2009 EAGLE CREEK ANNUAL REPORT
WATERSHED OUTLET MONITORING PROGRAM

(Preliminary Data)

Prepared for:

Lower Minnesota River Watershed District

By:

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Introduction

Eagle Creek is a unique stream in the metropolitan area. It is a spring-fed, self-reproducing trout stream that originates at the Boiling Springs (a sacred area for the Mdewakanton Sioux Community) in Savage. To minimize impacts from a rapidly growing suburban area, measures have been taken to prevent degradation including storm water diversion from the stream and establishing a 400-foot native buffer along the creek.

Monitoring Eagle Creek for water quality, stage, flow, precipitation, temperature, and other parameters began in 1999. This study, the Eagle Creek Watershed Outlet Monitoring Program (WOMP), was designed and is currently managed by Metropolitan Council. The Lower Minnesota River Watershed District (LMRWD) funds this project and contracts with the Scott Soil and Water Conservation District (SWCD) to perform monitoring activities.

The monitoring station is located in Savage near Highway 13 and Highway 101, approximately 0.8 miles upstream of the confluence with the Minnesota River. This report summarizes the results of flow, precipitation, and water quality for 2009. This data is preliminary and is subject to change until the Metropolitan Council submits the final report for this period.

2009 Results

Many parameters are recorded continuously at the Eagle Creek WOMP station including stage, flow, conductivity, precipitation, and stream temperature. Table 1 displays average monthly flows, total monthly precipitation, and 30-year monthly precipitation average. Figures 1 – 4 illustrate hydrographs detailing when samples were taken, daily average flow or stage, and total daily precipitation. Samples are taken during base-flow conditions and storm events, while flow measurements are taken at various stages to create a stage:discharge relationship useful for determining flow at all stages of the hydrograph.

Monitoring data suggests that Eagle Creek meets state water quality standards and ecoregion means, with the exception of a few parameters. Bacteria, turbidity, and sediment are elevated in winter months, which is characteristic of this stream. Because the stream is spring fed, it does not freeze in the winter. The open water attracts a large number of waterfowl to the stream, which results in higher bacteria, sediment, and turbidity levels than seen in summer months. *Refer to Table 2 for all results.*

Table 1. Average flow and total precipitation at Eagle Creek WOMP station. Eight flow measurements were taken in 2009 to ensure accurate flow was being logged in the datalogger.

Month	Average Monthly Flow (cfs)***	*Precipitation (inches)	30 year precipitation average**
January	7.38	.22	.67
February	7.64	1.14	.72
March	n/a	1.69	1.54
April	7.26	1.53	2.13
May	6.53	.76	3.68
June	6.53	3.16	4.76
July	7.70	1.45	4.09
August	8.71	8.55	4.01
September	8.30	.5	2.67
October	9.48	4.89	1.92
November	8.74	.59	1.17
December	8.22	2.58	.77

*Precipitation data obtained from volunteer rain gauge monitor in Shakopee or rain gauge at WOMP station.
** Data from MN State Climatology Office
***Average monthly flow collected from Eagle Creek datalogger

