Clear Creek / Standley Lake Watershed Agreement

2012 Annual Report

August 16, 2013

Clear Creek Watershed Annual Report – 2012

August 16, 2013

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 Central
City of Golden
City of Idaho Springs
City of Northglenn
City of Thornton
City of Westminster
Clear Creek County
Clear Creek Skiing Corporation
Clear Creek Watershed Foundation
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

Prepared by:
Christine Hawley, Jean Marie Boyer, and Aleah Sommers
Hydros Consulting Inc.
1731 15th Street, Suite 103
Boulder, CO 80302

Table of Contents

Cover photograph compliments of the City of Westminster

List of Figures

List of Tables

List of Acronyms and Abbreviations

BHCCSD – Black Hawk/Central City Sanitation District

BMP – Best management practice

BNR – Biological nutrient removal

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

CC40 – Clear Creek Sampling Station: Clear Creek near Kermits (US-6 and I-70)

CC50 – Clear Creek Sampling Station: North Fork of Clear Creek at Mouth

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

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

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

CCAST11 – Farmers' Highline Canal Autosampler Station: Inflow to Standley Lake

CCAST27 – Church Ditch Autosampler Station: Inflow to Standley Lake

CCWF – Clear Creek Watershed Foundation

CDOT – Colorado Department of Transportation

CDPHE – Colorado Department of Public Health and Environment

Chl *a* – Chlorophyll *a*

Church – Church Ditch

Croke – Croke Canal

DBP – Disinfection By-Product

DEA – Drug Enforcement Administration

DO – Dissolved oxygen

EPA – U.S. Environmental Protection Agency

EWM – Eurasian Watermilfoil

FHL – Farmers' High Line Canal

I-70 – U.S. Interstate 70

KDPL – Kinnear Ditch Pipeline

MGD – Millions of gallons per day

NPDES – National Pollution Discharge Elimination System

ORP – Oxidation/Reduction Potential

OWTS – Onsite Wastewater Treatment System

SCADA – Supervisory Control and Data Acquisition

SCAP - Sediment Control Action Plan

SH119 – State Highway 119

SL10 – Standley Lake sampling location at WTP intake

TIN – Total inorganic nitrogen

TN – Total nitrogen

TOC – Total organic carbon

TP – Total phosphorus

TSS – Total suspended solids

UCCWA – Upper Clear Creek Watershed Association

USGS – United States Geological Survey

WWTP – Wastewater Treatment Plant

Executive Summary

ES-1. Introduction

Standley Lake is an off-channel, municipal and agricultural reservoir located in Jefferson County. This 43,000 acre-foot reservoir is a direct-use drinking water supply for over 250,000 consumers in the downstream cities of Northglenn, Westminster, and Thornton. In addition, the reservoir provides water to farms located in Adams and Weld counties and recreational opportunities. The Standley Lake watershed consists of 400 square miles of the upper Clear Creek watershed (the Upper Basin) and lands draining into the three Clear Creek delivery canals (the Canal Zone), as well as the lake's relatively small direct watershed. Figure ES-1 shows Standley Lake, the Upper Basin, and the Canal Zone.

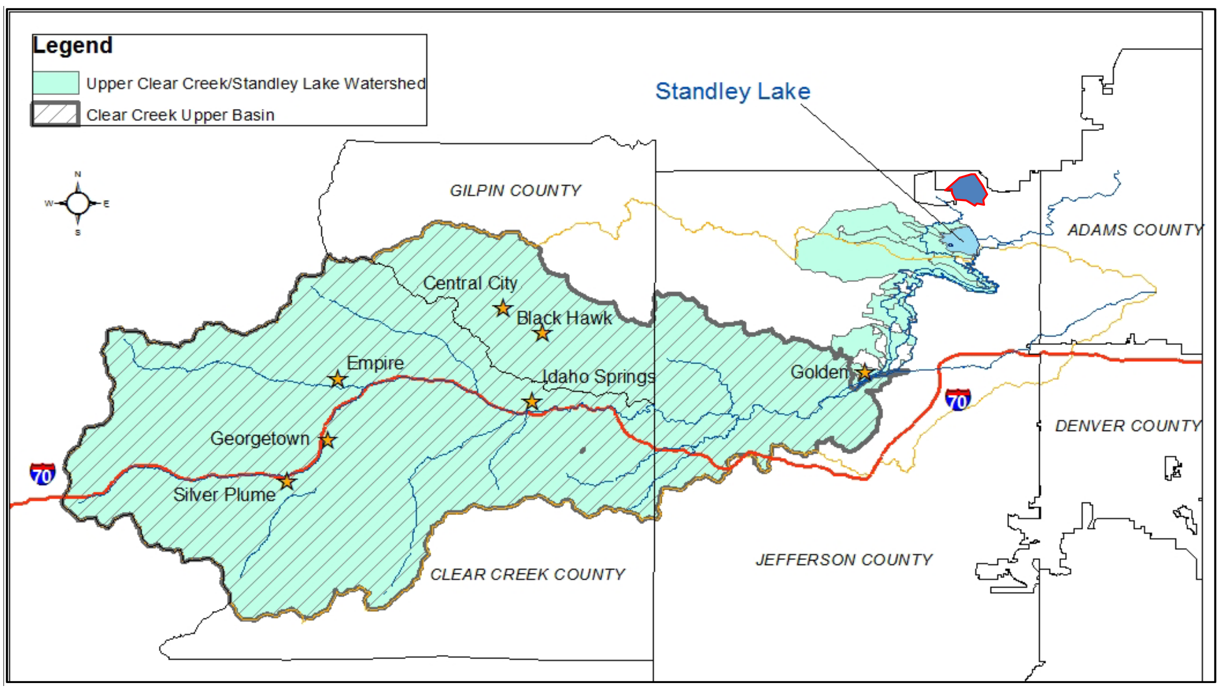


Figure ES-1. Standley Lake Watershed

The Upper Basin contains nine wastewater treatment plants (WWTPs) serving the local population and resorts. Additionally, the Upper Basin contains operating and abandoned mines, and trans-mountain diversions. The Upper Basin also has nonpoint sources, including numerous onsite wastewater treatment systems (OWTS), application of roadway deicers and traction sands, and residential and commercial stormwater runoff.

In 1993, the Clear Creek/Standley Lake Watershed Agreement (1993 Agreement) was signed to address certain water-quality issues and concerns within the Clear Creek watershed – specifically as they affect the water quality of Standley Lake. In accordance with the annual reporting obligations set forth in the

1993 Agreement, an overview of monitoring, activities and accomplishments protective of water quality, and 2012 observed wastewater treatment plant, Clear Creek, and Standley Lake water quality is presented in this report.

ES-2. 2012 Monitoring Activities

Flow and water-quality samples are collected in Standley Lake and at numerous stations throughout the watershed to monitor the concentrations and loading of nutrients, select metals, and other key constituents. Standley Lake is monitored throughout the year when ice is off the lake. Daily lake profiles are taken, and bi-monthly grab samples are also collected at three depths (at the surface, in the photic zone, and in the hypolimnion). In 2012, a total of 70 grab samples were collected from the lake and analyzed for 19 to 57 parameters, depending on the sampling event, in addition to algal speciation.

Upper Basin and Canal Zone monitoring for water quality includes grab sampling and the use of autosamplers. There has been a shift in recent years toward an increased use of autosamplers over grab sampling in the Upper Basin. The 24-hour composite samples collected by autosamplers provide a better measure of average water quality on the date of sampling, as compared to grab samples. In addition to collecting 24-hour ambient samples, the autosamplers are also used to collect specific storm-triggered event samples. A total of 160 grab samples, 58 ambient autosampler samples, and 18 event-triggered autosampler samples were collected in the Upper Basin and Canal Zone in 2012. Table ES-1 summarizes sample counts in 2012 by sample type and portion of the watershed.

Table ES-1. Number of Samples Collected and Number of Sampling Locations in the Upper Basin and in the Canal Zone, 2012

	Grab Samples		24-hour Ambient Auto-Samples		Storm Event-Triggered Auto-Samples	
	Number of Samples	Number of Locations	Number of Samples	Number of Locations	Number of Samples	Number of Locations
Upper Basin	83	16	52	4	12	3
Canal Zone	77	9	6	4	6	2

ES-3. 2012 Activities and Accomplishments

In 2012, members of the UCCWA, Standley Lake Cities, and all parties to the 1993 Agreement continued to work diligently to monitor, improve, and protect water quality. These efforts included:

- WWTP operational improvements;
- Addressing illicit discharges, emergency response, nonpoint sources, and abandoned mines;
- Conducting public education and outreach; and
- Planning and modeling investigations.

Highlights of this work are presented below. This is not a complete list, and additional important activities and details are presented in the main report.

Wastewater Treatment Plant Improvements

- The City of Idaho Springs overhauled the chlorine contact chamber gate valve in its WWTP to allow complete isolation of the two chambers for cleaning the sludge from the bottom, helping to keep solids from entering Clear Creek.
- The City of Idaho Springs enhanced staff training and supervision to improve operations and effluent water quality.
- Black Hawk Central City Sanitation District began planning improvements to its tertiary filtration. Planning was also conducted for a new chemical addition process with coagulation/flocculation to be added to reduce soluble reactive phosphorus following final clarification.

Efforts to Control Illicit Discharges, Emergency Response, Nonpoint Sources, and Abandoned Mines

- In 2012, the City of Golden responded to 34 reports of discharges or potential discharges to the storm sewer system, issuing 15 written warnings, 17 verbal warnings and billing two parties for clean-up costs.
- Through the City of Golden's Stormwater Maintenance Program, 210 inspections of permanent water-quality BMPs were conducted. The City of Golden also conducted 364 erosion and sediment control inspections and continued to perform water-quality improvements to existing drainage structures.
- The Clear Creek Office of Emergency Management continued to maintain and update the database for the call lists for its Code Red emergency call-down system. In 2012, the Clear Creek Office of Emergency Management did not launch any calls; however, the City of Golden Dispatch Center launched 5 calls for incidents within its jurisdiction impacting Clear Creek.
- The Colorado Department of Transportation (CDOT) restored a full mile of North Clear Creek and built a sediment basin to catch sand used on the highway.
- The Clear Creek County Environmental Health Department issued 24 OWTS permits in 2012 and continued monitoring existing systems for failure.
- The Clear Creek Watershed Foundation completed two erosion and sediment control projects to mitigate mine drainage runoff at the Lion Creek/Minnesota Mine north of Empire and Trail Creek near Idaho Springs. Additionally, a re-vegetation project was completed for a wetlands demonstration area near Georgetown.

Public Education, Outreach, and Partnerships

- The Clear Creek Watershed Foundation organized and hosted the fourth annual Clear Creek Watershed Festival in September 2012. The event held in Central Idaho Springs included more than 30 environmental education booths.
- Over 1,100 students, teachers and parents from the water service areas of Thornton, Northglenn, and Westminster participated in the annual Youth Water Festival at Front Range Community College in Westminster (held on May 15, 2012).

- The Clear Creek County Transfer Station sponsored three Household Hazardous Waste Collection events, collecting a total of 5,640 units of material.
- Staff from the City of Golden's Stormwater Program distributed educational materials and attended/hosted public events, including the Waterwise Seminar, the Golden Flower Show, and Greener Golden.
- The City of Golden continued funding for the Rooney Road Recycling Center, which provides critical recycling and disposal services of household chemicals and annually serves more than 3,000 Jefferson County residents.
- The Drug Enforcement Administration (DEA) sponsored National Pharmaceutical Take-Back Days in 2012. The City of Arvada collected 1,224 pounds of medications, the City of Golden collected 167 pounds, and the Standley Lake Cities collected 1,167 pounds.

Planning and Modeling Investigations

- The Upper Clear Creek Watershed Association and the Standley Lake Cities provided funding toward completion of the Clear/Bear Creek Wildfire/Watershed Assessment Report developed by JW Associates Inc. The report presents priority maps and zones of concern along with identification and prioritization of measures to protect critical water supplies in the event of a wildfire.
- The Standley Lake Cities funded an update and refinement of the Standley Lake Water-Quality Model, which serves as a useful tool for ongoing management of the lake.
- CDOT continued work on the Clear Creek Sediment Control Action Plan, which will be incorporated into future capital projects along the I-70 corridor within Clear Creek County, and may include sediment basins or other structures to collect sediment.

ES-4. 2012 Observed Flow and Water Quality

To assess conditions in 2012 in Clear Creek and in Standley Lake, flow and water-quality records for 2012 were reviewed and compared to the previous five years of record (2007-2011). The water-quality analysis focused on total suspended solids (TSS), total nitrogen (TN), and total phosphorus (TP). In addition, chlorophyll *a*, Secchi depth, and dissolved oxygen were assessed in the lake. In the Upper Clear Creek Basin, data analyses focused on results from Clear Creek near the Upper Basin at Lawson (CCAS26/CC26) and near the downstream end of the Upper Basin (CCAS59/CC60) located near the canal diversion points to Standley Lake. In this report, water-quality analyses of Standley Lake focused on results from sampling location SL10, near the deepest part of the lake. Highlights of findings from these analyses are presented below.

2012 Runoff Flow Rates

Flow rates in 2012 were low relative to the recent record due to low snowpack. Annual hydrographs for CC60 (located near the downstream end of the Upper Basin) are presented in Figure ES-2. In 2012, runoff from snowmelt peaked in early June, and a later and higher peak occurred in July. The July 7 peak was in response to storms that produced 1.6 inches of rain in a single day in the Upper Basin near Georgetown and 2.7 inches in 3 days near Golden (July 6-8). Annual total flow volumes at CC60 in 2012 were 53% below the average of the preceding five years.

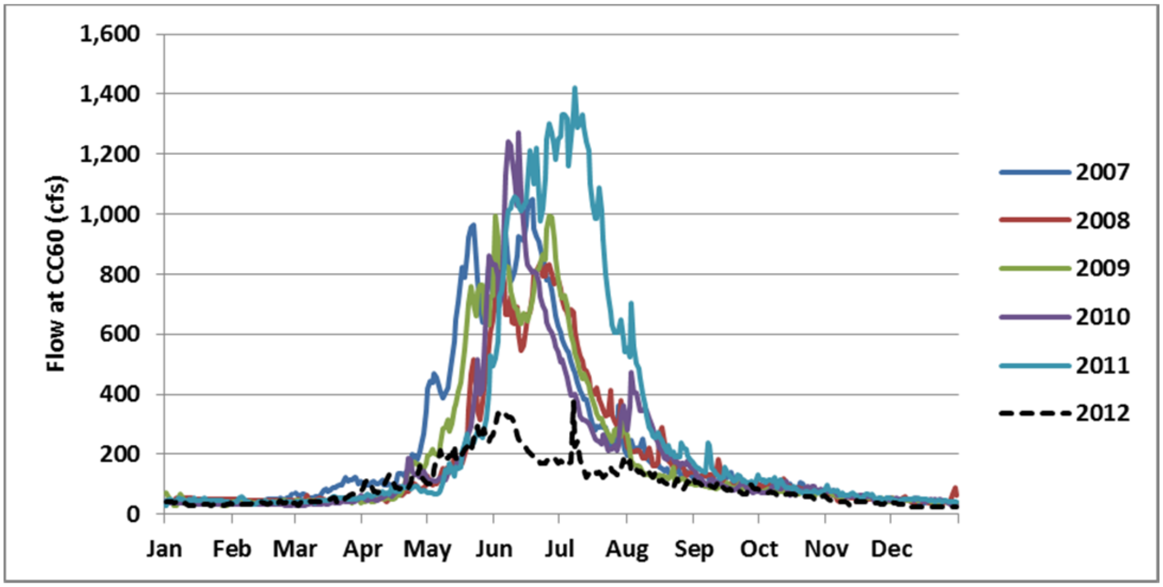


Figure ES-2. Annual Hydrographs for 2007-2012 Near the Downstream End of the Upper Basin (CC60)

WWTP Effluent Concentrations

The WWTPs in the Clear Creek watershed continued efforts in 2012 to reduce nutrient discharges. A summary of 2012 TP and TN effluent data from the nine WWTPs in the watershed, as measured by the Upper Clear Creek/Standley Lake Monitoring Program, is presented in Table ES-2.

Table ES-2. Summary of Total Phosphorus and Total Nitrogen Concentrations in Wastewater Treatment Plant Effluent, 2012 (Grab Samples)

	Total Phosphorus (mg/L)			Total Nitrogen (mg/L)		
WWTP	Min	Max	Average	Min	Max	Average
Loveland Ski Area*	-	-	0.29	-	-	11.40
Georgetown	0.02	0.06	0.05	3.10	10.00	6.15
Empire*	-	-	0.32	-	-	7.60
Central Clear Creek	0.43	3.16	1.71	7.90	24.00	15.10
St. Mary's*	-	-	0.67	-	-	4.00
Idaho Springs	1.21	1.58	1.40	4.50	5.10	4.80
Black Hawk / Central City	0.09	0.13	0.11	3.70	9.10	6.73
Henderson Mine*	-	-	0.02	-	-	2.50
Eisenhower Tunnel	0.22	0.76	0.49	2.00	6.50	4.25

*Only one data point for 2012, so Min and Max not restated.

Total Suspended Solids and Nutrients in Clear Creek

In 2012, average TSS, TP, and TN concentrations in Clear Creek were lower than averages from the previous five years. This is expected to be a reflection of the reduced transport of solids due to low runoff rates. The combined set of observations from the CCAS59 and CC60, which are located on Clear Creek near the diversion points for the three main canals that bring water to Standley Lake, is presented in Figure ES-3.

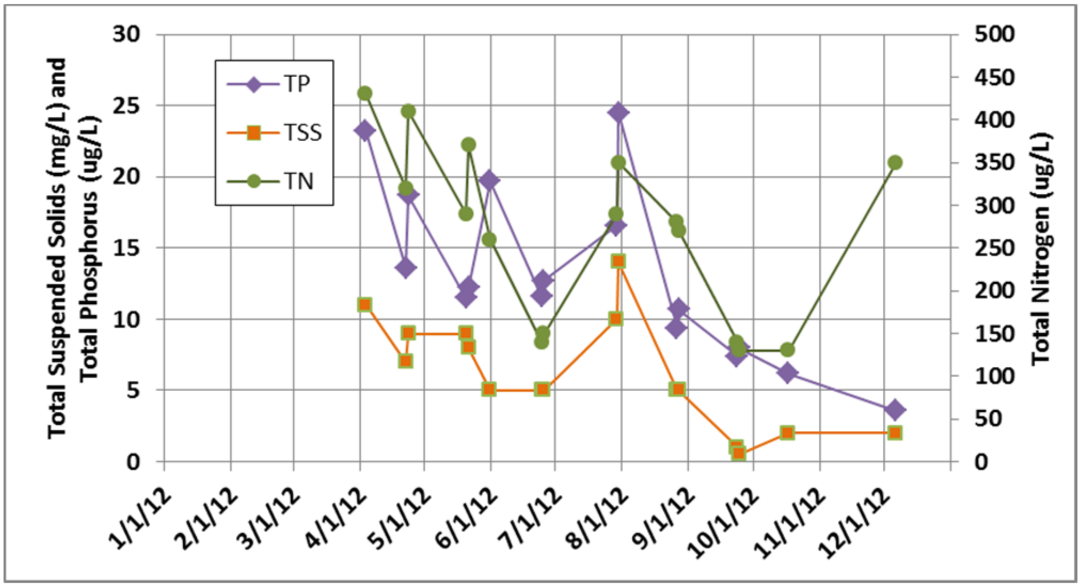


Figure ES-3. Total Suspended Solids and Nutrient Concentrations in the Upper Basin at CC60/CCAS59, as Measured by Grab Samples and 24-Hour Ambient Autosampler Data, 2012

The analysis of data indicates that 2012 loads of TSS, TP, and TN in Clear Creek were lower than the 2007-2011 average values, reflecting the sharp decrease in flow rates. Further, average volume-weighted concentrations of TSS, TP, and TN were also lower in 2012 in Clear Creek as compared to the average of the previous five years.

Inflow and Loading into Standley Lake

The total inflow volume to Standley Lake in 2012 was 22% lower than the 2007-2011 average. In 2012, a greater percentage of the inflow into Standley Lake came through the Kinnear Ditch Pipeline (KDPL) – 11% in 2012, as compared to an average of 3% from 2007-2011. This increase from KDPL largely mirrors a decrease in inflows from Farmers' High Line Canal of 26%, relative to the average of the previous five years. Figure ES-4 presents total annual inflow and outflow volumes for 2007-2012 as well as 2007-2011 averages.

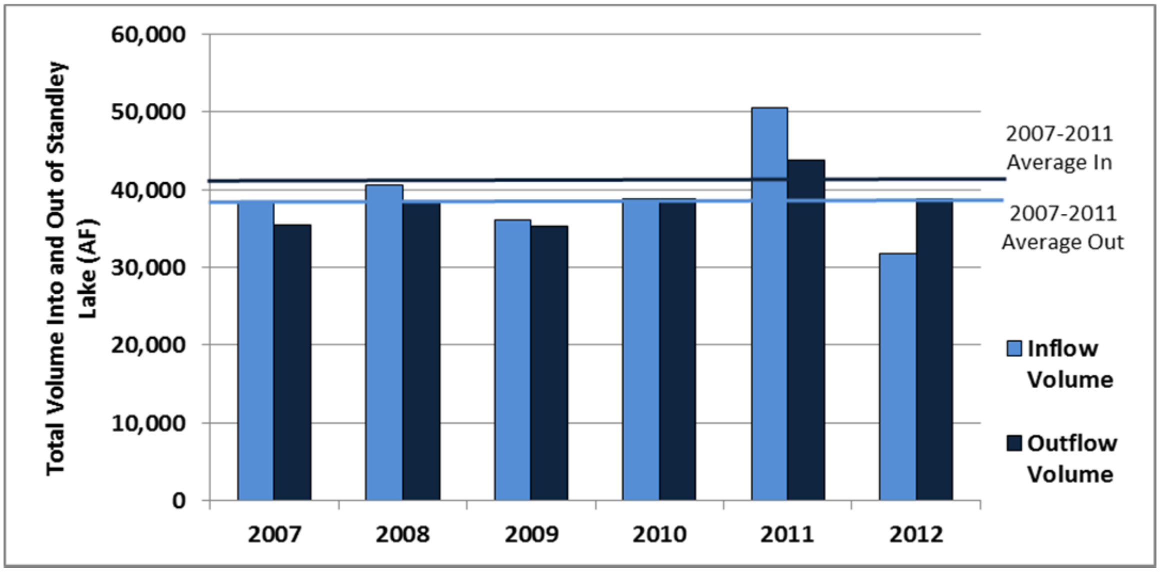


Figure ES-4. Total Annual Inflow and Outflow Volumes for Standley Lake, 2007-2012

Standley Lake daily contents in 2012 are presented with 2007-2011 contents data in Figure ES-5. As a reflection of the water demands and low snowpack, the lake did not reach its maximum capacity in 2012, unlike the previous five years. The average lake volume in 2012 was 9% lower than the 2007-2011 average.

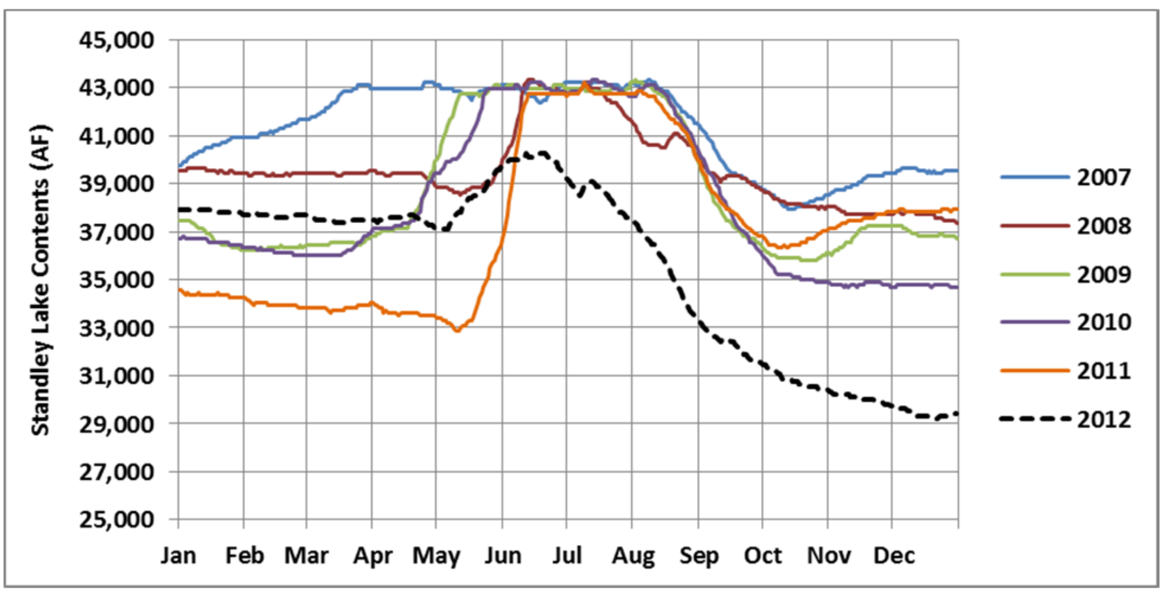


Figure ES-5. Standley Lake Contents, 2007-2012

Total phosphorus loading into and out of Standley Lake for 2007-2012 is displayed in Figure ES-6. Total phosphorus loading into Standley Lake was 34% less in 2012 than the 2007-2011 average. The volume-weighted TP concentration of the 2012 inflow was 13% lower than the 2007-2011 average, but similar to the previous two years.

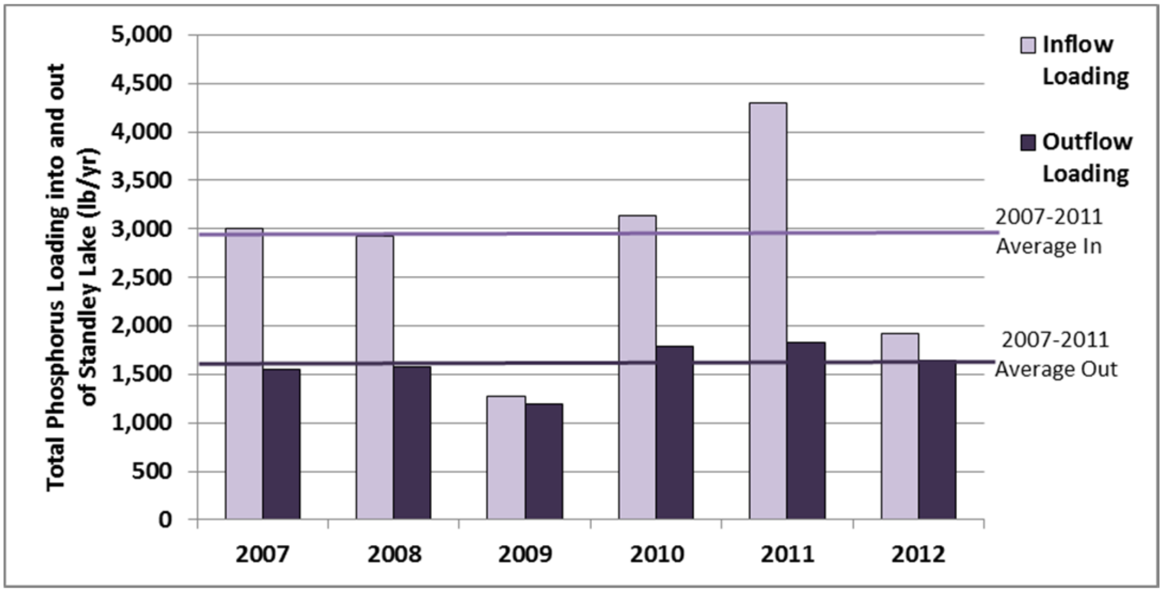


Figure ES-6. Total Phosphorus Loading into and out of Standley Lake, using Grab Samples and 24-Hour Ambient Autosampler Data, 2007-2012

Total nitrogen loading into and out of Standley Lake for 2007-2012 is presented in Figure ES-7. Total nitrogen loading was 28% lower in 2012 than the 2007-2011 average. The volume-weighted TN concentrations into Standley Lake were 25% lower than the 2007-2011 average.

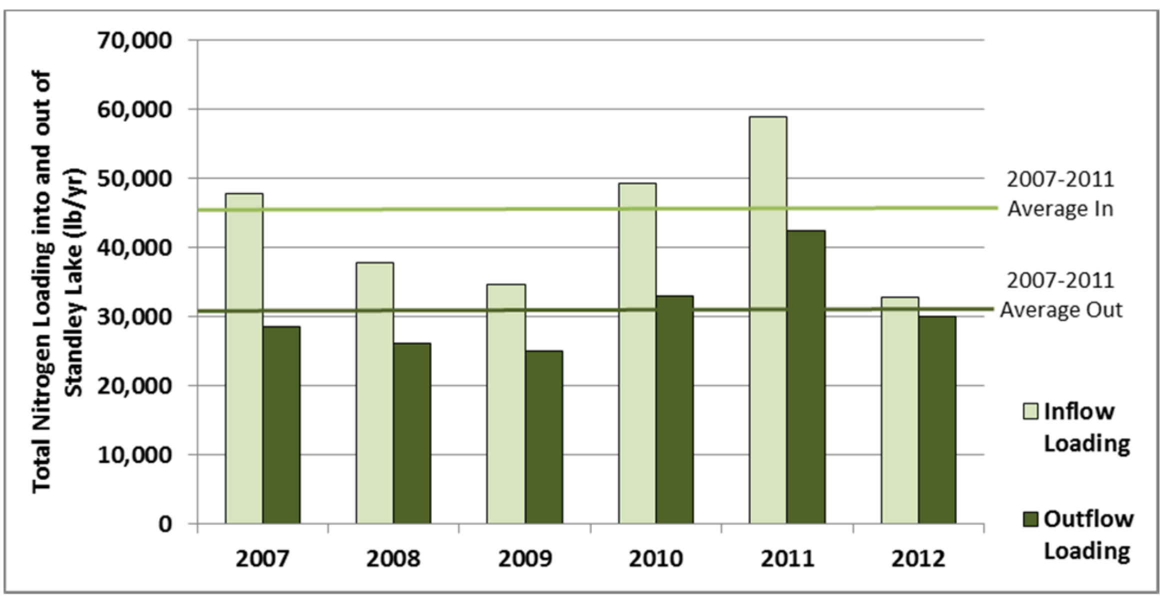


Figure ES-7. Total Nitrogen Loading into and out of Standley Lake, using Grab Samples and 24-Hour Ambient Autosampler Data, 2007-2012

Water Quality in Standley Lake

Standley Lake experienced good water quality in 2012, generally following seasonal patterns observed in previous years. The total number of days of hypoxia (<2mg/L dissolved oxygen) at the bottom of the reservoir in 2012 was greater than that observed in the recent five years, reflecting an early onset of hypoxia. The hypoxic period lasted 109 days until turnover occurred in early October. The length of the hypoxic period in 2012 was approximately 3.5 weeks longer than the 2007-2011 average.

Nutrient concentrations followed typical seasonal patterns in 2012, with higher concentrations at times, reflecting internal loading and the extended period of hypoxia. As shown in Figure ES-8, TP concentrations near the top varied slightly but remained relatively constant throughout the year. At the bottom of the reservoir, release of ortho-phosphorus during stratification is apparent, peaking before turnover, then falling again by the mid-October sampling date. Overall, the average TP concentration in 2012 was 58% higher in the hypolimnion than the respective 2007-2011 average, and 14% higher in the photic zone. Similar photic zone and hypolimnion seasonal patterns are seen for TN (Figure ES-9), though average TN concentrations in 2012 were more comparable to the average of the previous five years, 6% and 8% higher in the hypolimnion and the photic zone, respectively.

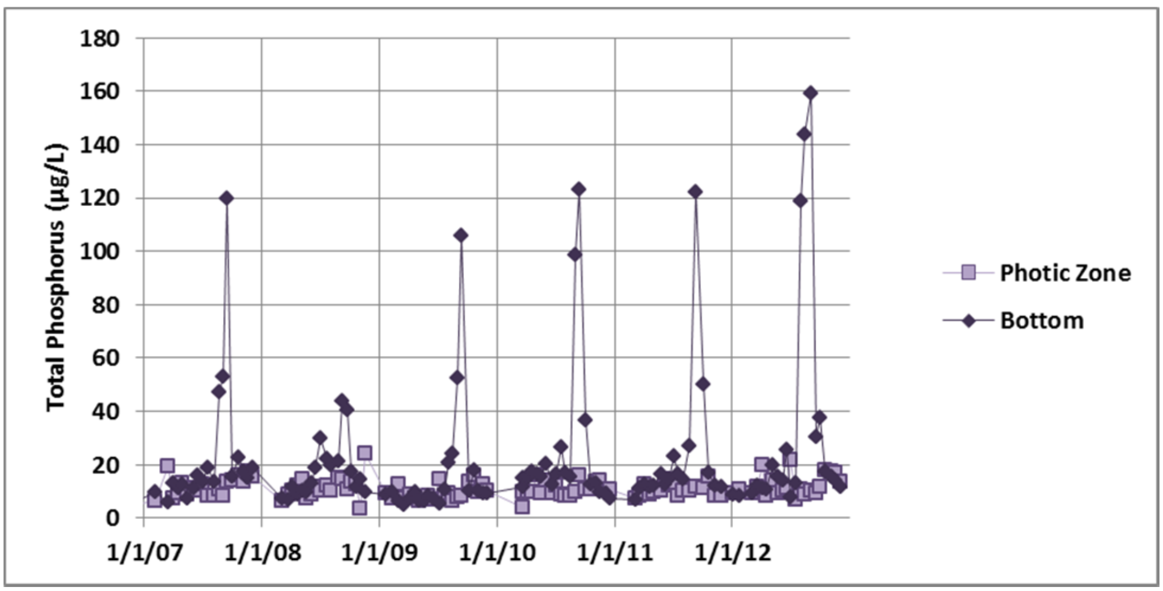


Figure ES-8. Total Phosphorus Concentrations in the Photic Zone and Bottom of Standley Lake, 2007-2012 (Site SL10)

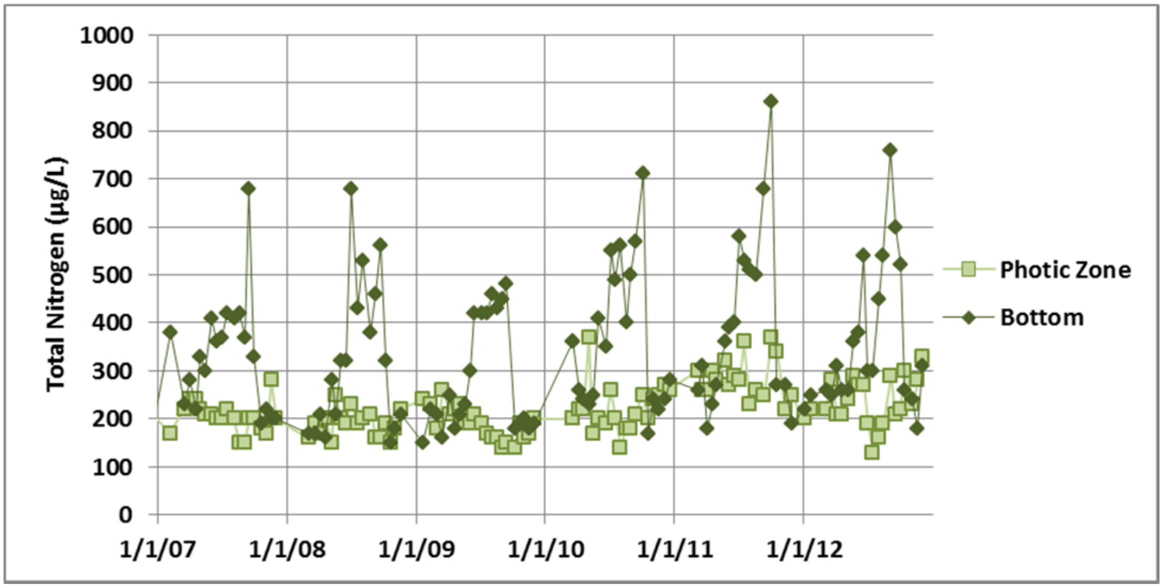


Figure ES-9. Total Nitrogen Concentrations in the Photic Zone and Bottom of Standley Lake, 2007-2012 (Site SL10)

Chlorophyll *a* concentrations in Standley Lake in 2012 were low during summer months and followed the typical pattern of higher concentrations in the spring and late fall and lower concentrations in the summer. The peak chlorophyll a concentration (14 ug/L) was higher than that observed in recent years and likely reflects increased nutrient concentrations after turnover following the extended period of hypoxia. The average chlorophyll *a* concentration from March through November was 3.3 µg/L, which is well below the standard of 4 µg/L. No March through November average values in the previous five years have exceeded the 4.4 ug/L assessment threshold or the 4 ug/L standard value, as shown in Figure ES-10.

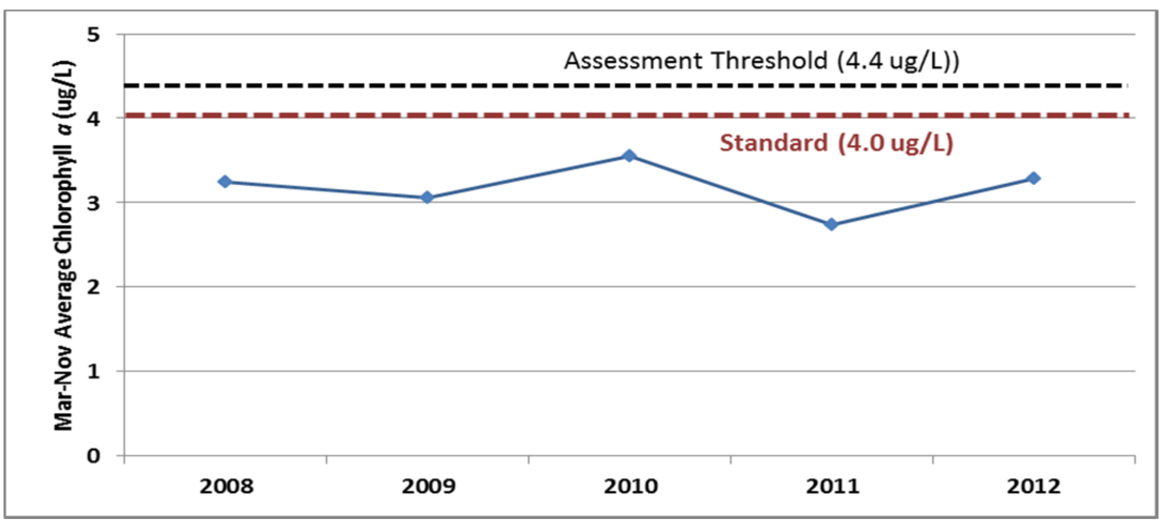


Figure ES-10. Observed Mean Chlorophyll *a* Concentrations (Mar-Nov) Compared with the Standard and the Assessment Threshold, 2007-2012 (Site SL10)

I. Introduction

Purpose and Scope of Report

In 1993, the Clear Creek/Standley Lake Watershed Agreement (1993 Agreement; Appendix A) was signed by a contingent of governmental agencies and private corporations to address certain water-quality issues and concerns within the Clear Creek watershed – specifically as they affect the water quality of Standley Lake. This annual water-quality report presents a review of 2012 water-quality efforts in the Clear Creek watershed, according to the annual reporting obligations set forth in the 1993 Agreement. Water-quality data for 2012 are also presented and compared to the previous five years of data (2007-2011). The cooperative Water Quality Monitoring Program document, the cornerstone of the 1993 Agreement, is included with the report (Appendix B).

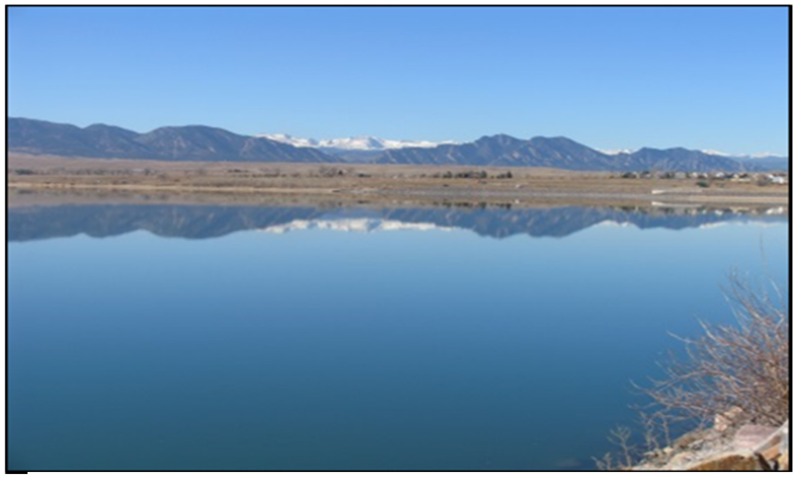


Figure 1. The View West from Standley Lake

Prior to 2009, a main focus for the signatories to the 1993 Agreement was to meet the 1993 narrative standard for Standley Lake:

> *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. Implementation of this narrative standard shall only be by Best Management Practices and controls implemented on a voluntary basis.*

Under the narrative standard, numerous water-quality improvements were achieved in the watershed. In 2009, the Water Quality Control Commission adopted a numeric chlorophyll *a* standard for Standley Lake. A 4.0 µg/L chlorophyll *a* standard is now in place as a protective measure for this drinking water supply reservoir. The intention of the numeric standard is to control the contribution of algae to the formation of disinfection by-product (DBP) precursors. In addition to the numeric standard, the Commission retained the first sentence of the narrative standard described above, which refers to maintaining mesotrophic conditions in the lake.

The Clear Creek watershed spans 575 square miles from its headwaters near the Continental Divide to the South Platte River. The Standley Lake watershed consists of the upper 400 square miles of the Clear Creek watershed, lands draining into the three Clear Creek delivery canals, and the lake's direct watershed. For purposes of this report, the Standley Lake watershed geographic area is divided into three sub-regions:

- **The Upper Basin** – the upper portion of the Clear Creek watershed, from its headwaters to the Croke Canal headgate;
- **The Canal Zone** – the three canals that deliver water from Clear Creek to Standley Lake, from their headgates to their lake entry points, including their direct watersheds; and
- **Standley Lake** – the lake and its direct watershed.

Organization of the Report

Following this introductory section, the report is organized as follows:

- **Section II. Description of the Lake, Watershed, and Routine Monitoring**– An overview of Standley Lake and its watershed, including maps and monitoring practices.
- **Section III. Activities and Accomplishments in 2012** – A summary of water-quality efforts in the Clear Creek Basin, including monitoring, wastewater treatment plants, illicit discharges, nonpoint source control, public education, outreach and partnerships, emergency response, planning, and modeling efforts.
- **Section IV. Upper Basin Water Quality** – A presentation of data collected from key locations in the Upper Basin, with a focus on nutrient concentrations and annual loading of total nitrogen, total phosphorus, and total suspended solids.
- **Section V. Standley Lake Inflow, Outflow, and Volume –** A summary of 2012 inflow to Standley Lake, including timing of use of each canal, outflow from the lake, and lake volume.
- **Section VI. Loading Into and Out of Standley Lake** – An analysis of nutrient loading into and out of the lake, with consideration of total nitrogen and total phosphorus loads from each canal.
- **Section VII. Standley Lake Water Quality -** An analysis of lake water quality with a focus on total nitrogen, total phosphorus, chlorophyll *a,* dissolved oxygen, and clarity as measured by Secchi depth.
- **Section VIII. Conclusions** – A summary of findings from the report.

II. Description of the Lake, Watershed, and Routine Monitoring

This section presents a broad description of Standley Lake and its watershed (the Upper Basin and the Canal Zone). The discussion also includes a summary of routine monitoring activities.

Standley Lake Overview

Standley Lake is an off-channel, municipal and agricultural reservoir located in Jefferson County. This 43,000 acre-foot reservoir is a direct-use drinking water supply for over 250,000 consumers in the downstream cities of Northglenn, Westminster, and Thornton. In addition, the reservoir provides water for recreational activities and to farms located in Adams and Weld counties. It is owned and operated by Farmers' Reservoir and Irrigation Company.

Figure 2. Stella Effinger, Cannon Frost, and Cash Cooley with a 10 lb. Walleye Caught on Standley Lake

Through the Standley Lake Monitoring Program, the lake is frequently monitored throughout the year when ice is off the lake. The lake is sampled at multiple locations, and this report focuses on the results from the SL10 location (Figure 4). This location represents the deepest part of the lake and is the approximate location of the municipal supply intakes. Lake monitoring efforts are summarized as follows:

Daily Profiles – Standley Lake water quality is measured every meter, from the surface to within 3 meters of the bottom, four times daily using an automated profiler. The profiler is equipped with a multi-probe sonde and provides readings of water temperature, dissolved oxygen, pH, conductivity, turbidity, oxidation reduction potential (ORP), and chlorophyll *a* concentrations.

Figure 3. On the Lake

Surface and Bottom Sampling – Grab samples are collected in the lake at the surface, in the photic zone (at two times the measured Secchi depth), and five feet from the bottom. Sampling occurs twice each month from March through November and is often extended during the winter if the lake is not frozen. A wide range of constituents are measured, including nutrients, metals, algae, suspended solids, and numerous field parameters.

Zooplankton Tows – Zooplankton tows are conducted throughout the summer months.

Invasive Species Monitoring – Monitoring focused on Eurasian watermilfoil and zebra and quagga mussels occurs every summer.

Routine monitoring practices for Standley Lake are described in detail in Appendix B.

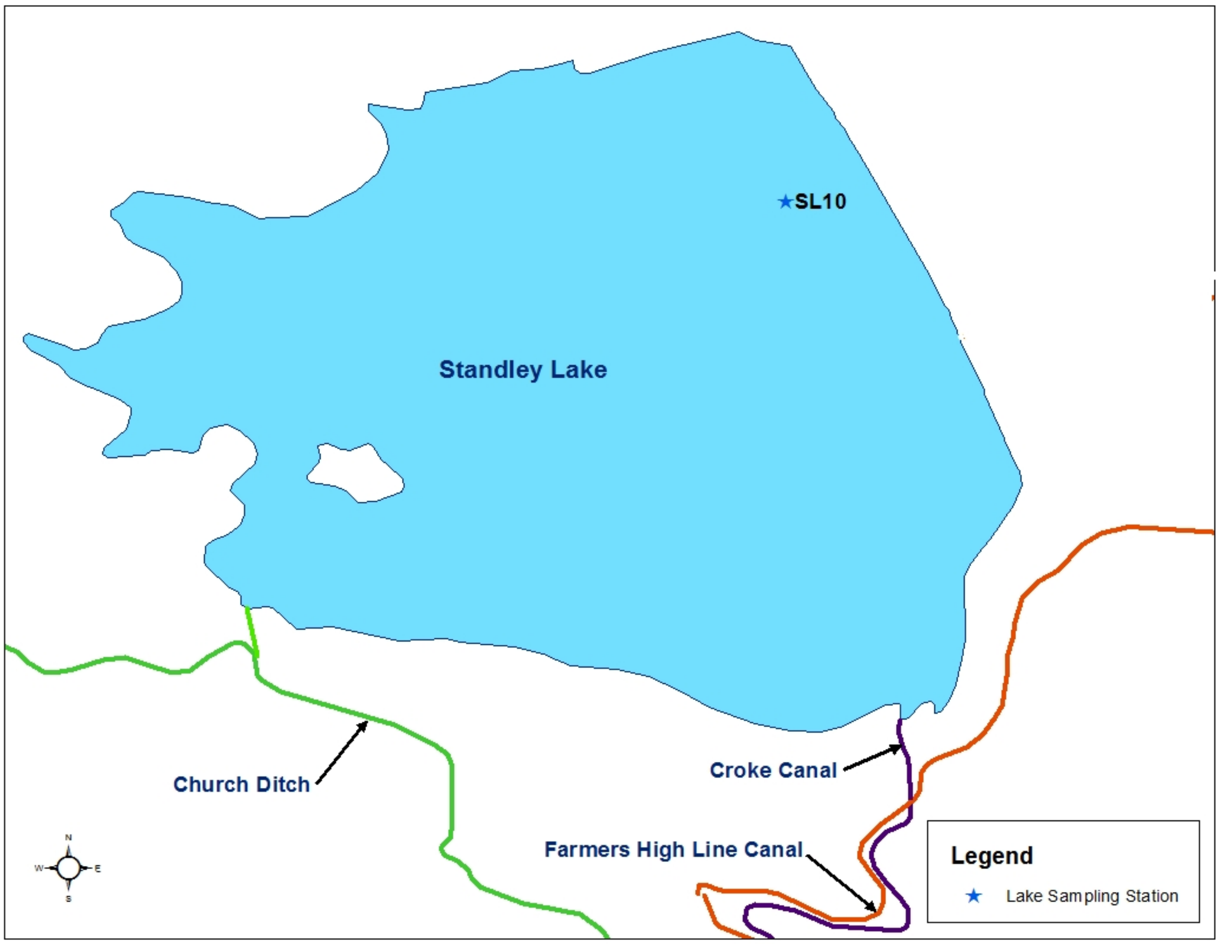


Figure 4. Standley Lake and Sampling Location (SL10)

Description of the Watershed

The Clear Creek watershed is located west of Denver, Colorado, with its headwaters in the mountains up to the Continental Divide (Figure 5). The watershed covers an area of 575 square miles, beginning at an elevation of about 14,000 feet and descending to approximately 5,000 feet where it joins the South Platte River in north Denver. In addition to supplying drinking water to 350,000 residents in the watershed, Clear Creek provides water for various recreational, agricultural, and industrial purposes.

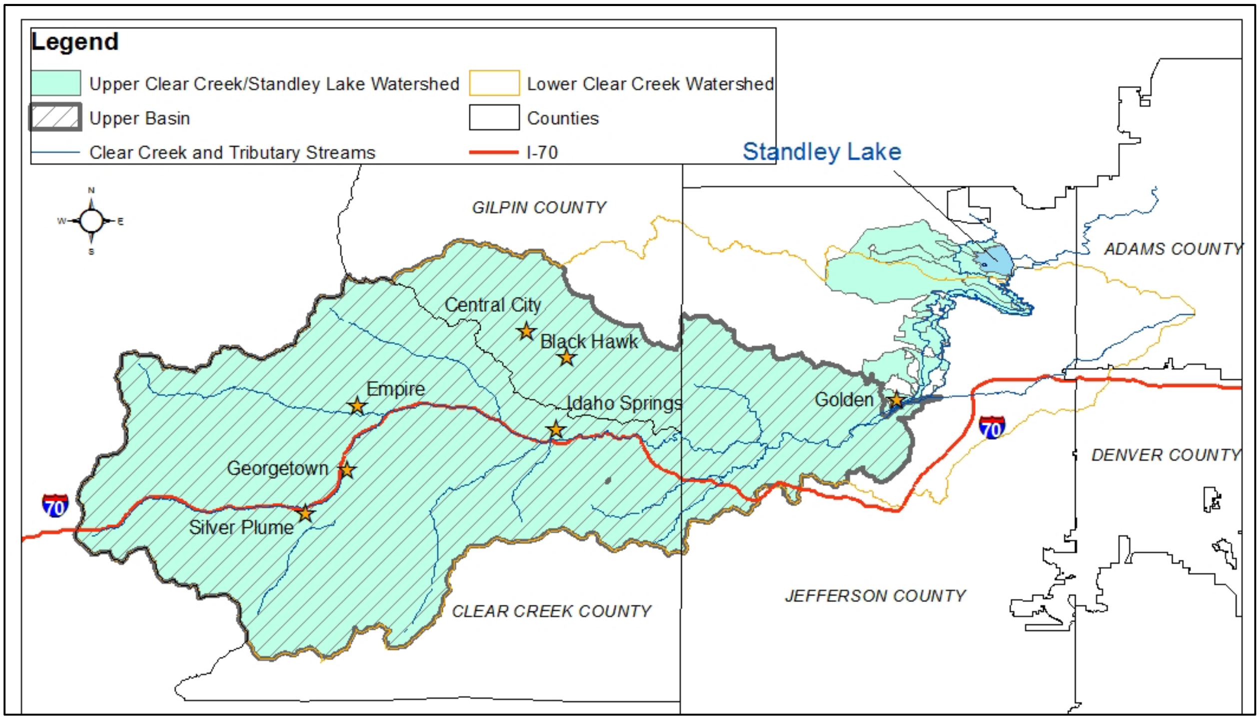


Figure 5. Clear Creek Watershed and the Upper Basin

The Standley Lake watershed includes the Upper Basin of the Clear Creek watershed, the canals used to transport water from Clear Creek to the lake (the Canal Zone), and a direct watershed. The following subsections describe the Upper Basin and the Canal Zone.

Upper Basin

The Upper Basin region of the Clear Creek watershed (Figure 5) includes the 400 square miles upstream of the Croke Canal headgate. This region includes the upper portion of Clear Creek and its various tributaries, the most prominent of these being the West Fork of Clear Creek, Leavenworth Creek, the South Fork of Clear Creek, Fall River, Chicago Creek, the North Fork of Clear Creek, Beaver Brook, Soda Creek, and Elk Creek. Numerous towns are scattered throughout this mountainous area including Idaho Springs, Black Hawk, Central City, Empire, Georgetown, and Silver Plume. Additionally, U.S. Interstate 70 (I-70), a highly-utilized corridor, runs through the watershed, providing access to towns and recreational areas.

The Upper Basin contains nine wastewater treatment plants (WWTPs) which serve the local population and resorts (Figure 6). Additionally, the Upper Basin contains operating and abandoned mines and trans-mountain diversions. Water quality in the Upper Basin may also be impacted by nonpoint sources, including numerous onsite wastewater treatment systems (OWTS), application of roadway deicers and traction sands, and residential and commercial stormwater runoff.

