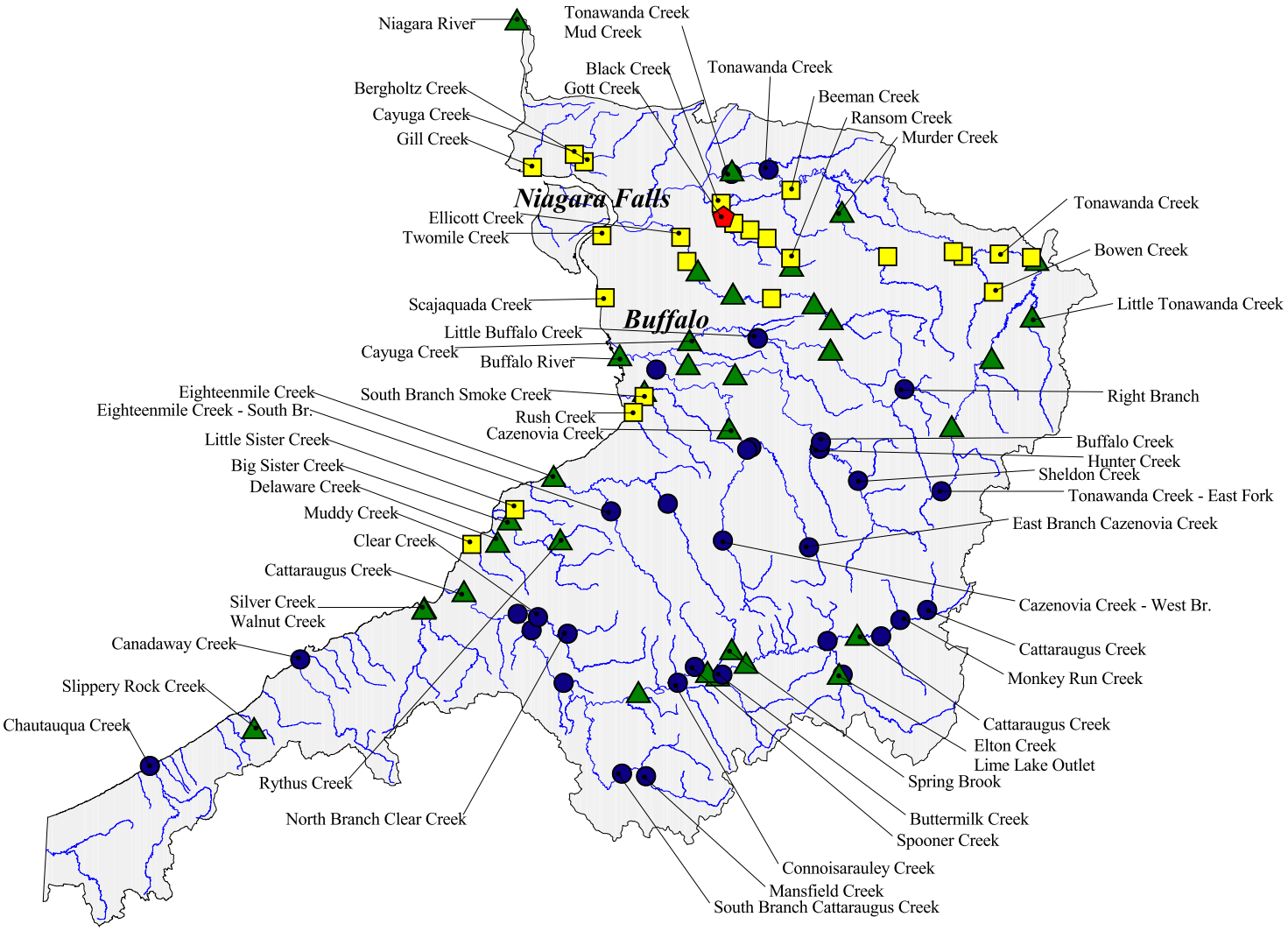
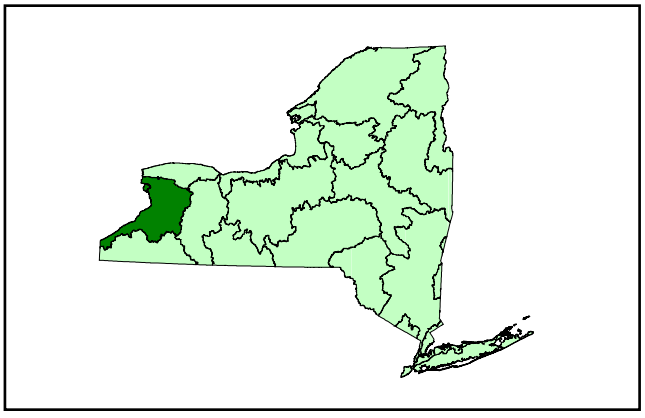
Lake Erie & Niagara River Drainage Basin





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Water Quality Assessment based on Resident Macroinvertebrates

- non-impacted
- slightly impacted
- moderately impacted
- severely impacted

0 20 40 Miles

LAKE ERIE-NIAGARA RIVER DRAINAGE BASIN SAMPLING SITES, 1972-2002

STATION	LOCATION	YEAR SAMPLED									
BARGE CANAL, WEST (WCAN)											
01	North Tonawanda, Rte. 62 bridge	75	81								
02	Pendleton, west of Tonawanda Creek confluence	75	81								
BEEMAN CREEK (BMAN)											
01	Wolcottburg, Rapids Rd. bridge									00	
BERGHOLTZ CREEK (BERG)											
01	Niagara Falls, Williams Rd. bridge									00	
BIG SISTER CREEK (BSIS)											
01	Evans Center, Rte. 5 bridge							93	94	00	01
BLACK CREEK (BLKE)											
01	Swormville, Smith Rd. bridge									00	
BOWEN CREEK (BOWE)											
01	North of Alexander, Pike Rd. bridge									00	
BUFFALO CREEK (BUFC)											
01	Wales Center, Rte. 20A bridge									00	
03	Gardenville, Rte. 277	76	82		88			93	94	00	01
03A	Elma, Knabb Rd.			87							
BUFFALO RIVER (BUFF)											
06	Buffalo, Bailey Ave. bridge	76	82								
07	Buffalo, Ohio St. bridge	76	82	87	88			93		00	
08	Buffalo, near mouth		82								
BUTTERMILK CREEK (BUTT)											
01	West of Thomas Corners, Thomas Corners Rd. bridge									00	
CANADAWAY CREEK (CWAY)											
01	Dunkirk, Rte. 5 Bridge			87	88			93	94	00	
CATTARAUGUS CREEK (CATT)											
00	East Arcade, East Arcade Rd. bridge										01
01	Arcade, Water St. bridge								94		
02	Arcade, North Woods Rd. bridge								94		
03	Sardinia, McKinstry Rd. bridge								94		
04	Springville, Rte. 240 (Vaughn St.) bridge								94	00	
05	Below Springville, Scoby Hill Rd. bridge								94		
06	Zoar, N. Otto Rd. bridge								94		
07	Gowanda, Rte. 39 bridge			87	88				94	00	

