Appendix A: Summary Bear Creek Watershed Stream Monitoring Program
Off-Season: October 2006-April 2007
Seasonal: May 1- October 31, 2007

Bear Creek Watershed Association

May 14, 2008

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EXECUTIVE SUMMARY

2006-2007 Off-Season

The off-season program locations included eight sites situated between the dam at Evergreen Lake and the west end of Morrison in the Bear Creek watershed (Figure 1). The 2006-2007 Off-Season special stream-monitoring program in Bear Creek Segment 1a showed no evidence of temperature or water quality impairment.

- 100% of the 2006-2007 Off-Season recorded temperature values would be consistent with a proposed underlying temperature standard of 9°C Weekly Average Temperature (WAT).

- 100% of the recorded temperature values complied with an interim temperature standard of 20°C Maximum Weekly Average Temperature (MWAT).

- 100% of the calculated temperature values complied with a proposed underlying temperature standard of 13°C Daily Maximum (DM).

- Analysis of all (7 months, eight locations) in-stream measurements (46 for pH and 53 for dissolved oxygen) results in 98% compliance for pH and 100% compliance for Dissolved Oxygen stream standards.

- Although the Association's Table Value Standard (TVS) calculations for total ammonia have not been confirmed by the Water Quality Control Division at the time of completion of this Report, individual results of total ammonia analyses indicate a range of 5ug/L-560ug/L with an average of 74ug/L throughout the twenty locations sampled in the watershed. All indications are that these values comply with a calculated TVS for total ammonia.

- For all five WWTP effluents, Daily Average temperatures equaled 7.9°C and Weekly Average Temperatures equaled 7.9°C.

- 100% of the WWTP effluent pH and total ammonia values met permit limits.

2007 Seasonal

The program locations included fifteen sites in Segment 1a, one site in Segment 1b and four sites in the Turkey Creek drainage, for twenty sites. The 2007 Seasonal special stream-monitoring program in the Bear Creek Watershed (Segment 1a, 1b and Turkey Creeks) showed no evidence of impairment.

- 100% of the recorded temperature values complied with an interim temperature standard of 20°C MWAT. Despite this, the impact of temperature on the stream fishery remains controversial.

- 98% of the 2007 Seasonal recorded temperature values would meet a proposed underlying temperature standard of 18.2°C WAT, and a stream standard of 18.2°C WAT could be achieved during most of the growing season.

- +99% of the recorded temperature values would be consistent with a proposed underlying temperature standard of 23.8°C DM, which supports the supposition that a stream standard of 23.8°C DM could be achieved during most of the growing season.

- Analysis of all (6 months, twenty locations) in-stream measurements (121 for pH and 115 for dissolved oxygen) results in 100% compliance with pH and Dissolved Oxygen stream standards.

- Although the Association's Table Value Standard (TVS) calculations for total ammonia have not been confirmed by the Water Quality Control Division at the time of completion of this Report, individual results of total ammonia analyses indicate a range of 5ug/L-63ug/L with an average of 17ug/L throughout the twenty locations sampled in the watershed. All indications are that these values comply with a calculated TVS for total ammonia.

- Analysis of all in-stream sampling results (115 measurements) for Nitrate+Nitrite produced 100% compliance for the stream standard for Nitrate.

- For all five WWTP effluents, Daily Average temperatures equaled 16.4°C and Weekly Average Temperatures equaled 16.5°C.

- 100% of the WWTP effluent pH, Total Ammonia and Total Phosphorous values met permit limits.

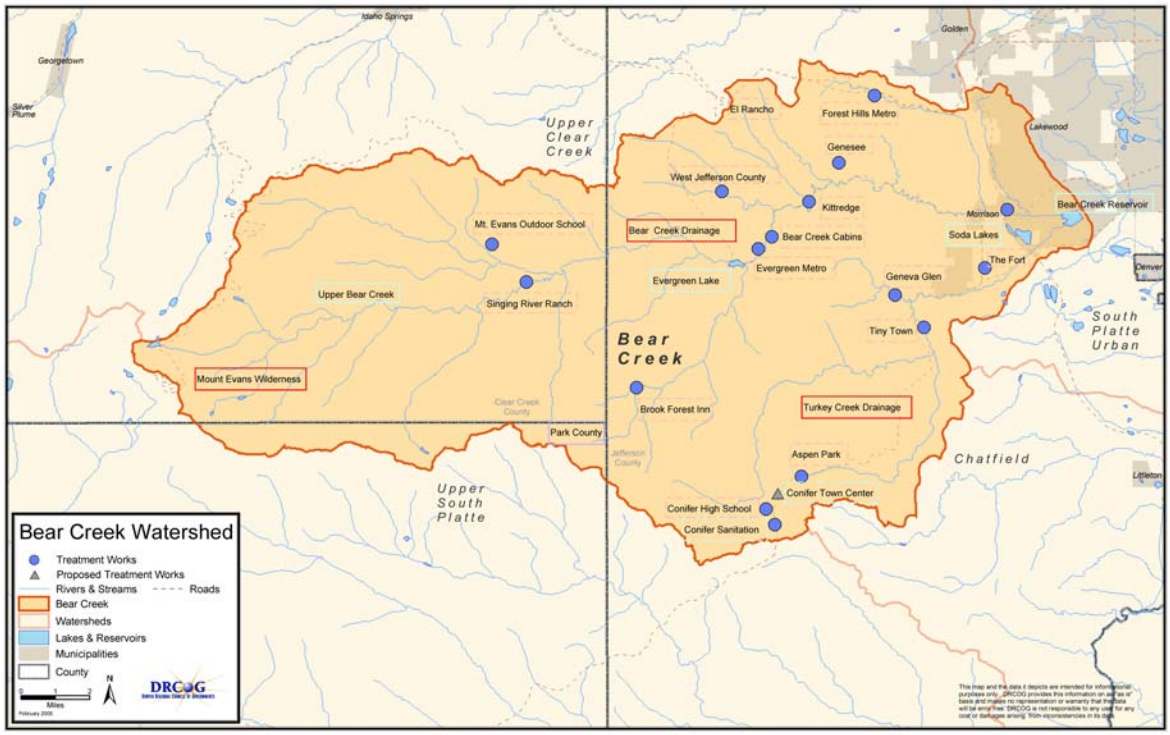

Figure 1 Bear Creek Watershed

STREAM MONITORING PROGRAM

Purpose

The Bear Creek Watershed Association (Association) conducts special stream monitoring programs within the Bear Creek Watershed including Segment 1a and a portion of Segment 1b of Bear Creek, and a portion of the Turkey Creek Drainage (North and South Turkey Creek). The monitoring year is divided into a seasonal period with more intense sampling and an off-season period, designed to provide minimal but critical winter and spring data. This technical appendix summarizes temperature and water quality monitoring data, sampling results obtained from in-stream locations, and data from five-wastewater treatment plant (WWTP) effluents. The complete 2006-2007 Off-Season and 2007 Seasonal water quality data set is an electronic attachment to this data summary report.

The Program is a cooperative effort between the Association and the five larger wastewater treatment plant dischargers into Bear Creek Segment 1a and 1b. The entities include Evergreen Metropolitan District (EMD), West Jefferson County Metropolitan District (WJCMD), Kittredge Sanitation and Water District (KSWD), Genesee Water and Sanitation District (GWSD), and the Town of Morrison. This Seasonal 2007 monitoring program began May 1, 2007 with completion on October 31, 2007. The in-stream monitoring program provides more detailed water quality information specifically for temperature, pH, dissolved oxygen, specific conductance, total ammonia, nitrate+nitrite and total phosphorous in Bear Creek watershed streams. The Off-Season 2006-2007 monitoring program began in October 2006 with completion in April 2007.

Off-Season Program

The 2006-2007 Off-Season sampling and monitoring program collected data from eight in-stream locations, including the seven identified Colorado Division of Wildlife (CDOW) fish survey sites, and the five “larger” wastewater plant dischargers to Bear Creek. The Program began in October 2006 and ran through April 2007.

Monitoring for pH, dissolved oxygen, temperature and specific conductance was performed monthly at the eight Segment 1a locations. Sampling for Total Ammonia and Total Organic Carbon (TOC) was performed coincidentally with monthly monitoring. Analyses were performed at the Limnology Laboratory at CU Boulder. All of the locations were coincident with temperature dataloggers. Wastewater treatment plant (WWTP) effluent data summarizes monthly process control sheets and results of permit- and non-permit required effluent analyses. Data includes pH, dissolved oxygen, temperature, effluent flow, total ammonia, nitrate and total phosphorous. All of the locations were coincident with temperature dataloggers.

Seasonal Program

The 2007 Seasonal sampling and monitoring program collected from twenty locations within the defined Bear Creek Segment 1a, Bear Creek Segment 1b, and the Turkey Creek drainage. The Program included the seven identified Colorado Division of Wildlife (CDOW) fish survey sites, and the five “larger” wastewater plant dischargers to Bear Creek. The Program began on May 1, 2007 and ran through on October 31, 2007.

Monitoring for pH, dissolved oxygen, temperature and specific conductance was performed monthly at fifteen Segment 1a locations, one Segment 1b location and four Turkey Creek drainage locations. Sampling for Total Ammonia, Nitrate+Nitrite and Total Phosphorous was performed coincidentally with monthly monitoring. Analyses were performed by GEI Consultants/Chadwick Ecological Consultants, Inc. in Littleton, Colorado. Wastewater treatment plant (WWTP) effluent data summarizes monthly process control sheets and results of permit- and non-permit required effluent analyses. Data includes pH, dissolved oxygen, temperature, effluent flow, total ammonia, nitrate and total phosphorous. All of the locations were coincident with temperature dataloggers. The Segment 1b location is located at the USGS gaging station within Bear Creek Lake Park.

A sonde-type data collector was deployed at one location (above Evergreen Lake at the CDOW site) once during the Seasonal Program. These data are analyzed and summarized on individual site tables. Flow data summarizes the three flow gages located on Bear Creek. These locations include above Evergreen Lake, above Morrison and below Morrison within Bear Creek Lake Park. Weather data from the reporting station located at the EMD WWTP was collected, analyzed and summarized.

Supporting Stream Study Efforts

Special Flow Study

A portable velocity meter was purchased by the BCWA to spot check estimated flows at CDOW fish survey sites. CDOW locations were monitored for flows three times during the Study period (Table 1; Figure 1). The flow measurements match closely with the USGS measured flows at Keys on the Green and Morrison. The flow drop from Morrison Park to Bear Creek Park is due to diversion at the Harriman Ditch.

Table 1 2007 Bear Creek Watershed Stream Flow Data

Site	Jul-07	Sep-07	Oct-07
Lost & Found		40	22
Williams	49	39	22
USGS Gage EGL	48	45	28
Keys on the Green	48	43	27
Little Bear	58	54	23
Bear Creek Cabins	40	57	23
O'Fallon Park	70	63	27
Lair O' The Bear	53	38	21
Barker Bridge	73	61	26
Morrison Park	74	66	28
Bear Creek Park	36	28	17
USGS Gage BCP	75?	28	18
Turkey Creek		0.8	1.7

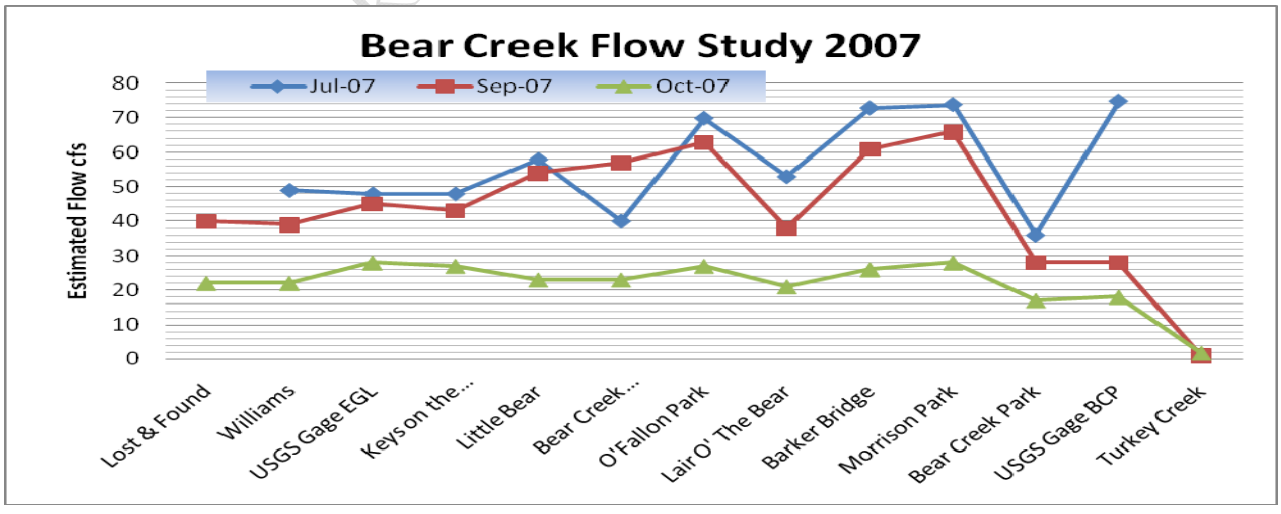

Figure 2 2007 Bear Creek Watershed Stream Flow Data

Macroinvertebrate Assessment

The macroinvertebrate integrity of Bear Creek Segment 1a is under assessment. Macroinvertebrate samples collected at the eight CDOW fish survey sites along Bear Creek: Morrison (west end), Idledale, Lair o' the Bear Park, O' Fallon Park, Bear Creek Cabins, Main Street Evergreen (across from the Little Bear), above Evergreen Lake upstream of the USGS gaging station, and at the Williams Property. The cooperative macroinvertebrate sampling was done by the Association on September 17, 2007 at the DOW fish survey locations (Table 2) with analyze compiled by the WQCD. Sample collection done by the state timed-kick net methodology protocol. Annual macroinvertebrate samples collected in the fall at fish survey sites with a target of a five-year data set. Once sufficient data is obtained, the processed species indexes will be used to help establish expected conditions.

Table 2 2007 Macroinvertebrate MMI and OE Scores

Bear Creek September 17, 2007		2007	
Station ID	Location	MMI	OE
122	above Morrison Park	64.688243	0.639495
122	above Morrison Park	44.455728	0.895293
122a	at Lair of the Bear Park	63.813902	0.713295
122a	at Lair of the Bear Park	56.472955	0.855954
122b	at O'Fallon Park	69.691156	0.636196
122b	at O'Fallon Park	72.112641	0.636196
122C	at Baker Bridge (Idledale)	69.292742	0.693436
122C	at Baker Bridge (Idledale)	71.415758	0.554748
122C	at Baker Bridge (Idledale)	70.701676	0.693436
122C	at Baker Bridge (Idledale)	72.998896	0.554748
5762	below Evergreen (BC Cabins)	52.526089	0.515119
5762	below Evergreen (BC Cabins)	63.257185	0.686825
5763	at Little Bear	60.010803	0.353521
5763	at Little Bear	59.941194	0.618661
5763	at Little Bear	59.817008	0.707041
5763	at Little Bear	60.669195	0.530281
5764	at Key of the Green GC	57.758621	0.346528
5764	at Key of the Green GC	70.97749	0.779687
5768	at Dick Williams Ranch	57.758621	0.325393
5768	at Dick Williams Ranch	60.039348	0.244045

CDOW Fish Survey Bear Creek

CDOW conducted their annual fish survey at eight locations September 2007. The survey included six historic sites and two additional sites. The added fishery survey sites were upstream of Evergreen Lake (ALKDOW), near Keys-on-the Green restaurant, and in the upper portion of the watershed at the Williams Property. Table 3 summarizes the fishery data at the sites for the 2007 sampling event. There are complete fishery data surveys from five fish monitoring stations prior to 2005 (1991, 1994, 1999, 2002, 2003, 2004, and 2005). In 2005 and into future survey years there are seven to eight fish monitoring stations and CDOW will strive to monitor all fish survey sites each year to produce, at a minimum, a five-year complete record from 2005-2010. There are partial survey year records (2-4 fish monitoring sites) for 1988, 1989, 1990, 1987, 2000, and 2001). While these partial data years provide valuable information, caution must be used to extrapolate this data over the “Stream Reach”. However, this data may be used to help characterize fishery behavior at specific locations in the “Stream Reach”.

Table 3 2007 Raw Fishery Data

Station	Standardized Average Width (ft)	Species	2007			
			No./Acre	lb/Acre	No./Acre >12cm	lb/Acre >12cm
Williams Property	23	Brown	716	87	664	87
		Rainbow	----	----	----	----
		TOTAL	716	87	664	87
Dedisse Park	33	Brown	640	65	430	64
		Rainbow	403	101	392	101
		TOTAL	1043	166	822	165
Downtown Evergreen	34	Brown	588	171	536	170
		Rainbow	108	42	95	42
		TOTAL	696	213	631	212
Bear Creek Cabins	32	Brown	644	115	587	115
		Rainbow	367	48	335	48
		TOTAL	1011	163	922	163
O'Fallon Park	31	Brown	491	89	346	88
		Rainbow	96	8	89	7
		TOTAL	587	97	435	95
Lair O' the Bear	29	Brown	841	148	709	146
		Rainbow	258	20	198	20
		TOTAL	1099	168	907	166
Idledale	25	Brown	520	89	481	89
		Rainbow	76	18	55	18
		TOTAL	596	107	536	107
Morrison	30	Brown	517	76	383	73
		Rainbow	206	18	63	14
		TOTAL	723	94	446	87

Turkey Creek Fishery Screening

In cooperation with Colorado Division of Wildlife, a species presence survey was done on the mainstem, South and North Turkey Creeks. Paul Winkle used a backpack shocker to survey about 200 feet of stream segment at each site. Species presence was done by Paul Winkle in the field (Table 4).

