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New York State
Department of Environmental Conservation

Division of Water

Kelsey Creek

Biological Assessment

2002 Survey

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KELSEY CREEK

BIOLOGICAL ASSESSMENT

Black River Basin
Jefferson County, New York

Survey date: July 17, 2002
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Stream: Kelsey Creek, Jefferson County, New York

Reach: Route 37 to West Main Street, Watertown, New York

Background:

The Stream Biomonitoring Unit conducted biological sampling on Kelsey Creek on July 17, 2002. Macroinvertebrate communities were sampled at five sites on the main stem and on Oily Creek, a tributary. Crayfish were collected at mainstream Kelsey Creek sites for tissue analysis for metals, PAHs, and PCBs. This follow-up investigation was conducted at the request of Philip Waite (NYSDEC, Environmental Remediation), to assess water quality and invertebrate chemical body burdens, and compare to results of sampling in 2000 and 1991.

Traveling kick samples for macroinvertebrates were taken in riffle areas using methods described in the Quality Assurance document (Bode et al., 2002) and summarized in Appendix I. The contents of each sample were field-inspected to determine major groups of organisms present, and then preserved in alcohol for laboratory inspection of a 100-specimen subsample. Macroinvertebrate community parameters used in the determination of water quality included species richness, biotic index, EPT value, and percent model affinity (see Appendices II and III). Table 5 provides a listing of sampling sites, and Table 6 provides a listing of all macroinvertebrate species collected in the present survey. This is followed by macroinvertebrate data reports, including individual site descriptions and raw invertebrate data from each site.

Crayfish were collected with aquatic nets at three sites on the main stem of Kelsey Creek, and were processed as described in Appendix XI. The samples were submitted to the Wadsworth Center, New York State Department of Health, for analysis of PAHs and PCBs, and to Columbia Analytical Services for analysis of metals.

Results and Conclusions:

1. As in 2000, all locations sampled on Kelsey Creek were assessed as moderately impacted; however, some improvements were noted within the range of moderate impact. Substantial improvements were apparent compared with 1991, when 2 of the 3 sites were assessed as severely impacted.

2. Water quality in Oily Creek was assessed as moderately to severely impacted, and worsened slightly compared to 2000 sampling.

3. Crayfish tissues showed elevated levels of PCBs and PAHs at some sites, exceeding levels of concern. Metals in crayfish tissues were below levels of concern.

Discussion

The purpose of this sampling was to assess water quality and measure invertebrate body burdens of PCBs, PAHs, and 10 metals, and compare these to the findings of 2000 and 1991. Biological sampling in 1991 (Bode et al., 1991) found severe impairment in the lower 0.5 mile reach of Kelsey Creek, and elevated body burdens of PCBs and several metals. In recent years, remediation efforts in the Kelsey Creek watershed were performed, including excavation of portions of the creek bed, and installation of stormwater treatment. Three sites that were sampled in 1991 coincide with the three mainstream sites in the present survey: Route 37 (Station 2), Bradley Street (Station 4), and Route 12E (Station 5). In the 1991 sampling, water quality at Station 2 was assessed as moderately impacted, and Stations 4 and 5 were assessed as severely impacted. Biological sampling in 2000 (Bode et al., 2001) included the 1991 sites plus two sites (Stations 3 and 3A) on Oily Creek, a tributary. All 5 sites were assessed as moderately impacted. The remediation area included Stations 3, 3A, and 4.

Based on analysis of macroinvertebrate communities in the present survey, all sites sampled on Kelsey Creek were assessed as moderately impacted; Oily Creek assessments ranged from moderately to severely impacted (Figure 1). Impact Source Determination (Table 1) showed that Kelsey Creek was affected primarily by municipal/industrial influences or toxic influences; most sites were also affected by impoundment effects. Most macroinvertebrate communities were dominated by *Gammarus* scuds (side-swimming crustaceans) or sowbugs, and all sites were affected to some degree by poor habitat. The upstream site on Kelsey Creek suffered from low dissolved oxygen, likely due to the sluggish nature of the stream above there. Two species of mayflies were found at the lower Kelsey site in the present survey; no mayflies found in the 1991 survey. Mayflies are associated with good water quality, and continue to be indicators of recovery in Kelsey Creek.

Oily Creek received a discharge downstream of the trailer park at LeRay Avenue that had a substantial effect on the stream. The daytime dissolved oxygen level increased from 6.1 ppm to 11.9 ppm (125 % saturation) in the 0.2 miles downstream of the trailer park, likely reflecting abundant algal growth that would cause daytime oxygen supersaturation and nighttime oxygen deficits. The downstream site displayed a macroinvertebrate community dominated by tolerant midges, worms, and sowbugs, indicators of organic enrichment, as reflected in the ISD table (Table 1). As species richness increased with the organic loading, the assessment changed from the severely impacted category to the moderately impacted category, although the metrics at the two sites were similar (Figure 1).

The tissue analysis portion of this study documented continuing elevated levels of PCBs in crayfish tissues in Kelsey Creek in the lower 0.5 mile reach (Table 2), although showing a trend in decreasing levels. The highest PCB levels were found in crayfish collected at the Bradley Street site (KLSY-4) as in 2000; no crayfish were analyzed from this site in 1991. The provisional level of concern for total PCBs in crayfish tissues in New York State is 200 ppb dry weight (Bode et al., 1996). This data shows that a source of PCBs remains in Kelsey Creek upstream of the Route 12 site (Bradley Street).

Crayfish PAHs showed continued elevated levels of some PAHs (Table 2), especially at the Route 12 site (Station 4). No elevated levels of PAHs were found at the Main Street site (Station 5), an improvement from 2000. Crayfish metals showed reductions in body burdens for some metals, compared to 1991 levels (Table 4). Reductions were documented for lead, mercury, and titanium. The present levels are all below the levels of concern (LOCs). The 1991 LOCs for mercury and titanium, which were exceeded in the 1991 study at Station 5, were adjusted in subsequent QA documents (Bode et al., 1996, 2002); the 1991 levels are just below the new LOCs, and do not appear as exceedances in Table 4.

Based on macroinvertebrate community analysis and tissue analysis, water quality has improved in Kelsey Creek since the 1991 sampling (Figure 2), although some problems persist. The lower 0.5 mile reach of the river shows changes in community composition, improving from severely impacted to moderately impacted (Figure 2), and PCB levels continue to drop. Other PCB sources apparently remain upstream of the Bradley Street site, and in Oily Creek.

Literature Cited:

Bode, R. W., M. A. Novak, L. E. Abele, and D. L. Heitzman. 2001. Biological stream assessment, Kelsey Creek. New York State Department of Environmental Conservation, Technical Report, 41 pages.

Bode, R. W., M. A. Novak, and L. E. Abele. 1991. Biological stream assessment, Kelsey Creek. New York State Department of Environmental Conservation, Technical Report, 20 pages.

Bode, R. W., M. A. Novak, L. E. Abele, D.L. Heitzman, and A. J. Smith. 2002. Quality assurance work plan for biological stream monitoring in New York State. New York State Department of Environmental Conservation, Technical Report, 115 pages.

Bode, R. W., M. A. Novak, and L. E. Abele. 1996. Quality assurance work plan for biological stream monitoring in New York State. New York State Department of Environmental Conservation, Technical Report, 89 pages.

Overview of field data

On the date of sampling, July 17, 2002, Kelsey Creek at the sites sampled was 2-8 meters wide, 0.1 meters deep, and had current speeds of 25-75 cm/sec in riffles. Dissolved oxygen was 2.8-9.5 mg/l, specific conductance was 845-1405 µmhos, pH was 6.5-7.9, and the temperature was 17.4-20.7 °C (63-69 °F). Oily Creek at the sites sampled was 1 meter wide, 0.1 meters deep, and had current speeds of 30-50 cm/sec in riffles. Dissolved oxygen was 6.1-11.9 mg/l, specific conductance was 890-904 µmhos, pH was 6.7-7.2, and the temperature was 13.9-16.7 °C (57-62 °F). Measurements for each site are found on the field data summary sheets.

Figure 1. Biological Assessment Profile of index values, Kelsey and Oily Creeks, 2002. Values are plotted on a normalized scale of water quality. The line connects the mean of the four values for each site, representing species richness, EPT richness, Hilsenhoff Biotic Index, and Percent Model Affinity.

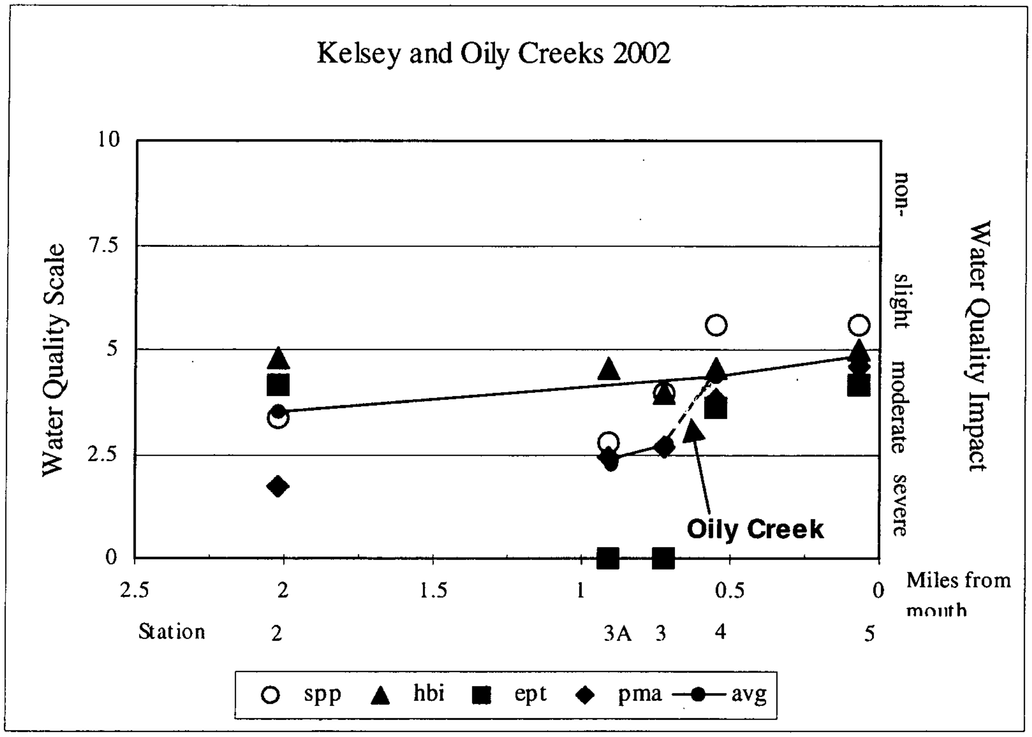


Figure 2. Biological Assessment Profile of index values, Kelsey Creek, 1991-2002.

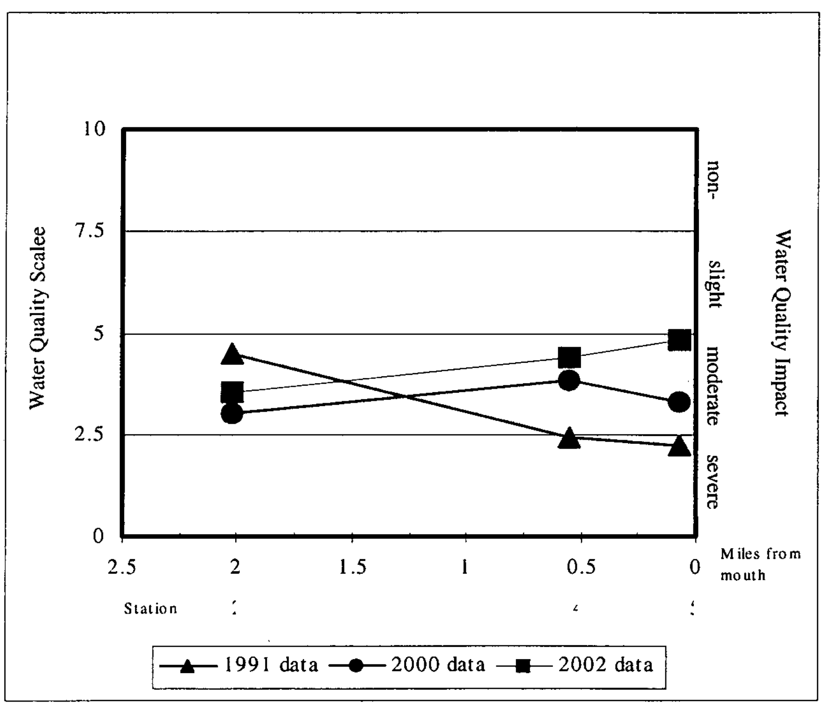


Table 1. Impact Source Determination, Kelsey Creek and Oily Creek, 2002. Numbers represent similarity to community type models for each impact category. The highest similarity at each station is highlighted. Similarities less than 50% are less conclusive.

