

Table 1.CW. Crow River (Rockford) Monitoring Station Information



Station Address: 8200 State Highway 55, Rockford, MN
County: Wright
Major Basin: Mississippi River Basin
Watershed: Crow River
Drainage Area: 2,620 square miles

Station Operator: Wright County Soil and Water Conservation District

Metropolitan Council Environmental Services Contact Information:

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

Crow River Organization of Water (CROW)

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 the Crow River since 1999. The monitoring station is located in Rockford, Minnesota, 23.1 miles upstream from the river confluence with the Mississippi River. The Crow River flows through the following Minnesota counties: Pope, Stearns,

Kandiyohi, Meeker, Renville, McCloud, Sibley, Carver, Wright and Hennepin. The Crow River has three major branches: the North, Middle, and South Forks. The North and Middle Forks converge in Manannah, Minnesota, where the North Fork then continues downstream. The North and South Forks intersect about one mile upstream from the MCES monitoring station. Buffalo Creek is a major tributary of the South Fork. The eastern part of the Crow River Watershed is developing into exurban areas. Agriculture is the predominant land use in the remainder of the watershed.

MCES partners with the Wright County Soil and Water Conservation District to operate the monitoring station. MCES also partners with the USGS to maintain the rating curve at this location. USGS has been monitoring flow at this location, station number 05280000, since 1906. USGS also intermittently collected water quality samples at this station during the 1952-1997 period. A rain gauge is present at this location for measurement of precipitation.

2003 Monitoring Year: Year-round measurement of Crow River stage and flow was possible in 2003, as the river channel remained mostly open throughout the winter months. The ice-out date occurred on March 15, 2003. Snowmelt runoff in the watershed began in early March 2003, but the annual spring snowmelt event in mid-March was somewhat subdued, largely due to the lack of significant snow pack accumulation during the winter of 2002-2003. This pattern is uncharacteristic, compared to previous years. The peak daily average flow of 5,047 cfs, with a stage of 8.8 feet, occurred on July 6, 2003, in response to a large, watershed-wide rain event on June 25-26. Over the course of these two days, the rain gauge at the Crow River station recorded a total of 5.4 inches of precipitation.

Twenty-seven samples were collected for water chemistry analysis during 2003, including 10 composite samples and 17 grab samples. Runoff event-based composite sampling began in mid-March 2003 and continued through mid-September. 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 2003 sampling scheme met the goals of the MCES monitoring work plan; however, a limited number of composite samples were obtained during the last half of 2003 due to drought conditions.