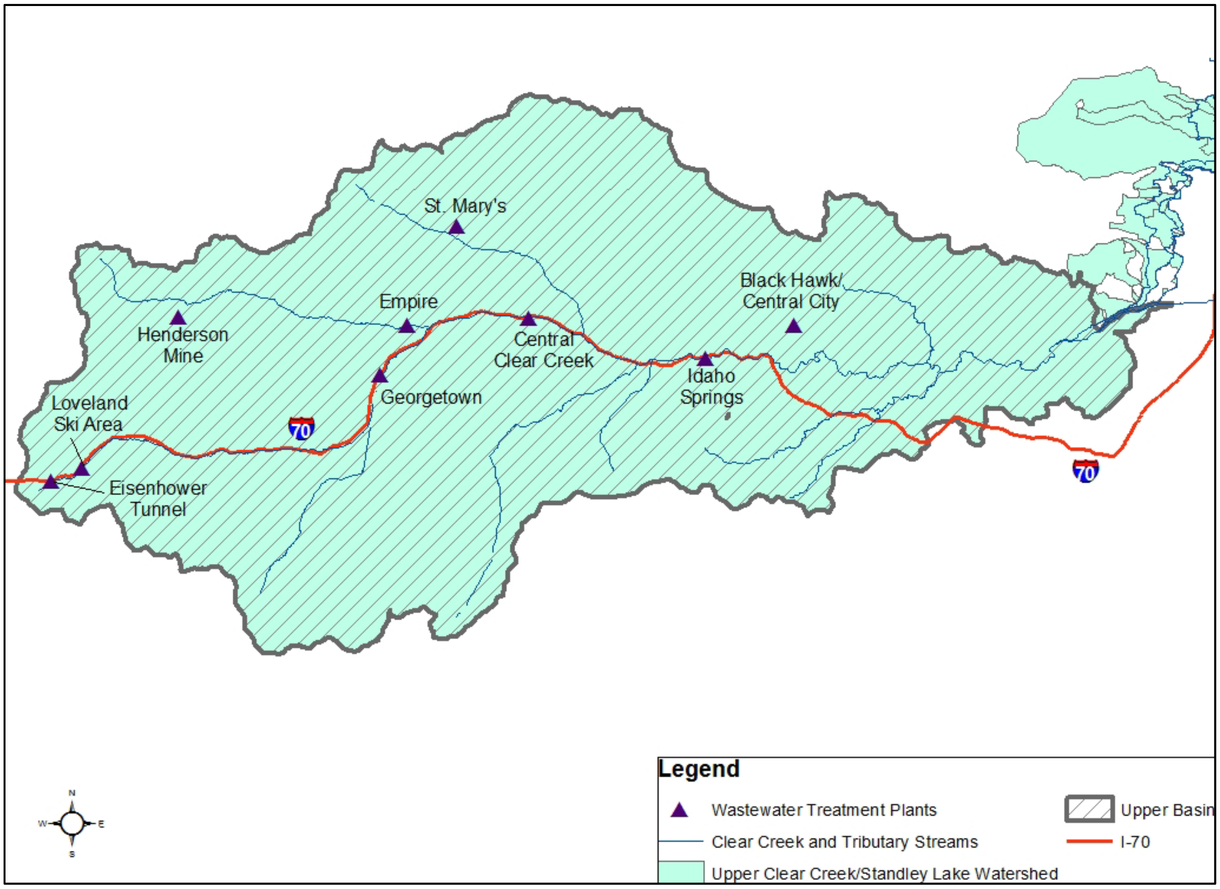


Figure 6. Wastewater Treatment Plants in the Upper Basin

Flow measurements and water-quality samples are collected at numerous stations throughout the watershed to monitor the concentrations of nutrients, select metals, and other key constituents (Figure 7).

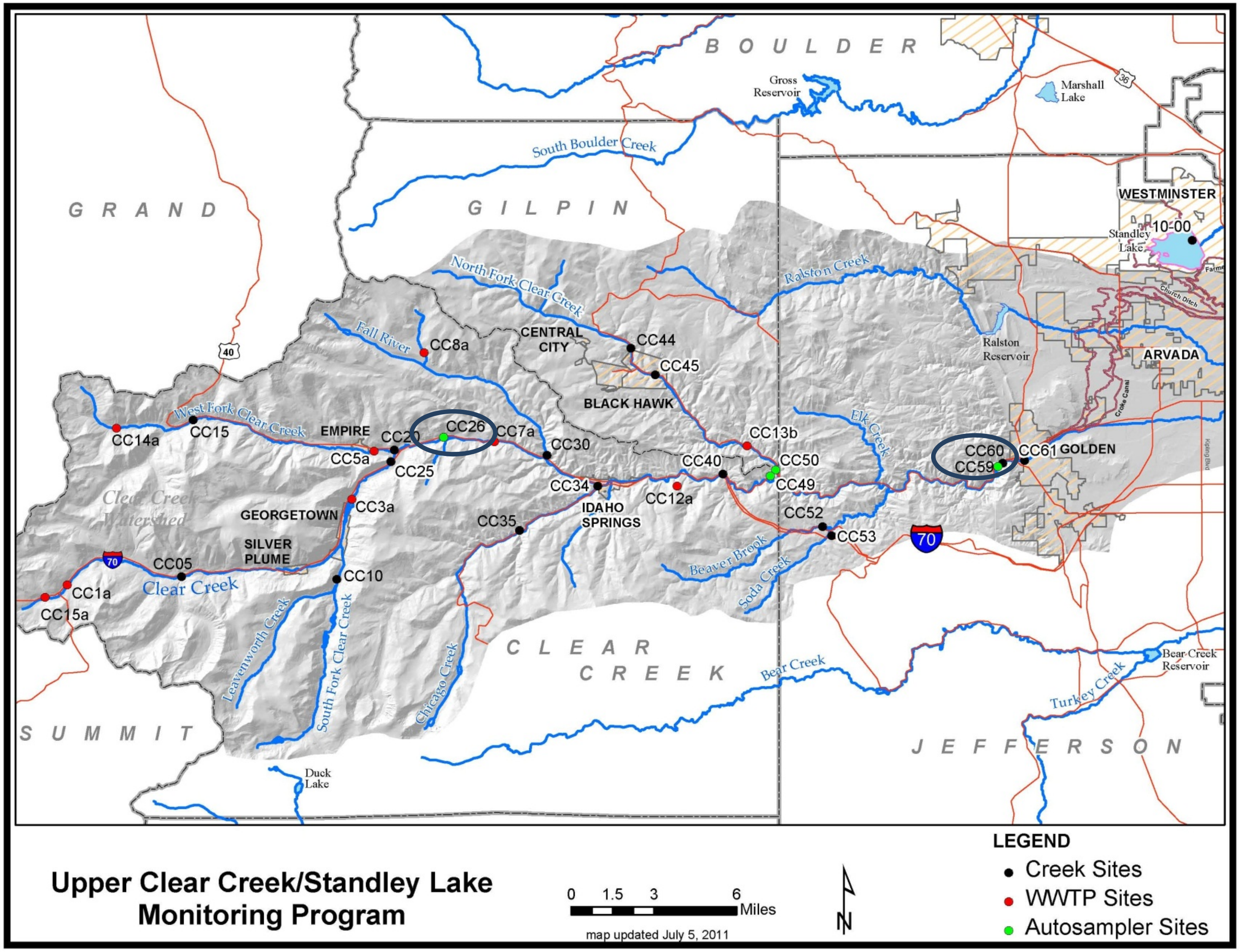


Figure 7. Upper Clear Creek Sampling Stations (Key Locations for this Report are Circled)

Upper Basin monitoring activities have been designed to evaluate the relative contributions of various nutrient sources, effectiveness of BMPs, wastewater treatment plant operational changes, and nutrient reductions from treatment plant upgrades. In recent years, the monitoring program has shifted toward increased use of autosamplers relative to grab sampling in the Upper Basin. The 24-hour composite samples collected by autosamplers are more representative than grab samples of water quality on the date of sampling. In addition to collecting 24-hour ambient samples, the autosamplers are also used to collect specific storm-triggered event samples. Routine monitoring for the Upper Basin is described in detail in Appendix B.

The analysis presented in the Upper Basin portion of this report is based on data from two key locations (circled on Figure 7). These data include grab samples collected at sampling locations CC26 (Clear Creek at Lawson Gage) and CC60 (Clear Creek at Church Ditch Headgate), combined with 24-hour composite samples from nearby autosampler locations CCAS26 (Clear Creek at Lawson Gage) and CCAS59 (Clear Creek 2 miles west of Highway 58/US6). These locations were selected to present a picture of water quality high in the Upper Basin and prior to diversion into delivery canals. Because both grab sample data and autosampler data are available for these locations, these sites provide the most samples throughout the year. Data presented in this report for the Upper Basin include total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) concentrations.

Canal Zone

The Canal Zone is composed of three canals that divert water from Clear Creek into Standley Lake: Church Ditch, Farmers' High Line Canal (FHL), and the Croke Canal (Figure 5). In addition to the three canals diverting water from Clear Creek, Kinnear Ditch Pipeline (KDPL) also contributes water to Standley Lake from Coal Creek and the Boulder Diversion Canal. The canals are open, slow-flowing, and largely unlined ditches that direct water to the reservoir. The canals are subject to nonpoint source loading from adjacent horse and cattle operations, agricultural operations, and residential properties (some with onsite wastewater treatment systems). Note that a significant percentage (~80%) of the historical direct runoff drainage area into the canals has been eliminated since the 1990s in order to protect Standley Lake water quality.

To provide information for evaluation of the nutrient loadings from nonpoint sources in the Canal Zone, the three canals are sampled at the headgates, where water is diverted from Clear Creek, and at the inlets into the lake. Figure 8 shows the inlet monitoring location for each canal. Routine monitoring for the Canal Zone is described in detail in Appendix B.

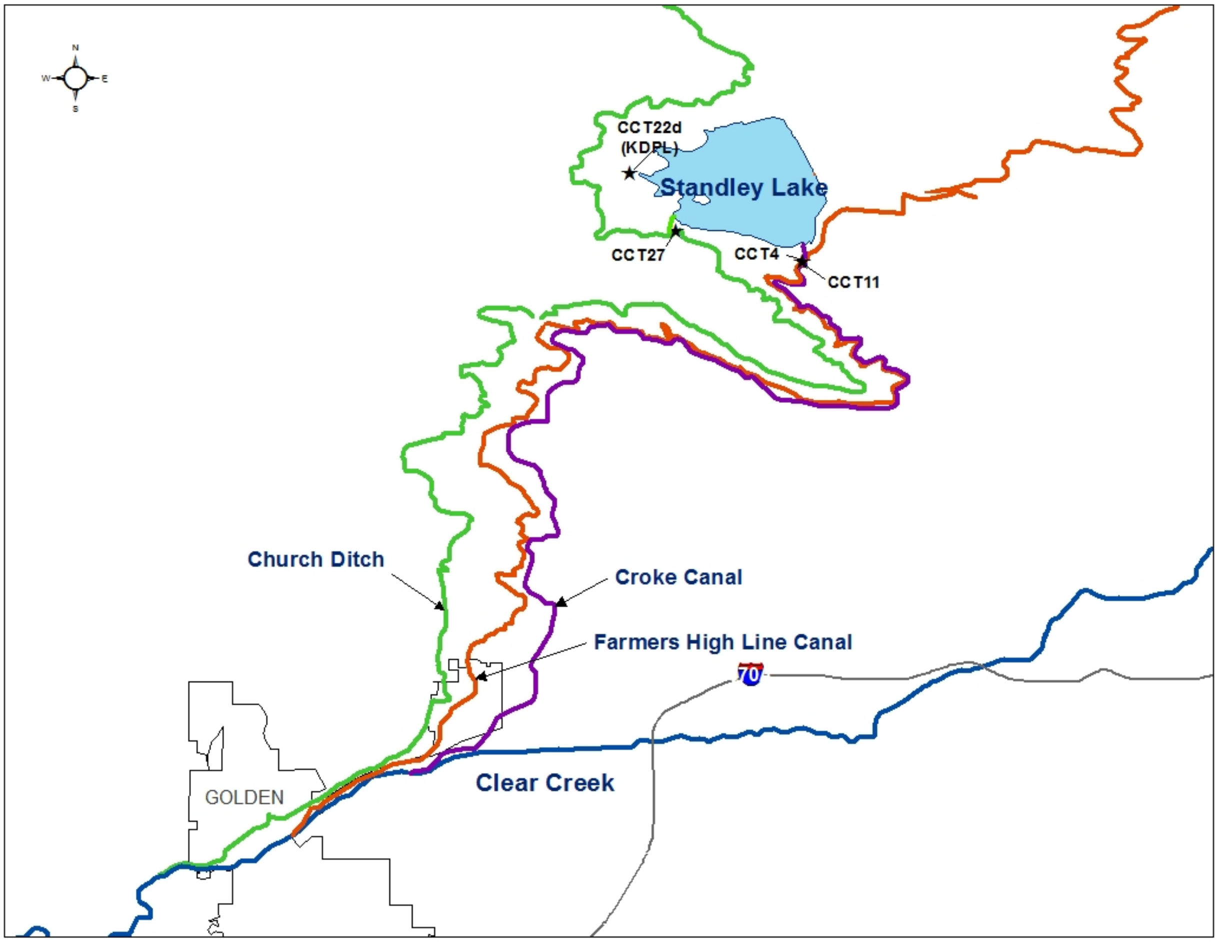


Figure 8. Standley Lake, the Three Canals that Divert Water from Clear Creek, and Sampling Stations at Lake Inflow Locations

III. Activities and Accomplishments in 2012

Many groups and facilities with the potential to impact water quality in the Clear Creek watershed and Standley Lake continued efforts in 2012 to enhance and protect water quality. This section highlights 2012 activities and accomplishments in the following areas:

- Monitoring,
- Wastewater treatment plants,
- Illicit discharges,
- Nonpoint source control,
- Public education, outreach, and partnerships,
- Emergency response,
- Planning, and
- Modeling efforts.

2012 Monitoring Activities

The Upper Clear Creek/Standley Lake Watershed Water Quality Monitoring Program (Appendix B) provides the framework for routine collection of flow and water-quality samples throughout the Upper Basin, the Canal Zone, and in Standley Lake. The program was briefly described in Section II and all monitoring data for 2012 are included in Appendix C. Monitoring conducted in 2012 is discussed below.

2012 Upper Basin and Canal Zone Water Quality Sampling

In 2012, samples were collected in the Upper Basin through a combination of grab samples at 16 locations and autosamplers at four locations. The autosamplers collect ambient samples as well as event-triggered storm samples (all sampling locations shown in Figure 7). In 2012, a total of 83 grab samples were collected in the Upper Basin, and autosamplers collected 52 ambient 24-hour samples and an additional 12 event-triggered samples.

Similarly, both grab sampling and autosamplers were utilized in the Canal Zone. Grab samples were collected at nine locations and autosamplers collected samples at four locations. In 2012, a total of 77 grab samples were collected, along with 6 ambient 24-hour samples and 6 event-triggered samples collected by autosamplers.

In 2012, the City of Golden established a new year-round Clear Creek monitoring station at the Ford Street Bridge. Designated CC62, this station collects continuous and event-triggered data similar to the monitoring stations upstream. Note that this station is not part of the Upper Basin or Canal Zone, but the additional monitoring location is noted here as an activity in the downstream portion of the larger basin.

2012 Standley Lake Water Quality Sampling

In 2012, daily lake profiles were taken in Standley Lake, along with bi-monthly grab samples collected at three depths (at the surface, in the photic zone, and in the hypolimnion). A total of 70 grab samples were collected and analyzed.

Figure 9. Standley Lake Profiler

Flow and Water Quality Monitoring Costs

In 2012, Clear Creek water-quality monitoring costs for the City of Golden were approximately $24,000, a 20% increase from 2011. The City of Golden contributed $9,729 to fund the USGS gage on the West Fork of Clear Creek at Empire. The Upper Clear Creek Watershed Association (UCCWA) costs associated with maintenance and monitoring of the CC40 gage (Clear Creek near the former Kermit's, US 6 and I-70) were $5,140. Clear Creek County continued sponsorship of two gages, on Leavenworth Creek and at Berthoud Falls, for a total cost in 2012 of $9,500. Monitoring costs for the City of Idaho Springs in 2012 were approximately $8,000. In addition, the Standley Lake Cities contributed $10,520 to fund operations of the USGS gages on Clear Creek at Lawson and Bakerville. In all, the Standley Lake Cities monitoring and modeling costs were in excess of $200,000 in 2012.

CC59 Data Summary Report

The City of Golden operates a permanent monitoring station at CC59 and provides funding for an annual data summary report for ambient and storm event-triggered sampling. In operation since 2005, monitoring results have established a strong correlation between turbidity levels/total suspended solids loading and metals/nutrient levels in the creek. Monitoring for specific conductivity is year round, and data demonstrate that elevated conductivity in the stream can also be correlated with an increase in chloride levels. Figure 10, provided by Clear Creek Consultants, shows the correlation between TP and TSS at sampling locations CC40 and CC59.

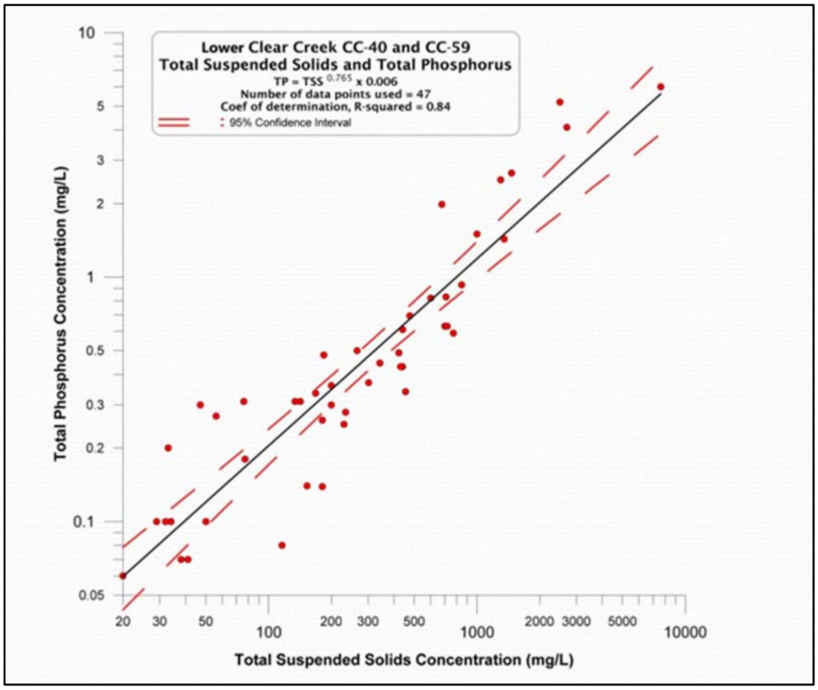


Figure 10. Total Phosphorus and Total Suspended Solids Concentrations at CC40 and CC59. ***Graph provided by Clear Creek Consultants.***

Wastewater Treatment Plants

Nine wastewater treatment plants are situated in the Upper Basin (see locations in Figure 6). Following is a brief discussion to highlight 2012 activities at individual plants as well as a presentation of observed effluent nutrient concentrations.

Idaho Springs WWTP

The City of Idaho Springs overhauled the chlorine contact chamber gate valve in its WWTP to allow complete isolation of the two chambers for cleaning the sludge from the bottom, helping to keep solids from entering Clear Creek.

The Idaho Springs WWTP had two monitoring violations in 2012, both early in the year. In January there was a pH monitoring violation for collecting only 25 daily samples rather than 31. In February there was an E. coli violation. Subsequently, staff training was enhanced and supervision was increased, with no more violations during 2012.

In anticipation of the Twin Tunnels widening project, and particularly the associated blasting, the City of Idaho Springs and the Colorado Department of Transportation (CDOT) began collaborative planning to anticipate and forestall any potential negative impacts on the plant during the project.

Black Hawk/Central City Sanitation District WWTP

Black Hawk Central City Sanitation District (BHCCSD or District) continues to achieve excellent nutrient removal in its wastewater treatment plant effluent. The District's WWTP is considered a Level 4 treatment plant and employs enhanced biological nutrient removal (BNR) treatment plus filtration and UV disinfection. The concentration of total phosphorus measured in the effluent ranged from 0.03 mg/L to 0.35 mg/L during the water year of 2012 (November 2011 through October 2012). Total inorganic nitrogen (TIN) concentrations ranged from 2.25 mg/L to 11.2 mg/L. Overall, the BHCCSD WWTP effluent TP and TIN concentrations were similar to concentrations observed during 2011, which ranged from 0.03 mg/L to 1.10 mg/L and 1.75 mg/L to 9.85 mg/L, respectively. Average daily effluent flow rates were also similar to 2011, averaging 0.416 million gallons per day (MGD) in 2012 versus 0.417 MGD in 2011. The District continues to operate its enhanced BNR treatment plant and remove nutrients to very low levels as an ongoing component in its efforts to protect water quality in Clear Creek.

The BHCCSD discharge permit was renewed by the Water Quality Control Division in May of 2012. With that renewal, new monitoring requirements have been established for temperature and nonylphenol, an endocrine disruptor.

During 2012, BHCCSD began planning improvements to its tertiary filtration process by replacing the existing shallow bed sand filters with mechanical disk filters. Additionally, a new chemical addition process with coagulation/flocculation will be added to reduce soluble reactive phosphorus following final clarification. Work is expected to be completed in early 2013.

Observed WWTP Effluent Concentrations

The WWTPs in the Upper Basin of the Clear Creek watershed continued efforts in 2012 to reduce nutrient discharges. Effluent nutrient data presented here are representative of end-of-pipe samples. Nutrient reporting was not required in NPDES permits prior to and including 2012. Total phosphorus and TN concentrations measured for each WWTP in 2007-2012 are presented in Figure 11 through Figure 16, based on observations from the Upper Clear Creek Monitoring Program. Note that the sampling frequency varied by WWTP and over the course of the year.

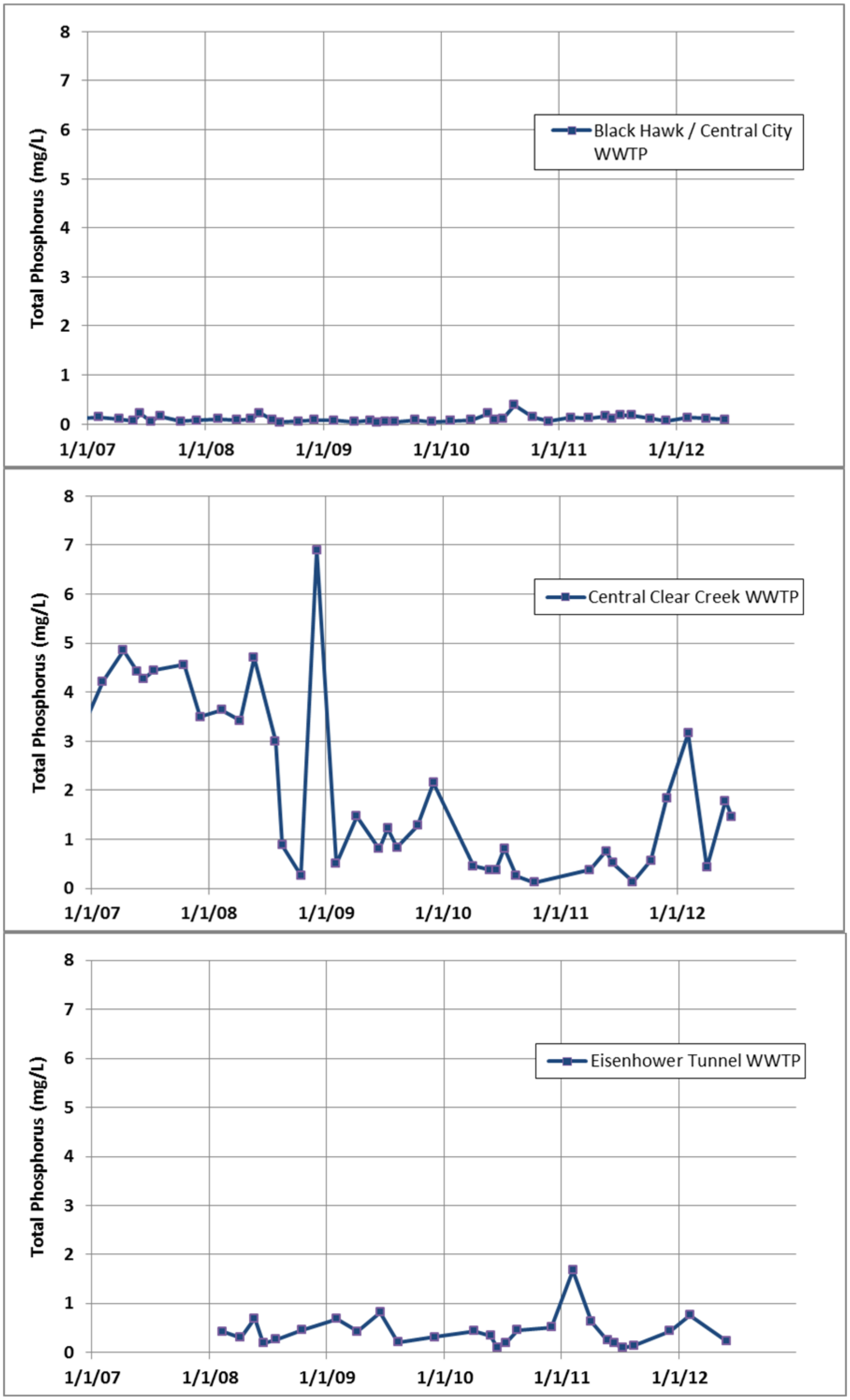


Figure 11. Effluent TP Concentrations (2007-2012) for Black Hawk/Central City, Central Clear Creek, and Eisenhower Tunnel

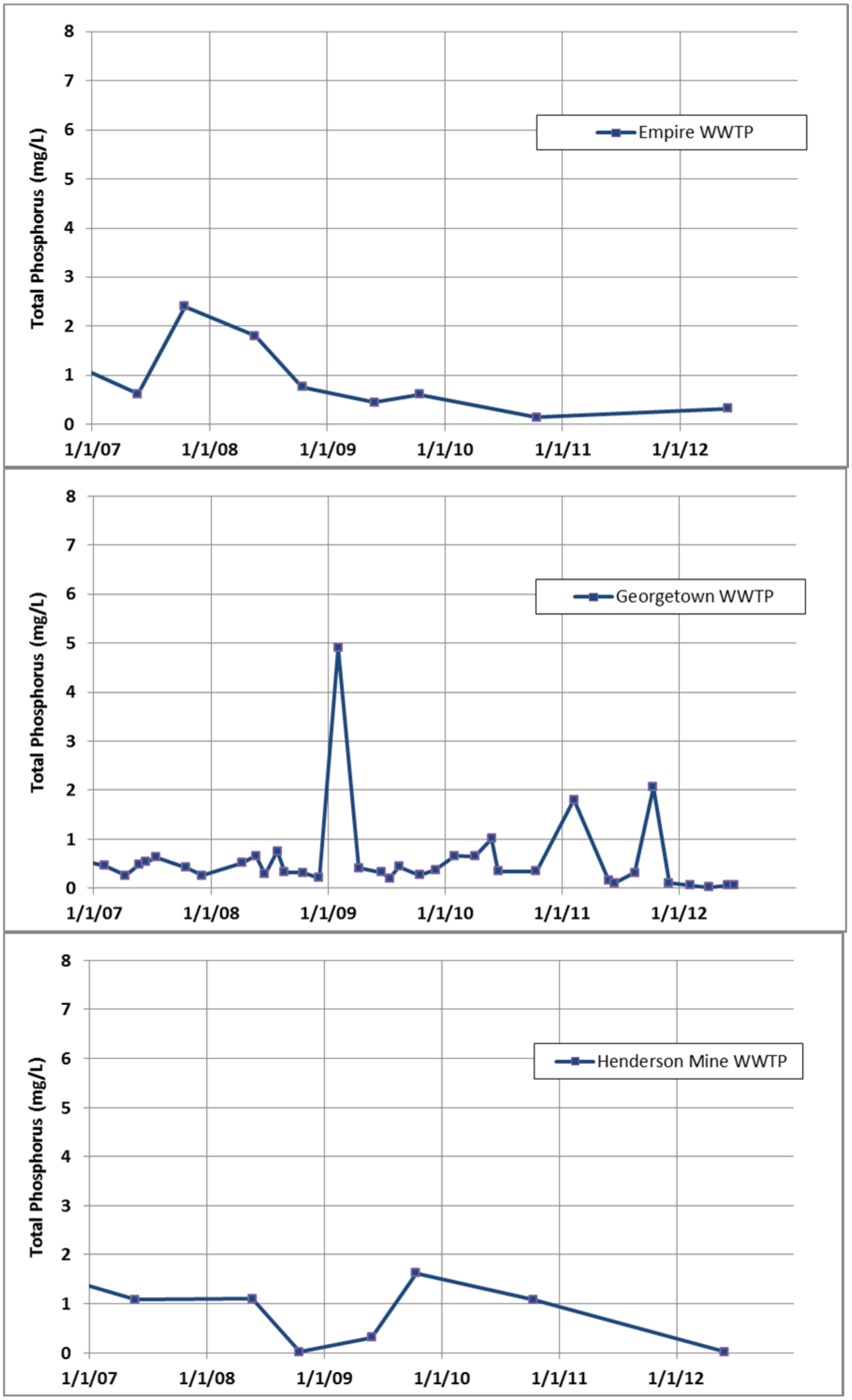


Figure 12. Effluent TP Concentrations (2007-2012) for Empire, Georgetown, and Henderson Mine

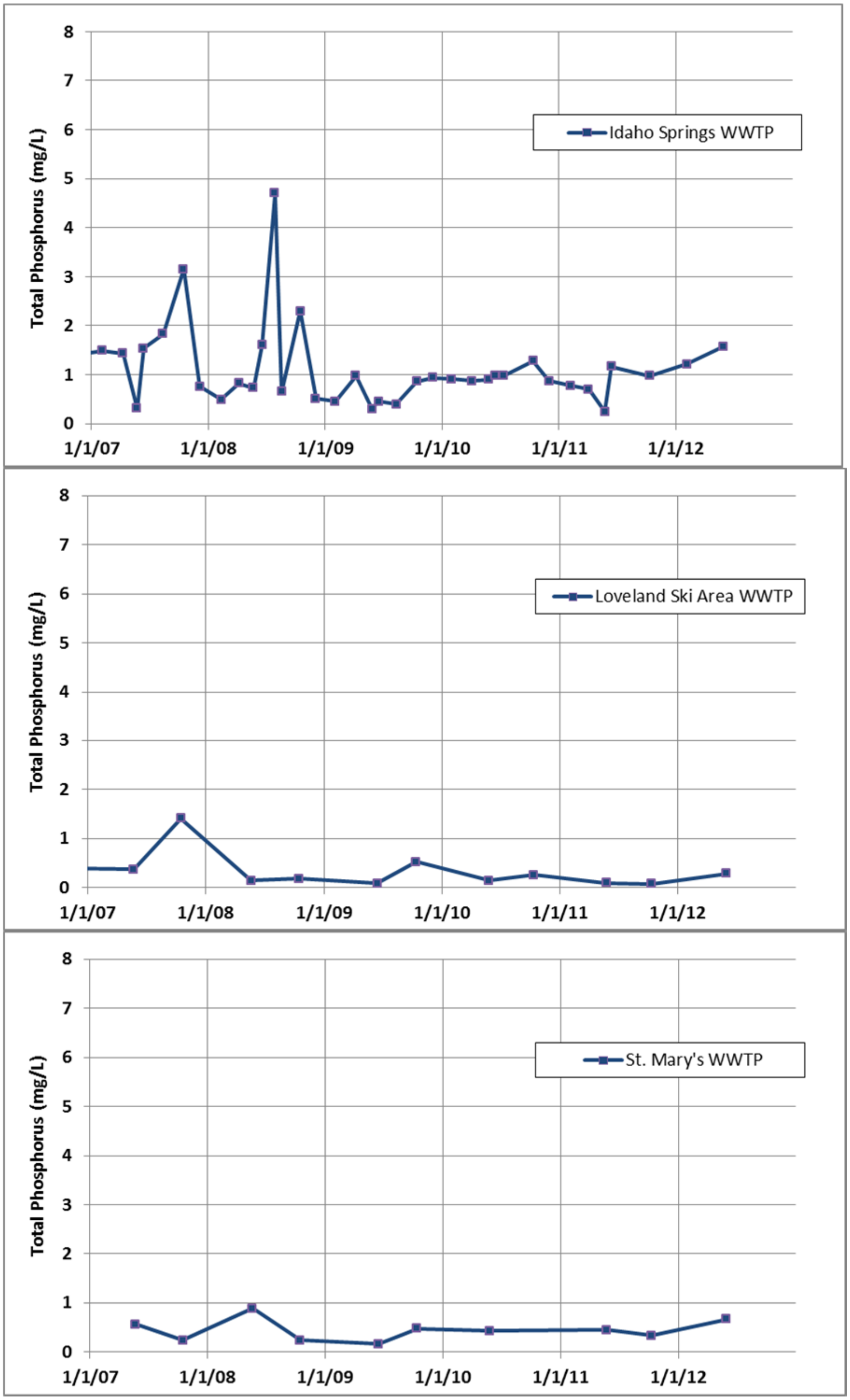


Figure 13. Effluent TP Concentrations (2007-2012) for Idaho Springs, Loveland Ski Area, and St. Mary's

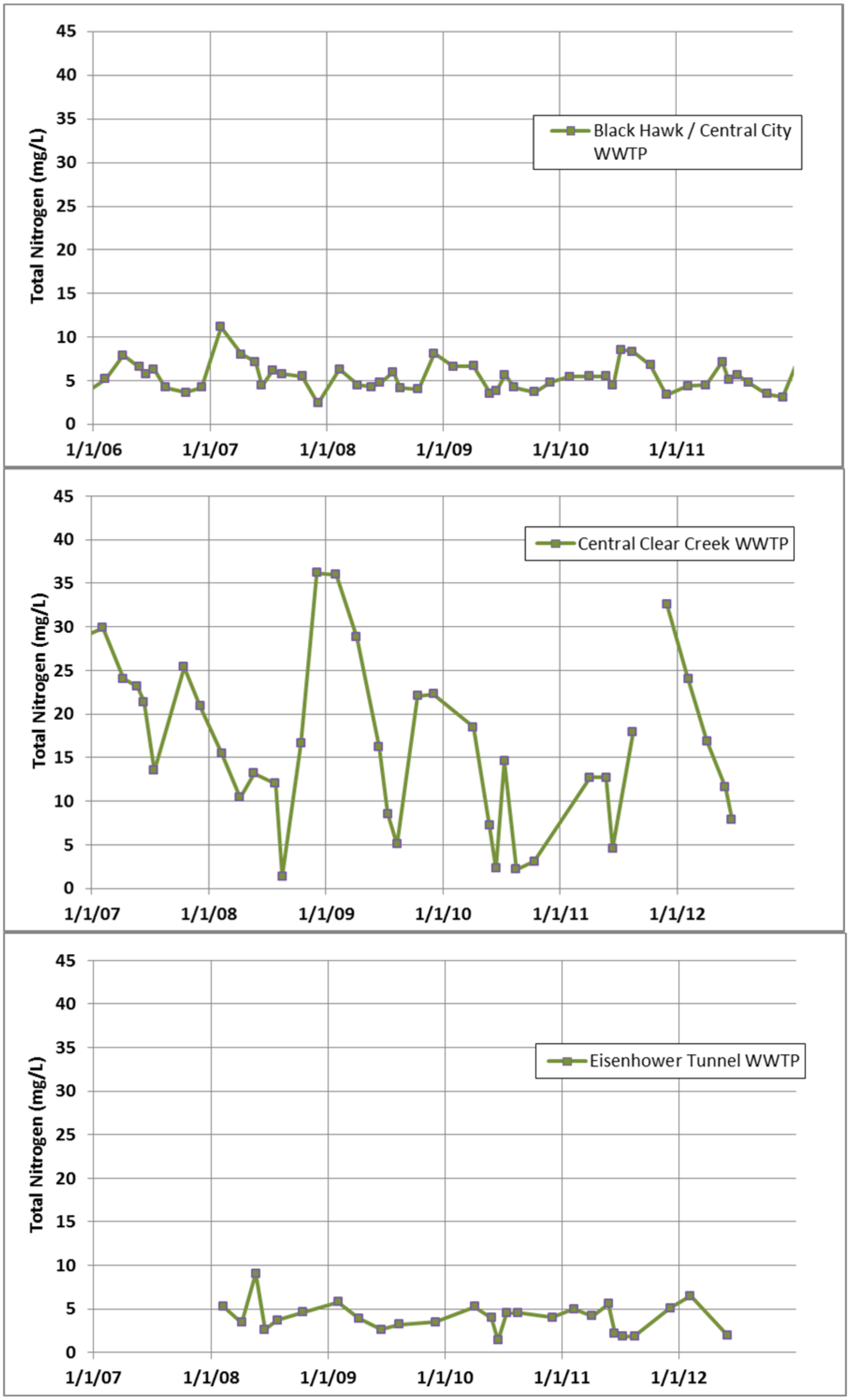


Figure 14. Effluent TN Concentrations (2007-2012) for Black Hawk/Central City, Central Clear Creek, and Eisenhower Tunnel

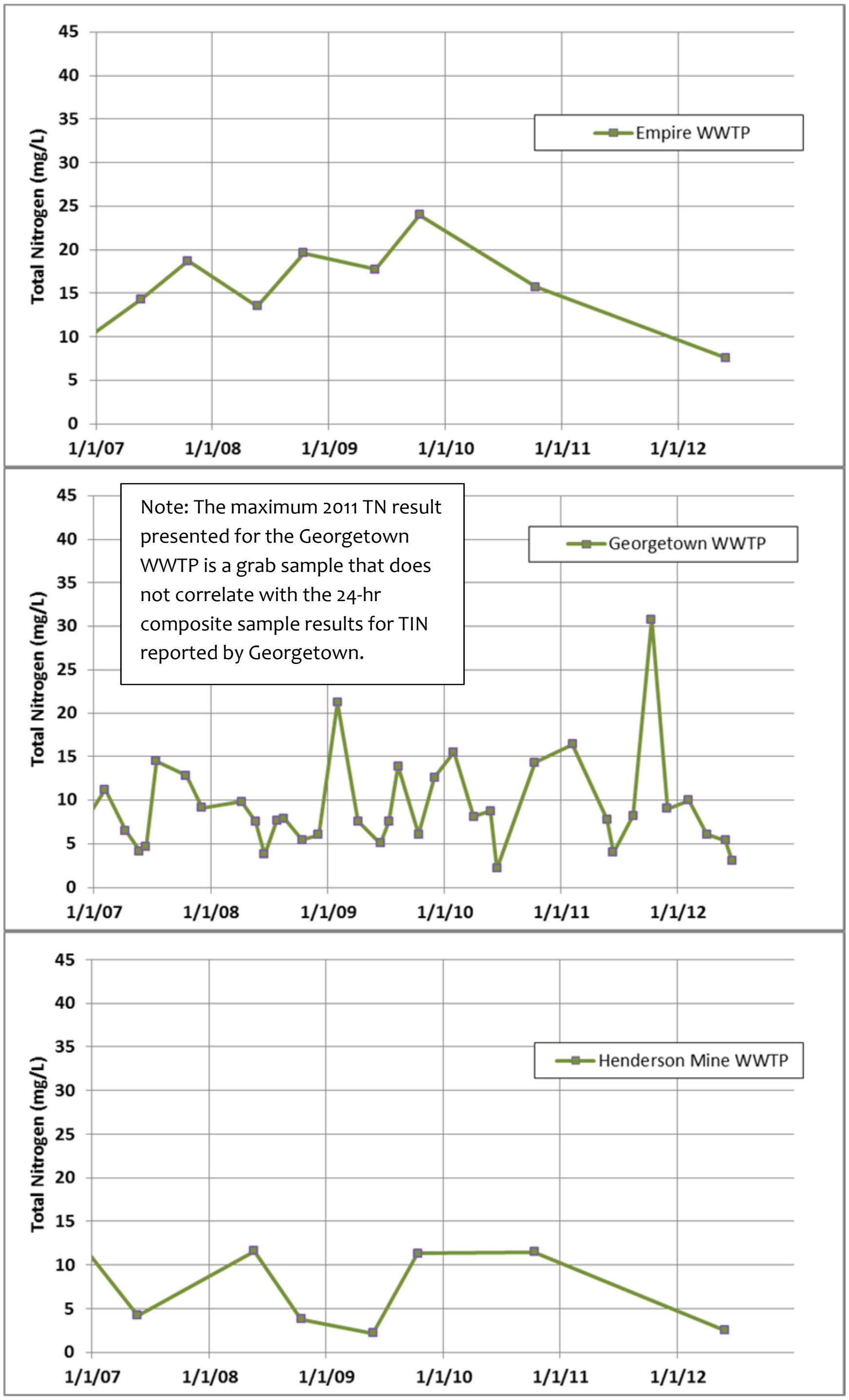


Figure 15. Effluent TN Concentrations (2007-2012) for Empire, Georgetown, and Henderson Mine

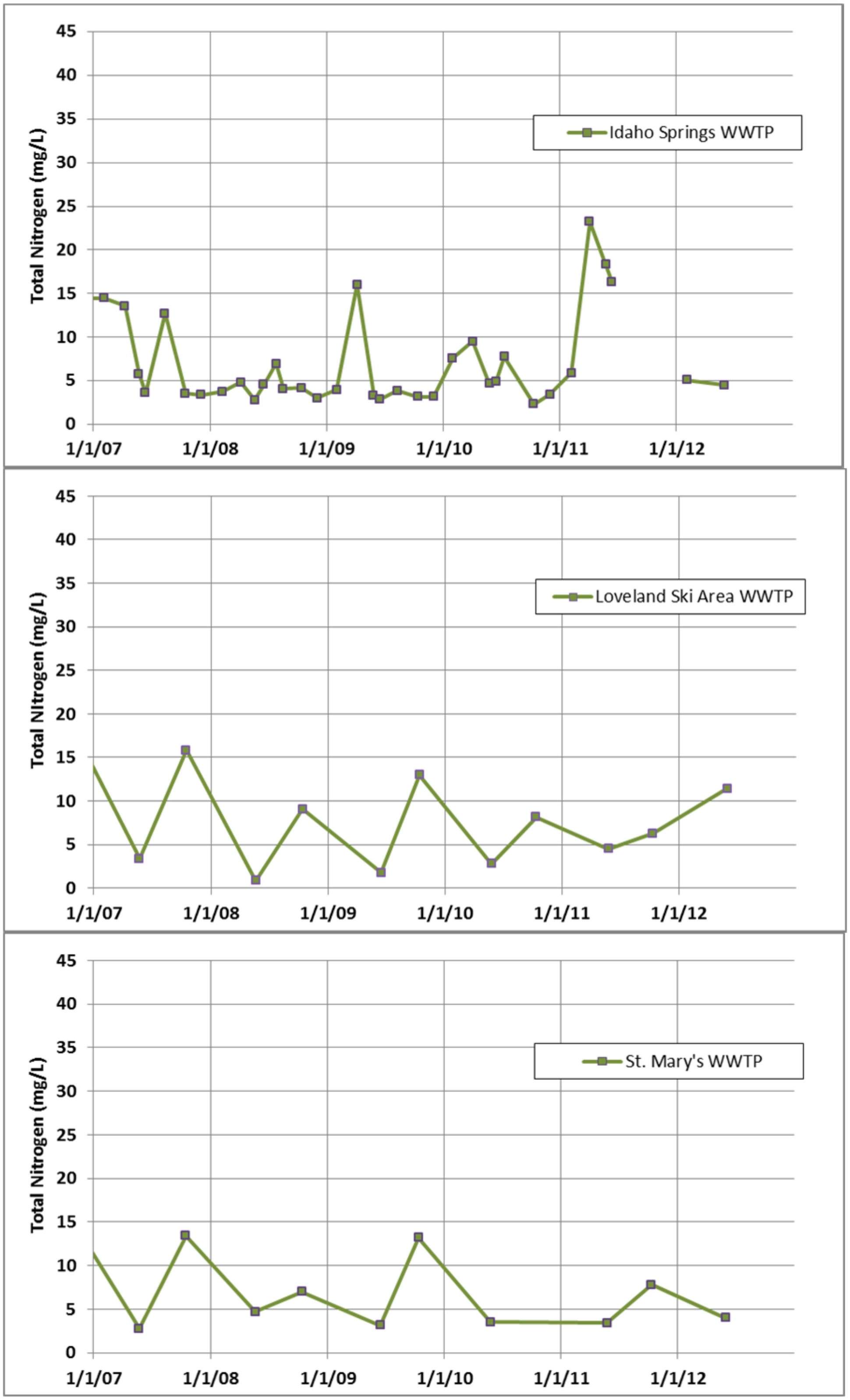


Figure 16. Effluent TN Concentrations (2007-2012) for Idaho Springs, Loveland Ski Area, and St. Mary's

Illicit Discharges and Emergency Response

Illicit discharges

In 2012, the City of Golden responded to 34 reports of discharges or potential discharges to the storm sewer system, issuing 15 written warnings, 17 verbal warnings and billing two parties for clean-up costs.

Emergency Response

In order to promptly and effectively notify downstream users of water from Clear Creek of any potential contamination from an upstream source, Clear Creek County uses the Code Red emergency call-down system. The Clear Creek Office of Emergency Management continues to maintain and update the database for the call lists. The system applies to incidents and spills into Clear Creek and tributaries leading into Clear Creek that occur in Clear Creek County. Fortunately, in 2012 the Clear Creek Office of Emergency Management did not launch any calls.

The City of Golden Dispatch Center launched 5 calls for incidents within its jurisdiction impacting Clear Creek. In addition, three notifications were generated by CDPHE through the Clear Creek County Environmental Health Department.

Nonpoint Source Control, Stormwater Management, and Abandoned Mine Remediation

Parties to the Agreement made substantial efforts in 2012 to reduce nonpoint sources to Clear Creek, including sediment management on highways, erosion and sediment control in urban areas, onsite wastewater treatment system monitoring, and site remediation. Below are highlights of particular activities.

Management of Sediment from Highway Activities

In 2012, CDOT completed construction on a safety project along SH119 south of Black Hawk. As part of the project, CDOT restored a full mile of North Clear Creek and built a sediment basin to catch sand used on the highway. The basin has a valve that can be closed to contain potentially hazardous spills in this section of the roadway.

Erosion and Sediment Control in Urban Areas

The City of Golden administered 24 stormwater quality construction permits in 2012; conducted 364 erosion and sediment control inspections; issued 91 written notifications of violation, 100 verbal notifications of violation, and used performance security funds for corrections at one site. Golden's Stormwater Maintenance Program conducted 210 inspections of permanent water quality BMPs and sent 195 letters requesting maintenance to land owners, with subsequent 100% compliance. Golden also continues to perform water-quality improvements to existing drainage structures.

Onsite Wastewater Treatment Systems

The Clear Creek County Environmental Health Department issued 24 Onsite Wastewater Treatment System permits in 2012 and continued monitoring existing systems for failure. No failures were identified during the year.

Abandoned Mines Remediation

The Clear Creek Watershed Foundation (CCWF) continued its efforts in remediation of abandoned mine sites, thereby improving water quality in Clear Creek and its tributaries. In 2012, the Foundation completed two erosion and sediment control projects to mitigate mine drainage runoff. These projects were at Lion Creek/Minnesota Mine north of Empire and Trail Creek near Idaho Springs. Additionally, a re-vegetation project was completed for a wetlands demonstration area near Georgetown.

Public Education, Outreach, and Partnerships

A number of activities and events were held in 2012 to educate and involve the public in water quality conservation efforts. These included festivals, seminars, and public meetings, as well as convenient household chemical disposal programs.

General Public Education and Outreach

CCWF organized and hosted the fourth annual Clear Creek Watershed Festival in September 2012. This popular event was held along the banks of Clear Creek in central Idaho Springs and helped raise the consciousness of the community about the watershed. The festival included over 30 environmental education booths, with numerous booths sponsored by UCCWA members and Standley Lake Cities.

The City of Golden Stormwater Program continues its public education campaign by distributing educational materials and attending or hosting public events, including the Waterwise Seminar, the Golden Flower Show, and Greener Golden.

Figure 17. Golden Community Garden. (Photo from http://www.goldencommunitygarden.org/index.html)

Starting in late 2012, the City of Golden conducted a series of meetings to discuss better ways to protect and improve Clear Creek riparian areas within the city limits. Low water levels and hot days drew many more visitors to the Golden area than in previous years, prompting city officials and interested citizens to come together. New improvements include widening the existing trail along the Creek and prohibiting access to some sensitive or compromised riparian areas.

Recycling and Disposal of Household Chemicals and Hazardous Waste

In 2012, the City of Golden contributed $7,903 to the Rooney Road Recycling Center. The City actively participates as a member of the Board of Managers for the Rooney Road Recycling Center Authority. This facility provides critical recycling and disposal services of household chemicals and annually serves more than 3,000 Jefferson County residents. Less than 1% of all materials collected at the facility are deposited in landfills. The City has also been an active founding member of the Rooney Road Recycling Center Foundation. The foundation was created to help secure additional funding for the Rooney Road Recycling Center Authority to further grow the number of residents served by the chemical recycling and disposal aspect of the facility.

The Clear Creek County Transfer Station sponsored three Household Hazardous Waste Collection events, collecting a total of 5,640 units of material. The Transfer Station also collected and transferred 1,074 tons of municipal waste to an appropriate disposal site and sent 4,334 units of recyclable materials for reuse.

Pharmaceutical Disposal

The Drug Enforcement Administration (DEA) once again sponsored National Pharmaceutical Take-Back Days in 2012. These nationwide events provided a unified opportunity for the public to surrender expired, unwanted, or unused pharmaceutical controlled substances and other medications to law enforcement officers for destruction. The DEA's efforts bring national focus to the issues of pharmaceutical substance abuse and the hazards associated with contamination of our water systems with prescription drugs. DEA efforts also provide a secure outlet for disposal that will protect our water resources. In 2012, the City of Arvada collected 1,224 pounds of medications, the City of Golden collected 167 pounds, and the Standley Lake Cities collected 1,167 pounds.

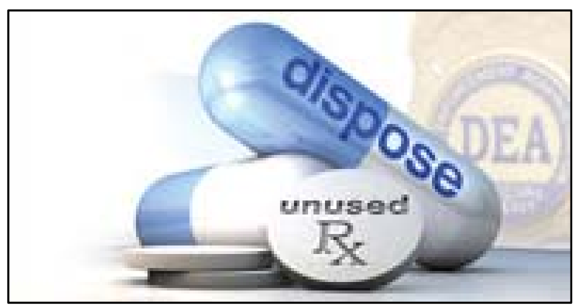


Figure 18. National Take-Back Initiative (Image from http://www.deadiversion.usdoj.gov/drug_disposal/takeback/)

Youth Water Festival

On May 15, 2012, fourth and fifth graders converged to learn about a variety of Colorado water topics. Children from the water service areas of Thornton, Northglenn, and Westminster participated in the annual Youth Water Festival at Front Range Community College in Westminster. Over 1,100 students, teachers and parents attended the event, which offered a day of fun and educational workshops featuring active learning and hands-on activities. Fifty-five presenters from local, state, federal, non-profit, and private businesses provided the time and energy needed to make this a successful event. The Festival's workshops were designed to teach students about water conservation, water chemistry, the water cycle, local water supplies, water treatment, Colorado water law, aquatic wildlife, ecology and more. For a well-rounded experience, each class of about twenty-eight students was scheduled to attend five to six workshops on different topics during the day.

The 2012 Water Festival was funded by the cities of Northglenn, Thornton and Westminster. Front Range Community College also contributed by providing discounted facility rental rates.

Figure 19. 2012 Youth Water Festival: Water Conservation at Home (left) and Water Quality Analysis (right)

Planning Activities

Wildfire Watershed Assessment

In 2012, UCCWA and the Standley Lake Cities contributed toward the cost of preparing the Clear/Bear Creek Wildfire Watershed Assessment. The assessment was developed by JW Associates Inc. The goal of the assessment was to develop priority maps and zones of concern along with identification and prioritization of measures to protect critical water supplies in the event of a wildfire. Possible post-wildfire adverse effects considered include flooding, erosion, debris flows, and deposition. The initial analysis for the Clear Creek watershed was completed as part of the Bark Beetle Incident Watershed work. Figure 20 shows a map of resultant wilfire hazard rankings. The Clear/Bear Creek Wildfire/Watershed Assessment Report (JW Associates Inc., 2013) was completed on March 1, 2013 and is available through the JW Associates Inc. website (http://www.jw-associates.org/clearbearcreek.html).

