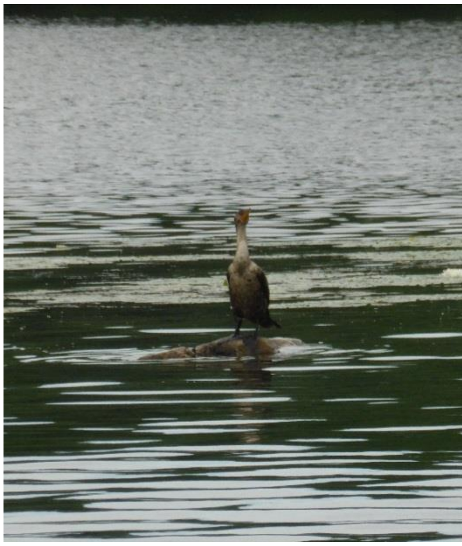
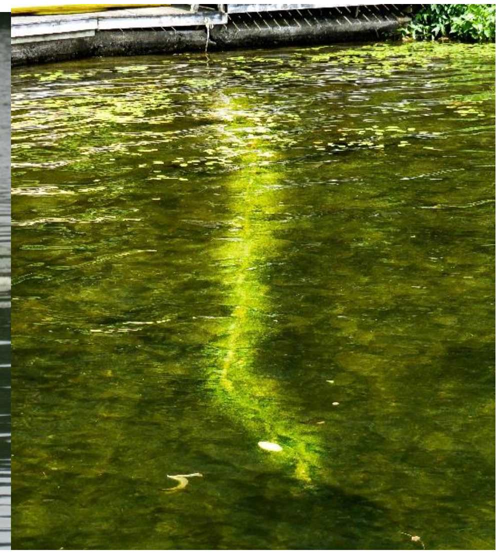


FINAL REPORT: November 2017

Upstate New York lake monitoring for presence of pesticides that may reach lakeshore individual water supplies

For: NYS Department of Environmental Conservation, Division of Materials Management, Bureau of Pest Management

Work by:

Lake Association Volunteers
NYSDEC Division of Water
NYSDEC Division of Air Resources, analytical laboratory
Cornell University, Biological and Environmental Engineering, Soil and Water Lab

Front cover photos: Cormorant and household water supply intake pipe (highlighted via editing), Lake Waccabuc, South Salem NY; shoreline of Sleepy Hollow Lake, Athens NY, with well-maintained turfgrass. Below: pond at major golf course on main tributary to Lake Waccabuc. Back cover: houses near lakeshore on Lake Waccabuc.

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Abbreviations

CAS = Chemical Abstracts Service, which assigns a unique number to chemical compounds. This helps to reduce confusion over chemical compounds that have several names.

CSLAP = Citizens Statewide Lake Assessment Program. A joint venture of volunteer lake enthusiasts (via FOLA) and the NYS Department of Environmental Conservation to observe the chemical and biological health of many lakes. http://www.dec.ny.gov/chemical/81576.html .

ELISA = Enzyme-Linked ImmunoSorbent Assay. Method to measure concentrations of pesticides. Used at Cornell.

EQuIS™ = A commercial database system (EarthSoft® Inc.) used by NYSDEC containing sample analytical results, descriptions of samples, and descriptions of sampling locations. This facilitates data sharing across multiple NYSDEC programs.
http://www.dec.ny.gov/chemical/62440.html

FOLA = (New York State) Federation of Lake Associations. Organization linking all of New York's many volunteer-based Lake Associations. http://nysfola.mylaketown.com/

IC = Ion Chromatograph. This is an analytical machine used to measure anion (negative ion) concentrations. Used at Cornell.

ICP = Inductively Coupled Plasma. This is an analytical machine used to measure cation (positive ion) concentrations. Used at Cornell.

nd = not detected. This means that the concentration was too low for the analytical method to detect anything reliably.

PSUR = (New York) Pesticide Sales and Use Reporting (system). Users and sellers of restricted-use pesticides must report their products, locations, and dates of use (excepting farmers) and sales (to farmers) to NYSDEC annually. http://psur.cce.cornell.edu/

UPLC MSMS = Ultra Performance Liquid Chromatograph, with tandem Mass Spectrometer. This is a linked pair of analytical machines used to measure pesticide concentrations. Used at NYSDEC Division of Air, assisting NYSDEC Bureau of Pest Management. "Ultra Performance" is an industry marketing phrase to distinguish the chromatography device from previous "High Performance" chromatographs abbreviated "HPLC".

1. Purpose and context

1.1 Introduction

In many areas, individual rural water supplies are commonly vulnerable to contaminants because:

- Chemical or biological testing is rarely conducted.
- Health-protective treatment, such as disinfection, is rarely conducted. A more common treatment is for aesthetics, such as softening or iron removal.
- Old technology, such as dug wells, is often used.
- These water supplies are often found in vulnerable locations, such as adjacent to possible contaminant sources including agricultural and developed land potentially treated with various pesticides.
- There is typically less regulatory oversight.

Particularly vulnerable types of individual water supplies can be thought of as sentinels for contamination. Vulnerable household wells have been a focal area for NYSDEC's upstate water sampling for pesticides since 2000. In 2013, another vulnerable class of water supplies began to be evaluated, indirectly: lakeshore areas typical of those relied upon by individual near-shore intake pipes as a source of potable water. There could be many thousands of New York households adjacent to lakes that tap the conveniently nearby lake water directly, via intake pipes, or indirectly via near-shore wells.

> *Note: Private lake water intakes are discouraged by health authorities for several reasons. Individual well water supplies are considered less vulnerable to pathogens and some other contaminants because the physical media of soil and aquifer provide physical filtration and retention time during which pathogens may die off, chemical reactions may occur, and transiently contaminated water may be diluted by cleaner water recharged before and after a transient pollutant release. Transit time in streams, rivers, and small lakes can be too short to offer much natural protection.*

Objectives of pilot project:

1. Evaluate the utility of sampling near-shore lake areas for pesticide residues, as a companion to rural private well sampling.
2. Test a protocol for involving lake association volunteers for water sampling, integrated with the Citizen's Statewide Lake Assessment Program (CSLAP[1]).

[1] See table of abbreviations prior to page 1 for definitions of acronyms used in this report.

1.2 Context

The NYSDEC Bureau of Pest Management includes pesticide product label requirements targeted at protection of human health and the environment from onsite or offsite exposure to the product when it is used in the open environment. Water monitoring data collected from areas adjacent to where pesticides are applied provide an opportunity to assess the effectiveness of product label requirements. The volunteer surface water samplers were thanked in advance in this spirit:

> "Thank you for agreeing to extend your role in CSLAP to assist the NYSDEC Division of Materials Management and the NYSDEC Division of Water in evaluating the possible exposure to pesticide residues of people using lakes. The primary objective of the project is to inform New York's pesticide regulatory process so that chemical use rules take into account the actual environmental fates of pesticide active ingredients."

1.3 Approach

Collaboration was established between the NYSDEC Division of Materials Management, who regulate pesticides, and the NYSDEC Division of Water, who monitor lakes and facilitate a network of trained volunteer lake samplers. Cornell University personnel (under contract to the Division of Materials Management for water monitoring) assisted the volunteers by providing sample collection guidance and supplies. The volunteers collected samples, preserved them by freezing, and forwarded the samples to Cornell for storage until analysis was conducted at the Division of Materials Management's affiliated lab and Cornell itself. Cornell was also responsible for data management and reporting.

The Division of Water consulted with the NYS Federation of Lake Associations about which lakes had interested volunteers. From among the candidates, the Division of Water recommended several, and the two Divisions jointly selected three lakes plus one additional urban CSLAP lake requested by the Division of Water.

As outlined in the 2012-2013 Scope of Services prepared by Cornell University for the Department, volunteers at the four lakes collected samples from late spring to early fall 2013. Cornell and NYSDEC's Division of Air laboratory analyzed samples between summer 2013 and spring 2015. Volunteers for the two larger lakes collected additional samples between fall 2015 and summer 2016. This report documents the process and presents and interprets the analytical results.

2. Lake Sampling and Chemical Analysis

2.1 Selected Lakes

Figure 1 shows the locations of all four sampled lakes. Three of the lakes are located in the Hudson River Basin between Albany and Westchester, and the fourth lake (Petonia) is in the Susquehanna River Basin. Buckingham Pond is an urban lake considered unrepresentative of private water supply use, but is of interest as an indicator of pesticide occurrence in highly urbanized watersheds.

Figure 1: Locations of selected lakes

Table 1 characterizes the lakes. All of the lakes have residential properties nearby; Buckingham Pond is amidst a 100% developed residential area of the City of Albany. Petonia and Sleepy Hollow Lakes have mixed wooded and agricultural catchments. Lake Waccabuc's land use is dominated by forestland, with one large golf course and nearshore houses similar to the surroundings of many NY lakes. Appendix C shows maps of 2006 or 2011 land use in the catchments of the lakes.

Table 1: Characteristics of sampled lakes

Name and location	Watershed land uses	Water supply uses	Scales*	Inflows and outflow
Buckingham Pond (Albany County); also called Buckingham Lake	100% urban	None	Watershed: 135.9 ha Surface: 1.7 ha Max depth: 1.5m Mean depth: 1.0m Retention: 0.1 yrs	In: Local drainage Out: Normans Kill then Hudson River
Petonia Lake (Chenango County)	Wooded, residential near lakeshore, small % agriculture	None	Watershed: 179 ha Surface: 10.4 ha Max depth: 9.2m Mean depth: 4.5m Retention: 0.6 yrs	In: Local drainage; Out: Genegantslet Creek to Chenango River to Susquehanna River
Sleepy Hollow Lake (Greene County)	Agriculture, residential near most of lakeshore	Primary supply for Sleepy Hollow Lake community. Backup supply for village of Athens.	Watershed: 3650 ha Surface: 131.9 ha Max depth: 19m Mean depth: 8.9m Retention: 0.8 yrs	Impoundment on Murderer's Creek; to Hudson River
Lake Waccabuc (Westchester County)	Wooded, low density suburban, golf course; residential near part of lakeshore	Tributary to NYC watershed; around 20 individual intakes.	Watershed: 890 ha Surface: 51.8 ha Max depth: 14.2m Mean depth: 7.3m Retention: 0.9 yrs	In: two other lakes; Waccabuc Creek Out: Waccabuc River, to Cross River, to Hudson River

* Source: individual CSLAP lake reports

2.2 Sampling Zones within Lakes and Times of Sampling

Because the focus was on evaluating water quality in parts of lakes like those that typically host individual water supply intakes, most sampling locations were recommended near shorelines at the two larger lakes (Sleepy Hollow Lake and Lake Waccabuc). The zone near the main tributary was included in both cases. Laboratory workload considerations limited Petonia Lake to a single sampling site that was chosen near the center of the lake. With so much of its catchment impervious, Buckingham Pond's surface sources are primarily storm sewers. It has no tributary inlet and its outlet is to recharge ground water.

Since most individual water intakes are located near the lake bottom and not within the water column, sampling was recommended to be close to the bottom. To avoid disturbing bottom sediments via sampling, the selected depth was roughly 1.5 meters from the bottom at the indicated location. (The volunteer samplers are very familiar with the bottom configuration from previously conducted bathymetric surveys.)

Appendix A includes aerial photographs of each lake as provided to samplers with recommended sampling locations identified with white "X" marks. Table 2 shows the locations with nominal depths below the surface.

Table 2: Sampled locations, all lakes

Sample location code	Common name	Latitude	Longitude	Nominal depth (ft)
Buckingham Pond				
BUCKP-1	(east)	42.663	-73.805	5
BUCKP-2	(west)	42.664	-73.80893	5
Lake Waccabuc				
LWACC-1	Waccabuc Creek (inlet)	41.2962	-73.5959	7
LWACC-2	CSLAP site	41.2986	-73.5819	7
LWACC-3	The Hook	41.2965	-73.5804	7
LWACC-4	26 Cove Rd.	41.2983	-73.5762	7
Petonia Lake				
PETON-1	(center)	42.33188	-75.79903	7
Sleepy Hollow Lake				
SLEEL-1	Near dam	42.28238	-73.8066	7, later 52
SLEEL-2	Dutchman	42.28994	-73.80469	7
SLEEL-3	Lodge	42.30135	-73.80548	7
SLEEL-4	Murderers Kill	42.30897	-73.81119	7
SLEEL-5	Longwood / Billingswood	42.28594	-73.81312	7

Regarding timing of samples, USGS' sampling of surface waters for the Division of Materials Management has demonstrated that agricultural chemicals appear in New York surface waters at highest concentrations if there is a heavy product use over much of a watershed, followed by heavy rainfall events shortly after the application. The highest concentrations identified by the USGS are of some of the most commonly used herbicides including atrazine, in late spring after heavy seasonal use. This would most affect Sleepy Hollow Lake among the four lakes sampled in this study.

Urban pesticides do not have as consistent seasonal timetables as the spring agricultural herbicides. However, it is more likely that precipitation events transport higher concentrations into waterways (despite the greater dilution potential of the higher flow). The Lake Waccabuc and Buckingham Pond watersheds probably do not have a focused season of heavier pesticide use.

The specific requested sample timings for the first cycle of seasons (2013) were:

- *one sample near the peak pesticide application period (if relevant in watershed)*
- *one sample during summer low flow*
- *one sample after one summer storm event - as soon as safely possible after storm*
- *one sample during fall conditions*

Similar conditions were pursued for the second cycle of sampling (2015-2016) at Waccabuc and Sleepy Hollow.

Table 3 provides the actual sampling dates and correlates samples with seasons and antecedent rainfall.

Table 3: Actual sample dates, all lakes

location ID	date	time	sample ID	start depth (ft)	season (recent rain)
Buckingham Pond					
BUCKP-1	6/15/2013	n/a	BUCKP-1-1	5	Late spring wet (1.5" two days before)
BUCKP-2	6/15/2013	n/a	BUCKP-1-2	5	
BUCKP-2	8/24/2013	08:45	BUCKP-3-2	5	Fall, dry the week before
Lake Waccabuc					
LWACC-1	5/27/2013	12:15	LWACC-1-1	7	Spring wet (1.5" three days before)
LWACC-2	5/27/2013	12:45	LWACC-1-2	7	
LWACC-3	5/27/2013	11:45	LWACC-1-3	7	
LWACC-4	5/27/2013	13:30	LWACC-1-4	7	
LWACC-1	7/20/2013	10:45	LWACC-2-1	7	Summer dry (0.2" two days before)
LWACC-2	7/20/2013	11:00	LWACC-2-2	7	
LWACC-3	7/20/2013	10:15	LWACC-2-3	7	
LWACC-4	7/20/2013	11:45	LWACC-2-4	7	
LWACC-1	8/29/2013	13:00	LWACC-3-1	7	Late summer wet (0.8" two days before)
LWACC-2	8/29/2013	13:20	LWACC-3-2	7	
LWACC-3	8/29/2013	12:45	LWACC-3-3	7	
LWACC-4	8/29/2013	12:30	LWACC-3-4	7	
LWACC-1	9/22/2013	14:55	LWACC-4-1	7	Fall wet (1.4" on day sampled and prior)
LWACC-2	9/22/2013	15:10	LWACC-4-2	7	
LWACC-3	9/22/2013	14:30	LWACC-4-3	7	
LWACC-4	9/22/2013	14:15	LWACC-4-4	7	

location ID	date	time	sample ID	start depth (ft)	season (recent rain)
LWACC-1	9/27/2015	12:50	LWACC-5-1	7	Fall dry (dry prior week)
LWACC-2	9/27/2015	13:20	LWACC-5-2	7	
LWACC-3	9/27/2015	12:30	LWACC-5-3	7	
LWACC-4	9/27/2015	12:20	LWACC-5-4	7	
LWACC-1	4/5/2016		LWACC-6-1	7	Spring wet (1.3" prior 5 days)
LWACC-2	4/5/2016		LWACC-6-2	7	
LWACC-3	4/5/2016		LWACC-6-3	7	
LWACC-4	4/5/2016		LWACC-6-4	7	
LWACC-1	7/26/2016	13:05	LWACC-7-1	7	Summer wet (1.89" prior 2 days)
LWACC-2	7/26/2016	13:30	LWACC-7-2	7	
LWACC-3	7/26/2016	12:40	LWACC-7-3	7	
LWACC-4	7/26/2016	12:30	LWACC-7-4	7	
Petonia Lake					
PETOL-1	6/8/2013	15:15	PETOL-1-1	7	Spring wet (1" on prior two days)
PETOL-1	7/2/2013	10:00	PETOL-3-1*	7	Summer wet (1.8" day before)
PETOL-1	9/7/2013	16:00	PETOL-2-1*	5	Late summer (0.8" week before)
PETOL-1	9/27/2013	13:00	PETOL-4-1	5	Dry fall (0.5" week before)
Sleepy Hollow Lake					
SLEEL-1	5/22/2013	12:15	SLEEL-1-1	7	Wet spring (1" on sample day)
SLEEL-2	5/22/2013	12:30	SLEEL-1-2	7	
SLEEL-3	5/22/2013	12:40	SLEEL-1-3	7	
SLEEL-4	5/22/2013	13:00	SLEEL-1-4	7	
SLEEL-5	5/22/2013	13:30	SLEEL-1-5	7	
SLEEL-1	8/10/2013	08:10	SLEEL-3-1	7	Wet summer (1.9" day before)
SLEEL-2	8/10/2013	08:33	SLEEL-3-2	7	
SLEEL-3	8/10/2013	08:42	SLEEL-3-3	7	
SLEEL-4	8/10/2013	08:53	SLEEL-3-4	7	
SLEEL-5	8/10/2013	08:23	SLEEL-3-5	7	
SLEEL-1	9/19/2013	11:00	SLEEL-4-1	7	Fall (1.4" week before)
SLEEL-2	9/19/2013	11:10	SLEEL-4-2	7	
SLEEL-3	9/19/2013	11:50	SLEEL-4-3	7	
SLEEL-4	9/19/2013	12:00	SLEEL-4-4	7	
SLEEL-5	9/19/2013	11:25	SLEEL-4-5	7	

location ID	date	time	sample ID	start depth (ft)	season (recent rain)
SLEEL-1	10/2/2015	09:42	SLEEL-5-1	52	Fall wet (3.0" on 9/30)
SLEEL-2	10/2/2015	09:45	SLEEL-5-2	7	
SLEEL-3	10/2/2015	10:27	SLEEL-5-3	7	
SLEEL-4	10/2/2015	10:40	SLEEL-5-4	7	
SLEEL-5	10/2/2015	10:10	SLEEL-5-5	7	
SLEEL-1	6/6/2016	10:43	SLEEL-6-1	52	Spring wet (1.87" prior 3 days)
SLEEL-2	6/6/2016	10:55	SLEEL-6-2	7	
SLEEL-3	6/6/2016	11:05	SLEEL-6-3	7	
SLEEL-4	6/6/2016	11:18	SLEEL-6-4	7	
SLEEL-5	6/6/2016	11:34	SLEEL-6-5	7	
SLEEL-1	8/25/2016	13:12	SLEEL-7-1	52	Summer (0.53 on 8/22)
SLEEL-2	8/25/2016	13:25	SLEEL-7-2	7	
SLEEL-3	8/25/2016	13:32	SLEEL-7-3	7	
SLEEL-4	8/25/2016	13:51	SLEEL-7-4	7	
SLEEL-5	8/25/2016	12:58	SLEEL-7-5	7	

* Petonia sampling round numbers 2 and 3 were inverted.

