



Monitoring and Evaluation of Cyanobacteria in Lake Champlain

Summer 2007

Prepared by

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for
Lake Champlain Basin Program

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**MONITORING AND EVALUATION OF CYANOBACTERIA
IN LAKE CHAMPLAIN**

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Report to

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EXECUTIVE SUMMARY

In 2007, monitoring for potential toxin-producing cyanobacteria continued on Lake Champlain with the following specific objectives:

- Continue monitoring of blue-green algae (BGA) at the Long-term Water Quality and Biological Monitoring Project sites, selected stations in the greater Burlington area, St. Albans Bay and Missisquoi Bay by UVM and the Vermont DEC.
- Continue to work with volunteer Citizen monitors in Missisquoi Bay and in other locations in the north lake and on the New York side of the lake.
- Continue screening for the presence of toxins when potential toxin-producing BGA are observed.
- Continue to use and refine a tiered BGA alert system framework, incorporating data and knowledge gained from 2003 through 2005.
- Maintain the existing communication network among state and provincial agencies in Vermont, New York and Quebec to facilitate regular exchange of information about current BGA conditions and the potential for human exposure to toxins. Continue to work toward a lake-wide standard for reporting this information.

Collections of net and whole water plankton began in June in most locations, and continued into mid-October. Sample sites encompassed all of Lake Champlain, but a special effort was made in Missisquoi Bay, St. Albans Bay, and the north lake, areas known to have problems with toxic blooms in the past. Citizen monitors living around the lake at 16 specific sites were recruited to collect samples from shoreline locations where algae accumulated.

In 2007, the density of potential toxin-producing cyanobacteria was very low compared to previous years. Highest densities of potential toxin producing cyanobacteria were found in a transient fall bloom near the Burlington Dingy Dock in Burlington Bay. Cyanobacteria did not dominate the plankton in Missisquoi Bay and no microcystin was measured in this bay during the 2007 growing season. Cyanobacteria densities in St Albans Bay overall were lower than previous years and measured microcystin concentrations were also low. Trace amounts of microcystin were found at several locations in the north lake during July and August. No anatoxin-*a* was found at any site in 2007.

The e-mail notification system worked well to keep public health officials informed about algal and toxin conditions. In 2007, we continued to collaborate with Vermont Department of Health to post information about blue-green algae and the weekly results of our testing on their web site to improve communication with the users of Lake Champlain. Information from all locations where samples were tested was included on the website.

INTRODUCTION

Lake Champlain is one of the largest lakes in the United States and is often called the "Sixth Great Lake." Although primarily a recreational lake, it also serves as a source of drinking water and a site for the disposal of municipal wastes in communities throughout the basin.

In response to a dog-poisoning attributed to cyanobacteria toxins in 1999, the LCBP initiated a study to investigate the occurrence of potential toxin-producing cyanobacteria and their toxins in Lake Champlain in 2000. Over the next seven years, this monitoring program has evolved to document the presence and extent of toxic cyanobacteria blooms in Lake Champlain, and the levels of cyanotoxins that have occurred.

In addition, a project supported through NOAA's MERHAB program began in 2002 and continued through 2007 on Lake Champlain, through a partnership between UVM, SUNY-ESF and SUNY-Plattsburgh. The project has multiple objectives, including documenting the distribution of cyanotoxins in the lake, developing a rapid screening method for anatoxin-*a*, and developing methods for monitoring throughout the lower Great Lakes (Lakes Erie, Ontario and Champlain). Data collected from this project are not available rapidly enough to drive the weekly public alert system, but data are regularly shared among the project investigators.

Beginning in 2003, regular monitoring has been conducted by UVM in partnership with the LCBP long-term monitoring program and with citizen monitors recruited with the assistance of the Lake Champlain Committee. In 2006 we continued this effort with the following specific objectives:

Objectives:

- Continue monitoring of BGA at the Long-term Water Quality and Biological Monitoring Project (LTMP) sites, selected stations in the greater Burlington area, St. Albans Bay and Missisquoi Bay by UVM and the Vermont DEC.
- Continue to work with volunteer Citizen Monitors in Missisquoi Bay and in other locations in the north lake and on the New York side of the lake.
- Continue screening for the presence of toxins when potential toxin-producing
- Continue to use a tiered BGA alert system framework, incorporating data and knowledge gained from 2003 through 2005.
- Maintain the existing communication network among state and provincial agencies in Vermont, New York and Quebec to facilitate regular exchange of information about current BGA conditions and the potential for human exposure to toxins. Continue to work toward a lake-wide standard for reporting this information.

METHODS

Field Collection

To survey plankton populations lakewide, we established partnerships with the VT DEC and NY DEC staff conducting the LCBP long-term monitoring program. VT DEC staff collected plankton samples from the 15 LTMP sites during their routine collections (Figure 1). Working with the Lake Champlain Committee, we also recruited volunteers to sample shoreline locations in Missisquoi Bay, Maquam Bay, and other areas of the lake (Figure 1). We also sampled sites in Missisquoi Bay, St. Albans Bay, and Burlington Bay, where the highest population density of basin residents live and two large water supply systems draw their water.

Frequency. Monitoring for the presence of BGA began in June at the LTMP sites and at the UVM sites and in early July at the citizen monitoring sites. The LTMP sites were sampled approximately biweekly regardless of bloom conditions, as dictated by the state's regular program activities. Frequency of sample collection in Burlington Bay, Missisquoi Bay, and St. Albans Bay was bi-weekly or weekly, as determined following the tiered alert system framework (Table 1). This framework, based on recommendations in Chorus and Bartram (1999) calls for less frequent sampling initially, then weekly sampling once bloom conditions appear. Citizen monitors sampled weekly from July through August. In Burlington Bay, cyanobacteria levels remained low throughout the season, and we remained at a bi-weekly sampling interval for the entire period. In Missisquoi and St. Albans Bay, algal densities were much higher, and weekly sampling was initiated in early July and continued into early November, when cell densities indicated the decline of the bloom.

Analytical Parameters. The following types of samples were collected in Burlington Bay, St. Albans Bay and Missisquoi Bay during 2007:

- whole water and net plankton
- whole water for total nitrogen
- whole water for total phosphorus
- whole water for chlorophyll *a*
- whole water for toxins (the analysis of this parameter began when microscopic analysis indicated potential toxin-producing taxa have reached densities of concern)

At the LTMP sites, only net plankton samples were collected for this project; however, total nitrogen, total phosphorus, and chlorophyll samples were collected as part of the Long-Term Biomonitoring Project.

Sample Collection. Net plankton samples were obtained using a 63- μ m Wisconsin net. A single 3 m tow was collected, placed in a cooler, and transported back to the laboratory where the total volume was recorded and a subsample was preserved for analysis.

Total nitrogen, total phosphorus, chlorophyll *a*, and whole water plankton samples were collected by surface grab sampling. Two replicates were collected for each parameter.

Figure 1. Location of the blue-green algae monitoring locations.

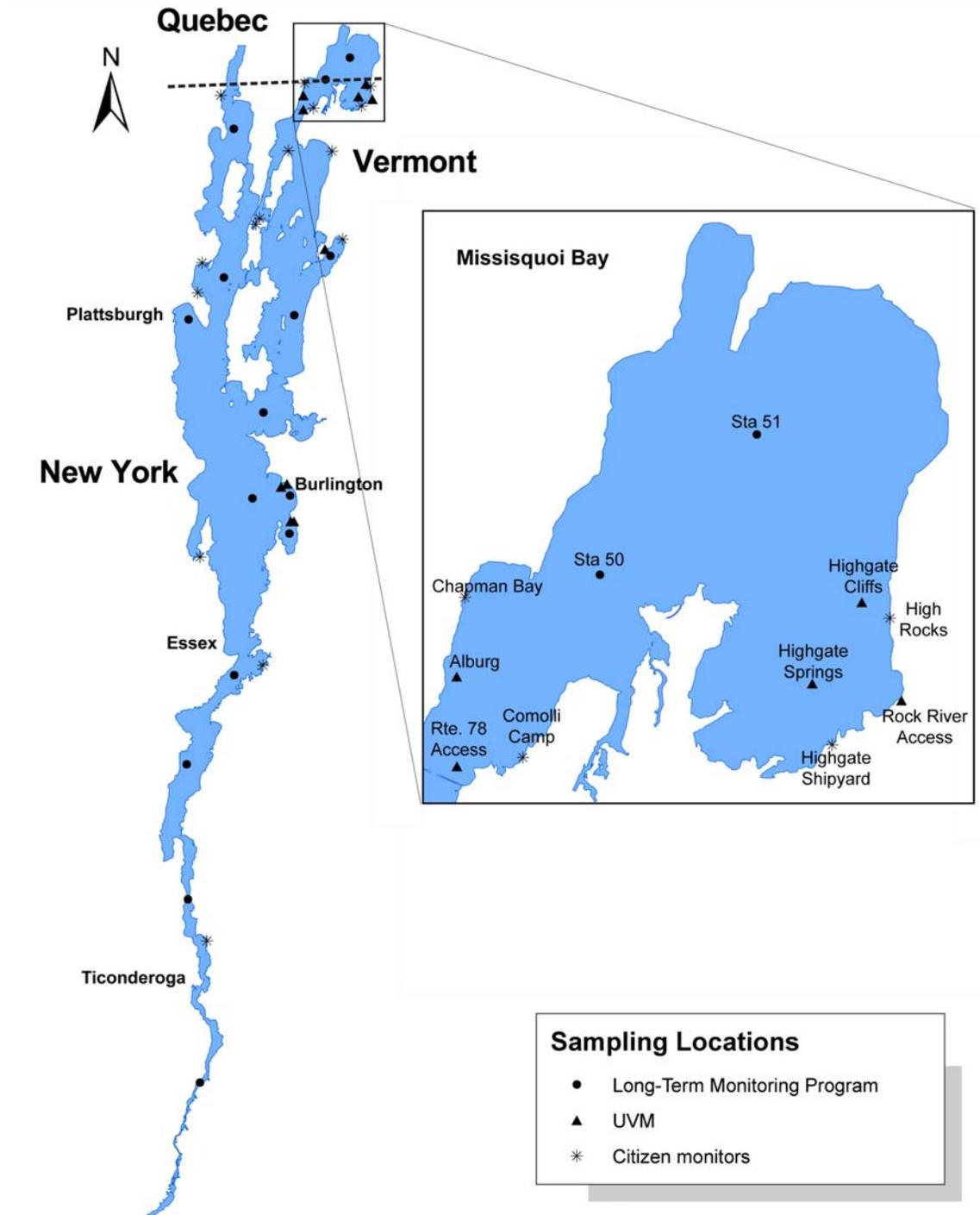


Table 1. Outline of our prototype tiered sampling and alert framework.

Qualitative Sampling

Frequency: 2/month

Collect: Vertical plankton tows (63- μ m net, upper 3 m)
Screened within 48 hours

Conclusions: If potential toxin-producing taxa observed,
proceed to *Quantitative sampling*

Quantitative Sampling

Frequency: 2/month

Collect: Vertical plankton tow (63- μ m net, upper 3m)
Full enumeration within 48 hours

Conclusions: If BGA reaches densities reach 2000 cells/mL,
proceed to *Vigilance level*

Vigilance Level

Frequency: 1/wk at midday

Collect: Vertical plankton tow (63- μ m net, upper 3m)
Full enumeration within 48 hours

Conclusions: If BGA exceed 4,000 cells/mL, proceed to *Alert Level 1*
Return to *Quantitative sampling* if densities fall below 2,000 BGA cells/mL
Notify public health officials that BGA are abundant and blooms could form

Alert Level 1

Frequency: 1/wk at midday (or more frequently as needed)

Collect: Whole water phytoplankton samples
Whole water chlorophyll *a*
Whole water toxin samples

Conclusions: If microcystin concentration exceeds 6 μ g/L (VDH recreational standard),
proceed to *Alert Level 2*
Notify public health officials of potential risks to humans and animals

Alert Level 2

Frequency: 1/wk at mid-day (or more frequently as weather conditions dictate)

Collect: As for Alert Level 1

Conclusions: Return to *Alert Level 1* if microcystin concentration drops below 6 μ g/L
Notify public health officials that significant risk to humans and animals exists.
Public Health Advisories should be issued by appropriate agencies.

Preservation and storage. Nalgene high-density polyethylene bottles were used for all samples, excluding total nitrogen samples which were collected in 50 mL polypropylene centrifuge tubes. Total phosphorus containers were cleaned with 20% hydrochloric acid solution prior to use. Nitrogen samples were preserved with sulfuric acid to a pH less than 2 and stored at 4°C until analysis. Total phosphorus samples were frozen until analysis. Plankton samples were preserved with 1% Lugols iodine solution and stored in the dark until analysis. Chlorophyll samples were filtered within 24 hours and frozen prior to analysis. Lake water samples for toxin analysis were preserved in one of two ways: filtered and frozen upon return to the lab, filtered and shipped for analysis at SUNY-ESF or at Vermont Department of Health.

Sample Analysis

Chlorophyll. All samples were thoroughly mixed and then filtered onto glass fiber filters (Whatman 934-AH; retention size ~1.5 μm) under low vacuum. After sufficient material was filtered to leave a visible green layer, filters were placed in clean 15 mL plastic centrifuge tubes and frozen. For chlorophyll extraction, 8 mL of 95% ethanol was added to each tube, all tubes were placed in an 80°C water bath for 8 minutes. Then samples were covered in foil and placed in a refrigerator overnight. After the extraction, samples were brought to room temperature, shaken to homogenize the extract, and centrifuged at 3000 rpm for 10 minutes. Non-acidified and acidified extract absorbance was measured at 665 and 750 nm.

Net plankton. Net plankton were analyzed either as qualitative or quantitative samples. Initially samples were evaluated qualitatively: all taxa present were noted and recorded. Once potentially toxic cyanobacteria were identified in the samples, evaluation became quantitative; individual algal units in the samples were identified and enumerated, and densities were calculated for each taxon.

An aliquot of well-mixed sample was placed in a Sedgwick Rafter cell and allowed to settle for 10 minutes. Slides were examined at 100X with phase contrast using an inverted Olympus IX70 microscope. For qualitative screening, the entire chamber was scanned and algal taxa present were recorded. For quantitative screening, algal units were identified and enumerated. Counting continued until 100 cells of the most abundant genus had been observed or at least 10 fields had been examined. Algal units were categorized by size (single cells, fragments of colonies or filaments, small, medium, or large colonies or filaments). The enumerated natural units were multiplied by a cell factor to estimate cell densities (Table 2). Cell densities were extrapolated to reflect plankton populations in the original lake water.

Whole water plankton. Whole water plankton were examined using Utermöhl settling chambers. Aliquots of well-mixed samples were allowed to settle for 1-4 days, depending on the chamber volume, and then counted using an Olympus IX70 or an Olympus IX71 inverted microscope with phase contrast at 400X. Both natural units and individual cells comprising the natural units were enumerated. Counting continued until 100 units of the most abundant taxa had been observed or 100 fields had been evaluated.

Table 2. Cell factors used to estimate field densities of colonial algae.

