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EAST TWIN RIVER WATERSHED  
HILSENHOFF SAMPLING  
SPRING AND FALL 1979  
by TIM DOELGER

East Twin R. 000  
W.D.F.

Introduction

This report identifies general water quality conditions throughout the East Twin River watershed. The primary purpose of the survey was to point out areas in the watershed with water quality problems caused by nonpoint sources. The data gathered can be used to direct efforts for future abatement of nonpoint source pollution. In certain instances, the survey may define localized water quality degradation from point sources. This, however, is an indirect product of the survey.

Water quality was determined using macroinvertebrate populations. Hilsenhoff's biotic index system was applied to the macroinvertebrates collected. Results will be used to identify water quality problem areas in the tributaries and streams of the basin.

6 stations were established and sampled in the watershed. The major sampling occurred during the spring and fall of 1979, and was accomplished by Linda Yogen of the Lake Michigan District.

Methods and Materials

Site Selection

The watershed was reviewed to determine the number of significant tributaries or branches to the mainstem. Stations were selected at crossroads for ease of access. The number of stations per tributary or branch was determined by the length of the stream. A long tributary may have several stations located along its reach while a short tributary may have only one station near its mouth. The stations were located along the tributary to reflect the water quality of the tributary. Combining the results of the separate tributaries provided an overall water quality evaluation of the entire river system.

Site selection at the station was mostly limited to acceptable riffle areas. If a station did not have good riffle areas, the station was moved upstream or downstream when conditions permitted. When conditions did not permit moving of the station, vegetation and debris were sampled.

Sampling Procedure

Each station was perused to determine the best area to obtain an acceptable sample. Good riffle areas with fast moving water upstream from the road crossing were first choice to eliminate any influence from the crossing. Other areas were selected when good riffle areas could not readily be found.

The sampling procedure utilized a D-Frame aquatic net. The D-Frame aquatic net was held against the substrate. The substrate was disturbed with one's feet directly above the D-Frame net. The dislodged insects were allowed to drift into the net held downstream. Sampling continued until more than 100 insects greater than 3 mm long were caught in the net. The insects and debris collected in the net were then transferred to a jar containing 95% alcohol. Vegetation and debris samples were hand washed in the D-Frame net until adequate numbers were reached. These samples were also placed in alcohol. All samples collected were returned to the lab for later sorting.

#### Sampling Sorting

Random picking of the macroinvertebrates from debris was done with a grid system. The sample was first rinsed with clean water and placed in a 7" x 12" glass tray set over a 1" numbered grid system. Sufficient water was added to cover debris, insects, and to facilitate even dispersal of the sample. Grid numbers were selected at random. All insects greater than 3 mm were picked from the consecutive numbered grids until 100 to 125 insects were obtained. Picking ceased at that point and the insects were placed in 70% alcohol for later transport to the University of Wisconsin Entomology Lab. Identification of the samples was conducted by Jeff Stevens at the U.W. Lab of Entomology under the direction of Dr. William Hilsenhoff, Professor of Entomology.

Hilsenhoff's Biotic Index was calculated by using the formula:

$$B.I = \frac{\sum n_j a_j}{N}$$

Where  $n_j$  is the number of each species,  $a_j$  is the value for that species (Appendix I), and  $N$  is the total number of arthropods in the sample (usually 100).

#### Water Quality Determination from Biotic Index Values

Biotic Index	Water Quality	State of the Stream
0 - 1.75	Excellent	No organic Pollution
1.76 - 2.25	Very Good	Possible Slight Pollution
2.26 - 2.75	Good	Some Pollution
2.76 - 3.50	Fair	Significant Pollution
3.51 - 4.25	Poor	Very Significant Pollution
4.26 - 5.00	Very Poor	Severe Pollution

The Biotic Index value indicated in ( ) was calculated for each stream using a value of 3 for Caenis, Gneumatopsysche, and the Symphitopsysche bifida group. The other calculated number did not use these insects.

