

River Watch Program

The Elm Creek Watershed Management Commission has supported the macroinvertebrate monitoring (River Watch) program since its inception in 1995. There are currently seven schools monitoring seven sites in this watershed. While Elm Creek is a relatively low gradient stream with a high degree of sedimentation, an effort has been made to choose high quality habitat sites in the watershed. Higher gradient, rocky streambeds have better habitat for macroinvertebrates. The average habitat score for the sampling sites is 94. This is very close to the average of 95 for all the sites in the Hennepin County River Watch program. It is important to consider the quality of habitat when comparing water quality data from different sites and creeks.

Site 1

This is the most upstream Elm Creek sample site. It is located at the border of Medina and Plymouth, near Wayzata High School and drains the Medina area. Part of the creek is fed by untreated storm sewers and part is fed by ditches. Most upstream areas of Elm Creek have little or no vegetated buffers to protect the creek. Land use is residential and agricultural. Cattle have access to the creek in at least one location. In 2003, the site was sold to the adjacent golf course, a large facility was built adjacent to the creek and much of the vegetated buffer was removed. The 2001 reference habitat site score for this site was 61. (On a scale of 0-180)



David Astin inspects Site 1 during low flow conditions.

Prior to the 2001 sampling season, this site always reported densities of less than 100 organisms. Therefore, the sampling area was moved downstream approximately 500 meters to an area with a more adequate substrate for macroinvertebrate habitat. Fall 2001 was the first season at this new location; however, low numbers are still a problem. Any analysis based on this data should be viewed with caution. Values for the three primary metrics indicate an impacted stream, with possible slight improvement in recent years. This may be due to a change in monitoring location with better substrate.

Teachers Elizabeth Thornton and David Astin led the monitoring effort at Site 1 from 1995-1999. Thornton retired in 1999 and Astin continues to lead the monitoring effort. Due to class size and changes in school curriculum the school was not able to monitor in 2003 and 2004. River Watch staff are currently looking to find a replacement for 2005.

Results for Site 1

Date	# Identified	Family biotic index	Habitat Score	EPT	Number of Families	Dominant family	Dominant family % overall	Stream Quality Grade
10/12/95	∇	6.5	0*	3	8	Caenidae	34.0	C
5/8/97	∇	6.3	0*	2	10	Chironomidae	50.0	D+
10/1/97	∇	7.0	81	1	6	Chironomidae, red	31.0	D+
5/6/98	∇	6.2	70	3	8	Pelecypoda	51.0	C
5/5/99	∇	6.0	93	2	6	Chironomidae	72.0	C-
10/6/99	∇	5.8	0*	2	7	Chironomidae	58.0	C-
5/18/01	∇	5.3	79	3	7	Baetidae	44.0	B-
**10/11/01	186	5.8	55	4	12	Heptageniidae	23.0	B-

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

** Sampling site was moved 500 m downstream. Explanation below.

∇ Less than 100 organisms were identified. State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.



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Site 2

This site is located in a wooded area that is part of a City forest reserve in Maple Grove. Land use in the surrounding area has changed drastically from agricultural to suburban residential in the last few years. In 1996, a bioengineering and education project was done to repair an eroded stream bank approximately 100 yards upstream from the sample site. The drainage area between upstream Site 1 and Site 2 consists of wetlands and residential land use. This drainage area is undergoing rapid development. The 2001 reference habitat site score for this site was 95. (On a scale of 0-180)



Elm Creek at Site 2

When visiting this beautiful wooded stretch of Elm Creek, one might guess that it is a pristine and healthy stream. However, the biotic index, EPT and family richness indicate an impacted site. In the spring of 2002 the monitors began using the multi-habitat sampling method in an effort to improve the number of organisms collected, which was frequently below 100. Black flies, which are tolerant of pollution, are most often the dominant species at this site. MMCD treated for black flies at upstream and downstream Elm Creek sites in 1998-1999. This site has many more Simuliidae than the treated sites. It is not known what treatments occurred beyond 1999.

Although this site has been monitored since 1996, most of the samples had an inadequate sample size. A trend analysis shows fairly stable conditions. However, the 2004 sample indicates a possible positive change in water quality. Additional sampling in 2005 and beyond will help verify if improvements in stream quality are occurring.

Armstrong High School has been monitoring this site since the program started in 1995. Teacher Dan Hanka led the monitoring effort until his retirement in 2004. A new monitor is needed for this site in 2005.

The 2004 spring sample had an adequate number of invertebrates and a surprising change in dominant species and species composition. The Pronggilled Mayfly dominated the sample (67%). This mayfly is sensitive to pollution and indicative of better water quality than previously observed. Two families of stoneflies were also found in this sample, again indicating good water quality. The FBI for the spring 2004 sample was at its lowest value of 3.2 compared to the previous years' range of 5.2 to 6.6.

