

BCWA DR2016 - *BCWA Data Report*



Draft April 12, 2017

Prepared by
Tony Langowski (Evergreen Metropolitan District)
And
RNC Consulting LLC

**Bear Creek Watershed Association
1529 South Telluride St
Aurora, CO 80017**

**Manager: Russell N Clayshulte
303-751-7144
rclayshulte@earthlink.net
www.bearcreekwatershed.org**

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I. BCWA Sampling Program

Data Report Purpose

The Bear Creek Watershed Association (Association) collects annual water quality data from multiple sampling locations throughout the watershed. The monitoring program has four major water quality and environmental data generating elements:

1. Bear Creek Reservoir water quality characterization including source inputs from Bear Creek and Turkey Creek and reservoir discharge consistent with the intent of the Bear Creek Reservoir Control Regulation # 74 and as defined in the **BCWA PGO15 Water Monitoring Program and Sample Analyses Plan Version 2015.02, BCWA February 18, 2015, and subsequent annual updates.**
2. Bear Creek Watershed surface water characterizations during selected months beginning at the headwaters of both Bear Creek and Turkey with a primary focus on nutrients and base field parameters, which is also defined in the **BCWA PGO15 Water Monitoring Program and Sample Analyses Plan Version 2015.02, BCWA February 18, 2015, and subsequent annual updates.**
3. Bear Creek Watershed surface water temperature characterization by major stream segments for both the cold and warm seasons, which is also defined in the **BCWA PGO15 Water Monitoring Program and Sample Analyses Plan Version 2015.02, BCWA February 18, 2015, and subsequent annual updates.**
4. Special water quality characterization and analyses studies on a site-specific basis.

The Association provides multiple reporting documents designed to meet the multiple functions of various groups and to specifically address elements of the Bear Creek Watershed association electronic Watershed Plan (See BCWA PGO1-Master Index List for listing of all documents that are incorporated into the Watershed Plan and BCWA PGO2 Document categories). The Association produces an annual report that addresses program elements identified in the control regulation and the Bear Creek Watershed Plan. The Association also produces an executive summary of the annual report to meet reporting requirements of the Water Quality Control Commission. The Association produces an annual series of technical memorandum designed to summarize the site-specific studies and data results for any given year (Table 1).

Table 1 **2016 Technical Memorandum of the Association**

TM 2016.01	TM 2016.01 Sediment Survey BCR
TM 2016.02	UBCW Summary
TM 2016.03	Coyote Gulch Summary
TM 2016.04	BCR 2016 Summary Statistics and Graphs
TM 2016.05	MBCW 2016 Nutrient Summary
TM 2016.06	P1 Summary
TM 2016.07	Barr Milton TMDL Summary
TM 2016.08	EGL Summary
TM 2016.09	BCR Phytoplankton Summary
TM 2016.10	Fisheries
TM 2016.11	Fall 2016 Macroinvertebrate Data
TM 2016.11b	Macroinvertebrates
TM 2016.12	Copper Study

This data report is a summary of the watershed characterization program with a primary focus on the annual temperature data record. The data report summarizes the temperature and water quality compliance record for the annual program. This data report summarizes information used in the annual report, technical memorandum, information series, fact sheets or program guidelines and operations documents.

BCWA PGO24

A generally continuous collection of surface quality data began in 1990 for the Bear Creek Watershed (Figure 1). Data collection includes specific chemical, physical and biological parameters. Data is collected monthly and bi-monthly at Bear Creek Reservoir and along Turkey Creek and Bear Creek, and at selected months in the watershed. The Association meets water quality data sampling and analyses objectives established in the Bear Creek Reservoir Control Regulation # 74. The BCWA monitoring program is contained in an annually updated Sample Analyses Plan (Association, February 18, 2015; *BCWA PGO15 Surface Water Monitoring Program and Sample Analyses Plan Version 2015.02*).

The BCWA PGO15 Bear Creek 2015 Sample Plan Version 2015.02 is posted on the Association website monitoring page at www.bearcreekwatershed.org. The monitoring plan is reviewed annually and updated as appropriate. The Water Quality Control Division staff reviews the annual monitoring plan (generally in December) and proposes changes as appropriate. The dual review is consistent with the requirements of the *Bear Creek Control Regulation*.

The 2015 data results are contained in the MSD2015 P1-P4 Master Spreadsheet posted on the Association website monitoring page and a specific watershed spreadsheet for the temperature data. Monthly summary reports are provided to the Association Board and these data files are also posted to the website. Selected data and a summary of the water quality management program is presented in the BCWA AR2015 BCWA Annual Report WQCC (BCWA, June 2016), which also posted with previous Association annual reports.



Figure 1 **Bear Creek Watershed**

The Association maintains five distinct types of monitoring efforts to characterize water and environmental quality within the Bear Creek Watershed:

P1- Routine water quality monitoring at Bear Creek Reservoir (multiple vertical stations), Turkey Creek inflow to reservoir, Bear Creek inflow to reservoir, and reservoir discharge into lower Bear Creek. The P1 sites are long-term reference monitoring sites consistent with the intent of the monitoring program outlined in the Bear Creek Reservoir Control Regulation #74.

P2- Supplemental sampling of restoration or other project specific sites (e.g., Coyote Gulch in cooperation with the City of Lakewood). These types of monitoring efforts can be either of limited duration, or long-term on a site-specific basis, and generally these programs monitor for specific parameters of interest to the project.

P3- Watershed surface water monitoring along Bear Creek and Turkey Creek drainages for site-specific characterizations (e.g., temperature trends, nutrient loading, flow studies). These are interim and long-term monitoring sites for watershed characterizations. Watershed monitoring stations include both long-term reference sites where multi-year data is desirable, and target sites that may provide only a couple years of data. The nutrient monitoring is on a watershed basis that begins near Summit Lake and extends through Bear Creek Reservoir.

P4- Supplemental environmental characterizations of Bear Creek watershed including, but not limited to macroinvertebrates, flow analysis, habitat characterizations, fishery evaluations, system productivity, or other environmental factors that potentially affect fisheries or watershed health.

P5- Wastewater treatment facility nutrient sampling consistent with regulation #85.

II. Association Data Record

Data Management

Large quantities of varied data were collected during the Program: Monthly stream monitoring and sampling, laboratory results, thirty-minute temperature measurements from dataloggers, wastewater treatment plant effluent process control and permit monitoring data (from five larger treatment plants), weather statistics and stream flows comprise raw data. All data are stored on an office computer. Most the data reside in and analyses occurred in Excel spreadsheet format. Data is backed up to a server.

Depositories

The Association data is located at two different locations. Watershed data collected with the assistance of EMD staff is maintained on computer systems at the EMD offices (Limited years). All raw watershed data electronically forwarded from EMD staff to the Manager for data summary and analyses. RNC Consulting LLC maintains all monitoring data for all Association monitoring programs. Data is kept on a computer with daily back-up to an external hard drive. Additionally, a back-up set of data is kept on flash drives.

Electronic Transfers WQCD/ Depositories

1. Spreadsheet watershed QA/QC spreadsheet data only (WQCD - 4); depositories (2)
2. Spreadsheet watershed QA/QC spreadsheet with summary information and standard analyses (WQCD - 2); depositories (2)
3. Temperature record (WQCD - 2); depositories (2);
4. WQCC annual report, 2016 Data Report; (WQCD - 2), depositories (2)

Reports, Technical Memorandum and Specialized Spreadsheets

The Association produces an annual data summary of watershed data, ongoing technical memorandum, a *MSD2016 P1-P4 Master Spreadsheet (April 2017)* that includes data analyses and raw data for Bear Creek Reservoir and watershed nutrient collection program. The Association transmits this data report to the Water Quality Control Division Staff (Association website www.bearcreekwatershed.org).

All the Association annual reporting documents are available electronically and posted on the website. However, not all data can be posted due to size limitations. The annual temperature record is very large and kept in spreadsheets only available on request. The Association provides multiple reporting documents designed to meet the multiple functions of various groups. The reporting helps member entities with reporting to their respective boards, commissions and groups. There is also a citizen interest in the watershed and reporting helps keep the public informed. Many educational groups visit the watershed and it has become a widely used outdoor classroom. The Association supplies water quality and environmental materials for these various educational uses.

Spreadsheets in Master Data Series Updated 2017

MSD1998	P1 Master Spreadsheet
MSD1999	P1 Master Spreadsheet
MSD2000	P1 Master Spreadsheet
MSD2001	P1 Master Spreadsheet
MSD2002	P1 Master Spreadsheet
MSD2003	P1 Master Spreadsheet
MSD2004	P1 Master Spreadsheet
MSD2005	P1 Master Spreadsheet
MSD2006	P1 Master Spreadsheet
MSD2007	P1 Master Spreadsheet
MSD2008	P1 Master Spreadsheet
MSD2009	P1-P4 Master Spreadsheet
MSD2010	P1-P4 Master Spreadsheet
MSD2011	P1-P4 Master Spreadsheet
MSD2012	P1-P4 Master Spreadsheet
MSD2013	P1-P4 Master Spreadsheet

MSD2014	P1-P4 Master Spreadsheet
MSD2015	P1-P4 Master Spreadsheet
MSD2016	P1-P4 Master Spreadsheet
MSD01	BCWA Site ID Historical Master
MSD02	Macroinvertebrate Summary
MSD03	BCW Flow & Watershed Record
MSD04	Total Phosphorus & WS Nutrient Master Record
MSD05	Evergreen Lake BCWA Data Master
MSD06	Site 45 Data Summary
MSD07	Sheridan Data Record BCWA
MSD08	TIN Watershed
MSD09	Program Master
MSD10	BCWA Master WWTF and IFS
MSD11	Coyote Gulch Data Master
MSD12	Kerr Swede Master
MSD13	Turkey Creek Flow
MSD14	WLA Working
MSD15	Master Dues Budget
MSD16	BCWA Attendance Log Master
MSD17	Phytoplankton Master
MSD18	Bear Creek Fishery Master
MSD19	Copper Data Base

Fact Sheets in Watershed Plan Updated 2017

Fact Sheet 1	BCWA Overview
Fact Sheet 2	BCR Sedimentation
Fact Sheet 3	BCR Sediment & Water Quality
Fact Sheet 4	Pine Beetle
Fact Sheet 5	BCR Dam Facts
Fact Sheet 6	BCR Aeration
Fact Sheet 7	BCR Sample Sites
Fact Sheet 8	Evergreen Lake
Fact Sheet 9	Signs Geocache
Fact Sheet 10	Control Regulation 74
Fact Sheet 11	Zebra Mussel Program
Fact Sheet 12	Fish Species
Fact Sheet 13	Water Quality is Better
Fact Sheet 14	Flood Recovery Tips
Fact Sheet 15	Watershed Sampling
Fact Sheet 16	September 2013 Flood
Fact Sheet 17	Health, Hydrology & Sediments
Fact Sheet 18	Flood Score Card
Fact Sheet 19	EHS Rain Garden
Fact Sheet 20	Instream Flow Rights
Fact Sheet 21	Pollutants of Concern 303d
Fact Sheet 22	Pollutants of Concern Watershed
Fact Sheet 23	Evergreen Medical Take-back Program
Fact Sheet 24	Coyote Gulch Trade Pounds
Fact Sheet 25	Major Physical Features BCW
Fact Sheet 26	BCW Watershed Demographics
Fact Sheet 27	BCW Segments

Fact Sheet 28	BCW Stream Standards
Fact Sheet 29	BCW Stream Classifications
Fact Sheet 30	BCW T&E Species
Fact Sheet 31	TMDL Status
Fact Sheet 32	BCW Macroinvertebrates
Fact Sheet 33	BCW Segment Temperature Standards
Fact Sheet 34	New Morrison WWTF
Fact Sheet 35	Recreational Use Types
Fact Sheet 36	Larger Mammals
Fact Sheet 37	Smaller Mammals
Fact Sheet 38	BCR Phytoplankton
Fact Sheet 39	BCW E. Coli
Fact Sheet 40	Genesee Dam
Fact Sheet 41	Wastewater Demographics
Fact Sheet 42	BCR Zooplankton
Fact Sheet 43	BCW Evergreen Audubon Bird Atlas
Fact Sheet 44	CCC Transfer Station 2014
Fact Sheet 45	BCW Embeddedness Estimator
Fact Sheet 46	BCW Periphyton Estimator
Fact Sheet 47	New BCR Aeration System
Fact Sheet 48	Wetlands, Fens and WQ BCW
Fact Sheet 49	Coal-Tar Alternatives
Fact Sheet 50	Reducing Risk of E Coli Contamination of Streams
Fact Sheet 51	Reducing Risk of E Coli Contamination of Waterbodies
Fact Sheet 52	Mt Evans Fen WQ
Fact Sheet 53	BCR 2015 Regulation 38 Update
Fact Sheet 54	2015 303(d) List
Fact Sheet 55	BCW Buchanan Ponds

Policies in Watershed Plan Updated 2017

Policy 1	Trading Program
Policy 2	Site Application Review
Policy 3	4 step Review Policy
Policy 4	BC Manure Management
Policy 5	Meeting Attendance and E-Distribution
Policy 6	BCWA Weighted Vote
Policy 7	Evergreen Lake Temperature By-Pass
Policy 8	Bear Creek Reservoir Aeration
Policy 9	Aspen Park Conifer Wastewater Policy
Policy 10	Water Quality Monitoring Tiers
Policy 11	Vault & SS Disposal Systems
Policy 11s	Supplement ISDS Vault Regulations
Policy 12	Vision Mission & Targets
Policy 13	Watershed Boundary
Policy 14	Data Collection in BCW
Policy 15	Nonpoint Source Strategies and BMPs
Policy 16	Membership
Policy 17	Recycling Support
Policy 18	Illegal Material Dumping as a Pollutant in Bear Creek Watershed
Policy 19	Nutrient Trading Program Eligibility
Policy 20	Preferred Management Strategies for EGL and BCR

Policy 21	Online Management System
Policy 22	Project Evaluation Process
Policy 23	System of WWTF
Policy 24	DMR Reporting (WWTF)
Policy 25	Water Reuse and Conservation
Policy 26	Point to Point Trade Administration
Policy 27	Source Water Protection Plans
Policy 28	BCWA Watershed Plan
Policy 29	BCWA Integration with Other Planning Efforts
Policy 30	Financial Plan
Policy 31	BCWA Estimation Reporting
Policy 32	BCWA Annual Reporting
Policy 33	BCWA Shared Cost Program
Policy 34	BCWA Phosphorus WLA Purpose
Policy 35	Membership Entity Termination and Permit Closure

