8/9/19

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

**The DEP's advisory remains in effect for all areas of the lake except Indian Harbor, Henderson Cove and now Byram Cove. On 8/8, beaches in this area of the lake were sampled and results are included in the tables below. These beaches will be resampled by DEP on 8/12. 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.**

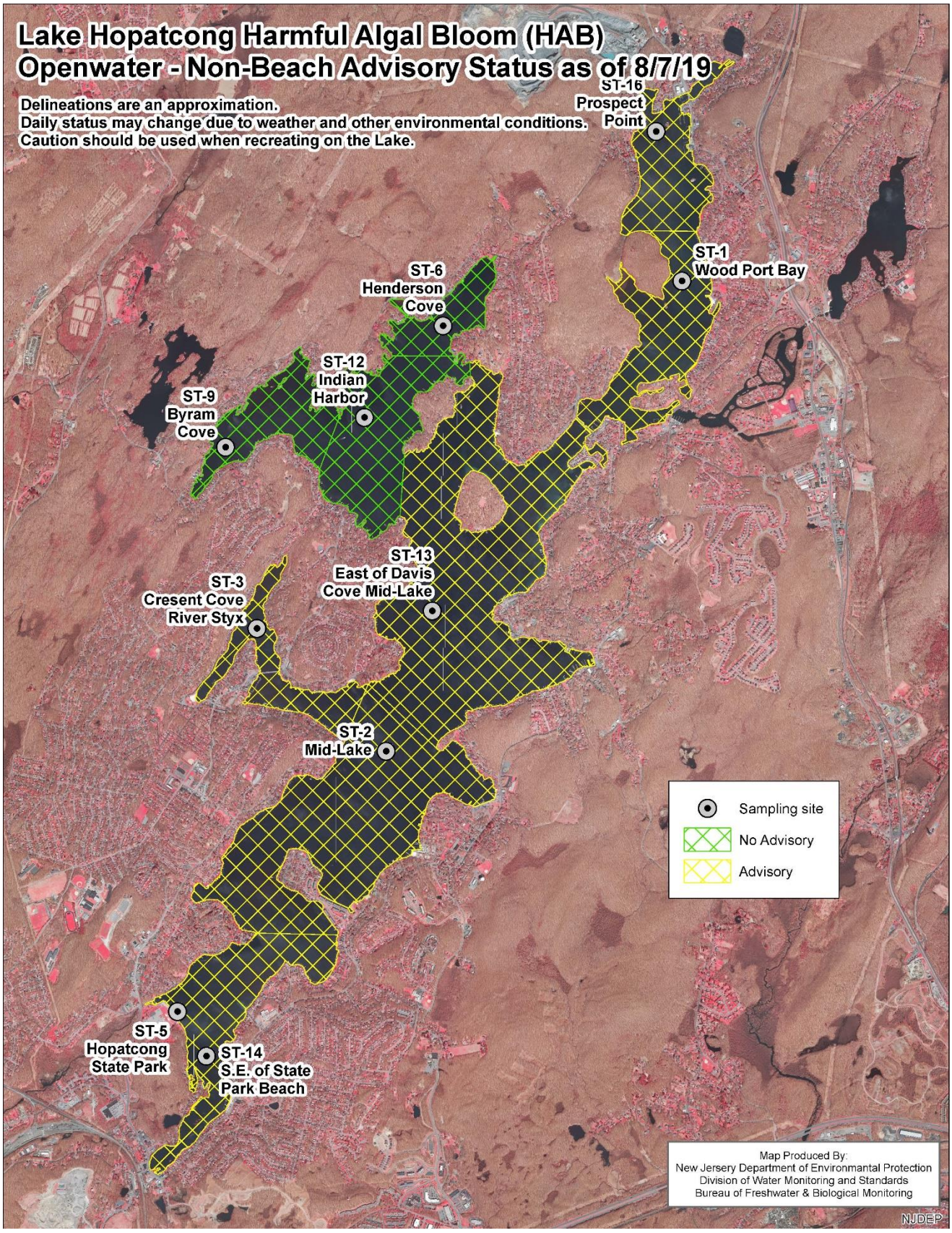
The DEP urges the public to avoid swimming or water sports that may result in contact with the water, such as water-skiing, tubing, canoeing, paddle boarding and kayaking. There is no recommended limitation on fishing or passive recreational boating that does not have the potential for splashing. However,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

