

VERMILLION RIVER WATCH PROGRAM

2008 Annual Report

By Joe Beattie

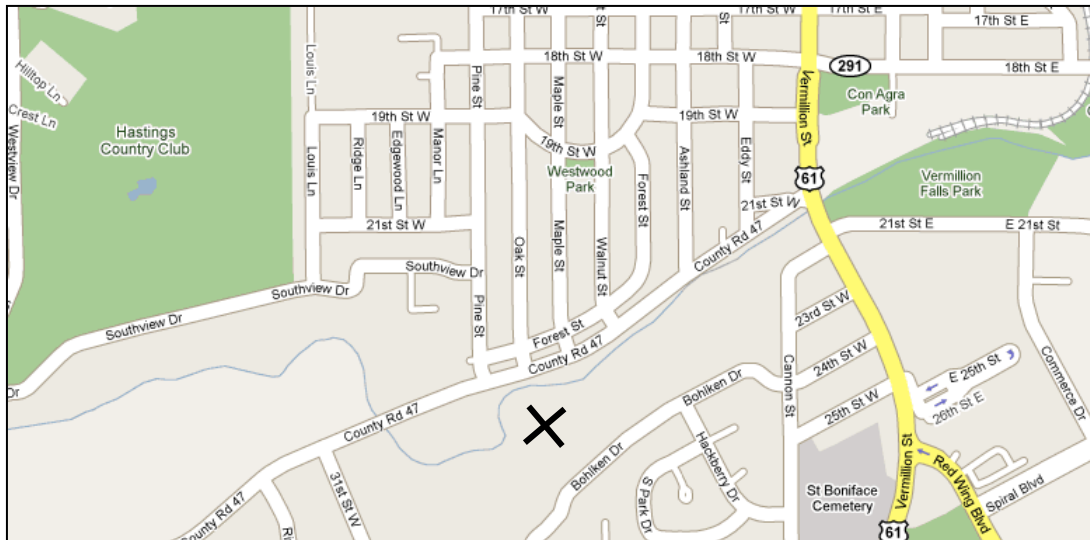
Part 1 How do we carry out river monitoring?

High school students gather a sample of benthic macroinvertebrates, spineless organisms visible to the eye that can live on the bottom of the river. In order to gain a diverse sample, students employ the multi-habitat technique where macroinvertebrates are gathered from the rocky bottom, snags and logs, and the vegetated margin of the river. After students collect a sample, the macroinvertebrates are preserved in alcohol and brought back to the lab. In the lab the students sort and identify the macroinvertebrates to the family level using a dichotomous key. Identified macroinvertebrates are then used to calculate metrics of river health.

