

Table 1.BD. Beauford Ditch Monitoring Station Information



Station Address: 16265 State Highway 22, Mapleton, MN 56065
County: Blue Earth
Major Basin: Minnesota River Basin
Watershed: Le Sueur River
Drainage Area: 7.0 square miles

Station Operator: Metropolitan Council Environmental Services

Metropolitan Council Environmental Services Contact Information:

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Station Overview: MCES, with funding provided by the Minnesota Legislature via a grant from the Minnesota Pollution Control Agency (MPCA), has conducted water quality monitoring of Beauford Ditch since 1999. The monitoring station is located near Mapleton, Minnesota, 0.06 mile upstream from the ditch confluence with the Cobb River. Beauford Ditch flows through agricultural land in Blue Earth County.

MCES is the sole operator of this monitoring station, which is located at the site of a former USGS station known as Cobb River Tributary (USGS station number 05320300).

The USGS station was operated as a high flow partial-record station from 1958 until sometime in the 1980's. At this location, Beauford Ditch flows through a box culvert, and the MCES station intake line is situated near the opening of this culvert. A rain gauge at this monitoring station collects rainfall data during the April-December period.

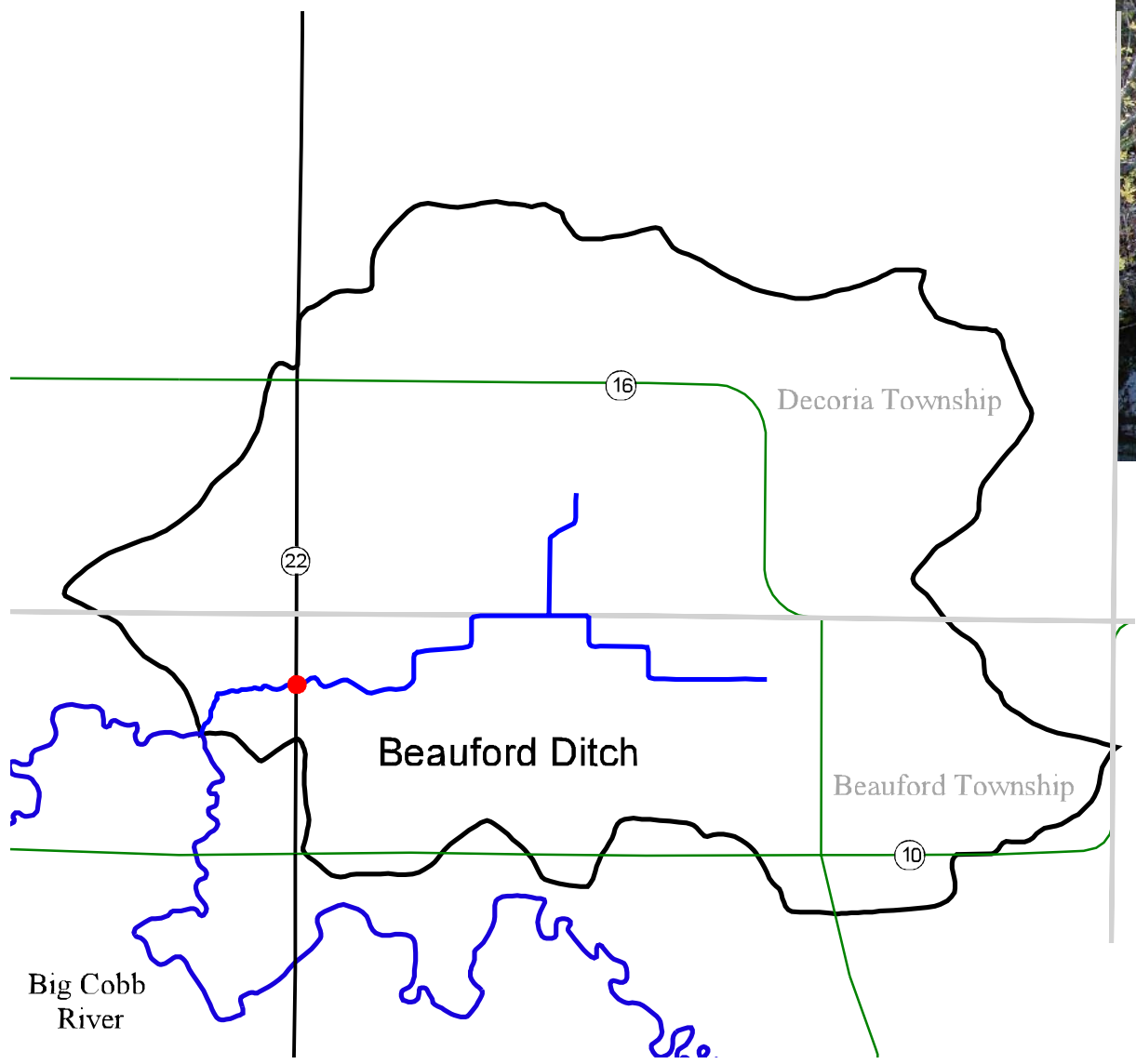
2003 Monitoring Year: The 2003 snowmelt at Beauford Ditch had a minimal impact on ditch flow. Due to dry conditions in 2002, the ditch was completely dry and had no flow until mid-March 2003. Ice-out occurred in mid-March. The peak daily average flow of 110 cfs, with a stage of 15.31 feet, occurred on May 11, 2003. After an early July runoff event, the ditch receded to a low-flow condition and effectively ceased flowing by August. Although there was additional light rainfall during the remainder of the year, the ditch did not flow again.

