissolved Organic Matter
ORP	Oxidation Reduction Potential
OWTS	Onsite Wastewater Treatment System
pCi/L	picocuries per liter
P	Phosphorus
QC	Quality Control
SDWA	Safe Drinking Water Act
SFCC	South Fork Clear Creek
SLC	Standley Lake Cities
SLWQIGA	Standley Lake Water Quality Intergovernmental Agreement
SM	Standard Methods for the Examination of Water and Wastewater
TH	City of Thornton
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TVSS	Total Volatile Suspended Solids
UCC	Upper Clear Creek
USGS	United States Geological Survey
Westy	City of Westminster
WFCC	West Fork Clear Creek
WMA	Upper Clear Creek Watershed Management Agreement
WQIGA	Water Quality Intergovernmental Agreement (Standley Lake)
WQS	Colorado Water Quality Standards (Regs #31 and #38)
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant



*Staff from Golden, Northglenn, Thornton, and Westminster at the  
2017 Standley Lake Analyst Appreciation Picnic*

## **MONITORING PROGRAMS OVERVIEW**

### **Introduction**

The quality of the water in Standley Lake has been monitored for more than two decades. Efforts to protect Standley Lake through State water quality regulations culminated in adoption of the numeric chlorophyll *a* standard for the lake in 2009. The Colorado Water Quality Control Commission (“CWQCC”) established the chlorophyll *a* standard at 4.0 µg/L with a statistically derived assessment threshold of 4.4 µg/L. The standard is based on the arithmetic average of the individual monthly average chlorophyll *a* data for samples collected during March through November in each year. Exceedance of the standard would occur if the yearly 9-month average of the monthly chlorophyll *a* average results is greater than 4.4 µg/L more frequently than once in five years. In addition, a version of the narrative standard adopted in 1993 was also retained stating that the trophic status of Standley Lake shall be maintained as mesotrophic as measured by a combination of common indicator parameters such as total phosphorus, chlorophyll *a*, Secchi depth and dissolved oxygen. The voluntary implementation of best management practices clause included in the 1993 version of the standard was eliminated from the 2009 narrative standard.

The Standley Lake Cities (“SLC”) of Northglenn, Thornton and Westminster remain committed to effective and efficient water quality monitoring in the watershed as originally agreed to in the 1993 Watershed Management Agreement. The Standley Lake Water Quality Intergovernmental Agreement (“SLWQIGA” or “WQIGA”), entered into between the SLC, details the provisions for costs sharing related to cooperative efforts regarding water quality issues in the Clear Creek Basin and Standley Lake. The WQIGA monitoring program is subdivided into three inter-related programs for which the SLC provide field sampling, laboratory analyses and data management support: the Upper Clear Creek Monitoring Program, the Tributary Basin Monitoring Program and the Standley Lake Monitoring Program.

The Monitoring Committee was formed to periodically evaluate the monitoring programs and propose appropriate modifications as necessary. The proposals are evaluated by the SLWQIGA committee prior to implementation. Representatives from the SLC, Upper Clear Creek Basin and the Tributary Basin are actively

involved in committee activities as appropriate. This document details the specific requirements and responsibilities of the SLC and outlines the commitments of additional entities involved in the Standley Lake watershed monitoring programs.

Standley Lake serves as the sole drinking water source for the cities of Northglenn and Westminster and is one of several drinking water sources for the city of Thornton. The monitoring program is designed to collect samples from a variety of locations in the watershed with varying anthropogenic and natural sources of pollutants. The data is used for trend analysis, modeling and for numerous other applications. Interpretation of the results allows the upstream and downstream communities to work cooperatively to minimize impacts to water quality.

### **Safety Considerations**

The personal safety of the sampling team members is paramount in the decision making process for collection of water quality samples. At no time should personal safety be jeopardized in order to collect a sample. Environmental conditions may change suddenly and are variable throughout the watershed.

The following safety measures should be observed during all sampling activities:

- Sample collection should be performed by a two person team whenever possible.
- Weather conditions at the sampling sites should be evaluated prior to leaving the laboratory.
- Personal flotation devices should be worn if the creek water level is greater than twelve inches deep. Hydrostatically triggered, self-inflating personal flotation devices are recommended for non-lake sampling, as the device will automatically inflate if the sensor is submerged below six inches of water.
- Personal flotation devices are mandatory on Standley Lake. Lake sampling team members should be experienced swimmers.
- Wear waterproof gloves and sock liners, as appropriate.
- Exercise caution on slippery rocks, river banks, and boat docks.
- Cell phones must be available during sampling, but be aware that cell phone signals are not reliable in all areas of Clear Creek Canyon.
- First aid kits must be available in all sampling vehicles, including boats. It is recommended that sampling team members be trained in basic first aid techniques.
- Supervisors are notified of the sampling team's itinerary and the expected return time to the lab. Sampling teams will notify supervisors of any delay in the expected return time.

## UPPER CLEAR CREEK MONITORING PROGRAM

The Upper Clear Creek (“UCC”) Monitoring Program is designed to provide water quality information in order to evaluate nutrient loadings from both point sources (discrete) and non-point sources (dispersed) within the Upper Clear Creek Basin.

The UCC Monitoring Program includes three distinct sub-programs, each designed to obtain water quality data during specified conditions:

- ambient grab samples;
- continuous stream monitoring and the automated collection of 24-hour ambient samples; and
- the automated collection of event samples.



*Sampling at CC15 during a Long Schedule*

### **UCC – AMBIENT GRAB SAMPLES**

#### **Program Coordination and Sampling Team: Thornton**

Grab samples are single, point-in-time samples collected in-stream throughout the Upper Clear Creek Basin. Grab sample locations were selected to correspond with established USGS gage stations and additional sites have been included over the years as the monitoring program has evolved. Refer to the table below for sample site locations. The rationale for selection of the specific sampling sites is included in Appendix A. A map of the watershed is included in Appendix B.

Grab samples are collected five times during the year to correspond with seasonally varying flow conditions in Clear Creek. The *Short Schedule* is collected three times per year (February, April and December) and includes four stream locations. The *Long Schedule* is collected twice per year (June and October) and includes 15 stream locations. Laboratory analytical protocols and Thornton’s internal sampling programs limit sample collection to only Wednesdays. Sampling is performed each year on approximately the same schedule. The specific sampling dates for the year are predetermined at the beginning of the year.

Since 2013, Wastewater Treatment Plant (WWTP) effluent samples collected by treatment plant staff are analyzed for nutrients (nitrogen and phosphorus) by commercial laboratories in accordance with Colorado Regulation 85. Sampling and analysis plans were developed by each WWTP outlining the monitoring locations, frequency and analytical parameters for testing. The analytical data reported by the WWTPs to the Colorado Water Quality Control Division will be included in the watershed annual reports.

WWTP Effluent Sample ID	Sample Location
CC1A	Loveland WWTP
CC3A	Georgetown WWTP
CC5A	Empire WWTP
CC7A	Central Clear Creek WWTP
CC8A	St Mary's WWTP
CC12A	Idaho Springs WWTP
CC13B	Black Hawk/Central City WWTP
CC14A	Henderson Mine WWTP
CC15A	Eisenhower Tunnel WWTP

### **UCC – AMBIENT GRAB SAMPLES**

#### **Locations and Sample Schedule**

Clear Creek Sample ID	Flow Gage	Sample Location <sup>1</sup>	Feb	Apr	Jun	Oct	Dec
CC05	Staff gage	MSCC at Bakerville			X	X	
CC10	Recording gage	SFCC upstream of Georgetown Reservoir			X	X	
CC15	Staff gage	WFCC below Berthoud			X	X	
CC20	Recording gage	WFCC below Empire			X	X	
CC25	Recording gage	MSCC above WFCC			X	X	
CC26	Recording gage	MSCC at Lawson Gage	X	X	X	X	X
CC30	Staff gage	Fall River above MSCC			X	X	
CC34	----	MSCC above Chicago Creek			X	X	
CC35	Recording gage	Chicago Creek above Idaho Springs WTP			X	X	
CC40	Recording gage	MSCC below Idaho Springs WWTP (US 6 and I-70)	X	X	X	X	X
CC44	Staff gage	NFCC above BH/CC WTP intake			X	X	
CC50	Recording gage	NFCC at the mouth	X	X	X	X	X
CC52	----	Beaver Brook at the mouth			X	X	
CC53	----	Soda Creek at the mouth			X	X	
CC60	----	MSCC at Church Ditch Headgate	X	X	X	X	X

<sup>1</sup> MSCC = Mainstem Clear Creek  
SFCC = South Fork Clear Creek

WFCC = West Fork Clear Creek  
NFCC = North Fork Clear Creek

WTP = Water Treatment Plant  
WWTP = Wastewater Treatment Plant

## **UCC – AMBIENT GRAB SAMPLES**

### **Analytical Parameters for Creek samples – includes parameters for both *Short and Long Schedules***

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>	Responsible Laboratory
Total Nitrogen	SM 4500-NO3 I	0.02 mg/L	Westminster
Nitrate/Nitrite as N	SM 4500-NO3 I	0.01 mg/L	Westminster
Ammonia as N	SM 4500-NH3 H	0.01 mg/L	Westminster
Total Phosphorus	SM 4500-P E	0.005 mg/L	Northglenn
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.005 mg/L	Northglenn
Total Organic Carbon (TOC) <sup>3</sup>	SM 5310 B	0.5 mg/L	Thornton
Total Suspended Solids	SM 2540 D	1 mg/L	Thornton
Chloride	EPA 300	5 mg/L	Thornton
Bromide	EPA 300	0.1 mg/L	Thornton
Sulfate	EPA 300	10 mg/L	Thornton
Temperature (field) <sup>4</sup>	SM 2550 B	1.0 °C	Thornton
pH (field)	SM 4500-H+ B-2000	1.0 Std Units	Thornton
Conductivity (field)	SM 2510 B-1997	10 µS/cm	Thornton
Turbidity (field)	ASTM D7315	1.0 NTU	Thornton
Dissolved Oxygen (field)	ASTM D888-09 (C)	1.0 mg/L	Thornton
Stream Depth	Staff gage reading	0.1 ft	Thornton

<sup>1</sup> SM refers to the 23<sup>rd</sup> Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limit goals are matrix dependent and may be increased for complex matrices and may be lower depending on laboratory capability.

<sup>3</sup> TOC is analyzed on samples from sites CC05, CC20, CC26, CC35, CC40, CC50, CC52, CC53, and CC60 during the Long Schedule events. TOC is analyzed on all four creek grab samples during the Short Schedule events.

<sup>4</sup> YSI/Xylem ProDSS or 6-series sondes are used for field measurements.

## **UCC – AMBIENT GRAB SAMPLES**

### **Flow Monitoring**

Various mechanisms are employed throughout the watershed for monitoring the hydrologic conditions at strategic locations. USGS real-time recording gages are installed at CC10, CC20, CC25, CC26, CC35, CC50 and CC61 (Clear Creek at Golden). USGS staff gages are in place at CC05, CC15, CC30 and CC44. The staff gage readings are recorded to the nearest 0.1 foot and may be converted to stream flow using the USGS calibration rating curve established for the location.

The recording gage at CC40 (Clear Creek at US 6 and I-70) is operated and maintained by Clear Creek Consultants on behalf of UCCWA. The SLC provide financial support for the USGS gages at CC05 at Bakerville (staff gage), CC15 on the West Fork below Berthoud (staff gage), and CC26 at Lawson (recording gage). The SLC provide financial support for the Department of Natural Resources staff gage at CC30 on Fall River at the mouth. The City of Golden provides financial support for the USGS gage on the West Fork of Clear Creek at Empire.

## **UCC – AMBIENT GRAB SAMPLES**

### **Program Coordination and Sampling Team - *Short Schedule: Thornton***

Two weeks before the scheduled Clear Creek sampling date:

- Contact Westminster and Northglenn to request adequate supply of sample bottles from each lab.
- Prepare four sample kits as directed below. Each sample bottle kit includes the containers for sampling at one location.

### **Sample Bottle Kit Prep- *Short Schedule***

Destination	Quantity	Volume	Bottle Type	Parameter	Laboratory	Additional Documentation <sup>1</sup>
Clear Creek Team – Feb, April and Dec <b>ONLY</b>  (Collect samples at CC26, CC40, CC50 and CC60)	4	500 mL	Rectangular plastic	Phosphorus <sup>2</sup> series	Northglenn	Instructions, COCs and one field data sheet
	4	500 mL	Plastic jug	TSS	Thornton	
	4	125 mL	Brown plastic	Nitrogen series <sup>3</sup>	Westminster	
	4	40 mL	Glass vial	TOC	Thornton	
	4	500 mL	Plastic	Chloride/Bromide/Sulfate	Thornton	

<sup>1</sup> The additional documentation forms are included in Appendix C.

<sup>2</sup> Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP).

<sup>3</sup> Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.

### **On Clear Creek sampling day (*Short Schedule*):**

- Calibrate field equipment in the lab. Ensure all probes and meters are working properly before leaving the lab. Take aliquots of the standards into the field to check instrument calibration if necessary.
- At each sample location, collect samples and analyze for field parameters (pH, temperature, DO, conductivity, and turbidity). Complete the COC and record all results on the Field Data Sheet (refer to Appendix C).
- The field samples are returned to the Thornton Lab and refrigerated until pickup by Westminster and Northglenn personnel. The samples are relinquished to Westminster (nitrogen) and Northglenn (phosphorus) and the COCs are signed appropriately. The original copies of the COCs are retained by Westminster and Northglenn. Original field data sheets and copies of the COCs are retained by the city of Thornton for permanent archive.

## **UCC – AMBIENT GRAB SAMPLES**

### **Sampling Locations Directions and Narrative Descriptions - *Short* Schedule**

Sampling Frequency: Feb, April, Dec

<u>POINT</u>	<u>DIRECTIONS AND DESCRIPTION OF LOCATION</u>
CC26	Travel westbound I-70 to exit at Lawson. Travel frontage road through Lawson. Immediately before the I-70 overpass, on your right, is a parking area. Sample creek at gage and USGS sampling station by bridge. [RECORDING GAGE] (39-45-57N/105-37-32W) <b>Sample TOC</b>
CC40	Traveling eastbound on I-70 take US 6 exit. Pull off in parking area just east of the off ramp. (Tributary Restaurant is across the road) Sample approx. 100 yards east of stop sign below recording gage. (39-44-47N/105-26-08W) [RECORDING GAGE] <b>Sample TOC</b>
CC50	Travel Hwy 119 eastbound toward US 6. Approximately 2 miles downstream of the Black Hawk/Central City WWTP and ¼ mile upstream from intersection is a pullout area to the right immediately before the junction. Sample at the recording gage. (39-44-56N/105-23-57W) [RECORDING GAGE] <b>Sample TOC</b>
CC60	Approximately 1 mile west of the intersection of Hwy 58 and US 6. Park in the pullout on the south side of highway and walk down (or drive) downhill to the Church Ditch diversion structure. Go across the bridge and sample from the main stem of Clear Creek. Do <u>not</u> sample from Church Ditch. (39-45-11N/105-14-40W) <b>Sample TOC</b>

Photographs of the sampling locations and GPS coordinates are included in Appendix D.

## **UCC – AMBIENT GRAB SAMPLES**

### **Program Coordination and Sampling Teams - Long Schedule: Thornton**

Two weeks before the scheduled Clear Creek sampling date:

- Contact Westminster and Northglenn to request adequate supply of sample bottles from each lab.
- Prepare sample kits as directed below. Each sample bottle kit includes the containers for sampling at one location.
- Coordinate with Northglenn to borrow the YSI multiprobe for use on the sampling day.

Prepare sample bottle kits as directed below. Each sample bottle kit contains the prepared sample bottles to collect samples at one location. Prepare 15 bottle kits: 8 kits Creek Team A and 7 kits for Creek Team B.

### Sample Bottle Kit Prep- Long Schedule

Destination	Quantity	Volume	Bottle Type	Parameter	Laboratory	Additional Documentation <sup>1</sup>
Clear Creek Team A  (Collects samples at CC25, CC05, CC10, CC26, CC34, CC35, CC52 and CC53)	8	500 mL	Rectangular plastic	Phosphorus series <sup>2</sup>	Northglenn	One set of: Instructions, COCs and one field data sheet
	8	16 oz	Plastic	TSS	Thornton	
	8	125 mL	Brown plastic	Nitrogen series <sup>3</sup>	Westminster	
	5	40 mL	Glass vial	TOC	Thornton	
	8	500 mL	Plastic	Chloride/Sulfate/Bromide	Thornton	
Clear Creek Team B  (Collects samples at CC15, CC20, CC30, CC40, CC44, CC50 and CC60)	7	500 mL	Rectangular plastic	Phosphorus series	Northglenn	One set of: Instructions, COCs and one field data sheet
	7	16 oz	Plastic	TSS	Thornton	
	7	125 mL	Brown plastic	Nitrogen series	Westminster	
	4	40 mL	Glass vial	TOC	Thornton	
	7	500 mL	Plastic	Chloride/Sulfate/Bromide	Thornton	
QC	4	Half gallon	1:1 HCl-rinsed plastic	QC spikes and dups for Golden	Thornton	QC sampling completed by Team A in May and Team B in October.
	1 (blank)	1 L	Rectangular plastic	Phosphorus series	Northglenn	
	1 (blank)	250 mL	Brown plastic	Nitrogen series	Westminster	

<sup>1</sup> The additional documentation forms are Included in Appendix C.

<sup>2</sup> Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP).

<sup>3</sup> Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.

**On Clear Creek sampling day (Long Schedule):**

- Calibrate field equipment in the lab. Ensure all probes and meters are working properly before leaving the lab. Take aliquots of the standards into the field to check instrument calibration if necessary.
- Prepare coolers with ice and sample bottle kits. The Creek Team chosen for QC sampling must also include in the field sample bottle kit: field blank bottles (nitrogen and phosphorus), and at least 4 half-gallon bottles for QC samples. Thornton prepares both sample kits for Clear Creek Teams A and B and will provide the extra materials needed for the QC sampling in the appropriate sample kit.
- At each sample location, collect samples and analyze for field parameters (pH, temperature, DO, conductivity, and turbidity). Complete the COC and record all results on the Field Data Sheet (refer to Appendix C). Samples will be collected at all creek sites for nitrogen series, phosphorus series and TSS. TOC samples are collected only at designated creek sites: CC05, CC20, CC26, CC35, CC40, CC50, CC52, CC53, and CC60.
- The Clear Creek Team selected for QC sampling will randomly select four creek sites. Collect one sample (half-gallon, HCl-rinsed bottle) at four randomly selected creek sites for preparation of the spike and duplicate nutrient QC samples by Thornton staff.
- Complete the COC for the QC samples.
- Return to the Thornton Lab when sampling is completed. Relinquish the QC samples to the Thornton Lab staff.
- Thornton's Lab staff prepares one duplicate and one spike sample for total nitrogen and total phosphorus from the four QC samples.
- Analyze and complete any missed field parameters as allowable.
- Make one copy of each team's field data sheet for Westminster to use for logging in the samples to the electronic spreadsheet.
- The field samples and prepared QC samples are relinquished to Westminster (nitrogen) and Northglenn (phosphorus) and the COCs are signed appropriately. The original copies of the COCs are retained by Westminster and Northglenn. Original field data sheets and copies of the COCs are retained by the city of Thornton for permanent archive.

## UCC – AMBIENT GRAB SAMPLES

### Sampling Locations Directions and Narrative Descriptions - Long Schedule

#### Clear Creek Team A

Sampling frequency: Jun, Oct

Sample bottles: Creek sites: One 500mL rectangular (phosphorus series), one 500 mL (TSS/chloride/bromide/sulfate), one 125 mL (nitrogen series) and one 40 mL amber glass vial (TOC) as required.

<u>POINT</u>	<u>DIRECTIONS AND DESCRIPTION OF LOCATION</u>
CC05	I-70 westbound to Exit 221 (Bakerville); go south back over Interstate (left). Park at call box. Take sample upstream of parking area, read gage located downstream. [STAFF GAGE] (39-41-31N/105-48-15W) <b>Sample TOC</b>
CC10	I-70 eastbound to Georgetown. Begin at intersection of 6th and Rose in Georgetown. Go 2.2 miles up Guanella Pass Road (go to the first lake). U-turn by the inlet and park on the right side of road. Sample from stream above lake inlet point. [RECORDING GAGE] (39-41-11N/105-42-00W)
CC25	Return towards but do not enter I-70. Instead take the frontage road (Alvarado Road) back towards Empire. Travel on the road approximately 3.3 miles until you see a large dirt pull off on the left, across the road from the cemetery. You'll need to hop the barb wire fence to access the creek. Sample near the culvert under I-70. (39-45-05N/105-39-45W)
CC26	Continue approximately 2.3 miles down Alvarado Road towards and through Lawson. Immediately before the road curves left under I-70 is a parking area straight ahead through an opening at the end of a guardrail. Sample creek at gage and USGS sampling station by the bridge over the creek. [RECORDING GAGE] (39-45-57N/105-37-32W) <b>Sample TOC</b>
CC34	From I-70 (either direction) Exit 240 (Chicago Creek), pull off in the small parking area on the other side of the bridge. Sample the main stem of Clear Creek upstream of Chicago Creek across from the Forest Service Building. (39-44-26N/105-31-17W)
CC35	Continue approx. 3.7 miles on Hwy 103. Pull off on the right shoulder just past the green roofed house that looks like a barn (on the left). Sample where the creek emerges from the culvert underneath the road. Note: a nearby homeowner is suspicious of people along the south side of the road. [RECORDING GAGE] (39-42-58N/105-34-15W) <b>Sample TOC</b>
CC52	Exit I-70 eastbound at Beaver Brook/Floyd Hill (Exit #247). Turn Left to the north frontage road (US Hwy 40). Travel east approximately 2.4 miles. Pull off to the side of road and sample Beaver Brook at this point. (39-43-7N/105-22-4W) <b>Sample TOC</b>
CC53	Continue travelling east bound 0.3 miles and cross the second white bridge. Exit immediately on the right to Soda Creek Drive. Park on the right. Sample Soda Creek upstream of the bridge. (39-42-50N/105-21-42W) <b>Sample TOC</b>

Photographs of the sampling locations and GPS coordinates are included in Appendix D.

## **UCC – AMBIENT GRAB SAMPLES**

### **Sampling Locations Directions and Narrative Descriptions - Long Schedule**

#### **Clear Creek Team B**

Sampling frequency: Jun, Oct

Sample bottles: Creek sites: One 500 mL rectangular (phosphorus series), one 500 mL (TSS/chloride/bromide/sulfate), one 125 mL (nitrogen series) and one 40 mL amber glass vial (TOC) as required.

<u>POINT</u>	<u>DIRECTIONS AND DESCRIPTION OF LOCATION</u>
--------------	---

- |      |  |
|------|--|
| CC15 | Travel west on US 40 through Empire. Begin at Empire Dairy King and continue 6.0 miles west on US 40. There is a large pullout on the creek side of highway with a large stump in the middle of the pullout located a ¼ mile past mile marker 250. Sample directly below the stump at the creek. Staff gage is along the north bank of stream next to a tree at the stream's edge. (39-46-05N/105-47-36W) [Read the STAFF GAGE and record on the field data sheet]           |
| CC20 | Returning back through Empire eastbound, travel along the road/ramp from US 40 to Westbound I-70. Immediately after turning onto road/ramp, there is a large open space on right side of road/ramp. Park in open space and cross road to the Colorado Dept. of Transportation (CDOT) fence enclosing their maintenance yard. Enter fence and sample approximately 100 feet downstream of bridge at recording gage. (39-45-23N/105-39-34W) [RECORDING GAGE] <b>Sample TOC</b> |
| CC30 | East on I-70. Exit 238 (Fall River Road/St. Mary's Glacier). Approximately 100 yards up Fall River Road, there is a small turnout on right by a wooden support wall. Cross road and sample creek at staff gage. (39-45-23N/105-33-20W) [Read the STAFF GAGE and record on the field data sheet]  |
| CC40 | Traveling eastbound on I-70 take US 6 exit. Pull off in parking area just east of the off ramp. (Tributary Restaurant is across the road) Sample approximately 100 yards east of stop sign below recording gage. (39-44-47N/105-26-08W) [RECORDING GAGE] <b>Sample TOC</b>   |
| CC44 | Continue east on US 6 to 119. Drive west on 119 to Black Hawk. From the Black Hawk intersection travel westbound approximately 1 mile on Hwy 119. There is a small wooden building and parking area on the left side of the road. This is the Black Hawk water intake. Walk approximately 100 feet upstream and sample at staff gage. (39-44-56N/105-23-57W) [STAFF GAGE] Record the staff gage and sample near there.   |
| CC50 | Continue on Hwy 119 eastbound toward US 6. Approximately 1 mile downstream of the Black Hawk/Central City WWTP and ¼ mile upstream from intersection is a pullout area just past a masonry building on the right by Tunnel 4 (out of service) above the junction of US-6 and CO-119. Sample at the recording gage. (39-44-56N/105-23-57W) [RECORDING GAGE] <b>Sample TOC</b>   |
| CC60 | Site is approximately 1 mile west of intersection of Hwy 58 and US 6. Park in the pullout on the south side of highway and walk down (or drive) downhill to the Church Ditch diversion structure. Go across the bridge and sample from the main stem of Clear Creek. Do not sample from Church Ditch. (39-45-11N/105-14-40W) <b>Sample TOC</b>   |

Photographs of the sampling locations and GPS coordinates are included in Appendix D.

## **UCC – AMBIENT GRAB SAMPLES**

### **QA/QC Program - Long Schedule Only**

Duplicate and spike quality control samples are prepared from creek samples collected during the Clear Creek Long Schedule sampling events for selected nutrients and are analyzed by Westminster (total nitrogen) and Northglenn (total phosphorus). The QC samples are prepared by the city of Thornton at their laboratory on the day of sampling. Four creek locations are randomly selected for preparation of the QC samples. One duplicate and one spike are submitted to each Westminster and Northglenn.

In 2018, Thornton took over preparation of QC samples from the city of Golden. Only commercially prepared, certified of nitrate-N and phosphate stock standards are used. All calculations below are for phosphate as P. Thornton staff will need to remain vigilant of that as all stock standards are phosphate as PO<sub>4</sub>. Multiply all concentrations as PO<sub>4</sub> by 0.326 to convert into concentrations as P.

The analytical procedure for QC preparation is detailed below:

- Prepare 4 sample bottles for spike and duplicate samples. Bottles used for spike and duplicate prep are provided by the city of Thornton and are the plastic HCl-washed, 16-ounce “milk type” bottles.
- The bottles are marked with (##) corresponding to the date of the sampling (for example, “061419” for June 14, 2019). Mark the 4 bottles with the following information:
  - Northglenn - P(##) - Spike for phosphate-P, Date of sampling.
  - Northglenn - D(##) - Duplicate for phosphate-P, Date of sampling.
  - Westminster - N(##) - Spike for nitrate-N, Date of sampling.
  - Westminster - D(##) - Duplicate for nitrate-N, Date of sampling.
- Select ONE of these as the QC sample (**spike and duplicate**) and set aside. Record which site was chosen in the QC log book. This sample will be spiked with both nitrogen and phosphorus at concentrations within the analytical ranges of Northglenn's and Westminster's labs.
- **To Prepare Spiked Sample:**
  - Rinse out a clean 1-Liter volumetric flask with DI.
  - Then rinse flask with a small portion of the selected QC Creek sample - 2 times.
  - Fill the flask half way with creek sample.
  - Add appropriate amounts of phosphate-P and nitrate-N to the flask:
    - Amounts for phosphate-P are within a total spiked concentration of 0.00875 to 0.015 ppm.
    - Amounts for nitrate-N are within a total spiked concentration of 0.15 to 0.3 ppm.
  - Mix well.
  - Add remaining amount of creek sample to bring the volume up to 1 liter. Use a pipet as pouring accurately from the half-gallon bottle will be difficult.
  - Mix well and pour into 2 bottles labeled for spike samples (“N” and “P”).
- **To Prepare Duplicate Sample:**
  - Thoroughly mix remaining Clear Creek sample.
  - Pour into 2 bottles labeled for duplicates (“D”).
- Record the following information:
  - the new (##) number discussed earlier,

- the Clear Creek sample site number that was selected for preparation of the QC samples, and
  - spike concentrations for phosphorus and nitrogen.
- It is advisable to email QC information (spikes values and identity of QC parent samples) to Westminster and Northglenn at a later date so it is not accidentally lost. Westminster will record QC results and recoveries into the shared database.
- Add the QC samples to the chain of custody forms for the respective labs along with the rest of their creek samples.



*Collecting ambient samples from CC50*

**UCC GRAB SAMPLES ASSOCIATED WITH 24-HOUR AMBIENT TRIBUTARY SAMPLES**

***Program Coordination and Sampling Team: Westminster***

Autosampler sites were selected at strategic locations in the watershed in order to assess diurnal variations and sporadic weather events that would normally not be captured by the discreet, grab sampling. Beginning in fall 2023, due to staff limitations and the time required to collect 24-hour composites in the upper watershed, only grab samples are collected in the upper watershed and autosamplers are utilized at the FHL head-gate and at the lake inlet. (The canal autosamplers are set to trigger at specific times based on total flows entering the canal to better characterize changes in water quality from the head-gate to the reservoir. See the “TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES” Section for more details.)

## UCC GRAB SAMPLES ASSOCIATED WITH 24-HOUR AMBIENT TRIBUTARY SAMPLES

### Grab Sample Locations

CCAS26	Mainstem of CC at USGS Lawson gage
CCAS49	Mainstem of CC above the confluence with the North Fork
CCAS50	North Fork of CC above confluence with Mainstem of CC at USGS gage
CCAS59 <sup>1</sup>	Mainstem of CC above Golden and Church Ditch diversions

<sup>1</sup> In 2016, Westminster assumed responsibility for sample collection at and maintenance of the new autosampler location at CCAS59 installed approximately 100 feet upstream of the City of Golden's CC59 station.

## UCC GRAB SAMPLES ASSOCIATED WITH 24-HOUR AMBIENT TRIBUTARY SAMPLES

### Analytical Parameters

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>	Responsible Laboratory <sup>3</sup>
Total Nitrogen <sup>4</sup>	SM 4500-NO3 I	0.02 mg/L	Westminster
Nitrate/Nitrite-N	SM 4500-NO3 I	0.01 mg/L	Westminster
Ammonia-N	SM 4500-NH3 H	0.01 mg/L	Westminster
Total Phosphorus	SM 4500-P E	0.005 mg/L	Northglenn
Ortho-phosphate-P (dissolved) or DRP	SM 4500-P E	0.005 mg/L	Northglenn
Total Suspended Solids (TSS)	SM 2540 D	1 mg/L	Thornton
Total Organic Carbon (TOC)	SM 5310 B	0.5 mg/L	Thornton
Chloride	EPA 300	5 mg/L	Thornton
Bromide	EPA 300	0.1 mg/L	Thornton
Sulfate	EPA 300	10 mg/L	Thornton
pH (field) <sup>5</sup>	SM 4500-H+ B-2000	1.0 Std Units	Westminster
Temperature (field)	SM 2550 B	1.0 °C	Westminster
Conductivity (field)	SM 2510 B-1997	10 µS/cm	Westminster
Turbidity (field)	ASTM D7315	1.0 NTU	Westminster
Total and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Barium	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Beryllium	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Chromium	EPA 200.8	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Iron	EPA 200.7	0.02 mg/L	Westminster Contract Laboratory
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Nickel	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Selenium	EPA 200.8	0.005 mg/L	Westminster Contract Laboratory
Total and Dissolved Silver	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Strontium	EPA 200.7	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Vanadium	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Zinc	EPA 200.8	0.02 mg/L	Westminster Contract Laboratory

<sup>1</sup> SM refers to the 23rd Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limit goals are matrix dependent and may be increased for complex matrices and may be lower depending on laboratory capability.

<sup>3</sup> EPA recommended holding times less than 72 hours may not be met due to the extended sampling routine.

<sup>4</sup> Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading of greater than 100 NTU may be analyzed by commercial laboratories that have demonstrated proficiency in analyzing complex matrices for nutrients.  
<sup>5</sup> YSI/Xylem 6-series or EXO sondes are used for field measurements.



*High turbidity at CC26 from a storm event*

**UCC AUTOSAMPLERS – EVENT SAMPLES**

**Sample Locations**

CCAS49 Event	Mainstem of CC above the confluence with the North Fork
CCAS50 Event	North Fork of CC above confluence with Mainstem of CC at USGS gage
CCAS59 Event	Mainstem of CC above Golden and Church Ditch diversions

**UCC AUTOSAMPLERS – EVENT SAMPLES**

**Flow Monitoring**

Westminster will obtain the 15 minute interval flow data from the USGS gage at CC61 (Clear Creek at Golden) to correlate to CCAS59. The average event flow will be calculated to correspond to the specific time-event composited samples. If the 15 minute interval flow data is not available, the average daily flow will be associated with the event. The average daily flow at UCCWA gage CC40 will be used to correlate with CCAS49. Flow at CC50 is measured by a USGS gage at that site.

**UCC AUTOSAMPLERS – EVENT SAMPLES**

**Analytical Parameters**

Storm event samples are analyzed for the same suite of analytical parameters listed in the previous section for the 24-hour ambient samples.

Westminster will collect storm samples triggered at CCAS49, CCAS50, and CCAS59 and send them out to their contract laboratory for metals analysis. Independently from this Monitoring Plan, the City of Golden will perform metals analyses collected at CC59 event samples using EPA Method 200.8. Some samples may be analyzed outside the EPA recommended holding time for some parameters based on the random nature of the storm event triggering. Golden and the Standley Lake cities have agreed to share their data. The SLC will submit all other autosampler event samples to a commercial lab for metals testing.

## **UCC AUTOSAMPLERS – EVENT SAMPLES**

### **Program Coordination and Sampling Team: Westminster**

The event autosampler program was initiated in 2006 to assess the pollutant concentrations mobilized during significant snow melt (runoff) or rain events at the 24-hour ambient locations CCAS49, CCAS50 and CCAS59. Automated sample collection of stormwater is triggered based on changes in ambient turbidity, conductivity, stage height, or rain gage readings, depending on the autosampler location. The autosamplers are currently set to trigger when the 25 minute running average exceeds a predetermined turbidity level (for example, 100 NTU). The autosampler at CCAS50 triggers based on a combination of change in stream depth, precipitation and turbidity in order to eliminate triggering autosampler event sampling that might be associated with localized human disturbances in the creek (e.g. sluice mining). Autosamplers trigger independently depending on the localized conditions in the watershed. The autosampler collects discrete samples every 15 minutes until the parameter that triggered the event returns to the ambient condition or until the maximum number of samples is collected. The discrete samples may be analyzed individually or multiple discrete samples may be composited based on the field observations. As necessary, refer to the previous section for instructions on compositing samples from autosamplers. Event sampling can also be started remotely in the event of a spill or other event that might not cause the triggering parameters to be met. Westminster coordinates sampling at CCAS49, CCAS50 and CCAS59. Golden is in charge of CC59, independently from this Monitoring Plan. Golden and the Standley Lake cities have agreed to share their data.

## **UCC AUTOSAMPLERS - EVENT SAMPLES**

### **Field Equipment**

Storm event sampling utilizes the same equipment listed in the previous section for the 24-hr ambient samples.

### **Autosampler Operation**

Field equipment used for storm event sampling is operated using the same techniques as described in the previous section for 24-hr ambient sampling.

### **Sample Compositing**

Sample compositing is performed similarly to the procedure described in the previous section for 24-hr ambient sampling; however, fewer or more samples may be composited based on the intensity and duration of a storm event.

## **TRIBUTARY BASIN MONITORING PROGRAM**

The Standley Lake Tributary Basin Monitoring Program is designed to provide water quality information for evaluation of the nutrient loadings from non-point sources in the Standley Lake Tributary Basin. The only point source discharge between CC60 on the main stem of Clear Creek and the canal diversions to Standley Lake is the Coors cooling basin return flow.

Three tributaries (the terms trib and canal are interchangeable) divert Clear Creek water to Standley Lake: the Church Ditch, the Farmers Highline (“FHL”) Canal and the Croke Canal. The trib monitoring locations were selected to assess the relative loadings to the canals from areas within unincorporated Jefferson County and the city limits of Golden and Arvada. Denver Water supplies Westminster with a small quantity of water via the Kinnear Ditch Pipeline (“KDPL”) which enters Standley Lake after passing through a wetlands area located west of 96<sup>th</sup> Ave and Alkire Street. The upstream and downstream locations near the wetlands are monitored when there is flow through the pipeline. The Denver Water raw water sources include Gross Reservoir and Coal Creek.

The Church Ditch delivery structure at Standley Lake was relocated in 2008 from the west side of the lake to the south side of the lake in order to avoid the potential for significant stormwater impacts to the lake. The former Church Ditch monitoring location at Standley Lake (T-09) was abandoned in 2009 when the new delivery structure (T-27) became operational.

### **TRIB AMBIENT GRAB SAMPLES**

Trib ambient grab samples are collected year-round on the first Wednesday of each month. All tributaries flowing at a rate that allows collection of a representative sample are monitored.

The raw water pipeline at Semper (T-24) is monitored monthly to provide lake outflow data used to determine lake outflow loadings. The raw water pipeline at NWWTP (T-25) is monitored only when the Semper facility is offline.

### **Locations and Sample Schedule**

<b>Sample ID</b>	<b>Sample Location<sup>1</sup></b>	<b>Every month of the year when flowing<sup>2</sup></b>
T-01	Church Ditch at Headgate on MSCC	X
T-02	FHL at Headgate on MSCC	X
T-03	Croke Canal at Headgate on MSCC	X
T-04	Croke Canal at Standley Lake	X
T-11	FHL at Standley Lake	X
T-22A	Kinnear Ditch Pipeline (KDPL) – at Coal Creek entry point into pipeline	X
T-22D	Kinnear Ditch Pipeline (KDPL) downstream of wetlands	X
T-24	Raw Water Pipeline at Semper	X
T-25	Raw Water Pipeline at NWWTP	X
T-27	Church Ditch delivery structure at SL (est. 2009)	X

<sup>1</sup> MSCC = Mainstem Clear Creek

<sup>2</sup> Exceptions noted in paragraph above the table.

## TRIB AMBIENT GRAB SAMPLES

### *Analytical Parameters and Analytical Scheme*

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>	Responsible Laboratory	Monitoring Frequency
Temperature (field) <sup>3</sup>	SM 2550 B	1.0 °C	Northglenn	Monthly
pH (field)	SM 4500-H+ B-2000	1.0 Std Units	Northglenn	Monthly
Conductivity (field)	SM 2510 B-1997	10 µS/cm	Northglenn	Monthly
Turbidity (field)	ASTM D7315	1.0 NTU	Northglenn	Monthly
Dissolved Oxygen (field)	ASTM D888-09 (C)	1.0 mg/L	Northglenn	Monthly
Total Phosphorus <sup>4</sup>	SM 4500-P E	0.005 mg/L	Northglenn	Monthly
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.005 mg/L	Northglenn	Monthly
Total Suspended Solids (TSS)	SM 2540 D	1 mg/L	Thornton	Monthly
Total Organic Carbon	SM 5310	0.5 mg/L	Thornton	Monthly
E. coli	SM 9223 B	1 cfu/100mL	Thornton	Monthly
Chloride	EPA 300	5 mg/L	Thornton	Monthly
Bromide	EPA 300	0.1 mg/L	Thornton	Monthly
Sulfate	EPA 300	10 mg/L	Thornton	Monthly
Total and Dissolved Iron	EPA 200.7	0.05 mg/L	Westminster Contract Lab	Monthly
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Monthly
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Westminster Contract Lab	Monthly
Total Nitrogen	SM 4500-NO3 I	0.02 mg/L	Westminster	Monthly
Nitrate/Nitrite as N	SM 4500-NO3 I	0.01 mg/L	Westminster	Monthly
Ammonia as N	SM 4500-NH3 H	0.01 mg/L	Westminster	Monthly
Gross Alpha and Gross Beta	EPA 901.1	0.1 pCi/L	Westminster Contract Lab	Quarterly <sup>5</sup>
Total and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Barium	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Beryllium	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Chromium	EPA 200.8	0.001 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Nickel	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Selenium	EPA 200.8	0.005 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Silver	EPA 200.8	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Strontium	EPA 200.7	0.002 mg/L	Westminster Contract Lab	Quarterly
Total and Dissolved Vanadium	EPA 200.8	0.0005 mg/L	Westminster Contract Lab	Quarterly
Total Hardness (as CaCO <sub>3</sub> )	EPA 130.2	5 mg/L	Thornton	Quarterly

<sup>1</sup> SM refers to the 23rd Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limit goals are matrix dependent and may be increased for complex matrices and may be lower depending on laboratory capability.

