BCWA DR2017 - *BCWA Data Report*

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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 PGO29** ***Water Monitoring Program and Sample Analyses Plan Version 2017.01, BCWA January 6, 2017, 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 PGO29 Water Monitoring Program and Sample Analyses Plan Version 2017.01, BCWA January 6, 2017, 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 PGO29 Water Monitoring Program and Sample Analyses Plan Version 2017.01, BCWA January 6, 2017, 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	2017 Technical Memorandum of the Association
TM2017.01	Sediment Survey BCR
TM2017.02	UBCW Summary
TM2017.03	Coyote Gulch Summary
TM2017.04	BCR Summary Statistics and Graphs
TM2017.05	MBCW 2017 Nutrient Summary
TM2017.06	P1 Summary
TM2017.07	Barr Milton TMDL Summary
TM2017.08	EGL Summary
TM2017.09	BCR Phytoplankton Summary
TM2017.10	Fisheries
TM2017.11	Macroinvertebrates
TM2017.12	Copper Study
TM2017.13	Regulation 85 Summary

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 summaries information used in the annual report, technical memorandum, information series, fact sheets or program guidelines and operations documents.

BCWA PGO29

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 (**BCWA PGO29 Water Monitoring Program and Sample Analyses Plan Version 2017.01, BCWA January 6, 2017, and subsequent annual updates.**).

The *BCWA PGO29 Bear Creek 2017 Sample Plan Version 2017.01* 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 2017 data results are contained in the MSD*2017 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 AR*2017 BCWA Annual Report WQCC (BCWA,* May 2018*),* which also posted with previous Association annual reports.

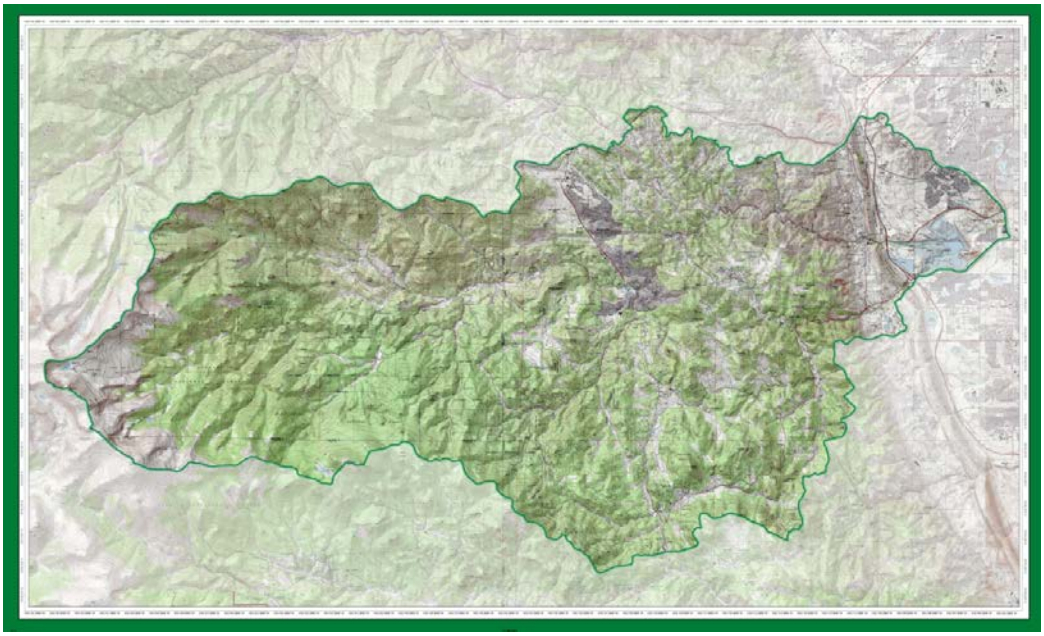

Figure 1 Bear Creek Watershed

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 extents 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 is 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 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 MSD*2017 P1-P4 Master Spreadsheet (February 2018)* 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 supplemental classroom. The Association supplies water quality and environmental materials for 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
MSD2017	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
MSD20	Cost Share Structure

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
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Fact Sheet 24	Coyote Gulch Trade Pounds
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Fact Sheet 36	Larger Mammals
Fact Sheet 37	Smaller Mammals
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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
Fact Sheet 56	Climate Model UBCW

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
Policy 36	Reservoir and Lake Management Cost Share

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 2017 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 MSD*2017 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 2018 after approval from the Association Board (Bear Creek Association March 2018). 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)]	22.5
Average Annual Chlorophyll-a [ug/l (-1m)]	12.8
Peak Chlorophyll-a [ug/l]	44.2
Total Phosphorus	
Average Annual Total Phosphorus [ug/l]: Water Column	45.0
Average Annual Total Phosphorus [ug/l] -1m	32.9
Average Annual Total Phosphorus [ug/l] -10m	57.1
Growing Season Total Phosphorus [ug/l]: Water Column	61.8
Growing Season Total Phosphorus [ug/l]: -1m	51.0
Growing Season Total Phosphorus [ug/l]: -10m	72.7
Peak Annual Total Phosphorus [ug/l] Water Column	111.0
Total Nitrogen	
Average Annual Total Nitrogen [ug/l]: Water Column	771
Average Total Nitrogen [ug/l]: -1m	74
Average Total Nitrogen [ug/l]: -10m	795
Growing Season Total Nitrogen [ug/l]: Water Column	669
Growing Season Total Nitrogen [ug/l]: -1m	680
Growing Season Total Nitrogen [ug/l]: -10m	658
Clarity (All Profiles)	
Average Annual Secchi Depth (meters)	2.17
Growing Season Average Secchi Depth (meters)	1.92
Dissolved Oxygen (site 40 Profile)	
Annual Average at -1/2m - 2m [mg/l]	9.56
Seasonal Average at -1/2 - 2m [mg/l]	7.54
Seasonal Minimum at -1/2 - 2m [mg/l]	5.02
pH	
Annual Average at -1/2m - 2m [mg/l]	8.18

Seasonal Average at -1/2 - 2m [mg/l]	8.08
Seasonal Maximum at -1/2 - 2m [mg/l]	8.03
Specific Conductance	
Annual Average at -1/2m - 2m [uS/cm]	429.5
Seasonal Average at -1/2 - 2m [uS/cm]	316.8
Seasonal Minimum at -1/2 - 2m [uS/cm]	308.8
Phytoplankton Species	
Phytoplankton Co-dominant Species - Site 40 (July-September 2017)	*Anabaena flos-aquae*
	Microcystis aeruginosa
	Cryptomonas erosa
	Diatoma vulgare
	Gomphoneis herculeana
	Melosira granulata
	Stephanodiscus niagarae
	Chlamydomonas sp.
Peak Phytoplankton	
Microcystis aeruginosa	Density cells/ml = 75,154
Microcystis aeruginosa	Peak Biovolume (um^3/mL) = 2,268,627
Loading - Annual Pounds	
Total Nitrogen -Total Load In to BCR	48,411
Total Nitrogen -Total Load From BCR	36,360
Total Nitrogen -Total Deposition into BCR	11,950
Total Phosphorus -Total Load In to BCR	6,034
Total Phosphorus -Total Load From BCR	3,051
Total Phosphorus -Total Deposition into BCR	2,983

IV. P3-Summary Bear Creek Watershed 2017 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, 2017 were replaced with other loggers that had already been returned from the manufacturer 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 downloaded after September 30, 2017. 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, and segment 1e (site 5 due to logger being pulled from flow by Non-BCWA personnel). Segment 1a (Sites 58, 2a and 3a), Segment 1b (Site 15a), Segment 1e (8a, 9, 13a, 14a), Segment 3(Site 25,

and 89), Segment 5(Site 26), Segment 6a (Site 18 and 16a), and Segment 16b (Site 19, only limited cold data is available due to logger being removed by non BCWA personnel.) 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 2017 and ended on December 31 of 2017. The data presented in this report reflects the temperature measurements collected from January 1 through December 31, 2017. (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 totals at the Evergreen Lake profile station, and 2 totals 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 2017 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.

249,574 individual temperature data points were obtained from the twenty-three 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 were723 weekly averages calculated for the program period. 62,376 two-hour blocks were averaged, and 4,916 Daily Maximum values were calculated. 87,599 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 thier permits, a data summary consisting of number of measurements and calculations, Weekly Average and Daily Average temperatures are presented.

Table 3 Bear Creek Watershed 2017 Temperature Compliance by Segment

Segment	Cold-season		Warm Season	
Segment 3	**9°C WAT**	**13°C DM**	**17°C WAT**	**21.2°C DM**
# Exceedances	0	15	0	0
% Compliance	100%	94%	100%	100%
Segment 1a	**9°C WAT**	**13°C DM**	**17°C WAT**	**21.2°C DM**
# Exceedances	3	10	0	0
% Compliance	94%	97%	100%	100%
Segment 1d	**9.0°C WAT**	**13.0°C DM**	**18.2°C WAT**	**23.8°C DM**
# Exceedances			0	0
% Compliance			100%	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	1	0	0
% Compliance	100%	99%	100%	100%
Segment 5	**9°C WAT**	**13°C DM**	**18.2°C WAT**	**23.8°C DM**
# Exceedances	0	0	0	0
% Compliance	100%	100%	100%	100%
Segment 6a	**9°C WAT**	**13°C DM**	**18.2°C WAT**	**23.8°C DM**
# Exceedances	0	1	0	0
% Compliance	100%	99%	100%	100%
Segment 6b	**9°C WAT**	**13°C DM**	**17°C WAT**	**21.2°C DM**
# Exceedances	0	0		
% Compliance	100%	100%		
Segment 2	**13.7°C WAT**	**14.3°C DM**	**27.5°C WAT**	**28.6°C DM**

Segment	Cold-season		Warm Season	
# Exceedances	0	0	0	1
% Compliance	100%	100%	100%	100%
Segment 1c	**9°C WAT**	**13°C DM**	**23.3°C WAT**	**23.8°C DM**
# Exceedances	2	0	0	0
% Compliance	0%	100%	100%	100%

NA-Indicates no logger data obtained.