	STATION				
Community Type	KLSY-2	KLSY-4	KLSY-5	KLSY-3A (Oily Cr.)	KLSY-3 (Oily Cr.)
Natural: minimal human impacts	18	20	22	13	15
Nutrient additions; mostly nonpoint, agricultural	23	23	35	16	17
Toxic: industrial, municipal, or urban run-off	35	46	53	37	37
Organic: sewage effluent, animal wastes	57	28	36	45	42
Complex: municipal/industrial	63	32	41	58	36
Siltation	28	36	35	18	21
Impoundment	61	43	49	49	42

TABLE SUMMARY:

KLSY-2	Complex, impoundment
KLSY-4	Toxic
KLSY-5	Toxic
KLSY-3A	Complex
KLSY-3	Organic

Table 2. Levels of total PCBs in Kelsey Creek crayfish, 1991-2002. All values in $\mu g/kg$ (parts per billion) dry weight. Exceedances of levels of concern highlighted. Complete results in Appendix XII.

STATION	Miles from mouth	Station description	2002 PCBs	2000 PCBs	1991 PCBs
KLSY-2	2.0	Below Route 37 bridge	<250	<150	no sample
KLSY-4	0.5	Below Route 12 bridge	1400	2320	no sample
KLSY-5	0.02	Above Main St. bridge	740	920	1190

Table 3. Levels of select PAHs in Kelsey Creek crayfish, 2002 and 2000. All values in $\mu g/kg$ (parts per billion) dry weight. Exceedances of levels of concern highlighted. Complete results in Appendix XII.

PAH	KLSY-2 2002	KLSY-2 2000	KLSY-4 2002	KLSY-4 2000	KLSY-5 2002	KLSY-5 2000	level of concern
Chrysene	280	180	1000	460	96	530	400
Fluoranthene	38	13	220	56	40	190	150
Phenanthrene	220	62	660	120	120	290	200
Pyrene	280	190	1000	360	160	630	400
Benzo (A) Anthracene	61	250	250	610	36	700	400

Table 4. Levels of metals in crayfish tissue, Kelsey Creek, 2002, 2000, and 1991. All values in mg/kg (parts per million) dry weight. Exceedances of levels of concern highlighted. Complete results in Appendix XII.

	STATION			
Metal	KLSY-5 2002	KLSY-5 2000	KLSY-5 1991	level of concern
Arsenic	0.52	0.88	< 2	5
Cadmium	0.54	0.42	< 3	2
Chromium	0.52	0.76	< 3	5
Copper	160	140	68.4	200
Lead	0.70	0.63	39.6	20
Mercury	0.10	0.06	.28	.3
Nickel	0.37	0.61	< 3	2
Selenium	3.1	[3.9]*	< 1	4
Titanium	2.1	5.4	9.0	10
Zinc	73.3	70.9	86.9	150

* this selenium result not considered reliable, due to high variability in spiked sample recovery.

TABLE 5. STATION LOCATIONS FOR KELSEY CREEK, JEFFERSON COUNTY, NEW YORK (see map).

STATION	LOCATION
Kelsey Creek	
02	Watertown 15 m below Rt. 37 bridge 2.0 river miles upstream of mouth 44°00'20"; 75°54'09"
04	Watertown 100 m below Rt. 12 (Bradley St) bridge 0.50 river miles upstream of mouth 43°59'26"; 75°55'01"
05	Watertown 5 m above RR bridge at Rt. 12E 0.02 river miles upstream of mouth 43°59'22"; 75°55'27"
Oily Creek	
03A	Watertown trailer park at LeRay St 0.24 river miles upstream of mouth 43°59'27"; 75°54'35"
03	Watertown 75 meters above Morrison Ave 0.04 river miles upstream of mouth 43°59'27"; 75°54'46"

Figure 2 | Site Location Map | Kelsey Creek

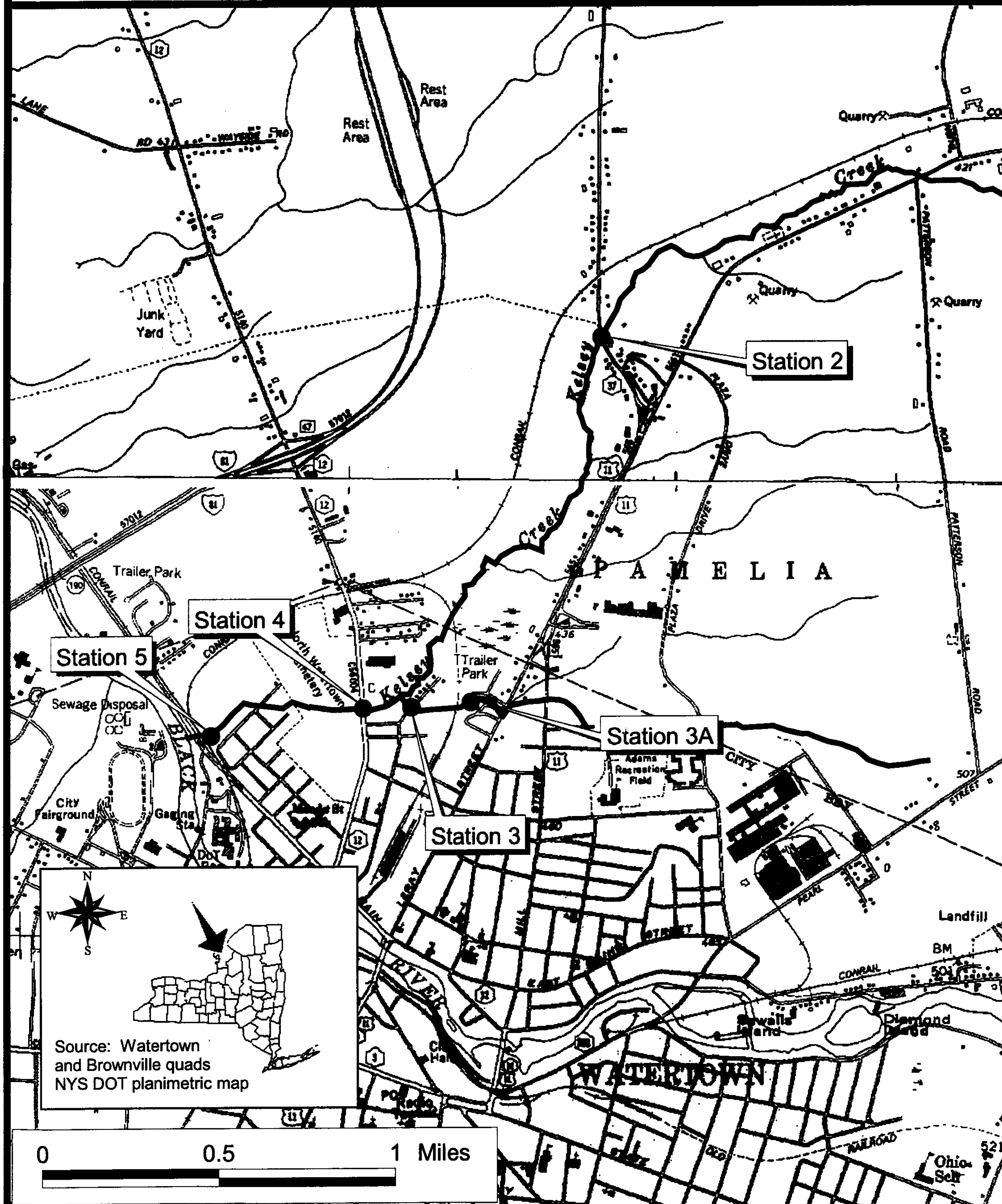


TABLE 6. MACROINVERTEBRATE SPECIES COLLECTED IN KELSEY CREEK AND OILY CREEK, JEFFERSON COUNTY, NEW YORK, 2002.

PLATYHELMINTHES
- TURBELLARIA
  - Undetermined Turbellaria

OLIGOCHAETA
- LUMBRICIDA
  - Undetermined Lumbricina
- TUBIFICIDA
  - Tubificidae
    - Undet. Tubificidae w/o cap. setae
  - Naididae
    - Nais variabilis

HIRUDINEA
- Undetermined Hirudinea

MOLLUSCA
- GASTROPODA
  - Physidae
    - Physella sp.
    - Undetermined Physidae

ARTHROPODA
- CRUSTACEA
  - ISOPODA
    - Asellidae
      - Caecidotea racovitzai
  - AMPHIPODA
    - Gammaridae
      - Gammarus sp.

INSECTA
- EPHEMEROPTERA
  - Baetidae
    - Baetis flavistriga
    - Undetermined Baetidae
  - Heptageniidae
    - Stenonema femoratum
- COLEOPTERA
  - Dytiscidae
    - Agabus sp.
  - Gyrinidae
    - Gyrinus sp.
  - Elmidae
    - Stenelmis crenata
    - Stenelmis sp.

TRICHOPTERA
- Hydropsychidae
  - Cheumatopsyche sp.
  - Hydropsyche betteni
  - Hydropsyche sparna
  - Hydropsyche sp.

DIPTERA
- Ceratopogonidae
  - Undetermined Ceratopogonidae
- Simuliidae
  - Simulium vittatum
- Empididae
  - Hemerodromia sp.
- Muscidae
  - Undetermined Muscidae
- Chironomidae
  - Tanypodinae
    - Thienemannimyia gr. spp.
  - Diamesinae
    - Diamesa sp.
  - Prodiamesinae
    - Prodiamesa sp. 2
  - Orthocladiinae
    - Cardiocladius obscurus
    - Cricotopus bicinctus
    - Cricotopus tremulus gr.
    - Cricotopus vierriensis
    - Eukiefferiella claripennis gr.
    - Orthocladius sp.
    - Parametriocnemus lundbecki
    - Thienemanniella xena
    - Tvetenia bavarica gr.
  - Chironominae
    - Chironomini
      - Cryptochironomus fulvus gr.
      - Polypedilum flavum
    - Tanytarsini
      - Micropsectra polita
      - Paratanytarsus confusus

STREAM SITE:	Kelsey Creek, Station 2
LOCATION:	Rte 37 bridge, Watertown
DATE:	July 17, 2002
SAMPLE TYPE:	Kick sample
SUBSAMPLE:	100 individuals

PLATYHELMINTHES			
TURBELLARIA		Undetermined Turbellaria	3
ANNELIDA			
OLIGOCHAETA			
LUMBRICIDA		Undetermined Lumbricina	2
ARTHROPODA			
CRUSTACEA			
ISOPODA	Asellidae	Caecidotea racovitzai	33
AMPHIPODA	Gammaridae	Gammarus sp.	40
INSECTA			
COLEOPTERA	Elmidae	Stenelmis sp.	1
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	4
		Hydropsyche betteni	7
		Hydropsyche sparna	1
		Hydropsyche sp.	1
DIPTERA	Ceratopogonidae	Undet. Ceratopogonidae	1
	Chironomidae	Thienemannimyia gr. spp.	4
		Parametriocnemus lundbecki	1
		Polypedilum flavum	2

SPECIES RICHNESS	13 (poor)
BIOTIC INDEX	6.65 (poor)
EPT RICHNESS	4 (poor)
MODEL AFFINITY	30 (very poor)
ASSESSMENT	moderately impacted

DESCRIPTION The kick sample was taken 30 meters upstream of the bridge. The habitat was poor, with a slow current speed and a wetland area upstream. The macroinvertebrate community was dominated by scuds and sowbugs, and was very similar to the fauna sampled at this site in 2000. Water quality was similarly assessed as moderately impacted, although poor habitat is partly responsible for this assessment.