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

Figure 1.CW. Crow River Monitoring Station Location and Watershed

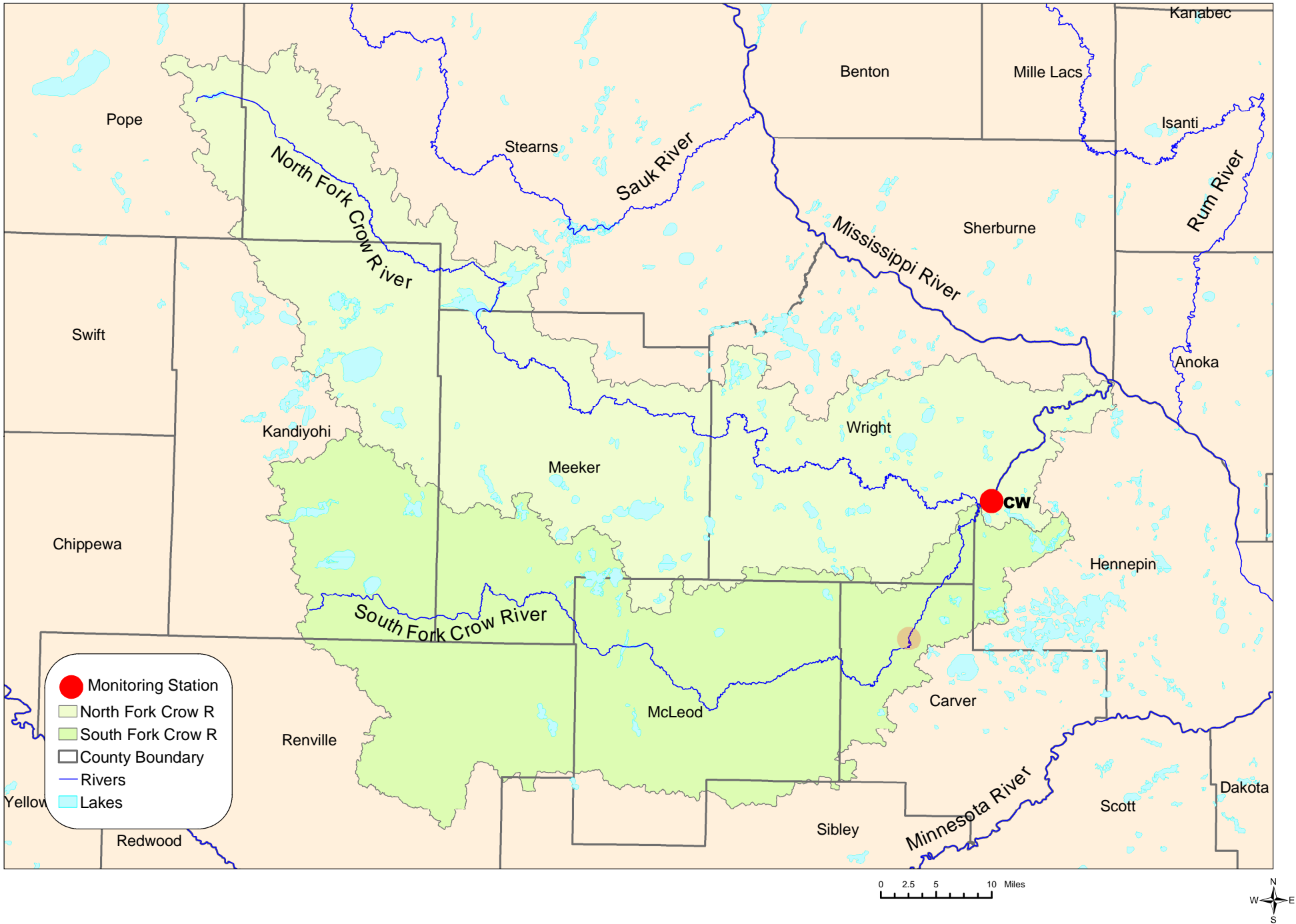


Figure 2.CW. Crow River 2003 Hydrograph, Precipitation and Sampling Information

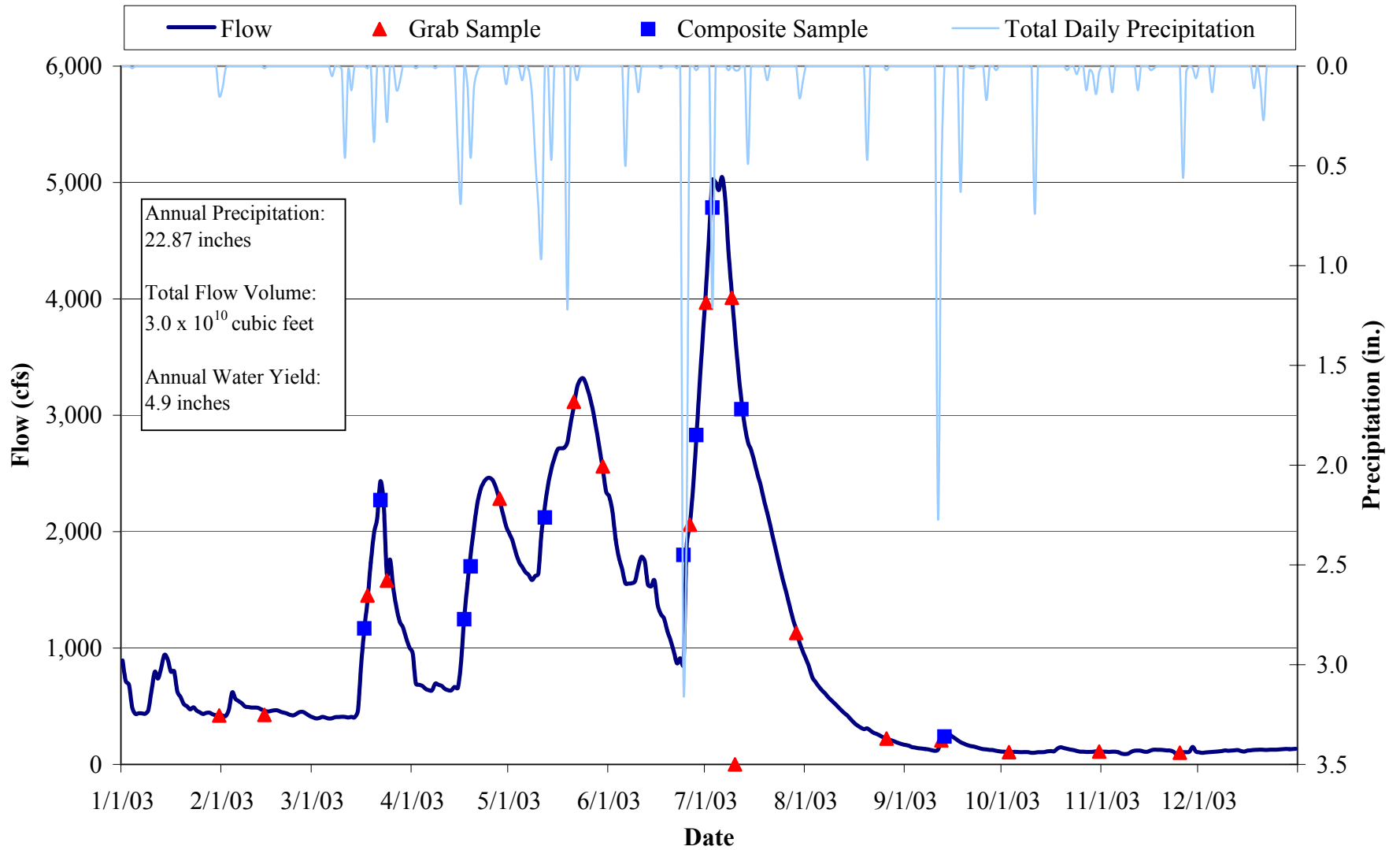


Table 2.CW. Crow River 2003 Water Chemistry Information

Variable	N	Mean	Median	Minimum	Maximum	25%	75%	STD
Chloride, mg/L	20	33	27	14	90	22	38	19
Hardness, mg/L	20	264	259	186	348	233	306	53
Cadmium, ug/L	5	0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1
Chromium, ug/L	5	1.8	1.4	0.6	4.3	1.0	1.6	1.5
Copper, ug/L	5	4.4	3.8	3.4	7.0	3.7	3.9	1.5
Lead, ug/L	5	2.0	1.1	0.8	5.6	1.0	1.6	2.0
Nickel, ug/L	5	4.6	4.2	3.3	7.4	3.5	4.5	1.7
Zinc, ug/L	5	11.2	7.9	6.8	24.0	7.7	9.6	7.2
Total Kjeldahl Nitrogen, mg/L	20	1.69	1.70	0.74	3.00	1.00	2.03	0.67
Total Nitrate Nitrogen, mg/L	20	1.60	1.63	0.13	3.04	0.87	2.34	0.92
Total Phosphorus, mg/L	20	0.31	0.26	0.15	0.64	0.22	0.36	0.14
Total Dissolved Phosphorus, mg/L	20	0.15	0.14	0.01	0.45	0.08	0.19	0.10
Total Suspended Solids, mg/L	19	62	56	3	310	18	69	71
Volatile Suspended Solids, mg/L	19	13	10	2	42	6	14	11
Turbidity, NTU	16	15	10	3	75	5	17	18