Results for Site 2

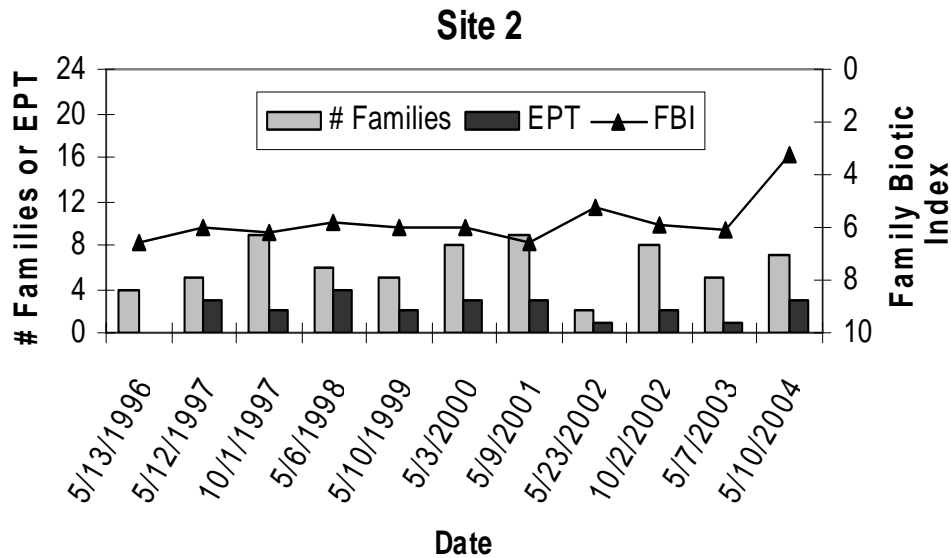
Date	# Identified	Family Biotic index	Habitat Score	EPT	Number of Families	Dominant family	Dominant family % overall	Stream Quality Grade
5/13/96	<70**	6.6	0*	0	4	Simuliidae	61.0	D
5/12/97	200+	6.0	0*	3	5	Simuliidae	99.0	C-
10/1/97	<70**	6.2	93	2	9	Simuliidae	55.0	C-
5/6/98	200+	5.8	99	4	6	Simuliidae	85.0	C
5/10/99	<70**	6.0	100	2	5	Chironomidae	38.0	D+
5/3/00	<70**	6.0	81	3	8	Simuliidae	55.0	C
5/9/01	<70**	6.6	103	3	9	Chironomidae	56.0	C
5/23/02	12	5.2	0*	1	2	Chironomidae	83.3	C-
10/2/02	76**	5.9	27	2	8	Simuliidae	52.6	C-
5/7/03	57**	6.1	0*	1	5	Chironomidae	70.2	D+
5/10/04	229	3.2	0*	3	7	Leptophlebiidae	67.0	B-

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

**State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.



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Site 3

This is a small unnamed tributary of Elm Creek located in a residential area. It drains the southern part of Corcoran and a small part of southwestern Maple Grove. During the summer of 1997 Lawndale Lane was widened and this site was highly impacted during the road construction. This site experiences great fluctuations in water levels. While it is typically too low to monitor in the fall, spring 2001 saw extremely high water levels at this site. The 2001 reference habitat site score for this site was 91. (On a scale of 0-180)

Orono High School began monitoring this site in 1995. West Lutheran High School monitored this site in 1997, 1998 and again in 2003. In spring 2001 Girl Scout Troop 1506 from West-Tonka/Orono monitored this site. Providence Academy under teacher Dr. Yvonne Boldt began monitoring the site in 2002.

For several of the samples, the total number of organisms collected at Site 3 was below 100. To accurately determine the Family Biotic Index a minimum of 100 organisms should be collected. With the exception of the fall 2002 sample, the water quality determined by the biotic index is fairly poor. The site generally has a below average biotic index, EPT score and a high percentage of pollution tolerant families.



Providence Academy students at site 3, fall 2004.

Road construction and a housing development disturbed this site and prevented monitoring during 1999 and spring 2000. Future monitoring at this site will give us the opportunity to see how the system recovers from riparian and aquatic habitat changes. This was the most drastically altered site monitored. It went from a stable drainage ditch with good riparian vegetation to a ripped up construction site, to a newly constructed stream bed. It now appears stable again with good vegetation, but the stream channel has been changed entirely. A trend analysis indicates variable conditions between the metrics. No trend can be predicted based on the limited data available.