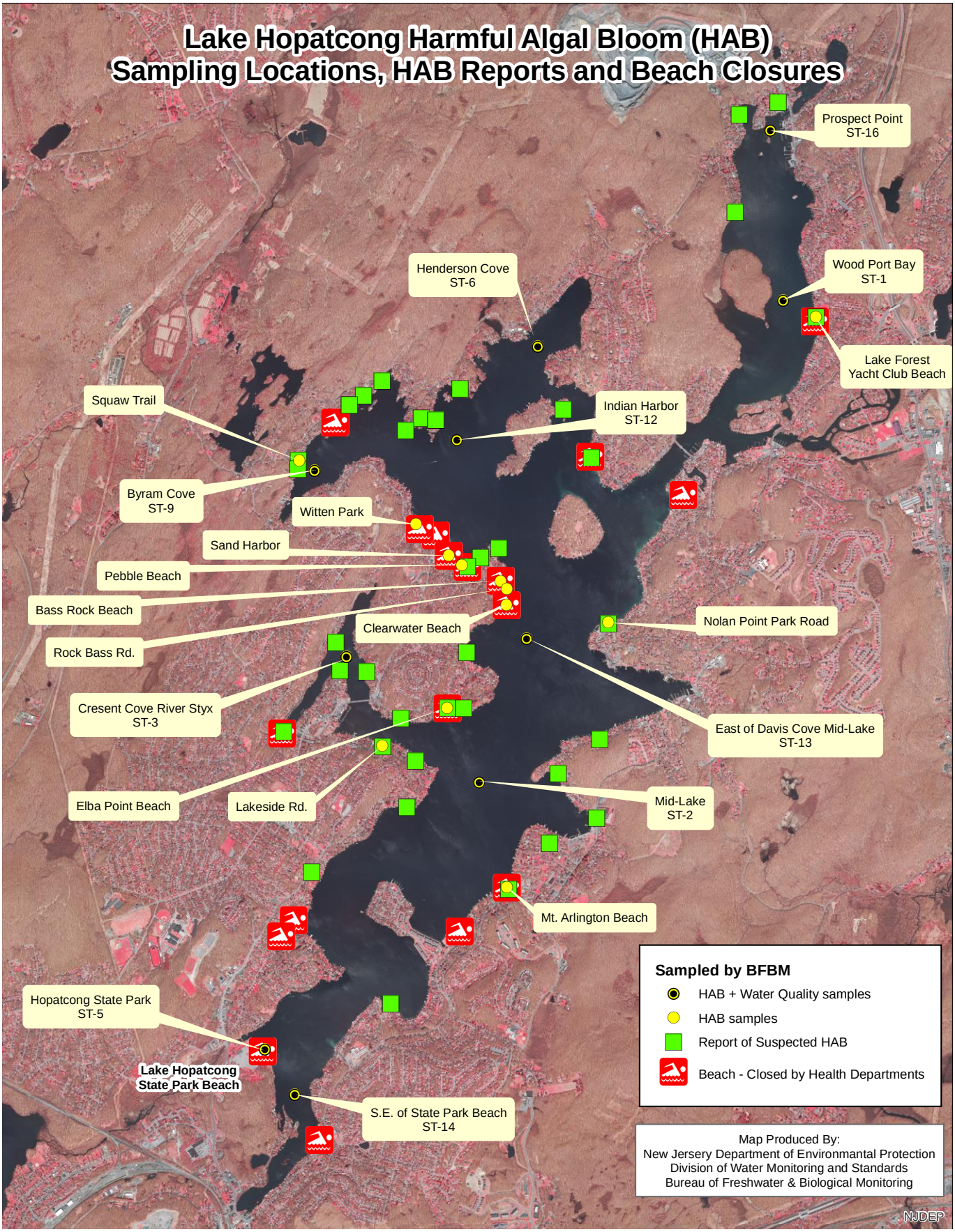
Due to the widespread nature of this bloom, based on field sampling, laboratory results and aircraft remote sensing, on 6/27, 7/3 and 7/12 DEP issued press releases advising the public to avoid swimming in or contact with Lake Hopatcong water. In addition to some beaches already being closed due to visual, 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, and the recent results now support lifting the advisory in Byram Cove – see advisory status map below. 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 8/8/19 show continued cell counts above advisory levels for many locations as highlighted in the table below.