### Discussion

Sampling using the described methodology was conducted in the watershed during spring and fall, 1979, to ascertain its water quality. The site locations and their physical characteristics are found on the attached maps and in Table 1.

Results of the sampling are found in Tables 2 and 3.



± Grid based on Wisconsin coordinate system, north-south control roots.

Compiled from U.S.G.S. 0-50,000 scale maps

DATE: JAN. 1978

SCALE: 1" = 1 MILE

STATE OFFICE BUILDING  
DIVISION OF TRANSPORTATION

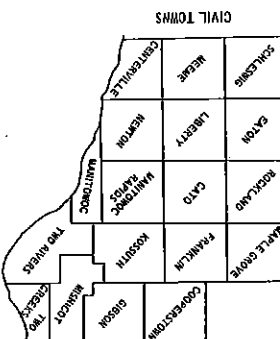
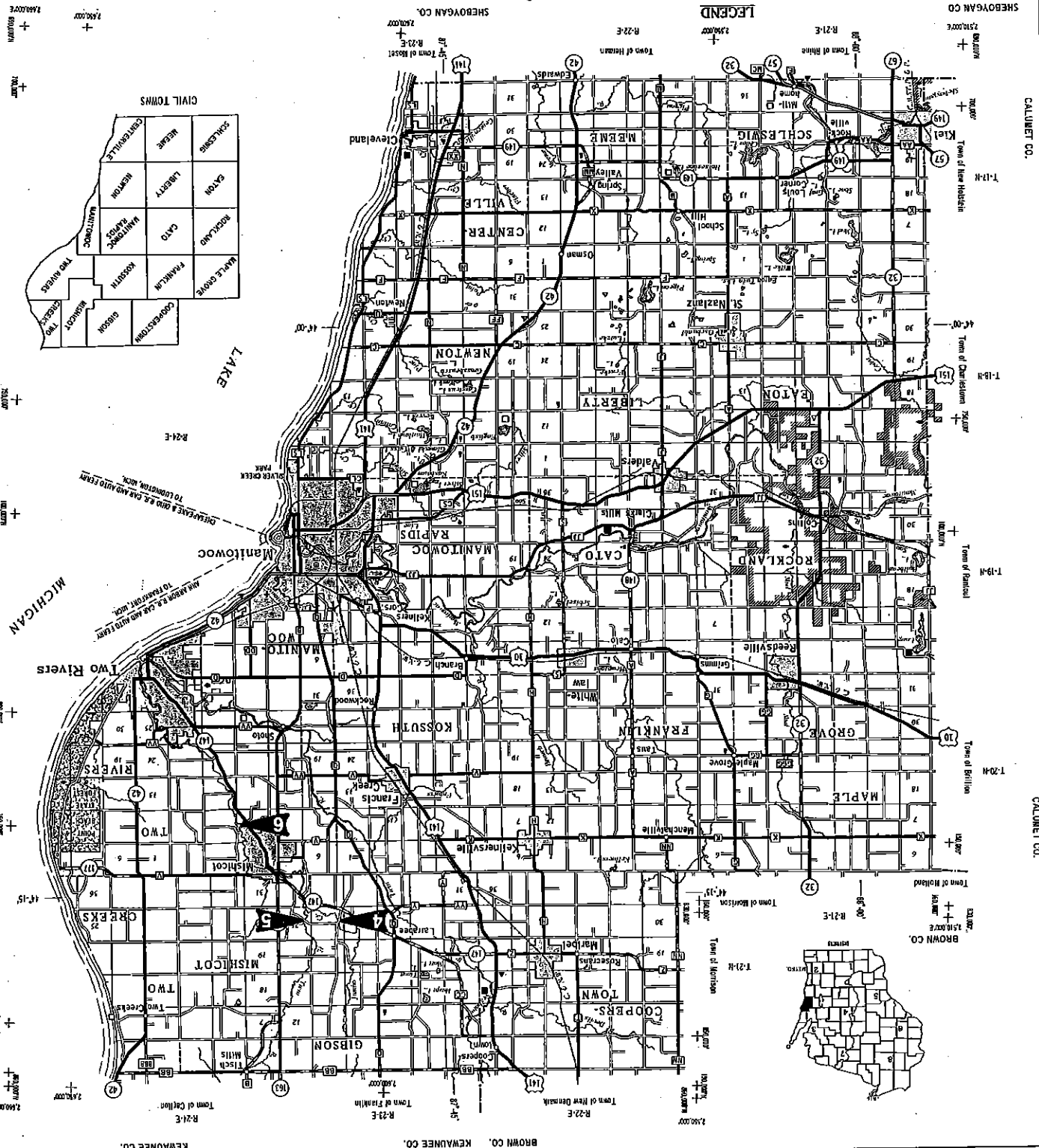
MANITOWOC CO.