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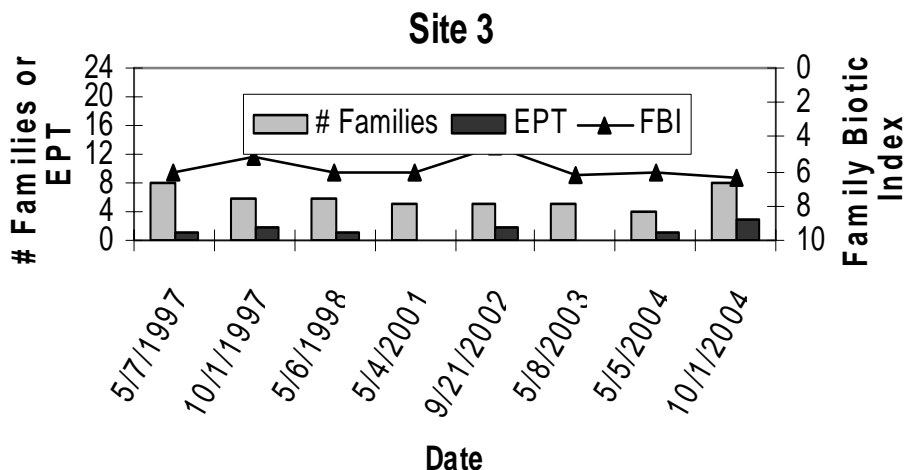
Results for Site 3

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
5/7/97	∇	6.1	79	1	8	Simuliidae	71.0	C
10/1/97	∇	5.1	20	2	6	Hydropsychidae	33.0	C
5/6/98	∇	6.0	62	1	6	Simuliidae	47.0	C-
5/4/01	471	6.0	93	0	5	Chironomidae	80.0	D+
9/21/02	134	4.6	0*	2	5	Baetidae	63.0	C-
5/8/03	39**	6.2	0*	0	5	Simuliidae	69.0	D+
5/5/04	100	6.0	0*	1	4	Chironomidae	71.0	C-
10/1/04	108	6.4	0*	3	8	Chironomidae	52.8	C-

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

∇ Less than 100 organisms were identified. State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.

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Site 4

This is farthest upstream sample site on Rush Creek. Rush Creek is a tributary of Elm Creek, north of its main stem. This is the only site on the south fork of Rush Creek. It is the only grazed agricultural sample site in the River Watch program. Cattle are often present in or near the stream. Water draining from most of Corcoran and northern Maple Grove flows into this stretch of creek. The 2001 reference habitat site score for this site was 77. (On a scale of 0-180)

Maple Grove High School students monitored this site from fall of 1997-2000. Both Rockford High School and Dolan Home School have sampled this site dating back to 1995. In fall 2001, Connie Fortin, Hennepin County River Watch founder, and her colleagues at Fortin Consulting volunteered to monitor the site. Teacher Dr. Yvonne Boldt and her students monitored the site in fall 2002.



Providence Academy at Site 4, Fall 2004.



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This site appears to be impacted. The high biotic indexes reported at this site reveal that organic pollution is likely. These results could be due to things, such as agricultural runoff or cattle in the creek.

It is interesting to note that the number of families has varied widely, from two in '97 to eighteen in '01. With the exception of 1998, the family has always been a pollution tolerant family. Water levels fluctuate greatly at this site.

Metropolitan Mosquito Control District treats this area for black flies (Simuliidae). Treatment may temporarily reduce the number of black flies at this site. It may also change their relative proportion in the invertebrate community. This site was not treated in 2000 and 2001. It is not known if treatments were applied in 2002 or later. A trend analysis of the samples indicates fairly stable, but impacted conditions.

