Lake Hopatcong Harmful Algal Bloom: Field Sampling Locations, Results and Aircraft Remote Sensing Information

9/18/19

The DEP's advisory remains in effect for all areas of the lake except Indian Harbor, Henderson Cove, Byram Cove, Byrum Bay to Halsey Island, and, as of 9/6, the area surrounding ST-14 (S.E. of State Park beach) in the southern part of the lake (see map).

On 8/8, 8/12 and 8/15, beaches in this area of the lake were sampled and results are included in the tables below. As per the DEP/DOH Harmful Algal Bloom (HAB) Freshwater Recreational Response Strategy, two subsequent samples below the health advisory guidance thresholds are required for reopening of a regulated Public Recreational Bathing facility. Based on the data, DEP/DOH has approved the local health department to re-open the following beaches: as of 8/13 Pebble Beach, Sand Harbor, Bass Rock Beach, Sperry Springs Beach, Beck Lane Beach and CAPP Beach, and as of 8/16, Byram Bay Community Club Beach and Clearwater Beach.

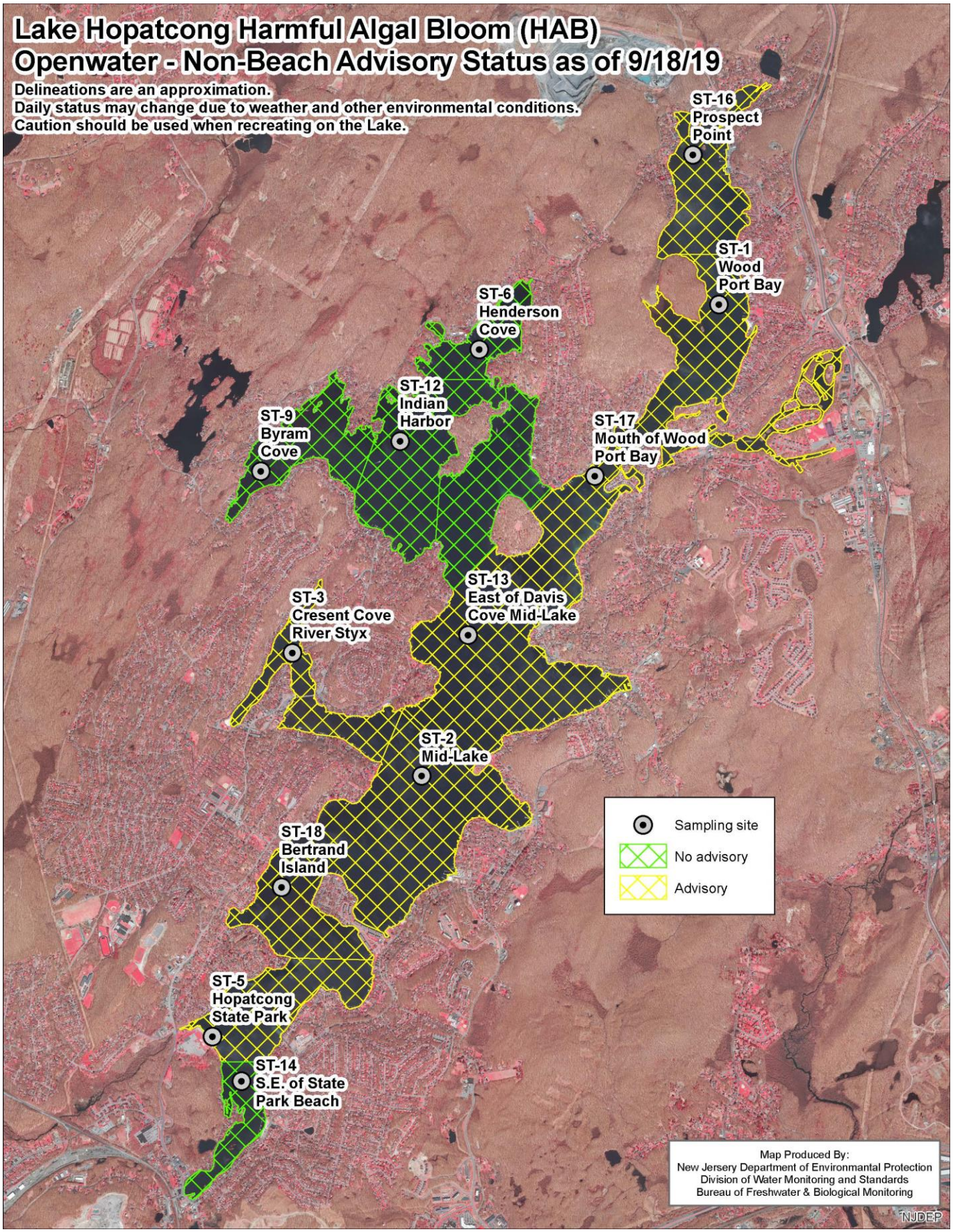
The DEP urges the public to avoid swimming or water sports that may result in contact with the water, such as water-skiing, tubing, canoeing, paddle boarding and kayaking. There is no recommended limitation on fishing or passive recreational boating that does not have the potential for splashing. However, fish caught should not be eaten. The public is further advised that pets should not be allowed in the water or to drink it.

Since the initial report of an algal bloom on 6/17/19, the DEP Bureau of Freshwater and Biological Monitoring has been sampling and analyzing the waters in Lake Hopatcong to identify the algal species and to determine whether cell count levels or cyanotoxins are present above NJ Health Advisory Guidance Levels. HAB response has been conducted in accordance with NJ's Cyanobacterial Harmful Algal Bloom (HAB) Freshwater Recreational Response Strategy, which is a unified interagency approach for responding to HABs Sampling will be conducted on Tuesdays and Thursdays with results posted on the following days. Flights will continue once a week.

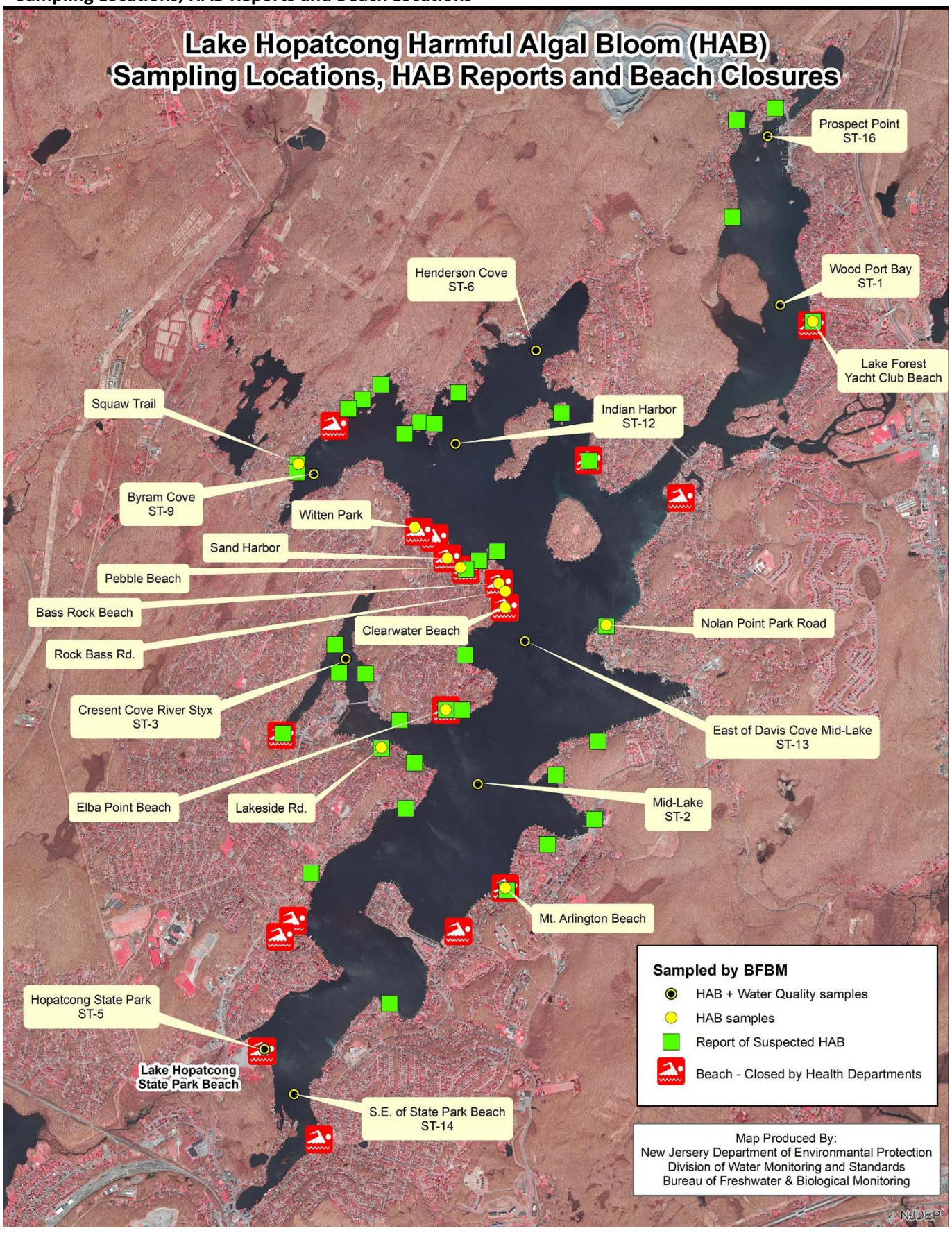
Due to the widespread nature of this bloom, based on field sampling, laboratory results and aircraft remote sensing, on 6/27, 7/3 and 7/12 DEP issued press releases advising the public to avoid swimming in or contact with Lake Hopatcong water. In addition to some beaches already being closed due to visual, field or lab results, as a precaution, DEP recommended that local health authorities close all public swimming beaches along the lake. On 7/26, DEP issued a press release lifting the advisory in the Indian Harbor area of the lake. On 8/1, DEP lifted the advisory in Henderson Cove, on 8/9 the advisory was lifted in Byram Cove, and as of 8/13 and 8/16 the advisory in Pebble Beach, Sand Harbor, Bass Rock Beach. Sperry Springs Beach, Beck Lane Beach and CAPP Beach was lifted – see advisory status map below. Other swimming beaches remain closed.

