

Bear Creek Watershed Association

DATE: October 7, 2009

RE: September 2009 Watershed Monthly Sampling and Monitoring Summary



This memo summarizes the September 2009 sampling and monitoring events performed on Bear Creek mainstem from Summit Lake in the Mt. Evans Wilderness to Morrison Park and the North and South Turkey Creek drainages. Also added to this event was Site 38, Bear Tracks (within the Mt. Evans Wilderness). Sampling and monitoring was performed on September 2 (Summit Lake sites) and September 3 (all other Sites). Data collection for Evergreen Lake profile Site 4 is specific for a lake/reservoir characterization. This includes a vertical profile data at 1-meter increments and nutrient measurements in the surface and bottom layers.

The data consists of four Tables and four charts (Figures). Table 1 summarizes monitoring and sampling results with statistical analyses. Table 2 details Site ID and locations. Table 3 summarizes measured flows. Table 4 summaries sampling and monitoring at the Evergreen Lake profile station.

Figure 1 graphs monitoring results at all Sites for the four parameters (pH, Temperature, Dissolved Oxygen and Specific Conductance). Figure 2 graphs sampling results for water quality parameters (Ammonia as N, Nitrate+Nitrite as N, (Total Inorganic Nitrogen—TIN as N), and Total Phosphorous). Figure 3 graphs monitoring results at the Evergreen Lake profile station. Figure 4 graphs the sampling results for the Evergreen Lake profile station.

On the Monitoring chart (Figure 1), Specific Conductance is reported on the secondary X-axis. On the Sampling chart (Figure 2), Ammonia and Total P results were plotted against the primary X-axis, and Nitrate+Nitrite and TIN results are reported on the secondary X-axis. All monitoring points were reported, including the sub-surface Lake profile stations.

For the September 2009 sampling and monitoring events, there were several measurements of note. Elevated Specific Conductance values were recorded at Sites 18 and 19 (which has been typical) and the highest instantaneous temperature recorded (above 17°C) was at Site 8a. There was one exceedance of pH (9.11 at Site 9). There were no exceedances of the stream standard for DO. Regarding nutrients, it should be noted that the NO₃+NO₂ results from Sites 36, 37 and 3 (Summit Lake, below Summit Lake and Bear Tracks) continue to be higher than expected. Also, NO₃+NO₂ results at Sites 8a through 14a-moving downstream-were significantly higher than other sample sites. Results from the NO₃+NO₂ analyses show no exceedances of the 10 mg/L Nitrate stream standard.

Evergreen Lake monitoring resulted in two of five measurements of DO below 6.0 mg/L at the profile station, while the calculated average DO for the Profile Station (0-3m) was 8.45 mg/L. One of five pH monitoring results were below 6.5. Results from Evergreen Lake sampling (one meter from the surface and one meter from the bottom) showed lower than average NO₃+NO₂ and slightly above Total P values at each sample site.

NOTE: Last month, Site 35 was inadvertently referred to as “below Brook Forest Inn”. The Site is above Brook Forest Inn.

Bill Todino
Data Manager

Table 1 Bear Creek Monthly Sampling and Monitoring Summary-August 2009

Bear Creek Monthly Sampling and Monitoring Summary-August 6, 2009 (Sites 36 and 37 sampled/monitored August 5, 2009). Bear Creek from Mt. Evans Wilderness drainage to the west end of Morrison (Morrison Park), and Turkey Creek drainages.