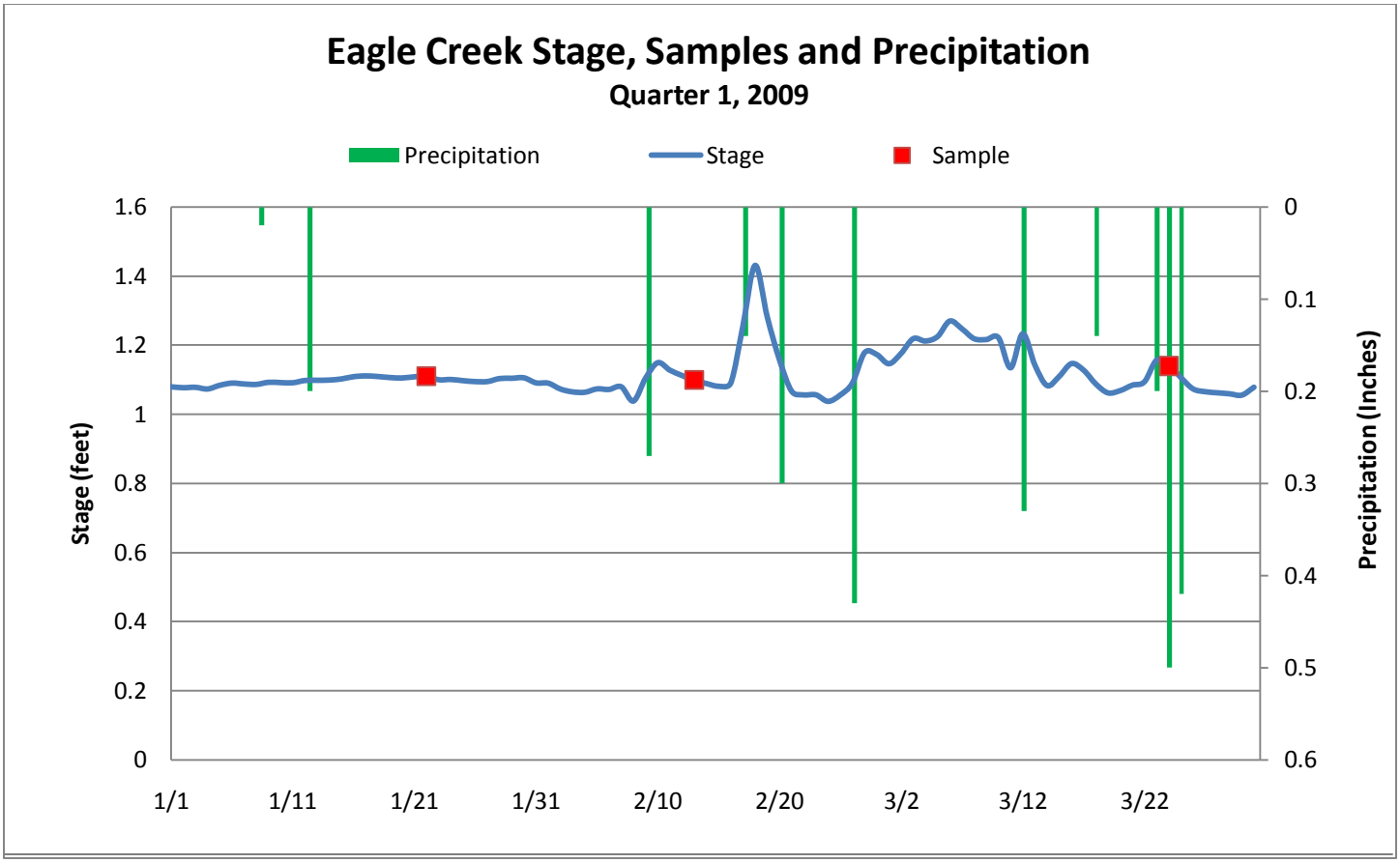

Figure 1. Stage, samples, and precipitation of Quarter 1 (January – March), 2009.