Bloom reports and sampling locations, as well as the results from sampling events can be found in the sampling locations map and results table below. NJ Health Advisory Guidance Levels include cell counts ≥ 20,000 cells/ml and microcystin levels ≥ 3µg/L. While many HAB cell counts in Lake Hopatcong have been above NJ Health Advisory Guidance Levels, measurable microcystin levels have been below the guidance. DEP will continue to monitor the lake until the HAB subsides to levels below all NJ Health Advisory Guidance triggers.

Non-Beach Advisory Status



Sampling Locations, HAB Reports and Beach Locations



Potential Health Effects and Results

Exposure to cyanobacteria can cause a range of health effects, including rashes, allergy-like reactions, flu-like symptoms, gastroenteritis, respiratory irritation and eye irritation. Exposure to a HAB which is actively producing cyanotoxins may result in more serious health effects including liver toxicity and neurological effects. HABs may begin to produce cyanotoxins at any time.

In order to be classified as a harmful algal bloom, NJ first identifies the presence of cyanobacterial species and then performs analyses for cell counts and/or toxins. The chart below details the sampling that has occurred since 6/18/2019, as well as the results to date. Due to the characteristics of the lake, as the bloom progresses, some areas may test higher on some days than previous days. This variability is expected due to the shift in cyanobacteria populations, wind or water currents moving the blooms around the lake.

Results from sampling conducted on 9/17/19 show continued cell counts above advisory levels for locations as highlighted in the first table below. Toxin levels are shown in the second table.

Lake Hopatcong Harmful Algal Bloom (HAB) Samples and Results as of 9/17/2019

Cell Counts

Site name	Station# (where applicable)	Cyanobacteria Counts cells/mL*																														
		Date Sampled																														
Bathing Beach Sites		6/18/2019	6/21/2019	6/26/2019	6/27/2019	6/28/2019	7/1/2019	7/2/2019	7/5/2019	7/9/2019	7/11/2019	7/16/2019	7/19/2019	7/23/2019	7/25/2019	7/30/2019	8/1/2019	8/6/2019	8/8/2019	8/12/2019	8/15/2019	8/20/2019	8/22/2019	8/27/2019	8/29/2019	9/3/2019	9/5/2019	9/10/2019	9/12/2019	9/17/2019
Pebble Beach		57000	---	---	---	---	95000	16850	---	19300	---	---	---	24750	---	---	---	---	15250	18625	---	---	---	---	---	---	---	---	---	---	---	---
Sand Harbor		51375	---	---	---	---	9250	27800	---	17750	---	---	---	24500	---	---	---	---	12750	13500	---	---	---	---	---	---	---	---	---	---	---	---
Clearwater Beach		---	8750	---	---	---	21000	13000	---	33375	---	---	---	13000	---	---	---	---	21000	16250	18500	---	---	---	---	---	---	---	---	---	---	---
Bass Rock Beach		---	35812	---	---	---	33030	53450	---	24125	---	---	---	26750	---	---	---	---	12000	17250	---	---	---	---	---	---	---	---	---	---	---	---
Lake Forest Yacht Club Beach		---	---	9750	---	---	115000	4400	---	21250	---	---	---	45000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Elba Point Beach		---	---	37125	---	---	18500	29090	---	12875	---	---	---	24000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mt. Arlington Beach		---	---	---	179000	---	12750	14125	---	25875	---	---	---	30500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Hopatcong State Park	ST-5	---	---	---	---	24250	7750	0	17125	32000	46750	35000	48000	47250	71000	35000	63000	57250	27250	18250	18375	45000	46000	31250	31375	15625	35000	16500	24000	32750
Sperry Springs Beach		---	---	---	---	---	---	---	---	---	---	---	---	32500	---	---	---	---	6500	9750	---	---	---	---	---	---	---	---	---	---	---	---
Byram Bay Community Club Beach		---	---	---	---	---	---	---	---	---	---	---	---	38250	---	---	---	---	21250	16750	17250											
Beck Lane Beach		---	---	---	---	---	---	---	---	---	---	---	---	55500	---	---	---	---	13750	17000	---	---	---	---	---	---	---	---	---	---	---	---
CAPP Beach		---	---	---	---	---	---	---	---	---	---	---	---	42750	---	---	---	---	5250	4500	---	---	---	---	---	---	---	---	---	---	---	---
East Shore Beach		---	---	---	---	---	---	---	---	---	---	---	---	15825	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Hopatcong Homestead Beach		---	---	---	---	---	---	---	---	---	---	---	---	29250	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ingram Cove		---	---	---	---	---	---	---	---	---	---	---	---	18500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Crescent Cove Beach		---	---	---	---	---	---	---	---	---	---	---	---	45750	198000	---	160000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Shore Hills Beach	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20250	32500	21625		
Other Lake Sites																																
Nolan Point Park Road		12500	---	---	---	---	12500	11900	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock Bass Rd.		---	9750	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Squaw Trail		---	11875	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lakeside Rd.		---	10281	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Witten Park		---	---	---	14500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Wood Port Bay	ST-1	---	---	---	---	34000	---	8000	20475	30500	9525	15000	18000	78000	19750	59500	96750	54750	40000	55750	17250	60250	42125	53000	44750	87500	95250	91375	136375	51000		
Mid-Lake (collected at surface, 0.5, 1.0, and 2 meters. Highest results listed)	ST-2	---	---	---	---	36000 at 1 meters	---	65750 at 2 meters	22750	29875 at 0.1 meters	31500 at 3.0.2 meters	19000 at 0.1 meters	21000 at 0.1 meters	60750 at 0.5 meters	33250 at 0.1 meters	35000 at 1 meters	47500 at 0.1 meters	56125 at 0.1 meters	37750 at 1 meters	53000 at 1 meters	67000 at 1 meter	30875 at 1 meters	44125 at 1 meters	26375 at 1 meters	34250 at 0.1 meters	23750 at 0.1 meters	27500 at 1 meters	25500 at 1 meters	22375 at 0.1 meters	33500 at 1 meter		
Cresent Cove River Styx	ST-3	---	---	---	---	34500	---	2000	35500	79000	37000	52000	43000	46500	205500	65250	84000	80750	50625	148000	62875	60625	40750	22750	29750	28250	31000	19125	32625	6000		
Henderson Cove	ST-6	---	---	---	---	28280	---	19000	13000	18500	15000	32000	26000	40000	17250	11250	19750	15000	17375	12250	---	---	---	---	---	---	---	---	---	---	---	
Byram Cove	ST-9	---	---	---	---	10250	---	28000	37000	29000	47500	28000	22000	43250	50050	25500	18000	13750	17500	14500	---	---	---	---	---	---	---	---	---	---	---	
Indian Harbor	ST-12	---	---	---	---	22000	---	39750	10000	8000	16000	8000	9000	19000	18500	17750	14250	11750	17250	17250	---	---	---	---	---	---	---	---	---	---	---	
East of Davis Cove Mid-Lake	ST-13	---	---	---	---	18500	---	19000	7000	18500	60000	13000	18000	49000	38750	31500	44000	38250	22500	42750	48250	26500	26750	24500	35125	25000	18750	30500	23250	17250		
S.E. of State Park Beach	ST-14	---	---	---	---	34000	---	21100	17500	---	10000	6000	14000	40500	53825	49500	48500	41500	24250	59125	54500	27000	27500	30500	26500	9500	17750	---	---	---		
Prospect Point	ST-16	---	---	---	---	---	---	5150	37000	6000	10000	10000	14000	18750	34500	41750	63000	30000	28000	73000	42250	25250	35500	30750	56500	55250	49750	72500	53500	32400		
Mouth of Wood Port Bay	ST-17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	43000	27000	29000	28250	49125	26750	45500	35000	24750	13500		
Bertrand Island	ST-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	53125	39250	36750	29500	22000	21750	22375	19000	29250	19375		