Runoff event-based composite sampling began on May 9, 2003. Two significant rainfall events of 1 inch and 1.5 inches during the May 8-11 period caused the ditch water level to rise approximately 3 feet in 10 hours. The May 11 composite sample had the highest total suspended solids (TSS) concentration (800 mg/L) of all 2003 samples. One additional composite sampling event occurred in early July 2003. An intense rainfall of 1.3 inches in 45 minutes triggered this event.

Thirteen samples were collected for water quality analysis during 2003, including 3 composite samples and 10 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 reduced number of composite and grab samples collected in 2003 is attributed to the small number of runoff events and the lack of flow during the January-February and August-December periods. The 2003 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.BD. Beauford Ditch Monitoring Station Location and Watershed



Beauford Ditch October 2002

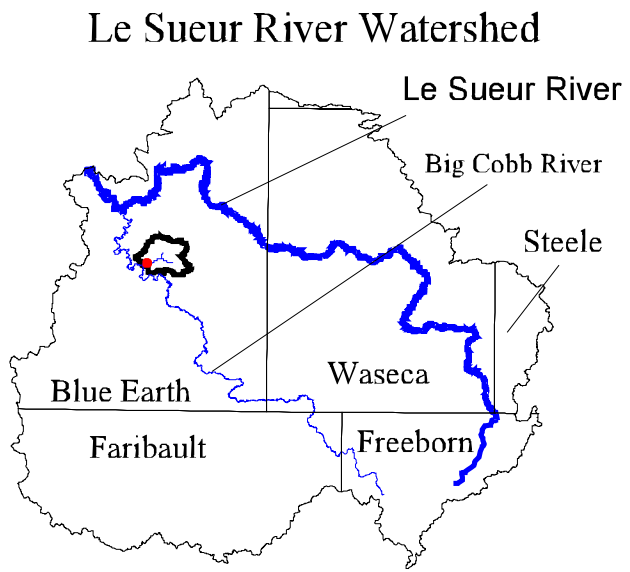


Figure 2.BD. Beauford Ditch 2003 Hydrograph, Precipitation and Sampling Information

