EAST WINNEBAGO RIVER WATERSHED
HILSENHOFF SAMPLING
SPRING AND FALL 1979

by TIM DOELGER

Introduction

This report identifies general water quality conditions throughout the East Winnebago 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.

5 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.

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:

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

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, Cheumatopysche, 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

LEGEND

- Portland Cement or Bitum. Concrete — U.S. & STATE / COUNTY
- Bituminous
- Gravel
- Earth
- *Town Road
- Fire Lane
- Multilane Divided
- Freeway
- Interchange
- Highway Separation
- Interstate Highway No. (90)
- U.S. Highway No. (41)
- State Highway No. (13)
- County Hwy. Letter (A)
- Railroad
- Dam
- 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
- Lookout Tower
- Ranger Station
- Public Camp & Picnic Grds.
- State Park — With Campsites / Without Campsites / With Facilities / Without Facilities
- County Park — With Facilities / Without Facilities
- Wayside — With Facilities / Without Facilities

*Surface types on town roads not shown

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 ..... 315 Sq. Mi.
Population 27,625
County Seat ..... Chilton

MILES OF HIGHWAY as of Jan. 1, 1974

STATE	106
COUNTY	103
LOCAL ROADS	531
OTHER ROADS	5
TOTAL FOR COUNTY	745

CALUMET CO.

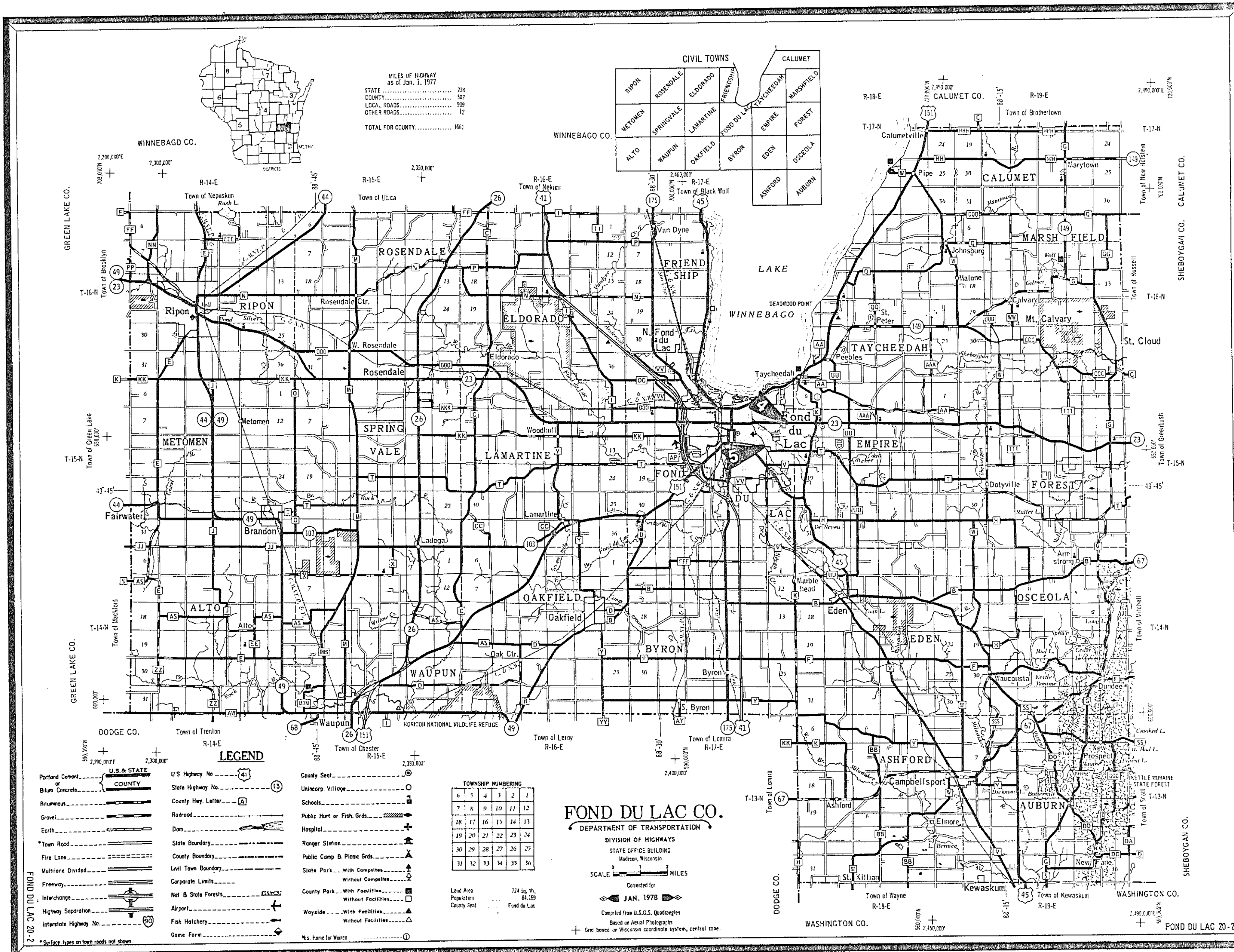
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OFFICE BUILDING
Madison, Wisconsin