LAKE ERIE-NIAGARA RIVER DRAINAGE BASIN SAMPLING SITES, 1972-2002

STATION	LOCATION	YEAR SAMPLED										
CATTARAUGUS CREEK (CATT) cont'd												
07A	South Branch, Otto, Rte. 11 bridge										00	
08	Versailles, below Versailles Plank Rd. bridge								94			
09	Irving, Rte. 20				87	88			94		00	01
CAYUGA CREEK (YUGA)												
A	Alden, Three Rod Rd. bridge							93				
00	Alden, Rte. 354 bridge				87							
01	Lancaster, Bowen Rd.	76	82			88					00	
02	Depew, Rte. 277 bridge	76	82				90	93	94		00	01
CAYUGA CREEK (CYGA)												
01	Niagara Falls, Rte.182 bridge										00	01
CAZENOVIA CREEK (CAZE)												
04A	Below East Aurora, Rte. 20		82									
04B	East Aurora, Willardshire Rd. bridge		82			88						
05	West Seneca, Seneca St.	76	82									
05A	Buffalo, Parkside Dr. bridge								94		00	01
CAZENOVIA CREEK, EAST BRANCH (CAZE)												
02	Holland, Glenwood Rd. Bridge										00	
04	East Aurora Mill Rd.	76	82									
04C	East Aurora, Jewett Holmwood Rd. bridge				87				94		00	
CAZENOVIA CREEK, WEST BRANCH (CAZE)												
01	Colden, Rte. 240 Bridge										00	
04D	East Aurora, West Branch, Jewett Holmwood Rd.				87				94		00	
CHAUTAUQUA CREEK (CHAU)												
01	Barcelona, Rte. 5 bridge				87	88		93	94		00	01
CLEAR CREEK (CATT)												
08A	Versailles, above Versailles Plank Rd. bridge								94			
08AA	Taylor Hollow, Rte. 62 bridge										00	
08B	Iroquois, Rte. 438 bridge										00	
CONNOISARAULEY CREEK (CONN)												
01	East Otto, Hammond Hill Rd. bridge										00	
DELAWARE CREEK (DELC)												
01	Angola, Rte. 5 bridge										00	

LAKE ERIE-NIAGARA RIVER DRAINAGE BASIN SAMPLING SITES, 1972-2002

STATION	LOCATION	YEAR SAMPLED
EIGHTEENMILE CREEK (TEEN)		
A	North Boston, Rte. 277 bridge	00
01	Highland-on-the-Lake, Rte. 5 bridge	87 88 93 94 00 01
B	(South Branch) Eden Valley, Eden Valley Rd. bridge	00
ELLICOTT CREEK (ELLI)		
01	Alden Center, Sandbridge Rd. bridge	01
02	Wende, Walden Ave. bridge	01
03	Lancaster, Pavement Rd.	01
04	Bowmanville, Main St. bridge	01
05	Williamsville, Mill St.	00 01
06	Williamsville, Sheridan Ave. (Rte. 324) bridge	93 94 00 01
07	Amherst, St. Rita's Lane bridge	01
ELTON CREEK (ELTO)		
01	Delevan, Rte.e. 16 bridge	00
GILL CREEK (GILL)		
01	Niagara Falls, Rte. 384 bridge	00
GOTT CREEK (GOTC)		
01	Swormville, N. French Rd. bridge	00
HUNTER CREEK (HUNE)		
01	Wales, Hunter Creek Rd. bridge	00
LIME LAKE OUTLET (LIMO)		
01	Delevan, Mill St. bridge	00
LITTLE BUFFALO CREEK (LBUF)		
01	East Lancaster, Bowen Rd. bridge	00
LITTLE SISTER CREEK (LSIS)		
01	Evans Center, Rte. 5	00
LITTLE TONAWANDA CREEK (LTON)		
01	East Alexander, Creek Rd. bridge	00
MANSFIELD CREEK (MANS)		
01	Otto, Scotts Corners Rd. bridge	00
MONKEY RUN CREEK (MKEY)		
01	Arcade Center, Rte. 98 bridge	00
MUD CREEK (MUDN)		
01	Millersport, Tonawanda Ck Rd. bridge	00

LAKE ERIE-NIAGARA RIVER DRAINAGE BASIN SAMPLING SITES, 1972-2002

STATION	LOCATION	YEAR SAMPLED											
MUDDY CREEK (MDDE)													
01	Lake Erie Beach, Lake Shore Rd.										00		
MURDER CREEK (MURD)													
04	Pembroke, Lake Rd. bridge										00		
07	Swifts Mills, Rte. 93 bridge							93	94		00	01	
NIAGARA RIVER (NIAG)													
00	Buffalo, south of Peace Bridge		82	87	88								
01	Buffalo, south of Strawberry Island, Buoy 1	76	82	87	88			93			00		
01A	Buffalo, Buoy 7										00		
02E	Buffalo, Tonawanda Channel, east of Motor Island	76	82										
02W	Buffalo, Tonawanda Channel, west of Motor Island	76	82										
03E	Buffalo, Tonawanda Channel, east side	76	82										
03W	Buffalo, Tonawanda Channel, west side	76	82										
04E	North Tonawanda, Tonawanda Channel, east side		82										
04W	Niagara Falls, Tonawanda Channel, south	76	82										
05	Chippewa Channel	76											
06	Lewiston	76											
07	Youngstown, Marina buoy B	76	82	87	88			93			00		
RANSOM CREEK (RANS)													
01	Clarence, Ransom Rd. bridge				88								
02	Below Clarence, Brokhaven Rd. bridge				88								
03	Clarence Center, Rte. 217 bridge				88								
04	Below Clarence Center, Conner Rd. bridge			87	88								
05	Swormville, Miles Rd. bridge				88						00		
RIGHT BRANCH (RIGT)													
01	Bennington Center, Rte. 77 culvert										00		
RUSH CREEK (RUCK)													
01	Blasdell, Mile Strio Rd. culvert										00		
RYTHUS CREEK (RYTH)													
01	Pontiac, New Jerusalem Rd. bridge										00		
SCAJAQUADA CREEK (SCAJ)													
01	Buffalo, West Ave. bridge										00		