2.3 Sample Collection and Processing

Figure 2 provides an overview of the handling of sample containers and samples. Cornell provided empty containers (complying with NYSDEC Bureau of Pest Management specifications) in an insulated shipping box. The samplers accessed the sampling locations using boats. They filled the containers, froze them shortly after return to shore, and shipped frozen in the insulated shipping box back to Cornell. Cornell stored the samples frozen until after the final samples of an annual set were received from the samplers, then thawed all containers to prepare aliquots for NYSDEC analysis. Cornell shipped aliquots frozen to NYSDEC in 2013 and 2016. The original samples continue to be stored frozen for years afterward in case new analyses are required.

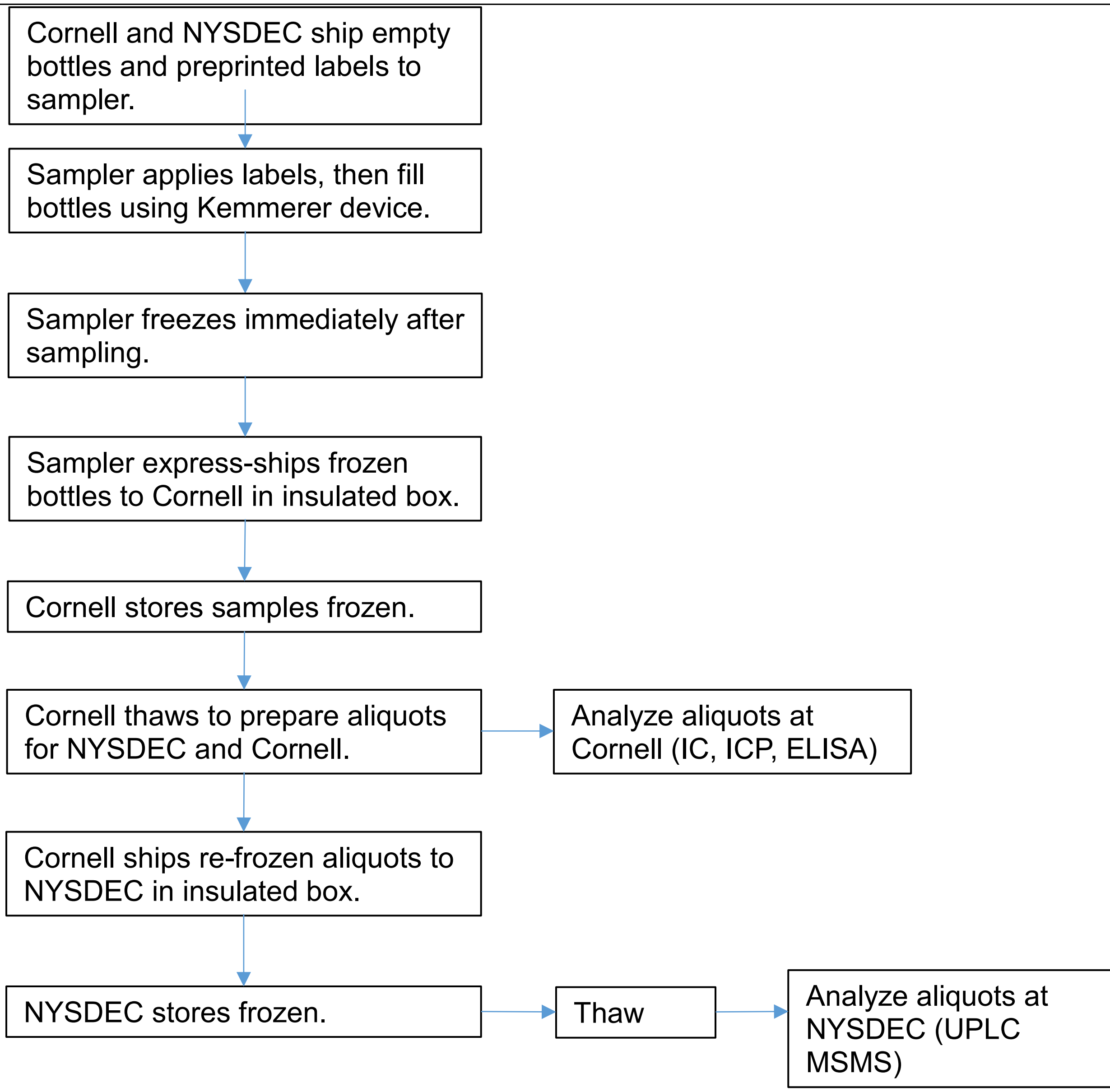

Figure 2: Overview of container and sample handling

Two types of containers were used during the sampling program. The sampling containers were "certified pre-cleaned" HDPE (Nalgene) 250-milliliter (mL) wide mouth bottles (Source: Environmental Sampling Supply). During earlier sampling programs (from groundwater wells), the NYSDEC lab had specified these same 250 mL wide mouth bottles for sampling. During this sampling program, the NYSDEC lab changed its requested container type to two 50 mL polypropylene centrifuge tubes per sample (Corning Centristar), because of evolved analytical techniques, which are less subject to interference and require a smaller sample volume per analysis. Cornell thawed the samplers' larger 250 mL bottles and partitioned aliquots for NYSDEC in the 50 mL containers.

Figure 3 details how the volunteers collected samples. In the field, the samplers followed their well-practiced CSLAP sampling protocol (New York Citizens Statewide Lake Assessment Program, 2015) for depth-specific sampling. This uses a Kemmerer 1.2L sampling tube that is lowered open at both ends to the desired depth, then closed in-situ to return lake water from the specific depth. For this specific project, the Kemmerer is immersed once to rinse the device of any carryover droplets from the previous usage, closed, brought back to the surface and dumped. Then it is immersed and closed a second time to draw the actual sample.

The samplers maintained field log sheets; see example in Appendix C.

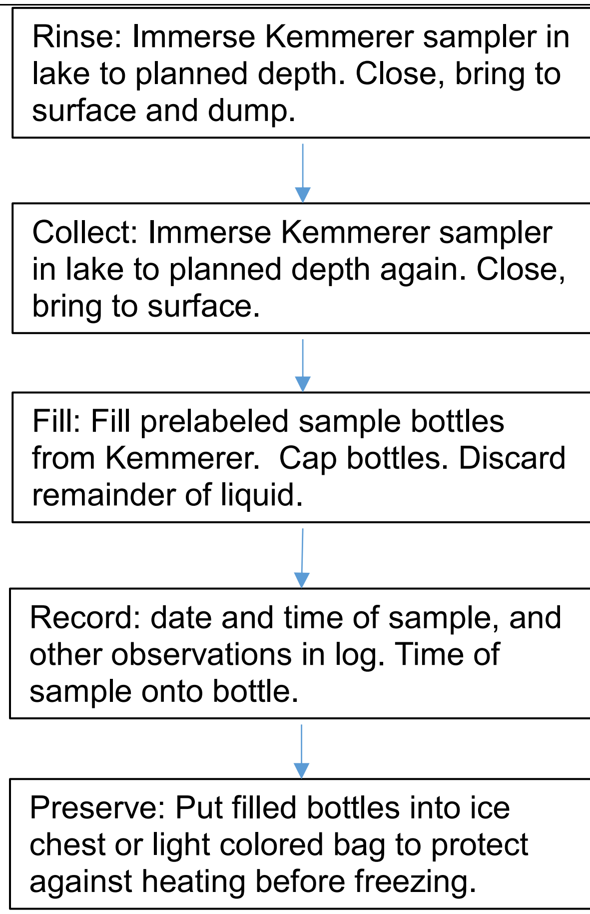

Figure 3: Sample collection process

At Lake Waccabuc and Sleepy Hollow Lake, the samplers were requested to collect field blanks to test how well the rinse first/sample second protocol was working to prevent carryover between samples. Figure 4 details the field blank process. Cornell shipped each sampler 2 liters (L) of high-purity deionized water in 1-liter Nalgene bottles similar to the 250 mL sample bottles. Cornell reserved some of the deionized water, frozen in 250 mL HDPE bottles, as a "lab blank" for later analysis and results comparison to the "field blanks" returned by the sampling teams.

The sampling teams were asked to simulate the rinsing and sample drawing process, then to handle the field blank bottles as if they were conventional samples. From this point the lab blank and the two field blank samples were processed with the conventional samples, including freezing, shipment, thawing to make aliquots, shipment from Cornell to NYSDEC, and analysis for all parameters at Cornell and NYSDEC labs.

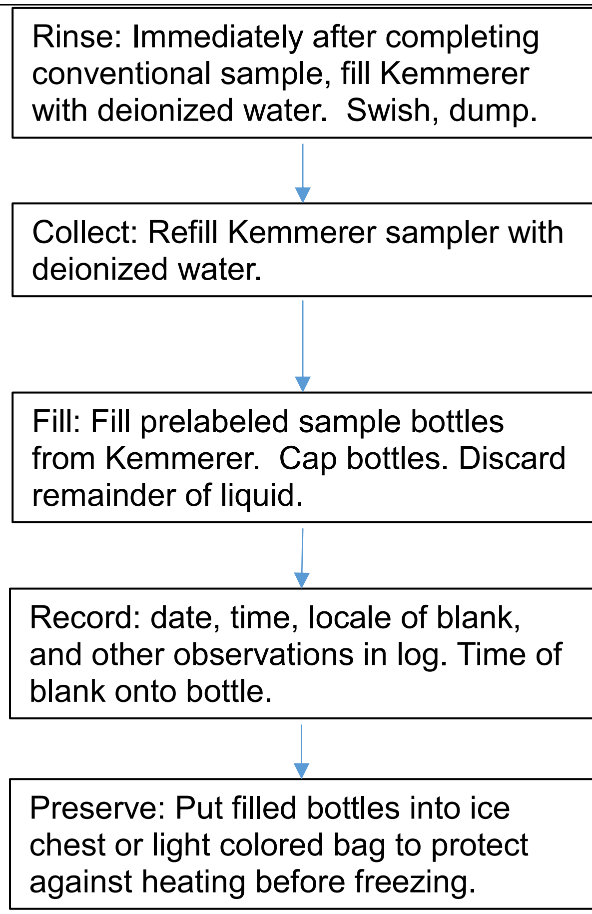

Figure 4: Field blank procedure

Cornell kept the samples frozen in darkness after receipt, except for several hours during two days when making aliquots and performing analyses. The first thawing day was for 2,4-D ELISA analysis at Cornell, using one bottle from each of the earlier two rounds of samples. The second day of thawing, after all rounds of sampling were complete, included one bottle from each sample and one bottle from each of the three blanks. Each thawed bottle was used to fill two 50 mL centrifuge tubes for NYSDEC: one plastic test tube for ICP cations analysis, one plastic vial for IC anions analysis, and one polycarbonate test tube for atrazine ELISA analysis. The centrifuge tubes and the original sample bottles were refrozen shortly after they were handled.

Note that samples were not filtered except as required by specific types of analysis. ELISA pesticide and ICP cations analysis at Cornell required no filtering because the samples were not visually turbid. IC anions analysis at Cornell involves filtration within a laboratory autosampler.

2.4 Analytical Methods

Tables 4 and 5 enumerate the analyses performed at Cornell and NYSDEC, including respective methods and the minimum detectable concentrations. Cornell performed the ELISA herbicide analyses mainly to obtain an earlier result than is possible from the heavily committed NYSDEC lab.

> Note: The NYSDEC laboratory involved in this work is authoritative for pesticides in New York and its key personnel have been pesticide specialists for many years. All Cornell laboratory analyses in this work yield data of "screening" level quality since the laboratory is not certified and most of the personnel involved are non-specialists. The cation analyses were performed by a veteran analytical chemist in a different unit at Cornell operated by the US Department of Agriculture.

The analyte list was changed (Table 5) for the later samplings to substitute active ingredients more associated with non-agricultural types of use, and to eliminate long-banned aldicarb which remains a concern only in Long Island's deepest flowing ground water. Among the chemicals added to the list is glyphosate, the most widely used herbicide in New York and easily available in unrestricted forms. This pesticide was previously considered difficult to analyze, highly unlikely to reach watercourses in dissolved form, and inconsequential to human health. US Geological Survey sampling has been finding it widely across the US (at low concentrations) perhaps because of increasing use on GMO corn and soybeans. It appears briefly in tile and ditch drainage in the 10s of micrograms per liter at some Cornell experimental fields when it rains within days after spraying. The human health effects are being re-examined particularly in Europe. The NYSDEC lab has a usable analytical method. It is time to monitor for it in surface water at least.