# Lake Hopatcong Harmful Algal Bloom (HAB) Samples and Results as of 8/8/2019

## 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 |
| Pebble Beach | | 57000 | --- | --- | --- | --- | 95000 | 16850 | --- | 19300 | --- | --- | --- | 24750 | --- | --- | --- | --- | 15250 |
| Sand Harbor | | 51375 | --- | --- | --- | --- | 9250 | 27800 | --- | 17750 | --- | --- | --- | 24500 | --- | --- | --- | --- | 12750 |
| Clearwater Beach | | --- | 8750 | --- | --- | --- | 21000 | 13000 | --- | 33375 | --- | --- | --- | 13000 | --- | --- | --- | --- | 21000 |
| Bass Rock Beach | | --- | 35812 | --- | --- | --- | 33030 | 53450 | --- | 24125 | --- | --- | --- | 26750 | --- | --- | --- | --- | 12000 |
| 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 |
| Sperry Springs Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 32500 | --- | --- | --- | --- | 6500 |
| Byram Bay Community Club Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 38250 | --- | --- | --- | --- | 21250 |
| Beck Lane Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 55500 | --- | --- | --- | --- | 13750 |
| CAPP Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 42750 | --- | --- | --- | --- | 5250 |
| East Shore Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 15625 | --- | --- | --- | --- | --- |
| Hopatcong Homestead Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 29250 | --- | --- | --- | --- | --- |
| Ingram Cove | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 18500 | --- | --- | --- | --- | --- |
| Crescent Cove Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 45750 | 198000 | --- | 160000 | --- | --- |
| **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 |
| 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 3.02 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 |
| Cresent Cove River Styx | ST-3 | --- | --- | --- | --- | 34500 | --- | 2000 | 35500 | 79000 | 37000 | 52000 | 43000 | 46500 | 205500 | 65250 | 84000 | 80750 | 50625 |
| Henderson Cove | ST-6 | --- | --- | --- | --- | 28280 | --- | 19000 | 13000 | 18500 | 15000 | 32000 | 26000 | 40000 | 17250 | 11250 | 19750 | 15000 | 17375 |
| Byram Cove | ST-9 | --- | --- | --- | --- | 10250 | --- | 28000 | 37000 | 29000 | 47500 | 28000 | 22000 | 43250 | 50050 | 25500 | 18000 | 13750 | 17500 |
| Indian Harbor | ST-12 | --- | --- | --- | --- | 22000 | --- | 39750 | 10000 | 8000 | 16000 | 8000 | 9000 | 19000 | 18500 | 17750 | 14250 | 11750 | 17250 |
| East of Davis Cove Mid-Lake | ST-13 | --- | --- | --- | --- | 18500 | --- | 19000 | 7000 | 18500 | 60000 | 13000 | 18000 | 49000 | 38750 | 31500 | 44000 | 38250 | 22500 |
| S.E. of State Park Beach | ST-14 | --- | --- | --- | --- | 34000 | --- | 21100 | 17500 | --- | 10000 | 6000 | 14000 | 40500 | 53825 | 49500 | 48500 | 41500 | 24250 |
| Prospect Point | ST-16 | --- | --- | --- | --- | --- | --- | 5150 | 37000 | 6000 | 10000 | 10000 | 14000 | 18750 | 34500 | 41750 | 63000 | 30000 | 28000 |

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

Indicates > than advisory levels

## Toxin

| Site name | Station# (where applicable) | Microcystins µg/l (lowest Reporting Level 0.15µg/l)* | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Date Sampled | | | | | | | | | | | | | | | | | |
| Bathing Beach Sites | | 06/18/19 | 06/21/19 | 06/26/19 | 06/27/19 | 06/28/19 | 7/1/19 | 7/2/19 | 7/5/19 | 7/9/19 | 07/11/19 | 07/16/19 | 07/19/19 | 07/23/19 | 07/25/19 | 07/25/19 | 8/1/19 | 8/6/19 | 8/8/19 |
| Pebble Beach | | 0.83 | --- | --- | --- | --- | 0.15 | 0.16 | --- | 0.17 | --- | --- | --- | 0.25 | --- | --- | --- | --- | 0.29 |
| Sand Harbor | | 1.35 | --- | --- | --- | --- | 0.17 | < Reporting Level | --- | 0.21 | --- | --- | --- | 0.22 | --- | --- | --- | --- | 0.26 |
| Clearwater Beach | | --- | 0.16 | --- | --- | --- | < Reporting Level | 0.18 | --- | 0.24 | --- | --- | --- | 0.23 | --- | --- | --- | --- | 0.23 |
| Bass Rock Beach | | --- | 0.21 | --- | --- | --- | 0.08 | 0.16 | --- | 0.23 | --- | --- | --- | 0.25 | --- | --- | --- | --- | 0.30 |
| 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 |
| Sperry Springs Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.16 |
| Byram Bay Community Club Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.26 |
| Beck Lane Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.17 |
| CAPP Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.27 |
| East Shore Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hopatcong Homestead Beach | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ingram Cove | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Crescent Cove Beach | | | | | | | | | | | | | | 0.62 | 1.29 | --- | 1.947 | --- | --- |
| 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 | | --- | --- | --- | 0.06 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
| (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 meter | 0.32 at 1 meter | 0.24 at 1 meter | 0.168 at 1 meter | 0.22 at 1 meter | 0.23 at 1 meter |
| Crescent 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |

