

Chippewa River Watershed Project Annual Benthic Macro-Invertebrate Biomonitoring Network Report 2003-04



Introduction

The collection and identification of Benthic Macro Invertebrates (BMI) from the streams of the Chippewa River Watershed is a viable tool for monitoring water quality. Benthic Macro Invertebrates are organisms that lack backbones, are large enough to be seen without a microscope, and live all or part of their life cycle on the river bottom. Basically, the bugs found in the river. These organisms reflect water quality much like the canary in the coal mine reflects air quality. The presence or absence, the abundance or scarcity of specific species of macroinvertebrates can tell a great deal about water quality and stream habitat. Macroinvertebrates such as insects, insect larvae, snails and crayfish are excellent indicators of stream quality. Water temperature, quality, type of stream substrate and type of food available determine the kinds of macroinvertebrates that inhabit a particular part of a stream. Macroinvertebrates are affected by the physical, chemical, and biological conditions of the stream. They cannot escape pollution and they are a critical part of the stream's food web. In addition, the relative sensitivity or tolerance of many macroinvertebrates is known. Thus, they provide a simple hands-on approach to understand and measuring stream health. BMI monitoring provides information beyond chemical analysis. The Chippewa River Watershed has a total stream network of over 2,000 miles. This includes both perennial and intermittent streams. The CRWP can not rely on chemical analysis alone as the sole determiner of watershed health and therefore established the BMI Biomonitoring Network.

The BMI Biomonitoring Network is a relatively new program of the Chippewa River Watershed Project. The BMI Biomonitoring Network is a collaboration between project staff, teachers and high school students. The first samples were collected in 2001 with the Benson High School. Since then staff have collected samples from project monitoring sites, and added four additional schools along with training several teachers and citizen monitors in the biomonitoring protocol. During the 2003-2004 BMI Biomonitoring Network collected samples from eleven sites. Samples were collected by high school students at five of those sites. This report discusses the results of the sampling during 2003-04 as well as gives a history of results at each site.

Methods

The protocols of the Chippewa River Watershed Project BMI Biomonitoring Network are primarily based on the methods employed by Fortin Consulting, Inc., a modified and user friendly approach to the protocols set forth by the National River Watch Network. BMI biomonitoring is undertaken in the spring and fall of the year. It is similar to a bird census. Participants go out to a site that is easily waded and collect the macroinvertebrates residing under and on the rocks and logs in the stream. These are then taken back to a lab where they are identified and recorded. While at the stream participants can also conduct a habitat assessment.



Understanding the Terms

Number of Organisms Identified– For the sampling and analysis protocol that the BMI Biomonitoring Network uses, it has been determined that a minimum of 100 correctly identified organisms is necessary to make an accurate assessment. When less than 100 organisms are identified, the information is still useful but cannot be relied upon for an accurate characterization of the site’s health.

Family Biotic Index (FBI)- Summarizes pollution tolerance values for all families in a sample. FBI scores range from 0-10, with lower values reflecting higher water quality in regards to organic pollution. Each macroinvertebrate family has a unique tolerance value assigned to it, with 0 being intolerant to pollution and 10 being the most tolerant to pollution. This analysis was developed by Hilsenhoff. The FBI tends to increase with pollution from organic material sources such as sewage or animal manure.

Interpreting the Results Using Hilsenhoff’s Family Level Biotic Index	
<i>FBI</i>	<i>Water Quality</i>
0-3.75	Excellent
3.76-4.25	Very Good
4.26-5.00	Good
5.01-5.75	Fair
5.76-6.50	Fairly Poor
6.51-7.25	Poor
>7.26	Very Poor

Habitat Score– reflects the ability of a site to host macroinvertebrates regardless of water quality. The site is scored using the habitat assessment based on the National River Watch Network’s protocol as found in Living Waters: Using Benthic Macroinvertebrates and Habitat to Assess Your River’s Health. Primary and secondary habitat characteristics are examined in the field and then rated on the Scoring Worksheet. Scores could range from 0-150, with a higher score reflecting better habitat quality. When ND (No Data) is indicated in the results, it indicates that habitat was not examined and scored at the time of sampling. Habitat assessment work is quite subjective and fluctuating scores might be more related to the samplers rather than actual habitat changes. The habitat assessment portion of the BMI Biomonitoring Network is looked upon more as a qualitative assessment rather than quantitative.