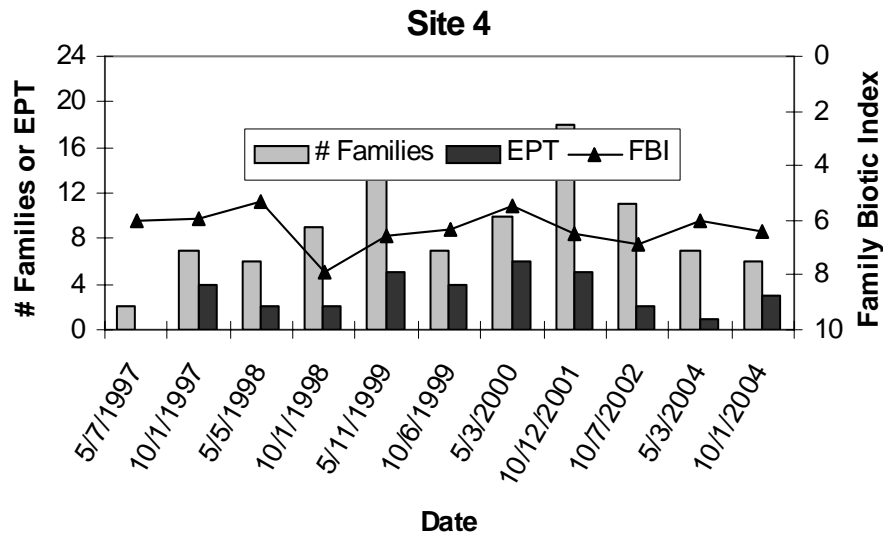
Results for Site 4

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
5/7/97	▲	6.0	0*	0	2	Simuliidae	98.0	D+
10/1/97	▲	5.9	120	4	7	Simuliidae	77.0	D+
5/5/98	▲	5.3	111	2	6	Baetidae	61.0	D+
10/1/98	▲	7.9	113	2	9	Talitridae	90.0	D+
5/11/99	▲	6.6	98	5	14	Simuliidae	43.0	C+
10/6/99	▲	6.3	81	4	7	Talitridae	55.0	C+
5/3/00	▲	5.5	0*	6	10	Simuliidae	42.0	B
10/12/01	▲	6.5	68	5	18	Talitridae	34.0	B-
10/7/02	72**	6.9	0*	2	11	Oligochaeta	46.0	C
5/3/04	166	6.0	0*	1	7	Simuliidae	66.0	C-
10/1/04	200	6.4	0*	3	6	Chironomidae	67.5	C-

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

▲ The number of organisms identified is greater than or equal to 100.

** State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.



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Site 5

This Elm Creek sample site is directly downstream from Rice Lake. The site is located in a wooded natural area, but the riffles are typically small. The water flow varies. Sometimes the water flows over the upstream dam, which oxygenates the water. At other times it runs through a bypass culvert and has more of the characteristics of lake water. The 2001 reference habitat site score for this site was 96. (On a scale of 0-180)

Maple Grove High School teacher Gary Gerst started monitoring this site in the fall of 1995. Elm Creek runs directly behind the school, giving the students an excellent opportunity to learn about their local creek. Due to curriculum changes and increased class size students were unable to monitor in 2003 and 2004.



High water at Site 5

The consistently high biotic index and relatively low EPT at this site reflect an impacted site with fairly poor water quality and substantial organic pollution likely. Some families that are more common in lakes have been collected at this site, likely due to inputs from Rice Lake. The dominant family at this site has consistently been a pollution tolerant family. Rice Lake flows into this site and has very poor water quality. The water contains about five times the phosphorus of Fish Lake. The lake contributes a large food source for filter feeding organisms in the creek, such as Simuliidae and Hydropsychidae. This site identified less than 100 organisms during the fall 1996 sampling season. The family biotic index from fall '96 is the only value that does not fall between 5.9 and 7.0 for this site. The variance in results for this sample may validate the need for identifying more than 100 organisms per sample.

In the fall of 1998, students found thousands of dead minnows and a few larger species at this site. The exact cause of the fish kill is unknown. DNR analysis showed a very large number of parasites on the fish, although the water chemistry appeared normal. A trend analysis indicates fairly stable conditions with a possible slight improvement in water quality. The number of families has been variable.

Results for Site 5

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
5/15/96	▲	6.0	0*	0	3	Simuliidae	86.0	D
9/25/96	▽	9.0	0*	0	2	Hirudinea	67.0	D
5/8/97	▲	6.1	0*	0	5	Simuliidae	92.0	D+
10/1/97	▲	7.0	135	2	13	Talitridae	36.0	D+
5/6/98	▲	6.6	58	2	12	Chironomidae	50.0	C
9/30/98	▲	6.4	0*	2	11	Simuliidae	64.0	C
5/10/99	▲	6.3	0*	1	10	Chironomidae	80.0	C
10/4/99	▲	5.9	89	1	13	Simuliidae	42.0	C
5/1/00	▲	6.1	115	3	8	Talitridae	30.0	C-
10/3/00	▲	6.7	68	1	8	Simuliidae	60.0	C-
10/2/01	▲	6.5	94	1	8	Simuliidae	62.0	C-
5/16/02	163	6.1	95	1	5	Simuliidae	81.6	C-
10/4/02	263	6.8	0*	2	11	Talitridae	47.9	C-

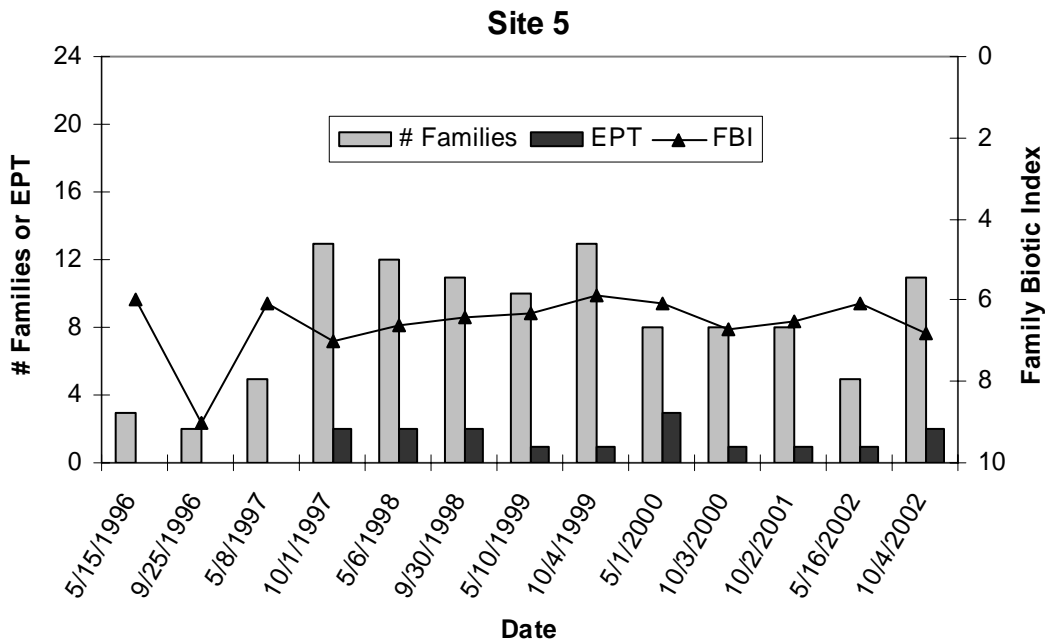
* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