Table 4 Number of Temperature Measurements (Not Including WWTP)

	30-minute Temps	Calculated WAT	2-hr Avg DM Calculations	Calculated DM
SEGMENT 1A	34019	95	8501	693
SEGMENT 1B	14422	43	3605	300
SEGMENT 1C	25486	74	6370	266
SEGMENT 1D	41208	120	10300	856
SEGMENT 1E	52472	152	13111	1098
SEGMENT 2	20186	58	5046	422
SEGMENT 3	22638	66	5591	461
SEGMENT 5	10972	32	2743	229
SEGMENT 6A	26350	77	6587	548
SEGMENT 6B	2091	6	522	43

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

- No temperature loggers were placed in either of these segments in 2017.

Segment 3 (Site 25 and 89)

- 94% of the cold season temperature data complied with the standards given for this segment and 100% of the data complied during the warm season.
- 100% of MWAT temperatures complied with stream standards in both the cold and warm seasons.

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

- 94% of the recorded temperature values for Weekly Average Temperature (WAT) complied with the cold season temperature standards of 9ºC.
- 97% of the recorded temperature values for cold season daily max(DM) of 13.0 ºC complied with the standard.
- 100% of the recorded temperature values complied with the 17.0°C Weekly Average Temperature (WAT) standard June 1 through September 30.
- 100% 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)

- 100% 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 5 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)

- 100% of the recorded temperature values for Weekly Average Temperature (WAT) complied with the cold season temperature standards of 9ºC.
- 99% of the recorded temperature values for cold season daily max(DM) of 13.0 ºC complied with the standard.
- 100% of the recorded temperature values complied with the 19.3°C Weekly Average

Temperature (WAT) standard.

- 100% of the recorded temperature values complied with the 23.8°C Daily Maximum

Segment 5 (50)

- All temperatures complied 100% with the temperature standards set for this segment for both cold and warm seasons.

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.
- 100% of the recorded temperature values complied with the 23.8°C Daily Maximum (DM) Temperature standards for CLL designation.
- 100% of the recorded temperature values complied with the 9.0°C cold season (WAT) standard
- 99% 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 cold season, noting that the logger was removed from flow and taken off site, by non BCWA personnel giving the association no warm season data.

Segment 2(Site 45)

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

Segment 1c (Site 40 Profile)

- 0% of the cold season, Weekly Average Temperature (WAT) complied with the 9ºC standard.
- 100% of the cold season daily Max Temperature (DM) complied with the standard of 13°C.
- 100% of the recorded temperature values complied with the 23.3°C Weekly Average Temperature (WAT) standards for CLL designation.
- 100% of the recorded temperatures complied with the 23.8°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 of the wastewater treatment facility discharge.

Table 5 WWTP Number of Temperature Measurements 2017

	# 30-min. measurements	# Calculated WAT	# Daily Max
EMD WWTP (1e)	17519	52	365
WJCMD WWTP (5)	17520	51	365
KSWD WWTP (1e)	17520	51	365
GWSD WWTP (5)	17520	51	365
Morrison WWTP (1b)	17520	51	365
Totals (Jan 1-Dec. 31)	87599	256	1825

Table 6 WWTP Logger summary 2017

	Cold-season		Growing Season	
Segment 1e	**9°C WAT**	**13°C DM**	**19.3°C WAT**	**23.8°C DM**
# Exceedances	21	8	11	0
% Compliance	50%	99%	82%	100%
	Cold-season		**Growing Season**	
Segment 1b	**9°C WAT**	**13°C DM**	**19.3°C WAT**	**23.8°C DM**
# Exceedances	14	26	14	4
% Compliance	33%	83%	53%	98%
Segment 5	**9°C WAT**	**13°C DM**	**18.2°C**	**23.8°C**
# Exceedances	42	50	11	0
% Compliance	0%	83%	82%	100%

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 2017 Water Quality Compliance by Segment

	Stream Std. pH (6.5-9 SU)	Stream Std. DO (6.0 mg/L 2-meter avg. for lakes)	Proposed Stream Std Total Nitrogen 1250 ug/L	Proposed Stream Std Total Phosphorous (110 ug/L)
Segment 8				
# Exceedances	1	5	1	4
# Measurements	16	16	16	16
% Compliance	94%	69%	94%	75%
Segment 7				
# Exceedances	0	0	0	0
# Measurements	4	4	4	4
% Compliance	100%	100%	100%	100%
Segment 3				
# Exceedances	0	0	0	1
# Measurements	12	12	12	12
% Compliance	100%	100%	100%	92%
Segment 1a				
# Exceedances	0	0	0	1
# Measurements	21	21	18	18
% Compliance	100%	100%	100%	94%
Segment 1d				
# Exceedances	0	0	0	1
# Measurements	69	69	12	12
% Compliance	100%	100%	100%	92%
Segment 1e				
# Exceedances	0	0	0	1
# Measurements	61	61	36	36
% Compliance	100%	100%	100%	97%
Segment 1b				
# Exceedances	0	0	2	2
# Measurements	16	16	15	15
% Compliance	100%	100%	87%	87%
Segment 5				
# Exceedances	0	0	3	2
# Measurements	18	18	18	18
% Compliance	100%	100%	83%	89%
Segment 6a				
# Exceedances	0	1	0	0
# Measurements	21	21	20	20
% Compliance	100%	95%	100%	100%
Segment 6b				
# Exceedances	0	0	0	0
# Measurements	6	6	6	6
% Compliance	100%	100%	100%	100%
Segment 4a				
# Exceedances	0	0	6	0
# Measurements	18	18	6	6
% Compliance	100%	100%	0%	100%
Segment 2				
# Exceedances	0	1	2	1
# Measurements	31	31	28	28
% Compliance	100%	97%	93%	96%

Segment 7 (Site 37, 76, 95, and 63)
94% of the measured pH and 69% of the dissolved oxygen complied with adopted water quality standards. 94% of the Total Nitrogen, and 75% of the Total Phosphorous complied with the proposed water quality standards.

Segment 8 (Sites 36)
100% of the measured parameters complied with water quality standards.

Segment 3 (Site 25and 89)
100% of the measured pH, dissolved oxygen and Total Nitrogen parameters complied with adopted and proposed water quality standards. 92% of Total Phosphorous complied with proposed water quality standards.

Segment 1a (Sites 58, 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)
100% of pH, dissolved oxygen and proposed Total Nitrogen were achieved, while 92% of the proposed water quality standard for Total Phosphorous was met in 2017.

Segment 1e (Sites 5, 8a, 9, 12, 13a and 14a)
100% of the measured parameters for pH, dissolved oxygen and Total Nitrogen complied with adopted and proposed water quality standards. While 97% of the Total Phosphorous was achieved for the proposed water quality standard.

Segment 1b (Sites 15a)
100% of all parameters measured complied with all adopted and proposed water quality standards, except Total Nitrogen which complied 87% with the proposed water quality standard of 1250ug/L and 87% of Total Phosphorous complied with the proposed water quality standard of 110 µg/L.

Segment 5 (Sites 26, 32a, and 64)
100% of the measured pH and DO values complied with the adopted water quality stream standards. 83% 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 (Sites 16a and 18)
100% of the measured pH, Total Nitrogen and Total Phosphorous parameters complied with adopted and proposed water quality standards. While 95% of dissolved oxygen complied with water quality parameters.

Segment 6b (Site 19)
100% of the measured parameters complied with adopted and proposed water quality standards

Segment 4a (sites 87/34B and 94/92)
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 (sites 45and 90)
pH complied 100% with proposed standards, while dissolved oxygen complied 97%, Total Nitrogen complied 93% and Total Phosphorous complied 96% 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 100% compliance for the WAT and 99% 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 100% compliance for the calculated WAT and 98% 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 98% 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 249,574 30- minute measurements at 23 in-stream/lake sites throughout the watershed, excluding the WWTP facilities, provided the data for analyses.

The evaluation of the entirety of temperature data logger measurements recorded during the calendar year at 23 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 2 for the MWAT, and in segments 2 for the DM. Temperature compliance issues only occurred during the cold season in segment 1a, 1b, 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 87,599 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 42+ 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. 99% compliance for pH and 96% compliance for Dissolved Oxygen were achieved. 191 samples were analyzed for Total Nitrogen and 191 samples were analyzed for Total Phosphorus. Sampling results show 96% compliance for proposed Total Nitrogen of 1250ug/L and 91% 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 2017. 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 extremely average when compared to historical data. Bear Creek stream flows tracked during May, on daily average at the gage above Evergreen Lake, on average with the historic daily average in May. The stream gage above Morrison followed the Evergreen gage values. The stream flows remained right on average for monthly historic averages in May. The remaining months, June through October showed flows that were moderately lower than historical averages, but by a slim ratio.