Table 4: Analytes for lake samples and test blanks (first cycle at four lakes)

Lab	Parameter	Official EQuIS name (note 1)	Min detect	units	Method (note 2)	CAS number (note 3)
CORNELL	2,4-D	2,4-D (DICHLOROPHENOXYACETIC ACID)	0.1	µg/L	ELISA	94-75-7
CORNELL	Atrazine	ATRAZINE	0.05	µg/L	ELISA	1912-24-9
CORNELL	Chloride	CHLORIDE (AS CL)	2	mg/l	IC	16887-00-6
CORNELL	Nitrate-N	NITROGEN, NITRATE (AS N)	0.1	mg/l	IC	14797-55-8
CORNELL	Calcium	CALCIUM	0.1	mg/l	ICP	7440-70-2
CORNELL	Magnesium	MAGNESIUM	0.1	mg/l	ICP	7439-95-4
CORNELL	Potassium	POTASSIUM	0.1	mg/l	ICP	7440-09-7
CORNELL	Sodium	SODIUM	0.1	mg/l	ICP	7440-23-5
CORNELL	Sulfur	SULFUR	0.1	mg/l	ICP	63705-05-5
NYSDEC	Propoxur	2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	0.1	µg/L	UPLCMSMS	114-26-1
NYSDEC	2,4-D	2,4-D (DICHLOROPHENOXYACETIC ACID)	0.1	µg/L	UPLCMSMS	94-75-7
NYSDEC	Hydroxy Atrazine[4]	2-HYDROXY ATRAZINE	0.025	µg/L	UPLCMSMS	2163-68-0
NYSDEC	Diuron	3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	0.1	µg/L	UPLCMSMS	330-54-1
NYSDEC	3 Hydroxy Carbofuran[4]	3-HYDROXYCARBOFURAN	0.1	µg/L	UPLCMSMS	16655-82-6
NYSDEC	Acetochlor	ACETOCHLOR	0.2	µg/L	UPLCMSMS	34256-82-1
NYSDEC	Acetochlor ESA[4]	ACETOCHLOR ESA	0.1	µg/L	UPLCMSMS	187022-11-3
NYSDEC	Acetochlor OA[4]	ACETOCHLOR OA	0.1	µg/L	UPLCMSMS	194992-44-4
NYSDEC	Alachlor	ALACHLOR	1	µg/L	UPLCMSMS	15972-60-8
NYSDEC	Alachlor - ESA[4]	ALACHLOR ESA	0.1	µg/L	UPLCMSMS	140939-15-7
NYSDEC	Alachlor - OA[4]	ALACHLOR OA	0.1	µg/L	UPLCMSMS	171262-17-2
NYSDEC	Aldicarb[5]	ALDICARB	0.1	µg/L	UPLCMSMS	116-06-3
NYSDEC	Aldicarb Sulfone[4, 5]	ALDICARB SULFONE	0.1	µg/L	UPLCMSMS	1646-88-4
NYSDEC	Aldicarb Sulfoxide[4, 5]	ALDICARB SULFOXIDE	0.1	µg/L	UPLCMSMS	1646-87-3
NYSDEC	AMPA[4]	AMPA	1	µg/L	UPLCMSMS	77521-29-0
NYSDEC	Atrazine	ATRAZINE	0.1	µg/L	UPLCMSMS	1912-24-9
NYSDEC	Azinphos Methyl	AZINPHOS, METHYL (GUTHION)	0.1	µg/L	UPLCMSMS	86-50-0
NYSDEC	Azoxystrobin	AZOXYSTROBIN	0.1	µg/L	UPLCMSMS	131860-33-8
NYSDEC	Carbendazim	CARBENDAZIM	0.1	µg/L	UPLCMSMS	10605-21-7
NYSDEC	Carbofuran	CARBOFURAN	0.1	µg/L	UPLCMSMS	1563-66-2
NYSDEC	Chlorosulfuron	CHLORSULFURON	0.1	µg/L	UPLCMSMS	69402-72-3
NYSDEC	Clethodim	CLETHODIM	0.1	µg/L	UPLCMSMS	99129-21-2
NYSDEC	Clopyralid	CLOPYRALID	0.2	µg/L	UPLCMSMS	1702-17-6
NYSDEC	Cyprodynil	CYPRODINIL	0.1	µg/L	UPLCMSMS	121552-61-2
NYSDEC	De Ethyl Atrazine[4]	DEETHYLATRAZINE	0.025	µg/L	UPLCMSMS	6190-65-4
NYSDEC	De Isopropyl Atrazine[4]	DEISOPROPYLATRAZINE	0.1	µg/L	UPLCMSMS	1007-28-9
NYSDEC	Diazinon	DIAZINON	0.1	µg/L	UPLCMSMS	333-41-5
NYSDEC	Dicamba	DICAMBA	0.1	µg/L	UPLCMSMS	1918-00-9
NYSDEC	Dimethoate	DIMETHOATE	0.1	µg/L	UPLCMSMS	60-51-5
NYSDEC	Dithiopyr	DITHIOPYR	1	µg/L	UPLCMSMS	97886-45-8
NYSDEC	Fluazafop-p-butyl	FLUAZIFOP-P-BUTYL	0.1	µg/L	UPLCMSMS	79241-46-6

Lab	Parameter	Official EQuIS name (note 1)	Min detect	units	Method (note 2)	CAS number (note 3)
NYSDEC	Fluoxastrobin	FLUOXASTROBIN	0.1	µg/L	UPLCMSMS	361377-29-9
NYSDEC	Halofenozide	HALOFENOZIDE	0.1	µg/L	UPLCMSMS	112226-61-6
NYSDEC	Imazalil[5]	IMAZALIL	0.2	µg/L	UPLCMSMS	35554-44-0
NYSDEC	Imidacloprid	IMIDACLOPRID	0.1	µg/L	UPLCMSMS	138261-41-3
NYSDEC	Malathion	MALATHION	0.4	µg/L	UPLCMSMS	121-75-5
NYSDEC	MCPA	MCPA	0.1	µg/L	UPLCMSMS	94-74-6
NYSDEC	MCPP	MCPP	0.1	µg/L	UPLCMSMS	93-65-2
NYSDEC	Metalaxyl	METALAXYL	0.1	µg/L	UPLCMSMS	57837-19-1
NYSDEC	Methomyl	METHOMYL	0.1	µg/L	UPLCMSMS	16752-77-5
NYSDEC	Metolachlor	METOLACHLOR	0.07	µg/L	UPLCMSMS	51218-45-2
NYSDEC	Metolachlor ESA[4]	METOLACHLOR ESA	0.1	µg/L	UPLCMSMS	171118-09-5
NYSDEC	Metolachlor OA[4]	METOLACHLOR OA	0.1	µg/L	UPLCMSMS	152019-73-3
NYSDEC	Metsulfuron Methyl	METSULFURON METHYL	0.1	µg/L	UPLCMSMS	74223-64-6
NYSDEC	Nicosulfuron	NICOSULFURON	0.1	µg/L	UPLCMSMS	111991-09-4
NYSDEC	Oxamyl	OXAMYL	0.1	µg/L	UPLCMSMS	23135-22-0
NYSDEC	Oxydemeton Methyl	OXYDEMETON METHYL	0.1	µg/L	UPLCMSMS	301-12-2
NYSDEC	Propamocarb	PROPAMOCARB	0.1	µg/L	UPLCMSMS	24579-73-5
NYSDEC	Prosulfuron[5]	PROSULFURON	0.1	µg/L	UPLCMSMS	94125-34-5
NYSDEC	Carbaryl	SEVIN (CARBARYL)	0.1	µg/L	UPLCMSMS	63-25-2
NYSDEC	Simazine	SIMAZINE	0.1	µg/L	UPLCMSMS	122-34-9
NYSDEC	Sulfentrazone	SULFENTRAZONE	0.2	µg/L	UPLCMSMS	122836-35-5
NYSDEC	Tebuconazole	TEBUCONAZOLE	0.01	µg/L	UPLCMSMS	107534-96-3
NYSDEC	Tebufenozide[5]	TEBUFENOZIDE	0.1	µg/L	UPLCMSMS	112410-23-8
NYSDEC	Thiacloprid	THIACLOPRID	0.1	µg/L	UPLCMSMS	111988-49-9
NYSDEC	Thiamethoxam	THIAMETHOXAM	0.1	µg/L	UPLCMSMS	153719-23-4
NYSDEC	Thifensulfuron Methyl	THIFENSULFURON METHYL (PINNACLE)	0.1	µg/L	UPLCMSMS	79277-27-3
NYSDEC	Thiodicarb	THIODICARB	0.1	µg/L	UPLCMSMS	59669-26-0

Notes: 1. EQuIS™ = DEC cross-program database of sampling results. Proprietary product of EarthSoft® Inc.

2. ELISA = antibody-based screening technique. IC=ion chromatography. ICP=inductively coupled plasma. UPLCMSMS= ultra (sic) performance liquid chromatography with tandem mass spectrometry.

3. CAS = Chemical Abstracts Service, which assigns a unique number to chemical compounds. This helps to reduce confusion over chemical compounds that have several names.

4. Environmental breakdown product of a pesticide. AMPA is a breakdown product of glyphosate.

5. Deleted in second cycle of samples.

Table 5: Analytes for lake samples and test blanks (second cycle at two lakes)

Lab	Parameter	Official EQuIS name (note 1)	Min detect	units	Method (note 2)	CAS number (note 3)
CORNELL	Chloride	CHLORIDE (AS CL)	2	mg/l	IC	16887-00-6
CORNELL	Nitrate-N	NITROGEN, NITRATE (AS N)	0.1	mg/l	IC	14797-55-8
NYSDEC	Propoxur	2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	0.05	µg/L	UPLCMSMS	114-26-1
NYSDEC	2,4-D	2,4-D (DICHLOROPHENOXYACETIC ACID)	0.1	µg/L	UPLCMSMS	94-75-7
NYSDEC	Hydroxy Atrazine	2-HYDROXY ATRAZINE	0.025	µg/L	UPLCMSMS	2163-68-0
NYSDEC	Diuron	3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	0.1	µg/L	UPLCMSMS	330-54-1
NYSDEC	3-Hydroxy Carbofuran	3-HYDROXYCARBOFURAN	0.025	µg/L	UPLCMSMS	16655-82-6
NYSDEC	Acetochlor	ACETOCHLOR	0.05	µg/L	UPLCMSMS	34256-82-1
NYSDEC	Acetochlor ESA	ACETOCHLOR ESA	0.1	µg/L	UPLCMSMS	187022-11-3
NYSDEC	Acetochlor OA	ACETOCHLOR OA	0.25	µg/L	UPLCMSMS	194992-44-4
NYSDEC	Alachlor	ALACHLOR	0.05	µg/L	UPLCMSMS	15972-60-8
NYSDEC	Alachlor ESA	ALACHLOR ESA	0.1	µg/L	UPLCMSMS	140939-15-7
NYSDEC	Alachlor OA	ALACHLOR OA	0.1	µg/L	UPLCMSMS	171262-17-2
NYSDEC	AMPA	AMPA	1	µg/L	UPLCMSMS	77521-29-0
NYSDEC	Atrazine	ATRAZINE	0.025	µg/L	UPLCMSMS	1912-24-9
NYSDEC	Azinphos Methyl	AZINPHOS, METHYL (GUTHION)	0.025	µg/L	UPLCMSMS	86-50-0
NYSDEC	Azoxystrobin	AZOXYSTROBIN	0.1	µg/L	UPLCMSMS	131860-33-8
NYSDEC	Carbofuran	CARBOFURAN	0.1	µg/L	UPLCMSMS	1563-66-2
NYSDEC	Chlorothalonil[5]	CHLOROTHALONIL	0.1	µg/L	UPLCMSMS	1897-45-6
NYSDEC	Chlorosulfuron	CHLORSULFURON	0.1	µg/L	UPLCMSMS	69402-72-3
NYSDEC	Clethodim	CLETHODIM	0.1	µg/L	UPLCMSMS	99129-21-2
NYSDEC	Clopyralid	CLOPYRALID	0.2	µg/L	UPLCMSMS	1702-17-6
NYSDEC	Clothianidin[5]	CLOTHIANIDIN	0.025	µg/L	UPLCMSMS	201880-92-5;205510-53-8
NYSDEC	Cyprodynil	CYPRODINIL	0.1	µg/L	UPLCMSMS	121552-61-2
NYSDEC	Des Ethyl Atrazine	DEETHYLATRAZINE	0.025	µg/L	UPLCMSMS	6190-65-4
NYSDEC	Des Isopropyl Atrazine	DEISOPROPYLATRAZINE	0.025	µg/L	UPLCMSMS	1007-28-9
NYSDEC	Diazinon	DIAZINON	0.025	µg/L	UPLCMSMS	333-41-5
NYSDEC	Dicamba	DICAMBA	0.1	µg/L	UPLCMSMS	1918-00-9
NYSDEC	Dimethoate	DIMETHOATE	0.025	µg/L	UPLCMSMS	60-51-5
NYSDEC	Dithiopyr	DITHIOPYR	0.1	µg/L	UPLCMSMS	97886-45-8
NYSDEC	Fluazafop-p-butyl	FLUAZIFOP-P-BUTYL	0.025	µg/L	UPLCMSMS	79241-46-6
NYSDEC	Fluopicolide[5]	FLUOPICOLIDE	0.05	µg/L	UPLCMSMS	239110-15-7
NYSDEC	Fluoxastrobin	FLUOXASTROBIN	0.1	µg/L	UPLCMSMS	361377-29-9
NYSDEC	Fomesafen[5]	FOMESAFEN	0.1	µg/L	UPLCMSMS	72178-02-0
NYSDEC	Glyphosate[5]	GLYPHOSATE	1	µg/L	UPLCMSMS	1071-83-6
NYSDEC	Halofenozide	HALOFENOZIDE	0.05	µg/L	UPLCMSMS	112226-61-6
NYSDEC	Imidacloprid	IMIDACLOPRID	0.025	µg/L	UPLCMSMS	138261-41-3
NYSDEC	Malathion	MALATHION	0.1	µg/L	UPLCMSMS	121-75-5
NYSDEC	MCPA	MCPA	0.1	µg/L	UPLCMSMS	94-74-6
NYSDEC	MCPP	MCPP	0.1	µg/L	UPLCMSMS	93-65-2
NYSDEC	Mesotrione[5]	MESOTRIONE	0.025	µg/L	UPLCMSMS	104206-82-8
NYSDEC	Metalaxyl	METALAXYL	0.1	µg/L	UPLCMSMS	57837-19-1

Lab	Parameter	Official EQuIS name (note 1)	Min detect	units	Method (note 2)	CAS number (note 3)
NYSDEC	Methomyl	METHOMYL	0.025	µg/L	UPLCMSMS	16752-77-5
NYSDEC	Metolachlor	METOLACHLOR	0.025	µg/L	UPLCMSMS	51218-45-2
NYSDEC	Metolachlor ESA	METOLACHLOR ESA	0.1	µg/L	UPLCMSMS	171118-09-5
NYSDEC	Metolachlor OA	METOLACHLOR OA	0.1	µg/L	UPLCMSMS	152019-73-3
NYSDEC	Metsulfuron Methyl	METSULFURON METHYL	0.1	µg/L	UPLCMSMS	74223-64-6
NYSDEC	Nicosulfuron	NICOSULFURON	0.025	µg/L	UPLCMSMS	111991-09-4
NYSDEC	Oxamyl	OXAMYL	0.1	µg/L	UPLCMSMS	23135-22-0
NYSDEC	Oxydemeton Methyl	OXYDEMETON METHYL	0.1	µg/L	UPLCMSMS	301-12-2
NYSDEC	Propamacarb	PROPAMOCARB	0.1	µg/L	UPLCMSMS	24579-73-5
NYSDEC	Quinclorac[5]	QUINCLORAC	0.025	µg/L	UPLCMSMS	84087-01-4
NYSDEC	Carbaryl	SEVIN (CARBARYL)	0.1	µg/L	UPLCMSMS	63-25-2
NYSDEC	Simazine	SIMAZINE	0.1	µg/L	UPLCMSMS	122-34-9
NYSDEC	Sulfentrazone	SULFENTRAZONE	0.05	µg/L	UPLCMSMS	122836-35-5
NYSDEC	Tebuconazole	TEBUCONAZOLE	0.025	µg/L	UPLCMSMS	107534-96-3
NYSDEC	Thiocloprid	THIACLOPRID	0.1	µg/L	UPLCMSMS	111988-49-9
NYSDEC	Thiamethoxam	THIAMETHOXAM	0.025	µg/L	UPLCMSMS	153719-23-4
NYSDEC	Thifensulfuron Methyl	THIFENSULFURON METHYL (PINNACLE)	0.1	µg/L	UPLCMSMS	79277-27-3
NYSDEC	Thiodicarb	THIODICARB	0.1	µg/L	UPLCMSMS	59669-26-0

Notes: 1. EQuIS™ = NYSDEC cross-program database of sampling results. Proprietary product of EarthSoft® Inc.

2. ELISA = antibody-based screening technique. IC=ion chromatography. ICP=inductively coupled plasma. UPLCMSMS= ultra (sic) performance liquid chromatography with tandem mass spectrometry.

3. CAS = Chemical Abstracts Service, which assigns a unique number to chemical compounds. This helps to reduce confusion over chemical compounds that have several names.

4. Environmental breakdown product of a pesticide. AMPA is a breakdown product of glyphosate.

5. New in second cycle.

Cornell's ELISA analyses were performed in duplicate using immunoassay kits from Modern Water (atrazine) and Abraxis (2,4-D). Both kits use an approach in which highly specific antibodies for the pesticides are reacted with the pesticide molecules and further reactions make the color of the processed sample yellow at different opacities. A spectrophotometer set for 450 nm wavelength measures light absorbance, which is related quantitatively to the original concentration of the target pesticide. Absorbances were read using a Bio-Rad 3000 Smart Spec spectrophotometer. The procedure yields several measures to help judge results acceptability, including:

- statistical goodness of fit of the calibration that relates the light absorbances to known concentrations of pesticide at four or more levels;
- a result from the kit's known concentration test sample (not used in calibration);

- absorbances all within a particular range;
- always-decreasing absorbances from a zero standard (test blank) through increasing concentrations of calibration standards; and
- low coefficients of variation within the duplicates of standards.

(Note that the Modern Water kit provides these criteria, which were used for both kits; the Abraxis kit leaves this type of assessment up to the lab.)

Some of the samples were analyzed for a few common anions and cations at Cornell. These are mostly to provide a geochemical or watershed land use context for the pesticide analyses. For example, high nitrate is commonly associated with livestock agriculture, heavily fertilized vegetable farms or lawns, or nearby onsite wastewater disposal systems.

Cornell's Ion Chromatographic (IC) analyses for selected anions are performed with a Dionex IC-2000 machine. Samples, blanks, and calibration standards for each target anion are placed into 0.5 mL plastic vials with filter caps. As noted above, the samples are filtered when the autosampler part of the IC apparatus draws liquid from the vial.

Cornell's Inductively Coupled Plasma (ICP) analyses for selected cations were performed with a Thermo iCAP 6500 series instrument. Samples are placed into plastic test tubes from which an autosampler draws a small amount of liquid for injection into the device. Multiple "sips" are drawn from each tube and the apparatus reports a mean concentration and standard deviation across all sips from a given tube.

