Stream: Flint Creek, Ontario and Yates Counties, New York

Reach: Italy to Phelps, New York

Background:

The Stream Biomonitoring Unit conducted biological sampling on Flint Creek on July 16, 2002. The purpose of the sampling was to assess general water quality, and to provide documentation on conditions in the reach from the hamlet of Potter north to the Ontario County line, listed in the Priority Waterbodies List (see Figure 4). Water supply use is listed as threatened in this reach, because of the potential for pesticide runoff from intensive agriculture. In particular, the area of the mouth of Nettle Valley Creek in Potter (a tributary to Flint Creek within the PWL reach) has been of concern to regional staff. In addition to benthic sampling, crayfish were collected for tissue analysis at three sites within the PWL reach. Traveling kick samples for macroinvertebrates were taken in riffle areas at 7 sites on Flint Creek and 1 site on Nettle Valley Creek in Potter, 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 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 macroinvertebrate data reports, including individual site descriptions and raw invertebrate data from each site.

Results and Conclusions:

1. Based on macroinvertebrate indicators, water quality in Flint Creek ranged from non-impacted to moderately impacted. The likely contributing factor to impairment is nutrient enrichment as a result of agricultural practices within the entire Flint Creek watershed.

2. However Impact Source Determination suggests water quality may be influenced by complex municipal/industrial contributions within the reach extending from Station 4, to Station 5. Moderate impact at these sites may also be the result of the drained and irrigated swamp land upstream of these stations.

3. The majority of impairment within Flint Creek is attributed to non-point source nutrient runoff from surrounding agricultural areas, and toxic: industrial, municipal or urban runoff. Poor habitat throughout the stream is also considered to be a contributing factor to impairment.

Discussion

Historically, biological monitoring on Flint Creek has been conducted at Phelps, NY (Station 7) as part of the State's Rotating Intensive Basin (RIBS) monitoring and assessment activities in 1995, 1996 and 2001. Water quality at this site has consistently been assessed as slightly impacted (NYS DEC, 1999) (NYS DEC unpublished, 2001). As part of a DEC study investigating pesticide use in the Flint Creek watershed, benthic invertebrate community samples were collected from 3 sites in 1999. These stations were located at sites corresponding to those of the present survey, located within the reach of Potter to Stanley. The study found water quality to range from slightly impacted just above Potter, to moderately impacted in Gorham (G. Neuderfer, study conductor, pers. comm.).

Based on macroinvertebrate results from the current survey, water quality in Flint Creek ranged from non-impacted to moderately impacted (Figure 1). The headwater reaches of the stream are located in forested upland habitat with cool, oxygenated waters. Although results from Station 1 reflect reduced species richness, this is attributed to the effects of the headwater environment (see Appendix XI). Downstream of Station 1, agricultural practices intensify throughout the watershed. Water quality declines to slightly impacted at Stations 2 and 3 (Figure 1), most likely the result of non-point source runoff from crop-lands (Station 2) and impoundment effects (Station 3) from the swamp land habitat in the area of Station 3 (see Appendix XII).

The stream reach from the hamlet of Potter (Station 3) north to the Ontario County line (near Station 4) has been listed on the DEC Priority Waterbodies List (PWL), with the use of the stream as a water supply cited as the area of concern due to "extensive use of pesticides in the watershed" (NYS DEC, 1996). Because of this concern, three sampling sites (Stations 3-5) were concentrated within this reach to provide documentation of the possible impairment. Macroinvertebrate data indicate water quality upstream of the reach is only slightly impaired (Station 3), worsening downstream to moderate impact at Stations 4 - 5. Results of Impact Source Determination (Table 1) suggest the impairments at these stations are the product of more complex municipal/industrial, toxic and organic effluents than of nutrient enrichment from nonpoint source runoff (see also Appendix X). Impoundment effects are also indicated, likely reflecting the physical nature of the area, with the stream flowing through an extensive series of muckland drainage ditches (see Figure 3b).

Water column sampling for pesticides by the USGS at Phelps in 1997 (Phillips et al., 1998) found atrazine, simazine, and alachlor. This indicates the presence of pesticides in Flint Creek which may influence the biological assessment of water quality. In the present study, invertebrate tissue samples were collected for analysis of pesticides at Stations 3-5, but results of the analysis are not yet available. Earlier investigations of the reach by DEC in 1999 suggested that municipal/industrial, toxic and organic runoff was the source of the impact at the moderately impacted stations (Gary Neuderfer pers. comm.). Point source discharges located between Stations 4 and 5 include the SPDES permitted Gorham (T) Sewage Treatment Plant and Agrilinks Food Inc. The Potter landfill is also located nearby in the watershed.

Water quality improves downstream of Station 5 and is assessed as slightly impacted, with siltation as the contributing factor to impairment (Table 1). This is likely the result of sediment contributed by runoff from the upstream agricultural areas settling out in the lower reaches of the stream. Conditions continue to improve steadily to Phelps (Station 7), the most downstream site. Nettle Valley Creek, a tributary to Flint Creek which joins the stream between Stations 3 and 4, is assessed as slightly impacted (Table 1).

Flint Creek flows through a range of habitats. Even without nutrient additions, many portions of the stream may appear to be slightly impaired simply as a result of the lowland habitat dominating the landscape. However, the high percentage of agricultural land-use within the watershed contributes to non-point source nutrient enrichment within the stream. The use of pesticides by farm operations in certain areas, along with scattered villages, may be causing a greater reduction in water quality. This is especially true within the area located between Stations 3 and 5. The results of invertebrate tissue analysis and additional water column sampling may help to further define this problem.

