

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 volume in relation to its relatively small drainage area of 16.8 square miles. The

stream flows perennially and does not freeze during the winter. Valley Creek is a Minnesota Department of Natural Resources (MDNR) designated trout stream.

MCES partners with the St. Croix Watershed Research Station of the Science Museum of Minnesota to maintain the rating curve as well as to conduct monitoring at this station. The St. Croix Watershed Research Station has been collecting water quality samples and conducting continuous monitoring at two upstream Valley Creek locations since 1998. While there is no rain gage at the MCES station, precipitation data are continuously collected and recorded at the upstream stations.

2001 Monitoring Year: Snowmelt began in late March, 2001. Due to backwater effects created by significant St. Croix River flooding, daily average flows for Valley Creek were estimated during the April 14-20 and April 25-May 1, 2001 periods. However, actual water level (stage) information was obtained at the monitoring station during these time periods. The peak daily average flow of 20.67 cfs, with a stage of 1.22 feet, occurred on June 13, 2001.

There was a significant storm event on April 22, 2001, when 1.84 inches of rain coincided with the late spring snowmelt and flooding of the St. Croix River. Water quality sampling was not conducted during this event due to the presence of St. Croix River backwaters at the Valley Creek monitoring station.

Thirty-four samples were collected for water chemistry analysis during 2001, including 23 composite samples and 11 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 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

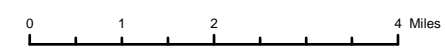
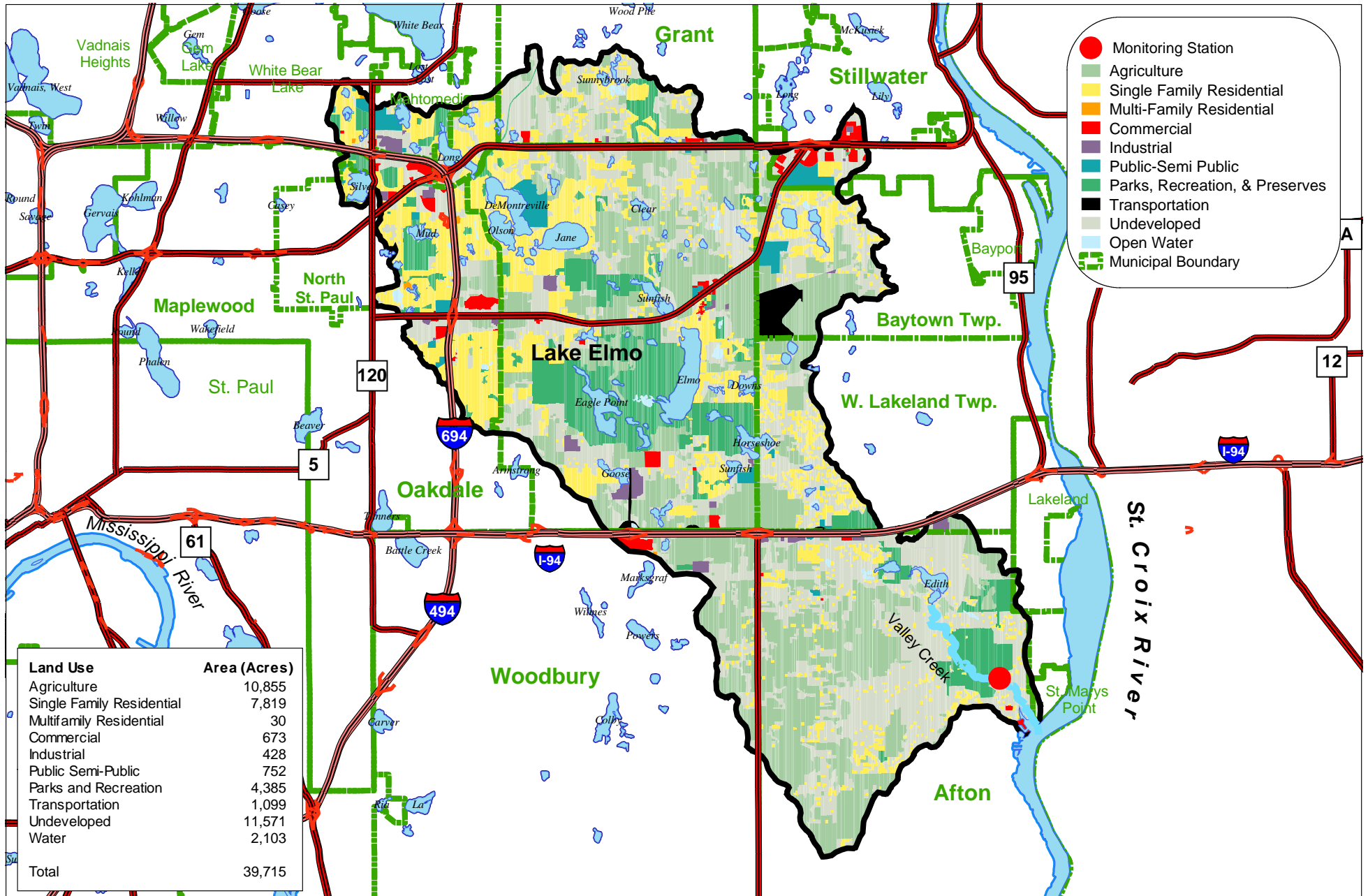