LAKE ERIE-NIAGARA RIVER DRAINAGE BASIN SAMPLING SITES, 1972-2002

STATION	LOCATION	YEAR SAMPLED							
SHELDON CREEK (SHED)									
01	North of Strykersville, Rte. 78 bridge							00	
SILVER CREEK (SILV)									
01	Silver Creek, Rte. 5 bridge					93	94	00	
SLIPPERY ROCK CREEK (SLIP)									
01	Brocton, Rte. 20 bridge							00	
SMOKE CREEK (SMOK)									
01	Lackawanna, South Park Ave. bridge							00	
SMOKE CREEK - SOUTH BRANCH (SMOS)									
01	Lackawanna, South Park Ave.							00	
SPOONER CREEK (SPOO)									
01	South of Springville, Zoar Valley Rd. bridge							00	
SPRING BROOK (CATT)									
04A	Springville, Maple Ave. bridge						94		
04B	Below Springville, Mill St.						94	00	
TONAWANDA CREEK (TONA)									
A	Below Varysburg, Eck Rd. bridge							00	01
B	Attica, Stroh Rd. bridge							00	
C	Above Batavia, Cookson Rd. bridge	84							
D	Above Batavia, Dorman Rd. bridge	84							
E	(East Fork) below Johnsonburg, Rte. 98 bridge							00	
01	Batavia, USGS Gaging Station, above Walnut St.				92				
02	Batavia, Lyon St. bridge	84		88	92			00	
03A	Batavia, River St. bridge	84							
03B	Below Batavia, Rte. 37	84		88	92				
04A	Bushville, Old Mill St.	84			92				
08	East Pembroke, Slusser Rd. bridge	84	87		92				
08A	East Pembroke, Creek Rd. bridge			88					
09	Rapids, Rapids Rd. bridge					93	94		01
10	Millersport, Rte. 78 bridge		87	88				00	
TWENTYMILE CREEK (TWEN)									
01	Robinson Stop, Pennsylvania, Rte. 5 bridge							00	
TWOMILE CREEK (TWOM)									
01	Tonawanda, Fletcher Rd. bridge							00	
WALNUT CREEK (WLNT)									
01	Silver Creek, Rte. 5 bridge					93	94	00	

ASSESSMENTS OF WATER QUALITY OF STREAMS IN THE LAKE ERIE - NIAGARA RIVER DRAINAGE BASIN, BASED ON MACROINVERTEBRATE COMMUNITIES

Site/Reach	Water Quality Assessment	Change from 1992
Beeman Creek, Wolcottburg	moderately impacted	no prior data
Bergholtz Creek, Niagara Falls	moderately impacted	no prior data
Big Sister Creek, Evans Center	slightly impacted	no prior data
Black Creek, Swormville	moderately impacted	no prior data
Bowen Creek, North of Alexander	moderately impacted	no prior data
Buffalo Creek, Wales Center	non impacted	no prior data
Buffalo Creek, Gardenville	slightly impacted	no change
Buffalo River, Buffalo	slightly impacted	**IMPROVED**
Buttermilk Creek, Thomas Corners	non-impacted	no prior data
Canadaway Creek, Dunkirk	non-impacted	**IMPROVED**
Cattaraugus Creek, East Arcade	non-impacted	no prior data
Cattaraugus Creek, Arcade	non-impacted	no prior data
Cattaraugus Creek, below Arcade	slightly impacted	no prior data
Cattaraugus Creek, Sardinia	non-impacted	no prior data
Cattaraugus Creek, Springville	slightly impacted	no prior data
Cattaraugus Creek, Below Springville	slightly impacted	no prior data
Cattaraugus Creek, Zoar	slightly impacted	no prior data
Cattaraugus Creek, Gowanda	non-impacted	no change
Cattaraugus Creek, South Branch, Otto	non-impacted	no prior data
Cattaraugus Creek, Versailles	non-impacted	no prior data
Cattaraugus Creek, Irving	slightly impacted	**DECLINED**
Cayuga Creek, Alden	slightly impacted	no prior data
Cayuga Creek, Lancaster	non-impacted	**IMPROVED**
Cayuga Creek, Depew	slightly impacted	no change
Cayuga Creek, Niagara Falls	moderately impacted	no prior data
Cazenovia Creek, Buffalo	slightly impacted	no prior data
Cazenovia Creek, East Branch, Holland	non-impacted	no prior data
Cazenovia Creek, East Branch, E. Aurora	non-impacted	no change
Cazenovia Creek, West Branch, Colden	non-impacted	no prior data
Cazenovia Creek, West Branch, E. Aurora	non-impacted	no change
Chautauqua Creek, Barcelona	non-impacted	**IMPROVED**
Clear Creek, Versailles to Iroquois	non-impacted	no prior data
Connoisarauley Creek, East Otto	non-impacted	no prior data
Delaware Creek, Angola	slightly impacted	no prior data

ASSESSMENTS OF WATER QUALITY OF STREAMS IN THE LAKE ERIE - NIAGARA RIVER DRAINAGE BASIN, BASED ON MACROINVERTEBRATE COMMUNITIES

Site/Reach	Water Quality Assessment	Change from 1992
Eighteenmile Creek, North Boston	non-impacted	no prior data
Eighteenmile Creek, Highland-on-the-Lake	slightly impacted	no change
Eighteenmile Cr., S. Br., Eden Valley	non-impacted	no prior data
Ellicott Creek, Alden Center	slightly impacted	no prior data
Ellicott Creek, Wende	slightly impacted	no prior data
Ellicott Creek, Lancaster	moderately impacted	no prior data
Ellicott Creek, Bowmanville	slightly impacted	no prior data
Ellicott Creek, Williamsville, Mill St.	slightly impacted	no prior data
Ellicott Creek, Williamsville, Sheridan Ave.	moderately impacted	no prior data
Ellicott Creek, Amherst	moderately impacted	no prior data
Elton Creek, Delevan	non-impacted	no prior data
Gill Creek, Niagara Falls	moderately impacted	no prior data
Gott Creek, Swormville	moderately impacted	no prior data
Hunter Creek, Wales	non-impacted	no prior data
Lime Lake Outlet, Delevan	slightly impacted	no prior data
Little Buffalo Creek, East Lancaster	non-impacted	no prior data
Little Sister Creek, Evans Center	moderately impacted	no prior data
Little Tonawanda Creek, East Alexander	slightly impacted	no prior data
Mansfield Creek, Otto	non-impacted	no prior data
Monkey Run Creek, Arcade Center	non-impacted	no prior data
Mud Creek, Millersport	slightly impacted	no prior data
Muddy Creek, Lake Erie Beach	moderately impacted	no prior data
Murder Creek, Pembroke	moderately impacted	no prior data
Murder Creek, Swifts Mills	slightly impacted	no prior data
Niagara River, Buffalo, south of Peace Bridge	slightly impacted	no prior data
Niagara River, Buffalo, Buoy 1	moderately impacted	**DECLINED**
Niagara River, Buffalo, Buoy 7	severely impacted	no prior data
Niagara River, Youngstown	slightly impacted	no change
Ransom Creek, Swormville	moderately impacted	no change
Right Branch, Bennington Center	non-impacted	no prior data