Literature Cited:

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

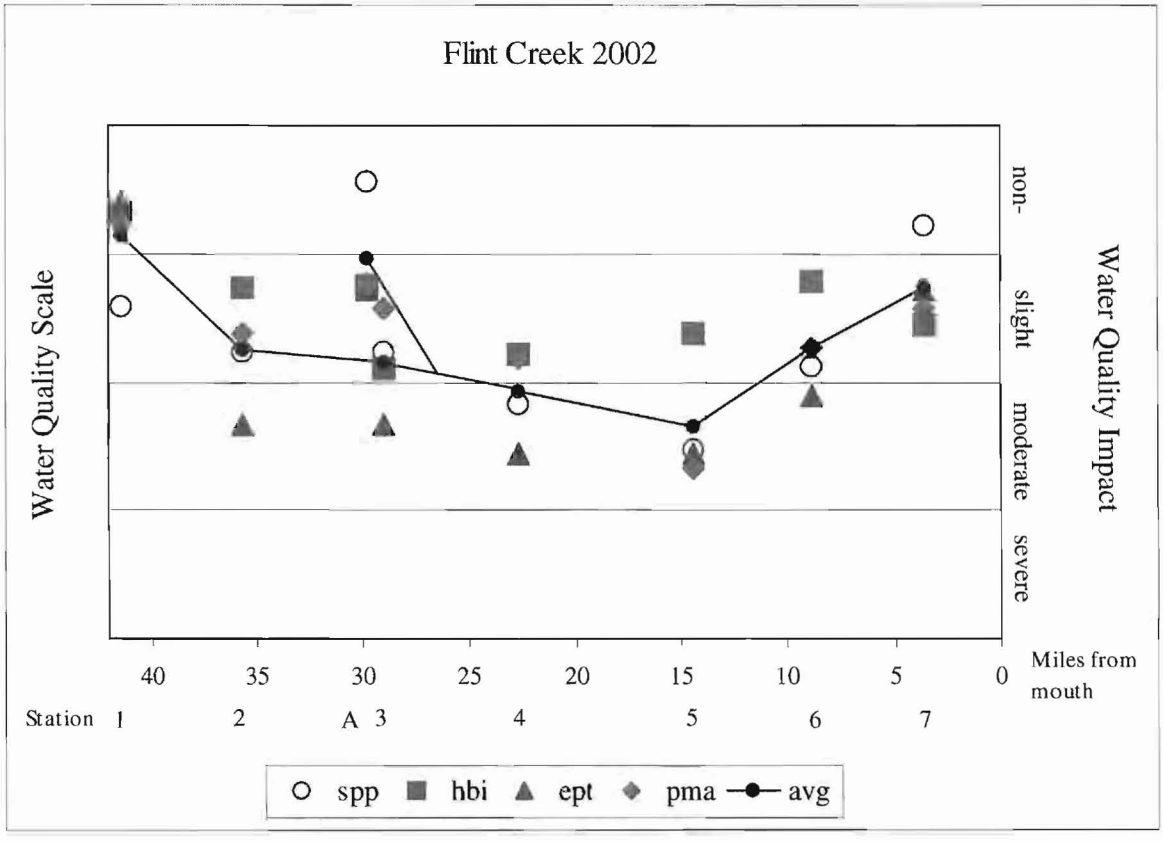
New York State Department of Environmental Conservation. 1999. The Oswego-Seneca-Oneida Rivers Basin, Biennial Report, 1995-96. Rotating Intensive Basin Studies. New York State Department of Environmental Conservation, Technical Report. 115 pages + appends.

New York State Department of Environmental Conservation. 2001. Unpublished report for The Oswego-Seneca-Oneida Rivers Basin. Rotating Intensive Basin Studies

New York State Department of Environmental Conservation. 1996. Priority Waterbodies List for The Oswego-Seneca-Oneida River Basin. New York State Department of Environmental Conservation, Technical Report. 196 pages.

Phillips, P. J., G. R. Wall, D. A. Eckhardt, D. A. Freehafer, and L. A. Rosenmann. 1998. Pesticide concentrations in surface waters of New York State in relation to land use 1997. U. S. Geological Survey publication WRIR 98-4104. 10 pages.

Figure 1. Biological Assessment Profile of index values, Flint and Nettle Valley 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. See Appendix IV for more complete explanation.



Overview of field data

On the date of sampling, July 16, 2002, Flint Creek at the sites sampled was 3-15 meters wide, 0.1-0.2 meters deep, and had current speeds of 40-91 cm/sec in riffles. Dissolved oxygen was 6.8-12.1 mg/l, specific conductance was 163-318 µmhos, pH was 7.5-8.6, and the temperature was 15.5-27.7 °C. Measurements for each site are found on the field data summary sheets.

Table 1. Impact Source Determination, Flint and Nettle Valley Creeks, 2002. Numbers represent similarity to community type models for each impact category. The highest similarities at each station within approximately 5% are highlighted. Similarities less than 50% are less conclusive.

	STATION, FLINT & NETTLE VALLEY CREEKS							
Community Type	1	2	3	4	5	6	7	A
Natural: minimal human impacts	58	40	32	31	31	33	36	39
Nutrient additions; mostly nonpoint, agricultural	55	37	47	51	51	51	48	43
Toxic: industrial, municipal, or urban run-off	45	28	58	64	65	60	55	39
Organic: sewage effluent, animal wastes	24	23	43	64	66	58	45	33
Complex: municipal/industrial	26	19	44	59	68	51	53	31
Siltation	44	31	46	58	57	72	62	42
Impoundment	40	30	64	60	62	50	49	41

TABLE

STATION	COMMUNITY TYPE
1	Natural / Non - point source
2	Natural / Non - point source
3	Impoundment
4	Toxic / Organic / Complex / Impoundment
5	Toxic / Organic / Complex
6	Siltation
7	Siltation
A	Natural / Non - point source / Toxic / Siltation /

TABLE 2. STATION LOCATIONS FOR FLINT AND NETTLE VALLEY CREEKS, ONTARIO AND YATES COUNTIES, NEW YORK (see map).