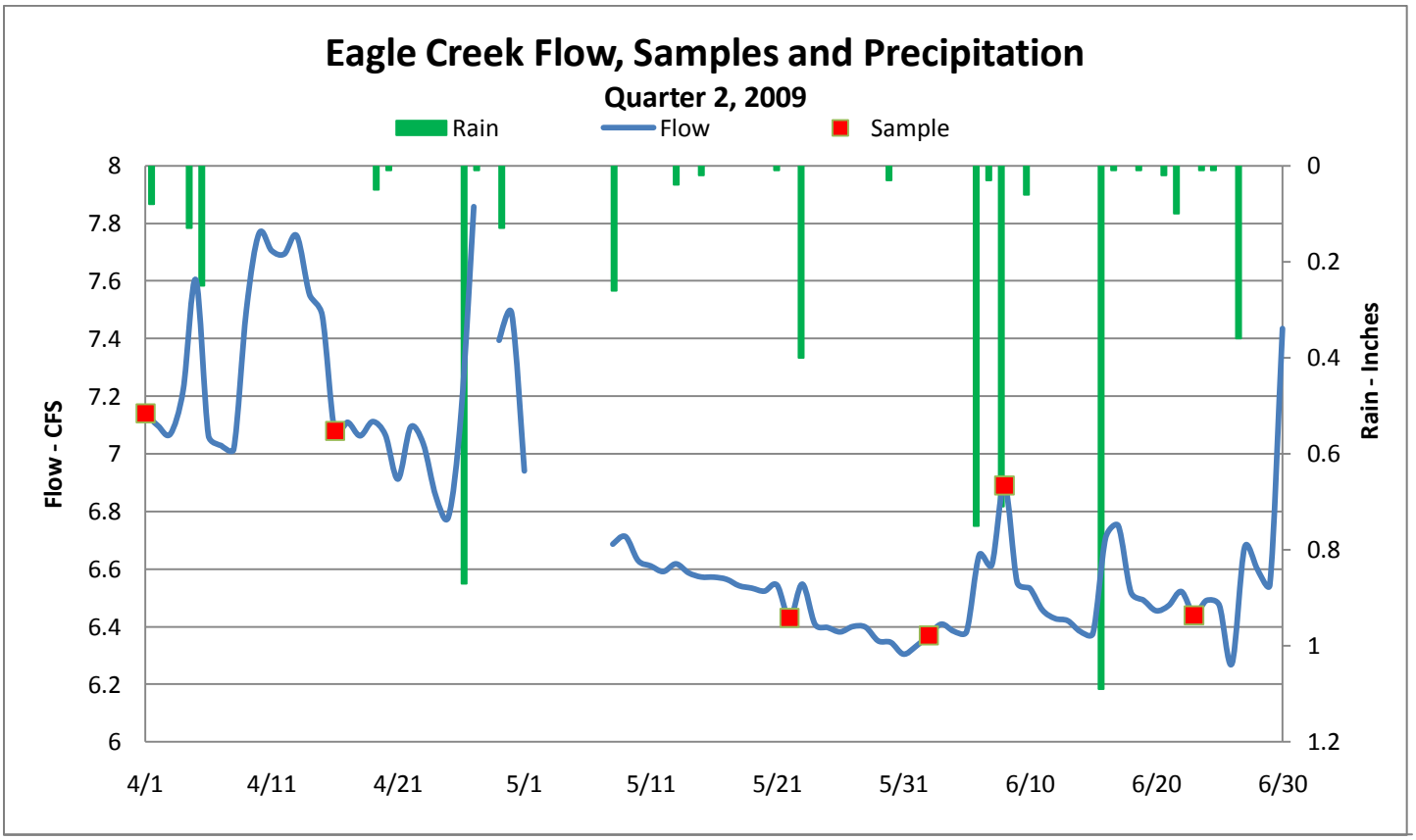

Figure 2. Flow, samples, and precipitation of Quarter 2 (April – June), 2009. Note - some flow data missing due to equipment malfunction.

