Evaluation of Water Quality Standards in Watershed Streams Using the Protocols of the DEC/DEP MOU, Addendum E

New York City Water Supply

Report for 2012

Prepared by: Bureau of Water Supply
Watershed Water Quality Science & Research
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1. Introduction

In September 1997, the New York State Department of Environmental Conservation (DEC) and the New York City Department of Environmental Protection (DEP) finalized a Memorandum of Understanding (MOU) governing several aspects of enforcement protocols in the New York City water supply watersheds. Addendum E of the MOU describes a series of methods to examine routine stream sampling data collected by DEP's Division of Watershed Water Quality Operations to evaluate water quality. According to Addendum E, DEP will submit reports describing the results of this analysis along with any other documentation of water quality concerns (*e.g.*, exceedances of TMDLs, results of non-routine special sampling efforts, biomonitoring information).

2. Data Analysis Description

Fecal and total coliform bacteria, pH, total phosphorus, dissolved oxygen, total ammonia, and nitrate-nitrite are the analytes routinely examined by these protocols. However, according to Addendum E, any constituent listed in 6 NYCRR §703 can be included in this analysis. The means of the analytes were calculated for each site, and compared to the stream water quality guidance values listed in Table I of Addendum E, which is reproduced here as Table 1. Values below detection were converted to one-half the detection limit for the purpose of calculating mean values. Mean coliform concentrations were calculated in the log system. Coliform values listed as "too numerous to count" in the dataset were not used in the summary statistics for each sampling site because they could not be converted into a numerical value. To calculate the compliance of streams with the Addendum E pH standards ($6.5 \leq pH \leq 8.5$) this protocol converts pH values to hydrogen ion concentrations, calculates the mean, and compares the mean to the pH standards also expressed as hydrogen ion concentrations (*i.e.*, $0.31623 \geq [H^+] \geq 0.0031623$).

Table 1. Water Quality Guidance Values used to compare routine stream monitoring data.

Parameter	Guidance Value
pH	$6.5 \leq pH \leq 8.5$
fecal coliform bacteria	≤ 200 CFU $100ml^{-1}$
total coliform bacteria	≤ 2400 CFU $100ml^{-1}$
total phosphorus	≤ 50 µg L^{-1}
dissolved oxygen	≥ 6 mg L^{-1}
total ammonia (NH_3+NH_4-N)	≤ 2 mg L^{-1}
nitrate-nitrite (NO_3+NO_2-N)	≤ 10 mg L^{-1}

Summary statistics for all sites for the year 2012 can be found in Appendix A. Maps showing routine stream sample sites, surface discharging WWTPs, and stream biomonitoring sites are included as Appendix B. Table 2 lists the 49 sites with contraventions of water quality standards out of the 117 sites analyzed. The 6 sites at which mean concentrations contravened the Table 1 guidance values are noted in the third column of Table 2.

Most of the sites in Table 2 are there not because their mean concentrations actually contravened the Table 1 guidance values, but because there were more than two contraventions of the spike concentration values at

the site. A spike is defined in the Addendum as "...an ambient water quality concentration found to be above the [guidance] value by three standard deviations of the...mean at a given site." The concept of the spike concentration is important because most loading from non-point sources occurs during rainfall events. Since the routine samples are collected on a fixed frequency basis, average values from the routine sampling data may not reveal sites that occasionally receive excessive non-point loading. Such sites could be considered for special investigation. If there are a total of more than two spikes at a site, they are listed in the fourth column of Table 2. If the number of samples taken at a site during the sample period was unusually high (>30) or low (<10), it is so noted in the table.

If a reservoir is listed as phosphorus restricted ("P-restricted") as of this report's time frame, it is so noted in Table 2. DEC removed Cannonsville Reservoir from the list of phosphorus restricted reservoirs in 2002, and added Bog Brook Reservoir and New Croton Reservoir in 2002 and 2004 respectively. One phosphorus restricted reservoir in the Croton System, Bog Brook Reservoir, is not listed in Table 2 because, for 2012, it had no stream sites meeting the criteria for inclusion.

Addendum E also specifies the application of a t-test to examine differences in concentrations of the seven constituents listed in Table 1 between sampling sites that are paired above and below selected wastewater treatment plant (WWTP) discharges. This test looks at the difference between the upstream and downstream concentrations, subtracts an allowable amount of increase (one half of the guidance value or one standard unit in the case of pH) and determines if the result is statistically less than zero at the 95% confidence level. The null hypothesis for this test is that the difference is greater than or equal to zero, that is, that the plant is increasing in-stream concentrations above an allowable amount. To reject the null hypothesis, and so conclude that the plant is not increasing in-stream concentrations above an allowable amount, the t-statistic must fall within the lower tail (or the upper tail in the case of alkaline pH and dissolved oxygen). The results of this analysis are listed in Table 3.

The second column of Table 3 lists those analytes for which the WWTP was found by this test to be a significant source, and whose mean concentrations at the downstream sampling site contravene the water quality guidelines listed in Table 1. WWTPs with entries in this column may be considered sources of water quality problems.

The third column of Table 3 lists those analytes for which the WWTP was found by this test to be a significant source, but whose mean concentrations at the downstream site do not contravene the Table 1 guidelines. For these analytes, the WWTP can be considered to be a significant source, but not a significant problem.

New York State does not have a numeric water quality standard for phosphorus. In the past, DEP has used the DEC phosphorus guidance value of 20 $\mu g\ L^{-1}$ when determining Phosphorus Restricted Basins and the Phase I TMDLs. The Phase II TMDLs, which were approved by EPA in October 2000, incorporate a site-specific guidance value of 15 $\mu g\ L^{-1}$ for source water reservoirs (New Croton, Cross River, Croton Falls, Kensico, West Branch, Rondout and Ashokan), and apply the existing New York State guidance value of 20 $\mu g\ L^{-1}$ for upstream reservoirs. For this stream water analysis, a 50 $\mu g\ L^{-1}$ guidance value is used. This value, intended to protect downstream impoundments from eutrophication, was taken from the Federal Water Quality Criteria "Gold Book", and has been accepted by New York State.

3. Discussion

For the year 2012, 1,798 samples from 117 stream sample sites were analyzed. Of these, 49 sites are listed in Table 2. As in previous Addendum E water quality reports, most of the sites listed in Table 2 are there because of intermittently high concentrations ("spikes") of coliform bacteria, from sources other than WWTPs. See "Likely sources" in Table 2.)

Regarding pollutants from WWTPs, Addendum E analysis since 1997 has shown that sites downstream of WWTPs have often had excess total phosphorus (TP) concentrations. For 2012, however, only one stream sample site had a mean TP>50 $\mu g\ L^{-1}$ and it is not located downstream of a WWTP. This low number continues to indicate a significant reduction in phosphorus loading in general, and in particular from WWTPs.

Previous Addendum E reports have shown by t-test analysis that, as each plant has been upgraded, it is no longer a source of unacceptably high levels of phosphorus, and is therefore no longer listed for phosphorus in the second column of Table 3. For 2012, of the 11 WWTPs analyzed by this method all plants have been upgraded. Yorktown Heights WWTP was the last to be upgraded, and is no longer listed in the second column of Table 3. For the third year in a row since the report was started there are no entries in Table 3, another sign of improved water quality.

Addendum E reports for 1998 through 2011 reported that stream sample sites with mean TP>50 $\mu g\ L^{-1}$ often exhibited a significant correlation between phosphorus and turbidity measurements (Spearman's correlation analysis, at $p<0.1$). In 2012, there was only one site with mean TP>50 $\mu g\ L^{-1}$ and with sufficient turbidity data required to perform the analysis (listed in Table 2). Five sites exhibited a significant correlation between phosphorus and turbidity measurements, which is a slight increase from three sites in 2011. Due to improved water quality and changes to the sampling schedule the number of sites still available for this analysis is low. However, the TP/turbidity correlation continues to suggest that management strategies, such as stormwater retrofit and whole farm planning that reduce turbidity and/or suspended solids also mitigate non-point source TP loading.