6	5	4	3	2	1
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

TOWNSHIP NUMBERS

- U.S. STATE
- County Line
- State Boundary
- County Boundary
- City Boundary
- Town Boundary
- Public Road
- Private Road
- Highway
- Interstate Highway
- U.S. Highway
- State Highway
- County Highway
- County Street
- Local Road
- Other Road
- TOTAL FOR COUNTY

- U.S. STATE
- County Line
- State Boundary
- County Boundary
- City Boundary
- Town Boundary
- Public Road
- Private Road
- Highway
- Interstate Highway
- U.S. Highway
- State Highway
- County Highway
- County Street
- Local Road
- Other Road
- TOTAL FOR COUNTY



CIVIL TOWNS			
COOPERSTOWN	FRANKLIN	ROCKLAND	SH. LANSING
GIBSON	MANITOWOC	CATO	NEWTON
LIBERTY	NEWTON	LIBERTY	NEWTON
NEWTON	NEWTON	NEWTON	NEWTON
NEWTON	NEWTON	NEWTON	NEWTON

LAKE MICHIGAN

TWO RIVERS

MANITOWOC RAPIDS

LIBERTY

CATO

NEWTON

FRANKLIN

ROCKLAND

SH. LANSING

COOPERSTOWN

GIBSON

LIBERTY

NEWTON

NEWTON

NEWTON

NEWTON

NEWTON

East Twin River Watershed

Table 1

SAMPLE #	STREAM	STATION LOCATION	DATE	SUBSTRATE	ST. CHAR.		CURRENT	SAMP. STRUCT.
					WIDTH	DEPTH		
1	East Twin River	Krok Rd.	5/29/79	Rock, Gravel	15'	.5-2'	Slow	Rock
	East Twin River	Krok Rd.	11/5/79	Silt	10-15'	1-1.5'	Slow	Rock
2	Tributary to East Twin R.	CTH BB	5/3/79	Rock, Sand	10'	3'	Fast	Riffle
	Tributary to East Twin R.	CTH BB	11/5/79	Rock, Sand	8-10'	1'	Fast	Riffle
3	East Twin	Nuclear Road	5/29/79	Sandy Loam	12'	.5-2.5'	Moderate	Rocks Debris
	East Twin	Nuclear Road	11/5/79	Silt	15-20'	.5-1'	Slow	Rocks Debris
4	Jambo Creek	Jambo Creek Rd.	6/4/79	Rock	5-8'	.5-2'	Fast	Riffle
	Jambo Creek	Jambo Creek Rd.	11/5/79	Rock	8-10'	.5-1'	Fast	Riffle
5	East Twin R.	Rock Ledge Rd.	6/4/79	Rock, Sand	40'	.5-2'	Fast	Riffle
	East Twin R.	Rock Ledge Rd.	11/5/79	Rock, Sand	20'	.5-1.5'	Fast	Riffle
6	East Twin R.	Stiener Drive	5/29/79	Gravel, Sand	15-20'	.5-2'	Moderate	No Riffle
	East Twin R.	Stiener Drive	11/5/79	Gravel, Sand	10-15'	.5-1'	Fast	Riffle

