

Table 1.BA. Battle Creek Monitoring Station Information



Station Address: Battle Creek near U.S. Highway 61, St. Paul, MN
County: Ramsey
Major Basin: Mississippi River Basin
Watershed: Battle Creek
Drainage Area: 11.40 square miles

Station Operator: Ramsey-Washington-Metro Watershed District

Metropolitan Council Environmental Services Contact Information:

Contact Person: Casandra Champion
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Watershed District or Watershed Management Organization:

Ramsey-Washington-Metro Watershed District

Station Overview: MCES has supported water quality monitoring of Battle Creek since 1996. The monitoring station is located in St. Paul, Minnesota, 2.2 miles upstream from the creek confluence with the Mississippi River. There is no rain gage at this station.

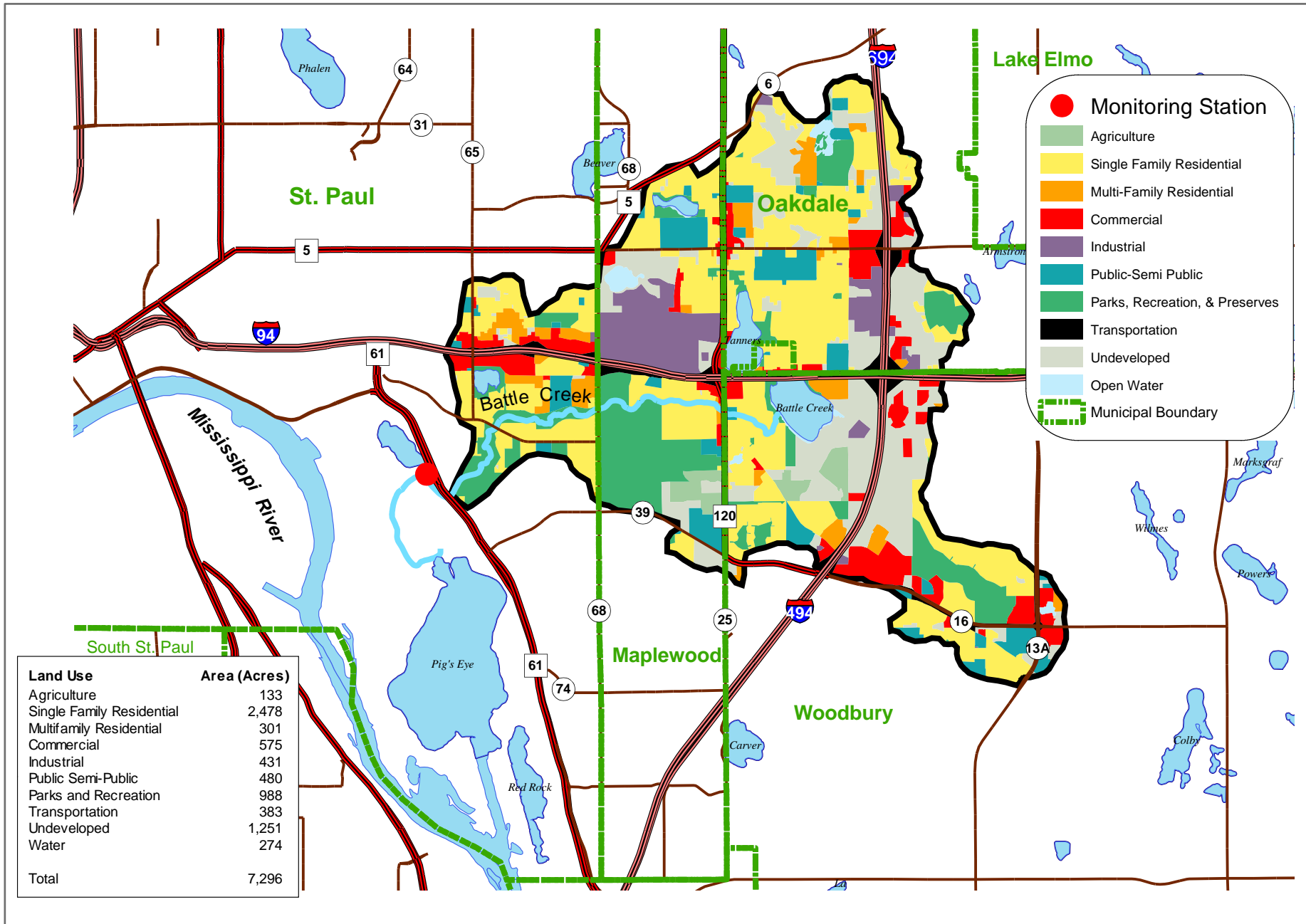
2001 Monitoring Year: Snowmelt began during the last week of March 2001. Daily average flows were estimated prior to May 15 and after December 6. The peak daily average flow of 155 cfs occurred on June 13, 2001. Monitoring equipment was installed on May 14 and removed on December 6.

