Stream: Ischua Creek, Cattaraugus County, New York

Reach: above Franklinville to Hinsdale, New York

Background:

The Stream Biomonitoring Unit conducted biological sampling on Ischua Creek on September 2, 1998. The purpose of the sampling was to assess general water quality and compare results to previous studies. Regional DEC personnel had reported possible problems resulting from salt piles and junk piles in the drainage of Rock Spring Brook, a tributary of Ischua Creek. Traveling kick samples were taken in riffle areas at 7 sites, using methods described in the Quality Assurance document (Bode et al., 1996) 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. Water quality assessments were based on resident macroinvertebrates (aquatic insects, worms, mollusks, crustaceans). 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 2 provides a listing of sampling sites, and Table 3 provides a listing of all macroinvertebrate species collected in the present survey. This is followed by site collection pages, which include the raw invertebrate data from each site and descriptions of each site. A previous macroinvertebrate study of Ischua Creek conducted by Preddice in 1975 was used for site selection and comparison of results.

The Stream Biomonitoring Unit acknowledges the help of the Region 9 personnel who assisted in this survey.

Results and Conclusions:

1. Water quality in Ischua Creek ranged from non-impacted to slightly impacted. Impacts appeared in the upstream reaches below the confluence of Rock Spring Brook, and displayed some attributes that could be consistent with leachate from salt piles and solid waste in the drainage, as reported by Regional personnel. These concerns could be further investigated with chemical sampling.

2. Nutrient runoff from the Ischua Valley Golf Course appears to be enriching Ischua Creek above Franklinville. Filter-feeding caddisflies were very numerous downstream of the golf course, indicating increased levels of plankton.

3. Water quality from Cadiz to the mouth at Hinsdale was assessed as non-impacted.

4. Compared to results from a DEC study conducted in 1975 (Preddice, 1977), improved water quality is documented downstream of Franklinville, likely due to the 1987 upgrade of the sewage treatment plant.

Discussion:

The purpose of this biological sampling of Ischua Creek was to assess general water quality, and compare to results of previous studies. A previous NYS DEC macroinvertebrate study of Ischua Creek was conducted in 1975 by Preddice (1977). Five of the sites sampled in the present survey were included in Preddice's study, and the site numbering is the same. The 1975 study found good overall water quality in Ischua Creek, with some degradation downstream of the Franklinville sewage treatment plant discharge, and slight degradation at all sites due to siltation. Station 2 at Cadiz appeared to show the most impact in the 1975 study, and Station 5 below Ischua showed the best water quality.

From upstream to downstream, the results of the present study show that water quality is non-impacted at the most upstream site above Franklinville (Station A). Although three metrics were depressed at this site, this is likely due to a combination of headwater effects, low gradient, and a gravel substrate. Metric values and dominant species closely fit the pattern described for headwater streams; even though this site is several miles below the source, most of the upstream reach is low gradient, contributing to a prolonged headwater effect. The assessment for this site was consequently upgraded from slightly impacted to non-impacted after applying the recommended correction factor (Appendix X).

Rock Spring Brook was one of the subjects of investigation in the present study. Regional DEC personnel reported possible problems resulting from salt piles and junk piles in its drainage. The stream enters Ischua Creek 0.5 miles upstream of Station 1A. Rock Spring Brook was sampled for invertebrates, but this sample was not considered to be representative of water quality, since the stream is believed to be intermittent and had poor habitat. The specific conductance of Rock Spring Brook was elevated, with a value of 658 μmhos, compared to 413 μmhos in Ischua Creek above the confluence. The invertebrate sample taken in Ischua Creek below the Rock Spring Brook confluence (Station 1A) showed slightly impacted water quality. Similar impacts were found 2.1 miles downstream at Station 1. Impact Source Determination (ISD) showed that the impacts above Franklinville (Station 1A) may include sources of toxic and complex origin, (see Table 1). Rock Spring Brook is thus considered a possible cause of these impacts. Although the faunal shift between Stations A and 1A is subtle, the appearance of high numbers of the tolerant black fly Simulium vittatum downstream of the Rock Spring Brook confluence is a strong indicator of probable impact. The impacts observed downstream of Rock Spring Brook could be consistent with leachate from salt piles and solid waste in the drainage, and these concerns should be further investigated with chemical sampling.

Ischua Creek runs through the Ischua Valley Golf Course between Stations 1A and 1 above Franklinville. Station 1 in Franklinville, just downstream of the golf course, exhibited a large increase in filter-feeding caddisflies compared to upstream Station 1A. These caddisflies filter planktonic particles and organisms from the water column, and their increase is usually a direct indicator of increased levels of plankton, often due to nutrient enrichment. This site carried the highest percentage of filter-feeding caddisflies of any Ischua Creek site, and appears to be an indicator of nutrient enrichment from the golf course.

Water quality improved at Cadiz (Station 2) and sites downstream. Nonpoint sources appear to be contributing some nutrients and silt, especially at Station 3 (Table 1), but all these sites are assessed as non-impacted. The invertebrate communities at these sites maintained diverse populations of clean-water mayflies, stoneflies, caddisflies, and beetles, and water quality was considered excellent.