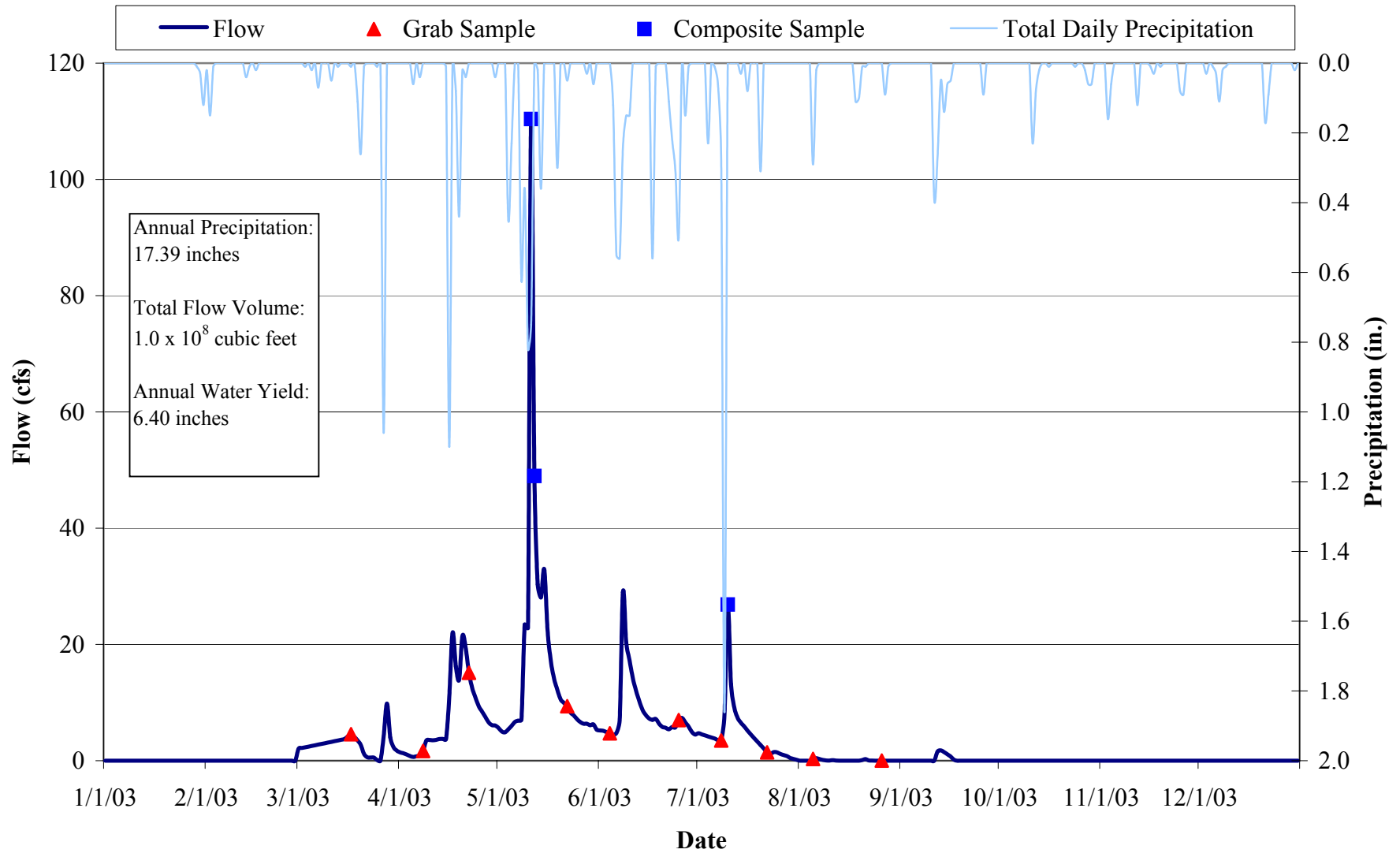


Table 2.BD. Beauford Ditch 2003 Water Chemistry Information

Variable	N	Mean	Median	Minimum	Maximum	25%	75%	STD
Chloride, mg/L	10	17	17	14	23	15	19	3
Hardness, mg/L	5	308	336	214	366	235	366	69
Cadmium, ug/L	5	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Chromium, ug/L	5	0.3	0.2	0.1	0.7	0.1	0.6	0.3
Copper, ug/L	5	2.4	2.0	1.7	4.0	1.8	3.3	0.9
Lead, ug/L	5	0.2	0.2	0.0	0.4	0.0	0.4	0.2
Nickel, ug/L	5	3.5	3.2	3.0	4.5	3.1	4.1	0.6
Zinc, ug/L	5	2.6	1.7	1.3	6.0	1.5	4.3	1.9
Nitrogen, Total Kjeldahl, mg/L	13	1.54	1.30	0.47	5.10	0.63	2.10	1.27
Nitrogen, Total Nitrate, mg/L	13	12.34	12.90	0.17	23.40	8.43	17.95	6.64
Phosphorus, Total, mg/L	13	0.29	0.18	0.03	1.06	0.06	0.47	0.30
Phosphorus, Total Dissolved, mg/L	13	0.14	0.09	0.01	0.38	0.03	0.23	0.12
Solids, Total Suspended, mg/L	13	120	14	2	800	6	209	225
Solids, Volatile Suspended, mg/L	13	17	2	1	100	2	31	28
Turbidity, NTU	13	33	7	1	190	3	46	53
Transparency Tube, cm	10	44	52	5	60	33	60	20