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

Indicates > than advisory levels

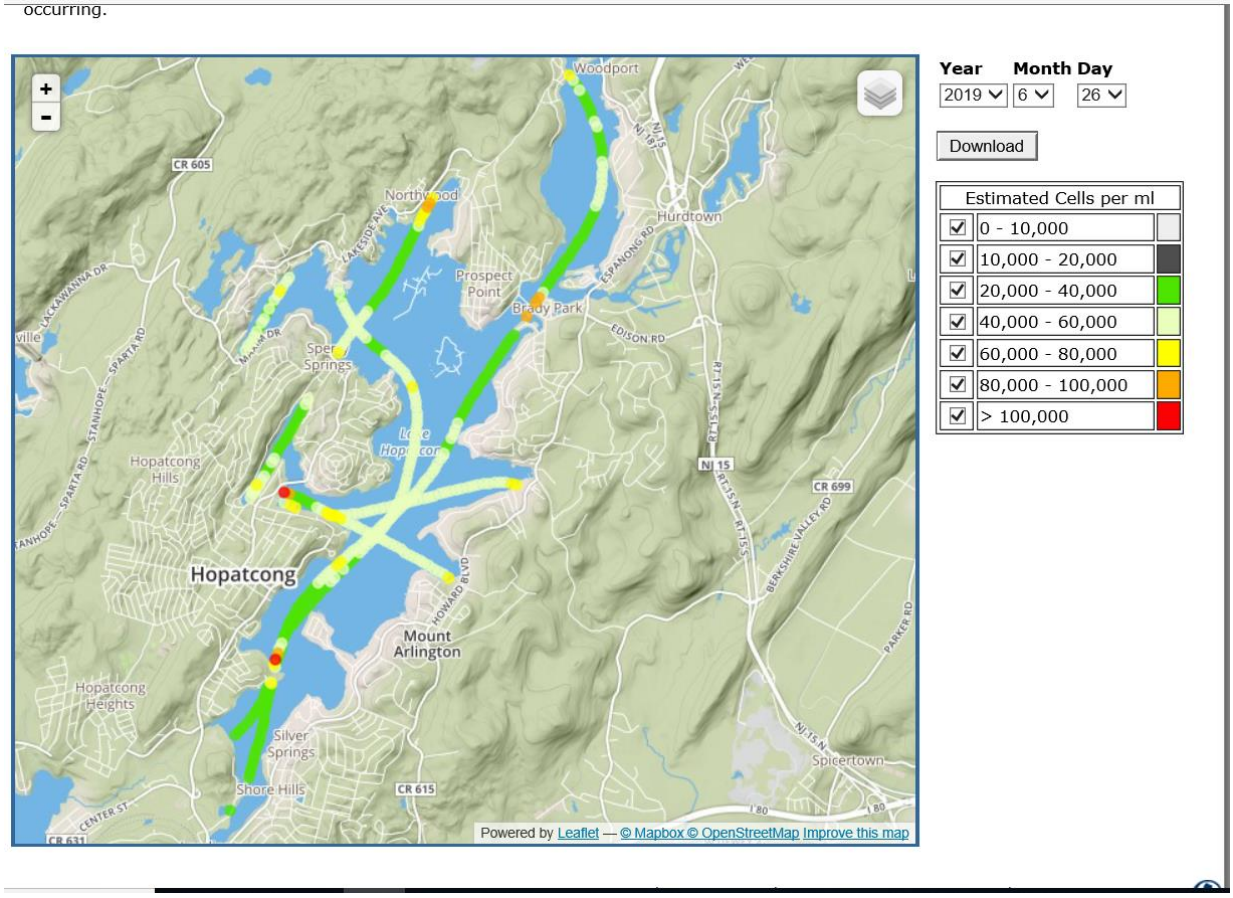
**Aircraft Remote Sensing Information and Results**

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.

