

Citizen Stream Monitoring

2006 Year in Review

Newsletter of the Faribault County Soil and Water Conservation District

CSMP Refresher...

The Citizen Stream Monitoring Program (CSMP) works to combine the technical expertise of the Minnesota Pollution Control Agency (MPCA) and local agencies such as the Soil and Water Conservation District (SWCD) with local knowledge of interested citizens to develop a statewide network for monitoring the state's 92,000 miles of streams. The network works to increase understanding of how human activities, such as land use, affect water quality.

The goal of the CSMP is to help determine the condition of Minnesota streams, provide the opportunity for anyone interested to participate, facilitate awareness and understanding of water quality issues, and promote shared responsibility for protection of our water resources.

During rainfall events, stream transparency can decrease as sediments are delivered to streams in runoff. In addition, sediments may carry other pollutants to streams. CSMP

records of rainfall amount, stream stage estimates, and transparency readings can tell us where runoff may be contributing sediment and other pollutants to streams. Changes over time can also help to measure improvements or declines in water quality. Increased monitoring will help identify problems, develop strategies, prioritize activities for improving water quality, and track progress toward improvement.

The Year in Review...

This was the fourth year of stream monitoring in Faribault County. From April through October, 6 volunteers monitored the water quality of 6 sites on 4 major rivers and streams. Sites were located on the Blue Earth River, Coon Creek, East Branch Blue Earth River, and Judicial Ditch 13.

<i>NAME</i>	<i>NAME</i>	<i>RIVER/STREAM</i>
Kay Bogan	Blue Earth, Sec 17 on the East Street Bridge	East Branch BE River
Orville Goemann	Foster, Sec 8 on County Road 16	East Branch BE River
Robert Worner	Blue Earth, Sec 7 on County Road 16	Blue Earth River
Laurie Ristau	Blue Earth, Sec 20 near BE Swimming Pool	Blue Earth River
Barbara Baker	Rome, Sec 35 on County Road 17 near IA border	Judicial Ditch 13
Wilma Bittinger	Blue Earth, Sec 29 on 385th Ave south of BE	Coon Creek

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Special thanks to all of the Citizen Stream Monitors who took the time to monitor the rivers and streams of Faribault County. Your dedication and persistence makes this report possible and has helped to shape the direction of work done by resource managers throughout Faribault County.

2006 Data Summary...

The mean stream transparency and total rainfall are listed in the table below for each site. The mean transparency from 2005 is listed in red.

The stream with the highest average transparency (44) was **Judicial Ditch 13** near the Iowa border. The next highest site was the **Blue Earth River** near the Blue Earth swimming pool with an average reading of 38. The site with the lowest mean transparency (14) reported was the **East Branch of the Blue Earth River** in Foster Township on County Road 16.

<i>Citizen Monitor/ Monitored Water Body</i>	<i># of Samples</i>	<i>2006 Mean cm</i> <i>2005</i>	<i>Min cm</i>	<i>Max cm</i>	<i># > 60</i>	<i>Total Rain Inches</i>	<i>Collection Dates</i>
Kay Bogan / East Branch Blue Earth River	27	26 <i>22</i>	3	60+	1	23.75"	4/1/06-10/11/06
Orville Goemann / East Branch Blue Earth River	27	14 <i>16</i>	5	32		25.20"	4/1/06-10/9/06
Robert Worner / Blue Earth River	33	29 <i>26</i>	4	60+	2	27.19"	4/1/06-10/22/06
Laurie Ristau Blue Earth River	156	38 <i>33</i>	4	60+	23	23.32"	3/29/06-10/31/06
Barbara Baker Judicial Ditch 13	48	44 <i>32</i>	7	60+	22	22.39"	4/1/06-10/31/06
Wilma Bittinger Coon Creek	7	39	24	60+	1	19.81"	5/1/06-10/4/06

Uses for CSMP Data...



Transparency
Tube

Changes over time in transparency, appearance and recreational suitability can serve as yardsticks to measure improvements or declines in water quality. Individuals and organizations can use CSMP data to detect trends in water quality and help decide if additional assessments or actions are needed to protect and improve water

quality. Some potential projects for CSMP monitoring include:

➔ **Before and after a change in upstream land use:** If a land management change is planned near a stream or river, select a monitoring site just downstream of where the change will take place. Monitor

before and after the change occurs to detect any potential effects on the stream.

➔ **Seasonal storm monitoring:** Compare CSMP data for rainfall events during spring, summer, and fall to background or baseflow (low flow) conditions. Keep track of upstream land management practices or crop status during this period.

➔ **Upstream and downstream of a water quality improvement project:** Monitor a site upstream, and a site downstream of a stormwater retention pond or stream vegetative buffer (fenced area along the edges of a stream) to evaluate its effectiveness at reducing sediment inputs.

➔ **To assess water quality and determine impairments:**

Every two years the Minnesota Pollution Control Agency is required to report to the Environmental Protection Agency, on the condition on Minnesota's lakes and streams. In this report, turbidity measurements are compared to Minnesota's water quality standards. If a certain number of turbidity measurements exceed the water quality standard, then the stream is listed as impaired. Transparency tube readings are good predictors of the turbidity (cloudiness) of the water. When a stream transparency reading is below 20 centimeters, the turbidity standard is exceeded. Specific criteria for using transparency tube data in the turbidity assessment process have been developed.



T-TUBE DATA: How It Will Be Used in 2006 to Assess Turbidity

What is Minnesota's Process for assessing waters of the state?

Since 1975, MPCA has been assessing the quality of its waters and reporting to Congress as required under the Clean Water Act. In addition, since 1992, the Agency has developed a list of impaired waters. Beginning in 2004, Minnesota integrated its reports and water body impairment list into one process. Minnesota assesses its waterbodies every two years. This article describes changes made during the 2006 assessment to the process for determining stream impairments caused by high turbidity.

What is Turbidity?

Turbidity is the cloudiness of water caused by soil, algae, and other suspended particles that scatter light in the water column. Excess turbidity can degrade the aesthetic qualities of streams and rivers. People are less likely to fish or swim in waters degraded by excess turbidity. Turbidity can also make the water more expensive to treat for drinking or food processing. Turbidity may make it hard for fish and other aquatic animals to find food, breathe through gills, and reproduce when spawning beds are clogged with deposited sediment. Turbidity is measured in nephelometric turbidity units (NTU). The standards are shown below:

- 10 NTU, Class 2A waters (Designated Trout Stream)
- 25 NTU, Class 2Bd, B, C, D

How are Transparency Tube and Total Suspended Solids Data Used to Assess Turbidity?

Large data sets indicate that total suspended solids (TSS) and transparency values reliably predict turbidity. Correlations allow the MPCA to use TSS and transparency as surrogates for turbidity at sites where there are not enough turbidity observations.

Transparency tube (T-tube) data were used for determining turbidity impairments for the first time during the 2006 stream assessments. Stream water clarity, measured with a T-tube, is recorded by volunteers in the Citi-

zen Stream Monitoring Program.