SCALE 0 1 2 MILES

Corrected for
JAN. 1975

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

+ Grid based on Wisconsin coordinate system, south-central zone


FOND DU LAC 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, central zone.
MILES OF HIGHWAY
as of Jan. 1, 1977
STATE 238
COUNTY 502
LOCAL ROADS 909
OTHER ROADS 12
TOTAL FOR COUNTY 1661
CIVIL TOWNS
CALUMET
RIPON
ROSENDALE
ELDORADO
FRIENDSHIP
FOND DU LAC
TAYCHEEDAH
MARSHFIELD
METOMEN
SPRINGVALE
LAMARTINE
EMPIRE
FOREST
ALTO
WAUPUN
OAKFIELD
BYRON
EDEN
OSCEOLA
ASHFORD
AUBURN
TOWNSHIP NUMBERING
Land Area 724 Sq. Mi.
Population 84,169
County Seat Fond du Lac
LEGEND
Portland Cement or Bitum Concrete
U.S. & STATE
COUNTY
Bituminous
Gravel
Earth
*Town Road
Fire Lane
Multilane Divided
Freeway
Interchange
Highway Separation
Interstate Highway No.
*Surface types on town roads not shown
U.S Highway No.
State Highway No.
County Hwy. Letter
Railroad
Dam
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
Without Campsites
County Park With Facilities
Without Facilities
Wayside With Facilities
Without Facilities
Wis. Home for Women
WINNEBAGO CO.
GREEN LAKE CO.
DODGE CO.
WASHINGTON CO.
SHEBOYGAN CO.
CALUMET CO.
LAKE WINNEBAGO
DEADWOOD POINT
HORICON NATIONAL WILDLIFE REFUGE
KETTLE MORAINE STATE FOREST
Ripon
Rosendale
Waupun
Brandon
Fairwater
Alto
Oakfield
Campbellsport
Eden
North Fond du Lac
Fond du Lac
Taycheedah
St. Peter
Calumetville
Pipe
Marytown
Johnsburg
Malone
Calvary
Mt. Calvary
St. Cloud
Peebles
Dotyville
Armstrong
Marblehead
Waucousta
Dundee
New Prospect
New Fane
Kewaskum
St. Killian
Ashford
Elmore
Byron
S. Byron
Oak Ctr.
Ladoga
Lamartine
Woodhull
Metomen
Eldorado
W. Rosendale
Rosendale Ctr.
Van Dyne
Town of Brothertown
Town of New Holstein
Town of Russell
Town of Greenbush
Town of Mitchell
Town of Scott
Town of Kewaskum
Town of Wayne
Town of Lomira
Town of Leroy
Town of Chester
Town of Trenton
Town of Mackford
Town of Green Lake
Town of Brooklyn
Town of Nepuskun
Town of Utica
Town of Nekimi
Town of Black Wolf
T-17-N
T-16-N
T-15-N
T-14-N
T-13-N
R-14-E
R-15-E
R-16-E
R-17-E
R-18-E
R-19-E
43°-45'
88°-45'
88°-30'
88°-15'
FOND DU LAC 20-2