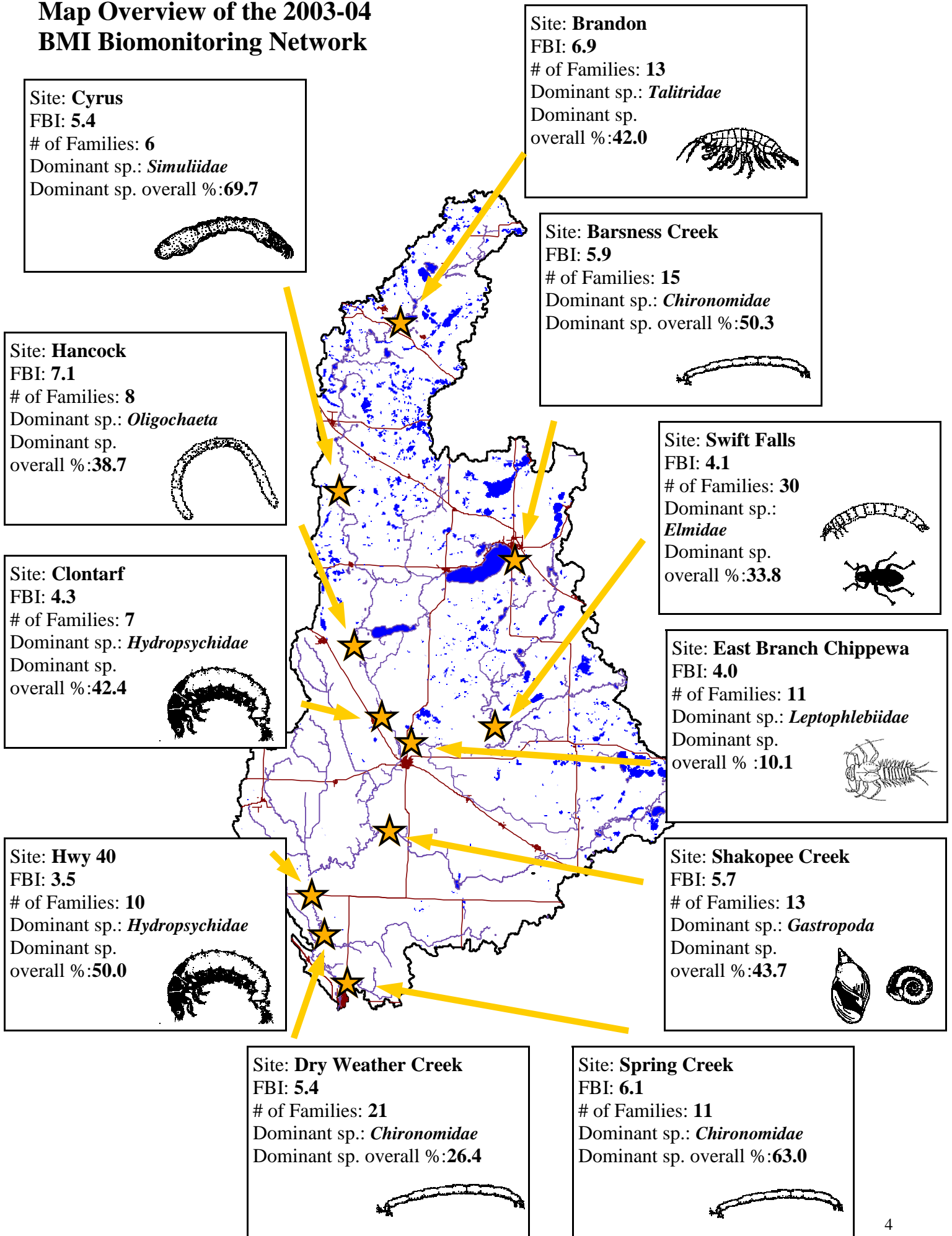
EPT Index– The number of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) families within the total invertebrate sample. These orders are known to contain many families that are sensitive to water quality changes and are pollution intolerant insects. Thus, the total number of taxa within the EPT insect groups is used to evaluate community balance. Healthy biotic conditions are reflected when these taxa are well represented in the benthic community. A higher EPT number is indicative of better water quality.