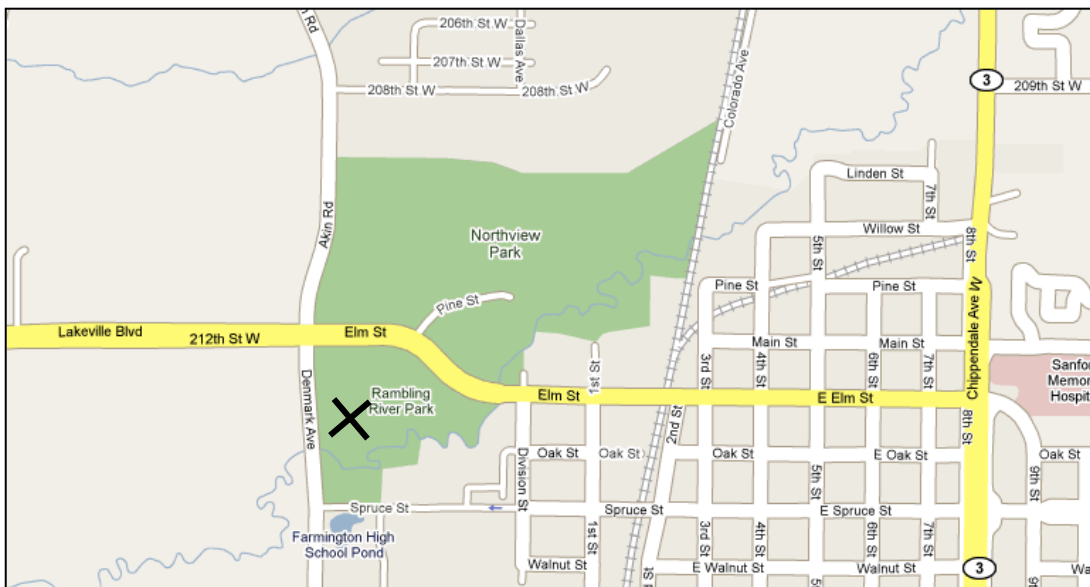


Part 2 Where do we monitor the Vermillion River?

Hastings High School students monitor at county highway 47 and Pine Street in Hastings. (D7)



Rosemount High School students monitor at Rambling River Park in Farmington. (D3)



Part 3 Why do we look at benthic macroinvertebrates?

Benthic macroinvertebrates form a critical part of any river system, particularly in breaking down detritus. Unlike fish, macroinvertebrates tend to stay in a localized area of a river throughout their life. They are continually subjected to both chemical and physical factors in the river environment. Thus they can be used to provide excellent insight into the health of a river, arguably better than the momentary snapshot of health gained by chemical monitoring.

NOTE for the following page: The Hastings High School class was divided into five teams (e.g. HHS 2).

Part 4 What benthic macroinvertebrates did we find in 2008?

	HHS Spring	HHS 1 Fall	HHS 2 Fall	HHS 3 Fall	HHS 4 Fall	HHS 5 Fall	RHS Fall
EPHEMEROPTERA (mayflies)							
Baetidae	1			2			43
Baetiscidae	1					1	
Heptageniidae	14	3	11	32	5	2	
Tricorythidae						1	
ODONATA (dragonflies and damselflies)							
Aeshnidae				1			
Calopterygidae		4	1		1	3	
Gomphidae						1	
Lestidae							1
PLECOPTERA (stoneflies)							
Perlidae				3	1	2	
Pteronarcidae		3	9	4	4		
COLEOPTERA (beetles)							
Dytiscidae			3		2	6	
Elmidae	3	4	4	9	5	1	14
Haliplidae						1	1
Hydrophilidae					1		3
HEMIPTERA (true bugs)							
Belostomatidae			1	2	3	8	4
Corixidae			4		1	6	4
Gerridae							1
Nepidae			3	2		2	
Veliidae						2	
TRICHOPTERA (caddisflies)							
Hydropsychidae	31	57	13	62	56	3	5
Leptoceridae							8
DIPTERA (flies)							
Chironomidae	27	1		1	1	2	16
Simuliidae							2
Tabanidae						1	1
Tipulidae	1	4	18	5	20	11	2
AMPHIPODA (scuds)							
Gammaridae	2	22	13	19	9	13	75
Hyalellidae	1					1	43
ISOPODA (pillbugs)							
Asellidae	1		1			2	
OTHER							
Cambaridae							1
Oligochaeta				1		3	7
Hirudinea		2					2
Gastropoda	3	5	4	5	6	18	7
Pelecypoda	15		1	5			5
Turbellaria				1	1		