ASSESSMENTS OF WATER QUALITY OF STREAMS IN THE LAKE ERIE - NIAGARA RIVER DRAINAGE BASIN, BASED ON MACROINVERTEBRATE COMMUNITIES

Site/Reach	Water Quality Assessment	Change from 1992
Rush Creek, Blasdell	moderately impacted	no prior data
Rythus Creek, Pontiac	slightly impacted	no prior data
Scajaquada Creek, Buffalo	moderately impacted	no prior data
Sheldon Creek, North of Strykersville	non-impacted	no prior data
Silver Creek, Silver Creek	slightly impacted	no prior data
Slippery Rock Creek, Brocton	slightly impacted	no prior data
Smoke Creek, Lackawanna	slightly impacted	no prior data
Smoke Creek - S. Branch, Lackawanna	moderately impacted	no prior data
Spooner Creek, South of Springville	non-impacted	no prior data
Spring Brook, Springville	slightly impacted	no prior data
Spring Brook, Below Springville	slightly impacted	**IMPROVED**
Tonawanda Creek, Varysburg	slightly impacted	no prior data
Tonawanda Creek, Attica	slightly impacted	no prior data
Tonawanda Creek (East Fork), below Johnsonburg	non-impacted	no prior data
Tonawanda Creek, Batavia, Lyon St.	moderately impacted	no change
Tonawanda Creek, Rapids	non-impacted	no prior data
Tonawanda Creek, Millersport	non-impacted	no change
Twentymile Creek, Robinson Stop	non-impacted	no prior data
Twomile Creek, Tonawanda	moderately impacted	no prior data
Walnut Creek, Silver Creek	slightly impacted	no prior data

REPORTS OF MACROINVERTEBRATE SURVEYS WITHIN THE LAKE ERIE-NIAGARA RIVER WATERSHED

STREAM	YEAR OF SURVEY	REPORT
Buffalo River	1969	GLL
Buffalo River		EPA,1975
Buffalo River	1976	DOH
Cattaraugus Creek	1976	AVON
Cattaraugus Creek	1994	SBU, 1995
Ellicott Creek	2001	SBU, 2002
Erie County streams	1973	Erie Co., 1974
French Creek	1996	SBU, 1997
Niagara River	1968	OME,1968
Niagara River	1976	DOH
Niagara River	1982	DOH, 1983
Tonawanda Creek	1969	DOH
Tonawanda Creek	1984	SBU, 1984
Tonawanda Creek	1992	SBU, 1993
Watershed streams	1987-1988	RIBS, 1990
Watershed streams	1993-1994	RIBS, 1997
Watershed streams	2000-2001	RIBS (unpubl.)

AVON Avon Pollution Investigations Unit, Div. of Fish & Wildlife, NYS DEC
DOH New York State Department of Health
EPA United States Environmental Protection Agency
Erie Co. Erie County Soil and Water Conservation District
GLL Great Lakes Laboratory
OME Ontario Ministry of the Environment
RIBS Rotating Intensive Basin System, Statewide Waters Assessment Section, NYS DEC
SBU Stream Biomonitoring Unit, Division of Water, NYS DEC

Beeman Creek

Based on 2000 macroinvertebrate sampling at Wolcottsburg, water quality was assessed as moderately impacted, likely by municipal/industrial inputs. The fauna was dominated by caddisflies and scuds. No prior data were available for this stream.

Bergholtz Creek

Water quality was assessed as moderately impacted, based on 2000 macroinvertebrate sampling in Niagara Falls. Organic wastes were the likely source of impact, as determined by Impact Source Determination. The fauna was dominated by sewage-tolerant sowbugs.

Big Sister Creek

Slightly impacted water quality was assessed for the site in Evans Center, based on 2001 macroinvertebrate sampling. Nutrient enrichment and municipal/industrial inputs were the likely source of impacts. The fauna was dominated by facultative and tolerant midges. The site was previously assessed as moderately impacted in 1993 and 2000, and non-impacted in 1994. Due to the fluctuating water quality assessments, continued monitoring is recommended for this site.

Black Creek

Based on 2000 macroinvertebrate sampling at Swormville, water quality was assessed as moderately impacted, by municipal/industrial inputs. A few mayflies and caddisflies were found, but most of the fauna was dominated by pollution-tolerant crustaceans. No prior data were available for the stream.

Bowen Creek

Moderately impacted water quality was assessed for the site in Alexander, based on 2000 macroinvertebrate sampling. Organic wastes were the likely source of impact, as determined by Impact Source Determination. The fauna was heavily dominated by pollution-tolerant sowbugs. No prior data were available for the stream.

Buffalo Creek

Upstream water quality at Wales Center is currently assessed as non-impacted. The 2000 macroinvertebrate sample was field-assessed as passing screening, and the sample was not laboratory-processed. Water quality assessments for Buffalo Creek at Gardenville have fluctuated, but still remain as slightly impacted, similar to assessments from 1976 to1988. When sampled during high-flow years - 1994 and 2000 - water quality was assessed as non-impacted, while samplings during low-flow years - 1993 and 2001- result in assessments of slight impact. These results tend to show that point sources are the primary factors causing impact, being less-diluted during low-flow years. Siltation has been indicated to be a factor at the Gardenville site.

Buffalo River

Water quality has improved dramatically in the Buffalo River since it was first sampled in 1976. The river has progressed from severely impacted in 1976 to moderately impacted in 1988 to slightly impacted in 1993 and 2000, based on resident macroinvertebrate communities. Municipal/industrial inputs are the likely stressor. Caddisflies were first collected in 1988, and more sensitive mayflies were first collected in 2000. In the 2000 multiplate samples, 4 species of