Map Series in Watershed Plan Updated 2017

MS01	Watershed Boundary
MS02	BCR Aeration System
MS03	BCR Sample Sites
MS04	BCR Sediment Sample Sites
MS05	Coyote Gulch Sample Sites
MS06	BCR P-1 Sample Sites
MS07	Evergreen Lake Sample Sites
MS08	Kerr-Swede Gulch Sample Sites
MS09	Composite Hazard Map
MS10	Pine Beetle Progression Map
MS11	Bear Creek 5th Order Watersheds
MS12	Wildfire Hazard Areas of Concern
MS13	Road Density Areas of Concern
MS14	Ruggedness Areas of Concern
MS15	Debris Flow & Flood Areas of Concern
MS16	Erodibility Areas of Concern
MS17	Macroinvertebrate Sites
MS18	Wastewater Treatment Plants
MS19	CDPW Fish Survey Sites
MS20	Segment 1e Sample Sites
MS21	Lower BCW Sample Sites 2014
MS22	Summit Lake Monitoring 2014
MS23	BCW Parks & Open Space
MS24	BCW Wildfire Hazards
MS25	BCW OWTS Septic System Areas
MS26	BCW Subbasin Population 2010 Census
MS27	BCW WWTF vs. OWTS areas
MS28	BCW Elevations
MS29	BCW Slope and Run-Off Potential
MS30	BCW Unpaved Roads, Pastures, Horses
MS31	BCW Jeff Co Community Plan Areas
MS32	BCW Large Animal Operations

III. Bear Creek Reservoir 2016 Data

The routine monitoring program (P1) focuses on Turkey Creek drainage and Bear Creek drainage inputs, and discharge from Bear Creek Reservoir into lower Bear Creek with a central pool characterization of the reservoir near the dam (Figure 2; BCWA site 40). The outlet structure is near BCWA site 41 with Bear Creek inflow near BCWA site 44 and Turkey Creek inflow near BCWA site 43. The reservoir chemistry and biological characterization monitoring occurs at BCWA site 40. Vertical probe samples for specific conductance, temperature, dissolved oxygen, and pH measured at ½ and 1-meter intervals at all reservoir sites. The current monitoring program optimizes data generation to evaluate reservoir inflow loading, trophic state changes within the reservoir, and reservoir outflow, while minimizing monitoring cost. The aeration sites are visible in Figure 2. Figure 3 shows all monitoring stations within Bear Creek Park. The Association maintains maps of recent sampling sites and wastewater treatment plant locations on the Association web site.



Figure 2 Bear Creek Reservoir with Sampling Stations

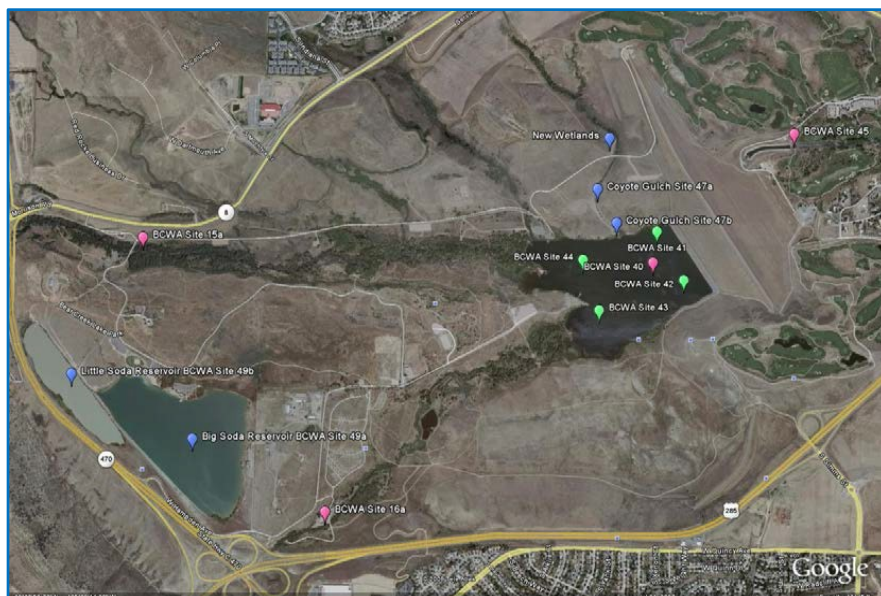


Figure 3 Bear Creek Park with BCWA Sampling Sites

The P1 monitoring program is contained in a spreadsheet titled *MSD2015 P1-P4 Master Spreadsheet*. The spreadsheet contains all data and analyses. Copies of the spreadsheet are distributed to Association membership, WQCD staff and interested parties in March/April 2016 after approval from the Association Board (Bear Creek Association March 2016). The Bear Creek Reservoir data and analyses are summarized in the annual report to the Water Quality Control Commission. Table 2 summarizes the Bear Creek Reservoir monitoring data.

Table 2 Bear Creek Reservoir Data Summary

Reservoir Monitoring Parameters	Reservoir
Chlorophyll (Site 40)	
Average Growing Season Chlorophyll-a [ug/l (-1m)]	14.6
Average Annual Chlorophyll-a [ug/l (-1m)]	10.1
Peak Chlorophyll-a [ug/l]	23.9
Total Phosphorus	
Average Annual Total Phosphorus [ug/l]: Water Column	63
Average Annual Total Phosphorus [ug/l] -1m	39
Average Annual Total Phosphorus [ug/l] -10m	93
Growing Season Total Phosphorus [ug/l]: Water Column	95
Growing Season Total Phosphorus [ug/l]: -1m	57
Growing Season Total Phosphorus [ug/l]: -10m	134
Peak Annual Total Phosphorus [ug/l] Water Column	422
Total Nitrogen	
Average Annual Total Nitrogen [ug/l]: Water Column	784
Average Total Nitrogen [ug/l]: -1m	759
Average Total Nitrogen [ug/l]: -10m	799
Growing Season Total Nitrogen [ug/l]: Water Column	670
Growing Season Total Nitrogen [ug/l]: -1m	669
Growing Season Total Nitrogen [ug/l]: -10m	671
Clarity (All Profiles)	
Average Annual Secchi Depth (meters)	1.22
Growing Season Average Secchi Depth (meters)	0.66
Dissolved Oxygen (site 40 Profile)	
Annual Average at -1/2m - 2m [mg/l]	8.56
Seasonal Average at -1/2 - 2m [mg/l]	6.80
Seasonal Minimum at -1/2 - 2m [mg/l]	4.62
pH	
Annual Average at -1/2m - 2m [mg/l]	8.18
Seasonal Average at -1/2 - 2m [mg/l]	8.10
Seasonal Maximum at -1/2 - 2m [mg/l]	8.91
Specific Conductance	
Annual Average at -1/2m - 2m [uS/cm]	398
Seasonal Average at -1/2 - 2m [us/cm]	615
Seasonal Minimum at -1/2 - 2m [us/cm]	261
Phytoplankton Species	
Phytoplankton Co-Dominant Species - Site 40 (July-October 2016)	Aphanizomenon flos-aquae
	Cladophora sp.
	Cryptomonas erosa
	Cymbella minuta
	Cymbella mexicana
	Diatoma vulgare
	Microcystis aeruginosa
	Melosira ambigua
	Melosira granulata
	Melosira varians
	Rhoicosphenia curvata
	Synedra ulna

Reservoir Monitoring Parameters	Reservoir
Peak Phytoplankton	
<i>Aphanizomenon flos-aquae</i>	Density cells/ml = 29,006
<i>Aphanizomenon flos-aquae</i>	Peak Biovolume ($\mu\text{m}^3/\text{mL}$) = 40,202,900
Loading - Annual Pounds	
Total Nitrogen -Total Load In to BCR	84,580
Total Nitrogen -Total Load From BCR	90,227
Total Nitrogen -Total Deposition into BCR	-5,646
Total Phosphorus -Total Load In to BCR	5,657
Total Phosphorus -Total Load From BCR	4,369
Total Phosphorus -Total Deposition into BCR	1,288

IV. P3-Summary Bear Creek Watershed 2016 Monitoring Data

Overview

Sampling and Monitoring Program Notes

Data organization reflects the Colorado Water Quality Control Division's segmentation and water quality standards to water bodies in the Bear Creek Watershed per Regulation 38. Sampling and monitoring data is presented for the calendar year, compared to applicable water quality standards. Site numbers identify exact locations, but are grouped into respective segments, with segment summary tables at the beginning of a segment group. All data collected is presented in table form, with summary analyses.

Temperature data loggers that were in stream segments since January 1, 2016 were replaced with other loggers that had already been returned from the manufacture after being recalibrated and recertified in early February ready to begin collecting data at 30-min intervals. The additional loggers were sent to the manufacturer for annual recalibration and recertification. The loggers were returned to sites and programmed to begin data collection at 30-minute intervals on the days that they were placed at the sites. All loggers were removed and data downloaded after September 30, 2016. Stream and lake sampling and monitoring data, including pH, Temperature, Dissolved Oxygen, Specific Conductance, Total Nitrogen, Dissolved Phosphorus, Total Phosphorous, Total Suspended Solids, and Chlorophyll A were collected from May through October, at 39 sites. Stream and lake temperature data loggers were used at 28 sites, including the Evergreen Lake profile station, and the Bear Creek Reservoir profile station, excluding the five WWTPs.

Temperature Compliance

The Cold- and Warm-season timeframe was redefined by the adoption of Regulation 38, which assigned calendar dates by Segment for cold-season and warm season regarding water quality standards for temperature. For this reporting format, the Cold-season program is defined as approximately November to March, depending on specific stream segments (which are outlined in Appendix C of Reg. 74). Regarding temperature data loggers, Cold-season locations included sites in all segments excluding segment 1d situated in Evergreen Lake, segment 2(site 45 and 90), segment 1c (Site 40A, 40B, 40C, and 40D), and segment 1e (site 12 due to logger being pulled from flow by Non-BCWA personnel). Segment 1a (Sites 58, 2a and 3a), Segment 1b (Site 15a), Segment 1e (Sites 5, 8a, 9, 13a, 14a), Segment 3(Site 25 and 89), Segment 5(Site 50), Segment 6a (Site 18 and 16a), and Segment 16b (Site 19) comprise the Cold-season locations for temperature data loggers. It is worth mentioning that many of these sites only recorded data during the shoulder season the month before the warm season began and post warm season. The program began in January 1of 2016 and ended on December 31 of 2016. The data presented in this report reflects the temperature measurements collected from January 1 through December 31, 2016. (This change represents the revision of reporting data collected in a calendar year broken into cold and warm seasons).

The Warm-season program locations included twenty-six sites in Bear Creek Segments 1a, 1b, 1c, 1d, 1e, 2, 3, 5, (including four total at the Evergreen Lake profile station, and 4 total at the Bear Creek Reservoir profile station), and three sites in Turkey Creek Segments 6a and 6b. Additionally, the five major wastewater treatment plants discharging into Segment 1e (EMD and KSWD), segment 5(WJCMD and GWSD) and 1b (Morrison) were monitored. The 2016 Warm-season program for temperature data collection began on April 1, May 1, and June 1, and concluded on September 30 and October 31 depending on the segment.

Temperature compliance, as compared to water quality standards, is presented by segment, roughly progressing from the upper reaches of the watershed to lower. Some sites only have temperature data collection during the Warm-season, while other sites have data loggers almost throughout the year.

268,788 individual temperature data points were obtained from the twenty-six data logger sites within the watershed. The evaluating criteria used to determine potential impairment of stream temperature is detailed in the tables below, specific to segment. There were 767 weekly averages calculated for the program period. 67,182 two-hour blocks were averaged and 5,603 Daily Maximum values were calculated. 74,919 individual temperature data points were obtained from the five data loggers located in the WWTP effluents that discharge into Bear Creek Segments 1e, 5, and 1b. Recognizing that Morrison wastewater treatment facility, Evergreen Metro District, and West Jefferson County Metro district have temperature requirements in their permits, a data summary consisting of number of measurements and calculations, Weekly Average and Daily Average temperatures are presented.

Table 3 Bear Creek Watershed 2016 Temperature Compliance by Segment

	Cold-season		Warm Season	
Segment 3	9°C WAT	13°C DM	17°C WAT	21.2°C DM
# Exceedances	1	0	1	0
% Compliance	96	100	96	100
Segment 1a	9°C WAT	13°C DM	17°C WAT	21.2°C DM
# Exceedances	0	0	0	2
% Compliance	100	100	100	99
Segment 1d	9.0°C WAT	13.0°C DM	18.2°C WAT	23.8°C DM
# Exceedances			6	0
% Compliance			95	100
Segment 1e	9°C WAT	13°C DM	19.3°C WAT	23.8°C DM
# Exceedances	0	0	0	0
% Compliance	100	100	100	100
Segment 1b	9°C WAT	13°C DM	19.3°C WAT	23.8°C DM
# Exceedances	0	0	0	0
% Compliance	100	100	100	100
Segment 5	9°C WAT	13°C DM	18.2°C WAT	23.8°C DM
# Exceedances		0	0	0
% Compliance		100	100	100
Segment 6a	9°C WAT	13°C DM	18.2°C WAT	23.8°C DM
# Exceedances	2	0	0	1
% Compliance	75	100	100	99.8
Segment 6b	9°C WAT	13°C DM	17°C WAT	21.2°C DM
# Exceedances	0	0	0	0
% Compliance	100	100	100	100
Segment 2	13.7°C WAT	14.3°C DM	27.5°C WAT	28.6°C DM
# Exceedances			0	0
% Compliance			100	100
Segment 1c	9°C WAT	13°C DM	24.0°C WAT	26.0°C DM
# Exceedances			0	8
% Compliance			100	98.9

NA-Indicates no logger data obtained.

Table 4 Number of Temperature Measurements (Not Including WWTP)

2016 Total Number of Measurements (Off- and Growing seasons)				
	# 30-min. Temps.	# Calculated WAT	# 2-Hr. Avgs. For DM calculation	# Calculated DM
Segment 3	21,067	60	5265	438
Segment 1a	28,547	72	7,134	597
Segment 1d	40,236	116	10,056	836
Segment 1e	64,717	191	16,177	1,353
Segment 1b	13,029	33	3,257	271
Segment 1c	34,632	102	8,658	720
Segment 2	23,750	69	5,935	497
Segment 5	10,150	30	2,537	211
Segment 6a	22,846	66	5,710	476
Segment 6b	9,814	28	2,453	204
Watershed totals	268,788	767	67,182	5,603

Segment 8 (Site 36,76,95, and 63) and Segment 7 (Sites 37)

- No temperature loggers were placed in either of these segments in 2016.

Segment 3 (Site 25 and 89)

- All daily max temperatures complied 100% with the standards given for this segment during both warm and cold seasons.
- 96% of MWAT temperatures complied with stream standards in both the cold and warm seasons.

