Stream: Alplaus Kill, Saratoga and Schenectady Counties, New York

Reach: Galway to Alplaus, New York

NYS Drainage Basin: Mohawk River

Background:

The Stream Biomonitoring Unit sampled the Alplaus Kill in Saratoga County, New York, on July 14, 2005. The purpose of the sampling was to assess overall water quality and establish baseline data for comparison with future results.

In riffle areas at seven sites, a traveling kick sample for macroinvertebrates was taken 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 from each site. Macroinvertebrate community parameters used in the determination of water quality included species richness, biotic index, EPT richness, and percent model affinity (see Appendices II and III). Expected variability of results is stated in Smith and Bode (2004). 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 raw data from each site. Fish communities were also sampled, using methods described in Appendix XII. Expanded habitat analysis was also performed at all sites.

Results and Conclusions:

1. Water quality in the Alplaus Kill was assessed as slightly impacted at all sites, based on resident macroinvertebrate communities. Nutrient enrichment was the primary factor affecting the fauna.

2. The Nutrient Biotic Index, recently developed by Smith (2005) to evaluate levels of nutrient enrichment, was included in the Biological Assessment Profile for the first time in this report. The index showed eutrophic conditions at most sites.

3. Fish community longitudinal trends were well correlated with habitat scores and metrics based on macroinvertebrate data.

Discussion:

The Alplaus Kill originates north of West Charlton in Saratoga County, New York, and flows approximately 19 miles in a southeasterly direction before flowing into the Mohawk River at Alplaus. The stream is classified as follows:

- from the mouth to Route 50 at Burnt Hills: B
- from Route 50 to Tributary 19, 0.2 miles south of West Charlton: B(T)
- from Tributary 19 to source: B

Waters classified as B have as their best use swimming, fishing, and fish propagation. The Alplaus Kill is stocked annually with rainbow trout (see the NYSDEC website http://www.dec.state.ny.us/website/dfwmr/fish/stoksara.html).

The purpose of the present study was to assess overall water quality and establish baseline data for comparison to future results. The Alplaus Kill was previously sampled by the NYSDEC Stream Biomonitoring Unit in 2000 and 2001 at the Glenridge site (Station-6), and was assessed both times as non-impacted. The 2000 assessment was based on a field-assessed sample, and the 2001 assessment was based on a laboratory-processed sample. Based on Impact Source Determination, nutrient enrichment was also indicated for the 2001 sample.

In the present study water quality in the Alplaus Kill was assessed as slightly impacted at all seven sites from West Charlton to Alplaus (Figure 1). Longitudinal trends show greater impact near the source, best water quality at Charlton (Station-3), and slightly declining water quality toward the mouth. Resident macroinvertebrate communities included clean-water stoneflies and mayflies, but were heavily dominated by riffle beetles, which feed on epilithic algae (occurring on rock surfaces). Impact Source Determination (Table 1) indicated nutrient enrichment at all sites, and Nutrient Biotic Index (NBI) values (see Macroinvertebrate Data Reports) were nearly all in the eutrophic range.

NBI, a metric recently developed by Smith (2005) to evaluate levels of nutrient enrichment, is included in the Biological Assessment Profile for the first time in this report. Overall water quality assessments are thus based on the average of five metrics. Since NBI values denote nutrient enrichment at all sites on the Alplaus Kill, the overall assessment is lowered somewhat. Applying NBI values to the 2001 data would still yield a non-impacted assessment.

Nutrient enrichment appears to be the primary factor controlling water quality in the Alplaus Kill. Even the most upstream site (Station-1), less than 3 miles from the stream's source, displayed facultative species, rather than sensitive headwater species. Upstream agricultural land use accounts for the nutrient-enriched community found at this site. The agricultural and suburban nature of the watershed circumscribes the water quality of the stream for its entire length (Figures 2, 4). The presence of clean-water stoneflies is a remaining pollution-sensitive indicator in the stream. The stonefly *Agnetina capitata*, found at all riffle sites, could be monitored in future studies of the Alplaus Kill as a clean-water indicator whose continued presence reflects acceptable water quality in the stream.

Land use types were was calculated for the seven sites using National Land Cover Dataset 1992 (Figure 2, also see USGS website, landcover.usgs.gov/natllandcover.asp), and is likely a major determinant of water quality in the Alplaus Kill. Total forested area generally decreased downstream and was highest at Station-3, which received the highest overall assessment. Total residential area increased downstream (Figure 2) and was highest at Station-7, which received the poorest NBI value (Figure 1). Total agricultural area generally decreased downstream and was highest at Station-2, which received the lowest overall assessment, and the second poorest NBI value.

Habitat assessments were performed at all sites, using the methods described in the EPA Rapid Bioassessment Protocols (Barbour et al., 1999). Scores ranged from 144 to 170, out of a possible 200. Habitat score trends generally followed those for macroinvertebrate and fish community assessments, being lowest at Station-1 and highest at Station-3 (Figure 3).

