NYSDEC - DIVISION OF WATER

WATERBODY INVENTORY and PRIORITY WATERBODIES LIST (PWL) WORKSHEET

2/11/2013
Date

WATERBODY LOCATION INFORMATION

Segment ID _____

1. **Waterbody Name** Owego Creek - Upper East Branch
2. **Waterbody Type** River (low flow)
3. **Water Index Number (WIN)** SR-16-8
4. **Drainage Basin and Sub-basin** Susquehanna River / Upper Susquehanna River
5. **Hydrologic (Watershed) Unit Code** 0205010314 0
6. **Flow Category** (if river segment) low flow
7. **Affected Length/Area** 4 **Units** (mi, acres) miles
8. **Describe Waterbody Segment** Stream + tributaries from Rt. 221 in Harford Mills downstream to Rt 38 / Payne Marsh Rd in Berkshire (see ***Waterbody Inventory***, if available)
9. **Waterbody Classification** C (T)
10. **County** (primary) Tioga / 54
10a. **Additional Counties** Cortland / 12
11. **NYSDEC Region** 7
12. **Quad Map** Richford
12a. **Quad Num** L - 16 - 4 **More Quads?** __

WATER QUALITY PROBLEM INFORMATION

13. **Water Uses Impacted/Severity of Water Quality Problem** *Select all that apply*

Waterbody Uses Indicate precluded, impaired, stressed or threatened (P,I,S,T)		**Problem Documentation** Known	Suspected	Possible
Water Supply (Class A, AA, GA)				
Shellfishing (Class SA)				
Public Bathing (Class B, SB or above)				
Fishing Consumption				
Aquatic Life (Class C, SC or above)	T	✓		
Recreation				
Natural Resources Habitat/Hydrology	T	✓		
Aesthetics				

14. **Type of Pollutant(s)** Select all that apply. Indicate as *known* (K), *suspected* (S), or *possible* (P). **Circle *Major* pollutant types (i.e., those contributing to most severe use impacts/impairment); others are considered *Minor*.**

CHEMICAL CAUSES

_____ Nutrients	_____ Metals	_____ Pesticides
_____ Ammonia	_____ Acid/Base (pH)	_____ Priority Organics
_____ Chlorine	K (Salts)	_____ Non-Priority Organics
_____ Unknown Toxic	K Other Inorganics	_____ Oil and Grease

BIOLOGICAL CAUSES

_____ Pathogens	_____ Problem Species	_____ Species Alteration

PHYSICAL CAUSES

_____ D.O./Oxygen Demand	_____ Thermal Changes	_____ Restricted Passage
_____ Siltation/Sediment	_____ Water Level/Flow	_____ Aesthetics (float, odor, etc)

_____ **OTHER CAUSES** _____

15. Source(s) of Pollutant(s) Select all that apply. Indicate as *known* (K), *suspected* (S), or *possible* (P). **Circle *Major* source types (i.e., those contributing to most severe use impacts/impairment); others are considered *Minor*.**

POINT SOURCES

S Industrial
_____ Municipal
_____ Private/Commercial/Institution
_____ Power Generating Facilities
_____ Comb Sewer Overflows (CSOs)
_____ Other Sanitary Discharges

NONPOINT SOURCES

_____ Agriculture
_____ Urban/Storm Runoff
_____ On-site Septic Systems
_____ Silviculture
_____ Construction
_____ Habitat Modification
_____ Hydrologic Modification
_____ Streambank Erosion
_____ Roadbank Erosion
_____ De-Icing (Storage/Application)
_____ Atmospheric Deposition
_____ Contaminated/Toxic Sediments
P Chemical (Petroleum) Leaks/Spills
_____ Landfills/Land Disposal
_____ Resource Extraction(Drilling/Mining)