Two sites on Ischua Creek were previously sampled by the NYS DEC Stream Biomonitoring Unit in 1990 (Bode et al., 1992). Station 2 in Cadiz was found to be non-impacted, representing an improvement from the 1975 conditions documented by Preddice (1977). This is likely related to the 1987 upgrade of the Franklinville sewage treatment plant. Station 3 below Cadiz was found to be slightly impacted in the 1990 sampling, probably by nonpoint source nutrients and other inputs. This site exhibited the best water quality found in the stream in the present study, and may represent a slight improvement from 1990.

Literature cited

Bode, R.W., M.A. Novak, and L.E. Abele. 1992. Rotating Intensive Basin Studies. Appendix B. Macroinvertebrate Data. New York State Department of Environmental Conservation, Albany, NY. NYS DEC Technical Report, 178 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, Albany, NY. NYS DEC Technical Report, 89 pages.

Preddice, T.L. 1977. Water quality and quantitative macroinvertebrate survey of segments of Ischua, Oil, and Olean Creeks, July, 1975. New York State Department of Environmental Conservation, Avon Pollution Investigations. NYS DEC Technical Report, 66 pages.

Overview of field data:

On the date of sampling, September 2, 1998, the sites sampled on Ischua Creek were 4-20 meters wide, 0.2-0.3 meters deep in riffles, and had current speeds of 83-100 cm/sec in riffles. Dissolved oxygen was 7.5-11.4 mg/l, specific conductance was 344-429 μmhos, pH was 7.8-8.6, and the temperature was 13.9-20.1 °C (57-68 °F). Measurements for each site are found on the field data summary sheets.

Figure 1. Biological Assessment Profile of index values, Ischua Creek, 1998. 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. See Appendix IV for more complete explanation.