Fish sampling was conducted at six of the Alplaus Kill sites by Douglas Carlson (NYSDEC Fisheries) at the same time as the macroinvertebrate sampling. Methods of sampling and data analysis are contained in Appendix XII. Based on metric analysis of fish community data, water quality is assessed as moderately impacted at the most upstream site (Station-1), non-impacted at the Charlton site (Station-3), and slightly impacted at all other sites. Longitudinal trends appear well correlated with those based on macroinvertebrate data (Figure 3).

Literature Cited:

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling, 1999, Rapid bioassessment protocols for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates and fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water: Washington, D.C.

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.

Smith, A.J., 2005, Development of a Nutrient Biotic Index for use with benthic macroinvertebrates. Masters Thesis, SUNY Albany, 70 pages.

Smith, A. J., and R. W. Bode, 2004, Analysis of variability in New York State benthic macroinvertebrate samples. New York State Department of Environmental Conservation, Technical Report, 43 pages.

Overview of field data:

On July 14, 2005, the Alplaus Kill at the sites sampled was 6-40 meters wide, 0.1-0.4 meters deep, and had current speeds of 60-100 cm/sec in riffles. Dissolved oxygen was 7.2-10.0 mg/l, specific conductance was 297-368 μmhos, pH was 7.3-7.9 and the temperature was 20.7-24.0 °C (69-75 °F). Measurements for each site are found on the field data summary sheets.

Figure 1. Biological Assessment Profile (BAP) of metric values, Alplaus Kill, 2005. Values are plotted on a normalized scale of water quality. The line connects the mean of the five values for each site, representing species richness (SPP), EPT richness (EPT), Hilsenhoff Biotic Index (HBI), Percent Model Affinity (PMA), and Nutrient Biotic Index (NBI). See Appendix IV for more complete explanation.

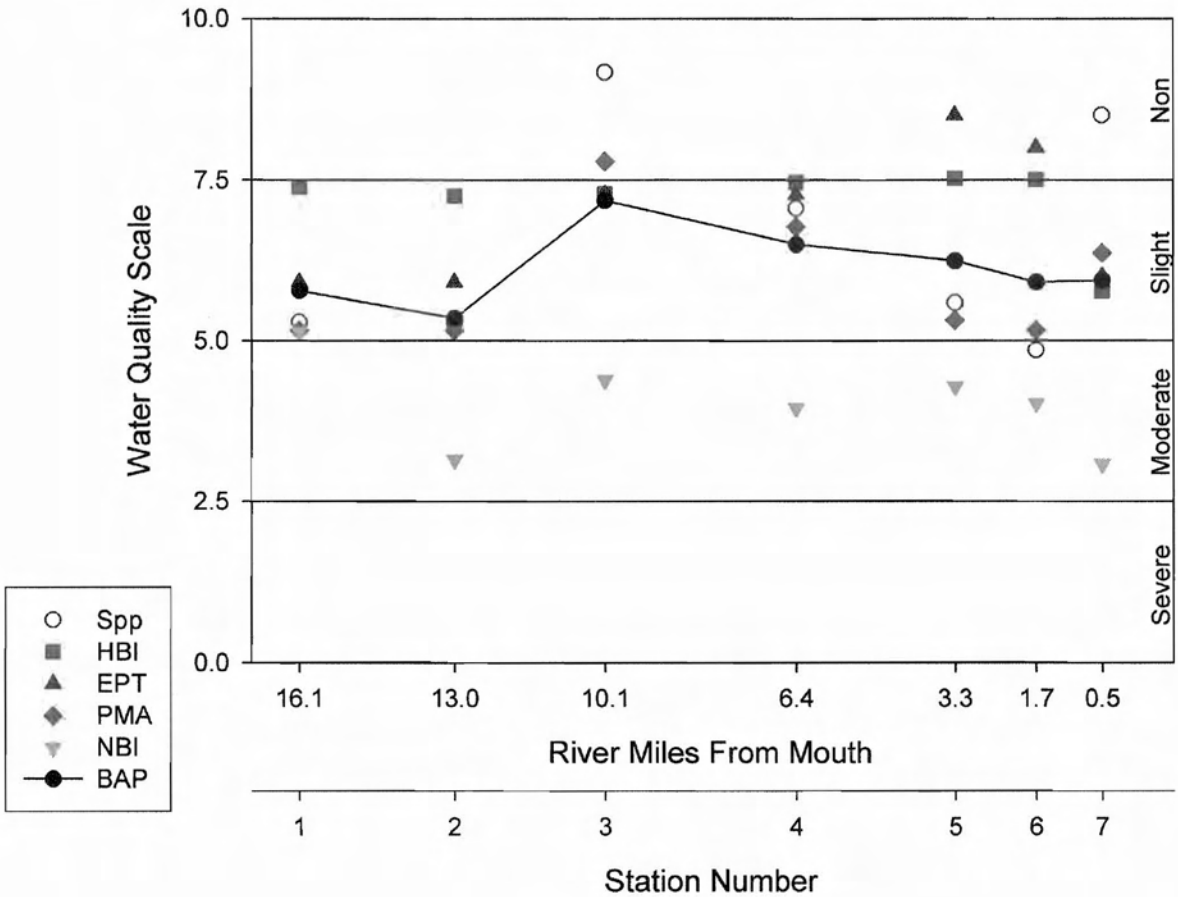


Figure 2. Percent land use composition, Alplaus Kill. General downstream trends suggest increasing residential and commercial land use, and decreasing forest and agricultural land use.