N: Sample Count

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

STD: Standard Deviation

Table 3.BD. Beauford Ditch 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)
Solids, Total Suspended	460	210	32	141
Phosphorus, Total	1.01	0.45	0.07	0.31
Phosphorus, Total Dissolved	0.44	0.20	0.03	0.14
Nitrogen, Total Nitrate+Total Nitrite	55.1	24.6	3.84	16.9

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

Figure 3.BD. Beauford Ditch 2003 Hydrograph with Total Suspended Solids and Nitrate Nitrogen Concentrations

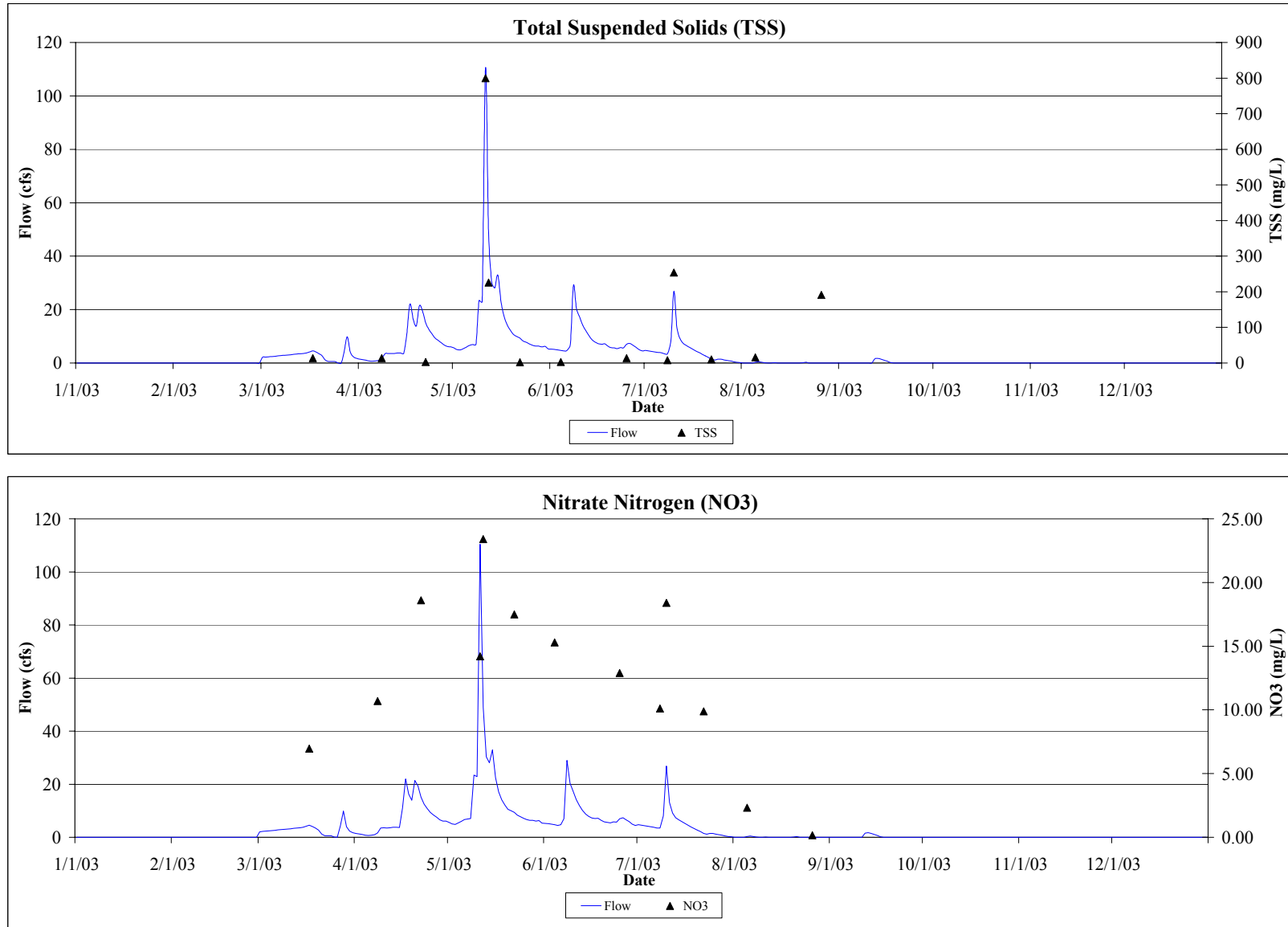


Figure 4.BD. Beauford Ditch 2003 Hydrograph with Total and Dissolved Phosphorus Concentrations

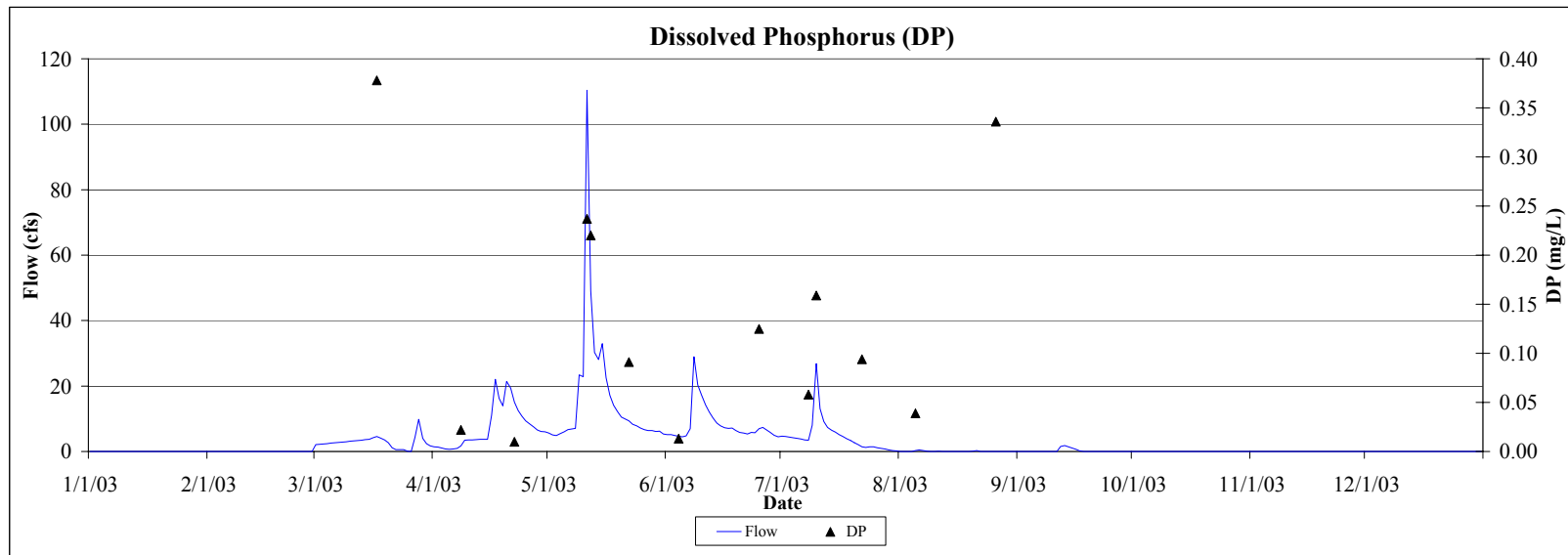
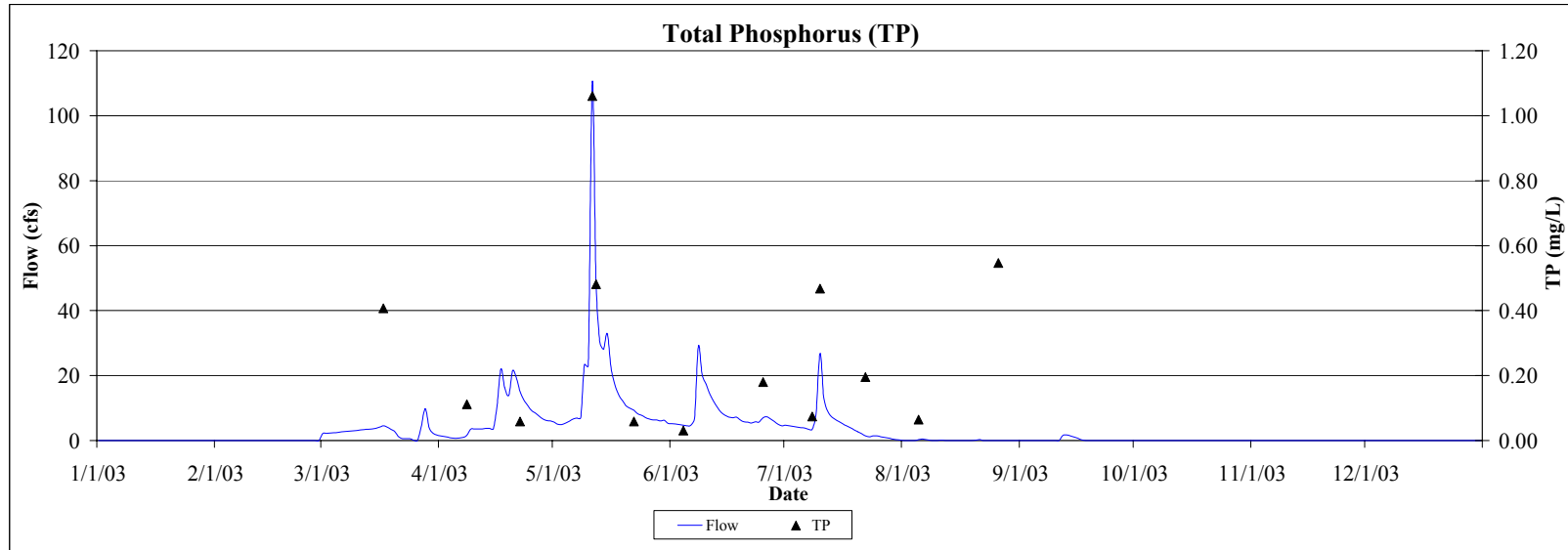