OTHER SOURCES

_____ Unknown Source
S Other Source Underground Propane storage

16. Waterbody Problem Description/Documentation/History/Notes Attach additional pages as necessary.

The narrative description should contain any and all information about the waterbody segment and its water quality problem/impairment including 1) examples/ instances of *specific* water use impairments, 2) details regarding the specific pollutant/source of pollutant and relationship to the impairment, 3) references for specific reports, studies, monitoring data and/or other documentation, 4) any activities currently underway or planned, and 5) description of the waterbody and surrounding watershed area, if pertinent. (see worksheet instructions for further guidance)

See attached

Next Update: _____

17. Waterbody Nominated/Form Completed By:

Name: Becky Bowen
Affiliation: Community Science Institute
Address: 95 Brown Road
Ithaca, NY 14850
607-257-6606

16) Waterbody Problem Description/Documentation/History/Notes

Background:

The Community Science Institute (CSI) is a nonprofit organization based in Ithaca, NY whose mission is to empower citizens to monitor and protect water resources by monitoring water quality. CSI operates a state-certified water quality testing lab (NYSDOH-ELAP #11790) and publishes surface water results in our free online database at www.communityscience.org/database. The CSI lab works in partnership with volunteer groups to collect scientifically credible data for use in protecting the environment and managing natural resources sustainably. Most recently, CSI expanded the "red flag" monitoring program to establish baseline water quality for regional creeks and streams in advance of "hydrofracking" being approved in New York. Volunteers in this program perform monthly field tests for temperature, pH, conductivity, total hardness and dissolved oxygen. Volunteers are required to perform three quality control measures: checking equipment with calibration standards prior to monitoring, performing duplicate tests once per event, and splitting samples with the CSI lab on a regular basis to ensure accurate results. All of the water quality data referenced in this report are also available for view or download from the CSI database at http://www.communityscience.org/database.

Specific Incident:

One of the creeks that is being monitored with the CSI's "red flag" monitoring program is Owego Creek. The "Up We Go" team has been monitoring monthly since July, 2012, and monitors six sites on Owego Creek - West Owego Creek at Pacific Road in Caroline (OWP), West Owego Creek at West Creek Road Angler's Access point in Richford (OWA), West Owego Creek at Mill Road in Speedsville (OWSP), East Owego Creek tributary at State Route 221 in Harford Mills (OWPB), East Owego Creek at State Route 38 near Zimmer Road in Richford (OWHM), and East Owego Creek at State Route 38 near Belden Ryan Road in Berkshire

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(OWBK). All results described in this section and GPS coordinates for monitoring sites are presented in Table 1 (attached) and in the CSI database at www.communityscience/org/database.

From July - October, "Up We Go" reported conductivity values at OWBK ranging from 319 to 330 us/cm with a mean of 325 us/cm and standard deviation of 4.9 (n=4) and conductivity values at OWHM ranging from 305 to 322 us/cm with a mean of 314 us/cm and a standard deviation of 6.9 (n=4).

On November 11th, 2012, during their monthly sampling, the "Up We Go" monitoring team reported conductivity values of 507 us/cm at OWBK and 513 us/cm at OWHM, 37 and 28 standard deviations above the respective means. Total hardness values were not elevated. Conductivity at other locations were consistent with previous results. The volunteers sampled two additional locations on this date: East Owego Creek at State Route 200 near State Route 38 in Harford Mills (OW200), and East Owego Creek at State Route 200 and State Route 221 in Harford Mills (OWHW). These locations were chosen because they are downstream and upstream, respectively, of the Enterprise Storage Terminal, an underground propane storage facility, located along State Route 200 in Harford Mills. Due to the use of brine at this facility, volunteers hypothesized that it could be the reason for the observed increases in conductivity, and they collected these two additional samples to test this hypothesis. Volunteers reported conductivity values of 106 us/cm at the upstream location (OWHW) and 583 us/cm at the downstream location (OW200), indicating that it is possible that the facility is causing the impact. Volunteers reported no unusual visual observations on this date. No environmental spills were reported to the DEC in this area during the week prior to November 11th, 2012. No unusual or extreme weather events had recently taken place. Figure 1 below shows a map of sampling locations in the vicinity of the Enterprise Storage Terminal.