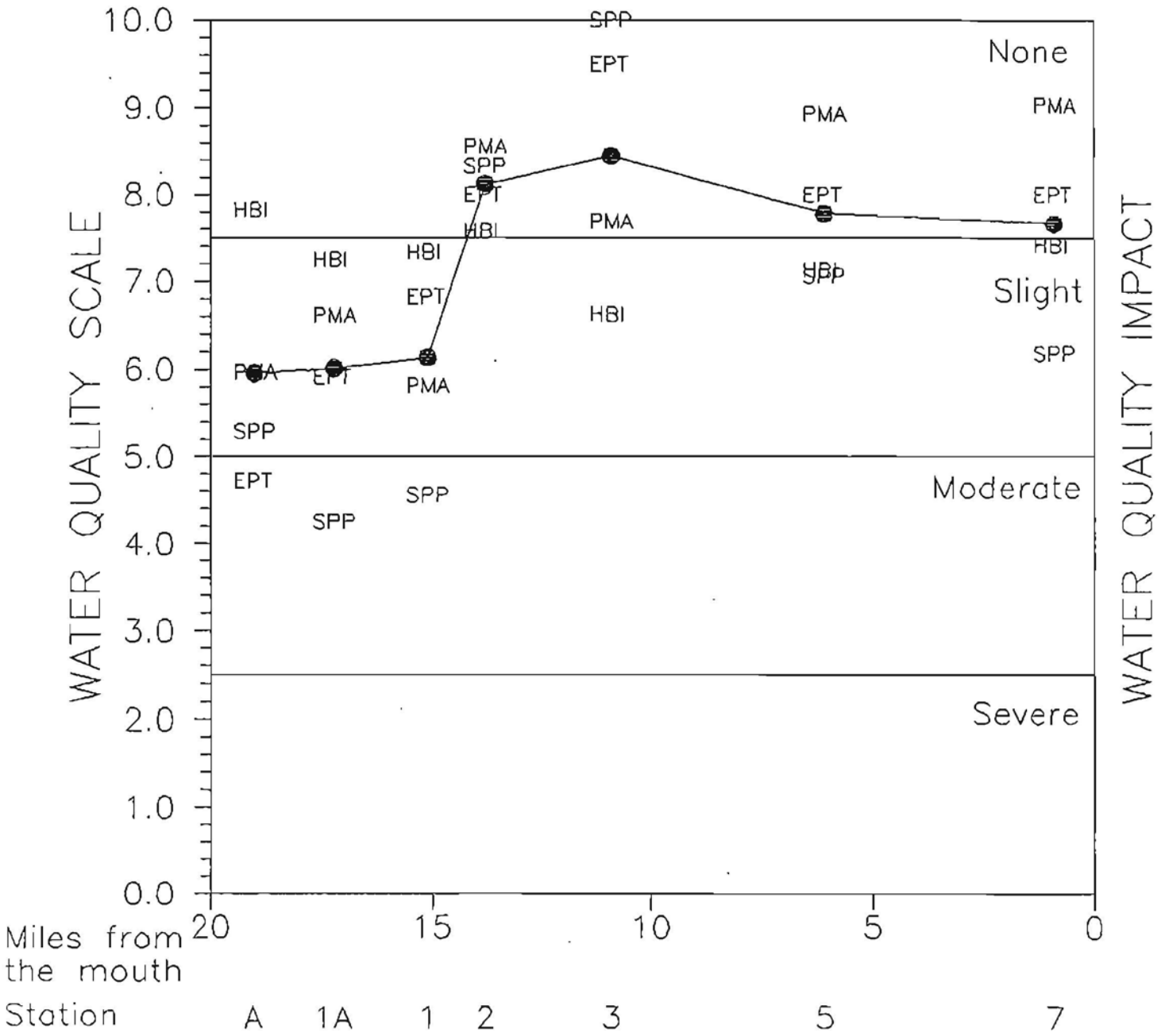


Table 1. Impact Source Determination, Ischua Creek, 1998. Numbers represent similarity to community type models for each impact category. The highest similarity at each station is highlighted. Similarities less than 50% are less conclusive.

	STATION						
Community Type	ISCH A	ISCH 01A	ISCH 01	ISCH 02	ISCH 03	ISCH 05	ISCH 07
Natural: minimal human impacts	54	50	51	48	52	62	64
Nutrient additions: mostly nonpoint runoff	53	48	58	45	64	57	57
Toxic: industrial, municipal, or urban run-off	27	46	40	34	51	54	51
Organic: sewage effluent, animal wastes	29	38	40	30	50	37	44
Complex: municipal/industrial	33	51	66	38	63	47	46
Siltation	40	42	45	43	64	50	54
Impoundment	41	39	56	36	60	47	49

