

Table 1.VA. Valley Creek Monitoring Station Information



Station Address: 15800 Putnam Boulevard South, Afton, MN
County: Washington
Major Basin: St. Croix River Basin
Watershed: Valley Creek
Drainage Area: 62 square miles

Station Operator: St. Croix Watershed Research Station

Metropolitan Council Environmental Services Contact Information:

Contact Person: Leigh Harrod, P.G.
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Watershed District or Watershed Management Organization:
Valley Branch Watershed District

Station Overview: MCES, with funding provided by the Minnesota Legislature via a grant from the Minnesota Pollution Control Agency (MPCA), has supported water quality monitoring of Valley Creek since 1999. The monitoring station is located in Afton, Minnesota, 1.0 mile upstream from the creek confluence with the St. Croix River. Situated in a groundwater discharge zone, Valley Creek has a disproportionately high water yield relative to its drainage area. The stream flows perennially and does not freeze

during the winter. Valley Creek is a Minnesota Department of Natural Resources (MDNR) designated trout stream.

Land use in the Valley Creek Watershed is largely a mix of agriculture and rural residential development, although large tracts have been set aside in land trusts and restored to prairie. In addition, much of the riparian corridor is re-developing into floodplain forest following cessation of agriculture in the stream valley 30-40 years ago.

MCES partners with the Valley Branch Watershed District and the St. Croix Watershed Research Station (SCWRS) to conduct monitoring at this station. The SCWRS, an affiliate of the Science Museum of Minnesota, conducts continuous monitoring, maintains the rating curve, and collects all water quality samples. The SCWRS has also been conducting continuous monitoring and collecting water quality samples at two upstream Valley Creek locations since 1998. A dense canopy cover precludes the collection of precipitation data at the MCES station. However, precipitation data are continuously collected and recorded at the two SCWRS stations upstream.

2002 Monitoring Year: Snowmelt began during the last week of March 2002. However, the highest flows of the year were related to runoff from rainfall events rather than the annual spring snowmelt event. The peak daily average flow of 34 cfs, with a stage of 1.29 feet, occurred on August 21, 2002, in response to a 1.75-inch rain event.

Precipitation was recorded on 117 days in the watershed in 2002, with precipitation events greater than 1 inch occurring on 8 days. A series of significant rain events occurred between June 21 and October 4, 2002. The largest rain event (2.14 inches) occurred on June 21, 2002. Runoff event-based composite sampling began in early March 2002 and continued through mid October.

Thirty-five samples were collected for water quality analysis during 2002, including 23 composite samples and 12 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 2002 sampling scheme met the goals of the MCES monitoring work plan.

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

Figure 1.VA. Valley Creek Monitoring Station Location and Watershed Characteristics