<sup>3</sup> YSI/Xylem ProDSS used for field measurements.

<sup>4</sup> Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading of greater than 100 NTU may be analyzed by commercial laboratories that have demonstrated proficiency in analyzing complex matrices for nutrients.

<sup>5</sup> Quarterly parameters are analyzed in March, June, September and December at all sampled locations.

## **TRIB AMBIENT GRAB SAMPLES**

### **Program Coordination and Sampling Team: Northglenn**

*Before the scheduled Tributary sampling date:*

- Ensure an adequate supply of sample containers is available from Thornton. Westminster's bottles will be picked up at Westminster on sampling day before the start of sampling at T-24.
- Label the Trip blank bottle and fill with laboratory DI water.
- Calibrate the field equipment.
- Analyze the Trip Blank for field parameters.
- Pack Trip Blank in cooler to monitor field activities for phosphorus contamination.

### **Sample Bottle Kit – Tribs Monthly and Quarterly**

<b>Quantity (Dependent on which canals are delivering water to SL)</b>	<b>Volume</b>	<b>Bottle Type</b>	<b>Parameter</b>	<b>Laboratory</b>
9	500 mL	Rectangular plastic	Phosphorus series	Northglenn
1 (Trip blank)	500 mL	Rectangular plastic	Phosphorus series	Northglenn
9	500 mL	Plastic	TSS, Total Hardness, Chloride, Sulfate, Bromide	Thornton
9	40 mL	Glass vial	TOC	Thornton
9	125 mL	Plastic	E. coli	Thornton
9	500 mL	Plastic	Total Metals	Westminster
9	500 mL	Plastic	Dissolved Metals	Westminster
9	125 mL	Brown plastic	Nitrogen series	Westminster
9	1 L	Plastic	Rads	Westminster

### **Sample Collection**

#### **Equipment required:**

- Key to access T-2
- Key to access T-27
- Gate Code for access at T-22A
- Field data book
- Cooler with blue ice or ice
- Trip blank filled with DI
- Sample bottles as detailed above
- Bucket for sample collection
- YSI/Xylem ProDSS and probes

- Ballpoint pen
- Waterproof marker
- Chain of custody forms
- NOTE – Four wheel drive vehicle recommended for sampling due to steep inclines at some locations and potentially rugged or muddy conditions.

**Sample collection procedure:**

1. Meet with Westminster staff at Semper. Drop off bottles for Westminster staff to collect sample at T-25, if necessary.
2. Starting with T-24, collect field samples in the order detailed in the next section at each location where water is flowing.
3. Rinse the sample bucket with the field sample water repeatedly at each location before collecting the sample.
4. Collect enough volume of the field sample in the bucket to fill all sample bottles for the location.
5. Fill the appropriate sample bottles from the bucket.
6. Label the sample bottles with location, date and time of collection.
7. Analyze the field parameters and record data in the field notebook.
8. Repeat the process at each location.
9. Return to Westminster's Semper WTP. Receive T-25 sample from Westminster staff if necessary. Sign COC and keep the original copy of the COC.
10. Leave an unsigned copy of the Thornton COC at Westminster so the samples can be logged into the Excel spreadsheet by Westminster staff.
11. Complete the COCs and relinquish custody of the samples to Westminster staff. Sign COC and keep a copy of the COC. Leave the original COC with the samples.
12. Return to Northglenn Lab.
13. Contact Thornton to pick up collected field samples. Request replenishment of bottles for the next sampling event as needed.
14. Relinquish samples to Thornton and sign COCs. Retain a copy of the COC. Thornton takes possession of the original COC.
15. Northglenn retains a copy of all COCs and field documentation for permanent archive.

## **TRIB AMBIENT GRAB SAMPLES**

### **Sampling Locations Directions and Narrative Descriptions**

Tributary sampling occurs generally in an upstream to downstream fashion. Samples are collected at designated locations when water is flowing.

#### **Trib 24**

T-24 is located at Westminster's Semper Water Treatment Plant at 8900 Pierce Street. The sample is collected from the RAW water tap in the Operator's Laboratory. Do **NOT** increase the flow at the tap at this location. First tap on the left labeled 24.

#### **Trib 22A**

T-22A is the upstream sample point on the Kinnear Ditch pipeline. It is accessed through a gate located at Hwy. 72 and Plainview Rd. A key is required to access the location. The sample point is approximately 0.2 miles from Plainview Rd. Sample is taken at the flume where Coal Creek enters the pipeline.

#### **Trib 1**

T-01 is located at the Church Ditch headgate on Clear Creek. This site is accessed via Hwy 6 approximately 0.5 miles west of Hwy 93. There is a diversion from Clear Creek above this location which diverts water from Clear Creek and runs it parallel to the Creek. There are two gates at this location one sends water back into Clear Creek and the other is the Church Ditch headgate. Sample is taken from the bridge just above both gates.

#### **Trib 2**

T-2 is located at the Farmers Highline headgate on Clear Creek. The site is accessed behind the Coors office building at the end of Archer St. Sample is taken from the bridge just inside the gate. Sample the downstream side of the headgate if it is open or on the upstream side if the headgate is closed (Clear Creek side).

#### **Trib 3**

T-3 is located at the Croke Canal headgate on Clear Creek. This site is on Coors property. It is along the frontage road through Coors, on the east side of a small "pond". Sample the downstream side of the headgate if it is open or on the upstream side if the headgate is closed (Clear Creek side).

#### **Trib 22D**

T-22D is on the Kinnear Ditch Pipeline between 96<sup>th</sup> Ave and 88<sup>th</sup> Ave on Alkire St. The sample is taken just downstream of the culvert on the east side of Alkire St.

#### **Trib 04 and Trib 11**

The Croke Canal (T-04) passes UNDER the Farmers Highline (T-11) in the area just west of 86<sup>th</sup> and Kipling prior to entering Standley Lake. The Farmers Highline passes OVER the Croke in a concrete structure. Sample the Croke on the south side of the Farmers Highline concrete structure. Sample the Farmers next to the white autosampler housing box.

#### **Trib 25**

Located at Westminster's Northwest Water Treatment Plant located at 104<sup>th</sup> & Wadsworth. The sample is collected by Westminster from the raw water tap on the west wall in the membrane filter gallery. Sample only if T-24 is not running.

#### **Trib 27**

T-27 is located on the south side of Standley Lake at the Church Ditch delivery structure. From Alkire, take 88th Ave east. Open Standley Lake Park gate number 23-D using a master lock key number 2006. Drive north down the trail; it curves east and intersects with a trail going south. Drive down the south trail to the delivery structure.

Photographs of the sampling locations and GPS coordinates are included in Appendix D.

## **TRIB CONTINUOUS MONITORING**

### **Program Coordination and Sampling Team: Westminster**

At least one YSI multi-parameter sonde and data logging equipment are deployed year-round at the trib location where the Farmers Highline Canal (T-11) crosses over the Croke Canal (T-04), provided there is sufficient flow in one of the canals. Sondes were installed at the new Church Ditch inlet (T-27) in 2009, the FHL headgate (T-02) in 2014 and the Croke headgate (T-03) in 2015 to provide continuous in-stream monitoring of pH, ORP, turbidity, temperature, conductivity and fDOM during the months when each canal is diverting water to Standley Lake. Remote access to the data logger data facilitates monitoring of water quality at these inflow locations to Standley Lake.

## **TRIB CONTINUOUS MONITORING**

### **Sample Locations**

<sup>1</sup> CCAST02	FHL at Headgate on MSCC
CCAST03	Croke Canal at Headgate on MSCC
CCAST04	Croke Canal approximately 0.5 mile from Standley Lake inlet
CCAST11	Farmers Highline Canal approximately 0.5 mile from Standley Lake inlet
CCAST27	Church Ditch at Standley Lake inlet

---

<sup>1</sup> Limited historical data from these locations are available as part of the Clear Creek Canal Program that was eliminated in 2008. The sample location identifications associated with the Clear Creek Canal Program have been retained.

## **TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES**

### **Program Coordination and Sampling Team: Westminster**

Autosampler sites in the Tributary Basin are located at the canal headgates and inlets to Standley Lake. The 24-hour ambient composites are collected with programmable automatic sampling devices as described in the UCC autosampler 24-hr ambient program section of this plan (page 17) in order to assess any water quality impacts introduced to or removed from the canals.

Ambient samples are collected approximately seven times per year on a monthly schedule starting in April and ending in October as a continuation of the UCC autosampler 24-hr ambient sample program. To assist with sample pick-up logistics between the cities of Northglenn and Thornton, efforts will be made to set these sampling periods to be collected on Monday or Tuesday of the fourth week of the month. This may not always be possible due to weather forecasts, stream flows, or other uncontrollable factors.

Time of travel is estimated between CCAS59 and T-02, then a time of travel table is used to set the start time for sample collection at T-11 in order to capture approximately the same slug flow of water collected at the upstream sites. Composite samples are not collected on the Croke Canal or Church Ditch due to season of operation or limited flow volumes.

## TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES

### Sample Locations

CCAST02	FHL at Headgate on MSCC
CCAST03	Croke Canal at Headgate on MSCC
CCAST04	Croke Canal approximately 0.5 mile from Standley Lake inlet
CCAST11	Farmers Highline Canal approximately 0.5 mile from Standley Lake inlet
CCAST27	Church Ditch at Standley Lake inlet

## TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES

### Flow Monitoring

Flow in the canals is tracked by the ditch operators and water accountants.

## TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES

### Analytical Parameters

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>	Responsible Laboratory <sup>3</sup>
Total Nitrogen <sup>4</sup>	SM 4500-NO3 I	0.02 mg/L	Westminster
Nitrate/Nitrite-N	SM 4500-NO3 I	0.01 mg/L	Westminster
Ammonia-N	SM 4500-NH3 H	0.01 mg/L	Westminster
Total Phosphorus	SM 4500-P E	0.005 mg/L	Northglenn
Ortho-phosphate-P (dissolved) or DRP	SM 4500-P E	0.005 mg/L	Northglenn
Total Suspended Solids (TSS)	SM 2540 D	1 mg/L	Thornton
Total Organic Carbon (TOC)	SM 5310 B	0.5 mg/L	Thornton
Chloride	EPA 300	5 mg/L	Thornton
Bromide	EPA 300	0.1 mg/L	Thornton
Sulfate	EPA 300	10 mg/L	Thornton
Total and Dissolved Cadmium <sup>5</sup>	EPA 200.8	0.0005 mg/L	Westminster Contract Lab
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Westminster Contract Lab
Total and Dissolved Iron	EPA 200.7	0.05 mg/L	Westminster Contract Lab
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Westminster Contract Lab
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Westminster Contract Lab
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Westminster Contract Lab
pH (field) <sup>6</sup>	SM 4500-H+ B-2000	1.0 Std Units	Westminster
Temperature (field)	SM 2550 B	1.0 °C	Westminster
Conductivity (field)	SM 2510 B-1997	10 µS/cm	Westminster
Turbidity (field)	ASTM D7315	1.0 NTU	Westminster

<sup>1</sup> SM refers to the 23rd Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limit goals are matrix dependent and may be increased for complex matrices and may be lower depending on laboratory capability.

<sup>3</sup> EPA recommended holding times less than 72 hours may not be met due to the extended sampling routine.

<sup>4</sup> Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading > 100 NTU may be analyzed by commercial laboratories that have demonstrated proficiency in analyzing complex sample matrices for nutrients.

<sup>5</sup> Metals will be analyzed in May, July and October on the canals operating at that time intended to capture low, medium and high canal flows delivered to Standley Lake

<sup>6</sup> YSI/Xylem 6-series or EXO sondes are used for field measurements.

## **TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES**

### **Program Coordination and Sampling Team (Westminster)**

#### **Field Equipment**

##### **Equipment Installed At Autosampler Locations**

- Permanent and tamper-proof enclosure box with lock
- American Sigma 900, 900 Max or other automated sampler
- Power supply – solar panel, rechargeable battery or direct power
- Sample tubing long enough to reach from the autosampler to the streambed. Probes must be contained in protective piping secured in the creek bed
- Sondes equipped with dedicated field probes for turbidity, temperature, conductivity, pH, and depth/pressure sensor
- Rain gage at T-02 and T-04/T-11
- 24 discrete HCl or Citric Acid washed and rinsed bottles with caps. Bottles must be numbered and inserted in the designated position in autosampler (positions numbered 1 through 24). Though samples will only be collected in bottles 1-12, a full rack of sample bottles is required to secure sample bottles in place.
- Continuous recording datalogger
- Cellular modem and antenna at T-02, T-03, T-04/T-11 and T-27

## **TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES**

### **Autosampler Operation**

On a monthly basis between April and October, autosamplers are set to collect time-weighted discrete samples for a 24 hour period. The autosamplers are located at the canal head-gates and inlets to Standley Lake. In order to associate the relative impacts of the point and nonpoint pollutant sources located between the last autosampler location on Clear Creek (CCAS59), it is advisable to observe the same “slug” of water at the canal inlets to Standley Lake. The time of travel in the Farmer’s Highline canal is calculated from the inflows to the canal at the headgate on Clear Creek.

Total flow into the Farmers Highline canal is determined from the Colorado DNR website, and time-of-travel from the head-gate to the lake is calculated using a formula developed by observing turbidity peaks during storm events at different flow rates.

The time of travel estimates table for the Farmer’s Highline Canal is included in Appendix E. Time of travel estimates have not been established for the Croke Canal. The Ditch operators assist in estimating when water will arrive at Standley Lake after the ditch is turned on.

## **Autosampler Setup:**

### **Equipment required:**

- 24 discrete HCl or Citric Acid washed and rinsed autosampler bottles with caps. Though samples will only be collected in bottles 1-12, a full rack of sample bottles is required to secure sample bottles in place.
- Keys and/or tools to access autosampler enclosure.
- Field data collection/station audit sheets.

### **Setup Procedure:**

1. Unlock sample enclosure and remove sampler head. Set aside without disturbing or bumping the distributor arm.
2. Ensure a full set of clean bottles are deployed or load uncapped bottles in the correct positions in the bottom of the sampler.
3. Secure bottles in place with the retaining ring. Store caps in a ziplock bag inside the autosampler until sample collection.
4. Program the sampler according to manufacturer's instructions to collect two 450 ml storm samples per bottle, one sample per pulse.
5. After starting the autosampler, ensure that the distributor arm is positioned above bottle #1.
6. Replace sampler head and lock in place.
7. Record station/equipment information on field sheet.
8. Make sure the autosampler program is **RUNNING** before locking the enclosure.
9. The autosampler may be set up ahead of a scheduled start time.

## **Sample Collection**

### **Additional equipment required:**

- Keys and/or tools to access autosampler enclosures
- Large cooler with ice to collect sample bottles
- 12 pre-cleaned, HCl or Citric Acid washed and rinsed, discrete sample replacement bottles
- Field data sheets/station audit sheets
- Chain of custody forms
- Laptop with Loggernet software and data cable (9 pin serial cable with SC32B adapter) if retrieving data directly from datalogger
- One 3-liter Nalgene bottle (clean and rinsed with 1:1 hydrochloric acid) for compositing samples
- 250 mL graduated cylinder (clean and rinsed with 1:1 hydrochloric acid) for compositing samples
- Prepared sample bottles provided by participating Cities for nutrients, solids and metals analyses
  - 500 mL square plastic – phosphorus series (Northglenn)
  - 125 mL brown plastic – nitrogen series (Westminster)
  - 500 mL plastic bottle – TSS (Thornton)
  - 40 mL amber glass vial with septa cap – TOC (Thornton)
  - 500 mL plastic – Chloride/Bromide/Sulfate (Thornton)

- 500 mL non-preserved total metals (Westminster)
- 500 mL non-preserved bottle – dissolved metals (Westminster)
- Chain of Custody forms – Refer to Appendix C
- Field Sampling form - Refer to Appendix C

**Sample Collection Procedure:**

1. Unlock enclosure and remove sampler head.
2. Retrieve date/time information from autosampler if required. To collect sample history on American Sigma samplers, press <Change/ Halt> button, press <time/read> button for 5 seconds. The sample collection time for the first sample will appear. Record data on the field sheet. Press <yes> for next sample time to appear. Continue until all data is recorded.
3. Date and time information for samples is also automatically stored in a data file by the dataloggers at all sites.
4. Record station/equipment information on field sheet.
5. Make note of any samples with high turbidity determined by visual observance or data obtained from the datalogger.
6. Optional compositing of samples in the field is performed by pouring off equal volumes into a 3-liter (or larger) pre-cleaned bottle. The 12 sample bottles may also be brought back to a laboratory for compositing. Refer to the Sample Compositing Procedure Step 1. Save remaining volume of any high turbidity samples to take back to the lab. Discard remaining sample.
7. Clean out autosampler base and reload with a new set of pre-cleaned bottles.
8. Reset the autosampler by pressing the START button (Sigma 900 autosampler). Ensure that the distributor arm is parked over bottle #1 and the display reads “Program Running” before closing the autosampler and placing it back in the enclosure.
9. Return to the Westminster Water Quality Laboratory for sample splitting and distribution.

**TRIB AUTOSAMPLER 24-HOUR AMBIENT SAMPLES**

**Sample Compositing**

1. Composite samples in the laboratory if compositing was not performed in field. Shake sample bottles and pour equal volumes of sample from the first 12 bottles into a composite bottle.
2. Perform turbidity, temperature, pH and conductivity field measurements on the composited sample. Enter data on the Sampling Form.
3. Use the well mixed composite sample to fill the appropriate bottles for the Northglenn, Thornton and Westminster labs.
4. If any discreet bottle(s) appears to have an unusually high turbidity and enough sample is available, analyze for turbidity and conductivity. Record on Sampling Form. If there is enough sample, pour the high turbidity discreet samples into separate nutrient and solids bottles for individual analysis.
5. Complete the COCs.
6. Relinquish to each city their respective samples (Westminster-nitrogen series and metals, Thornton-TSS and TOC, Northglenn-phosphorus series) and sign COCs as appropriate.
7. Original field data sheets and COCs are retained by the Cities of Westminster for permanent archive.
8. Samples are created in the web-accessible Excel spreadsheet by Westminster for data entry and results archive.

## **TRIB AUTOSAMPLER EVENT SAMPLES**

### **Program Coordination and Sampling Team (Westminster)**

The event autosampler program was initiated on the Tributaries in 2009 at CCAST11 to assess the pollutant concentrations mobilized during significant snow melt (runoff) or rain events at the location closest to Standley Lake. Automated sample collection of stormwater is triggered based on a turbidity reading of 100 NTU. The autosampler may also be activated remotely to begin sampling immediately or programmed to start sampling at a designated time in an attempt to capture the downstream effects of a storm in the upper watershed based on time of travel. The autosampler collects discrete samples every 15 minutes until the ambient condition drops below the trigger level or until the maximum number of samples is collected. The discrete samples may be analyzed individually or multiple discrete samples may be composited based on the field observations. Automated collection of storm event samples was initiated in 2014 at the headgates for the FHL and in 2015 in the Croke Canal. These locations trigger sample collection when the turbidity is greater than the trigger value for each specific site. The event samples collected on the Croke Canal and Church Ditch when water is first delivered to the lake during seasonal startup of the canals/ditches are considered first flush samples.

## **TRIB AUTOSAMPLERS EVENT MONITORING**

### **Sample Locations**

Localized events may trigger sample collection at any of the Trib Autosampler Continuous Monitoring locations.

<sup>1</sup> CCAST02 Event	FHL at Headgate on MSCC
CCAST03 Event	Croke Canal at Headgate on MSCC
CCAST04 Event	Croke Canal approximately 0.5 mile from Standley Lake inlet
CCAST11 Event	Farmers Highline Canal approximately 0.5 mile from Standley Lake inlet
CCAST27 Event	Church Ditch at Standley Lake inlet

---

<sup>1</sup> Historical data from these locations may be available as part of the Clear Creek Canal Program which was eliminated in 2008. The sample location identifications associated with the Clear Creek Canal Program have been retained

## **TRIB AUTOSAMPLER EVENT SAMPLES**

### **Flow Monitoring**

Flow in the canals is tracked by the ditch operators and water accountants. The average daily flow data corresponding with the time-event composited samples will be used for loadings calculations for storm events.

Refer to Appendix E for the time of travel data for the Farmers Highline Canal. Time of travel studies have not been performed from the canal headgates on Clear Creek to Standley Lake for the Croke Canal or the relocated Church Ditch inlet structure.

## TRIB AUTOSAMPLER EVENT SAMPLES

### Analytical Parameters

Storm event samples are analyzed for the suite of analytical parameters listed below.

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>	Responsible Laboratory <sup>3</sup>
Temperature (field) <sup>4</sup>	SM 2550 B	1.0 °C	Westminster
pH (field)	SM 4500-H+ B-2000	1.0 Std Units	Westminster
Conductivity (field)	SM 2510 B-1997	10 µS/cm	Westminster
Turbidity (field)	ASTM D7315	1.0 NTU	Westminster
Total Nitrogen <sup>5</sup>	SM 4500-NO3 I	0.02 mg/L	Westminster
Nitrate/Nitrite as N	SM 4500-NO3 I	0.01 mg/L	Westminster
Ammonia as N	SM 4500-NH3 H	0.01 mg/L	Westminster
Gross Alpha and Gross Beta	EPA 900.0	0.1 pCi/L	Westminster Contract Laboratory
Total Phosphorus	SM 4500-P E	0.005 mg/L	Northglenn
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.005 mg/L	Northglenn
Total Organic Carbon	SM 5310 B	0.5 mg/L	Thornton
Total Suspended Solids	SM 2540 D	1 mg/L	Thornton
Chloride	EPA 300	5 mg/L	Thornton
Bromide	EPA 300	0.1 mg/L	Thornton
Sulfate	EPA 300	10 mg/L	Thornton
Total and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Barium	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Beryllium	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Chromium	EPA 200.8	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Iron	EPA 200.7	0.05 mg/L	Westminster Contract Laboratory
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Nickel	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Selenium	EPA 200.8	0.005 mg/L	Westminster Contract Laboratory
Total and Dissolved Silver	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Strontium	EPA 200.7	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Vanadium	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Westminster Contract Laboratory

<sup>1</sup> SM refers to the 23rd Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limit goals are matrix dependent and may be increased for complex matrices and may be lower depending on laboratory capability.

<sup>3</sup> EPA recommended holding times less than 72 hours may not be met due to the extended sampling routine.

<sup>4</sup> YSI/Xylem 6-series or EXO sondes are used for field measurements.

<sup>5</sup> Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading of greater than 100 NTU are analyzed by commercial laboratories that have demonstrated proficiency in analyzing complex matrices for nutrients

## TRIB AUTOSAMPLER EVENT SAMPLES

### Field Equipment

Storm event sampling utilizes the same equipment listed in the previous section for the 24-hr ambient samples.

### Autosampler Operation

Field equipment used for storm event sampling is operated using the same techniques as described in the previous section for 24-hr ambient sampling.

### Sample Compositing

Sample compositing is performed similarly to the procedure described in the previous section for 24-hr ambient sampling; however, fewer samples are typically composited based on the intensity and/or duration of a storm event.



*Sampling Standley Lake –photo courtesy of Eric Scott*

## **STANDLEY LAKE MONITORING PROGRAM**

Standley Lake is a storage reservoir that serves as the raw drinking water source for the SLC. Over 250,000 consumers rely on Standley Lake for their drinking water. The Standley Lake (“SL”) Monitoring Program is designed to provide water quality information in order to evaluate internal loadings in Standley Lake and the effects of nutrient reduction measures and best management practices on the trophic status of Standley Lake. Regularly spaced and frequent sampling is necessary to provide sufficient data for monitoring trends for the analytes used to evaluate trophic status including dissolved oxygen, chlorophyll and nutrients.

The main water quality monitoring efforts on Standley Lake include:

- Daily top to bottom lake profiles
- Bimonthly grab samples
- Zooplankton tows
- Invasive species monitoring and control

### **SL – DAILY LAKE PROFILES**

#### **Program Coordination (Westminster)**

The sampling location in Standley Lake (Site 10-00) is situated 225 meters south of the lower lake outlet structure, between the lake outlets and the two main inlets to the lake. The lake site was selected based on the lengthy historical record of water quality monitoring data and because the water is drawn from the lake near this location via pipelines to the SLC’s water treatment plants. Sampling at varying depths in the lake provides extensive information for use in drinking water treatment process decisions and evaluating water resource management options.

Standley Lake is monitored at Site 10-00 using an automated profiler equipped with a multi-probe sonde four times each day from early spring to late fall for the analytes listed in the following table. The profiler is removed from the lake prior to freezing of the lake surface. Refer to the watershed map in Appendix B for

the location of the SL monitoring location. The solar powered unit collects data from the surface of the lake to within one meter off the bottom and every meter in between. The profiler data is telemetered using a cellular telephone modem and provides a depth-integrated profile of the lake water quality.

### **SL – DAILY LAKE PROFILES**

#### **Analytical Parameters**

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>
Temperature <sup>3</sup>	SM 2550 B	1.0 °C
pH	SM 4500-H+ B-2000	1.0 Std Units
Conductivity	SM 2510 B-1997	10 µS/cm
Turbidity	ASTM D7315	1.0 NTU
Dissolved Oxygen	ASTM D888-09 (C)	1.0 mg/L
Chlorophyll	YSI (optical probe)	1.0 µg/L
ORP	SM 2580 A	1.0 mv
fDOM	YSI (optical probe)	1.0 µg/L

<sup>1</sup> SM refers to the 23rd Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limits are matrix dependent and may be increased for complex matrices.

<sup>3</sup> YSI/Xylem EXO sondes are used for all lake profile measurements.

### **SL – BIMONTHLY GRAB SAMPLES**

#### **Program Coordination and Sampling Team: Westminster**

The same sampling location in Standley Lake (Site 10-00) is used for both the daily lake profiles and the bimonthly grab samples. Sampling at varying depths in the lake provides extensive information for use in drinking water treatment process decisions and evaluating water resource management options. Refer to the watershed map in Appendix B for the location of the SL monitoring location.

#### **Locations**

Grab samples are collected twice each month as long as the lake is not frozen and weather permits. The raw water pipeline at Semper (T-24) may be sampled for a subset of the routine analytical parameters when the lake is frozen or when safety of the sampling team is a concern (i.e. high winds, frozen boat ramp, etc.).

Sample Identification	Sample Location
SL 10-00	SL surface
SL 10-03	SL at one meter depth
SL 10-PZ	SL at two times the Secchi depth
SL 10-70	SL at one meter above the lake bottom. (The depth of the lake is 23.7 meters (77.75 ft) at Site SL 10-00 when the lake is full at gage height 96.)
SL 69-00	SL surface at the boat dock
T-24	Raw water line coming into Semper Water Treatment Plant. Comes from either the lower intake, upper intake, or a combination of both intakes in Standley Lake. Intake flow is changed seasonally. The upper and lower intakes are located approximately 11 meters and 20 meters below lake surface level when the lake is full (gage height 96).

## **SL – BIMONTHLY GRAB SAMPLES**

### **Analytical Parameters**

Analyte	Analytical Method Reference <sup>1</sup>	Reporting Limit Goal <sup>2</sup>	Responsible Laboratory
Temperature (field) <sup>3</sup>	SM 2550 B	1.0 °C/	Westminster
pH (field)	SM 4500-H+ B-2000	1.0 Std Units	Westminster
Conductivity (field)	SM 2510 B-1997	10 µS/cm	Westminster
Turbidity (field)	ASTM D7315	1.0 NTU	Westminster
Dissolved Oxygen (field)	ASTM D888-09 (C)	1.0 mg/L	Westminster
ORP (field)	YSI (electrode)	1 mv	Westminster
Chlorophyll (field)	YSI (electrode)	1.0 µg/L	Westminster
fDOM (field)	YSI optical probe	1.0 µg/L	Westminster
Secchi Depth (field)	Secchi disk	0.1 meter	Westminster
Total Nitrogen	SM 4500-NO3 I	0.02 mg/L	Westminster
Nitrate/Nitrite as N	SM 4500-NO3 I	0.01 mg/L	Westminster
Ammonia as N	SM 4500-NH3 H	0.01 mg/L	Westminster
Gross Alpha and Gross Beta	EPA 900.0	0.1 pCi/L	Westminster
Zooplankton	SM 10900	1 per L	Westminster
Algae	SM 10900	1 per mL	Westminster
Chlorophyll <i>a</i>	SM 10200-H	1.0 µg/L	Westminster
Total Phosphorus	SM 4500-P E	0.005 mg/L	Northglenn
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.005 mg/L	Northglenn
Total Organic Carbon	SM 5310 B	0.5 mg/L	Thornton
Total Suspended Solids	SM 2540 D	1 mg/L	Thornton
Total Hardness (as CaCO <sub>3</sub> )	EPA 130.2	5 mg/L	Thornton
Chloride	EPA 300	5mg/L	Thornton
Bromide	EPA 300	0.1 mg/L	Thornton
Sulfate	EPA 300	10 mg/L	Thornton
E. coli	Hach 10029	1 cfu/100mL	Westminster
Total and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Barium	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Beryllium	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Chromium	EPA 200.8	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Iron	EPA 200.7	0.05 mg/L	Westminster Contract Laboratory
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Nickel	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Selenium	EPA 200.8	0.005 mg/L	Westminster Contract Laboratory
Total and Dissolved Silver	EPA 200.8	0.002 mg/L	Westminster Contract Laboratory
Total and Dissolved Strontium	EPA 200.7	0.001 mg/L	Westminster Contract Laboratory
Total and Dissolved Vanadium	EPA 200.8	0.0005 mg/L	Westminster Contract Laboratory
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Westminster Contract Laboratory
Dissolved Silica	EPA 200.8	0.1 mg/L	Westminster Contract Laboratory
Total Mercury	EPA 245.1	0.0002 mg/L	Westminster Contract Laboratory

<sup>1</sup> SM refers to the 23rd Edition of Standard Methods for the Examination of Water and Wastewater.

<sup>2</sup> Reporting limit goals are matrix dependent and may be increased for complex matrices and may be lower depending on laboratory capability.

<sup>3</sup> YSI/Xylem EXO sondes are used for all lake field measurements except for secchi depth.

**SL – BIMONTHLY GRAB SAMPLES**

**Analytical Scheme**

The analytical scheme for Standley Lake was designed to capture the biological, physical and chemical changes occurring in the lake ecosystem throughout the year. Seasonality plays an important role in lake dynamics and subsequently, on the water treatment processes. The table below details the variable analytical scheme, with the caveat that weather patterns may require modification to the plan.

Month	Lake Sample Location	Analytes															
		Hand Profile <sup>1</sup>	Secchi depth	Rads <sup>2</sup>	E coli	Zooplankton	Nutrients <sup>3</sup>	Metals <sup>4</sup>	Algae	Chlorophyll <i>a</i>	TOC	TSS	Total Hardness <sup>5</sup>	Chloride	Bromide	Sulfate	Silica (dissolved)
January 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X					X			X	X	X					
	10-PZ						X	X	X	X	X	X	X	X	X	X	X
	10-70	X			X		X	X			X	X	X	X	X	X	X
January 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X		X	X							X
	10-70	X					X										X
February 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X					X			X	X	X					
	10-PZ						X		X	X	X		X	X	X	X	X
	10-70	X			X		X				X	X		X	X	X	X
February 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X		X	X							X
	10-70	X					X										X
March 1 <sup>st</sup> week	10-00	X	X	X	X	X											
	10-03	X					X			X	X	X					
	10-PZ			X			X	X	X	X	X	X	X	X	X	X	X
	10-70	X		X	X		X	X			X	X	X	X	X	X	X
March 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X		X	X							X
	10-70	X					X										X
April 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X					X			X	X	X					
	10-PZ						X		X	X	X		X	X	X	X	X
	10-70	X			X		X				X	X		X	X	X	X

Month	Lake Sample Location	Hand Profile <sup>1</sup>	Analytes														
			Secchi depth	Rads <sup>2</sup>	E coli	Zooplankton	Nutrients <sup>3</sup>	Metals <sup>4</sup>	Algae	Chlorophyll <i>a</i>	TOC	TSS	Total Hardness <sup>5</sup>	Chloride	Bromide	Sulfate	Silica (dissolved)
April 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X				X			X								
	10-PZ					X		X	X								X
	10-70	X				X											X
May 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X				X			X	X	X						
	10-PZ					X		X	X	X	X		X	X	X	X	X
	10-70	X			X	X				X	X		X	X	X	X	X
May 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X				X			X								
	10-PZ					X		X	X								X
	10-70	X				X											X
June 1 <sup>st</sup> week	10-00	X	X	X	X	X											
	10-03	X				X			X	X	X						
	10-PZ			X		X	X	X	X	X	X	X	X		X	X	X
	10-70	X		X	X	X	X			X	X	X	X		X	X	X
June 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X				X			X								
	10-PZ					X		X	X								X
	10-70	X				X											X
July 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X				X			X	X	X						
	10-PZ					X		X	X	X	X		X	X	X	X	X
	10-70	X			X	X				X	X		X	X	X	X	X
July 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X				X			X								
	10-PZ					X		X	X								X
	10-70	X				X											X
August 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X				X			X	X	X						
	10-PZ					X		X	X	X	X		X	X	X	X	X
	10-70	X			X	X				X	X		X	X	X	X	X
August 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X				X			X								
	10-PZ					X		X	X								X
	10-70	X				X											X

Month	Lake Sample Location	Hand Profile <sup>1</sup>	Analytes														
			Secchi depth	Rads <sup>2</sup>	E coli	Zooplankton	Nutrients <sup>3</sup>	Metals <sup>4</sup>	Algae	Chlorophyll <i>a</i>	TOC	TSS	Total Hardness <sup>5</sup>	Chloride	Bromide	Sulfate	Silica (dissolved)
September 1 <sup>st</sup> week	10-00	X	X	X	X	X											
	10-03	X					X			X	X	X					
	10-PZ			X			X	X	X	X	X	X	X	X	X	X	X
	10-70	X		X	X		X	X			X	X	X	X	X	X	X
September 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X		X	X							X
	10-70	X					X										X
October 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X					X			X	X	X					
	10-PZ						X	X	X	X	X	X	X	X	X	X	X
	10-70	X			X		X	X			X	X	X	X	X	X	X
October 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X	X	X	X	X	X	X	X	X	X	X
	10-70	X					X	X			X	X	X	X	X	X	X
November 1 <sup>st</sup> week	10-00	X	X		X	X											
	10-03	X					X			X	X	X					
	10-PZ						X		X	X	X	X	X	X	X	X	X
	10-70	X			X		X				X	X		X	X	X	X
November 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X		X	X							X
	10-70	X					X										X
December 1 <sup>st</sup> week	10-00	X	X	X	X	X											
	10-03	X					X			X	X	X					
	10-PZ			X			X	X	X	X	X	X	X	X	X	X	X
	10-70	X		X	X		X	X			X	X	X	X	X	X	X
December 3 <sup>rd</sup> week	10-00	X	X			X											
	10-03	X					X			X							
	10-PZ						X		X	X							X
	10-70	X					X										X

<sup>1</sup> Hand profile collects data using the sonde for temperature, pH, conductivity, turbidity, DO, chlorophyll and ORP at 0.5 meter intervals from the surface of the lake to 10 meters depth, then at 1 meter intervals to the bottom of the lake.

<sup>2</sup> Rads includes Gross Alpha and Gross Beta.

<sup>3</sup> Nutrients include the phosphorus series and the nitrogen series analytes. Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP). Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.

<sup>4</sup> The full list of metals will be analyzed during the first week of Jan, Mar, June, Sept and Dec and the third week in October (after turnover).

<sup>5</sup> Total Hardness is reported as CaCO<sub>3</sub>

## **SL – BIMONTHLY GRAB SAMPLES**

### **Program Coordination (Westminster)**

#### **SL Sample bottle kit**

The sample containers required for each monitoring event varies depending on the parameters to be analyzed. Westminster will assemble sample bottle kits for each event. The following table details the sample containers for various parameters.

<b>Parameter</b>	<b>Volume</b>	<b>Bottle Type</b>	<b>Laboratory</b>
Phosphorus series <sup>1</sup>	500 mL	Rectangular plastic	Northglenn
Nitrogen series <sup>2</sup> , UV-254	125 mL	Rectangular brown plastic	Westminster
Rads <sup>3</sup>	1 L	Plastic	Westminster
Zooplankton	250 mL	Plastic	Westminster
Algae	1 L	Plastic	Westminster
Chlorophyll <i>a</i>	1 L	Brown plastic	Westminster
Total metals, Total Hg, Dissolved Silica	500 mL	Plastic	Westminster
Dissolved metals	500 mL	Plastic	Westminster
Chloride/Bromide/Sulfate	500 mL	Plastic	Thornton
TOC	40 mL	Glass vial	Thornton
TSS, Total Hardness	16 oz	Plastic	Thornton
E. coli	125 mL	Plastic	Westminster

<sup>1</sup>Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP).

<sup>2</sup> Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.

<sup>3</sup> Rads includes Gross Alpha and Gross Beta

## **SL – BIMONTHLY GRAB SAMPLES**

### **Sample Collection**

#### **Equipment**

- Pontoon Boat
- Marking Pen – Waterproof
- Depth Finder
- Secchi Disk
- Log book and pen
- Van Dorn bottle
- Labeled sample bottles (refer to individual monitoring plans)
- Churn sample splitter
- PZ tube sampler
- Ice packs
- Coolers
- Chain of custody forms
- YSI EXO2 Sonde – calibrated for hand profile/swap out
- Handheld anemometer/%Relative humidity meter
- Cellular phone
- GPS unit
- Digital camera
- Boat Tool Kit
- Laptop computer – fully charged with communication cable and Loggernet application installed

- Water pitcher and wide bristle brush for cleaning sonde cage
- Jackets, hats, gloves or other protective clothing as appropriate for the weather conditions
- First aid kit
- Personal flotation devices (one per person)
- Survival Suits – yellow (1 hr protection) and orange (1/2 hr protection) -as appropriate
- Profiler enclosure key
- Boat Anchor(s)
- Key for boat ramp during off-season
- Zooplankton tow net – 63  $\mu\text{m}$

### **Sample collection procedure**

#### **At Laboratory**

- Prepare and label all required sampling containers.
- Complete basic information on the chain of custody (COC) forms.
- Update the YSI EXO2 file names using the format XXMMDDYY, where XX denotes the field sampling program identification (e.g. SL, CC, RC, etc.), MM denotes the month, DD denotes the day and YY denotes the year.
- Notify laboratories about the sampling event and schedule sample pickup.
- Assemble the sampling equipment and load into the truck.
- Calibrate a YSI EXO2 sonde for the hand profile. While the Profiler is deployed, swap out the profiler YSI EXO2 sonde with the newly calibrated sonde.

### **Sampling on Standley Lake**

#### **Van Dorn Bottle**

- The Van Dorn bottle provides a means of collecting water samples at selected depths below the surface. It is made of an open-ended plastic cylinder that is attached to a rope, and lowered to any desired depth.
- Each end of the cylinder is fitted with a rubber cover. The Van Dorn bottle is attached to the length of rope, marked in 0.1 m increments, with the covers pulled out and attached to the trigger device.
- The depth of the lake is determined using the sonde. The bottle is lowered to a depth one meter above the bottom of the lake.
- A metal weight called a "messenger" is attached to the rope above the bottle. The water sample is taken by dropping a weighted "messenger" down the rope. When the weight hits the triggering device on the upper Van Dorn bottle, the catch releases the rubber end covers. The two covers are pulled together and seal off the ends.
- When the bottle has been closed, it is pulled to the surface.
- Water samples from the Van Dorn bottle are transferred to the appropriate sample containers.
- The Van Dorn sampler has a four liter capacity. If the volume of sample required is greater than the Van Dorn sampler can hold, multiple sample volumes can be collected and combined in the churn. The churn and churn spigot should be rinsed out with new sample water prior to sample collection in order to prevent cross-contamination from prior samples. Once the churn contains enough sample, it is thoroughly mixed and the sample is dispensed into the required sample containers.
- Sample containers are labeled with sample location, date and time of sample collection and the sampler's initials. The label should indicate any preservative in the sample container.
- Full sample containers are placed in coolers with ice packs until they are returned to the laboratory.

#### **PZ Tube Sampler**

- The PZ (photic zone) sampler is used to sample a column of water from the surface of the lake to the depth of the photic zone. Photic zone is defined as twice the secchi depth. The PZ sampler is comprised of a churn sample splitter connected to a polypropylene tube equipped with a quick release connector on one end and a check valve on the other end.