It should be noted that seventeen sites had no contraventions of water quality standards and are not listed in Table 2. However, all were assessed as being slightly impaired using biomonitoring protocols. They are:

- Esopus Creek, site no. 255: '12 - slightly impaired. Catskill System
- AEAWDL (site no. 227) Esopus Creek: '06, '12 - slightly impaired. Catskill System
- E16I (site no. 213) Esopus Creek: '12 - slightly impaired. Catskill System
- E5 (site no. 215) Esopus Creek: '12 - slightly impaired. Catskill System
- SCL (site no. 217) Stony Clove: '12 - slightly impaired. Catskill System
- S10 (site no. 206) Batavia Kill: '08, '09, '10, '12 - slightly impaired. Catskill System
- S3 (site no. 202) Schoharie Creek: '12 - slightly impaired. Catskill System
- S4 (site no. 216) Schoharie Creek: '12 - slightly impaired. Catskill System
- S5I (site no. 204) Schoharie Creek: '06, '08, '12 - slightly impaired. Catskill System
- West Kill, site 258: '12 - slightly impaired. Catskill System
- West Kill, site 259: '12 - slightly impaired. Catskill System
- BELLEGIG (site no. 229) Giggle Hollow: '11, '12 - slightly impaired. Catskill System
- WSPB (site no. 304) West Branch Delaware River: '06, '08, '12 - slightly impaired. Delaware System
- EDRB (site no. 321) East Branch Delaware River: '12 - slightly impaired. Delaware System

- NK4 (site no. 307) Aden Brook: ’08, ’10, ‘12 - slightly impaired. Delaware System
- RDOA (site no. 310) Rondout Creek: ’12 - slightly impaired. Delaware System
- ANGLE5 (site no. 102) Angle Fly Brook: ’07, ’08, ’09, ‘12 - slightly impaired. Southern Basins of the Croton Watershed

In the Catskill and Delaware Systems, the sites that had extremely low sample numbers in 2011 all had sufficient organisms present in the sample in 2012 to generate the 100-count subsample required by the SBU protocols. Even though subsample numbers returned to normal, however, an unusually high percentage of sites in both these systems was rated as impaired in 2012. In the Catskill System, 13 sites (61.9%) were rated slightly impaired, while only 8 assessed as non-impaired. In the Delaware System, the percentage was lower, but still almost half (5 of 11, (45.5%)) were designated as slightly impaired.

Of the 18 impaired sites, one, Site 206, was clearly still recovering from the severe scour caused by the 2011 storms, with all metrics well below the historical average. For the other sites, however, the source of impairment was not so clear-cut. One possible cause is suggested by the NBI-P metric, which was high at most impaired sites. This metric, an indicator of nutrient enrichment in streams, was introduced by the New York State Stream Biomonitoring Unit in 2012. Another metric whose depressed scores in 2012 contributed greatly to the many impaired results was Percent Model Affinity. Low PMA values, often accompanied by low total taxa counts, were widespread, occurring at 17of the 18 impaired sites and at some non-impaired sites as well. PMA is a measure of what is considered the typical composition of a macroinvertebrate community in New York State streams, so low scores indicate a departure from this model, and often the dominance of one group over the others. In almost all cases, the dominant group in 2012 was the family Hydropsychidae, the net-spinning caddisflies. It is not clear what factor or factors were responsible for the high proportion of hydropsychids, but it is possible that this group was able to tolerate the exceedingly high flows of Tropical Storms Irene and Lee (which occurred in 2011) better than other macroinvertebrate taxa.

Table 2. List of routine stream sampling sites with contraventions of water quality guidelines in 2012.

Reservoir basin	Site	Mean contravened water quality guidelines	Number of samples contravening spike threshold	Likely sources	Notes
East-of-Hudson					
Kensico	E10		4-fecal coli.; 5-total coli.	highway runoff; wildlife	Site not sampled for nutrients.
	E11		3-fecal coli.; 1-total coli.	urban runoff; wildlife	
	E9		3-fecal coli.; 3-total coli.	urban runoff; wildlife	Site not sampled for nutrients.
	MB-1		7-fecal coli.; 2-total coli.	urban runoff; wildlife	
	N5-1	TP	4-fecal coli.; 4-total coli.	urban runoff; wildlife	Significant TP/turbidity correlation. Benthic monitoring ’97: slightly impaired.
	N12		3-fecal coli.; 4-total coli.	urban runoff; wildlife	
	WHIP		2-fecal coli.; 4-total coli.	urban runoff; wildlife	Benthic monitoring ’05, ‘09 - slightly impaired.
	BG9		2-fecal coli.; 1-total coli.	urban runoff; wildlife	
New Croton (P-restricted)	HUNTER1		3-fecal coli.; 5-total coli.	urban runoff; wildlife	Significant TP/turbidity correlation. Benthic monitoring ’00, ’01, ’02, ’03, ’04, ’05, ’06, ’07, ’08, ’09, ’10, ‘12 - slightly impaired.

Table 2. List of routine stream sampling sites with contraventions of water quality guidelines in 2012.

Reservoir basin	Site	Mean contravened water quality guidelines	Number of samples contravening spike threshold	Likely sources	Notes
New Croton (P-restricted)	CORNELL1		4-fecal coli.; 5-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	CATHY7		3-fecal coli.; 2-total coli.	urban runoff; wildlife; construction site	Site sampled for bact. only. Benthic monitoring ’05, ‘06 - slightly impaired.
	FRENCH5		1-fecal coli.; 5-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	COLABAUGH1		2-fecal coli.; 3-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	ILLINGTON1		2-fecal coli.; 2-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	KITCHAWAN1		2-fecal coli.; 2-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	NCBAILEY1		1-fecal coli.; 4-total coli.	urban runoff; wildlife	Site sampled for bact. only. Benthic monitoring ’05, ‘06 - slightly impaired.
	PURDY1		3-fecal coli.; 2-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	SAWMILL1		2-fecal coli.; 0-total coli.	urban runoff; wildlife	Site sampled for bact. only. Benthic monitoring ’05 - slightly impaired.
	GEDNEY3		3-fecal coli.; 1-total coli.	urban runoff; wildlife	Site sampled for bact. only.
	WHITE2		1-fecal coli.; 4-total coli.	urban runoff; wildlife	Site sampled for bact. only.

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Reservoir basin	Site	Mean contravened water quality guidelines	Number of samples contravening spike threshold	Likely sources	Notes
New Croton (P-restricted)	KISCO3		3-fecal coli.; 4-total coli.	urban runoff; wildlife	Significant TP/turbidity correlation. Benthic monitoring ’95, ’96, ’01, ‘06 - slightly impaired.
	HMILL7		4-fecal coli.; 3-total coli.	urban runoff; wildlife	Located above Yorktown Heights WWTP. Benthic monitoring: ’94, ’98, ’99, ’07, ’08, ‘09 , ’10 –slightly impaired; ’95, ’00, ’04, ’06, ‘11 –moderately impaired.
	HMILL4		5-fecal coli.; 6-total coli.	municipal WWTP; urban runoff, wildlife	Located below Yorktown Heights WWTP. Benthic monitoring: ’94, ’98, ’06, ‘08 – moderately impaired; ’95, ’99, ’00, ‘07 – severely impaired; ’09, ’10, ‘11 -slightly impaired.
Muscoot (P-restricted)	MUSCOOT5		3-fecal coli.; 4-total coli.	municipal WWTP; urban runoff; wildlife	Located below Yorktown Heights WWTP. Benthic monitoring: ’95-moderately impaired; ’96, ’99, ’01, ’06, ‘12 – slightly impaired.
	PLUM2		0-fecal coli.; 2-total coli.	urban runoff; wildlife	Benthic monitoring: ’98 – moderately impaired; ‘99, ’00, ’04, ‘12 – slightly impaired.

Table 2. List of routine stream sampling sites with contraventions of water quality guidelines in 2012.

Reservoir basin	Site	Mean contravened water quality guidelines	Number of samples contravening spike threshold	Likely sources	Notes
Muscoot (P-restricted)	STONE5		5-fecal coli.; 4-total coli.	WWTP; urban runoff; wildlife	Downstream from WWTP on Broad Brook; Significant TP/turbidity correlation. Benthic monitoring upstream: ’97, ’98, ’01, ’02, ’04, ’05, ’06, ’07, ’08, ’10, ’11, ‘12 - slightly impaired;
	HOLLY12		2-fecal coli.; 1-total coli.	urban runoff; wildlife	Small no.of samples. Site located in Town of Southeast, on Holly stream.
Cross River	CROSS2		1-fecal coli.; 2-total coli.	wildlife	Site located in Ward Pound Reservation (county park). Benthic monitoring ‘12 - slightly impaired.
Amawalk (P-restricted)	MUSCOOT 10		6-fecal coli.; 6-total coli.	urban runoff; wildlife	Significant TP/turbidity correlation. Benthic monitoring ‘06 – slightly impaired. ’12 – moderately impaired.
Titicus (P-restricted)	TITICUS3		3-fecal coli.; 4-total coli.	urban runoff; wildlife	
Croton Falls (P-restricted)	MIKE2		6-fecal coli.; 8-total coli	municipal WWTP; wildlife, agriculture	Located below Carmel #2 WWTP; Benthic monitoring ’99, ’00, ’05, ‘10 – slightly impaired.

Table 2. List of routine stream sampling sites with contraventions of water quality guidelines in 2012.

