

EAST TWIN RIVER WATERSHED
HILSENHOFF SAMPLING
SPRING AND FALL 1979

by TIM DOELGER

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 Vogen 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.

East Twin R. WOU
W.P.F.

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

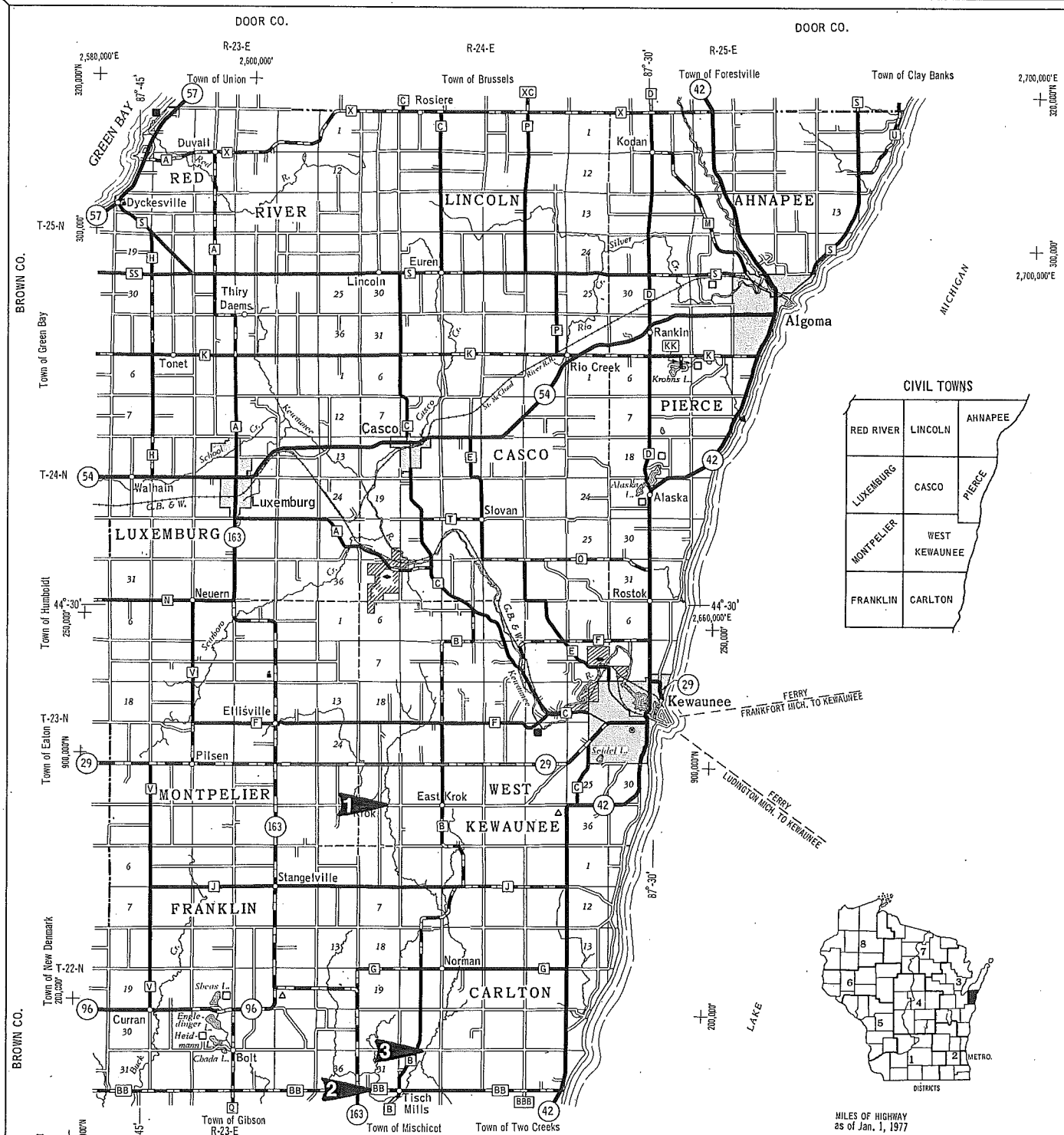
Biotic Index	Water Quality	State of the Stream
0 - 1.75	Excellent	No organic Pollution
1.76 - 2.25	Very Good	Possible Slight Pollution
2.26 - 2.75	Good	Some Pollution
2.76 - 3.50	Fair	Significant Pollution
3.51 - 4.25	Poor	Very Significant Pollution
4.26 - 5.00	Very Poor	Severe Pollution