A significant runoff event occurred during the June 11-22, 2001 period. A composite sample collected on June 11-13 had the highest total suspended solids (TSS) concentration (161 mg/L) of all 2001 samples.

Twenty-three samples were collected for water quality analysis during 2001, including 14 composite samples and nine grab samples. The MCES annual water quality monitoring plan includes 12 monthly baseflow (“non-event”) grab samples and approximately 10 to 15 flow-weighted composite samples collected during all runoff events in the open-water season (March-November). The 2001 sampling scheme did not meet the goals of the MCES monitoring work plan. January and February baseflow conditions were not characterized with baseflow grab samples, and the 2001 snowmelt period was not sampled.

For additional stream monitoring information and monitoring methods regarding this site, see www.metrocouncil.org/environment/RiversLakes.

Figure 1.BA. Battle Creek Monitoring Station Location and Watershed Characteristics



0 0.25 0.5 1 Miles



Figure 2.BA. Battle Creek 2001 Hydrograph with Sampling Information

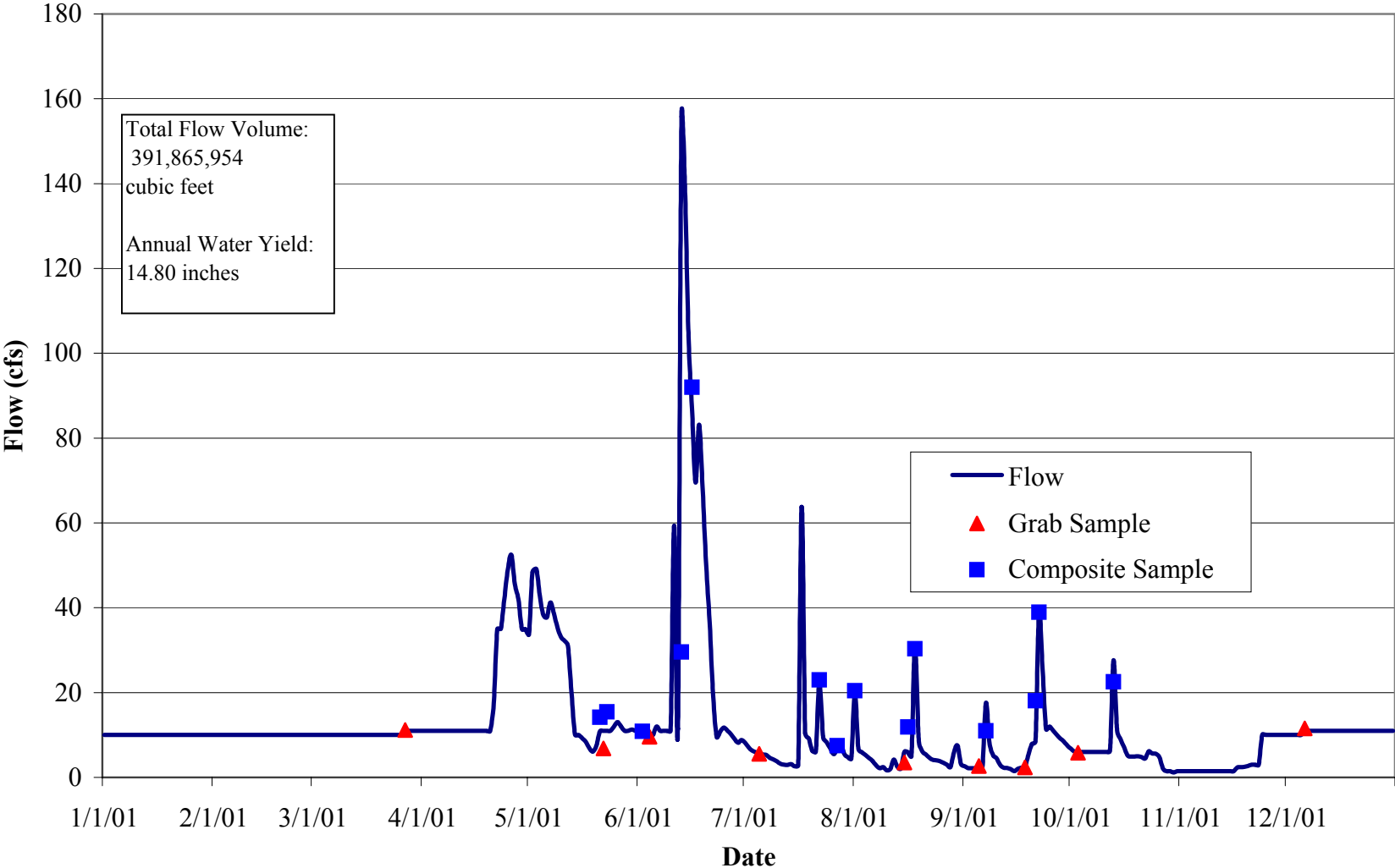


Table 2.BA. Battle Creek 2001 Water Chemistry Information

Variable	N	Mean	Median	Minimum	Maximum	25%	75%	STD
Hardness, mg/L	22	166	160	68	292	110	204	62
Cadmium, ug/L	22	0.1	0.1	0.1	0.4	0.1	0.1	0.1
Chromium, ug/L	22	1.6	1.0	0.5	7.1	0.5	2.1	1.8
Copper, ug/L	22	5.3	4.2	1.5	16.6	2.6	7.3	3.7
Lead, ug/L	22	3.2	1.9	0.5	16.0	0.5	4.8	3.8
Nickel, ug/L	22	3.3	2.7	2.0	9.8	2.3	3.9	1.8
Zinc, ug/L	22	21.0	12.0	1.0	153.0	4.0	24.0	32.0
Nitrogen, Total Kjeldahl, mg/L	22	0.90	0.90	0.30	1.80	0.60	1.00	0.40
Nitrogen, Total Nitrate, mg/L	23	0.38	0.33	0.06	0.93	0.23	0.53	0.21
Phosphorus, Total, mg/L	22	0.15	0.14	0.04	0.38	0.07	0.19	0.09
Phosphorus, Total Dissolved, mg/L	23	0.06	0.04	0.01	0.40	0.03	0.04	0.08
Solids, Total Suspended, mg/L	22	33	21	2	161	6	56	38
Solids, Volatile Suspended, mg/L	22	7	5	2	30	2	11	7
Turbidity, NTU	21	8	4	1	24	3	14	6