STREAM SITE:	Kelsey Creek, Station 4
LOCATION:	Rte 12 (Bradley Street), Watertown
DATE:	July 17, 2002
SAMPLE TYPE:	Kick sample
SUBSAMPLE:	100 individuals

ANNELIDA			
OLIGOCHAETA			
TUBIFICIDA	Naididae	Nais variabilis	2
HIRUDINEA		Undetermined Hirudinea	4
MOLLUSCA			
GASTROPODA	Physidae	Physella sp.	7
ARTHROPODA			
CRUSTACEA			
ISOPODA	Asellidae	Caecidotea racovitzai	10
AMPHIPODA	Gammaridae	Gammarus sp.	3
INSECTA			
EPHEMEROPTERA	Baetidae	Undetermined Baetidae	1
COLEOPTERA	Dytiscidae	Agabus sp.	1
	Gyrinidae	Gyrinus sp.	1
	Elmidae	Stenelmis crenata	1
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	1
		Hydropsyche sparna	5
DIPTERA	Simuliidae	Simulium vittatum	2
	Empididae	Hemerodromia sp.	1
	Chironomidae	Thienemannimyia gr. spp.	9
		Cricotopus bicinctus	31
		Cricotopus vierriensis	9
		Orthocladius sp.	8
		Parametriocnemus lundbecki	2
		Cryptochironomus fulvus gr.	1
		Paratanytarsus confusus	1

SPECIES RICHNESS	20 (good)
BIOTIC INDEX	6.87 (poor)
EPT RICHNESS	3 (poor)
MODEL AFFINITY	42 (poor)
ASSESSMENT	moderately impacted

DESCRIPTION The site was accessed at the cemetery, as in previous years. The stream bottom was dominated by bedrock, with long strands of algae attached. The macroinvertebrate fauna was mostly midges, although some caddisflies and mayflies were present. As in 2000, water quality was assessed as moderately impacted.

STREAM SITE:	Kelsey Creek, Station 5
LOCATION:	Main St., Watertown, 100 meters upstream
DATE:	July 17, 2002
SAMPLE TYPE:	Kick sample
SUBSAMPLE:	100 individuals

PLATYHELMINTHES			
TURBELLARIA		Undetermined Turbellaria	9
ANNELIDA			
OLIGOCHAETA			
LUMBRICIDA			
HIRUDINEA		Undetermined Lumbricina	1
MOLLUSCA		Undetermined Hirudinea	2
GASTROPODA	Physidae	Physella sp.	2
ARTHROPODA			
CRUSTACEA			
ISOPODA	Asellidae	Caecidotea racovitzai	21
AMPHIPODA	Gammaridae	Gammarus sp.	10
INSECTA			
EPHEMEROPTERA	Baetidae	Baetis flavistriga	1
	Heptageniidae	Stenonema femoratum	1
COLEOPTERA			
TRICHOPTERA	Elmidae	Stenelmis crenata	18
	Hydropsychidae	Cheumatopsyche sp.	1
		Hydropsyche betteni	3
DIPTERA	Simuliidae	Simulium vittatum	1
	Empididae	Hemerodromia sp.	4
	Chironomidae	Thienemannimyia gr. spp.	1
		Diamesa sp.	1
		Cardiocladius obscurus	1
		Cricotopus bicinctus	12
		Cricotopus tremulus gr.	5
		Cricotopus vierriensis	2
		Orthocladius sp.	4

SPECIES RICHNESS	20 (good)
BIOTIC INDEX	6.51 (poor)
EPT RICHNESS	4 (poor)
MODEL AFFINITY	47 (poor)
ASSESSMENT	moderately impacted

DESCRIPTION The kick sample was taken 20 meters upstream of the railroad bridge. The macroinvertebrate fauna was dominated by sowbugs, scuds, beetles, and midges, although caddisflies and mayflies were also present. As in the 2000 sampling, water quality was assessed as moderately impacted.

STREAM SITE:	Oily Creek, Station 3A
LOCATION:	LeRay Avenue, Watertown, access via trailer park
DATE:	July 17, 2002
SAMPLE TYPE:	Kick sample
SUBSAMPLE:	100 individuals

ANNELIDA			
OLIGOCHAETA			
LUMBRICIDA		Undetermined Lumbricina	1
TUBIFICIDA	Tubificidae	Undet. Tubificidae w/o cap. setae	2
HIRUDINEA		Undetermined Hirudinea	1
ARTHROPODA			
CRUSTACEA			
ISOPODA	Asellidae	Caecidotea racovitzai	32
AMPHIPODA	Gammaridae	Gammarus sp.	40
INSECTA			
COLEOPTERA	Dytiscidae	Agabus sp.	1
DIPTERA	Simuliidae	Simulium vittatum	1
	Chironomidae	Cricotopus bicinctus	10
		Parametriocnemus lundbecki	2
		Tvetenia bavarica gr.	2
		Micropsectra polita	8

SPECIES RICHNESS	11 (poor)
BIOTIC INDEX	6.86 (poor)
EPT RICHNESS	0 (very poor)
MODEL AFFINITY	34 (very poor)
ASSESSMENT	severely impacted

DESCRIPTION The site was accessed through the trailer park at LeRay Avenue. The habitat was adequate, but the macroinvertebrate fauna was very poor, with the fauna consisting of worms, leeches, scuds, sowbugs, beetles, and midges. Based on the metrics, water quality was assessed as severely impacted.

STREAM SITE:	Oily Creek, Station 3
LOCATION:	Morrison Avenue, Watertown, 75 meters above Kelsey Creek
DATE:	July 17, 2002
SAMPLE TYPE:	Kick sample
SUBSAMPLE:	100 individuals

ANNELIDA			
OLIGOCHAETA			
TUBIFICIDA	Tubificidae	Undet. Tubificidae w/o cap. setae	6
HIRUDINEA		Undetermined Hirudinea	9
MOLLUSCA			
GASTROPODA	Physidae	Physella sp.	1
ARTHROPODA			
CRUSTACEA			
ISOPODA	Asellidae	Caecidotea racovitzai	26
AMPHIPODA	Gammaridae	Gammarus sp.	14
INSECTA			
DIPTERA	Muscidae	Undetermined Muscidae	1
	Chironomidae	Thienemannimyia gr. spp.	2
		Prodiamesa sp. 2	4
		Cricotopus bicinctus	3
		Cricotopus vierriensis	4
		Eukiefferiella claripennis gr.	1
		Orthocladius sp.	4
		Thienemanniella xena	2
		Tvetenia bavarica gr.	1
		Micropsectra polita	22

SPECIES RICHNESS	15 (poor)
BIOTIC INDEX	7.33 (poor)
EPT RICHNESS	0 (very poor)
MODEL AFFINITY	35 (poor)
ASSESSMENT	moderately impacted

DESCRIPTION The site was accessed at Morrison Avenue. The rubble bottom had long stands of algae on the rocks. The homeowner at this site reported apparent waste discharges upstream. The fauna was heavily dominated by scuds, sowbugs, and midges, with no caddisflies or mayflies. Water quality was assessed as moderately impacted.

LABORATORY DATA SUMMARY				
STREAM NAME: Kelsey Creek		**DRAINAGE: 08**		
DATE SAMPLED: 07/17/02		**COUNTY: Jefferson**		
SAMPLING METHOD: Traveling Kick				
STATION **LOCATION**	02 Rt. 37 bridge	04 Rt 12, Bradley St	05 Main St.	
DOMINANT SPECIES/%CONTRIBUTION/TOLERANCE/COMMON NAME				
1.	Gammarus sp. 40 % facultative scud	Cricotopus bicinctus 31 % tolerant midge	Caecidotea racovitzai 21 % tolerant sowbug	
2. **Intolerant = not tolerant of poor water quality**	Caecidotea racovitzai 33 % tolerant sowbug	Caecidotea racovitzai 10 % tolerant sowbug	Stenelmis crenata 18 % facultative beetle	
3. **Facultative = occurring over a wide range of water quality**	Hydropsyche betteni 7 % facultative caddisfly	Thienemannimyia gr. spp. 9 % facultative midge	Cricotopus bicinctus 12 % tolerant midge	
4. **Tolerant = tolerant of poor water quality**	Cheumatopsyche sp. 4 % facultative caddisfly	Cricotopus vierriensis 9 % facultative midge	Gammarus sp. 10 % facultative scud	
5.	Thienemannimyia gr. spp. 4 % facultative midge	Orthocladius sp. 8 % facultative midge	Undetermined Turbellaria 9 % facultative flatworm	
% CONTRIBUTION OF MAJOR GROUPS (NUMBER OF TAXA IN PARENTHESES)				
Chironomidae (midges)	7.0 (3.0)	61.0 (7.0)	26.0 (7.0)	
Trichoptera (caddisflies)	13.0 (4.0)	6.0 (2.0)	4.0 (2.0)	
Ephemeroptera (mayflies)	0.0 (0.0)	1.0 (1.0)	2.0 (2.0)	
Plecoptera (stoneflies)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	
Coleoptera (beetles)	1.0 (1.0)	3.0 (3.0)	18.0 (1.0)	
Oligochaeta (worms)	2.0 (1.0)	2.0 (1.0)	1.0 (1.0)	
Mollusca (clams and snails)	0.0 (0.0)	7.0 (1.0)	2.0 (1.0)	
Crustacea (crayfish, scuds, sowbugs)	73.0 (2.0)	13.0 (2.0)	31.0 (2.0)	
Other insects (odonates, diptera)	1.0 (1.0)	3.0 (2.0)	5.0 (2.0)	
Other (Nemertea, Platyhelminthes)	3.0 (1.0)	4.0 (1.0)	11.0 (2.0)	
SPECIES RICHNESS	13	20	20	
BIOTIC INDEX	6.65	6.87	6.51	
EPT RICHNESS	4	3	4	
PERCENT MODEL AFFINITY	30	42	47	
FIELD ASSESSMENT	severe	severe	severe	
OVERALL ASSESSMENT	moderate impact	moderate impact	moderate impact	

LABORATORY DATA SUMMARY				
STREAM NAME: Oily Creek		**DRAINAGE: 08**		
DATE SAMPLED: 07/17/02		**COUNTY: Jefferson**		
SAMPLING METHOD: Traveling Kick				
STATION **LOCATION**	03 LeRay St.	03A Morrison Ave.		
DOMINANT SPECIES/%CONTRIBUTION/TOLERANCE/COMMON NAME				
1.	Caecidotea racovitzai 26 % tolerant sowbug	Gammarus sp. 40 % facultative scud		
2. **Intolerant = not tolerant of poor water quality**	Micropsectra polita 22 % facultative midge	Caecidotea racovitzai 32 % tolerant sowbug		
3. **Facultative = occurring over a wide range of water quality**	Gammarus sp. 14 % facultative scud	Cricotopus bicinctus 10 % tolerant midge		
4. **Tolerant = tolerant of poor water quality**	Undetermined Hirudinea 9 % tolerant leech	Micropsectra polita 8 % facultative midge		
5.	Undet. Tubificidae w/o cap. setae 6 % tolerant worm	Undet. Tubificidae w/o cap. setae 2 % tolerant worm		
% CONTRIBUTION OF MAJOR GROUPS (NUMBER OF TAXA IN PARENTHESES)				
Chironomidae (midges)	43.0 (9.0)	22.0 (4.0)		
Trichoptera (caddisflies)	0.0 (0.0)	0.0 (0.0)		
Ephemeroptera (mayflies)	0.0 (0.0)	0.0 (0.0)		
Plecoptera (stoneflies)	0.0 (0.0)	0.0 (0.0)		
Coleoptera (beetles)	0.0 (0.0)	1.0 (1.0)		
Oligochaeta (worms)	6.0 (1.0)	3.0 (2.0)		
Mollusca (clams and snails)	1.0 (1.0)	0.0 (0.0)		
Crustacea (crayfish, scuds, sowbugs)	40.0 (2.0)	72.0 (2.0)		
Other insects (odonates, diptera)	1.0 (1.0)	1.0 (1.0)		
Other (Nemertea, Platyhelminthes)	9.0 (1.0)	1.0 (1.0)		
SPECIES RICHNESS	15	11		
BIOTIC INDEX	7.33	6.86		
EPT RICHNESS	0	0		
PERCENT MODEL AFFINITY	35	34		
FIELD ASSESSMENT	severe	severe		
OVERALL ASSESSMENT	moderate impact	severe impact		