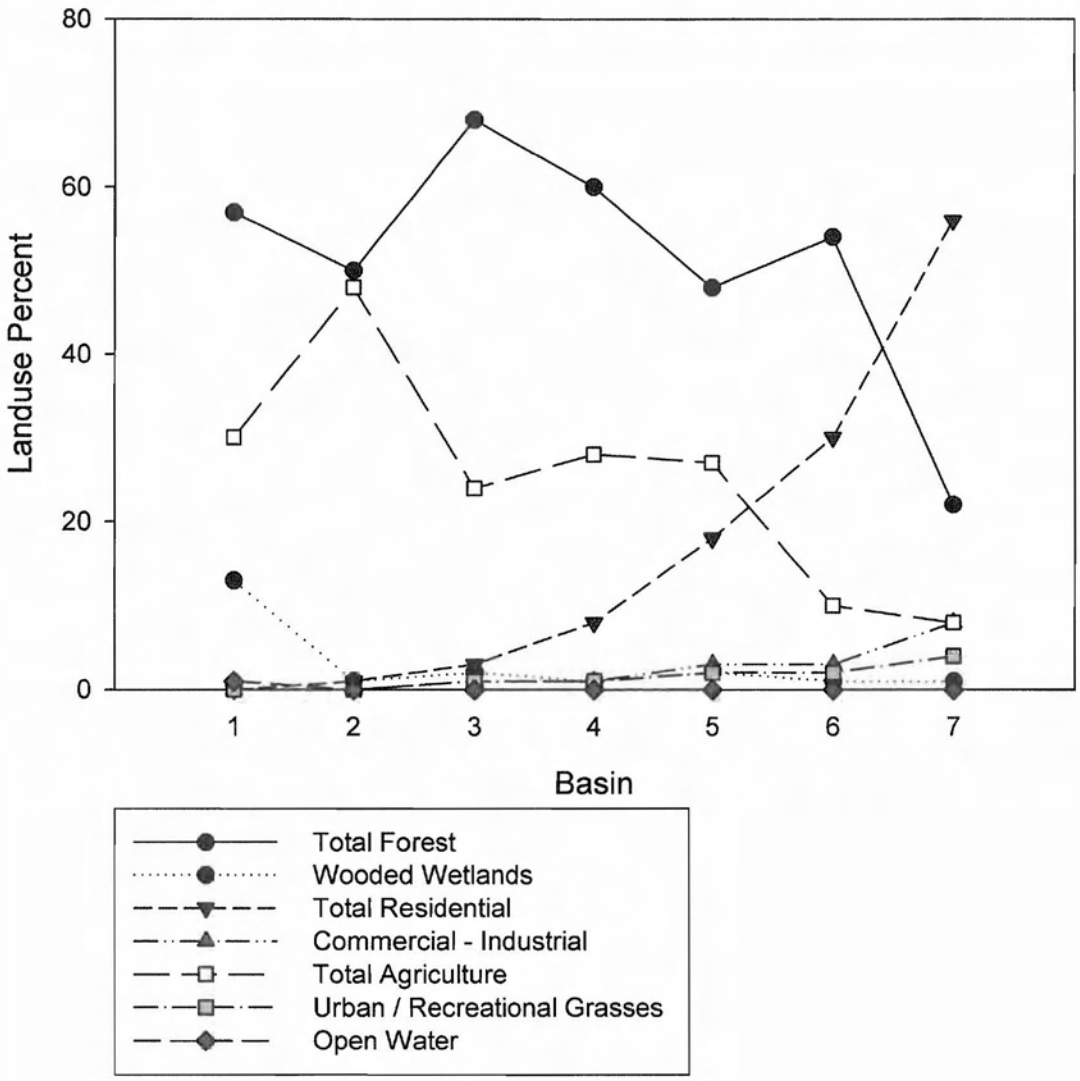


Figure 3. Biological Assessment Profile (BAP) using 4 metrics vs. 5 metrics, Fish Assessment Profile (FAP) and Habitat (HAB) scores, Alplaus Kill, 2005. A 4-metric BAP is composed of species richness, Hilsenhoff Biotic Index, Percent Model Affinity, and EPT richness. A 5-metric BAP is composed of species richness, Hilsenhoff Biotic Index, Percent Model Affinity, EPT richness, and Nutrient Biotic Index.