Table 4 Turkey Creek Fish Screen Results

Date	Stream	Location	Species (number)	Comments
Mainstem Turkey Creek				
9/24/2007	Turkey Creek	Below Tiny Town	Longnose sucker (7)	1 adult, 6 young-of-the-year (YOY)
			White sucker (1)	YOY
			Longnose dace (3)	
South Turkey Creek				
9/24/2007	S. Turkey Creek	Meyers Ranch	Fathead minnow (9)	5 adults, 4 YOY
Upper North Turkey Creek				
9/24/2007	N. Turkey Creek	Flyin' J Ranch	Brook trout (8)	6 adults, 2 YOY, observed 10-15 more, not collected

Date	Stream	Location	Species (number)	Comments
Lower North Turkey Creek				
9/24/2007	N. Turkey Creek	2 miles below HWY 73; private residence	Brown trout (1)	
			White sucker (5)	
			Longnose sucker (8)	
			Fathead minnow (6)	
			Iowa darter (1)	

Reference Reaches

Multiple reference points in the steam reach coupled with coordinated chemistry, biological, physical data collection and an analysis matrix will establish a reference condition for the entire "Stream Reach" or reference conditions by sub-reaches, as appropriate (Table 5).

Table 5 Potential Reference Reaches in Bear Creek Segment 1a

Bear Creek Segment 1a	Reference Points
Stream Reach	(1) Keys on the Green, (2) Little Bear Evergreen, (3) Bear Creek Cabins, (4) O'Fallon Park, (5) Lair O' the Bear, (6) Idledale, (7) Morrison Park
Sub-reach 1	(2) Little Bear Evergreen, (3) Bear Creek Cabins, (4) O'Fallon Park, (5) Lair O' the Bear, (6) Idledale, (7) Morrison Park
Sub-reach 1a	(2) Little Bear Evergreen, (3) Bear Creek Cabins, (4) O'Fallon Park, (5) Lair O' the Bear
Sub-reach 1b	(6) Idledale, (7) Morrison Park
Sub-reach 2	(1) Keys on the Green

STREAM MONITORING PROGRAM COMPONENTS

The Program consisted of several components in an effort to assemble as much pertinent scientific data and information about Bear Creek watershed as possible.

Off-Season Monitoring Sites

The locations listed in Table 6 are the sampling and monitoring sites utilized in the 2006-2007 Off-Season Program. Site Numbers and Sampling/Monitoring IDs help manage data. Assigned site numbers minimize confusion in the report format. Table 7 lists the sampling and monitoring data collected at each of the locations.

Table 6 Off-Season Monitoring Stations

Site #	Site Location
Site 3	Above Evergreen Lake at CDOW Site
Site 5	Above EMD WWTP, at CDOW downtown site
Site 8	Bear Creek Cabins at CDOW Site
Site 9	O'Fallon Park, west end at CDOW Site
Site 12	Lair o' the Bear Park, at CDOW site
Site 13a	Below Idledale, Shady Lane at CDOW site
Site 13b	Below Idledale at Baker Bridge
Site 14	Morrison Park west end of town, at CDOW Site
Site 20	EMD WWTP Effluent
Site 21	WJCMD WWTP Effluent
Site 22	KSWD WWTP Effluent
Site 23	GWSD WWTP Effluent
Site 24	Morrison WWTP Effluent

Table 7 Off-Season Water Quality Sampling and Monitoring Parameters

Site #	Sam/Mon ID	Site Location
Site 3	ALKDOW	pH, Temperature (Temp.), Dissolved Oxygen (DO), Specific Conductance (SpCd); Total Ammonia (NH3), Total Organic Carbon (TOC); Temp. Datalogger (logger)
Site 5	LTLBAR	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 8	BCCDOW	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 9	OFPDOW	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 12	LOBDOW	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 13a	IDLEDALE	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 13b	EMD5A	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 14	MORR10	pH, Temp, DO, SpCd, NH3, TOC, logger
Site 20	EMD5	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 21	WJ6	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 22	KSWD8	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 23	GWSD9A	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 24	MORR12	pH, Temp, DO, SpCd, NH3, P, logger, Effluent flow

For Off-Season samples, sampling events resulted in same-day transport to the Limnology Laboratory at CU Boulder. Samples were iced during transport. The Limnology Lab at CU Boulder uses a low level, spectrophotometric method: Method 4500-NH3 F., *Standard Methods for the Analysis of Water and Wastewater, 20th Edition.* A Thermo Genesys 6 spectrophotometer was used for analyses. TOC analysis is per ASTM 1994 High Temperature Combustion method, performed with a Shimadzu TOC 5000A analyzer. Summary results of the total ammonia and total organic carbon sampling are presented in the table formats.

Seasonal Monitoring Sites

The locations listed in Table 8 are the sampling and monitoring sites utilized in the 2007 Seasonal Program. Site Numbers and Sampling/Monitoring IDs help manage data. Assigned site numbers minimize confusion in the report format.

Table 8 Seasonal Monitoring Stations

Site #	Site Location
Site 1a	Above Lost and Found (Singin' River Ranch) complex
Site 1	Below West Bryant Singin' River Ranch-Williams Property
Site 2	Above Evergreen Lake at Clear Creek County line
Site 3	Above Evergreen Lake at CDOW Site
Site 4	Evergreen Lake Surface, profile station
Site 5	Above EMD WWTP, at CDOW downtown site
Site 6	Above EMD WWTP effluent
Site 7	Below EMD WWTP effluent
Site 8	Bear Creek Cabins at CDOW Site
Site 9	O'Fallon Park, west end at CDOW Site
Site 10	O'Fallon Park, east end above KSWD WWTP effluent

Site #	Site Location
Site 11	Lair o' the Bear Park, west end above GWSD WWTP effluent
Site 12	Lair o' the Bear Park, at CDOW site
Site 13a	Below Idledale, Shady Lane at CDOW site
Site 14	Morrison Park west end of town, at CDOW Site
Site 15	Bear Creek Segment 1b at the USGS gaging station within Bear Creek Park
Site 16	Turkey Creek within Bear Creek Park
Site 17	Confluence of North and South Turkey Creeks
Site 18	South Turkey Creek Aspen Park Metropolitan District
Site 19	North Turkey Creek Conifer Metropolitan District
Site 20	EMD WWTP Effluent
Site 21	WJCMD WWTP Effluent
Site 22	KSWD WWTP Effluent
Site 23	GWSD WWTP Effluent
Site 24	Morrison WWTP Effluent

Seasonal Water Quality Monitoring Measurements and Methods

Monitoring for pH, dissolved oxygen, temperature and specific conductance was performed monthly at twenty locations in Segment 1a, 1b and in the Turkey Creek drainage. All of the locations were coincident with temperature dataloggers. Monitoring was performed in Evergreen Lake at the profile station at depths of 0.5 meters down (surface), 1.5 meters, 2.5 meters, 3.5 meters and 4.5 meters down. The monitoring parameters measured are shown in Table 9.

Table 9 Seasonal Water Quality Monitoring Events

Site #	Sam/Mon ID	Site Location
Site 1a	L&F	pH, Temperature (Temp.), Dissolved Oxygen (DO), Specific Conductance (SpCd); Total Ammonia (NH3), Nitrate+nitrite (NO3/NO2), Total Phosphorous (P); Temp. Datalogger (logger)
Site 1	ALKSRR	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 2	ALKCC	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 3	ALKDOW	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 4	EMD2A	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 5	LTLBAR	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 6	EMD4	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 7	EMD3	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 8	BCCDOW	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 9	OFPDOW	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 10	KSWD7	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 11	GWSD9	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 12	LOBDOW	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 13a	IDLEDALE	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 14	MORR10	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 15	MORR11	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 16	TURK2	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger

Site #	Sam/Mon ID	Site Location
Site 17	TURK1	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 18	APMD1	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 19	CMD1	pH, Temp, DO, SpCd, NH3, NO3/NO2, P, logger
Site 20	EMD5	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 21	WJ6	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 22	KSWD8	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 23	GWSD9A	pH, Temp, DO, SpCd, NH3, NO3, P, logger, Effluent flow
Site 24	MORR12	pH, Temp, DO, SpCd, NH3, P, logger, Effluent flow

Monthly measurements were performed in the morning and began at approximately 08:00 in Evergreen Lake. Measurements were recorded with a Yellow Springs Instruments, Inc. (YSI) Model 556 MPS hand-held meter. The meter utilizes a multi-probe sensor, capable of measuring pH, temperature, dissolved oxygen and specific conductance simultaneously. The measurements are logged and retained in the on-board computer then manually or electronically downloaded. Typically, the logged data was manually downloaded by viewing each file and transcribing data onto monthly Logsheets. At the completion of the Program, the memory was downloaded to a computer for use as a quality control check. Prior to the Program, the meter was calibrated by certified technicians at QA Balance in Aurora, Colorado. Prior to each monitoring event, the meter was calibrated for each parameter, using a purchased calibration solution for specific conductance and technician-mixed pH buffers (two-point calibration, 7.00 and 10.01). All calibrations were documented on a Calibration Logsheet.

Fresh batteries were installed in the meter at the start of the Program and batteries were replaced when the observed battery charge reached 50%. The YSI multi-meter utilizes an YSI software program to download and present collected data. Ecowatch software presents the data in graphic and tabular formats and data can be exported into a spreadsheet program.

Monthly sampling for total ammonia, nitrate+nitrite and total phosphorous was performed concurrently with monthly monitoring at all twenty locations. The monthly sampling and monitoring was also coordinated with permit sampling performed by the WWTP's discharging into Bear Creek. The reason for this coordinated effort was to attempt to provide a water quality "snapshot" of Bear Creek at that point in time.

WWTP effluent total ammonia, nitrate and total phosphorous samples are analyzed by treatment plant laboratories: EMD, WJCMD and KSWD plant effluents were analyzed by EMD personnel, as typically done for CPDES permit reporting. EMD personnel utilize the EPA-approved Method 4500-NH3 D. ammonia selective electrode, *Standard Methods for the Analysis of Water and Wastewater, 21st Edition* for Total Ammonia analysis, EPA-approved HACH Method 8190 (equivalent to Method 4500-P B, 5 & P E Total Phosphorous, *Standard Methods for the Analysis of Water and Wastewater, 20th Edition)* for Total Phosphorous and HACH Method 8039, cadmium reduction method for Nitrate analysis. Total Phosphorous and Nitrate analyses were performed with the HACH 2010 spectrophotometer.

Similarly, GWSD WWTP personnel analyzed plant effluent per approved methods: For Total Ammonia, Method 417 E., *Standard Methods for the Analysis of Water and Wastewater, 16th Edition;* Total Phosphorous, HACH Method 8048, and Nitrate HACH Method 8153. Total Phosphorous and Nitrate analyses were performed with the HACH 2010 spectrophotometer.

The Town of Morrison utilizes Evergreen Analytical in Wheat Ridge, Colorado for effluent testing of total ammonia and total phosphorous. Evergreen Analytical uses the following methods for

testing: EPA-approved Method 4500-NH3 D., *Standard Methods for the Analysis of Water and Wastewater, 20th Edition* for Total Ammonia analysis and EPA Method 200.7, Digestion and ICP analysis for Total Phosphorous.

Samples taken in the field were documented on Monthly Logsheets and on EMD Chain of Custody forms. Samples were taken in 1-liter polyethylene bottles, unpreserved, and immediately iced. For Seasonal samples, sampling events resulted in same-day transport to GEI Consultants, Inc. /Chadwick Ecological Division in Littleton, Colorado. Samples were iced during transport. GEI Consultants use QuickChem Method 10-107-06-3 D for Total Ammonia analyses, Method 4500-NO3 I, *Standard Methods for the Analysis of Water and Wastewater, 21st Edition* for Nitrate +Nitrite analyses and Method 4500 P. G, *Standard Methods for the Analysis of Water and Wastewater, 21st Edition* for Total Phosphorous analyses. Analyses are performed with a Lachat QuickChem FIA+ 8000 series analyzer. Summary results of the total ammonia, nitrate/nitrite and total phosphorous sampling are presented in the table formats.

24-hour Profiling

In addition to monthly sampling and monitoring, the Association employed a programmable, sonde-type, recording, multi-sensor probe to simultaneously profile one selected site for pH, temperature, dissolved oxygen and specific conductance over a 24-hour period. The selected location was Bear Creek Segment 1a, above Evergreen Lake at the CDOW fish survey site. This location was selected because this particular reach had not been profiled in previous years. This location has macroinvertebrate data, CDOW fish survey data, water quality sampling and monitoring results and flow gage data, but was missing a diurnal snapshot of typical parameters.

The probe employed for the Program was an YSI 600XLM. Calibrations were performed and documented prior to use. A two-point calibration was used for pH (7.00 and 10.01) and the specific conductance calibration was performed with a purchased solution. There is no certification available for calibration of this particular multi-sensor probe. The calibration program requires that each parameter must be individually accepted to record valid measurements. If a parameter calibration is rejected, the measurements recorded will be flagged as unacceptable. The probe was programmed for a delayed start and to measure parameters at 30-minute intervals. The probe was weighted, disguised and deployed at the ALKDOW location once during the Program. The YSI Ecowatch software downloads data and presents it in graphic and tabular formats. Data can be exported into a spreadsheet program.

Stream Monitoring and Sampling Data

Monthly stream monitoring and sampling data are tabulated into datasets. Data was retrieved from the YSI memory shortly after each monitoring event. Data are transcribed onto the Monthly Logsheets and subsequently entered onto Excel spreadsheets. Each monitoring group (Segment 1a, non-Segment 1a and WWTP effluent) has an individual folder, with one spreadsheet and multiple worksheets of data. Minimum, maximum, average and standard deviation analyses were performed on this (and mostly all) data.

Temperature Dataloggers

Programmable temperature dataloggers measure and record Segment 1a, non-Segment 1a and WWTP effluent temperatures every thirty minutes. The loggers used in the Program are Onset Computer Corporation brand, HOBO model H1 and H8 and model Water Temp Pro v2 programmable dataloggers. Prior to the start of the Program, all model dataloggers were returned to Onset for NIST (National Institute of Standards and Technology) two-point certification and a 'tune-up'. The two-point certification was performed against calibration standards at 10°C and 20°C. The 'tune-up' consists of a new battery and quality control testing, assuring the dataloggers meet manufacturer's operating specifications. This process occurs every spring, prior to the start

of the special stream monitoring Program. The Association maintains a fact sheet with temperature monitoring protocols, as included in the Association annual report.

The Water Temp Pro models were utilized at all locations except the Evergreen Lake profile station and at the WWTP effluents. Model HOBO 8 loggers were used at the Evergreen Lake profile station and model HOBO 1 loggers were used at all WWTP effluents. The dataloggers are placed into watertight cases (Models HOBO 1 and 8) and secured to weights before being placed underwater. The Program uses Onset computer software specifically designed for these dataloggers, which enables launch and readout (start and stop) and viewing of downloaded data. Data download devices (Shuttles) were employed to download temperature data from the HOBO model and Water Temp Pro units in the field. This provided downloads with little or no omission of data. The software automatically presents the downloaded data in graph and table formats and allows data export into a spreadsheet format.

The dataloggers were programmed for measurements every thirty minutes at an office computer equipped with the Onset software. At this frequency, the memory capacity is approximately 35 days for the H1 series logger, 165 days for the H8 series logger and 905 days for the U22 (Water Temp Pro) series logger. Certain Onset datalogger models begin recording temperatures immediately, once launched. The Association employs newer model with delayed-start capabilities. Logsheets were utilized to record the exact time of deployment and retrieval of all units, so that erroneous measurements (measurements recorded out of water) could be omitted during the data evaluation process. In 2006, the Association purchased “shuttle” devices capable of field-downloading data from newer model dataloggers. This capability eliminated much of the erroneous measurements mentioned above.

A typical data retrieval procedure is as follows for the loggers located at WWTP effluents: Older HOBO 1 series loggers were utilized at the WWTPs because of their secure location. A laptop with the Onset software was brought to the effluent locations and the loggers were removed from their cases, data downloaded, relaunched (started) and returned to the effluent flow. After downloading, the logger cases are prepared for re-immersion by inserting a fresh desiccant packet and coating the o-ring with silicone sealant. Each logger is closed hand-tight and re-immersed.

The HOBO8 series loggers were utilized at the Evergreen Lake location. For downloading, these loggers were removed from their cases, connected to a shuttle device and data downloaded. After downloading, the logger cases are prepared for the re-immersion by coating the o-ring with silicone sealant. Each logger is closed hand-tight and re-immersed. H8 loggers continue with programmed measurements and do not require a re-launch. The shuttle device is then offloaded to the PC at the EMD office. Occasionally, the download process occurred precisely at the measurement instance and a measurement was lost.

The U22 series loggers were utilized in all Segment 1a locations, in addition to the Segment 1b and Turkey Creek locations. These loggers were downloaded to a shuttle device. Occasionally, the download process occurred precisely at the measurement instance and a measurement was lost. There are no watertight cases required for the U22 model loggers. The date and deployment time for all loggers is noted on a logsheet.

After downloading the last logger in Morrison, the laptop and shuttles are transported to the desktop computer with the Onset software at the EMD Administration office. The logger data is transferred from the laptop and from the shuttles to the desktop. The shuttles are connected to the computer via a download cable, and data on the shuttles are individually downloaded into separate program files.

Precautions were taken during the Program to avoid lost temperature data. In previous years, dataloggers have been stolen from their location and all data for that recording period lost. In an effort to minimize lost data, all dataloggers located in Segment 1a and WWTP effluent were retrieved and/or downloaded on an approximate monthly schedule. Summary results from the temperature dataloggers are presented in the table format.

