

## Appendix E. Benthic Water Quality

### E.1 Background

Benthic macroinvertebrates (BMI) are bottom dwelling insects and other small organisms that live in rivers, streams and lakes. They include the larval and adult stages of beetles, aquatic worms, dragonflies, damselflies, leeches, stoneflies, caddisflies, crustaceans, and mayflies. Generally speaking the BMI are abundant in most stream substrates and have fairly well known tolerances to pollution and habitat disturbances. They also provide a long term assessment of water and habitat quality as most are relatively sedentary, spend all or most of their lives in their aquatic environment and have life spans that last most of the year (or more). BMI are collected because they are relatively easy to sample and can be reliably identified at least to taxonomic levels suitable for monitoring purposes.

#### E.1.1 Background Data Collection and Assimilation

Historic benthic data for Oxford County was collected from conservation authorities and Ontario Ministry of Natural Resources (MNR) offices. After the information was compiled and assessed, data gaps were identified for further investigation.

#### E.1.2 Field Investigations

The Aquatic Technical Team agreed that additional benthic monitoring and a current benthic assessment were required to compliment the water quality information. The Ontario Benthos Biomonitoring Network (OBBN) protocol was followed to collect benthic information and more detailed habitat information. The Ontario Stream Assessment Protocol (OSAP) also contains the procedure to collect and analyse the benthic community.

27 benthic samples were collected in the summer and fall of 2005 and these samples were analysed during the following winter months. Benthic samples were collected at the same sites as the Provincial Water Quality Monitoring Network (PWQMN), and additional samples were taken throughout the County to provide graphically distributed baseline data.

#### E.1.3 Data Management and Maintenance

All data gathered was compiled in a Microsoft Access database. The OBBN provides the database to house the current data collected through a web application.



*Damselfly*

## E.2 Results and Findings

Results of the benthic analysis is summarised in Table E.1. The range of results of the benthic samples vary from excellent to fairly poor. Further investigation would be required to evaluate the indication of water quality in these streams. Future monitoring would also provide an indication of trends throughout the County.

**Table E.1. ONHS Benthic Water Quality Sampling Summary**

Conservation Authority	STREAM NAME	LOCATION	DATE	Family Biotic Index (FBI) Value	
Catfish Creek	Catfish Creek	College Line	10/31/2005	5.9214	Fairly Poor
Grand River	Alder Creek	Oxford Road 8	11/21/2005	4.8694	Good
	Horner Creek	Oxford Road 2 d/s bridge	10/26/2005	4.1032	Excellent
		MacGee Farm	10/13/2005	5.4505	Fair
		Oxford Road 8, West of Bright	10/26/2005	4.7817	Good
	Kenny Creek	Muir Road, South of Old Stage Road	10/26/2005	5.1921	Fair
	Nith River	U/S of Canning, Canning Rd, S. Twn Rd 3	10/26/2005	4.1827	Excellent
		Blenheim Road, North of Township Road	10/26/2005	3.9835	Excellent
		River Road, N. Plattsville	10/26/2005	5.0161	Fair
	Wilmot Creek	Oxford Road 42	10/26/2005	5.4176	Fair
	Washington Creek	Oxford Rd. 3, South of Washington	10/26/2005	6.4607	Fairly Poor
Long Point Region	Otter Creek	Bayham Road	10/31/2005	5.7862	Fairly Poor
		Rock's Mill New Road	10/31/2005	5.3211	Fair
		Maple Dell Road	10/26/2005	5.3582	Fair
		Evergreen Road	10/26/2005	6.8209	Poor
	Spittler Creek	Milldale Road	10/26/2005	5.6935	Fair
		Airport Road, Hwy 19	10/31/2005	6.5433	Poor
Upper Thames River		Brownsville Road	10/31/2005	7.1818	Poor
	Cedar Creek	Westend Park, Woodstock	5/18/2005	7.1004	Poor
	Middle Thames River	3 KM south of Thamesford	6/3/2005	5.7630	Fairly Poor
		Cty Rd 6 south of Embro	5/18/2005	5.9246	Fairly Poor
	Nissouri Creek	West of Embro	5/18/2005	5.0277	Fair
	Reynolds Creek	South of Putnam	6/3/2005	6.0507	Fairly Poor
	South Thames River	at Innerkip	5/18/2005	5.4907	Fair
			10/19/2005	5.3578	Fair
		South of Tavistock	5/18/2005	6.0178	Fair
	Downstream of Ingersoll	6/3/2005	7.3580	Very Poor	
	Trout Creek	Below junction of main tributaries	5/26/2005	6.2078	Fairly Poor

Biotic indices are values assigned to benthic invertebrate taxa indicating their pollution sensitivity and tolerance on a scale from 0 to 10. Lower numbers indicate pollution sensitivity and high numbers tolerance. The Family Biotic Index (FBI) is the weighted average of the biotic index and number of bugs in each taxon in the sample. The water quality ranges for the FBI values are as follows: <4.25 = Excellent; 4.25-5.00 = Good; 5.00-5.75 = Fair; -5.75-6.50 = Fairly Poor; 6.50 – 7.50 = Poor; >7.50 = Very Poor.

### **E.3 Technical Guidance**

The guidance points for the benthic monitoring are the same as those suggested for the Aquatic Resources in Appendix D. More emphasis would be placed on the continuous monitoring and adaptive management recommendations.

The information collected provides baseline data on aquatic ecosystems through a well distributed monitoring network in Oxford County. Further monitoring will allow for the assessment of changes over time, the evaluation of protective and remedial efforts and the recommendations for adaptive management.