Segment 1a (Sites 1a, 2, 3a)

- 100% of the recorded temperature values complied with the cold season temperature standards.
- 100% of the recorded temperature values complied with the 17.0°C Weekly Average Temperature (WAT) standard June 1 through September 30.
- 99% of the recorded temperature values complied with the 21.2°C Daily Maximum (DM) temperature standard for June 1 through September 30.

Segment 1d (Sites 4b, 4c and 4d)

- 95% of the recorded temperature values complied with the 18.2°C Weekly Average Temperature (WAT) standards for CLL designation.
- 100% of the recorded temperature values complied with the 23.8°C Daily Maximum (DM) Temperature standards for CLL designation.
- There were no temperature recordings for the cold season in this segment.

Segment 1e (Sites 5, 7, 8a, 9, 12, and 13a)

- All temperatures complied 100% with the temperature standards set for this segment during both warm and cold seasons, recognizing that site 12 did not have any temperature measurements recorded for the cold season due to NON-BCWA personnel removing the logger from flow.

Segment 1b (Sites 15a and 27b)

- All temperatures complied 100% with the temperature standards set for this segment.

Segment 5 (50)

- All temperatures complied 100% with the temperature standards set for this segment, recognizing that no cold season WAT temperatures were recorded.

Segment 6a (Sites 16a and 18)

- 100% of the recorded temperature values complied with the 18.2°C Weekly Average Temperature (WAT) standards for CLL designation.
- 99.8% of the recorded temperature values complied with the 23.8°C Daily Maximum (DM) Temperature standards for CLL designation.
- 75% of the recorded temperature values complied with the 9.0°C cold season (WAT) standard
- 100% of the recorded temperature values complied with the 13.0°C cold season Daily Maximum (DM).

Segment 6b (Site 19)

- All other temperatures complied 100% with all standards set for this segment during the warm season.

Segment 2(Site 45)

- All temperatures complied 100% with the temperature standards set for this segment. There were no cold season temperature readings.

Segment 1c (Site 40 Profile)

- There were no cold season temperatures recorded.
- 100% of the recorded temperature values complied with the 24.0°C Weekly Average Temperature (WAT) standards for CLL designation.
- 99% of the recorded temperatures complied with the 26.0°C Daily Maximum (DM) standard.

Wastewater treatment plant effluents

Morrison WWTP, Evergreen Metro District, and West Jefferson County Metro District are the only treatment plants with temperature requirements in their permit, all five of the major wastewater treatment plants have datalogger measurements have been analyzed and summarized below using the representative segment standard that the wastewater treatment facility discharges into.

Table 5 **WWTP Number of Temperature Measurements 2016**

	# 30-min. measurements	# Calculated WAT	# Daily Max
EMD WWTP (1e)	15926	47	332
WJCMD WWTP (5)	15929	46	333

	# 30-min. measurements	# Calculated WAT	# Daily Max
KSWD WWTP(1e)	11108	31	232
GWSD WWTP (5)	15926	46	333
Morrison WWTP (1b)	16030	46	320
Totals (Jan 1-Dec. 31)	74,919	216	1,550

Table 6 WWTP Logger summary 2016

	Cold-season		Growing Season	
Segment 1e	9°C WAT	13°C DM	19.3°C WAT	23.8°C DM
# Exceedances	10	28	5	0
% Compliance	68%	88%	89%	100%
Segment 1b	9°C WAT	13°C DM	19.3°C WAT	23.8°C DM
# Exceedances	9	20	4	0
% Compliance	44%	81%	93%	100%
Segment 5	9°C WAT	13°C DM	18.2°C	23.8°C
# Exceedances	31	74	15	26
% Compliance	3%	69%	50%	88%

Water Quality Compliance

Water quality compliance was determined by sampling and monitoring selected sites during the Growing season timeframe. Dissolved Oxygen, pH, Total Nitrogen, and Total phosphorous measurements were compared to water quality standards and anticipated standards to determine compliance.

Table 7 Bear Creek Watershed 2016 Water Quality Compliance by Segment

	Stream Std. pH (6.5-9 SU)	Stream Std. DO (6.0 mg/L 2-meter avg.)	Proposed Stream Std TOTAL NITROGEN 1250 ug/L	Proposed Stream Std Total Phosphorous (110 ug/L)
Segment 8				
# Exceedances	1	5	0	0
# Measurements	11	11	8	8
% Compliance	82%	55%	100%	100%
Segment 7				
# Exceedances	0	0	0	0
# Measurements	4	4	4	4
% Compliance	100%	100%	100%	100%
Segment 3				
# Exceedances	0	0	0	0
# Measurements	11	11	11	11
% Compliance	100%	100%	100%	100%
Segment 1a				
# Exceedances	0	0	0	1
# Measurements	18	18	18	18
% Compliance	100%	100%	100%	94%
Segment 1d				
# Exceedances	2	0	0	0
# Measurements	70	70	14	14
% Compliance	97%	100%	100%	100%
Segment 1e				
# Exceedances	0	0	0	0
# Measurements	43	43	36	36
% Compliance	100%	100%	100%	100%
Segment 1b				
# Exceedances	0	0	1	0
# Measurements	15	15	15	15
% Compliance	100%	100%	93%	100%
Segment 5				
# Exceedances	0	0	5	2
# Measurements	19	19	19	19

	Stream Std.	Stream Std.	Proposed Stream Std	Proposed Stream Std
	pH (6.5-9 SU)	DO (6.0 mg/L 2-meter avg.)	TOTAL NITROGEN 1250 ug/L	Total Phosphorous (110 ug/L)
% Compliance	100%	100%	74%	89%
Segment 6a				
# Exceedances	0	0	0	0
# Measurements	21	21	21	21
% Compliance	100%	100%	100%	100%
Segment 6b				
# Exceedances	0	0	0	0
# Measurements	4	4	4	4
% Compliance	100%	100%	100%	100%
Segment 4a				
# Exceedances	0	0	6	0
# Measurements	6	6	6	6
% Compliance	100%	100%	0%	100%
Segment 2				
# Exceedances	1	1	1	0
# Measurements	30	30	30	30
% Compliance	97%	97%	97%	100%

Segment 7 (Site 37, 76, 95, and 63)

- 82% of measured pH values and 55% of measured dissolved Oxygen complied with the adopted water quality standards. All other parameters measured complied 100% with adopted and proposed water quality standards.

Segment 8 (Sites 36)

- 100% of the measured parameters complied with adopted and proposed water quality standards.

Segment 3 (Site 25)

- 100% of the measured parameters complied with adopted and proposed water quality standards.

Segment 1a (Sites 2a and 3a)

- 94% the proposed water quality standard for Total Phosphorus (110 ug/L) was achieved, while 100% of all other parameters adopted and proposed were met.

Segment 1d (Sites 4a, 4b, 4c, 4d and 4e)

- 97% of the measured pH values from the profile station complied with the adopted water quality standards. While 100% of all other water quality parameters adopted and proposed was achieved.

Segment 1e (Sites 5, 7, 8a, 9, 12, 13a and 14a)

- 100% of the measured parameters complied with adopted and proposed water quality standards

Segment 1b (Sites 15a)

- 100% of all parameters measured complied with all adopted and proposed water quality standards, except Total Nitrogen which complied 93% with the proposed water quality standard of 1250ug/L.

Segment 5 (Site 35)

- 100% of the measured pH and DO values complied with the adopted water quality stream standards. 74% of measured Total Nitrogen complied with proposed water quality standard of 1250ug/L. 89% of measured Total Phosphorus complied with proposed water quality standard of 110ug/L.

Segment 6a (Site 18)

- 100% of the measured parameters complied with adopted and proposed water quality standards

Segment 6b (Site 19)

- 100% of the measured parameters complied with adopted and proposed water quality standards

Segment 4a (site 87)

- 100% of all parameters measured complied adopted and proposed water quality standards except Total Nitrogen which complied 0% with the proposed standard of 1250ug/L.

Segment 2(site 45and 90)

- Total Phosphorus complied 100% with proposed standard of 110ug/L, while all other water quality parameters complied 97% with adopted and proposed water quality standards.

Summary

Temperature Compliance

Segments 1a, 1b, 1c, 1d, 1e, 2, 3, 5, and Turkey Creek Segments 6a and 6b showed little impairment during both the Cold- and Warm Seasons. Comparisons with adopted temperature standards resulted in 99% compliance for the WAT and 99.8% compliance for the DM calculated for the calendar year throughout the Watershed, utilizing the 85th%-tile qualifier. Comparisons with adopted temperature standards for the Warm season resulted in 99% compliance for the calculated WAT and 99.8% compliance for the calculated DM. A comparison with the adopted temperature standards for the cold season resulted in 98% compliance for the calculated WAT and 100% compliance for the calculated DM, the monitored locations of the Watershed, utilizing the 85th%-tile qualifier. A comprehensive temperature data collection effort spanning January through December, summarized in 268,788 30-minute measurements at TWENTY-SIX in-stream/lake sites throughout the Watershed, excluding the WWTP facilities, provided the data for analyses.

The evaluation of the entirety of temperature datalogger measurements recorded during the calendar year at TWENTY-SIX sites in the Watershed from Mt. Evans Wilderness to just below Bear Creek Lake in Lakewood and Turkey Creek do not indicate that a problem exists, either man-induced or natural, when compared to water quality standards. Compliance exceedance issues only occurred during the warm season in segments 3 and 1d for the MWAT, and in segments 1a and 6a for the DM. Temperature compliance issues only occurred during the cold season in segment 3 and 6a for the MWAT which only occurred during the shoulder season.

Wastewater plant discharges into Bear Creek did not cause temperature impairment. A comprehensive temperature data collection effort from January through December, summarized in 74,919 30-minute measurements in five wastewater treatment plant effluents that discharge into Bear Creek Segment 1e and 1b, and 5 showed no evidence of thermal pollution downstream of the discharge points. Although only three of the five WWTPs that discharge into Segments 1e, 1b, and 5 have temperature discharge requirements, the resulted data collected and presented do not indicate evidence of impairment due to temperature when analyzing the downstream data.

Water Quality Compliance

Segments 1a, 1b, 1d, 1e, 2, 3, 4a, 5, 7, 8 and Turkey Creek Segments 6a and 6b showed little water quality impairment. Sampling and monitoring was performed at 38 sites within the watershed at varying intervals ranging from samples throughout the year to sampling 1 time throughout the season. 254 measurements of pH and DO were performed at these Sites. 98% compliance for pH and 98% compliance for Dissolved Oxygen were achieved. 188 samples were analyzed for Total Nitrogen and 188 samples were analyzed for Total Phosphorus. Sampling results show 93% compliance for proposed Total Nitrogen of 1250ug/L and 98% compliance for proposed Total Phosphorus of 110ug/L.

Wastewater plant discharges into Bear Creek result in no evidence of water quality impairment. 100% of four wastewater plant effluent pH and 100% of effluent Ammonia values met permit limits, as well as 100% Total Phosphorous met permit effluent limits as well. Four of the five larger wastewater treatment plants met discharge limits stated in their Colorado Discharge Pollutant Elimination System (CDPES) permit for pH, Total Phosphorous and Total Ammonia during 2016. Wastewater treatment plant effluents had no detrimental effect on the water quality of Segment 1e, 1b, and 5. There were no observed impairment issues or temperature issues in the Watershed due to wastewater plant effluents during the program.

Bear Creek stream flows were moderately higher to significantly higher in May 2016. Bear Creek stream flows tracked during May, on daily average at the gage above Evergreen Lake, were somewhat to significantly higher than the historic daily average in May. The stream gage above Morrison followed the Evergreen gage values. The stream flows remained slightly higher to significantly higher above monthly historic averages in May. The remaining months, June through October showed flows that were moderately to significantly lower than historical averages.

Weather and climate in the May through September timeframe were approximately average to below average as compared to historic averages. Measurably less precipitation was noticed verses historic averages in May through September.

The Average Monthly Mean temperatures were approximately equal to historical data for May through September. The Average Monthly Maximum temperatures were approximately equal to historical averages for May through September. However, the Average Daily Minimum temperatures were slightly higher or equal to historical averages in all months. The Average Monthly temperatures were unremarkable and only 3 days reached a temperature higher than 90°F in Evergreen, CO.

Watershed Monitoring

WWTP Effluent Temperature and Water Quality

The Process Control and permit sampling and monitoring summaries in the tables below are annual summaries, from January through December. Datalogger temperature measurements of plant effluent were obtained at the identical frequency of the in-stream dataloggers (30-minute intervals) during a study period of January 1 through December 31, broken into a cold and warm season per the listing requirements. The tables are listed in a downstream direction, as the effluents enter Bear Creek, from the EMD WWTP to the Morrison WWTP. Test results for Ammonia, Nitrate, Nitrite and Phosphorous are provided by the wastewater treatment plant laboratories for EMD, WJCMD, KSWD and GWSD and are represented in ug/L. TIN was determined as the sum of Ammonia, Nitrate and Nitrite. Averaged pH values are for statistical analyses only. The town of Morrison utilizes a contract laboratory for analyses.

Table 8 Evergreen Metropolitan District (Site 20)

EMD WWTP Effluent Summary 2016									
2016 Process Control and Permit Sampling and Monitoring									
Parameter	pH, SU	Temp, °C	D. O., mg/L	Total NH3-N, ug/L	NO3-N, ug/L	NO2-N, ug/L	TIN, ug/L	Total P, ug/L	Flow, MGD
Min	6.40	6.80	2.72	11.3	2880	8	4913	20	0.22
Max	6.99	20.10	8.20	7460	14200	410	18919	850	1.17
Avg	6.69	13.51	3.78	1312.70	9267.69	41.42	10955.54	216.64	0.48
Std. Dev.	0.12	4.35	0.51	1844.98	2660.44	61.11	3043.50	169.24	0.12
Measurements	264	252	253	51	52	52	47	53	366
Exceedances	0			0				0	
Effluent Datalogger Temperature Summary: Cold Season/Warm Season 2016									
All Temperatures in °C		30-Min Temp. COLD/WARM		Daily Avg. Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM			
Min		7.22	8.3	7.35	8.4	7.60	8.7		
Max		16.27	21.8	16.01	19.8	15.64	19.7		
Avg		10.47	15.6	10.47	15.6	10.36	15.6		
Std. Dev.		9.83	3.8	9.85	3.8	9.32	3.9		
Measurements		5654	10272	118	214	17	30		

[Datalogger ID: EMD5 GPS Coordinates: 39.6376°N, 105.3150°W; Sampling/monitoring site is the EMD WWTP effluent. The datalogger is in the UV channel just upstream of the outfall. Effluent flows directly from the UV building to Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: Jan.-**9,900**, Feb.-**9,900**, Mar.-**12,000**, Apr.-**13,000**, May-**17,000** June-**16,000** July **9,400** Aug. **7,700** Sept.-**7,900**; Oct.-**5,700**; Nov.-**6,900**; Dec.-**9,200**; **pH 6.1-9.0**. New methodology for calculating DM and MWAT in accordance with the new permit is now in effect as of August 1, 2013.