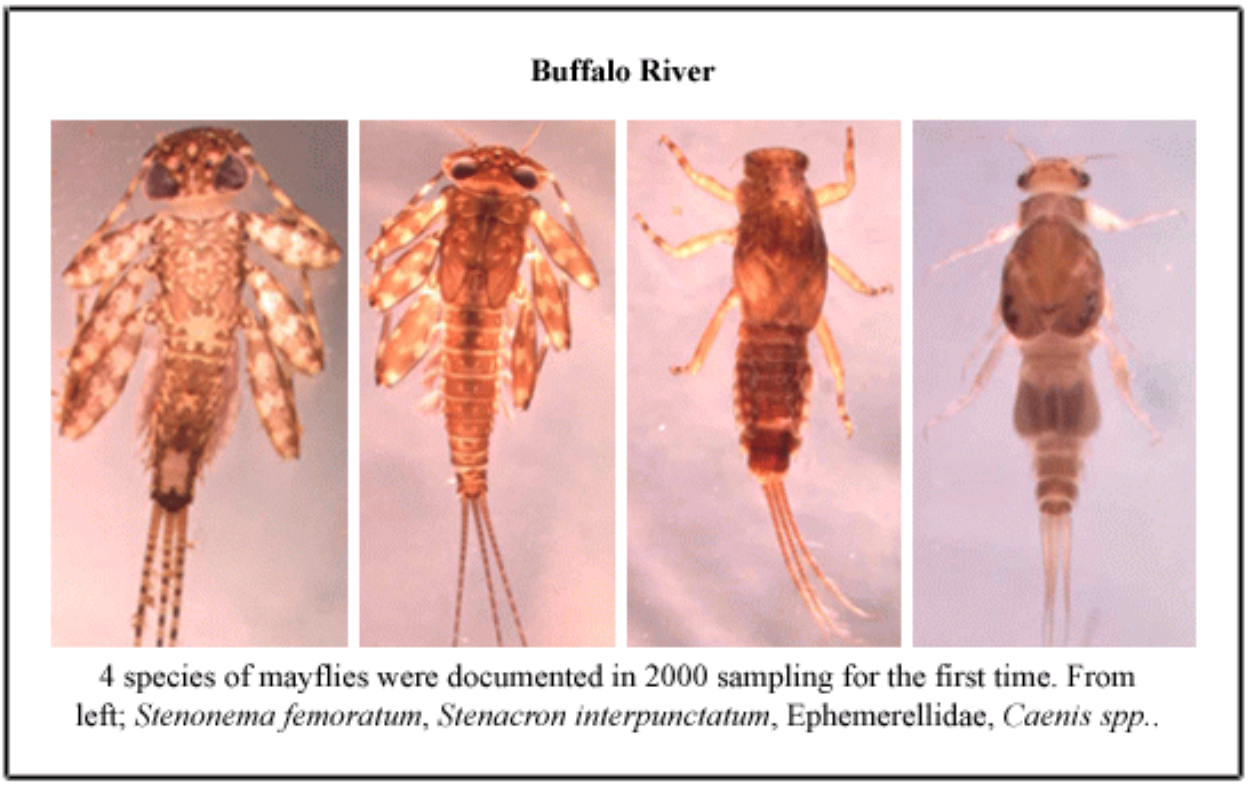

Figure 1-1. Mayflies from the Buffalo River, 2000.

clean-water mayflies were found at the Ohio Street bridge site. Zebra mussels are now numerous in the river, and are occasionally numerous enough to invalidate the multiplate samples.

Buttermilk Creek

Water quality is assessed as non-impacted for this tributary of Cattaraugus Creek, based on 2000 macroinvertebrate sampling in Thomas Corners. The stream habitat was considered good, with a mix of rock, rubble, gravel, and sand. Clean-water mayflies heavily dominated the fauna, and dragonfly larvae were also numerous.

Canadaway Creek

Improvement is indicated for this stream, but needs verification. The 2000 assessment of non-impacted was based only on field screening during a high-flow year. The 1994 assessment of non-impacted was from a laboratory-processed sample, but also during a high-flow year. The prior year, a low-flow year, yielded an assessment of moderately impacted. The 1988 assessment indicated slight impact. The invertebrate fauna continues to be dominated by filtering caddisfly larvae, but populations of mayflies and stoneflies are also maintained.

Cattaraugus Creek

Overall water quality in the creek ranges from good to very good. Non-impacted conditions were documented for East Arcade and Arcade. Slightly impacted water quality was assessed for the site at Springville, based on 1994 and 2000 samples. Nonpoint nutrient enrichment and siltation are the likely causes of impact. At Gowanda, water quality was assessed as non-impacted in 2000 macroinvertebrate sampling, although some nutrient enrichment and siltation were present.

Conditions at this site appear similar to those sampled in 1988. At Irving, water quality was found to be slightly impacted in 1994 and 2001, compared to non-impacted in 1987 and 1988. It was assessed as non-impacted in 2000, but this was based on a field determination during a high-flow year, and is considered less reliable than the 2001 sampling. Water quality at Irving is considered as declined, but needs verification. The South Branch of Cattaraugus Creek was assessed as non-impacted, based on 2000 macroinvertebrate sampling at Otto.

Cayuga Creek (Erie County)

Water quality at Lancaster was assessed as non-impacted, based on 2000 macroinvertebrate sampling. The fauna was dominated by clean-water mayflies and caddisflies. This represents an improvement in water quality compared to the years from1976 to 1988, when slight impact was documented. Slightly impacted water quality was assessed for the site in Depew, based on 2000 and 2001 macroinvertebrate sampling. Nonpoint source nutrient enrichment and siltation were the primary causes of impact. Similar conditions at this site were documented in 1993 and 1994, maintaining good water quality following well-documented improvements in the 1980's. Sampling upstream at Alden in 1993 indicated slight impact, likely due to nonpoint source nutrient enrichment.

Cayuga Creek (Niagara County)

Water quality was assessed as moderately-impacted at the Niagara Falls site, based on sampling in 2000 and 2001. Specific conductance was high at this site, and Impact Source Determination indicated that toxic inputs were the primary causes of impact. The macroinvertebrate fauna was dominated by tolerant sowbugs and riffle beetles.

Cazenovia Creek

Water quality in Cazenovia Creek currently ranges from non-impacted to slightly impacted, as in 1992. The most downstream site, in Cazenovia Park in Buffalo, displayed a diverse fauna of clean-water mayflies, stoneflies, and caddisflies in 2000 and 2001 samplings. The water quality assessment was non-impacted in 2000, a high-flow year, and slightly impacted in 2001, a low-flow year. Nonpoint source nutrient enrichment is the primary stressor. The site was assessed as non-impacted in 1994. Previous sampling of the creek, 2 miles upstream in West Seneca, showed the creek to be slightly impacted in 1976 and 1982. The East Branch and West Branch, both sampled at Jewett Holmwood Road just upstream of their confluence, exhibited non-impacted conditions in 1994 and 2000. Upstream locations at Colden on the West Branch and Holland on the East Branch were also assessed as non-impacted in 2000 sampling.

Chautauqua Creek

Improved water quality is indicated for this stream. Water quality was assessed as non-impacted in both 2001 and 2000 at the site in Barcelona, although the 2000 assessment was based only on field screening. It was assessed as non-impacted in 1994, a high-flow year, but slightly impacted in 1993, a low-flow year, and in 1987 and 1988. Based on the last three assessments, water quality is considered non-impacted. The improvements may be related to the 1988 upgrade

of the Westfield (V) Wastewater Treatment Facility, located 2 miles upstream.

Clear Creek

Water quality was assessed as non-impacted for this tributary of Cattaraugus Creek, based on 2000 macroinvertebrate sampling at Taylor Hollow and Iroquois. Clean-water mayflies dominated the fauna. No prior data were available for the stream.

