

## *River Watch Results*

### **Macroinvertebrate Monitoring (River Watch) Program**

One of the goals of the River Watch program is to promote an understanding of watersheds and how water quality is related to land use. The water quality found in one short stretch of stream does not just reflect what is happening in that one area, it reflects the water quality of all upstream areas draining into it. It is a goal of this program that it will encourage citizens to reflect on the connection between watershed land use and water quality and to take action to protect and improve our streams.

A healthy stream is home to a diverse invertebrate community. As the stream is degraded, the invertebrate community will change. For example, elevated sediment levels in a stream may fill in the niches among rocks that are normally occupied by different organisms, making it difficult for these animals to survive. With toxic pollutants there will be a general decline in the number and variety of all organisms. High amounts of organic pollution could lead to an increase in algal growth, which may increase the populations of organisms that graze for food. Organic material also uses oxygen as it decomposes, and too much organic decomposition can make dissolved oxygen levels so low that sensitive taxa cannot survive.

In addition, changes in the land along the stream can impact the animals that live in the stream. Removal of natural vegetation and trees from streambanks can cause the water to warm up, which can lower the level of dissolved oxygen. Fertilizer run-off may cause high levels of organic nutrients in the streams that may change water quality. As water quality worsens, the diversity seen in a healthy stream is reduced to a few taxa that can tolerate the degraded conditions.

Monitoring is conducted by schools in both fall (first week of October) and spring (the first week of May). Hennepin County River Watch staff selected all of the sites, choosing ones that are convenient for schools, are safe for students, and have adequate macroinvertebrate habitat.

#### ***Methods***

The methods used in the River Watch program are primarily based on National River Watch Network's benthic macroinvertebrate monitoring protocols and the Environmental Protection Agency's stream monitoring methods. They are described in the respective publications; *Living Waters: Using Benthic Macroinvertebrates and Habitat to Assess Your River's Health* and *Volunteer Stream Monitoring: A Methods Manual*.

At sites with adequately rocky substrate and gradient, monitoring is focused on collecting three replicate samples from riffle areas. In 2001, Hennepin County River Watch began incorporating some multi-habitat sampling methods based on EPA bio-assessment protocols. At sites with very small or non-existent riffle areas, d-nets are used to collect macroinvertebrates from overhanging roots, leaf-packs, woody debris and other habitat areas. In fall 2001, monitors at some of the sites with moderately adequate riffles made two riffle sample replicates and also collected one sample using multi-habitat methods. This multi-habitat method of sampling is now in use at all sites. In addition, volunteers conduct an assessment of habitat on their segment of the creek. The habitat assessment follows specific protocols, but it is fairly subjective.

Several steps are taken to ensure high quality and accurate data. Training sessions for participating teachers are held each year. These sessions include field work to learn the sampling and habitat assessment techniques, as well as lab work to learn how to identify the macroinvertebrates and record results. Hennepin County River Watch staff observes many of the schools' field and lab work in order to gain insight that will help improve the program. The formal results are distributed in the annual report. Hennepin County River Watch and Volunteer Stream Monitoring Partnership staff verifies identification of every macroinvertebrate that is turned in by schools, in order to report accurate results.

Two sites are located in the Pioneer-Sarah Creek watershed. **Site 12**, where the Crow River runs through the City of Rockford, has been monitored for eight years. Some of the metrics indicate a possible decline in water quality. Continued monitoring will be important to determine if a downward trend in stream health is occurring. Chemical monitoring results from the Rockford monitoring station should be compared to the biological monitoring. The Crow River has a high turbidity, due to soil erosion from its large agricultural watershed. Low oxygen level has been a concern for some areas of the Crow.

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This area hosts a variety of large, beautiful riffle areas and often shows the best water quality of the sample sites. However, since the river is wide and subject to flooding, it is sometimes too dangerous to do spring sampling. Because this site is on a large river, the results are not directly comparable to the majority of the River Watch sites which are located on small creeks. The biotic index frequently reflects good water quality at this site. In addition, this site also has high EPT and family diversity values. The dominant family has always been one of the EPT families which are the most sensitive to organic pollution and, therefore, their presence indicates good water quality.