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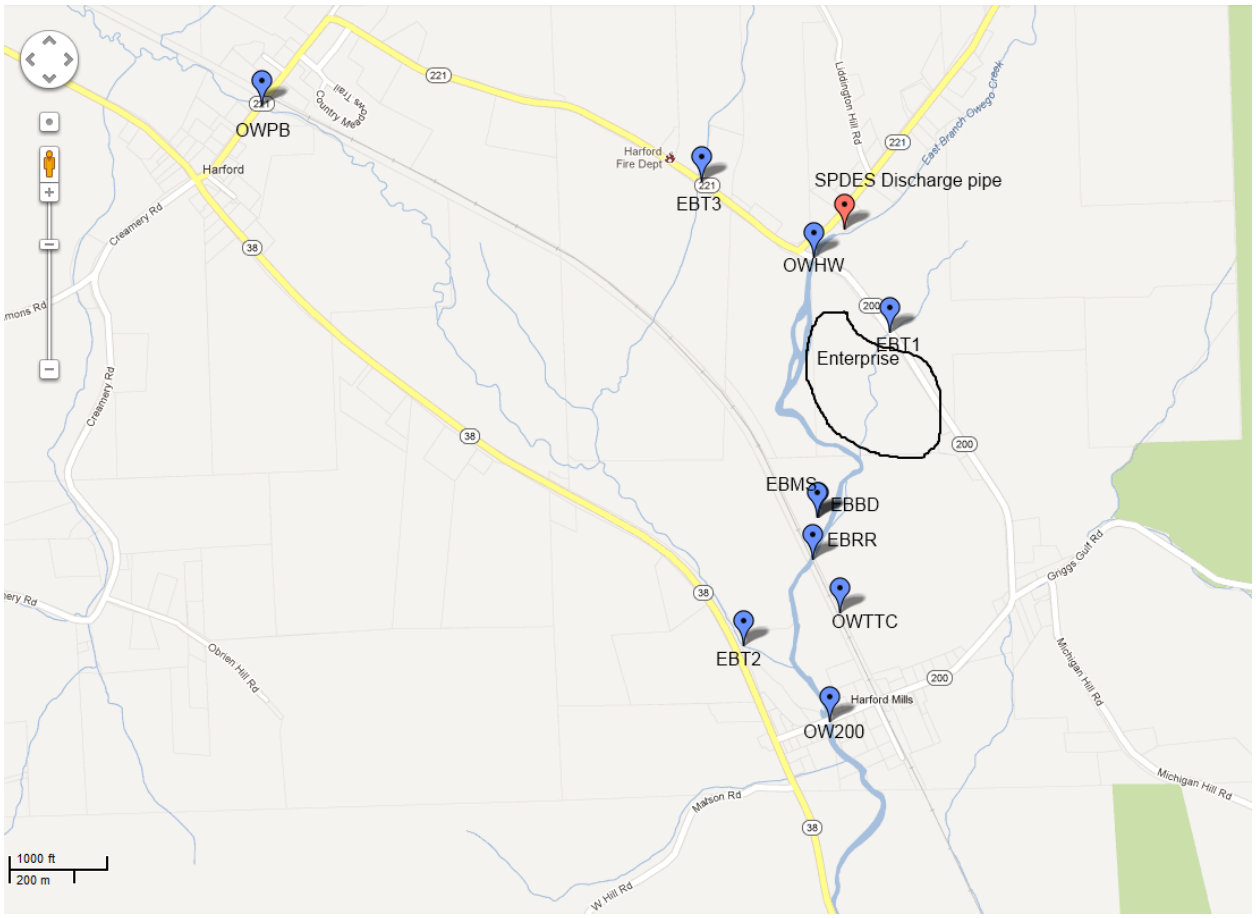

Figure 1. Locations and field codes of volunteer water sampling locations and Enterprise Storage Terminal (black outline) and effluent pipe location along Owego Creek near Harford Mills in Cortland County, NY.