The Biotic Index value indicated in () was calculated for each stream using a value of 3 for Caenis, Cheumatopsyche, and the Symphitopsyche 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.



CIVIL TOWNS

RED RIVER	LINCOLN	AHNAPEE
LUXEMBURG	CASCO	PIERCE
MONTPELIER	WEST KEWAUNEE	
FRANKLIN	CARLTON	



MILES OF HIGHWAY as of Jan. 1, 1977

STATE	85
COUNTY	189
LOCAL ROADS	520
OTHER ROADS	3
TOTAL FOR COUNTY	797

- LEGEND**
- Portland Cement U.S. & STATE COUNTY
 - Bitum. Concrete
 - Bituminous
 - Gravel
 - Earth
 - Town Road
 - Fire Lane
 - Multilane Divided
 - Freeway
 - Interchange
 - Highway Separation
 - Interstate Highway No.
 - U.S. Highway No.
 - State Highway No.
 - County Hwy. Letter
 - Railroad
 - Dom.
 - State Boundary
 - County Boundary
 - Civil Town Boundary
 - Corporate Limits
 - Nat. & State Forests
 - Airport
 - Fish Hatchery
 - Game Farm
 - County Seat
 - Unincorp. Village
 - Schools
 - Public Hunt. or Fish. Grds.
 - Hospital
 - Ranger Station
 - Public Camp & Picnic Grds.
 - State Park - With Campsites
 - State Park - Without Campsites
 - County Park - With Facilities
 - County Park - Without Facilities
 - Wayside - With Facilities
 - Wayside - Without Facilities

TOWNSHIP NUMBERING

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

KEWAUNEE CO.
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OFFICE BUILDING
Madison, Wisconsin