Figure 2	Site Overview Map	Ischua Creek

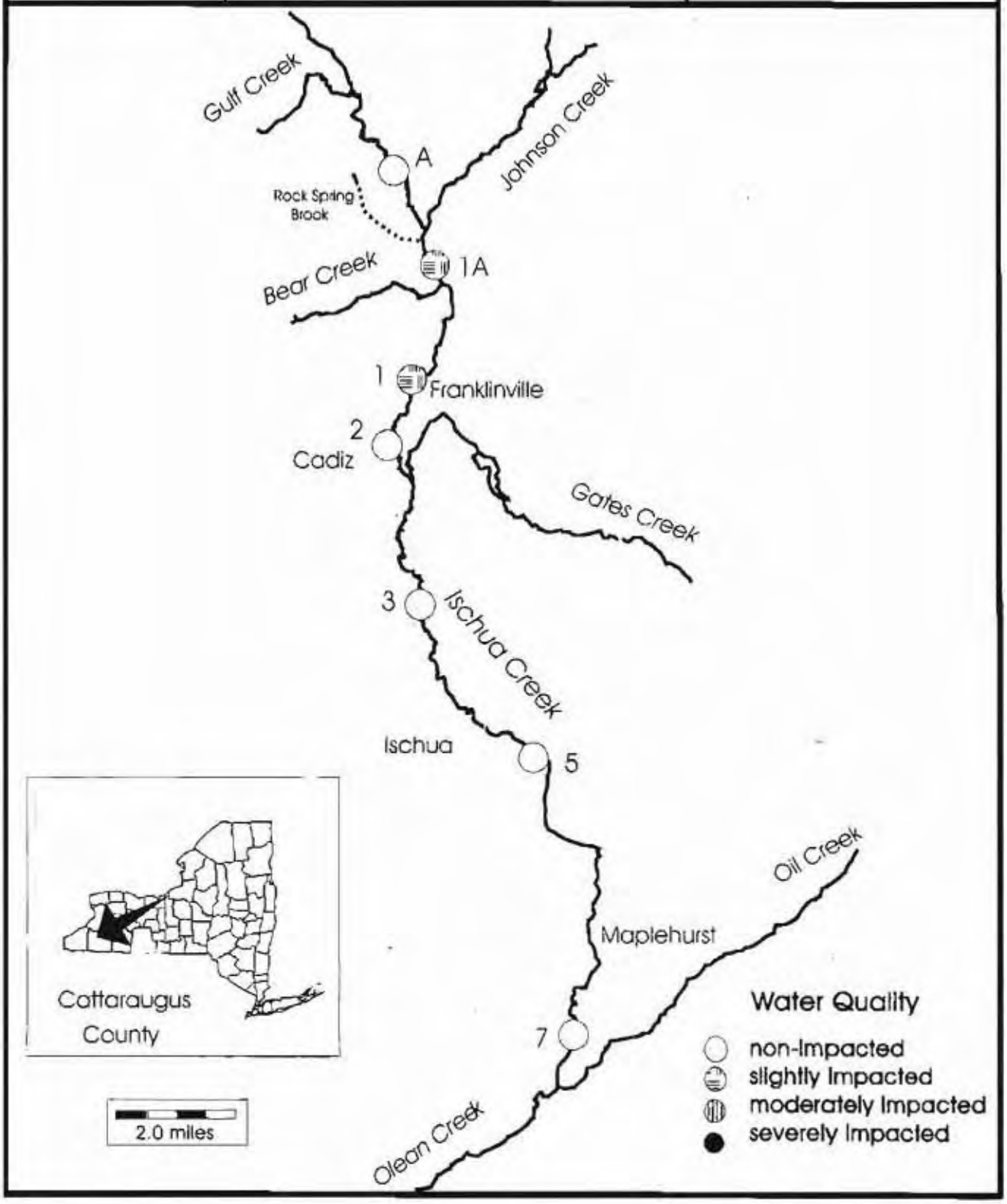
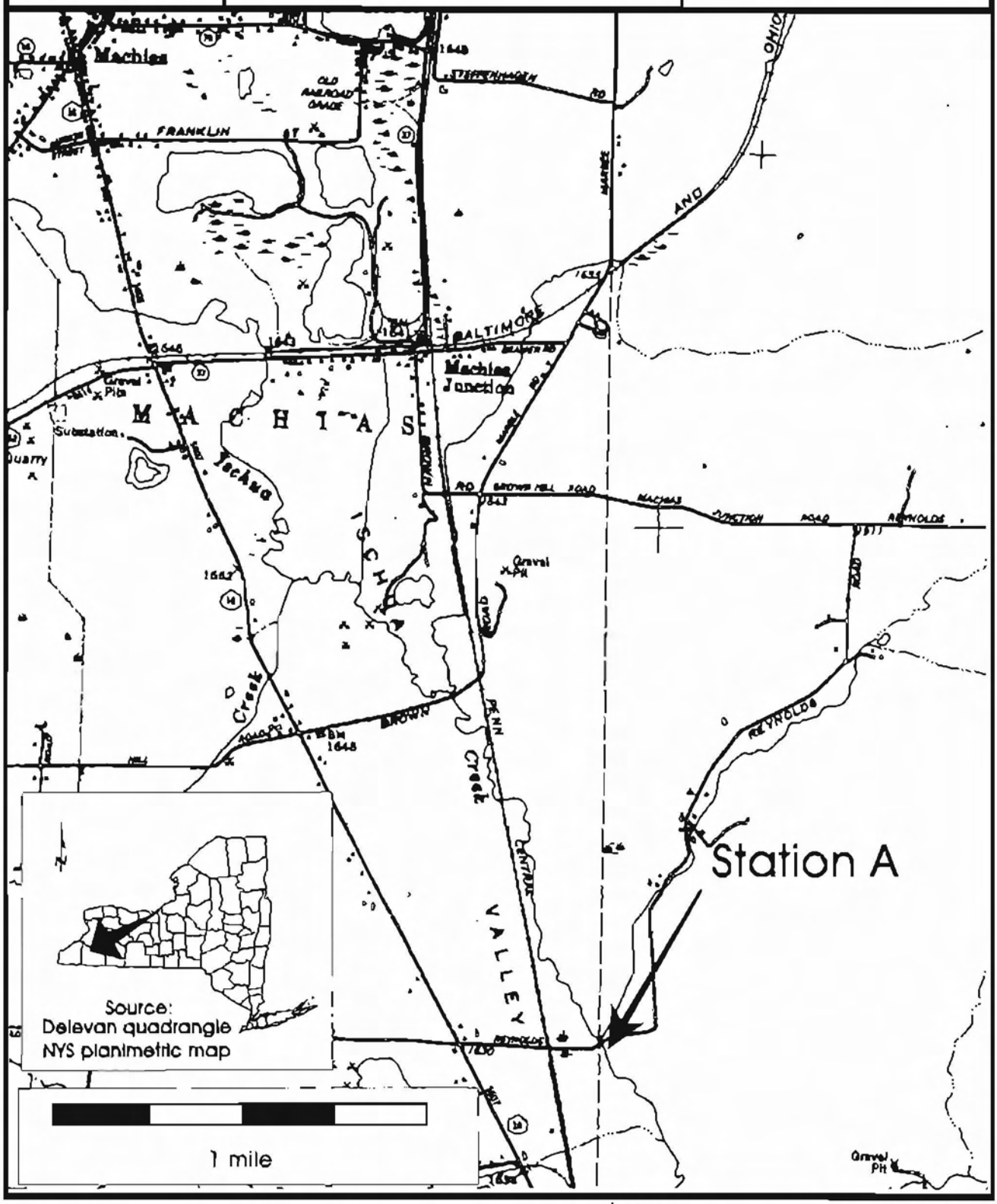


TABLE 2. STATION LOCATIONS FOR ISCHUA CREEK, CATTARAUGUS COUNTY, NEW YORK (see map).