All NYSDEC lab pesticide analyses were performed using Waters equipment combining liquid chromatography with tandem mass spectrometry. There was no sample preprocessing; this is considered "direct injection."

A number of the target analytes are environmental breakdown products ("metabolites") of active pesticide ingredients. They are indicators that the original parent compound was used upstream of the sampled location and that there is sufficient retention time along the way for microbiological, physical, or chemical processes to convert the original compound into a different compound.

2.5 Note about Data Quality

The data from this project are intended to be used for reconnaissance and planning purposes. Except possibly for the NYSDEC laboratory results, the data are not rigorously enough checked to make them appropriate for regulatory or legal/investigative purposes. All Cornell laboratory results are marked as "screening" quality and unvalidated when submitted to NYSDEC's EQuIS information system. The NYSDEC laboratory results are marked as regular (not "screening") and unvalidated to be conservative for future data reuses.

3. Results and Interpretations

3.1 Results overall

Samples from Sleepy Hollow Lake often contained several agricultural herbicide (and metabolite) residues below 1 µg/L, typical of upstate NY surface water as found in earlier USGS sampling. Lake Waccabuc was quite clean, with detections of only tebuconazole at trace levels during one of the two sampling cycles. Petonia Lake had no detections during its sole first cycle, and Buckingham Pond had a low concentration in one sample of the popular 2,4-D landscape herbicide.

Note that the generally good results for Lake Waccabuc and Petonia Lake are not evidence that it is a good idea to draw drinking water untreated from these lakes (or any lake). Individual water supply intakes from surface water are not recommended by NYS DOH because of pathogen and turbidity concerns.[2] (This project did not test for pathogens.)

The field blank collected at Lake Waccabuc and the corresponding lab blank contained nothing detectable of any analyte, pesticides, anions (IC) or cations (ICP). Sleepy Hollow Lake's first-cycle field blank was evidently collected in a different way than intended; see the discussion in section 3.3 below. Sleepy Hollow Lake's second field blank in 2015 came out as expected, just like the Waccabuc field blank.

Appendix E contains full analytical results for all samples. The following sections itemize the detected analytes.

Table 5 contains New York's applicable public drinking water and surface water criteria for all analytes detected in any sample.

[2] Personal communication with NYS DOH, Bureau of Water Supply Protection, before the project began.

Table 5: Applicable water quality standards and guidance values

Chemical	NYSDEC standard (surface water classes A, A-S, AA, AA-S)[3]	NYS DOH standard (public water supplies)[4]
Atrazine	3.0 µg/L ("guidance value")	3.0 µg/L
Nitrate as nitrogen	10 mg/L	10 mg/L
Chloride	250 mg/L	250 mg/L
Sodium	no standard	no standard (20 mg/L warning for people on sodium restricted diets)
2,4-D	50 µg/L	50 µg/L
Metolachlor	no standard	no explicit standard
Tebuconazole	no standard	no explicit standard
Sulfentrazone	no standard	no explicit standard
Breakdown products (metabolites) of atrazine	no standards	no standards
Breakdown products of metolachlor	no standards	no standards
Calcium, magnesium, sulfur	no standards	no standards

3.2 Lake Waccabuc Pesticides

Tables 6 and 7 present the detected analytes for Lake Waccabuc. Among the pesticides, there were atrazine traces in two of four July 2013 samples via ELISA (lower than the NYSDEC detection limit of 0.1 µg/L, thus consistent with NYSDEC's result), and there were trace amounts in all samples of the fungicide tebuconazole when the NYSDEC lab refined its detection limit down to 0.01 µg/L. The trace atrazine result may be a false positive because there is no obvious

[3] NYSDEC Division of Water. Technical and Operational Guidance Series. 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998. Retrieved June 8, 2016. URL: http://www.dec.ny.gov/docs/water_pdf/togs111.pdf
[4] NYS DOH regulations. Part 5, Subpart 5-1 Public Water Systems - Tables. Retrieved June 8, 2016. URL: https://www.health.ny.gov/regulations/nycrr/title_10/part_5/subpart_5-1_tables.htm

land in the watershed of a type where atrazine would be used according to the label; there were also no atrazine metabolites in the second cycle samples, which were analyzed at much lower detection limits than in the first cycle.

One reason for the very small number of detections in Lake Waccabuc's water in the first cycle is that the list of pesticide analytes tested for (based largely on prior well sampling in agricultural areas) was dominated by agricultural chemicals and their environmental degradation products. The Lake Waccabuc watershed's land types (mapped and tabulated in Appendix C) and nearby Pesticide Sales and Use Reporting-documented (PSUR) chemical uses indicate that non-agricultural chemicals were most common in this watershed and agricultural chemicals were rare. Several more urban-oriented analytes were added to the analyte list for the second cycle of sampling in 2015-2016 for both continuing lakes. None of these was found in the second cycle Lake Waccabuc samples, nor did tebuconazole recur after the first cycle.

Products containing tebuconazole are registered for golf course use, so low concentrations may be coming from a nearby golf course. These concentrations would have escaped detection without the unusually low detection limit of 0.01 µg/L for this analyte at the NYSDEC lab.

Table 6: Anions and cations at Lake Waccabuc (for land use and geochemical context)

Sample ID	Sample date	Calcium * (mg/L)	Chloride * (mg/L)	Magne-sium (mg/L)	Nitrate (as N) (mg/L)	Potas-sium (mg/L)	Sodium (mg/L)	Sulfate (as SO_4) (mg/L)
drinking water standard			*250.0*		*10.0*		*(warning 20.0)*	
LWACC-1-1	27-May-13	8.6	27.4	4.1	1.1	2.1	13.0	
LWACC-2-1	20-Jul-13	8.3	20.5	3.2	0.9	1.7	10.7	
LWACC-3-1	29-Aug-13	9.6	24.3	4.3	0.9	2.4	14.9	
LWACC-4-1	22-Sep-13	9.4	22.4	3.7	1.0	1.9	12.0	
LWACC-5-1	27-Sep-15		37.8		nd <0.5			7.5
LWACC-6-1	15-Apr-16		38.5		nd			7.9
LWACC-7-1	26-Jul-16		36.7		nd			7.9
LWACC-1-2	27-May-13	8.3	26.3	3.9	1.0	1.9	12.7	
LWACC-2-2	20-Jul-13	8.7	24.7	4.3	1.1	2.2	14.9	
LWACC-3-2	29-Aug-13	9.1	20.3	3.2	1.0	1.5	10.0	
LWACC-4-2	22-Sep-13	8.8	24.1	3.6	1.0	1.9	11.9	
LWACC-5-2	27-Sep-15		38.2		nd			7.5
LWACC-6-2	15-Apr-16		23.9		nd			5.3
LWACC-7-2	26-Jul-16		40.4		nd			7.7
LWACC-1-3	27-May-13	9.9	26.6	4.0	1.0	2.0	13.1	
LWACC-2-3	20-Jul-13	7.8	24.2	4.0	1.0	2.1	13.8	
LWACC-3-3	29-Aug-13	7.9	24.4	3.8	1.1	2.0	13.2	

Sample ID	Sample date	Calcium * (mg/L)	Chloride * (mg/L)	Magne-sium (mg/L)	Nitrate (as N) (mg/L)	Potas-sium (mg/L)	Sodium (mg/L)	Sulfate (as SO_4) (mg/L)
drinking water standard			*250.0*		*10.0*		*(warning 20.0)*	
LWACC-4-3	22-Sep-13	10.2	24.4	3.7	1.1	1.9	11.9	
LWACC-5-3	27-Sep-15		38.0		nd			7.6
LWACC-6-3	15-Apr-16		33.3		nd			6.9
LWACC-7-3	26-Jul-16		38.9		nd			7.6
LWACC-1-4	27-May-13	9.3	26.4	3.9	1.1	1.9	12.7	
LWACC-2-4	20-Jul-13	9.7	24.9	3.8	0.9	nd <1.0	12.6	
LWACC-3-4	29-Aug-13	10.6	20.6	3.7	0.9	1.9	12.4	
LWACC-4-4	22-Sep-13	7.7	12.0	2.0	0.5	nd	6.1	
LWACC-5-4	27-Sep-15		38.1		nd			7.6
LWACC-6-4	15-Apr-16		36.9		nd			7.8
LWACC-7-4	26-Jul-16		39.3		nd			7.5
LWACC-FB	19-Sep-13	nd	nd	nd	nd	nd	nd	Nd
* Note: CSLAP calcium data for Waccabuc in years surrounding 2013 were consistently 13-17 mg/l. Chloride was first analyzed in CSLAP in 2015-2016, and those readings were 35-40 mg/l. Nitrate+nitrite nitrogen ranged from 0.01 to 0.04 mg/l in 2013. CSLAP's sampling site was in open water near the center of the lake at the site with suffix 2 in this project (Source: Personal communication with collaborator Scott Kishbaugh).								

Table 7: Pesticide detections at Lake Waccabuc

Sample ID	Sample date	Atrazine (ELISA) (µg/L)	Tebuconazole (µg/L)
drinking water standard		*3.0*	
LWACC-1-1	27-May-13	nd <0.05	0.04
LWACC-2-1	20-Jul-13	trace <0.1	0.02
LWACC-3-1	29-Aug-13	nd	0.01
LWACC-4-1	22-Sep-13	nd	0.01
LWACC-5-1	27-Sep-15		nd <0.01
LWACC-6-1	15-Apr-16		nd
LWACC-7-1	26-Jul-16		nd
LWACC-1-2	27-May-13	nd	0.02
LWACC-2-2	20-Jul-13	trace <0.1	0.01
LWACC-3-2	29-Aug-13	nd	0.01
LWACC-4-2	22-Sep-13	nd	0.01
LWACC-5-2	27-Sep-15		nd
LWACC-6-2	15-Apr-16		nd
LWACC-7-2	26-Jul-16		nd
LWACC-1-3	27-May-13	nd	0.03
LWACC-2-3	20-Jul-13	nd	0.02
LWACC-3-3	29-Aug-13	nd	0.01
LWACC-4-3	22-Sep-13	nd	0.01
LWACC-5-3	27-Sep-15		nd
LWACC-6-3	15-Apr-16		nd
LWACC-7-3	26-Jul-16		nd
LWACC-1-4	27-May-13	nd	0.02
LWACC-2-4	20-Jul-13	nd	0.02
LWACC-3-4	29-Aug-13	nd	0.01
LWACC-4-4	22-Sep-13	nd	0.01
LWACC-5-4	27-Sep-15		nd
LWACC-6-4	15-Apr-16		nd
LWACC-7-4	26-Jul-16		nd
LWACC-FB	19-Sep-13	nd	nd

As mentioned earlier, the field blank -- denoted with "FB" in the sample identification -- did not contain any detectable target anions, cations, pesticides or metabolites. The results were the same in a "lab blank" that was made at Cornell from the same deionized water sent to the volunteer samplers. The consistency between lab blank and field blank indicate that there was no carryover between samples and that the field blank was collected properly.

3.3 Sleepy Hollow Lake Pesticides

In contrast with Lake Waccabuc, the earlier analyte list matched well with the Sleepy Hollow Lake watershed's land use. The cations and anions in Table 8 indicate a mild enrichment with nitrate[5] compared with mostly-forested Lake Waccabuc's typical 0.5-1.0 mg/L (also seen at rural Petonia Lake). Table 9 reports numerous across-the-lake detections of atrazine, metolachlor, and metabolites of both in samples from most seasons. Spring (May 2013, June 2016) was the clear exception, despite this being the most common season for applying these herbicides. For detectable concentrations of a degradable, mobile terrestrial-use pesticide to reach a lake from the watershed, there must be pesticide use in the watershed followed by sufficiently sized runoff events to carry residues far enough downstream before they have time to degrade.[6] The more intensive and widespread the use, and the shorter the interval between use and transport events after use, the more likely the pesticide will show up downstream at higher concentrations. The metabolites take time to form, thus they lag somewhat. An original pesticide or metabolite that is mobile in ground water (such as atrazine) will show up in stream baseflow for an extended period.

Atrazine had the highest concentration among this group of analytes, at most 0.47 µg/L. Herbicide metabolites were all below 0.2 µg/L. Table 10 reports two trace detections of herbicide sulfentrazone and one trace detection of fungicide tebuconazole, all under 0.1 µg/L.

Based on comparing the atrazine results to the national drinking water standard of 3 µg/L (parent chemical only), there is no follow-up action necessary based on either cycle of sampling. These levels are typical of those found by USGS in surface waters of semi-agricultural watersheds of upstate NY. In USGS' more time-frequent sampling, some watersheds have short periods when concentrations peak above 3.0 in the spring of some years. Spring is a very popular atrazine application period on some types of agricultural land. This project's successful targeting of seasonal high flow events, combined with the lower concentrations found in the spring samples, suggests that it is unlikely that peak atrazine concentrations in this lake will be much higher than the observed values, which are well below the drinking water standard.

ELISA atrazine results are higher across the board than UPLCMSMS results from NYSDEC, though the timing of non-detect results is identical. ELISA results are considered "screening" thus, when both ELISA and UPLCMSMS results are present, the latter are given more credence.

[5] CSLAP nitrate-nitrogen readings at this lake range from 0.01-0.10 mg/L. (Source: Personal communication with collaborator Scott Kishbaugh.)
[6] As found by USGS in surface water in Upstate NY (Eckhardt et al., 1999).

Table 8: Anions and cations at Sleepy Hollow Lake (for land use and geochemical context)

Sample ID	Sample date	Calcium* (mg/L)	Chloride (mg/L)	Mag-nesium (mg/L)	Nitrate (as N) (mg/L)	Potas-sium (mg/L)	Sodium (mg/L)	Sulfate (as SO_4) (mg/L)	Sulfur (mg/L)
drinking water standard			*250.0*		*10.0*		*(warning 20.0)*		
SLEEL-1-1	22-May-13	15.3	17.9	9.0	3.6	2.6	11.5		11.4
SLEEL-3-1	10-Aug-13	11.5	14.7	7.5	3.0	2.5	10.2		9.2
SLEEL-4-1	19-Sep-13	16.9	14.9	8.0	3.1	2.6	10.5		9.5
SLEEL-5-1	02-Oct-15		20.6		nd <0.5			27.9	
SLEEL-6-1	06-Jun-16		21.7		0.3			30.3	
SLEEL-7-1	25-Aug-16		24.8		nd			33.0	
SLEEL-1-2	22-May-13	14.1	17.9	8.8	3.6	2.6	11.4		11.2
SLEEL-3-2	10-Aug-13	10.9	14.7	7.4	2.8	2.5	10.1		9.2
SLEEL-4-2	19-Sep-13	17.0	14.5	7.9	3.0	2.6	10.4		9.4
SLEEL-5-2	02-Oct-15		26.0		nd			31.7	
SLEEL-6-2	06-Jun-16		23.3		nd			32.7	
SLEEL-7-2	25-Aug-16		24.1		nd			32.4	
SLEEL-1-3	22-May-13	9.8	17.8	8.6	3.5	2.6	11.3		11.1
SLEEL-3-3	10-Aug-13	10.6	14.6	7.2	2.9	2.5	10.1		9.1
SLEEL-4-3	19-Sep-13	16.7	15.1	8.0	3.1	2.6	10.5		9.5
SLEEL-5-3	02-Oct-15		22.9		nd			28.6	
SLEEL-6-3	06-Jun-16		21.8		nd			31.9	
SLEEL-7-3	25-Aug-16		22.8		nd			31.6	
SLEEL-1-4	22-May-13	10.8	18.3	9.1	3.8	2.7	11.9		11.7
SLEEL-3-4	10-Aug-13	9.8	15.5	7.7	3.0	2.5	10.4		9.6
SLEEL-4-4	19-Sep-13	15.1	14.9	8.1	3.1	2.6	10.6		9.7
SLEEL-5-4	02-Oct-15		21.0		nd			28.2	
SLEEL-6-4	06-Jun-16		23.9		nd			32.3	
SLEEL-7-4	25-Aug-16		22.8		nd			33.0	
SLEEL-1-5	22-May-13	11.4	17.8	8.8	3.6	2.6	11.4		11.1
SLEEL-3-5	10-Aug-13	10.3	8.5	4.4	1.7	nd	5.7		5.3
SLEEL-4-5	19-Sep-13	15.3	15.0	9.3	3.0	2.9	12.2		11.2
SLEEL-5-5	02-Oct-15		23.9		nd			31.0	
SLEEL-6-5	06-Jun-16		23.4		nd			31.9	
SLEEL-7-5	25-Aug-16		24.3		nd			32.4	
SLEEL-5-FB	02-Oct-15		nd		nd			nd	
*Note: CSLAP calcium at this lake is typically 20-30 mg/L and CSLAP chloride is typically 25-30. (Source: Personal communication with collaborator Scott Kishbaugh.)									