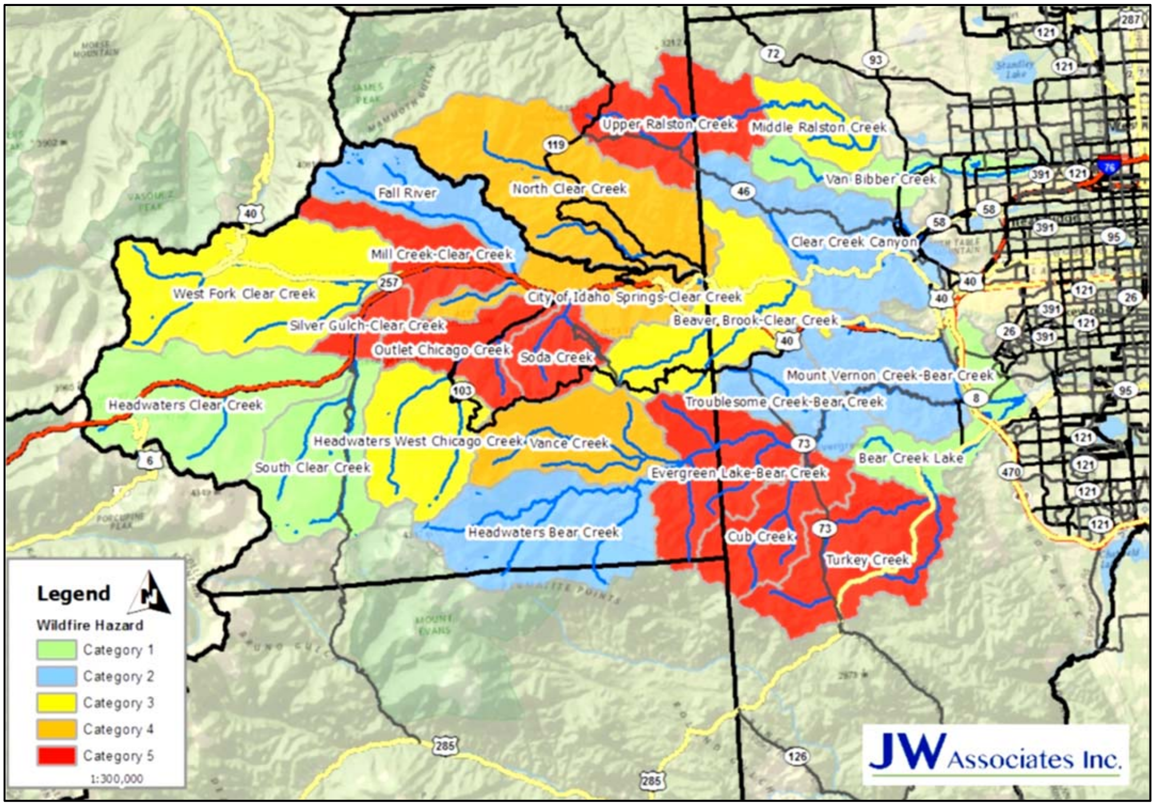


Figure 20. Clear/Bear Creek Watershed Wildfire Hazard Ranking, Figure 3 in JW Associates Inc, (2013)
Note: Wildfire Hazard Rankings shown on this figure reflect Composite Hazard Rankings, with Category 1 being the lowest hazard and category 5 being the highest.

Reservoir Modeling

In an effort to better understand the factors influencing water quality in Standley Lake and to protect this water resource, the existing dynamic, mechanistic model was refined and updated to simulate water-quality constituents for 2005-2011. Model refinements and accompanying data analyses, conducted by Hydros Consulting on behalf of the Standley Lake Cities, resulted in an improved understanding of reservoir water-quality dynamics, including the following:

- A relationship is observed between hydraulic residence time and average summertime chlorophyll *a* concentrations, whereby decreased residence times result in lower chlorophyll *a* concentrations. Higher summer chlorophyll *a* concentrations can be important in that 1) they result in a higher base from which fall increases occur, and 2) they more directly impact chlorophyll *a* standards assessment computations.
- The mean 2005-2011 hydraulic residence time is about 1 year; thus advection (transport due to bulk flow of water) is likely an important aspect of reservoir mixing. During this six-year period, reservoir releases were higher and reservoir contents were lower than in earlier years, resulting in more flushing. Annual hydraulic residence times for the period 1990-1995 were 20% higher.

- Spring-time releases from the reservoir appear to play a role in the onset of hypoxia in the hypolimnion.
- Years with longer periods of hypoxia have higher ammonia and total phosphorus concentrations in the hypolimnion during late summer / early fall.
- There are consistent patterns of ammonia, nitrate, phosphorus, and DO in the hypolimnion of the reservoir.
- Meteorological factors, such as solar radiation and air temperature, appear to impact algal growth and the hypoxic period.
- Historically, KDPL has had high volume-weighted concentrations of TP, TN, and Total Organic Carbon (TOC), relative to other sources, and thus affects reservoir water quality. In recent years, however, concentrations of TP and TN constituents have significantly decreased. Volume-weight concentrations of TOC, however, have remained high.
- The observed decline in volume-weighted concentrations of nutrients in Church Ditch coincides with the implementation of the Church Ditch by-pass in 2009.

Sediment Management, Erosion Control and Spill Containment

CDOT continued work on the Clear Creek Sediment Control Action Plan (SCAP). SCAP features will be incorporated into future capital projects along the I-70 corridor within Clear Creek County, and may include sediment basins or other structures to collect sediment.

Other Activities

Black Hawk's Hidden Valley Water Treatment Plant

The Hidden Valley Water Treatment Plant completed construction of a new raw water intake and infiltration gallery. The new infiltration gallery is located under the channel and consists of six horizontal well screens that extend into the creek. The water quality taken into the water treatment plant was greatly improved with the addition of the infiltration gallery.

Figure 21. Hidden Valley Water Treatment Plant Infiltration Gallery

North Fork Flow Issues

Construction of a CDPHE/EPA water treatment facility intended to remove heavy metals from the North Fork of Clear Creek was postponed due to the effects of existing water rights in the stream that could render the facility of little or no value. In an effort to move the project forward, CDPHE, Gilpin County, the City of Black Hawk, the City of Central and other agencies began negotiations to resolve the conflict. Progress is being made and the hope is that construction can commence by 2014.

Upper Basin 208 Management

UCCWA is the designated 208 management agency for the Upper Basin responsible for testing, monitoring, overseeing, and reporting water-quality and water-resource issues through the upper portion of the Clear Creek watershed. In that capacity, UCCWA reviewed and commented on two referrals in 2012; one from Clear Creek County and one from the U.S. Forest Service.

Green Lake

The City of Black Hawk, along with Clear Creek County, has been operating Green Lake which receives water delivery by way of Vidler Tunnel and Leavenworth Creek. The County and City installed an additional 630 linear feet of 18-inch pipe starting at the headgate at Leavenworth Creek toward the lake. The remaining “old” pipe will be replaced in stages over the next three years.

Figure 22. New Pipe from Leavenworth Creek toward Green Lake

Georgetown Lake

The City of Black Hawk continues to work with the Town of Georgetown to upgrade the existing Georgetown Lake Dam outlet. Smith Geotechnical was hired to complete the final design. The new outlet will be able to pass a flow of at least 500 cubic feet per second. This will reduce the out-of-priority storage in the lake.

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 (Myriophillum sibiricum). The hybrid species is more robust and grows even faster than the Eurasian watermilfoil.

EWM weevils have been stocked in the lake (on the west side) on four occasions from 2004 through 2011. The weevil larvae 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. Annual surveys of weevil populations in the lake are performed by contractors. Standley Lake experienced a steady milfoil density decline from 2006 to 2011, from 500 stems/m^2 to 26 stems/m^2. Unfortunately with the appearance of the hybrid milfoil, the density again increased in 2012 to 106 stems/m^2.

In 2007 the SLC initiated a pilot study on Standley Lake using two solar pond aerators to investigate the theory that continuous aeration would oxidize the sediment and deprive the milfoil of nutrients. Samples were collected and analyzed for nutrients to assess nutrient reduction at the aerator sites compared to other sites in the lake. The solar aerators were removed in the fall of 2009. The results of the study were inconclusive as there was an overall reduction in milfoil growth throughout the lake in 2009.

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. Additionally, no live aquatic baits are allowed at Standley Lake.

Standley Lake is monitored for aquatic mussels every two weeks using the zooplankton tow procedure. 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 can 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.

IV. Upper Basin Water Quality

The previous section highlighted particular activities and accomplishments of various groups to enhance and protect water quality. This section presents an analysis of 2012 water-quality data in the Upper Basin. Constituents presented include discharge (flow), total suspended solids, total phosphorus, and total nitrogen. The analysis is based on grab sample data collected at sampling locations CC26 (Clear Creek at Lawson Gage) and CC60 (Clear Creek at Church Ditch Headgate), combined with data from the the respective proximal ambient autosamplers, CCAS26 (Clear Creek at Lawson Gage) and CCAS59 (Clear Creek 2 miles west of Highway 58/US-6). Locations CC26 and CCAS26 (jointly referred to as simply CC26 in this report) provide information on water quality in the upper portion of the Upper Basin, while CC60 and CCAS59 (jointly referred to as CC59/60) provide data at the bottom of the Upper Basin near Golden. Figure 7 in Section II indicates the locations of these key sampling stations.

Discharge

Flow rates in 2012 were low relative to the recent record due to low snowpack. Annual hydrographs for the key Upper Basin locations (CC26 and CC60) are presented in Figure 23, compiled from mean daily flow rates. Flow rates began to increase in late March, coinciding with snowmelt and spring runoff. The runoff reached a peak in early June then decreased, with a subsequent spike (the maximum flow of the year at CC60) in early July. The July 7 spike coincided with a storm that contributed 1.6 inches in a single day in the Upper Basin near Georgetown and 2.7 inches in 3 days near Golden (according to data from Utah Climate Center) and triggered an event autosampler response at CC60.

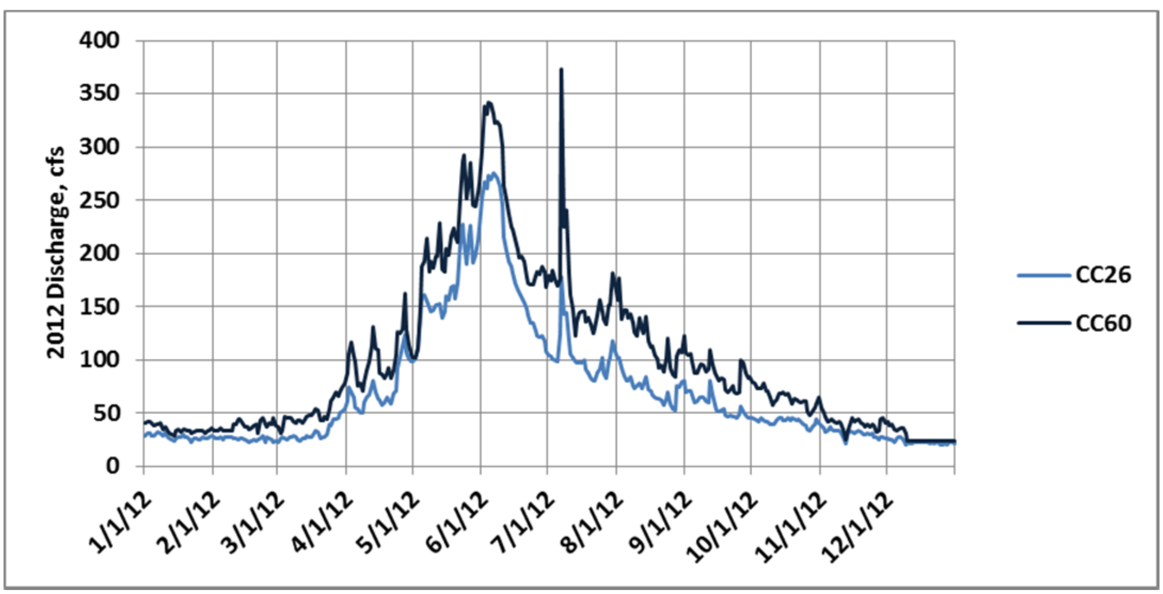


Figure 23. 2012 Hydrographs for the Upper Basin (CC26, CC60)

The total flow volume through Clear Creek was low in 2012, relative to recent previous years. Compared with the average of the previous five years (2007-2011), 2012 annual flows were 53% below average at CC60 and 55% below average at CC26. This stands in particular contrast to the prior year, 2011, which was an unusually high runoff year. Total annual flow volumes (in acre-feet per year) for 2007-2012 are presented in Figure 24, which also indicates the 2007-2011 average flow volume at each location for reference. The lower runoff in 2012 is strikingly apparent in the overlaid hydrographs from CC60 for years 2007-2012, presented in Figure 25. The effects of these lower flow conditions on water quality are examined in the following sections.

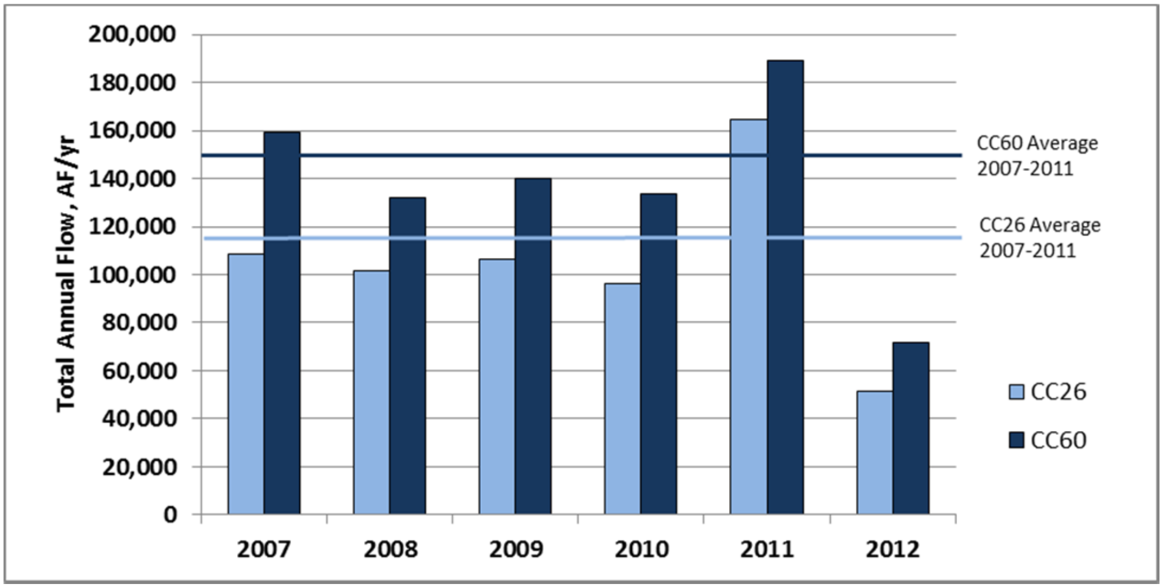


Figure 24. Total Annual Flow in Clear Creek at CC26 and CC60, 2007-2012

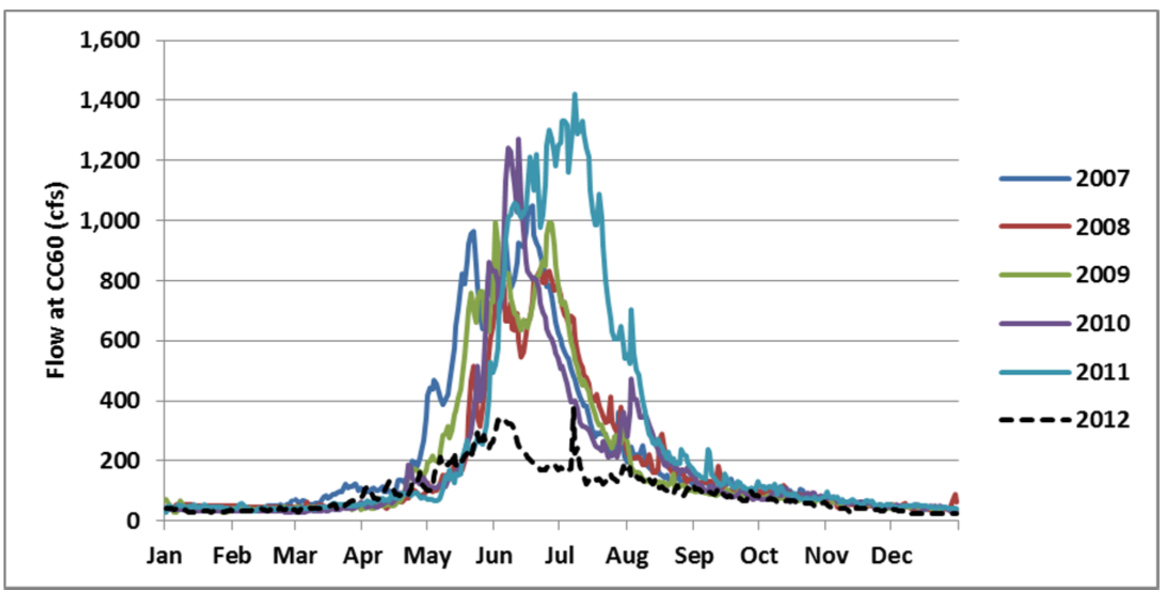


Figure 25. Annual Hydrographs for 2007-2012 in the Upper Basin (CC60)

Total Suspended Solids

Total suspended solids concentrations in the Upper Basin for 2012 are presented in Figure 26. The lower part of the basin (location CC59/60) experienced higher concentrations than the upper portion of the basin (CC26). This is consistent with previous years and reflects land use loading patterns. The peak TSS concentration (14 mg/L) was measured at CCAS59 on 7/30/12 following several storms (totaling 2.3 inches of precipitation near Georgetown over 7 days, and 0.6 inches near Golden), but well after peak runoff and the July 7 stormwater event which is apparent on the annual hydrograph.

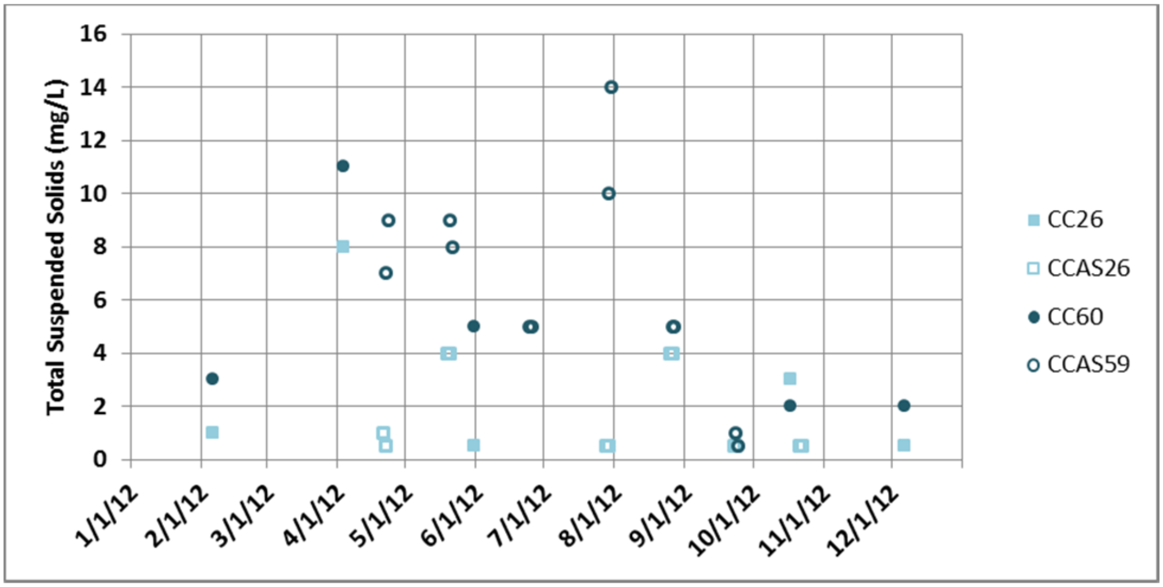


Figure 26. Total Suspended Solids Concentrations in the Upper Basin, 2012

TSS concentrations in the Upper Basin for 2007-2012 are presented in Figure 27. The pattern of higher concentrations at the lower location (CC59/60) is apparent. When compared to previous years, peak 2012 TSS concentrations, particularly at CC59/CC60, were noticeably lower. Lower runoff rates tend to mobilize fewer solids from the watershed and within the channel (via resuspension).

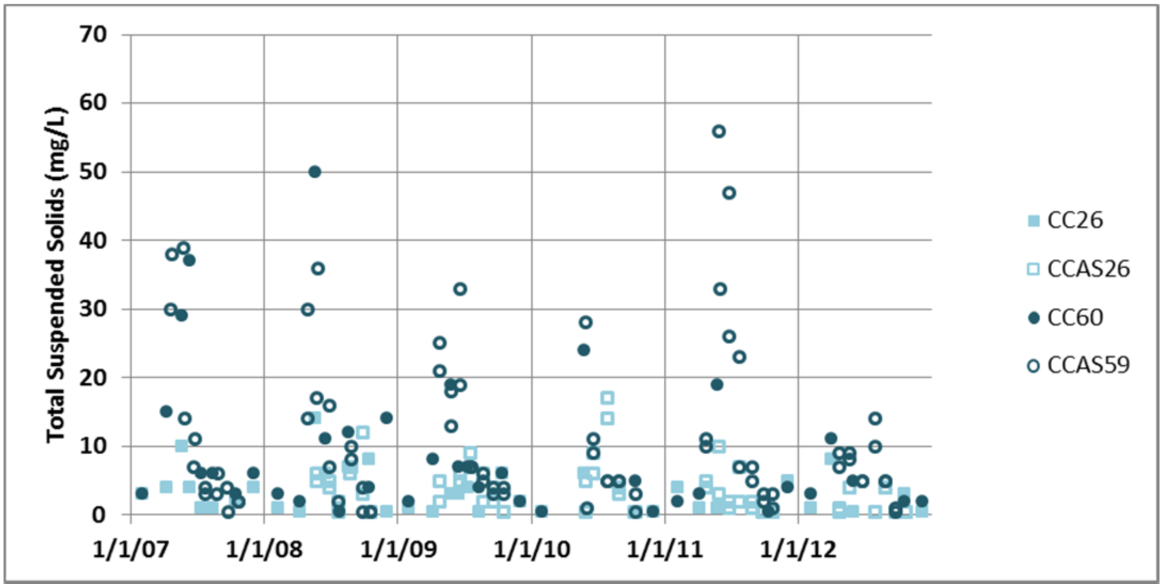


Figure 27. Total Suspended Solids Concentrations in the Upper Basin, 2007-2012

Average monthly TSS concentrations at CC59/60 are presented in Table 1 for 2012 and previous years (2007-2011). For the majority of the year, TSS concentrations in 2012 were substantially lower than the 2007-2011 average for each month, with the exceptions of February and July.

Table 1. Monthly Average Total Suspended Solids Concentrations in the Upper Basin at CC59/60

Month	2012 TSS Concentrations (mg/L)	2007-2011 Average TSS (mg/L)	% Change in 2012 from the 2007-2012 Average
February	2.0*	2.0	0%
April	6.1	10.5	-42%
May	5.1	18.2	-72%
June	5.0	12.5	-60%
July	6.3	6.1	+3%
August	4.5	5.1	-11%
September	0.6	3.1	-80%
October	1.5*	2.1	-29%
December	1.3*	3.9	-68%

*Average based on one observed value.

An examination of TSS loading in the Upper Basin helps to further quantify the disparity between 2012 and previous years. Figure 28 presents annual TSS loading at CC26 and CC59/60 for 2007-2012. The load in 2012 was 81% lower at both locations than the respective 2007-2011 averages indicated on the figure.

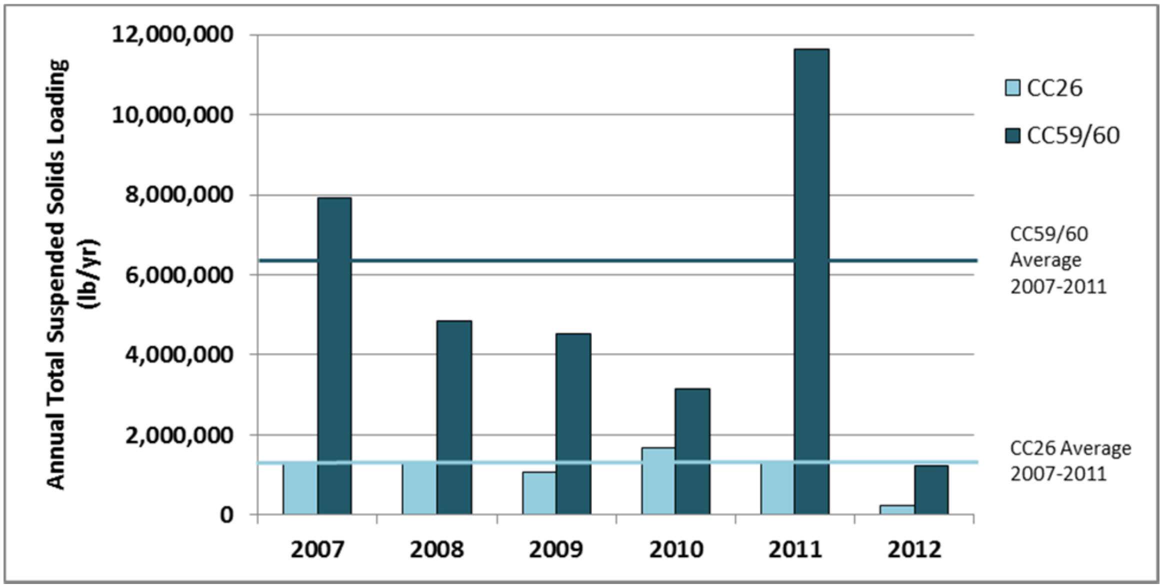


Figure 28. Total Suspended Solids Loading in the Upper Basin, 2007-2012

Volume-weighted TSS concentrations in 2012 were also lower than observed in previous years. Figure 29 presents volume-weighted concentrations at both key locations for 2007-2012. The average 2012 volume-weighted concentration was 60% lower than the 2007-2011 average at CC26 and 58% lower at CC59/60.

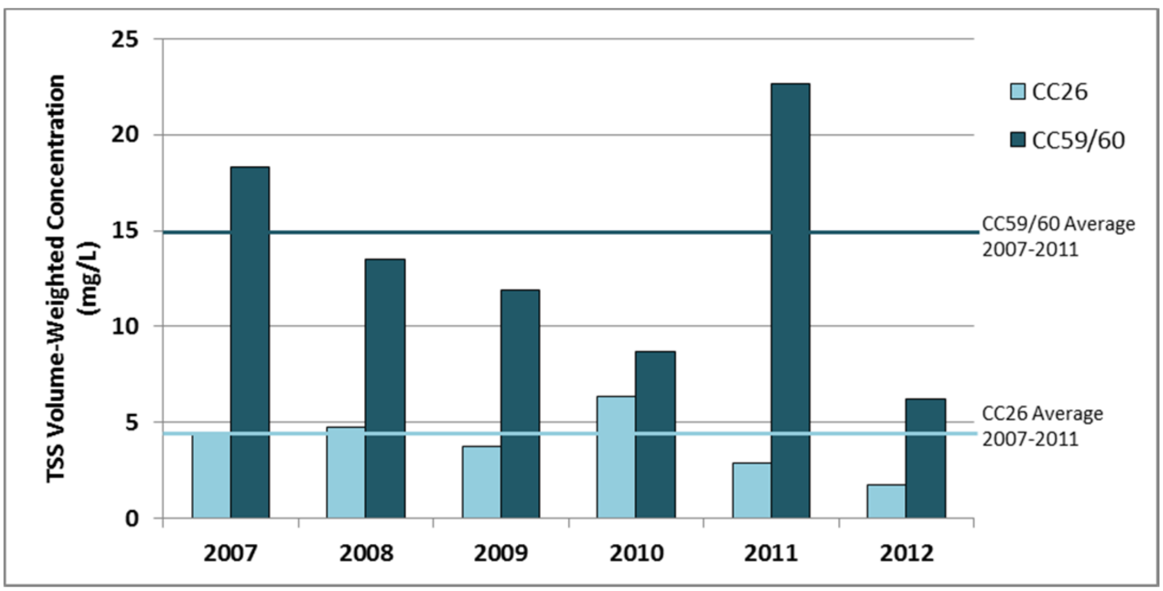


Figure 29. Total Suspended Solids Volume-Weighted Concentrations in the Upper Basin, 2007-2012

Total Phosphorus

Total phosphorus concentrations observed in 2012 in the Upper Basin are presented in Figure 30, including grab samples and ambient autosampler data. Total phosphorus concentrations generally increase at both locations in the spring and summer, then decrease from late summer through fall. Concentrations tend to be higher at CC56/CC60 relative to CC26 during spring and summer, but more comparable in late summer and fall. This likely reflects the similar pattern observed for TSS. The maximum measured concentration of 24.5 µg/L occurred on 7/30/12 at CCAS59, which is the same date as the maximum TSS concentration, following a period of storms.

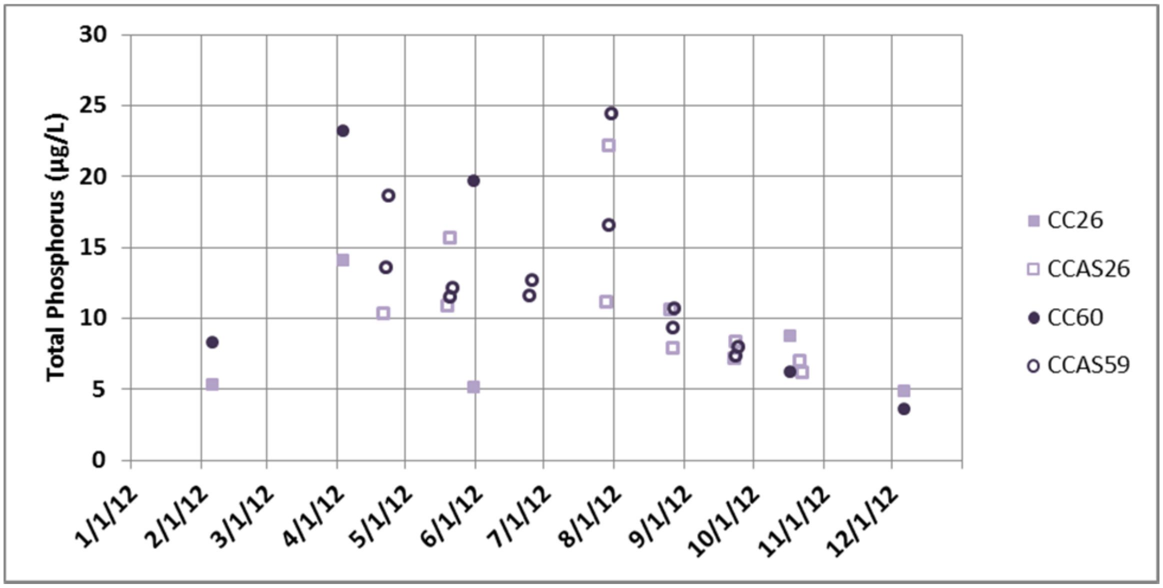


Figure 30. Total Phosphorus Concentrations in the Upper Basin, 2012

The seasonal TP pattern observed in 2012 is generally consistent with that observed in previous years. Upper BasinTP concentrations for 2007-2012 are displayed in Figure 31.

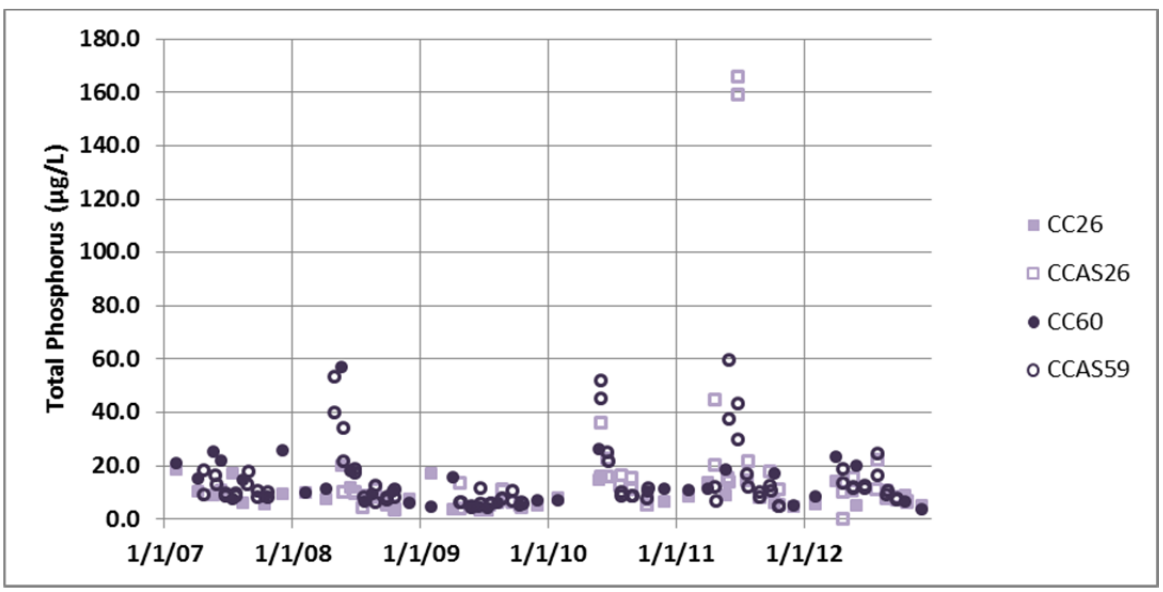


Figure 31. Total Phosphorus Concentrations in the Upper Basin, 2007-2012

Table 2 presents monthly average TP concentrations for 2012 and for the 2007-2011 average. With the exception of July and April, most months in 2012 have TP concentrations below the 2007-2011 monthly averages. July 2012 shows an 89% increase from the July average for 2007-2011, and April shows a 13% increase over the respective average. The high July average includes the maximum annual TP concentrations from 7/30/2012 following a period of storms.

Table 2. Monthly Average Total Phosphorus Concentrations in the Upper Basin at CC59/60

Month	2012 Average TP (µg/L)	2007-2011 TP (µg/L)	% Change in 2012
February	6.8*	11.4	-41%
April	16.0	14.2	+13%
May	12.5	21.7	-42%
June	12.2	28.6	-57%
July	18.6	9.9	+89%
August	9.7	9.8	-2%
September	7.8	9.2	-16%
October	7.0*	7.2	-3%
December	4.3*	8.7	-51%

*Average based on one observed value.

For additional perspective, TP loading in the Upper Basin is presented in Figure 32 for 2007-2012. The loads in both locations were similar in 2012 to those observed in 2009 and lower than the averages at each location for the previous five-year period. The TP load was 67% lower than the 2007-2011 average load at CC26, and 64% lower at CC59/60.

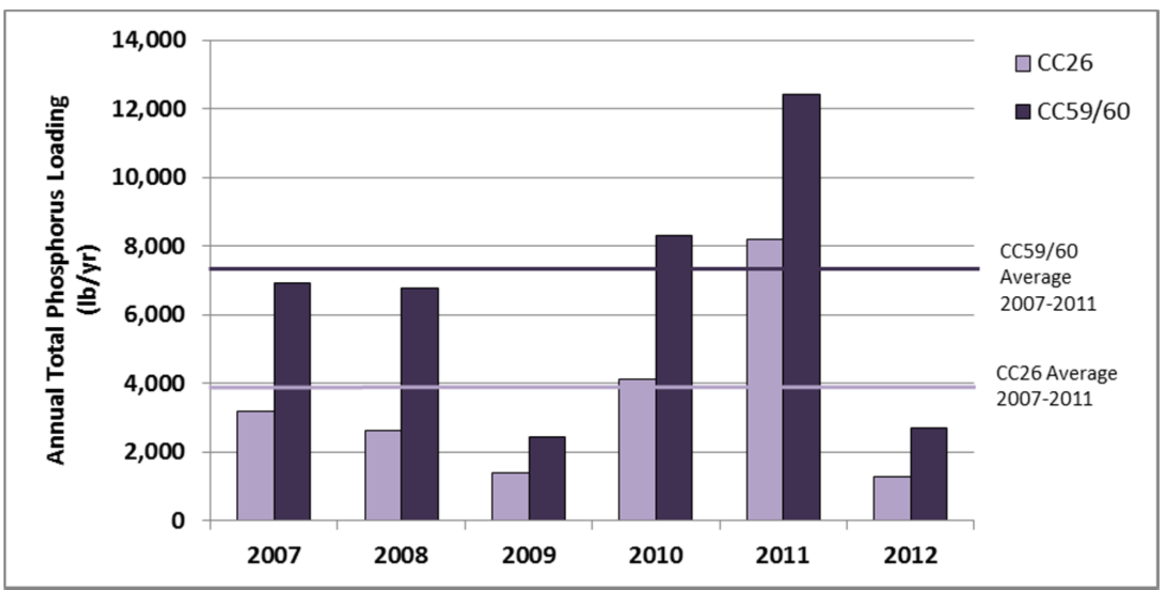


Figure 32. Annual Total Phosphorus Loads in the Upper Basin, 2007-2012

Volume-weighted concentrations in the Upper Basin for 2007-2012 are presented in Figure 33. The volume-weighted concentrations at both locations were higher in 2012 than in 2009 (the year with a similar total TP load), but still lower than the five-year 2007-2011 averages indicated in the figure (23% lower at CC26 and 22% lower at CC59/60).

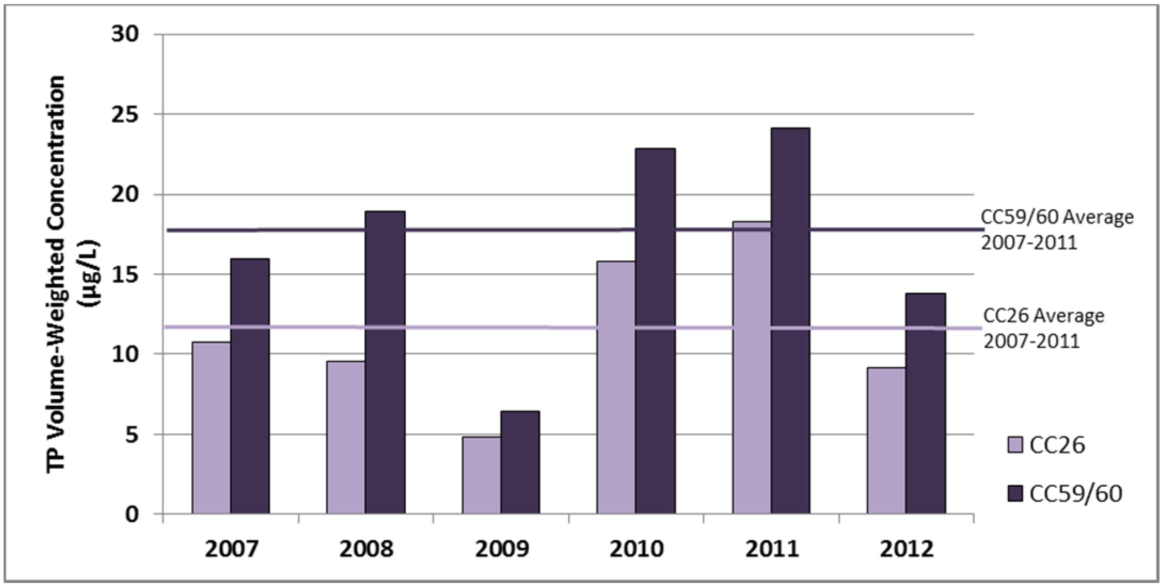


Figure 33. Volume-Weighted Total Phosphorus Concentrations in the Upper Basin, 2007-2012

Total Nitrogen

Figure 34 presents ambient total nitrogen concentrations observed in the Upper Basin for 2012 based on grab samples and 24-hour composite autosampler data. Data from both stations follow the same general seasonal pattern, with lower concentrations during the snowmelt runoff, a spike in July, then an increase from September through the end of the year. The mid-summer peak concentration was observed on 7/30/2012, coincident with the peak TSS and TP concentrations.

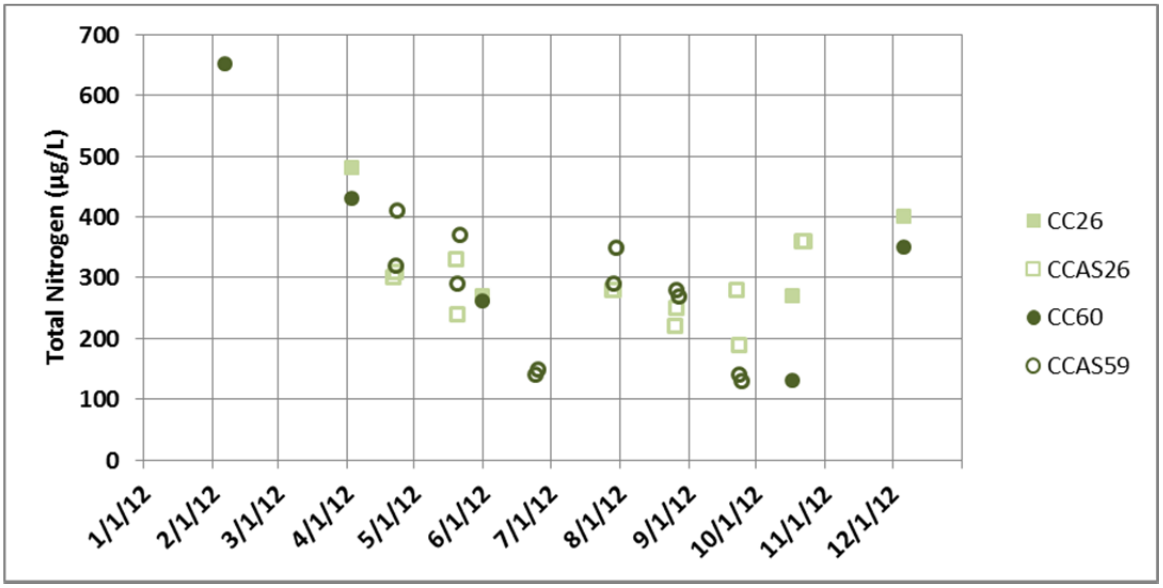


Figure 34. Total Nitrogen Concentrations in the Upper Basin, 2012

This temporal pattern is consistent with previous years, as shown in Figure 35. The minimum and maximum observed concentrations, however, were lower in 2012 than in the previous five years.

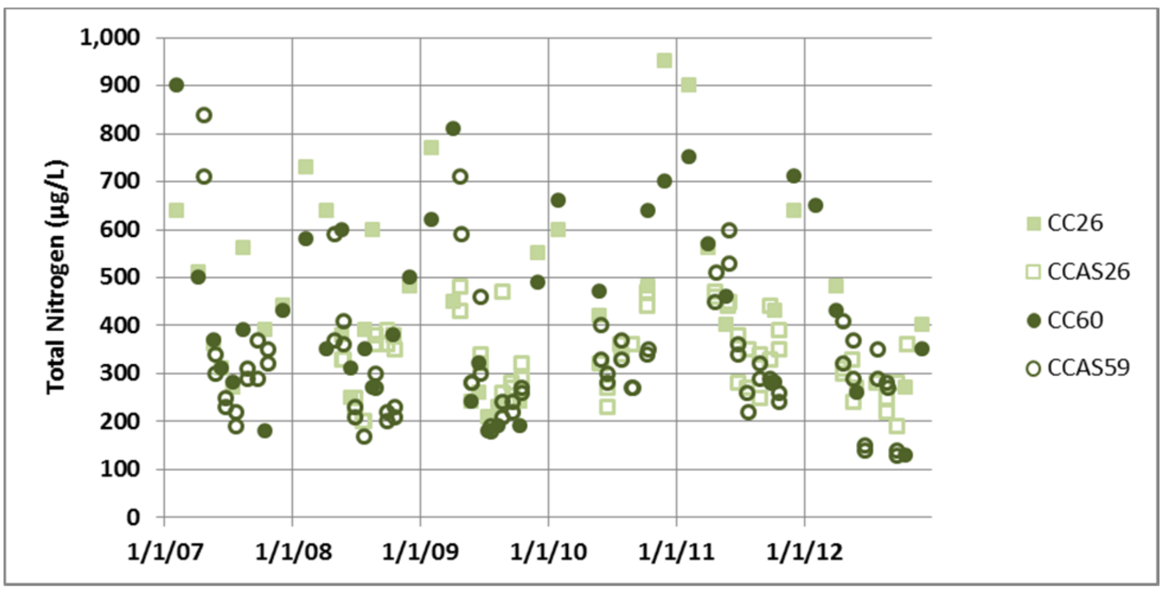


Figure 35. Total Nitrogen Concentrations in the Upper Basin, 2007-2012

A comparison of monthly average TN concentrations at CC59/60 for 2012 and the 2007-2011 average is provided in Table 3. Apart from the month of July, TN concentrations were lower in 2012 than the previous five year average. July, however, represented a 15% increase over the 2007-2011 July average. As noted above, there were several small storm events in late July.

Table 3. Monthly Average Total Nitrogen Concentrations in the Upper Basin at CC59/60

Month	2012 TN (µg/L)	2007-2011 Average TN (µg/L)	% Change in 2012
February	650*	715	-9%
April	375	548	-32%
May	293	388	-24%
June	145	303	-52%
July	300	261	+15%
August	255	325	-21%
September	185	299	-38%
October	280*	336	-17%
December	375*	589	-36%

*Average based on one observed value.

Annual TN loading in the Upper Basin for 2007-2012 is shown in Figure 36. The 2012 loading is visibly lower than in previous years. Compared with the 2007-2011 respective averages indicated on the figure, 2012 TN loading was 59% lower at CC26 and 61% lower at CC59/60.

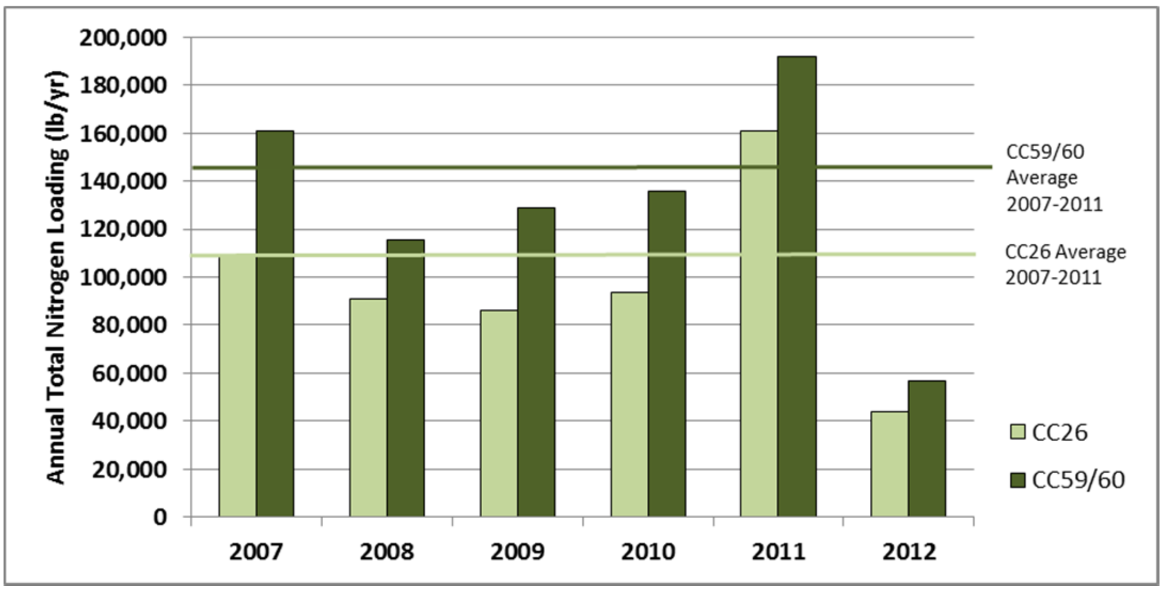


Figure 36. Total Nitrogen Loading in the Upper Basin, 2007-2012

In terms of volume-weighted concentrations, however, TN in 2012 was not so different from previous years. Figure 37 presents volume-weighted TN concentrations in the Upper Basin for 2007-2012, with the 2007-2011 average indicated for each location. At CC26, the volume-weighted average TN concentration in 2012 was 8% lower than the respective 2007-2011 average and 18% lower at CC59/60.

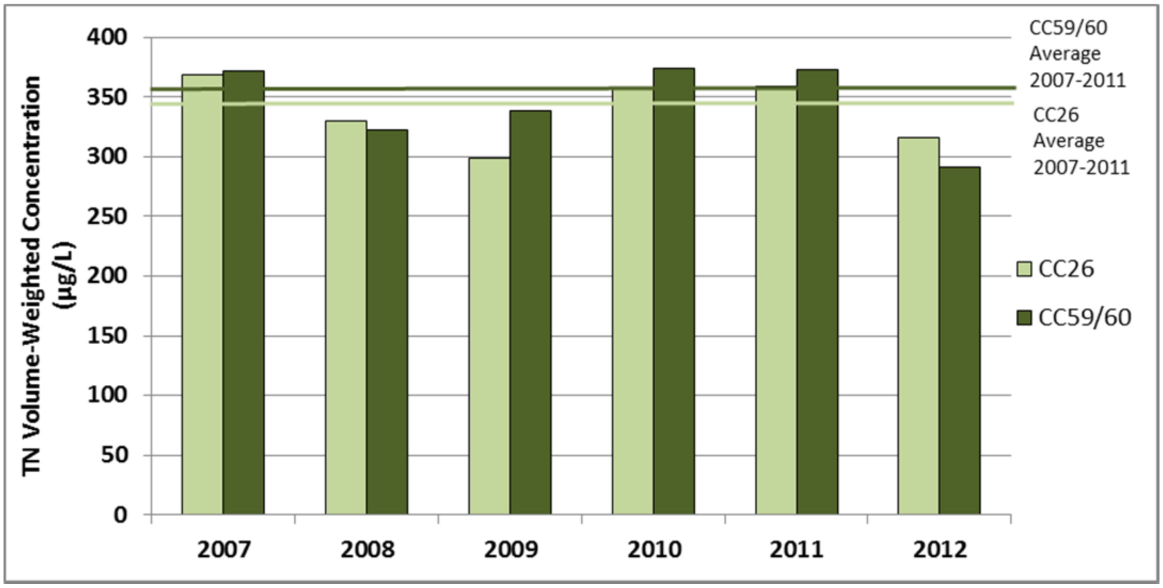


Figure 37. Volume-Weighted Total Nitrogen Concentrations in the Upper Basin, 2007-2012

Effects of Storm Events on Loading

The loading calculations presented above and in previous reports incorporate grab samples and ambient autosampler data. Event-triggered autosampler data are not included in those annual loading estimates. As discussed in the 2011 Clear Creek/Standley Lake Annual Report, storm events do have the capacity to substantially impact nutrient loading estimates. In 2012, four events were sampled at CCAS59 (two 24-hour composite samples each for two events), and no event-triggered samples were collected at CCAS26. The dates of the sampled events were 7/6/12, 7/7/12 (corresponding to the hydrology spike described above), 8/1/12, and 8/2/12. Incorporating these event samples into the annual loading calculations yields increases of 12% for TN, 64% for TP, and 62% for TSS. The effects are even more apparent in the monthly loading for the months in which the events occurred (July and August 2012). Table 4 presents a summary of the increase in TN, TP, and TSS loading on an annual scale and a monthly scale for the events sampled in 2012 at location CCAS59. Storm-event concentrations were assumed to represent concentrations for the full day of the composite sample, though runoff events can cover longer or shorter periods.

Table 4. Effect of Storm Events on Annual and Monthly Loading with 2012 Event Autosampler Data at CCAS59

Time Period	Increase in TN Loading with Storm Events	Increase in TP Loading with Storm Events	Increase in TSS Loading with Storm Events
2012 (Annual Load)	12%	64%	62%
July 2012 (Monthly Load)	91%	283%	189%
August 2012 (Monthly Load)	17%	156%	185%

Figure 38 presents a comparison of nutrient loads with and without available storm event data for 2012 at CCAS59. The results from this analysis show that annual loads for 2012 do increase for TN, TP, and TSS with the incorporation of storm events, with the largest increases in TP and TSS loading. This is consistent with the results reported in the 2011 Clear Creek/Standley Lake Annual Report regarding the effects of storm events on annual nutrient loading.

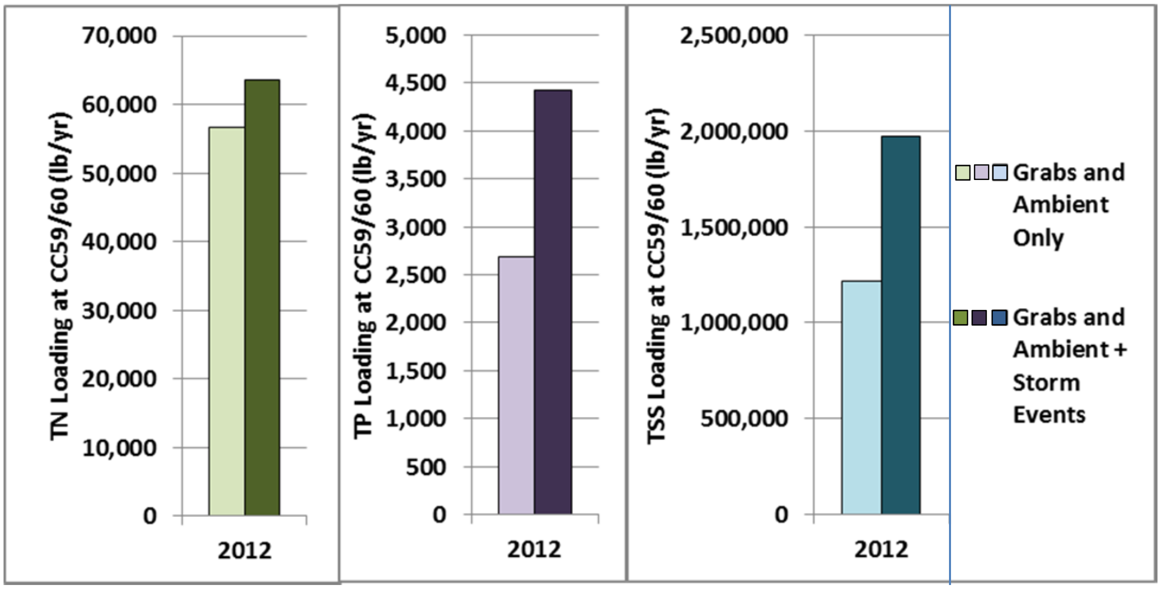


Figure 38. Total Nitrogen, Total Phosphorus, and Total Suspended Solids Loading in 2012, With and Without Storm Events

V. Standley Lake Inflow, Outflow, and Volume

The preceding section discussed water quality in the Upper Basin. Here, inflow to and outflow from Standley Lake is described, along with lake volume. Water enters Standley Lake through four managed sources: Church Ditch, Croke Canal, Farmers' High Line Canal (as described previously and shown in Figure 8), and through the Kinnear Ditch Pipeline (KDPL). Figure 40 presents a hydrograph of the inflow to Standley Lake in 2012 by source. Delivery periods for each source are apparent in the figure. The Croke Canal was the main contributing source from January-March and November-December, following the usual usage pattern, and Farmers' High Line Canal (FHL) was the dominant source for the period April-October. Figure 41 presents a hydrograph of outflow from the lake in 2012, with the largest outflow volumes in June and August.