▲ Number of organisms identified is greater than or equal to 100.

▽ Less than 100 organisms were identified. State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.



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Site 6

This sample site is on Rush Creek, which is a tributary to Elm Creek. It is located in the Elm Creek Park Reserve and has a naturally vegetated riparian zone. It is a slow-moving, meandering stream at this site. Just upstream from this site, the south fork of Rush Creek (sample site 4) joins the north fork of Rush Creek (no sample sites). The 2001 reference habitat site score for this site was 108. (On a scale of 0-180)

Osseo High School has been monitoring this site since 1996. Teacher Jim Schultz leads the monitoring effort. In 1995, the Hennepin Conservation District monitored this site.

Site 6 has been sampled since 1995. When compared to other Elm Creek sites, this site usually shows a lower family biotic index (FBI), a higher EPT and larger number of families. These are all indicators of a relatively healthy stream with fair water quality and some organic pollution probable. The water quality, based on the macroinvertebrate community, has remained fairly stable. The average FBI is 5.3, indicating fair water quality with substantial pollution likely. This is one of the few sites in our program with a naturally vegetated riparian zone. This situation probably helps maintain good water quality. Site 6 was not monitored in fall '00 due to low flow conditions.

Metropolitan Mosquito Control District treats this area for black flies (Simuliidae). Treatment may temporarily reduce the number of black flies at this site. It may also change their relative proportion in the invertebrate community. The site was not treated in 2000 or 2001. It is not known if treatments occurred in 2002 and later.



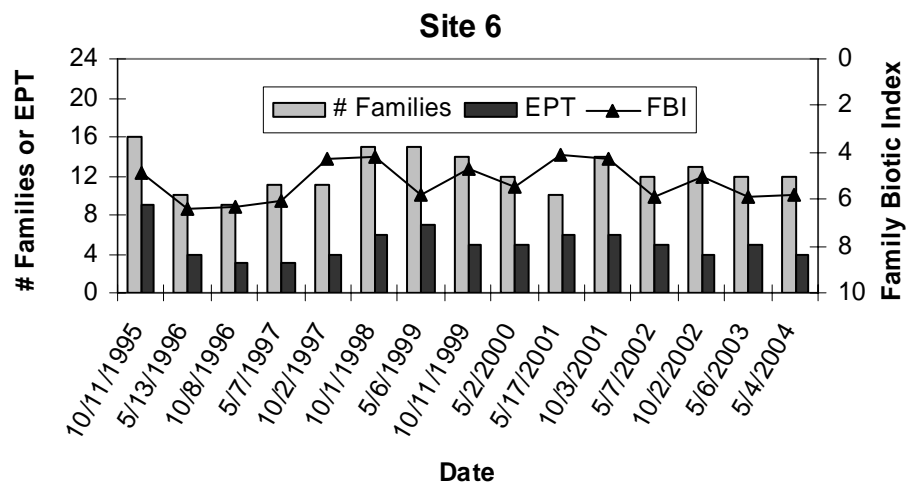
River Watch Program

Results for Site 6

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
10/11/95	▲	4.9	0*	9	16	Hydropsychidae	23.0	A
5/13/96	▲	6.4	0*	4	10	Chironomidae	52.0	C+
10/8/96	▲	6.3	0*	3	9	Talitridae	37.0	C+
5/7/97	▲	6.1	0*	3	11	Simuliidae	72.0	B-
10/2/97	▲	4.3	127	4	11	Hydropsychidae	52.0	B-
10/1/98	▲	4.2	112	6	15	Hydropsychidae	70.0	B+
5/6/99	▲	5.8	0*	7	15	Simuliidae	49.0	B+
10/11/99	▲	4.7	89	5	14	Hydropsychidae	51.0	B+
5/2/00	▲	5.5	111	5	12	Simuliidae	55.0	B
5/17/01	▲	4.1	145	6	10	Limnephilidae	24.0	B
10/3/01	▲	4.3	106	6	14	Hydropsychidae	64.0	B
5/7/02	259	5.9	116	5	12	Simuliidae	76.0	B
10/2/02	302	5.0	0*	4	13	Hydropsychidae	50.7	B
5/6/03	258	5.9	0*	5	12	Chironomidae	48.4	B-
5/4/04	347	5.8	0*	4	12	Chironomidae	34.0	B-

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

▲ Number of organisms identified is greater than or equal to 100.