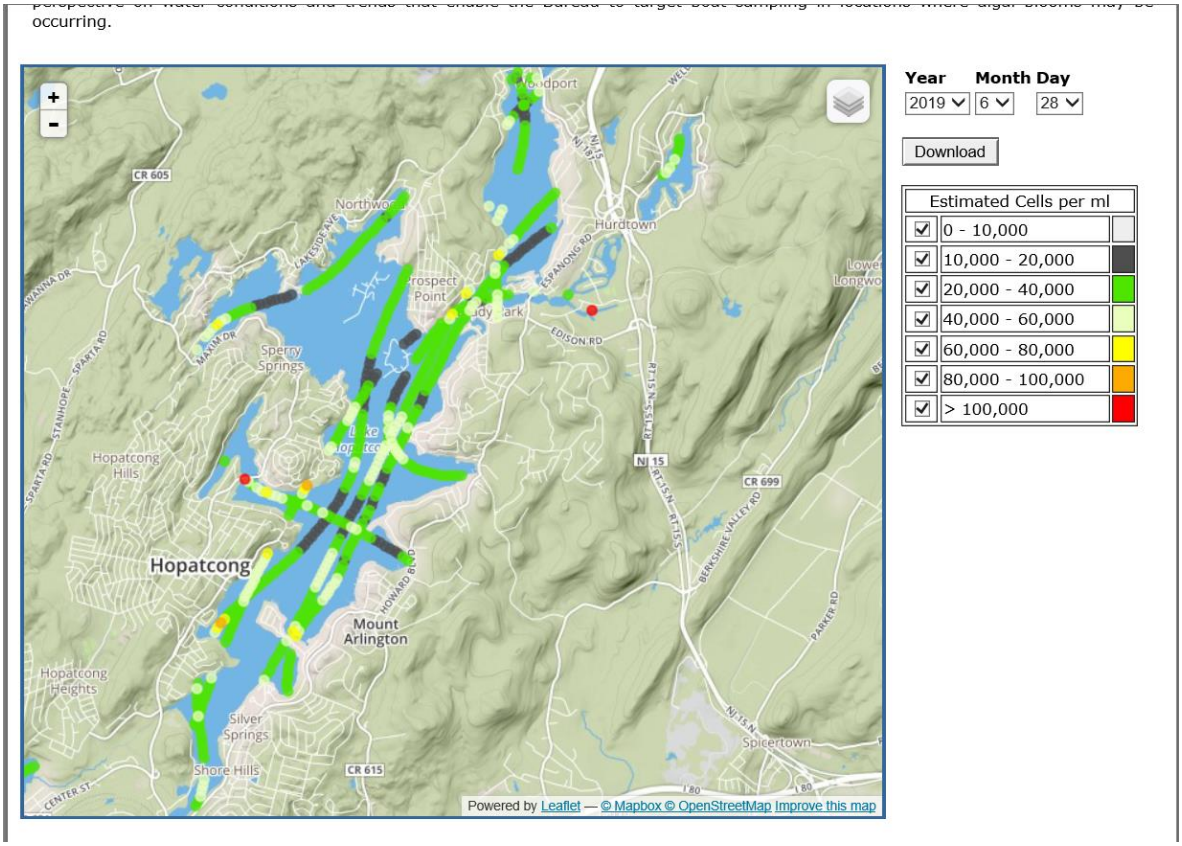
Remote sensing flights were conducted over Lake Hopatcong on 6/26, 6/28, 6/30, 7/3, 7/10, 7/17, 7/24, 7/30 and 8/9 . The scale below estimates the pigment concentrations and cell counts; the bright yellow to red is estimated to be over 20,000 cells/ml or higher, light green denotes an area of concern 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.

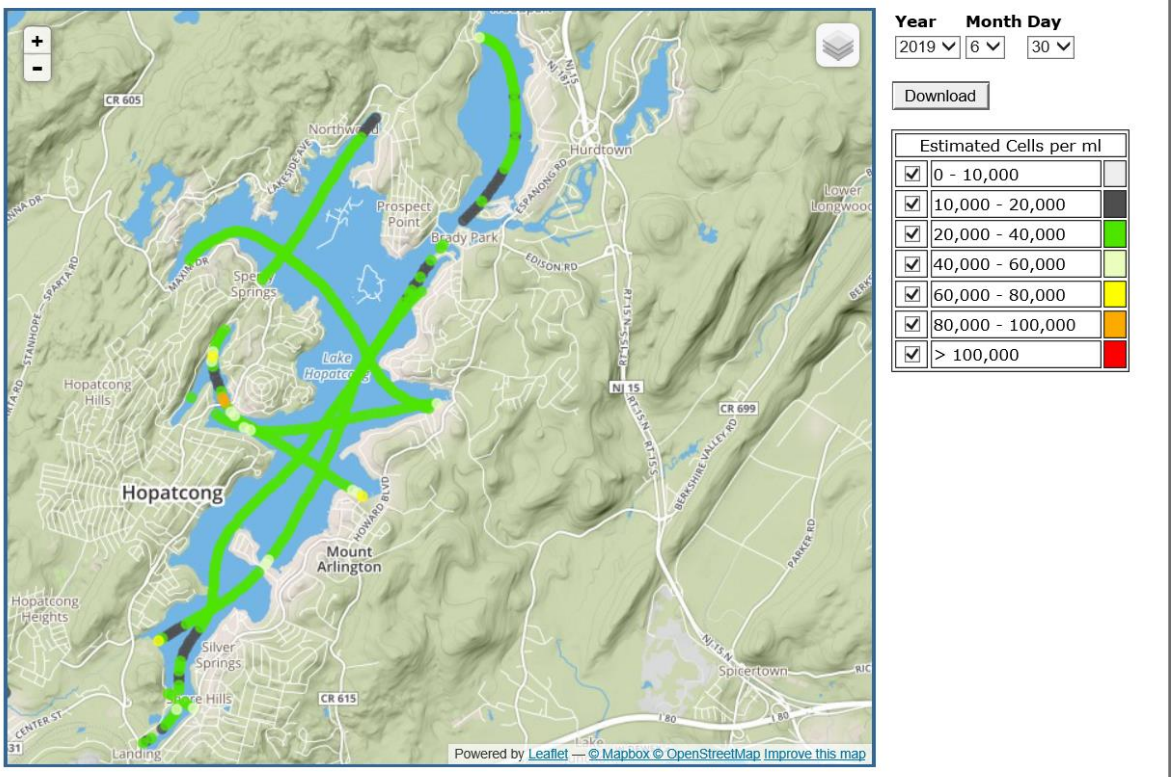
occurring.