Table 9 West Jefferson County Metropolitan District (Site 21)

WJCMD WWTP Effluent Summary 2016									
2016 Process Control and Permit Sampling and Monitoring									
Parameter	pH, SU	Temp, °C	D. O., mg/L	Total NH3-N, ug/L	NO3-N, ug/L	NO2-N, ug/L	TIN, ug/L	Total P, ug/L	Flow, MGD
Min	6.40	8.80	2.42	30	862	11	1449	50	0.29
Max	6.91	18.70	4.60	9920	9350	269	14986	1270	0.82
Avg	6.61	13.52	3.24	2661.25	3082.15	92.69	5819.23	189.43	0.48
Std. Dev.	0.10	3.39	0.31	2745.02	1779.35	50.58	3436.57	173.42	0.08
Measurements	275	245	246	64	52	52	48	53	366
Exceedances	0			0				0	
Effluent Datalogger Temperature Summary Cold/Warm Seasons 2016									
All Temperatures in °C		30-Min Temp. COLD/WARM		Daily Avg.Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM			
Min		-1.0	9.1	8.5	9.4	8.8	9.7		
Max		16.1	18.8	15.9	18.6	15.5	18.5		
Avg		11.2	15.1	11.2	15.1	11.2	15.1		
Std. Dev.		2.2	3.1	2.2	3.1	2.2	3.1		
Measurements		5657	10272	119	214	16	30		

[Datalogger ID: WJ6 GPS Coordinates: 39.6621°N, 105.3351°W; Sampling/monitoring site is the WJCMD WWTP effluent. The datalogger was in the end of the abandoned chlorine contact chamber. (Disinfection currently occurs by UV radiation.) The effluent flows into a ditch and joins Troublesome Gulch just outside the plant boundary.

Troublesome Gulch flows to Kittredge and combines with Bear Creek at the west end of Kittredge.] Notes: Discharge permit limits for Total Ammonia (NH₃-N), in ug/L are as follows: Jan.-**8000**, Feb.-**7400**, Mar.-**6800**, Apr.-**5400**, May-**5000** June-**4000** July-**3200** Aug.-**3500** Sept.-**3700**; Oct.-**4300**; Nov.-**5400**; Dec.-**7400**; pH **6.4-9.0**. New methodology for calculating DM and MWAT in accordance with the new permit is now in effect.

Table 10 Kittredge Sanitation and Water District (Site 22)

KSWD WWTP Effluent Summary 2016									
2016 Process Control and Permit Sampling and Monitoring									
Parameter	pH, SU	Temp, °C	D. O., mg/L	Total NH ₃ -N, ug/L	NO ₃ -N, ug/L	NO ₂ -N, ug/L	TIN, ug/L	Total P, ug/L	Flow, MGD
Min	6.60	3.40	0.14	92	2910	89	4134	100	0.04
Max	7.54	24.00	16.49	1660	19100	638	19476	700	0.10
Avg	6.81	11.19	2.97	554.33	8599.68	220.90	9388.16	327.60	0.07
Std. Dev.	0.12	4.95	2.72	369.83	4014.51	125.50	3912.91	158.20	0.01
Measurements	246	214	212	52	31	30	31	25	366
Exceedances	0			0				0	
Effluent Datalogger Temperature Summary Cold/Warm Seasons 2016									
All Temperatures in °C		30-Min Temp. COLD/WARM		Daily Avg.Temp. COLD/WARM		Weekly Avg. Temp. COLD /WARM			
Min		3.6		19.8		3.9		18.7	
Max		11.4		19.8		9.8		18.7	
Avg		5.3		15.5		5.3		15.7	
Std. Dev.		1.8		2.80		1.8		2.60	
Measurements		5156		5952		108		124	

[Datalogger ID: KSWD8 GPS Coordinates: 39.6585°N, 105.2868°W; Sampling/monitoring site is the KSWD WWTP effluent. The datalogger was located near the flow-measuring flume, just upstream of the outfall. Effluent flows from the datalogger location under Highway 74 to the outfall in Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH₃-N), in ug/L are as follows: Jan.-**10,100**, Feb.-**4,500**, Mar.-**5,300**, Apr. **7400**, May-**10000** June-**12000** July-**5300** Aug.-**4300** Sept.-**4400**; Oct.-**5200**; Nov.-**17000**; Dec **14000**; pH **6.0-9.0**

Table 11 Genesee Water and Sanitation District (Site 23)

GWSD WWTP Effluent Summary 2016									
2016 Process Control and Permit Sampling and Monitoring									
Parameter	pH, SU	Temp, °C	D. O., mg/L	Total NH ₃ -N, ug/L	NO ₃ -N, ug/L	NO ₂ -N, ug/L	TIN, ug/L	Total P, ug/L	Flow, MGD
Min	6.69	8.00	5.83	90	8.02	0.4	242.78	124	0.02
Max	7.49	22.10	8.87	3700	12880	341	13360.5	571	0.52
Avg.	7.03	14.57	7.80	271.06	7362.62	27.47	7661.15	284.71	0.25
Std. Dev.	0.14	3.54	0.59	486.72	2027.08	49.81	2019.09	118.22	0.06
Measurements	366	366	366	52	52	52	52	52	366
Exceedances				0				0	
Effluent Datalogger Temperature Summary COLD/WARM Seasons 2016									
All Temperatures in °C		30-Min Temp. COLD/WARM		Daily Avg.Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM			
Min		9.7		9.8		9.9		10.1	
Max		16.9		19.6		16.8		19.4	
Avg		12.5		15.8		12.5		15.8	
Std. Dev.		2.3		3.4		2.3		3.4	
Measurements		5654		10272		119		214	

[Datalogger ID: GWSD9A GPS Coordinates: 39.6732°N, 105.2712°W; Sampling/monitoring site is the GWSD WWTP effluent. The datalogger was in a wet well, just upstream of the outfall at the plant. Effluent flows from the datalogger location into a drainage, down to and under Highway 74 at the west end of Lair o' the Bear Park, and into Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH₃-N), in ug/L are as follows: Jan.-**8000**, Feb.-**8100**, Mar.-**8000**, Apr.-**6000**, May-**6000** June-**5600** July-**5000** Aug.-**4800** Sept.-**5100**; Oct.-**5500**; Nov.-**6000**; Dec.-**7100**; pH **6.5-9.0**

Table 12 **Town of Morrison (Site 24)**

Table 11
TOWN OF MORRISON (Site 24)

Morrison WWTP Effluent Summary 2016									
2016 Process Control and Permit Sampling and Monitoring									
Parameter	pH, SU	Temp, °C	D. O., mg/L	Total NH3-N, ug/L	NO3- N, ug/L	NO2- N, ug/L	TIN, ug/L	Total P, ug/L	Flow, MGD
Min	NO DATA PROVIDED								
Max									
Avg									
Std. Dev.									
Measurements									
Exceedances									
Effluent Datalogger Temperature Summary COLD/WARM Seasons 2016									
All Temperatures in °C		30-Min Temp. COLD/WARM		Daily Avg.Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM			
Min		5.5	7.4	6.6	10.4	8.0		12.1	
Max		17.2	26.6	16.2	23.6	15.2		23.2	
Avg		10.1	18.6	10.1	18.6	10.1		18.7	
Std. Dev.		2.2	3.61	2.1	3.48	2.1		3.47	
Measurements		5758	10272	121	214	16		30	

[Datalogger ID: MORR12 GPS Coordinates: 39.6541°N, 105.1796°W; Sampling/monitoring site is the GWSD WWTP effluent. The datalogger was in a wet well, just upstream of the outfall at the plant. Effluent flows from the datalogger location into a drainage, down into Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: Jan.-**10,000**, Feb.-**8,600**, Mar.-**10,000**, Apr.-**10,000**, May-**8,600** June-**20,000** July-**30,000** Aug.-**28,000** Sept.-**28,000**; Oct.-**16,000**; Nov.-**14,000**; Dec.-**10,000**; pH 6.5-9.0

Other Small Treatment Facilities

Table 13 **Tiny Town Effluent Summary**

TINY TOWN WWTP Effluent Summary 2016			
2016 Process Control and Permit Sampling and Monitoring			
Parameter	pH, SU	Total P, ug/L	Flow, MGD
Min	NO DATA PROVIDED ALL EFFLUENT HAULED OFF SITE		
Max			
Avg			
Std. Dev.			
Measurements			
Exceedances			

Table 14 **Brook Forest Inn Effluent Summary**

BROOK FOREST INN WWTP Effluent Summary 2016				
2016 Process Control and Permit Sampling and Monitoring				
Parameter	pH, SU	Temp, °C	Total P, ug/L	Flow, MGD
Min	NO DATA PROVIDED			
Max				
Avg				
Std. Dev.				
Measurements				
Exceedances				

Bear Creek Stream Segments

Sampling and monitoring was performed by Evergreen Metropolitan District personnel and watershed associates. Laboratory analyses were performed by a contract facility. A summary table for each Segment is presented before individual Site tables in that Segment. When there is only one Site per Segment, the summary table is omitted. Sites where only Warm Season temperature data exists have Cold-season portions of the table blacked out.

The following applies to all Segment Data tables: Existing stream standards: Table Value Standard (TVS) for Total Ammonia (NH₃-N), chronic; 10 mg/L (10,000 ug/L) Nitrate (NO₃-N), chronic; pH 6.5-9.0 SU; DO 6.0 mg/L; TIN was determined as the sum of Ammonia and Nitrate+Nitrite. Threshold to Evaluate Potential Temperature Impairment: WAT (Weekly Average Temperature), DM (Daily Maximum Temperature), Segment-specific; 2-HR Avg. Temperature data are calculations used to evaluate against DM.

Segments 7 (Mt Evans Wilderness)

Table 15 **Summit Lake Site 36 (In Summit Lake near outlet) Segment 8**

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.35	4.7	7.17	21.2	279	5
Max	8.83	9.50	9.37	23.80	292	9
Avg	8.03	7.85	8.48	22.43	284.75	7.50
Std. Dev.	0.59	1.90	0.82	0.98	5.85	1.66
Measurements	4	4	4	4	4	4

[Monitoring station GPS Coordinates: 39.5979 °N, 105.6411 °W; Sampling /monitoring site is in Summit Lake, near outlet.]

Table 16 **Segment 8 (Sites 37,76,95,63)**

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	5.99	4.7	2.09	1.98	6	6
Max	9.05	10.90	10.05	45.50	402.00	62.00
Avg	7.81	7.59	5.60	21.01	204.00	18.75
Std. Dev.	1.02	2.18	2.70	12.15	132.12	16.95
Measurements	11	11	11	11	8	8

[Monitoring station GPS Coordinates: 39.5955 °N, 105.6334 °W; Sampling /monitoring site is in Bear Creek, downstream of outlet from Summit Lake.]

Table 17 **(Site 37) Mount Evans Mainstem ¼ mile downstream**

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.35	4.7	7.17	21.2	279	5
Max	8.83	9.5	9.37	23.8	292	9
Avg	8.03	7.85	8.48	22.43	284.75	7.50
Std. Dev.	0.59	1.90	0.82	0.98	5.85	1.66
Measurements	4	4	4	4	4	4

[Monitoring station GPS Coordinates: Sampling /monitoring site

Table 18 **(Site 76) Between 2 large ponds on east side of Summit Lake outfall. Segment 8**

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	6.54	4.7	2.09	23.1	99	11
Max	8.67	6.7	4.79	45.5	402	19
Avg	7.61	5.70	3.44	34.30	250.50	15.00
Std. Dev.	1.06	1.00	1.35	11.20	151.50	4.00
Measurements	2	2	2	2	2	2

Table 19 **(Site 95) Segment 8**

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	5.99	8.2	2.36	13.1	6	11
Max	8.62	10.9	6.46	36	99	14
Avg	7.64	9.97	4.22	23.83	49	12.33
Std. Dev.	1.17	1.25	1.69	9.40	38.29	1.25
Measurements	3	3	3	3	3	3

Table 20

(Site 63) Segment 8 ONLY MONITORING POINT IN 2016

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
8/27/2016	7.2	6.15	6	1.98

Segment 1a (Above Evergreen Lake)

Table 21

Segment 1a Summary

Segment 1a Sampling/Monitoring Summary 2016								
Monthly Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.77		3.5	7.78	36.9	97	4	
Max	8.62		12.7	12.29	74	302	133	
Avg	8.13		8.45	10.23	53.54	186.94	30.39	
Std. Dev.	0.27		2.93	1.34	10.29	62.79	34.07	
Measurements	18		18	18	18	18	18	
Segment 1a Data Logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASONS		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 Stream DM (21.2°C)
Min	-0.1	3.1	0.9	0.0	0.1	7.5	3.1	7.7
Max	12.6	29.1	7.8	12.4	12.4	15.3	25.3	25.3
Avg	4.3	11.9	5.1	4.3	6.0	12.0	11.9	14.3
Measurements	13774	14773	30	3443	287	42	3691	310
9°C WAT exceeded			0					
% Compliance WAT			100%					
13°C DM exceeded					0			
% Compliance DM					100%			
17°C WAT exceeded						0		
% Compliance WAT						100%		
21.2°C DM exceeded								2
% Compliance DM								99%

Table 22

Above Lost & Found, Below Mount Evans Wilderness (Site 58)

5 Monthly Sampling/Monitoring Events June 1 – October 31, 2016								
Monthly Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.77		3.5	8.14	36.9	97	4	
Max	8.62		8.5	12.25	49.3	302	34	
Avg	8.3		6.4	10.6	42.5	210.3	18.3	
Std. Dev.	0.35		2.06	1.41	4.21	64.13	12.16	
Measurements	6		6	6	6	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. Cold/Warm Season		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 Stream DM (21.2°C)
Min	-0.1	3.1	4.0	0.0	3.8	7.5	3.1	7.7
Max	8.6	29.1	4.4	8.4	8.4	12.3	25.3	25.3
Avg	4.4	9.7	4.2	4.4	6.2	9.8	9.7	12.3
Std. Dev.	1.8	2.6	0.2	1.8	1.3	1.5	2.6	3.0

Measurements	838	3890	2	209	18	11	971	83
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								2
% Compliance DM								98%

[Monitoring station/Datalogger ID: L&F GPS Coordinates: 39.6234 °N, 105.4451 °W; Sampling /monitoring site is in Bear Creek, above Lost & Found (old Singin' River

Table 23 Golden Willow Rd (Site 2a)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.79		5	7.82	47.80	108	6	
Max	8.36		12	12.29	59.8	223	83	
Avg	8.05		9.22	10.34	54.20	165.33	25.83	
Std. Dev.	0.22		2.67	1.37	4.69	47.21	26.79	
Measurements	6		6	6	6	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. Cold/Warm Season		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 Stream DM (21.2°C)
Min	-0.06	5.1	2.82	-0.05	1.36	9.8	5.2	10.6
Max	12.56	19.9	7.08	12.38	12.38	15.3	19.8	19.8
Avg	5.42	12.4	5.43	5.42	8.02	12.5	12.4	14.9
Std. Dev.	2.64	2.5	1.40	2.62	2.36	1.6	2.5	1.9
Measurements	4296	5856	12	1074	89	17	1464	122
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								0
% Compliance DM								100%

Table 24 Above Evergreen Lake, at CDOW site (Site 3a)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.81	5.6	7.78	55.3	102	9	
Max	8.27	12.7	11.1	74	266	85	
Avg.	8.1	9.8	9.8	63.9	185.2	29.0	
Std. Dev.	0.18	2.82	1.10	6.87	66.86	26.42	
Measurements	6	6	6	6	6	6	
Data logger Temperature Data 2016							
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASONS	Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 Stream DM (21.2°C)

Min	0.0	6.3	0.0	0.0	0.1	10.9	6.4	10.8
Max	12.5	19.0	7.8	12.4	12.4	15.3	19.0	19.0
Avg	3.7	13.0	3.6	3.7	4.9	13.1	13.0	15.1
Std. Dev.	3.2	2.3	2.7	3.2	3.7	1.4	2.3	1.9
Measurements	8640	5027	25	2159	180	14	1256	105
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: ALKDOW GPS Coordinates: 39.6331 °N, 105.3372 °W; Sampling /monitoring site in Bear Creek Above Evergreen Lake, at the CDOW fish survey site.]