The depth of the water when the black and white symbol becomes visible in the T-tube is recorded in centimeters. For transparency, a water body is in violation of the 25 NTU turbidity standard if a T-tube value is less than 20 centimeters. The MPCA feels that by applying these TSS and transparency thresholds, only a few truly impaired waters will be missed, while minimizing the number of waterbodies falsely identified as impaired.

What Criteria are Applied for Using T-tube and TSS Data in Turbidity Assessments?

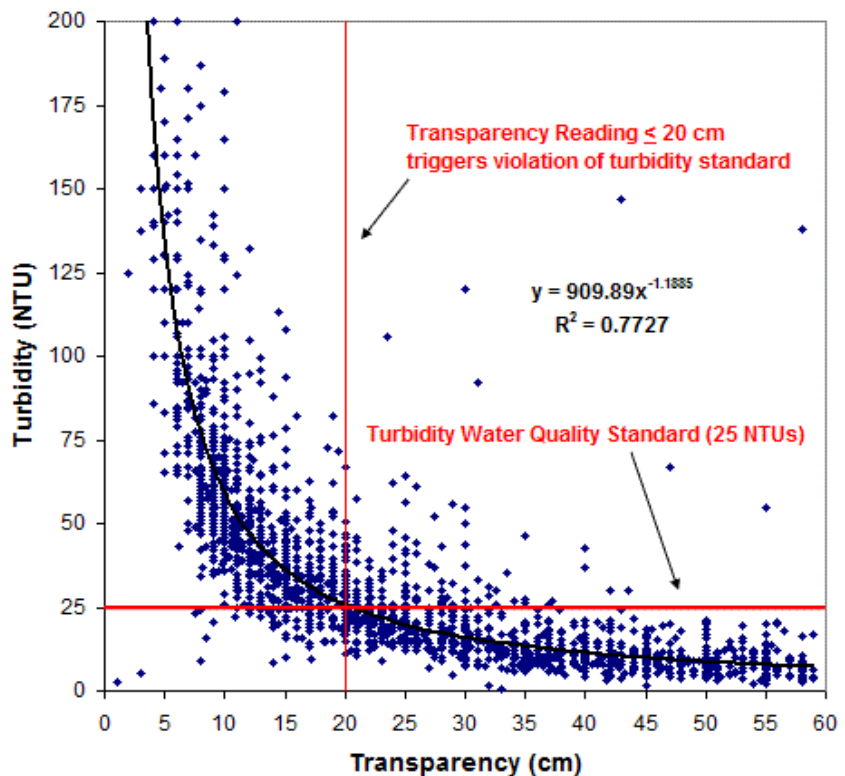
Turbidity is a highly variable water quality measure. Because of this variability, and the use of TSS and transparency as surrogates, a total of 20 independent observations are now required for a turbidity assessment. If sufficient turbidity measurements exist, only turbidity measurements will be used to determine impairment. If there are insufficient turbidity measurements, any combination of independent turbidity, transparency,

and total suspended solids observations may be combined to meet assessment criteria.

For a water body to be listed as impaired for turbidity, at least 3 observations **and** 10% of observations must be in violation of the turbidity standard. Assessments that rely on volunteer collected transparency tube observations must be corroborated by the judgment of MPCA staff, and by local resource and/or watershed project staff, if available.

What is the Impact of T-tube Data on Assessments?

For the 2006 assessments, a total of 88 stream segments were assessed using T-tube data. Of these, 55 new segments are proposed to be listed as impaired for turbidity based entirely or in-part on T-tube data. Another 28 segments are proposed to be listed as fully supporting of the turbidity standard. An additional 190 segments had enough data to meet assessment criteria, but corroboration by MPCA staff or a local resource professional was not available.



Understanding the Transparency Reading...

The transparency tube has become a common tool used to understand and measure stream conditions. The greater the reading in centimeters, the greater the water clarity. A reading of less than 20 cm is poor transparency and often occurs in ditches and streams after rainfall events. If poor transparency is the norm rather than the exception, this may indicate a more serious, long term problem. Readings between 20 and 40 cm are considered moderate transparency and consistent readings of 40 cm and

above during both high and low flow conditions indicate very good water quality.

Water transparency can be affected by a number of factors. For the majority of water bodies, the amount of suspended solids is the most important factor. In rivers and streams, soil particles are the primary sources of suspended solids. Transparency is a good indicator for some key water pollutants and a low transparency is generally the result of excessive sedi-

ment. Excessive soil material is a pollutant in itself as it can degrade the habitat of fish and other stream life and reduce light penetration necessary for aquatic life. In addition, soil particles may carry pollutants such as phosphorus attached to them. The pollutants may impact the flowing river or stream directly, but often times are carried downstream to a lake. Excess phosphorus is the trigger for large algae blooms.

2006 Rainfall Summary...

NAME	Township	Sec.	April	May	June	July	Aug.	Sept.	Oct.	TOTAL	% N
Orville Goemann	Foster	10	7.35	1.57	3.73	2.14	7.37	2.03	1.01*	25.20	106.5
Robert Worner	Blue Earth	7	8.23	1.71	2.96	1.91	7.47	3.68	1.23*	27.19	114.9
Kay Bogan	Blue Earth	17	6.41	1.49	2.88	1.71	7.19	3.07	1.00*	23.75	100.4
Laurie Ristau	Blue Earth	31	6.00	1.25	2.16	2.39	6.96	2.82	0.78	22.36	94.5
Wilma Bittinger	Blue Earth	30		4.29	2.64	2.15	7.72	2.79	0.22*	19.81	83.7
Barbara Baker	Rome	35	6.21	1.86	2.70	2.26	5.87	2.99	0.50	22.39	94.6
	Monthly	Ave	6.84	2.03	2.85	2.09	7.10	2.90	0.79	23.45	99.1
NORMAL	Faribault	Co	2.80	3.48	4.01	4.08	3.79	3.24	2.26	23.66	

***Note: Some monthly totals do not include the entire month (depending on start and end dates of monitoring).**

Rainfall's Effect on Transparency...

Transparency will vary over the length of the monitoring season for a variety of reasons, but often times this change is the result of precipitation. To get a better understanding of this relationship, transparency readings must be looked at together with rainfall amounts. Often when this data is looked at together, a decline in



transparency after a rainfall event can be observed. The graphs starting on page 8 help to show this relationship between precipitation and transparency. When a peak in rainfall is observed, a fall in transparency is often also observed. This appears truer during the spring of the year until mid summer. Rainfall tends