On November 13, 2012, volunteers resampled OWHW and OW200, the locations just upstream and just downstream of the Enterprise facility, to determine whether the impact was still present. The conductivity values reported were 81 and 257 us/cm, respectively, indicating that whatever was causing the elevated conductivity values had passed.

On November 18, 2012, one week after the initial increase in conductivity, both the "Up We Go" monitoring team as well as the "Streamloggers" monitoring team that monitors Lower Owego Creek, collected data and samples from their regular monitoring locations. The

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Streamloggers team was asked to monitor on the same day in order to investigate the extent of the area that was being affected. Three new investigative tributary locations were added in an attempt to isolate the source of the elevated conductivity. EBT1, EBT2, and EBT3 (Figure 1), are all located on tributary streams entering East Owego Creek between the initial upstream (OWHW) and downstream (OW200) sampling locations. These locations were sampled to see if the increase in conductivity could be attributed to a tributary. EBT1 had no flowing water and EBT2 and EBT3 had conductivity values of 329 and 44 us/cm, respectively (Table 1) indicating those tributaries are not the source of the elevated conductivity. With the tributaries ruled out, volunteers sampled three additional locations in between OWHW and OW200: EBBD, EBRR and OWTTC (Figure 1). OWTTC, which volunteers described as slowly moving water near a concrete culvert pipe, had conductivity values above 2000 us/cm, the upper range of the volunteers' conductivity meter. Volunteers collected a 1L sample and transported it to the CSI lab for certified analysis. The CSI lab confirmed the high conductivity at 2780 us/cm. The OWTTC sample was also tested for chloride and total hardness and shown to have concentrations of 770 mg/L and 650 mg/L, respectively (Table 1). These values are outside of the non-enforceable guidelines for healthy streams indicated in the Hudson Basin River Watch (HBRW) guidance document (attached). The other investigative locations, EBBD and EBRR, were just above and just below a beaver dam along Owego Creek and had conductivity values of 622 and 604 us/cm respectively (Table 1). These investigative locations are as close to the suspected source of the elevated conductivity as we have been able to find.

On December 2, 2012, volunteers collected split samples for certified lab analysis from EBBD and EBRR. The chloride concentrations were 378 mg/L and 837 mg/L, respectively. The conductivity values were 1240 us/cm and 2580 us/cm, respectively. The total hardness values were 46.7 mg/L and 78 mg/L, respectively (Table 1). The chloride and conductivity values were above the guidelines for healthy streams indicated in the HBRW guidance document.

Biological Monitoring:

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On November 23, 2012, under the guidance of CSI staff, volunteers collected BMI (benthic macroinvertebrate) samples from the OWHW (Figure 1) and OWHM (downstream, not shown on Figure 1) locations following the HBRW protocols. To date, one of two replicate samples collected at OWHM has been processed. The metrics for Family Richness, EPT Richness and Family Biotic Index all indicate a "non-impacted" stream. The Percent Model Affinity metric indicates a slight impact and is also based on a summer community, whereas this sample was collected in November. This sample is unusual compared with other samples that CSI staff and volunteers have processed in that it contains an exceptionally large number of organisms. This is also the only sample that CSI has collected in November, although CSI has sampled Fall Creek during October in the past. Typically, a kick sample contains about 400 organisms whereas this sample had over 7,000 organisms, of which 1/4, or 1815 organisms, were identified. The dominant family was Hydropsychidae, of which there were 521 Hydropsychids (common netspinner caddisflies) making up about 29% of the total number of organisms. High numbers of Hydropsychids are associated with organic pollution ("Measuring the Health of California Streams and Rivers: A Methods Manual for Water Resources Professionals, Citizen Monitors, and Natural Resources Students" (Harrington and Born 2000)). CSI volunteers and staff plan to analyze the OWHW upstream sample at the earliest opportunity.