E. Winnebago River Watershed

Table 1

SAMPLE #	STREAM	STATION LOCATION	DATE	SUBSTRATE	ST. CHAR. WIDTH	ST. CHAR. DEPTH	CURRENT	SAMP. STRUCT.
1	Mill Creek	CTH E	5/4/79	Rock, Sand	6-9'	½-1'	Fast	Riffle
	Mill Creek	CTH E	11/14/79	Rock, Gravel	5-10'	8"	Fast	Riffle
2	Mud Creek	Mud Creek Road	5/4/70	Rock, Gravel	3-5'	½-1½'	Fast	Riffle
	Mud Creek	Mud Creek Road	11/14/79	Clay, Gravel, Sand	2-14'	1'	Fast	Riffle
3	Brothertown Creek	Harbor Rd.	5/4/79	Rock	2-3'	½-1½'	Fast	Riffle
	Brothertown Creek	Harbor Rd.	11/14/79	Clay, Rock, Gravel	3'	1'	Fast	Riffle
4	Taycheeda Creek	STH 23	5/4/79	Silt	5-6'	1-3'	Fast	Riffle
	Taycheeda Creek	STH 23	11/14/79	Gravel, Loam	3-10'	½-2'	Moderate	Riffle
5	DeHeveu Creek	CTH T	5/4/79	Rock, Sand	3-4'	1-2'	Fast	Riffle
	DeHeveu Creek	CTH T	11/14/79	Rock	6-8'	½-2'	Fast	Riffle

Watershed: E. Winnebago River Watershed

Stream: Mill Creek Station #: 1

Table 2

Spring

Genus	Species	No.of Indiv.	Index Value	Total No.
Cheumatopsyche		5		
Psychomyia	flavida	1	2	2
Hydropsyche	betteni	2	3	6
Symphitopsyche	slossonae	1	2	2
Baetis	phoebus	4	2	8
Stenacron	interpunctatum	5	3	15
Stenelmis	crenata	1	3	3
Optioservus	fastiditus	4	2	8
Stenelmis	larvae	2	3	6
Optioservus	larvae	61	2	122
Asellus	intermedius	1	5	5
Gammarus	pseudolimneus	13	2	26
Dicranota		3	2	6
Antocha		2	2	4
Simulium	vittatum	1	4	4
Orthocladius		2	3	6
BI = 2.17 (2.21)		104		226

Fall

Genus	Species	No.of Indiv.	Index Value	Total No.
Stenacron	interpunctatum	1	3	3
Stenelmis	larvae	2	3	6
Optioservus	fastiditus	2	2	4
Simulium	tuberosum	7	2	14
Simulium	venustum	20	3	60
Gammarus	pseudolimneus	4	2	8
Asellus	intermedius	8	5	40
Psychomyia	flavida	1	2	2
Cheumatopsyche		9		
Symphitopsyche	slossonae	8	2	16
Symphitopsyche	bifida G.	1		
Hydropsyche	betteni	3	3	9
Orthocladius	spp.	66	3	198
Polypedilum	spp.	1	3	3
BI = 2.96 (2.95)		123		363

Watershed: E. Winnebago River Watershed

Stream: Mud Creek Station #: 2

Table 2

Spring

Genus	Species	No.of Indiv.	Index Value	Total No.
Simulium	tuberosum	1	2	2
Simulium	verecundum	1	3	3
Hyalella	azteca	1	4	4
Asellus	intermedius	105	5	525
Parametriochemus	sp. A	1	3	3
Eukiefferiella	spp.	2	2	4
BI = 4.87		111		541

Fall

Genus	Species	No.of Indiv.	Index Value	Total No.
Dubiraphia	larvae	1	3	3
Gammarus	pseudolimneus	15	2	30
Hyalella	azteca	4	4	16
Asellus	intermedius	96	5	480
BI = 4.56		116		529