Segment 1d (Evergreen Lake)

Sites 4a-4j comprises a profile monitoring station in Evergreen Lake. During the study period, sampling and monitoring were performed monthly at the individual Site locations at this profile station. This data is presented below. Also during the study period, temperature data collected with dataloggers at the individual Site locations were analyzed and compared to state water quality standards.

Table 25 Segment 1d Summary

Segment 1d Sampling/Monitoring Summary 2016							
Monthly Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.72	6.6	6.85	0.134	232	19	
Max	9.05	18.2	9.95	77.6	522	70	
Avg	8.30	12.83	8.45	59.57	318.43	31.14	
Std. Dev.	0.39	3.70	0.84	24.91	67.28	15.57	
Measurements	70	70	70	70	14	14	
Segment 1d Data Logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. WARM SEASONS	Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 Stream DM (21.2°C)
Min	2.4				5.5	2.5	4.0
Max	21.3				19.0	21.0	21.0
Avg	12.8				12.9	12.8	13.3
Measurements	40236				116	10056	836
# 9°C WAT exceeded							
% Compliance WAT							
# 13°C DM exceeded							
% Compliance DM							
# 18.2°C WAT exceeded					6		
% Compliance WAT					95%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

Table 26 Evergreen Lake Profile station 0.5 meters (Site 4A)

6 Monthly Sampling/6 Monitoring Events May 1-Oct. 31, 2016							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	CHLOROPHYLL A ug/L
Min	7.9	8.5	7.55	0.136	278	19	2.1
Max	9.05	18.2	9.95	77.6	522	70	19.8
Avg	8.4	13.2	8.7	59.8	344.9	31.6	6.7
Std. Dev.	0.39	3.64	0.87	24.96	75.54	16.07	6.21
Measurements	7	7	7	7	7	7	6
Data logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Jan 1-Mar 31 Stream Std. WAT (9°C)	Jan 1-Mar 31 2-Hr Avg. Temp.	Jan 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Dec. 31 Stream Std. WAT (19.3°C)	Apr 1-Dec 31 2-HR Avg. Temp.	Apr 1-Dec 31 Stream DM (23.8°C)
Min	2.5				5.9	2.6	4.0
Max	21.3				19.0	21.0	21.0
Avg	12.9				13.1	12.9	13.5
Std. Dev.	4.2				4.1	4.2	4.2
Measurements	10059				29	2514	209
# 18.2°C WAT exceeded					2		
% Compliance WAT					93%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Datalogger ID: EMD2A GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, on the surface, near the EMD WTP intake.] N/A* indicates temp. readings not taken.

N/A** Indicates no sampling at this location.

Table 27 Evergreen Lake, 1.0m below surface, near dam (Site 4b)

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.9	8.6	7.34	0.134
Max	9.03	17.9	9.94	77.5
Avg	8.4	13.1	8.6	59.6
Std. Dev.	0.41	3.51	0.96	24.92
Measurements	7	7	7	7

Data logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Jan 1-Mar 31 Stream Std. WAT (9°C)	Jan 1-Mar 31 2-Hr Avg. Temp.	Jan 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Dec. 31 Stream Std. WAT (19.3°C)	Apr 1-Dec 31 2-HR Avg. Temp.	Apr 1-Dec 31 Stream DM (23.8°C)
Min	2.5				5.7	2.5	4.0
Max	20.6				18.9	20.5	20.5
Avg	12.8				12.9	12.8	13.3
Std. Dev.	4.2				4.1	4.2	4.2
Measurements	10059				29	2514	209
# 18.2°C WAT exceeded					2		
% Compliance WAT					93%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Datalogger ID: EMD2B GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 1.5m below surface, near the EMD WTP intake.]

Table 28 **Evergreen Lake, 1.5m below surface, near dam (Site 4c)**

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.89	8.1	7.42	0.135
Max	8.99	17.9	9.61	77.4
Avg	8.3	13.0	8.5	59.5
Std. Dev.	0.40	3.57	0.85	24.90
Measurements	7	7	7	7

Data logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Jan 1-Mar 31 Stream Std. WAT (9°C)	Jan 1-Mar 31 2-Hr Avg. Temp.	Jan 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Dec. 31 Stream Std. WAT (19.3°C)	Apr 1-Dec 31 2-HR Avg. Temp.	Apr 1-Dec 31 Stream DM (23.8°C)
Min	2.4				5.5	2.5	4.0
Max	20.3				18.7	20.3	20.3
Avg	12.7				12.8	12.7	13.1
Std. Dev.	4.2				4.1	4.2	4.1
Measurements	10059				29	2514	209
# 18.2°C WAT exceeded					1		
% Compliance WAT					97%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Datalogger ID: EMD2C GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 2.5m below the surface, near the EMD WTP intake.]

Table 29 **Evergreen Lake, 2.0m below surface, near dam (Site 4d)**

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.9	8.1	7.37	0.135
Max	8.93	17.8	9.5	77.4
Avg	8.3	13.0	8.5	59.6
Std. Dev.	0.39	3.55	0.80	24.91
Measurements	7	7	7	7

Data logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Jan 1-Mar 31 Stream Std. WAT (9°C)	Jan 1-Mar 31 2-Hr Avg. Temp.	Jan 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Dec. 31 Stream Std. WAT (19.3°C)	Apr 1-Dec 31 2-HR Avg. Temp.	Apr 1-Dec 31 Stream DM (23.8°C)
Min	2.9				5.5	3.0	4.1
Max	20.2				18.8	20.0	20.0
Avg	12.7				12.9	12.7	13.2
Std. Dev.	4.2				4.1	4.2	4.1
Measurements	10059				29	2514	209
# 18.2°C WAT exceeded					1		
% Compliance WAT					97%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Datalogger ID: EMD2D GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 3.5m below the surface, near the EMD WTP intake.]

Table 30

Evergreen Lake, 2.5m below surface, near dam (Site 4e)

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.88	7.1	7.41	0.138
Max	8.9	17.8	9.58	77.4
Avg	8.3	12.8	8.5	59.5
Std. Dev.	0.38	3.77	0.81	24.90
Measurements	7	7	7	7

[Monitoring station/Datalogger ID: EMD4E GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 2.5m below the surface, near the EMD WTP intake.]

Table 31

Evergreen Lake, 3.0m below surface, near dam (Site 4f)

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.85	6.9	7.26	0.138
Max	8.9	17.8	9.49	77.4
Avg	8.3	12.8	8.5	59.5
Std. Dev.	0.39	3.79	0.76	24.90
Measurements	7	7	7	7

[Monitoring station/Datalogger ID: EMD4f GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 3.0m below the surface, near the EMD WTP intake.]

Table 32

Evergreen Lake, 3.5m below surface, near dam (Site 4g)

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.77	7	7.12	0.138
Max	8.88	17.8	9.52	77.5
Avg	8.3	12.8	8.5	59.6
Std. Dev.	0.39	3.77	0.80	24.91
Measurements	7	7	7	7

Monitoring station/Datalogger ID: EMD4g GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 3.5m below the surface, near the EMD WTP intake.]

Table 33

Evergreen Lake, 4.0m below surface, near dam (Site 4h)

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.74	6.9	7.32	0.138
Max	8.85	17.8	9.6	77.4
Avg	8.3	12.7	8.4	59.5
Std. Dev.	0.39	3.79	0.74	24.89
Measurements	7	7	7	7

Monitoring station/Datalogger ID: EMD4h GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 4.0m below the surface, near the EMD WTP intake.]

Table 34

Evergreen Lake, 5.0m below surface, near dam (Site 4i)

6 Monthly Sampling/6 Monitoring Monthly Monitoring Events May 1-Oct. 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.72	6.7	7.21	0.138	232	21
Max	8.8	17.7	9.76	77.4	371	67
Avg	8.2	12.6	8.2	59.5	292.0	30.7
Std. Dev.	0.38	3.77	0.77	24.89	44.15	15.05
Measurements	7	7	7	7	7	7

Monitoring station/Datalogger ID: EMD4i GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 5.0m below the surface, near the EMD WTP intake.]

Table 35

Evergreen Lake, 6.0m below surface, near dam (Site 4j)

6 Monthly Monitoring Events May 1-Oct. 31, 2016				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm
Min	7.72	6.6	6.85	0.138
Max	8.82	17.5	9.54	77.4
Avg	8.2	12.4	8.1	59.5
Std. Dev.	0.39	3.74	0.89	24.89
Measurements	7	7	7	7

Monitoring station/Datalogger ID: EMD4j GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, 6.0m below the surface, near the EMD WTP intake.]

Segment 1e (Mainstem below Evergreen Lake and Above Harriman Diversion)**Table 36****Segment 1e Summary**

Segment 1e Sampling/Monitoring Summary 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.63		0	6.92	62.3	205	16	
Max	8.65		17.3	15.52	334.7	729	102	
Avg	8.12		12.00	9.81	155.78	448.47	36.08	
Std. Dev.	0.20		4.48	1.87	64.39	126.47	21.56	
Measurements	46		46	46	46	36	36	
Segment 1e Data Logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	-0.03	-0.3	0.04	0.00	0.02	4.4	-0.1	1.0
Max	11.25	23.0	7.65	10.44	10.44	18.9	22.9	22.9
Avg	3.54	12.7	3.55	3.54	4.84	12.7	12.7	14.5
Measurements	10175	54542	29	2543	215	162	13634	1138
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

Table 37**Downtown Evergreen, at CDOW site (Site 5)**

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016							
	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.76	8.1	6.92	62.3	205	16	
Max	8.22	16.7	10.49	98	340	102	
Avg	8.0	13.0	8.9	78.9	261.5	35.8	
Std. Dev.	0.19	3.02	1.06	11.57	55.66	30.35	
Measurements	6	6	6	6	6	6	
Site 5 Data logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON	Nov 1- Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)

Min	2.37	2.2	3.22	2.39	3.27	4.4	2.3	3.6
Max	9.51	21.6	7.65	9.35	9.35	18.8	21.2	21.2
Avg	4.94	12.6	4.91	4.94	5.50	12.6	12.6	13.4
Std. Dev.	1.77	4.5	1.67	1.77	1.86	4.4	4.5	4.4
Measurements	1657	10032	5	414	35	30	2508	209
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

Monitoring station/Datalogger ID: LTLBAR GPS Coordinates: 39.6327 °N, 105.3183 °W; Sampling /monitoring site in Bear Creek near the west end of public parking lot, across from the Little Bear, CDOW fish survey site.]

Table 38 Bear Creek Cabins (Site 8a)

9 Monthly Sampling/Monitoring Events March - November, 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.71		8.2	7.09	73.4	278	19	
Max	8.21		17	10.8	115.5	569	39	
Avg	8.0		13.3	9.1	97.5	443.2	28.3	
Std. Dev.	0.18		3.24	1.33	16.40	93.80	7.43	
Measurements	6		6	6	6	6	6	
Site 8a Data Logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	0.19	2.1	2.00	0.23	3.02	4.5	2.2	3.6
Max	11.25	22.1	7.42	10.44	10.44	18.7	22.1	22.1
Avg	4.48	12.6	4.45	4.48	6.30	12.5	12.6	14.2
Std. Dev.	2.30	4.5	1.95	2.29	2.23	4.4	4.5	4.6
Measurements	1657	10032	5	414	35	30	2508	209
# 9°C WAT exceeded			0					
% Compliance WAT								
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: BCCDOW GPS Coordinates: 39.6425°N, 105.3084°W; Sampling/ monitoring site at bridge above the Bear Creek Cabins WWTP effluent discharge, at the CDOW fish survey site.]

Table 39 O'Fallon Park (Site 9)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.63	8.2	6.99	90.7	329	22
Max	8.52	17	11.75	147.6	501	60
Avg	8.2	12.1	9.5	121.7	410.7	32.2
Std. Dev.	0.28	3.21	1.60	19.84	61.22	13.90

Measurements	6	6	6	6	6	6	6
Datalogger Temperature Data 2016							
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASONS	Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	0.00	1.3	0.51	0.02	0.09	4.7	4.2
Max	9.93	23.0	6.87	9.86	9.86	18.7	22.9
Avg	3.66	12.5	3.62	3.66	5.23	12.4	14.8
Std. Dev.	2.66	4.6	2.25	2.65	3.09	4.3	4.7
Measurements	1657	10032	5	414	35	30	209
# 9°C WAT exceeded			0				
% Compliance WAT			100%				
# 13°C DM exceeded					0		
% Compliance DM					100%		
# 19.3°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Datalogger ID: OFPDOW GPS Coordinates: 39.6564°N, 105.2917°W; Sampling/ monitoring site north side of the creek above ETU restoration site, at the CDOW fish survey site.]

Table 40 **Lair o' the Bear (Site 12)**

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L		Total Phosphorus ug/L	
Min	7.87	7.7	7.28	110.1	348		23	
Max	8.34	17	11.73	230	729		94	
Avg	8.1	12.6	9.6	167.7	543.2		41.0	
Std. Dev.	0.14	3.51	1.56	41.91	110.46		24.26	
Measurements	6	6	6	6	6		6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/WARM SEASON		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	NO DATA	0.5	NO DATA	NO DATA		4.8	0.6	4.4
Max		22.9				18.3	22.7	22.7
Avg		12.9				13.0	12.9	15.3
Std. Dev.		4.9				4.6	4.9	5.0
Measurements		7312				22	1828	153
# 9°C WAT exceeded								
% Compliance WAT								
# 13°C DM exceeded								
% Compliance DM								
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: LOBDOW GPS Coordinates: 39.6672°N, 105.2687°W; Sampling/ monitoring site in Bear Creek at the end of main path to Bear Creek from the parking lot, at the CDOW fish survey site.]