Table 4.BD. Beauford Ditch: Comparison of 2001-2003 Hydrology and Water Chemistry

	2001	2002	2003
Hydrology			
Total Precipitation (inches)	27.88	insufficient data	17.39
Water Yield (inches)	22.9	9.1	6.4
Total Volume (cubic feet)	3.7×10^8	1.5×10^8	1.0×10^8
Annual Load (tons)			
Total Suspended Solids	2,710	850	460
Total Phosphorus	5.51	2.15	1.01
Total Dissolved Phosphorus	2.76	0.72	0.44
Total Nitrate Nitrogen	125	68.0	55.1
Annual Yield (lbs/acre)			
Total Suspended Solids	1,210	380	210
Total Phosphorus	2.46	0.96	0.45
Total Dissolved Phosphorus	1.23	0.32	0.20
Total Nitrate Nitrogen	55.6	30.3	24.6
Annual Normalized Yield (lbs/acre/inch of water)			
Total Suspended Solids	53	42	32
Total Phosphorus	0.11	0.10	0.07
Total Dissolved Phosphorus	0.05	0.04	0.03
Total Nitrate Nitrogen	2.44	3.32	3.84
Flow-Weighted Mean Concentration (mg/L)			
Total Suspended Solids	234	184	141
Total Phosphorus	0.48	0.46	0.31
Total Dissolved Phosphorus	0.24	0.15	0.14
Total Nitrate Nitrogen	10.8	14.6	16.9