Watershed: E. Winnebago River Watershed

Stream: Brothertown Creek Station #: 3

Table 2

Spring					Fall				
Genus	Species	No.of Indiv.	Index Value	Total No.	Genus	Species	No.of Indiv.	Index Value	Total No.
Simulium	venustum	42	3	126	Cheumatopsyche		79		
Simulium	tuberosum	19	2	38	Symphitopsyche	slossonae	14	2	28
Simulium	vittatum	3	4	12	Symphitopsyche	bifida G.	1		
Asellus	intermedius	15	5	75	Gammarus	pseudolimneus	1	2	2
Cheumatopsyche		2			Asellus	intermedius	3	5	15
Hydropsyche	betteni	2	3	6	Simulium	vittatum	10	4	40
Eukiefferiella	spp.	13	2	26	Orthocladius		1	4	4
Cricotopus	spp.	1	4	4					
					BI = 3.07 (3.02)		29		89
BI = 3.02 (3.02)		95		287					

Watershed: E. Winnebago River Watershed

Stream: Taycheedah Creek Station #: 4

Table 2

Spring

Genus	Species	No.of Indiv.	Index Value	Total No.
Stenonema	vicarium	1	1	1
Optioservus	larvae	1	2	2
Empididae	all	6	3	18
Simulium	venustum	2	3	6
Asellus	intermedius	42	5	210
Hyalella	azteca	2	4	8
Cheumatopsyche		14		
Symphitopsyche	sparna	3	1	3
Symphitopsyche	bifida G.	4		
Hydropsyche	betteni	3	3	9
Eukiefferiella	spp.	13	2	26
Conchapelopia	spp.	2	3	6
BI = 3.85 (3.69)		75		289

Fall

Genus	Species	No.of Indiv.	Index Value	Total No.
Cheumatopsyche		4		
Stenonema	vicarium	2	1	2
Stenacron	interpunctatum	1	3	3
Optioservus	larvae	7	2	14
Asellus	intermedius	115	5	575
Simulium	vittatum	1	4	4
Chrysops		1	3	3
Conchapelopia		1	3	3
BI = 4.72 (4.67)		128		604

Watershed: E. Winnebago River Watershed

Stream: DeNeveu Creek Station #: 5

Table 2

Spring

Genus	Species	No.of Indiv.	Index Value	Total No.
Caenis		3		
Stenelmis	larvae	11	3	33
Optioservus	larvae	1	2	2
Stenelmis	crenata	1	3	3
Simulium	vittatum	5	4	20
Tipula	spp.	1	2	2
Asellus	intermedius	44	5	220
Cheumatopsyche		9		
Symphitopsyche	sparna	2	1	2
Symphitopsyche	bifida G.	4		
Hydropsyche	betteni	3	3	9
Orthocladius	spp.	68	3	236
Eukiefferiella	spp.	3	2	6
Conchapelopia	spp.	1	3	3
BI = 4.00 (3.84)		84		336

Fall

Genus	Species	No.of Indiv.	Index Value	Total No.
Cheumatopsyche		42		
Symphitopsyche	bifida G.	12		
Hydropsyche	betteni	13	3	39
Stenacron	interpunctatum	1	3	3
Stenelmis	crenata	1	3	3
Optioservus	larvae	2	2	4
Stenelmis	larvae	1	3	3
Limnophora		1	2	2
Simulium	vittatum	24	4	96
Asellus	intermedius	13	5	65
BI = 3.84 (3.43)		56		215

Watershed: E. Winnebago 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
Mill Creek	1	104	10	2.17 (2.21)	V. Good	123	5	2.95 (2.95)	Fair
Mud Creek	2	111	1	4.87	V. Poor	116	0	4.56	V. Poor
Brothertown Creek	3	95	2	3.02 (3.02)	Fair	29	80	3.07 (3.02)	Fair
Taycheedah Creek	4	75	18	3.85 (3.60)	Poor	128	4	4.72 (4.67)	V. Poor
Deneveu Creek	5	85	16	4.00 (3.84)	V. Poor-Poor	56	54	3.84 (3.43)	Poor-Fair