Site #	pH SU	Temp °C	DO mg/L	Sp Cond uS/cm	NH3-N ug/L	NO3+NO2-N ug/L	TIN ug/L	Total P ug/L	TSS mg/L
Segment 1a – Bear Creek Drainage above Evergreen Lake									
Site 1a	8.05	8.12	12.5	0.043	12	70	82	3	
Site 3a	8.56	12.24	11.75	0.058	31	39	70	6	
Segment 3 – Tributary of Upper Bear Creek									
Site 25	8.14	8.58	12.1	0.065	14	23	37	6	
Segment 1d - Evergreen Lake (EGL)									
Site 4a	8.04		9.85	0.065					
Site 4b	7.66	15.03	9.61	0.065		9		24	4.2
Site 4c	7.48	15.01	9.66	0.066					
Site 4d	6.69	14.16	4.67	0.067					
Site 4e	6.34	13.61	1.83	0.07		12		19	5.2
Segment 1e – Mainstem Bear Creek from EGL to Harriman Ditch									
Site 5	8.34	15.35	10.32	0.075	36	11	47	14	
Site 7	8.24	16.13	10.01	0.086	82	93	175	13	
Site 8a	8.59	17.1	10.54	0.105	128	259	387	17	
Site 9	9.11	16.55	11.92	0.133	34	299	333	31	
Site 12	8.95	15.59	11.14	0.166	16	386	402	24	
Site 13a	8.99	16.68	10.74	0.175	14	486	500	25	
Site 14a	8.83	16.44	10.82	0.163	13	321	334	18	
Segment 6a Mainstem Turkey Creek and South Turkey Creek									
Site 18	8.41	13.79	10.46	1.013	15	37	52	16	
Segment 6b – North Turkey Creek									
Site 19	8.51	14.37	11.01	0.782	21	11	32	7	
Segment 7 – Bear Creek downstream of Summit Lake									
Site 37	7.84	8.49	7.77	0.022	12	77	89	25	
Site 38	8.19	7.66	12.09	0.037	17	121	138	5	
Segment 8 – Summit Lake									
Site 36	8.85	7.67	7.97	0.019	10	47	57	17	
Segment 5-Cub Creek above Brook Forest Inn									
Site 35	7.89	11.94	8.34	0.076	29	91	120	9	
MIN	6.34	7.66	1.83	0.019	10	9	32	3	
MAX	9.11	17.10	12.50	1.013	128	486	500	31	
AVG	8.18	13.23	9.77	0.160	30	133	178	16	
StDev	0.69	3.24	2.51	0.246	30	144	152	8	
Stream Std. Exceedance	2	None	2			0			
Stream Std.	6.5 – 9 SU	See note	6.0 mg/L			(NO3-N) 10,000 ug/L			

Temperature Standards:

Segment 1a, Segment 3, Segment 7= T=TVS °C (CS-I), June-Sept 17.0 MWAT/21.2 DM

Segment 1d = TVS °C (CLL), Apr-Dec 18.2 MWAT/23.8 DM

Segment 1e, Segment 5, Segment 6a = T=TVS °C (CS-II), Apr-Oct 18.2 MWAT/23.8 DM

Segment 6b = T=TVS °C (CS-I), June-Sept 17.0 MWAT/21.2 DM

Segment 8 T=TVS °C (CLL), Apr-Dec 17.0 MWAT/21.2 DM

Table 2 Site Locations

Site #	Site Location
Site 1a	Lost & Found (Singin' River Ranch)
Site 25	Mt. Evans Wilderness drainage (Vance Creek)
Site 3a	Above Evergreen Lake at CDOW Site
Site 4a	Evergreen Lake Surface, Profile Station
Site 4b	Evergreen Lake Profile Station, one meter down
Site 4c	Evergreen Lake Profile Station, two meters down
Site 4d	Evergreen Lake Profile Station, three meters down
Site 4e	Evergreen Lake Profile Station, four meters down
Site 5	Above EMD WWTP, at CDOW downtown site
Site 7	Below EMD WWTP effluent
Site 8a	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 14a	Morrison Park west end of town, at CDOW Site
Site 18	South Turkey Creek Aspen Park Metropolitan District
Site 19	North Turkey Creek Conifer Metropolitan District
Site 35	Cub Creek above Brook Forest Inn
Site 36	Summit Lake
Site 37	Below Summit Lake outfall, at 1 st ripple of Bear Creek
Site 38	Bear Tracks (Bear Creek within Mt. Evans Wilderness)

Table 3 2009 Bear Creek Special Study - Flow (cfs)**2009 Bear Creek Special Study - Flow (cfs)**

	May-09	Jun-09	Jul-09	Aug-09	Sep-09
Bear Creek					
Site 36- Summit				5.4	1.24
Site 37 - Upper Bear Creek				4.9	1.35
Site 38 - Bear Tracks					8.36
Site 25 - Vance	13.9	26.8	8.3	6.4	2.9
Site 1a - Singing River	43.5	53.3	38.3	28.6	13.1
USGS Gage EGL	54	71	38	27	14
Site 35 - Cub Creek (BFI)				1	0.83
Site 3a - Keys on the Green	48	75	38	27	14
Site 5 - Little Bear			56.7		13.1
Site 7 - Below EMD WWTP		110.5	52.3	27.2	13
Site 8a - Bear Creek Cabins			51.8	34.9	13.9
Site 9 - O'Fallon Park	94.4		45.7	34.3	15.7
Site 12 - Lair O' The Bear	112.7		52.5	31.3	14.3
Site 13a - Idledale	126.2	97.3	56.3	40.7	15.9
Site 14a - Morrison Park West			60.9	32.8	10.6
USGS Gage BCP	72	113	29	18	5.3
Turkey Creek					
Site 19 - North Turkey Creek	30.7	15.4	2.2	1.21	0.31
Site 18 - South Turkey Creek	1.5	2.9	0.8	0.6	0.1