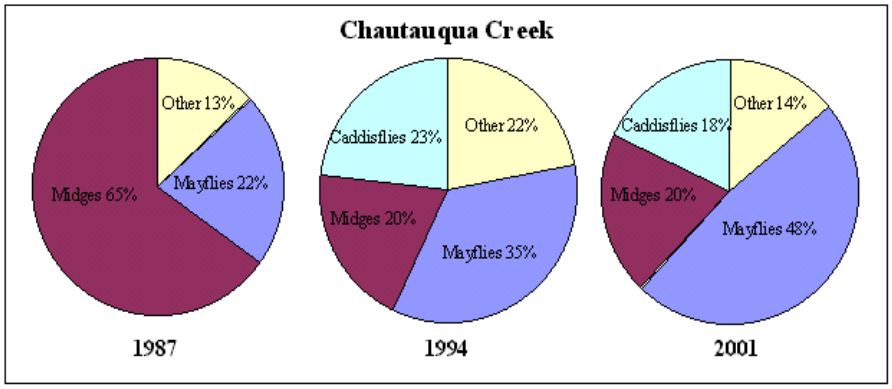

Figure 1-2. Faunal changes in Chautauqua Creek, 1987-2001.

Connoisarauley Creek

Based on a single sampling and field assessment in 2000, water quality is assessed as non-impacted. Clean-water stoneflies were very numerous at the East Otto site, with caddisflies, mayflies, dragonflies and beetles also were present. No water quality problems were indicated.

Delaware Creek

Water quality was assessed as slightly-impacted, based on 2000 macroinvertebrate sampling at Angola. The fauna was dominated by facultative midges and black fly larvae, and municipal/industrial inputs was the likely cause of impact.

Eighteenmile Creek

Slightly impacted water quality was assessed for the site at Highland-on-the-Lake, based on macroinvertebrate sampling in 2000 and 2001. The primary cause of impact was determined to be nonpoint source nutrient enrichment. Non-impacted water quality was documented for upstream sites at North Boston and Eden Valley (South Branch) in 2000, based on field assessments.

Ellicott Creek

Water quality in Ellicott Creek has ranged between slightly and moderately impacted. Most of the impact is in the lower portion of the creek in Amherst. A site upstream of Bowmansville was assessed as moderately impacted in the 2001 sampling, but poor habitat may be partially responsible for that determination. The Sheridan Avenue site between Williamsville and Amherst was clearly moderately impacted in the 1993 and 1994 samplings, and again in 2001. The sampling in 2000, a high-flow year, yielded only slight impact at this site, with 2 species of mayflies found. Nonpoint source runoff is considered to be the major cause of impact, with municipal/industrial inputs indicated for the lower portion of the stream. Fish collections by Doug Carlson (NYSDEC Fisheries) at 7 sites in 2001 showed similar trends as the macroinvertebrates (Figure 1-3).

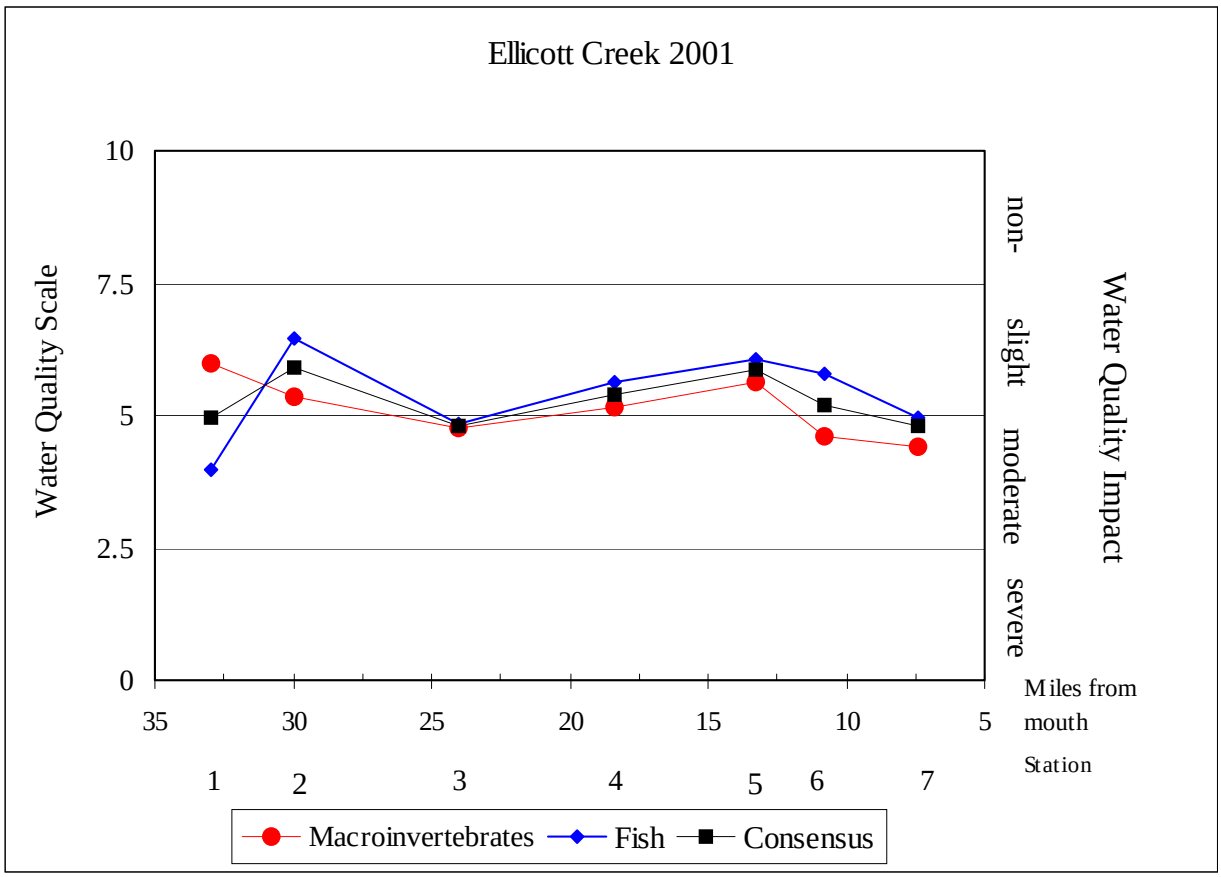

Figure 1-3. Ellicott Creek water quality as determined by macroinvertebrate and fish sampling, 2001.

Elton Creek

Based on a single sampling and field assessment in 2000, water quality was assessed as non-impacted. Clean-water stoneflies, caddisflies, mayflies, and beetles were present. The habitat was excellent, and no water quality problems were indicated.

Gill Creek

Moderately impacted water quality was assessed for the Niagara Falls site, based on 2000 macroinvertebrate sampling. Impact Source Determination indicated that municipal/industrial inputs were the primary cause of impact. No prior data were available for the stream.