Table 9: Atrazine, metolachlor, and their metabolites at Sleepy Hollow Lake

Sample ID	Sample date	Atrazine (µg/L)	Atrazine (ELISA) (µg/L)	2-hydroxy atrazine (µg/L)	Deethyl-atrazine (µg/L)	Metola-chlor (µg/L)	Metola-chlor ESA (µg/L)	Metola-chlor OA (µg/L)
drinking water standard		*3.0*	*3.0*					
SLEEL-1-1	22-May-13	nd	nd <0.05	0.042	nd	nd	nd	nd
SLEEL-3-1	10-Aug-13	0.416	0.95	0.065	0.067	0.161	0.134	0.161
SLEEL-4-1	19-Sep-13	0.166	0.69	0.028	nd	0.070	nd	nd
SLEEL-5-1	02-Oct-15	0.037		0.026	nd	0.031	0.106	nd
SLEEL-6-1	06-Jun-16	nd		nd	nd	nd	0.111	nd
SLEEL-7-1	25-Aug-16	0.021		0.023	nd	nd	0.156	0.149
SLEEL-1-2	22-May-13	nd	nd	0.038	nd	nd	nd	nd
SLEEL-3-2	10-Aug-13	0.459	0.78	0.063	0.073	0.174	0.174	0.152
SLEEL-4-2	19-Sep-13	0.345	0.46	0.074	0.082	0.085	nd	nd
SLEEL-5-2	02-Oct-15	0.053		0.033	0.027	0.050	0.162	0.153
SLEEL-6-2	06-Jun-16	0.033		nd	nd	0.035	0.150	0.102
SLEEL-7-2	25-Aug-16	0.025		0.021	nd	nd	0.162	0.133
SLEEL-1-3	22-May-13	nd	nd	0.041	nd	nd	nd	nd
SLEEL-3-3	10-Aug-13	0.225	0.86	0.032	0.037	0.080	nd	nd
SLEEL-4-3	19-Sep-13	0.441	0.80	0.069	0.074	0.120	0.110	nd
SLEEL-5-3	02-Oct-15	0.044		0.03	0.025	0.066	0.198	0.197
SLEEL-6-3	06-Jun-16	nd		nd	nd	nd	nd	nd
SLEEL-7-3	25-Aug-16	0.025		0.022	nd	0.032	0.157	0.111
SLEEL-1-4	22-May-13	nd	nd	0.038	nd	nd	nd	nd
SLEEL-3-4	10-Aug-13	0.394	0.91	0.057	0.069	0.144	0.123	nd
SLEEL-4-4	19-Sep-13	0.472	0.80	0.079	0.080	0.128	0.126	0.139
SLEEL-5-4	02-Oct-15	0.031		nd	0.025	0.048	0.203	0.156
SLEEL-6-4	06-Jun-16	0.027		0.025	nd	nd	0.133	nd
SLEEL-7-4	25-Aug-16	0.029		0.023	nd	nd	0.144	0.147
SLEEL-1-5	22-May-13	nd	nd	0.032	nd	nd	nd	nd
SLEEL-3-5	10-Aug-13	0.247	0.45	0.027	0.035	0.119	nd	nd
SLEEL-4-5	19-Sep-13	0.336	0.84	0.053	0.058	0.139	nd	nd
SLEEL-5-5	02-Oct-15	0.052		0.039	0.033	0.064	0.145	0.190
SLEEL-6-5	06-Jun-16	nd		0.021	nd	0.034	0.119	0.102
SLEEL-7-5	25-Aug-16	0.030		0.031	nd	nd	0.162	0.160

Sample ID	Sample date	Atrazine (µg/L)	Atrazine (ELISA) (µg/L)	2-hydroxy atrazine (µg/L)	Deethyl-atrazine (µg/L)	Metola-chlor (µg/L)	Metola-chlor ESA (µg/L)	Metola-chlor OA (µg/L)
drinking water standard		*3.0*	*3.0*					
SLEEL-5-FB	02-Oct-15	nd		nd	nd	nd	nd	nd

Table 10: Sulfentrazone and Tebuconazole at Sleepy Hollow Lake

Sample ID	Sample date	Sulfentrazone	Tebuconazole
no drinking water standards			
SLEEL-1-1	22-May-13	nd	nd
SLEEL-3-1	10-Aug-13	nd	nd
SLEEL-4-1	19-Sep-13	nd	nd
SLEEL-5-1	02-Oct-15	nd	nd
SLEEL-6-1	06-Jun-16	nd	nd
SLEEL-7-1	25-Aug-16	nd	nd
SLEEL-1-2	22-May-13	nd	nd
SLEEL-3-2	10-Aug-13	nd	nd
SLEEL-4-2	19-Sep-13	nd	nd
SLEEL-5-2	02-Oct-15	nd	nd
SLEEL-6-2	06-Jun-16	nd	nd
SLEEL-7-2	25-Aug-16	nd	nd
SLEEL-1-3	22-May-13	nd	nd
SLEEL-3-3	10-Aug-13	nd	nd
SLEEL-4-3	19-Sep-13	nd	nd
SLEEL-5-3	02-Oct-15	nd	nd
SLEEL-6-3	06-Jun-16	nd	nd
SLEEL-7-3	25-Aug-16	nd	nd
SLEEL-1-4	22-May-13	nd	nd
SLEEL-3-4	10-Aug-13	nd	nd
SLEEL-4-4	19-Sep-13	nd	nd
SLEEL-5-4	02-Oct-15	nd	0.032
SLEEL-6-4	06-Jun-16	0.052	nd
SLEEL-7-4	25-Aug-16	nd	nd

Sample ID	Sample date	Sulfentrazone	Tebuconazole
SLEEL-1-5	22-May-13	nd	nd
SLEEL-3-5	10-Aug-13	nd	nd
SLEEL-4-5	19-Sep-13	nd	nd
SLEEL-5-5	02-Oct-15	nd	nd
SLEEL-6-5	06-Jun-16	nd	nd
SLEEL-7-5	25-Aug-16	0.074	nd
SLEEL-5-FB	02-Oct-15	nd	nd

2013 field blank results (not shown) were almost identical to those for a field sample taken elsewhere in the same lake on the same day (round 4). Discussion found a miscommunication between Cornell and the sampler about the field blank procedure, thus this test was invalid. The second cycle's 2015 field blank was prepared consistently with instructions and had analytical results identical to those for Lake Waccabuc's field blank: no pesticide, cation, or anion detections across the board.

3.4 Lake Petonia Pesticides

There were no detections of any pesticide or metabolite at Petonia Lake in the first sampling cycle. This is consistent with the largely forested watershed. This lake was included in the first sampling cycle only.

Table 11: Detected analytes at Petonia Lake (for land use and geochemical context)

	Nitrate (as N) (mg/L)	Chloride* (mg/L)	Calcium (mg/L)	Magnes-ium (mg/L)	Potas-sium (mg/L)	Sodium (mg/L)	Sulfur (mg/L)
Method (lab)	IC (Cornell)	IC (Cornell)	ICP (Cornell)	ICP (Cornell)	ICP (Cornell)	ICP (Cornell)	ICP (Cornell)
Drinking water standard	*10.0*	*250.0*				*(warning 20.0)*	
Sample PETON-1-1	0.7	17.0	4.9	nd <0.1	nd <0.1	5.5	1.8
Sample PETON-2-1	0.6	9.1	4.6	1.0	1.0	5.4	1.7
Sample PETON-3-1	0.8	10.4	4.6	1.1	nd <0.1	5.5	1.8
Sample PETON-4-1	0.7	10.3	4.7	1.0	1.1	5.5	1.7

* Note: Chloride levels in CSLAP Petonia Lake samples were 16-20 mg/L (Source: Personal communication with collaborator Scott Kishbaugh).

3.5 Buckingham Pond Pesticides

At Buckingham Pond, Table 12 indicates that the only pesticide detected was 2,4-D, a high-selling herbicide available for unrestricted use on home and business properties as well as in restricted products. The absence of other pesticide detections could be an artifact of the analyte list pursued in the project, for the same reason cited for Lake Waccabuc -- the list is mostly representative of agricultural chemicals and contains few pesticides used in urban settings.

This lake was included in the first cycle only.

Table 12: Detected analytes at Buckingham Pond (anions and cations for land use and geochemical context)

	2.4-D (µg/L)	2,4-D (µg/L)	Nitrate (as N) (mg/L	Chloride (mg/L)	Calcium (mg/L)	Mag-nesium (mg/L)	Potas-sium (mg/L)	Sodium (mg/L)	Sulfur (mg/L)
Method (lab)	ELISA (Cornell)	UPLC-MSMS (NYSDEC)	IC (Cornell)	IC (Cornell)	ICP (Cornell)	ICP (Cornell)	ICP (Cornell)	ICP (Cornell)	ICP (Cornell)
Drinking water standard	*50.0*	*50.0*	*10.0*	*250.0*				*(warning 20.0)*	
Sample BUCKP-1-1	nd <0.1	nd <0.1	1.1	248.4	8.4	15.3	nd <0.1	138.7	1.8
Sample BUCKP-1-2	nd <0.1	0.162	0.9	210.6	7.8	11.9	3.7	112.2	1.7
Sample BUCKP-3-2	nd <0.1	nd <0.1	0.6	135.1	8.3	8.1	3.2	73.9	1.8

4. Conclusions and Follow-Up

The results from Sleepy Hollow Lake samples are consistent with the earlier finding by USGS that agricultural herbicide and herbicide metabolite residues are often present in upstate surface water, correlated in concentration with watershed land use. Since pesticides were detected in samples collected from this lake, and since its surrounding community uses the lake for drinking water, a second cycle of samples was definitely merited. The second cycle results were very similar to the first cycle results.

Lake Waccabuc was unusually free of pesticide residues, having only one analyte detected at very low concentrations, and only in the first cycle. However, only a small fraction of active pesticide ingredients in use could be tested for within the available capacity of NYSDEC's lab. In light of this, the second cycle of samples from Lake Waccabuc (and Sleepy Hollow Lake) was analyzed for a few different more urban chemicals, none of which were detected.

The analyte list was focused on agricultural chemicals, while there were two of four lakes dominated by urban land use. If urban lakes are to be sampled in the future, an analyte list focusing on residential, institutional, and commercial pesticide types should be used. Lake Waccabuc and Buckingham Pond may have had an absence of pesticide detections in the first cycle because of the analyte list. The analyte list used in the second cycle of sampling was modified to include more residential/urban pesticides, but remained a compromise between agriculture and urban focus to enable using one analyte list for both agricultural+residential Sleepy Hollow Lake and residential+golf Lake Waccabuc.

The lack of pesticides being detected in Petonia Lake is consistent with its watershed land uses. Additional sampling would not have affected that conclusion. Suburban Buckingham Pond is not representative of the lakes that could be used for individual water supply, thus had lowest priority.

Volunteer samplers at all lakes were willing and able to sample in vulnerable locations (near shore zones) and at vulnerable times (immediately after storms). The Waccabuc and retried Sleepy Hollow field blank results indicate that a "rinse once, then fill" approach prevents carryover of residues between samples taken with the Kemmerer type of sampler.

The volunteer sampling approach was successful (as is CSLAP in general), combining local enthusiasts with thorough knowledge of their lake, and trained in careful sample collection, with an advanced laboratory. If the NYSDEC Division of Materials Management wishes to use shallow portions of large lakes along with private wells as indicators of pesticide occurrence in vulnerable supplies, the same approach of volunteer samples could be repeated. The Lake Associations could also provide a means to access households who actually tap lake water for household supplies, analogous to how Soil and Water Conservation Districts have recruited private well users for ongoing pesticide-vulnerability sampling in Upstate New York.

References

Eckhardt, D.A.V., Kappel, W.M., Coon, W.F. & Phillips, P.J., 1999. *Herbicides and their Metabolites in Cayuga Lake and its Tributaries, New York*. Water Resources Investigations Report 99-4018. Ithaca, NY: US Geological Survey.

New York Citizens Statewide Lake Assessment Program, 2015. *CSLAP Sampling Protocol*. Albany, NY: NYS Department of Environmental Conservation.

Acknowledgments

Lake samplers: Volunteers Jan Andersen and Lou Feeney collected samples from Lake Waccabuc, and provided a later boat tour of the sampling sites to Cornell's project personnel. Laurel Mann collected samples from Sleepy Hollow Lake, and provided a 2015 boat tour for a Cornellian. Judi and Bruce Myers collected samples from Petonia Lake. Harry Ermides collected samples from Buckingham Pond. All of these volunteers are leading members of their local lake associations and participate in the New York Federation of Lake Associations.

NYSDEC Division of Materials Management, Bureau of Pest Management: Luanne Whitbeck originated the lake project and participated in lake selection and operational organization. Luanne's successor Jason Pelton took over as contract officer to Cornell after Luanne's retirement, succeeded by Jim Carpentier in 2016 after Jason's transfer to another NYSDEC Division. Scott Menrath, Jason, and Jim provided helpful comments on a draft of this report.

NYSDEC Division of Water: Scott Kishbaugh, Director of the statewide Citizens Statewide Lake Assessment Program (CSLAP), recommended candidate lakes and recruited volunteer samplers. He negotiated the final lakes with Luanne. He recommended the specific sampling locations within lakes including the maps in Appendix A. He prepared container labels for use by the samplers.

Luanne Whitbeck's husband Dean Long, a member of the board of directors of the NYS Federation of Lake Associations, helped to recruit candidate lakes. He influenced Luanne to take interest in the possibly vulnerable population of direct lake water drinkers.

NYSDEC Division of Air, laboratory: Pete Furdyna and Christine Van Patten performed the pesticide analyses of samples and advised about the field blank process. Pete advised about the feasibility of the original and revised analyte lists.

Cornell University, Department of Biological and Environmental Engineering: Steven Pacenka recommended the per-lake sampling strategy, compiled this report, took the cover photos, provided supplies to the volunteer samplers, stored and catalogued samples (including for EQuIS), and performed ELISA analyses for pesticides and IC analyses for anions. Luam Azmera assisted with the ELISA and IC work. Shree K. Giri performed the ICP cation analyses.

Appendix A: Recommended Sampling Sites per Lake

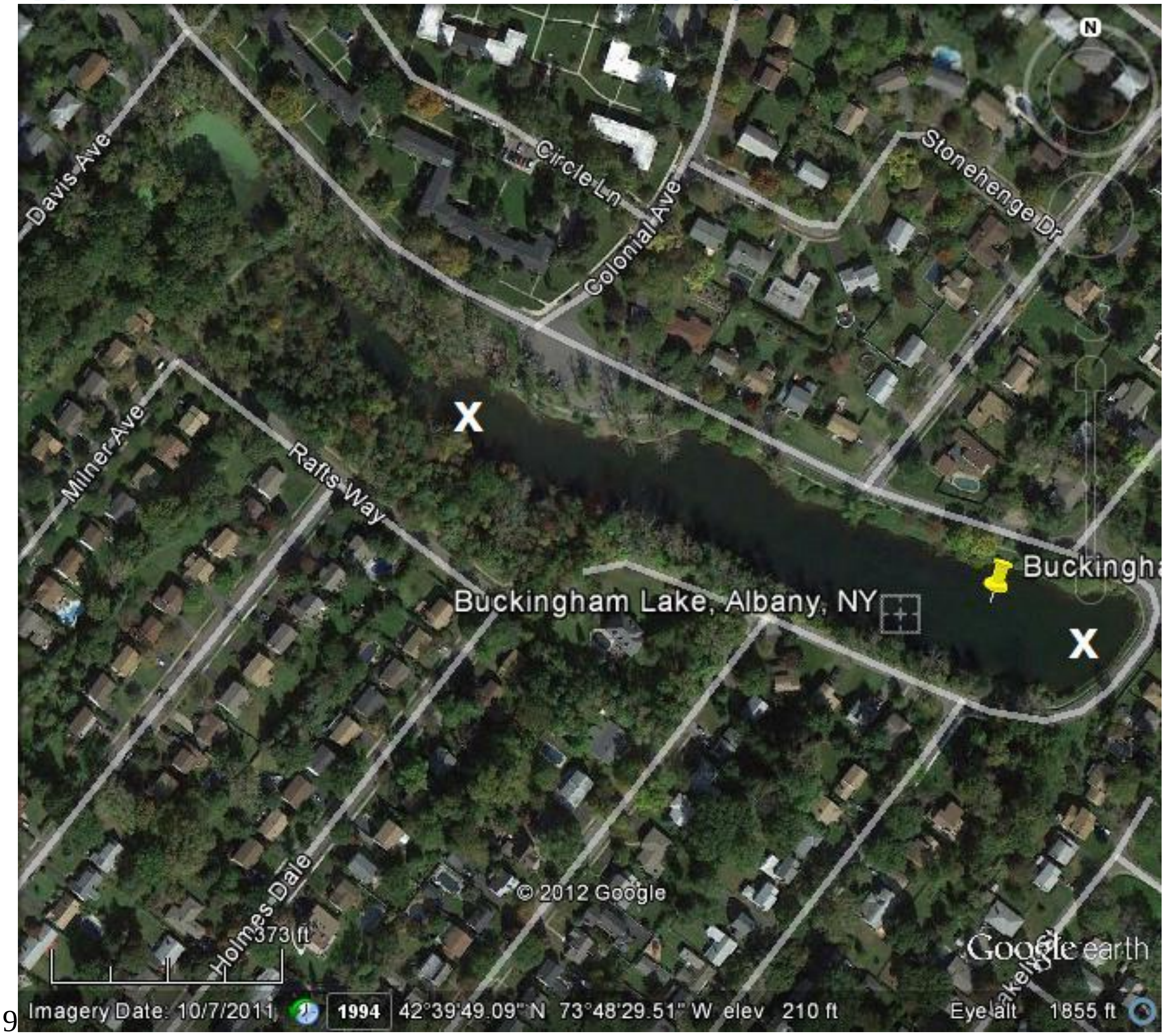

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Figure 5: Recommended sampling sites for Buckingham Pond

Sites BUCKP-1 and BUCKP-2 are numbered from east (right) to west.