Taxon	Unit Category	Estimated Cells/Unit	Cell Factor
		1 – 20	
<i>Anabaena spp.</i> ,	fragment		10
<i>Aulacoseira</i> ,	small	20 – 100	60
<i>Fragilaria</i>	medium	100 – 1000	500
	large	>1000	1000
	small	<100	50
<i>Microcystis</i> ,	medium	100 - 1000	500
<i>Coelosphaerium</i>	large	>1000	1000
	fragment	single trichome	20
	small	quarter of a colony	2500
<i>Gloeotrichia spp.</i>	medium	half of a colony	5000
	large	entire colony	10,000
	fragment	single trichome	measured
<i>Aphanizomenon spp.</i>	small	small flake	200
	medium	medium flake	500
	large	large flake	1000

Total Phosphorus. Total phosphorus samples were thawed and mixed thoroughly. An aliquot (generally 50 mL) was digested using ammonium persulfate (1998) and analyzed following Quikchem™ Method 10-115-01-1-F using a Lachat Quikchem™ 8000 Series Flow Injection Analyzer.

Total Nitrogen. Total nitrogen samples were analyzed using persulfate digestion (APHA 1998) and cadmium reduction following Quikchem™ Method 10-107-06-2-H using a Lachat Quikchem™ 8000 Series Flow Injection Analyzer.

Toxin Sample Preparation. Filters for analysis of toxins by high performance liquid chromatography (HPLC) at the Vermont Department of Health were placed on dry ice and delivered to the lab within 24 hours. Filters for ELISA assay by UVM were placed in 15 mL glass centrifuge tubes with Teflon-lined caps in 8 mL of 50% methanol, shaken well and stored at –80°C until analysis.

Microcystin(s) by ELISA. Toxin samples in 50% methanol were thawed, shaken and re-frozen two times before beginning analysis. Extracted samples were diluted with deionized water until methanol represented less than 5% of the total volume, following recommendations to improve the accuracy of the method (Metcalf et al. 2000). Microcystin plate kits were purchased from Envirologix Inc. (Portland, ME).

Samples were run in duplicate following manufacturer’s instructions on a KC Jr. plate reader (Biotek Instruments), utilizing standards provided in the kit. Mean values were used to determine the toxin concentration of each pair of samples. Samples exceeding the range recommended by the kit were diluted and re-analyzed. Samples below the range were also re-analyzed using manufacturer recommended dilution procedures for the standards.

Anatoxin-a by HPLC. At Vermont Department of Health, algal material was freeze-dried and then extracted with acidified methanol. Solid phase extraction cartridges were eluted with 100% methanol. Samples were analyzed following James et al. (1997).

RESULTS

Cyanobacteria and Toxins at the Monitoring Sites

While many of the samples collected at the Long Term Monitoring Sites were analyzed qualitatively until mid to late summer, almost all of the samples collected by UVM and the citizen monitors were analyzed quantitatively. The total number of samples collected for each type of analysis (quantitative plankton and toxin) was about 500 in 2007 (Table 3).

Table 3. Number of quantitative samples collected and analyzed in the Cyanobacteria Monitoring Program in 2007.

Sample Type	Phytoplankton		Microcystin	Anatoxin-a*
	Net	Whole Water		
Number of Samples Collected	249	211		
Number of Samples Analyzed	234	149	46	5

*Analyzed at Vermont Department of Health Laboratory

The alert status reached and the maximum density of potentially toxic cyanobacteria cells at each site monitored are listed in Table 4. *Aphanizomenon* spp., *Microcystis* spp. and *Anabaena flos-aquae* were all widely distributed at sites across Lake Champlain. In 2007, however, cell densities were much lower than previous years. Except for the shoreline bloom near the Burlington Dingy Dock in October, no site had densities in the 100,000 cells per mL range, while in previous years, cell densities at this level were common in the north lake.

None of the Long Term Monitoring sites reached Alert status during the summer of 2007. Among the regular UVM Sites, the site in St. Albans Bay and a supplemental sample collected near the Champlain Water intake in Burlington Bay reached Alert Level 1. Shoreline samples collected at Maquam Bay, Knight Point, North Hero State Park, Pelots Bay, St. Albans Bay Park and several nearby sites along the shoreline, the Burlington Bay Dingy Dock, and the Melosira Boat Slip reached Alert Level 1. No site achieved Alert Level 2 in 2007.

**Table 4. Summary of plankton sample status at cyanobacteria monitoring stations in 2007.
All microcystin concentrations are based on ELISA tests conducted at UVM.**

LCBP Long Term Monitoring Program Sites

Region	Station/Location	Monitoring Status	Date Achieved	Cyanobacteria Present	Maximum Density of Potentially Toxic Cells/mL
South	2. Benson Landing	Quantitative	06/12/07		0 (06/12/07)
	4. Crown Point	Quantitative	06/12/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	223 (08/07/07)
	7. Cole Bay	Quantitative	06/26/07	<i>Anabaena,</i> <i>Aphanizomenon</i>	268 (08/21/07)
	9. Diamond Island	Quantitative	08/21/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	144 (08/21/07)
Main	16. Shelburne Bay	Quantitative	06/11/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	322 (07/24/07)
	19. Main Lake	Quantitative	07/06/07	<i>Anabaena,</i> <i>Aphanizomenon</i>	17 (08/09/07)
	21. Burlington Harbor	Quantitative	07/24/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	88 (07/24/07)
	25. Malletts Bay	Quantitative	06/14/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	142 (08/15/07)
Northwest	33. Cumberland Bay	Quantitative	06/18/07	<i>Anabaena</i>	28 (07/31/07)
	36. Point au Roche	Quantitative	06/18/07	<i>Anabaena,</i> <i>Aphanizomenon</i>	46 (08/27/07)
	46. Alburg Center	Quantitative	07/02/07	<i>Anabaena,</i> <i>Microcystis,</i>	58 (09/18/07)
Northeast	34. Inland Sea	Quantitative	06/19/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	700 (07/16/07)
	40. St. Albans Bay	Quantitative	06/19/07	<i>Anabaena,</i> <i>Microcystis,</i> <i>Aphanizomenon</i>	1,107 (07/30/07)
Missisquoi Bay	50. Missisquoi Bay	Quantitative	06/14/07	<i>Microcystis</i>	25 (08/13/07)
	51. Missisquoi Bay	Quantitative	06/14/07	<i>Anabaena</i>	30 (08/29/07)

UVM Monitoring Sites

Region	Location	Monitoring Status	Date Achieved	Highest Microcystin (µg/L) Observed (wwp)	Cyanobacteria Present	Maximum Density of Potentially Toxic Cells/mL (net or wwp*)
Main	Burlington Water Bay	Quantitative	07/12/07	Not measured	<i>Anabaena, Microcystis, Aphanizomenon</i>	154 (08/23/07)
	Champlain Water Bay	Quantitative	06/13/07	Not measured	<i>Anabaena, Microcystis, Aphanizomenon</i>	114 (08/06/07)
	North Beach	Quantitative	06/13/07	Not measured	<i>Microcystis, Aphanizomenon</i>	34 (09/13/07)
	Red Rocks Beach	Quantitative	07/12/07	Not measured	<i>Anabaena, Microcystis</i>	171 (07/23/07)
Northeast	St. Albans Boatlaunch	Alert 1	08/07/07	0.042 (08/14/07)	<i>Anabaena, Microcystis, Aphanizomenon</i>	5,262 (08/07/07)
Missisquoi Bay	Rte. 78 Access	Quantitative	06/19/07	Not measured	<i>Anabaena</i>	263 (10/02/07)
	Alburg	Quantitative	06/19/07	Not measured	<i>Anabaena, Microcystis</i>	61 (08/21/07)
	Highgate Cliffs	Quantitative	06/19/07	Not measured	<i>Anabaena</i>	411 (09/18/07)
	Highgate Springs	Quantitative	06/05/07	Not measured	<i>Anabaena</i>	181 (09/18/07)
	Highgate Springs Shipyard	Quantitative	10/15/07	Not measured		0 (10/15/07)
	Rock River Access	Quantitative	07/31/07	Not measured	<i>Anabaena</i>	1,116 (08/21/07)

* whole water grab, analyzed by rapid count protocol

Citizen Monitoring Sites

Region	Location	Monitoring Status	Date Achieved	Highest Microcystin (µg/L) Observed	Cyanobacteria Present	Maximum Density of Potentially Toxic Cells/mL
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South	Littlefield Shore	Vigilance	07/15/07	Not measured	<i>Anabaena</i>	3,070 (07/15/07)
Main	Long Point	Quantitative	07/22/07	Not measured	<i>Anabaena</i>	351 (07/22/07)
	Beggs Park	Quantitative	08/05/07	Not measured	<i>Aphanizomenon</i>	474 (08/26/07)
	Willsboro Bay	Quantitative	08/06/07	Not measured		0 (08/06/07)
Northwest	Cumberland Bay State Park	Quantitative	08/19/07	Not measured		0 (08/19/07)
	Point Au Roche	Quantitative	07/29/07	Not measured		0 (07/29/07)
	Rouses Point	Quantitative	07/16/07	Not measured	<i>Anabaena</i>	1,684 (08/13/07)
Northeast	Carry Bay	Vigilance	08/20/07	Not measured	<i>Anabaena</i>	3,789 (08/20/07)
	City Bay	Quantitative	07/01/07	Not measured	<i>Anabaena</i>	1,684 (08/13/07)
	Dunham Bay	Quantitative	08/13/07	Not measured		0 (08/13/07)
	Knight Point	Alert 1	07/23/07	0.037 (07/23/07)	<i>Anabaena,</i> <i>Microcystis</i>	10,842 (07/23/07)
	Maquam Bay	Quantitative	07/09/07	Not measured	<i>Anabaena</i>	88 (07/09/07)
	North Hero State Park	Alert 1	08/20/07	0.046 (08/20/07)	<i>Microcystis</i>	7,895 (08/20/07)
	Pelots Bay	Alert 1	08/13/07	0.073 (08/13/07)	<i>Anabaena</i>	90,038 (08/13/07)
	St. Albans Bay Park	Alert 1	07/10/07	0.177 (08/20/07)	<i>Anabaena,</i> <i>Microcystis</i>	40,395 (08/13/07)
Missisquoi Bay	Chapman Bay	Quantitative	08/05/07	Not measured	<i>Anabaena</i>	632 (08/12/07)
	Comolli Campsite	Quantitative	07/23/07	Not measured		0 (07/23/07)
	High Rocks	Quantitative	07/01/07	Not measured	<i>Microcystis</i>	526 (08/19/07)
	Highgate Springs Shipyard	Quantitative	07/01/07	Not measured	<i>Aphanizomenon</i>	70 (07/22/07)

Supplemental samples collected when bloom conditions were apparent, June – October

Region	Location	Monitoring Status	Date Achieved	Highest Microcystin (µg/L) Observed	Cyanobacteria Present	Maximum Density of Potentially Toxic Cells/mL
Main	Burlington Dingy Dock	Alert 1	10/17/07	No toxin sample collected	<i>Anabaena,</i> <i>Microcystis</i>	1,118,667 (10/17/07)
	Champlain Water Bay vicinity	Alert 1	07/12/07	0.02 (07/12/07)	<i>Anabaena</i>	156,842 (07/12/07)

	Coast Guard Station vicinity	Quantitative	09/13/07	Not measured	<i>Microcystis</i>	36 (09/13/07)
	Melosira Boat Slip	Alert 1	10/18/07	No toxin sample collected	<i>Anabaena, Microcystis, Aphanizomenon</i>	14,500 (10/18/07)
Northeast	Carry Bay	Quantitative		No toxin sample collected	<i>Anabaena, Microcystis, Aphanizomenon</i>	16 (08/27/07)
	Fish Bladder Island	Vigilance	07/05/07	No toxin sample collected	<i>Anabaena, Microcystis</i>	2,272 (07/05/07)
	Maquam Bay vicinity-southeast	Alert 1	07/26/07	No toxin sample collected	<i>Anabaena, Microcystis</i>	20,614 (07/26/07)
	St. Albans Bay near Sta 40	Alert 1	07/12/07	0.072 (07/12/07)	<i>Anabaena, Microcystis</i>	68,526 (07/12/07)
	St. Albans Bay near Steven's Brook	Alert 1	07/12/07	No toxin sample collected	<i>Anabaena</i>	33,070 (07/12/07)
Missisquoi Bay	Near Sta 50	Quantitative	08/21/07	No toxin sample collected	<i>Anabaena</i>	1,158 (08/21/07)

The highest concentration of microcystins in 2007 was found in a fall supplemental sample collected near the Burlington Dinghy Dock (Table 5). A trace of microcystins was also found near the Champlain Water intake in Burlington Bay in a fall sample. Low concentrations of microcystins were found at several sites in St. Albans Bay, and at North Hero State Park, Pelots Bay, and Knights Point. Similar to previous years, no anatoxin-*a* was found at any site in 2007.

Table 5. Number of samples tested and maximum concentration of microcystins measured in 2007.

Region	Collected by	Location	No. Samples Tested	Max. Microcystin Conc. (µg/L)
South	Citizen Monitor	Littlefield Shore	0	
Main	Citizen Monitor	Long Point	0	
		Begg's Park	0	
		Willsboro Bay	0	
	UVM	Red Rocks Beach	0	
		Champlain Water Bay	0	
		Champlain Water Bay vicinity	1	0.02
		Burlington Water Bay	0	
		North Beach	0	
Burlington Dingy Dock	1	5.61		
Northwest	Citizen Monitor	Point Au Roche	0	
		Rouses Point	0	
Northeast	Citizen Monitor	Carry Bay	0	
		City Bay	0	

		North Hero State Park	1	0.05
		Pelots Bay	2	0.07
		Knight Point	1	0.04
		Maquam Bay	0	
St. Albans Bay	Citizen Monitor	St. Albans Bay Park	5	0.54
	UVM	St. Albans Boatlaunch	12	0.07
	VT DEC	St. Albans_1	3	0.08
		St. Albans_2	3	0.12
		St. Albans_3	3	0.11
		St. Albans_4	3	0.12
		St. Albans_6	3	0.09
		St. Albans_7	3	0.12
		St. Albans_8	3	0.13
		Sta 40	1	0.03
		Near Sta 40	1	0.07
Missisquoi Bay	Citizen Monitor	Chapman Bay	0	
		Comolli Campsite	0	
		High Rocks	0	
		Highgate Springs Shipyard	0	
	UVM	Rte. 78 Access	0	
		Alburg	0	
		Alburg-shoreline	0	
		Highgate Cliffs	0	
		Highgate Springs	0	
		Highgate Springs-Shipyard	0	
		Rock River Access	0	
Total Number of Samples Tested			46	

Nutrients at the Cyanobacteria Monitoring Sites

Concentrations of total phosphorus (TP) and total nitrogen (TN) were averaged by date for monitoring sites in Burlington Bay, St. Albans Bay, and Missisquoi Bay. Mean concentrations of both nutrients were almost always highest in Missisquoi Bay, intermediate in St. Albans Bay, and lowest at Burlington Bay. The seasonal pattern of TP illustrates the general pattern we found across the three bays with both nutrients (Figure 2).