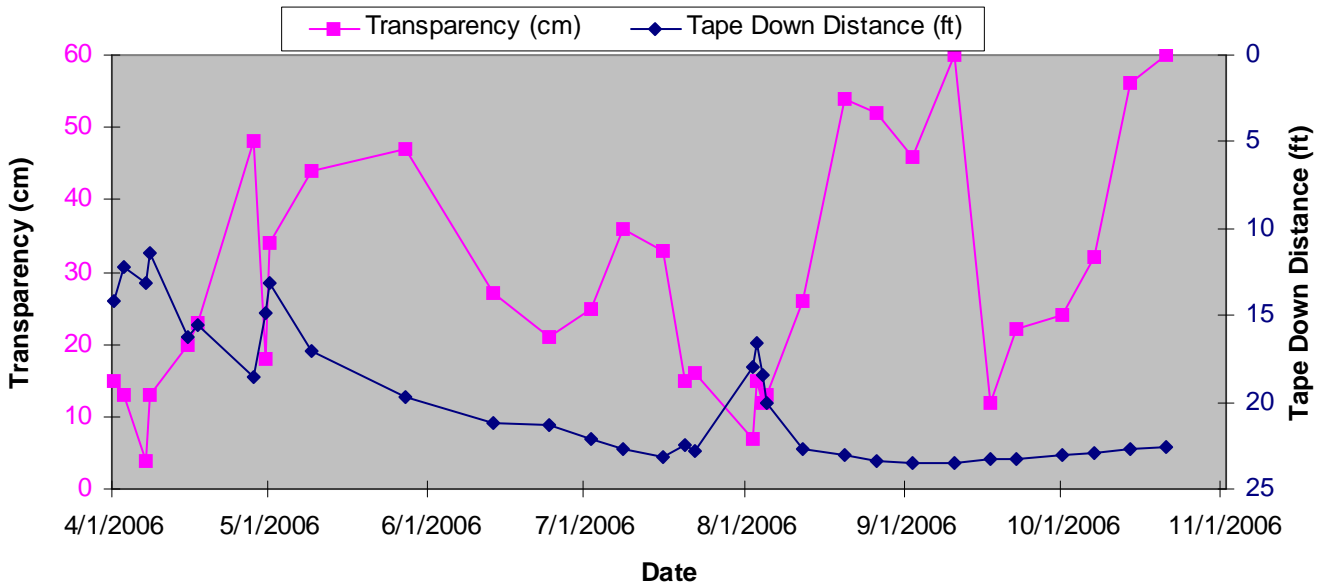
to produce more runoff during this time because there is less ground cover (crops, grass). During later summer and into fall, there tends to be more ground cover and crop canopy that slows and filters rainfall, producing less rapid runoff and therefore less noticeable transparency changes. Although generalizations can be made, site specific conditions also largely contribute to transparency tube readings.



Transparency and Stream Depth

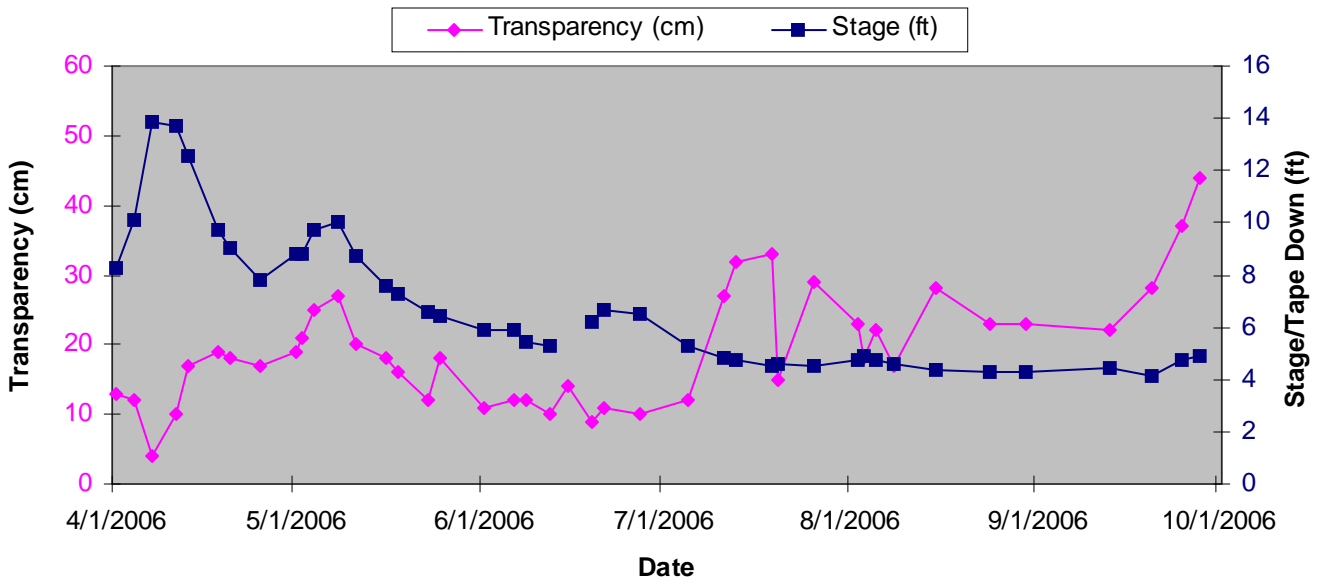
Sites may also show a correlation between transparency and stream depth. First of all an increase in water level is normally the result of rainfall. In an area where erosion is likely there will be a drop in transparency. In areas where erosion is not likely, the rainwater that enters the stream could actually dilute the pollutants and cause transparency to improve. However, local relationships can be complicated and may take observation over several years to understand the data at any one site. We reside in an agricultural area where erosion is likely during rain events, so our charts generally show a decrease in transparency as water levels rise from rain events.

Blue Earth Section 7 Transparency and Tape Down Measurements



This chart shows how the transparency increases as the stream becomes shallower. Notice how the lines mirror each other and often move in opposite directions.