Weather and climate in the May through September timeframe were approximately average to below average as compared to historic averages. Flows fluctuated from May to September from below average to above historical average. 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 had no days where the temperature reached 90°F or higher 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. Data logger temperature measurements of plant effluent were obtained at the identical frequency of the in-stream data loggers (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, GWSD, and MORR and results 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 2017									
2017 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	6.23	7.10	3.42	16.50	2810	6	4556	50	0.35
Max	7.96	20.40	5.20	8110	14500	42	14756	690	0.80
Avg	6.52	13.84	4.01	1360.80	6802.50	12.77	8176.07	188.46	0.45
Std. Dev.	0.15	3.80	0.32	2114.12	2356.37	7.85	2356.96	145.53	0.06
Measurements	261	249	249	52	52	52	52	52	365
Exceedances				0				0	

Effluent Datalogger Temperature Summary: Cold Season/Warm Season 2017						
All Temperatures in °C	30-Min Temp. COLD/WARM		Daily Avg. Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM	
Min	8.10	10.6	8.20	10.6	8.52	10.8
Max	13.91	19.7	13.72	19.5	13.53	19.3
Avg	10.15	16.1	10.15	16.1	10.18	16.1
Std. Dev.	1.45	2.8	1.45	2.8	1.46	2.8
Measurements	7248	10271	151	214	21	31

[Data logger ID: EMD5 GPS Coordinates: 39.6376□N, 105.3150□W; Sampling/monitoring site is the EMD WWTP effluent. The data logger 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.-**13000**, 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 2017									
2017 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	9.40	0.96	74.90	503	1.99	786	70	0.32
Max	7.48	19.20	5	18500	17300	283	27423	660	0.67
Avg	6.68	13.69	3.29	2770.87	3551.44	75.46	6010.24	190.58	0.47
Std. Dev.	0.16	2.92	0.38	3931.17	4201.69	54.98	6312.47	99.56	0.05
Measurements	287	250	250	66	52	52	52	52	365
Exceedances				0				0	

Effluent Data Logger Temperature Summary Cold/Warm Seasons 2017						
All Temperatures in °C	30-Min Temp. COLD/WARM		Daily Avg. Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM	
Min	8.8	10.8	9.2	11.1	9.5	11.2
Max	14.2	18.9	14.0	18.6	13.8	18.4
Avg	11.0	15.5	11.0	15.5	11.0	15.5
Std. Dev.	1.2	2.38	1.2	2.4	1.2	2.4
Measurements	7248	10272	151	214	21	30

[Data logger ID: WJ6 GPS Coordinates: 39.6621□N, 105.3351□W; Sampling/monitoring site is the WJCMD WWTP effluent. The data logger 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 2017									
2017 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	6.49	2.60	0.17	30	989	37	1852	130	0.03
Max	7.23	19.00	15.73	2810	14100	270	15589	1000	0.10
Avg	6.72	11.20	2.74	564.42	5748.29	153.58	6463.68	285.86	0.06
Std. Dev.	0.11	4.75	2.74	492.00	3949.73	61.82	3977.34	162.24	0.01
Measurements	242	215	215	52	24	24	24	29	365
Exceedances	0			0				0	

Effluent Data Logger Temperature Summary Cold/Warm Seasons 2017						
All Temperatures in °C	30-Min Temp. COLD/WARM		Daily Avg. Temp. COLD/WARM		Weekly Avg. Temp. COLD /WARM	
Min	3.5	6.3	3.9	7.5	4.0	9.3
Max	12.6	19.4	12.4	18.9	12.2	18.6
Avg	7.0	14.6	7.0	14.6	7.1	14.7
Std. Dev.	2.9	3.01	2.8	2.96	2.8	2.71
Measurements	7248	10272	151	214	21	30

[Data logger ID: KSWD8 GPS Coordinates: 39.6585□N, 105.2868□W; Sampling/monitoring site is the KSWD WWTP effluent. The data logger was located near the flow-measuring flume, just upstream of the outfall. Effluent flows from the data logger 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 2017									
2017 Process Control and Permit Sampling and Monitoring									
Parameter	pH, SU	Temp, °C	D. O., mg/L	NH3-N, ug/L	NO3-N, ug/L	NO2- N, ug/L	TIN, ug/L	Total P, ug/L	Flow, MGD
Min	6.51	10.30	5.03	100	2670	3	6792	89	0.19
Max	7.53	22.10	8.97	8170	10180	1320	10885	961	0.40
Avg.	6.95	15.00	7.76	387.79	8011.54	56.94	8456.27	402.31	0.26
Std. Dev.	0.18	2.89	0.50	1105.44	1256.52	183.06	1016.11	176.65	0.03
Measurements	365	365	365	52	52	52	52	49	365
Exceedances	0			0				0	

Effluent Datalogger Temperature Summary COLD/WARM Seasons 2017						
All Temperatures in °C	30-Min Temp. COLD/WARM		Daily Avg. Temp COLD/WARM		Weekly Avg. Temp COLD/WARM	
Min	10.4	11.7	10.6	12.0	10.7	12.2
Max	15.1	19.5	14.9	19.3	14.8	19.2
Avg	12.0	16.2	12.0	16.2	12.1	16.2
Std. Dev.	1.2	2.5	1.2	2.5	1.2	2.5
Measurements	7248	10272	151	214	21	30

[Data logger ID: GWSD9A GPS Coordinates: 39.6732N, 105.2712W; Sampling/monitoring site is the GWSD WWTP effluent. The data logger was in a wet well, just upstream of the outfall at the plant. Effluent flows from the data logger 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)

Morrison WWTP Effluent Summary 2017
2017 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	6.51	5.50		60				70	0.04
Max	7.75	22		7410				901	0.928
Avg	7.22	14.03		762.28				396.82	0.08
Std. Dev.	0.26	4.42		1696.20				211.58	0.05
Measurements	365	365		18				17	365
Exceedances	0								

All Temperatures in °C	30-Min COLD/WAR		Daily Avg. Temp. COLD/WARM		Weekly Avg. Temp. COLD/WARM	
Min	5.1	10.5	6.1	11.7	7.4	12.4
Max	14.6	24.4	13.9	22.7	13.3	22.3
Avg	9.9	18.0	9.9	18.0	10.0	18.1
Std. Dev.	2.1	3.26	2.0	3.15	1.9	3.06
Measurements	7248	10272	151	214	21	30

[Datalogger ID: MORR12 GPS Coordinates: 39.6541□N, 105.1796□W; Sampling/monitoring site is the MORR 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 pipe, under Bear Creek Rd, and 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

Tiny Town and Brookforest provided no effluent Summary to the BCWA.

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 13 Summit Lake Site 36 (In Summit Lake near outlet) Segment 8

Monthly Parameter Results	pH, SU	Temp °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.73	4.4	7.72	21.8	239	4
Max	8.75	9.5	9.79	72.2	317	7
Avg	8.25	7.68	8.45	35.43	270.25	6.00
Std. Dev.	0.37	2.04	0.80	21.27	28.75	1.22
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.]

Segment 8 (Sites 37, 76, 95, and 63)

Table 14 Summary Sites 37, 76, 95 and 63

Monthly Parameter Results	pH SU	Temp, °C	D. O., mg/L	Sp. Cd. us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	6.17	1.2	0.87	8.46	19	6
Max	8.81	9.90	10.80	52.50	1803.00	1794.00
Avg	7.40	7.51	6.50	28.25	347.81	157.50

Std. Dev.	0.81	2.17	2.74	12.51	399.21	427.27
Measurements	16	16	16	16	16	16

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

Table 15 (Site 37) Mount Evans Main stem ¼ mile downstream

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	6.5	5.8	7.31	21.5	246	6
Max	8.45	8.8	10.8	23.1	263	6
Avg	7.32	7.75	8.59	22.25	256.25	6
Std. Dev.	0.83	1.23	1.35	0.61	7.19	0
Measurements	4	4	4	4	4	4

Table 16 (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., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	6.53	5	5.47	17.2	156	9
Max	8.81	9.8	8.85	41.4	593	132
Avg	7.58	6.95	7.67	26.30	320.25	48.75
Std. Dev.	0.92	1.76	1.33	9.08	164.19	50.09
Measurements	4	4	4	4	4	4

Table 17 (Site 95) Segment 8 South Fen Reference site

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	6.17	1.2	0.87	8.46	19	14
Max	8.37	9.7	7.34	52.5	443	19
Avg	7.26	6.73	4.40	30.42	164	16
Std. Dev.	0.83	3.27	2.59	21.01	164.27	2.12
Measurements	4	4	4	4	4	4

Table 18 (Site 63) Segment 8 Below site 36, above 2nd pond, middle of 1st pond

Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	6.73	7.1	2	27.9	138	78
Max	8.35	9.9	8.46	41.2	1803	1794
Avg	7.46	8.60	5.36	34.03	650.75	559.25
Std. Dev.	0.59	1.14	2.87	4.90	669.90	715.20
Measurements	4	4	4	4	4	4

Segment 1a (Above Evergreen Lake)

Table 19 Segment 1a Summary

Segment 1a Sampling/Monitoring Summary 2017						
Monthly Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.00	0.40	7.40	31.20	166	2
Max	8.65	15.3	12.77	86.1	517	373
Avg	7.77	9.17	10.65	54.29	254.50	33.44
Std. Dev.	0.35	3.91	1.81	16.65	78.33	82.63
Measurements	21	21	21	21	18	18

Segment 1a Data logger Temperature Summary 2017							
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	-6.9	2.7	0.0	-6.6	-4.7	6.0	2.7	4.7
Max	15.7	20.3	9.8	15.4	15.4	14.2	19.7	19.7
Avg	4.2	11.0	4.4	4.2	6.5	11.2	11.0	13.0
Measurements	18287	15732	49	4570	364	46	3931	329
9°C WAT exceeded			3					
% Compliance WAT			94%					
13°C DM exceeded					10			
% Compliance					97%			
17°C WAT exceeded						0		
% Compliance						100%		
21.2°C DM exceeded								0
% Compliance DM								100%

Table 20 Below Mount Evans Wilderness (Site 58)

5 Monthly Sampling/Monitoring Events J u n e 1 – October 31, 2017						
Monthly Results	pH, SU	Temp, °C	D.O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.51	0.4	7.83	35.5	205	2
Max	8.65	12.4	12.77	86	517	373
Avg	7.9	7.8	10.8	53.0	301.2	70.5
Std. Dev.	0.34	3.78	1.77	20.69	101.79	135.45
Measurements	7	7	7	7	6	6