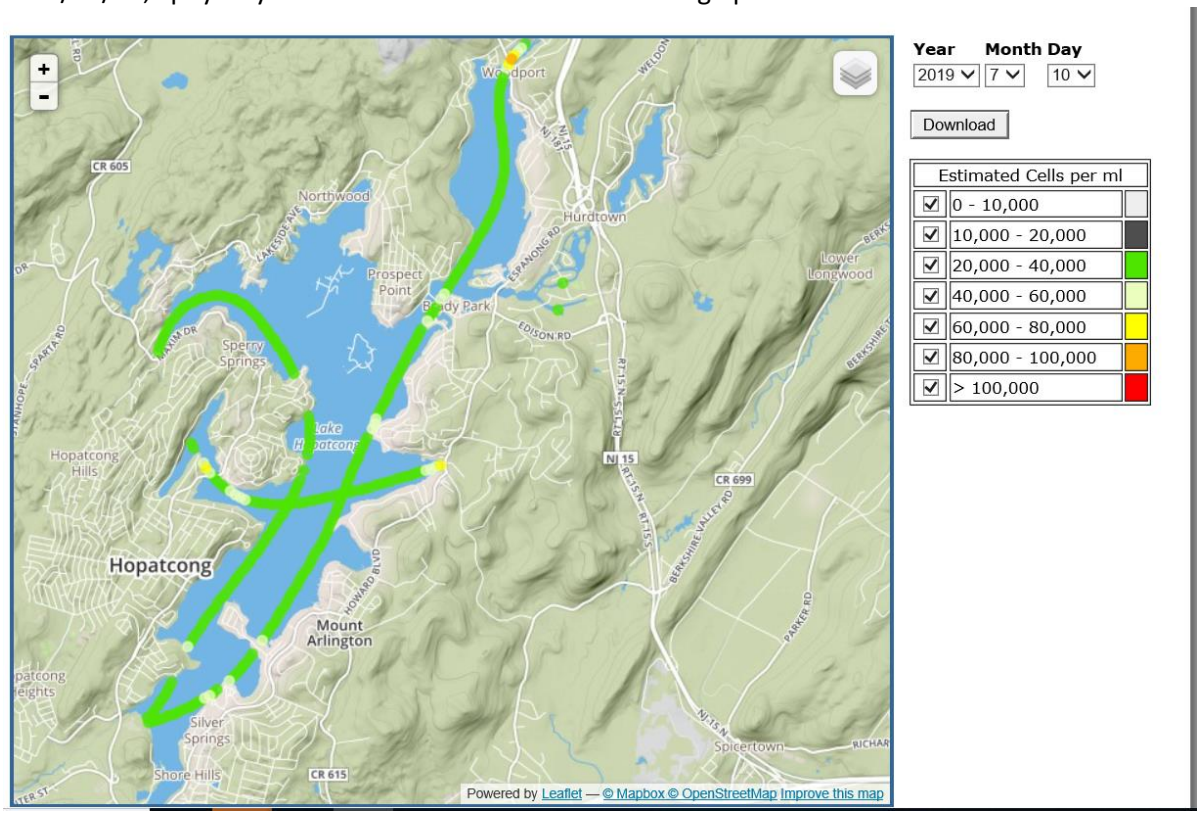
On 6/28/2019, the bloom still covers a large section of the lake, with the coves to the north showing signs that the bloom was diminishing.