N: Sample Count

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

STD: Standard Deviation

Table 3.CW. Crow River 2003 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	50,300	60	12	54
Total Phosphorus	323	0.39	0.08	0.34
Total Dissolved Phosphorus	218	0.26	0.05	0.23
Total Nitrate Nitrogen	1,960	2.34	0.48	2.09

* 2003 Annual Loading Information is provisional and may be subject to minor revisions.

Figure 3.CW. Crow River 2003 Hydrograph with Total Suspended Solids and Nitrate Nitrogen Concentrations

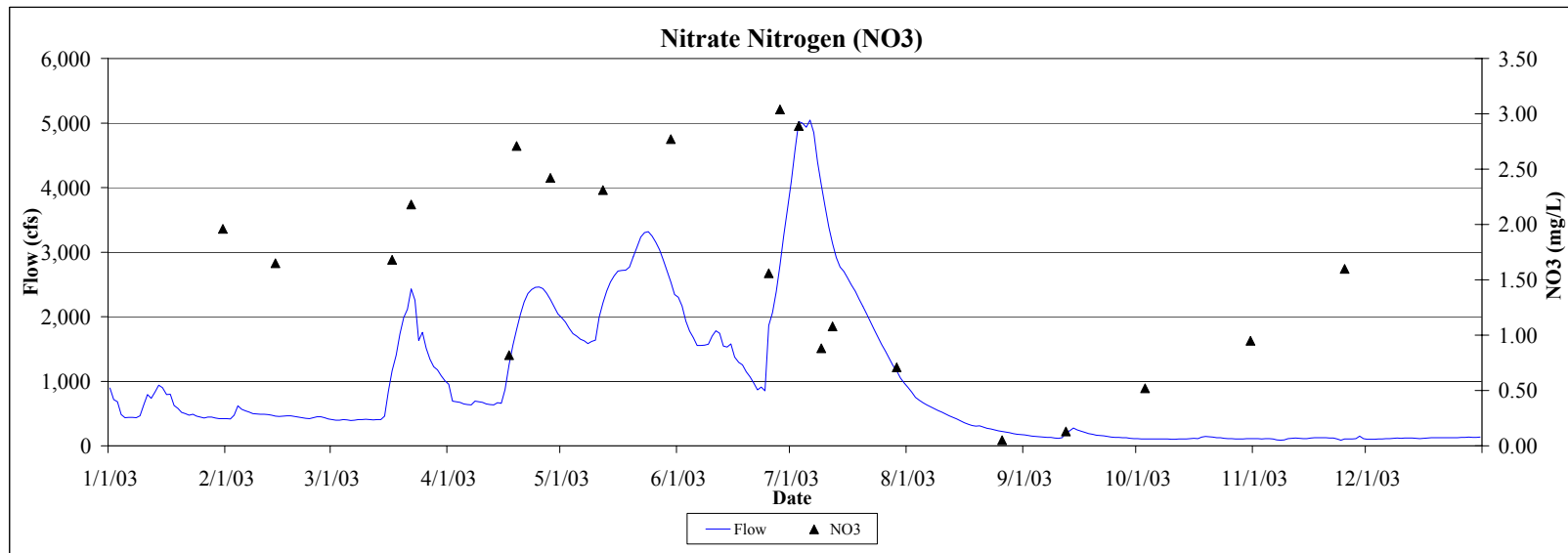
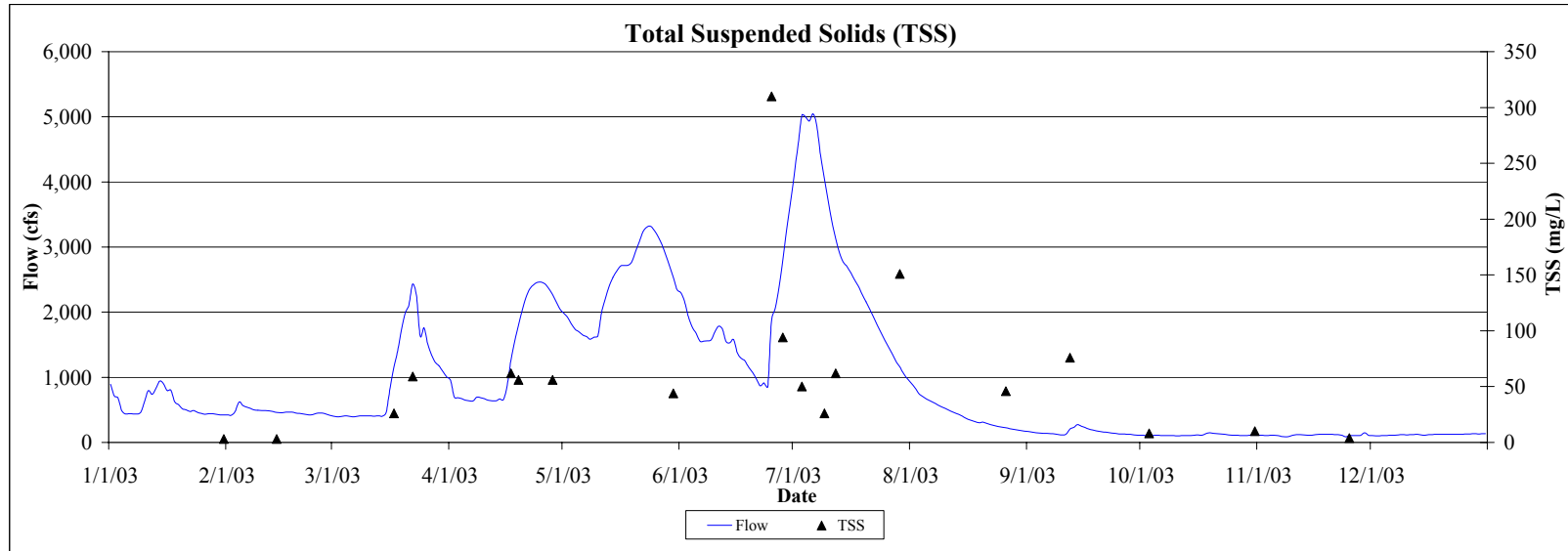