Figure 6: Recommended Sampling Sites for Petonia Lake

Figure 7: Recommended Sampling Sites for Sleepy Hollow Lake

Sites are numbered counterclockwise, starting at the southernmost (near the pin) as SLEEL-1 through SLEEL-5.

Figure 8: Recommended Sampling Sites for Lake Waccabuc

Sites are numbered from left (west) to right (east) as LWACC-1 through LWACC-4.

Appendix B: Instructions to Samplers

Cornell University
Biological and Environmental Engineering

Riley-Robb Hall
Ithaca, NY 14853
Soil and Water Group
607-222-9108
sp17@cornell.edu

PLEASE READ THIS FIRST

1 May 2013

[CSLAP volunteer's address]

Dear [first name]:

Thank you for agreeing to extend your role in CSLAP to assist the NYSDEC Division of Materials Management and the NYSDEC Division of Water in evaluating the possible exposure to pesticide residues of people using lakes. The primary objective of the project is to inform New York's pesticide regulatory process so that chemical use rules take into account the actual environmental fates of pesticide active ingredients. This letter outlines our respective roles with an emphasis on how to collect samples.

The project will collect samples from four lakes and test them at NYSDEC's pesticide analytical lab and Cornell University for various pesticides and other chemical parameters. You will receive the results.

Your key role is to collect samples up to four times between spring and fall 2013, from one or more representative locations in your lake. You will freeze, then express ship the frozen samples to me at Cornell. Cornell will provide empty sample bottles, insulated shipping materials, and UPS forms that will direct that the shipping costs be paid by Cornell. The first set of these accompanies this letter.

Expendables used in field (provided by Cornell except for bottle labels by NYSDEC Division of Water):

* 250 mL Nalgene cylindrical bottles, certified precleaned, 250 mL size. Two per sample.
* Preprinted waterproof bottle labels per sample. (from NYSDEC)

* UPS box shipping labels, for use from samplers to Cornell.
* Markers with insoluble ink that can write on bottle labels.
* Shipping tape.

Durables used in field and for shipping samples from field to Cornell (included in separate shipment from NYSDEC or part of your CSLAP lake sampling kit, except where noted):

* Field data form with waterproof paper and writing utensil.
* Sampling location map and instructions on laminated paper
* Depth-specific Kemmerer sampling device, used from boat.
* Boat with personal safety equipment.
* thermometer
* Light colored bag or box to hold filled sample bottles (volunteer will need to provide).
* Insulated shipping boxes. Foam lined, outer cardboard (provided by Cornell).

Where and when to sample: Each lake has one to four specific sampling locations identified. Scott Kishbaugh will send you a waterproofed map with a checklist to use in the field. We will appreciate your collection from each mapped location at the following four times:

* one near peak pesticide application period (early summer?)
* one summer low flow
* after one summer storm (opportunistic)- as soon as safely possible after storm
* one in fall

Please collect samples at the following depth: 1-2 meters off the bottom and at least 2 meters below the surface referenced to when the lake is at a normal level. Be consistent in distance from the bottom when sampling the same location at different times.

Besides the waterproofed map and field checklist, Scott will send you bottle labels and field log form.

We appreciate your help. Please contact me or Scott if you have questions. If your contact information or your role changes during the year, it is very important that Scott and I know current contact information for the person to whom I will send fresh bottles and the shipping container.

Sincerely yours,

[original signed]

Steven Pacenka, Water Specialist
Assisting the NYSDEC Bureau of Pest Management
Cooperating with the NYSDEC Division of Water

Enclosures:

- new bottles for first sampling
- UPS return shipping form and plastic envelope for first sampling
- bubble wrap for cushioning
- roll of shipping tape
- waterproof pen
- insulated shipping box holding all of the above

Shipped separately to you by Scott Kishbaugh of NYSDEC Division of Water

- map of your lake with sampling sites (laminated to be waterproof)
- list of steps for sampling and sample handling (on back of map)
- sample bottle labels
- waterproof data form to enclose with filled bottles when shipping

Appendix C: Land uses in watersheds (from 2014 CSLAP reports except Lake Waccabuc, from 2016)

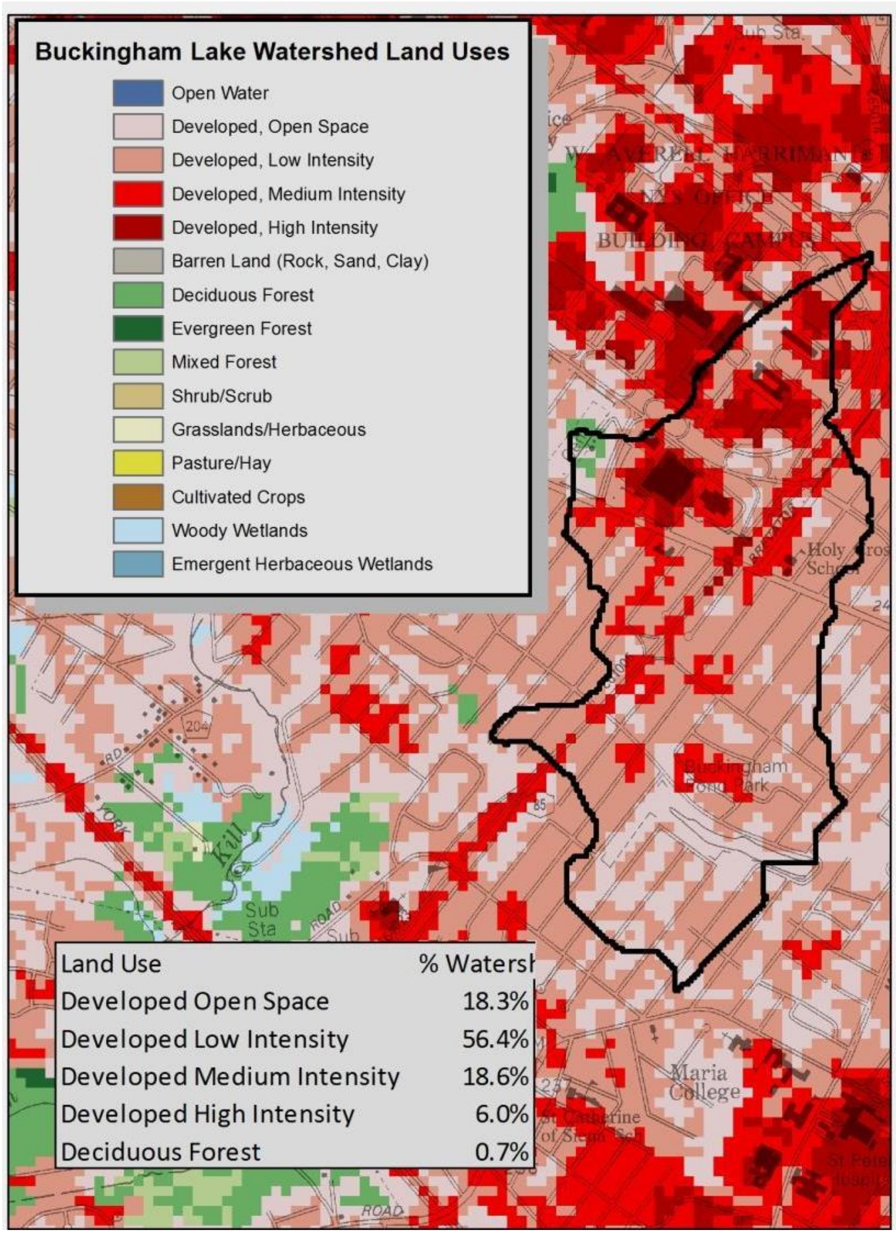

Figure 9: Buckingham Pond watershed land uses (2006 data)

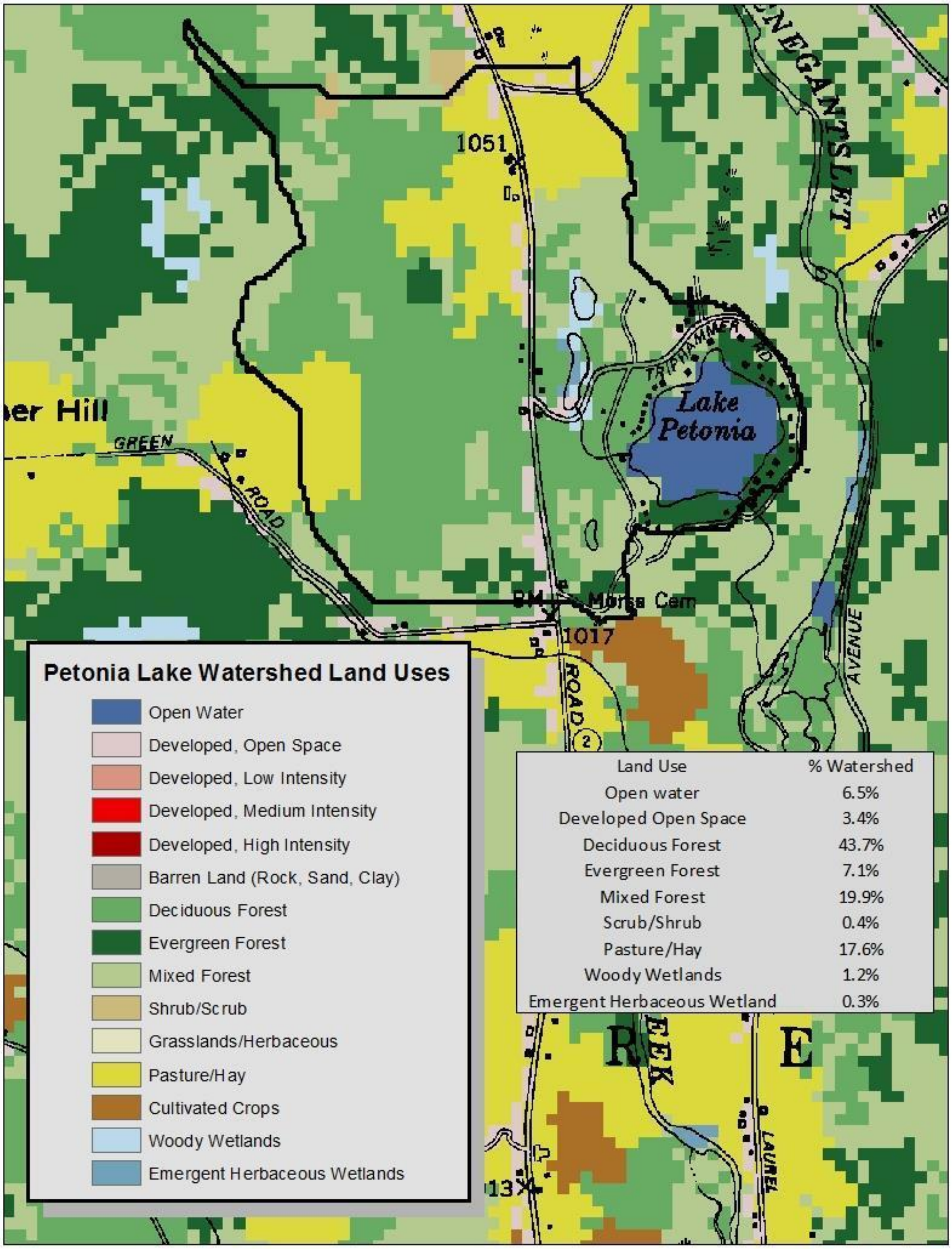

Figure 10: Petonia Lake watershed land uses (2006 data)

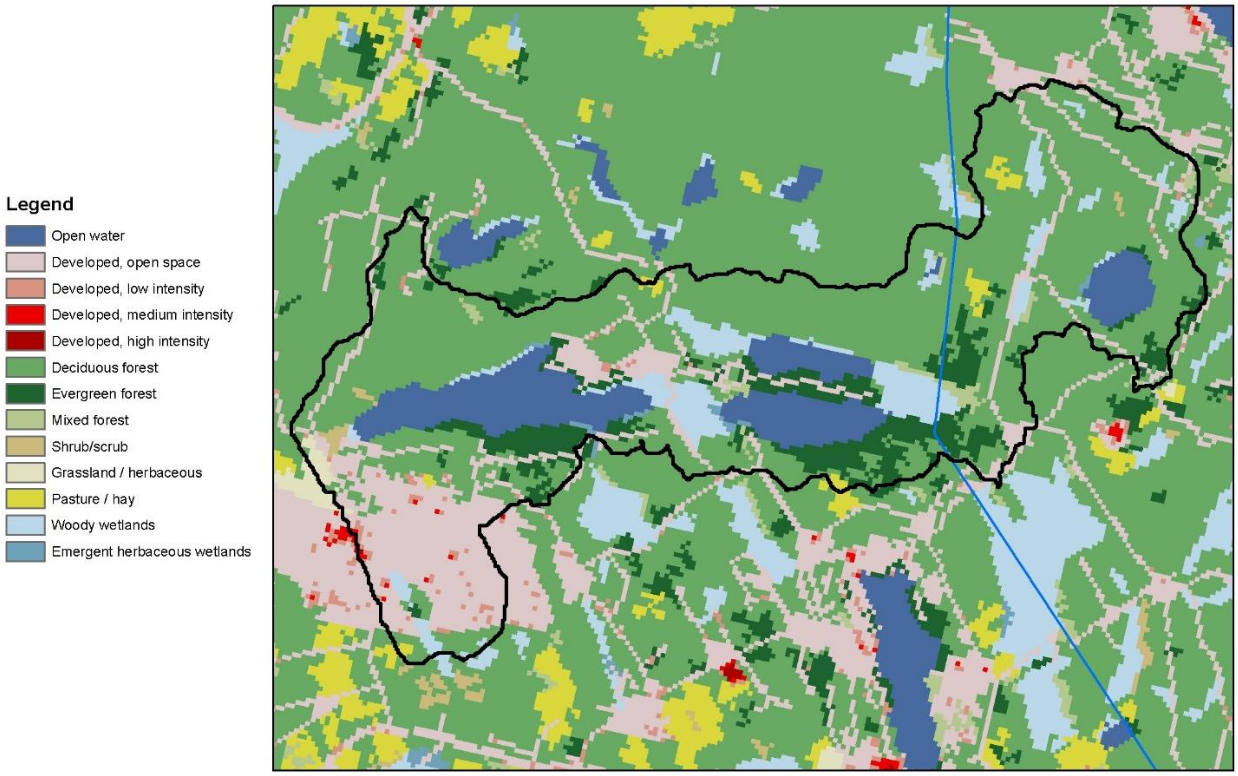

Figure 11: Lake Waccabuc watershed land cover (2011 data)

Table 13: Lake Waccabuc watershed land cover distribution (2011)

ID no.	Category Name	% of total
11	Open water	12.7%
21	Developed, open space	15.5%
22	Developed, low intensity	0.8%
23	Developed, medium intensity	0.1%
24	Developed, high intensity	0.0%
41	Deciduous forest	51.9%
42	Evergreen forest	9.2%
43	Mixed forest	1.0%
52	Shrub / scrub	0.4%
71	Grassland / herbaceous	0.4%
81	Pasture / hay	0.9%
90	Woody wetlands	6.7%
95	Emergent herbaceous wetlands	0.4%

Source for Lake Waccabuc data (GIS data set): Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015,

Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354. Data from URL:
<https://www.mrlc.gov/nlcd2011.php>

(no 2014 report for Sleepy Hollow Lake found)

Appendix D: Sample field log sheet

CSLAP PESTICIDES MONITORING PROJECT
WATER QUALITY FIELD SHEET

LAKE NAME Lake Waccabuc DATE 5/27/13

WEATHER COOL SUNNY, BREEZY-WINDY! (current) overcast, drizzle rain, v. windy (past 48 hours)

RAINFALL AMT ∅ (current) 0.47 (past 48 hours)

SAMPLE RUN Run#1: "Early Runoff"- near peak pesticide application period

SAMPLE DESCRIPTION

Site #	Site Description	Site ID	Coordinates	Sample Time	Sample Depth	Water Temp	Field Notes
1	Waccabuc Creek	LWACC-1-1	Lat: 41°17'46.16N Long: 73°35'45.38	12:15	2	17	sand bar cut by stream input.
UTM 18T 603,596 0617603 4572596 ± 4m							
2	CSLAP Site	LWACC-1-2	Lat: 41°17'54.83" Long: 73°34'54.45"	12:45	2	18	
UTM18T 8618614, 4572855±4m							
3	4 The Hook	LWACC-1-3	Lat: 41°17'47.42 Long: 73°34'44.42	11:45	2	18	
UTM 18T 0618981 x 4572655 ± 3m							
4	26 Cove Road	LWACC-1-4	Lat: 41°17'53.89 Long: 73°34'34.20	13:30	2	18	
UTM18T 201 841 0619201 4572841 ± 2m							
5							
Field Blank							

Samplers Lou Feeney, Jan Andersen

Additional Comments:
see back for profiles, pH, spec. cond.
large particles in water - green cast. water high after recent rains
significant recent rainfall by morning measured
5/24 3.31"
5/25 1.06"
5/26 0.47"
harder than expected to stay in place w/o anchoring.