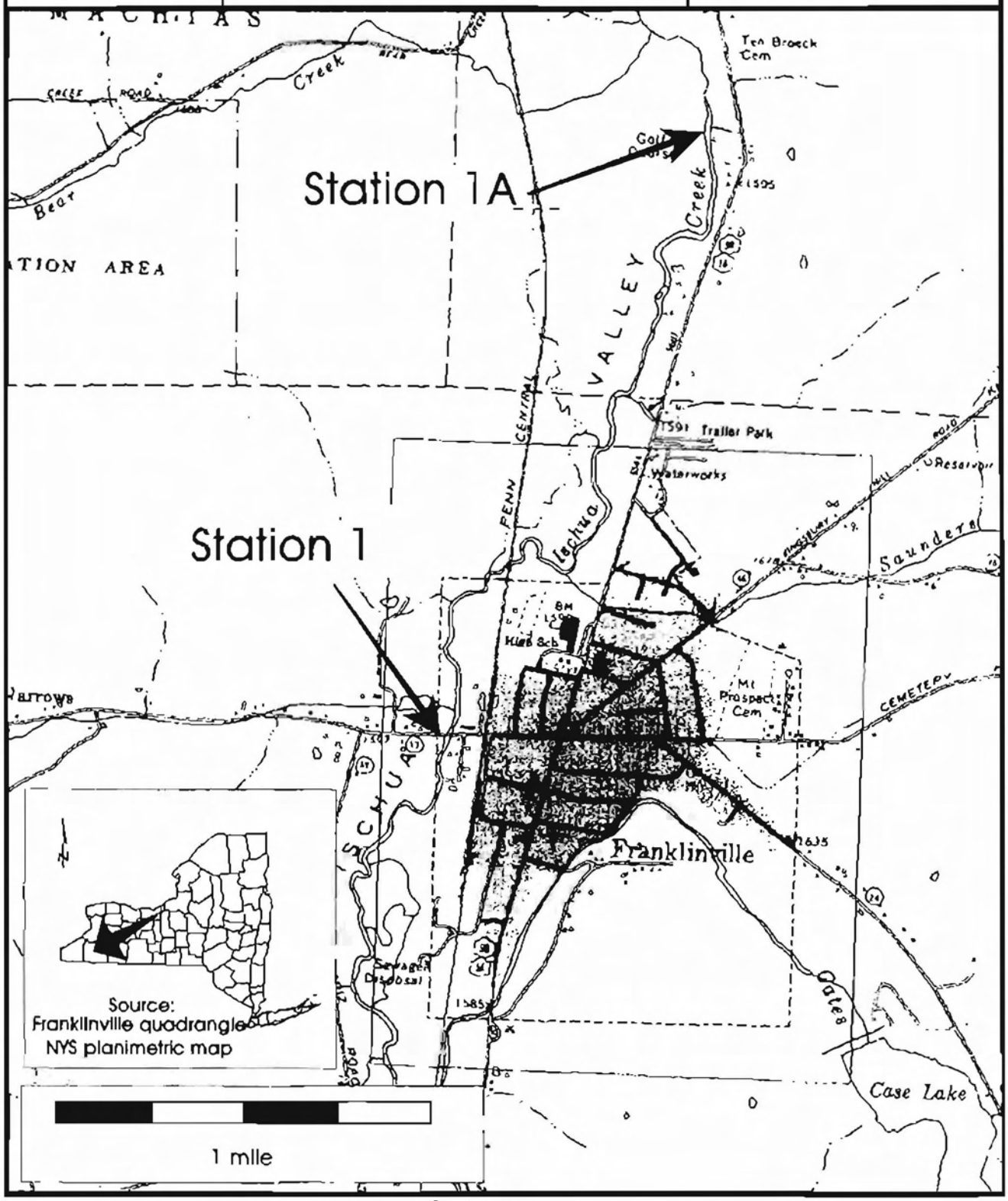
STATION	LOCATION
A	above Franklinville 30 meters below Reynolds Rd. bridge 19.0 miles above mouth latitude/longitude: 42°22'54";78°27'53"
01A	above Franklinville opposite 6th tee, Ischua Valley golf course 17.2 miles above mouth latitude/longitude: 42°21'35"; 78°27'07"
01	Franklinville 50 meters below West Main St. bridge 15.1 miles above mouth latitude/longitude: 42°20'12"; 78°27'47"
02	Cadiz 50 meters above Rt. 98 bridge 13.8 miles above mouth latitude/longitude: 42°19'17"; 78°27'54"
03	below Cadiz 150 meters below Coal Chutes Rd. bridge 10.9 miles above mouth latitude/longitude: 42°17'12"; 78°27'25"
05	Ischua 5 meters below Old Dutch Hill Rd. bridge 6.1 miles above mouth latitude/longitude: 42°14'34"; 78°23'51"
07	Maplehurst 20 meters above Mill St. bridge (closed) 0.9 miles above mouth latitude/longitude: 42°10'51"; 78°23'05"