*NJ Health Advisory Guidance Levels
Cell Count ≥ 20,000 cells/ml;
Microcystins ≥ 8µg/L

Indicates > than advisory levels

Toxins

Site name	Station# (where applicable)	Microcystins µg/l (lowest Reporting Level 0.15µg/l)*																												
		Date Sampled																												
Bathing Beach Sites		6/18/19	6/21/19	6/26/19	6/27/19	6/28/19	7/1/19	7/2/19	7/5/19	7/9/19	7/11/19	7/16/19	7/19/19	7/23/19	7/25/19	7/25/19	8/1/19	8/6/19	8/8/19	8/12/19	8/15/19	8/20/19	8/22/19	8/27/19	8/29/19	9/3/19	9/5/19	9/10/19	9/12/19	9/17/19
Pebble Beach		0.83	---	---	---	---	0.15	0.16	---	0.17	---	---	---	0.25	---	---	---	---	0.29	0.23	---	---	---	---	---	---	---	---	---	---
Sand Harbor		1.35	---	---	---	---	0.17	< Reporting Level	---	0.21	---	---	---	0.22	---	---	---	---	0.26	0.15	---	---	---	---	---	---	---	---	---	---
Clearwater Beach		---	0.16	---	---	---	< Reporting Level	0.18	---	0.24	---	---	---	0.23	---	---	---	---	0.23	0.29	0.12	---	---	---	---	---	---	---	---	---
Bass Rock Beach		---	0.21	---	---	---	0.06	0.16	---	0.23	---	---	---	0.25	---	---	---	---	0.30	0.18	---	---	---	---	---	---	---	---	---	---
Lake Forest Yacht Club Beach		---	---	0.38	---	---	0.24	0.35	---	0.29	---	---	---	0.42	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Elba Point Beach		---	---	< Reporting Level	---	---	0.19	< Reporting Level	---	0.19	---	---	---	0.34	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mt. Arlington Beach		---	---	---	0.15	---	< Reporting Level	0.16	---	0.32	---	---	---	0.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Hopatcong State Park	ST-5	---	---	---	---	< Reporting Level	< Reporting Level	0.15	< Reporting Level	0.24	0.24	0.24	0.39	0.42	0.36	0.61	0.375	0.30	0.36	0.60	0.22	0.47	0.26	0.6	0.6	0.4	0.35	0.36	0.41	0.37
Sperry Springs Beach		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.16	0.17	---	---	---	---	---	---	---	---	---	---
Byram Bay Community Club Beach		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.26	0.19	0.17									
Beck Lane Beach		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.17	0.16	---	---	---	---	---	---	---	---	---	---
CAPP Beach		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.27	0.19	---	---	---	---	---	---	---	---	---	---
East Shore Beach		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Hopatcong Homestead Beach		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ingram Cove		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Crescent Cove Beach														0.62	1.29	---	1.947	---	---	---	---	---	---	---	---	---	---	---	---	---
Shore Hills Beach	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.47	---	0.36
Other Lake Sites																														
Nolan Point Park Road		< Reporting Level	---	---	---	---	< Reporting Level	< Reporting Level	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rock Bass Rd.		---	0.23	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Squaw Trail		---	0.16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lakeside Rd.		---	0.17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Witten Park		---	---	---	< Reporting Level	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Wood Port Bay	ST-1	---	---	---	---	0.34	---	0.38	0.42	0.41	0.41	0.38	0.59	0.65	0.41	0.33	0.366	0.30	0.30	0.37	0.34	0.36	0.38	0.38	0.48	0.23	0.26	0.27	0.23	0.17
Mid-Lake (collected at surface, 0.5, 1.0, and 2 meters. Highest results listed)	ST-2	---	---	---	---	0.15	---	0.16	0.15	0.22 at 0.1 meters	0.19 at 0.1 meters	0.23 at 4 meters	0.36 at 0.1 meters	0.30 at 1 meters	0.32 at 1 meters	0.24 at 1 meters	0.168 at 1 meter	0.22 at 1 meters	0.23 at 1 meters	0.36 at 0.1 meters	0.94 at 0.1 meters	0.32 at 0.1 meters	< Reporting Level	0.19 at 1 meters	0.26 at 1 meters	< Reporting Level	0.17 at 13 meters	0.18 at 1 meters	0.19 AT 13 meters	0.15
Cresent Cove River Styx	ST-3	---	---	---	---	0.18	---	< Reporting Level	< Reporting Level	0.26	0.29	0.32	0.48	0.25	0.39	0.42	0.28	0.30	0.49	0.54	0.43	0.41	1.24	0.63	0.60	0.55	0.51	0.18	0.4	< Reporting Level
Henderson Cove	ST-6	---	---	---	---	< Reporting Level	---	0.15	0.18	< Reporting Level	< Reporting Level	0.18	0.25	0.25	0.35	0.22	0.185	0.22	0.25	0.25	---	---	---	---	---	---	---	---	---	---
Byram Cove	ST-9	---	---	---	---	0.2	---	< Reporting Level	0.16	0.18	< Reporting Level	0.18	0.18	0.37	0.24	0.19	0.244	0.44	0.22	0.15	---	---	---	---	---	---	---	---	---	---
Indian Harbor	ST-12	---	---	---	---	< Reporting Level	---	0.32	0.16	0.19	0.15	0.26	0.24	0.29	0.23	0.21	0.253	0.16	0.29	0.17	---	---	---	---	---	---	---	---	---	---
East of Davis Cove Mid-Lake	ST-13	---	---	---	---	< Reporting Level	---	< Reporting Level	0.28	0.45	0.17	0.18	0.32	0.18	0.13	0.23	0.162	0.16	0.23	0.42	0.31	0.22	0.22	0.22	0.16	< Reporting Level	< Reporting Level	< Reporting Level	0.34	< Reporting Level
S.E. of State Park Beach	ST-14	---	---	---	---	0.16	---	< Reporting Level	< Reporting Level	---	0.22	0.25	0.22	0.34	0.24	0.32	0.476	0.53	0.41	0.44	0.44	0.23	0.54	0.53	0.57	0.41	0.35	---	---	---
Prospect Point	ST-16	---	---	---	---	---	---	0.35	0.31	0.28	0.45	0.57	0.43	0.61	0.43	0.3	0.192	0.37	0.40	0.39	0.31	0.23	0.31	0.26	0.26	0.23	0.20	0.23	0.34	< Reporting Level
Mouth of Wood Port Bay	ST-17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.20	0.21	< Reporting Level	0.24	0.24	< Reporting Level	< Reporting Level	< Reporting Level	0.17	< Reporting Level
Bertrand Island	ST-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.21	0.26	< Reporting Level	0.19	0.24	< Reporting Level	0.21	0.18	< Reporting Level	0.16

*NJ Health Advisory Guidance Levels
Cell Count ≥ 20,000 cells/ml;
Microcystins ≥ 3µg/L