Table 41 **Idledale (Shady Lane-Site 13a)**

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.86	7.6	7.31	115	400	26
Max	8.29	17.3	11.63	217.4	663	75
Avg	8.1	12.9	9.6	169.9	545.3	40.5

Std. Dev.	0.13		3.58	1.53	38.87	86.49	17.54	
Measurements	6		6	6	6	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31. 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	0.0	0.0	0.0	0.0	0.0	4.6	0.0	4.6
Max	7.8	22.8	3.6	7.6	7.6	18.7	22.7	22.7
Avg	2.3	12.9	2.2	2.3	3.8	12.8	12.9	15.2
Std. Dev.	2.1	5.1	1.2	2.1	2.4	4.8	5.1	5.1
Measurements	2251	7584	6	563	48	22	1896	158
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: IDLE GPS Coordinates: 39.6621°N, 105.2406°W; Sampling/ monitoring site in Bear Creek at the CDOW fish survey site.]

Table 42 West End of Morrison (Site 14a)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Parameter Results	pH, SU		Temp °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.9		0	7.57	112.8	344	21	
Max	8.65		16.9	15.52	245.5	545	91	
Avg	8.2		10.5	10.9	184.8	487.0	38.7	
Std. Dev.	0.21		5.86	2.36	45.28	66.26	24.43	
Measurements	8		8	8	8	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	0.00	-0.28	0.04	0.02	0.03	4.96	-0.10	1.00
Max	8.67	22.01	6.39	8.62	8.62	18.93	21.83	21.83
Avg	3.15	12.90	3.13	3.15	4.26	13.06	12.90	14.69
Std. Dev.	2.38	4.75	1.85	2.38	2.51	4.31	4.74	4.72
Measurements	2953	9550	8	738	62	28	2386	200
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: MORR10 GPS Coordinates: 39.6529°N, 105.2003°W; Sampling/ monitoring site west end of Morrison, at the gated bridge to Denver Mountain Parks Headquarters, at the CDOW fish survey site]

Table 43 East End of Morrison (Site 14c)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016						
Monthly Parameter Results	pH, SU	Temp °C	D. O., mg/L	Sp. Cd., mS/cm	CU ug/L	CaCO3 mg/L
Min	7.87	0.5	7.7	149.3	1.1	50
Max	8.38	17.1	14.08	334.7	4.7	104
Avg	8.1	10.6	10.6	232.7	1.9	79.8
Std. Dev.	0.15	5.70	2.01	60.43	1.13	18.31
Measurements	8	8	8	8	8	8

Segment 1b (Below Harriman Diversion SUMMARY) (Site 15a)

Segment 1b Sampling/Monitoring Summary 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.7		0.4	7.4	168.7	508	14	
Max	8.9		16.7	15.4	403.3	1390	104	
Avg	8.3		9.1	10.3	283.6	894.7	33.3	
Std. Dev.	0.34		5.88	2.15	74.06	228.47	21.86	
Measurements	15		15	15	15	15	15	
Segment 1b Data Logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	-0.1	0.0	2.8	0.0	0.0	5.2	0.1	4.7
Max	10.5	21.7	4.3	10.5	10.5	19.0	21.6	21.6
Avg	4.2	12.8	3.8	4.2	5.9	12.9	12.8	14.7
Std. Dev.	2.5	4.6	0.7	2.5	2.4	4.3	4.6	4.4
Measurements	2757	10272	3	689	58	30	2568	214
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: MORR11 GPS Coordinates: 39.6522 °N, 105.1731 °W; Monitoring site in Bear Creek near USGS gage in Bear Creek Park.]

Table 44 Segment 3 Summary

Segment 3 Sampling/Monitoring Summary 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.7		3.1	7.34	54.4	91	4	
Max	8.89		12.7	12.55	116.4	245	92	
Avg	8.30		8.50	10.01	81.44	154.55	33.18	
Std. Dev.	0.39		2.98	1.45	18.29	45.50	24.65	
Measurements	11		11	11	11	11	11	
Segment 3 Data logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (17.0°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (21.2°C)
Min	-0.1	4.4	0.8	-0.1	0.1	9.1	4.5	9.8
Max	12.2	19.2	7.0	12.0	12.0	15.4	19.1	19.1
Avg	4.4	12.0	4.3	4.4	6.9	12.0	12.0	14.7
Std. Dev.	2.85	2.7	1.91	2.83	2.94	1.7	2.7	2.1

Measurements	9355	11712	26	2337	194	34	2928	244
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

Table 45 Mt. Evans Wilderness Drainage, Vance Creek (Site 25)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L		
Min	7.93	3.1	8.3	63.8	91	4		
Max	8.89	9.7	12.55	86.9	210	92		
Avg	8.5	7.3	10.7	74.9	140.2	27.3		
Std. Dev.	0.36	2.51	1.43	8.06	39.76	29.90		
Measurements	6	6	6	6	6	6		
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (21.2°C)
Min	0.0	4.4	0.8	0.0	0.1	9.1	4.5	10.2
Max	12.2	18.9	6.2	12.0	12.0	13.9	18.8	18.8
Avg	3.9	11.4	3.7	3.9	6.7	11.5	11.4	14.5
Std. Dev.	3.13	2.7	1.99	3.11	3.46	1.3	2.6	1.8
Measurements	5059	5856	14	1264	105	17	1464	122
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: ALKMEL GPS Coordinates: 39.6322°N, 105.4558°W; Sampling/ monitoring site in Vance Creek.]

Table 46 Yankee Creek @ Mouth to Bear Creek (Site 89)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.7	4.9	7.34	54.4	109	32
Max	8.44	12.7	10.32	116.4	245	133
Avg	8.1	10.0	9.2	89.3	171.8	61.8
Std. Dev.	0.27	2.81	0.99	23.33	45.95	37.19
Measurements	5	5	5	5	5	5
Data logger Temperature Data 2016						

All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1- Sept 30 2- HR Avg. Temp.	June 1- Sept 30 DM (21.2°C)
Min	-0.1	5.2	2.1	-0.1	0.8	9.1	5.3	9.8
Max	11.2	19.2	48.2	11.0	11.0	15.4	19.1	19.1
Avg	4.9	12.6	5.7	5.0	6.9	12.6	12.6	14.9
Std. Dev.	2.3	2.6	11.6	2.3	2.2	1.8	2.6	2.3
Measurements	4296	5856	13	1073	89	17	1464	122
# 9°C WAT exceeded			1					
% Compliance WAT			92%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17.0°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.0 °C DM exceeded								0
% Compliance DM								100%

Monitoring station/Datalogger ID: Yankee Creek GPS Coordinates: 39.6322°N, 105.4558°W; Sampling/ monitoring site in Yankee Creek.]

Segment 5 (Cub Creek)

Table 47 Segment 5 Summary

Segment 5 Sampling/Monitoring Summary 2016								
Monthly Parameter Results	pH, SU		Temp °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.44		3	6.99	48.9	135	15	
Max	8.7		17.4	12.35	783	1739	133	
Avg	8.07		11.01	9.50	403.68	786.33	61.75	
Std. Dev.	0.32		3.56	1.42	287.18	464.53	34.64	
Measurements	24		24	24	24	24	24	
Segment 5 Data logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	2.2	-0.1		2.3	7.3	2.4	-0.1	1.3
Max	8.1	20.5		7.8	7.8	15.7	20.3	20.3
Avg	5.2	9.8		5.3	7.5	9.7	9.8	12.5
Std. Dev.	1.5	4.6		1.4	0.2	4.1	4.6	4.5
Measurements	118	10032		29	2	30	2508	209
9°C WAT exceeded								
% Compliance WAT								
13°C DM exceeded					0			
% Compliance DM					100%			
17.0°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.0 °C DM exceeded								0
% Compliance DM								100%

Table 48 Little Cub Creek above Brook Forest Inn (Site 35)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Parameter Results	pH, SU	Tem p, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L		
Min	8.17	3	11	70.8	473	113		
Max	8.17	3	11	70.8	473	113		
Avg	8.2	3.0	11.0	70.8	473.0	113.0		
Std. Dev.	0.00	0.00	0.00	0.00	0.00	0.00		
Measurements	1	1	1	1	1	1		
Data logger Temperature Data 2016 LOGGER STOLEN								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON.	Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)	
Min	LOGGER REMOVED FROM FLOW BY NON BCWA PESONNEL							
Max								
Avg								
Std. Dev.								
Measurements								
18.2°C WAT exceeded								
% Compliance WAT								
23.8°C DM exceeded								
% Compliance DM								
9°C WAT exceeded								
% Compliance WAT								
13°C DM exceeded								
% Compliance DM								

[Monitoring station/Datalogger ID: (ABFI) GPS Coordinates: 39.5795°N, 105.3817°W; Sampling/ monitoring site in Little Cub Creek above Brook Forest Inn WWTP discharge.] **LOGGER STOLEN**

Table 49 Cub Creek Park on Little Cub Creek (site 50)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.81		6.7	7.3	70.4	135	22	
Max	8.45		17.4	11.53	185.5	644	65	
Avg	8.1		12.4	9.5	136.1	323.2	43.3	
Std. Dev.	0.19		3.56	1.44	40.75	176.76	14.37	
Measurements	6		6	6	6	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (21.2°C)
Min	2.2	-0.1		2.3	7.3	2.4	-0.1	1.3
Max	8.1	20.5		7.8	7.8	15.7	20.3	20.3
Avg	5.2	9.8		5.3	7.5	9.7	9.8	12.5
Std. Dev.	1.5	4.6		1.4	0.2	4.1	4.6	4.5
Measurements	118	10032		29	2	30	2508	209
9°C WAT exceeded								
% Compliance WAT								
13°C DM exceeded					0			
% Compliance DM					100%			
17°C WAT exceeded						0		
% Compliance WAT						100%		
21.2°C DM exceeded								0
% Compliance DM								100%

Table 50 Upper Troublesome Creek (site 64)

6 Monthly Sampling/Monitoring Events May 1- October 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.51	5.5	7.89	648.2	547	25
Max	8.7	14	11.85	783	794	87
Avg	8.2	10.5	9.6	717.9	639.7	49.3
Std. Dev.	0.40	2.86	1.33	55.48	78.97	20.37
Measurements	6	6	6	6	6	6

Table 51 Lower Troublesome Creek (Site 32)

6 Monthly Sampling/Monitoring Events May 1- October 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.44	7.3	8.27	568.2	728	75
Max	8.27	15.4	12.35	738	1739	118
Avg	7.9	11.6	9.9	653.3	1391.8	97.2
Std. Dev.	0.29	3.09	1.46	57.40	325.72	13.75
Measurements	6	6	6	6	6	6

Table 52 Upper Cub Creek @ Sullivan Rd (Site 88)

6 Monthly Sampling/Monitoring Events May 1- October 31, 2016						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.52	6.9	6.99	48.9	266	15
Max	8.33	16	10.32	154.2	1296	133
Avg	8.0	10.9	8.7	114.7	854.2	46.0
Std. Dev.	0.33	2.97	1.12	38.03	340.67	43.77
Measurements	5	5	5	5	5	5

Turkey Creek Stream Segments**Segment 6a South Turkey Creek****Table 53 Segment 6a Summary**

Segment 6a Sampling/Monitoring Summary 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.30		1.00	6.01	111.40	335	2	
Max	8.89		19.40	15.70	2121	1059	107	
Avg	8.04		10.58	9.87	1090.41	811.52	39.57	
Std. Dev.	0.44		5.24	2.40	528.88	185.27	32.95	
Measurements	21		21	21	21	21	21	
Data logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	0.4	0.0	4.1	0.6	4.0	3.1	0.0	0.0
Max	12.6	24.6	11.0	12.5	12.5	17.5	24.5	24.5
Avg	6.3	12.0	6.6	6.3	8.0	12.0	12.0	14.6
Std. Dev.	3.0	4.8	2.4	3.0	2.4	4.3	4.8	4.7
Measurements	2878	19968	8	718	60	58	4992	416
# 9°C WAT exceeded			2					
% Compliance WAT			75%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								1
% Compliance DM								99.76%

Table 54 South Turkey Creek in Bear Creek Lake Park (Site 16a)

Table 34 South Turkey Creek in Bear Creek Lake Park (Site 100)

15 Monthly Sampling/Monitoring Events January 1-December 31, 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.3		1.0	7.6	111.4	581	2	
Max	8.9		15.5	13.8	2,121.0	1059	90	
Avg	8.0		9.6	10.0	1,139.6	880.6	24.5	
Std. Dev.	0.49		5.04	1.62	574.15	143.21	22.34	
Measurements	15		15	15	15	15	15	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	0.4	0.3	4.1	0.6	4.0	3.8	0.6	2.1
Max	12.6	21.0	11.0	12.5	12.5	17.5	20.9	20.9
Avg	6.4	12.5	6.6	6.4	8.0	12.5	12.5	14.3
Std. Dev.	3.1	4.4	2.4	3.1	2.4	4.1	4.4	4.3
Measurements	2759	10272	8	689	58	30	2568	214
# 9°C WAT exceeded			2					
% Compliance WAT			75%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Datalogger ID: TURK2 GPS Coordinates: 39.6394°N, 105.161°W; Sampling/ monitoring site in Turkey Creek, inside Bear Creek Lake Park, at the maintenance shop site.]

Table 55 Aspen Park Metropolitan District, South Turkey Creek (Site 18)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.65		7	6.01	319	335	35	
Max	8.46		19.4	15.7	1373	812	107	
Avg	8.1		13.0	9.5	967.3	638.8	77.2	
Std. Dev.	0.28		4.92	3.66	365.60	164.69	23.95	
Measurements	6		6	6	6	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. COLD/WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	1.8	0.0		1.9	7.5	3.1	0.0	0.0
Max	8.2	24.6		8.2	8.2	17.4	24.5	24.5
Avg	5.0	11.3		5.0	7.9	11.5	11.3	14.8
Std. Dev.	1.7	5.23		1.7	0.3	4.40	5.21	5.18
Measurements	119	9696		29	2	28	2424	202
# 9°C WAT exceeded								
% Compliance WAT								
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								1
% Compliance DM								99.5%

[Monitoring station/Datalogger ID: APMD1 GPS Coordinates: 39.5461°N, 105.2708°W; Sampling/ monitoring site in South Turkey Creek downstream of the APMD WWTP.]