Facility Information:

Based on information that CSI staff has been able to access to date, the Enterprise Storage Terminal has current, valid permits both for discharging wastewater into the East Branch of Owego Creek (SPDES NY0071111) and for underground brine injection (EPA UIC122X001). The EPA's Enforcement and Compliance History Online (ECHO) Database shows that the facility had exceeded its allowed discharge levels for chlorides and suspended solids on multiple occasions in the past 3 years, most notably exceeding their permitted discharge level of total suspended solids by 1033% in March of 2010. The ECHO database also showed a formal administrative case against Enterprise Storage Terminal in March 2011 because the facility had injected brine underground without a permit, a violation of the Safe Drinking Water Act. The

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facility received a permit for underground brine injection on August 8, 2012. These incidents contribute to the plausibility that leakage from underground caverns at the Enterprise Storage Terminal could be responsible for the elevated conductivity in Owego Creek. It is worth noting that the company's permit for underground brine injection (EPA UIC122X001, attached) approves leakage of up to 1,000 barrels (55,000 gallons) of brine annually. CSI staff estimate that the annual flow in Owego Creek is about 989 million cubic feet. The permitted leakage is roughly 0.0043% of this annual stream flow. Under low flow conditions, the permitted leakage represents 0.005% of the annual stream flow. The impact on Owego Creek could be substantial if hundreds of gallons of brine leaked during low flow conditions in Owego Creek. It is also worth noting that despite the fact that Enterprise has a SPDES permit to discharge into the East Branch of Owego Creek, Megan Gilbert, from the NYSDEC Region 7 Permits office, said in a phone conversation that the facility had not discharged to Owego Creek in over two years.

Summary:

Specific conductance exceeded the HBRW guideline of 500 us/cm for healthy streams at six locations downstream from the Enterprise Harford Mills Terminal facility in November 2012, while chloride exceeded the HRBW guideline of 50 mg/L at five locations in November and December 2012. Total hardness at one location was 650 mg CaCO3/L, approximately 6 times higher than the mean values for Owego Creek locations July-October 2012. There is no NYSDEC standard or HRBW guideline for total hardness.

Two possible sources of these impacts are: a) the SPDES-permitted discharge from the brine storage pond, and b) leakage from the underground cavern used to store brine and liquid propane. The SPDES outfall is located immediately upstream from the sampling location OWHW (see Figure 1 and SPDES permit, attached). Values for conductivity, chloride and total hardness at OWHW were among the lowest recorded by volunteers in this area. Furthermore, the Harford Mills facility has reportedly not discharged brine from its effluent pipe in over two years, according to NYSDEC Region 7 staff member Megan Gilbert. The reported absence of

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any SPDES-permitted discharges coupled with the volunteer and certified lab measurements of low values for conductivity, chloride and total hardness at OWHW on November 11, 13, and 18 suggests that discharges from the brine ponds to Owego Creek were not the cause of the observed spiking concentrations of brine-related parameters.

The only plausible alternative source of brine in Owego Creek and its tributaries is leakage from underground storage caverns. Gas is typically removed at the start of the heating season and replaced by injecting brine from the facility's ponds into the caverns. The timing of the observed increases in brine-related parameters is consistent with the expected withdrawal of propane at the start of the heating season.