- Measure the secchi depth through the floor port on the pontoon boat. Do not wear sunglasses. Record data in the logbook.
- Connect the end of the tube to the hose barb on the churn.
- The tube is marked in 0.5 meter lengths. Lower the end of the tube with the check valve into the water until it is at the depth of the photic zone.
- Pull the tube up out of the water and hold the end with the check valve upside-down at a height over your head, until the tube drains down to floor level, then quickly drop the check-valve end of the tube back into the water vertically to the depth of the photic zone. The water entering the end of the tube will push the air bubble and prior sample into the churn as the tube is lowered into the water. Use the first collected volume of sample to rinse the tube and churn. Waste the sample back to the lake. Start collecting the second volume of sample. Repeat this step until sufficient quantity of sample has been collected in the churn. The capacity of the churn is 12 liters.
- Once the churn contains enough sample, it is thoroughly mixed and the sample is dispensed into the required sample containers.
- Sample containers are labeled with sample location, date and time of sample location and the sampler's initials. The label should indicate any preservative in the sample container.
- Sample containers are placed in a cooler with ice packs until they are returned to the laboratory.

### Surface Sampling

- Surface sampling is accomplished through the floor port of the pontoon boat. Sample containers are dipped into the water until full to collect samples.
- Sample containers are labeled with sample location, date and time of sample collection and the sampler's initials. The label should indicate any preservative in the sample container.
- Sample containers are placed in a cooler with ice packs until they are returned to the laboratory.

### Zooplankton Tows

- Zooplankton samples are collected at SL-10 using a 63  $\mu\text{m}$  tow net.
- A vertical tow sampling methodology involves lowering the tow net to the bottom of the lake and retrieving it at a slow speed of approximately one foot per second up to the surface.
- The zooplankton collected in the net are washed into a 250 mL sample bottle using multiple DI water rinses to ensure all organisms in the net are transferred to the sample container. The final volume in the bottle is not required to be consistent.
- The sample depth is recorded on the sample bottle along with date and location.

## **SL – AQUATIC INVASIVE SPECIES MANAGEMENT**

### **Eurasian Watermilfoil**

Eurasian Watermilfoil (“EWM”), *Myriophyllum spicatum* L, is a non-native, aquatic, noxious weed that grows rapidly and to a depth of 35 feet. EWM grows in dense mats that severely interfere with recreation and has been known to provide a substrate for blue-green algae growth. Blue-green algae blooms can ultimately cause taste and odor events in drinking water supplies. EWM was first observed in Standley Lake in 1998. It was positively identified in 2000. In 2012, it was confirmed that the Eurasian watermilfoil hybridized with a native Colorado species Northern watermilfoil (*Myriophyllum sibiricum*). The hybrid species is more robust and grows even quicker than the Eurasian watermilfoil.

Annual surveys of weevil populations in the lake were performed by contractors until 2013, but beginning in 2014 will be performed by the city of Westminster.

Eurasian milfoil weevils have been stocked in the lake (on the west side) on four occasions from 2004 through 2011. The weevil larva bore into the stem of the milfoil which damages the plant. When an adequate weevil population is sustained, the weevils may be able to control the spread of the milfoil.

As lake conditions permit, bathymetric studies are performed on Standley Lake during the early summer for mapping the submerged aquatic vegetation in order to assess milfoil growth and the effectiveness of the remedies.

### **Zebra and Quagga Mussels**

Zebra and quagga mussels are non-native, aquatic invasive species that are introduced to new water bodies by the unintentional transfer of organisms from an infested water body via boats or fishing bait. Aquatic mussels cause serious damage to the ecosystem and result in costly control procedures for drinking water treatment facilities. Both zebra and quagga mussels were discovered in 2008 in a few of Colorado’s lakes. Prevention of aquatic mussel infestation is key to protecting Standley Lake. An intensive boat inspection and decontamination program was initiated in 2008 to protect the lake from new invasive species. No live aquatic baits are allowed at Standley Lake.

Standley Lake is monitored for aquatic mussels every two weeks using the zooplankton tow procedure described previously. The tows are performed at the lake inlets, SL-10, and the boat ramp/outlet area. Several invasive species have a planktonic life stage and sampling with the plankton nets will provide early warning of infestation. In addition, substrate samplers, constructed and monitored by Colorado Parks and Wildlife are placed throughout the lake. Substrate samplers are made up of a float, rope, plastic plates and an anchor weight. A plate is located at every 10 feet of depth from the surface to the bottom of the lake at various locations. The plates and ropes are checked periodically for aquatic mussel growth. A plate or rope that feels like sand paper will be scraped and examined under the microscope for veligers (zebra or quagga mussel larvae).

Shoreline surveys are performed when the water level is at the lowest for the year. A shoreline survey consists of walking the shoreline in teams looking for adult mussels attached to any hard substrate.

## **SL – WEATHER STATION**

A weather station is located at the northeastern end of the Standley Lake dam. The equipment is located inside the fenced area of the Shaft House. The weather station collects readings every ten minutes and can be accessed remotely through a cellular modem and datalogger.

Weather conditions collected at this location include: Rain rate/accumulation, Air Temperature, Relative Humidity, Barometric Pressure, Wind Speed and Wind Direction.

## **DATA MANAGEMENT AND REPORTING**

The city of Westminster is responsible for management of the data collected in support of the IGA monitoring efforts. A Microsoft Excel spreadsheet is used for archival of monitoring data collected for all programs detailed in this document except the lake profile data. The IGA partners have access to the system via Dropbox. Backups are available as “previous versions” stored historically on the Dropbox system.

The city of Westminster logs in all samples collected by the various sampling teams. The coordinated sample creation effort reduces interpretation errors and subsequent reporting inconsistencies. Each IGA partner is responsible for data entry of the analytical results for their assigned analyses into the spreadsheet. On a semi-annual basis, a peer review team comprised of at least one representative from each of the SLC, evaluates the data and identifies possible errors or data anomalies. Each city makes corrections to the spreadsheet and submits a final version of the data.

Data results from this program, along with other reporting requirements as stated in the Joint Agreement, will be reported to the Colorado Water Quality Control Commission on an annual basis. Only data collected during the normal sampling schedule is included in the annual report. The data is reported in tabular and graphic formats.

Each laboratory must retain all records (i.e. field notebooks and logs, instrument logs, bench sheets, instrument printouts, electronic data files, chain of custody forms, etc.) pertaining to the monitoring programs until the SLC IGA representatives jointly, in writing, authorize disposal of the records.

The periods of record for monitoring data formats are summarized in the following table:

Program	Period of Record	Available Format
Clear Creek Grabs	1994 – 2001	MS Access/Excel
	2002 – current	MS Excel
Clear Creek Grabs - EPA Metals Data	1994 – current	MS Excel
Clear Creek Autosamplers Ambient	2006 – current	MS Excel
Clear Creek Autosamplers Event	2006 – current	MS Excel
Standley Lake Tributaries – grabs and autosamplers (includes data for the program formerly called Clear Creek Canals)	1988 – 2001	MS Access/Excel
	2002 - current	MS Excel
Standley Lake	1988 – 2001	MS Access/Excel
	2002 - current	MS Excel

Table Notes: The data archive includes phosphorus data from 1999-current, all Thornton data from 2001-current and all Westminster data from 2002-current.



**SUPPLEMENTAL INFORMATION - 3**  
GRAPHICAL DISPLAY OF SELECT CLEAR CREEK / STANDLEY  
LAKE DATA - 2024

## TABLE OF CONTENTS

---

<b>I.</b>	<b>Introduction .....</b>	<b>1</b>
<b>II.</b>	<b>Upper Basin Flows and Water Quality .....</b>	<b>1</b>
	Discharge.....	1
	Water Quality and Nutrient Loading.....	3
<b>III.</b>	<b>Canal Zone Flows and Water Quality.....</b>	<b>9</b>
	Flows from Canals and KDPL .....	9
	Changes in Water Quality for the FHL and Croke Canals.....	9
<b>IV.</b>	<b>Standley Lake Flows, Contents, and Loadings .....</b>	<b>11</b>
	Flows and Contents .....	11
	Loading Into and Out of Standley Lake and Inflow Water Quality .....	13
<b>V.</b>	<b>Standley Lake Water Quality .....</b>	<b>17</b>
	Temperature .....	18
	Dissolved Oxygen .....	19
	Days of Hypoxia .....	20
	Nutrients.....	21
	Chlorophyll <i>a</i> .....	23
	Secchi Depth.....	25
	<b>Acronyms.....</b>	<b>27</b>

# 2024 UPPER BASIN WATER QUALITY

## I. INTRODUCTION

This document serves as a supplement to the 2024 Clear Creek / Standley Lake Watershed Annual Report. It provides graphical summaries of 2024 water-quality data from the Upper Basin, Canal Zone, and Standley Lake, and compares data from 2024 to data from the previous five years (2019-2023). Constituents included in these figures are discharge (flow), total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN). Constituent concentrations that are below the detection limit are analyzed and reported at ½ the detection limit.

## II. UPPER BASIN FLOWS AND WATER QUALITY

This section presents water-quality data from the Upper Basin in 2024. The analysis is based on data from two sampling locations CC26 (the upper station - Clear Creek at Lawson Gage) and CCAS59/60 (the lower station - Clear Creek upstream of the Church Ditch headgate). The data from each location include grab samples collected manually and via autosampler. The data presentation and discussion in this section focus on ambient (non-event) samples. Loads were calculated using daily flows from USGS gage measurements and concentration data from CC26/CCAS26 and CC60/CCAS59. Consistent with previous analyses, a mid-point step function was used to fill in daily concentrations between available sample data. Annual loads were then calculated as the sum of individual daily loads. Volume-weighted concentrations were calculated by summing the annual load and dividing by the annual flow volume.

### DISCHARGE

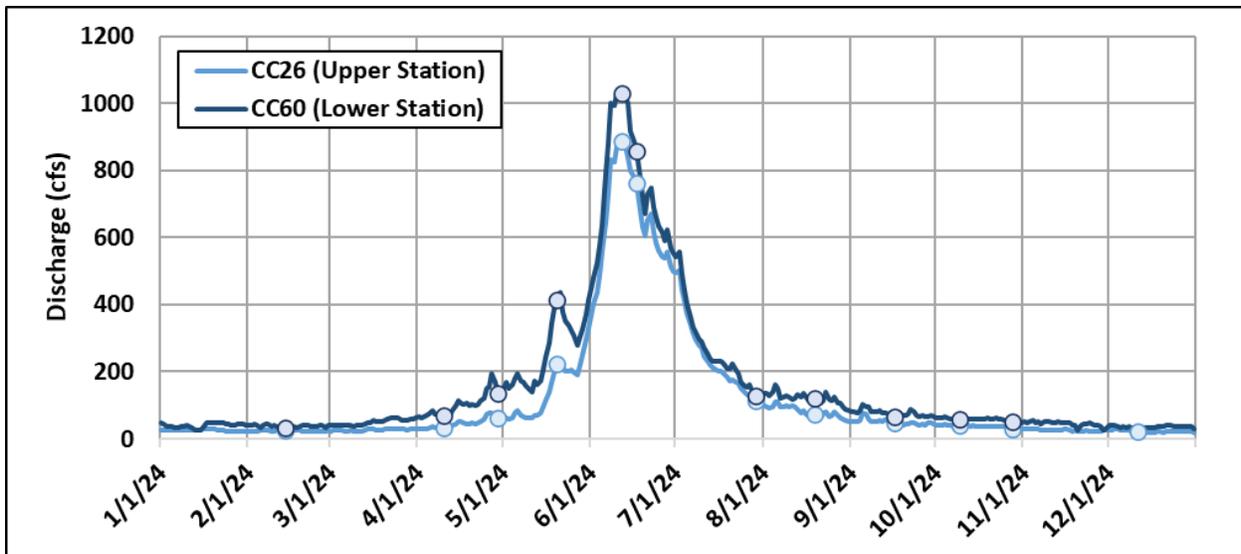


Figure 1. 2024 Clear Creek Hydrographs for the Upper Station (CC26) and the Lower Station (CC60), with Sampling Dates Indicated by Symbols

# 2024 UPPER BASIN WATER QUALITY

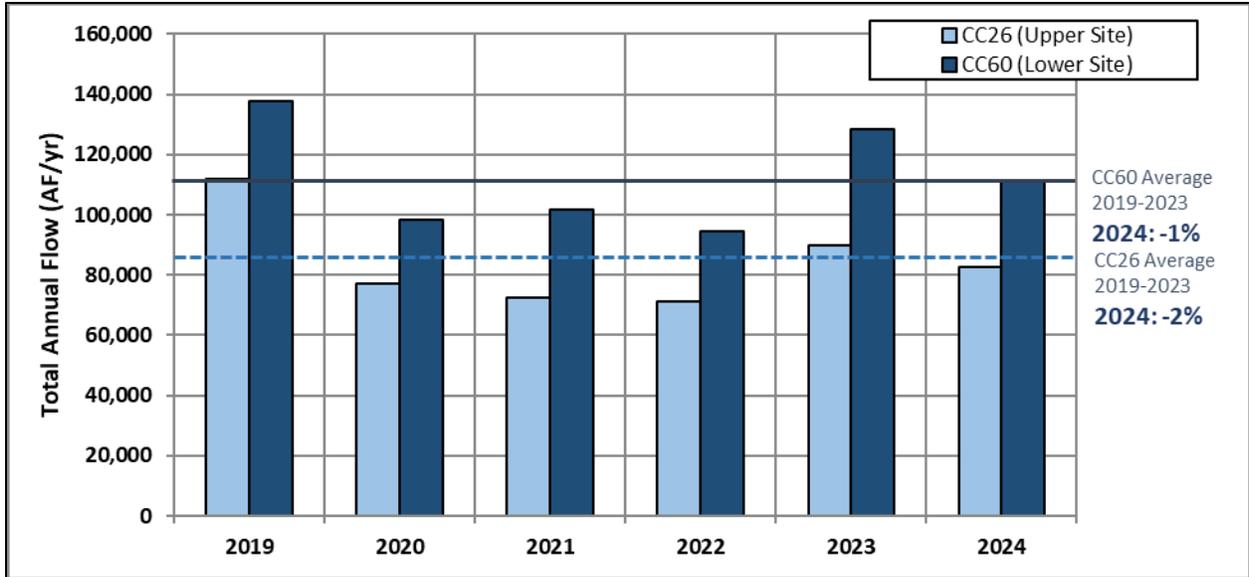


Figure 2. Total Annual Flow in Clear Creek at CC26 and CC60, 2019-2024

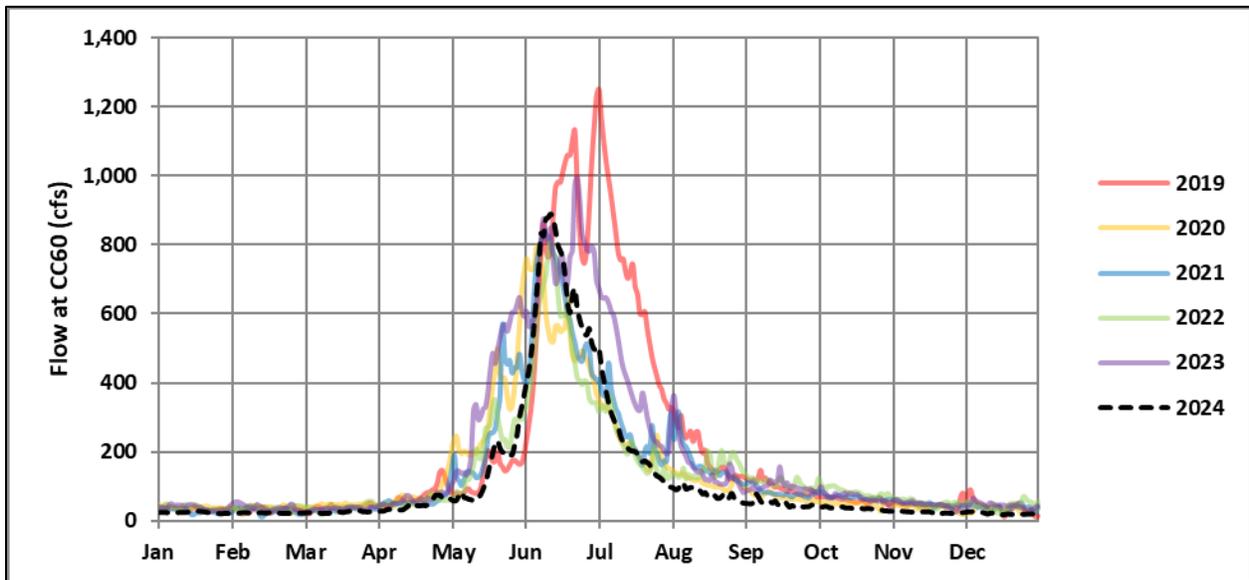


Figure 3. Annual Clear Creek Hydrographs for 2019-2024 (CC60)

# 2024 UPPER BASIN WATER QUALITY

## WATER QUALITY AND NUTRIENT LOADING

### Total Suspended Solids

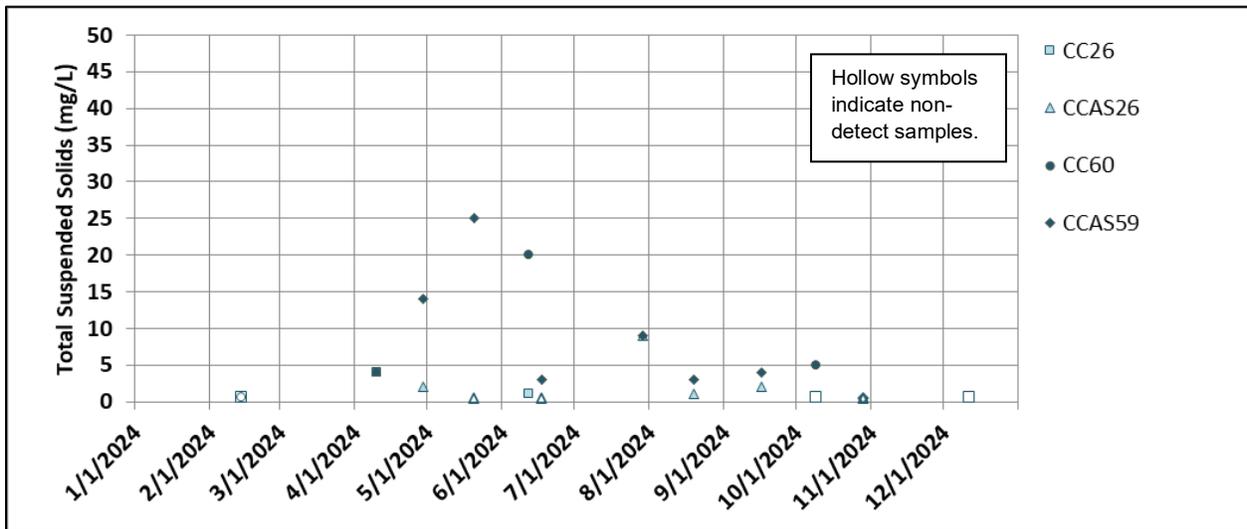


Figure 4. Total Suspended Solids Concentrations (Non-Event) in the Upper Basin, 2024

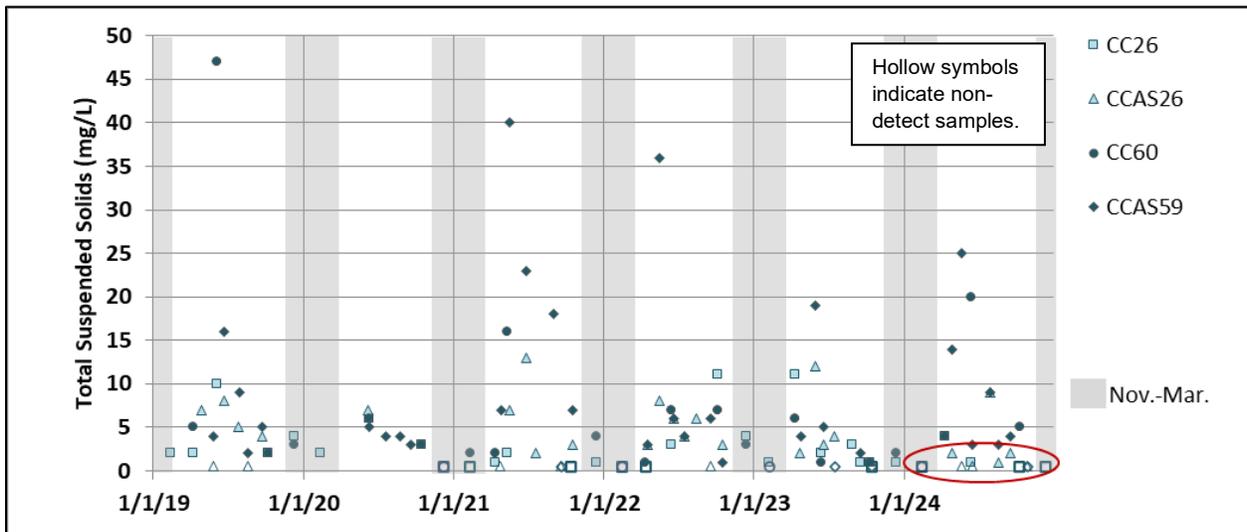


Figure 5. Total Suspended Solid Concentrations (Non-Event) in the Upper Basin, 2019-2024

# 2024 UPPER BASIN WATER QUALITY

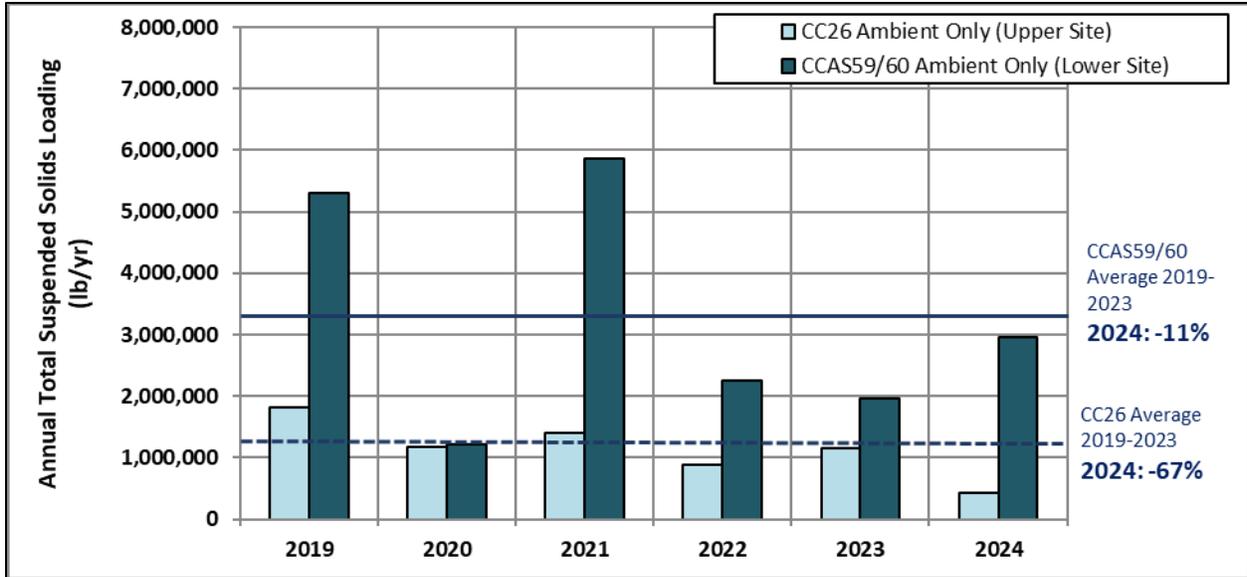


Figure 6. Total Suspended Solids Load Estimates in the Upper Basin, 2019-2024

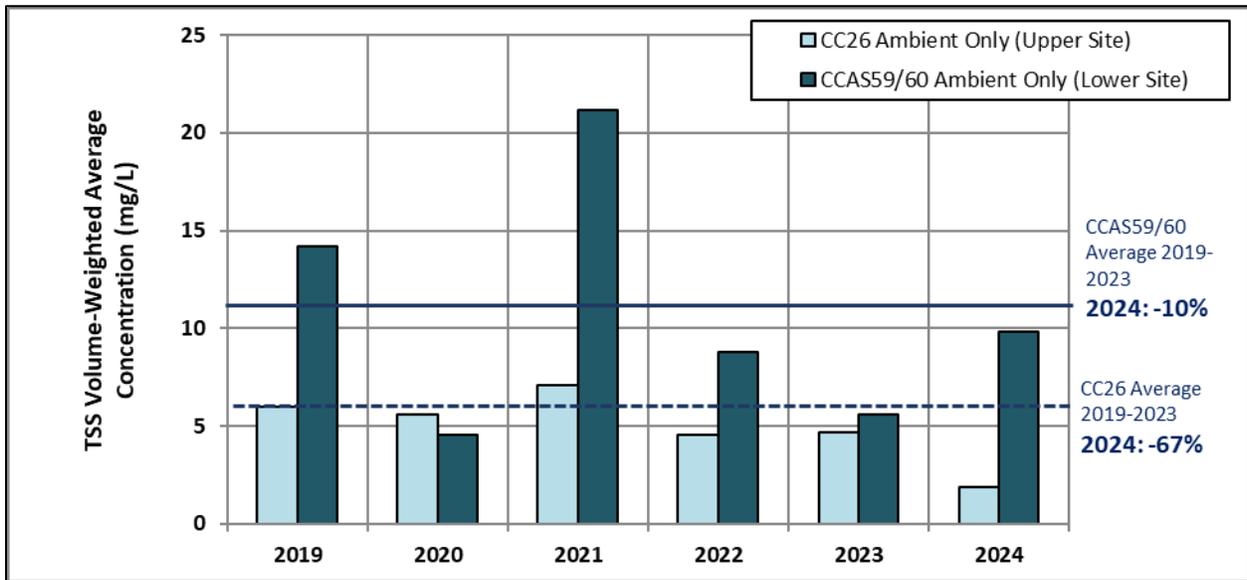


Figure 7. Total Suspended Solids Volume-Weighted Concentration Estimates in the Upper Basin, 2019-2024

# 2024 UPPER BASIN WATER QUALITY

## Total Phosphorus

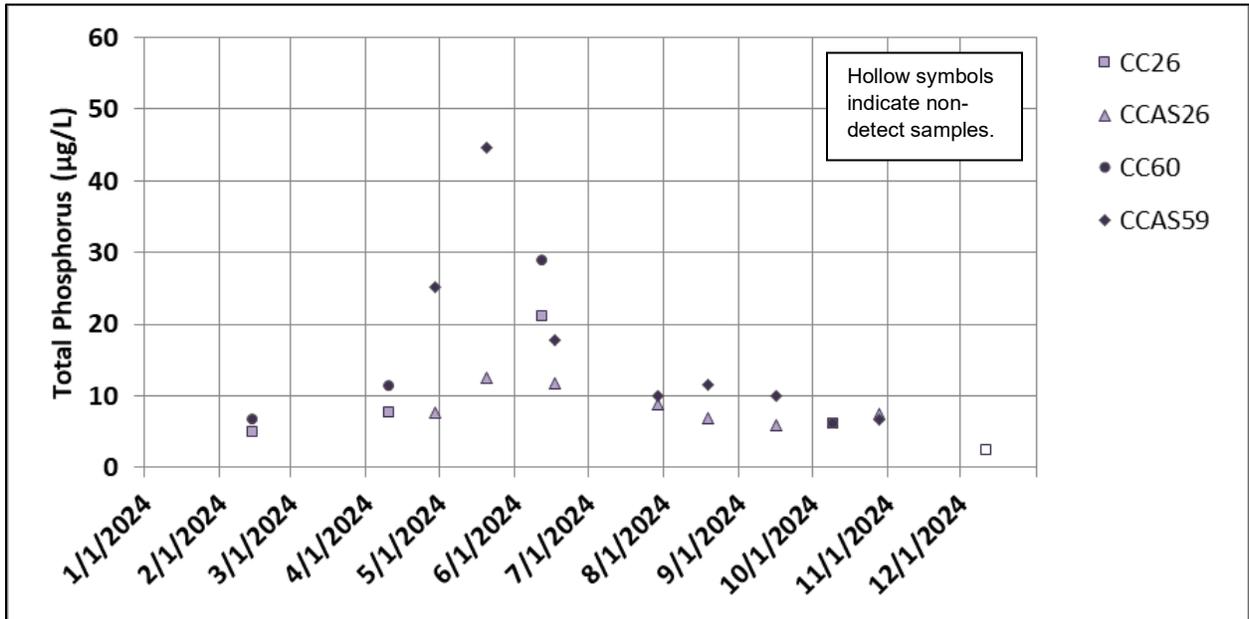


Figure 8. Total Phosphorus Concentrations (Non-Event) in the Upper Basin, 2024

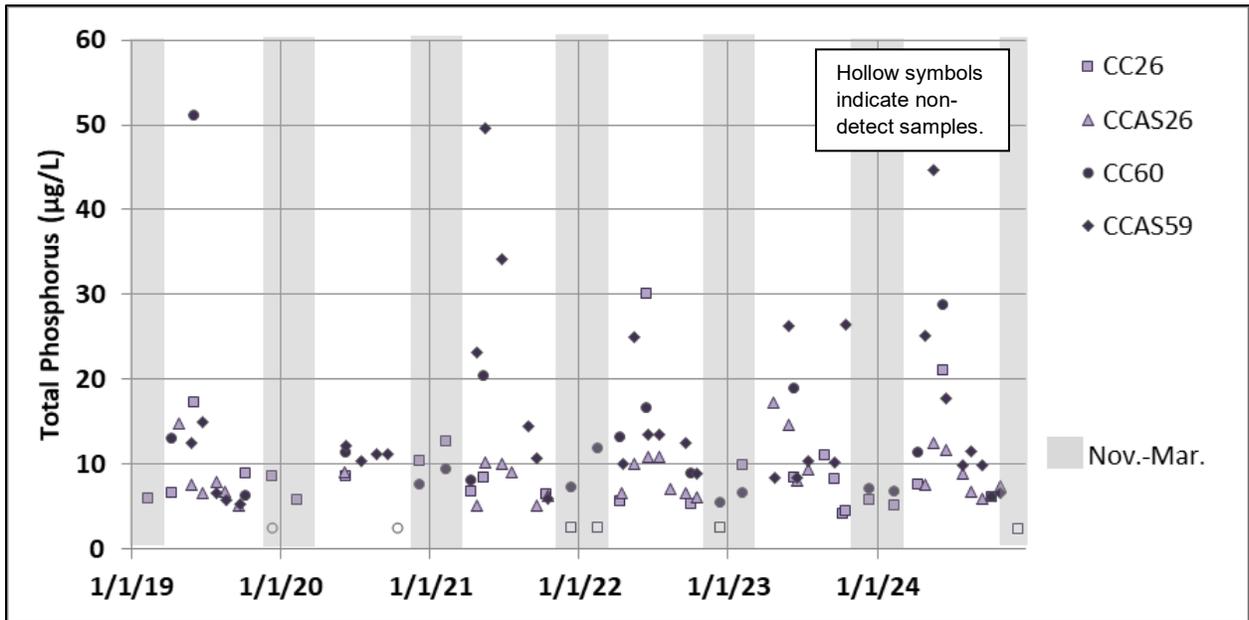


Figure 9. Total Phosphorus Concentrations (Non-Event) in the Upper Basin, 2019-2024

## 2024 UPPER BASIN WATER QUALITY

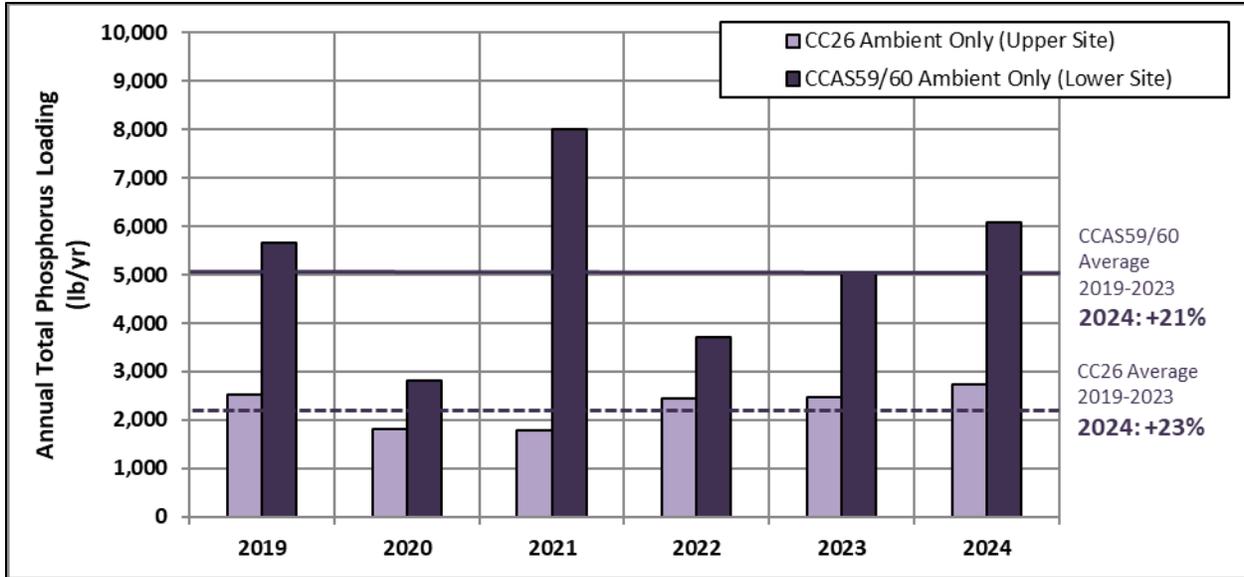


Figure 10. Annual Total Phosphorus Loading Estimates in the Upper Basin, 2019-2024

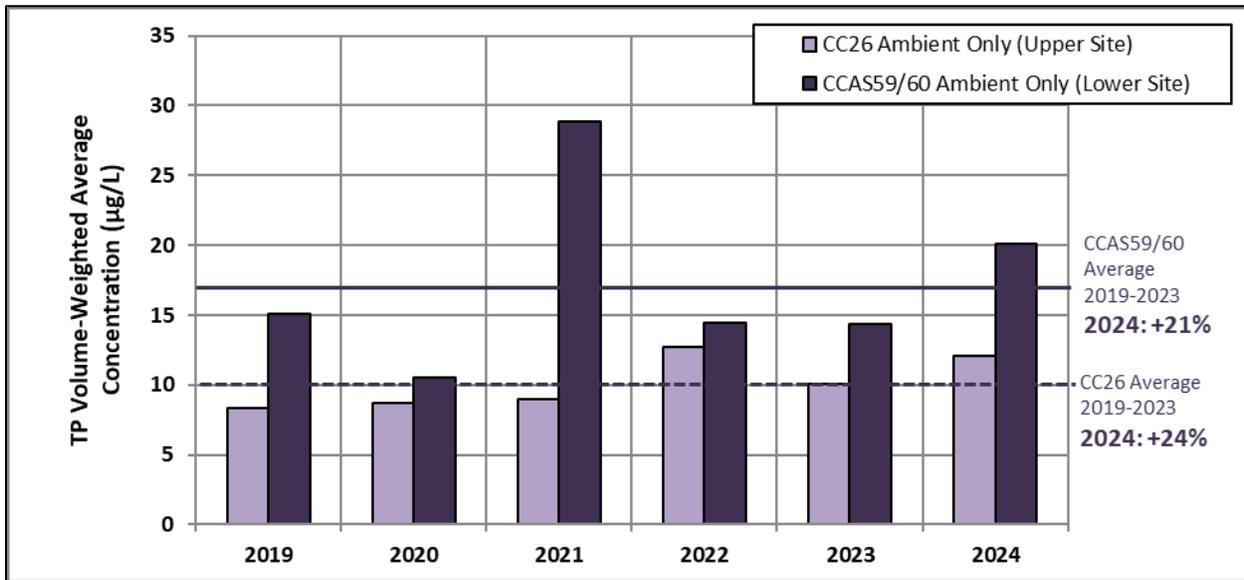


Figure 11. Volume-Weighted Total Phosphorus Concentration Estimates in the Upper Basin, 2019-2024

# 2024 UPPER BASIN WATER QUALITY

## Total Nitrogen

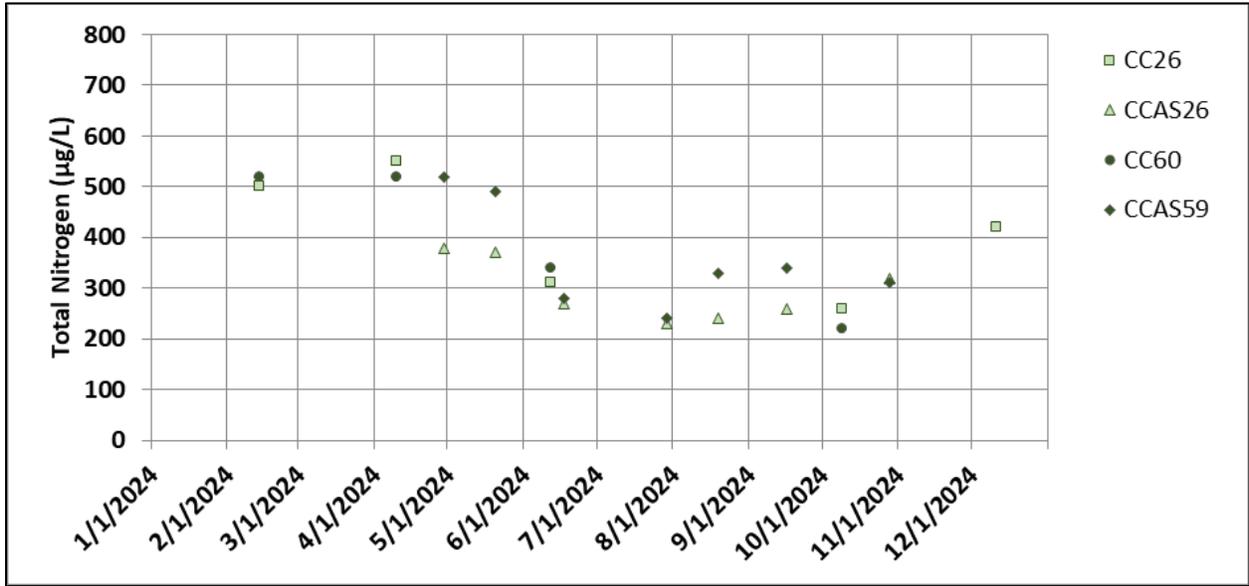


Figure 12. Total Nitrogen Concentrations (Non-Event) in the Upper Basin, 2024

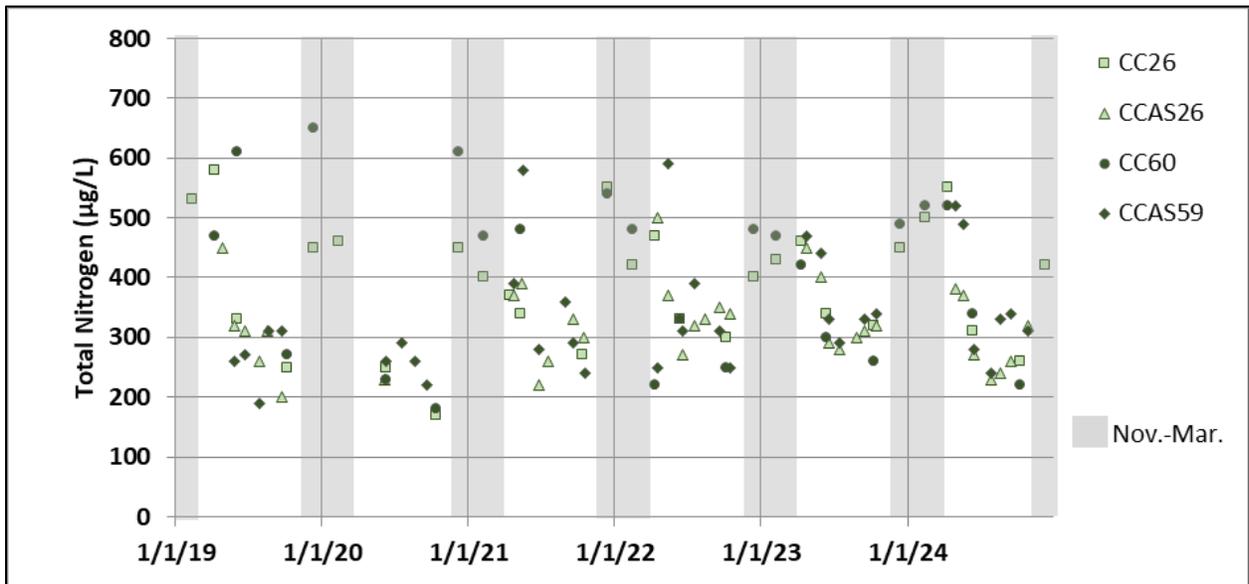


Figure 13. Total Nitrogen Concentrations (Non-Event) in the Upper Basin, 2019-2024

## 2024 UPPER BASIN WATER QUALITY

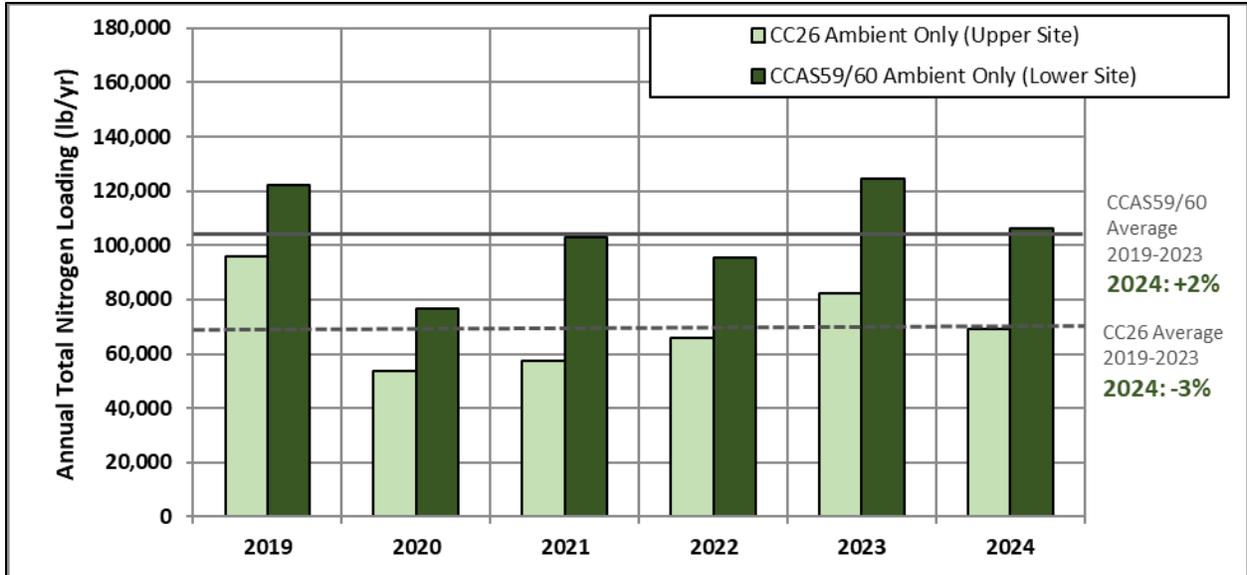


Figure 14. Total Nitrogen Loading Estimates in the Upper Basin, 2019-2024

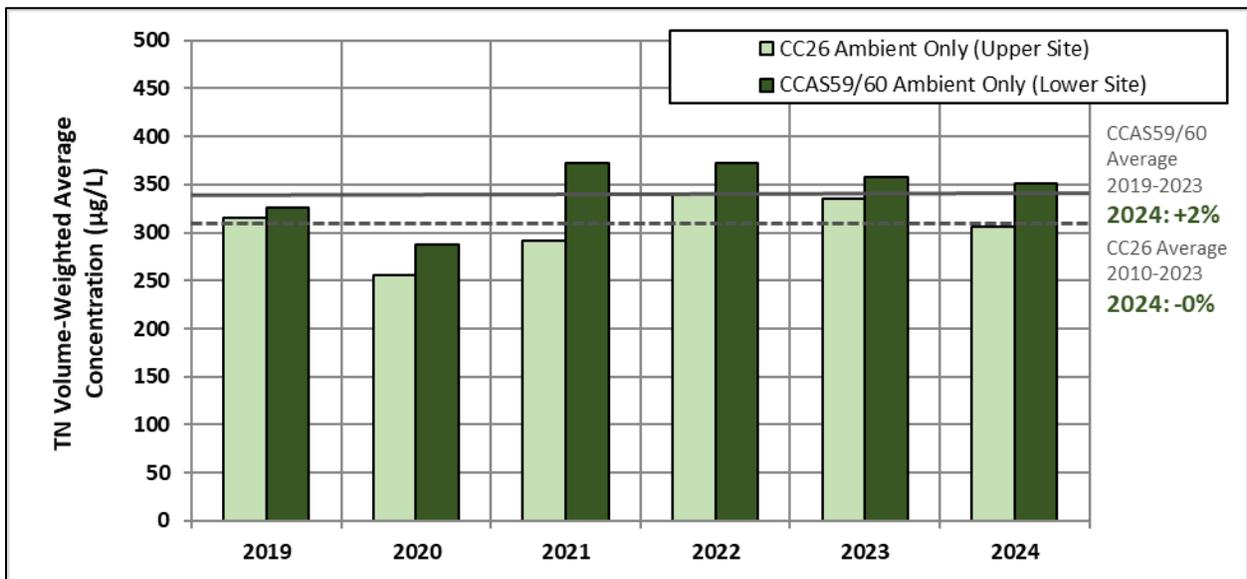


Figure 15. Volume-Weighted Total Nitrogen Concentration Estimates in the Upper Basin, 2019-2024

## III. CANAL ZONE FLOWS AND WATER QUALITY

The Upper Basin is the source for the water diverted into four inflow canals (Church Ditch, Croke Canal, Farmers' High Line Canal (FHL), and Kinnear Ditch Pipeline (KDPL)) that lead to Standley Lake. This section presents the timing and volume of flows for the inflow canals. In addition, a description of water-quality changes along the two major inflow (FHL and Croke) canals from their points of diversion on Clear Creek to the reservoir are included.