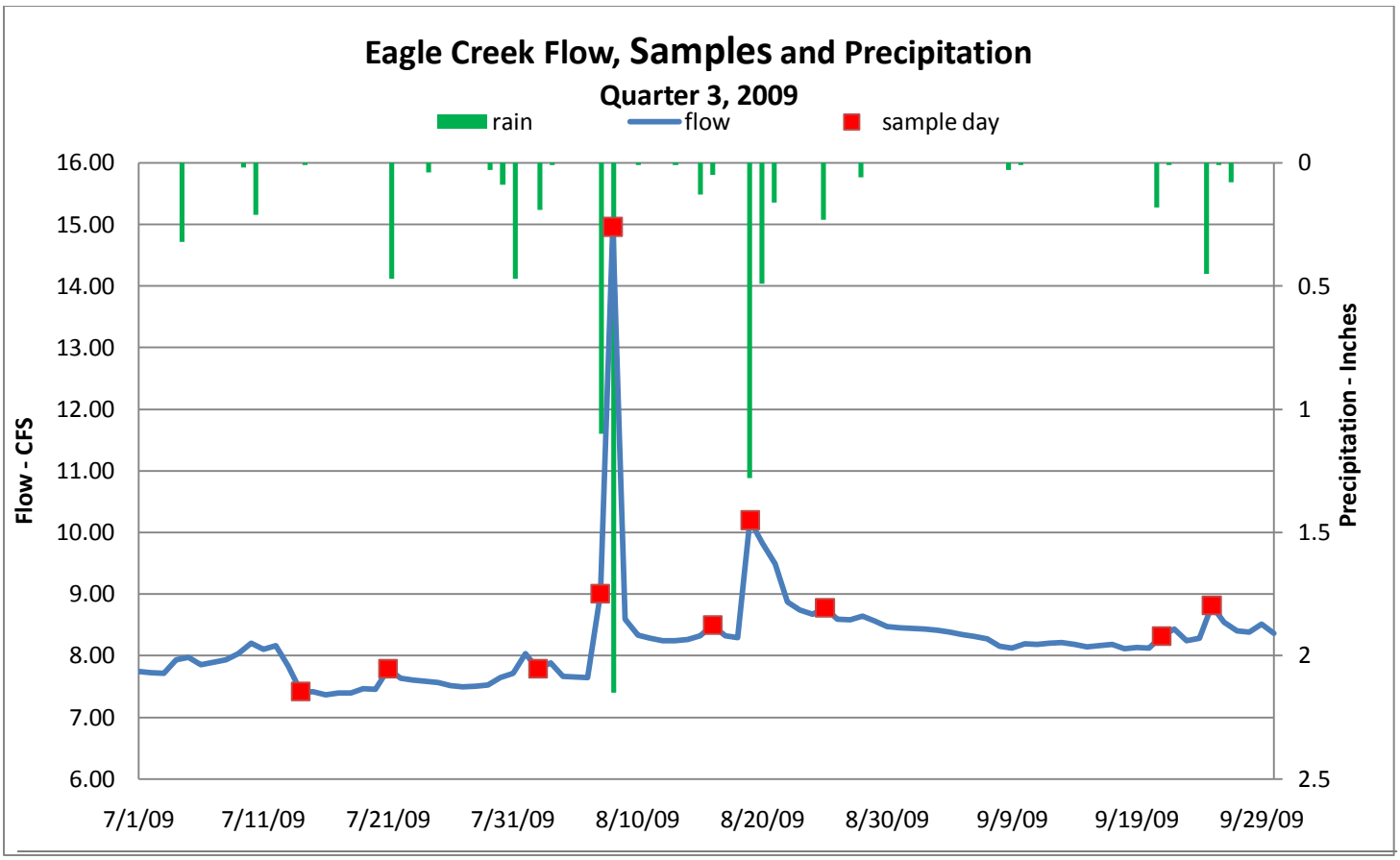

Figure 3. Flow, samples, and precipitation of Quarter 3 (July - September), 2009.