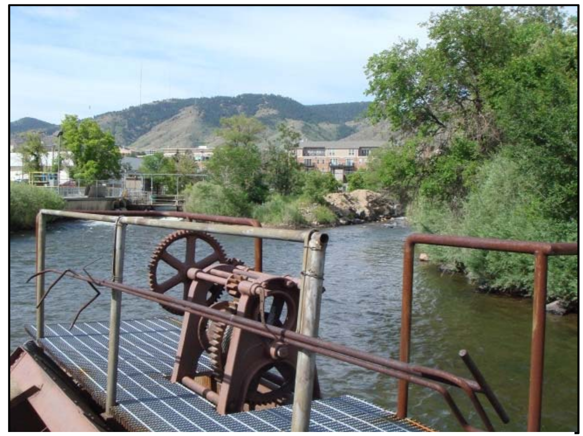


Figure 39. Farmers' High Line Canal Headgate Looking Southwest toward the Confluence of Coors Cooling Water and Clear Creek.

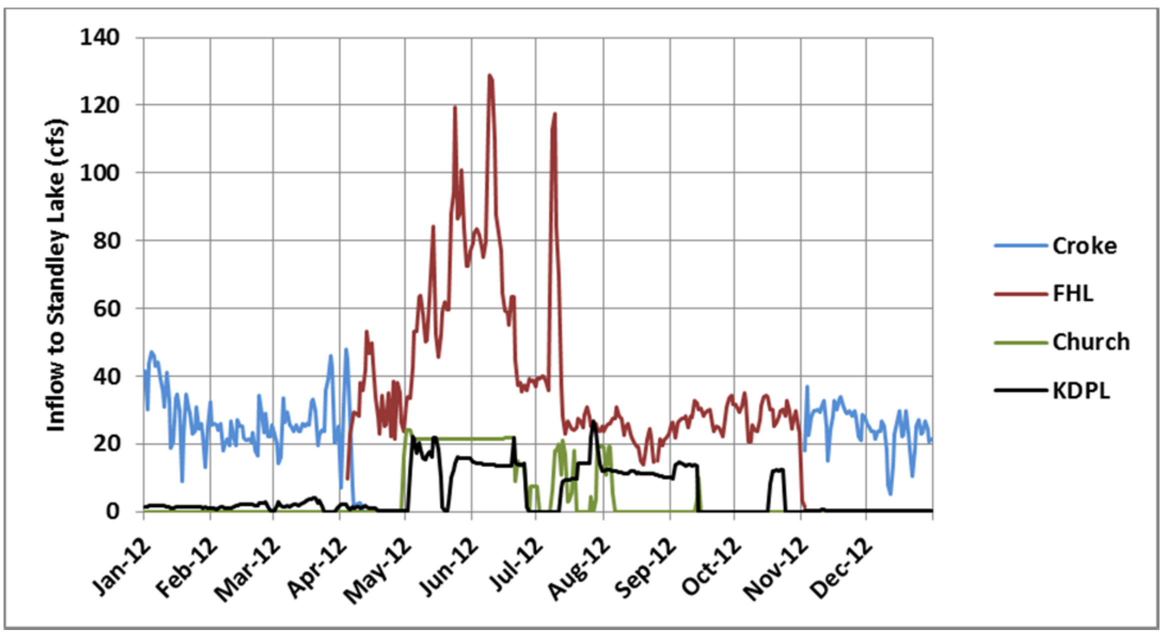


Figure 40. Hydrograph of Inflow to Standley Lake, 2012

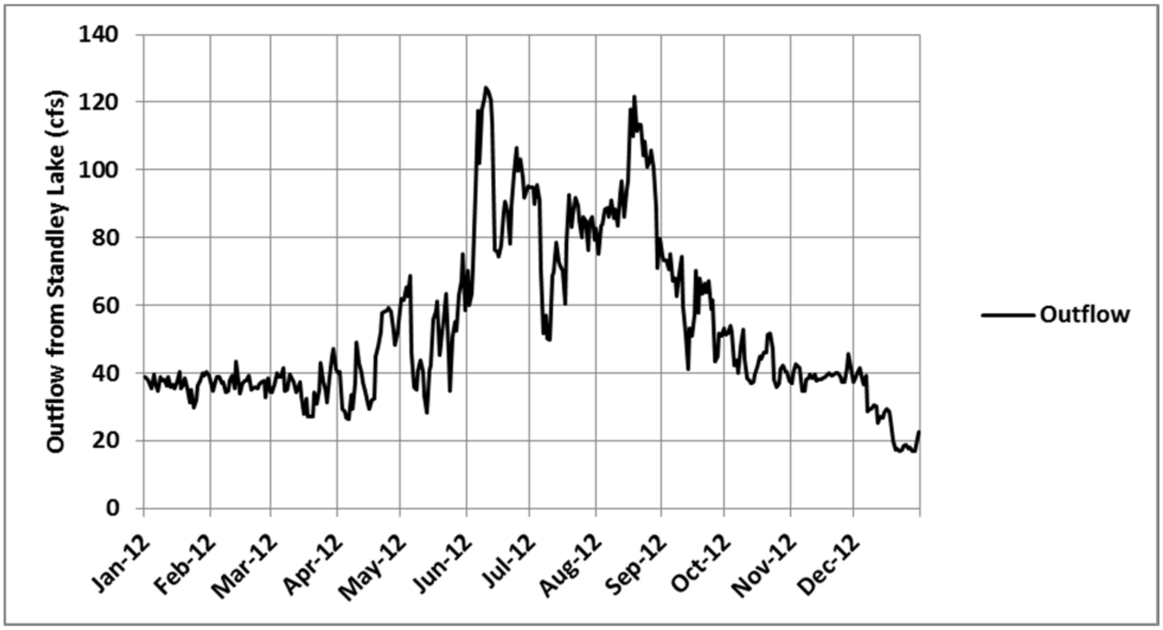


Figure 41. Hydrograph of Outflow from Standley Lake, 2012

The annual inflow volume from each source for 2007-2012 is shown in Figure 42. In 2012, a greater percentage of the inflow into Standley Lake came through the Kinnear Ditch Pipeline (KDPL) – 11% in 2012, as compared to an average of 3% from 2007-2011. This increase from KDPL largely mirrors a decrease in inflows from Farmers' High Line Canal of 26%, relative to the average of the previous five years.

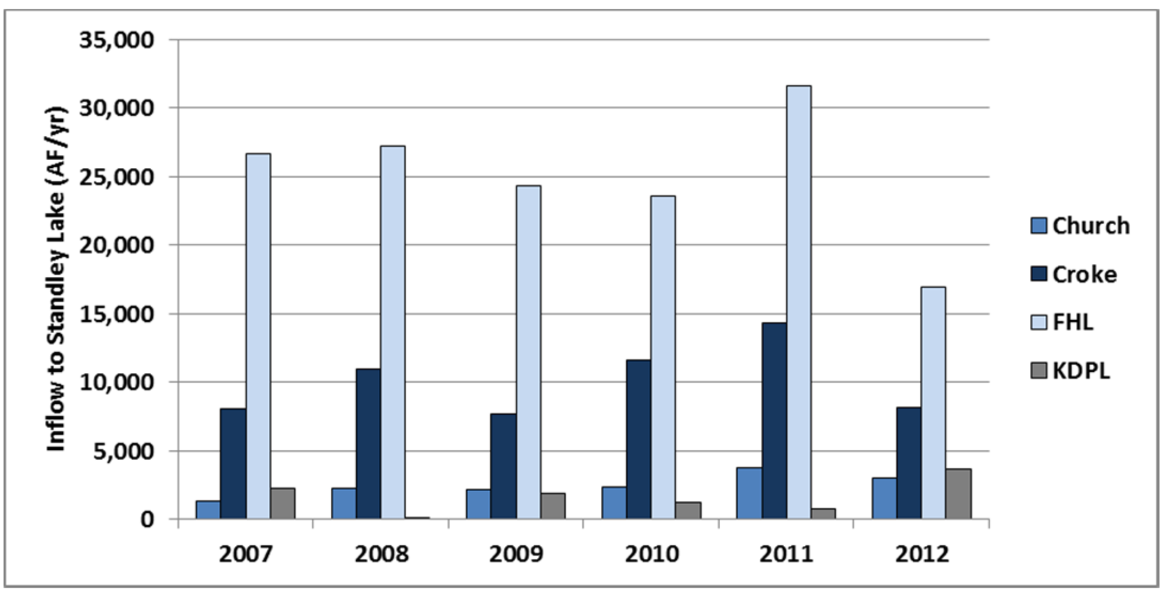


Figure 42. Annual Inflow to Standley Lake by Source, 2007-2012

The total annual inflow (all four sources combined) and outflow volumes for these years are presented in Figure 43. Corresponding to the low runoff, the total inflow volume in 2012 was 22%

lower than the 2007-2011 average indicated in the figure. Outflow, however, was 1% higher than the 2007-2011 average, yielding a net reduction in contents in 2012.

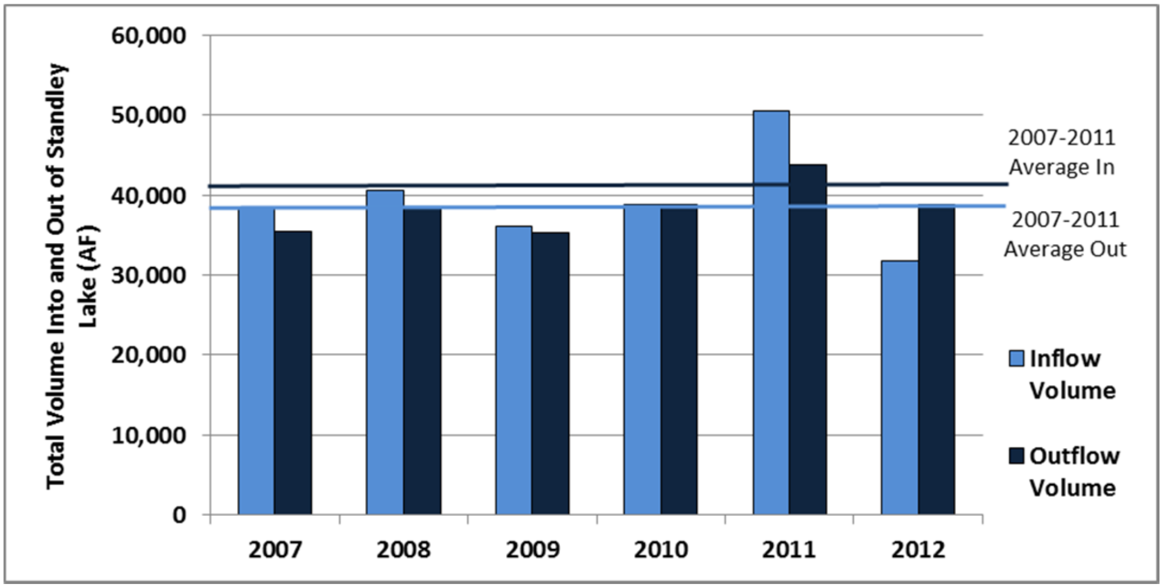


Figure 43. Total Annual Standley Lake Inflow and Outflow Volumes, 2007-2012

The daily volume records for Standley Lake for 2012 and previous years are presented in Figure 44. The volume was calculated using gage-height measurements and elevation-area-volume data for the lake. As a reflection of the low snowpack, the lake did not fill in 2012, unlike the previous five years. The maximum 2012 volume was 7% less than maximum capacity. The average lake volume in 2012 was 9% lower than the 2007-2011 average.

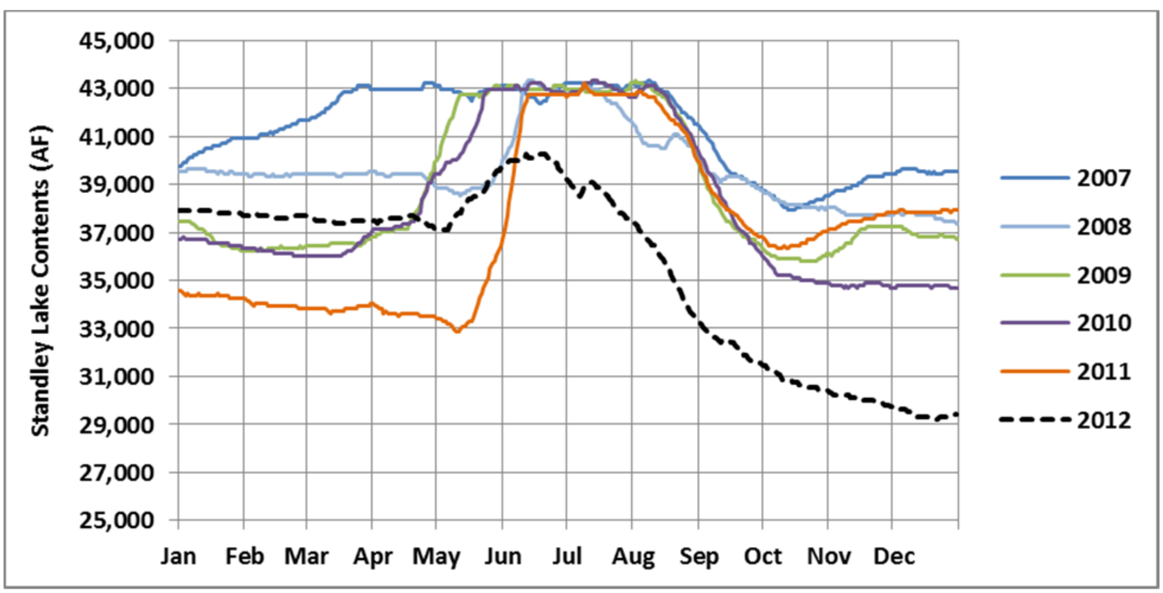


Figure 44. Standley Lake Volume, 2007-2012

VI. Loading Into and Out of Standley Lake

Water quality in the Upper Basin for 2012 is analyzed and discussed in Section IV, and lake inflows, outflows, and contents are presented in Section V. This section describes nutrient loading into and out of the lake. Loads are calculated using grab sample and 24-hour ambient autosampler data. Event-triggered samples are not included in the loading calculations; those results are assessed at the end of this section.

Total Phosphorus

Total phosphorus loading into Standley Lake is presented in Figure 45 by source for 2007-2012. Although Church Ditch and the KDPL experienced larger loading than in previous years, the main contributing sources (Croke Canal and Farmers' High Line Canal) both delivered lower TP loads.

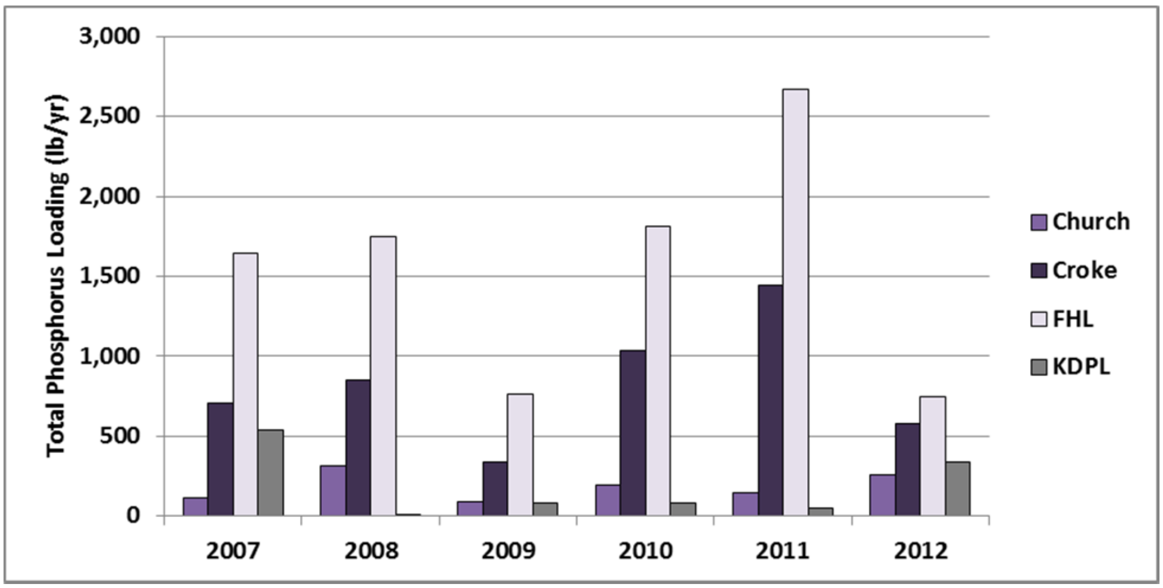


Figure 45. Total Phosphorus Loading into Standley Lake by Source, Using Grab Samples and 24-Hour Ambient Autosampler Data, 2007-2012

TP loading into and out of Standley Lake for 2007-2012, with the 2007-2011 averages indicated, is presented in Figure 46. The 2012 TP loading into the lake was 34% below the 2007-2011 average.

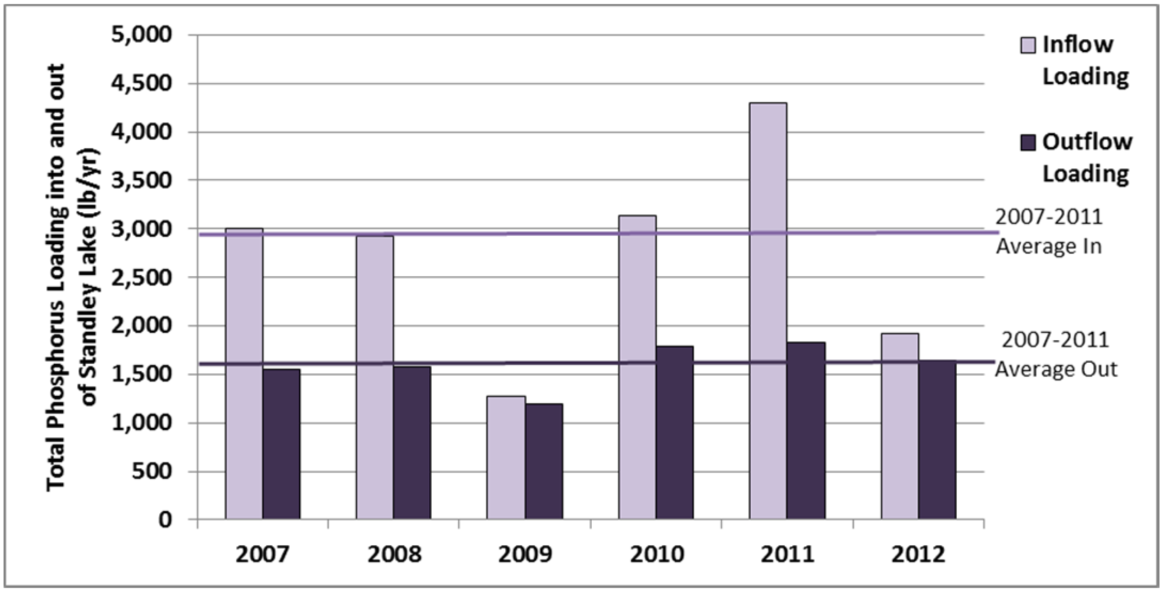


Figure 46. Total Phosphorus Loading into and Out of Standley Lake, 2007-2012

The volume-weighted TP concentrations into Standley Lake are presented in Figure 47 by source. Note that the volume-weighted average TP concentrations from KDPL during the 2007-2008 period were much higher than observed in the recent four years. In 2012, the average concentration from all sources combined was 13% lower than the combined average for 2007-2011.

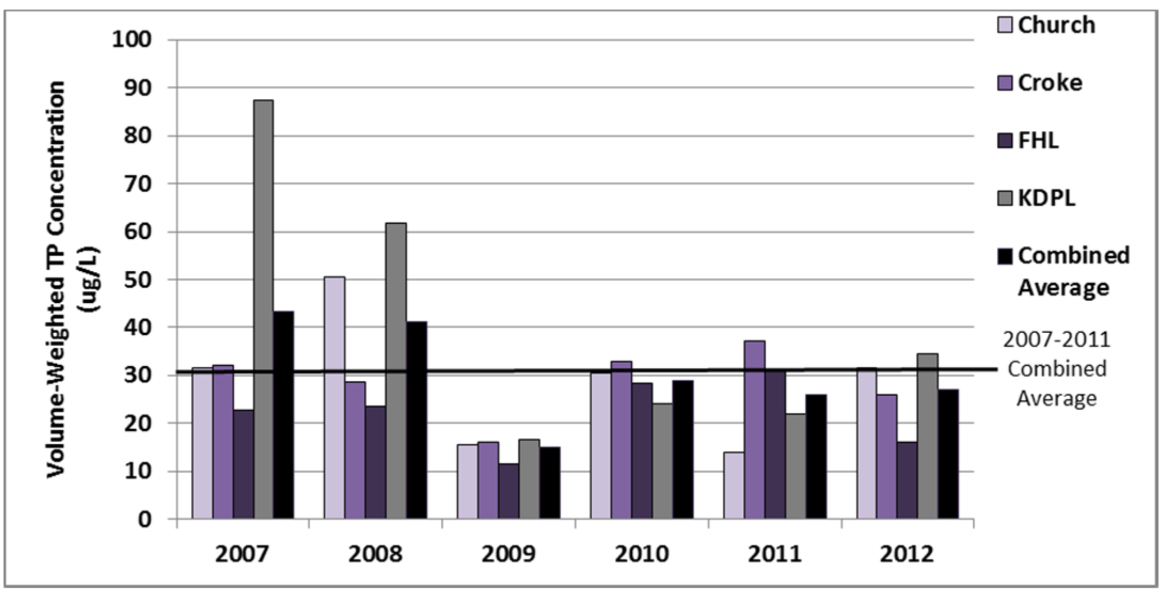


Figure 47. Volume-Weighted Total Phosphorus Concentrations into Standley Lake, 2007-2012

In 2009, a by-pass project was implemented in Church Ditch with the aim of reducing its high nutrient concentrations. Monthly volume-weighted TP concentrations in Church Ditch for 2005-2012 are provided in Figure 48. The median volume-weighted TP concentrations have decreased by 44% comparing 2005-2008 to 2009-2012. The statistical significance of this decrease was tested using a two-sample Kolmogorov-Smirnov test[1]. The test results indicate a 99.9% probability that there has been a decrease in TP concentrations since implementation of the by-pass project.

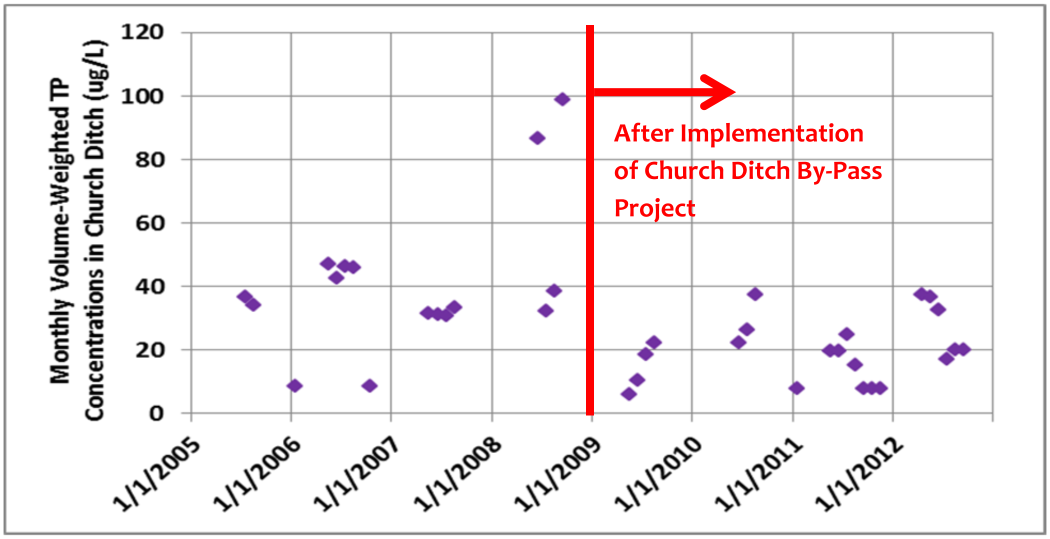


Figure 48. Volume-Weighted Average Total Phosphorus Concentrations, 2005-2012

Total Nitrogen

Total nitrogen loading into Standley Lake is presented in Figure 49 by source. Combined TN loading into (from all four sources) and out of the lake is presented in Figure 50. Loading into the lake was 28% lower in 2012 than the 2007-2011 average.

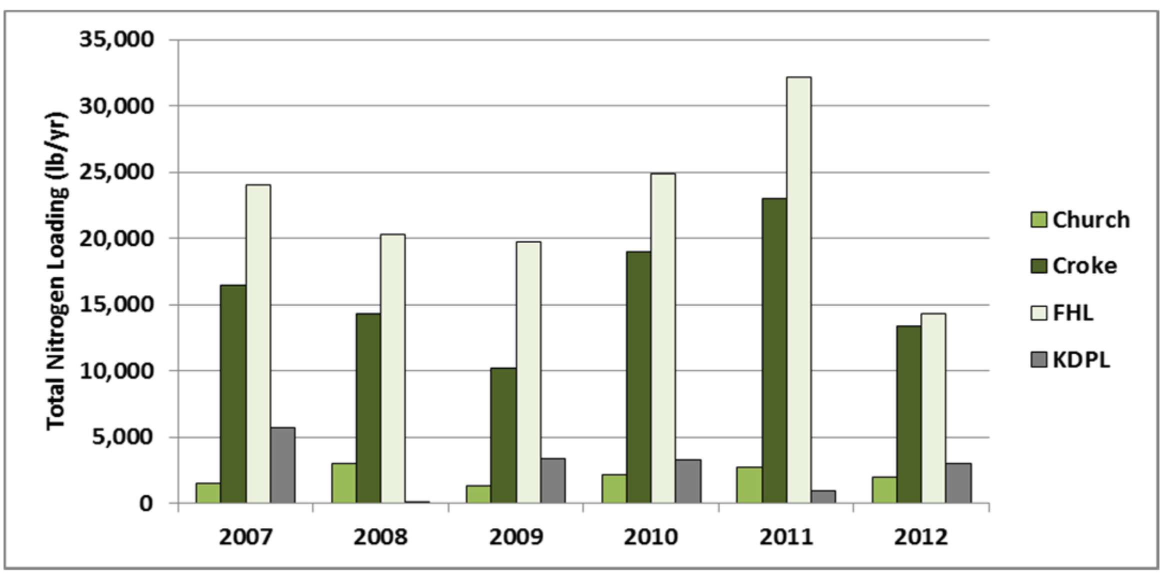


Figure 49. Total Nitrogen Loading into Standley Lake by Source, 2007-2012

[1] A two-sample Kolmogorov-Smirnov test is a nonparametric statistical test of two datasets that assesses a null hypothesis that the two datasets are drawn from the same distribution.

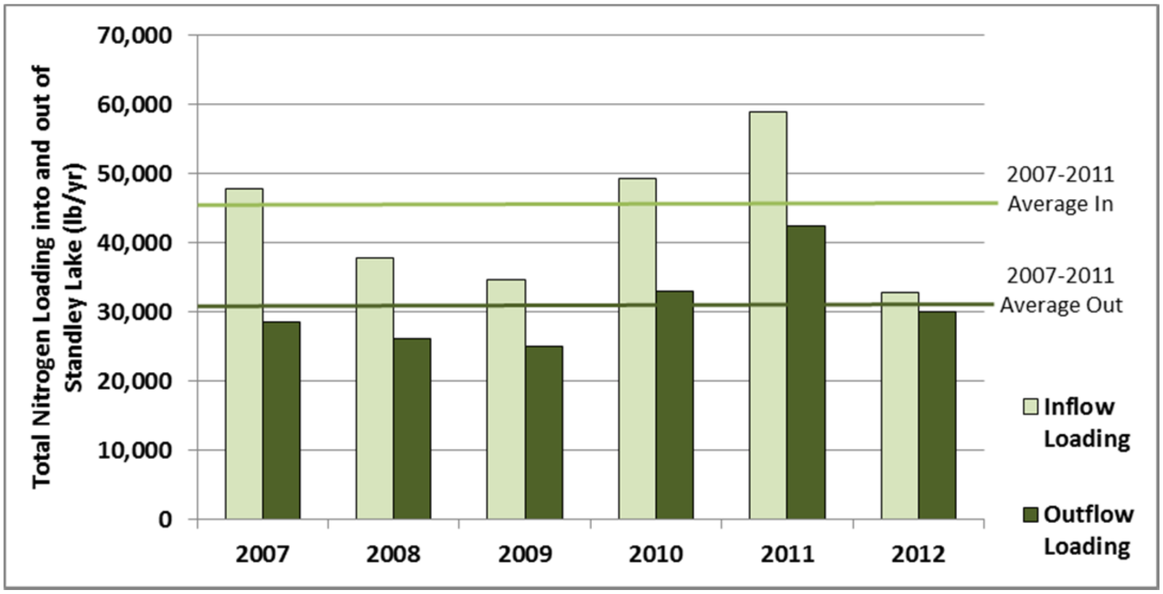


Figure 50. Total Nitrogen Loading into and Out of Standley Lake, 2007-2012

Volume-weighted total nitrogen concentrations into the lake are presented in Figure 51. Note that the volume-weighted average TN concentrations from KDPL were higher in 2007-2010, as compared to the 2011 and 2012 observations. The combined average from all sources in 2012 was 25% lower than the combined average for 2007-2011.

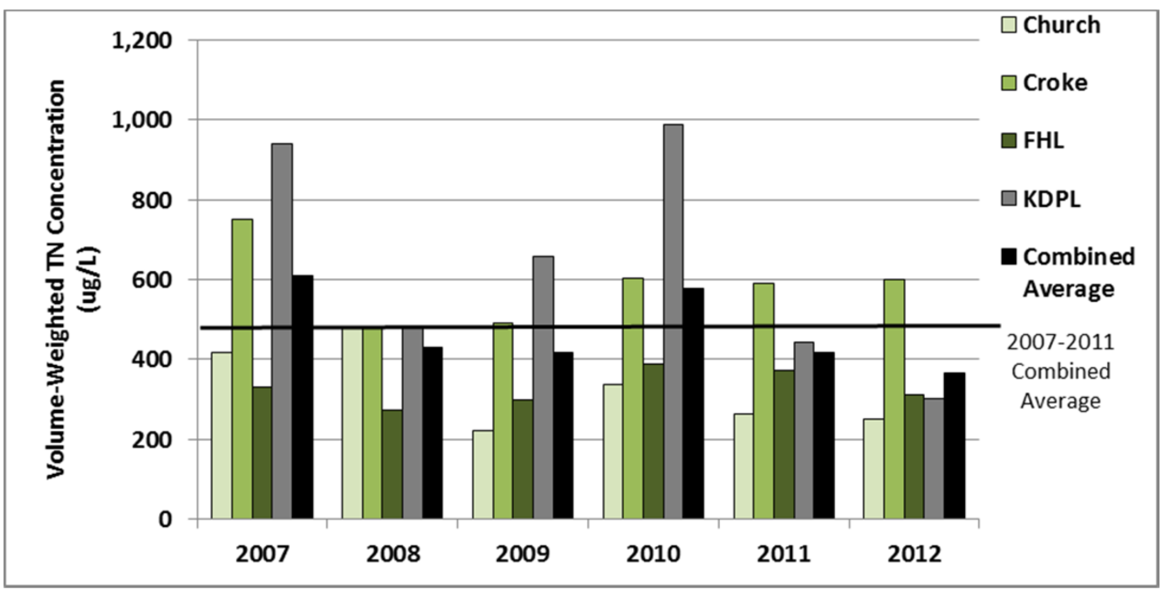


Figure 51. Volume-Weighted Total Nitrogen Concentrations into Standley Lake, 2007-2012

Volume-weighted TN concentrations in Church Ditch for the period 2005-2012 are presented in Figure 52. As seen above with TP concentrations, the volume-weighted TN concentrations in Church Ditch are lower beginning in 2009, coinciding with the implementation of the by-pass project. The median volume-weighted TN concentrations have decreased by 45% comparing 2005-2008 to 2009-2012. The statistical significance of this decrease in TN was tested using a two-sample Kolmogorov-Smirnov test[2]. As seen for TP, the test results indicate a 99.9% probability that there has been a decrease in TN concentrations since implementation of the by-pass project.

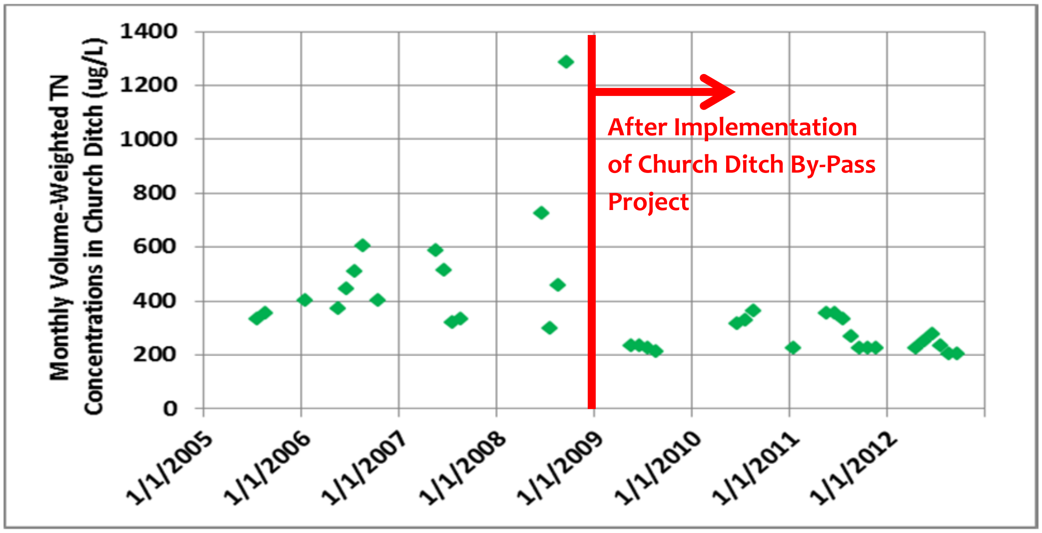


Figure 52. Volume-Weighted Average Total Nitrogen Concentrations in Church Ditch, 2005-2012

Effect of Storm Events on Nutrient Loading

The nutrient loads presented above were calculated using grab samples and ambient autosampler data. To compute the loads, daily concentrations were filled using a mid-point step function between the available sample data. Event-triggered autosampler data were not included in those calculations. In 2012, six event-triggered samples were collected in the canals (six 24-hour composite samples for three 2-day events). Event samples were collected at CCAST11 (Farmers' High Line Canal) on 4/5/12 and 4/6/12, and 7/8/12 and 7/9/12 (corresponding to the large storm discussed above in the Upper Basin). At CCAST27 (Church Ditch), event samples were collected on 5/1/12 and 5/2/12. To evaluate the effects of storm events on nutrient loading, TN and TP loads in 2012 were calculated for these two canals with and without the events. Storm event samples were assumed to represent conditions for the full 24-hour period on the sample date.

In Figure 53, a comparison of nutrient loading into Standley Lake from Farmers' High Line Canal in 2012 with and without the sampled storm events taken into consideration is shown. The lighter bars in the figure represent the loading presented in the sections above using only grab samples and ambient autosampler data. The darker bars represent nutrient loading that includes the events listed above in the calculations. As a reminder, this figure shows the effect on annual loads in Farmers' Highline Canal from two stormwater sampling events (each sampled over a two-day period). Incorporation of the observed storm events yields a 5% increase in 2012 TN loading from Farmers'

[2] A two-sample Kolmogorov-Smirnov test is a nonparametric statistical test of two datasets that assesses a null hypothesis that the two datasets are drawn from the same distribution.

High Line Canal and a 39% increase in TP loading. Similar calculations from 2011 data, presented in the 2011 Annual Report, showed 34% and 31% increases in TN and TP loading, respectively.

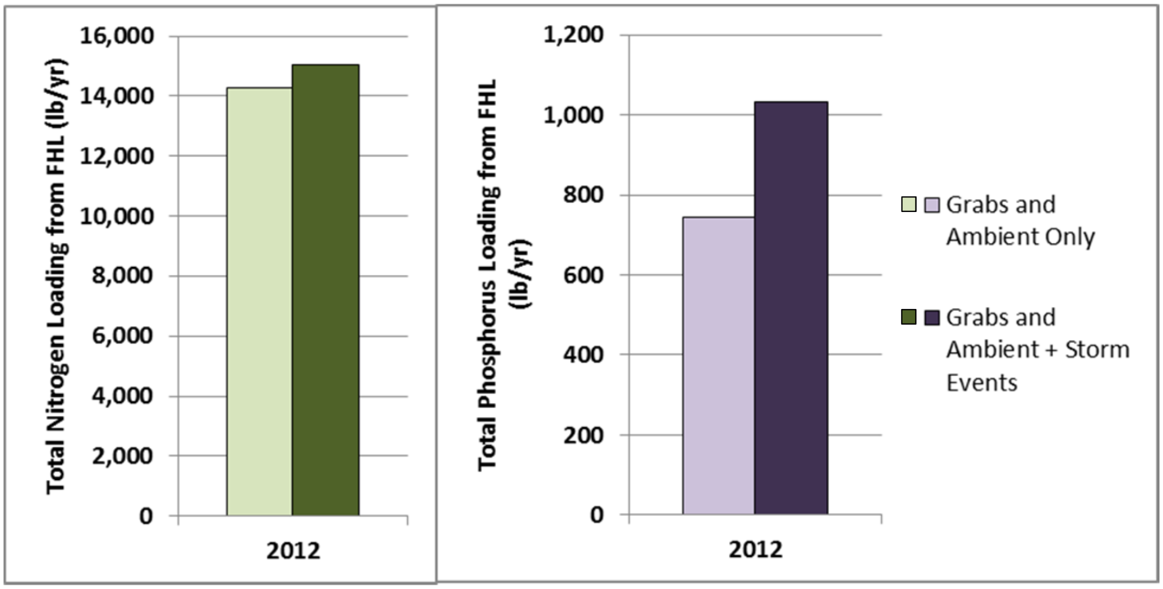


Figure 53. Nutrient Loading to Standley Lake from Farmers' High Line Canal in 2012, With and Without Storm Events

A similar comparison is presented for Church Ditch in Figure 54. In this case, the contribution of the two 24-hour composite event samples from 5/1/12 and 5/2/12 does not yield a significant difference in the nutrient loads as compared to the ambient calculations. Incorporation of the event samples produces a 1% increase in 2012 TN loading from Church Ditch and no change in the TP loading. It is difficult to interpret this result, since it represents only one (two consecutive days) sampling event and it is not directly comparable to results from FHL or any previous results from Church Ditch. Note that the precipitation event sampled on Church Ditch was not the same event as that sampled on the Farmers' High Line (discussed above), so direct comparisons cannot be made. Further, no events were sampled on Church Ditch in 2011, so the 2012 observations cannot be compared to previous patterns.

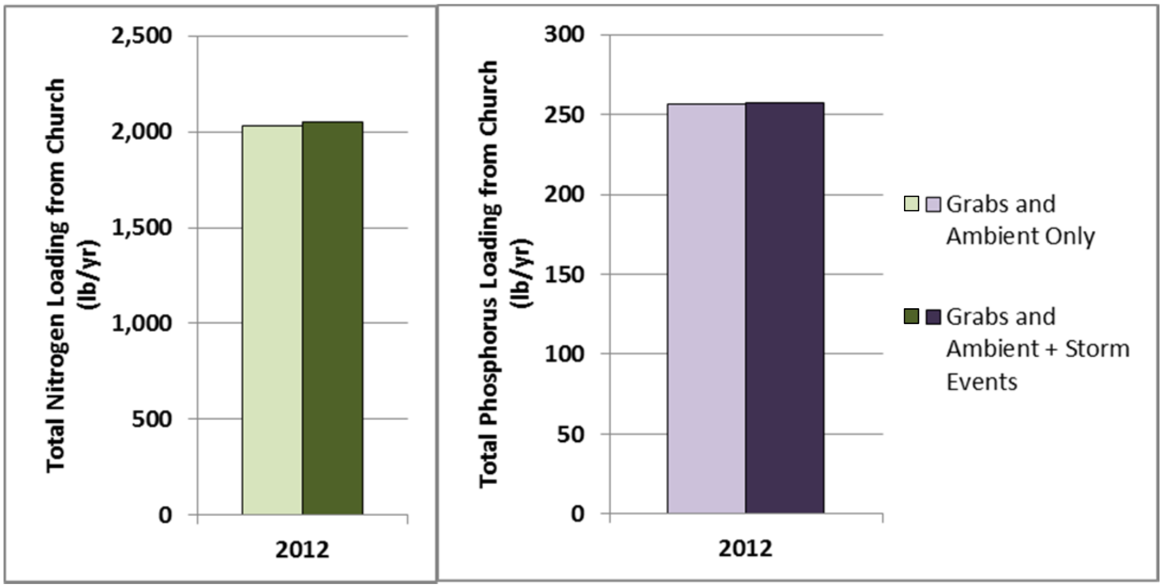


Figure 54. Nutrient Loading to Standley Lake from Church Ditch in 2012, With and Without Storm Events

VII. Standley Lake Water Quality

Inflows, outflows, and the nutrient loads to Standley Lake were described in the previous sections. In this section, water-quality data in the reservoir are presented. The data considered here were measured at sampling location SL-10 (Figure 4). This analysis focuses on dissolved oxygen (DO), total phosphorus (TP), total nitrogen (TN), chlorophyll *a*, and clarity as measured by Secchi depth.

Dissolved Oxygen

Dissolved oxygen is important from both an aquatic life and a drinking water treatment perspective. With respect to drinking water treatment, low DO at the sediment-water interface (i.e. the bottom of the lake) is of particular concern, as low DO concentrations can result in the release of nutrients and certain metals from the sediment. This can, in turn, lead to increases in water treatment costs and the potential for taste and odor events in drinking water.

Each year, Standley Lake experiences hypoxic (DO ≤ 2 mg/L) conditions in the hypolimnion, which is common for stratified reservoirs in Colorado. In 2012, hypoxic conditions started in mid-June, the earliest start over the past decade. The onset of thermal stratification also occurred earlier in 2012 than typically observed in Standley Lake. Hypoxic conditions in 2012 ended in early October during turnover, which is typical. An isopleth of dissolved oxygen concentrations in Standley Lake for March through November 2012 is provided in Figure 55.

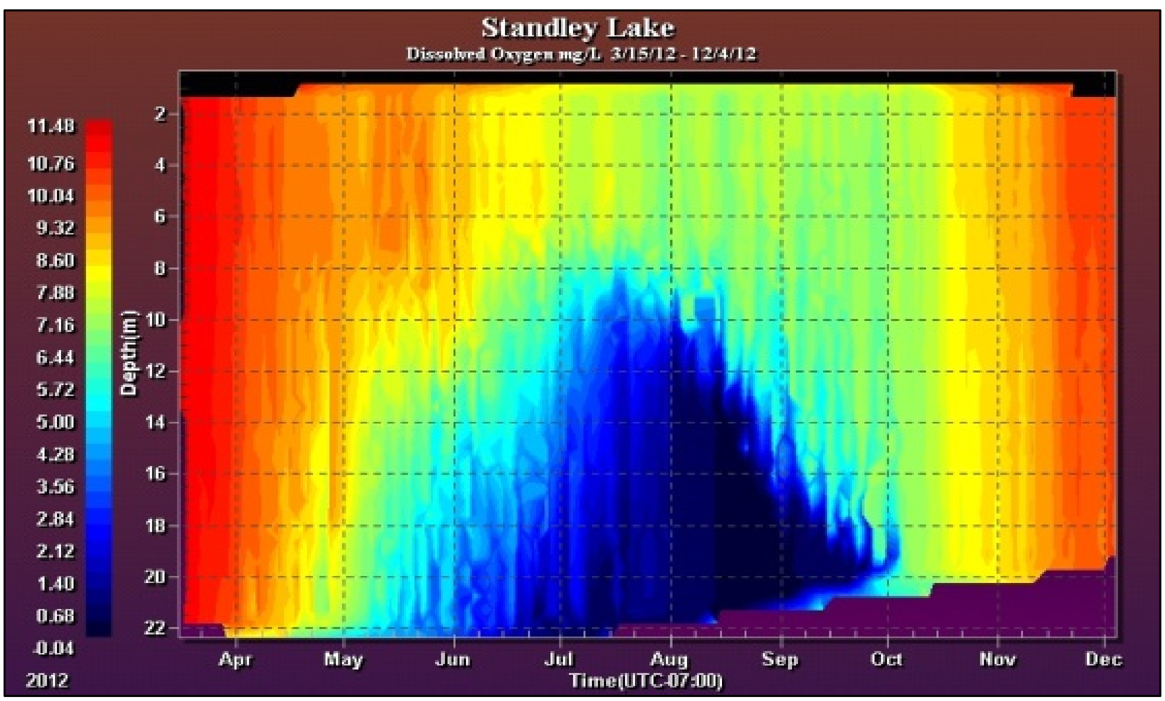


Figure 55. Isopleth of Dissolved Oxygen in Standley Lake, March-November 2012

Dissolved oxygen concentrations observed at the top and bottom of Standley Lake in 2012 are shown in Figure 56. Concentrations at the surface largely reflect changing solubility of dissolved oxygen with changing water temperatures. At the bottom of the reservoir, decay of organic matter in the water column and sediment oxygen demand result in decreased dissolved oxygen concentrations throughout the period of stratification. Concentrations increase sharply with mixing at fall turnover.

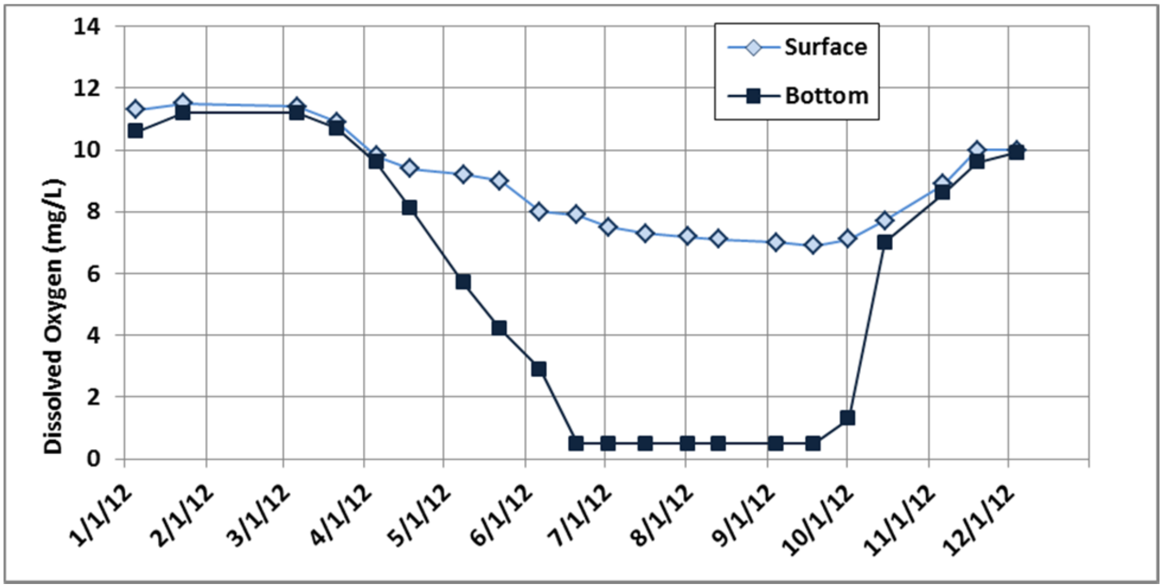


Figure 56. Dissolved Oxygen Concentrations in Standley Lake, 2012

The 2012 seasonal dissolved oxygen pattern closely matches those observed in previous years in Standley Lake, as shown in Figure 57.

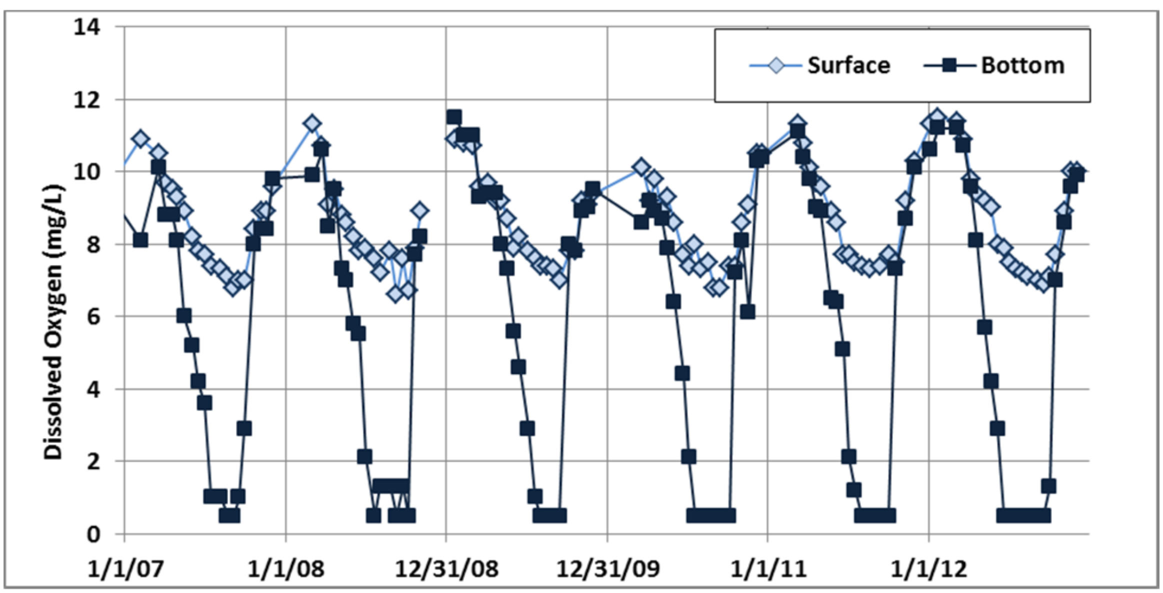


Figure 57. Dissolved Oxygen Concentrations in Standley Lake, 2007-2012

Hypoxia occurs each year in the hypolimnion of Standley Lake, but the duration varies from year to year. In 2012, DO at the bottom dropped below 2 mg/L in mid-June. The hypoxic period lasted 109 days until turnover occurred in early October. The length of the hypoxic period has been increasing since 2009 (Figure 58), and in 2012, the lake was hypoxic for ~3.5 weeks longer than the 2007-2011 average.

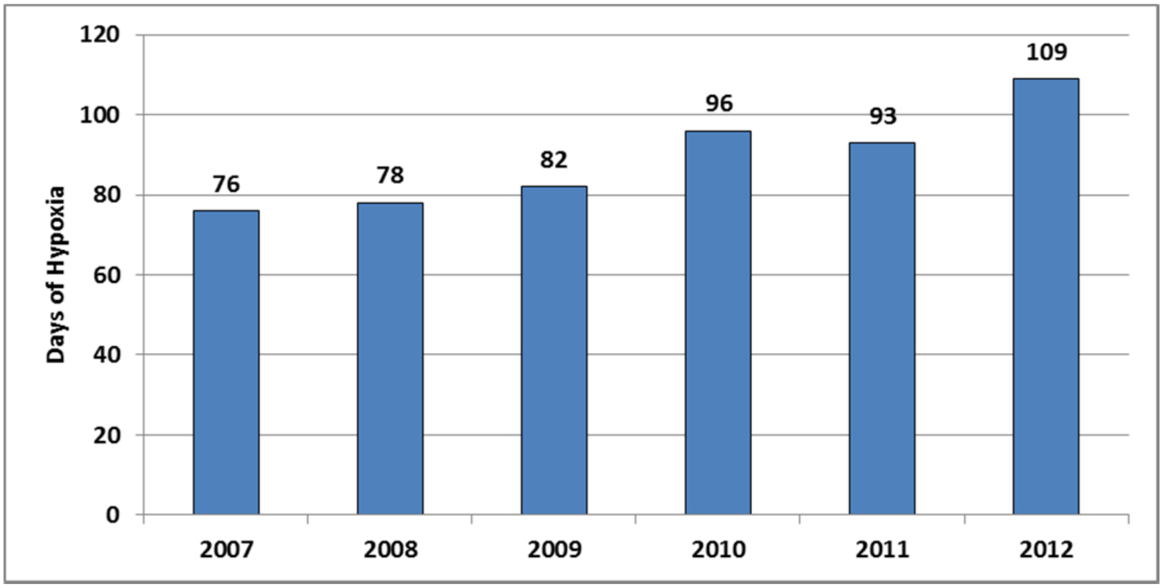


Figure 58. Days of Hypoxia (DO < 2.0 mg/L), 2007-2012

Total Phosphorus

Total phosphorus concentrations observed in 2012 in the photic zone (twice the Secchi depth) and at the bottom (hypolimnion) of Standley Lake are presented in Figure 59. As seen in the figure, the most visible feature of the annual time-series is the spike in phosphorus in the hypolimnion of the lake in late summer/early fall, which reached a maximum observed concentration of 159 µg/L on 9/4/12. This pattern of increasing hypolimnetic TP concentrations in fall occurs due to sediment releases of nutrients during conditions of hypoxia.