Watershed: East Twin River

Stream: East Twin River

Station #: 1

Spring

Table 2

Fall

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
<u>Perlesta</u>	<u>placida</u>	2	2	4	<u>Cheumatopsyche</u>		4		6
<u>Baetis</u>	<u>phoebus</u>	27	2	54	<u>Pycnopsyche</u>	<u>diversa</u>	3	2	4
<u>Baetis</u>	<u>brunneicolor</u>	18	2	36	<u>Lype</u>	<u>bifida gr</u>	4	1	4
<u>Pseudocloeon</u>	<u>punctiventris</u>	3	2	6	<u>Symphiotopsyche</u>	<u>slossonae</u>	1	1	1
<u>Stenacron</u>	<u>interpunctatum</u>	3	3	9	<u>S.</u>	<u>interpunctatum</u>	2	2	2
<u>Antocha</u>	<u>spp.</u>	1	2	2	<u>Stenacron</u>		2	3	6
<u>Gammarus</u>	<u>pseudotimneus</u>	3	2	6	<u>Leptophlebia</u>		28	2	56
<u>Pycnopsyche</u>	<u>spp.</u>	4	2	8	<u>Dubiraphia</u>		10	3	30
<u>Helicopsyche</u>	<u>borealis</u>	1	2	2	<u>Galopteryx</u>		1	2	2
<u>Mystacidae</u>	<u>sepuichralis</u>	2	2	4	<u>Gammarus</u>	<u>pseudotimneus</u>	4	2	8
<u>Anabolia</u>	<u>all</u>	11	2	22	<u>Empididae</u>		1	3	3
<u>Limnephilus</u>	<u>spp.</u>	1	2	2	<u>Ptilaria</u>		3	3	9
<u>Cheumatopsyche</u>	<u>slossonae</u>	5	2	10	<u>Chrysops</u>		7	3	21
<u>Symphiotopsyche</u>	<u>spp.</u>	1	2	2	<u>Stimulium</u>	<u>vittatum</u>	15	4	60
<u>Polypedilum</u>	<u>spp.</u>	7	3	21	<u>Microtendipes</u>		2	3	6
<u>Stempellinella</u>	<u>spp.</u>	6	2	12	<u>Paracladopelma</u>		1	3	3
<u>Orthocladus</u>	<u>spp.</u>	3	3	9	<u>Brillia</u>		2	3	6
<u>Cricotopus</u>	<u>spp.</u>	1	4	4	<u>Paratendipes</u>		1	2	2
<u>Eukiefferiella</u>	<u>spp.</u>	1	2	2	<u>Micropsectra</u>		10	3	30
<u>Rheotanytarsus</u>	<u>spp.</u>	1	3	3	<u>Zavrelimyia</u>		1	4	4
<u>Conchapeloptia</u>	<u>spp.</u>	1	3	3	<u>Conchapeloptia</u>		1	3	3
<u>Micropsectra</u>	<u>spp.</u>	2	3	6	<u>Chironomus</u>		1	5	5
<u>Cladotanytarsus</u>	<u>sp. C.</u>	1	3	3	<u>Cricotopus</u>		2	4	8
					<u>Chaetocladus</u>		2	3	6
					<u>Paratanytarsus</u>		1	3	3
		100		220			104		286

BI = 2.20 (2.24)

BI = 2.75 (2.76)