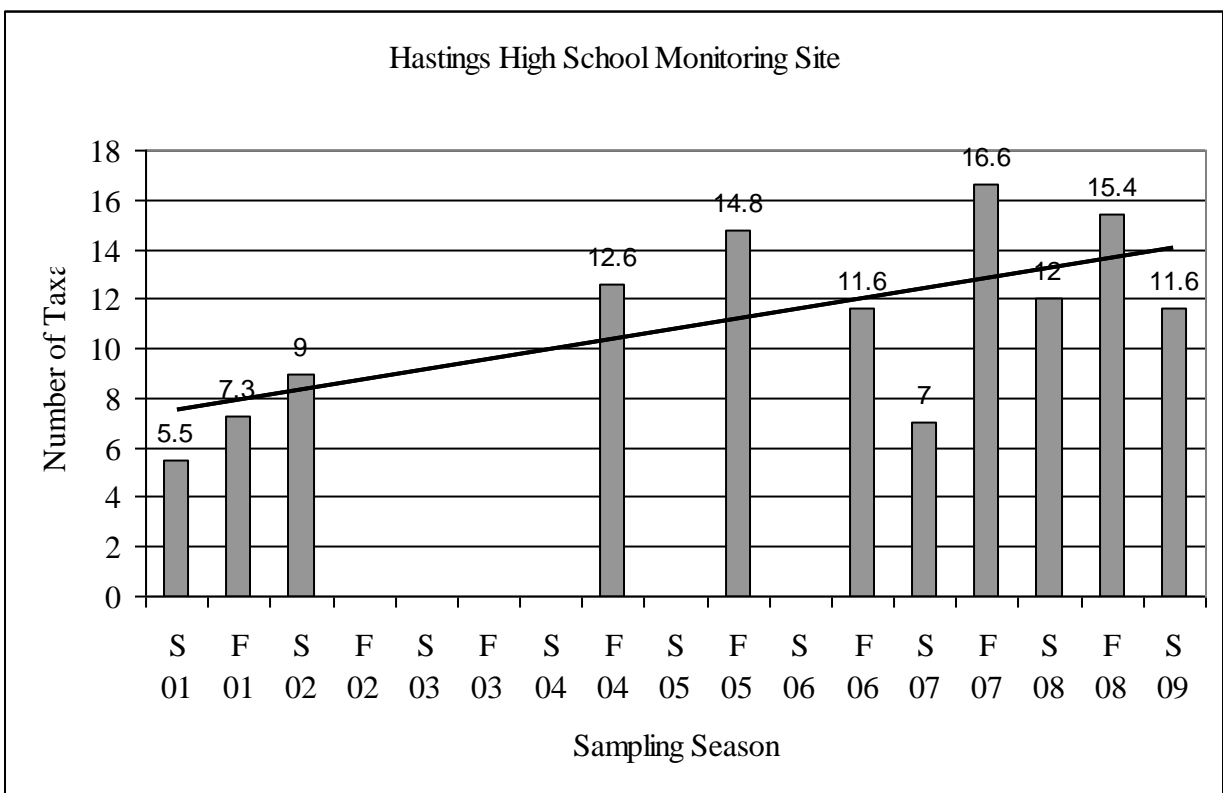
Part 5 What do the metrics tell us?

A. Number of macroinvertebrate families

As a general rule in ecology, the greater the diversity of life, the greater the health of the system. This rule holds true for benthic macroinvertebrates in the Vermillion River. Therefore, we are interested in the number of macroinvertebrate families that inhabit the river.

The graph below suggests that the number of macroinvertebrate families is increasing at the Hastings site. An increasing number indicates that health of the river is improving.

Rosemount High School found 22 different macroinvertebrate taxa in the fall of 2008. Although long-term data is not available, this biodiversity compares favorably with the Hastings site.