Data logger Temperature Data 2017								
All Temperatures in °C	30-Min Temp. Cold/Warm Season		Oct 1-May 31Stream 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-Sept30 Stream DM (21.2) °C
Min	0.0	2.7	0.4	0.0	0.1	6.0	2.7	4.7
Max	12.2	14.8	6.2	12.2	12.2	11.3	14.6	14.6
Avg	3.2	9.5	3.2	3.2	5.3	9.6	9.5	11.4
Std. Dev.	2.6	2.1	1.6	2.6	3.0	1.4	2.1	1.9
Measurements	5736	5856	16	1434	119	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: L&F GPS Coordinates: 39.6234 □N, 105.4451 □W; Sampling /monitoring site is in Bear Creek, above Lost & Found (old Singing River Ranch)

Table 21 Golden Willow Rd (Site 2a)

6 Monthly Sampling/Monitoring Events M a y 1 – October 31, 2017						
Monthly Results	pH, SU	Temp, °C	DO, mg/	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.4	2.1	7.64	31.2	166	2
Max	8.27	15.3	12.44	63.2	249	20
Avg	7.7	9.7	10.7	47.7	205.7	10.7
Std. Dev.	0.27	3.80	1.71	9.49	33.80	5.73
Measurements	7	7	7	7	6	6

Data logger Temperature Data 2017								
All Temperatures in	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	-0.09	4.1	0.04	-0.07	-0.01	7.8	4.2	6.4

Max	15.68	17.8	9.62	15.41	15.41	13.7	17.7	17.7
Avg	4.63	11.8	4.71	4.63	7.21	11.9	11.8	13.9
Std. Dev.	3.49	2.4	2.74	3.48	3.71	1.5	2.3	2.1
Measurements	6838	5856	20	1709	142	17	1464	122
# 9°C WAT exceeded			2					
% Compliance WAT			90%					
# 13 °C DM exceeded					8			
% Compliance DM					94%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								0
% Compliance DM								100%

Table 22 Above Evergreen Lake, at CDOW site (Site 3a)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017								
Monthly Parameter	pH, SU		Temp, °C	D.O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7		2.2	7.4	46.4	177	16	
Max	8.23		14.4	12.6	86.1	332	24	
Avg.	7.7		10.1	10.5	62.2	258.7	19.0	
Std. Dev.	0.38		3.75	1.93	14.35	47.71	2.94	
Measurements	7		7	7	7	6	6	
Data logger Temperature Data 2017								
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	-6.9	4.9	0.1	-6.6	-4.7	8.4	4.9	6.9
Max	14.1	20.3	9.8	14.1	14.1	14.2	19.7	19.7
Avg	4.6	12.2	5.2	4.6	6.9	12.4	12.2	14.3
Std. Dev.	3.3	2.6	2.8	3.3	3.6	1.6	2.6	2.4
Measurements	5714	4020	13	1427	103	12	1003	85
# 9°C WAT exceeded			1					
% Compliance WAT			92%					
# 13 °C DM exceeded					2			
% Compliance DM					98%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Data logger 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 data loggers at the individual Site locations were analyzed and compared to state water quality standards.

Table 23 Segment 1d Summary

Segment 1d Sampling/Monitoring Summary 2017						
Monthly Results	pH, SU	Temp, °C	DO mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.22	4.8	6.01	53.9	131	11
Max	8.41	16.6	16.5	143.6	424	163
Avg	7.54	12.02	8.44	73.57	270.75	26.50
Std. Dev.	0.23	3.65	1.95	21.55	75.95	41.22

Measurements	69	69	69	69	12	12
Segment 1d Data logger Temperature Summary 2017						
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	2.8				4.3	3.2	4.1
Max	19.7				17.6	19.1	19.1
Avg	12.3				12.5	12.3	13.2
Measurements	41208				120	10300	856
# 18.2°C WAT					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0
% Compliance							100%

Table 24 Evergreen Lake Profile station 0.5 meters (Site 4A)

6 Monthly Sampling/6 Monitoring Events May 1-Oct. 31, 2017							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen,	Total Phosphorus ug/L	Chlorophyll A ug/L
Min	7.26	6.4	6.35	54.1	161	11	1.65
Max	8.41	16.6	10.89	110.4	287	17	4.4
Avg	7.7	13.1	8.7	73.3	251.3	12.7	3.3
Std. Dev.	0.34	3.56	1.79	19.85	42.93	2.13	1.04
Measurements	7	7	7	7	6	6	4
Data logger Temperature Summary 2017							
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 (1 °C 3)	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				4.5	3.2	4.4
Max	19.7				17.6	19.1	19.1
Avg	12.6				12.7	12.6	13.5
Std. Dev.	3.9				3.7	3.9	4.1
Measurements	10302				30	2575	214
# 18.2°C WAT					0		
% Compliance					100%		
# 23.8°C DM							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 25 Evergreen Lake, 1.0m below surface, near dam (Site 4b)

6 Monthly Sampling/6 Monitoring Events May 1-Oct. 31, 2017							
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm			
Min	7.27	6.5	6.01	54.1			
Max	8.16	16.6	10.64	110.2			
Avg	7.6	12.7	8.4	73.0			
Std. Dev.	0.30	3.38	1.76	19.93			
Measurements	7	7	7	7			
			Data logger Temperature Summary 2017				
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	2.8				4.4	3.3	4.2
Max	19.1				17.4	19.0	19.0

Avg	12.4				12.6	12.4	13.3
Std. Dev.	3.9				3.6	3.9	4.1
Measurements	10302				30	2575	214
# 18.2°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Data logger 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 26 Evergreen Lake, 1.5m below surface, near dam (Site 4c)

6 Monthly Sampling/6 Monitoring Events May 1-Oct. 31, 2017							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm			
Min	7.89	8.1	7.42	.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	.85	24.90			
Measurements	7	7	7	7			

All Temperature 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	2.8				4.3	3.3	4.1
Max	19.0				17.1	18.9	18.9
Avg	12.1				12.3	12.1	13.0
Std. Dev.	3.8				3.6	3.8	4.0
Measurements	10302				30	2575	214
# 18.2°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0
% Compliance DM							100%

[Monitoring station/Data logger 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 27 Evergreen Lake, 2.0m below surface, near dam (Site 4d)

6 Monthly Sampling/6 Monitoring Events May 1-Oct. 31, 2017							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm			
Min	7.28	5.9	6.29	7.37			
Max	54.1	15.1	16.5	110.2			
Avg	14.2	11.1	9.8	66.5			
Std. Dev.	16.29	3.51	3.20	30.35			
Measurements	7	7	7	7			

Data logger Temperature Summary 2017							
All Temperature 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				4.4	3.5	4.2
Max	19.0				17.1	18.6	18.6
Avg	12.1				12.3	12.1	12.8
Std. Dev.	3.8				3.6	3.8	3.8
Measurements	10302				30	2575	214
# 18.2°C WAT					0		
% Compliance					100%		
# 23.8°C DM							0
% Compliance							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 28 Evergreen Lake, 2.5m below surface, near dam (Site 4e)

6 Monthly Monitoring Events May 1-Oct. 31, 2017				
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm
Min	7.3	5.7	6.29	54.1
Max	7.79	16.2	10.46	110.2
Avg	7.5	12.4	8.3	73.1
Std. Dev.	0.16	3.47	1.69	20.00
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 29 Evergreen Lake, 3.0m below surface, near dam (Site 4f)

6 Monthly Monitoring Events May 1-Oct. 31, 2017				
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm
Min	7.31	5.6	6.37	54.1
Max	7.82	16	10.4	110.1
Avg	7.5	12.3	8.3	72.9
Std. Dev.	0.17	3.47	1.64	19.99
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 30 Evergreen Lake, 3.5m below surface, near dam (Site 4g)

6 Monthly Monitoring Events May 1-Oct. 31, 2017				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm
Min	7.3	5.3	6.29	54.1
Max	7.85	16	10.7	110.4
Avg	7.5	12.2	8.3	72.6
Std. Dev.	0.18	3.54	1.77	19.88
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 31 Evergreen Lake, 4.0m below surface, near dam (Site 4h)

6 Monthly Monitoring Events May 1-Oct. 31, 2017				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm
Min	7.27	5.2	6.27	54.1
Max	7.79	16	10.27	110.1
Avg	7.5	12.1	8.2	72.5
Std. Dev.	0.18	3.51	1.67	19.78
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 32 Evergreen Lake, 5.0m below surface, near dam (Site 4i)

6 Monthly Sampling/6 Monitoring Monthly Monitoring Events May 1-Oct. 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.24	5.4	6.04	53.9	131	14
Max	7.8	14.4	10	121.2	424	163
Avg	7.5	11.9	7.8	72.7	290.2	40.3
Std. Dev.	0.20	3.02	1.60	24.55	94.54	54.88

Measurements	6	6	6	6	6	6

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

6 Monthly Monitoring Events May 1-Oct. 31, 2017				
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm
Min	7.22	4.8	6.04	54.3
Max	7.82	15.5	10.06	143.6
Avg	7.4	10.6	8.0	79.4
Std. Dev.	0.20	4.08	1.50	31.48
Measurements	6	6	6	6

Monitoring station/Data logger 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 (Main stem below Evergreen Lake and Above Harriman Diversion)

Table 34 Segment 1e Summary

Segment 1e Sampling/Monitoring Summary 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.3	0.4	6.69	59.3	152	13
Max	8.95	16.9	13.23	451.4	774	126
Avg.	8.08	11.19	10.15	157.53	435.44	29.83
Std. Dev.	0.36	5.20	1.80	85.87	153.09	20.05
Measurements	61	61	61	61	36	36

Segment 1e Data logger Temperature Summary 2017								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Nov 1-Mar 31 Stream Std. WAT (9°C)	Nov 1-Mar 31 -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	0.6	0.3	0.0	0.1	4.7	0.7	3.2
Max	12.5	22.0	7.7	12.1	12.1	18.4	21.9	21.9
Avg.	4.1	12.4	4.1	4.1	5.9	12.5	12.4	14.4
Measurements	14396	38076	40	3598	300	112	9513	798
# 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 35 Downtown Evergreen, at CDOW site (Site 5) LOGGER REMOVED AND TAKEN