We also calculated the ratio of TN:TP in Burlington Bay, St. Albans Bay, and Missisquoi Bay (Figure 3). In 2007, there was a lesser difference in the ratios between Missisquoi Bay and St. Albans Bay than in previous years; both these sites had lower ratios than those found in Burlington Bay, especially from mid-summer through the fall.

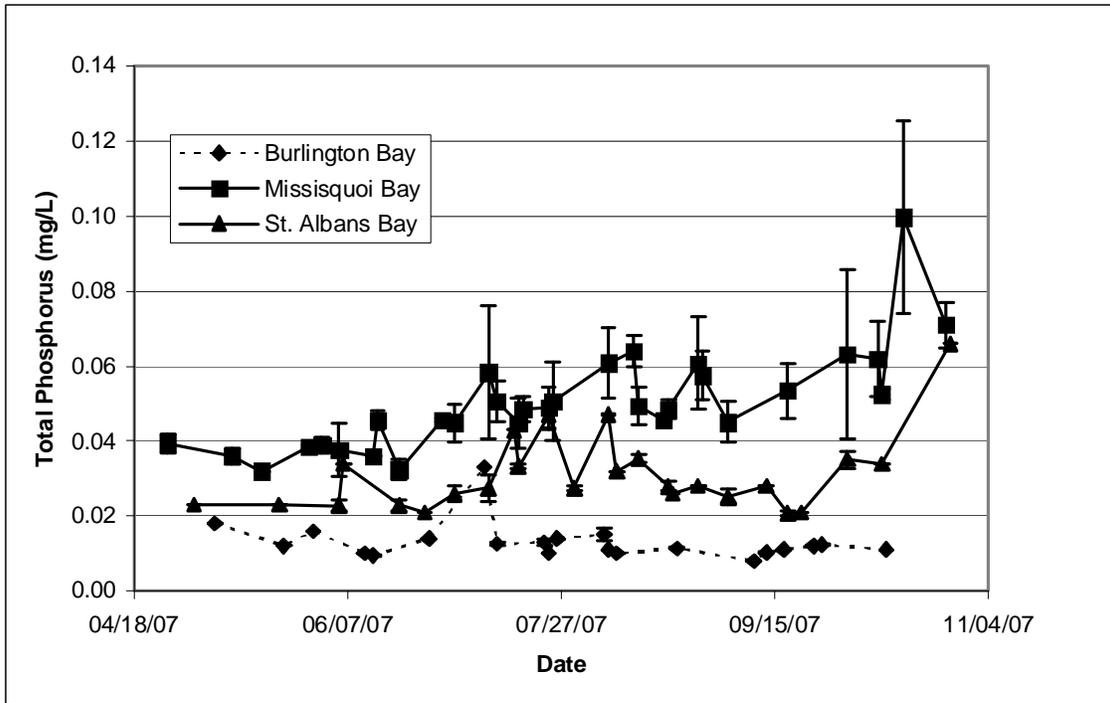


Figure 2. Total phosphorus concentrations (mg/L) in Missisquoi Bay, St. Albans Bay, and Burlington Bay (± 1 standard error) over the 2007 growing season.

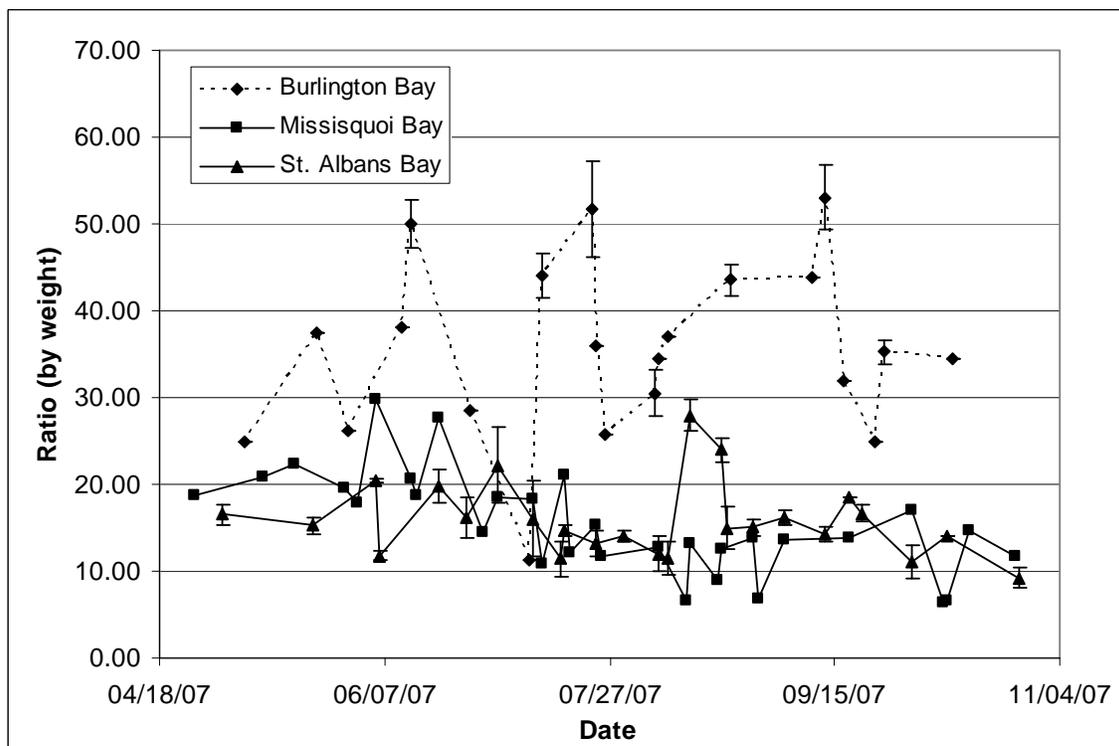


Figure 3. TN:TP ratios (± 1 standard error) across all stations sampled in Burlington Bay, St. Albans Bay and Missisquoi Bay in 2007.

Coordination

Coordination meetings were held with Vermont Department of Health officials in May 2007, and an e-mail distribution list that included 40 partner organizations and individuals was again established for regular information sharing over the summer season. Beginning in June, weekly or bi-weekly e-mail updates on monitoring results were distributed to these officials and to other professionals with an interest in bloom conditions and public health. Working with the Vermont Department of Health, we also posted background information about cyanobacteria and cyanotoxins, and provided information for a map depicting bloom conditions across the lake on their website (http://healthvermont.gov/enviro/bg_algae/weekly_status.aspx). Information on bloom conditions was updated on a weekly basis from early July through September.

DISCUSSION AND CONCLUSIONS

Comparison of Patterns of Cyanobacteria and Toxins 2003-2007

There was a striking difference in the phytoplankton community composition between 2007 and previous years, especially in Missisquoi Bay (Figures 4-6). In Missisquoi Bay, cyanobacteria did not dominate the phytoplankton for the first time since this monitoring program began. *Aphanizomenon* was rare in the bay, and both *Microcystis* and *Anabaena* comprised a lower percentage of the community composition than 2006 (Figure 4). *Aphanizomenon* was also a lower percentage of the community composition in St. Albans Bay (Figure 5). The composition of the Burlington Bay phytoplankton community in 2007 was quite similar to previous years (Figure 6).

Figure 4. Seasonal mean percent generic composition of phytoplankton in Missisquoi Bay, 2003-2007.

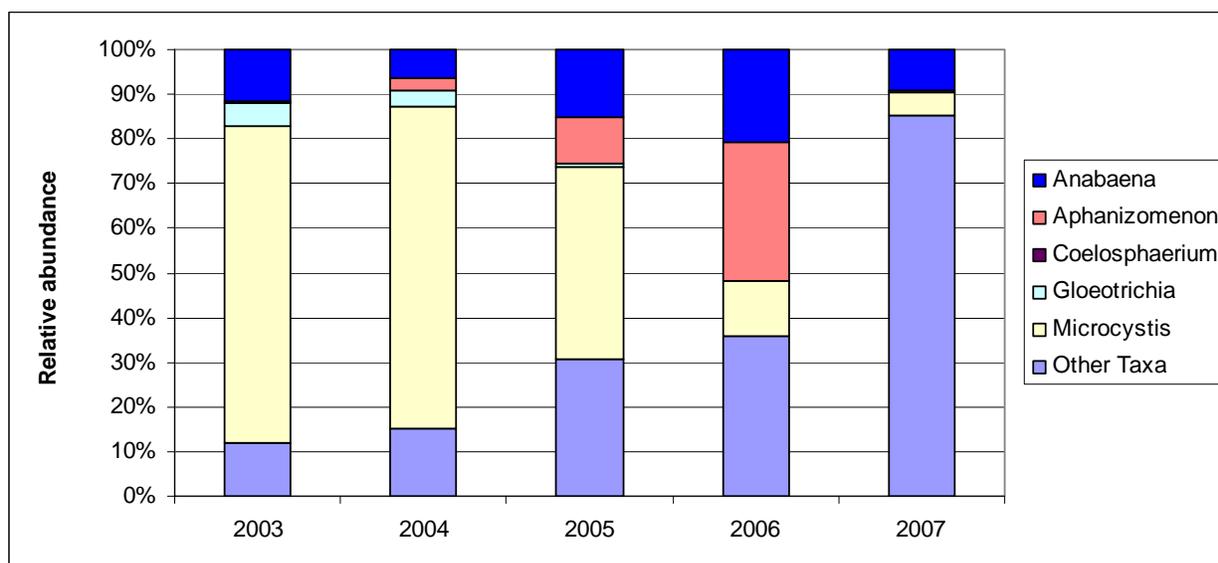


Figure 5. Seasonal mean percent generic composition of phytoplankton in St. Albans Bay, 2003-2007.

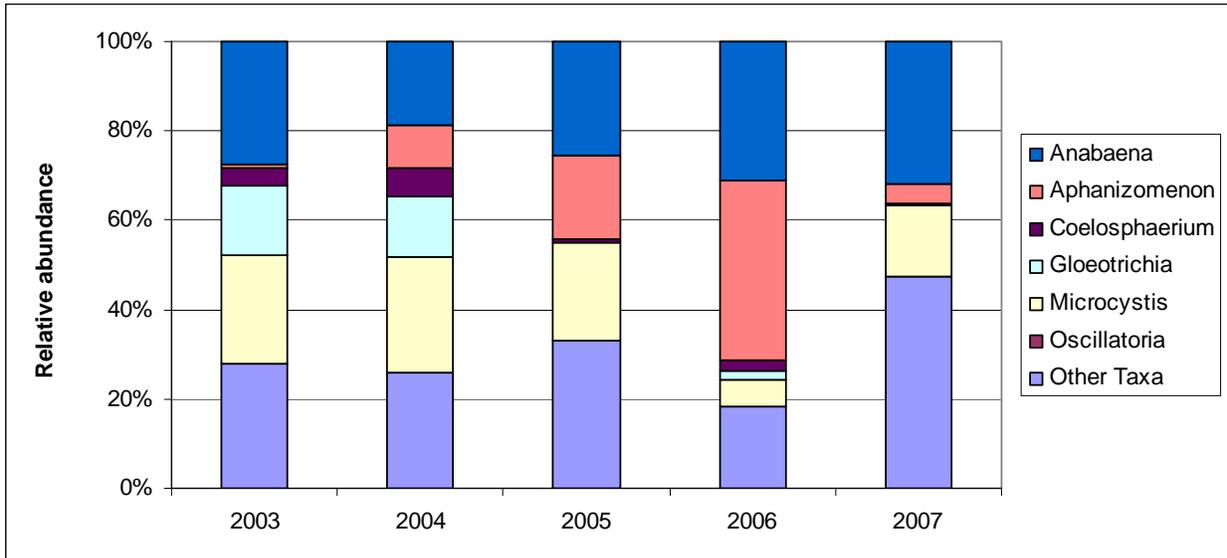
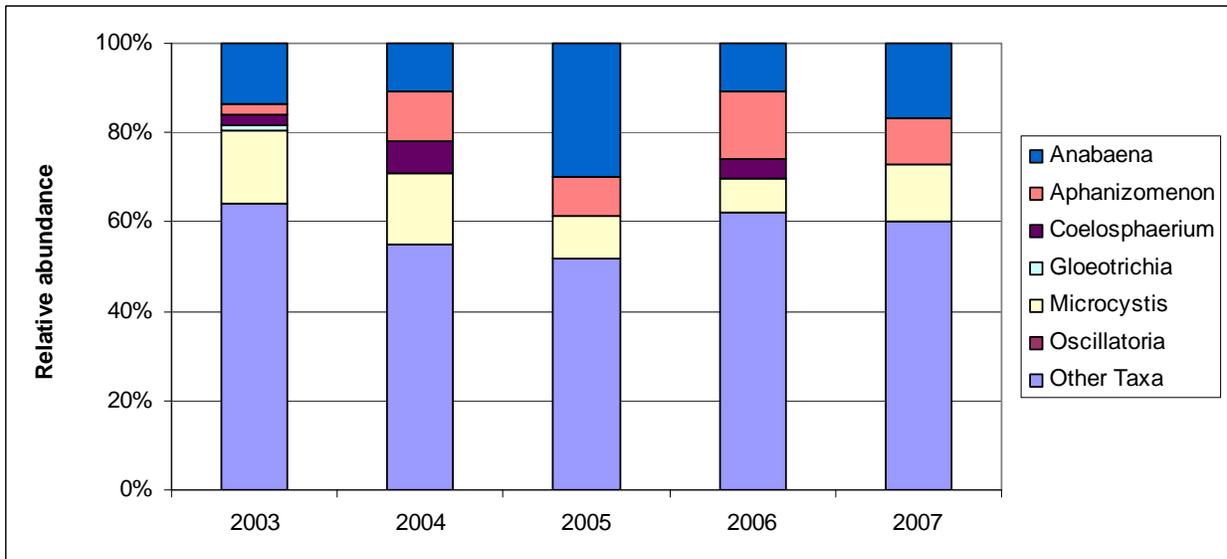


Figure 6. Seasonal mean percent generic composition of phytoplankton in Burlington Bay, 2003-2007.



As a result of the changes in phytoplankton community composition, the median microcystin concentration measured in most lake regions was very different from previous years. In 2007, the highest median concentration was in Burlington Bay, and no microcystin was measured in Missisquoi Bay (Table 6). Microcystin concentration in St. Albans Bay was the exception, with both the range and the median similar to that measured in 2006 (Table 6).

Table 6. Microcystin concentrations ($\mu\text{g/L}$) in various lake segments, 2003 – 2007.