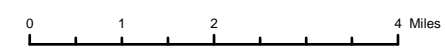
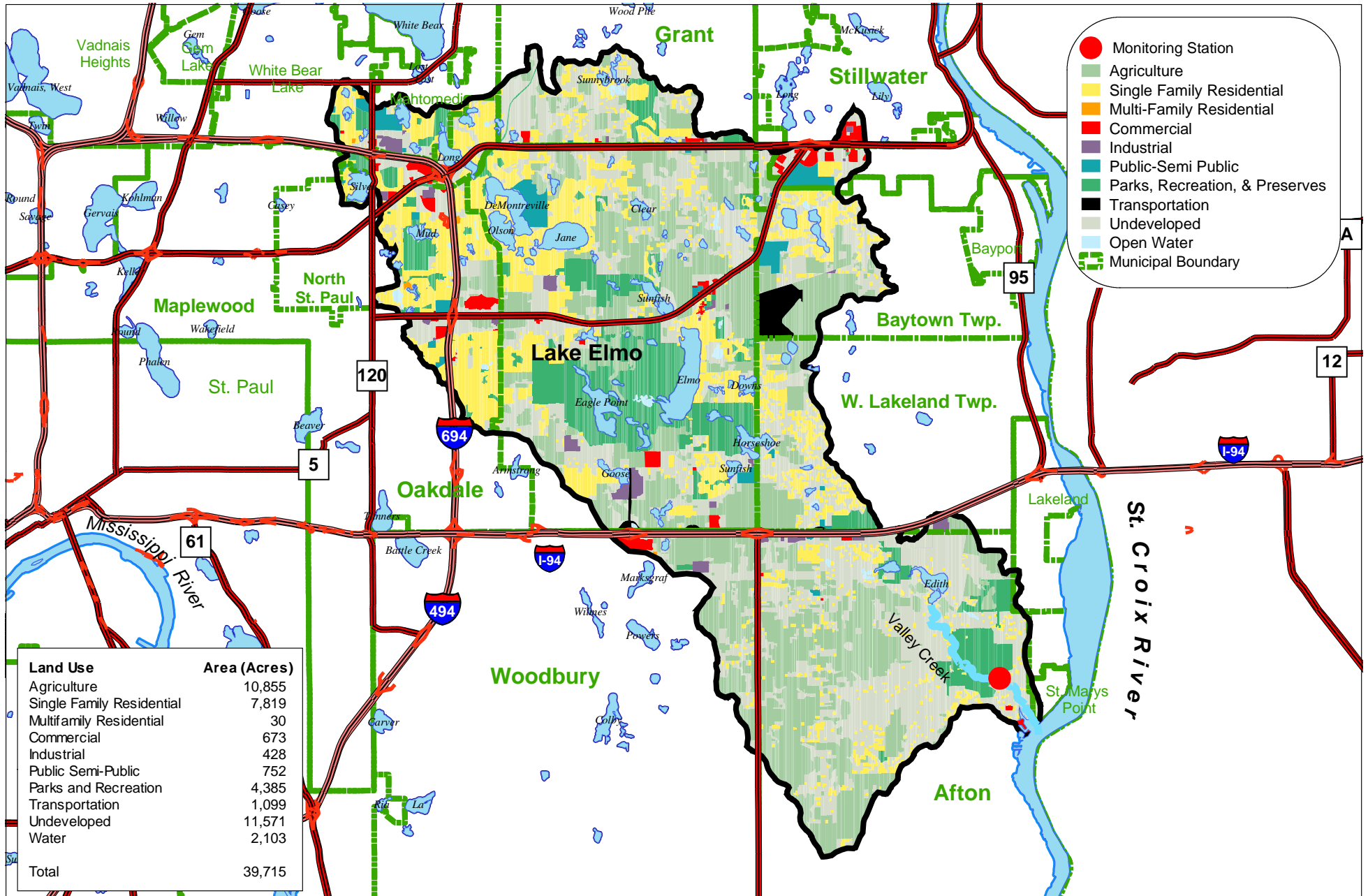


Figure 2.VA. Valley Creek 2002 Hydrograph, Precipitation and Sampling Information