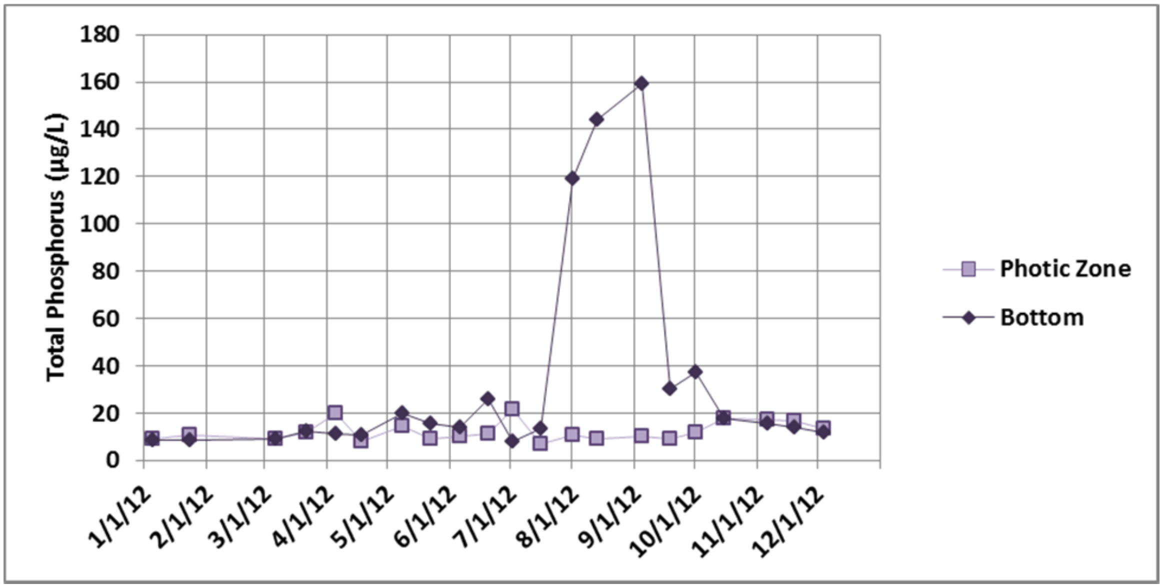


Figure 59. Total Phosphorus Concentrations in Standley Lake, 2012

This observed pattern is typical of previous years, as shown in Figure 60. For the years considered (2007-2012), internal loading from sediments results in a rise in hypolimnion TP concentrations in late summer/early fall, peaking in September. The peak concentration in 2012 was higher than those observed in the previous five years and is related to the prolonged period of hypoxia and low reservoir contents. Overall, the average TP concentration in 2012 was 58% higher in the hypolimnion than the respective 2007-2011 average, and 14% higher in the photic zone.

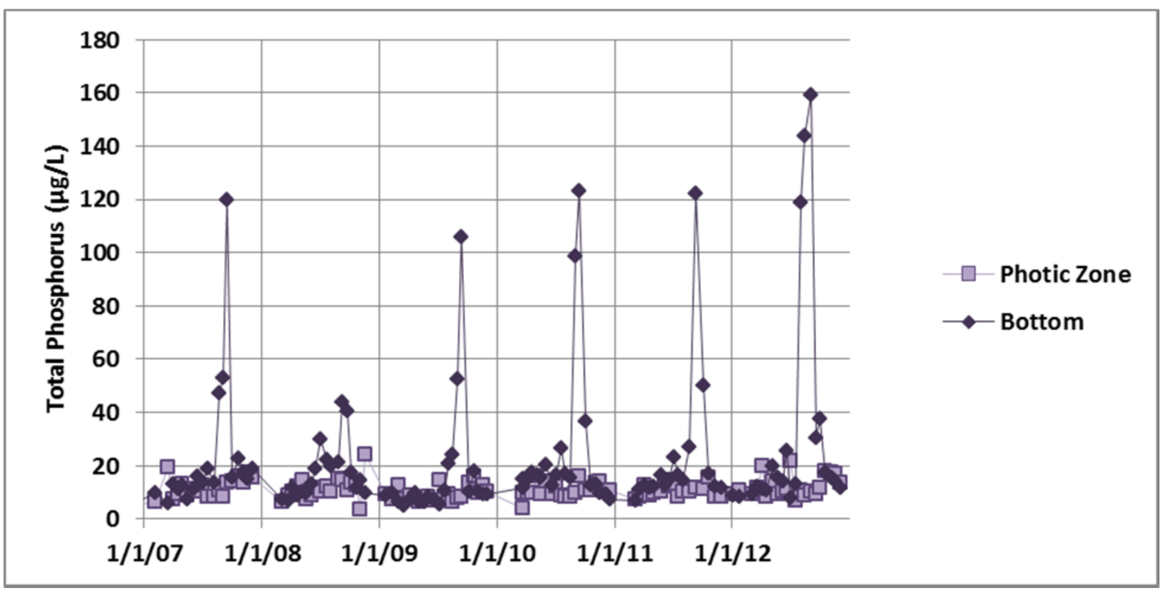


Figure 60. Total Phosphorus Concentrations in Standley Lake, 2007-2012

Total Nitrogen

Presented in Figure 61 are TN concentrations observed in Standley Lake in the photic zone and hypolimnion (bottom) for 2012. The pattern in the hypolimnion is similar to that seen in other years and is a reflection of external loading during runoff, subsequent nitrification dynamics, and internal loading in late summer. The maximum 2012 concentration observed in the hypolimnion (760 µg/L) was observed on 9/4/12. Concentrations in the photic zone display smaller fluctuations throughout the year.

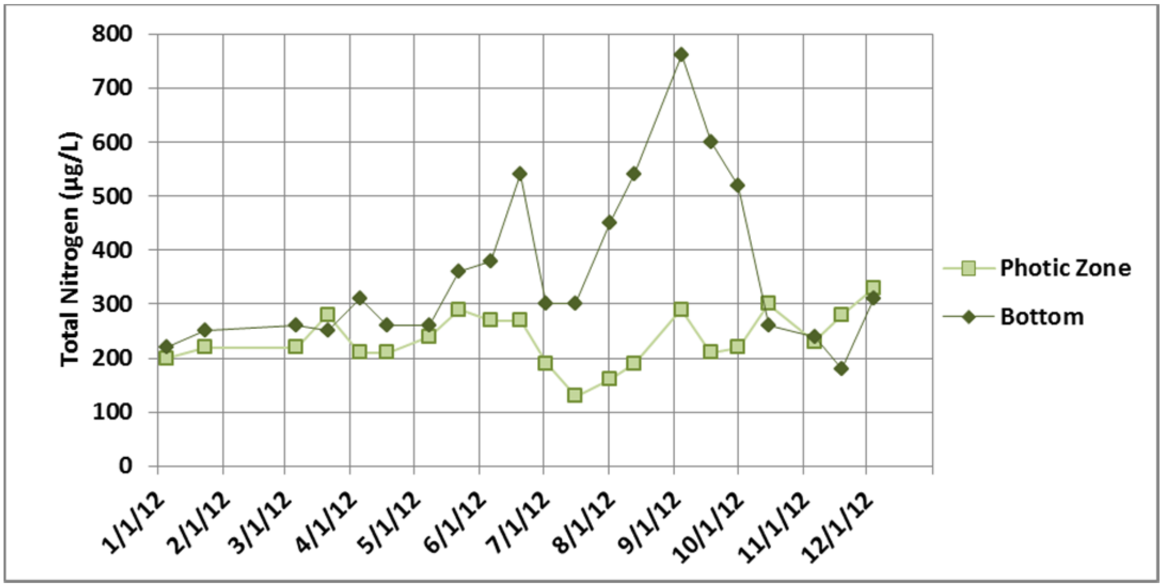


Figure 61. Total Nitrogen Concentrations in Standley Lake, 2012

Concentrations of TN in the lake for 2007-2012 are shown in Figure 62. Overall, TN concentration ranges observed in 2012 in the photic zone and at the bottom were similar to previous years. When compared with the 2007-2011 annual average concentrations, the average TN concentrations were 6% and 8% higher in the hypolimnion and the photic zone, respectively.

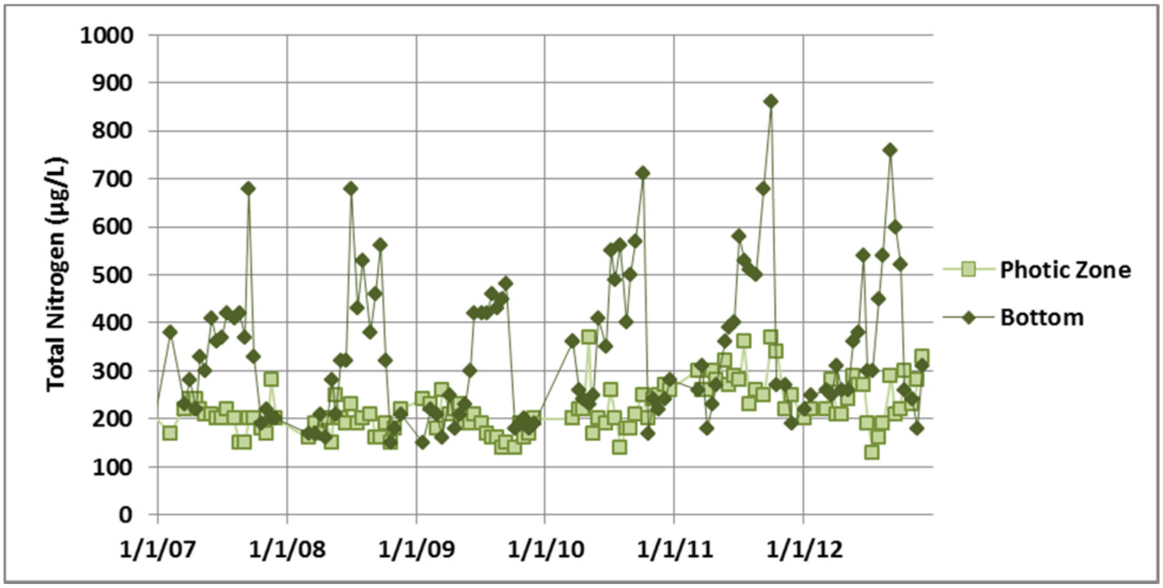


Figure 62. Total Nitrogen Concentrations in Standley Lake, 2007-2012

Chlorophyll *a*

The chlorophyll *a* standard of 4 µg/L (assessed at 4.4 µg/L) established in 2009 for Standley Lake is evaluated on an annual basis as the average of observed data from March through November. Presented in Figure 63 are chlorophyll *a* concentrations observed in Standley Lake in 2012, with March-November observations outlined in green. The maximum concentration measured in 2012 was 14 µg/L and occurred on 11/19/12.

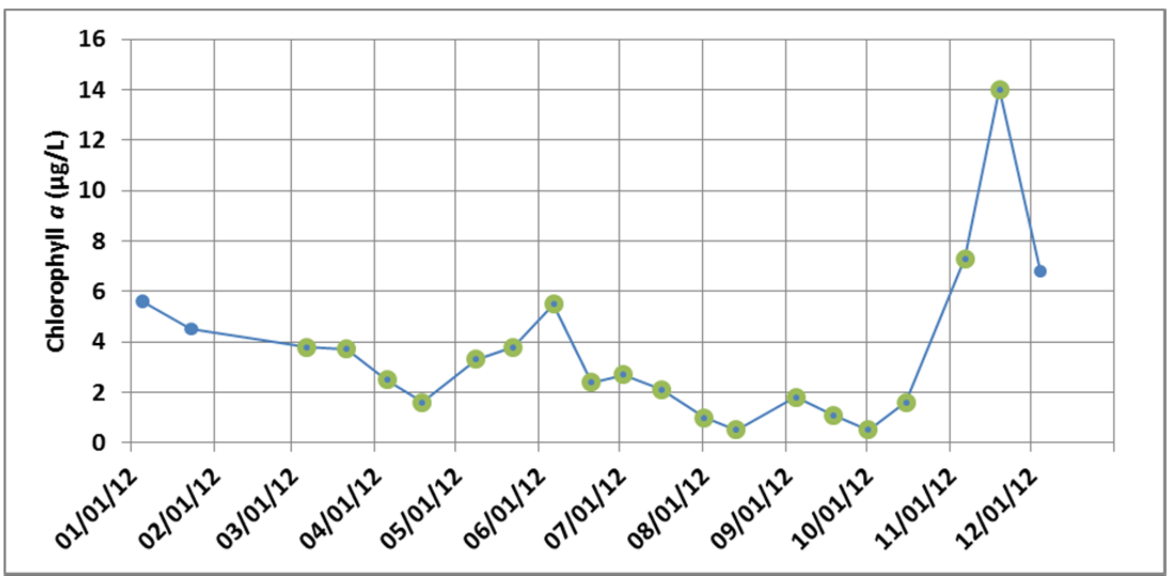


Figure 63. Chlorophyll *a* Concentrations in Standley Lake, 2012 (with March-November observations highlighted)

Chlorophyll *a* concentrations observed from 2007 through 2012 are presented in Figure 64. The green-outlined markers indicate March-November observations used to evaluate the chlorophyll *a* standard. The 2012 seasonal pattern with chlorophyll *a* concentrations peaking after fall turnover is typical for Standley Lake. The 2012 peak, however, is 6 µg/L higher than the highest March-November value from the previous five year period (8 µg/L on 11/18/10). This higher chlorophyll *a* peak in 2012 may be a reflection of the low reservoir contents and extended period of stratification resulting in extended hypoxia and greater sediment nutrient releases.

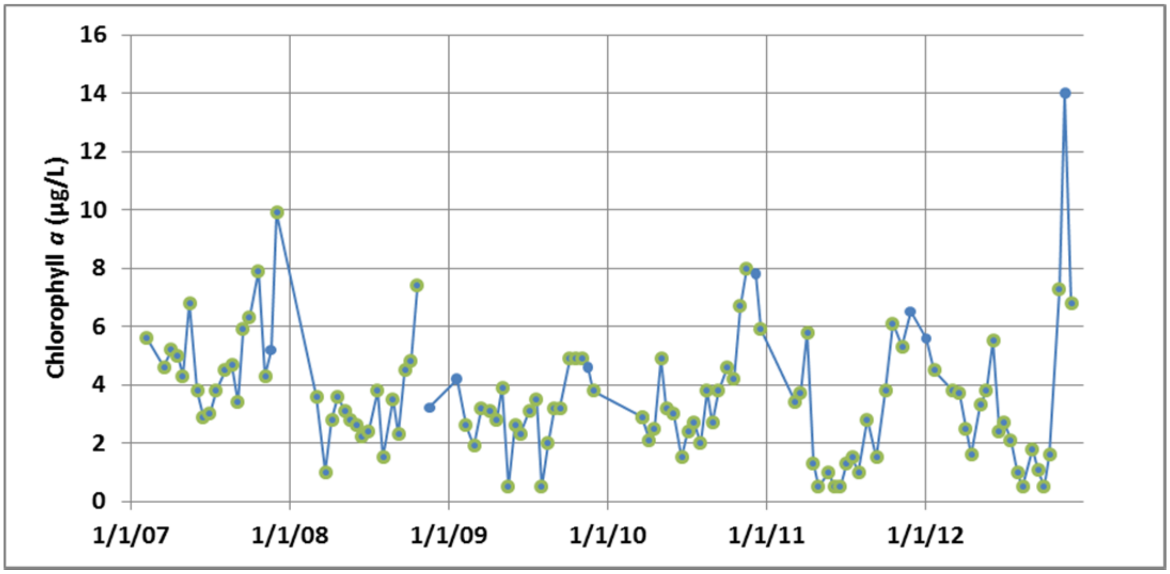


Figure 64. Chlorophyll *a* Concentrations in Standley Lake, 2007-2012 (with March-November observations highlighted)

An isopleth of chlorophyll *a* concentrations in Standley Lake for March-November 2012 is shown in Figure 65. The annual peak algae bloom is apparent beginning in November and extending into December. Compared to this bloom at the end of the year, the rest of the year appears fairly uniform. For resolution during the period before November, an isopleth for March through October 2012, excluding the end-of-year bloom, is provided in Figure 66. Several small increases are observed throughout the season, particularly in March and June. The chlorophyll *a* increase in late July (Figure 66) is somewhat unusual and may be due to the July 7, 2012 storm and corresponding spike in inflow from Farmers High Line Canal. Concentration peaks apparent in June, July, and September do not extend to the bottom, as seen for the November bloom, due to summer thermal stratification. Note that the color scale is different between the two isopleths to provide visible contrast over the concentrations included in the respective time periods.

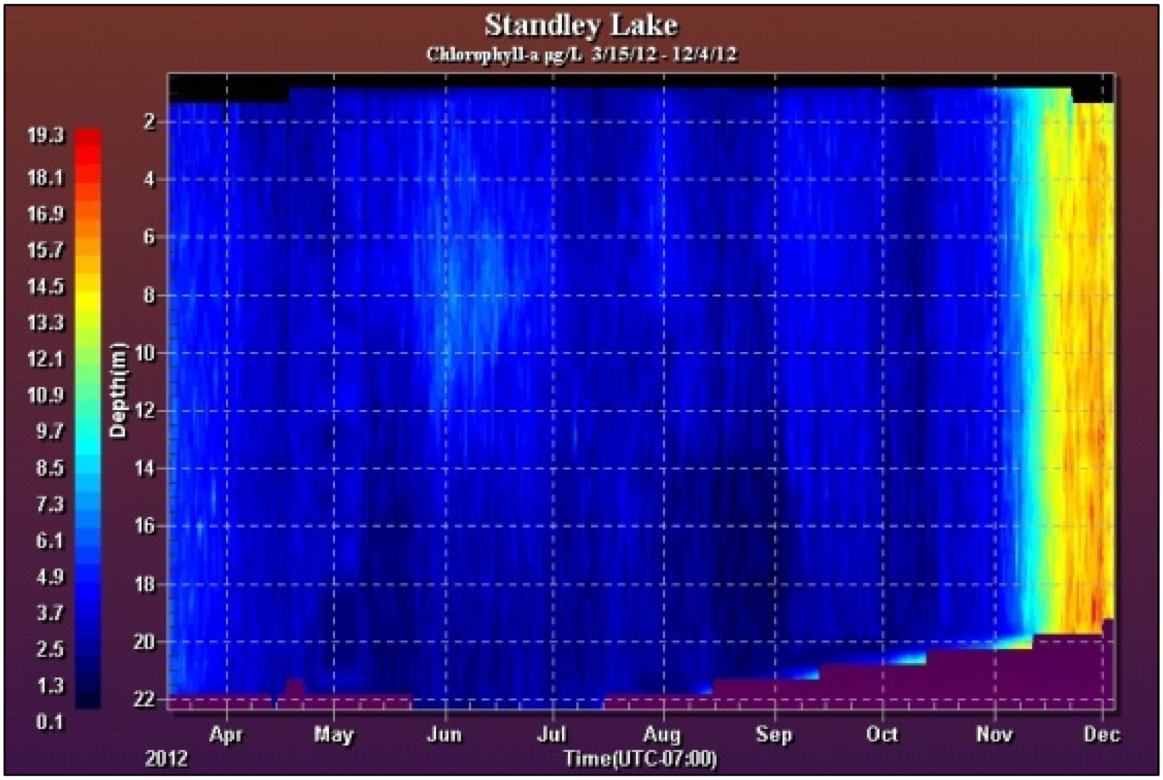


Figure 65. Isopleth of Chlorophyll *a* Concentrations in Standley Lake, March-November 2012

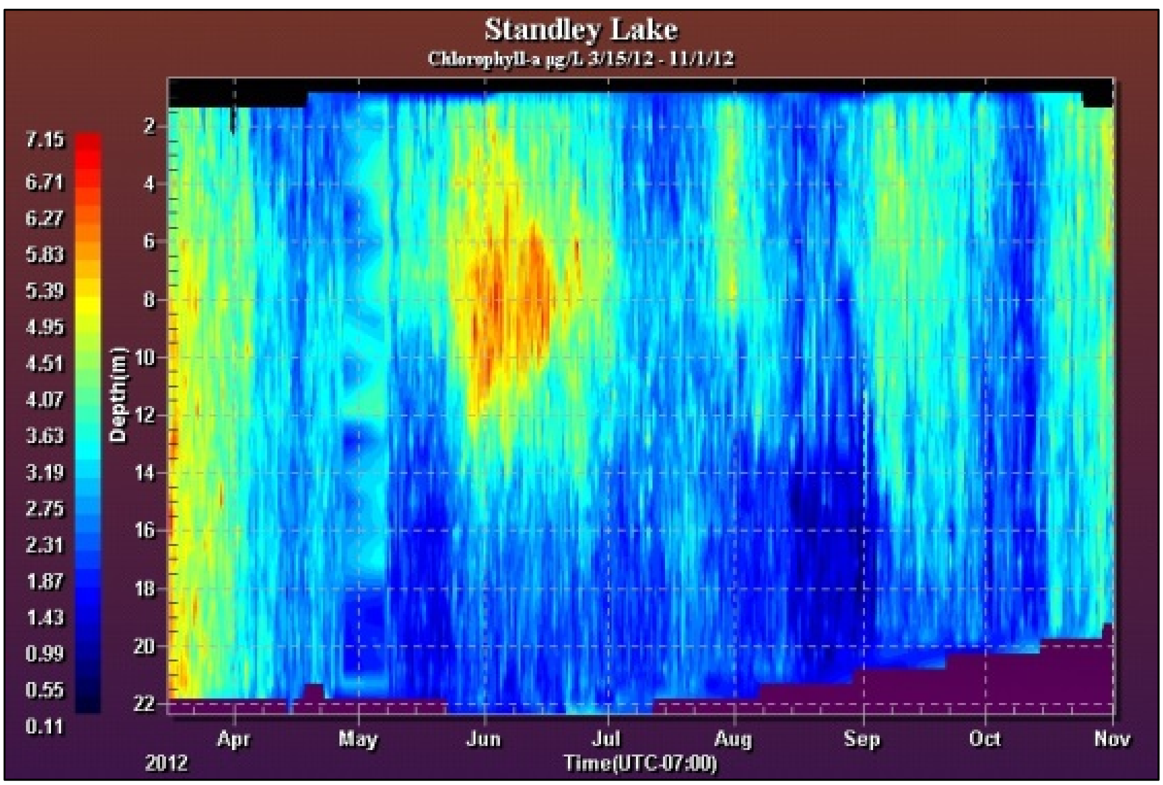


Figure 66. Isopleth of Chlorophyll *a* Concentrations in Standley Lake, March-October 2012

The chlorophyll *a* standard for Standley Lake was met in 2012 (Figure 67). The standard is met when four out of the five recent years have a March-though-November average below 4.0 µg/L. An assessment threshold of 4.4 µg/L is used, calculated using the annual arithmetic mean of observations in the photic zone. In 2012, the average March-November concentration was 3.3 µg/L, which complies with the 4 µg/L standard and is below the assessment threshold. For the five-year period 2008-2012, all five years had March-November average concentrations below 4.0 µg/L.

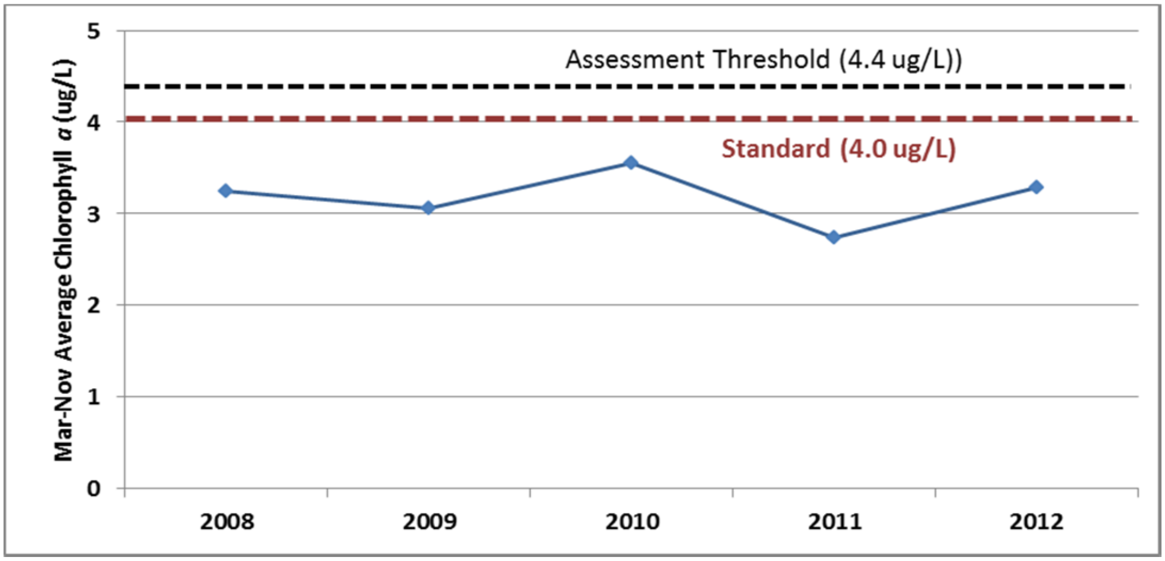


Figure 67. March - November Average Chlorophyll *a* Concentrations for Standard Evaluation, 2008-2012

The seasonal patterns for total algae count and observed chlorophyll *a* concentrations in Standley Lake for 2012 are presented in Figure 68. Algae counts track chlorophyll *a* concentrations well.

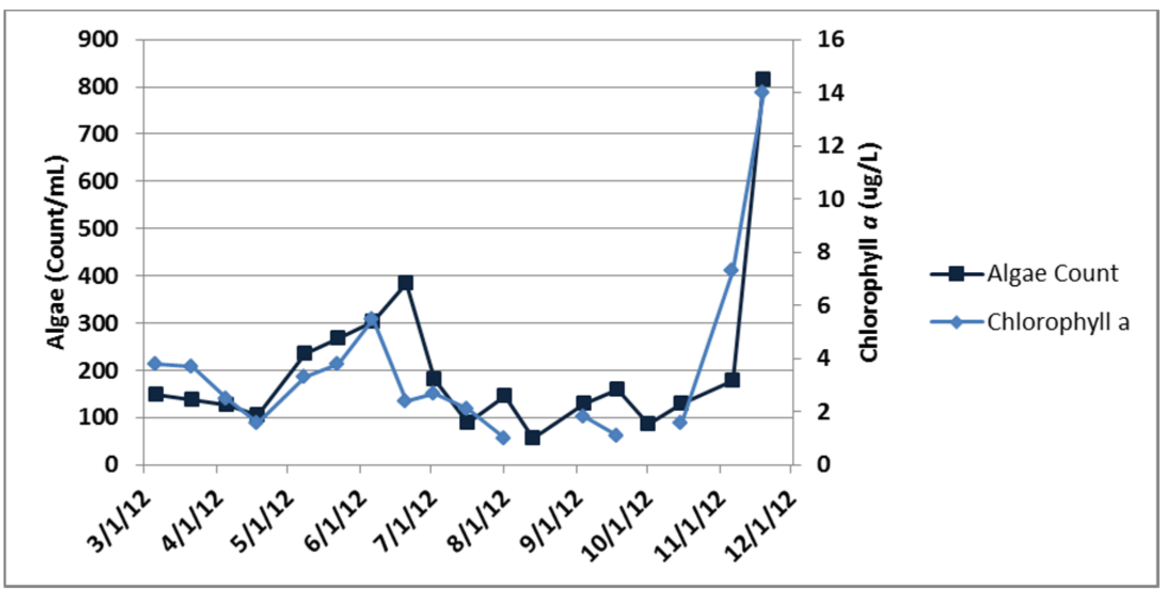


Figure 68. Algae Count and Chlorophyll *a* Concentrations in the Photic Zone of Standley Lake, March-November 2012

Secchi Depth

Clarity in Standley Lake is measured using a Secchi disk. A black-and-white painted disk is lowered vertically from the lake surface until the pattern is no longer visible. The Secchi depth is a combined measure of scattering and absorption of light in the upper portion of the water column, including the effects of algae, non-algal organic particulate matter, inorganic suspended solids, dissolved organic matter, and the water molecules themselves. Secchi-depth measurements for Standley Lake in 2012 are shown in Figure 69. The deepest measure of clarity (5 m) occurred on both 5/8/12 and 7/16/12.

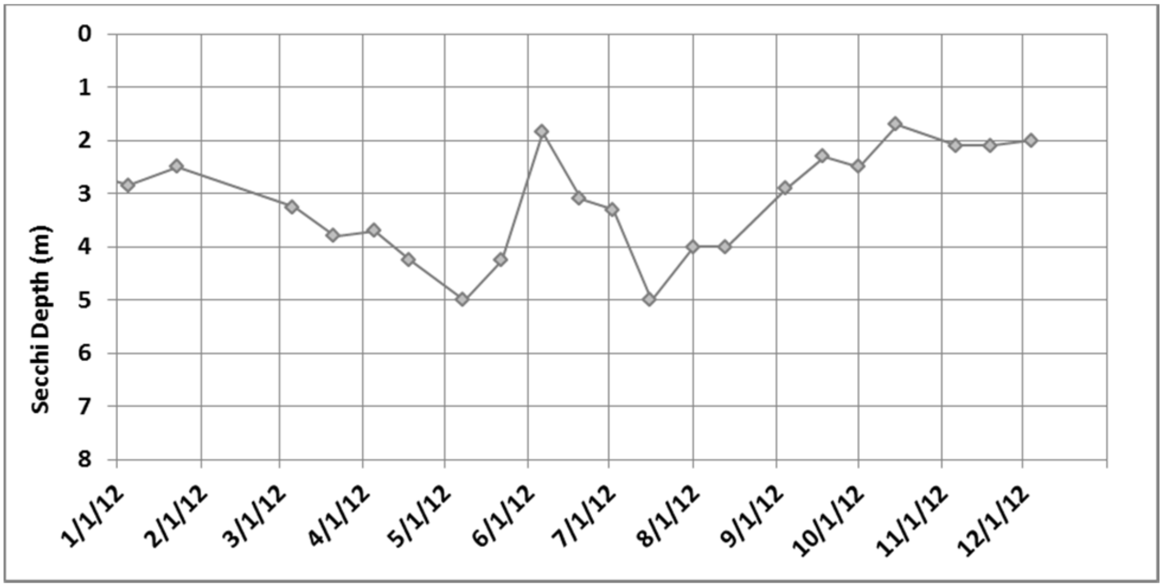


Figure 69. Clarity as Measured by Secchi Depth in Standley Lake, 2012

Secchi-depth measurements for 2007-2012 are shown in Figure 70. Clarity fluctuates for all years, but the maximum Secchi depth measurements in 2012 were not as deep as in previous years. Figure 71 presents average annual Secchi depths for 2007-2012.

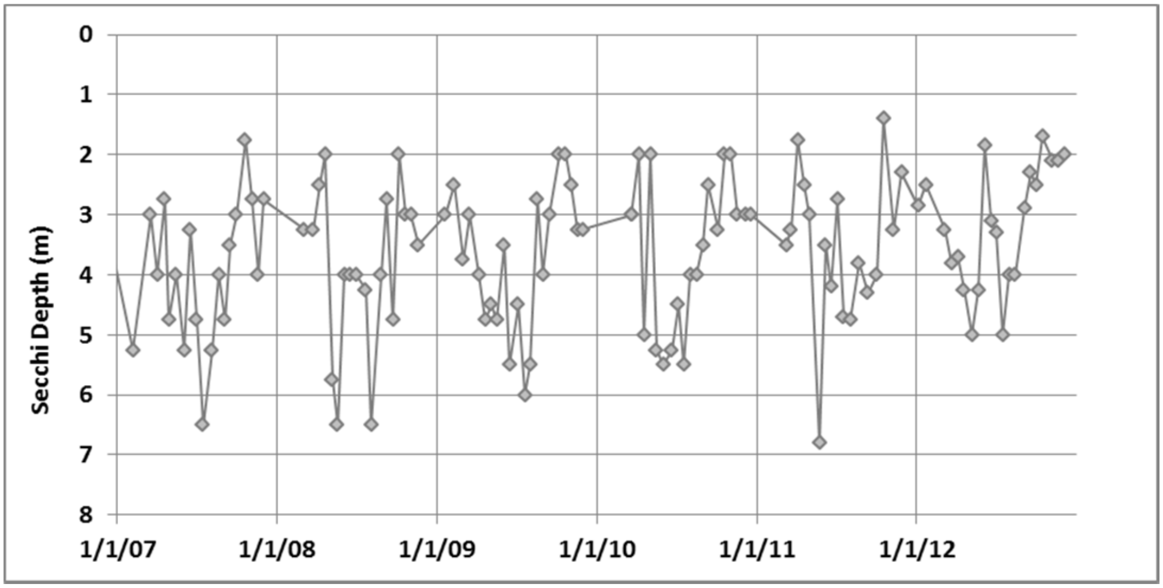


Figure 70. Clarity as Measured by Secchi Depth in Standley Lake, 2007-2012

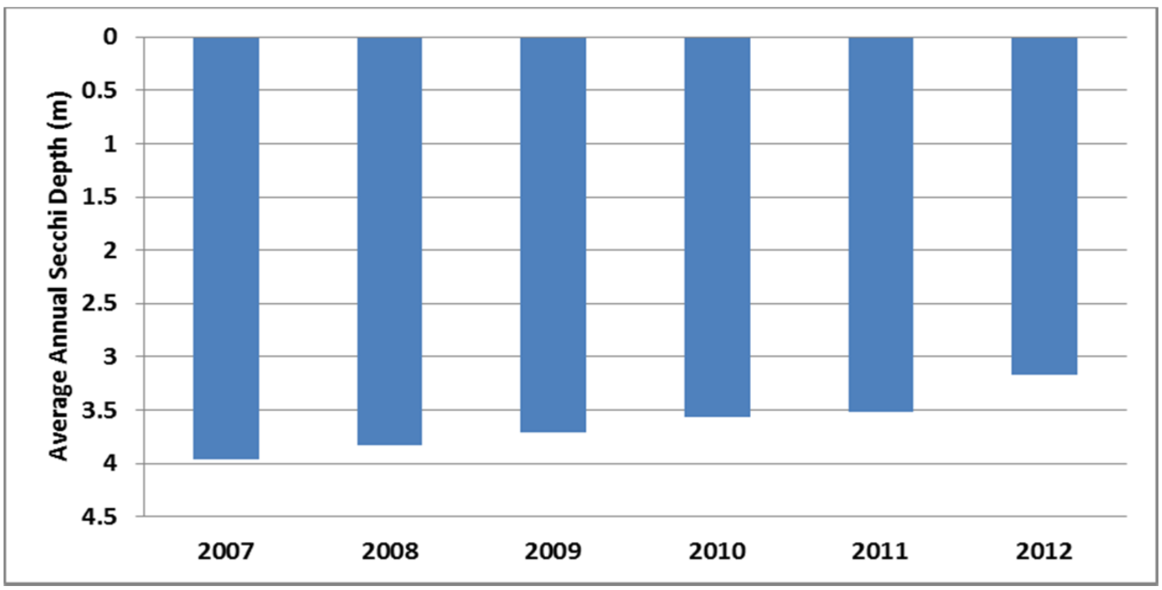


Figure 71. Average Annual Secchi Depth in Standley Lake, 2007-2012

VIII. Conclusions

Members of the UCCWA, Standley Lake Cities, and all parties to the 1993 Agreement made effective efforts in 2012 to monitor, preserve, and improve water quality in Clear Creek and Standley Lake. These activities included site remediation, control of sediment and nonpoint sources, numerous public outreach and educational activities, extensive water quality monitoring, advanced planning, and reservoir modeling efforts to support management.

In 2012, the snowpack in the Upper Basin was low compared to previous years, resulting in low runoff volumes throughout the Clear Creek/Standley Lake watershed. Relative to the 2007-2011 average, 2012 volumes were 53% lower at CC60 near Golden. The maximum flow of the year at that location occurred in response to a large storm event on July 7, whereas the typical peak flow rate is that of the snowmelt hydrograph. Overall, concentrations of TSS, TP, and TN were lower in the Upper Basin than in the previous five years. The lower concentrations and flow rates resulted in lower nutrient and TSS loads at CC60, as compared to the previous five-year averages.

A statistical analysis of the TN and TP concentration data was conducted to assess data from before and after implementation of the Church Ditch by-pass. The by-pass was completed in 2009, so data from 2005-2008 were compared to data from 2009-2012. The analysis indicates that the by-pass was successful, and there is a statistically significant reduction in concentrations of TN and TP flowing to Standley Lake. Specifically, the median TN and TP concentrations have decreased by 45% and 44%, respectively.

Standley Lake exhibited good water quality in 2012, in spite of an extended period of hypolimnetic hypoxia (<2 mg/L dissolved oxygen; 24 days longer than the average of the previous five years). Inflow volumes to Standley Lake were lower than in previous years, while outflow volumes from the lake were higher. In 2012, unlike the previous five years, Standley Lake did not reach its maximum capacity. Average nutrient concentrations and external loading into the lake were lower than in previous years. The onset of hypoxia in the hypolimnion occurred early in 2012. As a result, peak TN and TP concentrations observed at the bottom of Standley Lake were higher than in previous recent years. Near the surface, however, summer-time chlorophyll *a* concentrations were low. The peak chlorophyll *a* concentration in 2012, which occurred after fall turnover and the mixing of internal nutrient loads, was also higher than that of the previous five years. The site-specific March through November chlorophyll *a* standard of 4 µg/L, however, was met in 2012 with an average value of 3.3 µg/L. No March through November average values in the previous five years have exceeded the 4.4 µg/L assessment threshold or the 4 µg/L standard value.

Appendix A – Clear Creek/Standley Lake Watershed Agreement

Appendix A

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.

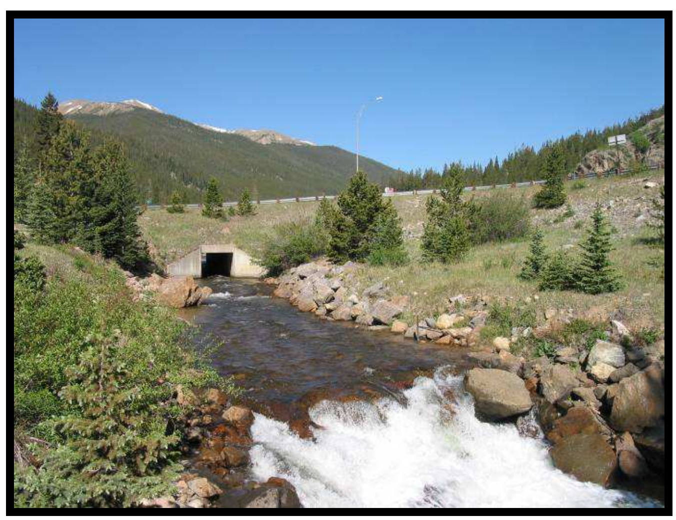
12. It is anticipated that other regional agencies with land use and/or water quality responsibilities or impacts within the Clear Creek Basin (as above defined) may join in the parties' monitoring and other efforts pursuant to this Agreement.

13. This Agreement may be executed in counterparts.

Appendix B – Upper Clear Creek/Standley Lake Watershed Water Quality Monitoring Program

Upper Clear Creek/Standley Lake Watershed

Water Quality Monitoring Plan



April 2011

TABLE OF CONTENTS

APPENDICES

Abbreviations and Acronyms

BH/CC	Blackhawk/Central City
C	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
ISDS	Individual Sewage Disposal System
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
ORP	Oxidation Reduction Potential
OWS	Onsite Waste System (ISDS)
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

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 potential 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 teams 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 Upper Clear Creek 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 48-hour ambient samples, and
- the automated collection of event samples.

UCC – AMBIENT GRAB SAMPLES

Program Coordination: Thornton
Program Participants: Thornton, Westminster, Arvada, Golden, Upper Basin WWTPs

Grab samples are single point-in-time samples collected in-stream and at wastewater treatment plant ("WWTP") effluents throughout the watershed. Grab samples 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 eight times during the year to correspond with seasonally varying flow conditions in Clear Creek. The *Short Schedule* is collected six times per year and includes four stream locations and the five major WWTP effluents. Grab samples are collected at the stream locations during the February, April and December events **ONLY**. Ambient autosampler samples are collected during June, July and August. Refer to the following section for more information on autosamplers. The *Long Schedule* is collected twice per year and includes 25 locations - all 16 stream locations and all 9 WWTP effluents in the program. WWTP employees collect the effluent samples, analyze the samples for field parameters (temperature, pH and dissolved oxygen), record the discharge flow, and then deliver the samples to the field sampling teams at predetermined locations. Laboratory analytical protocols limit sample collection to Monday through Thursday. Sampling is performed each year on approximately the same schedule. The exact sampling dates for the year are predetermined at the beginning of the year. Refer to the sampling table below for the approximate schedule.

UCC – AMBIENT GRAB SAMPLES
Locations and Sample Schedule

Sample ID	Flow Gage	Sample Location *	Early Feb Mon	Early Apr Tues	Late May Thurs	Mid Jun Weds	Mid Jul Mon	Mid Aug Tues	Mid Oct Weds	Early Dec Thurs
CC05	Staff gage	MSCC at Bakerville			X				X	
CC10	Recording gage	SFCC upstream of the lake			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 (Kermits)	X	X	X				X	X
CC44	Staff gage	NFCC above BH/CC WTP intake			X				X	
CC45		NFCC above original BH/CC WWTP			X				X	
CC50	Recording gage	NFCC above confluence with MSCC	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
CC1A		Loveland WWTP			X				X	
CC3A		Georgetown WWTP	X	X	X	X	X	X	X	X
CC5A		Empire WWTP			X				X	
CC7A		Central Clear Creek WWTP	X	X	X	X	X	X	X	X
CC8A		St Mary's WWTP			X				X	
CC12A		Idaho Springs WWTP	X	X	X	X	X	X	X	X
CC13B		BH/CC WWTP	X	X	X	X	X	X	X	X
CC14A		Henderson Mine WWTP			X				X	
CC15A		Eisenhower Tunnel WWTP	X	X	X	X	X	X	X	X

* MSCC = Mainstem Clear Creek
SFCC = South Fork Clear Creek
BH/CC = Blackhawk/Central City
WFCC = West Fork Clear Creek
NFCC = North Fork Clear Creek
WTP = Water Treatment Plant
WWTP = Wastewater Treatment Plant

** The recording gage at CC40 is operated and maintained by Clear Creek Consultants on behalf of UCCWA.

Note: Sampling schedule translation = Early Feb Mon means early in the month of February on a Monday.
Exact sampling dates are scheduled each year in advance by the coordinator.

UCC – AMBIENT GRAB SAMPLES

Analytical Parameters – includes parameters for both Short and Long Schedules

Analyte	Analytical Method Reference	Reporting Limit	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	0.0025 mg/L	Northglenn
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.0025 mg/L	Northglenn
Total Organic Carbon (TOC)	SM 5310 B	0.5 mg/L	Thornton
Total Suspended Solids	SM 2540 D	1 mg/L	Thornton
Temperature	SM 2550 B	0.1 °C	Field Teams/Golden
pH	SM 4500-H+ B	0.1 Std Units	Field Teams/Golden
Conductivity	SM 2510 B	1 µS/cm	Field Teams/Golden
Turbidity	SM 2130 B	0.1 NTU	Field Teams/Golden
Dissolved Oxygen	SM 4500-O G	0.1 mg/L	Field Teams/Golden
Stream Flow	Gage readings	1 cfs	USGS/ Clear Creek Consultants
Stream Height	Staff gage reading	0.1 ft	Field Teams
WWTP Discharge Flow	Flow Meter readings	0.01 mgd	WWTPs

Table Notes:
1) SM refers to the 21st Edition of Standard Methods for the Examination of Water and Wastewater.
2) Reporting limits are matrix dependent and may be increased for complex matrices.
3) TOC is analyzed on samples from sites CC05, CC20, CC26, CC35, CC40, CC45, CC50, CC52, CC53, and CC60 during the Long Schedule events. TOC is analyzed on grab samples from sites CC26, CC40, CC50 and CC60 during the Short Schedule events in Feb, April and Dec **ONLY**.

UCC – AMBIENT GRAB SAMPLES

Flow Monitoring

Various mechanisms are employed throughout the watershed for monitoring the hydrological 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 established for the location. The recording gage at CC40 is operated and maintained by Clear Creek Consultants on behalf of UCCWA.

The WQIGA provides financial support for the USGS gages at CC05 at Bakerville (staff gage) and CC26 at Lawson (recording gage).

Wastewater treatment plant effluent discharge flows are provided by the individual WWTPs at the time of sample collection.

UCC – AMBIENT GRAB SAMPLES

Program Coordination - Short Schedule (Thornton)

Two weeks before the scheduled Clear Creek sampling date:

- Call Westminster and Northglenn to request enough prepared sample bottles from each lab for at least the next **two** sampling events. Contact and coordinate the sampling team. Make sure that there are two samplers available and one set of field meters (turbidity, pH, conductivity and DO). Refer to the Program Participants Contact Information list in Appendix F for sampling personnel options.

- Prepare sample bottle kits as directed below. Each sample bottle kit contains enough prepared sample containers for sampling at one location. Prepare nine sample kits for each event: four for the Creek Team, one for BH/CC to be delivered to SouthWest Water, one for Idaho Springs, and three for AAA Operations in Dumont which includes one kit to be picked up by CDOT for the Eisenhower Tunnel WWTP.

- Deliver bottle kits for the next sampling event at least one week prior to the event.

Sample Bottle Kit Prep- Short Schedule

Destination	Quantity	Volume	Bottle Type	Parameter	Laboratory	Additional Documentation
AAA - Dumont (AAA collects samples at CC3A and CC7A. CDOT will pick up kit and sample CC15A.	3	1L	Rectangular plastic	Phosphorus series	Northglenn	2 - Instructions (one for each WWTP) 3- COC (AAA will complete one COC for each sample location and CDOT will complete one COC for CC15A)
	3	500 mL	Plastic jug	TSS	Thornton	
	3	250 mL	Rectangular plastic	Nitrogen series	Westminster	
SouthWest Water (Collects samples at CC13B)	1	1L	Rectangular plastic	Phosphorus series	Northglenn	2 - Instructions and COCs (one for each WWTP)
	1	500 mL	Plastic jug	TSS	Thornton	
	1	250 mL	Rectangular plastic	Nitrogen series	Westminster	
Idaho Springs (Collects sample at CC12A)	1	1L	Rectangular plastic	Phosphorus series	Northglenn	Instructions and one COC
	1	500 mL	Plastic jug	TSS	Thornton	
	1	250 mL	Rectangular plastic	Nitrogen series	Westminster	
Clear Creek Team – Feb April and Dec **ONLY** (Collects samples at CC26, CC40, CC50 and CC60)	4	1L	Rectangular plastic	Phosphorus series	Northglenn	Instructions, four COCs and one field data sheet
	4	500 mL	Plastic jug	TSS	Thornton	
	4	250 mL	Rectangular plastic	Nitrogen series	Westminster	
	4	40 mL	Glass vial	TOC	Thornton	

Table Notes:
1) Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP).
2) Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.
3) The additional documentation forms are included in Appendix C.

<u>On Clear Creek sampling day (Short Schedule):</u>

- Additional steps for Feb, April and Dec events **<u>ONLY</u>**:
  - Calibrate turbidity, pH, conductivity, and DO meters 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 as necessary.
  - Fill the three bottles for quality control blanks with deionized water at the laboratory.
  - Thornton prepares the sample kits for the Clear Creek Team.
  - At each sample location, collect samples and analyze for pH, temperature, DO, conductivity, and turbidity. Complete the COC and record all results on the Field Data Sheet (refer to Appendix C).
- Pick up WWTP samples for all events.
- The field samples are returned to the Thornton Lab and refrigerated or frozen (nitrogen only). 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.

<u>UCC – AMBIENT GRAB SAMPLES</u>
<u>Sampling Locations Directions and Narrative Descriptions - Short Schedule</u>

Sampling Frequency: Feb, April, June, July, Aug, Dec (Note: Grab samples at stream sites CC26, CC40, CC50 and CC60 are collected during the Feb, April and Dec events **<u>ONLY</u>**. WWTP effluent samples are collected during all six events.)

Sample bottles: Creek sites (Feb, April and Dec **<u>ONLY</u>**): One 1 liter rectangular (phosphorus series), one 500 mL (TSS), one 250 mL (nitrogen series) and one 40 mL glass vial (TOC)

WWTPs: One 1 liter rectangular, one 500 mL and one 250 mL

<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 USGS gage and sampling station by bridge. [RECORDING GAGE] **Sample TOC**
Dumont	**AAA Operations in Dumont:** CC7A (Central Clear Creek), CC3A (Georgetown WWTP) and CC15A (Eisenhower Tunnel) samples. Continue east down Hwy 308. Drive down past the service shops. Turn right at Mill Creek Road. Address is 48

Mill Creek Road. It's the warehouse-like building across from the Dumont Post Office. Operators to drop samples off by 10:00 am.

CC40 Traveling eastbound on I-70 take US 6 exit. Pull off in parking area just east of the off ramp. (Kermits Restaurant is across the road) Sample approx. 100 yards east of stop sign below USGS recording gage. CC12A (Idaho Springs): Idaho Springs operator to meet at Kermits to drop off samples. They should have called to arrange a meeting time. [RECORDING GAGE] **Sample TOC**

CC13B Travel Hwy 119 eastbound toward US 6. Proceed to the new BH/CC WWTP five miles down the road. The new WWTP is on your left side. Meet the BH/CC operator in the main office building to pick up CC13B (BH/CC WWTP) samples**.** The operator will follow you down to CC50 and give you two extra bottles there for collection of split samples.

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 USGS recording gage. [RECORDING GAGE] **Sample TOC**

CC60 Approximately 1 mile west of intersection of Hwy 58 and US 6. Park in the pullout on the south side of highway and walk (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. **Sample TOC**

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

UCC – AMBIENT GRAB SAMPLES

Program Coordination - Long Schedule (Thornton)

Two weeks before the scheduled Clear Creek sampling date:

- Call Westminster and Northglenn to request enough prepared sample bottles from each lab for at least the next **two** sampling events. Contact and coordinate the sampling team. Make sure that there are two samplers available and one set of field meters (turbidity, pH, conductivity and DO) for each Creek Team. Refer to the Program Participants Contact Information list in Appendix F for sampling personnel options.

- Prepare sample bottle kits as directed below. Each sample bottle kit contained enough prepared sample bottles to collect samples at one location. Prepare 25 bottle kits: 8 kits each for Creek Teams A and B, 7 kits for AAA Operations in Dumont (includes one each for CDOT, Henderson Mine and Empire WWTP), one for Idaho Springs, and one for SouthWest Water in Arvada. CDOT will pick up a sample kit from AAA Operations for sampling at the Eisenhower Tunnel WWTP.

- Deliver bottle kits for the next event at least one week prior to the first sampling day. Notify Empire at least one week prior to sampling to schedule for Creek Team A to stop in Empire to pick up the samples.

Sample Bottle Kit Prep- Long Schedule

Destination	Quantity	Volume	Bottle Type	Parameter	Laboratory	Additional Documentation*
AAA – Dumont (AAA collects samples at CC1a, CC3a, CC7a and CC8a. Empire, Henderson Mine, and CDOT will pick up kit at AAA and sample CC5a, CC14A, and CC15a, respectively.)	7	1L	Rectangular plastic	Phosphorus series	Northglenn	7 - Instructions (one for each WWTP) 7 – COCs (AAA will complete one COC for each sample. CDOT will complete the COC for CC15a)
	7	500 mL	Plastic jug	TSS	Thornton	
	7	250 mL	Rectangular plastic	Nitrogen series	Westminster	
SouthWest Water (Collects samples at CC13b)	1	1L	Rectangular plastic	Phosphorus series	Northglenn	Instructions and COC
	1	500 mL	Plastic jug	TSS	Thornton	
	1	250 mL	Rectangular plastic	Nitrogen series	Westminster	
Idaho Springs	1	1L	Rectangular plastic	Phosphorus series	Northglenn	Instructions and COC
	1	500 mL	Plastic jug	TSS	Thornton	
	1	250 mL	Rectangular plastic	Nitrogen series	Westminster	
Clear Creek Team A (Collects samples at CC25, CC05, CC10, CC34, CC35, CC52 and CC53. Meets AAA in Dumont for sample transfer)	8	1L	Rectangular plastic	Phosphorus series	Northglenn	One set of: Instructions, four COCs and one field data sheet
	8	500 mL	Plastic jug	TSS	Thornton	
	8	250 mL	Rectangular plastic	Nitrogen series	Westminster	
	5	40 mL	Glass vial	TOC	Thornton	
Clear Creek Team B (Collects samples at CC15, CC20, CC26, CC30, CC40, CC44, CC45, CC50 and CC60) Meets Idaho Springs, Empire, Henderson, and Blackhawk for WWTP samples.)	8	1L	Rectangular plastic	Phosphorus series	Northglenn	One set of: Instructions, four COCs and one field data sheet
	8	500 mL	Plastic jug	TSS	Thornton	
	8	250 mL	Rectangular plastic	Nitrogen series	Westminster	
	5	40 mL	Glass vial	TOC	Thornton	
QC	4	2 L	1:1 HCl rinsed Rectangular plastic	QC spikes and dups for Golden	Golden	QC sampling done by Team A in May and Team B in October.
	1 (blank)	1 L	Rectangular plastic	Phosphorus series	Northglenn	
	1 (blank)	250 mL	Rectangular plastic	Nitrogen series	Westminster	

Table Notes:
1) Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP).
2) Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.
3) The additional documentation forms are included in Appendix C.

<u>On Clear Creek sampling day (Long Schedule):</u>

- Calibrate turbidity, pH, conductivity, and DO meters 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 as necessary.

- Fill the three bottles for quality control blanks with deionized water at the laboratory.

- Prepare a minimum of two coolers with ice and your team's sample bottle kit. The Creek Team chosen for QC sampling must also include in the field sample bottle kit: field blank bottles (nitrogen and phosphorus), one field duplicate cubitainer, and at least 4 two-liter 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.

- Meet your sampling team partner at the designated location (usually City of Golden Public Works).

- At each sample location, collect samples and analyze for pH, temperature, DO, conductivity, and turbidity. Complete the COC and record all results on the Field Data Sheet (refer to Appendix C). Temperature, pH, and DO are analyzed by the WWTP operator at each plant and the data is recorded on the COC. Each sampling team will analyze their respective WWTP samples for turbidity, conductivity and other missing field parameters upon arrival at the Golden Laboratory. Samples will be collected at all <u>creek</u> sites for nitrogen series, phosphorus series and TSS. TOC samples are collected only at designated creek sites: CC05, CC20, CC26, CC35, CC40, CC45, CC50, CC52, CC53, and CC60.

- The Clear Creek Team selected for QC sampling will randomly select four <u>creek</u> sites. Collect one sample (2-liter HCl rinsed bottle) at four randomly selected creek sites for preparation of the spike and duplicate nutrient QC samples by Golden Laboratory staff.