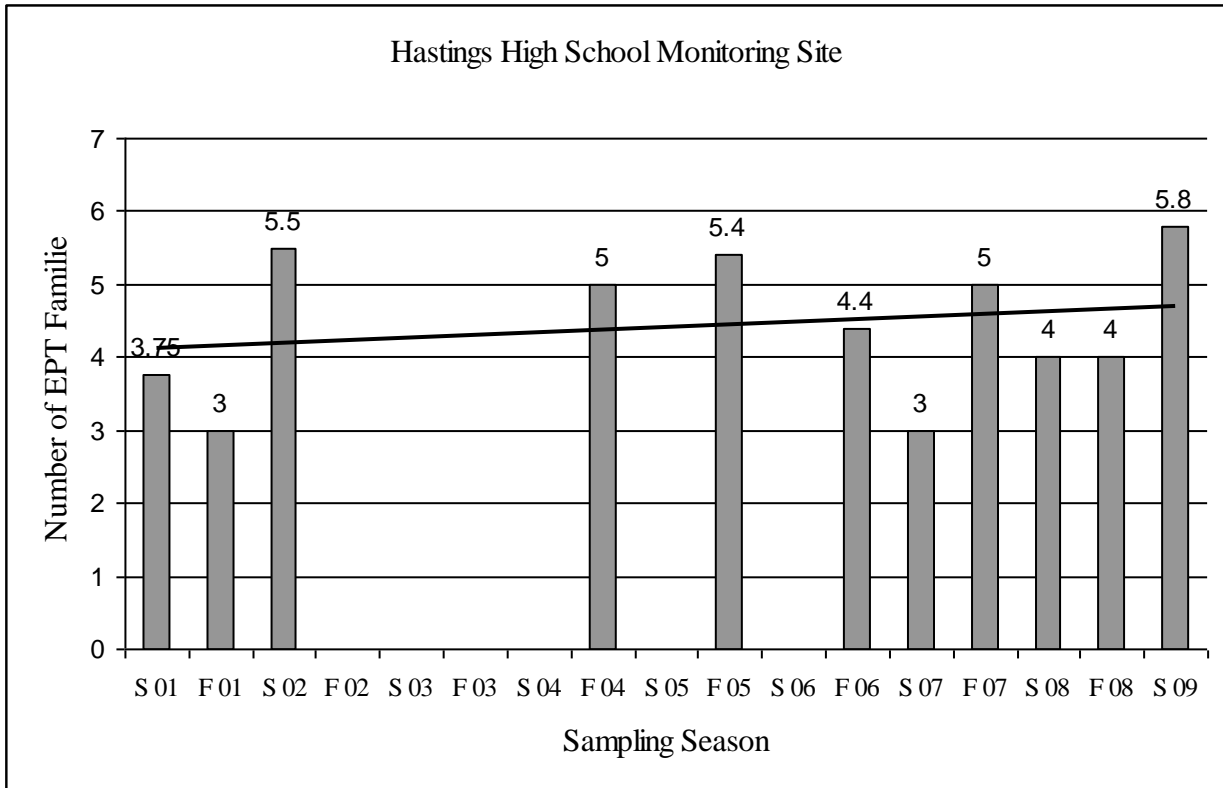


B. Number of EPT families

The EPT families belong to three macroinvertebrate orders: Ephemeroptera or mayflies, Plecoptera or stoneflies, and Trichoptera or stoneflies. The orders are particularly intolerant of environmental degradation. Monitoring the diversity within these orders is thus of great interest.

The graph on the following page suggests that the number of EPT families has remained stable over time in Hastings. The trend line indicates a range of four to five EPT families. This metric might be more powerful if we had a reference site by which to form a data comparison.

Rosemount High School found three EPT families in the fall of 2008. Although long-term data is not available for comparison, this figure ranks just slightly lower than the Hastings trend line.