Reservoir basin	Site	Mean contravened water quality guidelines	Number of samples contravening spike threshold	Likely sources	Notes
Middle Branch (P-restricted)	MIDBR3		4-fecal coli.; 3-total coli.	urban runoff; wildlife	Benthic monitoring upstream: '00, '01, '10 – slightly impaired.
East Branch (P-restricted)	EASTBR		3-fecal coli.; 4-total coli.	urban runoff; wildlife	Benthic monitoring '06, '08, '09, '10, '11, '12 – slightly impaired.
	HH7		1-fecal coli.; 4-total coli.	urban runoff; wildlife	Large no.of samples: n=40.
	MUDTRIB1		4-fecal coli.; 3-total coli.	urban runoff, wildlife; WWTPs	Located below Patterson V. and Cornwall Meadows WWTPs. Site sampled for bact. only.
	BB5		3-fecal coli.; 4-total coli.	urban runoff; wildlife	Benthic monitoring: '94, '95, '98, '99, '00, '01, '02, '03, '05, '08, '10 - slightly impaired. '04 – moderately impaired. Site sampled for bact. only.
West Branch	GYPSYTRL1		0-fecal coli.; 1-total coli.	urban runoff; wildlife	Benthic monitoring: '00, '01, '09 – slightly impaired.
	LONGPD1		3-fecal coli.; 1-total coli.	urban runoff; wildlife	Benthic monitoring: '00, '03, '10 - slightly impaired.
	HORSEPD12		1-fecal coli.; 1-total coli.	urban runoff; wildlife	Benthic monitoring: '10, '11, '12 - slightly impaired.
	WESTBR7		1-fecal coli.; 0-total coli.	urban runoff; wildlife	

Table 2. List of routine stream sampling sites with contraventions of water quality guidelines in 2012.

Reservoir basin	Site	Mean contravened water quality guidelines	Number of samples contravening spike threshold	Likely sources	Notes
	LEETOWN3		2-fecal coli.; 1-total coli.	urban runoff; wildlife	
Catskill District					
Esopus	AEHG	pH (acid)	1-pH	acid precipitation	Benthic monitoring: '12 - slightly impaired.
Schoharie	SSHG	pH (acid)		acid precipitation	
Delaware District					
Cannonsville	C-7		1-fecal coli.	urban runoff; agriculture; wildlife.	
	CLDG		2-fecal coli.	urban runoff; wildlife	
	WDHOA		2-fecal coli.	urban runoff; wildlife	Benthic monitoring: '12 - slightly impaired.
Neversink	NK6	pH (acid)		acid precipitation	
	NCG	pH (acid)		acid precipitation	Benthic monitoring '11 – slightly impaired.
Rondout	RRHG	pH (acid)	1-pH	acid precipitation	Benthic monitoring '06 – slightly impaired.

Table 3. WWTPs shown by t-tests of upstream/downstream sampling to be sources of contraventions of water quality standards at the downstream site for 2012.

WWTP (and upstream/downstream sample sites)	Parameters excessively contributed to by WWTP, and the mean at downstream site contravenes Table 1 guidelines.	Parameters excessively contributed to by WWTP, but the mean at downstream site does not contravene Table 1 guidelines.
Yorktown Heights (HMILL7 / HMILL4)	*none*	*none*
Margaretville (PMSA / PMSB)	"	"
Pine Hill (E3 / E15)	"	"
Grand Gorge (S8 / S9)	"	"
Tannersville (S1 / S2)	"	"
Hobart (WDHOM / WDHOB)	"	"
Delhi (DTPA / DTPB)	"	"
Walton (WSPA / WSPB)	"	"
Mountainside (DCDA / DCDB) (Subsurface Industrial Discharge)	"	"
Grahamsville (RGA / RGB)	"	"
Roxbury Run (EDRA / EDRB)	"	"
Stamford (WDSTM / WDSTB)	"	"

APPENDIX A. SUMMARY STATISTICS FOR EACH SAMPLING SITE FOR 2012.
The four lines for each site display, respectively, n (number of samples), maximum, minimum, and mean values (in boldface). Where "nd" is noted next to a value, the minimum (and occasionally the maximum) was below detection and the displayed value is one-half the detection limit, which was the quantity used to calculate mean concentrations. Coliform values listed as “too numerous to count” in the dataset were not used in the summary statistics.