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017						
	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.52	5.5	6.76	59.3	152	13
Max	8.42	16.3	11.68	132.5	529	31
Avg	7.9	13.0	9.5	79.5	270.5	18.0
Std. Dev.	0.26	3.75	1.79	24.04	120.40	6.40
Measurements	7	7	7	7	7	7

Monitoring station/Data logger 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 36 Bear Creek Cabins (Site 8a)

9 Monthly Sampling/Monitoring Events March - November, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.36	6.1	7.62	65.7	295	14
Max	8.04	16.8	11.57	146.1	680	35
Avg.	7.7	13.5	9.6	89.7	393.3	21.8
Std. Dev.	0.25	3.79	1.52	25.98	133.15	7.08
Measurements	7	7	7	7	7	7

Site 8a Data logger Temperature Summary 2017								
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	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct31 Stream DM (23.8°C)
Min	-0.03	2.9	1.89	0.01	2.98	5.0	3.0	4.0
Max	11.22	17.0	7.19	11.13	11.13	14.5	16.8	14.9
Avg.	4.46	9.2	4.40	4.46	6.78	9.4	9.2	10.0
Std. Dev.	2.33	3.5	1.80	2.31	2.10	3.3	3.5	3.2
Measurements	2525	2685	7	631	53	8	669	58
# 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/Data logger 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 37 O'Fallon Park (site 9)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.94	5.9	6.79	77.4	295	19
Max	8.39	16.9	11.63	177.3	774	63
Avg	8.1	13.4	9.7	112.9	453.5	28.7
Std. Dev.	0.17	3.71	1.81	33.30	160.11	15.55
Measurements	7	7	7	7	6	6

Data logger Temperature Data 2017								
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
Min	0.00	0.6	0.94	0.02	0.78	4.9	0.7	4.9
Max	12.46	21.5	6.96	12.11	12.11	17.7	21.4	21.4
Avg	4.25	12.5	4.20	4.25	6.68	12.4	12.5	14.9
Std. Dev.	2.70	4.4	2.08	2.69	2.81	4.0	4.4	3.9
Measurements	2524	8405	7	631	53	25	2100	177
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

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

Table 38 Liar O' the Bear Park (Site 12)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017								
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L		Total Phosphorus ug/L	
Min	7.71	5.5	7.04	91.3	358		20	
Max	8.18	16.7	11.81	182.7	751		57	
Avg	8.0	13.3	9.7	127.7	494.2		34.2	
Std. Dev.	0.17	3.76	1.71	31.17	133.51		12.55	
Measurements	7	7	7	7	6		6	
Data logger Temperature Data 2017								
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.	Apr 1-Oct 31 2- HR Avg. Temp.	Apr 1-Oct 31 Stream DM
Min	-0.1	0.6	0.3	0.0	0.1	5.9	0.7	5.8
Max	11.0	22.0	7.1	10.8	10.8	17.8	21.7	21.7
Avg	3.8	12.2	3.8	3.8	5.2	13.8	13.8	16.3
Std. Dev.	2.5	4.6	2.1	2.5	2.7	3.5	4.0	3.6
Measurements	3242	8025	9	810	68	17	1494	124
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 19.3°C WAT						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

[Monitoring station/Data logger ID: LOBDOW GPS Coordinates: 39.6672N, 105.2687W; 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 39 Idledale (Shady Lane-Site 13a)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017									
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L			
Min	7.3	5.8	6.69	96.7	365	21			
Max	8.03	16.9	11.73	199.6	724	53			
Avg	7.8	13.4	9.9	134.2	493.2	33.8			
Std. Dev.	0.25	3.67	1.80	34.46	122.82	10.02			
Measurements	7	7	7	7	6	6			
Data logger Temperature Data 2017									
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	0.6	0.3	0.0	0.1	5.1	0.8	4.5	
Max	11.8	22.0	7.5	11.5	11.5	18.0	21.9	21.9	
Avg	4.1	13.0	4.1	4.1	5.9	13.2	13.0	15.2	
Std. Dev.	2.9	4.5	2.5	2.9	3.2	4.0	4.5	4.5	
Measurements	2524	8689	7	631	52	25	2172	181	
# 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									

[Monitoring station/Data logger ID: IDLE GPS Coordinates: 39.6621°N, 105.2406°W; Sampling/ monitoring

site in Bear Creek at the CDOW fish survey site.]

Table 40 West End of Morrison (Site 14a)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2016									
Monthly Parameter Results	pH, SU		Temp C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L		
Min	7.4		0.4	8.2	102.1	418.0	17.0		
Max	8.95		15.30	13.10	355.70	696.00	126.00		
Avg	8.37		8.67	10.78	187.69	508.00	42.50		
Std. Dev.	0.41		5.50	1.60	72.50	92.16	37.70		
Measurements	14		14	14	14	6	6		
Data logger Temperature Data 2016									
All Temperatures in °C	30-Min Temp. COLD/ WARM		Nov 1-Mar 31 Stream Std. WAT	Nov 1-Mar 31 2-Hr Avg. Temp.	Nov 1-Mar 31 Stream Std. DM (13°C)	Apr 1-Oct 31 Stream Std. WAT	Apr 1-Oct 31 2-HR Avg. Temp.	Apr 1-Oct 31 (23.8°C)	
Min	0.00	0.72	1.23	0.00	0.16	5.59	0.79	3.16	
Max	11.57	21.13	7.68	11.40	11.40	18.42	21.10	21.10	
Avg	4.09	12.73	3.93	4.09	5.42	12.89	12.73	14.59	
Std. Dev.	2.68	4.47	2.12	2.68	2.88	3.95	4.46	4.31	
Measurements	3581	10272	10	895	74	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: 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 41 East End of Morrison (Site 14c)

6 Monthly Sampling/Monitoring Events May 1 – October 31,						
Monthly Parameter	pH, SU	Temp °C	D. O., mg/L	Sp. Cd., us/cm	CU ug/L	CaCO3 mg/L
Min	7.9	0.4	8.2	154.2	0.3	48.0
Max	8.54	15.50	13.23	451.40	6.40	122.00
Avg	8.25	7.88	10.83	264.53	1.64	79.83
Std. Dev.	0.20	5.43	1.77	89.26	1.51	24.74
Measurements	12	12	12	12	12	12

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

Table 42 Segment 1b Summary

Segment 1b Sampling/Monitoring Summary 2017								
Monthly Parameter Results	pH, SU	Temp, °C	DO., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L		
Min	8.0	0.1	7.8	166.2	467.0	13.0		
Max	8.85	16.8	15.39	1263	1629	356		
Avg	8.37	9.92	10.70	313.74	836.57	66.43		
Std. Dev.	0.23	5.56	2.21	259.36	360.98	85.37		
Measurements	16	16	16	16	14	14		
Segment 1b Data logger Temperature Summary 2017								
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 31Stream Std. DM (13°C)	Apr 1-Oct 31Stream Std. WAT (19.3°C)	Apr 1-Oct 312-HR Avg. Temp.	Apr 1-Oct 31 Stream DM
Min	-0.1	0.7	0.3	-0.1	0.1	6.5	0.9	3.8
Max	13.4	20.	8.7	13.3	13.3	18.4	20.8	20.8
Avg	4.213	12.	4.0	4.2	6.0	13.1	12.9	14.7

Std. Dev.	3.0	4.4	2.4	3.0	3.3	3.8	4.4	4.1
Measurements	4150	1027	12	1037	86	31	2568	214
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					1			
% Compliance DM					99%			
# 19.3°C WAT						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.]

Segment 3

Table 43 Segment 3 Summary

Segment 3 Sampling/Monitoring Summary 2017						
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.47	0.4	6.85	55.9	71	2
Max	8.57	13	12.88	93.2	330	165
Avg	7.99	8.08	10.31	77.99	152.67	33.00
Std. Dev.	0.32	3.65	2.00	11.10	63.40	41.62
Measurements	12	12	12	12	12	12

Segment 3 Data logger Temperature Summary 2017								
All Temperatures in °C	30-Min Temp. COLD/ WARM SEASON		Nov 1- Mar 31 Stream Std. WAT (9C)	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-Oct31 Stream DM (21.2°C)
Min	0.0	4.1	1.1	0.0	0.6	7.3	4.1	7.1
Max	16.2	19.6	8.9	16.0	16.0	15.1	19.4	19.4
Avg	4.9	12.1	5.0	4.9	8.0	12.2	12.1	14.8
Std. Dev.	3.2	2.8	2.0	3.2	3.1	1.8	2.8	2.5
Measurements	11808	10560	34	2951	240	32	2640	221
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					15			
% Compliance DM					94%			
# 19.3°C WAT						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
% Compliance DM								100%

Table 44 Mt. Evans Wilderness Drainage, Vance Creek (Site 25)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.82	0.4	7.82	55.9	71	2
Max	8.57	10	12.88	82.7	161	20
Avg	8.2	7.1	10.5	69.7	122.7	11.2
Std. Dev.	0.27	3.32	1.98	9.61	30.23	5.90
Measurements	6	6	6	6	6	6

Data logger Temperature Data 2017								
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 (17C°)	June 1- Sept 30 2- HR Avg. Temp.	June 1-Sept 30 DM (21.2°C)
Min	0.0	4.1	1.1	0.0	1.4	7.3	4.1	7.1
Max	16.2	19.1	8.9	16.0	16.0	13.4	18.3	18.3
Avg	4.9	11.4	4.8	4.9	8.5	11.4	11.4	14.3
Std. Dev.	3.4	2.8	2.0	3.4	3.1	1.6	2.8	2.3