STATION	LOCATION
01	Italy 20 m downstream of Basset Rd. bridge Latitude/Longitude: 42°36'05"; 77°19'25" 41.5 river miles above mouth
02	Italy 20 m downstream of County Rte. 18 bridge Latitude/Longitude: 42°39'06"; 77°16'15" 35.6 river miles above mouth
03	Potter 50 m downstream of Rte. 364 bridge Latitude/Longitude: 42°42'10"; 77°12'20" 29.0 river miles above mouth
A (Nettle Valley Creek)	Potter Immediately downstream of Rte. 364 bridge Latitude/Longitude: 42°41'34"; 77°11'22" 29.8 river miles above mouth
04	Cole Corners Immediately downstream of Rte. 4 bridge Latitude/Longitude: 42°45'20"; 77°09'03" 22.7 river miles
05	Stanley 30 m below Mott Rd. bridge Latitude/Longitude: 42°49'33"; 77°07'28" 14.4 river miles above mouth
06	Seneca Castle At Ferguson Rd. bridge Latitude/Longitude: 42°53'01"; 77°06'02" 8.9 river miles above mouth
07	Phelps 30 m upstream of Griffith Rd. bridge Latitude/Longitude: 42°56'41"; 77°05'22" 3.6 river miles above mouth

Figure 2 Site Overview Map Flint Creek

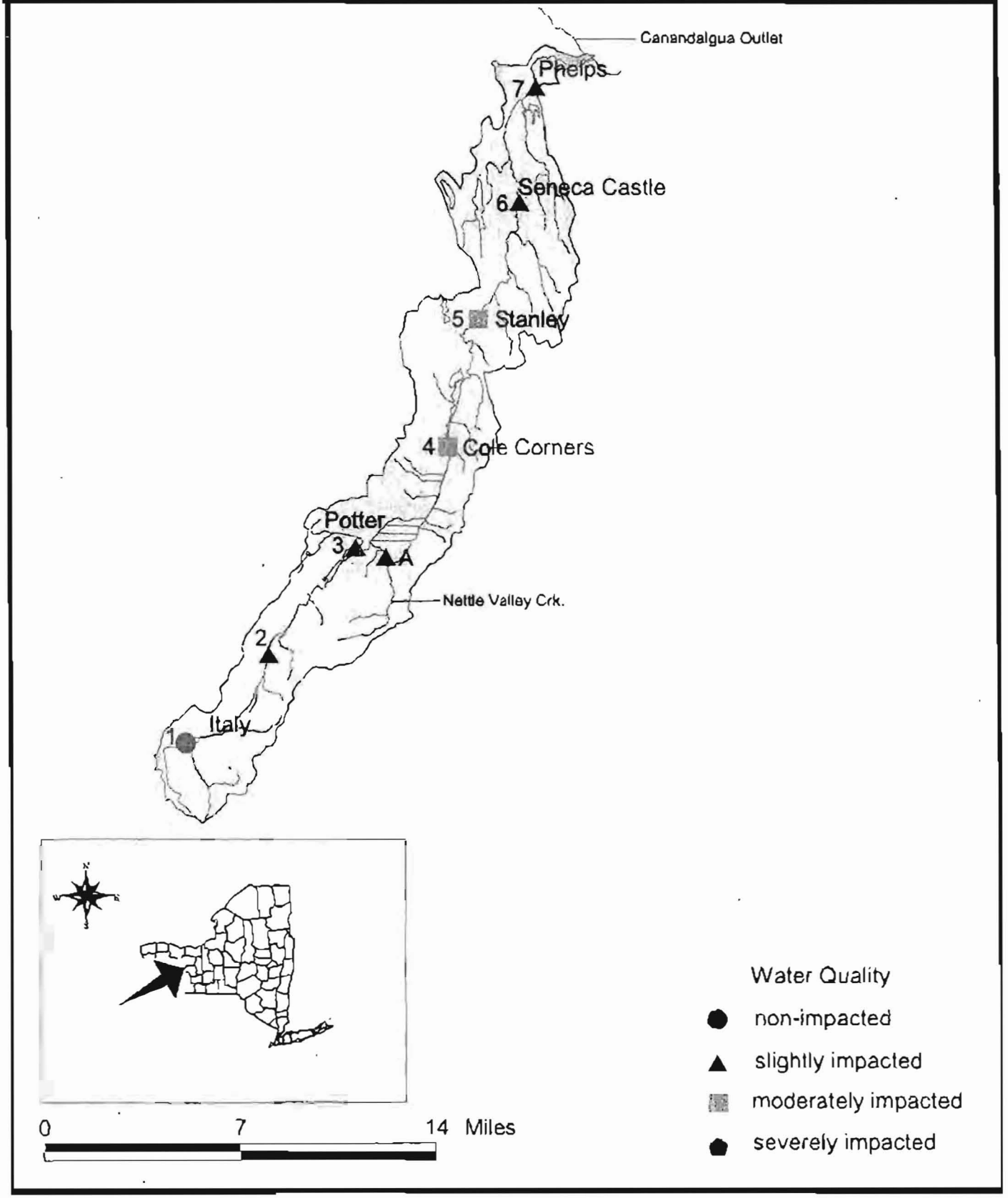


Figure 3.	Site Location Map	Flint Creek

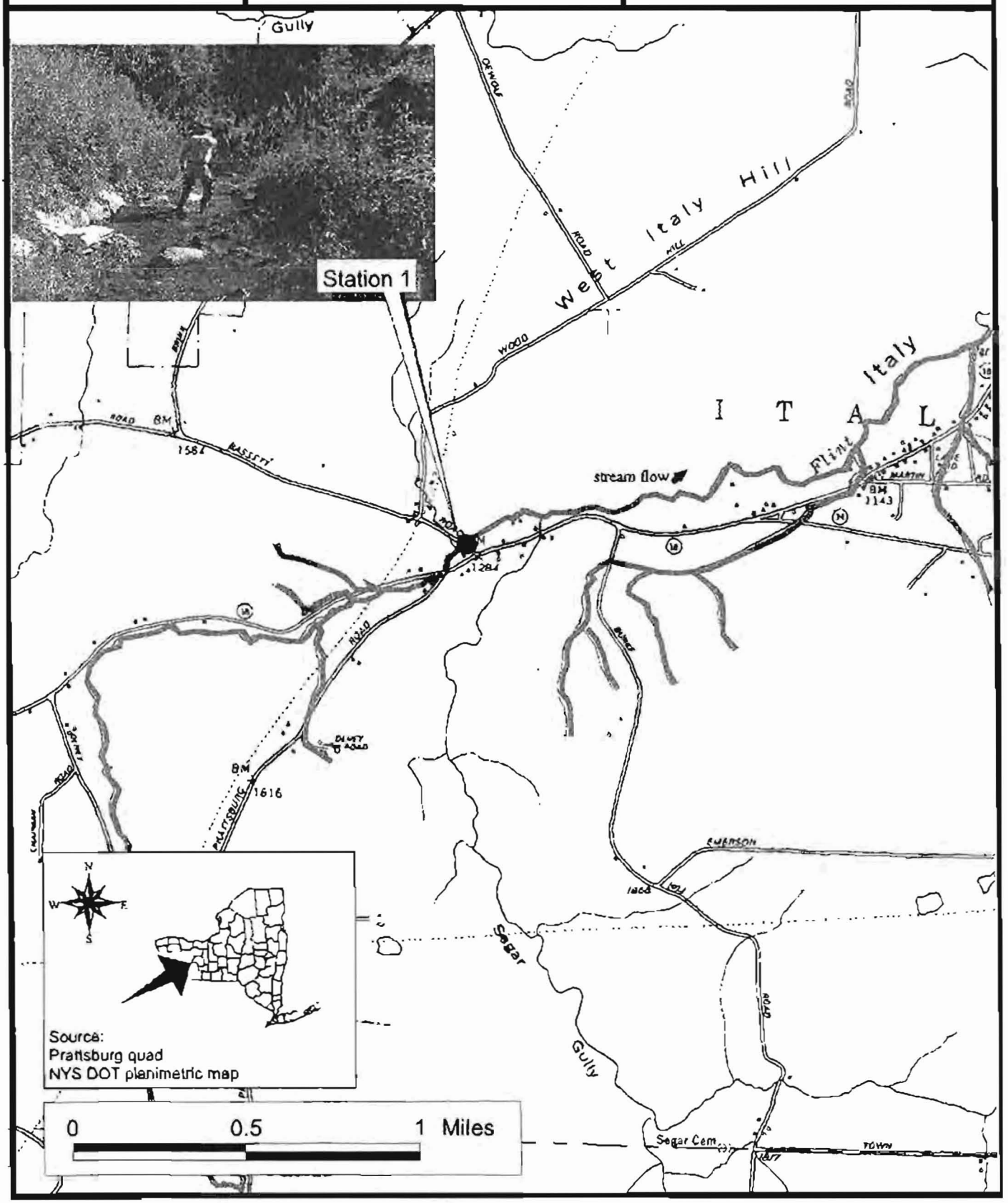


Figure 3a.	Site Location Map	Flint Creek

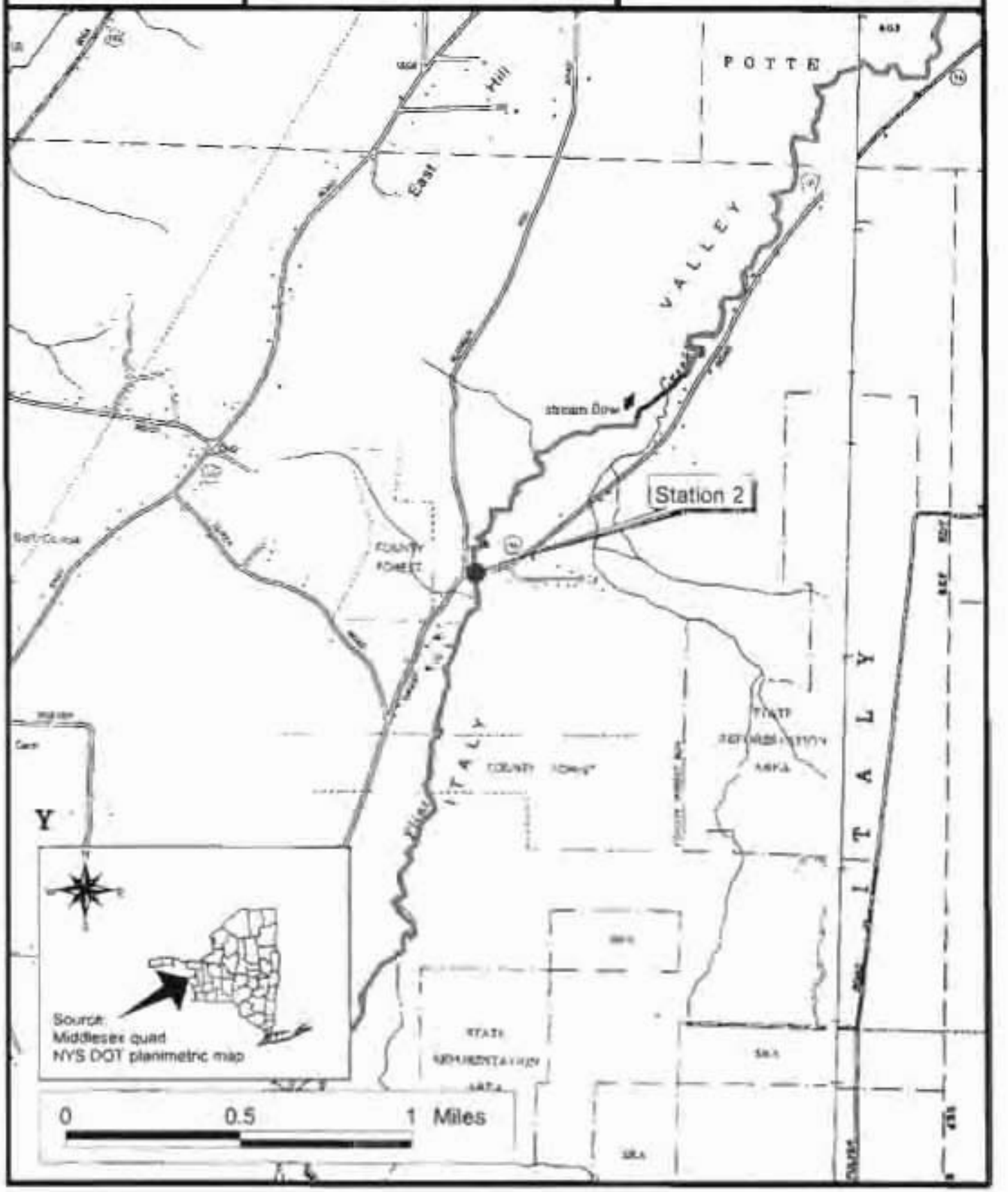


Figure 3b.	Site Location Map	Flint Creek

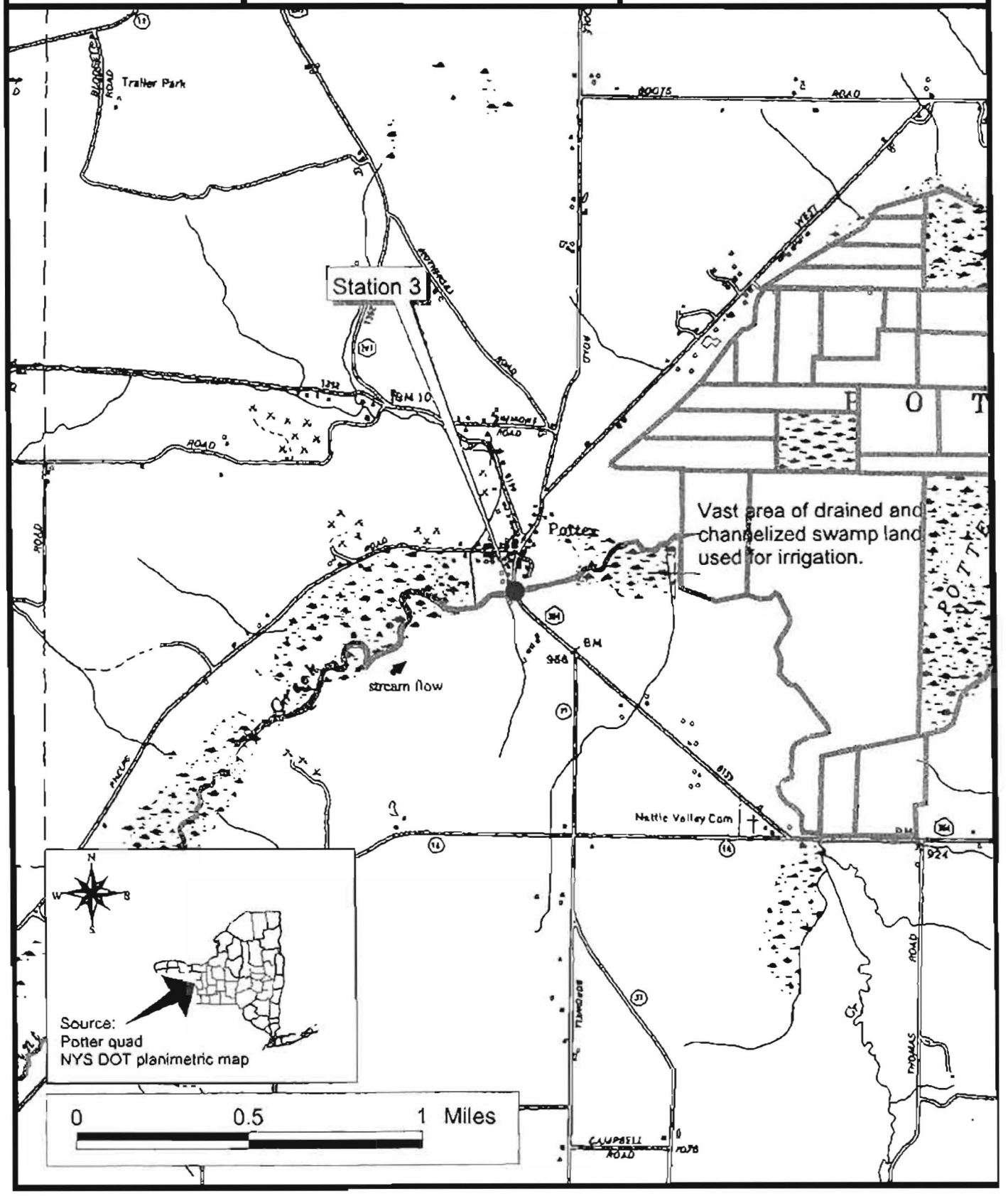


Figure 3c.	Site Location Map	Nettle Valley Creek