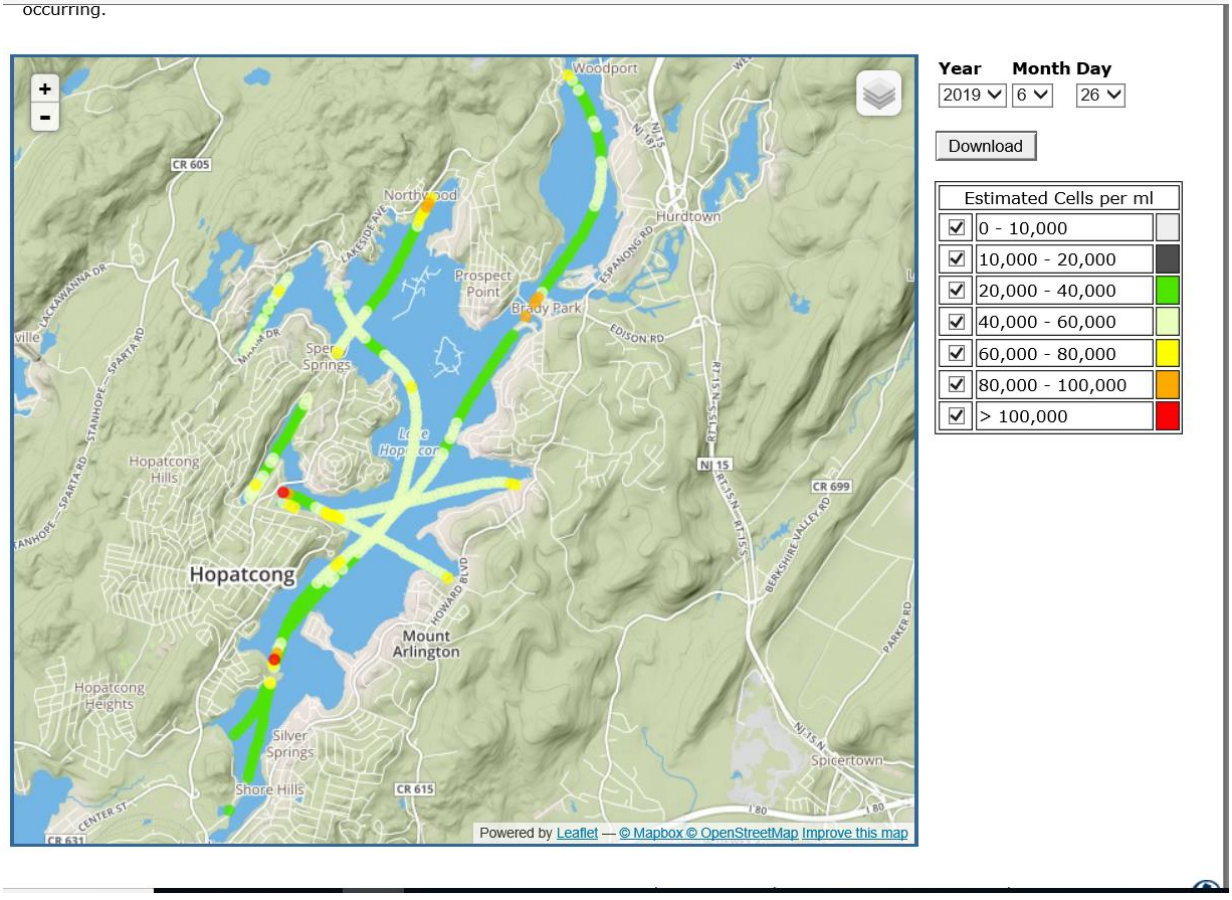
Aircraft Remote Sensing Information and Results

In addition to the response to Harmful Algal Bloom visual reports, field sampling and laboratory analyses described above, the DEP has developed aircraft remote sensing capabilities for general cyanobacteria detection and tracking. A sensor is used to pick up wavelengths of light specific to the cyanobacteria pigment phycocyanin in a waterbody. This advanced monitoring method provides immediate feedback on the presence and relative cyanobacteria cell counts, and can serve as a screening method to target waters for sample collection. While laboratory analyses serve as the definitive determination of whether results exceed NJ Health Advisory Guidance levels, remote sensing data provides useful information on the general extent and trends of a bloom.

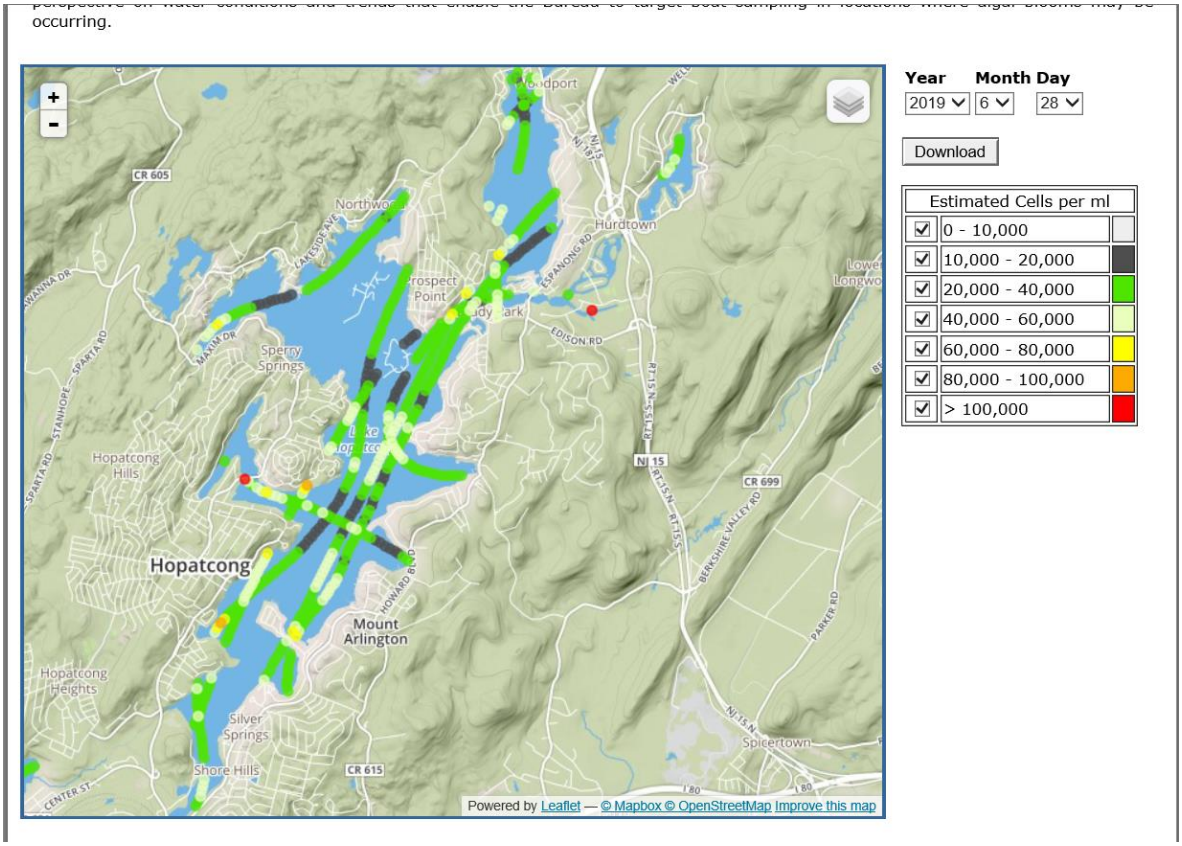
Remote sensing flights were conducted over Lake Hopatcong on 6/26, 6/28, 6/30, 7/3, 7/10, 7/17, 7/24, 7/30, 8/9, 8/20, 8/27, 9/3, 9/11 and 9/17. The scale below estimates the pigment concentrations and cell counts; the bright yellow to red is estimated to be over 20,000 cells/ml or higher, light green denotes an area of concern where cell counts may be near 20,000 cells/ml and dark gray denotes low levels or non-detect. Images are available below for six of the flights. Samples results are needed to confirm sensor estimates.

On 6/26/2019, the flight data shows elevated levels of the phycocyanin pigment covering almost the entire lake.