FIELD DATA SUMMARY

STREAM NAME: Kelsey Creek **DATE SAMPLED: 07/17/02**
REACH: Rt. 37 through Watertown
FIELD PERSONNEL INVOLVED:Abele, Heitzman

STATION	02	04	05	
ARRIVAL TIME AT STATION	8:10	10:05	10:45	
LOCATION	Rt. 37 bridge	Rt. 12- Bradley St	Main St.	
PHYSICAL CHARACTERISTICS				
Width (meters)	2.0	8.0	2.0	
Depth (meters)	0.1	0.1	0.1	
Current speed (cm per sec.)	25	75	75	
Substrate (%)				
Rock (>25.4 cm, or bedrock)	0	0	10	
Rubble (6.35 - 25.4 cm)	40	100	30	
Gravel (0.2 – 6.35 cm)	10		20	
Sand (0.06 – 2.0 mm)	20		10	
Silt (0.004 – 0.06 mm)	30		30	
Embeddedness (%)	30	0	40	
CHEMICAL MEASUREMENTS				
Temperature (° C)	18.6	17.4	20.7	
Specific Conductance (umhos)	1405	860	845	
Dissolved Oxygen (mg/l)	2.8	9.5	9.3	
pH	6.5	7.4	7.9	
BIOLOGICAL ATTRIBUTES				
Canopy (%)	0	0	80	
Aquatic Vegetation				
algae – suspended				
algae – attached, filamentous	present	present	present	
algae - diatoms				
macrophytes or moss	present			
Occurrence of Macroinvertebrates				
Ephemeroptera (mayflies)				
Plecoptera (stoneflies)				
Trichoptera (caddisflies)			X	
Coleoptera (beetles)	X	X		
Megaloptera(dobsonflies,alderflies)				
Odonata (dragonflies, damselflies)				
Chironomidae (midges)	X	X	X	
Simuliidae (black flies)		X		
Decapoda (crayfish)		X	X	
Gammaridae (scuds)	X	X	X	
Mollusca (snails, clams)	X	X		
Oligochaeta (worms)			X	
Other	X	X	X	
FIELD ASSESSMENT	severe	severe	severe	

FIELD DATA SUMMARY				
STREAM NAME: Oily Creek	DATE SAMPLED: 07/17/02			
REACH: Watertown				
FIELD PERSONNEL INVOLVED: Abele, Heitzman				
STATION	03A	03		
ARRIVAL TIME AT STATION	8:55	9:25		
LOCATION	LeRay St.	Morrison Ave.		
PHYSICAL CHARACTERISTICS				
Width (meters)	1.0	1.0		
Depth (meters)	0.1	0.1		
Current speed (cm per sec.)	30	50		
Substrate (%)				
Rock (>25.4 cm, or bedrock)	0	0		
Rubble (6.35 - 25.4 cm)	40	50		
Gravel (0.2 – 6.35 cm)	10	20		
Sand (0.06 – 2.0 mm)	20	10		
Silt (0.004 – 0.06 mm)	30	20		
Embeddedness (%)	40	30		
CHEMICAL MEASUREMENTS				
Temperature (° C)	13.9	16.7		
Specific Conductance (umhos)	904	890		
Dissolved Oxygen (mg/l)	6.1	11.9		
pH	6.7	7.2		
BIOLOGICAL ATTRIBUTES				
Canopy (%)	80	0		
Aquatic Vegetation				
algae – suspended				
algae – attached, filamentous	present	abundant		
algae - diatoms				
macrophytes or moss				
Occurrence of Macroinvertebrates				
Ephemeroptera (mayflies)				
Plecoptera (stoneflies)				
Trichoptera (caddisflies)				
Coleoptera (beetles)	X			
Megaloptera(dobsonflies,alderflies)				
Odonata (dragonflies, damselflies)				
Chironomidae (midges)	X	X		
Simuliidae (black flies)		X		
Decapoda (crayfish)				
Gammaridae (scuds)	X	X		
Mollusca (snails, clams)				
Oligochaeta (worms)		X		
Other	X	X		
FIELD ASSESSMENT	severe	severe		

Appendix I. BIOLOGICAL METHODS FOR KICK SAMPLING

A. Rationale. The use of the standardized kick sampling method provides a biological assessment technique that lends itself to rapid assessments of stream water quality.

B. Site Selection. Sampling sites are selected based on these criteria: (1) The sampling location should be a riffle with a substrate of rubble, gravel, and sand. Depth should be one meter or less, and current speed should be at least 0.4 meters per second. (2) The site should have comparable current speed, substrate type, embeddedness, and canopy cover to both upstream and downstream sites to the degree possible. (3) Sites are chosen to have a safe and convenient access.

C. Sampling. Macroinvertebrates are sampled using the standardized traveling kick method. An aquatic net is positioned in the water at arms' length downstream and the stream bottom is disturbed by foot, so that the dislodged organisms are carried into the net. Sampling is continued for a specified time and for a specified distance in the stream. Rapid assessment sampling specifies sampling 5 minutes for a distance of 5 meters. The net contents are emptied into a pan of stream water. The contents are then examined, and the major groups of organisms are recorded, usually on the ordinal level (e.g., stoneflies, mayflies, caddisflies). Larger rocks, sticks, and plants may be removed from the sample if organisms are first removed from them. The contents of the pan are poured into a U.S. No. 30 sieve and transferred to a quart jar. The sample is then preserved by adding 95% ethyl alcohol.

D. Sample Sorting and Subsampling. In the laboratory the sample is rinsed with tap water in a U.S. No. 40 standard sieve to remove any fine particles left in the residues from field sieving. The sample is transferred to an enamel pan and distributed homogeneously over the bottom of the pan. A small amount of the sample is randomly removed with a spatula, rinsed with water, and placed in a petri dish. This portion is examined under a dissecting stereo microscope and 100 organisms are randomly removed from the debris. As they are removed, they are sorted into major groups, placed in vials containing 70 percent alcohol, and counted. The total number of organisms in the sample is estimated by weighing the residue from the picked subsample and determining its proportion of the total sample weight.

E. Organism Identification. All organisms are identified to the species level whenever possible. Chironomids and oligochaetes are slide-mounted and viewed through a compound microscope; most other organisms are identified as whole specimens using a dissecting stereomicroscope. The number of individuals in each species, and the total number of individuals in the subsample is recorded on a data sheet. All organisms from the subsample are archived, either slide-mounted or preserved in alcohol. Following identification of a subsample, if the results are ambiguous, suspected of being spurious, or do not yield a clear water quality assessment, additional subsampling may be required.

Appendix II. MACROINVERTEBRATE COMMUNITY PARAMETERS

1. Species richness. This is the total number of species or taxa found in the sample. Expected ranges for 100-specimen subsamples of kick samples in most streams in New York State are: greater than 26, non-impacted; 19-26, slightly impacted; 11-18, moderately impacted; less than 11, severely impacted.

2. EPT richness. EPT denotes the insect orders of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera). These are considered to be mostly clean-water organisms, and their presence generally is correlated with good water quality (Lenat, 1987). Expected ranges of EPT richness in average 100-organism subsamples of kick samples from most streams in New York State are: greater than 10, non-impacted; 6-10, slightly impacted; 2-5, moderately impacted; and 0-1, severely impacted.

3. Biotic index. The Hilsenhoff Biotic Index is a measure of the tolerance of the organisms in the sample to organic pollution (sewage effluent, animal wastes) and low dissolved oxygen levels. It is calculated by multiplying the number of individuals of each species by its assigned tolerance value, summing these products, and dividing by the total number of individuals. On a 0-10 scale, tolerance values range from intolerant (0) to tolerant (10). For purposes of characterizing species' tolerance, intolerant = 0-4, facultative = 5-7, and tolerant = 8-10. Values are listed in Hilsenhoff (1987); additional values are assigned by the NYS Stream Biomonitoring Unit. The most recent values for each species are listed in the Quality Assurance document (Bode et al., 1996). Ranges for the levels of impact are: 0-4.50, non-impacted; 4.51-6.50, slightly impacted; 6.51-8.50, moderately impacted; and 8.51-10.00, severely impacted.

4. Percent Model Affinity is a measure of similarity to a model non-impacted community based on percent abundance in 7 major groups (Novak and Bode, 1992). Percentage similarity is used to measure similarity to a community of 40% Ephemeroptera, 5% Plecoptera, 10% Trichoptera, 10% Coleoptera, 20% Chironomidae, 5% Oligochaeta, and 10% Other. Ranges for the levels of impact are: >64, non-impacted; 50-64, slightly impacted; 35-49, moderately impacted; and <35, severely impacted.

Bode, R.W., M.A. Novak, and L.E. Abele. 1996. Quality assurance work plan for biological stream monitoring in New York State. NYS DEC technical report, 89 pp.

Hilsenhoff, W. L. 1987. An improved biotic index of organic stream pollution. The Great Lakes Entomologist 20(1): 31-39.

Lenat, D. R. 1987. Water quality assessment using a new qualitative collection method for freshwater benthic macroinvertebrates. North Carolina DEM Tech. Report. 12 pp.

Novak, M.A., and R.W. Bode. 1992. Percent model affinity: a new measure of macroinvertebrate community composition. J. N. Am. Benthol. Soc. 11(1):80-85.

Appendix III. LEVELS OF WATER QUALITY IMPACT IN STREAMS.

The description of overall stream water quality based on biological parameters uses a four-tiered system of classification. Level of impact is assessed for each individual parameter, and then combined for all parameters to form a consensus determination. Four parameters are used: species richness, EPT value, biotic index, and percent model affinity. The consensus is based on the determination of the majority of the parameters; since parameters measure different aspects of the community, they cannot be expected to always form unanimous assessments. The ranges given for each parameter are based on 100-organism subsamples of macroinvertebrate riffle kick samples, and also apply to most multiplate samples, with the exception of percent model affinity.

1. Non-impacted

Indices reflect very good water quality. The macroinvertebrate community is diverse, usually with at least 27 species in riffle habitats. Mayflies, stoneflies, and caddisflies are well-represented; EPT richness is greater than 10. The biotic index value is 4.50 or less. Percent model affinity is greater than 64. Water quality should not be limiting to fish survival or propagation. This level of water quality includes both pristine habitats and those receiving discharges which minimally alter the biota.

2. Slightly impacted

Indices reflect good water quality. The macroinvertebrate community is slightly but significantly altered from the pristine state. Species richness usually is 19-26. Mayflies and stoneflies may be restricted, with EPT values of 6-10. The biotic index value is 4.51-6.50. Percent model affinity is 50-64. Water quality is usually not limiting to fish survival, but may be limiting to fish propagation.