site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
East-of-Hudson District							
ANGLE5	1	0	0	0	1	0	0
	8.2	.	.	.	10.99	.	.
	8.2	.	.	.	10.99	.	.
	8.200	**.**	**.**	**.**	**11.0**	**.**	**.**
BB5	0	13	13	0	0	0	0
	.	500	7100	.	.	.	.
	.	5	80	.	.	.	.
	.	**54**	**1300**	**.**	**.**	**.**	**.**
BG9	12	14	12	12	12	11	12
	7.47	310	4700	103	12.69	0.084	0.413
	6.62	1(nd)	91(nd)	15	1.78	0.01(nd)	0.01 (nd)
	7.138	**33**	**382**	**36.5**	**8.20**	**0.0395(nd)**	**0.1632**
CATHY7	0	14	14	0	0	0	0
	.	1400	26000	.	.	.	.
	.	4(nd)	80(nd)	.	.	.	.
	.	**42**	**548**	**.**	**.**	**.**	**.**
COLABAUGH	0	14	14	0	0	0	0
	.	650	8800	.	.	.	.
	.	1(nd)	160	.	.	.	.
	.	**21**	**802**	**.**	**.**	**.**	**.**
CORNELL1	0	14	14	0	0	0	0
	.	2600	55000	.	.	.	.
	.	7(nd)	160	.	.	.	.
	.	**80**	**1140**	**.**	**.**	**.**	**.**
CROSS2	12	19	19	12	13	12	12
	10.22	3100	22000	72	15.95	0.025	0.295
	7.57	5(nd)	33(nd)	15	7.77	0.01(nd)	0.01(nd)
	8.061	**34**	**500**	**34.9**	**11.8**	**0.0123(nd)**	**0.1310**
E10	12	14	12	0	12	0	0
	7.93	2000	9300	.	14.49	.	.
	7.65	5(nd)	40	.	7.55	.	.
	7.767	**76**	**1356**	**.**	**11.1**	**.**	**.**
E11	12	13	11	12	12	11	12
	7.84	1100	10000	124	13.91	0.133	0.253
	7.2	1(nd)	25(nd)	14	0.91	0.01(nd)	0.01(nd)
	7.532	**28**	**670**	**39.7**	**8.54**	**0.0301(nd)**	**0.0721**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
E9	12	14	12	0	12	0	0
	7.66	5400	59000	.	14.58	.	.
	6.63	2(nd)	40	.	2.83	.	.
	7.093	**71**	**1487**	**.**	**7.07**	**.**	**.**
EASTBR	12	19	19	12	13	12	12
	7.67	1000	6000	73	13.44	0.073	0.261
	6.93	8(nd)	40	16	4.28	0.01(nd)	0.01(nd)
	7.323	**50**	**670**	**35.8**	**8.55**	**0.0226**	**0.0701**
FRENCH5	0	14	14	0	0	0	0
	.	230	4600	.	.	.	.
	.	1(nd)	25	.	.	.	.
	.	**10**	**465**	**.**	**.**	**.**	**.**
GEDNEY3	0	14	13	0	0	0	0
	.	2300	14000	.	.	.	.
	.	1(nd)	120	.	.	.	.
	.	**44**	**800**	**.**	**.**	**.**	**.**
GYPSYTRL1	11	19	18	12	12	12	12
	8.16	170	20000	71	14.5	0.052	0.393
	7.02	1	50(nd)	9	7.99	0.01(nd)	0.01(nd)
	7.364	**17**	**500**	**25.3**	**10.4**	**0.0143(nd)**	**0.0608**
HH7	6	14	14	7	7	7	7
	7.73	350	4400	27	14.61	0.01(nd)	0.401
	7.43	3	80	9	9.66	0.01(nd)	0.177
	7.552	**34**	**775**	**13.7**	**11.8**	**0.0100(nd)**	**0.3004**
HMILL4	0	13	14	0	0	0	0
	.	1100	27000	.	.	.	.
	.	8	180	.	.	.	.
	.	**142**	**1889**	**.**	**.**	**.**	**.**
HMILL7	0	14	14	0	0	0	0
	.	1700	23000	.	.	.	.
	.	13	83(nd)	.	.	.	.
	.	**107**	**781**	**.**	**.**	**.**	**.**
HOLLY12	7	7	7	7	7	7	7
	8.26	1900	12000	72	16.68	0.029	0.816
	7.41	7	160	10	8.59	0.01(nd)	0.477
	7.699	**82**	**1100**	**25.7**	**12.0**	**0.0164(nd)**	**0.6124**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
HORSEPD12	12	19	19	12	13	12	12
	8.16	1000	11000	65	14.4	0.01(nd)	0.472
	7.29	1(nd)	8	9	9.14	0.01(nd)	0.184
	7.734	**17**	**670**	**20.3**	**11.2**	**0.0100(nd)**	**0.3248**
HUNTER1	12	19	19	12	12	12	12
	8.22	6200	28000	70	15.54	0.021	0.743
	7.61	7(nd)	50(nd)	12	7.99	0.01(nd)	0.3
	7.921	**72**	**500**	**29.6**	**11.8**	**0.0109(nd)**	**0.5167**
ILLINGTON	0	14	14	0	0	0	0
	.	2200	18000	.	.	.	.
	.	1(nd)	80	.	.	.	.
	.	**37**	**1000**	**.**	**.**	**.**	**.**
KISCO3	11	19	19	12	12	12	12
	10.23	6400	79000	120	14.95	0.029	0.944
	7.23	18	120	21	7.36	0.01(nd)	0.191
	7.843	**100**	**1200**	**48.4**	**11.6**	**0.0142(nd)**	**0.5637**
KITCHAWAN	0	14	14	0	0	0	0
	.	1700	28000	.	.	.	.
	.	2(nd)	40	.	.	.	.
	.	**36**	**727**	**.**	**.**	**.**	**.**
LEETOWN3	6	14	14	7	7	7	7
	7.89	510	10000	37	13.6	0.043	0.339
	7.54	1(nd)	25(nd)	10	7.34	0.01(nd)	0.03
	7.662	**10**	**548**	**23.6**	**10.2**	**0.0219**	**0.1521**
LONGPD1	11	19	19	12	12	12	12
	7.85	640	6200	27	15.05	0.02	0.271
	7.6	4(nd)	100	9	8.69	0.01(nd)	0.036
	7.765	**24**	**670**	**17.8**	**11.1**	**0.0108(nd)**	**0.1853**
MB-1	10	19	12	12	12	11	12
	7.55	1500	10000	76	13.73	0.087	0.502
	6.91	2	40	21	7.17	0.022(nd)	0.048
	7.244	**78**	**473**	**39.0**	**10.6**	**0.0488(nd)**	**0.2591**
MIDBR3	11	19	19	12	12	12	12
	8.3	520	7000	60	14.3	0.09	1.576
	7.43	3(nd)	17(nd)	7	8.51	0.01(nd)	0.178
	7.902	**41**	**330**	**29.6**	**11.2**	**0.0280**	**0.4310**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
MIKE2	11	19	19	12	12	12	12
	7.98	1600	35000	74	13.96	0.039	10.98
	7.23	12	25(nd)	13	8.89	0.01(nd)	0.508
	7.650	**125**	**1700**	**37.5**	**11.1**	**0.0153(nd)**	**3.8178**
MUDTRIB1	0	14	14	0	0	0	0
	.	900	14000	.	.	.	.
	.	4(nd)	100(nd)	.	.	.	.
	.	**45**	**360**	**.**	**.**	**.**	**.**
MUSCOOT10	11	19	19	12	12	12	12
	7.58	2200	27000	75	13.48	0.117	1.434
	7.1	13	100	10	5.96	0.01(nd)	0.225
	7.445	**132**	**1000**	**44.8**	**9.37**	**0.0480**	**0.8218**
MUSCOOT5	13	19	19	12	13	12	12
	8.15	3400	21000	61	14.7	0.137	1.244
	7.44	10(nd)	100	16	8.47	0.01(nd)	0.603
	7.937	**61**	**830**	**30.3**	**11.7**	**0.0475**	**0.9281**
MUSCOOT9	1	0	0	0	1	0	0
	8.04	.	.	.	9.38	.	.
	8.04	.	.	.	9.38	.	.
	8.040	**.**	**.**	**.**	**9.38**	**.**	**.**
N12	10	13	12	12	12	11	12
	8.01	3200	39000	75	14.64	0.077	1.305
	7.61	1(nd)	80(nd)	12	8.63	0.01(nd)	0.566
	7.792	**40**	**525**	**24.4**	**11.5**	**0.0192(nd)**	**0.8091**
N5-1	10	13	12	12	12	11	12
	7.77	1000	39000	106	12.56	0.286	1.197
	6.98	18	80	20	3.56	0.038(nd)	0.221
	7.335	**105**	**635**	**53.2**	**9.02**	**0.1068(nd)**	**0.6727**
NCBAILEY1	0	14	14	0	0	0	0
	.	540	6000	.	.	.	.
	.	4(nd)	80	.	.	.	.
	.	**23**	**644**	**.**	**.**	**.**	**.**
PLUM2	8	14	14	7	8	7	7
	8.24	170	3800	60	15.68	0.146	1.29
	7.36	1(nd)	17	14	6.41	0.01(nd)	0.587
	7.770	**19**	**489**	**29.7**	**11.3**	**0.0359**	**0.9129**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
PURDY1	0	14	13	0	0	0	0
	.	10000	6000	.	.	.	.
	.	1(nd)	25(nd)	.	.	.	.
	.	**26**	**800**	.	.	.	.
SAWMILL1	0	14	13	0	0	0	0
	.	1800	1500	.	.	.	.
	.	2(nd)	40(nd)	.	.	.	.
	.	**26**	**320**	.	.	.	.
STONE5	12	19	19	12	13	12	12
	10.18	5800	70000	110	16.48	0.067	0.963
	7.64	3	83	7	7.75	0.01(nd)	0.425
	8.137	**64**	**830**	**39.5**	**11.8**	**0.0225**	**0.7661**
TITICUS3	11	18	18	12	12	12	12
	8.5	5500	19000	127	15.46	0.315	0.655
	7.48	2(nd)	120	10	7.34	0.01(nd)	0.109
	8.053	**81**	**840**	**43.0**	**11.8**	**0.0404**	**0.3808**
WESTBR7	11	19	19	12	12	12	12
	7.72	290	1700	19	14.51	0.025	0.105
	6.98	1(nd)	17(nd)	9	7.86	0.01(nd)	0.01(nd)
	7.432	**17**	**430**	**14.2**	**10.7**	**0.0135(nd)**	**0.0523**
WHIP	10	13	12	12	12	11	12
	7.88	620	10000	35	16.38	0.021	1.452
	7.6	2(nd)	40(nd)	11	8.42	0.01(nd)	0.44
	7.727	**23**	**812**	**21.2**	**11.9**	**0.0119(nd)**	**0.8660**
WHITE2	0	14	14	0	0	0	0
	.	260	6500	.	.	.	.
	.	1(nd)	83	.	.	.	.
	.	**14**	**890**	.	.	.	.