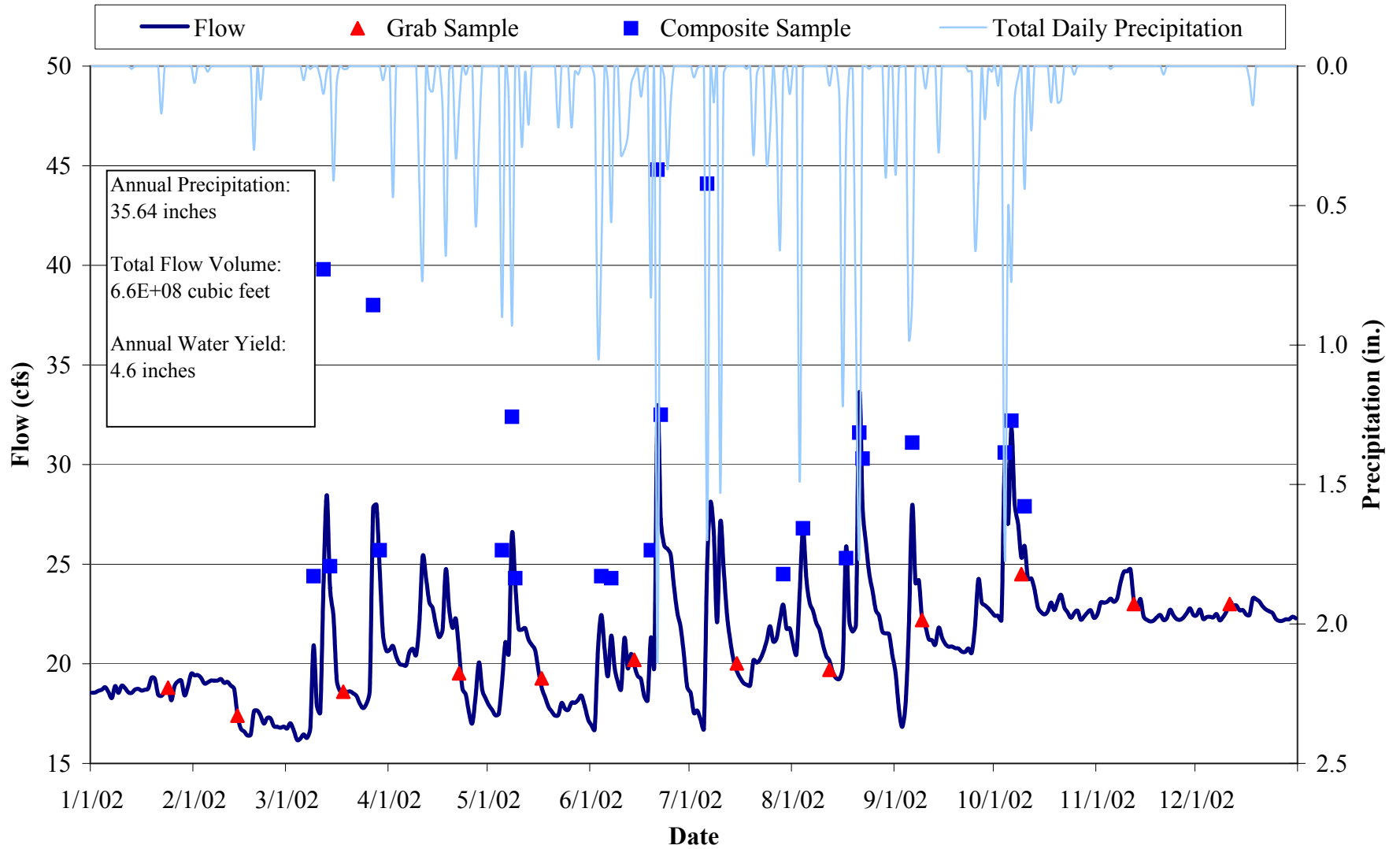


Table 2.VA. Valley Creek 2002 Water Chemistry Information

Variable	N	Mean	Median	Minimum	Maximum	25%	75%	STD
Chloride, mg/L	36	16	17	11	20	16	18	2
Hardness, mg/L	35	221	220	168	260	208	232	21
Cadmium, ug/L	5	0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1
Chromium, ug/L	5	1.4	0.7	0.5	4.2	0.6	1.0	1.6
Copper, ug/L	5	2.5	1.6	1.0	6.8	1.1	1.8	2.4
Lead, ug/L	5	1.1	0.5	0.4	3.2	0.5	0.9	1.2
Nickel, ug/L	5	2.2	1.9	1.7	3.9	1.7	2.0	0.9
Zinc, ug/L	5	6.7	4.3	4.1	16.4	4.2	4.6	5.4
Total Kjeldahl Nitrogen, mg/L	36	0.66	0.34	0.03	2.80	0.22	0.66	0.75
Total Nitrate Nitrogen, mg/L	35	3.77	3.75	2.95	4.56	3.48	4.06	0.41
Total Phosphorus, mg/L	36	0.14	0.06	0.01	0.71	0.04	0.14	0.19
Total Dissolved Phosphorus, mg/L	33	0.05	0.03	0.01	0.27	0.02	0.04	0.06
Total Suspended Solids, mg/L	32	61	17	2	405	7	31	107
Volatile Suspended Solids, mg/L	32	11	4	2	64	2	7	17
Turbidity, NTU	27	12	3	1	95	1	11	21