Figure 2.VA. Valley Creek 2001 Hydrograph with Rainfall and Sampling Information

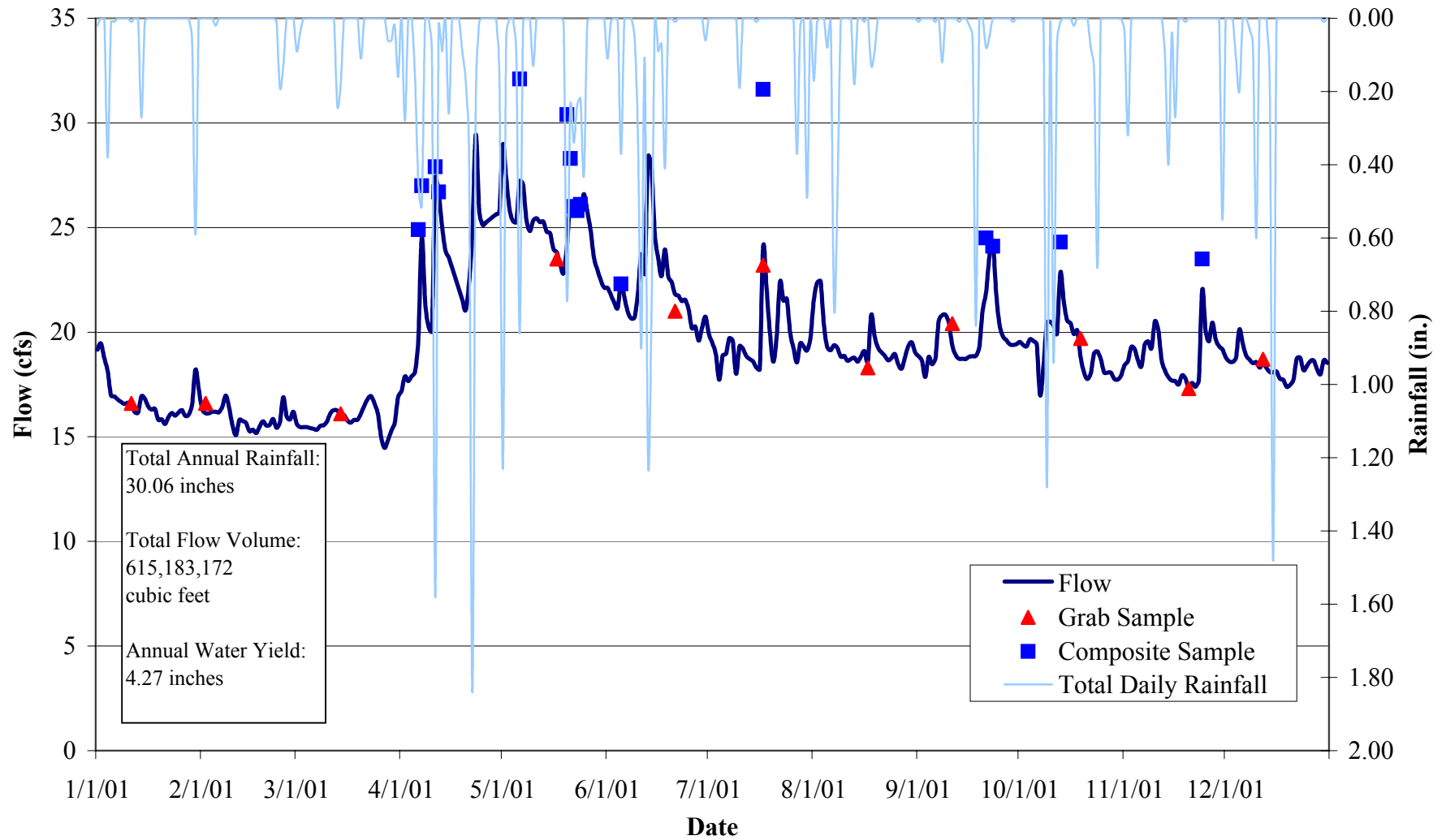


Table 2.VA. Valley Creek 2001 Water Chemistry Information

| Variable | N | Mean | Median | Minimum | Maximum | 25% | 75% | STD |
|-----------------------------------|----|------|--------|---------|---------|------|------|------|
| Chloride, mg/L | 24 | 15 | 16 | 12 | 18 | 14 | 17 | 2 |
| Hardness, mg/L | 24 | 229 | 230 | 192 | 262 | 216 | 239 | 18 |
| Cadmium, ug/L | 24 | 0.1 | 0.1 | 0.1 | 0.7 | 0.1 | 0.1 | 0.1 |
| Chromium, ug/L | 24 | 0.7 | 0.7 | 0.5 | 1.1 | 0.5 | 0.8 | 0.2 |
| Copper, ug/L | 24 | 4.9 | 2.2 | 0.9 | 53.0 | 1.3 | 3.7 | 9.6 |
| Lead, ug/L | 24 | 0.9 | 0.5 | 0.5 | 11.2 | 0.5 | 0.5 | 1.8 |
| Nickel, ug/L | 24 | 1.7 | 1.7 | 1.1 | 2.0 | 1.6 | 1.8 | 0.2 |
| Zinc, ug/L | 24 | 3.0 | 2.0 | 1.0 | 9.0 | 2.0 | 3.0 | 2.0 |
| Nitrogen, Total Kjeldahl, mg/L | 24 | 0.30 | 0.30 | 0.20 | 1.00 | 0.20 | 0.30 | 0.20 |
| Nitrogen, Total Nitrate, mg/L | 29 | 3.88 | 3.81 | 3.22 | 4.97 | 3.57 | 4.04 | 0.43 |
| Phosphorus, Total, mg/L | 29 | 0.04 | 0.04 | 0.01 | 0.11 | 0.03 | 0.05 | 0.02 |
| Phosphorus, Total Dissolved, mg/L | 26 | 0.02 | 0.02 | 0.01 | 0.04 | 0.01 | 0.05 | 0.02 |
| Solids, Total Suspended, mg/L | 24 | 14 | 7 | 2 | 86 | 4 | 12.2 | 19.6 |
| Solids, Volatile Suspended, mg/L | 24 | 4 | 3 | 2 | 20 | 2 | 5 | 4 |
| Turbidity, NTU | 11 | 2 | 1 | 1 | 2 | 1 | 2 | 0 |

Table 3.VA. Valley 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 | 125 | 6 | 1 | 6 |
| Phosphorus, Total | 0.70 | 0.04 | 0.01 | 0.04 |
| Phosphorus, Total Dissolved | 0.46 | 0.02 | 0.01 | 0.02 |
| Nitrogen, Total Nitrate | 79.37 | 4.00 | 0.94 | 4.13 |

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

Table 4.VA. Valley Creek 2001 Macroinvertebrate Monitoring Results and Metrics