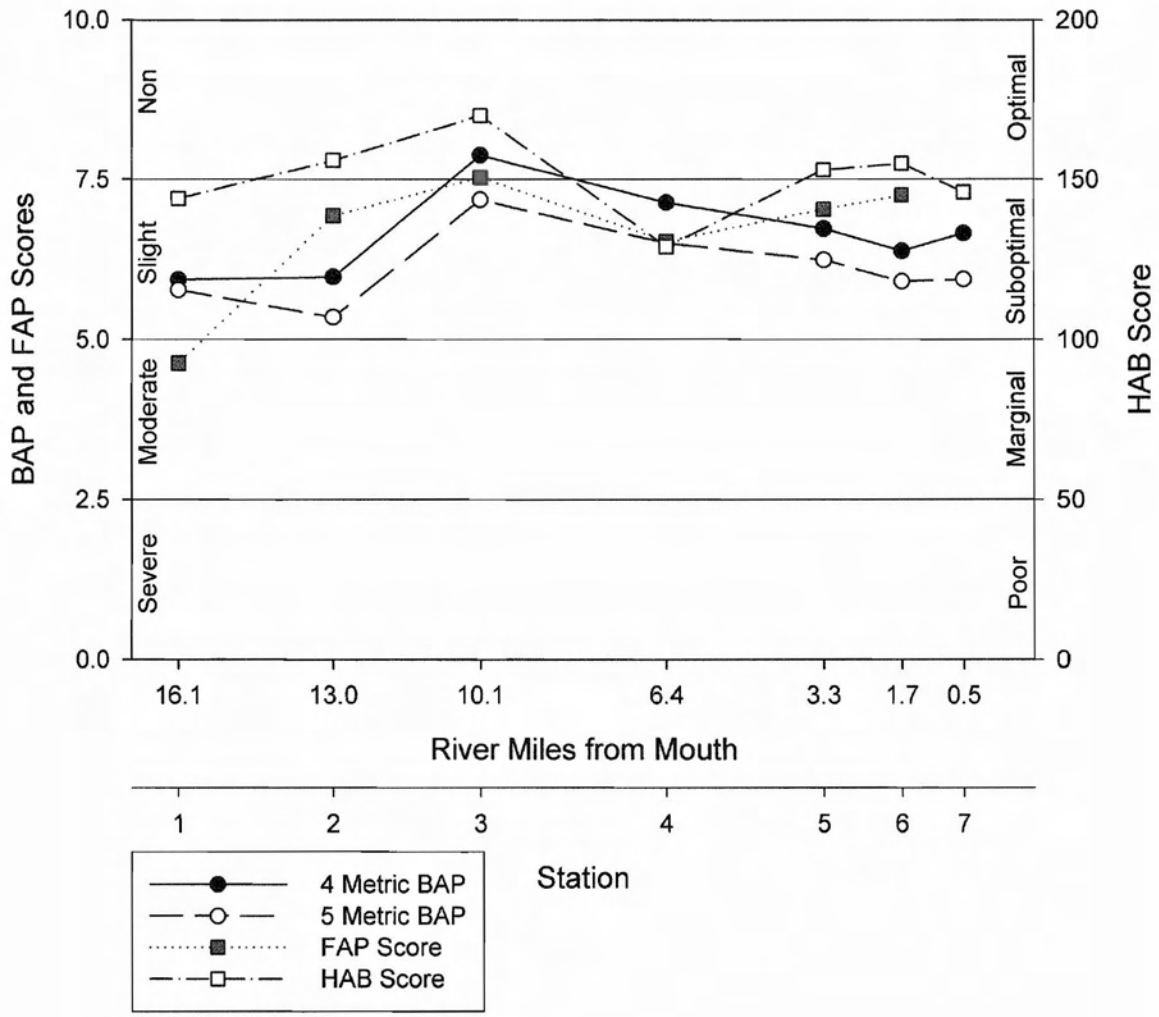


Table 1. Impact Source Determination, Alplaus Kill, 2005. Numbers represent percent similarity to community type models for each impact category. Highest similarities at each station are shaded. Similarities less than 50% are less conclusive. Highest numbers represent probable type of impact. See Appendix X for further explanation.

	Station					
Community Type	01	02	03	04	05	06
Natural: minimal human impacts	47	49	44	51	57	51
Nutrient enrichment	62	69	45	59	56	67
Toxic: industrial, municipal, or urban run-off	46	52	36	44	45	48
Organic: sewage, animal wastes	34	44	30	32	32	31
Complex: municipal and/or industrial	46	42	22	25	36	28
Siltation	36	53	43	38	43	43
Impoundment	52	57	43	49	45	52

STATION	COMMUNITY TYPE
ALPL-01	Nutrients
ALPL-02	Nutrients
ALPL-03	Natural, Nutrients, Siltation, Impoundment
ALPL-04	Nutrients
ALPL-05	Natural, Nutrients
ALPL-06	Nutrients

Table 2. Station Locations for the Alplaus Kill, Saratoga and Schenectady Counties, New York.

STATION	LOCATION	
ALPL-01	West Charlton, NY, below Route 67 latitude 42° 58' 28" longitude 74° 01' 12" 16.1 river miles above mouth	
ALPL-02	Charlton, NY, above Charlton Road latitude 42° 56' 16" longitude 74° 00' 23" 12.9 river miles above mouth	
ALPL-03	Charlton, NY below Swaggertown Road latitude 42° 55' 29"; longitude 73° 58' 14" 9.9 river miles above mouth	
ALPL-04	East Glenville, NY above Van Vorst Road latitude 42° 54' 19" longitude 73° 55' 08" 6.2 river miles above mouth	[no photograph available]
ALPL-05	Burnt Hills, NY at end of Rustic Road latitude:42° 53' 15" longitude 73° 53' 47" 3.0 river miles above mouth	

Table 2. Station Locations for the Alplaus Kill, Saratoga and Schenectady Counties, New York, cont'd.