Elm Creek Transparency and Stage/Tape Down Measurements

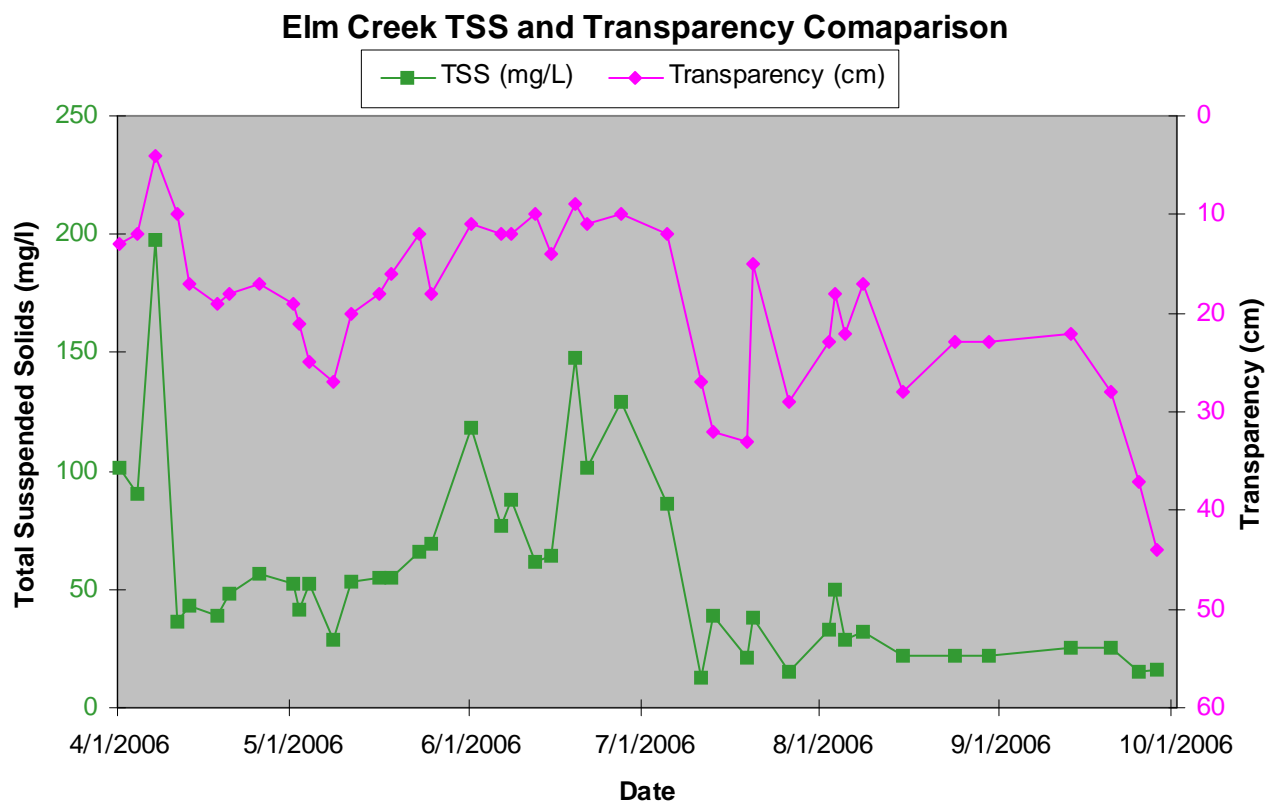


This chart shows how the transparency increases as the stream becomes shallower. Although not as drastic as the chart above the lines are moving in opposite directions.



You've been consistently going out to your monitoring sites and making these transparency tube readings. Other than the fact that the water is difficult to see through at times, what do all of your measurements mean? The simple answer: A low transparency reading means more pollution in the stream that you are watching so closely. So, how do we come to that conclusion?

The Minnesota Pollution Control Agency has studied a connection between transparency tube readings and the amount of total suspended solids (TSS) in the waters being sampled. Basically, a low transparency reading is going to mean a high level of TSS. This can be confirmed with samples collected by a Clean Water Partnership monitoring station on Elm Creek. Elm Creek is branch of the Blue Earth River that has a watershed in Martin and Faribault Counties. A transparency tube reading is taken every time samples are pulled from the creek, which allows for a comparison of the lab results from sampled pollutants and the transparency readings. The chart below shows a strong connection of TSS increasing as the transparency is decreasing.

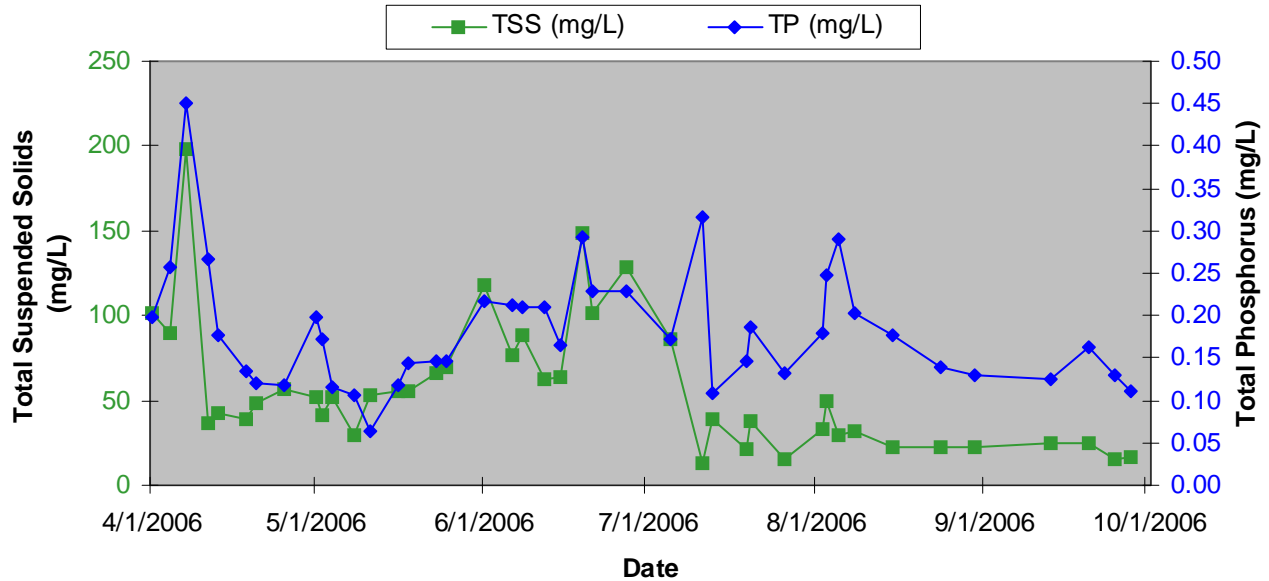


Notice how the peaks and valleys of the lines rise and fall at similar times. The lines might not fit together like a perfect puzzle piece, but they do follow a similar pattern.

The correlation between TSS and transparency is strong which tells us that there is pollution in the water because sediment, a contributor to TSS, is considered a pollutant on its own. Is there pollution in addition to the sediment? Chemical pollutants are also associated with TSS because they are attached to sediment or other particles. When soil is eroded during a rain event the soil brings attached pollutants. The following charts show the connection between TSS levels and lab results of Phosphorus levels. Phosphorus is a pollutant associated with soil erosion because it is attached to soil particles. The other chart proves again that the transparency can also be used to assess the presence of certain chemical pollutants.