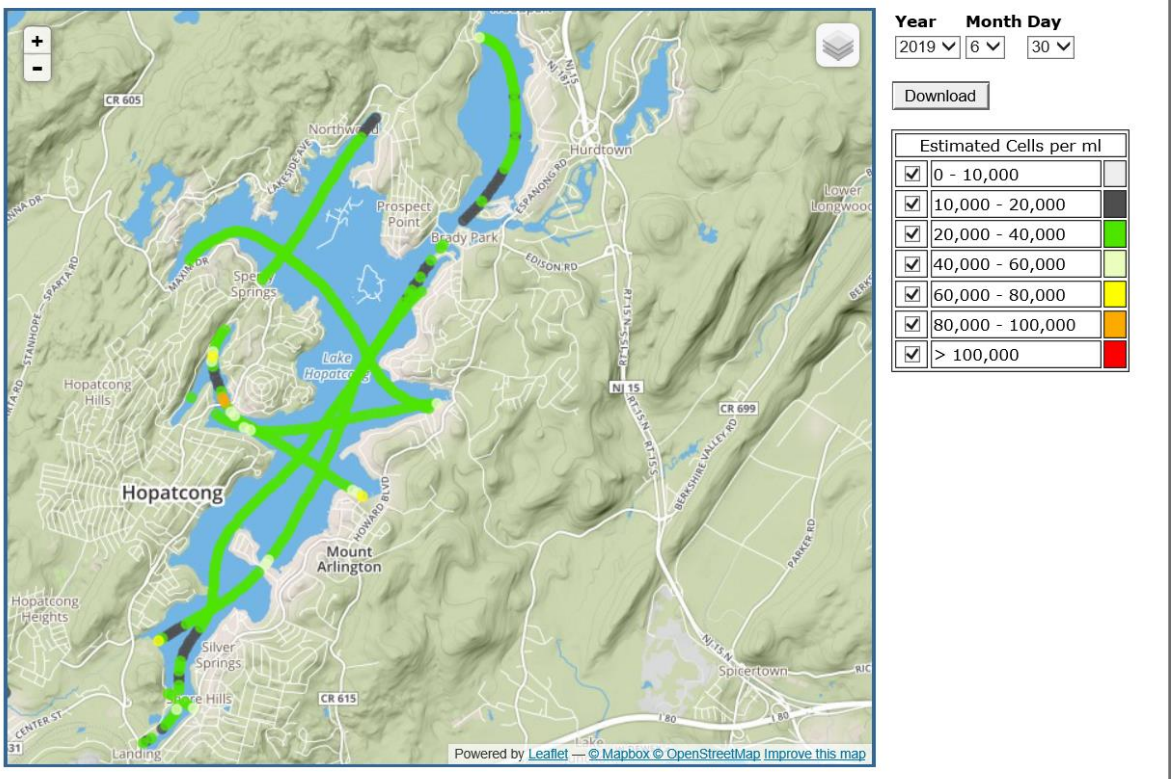
occurring.



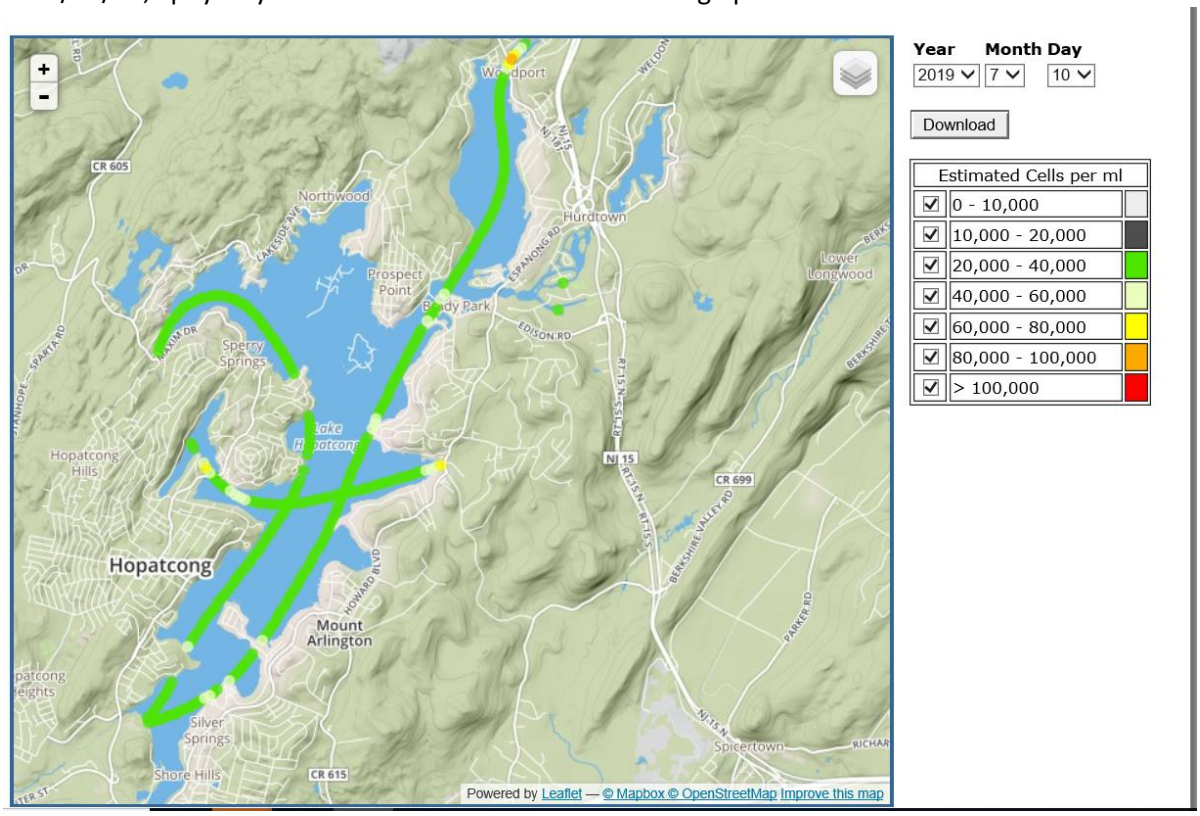
On 6/28/2019, the bloom still covers a large section of the lake, with the coves to the north showing signs that the bloom was diminishing.



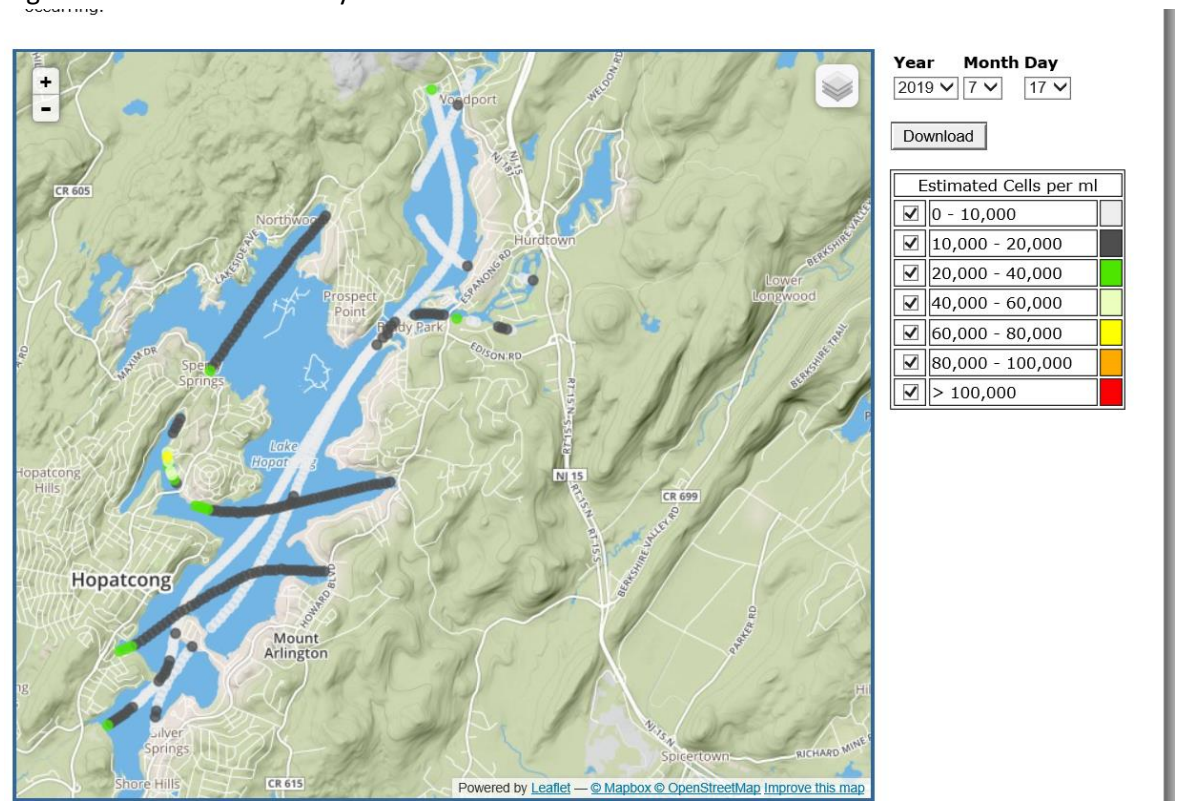
On 6/30/2019, the intensity of the bloom appears to be diminishing, but there are still areas of concern in many coves and by the State Park Beach.