### FLOWS FROM CANALS AND KDPL

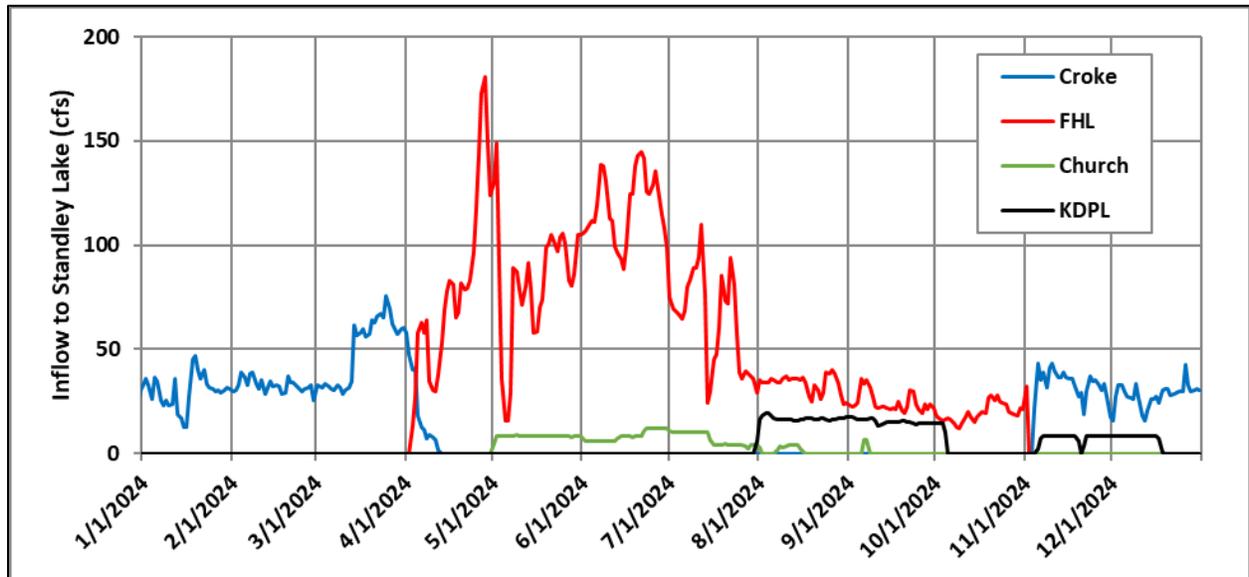


Figure 16. Inflow to Standley Lake, 2024

### CHANGES IN WATER QUALITY FOR THE FHL AND CROKE CANALS

The Croke Canal and the FHL Canal are the dominant sources of water to Standley Lake. These canals follow parallel paths for approximately 15 miles between their headgates at Clear Creek and their turnouts to Standley Lake. Over this distance the canals pass through a diverse range of land uses. When a canal is in use, water-quality samples are collected at both the headgate and at the release point to Standley Lake. To better understand the effects of the Canal Zone on water quality, an analysis of concentration differences observed between the canal headgates and turnouts was performed. As with the Upper Basin and Standley Lake water-quality discussions, this analysis focused on TSS, TP, and TN. Median annual concentrations were calculated for TSS, TP, and TN. These medians were calculated for the canal headgate and at the release points into the lake for the Croke and FHL.

## 2024 CANAL ZONE WATER QUALITY

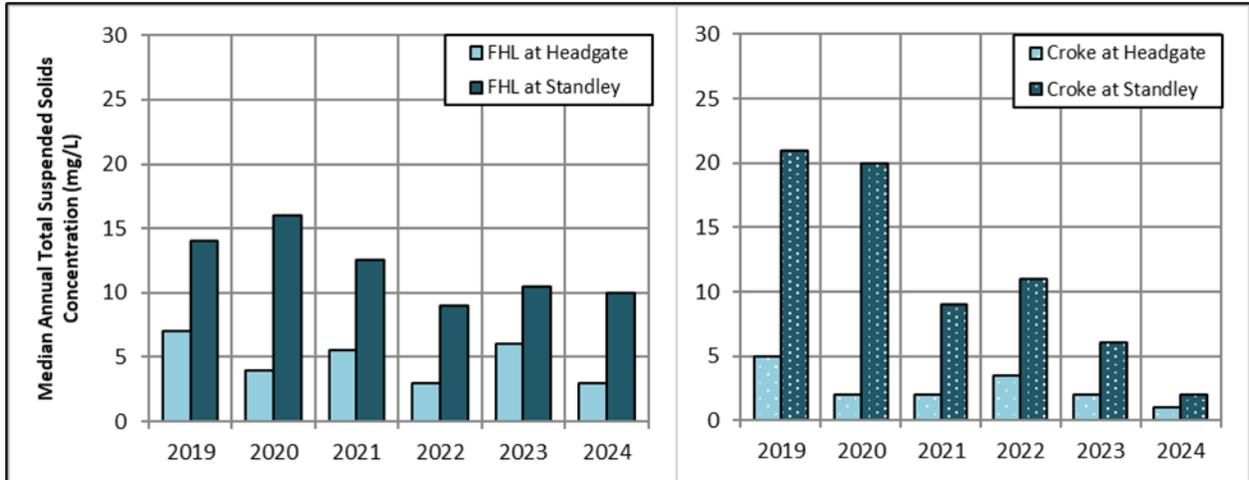


Figure 17. Median Total Suspended Solids Concentrations in FHL (left) and Croke (right) Canals

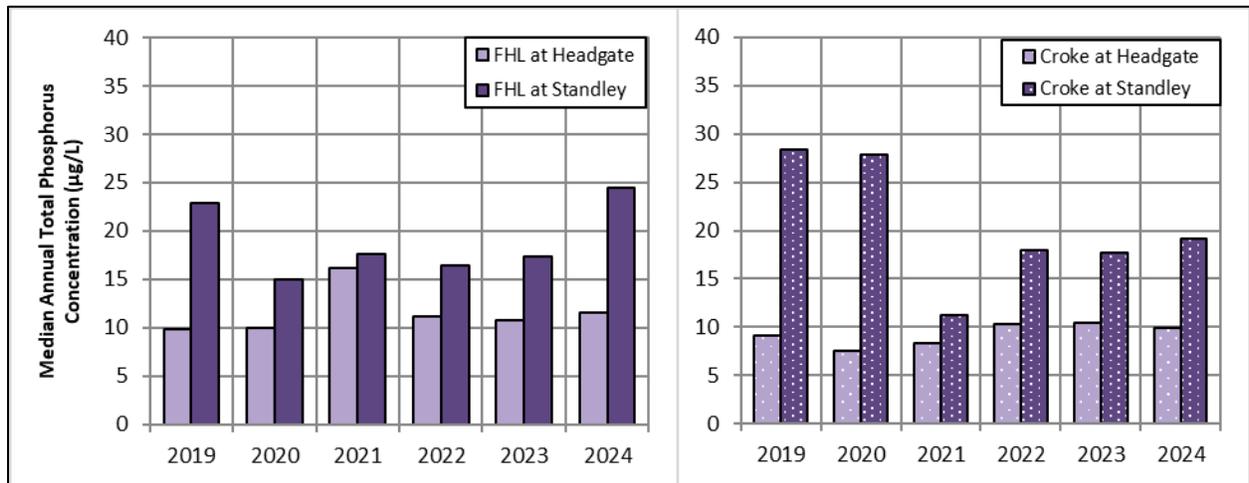


Figure 18. Median Total Phosphorus Concentrations in FHL (left) and Croke (right) Canals

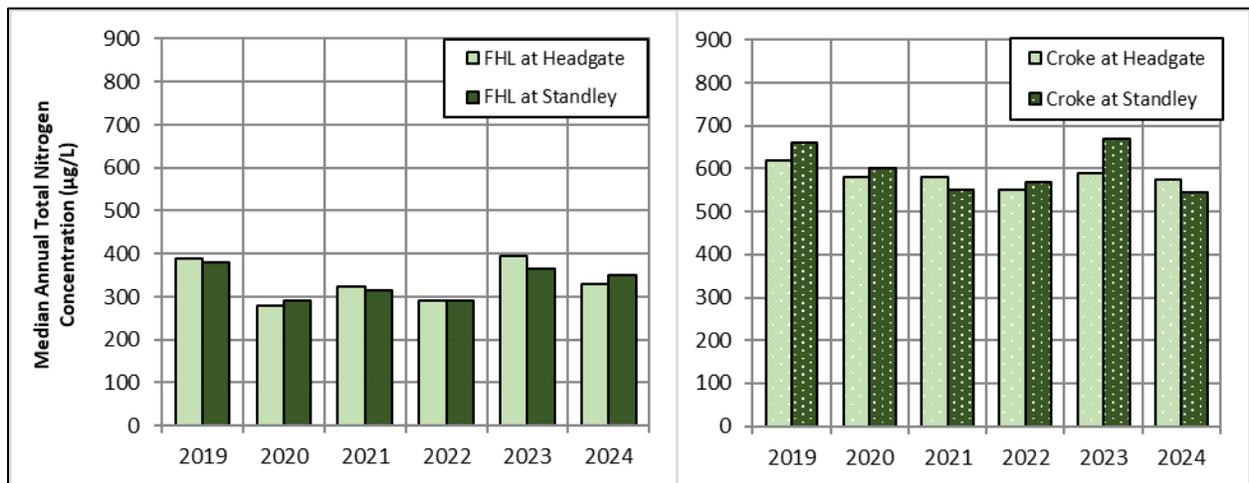


Figure 19. Median Total Nitrogen Concentrations in FHL (left) and Croke (right) Canals

## 2024 STANDLEY LAKE WATER QUALITY

### IV. STANDLEY LAKE FLOWS, CONTENTS, AND LOADINGS

This section presents the quantity and quality of the inflows to and outflows from Standley Lake, based on samples collected as part of the Upper Clear Creek/Standley Lake Watershed Water Quality Monitoring Program. In addition, the loadings and flow-weighted concentrations of TSS, TN and TP were calculated as described above (Section II, page 1).

#### FLOWS AND CONTENTS

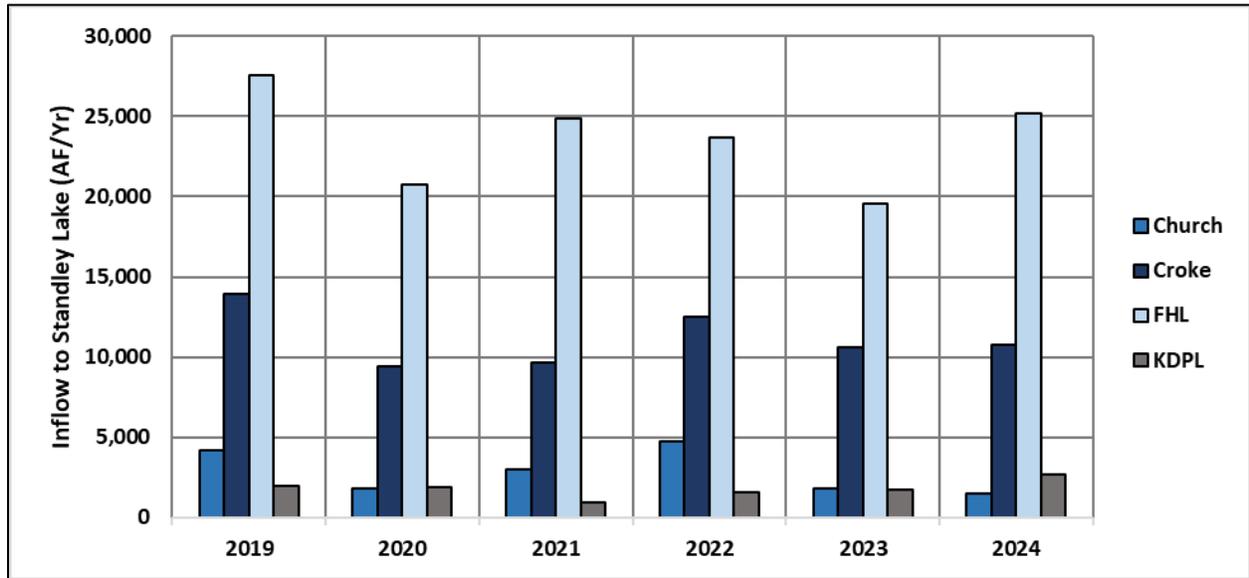


Figure 20. Inflow Volumes to Standley Lake by Source, 2019-2024

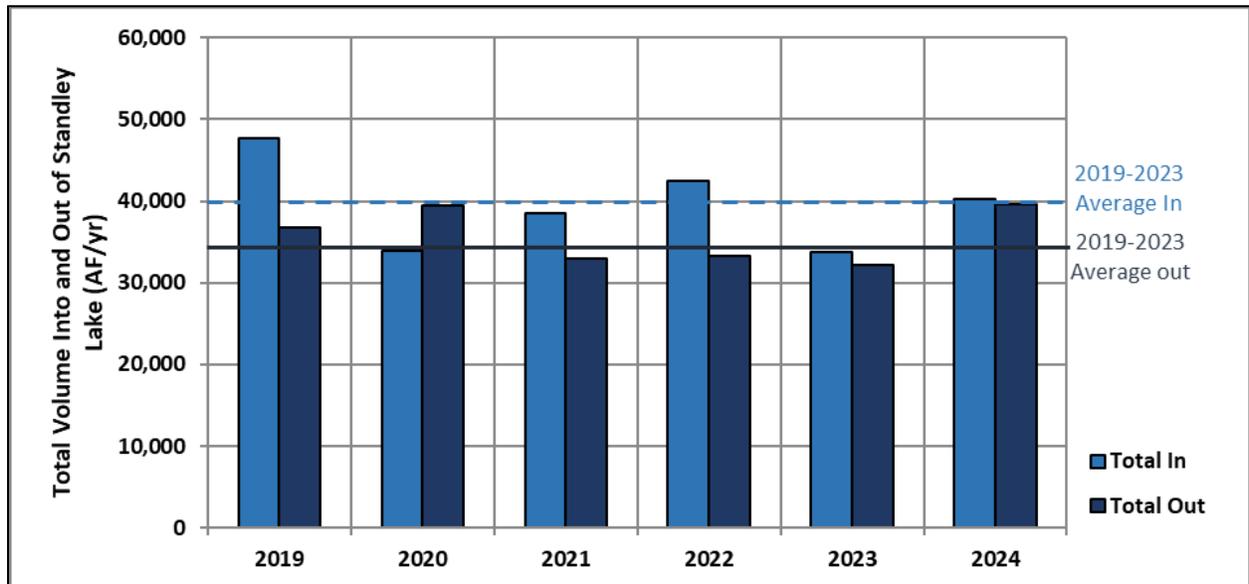


Figure 21. Total Measured Annual Standley Lake Inflow and Outflow, 2019-2024

# 2024 STANDLEY LAKE WATER QUALITY

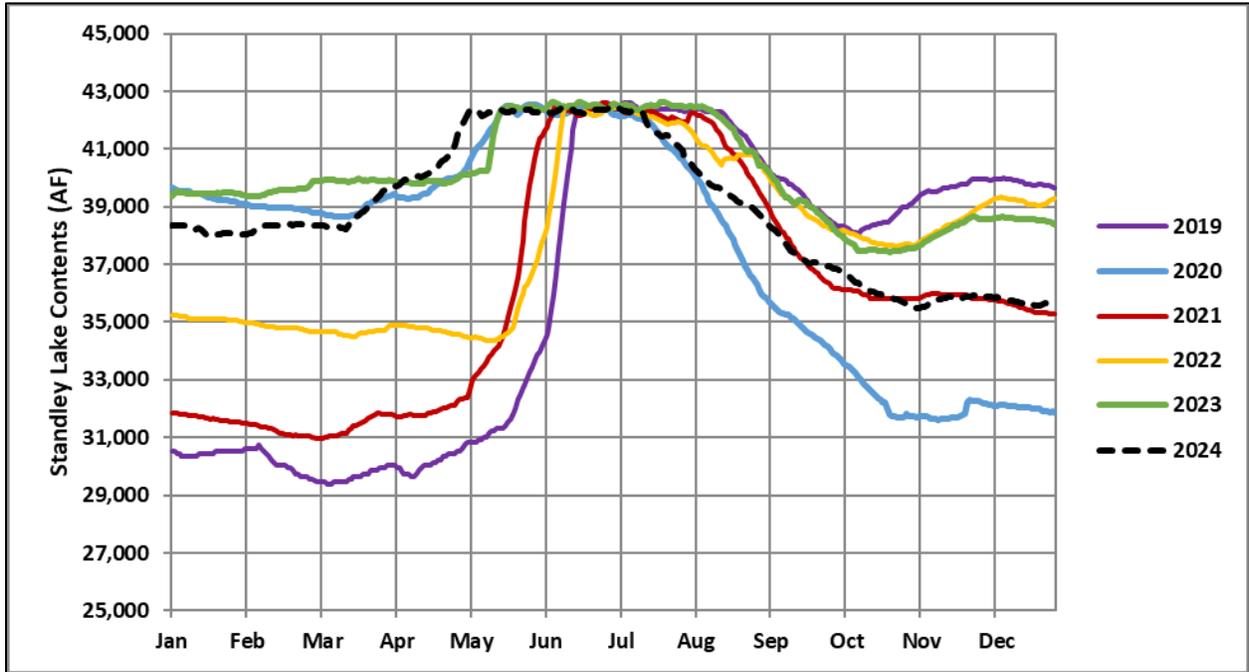


Figure 22. Standley Lake Contents, 2019-2024

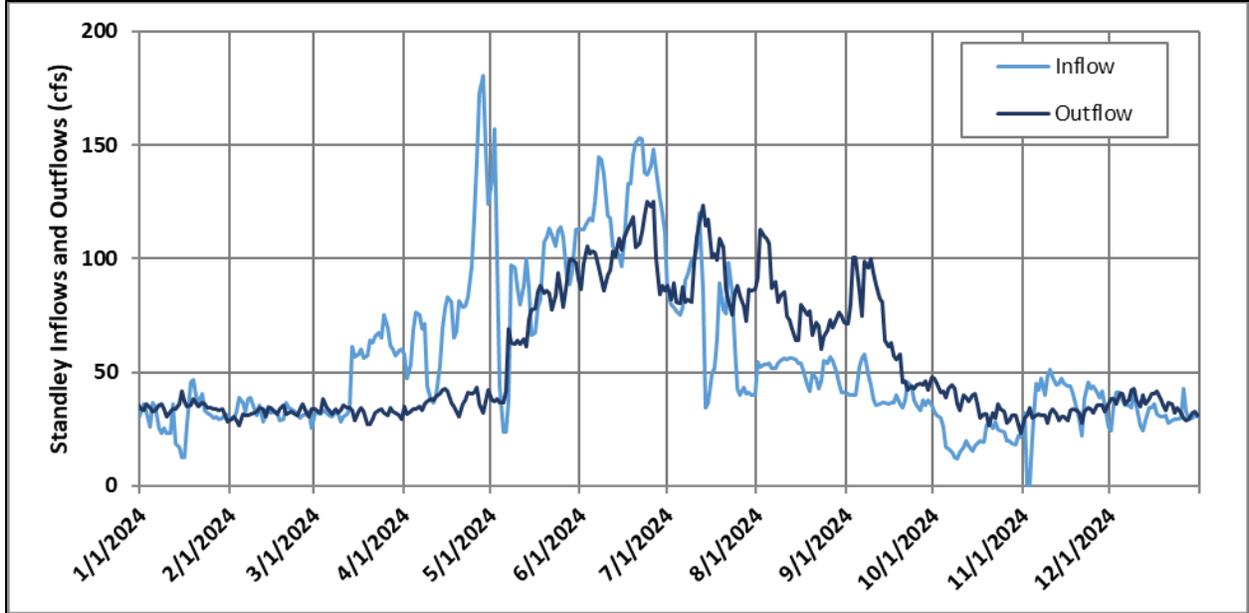


Figure 23. Inflows to and Outflows from Standley Lake, 2024

# 2024 STANDLEY LAKE WATER QUALITY

## LOADING INTO AND OUT OF STANDLEY LAKE AND INFLOW WATER QUALITY

### Total Suspended Solids

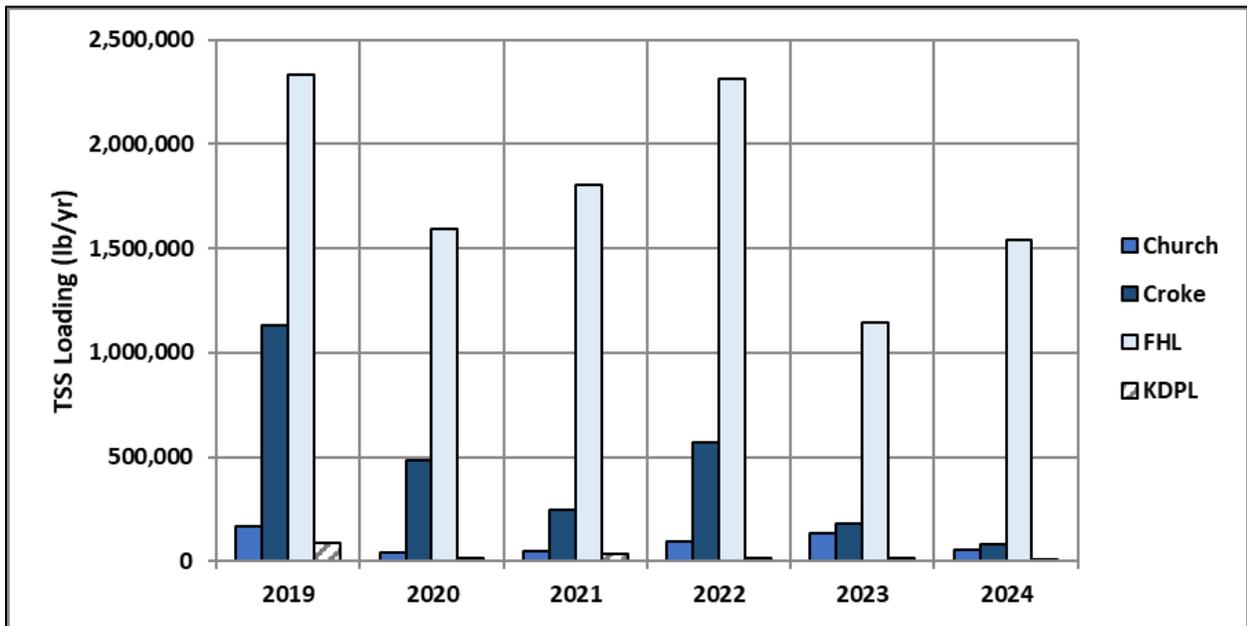


Figure 24. Total Suspended Solids Loading Into Standley Lake by Source, 2019-2024

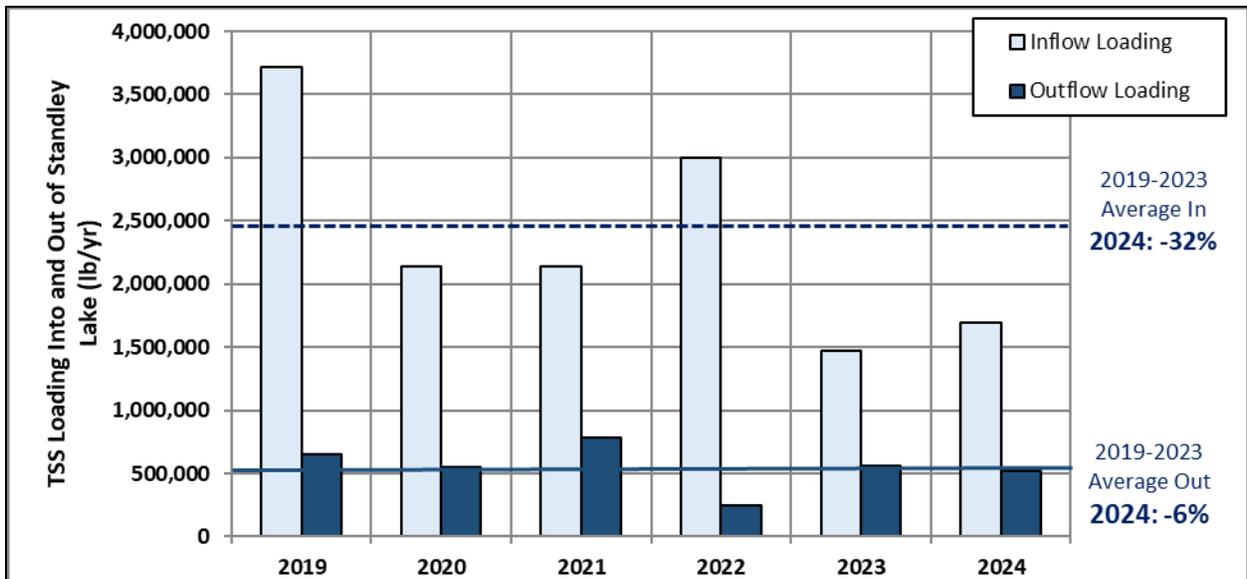


Figure 25. Total Suspended Solids Loading Into and Out of Standley Lake, 2019-2024

## 2024 STANDLEY LAKE WATER QUALITY

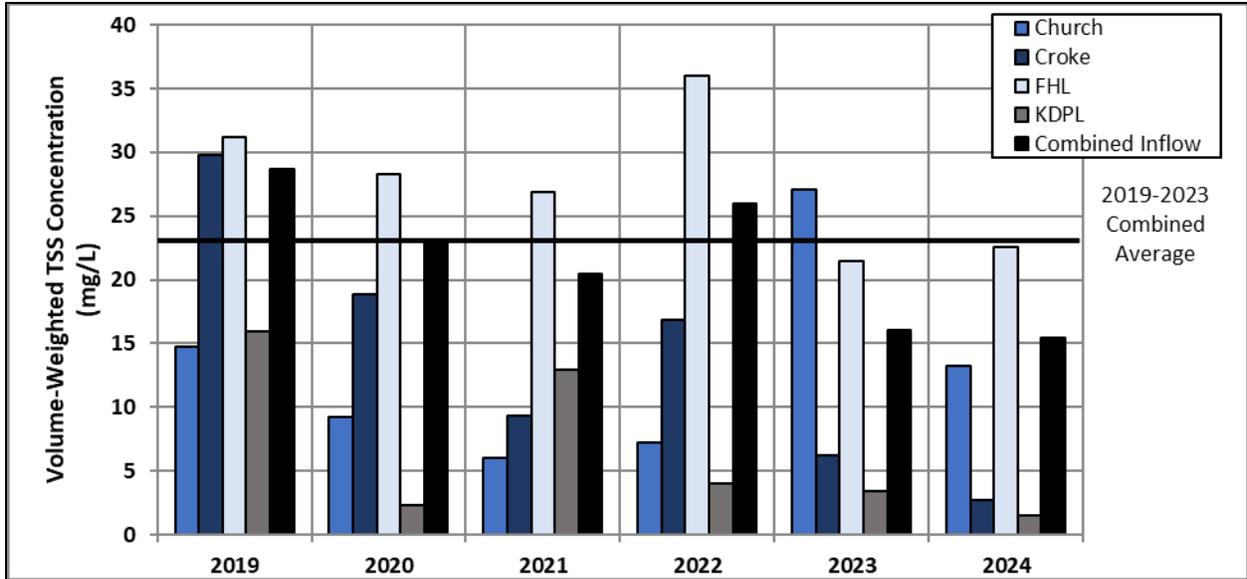


Figure 26. Volume-Weighted Total Suspended Solids Concentrations Into Standley Lake by Source, 2019-2024

### Total Phosphorus

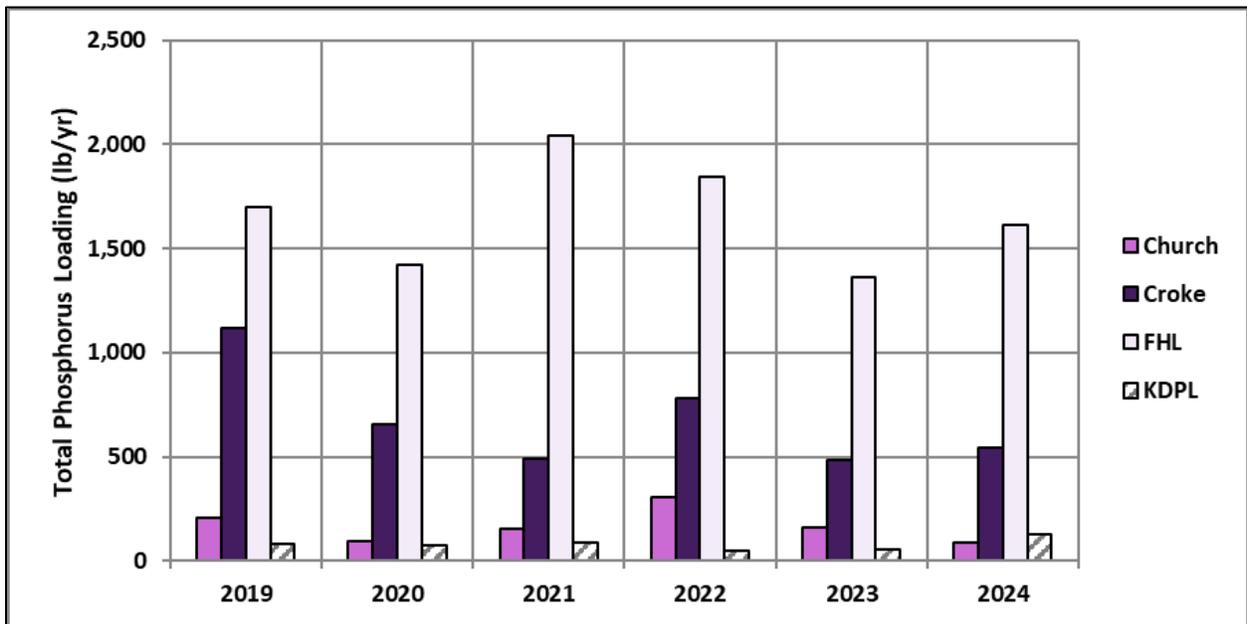


Figure 27. Total Phosphorus Loading Into Standley Lake by Source, 2019-2024

# 2024 STANDLEY LAKE WATER QUALITY

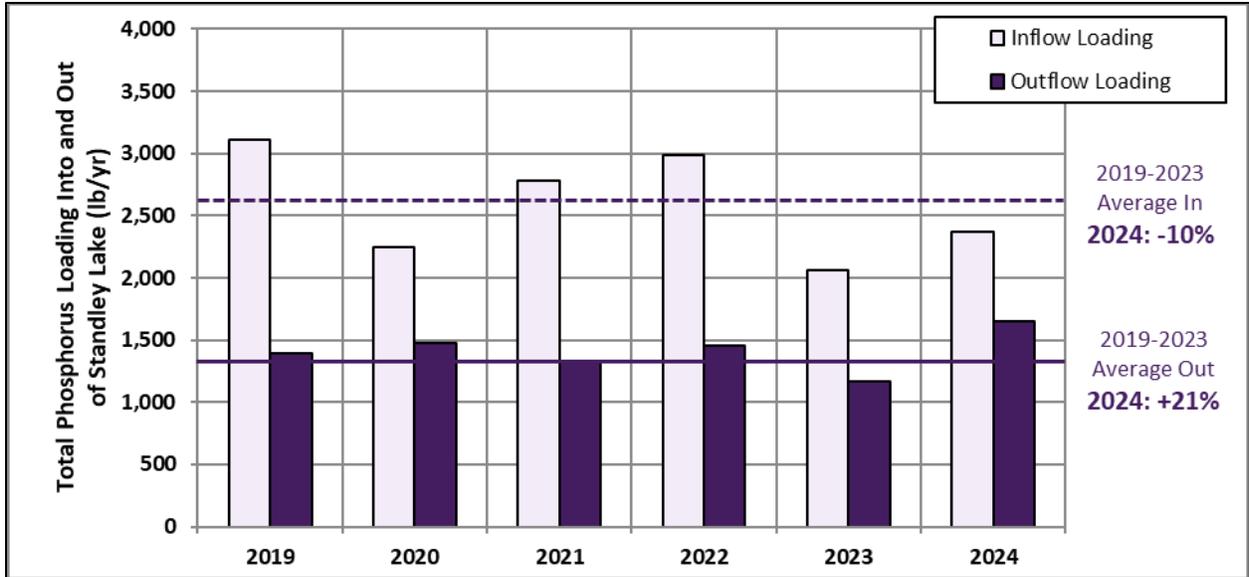


Figure 28. Total Phosphorus Loading Into and Out of Standley Lake, 2019-2024

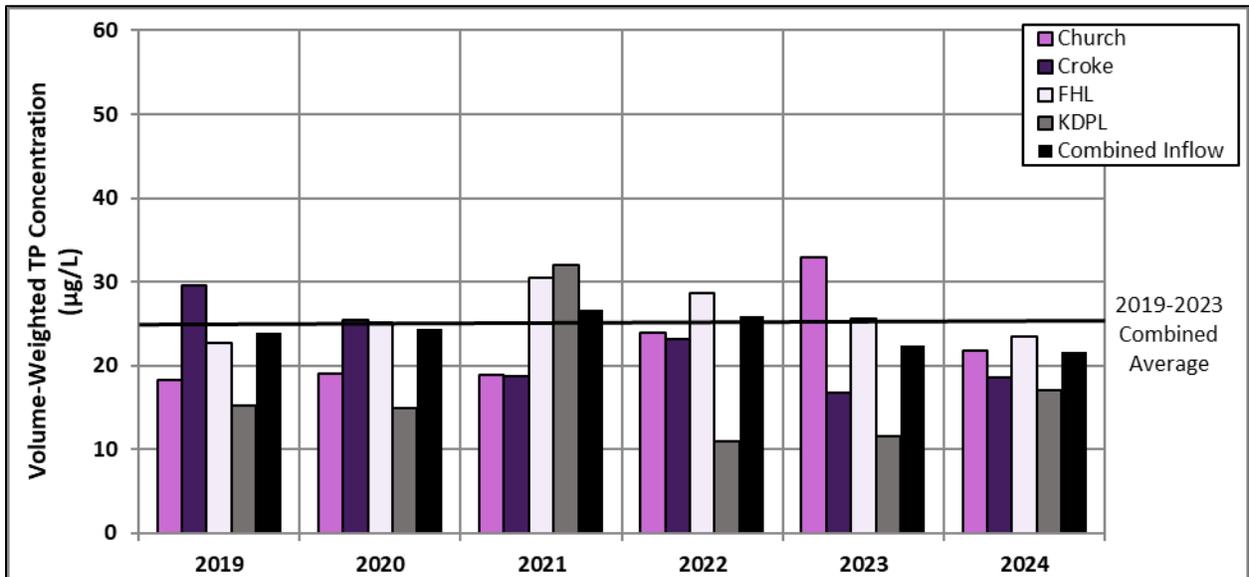


Figure 29. Volume-Weighted Total Phosphorus Concentrations Into Standley Lake by Source, 2019-2024