- Complete the COC for the QC samples.

- Return to the Golden Lab when sampling is completed. Relinquish the QC samples to the Golden Lab staff.

- Golden 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 two copies of each team's field data sheet: one of each for Golden and one of each for Westminster.

- The field samples and prepared QC samples are returned to the Thornton Lab and refrigerated. 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 - Long Schedule

Clear Creek Team A

Sampling Frequency: late May, mid Oct

Sample bottles: Creek sites: One 1 liter rectangular (phosphorus series), one 500 mL (TSS), one 250 mL (nitrogen series) and one 40 mL amber glass vial (TOC, as required)

WWTPs: One 1 liter rectangular, one 500 mL and one 250 mL

POINT	DIRECTIONS AND DESCRIPTION OF LOCATION
CC25	Travel west on I-70 approximately 0.8 miles west of mile marker 232. Pull off the highway on the right side immediately beyond the guardrail for the bridge structure. Walk down the hill to the creek. Sample immediately downstream of the box culvert across from the recording gage located downstream. [RECORDING GAGE]
CC05	1-70 westbound to Exit 221 (Bakerville) Exit; go south back over Interstate (left) Park at call box. Take sample upstream of parking area, read gage located downstream. [Read the STAFF GAGE and record on the field data sheet]. **Sample TOC**
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 lake inlet and park on the right side of road. Sample from stream above lake inlet point. [RECORDING GAGE]
CC26	Travel eastbound I-70 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] **Sample TOC**
Dumont	**AAA Operations in Dumont:** CC1A (Loveland), CC7A (Central Clear Creek), CC3A (Georgetown WWTP), CC8A (St. Mary's WWTP) and CC15A (Eisenhower Tunnel) samples. Proceed under the highway. Turn right at the intersection onto Hwy 308. Drive down pass the service shops. Take a right at Mill Creek Road. Address is 48 Mill Creek Road across from the Dumont Post Office. There is no sign on the warehouse-like building. The operators were asked to drop samples off by 10:00 am. Please measure conductivity, turbidity, and any missed parameters on WWTP sample in Golden.

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.

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). Cross road and sample creek at recording gage. [RECORDING GAGE] **Sample TOC**

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. **Sample TOC**

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. **Sample TOC**

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

Clear Creek Team B

Sampling Frequency: late May, mid Oct

Sample bottles: Creek sites: One 1 liter rectangular (phosphorus series), one 500 mL (TSS), one 250 mL (nitrogen series) and one 40 mL amber glass vial (TOC, as required)

WWTPs: One 1 liter rectangular, one 500 mL and one 250 mL

POINT	DIRECTIONS AND DESCRIPTION OF LOCATION
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 tree in the middle of the pullout. Sample directly below the tree at the creek. Staff gage is along the north bank of stream next to a tree at the stream's edge. [Read the STAFF GAGE and record on the field data sheet]
Empire	East on US40 to Empire. Meet Empire, Henderson Mine, and Idaho Springs operators at the Tomato Convenience Store in Empire at 9:30 am. CC5A (Empire WWTP), CC12A (Idaho Springs WWTP) and CC14A (Henderson Mine WWTP).
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 approx. 100 feet downstream of bridge at recording gage. [RECORDING GAGE] **Sample TOC**

CC30 East on 1-70. Exit 238 (Fall River Road/St. Mary's Glacier) Approx. 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. [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. (Kermits Restaurant is across the road) Sample approx. 100 yards east of stop sign below recording gage. [RECORDING GAGE] **Sample TOC**

CC44 Continue east on US 6 to 119. Drive west on 119 to Black Hawk. From the Black Hawk intersection travel westbound approx. 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 approx. 100 feet upstream and sample at staff gage. [Read the STAFF GAGE and record on the field data sheet] Sample near the staff gage.

CC45 Turn around and drive east on 119. Turn off side of road right right after Mill Street. Sample just upstream of the old Black Hawk WWTP. *Note: we are no longer grabbing splits for Blackhawk at CC45.* **Sample TOC**

CC13B Travel Hwy 119 eastbound toward US 6. Proceed to the new BH/CC WWTP 5 miles down the road. The new WWTP is on your left side. Meet the BH/CC operator in the main office building to pick up CC13B (BH/CC WWTP) samples**.** The operator will follow you down to CC50 and give you two extra bottles there for collection of split samples.

CC50 Continue 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 to the right immediately before the junction. Sample at the recording gage. [RECORDING GAGE] **Sample TOC**

CC60 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. **Sample TOC**

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 Golden 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 laboratory. Samples from the wastewater treatment plants will not be regularly included in the split/spike portion of the QA/QC program because of the anticipated higher nutrient concentrations. The analytical procedure for QC preparation is detailed below:

SOP - QC Preparation for Clear Creek Studies

Night before:

- Soak 2 1-Liter Class A volumetric flasks with 1:1 HCl. One flask will be used to make up fresh Nitrate Standard and the other will be used for spiking the selected Clear Creek sample (with both nitrate and phosphorus spikes).

The Morning of Sampling Day:

- Remove 5 mg/L Phosphorus standard from fridge to warm to room temperature. This standard is prepared by the City of Northglenn and is stable for 3 months. It is usually in a 125 ml brown glass bottle.
- Remove 100 mg/L Nitrate-N standard from fridge. It is stored in a 125 ml brown Nalgene bottle. This standard is prepared fresh by the City of Golden each time. The method to prepare a 100 mg/L NO3-N standard is in Standard Methods, 21st Ed., page 4-120.

- **To Prepare Fresh Nitrate-N Standard**
  - Thoroughly rinse out one of the HCl acid soaked 1-Liter flasks to prepare the fresh standard in.
  - Fill flask with 200-300 mL DI water
  - Weigh out 0.7218 grams of KNO3 and add to flask. (KNO3 is stored in the desiccator with bacteria media).
  - Dilute to 1-Liter volume with DI and mix thoroughly.
  - Discard old standard and refill bottle with fresh standard. Rinse bottle out with fresh standard 2-3 times before filling. Record new prep date on bottle.

- 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 square plastic 16 ounce “milk type” bottle. They are pre HCl washed and stored in the cabinet above the wastewater sink.

  Two labs receive spike and duplicate samples from this program:
  - Northglenn for low level total phosphorus analysis.
  - Westminster for total nitrogen analysis.

The bottles are marked with consecutive numbers from month to month, year after year. Refer to the last sample set numbers in the brown Clear Creek Quality Control Log Book (above Vicki's desk) and mark new bottles with the next consecutive number set (##). Mark the 4 bottles with the following information:

- City of Northglenn - P(##) - Spike for Phosphorus, Date of sampling.
- City of Northglenn - D(##) - Duplicate for Phosphorus, Date of sampling.

- City of Westminster - N(##) - Spike for Nitrogen, Date of Sampling.
- City of Westminster - D(##) - Duplicate for Nitrogen, Date of sampling.

When Samples Arrive in Golden's Lab:

Certain 2 Liter samples from Clear Creek sites will have been randomly selected by the sampling team as "QC" samples.

- 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.

The "**spiked sample"** will be made in the remaining HCl rinsed volumetric flask. and will use up 1 liter from the 2 liter bottle.
The remaining 1 liter volume will be split into the "**duplicate sample**" bottles for both labs.

- **To Prepare Spiked Sample**

  - Rinse out the remaining 1-Liter volumetric flask with DI.
  - Then rinse flask with a small portion of the selected QC Creek sample - 2 times.
  - Refer to the last sampling to determine new spike volumes.

  **Spike amounts for Phosphorus are usually within the 1.75 to 3.0 ml volume range for a total spiked concentration of 0.00875 mg/L to 0.015 mg/L, i.e.,*

  1.75 mL of 5 mg/L phosphorus standard in 1 liter = 0.00875 mg/L concentration spiked

  **Spike amounts for Nitrogen are usually within a 1.5 to 3.0 ml volume range for a total spiked concentration of 0.15 mg/L to 0.3 mg/L, i.e.,*

  1.5 mL of 100 mg/L nitrogen-N standard in 1 liter = 0.15 mg/L concentration spiked

- Mix the Clear Creek sample well and pour approximately 500 mL into pre-rinsed flask.
- Add determined spike volumes of both standards to flask. Mix well.
- Dilute to volume with additional Creek sample finalizing volume with a pipet. (It is too hard to bring it to volume by pouring from the 2 liter container!)
- Mix well and pour into 2 bottles labeled for spike samples (“N” and “P”).

<u>To Prepare Duplicate Sample</u>

- Thoroughly mix remaining Clear Creek sample
- Pour into 2 bottles labeled for duplicates ("D").

Record the following information in the brown "Clear Creek QC" book:

1. the time the samples arrived at Golden
2. the new consecutive sample numbers
3. the Clear Creek sample site number that was selected for preparation of the QC samples
4. the volumes spiked for phosphorus and nitrogen

Generate new chain of custody forms for the 4 new samples. One form can be filled out for both Westminster and Northglenn labs. Sampling teams will deliver samples to respective labs. Copies of previous chain of custody forms are in the lower file drawer in drinking water cabinet.

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES
Program Coordination (Westminster and Golden)

Field Sampling Teams: Westminster, Thornton, Golden, Arvada

Permanent autosampler sites were selected at strategic locations in the watershed in order to assess diurnal variations in water quality in Clear Creek. The 48-hour ambient composites are collected with programmable automatic sampling devices. Each of the 24 sample bottles represents a two hour time period, resulting from collecting equal volumes of sample in each of two consecutive hours; therefore, 48 hours of samples are collected in 24 bottles. The 24 discrete samples are composited into two 24 hour samples on a time weighted basis (i.e. equal sample volumes are taken from 12 discrete autosampler bottles and combined into a single composite sample.) Additional discrete or composite samples may be submitted for analysis based on anomalies noted in field observations for the individual autosampler bottles.

Ambient samples are collected approximately seven times per year on a monthly schedule starting in April and ending in October. Ambient autosampler sample collection will correlate with the Clear Creek grab sample program during the months of April, June, July and August whenever possible. The schedule for the ambient sampling is based on clear weather predictions and is staggered at different times during the week, including weekends.

Analytical probes and data logging equipment are active at the autosampler sites year-round to continuously monitor in-stream conditions for temperature and conductivity. From April through October, or as weather conditions permit, additional probes are deployed for pressure (depth), turbidity and pH. YSI multi-probe sondes are deployed at CC26 and CC49. The sample locations are equipped with data loggers for remote monitoring of water quality conditions in the watershed.

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES
Sample Locations

CC AS 26	Mainstem of CC at USGS Lawson gage
CC AS 49	Mainstem of CC above the confluence of the North Fork
CC AS 50	North Fork of CC above confluence of Mainstem of CC at USGS gage
CC AS 59	Mainstem of CC above Golden and Church Ditch diversions

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES
Flow Monitoring

USGS gages will provide the average daily flow associated with each of the two 24-hour composite samples for the ambient autosamplers. Data will be obtained directly from the gage stations at CC26 and CC50 to correlate with CC AS 26 and CC AS 50. Flow data from the gage at CC40 will be used to correlate to CC AS 49 because there are no significant inflows to or diversions from Clear Creek between CC40 and CC AS 49.

The flow data associated with CC AS 59 is considered to be an estimated flow. The flows diverted to the City of Golden water plant and the Church Ditch will be added to the gage flows recorded at the USGS gage at CC61 (Clear Creek at Golden) to estimate the flow at CC AS 59.

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES

Analytical Parameters

Analyte	Analytical Method Reference	Reporting Limit	Responsible Laboratory
Total Nitrogen	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	0.0025 mg/L	Northglenn
Ortho-phosphate-P (dissolved) or DRP	SM 4500-P E	0.0025 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
pH	SM 4500-H+ B	0.1 Std Units	Field Teams
Temperature	SM 2550 B	0.1 °C	Field Teams
Conductivity	SM 2510 B	1 µS/cm	Field Teams
Turbidity	SM 2130 B	0.1 NTU	Field Teams
Total and Dissolved Cadmium	EPA 200.7	0.001 mg/L	Golden
Total and Dissolved Copper	EPA 200.7	0.005 mg/L	Golden
Total and Dissolved Iron	EPA 200.7	0.007 mg/L	Golden
Total and Dissolved Lead	EPA 200.7	0.011 mg/L	Golden
Total and Dissolved Manganese	EPA 200.7	0.001 mg/L	Golden
Total and Dissolved Zinc	EPA 200.7	0.005 mg/L	Golden
Stream Flow	Gage readings	1 cfs	USGS/UCCWA/Golden/ FRICO

Table Notes:
1) SM refers to the 21st Edition of Standard Methods for the Examination of Water and Wastewater.
2) Reporting limits are matrix dependent and may be increased for complex matrices.
3) EPA recommended holding times less than 72 hours may not be met due to the extended sampling routine.
4) Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading of greater than 100 NTU shall be diluted prior to analysis and may be analyzed as a spiked sample in order to evaluate digestion efficiency. Highly turbid samples may be split with a commercial laboratory to confirm nutrient concentrations.

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES
Program Coordination (Westminster and Golden)

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
- Dedicated field probes for turbidity, temperature, conductivity and pH
- Depth/velocity flow sensor
- Recording gage at CC26 – Operated and maintained by USGS
- Staff gage at CC50
- Rain gage at CC59
- 24 discrete HCl rinsed autosampler bottles with caps. Bottles must be numbered and inserted in the designated position in autosampler (positions numbered 1 through 24)
- Continuous recording datalogger
- Cellular modem and antenna at CC26, CC50 and CC59

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES
Autosampler Operation

On a monthly basis between April and October, autosamplers will be set to collect time-weighted discrete samples for a 48 hour period. The autosamplers are strategically located in order to correlate stream flow with the chemical water quality data collected on the samples. In order to associate the relative impacts of the point and nonpoint pollutant sources located between the sample stations, it is advisable to observe the same "slug" of water at both the upstream and downstream locations. Using the "time of travel" study conducted by USGS in 1999, the downstream autosamplers can be delayed for a predetermined time based on in-stream flow velocity. The time of travel considerations will permit comparing the same "slug" of water at both locations and facilitate pollutant impact assessments.

The time of travel estimates table is included in Appendix E.

Autosampler Setup:

Equipment required:

- 24 discrete HCl rinsed autosampler bottles with caps
- 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. 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. Replace sampler head and lock in place. Use care to ensure the distributor arm is set above the first bottle.
5. Program the sampler according to manufacturer's instructions to collect two sequential 350 mL to 450 mL samples in each of 24 one-liter bottles in a 48 hour period.
6. Record station/equipment information on field sheet.
7. Make sure the autosampler program is set to ***RUN*** before locking the enclosure.
8. The autosampler may be set up a day or two ahead of programmed start time.

Sample Collection

Additional equipment required:

- Keys and/or tools to access autosampler enclosures
- Large cooler with ice to collect sample bottles
- 24 pre-cleaned, HCl 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
- 2 or 3 pre-cleaned, HCl rinsed, Nalgene composite sample bottles if compositing in the field
- Two-liter Nalgene bottles (washed and rinsed with 1:1 hydrochloric acid) for compositing samples
- 250 mL graduated cylinder (washed and rinsed with 1:1 hydrochloric acid) for compositing samples

- Prepared sample bottles provided by participating Cities for nutrients, solids and metals analyses
    - 1 L square plastic – phosphorus series (Northglenn)
    - 250 mL plastic – nitrogen series (Westminster)
    - 500 mL plastic bottle – TSS (Thornton)
    - 250 ml round plastic – total and dissolved metals (Golden)
- 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. Record station/equipment information on field sheet.
4. Make note of any samples with high turbidity determined by visual observance or data obtained from the datalogger.
5. Cap bottles and place in a cooler with ice for transport to Golden lab for compositing.

   Optional compositing of samples in the field is performed by pouring off equal volumes into two-liter pre-cleaned bottles. Refer to the Sample Compositing Procedure Step 1. Save remaining volume of any high turbidity samples to take back to the lab. Pour remaining sample on the ground.
6. Clean out autosampler base and reload with a new set of pre-cleaned bottles.
7. During storm season, reset sampler for event triggered monitoring between the monthly sampling events.
8. Take all samples to the Golden Water Quality Laboratory for compositing, splitting, distribution and wet chemistry analysis of pH, turbidity and conductivity.

UCC AUTOSAMPLER 48-HOUR AMBIENT SAMPLES

Sample Composting

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 marked “A”. Shake sample bottles and pour equal volumes of sample from the remaining 12 bottles into a composite bottle marked “B”.
2. Perform turbidity, pH and conductivity measurements on composited samples. Enter data on the Sampling Form.
3. Use the well mixed composites (A and B) to fill the appropriate bottles for the Northglenn, Thornton, Westminster and Golden 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. Deliver and relinquish to each city their respective samples (Westminster-nitrogen series, 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 and Golden for permanent archive.
8. Samples are created in the web-accessible Tribal data system by Westminster for data entry and results archive.

UCC AUTOSAMPLERS – EVENT SAMPLES
Program Coordination (Westminster and Golden)

Field Sampling Teams: Westminster, Thornton, Golden, Arvada

The event autosampler program was initiated in 2006 to assess the pollutant concentrations mobilized during significant snow melt (runoff) or rain events at 48-hour ambient locations CC AS 49 and CC AS 59. Automated sample collection of stormwater may be 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 30 minute running average exceeds a predetermined turbidity level (typically 100 NTU). The autosampler at CC AS 59 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 (placer 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.

Storm event samples are analyzed for the same suite of analytical parameters listed in the previous section for the 48-hour ambient samples. Samples may not be analyzed within the EPA recommended holding time for some parameters based on the random nature of the storm event triggering.

UCC AUTOSAMPLERS - EVENT SAMPLES
Sample Locations

CC AS 26 Event	Mainstem of CC at USGS Lawson gage
CC AS 49 Event	Mainstem of CC above the confluence of the North Fork
CC AS 50 Event	North Fork of CC above confluence of Mainstem of CC at USGS gage
CC AS 59 Event	Mainstem of CC above Golden and Church Ditch diversions

UCC AUTOSAMPLERS – EVENT SAMPLES
Flow Monitoring

Westminster and Golden will obtain the 15 minute interval flow data from the USGS gage at CC61 (Clear Creek at Golden) to correlate to CC AS 59. 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 CC AS 49. The flow data will be entered into the LDMS to be used for loadings calculations for storm events.

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 96th 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.

Trib samples are collected year-round on a monthly basis. All tributaries flowing at a rate that allows collection of a representative sample will be monitored.

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.

The raw water pipeline at Semper (T-24) is monitored monthly. The raw water pipeline at NWWTP (T-25) is monitored only when the Semper facility is offline.

TRIB SAMPLES

Locations and Sample Schedule

Sample ID	Sample Location *	Every month of the year when flowing**
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) above wetlands	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

*MSCC = Mainstem Clear Creek

** Exceptions noted in paragraph above the table.

TRIB SAMPLES

Analytical Parameters and Analytical Scheme

Analyte	Analytical Method Reference	Reporting Limit	Responsible Laboratory	Monitoring Frequency
Temperature	SM 2550 B	0.1 °C	Field Team	Monthly
pH	SM 4500-H+ B	0.1 Std Units	Field Team	Monthly
Conductivity	SM 2510 B	1 µS/cm	Field Team	Monthly
Turbidity	SM 2130B	0.1 NTU	Field Team	Monthly
Dissolved Oxygen	SM 4500-O G	0.1 mg/L	Field Team	Monthly
Total Phosphorus	SM 4500-P E	0.0025 mg/L	Northglenn	Monthly
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.0025 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 9221 D	1 cfu/100mL	Thornton	Monthly
Total and Dissolved Iron	EPA 200.7	0.02 mg/L	Thornton	Monthly
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Thornton	Monthly
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Thornton	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
UV-254	SM 5910 B	0.001 cm^{-1}	Westminster	Monthly
Gross Alpha and Gross Beta	EPA 901.1	0.1 pCi/L	Westminster	Quarterly
Dissolved Barium	EPA 200.8	0.002 mg/L	Thornton	Quarterly
Dissolved Beryllium	EPA 200.8	0.001 mg/L	Thornton	Quarterly
Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Thornton	Quarterly
Dissolved Chromium	EPA 200.8	0.001 mg/L	Thornton	Quarterly
Dissolved Copper	EPA 200.8	0.002 mg/L	Thornton	Quarterly
Dissolved Lead	EPA 200.8	0.0005 mg/L	Thornton	Quarterly
Dissolved Nickel	EPA 200.8	0.005 mg/L	Thornton	Quarterly
Total and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Thornton	Quarterly
Total and Dissolved Selenium	EPA 200.8	0.005 mg/L	Thornton	Quarterly
Total and Dissolved Silver	EPA 200.8	0.0005 mg/L	Thornton	Quarterly
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Thornton	Quarterly
Chloride	SM 4500-Cl G	5 mg/L	Thornton	Quarterly
Sulfate	SM 4500 SO4 E	10 mg/L	Thornton	Quarterly
Total Hardness (as $CaCO_3$)	EPA 130.2	5 mg/L	Thornton	Quarterly

Table Notes:
1) SM refers to the 21st Edition of Standard Methods for the Examination of Water and Wastewater.
2) Reporting limits are matrix dependent and may be increased for complex matrices.
3) Quarterly parameters are analyzed in March, June, September and December at all sampled locations.
4) UV-254 is analyzed monthly at Standley Lake inflows when flows are greater than 10 cfs (T-4, T-11, T-22D and T-27 when sampled) and the pipelines (T-24 and T-25 when sampled).
5) Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading of greater than 100 NTU shall be diluted prior to analysis and may be analyzed as a spiked sample in order to evaluate digestion efficiency. Highly turbid samples may be split with a commercial laboratory to confirm nutrient concentrations.

TRIB SAMPLES

Program Coordination (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 pH and DO meters.
- Analyze the Trip Blank for pH and DO.
- Pack Trip Blank in cooler to monitor field activities for phosphorus contamination.

Sample Bottle Kit – Tribs Monthly and Quarterly

Quantity	Volume	Bottle Type	Parameter	Laboratory
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	Thornton
9	40 mL	Glass vial	TOC	Thornton
9	250 mL	Glass	E. coli	Thornton
9	125 mL	Plastic	Total Metals	Thornton
9	125 mL	Plastic	Dissolved Metals	Thornton
9	250 mL	Plastic	Nitrogen series, UV-254	Westminster
9	1 L	Plastic	Rads	Westminster

Table Note: Additional sites are sampled quarterly for metals; otherwise only four bottles are required for monthly monitoring for total metals and four bottles for dissolved metals.

Sample Collection

Equipment required:

- Key to access T-2.
- 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
- pH and DO meters 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.
2. Starting with T-24, collect field samples in the order detailed below for 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 sample in the field for pH, DO and temperature. Record data in the field notebook.
8. Repeat the process at each location.
9. Return to Westminster's Semper WTP to receive T-25 sample from Westminster staff. 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 Tribal database 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 and analyze samples for conductivity and turbidity on calibrated meters. Record data in the field notebook.
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 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 just before the beginning of the pipeline.

Trib 1
T-1 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 96th Ave and 88th 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 86th 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 104th & 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
Located on the south side of Standley Lake at the Church Ditch delivery structure. This sampling location was activated in 2009.

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

TRIB CONTINUOUS MONITORING
Program Coordination (Westminster)

Field sampling team: Westminster

A 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. A sonde was also installed at the new Church Ditch inlet (T-27) in 2009 and operates under similar conditions. The probes provide continuous in-stream monitoring of pH, ORP, temperature, depth (pressure transducer), conductivity and turbidity. Remote access to the data logger data facilitates monitoring of water quality at these inflow locations to Standley Lake. The FHL/Croke station is also equipped with a tipping-bucket rain gauge.

TRIB CONTINUOUS MONITORING
Sample Locations

CC AS T04	Croke Canal approximately 0.5 mile from Standley Lake inlet
CC AS T11	Farmers Highline Canal approximately 0.5 mile from Standley Lake inlet
CC AS T27	Church Ditch at Standley Lake inlet

Table Note: Historical data from these locations are 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
Program Coordination (Westminster)

Field Sampling Teams: Westminster

The event autosampler program was initiated on the Tributaries in 2009 at CC AS T11 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.

Trib Autosampler Event Samples are only collected at CC AS T11. First flush samples may be collected at all three Trib Autosampler Continuous Monitoring locations described in the previous section.

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

TRIB AUTOSAMPLERS EVENT MONITORING
Sample Location

CC AS T11 Event	Farmers Highline Canal approximately 0.5 mile from Standley Lake inlet

Table Note: Historical data from this location is 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

Westminster will obtain the canal flow data from FRICO. The average daily flow data corresponding with the time-event composited samples will be entered into the LDMS to be used for loadings calculations for storm events.

TRIB AUTOSAMPLER EVENT SAMPLES
Analytical Parameters

Analyte	Analytical Method Reference	Reporting Limit	Responsible Laboratory
pH	SM 4500-H+ B	0.1 Std Units	Field Teams
Temperature	SM 2550 B	0.1 °C	Field Teams
Conductivity	SM 2510 B	1 µS/cm	Field Teams
Turbidity	SM 2130 B	0.1 NTU	Field Teams
Total Nitrogen	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	0.0025 mg/L	Northglenn
Ortho-phosphate-P (dissolved) or DRP	SM 4500-P E	0.0025 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
Total and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Thornton
Total and Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Thornton
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Iron	EPA 200.7	0.02 mg/L	Thornton
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Thornton
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Thornton
Canal Flow	Weekly Dam Report	1 cfs	FRICO

Table Notes:
1) SM refers to the 21st Edition of Standard Methods for the Examination of Water and Wastewater.
2) Reporting limits are matrix dependent and may be increased for complex matrices.
3) EPA recommended holding times less than 72 hours may not be met due to the extended sampling routine.
4) Samples collected for nutrients (nitrogen and phosphorus) with a turbidity reading of greater than 100 NTU shall be diluted prior to analysis and may be analyzed as a spiked sample in order to evaluate digestion efficiency. Highly turbid samples may be split with a commercial laboratory to confirm nutrient concentrations.

TRIB AUTOSAMPLER EVENT SAMPLES
Field Equipment

Equipment Installed At Autosampler Location

- 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

- Dedicated field probes for turbidity, temperature, conductivity, ORP, pressure transducer (depth) and pH
- 24 discrete HCl rinsed autosampler bottles with caps. Bottles must be numbered and inserted in the designated position in autosampler (positions numbered 1 through 24)
- Continuous recording datalogger
- Meteorological data acquisition equipment (e.g. rain gauge or anemometer)
- Cellular modem and antenna

Autosampler Operation and Setup, and Sample Collection and Compositing

Refer to the UCC Autosampler 48-HR Ambient/Event sections for directions; however, Westminster will collect and composite the samples at the Semper Water Treatment Facility.

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 near the outlet structure. 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 at 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 five feet off the bottom and every meter in between. The profiler data is accessible via the internet and provides a depth-integrated profile of the lake water quality.

SL – DAILY LAKE PROFILES

Analytical Parameters

Analyte	Analytical Method Reference	Reporting Limit
Temperature	SM 2560 A	0.01 °C
pH	SM 4500-H+ B	0.01 Std Units
Conductivity	SM 2510 B	1 µS/cm
Turbidity	SM 2130 B	0.1 NTU
Dissolved Oxygen	YSI (optical probe)	0.01 mg/L
Chlorophyll	YSI (electrode)	0.1 µg/L
ORP	SM 2580 A	0.1 mv

SL – BIMONTHLY GRAB SAMPLES
Program Coordination: 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.

SL – BIMONTHLY GRAB SAMPLES
Locations

Grab samples are collected twice each month from March through November, but the sampling may be extended during the winter if the lake is not frozen. 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 dock ramp, etc).

Sample Identification	Sample Location
SL 10-00	SL surface
SL 10-PZ	SL at two times the Secchi depth
SL 10-70	SL at five feet off the bottom. (Approximate depth of 60 ft when lake if full at gage height 96)
SL 69-00	SL surface at the boat dock
T-24	Semper raw water pipeline. T-24 is approximately 10 ft higher than SL 10-70.

SL – BIMONTHLY GRAB SAMPLES
Analytical Parameters

Analyte	Analytical Method Reference	Reporting Limit	Responsible Laboratory
Temperature	SM 2550 B	0.1 °C	Field Team
pH	SM 4500-H+ B	0.1 Std Units	Field Team
Conductivity	SM 2510 B	1 µS/cm	Field Team
Turbidity	SM 2130 B	0.1 NTU	Field Team
Dissolved Oxygen	YSI (optical probe)	0.1 mg/L	Field Team
ORP	YSI (electrode)	1 mv	Field Team
Chlorophyll	YSI (electrode)	0.1 µg/L	Field Team
Secchi Depth	Secchi disk	0.1 meter	Field Team
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 *a*	SM 10200-H	1.0 µg/L	Westminster
UV-254	SM 5910 B	0.001 cm^{-1}	Westminster
Total Phosphorus	SM 4500-P E	0.0025 mg/L	Northglenn
Ortho-phosphate as P (dissolved) or DRP	SM 4500-P E	0.0025 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 and Dissolved Arsenic	EPA 200.8	0.001 mg/L	Thornton
Total and Dissolved Barium	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Beryllium	EPA 200.8	0.001 mg/L	Thornton
Total and Dissolved Cadmium	EPA 200.8	0.0005 mg/L	Thornton
Total and Dissolved Chromium	EPA 200.8	0.001 mg/L	Thornton
Total and Dissolved Copper	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Iron	EPA 200.7	0.02 mg/L	Thornton
Total and Dissolved Lead	EPA 200.8	0.0005 mg/L	Thornton
Total and Dissolved Manganese	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Molybdenum	EPA 200.8	0.002 mg/L	Thornton
Total and Dissolved Nickel	EPA 200.8	0.005 mg/L	Thornton
Total and Dissolved Selenium	EPA 200.8	0.005 mg/L	Thornton
Total and Dissolved Silver	EPA 200.8	0.0005 mg/L	Thornton
Total and Dissolved Zinc	EPA 200.8	0.020 mg/L	Thornton
Total Mercury	EPA 245.1	0.0002 mg/L	Thornton
Total Hardness (as $CaCO_3$)	EPA 130.2	5 mg/L	Thornton
E. coli	SM 9221 D	1 cfu/100mL	Thornton
BTEX	EPA 524.2	0.5 µg/L	Thornton

Table Notes:
1) SM refers to the 21st Edition of Standard Methods for the Examination of Water and Wastewater.
2) Reporting limits are matrix dependent and may be increased for complex matrices.

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. Rads (Gross Alpha and Gross Beta) and metals are collected before and after run-off, and before and after lake turnover, which are both subject to annual fluctuation.

Month	**Lake Sample Location**	**Analytes**													
		Hand Profile	Secchi depth	Rads	E coli	Zooplankton	Nutrients	Metals	Algae	Chlorophyll *a*	TOC	TSS	Total Hardness	BTEX	UV-254
January 1st week	10-00	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
	T-24								X	X					X
January 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	T-24								X	X					X
February 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X	X		X
	10-70	X			X		X				X	X	X		X
	T-24								X	X					X
February 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	T-24								X	X					X
March 1st week	10-00	X	X	X	X	X									
	10-PZ			X			X		X	X	X	X	X		X
	10-70	X		X	X		X				X	X	X		X
	T-24								X	X					X
March 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	T-24								X	X					X
April 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X	X		X
	10-70	X			X		X				X	X	X		X
	69-00													X	
	T-24								X	X					X
April 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	T-24								X	X					X

Month	Lake Sample Location	Analytes													
		Hand Profile	Secchi depth	Rads	E coli	Zooplankton	Nutrients	Metals	Algae	Chlorophyll *a*	TOC	TSS	Total Hardness	BTEX	UV-254
May 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X	X		X
	10-70	X			X		X				X	X	X		X
	T-24								X	X					X
May 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	69-00													X	
	T-24								X	X					X
June 1st week	10-00	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
	T-24								X	X					X
June 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	69-00													X	
	T-24								X	X					X
July 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X	X		X
	10-70	X			X		X				X	X	X		X
	T-24								X	X					X
July 3rd week	10-00	X	X			X									
	10-PZ						X	X	X	X			X		X
	10-70	X					X	X					X		X
	69-00													X	
	T-24								X	X					X
August 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X			X
	10-70	X			X		X				X	X			X
	T-24								X	X					X
August 3rd week	10-00	X	X	X		X									
	10-PZ			X			X	X	X	X			X		X
	10-70	X		X			X	X					X		X
	69-00													X	
	T-24								X	X					X
September 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X			X
	10-70	X			X		X				X	X			X
	T-24								X	X					X

Month	Lake Sample Location	Analytes													
		Hand Profile	Secchi depth	Rads	E coli	Zooplankton	Nutrients	Metals	Algae	Chlorophyll *a*	TOC	TSS	Total Hardness	BTEX	UV-254
September 3rd week	10-00	X	X	X		X									
	10-PZ			X			X	X	X	X			X		X
	10-70	X		X			X	X					X		X
	69-00													X	
	T-24								X	X					X
October 1st week	10-00	X	X		X	X									
	10-PZ						X	X	X	X	X	X	X		X
	10-70	X			X		X	X			X	X	X		X
	T-24								X	X					X
October 3rd week	10-00	X	X	X		X									
	10-PZ			X			X	X	X	X			X		X
	10-70	X		X			X	X					X		X
	69-00													X	
	T-24								X	X					X
November 1st week	10-00	X	X		X	X									
	10-PZ						X		X	X	X	X	X		X
	10-70	X			X		X				X	X	X		X
	T-24								X	X					X
November 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	T-24								X	X					X
December 1st week	10-00	X	X	X	X	X									
	10-PZ			X			X		X	X	X	X	X		X
	10-70	X		X	X		X				X	X	X		X
	T-24								X	X					X
December 3rd week	10-00	X	X			X									
	10-PZ						X		X	X					X
	10-70	X					X								X
	T-24								X	X					X

Table notes:

1) Hand Profile includes analysis of temperature, pH, conductivity, turbidity, DO, chlorophyll and ORP at the surface of the lake and at the bottom of the lake using the sonde.
2) Rads includes Gross Alpha and Gross Beta.
3) Metals includes the total and dissolved forms of As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Mn, Mo, Ni, Se, Ag and Zn, and total Hg. **Metals for the 3rd week of July and the 1st week of October consist of ONLY total and dissolved arsenic.**
4) 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.
5) Total Hardness is reported as $CaCO_3$.

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.

Parameter	**Volume**	**Bottle Type**	**Laboratory**
Phosphorus series	1L	Rectangular plastic	Northglenn
Nitrogen series, UV-254	250 mL	Rectangular plastic	Westminster
Rads	1 L	Plastic	Westminster
Zooplankton	250 mL	Plastic	Westminster
Algae	1 L	Plastic	Westminster
Chlorophyll *a*	1 L	Brown plastic	Westminster
Total metals, Total Hg	500 mL	Plastic	Thornton
Dissolved metals	500 mL	Plastic	Thornton
TOC	40 mL	Glass vial	Thornton
TSS, Total Hardness	500 mL	Plastic jug	Thornton
E. coli	250 mL	Glass	Thornton
BTEX	40 mL	Glass vial	Thornton
BTEX trip blank	40 mL	Glass vial	Thornton

Table Notes:
1) A trip blank is required to be prepared when field samples are collected for BTEX. The trip blank is comprised of a pre-cleaned glass vial filled with DI and is used to monitor for volatile organic contamination during transport and lab storage prior to analysis. Analysis of the trip blank is only required when any of the BTEX analytes are detectable in the field samples.
2) Phosphorus series includes total P and dissolved ortho-phosphate-P (also referred to as DRP).
3) Nitrogen series includes total N, ammonia-N and nitrate/nitrite-N.
4) Rads includes: Gross Alpha and Gross Beta
5) BTEX includes: benzene, toluene, ethyl benzene and total xylenes

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 6600 Sonde - calibrated
YSI 650 Meter and cable
Handheld anemometer/%Relative humidity meter
Cellular phone
GPS unit
Digital camera
Boat Tool Kit
Laptop computer – fully charged with communication cable and “console” 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 µm

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 6600 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 the 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.
- Hook up the quick release connector end of the tube to 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 step 7.4.2.5 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 µm 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.

Eurasian milfoil weevils have been stocked in the lake (on the west side) on three occasions from 2004 through 2006. The weevil larva bore into the stem of the milfoil which damages the plant. If an adequate weevil population can be sustained at Standley Lake, the weevils may be able to control the spread of the milfoil. Annual surveys of weevil populations in the lake are performed by contractors.

In 2007 the SLC initiated a pilot study on Standley Lake using two solar pond aerators to investigate the theory that continuous aeration will oxidize the sediment and deprive the milfoil of nutrients. Samples were collected and analyzed for nutrients to assess nutrient reduction at the aerator sites compared to other sites in the lake. The solar aerators were removed in the fall of 2009. The results of the study were inconclusive as there was an overall reduction in milfoil growth throughout the lake in 2009.

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. 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 every two weeks 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). All the tow net sites have a substrate sampler located in the same place for comparison.

Shoreline surveys are performed when the water level is at the lowest for the year. A shoreline survey consists of walking the shoreline by the boat ramp, and outlet area looking for adult mussels attached to any hard substrate.

DATA MANAGEMENT AND REPORTING

The City of Westminster is responsible for administration of the Tribal database used jointly by the WQIGA partners. The database is commonly referred to as the 3-City database which 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 an internet host site.

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 analytical results entry for their assigned analyses into the Tribal database. Personnel are encouraged to document any changes to previously saved analytical data in the Tribal system. On a quarterly basis, a peer review team, comprised of at least one representative from each of the SLC, meets to evaluate the data and identify possible errors or data anomalies. Each city makes corrections to the database and submits a final version of the data. The Tribal database is current to within six months.

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. Data interpretation is not part of the annual Clear Creek Watershed Agreement report; however, trends are identified for key trophic status parameters.

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 are summarized in the following table:

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

Table Notes: The 3-City Tribal database contains phosphorus data from 1999-current, all Thornton data from 2001-current and all Westminster data from 2002-current.

Appendix C – Clear Creek and Standley Lake Water Quality Monitoring Data – 2012

Clear Creek - Grab Sampling Results

			Method	**SM2550B**	**SM4500H+B**	**SM2510B**	**SM4500OG**	**SM2130B**	**SM5310B**	**SM2540D**	**SM4500NH3H**	**SM4500NO3I**	**SM4500NO3I**	**SM4500PE**	**SM4500PE**	**NA**	**NA**
			DL	**1.0**	**1.0**	**1**	**1.0**	**1**	**0.5**	**1**	**0.01**	**0.01**	**0.02**	**0.0025**	**0.0025**	**NA**	**NA**
			Reporting Units	**°C**	**s.u.**	**µS/cm**	**mg/L**	**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**NA**	**NA**
Sample Date	**Sample Time**	**Sample Type**	**Location ID**	**Temp**	**pH**	**Conductivity, Specific**	**Oxygen, Dissolved**	**Turbidity**	**Carbon, Total Organic**	**Solids, Total Suspended**	**Nitrogen, Ammonia (Salicylate)**	**Nitrogen, Nitrate+Nitrite**	**Nitrogen, Total Nitrogen**	**Phosphorus, Dissolved (DRP)**	**Phosphorus, Total**	**Notes**	**Lab Notes**
02/06/12	8:30	G	CC 3A, Georgetown WWTP	4.3	7.6	517	6.8	<1		8	0.13	2	10	0.0042	0.057		
02/06/12	7:30	G	CC 7A, CCC WWTP	6.5	6.8	1005	7.4	8.5		12	0.03	21	24	2.479	3.163		
02/05/12	12:15	G	CC 12A, Idaho Springs WWTP	9.7	6.7	372	6.5	3.2		10	2.21	0.14	5.1	0.292	1.213		
02/06/12	7:30	G	CC 13B, BH/CC WWTP	14	7.4	999	5.7	<1		3	0.05	7.1	9.1	0.0796	0.133		
02/06/12	8:29	G	CC 15A, Eisenhower T. WWTP	9.9	6.6	639	5.4	<1		<1	1	4.2	6.5	0.629	0.758		
02/06/12	9:49	G	CC 26	<1	7.9	409	7.6	<1	1.1	1	< 0.01	0.6	S 0.59	< 0.0025	0.0053		Suspect incomplete digestion
02/06/12	9:30	G	CC 40	<1	8	475	7.9	<1	1.2	<1	< 0.01	0.54	0.7	0.0137	0.021		
02/06/12	10:30	G	CC 50	1.3	7.6	764	7.9	11.8	2.4	14	< 0.01	1.4	1.7	0.0027	0.0178		
02/06/12	10:45	G	CC 60	<1	7.8	512	8.1	<1	1.4	3	< 0.01	0.56	0.65	< 0.0025	0.0083		
04/03/12	11:30	G	CC 3A, Georgetown WWTP	2.2	7.8	515	NT	<1		1	4.31	1.15	6.1	0.0025	0.0168		DO not measured due to lab error
04/03/12	12:00	G	CC 7A, CCC WWTP	2.1	7.3	883	7.2	<1		6	0.05	13.8	16.9	0.237	0.43		
04/03/12	11:40	G	CC 13B, BH/CC WWTP	2	7.6	1030	7.7	2		3	0.15	5.25	7.4	0.0144	0.11		
04/03/12	10:18	G	CC 26	1.6	8.4	329	8.9	2.1	2	8	0.02	0.29	0.48	< 0.0025	0.0141		
04/03/12	9:51	G	CC 40	2.1	8.7	370	11.8	<1	1.6	2	0.02	0.27	0.48	0.0046	0.0213		
04/03/12	11:03	G	CC 50	1.7	8.2	457	8.7	15.8	1.6	11	0.01	0.34	0.44	< 0.0025	0.0133		
04/03/12	11:25	G	CC 60	2.2	8.2	337	10.8	5.6	1.8	11	0.02	0.28	0.43	< 0.0025	0.0232		
05/31/12	15:00	G	CC 1A, Loveland WWTP	7.9	8	2910	8.8	<1		5	0.07	8.9	11.4	0.133	0.289		
05/31/12	8:00	G	CC 3A, Georgetown WWTP	11.1	8.5	476	9	<1		4	0.07	4.4	5.4	0.0046	0.057		
05/31/12	8:30	G	CC 5A, Empire WWTP	13.7	7.5	402	NT	7.4		10	5.3	1.6	7.6	0.0161	0.323		
05/31/12	10:00	G	CC 7A, CCC WWTP	14.6	8.9	960	9	<1		9	0.23	11.2	11.6	1.25	1.79		
05/31/12	12:00	G	CC 8A, St. Mary's WWTP	7.1	8.3	247	8.5	7		12	0.05	2.6	4	0.262	0.672		
05/31/12	unknown	G	CC 12A, Idaho Springs WWTP	25	6.8	348	NT	6.2		8	0.61	1.2	4.5	1.05	1.58		
05/31/12	7:55	G	CC 13B, BH/CC WWTP	14.4	7.4	827	NT	1.5		2	0.06	2.7	3.7	0.0411	0.091		
05/31/12	8:30	G	CC 14A, Henderson Mine WWTP	13.6	8.2	1510	9.4	<1		2	0.14	0.92	2.5	< 0.0025	0.0173		
05/31/12	7:59	G	CC 15A, Eisenhower T. WWTP	10.9	7.5	984	2.8	<1		2	0.88	0.52	2	0.193	0.224		
05/31/12	9:50	G	CC 05	6.2	6.8	97	11.5	<1	2.6	<1	<0.01	0.15	0.21	< 0.0025	0.0062		
05/31/12	10:12	G	CC 10	8.1	7	97	12.4	<1		1	<0.01	0.08	0.13	< 0.0025	0.0034		
05/31/12	10:04	G	CC 15	5.6	7	133	8.4	1.1		3	<0.01	0.12	0.17	< 0.0025	0.0058		
05/31/12	10:25	G	CC 20	6.4	7.3	113	9.3	1.5	2.1	2	<0.01	0.1	0.25	< 0.0025	0.003		
05/31/12	9:35	G	CC 25	11.9	6.2	110	11.1	<1		3	0.01	0.09	0.18	< 0.0025	0.0063		
05/31/12	10:32	G	CC 26	9.2	7.1	129	10.7	<1	2.6	<1	<0.01	0.1	0.27	< 0.0025	0.0051		
05/31/12	10:45	G	CC 30	7.3	7.2	43	9	<1		1	<0.01	0.04	0.16	< 0.0025	0.0067		
05/31/12	11:20	G	CC 34	10.4	7.4	125	12.6	<1		1	<0.01	0.1	0.24	< 0.0025	0.0055		
05/31/12	11:05	G	CC 35	9.4	7.3	64	12	<1	2.7	1	<0.01	0.03	0.11	< 0.0025	0.0056		
05/31/12	11:05	G	CC 40	9.4	7.4	112	S 4.2	3.4	2.1	11	<0.01	0.09	0.21	< 0.0025	0.0079		
05/31/12	11:35	G	CC 44	8.4	7.3	51	8.8	1.2		1	<0.01	0.01	0.13	< 0.0025	0.0051		
05/31/12	11:45	G	CC 45	9.8	9.4	141	8.7	13.9	1.4	12	0.01	0.01	0.24	0.0025	0.0036		
05/31/12	12:15	G	CC 50	13.7	7.2	232	8	9.2	1.7	11	<0.01	0.17	0.27	< 0.0025	0.0086		
05/31/12	11:35	G	CC 52	11.8	7.4	940	13	<1	2.2	2	0.02	0.52	0.8	< 0.0025	0.123		
05/31/12	11:42	G	CC 53	13.7	7.7	761	13.3	1.5	2.5	6	0.03	0.25	0.53	0.0036	0.225		
05/31/12	12:45	G	CC 60	12.4	7.6	120	8.8	3.6	1.8	5	<0.01	0.07	0.26	< 0.0025	0.0197		
06/20/12	9:15	G	CC 3A, Georgetown WWTP	12.4	NT	NT	NT	NT		4	0.06	1.8	3.1	0.0055	0.0561		
06/20/12	9:30	G	CC 7A, CCC WWTP	17.1	6.8	NT	2.1	NT		3	0.12	6.1	7.9	1.21	1.45		
06/19/12	7:45	G	CC 12A, Idaho Springs WWTP	18.1	NT	NT	NT	NT		6	0.37	0.45	4.3	0.372	0.634		samples for nitrogen series
06/20/12	7:45	G	CC 13B, BH/CC WWTP	19.7	7.8	NT	4.5	NT		6	0.06	3.2	5.9	0.013	0.083		
07/16/12	9:30	G	CC 3A, Georgetown WWTP	14.4	NT	NT	NT	NT		8	1.5	4.4	6.5	0.0082	0.0652		
07/16/12	7:15	G	CC 7A, CCC WWTP	18.2	7.3	NT	2	NT		8	4.6	1.7	7.3	0.816	1.08		
07/15/12	14:30	G	CC 12A, Idaho Springs WWTP	NT	NT	NT	NT	NT		21	NT	NT	NT	0.443	1.03	Never received nitrogen sample.	
07/16/12	7:30	G	CC 13B, BH/CC WWTP	NT	7.4	NT	3.9	NT		4	2.8	10.2	16.1	0.0806	0.306		
07/16/12	8:35	G	CC 15A, Eisenhower T. WWTP	13.2	7.1	NT	0.1	NT		<1	1.2	1	4	0.282	0.369		

Clear Creek - Grab Sampling Results

			Method	**SM2550B**	**SM4500H+B**	**SM2510B**	**SM4500OG**	**SM2130B**	**SM5310B**	**SM2540D**	**SM4500NH3H**	**SM4500NO3I**	**SM4500NO3I**	**SM4500PE**	**SM4500PE**	**NA**	**NA**
			DL	**1.0**	**1.0**	**1**	**1.0**	**1**	**0.5**	**1**	**0.01**	**0.01**	**0.02**	**0.0025**	**0.0025**	**NA**	**NA**
			Reporting Units	**°C**	**s.u.**	**µS/cm**	**mg/L**	**NTU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**NA**	**NA**
Sample Date	**Sample Time**	**Sample Type**	**Location ID**	**Temp**	**pH**	**Conductivity, Specific**	**Oxygen, Dissolved**	**Turbidity**	**Carbon, Total Organic**	**Solids, Total Suspended**	**Nitrogen, Ammonia (Salicylate)**	**Nitrogen, Nitrate+Nitrite**	**Nitrogen, Total Nitrogen**	**Phosphorus, Dissolved (DRP)**	**Phosphorus, Total**	**Notes**	**Lab Notes**
08/14/12	unknown	**G**	**CC 12A, Idaho Springs WWTP**	21.3	6.9	391	5.1	8.7		8	9.8	<0.01	14.8	5.37	6.37		
08/14/12	unknown	**G**	**CC 13B, BH/CC WWTP**	22.9	7.8	680	4.1	2.3		5	0.14	5.5	8.6	0.0934	0.234		
08/14/12	unknown	**G**	**CC 15A, Eisenhower T. WWTP**	15.2	7.4	494	3.1	2.9		5	2	0.56	4.7	0.429	0.65		
10/17/12	8:30	**G**	**CC 1A, Loveland WWTP**	11.3	7.7	1860	0.9	1.6		5	0.03	4.6	7	0.267	0.392		
10/17/12	9:00	**G**	**CC 3A, Georgetown WWTP**	11.7	8.3	531	5.5	0.4		NT	0.16	2.9	4.8	0.039	0.119		
10/17/12	9:35	**G**	**CC 5A, Empire WWTP**	15.7	5.8	394	NT	5.6		8	2.7	24.8	30.7	1.377	2.25		
10/17/12	11:00	**G**	**CC 12A, Idaho Springs WWTP**	NT	NT	374	NT	6.8		7	0.53	1.3	6.5	0.299	0.688		
10/17/12	10:10	**G**	**CC 13B, BH/CC WWTP**	20	7.3	997	3.5	2.6		<1	0.07	5.3	8.2	0.062	0.199		
10/17/12	9:15	**G**	**CC 15A, Eisenhower T. WWTP**	13.3	7.3	681	3	0.2		<1	1.8	1.4	4.9	0.35	0.436		
10/17/12	12:30	**G**	**CC 05**	2.1	8.7	201	**S** 5.0	0.1	2.1	<1	<0.01	0.32	0.41	< 0.0025	0.0042		
10/17/12	10:57	**G**	**CC 10**	5.3	8.7	138	**S** 6.0	0.8		<1	<0.01	0.15	0.17	< 0.0025	0.0032		
10/17/12	10:01	**G**	**CC 15**	2.4	7.5	619	9.5	0.3		3	0.01	0.41	0.56	< 0.0025	0.009		
10/17/12	10:26	**G**	**CC 20**	3.7	7.6	373	9.8	0.7	1.4	<1	<0.01	0.24	0.49	< 0.0025	0.0074		
10/17/12	10:00	**G**	**CC 25**	4.4	8.7	286	**S** 5.3	0.6		4	<0.01	0.19	6.9 S	0.0041	0.0122		Really low flows.
10/17/12	11:20	**G**	**CC 26**	4.1	8.3	151	**S** 6.2	2.2	1.7	3	0.01	0.18	0.27	< 0.0025	0.0087		
10/17/12	10:45	**G**	**CC 30**	2.9	7.4	50	10.2	1.7		<1	<0.01	0.03	0.03	< 0.0025	0.008		
10/17/12	12:05	**G**	**CC 34**	3.4	8.8	87	**S** 6.4	0.9		<1	<0.01	0.04	0.14	0.0034	0.0075		
10/17/12	11:45	**G**	**CC 35**	2.2	8.8	80	**S** 5.6	0.7	2.2	<1	0.01	0.09	0.24	0.0046	0.0097		
10/17/12	11:22	**G**	**CC 40**	4	7.8	260	10.1	1.2	1.8	<1	<0.01	0.14	0.2	0.0027	0.0074		
10/17/12	11:47	**G**	**CC 44**	3.4	7.4	123	9.6	0.9		3	<0.01	<0.01	0.04	0.0025	0.004		
10/17/12	12:03	**G**	**CC 45**	4.4	6.2	519	**S** 1.7	44.5	2.2	33	0.04	0.03	0.11	0.003	0.008		
10/17/12	12:28	**G**	**CC 50**	8.8	7.3	656	NT	4.1	2.8	3	<0.01	0.62	0.78	< 0.0025	0.0099		
10/17/12	12:23	**G**	**CC 52**	4.6	7.7	1310	**S** 5.6	0.8	2.5	<1	0.01	0.06	0.13	0.0025	0.0037		
10/17/12	12:30	**G**	**CC 53**	4.9	8.3	497	**S** 6.3	4.2	6.9	1	0.02	0.2	0.53	0.0025	0.0228		
10/17/12	13:21	**G**	**CC 60**	7.1	7.8	280	10.1	1.4	1.7	2	<0.01	0.09	0.13	< 0.0025	0.0062		
12/06/12	8:00	**G**	**CC 3A, Georgetown WWTP**	6.8	7.7	377	7.6	0.3		3	0.11	3.2	5.4	0.052	0.092		
12/06/12	9:30	**G**	**CC 7A, CCC WWTP**	8.4	7.4	867	9.1	3.2		2	0.06	19.5	23.8	0.284	0.538		
12/05/12	9:00	**G**	**CC 12A, Idaho Springs WWTP**	6.9	7.7	386	6.6	8.4		13	0.67	0.57	3.7	0.33	0.798		
12/06/12	10:35	**G**	**CC 13B, BH/CC WWTP**	9.3	7.7	828	9.5	<0.1		<1	0.04	2.7	3.8	0.07	0.142		
12/06/12	10:20	**G**	**CC 26**	3	8.4	337	9.9	0.9	0.7	<1	< 0.01	0.27	0.4	< 0.0025	0.0049		
12/06/12	10:35	**G**	**CC 40**	2.8	8	303	10.2	<0.1	0.7	<1	0.01	0.31	0.38	< 0.0025	0.0068		
12/06/12	11:10	**G**	**CC 50**	5.4	7.7	630	9.7	5.1	1.7	7	< 0.01	0.56	0.57	< 0.0025	0.0152		
12/06/12	11:40	**G**	**CC 60**	3.4	8.1	341	10.4	<0.1	0.8	2	< 0.01	0.29	0.35	< 0.0025	0.0036		