Number of Families– This is the total number of different families that were identified in the sample. It is a rough estimate of the diversity of the macroinvertebrate community. In general, more diversity is better. Therefore a large number of families tends to reflect higher water quality.

Dominant Family– The family which comprises the largest single portion of the total invertebrate sample.

Dominant Family Overall %– The dominant family’s percentage of the total invertebrate sample. A dominance of greater than 50% is an indication of low diversity and possible stream degradation.

Map Overview of the 2003-04 BMI Biomonitoring Network



Site 2– Cyrus

About the Site

This site is a primary monitoring site of the CRWP. It is located along the Chippewa River in Stevens County, Section 25 of Swan Lake Township. The river is a wide prairie river in this section.

About the Monitors

CRWP staff collects and identifies the macroinvertebrates from this site. Data has been collected since 2003.



Dominant Family



Simuliidae
(Black Fly))

Black flies are very common in Minnesota streams. They have a moderate tolerance for pollution and can be found in moderate to fast flowing streams. They are whitish-gray in color and have bowling pin shaped bodies. They can be up to 1/2” in length. Simuliidae use a brush like structure to filter fine organic matter from the water column. Black fly abundance is strongly related to time of year.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
2003	234	5.4	ND	4	6	Simuliidae	69.7

Order Composition of Sample		
Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	1.7%
Stoneflies	Plecoptera	0.0%
Caddisflies	Trichoptera	27.8%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	70.5%
Water Beetles	Coleoptera	0.0%
Aquatic Earthworms	Oligochaeta	0.0%
Damselflies, Dragonflies	Odonata	0.0%
Scuds	Amphipoda	0.0%
Others	Other	0.0%

Site Assessment

- FBI score indicates fair water quality
- EPT of 4 is rather low, additionally a very low percentage of Ephemeroptera and no Plecoptera
- Number of families identified is lower than the watershed average
- Family Simuliidae is moderately tolerant of pollution but has a high level of dominance in this sample indicating low diversity

Site 6—Clontarf

About the Site

This site is located on the Chippewa River about one mile east of Clontarf on County Road 22 in Swift County. Both sides of the banks are fairly wooded, with deadfall located upstream and downstream of the bridge.

About the Monitors

CRWP staff collects and identifies the macroinvertebrates from this site. Data has been collected since 2002.



Dominant Family



Hydropsychidae
(Common Net-Spinner)

The hydropsychid caddisfly is the most commonly collected caddisfly. It has a moderate pollution tolerance and is often found in moderate to slow flowing streams of moderate to low gradient. Hydropsychidae are distinguished by the pairs of fluffy gills found on the underside of their abdomens. They collect food by spinning a silk web between rocks that filters out organic matter.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
10/22/03	118	4.3	ND	3	7	Hydropsychidae	42.4
09/01/02	235	4.5	95	11	20	Hydropsychidae	26.7

Order Composition of Sample

Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	44.1%
Stoneflies	Plecoptera	0.0%
Caddisflies	Trichoptera	42.4%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	11.0%
Water Beetles	Coleoptera	1.7%
Aquatic Earthworms	Oligochaeta	0.0%
Damselflies, Dragonflies	Odonata	0.0%
Scuds	Amphipoda	0.8%
Others	Other	0.0%

Site Assessment

- FBI score indicates good water quality
- EPT is low despite the high sample composition percentage of both Ephemeroptera and Trichoptera.
- Number of families is below the watershed average
- Dominant Hydropsychidae is moderately tolerant to pollution and dominance is nearly the threshold of lowered diversity.
- Comparing the two years, FBIs were nearly identically but a decrease in all other indices raise concern

Site 9-East Branch Chippewa

About this Site

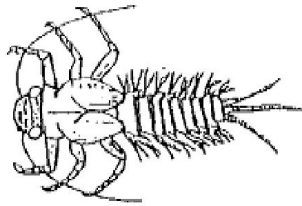
This site is located near the mouth of the East Branch Chippewa River. It is located in Swift County, ~1.5 miles northeast of Benson. The East Branch Chippewa River Watershed covers 323,767 acres and is the largest tributary to the Chippewa River. This portion of the East Branch has been channelized and a large amount of sediment tends to deposit in areas under the bridge. It is a highly used area as evidenced by the abundance of trash and debris frequently left on the banks.