Monitoring Date 05/16/01

| Class | Order | Family | Common Name | Life Stage | Organism Count |
|--------------|---------------|----------------|-----------------------|-------------------|-----------------------|
| Crustacea | Amphipoda | | Scuds | | 45 |
| Crustacea | Isopoda | | Sowbugs | | 5 |
| Hirudinea | | | Leeches | | 2 |
| Insecta | Coleoptera | Elmidae | Riffle Beetles | Adult | 4 |
| Insecta | Coleoptera | Elmidae | Riffle Beetles | Larvae | 2 |
| Insecta | Diptera | Simuliidae | Black Flies | Larvae | 6 |
| Insecta | Diptera | Tipulidae | Crane Flies | Larvae | 1 |
| Insecta | Ephemeroptera | Baetidae | Small Minnow Mayflies | Larvae | 48 |
| Insecta | Ephemeroptera | Ephemerellidae | Spiny Crawlers | Larvae | 54 |
| Insecta | Hemiptera | Gerridae | Water Striders | Larvae | 1 |
| Insecta | Hemiptera | Nepidae | Water Scorpion | Adult | 1 |
| Insecta | Trichoptera | Hydropsychidae | Common Netspinners | Larvae | 106 |
| Insecta | Trichoptera | Odontoceridae | Strongcase Makers | Larvae | 1 |

Macroinvertebrate Taxa Metrics

| | |
|----------------------|------|
| Total Taxa | 12 |
| EPT Taxa | 4 |
| % EPT Taxa | 33 |
| Diptera Taxa | 2 |
| % Diptera Taxa | 17 |
| Mean Tolerance Value | 4.81 |

Macroinvertebrate Organism Metrics

| | |
|----------------------------|-----|
| Total Organisms | 276 |
| EPT Individuals | 209 |
| % EPT Individuals | 76 |
| Diptera Individuals | 7 |
| % Diptera Individuals | 3 |
| Chironomidae Individuals | 0 |
| % Chironomidae Individuals | 0 |

Water Quality

Degree of Organic Pollution

| | | | |
|--------------------------------|------|-----------|-----------------------------------|
| Hilsenhoff Biotic Index | 3.57 | Very Good | Possible slight organic pollution |
|--------------------------------|------|-----------|-----------------------------------|