Temperature Datalogger Measurements

30-minute datalogger temperature measurements were exported from the Onset Computer software into Excel spreadsheets. Each download of temperature data is treated as a file in the Onset software. Once the Onset file formats had been exported and saved as separate Excel files, the Excel spreadsheets for each location were combined into one Excel file with multiple worksheets. Therefore, each Excel file contains multiple worksheets, one for each separate download of data, and a summary worksheet. A summary spreadsheet file contains multiple worksheets with the combined individual data files and statistical analysis for each group (Segment 1a, non-Segment 1a and WWTP).

The date and time recorded on the Launch/Retrieval Logsheet were used to eliminate erroneous temperature measurements prior to data analysis. The majority of these erroneous measurements were eliminated by utilizing the shuttle devices to field-download data. Occasionally, the field download process occurred exactly at the time of a measurement, and an erroneous value was recorded or missed. These were also removed from the raw data prior to analysis. Once in a spreadsheet format, the data was evaluated against the underlying standard Weekly Average Temperature (WAT) criteria of 18.2°C, against the underlying standard Daily Maximum Temperature (DM) criteria of 23.8°C and against the Maximum Weekly Average Temperature (MWAT) criteria of 20°C. Percentages of compliance were calculated. Weekly average temperatures were determined by calculating the mean temperature of seven consecutive days beginning with either May 1, 2007 or the first day of data collection. Any lack of data collection resulting in a data gap of one day or more, required that the seven-day period begin anew. Maximum Weekly Average Temperatures were determined by evaluating the calculated Weekly Average Temperatures. Daily Maximum values were obtained by calculating the average temperature of a two-hour period beginning with the first temperature recorded, and averaging those values from one day. In most cases, there were four measurements in a two-hour period.

Wastewater Treatment Plant Data

Since there are five, “larger” wastewater treatment facilities that discharge into Bear Creek (four into Segment 1a and one into Segment 1b), an effort was undertaken to analyze effluent parameters that would be consequential to the receiving waters. Table 10 lists the parameters of concern (effluent flow, temperature, dissolved oxygen, pH, total ammonia, nitrate and total phosphorous) that were collected and analyzed. Only data that typically comprises daily Process Control and permit-mandated monitoring was reviewed. In prior years, the same data was collected and combined with monitoring and measurements taken in Bear Creek. This combined data was introduced to separate temperature, dissolved oxygen models to document existing effects, and predict possible outcomes of specific scenarios.

Table 10 Wastewater Treatment Plants and Parameters

WWTP	Parameters
EMD	Flow, pH, Temperature (Temp), Dissolved Oxygen (DO); Total Ammonia (NH3), Nitrate (NO3), Total Phosphorous (P); Temp Datalogger (logger)
WJCMD	Flow, pH, Temp, DO, NH3, NO3, P, logger
KSWD	Flow, pH, Temp, DO, NH3, NO3, P, logger
GWSD	Flow, pH, Temp, DO, NH3, NO3, P, logger
Morrison	Flow, pH, Temp, DO, NH3, P, logger

The sampling and monitoring portion of the Program was coordinated with the permit required effluent sampling. This occurred on Thursdays during the Program.

Weather (local)
A National Weather Service Cooperative Reporting Station Number 052790 is maintained at the EMD WWTP. Daily high and low air temperatures and precipitation are recorded and transmitted monthly to the National Weather Service. Weather data was tabulated and correlated with Bear Creek stream flows (obtained at the USGS gage above Evergreen Lake) for the Program. Weather data collected during the Program period was compared to the available historical weather records, obtained at the NWS High Plains Climate Center.

Gaging Station Stream Flows
A USGS stream gage (USGS 06710385) is maintained at a location above Evergreen Lake, near the CDOW fish survey site identified as ALKDOW. The gage location is adjacent to the Denver Mountain Parks golf course and restaurant (Keys on the Green) parking lot. The gage station received restoration in early July 2005. The dam structure creating the pool for level sensing was rebuilt. The second gaging station is located below the temperature datalogger location ID MORR10, above the town of Morrison, just west of the Highway 8 bridge over Bear Creek. This station (BCMORCO 06710500) is maintained by the US Army Corps of Engineers and the Colorado Division of Water Resources. The third gaging station is located in Bear Creek Segment 1b (within Bear Creek Lake Park) and is operated by USGS (06710605). Weekly stream flow graphs were printed from all three stations and filed for record. Monthly average daily flows from all three gages have been exported to a spreadsheet for comparison with historical data.

For this report, there were 23 years of historical record available for the gage above Evergreen Lake (October 1984 through September 2007). For the gage located in Morrison, there were 88 years of historical record available. Although flow records began at this location in 1899, the most complete data record exists from 1919 through 2007. For the USGS gage within Bear Creek Lake Park, there were 22 years of record. Historic records were obtained from the USGS National Water Information system website.

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 treatment plants), weather statistics and stream flows comprise raw data. All data are stored on an office computer, using Microsoft Office XP Professional software. The majority of the data resides in and analyses occurred in Excel spreadsheet format. The PC is connected to a LAN, which provides nightly backup to a server. Other software programs that contain raw data include Onset Computer Corporation Boxcar software and YSI Ecowatch software. Both of these programs reside on the same PC.

Laboratory results consisted of total ammonia, nitrate+nitrite and total phosphorous (Seasonal) from GEI Consultants, Inc. in Littleton and total ammonia and total organic carbon (TOC) (Off-Season) results from the Limnology Laboratory at CU Boulder. Results in spreadsheet form were transmitted to the EMD staff electronically via email attachments. Results are incorporated into the spreadsheet files for individual sampling locations. All raw data was electronically forwarded from EMD staff to BT Consulting, LLC for data summary and analyses.

Problems
Relatively few major problems were encountered during the 2006-2007 Off-Season and 2007 Seasonal Programs. However, the following was noted:

- Off-Season: The datalogger located at the west end of Morrison (MORR10) was retrieved on March 13, but moisture was detected inside the instrument. No data was salvaged from this logger.

- Off-Season: The temperature datalogger at the WJCMD WWTP (WJ6) recorded a majority (78%) of erroneous measurements during the Program that were not in line with the immediate preceding or subsequent datalogger measurements nor with manual daily effluent temperature measurements and were omitted from the data analyses.

- Seasonal and Off-Season: Dataloggers were relocated, as necessary, due to fluctuating flows in Bear Creek.

- Seasonal: Monthly sampling and monitoring measurements at the Evergreen Lake profile station were not performed on 6/7/07 due to windy weather and unsafe boating conditions.

- Seasonal: Monthly monitoring of pH measurements at Bear Creek sites on 6/7/07 was performed with a HACH pH meter, due to problems calibrating the YSI 556 for that parameter. The HACH meter was properly calibrated prior to use.

- Seasonal: Manual flow measurements were made at the ALKSRR site on 6/26/07, but additional locations downstream were rescheduled because of safety concerns due to high flows.

- Seasonal: From 7/11/07 forward, the HACH portable pH was used to obtain pH measurements in Bear Creek. The YSI 556 could not be calibrated for pH and budget constraints prevented sensor replacement or further troubleshooting investigations. The only pH measurement possible in Evergreen Lake is surface, because of the length of the HACH sensor cable.

- Seasonal: The temperature datalogger at the WJCMD WWTP (WJ6) recorded 7 erroneous measurements during the Program that were not in line with the immediate preceding or subsequent datalogger measurements and were omitted from the data analyses.

- Seasonal: The temperature datalogger below the KSWD WWTP (KSWD7) effluent recorded 107 erroneous measurements during the Program. These temperatures ranged from 0°C to -94°C and were omitted from data analyses.

- Seasonal: Dataloggers at locations EMD3, BCCDOW, GWSD9, LOBDOW, IDLEDALE, MORR10, MORR11, TURK1, TURK2, CMD1 and APMD1 experienced issues after field downloading and re-launching. Temperatures were recorded but the Date/Time stamp failed. Launch/Retrieval Logsheet data was used to re-create Date/Time stamps to coincide with temperature measurements.

DATA SHEETS AND STUDY FORMS

Forms were generated by EMD personnel to document measurements and actions during the Program. Logsheets used in the Program include Datalogger Launch/Retrieve; Calibration Record-YSI 556; Calibration Record-YSI Sonde; Bear Creek Monthly Checks Log; EMD Chain of Custody form

Data Sheets-Launch/Retrieve Record
This form was used during the Program to document the precise time and date when the dataloggers were removed from and immersed in Bear Creek. This was an important to document because not all of the dataloggers have delayed-start capabilities. For some of the dataloggers, temperature measurement began as soon as the logger was launched at the computer, so documenting exactly when the logger was immersed allows for the exclusion of erroneous readings. In addition, manual Date and Time records allow for coordination of time and temperature, should recording problems occur. Date, time and initials were recorded.

Data Sheets-Calibrations
The two-calibration log sheets used during the Program documented the instrument calibrations performed before each measuring activity. Date, time, equipment warm-up time, pH (7.00 and 10.01), dissolved oxygen, temperature, specific conductance and initials were recorded. Both the YSI 556 and the YSI 600 XLM Sonde instruments were calibrated prior to each use. Any unusual conditions (unit will not calibrate) or service activities (changing batteries) were also noted.

Data Sheets-Monthly Log
The monthly log sheets used during the Program summarized sampling and monitoring event results. Date, pH, temperature, dissolved oxygen, specific conductance, sampling time and initials were documented. Parameter results and monitoring time were transcribed from the YSI 556 meter memory. A note was also made regarding the presence (or absence) of the datalogger. Weather observations were noted.

Data Sheets-EMD Chain of Custody
The Chain of Custody form was used during the Seasonal and Off-Season Programs to document the secure handling of stream samples obtained. Date, time, sample location, sample type (composite/grab), number of containers, analysis (Total Ammonia, Nitrate+Nitrite, Total Organic Carbon, Total Phosphorous, as appropriate), sampler signature, remarks, relinquished by and received by signatures was recorded. The form is a carbonless copy, and the copy remained with the samples at the GEI Consultants laboratory in Littleton, Colorado or at the Limnology Laboratory at CU Boulder and the original was retained on file by EMD. Datasets include all locations from individual events, graphed representation of such data and all recorded temperature data (exported to spreadsheet format) from the dataloggers. This data is available from the Association.

OFF-SEASON DATA SUMMARIES

Temperature Datalogger Results
51,153 individual temperature data points were obtained from the eight-datalogger locations within Segment 1a. The evaluating criteria used to determine potential impairment of stream temperature is the proposed, seasonal underlying 9°C Weekly Average Temperature (WAT), the proposed, seasonal underlying 13°C Daily Maximum Temperature (DM) and the interim (July 2009) 20°C Maximum Weekly Average Temperature (MWAT).

The WAT is determined by calculating the seven-day average temperature of all measurements collected in seven consecutive days, beginning with the first day of data collection. There were 150 weekly averages calculated for the program period. There were no exceedances of the evaluating criteria (9°C WAT) at any of the eight locations within the Segment. **This results in 100% compliance with the proposed underlying standard of 9°C as a WAT.**

The second and currently applicable evaluating criteria used to determine potential impairment of stream temperature is the interim 20°C Maximum Weekly Average Temperature (MWAT). The MWAT is determined by calculating the seven-day average temperature of all measurements

collected in seven consecutive days, beginning with the first day of data collection. There were 150 weekly averages calculated for the Study period. There were no exceedances of the evaluating criteria (20°C MWAT), at any of the eight locations within the Segment. **This results in 100% compliance with the interim standard of 20°C as an MWAT.**

The third applicable evaluating criteria used to determine potential impairment of stream temperature in the proposed underlying 13°C Daily Maximum Temperature (DM). The DM is calculated by averaging temperature measurements recorded in a two-hour period and determining the maximum of these values in one day. 12,787 two-hour blocks were evaluated and 1,065 Daily Maximum values were calculated. There were no exceedances of the proposed underlying criteria (DM 13°C), at any of the eight locations within the Segment. **This results in 100% compliance with the proposed underlying standard of 13°C as a DM.**

24,197 individual temperature data points were obtained from the five dataloggers located in the WWTP effluents that discharge into Segments 1a and 1b. Recognizing that there are no permit temperature limits, the following data summary is presented. **Daily Average Temperatures for all five effluents was 7.9°C and Weekly Average Temperatures for all effluents was 7.9°C.**

Monitoring Parameter Results

Monthly monitoring measurements were obtained from eight locations in Segments 1a. 56 total measurements of temperature were obtained from the locations mentioned above. Since these were monthly monitoring events, the evaluating criteria mentioned above were not considered. **The Maximum temperature value at any location did not exceed 6.31°C and the average of all monthly Maximum temperatures for these locations was 5.32°C.**

46 total measurements of pH were obtained at eight locations noted above. The pH stream standard range is 6.5 – 9.0. One pH value at the Downtown Evergreen CDOW site was elevated at 9.57. With that measurement, **98% of the monthly pH values obtained was in compliance.**

53 total measurements of dissolved oxygen were obtained at eight locations noted above. The minimum dissolved oxygen stream standard is 6.0 mg/L. **100% of the monthly dissolved oxygen measurements obtained was in compliance.**

Monthly grab samples were taken at eight locations noted above and analyzed for Total Ammonia and Total Organic Carbon (TOC). 54 samples were analyzed for total organic carbon. **Samples were analyzed for TOC and results reported, although no stream standard exists.**

56 samples were analyzed for total ammonia. Although the Association's Table Value Standard (TVS) calculations for total ammonia have not been confirmed by the Water Quality Control Division at the time of completion of this Report, individual results of total ammonia analyses indicate a range of 5ug/L-560ug/L with an average of 74ug/L throughout the twenty locations sampled in the watershed. **All indications are that these values comply with a calculated TVS for total ammonia.**

WWTP effluent measurements and samples were taken as necessary according to discharge permit requirements. Process control measurements were taken during the normal course of plant operations. 818 total measurements of temperature were obtained at the five WWTP effluents during the Program. None of the five WWTP discharge permits has limits for temperature. **Since these measurements were obtained once daily, no analysis of data was performed.**

861 total measurements of pH were obtained at the five WWTP effluents monitored during the Program. The discharge permit pH range is 6.5 – 9.0. **100% of pH values were in compliance.**

609 total measurements of dissolved oxygen were obtained at the five WWTP effluents monitored during the Program. None of the five WWTP discharge permits has limits for dissolved oxygen. 133 total ammonia samples were analyzed during the Program period. **100% of the effluent analysis results for total ammonia for each permit limit were in compliance.**

Temperature and Water Quality Compliance

The 30-minute temperature datalogger measurements recorded in Bear Creek at eight locations from just below the Evergreen Lake dam to the west end of Morrison do not indicate that a problem exists, either man-induced or natural. The 30-minute temperature measurements that are used to calculate the WAT values result in 100% compliance of the evaluating criteria of 9°C WAT, utilizing the 85th%-tile qualifier, as a proposed underlying standard for class 1 cold waters. This proposed underlying standard was met this Off-Season Program period. **100% of the 2006-2007 Off-Season recorded values would be consistent with a proposed underlying standard of 9°C WAT.**

The 30-minute temperature measurements that are used to calculate the MWAT values result in full compliance of the evaluating interim standard criteria of 20°C MWAT, utilizing the 85th%-tile qualifier. Although this proposed limit was met during this Off-Season Program period, the assumption should not be made that this will always be the case. **100% of the 20°C MWAT temperature values complied with an interim standard of 20°C MWAT.**

The 30-minute temperature measurements that are used to calculate the DM values result in full compliance of the evaluating proposed underlying standard criteria of 13°C DM, utilizing the 85th%-tile qualifier. Although this proposed limit was met during this Off-Season Program period, the assumption should not be made that this will always be the case. **100% of the calculated temperature values complied with a proposed underlying standard of 13°C DM.**

Monthly in-stream monitoring measurements recorded in Bear Creek at eight locations from just below the Evergreen Lake dam to the west end of Morrison, do not indicate that a problem exists, either man-induced or natural, that results in the non-compliance of stream standards for pH and Dissolved Oxygen, utilizing the 85th%-tile qualifier. Temperature could not be evaluated against the proposed criteria because of the monthly monitoring frequency. There is no stream standard for Specific Conductance. **Analysis of all (7 months, eight locations) in-stream measurements (46 for pH and 53 for dissolved oxygen) results in 98% compliance for pH and 100% compliance for Dissolved Oxygen.**

Monthly in-stream ammonia sampling results obtained in Bear Creek at eight locations from just below the Evergreen Lake dam to the west end of Morrison, do not indicate that a problem exists, either man-induced or natural, that results in the non-compliance of stream standards for Total Ammonia, utilizing the 85th%-tile qualifier. Although the Association's Table Value Standard (TVS) calculations for total ammonia have not been confirmed by the Water Quality Control Division at the time of completion of this Report, individual results of total ammonia analyses indicate a range of 5ug/L-560ug/L with an average of 74ug/L throughout the twenty locations sampled in the watershed. **All indications are that these values comply with a calculated TVS for total ammonia.**

The 30-minute temperature datalogger measurements recorded in the five WWTP effluents that discharge into Bear Creek in Segment 1a and 1b do not indicate that a stream temperature problem exists as a result of any WWTP effluent. **Since there are no temperature effluent limits for the five-wastewater plants, the Daily Average Temperature and Weekly Average Temperatures were calculated. For all five WWTP effluents, Daily Average temperatures equaled 7.9°C. For all five WWTP effluents, Weekly Average Temperatures equaled 7.9°C.**

The daily WWTP Process Control measurements recorded in the five WWTP effluents that discharge into Bear Creek in Segment 1a and 1b do not indicate that a problem exists in any WWTP effluent that results in the non-compliance of any pH, Temperature, Dissolved Oxygen or Ammonia stream standard. It is important to note that there were no permit violations for any WWTP with respect to pH or Ammonia. None of the WWTP discharge permits have temperature or dissolved oxygen limits. **100% of the effluent pH and total ammonia values met permit limits.**

The 2006-2007 Off-Season special stream monitoring program in Bear Creek Segment 1a showed no evidence of impairment. Comparisons with the interim temperature standards resulted in compliance. The interim Maximum Weekly Average Temperature (MWAT) of 20ºC, proposed underlying standard Weekly Average Temperature (WAT) of 9ºC and proposed underlying standard Daily maximum (DM) of 13ºC were met with full compliance at all monitoring locations. A comprehensive temperature data collection effort, summarized in 51,153 30-minute measurements at eight in-stream locations throughout the Segment, provided the data for analyses. The calculated MWAT values were met this year.