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
CATSKILL DISTRICT							
ABCG	12	9	0	12	10	12	12
	8.47	130	.	19	14.9	0.01(nd)	0.32
	6.97	1	.	10	10.3	0.01(nd)	0.16
	7.690	**10**	**.**	**14.3**	**12.1**	**0.0100(nd)**	**0.2325**
AEHG	12	6	0	12	10	12	12
	7.03	31	.	15	14.9	0.02	0.8
	5.72	1(nd)	.	5	10.1	0.01(nd)	0.25
	6.487	**5**	**.**	**9.1**	**11.6**	**0.0108(nd)**	**0.4575**
ASCHG	12	4	0	12	10	12	12
	7.75	2	.	14	13.9	0.01(nd)	0.62
	6.14	1(nd)	.	6	9.7	0.01(nd)	0.32
	6.938	**1**	**.**	**10.1**	**11.9**	**0.0100(nd)**	**0.4583**
BK	12	12	0	12	10	12	12
	8.75	34	.	14	16	0.02	0.23
	6.92	1(nd)	.	5	8.6	0.01(nd)	0.01(nd)
	7.629	**3**	**.**	**7.9**	**12.0**	**0.0108(nd)**	**0.1133**
BNV	12	11	0	12	10	12	12
	8.08	34	.	25	14.8	0.02	0.51
	7.03	1(nd)	.	10	10.1	0.01(nd)	0.22
	7.555	**8**	**.**	**14.2**	**12.1**	**0.0108(nd)**	**0.3383**
BRD	12	12	0	12	10	12	12
	7.81	20	.	20	15.7	0.01(nd)	0.88
	7.12	1(nd)	.	8	9.6	0.01(nd)	0.12
	7.417	**4**	**.**	**13.5**	**12.0**	**0.0100(nd)**	**0.3058**
E10I	12	9	0	12	10	12	12
	7.88	10	.	11	14.9	0.02	0.22
	6.98	1(nd)	.	5	9.1	0.01(nd)	0.05
	7.393	**5**	**.**	**7.7**	**11.9**	**0.0108(nd)**	**0.1592**
E16I	12	11	0	12	10	12	12
	8.33	68	.	23	15.8	0.02	0.35
	7.05	1(nd)	.	8	9.7	0.01(nd)	0.08
	7.686	**7**	**.**	**14.7**	**12.4**	**0.0117(nd)**	**0.2325**
E5	12	9	0	12	10	12	12
	8.48	28	.	25	15.4	0.03	0.3
	6.99	1(nd)	.	6	9.9	0.01(nd)	0.01(nd)
	7.533	**5**	**.**	**10.5**	**12.0**	**0.0125(nd)**	**0.1817**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
LBK	12	11	0	12	10	12	12
	7.72	38	.	14	15.7	0.02	0.2
	6.91	2(nd)	.	6	8.5	0.01(nd)	0.01(nd)
	7.393	**6**	**.**	**10.3**	**11.6**	**0.0117(nd)**	**0.0275**
M-1	17	28	0	7	10	7	7
	7.43	65	.	24	14.5	0.02	0.32
	6.72	1(nd)	.	7	9.4	0.01(nd)	0.17
	7.046	**3**	**.**	**12.4**	**11.3**	**0.0114(nd)**	**0.2543**
S10	11	11	0	12	10	12	12
	8.83	44	.	40	15.5	0.01(nd)	0.39
	7.29	1(nd)	.	9	9	0.01(nd)	0.01(nd)
	8.111	**6**	**.**	**27.6**	**12.0**	**0.0100(nd)**	**0.1725**
S4	11	12	0	12	10	12	12
	7.89	52	.	9	14.8	0.01(nd)	0.37
	6.51	1(nd)	.	2.5(nd)	8.5	0.01(nd)	0.01(nd)
	7.292	**7**	**.**	**6.1**	**11.7**	**0.0100(nd)**	**0.1958**
S5I	11	12	0	12	10	12	12
	8.13	98	.	29	15.5	0.01(nd)	0.57
	7.3	1(nd)	.	7	7.9	0.01(nd)	0.01(nd)
	7.768	**8**	**.**	**13.8**	**11.8**	**0.0100(nd)**	**0.2392**
S6I	10	11	0	11	9	11	11
	8.76	2000	.	46	15.4	0.02	1.24
	7.53	1(nd)	.	9	8.8	0.01(nd)	0.18
	8.091	**7**	**.**	**23.6**	**11.7**	**0.0109(nd)**	**0.4491**
S7I	11	11	0	12	10	12	12
	8.65	150	.	23	14.8	0.02	0.23
	7.37	1(nd)	.	2.5(nd)	8.5	0.01(nd)	0.01(nd)
	7.908	**6**	**.**	**9.5**	**11.6**	**0.0108(nd)**	**0.0900**
SBKHG	10	8	0	12	9	12	12
	7.35	9	.	30	14.3	0.01(nd)	0.64
	6.37	1(nd)	.	7	8.8	0.01(nd)	0.11
	6.885	**2**	**.**	**13.3**	**11.0**	**0.0100(nd)**	**0.3908**
SCL	12	12	0	12	10	12	12
	8.8	170	.	31	15.6	0.02	0.38
	6.57	1(nd)	.	9	9.5	0.01(nd)	0.01(nd)
	7.604	**6**	**.**	**16.6**	**12.2**	**0.0108(nd)**	**0.2333**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
SCL-A	12	0	0	0	10	0	0
	7.89	.	.	.	15.2	.	.
	6.82	.	.	.	9	.	.
	7.244	**.**	**.**	**.**	**12.5**	**.**	**.**
SCL-B	12	11	0	12	10	0	0
	8.46	56	.	28	16.1	.	.
	7.05	1(nd)	.	9	9	.	.
	7.487	**5**	**.**	**17.9**	**12.2**	**.**	**.**
SEK	10	9	0	12	9	12	12
	8.86	4	.	16	12.5	0.02	0.29
	7.15	1(nd)	.	6	5.2	0.01(nd)	0.01(nd)
	7.970	**1**	**.**	**8.3**	**10.0**	**0.0108(nd)**	**0.1150**
SSHG	10	9	0	12	9	12	12
	7.23	4	.	16	13.1	0.02	0.74
	6.29	1(nd)	.	2.5(nd)	6.6	0.01(nd)	0.12
	6.533	**2**	**.**	**7.3**	**10.4**	**0.0108(nd)**	**0.4767**
SSMA	10	10	0	12	9	12	12
	7.44	6	.	12	13.2	0.01(nd)	0.27
	6.72	1(nd)	.	2.5(nd)	6.1	0.01(nd)	0.01(nd)
	7.020	**2**	**.**	**5.8**	**10.5**	**0.0100(nd)**	**0.1258**
SSMB	10	12	0	12	9	12	12
	7.49	220	.	10	13.1	0.01(nd)	0.31
	6.83	1(nd)	.	5	5.5	0.01(nd)	0.01(nd)
	7.140	**7**	**.**	**7.5**	**10.2**	**0.0100(nd)**	**0.1508**
STHHG	11	11	0	12	10	12	12
	7.36	69	.	39	14.9	0.01(nd)	0.68
	6.88	1(nd)	.	10	7.3	0.01(nd)	0.01(nd)
	7.104	**3**	**.**	**21.8**	**11.1**	**0.0100(nd)**	**0.3650**
SWK	10	11	0	11	9	11	11
	8.68	77	.	81	11.5	0.01(nd)	0.41
	7.23	1(nd)	.	5	6.2	0.01(nd)	0.01(nd)
	7.868	**4**	**.**	**21.9**	**9.88**	**0.0100(nd)**	**0.1573**
SWKHG	10	6	0	10	8	10	10
	7.45	8	.	19	12.6	0.01(nd)	0.46
	6.4	1(nd)	.	5	9	0.01(nd)	0.01(nd)
	6.848	**2**	**.**	**9.9**	**10.4**	**0.0100(nd)**	**0.2820**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
WDL	13	11	0	13	10	13	13
	8.7	76	.	31	14.9	0.01(nd)	0.33
	6.97	1(nd)	.	7	9.3	0.01(nd)	0.1
	7.485	**7**	**.**	**11.5**	**11.9**	**0.0100(nd)**	**0.2300**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
DELAWARE DISTRICT							
C-7	12	10	0	12	12	12	12
	7.85	300	.	137	14.9	0.02	0.44
	6.87	4(nd)	.	7	9.3	0.01(nd)	0.14
	7.187	**30**	**.**	**25.7**	**11.8**	**0.0117(nd)**	**0.2908**
C-8	12	8	0	12	12	12	12
	7.83	26	.	32	15.1	0.01(nd)	0.4
	7.06	5(nd)	.	8	8.6	0.01(nd)	0.14
	7.378	**10**	**.**	**13.6**	**11.5**	**0.0100(nd)**	**0.2517**
CCBHG	12	10	0	12	12	12	12
	7.17	47	.	33	15	0.03	0.63
	6.66	1	.	11	8.1	0.01(nd)	0.18
	6.829	**7**	**.**	**17.3**	**10.9**	**0.0117(nd)**	**0.4042**
CDG	12	11	0	12	12	12	12
	8.07	170	.	38	15.7	0.02	0.85
	6.96	1	.	14	9.1	0.01(nd)	0.19
	7.415	**20**	**.**	**25.9**	**11.3**	**0.0108(nd)**	**0.5742**
CEBG	12	10	0	12	12	12	12
	7.74	88	.	58	15.7	0.02	0.44
	6.92	2	.	6	8.4	0.01(nd)	0.08
	7.257	**13**	**.**	**15.2**	**11.6**	**0.0117(nd)**	**0.2567**
CEBHG	12	8	0	12	12	12	12
	7.12	26	.	46	15	0.02	0.36
	6.52	1(nd)	.	6	7	0.01(nd)	0.06
	6.856	**4**	**.**	**15.9**	**10.9**	**0.0125(nd)**	**0.2225**
CLDG	12	11	0	12	12	12	12
	8.77	360	.	23	16.3	0.03	0.47
	7.08	4	.	9	9	0.01(nd)	0.025(nd)
	7.615	**48**	**.**	**16.3**	**11.6**	**0.0125(nd)**	**0.2600**
CTNBG	12	12	0	12	12	12	12
	7.95	150	.	29	16	0.02	0.66
	7.05	2	.	13	8.6	0.01(nd)	0.025(nd)
	7.535	**18**	**.**	**22.3**	**11.4**	**0.0125(nd)**	**0.2925**
CTNHG	12	9	0	12	12	12	12
	7.34	13	.	30	16	0.01(nd)	0.74
	6.65	2	.	11	7.9	0.01(nd)	0.29
	6.947	**3**	**.**	**18.2**	**11.2**	**0.0100(nd)**	**0.5625**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
NCG	12	11	0	12	12	12	12
	6.6	33	.	8	13.8	0.06	0.44
	6.1	1	.	2.5(nd)	8.1	0.01(nd)	0.14
	6.345	**4**	**.**	**5.5**	**10.9**	**0.0158(nd)**	**0.3008**
NK4	13	7	0	12	13	12	12
	7.02	16	.	11	14.3	0.02	0.39
	6.23	1	.	2.5(nd)	5.6	0.01(nd)	0.05
	6.628	**2**	**.**	**5.1**	**10.7**	**0.0108(nd)**	**0.1817**
NK6	13	10	0	12	13	12	12
	6.69	38	.	77	13.1	0.14	0.57
	6.28	5	.	17	5.5	0.01(nd)	0.025(nd)
	6.449	**14**	**.**	**44.6**	**8.99**	**0.0483**	**0.2542**
P-13	12	12	0	12	12	12	12
	7.43	160	.	19	14.7	0.02	0.53
	7.02	3	.	7	8.7	0.01(nd)	0.06
	7.201	**16**	**.**	**12.3**	**11.3**	**0.0117(nd)**	**0.2992**
P-21	12	11	0	12	12	12	12
	8.02	33	.	25	15.8	0.02	0.55
	7	2	.	7	8.9	0.01(nd)	0.05
	7.499	**9**	**.**	**13.8**	**11.8**	**0.0108(nd)**	**0.2750**
P-50	12	12	0	12	12	12	12
	8.51	55	.	21	14	0.02	0.41
	7.24	1	.	10	8.6	0.01(nd)	0.025(nd)
	7.743	**5**	**.**	**14.9**	**11.2**	**0.0108(nd)**	**0.1829**
P-60	12	10	0	12	12	12	12
	7.77	51	.	8	15.4	0.01(nd)	0.65
	6.69	2	.	2.5(nd)	8.6	0.01(nd)	0.13
	7.206	**5**	**.**	**5.7**	**11.7**	**0.0100(nd)**	**0.3292**
P-7	12	12	0	12	12	12	12
	7.6	160	.	32	14.4	0.01(nd)	0.52
	6.92	3	.	9	8.4	0.01(nd)	0.16
	7.294	**18**	**.**	**18.1**	**11.2**	**0.0100(nd)**	**0.3625**
P-8	12	12	0	12	12	12	12
	7.47	180	.	21	14.1	0.01(nd)	0.6
	6.65	1	.	7	8.6	0.01(nd)	0.12
	7.182	**4**	**.**	**12.9**	**11.2**	**0.0100(nd)**	**0.3800**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
PBKG	12	11	0	12	12	12	12
	7.56	62	.	20	13.8	0.02	0.49
	6.69	3	.	6	7.4	0.01(nd)	0.08
	7.106	**12**	**.**	**10.9**	**10.8**	**0.0108(nd)**	**0.2800**
PBRA	12	8	0	12	12	12	12
	7.74	5	.	15	13.7	0.01(nd)	0.53
	7.21	1	.	7	8.9	0.01(nd)	0.025(nd)
	7.453	**2**	**.**	**11.3**	**10.9**	**0.0100(nd)**	**0.2479**
PBRB	12	9	0	12	12	12	12
	7.99	180	.	28	14	0.01(nd)	0.67
	7.29	3	.	6	8.3	0.01(nd)	0.025(nd)
	7.682	**34**	**.**	**14.8**	**10.9**	**0.0100(nd)**	**0.2996**
PDRY	12	12	0	12	12	12	12
	7.76	42	.	13	13.8	0.01(nd)	0.52
	6.96	2	.	2.5(nd)	8.5	0.01(nd)	0.08
	7.193	**8**	**.**	**7.9**	**11.2**	**0.0100(nd)**	**0.2708**
PMSB	12	11	0	12	12	12	12
	8.2	69	.	33	13.4	0.02	0.86
	7	2	.	8	9.3	0.01(nd)	0.07
	7.339	**18**	**.**	**14.4**	**11.4**	**0.0108(nd)**	**0.3650**
PROXG	12	11	0	12	12	12	12
	7.07	310	.	74	12.7	0.02	0.37
	6.6	1	.	22	8.4	0.01(nd)	0.1
	6.833	**21**	**.**	**39.6**	**10.2**	**0.0133(nd)**	**0.2300**
RD1	12	10	0	12	12	12	12
	7.02	310	.	33	14.8	0.03	0.25
	6.39	2	.	8	9	0.01(nd)	0.06
	6.705	**10**	**.**	**14.1**	**11.5**	**0.0133(nd)**	**0.1775**
RD4	12	9	0	12	12	12	12
	7.05	23	.	15	14.9	0.01(nd)	0.14
	6.35	1(nd)	.	2.5(nd)	9.3	0.01(nd)	0.025(nd)
	6.763	**3**	**.**	**8.0**	**11.4**	**0.0100(nd)**	**0.0588**
RDOA	12	11	0	12	12	12	12
	6.73	32	.	10	15.3	0.03	0.37
	6.47	3	.	5	9.1	0.01(nd)	0.15
	6.558	**7**	**.**	**6.7**	**11.6**	**0.0117(nd)**	**0.2542**