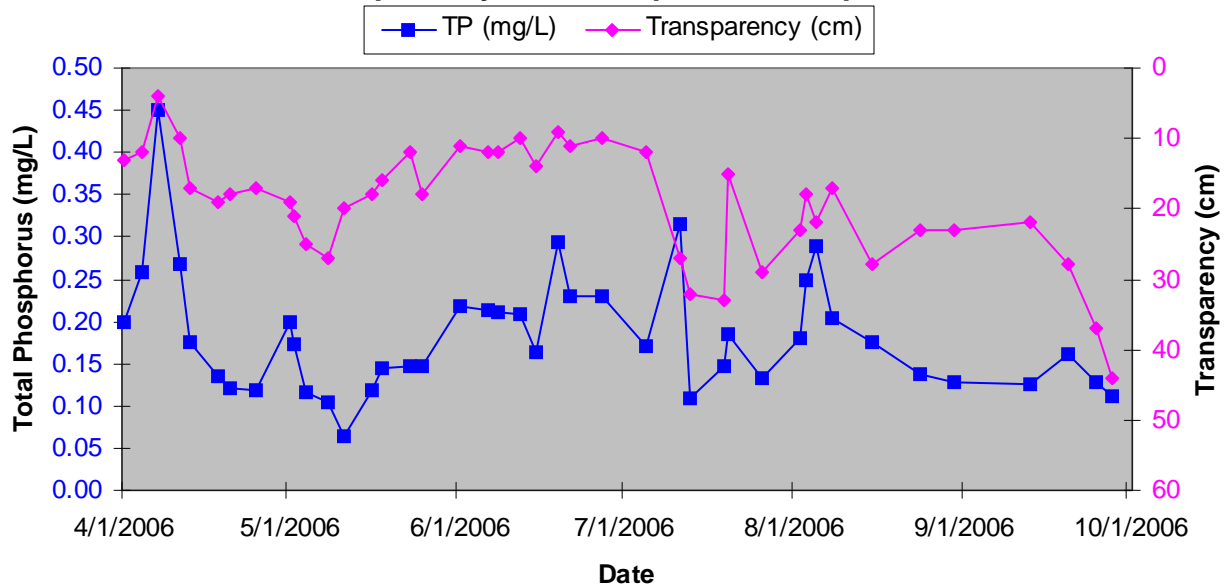


Elm Creek TSS and Phosphorus Comparison



Notice the similar pattern again.

Transparency and Phosphorus Comparison



Like the TSS, the transparency follows a similar pattern as the Phosphorus.

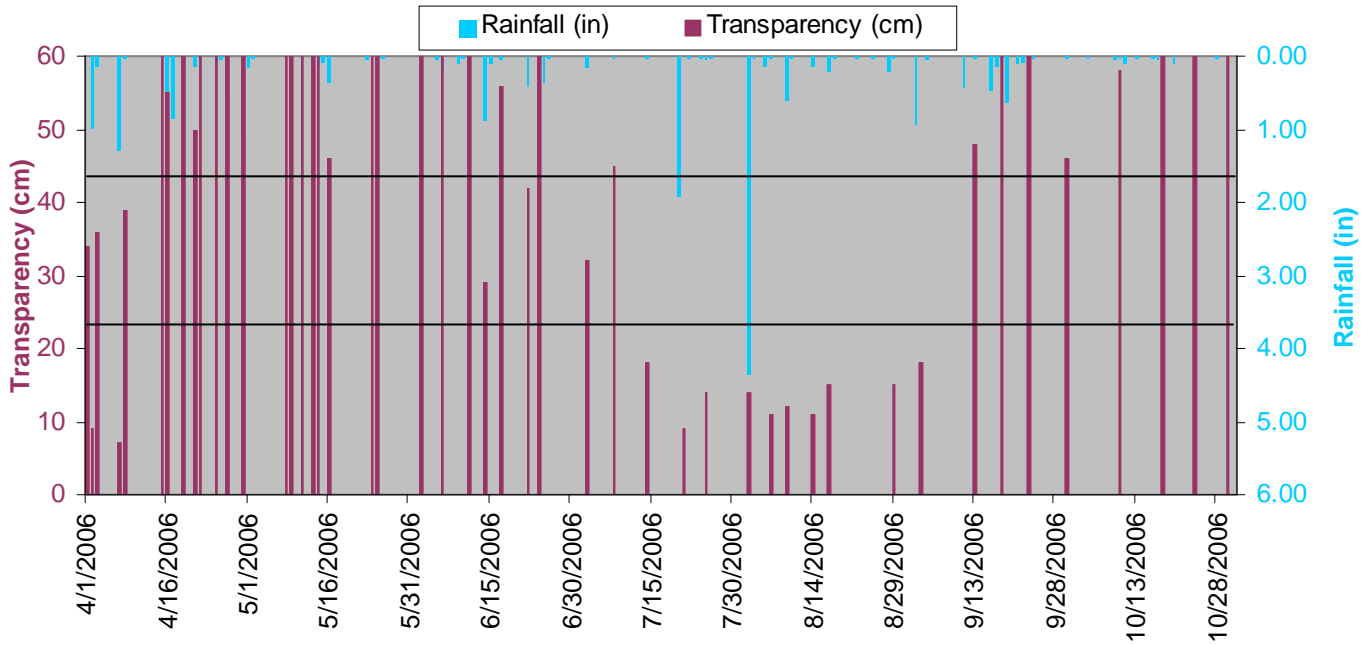
A simple conclusion after looking at transparency tube numbers compared with actual lab results is that a transparency reading can be an accurate way to assess a stream. The information that you are collecting at your sample sites does evaluate the clarity of the water. Additionally, your transparency results offer further evaluation of other pollutants that are associated with elevated levels of TSS. The next time you go out to take a transparency reading you can assess what else might be in the water. These comparisons and results will differ from stream to stream, but after all the MPCA relies on your results for their stream impairment evaluations.



Your 2006 Monitoring Data...

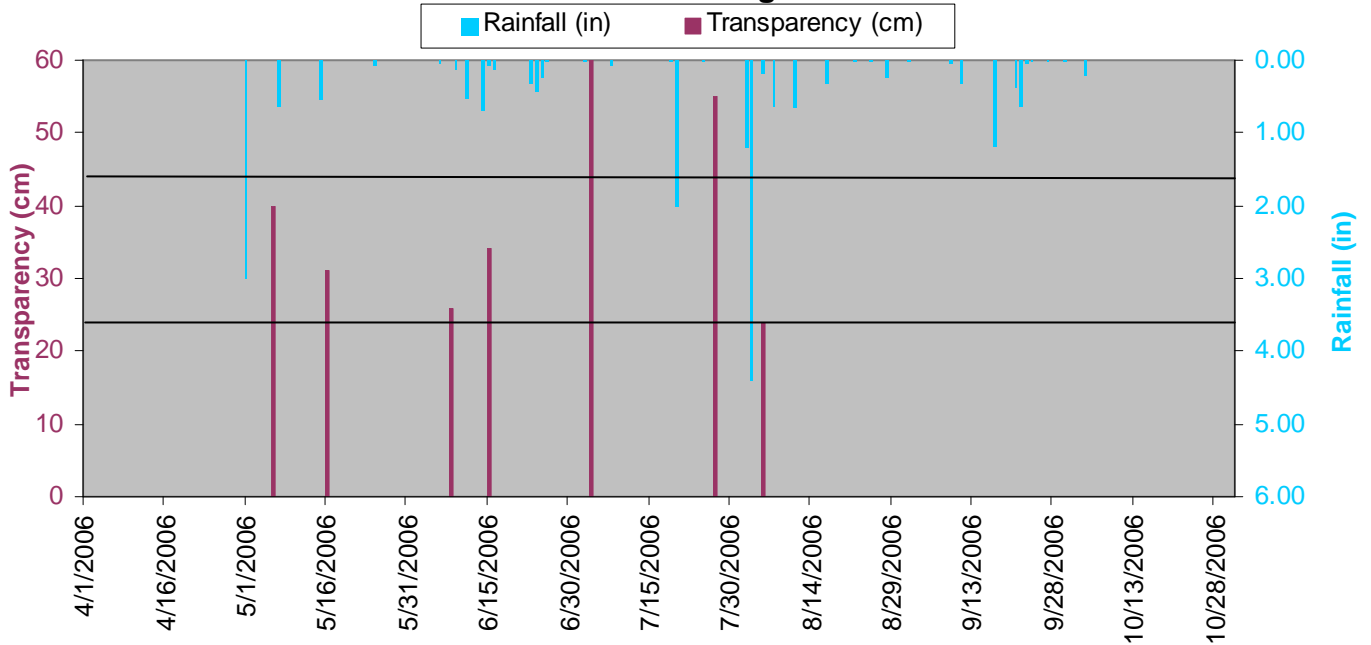
CSMP Data - Judicial Ditch 13, Rome Section 35