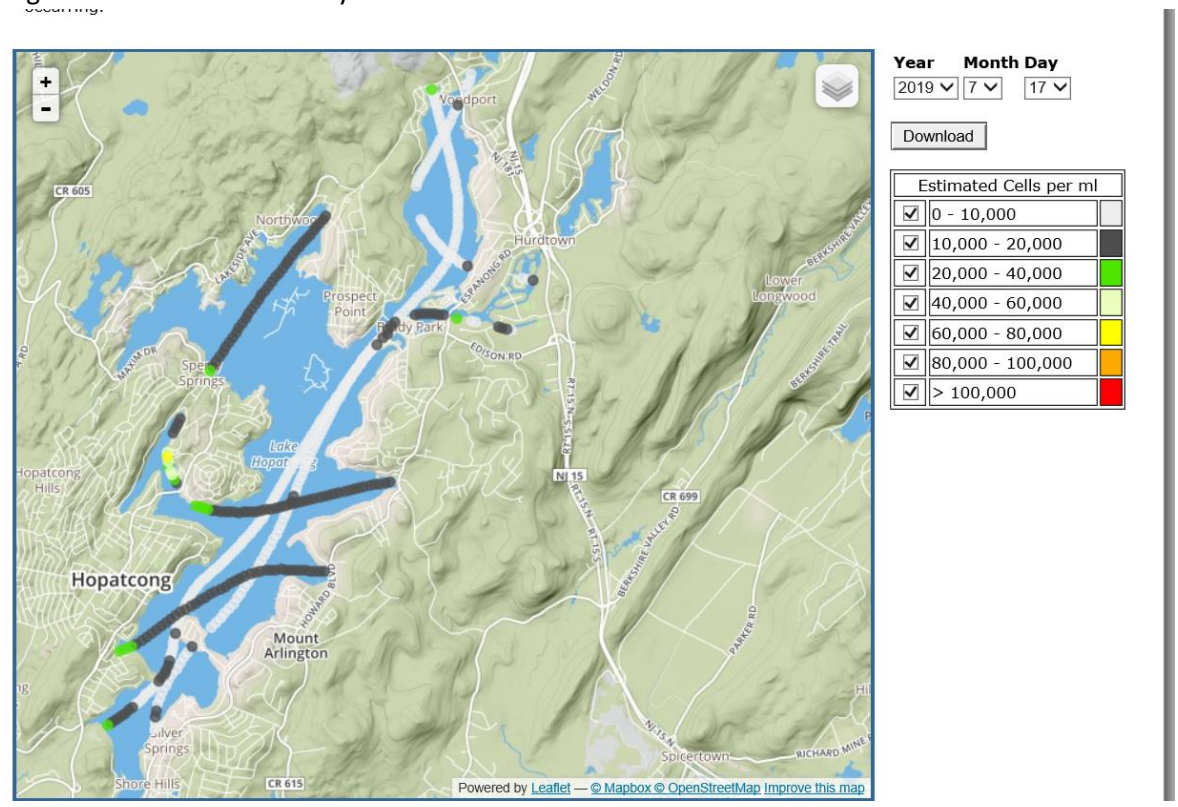

On 6/30/2019, the intensity of the bloom appears to be diminishing, but there are still areas of concern in many coves and by the State Park Beach.



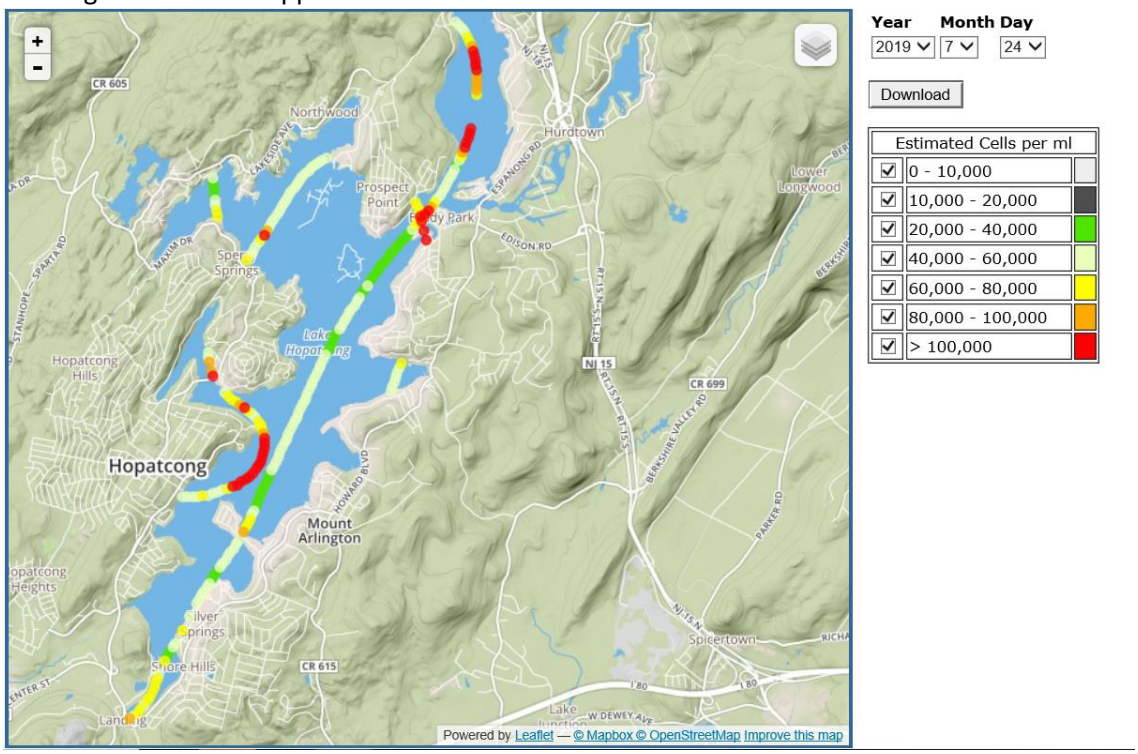
On 7/10/19,  phycocyanin levels have increased over a large portion of the lake.