Lake Region		2003	2004	2005	2006	2007
Burlington Bay, Main Lake	Median	0.02		7.42	0.04	2.82
	Range	ND - 0.12		6.04 - 8.80	0.04 - 3.47	0.02-5.61
	# of Samples	9		2	6	2
Missisquoi Bay	Median	0.20	0.88	0.74	0.64	
	Range	ND - 23.9	ND - 6490	ND - 22.1	0.03 - 21.29	
	# of Samples	160	142	125	134	
Northeast Bays	Median	0.05	0.51	0.08	0.27	0.05
	Range	ND - 0.18	ND - 17.5	ND - 0.19	0.04 - 42.14	0.04-0.07
	# of Samples	6	8	7	14	4
South Lake	Median	0.53		0.05		
	Range	ND - 1.4		ND - 0.07		
	# of Samples	3		3		
St. Albans Bay	Median	0.05	0.04	0.44	0.06	0.05
	Range	ND - 0.46	ND - 22.5	0.06 - 0.94	0.01 - 0.43	0.03-0.54
	# of Samples	16	22	15	34	40*

* includes extra samples for Solar Bee study; 9 samples based on tiered alert system

At this time it is not clear why the 2007 growing season was so dramatically different from previous years. We have collected consistent data on nutrient concentrations and cyanobacteria abundance for the last five years (2003-2007). We are currently conducting a much larger analysis of this data set and hope it may provide some clues into what factors might be driving bloom dynamics in Lake Champlain, but this is beyond the scope of this annual report.

Coordination

The e-mail notification system again worked well in 2007 for rapid communication among the professional community. Our partnership with the Vermont Department of Health to post weekly information about bloom conditions on their website also continued to work well. In 2006, we updated the background information on blue-green algae, and provided additional detail in the distribution map.

Our volunteer citizen monitoring effort also continues to be highly successful. In 2007, our volunteer effort included 16 volunteers across all sections of the lake providing a good perspective on shoreline conditions lake-wide. In addition, through our partnership with the Lake Champlain Committee, we were able to catch several transitory bloom events along shorelines in New York and in the Islands.

ACKNOWLEDGMENTS

In addition to the funding provided by the Lake Champlain Basin Program, significant funding for this project was provided by NOAA's MERHAB program. We gratefully acknowledge the assistance provided by Dr. Bob Drawbaugh, Vermont Department of Health, who conducted the anatoxin-*a* analyses for us. We also thank Dick Furbush and Marc Eisenhower of UVM, and Angela Shambaugh, Pete Stangel, and other staff of Vermont and New York DEC for assistance in the field. We thank Mike Winslow, and Lori Fisher, the Lake Champlain Committee; and Mark Sweeney, US Fish and Wildlife Service, who assisted with citizen monitoring effort. And finally, none of the shoreline data collection would have been possible without our dedicated group of volunteer monitors.

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Appendix A. Results of Qualitative Sample Screening – Data Summary 2007

Date	UVM Sample No.	Sample Location	BGA?	<i>Microcystis</i>	<i>Aphanizomenon</i>	<i>Gloeotrichia</i>	<i>Anabaena</i>	<i>Coelospherium</i>	<i>Nodularia</i>	Status
06/05/07	4216	Rte. 78 Access	No							Remain at qualitative
	4217	Rte. 78 Access	No							Remain at qualitative
06/06/07	4220	Highgate Cliffs	No							Remain at qualitative
	4222	Highgate Springs	Yes	X						Go to quantitative
	4224	Rock River	No							Remain at qualitative
	4221	Highgate Cliffs	No							Remain at qualitative
	4218	Alburgh	No							Remain at qualitative
	4226	St. Albans Boatlaunch	Yes	X	X					Go to quantitative
	4225	Rock River	No							Remain at qualitative
	4219	Alburgh	No							Remain at qualitative
06/07/07	4223	Highgate Springs	Yes	X						Go to quantitative
	4227	St. Albans Boatlaunch	Yes	X				X		Go to quantitative
06/14/07	4228	Burlington Water Bay	No							Remain at qualitative
	4230	Champlain Water Bay	No							Remain at qualitative
	4232	North Beach	No							Remain at qualitative
	4234	Red Rocks Beach	No							Remain at qualitative
	4229	Burlington Water Bay	No							Remain at qualitative

	4242	Sta 25	Yes	X			X	X		Go to quantitative
06/15/07	4231	Champlain Water Bay	Yes					X		Go to quantitative
	4233	North Beach	Yes					X		Go to quantitative
	4236	Sta 16	Yes	X						Go to quantitative
	4240	Sta 51	Yes		X					Go to quantitative
06/15/07	4235	Red Rocks Beach	No							Remain at qualitative
	4238	Sta 02	Yes				X			Go to quantitative
	4239	Sta 04	Yes				X			Go to quantitative
	4237	Sta 21	NO							Remain at qualitative
	4241	Sta 50	Yes	X						Go to quantitative
06/19/07	4243	Rte. 78 Access	Yes	X						Go to quantitative
06/20/07	4245	Alburgh	Yes					X		Go to quantitative
	4244	Rte. 78 Access	Yes	X						Go to quantitative
	4251	Rock River	No							Remain at qualitative
	4247	Highgate Cliffs	Yes	X						Go to quantitative
	4248	Highgate Cliffs	Yes	X						Go to quantitative
	4246	Alburgh	Yes	X				X		Go to quantitative
	4252	Rock River	No							Remain at qualitative
06/21/07	4255	VT DEC/Carry Bay	Yes				X			Go to quantitative
	4257	Sta 36	Yes	X			X			Go to quantitative

	4258	Sta 46	No							Remain at qualitative
	4259	Sta 34	Yes	X	X		X			Go to quantitative
	4260	Sta 40	Yes	X	X		X	X		Go to quantitative
	4256	Sta 33	Yes	X			X			Go to quantitative
07/02/07	4269	Rock River Access	No							Remain at qualitative
	4270	Rock River Access	No							Remain at qualitative
07/03/07	4281	N. Hero State Park	No							Remain at qualitative
	4283	Willsboro Bay	No							Remain at qualitative
	4276	High Rocks	Yes				X			Go to quantitative
07/03/07	4273	Highgate Springs Shipyard	Yes				X			Go to quantitative
	4275	Comolli Camp	No							Remain at qualitative
	4274	Chapman Bay	No							Remain at qualitative
	4279	City Bay	Yes							Go to quantitative
	4280	Carry Bay	No							Remain at qualitative
	4284	Begg's Park	No							Remain at qualitative
	4278	Pelots Bay	No							Remain at qualitative
	4282	Point au Roche State Park	No							Remain at qualitative
	4277	Rouses Point	No							Remain at qualitative
07/05/07	4289	Sta 46	Yes	X						Go to quantitative

	4285	Sta 07	Yes	X	X					Go to quantitative
	4286	Sta 09	Yes	X			X			Go to quantitative
07/10/07	4314	Begg's Park	No							Remain at qualitative
	4317	N. Hero State Park	No							Remain at qualitative
	4315	Carry Bay	No							Remain at qualitative
	4320	Rouses Point	No							Remain at qualitative
	4319	Point Au Roche State Park	No							Remain at qualitative
	4318	Pelots Bay	No							Remain at qualitative
	4322	Willsboro Bay	No							Remain at qualitative
7/11/07	4323	Maquam Bay	No							Remain at qualitative
	4527	Chapman Bay	No							Remain at qualitative
	4300	Rock River Access	No							Remain at qualitative
	4301	Rock River Access	No							Remain at qualitative
	4326	Comolli Camp	No							Remain at qualitative
	4328	Maquam Bay	Yes				X			Go to quantitative
	4329	St. Albans Bay	Yes	X			X	X		Go to quantitative
7/12/07	4342	Sta. 19	Yes	X			X			Go to quantitative
	4346	Champlain Water Bay vicinity	Yes	X			X			Go to quantitative
	4304	Burlington Water Bay	Yes				X			Go to quantitative

	4310	Red Rocks Beach	Yes	X						Go to quantitative
7/16/07	4357	Long Point	No							Remain at qualitative
	4358	Carry Bay	No							Remain at qualitative
7/17/07	4361	Point Au Roche State Park	No							Remain at qualitative
	4363	Rouses Point	Yes				X			Go to quantitative
	4364	Willsboro Bay	No							Remain at qualitative
	4365	N. Hero State Park	No							Remain at qualitative
	4359/4366	Begg's Point/Pelots Bay	No							Remain at qualitative
	4359/4366	Begg's Point/Pelots Bay	No							Remain at qualitative
7/18/07	4338	Rock River Access	No							Remain at qualitative
	4368	Chapman Bay	No							Remain at qualitative
	4370	Comolli Camp	No							Remain at qualitative
	4372	Champlain Water Bay vicinity	Yes				X			Remain at quantitative
7/19/07	4339	Rock River Access	No							Remain at qualitative
7/24/07	4393	Begg's Park	No							Remain at qualitative
	4394	Carry Bay	Yes				X			Go to quantitative
	4396	Point Au Roche State Park	No							Remain at qualitative
	4397	N. Hero State Park	No							Remain at qualitative
	4398	Pelots Bay	No							Remain at qualitative

	4401	Long Point	Yes				X			Go to quantitative
	4406	Sta. 21	Yes		X		X	X		Go to quantitative
7/25/07	4411	Comolli Camp	Yes				X			Go to quantitative
	4409	Chapman Bay	No							Remain at qualitative
	4381	Rock River Access	No							Remain at qualitative
7/26/07	4382	Rock River Access	No							Remain at qualitative
7/30/07	4435	Begg's Park	No							Remain at qualitative
7/31/07	4437	Pointe Au Roche	Yes		X					Go to quantitative
	4438	Willsboro Bay	No							Remain at qualitative
7/31/07	4441	N. Hero State Park	No							Remain at qualitative
	4443	Pelots Bay	No							Remain at qualitative
	4446	Chapman Bay	No							Remain at qualitative
8/1/07	4422	Rock River Access	Yes				X			Go to quantitative
	4423	Rock River Access	Yes					X		Go to quantitative
8/6/07	4475	Pelots Bay	Yes	X			X			Go to quantitative
	4478	Willsboro Bay	Yes				X			Go to quantitative
	4479	Begg's Park	Yes				X			Go to quantitative
8/7/07	4483	Chapman Bay	Yes	X						Go to quantitative
	4473	N. Hero State Park	Yes	X			X			Go to quantitative

Appendix B. Counts of Algae in Quantitative Samples – Data Summary 2007

					Algal Cells per mL Lakewater									
Location	Sample Type	Date	Rep	Count Rep	Bacillariophyceae	Chlorophyceae	Chrysothryx	Cryptophyceae	Dinophyceae	Euglenophyceae	Myxophyceae	Potential Toxin Producers	Total	Collection Source
Highgate Springs	net	06/05/07	1	1	1.9	1.4							3	UVM
Highgate Springs	net	06/05/07	2	1	0.3								0	UVM
St. Albans Boat Launch	net	06/05/07	1	1	4.6			0.2	0.2				5	UVM
St. Albans Boat Launch	net	06/05/07	2	1	9.4				0.1				10	UVM
Champlain Water Bay	net	06/13/07	2	1	204.1								204	UVM
North Beach	net	06/13/07	2	1	283.9								284	UVM
VTDEC Sta16	net	06/11/07	1	1	322.5								323	VT DEC
VTDEC Sta02	net	06/12/07	1	1	130.2	18.5	38.8	2.1					189	VT DEC
VTDEC Sta04	net	06/12/07	1	1	198.7								199	VT DEC
VTDEC Sta51	net	06/14/07	1	1		3.5	2.8	0.0			1.8		8	VT DEC
VTDEC Sta50	net	06/14/07	1	1	3.7	3.0	1.9	0.6					9	VT DEC
VTDEC Sta25	net	06/14/07	1	1	1.4		3.5		0.1		64.2	58.2	69	VT DEC
Rte 78 Access	net	06/19/07	1	1	25.2	3.7	0.1						29	UVM
Rte 78 Access	net	06/19/07	2	1	29.4	6.5	1.1						37	UVM
Alburg	net	06/19/07	1	1	6.9	2.0	0.2						9	UVM
Alburg	net	06/19/07	2	1	16.2	6.7	0.1						23	UVM
Highgate Cliffs	net	06/19/07	1	1	9.1	3.9	0.9				1.4	1.4	15	UVM
Highgate Cliffs	net	06/19/07	2	1	7.8	1.8	0.4		0.0		5.3	5.3	15	UVM
Highgate Springs	net	06/19/07	1	1	1.8	1.5	0.0	0.0			0.8	0.8	4	UVM
Highgate Springs	net	06/19/07	2	1	1.2		0.0				3.2	3.2	4	UVM
St. Albans Boat Launch	net	06/19/07	1	1	0.8	9.5	0.1				62.1	60.2	72	UVM

St. Albans Boat Launch	net	06/19/07	2	1	0.0	1.7					23.1	23.1	25	UVM
Carry Bay	net	06/18/07	1	1	499.8								500	VT DEC
VTDEC Sta33	net	06/18/07	1	1	78.3			0.0	0.0		15.2	15.2	94	VT DEC
VTDEC Sta36	net	06/18/07	1	1	192.0						2.4	2.4	194	VT DEC
VTDEC Sta34	net	06/19/07	1	1	3.1	4.5		0.0	0.2		27.0	27.0	35	VT DEC
VTDEC Sta40	net	06/19/07	1	1	0.1	0.7	1.7	0.0	0.4		40.0	40.0	43	VT DEC
Rte 78 Access	net	07/02/07	1	1	33.6	2.9	0.4						37	UVM
Rte 78 Access	net	07/02/07	2	1	113.6	5.0	1.1						120	UVM
Alburg	net	07/02/07	1	1	3.3	0.9	0.3						4	UVM
Alburg	net	07/02/07	2	1	5.4		0.2						6	UVM
Highgate Cliffs	net	07/02/07	1	1	46.3	12.2	0.7						59	UVM
Highgate Cliffs	net	07/02/07	2	1	39.4	3.4	0.3				2.1	2.1	45	UVM
Highgate Springs	net	07/02/07	1	1	4.9		0.1						5	UVM
Highgate Springs	net	07/02/07	2	1	5.2		0.0						5	UVM
St. Albans Boat Launch	net	07/02/07	1	1	25.0	64.9	0.4		4.3		36.9	36.9	131	UVM
St. Albans Boat Launch	net	07/02/07	2	1	100.3	77.2	3.2		3.6		21.6	21.6	206	UVM
Highgate Springs-Shipyard	ww counted as net	07/01/07	1	1	26.3		26.3						53	BGA VLNTR
High Rocks	ww counted as net	07/01/07	1	1			684.0	52.6					737	BGA VLNTR
City Bay	ww counted as net	07/01/07	1	1			223.6	1183.8					1407	BGA VLNTR
VTDEC Sta07	net	06/26/07	1	1	268.3		9.8						278	VT DEC
VTDEC Sta09	net	06/26/07	1	1	329.3		0.3	1.2					331	VT DEC
VTDEC Sta02	net	06/27/07	1	1	5.1	5.6	22.0	0.4	0.0	0.0			33	VT DEC
VTDEC Sta04	net	06/27/07	1	1	124.3	1.6	10.2	3.1					139	VT DEC
VTDEC Sta46	net	07/02/07	1	1	18.1		0.1	0.1	0.0		0.8	0.8	19	VT DEC
VTDEC Sta50	net	07/02/07	1	1	31.3	0.8	1.9	0.1			0.8	0.8	35	VT DEC
VTDEC Sta51	net	07/02/07	1	1	241.2	4.9	3.4						250	VT DEC
Rte 78 Access	net	07/10/07	1	1	23.9	1.1	1.5	1.2					28	UVM