Figure 3a	Site Location Map	Ischua Creek



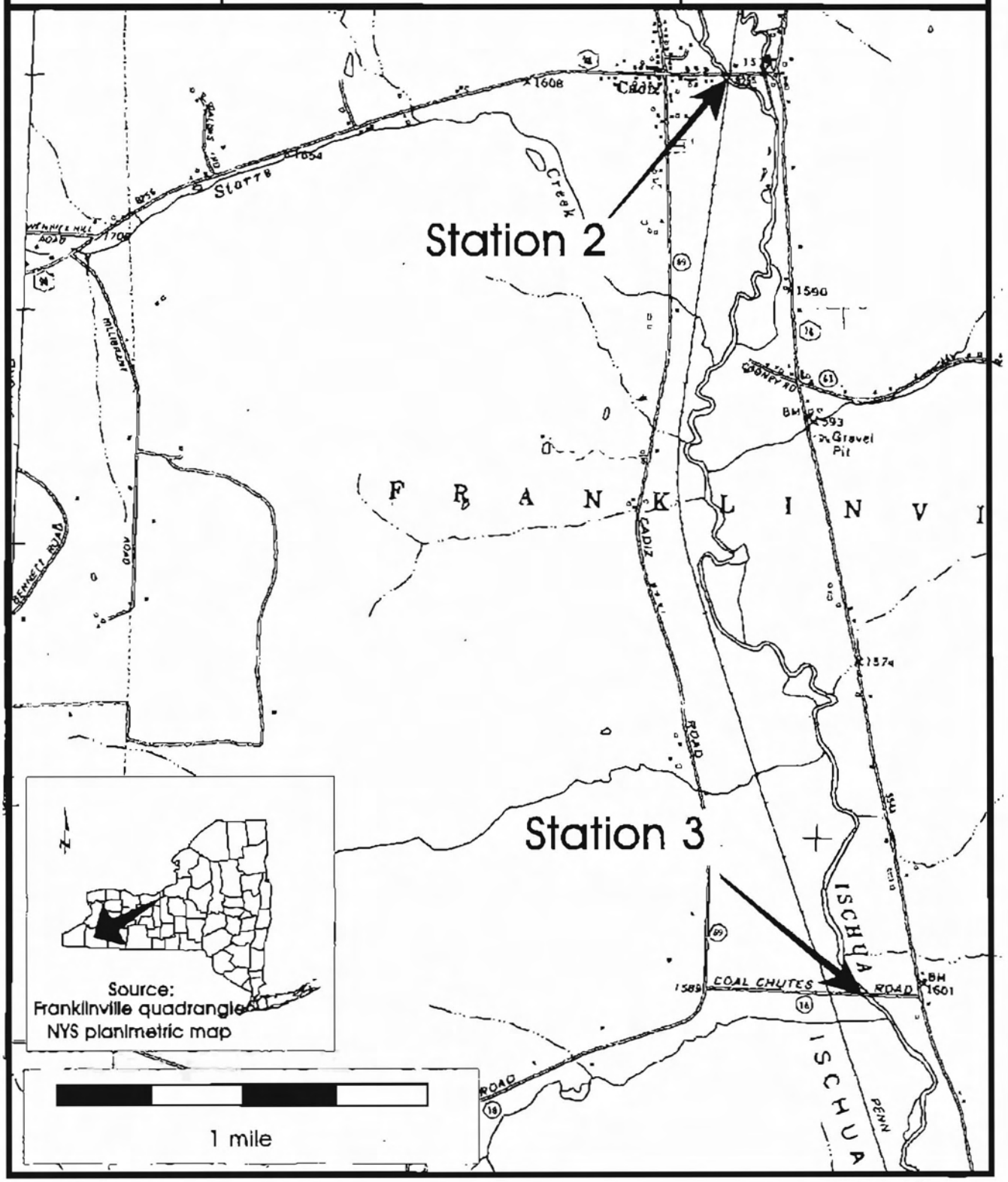
stream flow

Figure 3b	Site Location Map	Ischua Creek



stream flow