Gott Creek

Based on 2000 macroinvertebrate sampling at Swormville, water quality was assessed as moderately impacted, likely by organic wastes. The fauna was heavily dominated by sewage-tolerant worms, and scuds. The substrate at this site was predominantly mud, and the data were analyzed using criteria for sandy streams and for soft sediments.

Hunter Creek

Based on a field assessment at Wales in 2000, water quality was assessed as non-impacted. Clean-water mayflies, stoneflies, caddisflies, and beetles were present. No water quality problems were indicated.

Lime Lake Outlet

Water quality was assessed as slightly-impacted at Delevan, based on 2000 macroinvertebrate sampling. Several species of clean-water mayflies and caddisflies were present, and impacts appeared to be minor. Nonpoint source nutrient enrichment is the likely stressor.

Little Buffalo Creek

Based on a single sampling and field assessment in East Lancaster in 2000, water quality was assessed as non-impacted. Clean-water mayflies, stoneflies, caddisflies, and beetles were present. No water quality problems were indicated.

Little Sister Creek

Water quality was assessed as moderately impacted, based on 2000 macroinvertebrate sampling in Evans Center. The fauna was dominated by midges and scuds, and Impact Source Determination indicated that the municipal/industrial input category was the primary cause of impact.

Little Tonawanda Creek

Slightly impacted water quality was assessed for the site in East Alexander, based on 2000 macroinvertebrate sampling. Nonpoint source nutrient enrichment was the likely source of impact.

Mansfield Creek

Based on a single sampling and field assessment in Otto in 2000, water quality was assessed as non-impacted. Clean-water mayflies, stoneflies, caddisflies, beetles, and dragonflies were present. No water quality problems were indicated.

Monkey Run Creek

Water quality was assessed as non-impacted, based on 2000 macroinvertebrate sampling in Arcade Center. Clean-water mayflies and caddisflies dominated the fauna.

Mud Creek

Based on a single sampling and field assessment in Millersport in 2000, water quality was assessed as slightly impacted. No riffle habitat was available to sample, reducing the efficacy of the assessment. Some caddisflies and mayflies were present. The status of this stream needs verification.

Muddy Creek

Water quality was assessed as moderately-impacted, based on 2000 macroinvertebrate sampling at Angola. Impact Source Determination indicated that municipal/industrial inputs of a toxic nature were the likely cause of impact.

Murder Creek

Murder Creek has been sampled four times at two locations during the last ten years. Water quality has ranged from slightly to moderately impacted, based on resident macroinvertebrate communities. At Swifts Mills, the downstream site, water quality was assessed as moderately impacted in 1993, but slightly impacted in 1994, 2000, and 2001. Impact Source Determination indicated that nonpoint enrichment and inputs from municipal/industrial facilities are likely sources. Based on 2000 sampling, water quality upstream at Pembroke was considered to be moderately-

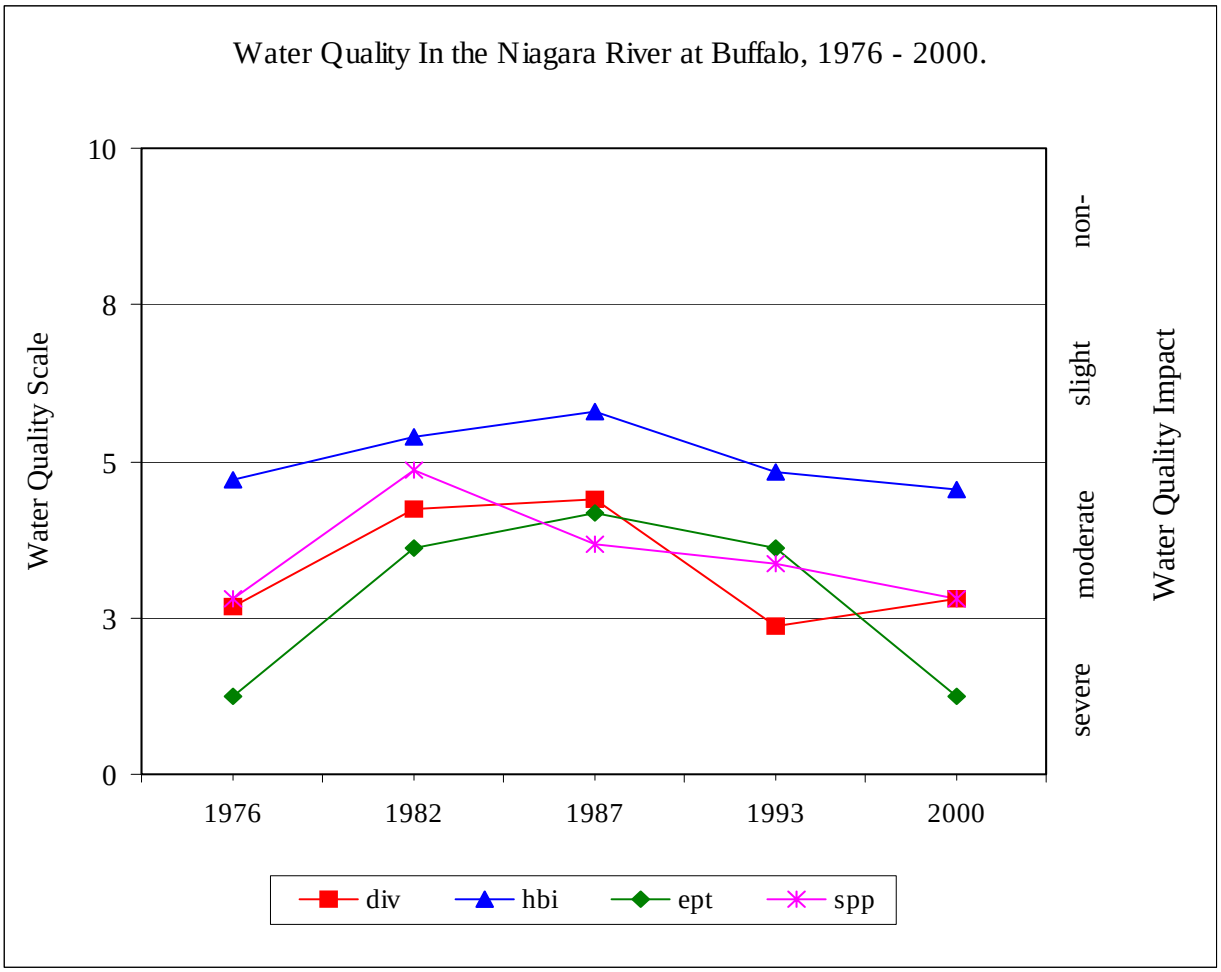

Figure 1-4. Water quality in the Niagara River at Buffalo, 1976-2000. DIV= species diversity, SPP= species richness, HBI= Hilsenhoff biotic index, EPT= richness of mayflies, stoneflies, and caddisflies,

impacted, with toxic inputs the likely cause.