Site 7

This site at the mouth of Elm Creek was monitored by Champlin Park High School from '96—'00. It was dropped from the Hennepin County River Watch program in 2001 because the site was too heavily influenced by macroinvertebrates from the Mississippi River. It was replaced by site 26 approximately one mile upstream. Students from Champlin Park High School did return to monitor the site in spring 2002.

The high fluctuation in biotic index and EPT scores and the high diversity of organisms is probably a result of sampling organisms from the Mississippi River. Based on the biotic index, this site exhibits fairly poor water quality. A trend analysis indicated fairly stable water quality with variability between the metrics.



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Results for Site 7

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
5/13/96	▲	6.6	0*	3	12	Talitridae	38.0	B
9/22/96	▲	3.9	0*	7	13	Hydropsychidae	84.0	
5/8/97	▲	6.0	95	4	11	Chironomidae	61.0	C+
10/1/97	▲	6.4	0*	2	9	Chironomidae	63.0	
5/6/98	▲	6.0	82	4	10	Simuliidae	74.0	B-
10/9/98	▲	6.7	108	6	14	Chironomidae	47.0	
5/5/99	▲	6.8	96	3	10	Chironomidae	53.0	C+
10/8/99	▲	7.2	81	8	14	Talitridae	44.0	
5/1/00	▲	6.6	88	3	8	Chironomidae	47.0	C+
10/15/00	▲	6.2	0*	5	13	Chironomidae	80.9	
5/29/02	93**	7.0	0*	4	10	Talitridae	30.0	C

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

▲ Number of organisms identified is greater than or equal to 100.

** State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.

Site 17

This site was located on the Wayzata High School grounds just downstream from the school's storm water holding ponds. Monitoring at this site was completed as an experiment with artificial samplers (mesh rock bags) for collecting organisms at this site. Due to the lack of organisms found, it is no longer in use.

In the two years monitored, this site reported less than 100 organisms. The data should not be directly compared to other sites.



Eroded streambank at Site 17, Spring 2004

Results for Site 17

Date	# Identified	Family biotic index	Habitat Score	EPT	No. of Families	Dominant Family	Dominant Family % Overall	Stream Quality Grade
10/12/95	∇	6.5	0*	3	8	Caenidae	34.0	C
5/6/98	∇	6.2	70	3	8	Chironomidae	51.0	C

* A Habitat Score of 0 indicates that the habitat was not scored using the River Watch Network Habitat Assessment field sheet.

∇ Less than 100 organisms were identified. State agencies recommend identifying at least 100 macroinvertebrates per sample for standard site characterization.



River Watch Program

Site 26

The site replaces site 7 as the most downstream site on Elm Creek. It is located in Josephine Nunn Park in Champlin between Hayden Lake and the Mill Pond. It is a forested stretch of river with high banks and several riffle areas. It should provide better macroinvertebrate collections than site 7. The wooded south side of the creek is now being developed. In 2001, Saint Paul Academy students monitored this site under the supervision of teacher Larry Nelson. Teacher Kim Kovich and his students from Champlin Park High School adopted the site in fall 2002.