Attachments:

Appendix A - Hudson Basin River Watch Guidance Document page 34 "New York State Water Quality Standards"

Copy of NYSDEC SPDES Permit NY0071111

Copy of NYSDEC SPDES Permit NY0071111 transfer

Copy of Underground Injection Permit EPA UIC122X001

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Table 1 - Monitoring locations (listed North to South) and water quality data for Owego Creek

Field Code	Latitude	Longitude	Conductivity	Total Hardness	Conductivity	Total hardness	Conductivity	Total hardness	Chloride
			Mean Value and SD July- October 2012		11-Nov-12		13-Nov-12		
OWPB	42.428	-76.2251	390 +/- 23.7	166 +/- 6.6	368	148	ND	ND	ND
EBT3	42.4259	-76.2086	ND	ND	ND	ND	ND	ND	ND
OWHW	42.4237	-76.2043	ND	ND	106	ND	81	**22.86**	**8.76**
EBBD	42.4158	-76.2045	ND	ND	ND	ND	ND	ND	ND
EBRR	42.4152	-76.2042	ND	ND	ND	ND	ND	ND	ND
OWTTC	42.414	-76.2035	ND	ND	ND	ND	ND	ND	ND
EBT2	42.4131	-76.2071	ND	ND	ND	ND	ND	ND	ND
OW200	42.4109	-76.2037	ND	ND	583	92	257	**50**	**50.6**
OWFA	42.3948	-76.1921	ND	ND	ND	ND	ND	ND	ND
OWP	42.3799	-76.2915	312 +/- 9.4	125 +/- 11.5	270	81	ND	ND	ND
OWHM	42.3714	-76.1948	314 +/- 6.9	102 +/- 1.6	513	84	ND	ND	ND
OWA	42.3424	-76.2444	244 +/- 1.6	91 +/- 10.9	213	70	ND	ND	ND
OWBK	42.3408	-76.1967	325 +/- 4.9	103 +/- 2.9	507	88	ND	ND	ND
OWSP	42.3067	-76.2503	283 +/- 9.5	113 +/- 12.9	228	70	ND	ND	ND
OWUP	42.2326	-76.2342	247 +/- 55.1	95.8 +/-26.4	ND	ND	ND	ND	ND
OWDK	42.1935	-76.2058	326+/- 53.3	124.5 +/- 35	ND	ND	ND	ND	ND
OW1B	42.1856	-76.2471	256 +/- 70	111 +/- 24.7	ND	ND	ND	ND	ND
OWFB	42.1682	-76.2462	329 +/- 29.6	112.5 +/- 25.7	ND	ND	ND	ND	ND
OWTB	42.1268	-76.2704	287.5 +/-57.7	111 +/- 26.9	ND	ND	ND	ND	ND
OWWM	42.0972	-76.2776	314 +/- 49.5	118 +/- 23.2	ND	ND	ND	ND	ND

Bold = certified lab measurement

ND = No data collected

Red = exceeds HBRW Guidelines for healthy streams

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Field Code	Conductivity	Total hardness	Chloride	Conductivity	Conductivity	Conductivity	Conductivity	Total hardness	Chloride
	11/18/2012			11/23/2012	11/24/2012	11/27/2012	12/2/2012		
OWPB	328	ND	ND	ND	371	366	ND	ND	ND
EBT3	44	ND	ND	ND	50	49	ND	ND	ND
OWHW	83	**26**	**9.71**	82	81	84	ND	ND	ND
EBBD	**622**	**35**	**172**	ND	919	1053	**1240**	**46.66**	**378**
EBRR	**604**	ND	ND	ND	768	1037	**2580**	**78**	**837**
OWTTC	**2780**	**650**	**770**	ND	ND	ND	ND	ND	ND
EBT2	194	ND	ND	ND	ND	ND	ND	ND	ND
OW200	476	**71.4**	**108**	ND	557	589	ND	ND	ND
OWFA	406	**65.5**	**85.9**	ND	ND	ND	ND	ND	ND
OWP	194	ND	ND	ND	ND	ND	ND	ND	ND
OWHM	370	ND	ND	465	450	ND	ND	ND	ND
OWA	157	ND	ND	ND	ND	ND	ND	ND	ND
OWBK	361	ND	ND	ND	ND	466	ND	ND	ND
OWSP	172	ND	ND	ND	ND	ND	ND	ND	ND
OWUP	166	ND	ND	ND	ND	ND	ND	ND	ND
OWDK	261	ND	ND	ND	ND	ND	ND	ND	ND
OW1B	171	ND	ND	ND	ND	ND	ND	ND	ND
OWFB	265	ND	ND	ND	ND	ND	ND	ND	ND
OWTB	238	ND	ND	ND	ND	ND	ND	ND	ND
OWWM	249	ND	ND	ND	ND	ND	ND	ND	ND
Bold = certified lab measurement									
ND = No data collected									
Red = exceed healthy streams guidance value									