Segment Summary 6b (North Turkey Creek)

Table 56 Conifer Metropolitan District, North Turkey Creek (Site19)

9 Monthly Sampling/Monitoring Events March 1-November 30, 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	8.04		5	7.79	120.1	130	16	
Max	8.36		17.4	12.11	565.8	681	103	
Avg	8.2		10.8	9.6	337.4	369.5	49.0	
Std. Dev.	0.11		4.27	1.45	177.05	180.39	29.73	
Measurements	6		6	6	6	6	6	
Data logger Temperature Data 2016								
All Temperatures in °C	30-Min Temp. Cold/ Warm Seasons		Oct 1-May 31 Stream Std. WAT (9°C)	Oct 1-May 31 2-Hr Avg. Temp.	Oct 1-May 31 Stream Std. DM (13°C)	June 1-Sept 30 Stream Std. WAT (17°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1- Sept 30 DM (21.2°C)
Min	0.0	4.6	2.0	0.0	0.1	8.7	4.6	8.5
Max	10.5	20.0	7.2	10.4	10.4	14.9	19.9	19.9
Avg	5.2	12.3	5.2	5.2	7.1	12.4	12.3	14.8
Std. Dev.	2.3	2.8	1.6	2.3	2.3	2.0	2.8	2.8
Measurements	3958	5856	11	989	82	17	1464	122
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								0
% Compliance DM								100%

Segment 1c: Bear Creek Reservoir Temperature Summary 2016

Segment 1c Data Logger Temperature Summary 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (19.3°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 Stream DM (23.8°C)
Min	2.2				5.5	2.3	3.6
Max	25.4				23.1	25.0	25.0
Avg	15.4				15.5	15.4	16.0
Std. Dev.	5.3				5.2	5.3	5.3
Measurements	34632				102	8658	720
# 9°C WAT exceeded							
% Compliance WAT							
# 13°C DM exceeded							
% Compliance DM							
# 23.3°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							8
% Compliance DM							99%

Table 57 Bear Creek Reservoir Profile Station (Site 40T 0.5)

Data logger Temperature Data 2016				
All Temperatures in °C	30-Min Temp. WARM SEASON	June 1-Sept 30 Stream Std. WAT (23.3°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (23.8°C)
Min	2.2	5.6	2.3	3.6
Max	25.4	23.1	25.0	25.0
Avg	15.6	15.7	15.6	16.4
Std. Dev.	5.4	5.2	5.4	5.4
Measurements	11544	34	2886	240
# 23.3 °C WAT exceeded		0		
% Compliance WAT		100%		
# 23.8 °C DM exceeded				7
% Compliance DM				97%

[Monitoring station/Datalogger ID: 40T (0.5) GPS Coordinates: 39° 39'06.27" N 105°08'30.60"W; Sampling/monitoring site in Bear Creek Reservoir by dam at profile station.]

Table 58 Bear Creek Reservoir Profile Station (Site 40T 1.0)

Data logger Temperature Data 2016				
All Temperatures in °C	30-Min Temp. WARM SEASON	June 1-Sept 30 Stream Std. WAT (23.3°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (23.8°C)
Min	2.2	5.5	2.6	3.6
Max	24.3	22.9	23.9	23.9
Avg	15.4	15.5	15.4	16.0
Std. Dev.	5.3	5.1	5.3	5.3
Measurements	11544	34	2886	240
# 23.3 °C WAT exceeded		0		
% Compliance WAT		100%		
# 23.8 °C DM exceeded				1
% Compliance DM				99.6%

[Monitoring station/Datalogger ID: 40T (1.0) GPS Coordinates: 39° 39'06.27"N 105°08'30.60"W; Sampling/monitoring site in Bear Creek Reservoir by dam at profile station.]

Table 59 Bear Creek Reservoir Profile Station (Site 40T 1.5)

Data logger Temperature Data 2016				
All Temperatures in °C	30-Min Temp. WARM SEASON	June 1-Sept 30 Stream Std. WAT (23.3°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (23.8°C)
Min	LOGGER LOST			
Max				
Avg				
Std. Dev.				
Measurements				
# 23.3 °C WAT exceeded				
% Compliance WAT				
# 23.8 °C DM exceeded				
% Compliance DM				

[Monitoring station/Datalogger ID: 40T (1.5) GPS Coordinates: 39° 39'06.27"N 105°08'30.60"W; Sampling/monitoring site in Bear Creek Reservoir by dam at profile station.]

Table 60 Bear Creek Reservoir Profile Station (Site 40T 2.0)

Data logger Temperature Data 2016				
All Temperatures in °C	30-Min Temp. WARM SEASON	June 1-Sept 30 Stream Std. WAT (23.3°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (23.8°C)
Min	3.1	5.6	3.1	3.7

Data logger Temperature Data 2016				
All Temperatures in °C	30-Min Temp. WARM SEASON	June 1-Sept 30 Stream Std. WAT (23.3°C)	June 1-Sept 30 2-HR Avg. Temp.	June 1-Sept 30 DM (23.8°C)
Max	23.6	22.8	23.4	23.4
Avg	15.2	15.4	15.2	15.7
Std. Dev.	5.3	5.2	5.3	5.2
Measurements	11544	34	2886	240
# 23.3 °C WAT exceeded		0		
% Compliance WAT		100%		
# 23.8 °C DM exceeded				0
% Compliance DM				100%

[Monitoring station/Datalogger ID: 40T (2.0) GPS Coordinates: 39° 39'06.27"N 105°08'30.60"W; Sampling/monitoring site in Bear Creek Reservoir by dam at profile station.]

Bear Creek Segment 2

Table 61 Summary (sites 45 and 90)

Segment 2 Sampling/Monitoring Summary 2016								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.61		2.6	5.02	261.4	346	8	
Max	9.03		22.5	15.24	795.6	1296	102	
Avg	8.17		13.62	9.30	477.56	822.57	41.80	
Std. Dev.	0.32		6.91	2.16	151.12	262.69	26.59	
Measurements	30		30	30	30	30	30	
Data logger Temperature Summary 2016								
All Temperatures in °C	30-Min Temp. COLD/WARM SEASONS		Nov 1-Mar 31 Stream Std. WAT (13.7°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (14.3°C)	Apr 1-Oct 31 Stream Std. WAT (27.5°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (28.6°C)
Min	1.62	-2.3		1.6	2.1	5.8	-1.6	3.7
Max	4.32	29.2		4.0	4.0	22.6	26.7	26.7
Avg	2.85	13.6		2.8	3.1	13.7	13.6	15.3
Std. Dev.	0.97	5.7		1.0	0.9	5.5	5.7	6.0
Measurements	45	23705		10	2	69	5925	495
# 9°C WAT exceeded								
% Compliance WAT								
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

Table 62 Site 90 West of Wadsworth bridge

15 Monthly Sampling/Monitoring Events January 1-December 31, 2016							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.6	3.1	7.1	319.5	346	12	
Max	8.5	21.9	15.2	795.6	1296	102	
Avg	8.1	13.4	10.0	537.2	899.6	44.2	
Std. Dev.	0.23	6.82	1.96	148.45	246.12	28.84	
Measurements	15	15	15	15	15	15	
Data logger Temperature Data 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)

15 Monthly Sampling/Monitoring Events January 1-December 31, 2016							
Min	1.4				6.2	1.6	3.7
Max	27.0				21.9	26.7	26.7
Avg	13.8				14.0	13.8	15.9
Std. Dev.	5.7				5.3	5.7	6.0
Measurements	13008				38	3252	271
# 9°C WAT exceeded							
% Compliance WAT							
# 13°C DM exceeded							
% Compliance DM							
# 18.2°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

Table 63 Site 45 Below Trace Weir at spillway of Bear Creek Reservoir

15 Monthly Sampling/Monitoring Events January 1-December 31, 2016							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.7	2.6	5.0	261.4	402	8	
Max	9.0	22.5	13.2	670.3	1193	97	
Avg	8.3	13.8	8.6	417.9	745.5	39.4	
Std. Dev.	0.38	6.99	2.13	128.54	256.06	23.88	
Measurements	15	15	15	15	15	15	
Data logger Temperature Data 2016							
All Temperatures in °C	30-Min Temp. WARM SEASON	Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT (18.2°C)	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	-2.3				5.8	-1.6	5.7
Max	29.2				22.6	26.1	26.1
Avg	13.3				13.4	13.3	14.5
Std. Dev.	5.7				5.7	5.7	5.8
Measurements	10697				31	2673	224
# 9°C WAT exceeded							
% Compliance WAT							
# 13°C DM exceeded							
% Compliance DM							
# 18.2°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

USGS Stream Flow Data Tables

During the Program, stream flows for Bear Creek were tracked using three gaging stations. The stations are the USGS station above Evergreen Lake (Segment 1a), the DWR/U.S. Army COE station above Morrison (Segment 1e) and the USGS station within Bear Creek Lake Park (Segment 1b). Weekly downloads of flow graphs were printed to document flows. Downloads were obtained at www.waterdata.usgs.gov. The available historic record for the gage above Evergreen Lake is 25 years. The available historic record for the gage above Morrison is 90 years (1899-2006— however, permanent reliable data was recorded from 1919). The available historic record for the USGS gage in Bear Creek Lake Park is 25 years. NOTE: Operation of this gage was discontinued on September 30, 2009. For the 2009 Program period, historical Minimum, Maximum and Average were calculated. A Deviation from Historic averages was also calculated; however, when both the Minimum and Maximum values for Deviation from Historic were negative, these values are interchanged to reflect the desired interpretation.

Table 64 2016 May Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) May 2016	Historic Daily Mean Flow (cfs) 25 Years for May	Deviation from Historic Flow (cfs)
1	64	17	-47

Date	Daily Mean Flow (cfs) May 2016	Historic Daily Mean Flow (cfs) 25 Years for May	Deviation from Historic Flow (cfs)
2	72	21	-51
3	80	17	-63
4	83	20	-63
5	94	19	-75
6	103	21	-82
7	117	21	-96
8	116	25	-91
9	103	43	-60
10	100	47	-53
11	98	57	-41
12	91	57	-34
13	91	43	-48
14	97	47	-50
15	101	46	-55
16	106	57	-49
17	101	56	-45
18	96	67	-29
19	96	103	7
20	97	113	16
21	103	113	10
22	115	94	-21
23	114	104	-10
24	107	115	8
25	106	118	12
26	106	129	23
27	108	128	20
28	102	122	20
29	98	114	16
30	94	102	8
31	95	97	2
MIN	64	17	-96
MAX	117	129	23
AVG	99	69	-30

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W

Table 65 2016 June Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) June 2016	Historic Daily Mean Flow (cfs) 25 Years for June	Deviation from Historic Flow (cfs)
1	98	134	36.0
2	100	160	60.0
3	100	134	34.0
4	101	126	25.0
5	104	142	38.0
6	112	181	69.0
7	124	174	50.0
8	118	149	31.0
9	112	143	31.0
10	108	153	45.0
11	104	153	49.0
12	106	150	44.0
13	114	140	26.0
14	112	161	49.0
15	102	138	36.0
16	98	157	59.0
17	91	140	49.0
18	86	125	39.0
19	84	116	32.0

Date	Daily Mean Flow (cfs) June 2016	Historic Daily Mean Flow (cfs) 25 Years for June	Deviation from Historic Flow (cfs)
20	87	110	23.0
21	116	108	-8.0
22	93	106	13.0
23	105	100	-5.0
24	89	95	6.0
25	84	86	2.0
26	78	78	0.0
27	72	74	2.0
28	68	73	5.0
29	66	73	7.0
30	65	77	12.0
MIN	65	73	-8
MAX	124	181	69
AVG	97	125	29

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W

Table 66 2016 July Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) July 2016	Historic Daily Mean Flow (cfs) 25 Years for July	Deviation from Historic Flow (cfs)
1	108	69	-37
2	95	65	-30
3	89	64	-25
4	73	61	-12
5	74	56	-18
6	65	54	-11
7	60	54	-6
8	57	60	3
9	55	58	3
10	52	75	23
11	50	62	12
12	49	61	12
13	47	63	16
14	45	53	8
15	44	49	5
16	43	46	3
17	41	48	7
18	41	50	9
19	43	54	11
20	47	50	3
21	45	55	10
22	42	67	25
23	39	100	61
24	37	99	62
25	35	88	53
26	33	89	56
27	33	81	48
28	32	71	39
29	31	66	35
30	31	64	33
31	29	62	33
MIN	29	46	-37
MAX	95	100	62
AVG	49	64	14

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W

Table 67 **2016 August Bear Creek Evergreen vs. Historic Bear Creek Flow**

Date	Daily Mean Flow (cfs) August 2016	Historic Daily Mean Flow (cfs) 25 Years for August	Deviation from Historic Flow (cfs)
1	32	69	37
2	29	72	43
3	28	108	80
4	27	152	125
5	29	105	76
6	32	100	68
7	30	102	72
8	29	92	63
9	26	95	69
10	25	93	68
11	26	99	73
12	24	100	76
13	23	100	77
14	22	96	74
15	21	86	65
16	23	82	59
17	23	78	55
18	21	76	55
19	24	97	73
20	27	90	63
21	23	83	60
22	21	74	53
23	20	71	51
24	24	69	45
25	27	68	41
26	34	71	37
27	26	71	45
28	22	89	67
29	23	84	61
30	22	69	47
31	23	65	42
MIN	20	65	37
MAX	34	152	125
AVG	25	87	62

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W

Table 68 **2016 September Bear Creek Evergreen vs. Historic Bear Creek Flow**

Date	Daily Mean Flow (cfs) September 2016	Historic Daily Mean Flow (cfs) 25 Years for September	Deviation from Historic Flow (cfs)
1	22	62	40
2	22	65	43
3	21	68	47
4	20	61	41
5	19	58	39
6	18	56	38
7	17	55	38
8	17	59	42
9	16	52	36
10	16	53	37
11	16	53	37
12	16	61	45
13	18	67	49
14	20	54	34
15	18	50	32
16	17	48	31
17	17	47	30

Date	Daily Mean Flow (cfs) September 2016	Historic Daily Mean Flow (cfs) 25 Years for September	Deviation from Historic Flow (cfs)
18	16	47	31
19	16	47	31
20	15	45	30
21	15	43	28
22	15	41	26
23	15	40	25
24	14	39	25
25	15	39	24
26	15	38	23
27	15	37	22
28	14	36	22
29	14	35	21
30	14	47	33
MIN	14	35	21
MAX	22	68	49
AVG	17	50	33