There were no compliance issues regarding ammonia stream standards during the Program period. Total ammonia results from eight locations throughout the Segment; indicate that these values comply with a calculated TVS for total ammonia.

A comprehensive temperature data collection effort, summarized in 24,197 30-minute measurements in five wastewater treatment plant effluents that discharge into Bear Creek Segment 1a and 1b, showed no evidence of thermal pollution. Similarly, there were no ammonia or pH exceedances during the typical operation of these plants. All five plants met discharge limits stated in their Colorado Discharge Pollutant Elimination System (CDPES) permit for pH and ammonia during the Program period.

There were no observed impairment issues or temperature or ammonia issues in the Segment during the Program. Wastewater treatment plant effluents had no detrimental effect on the water quality of Segment 1a.

SEASONAL DATA SUMMARIES

Temperature Datalogger Results

163,265 individual temperature data points were obtained from the twenty-datalogger locations within Segment 1a, 1b and Turkey Creek. The evaluating criteria used to determine potential impairment of stream temperature is the proposed underlying 18.2°C Weekly Average Temperature (WAT), the proposed underlying 23.8°C Daily Maximum Temperature (DM) and the interim (July 2009) 20°C Maximum Weekly Average Temperature (MWAT).

The WAT is determined by calculating the seven-day average temperature of all measurements collected in seven consecutive days, beginning with the first day of data collection. There were 480 weekly averages calculated for the Program period. There were 10 exceedances of the evaluating criteria (18.2°C WAT) at all of the twenty locations monitored. **This results in 98% compliance with the proposed underlying standard of 18.2°C as a WAT.**

The second and currently applicable evaluating criteria used to determine potential impairment of stream temperature is the interim 20°C Maximum Weekly Average Temperature (MWAT). The MWAT is determined by calculating the seven-day average temperature of all measurements collected in seven consecutive days, beginning with the first day of data collection. There were 480 weekly averages calculated for the Program period. There were no exceedances of the

evaluating criteria (20°C MWAT), at any of the twenty locations monitored. **This results in 100% compliance with the interim standard of 20°C as an MWAT.**

The third applicable evaluating criteria used to determine potential impairment of stream temperature in the proposed underlying 23.8°C Daily Maximum Temperature (DM). The DM is calculated by averaging temperature measurements recorded in a two-hour period and determining the maximum of these values in one day. 40,832 two-hour blocks were evaluated and 3,415 Daily Maximum values were calculated. There was one exceedance of the proposed underlying criteria (DM 23.8°C), at all of the twenty locations monitored. **This results in +99% compliance with the proposed underlying standard of 23.8°C as a DM.**

43,668 individual temperature data points were obtained from the five dataloggers located in the WWTP effluents that discharge into Segments 1a and 1b. Recognizing that there are no permit related temperature limits, the following summary is presented: **Daily Average Temperatures for all five effluents was 16.4°C and Weekly Average Temperatures for all effluents was 16.5°C.**

Monitoring Parameter Results

Monthly monitoring measurements were obtained from twenty locations in Segments 1a, 1b and Turkey Creek over 6 months. 121 total measurements of temperature were obtained from the locations mentioned above. Since these were monthly monitoring events, the evaluating criteria mentioned above were not considered. One questionable value was recorded at the APMD1 location (in Turkey Creek below the Aspen Park Metro District WWTP effluent). On May 3, 2007, a stream temperature of 20.6°C was recorded at 13:48 during monitoring. When compared to a 16.89°C recorded at 13:30 with the datalogger, this appears to be an erroneous value. Omitting that value, the **maximum temperature value at any location did not exceed 18.03°C and the average of all monthly Maximum temperatures for these locations was 15.94°C.**

121 total measurements of pH were obtained at twenty locations noted above. The pH stream standard range is 6.5 – 9.0. **100% of the monthly pH values were in compliance.**

116 total measurements of dissolved oxygen were obtained at twenty locations noted above. The minimum dissolved oxygen stream standard is 6.0 mg/L. One questionable value was recorded at the location below Aspen Park metro District WWTP effluent. During the August monitoring event, a DO value of 3.63 mg/L was recorded. Omitting that questionable measurement results in **100% compliance of the monthly dissolved oxygen measurements.**

Monthly grab samples were taken for total ammonia at twenty locations noted above. 115 samples were analyzed. Although the Association's Table Value Standard (TVS) calculations for total ammonia have not been confirmed by the Water Quality Control Division at the time of completion of this Report, individual results of total ammonia analyses indicate a range of 5ug/L-63ug/L with an average of 17ug/L throughout the twenty locations sampled in the watershed. **All indications are that these values comply with a calculated TVS for total ammonia.**

Monthly grab samples were taken for nitrate-nitrite at twenty locations noted above. The stream standard for Nitrate is 10 mg/L. 115 samples were analyzed and results reported. **There were no values reported that exceeded the stream standard for Nitrate.**

Monthly grab samples were taken for total phosphorous at twenty locations noted above. There is no total phosphorous stream standard. **115 samples were analyzed and reported for total phosphorous.**

WWTP effluent measurements and samples were taken as necessary according to discharge permit requirements. Process control measurements were taken during the normal course of plant operations. 731 total measurements of temperature were obtained at the five WWTP effluents during the Program. None of the five WWTP discharge permits has limits for temperature. **Since these measurements were obtained once daily, no analysis of data was performed.**

754 total measurements of pH were obtained at the five WWTP effluents monitored during the program. The discharge permit pH range is 6.5 – 9.0. **100% of pH values were in compliance.**

543 total measurements of dissolved oxygen were obtained at the five WWTP effluents monitored during the Program. None of the five WWTP discharge permits has limits for dissolved oxygen. 104 total ammonia samples were analyzed during the Program period. **100% of the effluent analysis results for total ammonia for each permit limit were in compliance.**

None of the five WWTPs has a discharge limit for Nitrate. **45 nitrate samples were analyzed and reported during the Program period.**

133 total phosphorous samples were analyzed during the Program period. Each individual WWTP has specific discharge limits for Total Phosphorous. **100% of the effluent analysis results for total phosphorous for each permit limit were in compliance.**

24-Hour Profiling Results
At the ALKDOW location (above Evergreen Lake at the CDOW fish survey site), 48 measurements were obtained for each of the four parameters: pH, Temperature, Dissolved Oxygen and Specific Conductance. The existing stream standard for pH is 6.5-9.0 and 6.0 mg/L for Dissolved Oxygen. There are no existing stream standards for Specific Conductance. Temperatures could not be evaluated against the proposed WAT and MWAT values.

- **There was 100% compliance with pH stream standard.**
- **There was 100% compliance with Dissolved Oxygen stream standard.**

Stream Flow Data and Weather

The stream flows recorded during the Program, on daily average at the gage above Evergreen Lake, were significantly higher than the historic daily average in May and June, slightly higher in July and August, about average for September and slightly lower in October than the historic averages. Measurable precipitation was recorded on 15 days in May, 5 days in June, 8 days in July, 16 days in August, 9 days in September and 4 days in October. Precipitation was significantly above monthly historical averages in May, but significantly lower than monthly historic averages in June, July and September.

The stream gages above Morrison and within Bear Creek Lake Park somewhat followed the Evergreen Gage values. The gage above Morrison recorded significantly higher flows (as compared to monthly historic averages) in May and June, and slightly lower flows in July through October. The USGS gage within Bear Creek Lake park recorded significantly higher flows in May through July and slightly higher to average flows from August through October.

Precipitation was significantly higher in May as compared to monthly historical averages, coinciding with high stream flows. Precipitation was significantly lower than historic monthly averages in June, July and September and about average for August and October. Even with the lack of average precipitation in June and July, the stream flows remained above to slightly below monthly historic averages throughout the Segment.

The Average Monthly Mean temperatures were slightly higher than the historical data for all months. The Average Monthly Maximum temperatures were about equal to historical average, but the Average Monthly Minimum temperatures were slightly higher in all months. This equates to higher overnight temperatures and less overnight cooling. The Average Daily Maximum temperatures were within 1 to 3 degrees of historical averages, with the highest average daily maximum temperatures in July. The Average Monthly temperatures were within one degree of historical averages, with the exception of July at 3 degrees above historical average monthly temperatures. At higher air temperatures and no precipitation, stream temperatures naturally increase and flows decrease. The almost immediate lowering of stream temperatures coincides with the period of measurable precipitation, higher stream flows and lowered air temperatures.

Temperature and Water Quality Compliance

The 30-minute temperature datalogger measurements recorded in Bear Creek at twenty locations from well above Evergreen Lake to just upstream of Bear Creek Reservoir and North and South Turkey Creeks do not indicate that a problem exists, either man-induced or natural. The 30-minute temperature measurements that are used to calculate the WAT values result in 98% compliance of the evaluating criteria of 18.2°C WAT, utilizing the 85th%-tile qualifier, as a proposed underlying standard for class 1 cold waters. This proposed limit was mostly met a majority of this Program period, and this limit may be regularly achieved. However, during a Program period that does not include more typical precipitation events and more average minimum and maximum air temperatures, this limit could prove difficult to meet. **98% of the recorded values would be consistent with the underlying standard of 18.2°C WAT temperatures, which supports the supposition that a stream standard of 18.2°C WAT could be achieved during most of the growing season**.

The 30-minute temperature measurements that are used to calculate the MWAT values result in full compliance of the evaluating interim standard criteria of 20°C MWAT, utilizing the 85th%-tile qualifier. Although this proposed limit was met during this Program period, the assumption should not be made that this will always be the case. **100% of the 20°C MWAT temperature values complied with an interim standard of 20°C MWAT.**

The 30-minute temperature datalogger measurements recorded in Bear Creek at twenty locations from well above Evergreen Lake to just upstream of Bear Creek Reservoir and North and South Turkey Creeks do not indicate that a problem exists, either man-induced or natural. The 30-minute temperature measurements that are used to calculate the DM values result in +99% compliance of the evaluating criteria of 23.8°C DM, utilizing the 85th%-tile qualifier, as a proposed underlying standard for class 1 cold waters. This proposed limit was met a majority of this Program period, and this limit may be regularly achieved. However, during a Program period that does not include more typical precipitation events and more average minimum and maximum air temperatures, this limit could prove difficult to meet. **+99% of the 2007-recorded values would be consistent with a proposed underlying standard of 23.8°C DM, which supports the supposition that an underlying standard of 23.8°C DM could be achieved during most of the growing season**.

Weekly in-stream monitoring measurements recorded in Bear Creek at twenty locations from well above Evergreen Lake to Bear Creek Reservoir and North and South Turkey Creeks, do not indicate that a problem exists, either man-induced or natural, that results in the non-compliance of stream standards for pH and Dissolved Oxygen, utilizing the 85th%-tile qualifier. Temperature could not be evaluated against the proposed criteria because of the weekly monitoring frequency. There is no stream standard for Specific Conductance. **Analysis of all (6 months, twenty locations) in-stream measurements (121 for pH and 115 for dissolved oxygen) resulted in 100% compliance for pH and Dissolved Oxygen.**

Monthly in-stream ammonia sampling results and calculations obtained in Bear Creek at twenty locations from well above Evergreen Lake to just above Bear Creek Reservoir and north and South Turkey Creeks, do not indicate that a problem exists, either man-induced or natural, that results in the non-compliance of stream standards for Ammonia, utilizing the 85th%-tile qualifier. Although the Association's Table Value Standard (TVS) calculations for total ammonia have not been confirmed by the Water Quality Control Division at the time of completion of this Report, individual results of total ammonia analyses indicate a range of 5ug/L-63ug/L with an average of 17ug/L throughout the twenty locations sampled in the watershed. **All indications are that these values comply with a calculated TVS for total ammonia.**

Monthly in-stream nitrate+nitrite sampling results and calculations obtained in Bear Creek at twenty locations from well above Evergreen Lake to just above Bear Creek Reservoir and north and South Turkey Creeks, do not indicate that a problem exists, either man-induced or natural, that results in the non-compliance of stream standards for Nitrate, utilizing the 85th%-tile qualifier. **Analysis of all in-stream sampling results (115 measurements) results in 100% compliance for the stream standard of 10.0 mg/L Nitrate.**

The 30-minute temperature datalogger measurements recorded in the five WWTP effluents that discharge into Bear Creek in Segment 1a and 1b do not indicate that a stream temperature problem exists as a result of any WWTP effluent. **Since there are no temperature effluent limits for the five-wastewater plants, the Daily Average Temperature and Weekly Average Temperatures were evaluated. For all five WWTP effluents, Daily Average temperatures equaled 16.4°C and Weekly Average Temperatures equaled 16.5°C.**

The daily WWTP Process Control measurements recorded in the five WWTP effluents that discharge into Bear Creek in Segment 1a and 1b do not indicate that a problem exists in any WWTP effluent that results in the non-compliance of any pH, Temperature, Dissolved Oxygen or Ammonia stream standard. It is important to note that there were no permit violations for any WWTP with respect to pH, total ammonia or total phosphorous during the Program period. None of the WWTP discharge permits has temperature or dissolved oxygen limits. **100% of the effluent pH, Total Phosphorous and Total Ammonia values met permit limits.**

The results of the 24-hour profiling at the one selected location in Bear Creek Segment 1a do not indicate that a problem exists, either man-induced or natural, that results in the non-compliance of stream standards for pH and Dissolved Oxygen, utilizing the 85th%-tile qualifier. 48 measurements per parameter were recorded at the ALKDOW location. Temperature could not be evaluated against the proposed criteria because of the monitoring frequency. There is no stream standard for Specific Conductance. **100% compliance was achieved for the pH and Dissolved Oxygen stream standards.**

Weather records and stream gage readings indicated that the 2007 Program period was warmer and drier, but this was not detrimental to water quality conditions in Bear Creek. Stream gage measurements recorded at all three gaging stations mentioned above showed higher or equal to historic monthly averages through July, and average to slightly lower than historical average flows from August into October. For the Program period, the precipitation was significantly below historical average, with the exception of May. For the Program period, average daily minimum air temperatures were significantly higher and monthly average temperatures were about equal to the historical average.

The 2007 special stream monitoring program in the Bear Creek watershed, including Bear Creek Segment 1a, 1b and Turkey Creeks showed no evidence of impairment. Comparisons with the interim temperature standards resulted in compliance. The interim Maximum Weekly

Average Temperature of 20ºC was met with full compliance at all monitoring locations. Underlying standards of 18.2ºC WAT and 23.8ºC DM were calculated to at least 98% compliance at all monitoring locations. A comprehensive temperature data collection effort, summarized in 163,265 30-minute measurements at twenty in-stream locations throughout the Segment 1a, 1b and Turkey Creek, provided the data for analyses.

There were no compliance issues regarding ammonia stream standards during the Program period. Total ammonia results from twenty locations throughout Segment 1a, 1b and Turkey Creek, indicate that these values comply with a calculated TVS for total ammonia.

A surprising factor in the 2007 Program was the snow pack run-off and higher than average precipitation in May carried the stream through a lack of regular precipitation in and warm temperatures in June and July. Precipitation in August was only about historic average, but it was enough to maintain the stream flow at slightly above to slightly below historic average.

A comprehensive temperature data collection effort, summarized in 43,668 30-minute measurements in five wastewater treatment plant effluents that discharge into Bear Creek Segment 1a and 1b, showed no evidence of thermal pollution. Similarly, there was no ammonia, phosphorous or pH exceedances during the typical operation of these plants. All five plants met discharge limits stated in their Colorado Discharge Pollutant Elimination System (CDPES) permit for pH, ammonia and phosphorous during the Program period.

There were no observed impairment issues in the Segment or any permit violations in wastewater plant effluents during the Program. There were no observed temperature or ammonia issues with the Segment. Wastewater effluent had no detrimental effect on the water quality of Segment 1a. Snow pack run-off and May precipitation produced above or average stream flows for most of the Program period, and proposed MWAT criteria was not exceeded in the stream. Bioassessment and fish survey data indicate that the fishery continues to recover from the drastic conditions encountered in the most severe drought year of 2002.

OFF-SEASON DATA TABLES

The following applies to all off-season data tables: Existing stream standards: Table Value Standard (TVS) for Total Ammonia (NH3-N), chronic; pH 6.5-9.0 SU; DO 6.0 mg/L; Threshold to Evaluate Potential Temperature Impairment: 20°C MWAT (Maximum Weekly Average Temperature, Interim Standard), 9°C WAT (Weekly Average Temperature, Underlying Standard), 13°C DM (Daily Maximum Temperature, Underlying Standard); 2-HR Avg. Temperature data are estimates used to evaluate against DM Underlying Standard.