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Photos of select monitoring locations along Owego Creek. Photos by Mark Witmer, CSI Volunteer.

EBRR Looking upstream 11/27/12

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EBRR Looking Downstream 11/27/12

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EBBD Looking downstream towards EBRR 11/27/12

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EBBD Looking upstream 11/27/12

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New York State River Classifications

(For more complete info, see *NY State Codes, Rules and Regulations Title 6, Chapter X, Parts 700-705*)

Class A Drinking, cooking, contact recreation (swimming), fishing, fish propagation and survival (aquatic life). (For information on Class AA-Special, Class A-Special and Class AA, see NY State publication above).

Class B Primary and secondary contact recreation, fishing, fish propagation and survival (aquatic life).

Class C Fishing, fish propagation and survival (aquatic life). Can be suitable for contact recreation, but may be limited.

Class D Fishing. Cannot support fish propagation due to natural conditions such as streambed and flow. Suitable for fish survival. Contact recreation may be limited.

New York State Water Quality Standards (for surface freshwater)

Parameter	Class	Standard	Guideline for a Healthy Stream
pH	A,B,C	Between 6.5-8.5	See standards.
	D	Between 6.0-9.0	
DO	A, B, C	Trout spawning (TS) $\geq$ 7.0 mg/L Trout waters (T) never < 5.0 mg/L, daily ave. 6.0 Non-trout, never < 4.0 mg/L, daily ave 5.0	
	D	$\geq$ 3.0 mg/L	
Temperature		No standard	Trout, $\leq$ 70°F (21.1°C) Non-trout, <80°F(26.7°C)
Orthophosphate as $P0_4$ *(divide by 3 for orthophosphate as P)*		"None that will result in growths of algae, weeds, and slime that will impair uses" No numerical standard	> 0.15 mg/L impact likely > 0.3 mg/L impact certain (especially if slow moving area or upstream from lake)
Nitrate-nitrogen (NO_3-N)	A	$\leq$ 10 mg/L	Natural levels generally < 1 mg/L
	B, C, D	"None that will result in growths of algae, weeds, and slime that will impair uses"	
Ammonia-nitrogen (NH_3-N)		No standard	Not to exceed 0.10 mg/L
Alkalinity		No Standard	0-5 mg/L endangered or critical 5-10 mg/L highly sensitive 10-20 mg/L sensitive 20 mg/L not sensitive
Chloride	A	$\leq$ 250 mg/L	Natural levels generally <50 mg/L
	B, C, D	No standard	
Conductivity	Freshwater	No standard	Generally 150-500 uS/cm, salt water much higher
Fecal Coliforms	A, B, C, D	Monthly geometric mean of at least 5 samples $\leq$ 200 colonies/100 ml	See standards.
Total Coliforms	A, B, C, D	Monthly median value from at least 5 samples $\leq$ 2,400 colonies/100ml; and >20% of the samples, from at least 5 samples $\leq$ 5,000 colonies/100ml	
Turbidity	A, B, C, D	"No increase that will cause a substantial visible contrast to natural conditions"	
Suspended and settleable solids	A, B, C, D	"None from sewage, industrial wastes or other wastes that cause deposition or impair the waters for their best usages"	