Rte 78 Access	net	07/10/07	2	1	28.6		1.0	1.6			43.1		74	UVM
Alburg	net	07/10/07	1	1	37.4		1.1	0.9					39	UVM
Alburg	net	07/10/07	2	1	230.1		1.3	2.0					233	UVM
Highgate Cliffs	net	07/10/07	1	1	654.6		0.5						655	UVM
Highgate Cliffs	net	07/10/07	2	1	666.4	12.0	0.5						679	UVM
Highgate Springs	net	07/10/07	1	1	179.5		0.3						180	UVM
Highgate Springs	net	07/10/07	2	1	181.0		0.4						181	UVM
St. Albans Boat Launch	net	07/10/07	1	1	297.1	73.7	16.9		1.0		15.6	15.6	404	UVM
St. Albans Boat Launch	net	07/10/07	2	1	582.4	171.4	86.1				332.6	127.9	1173	UVM
Burlington Water Bay	net	07/12/07	1	1	739.6		3.5	0.5			59.8	59.8	803	UVM
Burlington Water Bay	net	07/12/07	2	1	352.1	3.3	3.8				18.1	18.1	377	UVM
Champlain Water Bay	net	07/12/07	1	1	691.5			0.6			108.2	108.2	800	UVM
Champlain Water Bay	net	07/12/07	2	1	548.6						5.9	5.9	554	UVM
North Beach	net	07/12/07	1	1	701.7						6.6	6.6	708	UVM
North Beach	net	07/12/07	2	1	773.0								773	UVM
Red Rocks Beach	net	07/12/07	1	1	137.3		3.0						140	UVM
Red Rocks Beach	net	07/12/07	2	1	685.9								686	UVM
Fish Bladder Island	net	07/05/07	1	1	491.0	142.7			3.9		2271.8	2271.8	2909	VT DEC
VTDEC Sta25	net	07/05/07	1	1	110.6	3.3	23.3		0.9		13.7	13.7	152	VT DEC
City Bay	ww counted as net	07/09/07	1	1	43.8		491.1	149.1					684	BGA VLNTR
Littlefield Shore	ww counted as net	09/08/07	1	1	10.5						2209.8	2209.8	2220	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	07/08/07	1	1	52.6		228.0	201.7					482	BGA VLNTR
High Rocks	ww counted as net	07/08/07	1	1	192.9		429.7	464.7					1087	BGA VLNTR

Maquam Bay	ww counted as net	07/09/07	1	1			8.8				87.7	87.7	96	BGA VLNTR
St. Albans Bay Park	ww counted as net	07/10/07	1	1	8.8	719.0					9908.8	9908.8	10637	BGA VLNTR
Rte 78 Access	net	07/17/07	1	1	678.8		1.0	4.8					685	UVM
Rte 78 Access	net	07/17/07	2	1	660.8			1.7					663	UVM
Alburg	net	07/17/07	1	1	79.4	1.1	0.0	0.1					81	UVM
Alburg	net	07/17/07	2	1	70.4		0.0	0.0					71	UVM
Highgate Cliffs	net	07/17/07	1	1	1041.6						26.3		1068	UVM
Highgate Cliffs	net	07/17/07	2	1	943.0	27.0							970	UVM
Highgate Springs	net	07/17/07	1	1	1209.0	8.2							1217	UVM
Highgate Springs	net	07/17/07	2	1	731.1	21.8	0.4		0.4		21.8	21.8	776	UVM
St. Albans Boat Launch	net	07/17/07	1	1	638.3	538.2	2.4		3.6		223.2	223.2	1406	UVM
St. Albans Boat Launch	net	07/17/07	2	1	642.8	474.3		1.3	7.5		378.7	378.7	1505	UVM
VTDEC Sta19	net	07/06/07	1	1	1372.8						476.5	1.6	1849	VT DEC
VTDEC Sta16	net	07/09/07	1	1	1269.1		0.3	0.2			22.3	22.3	1292	VT DEC
VTDEC Sta33	net	07/10/07	1	1	864.2	0.2	8.6				7.0	7.0	880	VT DEC
VTDEC Sta36	net	07/10/07	1	1	758.0		0.2				3.8	3.8	762	VT DEC
Champlain water Bay vicinity	ww counted as net	07/12/07	1	1	175.4	105.2	78.9	192.9			156787.3	156787.3	157340	UVM
St. Albans Bay near Steven's Brook	ww counted as net	07/12/07	1	1	289.4	1113.6	35.1	17.5			33058.6	33058.6	34514	VT DEC
St. Albans Bay near Sta. 40	ww counted as net	07/12/07	1	1		1904.6	10.5	10.5			68502.4	68502.4	70428	VT DEC
Burlington Water Bay	net	07/23/07	1	1	48.5	1.5	4.4				10.3	10.3	65	UVM
Burlington Water Bay	net	07/23/07	2	1	73.0	6.4	3.5				2.3	2.3	85	UVM
Champlain Water Bay	net	07/23/07	1	1	38.9	7.5	3.1				74.9	74.9	124	UVM

Champlain Water Bay	net	07/23/07	2	1	46.6	2.8	7.3		0.0		26.8	26.8	83	UVM
North Beach	net	07/23/07	1	1	56.7	3.2			0.0		2.7	2.7	63	UVM
North Beach	net	07/23/07	2	1	116.9	7.5	7.8		0.1		9.8	9.8	142	UVM
Red Rocks Beach	net	07/23/07	1	1	82.8	12.3	18.2	0.1	0.1		170.8	170.8	284	UVM
Red Rocks Beach	net	07/23/07	2	1	74.8	9.1	16.8				42.7	42.7	143	UVM
Littlefield Shore	ww counted as net	07/15/07	1	1	201.7	157.8	17.5	26.3			3069.1	3069.1	3472	BGA VLNTR
City Bay	ww counted as net	07/16/07	1	1	105.2	596.3	52.6	96.5			613.8	613.8	1464	BGA VLNTR
Rouses Point	ww counted as net	07/16/07	1	1	157.8		39.5	315.7					513	BGA VLNTR
High Rocks	ww counted as net	07/15/07	1	1	1613.5	96.5	52.6	43.8					1806	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	07/15/07	1	1	289.4	61.4	306.9	26.3					684	BGA VLNTR
St. Albans Bay Park	ww counted as net	07/16/07	1	1	447.2	3932.8	65.8				1683.6	1289.0	6129	BGA VLNTR
Champlain Water Bay vicinity	ww counted as net	07/18/07	1	1	350.8		359.5	324.4					1035	UVM
Rte 78 Access	net	07/24/07	1	1	4860.4		1.3						4862	UVM
Rte 78 Access	net	07/24/07	2	1	2210.7	5.7	1.1						2218	UVM
Alburg	net	07/24/07	1	1	340.4	4.5	0.4	0.4					346	UVM
Alburg	net	07/24/07	2	1	338.5		0.4						339	UVM
Highgate Cliffs	net	07/24/07	1	1	174.0	26.0	0.4						200	UVM
Highgate Cliffs	net	07/24/07	2	1	123.9	6.8	1.2		0.4				132	UVM
Highgate Springs	net	07/24/07	1	1	109.3	33.7		0.8			9.4	9.4	153	UVM
Highgate Springs	net	07/24/07	2	1	129.7								130	UVM

St. Albans Boat Launch	net	07/24/07	1	1	667.1	382.7			10.4		1459.3	1459.3	2520	UVM
St. Albans Boat Launch	net	07/24/07	2	1	490.2	250.2	2.9		13.2		1031.7	1031.7	1788	UVM
VTDEC Sta02	net	07/17/07	1	1	22.6		8.8	0.1	0.1				32	VT DEC
VTDEC Sta04	net	07/17/07	1	1	873.8	19.8	0.3		0.3				894	VT DEC
VTDEC Sta34	net	07/16/07	1	1	244.9	590.5	108.7		54.3		707.1	707.1	1705	VT DEC
VTDEC Sta40	net	07/16/07	1	1	1017.2	290.9			63.1		263.6	263.6	1635	VT DEC
VTDEC Sta46	net	07/18/07	1	1	81.2		1.4				3.1	3.1	86	VT DEC
VTDEC Sta50	net	07/18/07	1	1	1648.3	15.7	0.9						1665	VT DEC
VTDEC Sta51	net	07/18/07	1	1	2291.1	2.4							2293	VT DEC
Knight Point	ww counted as net	07/23/07	1	1		1452.1	84.2	42.1			10838.3	10838.3	12417	BGA VLNTR
Carry Bay	ww counted as net	07/22/07	1	1	652.4	42.1	10.5	21.0			7576.3		8302	BGA VLNTR
Littlefield Shore	ww counted as net	07/22/07	1	1		526.1							526	BGA VLNTR
Rouses Point	ww counted as net	07/23/07	1	1	10.5		862.9	526.1			105.2	105.2	1505	BGA VLNTR
City Bay	ww counted as net	07/23/07	1	1		42.1	126.3	10.5					179	BGA VLNTR
Long Point	ww counted as net	07/22/07	1	1			245.5	35.1			350.8	350.8	631	BGA VLNTR
VTDEC Sta07	net	07/21/07	1	1	233.8		5.6				7.4	7.4	247	VT DEC
VTDEC Sta09	net	07/21/07	1	1	354.0						89.4	89.4	443	VT DEC
VTDEC Sta16	net	07/24/07	1	1	62.6		16.0	0.2			325.9	325.9	405	VT DEC
VTDEC Sta19	net	07/24/07	1	1	107.5	4.0	5.7		0.2		10.3	10.3	128	VT DEC
VTDEC Sta21	net	07/24/07	1	1	59.9	0.7	13.2	0.1			89.5	89.5	164	VT DEC
VTDEC Sta25	net	07/23/07	1	1	23.6		9.2	0.2	0.8		26.9	26.9	61	VT DEC

High Rocks	ww counted as net	07/22/07	1	1	105.2		175.4	70.2					351	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	07/22/07	1	1	61.4		201.7	96.5			70.2	70.2	430	BGA VLNTR
Comolli Camp	ww counted as net	07/23/07	1	1	271.8	43.8	114.0	96.5					526	BGA VLNTR
Maquam Bay	ww counted as net	07/23/07	1	1	87.7		8.8	52.6					149	BGA VLNTR
St. Albans Bay Park	ww counted as net	07/23/07	1	1	21.0	5471.8	21.0	10.5			5471.8	420.9	10996	BGA VLNTR
Rte 78 Access	net	07/31/07	1	1	1175.8	80.3			2.2				1258	UVM
Rte 78 Access	net	07/31/07	2	1	1384.8				3.2		79.6		1468	UVM
Alburg	net	07/31/07	1	1	227.7			0.8	0.8				229	UVM
Alburg	net	07/31/07	2	1	142.9	13.9			0.3		3.8	3.8	161	UVM
Highgate Cliffs	net	07/31/07	1	1	975.7	35.6			0.5		26.2	26.2	1038	UVM
Highgate Cliffs	net	07/31/07	2	1	1028.5		0.8		0.8		47.4	47.4	1078	UVM
Highgate Springs	net	07/31/07	1	1	181.4	41.6			1.2		5.2	5.2	229	UVM
Highgate Springs	net	07/31/07	2	1	204.7	92.5			0.7		176.8	176.8	475	UVM
Rock River Access	ww counted as net	07/31/07	1	1		242.0	1567.9						1810	UVM
Rock River Access	ww counted as net	07/31/07	2	1	17.5	236.8	499.8	8.8					763	UVM
St. Albans Boat Launch	net	07/31/07	1	1	549.5	120.0	2.1		29.5		2018.9	2018.9	2720	UVM
St. Albans Boat Launch	net	07/31/07	2	1	273.2	203.7			12.4		2009.5	1512.7	2499	UVM
Maquam Bay vicinity-southeast	ww counted as net	07/26/07	1	1	701.5	122.8					20606.8	20606.8	21431	VDH

Point Au Roche State Park	ww counted as net	07/29/07	1	1	43.8	1043.5	122.8						1210	BGA VLNTR
High Rocks	ww counted as net	07/29/07	1	1	263.1	35.1	447.2	35.1					780	BGA VLNTR
St. Albans Bay Park	ww counted as net	07/29/07	1	1	221.0	2820.1	31.6	10.5		1578.4	1578.4		4662	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	07/29/07	1	1			789.2	10.5					800	BGA VLNTR
Comolli Camp	ww counted as net	07/30/07	1	1	126.3	63.1	42.1	31.6					263	BGA VLNTR
Maquam Bay	ww counted as net	07/30/07	1	1				63.1					63	BGA VLNTR
VTDEC Sta33	net	07/31/07	1	1	79.0	11.1	5.7		0.2		27.7	27.7	124	VT DEC
VTDEC Sta34	net	07/30/07	1	1	547.0	31.1	1.5		8.7		612.8	612.8	1201	VT DEC
VTDEC Sta40	net	07/30/07	1	1	346.4	137.4			1.9		1107.4	1107.4	1593	VT DEC
Rte 78 Access	net	08/07/07	2	1	7.9	3.4			0.1				11	UVM
Alburg	net	08/07/07	1	1	10.0	2.5	0.1	0.1	0.1				13	UVM
Alburg	net	08/07/07	2	1	14.1	13.9	0.1		0.3				28	UVM
Highgate Cliffs	net	08/07/07	1	1	170.2				0.9				171	UVM
Highgate Cliffs	net	08/07/07	2	1	142.7	1.2			0.1		23.0	23.0	167	UVM
Highgate Springs	net	08/07/07	1	1	40.6	3.0	0.2	0.1	0.5				44	UVM
Highgate Springs	net	08/07/07	2	1	40.9	1.0	0.1	0.2	0.2		2.4	2.4	45	UVM
Rock River Access	ww counted as net	08/07/07	1	1			389.3						389	UVM
Rock River Access	ww counted as net	08/07/07	2	1		294.6	410.4	31.6		10.5			747	UVM
St. Albans Boat Launch	net	08/07/07	1	1	119.2	141.1					5262.0	5262.0	5522	UVM

St. Albans Boat Launch	net	08/07/07	2	1	252.3	77.5			12.6		5394.3	4529.2	5737	UVM
Champlain Water Bay	net	08/06/07	1	1	61.5	14.2	2.5		0.4		101.3	101.3	180	UVM
Champlain Water Bay	net	08/06/07	2	1	82.2	16.0	5.4		0.5		106.7	106.7	211	UVM
North Beach	ww counted as net	08/06/07	1	1				8.8					9	UVM
Red Rocks Beach	net	08/06/07	1	1	24.7	5.5	0.4		0.2		71.1	71.1	102	UVM
Red Rocks Beach	net	08/06/07	2	1	21.0	3.9	2.7		0.2		91.8	91.8	120	UVM
Carry Bay	ww counted as net	08/06/07	1	1	115.7	84.2	31.6				17467.6	17467.6	17699	BGA VLNTR
Pelots Bay	ww counted as net	08/06/07	1	1	122.8		43.8				526.1	526.1	693	BGA VLNTR
City Bay	ww counted as net	08/06/07	1	1	347.2	84.2					1894.1	1894.1	2326	BGA VLNTR
Point Au Roche State Park	ww counted as net	08/06/07	1	1	126.3		42.1						168	BGA VLNTR
Willsboro Bay	ww counted as net	08/06/07	1	1		526.1	284.1	115.7					926	BGA VLNTR
Littlefield Shore	ww counted as net	08/05/07	1	1	42.1	31.6	10.5				8839.0	8839.0	8923	BGA VLNTR
Long Point	ww counted as net	08/05/07	1	1		94.7	31.6	31.6					158	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	08/05/07	1	1		42.1	21.0	21.0					84	BGA VLNTR