# 2024 STANDLEY LAKE WATER QUALITY

## Total Nitrogen

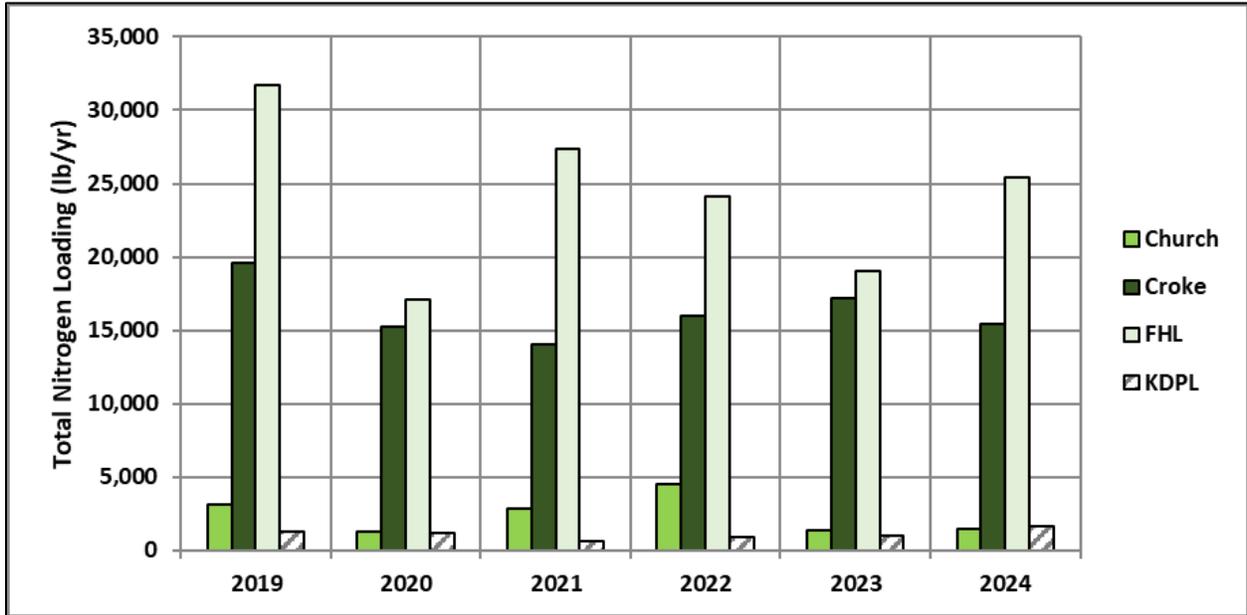


Figure 30. Total Nitrogen Loading Into Standley Lake by Source, 2019-2024

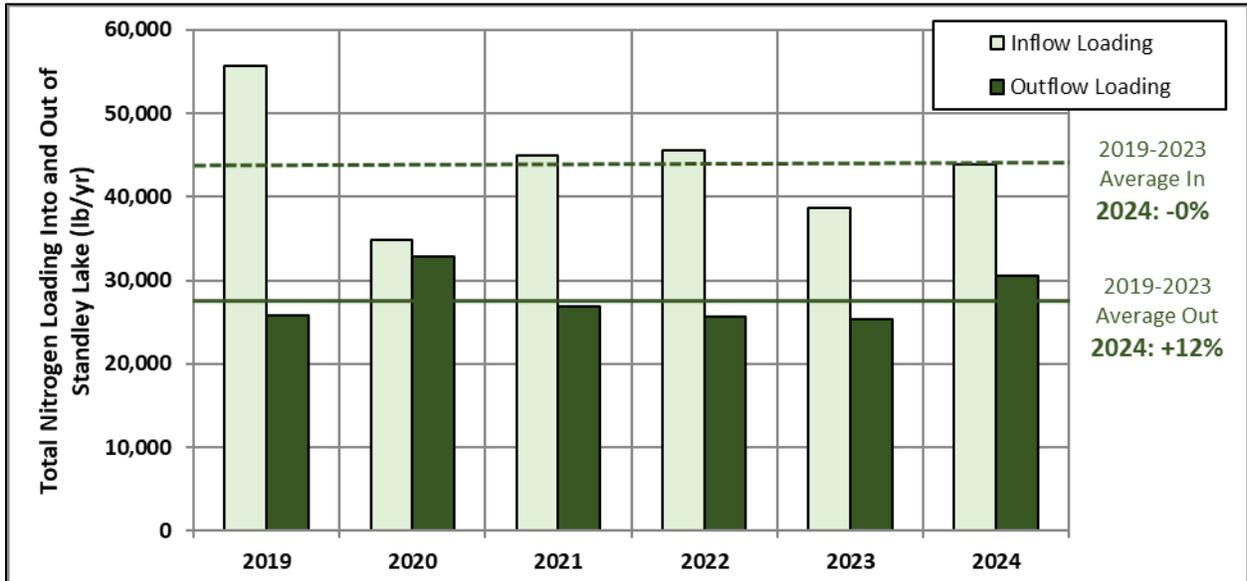


Figure 31. Total Nitrogen Loading Into and Out of Standley Lake, 2019-2024

## 2024 STANDLEY LAKE WATER QUALITY

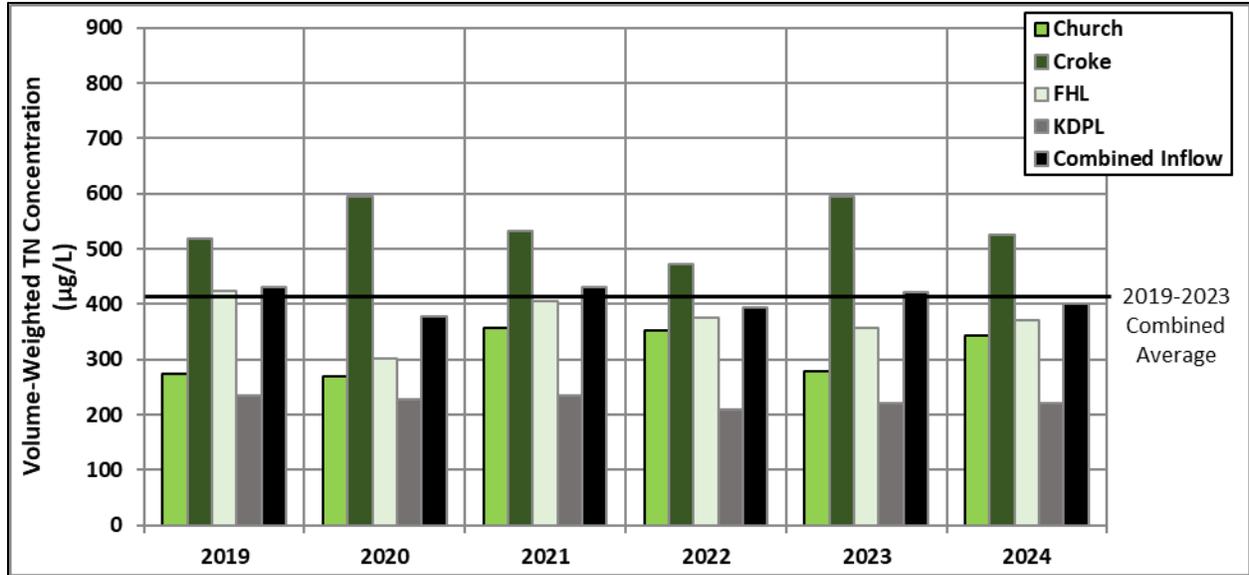


Figure 32. Volume-Weighted Total Nitrogen Concentrations Into Standley Lake by Source, 2019-2024

### V. STANDLEY LAKE WATER QUALITY

In this section, the in-reservoir water-quality at sampling location SL-10 is presented for 2024 and compared with recent years. This sampling location was selected as it has an extensive sampling history, is directly relevant to water treatment plant operations, and is the location of the automated lake profiler station. The water-quality indicators discussed here include temperature, dissolved oxygen (DO), TP, TN, chlorophyll *a*, and water clarity (Secchi depth).

TEMPERATURE

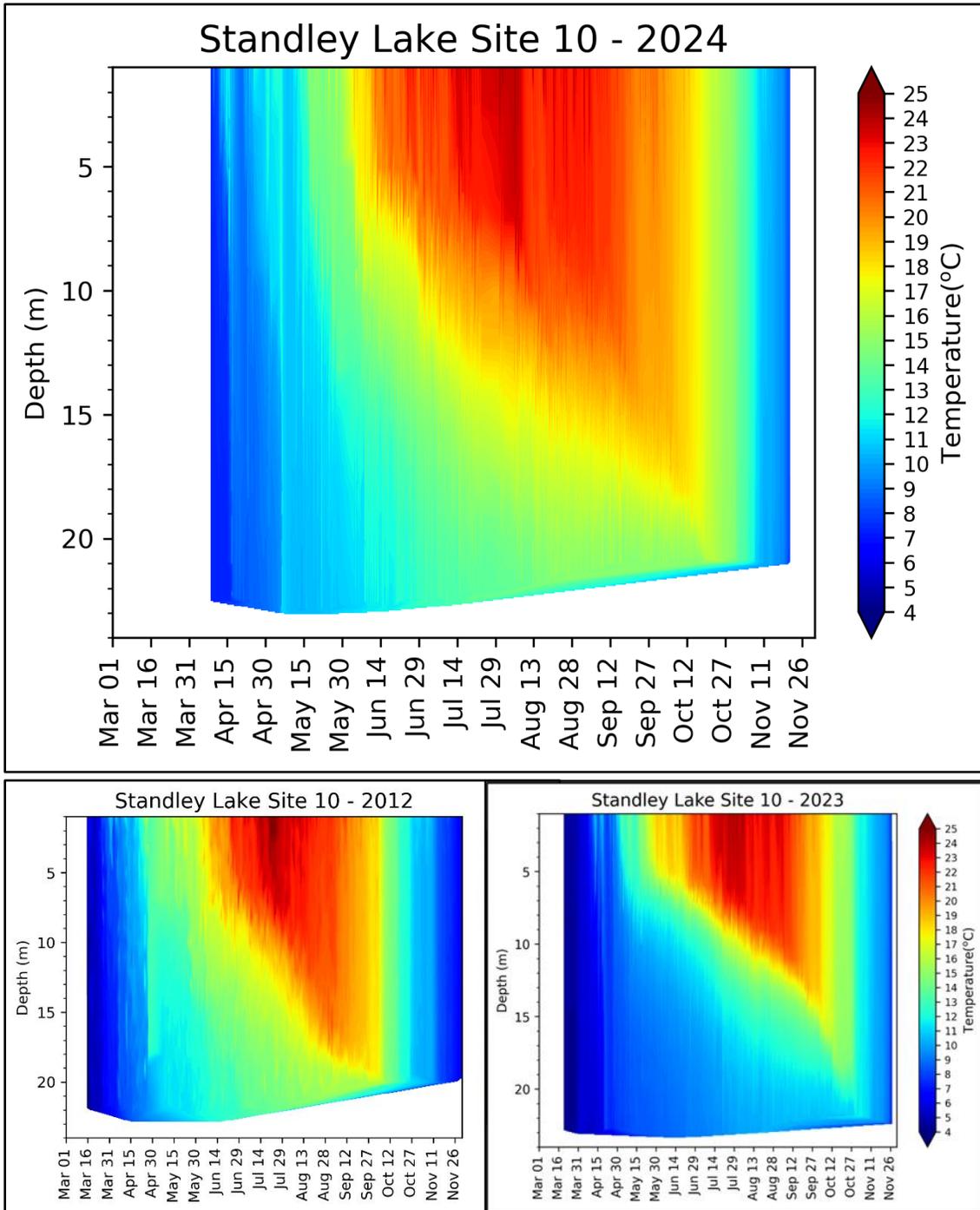


Figure 33. Contour Plots of Temperature in Standley Lake in 2024 (Top), with 2012 and 2023 shown for comparison.

# 2024 STANDLEY LAKE WATER QUALITY

## DISSOLVED OXYGEN

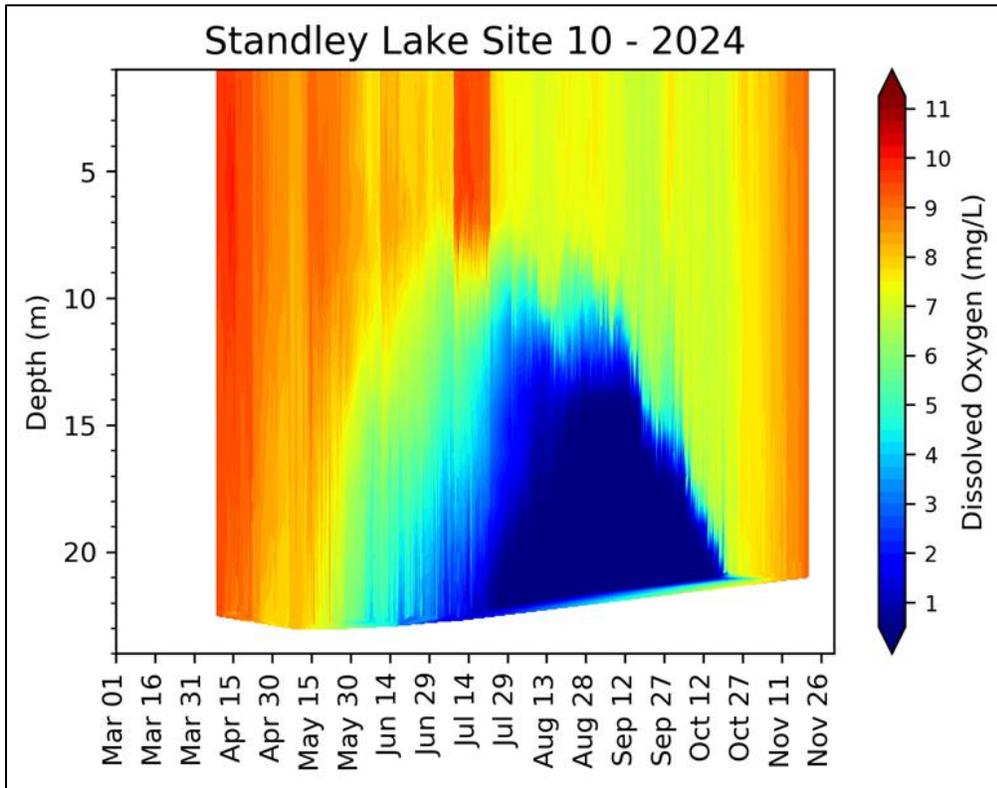


Figure 34. Contour Plot of Dissolved Oxygen in Standley Lake, March-November 2024

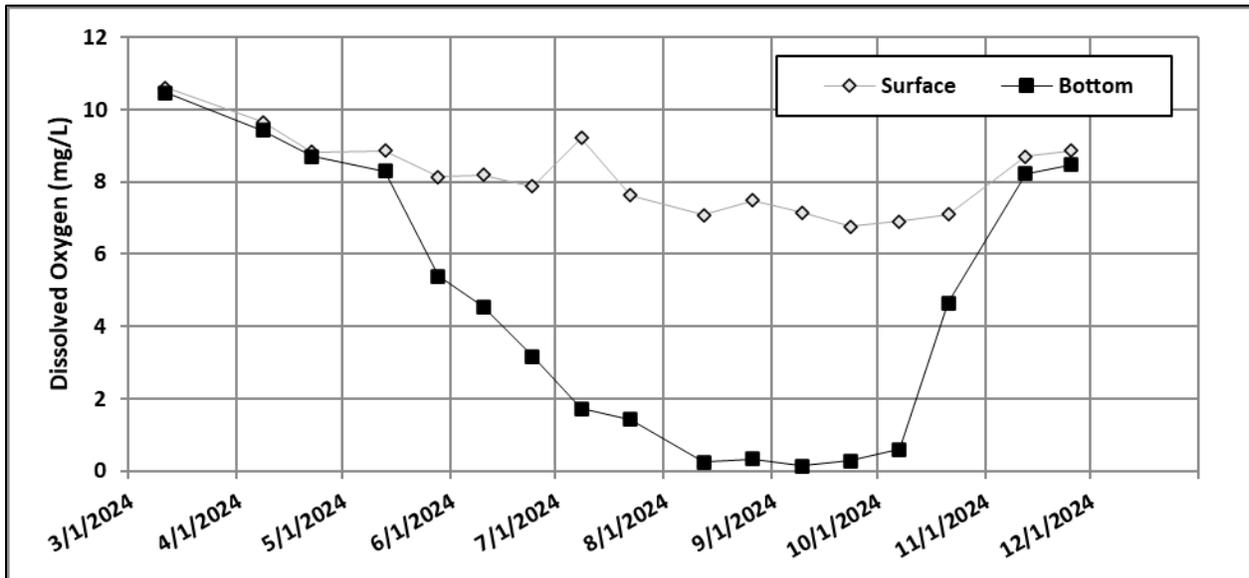


Figure 35. Dissolved Oxygen Concentrations in Standley Lake from Manual Profiles, 2024

# 2024 STANDLEY LAKE WATER QUALITY

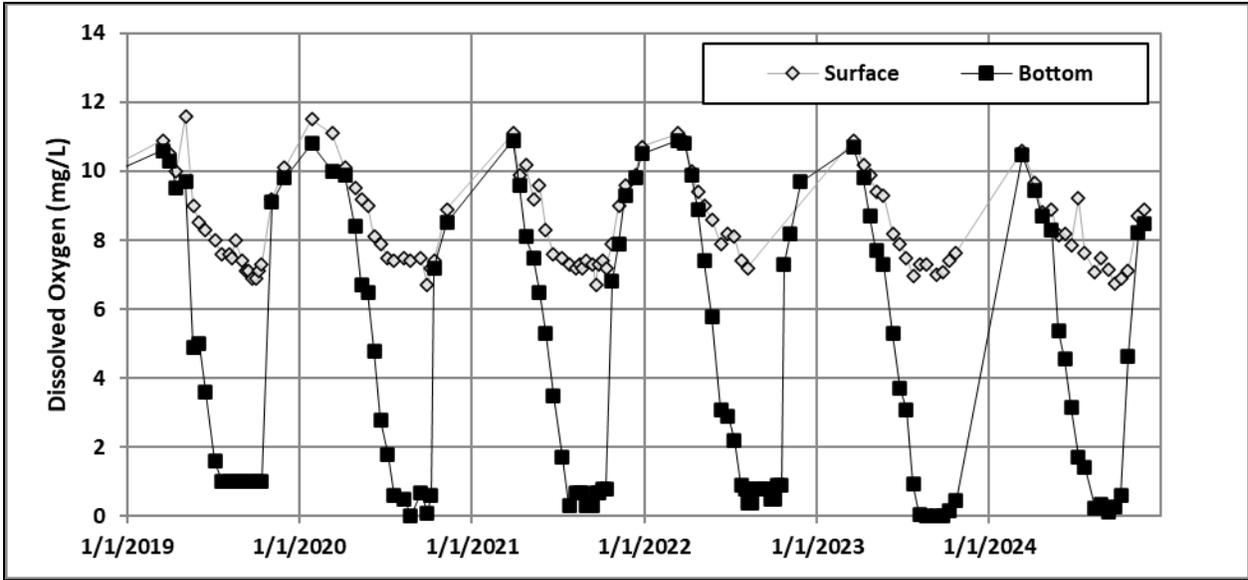


Figure 36. Dissolved Oxygen Concentrations in Standley Lake from Manual Profiles, 2019-2024