Table 3.BA. Battle Creek 2001 Annual Loading Information* for Suspended Solids and Nutrients

Variable	Annual Load (tons)	Annual Yield (lbs/acre)	Annual Normalized Yield (lbs/acre/in of water)	Flow Weighted Mean Concentration (mg/L)
Solids, Total Suspended	449	123	8	37
Phosphorus, Total	1.92	0.53	0.04	0.16
Phosphorus, Total Dissolved	0.57	0.16	0.01	0.05
Nitrogen, Total Nitrate	4.25	1.16	0.08	0.35

* 2001 Annual Loading Information is provisional and may be subject to minor revisions.

Table 4.BA. Battle Creek 2001 Macroinvertebrate Monitoring Results and Metrics

Monitoring Date 10/23/2001

Class	Order	Family	Common Name	Life Stage	Organism Count
Crustacea	Amphipoda		Scuds		39
Crustacea	Isopoda		Sowbugs		5
Gastropoda			Snails		11
Hirudinea			Leeches		7
Insecta	Coleoptera	Dytiscidae	Predaceous Diving Beetles	Adult	2
Insecta	Coleoptera	Elmidae	Riffle Beetles	Larvae	6
Insecta	Coleoptera	Elmidae	Riffle Beetles	Adult	3
Insecta	Coleoptera	Noteridae	Burrowing Water Beetles	Adult	4
Insecta	Diptera	Chironomidae	Midges	Larvae	7
Insecta	Diptera	Simuliidae	Black Flies	Larvae	6
Insecta	Diptera	Tipulidae	Crane Flies	Larvae	3
Insecta	Ephemeroptera	Baetidae	Small Minnow Mayflies	Larvae	4
Insecta	Hemiptera	Belostomatidae	Giant Water Bugs		5
Insecta	Hemiptera	Nepidae	Water Scorpion	Adult	1
Insecta	Odonata	Calopterygidae	Broadwinged Damselflies	Larvae	13
Insecta	Odonata	Coenagrionidae	Narrowwinged Damselflies	Larvae	4
Insecta	Trichoptera	Hydropsychidae	Common Netspinners	Larvae	39

Macroinvertebrate Taxa Metrics

Total Taxa	16
EPT Taxa	2
% EPT Taxa	13
Diptera Taxa	3
% Diptera Taxa	19
Mean Tolerance Value	5.44

Macroinvertebrate Organism Metrics

Total Individuals	163
EPT Individuals	43
% EPT Individuals	26
Diptera Individuals	16
% Diptera Individuals	10
Chironomidae Individuals	7
% Chironomidae Individuals	4

Water Quality

Degree of Organic Pollution

Hilsenhoff Biotic Index	4.95	Good	Some organic pollution
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