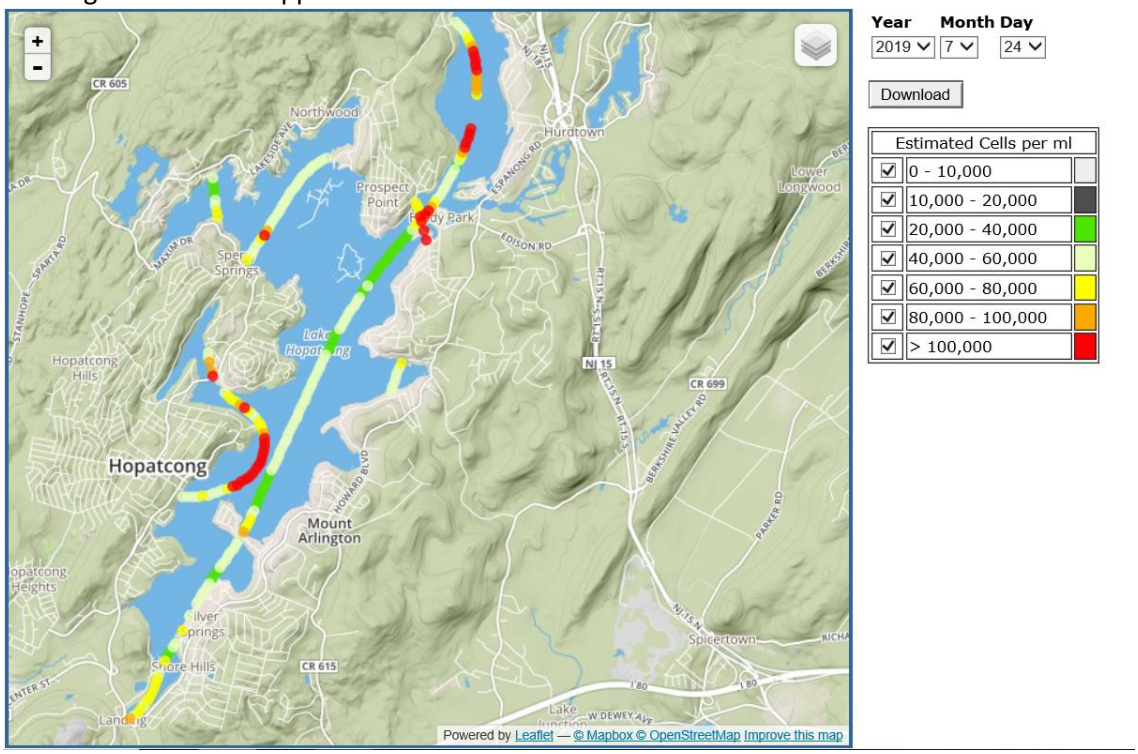
On 7/10/19, phycocyanin levels have increased over a large portion of the lake.



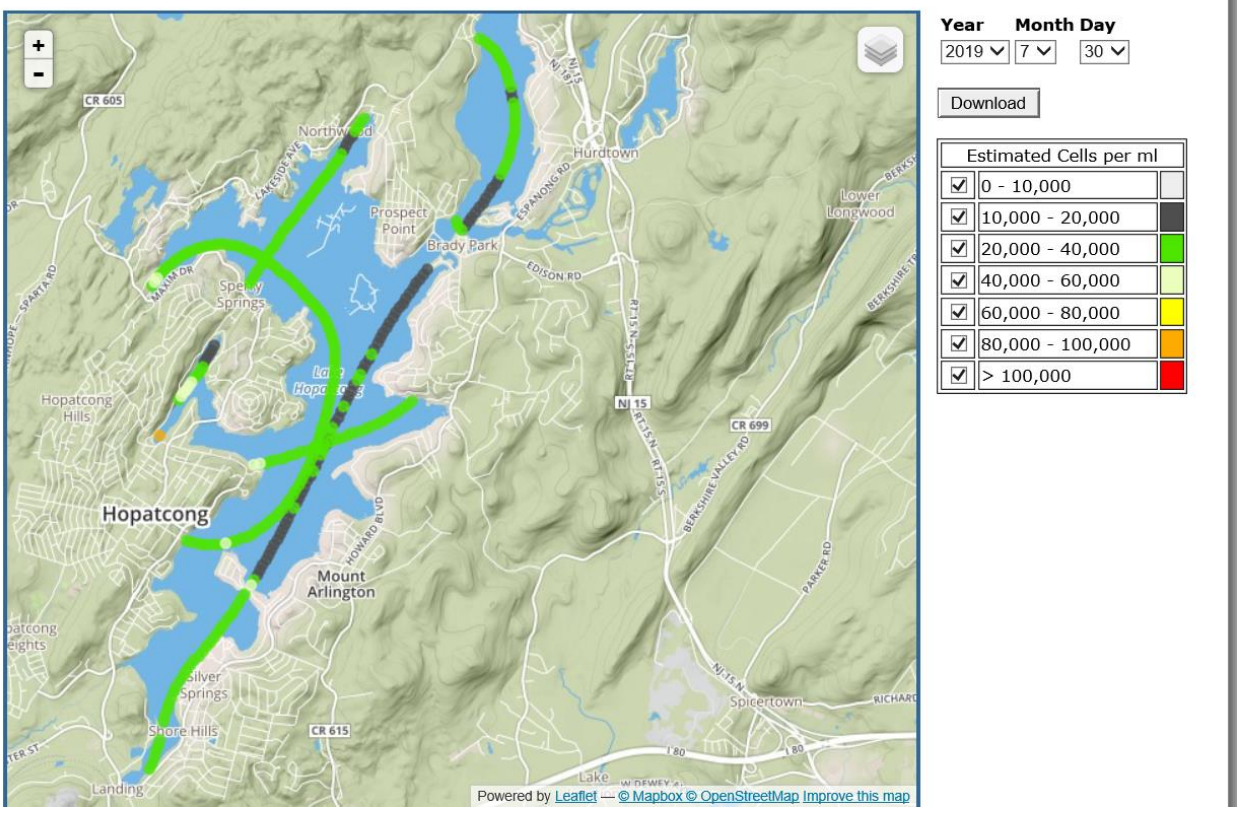
On 7/17/19, the flight shows the phycocyanin levels seem to have significantly decreased in spatial coverage. The highest levels are in River Styx.