Table 11 Above Evergreen Lake, at CDOW site (Site 3)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O. mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	6.80	-0.92	11.27	0.072	4.8	1.72
Max	8.79	3.08	13.56	0.113	13.4	7.67
Avg	7.71	0.37	12.43	0.092	8.0	3.73
Std. Dev.	0.71	1.56	0.75	0.017	2.5	2.31
# of measurements	5	7	7	5	7	7

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)	2-HR Avg. Temp.	DM (13°C)

Min	-0.14	-0.06	-0.06	-0.09	-0.06
Max	8.64	6.33	6.33	8.58	8.58
Avg	0.56	0.58	0.58	0.56	1.00
Std. Dev.	1.60	1.44	1.44	1.60	2.13
# of measurements	7396	22	22	1849	154
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

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

Table 12 Downtown Evergreen, at CDOW site (Site 5)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	6.46	-0.78	10.16	0.09	12.5	2.00
Max	9.57	5.06	13.10	0.17	23.2	7.52
Avg	7.78	1.75	11.67	0.13	17.6	3.87
Std. Dev.	0.93	2.14	1.01	0.029	4.7	2.02
# of measurements	6	7	7	5	7	7
Datalogger Temperature Data						
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)		2-HR Avg. Temp.	DM (13°C)
Min	-0.09	0.06	0.06		-0.09	-0.01
Max	10.03	8.93	8.93		9.84	9.84
Avg	1.71	1.74	1.74		1.71	2.13
Std. Dev.	2.24	2.23	2.23		2.24	2.37
# of measurements	7397	22	22		1849	154
# of 20°C MWAT exceeded		0				
% Compliance MWAT		100				
# of 18.2°C WAT exceeded			0			
% Compliance WAT			100			
# of 23.8°C DM exceeded						0
% Compliance DM						100

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

Table 13 Bear Creek Cabins (Site 8)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	7.28	-0.93	10.03	0.115	9.2	2.40
Max	8.35	5.40	13.18	0.198	560.2	8.64
Avg	7.99	1.94	11.72	0.158	219.2	4.37
Std. Dev.	0.39	2.48	0.99	0.031	205.0	2.25
# of measurements	6	7	7	5	7	7

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)	2-HR Avg. Temp.	DM (13°C)
Min	-0.17	-0.08	-0.08	-0.15	-0.13
Max	11.57	8.96	8.96	11.39	11.39
Avg	1.67	1.70	1.70	1.67	2.79
Std. Dev.	2.37	2.26	2.26	2.36	2.78
# of measurements	7397	22	22	1849	154
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

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

Table 14 O'Fallon Park (Site 9)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	7.21	-0.93	10.84	0.153	7.3	2.24
Max	8.83	5.48	13.96	0.294	123.9	7.97
Avg	8.11	1.67	12.32	0.199	55.4	4.12
Std. Dev.	0.53	2.59	1.15	0.052	41.8	2.09
# of measurements	5	7	7	5	7	7

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)	2-HR Avg. Temp.	DM (13°C)
Min	-0.12	-0.06	-0.06	-0.12	-0.09
Max	12.00	8.64	8.64	11.88	11.88
Avg	1.52	1.53	1.53	1.52	2.66
Std. Dev.	2.37	2.21	2.21	2.37	3.16
# of measurements	7540	22	22	1885	157
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: OFPDOW GPS Coordinates: 39.6564°N, 105.2917°W; Sampling/ monitoring site north side of the creek above the ETU restoration site across Hwy 74 from the CDOT station, at the CDOW fish survey site.]

Table 15 Lair o' the Bear (Site 12)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	6.26	-0.94	9.42	0.146	6.5	2.42
Max	8.73	5.35	13.58	0.289	249.6	7.92
Avg	7.88	1.56	11.66	0.212	80.9	4.31
Std. Dev.	0.85	2.70	1.33	0.050	86.5	2.11
# of measurements	6	7	7	5	7	7
Datalogger Temperature Data						
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)		2-HR Avg. Temp.	DM (13°C)
Min	-0.09	-0.03	-0.03		-0.06	-0.03
Max	11.03	8.42	8.42		10.93	10.93
Avg	1.34	1.36	1.36		1.34	2.10
Std. Dev.	2.32	2.14	2.14		2.31	2.88
# of measurements	7397	22	22		1849	154
# of 20°C MWAT exceeded		0				
% Compliance MWAT		100				
# of 18.2°C WAT exceeded			0			
% Compliance WAT			100			
# of 23.8°C DM exceeded						0
% Compliance DM						100

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

Table 16 Idledale (Shady Lane-Site 13a)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	7.24	-0.93	10.33	0.152	6.7	2.46
Max	8.81	5.87	13.51	0.289	235.1	7.94
Avg	8.12	1.74	11.93	0.216	74.2	4.29
Std. Dev.	0.57	2.87	1.16	0.048	84.5	1.95
# of measurements	6	7	6	5	7	7
Datalogger Temperature Data						
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)		2-HR Avg. Temp.	DM (13°C)
Min	-0.06	-0.03	-0.03		-0.06	-0.03
Max	8.59	4.99	4.99		8.46	8.46
Avg	1.00	0.95	0.95		1.00	1.67
Std. Dev.	1.76	1.49	1.49		1.75	2.30
# of measurements	7013	20	20		1753	146
# of 20°C MWAT exceeded		0				
% Compliance MWAT		100				
# of 18.2°C WAT exceeded			0			
% Compliance WAT			100			
# of 23.8°C DM exceeded						0
% Compliance DM						100

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

Table 17 Below Idledale (Site 13b)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	7.08	-0.93	10.17	0.154	5.8	2.54
Max	8.85	6.01	13.57	0.290	231.0	7.60
Avg	8.04	1.80	11.85	0.217	72.4	4.31
Std. Dev.	0.59	2.88	1.20	0.048	83.8	1.93
# of measurements	6	7	6	5	7	7

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)	2-HR Avg. Temp.	DM (13°C)
Min	-0.23	-0.20	-0.20	-0.21	-0.20
Max	8.47	4.81	4.81	8.38	8.38
Avg	0.83	0.77	0.77	0.83	1.54
Std. Dev.	1.77	1.49	1.49	1.77	2.33
# of measurements	7013	20	20	1753	146
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: EMD5A GPS Coordinates: 39.6614°N, 105.2355°W; Sampling/ monitoring site east end of Idledale, upstream side of the Baker bridge, near the CDOW fish survey site.]

Table 18 West End of Morrison (Site 14)

7 Monthly Sampling/Monitoring Events October, 2006-April, 2007						
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cond., mS/cm	Total NH3-N, ug/L	Total Organic Carbon (TOC), mg/L
Min	7.24	-0.92	10.37	0.164	7.1	2.54
Max	8.50	6.31	13.96	0.294	207.2	7.74
Avg	8.14	2.08	11.91	0.219	62.0	4.12
Std. Dev.	0.44	2.98	1.18	0.048	73.9	1.88
# of measurements	6	7	6	5	7	5

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (9°C)	2-HR Avg. Temp.	DM (13°C)
Min	NA	NA	NA	NA	NA
Max	NA	NA	NA	NA	NA
Avg	NA	NA	NA	NA	NA
Std. Dev.	NA	NA	NA	NA	NA
# of measurements	NA	NA	NA	NA	NA
# of 20°C MWAT exceeded		NA			
% Compliance MWAT		NA			
# of 18.2°C WAT exceeded			NA		
% Compliance WAT			NA		
# of 23.8°C DM exceeded					NA
% Compliance DM					NA

[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.]

Off-Season Data Tables-WWTP Effluent

The following data tables summarize wastewater effluent quality for dischargers into Bear Creek Segment 1a. Data was obtained from daily plant process control sheets and laboratory results that are utilized to complete CDPES Discharge Monitoring Reports (DMR). Since daily plant operations and reporting requirements differ, only available data was used. There were no additional requirements requested of plant operators for the Program. Datalogger temperature measurements of plant effluent were obtained at the identical frequency of the in-stream dataloggers (30-minute intervals). The datasheets listed in a downstream direction, as the effluents enter Bear Creek, from the EMD WWTP to the Morrison WWTP.

Table 19 Evergreen Metropolitan District

EMD WWTP Effluent October, 2006 - April, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.51	6.80	3.35	66	700	100	0.3900
Max	6.96	16.80	6.18	7900	5700	770	1.4362
Avg	6.73	9.88	4.75	3214	3029	284	0.5829
Std. Dev.	0.08	2.80	0.46	2270	1644	149	0.1586
# of Measurements	152	133	133	39	7	30	212

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	6.2	6.2	6.6
Max	15.6	15.4	14.9
Avg	9.0	9.0	9.1
Std. Dev.	2.4	2.4	2.5
# of measurements	7492	156	22

[Datalogger ID: EMD5 GPS Coordinates: 39.6376°N, 105.3150°W; Sampling/monitoring site is the EMD WWTP effluent. The datalogger was located 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: Oct.-4,200 Nov.-5,900 Dec.-4,700 Jan.-10,100 Feb.-6,500 Mar.-6,400 Apr.-5,300 ; pH 6.5-9.0

Table 20 West Jefferson County Metropolitan District

WJCMD WWTP Effluent October, 2006 - April, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.52	11.40	2.71	28	1800	140	0.2716
Max	7.04	19.90	7.55	566	3500	1700	0.7391
Avg	6.73	13.77	3.66	171	2557	459	0.4917
Std. Dev.	0.12	2.37	0.60	151	669	341	0.0710
# of Measurements	152	134	134	30	7	31	212

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	11.3	12.1	13.4
Max	16.7	16.1	15.3
Avg	13.8	13.9	14.2
Std. Dev.	1.1	1.0	0.8
# of measurements	1643	34	4

[Datalogger ID: WJ6 GPS Coordinates: 39.6621°N, 105.3351°W; Sampling/monitoring site is the WJCMD WWTP effluent. The datalogger was located 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: Oct.-6,500 Nov.-8,500 Dec.-6,300 Jan.-13,300 Feb.-9,000 Mar.-13,000 Apr.-8,000 ; pH 6.5-9.0

Table 21 Kittredge Sanitation and Water District

KSWD WWTP Effluent October, 2006 - April, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.70	2.10	3.58	88	5500	140	0.0312
Max	7.37	12.90	8.63	2230	18000	800	0.1292
Avg	6.96	6.16	6.58	795	10757	379	0.0572
Std. Dev.	0.11	2.77	1.21	588	4360	149	0.0129
# of Measurements	140	133	134	27	7	19	212

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	-0.1	0.6	0.8
Max	12.1	11.1	8.7
Avg	4.3	4.4	4.3
Std. Dev.	2.5	2.5	2.3
# of measurements	7526	157	22

[Datalogger ID: KSWD8 GPS Coordinates: 39.6585°N, 105.2868°W; Sampling/monitoring site is the KSWD WWTP effluent. The datalogger was located near the flow-measuring flume, just upstream of the outfall. Effluent flows from the datalogger location under Highway 74 to the outfall in Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: Oct.-2,600 Nov.-5,900 Dec.-4,700 Jan.-10,100 Feb.-4,500 Mar.-5,300 Apr.-3,600 ; pH 6.5-9.0

Table 22 Genesee Water and Sanitation District

GWSD WWTP Effluent October, 2006 - April, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.58	7.0	2.4	30	1100	25	0.2160
Max	7.95	17.5	9.1	13690	8900	890	0.5020
Avg	7.06	11.5	7.4	1531	4069	472	0.2889
Std. Dev.	0.17	2.4	0.6	3071	2050	175	0.0365
# of Measurements	211	212	208	33	36	30	212

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	9.8	9.9	10.0
Max	17.1	17.1	16.4
Avg	12.1	12.1	12.1
Std. Dev.	2.0	2.0	2.0
# of measurements	7536	157	22

[Datalogger ID: GWSD9A GPS Coordinates: 39.6732°N, 105.2712°W; Sampling/monitoring site is the GWSD WWTP effluent. The datalogger was located in a wet well, just upstream of the outfall at the plant.

Effluent flows from the datalogger location into a drainage, down to and under Highway 74 at the west end of Lair o' the Bear Park, and into Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: Oct.-6,500 Nov.-8,500 Dec.-6,300 Jan.-13,300 Feb.-8,000 Mar.-8,500 Apr.-7,200 ; pH 6.5-9.0

Table 23 Town of Morrison

Morrison WWTP Effluent October, 2006 - April, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.7	5.5	NA	<800	NA	100	0.02
Max	7.8	18.1	NA	900	NA	700	0.60
Avg	7.4	12.0	NA	110	NA	371	0.07
Std. Dev.	0.2	3.0	NA	281	NA	140	0.04
# of Measurements	206	206	NA	30	NA	30	212

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	NA	NA	NA
Max	NA	NA	NA
Avg	NA	NA	NA
Std. Dev.	NA	NA	NA
# of measurements	NA	NA	NA

[Datalogger ID: MORR12 GPS Coordinates: 39.6541°N, 105.1796°W; Sampling/monitoring site is the GWSD WWTP effluent. The datalogger was located in a wet well, just upstream of the outfall at the plant. Effluent flows from the datalogger location into a drainage, down to and under Highway 74 at the west end of Lair o' the Bear Park, and into Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: Oct.-16,000 Nov.-14,000 Dec.-10,000 Jan.-10,000 Feb.-8,600 Mar.-10,000 Apr.-10,000 ; pH 6.5-9.0

SEASONAL DATA TABLES

The following applies to all Seasonal 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; Threshold to Evaluate Potential Temperature Impairment: 20°C MWAT (Maximum Weekly Average Temperature, Interim Standard), 18.2°C WAT (Weekly Average Temperature, Underlying Standard), 23.8°C DM (Daily Maximum Temperature, Underlying Standard); 2-HR Avg. Temperature data are estimates used to evaluate against DM Underlying Standard

Table 24 Lost & Found (Singin' River Ranch-Site 1a)

2 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.50	2.54	10.19	0.040	5	113	5
Max	7.70	8.64	11.89	0.045	8	132	10
Avg	7.60	5.59	11.04	0.043	7	123	8
Std. Dev.	0.10	3.05	0.85	0.003	2	10	3
# of measurements	2	2	2	2	2	2	2
Datalogger Temperature Data							

All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	0.14	2.34	2.34	0.16	0.81
Max	14.94	11.66	11.66	14.90	14.90
Avg	7.17	7.34	7.34	7.17	8.52
Std. Dev.	3.50	3.23	3.23	3.49	3.52
# of measurements	3426	10	10	856	72
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

This Site added to the Program in September 2007. [Monitoring station/Datalogger ID: L&F GPS Coordinates: 39.6234 °N, 105.4451 °W; Sampling /monitoring site is in Bear Creek, at Lost & Found (old Singin' River Ranch)]

Table 25 Williams' property (Site 1)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.40	2.27	8.41	0.036	7	54	2
Max	7.90	11.66	12.96	0.049	15	135	46
Avg	7.70	6.58	10.68	0.043	11	94	21
Std. Dev.	0.16	3.76	1.50	0.005	3	34	15
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	-0.09	2.63	2.63	-0.05	1.77
Max	17.58	13.26	13.26	17.45	17.45
Avg	8.85	8.90	8.90	8.85	10.93
Std. Dev.	3.70	3.29	3.29	3.69	3.34
# of measurements	8810	26	26	2202	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: ALKSRR GPS Coordinates: 39.6264 °N, 105.4282 °W; Sampling /monitoring site is in Bear Creek, near the east end L&F (old Singin' River Ranch), on the Williams' property.]

Table 26 Above Evergreen Lake, at Clear Creek County line (Site 2)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D.O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.40	2.66	8.24	0.043	6	43	4
Max	7.85	12.74	12.80	0.062	14	105	68
Avg	7.64	7.23	10.46	0.051	10	73	22
Std. Dev.	0.15	3.89	1.47	0.006	3	25	22
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	-0.03	3.19	3.19	-0.02	3.06
Max	19.10	14.77	14.77	18.93	18.93
Avg	10.12	10.35	10.35	10.12	12.48
Std. Dev.	3.73	3.07	3.07	3.72	3.21
# of measurements	7649	22	22	1913	160
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: ALKCC GPS Coordinates: 39.6368 °N, 105.3972 °W; Sampling /monitoring site in Bear Creek near the Clear Creek County line, on Upper Bear Creek Road.]

Table 27 Above Evergreen Lake, at CDOW site (Site 3)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.30	3.13	8.15	0.043	9	24	0
Max	7.90	13.30	12.94	0.076	16	92	72
Avg	7.69	7.73	10.47	0.054	13	69	28
Std. Dev.	0.20	4.04	1.53	0.011	3	24	24
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	-0.12	3.42	3.42	-0.08	2.32
Max	20.27	15.22	15.22	20.20	20.20
Avg	10.52	10.62	10.62	10.52	12.59
Std. Dev.	3.91	3.40	3.40	3.90	3.73
# of measurements	8184	24	24	2046	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

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

Table 28 Evergreen Lake, at surface, near dam (Site 4)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	6.90	6.45	6.59	0.049	11	14	9
Max	8.21	18.03	10.18	0.086	53	84	50
Avg	7.36	12.60	8.15	0.060	26	60	19
Std. Dev.	0.41	3.66	1.12	0.010	15	24	16
# of measurements	11	11	11	11	5	5	5

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	3.74	5.98	5.98	4.05	5.20
Max	20.19	17.78	17.78	20.10	20.10
Avg	12.62	12.65	12.65	12.63	13.64
Std. Dev.	3.94	3.80	3.80	3.93	3.94
# of measurements	8761	26	26	2190	183
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: EMD2A GPS Coordinates: 39.6314 °N, 105.3231 °W; Sampling /monitoring site in Evergreen Lake near the dam, on the surface, near the EMD WTP intake.]

Table 29 Downtown Evergreen, at CDOW site (Site 5)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.40	6.09	7.45	0.056	11	16	10
Max	8.01	16.25	11.15	0.098	55	191	85
Avg	7.72	11.29	9.29	0.070	25	77	26
Std. Dev.	0.19	3.87	1.25	0.014	15	55	27
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	5.08	5.75	5.75	5.12	5.90
Max	20.08	18.08	18.08	20.05	20.05
Avg	12.69	12.79	12.79	12.69	13.55
Std. Dev.	3.69	3.53	3.53	3.68	3.82
# of measurements	8183	24	24	2045	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

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

Table 30 Above EMD WWTP effluent (Site 6)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.40	6.21	7.38	0.056	10	19	11
Max	7.86	16.41	11.21	0.104	47	189	84
Avg	7.73	11.35	9.29	0.071	22	85	24
Std. Dev.	0.15	3.91	1.30	0.016	13	52	27
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	4.84	5.77	5.77	4.87	6.16
Max	24.70	18.18	18.18	24.70	24.70
Avg	12.74	12.85	12.85	12.75	13.69
Std. Dev.	3.71	3.55	3.55	3.72	3.83
# of measurements	8175	24	24	2044	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					1
% Compliance DM					99

[Monitoring station/Datalogger ID: EMD4 GPS Coordinates: 39.6376°N, 105.3151°W; Sampling/monitoring site is in Bear Creek, behind the EMD WWTP UV building, upstream of the plant effluent outfall.]