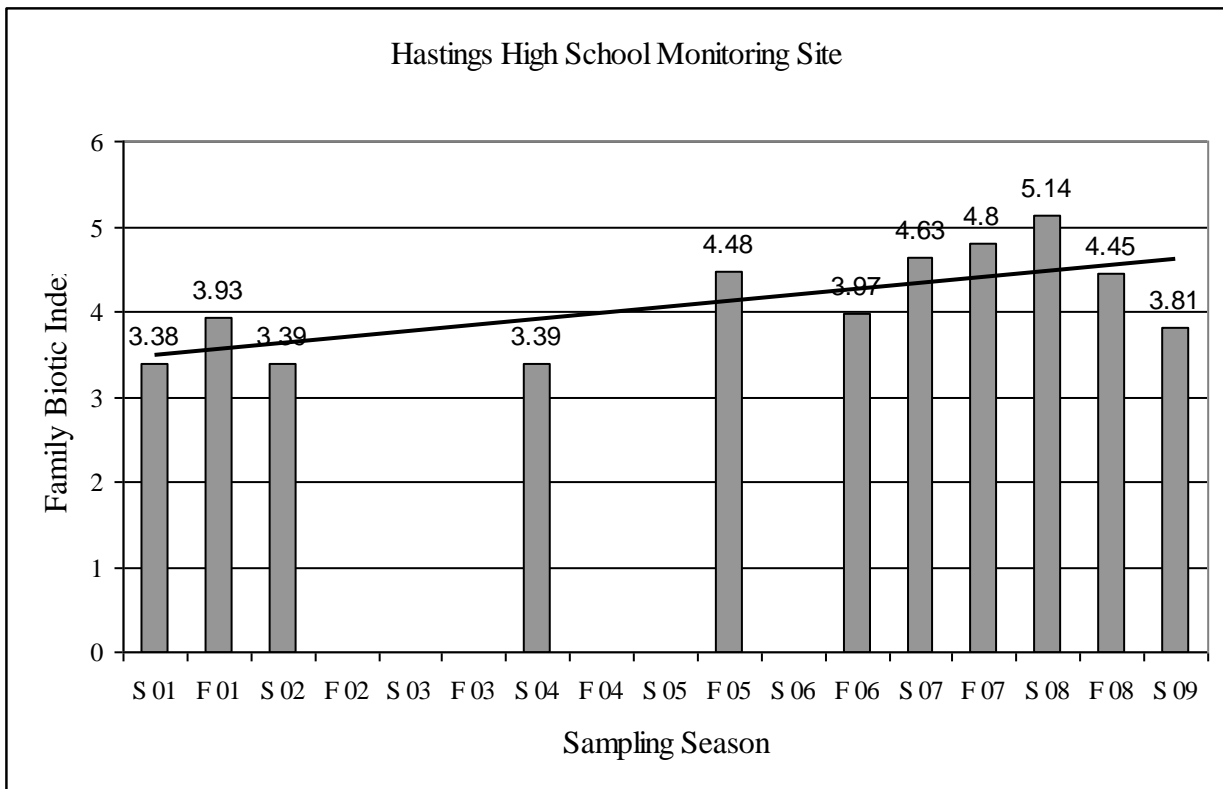


C. Family Biotic Index

Dr. William Hilsenhoff designed what came to be known as the Hilsenhoff Biotic Index (HBI) in 1977 at the University of Wisconsin – Madison. It provides a very effective means to assess organic pollution in streams. Although very accurate, the HBI requires identification to the genus level. Because of the challenges in identifying to the genus level, the Family Biotic Index (FBI) was developed later as a means of capturing a satisfactory but less demanding window into river health. On the basis of the table below and the graph on the next page, the Vermillion River at Hastings has declined slightly from the very good to the good range.

The FBI at Rosemount High School was 5.40 in the fall of 2008. This figure lies at the lower extent of the good range for this year although long-term data is not available for analysis.

FBI	water quality	degree of organic pollution
0.0 to 3.5	excellent	no apparent organic pollution
3.5 to 4.5	very good	possible slight organic pollution
4.5 to 5.5	good	some organic pollution
5.5 to 6.5	fair	fairly significant organic pollution
6.5 to 7.5	fairly poor	significant organic pollution
7.5 to 8.5	poor	very significant organic pollution
8.5 to 10.0	very poor	severe organic pollution



D. Grading the river

What grade would the Vermillion River receive based on the classic A-B-C grading scheme?

metric	A	B	C	D
number of families	12-15	9.1-11.9	6-9	<6
number of EPT families	9-12	6-8.9	3-5.9	<3
family biotic index	0-4	4.01-5.75	5.76-6.5	>6.5

- ✓ The number of families metric receives a “B” because the trend line ranges from 8 to 14.
- ✓ The number of EPT families metric receives a “C” because the trend line ranges from 4 to 5.
- ✓ The family biotic index receives an “B+” because the trend line ranges from 3.5 to 4.5.

It may be sensible to give the river a “B” for an overall grade. In the same way that students are graded in multiple ways, the river might be graded more accurately by including additional metrics such as percent dominance and the ratio of EPT to Chironomidae.