Niagara River

The Niagara River site in Buffalo was assessed as moderately impacted, based on macroinvertebrate multiplate sampling in 2000. The fauna was very limited, consisting mostly of midges, worms, and scuds. The results represent a decline from conditions documented in 1982-1993; the fauna sampled in 2000 was similar to that sampled in 1976 (Figure 1-4). No cause is

given for the decline in biological communities at this site, although they may have been influenced by the influx of zebra mussels in Lake Erie. The loss of filter-feeding caddisflies from the site is likely due to zebra mussels exploiting this planktonic resource. In the 2000 sampling, it appeared that the multiplate samples at this site (Buoy 1) were being influenced by the plume of a creek entering the river. To monitor this possibility, an additional site was sampled (Buoy 7) one half mile downstream; results from this sampling showed severe impact. At the Youngstown site, water quality was assessed as slightly impacted, based on 2000 macroinvertebrate multiplate sampling. Samples were dominated by midges and scuds. The invertebrate communities were similar to previous collections at this site since 1982.

Ransom Creek

Water quality was assessed as moderately impacted, based on 2000 macroinvertebrate sampling in Swormville. Impact Source Determination indicated that organic and toxic inputs were the likely causes of impact. Although the only assessment is based on this single sampling, it appears that the impacts previously documented for the creek have not been remediated.

Right Branch

Water quality was assessed as non-impacted, based on 2000 macroinvertebrate sampling at Bennington. Clean-water mayflies and caddisflies were numerous, although nonpoint source nutrient enrichment was also indicated.

Rush Creek

Water quality was assessed as moderately impacted, based on 2000 macroinvertebrate sampling at Woodlawn. Impact Source Determination indicated that municipal/industrial inputs of a toxic nature were the likely cause of impact.

Rythus Creek

Slightly impacted water quality was assessed for this site, based on 2000 macroinvertebrate sampling at Pontiac. The fauna was diverse, and only siltation was indicated as a source of impact.

Scajaquada Creek

Based on 2000 macroinvertebrate sampling in Buffalo, water quality was assessed as moderately impacted. The fauna was heavily dominated by sewage-tolerant worms, snails, and scuds. Municipal/industrial inputs were the likely cause of the impact. The substrate at this site was predominantly sand and silt, and sandy stream criteria were used to evaluate the data. The fauna was dominated by tolerant worms, snails, scuds, and midges. Zebra mussels were also found at this site.

Sheldon Creek

Based on a single sampling and field assessment near Strykersville in 2000, water quality was assessed as non-impacted. Clean-water mayflies, stoneflies, caddisflies, and beetles were present. No water quality problems were indicated.

Silver Creek

Slightly impacted water quality was assessed for the Silver Creek site, based on 2000 macroinvertebrate sampling. Nonpoint source nutrient enrichment was the likely source of impact.

This site was similarly assessed as slightly impacted in 1993 and 1994.

Slippery Rock Creek

Slightly impacted water quality was assessed for the site in Brocton, based on 2000 macroinvertebrate sampling. Nonpoint source nutrient enrichment was the likely source of impact.

Smoke Creek

Slightly impacted water quality was assessed for the site in Lackawanna, based on 2000 macroinvertebrate sampling. Impact Source Determination identified municipal/industrial effects and nonpoint sources effects, indicating that urban runoff is likely the primary stressor.

Smoke Creek, South Branch

Water quality was assessed as moderately-impacted, based on 2000 macroinvertebrate sampling in Lackawanna. Impact Source Determination indicated that nonpoint nutrient enrichment was the likely cause of impact.

Spooner Creek

Water quality was assessed as non-impacted, based on 2000 macroinvertebrate sampling at Springville. Clean-water mayflies, stoneflies, and caddisflies were numerous, although nonpoint source nutrient enrichment was also indicated. No prior data is known for this creek.

Spring Brook

This small tributary of Cattaraugus Creek appeared very turbid during samplings in 1994 and 2000, and has yielded a very sparse fauna near the mouth, but still is no more than slightly impacted, based on the macroinvertebrate metrics. Elevated levels of aluminum measured in crayfish collected at this site are likely caused by alum applications at the Springville (V) Wastewater Treatment Facility upstream. This site was assessed as moderately impacted in a 1976 macroinvertebrate sampling by the DEC Avon Pollution Investigations Unit. The recent samplings represent an apparent improvement in water quality since 1976, but the stream remains very turbid and the macroinvertebrate fauna remains very meager.

Tonawanda Creek

In Batavia, water quality was assessed as moderately impacted downstream of the sewage treatment plant discharge, based on 2000 macroinvertebrate sampling. This condition remains similar to that found in 1992, following the 1990 upgrade of the Batavia (C) Sewage Treatment Plant. The innovative treatment system includes a series of polishing wetlands in the final treatment process. Upstream of Batavia, water quality was assessed as slightly impacted by nutrient enrichment below Varysburg and slightly impacted by organic wastes below Attica. This impact is likely caused by the discharge of the Attica (V) Wastewater Treatment Facility. Water quality in the East Fork, in Johnsonburg was assessed as non-impacted, based on 2000 macroinvertebrate sampling. The fauna was dominated by clean-water mayflies and caddisflies.

Tonawanda Creek in Millersport was sampled in 2000 and field-assessed as non-impacted, with a good diversity of clean-water mayflies, stoneflies, and caddisflies. This may represent an improvement from the slightly impacted conditions of 1988, but needs verification, as the sample was not processed and organisms identified in the laboratory. Additionally, this sample was from

a high-flow year, and may not be representative. A sample in 2001 from Rapids, 3 miles upstream, resulted in an assessment of slight impact. The Rapids site was also assessed as slightly impacted in 1993 and 1994. Based on these data, the creek at Millersport is assigned a final assessment of slight impact.

Twentymile Creek

Based on a single sampling and field assessment in 2000, water quality was assessed as non-impacted. Clean-water mayflies, stoneflies, caddisflies, and beetles were present. No water quality problems were indicated.

Twomile Creek

Moderately impacted water quality was assessed for the site at Tonawanda, based on 2000 macroinvertebrate sampling. Organic wastes were the likely cause of impact. The fauna was dominated by midges and sewage-tolerant black flies, and a dissolved oxygen level of 3.8 mg/l was measured. No prior data were available for this stream.

Walnut Creek

Slightly impacted water quality was assessed for the site in the village of Silver Creek, based on 2000 macroinvertebrate sampling. Nonpoint source nutrient enrichment was the primary cause of impact. Walnut Creek had previously been assessed as slightly impacted in 1993, and non-impacted in 1994. The 1994 results were likely influenced by a high-flow year, and the sample is not considered representative of long-term conditions. No data prior to 1993 were available to determine trends.