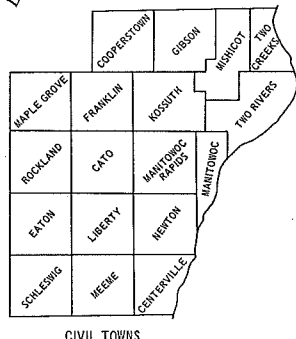
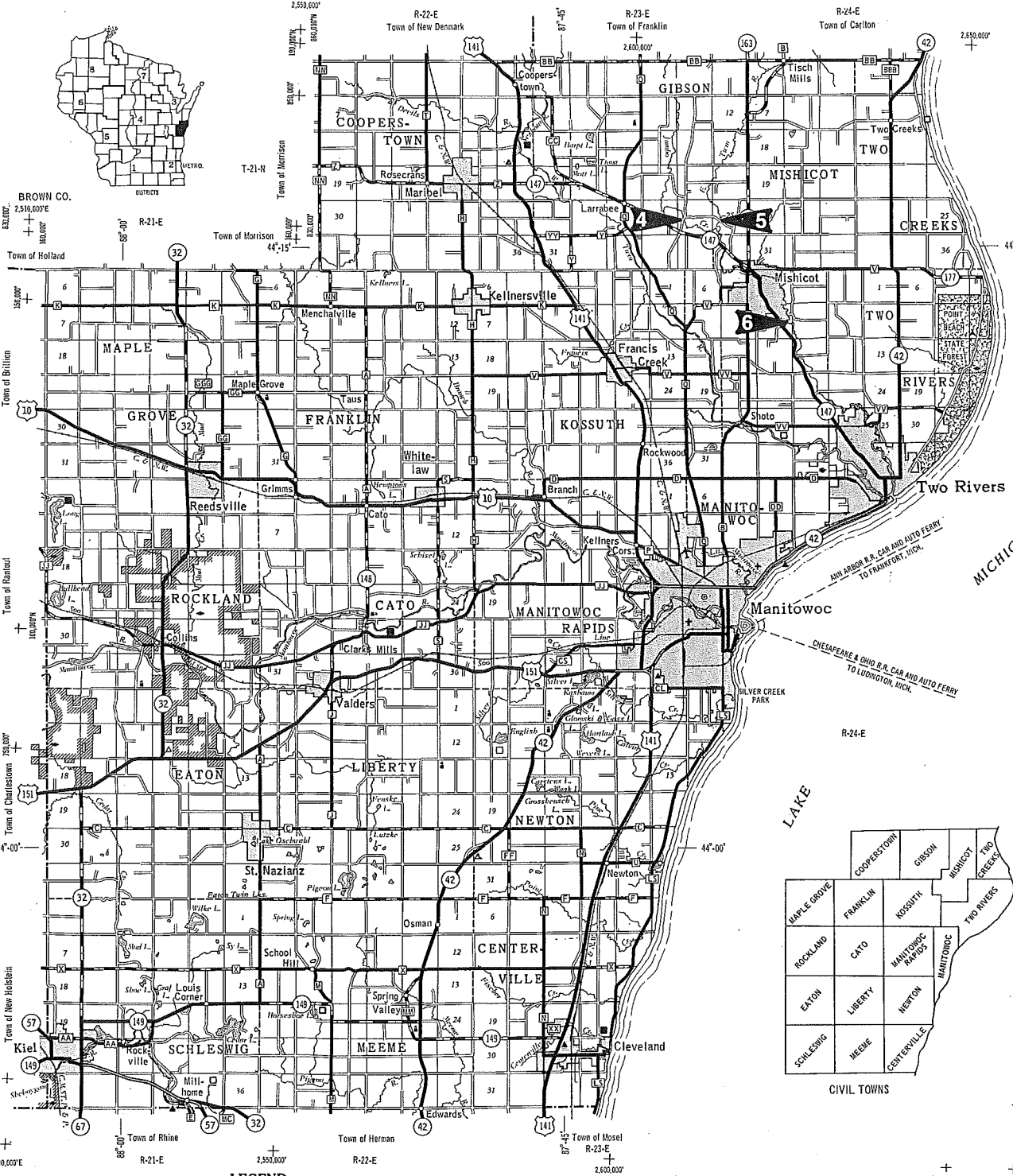
SCALE 0 1 2 MILES

Corrected for
JAN, 1978

Compiled from U.S.G.S. Quadrangles
Based on Aerial Photographs

Grid based on Wisconsin coordinate system, north-central zones.

Land Area 331 Sq. Mi.
Population 18,905
County Seat Kewaunee



LEGEND

Portland Cement	U.S. & STATE	Railroad	Ranger Station
Bitum Concrete	COUNTY	Dam	Public Camp & Picnic Grds.
Biluminous		State Boundary	State Park - WITH Complexes
Gravel		County Boundary	State Park - WITHOUT Complexes
Earth		Civil Town Boundary	County Park - WITH Facilities
*Town Road		Corporate Limits	County Park - WITHOUT Facilities
Fire Lane		Nat. & State Forests	Wayside - WITH Facilities
Multilane Divided		Airport	Wayside - WITHOUT Facilities
Freeway		Fish Hatchery	
Interchange		Game Farm	
Highway Separation		County Seal	
Interstate Highway No.		Unincorp. Village	
U.S. Highway No.		Schools	
State Highway No.		Public Haul. or Fish. Grds.	
County Hwy. Letter		Hospital	

*Surface types on town roads not shown.