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site	pH	fecal coliform (CFU 100ml^{-1})	total coliform (CFU 100ml^{-1})	total phosphorus (µg l^{-1})	dissolved oxygen (mg l^{-1})	total ammonia (mg l^{-1})	nitrate-nitrite (mg l^{-1})
RGA	12	12	0	12	12	12	12
	7.1	200	.	37	13.3	0.02	0.31
	6.78	1	.	10	8.8	0.01(nd)	0.14
	6.928	**15**	**.**	**15.6**	**10.9**	**0.0117(nd)**	**0.2333**
RGB	12	11	0	12	12	12	12
	7.08	180	.	35	13.7	0.01(nd)	0.51
	6.66	5	.	9	8.4	0.01(nd)	0.15
	6.917	**25**	**.**	**16.1**	**10.9**	**0.0100(nd)**	**0.3375**
RRHG	12	5	0	12	12	12	12
	6.22	8	.	8	14.5	0.03	0.54
	5.2	1	.	2.5(nd)	9.3	0.01(nd)	0.13
	5.763	**3**	**.**	**4.3**	**11.4**	**0.0117(nd)**	**0.3133**
WDBN	12	10	0	12	12	12	12
	7.93	60	.	26	15.2	0.04	0.76
	6.99	2	.	9	9.6	0.01(nd)	0.32
	7.500	**15**	**.**	**17.5**	**11.8**	**0.0175**	**0.5567**
WDHOA	12	12	0	12	12	12	12
	7.53	950	.	47	13.9	0.03	1.64
	6.71	7	.	16	7.7	0.01(nd)	0.5
	7.187	**40**	**.**	**30.5**	**10.9**	**0.0175**	**0.9325**