Table 4 Evergreen Lake Data Profiles

SITE: BCWA Site 4 - Dam Profile				DATE: 9-3-09			
DEPTH	TIME	pH	DO	TEMP	Sp Cond	Secchi (m)	T Depth (m)
0m(-6")	7:34	8.04	9.85		0.065	2.97	4.75
1m	7:36	7.66	9.61	15.03	0.065		

SITE: BCWA Site 4 - Dam Profile				DATE:9-3-09			
DEPTH	TIME	pH	DO	TEMP	Sp Cond	Secchi (m)	T Depth (m)
2m	7:38	7.48	9.66	15.01	0.066		
3m	7:39	6.69	4.67	14.16	0.067		
4m	7:40	6.34	1.83	13.61	0.07		
1-3 m WAT				14.73			
DO 0-3m			8.45				

Figure 1 Monitoring Summary

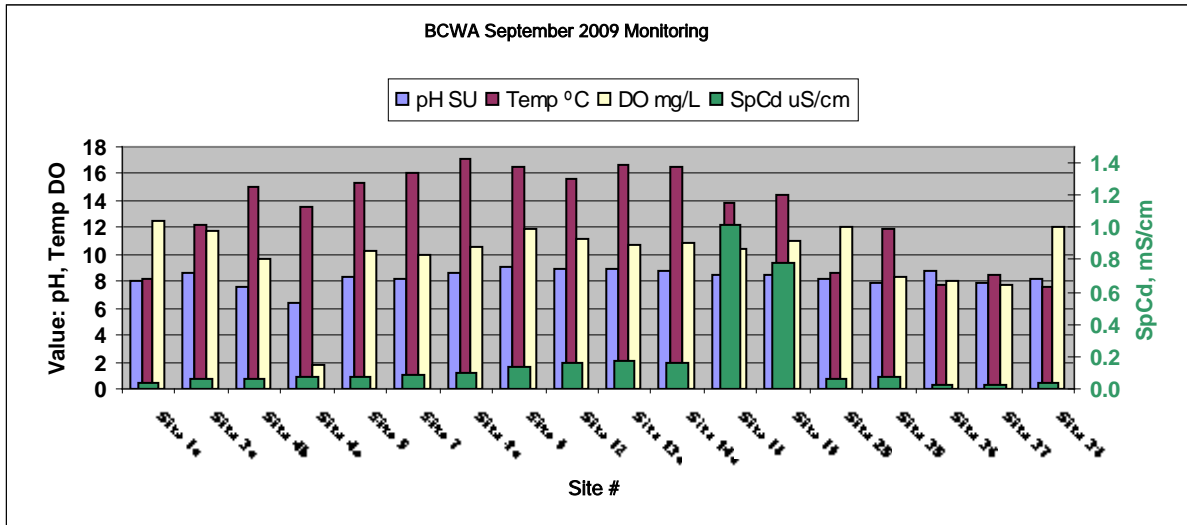


Figure 2 Sampling Results Summary

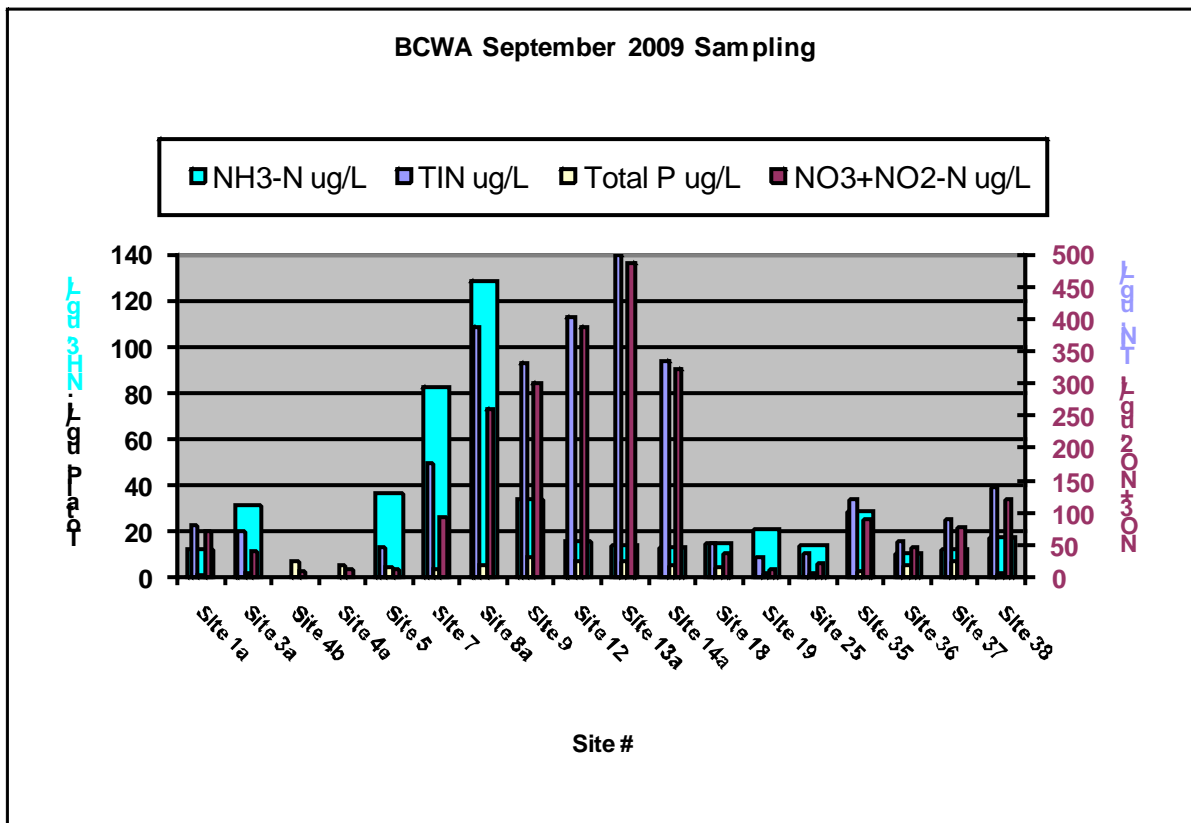


Figure 3 Evergreen Lake Profile Station Monitoring Summary

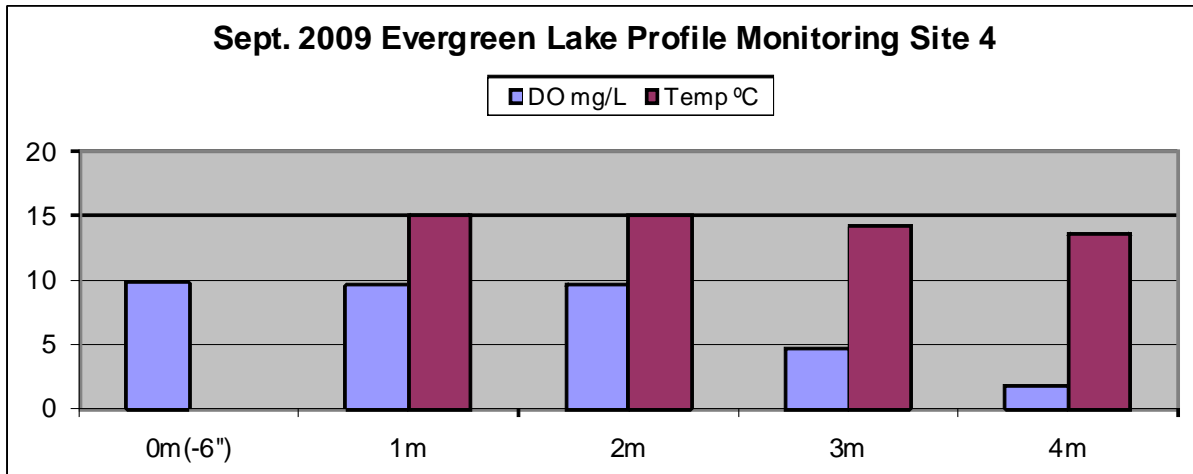


Figure 4 Evergreen Lake Profile Station Sampling Summary