Barbara Baker

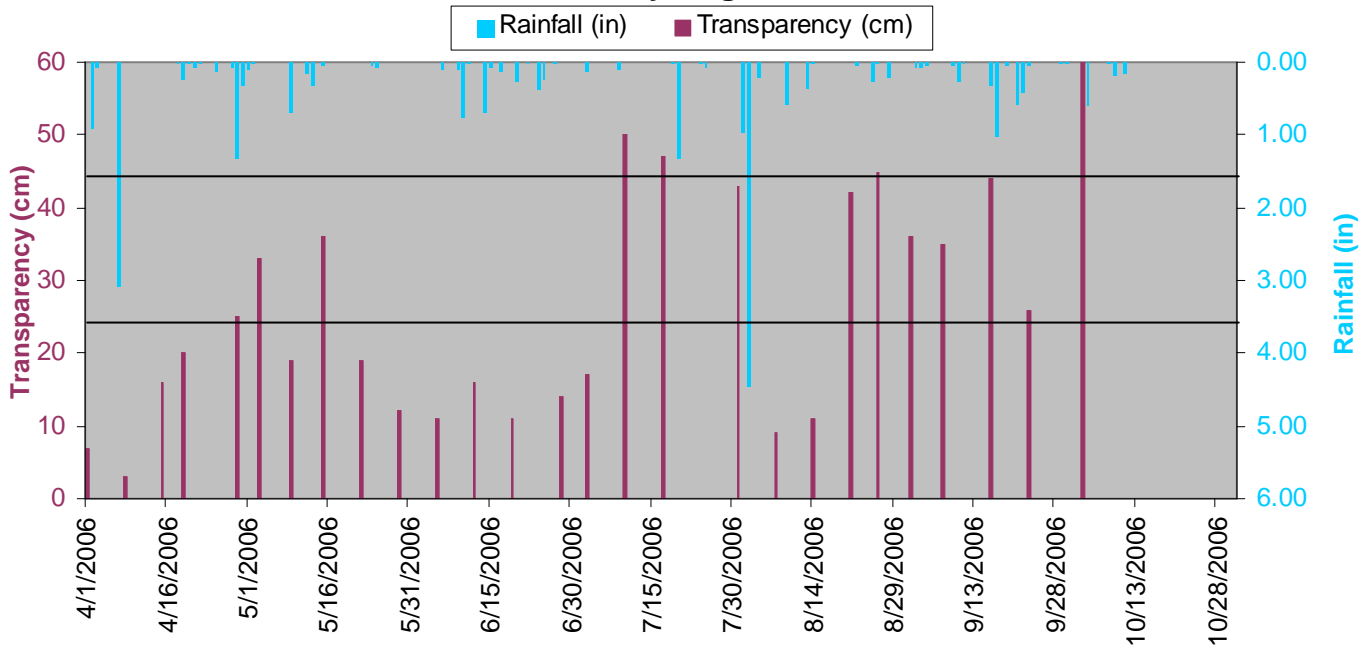


CSMP Data - Coon Creek, Blue Earth Section 29

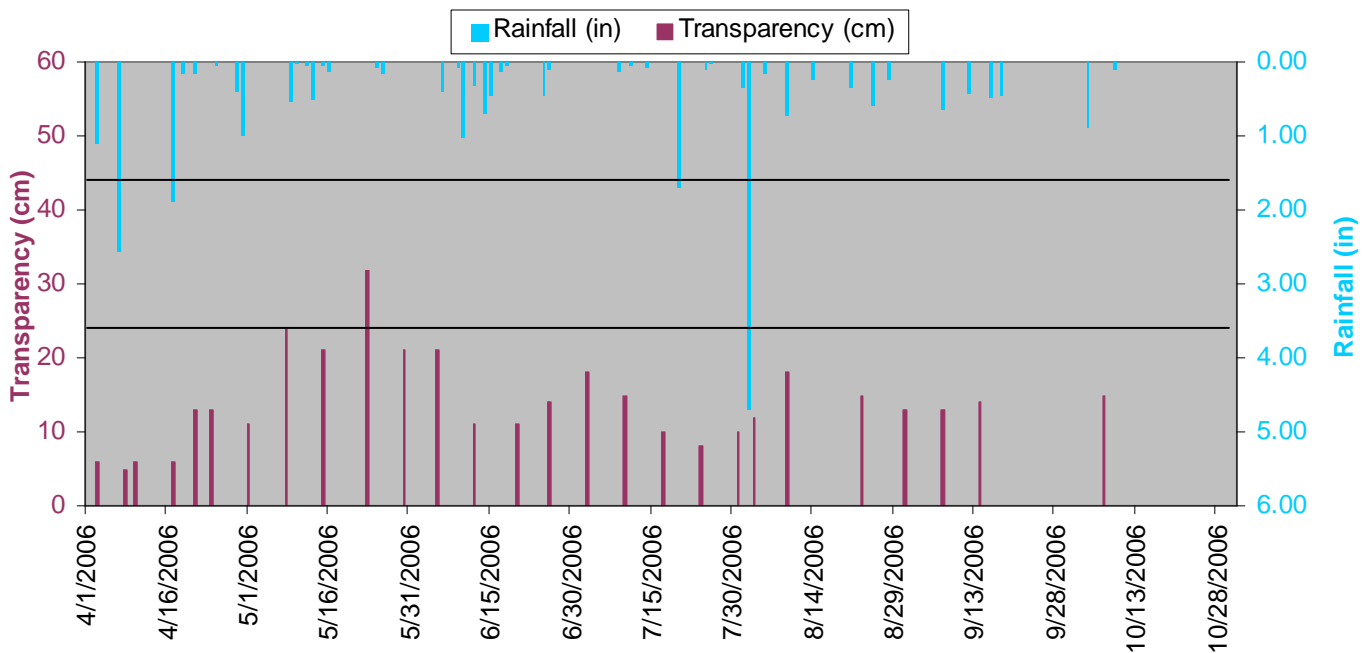
Wilma Bittering



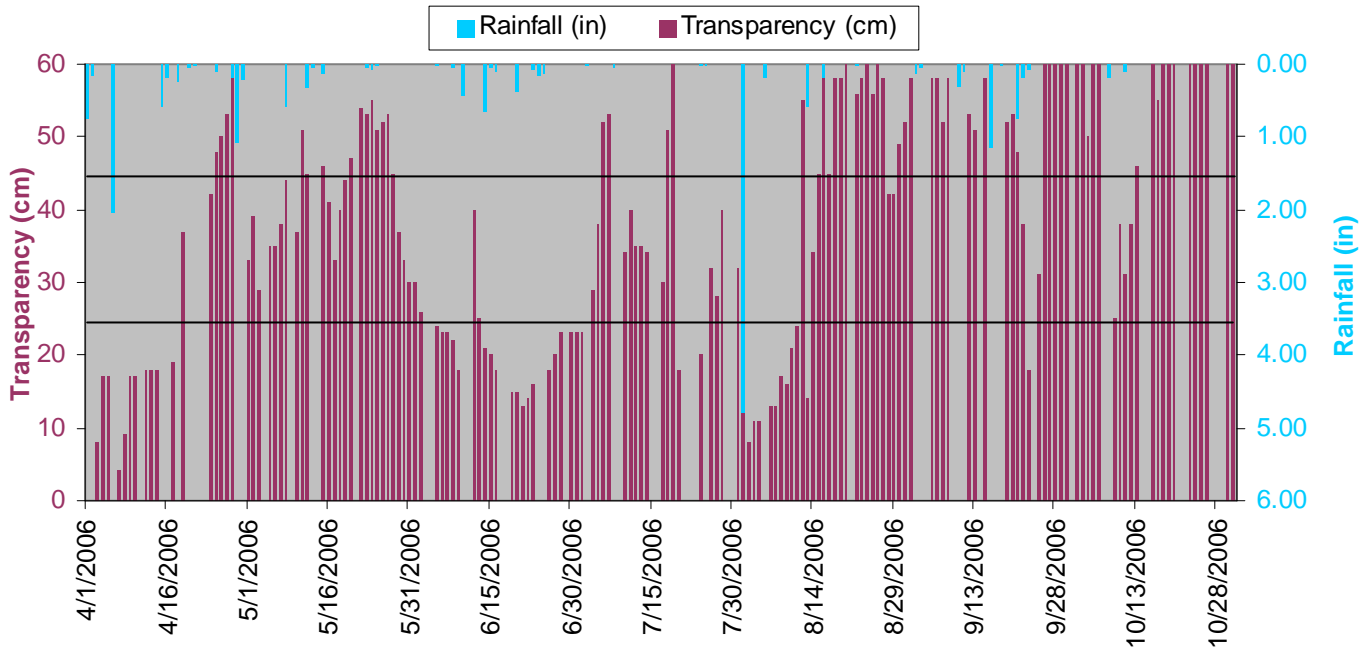