3. Moderately impacted

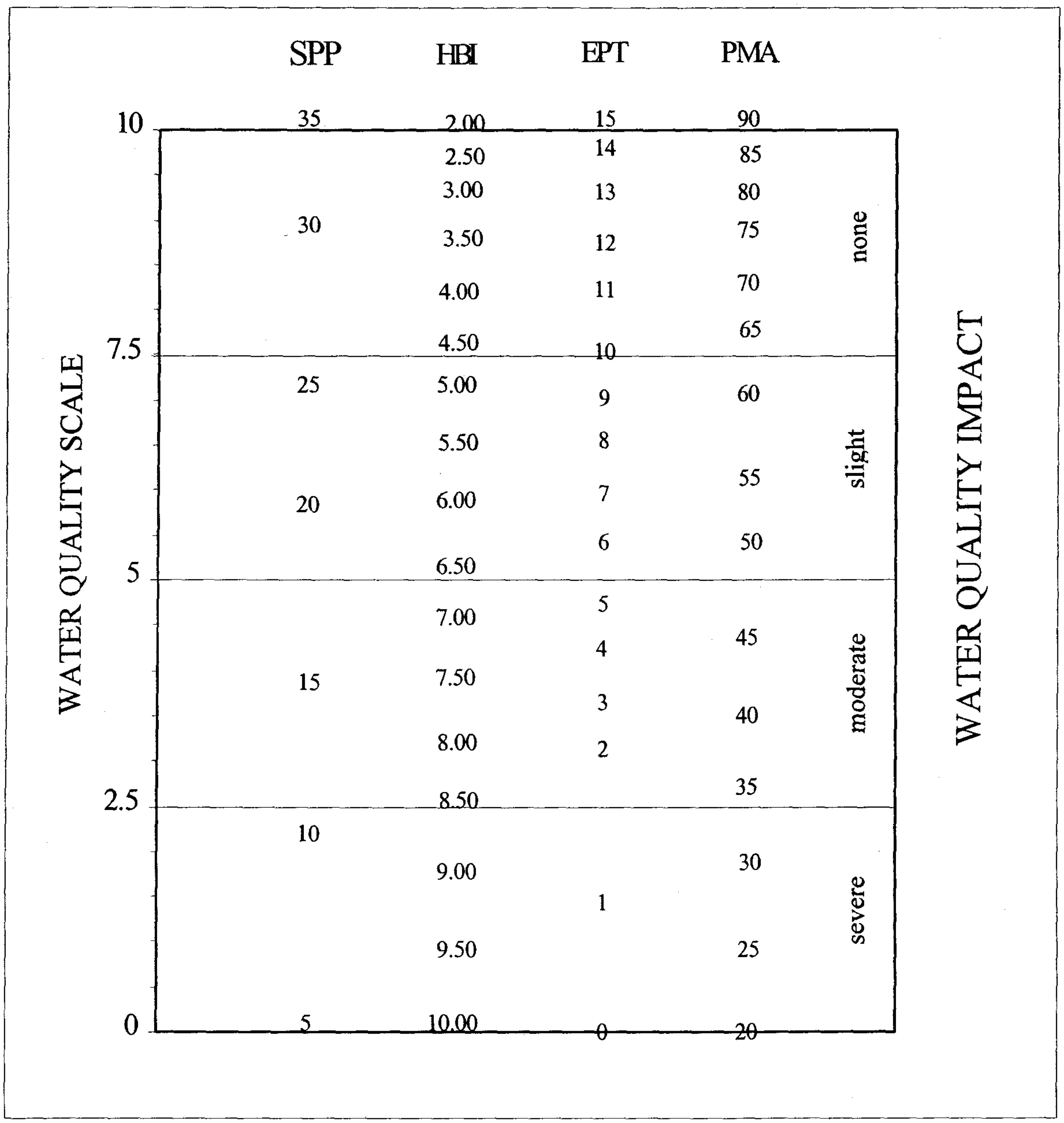
Indices reflect poor water quality. The macroinvertebrate community is altered to a large degree from the pristine state. Species richness usually is 11-18 species. Mayflies and stoneflies are rare or absent, and caddisflies are often restricted; EPT richness is 2-5. The biotic index value is 6.51-8.50. The percent model affinity value is 35-49. Water quality often is limiting to fish propagation, but usually not to fish survival.

4. Severely impacted

Indices reflect very poor water quality. The macroinvertebrate community is limited to a few tolerant species. Species richness is 10 or less. Mayflies, stoneflies, and caddisflies are rare or absent; EPT richness is 0-1. The biotic index value is greater than 8.50. Percent model affinity is less than 35. The dominant species are almost all tolerant, and are usually midges and worms. Often 1-2 species are very abundant. Water quality is often limiting to both fish propagation and fish survival.

Appendix IV. BIOLOGICAL ASSESSMENT PROFILE OF INDEX VALUES

The Biological Assessment Profile of index values, developed by Mr. Phil O'Brien, Division of Water, NYS DEC, is a method of plotting biological index values on a common scale of water quality impact. Values from the four indices defined in Appendix II are converted to a common 0-10 scale as shown in the figure below.



To plot survey data, each site is positioned on the x-axis according to river miles from the mouth, and the scaled values for the four indices are plotted on the common scale. The mean scale value of the four indices represents the assessed impact for each site.

Appendix V.
WATER QUALITY ASSESSMENT CRITERIA

for non-navigable flowing waters

	Species Richness	Hilsenhoff Biotic Index	EPT Value	Percent Model Affinity#	Diversity*
Non-Impacted	>26	0.00-4.50	>10	>64	>4
Slightly Impacted	19-26	4.51-6.50	6-10	50-64	3.01-4.00
Moderately Impacted	11-18	6.51-8.50	2-5	35-49	2.01-3.00
Severely Impacted	0-10	8.51-10.00	0-1	<35	0.00-2.00

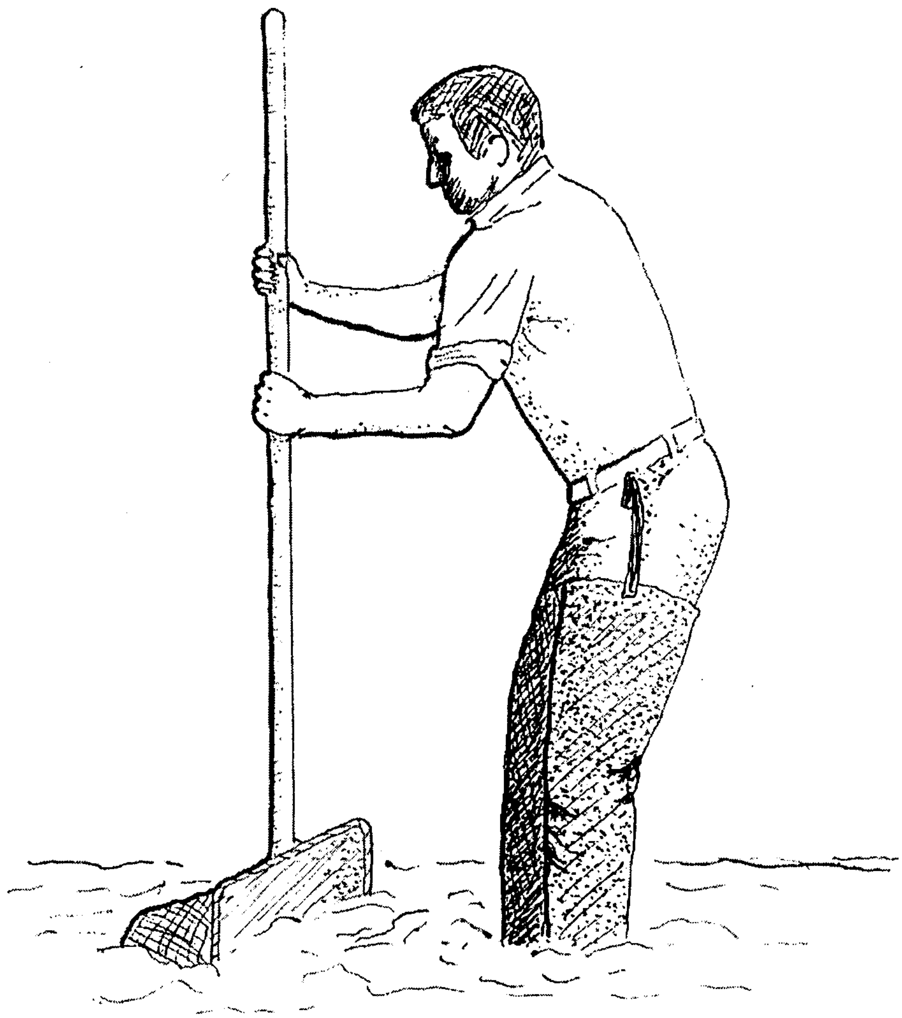
Percent model affinity criteria are used for traveling kick samples but not for multiplate samples.
* Diversity criteria are used for multiplate samples but not for traveling kick samples.

WATER QUALITY ASSESSMENT CRITERIA
for navigable flowing waters

	Species Richness	Hilsenhoff Biotic Index	EPT Value	Diversity
Non-Impacted	>21	0.00-7.00	>5	>3.00
Slightly Impacted	17-21	7.01-8.00	4-5	2.51-3.00
Moderately Impacted	12-16	8.01-9.00	2-3	2.01-2.50
Severely Impacted	0-11	9.01-10.00	0-1	0.00-2.00

Appendix VI.

THE TRAVELING KICK SAMPLE



← current

Rocks and sediment in the riffle are dislodged by foot upstream of a net; organisms dislodged are carried by the current into the net. Sampling is continued for five minutes, as the sampler gradually moves downstream to cover a distance of five meters

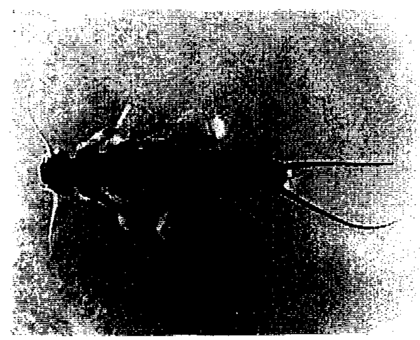
Appendix VII. A.

AQUATIC MACROINVERTEBRATES THAT USUALLY INDICATE GOOD WATER QUALITY

Mayfly nymphs are often the most numerous organisms found in clean streams. They are sensitive to most types of pollution, including low dissolved oxygen (less than 5 ppm), chlorine, ammonia, metals, pesticides, and acidity. Most mayflies are found clinging to the undersides of rocks.

MAYFLIES

Stonefly nymphs are mostly limited to cool, well-oxygenated streams. They are sensitive to most the same pollutants as mayflies, except acidity. They are usually much less numerous than mayflies. The presence of even a few stoneflies in a stream suggests that good water quality has been maintained for several months.

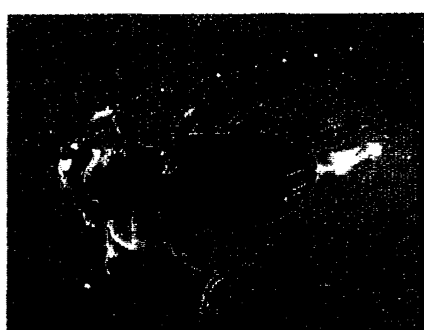


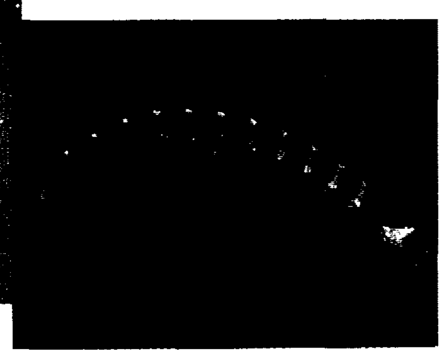
STONEFLIES

Caddisfly larvae often build a portable case of sand, stones, sticks, or other debris. Many caddisfly larvae are sensitive to pollution, although a few are tolerant. One family spins nets to catch drifting plankton, and is often numerous in nutrient-enriched stream segments.

CADDISFLIES

The most common beetles in streams are riffle beetles and water pennies. Most of these require a swift current and an adequate supply of oxygen, and are generally considered clean-water indicators.





BEETLES

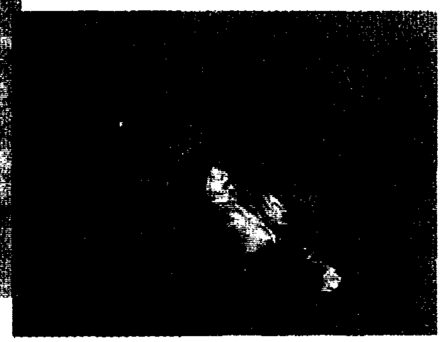
Appendix VII. B.

AQUATIC MACROINVERTEBRATES THAT USUALLY INDICATE POOR WATER QUALITY

Midges are the most common aquatic flies. The larvae occur in almost any aquatic situation. Many species are very tolerant to pollution. Large, red midge larvae called "bloodworms" indicate organic enrichment. Other midge larvae filter plankton, indicating nutrient enrichment when numerous.

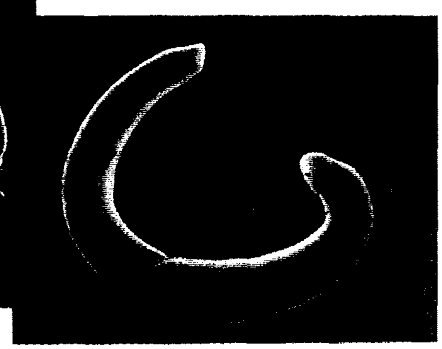
MIDGES

Black fly larvae have specialized structures for filtering plankton and bacteria from the water, and require a strong current. Some species are tolerant of organic enrichment and toxic contaminants, while others are intolerant of pollutants.