Table 31 Below EMD WWTP effluent (Site 7)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.50	6.29	7.37	0.066	11	26	11
Max	7.90	16.43	11.10	0.106	63	274	49
Avg	7.70	11.46	9.23	0.080	32	150	21
Std. Dev.	0.12	3.88	1.27	0.012	17	101	13
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	5.05	6.13	6.13	5.07	6.72
Max	19.96	18.13	18.13	19.87	19.87
Avg	12.83	12.93	12.93	12.83	13.78
Std. Dev.	3.64	3.48	3.48	3.64	3.62
# of measurements	8183	24	24	2045	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: EMD3 GPS Coordinates: 39.6377°N, 105.3141°W; Sampling/monitoring site upstream side of the Highway 74 vehicle bridge, downstream of the EMD WWTP plant effluent outfall.]

Table 32 Bear Creek Cabins (Site 8)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.53	6.56	7.35	0.062	13	48	16
Max	7.80	16.79	10.95	0.109	62	364	65
Avg	7.69	11.62	9.20	0.083	29	169	32
Std. Dev.	0.08	3.98	1.24	0.015	16	115	18
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	4.53	6.01	6.01	4.57	6.56
Max	20.20	18.12	18.12	20.07	20.07
Avg	12.76	12.86	12.86	12.76	13.84
Std. Dev.	3.69	3.51	3.51	3.69	3.63
# of measurements	8182	24	24	2045	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

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

Table 33 O'Fallon Park (Site 9)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.50	7.09	7.32	0.077	5	62	12
Max	8.00	16.88	11.11	0.123	23	240	74
Avg	7.87	11.59	9.36	0.095	17	152	27
Std. Dev.	0.18	4.10	1.35	0.015	6	79	22
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	2.37	5.73	5.73	2.42	6.65
Max	22.35	18.21	18.21	22.12	22.12
Avg	12.77	12.88	12.88	12.77	14.62
Std. Dev.	3.90	3.60	3.60	3.89	3.80
# of measurements	8177	24	24	2043	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			1		
% Compliance WAT			96		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: OFPDOW GPS Coordinates: 39.6564°N, 105.2917°W; Sampling/ monitoring site on the north side of the creek above the ETU restoration site across Hwy 74 from the CDOT station, at the CDOW fish survey site.]

Table 34 Above KSWD WWTP effluent (Site 10)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.47	7.30	7.44	0.077	15	66	13
Max	8.00	17.14	11.03	0.124	20	229	74
Avg	7.83	11.63	9.34	0.096	18	147	27
Std. Dev.	0.19	4.18	1.27	0.015	2	73	21
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	1.97	6.09	6.09	2.00	6.65
Max	22.99	18.58	18.58	22.83	22.83
Avg	13.30	13.50	13.50	13.22	15.30
Std. Dev.	3.86	3.35	3.35	3.89	3.74
# of measurements	7539	22	22	1911	160
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			1		
% Compliance WAT			96		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: KSWD7 GPS Coordinates: 39.6586°N, 105.2864°W; Sampling/ monitoring site at the east end of O'Fallon Park in Kittredge, just upstream of the Kittredge WWTP effluent outfall.]

Table 35 Above GWSD WWTP effluent (Site 11)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.60	6.48	7.41	0.084	8	79	11
Max	8.00	17.12	10.87	0.134	17	234	81
Avg	7.88	11.56	9.43	0.106	13	146	28
Std. Dev.	0.15	4.20	1.27	0.018	3	68	24
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	1.37	5.50	5.50	1.49	5.72
Max	23.33	18.45	18.45	23.07	23.07
Avg	12.94	13.05	13.05	12.94	15.02
Std. Dev.	4.08	3.70	3.70	4.07	4.16
# of measurements	8179	24	24	2043	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			1		
% Compliance WAT			96		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: GWSD9 GPS Coordinates: 39.6669°N, 105.2657°W; Sampling/ monitoring site at the west end of Lair o' the Bear Park (near Idledale), just upstream of the Genesee WWTP effluent outfall.]

Table 36 Lair o' the Bear (Site 12)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.70	6.97	7.46	0.090	13	111	17
Max	8.10	17.27	10.96	0.134	30	294	85
Avg	7.99	11.76	9.43	0.113	18	187	33
Std. Dev.	0.14	4.13	1.32	0.018	7	73	24
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	1.34	5.60	5.60	1.47	5.65
Max	23.45	18.52	18.52	23.24	23.24
Avg	13.02	13.13	13.13	13.02	15.18
Std. Dev.	4.10	3.71	3.71	4.09	4.19
# of measurements	8178	24	24	2042	171
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			1		
% Compliance WAT			96		
# of 23.8°C DM exceeded					0
% Compliance DM					100

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

Table 37 Idledale (Site 13a)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.70	7.08	7.43	0.091	5	102	14
Max	8.20	17.52	10.97	0.143	24	313	63
Avg	8.00	11.98	9.44	0.115	15	185	33
Std. Dev.	0.16	4.13	1.29	0.021	6	82	17
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	0.93	5.84	5.84	1.00	5.50
Max	23.40	18.30	18.30	23.28	23.28
Avg	12.67	12.73	12.73	12.67	14.82
Std. Dev.	4.28	3.90	3.90	4.27	4.44
# of measurements	8809	26	26	2202	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			1		
% Compliance WAT			97		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: IDLEDALE GPS Coordinates: 39. 6621°N, 105. 2406°W; Sampling/ monitoring site at the Shady Lane bridge, at the CDOW fish survey site.]

Table 38 West End of Morrison (Site 14)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.70	7.33	7.53	0.095	7	87	12
Max	8.20	17.91	11.45	0.143	38	306	83
Avg	7.95	12.29	9.58	0.116	17	168	31
Std. Dev.	0.15	4.11	1.39	0.020	10	99	24
# of measurements	6	6	6	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	1.13	6.08	6.08	1.28	4.69
Max	23.35	18.78	18.78	23.21	23.21
Avg	13.09	13.15	13.15	13.09	14.95
Std. Dev.	4.30	3.96	3.96	4.30	4.47
# of measurements	8808	26	26	2202	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			2		
% Compliance WAT			93		
# of 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 at the west end of Morrison, at the gated bridge to Denver Mountain parks Headquarters, at the CDOW fish survey site.]

Table 39 Morrison, within Bear Creek Lake Park (start of Segment 1b) (Site 15)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.97	8.32	7.80	0.118	11	139	19
Max	8.63	16.70	9.75	0.184	19	892	103
Avg	8.19	12.52	8.64	0.144	15	379	39
Std. Dev.	0.25	3.36	0.74	0.024	3	247	29
# of measurements	6	6	5	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	1.81	6.50	6.50	1.87	4.82
Max	22.99	19.06	19.06	22.91	22.91
Avg	13.41	13.47	13.47	13.41	15.24
Std. Dev.	4.27	3.93	3.93	4.26	4.34
# of measurements	8807	26	26	2201	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			3		
% Compliance WAT			89		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: MORR11 GPS Coordinates: 39.6518°N, 105.1716°W; Sampling/ monitoring site in Bear Creek at the west end of Bear Creek Lake Park, at the USGS gaging station.]

Table 40 Conifer Metropolitan District, North Turkey Creek (Site19)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.17	4.70	7.07	0.142	6	3	8
Max	8.14	13.70	9.18	0.574	16	423	101
Avg	7.70	9.52	8.07	0.340	11	160	35
Std. Dev.	0.32	2.86	0.69	0.145	3	134	35
# of measurements	6	6	5	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	0.00	3.17	3.17	0.00	1.51
Max	23.69	16.12	16.12	23.30	23.30
Avg	10.80	10.86	10.86	10.81	14.69
Std. Dev.	4.88	3.99	3.99	4.86	4.72
# of measurements	8803	26	26	2200	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: CMD1 GPS Coordinates: 39.542°N, 105.3155°W; Sampling/ monitoring site in North Turkey Creek downstream of the CMD WWTP.]

Table 41 Aspen Park Metropolitan District, South Turkey Creek (Site 18)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.57	5.50	3.63	0.233	13	2	15
Max	7.87	20.60	8.71	0.848	28	42	53
Avg	7.74	12.62	6.43	0.569	19	24	35
Std. Dev.	0.09	4.63	1.63	0.227	5	13	13
# of measurements	6	6	5	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	0.02	3.75	3.75	0.04	2.25
Max	22.32	16.53	16.53	22.09	22.09
Avg	11.89	11.94	11.94	11.89	14.66
Std. Dev.	4.37	3.67	3.67	4.35	3.91
# of measurements	8802	26	26	2200	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 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.]

Table 42 Confluence of North and South Turkey Creek (Site 17)

6 Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	7.63	3.88	7.34	0.230	8	3	10
Max	8.22	14.83	8.93	0.561	15	436	98
Avg	8.06	10.99	8.09	0.431	13	137	36
Std. Dev.	0.20	3.64	0.55	0.102	3	165	29
# of measurements	6	6	5	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	0.05	3.74	3.74	0.07	2.91
Max	22.75	17.21	17.21	22.20	22.20
Avg	12.04	12.11	12.11	12.04	14.69
Std. Dev.	4.51	3.96	3.96	4.50	4.22
# of measurements	8804	26	26	2201	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 23.8°C DM exceeded					0
% Compliance DM					100

[Monitoring station/Datalogger ID: TURK1 GPS Coordinates: 39.578°N, 105.2193°W; Sampling/ monitoring site in the confluence of North and South Turkey Creeks.]

Table 43 Turkey Creek within Bear Creek Lake Park (Site 16)

Monthly Sampling/Monitoring Events May 1-Oct 31, 2007							
Monthly Parameter Results	pH, SU	Temp, °C	D. O., mg/L	Sp. Cd., mS/cm	Total NH3-N, ug/L	NO3+NO2-N, ug/L	Total P, ug/L
Min	8.03	9.08	7.36	0.262	8	241	0
Max	8.40	15.89	9.92	2.054	24	667	97
Avg	8.21	12.51	8.56	1.213	13	471	25
Std. Dev.	0.14	2.89	0.94	0.695	6	152	33
# of measurements	6	6	5	6	6	6	6

Datalogger Temperature Data					
All Temperatures in °C	30-Min Temp.	MWAT (20°C)	WAT (18.2°C)	2-HR Avg. Temp.	DM (23.8°C)
Min	3.70	7.50	7.50	3.77	6.86
Max	20.94	17.79	17.79	20.81	20.81
Avg	13.63	13.67	13.67	13.63	15.32
Std. Dev.	3.59	3.24	3.24	3.58	3.41
# of measurements	8806	26	26	2201	184
# of 20°C MWAT exceeded		0			
% Compliance MWAT		100			
# of 18.2°C WAT exceeded			0		
% Compliance WAT			100		
# of 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 within Bear Creek Lake Park.]

Seasonal Data Tables-WWTP Effluent

The following data tables summarize the wastewater effluent quality for dischargers into Bear Creek Segment 1a. Data was obtained from daily plant process control sheets and laboratory results that are utilized to complete CDPES Discharge Monitoring Reports (DMR). Since daily plant operations and reporting requirements differ, only available data used. There were no additional requirements requested of plant operators for the Program. Datalogger temperature measurements of plant effluent obtained at the identical frequency of the in-stream dataloggers (30-minute intervals). The datasheets listed in a downstream direction, as the effluents enter Bear Creek, from the EMD WWTP to the Morrison WWTP.

Table 44 Evergreen Metropolitan District

EMD WWTP Effluent May 1-October 31, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.55	9.40	3.26	70	1500	60	0.3912
Max	7.04	19.50	6.60	5850	7000	240	1.5342
Avg	6.75	16.25	4.42	865	3967	147	0.6237
Std. Dev.	0.09	3.02	0.59	1259	1816	41	0.1894
# of Measurements	133	125	125	26	6	26	184

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	8.6	9.0	9.5
Max	19.0	19.0	18.8
Avg	15.8	15.8	15.8
Std. Dev.	2.9	2.9	2.9
# of measurements	8751	183	26

[Datalogger ID: EMD5 GPS Coordinates: 39.6376°N, 105.3150°W; Sampling/monitoring site is the EMD WWTP effluent. The datalogger 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: May-5,800 June-8,200 July-8,000 August-6,400 September-5,200 October-4,200; pH 6.5-9.0

Table 45 West Jefferson County Metropolitan District

WJCMD WWTP Effluent May 1-October 31, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.60	12.70	3.07	3.0	1000	60	0.3218
Max	7.35	21.70	7.43	690.0	5300	1800	0.7931
Avg	6.77	18.83	3.53	135.7	2717	507	0.5310
Std. Dev.	0.17	2.51	0.52	201.1	1440	511	0.0716
# of Measurements	132	123	123	26	6	36	184

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	7.4	9.6	10.0
Max	20.2	18.7	18.6
Avg	16.0	16.0	16.0
Std. Dev.	2.6	2.5	2.5
# of measurements	8748	183	26

[Datalogger ID: WJ6 GPS Coordinates: 39.6621°N, 105.3351°W; Sampling/monitoring site is the WJCMD WWTP effluent. The datalogger was located 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: May-10,000 June-12,600 July-13,000 August-10,700 September-8,400 October-6,500; pH 6.5-9.0

Table 46 Kittredge Sanitation and Water District

KSWD WWTP Effluent May 1-October 31, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.57	9.50	0.03	506	2500	100	0.0362
Max	7.16	18.90	3.65	3940	10400	870	0.1181
Avg	6.81	14.51	0.55	1167	5367	412	0.0689
Std. Dev.	0.12	2.84	0.81	748	3288	233	0.0162
# of Measurements	125	120	120	25	6	15	183

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	8.2	9.3	10.0
Max	19.4	18.8	18.5
Avg	14.7	14.6	14.7
Std. Dev.	2.9	2.8	2.8
# of measurements	8753	183	26

[Datalogger ID: KSWD8 GPS Coordinates: 39.6585°N, 105.2868°W; Sampling/monitoring site is the KSWD WWTP effluent. The datalogger was located near the flow-measuring flume, just upstream of the outfall. Effluent flows from the datalogger location under Highway 74 to the outfall in Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: May-5,500 June-5,200 July-7,700 August-5,500 September-3,300 October-2,600; pH 6.5-9.0

Table 47 Genesee Water and Sanitation District

GWSD WWTP Effluent May 1-October 31, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.63	10.5	6.50	3	1200	210	0.024
Max	7.70	20.0	9.10	819	6000	970	0.530
Avg	7.08	16.2	7.29	175	3022	490	0.293
Std. Dev.	0.16	2.6	0.45	211	1364	189	0.079
# of Measurements	180	181	175	26	27	30	184

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	10.21	10.21	10.49
Max	19.42	19.39	19.21
Avg	16.40	16.38	16.38
Std. Dev.	2.74	2.76	2.76
# of measurements	8753	183	26

[Datalogger ID: GWSD9A GPS Coordinates: 39.6732°N, 105.2712°W; Sampling/monitoring site is the GWSD WWTP effluent. The datalogger was located in a wet well, just upstream of the outfall at the plant.

Effluent flows from the datalogger location into a drainage, down to and under Highway 74 at the west end of Lair o' the Bear Park, and into Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: May-8,300 June-12,600 July-13,000 August-10,700 September-8,400 October-6,500; pH 6.5-9.0

Table 48 Town of Morrison

Morrison WWTP Effluent May 1-October 31, 2007							
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	Total P, ug/L	Flow, MGD
Min	6.9	11.9	NA	<800	NA	200	0.04
Max	8.0	25.0	NA	1300	NA	850	0.20
Avg	7.4	20.5	NA	52	NA	456	0.08
Std. Dev.	0.2	3.0	NA	255	NA	169	0.02
# of Measurements	184	182	NA	25	NA	26	184

Datalogger Temperature Data			
All Temperatures in °C	30-Min Temp.	Daily Avg.Temp.	Weekly Avg. Temp.
Min	13.3	14.2	14.7
Max	23.2	23.0	22.7
Avg	19.3	19.3	19.5
Std. Dev.	2.7	2.7	2.6
# of measurements	8663	181	25

[Datalogger ID: MORR12 GPS Coordinates: 39.6541°N, 105.1796°W; Sampling/monitoring site is the GWSD WWTP effluent. The datalogger was located in a wet well, just upstream of the outfall at the plant. Effluent flows from the datalogger location into a drainage, down to and under Highway 74 at the west end of Lair o' the Bear Park, and into Bear Creek.] Notes: Discharge permit limits for Total Ammonia (NH3-N), in ug/L are as follows: May-8,300 June-12,600 July-13,000 August-10,700 September-8,400 October-16,000; pH 6.5-9.0

Seasonal Data Tables—24-Hour Profile

A recording, multi-sensor probe collected 24-hour data from one specific site in Bear Creek during the Program. Parameters measured were pH, temperature, dissolved oxygen and specific conductance. Sensors were calibrated prior to each deployment and data was downloaded following retrieval. The purpose was to evaluate multiple parameters over a 24-hour period. The selected location was: Bear Creek Segment 1a, above Evergreen Lake at the CDOW fish survey site (ALKDOW, Site 3). This location was selected because this particular reach had not been profiled in previous years. This location has macroinvertebrate data, CDOW fish survey data, water quality sampling and monitoring results and flow gage data, but was missing a diurnal snapshot of typical parameters. Data collection began July 25, 2007 at 13:00 hours and was completed on July 26, 2007. The recording frequency was at 30-minute intervals.