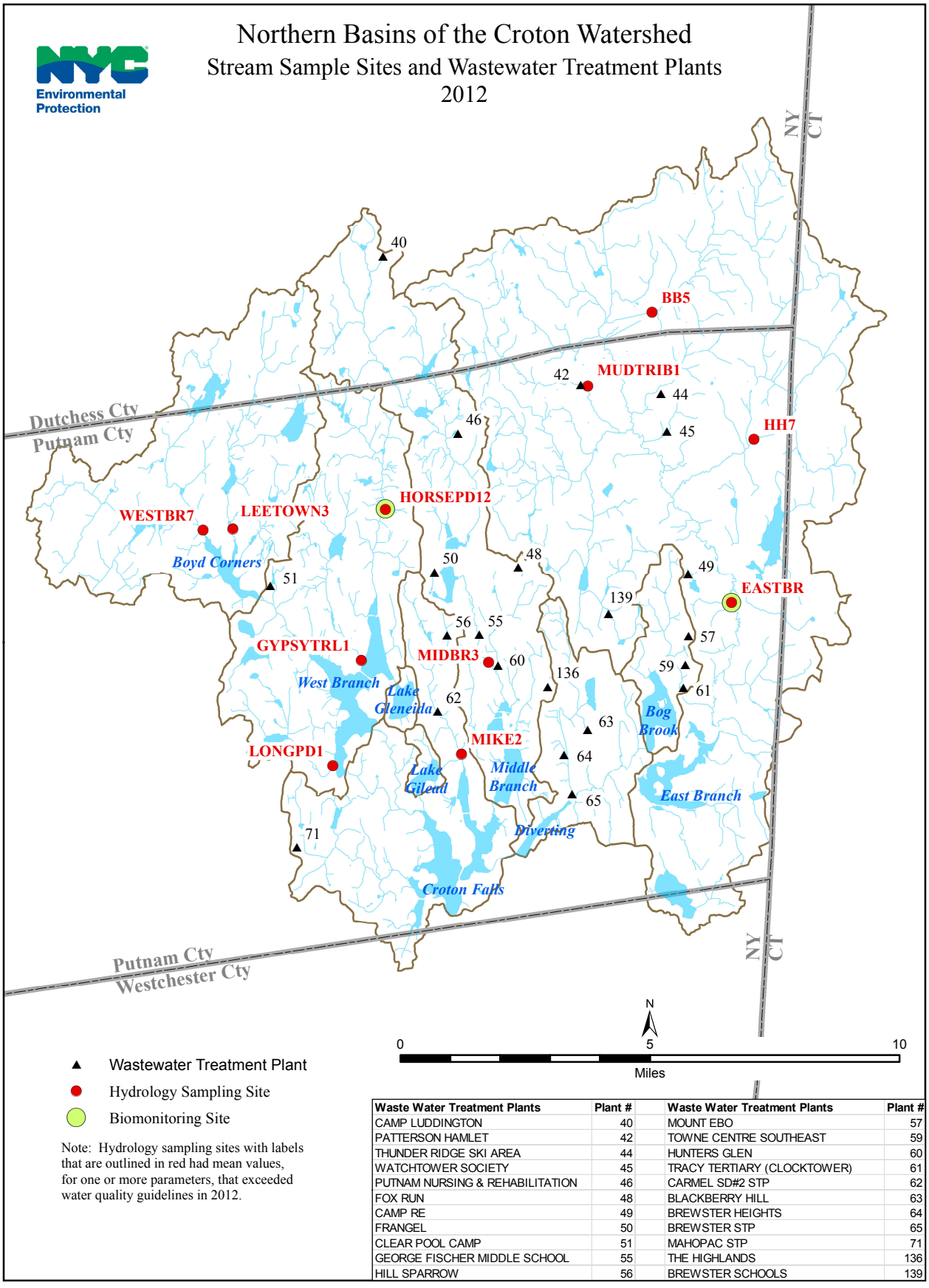
APPENDIX B

SITE MAPS

Northern Basins of the Croton Watershed

Stream Sample Sites and Wastewater Treatment Plants

2012



▲ Wastewater Treatment Plant

● Hydrology Sampling Site

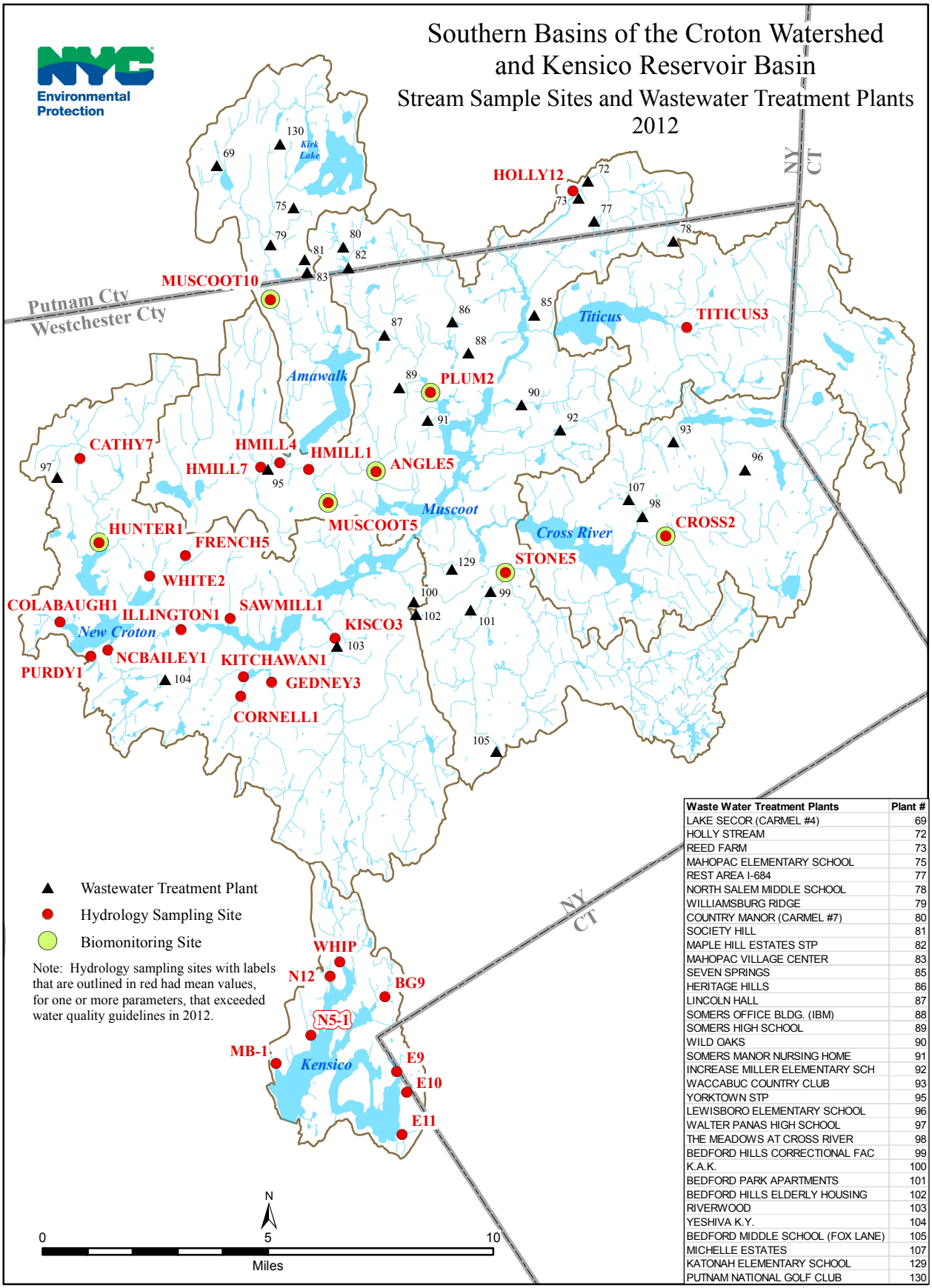
● Biomonitoring Site

Note: Hydrology sampling sites with labels that are outlined in red had mean values, for one or more parameters, that exceeded water quality guidelines in 2012.

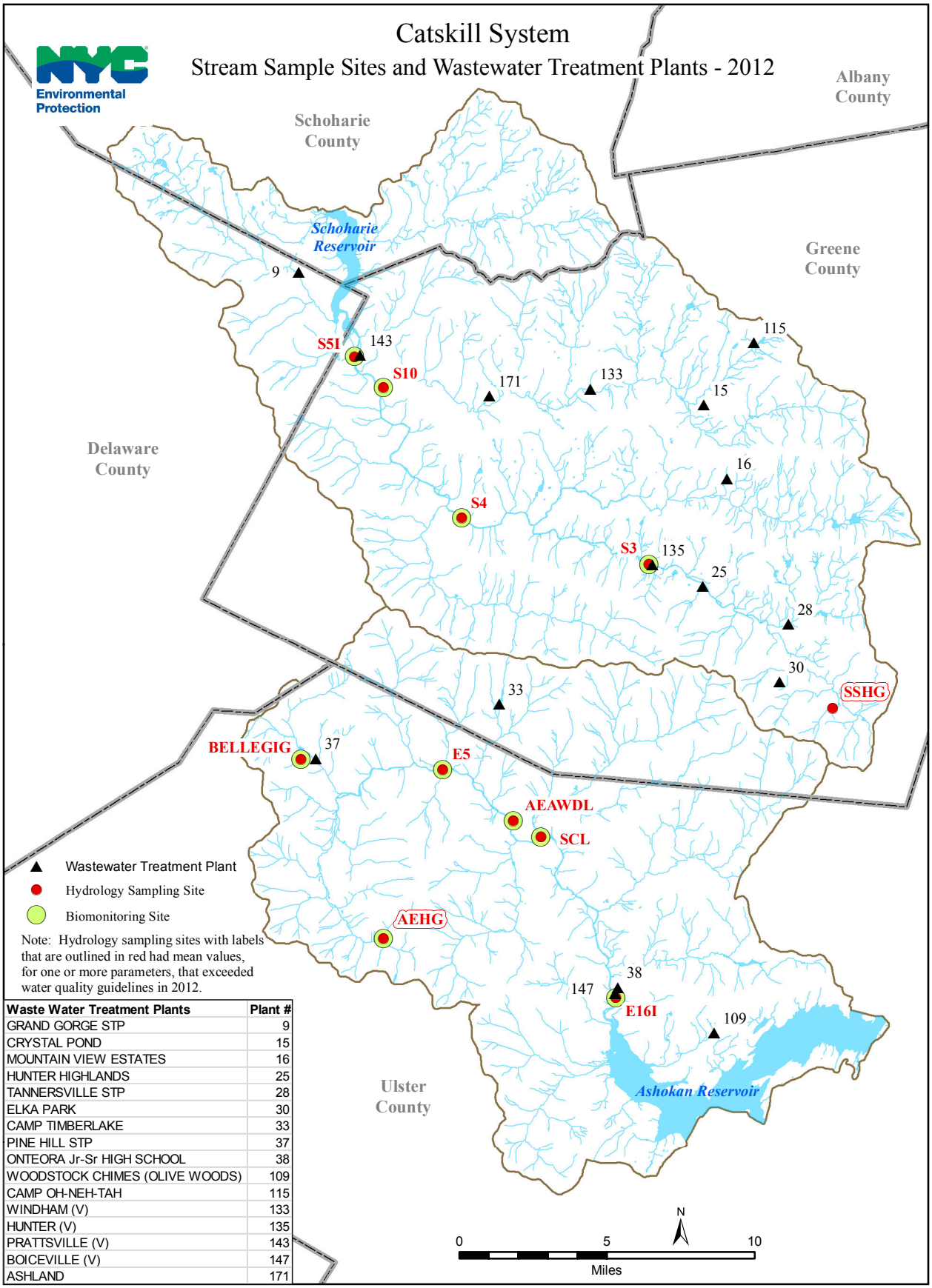
Waste Water Treatment Plants	Plant #	Waste Water Treatment Plants	Plant #
CAMP LUDDINGTON	40	MOUNT EBO	57
PATTERSON HAMLET	42	TOWNE CENTRE SOUTHEAST	59
THUNDER RIDGE SKI AREA	44	HUNTERS GLEN	60
WATCHTOWER SOCIETY	45	TRACY TERTIARY (CLOCKTOWER)	61
PUTNAM NURSING & REHABILITATION	46	CARMEL SD#2 STP	62
FOX RUN	48	BLACKBERRY HILL	63
CAMP RE	49	BREWSTER HEIGHTS	64
FRANGEL	50	BREWSTER STP	65
CLEAR POOL CAMP	51	MAHOPAC STP	71
GEORGE FISCHER MIDDLE SCHOOL	55	THE HIGHLANDS	136
HILL SPARROW	56	BREWSTER SCHOOLS	139