Chapman Bay	ww counted as net	08/05/07	1	1	8.8	157.8							167	BGA VLNTR
High Rocks	ww counted as net	08/05/07	1	1		568.2	84.2	94.7					747	BGA VLNTR
Comolli Camp	ww counted as net	08/06/07	1	1		652.4	42.1	52.6					747	BGA VLNTR
St. Albans Bay Park	ww counted as net	08/06/07	1	1			10.5						11	BGA VLNTR
Maquam Bay	ww counted as net	08/06/07	1	1	10.5	168.4	10.5						189	BGA VLNTR
Rte 78 Access	net	08/14/07	1	1	5.3	226.2	0.7		0.4		33.7	33.7	266	UVM
Rte 78 Access	net	08/14/07	2	1	1.9	226.0			0.6		29.2	29.2	258	UVM
Alburg	net	08/14/07	1	1	0.9				0.4				1	UVM
Alburg	net	08/14/07	2	1		3.0			0.2		4.9	4.9	8	UVM
Highgate Cliffs	net	08/14/07	1	1	10.7	16.3	0.0		0.9		2.0	2.0	30	UVM
Highgate Cliffs	net	08/14/07	2	1	11.2	16.2			0.5		1.4	1.4	29	UVM
Highgate Springs	net	08/14/07	1	1	16.5	22.6			1.0				40	UVM
Highgate Springs	net	08/14/07	2	1	14.2	11.7			0.8				27	UVM
Rock River Access	ww counted as net	08/14/07	1	1	10.5	968.1	168.4						1147	UVM
Rock River Access	ww counted as net	08/14/07	2	1		1062.8	42.1	10.5					1115	UVM
St. Albans Boat Launch	net	08/14/07	1	1	144.6	439.3	5.7				4503.9	4503.9	5093	UVM
St. Albans Boat Launch	net	08/14/07	2	1	272.1	251.9	2.2				3913.3	3913.3	4440	UVM
VTDEC Sta36	net	08/02/07	1	1	113.0	16.1	4.9		0.4		45.1	35.2	180	VT DEC
VTDEC Sta46	net	08/02/07	1	1	435.2	28.5	0.4	0.8	1.2		30.8	30.8	497	VT DEC
VTDEC Sta04	net	08/07/07	1	1	9.7	49.0	57.4	3.1			222.8	222.8	342	VT DEC

VTDEC Sta02	net	08/07/07	1	1	190.5		11.2	0.6					202	VT DEC
VTDEC Sta16	net	08/09/07	1	1	79.1	36.1	15.1		0.4		82.1	63.3	213	VT DEC
VTDEC Sta19	net	08/09/07	1	1	209.8		2.0	0.4	0.4		16.9	16.9	230	VT DEC
VTDEC Sta21	net	08/09/07	1	1	36.6	1.5	2.7		0.4		37.8	35.9	79	VT DEC
Carry Bay	ww counted as net	08/12/07	1	1	105.2		35.1	17.5			1052.3	1052.3	1210	BGA VLNTR
North Hero State Park	ww counted as net	08/12/07	1	1		42.1	52.6	94.7					189	BGA VLNTR
Littlefield Shore	ww counted as net	08/12/07	1	1	10.5	84.2							95	BGA VLNTR
Pelots Bay	ww counted as net	08/13/07	1	1	37.6		131.5				90006.2	90006.2	90175	BGA VLNTR
City Bay	ww counted as net	08/13/07	1	1		526.1	105.2	21.0			1683.6	1683.6	2336	BGA VLNTR
Rouses Point	ww counted as net	08/13/07	1	1	52.6	1094.4	336.7	199.9			1683.6	1683.6	3367	BGA VLNTR
Point Au Roche State Park	ww counted as net	08/13/07	1	1	1578.4	526.1	263.1	157.8					2525	BGA VLNTR
Willsboro Bay	ww counted as net	08/13/07	1	1	73.7			42.1			9470.4		9586	BGA VLNTR
Dunham Bay	ww counted as net	08/13/07	1	1			2091.4						2091	BGA VLNTR
Long Point	ww counted as net	08/12/07	1	1	10.5	526.1	63.1	420.9					1021	BGA VLNTR

Chapman Bay	ww counted as net	08/12/07	1	1		357.8	31.6	10.5			631.4	631.4	1031	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	08/12/07	1	1	10.5	242.0	1462.6	526.1					2241	BGA VLNTR
St. Albans Bay Park	ww counted as net	08/13/07	1	1	302.5	1723.1	52.6	13.2			40380.6	40380.6	42472	BGA VLNTR
Comolli Camp	ww counted as net	08/13/07	1	1		378.8	21.0	42.1					442	BGA VLNTR
VTDEC Sta50	net	08/13/07	1	1	20.0	44.9	0.2	0.7	0.7		25.0	25.0	91	VT DEC
Rte 78 Access	net	08/21/07	1	1	1.3	3.1	0.8	0.1	0.1		6.4	6.4	12	UVM
Rte 78 Access	net	08/21/07	2	1			1.9	1.0			25.8	25.8	29	UVM
Alburg	net	08/21/07	1	1			1.5	0.3	0.1		61.4	61.4	63	UVM
Alburg	net	08/21/07	2	1	0.8	1.2	0.6	0.1			6.6	6.6	9	UVM
Highgate Cliffs	net	08/21/07	1	1	2.0	5.4	0.3	0.0	0.3		21.2	21.2	29	UVM
Highgate Cliffs	net	08/21/07	2	1	4.4	1.1	0.3	0.1	0.4		16.0	15.1	22	UVM
Highgate Springs	net	08/21/07	1	1	6.1	12.8	0.7	0.1	0.4		40.4	40.4	60	UVM
Highgate Springs	net	08/21/07	2	1	5.5	1.5	0.4	0.2	0.5		72.1	66.4	80	UVM
Rock River Access	ww counted as net	08/21/07	1	1	73.7	515.6	115.7						705	UVM
Rock River Access	ww counted as net	08/21/07	2	1	536.7	452.5	168.4	21.0			1115.4	1115.4	2294	UVM
St. Albans Boat Launch	net	08/21/07	1	1	28.4	308.3	2.9	0.6			676.9	676.9	1017	UVM
St. Albans Boat Launch	net	08/21/07	2	1	52.0	220.2	4.6	1.6			381.4	381.4	660	UVM
Burlington Water Bay	net	08/23/07	1	1	545.1			1.3			44.9	44.9	591	UVM
Burlington Water Bay	net	08/23/07	2	1	686.6	15.4	0.5				154.4	154.4	857	UVM
Champlain Water Bay	net	08/23/07	1	1	1173.6	26.2	0.4		0.9		31.0	31.0	1232	UVM

Champlain Water Bay	net	08/23/07	2	1	989.1	16.5		2.8	1.7		57.5	57.5	1068	UVM
North Beach	net	08/23/07	1	1	119.4	2.0	0.1		0.3		5.6	5.6	127	UVM
North Beach	net	08/23/07	2	1	221.3	4.8	1.3	0.1	0.2		16.2	16.2	244	UVM
Red Rocks Beach	net	08/23/07	1	1	219.2	1.9	1.5		0.2		10.6	10.6	233	UVM
Red Rocks Beach	net	08/23/07	2	1	230.0	5.4	0.1		0.3		6.6	6.6	242	UVM
Pelots Bay	ww counted as net	08/20/07	1	1	2051.9	140.3	35.1				40862.9	40862.9	43090	BGA VLNTR
Point Au Roche State Park	ww counted as net	08/19/07	1	1			210.5	820.8					1031	BGA VLNTR
Carry Bay	ww counted as net	08/20/07	1	1	242.0	84.2		21.0			631.4	631.4	979	BGA VLNTR
North Hero State Park	ww counted as net	08/20/07	1	1	10.5			494.6			7892.0	7892.0	8397	BGA VLNTR
Rouses Point	ww counted as net	08/20/07	1	1	42.1	126.3	21.0						189	BGA VLNTR
Littlefield Shore	ww counted as net	08/19/07	1	1			10.5	189.4					200	BGA VLNTR
Beggs Park	ww counted as net	08/19/07	1	1			84.2	210.5					295	BGA VLNTR
Willsboro Bay	ww counted as net	08/20/07	1	1	31.6		31.6	52.6					116	BGA VLNTR
Cumberland Bay State Park	ww counted as net	08/19/07	1	1	284.1	526.1	42.1	42.1					894	BGA VLNTR
City Bay	ww counted as net	08/20/07	1	1			21.0	42.1					63	BGA VLNTR

Maquam Bay	ww counted as net	08/20/07	1	1			31.6	31.6					63	BGA VLNTR
St. Albans Bay Park	ww counted as net	08/20/07	1	1	42.1	2167.7	52.6	31.6			2315.0	2315.0	4609	BGA VLNTR
Comolli Camp	ww counted as net	08/20/07	1	1	21.0		31.6	52.6					105	BGA VLNTR
High Rocks	ww counted as net	08/19/07	1	1	21.0	1052.3	42.1				526.1	526.1	1642	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	08/19/07	1	1	21.0		115.7	221.0					358	BGA VLNTR
Chapman Bay	ww counted as net	08/20/07	1	1	10.5		21.0	284.1					316	BGA VLNTR
VTDEC Sta50	ww counted as net	08/21/07	1	1	10.5	336.7	221.0	126.3			1157.5	1157.5	1852	UVM
VTDEC Sta25	net	08/15/07	1	1	216.0	2.2	0.5	1.2	0.3		142.2	142.2	363	VT DEC
VTDEC Sta07	net	08/21/07	1	1	952.5	28.7	24.8		0.4		267.9	267.9	1274	VT DEC
VTDEC Sta09	net	08/21/07	1	1	415.3	20.1	147.9	0.8	1.2		82.2	82.2	668	VT DEC
Rte 78 Access	net	08/28/07	1	1	9.3	1.1			4.6				15	UVM
Rte 78 Access	net	08/28/07	2	1	14.1	2.3	0.2	0.6	3.6				21	UVM
Alburg	net	08/28/07	1	1	8.6		0.1		0.1		48.5	48.5	57	UVM
Alburg	net	08/28/07	2	1	7.7	5.2	0.1		0.5		20.3	20.3	34	UVM
Highgate Cliffs	net	08/28/07	1	1	12.0	5.1	0.0		1.0		18.0	18.0	36	UVM
Highgate Cliffs	net	08/28/07	2	1	10.0	4.6	0.6		0.6		22.0	0.7	38	UVM
Highgate Springs	net	08/28/07	1	1	2.8	7.1	0.1		0.8		4.2	4.2	15	UVM
Highgate Springs	net	08/28/07	2	1	3.3	3.7	0.1		1.6		3.3	3.3	12	UVM
Rock River Access	ww counted as net	08/28/07	1	1			947.0	21.0					968	UVM

Rock River Access	ww counted as net	08/28/07	2	1	21.0	42.1	1073.3	21.0					1157	UVM
St. Albans Boat Launch	net	08/28/07	1	1	63.1	187.7	2.2		0.2		640.6	640.6	894	UVM
St. Albans Boat Launch	net	08/28/07	2	1	53.1	278.8	0.5				871.5	871.5	1204	UVM
VTDEC Sta34	net	08/22/07	1	1	3.0	37.3	0.3				406.5	406.5	447	VT DEC
VTDEC Sta40	net	08/22/07	1	1	28.6	68.8	0.8		0.3		195.9	195.9	294	VT DEC
VTDEC Sta02	net	08/23/07	1	1	440.6		20.2	0.2					461	VT DEC
VTDEC Sta04	net	08/23/07	1	1	1229.1						33.1	33.1	1262	VT DEC
Long Point	ww counted as net	08/26/07	1	1			73.7	399.9			105.2	105.2	579	BGA VLNTR
Beggs Park	ww counted as net	08/26/07	1	1	84.2	42.1	105.2	115.7			473.5	473.5	821	BGA VLNTR
Littlefield Shore	ww counted as net	08/26/07	1	1	21.0								21	BGA VLNTR
Point Au Roche State Park	ww counted as net	08/26/07	1	1	326.2		52.6	347.2					726	BGA VLNTR
Willsboro Bay	ww counted as net	08/27/07	1	1	84.2		31.6	31.6					147	BGA VLNTR
Rouses Point	ww counted as net	08/27/07	1	1	21.0	589.3	115.7	105.2					831	BGA VLNTR
Pelots Bay	ww counted as net	08/27/07	1	1	42.1	126.3	52.6	147.3			315.7	315.7	684	BGA VLNTR
North Hero State Park	ww counted as net	08/27/07	1	1			63.1	378.8					442	BGA VLNTR

City Bay	ww counted as net	08/27/07	1	1			52.6	178.9					231	BGA VLNTR
Carry Bay	ww counted as net	08/27/07	1	1			31.6	63.1					95	BGA VLNTR
High Rocks	ww counted as net	08/26/07	1	1		42.1	420.9	242.0	10.5				716	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	08/26/07	1	1		442.0	810.2	357.8					1610	BGA VLNTR
Chapman Bay	ww counted as net	08/26/07	1	1			147.3	2651.7					2799	BGA VLNTR
Comolli Camp	ww counted as net	08/27/07	1	1			115.7	147.3					263	BGA VLNTR
Maquam Bay	ww counted as net	08/27/07	1	1			10.5	305.2					316	BGA VLNTR
St. Albans Bay Park	ww counted as net	08/27/07	1	1		3672.4	63.1	105.2			2136.1	2136.1	5977	BGA VLNTR
Rte 78 Access	net	09/04/07	1	1	7.3	1.4	0.5	1.2	0.4		1.8	1.8	13	UVM
Rte 78 Access	net	09/04/07	2	1	62.3	2.2	1.5	0.7	0.2				67	UVM
Alburg	net	09/04/07	1	1	5.0	0.8	1.7	0.5	0.3		60.9	60.9	69	UVM
Alburg	net	09/04/07	2	1	3.2		0.1	0.2	0.2		27.5	27.5	31	UVM
Highgate Cliffs	net	09/04/07	1	1	31.1	2.8	0.6		0.4		183.7	183.7	218	UVM
Highgate Cliffs	net	09/04/07	2	1	16.2				0.7		141.0	141.0	158	UVM
Highgate Springs	net	09/04/07	1	1	2.6	0.8		0.0	0.8		7.4	7.4	12	UVM
Highgate Springs	net	09/04/07	2	1	6.3	2.1	0.7	0.1	0.9		8.2	8.2	18	UVM
Rock River Access	ww counted as net	09/04/07	1	1		42.1	284.1	31.6					358	UVM

