



Northeast Aquatic Research, LLC

www.northeastaquaticresearch.net

74 Higgins Highway

Mansfield Center, CT 06250

June 26, 2020



TO: Residents of East Hampton, CT
ATTN: Town of East Hampton Conservation Lake Commission
FROM: Hillary Kenyon Garovoy, Certified Lake Manager
George Knoecklein, Ph.D. Principal Limnologist

RE: Results from June 19 & 22, 2020 Aeration System Water Quality Monitoring Visits

Please see the water clarity and oxygen results from the June 19 and 22, 2020 monitoring visits. These visits were scheduled to document water quality conditions before, during, and after the destratification aeration system was turned on. The following table shows the temperature, dissolved oxygen, and clarity readings from the deep hole monitoring station at Oakwood bay. As you can see, the aeration system has significantly reduced the volume of anoxic water. Anoxic water (<1mg/L dissolved oxygen) was present before aeration up to 5.5 meters. After three hours of aeration system operation, the anoxic boundary was pushed downwards to deeper water (7m). By the following Monday, the anoxic volume of water had been further reduced, but the lake remained anoxic from 8-10m at the lake bottom.

Oakwood Station (41.59758, -72.50849)

Water depth: 10.3 meters (33.8 feet)

Oakwood Station		Temperature, C			Dissolved Oxygen (mg/L)		
		6/19/2020		6/22/2020	6/19/2020		6/22/2020
Level	Depth (m)	Before Aeration	3hrs after	3 days after	Before Aeration	3hrs After	3 days after
surface	0	25.7	25.2	28.5	9.4	9.7	8.8
	1	25.4	25.2	26.5	9.4	9.7	8.6
	2	25.1	24.8	25.9	9.4	10.0	8.6
middle	3	24.1	24	25.6	9.6	9.6	8.5
	4	22.9	23	25	8.8	9.5	7.8
	5	20.2	21.2	24.3	3.3	6.8	7.4
	5.5	16.4	20.7	-	0.4	4.4	-
	6	15.7	16.2	23.5	0.3	1.6	6.6
bottom	7	14	13.7	21.9	0.3	0.4	5.1
	8	12.8	12.6	18.3	0.3	0.4	0.3
	9	12.2	12.1	15.3	0.3	0.3	0.3
	10	11.8	11.7	12.9	0.3	0.3	0.3
		Before Aeration	3hrs after	3 days after			
Water clarity (meters)		3.20	2.85	2.45			

The volume of anoxic water has been significantly reduced, but the bottom of the lake has not yet fully mixed and remains anoxic.

The immediate worsening of water clarity when the aeration system was turned on is due to upwards mixing of bottom water, which contains tiny sediment particles, including colloidal iron-sulfide and manganese, as well as hydrogen sulfide gas. The sulfide gas is the reason for the “rotten egg” smell that residents may have noticed around the aerators. The smell should subside over time as the aerators reduce the volume of anoxic water. Clarity was slightly worse by Monday afternoon, but the clarity reduction at Oakwood bay, again, did not seem to be related to phytoplankton on the 22nd. If the aeration system continues to mix the water column and reduce or eliminate anoxic

bottom-waters, the water column will respond with a change in phytoplankton algae and nutrient distribution. The next monitoring date is scheduled for the first week in July.

In addition to monitoring at the regular Oakwood bay station, an additional 18 water column profiles of temperature and dissolved oxygen were measured at 1m intervals on June 19th, next to and at varied distances from the aerators, across ten monitoring locations in Oakwood bay. These profiles were taken to document water column conditions before, during, and 3hrs-after the turning on of the destratification aeration system. The full results will be available in the year-end water quality report.

On June 22nd, an additional 10 temperature and oxygen profiles were measured, including both the Markham and Oakwood bays, and the same locations as measured on June 19th.

Map 1 June 19th Monitoring Locations



Map 2 June 22nd Monitoring Locations



One of the key findings of the many temperature and dissolved oxygen profile measurements is that the area of anoxic water seems to be shrinking, in addition to the reduction in the height of the anoxic boundary. These are positive results. For instance, the northernmost monitoring locations in Oakwood bay, which are both roughly 21ft deep, had a meter and a half of anoxic bottom water on the 19th and no anoxic water on the 22nd. We hope that the aeration system will continue to effectively shrink the area of bottom sediment that is capable of releasing iron-bound phosphorus (nutrients) into the water column.

Overall, the destratification aeration system appears to have reduced the area and volume of anoxic water in Oakwood bay, but anoxia is still present in the deepest waters. Markham bay remains at similar anoxic conditions but also decreased in water clarity from 3.25m on June 19th to 2.7m on June 22nd. We expect that Markham bay was somewhat impacted by upwelling of nutrient and mineral-rich waters from Oakwood bay. Nutrients in surface waters mix throughout, whereas oxygen conditions tend to be more locally impacted in the area of active aeration.

Nitrogen and phosphorus nutrient test results are not yet available, but will be reported shortly. We expect that there was a mixing of nutrients from bottom waters to surface waters once the aeration system was turned on, though the impacts of this mixing are not yet conclusive. Residents should continue to watch for signs of blue-green algae (cyanobacteria) presence in the water column. Phytoplankton results from both monitoring days are included below.

	Oakwood	Oakwood	Markham
Cyanobacteria Genus	19-Jun	22-Jun	22-Jun
Dolichosperum	598	583	2,172
Chrysosporum	598	598	408
Planktolynbya	0	0	787
Chroococcus	175	160	0
Total Cyanobacteria cells/mL	1,370	1,341	3,367

Cyanobacteria at Oakwood station from June 19th to June 22nd was largely unchanged. Markham station currently has more than double the amount of cyanobacteria than Oakwood station. However, cyanobacteria at both open-water stations was low overall. July monitoring will ultimately determine if cyanobacteria blooms will be prevented by the destratification aeration system. Non-cyanobacteria phytoplankton are included below in cells/mL.

	Oakwood	Oakwood	Markham
Non-Cyanobacteria Phytoplankton	19-Jun	22-Jun	22-Jun
GREENS	379	44	233
DIATOMS	3,411	2,128	4,344
CHRYSTOPHYTES	248	102	233
DINOFLAGELLATES	0	44	29

As more results become available, we will continue to inform the Town of East Hampton officials and residents.

Thank you.