## DAYS OF HYPOXIA

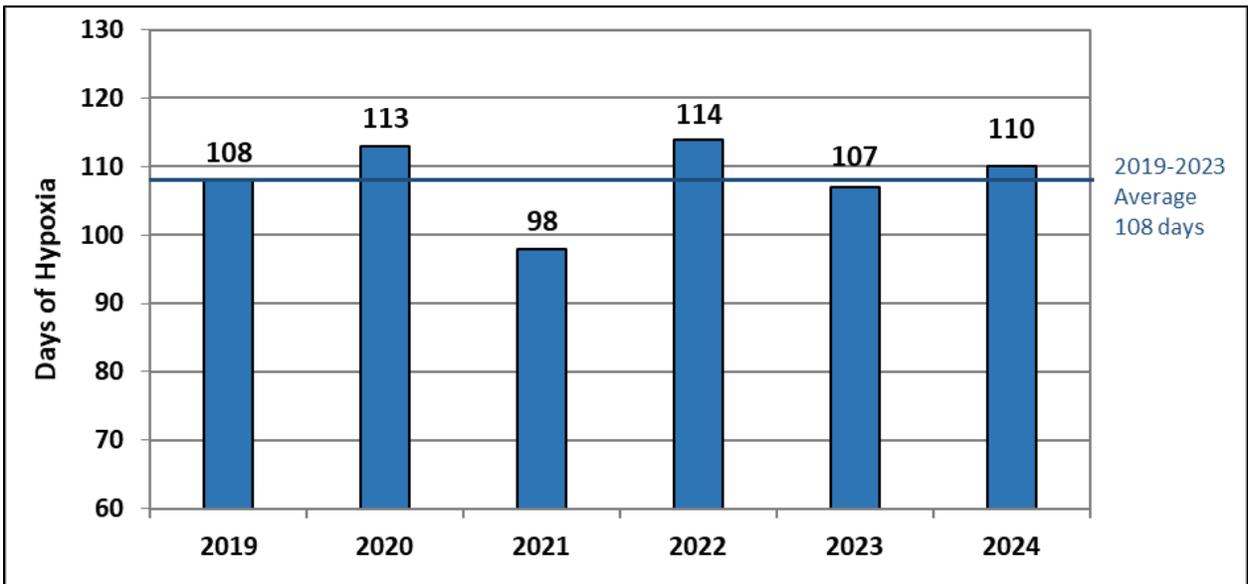


Figure 37. Days of Hypoxia (DO < 2.0 mg/l), 2019-2024

# 2024 STANDLEY LAKE WATER QUALITY

## NUTRIENTS

### Total Phosphorus

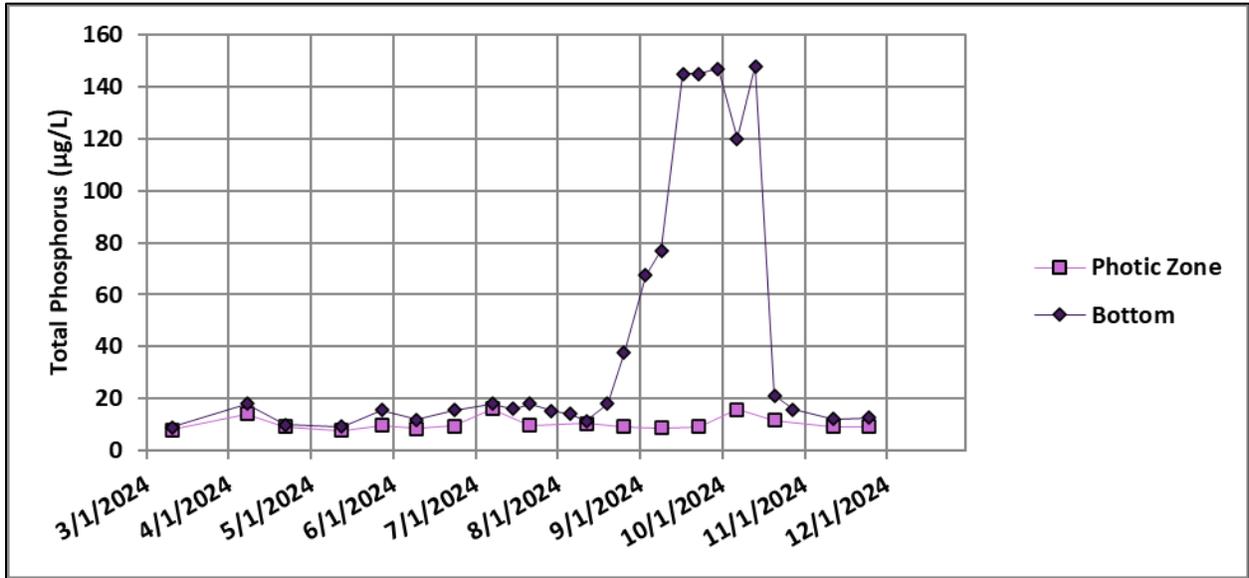


Figure 38. Total Phosphorus Concentrations in Standley Lake, 2024

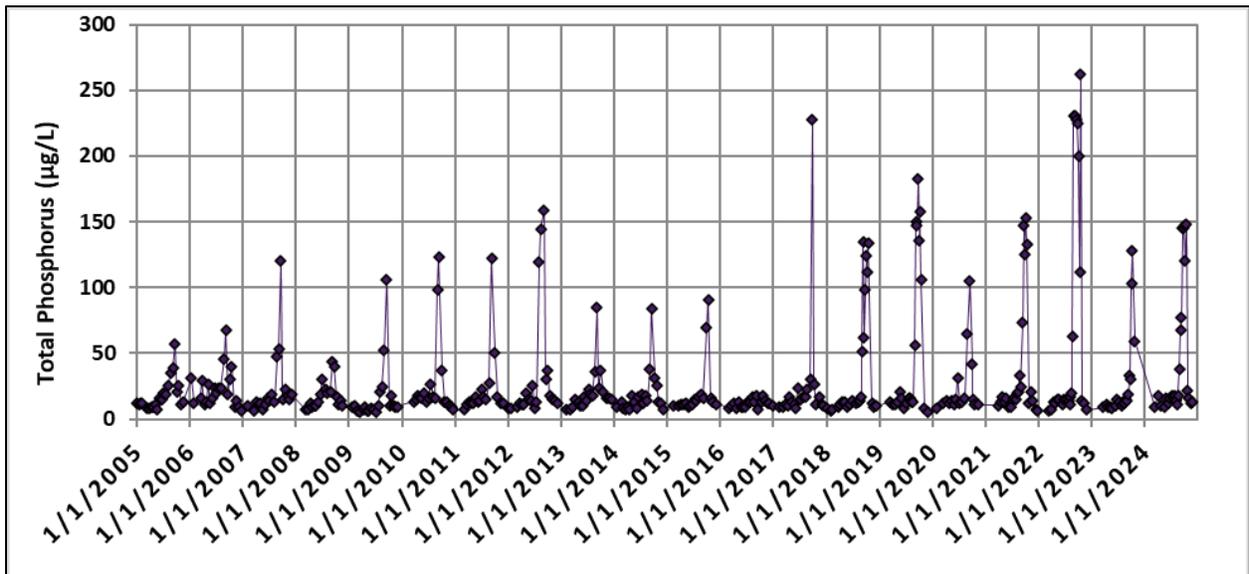


Figure 39. Total Phosphorus Concentrations in Standley Lake, Bottom, 2005-2024

# 2024 STANDLEY LAKE WATER QUALITY

## Total Nitrogen

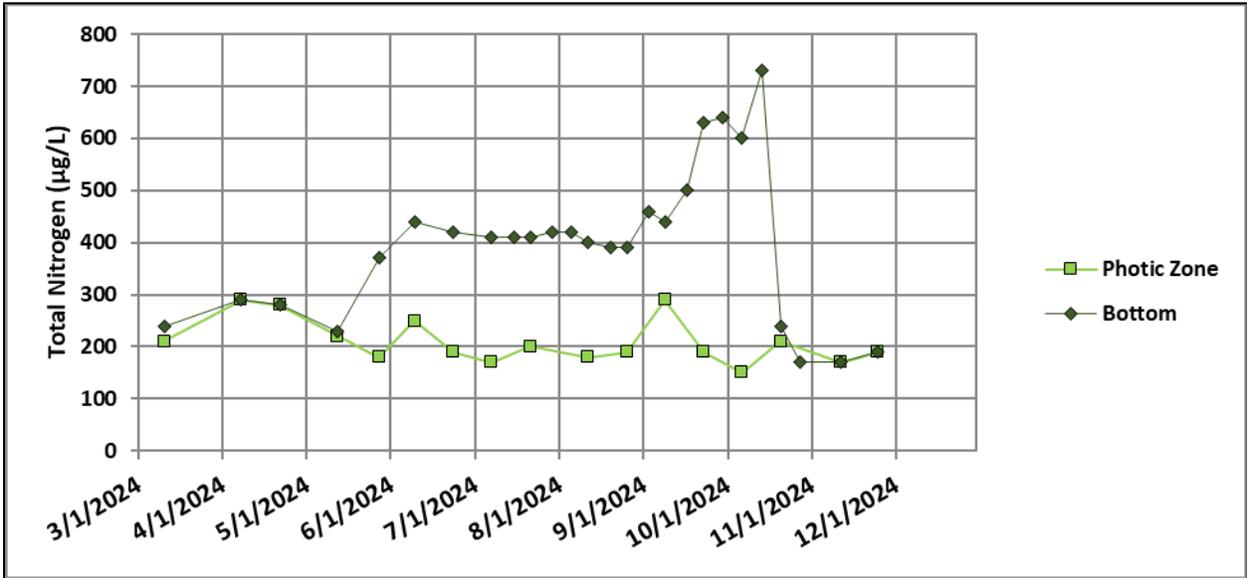


Figure 40. Total Nitrogen Concentrations in Standley Lake, 2024

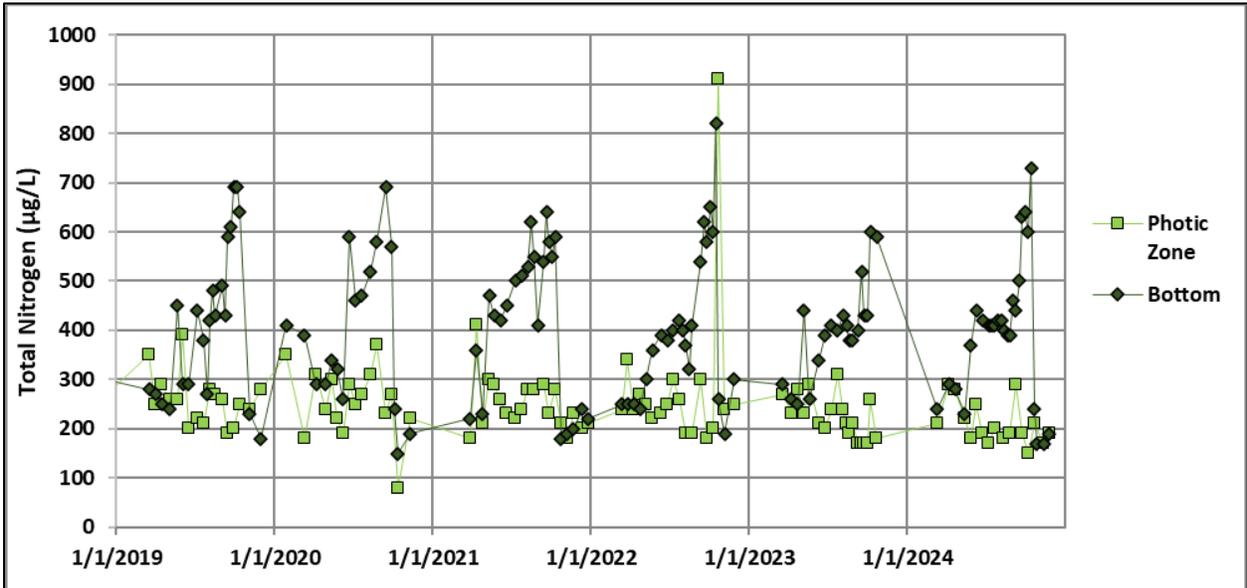


Figure 41. Total Nitrogen Concentrations in Standley Lake, 2019-2024

CHLOROPHYLL *a*

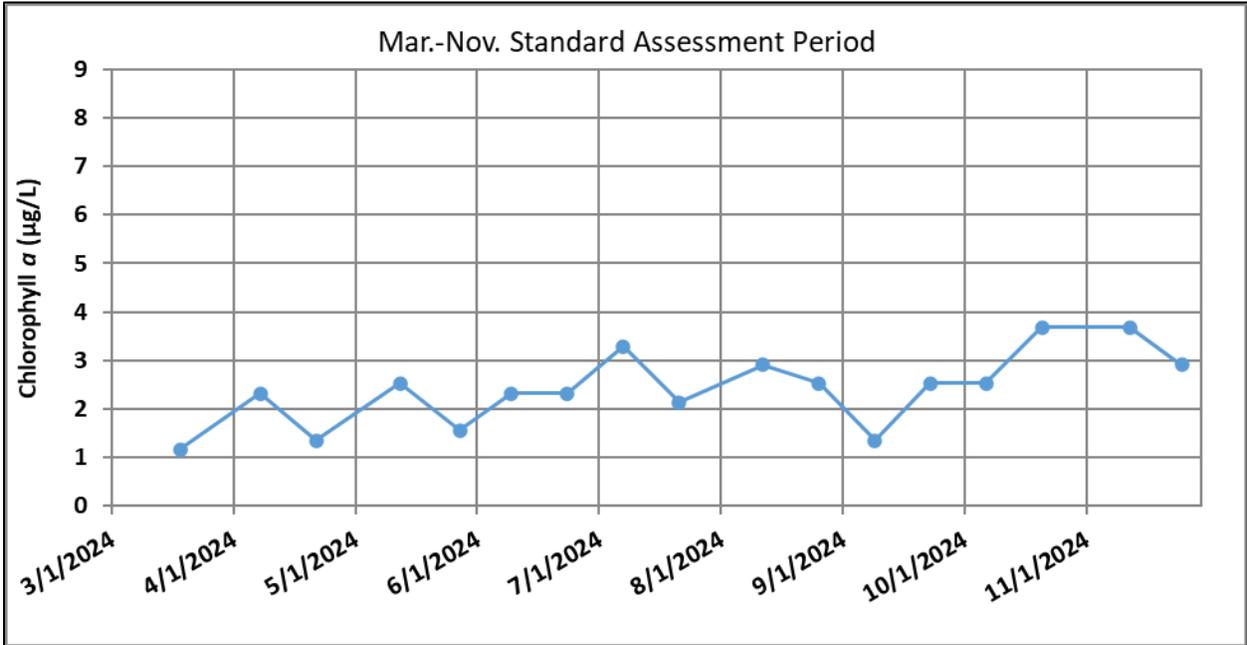


Figure 42. Chlorophyll a Concentrations in Standley Lake, 2024

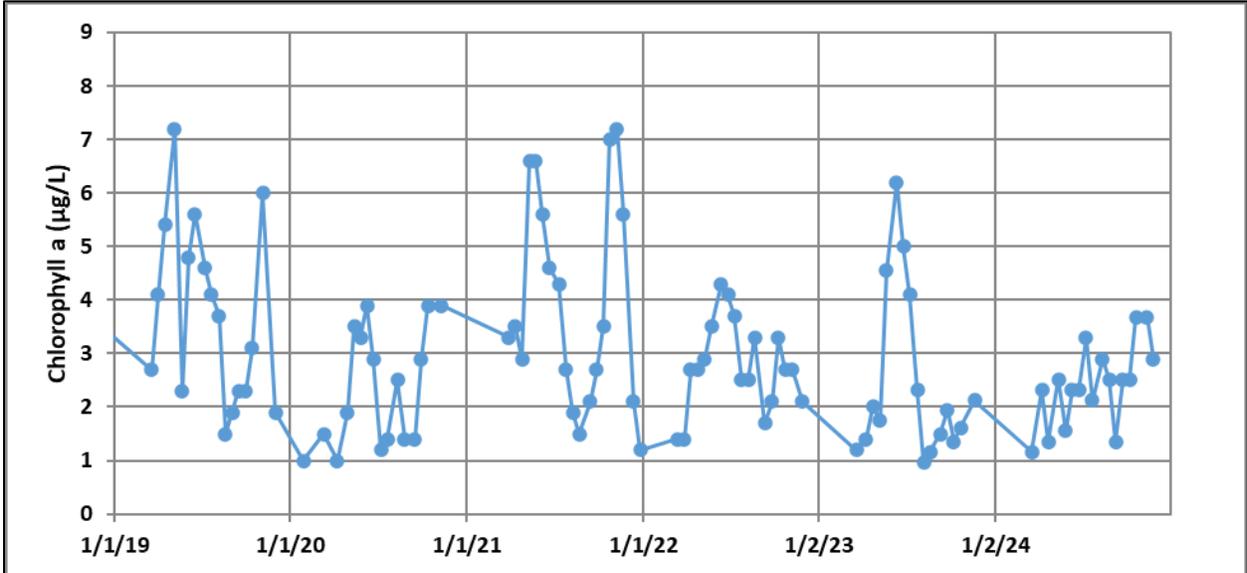


Figure 43. Chlorophyll a Concentrations in Standley Lake, 2019-2024

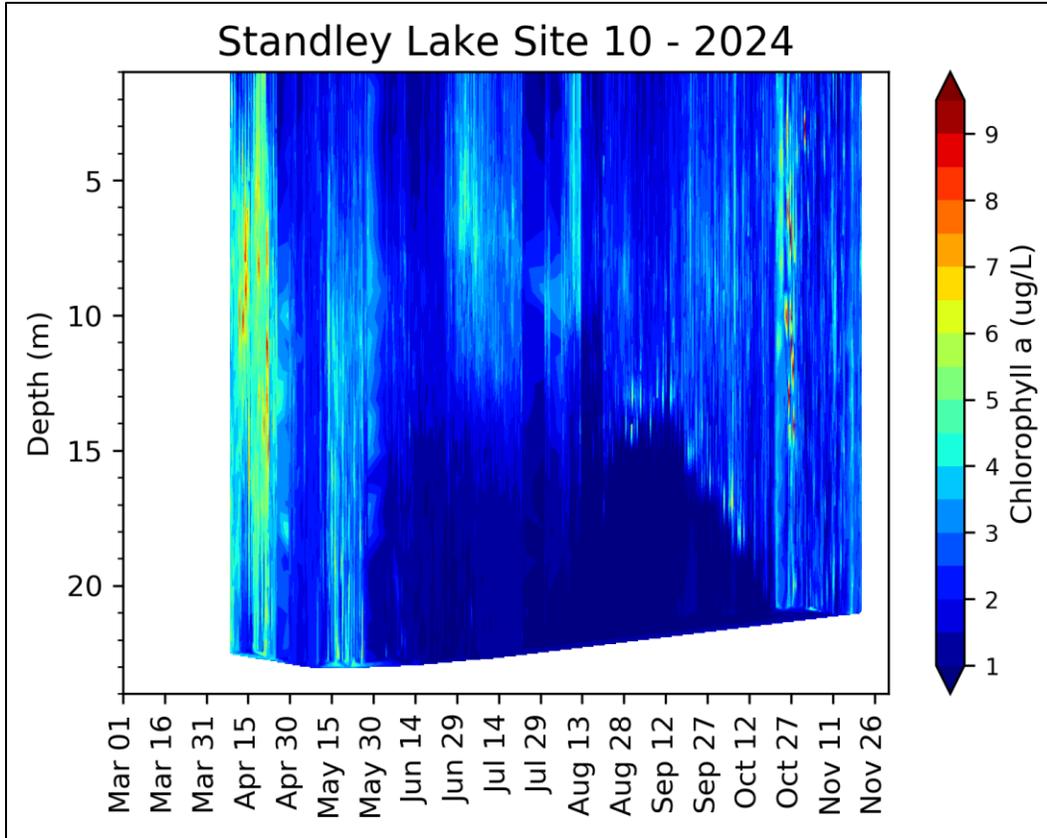


Figure 44. Contour Plot of Chlorophyll a Concentrations in Standley Lake, 2024

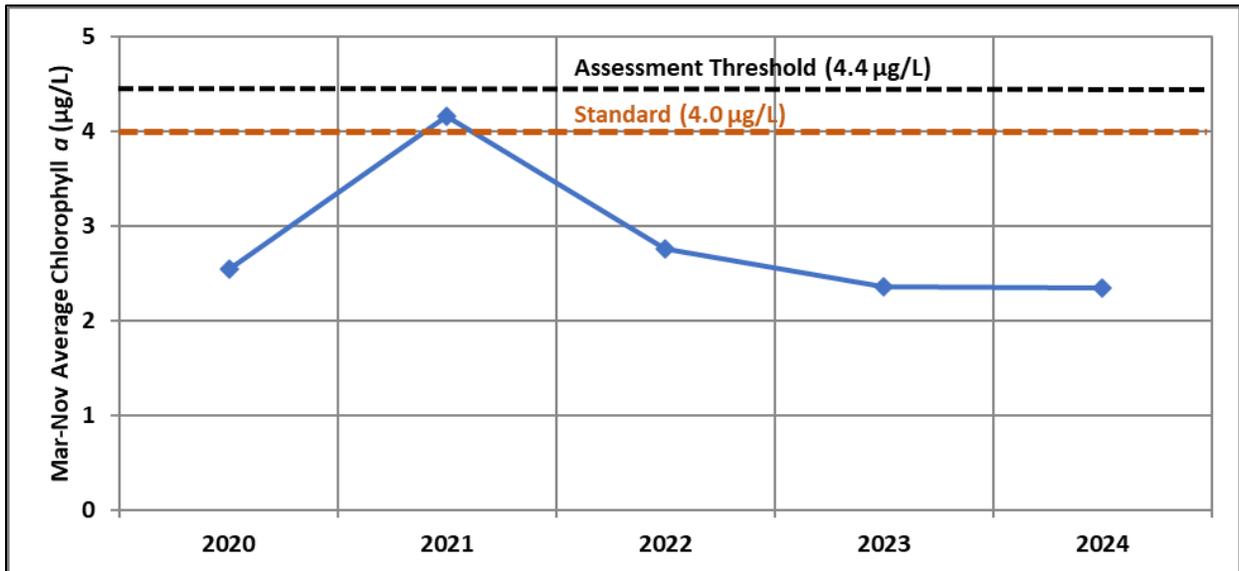


Figure 45. March-November Average Chlorophyll a Concentrations, 2019-2024

## SECCHI DEPTH

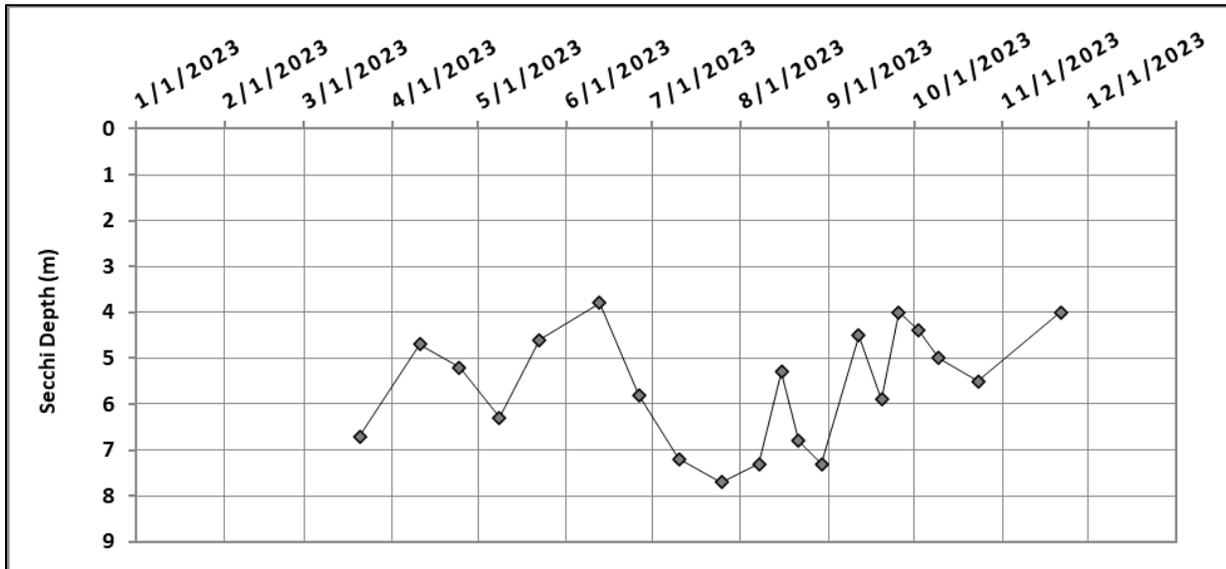


Figure 46. Clarity as Measured by Secchi Depth in Standley Lake, 2024

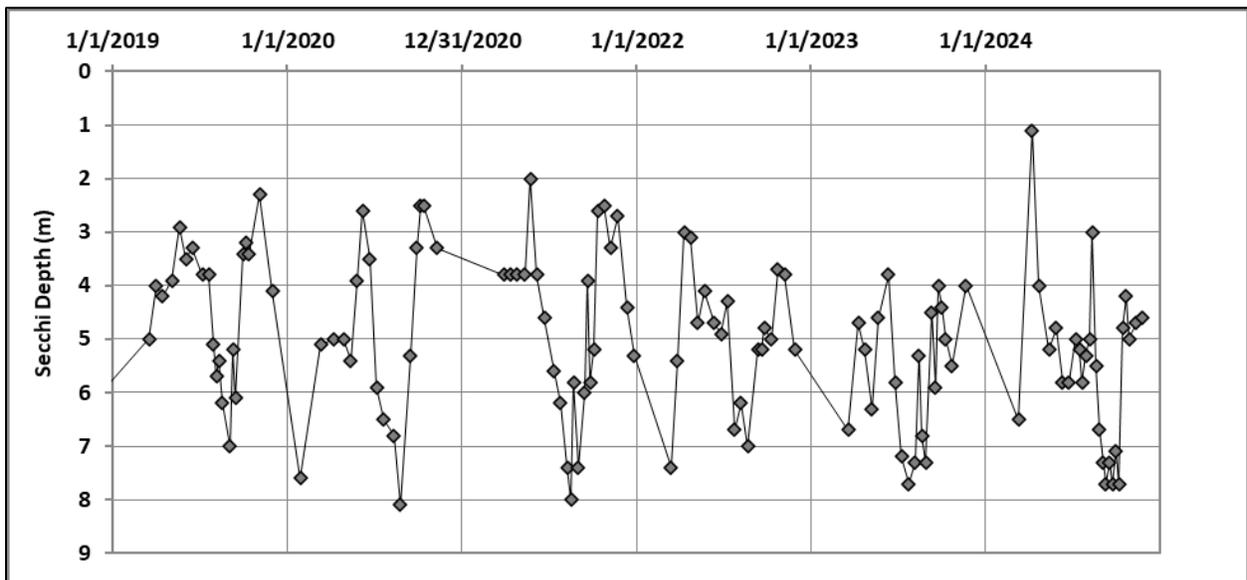


Figure 47. Clarity as Measured by Secchi Depth in Standley Lake, 2019-2024

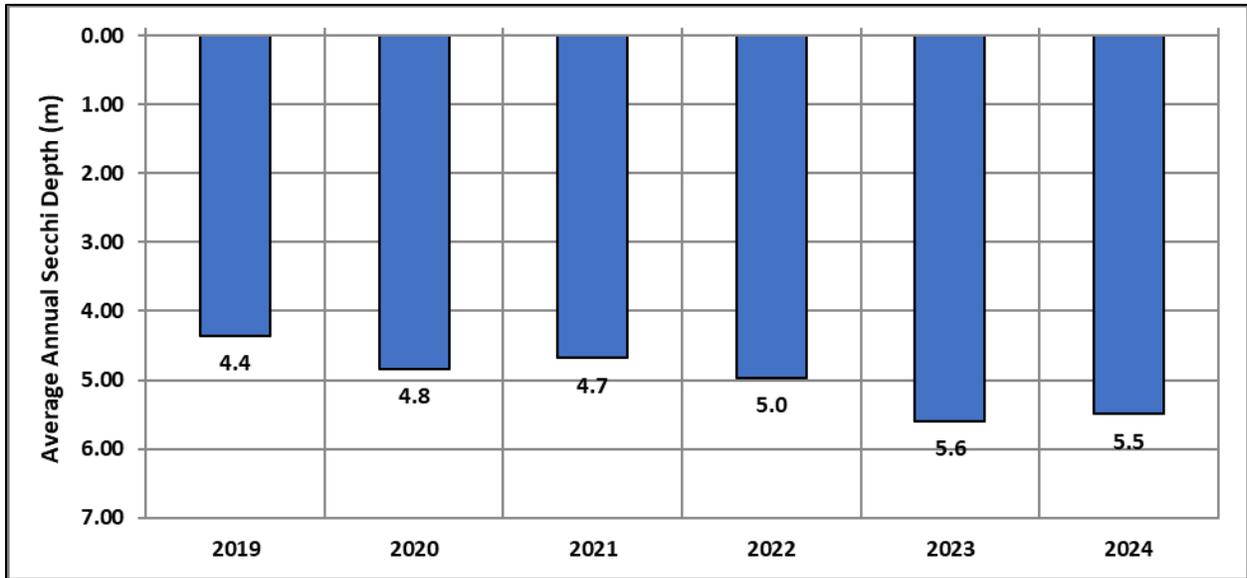


Figure 48. Average Annual Secchi Depth in Standley Lake, 2019-2024

## ADDITIONAL INFORMATION

### ACRONYMS

---

AF - Acre Feet

CC26 - Clear Creek Sampling Station: Clear Creek at Lawson Gage

CCAS26 - Clear Creek Autosampler Station: Clear Creek at Lawson Gage

CC59 - Clear Creek Autosampler Station: Clear Creek 2 Miles West of Highway 58/US6 in Golden. Storm water-Only Location Operated by City of Golden

CCAS59 - Clear Creek Autosampler Station: Clear Creek 2 Miles West of Highway 58/US6 in Golden

CC60 - Clear Creek Sampling Station: Clear Creek at Church Ditch Headgate

CFS - Cubic Feet per Second

FHL - Farmers' Highline Canal

Church - Church Ditch

Croke - Croke Canal

DO - Dissolved Oxygen

DP - Dissolved Phosphorus

KDPL - Kinnear Ditch Pipeline

TN - Total Nitrogen

TP - Total Phosphorus

TSS - Total Suspended Solids

USGS - United States Geological Survey



## SUPPLEMENTAL INFORMATION – 4

CLEAR CREEK, CANAL, AND STANDLEY LAKE WATER  
QUALITY MONITORING DATA - 2023

**Clear Creek Grabs**

Method				SM2550B	SM4500H+B	SM2510B	ASTMD888-09C	ASTMD7315	SM2540D	SM5310C	SM4500NH3H	SM4500NO3I	SM4500NO3	SM4500PE	SM4500PE	EPA300	EPA300	EPA300
DL				1.0	1.0	10	1.0	1	1	0.5	0.01	0.01	0.03	0.0025	0.0025	0.1	5	10
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				1	1	0	1	1	0	1	2	2	2	4	4	1	0	0
Reporting Units				°C	s.u.	µS/cm	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Oxygen, Dissolved	Turbidity	Solids, Total Suspended	Carbon, Total Organic	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Bromide	Chloride	Sulfate
02/14/24	9:58	G	CC 26	0.5	7.7	417	11.4	0.8	< 1	0.9	0.03	0.42	0.50	< 0.0025	0.005			
02/14/24	10:24	G	CC 50	1.7	7.4	1125	11.0	1.5	13	2.1	0.02	0.42	0.59	0.0034	0.0158			
02/14/24	10:59	G	CC 60	0.8	7.7	515	11.9	1.1	< 1	1.0	0.02	0.44	0.52	< 0.0025	0.0067			
04/10/24	9:43	G	CC 26	3.9	7.8	569	10.3	1.0	4	1.1	0.02	0.39	0.55	< 0.0025	0.0076	0.2	76	92
04/10/24	9:59	G	CC 40	4.5	7.7	521	10.4	1.6	4	1.5	0.03	0.40	0.57	< 0.0025	0.0098	0.2	63	97
04/10/24	10:12	G	CC 50	4.4	7.5	700	8.1	4.0	6	3.4	0.02	0.38	0.60	0.0039	0.018	0.2	110	112
04/10/24	10:44	G	CC 60	5.9	7.7	562	10.6	5.4	4	2.2	0.02	0.36	0.52	< 0.0025	0.0114	0.2	82	86
06/12/24	9:25	G	CC 05	7.1	8.1	111	8.8	2.7	< 1	3.4	0.03	0.18	0.35	< 0.0025	0.1280	< 0.1	12	< 10
06/12/24	9:50	G	CC 10	7.3	8.0	81	8.7	1.4	< 1		0.02	0.13	0.27	< 0.0025	0.0128	< 0.1	< 5	13
06/12/24	10:00	G	CC 15	5.9	7.6	104	9.2	2.1	< 1		0.02	0.11	0.26	< 0.0025	0.0105	< 0.1	< 5	29
06/12/24	10:16	G	CC 20	7.3	7.6	108	9.3	4.7	2	3.1	0.02	0.11	0.27	< 0.0025	0.0205	< 0.1	6	24
06/12/24	10:18	G	CC 25	8.2	7.8	109	8.8	6.2	5		0.02	0.15	0.34	< 0.0025	0.0229	< 0.1	12	< 10
06/12/24	10:30	G	CC 26	8.3	7.7	110	9.1	6.9	1	3.3	0.01	0.13	0.31	0.0031	0.0210	< 0.1	10	16
06/12/24	9:40	G	CC 30	8.0	7.9	38	9.3	9.0	6		0.02	0.10	0.29	< 0.0025	0.0400	< 0.1	< 5	< 10
06/12/24	11:08	G	CC 34	9.2	7.7	101	9.0	6.5	4		0.02	0.13	0.31	< 0.0025	0.0251	< 0.1	9	14
06/12/24	10:55	G	CC 35	9.4	7.8	56	8.4	2.6	< 1	4.2	0.02	0.15	0.36	0.0033	0.0126	< 0.1	< 5	< 10
06/12/24	9:25	G	CC 40	9.1	7.8	105	9.4	10.0	5	3.5	0.02	0.13	0.33	0.0045	0.0321	0.1	9.5	15
06/12/24	10:50	G	CC 44	8.2	7.8	40	9.1	10.1	2		0.02	0.01	0.21	0.0033	0.0182	< 0.1	< 5	< 10
06/12/24	11:10	G	CC 50	10.1	7.5	110	9.0	9.4	10	4.7	0.02	0.03	0.23	0.0033	0.0194	< 0.1	12	20
06/12/24	11:35	G	CC 52							4.6								
06/12/24	10:45	G	CC 52	16.9	8.0	522	7.4	14.5	21		0.02	0.23	0.52	0.0084	0.0441	0.3	128	10
06/12/24	11:35	G	CC 53	17.2	7.9	564	7.5	10.4	15	5.0	0.01	0.35	0.63	0.004	0.0367	0.2	119	13
06/12/24	11:55	G	CC 60	11.6	7.6	110	9.3	13.4	20	3.7	0.01	0.12	0.34	0.0028	0.0288	< 0.1	11	16
06/12/24	15:10	QC	UCC DUP								0.02	0.18	0.38		0.0213			
06/12/24	15:10	QC	UCC SPIKE								0.03	0.49	0.76		0.0822			
10/09/24	10:21	G	CC 05	4.1	8.2	247	8.9	2.9	< 1	1.1	0.02	0.24	0.31	0.0039	0.0052	< 0.1	28	21
10/09/24	10:57	G	CC 10	7.1	8.1	146	8.6	0.8	2		0.02	0.13	0.21	< 0.0025	0.0040	< 0.1	< 5	24
10/09/24	10:30	G	CC 15	7.0	7.0	889	8.5	0.3	< 1		0.13	0.57	0.82	< 0.0025	0.0036	< 0.1	6	399
10/09/24	10:50	G	CC 20	8.7	7.5	472	8.7	0.1	< 1	1.1	0.02	0.22	0.36	< 0.0025	0.0081	< 0.1	18	168
10/09/24	11:31	G	CC 25	10.0	7.8	267	8.4	2.0	< 1		0.03	0.10	0.22	< 0.0025	0.0066	0.1	29	26
10/09/24	11:43	G	CC 26	8.7	8.0	377	8.7	0.2	< 1	1.2	0.01	0.16	0.26	< 0.0025	0.0061	0.1	26	88
10/09/24	10:10	G	CC 30	7.8	7.4	69	9.2	1.1	5		0.02	0.11	0.25	0.007	0.0164	< 0.1	< 5	< 10
10/09/24	12:18	G	CC 34	9.1	8.0	313	8.8	4.2	2		0.02	0.11	0.24	< 0.0025	0.0095	< 0.1	23	67
10/09/24	12:04	G	CC 35	6.1	8.1	81	9.0	0.8	< 1	1.5	0.02	0.03	0.13	0.0034	0.0104	< 0.1	< 5	< 10
10/09/24	12:15	G	CC 40	10.1	8.0	347	8.9	0.3	< 1	1.2	0.02	0.15	0.27	< 0.0025	0.0085	0.1	24	79
10/09/24	11:30	G	CC 44	8.5	7.8	163	8.4	0.1	< 1		0.02	< 0.01	0.21	< 0.0025	0.0100	< 0.1	23	13
10/09/24	12:05	G	CC 50	12.9	7.7	991	8.4	0.6	2	1.9	0.02	0.28	0.45	< 0.0025	0.0112	0.2	110	275
10/09/24	13:52	G	CC 52	11.3	8.2	1176	8.4	7.1	4	3.6	0.02	0.37	0.71	0.0034	0.0166	0.6	283	18
10/09/24	14:04	G	CC 53	11.1	8.0	1623	8.2	1.3	24	2.4	0.01	0.54	0.68	< 0.0025	0.0061	0.8	392	15
10/09/24	13:50	G	CC 60	12.0	8.0	393	8.8	0.0	5	1.2	0.02	0.11	0.22	< 0.0025	0.0061	0.1	43	83
10/09/24	14:30	QC	UCC DUP								0.02	0.22	0.32		0.0085			
10/09/24	14:30	QC	UCC SPIKE								0.01	0.39	0.55		0.0605			
12/11/24	9:10	G	CC 26	0.7	7.7	421	11.2	0.5	< 1	0.9	0.02	0.35	0.42			0.1	44	92
12/11/24	9:43	G	CC 26											< 0.0025	0.0046			
12/11/24	9:50	G	CC 50	0.5	7.6	1165	11.0	0.3	< 1	1.8	0.05	0.49	0.64			0.1	142	282
12/11/24	10:12	G	CC 50											0.0031	0.0094			

Ambient Autosamplers				SM2550B	SM4500H+B	SM2510B	ASTMD7315	SM2540D	SM5310C	SM4500NH3H	SM4500NO3I	SM4500NO3	SM4500PE	SM4500PE	EPA300	EPA300	EPA300	EPA200.8	EPA200.8	
Method				1.0	1.0	10	1	1	0.5	0.01	0.01	0.03	0.0025	0.0025	0.1	5	10	0.001	0.001	
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				1	1	0	1	0	1	2	2	2	4	4	1	0	0	5	5	5
Max decimals				°C	s.u.	µS/cm	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Reporting Units																				
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Turbidity	Solids, Total Suspended	Carbon, Total Organic	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Bromide	Chloride	Sulfate	Arsenic, Dissolved	Arsenic, Total	
04/29/24	12:00	G	CC 26	10.2	7.7	546	3.1	2	2.1	0.02	0.27	0.38	< 0.0025	0.0076	0.2	95	76	< 0.001	< 0.001	
04/29/24	12:50	G	CC 49	8.5	7.8	475	6.8	6	2.6	0.01	0.26	0.47	0.0039	0.0176	0.2	73	73	< 0.001	< 0.001	
04/29/24	13:15	G	CC 50	10.3	7.7	393	14.9	20	5.6	0.02	0.31	0.59	0.0055	0.0381	0.1	61	57	< 0.001	< 0.001	
04/29/24	14:35	G	CC 59	12.5	7.8	469	10.1	14	3.6	0.01	0.30	0.52	< 0.0025	0.0251	0.2	76	63	< 0.001	< 0.001	
04/29/24	14:00	24C	CC AS T2	17.4	7.8	481	17.5	21	3.8	0.02	0.27	0.55	0.0028	0.0368	0.2	79	61	< 0.001	< 0.001	
04/30/24	3:00	24C	CC AS T11	14.1	7.7	499	31.5	70	3.8	0.01	0.31	0.61	0.0029	0.0424	0.2	82	62	< 0.001	0.0012	
05/20/24	10:55	G	CC 26	12.7	7.7	344	4.7	< 1	4.1	0.01	0.15	0.37	0.0025	0.0125	0.1	56	47	< 0.001	< 0.001	
05/20/24	11:54	G	CC 49	10.2	7.8	291	16.7	14	4.4	< 0.01	0.14	0.44	0.0034	0.0291	0.1	46	45	0.001	< 0.001	
05/20/24	11:39	G	CC 50	12.0	7.5	151	34.3	41	4.8	< 0.01	0.11	0.42	0.0062	0.0479	< 0.1	19	25	0.001	0.0015	
05/20/24	12:40	G	CC 59	12.9	7.8	271	24.6	25	4.6	< 0.01	0.14	0.49	0.0042	0.0446	< 0.1	43	39	< 0.001	0.0015	
05/20/24	10:00	24C	CC AS T2	20.3	7.8	299	31.2	59	4.6	0.01	0.15	0.53	0.0049	0.0516	0.1	48	41	< 0.001	0.0016	
05/21/24	4:30	24C	CC AS T11	14.6	7.5	298	31.5	53	4.5	0.01	0.15	0.51	0.0051	0.0574	0.1	46	41	< 0.001	0.0016	
06/16/24	10:00	24C	CC AS T2										0.0034	0.0283						
06/16/24	18:00	24C	CC AS T2	25.7	7.3	114	9.8	15	3.1	0.02	0.17	0.31			< 0.1	11	16	< 0.001	< 0.001	
06/17/24	10:55	G	CC 26										< 0.0025	0.0117						
06/17/24	11:35	G	CC 26	14.1	7.5	104	8.0	< 1	2.7	0.02	0.03	0.27			< 0.1	8	15	< 0.001	< 0.001	
06/17/24	11:54	G	CC 49										0.0027	0.0192						
06/17/24	12:47	G	CC 49	13.2	7.5	101	7.1	3	2.8	0.02	0.13	0.28			< 0.1	9	15	< 0.001	< 0.001	
06/17/24	11:39	G	CC 50										0.0034	0.0176						
06/17/24	12:26	G	CC 50	14.7	7.4	143	5.2	4	4.0	0.03	0.07	0.25			< 0.1	16	27	< 0.001	< 0.001	
06/17/24	12:40	G	CC 59										0.0025	0.0178						
06/17/24	13:50	G	CC 59	17.6	7.3	110	9.5	3	2.8	0.03	0.07	0.28			< 0.1	10	16	< 0.001	< 0.001	
06/18/24	9:00	24C	CC AS T11	18.9	7.6	117	16.7	33	2.9	0.02	0.12	0.33			< 0.1	11	16	< 0.001	0.001	
06/18/24	4:30	24C	CC AS T11										0.0032	0.0394						
07/29/24	11:05	G	CC 26	15.3	7.9	201	1.4	9	1.5	0.01	0.13	0.23	0.0029	0.0089	< 0.1	16	45	< 0.001	< 0.001	
07/29/24	11:40	G	CC 49	16.3	8.0	201	6.4	8	1.5	0.01	0.11	0.23	0.005	0.0097	< 0.1	17	45	< 0.001	< 0.001	
07/29/24	12:40	G	CC 50	22.4	7.9	525	12.1	27	2.2	0.02	0.43	0.61	0.005	0.0175	0.1	68	135	< 0.001	< 0.001	
07/29/24	13:35	G	CC 59	22.1	8.0	223	3.9	9	1.5	0.01	0.12	0.24	0.005	0.0099	< 0.1	22	48	< 0.001	< 0.001	
07/29/24	8:00	24C	CC AS T2	31.0	7.9	230	5.5	20	1.9	0.02	0.12	0.31	0.005	0.0172	< 0.1	24	46	< 0.001	< 0.001	
07/30/24	6:37	24C	CC AS T11	21.4	7.8	235	7.3	21	2.1	0.02	0.08	0.28	< 0.0025	0.0184	< 0.1	25	47	< 0.001	< 0.001	
08/19/24	10:50	G	CC 26	15.2	7.3	264	1.2	1	1.4	0.01	0.13	0.24	< 0.0025	0.0068	< 0.1	20	54	< 0.001	< 0.001	
08/19/24	12:10	G	CC 49	17.0	7.9	227	2.3	2	1.4	< 0.01	0.13	0.26	< 0.0025	0.0108	< 0.1	18	46	< 0.001	< 0.001	
08/19/24	11:30	G	CC 50	19.3	7.8	722	2.3	3	2.9	0.01	1.47	1.97	< 0.0025	0.0161	0.2	82	168	< 0.001	< 0.001	
08/19/24	13:01	G	CC 59	18.4	7.8	249	2.1	3	1.4	0.01	0.18	0.33	< 0.0025	0.0115	< 0.1	24	50	< 0.001	< 0.001	
08/19/24	8:00	24C	CC AS T2	25.8	7.9	264	2.5	3	1.7	0.01	0.18	0.40	< 0.0025	0.0135	< 0.1	24	50	< 0.001	< 0.001	
08/20/24	7:20	24C	CC AS T11	21.0	7.8	270	3.9	8	1.8	0.01	0.14	0.32	< 0.0025	0.0125	0.1	26	51	< 0.001	< 0.001	
09/16/24	11:25	G	CC 26	12.6	7.9	295	2.1	2	1.3	0.01	0.15	0.26	< 0.0025	0.0059	0.1	24	65	< 0.001	< 0.001	
09/16/24	12:10	G	CC 49	12.7	7.9	311	1.0	2	1.2	0.02	0.18	0.34	0.0028	0.0097	0.1	24	70	< 0.001	< 0.001	
09/16/24	12:40	G	CC 50	15.9	7.9	928	1.5	4	2.1	0.02	0.64	0.88	< 0.0025	0.0134	0.2	107	254	< 0.001	< 0.001	
09/16/24	13:50	G	CC 59	16.1	8.0	345	2.3	4	1.3	0.02	0.20	0.34	< 0.0025	0.0099	0.1	34	79	< 0.001	< 0.001	
09/16/24	7:00	24C	CC AS T2	24.6	7.9	344	1.6	1	1.4	0.01	0.19	0.36	< 0.0025	0.0116	0.1	33	69	< 0.001	< 0.001	
09/17/24	7:20	24C	CC AS T11	25.3	8.0	354	5.2	10	1.6	0.02	0.13	0.32	< 0.0025	0.0140	0.1	34	69	< 0.001	< 0.001	
10/28/24	12:00	G	CC 26	7.8	7.9	346	3.4	< 1	1.1	0.01	0.20	0.32	< 0.0025	0.0074	0.1	27	77	< 0.001	< 0.001	
10/28/24	12:56	G	CC 49	6.8	8.1	365	1.1	< 1	1.2	0.02	0.20	0.38	0.0035	0.0076	0.1	29	84	< 0.001	< 0.001	
10/28/24	12:35	G	CC 50	12	7.9	931	6.1	1	2.1	0.02	1.13	1.44	< 0.0025	0.0112	0.1	102	249	< 0.001	< 0.001	
10/28/24	13:35	G	CC 59	11.3	8.0	407	2.5	< 1	1.7	0.01	0.20	0.31	< 0.0025	0.0066	0.1	44	104	< 0.001	< 0.001	
10/28/24	9:00	24C	CC AS T2					7	1.5				< 0.0025	0.0126	0.1	42	90			
10/28/24	7:00	24C	CC AS T2	20.6	8.0	409	4.1	2	1.3	0.01	0.21	0.35	< 0.0025	0.0080	0.1	41	90	< 0.001	< 0.001	
10/29/24	9:00	24C	CC AS T11	15.8	7.8	416	7.2			0.01	0.16	0.32						< 0.001	< 0.001	

**Ambient Autosamplers**

Method				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DL				0.02	0.01	0.003	0.001	0.005	0.001	0.009	0.009	0.001	0.01	0.01	0.01	0.005	0.001	0.002	0.002
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Manganese, Dissolved	Manganese, Total
04/29/24	12:00	G	CC 26	0.07	0.069	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0045	0.0088	0.019	0.36	< 0.0005	0.0016	0.13	0.15
04/29/24	12:50	G	CC 49	0.059	0.061	< 0.0003	< 0.001	0.0012	0.0013	< 0.0009	< 0.0009	0.011	0.028	< 0.01	0.54	< 0.0005	0.0031	0.35	0.38
04/29/24	13:15	G	CC 50	0.0400	0.0480	< 0.0003	< 0.001	0.0026	0.0031	< 0.0009	0.0017	0.0210	0.0580	0.0260	1.5000	< 0.0005	0.0088	0.3500	0.4400
04/29/24	14:35	G	CC 59	0.058	0.064	< 0.0003	< 0.001	0.0012	0.0013	< 0.0009	< 0.0009	0.0097	0.026	0.012	0.99	< 0.0005	0.0048	0.23	0.31
04/29/24	14:00	24C	CC AS T2	0.06	0.067	< 0.0003	< 0.001	0.00091	0.0011	< 0.0009	0.0014	0.0083	0.027	0.012	1.4	< 0.0005	0.0071	0.17	0.3
04/30/24	3:00	24C	CC AS T11	0.059	0.083	< 0.0003	< 0.001	< 0.0005	0.0012	< 0.0009	0.0027	0.0055	0.029	0.012	3	< 0.0005	0.014	0.033	0.29
05/20/24	10:55	G	CC 26	0.049	0.051	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0039	0.006	0.076	0.7	0.0069	0.0041	0.072	0.13
05/20/24	11:54	G	CC 49	0.041	0.05	< 0.0003	< 0.001	< 0.0005	0.00082	< 0.0009	0.0013	0.0068	0.019	0.057	1.4	< 0.0005	0.0009	0.088	0.29
05/20/24	11:39	G	CC 50	0.021	0.046	< 0.0003	< 0.001	0.00075	0.0015	< 0.0009	0.004	0.012	0.043	0.08	3.5	< 0.0005	0.023	0.073	0.36
05/20/24	12:40	G	CC 59	0.037	0.06	< 0.0003	< 0.001	< 0.0005	0.0013	< 0.0009	0.0032	0.007	0.034	0.057	3.2	< 0.0005	0.02	0.058	0.48
05/20/24	10:00	24C	CC AS T2	0.037	0.066	< 0.0003	< 0.001	< 0.0005	0.0015	< 0.0009	0.0034	0.007	0.042	0.045	3.6	< 0.0005	0.024	0.058	0.53
05/21/24	4:30	24C	CC AS T11	0.038	0.064	< 0.0003	< 0.001	< 0.0005	0.0013	< 0.0009	0.0031	0.0062	0.037	0.043	3.3	< 0.0005	0.021	0.0076	0.41
06/16/24	10:00	24C	CC AS T2																
06/16/24	18:00	24C	CC AS T2	0.019	0.027	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	0.0009	0.0041	0.0087	0.029	< 0.01	< 0.0005	0.0051	0.02	0.2
06/17/24	10:55	G	CC 26																
06/17/24	11:35	G	CC 26	0.02	0.021	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0016	0.0019	0.031	0.24	< 0.0005	0.0022	0.031	0.081
06/17/24	11:54	G	CC 49																
06/17/24	12:47	G	CC 49	0.018	0.022	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	0.0044	0.031	0.48	< 0.0005	0.0031	0.035	0.11
06/17/24	11:39	G	CC 50																
06/17/24	12:26	G	CC 50	< 0.002	0.02	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	0.012	< 0.01	0.73	< 0.0005	0.003	< 0.002	0.11
06/17/24	12:40	G	CC 59																
06/17/24	13:50	G	CC 59	< 0.002	0.024	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	0.0057	0.03	0.51	< 0.0005	0.0034	< 0.002	0.12
06/18/24	9:00	24C	CC AS T11	< 0.002	0.035	< 0.0003	< 0.001	< 0.0005	0.00058	< 0.0009	0.0019	< 0.001	0.014	0.029	1.9	< 0.0005	0.0098	< 0.002	0.25
06/18/24	4:30	24C	CC AS T11																
07/29/24	11:05	G	CC 26	0.0310	0.0320	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.001	0.0014	0.044	0.14	< 0.0005	0.0011	0.044	0.059
07/29/24	11:40	G	CC 49	< 0.002	0.0310	0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0027	0.0039	0.034	< 0.01	< 0.0005	0.0014	0.048	0.067
07/29/24	12:40	G	CC 50	0.0370	0.0370	< 0.0003	< 0.001	0.001	0.0011	< 0.0009	< 0.0009	0.0052	0.012	< 0.01	0.85	< 0.0005	0.0057	0.2	0.22
07/29/24	13:35	G	CC 59	0.0360	0.0360	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0023	0.0038	0.016	0.2	< 0.0005	0.0016	0.025	0.053
07/29/24	8:00	24C	CC AS T2	0.0350	0.0380	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0031	0.0063	0.016	0.42	< 0.0005	0.0031	0.018	0.071
07/30/24	6:37	24C	CC AS T11	0.0360	0.0400	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0024	0.0054	0.014	0.42	< 0.0005	0.003	0.0088	0.053
08/19/24	10:50	G	CC 26		0.0390		< 0.001		< 0.001		< 0.0009		0.0013		0.002		0.0013		0.069
08/19/24	12:10	G	CC 49		0.0330		< 0.001		< 0.001		< 0.0009		0.0041		0.23		0.0011		0.067
08/19/24	11:30	G	CC 50		0.0380		< 0.001		0.00096		< 0.0009		0.0077		0.26		0.0011		0.18
08/19/24	13:01	G	CC 59		0.0370		< 0.001		< 0.001		< 0.0009		0.0041		0.23		0.0013		0.056
08/19/24	8:00	24C	CC AS T2		0.0380		< 0.001		< 0.001		< 0.0009		0.0065		0.33		0.002		0.073
08/20/24	7:20	24C	CC AS T11	0.0390	0.0380	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0026	0.0043	0.012	0.29	0.0005	0.0019	< 0.002	0.06
09/16/24	11:25	G	CC 26	0.0460	0.0440	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0011	0.0013	0.038	0.19	< 0.0005	0.0013	0.052	0.077
09/16/24	12:10	G	CC 49	0.0440	0.0410	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0031	0.0042	0.021	0.15	< 0.0005	0.00082	0.06	0.079
09/16/24	12:40	G	CC 50	0.048	0.046	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0045	0.0049	< 0.01	0.15	< 0.0005	0.00064	0.043	0.049
09/16/24	13:50	G	CC 59	0.047	0.046	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0024	0.0039	< 0.01	0.32	< 0.0005	0.0014	0.015	0.053
09/16/24	7:00	24C	CC AS T2	0.047	0.043	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0029	0.0042	< 0.01	0.17	< 0.0005	0.00083	0.007	0.04
09/17/24	7:20	24C	CC AS T11	0.047	0.047	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0022	0.0046	0.01	0.42	< 0.0005	0.0024	0.0082	0.072
10/28/24	12:00	G	CC 26	0.052	0.054	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	< 0.01	0.039	0.21	< 0.0005	0.0015	0.063	0.11
10/28/24	12:56	G	CC 49	0.045	0.046	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0031	0.0046	0.018	0.098	< 0.0005	0.00062	0.073	0.086
10/28/24	12:35	G	CC 50	0.043	0.046	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.004	0.0055	< 0.01	0.13	< 0.0005	0.00057	0.036	0.048
10/28/24	13:35	G	CC 59	0.052	0.053	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0022	0.0032	< 0.01	0.077	< 0.0005	< 0.001	0.018	0.03
10/28/24	9:00	24C	CC AS T2																
10/28/24	7:00	24C	CC AS T11	0.051	0.053	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.003	0.0057	< 0.01	0.16	< 0.0005	0.001	0.012	0.059
10/29/24	9:00	24C	CC AS T11	0.055	0.059	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	0.0048	0.011	0.42	< 0.0005	0.0025	0.023	0.077

Ambient Autosamplers				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
Method				0.002	0.002	0.001	0.005	0.002	0.002	0.0005	0.0005	0.002	0.002	0.002	0.002	0.005	0.005
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				5	5	5	5	5	5	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Strontium, Dissolved	Strontium, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total
04/29/24	12:00	G	CC 26	0.0055	0.0055	0.0014	0.0013	< 0.002	< 0.002	< 0.0005	< 0.0005	0.25	0.24	< 0.002	< 0.002	0.076	0.099
04/29/24	12:50	G	CC 49	0.0035	0.0033	0.0032	0.0033	< 0.002	< 0.002	< 0.0005	< 0.0005	0.23	0.22	< 0.002	< 0.002	0.23	0.3
04/29/24	13:15	G	CC 50	< 0.002	< 0.002	0.0055	0.0068	< 0.002	< 0.002	< 0.0005	< 0.0005	0.2000	0.1900	< 0.002	< 0.002	0.4200	0.5600
04/29/24	14:35	G	CC 59	0.0025	0.0025	0.0028	0.0034	< 0.002	< 0.002	< 0.0005	< 0.0005	0.22	0.22	< 0.002	< 0.002	0.19	0.29
04/29/24	14:00	24C	CC AS T2	0.0024	0.0025	0.0024	0.0035	< 0.002	< 0.002	< 0.0005	< 0.0005	0.23	0.22	< 0.002	< 0.002	0.14	0.27
04/30/24	3:00	24C	CC AS T11	0.0026	0.0028	0.0018	0.0045	< 0.002	< 0.002	< 0.0005	< 0.0005	0.23	0.24	< 0.002	0.0047	0.068	0.26
05/20/24	10:55	G	CC 26	0.0042	0.004	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.16	0.16	< 0.002	< 0.002	0.084	0.13
05/20/24	11:54	G	CC 49	0.003	0.003	0.0012	0.0021	< 0.002	< 0.002	< 0.0005	< 0.0005	0.14	0.14	< 0.002	< 0.002	0.087	0.21
05/20/24	11:39	G	CC 50	< 0.002	< 0.002	0.0018	0.0053	< 0.002	< 0.002	< 0.0005	< 0.0005	0.087	0.088	< 0.002	0.0034	0.13	0.29
05/20/24	12:40	G	CC 59	0.0025	0.0028	0.0012	0.0039	< 0.002	< 0.002	< 0.0005	< 0.0005	0.13	0.13	< 0.002	0.0026	0.085	0.32
05/20/24	10:00	24C	CC AS T2	0.0025	0.0027	0.0012	0.0045	< 0.002	< 0.002	< 0.0005	< 0.0005	0.13	0.14	< 0.002	0.004	0.085	0.35
05/21/24	4:30	24C	CC AS T11	0.0025	0.0026	0.001	0.0041	< 0.002	< 0.002	< 0.0005	< 0.0005	0.002	0.15	< 0.002	0.0044	0.045	0.31
06/16/24	10:00	24C	CC AS T2														
06/16/24	18:00	24C	CC AS T2	< 0.002	0.0021	< 0.001	0.001	< 0.002	< 0.002	< 0.0005	< 0.0005	0.068	0.069	< 0.002	< 0.002	0.031	0.095
06/17/24	10:55	G	CC 26														
06/17/24	11:35	G	CC 26	< 0.002	< 0.002	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.067	0.066	< 0.002	< 0.002	0.041	0.056
06/17/24	11:54	G	CC 49														
06/17/24	12:47	G	CC 49	< 0.002	< 0.002	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.063	0.063	< 0.002	< 0.002	< 0.005	0.069
06/17/24	11:39	G	CC 50														
06/17/24	12:26	G	CC 50	< 0.002	< 0.002	< 0.001	0.0015	< 0.002	< 0.002	< 0.0005	< 0.0005	< 0.002	0.079	< 0.002	< 0.002	< 0.005	0.1
06/17/24	12:40	G	CC 59														
06/17/24	13:50	G	CC 59	< 0.002	< 0.002	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	< 0.002	0.066	< 0.002	< 0.002	< 0.005	0.077
06/18/24	9:00	24C	CC AS T11	< 0.002	0.0021	< 0.001	0.002	< 0.002	< 0.002	< 0.0005	< 0.0005	< 0.002	0.074	< 0.002	0.0023	< 0.005	0.14
06/18/24	4:30	24C	CC AS T11														
07/29/24	11:05	G	CC 26	0.0036	0.0036	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.13	0.013	< 0.002	< 0.002	0.032	0.04100
07/29/24	11:40	G	CC 49	0.003	0.0028	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.14	0.13	< 0.002	< 0.002	0.052	0.06500
07/29/24	12:40	G	CC 50	< 0.002	< 0.002	0.0034	0.0037	< 0.002	< 0.002	< 0.0005	< 0.0005	0.29	0.28	< 0.002	< 0.002	0.15	0.21000
07/29/24	13:35	G	CC 59	0.0028	0.0028	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.14	0.14	< 0.002	< 0.002	0.04	0.05800
07/29/24	8:00	24C	CC AS T2	0.0028	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.14	0.14	< 0.002	< 0.002	0.029	0.05900
07/30/24	6:37	24C	CC AS T11	0.0029	0.0029	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.15	0.15	< 0.002	< 0.002	0.014	0.03900
08/19/24	10:50	G	CC 26		0.0041		< 0.005		< 0.002		< 0.0005		0.16		< 0.002		0.04500
08/19/24	12:10	G	CC 49		0.0026		< 0.005		< 0.002		< 0.0005		0.14		< 0.002		0.06600
08/19/24	11:30	G	CC 50		< 0.002		0.004		< 0.002		< 0.0005		0.35		< 0.002		0.18000
08/19/24	13:01	G	CC 59		0.0026		< 0.005		< 0.002		< 0.0005		0.15		< 0.002		0.06300
08/19/24	8:00	24C	CC AS T2		0.0026		< 0.005		< 0.002		< 0.0005		0.15		< 0.002		0.05800
08/20/24	7:20	24C	CC AS T11	0.0028	0.0027	< 0.001	< 0.005	< 0.002	0.002	0.0005	< 0.0005	0.17	0.15	< 0.002	< 0.002	0.014	0.02900
09/16/24	11:25	G	CC 26	0.004	0.0038	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.19	0.18	< 0.002	< 0.002	0.03	0.04300
09/16/24	12:10	G	CC 49	0.0031	0.0029	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.19	0.18	< 0.002	< 0.002	0.07	0.08000
09/16/24	12:40	G	CC 50	0.002	0.002	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.52	0.49	< 0.002	< 0.002	0.16	0.16
09/16/24	13:50	G	CC 59	0.003	0.0029	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.2	0.19	< 0.002	< 0.002	0.041	0.061
09/16/24	7:00	24C	CC AS T2	0.0028	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.2	0.19	< 0.002	< 0.002	0.032	0.045
09/17/24	7:20	24C	CC AS T11	0.003	0.0028	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.2	0.19	< 0.002	< 0.002	0.0089	0.033
10/28/24	12:00	G	CC 26	0.0034	0.0034	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.21	0.21	< 0.002	< 0.002	0.048	0.07
10/28/24	12:56	G	CC 49	0.0027	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.22	0.22	< 0.002	< 0.002	0.077	0.089
10/28/24	12:35	G	CC 50	< 0.002	< 0.002	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.54	0.55	< 0.002	< 0.002	0.21	0.23
10/28/24	13:35	G	CC 59	0.0027	0.0029	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.24	0.24	< 0.002	< 0.002	0.065	0.075
10/28/24	9:00	24C	CC AS T2														
10/28/24	7:00	24C	CC AS T2	0.0026	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.24	0.24	< 0.002	< 0.002	0.057	0.086
10/29/24	9:00	24C	CC AS T11	0.0026	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.26	0.25	< 0.002	< 0.002	0.025	0.05