Measurements	5737	4704	16	1434	113	15	1176	99
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					10			
% Compliance DM					91%			
# 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 45 Yankee Creek @ Mouth to Bear Creek (Site 89)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017								
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L		Total Phosphorus ug/L	
Min	7.47	2.2	6.85	79.5	106		25	
Max	8.33	13	12.77	93.2	330		165	
Avg	7.8	9.1	10.1	86.3	182.7		54.8	
Std. Dev.	0.27	3.70	1.99	4.02	72.98		49.76	
Measurements	6	6	6	6	6		6	
Data logger Temperature Data 2017								
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	5.2	1.5	0.0	0.6	8.5	5.3	7.2
Max	15.6	19.6	8.8	15.5	15.5	15.1	19.4	19.4
Avg	5.0	12.8	5.1	5.0	7.6	12.9	12.8	15.2
Std. Dev.	2.9	2.7	2.0	2.9	3.0	1.7	2.7	2.5
Measurements	6071	5856	18	1517	127	17	17	122
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					5			
% Compliance DM					96%			
# 17°C WAT exceeded						0		
% Compliance WAT						100%		
# 21.2°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

Table 46 Segment 5 Summary

Segment 5 Sampling/Monitoring Summary 2017								
Monthly Parameter Results	pH, SU		T°C emp	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.31		3	6.8	175.7	199	11	
Max	8.67		14.9	12.47	1713	3621	200	
Avg	7.83		10.55	9.65	587.61	892.61	67.94	
Std. Dev.	0.34		3.40	1.69	360.78	801.72	47.73	
Measurement	18		18	18	18	18	18	
Segment 5 Data logger Temperature Summary 2017								
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-HRAvg. Temp.	Apr 1-Oct 31 DM (23.8°C)
Min	-0.1	-0.1	0.7	-0.1	1.4	3.0	-0.1	.7

Max	6.1	20.0	2.9	6.1	6.1	15.6	19.6	19.6
Avg	2.0	9.8	1.8	2.0	3.4	10.0	9.8	12.2
Std. Dev.	1.7	4.5	1.1	1.7	1.7	3.8	4.4	4.0
Measurements	700	10272	2	175	15	30	2568	
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 17°C WAT exceeded								
% Compliance WAT						0		
# 21.2°C DM exceeded						100%		
% Compliance DM								0
# 9°C WAT exceeded								100%

Table 47 Upper Troublesome Creek (site 64)

6 Monthly Sampling/Monitoring Events May 1- October 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.45	4.2	6.93	672	213	18
Max	8.67	12.8	11.38	752	745	72
Avg	8.0	9.7	9.3	728.4	565.5	52.0
Std. Dev.	0.38	2.84	1.39	31.58	182.87	18.04
Measurements	6	6	6	6	6	6

Table 48 Lower Troublesome Creek (Site 32)

6 Monthly Sampling/Monitoring Events May 1- October 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.6	6.2	6.8	619.1	758	73
Max	8.28	14.9	11.08	1713	3621	200
Avg	7.9	12.0	9.7	837.5	1643.8	118.3
Std. Dev.	0.27	2.92	1.61	392.81	971.33	41.67
Measurements	6	6	6	6	6	6

Turkey Creek Stream Segments (Segment 6a South Turkey Creek)

Table 49 Segment 6a Summary

Segment 6a Sampling/Monitoring Summary 2017								
Monthly Parameter Results	pH, SU		Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.51		2.30	5.32	117.40	337	5	
Max	8.62		18.10	13.42	2009	1133	95	
Avg	8.06		11.09	10.23	1205.55	685.75	22.55	
Std. Dev.	0.27		5.07	1.89	533.84	233.26	19.82	
Measurements	21		21	21	21	20	20	
Data logger Temperature Summary 2017								
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	-0.1	0.1	1.9	0.0	1.3	2.3	0.2	1.1
Max	13.3	21.9	8.7	13.1	13.1	17.2	21.8	21.8
Avg	4.6	11.7	4.5	4.6	6.5	11.9	11.7	14.2
Std. Dev.	2.6	4.61	1.9	2.6	2.3	3.93	4.60	4.33
Measurements	5806	20544	16	1451		61	5136	428
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					1			
% Compliance DM					99%			

# 18.2°C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8°C DM exceeded							0

Table 50 South Turkey Creek in Bear Creek Lake Park (Site 16a)

15 Monthly Sampling/Monitoring Events January 1-December 31, 2017						
Monthly Parameter	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.9	2.3	8.4	203.6	387	5
Max	8.6	16.6	13.4	2,009.0	1065	95
Avg	8.2	9.7	10.9	1,229.3	741.5	20.7
Std. Dev.	0.20	4.88	1.51	520.30	203.36	22.86
Measurements	15	15	15	15	13	13

Data logger Temperature Data 2017								
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	-0.1	2.9	2.3	0.0	1.8	6.9	2.9	5.5
Max	13.3	20.9	8.7	13.1	13.1	17.2	20.7	20.7
Avg	5.3	12.5	5.2	5.3	7.1	12.7	12.5	14.4
Std. Dev.	2.4	4.0	1.8	2.4	2.2	3.4	4.0	3.8
Measurements	4149	10272	12	1037	86	31	2568	214
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					1			
% Compliance DM					99%			
# 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 51 Aspen Park Metropolitan District, South Turkey Creek (Site 18)

6 Monthly Sampling/Monitoring Events May 1 – October 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.51	7	5.32	117.4	397	14
Max	8.23	18.1	11.07	1777	1133	49
Avg	7.8	14.5	8.6	1146.2	623.2	28.5
Std. Dev.	0.28	3.80	1.78	561.91	246.68	10.63
Measurements	6	6	6	6	6	6

Data logger Temperature Data 2017								
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	0.0	0.1	1.9	0.0	1.3	2.3	0.2	1.1
Max	9.2	21.9	3.7	8.9	8.9	17.2	21.8	21.8
Avg	2.7	10.9	2.7	2.7	5.1	11.0	10.9	13.9
Std. Dev.	2.0	5.01	0.8	2.0	2.0	4.22	5.00	4.78
Measurements	1657	10272	4	414	34	30	2568	214
# 9°C WAT exceeded				0				
% Compliance WAT				100%				
# 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: 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 52 Conifer Metropolitan District, North Turkey Creek (Site19)

9 Monthly Sampling/Monitoring Events March 1-November 30, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.97	5.3	6.7	244	194	8
Max	8.22	15.6	10.85	795	640	32
Avg	8.1	11.7	9.2	460.2	402.5	18.8
Std. Dev.	0.09	3.31	1.52	179.69	135.17	9.55
Measurements	6	6	6	6	6	6

Data logger Temperature Data 2017								
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.	June 1-Sept 30 DM (21.2°C)
Min	0.0		1.4	0.0	0.2			
Max	12.7		7.3	12.2	12.2			
Avg	4.3		4.2	4.3	7.3			
Std. Dev.	3.0		2.0	3.0	2.9			
Measurements	2091		6	522	43			
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			

Segment 1c: Bear Creek Reservoir Temperature Summary 2017

Table 53 Segment 1c Data logger Summary

Segment 1c Data logger Temperature Summary 2017								
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	9.3	3.1	10.3	9.3	9.9	4.8	3.1	9.6
Max	11.4	23.9	10.3	11.3	11.3	22.2	23.4	23.4
Avg	10.2	14.8	10.3	10.2	10.5	14.9	14.8	17.0
Std. Dev.	0.5	15.0	0.0	0.5	0.4	14.6	15.0	16.7
Measurements	1056	24430	2	264	22	72	6106	244
# 9°C WAT exceeded			2					
% Compliance WAT			0%					
# 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 54 Bear Creek Reservoir Profile Station (Site 40T 0.5)

Segment 1c Data logger Temperature Summary 2017								
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	9.3	3.1	10.3	9.3	10.0	4.8	3.1	9.6
Max	11.4	23.9	10.3	11.3	11.3	22.2	23.4	23.4

Avg	10.2	14.9	10.3	10.2	10.6	15.1	14.9	17.2
Std. Dev.	0.5	5.4	0.0	0.5	0.4	5.2	5.4	4.1
Measurements	528		1	132	11	36	30	122
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
# 9°C WAT exceeded								100%

Bear Creek Reservoir Profile Station (Site 40T 1.0) LOGGER LOST

Table 55 Bear Creek Reservoir Profile Station (Site 40T 1.5)

Data logger Temperature Data 2017								
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	9.4	3.3	10.3	9.4	9.9	4.8	3.3	9.7
Max	11.3	22.8	10.3	11.3	11.3	22.0	22.8	22.8
Avg	10.1	14.7	10.3	10.1	10.5	14.8	14.7	16.7
Std. Dev.	0.5	5.3	0.0	0.5	0.4	5.1	5.3	3.9
Measurements	528	12215	1	132	11	36	3053	122
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT						0		
% Compliance WAT						100%		
# 23.8°C DM								0
% Compliance DM								100%

Bear Creek Reservoir Profile Station (Site 40T 2.0) LOGGER LOST

Segment 2

Table 56 Summary (sites 45 and 90)

Segment 2 Sampling/Monitoring Summary 2017							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L	
Min	7.94	4	5.92	273.4	487	11	
Max	8.99	22.4	14.43	928	1483	123	
Avg	8.26	14.60	9.69	488.43	809.61	37.96	
Std. Dev.	0.25	6.47	2.16	179.37	231.22	26.58	
Measurements	31	31	31	31	28	28	

Data logger Temperature Summary 2017								
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	2.7	5.4	5.0	2.7	3.3	6.3	5.4	6.2
Max	6.6	39.1	5.0	6.5	6.5	23.6	35.5	35.5
Avg	4.5	15.6	5.0	4.5	5.0	15.6	15.6	16.5
Std. Dev.	1.0	6.0	0.0	1.0	1.1	5.9	6.0	6.2
Measurements	504	7104	1	126	11	21	1776	148
# 9C WAT exceeded			0					
% Compliance WAT			100%					
# 13C DM exceeded					0			
% Compliance DM					100%			