BLACK FLIES

The segmented worms include the leeches and the small aquatic earthworms. The latter are more common, though usually unnoticed. They burrow in the substrate and feed on bacteria in the sediment. They can thrive under conditions of severe pollution and very low oxygen levels, and are thus valuable pollution indicators. Many leeches are also tolerant of poor water quality.



WORMS

Aquatic sowbugs are crustaceans that are often numerous in situations of high organic content and low oxygen levels. They are classic indicators of sewage pollution, and can also thrive in toxic situations.

Digital images by Larry Abele, New York State Department of Environmental Conservation, Stream Biomonitoring Unit.

SOWBUGS

APPENDIX VIII. THE RATIONALE OF BIOLOGICAL MONITORING

Biological monitoring as applied here refers to the use of resident benthic macroinvertebrate communities as indicators of water quality. Macroinvertebrates are larger-than-microscopic invertebrate animals that inhabit aquatic habitats; freshwater forms are primarily aquatic insects, worms, clams, snails, and crustaceans.

Concept

Nearly all streams are inhabited by a community of benthic macroinvertebrates. The species comprising the community each occupy a distinct niche defined and limited by a set of environmental requirements. The composition of the macroinvertebrate community is thus determined by many factors, including habitat, food source, flow regime, temperature, and water quality. The community is presumed to be controlled primarily by water quality if the other factors are determined to be constant or optimal. Community components which can change with water quality include species richness, diversity, balance, abundance, and presence/absence of tolerant or intolerant species. Various indices or metrics are used to measure these community changes. Assessments of water quality are based on metric values of the community, compared to expected metric values.

Advantages

The primary advantages to using macroinvertebrates as water quality indicators are:

1) they are sensitive to environmental impacts
2) they are less mobile than fish, and thus cannot avoid discharges
3) they can indicate effects of spills, intermittent discharges, and lapses in treatment
4) they are indicators of overall, integrated water quality, including synergistic effects and substances lower than detectable limits
5) they are abundant in most streams and are relatively easy and inexpensive to sample
6) they are able to detect non-chemical impacts to the habitat, e.g. siltation or thermal changes
7) they are vital components of the aquatic ecosystem and important as a food source for fish
8) they are more readily perceived by the public as tangible indicators of water quality
9) they can often provide an on-site estimate of water quality
10) they can often be used to identify specific stresses or sources of impairment
11) they can be preserved and archived for decades, allowing for direct comparison of specimens
12) they bioaccumulate many contaminants, so that analysis of their tissues is a good monitor of toxic substances in the aquatic food chain

Limitations

Biological monitoring is not intended to replace chemical sampling, toxicity testing, or fish surveys. Each of these measurements provides information not contained in the others. Similarly, assessments based on biological sampling should not be taken as being representative of chemical sampling. Some substances may be present in levels exceeding ambient water quality criteria, yet have no apparent adverse community impact.

APPENDIX IX. GLOSSARY

assessment: a diagnosis or evaluation of water quality

benthos: organisms occurring on or in the bottom substrate of a waterbody

biomonitoring: the use of biological indicators to measure water quality

community: a group of populations of organisms interacting in a habitat

drainage basin: an area in which all water drains to a particular waterbody; watershed

EPT value: the number of species of mayflies, stoneflies, and caddisflies in a sample

facultative: occurring over a wide range of water quality; neither tolerant nor intolerant of poor water quality

fauna: the animal life of a particular habitat

impact: a change in the physical, chemical, or biological condition of a waterbody

impairment: a detrimental effect caused by an impact

index: a number, metric, or parameter derived from sample data used as a measure of water quality

intolerant: unable to survive poor water quality

macroinvertebrate: a larger-than-microscopic invertebrate animal that lives at least part of its life in aquatic habitats

multiplate: multiple-plate sampler, a type of artificial substrate sampler of aquatic macroinvertebrates

organism: a living individual

rapid bioassessment: a biological diagnosis of water quality using field and laboratory analysis designed to allow assessment of water quality in a short turn-around time; usually involves kick sampling and laboratory subsampling of the sample

riffle: wadeable stretch of stream usually with a rubble bottom and sufficient current to have the water surface broken by the flow; rapids

species richness: the number of macroinvertebrate species in a sample or subsample

station: a sampling site on a waterbody

survey: a set of samplings conducted in succession along a stretch of stream

tolerant: able to survive poor water quality

APPENDIX X. METHODS FOR IMPACT SOURCE DETERMINATION

Definition Impact Source Determination (ISD) is the procedure for identifying types of impacts that exert deleterious effects on a waterbody. While the analysis of benthic macroinvertebrate communities has been shown to be an effective means of determining severity of water quality impacts, it has been less effective in determining what kind of pollution is causing the impact. Impact Source Determination uses community types or models to ascertain the primary factor influencing the fauna.

Development of methods The method found to be most useful in differentiating impacts in New York State streams was the use of community types, based on composition by family and genus. It may be seen as an elaboration of Percent Model Affinity (Novak and Bode, 1992), which is based on class and order. A large database of macroinvertebrate data was required to develop ISD methods. The database included several sites known or presumed to be impacted by specific impact types. The impact types were mostly known by chemical data or land use. These sites were grouped into the following general categories: agricultural nonpoint, toxic-stressed, sewage (domestic municipal), sewage/toxic, siltation, impoundment, and natural. Each group initially contained 20 sites. Cluster analysis was then performed within each group, using percent similarity at the family or genus level. Within each group four clusters were identified, each cluster usually composed of 4-5 sites with high biological similarity. From each cluster a hypothetical model was then formed to represent a model cluster community type; sites within the cluster had at least 50 percent similarity to this model. These community type models formed the basis for Impact Source Determination (see tables following). The method was tested by calculating percent similarity to all the models, and determining which model was the most similar to the test site. Some models were initially adjusted to achieve maximum representation of the impact type. New models are developed when similar communities are recognized from several streams.

Use of the ISD methods Impact Source Determination is based on similarity to existing models of community types (see tables following). The model that exhibits the highest similarity to the test data denotes the likely impact source type, or may indicate "natural", lacking an impact. In the graphic representation of ISD, only the highest similarity of each source type is identified. If no model exhibits a similarity to the test data of greater than 50%, the determination is inconclusive. The determination of impact source type is used in conjunction with assessment of severity of water quality impact to provide an overall assessment of water quality.

Limitations These methods were developed for data derived from 100-organism subsamples of traveling kick samples from riffles of New York State streams. Application of the methods for data derived from other sampling methods, habitats, or geographical areas would likely require modification of the models.

NATURAL

	A	B	C	D	E	F	G	H	I	J	K	L	M
PLATYHELMINTHES	-	-	-	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA	-	-	5	-	5	-	5	5	-	-	-	5	5
HIRUDINEA	-	-	-	-	-	-	-	-	-	-	-	-	
GASTROPODA	-	-	-	-	-	-	-	-	-	-	-	-	-
SPHAERIIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
ASELLIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
GAMMARIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
Isonychia	5	5	-	5	20	-	-	-	-	-	-	-	-
BAETIDAE	20	10	10	10	10	5	10	10	10	10	5	15	40
HEPTAGENIIDAE	5	10	5	20	10	5	5	5	5	10	10	5	5
LEPTOPHLEBIIDAE	5	5	-	-	-	-	-	-	5	-	-	25	5
EPHEMERELLIDAE	5	5	5	10	-	10	10	30	-	5	-	10	5
Caenis/Tricorythodes	-	-	-	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	-	-	-	5	5	-	5	5	15	5	5	5	5
Psephenus	5	-	-	-	-	-	-	-	-	-	-	-	-
Optioservus	5	-	20	5	5	-	5	5	5	5	-	-	-
Promoresia	5	-	-	-	-	-	25	-	-	-	-	-	-
Stenelmis	10	5	10	10	5	-	-	-	10	-	-	-	5
PHILOPOTAMIDAE	5	20	5	5	5	5	5	-	5	5	5	5	5
HYDROPSYCHIDAE	10	5	15	15	10	10	5	5	10	15	5	5	10
HELICOPSYCHIDAE/ BRACHYCENTRIDAE/ RHYACOPHILIDAE	5	5	-	-	-	20	-	5	5	5	5	5	-
SIMULIIDAE	-	-	-	5	5	-	-	-	-	5	-	-	-
Simulium vittatum	-	-	-	-	-	-	-	-	-	-	-	-	-
EMPIDIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	5	-	-	-	-
CHIRONOMIDAE													
Tanypodinae	-	5	-	-	-	-	-	-	5	-	-	-	-
Diamesinae	-	-	-	-	-	-	5	-	-	-	-	-	-
Cardiocladius	-	5	-	-	-	-	-	-	-	-	-	-	-
Cricotopus/ Orthocladius	5	5	-	-	10	-	-	5	-	-	5	5	5
Eukiefferiella/ Tvetenia	5	5	10	-	-	5	5	5	-	5	-	5	5
Parametriocnemus	-	-	-	-	-	-	-	5	-	-	-	-	-
Chironomus	-	-	-	-	-	-	-	-	-	-	-	-	-
Polypedilum aviceps	-	-	-	-	-	20	-	-	10	20	20	5	-
Polypedilum (all others)	5	5	5	5	5	-	5	5	-	-	-	-	-
Tanytarsini	-	5	10	5	5	20	10	10	10	10	40	5	5
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	

NONPOINT NUTRIENTS, PESTICIDES

	A	B	C	D	E	F	G	H	I	J
PLATYHELMINTHES	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA	-	-	-	5	-	-	-	-	-	15
HIRUDINEA	-	-	-	-	-	-	-	-	-	-
GASTROPODA	-	-	-	-	-	-	-	-	-	-
SPHAERIIDAE	-	-	-	5	-	-	-	-	-	-
ASELLIDAE	-	-	-	-	-	-	-	-	-	-
GAMMARIDAE	-	-	-	5	-	-	-	-	-	-
Isonychia	-	-	-	-	-	-	-	5	-	-
BAETIDAE	5	15	20	5	20	10	10	5	10	5
HEPTAGENIIDAE	-	-	-	-	5	5	5	5	-	5
LEPTOPHLEBIIDAE	-	-	-	-	-	-	-	-	-	-
EPHEMERELLIDAE	-	-	-	-	-	-	-	5	-	-
Caenis/Tricorythodes	-	-	-	-	5	-	-	5	-	5
PLECOPTERA	-	-	-	-	-	-	-	-	-	-
Psephenus	5	-	-	5	-	5	5	-	-	-
Optioservus	10	-	-	5	-	-	15	5	-	5
Promoresia	-	-	-	-	-	-	-	-	-	-
Stenelmis	15	15	-	10	15	5	25	5	10	5
PHILOPOTAMIDAE	15	5	10	5	-	25	5	-	-	-
HYDROPSYCHIDAE	15	15	15	25	10	35	20	45	20	10
HELICOPSYCHIDAE/ BRACHYCENTRIDAE/ RHYACOPHILIDAE	-	-	-	-	-	-	-	-	-	-
SIMULIIDAE	5	-	15	5	5	-	-	-	40	-
Simulium vittatum	-	-	-	-	-	-	-	-	5	-
EMPIDIDAE	-	-	-	-	-	-	-	-	-	-
TIPULIDAE	-	-	-	-	-	-	-	-	-	5
CHIRONOMIDAE										
Tanypodinae	-	-	-	-	-	-	5	-	-	5
Cardiocladius	-	-	-	-	-	-	-	-	-	-
Cricotopus/ Orthocladius	10	15	10	5	-	-	-	-	5	5
Eukiefferiella/ Tvetenia	-	15	10	5	-	-	-	-	5	-
Parametriocnemus	-	-	-	-	-	-	-	-	-	-
Microtendipes	-	-	-	-	-	-	-	-	-	20
Polypedilum aviceps	-	-	-	-	-	-	-	-	-	-
Polypedilum (all others)	10	10	10	10	20	10	5	10	5	5
Tanytarsini	10	10	10	5	20	5	5	10	-	10
TOTAL	100	100	100	100	100	100	100	100	100	100