**CSMP Data - East Branch Blue Earth River, Blue Earth Section 17
Kay Bogan**



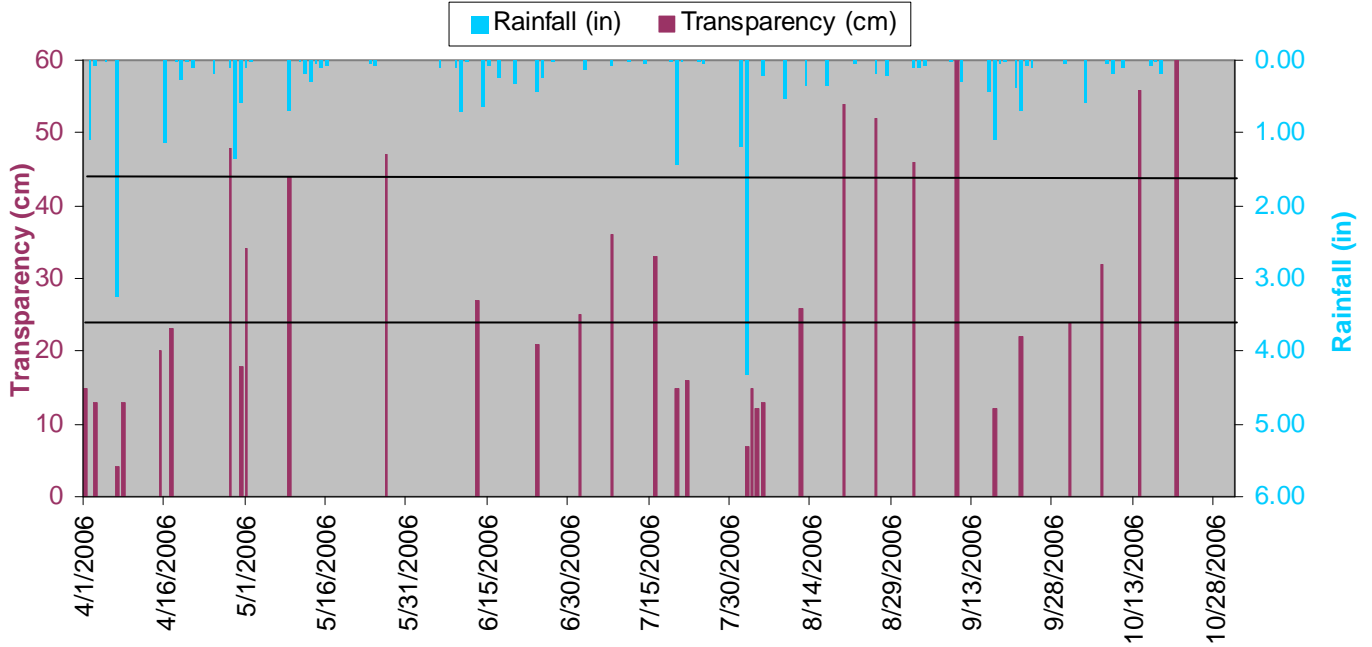
**CSMP Data - East Branch Blue Earth River, Foster Section 8
Orville Goemann**