**Event Autosamplers**

Method				SM2550B	SM4500H+B	SM2510B	ASTMD7315	SM2540D	SM5310C	SM4500NH3H	SM4500NO3I	SM4500NO3	SM4500PE	SM4500PE	EPA300	EPA300	EPA300	EPA200.8	EPA200.8
DL				1.0	1.0	10	1	1	0.5	0.01	0.01	0.03	0.0025	0.0025	0.1	5	10	0.001	0.001
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				1	1	0	1	0	1	2	2	2	4	4	1	0	0	5	5
Reporting Units				°C	s.u.	µS/cm	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Turbidity	Solids, Total Suspended	Carbon, Total Organic	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Bromide	Chloride	Sulfate	Arsenic, Dissolved	Arsenic, Total
04/03/24	9:45	CE	CC AS T2	15.4	7.9	606	8.9			0.01	0.44	0.65						< 0.001	< 0.001
04/03/24	9:45	CE	Trib 02					2	3.0				< 0.0025	0.0318	0.2	100	92		
04/03/24	5:30	CE	Trib 11												0.2		94		
04/04/24	5:30	CE	CC AS T11	15.3	7.8	624	8.1			< 0.01	< 0.01	< 0.03						< 0.001	0.0011
04/04/24	5:30	CE	Trib 11					11	2.7				< 0.0025	0.0233		103			
05/01/24	10:10	G	Trib 27															< 0.001	0.0011
06/15/24	9:48	CE	CC AS T11	11.8	7.4	133	99.6	29	4.0	0.02	0.17	0.55	0.0055	0.1130	< 0.1	16	17	< 0.001	0.0024
07/22/24	17:38	CE	CC AS T11	25.0	7.6	229	221.0	143	2.5	0.02	0.20	0.03	0.0060	0.0850	< 0.1	25	37	< 0.001	0.0061
07/31/24	16:05	G	Trib 22d	16.8	7.3	331	9.6	28	9.9	0.09	0.30	1.05	0.0987	0.1700	< 0.1	47	45	< 0.001	0.001
07/31/24	13:15	G	Trib 22b	12.5	7.7	49	1.9			0.01	0.04	0.19							
07/31/24	13:20	G	Trib 22b										< 0.0025	0.0087					
09/06/24	8:35	CE	CC AS T11	21.9	7.8	397	364.0	431	2.9	0.02	0.29	1.10	0.0125	0.1630	0.1	58	52	< 0.001	0.0029
11/04/24	8:35	G	Trib 03					33	2.6						0.1	60	91		
11/04/24	11:00	G	Trib 03	9.3	7.9	476	23.3			0.01	0.26	0.55	0.0053	0.0452				< 0.001	< 0.001
11/05/24	8:35	G	CC AS T4					17	3.5						0.1	48	98		
11/05/24	11:45	CE	CC AS T4	10.6	7.7	477	7.5			0.01	0.15	0.42	0.0078	0.0375				< 0.001	< 0.001

**Event Autosamplers**

Method				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DL				0.002	0.01	0.0003	0.001	0.0005	0.001	0.0009	0.0009	0.001	0.01	0.01	0.01	0.0005	0.001	0.002	0.002
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Manganese, Dissolved	Manganese, Total
04/03/24	9:45	CE	CC AS T2	0.071	0.073	< 0.0003	< 0.001	0.0007	0.00081	< 0.0009	< 0.0009	0.005	0.0069	< 0.01	0.00014	< 0.0005	0.00078	0.12	0.16
04/03/24	9:45	CE	Trib 02																
04/03/24	5:30	CE	Trib 11																
04/04/24	5:30	CE	CC AS T11	0.067	0.07	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0036	0.0051	< 0.01	< 0.01	0.0005	0.0013	< 0.002	0.068
04/04/24	5:30	CE	Trib 11																
05/01/24	10:10	G	Trib 27	0.055	0.07	< 0.0003	< 0.001	< 0.0005	0.00074	< 0.0009	0.002	0.0047	0.016			< 0.0005	0.01		
06/15/24	9:48	CE	CC AS T11	< 0.002	0.084	< 0.0003	0.00033	< 0.0005	0.00096	< 0.0009	0.0085	0.001	< 0.01	0.019	8.7	< 0.0005	0.036	< 0.002	0.48
07/22/24	17:38	CE	CC AS T11	0.034	0.11	< 0.0003	0.00034	< 0.0005	0.0012	< 0.0009	0.0009	0.0039	0.05	0.034	0.01	< 0.0005	0.094	0.0076	0.39
07/31/24	16:05	G	Trib 22d	0.029	0.036	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	0.0011	0.0019	0.0026	0.088	0.71	< 0.0005	0.001	0.14	0.2
07/31/24	13:15	G	Trib 22b																
07/31/24	13:20	G	Trib 22b																
09/06/24	8:35	CE	CC AS T11	0.058	0.27	< 0.0003	0.00085	< 0.0005	0.0013	< 0.0009	0.024	0.003	0.073	0.032		< 0.0005	0.051	0.0031	0.86
11/04/24	8:35	G	Trib 03																
11/04/24	11:00	G	Trib 03	0.058	0.065	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0026	0.017	0.031	1.5	< 0.0005	0.011	0.22	0.38
11/05/24	8:35	G	CC AS T4																
11/05/24	11:45	CE	CC AS T4	0.057	0.058	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.002	0.0066	0.037	0.62	< 0.0005	0.0052	0.055	0.086

**Event Autosamplers**

Method				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.7r4.4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 901.1	EPA 901.1	EPA 901.1	EPA 901.1
DL				0.002	0.002	0.001	0.005	0.002	0.002	0.0005	0.0005	0.002	0.002	0.002	0.002	0.005	0.005	variable	variable	variable	variable
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2
Max decimals				5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	1	1	1
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	pCi/L
Sample Date	Sample Time	Sample Type	Location ID	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Strontium, Dissolved	Strontium, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty
04/03/24	9:45	CE	CC AS T2	0.0024	0.0025	0.0022	0.0023	< 0.002	< 0.002	< 0.0005	< 0.0005	0.31	0.31	< 0.002	< 0.002	0.13	0.16				
04/03/24	9:45	CE	Trib 02																		
04/03/24	5:30	CE	Trib 11																		
04/04/24	5:30	CE	CC AS T11	0.003	0.003	0.0018	0.0021	< 0.002	< 0.002	< 0.0005	< 0.0005	0.35	0.34	< 0.002	< 0.002	0.057	0.084				
04/04/24	5:30	CE	Trib 11																		
05/01/24	10:10	G	Trib 27	0.0025	0.0026	0.0019	0.0032	< 0.002	< 0.002	< 0.0005	< 0.0005	0.25	0.26	< 0.002	0.0038						
06/15/24	9:48	CE	CC AS T11	< 0.002	0.0025	< 0.001	0.0069	< 0.002	< 0.002	< 0.0005	< 0.0005	< 0.002	0.083	< 0.002	0.011	< 0.005	0.25				
07/22/24	17:38	CE	CC AS T11	0.0024	0.003	< 0.001	0.0092	< 0.002	< 0.002	< 0.0005	0.00081	0.13	0.14	< 0.002	0.014	0.019	0.3	8.7	3.7	12.7	3.0
07/31/24	16:05	G	Trib 22d	< 0.002	< 0.002	< 0.001	0.0011	< 0.002	< 0.002	< 0.0005	< 0.0005	0.22	0.21	< 0.002	0.0023	0.0063	0.011				
07/31/24	13:15	G	Trib 22b																		
07/31/24	13:20	G	Trib 22b																		
09/06/24	8:35	CE	CC AS T11	0.0028	0.0031	< 0.001	0.016	< 0.002	< 0.002	< 0.0005	< 0.0005	0.19	0.21	< 0.002	0.048	0.0062	0.29	15.8	5.5	18.3	3.6
11/04/24	8:35	G	Trib 03																		
11/04/24	11:00	G	Trib 03	0.003	0.003	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.26	0.25	< 0.002	< 0.002	0.052	0.19				
11/05/24	8:35	G	CC AS T4																		
11/05/24	11:45	CE	CC AS T4	0.0031	0.003	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.29	0.28	< 0.002	< 0.002	0.059	0.093				

Tribes				SM2550B	SM4500H+B	SM2510B	ASTMD888-09C	ASTMD7315	SM2540D	SM5310C	SM 9223 B	SM4500NH3H	SM4500NO3I	SM4500NO3	SM4500PE	SM4500PE	SM2340C	EPA300	EPA300
Method				1.0	1.0	10	1.0	1	1	0.5	1	0.01	0.01	0.03	0.0025	0.0025	10	0.1	5
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				1	1	0	1	1	0	1	0	2	2	2	4	4	0	1	0
Max decimals				°C	s.u.	µS/cm	mg/L	NTU	mg/L	mg/L	cfu/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as CaCO3	mg/L	mg/L
Reporting Units																			
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Oxygen, Dissolved	Turbidity	Solids, Total Suspended	Carbon, Total Organic	E. coli	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Hardness	Bromide	Chloride
01/03/24	9:40	G	Trib 01	2.4	7.8	460	11.8	1.0	2	1.2	< 1	< 0.01	0.50	0.60	< 0.0025	0.0058	176	0.1	56
01/03/24	9:50	G	Trib 02	3.9	7.8	466	11.6	< 1	< 1	1.3	6.0	< 0.01	0.50	0.66	< 0.0025	0.0071	184	0.1	61
01/03/24	10:05	G	Trib 03	5.4	8.0	464	11.0	1.2	< 1	1.3	26.0	< 0.01	0.49	0.60	0.003	0.0090	180	0.1	59
01/03/24	10:35	G	Trib 04	5.2	7.9	470	10.7	2.7	8	1.4	62.0	< 0.01	0.46	0.58	0.0028	0.0177	180	0.1	57
01/03/24	9:00	G	Trib 24	13.5	7.8	355	9.1	1.4	1	2.0	< 1	< 0.01	0.05	0.21	0.0025	0.0109	124	< 0.1	42
02/07/24	9:15	G	Trib 01	2.4	7.9	496	11.7	1.0	< 1	1.1	1.0	0.03	0.43	0.52	< 0.0025	0.0074		0.1	60
02/07/24	9:30	G	Trib 02	4.4	7.9	525	11.2	1.1	5	1.2	7.0	0.02	0.46	0.54	< 0.0025	0.0074		0.1	63
02/07/24	9:50	G	Trib 03	6.0	8.0	542	10.5	1.1	1	1.3	12.0	0.02	0.47	0.56	0.0028	0.0109		0.1	68
02/07/24	10:25	G	Trib 04	5.3	8.0	604	10.3	3.2	1	1.7	72.0	0.03	0.45	0.59	0.0047	0.0196		0.1	82
02/07/24	8:30	G	Trib 24	8.3	7.9	416	10.4	< 1	1	2.2	2.0	0.03	0.14	0.29	< 0.0025	0.0090		< 0.1	49
03/06/24	9:40	G	Trib 01	2.6	7.9	592	11.5	< 1	< 1	1.1	1.0	0.02	0.42	0.53	< 0.0025	0.0059	192	0.2	65
03/06/24	9:50	G	Trib 02	7.6	7.9	574	10.6	< 1	< 1	1.1	< 1	0.03	0.45	0.56	< 0.0025	0.0054	196	0.2	68
03/06/24	10:05	G	Trib 03	8.2	8.0	592	10.0	< 1	< 1	1.3	6.0	0.03	0.47	0.58	0.0029	0.0088	212	0.2	74
03/06/24	10:35	G	Trib 04	7.4	8.0	603	9.9	3.0	< 1	1.5	105.0	0.03	0.33	0.49	0.0055	0.0186	196	0.2	78
03/06/24	9:00	G	Trib 24	9.0	7.9	387	10.1	< 1	< 1	1.9	< 1	0.03	0.04	0.21	< 0.0025	0.0067	122	0.1	44
04/03/24	9:10	G	Trib 01	8.2	7.8	611	10.6	1.6	2	2.2	< 1	0.02	0.42	0.60	< 0.0025	0.0100		0.2	93
04/03/24	9:25	G	Trib 02	10.3	8.0	641	9.8	1.7	3	2.5	11.0	0.02	0.42	0.60	< 0.0025	0.0098		0.2	101
04/03/24	9:40	G	Trib 03	10.9	8.1	664	9.5	1.7	2	2.7	6.0	0.04	0.46	0.74	< 0.0025	0.0116		0.2	104
04/03/24	10:20	G	Trib 04	10.6	8.0	668	9.5	6	3.4	38.0	0.04	0.38	0.62	0.0063	0.0229		0.2	105	
04/03/24	10:15	G	Trib 11	10.9	7.9	659	9.3	10	2.9	152.0	0.02	0.39	0.57	< 0.0025	0.0282		0.2	100	
04/03/24	8:30	G	Trib 24	11.5	7.7	405	9.1	1.1	< 1	2.0	4.0	0.04	0.08	0.26	< 0.0025	0.0079		< 0.1	47
05/01/24	9:05	G	Trib 01	10.4	7.7	443	9.5	7.7	14	4.2	33.0	0.02	0.38	0.49	0.0043	0.0375		0.1	68
05/01/24	9:20	G	Trib 02	11.0	7.9	472	9.4	8.9	17	4.3	3.0	0.02	0.27	0.52	0.005	0.0222		0.1	75
05/01/24	10:25	G	Trib 11	14.3	7.7	475	8.5	11.8	46	4.0	13.0	0.02	0.28	0.54	0.0048	0.0292		0.1	74
05/01/24	8:25	G	Trib 24	12.3	7.7	424	8.0	4.1	7	2.3	4.0				0.0025	0.0137		0.1	51
05/01/24	10:25	G	Trib 24									0.03	0.09	0.28					
05/01/24	10:10	G	Trib 27	11.9	7.7	485	8.3	20.0	45	4.9	236.0	0.02	0.28	0.63	0.0131	0.0583		0.2	73
06/05/24	9:05	G	Trib 01	13.0	7.5	160	9.4	7.2	25	4.0	20.0	0.01	0.11	0.40	< 0.0025	0.0380	56	< 0.1	23
06/05/24	9:20	G	Trib 02	13.1	7.6	151	9.5		28	4.0	38.0	0.01	0.11	0.42	< 0.0025	0.0338	52	< 0.1	16
06/05/24	9:35	G	Trib 02					9.4											
06/05/24	9:35	G	Trib 03	14.0	7.6	153	9.5	9.4	32	4.1	24.0	0.02	0.14	0.44	0.0051	0.0325	48	< 0.1	17
06/05/24	10:25	G	Trib 11	15.9	7.6	164	8.8	7.5	28	4.9	114.0	0.02	0.13	0.36	0.0052	0.0297	56	< 0.1	18
06/05/24	8:25	G	Trib 24	16.2	7.3	415	5.4	2.3	3	2.0	< 1	0.04	0.19	0.34	0.0034	0.0243	136	0.1	52
06/05/24	10:10	G	Trib 27	17.3	7.5	170	8.1	6.1	10	4.0	291.0	0.02	0.12	0.37	0.0059	0.0071	64	< 0.1	19
07/02/24	9:10	G	Trib 01	14.3	7.5	127	8.8	1.8	2	1.9	13.0	0.02	0.11	0.23	< 0.0025	0.0124	60		
07/02/24	9:25	G	Trib 02	14.3	7.5	129	8.6	2.3	3	4.0	< 1	0.02	0.11	0.22	< 0.0025	0.0116	52		
07/02/24	9:35	G	Trib 03	15.1	7.6	132	8.8	1.8	1	2.1	1.0	0.02	0.11	0.21	0.0025	0.0126	56		
07/02/24	10:40	G	Trib 11	17.9	7.6	141	8.3	4.2	10	2.1	91.0	0.02	0.08	0.25	0.0037	0.0245	60		
07/02/24	8:30	G	Trib 24	16.8	7.2	420	3.7	5.2	6	2.1	23.0	0.02	0.20	0.33	0.0056	0.0175	140		
07/02/24	10:20	G	Trib 27	17.8	7.6	137	7.9	4.4	4	2.8	91.0	0.03	0.08	0.23	0.005	0.0175	56		
08/07/24	9:00	G	Trib 01	17.9	7.6	255	7.9	1.9	3	2.2	34.0	0.02	0.12	0.25	< 0.0025	0.0180		< 0.1	23
08/07/24	9:15	G	Trib 02	19.5	7.7	264	7.6	1.7	4	2.1	64.0	0.03	0.13	0.26	0.0025	0.0109		0.1	24
08/07/24	9:30	G	Trib 03	23.5	7.8	325	7.0	2.0	8	2.5	921.0	0.03	0.14	0.38	0.0072	0.0207		0.1	36
08/07/24	10:30	G	Trib 11	20.7	7.4	253	7.8	4.4	17	2.08	93	0.02	0.11	0.26	0.0036	0.0101		< 0.1	23
08/07/24	10:00	G	Trib 22d	15.6	7.9	66	8.2	1.9	1	4.05	99	0.02	0.05	0.21	0.0026	0.0132		< 0.1	6
08/07/24	8:20	G	Trib 24	19.5	7.4	378	3.1	6.3	17	2.31	13	0.02	0.13	0.32	0.0072	0.0082		0.1	47
09/04/24	9:05	G	Trib 01	18.3	7.5	291	8.4	< 1	< 1	2.07	23	0.02	0.19	0.35	0.0026	0.0086		0.1	40
09/04/24	9:20	G	Trib 02	19.4	7.8	295	7.9	1	< 1	1.43	21	0.02	0.19	0.33	0.0148	0.0204		< 0.1	27
09/04/24	10:15	G	Trib 11	20.2	7.5	306	7.6	2.9	5	1.65	248	0.02	0.15	0.32	< 0.0025	0.012		0.1	28
09/04/24	10:00	G	Trib 22d	16.2	7.7	61	8.5	1.5	< 1	3.99	57				0.0051	0.0241		< 0.1	< 5
09/04/24	8:25	G	Trib 24	20.1	7.4	375	3.1	1.7	1	2.09	19	0.03	0.09	0.28	0.0118	0.0241		0.1	43

Tribes				SM2550B	SM4500H+B	SM2510B	ASTMD888-09C	ASTMD7315	SM2540D	SM5310C	SM 9223 B	SM4500NH3H	SM4500NO3I	SM4500NO3	SM4500PE	SM4500PE	SM2340C	EPA300	EPA300
Method				1.0	1.0	10	1.0	1	1	0.5	1	0.01	0.01	0.03	0.0025	0.0025	10	0.1	5
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				1	1	0	1	1	0	1	0	2	2	2	4	4	0	1	0
Reporting Units				°C	s.u.	µS/cm	mg/L	NTU	mg/L	mg/L	cfu/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as CaCO3	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Oxygen, Dissolved	Turbidity	Solids, Total Suspended	Carbon, Total Organic	E. coli	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Hardness	Bromide	Chloride
10/02/24	9:00	G	Trib 01	11.5	7.4	373	8.7	<1	<1	1.21	15	0.02	0.15	0.29	<0.0025	0.0076		0.1	35
10/02/24	9:10	G	Trib 02	19.3	7.8	370	8.0	<1	<1	1.17	15	0.02	0.19	0.32	<0.0025	0.0066		0.1	36
10/02/24	10:05	G	Trib 11	16.4	7.5	384	8.1	3	6	1.55	68	0.02	0.13	0.35	0.0025	0.0073		0.1	37
10/02/24	9:50	G	Trib 22d	14.8	7.8	67	8.6	2	<1	2.23	461	0.03	0.09	0.27	0.0062	0.0178		<0.1	<5
10/02/24	8:20	G	Trib 24	19.2	7.3	365	3.1	1.6	<1	1.97	50	0.03	0.09	0.29	0.0136	0.0219		0.1	46
11/06/24	9:15	G	Trib 01	1.8	7.7	479	11.4	1.5	1	1.46	1	0.01	0.24	0.36	<0.0025	0.0101		0.1	53
11/06/24	9:35	G	Trib 02	2.0	7.7	470	11.6	1.1	<1	1.31	38	0.01	0.26	0.41	<0.0025	0.0108		0.1	53
11/06/24	9:45	G	Trib 03	4.0	7.9	505	10.8	2.3	7	1.46	291	0.02	0.26	0.39	0.0032	0.0169		0.1	65
11/06/24	10:20	G	Trib 04	4.1	7.9	525	9.5	1.7	3	2.27	1120	0.01	0.13	0.28	0.008	0.0227		0.2	64
11/06/24	8:25	G	Trib 24	15.8	7.7	365	7.4	1.5	2	1.87	32	0.01	0.02	0.16	0.0035	0.0107		0.1	46
12/04/24	9:05	G	Trib 01	1.3	7.8	513	11.5	<1	1	1.17	<1	0.02	0.41	0.53	<0.0025	0.004		0.2	62
12/04/24	9:20	G	Trib 02	4.1	7.8	503	11.2	<1	1	1.19	2	0.02	0.42	0.54	<0.0025	0.0044		0.1	57
12/04/24	9:30	G	Trib 03	5.5	7.8	504	10.7	<1	1	1.11	11	0.02	0.41	0.57	<0.0025	0.0056		0.1	57
12/04/24	10:25	G	Trib 04	5.0	7.6	514	10.1	1.6	1	1.39	205	0.01	0.34	0.51	0.0028	0.0123		0.1	59
12/04/24	10:05	G	Trib 22d	6.1	8.1	118	10.7	1.6	4	2.33	6	0.01	0.05	0.17	0.0035	0.0108		<0.1	12
12/04/24	8:25	G	Trib 24	10.9	7.8	380	9.0	1	3	1.96	24	0.01	0.03	0.18	<0.0025	0.0084		0.1	44

Tribes																				
Method				EPA300	EPA200.8	EPA200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	PA 200.7 Rev 4	EPA 200.8	EPA 200.8
DL				10	0.001	0.001	0.002	0.01	0.0003	0.001	0.0005	0.001	0.0009	0.0009	0.001	0.01	0.01	0.01	0.0005	0.001
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Sulfate	Arsenic, Dissolved	Arsenic, Total	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total
01/03/24	9:40	G	Trib 01	112													0.02	0.039		
01/03/24	9:50	G	Trib 02	109													< 0.01	0.058		
01/03/24	10:05	G	Trib 03	108													0.0190	0.0870		
01/03/24	10:35	G	Trib 04	103													0.017	0.27		
01/03/24	9:00	G	Trib 24	59													< 0.01	0.025		
02/07/24	9:15	G	Trib 01	92													< 0.01	0.078		
02/07/24	9:30	G	Trib 02	98													< 0.01	0.07		
02/07/24	9:50	G	Trib 03	99													< 0.01	0.12		
02/07/24	10:25	G	Trib 04	103													0.042	0.27		
02/07/24	8:30	G	Trib 24	68													< 0.01	0.039		
03/06/24	9:40	G	Trib 01	117	< 0.001	< 0.001	0.06	0.06	< 0.0003	< 0.001	0.00053	< 0.001	< 0.0009	< 0.0009	0.0036	0.0046	< 0.01	0.052	< 0.0005	< 0.001
03/06/24	9:50	G	Trib 02	119	< 0.001	< 0.001	0.063	0.063	< 0.0003	< 0.001	0.00051	< 0.00053	< 0.0009	< 0.0009	0.0033	0.0042	< 0.01	0.044	< 0.0005	< 0.001
03/06/24	10:05	G	Trib 03	117	< 0.001	< 0.001	0.063	0.064	< 0.0003	< 0.001	< 0.0005	0.00051	< 0.0009	< 0.0009	0.0033	0.0046	< 0.01	0.071	< 0.0005	0.00058
03/06/24	10:35	G	Trib 04	107	< 0.001	< 0.001	0.063	0.065	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0021	0.0048	0.021	0.25	< 0.0005	0.0031
03/06/24	9:00	G	Trib 24	60	< 0.001	< 0.001	0.051	0.052	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0016	0.0017	< 0.01	0.026	< 0.0005	< 0.001
04/03/24	9:10	G	Trib 01	94													0.012	0.18		
04/03/24	9:25	G	Trib 02	88													< 0.01	0.16		
04/03/24	9:40	G	Trib 03	94													< 0.01	0.13		
04/03/24	10:20	G	Trib 04	86													0.01	0.31		
04/03/24	10:15	G	Trib 11	94													< 0.01	0.34		
04/03/24	8:30	G	Trib 24	60													< 0.01	0.055		
05/01/24	9:05	G	Trib 01	58													0.023	1.2		
05/01/24	9:20	G	Trib 02	59													0.021	1.2		
05/01/24	10:25	G	Trib 11	64													0.015	1.8		
05/01/24	8:25	G	Trib 24	63																
05/01/24	10:25	G	Trib 24	67													< 0.01	0.16		
05/01/24	10:10	G	Trib 27	67													0.018	1.9		
06/05/24	9:05	G	Trib 01	27	< 0.001	< 0.001	0.0230	0.0340	< 0.0003	< 0.001	< 0.0005	0.00077	< 0.0009	0.0013	0.0053	0.017	0.051	1.4	< 0.0005	0.011
06/05/24	9:20	G	Trib 02	21	< 0.001	< 0.001	0.0230	0.0390	< 0.0003	< 0.001	< 0.0005	0.00096	< 0.0009	0.002	0.0055	0.021	0.045	2	< 0.0005	0.014
06/05/24	9:35	G	Trib 02																	
06/05/24	9:35	G	Trib 03	21	< 0.001	< 0.001	0.0230	0.0370	< 0.0003	< 0.001	< 0.0005	0.00091	< 0.0009	0.0015	0.0055	0.02	0.046	1.6	< 0.0005	0.013
06/05/24	10:25	G	Trib 11	22	< 0.001	< 0.001	0.0240	0.0380	< 0.0003	< 0.001	< 0.0005	0.00076	< 0.0009	0.0016	0.0051	0.019	0.034	1.7	< 0.0005	0.01
06/05/24	8:25	G	Trib 24	62	< 0.001	< 0.001	0.0580	0.0600	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0026	0.0033	< 0.01	0.1	< 0.0005	< 0.001
06/05/24	10:10	G	Trib 27	25	< 0.001	< 0.001	0.0270	0.0300	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0051	0.0091	0.05	0.51	< 0.0005	0.0031
07/02/24	9:10	G	Trib 01														0.032	0.22		
07/02/24	9:25	G	Trib 02														0.032	0.21		
07/02/24	9:35	G	Trib 03														0.032	0.22		
07/02/24	10:40	G	Trib 11														0.025	0.41		
07/02/24	8:30	G	Trib 24														< 0.01	0.27		
07/02/24	10:20	G	Trib 27														0.045	0.54		
08/07/24	9:00	G	Trib 01	49													0.021	0.2		
08/07/24	9:15	G	Trib 02	49													0.02	0.25		
08/07/24	9:30	G	Trib 03	52													0.023	0.19		
08/07/24	10:30	G	Trib 11	47													0.019	0.28		
08/07/24	10:00	G	Trib 22d	< 10													0.036	0.11		
08/07/24	8:20	G	Trib 24	54													< 0.01	0.35		
09/04/24	9:05	G	Trib 01	66	< 0.001	< 0.001	0.043	0.044	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0025	0.004	0.023	0.11	< 0.0005	0.00073
09/04/24	9:20	G	Trib 02	59	< 0.001	< 0.001	0.043	0.045	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0024	0.0057	0.015	0.14	< 0.0005	0.001
09/04/24	10:15	G	Trib 11	59	< 0.001	< 0.001	0.045	0.048	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0018	0.004	0.014	0.21	< 0.0005	0.0016
09/04/24	10:00	G	Trib 22d	< 10																
09/04/24	8:25	G	Trib 24	50	< 0.001	0.001	0.051	0.056	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	0.0022	0.0035	< 0.01	0.12	< 0.0005	< 0.001

Tribes				EPA300	EPA200.8	EPA200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	PA 200.7 Rev 4	EPA 200.8	EPA 200.8
Method				10	0.001	0.001	0.002	0.01	0.0003	0.001	0.0005	0.001	0.0009	0.0009	0.001	0.01	0.01	0.01	0.0005	0.001
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Sulfate	Arsenic, Dissolved	Arsenic, Total	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total
10/02/24	9:00	G	Trib 01	82													0.011	0.064		
10/02/24	9:10	G	Trib 02	78													< 0.01	0.064		
10/02/24	10:05	G	Trib 11	81													0.011	0.33		
10/02/24	9:50	G	Trib 22d	< 10													0.048	0.22		
10/02/24	8:20	G	Trib 24	51													< 0.01	0.058		
11/06/24	9:15	G	Trib 01	100													< 0.01	0.11		
11/06/24	9:35	G	Trib 02	94													< 0.01	0.11		
11/06/24	9:45	G	Trib 03	97													0.011	0.29		
11/06/24	10:20	G	Trib 04	104													0.022	0.14		
11/06/24	8:25	G	Trib 24	60													< 0.01	0.069		
12/04/24	9:05	G	Trib 01	106	< 0.001	< 0.001	0.056	0.058	< 0.0003	< 0.001	< 0.0005	0.00058	< 0.0009	< 0.0009	0.0027	0.0034	< 0.01	0.047	< 0.0005	< 0.001
12/04/24	9:20	G	Trib 02	103	< 0.001	< 0.001	0.056	0.058	< 0.0003	< 0.001	< 0.0005	0.00052	< 0.0009	< 0.0009	0.0025	0.0032	< 0.01	0.051	< 0.0005	< 0.001
12/04/24	9:30	G	Trib 03	104	< 0.001	< 0.001	0.057	0.058	< 0.0003	< 0.001	< 0.0005	0.00051	< 0.0009	< 0.0009	0.0024	0.0041	< 0.01	0.077	< 0.0005	< 0.001
12/04/24	10:25	G	Trib 04	102	< 0.001	< 0.001	0.056	0.06	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	0.0027	0.012	0.13	< 0.0005	0.0013
12/04/24	10:05	G	Trib 22d	17	< 0.001	< 0.001	0.02	0.021	< 0.0003	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	< 0.01	0.025	0.011	< 0.0005	< 0.001
12/04/24	8:25	G	Trib 24	54	0.001	0.001	0.051	0.054	0.0003	0.0003	0.0005	0.0005	0.0009	0.0009	0.002	0.0025	0.01	0.047	0.0005	0.0005

Tribes				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
Method				0.002	0.002	0.002	0.002	0.001	0.005	0.002	0.002	0.0005	0.0005	0.002	0.002	0.002	0.002	0.005	0.005
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Max decimals				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Reporting Units																			
Sample Date	Sample Time	Sample Type	Location ID	Manganese, Dissolved	Manganese, Total	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Strontium, Dissolved	Strontium, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total
01/03/24	9:40	G	Trib 01	0.049	0.05													0.14	0.15
01/03/24	9:50	G	Trib 02	0.048	0.053													0.13	0.14
01/03/24	10:05	G	Trib 03	0.0450	0.0570													0.1200	0.1300
01/03/24	10:35	G	Trib 04	0.031	0.044													0.084	0.11
01/03/24	9:00	G	Trib 24	<0.002	0.009													0.01	0.011
02/07/24	9:15	G	Trib 01	0.047	0.058													0.12	0.14
02/07/24	9:30	G	Trib 02	0.045	0.057													0.12	0.13
02/07/24	9:50	G	Trib 03	0.044	0.068													0.11	0.13
02/07/24	10:25	G	Trib 04	0.062	0.075													0.078	0.099
02/07/24	8:30	G	Trib 24	0.0096	0.019													0.021	0.023
03/06/24	9:40	G	Trib 01	0.057	0.062	0.0028	0.0029	0.0016	0.0019	<0.002	<0.002	<0.0005	<0.0005	0.3	0.29	<0.002	<0.002	0.13	0.14
03/06/24	9:50	G	Trib 02	0.052	0.057	0.0027	0.0027	0.0014	0.002	<0.002	<0.002	<0.0005	<0.0005	0.31	0.31	<0.002	<0.002	0.12	0.13
03/06/24	10:05	G	Trib 03	0.046	0.059	0.0026	0.0026	0.0013	0.0017	<0.002	<0.002	<0.0005	<0.0005	0.32	0.31	<0.002	<0.002	0.11	0.12
03/06/24	10:35	G	Trib 04	0.1	0.11	0.0029	0.0028	0.0013	0.0017	<0.002	<0.002	<0.0005	<0.0005	0.32	0.32	<0.002	<0.002	0.053	0.074
03/06/24	9:00	G	Trib 24	0.0045	0.013	0.0027	0.0027	<0.001	0.0013	<0.002	<0.002	<0.0005	<0.0005	0.22	0.22	<0.002	<0.002	0.011	0.013
04/03/24	9:10	G	Trib 01	0.17	0.19													0.17	0.19
04/03/24	9:25	G	Trib 02	0.14	0.14													0.14	0.16
04/03/24	9:40	G	Trib 03	0.12	0.14													0.12	0.14
04/03/24	10:20	G	Trib 04	0.17	0.19													0.069	0.094
04/03/24	10:15	G	Trib 11	0.055	0.091													0.087	0.11
04/03/24	8:30	G	Trib 24	<0.002	0.016													0.016	0.018
05/01/24	9:05	G	Trib 01	0.22	0.32													0.2	0.33
05/01/24	9:20	G	Trib 02	0.2	0.29													0.17	0.29
05/01/24	10:25	G	Trib 11	0.047	0.21													0.076	0.21
05/01/24	8:25	G	Trib 24																
05/01/24	10:25	G	Trib 24	<0.002	0.1													0.0098	0.02100
05/01/24	10:10	G	Trib 27	0.0069	0.017													0.11	0.20000
06/05/24	9:05	G	Trib 01	0.032	0.32	0.0022	0.0027	<0.001	0.0021	<0.002	<0.002	<0.0005	<0.0005	0.082	0.081	<0.002	<0.002	0.06	0.19000
06/05/24	9:20	G	Trib 02	0.03	0.42	0.0022	0.003	<0.001	0.0027	<0.002	<0.002	<0.0005	<0.0005	0.084	0.084	<0.002	0.0025	0.06	0.23000
06/05/24	9:35	G	Trib 02																
06/05/24	9:35	G	Trib 03	0.034	0.38	0.0022	0.0027	<0.001	0.0024	<0.002	<0.002	<0.0005	<0.0005	0.084	0.086	<0.002	<0.002	0.06	0.22000
06/05/24	10:25	G	Trib 11	0.017	0.26	0.0024	0.0027	<0.001	0.0026	<0.002	<0.002	<0.0005	<0.0005	0.09	0.093	<0.002	<0.002	0.043	0.18000
06/05/24	8:25	G	Trib 24	0.0099	0.14	0.0028	0.0028	<0.001	0.0015	<0.002	<0.002	<0.0005	<0.0005	0.24	0.24	<0.002	<0.002	0.02	0.02700
06/05/24	10:10	G	Trib 27	0.033	0.074	0.0025	0.0025	<0.001	0.0013	<0.002	<0.002	<0.0005	<0.0005	0.096	0.095	<0.002	<0.002	0.1	0.07500
07/02/24	9:10	G	Trib 01	0.024	0.058													0.042	0.05800
07/02/24	9:25	G	Trib 02	0.024	0.059													0.041	0.05700
07/02/24	9:35	G	Trib 03	0.027	0.058													0.04	0.05400
07/02/24	10:40	G	Trib 11	0.014	0.066													0.023	0.05500
07/02/24	8:30	G	Trib 24	0.002	0.083													0.016	0.026
07/02/24	10:20	G	Trib 27	0.021	0.068													0.023	0.047
08/07/24	9:00	G	Trib 01	0.017	0.046													0.046	0.061
08/07/24	9:15	G	Trib 02	0.02	0.059													0.04	0.062
08/07/24	9:30	G	Trib 03	0.073	0.098													0.031	0.044
08/07/24	10:30	G	Trib 11	0.019	0.049													0.016	0.035
08/07/24	10:00	G	Trib 22d	0.0035	0.0089													<0.005	<0.005
08/07/24	8:20	G	Trib 24	<0.002	0.31													0.013	0.037
09/04/24	9:05	G	Trib 01	0.013	0.038	0.0026	0.0028	<0.001	<0.005	<0.002	<0.002	<0.0005	<0.0005	0.17	0.17	<0.002	<0.002	0.048	0.062
09/04/24	9:20	G	Trib 02	0.014	0.043	0.0027	0.003	<0.001	0.0012	<0.002	<0.002	<0.0005	<0.0005	0.18	0.18	<0.002	<0.002	0.042	0.064
09/04/24	10:15	G	Trib 11	0.038	0.067	0.003	0.0031	<0.001	<0.005	<0.002	<0.002	<0.0005	<0.0005	0.19	0.19	<0.002	<0.002	0.014	0.029
09/04/24	10:00	G	Trib 22d																
09/04/24	8:25	G	Trib 24	0.0048	0.2	0.0027	0.0028	<0.001	0.0012	<0.002	<0.002	<0.0005	<0.0005	0.22	0.22	<0.002	<0.002	0.013	0.022

Tribes				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
Method				DL	DL	DL	DL	DL	DL	DL	DL	DL	DL	DL	DL	DL	DL	DL	DL
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Manganese, Dissolved	Manganese, Total	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Strontium, Dissolved	Strontium, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total
10/02/24	9:00	G	Trib 01	0.013	0.025													0.056	0.058
10/02/24	9:10	G	Trib 02	0.013	0.077													0.051	0.037
10/02/24	10:05	G	Trib 11	0.037	0.044													0.017	0.005
10/02/24	9:50	G	Trib 22d	0.021	0.043													< 0.005	< 0.005
10/02/24	8:20	G	Trib 24	0.0055	0.12													0.015	0.015
11/06/24	9:15	G	Trib 01	0.036	0.064													0.098	0.11
11/06/24	9:35	G	Trib 02	0.036	0.062													0.096	0.1
11/06/24	9:45	G	Trib 03	0.05	0.094													0.076	0.1
11/06/24	10:20	G	Trib 04	0.017	0.029													0.063	0.068
11/06/24	8:25	G	Trib 24	< 0.002	0.041													0.0058	0.0091
12/04/24	9:05	G	Trib 01	0.049	0.054	0.0027	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.26	0.27	< 0.002	< 0.002	0.12	0.14
12/04/24	9:20	G	Trib 02	0.046	0.051	0.0027	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	< 0.002	< 0.002	< 0.002	< 0.002	0.12	0.13
12/04/24	9:30	G	Trib 03	0.044	0.054	0.0027	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.28	0.29	< 0.002	< 0.002	0.1	0.12
12/04/24	10:25	G	Trib 04	0.014	0.019	0.0025	0.0027	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.29	0.3	< 0.002	< 0.002	0.072	0.089
12/04/24	10:05	G	Trib 22d	0.011	0.018	< 0.002	< 0.002	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	< 0.0005	0.082	0.083	< 0.002	< 0.002	< 0.005	< 0.005
12/04/24	8:25	G	Trib 24	0.002	0.021	0.003	0.0031	0.005	0.005	0.002	0.002	0.005	0.005	0.21	0.22	0.003	0.003	0.0067	0.0094