Rock River Access	ww counted as net	09/04/07	2	1	10.5		336.7	115.7				463	UVM
St. Albans Boat Launch	net	09/04/07	1	1	66.0	107.5	1.6		1.3	673.4	657.0	850	UVM
St. Albans Boat Launch	net	09/04/07	2	1	166.8	62.5	1.2	1.2	0.3	579.3	564.5	811	UVM
VTDEC Sta36	net	08/27/07	1	1	117.8	10.1	0.2		0.5	46.4	46.4	175	VT DEC
VTDEC Sta33	net	08/27/07	1	1	56.9	3.2				17.4	17.4	78	VT DEC
Carry Bay	net	08/27/07	1	1	9.0	0.4	0.1	0.2	0.0	15.9	15.9	26	VT DEC
VTDEC Sta51	net	08/29/07	1	1	31.5	1.5	34.1	1.2	3.3	30.0	30.0	102	VT DEC
VTDEC Sta46	net	08/29/07	1	1	100.0	6.2	0.3	0.1	0.1	24.2	24.2	131	VT DEC
VTDEC Sta50	net	08/29/07	1	1	15.7	1.5	0.1	0.0	1.8	10.6	10.6	30	VT DEC
High Rocks	ww counted as net	09/02/07	1	1	31.6	42.1	31.6	52.6				158	BGA VLNTR
Long Point	ww counted as net	09/02/07	1	1	315.7		147.3	684.0				1147	BGA VLNTR
Chapman Bay	ww counted as net	09/02/07	1	1			52.6	10.5				63	BGA VLNTR
Comolli Camp	ww counted as net	09/03/07	1	1		84.2	157.8	284.1	10.5			537	BGA VLNTR
St. Albans Bay Park	ww counted as net	09/03/07	1	1	63.1	1452.1	10.5	94.7		526.1	526.1	2147	BGA VLNTR
Highgate Springs-Shipyard	ww counted as net	09/03/07	1	1		84.2	147.3					231	BGA VLNTR
Maquam Bay	ww counted as net	09/04/07	1	1	10.5			21.0				32	BGA VLNTR
Beggs Park	ww counted as net	09/02/07	1	1	294.6							295	BGA VLNTR

North Hero State Park	ww counted as net	09/03/07	1	1			368.3	2051.9					2420	BGA VLNTR
City Bay	ww counted as net	09/03/07	1	1	21.0		10.5	21.0			105.2	105.2	158	BGA VLNTR
Willsboro Bay	ww counted as net	09/04/07	1	1	21.0		21.0						42	BGA VLNTR
Carry Bay	ww counted as net	09/04/07	1	1	336.7		21.0	52.6					410	BGA VLNTR
Pelots Bay	ww counted as net	09/04/07	1	1	10.5		136.8	420.9			526.1	526.1	1094	BGA VLNTR
Rouses Point	ww counted as net	09/04/07	1	1	10.5	252.5	199.9	1588.9					2052	BGA VLNTR
Burlington Water Bay	net	09/13/07	1	1	12.7	7.6	0.4	0.7	0.2		56.5	56.5	78	UVM
Burlington Water Bay	net	09/13/07	2	1	15.6	4.7	0.2	1.1	0.1		51.3	51.3	73	UVM
Champlain Water Bay	net	09/13/07	1	1	9.3	5.6	0.2	1.4	0.3		28.8	28.8	46	UVM
Champlain Water Bay	net	09/13/07	2	1	45.9	2.1	0.2	0.6	0.1		53.7	53.7	103	UVM
North Beach	net	09/13/07	1	1	6.3	4.9		2.2	0.1		34.1	34.1	48	UVM
North Beach	net	09/13/07	2	1	7.5	5.4	0.1	0.8	0.1		30.2	30.2	44	UVM
Red Rocks Beach	net	09/13/07	1	1	2.5	0.1	0.3	1.3	0.1		33.3	33.3	37	UVM
Red Rocks Beach	net	09/13/07	2	1	3.2	1.7	0.2	1.5			36.9	36.9	44	UVM
Coast Guard Station Vicinity	net	09/13/07	1	1	6.3	0.3	0.2	1.5	0.1		36.5	36.5	45	UVM
Rte 78 Access	net	09/18/07	1	1	37.9	15.1	16.8		2.3		37.2	37.2	109	UVM
Rte 78 Access	net	09/18/07	2	1	9.0	9.0	24.4		0.9		66.8	66.8	110	UVM
Alburg	net	09/18/07	1	1	2.7	0.9	7.2	0.7			42.3	42.3	54	UVM
Alburg	net	09/18/07	2	1	1.2	1.1	3.3		0.4		40.8	40.8	47	UVM
Highgate Cliffs	net	09/18/07	1	1	75.6	3.3	16.4		0.8		410.8	410.8	507	UVM

Highgate Cliffs	net	09/18/07	2	1	58.3	3.3	12.3				246.5	246.5	320	UVM
Highgate Springs	net	09/18/07	1	1	4.4		1.6		0.0		11.9	11.9	18	UVM
Highgate Springs	net	09/18/07	2	1	7.3		150.2						158	UVM
Rock River Access	ww counted as net	09/18/07	1	1			368.3	10.5					379	UVM
Rock River Access	ww counted as net	09/18/07	2	1			480.4						480	UVM
St. Albans Boat Launch	net	09/18/07	1	1	1447.4						3898.5	3898.5	5346	UVM
St. Albans Boat Launch	net	09/18/07	2	1	248.4		12.4				4278.6	4278.6	4539	UVM
St. Albans Boat Launch	net	09/18/07	2	2	596.1						2762.1	2762.1	3358	UVM
High Rocks	ww counted as net	09/09/07	1	1	31.6	31.6	147.3	94.7					305	BGA VLNTR
VTDEC Sta25	net	08/30/07	1	1	109.0	7.0	0.7	2.0	0.4		78.6	78.6	198	VT DEC
VTDEC Sta46	net	09/18/07	1	1	19.3	0.7	0.1	0.1			58.4	58.4	79	VT DEC
Burlington Water Bay	net	09/26/07	1	1	10.4	8.6	0.1	1.1	0.4		49.6	49.6	70	UVM
Burlington Water Bay	net	09/26/07	2	1	11.0	9.1	14.3	1.0	0.4		36.5	36.5	72	UVM
Champlain Water Bay	net	09/26/07	1	1	16.0	3.5	0.1	0.9			71.0	71.0	92	UVM
Champlain Water Bay	net	09/26/07	2	1	7.2	4.4	0.2	1.1	0.1		29.8	29.8	43	UVM
North Beach	net	09/26/07	1	1	3.9	0.4	0.2	1.4	0.0		21.2	21.2	27	UVM
North Beach	net	09/26/07	2	1	5.1	3.6		0.7	0.1		21.7	21.7	31	UVM
Red Rocks Beach	net	09/26/07	1	1	7.1	3.1	0.1	0.6			54.3	54.3	65	UVM
Red Rocks Beach	net	09/26/07	2	1	6.9	0.2	0.1	0.6	0.1		12.1	12.1	20	UVM
Rte 78 Access	ww counted as net	10/02/07	1	1	13.2	52.6	65.8	1933.5	342.0				2407	UVM

Rte 78 Access	ww counted as net	10/02/07	2	1			52.6	815.5	565.6		263.1	263.1	1697	UVM
Alburg	ww counted as net	10/02/07	1	1	26.3		52.6	605.1	223.6				908	UVM
Alburg	ww counted as net	10/02/07	2	1				960.2	157.8				1118	UVM
Highgate Cliffs	ww counted as net	10/02/07	2	1	92.1	118.4	13.2	605.1	670.8		2367.6		3867	UVM
Highgate Springs	ww counted as net	10/02/07	1	1	78.9	52.6	52.6	565.6	486.7				1236	UVM
Highgate Springs	ww counted as net	10/02/07	2	1	92.1		92.1	802.4	657.7				1644	UVM
Rock River Access	ww counted as net	10/02/07	1	1	13.2		39.5	105.2					158	UVM
Rock River Access	ww counted as net	10/02/07	2	1		52.6	78.9	131.5	13.2				276	UVM
St. Albans Boat Launch	ww counted as net	10/02/07	1	1	144.7	52.6	92.1	328.8			526.1	526.1	1144	UVM
St. Albans Boat Launch	ww counted as net	10/02/07	2	1	78.9	157.8	92.1	907.6			263.1	263.1	1499	UVM
Rte 78 Access-shore	ww counted as net	10/15/07	1	1	10.5		94.7	157.8					263	UVM
Rte 78 Access-shore	ww counted as net	10/15/07	2	1		39.5	78.9	342.0					460	UVM

Alburg - Shore	ww counted as net	10/15/07	1	1	13.2		65.8	591.9					671	UVM
Alburg - Shore	ww counted as net	10/15/07	2	1			118.4	657.7					776	UVM
Highgate Springs-Shipyard	ww counted as net	10/15/07	1	1	105.2	13.2	13.2	263.1					395	UVM
Highgate Springs-Shipyard	ww counted as net	10/15/07	2	1	65.8		65.8	381.4					513	UVM
Rock River Access	ww counted as net	10/15/07	1	1	13.2			26.3					39	UVM
Rock River Access	ww counted as net	10/15/07	2	1		52.6	26.3	39.5					118	UVM
St. Albans Boat Launch	ww counted as net	10/15/07	1	1	26.3	105.2	328.8	973.3					1434	UVM
St. Albans Boat Launch	ww counted as net	10/15/07	2	1	263.1	543.7	280.6	868.1		2455.3	2455.3		4411	UVM
St. Albans Boat Launch	ww counted as net	10/15/07	2	2	526.1	35.1	280.6	798.0					1640	UVM
Burlington Dinghy Dock	ww counted as net	10/17/07	1	1				266.7		1118666.7	1118666.7		1118933	UVM
Melo Boat Slip	net	10/18/07	1	1	17.3			2.5		14499.8	14499.8		14520	UVM

Appendix C. Results of Toxin Analyses – Data Summary 2007

Collection Date	Sample Location	Rep	Whole water plankton or whole water filtrate	Microcystin by ELISA (run by UVM)		Anatoxin-a by HPLC (run by VDH)
				Conc. In Lakewater (µg/L)	Analysis Date	Conc. In Lakewater (ng/mL)
07/10/07	St. Albans Bay Park	1	wwp	0.02	01/16/08	<0.5
07/12/07	Champlain water Bay vicinity	1	wwp	0.02	08/09/07	<0.5
07/12/07	St. Albans Bay near Sta. 40	1	wwp	0.072	07/19/07	<0.5
07/23/07	Knight Point	1	wwp	0.037	07/26/07	
07/26/07	VTDEC St. Albans_1	1	wwp	0.026	01/16/08	
07/26/07	VTDEC St. Albans_2	1	wwp	0.037	01/16/08	
07/26/07	VTDEC St. Albans_3	1	wwp	0.028	01/16/08	
07/26/07	VTDEC St. Albans_4	1	wwp	0.031	01/16/08	
07/26/07	VTDEC St. Albans_6	1	wwp	0.03	01/16/08	
07/26/07	VTDEC St. Albans_7	1	wwp	0.034	01/16/08	
07/26/07	VTDEC St. Albans_8	1	wwp	0.047	01/16/08	
07/30/07	VTDEC Sta40	1	wwp	0.029	01/16/08	
08/07/07	St. Albans Boat Launch	2	wwp	0.037	08/09/07	
08/07/07	St. Albans Boat Launch	1	wwp	0.042	08/09/07	
08/13/07	Pelots Bay	1	wwp	0.073	08/16/07	<0.5
08/13/07	St. Albans Bay Park	1	wwp	0.077	08/16/07	<0.5
08/14/07	St. Albans Boat Launch	1	wwp	0.042	08/16/07	
08/14/07	St. Albans Boat Launch	2	wwp	0.039	08/16/07	
08/14/07	VTDEC St. Albans_1	1	wwp	0.034	01/16/08	
08/14/07	VTDEC St. Albans_2	1	wwp	0.079	01/16/08	
08/14/07	VTDEC St. Albans_3	1	wwp	0.09	01/16/08	

08/14/07	VTDEC St. Albans_4	1	wwp	0.076	01/16/08	
08/14/07	VTDEC St. Albans_6	1	wwp	0.054	01/16/08	
08/14/07	VTDEC St. Albans_7	1	wwp	0.097	01/16/08	
08/14/07	VTDEC St. Albans_8	1	wwp	0.084	01/16/08	
08/20/07	North Hero State Park	1	wwp	0.046	08/23/07	
08/20/07	Pelots Bay	1	wwp	0.05	08/23/07	
08/20/07	St. Albans Bay Park	1	wwp	0.177	08/23/07	
08/21/07	St. Albans Boat Launch	2	wwp	0.026	08/23/07	
08/21/07	St. Albans Boat Launch	1	wwp	0.029	08/23/07	
08/27/07	St. Albans Bay Park	1	wwp	0.54	01/16/08	
08/27/07	VTDEC St. Albans_1	1	wwp	0.075	01/16/08	
08/27/07	VTDEC St. Albans_2	1	wwp	0.118	01/16/08	
08/27/07	VTDEC St. Albans_3	1	wwp	0.114	01/16/08	
08/28/07	VTDEC St. Albans_4	1	wwp	0.123	01/16/08	
08/28/07	VTDEC St. Albans_6	1	wwp	0.088	01/16/08	
08/28/07	VTDEC St. Albans_7	1	wwp	0.116	01/16/08	
08/28/07	VTDEC St. Albans_8	1	wwp	0.126	01/16/08	
09/03/07	St. Albans Bay Park	1	wwp	0.072	01/16/08	
09/04/07	St. Albans Boat Launch	1	wwp	0.052	01/16/08	
09/04/07	St. Albans Boat Launch	2	wwp	0.053	01/16/08	
09/18/07	St. Albans Boat Launch	1	wwp	0.052	01/16/08	
09/18/07	St. Albans Boat Launch	2	wwp	0.05	01/16/08	
10/02/07	St. Albans Boat Launch	1	wwp	0.063	01/16/08	
10/02/07	St. Albans Boat Launch	2	wwp	0.068	01/16/08	
10/17/07	Burlington Dinghy Dock	1	wwp	5.612	01/16/08	