# 18.2C WAT exceeded					0		
% Compliance WAT					100%		
# 23.8C DM exceeded							1
% Compliance DM							99%

Table 57 Site 90 West of Wadsworth bridge

15 Monthly Sampling/Monitoring Events January 1-December 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	8.0	4.3	7.8	322.7	587.0	11.0
Max	8.5	22.4	14.4	928.0	1,483.0	54.0
Avg	8.2	14.9	10.4	538.0	839.6	29.0
Std. Dev.	0.14	6.43	1.87	188.16	251.63	12.36
Measurements	16	16	16	16	14	14

Data logger Temperature Data 2017								
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	0.6	3.9	4.3	0.6	2.4	6.2	3.9	7.2
Max	7.7	26.7	4.3	7.7	7.7	21.7	26.4	26.4
Avg	3.9	14.7	4.3	3.9	5.4	14.9	14.7	17.1
Std. Dev.	1.6	5.2	0.0	1.6	1.7	4.7	5.2	5.4
Measurements	507	12071	1	126	11	35	3018	252
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 13°C DM exceeded					0			
% Compliance DM					100%			
# 18.2°C WAT exceeded						0		
% Compliance WAT						100%		
# 23.8°C DM exceeded								0
# 9°C WAT exceeded								100%

Table 58 Site 45 Below Trace Weir at spillway of Bear Creek Reservoir

15 Monthly Sampling/Monitoring Events January 1-December 31, 2017						
Monthly Parameter Results	pH, SU	Temp, °C	DO, mg/L	Sp. Cd., us/cm	Total Nitrogen, ug/L	Total Phosphorus ug/L
Min	7.9	4.0	5.9	273.4	487	13
Max	9.0	22.4	12.4	779.0	1178	123
Avg	8.4	14.3	9.0	435.5	779.6	46.9
Std. Dev.	0.30	6.51	2.21	152.66	204.49	33.15
Measurements	15	15	15	15	14	14

Data logger Temperature Data 2017								
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	2.7	5.4	5.0	2.7	3.3	6.3	5.4	6.2
Max	6.6	39.1	5.0	6.5	6.5	23.6	35.5	35.5
Avg	4.5	15.6	5.0	4.5	5.0	15.6	15.6	16.5
Std. Dev.	1.0	6.0	0.0	1.0	1.1	5.9	6.0	6.2
Measurements	504	7104	1	126	11	21	1776	148
# 9°C WAT exceeded			0					
% Compliance WAT			100%					
# 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%

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 59 2017 May Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) May 2017	Historic Daily Mean Flow (cfs) 25 Years for May	Deviation from Historic Flow (cfs)
1	19	79	60
2	18	78	60
3	18	67	49
4	17	67	50
5	19	65	46
6	22	65	43
7	24	72	48
8	28	66	38
9	30	64	34
10	32	65	33
11	36	55	19
12	37	55	18
13	36	54	18
14	38	55	17
15	35	53	18
16	34	52	18
17	32	52	20
18	39	65	26
19	34	59	25
20	36	55	19
21	41	60	19
22	47	69	22
23	52	57	5
24	51	56	5
25	61	54	-7
26	61	55	-6
27	61	62	1
28	57	60	3
29	53	56	3
30	52	58	6
31	54	64	10
MIN	17	52	-7
MAX	61	79	60
AVG	38	61	23

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

Table 60 2017 June Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) June 2017	Historic Daily Mean Flow (cfs) 25 Years for June	Deviation from Historic Flow (cfs)
1	57	63	6
2	56	61	5

3	56	59	3
4	55	56	1
5	63	55	-8
6	71	56	-15
7	72	55	-17
8	73	54	-19
9	79	55	-24
10	75	60	-15
11	76	67	-9
12	76	74	-2
13	72	63	-9
14	65	59	-6
15	63	58	-5
16	63	54	-9
17	64	52	-12
18	65	52	-13
19	65	51	-14
20	64	53	-11
21	62	53	-9
22	62	52	-10
23	63	51	-12
24	61	51	-10
25	58	60	2
26	55	71	16
27	53	80	27
28	50	70	20
29	48	65	17
30	48	60	12
MIN	48	**51**	**-24**
AVG	**63**	**59**	**-4**
MAX	**79**	**80**	**27**

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

Table 61 2017 July Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) July 2017	Historic Daily Mean Flow (cfs) 25 Years for July	Deviation from Historic Flow (cfs)
1	47	56	9
2	45	56	11
3	43	50	7
4	42	46	4
5	40	44	4
6	38	42	4
7	39	41	2
8	41	42	1
9	42	42	0
10	39	39	0
11	38	38	0
12	40	43	3
13	45	47	2
14	40	38	-2
15	50	36	-14
16	41	44	3
17	40	45	5
18	38	38	0
19	41	34	-7
20	40	38	-2
21	49	35	-14

22	53	31	-22
23	44	30	-14
24	41	33	-8
25	39	37	-2
26	50	39	-11
27	64	32	-32
28	61	29	-32
29	52	28	-24
30	48	28	-20
31	49	28	-21
MIN	38	28	-32
MAX	64	56	11
AVG	44	39	-5

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

Table 62 2017 August Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) August	Historic Daily Mean Flow (cfs) 25 Years for August	Deviation from Historic Flow (cfs)
1	46	28	-18
2	41	27	-14
3	50	27	-23
4	48	27	-21
5	41	25	-16
6	41	26	-15
7	49	25	-24
8	69	24	-45
9	63	29	-34
10	52	25	-27
11	48	28	-20
12	45	32	-13
13	44	37	-7
14	42	27	-15
15	42	23	-19
16	40	23	-17
17	39	35	-4
18	37	33	-4
19	35	26	-9
20	34	23	-11
21	37	23	-14
22	34	23	-11
23	35	22	-13
24	35	80	45
25	37	70	33
26	33	46	13
27	31	36	5
28	30	31	1
29	29	29	0
30	28	28	0
31	29	30	1
MIN	28	22	-45
MAX	69	80	45
AVG	41	31	-10

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

Table 63 2017 September Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) September	Historic Daily Mean Flow (cfs) 25 Years for September	Deviation from Historic Flow (cfs)
1	31	32	1

2	28	28	0
3	26	26	0
4	25	25	0
5	25	24	-1
6	25	23	-2
7	24	23	-1
8	24	22	-2
9	24	21	-3
10	24	21	-3
11	26	21	-5
12	26	21	-5
13	23	20	-3
14	22	19	-3
15	23	19	-4
16	22	19	-3
17	22	20	-2
18	21	20	-1
19	20	20	0
20	19	22	3
21	19	20	1
22	18	20	2
23	22	19	-3
24	35	18	-17
25	30	18	-12
26	29	18	-11
27	37	17	-20
28	44	17	-27
29	42	17	-25
30	34	18	-16
MIN	18	17	-27
MAX	44	32	3
AVG	26	21	-5

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

Table 64 2017 May Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) May 2017	Historic Daily Mean Flow (cfs) 25Years for May	Deviation from Historic Flow (cfs)
1	34.8	78.2	43.4
2	32	77.3	45.3
3	28.4	71.6	43.2
4	28.6	70	41.4
5	24.7	67.5	42.8
6	27.7	68.1	40.4
7	29.9	73.8	43.9
8	41.8	74.2	32.4
9	58.3	73.9	15.6
10	56.4	73.5	17.1
11	74.6	66.1	-8.5
12	68.7	64.4	-4.3
13	62.7	63.2	0.5
14	61.7	62.2	0.5
15	57.8	62.8	5
16	51.3	60.7	9.4
17	47.5	59.1	11.6
18	72.3	68.8	-3.5
19	64.8	64.9	0.1
20	63.5	62.8	-0.7
21	82.4	67.5	-14.9

22	93.6	76.2	-17.4
23	102	68	-34
24	93.8	65.9	-27.9
25	99	65.4	-33.6
26	95.9	67.1	-28.8
27	103	70.9	-32.1
28	92.9	70.2	-22.7
29	81	68	-13
30	78.2	65	-13.2
31	76.1	72.9	-27.9
MIN	**24.7**	**59.1**	**-34**
MAX	**103**	**78.2**	**45.3**
AVG	**64**	**68**	**4**

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

Table 65 2017 June Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) June 2017	Historic Daily Mean Flow (cfs) 25 Years for June	Deviation from Historic Flow (cfs)
1	75.3	76.1	0.8
2	78.2	71	-7.2
3	74.8	67.9	-6.9
4	70.3	64.6	-5.7
5	74.4	61.7	-12.7
6	84.1	64.4	-19.7
7	83.2	65.2	-18
8	84.6	63.4	-21.2
9	85.6	61.8	-23.8
10	79.1	64.6	-14.5
11	80.7	67.3	-13.4
12	79.3	78	-1.3
13	78.9	68.7	-10.2
14	71.9	63.9	-8
15	69.3	62.3	-7
16	67.8	58.9	-8.9
17	67.7	56.6	-11.1
18	67.9	55.4	-12.5
19	69.2	52.8	-16.4
20	68.2	52.3	-15.9
21	65.2	68.3	3.1
22	64.3	66.4	2.1
23	67.1	66.3	-0.8
24	67.2	68.4	1.2
25	63	79	16
26	58.1	99.5	41.4
27	53.9	108	54.1
28	50.5	101	50.5
29	49.5	90.4	40.9
30	48.9	81.9	33
MIN	48.9	52.3	-23.8
MAX	**85.6**	**108**	**54.1**
AVG	**70**	**70**	**0**

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

Table 66 2017 July Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) July 2017	Historic Daily Mean Flow (cfs) 25 Years for July	Deviation from Historic Flow (cfs)
1	46.3	74.4	28.1
2	43.2	83.4	40.2