N: Sample Count

25%, 75%: 25th and 75th Percentiles

STD: Standard Deviation

Table 3.VA. Valley Creek 2002 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)
Total Suspended Solids	238	12	3	11
Total Phosphorus	0.86	0.04	0.01	0.04
Total Dissolved Phosphorus	0.45	0.02	<0.01	0.02
Total Nitrate Nitrogen	83.7	4.22	0.91	4.03

* 2002 Annual Loading Information is provisional and may be subject to minor revisions.

Figure 3.VA. Valley Creek 2002 Hydrograph with Total Suspended Solids and Nitrate Nitrogen Concentrations

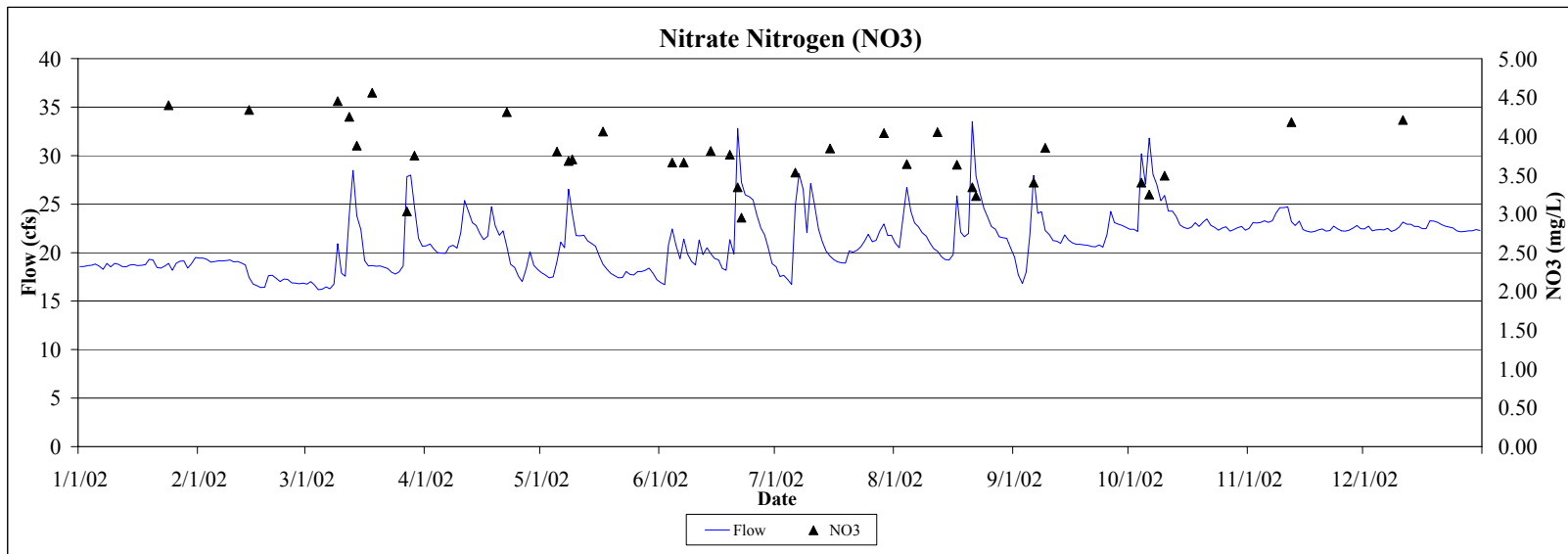
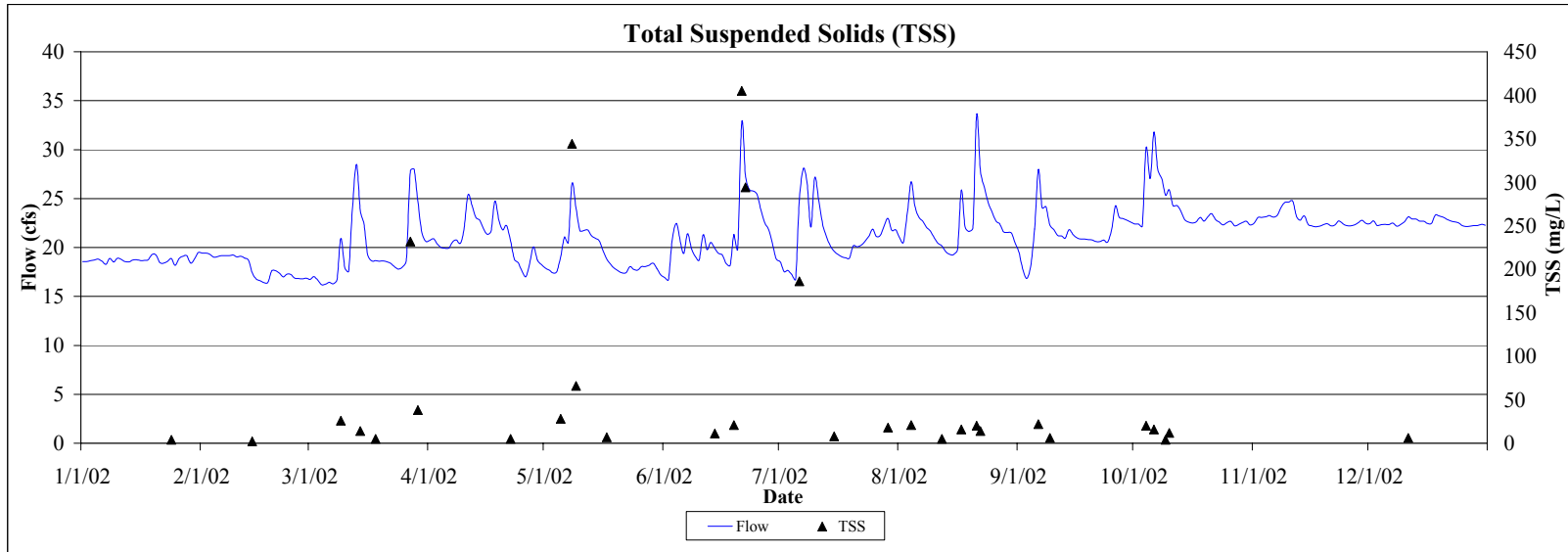