	TOXIC						MUNICIPAL/INDUSTRIAL						
	A	B	C	D	E	F	A	B	C	D	E	F	G
PLATYHELMINTHES	-	-	-	-	5	-	-	40	-	-	-	5	-
OLIGOCHAETA	-	10	20	5	5	15	20	20	70	10	-	20	-
HIRUDINEA	-	-	-	-	-	-	-	5	-	-	-	-	-
GASTROPODA	-	5	-	-	-	5	-	-	-	-	-	5	-
SPHAERIIDAE	-	-	-	-	-	-	-	5	-	-	-	-	-
ASELLIDAE	10	10	-	20	10	5	10	5	10	10	15	5	-
GAMMARIDAE	5	-	-	-	5	5	40	-	-	-	15	-	5
<u>Isonychia</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
BAETIDAE	15	10	20	-	-	5	5	-	-	-	5	-	10
HEPTAGENIIDAE	-	-	-	-	-	-	5	-	-	-	-	-	-
LEPTOPHLEBIIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMERELLIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Caenis/Tricorythodes</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Psephenus</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Optioservus</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Promoresia</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stenelmis</u>	10	15	-	40	35	5	5	-	-	10	5	-	5
PHILOPOTAMIDAE10	-	-	-	-	-	-	-	-	-	-	-	-	
HYDROPSYCHIDAE20	10	15	10	35	10	10	-	-	50	20	-	40	
HELICOPSYCHIDAE/ BRACHYCENTRIDAE/ RHYACOPHILIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
SIMULIIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium vittatum</u>	-	20	-	-	-	5	-	-	-	-	-	-	20
EMPIDIDAE	-	-	-	-	-	-	-	5	-	-	-	-	-
CHIRONOMIDAE													
Tanypodinae	5	10	-	-	-	25	-	10	-	-	5	15	-
<u>Cardiocladius</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cricotopus/ Orthocladius</u>	15	10	25	10	5	10	5	10	20	-	5	10	5
<u>Eukiefferiella/ Tvetenia</u>	-	-	20	10	-	-	-	-	-	-	-	-	-
<u>Parametriocnemus</u>	-	-	-	5	-	-	-	-	-	-	-	-	-
<u>Chironomus</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum aviceps</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> (all others)	10	-	-	-	-	5	-	-	-	10	20	40	10
Tanytarsini	-	-	-	-	-	5	-	-	-	10	10	-	5
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100

SEWAGE EFFLUENT, ANIMAL WASTES

	A	B	C	D	E	F	G	H	I	J
PLATYHELMINTHES	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA	5	35	15	10	10	35	40	10	20	15
HIRUDINEA	-	-	-	-	-	-	-	-	-	-
GASTROPODA	-	-	-	-	-	-	-	-	-	-
SPHAERIIDAE	-	-	-	10	-	-	-	-	-	-
ASELLIDAE	5	10	-	10	10	10	10	50	-	5
GAMMARIDAE	-	-	-	-	-	10	-	10	-	-
<u>Isonychia</u>	-	-	-	-	-	-	-	-	-	-
BAETIDAE	-	10	10	5	-	-	-	-	5	-
HEPTAGENIIDAE	10	10	10	-	-	-	-	-	-	-
LEPTOPHLEBIIDAE	-	-	-	-	-	-	-	-	-	-
EPHEMERELLIDAE	-	-	-	-	-	-	-	-	5	-
<u>Caenis/Tricorythodes</u>	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	-	-	-	-	-	-	-	-	-	-
<u>Psephenus</u>	-	-	-	-	-	-	-	-	-	-
<u>Optioservus</u>	-	-	-	-	-	-	-	-	5	-
<u>Promoresia</u>	-	-	-	-	-	-	-	-	-	-
<u>Stenelmis</u>	15	-	10	10	-	-	-	-	-	-
PHILOPOTAMIDAE	-	-	-	-	-	-	-	-	-	-
HYDROPSYCHIDAE	45	-	10	10	10	-	-	10	5	-
HELICOPSYCHIDAE/ BRACHYCENTRIDAE/ RHYACOPHILIDAE	-	-	-	-	-	-	-	-	-	-
SIMULIIDAE	-	-	-	-	-	-	-	-	-	-
<u>Simulium vittatum</u>	-	-	-	25	10	35	-	-	5	5
EMPIDIDAE	-	-	-	-	-	-	-	-	-	-
CHIRONOMIDAE										
Tanypodinae	-	5	-	-	-	-	-	-	5	5
<u>Cardiocladius</u>	-	-	-	-	-	-	-	-	-	-
<u>Cricotopus/ Orthocladius</u>	-	10	15	-	-	10	10	-	5	5
<u>Eukiefferiella/ Tvetenia</u>	-	-	10	-	-	-	-	-	-	-
<u>Parametriocnemus</u>	-	-	-	-	-	-	-	-	-	-
<u>Chironomus</u>	-	-	-	-	-	-	10	-	-	60
<u>Polypedilum aviceps</u>	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> (all others)	10	10	10	10	60	-	30	10	5	5
Tanytarsini	10	10	10	10	-	-	-	10	40	-
TOTAL	100	100	100	100	100	100	100	100	100	100

	SILTATION					IMPOUNDMENT									
	A	B	C	D	E	A	B	C	D	E	F	G	H	I	J
PLATYHELMINTHES	-	-	-	-	-	-	10	-	10	-	5	-	50	10	-
OLIGOCHAETA	5	-	20	10	5	5	-	40	5	10	5	10	5	5	-
HIRUDINEA	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
GASTROPODA	-	-	-	-	-	-	-	10	-	5	5	-	-	-	-
SPHAERIIDAE	-	-	-	5	-	-	-	-	-	-	-	-	5	25	-
ASELLIDAE	-	-	-	-	-	-	5	5	-	10	5	5	5	-	-
GAMMARIDAE	-	-	-	10	-	-	-	10	-	10	50	-	5	10	-
Isonychia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BAETIDAE	-	10	20	5	-	-	5	-	5	-	-	5	-	-	5
HEPTAGENIIDAE	5	10	-	20	5	5	5	-	5	5	5	5	-	5	5
LEPTOPHLEBIIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMERELLIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caenis/Tricorythodes	5	20	10	5	15	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psephenus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Optioservus	5	10	-	-	-	-	-	-	-	-	-	-	-	5	-
Promoresia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stenelmis	5	10	10	5	20	5	5	10	10	-	5	35	-	5	10
PHILOPOTAMIDAE	-	-	-	-	-	5	-	-	5	-	-	-	-	-	30
HYDROPSYCHIDAE	25	10	-	20	30	50	15	10	10	10	10	20	5	15	20
HELICOPSYCHIDAE/ BRACHYCENTRIDAE/ RHYACOPHILIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
SIMULIIDAE	5	10	-	-	5	5	-	5	-	35	10	5	-	-	15
EMPIDIDAE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CHIRONOMIDAE															
Tanypodinae	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
Cardiocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cricotopus/ Orthocladius	25	-	10	5	5	5	25	5	-	10	-	5	10	-	-
Eukiefferiella/ Tvetenia	-	-	10	-	5	5	15	-	-	-	-	-	-	-	-
Parametriocnemus	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Chironomus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polypedilum aviceps	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polypedilum (all others)	10	10	10	5	5	5	-	-	20	-	-	5	5	5	5
Tanytarsini	10	10	10	10	5	5	10	5	30	-	-	5	10	10	5
TOTAL	100	100	100	100	100	100	100	100	100	100	100	1000	100	100	

APPENDIX XI. MACROINVERTEBRATE TISSUE ANALYSIS MONITORING

Rationale

Macroinvertebrates, in addition to being useful at the community level as monitors of overall water quality, can also be used to monitor specific contaminants by having their tissues chemically analyzed. They are of particular interest because (1) they bioconcentrate contaminants to levels several times that found in water, (2) they occupy a middle position in the aquatic food chain, and may be linked to levels found in fish, (3) they are less mobile and shorter lived than fish, and may be used to pinpoint a contaminant source in relation to time and location, and (4) they are easily collected in most streams.

Field collection

For routine monitoring, it is desirable to collect the same type of organism at each site to allow maximum comparison of results. The organisms most commonly found in the majority of streams in adequate biomass for analysis are net-spinning caddisflies (Trichoptera: Hydropsychidae) and crayfish (Crustacea: Decapoda). The live field-collected organisms are placed in Hexane-washed glass jars containing water from the stream being sampled. The jars are kept on ice in a cooler until returned to the laboratory.

Laboratory processing

In the laboratory, the specimens are identified to genus or species; larger foreign particles are removed from the organisms. The organisms are placed in scintillation vials (without water) or 4-ounce glass jars and stored in a freezer until preparation for analysis. Prior to submitting specimens for analysis, they are weighed (wet-weight), freeze-dried, and re-weighed (dry-weight).

Chemical analysis

Specimens are submitted to an outside analytical chemistry laboratory for analysis.

Derivation of contaminant guidelines for invertebrate tissues

Original levels of concern for PCBs for caddisflies were derived from correlations with levels in fish tissues. Levels of concern for crayfish were correlated with levels in caddisflies. The level of 0.2 ppm dry weight in crayfish tissues is expected to correlate to levels of 2.0 ppm wet weight in fish collected at the corresponding site.

APPENDIX XII. MACROINVERTEBRATE TISSUE ANALYSIS RESULTS

The following results are appended:

SBU Accession Number	Stream	Station	Organism	Analyte
02-058	Kelsey Cr.	KLSY-02	Crayfish, tadpoles	Organochlorine pesticides, PCBs, PAHs
02-059	Kelsey Cr.	KLSY-04	Crayfish	Organochlorine pesticides, PCBs, PAHs
02-060	Kelsey Cr.	KLSY-02	Crayfish	Organochlorine pesticides, PCBs, PAHs
02-061	Kelsey Cr.	KLSY-05	Crayfish	Metals

WADSWORTH CENTER
EMPIRE STATE PLAZA, ALBANY NY 12201

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 200204654 SAMPLE RECEIVED: 12/30/2002 CHARGE: 11.00
PROGRAM: 570: DEC ROUTINE TOXICS SURVEILLANCE
SOURCE ID: DRAINAGE BASIN: 08 GAZETTEER CODE: 2201
POLITICAL SUBDIVISION: WATERTOWN C. COUNTY: JEFFERSON
LATITUDE: 44 00 20 LONGITUDE: 75 54 09
LOCATION: KELSEY CREEK IN WATERTOWN
DESCRIPTION: OTHR; 02-058; KLSY; 00002; RT 37
REPORTING LAB: TOX: LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: RIBS-BUGS2: ROTATING INTENSIVE BASIN STUDY - AQUATIC INSECTS 2
SAMPLE TYPE: 742: AQUATIC INSECTS
TIME OF SAMPLING : 07/17/2002 DATE PRINTED: 11/26/2003
CASE:M102 SDG:0502B CUST.NO.:02-058

ANALYSIS: PEST-PCB-S ORGANOCHLORINE PESTICIDES & PCBs'-SOIL/SED.
DATE PRINTED: 11/26/2003 FINAL REPORT

PARAMETER	RESULT
HEXACHLOROCYCLOPENTADIENE (C-56)	< 50. MCG/KG
HEXACHLOROBENZENE	< 50. MCG/KG
HCH,ALPHA	< 100. MCG/KG
HCH,GAMMA (LINDANE)	< 100. MCG/KG
HCH,BETA	< 100. MCG/KG
HCH,DELTA	< 100. MCG/KG
HEPTACHLOR	< 100. MCG/KG
ALDRIN	< 100. MCG/KG
HEPTACHLOR EPOXIDE	< 100. MCG/KG
ENDOSULFAN I	< 100. MCG/KG
4,4'-DDE	< 100. MCG/KG
DIELDRIN	< 100. MCG/KG
ENDRIN	< 50. MCG/KG
4,4'-DDD	< 100. MCG/KG
ENDOSULFAN II	< 100. MCG/KG
4,4'-DDT	< 100. MCG/KG
ENDRIN ALDEHYDE	< 100. MCG/KG
ENDOSULFAN SULFATE	< 100. MCG/KG
METHOXYCHLOR	< 500. MCG/KG
MIREX	< 100. MCG/KG
TOXAPHENE	< 2500. MCG/KG
CHLORDANE	< 250. MCG/KG
AROCLOR 1221	< 250. MCG/KG
AROCLOR 1232	< 250. MCG/KG
AROCLOR 1016/1242	< 250. MCG/KG
AROCLOR 1248	< 250. MCG/KG
AROCLOR 1254	< 250. MCG/KG