About the Monitors

CRWP staff collects and identifies the macroinvertebrates from this site. Data has been collected since 2002.



Dominant Family



These are small mayflies distinguished by forked gills. They have a low tolerance to pollution and are often found in moderate to fast moving streams. Mayflies generally have three tails and only have one tarsal claw on the end of each leg.

Leptophlebiidae
(Prong-Gills Mayfly)

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
11/19/03	99*	4.0	ND	6	11	Leptophlebiidae	10.1
10/25/02	96*	5.3	ND	5	13	Chironomidae, Other	35.4

*Less than 100 identified organisms lowers sample integrity

Order Composition of Sample

Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	41.4%
Stoneflies	Plecoptera	10.1%
Caddisflies	Trichoptera	11.1%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	13.1%
Water Beetles	Coleoptera	8.1%
Aquatic Earthworms	Oligochaeta	0.0%
Damselflies, Dragonflies	Odonata	0.0%
Scuds	Amphipoda	0.0%
Others	Other	16.2%

Site Assessment

- FBI scores indicates very good water quality
- EPT is somewhat low although Ephemeroptera, Plecoptera, and Trichoptera comprise the largest percentage of the sample. Encouraging to see Stoneflies comprising 10% of the overall sample
- Number of families is near watershed average
- Dominant family has a low tolerance to pollution and the low dominance reflects high diversity amongst the sample
- Appears to be a general improvement from the previous year in all indices

Site 16-Shakopee Creek

About this Site

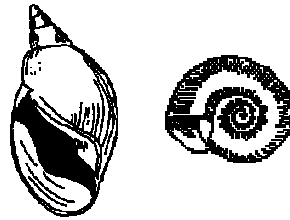
This site is on Shakopee Creek, 2 miles upstream from its confluence with the Chippewa River. It is in Swift County approximately 8 miles south of Benson, 2 miles west of State Highway 29, and 1 mile north of County Road 6. The Shakopee Watershed covers 197,111 acres with the majority of the stream having been channelized. There is little riffle habitat and high turbidity at this site.

About the Monitors

CRWP staff collects and identifies the macroinvertebrates from this site. Data has been collected since 2002.



Dominant Family



Gastropoda
(Snails)

Gastropoda is the class name for snails and limpits. Identification protocols do not require identification to the family level. Most snails have a high tolerance to pollution and can be found in slow to fast moving streams. Gastropods must be occupying their shell at the time of preservation to be counted in the identification analysis.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
11/19/03	96*	5.7	ND	6	13	Gastropoda	43.7
10/18/2002	310	4.4	ND	7	15	Chironomidae	33.2

*Less than 100 identified organisms lowers sample integrity

Order Composition of Sample

Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	6.8%
Stoneflies	Plecoptera	0.0%
Caddisflies	Trichoptera	5.8%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	26.2%
Water Beetles	Coleoptera	6.8%
Aquatic Earthworms	Oligochaeta	1.0%
Damselflies, Dragonflies	Odonata	2.9%
Scuds	Amphipoda	0.0%
Others	Other	50.5%

Site Assessment

- FBI score indicates fair water quality in regards to organic pollution
- EPT score lower than desired, but is still higher than many other monitored sites within the watershed
- Number of families represents the watershed average
- Gastropoda are mostly highly tolerant of pollution
- The required 100 organisms were not identified for this site. Although the results are quite similar to 2002 when an adequate number of organisms were identified.

Site 18-Highway 40

About this Site

This site is on the Chippewa River in Chippewa County. It is approximately 5.5 miles east of Milan on Highway 40. The river is quite wide at this section, with riffle, run and pool habitats. There is an island south of the bridge and canoe landing. Sampling is done in the channel on the side of the island.