Canal - Grab Sampling Results

Sample Date	Sample Time	Sample Type	Location ID	Conductivity, Specific	Oxygen, Dissolved	pH	Temp	Turbidity	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty	Carbon, Total Organic	Solids, Total Suspended	E. coli,	Iron, Dissolved
			Method	SM2510B	SM4500OG	SM4500H+B	SM2550B	SM2130B	SM4500PE	SM4500PE	SM4500NH3H	SM4500NO3I	SM4500NO3I	SM7110B	SM7110B	SM7110B	SM7110B	SM5310B	SM2540D	SM9221D	EPA200.7
			DL	1	1.0	1.0	1.0	1	0.0025	0.0025	0.01	0.01	0.02	variable	variable	variable	variable	0.5	1	1	0.02
			Reporting Units	µS/cm	mg/L	s.u.	°C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	pCi/L	mg/L	mg/L	cfu/mL	mg/L
01/04/12	9:35	G	Trib 01	386	11.3	7.6	2.1	< 1	0.0027	0.0052	0.01	0.57	0.63					0.7	3	1	<0.02
01/04/12	9:40	G	Trib 02	416	10.7	7.7	3.8	< 1	0.0035	0.0065	0.01	0.57	0.61					0.7	4	4	0.022
01/04/12	9:50	G	Trib 03	408	8.2	7.9	8.1	1.4	0.0041	0.0079	0.02	0.55	0.68					0.7	3	35	<0.02
01/04/12	10:35	G	Trib 04	433	9.3	7.8	5.6	16.9	0.0057	0.0273	0.01	0.54	0.82					0.8	29	46	0.02
01/04/12	9:05	G	Trib 22a	290	11.9	7.8	3.4	2.5	0.0054	0.0091	< 0.01	0.08	0.25					2.8	4	4	0.068
01/04/12	10:20	G	Trib 22d	387	10.7	7.9	4.6	2.4	0.0073	0.0087	< 0.01	0.09	0.22					2.8	5	5	0.069
01/04/12	8:30	G	Trib 24	271	11.4	7	7.6	1.9	0.0033	0.0128	< 0.01	0.02	0.19					1.5	4	<1	<0.020
02/01/12	9:20	G	Trib 01	410	12.6	7	1.2	2.2	< 0.0025	0.0131	< 0.01	0.52	0.54					0.9	5	3	<0.020
02/01/12	9:35	G	Trib 02	453	10	7.2	4.4	1.3	< 0.0025	0.0116	< 0.01	0.48	0.63					1	5	<1	<0.020
02/01/12	9:50	G	Trib 03	442	8	7.8	9.3	1.8	0.0034	0.0116	0.01	0.47	0.59					1	4	55	<0.020
02/01/12	10:30	G	Trib 04	460	8.9	7.9	6.1	14.5	0.0059	0.0226	0.01	0.46	0.66					1.1	26	13	<0.020
02/01/12	9:00	G	Trib 22a	347	12.2	7	2.4	1.1	< 0.0025	0.0069	< 0.01	0.04	0.11					2.4	1	<1	0.033
02/01/12	10:15	G	Trib 22d	461	10.7	7.9	3.9	2.1	0.0039	0.0087	0.01	0.03	0.2					2.7	1	4	0.041
02/01/12	8:35	G	Trib 24	288	10.7	7.8	7.5	1.2	< 0.0025	0.0094	0.01	0.03	0.19					1.9	5	<1	<0.020
03/07/12	9:40	G	Trib 01	422	12.4	7.2	1.6	3.3	0.0036	0.031	< 0.01	0.47	0.71					1	3	7	<0.020
03/07/12	10:20	G	Trib 02	431	11.2	7.8	4.5	2.9	0.0028	0.0295	0.01	0.56	0.8					1.1	8	11	<0.020
03/07/12	10:30	G	Trib 03	436	8.7	7.9	9.7	2.7	0.0036	0.0203	0.02	0.44	0.56					1.1	9	49	<0.020
03/07/12	11:10	G	Trib 04	464	8.5	8	7.4	14.3	0.0039	0.0263	0.01	0.5	0.66					1.3	8	22	<0.020
03/07/12	9:15	G	Trib 22a	355	12.4	7.4	2.5	3.4	0.0031	0.0133	< 0.01	0.3	0.51					3.4	1	5	0.053
03/07/12	11:00	G	Trib 22d	413	11.2	7.9	4	2.8	0.0025	0.0143	< 0.01	0.28	0.43					3.5	4	9	0.06
03/07/12	8:40	G	Trib 24	300	10.7	7.9	8.9	3.2	< 0.0025	0.011	< 0.01	0.04	0.22					1.8	4	<1	<0.020
04/04/12	9:35	G	Trib 01	369	10.6	7.8	5.7	3.2	< 0.0025	0.0138	< 0.01	0.26	0.43	0.5	2.2	0.4	2.2	1.7	4	<1	0.034
04/04/12	9:45	G	Trib 02	369	10.2	7.8	5.4	3	< 0.0025	0.0141	< 0.01	0.27	0.43	3.3	2.3	1.3	2.2	2.7	5	157	0.034
04/04/12	10:00	G	Trib 03	385	7.7	7.9	10.7	3.6	0.0039	0.0166	0.02	0.29	0.47	0	2	1.5	2.3	2.5	4	36	0.036
04/04/12	10:40	G	Trib 04	430	8.6	7.8	9.5	24.7	0.0094	0.0385	0.04	0.32	0.66	1.2	2	4.4	2.4	2.2	33	150	0.054
04/04/12	10:50	G	Trib 11	363	9.9	7.8	6.8	5.5	0.0028	0.0146	0.02	0.3	0.48	0	2.3	2.9	2.4	2.4	6	20	0.038
04/04/12	9:10	G	Trib 22a	296	11.9	7.8	4.5	6.1	0.0048	0.018	< 0.01	0.59	0.8	1.5	1.7	0.7	2.2	5.4	8	13	0.13
04/04/12	10:30	G	Trib 22d	380	10.2	7.8	7.1	5.8	0.0078	0.0203	< 0.01	0.51	0.82	7.5	3	0	2.2	1.7	NT	40	0.13
04/04/12	8:30	G	Trib 24	310	7.8	7.8	11.5	2.9	< 0.0025	0.0146	0.02	0.05	0.3	0	1.8	2.4	2.3	1.7	3	4	<0.020
05/02/12	9:20	G	Trib 01	243	8.6	7.7	11.3	3.8	0.0027	0.012	0.02	0.1	0.33					2.2	8	<1	0.073
05/02/12	9:50	G	Trib 02	247	8	7.8	12.1	2	0.0027	0.0129	0.02	0.11	0.42					1.9	7	52	0.068
05/02/12	10:00	G	Trib 03	264	5.9	7.7	17.2	3.3	0.0029	0.0145	0.03	0.12	0.27					1.9	6	51	0.056
05/02/12	10:50	G	Trib 11	260	6.6	7.7	15.8	4.3	0.0032	0.0143	0.03	0.11	0.3					1.9	6	84	0.05
05/02/12	8:25	G	Trib 24	304	6.6	7.5	15.4	7.4	0.0027	0.0152	0.02	0.06	0.23					1.6	9	5	<0.02
05/02/12	10:35	G	Trib 27 (New (	251	7.1	7.7	13.8	22.7	0.0062	0.0376	< 0.01	0.05	0.22					2.1	34	518	0.054

Canal - Grab Sampling Results

			Method	SM2510B	SM4500OG	SM4500H+B	SM2550B	SM2130B	SM4500PE	SM4500PE	SM4500NH3H	SM4500NO3I	SM4500NO3I	SM7110B	SM7110B	SM7110B	SM7110B	SM5310B	SM2540D	SM9221D	EPA200.7
			DL	1	1.0	1.0	1.0	1	0.0025	0.0025	0.01	0.01	0.02	variable	variable	variable	variable	0.5	1	1	0.02
			Reporting Units	µS/cm	mg/L	s.u.	°C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L	pCi/L	mg/L	mg/L	cfu/mL	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Conductivity, Specific	Oxygen, Dissolved	pH	Temp	Turbidity	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Gross Alpha	Gross Alpha, Uncertainty	Gross Beta	Gross Beta, Uncertainty	Carbon, Total Organic	Solids, Total Suspended	E. coli,	Iron, Dissolved
06/06/12	9:15	G	Trib 01	138	7.5	7.3	15.3	4.3	< 0.0025	0.0128	< 0.01	0.09	0.24	1.6	1.6	0	1.8	2.6	10	5	0.036
06/06/12	9:30	G	Trib 02	135	7.3	7.5	14.4	3.7	< 0.0025	0.0136	< 0.01	0.09	0.25	0.8	1.1	0.1	2	2	10	5	0.034
06/06/12	9:45	G	Trib 03	142	7.1	7.7	18	3.3	0.0039	0.0166	< 0.01	0.09	0.23	1.2	1.4	0	1.9	2.3	9	31	0.03
06/06/12	10:40	G	Trib 11	136	6.4	7.6	16.9	3.3	0.0028	0.0146	< 0.01	0.06	0.33	0.2	1.4	0	2	2.2	15	86	0.03
06/06/12	10:10	G	Trib 22d	75	9	7.7	12.7	7.3	0.003	0.0098	< 0.01	0.02	0.22	2.2	1.4	0	1.8	2.7	6	4	0.03
06/06/12	8:25	G	Trib 24	309	4.7	7.3	16.1	7.3	0.0032	0.013	< 0.01	0.13	0.38	0.8	1.6	0	2.1	2.1	9	5	<0.02
06/06/12	10:25	G	Trib 27 (New	131	6.4	7.5	16.3	14.4	0.0087	0.0352	< 0.01	0.02	0.28	1.5	1.7	2.2	2.2	2.4	29	1300	0.046
07/11/12	9:25	G	Trib 01	182	7.2	7.5	17.5	8.3	0.0038	0.0182	< 0.01	0.11	0.22					1.8	13	24	0.052
07/11/12	9:40	G	Trib 02	184	6.1	7.6	20.2	8	0.0031	0.0162	0.01	0.13	0.32					1.7	7	136	0.054
07/11/12	9:50	G	Trib 03	263	6	7.6	20.7	4.6	0.0032	0.0182	0.05	0.16	0.36					2	5	225	0.046
07/11/12	10:45	G	Trib 11	187	6	7.7	21.9	14.2	0.0046	0.0268	< 0.01	0.07	0.28					1.9	21	185	0.037
07/11/12	10:20	G	Trib 22d	515	5.4	7.6	20.5	5.6	0.272	0.323	0.04	0.01	0.92					9.3	6	489	0.26
07/11/12	8:30	G	Trib 24	289	1.3	7	18.1	10.4	0.0036	0.0141	< 0.01	0.14	0.34					1.6	13	<1	<0.02
07/11/12	10:30	G	Trib 27 (New	193	5.7	7.9	20.1	6.6	0.0045	0.0158	< 0.01	0.04	0.24					1.8	7	1733	0.049
08/01/12	9:15	G	Trib 01	189	6.3	7.5	19.6	5.8	0.0031	0.0147	< 0.01	0.12	0.33					1.6	8	69	0.036
08/01/12	9:30	G	Trib 02	192	5.4	7.8	23.4	6.2	< 0.0025	0.0159	< 0.01	0.12	0.33					1.5	8	89	0.035
08/01/12	9:45	G	Trib 03	210	4.8	7.8	24.3	5.6	0.0041	0.0197	0.02	0.13	0.33					1.7	8	411	0.038
08/01/12	10:40	G	Trib 11	196	7.1	7.8	21.4	7	0.0027	0.0149	< 0.01	0.08	0.34					1.9	6	518	0.045
08/01/12	10:10	G	Trib 22d	77	8.8	7.3	16.4	6.4	0.0072	0.0191	0.01	0.03	0.26					2.6	7	26	0.041
08/01/12	8:15	G	Trib 24	299	1	7.1	17.9	4.7	0.021	0.0301	0.12	0.04	0.33					1.7	7	17	<0.020
08/01/12	10:25	G	Trib 27 (New	183	6.4	7.4	21.4	11.1	0.0041	0.0202	< 0.01	0.02	0.2					1.8	14	921	0.055
09/05/12	9:40	G	Trib 01	240	8.9	7.2	17.3	1.4	< 0.0025	0.0072	< 0.01	0.1	0.26	1	1.8	0.4	2.1	1.2	3	6	0.026
09/05/12	10:05	G	Trib 02	246	6.5	7.7	20.4	1.4	< 0.0025	0.0069	< 0.01	0.14	0.32	0.9	2	0	2	1.7	3	53	0.025
09/05/12	10:20	G	Trib 03	266	5.6	7.8	19.4	1.6	0.0036	0.0094	0.02	0.07	0.31	0.7	1.6	0	2	1.5	2	192	0.042
09/05/12	11:20	G	Trib 11	246	6	7.6	20.1	3.1	< 0.0025	0.0088	< 0.01	0.07	0.29	1	2	0	1.9	2.5	6	147	0.02
09/05/12	11:00	G	Trib 22d	59	7.9	7.1	16.2	3.4	0.0041	0.0102	< 0.01	0.04	0.2	1.4	1.4	0	1.7	2.3	4	63	0.048
09/05/12	8:30	G	Trib 24	266	1.9	7.2	19.7	3.4	0.0065	0.0132	< 0.01	0.03	0.24	1.7	1.9	0.8	2.1	1.5	5	5	<0.02
10/03/12	9:10	G	Trib 01	267	8.1	7.2	11.2	1.8	< 0.0025	0.0112	< 0.01	0.17	0.41					2.5	1	7	0.02
10/03/12	9:30	G	Trib 02	262	6.1	7.9	18	1.1	< 0.0025	0.0083	0.02	0.08	0.31					1.1	4	59	0.021
10/03/12	9:40	G	Trib 03	318	6	7.7	16.2	5.5	0.003	0.0114	0.03	0.1	0.47					1.5	2	345	0.04
10/03/12	10:35	G	Trib 11	275	6.3	7.7	18.1	4	< 0.0025	0.0183	< 0.01	0.06	0.24					2.4	6	236	0.087
10/03/12	8:25	G	Trib 24	282	5	7.6	18.7	5.4	0.0035	0.0155	0.01	0.02	0.27					1.5	12	4	0.02
11/07/12	9:10	G	Trib 01	312	10.3	7.1	5.2	1.04	< 0.0025	0.0062	< 0.01	0.18	0.45					1.4	<1	7	<0.02
11/07/12	9:20	G	Trib 02	297	9.1	7.4	8.9	< 1	< 0.0025	0.0064	< 0.01	0.15	0.38					1.3	<1	7	<0.02
11/07/12	9:35	G	Trib 03	323	7.6	7.7	13.3	1.15	< 0.0025	0.0086	< 0.01	0.15	0.4					1.6	<1	29	<0.02
11/07/12	10:10	G	Trib 04	352	7.1	7.6	12.5	7.97	0.0034	0.0301	< 0.01	0.1	0.31					1.7	9	270	<0.02
11/07/12	8:25	G	Trib 24	275	7.17	7.2	12.9	4.9	0.0034	0.0172	< 0.01	0.04	0.22					1.6	5	37	0.038
12/05/12	9:05	G	Trib 01	406	12	7.5	4	1.07	< 0.0025	0.0055	< 0.01	0.35	0.54	1.3	1.9	0.6	2	1.1	2	1	0.027
12/05/12	9:20	G	Trib 02	394	11.4	7.4	4.6	< 1	< 0.0025	0.006	< 0.01	0.35	0.56	2.6	2.4	1.2	2.2	0.9	<1	9	0.025
12/05/12	9:35	G	Trib 03	390	7.3	7.8	11.4	1.32	0.0026	0.008	0.01	0.35	0.42	1	1.6	1.4	2.2	0.8	2	89	0.029
12/05/12	10:05	G	Trib 04	414	9	7.7	11.4	1.32	< 0.0025	0.0186	0.02	0.24	0.51	2.7	2	0.5	2	1.2	7	82	0.067
12/05/12	8:20	G	Trib 24	293	8.5	7.8	11.3	2.54	< 0.0025	0.0109	< 0.01	< 0.01	0.3	1.8	1.7	2	2.1	1.7	4	7	<0.02

Canal - Grab Sampling Results

			Method	EPA200.7	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA130.2	SM4500ClG	SM4500SO4E	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8
			DL	0.02	0.002	0.002	0.020	0.020	5	5	10	0.001	0.001	0.002	0.002	0.001	0.001	0.0005	0.0005	0.001	0.001	0.002
			Reporting Units	mg/L	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	mg/L	mg/L
Sample Date	**Sample Time**	**Sample Type**	**Location ID**	**Iron, Total**	**Manganese, Dissolved**	**Manganese, Total**	**Zinc, Dissolved**	**Zinc, Total**	**Hardness, Total**	**Chloride**	**Sulfate**	**Arsenic, Dissolved**	**Arsenic, Total**	**Barium, Dissolved**	**Barium, Total**	**Beryllium, Dissolved**	**Beryllium, Total**	**Cadmium, Dissolved**	**Cadmium, Total**	**Chromium, Dissolved**	**Chromium, Total**	**Copper, Dissolved**
01/04/12	9:35	G	Trib 01	0.084	0.12	0.15	0.19	0.2														
01/04/12	9:40	G	Trib 02	0.094	0.12	0.15	0.18	0.19														
01/04/12	9:50	G	Trib 03	0.1	0.1	0.13	0.16	0.17														
01/04/12	10:35	G	Trib 04	0.66	0.067	0.15	0.098	0.17														
01/04/12	9:05	G	Trib 22a	0.22	0.022	0.041	<0.020	<0.020														
01/04/12	10:20	G	Trib 22d	0.15	0.057	0.071	<0.020	<0.020														
01/04/12	8:30	G	Trib 24	0.051	0.0042	0.017	<0.020	<0.020														
02/01/12	9:20	G	Trib 01	0.13	0.18	0.18	0.2	0.2														
02/01/12	9:35	G	Trib 02	0.11	0.16	0.17	0.2	0.2														
02/01/12	9:50	G	Trib 03	0.15	0.11	0.15	0.16	0.18														
02/01/12	10:30	G	Trib 04	0.96	0.061	0.16	0.078	0.13														
02/01/12	9:00	G	Trib 22a	0.075	0.022	0.022	<0.020	<0.020														
02/01/12	10:15	G	Trib 22d	0.12	0.084	0.089	<0.020	<0.020														
02/01/12	8:35	G	Trib 24	0.026	<0.002	0.0096	<0.020	<0.020														
03/07/12	9:40	G	Trib 01	0.31	0.24	0.27	0.19	0.23	NT	NT	NT	<0.001	<0.001	0.045	0.049	<0.001	<0.001	0.00071	0.00088	<0.001	<0.001	0.0047
03/07/12	10:20	G	Trib 02	0.24	0.23	0.27	0.2	0.23	NT	NT	NT	<0.001	<0.001	0.046	0.051	<0.001	<0.001	0.00069	0.00086	<0.001	<0.001	0.0055
03/07/12	10:30	G	Trib 03	0.21	0.2	0.23	0.17	0.2	NT	NT	NT	<0.001	<0.001	0.048	0.05	<0.001	<0.001	0.00059	0.00077	<0.001	<0.001	0.0048
03/07/12	11:10	G	Trib 04	0.78	0.12	0.19	0.052	0.11	NT	NT	NT	<0.001	0.0019	0.052	0.061	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.003
03/07/12	9:15	G	Trib 22a	0.2	0.012	0.02	<0.020	<0.020	NT	NT	NT	<0.001	<0.001	0.061	0.068	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.002
03/07/12	11:00	G	Trib 22d	0.23	0.038	0.043	<0.020	<0.020	NT	NT	NT	<0.001	<0.001	0.066	0.07	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.002
03/07/12	8:40	G	Trib 24	0.096	<0.002	0.034	<0.020	<0.020	NT	NT	NT	<0.001	<0.001	0.042	0.047	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0024
04/04/12	9:35	G	Trib 01	0.33	<0.002	0.2	<0.020	0.19														
04/04/12	9:45	G	Trib 02	0.31	0.16	0.19	0.16	0.17														
04/04/12	10:00	G	Trib 03	0.3	0.11	0.15	0.12	0.14														
04/04/12	10:40	G	Trib 04	1.2	0.096	0.15	0.082	0.14														
04/04/12	10:50	G	Trib 11	0.26	0.021	0.037	0.075	0.075														
04/04/12	9:10	G	Trib 22a	0.47	0.0092	0.03	<0.020	<0.020														
04/04/12	10:30	G	Trib 22d	0.42	0.047	0.056	<0.020	<0.020														
04/04/12	8:30	G	Trib 24	0.1	<0.002	0.033	<0.020	<0.020														
05/02/12	9:20	G	Trib 01	0.49	0.09	0.15	0.088	0.12														
05/02/12	9:50	G	Trib 02	0.42	0.082	0.14	0.082	0.11														
05/02/12	10:00	G	Trib 03	0.39	0.087	0.18	0.074	0.1														
05/02/12	10:50	G	Trib 11	0.26	0.042	0.055	0.05	0.05														
05/02/12	8:25	G	Trib 24	0.32	<0.002	0.081	<0.02	<0.02														
05/02/12	10:35	G	Trib 27 (New (	1.6	0.0049	0.11	0.063	0.12														

Canal - Grab Sampling Results

			Method	EPA200.7	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA130.2	SM4500ClG	SM4500SO4E	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8
			DL	0.02	0.002	0.002	0.020	0.020	5	5	10	0.001	0.001	0.002	0.002	0.001	0.001	0.0005	0.0005	0.001	0.001	0.002
			Reporting Units	mg/L	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	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Iron, Total	Manganese, Dissolved	Manganese, Total	Zinc, Dissolved	Zinc, Total	Hardness, Total	Chloride	Sulfate	Arsenic, Dissolved	Arsenic, Total	Barium, Dissolved	Barium, Total	Beryllium, Dissolved	Beryllium, Total	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved
06/06/12	9:15	G	Trib 01	0.31	0.0065	0.12	0.056	0.098	76	12	33	<0.001	<0.001	0.02	0.02	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0024
06/06/12	9:30	G	Trib 02	0.31	0.0074	0.11	0.05	0.094	100	11	32	<0.001	<0.001	0.02	0.02	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0023
06/06/12	9:45	G	Trib 03	0.28	0.0041	0.11	0.054	0.088	88	12	33	<0.001	<0.001	0.02	0.02	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0027
06/06/12	10:40	G	Trib 11	0.4	<0.002	0.094	0.033	0.069	80	11	31	<0.001	<0.001	0.019	0.02	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0025
06/06/12	10:10	G	Trib 22d	0.17	<0.002	0.019	<0.020	<0.020	76	9	19	<0.001	<0.001	0.016	0.016	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.002
06/06/12	8:25	G	Trib 24	0.21	<0.002	0.09	<0.020	<0.020	148	22	55	<0.001	<0.001	0.047	0.048	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0024
06/06/12	10:25	G	Trib 27 (New	0.89	<0.002	0.094	0.033	0.069	88	11	31	<0.001	<0.001	0.02	0.025	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0031
07/11/12	9:25	G	Trib 01	0.59	0.0082	0.09	0.044	0.083														
07/11/12	9:40	G	Trib 02	0.37	0.0092	0.096	0.048	0.077														
07/11/12	9:50	G	Trib 03	0.34	<0.002	0.57	<0.020	0.062														
07/11/12	10:45	G	Trib 11	0.48	0.049	0.13	0.078	0.078														
07/11/12	10:20	G	Trib 22d	0.6	0.0022	0.32	<0.020	<0.020														
07/11/12	8:30	G	Trib 24	0.21	0.12	0.12	<0.020	<0.020														
07/11/12	10:30	G	Trib 27 (New	0.24	0.039	0.039	0.045	0.045														
08/01/12	9:15	G	Trib 01	0.48	<0.002	0.086	0.058	0.082														
08/01/12	9:30	G	Trib 02	0.41	<0.002	0.081	0.046	0.07														
08/01/12	9:45	G	Trib 03	0.39	0.014	0.16	0.036	0.054														
08/01/12	10:40	G	Trib 11	0.35	<0.002	0.042	0.022	0.029														
08/01/12	10:10	G	Trib 22d	0.38	<0.002	0.043	<0.020	0.13														
08/01/12	8:15	G	Trib 24	0.24	<0.002	0.71	<0.020	<0.020														
08/01/12	10:25	G	Trib 27 (New	0.56	<0.002	0.053	0.04	0.051														
09/05/12	9:40	G	Trib 01	0.13	0.0062	0.051	0.068	0.074	148	19	54	<0.001	<0.001	0.035	0.035	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0024
09/05/12	10:05	G	Trib 02	0.1	0.0084	0.05	0.062	0.062	164	15	54	<0.001	<0.001	0.035	0.035	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0036
09/05/12	10:20	G	Trib 03	0.15	0.1	0.14	0.044	0.044	176	16	55	<0.001	<0.001	0.038	0.038	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0029
09/05/12	11:20	G	Trib 11	0.13	0.0084	0.052	0.03	0.091	176	15	55	<0.001	<0.001	0.035	0.036	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0022
09/05/12	11:00	G	Trib 22d	0.18	0.0077	0.028	<0.020	<0.020	104	9	23	<0.001	<0.001	0.015	0.016	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.002
09/05/12	8:30	G	Trib 24	0.099	<0.002	0.033	<0.020	<0.020	164	<5	44	<0.001	<0.001	0.044	0.044	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0038
10/03/12	9:10	G	Trib 01	0.13	0.021	0.043	0.089	0.089														
10/03/12	9:30	G	Trib 02	0.11	0.018	0.038	0.068	0.068														
10/03/12	9:40	G	Trib 03	0.26	0.16	0.21	0.07	0.07														
10/03/12	10:35	G	Trib 11	0.16	0.03	0.047	0.035	0.035														
10/03/12	8:25	G	Trib 24	0.21	0.0051	0.12	<0.020	<0.020														
11/07/12	9:10	G	Trib 01	0.079	0.008	0.055	0.12	0.12														
11/07/12	9:20	G	Trib 02	0.069	0.04	0.046	0.1	0.1														
11/07/12	9:35	G	Trib 03	0.12	<0.002	0.058	0.08	0.08														
11/07/12	10:10	G	Trib 04	0.4	<0.002	0.074	0.041	0.041														
11/07/12	8:25	G	Trib 24	0.17	0.0024	0.025	<0.020	<0.020														
12/05/12	9:05	G	Trib 01	0.1	0.068	0.082	0.16	0.17	184	33	91	<0.001	0.0062	0.044	0.045	<0.001	<0.001	<0.0005	0.00062	<0.001	<0.001	0.0037
12/05/12	9:20	G	Trib 02	0.11	0.054	0.069	0.15	0.15	164	26	87	<0.001	0.0051	0.043	0.045	<0.001	<0.001	<0.0005	0.00053	<0.001	<0.001	0.003
12/05/12	9:35	G	Trib 03	0.2	0.04	0.068	0.11	0.12	176	27	83	<0.001	0.0013	0.043	0.049	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0028
12/05/12	10:05	G	Trib 04	0.48	0.097	0.12	0.04	0.061	188	27	85	<0.001	0.0016	0.05	0.065	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.002
12/05/12	8:20	G	Trib 24	0.12	<0.002	0.013	<0.020	<0.020	136	20	58	<0.001	0.0027	0.045	0.046	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	0.0021

Canal - Grab Sampling Results

			Method	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	NA	NA	NA
			DL	0.002	0.0005	0.0005	0.002	0.002	0.005	0.005	0.005	0.005	0.0005	0.0005	NA	NA	NA
			Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NA	NA	NA
Sample Date	**Sample Time**	**Sample Type**	**Location ID**	**Copper, Total**	**Lead, Dissolved**	**Lead, Total**	**Molybdenum, Dissolved**	**Molybdenum, Total**	**Nickel, Dissolved**	**Nickel, Total**	**Selenium, Dissolved**	**Selenium, Total**	**Silver, Dissolved**	**Silver, Total**	**Notes**	**Field Notes**	**Lab Notes**
01/04/12	9:35	G	Trib 01														
01/04/12	9:40	G	Trib 02														
01/04/12	9:50	G	Trib 03														
01/04/12	10:35	G	Trib 04														
01/04/12	9:05	G	Trib 22a														
01/04/12	10:20	G	Trib 22d														
01/04/12	8:30	G	Trib 24														
02/01/12	9:20	G	Trib 01														
02/01/12	9:35	G	Trib 02														
02/01/12	9:50	G	Trib 03														
02/01/12	10:30	G	Trib 04														
02/01/12	9:00	G	Trib 22a														
02/01/12	10:15	G	Trib 22d														
02/01/12	8:35	G	Trib 24														
03/07/12	9:40	G	Trib 01	0.011	<0.0005	0.0015	0.0024	0.0052	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
03/07/12	10:20	G	Trib 02	0.011	<0.0005	0.0012	0.0023	0.0027	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
03/07/12	10:30	G	Trib 03	0.0096	<0.0005	0.0012	0.0025	0.0027	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
03/07/12	11:10	G	Trib 04	0.012	<0.0005	0.009	0.0028	0.0028	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
03/07/12	9:15	G	Trib 22a	<0.002	<0.0005	<0.0005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
03/07/12	11:00	G	Trib 22d	<0.002	<0.0005	<0.0005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
03/07/12	8:40	G	Trib 24	0.0035	<0.0005	0.00057	0.003	0.0057	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	GAB not collected		
04/04/12	9:35	G	Trib 01														
04/04/12	9:45	G	Trib 02														
04/04/12	10:00	G	Trib 03														
04/04/12	10:40	G	Trib 04														
04/04/12	10:50	G	Trib 11													FHL canal started up for season - high TOC ok	
04/04/12	9:10	G	Trib 22a														
04/04/12	10:30	G	Trib 22d														
04/04/12	8:30	G	Trib 24														
05/02/12	9:20	G	Trib 01														
05/02/12	9:50	G	Trib 02														
05/02/12	10:00	G	Trib 03														
05/02/12	10:50	G	Trib 11														
05/02/12	8:25	G	Trib 24														
05/02/12	10:35	G	Trib 27 (New (														TOC "AS B"

Canal - Grab Sampling Results

			Method	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	NA	NA	NA
			DL	0.002	0.0005	0.0005	0.002	0.002	0.005	0.005	0.005	0.005	0.0005	0.0005	NA	NA	NA
			Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NA	NA	NA
Sample Date	Sample Time	Sample Type	Location ID	Copper, Total	Lead, Dissolved	Lead, Total	Molybdenum, Dissolved	Molybdenum, Total	Nickel, Dissolved	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Notes	Field Notes	Lab Notes
06/06/12	9:15	G	Trib 01	0.0063	<0.0005	0.0022	0.002	0.0025	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
06/06/12	9:30	G	Trib 02	0.006	<0.0005	0.0021	0.0021	0.0024	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
06/06/12	9:45	G	Trib 03	0.0066	<0.0005	0.002	0.0022	0.0026	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
06/06/12	10:40	G	Trib 11	0.0068	<0.0005	0.0024	0.0022	0.0025	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
06/06/12	10:10	G	Trib 22d	<0.002	<0.0005	<0.0005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
06/06/12	8:25	G	Trib 24	0.0061	<0.0005	0.0011	0.0026	0.0026	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
06/06/12	10:25	G	Trib 27 (New (	0.01	<0.0005	0.005	0.0023	0.0024	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
07/11/12	9:25	G	Trib 01														
07/11/12	9:40	G	Trib 02														
07/11/12	9:50	G	Trib 03														
07/11/12	10:45	G	Trib 11														
07/11/12	10:20	G	Trib 22d														
07/11/12	8:30	G	Trib 24														
07/11/12	10:30	G	Trib 27 (New (														
08/01/12	9:15	G	Trib 01														
08/01/12	9:30	G	Trib 02														
08/01/12	9:45	G	Trib 03														
08/01/12	10:40	G	Trib 11														
08/01/12	10:10	G	Trib 22d														
08/01/12	8:15	G	Trib 24														
08/01/12	10:25	G	Trib 27 (New (														
09/05/12	9:40	G	Trib 01	0.0043	<0.0005	0.001	0.0031	0.0032	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
09/05/12	10:05	G	Trib 02	0.006	<0.0005	0.00075	0.0032	0.0032	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
09/05/12	10:20	G	Trib 03	0.0045	<0.0005	0.0012	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
09/05/12	11:20	G	Trib 11	0.0041	<0.0005	0.0012	0.0035	0.0037	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
09/05/12	11:00	G	Trib 22d	<0.002	<0.0005	<0.0005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
09/05/12	8:30	G	Trib 24	0.0061	<0.0005	0.0006	0.0029	0.0031	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
10/03/12	9:10	G	Trib 01														
10/03/12	9:30	G	Trib 02														
10/03/12	9:40	G	Trib 03														
10/03/12	10:35	G	Trib 11														
10/03/12	8:25	G	Trib 24														
11/07/12	9:10	G	Trib 01														
11/07/12	9:20	G	Trib 02														
11/07/12	9:35	G	Trib 03														
11/07/12	10:10	G	Trib 04														
11/07/12	8:25	G	Trib 24														
12/05/12	9:05	G	Trib 01	0.006	<0.0005	<0.0005	0.0027	0.0027	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
12/05/12	9:20	G	Trib 02	0.0053	<0.0005	<0.0005	0.0023	0.0025	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
12/05/12	9:35	G	Trib 03	0.0056	<0.0005	0.0012	0.0024	0.0025	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
12/05/12	10:05	G	Trib 04	0.0055	0.0014	0.0062	0.0026	0.003	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			
12/05/12	8:20	G	Trib 24	0.0038	<0.0005	0.00057	0.0035	0.0035	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005			

Clear Creek and Canal -
Ambient Autosampler Results

			Method	SM2550B	SM4500H+B	SM2510B	SM2130B	SM4500NH3H	SM4500NO3I	SM4500NO3I	SM4500PE	SM4500PE	SM5310B	SM2540D	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.7
			DL	1	1	1	0.1	0.01	0.01	0.02	0.0025	0.0025	0.5	1	0.001	0.001	0.0005	0.0005	0.002	0.002	0.02
			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	mg/L	mg/L
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Turbidity	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Carbon, Total Organic	Solids, Total Suspended	Arsenic, Dissolved	Arsenic, Total	Cadmium, Dissolved	Cadmium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved
4/21/12	12:00:00	24C	CC AS 26	15.9	7	307	5.4	< 0.01	0.19	0.3	0.0025	0.0104	1.6	1							
4/22/12	12:00:00	24C	CC AS 26	13	7.1	294	3.7	< 0.01	0.2	0.31	0.0103	LE	1.4	<1							
4/21/12	23:00:00	24C	CC AS 49	14.9	7.8	296	2.8	0.01	0.14	0.33	< 0.0025	0.0111	1.5	1							
4/22/12	23:00:00	24C	CC AS 49	14.6	7.8	287	1.9	0.02	0.15	0.36	< 0.0025	0.0125	1.4	2							
4/21/12	23:00:00	24C	CC AS 50	14.2	7.4	394	14.8	< 0.01	0.41	0.58	< 0.0025	0.012	1.5	9							
4/22/12	23:00:00	24C	CC AS 50	14.2	7.4	367	16.5	< 0.01	0.4	0.49	0.0025	0.0129	1.6	13							
4/22/12	7:00:00	24C	CC AS 59	17	7.6	321	2.6	0.01	0.12	0.32	0.0028	0.0136	3.1	7							
4/23/12	7:00:00	24C	CC AS 59	18.3	7.9	304	3.2	0.03	0.11	0.41	0.0027	0.0187	1.5	9							
4/22/12	18:00:00	24C	CC AS T11	17	7.8	332	4.2	0.03	0.08	0.28	0.0035	LE	3.1	10	<0.001	<0.001	<0.0005	<0.0005	0.0031	0.0048	0.021
4/23/12	18:00:00	24C	CC AS T11	16.9	7.8	331	3.6	0.03	0.1	0.34	0.0037	0.0132	1.9	6	<0.001	<0.001	<0.0005	<0.0005	0.0031	0.0052	0.022
5/19/12	18:00:00	24C	CC AS 26	13.2	6.8	118	3.7	<0.01	0.1	0.33	< 0.0025	0.0109	2.1	4							
5/20/12	18:00:00	24C	CC AS 26	11.4	6.9	111	1.8	<0.01	0.11	0.24	0.0053	0.0157	1.9	4							
5/20/12	1:00:00	24C	CC AS 49	13.2	7	161	2.3	0.01	0.09	0.31	< 0.0025	0.0133	2	7							
5/21/12	1:00:00	24C	CC AS 49	12.8	7	161	2	0.01	0.08	0.32	< 0.0025	0.0088	2.5	7							
5/20/12	1:00:00	24C	CC AS 50	13.7	6.9	251	15.2	0.03	0.16	0.44	< 0.0025	0.0138	2.5	33							
5/21/12	1:00:00	24C	CC AS 50	13.8	7	247	6.8	0.02	0.21	0.47	< 0.0025	0.0102	2	22							
5/20/12	7:00:00	24C	CC AS 59	19.1	7.8	171	4.8	0.01	0.09	0.29	< 0.0025	0.0115	2.2	9							
5/21/12	7:00:00	24C	CC AS 59	18.8	7.9	173	3.8	0.01	0.07	0.37	< 0.0025	0.0122	1.9	8							
5/20/12	15:00:00	24C	CC AS T11	17.4	7	198	12	0.02	0.1	0.44	< 0.0025	0.0191	2.2	19	<0.001	<0.001	<0.0005	<0.0005	0.0042	0.0079	0.054
5/21/12	15:00:00	24C	CC AS T11	16.7	7.1	188	8.5	0.02	0.09	0.43	< 0.0025	0.0149	1.9	14	<0.001	NT	<0.0005	NT	0.0035	NT	0.074
6/24/12	0:30:00	24C	CC AS 49	23.6	7.6	164	1.7	0.02	0.08	0.21	< 0.0025	0.0162	1.4	5							
6/25/12	0:30:00	24C	CC AS 49	23.2	7.8	164	2.2	< 0.01	0.09	0.21	< 0.0025	0.0143	1.3	6							
6/24/12	0:30:00	24C	CC AS 50	23.5	7.8	406	4.4	< 0.01	0.41	0.51	< 0.0025	0.009	1.7	3							
6/25/12	0:30:00	24C	CC AS 50	23.4	7.9	418	4.6	0.01	0.59	0.76	< 0.0025	0.0083	1.6	4							
6/24/12	7:00:00	24C	CC AS 59	30.8	7.5	170	3.2	< 0.01	0.04	0.14	< 0.0025	0.0116	2.4	5							
6/25/12	7:00:00	24C	CC AS 59	29.1	7.2	175	2.1	< 0.01	0.05	0.15	< 0.0025	0.0127	2.1	5							
6/24/12	16:30:00	24C	CC AS T11	27.1	7.7	183	4.5	0.05	0.04	0.21	< 0.0025	0.0132	1.3	7	<0.001	<0.001	<0.0005	<0.0005	0.0022	0.0042	<0.02
6/25/12	16:30:00	24C	CC AS T11	26.2	7.9	181	3.6	0.01	0.05	0.22	< 0.0025	0.0129	1.3	7	<0.001	<0.001	<0.0005	<0.0005	0.0023	0.0038	<0.02
7/28/12	14:30:00	24C	CC AS 26	18.6	7.8	175	1.4	< 0.01	0.11	0.28	< 0.0025	0.0112	1.3	<1							
7/29/12	14:30:00	24C	CC AS 26	15.6	8	175	1.3	< 0.01	0.11	0.28	0.0118	0.0222	1.1	<1							
7/28/12	23:00:00	24C	CC AS 49	19.1	7.3	214	7.2	< 0.01	0.09	0.29	0.0025	0.0199	1.5	8							
7/29/12	23:00:00	24C	CC AS 49	19.2	7.4	160	9.8	0.01	0.1	0.29	0.0027	0.021	1.3	8							
7/28/12	23:00:00	24C	CC AS 50	20.3	7.5	417	31.9	< 0.01	1.06	1.4	0.0025	0.0332	2.1	27							
7/29/12	23:00:00	24C	CC AS 50	20.3	7.6	431	30.2	0.03	1.3	1.62	< 0.0025	0.036	LE	27							
7/29/12	8:00:00	24C	CC AS 59	22.1	7.8	198	5	< 0.01	0.07	0.29	0.0029	0.0166	1.8	10							
7/30/12	8:00:00	24C	CC AS 59	21.4	7.8	176	10.6	< 0.01	0.11	0.35	0.0025	0.0245	1.6	14							
7/29/12	18:30:00	24C	CC AS T11	22.5	7.4	199	3.9	0.02	0.02	0.23	< 0.0025	0.0128	1.3	5	<0.001	0.0015	<0.0005	<0.0005	0.0021	0.0042	0.024
7/30/12	18:30:00	24C	CC AS T11	22.4	7.4	190	3.4	0.01	0.03	0.19	< 0.0025	0.0121	2.5	5	<0.001	0.0023	<0.0005	<0.0005	0.0021	0.0036	0.022
8/25/12	12:00:00	24C	CC AS 26	17.8	7.2	255	2.3	0.01	0.1	0.22	< 0.0025	0.0106	1	4							
8/26/12	12:00:00	24C	CC AS 26	16.8	7.1	225	2.3	< 0.01	0.12	0.25	< 0.0025	0.0079	1	4							
8/25/12	23:00:00	24C	CC AS 49	21.9	7.4	205	2.1	0.02	0.09	0.16	< 0.0025	0.0092	1.5	6							
NS	NS	24C	CC AS 49	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT							
8/25/12	23:00:00	24C	CC AS 50	20.1	7.2	557	11.5	0.02	0.82	1.07	< 0.0025	0.0221	2.4	9							
8/26/12	12:00:00	24C	CC AS 50	19.7	7.4	584	10.2	0.01	1.07	1.32	< 0.0025	0.0169	2	9							
8/26/12	9:00:00	24C	CC AS 59	23.2	7.6	222	2.5	< 0.01	0.1	0.28	< 0.0025	0.0094	1.9	5							
8/27/12	9:00:00	24C	CC AS 59	NT	7	229	2.1	< 0.01	0.1	0.27	< 0.0025	0.0107	1.2	5							
8/26/12	21:00:00	24C	CC AS T11	21.5	7.7	248	9.8	0.05	0.09	0.35	0.0034	0.0177	1.4	10	<0.001	0.001	<0.0005	<0.0005	0.0026	0.0055	<0.02
8/27/12	21:00:00	24C	CC AS T11	21.7	7.9	242	5.3	0.02	0.09	0.3	< 0.0025	0.0111	1.2	9	<0.001	<0.001	<0.0005	<0.0005	0.0023	0.0048	<0.02
9/22/12	8:30:00	24C	CC AS 26	14.1	7.2	308	1.6	< 0.01	0.15	0.28	0.0041	0.0072	0.8	<1							
9/23/12	8:30:00	24C	CC AS 26	12.9	7.1	263	1.5	0.01	0.16	0.19	< 0.0025	0.0084	0.8	<1							
9/22/12	21:00:00	24C	CC AS 49	17.9	7.9	239	1.9	< 0.01	0.09	0.15	< 0.0025	0.0085	1.8	1							
9/23/12	21:00:00	24C	CC AS 49	17.3	8.1	237	1.6	0.01	0.11	0.13	< 0.0025	0.008	1.4	1							
9/22/12	21:00:00	24C	CC AS 50	15.7	8.1	661	5.3	0.01	0.9	0.98	< 0.0025	0.0117	1.8	3							
9/23/12	21:00:00	24C	CC AS 50	15.5	8.2	663	7.6	< 0.01	0.88	1	< 0.0025	0.0135	1.9	6							
9/23/12	8:00:00	24C	CC AS 59	21.6	7.9	249	1.4	< 0.01	0.05	0.14	< 0.0025	0.0074	1.6	1							
9/24/12	8:00:00	24C	CC AS 59	21.1	7.5	257	1.5	< 0.01	0.06	0.13	< 0.0025	0.008	1.3	<1							
9/23/12	19:00:00	24C	CC AS T11	16	8	269	6.3	0.01	0.03	0.2	< 0.0025	0.0184	1.4	8	<0.001	<0.001	<0.0005	<0.0005	0.0025	0.0061	<0.020
9/24/12	19:00:00	24C	CC AS T11	15.9	8.1	263	5.8	0.01	0.03	0.24	< 0.0025	0.0186	1.6	11	<0.001	0.001	<0.0005	<0.0005	0.0026	0.0056	<0.02
10/21/12	10:00:00	24C	CC AS 26	9.9	8.7	283	3.6	< 0.01	0.22	0.36	< 0.0025	0.007	1.1	<1							
10/22/12	10:00:00	24C	CC AS 26	8.1	8.2	260	3.4	0.01	0.19	0.36	< 0.0025	0.0062	1.1	<1							
10/21/12	23:00:00	24C	CC AS 49	10.3	7.7	273	1.6	< 0.01	0.13	0.3	< 0.0025	0.0091	1.2	5							
10/22/12	23:00:00	24C	CC AS 49	9.9	7.8	259	1.4	< 0.01	0.13	0.29	0.0025	0.0096	1.2	2							
10/21/12	23:00:00	24C	CC AS 50	8.3	7.9	692	2.9	0.01	0.92	1.1	< 0.0025	0.0122	2.5	5							
10/22/12	23:00:00	24C	CC AS 50	8.5	7.9	693	3.4	0.01	0.96	1.1	< 0.0025	0.0118	2.3	<1							
11/2/12	10:30:00	CE	CC AS T03	13.2	8.1	302	3.6	< 0.01	0.13	0.25	< 0.0025	0.0113	1.3	<1	<0.001	<0.001	<0.0005	<0.0005	0.0025	0.0046	<0.02
11/3/12	10:30:00	CE	CC AS T03	12.2	8	311	2.5	< 0.01	0.14	0.23	< 0.0025	0.0071	1.1	1	<0.001	<0.001	<0.0005	<0.0005	0.0026	0.006	0.02
11/3/12	9:30:00	CE	CC AS T04	8.8	7.8	348	22.3	< 0.01	0.04	0.21	0.0071	0.0368	1.7	18	0.0014	0.0026	<0.0005	<0.0005	0.002	0.013	0.047
11/4/12	9:30:00	CE	CC AS T04	8.5	8	341	9.6	< 0.01	0.07	0.16	0.0059	0.0202	1.5	34	0.0012	0.002	<0.0005	<0.0005	<0.002	0.0072	0.045

Clear Creek and Canal -
Ambient Autosampler Results

			Method	**EPA200.7**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**NA**	**NA**	**NA**
			DL	**0.02**	**0.0005**	**0.0005**	**0.002**	**0.002**	**0.002**	**0.002**	**0.02**	**0.02**	**NA**	**NA**	**NA**
			Reporting Units	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**NA**	**NA**	**NA**
Sample Date	**Sample Time**	**Sample Type**	**Location ID**	**Iron, Total**	**Lead, Dissolved**	**Lead, Total**	**Manganese, Dissolved**	**Manganese, Total**	**Molybdenum, Dissolved**	**Molybdenum, Total**	**Zinc, Dissolved**	**Zinc, Total**	**Notes**	**Field Notes**	**Lab Notes**
4/21/12	12:00:00	24C	CC AS 26										Sample A. Start time 1300 on 04/20/12, end time 1200 on 04/21/12.		
4/22/12	12:00:00	24C	CC AS 26										Sample B. Start time 1300 on 04/210/12, end time 1200 on 04/22/12.		LE = T-PO4 sample bottle broke.
4/21/12	23:00:00	24C	CC AS 49										Sample A. Start time 0000 on 04/21/12, end time 2300 on 04/21/12.		
4/22/12	23:00:00	24C	CC AS 49										Sample B. Start time 0000 on 04/22/12, end time 2300 on 04/22/12.		
4/21/12	23:00:00	24C	CC AS 50										Sample A. Start time 0000 on 04/21/12, end time 2300 on 04/21/12.		
4/22/12	23:00:00	24C	CC AS 50										Sample B. Start time 0000 on 04/22/12, end time 2300 on 04/22/12.		
4/22/12	7:00:00	24C	CC AS 59										Sample A. Start time 0800 on 04/21/12, end time 0700 on 04/22/12.		
4/23/12	7:00:00	24C	CC AS 59										Sample B. Start time 0800 on 04/22/12, end time 0700 on 04/23/12.		
4/22/12	18:00:00	24C	CC AS T11	0.17	<0.0005	0.00082	<0.002	0.049	0.0029	0.0033	0.032	0.037	Sample A. Start time 1900 on 04/21/12, end time 1800 on 04/22/12.		LE = T-PO4 sample bottle broke.
4/23/12	18:00:00	24C	CC AS T11	0.2	<0.0005	0.00084	<0.002	0.053	0.0029	0.0033	0.042	0.042	Sample B. Start time 1900 on 04/22/12, end time 1800 on 04/23/12.		
5/19/12	18:00:00	24C	CC AS 26										Sample A. Start time 1900 on 05/18/12, end time 1800 on 05/19/12.		
5/20/12	18:00:00	24C	CC AS 26										Sample B. Start time 1900 on 05/19/12, end time 1800 on 05/20/12.		
5/20/12	1:00:00	24C	CC AS 49										Sample A. Start time 0200 on 05/19/12, end time 0100 on 05/20/12.		
5/21/12	1:00:00	24C	CC AS 49										Sample B. Start time 0200 on 05/20/12, end time 0100 on 05/21/12.		
5/20/12	1:00:00	24C	CC AS 50										Sample A. Start time 0200 on 05/19/12, end time 0100 on 05/20/12.		
5/21/12	1:00:00	24C	CC AS 50										Sample B. Start time 0200 on 05/20/12, end time 0100 on 05/21/12.		
5/20/12	7:00:00	24C	CC AS 59										Sample A. Start time 0800 on 05/19/12, end time 0700 on 05/20/12.		
5/21/12	7:00:00	24C	CC AS 59										Sample B. Start time 0800 on 05/20/12, end time 0700 on 05/21/12.		
5/20/12	15:00:00	24C	CC AS T11	0.46	<0.0005	0.0028	<0.002	0.086	0.0023	0.0023	0.05	0.081	Sample A. Start time 1600 on 05/19/12, end time 1500 on 05/20/12.		
5/21/12	15:00:00	24C	CC AS T11	NT	<0.0005	NT	<0.002	NT	0.0028	NT	0.047	NT	Sample B. Start time 1600 on 05/20/12, end time 1500 on 05/21/12.	Total metals bottle labeling error. Not	
6/24/12	0:30:00	24C	CC AS 49										Sample A. Start time 0130 on 06/23/12, end time 0030 on 06/24/12.		
6/25/12	0:30:00	24C	CC AS 49										Sample B. Start time 0130 on 06/24/12, end time 0030 on 06/25/12.		
6/24/12	0:30:00	24C	CC AS 50										Sample A. Start time 0130 on 06/23/12, end time 0030 on 06/24/12.		
6/25/12	0:30:00	24C	CC AS 50										Sample B. Start time 0130 on 06/24/12, end time 0030 on 06/25/12.		
6/24/12	7:00:00	24C	CC AS 59										Sample A. Start time 0800 on 06/23/12, end time 0700 on 06/24/12.		
6/25/12	7:00:00	24C	CC AS 59										Sample B. Start time 0130 on 06/24/12, end time 0030 on 06/25/12.		
6/24/12	16:30:00	24C	CC AS T11	0.13	<0.0005	0.0012	<0.002	0.043	0.0029	0.0032	0.025	0.029	Sample A. Start time 1730 on 06/23/12, end time 1630 on 06/24/12.		
6/25/12	16:30:00	24C	CC AS T11	0.11	<0.0005	0.001	<0.002	0.038	0.0032	0.0032	<0.020	0.027	Sample B. Start time 1730 on 06/24/12, end time 1630 on 06/25/12.		
7/28/12	14:30:00	24C	CC AS 26										Sample A. Start time 1530 on 07/27/12, end time 1430 on 07/28/12.		
7/29/12	14:30:00	24C	CC AS 26										Sample B. Start time 1530 on 07/28/12, end time 1430 on 07/29/12.		
7/28/12	23:00:00	24C	CC AS 49										Sample A. Start time 0000 on 07/28/12, end time 2300 on 07/28/12.		
7/29/12	23:00:00	24C	CC AS 49										Sample B. Start time 0000 on 07/29/12, end time 2300 on 07/29/12.		
7/28/12	23:00:00	24C	CC AS 50										Sample A. Start time 0000 on 07/28/12, end time 2300 on 07/28/12.		
7/29/12	23:00:00	24C	CC AS 50										Sample B. Start time 0000 on 07/29/12, end time 2300 on 07/29/12.	vial.	
7/29/12	8:00:00	24C	CC AS 59										Sample A. Start time 0900 on 07/28/12, end time 0800 on 07/29/12.		
7/30/12	8:00:00	24C	CC AS 59										Sample B. Start time 0900 on 07/29/12, end time 0800 on 07/30/12.		
7/29/12	18:30:00	24C	CC AS T11	0.29	<0.0005	0.0019	<0.002	0.048	0.0029	0.0033	0.025	0.025	Sample A. Start time 1930 on 07/28/12, end time 1830 on 07/29/12.		
7/30/12	18:30:00	24C	CC AS T11	0.25	0.0005	0.0005	<0.002	0.041	0.0028	0.0029	<0.020	0.024	Sample B. Start time 1930 on 07/29/12, end time 1830 on 07/30/12.		
8/25/12	12:00:00	24C	CC AS 26										Sample A. Start time 1300 on 08/24/12, end time 1200 on 08/25/12.		
8/26/12	12:00:00	24C	CC AS 26										Sample B. Start time 1300 on 08/25/12, end time 1200 on 08/26/12.		
8/25/12	23:00:00	24C	CC AS 49										Sample A. Start time 0000 on 08/25/12, end time 2300 on 08/25/12.		
NS	NS	24C	CC AS 49										Not sampled. Autosampler error.	Autosampler distributor arm stuck on bottle #14 and	
8/25/12	23:00:00	24C	CC AS 50										Sample A. Start time 0000 on 08/25/12, end time 2300 on 08/25/12.		
8/26/12	12:00:00	24C	CC AS 50										Sample B. Start time 0000 on 08/26/12, end time 2300 on 08/26/12.		
8/26/12	9:00:00	24C	CC AS 59										Sample A. Start time 1000 on 08/25/12, end time 0900 on 08/26/12.		
8/27/12	9:00:00	24C	CC AS 59										Sample B. Start time 1000 on 08/26/12, end time 0900 on 08/27/12.		
8/26/12	21:00:00	24C	CC AS T11	0.29	<0.0005	0.002	<0.002	0.076	0.0037	0.0039	0.023	0.036	Sample A. Start time 0800 on 08/26/12, end time 2100 on 08/26/12.		
8/27/12	21:00:00	24C	CC AS T11	0.22	<0.0005	0.0018	<0.002	0.056	0.0037	0.0037	<0.020	0.031	Sample B. Start time 2200 on 08/26/12, end time 2100 on 08/27/12.	Canal turned off due to wastewater spill from Idaho Springs.	
9/22/12	8:30:00	24C	CC AS 26										Sample A. Start time 0930 on 09/21/12, end time 0830 on 09/22/12.		
9/23/12	8:30:00	24C	CC AS 26										Sample B. Start time 0930 on 09/22/12, end time 0830 on 09/23/12.		
9/22/12	21:00:00	24C	CC AS 49										Sample A. Start time 2200 on 09/21/12, end time 2100 on 09/22/12.		
9/23/12	21:00:00	24C	CC AS 49										Sample B. Start time 2200 on 09/22/12, end time 2100 on 09/23/12.		
9/22/12	21:00:00	24C	CC AS 50										Sample A. Start time 2200 on 09/21/12, end time 2100 on 09/22/12.		
9/23/12	21:00:00	24C	CC AS 50										Sample B. Start time 2200 on 09/22/12, end time 2100 on 09/23/12.		
9/23/12	8:00:00	24C	CC AS 59										Sample A. Start time 0900 on 09/22/12, end time 0800 on 09/23/12.		
9/24/12	8:00:00	24C	CC AS 59										Sample B. Start time 0900 on 09/23/12, end time 0800 on 09/24/12.		
9/23/12	19:00:00	24C	CC AS T11	0.22	<0.0005	0.0024	<0.002	0.056	0.0036	0.0048	0.027	0.038	Sample A. Start time 2000 on 09/22/12, end time 1900 on 09/23/12.		
9/24/12	19:00:00	24C	CC AS T11	0.23	<0.0005	0.0022	<0.002	0.058	0.0038	0.0038	0.032	0.04	Sample B. Start time 2000 on 09/23/12, end time 1900 on 09/24/12.		
10/21/12	10:00:00	24C	CC AS 26										Sample A. Start time 1100 on 10/20/12, end time 1000 on 10/21/12.		
10/22/12	10:00:00	24C	CC AS 26										Sample B. Start time 1100 on 10/21/12, end time 1000 on 10/22/12.		
10/21/12	23:00:00	24C	CC AS 49										Sample A. Start time 0000 on 10/21/12, end time 2300 on 10/21/12.		
10/22/12	23:00:00	24C	CC AS 49										Sample B. Start time 0000 on 10/22/12, end time 2300 on 10/22/12.		
10/21/12	23:00:00	24C	CC AS 50										Sample A. Start time 0000 on 10/21/12, end time 2300 on 10/21/12.		
10/22/12	23:00:00	24C	CC AS 50										Sample B. Start time 0000 on 10/22/12, end time 2300 on 10/22/12.		
11/2/12	10:30:00	CE	CC AS T03	0.14	<0.0005	0.00083	0.0021	0.048	0.0027	0.0028	0.078	0.084	Canal Start up. Bottles 1-12. Start time 1130 on 11/01/12, end time 1030 on 11/02/12.		
11/3/12	10:30:00	CE	CC AS T03	0.3	<0.0005	0.0017	<0.002	0.065	0.0028	0.0028	0.057	0.096	Canal Start up. Bottles 13-24. Start time 1130 on 11/02/12, end time 1030 on 11/03/12.		
11/3/12	9:30:00	CE	CC AS T04	1.3	0.00085	0.011	<0.002	0.11	0.0044	0.0046	0.024	0.1	Canal Start up. Bottles 1-12. Start time 1030 on 11/02/12, end time 0930 on 11/03/12.		
11/4/12	9:30:00	CE	CC AS T04	0.73	0.00075	0.0066	<0.002	0.071	0.0033	0.0033	<0.020	0.057	Canal Start up. Bottles 12-24. Start time 1030 on 11/03/12, end time 0930 on 11/04/12.		