Figure 4.CW. Crow River 2003 Hydrograph with Total and Dissolved Phosphorus Concentrations

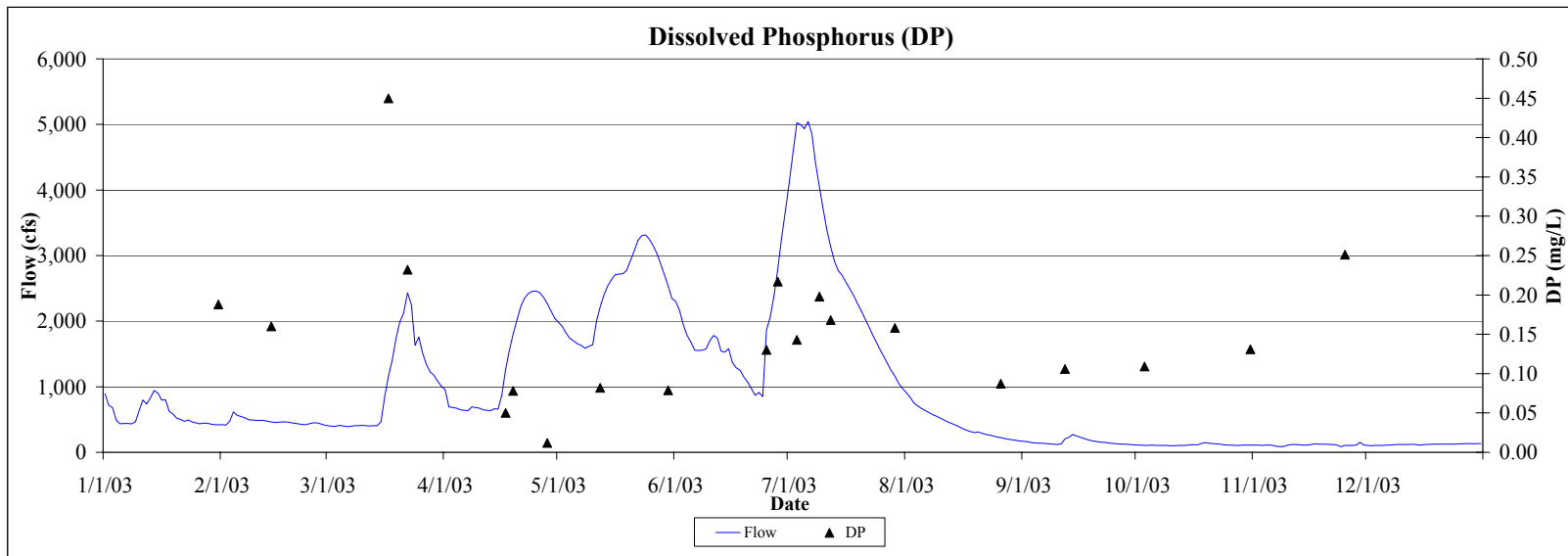
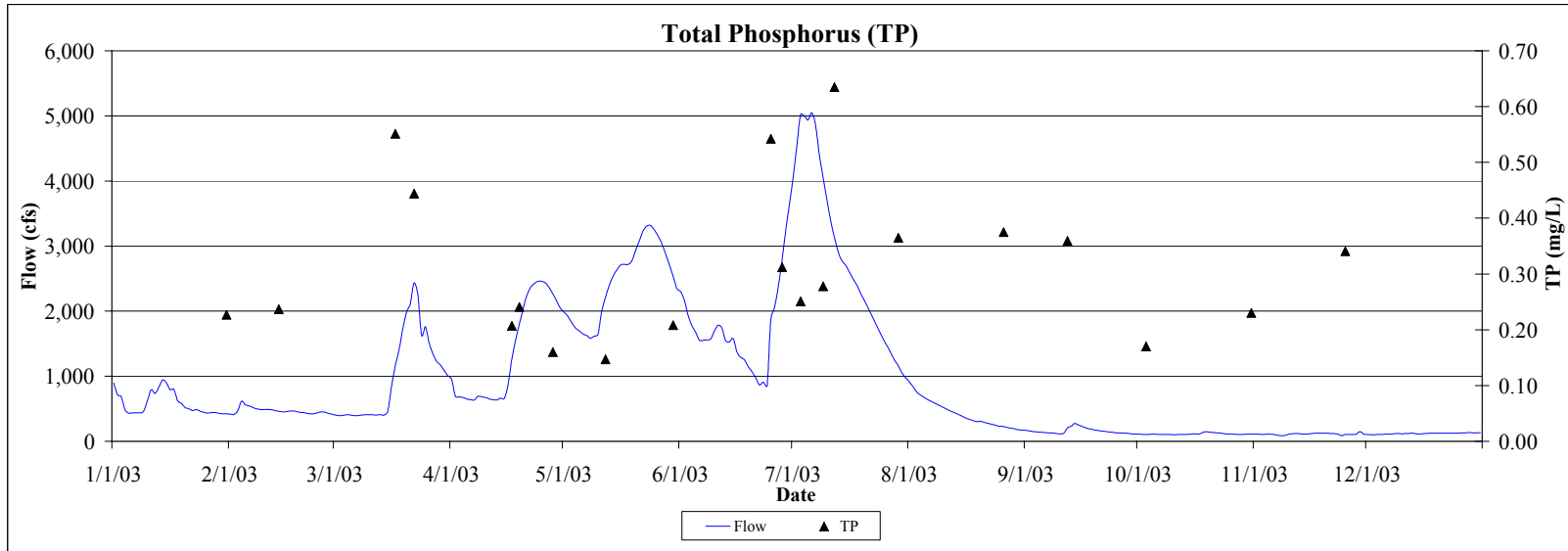