About the Monitors

CRWP staff collects and identifies the macroinvertebrates from this site. Data has been collected since 2001.



Dominant Family



Hydropsychidae
(Common Net-Spinner)

The hydropsychid caddisfly is the most commonly collected caddisfly. It has a moderate pollution tolerance and is often found in moderate to slow flowing streams of moderate to low gradient. Hydropsychidae are distinguished by the pairs of fluffy gills found on the underside of their abdomens. They collect food by spinning a silk web between rocks that filters out organic matter.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
10/01/03	94*	3.5	95	7	10	Hydropsychidae	50.0
10/18/02	158	5.0	95	10	14	Oligochaeta	23.9
09/26/01	333	4.7	95	8	16	Baetidae	32.0

*Less than 100 identified organisms lowers sample integrity

Order Composition of Sample		
Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	35.4%
Stoneflies	Plecoptera	0.6%
Caddisflies	Trichoptera	50.0%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	6.0%
Water Beetles	Coleoptera	3.8%
Aquatic Earthworms	Oligochaeta	0.0%
Damselflies, Dragonflies	Odonata	0.3%
Scuds	Amphipoda	0.0%
Others	Other	3.8%

Site Assessment

- FBI score reflects excellent water quality
- EPT is acceptable
- Number of families is not very high but appears to be wide representation among the orders.
- Dominant family is moderately tolerant to pollution and dominance level is reaching threshold of impaired diversity
- Identified organisms fell short of the necessary 100 to make confident analysis
- Interesting note, the dominant family of 2002 Oligochaeta, was not present in the 2003 sample
- Continued monitoring needed to assess trends

Site 19—Dryweather Creek

About this Site

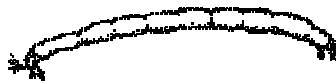
This site is on Dryweather Creek in Chippewa River a couple of river miles upstream from its confluence with the Chippewa River. The monitoring site is relatively natural compared to the heavily channeled stream and ditch system above it. There is a high abundance of riffle areas above and below the bridge.

About the Monitors

This is an established monitoring site for the CRWP with biomonitoring done by the Montevideo High School Students since 2002. The biology class under the direction of Steve Wolf collected and analyzed samples in 2003.



Dominant Family



Chironomidae
(Midges)

Chironomidae have a moderate to high pollution tolerance and can be found in all types of streams. The larvae have slender, slightly curved bodies, range in length (2-20 mm), and have a visible head. Adult midges are tiny flies.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
10/15/03	496	5.4	ND	10	21	Chironomidae, Other	26.4
09/28/02	313	4.7	ND	8	16	Hydropsychidae	49.5

Order Composition of Sample

Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	1.6%
Stoneflies	Plecoptera	1.0%
Caddisflies	Trichoptera	1.8%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	33.5%
Water Beetles	Coleoptera	26.2%
Aquatic Earthworms	Oligochaeta	16.1%
Damselflies, Dragonflies	Odonata	0.00%
Scuds	Amphipoda	0.00%
Others	Other	6.5%

Site Assessment

- FBI score reflects fair water quality
- EPT score is high
- Stoneflies present in sample
- Number of families is excellent
- Dominant family is pollution tolerant but it's low dominance, coupled with high family number indicates a diverse macroinvertebrate community
- Much lower percentage of caddisflies identified compared to 2002
- Sample timing relationship needs to be explored in coming monitoring seasons

Site 20-Spring Creek

About this Site

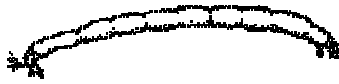
This site is located on Highway 29, ~.5 miles north of Montevideo in Chippewa County on Spring Creek. Spring Creek is a small watershed and the main target for the Montevideo well-head protection area. It is a heavily drained system, flashy system, with a steep gradient to the Chippewa River.

About the Monitors

This site has been sampled by either CRWP staff or Montevideo High School students since 2001. The samples in 2003 were collected and analyzed by CRWP staff.