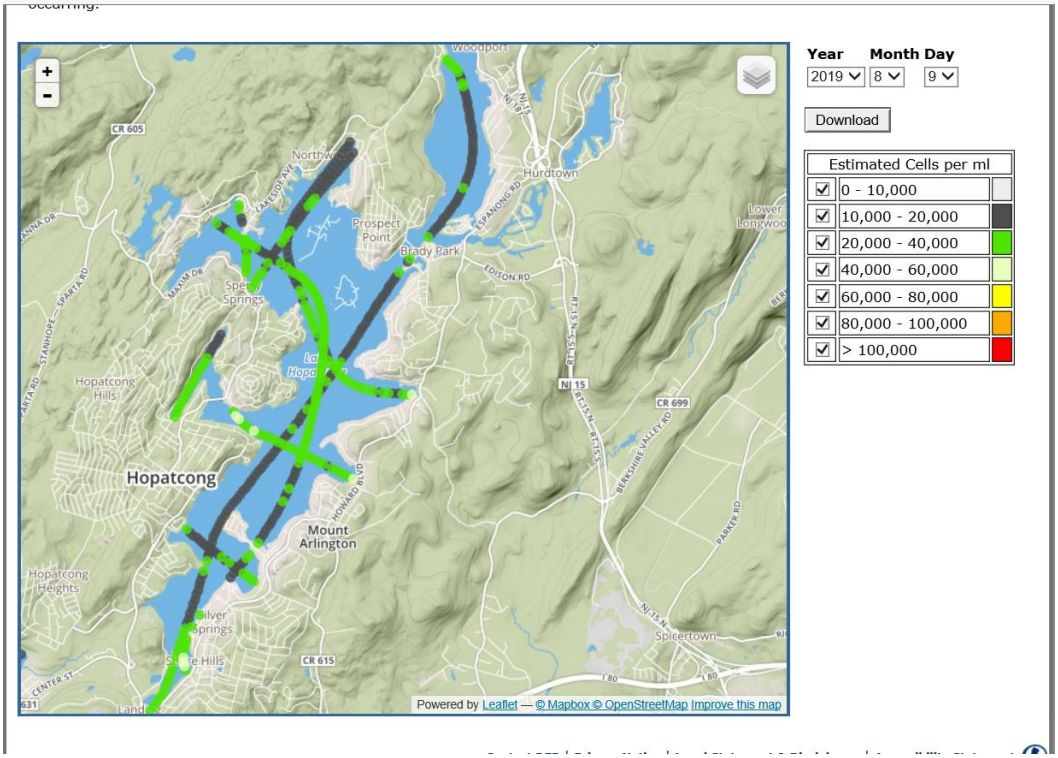
The 7/24 flight shows that the phycocyanin levels seem to have significantly increased in intensity and spatial coverage. The bloom appears to be lake wide.



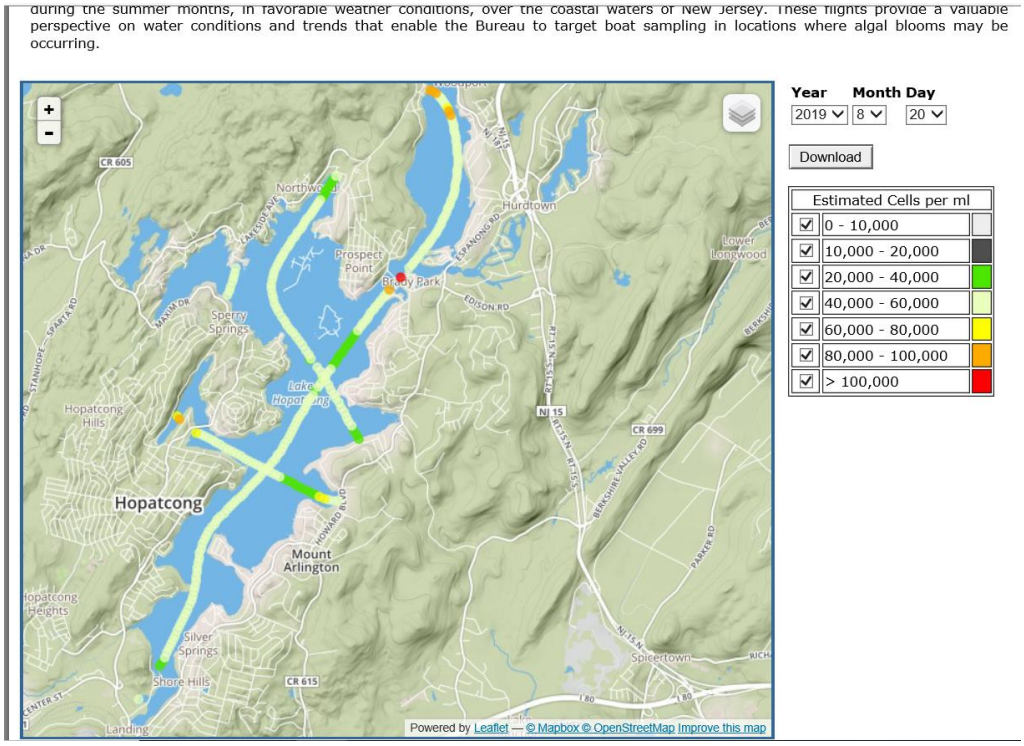
On 7/30 the phycocyanin levels seem to have decreased in intensity and spatial coverage. The bloom is still present in pockets with one near the buoy at ST-14.



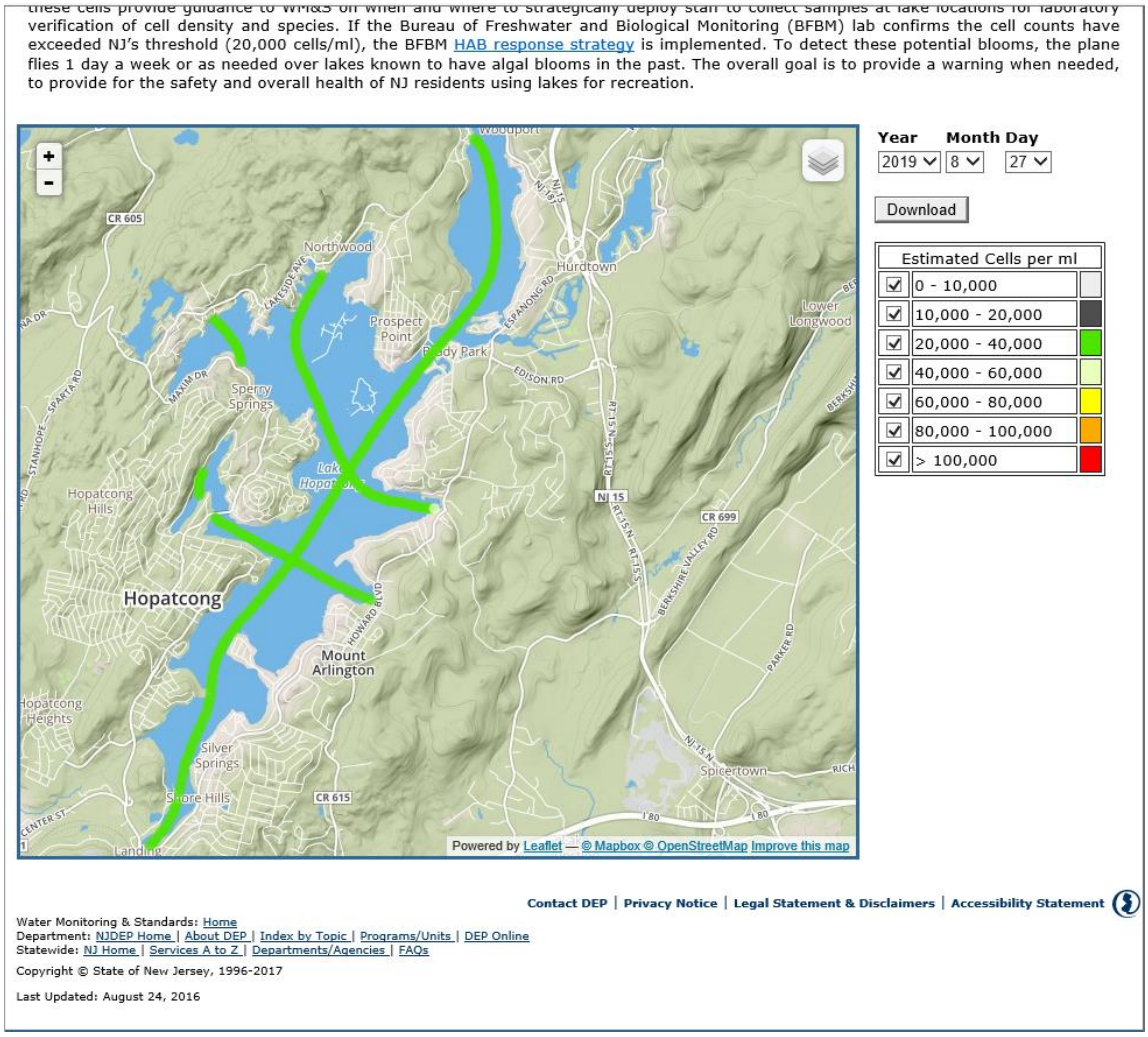
On 8/9, the Lake Hopatcong the phycocyanin levels seem to have remained at the same intensity but the spatial coverage seems to be diminishing. The bloom is still present in pockets with higher levels in the south near the buoy at station ST-14.