Tribes				EPA 901.1	EPA 901.1	EPA 901.1	EPA 901.1
Method				variable	variable	variable	variable
DL				2	2	2	2
Max Sig figs				1	1	1	1
Max decimals				pCi/L	pCi/L	pCi/L	pCi/L
Reporting Units							
Sample Date	Sample Time	Sample Type	Location ID	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty
01/03/24	9:40	G	Trib 01				
01/03/24	9:50	G	Trib 02				
01/03/24	10:05	G	Trib 03				
01/03/24	10:35	G	Trib 04				
01/03/24	9:00	G	Trib 24				
02/07/24	9:15	G	Trib 01				
02/07/24	9:30	G	Trib 02				
02/07/24	9:50	G	Trib 03				
02/07/24	10:25	G	Trib 04				
02/07/24	8:30	G	Trib 24				
03/06/24	9:40	G	Trib 01	< variable	2.3	5.2	2.7
03/06/24	9:50	G	Trib 02	4.3	3.2	3.5	2.5
03/06/24	10:05	G	Trib 03	3.2	3	3	3
03/06/24	10:35	G	Trib 04	5.7	3.7	3.7	2.9
03/06/24	9:00	G	Trib 24	3.9	2.7	2.6	2.6
04/03/24	9:10	G	Trib 01				
04/03/24	9:25	G	Trib 02				
04/03/24	9:40	G	Trib 03				
04/03/24	10:20	G	Trib 04				
04/03/24	10:15	G	Trib 11				
04/03/24	8:30	G	Trib 24				
05/01/24	9:05	G	Trib 01				
05/01/24	9:20	G	Trib 02				
05/01/24	10:25	G	Trib 11				
05/01/24	8:25	G	Trib 24				
05/01/24	10:25	G	Trib 24				
05/01/24	10:10	G	Trib 27				
06/05/24	9:05	G	Trib 01	3.60000	2.10000	3.40000	2.40000
06/05/24	9:20	G	Trib 02	4.60000	2.30000	5.00000	2.60000
06/05/24	9:35	G	Trib 02				
06/05/24	9:35	G	Trib 03	3.40000	2.10000	4.10000	2.70000
06/05/24	10:25	G	Trib 11	3.60000	2.20000	3.90000	2.60000
06/05/24	8:25	G	Trib 24	4.90000	3.20000	4.10000	2.60000
06/05/24	10:10	G	Trib 27	2.30000	1.80000	1.90000	2.50000
07/02/24	9:10	G	Trib 01				
07/02/24	9:25	G	Trib 02				
07/02/24	9:35	G	Trib 03				
07/02/24	10:40	G	Trib 11				
07/02/24	8:30	G	Trib 24				
07/02/24	10:20	G	Trib 27				
08/07/24	9:00	G	Trib 01				
08/07/24	9:15	G	Trib 02				
08/07/24	9:30	G	Trib 03				
08/07/24	10:30	G	Trib 11				
08/07/24	10:00	G	Trib 22d				
08/07/24	8:20	G	Trib 24				
09/04/24	9:05	G	Trib 01	1.8	2.3	3.1	2.3
09/04/24	9:20	G	Trib 02	2.4	2.1	2.5	2.3
09/04/24	10:15	G	Trib 11	2.3	2.2	2.2	2.4
09/04/24	10:00	G	Trib 22d				
09/04/24	8:25	G	Trib 24	3.6	2.7	4	2.7

Trib				EPA 901.1	EPA 901.1	EPA 901.1	EPA 901.1
Method				variable	variable	variable	variable
DL				2	2	2	2
Max Sig figs				1	1	1	1
Max decimals				pCi/L	pCi/L	pCi/L	pCi/L
Reporting Units							
Sample Date	Sample Time	Sample Type	Location ID	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty
10/02/24	9:00	G	Trib 01				
10/02/24	9:10	G	Trib 02				
10/02/24	10:05	G	Trib 11				
10/02/24	9:50	G	Trib 22d				
10/02/24	8:20	G	Trib 24				
11/06/24	9:15	G	Trib 01				
11/06/24	9:35	G	Trib 02				
11/06/24	9:45	G	Trib 03				
11/06/24	10:20	G	Trib 04				
11/06/24	8:25	G	Trib 24				
12/04/24	9:05	G	Trib 01				
12/04/24	9:20	G	Trib 02				
12/04/24	9:30	G	Trib 03				
12/04/24	10:25	G	Trib 04				
12/04/24	10:05	G	Trib 22d				
12/04/24	8:25	G	Trib 24				

STANDLEY LAKE																		
Method				SM2550B	SM4500H+B	SM2510B	ASTMD888-09C	SM2580A	ASTMD7315	YSI optical probe	SM 10200-H	SM 10900	Secchi Disk	SM2540D	SM5310C	SM5910B	SM 9223 B	SM4500NH3H
DL				1.0	1.0	10	1.0	1.0	1	1	1	1	0.1	1	0.5	0.001	1	0.01
Max Sig figs				3	3	3	3	3	3	3	3	4	3	3	3	3	3	3
Max decimals				1	1	0	1	0	1	1	1	0	2	0	1	3	0	2
Reporting Units				°C	s.u.	µS/cm	mg/L	mV	NTU	µg/L	µg/L	ct/mL	m	mg/L	mg/L	10 cm <sup>-1</sup>	cfu/100 mL	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Oxygen, Dissolved	ORP, Oxidation Reduction Potential	Turbidity	Chlorophyll a, Field	Chlorophyll a, Lab (Methanol)	Algae Count	Secchi Depth	Solids, Total Suspended	Carbon, Total Organic	UV254	E. coli	Nitrogen, Ammonia (Salicylate)
03/11/24	11:43	G	SL 10-00	5.2	7.9	383	10.6	240	1.4	1.0			6.5					
03/11/24	12:00	G	SL 10-03	5.2	7.9	383	10.7	240	1.4	0.8				< 1	2.1			0.03
03/11/24	12:30	G	SL 10-70	4.5	7.8	400	10.5	240	3.0	2.3				4	2.1	0.3		0.03
03/11/24	11:45	C	SL 10-PZ	4.4	7.9	385	10.7	247	1.7	1.7				2	2.1	0.3		0.03
03/19/24	11:45	G	SL 10-00								1.2	193						
04/08/24	11:43	G	SL 10-03	7.7	8.2	409	9.7	302	3.5	0.8			1.1				< 1	
04/08/24	12:15	G	SL 10-70	7.7	8.2	409	9.6	303	3.5	0.8				3	1.9			0.03
04/08/24	12:35	C	SL 10-PZ	7.3	8.2	410	9.4	300	6.3	3.7				9	1.9	0.3	1.0	0.04
04/08/24	12:20	G	SL 10-00	7.6	8.2	409	9.6	303	3.6	2.2	2.3	231		5	2.2	0.3		0.05
04/22/24	10:10	G	SL 10-03	10.0	8.0	416	8.8	201	1.7	1.2			4.0					
04/22/24	10:20	G	SL 10-70	10.0	8.0	416	8.8	201	1.7	1.3	1.4							0.04
04/22/24	10:26	G	SL 10-70	22.4	7.9	423	8.7	230	2.8	3.4						0.3		0.05
04/22/24	10:15	C	SL 10-PZ	8.8	7.9	287	8.8	220	1.8	3.3	1.4	234				0.3		0.05
05/13/24	11:10	C	SL 10-PZ	12.1	8.2	419	8.9	263	0.8	0.4			5.2				< 1	
05/13/24	11:15	G	SL 10-00	11.9	8.2	419	9.0	265	0.9	0.8	1.6			1	2.3			0.02
05/13/24	11:45	G	SL 10-03	10.5	7.9	420	8.3	298	3.6	1.7				2	2.2	0.3	2.0	0.03
05/13/24	11:30	G	SL 10-70	10.8	8.1	420	8.7	287	1.2	2.4	2.5	109		2	2.3	0.3		0.02
05/28/24	9:55	G	SL 10-70	15.5	8.3	418	8.1	206	1.3	0.6			4.8					
05/28/24	10:10	C	SL 10-PZ	15.3	8.3	417	8.1	207	1.4	1.0	1.2							0.02
05/28/24	10:20	G	SL 10-00	10.8	7.5	426	5.4	262	4.1	0.8						0.3		0.14
05/28/24	10:00	G	SL 10-03	14.0	8.2	420	8.0	230	1.6	1.8	1.6	123				0.3		0.02
06/10/24	11:30	G	SL 10-70	19.7	8.3	405	8.2	278	0.8	0.8			5.8				< 1	
06/10/24	11:50	C	SL 10-PZ	19.2	8.4	405	8.3	277	0.9	0.9				< 1	2.6			0.03
06/10/24	12:00	G	SL 10-00	11.3	7.2	425	4.6	312	3.1	1.0				< 1	2.4	0.3	3.0	0.19
06/10/24	11:40	G	SL 10-03	14.4	7.8	417	7.6	292	1.5	1.5	2.3	75		< 1	2.6	0.4		0.01
06/24/24	10:35	G	SL 10-70	21.9	8.5	392	7.9	257	0.8	1.2			5.8					
06/24/24	10:40	C	SL 10-PZ	21.8	8.5	392	7.9	260	0.9	0.8	1.9							0.01
06/24/24	10:30	G	SL 10-00	11.9	7.2	424	3.2	334	4.7	0.6						0.3		0.18
06/24/24	10:20	G	SL 10-03	15.2	7.6	408	6.6	315	1.8	1.3	2.3	53				0.4		0.03
07/08/24	11:25	G	SL 10-70	21.6	8.4	371	9.2	224		0.9			5.0				< 1	
07/08/24	11:30	C	SL 10-PZ	21.4	8.4	371	9.2	228	1.1	1.1	2.5			< 1	2.3			0.01
07/08/24	11:20	G	SL 10-00	13.0	7.2	421	1.7	316		0.3				5	1.9	0.3	2.0	0.01
07/08/24	11:00	G	SL 10-03								3.3	93		< 1	2.4	0.4		0.01
07/16/24	10:00	G	SL 10-70										5.2					
07/16/24	10:30	C	SL 10-PZ															0.23
07/22/24	9:40	G	SL 10-00	22.6	8.5	365	7.6	215		0.7			5.8					
07/22/24	10:00	G	SL 10-03	22.6	8.5	365	7.6	215		0.7	1.6							0.01
07/22/24	10:15	G	SL 10-70	14.0	7.0	414	1.4	272		0.6						0.3		0.02
07/22/24	9:45	C	SL 10-PZ								2.1	113				0.4		0.01
07/30/24	10:55	G	SL 10-00										5.3					
07/30/24	11:00	G	SL 10-03															0.03
08/06/24	10:25	G	SL 10-03										5.0					
08/06/24	10:30	G	SL 10-70															0.03
08/12/24	12:30	G	SL 10-70	22.9	8.2	347	7.1	339		0.4			3				< 1	
08/12/24	12:50	C	SL 10-PZ	22.1	8.2	360	7.2	336		0.4	1.6			2	2.14			0.01
08/12/24	13:05	C	SL 10-PZ	14.4	6.8	413	0.3	356		< 1				4	1.9	0.296	37	0.08
08/12/24	12:35	G	SL 10-00															
08/20/24	10:25	G	SL 10-70								2.9	103		< 1	2.3	0.312		0.01
08/20/24	10:30	C	SL 10-PZ										5.5					
08/26/24	10:05	G	SL 10-00	22.6	8.3	341	7.5	213		2.2			6.7					0.12
08/26/24	10:20	G	SL 10-03	22.6	8.3	341	7.5	217		2.2								0.01

**STANDLEY LAKE**

Method				SM2550B	SM4500H+B	SM2510B	ASTMD888-09C	SM2580A	ASTMD7315	YSI optical probe	SM 10200-H	SM 10900	Secchi Disk	SM2540D	SM5310C	SM5910B	SM 9223 B	SM4500NH3H
DL				1.0	1.0	10	1.0	1.0	1	1	1	1	0.1	1	0.5	0.001	1	0.01
Max Sig figs				3	3	3	3	3	3	3	3	4	3	3	3	3	3	3
Max decimals				1	1	0	1	0	1	1	1	0	2	0	1	3	0	2
Reporting Units				°C	s.u.	µS/cm	mg/L	mV	NTU	µg/L	µg/L	ct/mL	m	mg/L	mg/L	10 cm <sup>-1</sup>	cfu/100 mL	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Oxygen, Dissolved	ORP, Oxidation Reduction Potential	Turbidity	Chlorophyll a, Field	Chlorophyll a, Lab (Methanol)	Algae Count	Secchi Depth	Solids, Total Suspended	Carbon, Total Organic	UV254	E. coli	Nitrogen, Ammonia (Salicylate)
08/26/24	10:30	G	SL 10-03	15.0	7.0	406	0.3	78	0.5							0.345		0.17
08/26/24	10:15	G	SL 10-70								2.5	70				0.318		0.01
09/03/24	10:55	G	SL 10-70										7.3					
09/03/24	11:00	C	SL 10-PZ															0.22
09/09/24	12:10	C	SL 10-PZ	22.0	8.2	357	7.2	268	0.9				7.7				< 1	
09/09/24	12:25	G	SL 10-00	22.0	8.2	357	7.2	267	1.0	1.2				2	2.62			0.01
09/09/24	12:35	G	SL 10-70	15.1	7.0	407	0.1	332	0.3					4	3.01	0.368	30	0.24
09/09/24	12:15	C	SL 10-PZ								1.4	54		2	3.21	0.318		0.02
09/17/24	9:55	G	SL 10-00										7.3					
09/17/24	10:00	G	SL 10-03															0.31
09/17/24	10:30	G	SL 10-70															
09/23/24	9:55	C	SL 10-PZ	19.8	7.9	349	6.8	261	1.4				7.7					
09/23/24	10:15	G	SL 10-00	19.8	7.9	349	6.7	261	1.3									0.01
09/23/24	10:10	G	SL 10-70	14.9	7.0	409	0.3	202	0.3							0.445		0.36
09/23/24	10:00	C	SL 10-PZ													0.31		< 0.01
09/30/24	9:55	C	SL 10-PZ								2.5	59		7.1				
09/30/24	10:45	G	SL 10-00															0.4
10/07/24	9:45	G	SL 10-03	18.8	7.7	350	6.9	252	1.3								5	
10/07/24	10:05	G	SL 10-03	18.8	7.7	350	6.9	259	1.6	2.7				< 1	1.94			0.01
10/07/24	10:15	G	SL 10-70	15.2	7.0	406	0.6	186	0.4					1	2.21	0.31	163	0.42
10/07/24	9:50	C	SL 10-PZ								2.5	70		< 1	2.09	0.309		< 0.01
10/14/24	11:10	G	SL 10-00															
10/14/24	11:15	G	SL 10-70										4.8					0.5
10/21/24	9:50	C	SL 10-PZ	16.2	7.9	353	7.1	240	2.0									
10/21/24	9:55	G	SL 10-70	16.2	7.9	353	7.1	241	2.5	3.9				1	1.86			0.02
10/21/24	10:15	C	SL 10-PZ	15.9	7.4	368	4.7	262	0.6					3	1.91	0.307		0.07
10/21/24	10:00	G	SL 10-00								3.7	71		4	1.97	0.299		0.02
10/28/24	12:05	G	SL 10-03										5					
10/28/24	12:15	G	SL 10-03															0.01
10/28/24	12:05	G	SL 10-70															
11/12/24	11:15	G	SL 10-70	10.8	8.0	261	8.7	311	1.6				4.7				5	
11/12/24	11:30	G	SL 10-70	10.7	8.1	260	8.7	313	2.4		3.3			< 1	1.9			0.01
11/12/24	11:45	C	SL 10-PZ	10.1	7.9	395	8.2	333	2.0					3	1.88	0.304	147	0.02
11/12/24	11:20	C	SL 10-PZ								3.7	130		< 1	1.98	0.297		0.01
11/25/24	10:00	C	SL 10-PZ	8.0	8.0	366	8.9	232	1.7				4.6					
11/25/24	10:05	G	SL 10-00	8.0	8.0	366	8.9	236	2.1	3.5								0.02
11/25/24	10:31	G	SL 10-03	7.9	7.8	383	8.5	284	2.6									0.03
11/25/24	10:15	G	SL 10-03							2.9		133						0.02

STANDLEY LAKE				SM4500NO31	SM4500NO3	SM4500PE	SM4500PE	SM2340C	EPA300	EPA300	EPA300	EPA 200.8	EPA 200.7r4.4	EPA200.8	EPA200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
Method				0.01	0.03	0.0025	0.0025	10	0.1	5	10	0.002	0.1	0.001	0.001	0.002	0.01	0.003	0.001
DL				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max Sig figs				2	2	4	4	0	1	0	0	5	5	5	5	5	5	5	5
Max decimals				mg/L	mg/L	mg/L	mg/L	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Reporting Units																			
Sample Date	Sample Time	Sample Type	Location ID	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Hardness	Bromide	Chloride	Sulfate	Silica, Dissolved	Silicon, Dissolved	Arsenic, Dissolved	Arsenic, Total	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total
03/11/24	11:43	G	SL 10-00																
03/11/24	12:00	G	SL 10-03	0.03	0.21	< 0.0025	0.0056	144	0.1	47	62								
03/11/24	12:30	G	SL 10-70	0.04	0.24	< 0.0025	0.0089	160	0.1	48	63		0.0025	< 0.1	< 0.001	0.0520	0.0550	< 0.01	< 0.0003
03/11/24	11:45	C	SL 10-PZ	0.03	0.21	< 0.0025	0.0079	160	0.1	45	60		0.0023	< 0.1	< 0.001	0.052	0.055	< 0.01	< 0.0003
03/19/24	11:45	G	SL 10-00																
04/08/24	11:43	G	SL 10-03																
04/08/24	12:15	G	SL 10-70	0.04	0.25	< 0.0025	0.0131		0.1	59	62								
04/08/24	12:35	C	SL 10-PZ	0.04	0.29	< 0.0025	0.0180		0.1	49	62		2.5						
04/08/24	12:20	G	SL 10-00	0.04	0.29	< 0.0025	0.0140		0.1	49	62		2.5						
04/22/24	10:10	G	SL 10-03																
04/22/24	10:20	G	SL 10-70	0.03	0.22	< 0.0025	0.0078												
04/22/24	10:26	G	SL 10-70	0.05	0.28	< 0.0025	0.0100						2.9						
04/22/24	10:15	C	SL 10-PZ	0.03	0.28	0.005	0.0091						2.5						
05/13/24	11:10	C	SL 10-PZ																
05/13/24	11:15	G	SL 10-00	0.03	0.20	< 0.0025	0.0063		0.1	57	68								
05/13/24	11:45	G	SL 10-03	0.05	0.23	< 0.0025	0.0092		0.1	57	68		3						
05/13/24	11:30	G	SL 10-70	0.04	0.22	< 0.0025	0.0076		0.1	56	67		2.8						
05/28/24	9:55	G	SL 10-70																
05/28/24	10:10	C	SL 10-PZ	0.02	0.18	< 0.0025	0.0071												
05/28/24	10:20	G	SL 10-00	0.05	0.37	< 0.0025	0.0155						3.6						
05/28/24	10:00	G	SL 10-03	0.02	0.18	< 0.0025	0.0097						3						
06/10/24	11:30	G	SL 10-70																
06/10/24	11:50	C	SL 10-PZ	0.01	0.16	< 0.0025	0.0071		0.1	56	63								
06/10/24	12:00	G	SL 10-00	0.05	0.44	< 0.0025	0.0120		0.1	58	66		3.9	< 0.1	< 0.001	0.06	0.06	< 0.01	< 0.0003
06/10/24	11:40	G	SL 10-03	0.01	0.25	< 0.0025	0.0085		0.1	55	62		3	< 0.1	< 0.001	0.054	0.0530	< 0.01	< 0.0003
06/24/24	10:35	G	SL 10-70																
06/24/24	10:40	C	SL 10-PZ	< 0.01	0.16	< 0.0025	0.0081												
06/24/24	10:30	G	SL 10-00	0.09	0.42	0.0034	0.0155						4						
06/24/24	10:20	G	SL 10-03	0.01	0.19	< 0.0025	0.0094						3						
07/08/24	11:25	G	SL 10-70																
07/08/24	11:30	C	SL 10-PZ	< 0.01	0.16	< 0.0025	0.0071		0.1	48	58								
07/08/24	11:20	G	SL 10-00	0.25	0.41	0.0045	0.0179		0.1	56	65		5						
07/08/24	11:00	G	SL 10-03	0.01	0.17	< 0.0025	0.0161		0.1	48	57		2						
07/16/24	10:00	G	SL 10-70																
07/16/24	10:30	C	SL 10-PZ	0.41	0.02	0.003	0.0161												
07/22/24	9:40	G	SL 10-00																
07/22/24	10:00	G	SL 10-03	< 0.01	0.18	< 0.0025	0.0063												
07/22/24	10:15	G	SL 10-70	0.22	0.41	0.0053	0.0180						5						
07/22/24	9:45	C	SL 10-PZ	< 0.01	0.20	< 0.0025	0.0096						2.1						
07/30/24	10:55	G	SL 10-00																
07/30/24	11:00	G	SL 10-03	0.23	0.42	< 0.0025	0.0153												
08/06/24	10:25	G	SL 10-03																
08/06/24	10:30	G	SL 10-70	0.23	0.42	< 0.0025	0.0140												
08/12/24	12:30	G	SL 10-70																
08/12/24	12:50	C	SL 10-PZ	< 0.01	0.15	< 0.0025	0.0082		0.1	43	54								
08/12/24	13:05	C	SL 10-PZ	0.15	0.4	< 0.0025	0.0115		0.1	52	58		5.5						
08/12/24	12:35	G	SL 10-00	< 0.01	0.18	< 0.0025	0.0104		0.1	44	53		1.9						
08/20/24	10:25	G	SL 10-70																
08/20/24	10:30	C	SL 10-PZ	0.11	0.39	0.0055	0.0179												
08/26/24	10:05	G	SL 10-00																
08/26/24	10:20	G	SL 10-03	< 0.01	0.15	< 0.0025	0.0059												

**STANDLEY LAKE**

Method				SM4500NO31	SM4500NO3	SM4500PE	SM4500PE	SM2340C	EPA300	EPA300	EPA300	EPA 200.8	EPA 200.7r4.4	EPA200.8	EPA200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8
DL				0.01	0.03	0.0025	0.0025	10	0.1	5	10	0.002	0.1	0.001	0.001	0.002	0.01	0.0003	0.001
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Max decimals				2	2	4	4	0	1	0	0	5	5	5	5	5	5	5	5
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Hardness	Bromide	Chloride	Sulfate	Silica, Dissolved	Silicon, Dissolved	Arsenic, Dissolved	Arsenic, Total	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total
08/26/24	10:30	G	SL 10-03	0.08	0.39	0.0141	0.0375					6							
08/26/24	10:15	G	SL 10-70	0.02	0.19	< 0.0025	0.0091					2.3							
09/03/24	10:55	G	SL 10-70																
09/03/24	11:00	C	SL 10-PZ	0.05	0.46	0.0255	0.0674												
09/09/24	12:10	C	SL 10-PZ																
09/09/24	12:25	G	SL 10-00	0.01	0.18	< 0.0025	0.0063		0.1	44	53								
09/09/24	12:35	G	SL 10-70	< 0.01	0.44	0.0285	0.077		0.1	51	55	6.3		0.001	0.0012	0.053	0.054	< 0.01	< 0.0003
09/09/24	12:15	C	SL 10-PZ	< 0.01	0.29	< 0.0025	0.0086		0.1	43	52	2.4		< 0.1	< 0.001	0.05	0.05	< 0.01	< 0.0003
09/17/24	9:55	G	SL 10-00																
09/17/24	10:00	G	SL 10-03	0.5	< 0.03														
09/17/24	10:30	G	SL 10-70			0.0735	0.145												
09/23/24	9:55	C	SL 10-PZ																
09/23/24	10:15	G	SL 10-00	< 0.01	0.17	< 0.0025	0.0047												
09/23/24	10:10	G	SL 10-70	< 0.01	0.63	0.0604	0.145					7.1							
09/23/24	10:00	C	SL 10-PZ	< 0.01	0.19	< 0.0025	0.0091					2.5							
09/30/24	9:55	C	SL 10-PZ																
09/30/24	10:45	G	SL 10-00	< 0.01	0.64	0.0768	0.147												
10/07/24	9:45	G	SL 10-03																
10/07/24	10:05	G	SL 10-03	< 0.01	0.11	< 0.0025	0.0183		0.1	42	53								
10/07/24	10:15	G	SL 10-70	< 0.01	0.6	0.0884	0.12		0.1	49	51	7.6							
10/07/24	9:50	C	SL 10-PZ	< 0.01	0.15	< 0.0025	0.0159		0.1	43	51	2.9							
10/14/24	11:10	G	SL 10-00																
10/14/24	11:15	G	SL 10-70	< 0.01	0.73	0.1054	0.148												
10/21/24	9:50	C	SL 10-PZ																
10/21/24	9:55	G	SL 10-70	< 0.01	0.16	0.0075	0.0117		0.1	45	55								
10/21/24	10:15	C	SL 10-PZ	< 0.01	0.24	0.0132	0.0212		0.1	44	54	3.7		< 0.1	< 0.001	0.052	0.053	< 0.01	< 0.0003
10/21/24	10:00	G	SL 10-00	< 0.01	0.21	< 0.0025	0.0117		0.1	44	54	3.2		< 0.1	< 0.001	0.052	0.051	< 0.01	< 0.0003
10/28/24	12:05	G	SL 10-03																
10/28/24	12:15	G	SL 10-03	< 0.01	0.17	< 0.0025	0.0159												
10/28/24	12:05	G	SL 10-70																
11/12/24	11:15	G	SL 10-70																
11/12/24	11:30	G	SL 10-70	< 0.01	0.16	< 0.0025	0.007		0.1	43	54								
11/12/24	11:45	C	SL 10-PZ	0.02	0.17	0.0032	0.0121		0.1	49	56	3.5							
11/12/24	11:20	C	SL 10-PZ	< 0.01	0.17	< 0.0025	0.0093		0.1	43	53	3							
11/25/24	10:00	C	SL 10-PZ																
11/25/24	10:05	G	SL 10-00	< 0.01	0.16	< 0.0025	0.0096												
11/25/24	10:31	G	SL 10-03	0.02	0.19	< 0.0025	0.0126					3.6							
11/25/24	10:15	G	SL 10-03	< 0.01	0.19	< 0.0025	0.0091					3							

**STANDLEY LAKE**

Method				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8		
DL				0.0005	0.001	0.0009	0.0009	0.001	0.01	0.01	0.01	0.0005	0.001	0.002	0.002	0.0001	0.002	0.002		
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
Max decimals				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
Sample Date	Sample Time	Sample Type	Location ID	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Manganese, Dissolved	Manganese, Total	Mercury, Total	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	
03/11/24	11:43	G	SL 10-00																	
03/11/24	12:00	G	SL 10-03																	
03/11/24	12:30	G	SL 10-70	0.0005	0.0005	0.0009	0.0009	0.0013	0.0016	0.0100	0.0740	< 0.01	< 0.0005	0.0270	0.0340	0.0001	0.0028	0.0028	0.0011	
03/11/24	11:45	C	SL 10-PZ	< 0.001	< 0.0005	< 0.001	< 0.0009	0.0032	0.0014	0.01	0.039	< 0.01	< 0.0005	0.002	0.0025	0.0001	0.0028	0.0029	0.0012	
03/19/24	11:45	G	SL 10-00																	
04/08/24	11:43	G	SL 10-03																	
04/08/24	12:15	G	SL 10-70																	
04/08/24	12:35	C	SL 10-PZ																	
04/08/24	12:20	G	SL 10-00																	
04/22/24	10:10	G	SL 10-03																	
04/22/24	10:20	G	SL 10-70																	
04/22/24	10:26	G	SL 10-70																	
04/22/24	10:15	C	SL 10-PZ																	
05/13/24	11:10	C	SL 10-PZ																	
05/13/24	11:15	G	SL 10-00																	
05/13/24	11:45	G	SL 10-03																	
05/13/24	11:30	G	SL 10-70																	
05/28/24	9:55	G	SL 10-70																	
05/28/24	10:10	C	SL 10-PZ																	
05/28/24	10:20	G	SL 10-00																	
05/28/24	10:00	G	SL 10-03																	
06/10/24	11:30	G	SL 10-70																	
06/10/24	11:50	C	SL 10-PZ																	
06/10/24	12:00	G	SL 10-00	< 0.001	< 0.0005	< 0.001	< 0.0009	0.0011	0.0011	< 0.01	0.1	< 0.01	< 0.0005	0.17	0.2	< 0.002	0.0027	0.0028	0.0011	
06/10/24	11:40	G	SL 10-03	< 0.001	< 0.0005	< 0.001	< 0.0009	0.0019	0.0016	< 0.01	0.048	< 0.01	< 0.0005	< 0.001	0.0083	< 0.002	0.0027	0.0026	0.001	
06/24/24	10:35	G	SL 10-70																	
06/24/24	10:40	C	SL 10-PZ																	
06/24/24	10:30	G	SL 10-00																	
06/24/24	10:20	G	SL 10-03																	
07/08/24	11:25	G	SL 10-70																	
07/08/24	11:30	C	SL 10-PZ																	
07/08/24	11:20	G	SL 10-00																	
07/08/24	11:00	G	SL 10-03																	
07/16/24	10:00	G	SL 10-70																	
07/16/24	10:30	C	SL 10-PZ											0.0029	0.09					
07/22/24	9:40	G	SL 10-00																	
07/22/24	10:00	G	SL 10-03																	
07/22/24	10:15	G	SL 10-70																	
07/22/24	9:45	C	SL 10-PZ																	
07/30/24	10:55	G	SL 10-00																	
07/30/24	11:00	G	SL 10-03											< 0.001	0.16					
08/06/24	10:25	G	SL 10-03																	
08/06/24	10:30	G	SL 10-70											0.28	0.47					
08/12/24	12:30	G	SL 10-70																	
08/12/24	12:50	C	SL 10-PZ																	
08/12/24	13:05	C	SL 10-PZ																	
08/12/24	12:35	G	SL 10-00																	
08/20/24	10:25	G	SL 10-70																	
08/20/24	10:30	C	SL 10-PZ											0.76	0.82					
08/26/24	10:05	G	SL 10-00																	
08/26/24	10:20	G	SL 10-03																	

**STANDLEY LAKE**

Method				EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	
DL				0.0005	0.001	0.0009	0.0009	0.001	0.01	0.01	0.01	0.0005	0.001	0.002	0.002	0.0001	0.002	0.002	0.001	
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Max decimals				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Sample Date	Sample Time	Sample Type	Location ID	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Manganese, Dissolved	Manganese, Total	Mercury, Total	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	
08/26/24	10:30	G	SL 10-03																	
08/26/24	10:15	G	SL 10-70																	
09/03/24	10:55	G	SL 10-70																	
09/03/24	11:00	C	SL 10-PZ											1.2	1.3					
09/09/24	12:10	C	SL 10-PZ																	
09/09/24	12:25	G	SL 10-00																	
09/09/24	12:35	G	SL 10-70	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	< 0.01	0.3	< 0.01	< 0.0005	1.2	1.2	< 0.002	0.0035	0.0034	0.001	
09/09/24	12:15	C	SL 10-PZ	< 0.001	< 0.0005	< 0.001	< 0.0009	0.0012	0.0011	< 0.01	0.026	< 0.01	< 0.0005	0.0034	0.012	< 0.002	0.0028	0.0027	< 0.002	
09/17/24	9:55	G	SL 10-00																	
09/17/24	10:00	G	SL 10-03											1.4	1.2					
09/17/24	10:30	G	SL 10-70																	
09/23/24	9:55	C	SL 10-PZ																	
09/23/24	10:15	G	SL 10-00																	
09/23/24	10:10	G	SL 10-70																	
09/23/24	10:00	C	SL 10-PZ																	
09/30/24	9:55	C	SL 10-PZ																	
09/30/24	10:45	G	SL 10-00											1.6	1.7					
10/07/24	9:45	G	SL 10-03																	
10/07/24	10:05	G	SL 10-03																	
10/07/24	10:15	G	SL 10-70																	
10/07/24	9:50	C	SL 10-PZ																	
10/14/24	11:10	G	SL 10-00																	
10/14/24	11:15	G	SL 10-70											2.3	2.3					
10/21/24	9:50	C	SL 10-PZ																	
10/21/24	9:55	G	SL 10-70																	
10/21/24	10:15	C	SL 10-PZ	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	< 0.01	0.11	< 0.01	< 0.0005	0.24	0.27	< 0.002	0.003	0.0031	< 0.002	
10/21/24	10:00	G	SL 10-00	< 0.001	< 0.0005	< 0.001	< 0.0009	< 0.0009	< 0.001	< 0.01	0.075	< 0.01	< 0.0005	0.034	0.051	< 0.002	0.003	0.0029	< 0.002	
10/28/24	12:05	G	SL 10-03																	
10/28/24	12:15	G	SL 10-03											0.08	0.1					
10/28/24	12:05	G	SL 10-70																	
11/12/24	11:15	G	SL 10-70																	
11/12/24	11:30	G	SL 10-70																	
11/12/24	11:45	C	SL 10-PZ																	
11/12/24	11:20	C	SL 10-PZ																	
11/25/24	10:00	C	SL 10-PZ																	
11/25/24	10:05	G	SL 10-00																	
11/25/24	10:31	G	SL 10-03																	
11/25/24	10:15	G	SL 10-03																	

**STANDLEY LAKE**

Method				EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 901.1	EPA 901.1	EPA 901.1	EPA 901.1	
DL				0.005	0.002	0.002	0.0005	0.0005	0.002	0.002	0.002	0.002	0.005	0.005	variable	variable	variable	variable		
Max Sig figs				3	3	3	3	3	3	3	3	3	3	3	2	2	2	2		
Max decimals				5	5	5	5	5	5	5	5	5	5	5	1	1	1	1		
Reporting Units				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	pCi/L		
Sample Date	Sample Time	Sample Type	Location ID	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Strontium, Dissolved	Strontium, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty		
03/11/24	11:43	G	SL 10-00												2.2	2.3	3	2.7		
03/11/24	12:00	G	SL 10-03																	
03/11/24	12:30	G	SL 10-70	0.0011	< 0.005	< 0.002	< 0.002	< 0.0005	0.2300	0.2300			< 0.002	< 0.002	0.0120	0.0150	0.8	1.9	2.9	2.6
03/11/24	11:45	C	SL 10-PZ	0.0011	< 0.005	< 0.002	< 0.002	< 0.0005	0.22	0.23			< 0.002	< 0.002	0.001	0.0012	2.6	2.4	2.8	2.5
03/19/24	11:45	G	SL 10-00																	
04/08/24	11:43	G	SL 10-03																	
04/08/24	12:15	G	SL 10-70																	
04/08/24	12:35	C	SL 10-PZ																	
04/08/24	12:20	G	SL 10-00																	
04/22/24	10:10	G	SL 10-03																	
04/22/24	10:20	G	SL 10-70																	
04/22/24	10:26	G	SL 10-70																	
04/22/24	10:15	C	SL 10-PZ																	
05/13/24	11:10	C	SL 10-PZ																	
05/13/24	11:15	G	SL 10-00																	
05/13/24	11:45	G	SL 10-03																	
05/13/24	11:30	G	SL 10-70																	
05/28/24	9:55	G	SL 10-70																	
05/28/24	10:10	C	SL 10-PZ																	
05/28/24	10:20	G	SL 10-00																	
05/28/24	10:00	G	SL 10-03																	
06/10/24	11:30	G	SL 10-70																	
06/10/24	11:50	C	SL 10-PZ																	
06/10/24	12:00	G	SL 10-00	0.0011	< 0.005	< 0.002	< 0.002	< 0.0005	0.24	0.24			< 0.002	< 0.002	0.014	0.016				
06/10/24	11:40	G	SL 10-03	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	0.23	0.22			< 0.002	< 0.002	0.0067	0.0083				
06/24/24	10:35	G	SL 10-70																	
06/24/24	10:40	C	SL 10-PZ																	
06/24/24	10:30	G	SL 10-00																	
06/24/24	10:20	G	SL 10-03																	
07/08/24	11:25	G	SL 10-70																	
07/08/24	11:30	C	SL 10-PZ																	
07/08/24	11:20	G	SL 10-00																	
07/08/24	11:00	G	SL 10-03																	
07/16/24	10:00	G	SL 10-70																	
07/16/24	10:30	C	SL 10-PZ																	
07/22/24	9:40	G	SL 10-00																	
07/22/24	10:00	G	SL 10-03																	
07/22/24	10:15	G	SL 10-70																	
07/22/24	9:45	C	SL 10-PZ																	
07/30/24	10:55	G	SL 10-00																	
07/30/24	11:00	G	SL 10-03																	
08/06/24	10:25	G	SL 10-03																	
08/06/24	10:30	G	SL 10-70																	
08/12/24	12:30	G	SL 10-70																	
08/12/24	12:50	C	SL 10-PZ																	
08/12/24	13:05	C	SL 10-PZ																	
08/12/24	12:35	G	SL 10-00																	
08/20/24	10:25	G	SL 10-70																	
08/20/24	10:30	C	SL 10-PZ																	
08/26/24	10:05	G	SL 10-00																	
08/26/24	10:20	G	SL 10-03																	

STANDLEY LAKE				EPA 200.8	EPA 200.8	EPA 200.8	PA 200.7 Rev 4	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 200.8	EPA 901.1	EPA 901.1	EPA 901.1	EPA 901.1
Method				0.005	0.002	0.002	0.0005	0.0005	0.002	0.002	0.002	0.002	0.005	0.005	variable	variable	variable	variable
DL				3	3	3	3	3	3	3	3	3	3	3	2	2	2	2
Max Sig figs				5	5	5	5	5	5	5	5	5	5	5	1	1	1	1
Max decimals				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	pCi/L
Reporting Units																		
Sample Date	Sample Time	Sample Type	Location ID	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Strontium, Dissolved	Strontium, Total	Vanadium, Dissolved	Vanadium, Total	Zinc, Dissolved	Zinc, Total	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty
08/26/24	10:30	G	SL 10-03															
08/26/24	10:15	G	SL 10-70															
09/03/24	10:55	G	SL 10-70															
09/03/24	11:00	C	SL 10-PZ															
09/09/24	12:10	C	SL 10-PZ															
09/09/24	12:25	G	SL 10-00															
09/09/24	12:35	G	SL 10-70	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	0.22	0.22	< 0.002	< 0.002	0.0058	0.0061				
09/09/24	12:15	C	SL 10-PZ	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	0.2	0.2	< 0.002	< 0.002	< 0.002	< 0.005				
09/17/24	9:55	G	SL 10-00															
09/17/24	10:00	G	SL 10-03															
09/17/24	10:30	G	SL 10-70															
09/23/24	9:55	C	SL 10-PZ															
09/23/24	10:15	G	SL 10-00															
09/23/24	10:10	G	SL 10-70															
09/23/24	10:00	C	SL 10-PZ															
09/30/24	9:55	C	SL 10-PZ															
09/30/24	10:45	G	SL 10-00															
10/07/24	9:45	G	SL 10-03															
10/07/24	10:05	G	SL 10-03															
10/07/24	10:15	G	SL 10-70															
10/07/24	9:50	C	SL 10-PZ															
10/14/24	11:10	G	SL 10-00															
10/14/24	11:15	G	SL 10-70															
10/21/24	9:50	C	SL 10-PZ															
10/21/24	9:55	G	SL 10-70															
10/21/24	10:15	C	SL 10-PZ	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	0.2	0.21	< 0.002	< 0.002	< 0.002	< 0.005				
10/21/24	10:00	G	SL 10-00	< 0.001	< 0.005	< 0.002	< 0.002	< 0.0005	0.2	0.2	< 0.002	< 0.002	< 0.002	< 0.005				
10/28/24	12:05	G	SL 10-03															
10/28/24	12:15	G	SL 10-03															
10/28/24	12:05	G	SL 10-70															
11/12/24	11:15	G	SL 10-70															
11/12/24	11:30	G	SL 10-70															
11/12/24	11:45	C	SL 10-PZ															
11/12/24	11:20	C	SL 10-PZ															
11/25/24	10:00	C	SL 10-PZ															
11/25/24	10:05	G	SL 10-00															
11/25/24	10:31	G	SL 10-03															
11/25/24	10:15	G	SL 10-03															