Minimum, maximum and averages were calculated for all four parameters. Existing stream standards for pH and dissolved oxygen were footnoted at the bottom of the tables, but temperature and specific conductance were not. There is no existing stream standard for specific conductance and temperature data collected could not be evaluated against the proposed standards.

Table 49 ALKDOW July 25, 2007

Date	Time	pH, S. U.	Temp °C	D. O., mg/L	Spec. Cond., mS/cm
7/25/07	13:00	7.55	17.45	9.53	0.046
		7.60	18.06	9.46	0.045
	14:00	7.66	18.44	9.33	0.045
		7.69	18.67	9.22	0.046
	15:00	7.67	18.55	9.11	0.046
		7.65	18.54	9.07	0.046
	16:00	7.60	18.30	8.87	0.046
		7.54	18.01	8.94	0.047
	17:00	7.51	17.76	9.02	0.047
		7.49	17.57	9.09	0.047
	18:00	7.49	17.41	9.24	0.047
		7.51	17.25	9.30	0.047
	19:00	7.51	17.02	9.25	0.047
		7.49	16.79	9.22	0.048
	20:00	7.48	16.53	9.24	0.048
		7.45	16.27	9.24	0.048
	21:00	7.43	16.11	9.26	0.048
		7.41	15.93	9.29	0.049
	22:00	7.39	15.81	9.31	0.049
		7.38	15.68	9.33	0.049
	23:00	7.37	15.57	9.35	0.049
		7.36	15.43	9.40	0.050
7/26/07	00:00	7.35	15.32	9.40	0.050
		7.35	15.20	9.42	0.050
	01:00	7.34	15.07	9.47	0.050
		7.34	14.92	9.47	0.050
	02:00	7.34	14.77	9.52	0.051
		7.33	14.64	9.56	0.051
	03:00	7.33	14.51	9.59	0.051
		7.33	14.38	9.59	0.051
	04:00	7.33	14.22	9.64	0.051
		7.33	14.07	9.68	0.051
	05:00	7.32	13.89	9.73	0.051
		7.32	13.71	9.73	0.051
	06:00	7.32	13.53	9.79	0.051
		7.32	13.37	9.81	0.051
	07:00	7.32	13.25	9.87	0.051
		7.33	13.14	9.94	0.052
	08:00	7.34	13.11	10.04	0.052
		7.36	13.09	10.07	0.052
	09:00	7.37	13.16	10.14	0.052
		7.41	13.26	10.08	0.052
	10:00	7.43	13.55	10.08	0.052
		7.46	13.99	10.04	0.052
	11:00	7.50	14.53	9.96	0.052
		7.53	15.02	9.86	0.052
	12:00	7.55	14.88	9.71	0.052
		7.53	14.83	9.60	0.052
	MIN	7.32	13.09	8.87	0.045
	MAX	7.69	18.67	10.14	0.052
	AVG	7.44	15.51	9.52	0.049

GPS Coordinates: 39.6331°N, 105.3372°W Existing stream standards: pH 6.5-9.0; DO 6.0 mg/L

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, the DWR/U.S. Army COE station above Morrison 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 23 years. The available historic record for the gage above Morrison is 88 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 22 years. For the 2007 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 ere interchanged to reflect the desired interpretation.

Table 50 2007 May Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) May 2007	Historic Daily Mean Flow (cfs) 23 Years for May	Deviation from Historic Flow (cfs)
1	161	75	86
2	171	76	95
3	167	75	92
4	169	76	93
5	160	80	80
6	157	83	74
7	154	84	70
8	151	84	67
9	158	85	73
10	164	87	77
11	170	87	83
12	183	85	98
13	198	86	112
14	220	89	131
15	246	91	155
16	230	94	136
17	239	96	143
18	223	95	128
19	229	100	129
20	222	102	120
21	215	102	113
22	219	102	117
23	181	99	82
34	177	100	77
25	158	109	49
26	149	111	38
27	148	109	39
28	156	107	49
29	169	108	61
30	163	107	56
31	150	103	47
MIN	148	75	38
MAX	246	111	155
AVG	182	93	89

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

Table 51 2007 June Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) June 2007	Historic Daily Mean Flow (cfs) 23 Years for June	Deviation from Historic Flow (cfs)
1	151	104	47
2	151	100	51
3	164	100	64
4	156	98	58
5	153	99	54
6	158	99	59
7	147	104	43
8	140	100	40
9	144	108	36
10	145	106	39
11	145	100	45
12	189	100	89
13	223	102	121
14	182	99	83
15	183	99	84
16	186	100	86
17	188	101	87
18	179	103	76
19	163	95	68
20	156	93	63
21	148	90	58
22	140	90	50
23	130	86	44
34	120	82	38
25	111	79	32
26	107	79	28
27	107	76	31
28	100	76	24
29	96	75	21
30	89	72	17
MIN	89	72	17
MAX	223	108	121
AVG	148	94	55

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

Table 52 2007 July Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) July 2007	Historic Daily Mean Flow (cfs) 23 Years for July	Deviation from Historic Flow (cfs)
1	84	68	16
2	78	64	14
3	75	62	13
4	78	61	17
5	89	61	28
6	91	60	31
7	75	60	15
8	74	63	11
9	68	70	-2
10	63	67	-4
11	61	63	-2
12	62	61	1

Date	Daily Mean Flow (cfs) July 2007	Historic Daily Mean Flow (cfs) 23 Years for July	Deviation from Historic Flow (cfs)
13	74	61	13
14	59	57	2
15	56	54	2
16	53	53	0
17	51	58	-7
18	51	54	-3
19	59	54	5
20	67	54	13
21	64	54	10
22	56	51	5
23	49	54	-5
34	46	54	-8
25	56	53	3
26	49	54	-5
27	55	50	5
28	90	52	38
29	70	53	17
30	67	53	14
31	60	53	7
MIN	46	50	-8
MAX	91	70	38
AVG	65	58	8

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

Table 53 2007 August Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) August 2007	Historic Daily Mean Flow (cfs) 23 Years for August	Deviation from Historic Flow (cfs)
1	53	53	0
2	67	53	14
3	99	55	44
4	76	58	18
5	90	62	28
6	80	61	19
7	82	57	25
8	74	55	19
9	66	53	13
10	63	55	8
11	61	54	7
12	59	52	7
13	57	53	4
14	53	50	3
15	54	48	6
16	74	48	26
17	56	47	9
18	60	48	12
19	55	50	5
20	51	46	5
21	45	44	1
22	44	44	0
23	45	46	-1
34	47	47	0
25	42	44	-2
26	39	43	-4

Date	Daily Mean Flow (cfs) August 2007	Historic Daily Mean Flow (cfs) 23 Years for August	Deviation from Historic Flow (cfs)
27	39	41	-2
28	45	41	4
29	41	40	1
30	43	40	3
31	41	38	3
MIN	39	38	-4
MAX	99	62	44
AVG	58	49	9

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

Table 54 2007 September Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) September 2007	Historic Daily Mean Flow (cfs) 23 Years for September	Deviation from Historic Flow (cfs)
1	51	40	11
2	42	38	4
3	39	37	2
4	41	36	5
5	46	35	11
6	44	35	9
7	39	35	4
8	37	35	2
9	36	35	1
10	36	36	0
11	36	36	0
12	33	36	-3
13	32	34	-2
14	32	32	0
15	32	32	0
16	31	30	1
17	35	30	5
18	33	29	4
19	30	29	1
20	29	29	0
21	28	30	-2
22	27	29	-2
23	27	28	-1
34	28	28	0
25	28	28	0
26	27	28	-1
27	26	27	-1
28	26	27	-1
29	26	27	-1
30	25	27	-2
MIN	25	27	-3
MAX	51	40	11
AVG	33	32	1

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

Table 55 2007 October Bear Creek Evergreen vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) October 2007	Historic Daily Mean Flow (cfs) 23 Years for October	Deviation from Historic Flow (cfs)
1	25	28	-3
2	25	28	-3
3	24	28	-4
4	24	30	-6
5	24	29	-5
6	23	30	-7
7	22	30	-8
8	23	29	-6
9	23	29	-6
10	23	29	-6
11	24	28	-4
12	22	27	-5
13	22	26	-4
14	26	27	-1
15	26	26	0
16	25	26	-1
17	24	26	-2
18	20	25	-5
19	21	26	-5
20	24	26	-2
21	24	25	-1
22	22	25	-3
23	26	25	1
34	25	25	0
25	24	25	-1
26	23	25	-2
27	23	24	-1
28	23	25	-2
29	22	23	-1
30	22	24	-2
31	23	24	-1
MIN	20	23	-8
MAX	26	30	1
AVG	23	27	-3

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

Table 56 2007 May Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) May 2007	Historic Daily Mean Flow (cfs) 88 Years for May	Deviation from Historic Flow (cfs)
1	313.0	118	195
2	297.0	117	180
3	269.0	117	152
4	267.0	118	149
5	276.0	123	153
6	286.0	136	150
7	296.0	151	145
8	300.0	149	151
9	345.0	146	199
10	357.0	147	210
11	346.0	146	200
12	347.0	146	201

Date	Daily Mean Flow (cfs) May 2007	Historic Daily Mean Flow (cfs) 88 Years for May	Deviation from Historic Flow (cfs)
13	347.0	144	203
14	345.0	144	201
15	397.0	143	254
16	381.0	149	232
17	386.0	151	235
18	332.0	151	181
19	315.0	154	161
20	300.0	157	143
21	283.0	156	127
22	285.0	157	128
23	242.0	155	87
34	241.0	155	86
25	210.0	157	53
26	187.0	156	31
27	178.0	155	23
28	184.0	151	33
29	222.0	152	70
30	220.0	151	69
31	187.0	149	38
MIN	178	117	23
MAX	397	157	254
AVG	288	145	143

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

Table 57 2007 June Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) June 2007	Historic Daily Mean Flow (cfs) 88 Years for June	Deviation from Historic Flow (cfs)
1	182.0	148	34
2	179.0	148	31
3	191.0	150	41
4	184.0	151	33
5	184.0	158	26
6	189.0	152	37
7	175.0	152	23
8	172.0	151	21
9	188.0	154	34
10	187.0	157	30
11	183.0	156	27
12	217.0	149	68
13	272.0	149	123
14	199.0	146	53
15	193.0	143	50
16	194.0	139	55
17	201.0	136	65
18	189.0	135	54
19	170.0	129	41
20	160.0	124	36
21	152.0	122	30
22	145.0	128	17
23	140.0	118	22
34	130.0	111	19
25	121.0	107	14
26	112.0	106	6

Date	Daily Mean Flow (cfs) June 2007	Historic Daily Mean Flow (cfs) 88 Years for June	Deviation from Historic Flow (cfs)
27	113.0	100	13
28	104.0	96	8
29	99.7	94	5.7
30	90.0	94	-4
MIN	90	94	-4
MAX	272	158	123
AVG	167	133	34

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

Table 58 2007 July Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) July 2007	Historic Daily Mean Flow (cfs) 88 Years for July	Deviation from Historic Flow (cfs)
1	85.7	90	-4.3
2	81.0	85	-4
3	77.2	82	-4.8
4	81.6	79	2.6
5	79.9	77	2.9
6	94.9	76	18.9
7	73.7	79	-5.3
8	71.6	75	-3.4
9	69.6	76	-6.4
10	64.0	74	-10
11	63.3	72	-8.7
12	61.2	72	-10.8
13	74.4	68	6.4
14	60.9	67	-6.1
15	59.4	66	-6.6
16	55.3	65	-9.7
17	53.4	66	-12.6
18	53.1	67	-13.9
19	58.3	67	-8.7
20	68.9	67	1.9
21	64.9	65	-0.1
22	58.4	69	-10.6
23	51.3	68	-16.7
34	48.0	67	-19
25	53.7	67	-13.3
26	52.2	68	-15.8
27	56.9	64	-7.1
28	90.6	66	24.6
29	72.4	66	6.4
30	73.1	65	8.1
31	65.0	67	-2
MIN	48	64	-19
MAX	95	90	25
AVG	67	71	-4

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

Table 59 2007 August Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) August 2007	Historic Daily Mean Flow (cfs) 88 Years for August	Deviation from Historic Flow (cfs)
1	58.4	68	-9.6
2	65.2	69	-3.8
3	101.0	72	29
4	88.1	75	13.1
5	93.5	74	19.5
6	84.0	73	11
7	82.9	71	11.9
8	74.0	69	5
9	64.0	68	-4
10	61.9	65	-3.1
11	60.6	62	-1.4
12	57.9	63	-5.1
13	55.5	62	-6.5
14	52.5	63	-10.5
15	54.8	62	-7.2
16	69.5	60	9.5
17	55.6	62	-6.4
18	59.9	62	-2.1
19	56.1	62	-5.9
20	52.9	62	-9.1
21	45.1	64	-18.9
22	45.0	62	-17
23	45.2	60	-14.8
34	47.2	60	-12.8
25	42.9	60	-17.1
26	36.8	58	-21.2
27	38.0	56	-18
28	42.9	54	-11.1
29	41.7	53	-11.3
30	42.2	56	-13.8
31	39.9	52	-12.1
MIN	37	52	-21
MAX	101	75	29
AVG	59	63	-5

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

Table 60 2007 September Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) September 2007	Historic Daily Mean Flow (cfs) 88 Years for September	Deviation from Historic Flow (cfs)
1	45.7	51	-5.3
2	41.2	56	-14.8
3	36.0	53	-17
4	36.2	51	-14.8
5	43.4	49	-5.6
6	43.2	48	-4.8
7	37.8	49	-11.2
8	34.5	50	-15.5
9	34.2	47	-12.8
10	34.4	49	-14.6
11	34.3	50	-15.7

Date	Daily Mean Flow (cfs) September 2007	Historic Daily Mean Flow (cfs) 88 Years for September	Deviation from Historic Flow (cfs)
12	32.4	47	-14.6
13	30.7	44	-13.3
14	31.8	43	-11.2
15	32.4	41	-8.6
16	29.4	40	-10.6
17	32.0	40	-8
18	33.5	38	-4.5
19	30.4	37	-6.6
20	28.7	38	-9.3
21	27.1	37	-9.9
22	25.9	37	-11.1
23	25.3	37	-11.7
34	27.2	36	-8.8
25	29.4	37	-7.6
26	27.0	36	-9
27	25.6	36	-10.4
28	25.2	35	-9.8
29	25.2	35	-9.8
30	23.9	35	-11.1
MIN	24	35	-5
MAX	46	56	-17
AVG	32	43	-11

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

Table 61 2007 October Bear Creek Morrison vs. Historic Bear Creek Flow

Date	Daily Mean Flow (cfs) October 2007	Historic Daily Mean Flow (cfs) 88 Years for October	Deviation from Historic Flow (cfs)
1	24.1	35	-10.9
2	24.3	33	-8.7
3	24.2	33	-8.8
4	23.5	34	-10.5
5	23.4	34	-10.6
6	22.4	34	-11.6
7	24.0	32	-8
8	22.9	32	-9.1
9	23.3	32	-8.7
10	23.4	31	-7.6
11	24.7	30	-5.3
12	23.8	30	-6.2
13	22.9	30	-7.1
14	32.2	31	1.2
15	37.1	32	5.1
16	31.0	31	0
17	28.5	31	-2.5
18	25.3	31	-5.7
19	21.9	31	-9.1
20	26.4	30	-3.6
21	26.9	30	-3.1
22	23.4	29	-5.6
23	28.2	30	-1.8
34	28.3	29	-0.7
25	25.9	29	-3.1
26	24.0	29	-5

Date	Daily Mean Flow (cfs) October 2007	Historic Daily Mean Flow (cfs) 88 Years for October	Deviation from Historic Flow (cfs)
27	26.0	29	-3
28	23.6	29	-5.4
29	23.6	29	-5.4
30	23.7	28	-4.3
31	23.0	28	-5
MIN	22	28	-12
MAX	37	35	5
AVG	25	31	-5

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

Table 62 2007 May Bear Creek Above BC Reservoir vs. Historic BC Flow

Date	Daily Mean Flow (cfs) May 2007	Historic Daily Mean Flow (cfs) 22 Years for May	Deviation from Historic Flow (cfs)
1	329	104	225
2	315	102	213
3	286	102	184
4	280	99	181
5	277	107	170
6	306	113	193
7	317	117	200
8	331	115	216
9	356	113	243
10	363	113	250
11	369	112	257
12	367	109	258
13	362	104	258
14	367	106	261
15	380	105	275
16	366	113	253
17	367	126	241
18	355	122	233
19	355	132	223
20	345	133	212
21	327	132	195
22	328	127	201
23	299	120	179
34	296	117	179
25	271	136	135
26	255	139	116
27	250	136	114
28	256	128	128
29	280	132	148
30	270	129	141
31	249	121	128
MIN	249	99	114
MAX	380	139	275
AVG	319	118	200

USGS 06710605 GPS Coordinates: 39.6522°N, 105.1731°W

Table 63 2007 June Bear Creek Above BC Reservoir vs. Historic BC Flow

Date	Daily Mean Flow (cfs) June 2007	Historic Daily Mean Flow (cfs) 22 Years for June	Deviation from Historic Flow (cfs)
1	244	122	122
2	242	116	126
3	249	111	138
4	243	107	136
5	244	109	135
6	247	110	137
7	239	117	122
8	229	105	124
9	230	122	108
10	230	127	103
11	227	114	113
12	248	110	138
13	275	111	164
14	233	105	128
15	226	100	126
16	227	99	128
17	231	99	132
18	223	102	121
19	207	94	113
20	196	90	106
21	186	86	100
22	178	83	95
23	172	79	93
34	163	74	89
25	155	68	87
26	152	68	84
27	152	66	86
28	139	65	74
29	134	69	65
30	123	67	56
MIN	123	65	56
MAX	275	127	164
AVG	208	97	112