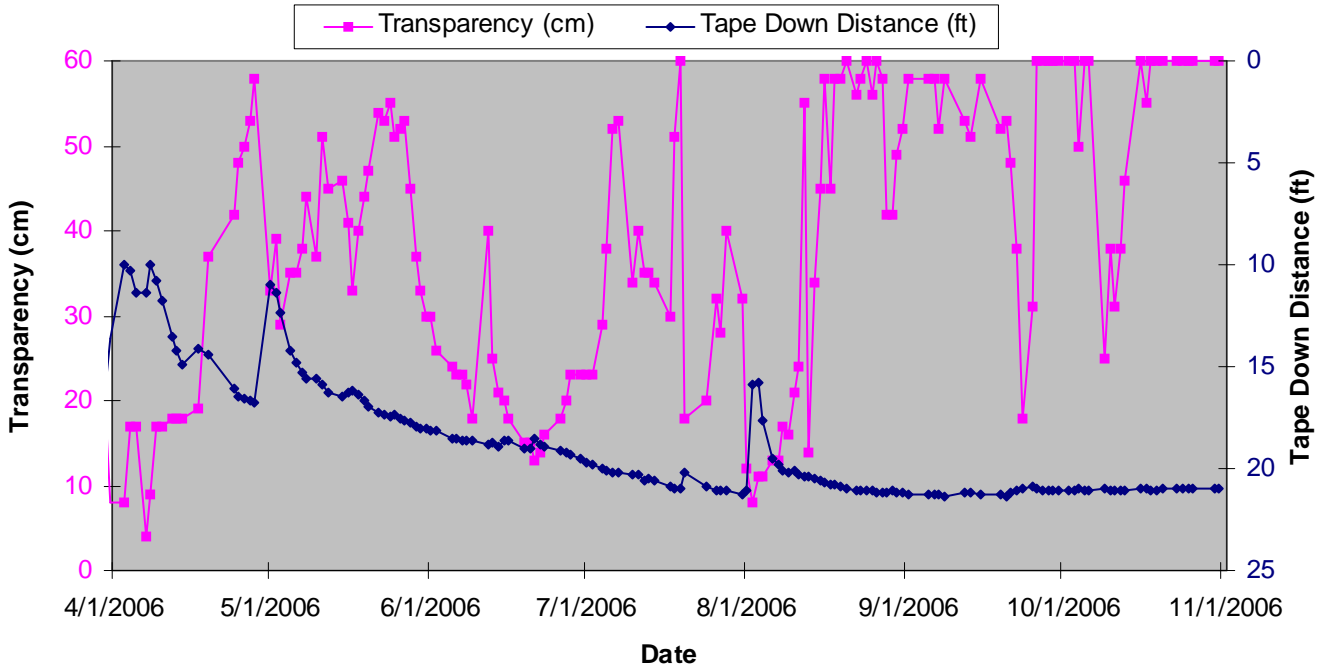
CSMP Data - Blue Earth River, Blue Earth Section 20
Laurie Ristau



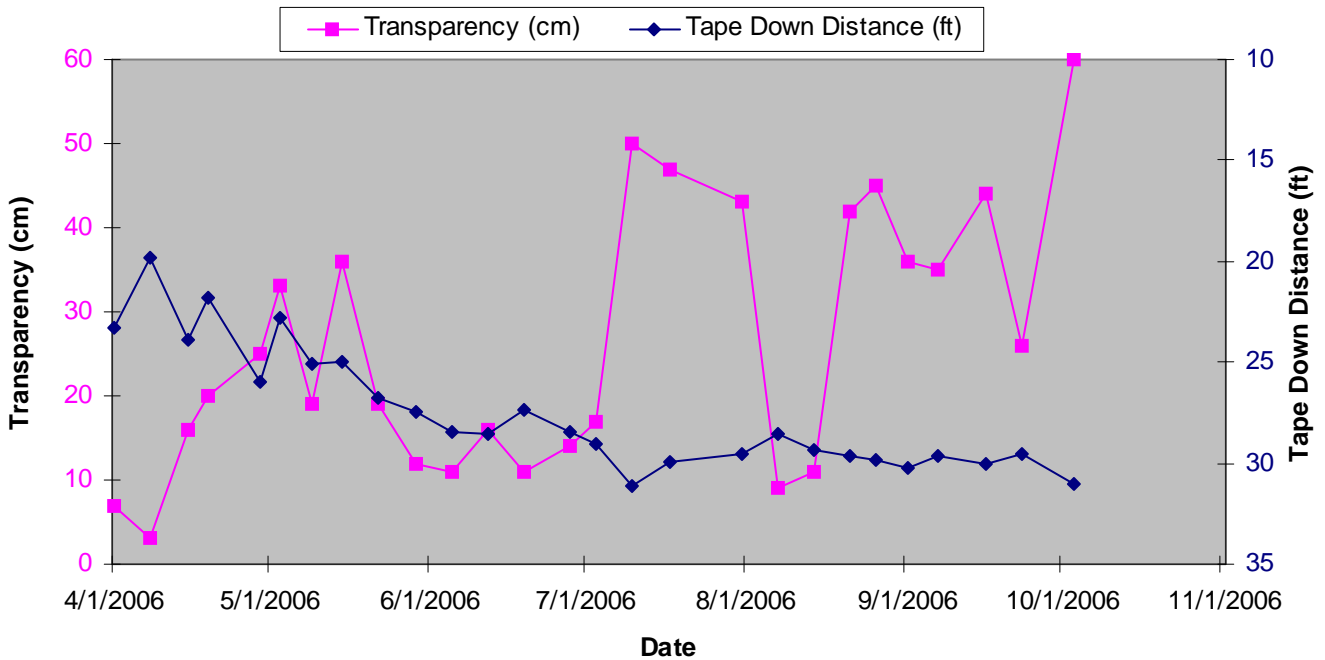
CSMP Data - Blue Earth River, Blue Earth Section 7
Robert Worner



Blue Earth Section 20 Transparency and Tape Down Measurements



Blue Earth Section 17 Transparency and Tape Down Measurements



For further information, please check out the Faribault County Soil & Water Conservation District/Planning & Zoning Website at www.faribaultcountyswcd.com



You can utilize this site to look at the *2003—2006 Citizen Stream Monitoring Year End Reports, maps, and links to MPCA's site* which includes more information on the monitoring program.

The MPCA site also contains a brand new CSMP Instruction Manual, including background information, program instructions,

and how rivers run. If you would like a copy of this manual, but don't have internet access, please contact me for a paper copy.

The *2006 Rain Gauge Cooperator Report, including 1992-2006 monthly reports*, are also available on the SWCD site.

For CSMP information, go to [Programs & Services / CSMP](#). Rainfall data can be found under the [Rain Gauge Network](#) link.

I also want to take this chance to acknowledge Laurie Ristau for her amazing 156 samples taken this year!!! MPCA does recognize the volunteer with the greatest number of readings in their yearly statewide report. After talking with them, she may likely be that person for 2006. WAY TO GO LAURIE!

2006 Flow Data



In 2006, our streams did experience quite a bit of fluctuation after rainfall events. The following fluctuations in stream height were determined using the Average Tape Down Distance.

Kay Bogan, East Branch Blue Earth River—**11.3 ft**

Orville Goemann, East Branch Blue Earth River—**3.8 ft**

Robert Worner, Blue Earth River—**12.1 ft**

Laurie Ristau, Blue Earth River—**11.3 ft**

Barbara Baker, Judicial Ditch 13—**2.5 ft**

LOOKING AHEAD...

Once again, we would like to thank all of the Faribault County Citizen Stream Monitors. We look forward to many more years of interesting river watching with you. We hope that you will once again choose to be a monitor and begin to make comparisons of your stream from year to year, and see relationships begin to develop between your streams transparency and precipitation and depth. As more monitoring is

done, more conclusions can start to be made about the condition of your stream.

If you know of anyone who might be interested in participating in the Citizen Stream Monitoring Program or if you have any questions yourself, contact the Faribault County Soil and Water Conservation District at (507) 526-2388. You can also email at b.douglas@faribaultcountyswcd.com

Additional information on the CSMP, including last year's County report can be found at www.faribaultcountyswcd.com

For more information on the Citizen Stream Monitoring Program, to search CSMP results, look up newsletters and publications, or find uses for CSMP data go to

<http://www.pca.state.mn.us/water/csmp.html>