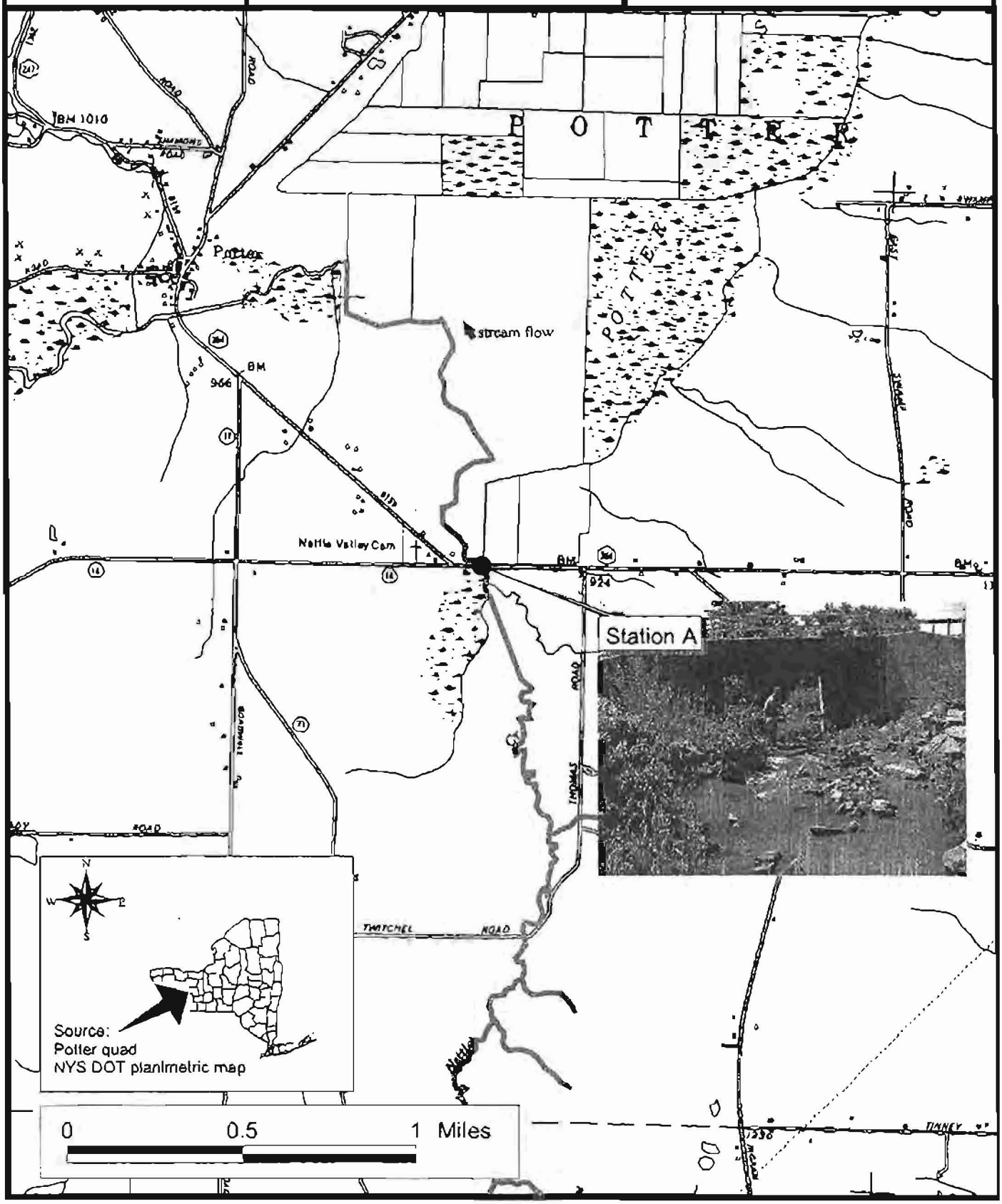


Figure 3d.	Site Location Map	Flint Creek

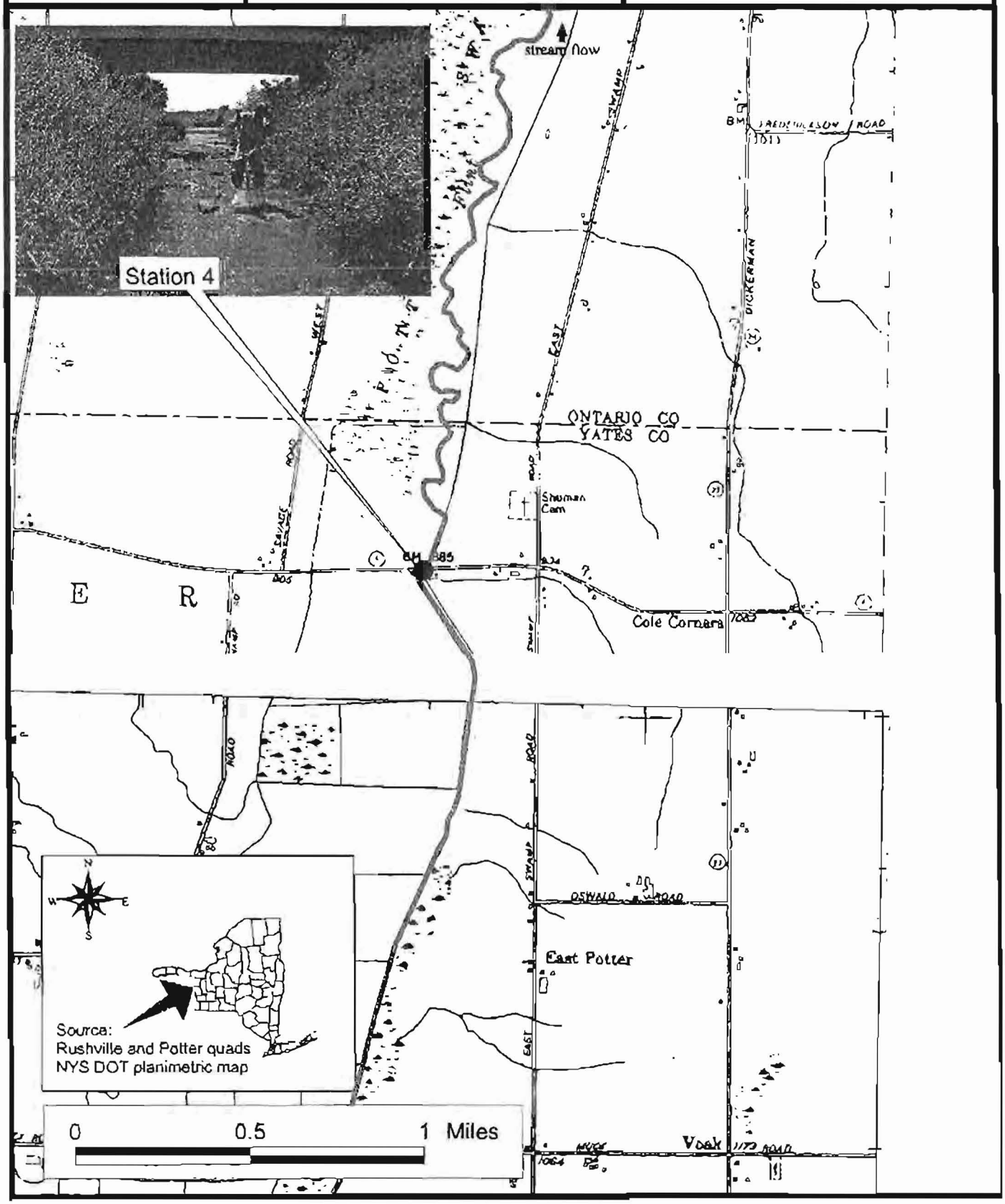


Figure 3e.	Site Location Map	Flint Creek

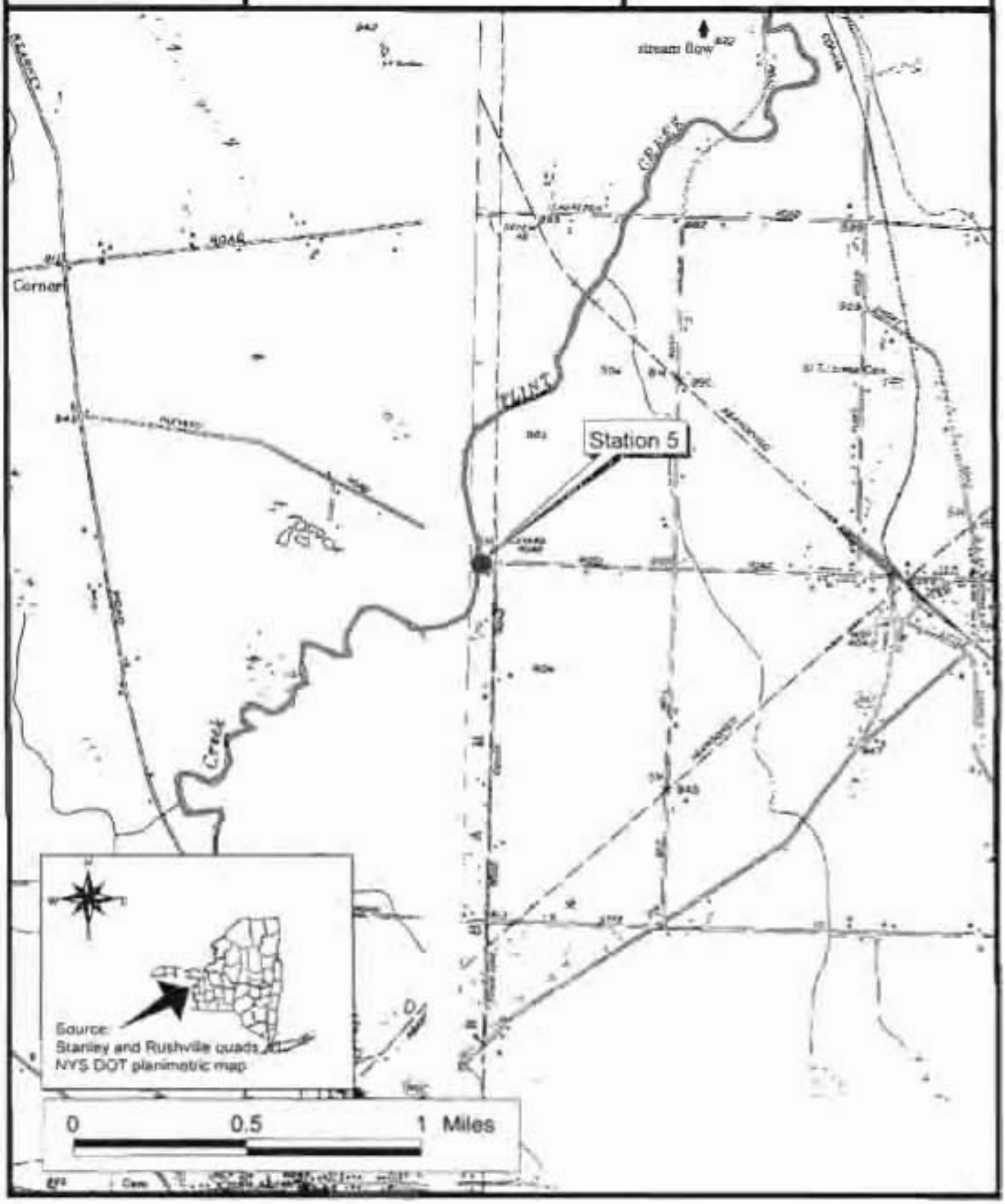


Figure 3f.	Site Location Map	Flint Creek

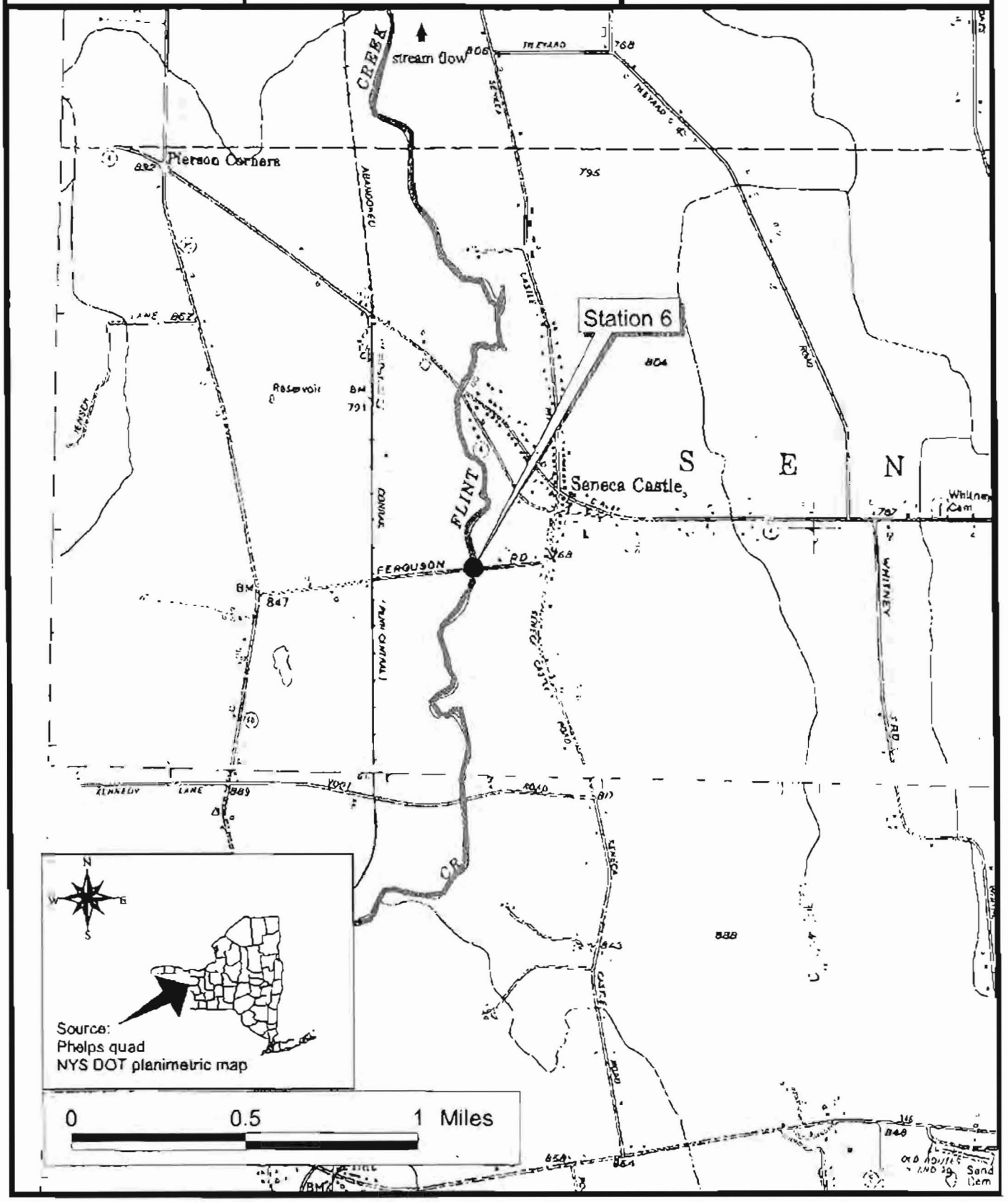


TABLE 3. MACROINVERTBERATES COLLECTED IN FLINT CREEK, ONTARIO AND YATES COUNTIES, NEW YORK, 2002.

PLATYHELMINTHES
TURBELLARIA
Undetermined Turbellaria
ANNELIDA
OLIGOCHAETA
LUMBRICIDA
Undetermined Lumbricina
LUMBRICULIDA
Lumbriculidae
Undetermined Lumbriculidae
TUBIFICIDA
Tubificidae
Limnodrilus hoffmeisteri
Undet. Tubificidae w/o cap. setae
Naididae