USGS 06710500 GPS Coordinates: 39.6522°N, 105.1731°W

Table 64 2007 July Bear Creek Above BC Reservoir vs. Historic BC Flow

Date	Daily Mean Flow (cfs) July 2007	Historic Daily Mean Flow (cfs) 22 Years for July	Deviation from Historic Flow (cfs)
1	117	61	56
2	107	53	54
3	100	48	52
4	106	46	60
5	103	44	59
6	122	44	78
7	97	45	52
8	94	50	44
9	89	54	35
10	80	54	26
11	78	48	30
12	76	45	31

Date	Daily Mean Flow (cfs) July 2007	Historic Daily Mean Flow (cfs) 22 Years for July	Deviation from Historic Flow (cfs)
13	96	44	52
14	75	42	33
15	72	40	32
16	68	37	31
17	64	42	22
18	63	38	25
19	72	35	37
20	88	34	54
21	82	33	49
22	72	32	40
23	62	36	26
34	56	34	22
25	63	31	32
26	63	32	31
27	71	29	42
28	121	32	89
29	101	33	68
30	103	34	69
31	89	33	56
MIN	56	29	22
MAX	122	61	89
AVG	85	41	45

USGS 06710500 GPS Coordinates: 39.6522°N, 105.1731°W

Table 65 2007 August Bear Creek Above BC Reservoir vs. Historic BC Flow

Date	Daily Mean Flow (cfs) August 2007	Historic Daily Mean Flow (cfs) 22 Years for August	Deviation from Historic Flow (cfs)
1	76	34	42
2	85	32	53
3	133	34	99
4	79	42	37
5	83	48	35
6	76	47	29
7	79	44	35
8	67	40	27
9	53	37	16
10	50	38	12
11	48	38	10
12	44	36	8
13	41	34	7
14	36	33	3
15	40	32	8
16	---	34	
17	---	33	
18	48	34	14
19	43	35	8
20	38	31	7
21	30	27	3
22	29	29	0
23	29	34	-5
34	32	37	-5
25	27	31	-4
26	21	30	-9

Date	Daily Mean Flow (cfs) August 2007	Historic Daily Mean Flow (cfs) 22 Years for August	Deviation from Historic Flow (cfs)
27	22	28	-6
28	29	28	1
29	28	28	0
30	28	27	1
31	25	24	1
MIN	21	24	-9
MAX	133	48	99
AVG	49	34	15

USGS 06710500 GPS Coordinates: 39.6522°N, 105.1731°W

Table 66 2007 Sept. Bear Creek Above BC Reservoir vs. Historic BC Flow

Date	Daily Mean Flow (cfs) September 2007	Historic Daily Mean Flow (cfs) 22 Years for September	Deviation from Historic Flow (cfs)
1	30	25	5
2	24	24	0
3	20	23	-3
4	20	22	-2
5	28	22	6
6	28	21	7
7	20	21	-1
8	18	22	-4
9	17	21	-4
10	19	21	-2
11	23	20	3
12	18	20	-2
13	17	19	-2
14	18	19	-1
15	19	18	1
16	17	15	2
17	19	15	4
18	21	15	6
19	17	16	1
20	16	16	0
21	16	17	-1
22	15	16	-1
23	15	16	-1
34	16	16	0
25	18	15	3
26	17	15	2
27	15	15	0
28	15	15	0
29	15	16	-1
30	15	16	-1
MIN	15	15	-4
MAX	30	25	7
AVG	19	18	0

USGS 06710500 GPS Coordinates: 39.6522°N, 105.1731°W

Table 67 2007 October Bear Creek Above BC Reservoir vs. Historic BC Flow

Date	Daily Mean Flow (cfs) October 2007	Historic Daily Mean Flow (cfs) 22 Years for October	Deviation from Historic Flow (cfs)
1	15	17	-2
2	14	17	-3
3	14	17	-3
4	14	17	-3
5	14	17	-3
6	14	18	-4
7	14	17	-3
8	14	17	-3
9	14	18	-4
10	14	18	-4
11	14	17	-3
12	14	16	-2
13	14	16	-2
14	19	17	2
15	22	16	6
16	18	16	2
17	17	16	1
18	15	16	-1
19	14	15	-1
20	17	16	1
21	17	16	1
22	16	15	1
23	21	16	5
34	21	16	5
25	20	17	3
26	17	17	0
27	20	18	2
28	17	18	-1
29	17	17	0
30	18	17	1
31	17	17	0
MIN	14	15	-4
MAX	22	18	6
AVG	16	17	0

USGS 06710605 GPS Coordinates: 39.6522°N, 105.1731°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 was 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 are recorded each morning. Daily readings were entered into a NWS software program. Local weather statistics were summarized, comparing 2006 monthly maximum, minimum and mean air temperatures and monthly precipitation to 45-year (1961-2006) historical data.

Table 68 Weather Data May-October 2007 Summary

Monthly Weather Data	May 2007	June 2007	July 2007	August 2007	September 2007	October 2007
Air Temp Low Max (°F)	47	60	73	69	50	32
Air Temp High Max (°F)	76	90	90	89	85	77
Air Temp High Avg (°F)	65	75	83	81	75	65
Total Precip (in.)	3.85	0.73	1.28	2.42	0.47	1.2
Days of Precip.	15	5	8	16	9	4

Table 69 2007 Weather Data vs. Historical Weather Data (45 years 1961-2006)

	Avg Daily Min (°F)	Avg Daily Max (°F)	Avg Mon. Mean (°F)	Precip (in.)
May 2007	36	65	50	3.85
May Hist	33.7	65.3	49.5	2.56
% Deviation	+7%	-1%	+1%	+50%
June 2007	42	75	59	0.73
June Hist	41	75.3	58.2	2.19
% Deviation	+2%	-1%	+1%	-66%
July 2007	50	83	67	1.28
July Hist	46.5	81.6	64.1	2.24
% Deviation	+7%	+2%	+5%	-43%
August 2007	50	81	65	2.42
August Hist	45.2	79.4	62.4	2.35
% Deviation	+10%	+2%	+4%	+3%
Sept. 2007	40	75	57	0.47
Sept. Hist	37	72.3	54.6	1.49
% Deviation	+8%	+4%	+4%	-68%
Oct. 2007	30	65	47	1.2
Oct. Hist	26.7	62.5	44.7	1.22
% Deviation	+12%	+4%	+5%	-2%

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 70 2007 May Bear Creek Evergreen vs. Weather Data

Date	May 2007 Daily Mean Flow (cfs)	May 2007 Daily Air Max Temp (°F)	May 2007 Precip. (in.)
1	161	74	0
2	171	61	0
3	167	63	0
4	169	72	0
5	160	47	0.22
6	157	50	1.26
7	154	48	0.33
8	151	47	0.04
9	158	61	0
10	164	67	0

Date	May 2007 Daily Mean Flow (cfs)	May 2007 Daily Air Max Temp (°F)	May 2007 Precip. (in.)
11	170	71	0
12	183	76	0
13	198	76	0.04
14	220	75	0
15	246	64	0.34
16	230	51	T
17	239	65	T
18	223	67	0.09
19	229	72	0
20	222	72	0.1
21	215	73	0
22	219	73	0.05
23	181	55	0.09
34	177	50	0.45
25	158	58	0
26	149	72	0
27	148	67	0.02
28	156	74	0
29	169	75	0
30	163	63	0.82
31	150	62	0
MIN	148	47	0.00
MAX	246	76	1.26
AVG	182	65	0.13
TOTAL			3.85

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 was obtained from the NWS reporting station located at the EMD WWTP.

Table 71 2007 June Bear Creek Evergreen vs. Weather Data

Date	June 2007 Daily Mean Flow (cfs)	June 2007 Daily Max Air Temp (°F)	June 2007 Precip (in.)
1	151	70	0
2	151	60	0
3	164	66	0.09
4	156	64	T
5	153	68	0.03
6	158	77	0
7	147	73	0
8	140	60	0
9	144	66	0
10	145	75	0
11	145	80	0
12	189	61	0
13	223	63	0.58
14	182	67	0
15	183	74	0
16	186	81	0
17	188	83	0.03
18	179	90	0
19	163	77	0
20	156	81	0
21	148	88	0
22	140	86	0

Date	June 2007 Daily Mean Flow (cfs)	June 2007 Daily Max Air Temp (°F)	June 2007 Precip (in.)
23	130	84	0
34	120	85	0
25	111	89	0
26	107	90	0
27	107	74	0
28	100	67	0
29	96	75	0
30	89	83	0
MIN	89	60	0.00
MAX	223	90	0.58
AVG	148	75	0.03
TOTAL			0.73

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 was obtained from the NWS reporting station located at the EMD WWTP.

Table 72 2007 July Bear Creek Evergreen vs. Weather Data

Date	July 2007 Daily Mean Flow (cfs)	July 2007 Daily Max Air Temp (°F)	July 2007 Precip (in.)
1	84	87	0
2	78	90	0
3	75	90	0
4	78	90	0
5	89	78	0
6	91	80	0
7	75	85	0
8	74	87	0
9	68	79	0.04
10	63	85	0
11	61	74	0
12	62	76	0.04
13	74	76	0.02
14	59	82	0
15	56	82	0.2
16	53	86	0
17	51	90	0
18	51	90	0
19	59	88	0
20	67	73	0.33
21	64	82	0
22	56	87	0
23	49	89	0
34	46	86	0
25	56	87	0
26	49	88	0.01
27	55	77	0
28	90	75	0.62
29	70	73	0
30	67	76	0.02
31	60	81	0
MIN	46	73	0.00
MAX	91	90	0.62
AVG	65	83	0.04
TOTAL			1.28

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 was obtained from the NWS reporting station located at the EMD WWTP.

Table 73 2007 August Bear Creek Evergreen vs. Weather Data

Date	August 2007 Daily Mean Flow (cfs)	August 2007 Daily Max Air Temp (ºF)	August 2007 Precip (in.)
1	53	84	0
2	67	83	0
3	99	75	0.12
4	76	83	0.48
5	90	73	0.2
6	80	81	0.35
7	82	72	0.22
8	74	76	0.01
9	66	83	0
10	63	85	0
11	61	84	0.24
12	59	85	0
13	57	88	0
14	53	89	0.01
15	54	85	0.23
16	74	77	0.15
17	56	80	0
18	60	82	0.02
19	55	79	0.03
20	51	82	0.1
21	45	88	0
22	44	88	0
23	45	79	0
34	47	69	0.08
25	42	81	0
26	39	87	0
27	39	85	0.02
28	45	78	0.16
29	41	77	0
30	43	71	0
31	41	80	0
MIN	39	69	0.00
MAX	99	89	0.48
AVG	58	81	0.08
TOTAL			2.42

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 was obtained from the NWS reporting station located at the EMD WWTP.

Table 74 2007 September Bear Creek Evergreen vs. Weather Data

Date	September 2007 Daily Mean Flow (cfs)	September 2007 Daily Max Air Temp (ºF)	September 2007 Precip (in.)
1	51	85	0
2	42	79	0.01
3	39	83	0.12
4	41	83	0
5	46	78	0
6	44	79	0.14

Date	September 2007 Daily Mean Flow (cfs)	September 2007 Daily Max Air Temp (ºF)	September 2007 Precip (in.)
7	39	80	0
8	37	74	0
9	36	77	0.03
10	36	65	0.05
11	36	50	0.01
12	33	74	0
13	32	80	0
14	32	70	0
15	32	63	0
16	31	85	0
17	35	80	0.01
18	33	80	0.03
19	30	80	0
20	29	77	0
21	28	81	0
22	27	81	0
23	27	83	0
34	28	74	0
25	28	55	0
26	27	62	0.07
27	26	69	0
28	26	69	0
29	26	74	0
30	25	70	0
MIN	25	50	0.00
MAX	51	85	0.14
AVG	33	75	0.02
TOTAL			0.47

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 was obtained from the NWS reporting station located at the EMD WWTP.

Table 75 2007 October Bear Creek Evergreen vs. Weather Data

Date	October 2007 Daily Mean Flow (cfs)	October 2007 Daily Max Air Temp (ºF)	October 2007 Precip (in.)
1	25	68	0
2	25	76	0
3	24	70	0
4	24	77	0
5	24	77	0
6	23	77	0
7	22	76	0
8	23	59	0
9	23	69	0
10	23	71	0
11	24	74	0
12	22	73	0
13	22	66	0
14	26	56	0.45
15	26	39	0.35
16	25	56	0
17	24	63	0
18	20	57	0

Date	October 2007 Daily Mean Flow (cfs)	October 2007 Daily Max Air Temp (ºF)	October 2007 Precip (in.)
19	21	50	0
20	24	74	0
21	24	74	0.13
22	22	32	0.27
23	26	50	0
34	25	62	0
25	24	74	0
	23	75	0
27	23	57	0
28	23	42	0
29	22	68	0
30	22	71	0
31	23	70	0
MIN	20	32	0.00
MAX	26	77	0.45
AVG	23	65	0.04
TOTAL			1.2

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 was obtained from the NWS reporting station located at the EMD WWTP.

EXAMPLE DATA FORMS

EVERGREEN METROPOLITAN DISTRICT
Water and Wastewater
P.O. Box 3819
Evergreen, Colorado 80437-3819
303-674-4112
Fax 303-674-7267

BEAR CREEK STUDY—SUMMER 2005 DATALOGGER LAUNCH/RETRIEVE

LOGGER #	LOGGERLOCATION	DATE OUT	TIME OUT	DATE IN	TIME IN	INITIALS
EMD1	Above Evergreen Lake, at gaging station					
EMD2	In Evergreen Lake, near dam, at surface					
EMD4	Above EMD WWTP effluent					
EMD3	Below EMD WWTP effluent					
EMD5	EMD WWTP effluent					
EMD5A	Below Idledale, at McGoldrick bridge					
WJ6	WJCMD WWTP effluent					
KSWD7	Above KSWD WWTP effluent, east end of O'Fallon					
KSWD8	KSWD WWTP effluent					
GWSD9	Above GWSD WWTP effluent, west end of Lair o' the Bear					
GWSD9A	GWSD WWTP effluent					
Morr10	Morrison gaging station, west end of town above Harriman Diversion					
Morr11	Above Morrison WWTP effluent, start of Bear Creek segment 1b					
Morr12	Morrison WWTP effluent					

COMMENTS:_____

EVERGREEN METROPOLITAN DISTRICT
Water and Wastewater
P.O. Box 3819
Evergreen, Colorado 80437-3819
303-674-4112
Fax 303-674-7267

BEAR CREEK STUDY—SUMMER 2005
pH/Temp/DO/COND METER CALIBRATION RECORD

MAKE __YSI_____MODEL___556 MPS____S/N____02E1048AA_____

Comments:_____

DATE	20 Min Warm up	DO Calib. OK?	pH 7 Calib OK?	PH 10 Calib OK?	Temp ºC	COND 1.413 mS/cm OK?	Probe Maint?	Init

EVERGREEN METROPOLITAN DISTRICT
Water and Wastewater
P.O. Box 3819
Evergreen, Colorado 80437-3819
303-674-4112
Fax 303-674-7267

BEAR CREEK STUDY—SUMMER 2005
pH/Temp/DO/COND SONDE CALIBRATION RECORD

MAKE __YSI Sonde___MODEL___600 XLM____S/N____03C0209_____

Comments:_____

_

DATE	20 Min Warm up	DO Calib. OK?	pH 7 Calib OK?	PH 10 Calib OK?	Temp ºC	COND 1.413mS @ 25˚C OK?	Probe Maint?	Init

BEAR CREEK STUDY—SUMMER 2005
WEEKLY CHECKS

DATE:_____ WEATHER:_____

LOGGER or YSI ID	LOCATION	PH (SU)	TEMP ˚C	DO (mg/L)	COND (mS)	Monitoring Time	Logger Intact? Y/N	Location Sampled? Y/N	Sampling Time
KSWD7	Above KSWD WWTP effluent, east end of O'Fallon Park								
KERR	Kerr Gulch, at Hwy 74 bridge						N/A		
GWSD9	Above GWSD WWTP effluent, west end of Lair o' the Bear Park								
IDLEWEST	Above Idledale, west end of town						N/A		
EMD5A	Below Idledale, at McGoldrick bridge								
Morr10	At Morrison gaging station, above Harriman Diversion								
Morr11	Above Morrison WWTP effluent, at start of Bear Creek segment 1b								

START TIME:_____ END TIME:_____INITIALS:_____

LOGGER or YSI ID	LOCATION	PH (SU)	TEMP ˚C	DO mg/L	COND (mS)	Monitoring Time	Logger Intact? Y/N	Location Sampled? Y/N	Sampling Time
EMD1	Above Evergreen Lake, at gaging station								
EMD2	In Evergreen Lake, near dam, at surface							N	N/A
EVLKMID	In Evergreen Lake, middle						N/A	N	N/A
EMD4	Above EMD WWTP effluent						N/A	N	N/A
EMD3	Below EMD WWTP effluent								
BCC1	Above Bear Creek cabins						N/A		
BCC	Below Bear Creek cabins, at bridge						N/A		
WELCHBR	Below Troublesome Gulch, at Welch Ave. bridge						N/A		
OFPWEST	O'Fallon Park, west end						N/A		

COMMENTS: Data retrieved from YSI memory
_____
_____

Evergreen Metropolitan District					# of Containers	Matrix (Water, Soil, Sludge)	List analyses requested here					
Sampler (Signature)												
Sample Number	Date	Time	Comp/ Grab	Sample Location								Remarks

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Notes: 1.) Label all samples.

2.) Transport all samples in coolers with ice or freeze packs. Store at 4°C.