Watershed: East Twin River  
 Stream: Tributary of East Twin River Station #: 2

*Fisch Mills Creek*

Spring

Table 2

Fa11

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
<u>Isoperla</u>	<u>signata</u>	1	1	1	<u>Cheumatopsyche</u>	<u>betteni</u>	5	3	3
<u>Ephemera</u>	<u>subvaria</u>	32	1	32	<u>Hydropsyche</u>	<u>atterima</u>	1	2	2
<u>Stenonema</u>	<u>femoratum</u>	1	3	3	<u>Chimarra</u>	<u>slossonae</u>	1	2	2
<u>Paraleptophlebia</u>	<u>spp.</u>	11	1	11	<u>Symphitopsyche</u>	<u>bifida</u> G.	3	2	6
<u>Statis</u>	<u>spp.</u>	1	2	2	<u>S.</u>	<u>riola</u>	1	1	1
<u>Nigronia</u>	<u>serricornis</u>	1	1	1	<u>S.</u>		8	1	3
<u>Optioservus</u>	<u>larvae</u>	1	2	10	<u>Glossosoma</u>	<u>subvaria</u>	3	1	3
<u>Stenelmis</u>	<u>crenata</u>	5	3	10	<u>Ephemera</u>	<u>fastiditus</u>	81	2	81
<u>Prosimulium</u>	<u>magnum</u>	1	1	3	<u>Optioservus</u>	<u>vicarium</u>	2	2	4
<u>Simulium</u>	<u>tuberosum</u>	4	2	4	<u>O.</u>		1	2	2
<u>Simulium</u>	<u>venustum</u>	3	3	6	<u>Stenonema</u>		1	1	1
<u>Antocha</u>	<u>spp.</u>	10	2	30	<u>Dicranota</u>		1	2	1
<u>Gammarus</u>	<u>pseudotimneus</u>	2	2	4			1	1	4
<u>Erioptera</u>		6	2	12			2	1	2
<u>Pycnopsyche</u>		1	3	3			1	2	1
<u>Neophylax</u>		1	2	6			1	2	6
<u>Limnephilus</u>		3	2	12			1	2	12
<u>Conchapelopia</u>		6	2	12			1	2	12
<u>Orthocladus</u>		1	3	3			1	3	3
		1	3	12			1	3	12
		4	3	12			4	3	12
		12	3	36			12	3	36
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		6	2	12			6	2	12
		1	3	3			1	3	3
		3							



Watershed: East Twin River

Stream: East Twin River

Station #: 3

Spring

Table 2

Fall 1

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
<u>Caenis</u>	<u>interpunctatum</u>	2			<u>Stenacron</u>	<u>interpunctatum</u>	2	3	6
<u>Stenacron</u>	<u>quadri-notata</u>	5	3	15	<u>Caenis</u>		1	3	3
<u>Dubiraphia</u>	<u>vitata</u>	1		6	<u>Stenelmis</u>		1	3	3
<u>Macronychos</u>	<u>glabratus</u>	1	2	2	<u>Dubiraphia</u>		11	3	33
<u>Baetis</u>	<u>phoebus</u>	1	2	2	<u>Enallagma</u>		2	3	6
<u>Empididae</u>	<u>all</u>	1	3	3	<u>Asellus</u>	<u>intermedius</u>	1	5	5
<u>Asellus</u>	<u>intermedius</u>	5	5	25	<u>Stictiochironomus</u>		11	3	33
<u>Pycnopsyche</u>	<u>spp.</u>	3	2	6	<u>Chironomus</u>		58	5	29
<u>Psychomyia</u>	<u>flavida</u>	1	2	2	<u>Cryptochironomus</u>		3	4	12
<u>Symphitopsyche</u>	<u>bifida</u> G.	1	4	4	<u>Microtendipes</u>		13	3	39
<u>Cricotopus</u>	<u>spp.</u>	45	3	180	<u>Paratendipes</u>		8	3	24
<u>Cladotanytarsus</u>	<u>sp. C.</u>	10		36	<u>Cladotanytarsus</u>	<u>sp. B.</u>	1	2	2
	<u>sp. B.</u>	2		3			10	3	30
<u>Micropsectra</u>	<u>spp.</u>	1	3	3					
<u>Conchapelopia</u>	<u>spp.</u>	3	3	9					
<u>Polypedilum</u>	<u>spp.</u>	1	3	3					
<u>Microtendipes</u>	<u>spp.</u>	1	3	3					
<u>Rheotanytarsus</u>	<u>spp.</u>	2	3	6					
		84		295			121		483