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 area near the site was treated in 1999 and 2001. Treatments status is unknown for 2002 and later. The fall 2001 results are a combination of West Lutheran and Rockford High Schools monitoring efforts. Both schools also sampled in the fall of 2003 and spring 2004 (listed separately). This site has dropped from a stream quality grade of A- in 1996 to B in 2004. Continued monitoring will be important to determine if stream health is declining as indicated. Chemical monitoring results should be compared to the biological monitoring.

### **Results for Site 12**

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
9/24/96	▲	4.3	0*	9	14	Hydropsychidae	48.0	A-
5/30/97	▲	5.2	13	6	12	Baetidae	38.0	B-
10/1/97	▲	4.2	0*	4	11	Hydropsychidae	74.0	
9/30/98	▲	4.2	75	12	18	Hydropsychidae	64.0	A-
5/28/99	▲	4.7	0*	5	12	Hydropsychidae	33.0	B+
10/13/99	Ñ	4.3	104	9	14	Hydropsychidae	59.0	
5/3/00	▲	4.2	103	6	11	Hydropsychidae	68.0	B
10/5/00	▲	4.0	87	6	9	Hydropsychidae	90.0	
10/2/01	▲	4.0	118	7	11	Hydropsychidae	61.0	B-
10/2/02	164	4.5	89	7	14	Hydropsychidae	67.0	B+
10/1/03	201	4.0	0*	3	4	Hydropsychidae	96.5	B-
10/2/03	293	4.2	0*	5	11	Hydropsychidae	84.3	
5/4/04	138	2.6	0*	6	9	Perlodidae	72.0	B
5/13/04	73	4.7	0*	6	10	Perlodidae	23.0	
10/12/04	61	4.1	0*	5	9	Hydropsychidae	54.0	

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

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

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

**Site 24** is the program's first site on Pioneer Creek. It is located adjacent to an Independence city park surrounded by agricultural land that is being converted to suburban housing developments on the north side of the Creek. Several homes now border the creek and much of the native vegetation has been cleared around those homes. Destruction of the riparian buffer is evident. Students from Rockford High School and teacher Jason Hester began monitoring this site in spring 2001.

## ***River Watch Reults***

The data from this site reflects poor quality based on the family biotic index, EPT and number of families. A trend analysis based on limited data indicates a possible downward trend. The dominant family since 2001 has been a midge, a family that is pollution tolerant. This may be due, in part, to the habitat condition mentioned above. As more data is collected, monitors will be able to better characterize the overall ecological health of this site.

### **Results for Site 24**

Date	# Identified	Family Biotic Index	Habitat Score	EPT	Number of Families	Dominant Family	Dominant Family % overall	Stream Quality Grade
10/2/01	▲ □	7.3	110	1	11	Pelecypoda	24.0	C-
5/6/02	119	7.4	108	2	12	Talitridae	39.5	D+
10/2/02	188	7.9	106	2	6	Chironomidae, red	87.8	D+
5/1/03	134	7.9	0*	0	5	Chironomidae, other	91.0	D+
10/6/03	75	6.9	0*	0	9	Chironomidae, other	57.3	D+
5/4/04	104	6.5	0*	0	5	Chironomidae, other	61.0	D+

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

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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, below normal in the summer and wetter than normal in the fall. 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. Consistent monitoring provides data that enables resource managers to evaluate the success of such conservation practices.

Analyzing the health of the streams in Hennepin County is a complex task; macroinvertebrate monitoring provides a valuable overview of water quality. 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. The data collected each year add to the historical picture of the streams over time. The health of the sites reflects the land use in the watershed. Implementing best management practices (BMPs) can improve the water quality of the streams. Examples of BMPs include maintaining native vegetation along the streambanks, limiting livestock access to streams, avoiding the use of chemical fertilizers close to water resources, and limiting disturbance to natural stream channels when building nearby.

For additional information about this program or becoming a River Watch partner contact Jenny Schaust, Environmental Education Coordinator, at: 612-596-9129.