Figure 3c	Site Location Map	Ischua Creek



stream flow

Figure 3d	Site Location Map	Ischua Creek

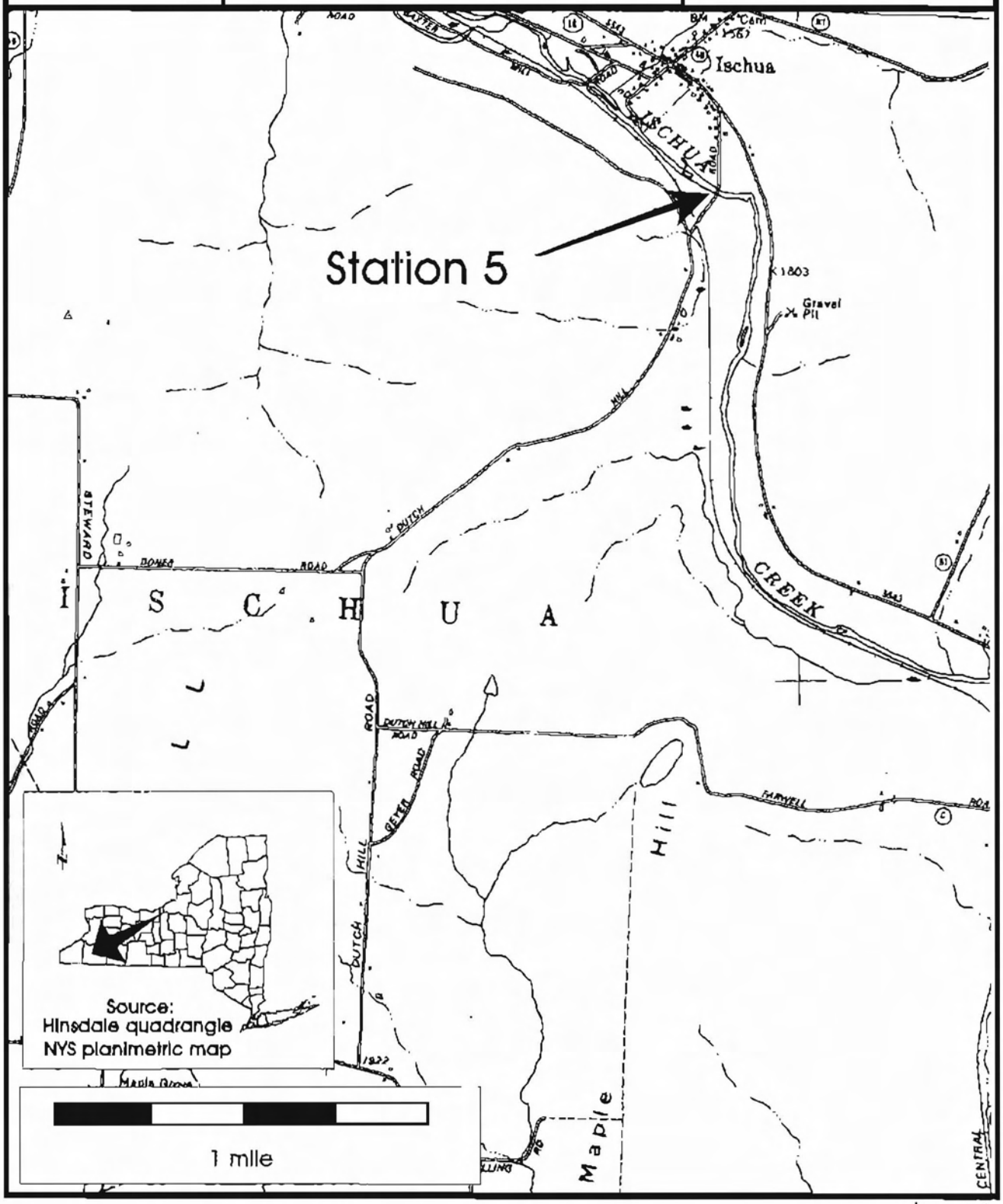
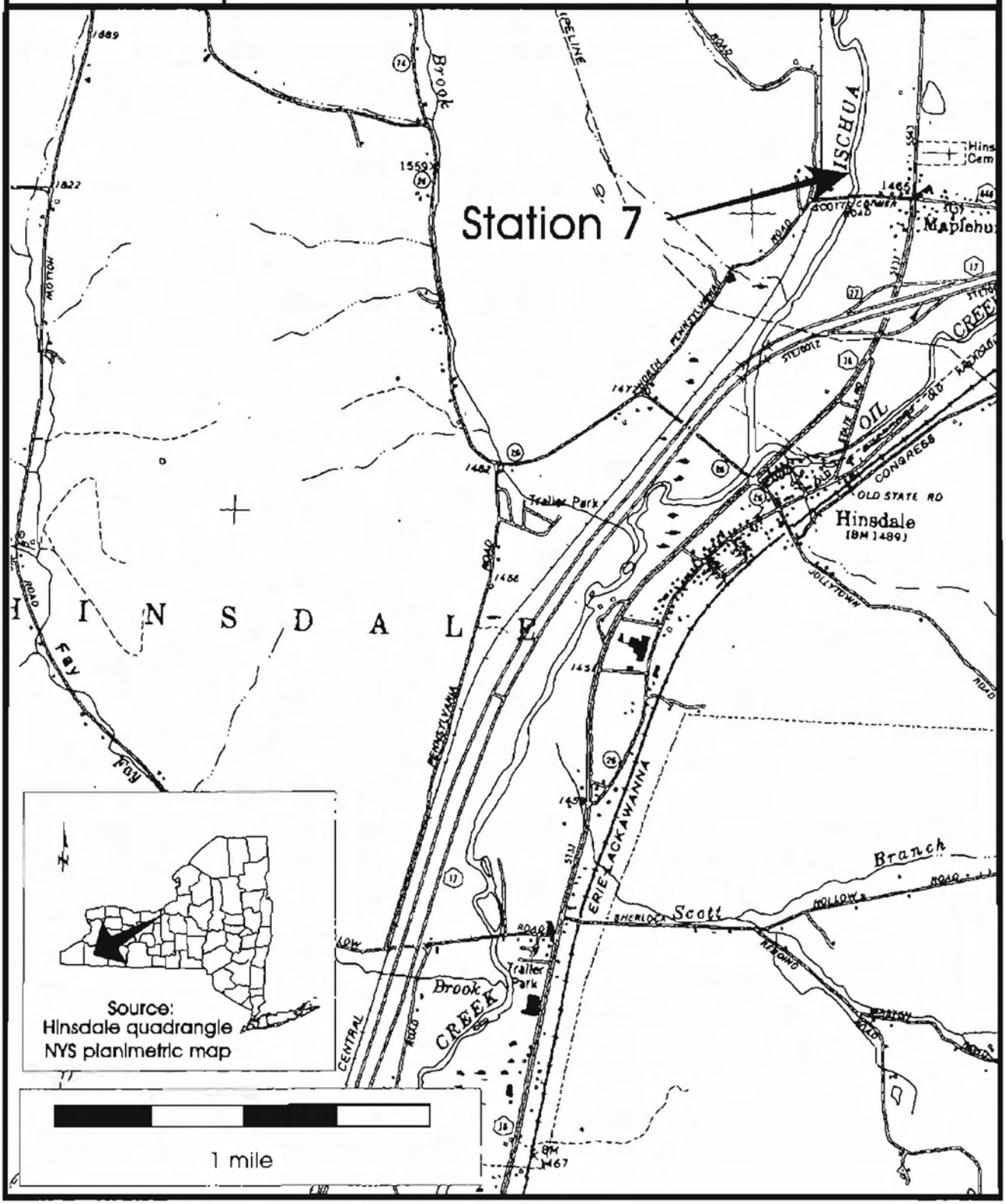