Southern Basins of the Croton Watershed and Kensico Reservoir Basin

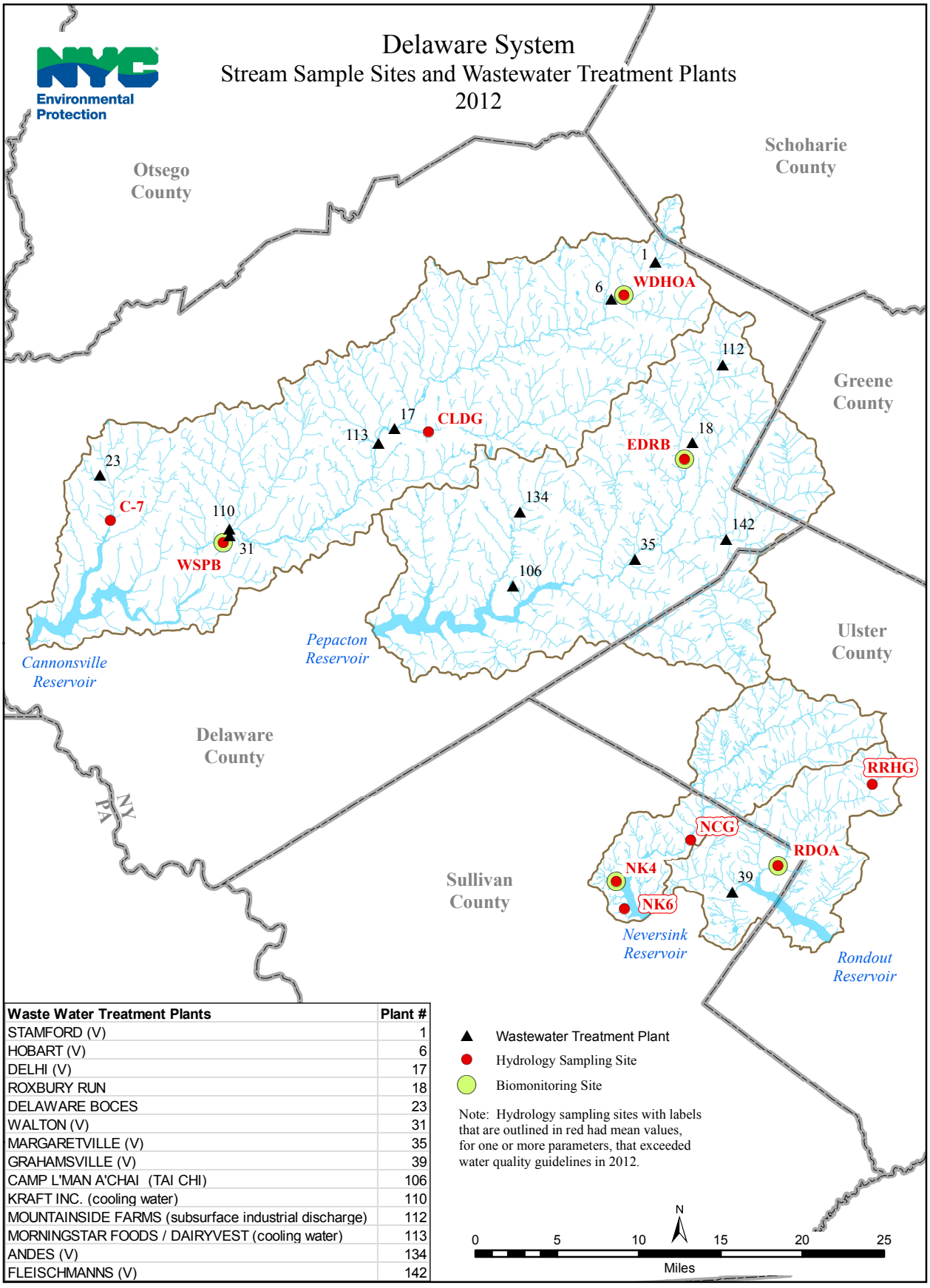
Stream Sample Sites and Wastewater Treatment Plants 2012



Waste Water Treatment Plants	Plant #
LAKE SECOR (CARMEL #4)	69
HOLLY STREAM	72
REED FARM	73
MAHOPAC ELEMENTARY SCHOOL	75
REST AREA I-684	77
NORTH SALEM MIDDLE SCHOOL	78
WILLIAMSBURG RIDGE	79
COUNTRY MANOR (CARMEL #7)	80
SOCIETY HILL	81
MAPLE HILL ESTATES STP	82
MAHOPAC VILLAGE CENTER	83
SEVEN SPRINGS	85
HERITAGE HILLS	86
LINCOLN HALL	87
SOMERS OFFICE BLDG. (IBM)	88
SOMERS HIGH SCHOOL	89
WILD OAKS	90
SOMERS MANOR NURSING HOME	91
INCREASE MILLER ELEMENTARY SCH	92
WACCABUC COUNTRY CLUB	93
YORKTOWN STP	95
LEWISBORO ELEMENTARY SCHOOL	96
WALTER PANAS HIGH SCHOOL	97
THE MEADOWS AT CROSS RIVER	98
BEDFORD HILLS CORRECTIONAL FAC	99
K.A.K.	100
BEDFORD PARK APARTMENTS	101
BEDFORD HILLS ELDERLY HOUSING	102
RIVERWOOD	103
YESHIVA K.Y.	104
BEDFORD MIDDLE SCHOOL (FOX LANE)	105
MICHELLE ESTATES	107
KATONAH ELEMENTARY SCHOOL	129
PUTNAM NATIONAL GOLF CLUB	130



Waste Water Treatment Plants	Plant #
GRAND GORGE STP	9
CRYSTAL POND	15
MOUNTAIN VIEW ESTATES	16
HUNTER HIGHLANDS	25
TANNERSVILLE STP	28
ELKA PARK	30
CAMP TIMBERLAKE	33
PINE HILL STP	37
ONTEORA Jr-Sr HIGH SCHOOL	38
WOODSTOCK CHIMES (OLIVE WOODS)	109
CAMP OH-NEH-TAH	115
WINDHAM (V)	133
HUNTER (V)	135
PRATTSVILLE (V)	143
BOICEVILLE (V)	147
ASHLAND	171



Waste Water Treatment Plants	Plant #
STAMFORD (V)	1
HOBART (V)	6
DELHI (V)	17
ROXBURY RUN	18
DELAWARE BOCES	23
WALTON (V)	31
MARGARETVILLE (V)	35
GRAHAMSVILLE (V)	39
CAMP L'MAN A'CHAI (TAI CHI)	106
KRAFT INC. (cooling water)	110
MOUNTAINSIDE FARMS (subsurface industrial discharge)	112
MORNINGSTAR FOODS / DAIRYVEST (cooling water)	113
ANDES (V)	134
FLEISCHMANNS (V)	142