Dominant Family



Chironomidae
(Midges)

Chironomidae have a moderate to high pollution tolerance and can be found in all types of streams. The larvae have slender, slightly curved bodies, range in length (2-20 mm), and have a visible head. Adult midges are tiny flies.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
11/05/03	108	6.1	ND	5	11	Chironomidae	63.0
9/27/02	198	6.9	ND	7	20	Talitridae	42.4
10/17/01	272	6.8	ND	4	14	Talitridae	55.9

Order Composition of Sample		
Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	3.7%
Stoneflies	Plecoptera	0.0%
Caddisflies	Trichoptera	6.5%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	63.0%
Water Beetles	Coleoptera	0.9%
Aquatic Earthworms	Oligochaeta	0.0%
Damselflies, Dragonflies	Odonata	0.0%
Scuds	Amphipoda	9.3%
Others	Other	16.7%

Site Assessment

- FBI scores ranks fairly poor water quality
- EPT is rather low, additionally there were no Plecoptera in the sample
- Number of families is acceptable
- Dominant family is pollution tolerant
- High level of dominance reflects lowered diversity
- Shift from Talitridae and a decline in the other indices triggers a need to watch this site

Site Swift Falls

About this Site

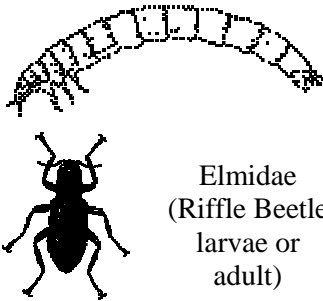
This site is on the East Branch Chippewa River as it flows through Swift Falls Park in Swift County. The site is located downstream of the dam. The channel is split with an island in the center of the channel. Monitoring takes place on the east side of the island.

About the Monitors

This site has been monitored by Benson High School Students since 2001. The environmental biology class under the direction of Matt Larson collected and analyzed samples in 2003. Other teachers instrumental in the BMI Network are Ruth Ahrndt and Renee Hayden.



Dominant Family



Elmidae
(Riffle Beetle
larvae or
adult)

Riffle beetles are one of the few beetle species which lives completely underwater in all life stages. They are moderately tolerant of pollution and are often found in moderate to fast flowing streams of any gradient. The small larvae (4-10 mm) are brown arc-shaped. The small adults (3-5 mm) have relatively long legs compared to their bodies.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
09/22/03	422	4.1	80	20	30	Elmidae	33.8
09/28/02	486	4.1	159	13	24	Baetidae	33.0
09/18/01	358	3.9	127	17	28	Baetidae	44.5

Order Composition of Sample

Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	49.1%
Stoneflies	Plecoptera	1.4%
Caddisflies	Trichoptera	8.6%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	3.7%
Water Beetles	Coleoptera	34.9%
Aquatic Earthworms	Oligochaeta	0.0%
Damselflies, Dragonflies	Odonata	1.14%
Scuds	Amphipoda	0.86%
Others	Other	0.3%

Site Assessment

- FBI score reflects very good water quality
- EPT very high, high percentage of Ephemeroptera and both Plecoptera and Trichoptera are present
- High number of species and relatively low family dominance suggest high macroinvertebrate diversity
- Large number of organisms identified and that contributes to both the high EPT and the high number of families
- Decreased habitat score is something to watch, could be the result of actual habitat degradation or monitor subjectivity

Site Brandon

About this Site

This site is the northern most site of the BMI network. It is located in Douglas County. The site near the outlet of a lake.

About the Monitors

Brandon High School students under the direction of Tom Otte joined the BMI Network in 2003.

No Available Photo

Dominant Family



Talitridae
(Scud)

Talitridae have a high tolerance for pollution and can often be found in slow moving areas of low gradient streams. They are crustaceans appear bleached white or orangeish when preserved. Scuds can swim very rapidly on their sides and are nicknamed “side-swimmer.”