Table 4.CW. Crow River: Comparison of 2001-2003 Hydrology and Water Chemistry

	2001*	2002*	2003
Hydrology			
Total Precipitation (inches)	21.04	29.90	22.87
Water Yield (inches)	6.5	9.3	4.9
Total Volume (cubic feet)	4.0×10^{10}	5.6×10^{10}	3.0×10^{10}
Annual Load (tons)			
Total Suspended Solids	50,300	101,000	50,300
Total Phosphorus	429	608	323
Total Dissolved Phosphorus	267	376	218
Total Nitrate Nitrogen	3,380	2,680	1,960
Annual Yield (lbs/acre)			
Total Suspended Solids	60	120	60
Total Phosphorus	0.51	0.73	0.39
Total Dissolved Phosphorus	0.32	0.45	0.26
Total Nitrate Nitrogen	4.03	3.20	2.34
Annual Normalized Yield (lbs/acre/inch of water)			
Total Suspended Solids	9	13	12
Total Phosphorus	0.08	0.08	0.08
Total Dissolved Phosphorus	0.05	0.05	0.05
Total Nitrate Nitrogen	0.62	0.34	0.48
Flow-Weighted Mean Concentration (mg/L)			
Total Suspended Solids	50	58	54
Total Phosphorus	0.35	0.35	0.34
Total Dissolved Phosphorus	0.22	0.23	0.23
Total Nitrate Nitrogen	2.73	1.52	2.09

* Note: Annual loads, yields, normalized yields, and flow-weighted mean concentrations have been revised.

Table 5.CW. Crow River 2003 Macroinvertebrate Monitoring Results and Metrics

Monitoring Date 10/6/2003

Class	Order	Family	Common Name	Organism Count
Insecta	Coleoptera	Elmidae	Riffle Beetles	27
Insecta	Coleoptera	Dytiscidae	Predaceous Diving Beetles	7
Insecta	Coleoptera	Gyrinidae	Whirligig Beetles	12
Insecta	Coleoptera	Hydrophilidae	Water Scavenger Beetles	6
Insecta	Coleoptera	Noteridae	Burrowing Water Beetles	68
Insecta	Diptera	Chironomidae	Midges	40
Insecta	Ephemeroptera	Leptophlebiidae	Pronggills	3
Insecta	Ephemeroptera	Baetiscidae	Armored Mayflies	1
Insecta	Ephemeroptera	Baetidae	Small Minnow Mayflies	19
Insecta	Ephemeroptera	Heptageniidae	Flatheaded Mayflies	151
Insecta	Ephemeroptera	Potamanthidae	Hackelgills	10
Insecta	Ephemeroptera	Caenidae	Small Squaregills	4
Insecta	Hemiptera	Belostomatidae	Giant Water Bugs	1
Insecta	Hemiptera	Corixidae	Water Boatman	88
Insecta	Trichoptera	Hydropsychidae	Common Netspinners	87
Insecta	Trichoptera	Leptoceridae	Longhorned Case Makers	2

Macroinvertebrate Taxa Metrics

Total Taxa	16
EPT Taxa	8
% EPT Taxa	50
Diptera Taxa	1
% Diptera Taxa	6
Mean Tolerance Value	4.3

Macroinvertebrate Organism Metrics

Total Individuals	526
EPT Individuals	277
% EPT Individuals	53
Diptera Individuals	40
% Diptera Individuals	8
Chironomidae Individuals	40
% Chironomidae Individuals	8

Water Quality

Degree of Organic Pollution

Family-Level Biotic Index	4.3	Very Good	Slight Organic Pollution
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