Figure 4.VA. Valley Creek 2002 Hydrograph with Total and Dissolved Phosphorus Concentrations

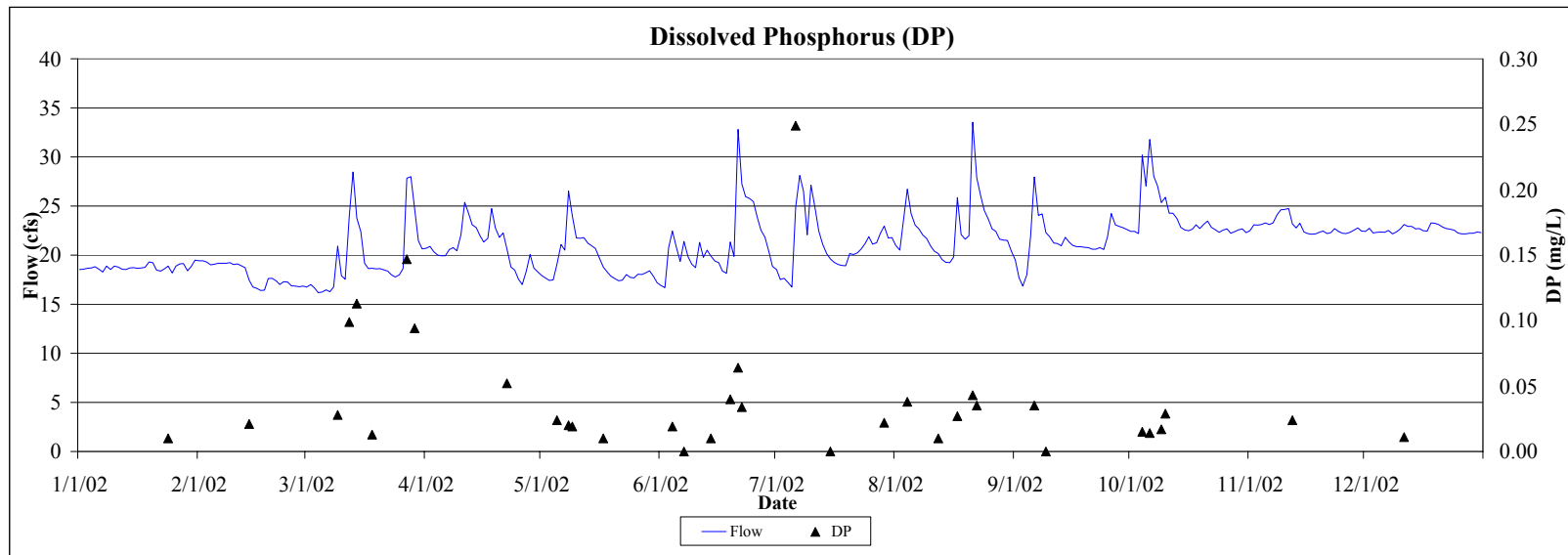
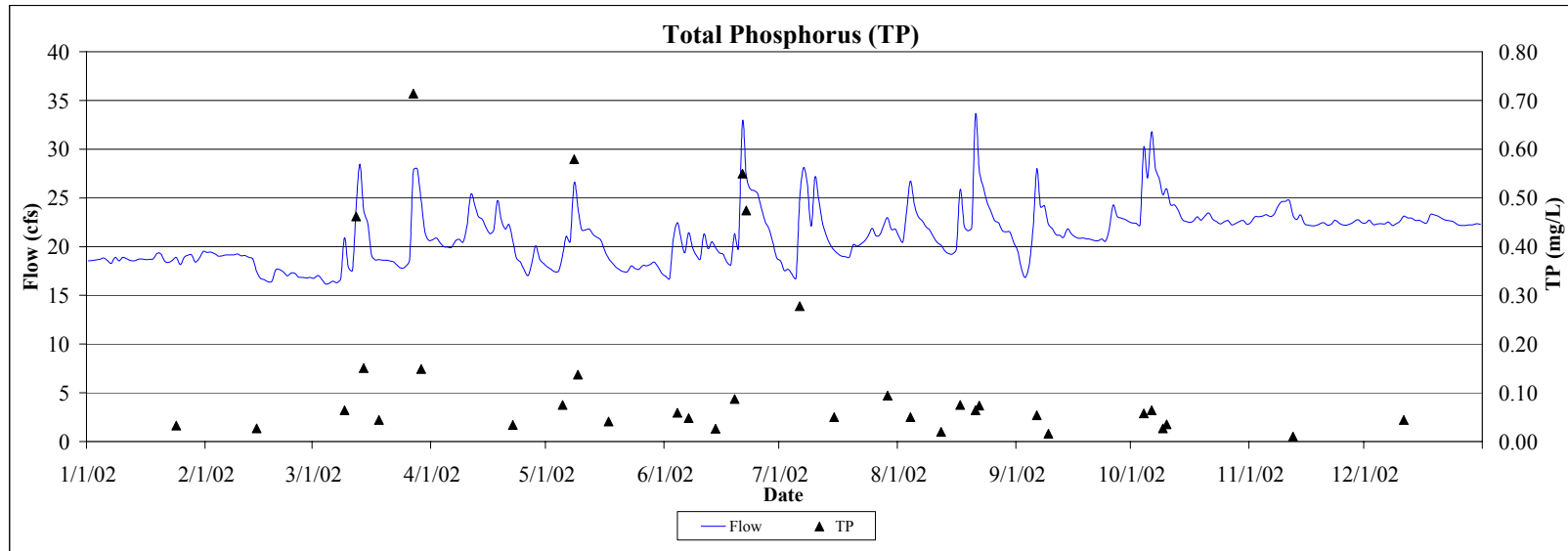