3	41.6	71.9	30.3
4	39.5	64.2	24.7
5	37.4	61.7	24.3
6	33.8	58.8	25
7	34.3	55.9	21.6
8	37.3	59.7	22.4
9	37.7	61.2	23.5
10	35.6	44.1	8.5
11	35	41.4	6.4
12	35.5	50.8	15.3
13	42.6	55.6	13
14	38.1	44.2	6.1
15	45.5	39.6	-5.9
16	40.9	48.9	8
17	34.8	52.2	17.4
18	32.4	46.6	14.2
19	34.2	39.9	5.7
20	32.7	44	11.3
21	43.9	48.1	4.2
22	46.8	36.9	-9.9
23	39.4	36.3	-3.1
24	36.9	37.8	0.9
25	33.5	40.4	6.9
26	43.8	44.4	0.6
27	71.4	38.2	-33.2
28	57	31.9	-25.1
29	50.3	30.2	-20.1
30	47.2	28.6	-18.6
31	47.1	27.1	-20
MIN	**32.4**	**27.1**	**-33.2**
MAX	**71.4**	**83.4**	**40.2**
AVG	**41**	**48**	**7**

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

Table 67 2017 August Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) August 2017	Historic Daily Mean Flow (cfs) 25 Years for August	Deviation from Historic Flow (cfs)
1	43.3	26.4	-16.9
2	40.1	26	-14.1
3	45.9	25.6	-20.3
4	50.3	27.6	-22.7
5	44.4	25.6	-18.8
6	43.5	24.7	-18.8
7	50.6	23.2	-27.4
8	72.7	22	-50.7
9	67.8	24.4	-43.4
10	57.9	23.3	-34.6
11	55.1	25.3	-29.8
12	52.6	29.7	-22.9
13	50.9	33.2	-17.7
14	48.9	27	-21.9
15	48.5	23.6	-24.9
16	46.3	21.4	-24.9
17	44.7	36.3	-8.4
18	41.2	33.7	-7.5
19	39	28.4	-10.6
20	36.1	24.8	-11.3

21	39.3	23.4	-15.9
22	36.6	22.8	-13.8
23	37.1	25	-12.1
24	36.1	93.5	57.4
25	38.5	90.3	51.8
26	32.6	56.1	23.5
27	29.4	45.3	15.9
28	27.7	38.8	11.1
29	25.7	34.9	9.2
30	24.6	33.2	8.6
31	25.4	34.8	9.4
MIN	**24.6**	**21.4**	**-33.2**
MAX	**72.7**	**93.5**	**40.2**
AVG	**43**	**33**	**7**

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

Table 68 2017 September Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) September	Historic Daily Mean Flow (cfs) 25 Years for September	Deviation from Historic Flow (cfs)
1	28.5	26.4	8.6
2	24.4	26	8.9
3	22.6	25.6	6.3
4	20.2	27.6	8
5	21.2	25.6	5.1
6	21.4	24.7	4.9
7	20.8	23.2	4.7
8	19.5	22	5.1
9	20.2	24.4	2.2
10	20.6	23.3	2.2
11	22	25.3	0.5
12	52.6	22.2	-0.1
13	50.9	20.7	-0.2
14	48.9	20.8	2
15	48.5	20.6	1.8
16	46.3	20.5	3.4
17	44.7	20.6	1.7
18	41.2	21.2	1.6
19	39	21.9	3.5
20	36.1	21.6	5.8
21	39.3	20.6	3.1
22	36.6	20.8	5.1
23	37.1	20.3	0.7
24	36.1	19.8	-27.1
25	38.5	19.9	-18.5
26	32.6	18.2	-18.1
27	29.4	18.3	-34.9
28	27.7	17.7	-41.8
29	25.7	18	-37.3
30	24.6	17.5	-22.7
MIN	**15.7**	**17.5**	**-41.8**
MAX	**59.5**	**37.1**	**8.9**
AVG	**26**	**23**	**-4**

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 an 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 69 Weather Data May-September 2017 Summary

Monthly Weather Data	May 2017	June 2017	July 2017	August 2017	September 2017
Air Temp Low Max (□F)	43	52	57	52	49
Air Temp High Max (□F)	79	90	89	85	88
Air Temp High Avg (□F)	61.74	77.17	80.71	76.10	70.47
Total Precip (in.)	4.07	0.4	1.9	2.01	2.46
Days of Precip.	12	6	14	11	11

Table 70 2017 Weather Data vs. Historical Weather Data (55 years 1961-2017)

	Avg. Daily Max (□F)	Avg Daily Min (□F)	Avg. Monthly (□F)	Precip. (in.)
May 2017	61.74	33.97	47.86	4.07
May Hist	65.2	33.9	49.6	2.57
% Deviation	95%	100%	96%	158%
June 2017	77.17	43.27	60.22	0.4
June Hist	75.3	41.1	58.2	2.14
% Deviation	102%	105%	103%	19%
July 2017	80.81	49.13	64.97	1.90
July Hist	81.6	46.8	64.2	2.23
% Deviation	99%	105%	101%	85%
August 2017	76.10	45.17	60.64	2.01
August Hist	79.3	45.3	62.4	2.31
% Deviation	96%	100%	97%	87%
Sept. 2017	70.47	40.40	55.44	2.46
Sept. Hist	72.1	37.1	56.57	1.47
% Deviation	98%	109%	98%	167%

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 71 2017 May Bear Creek Evergreen vs. Weather Data

Date	May 2017 Daily Mean Flow (cfs)	May 2017 Daily Air Max Temp (□F)	May 2017 Precip. (in.)
1	19	53	
2	18	61	
3	18	55	
4	17	46	0.06
5	19	64	
6	22	72	
7	24	77	
8	28	71	0.1
9	30	61	1.12
10	32	58	
11	36	47	0.52
12	37	67	

13	36	73	
14	38	79	
15	35	65	
16	34	72	
17	32	64	0.01
18	39	64	0.99
19	34	35	0.57
20	36	41	
21	41	56	
22	47	60	0.14
23	52	60	0.23
24	51	55	
25	61	76	
26	61	72	
27	61	62	0.02
28	57	53	0.3
29	53	63	
30	52	63	0.01
31	54	69	0.57
MIN	**17**	**35**	**0.01**
MAX	**61**	**79**	**1.12**
AVG	**38**	**61.74**	**0.34**
TOTAL			**4.07**

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 72 2017 June Bear Creek Evergreen vs. Weather Data

Date	June 2017 Daily Mean Flow (cfs)	June 2017 Daily Max Air Temp (□F)	June 2017 Precip (in.)
1	57	75	
2	56	72	
3	56	68	
4	55	68	0.04
5	63	75	
6	71	78	
7	72	74	0.05
8	73	73	0.05
9	79	75	
10	75	86	
11	76	89	
12	76	79	
13	72	85	
14	65	74	
15	63	78	
16	63	79	
17	64	86	
18	65	78	
19	65	78	
20	64	76	
21	62	88	
22	62	90	
23	63	84	0.03
24	61	53	0.01
25	58	65	
26	55	66	
27	53	80	

28	50	89	
29	48	78	
30	48	76	0.22
MIN	48.0	53	0.01
MAX	79.0	90	0.22
AVG	63	77.17	0.07
TOTAL			0.4

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 73 2017 July Bear Creek Evergreen vs. Weather Data

Date	July 2017 Daily Mean Flow (cfs)	July 2017 Daily Max Air Temp (□F)	July 2017 Precip (in.)
1	47	66	
2	45	80	
3	43	84	
4	42	84	
5	40	84	0.01
6	38	88	
7	39	87	
8	41	81	0.03
9	42	80	
10	39	88	
11	38	86	
12	40	85	0.02
13	45	71	0.02
14	40	78	
15	50	80	0.12
16	41	77	0.04
17	40	80	
18	38	85	
19	41	82	
20	40	89	
21	49	82	0.27
22	53	84	0.05
23	44	80	
24	41	80	
25	39	88	
26	50	84	0.18
27	64	71	0.86
28	61	77	0.02
29	52	81	0.1
30	48	70	0.13
31	49	73	0.05
MIN	38	66	0.01
MAX	64	89	0.86
AVG	44	80.81	0.14
TOTAL			1.9

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 74 2017August Bear Creek Evergreen vs. Weather Data

Date	August 2017 Daily Mean Flow (cfs)	August 2017 Daily Max Air Temp (ºF)	August 2017 Precip (in.)

1	46	76	
2	41	79	
3	50	84	0.23
4	48	65	0.1
5	41	84	
6	41	78	0.5
7	49	68	0.11
8	69	58	0.44
9	63	69	0.2
10	52	67	0.12
11	48	72	
12	45	71	0.07
13	44	79	
14	42	78	0.14
15	42	81	
16	40	75	0.07
17	39	67	
18	37	76	
19	35	82	
20	34	85	0.03
21	37	80	
22	34	79	
23	35	77	
24	35	80	
25	37	77	
26	33	80	
27	31	82	
28	30	78	
29	29	80	
30	28	M	M
31	29	M	M
MIN	28	58	0.03
MAX	69	85	0.5
AVG	41	76.10	0.18
TOTAL			2.01

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 75 2017 September Bear Creek Evergreen vs. Weather Data

Date	September 2017 Daily Mean Flow (cfs)	September 2017 Daily Max Air Temp (ºF)	September 2017 Precip (in.)
1	31	80	0.01
2	28	77	
3	26	81	
4	25	88	
5	25	86	0.04
6	25	64	
7	24	73	
8	24	78	
9	24	76	
10	24	81	
11	26	80	0.03
12	26	78	
13	23	81	
14	22	80	
15	23	79	

16	22	74	
17	22	60	
18	21	68	
19	20	75	
20	19	82	
21	19	69	
22	18	83	
23	22	78	0.01
24	35	51	0.76
25	30	44	0.12
26	29	42	0.16
27	37	49	0.62
28	44	46	0.52
29	42	54	0.18
30	34	57	0.01
MIN	18	42	0.01
MAX	44	88	0.76
AVG	26	70.47	0.22
TOTAL			2.46

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.