MILES OF HIGHWAY as of Jan. 1, 1977

STATE	187
COUNTY	257
LOCAL ROADS	1355
OTHER ROADS	8
TOTAL FOR COUNTY	1537

TOWNSHIP NUMBERING

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

Land Area: 839 Sq. Mi.
Population: 81,559
County Seal: Manitowoc

MANITOWOC CO.
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OFFICE BUILDING
Madison, Wisconsin

SCALE 0 1 2 MILES

Corrected for
JAN. 1978

Compiled from U.S.G.S. Quadrangles
Based on Aerial Photographs

Grid based on Wisconsin coordinate system, south-central zones.

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

Table 2

Spring

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		
<u>Baetis</u>	<u>phoebus</u>	27	2	54	<u>Pycnopsyche</u>		3	2	6
<u>Baetis</u>	<u>brunneicolor</u>	18	2	36	<u>Lype</u>	<u>diversa</u>	4	1	4
<u>Pseudocloeon</u>	<u>punctiventris</u>	3	2	6	<u>Symphitopsyche</u>	<u>bifida gr</u>	1	1	1
<u>Stenacron</u>	<u>interpunctatum</u>	3	3	9	<u>S.</u>	<u>slossonae</u>	2	2	4
<u>Antocha</u>	<u>spp.</u>	1	2	2	<u>Stenacron</u>	<u>interpunctatum</u>	2	3	6
<u>Gammarus</u>	<u>pseudolimneus</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>Calopteryx</u>		1	2	2
<u>Mystacidae</u>	<u>sepuichralis</u>	2	2	4	<u>Gammarus</u>	<u>pseudolimneus</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>Pilaria</u>		3	3	9
<u>Cheumatopsyche</u>		5			<u>Chrysops</u>		7	3	21
<u>Symphitopsyche</u>	<u>slossonae</u>	1	2	2	<u>Simulium</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>		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>Microspectra</u>		10	3	30
<u>Rheotanytarsus</u>	<u>spp.</u>	1	3	3	<u>Zavrclimya</u>		1	4	4
<u>Conchapelopia</u>	<u>spp.</u>	1	3	3	<u>Conchapelopia</u>		1	3	3
<u>Microspectra</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>Chaetocladius</u>		2	3	6
					<u>Paratanytarsus</u>		1	3	3
		100		220					286

BI = 2.20 (2.24)

BI = 2.75 (2.76)

Watershed: East Twin River Station #: 2
 Stream: Tributary of East Twin River Tisch Mills Creek

Table 2

Spring

Fall

Genus	Species	No. of Indiv.	Index Value	Total No.	Genus	Species	No. of Indiv.	Index Value	Total No.
Isoperla	signata	1	1	1	Cheumatopsyche	betteni	5		
Ephemera	subvaria	32	1	32	Hydropsyche	atterima	1	3	3
Stenonema	femoratum	1	3	3	Chimarra	slossonae	1	2	2
Paraleptophlebia	spp.	11	1	11	Symphitopsyche	bifida G.	3	2	6
Sialis	spp.	1	2	2	S.	riola	1		
Nigronia	serricornis	1	1	1	S.		8		
Optioservus	larvae	5	2	10	Glossosoma	subvaria	3	1	3
Stenelmis	crenata	1	3	3	Ephemerella		81	1	81
Prosimulium	magnum	4	1	4	Optioservus		2	2	4
Simulium	tuberosum	3	2	6	O.	fastiditus	1	2	2
Simulium	venustum	10	3	30	Stenonema	vicarium	1	1	1
Antocha	spp.	2	2	4	Dicranota		2	2	4
Gammarus	pseudolinneus	6	2	12					
Erioptera		1	3	3					
Pycnopsyche	spp.	3	2	6					
Neophylax	spp.	6	2	12					
Limnephilus	spp.	1	2	2					
Conchapelopia	spp.	1	3	3					
Orthocladus	spp.	4	3	12					
		94		157			95		106