Table 4.VA. Valley Creek: Comparison of 2001-2002 Hydrology and Water Chemistry

	2001	2002
Hydrology		
Total Precipitation (in)	30.06	35.64
Water Yield (in)	4.3	4.6
Total Volume (cf)	6.2E+08	6.6E+08
Annual Load (tons)		
Total Suspended Solids	125	238
Total Phosphorus	0.70	0.86
Total Dissolved Phosphorus	0.46	0.45
Total Nitrate Nitrogen	79.4	83.7
Annual Yield (lbs/acre)		
Total Suspended Solids	6	12
Total Phosphorus	0.04	0.04
Total Dissolved Phosphorus	0.02	0.02
Total Nitrate Nitrogen	4.00	4.22
Annual Normalized Yield (lbs/acre/in of water)		
Total Suspended Solids	1	3
Total Phosphorus	0.01	0.01
Total Dissolved Phosphorus	<0.01	<0.01
Total Nitrate Nitrogen	0.94	0.91
Flow-Weighted Mean Concentration (mg/L)		
Total Suspended Solids	6	11
Total Phosphorus	0.04	0.04
Total Dissolved Phosphorus	0.02	0.02
Total Nitrate Nitrogen	4.13	4.03

Table 5.VA. Valley Creek 2002 Macroinvertebrate Monitoring Results and Metrics

Monitoring Date 6/5/2002

Class	Order	Family	Common Name	Life Stage	Organism Count
Crustacea	Amphipoda		Scuds	Adult	561
Crustacea	Isopoda		Sowbugs	Adult	19
Insecta	Coleoptera	Elmidae	Riffle Beetles	Larvae	3
Insecta	Coleoptera	Elmidae	Riffle Beetles	Adult	3
Insecta	Coleoptera	Hydrophilidae	Water Scavenger Beetles	Larvae	2
Insecta	Coleoptera	Hydrophilidae	Water Scavenger Beetles	Adult	1
Insecta	Collembola	Isotomidae	Freshwater Springtails	Adult	2
Insecta	Diptera	Chironomidae	Midges	Larvae	110
Insecta	Diptera	Simuliidae	Black Flies	Larvae	7
Insecta	Diptera	Tipulidae	Crane Flies	Larvae	7
Insecta	Diptera		True Flies	Pupa	6
Insecta	Ephemeroptera	Baetidae	Small Minnow Mayflies	Larvae	96
Insecta	Ephemeroptera	Ephemerellidae	Spiny Crawlers	Larvae	20
Insecta	Ephemeroptera	Heptageniidae	Flatheaded Mayflies	Larvae	3
Insecta	Trichoptera	Hydropsychidae	Common Netspinners	Larvae	36
Insecta	Trichoptera	Lepidostomatidae	Lepidostomatid Case Makers	Larvae	38
Insecta	Trichoptera	Limnephilidae	Northern Case Makers	Larvae	3

Macroinvertebrate Taxa Metrics

Total Taxa	16
EPT Taxa	6
% EPT Taxa	38
Diptera Taxa	3
% Diptera Taxa	19
Mean Tolerance Value	4.6

Macroinvertebrate Organism Metrics

Total Organisms	917
EPT Individuals	196
% EPT Individuals	21
Diptera Individuals	130
% Diptera Individuals	14
Chironomidae Individuals	110
% Chironomidae Individuals	12

Water Quality

Degree of Organic Pollution

Family-Level Biotic Index	5.4	Fair	Fairly substantial pollution probable
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