UTM FROM ON LAKE GPS
LAT/LONG FROM GOOGLE EARTH

Appendix E: Detailed analytical results

Blanks indicate sample not analyzed for that parameter. "nd" = analyzed but not detected, meaning less than the indicated detection limit. Duplicate samples are omitted. These were tested only for a small number of analytes and had very similar results to the primary samples.

Table 14: Sleepy Hollow Lake first cycle analytical results

chemical_name	method	lab name	units	detec-tion limit	SLEEL-1-1	SLEEL-1-2	SLEEL-1-3	SLEEL-1-4	SLEEL-1-5	SLEEL-3-1	SLEEL-3-2	SLEEL-3-3	SLEEL-3-4	SLEEL-3-5	SLEEL-4-1	SLEEL-4-2	SLEEL-4-3	SLEEL-4-4	SLEEL-4-5
2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-D (DICHLOROPHENOXYACETIC ACID)	ELISA	CORNELL	µg/L	0.1	nd	nd	nd	nd	nd										
2,4-D (DICHLOROPHENOXYACETIC ACID)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-HYDROXY ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	0.042	0.038	0.041	0.038	0.032	0.065	0.063	0.032	0.057	0.027	0.028	0.074	0.069	0.079	0.053
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-HYDROXYCARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDICARB (SULFIDE, SULFOXIDE, AND SULFONE)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDICARB SULFONE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDICARB SULFOXIDE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AMPA	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ATRAZINE	ELISA	CORNELL	µg/L	0.05	nd	nd	nd	nd	nd	0.95	0.78	0.86	0.91	0.45	0.69	0.46	0.8	0.8	0.84
ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	0.416	0.459	0.225	0.394	0.247	0.166	0.345	0.441	0.472	0.336
AZINPHOS, METHYL (GUTHION)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AZOXYSTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CALCIUM	ICP	CORNELL	mg/l		15.3	14.1	9.8	10.8	11.4	11.5	10.9	10.6	9.8	10.3	16.9	17	16.7	15.1	15.3
CARBENDAZIM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORIDE (AS CL)	IC	CORNELL	mg/l	2	17.9	17.9	17.8	18.3	17.8	14.7	14.7	14.6	15.5	8.5	14.9	14.5	15.1	14.9	15
CHLORSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLETHODIM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

chemical_name	method	lab name	units	detec-tion limit	SLEEL-1-1	SLEEL-1-2	SLEEL-1-3	SLEEL-1-4	SLEEL-1-5	SLEEL-3-1	SLEEL-3-2	SLEEL-3-3	SLEEL-3-4	SLEEL-3-5	SLEEL-4-1	SLEEL-4-2	SLEEL-4-3	SLEEL-4-4	SLEEL-4-5
CLOPYRALID	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CYPRODINIL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEETHYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	0.067	0.073	0.037	0.069	0.035	nd	0.082	0.074	0.08	0.058
DEISOPROPYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIAZINON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICAMBA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIMETHOATE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DITHIOPYR	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUAZIFOP-P-BUTYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUOXASTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HALOFENOZIDE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
IMAZALIL	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
IMIDACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MAGNESIUM	ICP	CORNELL	mg/l		9	8.8	8.6	9.1	8.8	7.5	7.4	7.2	7.7	4.4	8	7.9	8	8.1	9.3
MALATHION	UPLCMSMS	NYSDEC	µg/L	0.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPP	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METALAXYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHOMYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR	UPLCMSMS	NYSDEC	µg/L	0.07	nd	nd	nd	nd	nd	0.161	0.174	0.08	0.144	0.119	0.07	0.085	0.12	0.128	0.139
METOLACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	0.134	0.174	nd	0.123	nd	nd	nd	0.11	0.126	nd
METOLACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	0.161	0.152	nd	nd	nd	nd	nd	nd	0.139	nd
METSULFURON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NICOSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NITROGEN, NITRATE (AS N)	IC	CORNELL	mg/l	0.1	3.6	3.6	3.5	3.8	3.6	3	2.8	2.9	3	1.7	3.1	3	3.1	3.1	3
OXAMYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
OXYDEMETON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
POTASSIUM	ICP	CORNELL	mg/l		2.6	2.6	2.6	2.7	2.6	2.5	2.5	2.5	2.5		2.6	2.6	2.6	2.6	2.9
POTASSIUM	ICP	CORNELL	mg/l	0.1										nd					
PROPAMOCARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PROSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SEVIN (CARBARYL)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SIMAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SODIUM	ICP	CORNELL	mg/l		11.5	11.4	11.3	11.9	11.4	10.2	10.1	10.1	10.4	5.7	10.5	10.4	10.5	10.6	12.2
SULFENTRAZONE	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SULFUR	ICP	CORNELL	mg/l		11.4	11.2	11.1	11.7	11.1	9.2	9.2	9.1	9.6	5.3	9.5	9.4	9.5	9.7	11.2
TEBUCONAZOLE	UPLCMSMS	NYSDEC	µg/L	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TEBUFENOZIDE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIAMETHOXAM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIFENSULFURON METHYL (PINNACLE)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIODICARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table 15: Sleepy Hollow Lake second cycle analytical results

chemical_name	method	lab name	units	detec-tion limit	SLEEL-5-1	SLEEL-5-2	SLEEL-5-3	SLEEL-5-4	SLEEL-5-5	SLEEL-6-1	SLEEL-6-2	SLEEL-6-3	SLEEL-6-4	SLEEL-6-5	SLEEL-7-1	SLEEL-7-2	SLEEL-7-3	SLEEL-7-4	SLEEL-7-5
2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-D (DICHLOROPHENOXYACETIC ACID)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-HYDROXY ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	0.026	0.033	0.03	nd	0.039	nd	nd	nd	0.025	0.021	0.023	0.021	0.022	0.023	0.031
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-HYDROXYCARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AMPA	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	0.037	0.053	0.044	0.031	0.052	nd	0.033	nd	0.027	nd	0.021	0.025	0.025	0.029	0.03
AZINPHOS, METHYL (GUTHION)	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AZOXYSTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORIDE (AS CL)	IC	CORNELL	mg/l	4	20.6	26	22.9	21	23.9	21.7	23.3	21.8	23.9	23.4	24.8	24.1	22.8	22.8	24.3
CHLOROTHALONIL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLETHODIM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLOPYRALID	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLOTHIANIDIN	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CYPRODINIL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEETHYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	0.027	0.025	0.025	0.033	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEISOPROPYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIAZINON	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICAMBA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIMETHOATE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DITHIOPYR	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUAZIFOP-P-BUTYL	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUOPICOLIDE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUOXASTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FOMESAFEN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
GLYPHOSATE	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HALOFENOZIDE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
IMIDACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MALATHION	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPP	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MESOTRIONE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

chemical_name	method	lab name	units	detec-tion limit	SLEEL-5-1	SLEEL-5-2	SLEEL-5-3	SLEEL-5-4	SLEEL-5-5	SLEEL-6-1	SLEEL-6-2	SLEEL-6-3	SLEEL-6-4	SLEEL-6-5	SLEEL-7-1	SLEEL-7-2	SLEEL-7-3	SLEEL-7-4	SLEEL-7-5
METALAXYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHOMYL	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR	UPLCMSMS	NYSDEC	µg/L	0.025	0.031	0.05	0.066	0.048	0.064	nd	0.035	nd	nd	0.034	nd	nd	0.032	nd	nd
METOLACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	0.106	0.162	0.198	0.203	0.145	0.111	0.15	nd	0.133	0.119	0.156	0.162	0.157	0.144	0.162
METOLACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	0.153	0.197	0.156	0.19	nd	0.102	nd	nd	0.102	0.149	0.133	0.111	0.147	0.16
METSULFURON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NICOSULFURON	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NITROGEN, NITRATE (AS N)	IC	CORNELL	mg/l	0.25	nd	nd	nd	nd	nd	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd
OXAMYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
OXYDEMETON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PROPAMOCARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QUINCLORAC	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SEVIN (CARBARYL)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SIMAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SULFATE (AS SO4)	IC	CORNELL	mg/l	1	27.9	31.7	28.6	28.2	31	30.3	32.7	31.9	32.3	31.9	33	32.4	31.6	33	32.4
SULFENTRAZONE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	0.052	nd	nd	nd	nd	nd	0.074
TEBUCONAZOLE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	0.032	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIAMETHOXAM	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIFENSULFURON METHYL (PINNACLE)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIODICARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table 16: Lake Waccabuc first cycle analytical results

chemical name	method	lab name	units	detect-ion limit	LWA CC-1-1	LWACC -1-2	LWACC -1-3	LWACC -1-4	LWACC -2-1	LWACC -2-2	LWACC -2-3	LWACC -2-4	LWACC -3-1	LWACC -3-2	LWACC -3-3	LWACC -3-4	LWACC -4-1	LWACC -4-2	LWACC -4-3	LWACC -4-4
2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-D (DICHLOROPHENOXYACETIC ACID)	ELISA	CORNELL	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd								
2,4-D (DICHLOROPHENOXYACETIC ACID)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-HYDROXY ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-HYDROXYCARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDICARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDICARB SULFONE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALDICARB SULFOXIDE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AMPA	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ATRAZINE	ELISA	CORNELL	µg/L	0.05	nd	nd	nd	nd	0.075	0.075	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AZINPHOS, METHYL (GUTHION)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AZOXYSTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CALCIUM	ICP	CORNELL	mg/L		8.6	8.3	9.9	9.3	8.3	8.7	7.8	9.7	9.6	9.1	7.9	10.6	9.4	8.8	10.2	7.7
CARBENDAZIM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORIDE (AS CL)	IC	CORNELL	mg/L	2	27.4	26.3	26.6	26.4	20.5	24.7	24.2	24.9	24.3	20.3	24.4	20.6	22.4	24.1	24.4	12
CHLORSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLETHODIM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLOPYRALID	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CYPRODINIL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEETHYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEISOPROPYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIAZINON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICAMBA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIMETHOATE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DITHIOPYR	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUAZIFOP-P-BUTYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUOXASTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

chemical name	method	lab name	units	detect-ion limit	LWA CC-1-1	LWACC -1-2	LWACC -1-3	LWACC -1-4	LWACC -2-1	LWACC -2-2	LWACC -2-3	LWACC -2-4	LWACC -3-1	LWACC -3-2	LWACC -3-3	LWACC -3-4	LWACC -4-1	LWACC -4-2	LWACC -4-3	LWACC -4-4
HALOFENOZIDE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
IMAZALIL	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
IMIDACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MAGNESIUM	ICP	CORNELL	mg/L		4.1	3.9	4	3.9	3.2	4.3	4	3.8	4.3	3.2	3.8	3.7	3.7	3.6	3.7	2
MALATHION	UPLCMSMS	NYSDEC	µg/L	0.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPP	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METALAXYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METHOMYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR	UPLCMSMS	NYSDEC	µg/L	0.07	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METSULFURON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NICOSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NITROGEN, NITRATE (AS N)	IC	CORNELL	mg/L	0.1	1.1	1	1	1.1	0.9	1.1	1	0.9	0.9	1	1.1	0.9	1	1	1.1	0.5
OXAMYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
OXYDEMETON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
POTASSIUM	ICP	CORNELL	mg/L		2.1	1.9	2	1.9	1.7	2.2	2.1		2.4	1.5	2	1.9	1.9	1.9	1.9	
POTASSIUM	ICP	CORNELL	mg/L	0.1								nd								nd
PROPAMOCARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PROSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SEVIN (CARBARYL)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SIMAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SODIUM	ICP	CORNELL	mg/L		13	12.7	13.1	12.7	10.7	14.9	13.8	12.6	14.9	10	13.2	12.4	12	11.9	11.9	6.1
SULFENTRAZONE	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SULFUR	ICP	CORNELL	mg/L		2.8	2.7	2.8	2.7	2.3	3	2.7	2.6	3	2.2	2.7	2.5	2.5	2.4	2.5	1.4
TEBUCONAZOLE	UPLCMSMS	NYSDEC	µg/L	0.01	0.04	0.02	0.03	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
TEBUFENOZIDE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIAMETHOXAM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIFENSULFURON METHYL (PINNACLE)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIODICARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table 17: Lake Waccabuc second cycle analytical results

chemical_name	method	lab name	units	detec-tion limit	LWACC-5-1	LWACC-5-2	LWACC-5-3	LWACC-5-4	LWACC-6-1	LWACC-6-2	LWACC-6-3	LWACC-6-4	LWACC-7-1	LWACC-7-2	LWACC-7-3	LWACC-7-4
2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-D (DICHLOROPHENOXYACETIC ACID)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-HYDROXY ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3-HYDROXYCARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ACETOCHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ALACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AMPA	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AZINPHOS, METHYL (GUTHION)	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
AZOXYSTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CARBOFURAN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORIDE (AS CL)	IC	CORNELL	mg/L	4	37.8	38.2	38	38.1	38.5	23.9	33.3	36.9	36.7	40.4	38.9	39.3
CHLOROTHALONIL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CHLORSULFURON	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLETHODIM	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLOPYRALID	UPLCMSMS	NYSDEC	µg/L	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CLOTHIANIDIN	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
CYPRODINIL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEETHYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DEISOPROPYLATRAZINE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIAZINON	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DICAMBA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DIMETHOATE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DITHIOPYR	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUAZIFOP-P-BUTYL	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUOPICOLIDE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FLUOXASTROBIN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
FOMESAFEN	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
GLYPHOSATE	UPLCMSMS	NYSDEC	µg/L	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
HALOFENOZIDE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
IMIDACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MALATHION	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPP	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MESOTRIONE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METALAXYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

METHOMYL	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR ESA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METOLACHLOR OA	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
METSULFURON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NICOSULFURON	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
NITROGEN, NITRATE (AS N)	IC	CORNELL	mg/L	0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
OXAMYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
OXYDEMETON METHYL	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PROPAMOCARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QUINCLORAC	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SEVIN (CARBARYL)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SIMAZINE	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SULFATE (AS SO4)	IC	CORNELL	mg/L	1	7.5	7.5	7.6	7.6	7.9	5.3	6.9	7.8	7.9	7.7	7.6	7.5
SULFENTRAZONE	UPLCMSMS	NYSDEC	µg/L	0.05	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
TEBUCONAZOLE	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIACLOPRID	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIAMETHOXAM	UPLCMSMS	NYSDEC	µg/L	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIFENSULFURON METHYL (PINNACLE)	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
THIODICARB	UPLCMSMS	NYSDEC	µg/L	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table 18: Buckingham Pond analytical results (all)

chemical_name	method	Lab	Detect Limit	BUCKP-1-1	BUCKP-1-2	BUCKP-1-2 dup	BUCKP-3-2
2,4-D (DICHLOROPHENOXYACETIC ACID)	ELISA	CORNELL	0.1	nd	nd		
ATRAZINE	ELISA	CORNELL	0.05	nd	nd		nd
CHLORIDE (AS CL)	IC	CORNELL	2.0	248.4	210.6		135.1
NITROGEN, NITRATE (AS N)	IC	CORNELL	0.1	1.1	0.9		0.6
CALCIUM	ICP	CORNELL		8.4	7.8		8.3
MAGNESIUM	ICP	CORNELL		15.3	11.9		8.1
POTASSIUM	ICP	CORNELL	0.1	nd	3.7		3.2
SODIUM	ICP	CORNELL		138.7	112.2		73.9
SULFUR	ICP	CORNELL		2.7	2.1		1.0
2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
2,4-D (DICHLOROPHENOXYACETIC ACID)	UPLCMSMS	NYSDEC	0.1	nd	0.162	0.14	nd
2-HYDROXY ATRAZINE	UPLCMSMS	NYSDEC	0.025	nd	nd	nd	nd
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
3-HYDROXYCARBOFURAN	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ACETOCHLOR	UPLCMSMS	NYSDEC	0.2	nd	nd		nd
ACETOCHLOR ESA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ACETOCHLOR OA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALACHLOR	UPLCMSMS	NYSDEC	1	nd	nd		nd
ALACHLOR ESA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALACHLOR OA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALDICARB	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
ALDICARB SULFONE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALDICARB SULFOXIDE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
AMPA	UPLCMSMS	NYSDEC	1	nd	nd	nd	nd
ATRAZINE	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
AZINPHOS, METHYL (GUTHION)	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
AZOXYSTROBIN	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
CARBENDAZIM	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
CARBOFURAN	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
CHLORSULFURON	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
CLETHODIM	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
CLOPYRALID	UPLCMSMS	NYSDEC	0.2	nd	nd	nd	nd
CYPRODINIL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
DEETHYLATRAZINE	UPLCMSMS	NYSDEC	0.025	nd	nd	nd	nd
DEISOPROPYLATRAZINE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DIAZINON	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
DICAMBA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DIMETHOATE	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
DITHIOPYR	UPLCMSMS	NYSDEC	1	nd	nd		nd
FLUAZIFOP-P-BUTYL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
FLUOXASTROBIN	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
HALOFENOZIDE	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
IMAZALIL	UPLCMSMS	NYSDEC	0.2	nd	nd		nd
IMIDACLOPRID	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
MALATHION	UPLCMSMS	NYSDEC	0.4	nd	nd		nd
MCPA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd

chemical_name	method	Lab	Detect Limit	BUCKP-1-1	BUCKP-1-2	BUCKP-1-2 dup	BUCKP-3-2
MCPP	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METALAXYL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
METHOMYL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
METOLACHLOR	UPLCMSMS	NYSDEC	0.07	nd	nd		nd
METOLACHLOR ESA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METOLACHLOR OA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METSULFURON METHYL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
NICOSULFURON	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
OXAMYL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
OXYDEMETON METHYL	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
PROPAMOCARB	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
PROSULFURON	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
SEVIN (CARBARYL)	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
SIMAZINE	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
SULFENTRAZONE	UPLCMSMS	NYSDEC	0.2	nd	nd	nd	nd
TEBUCONAZOLE	UPLCMSMS	NYSDEC	0.01	nd	nd		nd
TEBUFENOZIDE	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
THIACLOPRID	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
THIAMETHOXAM	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
THIFENSULFURON METHYL (PINNACLE)	UPLCMSMS	NYSDEC	0.1	nd	nd		nd
THIODICARB	UPLCMSMS	NYSDEC	0.1	nd	nd		nd