BI = 3.51 (3.49)

BI = 3.99 (3.98)

Watershed: East Twin River

Stream: Jambo Creek

Station #: 4

Spring

Table 2

Fall

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
<u>Perlesta</u>	<u>placida</u>	1	2	2	<u>Cheumatopsyche</u>		11	2	12
<u>Baetis</u>	<u>phoebus</u>	47	2	94	<u>Pycnopsyche</u>	<u>flavida</u>	6	2	2
<u>Pseudocloeon</u>	<u>dubium</u>	1	2	2	<u>Psychomyia</u>	<u>riola</u>	1	2	2
<u>Heptagenia</u>	<u>hebe</u>	2	1	2	<u>Symphitopsyche</u>	<u>slossonae</u>	3	2	6
<u>Helichus</u>	<u>striatus</u>	1	2	2	<u>S.</u>	<u>sparma</u>	2	2	4
<u>Stenelmis</u>	<u>larvae</u>	1	3	3	<u>S.</u>		1	1	1
<u>Optioservus</u>	<u>fastiditus</u>	1	2	2	<u>Taeniopteryx</u>		9	1	9
<u>Stimulium</u>	<u>venustum</u>	2	3	6	<u>Leptophlebia</u>		1	2	2
<u>Stimulium</u>	<u>vittatum</u>	7	4	28	<u>Stenonema</u>	<u>vicarium</u>	3	1	3
<u>Stimulium</u>	<u>verecundum</u>	2	3	6	<u>Optioservus</u>	<u>pseudolimneus</u>	2	2	4
<u>Stimulium</u>	<u>tuberosum</u>	2	2	4	<u>Gammarus</u>		1	2	2
<u>Orthocladus</u>	<u>spp.</u>	15	3	45	<u>Dicranota</u>		2	2	4
<u>Conchapelopia</u>	<u>spp.</u>	3	3	9	<u>Antocha</u>	<u>vittatum</u>	10	4	40
<u>Polypedilum</u>	<u>spp.</u>	1	3	3	<u>Stimulium</u>		3	4	9
<u>Cricotopus</u>	<u>spp.</u>	1	4	4	<u>Orthocladus</u>		1	3	3
<u>Eukiefferiella</u>	<u>spp.</u>	2	2	4	<u>Microtendipes</u>		1	3	3
<u>Micropsectra</u>	<u>spp.</u>	1	3	3	<u>Stictiochironomus</u>		1	3	3
<u>Tanytarsus</u>	<u>spp.</u>	1	3	3	<u>Parametriochimus</u>	<u>sp. A.</u>	1	3	3
<u>Chaetocladus</u>	<u>sp. C.</u>	1	3	3					
		92		225			49		111

BI = 2.45

BI = 2.27 (2.40)