Site 26 changes in riparian land use



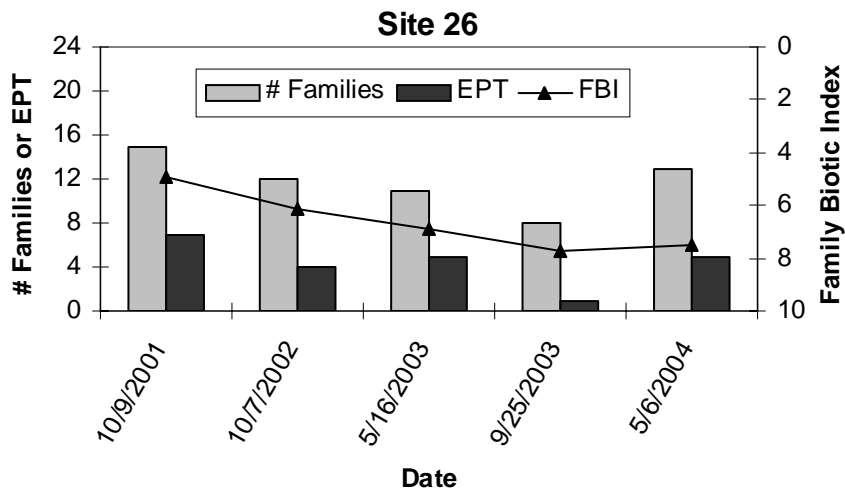
Champlin Park students, Spring 2004

It is concerning that the quality of Elm Creek at site 26 appears to be declining. In order to make a complete biological characterization it is recommended that data be collected for 5 years. Although there are only 5 data points over 4 years, a trend analysis indicates a definite decline in the number of families and the EPT and an increase in FBI. The water quality extrapolated from the FBI has gone from “Good” in 2001 to “Very Poor” in 2004. The land use around site 26 has also changed significantly in the past 2 years. A development has gone in along the south side of the creek, where there previously was open space and wooded areas. Ongoing monitoring at this site is needed to verify the possible downward trend in water quality.

Results for Site 26

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
10/9/01		4.9	115	7	15	Hydropsychidae	63.0	B+
10/7/02	167	6.1	0*	4	12	Asellidae	38.0	B-
5/16/03	246	6.9	0*	5	11	Simuliidae	23.0	C
9/25/03	346	7.7	0*	1	8	Asellidae	63.9	C
5/6/04	211	7.5	0*	5	13	Talitridae	57.0	C+

▲ Number of organisms identified is greater than or equal to 100.



River Watch Program

Selected Characteristics and Average Water Quality Metrics for 2004

Watershed Site	Area mi ²	Level of Development	Density People/mi ²	Impervious surface	Urban Land Use	Agricultural Land Use	Avg Family Biotic Index	Avg EPT	Avg # of Families	Stream Quality Grade	Trend
Elm Creek	109		340	6%	8.7%	85%	5.8 avg	3.2 avg	8.9avg		
Site #1		Developing					N/A	N/A	N/A	N/A	Variable
Site #2		Developing					3.2	3.0	7	B-	Stable, slight↑
Site #3		Developing					6.2	2	6	C-	Variable
Site #4		Rural					6.2	2	6.5	C-	Stable
Site #5		Developing					N/A	N/A	N/A	N/A	Stable, slight↑
Site #6		Rural					5.8	4.0	12.0	B-	Stable
Site #7		Developing					N/A	N/A	N/A	N/A	Variable
Site #26		Rural					6.5	0	5	C+	Possible ?,ND
Shingle Creek	43.5		2610	23%	71%	20%	6.0 avg	1.3 avg	7.7avg		
Site #10		Developed					7.5	0	5.5	D	Declining
Site #27		Developed					N/A	N/A	N/A	N/A	ND
Site #28		Developed					5.3	2.0	8	C	Variable, ND
Site #30		Developed					5.4	2.0	9.5	C+	Variable,ND
Minnehaha Creek	181		964	7%	37%	38%	5.2 avg	2.6 avg	8.9avg		
Site #19		Developed					5.3	2.5	6.5	C	Declining
Site #9		Developed					6.0	4	14	B-	Variable
Site #11		Developed					5.2	3.0	10	B-	Stable
Site #14		Developed					4.7	2.5	7	C	Variable
Site #25		Developed					4.8	1	7	C	Stable, ND
Site #16		Rural					N/A	N/A	N/A	N/A	Stable, possible ?
Purgatory Creek	31.4		1760	15%	83%	12%					
Site #18		Developed					N/A	N/A	N/A	N/A	Possible ?,ND
Nine Mile Creek	50		2210	28%	87%	6%					
Site #21		Developed					4.9	2	9	B-	Variable, possible slight?
Site #22		Developed					N/A	N/A	N/A	N/A	Variable, ND
Bassett Creek	39.1		2240	22%	82%	11%					
Site #13		Developed					5.0	4.3	10	B-	Variable
Site #15		Developed					N/A	N/A	N/A	N/A	Stable
Pioneer-Sarah Cr	59.4										
Site #24		Rural					6.5	0	5	D+	Possible ?,ND
Crow River	2,725						4.3 avg	5.9 avg	9.4avg	B avg	
Site #12		Developing					3.8	5.7	9.3	B	Steady, Possible ?
Site #31		Rural					4.8	6.0	9.5	B	ND
West Mississippi	23.5										
Site #20		Developed					5.1	1	9	C	Possible ?,ND

N/A- indicates no monitoring occurred or data is not available. ND- more data is needed to more accurately evaluate trends.

Impervious Surface, Population Density and Land Use Data—From USGS: Water Resources Investigations Report 99-4247.

EPT - The number of mayfly (Ephemeroptera), stonefly (Plecoptera), and caddisfly (Trichoptera) families in the sample. These families represent the pollution intolerant insects. A high EPT score reflects better water quality than a low one. **ave**= average

Family Biotic Index (FBI) - Summarizes pollution tolerances of families in a sample. Ranges from 0 to 10, **low** values=**high** water quality.