Table 19: Petonia Lake analytical results (all)

chemical_name	method	Lab	Detect Limit	PETON-1-1	PETON-2-1	PETON-3-1	PETON-4-1
2,4-D (DICHLOROPHENOXYACETIC ACID)	ELISA	CORNELL	0.1	nd	nd	nd	
ATRAZINE	ELISA	CORNELL	0.05	nd	nd	nd	nd
CHLORIDE (AS CL)	IC	CORNELL	2.0	17.0	9.1	10.4	10.3
NITROGEN, NITRATE (AS N)	IC	CORNELL	0.1	0.7	0.6	0.8	0.7
CALCIUM	ICP	CORNELL		4.9	4.6	4.6	4.7
MAGNESIUM	ICP	CORNELL	0.1	nd	1.0	1.1	1.0
POTASSIUM	ICP	CORNELL	0.1	nd	1.0	nd	1.1
SODIUM	ICP	CORNELL		5.5	5.4	5.5	5.5
SULFUR	ICP	CORNELL		1.8	1.7	1.8	1.7
2-(1-METHYLETHOXY) PHENOL METHYLCARBAMATE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
2,4-D (DICHLOROPHENOXYACETIC ACID)	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
2-HYDROXY ATRAZINE	UPLCMSMS	NYSDEC	0.025	nd	nd	nd	nd
3-(3,4-DICHLOROPHENYL)-1,1-DIMETHYLUREA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
3-HYDROXYCARBOFURAN	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ACETOCHLOR	UPLCMSMS	NYSDEC	0.2	nd	nd	nd	nd
ACETOCHLOR ESA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ACETOCHLOR OA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALACHLOR	UPLCMSMS	NYSDEC	1	nd	nd	nd	nd
ALACHLOR ESA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALACHLOR OA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALDICARB (SULFIDE, SULFOXIDE, AND SULFONE)	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALDICARB SULFONE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
ALDICARB SULFOXIDE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
AMPA	UPLCMSMS	NYSDEC	1	nd	nd	nd	nd
ATRAZINE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
AZINPHOS, METHYL (GUTHION)	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
AZOXYSTROBIN	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
CARBENDAZIM	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
CARBOFURAN	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
CHLORSULFURON	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
CLETHODIM	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
CLOPYRALID	UPLCMSMS	NYSDEC	0.2	nd	nd	nd	nd
CYPRODINIL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DEETHYLATRAZINE	UPLCMSMS	NYSDEC	0.025	nd	nd	nd	nd
DEISOPROPYLATRAZINE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DIAZINON	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DICAMBA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DIMETHOATE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
DITHIOPYR	UPLCMSMS	NYSDEC	1	nd	nd	nd	nd
FLUAZIFOP-P-BUTYL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
FLUOXASTROBIN	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
HALOFENOZIDE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
IMAZALIL	UPLCMSMS	NYSDEC	0.2	nd	nd	nd	nd
IMIDACLOPRID	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
MALATHION	UPLCMSMS	NYSDEC	0.4	nd	nd	nd	nd

chemical_name	method	Lab	Detect Limit	PETON-1-1	PETON-2-1	PETON-3-1	PETON-4-1
MCPA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
MCPP	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METALAXYL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METHOMYL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METOLACHLOR	UPLCMSMS	NYSDEC	0.07	nd	nd	nd	nd
METOLACHLOR ESA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METOLACHLOR OA	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
METSULFURON METHYL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
NICOSULFURON	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
OXAMYL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
OXYDEMETON METHYL	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
PROPAMOCARB	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
PROSULFURON	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
SEVIN (CARBARYL)	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
SIMAZINE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
SULFENTRAZONE	UPLCMSMS	NYSDEC	0.2	nd	nd	nd	nd
TEBUCONAZOLE	UPLCMSMS	NYSDEC	0.01	nd	nd	nd	nd
TEBUFENOZIDE	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
THIACLOPRID	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
THIAMETHOXAM	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
THIFENSULFURON METHYL (PINNACLE)	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd
THIODICARB	UPLCMSMS	NYSDEC	0.1	nd	nd	nd	nd

Appendix F: Lake Waccabuc and Sleepy Hollow Lake vicinity PSUR data, 2000-2009

These are unpublished transformations of published zip-code level annual data across New York. The transformations are primarily the merger of product composition data (% of each active ingredient) and liquid product density data with product use weights and volumes.

Table 20: Reported active ingredient sales and use, zip codes 10590+10597 (South Salem and Waccabuc), minimum 30 kg

ingr_name	ai_code	2000-2009	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2,4-D	030001	32		3		1	0	3	1	1	2	22
ACETIC ACID, (2,4-DICHLOROPHENOXY)-, 2-ETHYLHEXYL ESTER	030063	222	155	0			0	3	8	14	23	18
ALIPHATIC PETROLEUM SOLVENT	063503	51,138	9,327	2,865	3,465	3,501	11,488	3,444	10,317	2,482	2,240	2,010
BACILLUS THURINGIENSIS SUBSP. KURSTAKI	006402	34	1	18	2	1	5	2	1	1	2	1
BETA-CYFLUTHRIN	118831	36				0	0	27	1	0	1	7
BIFENTHRIN	128825	64	0	4	4	4	3	7	12	14	8	7
BORIC ACID	011001	35	1	1	0	0	0	0	0	2	5	25
CARBARYL	056801	1,043	624	24	25	59	51	40	10	13	80	117
CHLORFENAPYR	129093	114				0	0	0	55	1	1	56
CHLOROTHALONIL	081901	2,343	155	187	218	251	319	276	199	284	241	212
COAL TAR CREOSOTE	025004	148	148									
COPPER ETHANOLAMINE COMPLEX	024409	58	1	1	2	3	26	9	7	6	2	1
COPPER SULFATE PENTAHYDRATE	024401	5,902	841	897	943	179	626		715		630	1,072
COPPER TRIETHANOLAMINE COMPLEX	024403	35	0	1	1	2	16	5	4	4	1	1
CYFLUTHRIN	128831	93	67	8	4	3	2	3	3	3	1	1
DICAMBA	029801	34	27	0		0	0	0	1	1	2	3
DICAMBA, DIMETHYLAMINE SALT	029802	97	65	3	2	0	1	5	5	7	5	3
DIMETHYLAMINE (R)-2-(2-METHYL-4-CHLOROPHENOXY)PROPIONATE	031520	305	204	14	11	14	4	14	9	13	13	9
DIMETHYLAMINE 2,4-DICHLOROPHENOXYACETATE	030019	1,041	714	45	24	1	11	49	46	64	50	39
DIMETHYLAMINE SALT OF (+)-R-2-(2,4-DICHLOROPHENOXY)PROPANOIC ACID	031403	42	13	5	4	14	0	4	0	1	1	0
DITHIOPYR	128994	53	4	1	3	1	5	6	5	5	6	19
ENDOTHAL-DIPOTASSIUM	038904	874	202	115	246	196			115			
ETHYLHEXYL (R)-2-(2,4-DICHLOROPHENOXY)PROPIONATE	031465	76	76	0			0		0	0	0	
FOSETYL-AL	123301	319		4				8	171		25	112
GLYPHOSATE-ISOPROPYLAMMONIUM	103601	47	1	2	5	1	2	2	8	4	16	6
IMIDACLOPRID	129099	141	8	7	8	10	11	16	21	17	27	16
IPRODIONE	109801	430	13	18	15	14	11	6	31	98	110	114
ISOOCTYL 2-(2,4-DICHLOROPHENOXY)PROPIONATE	031463	152	152				0		0	0	0	
MANCOZEB	014504	389	3	1	9	16	1	20	49	25	67	197
MCPA, DIMETHYLAMINE SALT	030516	132	48	8	16	43	5	13	1			0
MECOPROP, DIMETHYLAMINE SALT	031519	655	382	34	13	0	98	50	15	22	24	17
METALAXYL-M	113502	67	0	0	0			9	9	16	16	16
MINERAL OIL - INCLUDES PARAFFIN OIL FROM 063503	063502	22,456					7,938	684	10,469	981	1,031	1,352
MONO- AND DI- POTASSIUM SALTS OF PHOSPHOROUS ACID	076416	247						5	120	3	4	115
PENDIMETHALIN	108501	407	76	88	49	27	15	39	67	14	15	18
PENTACHLORONITROBENZENE	056502	752	41	37	34	32	218	201	188			
PERMETHRIN, MIXED CIS,TRANS	109701	228	168	6	8	1	23	7	3	4	5	3
PIPERONYL BUTOXIDE	067501	44	19	16	2	1	0	1	1	1	2	1
POTASSIUM SALTS OF FATTY ACIDS	079021	734	5	93	72	71	38	80	75	129	113	58
PRODIAMINE	110201	67	0	1	-	3	1	2	10	17	13	20
PROPAMOCARB HYDROCHLORIDE	119302	195						28	5	76	40	47
PROPICONAZOLE	122101	89	13	0	1	0	5	2	24	21	0	23
SODIUM FLUORIDE	075202	289	289									
THIOPHANATE-METHYL	102001	443	24	35	56	50	77	68	90	14	11	18
THIRAM	079801	532	20	30	24	36	64	67	64	64	75	87
TRIADIMEFON	109901	241	16	18	11	7	18	16	21	32	67	35
TRICHLORFON	057901	570	62	98	43	44	27	95	24	121	55	
TRIETHYLAMINE TRICLOPYR	116002	89	73	3	3	0	4	2	0	2	1	2
TRIFLURALIN	036101	33	1		0	1	9	7	3	5	4	2
TRIISOPROPANOLAMINE 2,4-DICHLOROPHENOXYACETATE	030035	1,115	974	38	37	-	36	13	1		6	10
VINCLOZOLIN	113201	101							33	1	32	35

Table 21: Reported active ingredient sales and use, zip codes 12015+12051 (Athens and Coxsackie), minimum 40 kg

ingr_name	ai_code	2000-2009	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ACETIC ACID, (2,4-DICHLOROPHENOXY)-, 2-ETHYLHEXYL ESTER	030063	45		2		13	4	4	5	7	8	2
ACID BLUE 9	110301	52	3	2	5	4		4	16	4	13	
ALACHLOR	090501	492	54	58				52	102	70	145	11
ALIPHATIC PETROLEUM SOLVENT	063503	48	0	0	-	4	1	0	0	0	14	29
ARSENIC PENTOXIDE	006802	76,605	-	33,196		43,409						
ATRAZINE	080803	1,496	47	141	121	145	123	126	116	219	274	184
AZOXYSTROBIN	128810	80	4	14	6		17	25	10	1	3	
BASIC COPPER SULFATE	008101	184									184	
BENSULIDE	009801	49							5	9	36	
BORIC ACID	011001	598,656	57,729	41,985	1	52,483	36,828	95,601	96,020	108,066	61,401	48,542
BORON SODIUM OXIDE (B8NA2O13), TETRAHYDRATE (12280-03-4)	011103	156	3	39	35	5	32	7	18	10	3	3
BUTOXYETHYL 2,4-DICHLOROPHENOXYACETATE	030053	98	16	13	16	13		13	13	13		
BUTOXYETHYL TRICLOPYR	116004	105	11	56	8	6		6	8	9		0
CAPTAN	081301	61	7	2		23		7		22		
CARBOFURAN	090601	503	112	56	56	112			168			
CHLORO-2-METHYL-3(2H)-ISOTHIAZOLONE	107103	982	-	104	51	52	467				308	
CHLOROTHALONIL	081901	1,715	14	131		11	87	181	215	498	558	19
CHROMIC ACID	021101	107,022	-	46,377		60,645						
CLOMAZONE	125401	227	-	27			26	53	23	54	36	8
COPPER CARBONATE, BASIC	022901	519,371					128	94907	101632	115016	102517	105170
COPPER ETHANOLAMINE COMPLEX	024409	5,527									5,527	
COPPER HYDROXIDE	023401	925		48	119	250	127	47	22	302	11	
COPPER SULFATE PENTAHYDRATE	024401	28,829	6,959	3,547	5,231	3,480	5,545	2,380	476		584	629
CUPRIC OXIDE	042401	41,682	-	18,063		23,620						
CYFLUTHRIN	128831	133	1	1	0	0	0	109	2	0	0	19
DELTAMETHRIN	097805	45	0	0	0	5	1	4	0	5	16	13
DIAZINON	057801	63	2	0	24	0	10	9	9	9		
DICHLOBENIL	027401	78	22			45			5	6		
DIMETHENAMIDE-P	120051	349						32	37	111	128	41
DIMETHYLAMINE 2,4-DICHLOROPHENOXYACETATE [2,4-D]	030019	186	0	0	7	1	5	2	16	16	13	125
DIURON	035505	231	33	2	1	5	2	4	25	51	54	54
ENDOSULFAN	079401	216	7	0	32	23	28	3	7	89	14	14
ETHALFLURALIN	113101	529					19	140	73	155	116	27
FLURIDONE	112900	83										83
FOSAMINE AMMONIUM	106701	466	59		45	47		16	181	110	8	
GLUTARAL	043901	458			228	229			1			
GLYCINE, N-(PHOSPHONOMETHYL)-POTASSIUM SALT	103613	490				29	66	58	69	137	108	23
GLYPHOSATE-ISOPROPYLAMMONIUM	103601	4,767	36	122	74	40	120	3,972	48	67	182	105
IMIDACLOPRID	129099	78	1	1	0	5	4	0	1	25	40	1
ISOOCTYL(2-ETHYL-4-METHYLPENTYL) 2,4-DICHLOROPHENOXYACETATE	030064	43		2		13	4	4	5	7	8	
LAMBDA-CYHALOTHRIN	128897	190	0	1	0	21	5	60	34	41	16	12
MANCOZEB	014504	449	1	23	104	162	122	9	9	16	3	
MANEB	014505	159		27		19			18	59	36	
METALAXYL-M	113502	119						0	55	44	20	
METHYL-3(2H)-ISOTHIAZOLONE	107104	349	-	37	18	18	166				110	
METOLACHLOR	108800	960	14	107	164	170	139	82	70	87	126	
OCTHILINONE	099901	2,236					4				2,232	
PARAQUAT DICHLORIDE	061601	42			9			5	3	6	19	
PENDIMETHALIN	108501	739	0	29	34	40	37	29	50	175	261	83
PERMETHRIN, MIXED CIS,TRANS	109701	252	-	22	18	20	41	46	12	56	25	13
POLY(OXYETHYLENE (DIMETHYLIMINIO) ETHYLENE (DIMETHYLIMINIO) ETHYLENE DICHLORIDE)	069183	620			310	310						
POTASSIUM SALTS OF FATTY ACIDS	079021	42	-	2	5				25		10	1
PROPICONAZOLE	122101	1,281							0	0	528	753
SETHOXYDIM	121001	58		7	6	3	6	6	13	8	8	
SODIUM BENTAZON	103901	48				16		16	5	7	5	
SULFOMETURON METHYL	122001	52	1	2	0	3	22	1	1	4	4	13
TEBUCONAZOLE	128997	8,441					3	2,181	2,336	2,643	525	753
TRIISOPROPANOLAMINE 2,4-DICHLOROPHENOXYACETATE	030035	47	2	28	-	-	1		4	4	3	4