ALPL-06 Glenridge, NY
above Glenridge Road bridge
latitude 42° 52' 02"
longitude 73° 54' 10"
1.5 river miles above mouth

ALPL-07 Alplaus, NY
at Alplaus Avenue bridge.
latitude 42° 51' 17"
longitude 73° 54' 12"
0.2 river miles above mouth

Fig. 4. Alplaus Kill Watershed Overview

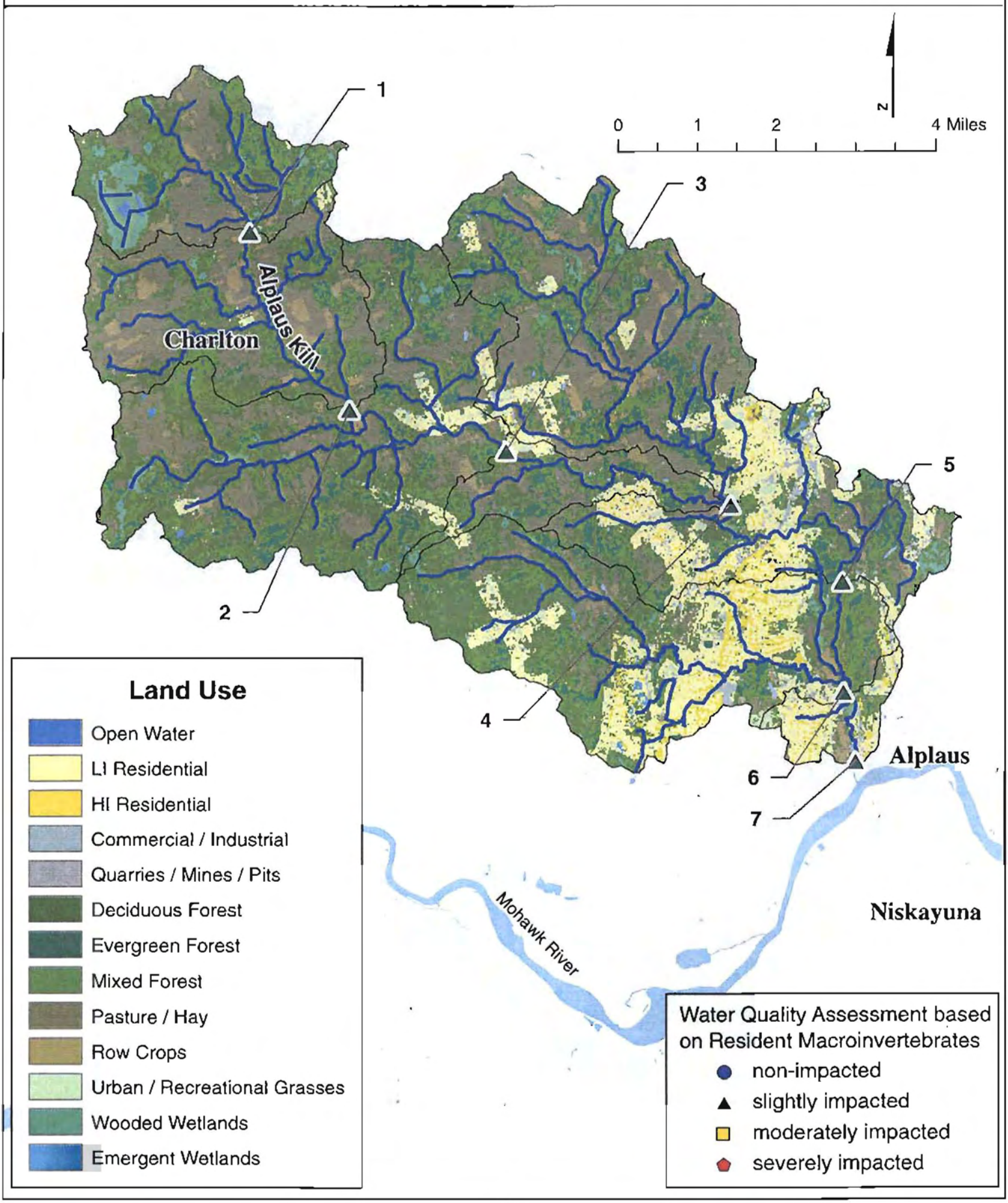