Number of Families - The number of different benthic macroinvertebrate families found at the site. In general, more diversity is better. **Site Grade** – Hennepin County issued an environmental report card in 2001. HCD developed the following grading system:

- A: Family Biotic Index 0.00-4.00; EPT 9-12; Number of Families 12-15
- B: Family Biotic Index 4.01-5.75; EPT 6.0-8.9; Number of Families 8-11.9
- C: Family Biotic Index 5.76-6.50; EPT 3-5.9; Number of Families 6-9.9
- D: Family Biotic Index > 6.50; Average EPT < 3; Number of Families < 6



River Watch Program

Discussion

Hennepin County River Watch has a range of one to 10 years of data on 30 monitoring sites. We have the most in-depth results on Elm Creek and Minnehaha Creek. It is important to note that not all sites have the recommended minimum five years worth of data to detect trends. As more sites reach this stage, it will become possible to use these macroinvertebrate indices as baseline data. Identifying trends or significant changes in the indices over time is probably the most fitting use for volunteer-collected stream data.

There are nine monitoring sites in the Elm Creek Watershed. Data was submitted for five of the sites in 2004. Stream Quality Grades for 2004 ranged from C- to B-. Elm Creek and its tributaries generally exhibit very poor to fair conditions. Site 2 showed some surprising results, with a major shift in species composition and metrics indicating much better biologic health than any previous sampling. Sites 26 and 7 exhibit better water quality than the other Elm Creek sites. They are located downstream of the Elm Creek Park Reserve. Flowing through this undisturbed riparian zone may be helping to improve stream health. The land adjacent to site 26 is now being developed. It will be important to continue monitoring and watch the results closely.

The table on the previous page compares land use and water quality in six of the primary watersheds in Hennepin County. It also includes the 2004 metric averages and trends. The Crow River, our only larger river, exhibits the best water quality. For the smaller streams, Nine Mile Creek, Bassett Creek and site 9 on Minnehaha Creek usually exhibit better water quality than the other watersheds. Some individual sites on the other creeks have also shown good water quality. In general, the watersheds that are undergoing changes, such as development are showing poor water quality. Pioneer Creek and parts of Shingle and Elm Creeks exhibit our poorest water quality.

Drawing conclusions based on comparisons between different watersheds and streams is difficult. Variations in gradient, flow, bottom composition, and other factors that impact habitat quality influence the results. We can make conjectures about water quality from the data and continue to look for trends. The comparisons are an attempt to identify trends and should not be considered statistically significant results.

Water Quantity & Biological Data

Changes in the quantity of water in the streams in Hennepin County may also play a role in macroinvertebrate populations. Precipitation for 2004 was above normal in the spring and fall, but below normal in the summer. During some years, some of the sites are too dry to sample. It is unclear how much this fluctuation is due to weather and precipitation and how much this is facilitated by the increases in impervious surface throughout the developing areas of the county. An increase in impervious surfaces may create faster velocity and higher volume run-off of storm water to streams, and less infiltration. This could result in higher flows during storm events and lower flows during drought periods. While regulations are in place to mitigate the loss of wetlands and most new development is required to create storm water ponds, the volume of stormwater entering Hennepin County Creeks is increasing and the amount of water available for base flow is likely decreasing. These changes are likely to result in impacts to the streambed and banks, water quality and aquatic life. Impacts such as erosion, increased sediment load, downcutting, and increased flooding have been observed. It is unclear how these replacement wetlands and detention ponds are impacting overall flow levels in area creeks and streams. It is also unclear how changes in flow impact water quality. The value of this biological monitoring program lies in these unanswered questions. Consistent monitoring provides data that enables resource managers to evaluate the success of such conservation practices.

Conclusions

Analyzing the health of the streams in Hennepin County is a complex task, but we believe macroinvertebrate monitoring provides a valuable overview of water quality. The macroinvertebrate data has given us additional insight on the health of our streams. For many of these stream reaches, this is the only monitoring that is occurring. It is critical to continue to monitor these streams and take action based on the findings. As we collect data each year, we will continue to add to the historical picture of the streams over time. The health of all of our sites reflects the land use in the watershed. Land use could be improved by implementing Best Management Practices (BMPs) in order to improve the water quality of the streams. Examples of BMPs include: keeping native vegetation along the stream banks, limiting livestock access to streams, avoiding the use of chemical fertilizers close to a water resource, limiting the disturbance to the natural stream channel when building nearby, etc.

It is a challenge to address water quality in an urban and rapidly developing county. Through this program we are trying to take advantage of the energy of high school and college students and direct it towards stream stewardship. As the River Watch Program completes its tenth year in Hennepin County we are encouraged by the ongoing commitment of the monitoring schools, and by the continued increase in interest from other schools, counties and agencies in our monitoring efforts.

To learn more about the program, contact Jenny Schaust, River Watch Program Coordinator, at Jenny.Schaust@co.hennepin.mn.us.