Watershed: East Twin River  
 Stream: East Twin River Station #: 5

Spring

Table 2

Fall

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
<u>Perlesta</u>	<u>placida</u>	9	2	18	<u>Cheumatopsyche</u>		8	3	21
<u>Baetis</u>	<u>phoebus</u>	52	2	104	<u>Hydropsyche</u>	<u>NR. demora</u>	7	2	7
<u>Pseudocloeon</u>	<u>punctiventris</u>	15	2	30	<u>Psychomyia</u>	<u>flavida</u>	2	2	2
<u>Caenis</u>		3			<u>Symphitopsyche</u>	<u>bifida</u> G.	26		
<u>Heptagenia</u>	<u>hebe</u>	1	1	1	<u>Leptophlebia</u>		2	2	4
<u>Stenonema</u>	<u>mediopunctatum</u>	1	2	2	<u>Stenacron</u>	<u>interpunctatum</u>	4	3	12
<u>Stenacron</u>	<u>interpunctatum</u>	2	3	6	<u>Stenonema</u>	<u>mediopunctatum</u>	21	2	42
<u>Stenelmis</u>	<u>Larvae</u>	2	3	6	<u>Dubiraphia</u>	<u>vittata</u>	1	3	3
<u>Optioservus</u>	<u>Larvae</u>	1	2	2	<u>Ectopria</u>	<u>nervosa</u>	1	2	2
<u>Stenelmis</u>	<u>crenata</u>	2	3	6	<u>Stenelmis</u>		9	3	27
<u>Antocha</u>	<u>spp.</u>	2	2	4	<u>S.</u>	<u>crenata</u>	8	3	24
<u>Optioservus</u>	<u>fastiditus</u>	2	2	4	<u>Optioservus</u>		7	2	14
<u>Psychomyia</u>	<u>flavida</u>	1	2	2	<u>O.</u>	<u>fastiditus</u>	1	2	2
<u>Hydropsyche</u>	<u>betteni</u>	1	3	3	<u>Antocha</u>		5	2	10
<u>Cricotopus</u>	<u>spp.</u>	15	4	60	<u>Microtendipes</u>		1	3	3
<u>Microtendipes</u>	<u>spp.</u>	1	3	3					
<u>Polypedilum</u>	<u>spp.</u>	2	3	6					
<u>Orthocladus</u>	<u>spp.</u>	1	3	3					
				260					168
BI = 2.36 (2.38)				110	BI = 2.40 (2.59)				70

Watershed: East Twin River

Stream: East Twin River

Station #: 6

Spring

Table 2

Fall

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
Baetis	phoebus	8	2	16	Cheumatopsyche		32		
Baetis	pygmaeus	1	3	3	Pycnopsyche		1	2	2
Pseudocloeon	punctiventris	42	2	84	Symphitopsyche	bifida G.	8		
Stenacron	interpunctatum	1	3	3		interpunctatum	8	2	16
Ischnura	verticalis	1	4	4			1	3	3
Dubiraphia	vittata	9	3	27			3	2	9
Empididae	all	1	3	3			1	4	4
Simulium	jenningsi	10	2	20		glabratulus	1	3	3
Aseplus	intermedius	3	5	15		azteca	1	4	4
Hydropsyche	cuanis	1	3	3		intermedius	9	5	45
Polypedilum	spp.	5	3	15			4	3	12
Conchapelopia	spp.	3	3	9			4	3	12
Dicrotendipes	spp.	1	3	3			1	3	3
Cricotopus	spp.	2	4	8		sp. A.	19	3	57
Orthocladus	spp.	1	4	4			2	3	6
Cladotanytarsus	sp. C.	4	3	12			1	4	4
	sp. B.	1	2	2			1	5	5
Eukiefferiella	spp.	1	2	2					
Microcricotopus		1	3	3					
Cryptotendipes		1	3	3					
Micropsyche	spp.	1	3	3					
		98		243			52		168

BI = 2.48

BI = 3.23 (3.13)

Watershed: East Twin River

Table 3

Spring Sampling

Fall Sampling

Stream	Sample Number	No. of Individuals	No. of Insects Not Used	Biotic Index Value	Rating	No. of Individuals	No. of Insects Not Used	Biotic Index Value	Rating
East Twin River	1	100	11	2.20 (2.24)	V. Good	104	14	2.75 (2.76)	Fair-Good
Tributary of East Twin R. - <i>2 Fish Mill Creek</i>	2	94	2	1.67	Excell.	95	14	1.12 (1.23)	Excell.
East Twin River	3	84	3	3.51 (3.49)	Poor-Fair	121	1	3.99 (3.98)	Poor
Jambo Creek	4	92	1	2.45	Fair	49	15	2.27 (2.40)	Good
East Twin River	5	110	3	2.36 (2.38)	Good	70	40	2.40 (2.59)	Good
East Twin River	6	98	2	2.48	Good	52	33	3.23 (3.13)	Fair