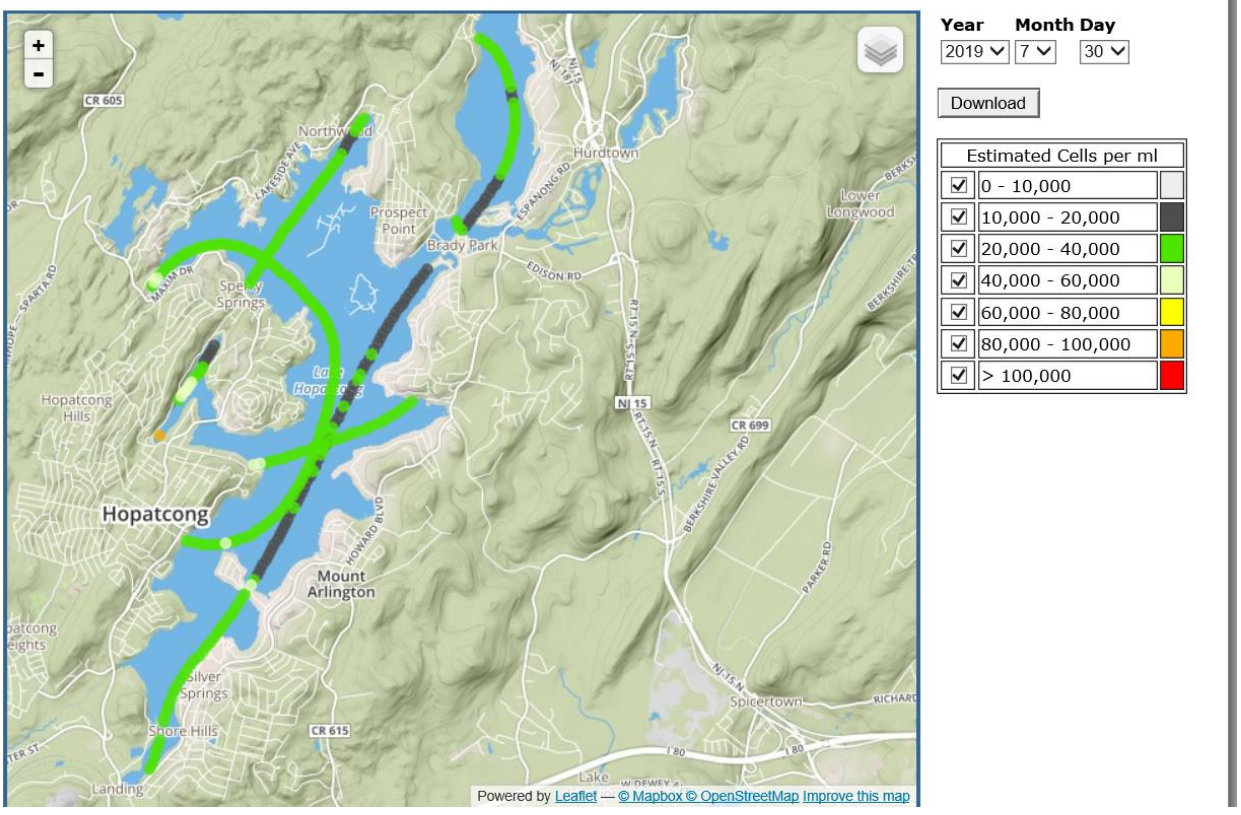

On 7/17/19, the flight shows the phycocyanin levels seem to have significantly decreased in spatial coverage. The highest levels are in River Styx.



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.