Figure 5a	Site Location Map	Alplaus Kill

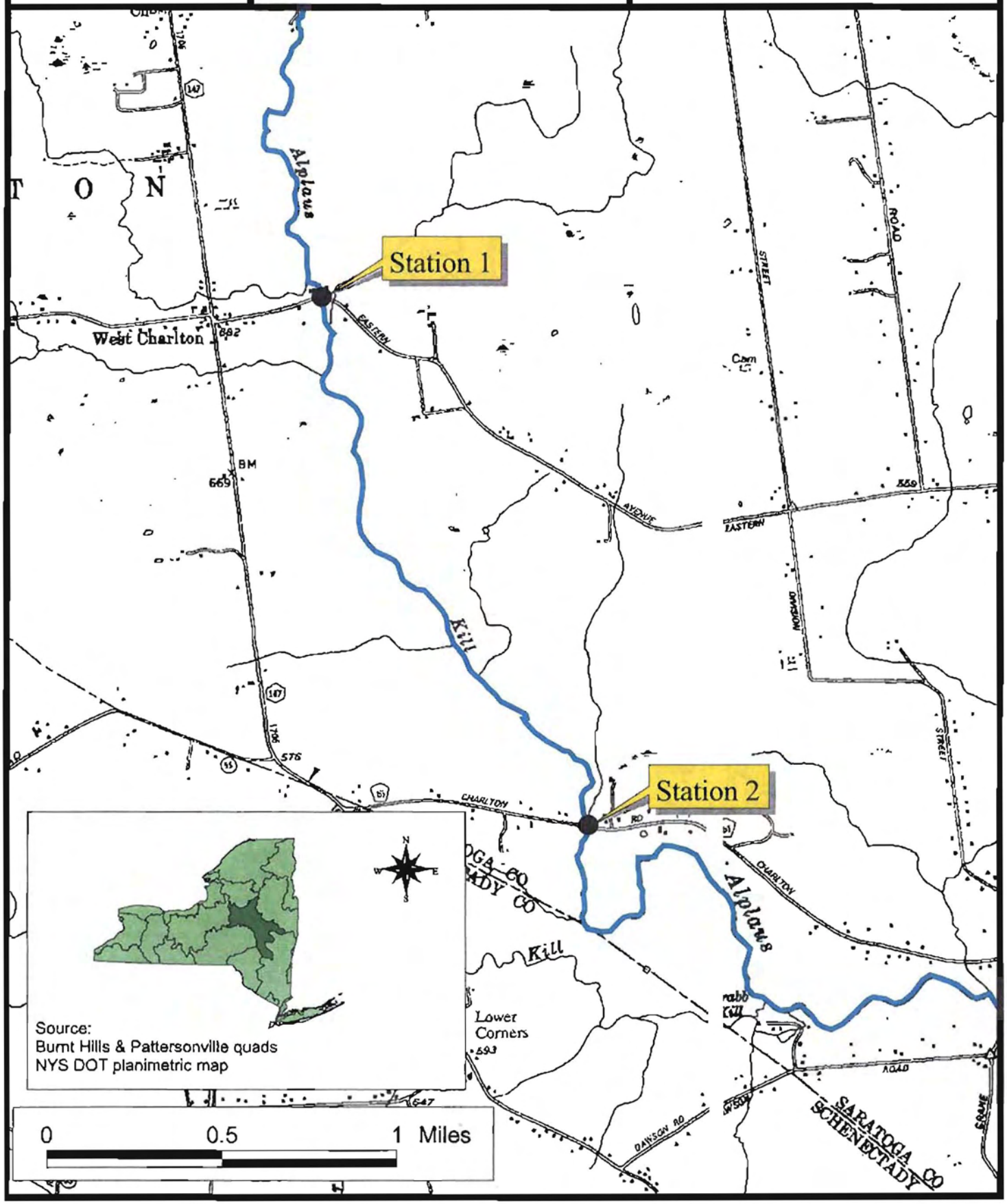
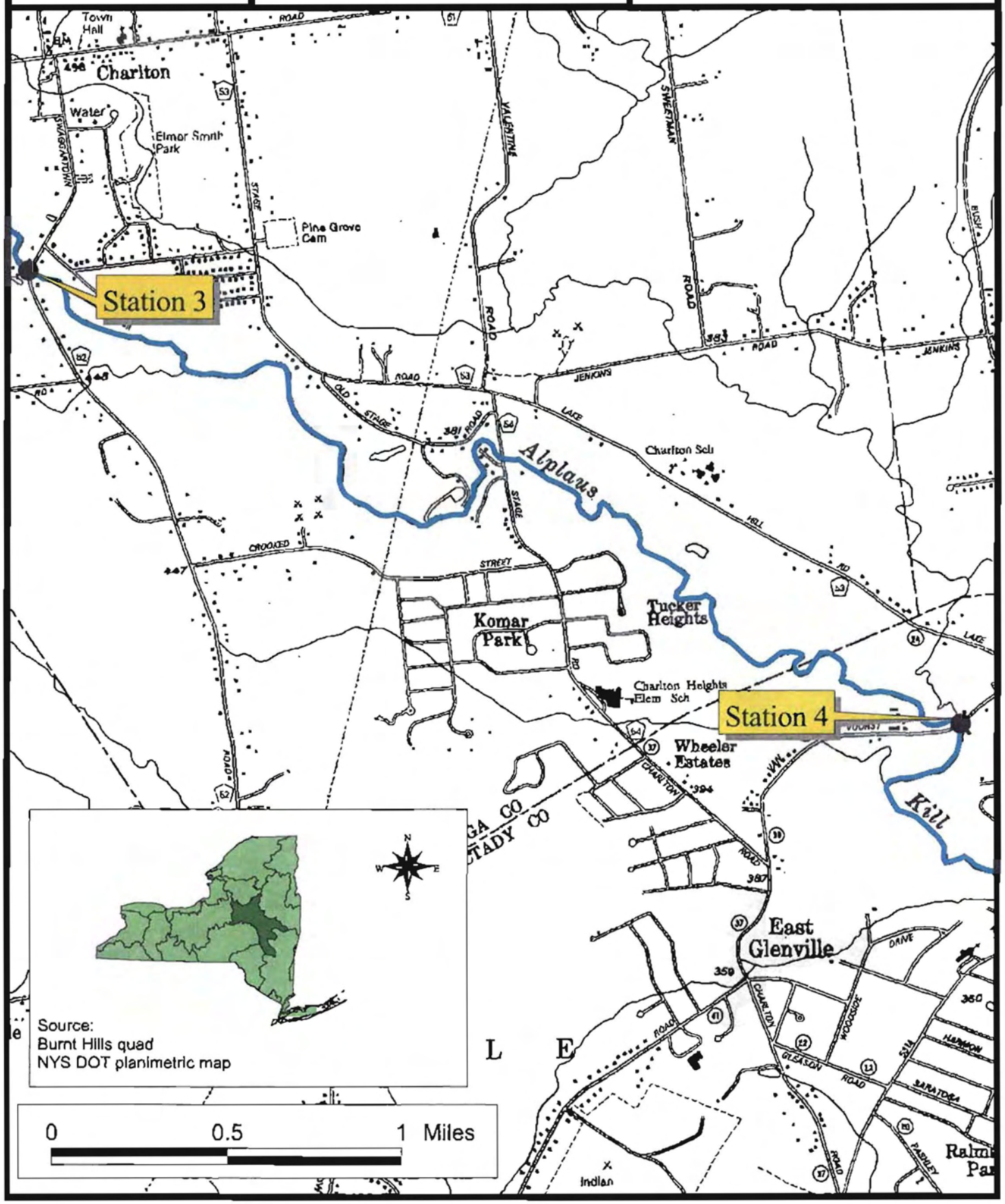
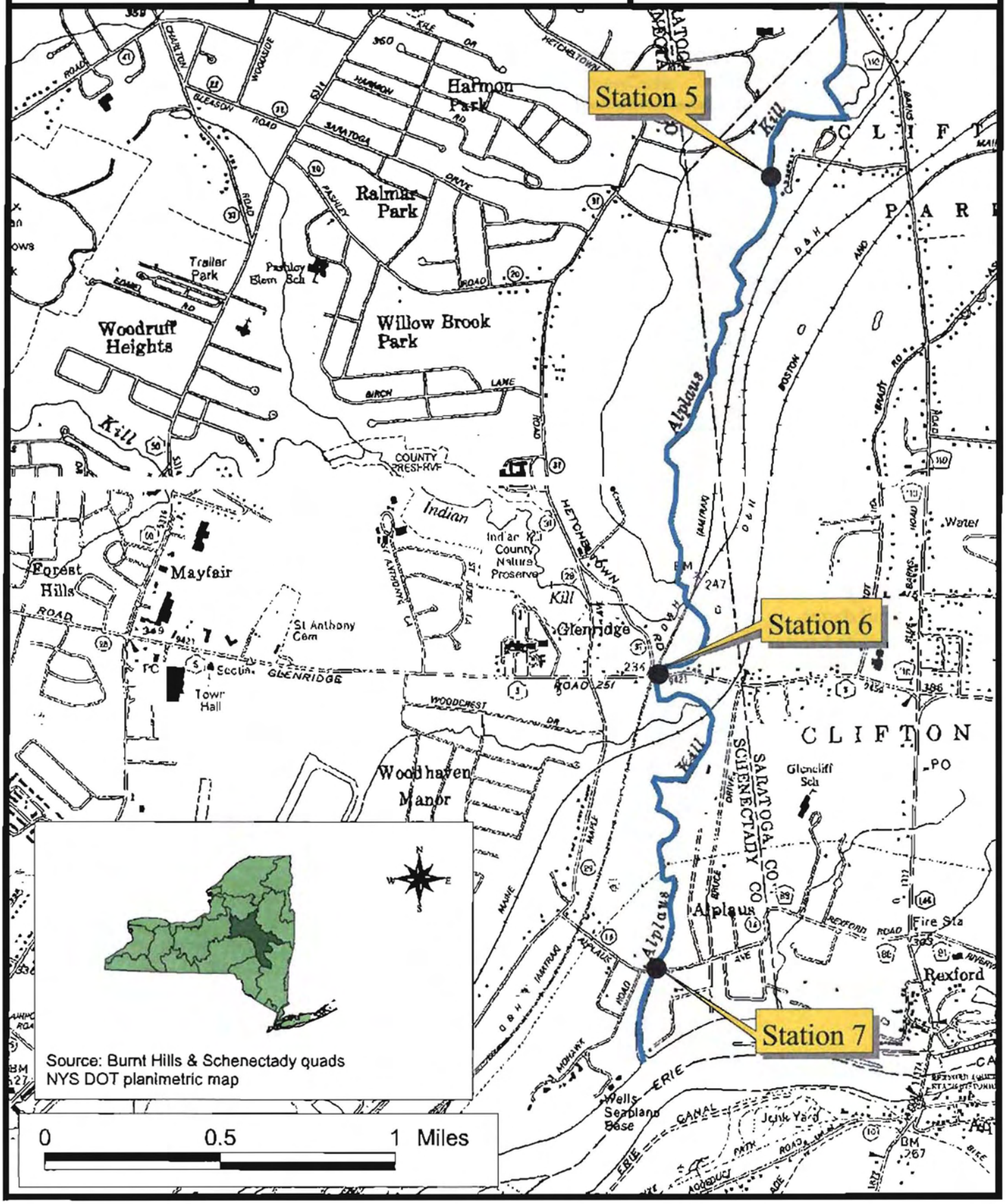