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
09/20/03	100	6.9	ND	4	13	Talitridae	42.0

Order Composition of Sample		
Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	9.0%
Stoneflies	Plecoptera	0.0%
Caddisflies	Trichoptera	4.0%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	26.0%
Water Beetles	Coleoptera	1.0%
Aquatic Earthworms	Oligochaeta	1.0%
Damselflies, Dragonflies	Odonata	3.0%
Scuds	Amphipoda	42.0%
Others	Other	13.0%

Site Assessment

- FBI scores indicates poor water quality
- EPT score is low and there were no Plecoptera in the sample
- Number of families is higher than most sites throughout the watershed
- Talitridae is a high pollution tolerant family and was present in a fairly high dominance
- The first year of monitoring points towards an impaired water, additional years of data will help to truly characterize this site

Site Barsness Creek

About this Site

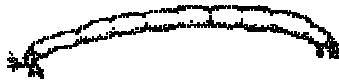
This site is on Barsness Creek that flows through Barsness Park in Glenwood, Pope County. It is a small tributary that flows directly to Lake Minnewaska. It is a shallow, narrow stream with rocky substrate bottom that exhibits riffle, run and pool habitats.

About the Monitors

This site has been monitored since 2002. It has been the site of CRWP training sessions and was most recently monitored by Minnewaska High School students under the direction of Vicky Peterson.



Dominant Family



Chironomidae
(Midges)

Chironomidae have a moderate to high pollution tolerance and can be found in all types of streams. The larvae have slender, slightly curved bodies, range in length (2-20 mm), and have a visible head. Adult midges are tiny flies.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
05/14/04	105	5.9	97	4	15	Chironomidae	50.3
05/05/03	100	6.0	71	3	9	Chironomidae	88.0
08/15/02	204	4.3	69	5	14	Baetidae	29.9

Order Composition of Sample		
Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	19.2%
Stoneflies	Plecoptera	0.3%
Caddisflies	Trichoptera	2.0%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	53.3%
Water Beetles	Coleoptera	1.0%
Aquatic Earthworms	Oligochaeta	1.3%
Damselflies, Dragonflies	Odonata	0.00%
Scuds	Amphipoda	0.99%
Others	Other	1.0%

Site Assessment

- FBI score indicates fairly poor water quality
- EPT is low, no Plecoptera and very few Trichoptera
- Number of families is higher than most sites
- Dominant family is pollution tolerant and nearly a dominance that points towards poor diversity
- Habitat score has improved consistently in the monitoring history, could be subjective or an indication of changing bank and streambed dynamics
- FBI and dominant family indices indicate a change from the first sampling date
- Sample timing should be investigated to see if spring vs. fall yields different results

Site Hancock

About this Site

This site is on the mainstem of the Chippewa River on County Road 2 in Pope County, ~3 miles east of Hancock. Just upstream of the monitoring site is the outlet of Lake Emily. This site has had moderate fish kills in the past and is also the site of a long-term citizen monitor.

About the Monitors

Hancock High School Students under the direction of Ben Tolles joined the BMI Biomonitoring Network in 2003.



Dominant Family



Oligochaeta
(Aquatic Earthworms)

Oligochaeta is the class name for aquatic earthworms. They have a high pollution tolerance and can be found in all types of streams. Aquatic earthworms have segmented bodies. Often severely impacted streams will have very large populations of these worms.

Date	# Identified	Family Biotic Index	Habitat Score	EPT Index	Number of Families	Dominant Family	Dominant Family Overall %
09/15/04	106	7.1	104	4	8	Oligochaeta	38.7

Order Composition of Sample		
Common Name	Order	Composition Percentage
Mayflies	Ephemeroptera	3.8%
Stoneflies	Plecoptera	0.9%
Caddisflies	Trichoptera	0.9%
Midges, Mosquitos, Aquatic Gnats, Flies	Diptera	31.1%
Water Beetles	Coleoptera	0.9%
Aquatic Earthworms	Oligochaeta	38.7%
Damselflies, Dragonflies	Odonata	0.0%
Scuds	Amphipoda	23.6%
Others	Other	1.9%

Site Assessment

- FBI score indicates poor water quality
- EPT is low, allow there was representation of all orders, mayflies, stoneflies and caddisflies
- Number of families is below the watershed average
- Dominant Oligochaeta is highly tolerant to pollution and represents a large portion of the overall sample
- Interesting note: A uncommon BMI to our samples, the Hydracarina (water mites), was identified in this sample
- This site is dominated by poor habitat and may be having a large influence on the BMI community