Nais bretscheri
Nais variabilis
HIRUDINEA
Undetermined Hirudinea
MOLLUSCA
GASTROPODA
Planorbidae
Undetermined Planorbidae
Ancylidae
Ferrissia sp.
PELECYPODA
Sphaeriidae
Sphaerium sp.
ARTHROPODA
CRUSTACEA
ISOPODA
Asellidae
Caecidotea racovitzai
INSECTA
EPHEMEROPTERA
Isonychiidae
Isonychia bicolor
Baetidae
Acentrella sp.
Baetis brunneicolor
Baetis intercalaris
Plauditus sp.
Heptageniidae
Nixe (Nixe) sp.
Stenacron interpunctatum
Stenonema ithaca
Stenonema sp.
Leptophlebiidae
Paraleptophlebia sp.
Leptohyphidae
Tricorythodes sp.
Caenidae
Caenis sp.
PLECOPTERA
Leuctridae
Leuctra sp.
Nemouridae
Undetermined Nemouridae
Taeniopterygidae
Taeniopteryx sp.
COLEOPTERA
Gyrinidae
Gyrinus sp.
Psephenidae
Ectopria nervosa
Psephenus herricki
Elmidae
Dubiraphia bivittata
Optioservus fastiditus
Optioservus trivittatus
Optioservus sp.
Promoresia elegans
Stenelmis crenata
MEGALOPTERA
Corydalidae
Nigronia serricornis
Sialidae
Sialis sp.
TRICHOPTERA
Philopotamidae
Chimarra obscura
Dolophilodes sp.
Polycentropodidae
Polycentropus sp.
Hydropsychidae
Cheumatopsyche sp.
Hydropsyche betteni
Hydropsyche bronta

Table 3. Macroinvertberates Collected in Flint Creek, Ontario And Yates Counties, New York, 2002. Continued

Hydropsyche slossonae
Hydropsyche sparna
Hydroptilidae
Hydroptila spatulata
Rhyacophilidae
Rhyacophila fuscula
DIPTERA
Tipulidae
Antocha sp.
Dicranota sp.
Hexatoma sp.
Tipula sp.
Ceratopogonidae
Undetermined Ceratopogonidae
Simuliidae
Simulium tuberosum
Simulium vittatum
Simulium sp.
Empididae
Hemerodromia sp.
Chironomidae
Tanypodinae
Thienemannimyia gr. spp.
Diamesinae
Diamesa sp.
Orthocladiinae
Corynoneura sp.
Cricotopus bicinctus
Cricotopus tremulus gr.
Cricotopus trifascia gr.
Cricotopus vierriensis
Parametriocnemus lundbecki
Tvetenia bavarica gr.
Tvetenia vitracies
Chironominae
Chironomini
Microtendipes pedellus gr.
Polypedilum aviceps
Polypedilum flavum
Tanytarsini
Micropsectra polita
Micropsectra sp.
Rheotanytarsus exiguus gr.
Rheotanytarsus pellucidus
Tanytarsus glabrescens gr.