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W

Table 69 2016 May Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) May 2016	Historic Daily Mean Flow (cfs) 25Years for May	Deviation from Historic Flow (cfs)
1	123	27.7	-95.3
2	128	30.3	-97.7
3	155	28.3	-126.7
4	157	31.7	-125.3
5	170	33.3	-136.7
6	188	32.7	-155.3
7	218	32.9	-185.1
8	200	35.2	-164.8
9	170	50.9	-119.1
10	159	56.8	-102.2
11	149	66.3	-82.7
12	131	67.7	-63.3
13	126	55.2	-70.8
14	130	57.9	-72.1
15	134	60.8	-73.2
16	143	84.2	-58.8
17	143	81.9	-61.1
18	127	81.3	-45.7
19	125	109	-16
20	122	120	-2
21	124	123	-1
22	132	102	-30
23	133	119	-14
24	124	134	10
25	122	139	17
26	120	146	26
27	128	143	15
28	123	137	14
29	108	128	20
30	105	117	12
31	104	109	
MIN	104	27.7	-185.1
MAX	218	146	26
AVG	139	82	-57

USGS 06710500 GPS Coordinates: 39.6530°N, 105.1950°W

Table 70 **2016 June Bear Creek Morrison vs. Historic Bear Creek Flow**

Date	Daily Mean Flow (cfs) June 2016	Historic Daily Mean Flow (cfs) 25 Years for June	Deviation from Historic Flow (cfs)
1	106	174	68
2	107	212	105
3	103	167	64
4	106	155	49
5	109	159	50
6	117	188	71
7	134	209	75
8	128		-128
9	117		-117
10	113	148	35
11	107	153	46
12	109	140	31
13	125	136	11
14	121	140	19
15	101	134	33
16	97.5	136	38.5
17	93.6	134	40.4
18	90.9	121	30.1
19	90.1	116	25.9
20	89.4	109	19.6
21	123	112	-11
22	99.5	117	17.5
23	111	109	-2
24	92.7	101	8.3
25	86	94.6	8.6
26	81.3	86.7	5.4
27	74.6	82.4	7.8
28	71.1	81.8	10.7
29	67.7	80.6	12.9
30	68.8	84.3	15.5
MIN	67.7	80.6	-128
MAX	134	212	105
AVG	101	131	21

USGS 06710500 GPS Coordinates: 39.6530°N, 105.1950°W

Table 71 **2016 July Bear Creek Morrison vs. Historic Bear Creek Flow**

Date	Daily Mean Flow (cfs) July 2016	Historic Daily Mean Flow (cfs) 25 Years for July	Deviation from Historic Flow (cfs)
1	112	78.6	-33.4
2	113	74.3	-38.7
3	98.8	73.3	-25.5
4	78.1	73.2	-4.9
5	79.1	67.2	-11.9
6	72.2	64.6	-7.6
7	65.7	63.9	-1.8
8	63.9	72.1	8.2
9	60.8	72.3	11.5
10	56.3	86.7	30.4
11	53.1	67.1	14
12	51.4	63.5	12.1
13	48.1	62.6	14.5
14	44.7	55.8	11.1
15	44.8	49.8	5
16	44.2	47.3	3.1
17	40.6	47.6	7
18	41.3	49	7.7

Date	Daily Mean Flow (cfs) July 2016	Historic Daily Mean Flow (cfs) 25 Years for July	Deviation from Historic Flow (cfs)
19	42.8	55.6	12.8
20	47.9	54.2	6.3
21	45.6	56.4	10.8
22	44.9	63.9	19
23	42.4	91.5	49.1
24	39.6	100	60.4
25	36	93.9	57.9
26	33.7	91.6	57.9
27	33.2	83.2	50
28	30.2	75	44.8
29	29.3	68.8	39.5
30	27.6	66.4	38.8
31	27.2	66.5	39.3
MIN	27.2	47.3	-38.7
MAX	113	100	60.4
AVG	53	69	16

USGS 06710500 GPS Coordinates: 39.6530°N, 105.1950°W

Table 72 2016 August Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) August 2016	Historic Daily Mean Flow (cfs) 25 Years for August	Deviation from Historic Flow (cfs)
1	28.8	68.8	40
2	25.8	74.8	49
3	24.5	109	84.5
4	23	157	134
5	26.4	114	87.6
6	33.1	102	68.9
7	31.7	102	70.3
8	27.6	91.7	64.1
9	24.8	94.7	69.9
10	23	93.4	70.4
11	22.8	96.5	73.7
12	22.2	97.4	75.2
13	20.1	99.3	79.2
14	18.9	95.1	76.2
15	18.3	85.9	67.6
16	17.9	83.1	65.2
17	25.7	80.8	55.1
18	19.9	78.9	59
19	22.1	92	69.9
20	28.6	91.3	62.7
21	22.8	84.2	61.4
22	19.3	79.3	60
23	17.9	76	58.1
24	21.8	75.1	53.3
25	29.8	73.1	43.3
26	34.3	75	40.7
27	29.7	72.3	42.6
28	23.4	87.3	63.9
29	22	90.2	68.2
30	24.3	74.4	50.1
31	22.8	70.4	47.6
MIN	17.9	68.8	40
MAX	34.3	157	134
AVG	24	89	65

USGS 06710500 GPS Coordinates: 39.6530°N, 105.1950°W

Table 73 **2016 September Bear Creek Morrison vs. Historic Bear Creek Flow**

Date	Daily Mean Flow (cfs) September 2016	Historic Daily Mean Flow (cfs) 25 Years for September	Deviation from Historic Flow (cfs)
1	22.2	67.7	45.5
2	22.3	69.8	47.5
3	20.1	74.5	54.4
4	19.8	69	49.2
5	19	63.7	44.7
6	17.1	56.3	39.2
7	17.8	55.9	38.1
8	16.6	60.1	43.5
9	16.1	54	37.9
10	15.9	53.3	37.4
11	15.9	55.6	39.7
12	15.4	58.9	43.5
13	17.2	69.5	52.3
14	20.1	58.3	38.2
15	18.3	53.4	35.1
16	16.7	50.4	33.7
17	16.2	48.2	32
18	15.7	47.7	32
19	14.9	48.3	33.4
20	14.7	45.8	31.1
21	14.3	44.4	30.1
22	15	42.5	27.5
23	15.5	42.9	27.4
24	14.1	40.8	26.7
25	14.9	40.7	25.8
26	15.1	40.1	25
27	15.2	38.2	23
28	15	37	22
29	14.6	35.7	21.1
30	15	51.4	36.4
MIN	14.1	35.7	21.1
MAX	22.3	74.5	54.4
AVG	17	52	36

USGS 06710500 GPS Coordinates: 39.6530°N, 105.1950°W

Weather Data

Local weather data was documented at the Evergreen Metropolitan District's WWTP. The plant has been operating the National Weather Service reporting station since EMD assumed operations of the plant in 1974. Online historical records however, are available from 1961 through 2006. Historical weather data obtained from the National Oceanographic and Atmospheric Administration/National Weather Service, High Plains Climate Center.

Maximum and minimum air temperature values along with precipitation measurements recorded each morning. Daily readings entered into a NWS software program. Local weather statistics are summarized, comparing 2016 monthly maximum, minimum and mean air temperatures and monthly precipitation to 53-year (1961-2014) historical data.

Table 74 **Weather Data May-September 2016 Summary**

Monthly Weather Data	May 2016	June 2016	July 2016	August 2016	September 2016
Air Temp Low Max (°F)	41	54	56	56	47
Air Temp High Max (°F)	78	92	92	87	85
Air Temp High Avg (°F)	60.52	80.24	82.90	77.60	74.67
Total Precip (in.)	1.06	1.21	1.88	1.66	0.26
Days of Precip.	10	12	10	16	3

Table 75 2016 Weather Data vs. Historical Weather Data (55 years 1961-2016)

	Avg. Daily Max (°F)	Avg Daily Min (°F)	Avg. Monthly (°F)	Precip. (in.)
May 2016	60.52	33.19	46.85	1.06
May Hist	65.2	33.9	49.6	2.57
% Deviation	93%	98%	94%	41%
June 2016	80.24	46.07	63.16	1.21
June Hist	75.3	41.1	58.2	2.14
% Deviation	107%	112%	109%	57%
July 2016	82.90	48.06	65.48	1.88
July Hist	81.6	46.8	64.2	2.23
% Deviation	102%	103%	102%	84%
August 2016	77.60	45.13	61.37	1.66
August Hist	79.3	45.3	62.4	2.31
% Deviation	98%	100%	98%	72%
Sept. 2016	74.31	38.12	56.21	0.26
Sept. Hist	72.1	37.1	56.57	1.47
% Deviation	103%	103%	99%	18%

Stream Flow vs. Local Weather

Stream flows, as measured at the USGS gage above Evergreen Lake, were compared to local weather observations obtained from the NWS reporting station located at the EMD WWTP. The following tables illustrate the relationship between high air temperatures and measured precipitation, and their effect on stream flows measured above Evergreen Lake.

Table 76 2016 May Bear Creek Evergreen vs. Weather Data

Date	May 2016 Daily Mean Flow (cfs)	May 2016 Daily Air Max Temp (°F)	May 2016 Precip. (in.)
1	64	33	0.14
2	72	34	0
3	80	54	0
4	83	61	0
5	94	69	0
6	103	74	0
7	117	72	0
8	116	57	0.13
9	103	57	0.02
10	100	63	0
11	98	60	0
12	91	56	0
13	91	66	0
14	97	69	0
15	101	50	0
16	106	60	0.01
17	101	43	0.32
18	96	39	0.03
19	96	58	0
20	97	68	0
21	103	72	0
22	115	78	0
23	114	66	0
24	107	60	0
25	106	66	0.02
26	106	68	0
27	108	57	0.08
28	102	54	0.3
29	98	67	0.01
30	94	70	0
31	95	75	T
MIN	64	33	0

Date	May 2016 Daily Mean Flow (cfs)	May 2016 Daily Air Max Temp (°F)	May 2016 Precip. (in.)
MAX	117	78	0.32
AVG	99	60.52	0.04
TOTAL			1.06

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W Daily Mean flows were obtained from the USGS gaging station above Evergreen Lake. Weather data obtained from the NWS reporting station located at the EMD WWTP.

Table 77 **2016 June Bear Creek Evergreen vs. Weather Data**

Date	June 2016 Daily Mean Flow (cfs)	June 2016 Daily Max Air Temp (°F)	June 2016 Precip. (in.)
1	98	62	0.04
2	100	68	0.01
3	100	80	0
4	101	74	0
5	104	73	0
6	112	M	T
7	124	79	0.21
8	118	73	0.01
9	112	79	0.01
10	108	82	0
11	104	86	0
12	106	85	0.04
13	114	79	0
14	112	70	0.54
15	102	78	0
16	98	84	0
17	91	87	0
18	86	81	0
19	84	87	0
20	87	92	0
21	116	74	0.16
22	93	91	0.01
23	105	76	0.1
24	89	82	0.01
25	84	86	0
26	78	79	0.07
27	72	84	0
28	68	85	0
29	66	85	0
30	65	86	0
MIN	65.0	62	0
MAX	124.0	92	0.54
AVG	97	80.24	0.04
TOTAL			1.21

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W Daily Mean flows were obtained from the USGS gaging station above Evergreen Lake. Weather data obtained from the NWS reporting station located at the EMD WWTP.

Table 78 **2016 July Bear Creek Evergreen vs. Weather Data**

Date	July 2016 Daily Mean Flow (cfs)	July 2016 Daily Max Air Temp (°F)	July 2016 Precip. (in.)
1	108	72	0.48
2	95	70	0.44
3	89	69	0.13
4	73	82	0
5	74	83	0.01
6	65	86	0
7	60	88	0
8	57	82	0

Date	July 2016 Daily Mean Flow (cfs)	July 2016 Daily Max Air Temp (°F)	July 2016 Precip (in.)
9	55	82	0
10	52	89	0
11	50	92	0
12	49	84	0
13	47	83	0
14	45	83	0
15	44	75	0
16	43	81	0.23
17	41	88	0
18	41	81	0
19	43	85	0.02
20	47	81	0.12
21	45	83	0.01
22	42	86	0
23	39	84	0.38
24	37	89	0.06
25	35	85	0
26	33	86	0
27	33	86	0
28	32	85	0
29	31	82	0
30	31	79	0
31	29	89	0
MIN	29	69	0
MAX	95	92	0.48
AVG	49	82.90	0.06
TOTAL			1.88

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W Daily Mean flows were obtained from the USGS gaging station above Evergreen Lake. Weather data obtained from the NWS reporting station located at the EMD WWTP.

- Data Missing Not Recorded

Table 79 **2016 August Bear Creek Evergreen vs. Weather Data**

Date	August 2016 Daily Mean Flow (cfs)	August 2016 Daily Max Air Temp (°F)	August 2016 Precip (in.)
1	32	85	0.2
2	29	86	0
3	28	85	0
4	27	87	0
5	29	70	0.05
6	32	64	0
7	30	75	0.07
8	29	84	0
9	26	81	0.15
10	25	87	0.01
11	26	84	0.01
12	24	81	0.12
13	23	75	0
14	22	80	0
15	21	82	0
16	23	82	0
17	23	80	0.32
18	21	81	0
19	24	77	0.08
20	27	74	0.16
21	23	68	0
22	21	81	0
23	20	83	0

Date	August 2016 Daily Mean Flow (cfs)	August 2016 Daily Max Air Temp (°F)	August 2016 Precip (in.)
24	24	77	0.02
25	27	61	0.19
26	34	63	0.11
27	26	70	0.01
28	22	74	0
29	23	77	0
30	22	M	0.02
31	23	74	0.14
MIN	20	61	0
MAX	34	87	0.32
AVG	25	77.60	0.05
TOTAL			1.66

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W Daily Mean flows were obtained from the USGS gaging station above Evergreen Lake. Weather data obtained from the NWS reporting station located at the EMD WWTP.

Table 80 **2016 September Bear Creek Evergreen vs. Weather Data**

Date	September 2016 Daily Mean Flow (cfs)	September 2016 Daily Max Air Temp (°F)	September 2016 Precip (in.)
1	22	73	0
2	22	80	0
3	21	76	0.04
4	20	79	0
5	19	81	0
6	18	84	0
7	17	77	0
8	17	80	0
9	16	81	0
10	16	70	0
11	16	76	0
12	16	85	0
13	18	67	0
14	20	56	0.18
15	18	76	0
16	17	70	0
17	17	65	0.04
18	16	73	0
19	16	82	0
20	15	82	0
21	15	82	0
22	15	74	0
23	15	69	T
24	14	79	0
25	15	63	0
26	15	62	0
27	15	71	0
28	14	75	0
29	14	74	0
30	14	78	0
MIN	14	56	0
MAX	22	85	0.18
AVG	17	74.67	0.01
TOTAL			0.26

USGS 06710385 GPS Coordinates: 39.6228°N, 105.3361°W Daily Mean flows were obtained from the USGS gaging station above Evergreen Lake. Weather data obtained from the NWS reporting station located at the EMD WWTP.