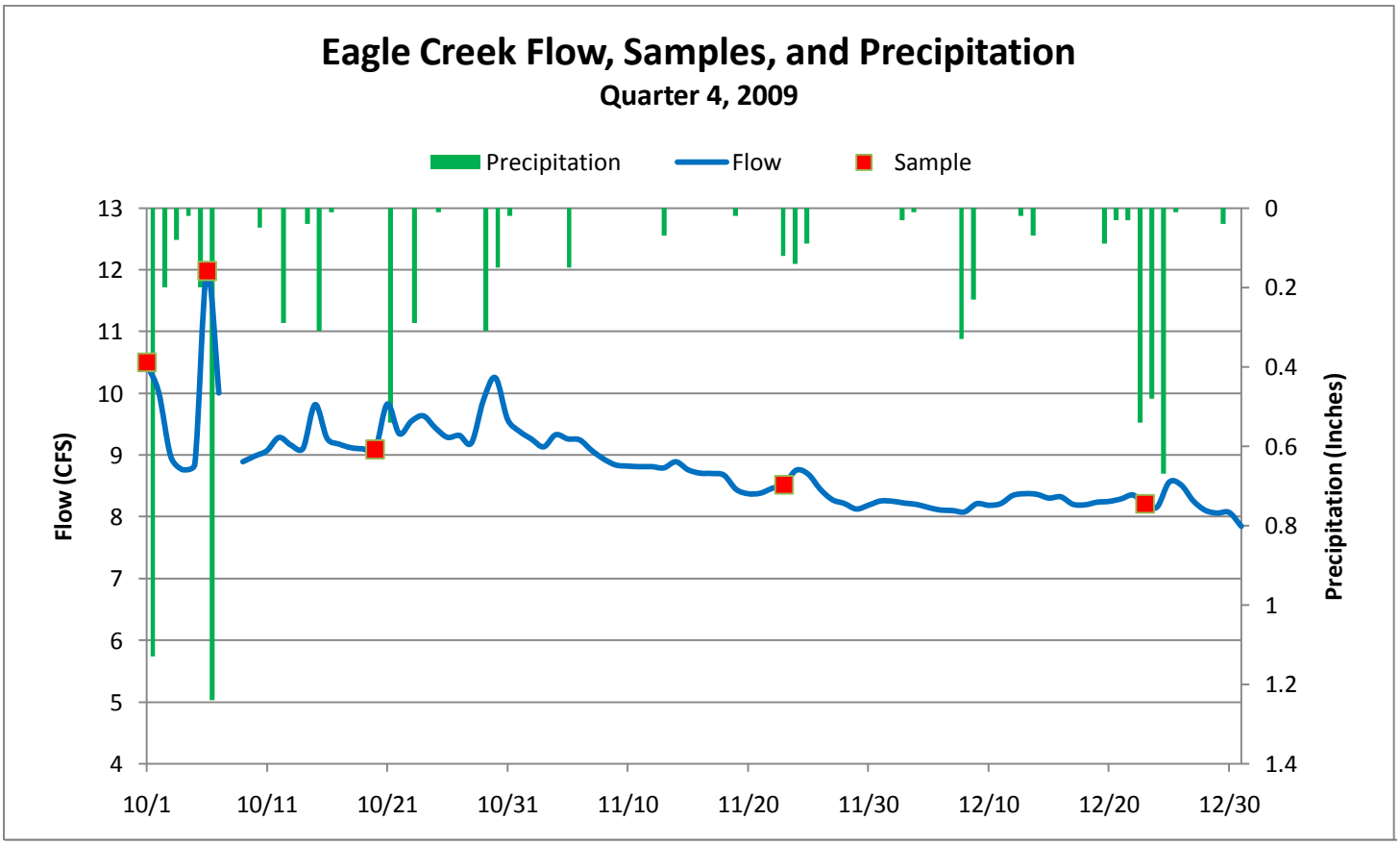

Figure 4. Flow, samples, and precipitation of Quarter 4 (October - December), 2009. Note - some flow data missing due to equipment malfunction.

Table 2. Twelve composite samples, thirteen base flow samples, and one event grab were collected in 2009. Below are the average concentrations at Eagle Creek WOMP Station during each quarter. Red text indicates sample was above state standard or out of ecoregion mean.

Parameter	1st quarter 2009	2nd Quarter 2009	3rd Quarter 2009	4th Quarter 2009	Unit	Notes
BOD5	1.25	1	1.26	1	mg/L	Ecoregion mean = 2.7 mg/L.
Cadmium	-	.5	.5	-	ug/L	State standard = 2.0 ug/L.
Chloride	28.5	32.7	32.7	31.2	mg/L	State standard = 230 mg/L.
Chlorophyll-a	78.5	72.75	68.5	63.0	ug/L	% Pheo-Corrected Average Of Result
Chromium	-	6	5	-	ug/L	State standard = 365 ug/L.
COD	13.33	8.8	9.36	8.4	mg/L	
Conductivity	580	601	629	608	mMHOs	
Copper		.5	.8	-	ug/L	State standard = 15 ug/L.
Dissolved Oxygen	9.24	8.87	8.03	8.3	mg/L	State standared = 7 mg/L.
*Escherichia coli (E Coli)*Bacteria	**919**	94.6	**145**	**137**	CFU/100mL	State Standard = 126 organisms/100 ml as a geometric mean of not < 5 samples within any calendar month (Apr 1 – Oct 31)
Fecal Coliform Bacteria	**301**	77.6	130	108	CFU/100mL	State standard = 200 CFU/100 ml water as geomean of at least 5 samples/month Apr – Oct.
Hardness	314	315	302	306	mg/L	No state standard. Water above 180 mg/L considered very hard water.
Lead	-	.1	.2	-	ug/L	State standard = 7.7 ug/L.
Nickel	-	2.9	2.6	-	ug/L	State standard = 283 ug/L.
Nitrogen Ammonia	.04	.04	.028	.04	mg/L	State standard of unionized Ammonia as N = .016 mg/L. Need to calculate N Ammonia to get unionized Ammonia as N.
Nitrate + Nitrite	.22	.14	.12	.13	mg/L	
pH	8.00	8.02	7.96	7.84	su	State standard = not less than 6.5 nor greater than 8.5.
Phosphorus, Total	.05	.02	.031	.04	mg/L	Ecoregion mean = 0.13 mg/L. EPA recommends less than 0.1 mg/L. These results are the unfiltered average of result.
Suspended Solids	**16.7**	5.25	5.36	6.20	mg/L	Ecoregion mean = 13.7.
Total Alkalinity	261	263	237	246	mg/L	No state standard. 20 – 200 mg/L typical. Less than 10 mg/L indicate poor buffer.
Total Kjeldahl Nitrogen	.17	.28	.24	0.26	mg/L	
Total Organic Carbon	3.2	2.87	2.94	2.84	mg/L	
Turbidity (NTRU)	**13**	6	5.1	6.0	NTU	State standard for trout waters = 10 NTU, however lab reports in NTRU. Not quite comparable.
Volatile Suspended Solids	4.7	2.25	2.09	2.00	mg/L	
Zinc	-	1.7	5	-	ug/L	State standard = 191 ug/L

mg/L = milligrams per liter
mMHO = micromhos or micorseimens
NTU = nephelometric turbidity units
su = standard units
ug/L = micrograms per liter
CFU = colony forming units
Highlighted areas indicate areas of concern.
State standard = state standard for Class 2A waters, hardness greater than 200