Clear Creek -
Ambient Autosampler Results -
Metals (Golden)

		Method	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7
		DL	variable	variable	variable	variable	variable	variable	0.004	0.004	0.01
		Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	**Sample Type**	**Location ID**	**Cadmium, Dissolved**	**Cadmium, Total**	**Chromium, Dissolved**	**Chromium, Total**	**Copper, Dissolved**	**Copper, Total**	**Iron, Dissolved**	**Iron, Total**	**Lead, Dissolved**
4/21/2012	24C	CC26 Comp A	< 0.001	< 0.001	NT	NT	< 0.006	0.008	0.024	0.16	< 0.01
4/21/2012	24C	CC49 Comp A	< 0.001	< 0.001	NT	NT	< 0.006	0.008	0.014	0.185	< 0.01
4/21/2012	24C	CC50 Comp A	0.001	0.0025	NT	NT	0.006	0.039	0.017	2.88	< 0.01
4/22/2012	24C	CC26 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.008	0.024	0.15	< 0.01
4/22/2012	24C	CC49 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.008	0.01	0.18	< 0.01
4/22/2012	24C	CC50 Comp B	< 0.001	0.002	NT	NT	0.006	0.042	0.021	3.23	< 0.01
4/22/2012	24C	CC59 Comp A	< 0.001	< 0.001	NT	NT	< 0.006	0.013	0.006	0.52	< 0.01
4/23/2012	24C	CC59 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.012	0.005	0.51	< 0.01
5/19/2012	24C	CC26 Comp A	< 0.001	< 0.001	NT	NT	0.006	0.006	0.05	0.12	< 0.01
5/20/2012	24C	CC49 Comp A	< 0.001	< 0.001	NT	NT	0.009	0.007	0.043	0.33	< 0.01
5/20/2012	24C	CC26 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.006	0.05	0.11	< 0.01
5/21/2012	24C	CC49 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.006	0.041	0.25	< 0.01
5/20/2012	24C	CC50 Comp A	< 0.001	0.003	NT	NT	0.007	0.058	0.055	5.05	< 0.01
5/20/2012	24C	CC59 Comp A	0.001	< 0.001	NT	NT	< 0.006	0.011	0.06	0.65	< 0.01
5/21/2012	24C	CC50 Comp B	< 0.001	0.002	NT	NT	0.006	0.03	0.045	2.77	< 0.01
5/21/2012	24C	CC59 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.009	0.05	0.49	< 0.01
6/24/2012	24C	CC49 Comp A	< 0.001	< 0.001	NT	NT	< 0.006	< 0.006	0.065	0.15	< 0.01
6/24/2012	24C	CC50 Comp A	< 0.001	0.001	NT	NT	< 0.006	0.01	0.058	0.63	< 0.01
6/24/2012	24C	CC59 Comp A	< 0.001	< 0.001	NT	NT	< 0.006	< 0.006	0.024	0.21	< 0.01
6/24/2012	24C	CC59 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	< 0.006	0.03	0.2	< 0.01
6/25/2012	24C	CC49 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	< 0.006	0.042	0.15	< 0.01
6/25/2012	24C	CC50 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	0.012	0.064	0.81	< 0.01
7/28/2012	24C	CC26 Comp A	< 0.001	< 0.001	NT	NT	0.011	0.02	0.04	0.16	< 0.01
7/28/2012	24C	CC49 Comp A	< 0.001	< 0.001	NT	NT	< 0.006	< 0.006	0.03	0.51	< 0.01
7/28/2012	24C	CC50Comp A	0.001	0.003	NT	NT	0.006	0.05	0.011	3.62	< 0.01
7/29/2012	24C	CC26 Comp B	< 0.001	< 0.001	NT	NT	0.009	0.016	0.04	0.15	< 0.01
7/29/2012	24C	CC49 Comp B	< 0.001	< 0.001	NT	NT	< 0.006	< 0.006	0.03	0.63	< 0.01
7/29/2012	24C	CC50Comp B	0.001	0.003	NT	NT	0.006	0.048	0.016	3.6	< 0.01
7/29/2012	24C	CC59 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	0.009	0.46	< 0.01
7/30/2012	24C	CC59 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.01	0.013	1	< 0.01
8/25/2012	24C	CC26 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	0.005	0.01	0.02	0.12	< 0.01
8/25/2012	24C	CC49 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	0.01	0.14	< 0.01
8/25/2012	24C	CC50 Comp A	< 0.04	< 0.04	< 0.01	< 0.01	0.007	0.02	0.005	1.295	< 0.01
8/26/2012	24C	CC26 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.009	0.019	0.119	< 0.01
8/26/2012	24C	CC50 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	0.007	0.019	0.007	1.121	< 0.01
8/26/2012	24C	CC59 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.006	< 0.004	0.227	< 0.01
8/27/2012	24C	CC59 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.006	< 0.004	0.195	< 0.01
9/22/2012	24C	CC26 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	0.009	0.133	< 0.01
9/22/2012	24C	CC49 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.005	< 0.004	0.137	< 0.01
9/22/2012	24C	CC50 Comp A	< 0.004	< 0.01	< 0.01	< 0.01	0.01	0.02	0.009	0.72	< 0.01
9/23/2012	24C	CC26 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	< 0.004	0.137	< 0.01
9/23/2012	24C	CC49 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.006	< 0.004	0.163	< 0.01
9/23/2012	24C	CC50 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	0.007	0.03	0.006	1.1	< 0.01
9/23/2012	24C	CC59 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	< 0.004	0.13	< 0.01
9/24/2012	24C	CC59 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	< 0.004	0.15	< 0.01
10/21/2012	24C	CC26 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.005	0.019	0.16	< 0.01
10/21/2012	24C	CC49 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	0.007	0.126	< 0.01
10/21/2012	24C	CC50 Comp A	< 0.004	< 0.004	< 0.01	< 0.01	0.007	0.016	0.015	0.52	< 0.01
10/22/2012	24C	CC26 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	0.018	0.16	< 0.01
10/22/2012	24C	CC49 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	< 0.005	0.007	0.11	< 0.01
10/22/2012	24C	CC50 Comp B	< 0.004	< 0.004	< 0.01	< 0.01	0.008	0.017	0.016	0.44	< 0.01

Clear Creek - Ambient Autosampler Results - Metals (Golden)

		Method	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7
		DL	0.01	0.001	0.001	0.030	0.030
		Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Type	Location ID	Lead, Total	Manganese, Dissolved	Manganese, Total	Zinc, Dissolved	Zinc, Total
4/21/2012	24C	CC26 Comp A	< 0.01	0.06	0.13	NT	NT
4/21/2012	24C	CC49 Comp A	< 0.01	0.016	0.18	NT	NT
4/21/2012	24C	CC50 Comp A	0.011	0.73	0.81	NT	NT
4/22/2012	24C	CC26 Comp B	< 0.01	0.062	0.13	NT	NT
4/22/2012	24C	CC49 Comp B	< 0.01	0.034	0.16	NT	NT
4/22/2012	24C	CC50 Comp B	0.0085	0.72	0.79	NT	NT
4/22/2012	24C	CC59 Comp A	< 0.01	0.029	0.22	NT	NT
4/23/2012	24C	CC59 Comp B	< 0.01	0.003	0.2	NT	NT
5/19/2012	24C	CC26 Comp A	< 0.01	0.072	0.072	NT	NT
5/20/2012	24C	CC49 Comp A	< 0.01	0.068	0.12	NT	NT
5/20/2012	24C	CC26 Comp B	< 0.01	0.074	0.074	NT	NT
5/21/2012	24C	CC49 Comp B	< 0.01	0.073	0.11	NT	NT
5/20/2012	24C	CC50 Comp A	0.026	0.58	0.66	NT	NT
5/20/2012	24C	CC59 Comp A	< 0.01	0.05	0.16	NT	NT
5/21/2012	24C	CC50 Comp B	0.01	0.57	0.59	NT	NT
5/21/2012	24C	CC59 Comp B	< 0.01	0.06	0.14	NT	NT
6/24/2012	24C	CC49 Comp A	< 0.01	0.01	0.059	0.037	0.065
6/24/2012	24C	CC50 Comp A	< 0.01	0.75	0.75	0.25	0.28
6/24/2012	24C	CC59 Comp A	< 0.01	0.022	0.07	0.034	0.06
6/24/2012	24C	CC59 Comp B	< 0.01	0.032	0.076	0.042	0.06
6/25/2012	24C	CC49 Comp B	< 0.01	0.025	0.063	0.042	0.058
6/25/2012	24C	CC50 Comp B	< 0.01	0.76	0.75	0.25	0.29
7/28/2012	24C	CC26 Comp A	< 0.01	0.032	0.05	0.03	0.04
7/28/2012	24C	CC49 Comp A	< 0.01	0.005	0.09	0.032	0.077
7/28/2012	24C	CC50Comp A	0.023	0.92	1	0.28	0.51
7/29/2012	24C	CC26 Comp B	< 0.01	0.032	0.05	0.032	0.04
7/29/2012	24C	CC49 Comp B	< 0.01	0.019	0.093	0.037	0.077
7/29/2012	24C	CC50Comp B	0.023	0.84	0.97	0.3	0.52
7/29/2012	24C	CC59 Comp A	< 0.01	0.003	0.079	0.025	0.071
7/30/2012	24C	CC59 Comp B	< 0.01	0.01	0.14	< 0.03	0.1
8/25/2012	24C	CC26 Comp A	< 0.01	0.004	0.04	< 0.03	< 0.03
8/25/2012	24C	CC49 Comp A	< 0.01	0.001	0.048	0.04	0.06
8/25/2012	24C	CC50 Comp A	< 0.01	0.671	0.794	0.23	0.36
8/26/2012	24C	CC26 Comp B	< 0.01	0.015	0.043	< 0.03	< 0.03
8/26/2012	24C	CC50 Comp B	< 0.01	0.617	0.669	0.18	0.29
8/26/2012	24C	CC59 Comp A	< 0.01	0.005	0.076	0.032	0.062
8/27/2012	24C	CC59 Comp B	< 0.01	0.003	0.063	< 0.03	0.06
9/22/2012	24C	CC26 Comp A	< 0.01	< 0.001	0.034	< 0.03	< 0.03
9/22/2012	24C	CC49 Comp A	< 0.01	< 0.001	0.061	0.04	0.08
9/22/2012	24C	CC50 Comp A	< 0.01	0.27	0.72	0.16	0.37
9/23/2012	24C	CC26 Comp B	< 0.01	< 0.001	0.038	< 0.03	0.04
9/23/2012	24C	CC49 Comp B	< 0.01	< 0.001	0.07	0.04	0.09
9/23/2012	24C	CC50 Comp B	< 0.01	0.01	0.7	0.13	0.47
9/23/2012	24C	CC59 Comp A	< 0.01	0.001	0.043	0.047	0.066
9/24/2012	24C	CC59 Comp B	< 0.01	< 0.001	0.047	0.04	0.072
10/21/2012	24C	CC26 Comp A	< 0.01	0.056	0.08	0.044	0.062
10/21/2012	24C	CC49 Comp A	< 0.01	0.065	0.085	0.083	0.11
10/21/2012	24C	CC50 Comp A	< 0.01	0.77	0.86	0.37	0.48
10/22/2012	24C	CC26 Comp B	< 0.01	0.055	0.08	0.044	0.06
10/22/2012	24C	CC49 Comp B	< 0.01	0.063	0.081	0.088	0.11
10/22/2012	24C	CC50 Comp B	< 0.01	0.84	0.89	0.43	0.5

Clear Creek and Canal -
Event Autosampler Results

			Method	SM2550B	SM4500H+B	SM2510B	SM2130B	SM4500NH3H	SM4500NO3I	SM4500NO3I	SM4500PE	SM4500PE	SM4500NH3H	EPA 300.0	SM4500NorgB	Calc
			DL	1	1	1	0.1	0.01	0.01	0.02	0.0025	0.0025	0.05	0.02	0.01	0.1
			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
Sample Date	Sample Time	Sample Type	Location ID	Temp	pH	Conductivity, Specific	Turbidity	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Phosphorus, Dissolved (DRP)	Phosphorus, Total	Nitrogen, Ammonia	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Kjeldahl	Nitrogen, Total Nitrogen
4/5/12	7:30:00	CE	CC AS T11	11.3	7.3	365	5.6	0.01	0.26	0.48	< 0.0025	0.0168				
4/6/12	7:30:00	CE	CC AS T11	11.4	7.4	374	8.3	< 0.01	0.19	0.41	< 0.0025	0.0151				
5/1/12	8:30:00	CE	CC AS T27	16.8	7.1	259	19.2	0.02	0.08	0.32	0.0064	0.0415				
5/2/12	8:30:00	CE	CC AS T27	15.6	7.3	250	13.4	0.02	0.06	0.26	0.0069	0.04				
7/5/12	22:19:00	CE	CC AS 49	17.4	7.4	200	850						0.32	0.15	1.8	2
7/7/12	1:25:00	CE	CC AS 49	16.7	7.7	142	361						0.42	0.2	2.8	3
7/6/12	23:47:00	CE	CC AS 50	17.9	7.2	352	900						0.29	0.43	4.1	4.5
7/7/12	3:59:00	CE	CC AS 50	18.5	7.4	266	820						0.31	0.3	2.9	3.2
7/6/12	6:12:00	CE	CC AS 59	21.4	7.5	203	304						0.27	0.19	1.4	1.6
7/7/12	6:48:00	CE	CC AS 59	NT	7.3	161	271						0.28	0.24	2.2	2.4
7/8/12	0:34:00	CE	CC AS T11	21.1	7.7	189	224						0.32	0.23	0.37	0.6
7/9/12	20:35:00	CE	CC AS T11	21	7.8	194	192						0.34	0.14	1.3	1.4
7/30/12	19:04:00	CE	CC AS 49	24.4	7.7	165	252							0.3	0.93	1.23
8/1/12	16:08:00	CE	CC AS 49	21.4	7.7	195	162							0.16	0.84	1
8/2/12	2:17:00	CE	CC AS 49	19.9	7.7	183	485							0.28	0.88	1.16
8/1/12	22:57:00	CE	CC AS 59	21.9	7.8	212	98.1							0.2	0.69	0.89
8/2/12	7:37:00	CE	CC AS 59	21.5	7.8	192	323							0.26	0.74	1
10/23/12	11:45:00	G	CC AS 50	17	7.9	639	145						0.5	0.74	2.81	3.55

Clear Creek and Canal - Event Autosampler Results

			Method	SM4500PE	SM4500PE	SM5310B	SM2540D	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.7	EPA200.7	EPA200.8	EPA200.8	EPA200.8
			DL	0.01	0.01	0.5	1	0.001	0.001	0.0005	0.0005	0.002	0.002	0.02	0.02	0.0005	0.0005	0.002
			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	Phosphorous, Dissolved (SRP)	Phosphorous, Total	Carbon, Total Organic	Solids, Total Suspended	Arsenic, Dissolved	Arsenic, Total	Cadmium, Dissolved	Cadmium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Manganese, Dissolved
4/5/12	7:30:00	CE	CC AS T11			2	4	<0.001	<0.001	<0.0005	<0.0005	0.0036	0.0052	0.03	0.25	<0.0005	0.0019	<0.002
4/6/12	7:30:00	CE	CC AS T11			1.9	10	<0.001	<0.001	<0.0005	<0.0005	0.0034	0.0061	<0.02	0.48	<0.0005	0.0019	<0.002
5/1/12	8:30:00	CE	CC AS T27			2	48	<0.001	<0.001	<0.0005	0.00052	0.0038	0.011	0.054	1.5	<0.0005	0.0069	<0.002
5/2/12	8:30:00	CE	CC AS T27			2.1	55	<0.001	<0.001	<0.0005	0.00053	0.0037	0.011	0.049	1.8	<0.0005	0.0071	0.0022
7/5/12	22:19:00	CE	CC AS 49	<0.01	1.1	1.9	637											
7/7/12	1:25:00	CE	CC AS 49	0.01	0.6	2.9	184											
7/6/12	23:47:00	CE	CC AS 50	0.09	1.1	8	848											
7/7/12	3:59:00	CE	CC AS 50	0.03	0.88	5.3	602											
7/6/12	6:12:00	CE	CC AS 59	<0.01	0.31	1.5	76											
7/7/12	6:48:00	CE	CC AS 59	<0.01	0.48	1.7	184											
7/8/12	0:34:00	CE	CC AS T11	0.03	0.38	3.8	152	<0.001	0.0079	<0.0005	0.0027	0.0071	0.075	0.14	2.4	0.00092	0.098	0.0021
7/9/12	20:35:00	CE	CC AS T11	<0.01	0.14	2.4	82	0.0023	0.0066	<0.0005	0.0012	<0.002	0.047	0.16	1.8	0.00067	0.092	0.14
7/30/12	19:04:00	CE	CC AS 49		0.029	1.9	229											
8/1/12	16:08:00	CE	CC AS 49		0.23	1.8	218											
8/2/12	2:17:00	CE	CC AS 49		0.43	2	406											
8/1/12	22:57:00	CE	CC AS 59		0.08	1.8	116											
8/2/12	7:37:00	CE	CC AS 59		0.5	1.5	266											
10/23/12	11:45:00	G	CC AS 50	0.2	0.51		138	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Clear Creek and Canal -
Event Autosampler Results

			Method	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	NA	NA
			DL	0.002	0.002	0.002	0.02	0.02	NA	NA
			Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	NA	NA
Sample Date	Sample Time	Sample Type	Location ID	Manganese, Total	Molybdenum, Dissolved	Molybdenum, Total	Zinc, Dissolved	Zinc, Total	Notes	Lab Notes
4/5/12	7:30:00	CE	CC AS T11	0.036	0.0023	0.0033	0.065	0.07	First Flush. Sample A. Start time 0830 on 04/04/12, end time 0730 on 04/05/12.	
4/6/12	7:30:00	CE	CC AS T11	0.049	0.0026	0.0034	0.064	0.064	First Flush. Sample B. Start time 0830 on 04/05/12, end time 0730 on 04/06/12.	
5/1/12	8:30:00	CE	CC AS T27	0.12	0.0026	0.0027	0.043	0.12	First Flush. Sample A. Start time 0930 on 04/30/12, end time 0830 on 05/01/12.	
5/2/12	8:30:00	CE	CC AS T27	0.13	0.0027	0.0029	0.044	0.12	First Flush. Sample B. Start time 0930 on 05/01/12, end time 0830 on 05/02/12.	
7/5/12	22:19:00	CE	CC AS 49						Event. Bottles 1-8. Start time 2034 on 07/05/12, end time 2219 on 07/05/12.	Nutrient analyses performed by SGS.
7/7/12	1:25:00	CE	CC AS 49						Event. Bottles 9-21. Start time 2224 on 07/06/12, end time 0125 on 07/07/12.	Nutrient analyses performed by SGS.
7/6/12	23:47:00	CE	CC AS 50						Event. Bottles 1-2. Start time 2332 on 07/06/12, end time 2347 on 07/06/12.	Nutrient analyses performed by SGS.
7/7/12	3:59:00	CE	CC AS 50						Event. Bottles 3-12. Start time 0143 on 07/07/12, end time 0359 on 07/07/12.	Nutrient analyses performed by SGS.
7/6/12	6:12:00	CE	CC AS 59						Event. Bottles 1-4. Start time 0400 on 07/06/12, end time 0612 on 07/06/12.	Nutrient analyses performed by SGS.
7/7/12	6:48:00	CE	CC AS 59						Event. Bottles 5-13. Start time 0056 on 07/07/12, end time 0648 on 07/07/12.	Nutrient analyses performed by SGS.
7/8/12	0:34:00	CE	CC AS T11	0.97	0.0037	0.0037	0.045	0.56	Event. Bottles 1-20. Start time 1948 on 07/07/12, end time 0034 on 07/08/12.	Nutrient analyses performed by SGS.
7/9/12	20:35:00	CE	CC AS T11	0.49	0.0027	0.0035	<0.020	0.3	Event. Bottles 1-13. Start time 1734 on 07/09/12, end time 2035 on 07/09/12.	Nutrient analyses performed by SGS.
7/30/12	19:04:00	CE	CC AS 49						Event. Bottles 1-3. Start time 1834 on 07/30/12, end time 1904 on 07/30/12.	Nutrient analyses performed by SGS.
8/1/12	16:08:00	CE	CC AS 49						Event. Bottles 1-2. Start time 1553 on 08/01/12, end time 1608 on 08/01/12.	Nutrient analyses performed by SGS.
8/2/12	2:17:00	CE	CC AS 49						Event. Bottles 3-9. Start time 0046 on 08/02/12, end time 0217 on 08/02/12.	Nutrient analyses performed by SGS.
8/1/12	22:57:00	CE	CC AS 59						Event. Bottles 1-3. Start time 2228 on 08/01/12, end time 2257 on 08/01/12.	Nutrient analyses performed by SGS.
8/2/12	7:37:00	CE	CC AS 59						Event. Bottles 8, 10, 12. 14. Start time 0610 on 08/02/12, end time 0737 on 08/02/12.	Nutrient analyses performed by SGS.
10/23/12	11:45:00	G	CC AS 50	NT	NT	NT	NT	NT	Single grab collected for event that occurred during ambient 48 hr compositing activities. TOC bottle not available for collection.	Nutrient analyses performed by SGS.

Clear Creek - Event Autosampler Results - Metals (Golden)

		Method	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7
		DL	variable	variable	variable	variable	variable	variable	0.004	0.004
		Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Type	Location ID	Cadmium, Dissolved	Cadmium, Total	Chromium, Dissolved	Chromium, Total	Copper, Dissolved	Copper, Total	Iron, Dissolved	Iron, Total
7/5/2012	CE	CC49 Event	< 0.001	0.018	NT	NT	< 0.006	0.37	0.022	43.7
7/7/2012	CE	CC49 Event	< 0.001	0.011	NT	NT	< 0.006	0.165	0.065	25.1
7/6/2012	CE	CC50 Event	< 0.001	0.043	NT	NT	0.006	0.95	0.088	80.9
7/6/2012	CE	CC59 Event	< 0.001	0.007	NT	NT	< 0.006	0.14	0.043	17.1
7/7/2012	CE	CC50 Event	< 0.001	0.022	NT	NT	0.007	0.55	0.16	48.8
7/7/2012	CE	CC59 Event	< 0.001	0.01	NT	NT	< 0.006	0.17	0.059	21.4
7/30/2012	CE	CC49 Event	< 0.004	0.006	< 0.01	0.016	< 0.005	0.088	0.036	16.5
8/1/2012	CE	CC 49 Event	< 0.004	0.005	< 0.01	0.015	< 0.005	0.034	0.05	15.4
8/1/2012	CE	CC 59 Event	< 0.004	< 0.004	< 0.01	< 0.01	< 0.005	0.03	0.055	8.15
8/2/2012	CE	CC 49 Event	< 0.004	0.012	< 0.01	0.035	< 0.005	0.16	0.037	30.8
8/2/2012	CE	CC 59 Event	< 0.004	0.008	< 0.01	0.022	< 0.005	0.12	0.05	21
10/23/2012	G	CC50 Event Grab	< 0.004	0.009	< 0.01	< 0.01	0.007	0.17	0.014	12.65

		Method	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	EPA200.7	NA
		DL	0.01	0.01	0.001	0.001	0.03	0.03	NA
		Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NA
Sample Date	Sample Type	Location ID	Lead, Dissolved	Lead, Total	Manganese, Dissolved	Manganese, Total	Zinc, Dissolved	Zinc, Total	Notes
7/5/2012	CE	CC49 Event	< 0.01	1.43	0.027	0.99	0.063	0.9	Bottles 1-8
7/7/2012	CE	CC49 Event	< 0.01	0.29	0.001	1.36	0.048	0.7	Bottles 9-21
7/6/2012	CE	CC50 Event	< 0.01	0.46	0.075	4.8	0.275	3.37	Bottles 1 and 2
7/6/2012	CE	CC59 Event	< 0.01	0.56	0.002	0.39	0.055	0.44	Bottles 1-4
7/7/2012	CE	CC50 Event	< 0.01	0.63	0.11	1.64	0.21	1.38	Bottles 3-12
7/7/2012	CE	CC59 Event	< 0.01	0.21	0.001	1.65	0.087	0.91	Bottles 5-12
7/30/2012	CE	CC49 Event	< 0.01	0.2	0.007	0.48	0.016	0.3	Bottles 1-3
8/1/2012	CE	CC 49 Event	< 0.01	0.018	0.013	0.56	< 0.03	0.18	Bottles 1 and 2
8/1/2012	CE	CC 59 Event	< 0.01	0.024	0.04	0.62	0.03	0.31	Bottles 1-3
8/2/2012	CE	CC 49 Event	< 0.01	0.65	0.15	0.9	0.022	0.57	Bottles 3-9
8/2/2012	CE	CC 59 Event	< 0.01	0.42	0.063	0.67	0.031	0.52	Bottles 8,10,12,14
10/23/2012	G	CC50 Event Grab	< 0.01	0.07	0.75	3.1	0.54	1.82	One grab sample

Standley Lake Results

		Method	electrode	SM2510B	electrode	SM4500OG	SM4500H+B	SM2550B	SM2130B	Secchi Disk	SM4500NH3H	SM4500NO3I	SM4500NO3I	FlowCAM	SM10200H	SM5910B	SM7110B
		DL	1.0	1	1	1.0	1.0	0.1	1	0.1	0.01	0.01	0.02	1	1.0	0.001	variable
		Reporting Units	µg/L	µS/cm	mv	mg/L	s.u.	°C	NTU	m	mg/L	mg/L	mg/L	ct/mL	µg/L	cm-1	pCi/L
Sample Date	Sample Type	Location ID	Chlorophyll a, Field	Conductivity, Specific	ORP Oxidation Reduction Potential	Oxygen, Dissolved	pH	Temp	Turbidity	Secchi Depth,	Nitrogen, Ammonia (Salicylate)	Nitrogen, Nitrate+Nitrite	Nitrogen, Total Nitrogen	Algae	Chlorophyll a, Lab (Methanol)	UV 254	Gross Alpha
01/05/12	G	SL 10-00	1.2	262	131	11.3	7.8	2.1	1.6	2.85							3.4
01/05/12	G	SL 10-PZ									0.01	0.01	0.2	341	5.6	0.343	2.2
01/05/12	C	SL 10-70	9.1	277	150	10.6	7.8	2.5	2.7		0.03	0.05	0.22			0.338	2.5
01/23/12	G	SL 10-00	1.9	292	193	11.5	7.4	1.4	< 1.0	2.5							
01/23/12	G	SL 10-PZ									0.02	0.02	0.22	367	4.5	0.341	
01/23/12	C	SL 10-70	5	298	204	11.2	7.7	1.4	1.1		0.01	0.02	0.25			0.34	
03/06/12	G	SL 10-00	2.2	293	353	11.4	7.8	2.4	2.1	3.25							2.2
03/06/12	G	SL 10-PZ									< 0.01	0.04	0.22	148	3.8	0.326	3
03/06/12	C	SL 10-70	4.4	293	341	11.2	7.9	2.4	2.2		< 0.01	0.04	0.26			0.328	3
03/21/12	G	SL 10-00	< 1.0	315	179	10.9	7.8	5.8	1.3	3.8							
03/21/12	G	SL 10-PZ									0.02	0.03	0.28	138	3.7	0.326	
03/21/12	C	SL 10-70	3.6	314	189	10.7	7.9	5.1	1.7		0.01	0.03	0.25			0.313	
04/05/12	G	SL 10-00	< 1.0	316	137	9.8	8	10.9	1.5	3.7							
04/05/12	G	SL 10-PZ									0.01	0.02	0.21	128	2.5	0.321	
04/05/12	C	SL 10-70	2.2	313	152	9.6	7.9	7.3	4.3		0.02	0.03	0.31			0.316	
04/05/12	G	69-00															
04/18/12	G	SL 10-00	1.4	303	114	9.4	7.8	11.7	2.2	4.25							
04/18/12	G	SL 10-PZ									0.02	0.02	0.21	105	1.6	0.315	
04/18/12	C	SL 10-70	2.3	302	117	8.1	7.4	8.8	7		0.04	0.02	0.26			0.296	
05/08/12	G	SL 10-00	1.1	317	150	9.2	8.2	15.1	1.4	5							
05/08/12	G	SL 10-PZ									0.01	< 0.01	0.24	236	3.3	0.305	
05/08/12	C	SL 10-70	1.6	320	168	5.7	7.6	11.1	14.7		0.11	0.03	0.26			0.285	
05/22/12	G	SL 10-00	2.2	249	140	9	8.2	17	1.7	4.25							
05/22/12	G	SL 10-PZ									< 0.01	< 0.01	0.29	267	3.8	0.321	
05/22/12	C	SL 10-70	1.7	303	152	4.2	7.2	11.3	9.6		0.11	0.09	0.36			0.288	
05/22/12	G	69-00															
06/06/12	G	SL 10-00	2.5	298	126	8	8.1	17.1	3.3	1.85							1.2
06/06/12	G	SL 10-PZ									< 0.01	< 0.01	0.27	303	5.5	0.351	1
06/06/12	C	SL 10-70	1.7	314	153	2.9	7.3	12	10.3		0.02	0.15	0.38			0.294	0.8
06/20/12	G	SL 10-00	2.1	273	119	7.9	8.1	19.6	2.1	3.1							
06/20/12	G	SL 10-PZ									< 0.01	< 0.01	0.27	385	2.4	0.337	
06/20/12	C	SL 10-70	2.4	298	131	< 1.0	6.9	12.3	18.8		0.03	0.18	0.54			0.303	
06/20/12	G	69-00															
07/02/12	G	SL 10-00	1.5	295	59	7.5	8.4	22.7	1.9	3.3							
07/02/12	G	SL 10-PZ									< 0.01	< 0.01	0.19	182	2.7	0.331	
07/02/12	C	SL 10-70	1.4	315	104	< 1.0	7.2	13.4	14.4		0.02	0.14	0.3			0.3	
07/16/12	G	SL 10-00	1.6	270	90	7.3	8.4	23.4	1.4	5							
07/16/12	G	SL 10-PZ									< 0.01	< 0.01	0.13	89	2.1	0.341	
07/16/12	C	SL 10-70	1.3	289	107	< 1.0	7.1	14.2	11.1		0.02	0.13	0.3			0.31	
07/16/12	G	69-00															
08/01/02	G	SL 10-00	2.9	284	70	7.2	8.5	23.5	1.6	4							
08/01/02	G	SL 10-PZ									< 0.01	< 0.01	0.16	145	1	0.334	
08/01/02	C	SL 10-70	1.5	306	43	< 1.0	7.4	14.5	7.1		0.26	< 0.01	0.45			0.404	
08/13/12	G	SL 10-00	1.5	269	79	7.1	8.4	22.9	1.7	4							1.2
08/13/12	G	SL 10-PZ									< 0.01	< 0.01	0.19	57	< 1	0.323	1.4
08/13/12	C	SL 10-70	1.1	295	-23	< 1.0	7.1	14.8	10.2		0.3	< 0.01	0.54			0.471	2.7
08/13/12	G	69-00															
09/04/12	G	SL 10-00	2.5	317	38	7	7.9	21.2	2	2.9							
09/04/12	G	SL 10-PZ									< 0.01	< 0.01	0.29	130	1.8	0.322	
09/04/12	C	SL 10-70	1.7	344	-151	< 1.0	7.2	14.8	8.6		0.51	< 0.01	0.76			0.524	
09/18/12	G	SL 10-00	2.5	258	149	6.9	8	19.5	2.5	2.3							0.5
09/18/12	G	SL 10-PZ									< 0.01	< 0.01	0.21	158	1.1	0.338	1.4
09/18/12	C	SL 10-70	1.4	232	95	<1.0	7	17	7.8		0.34	< 0.01	0.6			0.397	0
09/18/12	G	69-00															
10/01/12	G	SL 10-00	1.8	268	212	7.1	8.3	18.6	3.1	2.5							
10/01/12	G	SL 10-PZ									< 0.01	< 0.01	0.22	86	< 1	0.322	
10/01/12	C	SL 10-70	3.8	299	49	1.3	7.6	16.1	9.9		0.17	< 0.01	0.52			0.366	
10/15/12	G	SL 10-00	2.6	304	138	7.7	7.7	14.7	5.5	1.7							1.5
10/15/12	G	SL 10-PZ									0.04	0.01	0.3	130	1.6	0.322	1.7
10/15/12	C	SL 10-70	1.8	301	133	7	7.7	13.7	13.4		0.04	0.01	0.26			0.31	1.5
10/15/12	G	69-00															
11/06/12	G	SL 10-00	4.5	197	201	8.9	8.1	10.7	3.8	2.1							
11/06/12	G	SL 10-PZ									0.02	0.01	0.23	178	7.3	0.321	
11/06/12	C	SL 10-70	4.5	270	208	8.6	8.2	10.4	5.7		0.02	0.01	0.24			0.318	
11/19/12	G	SL 10-00	11.6	300	50	10	8.3	7.8	4.5	2.1							
11/19/12	G	SL 10-PZ									< 0.01	< 0.01	0.28	814	14	0.314	
11/19/12	C	SL 10-70	12.3	299	69	9.6	8.2	7.7	5.9		< 0.01	< 0.01	0.18			0.305	
12/04/12	G	SL 10-00	10.2	279	135	10	8.4	6.6	3.1	2							1.4
12/04/12	G	SL 10-PZ									< 0.01	< 0.01	0.33	931	6.8	0.303	0.2
12/04/12	C	SL 10-70	13.7	279	144	9.9	8.5	6.5	3.5		< 0.01	< 0.01	0.31			0.295	2.3

Standley Lake Results

		Method	**SM7110B**	**SM7110B**	**SM7110B**	**SM4500PE**	**SM4500PE**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA200.8**	**EPA524.2**	**EPA524.2**	**EPA524.2**	**EPA524.2**	**EPA200.8**
		DL	**variable**	**variable**	**variable**	**0.0025**	**0.0025**	**0.001**	**0.001**	**0.002**	**0.002**	**0.001**	**0.001**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**
		Reporting Units	**pCi/L**	**pCi/L**	**pCi/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 Type**	**Location ID**	**Gross Alpha, Uncertainty**	**Gross Beta**	**Gross Beta, Uncertainty**	**Phosphorus, Dissolved (DRP)**	**Phosphorus, Total**	**Arsenic, Dissolved**	**Arsenic, Total**	**Barium, Dissolved**	**Barium, Total**	**Beryllium, Dissolved**	**Beryllium, Total**	**BTEX, Benzene**	**BTEX, Ethylbenzene**	**BTEX, Tolune**	**BTEX, Xylenes**	**Cadmium, Dissolved**
01/05/12	G	SL 10-00	2.2	0	2													
01/05/12	G	SL 10-PZ	1.8	1.1	2.1	0.0027	0.0092	<0.001	<0.001	0.04	0.04	<0.001	<0.001					<0.0005
01/05/12	C	SL 10-70	1.8	0	2.1	0.0025	0.0087	<0.001	<0.001	0.041	0.042	<0.001	<0.001					<0.0005
01/23/12	G	SL 10-00																
01/23/12	G	SL 10-PZ				0.0078	0.0105											
01/23/12	C	SL 10-70				< 0.0025	0.0084											
03/06/12	G	SL 10-00	2.2	1.9	2.2													
03/06/12	G	SL 10-PZ	2.1	0	2.1	< 0.0025	0.0091											
03/06/12	C	SL 10-70	2.1	2.9	2.4	< 0.0025	0.0091											
03/21/12	G	SL 10-00																
03/21/12	G	SL 10-PZ				< 0.0025	0.0116											
03/21/12	C	SL 10-70				< 0.0025	0.0121											
04/05/12	G	SL 10-00																
04/05/12	G	SL 10-PZ				< 0.0025	0.02											
04/05/12	C	SL 10-70				< 0.0025	0.0113											
04/05/12	G	69-00												<0.0005	<0.0005	<0.0005	<0.0005	
04/18/12	G	SL 10-00																
04/18/12	G	SL 10-PZ				0.0029	0.0081											
04/18/12	C	SL 10-70				0.0032	0.0109											
05/08/12	G	SL 10-00																
05/08/12	G	SL 10-PZ				< 0.0025	0.0143											
05/08/12	C	SL 10-70				0.0043	0.02											
05/22/12	G	SL 10-00																
05/22/12	G	SL 10-PZ				< 0.0025	0.0092											
05/22/12	C	SL 10-70				0.0031	0.0154											
05/22/12	G	69-00												0.00064	<0.0005	0.0019	0.0019	
06/06/12	G	SL 10-00	2	0	2													
06/06/12	G	SL 10-PZ	1.7	0.3	2.1	< 0.0025	0.0104	<0.001	<0.001	0.043	0.043	<0.001	<0.001					<0.0005
06/06/12	C	SL 10-70	1.7	2	2.2	0.0034	0.0141	<0.001	<0.001	0.049	0.049	<0.001	<0.001					<0.0005
06/20/12	G	SL 10-00																
06/20/12	G	SL 10-PZ				< 0.0025	0.0113											
06/20/12	C	SL 10-70				0.0049	0.0258											
06/20/12	G	69-00												<0.0005	<0.0005	0.00055	<0.0005	
07/02/12	G	SL 10-00																
07/02/12	G	SL 10-PZ				< 0.0025	0.0217											
07/02/12	C	SL 10-70				0.0045	0.0079											
07/16/12	G	SL 10-00																
07/16/12	G	SL 10-PZ				< 0.0025	0.0068	<0.001	0.001									
07/16/12	C	SL 10-70				0.003	0.0132	<0.001	<0.001									
07/16/12	G	69-00												<0.0005	<0.0005	0.00074	0.00051	
08/01/02	G	SL 10-00																
08/01/02	G	SL 10-PZ				< 0.0025	0.0109											
08/01/02	C	SL 10-70				0.0698	0.119											
08/13/12	G	SL 10-00	1.8	0	2													
08/13/12	G	SL 10-PZ	1.8	1.9	2.1	< 0.0025	0.0089	<0.001	0.0022	0.043	0.043	<0.001	<0.001					<0.0005
08/13/12	C	SL 10-70	1.8	0	1.9	0.0243	0.144	<0.001	0.0033	0.039	0.048	<0.001	<0.001					<0.0005
08/13/12	G	69-00												<0.0005	<0.0005	<0.0005	<0.0005	
09/04/12	G	SL 10-00																
09/04/12	G	SL 10-PZ				< 0.0025	0.0102											
09/04/12	C	SL 10-70				0.0289	0.159											
09/18/12	G	SL 10-00	1.8	0.4	2.2													
09/18/12	G	SL 10-PZ	1.9	0	1.9	< 0.0025	0.0092	<0.001	0.0011	0.045	0.047	<0.001	<0.001	NT	NT	NT	NT	<0.0005
09/18/12	C	SL 10-70	1.5	1.7	2.3	0.0135	0.0302	0.0017	0.0023	0.044	0.052	<0.001	<0.001	NT	NT	NT	NT	<0.0005
09/18/12	G	69-00												<0.0005	<0.0005	<0.0005	<0.0005	
10/01/12	G	SL 10-00																
10/01/12	G	SL 10-PZ				< 0.0025	0.0117	<0.001	<0.001									
10/01/12	C	SL 10-70				< 0.0025	0.0374	0.0012	0.0018									
10/15/12	G	SL 10-00	1.9	0	2													
10/15/12	G	SL 10-PZ	1.4	0	2	0.0062	0.0179	<0.001	0.0011	0.047	0.049	<0.001	<0.001					<0.0005
10/15/12	C	SL 10-70	1.4	1	2.1	0.0063	0.0176	<0.001	0.0011	0.046	0.052	<0.001	<0.001					<0.0005
10/15/12	G	69-00												<0.0005	<0.0005	<0.0005	<0.0005	
11/06/12	G	SL 10-00																
11/06/12	G	SL 10-PZ				< 0.0025	0.0173											
11/06/12	C	SL 10-70				0.0028	0.0154											
11/19/12	G	SL 10-00																
11/19/12	G	SL 10-PZ				0.0037	0.0169											
11/19/12	C	SL 10-70				0.0037	0.0139											
12/04/12	G	SL 10-00	1.9	0	1.9													
12/04/12	G	SL 10-PZ	1.3	0	2	< 0.0025	0.0136											
12/04/12	C	SL 10-70	1.9	0.2	2	< 0.0025	0.0118											

Standley Lake Results

		Method	EPA200.8	SM5310B	EPA200.8	EPA200.8	SM9221D	EPA200.8	EPA200.8	EPA130.2	EPA200.7	EPA200.7	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA245.1	EPA200.8
		DL	0.0005	0.5	0.001	0.001	1	0.002	0.002	5	0.02	0.02	0.0005	0.0005	0.002	0.002	0.0002	0.002
		Reporting Units	mg/L	mg/L	mg/L	mg/L	cfu/mL	mg/L	mg/L	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date	Sample Type	Location ID	Cadmium, Total	Carbon, Total Organic	Chromium, Dissolved	Chromium, Total	E. coli,	Copper, Dissolved	Copper, Total	Hardness, Total	Iron, Dissolved	Iron, Total	Lead, Dissolved	Lead, Total	Manganese, Dissolved	Manganese, Total	Mercury, Total	Molybdenum, Dissolved
01/05/12	G	SL 10-00					<1											
01/05/12	G	SL 10-PZ	<0.0005	1.5	<0.001	<0.001		<0.002	<0.002	126	<0.020	0.054	<0.0005	0.00087	0.015	0.023	<0.0002	0.0028
01/05/12	C	SL 10-70	<0.0005	1.4	<0.001	<0.001	5	<0.002	<0.002	134	<0.020	0.071	<0.0005	0.00052	0.024	0.036	<0.0002	0.0027
01/23/12	G	SL 10-00																
01/23/12	G	SL 10-PZ																
01/23/12	C	SL 10-70																
03/06/12	G	SL 10-00					<1											
03/06/12	G	SL 10-PZ		1.8						132								
03/06/12	C	SL 10-70		1.8			1			156								
03/21/12	G	SL 10-00																
03/21/12	G	SL 10-PZ																
03/21/12	C	SL 10-70																
04/05/12	G	SL 10-00					<1											
04/05/12	G	SL 10-PZ		1.8						104								
04/05/12	C	SL 10-70		2			3			108								
04/05/12	G	69-00																
04/18/12	G	SL 10-00																
04/18/12	G	SL 10-PZ																
04/18/12	C	SL 10-70																
05/08/12	G	SL 10-00					<1											
05/08/12	G	SL 10-PZ		1.7						132								
05/08/12	C	SL 10-70		1.6			3			132								
05/22/12	G	SL 10-00																
05/22/12	G	SL 10-PZ																
05/22/12	C	SL 10-70																
05/22/12	G	69-00																
06/06/12	G	SL 10-00					4											
06/06/12	G	SL 10-PZ	<0.0005	2.9	<0.001	<0.001		<0.002	<0.002	120	<0.020	0.1	<0.0005	0.0012	<0.002	0.014	<0.0002	0.0025
06/06/12	C	SL 10-70	<0.0005	1.8	<0.001	<0.001	5	<0.002	<0.002	132	<0.020	0.28	<0.0005	0.0011	<0.002	0.11	<0.0002	0.003
06/20/12	G	SL 10-00																
06/20/12	G	SL 10-PZ																
06/20/12	C	SL 10-70																
06/20/12	G	69-00																
07/02/12	G	SL 10-00					<1											
07/02/12	G	SL 10-PZ		1.9						124								
07/02/12	C	SL 10-70		1.5			5			108								
07/16/12	G	SL 10-00																
07/16/12	G	SL 10-PZ								116								
07/16/12	C	SL 10-70								104								
07/16/12	G	69-00																
08/01/02	G	SL 10-00					<1											
08/01/02	G	SL 10-PZ		1.7														
08/01/02	C	SL 10-70		1.9			11											
08/13/12	G	SL 10-00																
08/13/12	G	SL 10-PZ	<0.0005		<0.001	<0.001		<0.002	<0.002	108	<0.02	0.061	<0.0005	<0.0005	<0.002	0.009	<0.0002	0.0034
08/13/12	C	SL 10-70	<0.0005		<0.001	<0.001		<0.002	<0.002	112	<0.02	1.4	<0.0005	0.00098	1	1.2	<0.0002	0.004
08/13/12	G	69-00																
09/04/12	G	SL 10-00					<1											
09/04/12	G	SL 10-PZ		1.6														
09/04/12	C	SL 10-70		2			41											
09/18/12	G	SL 10-00																
09/18/12	G	SL 10-PZ	<0.0005		<0.001	<0.001		<0.002	<0.002	104	<0.02	0.068	<0.0005	0.00054	<0.002	0.023	<0.0002	0.0032
09/18/12	C	SL 10-70	<0.0005		<0.001	<0.001	NT	<0.002	<0.002	116	<0.02	0.22	<0.0005	0.0011	1.7	2	<0.0002	0.0038
09/18/12	G	69-00																
10/01/12	G	SL 10-00					4											
10/01/12	G	SL 10-PZ		2						128								
10/01/12	C	SL 10-70		1			26			112								
10/15/12	G	SL 10-00																
10/15/12	G	SL 10-PZ	<0.0005		<0.001	<0.001		<0.002	0.0021	124	<0.02	0.21	<0.0005	0.00096	0.005	0.035	NT	0.0033
10/15/12	C	SL 10-70	<0.0005		<0.001	<0.001		<0.002	0.0026	114	<0.02	0.32	<0.0005	0.0014	0.013	0.076	NT	NT
10/15/12	G	69-00																
11/06/12	G	SL 10-00					24											
11/06/12	G	SL 10-PZ		2.5						124								
11/06/12	C	SL 10-70		2			29			120								
11/19/12	G	SL 10-00																
11/19/12	G	SL 10-PZ																
11/19/12	C	SL 10-70																
12/04/12	G	SL 10-00					8											
12/04/12	G	SL 10-PZ		1.7						128								
12/04/12	C	SL 10-70		1.6			29			130								

Standley Lake Results

		Method	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	EPA200.8	SM2540D	EPA200.8	EPA200.8	NA	NA
		DL	0.002	0.005	0.005	0.005	0.005	0.0005	0.0005	1	0.020	0.020	NA	NA
		Reporting Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NA	NA
Sample Date	Sample Type	Location ID	Molybdenum, Total	Nickel, Dissolved	Nickel, Total	Selenium, Dissolved	Selenium, Total	Silver, Dissolved	Silver, Total	Solids, Total Suspended	Zinc, Dissolved	Zinc, Total	Field Notes	Lab Notes
01/05/12	G	SL 10-00												
01/05/12	G	SL 10-PZ	0.0038	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	3	<0.020	<0.020		
01/05/12	C	SL 10-70	0.003	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	6	<0.020	<0.020		
01/23/12	G	SL 10-00												
01/23/12	G	SL 10-PZ												
01/23/12	C	SL 10-70												
03/06/12	G	SL 10-00												
03/06/12	G	SL 10-PZ								3				
03/06/12	C	SL 10-70								2				
03/21/12	G	SL 10-00												
03/21/12	G	SL 10-PZ												
03/21/12	C	SL 10-70												
04/05/12	G	SL 10-00												
04/05/12	G	SL 10-PZ								2				
04/05/12	C	SL 10-70								4				
04/05/12	G	69-00												
04/18/12	G	SL 10-00												
04/18/12	G	SL 10-PZ												
04/18/12	C	SL 10-70												
05/08/12	G	SL 10-00												
05/08/12	G	SL 10-PZ								6				
05/08/12	C	SL 10-70								5				
05/22/12	G	SL 10-00												
05/22/12	G	SL 10-PZ												
05/22/12	C	SL 10-70												
05/22/12	G	69-00												
06/06/12	G	SL 10-00												
06/06/12	G	SL 10-PZ	0.0034	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	6	<0.020	<0.020		
06/06/12	C	SL 10-70	0.003	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	16	<0.020	<0.020		
06/20/12	G	SL 10-00												
06/20/12	G	SL 10-PZ												
06/20/12	C	SL 10-70												
06/20/12	G	69-00												
07/02/12	G	SL 10-00												
07/02/12	G	SL 10-PZ								4				
07/02/12	C	SL 10-70								12				
07/16/12	G	SL 10-00												
07/16/12	G	SL 10-PZ								1				
07/16/12	C	SL 10-70								8				
07/16/12	G	69-00												
08/01/02	G	SL 10-00												
08/01/02	G	SL 10-PZ								2				
08/01/02	C	SL 10-70								16				
08/13/12	G	SL 10-00												
08/13/12	G	SL 10-PZ	0.0034	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	3	<0.020	<0.020		
08/13/12	C	SL 10-70	0.004	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	14	<0.020	<0.020		
08/13/12	G	69-00												
09/04/12	G	SL 10-00												
09/04/12	G	SL 10-PZ								1				
09/04/12	C	SL 10-70								13				
09/18/12	G	SL 10-00											Profiler data used for field parameters	
09/18/12	G	SL 10-PZ	0.0036	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	2	<0.020	<0.020		
09/18/12	C	SL 10-70	0.0045	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	9	<0.020	<0.020	Profiler data used for field parameters	
09/18/12	G	69-00												
10/01/12	G	SL 10-00												
10/01/12	G	SL 10-PZ								<1				
10/01/12	C	SL 10-70								9				
10/15/12	G	SL 10-00												
10/15/12	G	SL 10-PZ	0.0038	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005		<0.020	<0.020		Looks like Mg was read as Na on COC
10/15/12	C	SL 10-70	NT	NT	NT	<0.005	<0.005	<0.0005	<0.0005		<0.020	<0.020		Looks like Mg was read as Na on COC
10/15/12	G	69-00												
11/06/12	G	SL 10-00												
11/06/12	G	SL 10-PZ								3				
11/06/12	C	SL 10-70								3				
11/19/12	G	SL 10-00												
11/19/12	G	SL 10-PZ												
11/19/12	C	SL 10-70												
12/04/12	G	SL 10-00												
12/04/12	G	SL 10-PZ								<1				
12/04/12	C	SL 10-70								5				