Figure 5b	Site Location Map	Alplaus Kill



stream flow

Figure 5c	Site Location Map	Alplaus Kill



stream flow

Table 3. Fish collected in the Alplaus Kill, July 14, 2005.

Fish species	Station 1	2	3	4	5	6
rainbow trout		1				
redfin pickerel						1
cutlip minnow		4	1			
golden shiner			1			
common shiner	11	6	15	15	1	
spotfin shiner					10	
bluntnose minnow		1	11			
eastern blacknose dace	9	33	45	5		
longnose dace			5	10		
creek chub	60	32	19	22		
fallfish					2	
white sucker	8	6	8			
brook stickleback			1			
rockbass				4		
pumpkinseed	6	1	15		2	1
bluegill					1	
smallmouth bass					14	
largemouth bass	1	1	5	2		
fantail darter					6	3
tessellated darter			2	12		
logperch					1	
Individuals	95	85	128	70	37	5
Species richness	6	9	12	7	9	3
Weighted richness	6	9	10	5	7	1
% Non-tol. Individuals	28	54	70	69	70	100
% Non-tol. Species	67	67	67	86	67	100
PMA	30	66	64	56	74	80
Fish Assessment Profile	4.63	6.93	7.53	6.53	7.03	7.25

TABLE 4. Macroinvertebrate Species Collected in the Alplaus Kill, Saratoga County, NY, 2005.

OLIGOCHAETA
TUBIFICIDA
Enchytraeidae
Undetermined Enchytraeidae
Tubificidae
Undetermined Tubificidae w/o cap. setae
HIRUDINEA
Undetermined Hirudinea
MOLLUSCA
GASTROPODA
Physidae
Physella sp.
Ancylidae
Ferrissia sp.
ARTHROPODA
CRUSTACEA
DECAPODA
Cambaridae
Undetermined Cambaridae
INSECTA
EPHEMEROPTERA
Isonychiidae
Isonychia bicolor
Baetidae
Acentrella sp.
Baetis flavistriga
Baetis intercalaris
Centroptilum sp.
Heptageniidae
Stenonema sp.
Leptophlebiidae
Undetermined Leptophlebiidae
Caenidae
Caenis sp.
PLECOPTERA
Perlidae
Agnetina capitata
Paragnetina media
ODONATA
Gomphidae
Gomphus sp.
COLEOPTERA
Psephenidae
Psephenus herricki
Elmidae
Optioservus trivittatus
Optioservus sp.
Stenelmis crenata
Stenelmis sp.
MEGALOPTERA
Corydalidae
Nigronia serricornis
Sialidae
Sialis sp.
TRICHOPTERA
Polycentropodidae
Neureclipsis sp.
Philopotamidae
Chimarra aterrima?
Chimarra obscura
Psychomyiidae
Psychomyia flavida
Hydropsychidae
Cheumatopsyche sp.
Hydropsyche betteni
Hydropsyche bronta
Hydropsyche morosa
Hydropsyche slossonae
Hydropsyche sparna
Glossosomatidae
Glossosoma sp.
Helicopsychidae
Helicopsyche borealis
DIPTERA
Tipulidae
Antocha sp.
Dicranota sp.
Hexatoma sp.
Simuliidae
Simulium tuberosum
Simulium sp.
Athericidae
Atherix sp.
Empididae
Hemerodromia sp.
Chironomidae
Ablabesmyia mallochi
Thienemannimyia gr. spp.
Pagastia orthogonia
Cricotopus bicinctus
Cricotopus fugax
Cricotopus tremulus gr.
Cricotopus trifascia gr.
Cricotopus vierriensis
Eukiefferiella devonica gr.
Lopescladius sp.
Parachaetocladius sp.
Parametriocnemus lundbecki
Rheocricotopus robacki
Tvetenia vitracies
Chironomus sp.
Cryptochironomus fulvus gr.
Microtendipes pedellus gr.
Phaenopsectra dyari
Polypedilum aviceps
Polypedilum fallax gr.
Polypedilum flavum
Polypedilum illinoense
Cladotanytarsus
Rheotanytarsus exiguus gr.
Tanytarsus curticornus
Tanytarsus glabrescens gr.
Tanytarsus guerlus gr.