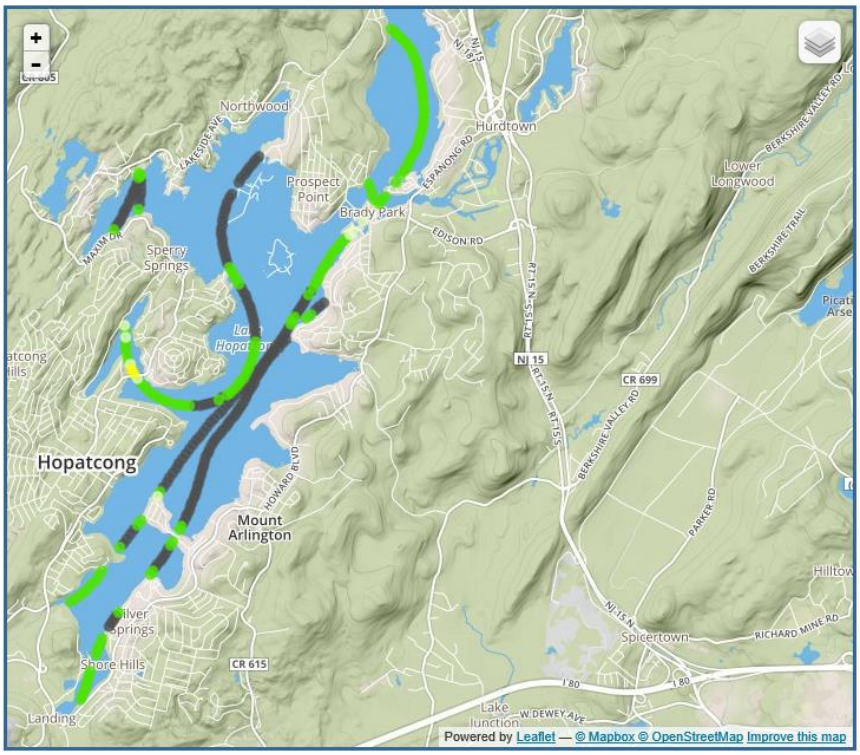
On 8/20, the phycocyanin levels were elevated lakewide, above 20,000 cells/ml. The flight confirmed the decrease in the bloom at the 2 buoy stations mid lake and in the south, but the bloom was still present lakewide with higher levels in the River Styx Crescent Cove area and in the extreme northern section. This flight shows an increase in intensity from the last flight on 8/9/2019.



On 8/27, the phycocyanin levels were elevated lake wide, above 20,000 cells/ml. The flight data showed a general decrease in the intensity since last week, but the bloom was still present lake wide. Cloud cover may have been limiting the cyanobacteria to deeper depths and not at the surface where the aircraft sensor detects the reflectance.



On 9/3, the phycocyanin levels were elevated in the northern and southern sections and were the highest in River Styx - all of those areas were above 20,000 cells/ml. The flight data shows a general decrease in the intensity and spatial distribution since last week, but the bloom is still present in areas. However, large areas were estimated to be below 20,000 cells/ml.

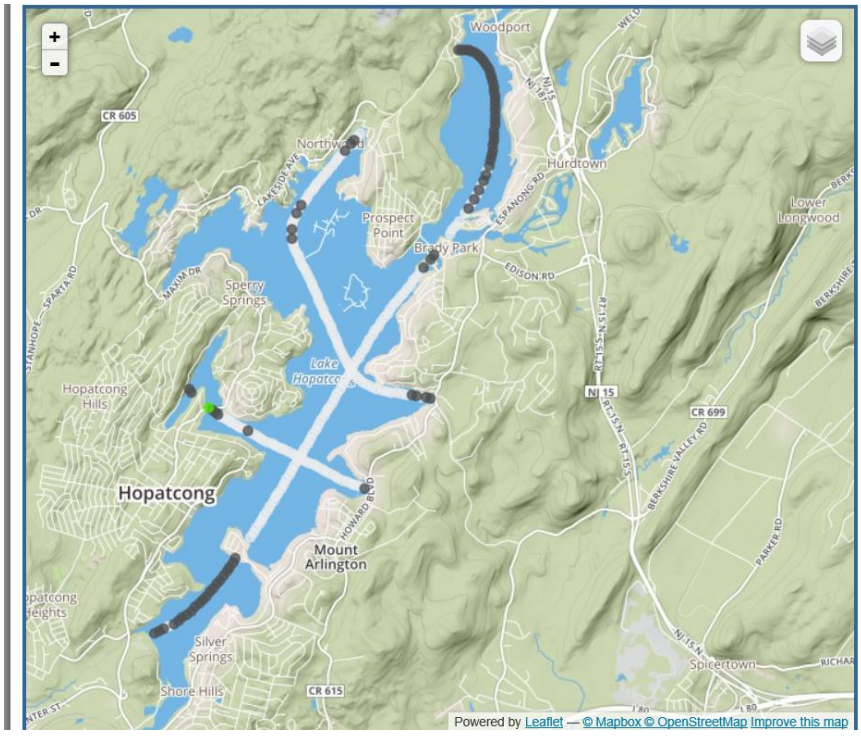


Year Month Day
2019 9 3

Download

Estimated Cells per ml	
0 - 10,000	
10,000 - 20,000	
20,000 - 40,000	
40,000 - 60,000	
60,000 - 80,000	
80,000 - 100,000	
> 100,000	

On 9/11, the phycocyanin levels have significantly declined. The flight data shows a general decrease in the intensity and spatial distribution since last week, with large areas estimated to be below 20,000 cells/ml. Confirmation will come from sample collection.

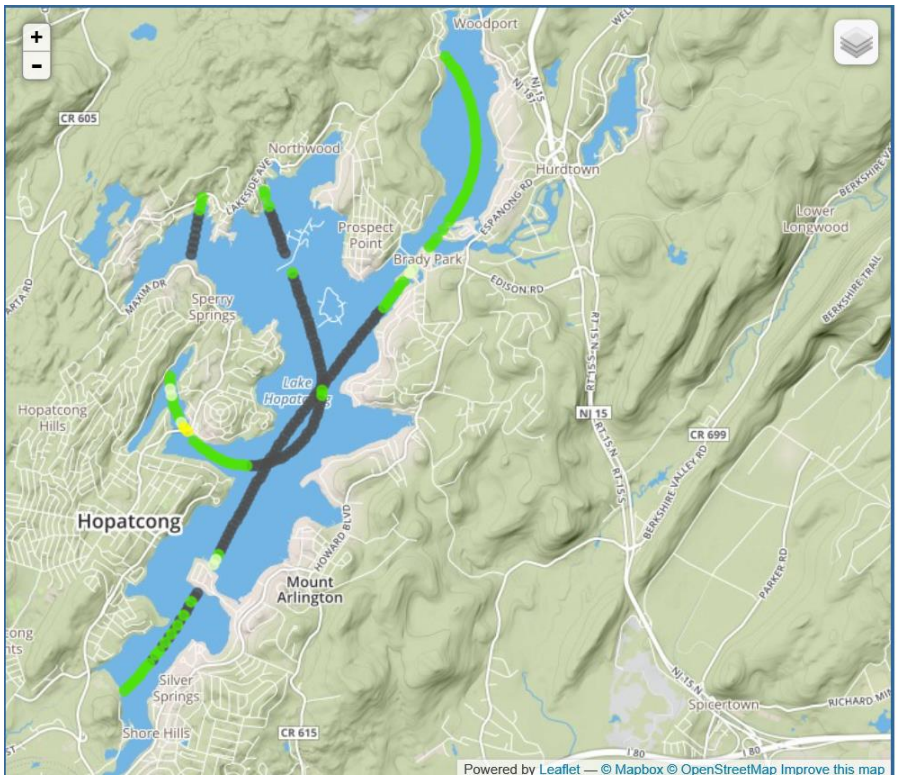


Year Month Day
2019 9 11

Download

Estimated Cells per ml	
0 - 10,000	
10,000 - 20,000	
20,000 - 40,000	
40,000 - 60,000	
60,000 - 80,000	
80,000 - 100,000	
> 100,000	

The phycocyanin levels have significantly declined over the last month. The 9/17 flight data shows a bloom is still present in areas and large areas are estimated to be below 20,000 cells/ml. The River Styx area has higher estimated levels.



Year **Month** **Day**

2019 | 9 | 17

Download

Estimated Cells per ml	
☑ 0 - 10,000	
☑ 10,000 - 20,000	
☑ 20,000 - 40,000	
☑ 40,000 - 60,000	
☑ 60,000 - 80,000	
☑ 80,000 - 100,000	
☑ > 100,000	