Appendix D. Chlorophyll, Total Phosphorus and Total Nitrogen Data Summary

Date	Location	Time	Rep	Chlorophyll a (µg/L)	TN (mg/L)	TP (µg/L)
06/05/07	Alburg	11:00 AM	1	1.38	0.79	19.86
06/05/07	Alburg	11:00 AM	2	1.16	0.76	21.17
06/05/07	Highgate Cliffs	10:30 AM	1	1.02	0.87	32.24
06/05/07	Highgate Cliffs	10:30 AM	2	0.76	0.76	30.60
06/05/07	Highgate Springs	10:05 AM	1	2.80	0.87	23.19
06/05/07	Highgate Springs	10:05 AM	2	3.82	0.96	24.11
06/05/07	Rock River Access	12:05 PM	1	4.07	1.81	75.24
06/05/07	Rock River Access	12:05 PM	2	4.33	1.68	79.93
06/05/07	Rte 78 Access	11:13 AM	1	2.06	0.85	40.83
06/05/07	Rte 78 Access	11:13 AM	2	2.57	0.81	29.89
06/05/07	St. Albans Boat Launch	12:55 PM	1	1.53	0.50	24.63
06/05/07	St. Albans Boat Launch	12:55 PM	2	1.27	0.53	19.70
06/13/07	Burlington Water Bay	10:23 AM	2	1.60	0.45	8.90
06/13/07	Champlain Water Bay	11:05 AM	1	1.02	0.40	8.46
06/13/07	Champlain Water Bay	11:05 AM	2	1.02	0.41	8.66
06/13/07	North Beach	10:10 AM	1	1.53	0.66	11.04
06/13/07	North Beach	10:10 AM	2	1.02	0.61	9.76
06/13/07	Red Rocks Beach	10:54 AM	1	1.27	0.46	9.43
06/13/07	Red Rocks Beach	10:54 AM	2	0.76	0.42	9.52
06/19/07	Alburg	10:45 AM	1	4.87	0.71	25.49
06/19/07	Alburg	10:45 AM	2	5.16	0.69	29.38
06/19/07	Highgate Cliffs	10:15 AM	1	12.32	0.95	27.66
06/19/07	Highgate Cliffs	10:15 AM	2	8.88	0.75	26.76
06/19/07	Highgate Springs	9:56 AM	1	11.46	0.98	27.13
06/19/07	Highgate Springs	9:56 AM	2	10.89	1.00	26.84
06/19/07	Rock River Access	11:55 AM	1	12.03	1.09	47.15
06/19/07	Rock River Access	11:55 AM	2	14.04	0.90	50.11
06/19/07	Rte 78 Access	11:04 AM	1	6.88	0.75	30.25
06/19/07	Rte 78 Access	11:04 AM	2	7.45	0.77	33.46
06/19/07	St. Albans Boat Launch	12:35 PM	1	2.86	0.60	23.59
06/19/07	St. Albans Boat Launch	12:35 PM	2	2.58	0.43	24.82

07/02/07	Alburg	11:28 AM	1	7.73	0.59	34.04
07/02/07	Alburg	11:28 AM	2	8.59	0.61	34.65
07/02/07	Highgate Cliffs	11:01 AM	1	5.16	0.55	34.84
07/02/07	Highgate Cliffs	11:01 AM	2	5.16	0.67	33.35
07/02/07	Highgate Springs	10:00 AM	1	4.87	1.18	41.46
07/02/07	Highgate Springs	10:00 AM	2	5.16	1.06	41.32
07/02/07	Rock River Access	12:41 PM	1	5.73	1.69	81.12
07/02/07	Rock River Access	12:41 PM	2	6.88	1.67	81.45
07/02/07	Rte 78 Access	11:45 AM	1	9.45	0.65	36.95
07/02/07	Rte 78 Access	11:45 AM	2	7.45	0.52	38.43
07/02/07	St. Albans Boat Launch	1:20 AM	1	5.16	0.62	24.04
07/02/07	St. Albans Boat Launch	1:20 AM	2	4.87	0.52	27.88
07/10/07	Alburg	11:15 AM	1	6.30	0.50	28.04
07/10/07	Alburg	11:15 AM	2	6.59	0.55	28.64
07/10/07	Highgate Cliffs	10:50 AM	1	11.17	0.57	33.20
07/10/07	Highgate Cliffs	10:50 AM	2	8.59	0.67	34.30
07/10/07	Highgate Springs	10:30 AM	1	12.60	0.69	33.52
07/10/07	Highgate Springs	10:30 AM	2	11.46	0.66	34.07
07/10/07	Rock River Access	12:15 PM	1	2.86	3.03	169.84
07/10/07	Rock River Access	12:15 PM	2	2.29	3.32	158.77
07/10/07	Rte 78 Access	11:30 AM	1	6.30	0.44	30.81
07/10/07	Rte 78 Access	11:30 AM	2	7.45	0.50	32.35
07/10/07	St. Albans Boat Launch	12:53 PM	2	7.73	0.58	30.97
07/12/07	Burlington Water Bay	10:56 AM	1	2.58	0.58	12.81
07/12/07	Burlington Water Bay	10:56 AM	2	2.01	0.52	12.65
07/12/07	Champlain Water Bay	11:50 AM	1	2.58	0.49	11.23
07/12/07	Champlain Water Bay	11:50 AM	2	1.72	0.57	11.51
07/12/07	North Beach	10:42 AM	1	2.29	0.71	11.99
07/12/07	North Beach	10:42 AM	2	1.43	0.48	10.40
07/12/07	Red Rocks Beach	11:40 AM	1	2.58	0.63	14.89
07/12/07	Red Rocks Beach	11:40 AM	2	2.01	0.55	14.47
07/17/07	Alburg	10:28 AM	1	1.43	0.44	26.45
07/17/07	Alburg	10:28 AM	2	1.43	0.45	27.99
07/17/07	Highgate Cliffs	10:10 AM	1	8.59	0.81	39.64
07/17/07	Highgate Cliffs	10:10 AM	2	9.45	1.00	47.20

07/17/07	Highgate Springs	10:00 AM	1	9.45	0.94	40.20
07/17/07	Highgate Springs	10:00 AM	2	8.02	0.99	40.92
07/17/07	Rock River Access	11:40 AM	1	9.74	2.48	83.73
07/17/07	Rock River Access	11:40 AM	2	8.59	2.58	81.76
07/17/07	Rte 78 Access	10:44 AM	1	2.86	0.42	30.80
07/17/07	Rte 78 Access	10:44 AM	2	3.42	0.42	28.87
07/17/07	St. Albans Boat Launch	12:20 PM	1	6.88	0.40	33.77
07/17/07	St. Albans Boat Launch	12:20 PM	2	8.88	0.57	32.56
08/06/07	Champlain Water Bay	10:15 AM	1	2.01	0.43	15.43
08/06/07	Champlain Water Bay	10:15 AM	2	2.29	0.45	19.47
08/06/07	North Beach	10:36 AM	1	1.43	0.42	11.43
08/06/07	North Beach	10:36 AM	2	1.43	0.45	12.34
08/06/07	Red Rocks Beach	10:00 AM	2	1.43	0.47	16.73
08/07/07	Alburg	10:40 AM	1	1.72	0.57	39.57
08/07/07	Alburg	10:40 AM	2	1.15	0.51	37.89
08/07/07	Highgate Cliffs	10:09 AM	1	3.72	0.68	48.73
08/07/07	Highgate Cliffs	10:09 AM	2	5.16	0.65	43.49
08/07/07	Highgate Springs	10:00 AM	1	3.72	0.82	44.14
08/07/07	Highgate Springs	10:00 AM	2	4.58	0.70	40.89
08/07/07	Rock River Access	11:45 AM	1	8.84	1.64	137.22
08/07/07	Rock River Access	11:45 AM	2	8.02	1.43	119.51
08/07/07	Rte 78 Access	10:55 AM	1	4.87	0.52	51.16
08/07/07	Rte 78 Access	10:55 AM	2	2.29	0.46	45.65
08/07/07	St. Albans Boat Launch	12:25 PM	1	12.22	0.52	47.12
08/07/07	St. Albans Boat Launch	12:25 PM	2	18.33	0.61	47.03
08/14/07	Alburg	11:20 AM	1		0.53	47.60
08/14/07	Alburg	11:20 AM	2		0.59	45.45
08/14/07	Highgate Cliffs	11:00 AM	1	6.22	0.42	37.67
08/14/07	Highgate Cliffs	11:00 AM	2	8.51	0.58	39.08
08/14/07	Highgate Springs	10:39 AM	1	2.62	0.70	37.93
08/14/07	Highgate Springs	10:39 AM	2		0.59	35.29
08/14/07	Rock River Access	12:30 PM	1	1.64	0.91	72.99
08/14/07	Rock River Access	12:30 PM	2	1.64	0.84	82.17
08/14/07	Rte 78 Access	11:34 AM	1	3.93	0.62	47.71
08/14/07	Rte 78 Access	11:34 AM	2	0.66	0.57	48.41

08/14/07	St. Albans Boat Launch	1:15 AM	1		1.01	34.35
08/14/07	St. Albans Boat Launch	1:15 AM	2	2.55	0.96	36.33
08/21/07	Alburg	11:01 AM	1	3.93	0.49	45.02
08/21/07	Alburg	11:01 AM	2	4.91	0.48	43.21
08/21/07	Highgate Cliffs	10:20 AM	1	7.86	0.77	48.19
08/21/07	Highgate Cliffs	10:20 AM	2	7.20	0.51	47.91
08/21/07	Highgate Springs	10:00 AM	1	18.33	0.59	47.27
08/21/07	Highgate Springs	10:00 AM	2	13.75	0.66	35.96
08/21/07	Rock River Access	12:15 PM	1	8.84	0.53	60.63
08/21/07	Rock River Access	12:15 PM	2	7.86	0.88	61.66
08/21/07	Rte 78 Access	11:20 AM	1	3.93	0.56	48.65
08/21/07	Rte 78 Access	11:20 AM	2	5.24	0.55	47.45
08/21/07	St. Albans Boat Launch	12:50 PM	1	10.80	0.82	26.63
08/21/07	St. Albans Boat Launch	12:50 PM	2	10.15	0.50	29.22
08/23/07	Burlington Water Bay	10:20 AM	1	4.07	0.61	11.64
08/23/07	Burlington Water Bay	10:20 AM	2	4.58	0.50	11.22
08/23/07	Champlain Water Bay	11:10 AM	1	4.33	0.49	11.50
08/23/07	Champlain Water Bay	11:10 AM	2	5.86	0.44	10.54
08/23/07	North Beach	10:10 AM	1	2.55	0.46	12.57
08/23/07	North Beach	10:10 AM	2	2.55	0.56	11.39
08/23/07	Red Rocks Beach	11:05 AM	1	3.06	0.44	10.38
08/28/07	Alburg	10:40 AM	1	1.78	0.54	51.09
08/28/07	Alburg	10:40 AM	2	3.31	0.46	47.37
08/28/07	Highgate Cliffs	10:12 AM	1	6.88	0.52	46.93
08/28/07	Highgate Cliffs	10:12 AM	2	1.02	0.54	39.19
08/28/07	Highgate Springs	10:00 AM	1	1.53	0.61	30.61
08/28/07	Highgate Springs	10:00 AM	2	3.82	0.73	26.20
08/28/07	Rock River Access	11:55 AM	1	6.62	2.02	133.66
08/28/07	Rock River Access	11:55 AM	2	8.15	1.80	132.01
08/28/07	Rte 78 Access	11:00 AM	1	0.00	0.46	52.42
08/28/07	Rte 78 Access	11:00 AM	2		0.34	47.45
08/28/07	St. Albans Boat Launch	12:35 PM	2	5.96	0.46	30.56
09/04/07	Alburg	10:41 AM	1	0.51	0.46	40.62
09/04/07	Alburg	10:41 AM	2		0.45	28.39
09/04/07	Highgate Cliffs	10:19 AM	1		0.49	28.59

09/04/07	Highgate Cliffs	10:19 AM	2	21.13	0.63	37.19
09/04/07	Highgate Springs	10:05 AM	1	4.33	0.50	33.69
09/04/07	Highgate Springs	10:05 AM	2		0.54	31.23
09/04/07	Rock River Access	11:55 AM	1	5.09	1.36	82.20
09/04/07	Rock River Access	11:55 AM	2	2.55	1.31	79.65
09/04/07	Rte 78 Access	11:00 AM	1	3.06	0.42	39.77
09/04/07	Rte 78 Access	11:00 AM	2	1.53	0.44	31.72
09/04/07	St. Albans Boat Launch	12:35 PM	1	0.00	0.41	23.18
09/04/07	St. Albans Boat Launch	12:35 PM	2	5.86	0.40	27.30
09/13/07	Burlington Water Bay	10:40 AM	2	0.57	0.56	10.48
09/18/07	Alburg	10:09 AM	1	1.96	0.45	40.03
09/18/07	Alburg	10:09 AM	2	2.62	0.52	40.73
09/18/07	Highgate Cliffs	10:30 AM	1	3.60	0.45	42.57
09/18/07	Highgate Cliffs	10:30 AM	2	9.49	0.45	40.41
09/18/07	Highgate Springs	10:15 AM	1	5.24	0.78	24.78
09/18/07	Highgate Springs	10:15 AM	2	2.29	0.62	22.25
09/18/07	Rock River Access	1:10 PM	1	1.64	2.05	122.92
09/18/07	Rock River Access	1:10 PM	2	3.27	1.63	86.58
09/18/07	Rte 78 Access	10:00 AM	1	2.29	0.57	49.14
09/18/07	Rte 78 Access	10:00 AM	2	2.62	0.48	50.39
09/18/07	St. Albans Boat Launch	1:40 PM	1	3.27	0.38	21.49
09/18/07	St. Albans Boat Launch	1:40 PM	2	2.62	0.39	20.05
09/26/07	Burlington Water Bay	10:14 AM	1	3.72	0.45	12.80
09/26/07	Burlington Water Bay	10:14 AM	2	1.72	0.51	11.74
09/26/07	Champlain Water Bay	10:50 AM	1	0.00	0.41	11.77
09/26/07	Champlain Water Bay	10:50 AM	2	4.30	0.40	13.06
09/26/07	North Beach	10:03 AM	1	1.15	0.40	12.06
09/26/07	North Beach	10:03 AM	2	0.86	0.46	12.14
09/26/07	Red Rocks Beach	10:43 AM	1	0.29	0.38	11.71
09/26/07	Red Rocks Beach	10:43 AM	2	1.15	0.45	12.96
10/02/07	Alburg	11:03 AM	1	3.69	0.46	25.69
10/02/07	Alburg	11:03 AM	2	3.82	0.42	23.51
10/02/07	Highgate Cliffs	10:45 AM	1	16.42	0.71	32.46
10/02/07	Highgate Cliffs	10:45 AM	2	17.57	0.70	30.50
10/02/07	Highgate Springs	10:10 AM	1	5.35	0.51	28.05

10/02/07	Highgate Springs	10:10 AM	2	0.00	0.48	21.71
10/02/07	Rock River Access	10:30 AM	1	2.29	2.51	202.66
10/02/07	Rock River Access	10:30 AM	2	1.91	2.62	192.34
10/02/07	Rte 78 Access	11:18 AM	1	4.58	0.43	38.32
10/02/07	Rte 78 Access	11:18 AM	2	7.64	0.47	37.12
10/02/07	St. Albans Boat Launch	12:14 PM	1	4.20	0.42	32.68
10/02/07	St. Albans Boat Launch	12:14 PM	2	5.73	0.35	37.48
10/15/07	Alburg - Shore	10:50 AM	1	0.57	0.47	44.33
10/15/07	Alburg - Shore	10:50 AM	2	0.86	0.43	44.47
10/15/07	Highgate Springs- Shipyard	10:15 AM	1		0.65	182.44
10/15/07	Highgate Springs- Shipyard	10:15 AM	2	0.00	0.69	23.11
10/15/07	Rock River Access	10:00 AM	1		3.49	168.12
10/15/07	Rock River Access	10:00 AM	2		3.65	160.90
10/15/07	Rte 78 Access- shore	10:35 AM	1	5.73	0.37	74.45