**** CONTINUED ON NEXT PAGE ****

NYS ELAP ID 10763, LAB DIR DR K. ALDOUS, CONTACT MR R. PAUSE 518-473-0323
COPIES SENT TO: CO(1), RO( ), LPHE( ), FED( ), INFO-P( ), INFO-L( ), 147

ROBERT BODE
C/O USGS
425 JORDAN ROAD
TROY, NEW YORK 12180

COLLECTED BY:STREAMBIO
SUBMITTED BY:MARGARETNO

WADSWORTH CENTER
EMPIRE STATE PLAZA, ALBANY NY 12201

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 200204654 SAMPLE RECEIVED: 12/30/2002 CHARGE: 11.00
POLITICAL SUBDIVISION: WATERTOWN C. COUNTY: JEFFERSON
LOCATION: KELSEY CREEK IN WATERTOWN
TIME OF SAMPLING : 07/17/2002 DATE PRINTED: 11/26/2003
CASE:M102 SDG:0502B CUST.NO.:02-058

-----------PARAMETER-------------	-----------RESULT---------------
AROCLOR 1260	< 250. MCG/KG

ANALYSIS: 610SKG POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
DATE REPORTED: 05/12/2003 REPORT MAILED OUT

-----------PARAMETER-------------	-----------RESULT---------------
NAPHTHALENE	< 240. MCG/KG
ACENAPHTHYLENE	< 240. MCG/KG
ACENAPHTHENE	< 240. MCG/KG
FLUORENE	< 240. MCG/KG
PHENANTHRENE	220. MCG/KG
ANTHRACENE	16. MCG/KG
FLUORANTHENE	38. MCG/KG
PYRENE	280. MCG/KG
BENZO (a) ANTHRACENE	61. MCG/KG
CHRYSENE	280. MCG/KG
BENZO (b) FLUORANTHENE	< 1. MCG/KG
BENZO (k) FLUORANTHENE	< 1. MCG/KG
BENZO (a) PYRENE	< 1. MCG/KG
DIBENZ (A,H) ANTHRACENE	< 1. MCG/KG
BENZO (ghi) PERYLENE	< 1. MCG/KG
INDENO (1,2,3-cd) PYRENE	< 1. MCG/KG

**** END OF REPORT ****

WADSWORTH CENTER
EMPIRE STATE PLAZA, ALBANY NY 12201

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 200204655 SAMPLE RECEIVED: 12/30/2002 CHARGE: 11.00
PROGRAM: 570: DEC ROUTINE TOXICS SURVEILLANCE
SOURCE ID: DRAINAGE BASIN: 08 GAZETTEER CODE: 2201
POLITICAL SUBDIVISION: WATERTOWN C. COUNTY: JEFFERSON
LATITUDE: 43 59 26 LONGITUDE: 75 55 01
LOCATION: KELSEY CREEK IN WATERTOWN
DESCRIPTION: CRAY; 02-059; KLSY; 00004; RT. 12
REPORTING LAB: TOX: LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: RIBS-BUGS2: ROTATING INTENSIVE BASIN STUDY - AQUATIC INSECTS 2
SAMPLE TYPE: 742: AQUATIC INSECTS
TIME OF SAMPLING : 07/17/2002 DATE PRINTED: 11/26/2003
CASE:MI02 SDG:0502B CUST.NO.:02-059

ANALYSIS: PEST-PCB-S ORGANOCHLORINE PESTICIDES & PCBs'-SOIL/SED.
DATE PRINTED: 11/26/2003 FINAL REPORT

PARAMETER	RESULT
HEXACHLOROCYCLOPENTADIENE (C-56)	< 100. MCG/KG
HEXACHLOROBENZENE	< 100. MCG/KG
HCH,ALPHA	< 200. MCG/KG
HCH,GAMMA (LINDANE)	< 200. MCG/KG
HCH,BETA	< 200. MCG/KG
HCH,DELTA	< 200. MCG/KG
HEPTACHLOR	< 200. MCG/KG
ALDRIN	< 200. MCG/KG
HEPTACHLOR EPOXIDE	< 200. MCG/KG
ENDOSULFAN I	< 200. MCG/KG
4,4'-DDE	< 200. MCG/KG
DIELDRIN	< 200. MCG/KG
ENDRIN	< 100. MCG/KG
4,4'-DDD	< 200. MCG/KG
ENDOSULFAN II	< 200. MCG/KG
4,4'-DDT	< 200. MCG/KG
ENDRIN ALDEHYDE	< 200. MCG/KG
ENDOSULFAN SULFATE	< 200. MCG/KG
METHOXYCHLOR	< 1000. MCG/KG
MIREX	< 200. MCG/KG
TOXAPHENE	< 500. MCG/KG
CHLORDANE	< 500. MCG/KG
AROCLOR 1221	< 500. MCG/KG
AROCLOR 1232	< 500. MCG/KG
AROCLOR 1016/1242	< 500. MCG/KG
AROCLOR 1248	< 500. MCG/KG
AROCLOR 1254	1400. MCG/KG [CR]

**** CONTINUED ON NEXT PAGE ****

NYS ELAP ID 10763, LAB DIR DR K. ALDOUS, CONTACT MR R. PAUSE 518-473-0323
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ROBERT BODE
C/O USGS COLLECTED BY:STREAMBIO
425 JORDAN ROAD SUBMITTED BY:MARGARETNO
TROY, NEW YORK 12180

WADSWORTH CENTER
EMPIRE STATE PLAZA, ALBANY NY 12201

PAGE 2 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 200204655 SAMPLE RECEIVED: 12/30/2002 CHARGE: 11.00
POLITICAL SUBDIVISION: WATERTOWN C. COUNTY: JEFFERSON
LOCATION: KELSEY CREEK IN WATERTOWN
TIME OF SAMPLING : 07/17/2002 DATE PRINTED: 11/26/2003
CASE:MI02 SDG:05028 CUST.NO.:02-059

-----------PARAMETER-------------	-----------RESULT---------------
AROCLOR 1260	< 500. MCG/KG

ANALYSIS: 610SKG POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
DATE REPORTED: 05/12/2003 REPORT MAILED OUT

-----------PARAMETER-------------	-----------RESULT---------------
NAPHTHALENE	< 510. MCG/KG
ACENAPHTHYLENE	< 510. MCG/KG
ACENAPHTHENE	< 510. MCG/KG
FLUORENE	< 510. MCG/KG
PHENANTHRENE	660. MCG/KG
ANTHRACENE	55. MCG/KG
FLUORANTHENE	220. MCG/KG
PYRENE	1000. MCG/KG
BENZO(a)ANTHRACENE	250. MCG/KG
CHRYSENE	1000. MCG/KG
BENZO(b)FLUORANTHENE	46. MCG/KG
BENZO(k)FLUORANTHENE	21. MCG/KG
BENZO(a)PYRENE	27. MCG/KG
DIBENZ(A,H)ANTHRACENE	< 2. MCG/KG
BENZO(ghi)PERYLENE	< 2. MCG/KG
INDENO(1,2,3-cd)PYRENE	< 2. MCG/KG

**** END OF REPORT ****

WADSWORTH CENTER
EMPIRE STATE PLAZA, ALBANY NY 12201

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 200204656 SAMPLE RECEIVED: 12/30/2002 CHARGE: 11.00
PROGRAM: 570: DEC ROUTINE TOXICS SURVEILLANCE
SOURCE ID: DRAINAGE BASIN: 08 GAZETTEER CODE: 2201
POLITICAL SUBDIVISION: WATERTOWN C. COUNTY: JEFFERSON
LATITUDE: 43 59 22 LONGITUDE: 75 55 27
LOCATION: KELSEY CREEK IN WATERTOWN
DESCRIPTION: CRAY; 02-060; KLSY; 00005; RT 12E
REPORTING LAB: TOX: LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: RIBS-BUGS2: ROTATING INTENSIVE BASIN STUDY - AQUATIC INSECTS 2
SAMPLE TYPE: 742: AQUATIC INSECTS
TIME OF SAMPLING : 07/17/2002 DATE PRINTED: 11/26/2003
CASE:MI02 SDG:0502B CUST.NO.:02-060

ANALYSIS: PEST-PCB-S ORGANOCHLORINE PESTICIDES & PCBs'-SOIL/SED.
DATE PRINTED: 11/26/2003 FINAL REPORT

PARAMETER	RESULT
HEXACHLOROCYCLOPENTADIENE (C-56)	< 10. MCG/KG
HEXACHLOROBENZENE	< 10. MCG/KG
HCH,ALPHA	< 20. MCG/KG
HCH,GAMMA (LINDANE)	< 20. MCG/KG
HCH,BETA	< 20. MCG/KG
HCH,DELTA	< 20. MCG/KG
HEPTACHLOR	< 20. MCG/KG
ALDRIN	< 20. MCG/KG
HEPTACHLOR EPOXIDE	< 20. MCG/KG
ENDOSULFAN I	< 20. MCG/KG
4,4'-DDE	< 20. MCG/KG
DIELDRIN	< 20. MCG/KG
ENDRIN	< 10. MCG/KG
4,4'-DDD	< 20. MCG/KG
ENDOSULFAN II	< 20. MCG/KG
4,4'-DDT	< 20. MCG/KG
ENDRIN ALDEHYDE	< 20. MCG/KG
ENDOSULFAN SULFATE	< 20. MCG/KG
METHOXYCHLOR	< 100. MCG/KG
MIREX	< 20. MCG/KG
TOXAPHENE	< 500. MCG/KG
CHLORDANE	< 50. MCG/KG
AROCLOR 1221	< 50. MCG/KG
AROCLOR 1232	< 50. MCG/KG
AROCLOR 1016/1242	< 50. MCG/KG
AROCLOR 1248	< 50. MCG/KG
AROCLOR 1254	740. MCG/KG [CR]

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COLLECTED BY:STREAMBIO
SUBMITTED BY:MARGARETNO

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PAGE 2 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 200204656 SAMPLE RECEIVED: 12/30/2002 CHARGE: 11.00
POLITICAL SUBDIVISION: WATERTOWN C. COUNTY: JEFFERSON
LOCATION: KELSEY CREEK IN WATERTOWN
TIME OF SAMPLING : 07/17/2002 DATE PRINTED: 11/26/2003
CASE:M102 SDG:0502B CUST.NO.:02-060

-----------PARAMETER-------------	-----------RESULT---------------
AROCLOR 1260	< 50. MCG/KG

ANALYSIS: 610SKG POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
DATE REPORTED: 05/12/2003 REPORT MAILED OUT

-----------PARAMETER-------------	-----------RESULT---------------
NAPHTHALENE	< 45. MCG/KG
ACENAPHTHYLENE	< 45. MCG/KG
ACENAPHTHENE	< 45. MCG/KG
FLUORENE	< 45. MCG/KG
PHENANTHRENE	120. MCG/KG
ANTHRACENE	3. MCG/KG
FLUORANTHENE	40. MCG/KG
PYRENE	160. MCG/KG
BENZO(a)ANTHRACENE	36. MCG/KG
CHRYSENE	96. MCG/KG
BENZO(b)FLUORANTHENE	6. MCG/KG
BENZO(k)FLUORANTHENE	3. MCG/KG
BENZO(a)PYRENE	4. MCG/KG
DIBENZ(A,H)ANTHRACENE	< 1. MCG/KG
BENZO(ghi)PERYLENE	3. MCG/KG
INDENO(1,2,3-cd)PYRENE	4. MCG/KG

**** END OF REPORT ****

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

02-061

Contract: R2215119

Lab Code: Case No.: MIR02 SAS No.: SDG NO.: 0702B,0802B

Matrix (soil/water): SOLID Lab Sample ID: 610389

Level (low/med): LOW Date Received: 12/20/02

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.52	B		P
7440-43-9	Cadmium	0.54			P
7440-47-3	Chromium	0.52	B		P
7440-50-8	Copper	160		N	P
7439-92-1	Lead	0.70	B		P
7439-97-6	Mercury	0.10			CV
7440-02-0	Nickel	0.37	B		P
7782-49-2	Selenium	3.1			P
7440-32-6	Titanium	2.1	B		P
7440-66-6	Zinc	73.3		E	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

66