BI = 1.12 (1.23)

BI = 1.67

Watershed: East Twin River

Stream: Jambo Creek

Station #: 4

Table 2

Spring

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		
<u>Baetis</u>	<u>phoebus</u>	47	2	94	<u>Pycnopsyche</u>	<u>flavida</u>	6	2	12
<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>sparna</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>Simulium</u>	<u>venustum</u>	2	3	6	<u>Leptophlebia</u>		1	2	2
<u>Simulium</u>	<u>vittatum</u>	7	4	28	<u>Stenonema</u>	<u>vicarium</u>	3	1	3
<u>Simulium</u>	<u>verecundum</u>	2	3	6	<u>Optioservus</u>		2	2	4
<u>Simulium</u>	<u>tuberosum</u>	2	2	4	<u>Gammarus</u>	<u>pseudolimneus</u>	1	2	2
<u>Orthocladius</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>		2	2	4
<u>Polypedilum</u>	<u>spp.</u>	1	3	3	<u>Simulium</u>	<u>vittatum</u>	2	4	40
<u>Cricotopus</u>	<u>spp.</u>	1	4	4	<u>Orthocladius</u>		3	3	9
<u>Eukiefferiella</u>	<u>spp.</u>	2	2	4	<u>Microtendipes</u>		1	3	3
<u>Microsectra</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>Chaetocladius</u>	<u>sp C.</u>	1	3	3					
BI = 2.45		92		225	BI = 2.27 (2.40)		49		111

Watershed: East Twin River

Stream: East Twin River

Station #: 5

Table 2

Spring

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>	<u>NR. demora</u>	8	3	21
<u>Baetis</u>	<u>phoebus</u>	52	2	104	<u>Hydropsyche</u>	<u>flavida</u>	7	2	4
<u>Pseudocloeon</u>	<u>punctiventris</u>	15	2	30	<u>Psychomyia</u>	<u>bifida G.</u>	2		
<u>Caenis</u>		3			<u>Symphitopsyche</u>		26		
<u>Heptagenia</u>	<u>hebe</u>	1	1	1					
<u>Stenonema</u>	<u>mediopunctatum</u>	1	2	2	<u>Leptophlebia</u>				
<u>Stenacron</u>	<u>interpunctatum</u>	2	3	6	<u>Stenacron</u>	<u>interpunctatum</u>	2	2	4
<u>Stenelmis</u>	<u>larvae</u>	2	3	6	<u>Stenonema</u>	<u>mediopunctatum</u>	4	3	12
<u>Optioservus</u>	<u>larvae</u>	2	2	2	<u>Dubiraphia</u>	<u>vittata</u>	21	2	42
<u>Stenelmis</u>	<u>crenata</u>	1	3	3	<u>Ectopria</u>	<u>nervosa</u>	1	3	3
<u>Antocha</u>	<u>spp.</u>	2	2	4	<u>Stenelmis</u>		1	2	2
<u>Optioservus</u>	<u>fastiditus</u>	2	2	4	<u>S.</u>	<u>crenata</u>	9	3	27
<u>Psychomyia</u>	<u>flavida</u>	1	2	2	<u>Optioservus</u>		8	3	24
<u>Hydropsyche</u>	<u>betteni</u>	1	3	3	<u>O.</u>	<u>fastiditus</u>	7	2	14
<u>Cricotopus</u>	<u>spp.</u>	15	4	60	<u>Antocha</u>		1	2	2
<u>Microtendipes</u>	<u>spp.</u>	1	3	3	<u>Microtendipes</u>		5	2	10
<u>Polypedilum</u>	<u>spp.</u>	2	3	6			1	3	3
<u>Orthocladius</u>	<u>spp.</u>	1	3	3					
BI = 2.36 (2.38)		110		260	BI = 2.40 (2.59)		70		168

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>Fische Mills 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