Figure 3e	Site Location Map	Ischua Creek



stream flow

TABLE 3. MACROINVERTEBRATE SPECIES COLLECTED IN ISCHUA CREEK, CATTARAUGUS COUNTY, NEW YORK, SEPTEMBER 2, 1998.

PLATYHELMINTHES
TURBELLARIA
Undetermined Turbellaria
OLIGOCHAETA
Undetermined Lumbricina
Lumbriculidae
Undetermined Lumbriculidae
MOLLUSCA
PELECYPODA
Sphaeriidae
Sphaerium sp.
ARTHROPODA
CRUSTACEA
ISOPODA
Asellidae
Caecidotea racovitzai
DECAPODA
Cambaridae
Cambarus sp.
INSECTA
EPHEMEROPTERA
Isonychiidae
Isonychia bicolor
Baetidae
Acentrella sp.
Baetis brunneicolor
Baetis flavistriga
Baetis intercalaris
Baetis sp.
Heptageniidae
Stenacron interpunctatum
Stenonema vicarium
Stenonema sp.
Ephemerellidae
Undetermined Ephemerellidae
Tricorythidae
Tricorythodes sp.
Caenidae
Caenis anceps
PLECOPTERA
Perlidae
Acroneuria carolinensis
Agnetina capitata
Paragnetina media
COLEOPTERA
Psephenidae
Psephenus herricki
Elmidae
Optioservus ovalis
Optioservus trivittatus
Optioservus sp.
Stenelmis sp.
Curculionidae
Undetermined Curculionidae
MEGALOPTERA
Corydalidae
Nigronia serricornis
TRICHOPTERA
Philopotamidae
Chimarra aterrima?
Chimarra obscura
Chimarra socia
Chimarra sp.
Hydropsychidae
Cheumatopsyche sp.
Hydropsyche betteni
Hydropsyche bronta
Hydropsyche morosa
Hydropsyche slossonae
Hydropsyche sparna
Rhyacophilidae
Rhyacophila sp.
Glossosomatidae
Glossosoma sp.
DIPTERA
Tipulidae
Antocha sp.
Hexatoma sp.
Ceratopogonidae
Undetermined Ceratopogonidae
Simuliidae
Simulium jenningsi
Simulium tuberosum
Simulium vittatum
Simulium sp.
Athericidae
Atherix sp.
Empididae
Hemerodromia sp.

TABLE 3 (continued). MACROINVERTEBRATE SPECIES COLLECTED IN ISCHUA CREEK, CATTARAUGUS COUNTY, NEW YORK, SEPTEMBER 2, 1998.

Chironomidae
- Tanypodinae
  - Thienemannimyia gr. spp.
- Podonominae
  - Pagastia sp. A
- Orthocladiinae
  - Cardiocladius obscurus
  - Cricotopus bicinctus
  - Cricotopus trifascia gr.
  - Eukiefferiella claripennis gr.
  - Eukiefferiella devonica gr.
  - Parametriocnemus lundbecki
  - Tvetenia bavarica gr.
  - Tvetenia vitracies
- Chironominae
- Chironomini
  - Microtendipes pedellus gr.
  - Microtendipes rydalensis gr.
  - Polypedilum aviceps
  - Polypedilum convictum
  - Polypedilum illinoense
- Tanytarsini
  - Micropsectra sp.
  - Paratanytarsus dimorphis
  - Rheotanytarsus distinctissimus gr.
  - Rheotanytarsus exiguus gr.
  - Sublettea coffmani
  - Tanytarsus guerlus gr.