

MEMORANDUM

To: Karen Beattie
Vice President of Science & Stewardship
Nantucket Conservation Foundation, Inc.
P.O. Box 13
118 Cliff Road
Nantucket, MA 02554-0013

From: Naomi Valentine, Ecological Restoration Team Lead

Date: March 6, 2023

Re: **2022 Summary of Work – Gibbs Pond / MassDEP File No. 48-3519**

REGULATORY SUMMARY

Nantucket Conservation Foundation, Inc. (NCF) received an Order of Conditions (OOC) on April 28, 2022, for pond management activities within Gibbs Pond (Map/Plat 51/1) in Nantucket, Massachusetts. Gibbs Pond is approximately 37 acres and prior to active pond management has been overtaken by harmful algal blooms for many years. The scope of work associated with this OOC (MassDEP File No. 48-3519) includes the application of copper-based algacide to manage harmful algae and the application of alum to manage excessive phosphorus concentrations within Gibbs Pond as needed. The goal of this management program is to monitor and manage potentially dangerous algae species, improve water quality, and minimize the negative health impacts that they cause. The expiration date associated with MassDEP File No. 48-3519 is April 28, 2025.

In compliance with lake and pond management regulations in the Commonwealth of Massachusetts, SWCA submitted an application for a License to Apply Chemicals to Waters of the Commonwealth (license to apply) prior to the start of work in 2022. The license to apply for Gibbs Pond was acquired by SWCA under License No. WM04-0001093.

This memo is presented in accordance with Special Conditions 19 to 24, which requires that a report be submitted to the Nantucket Conservation Commission summarizing management during each growing season. This memo includes a summary of all pond management activities performed within the reporting year, approximate algae regrowth, representative photographs of all management activities, and a plan for the next (2023) growing season.

OVERVIEW AND MANAGEMENT SUMMARY

Gibbs Pond is approximately 37 acres in size with a maximum depth of about 18 feet. While the Nantucket Land Council (NLC) has performed numerous water quality studies and monitored harmful

algae blooms (HABs), 2022 marks the first year of active algae management within Gibbs Pond. Although nutrient management was approved in the aforementioned OOC, no nutrient management took place in 2022.

In response to water quality concerns and microscopic algal growth and potential HAB levels, SWCA conducted partial algaecide applications on June 13 and August 8, 2022. These treatments were made via a small Jon boat and battery powered trolling motor while utilizing a low-pressure boat mounted sprayer system. The algaecide, Captain XTR, was applied to the northern portion in the shallowest areas at the manufacturers recommended rate specific to Gibbs Pond. A total of 25.0 gallons was applied on June 13 and 20.0 gallons on August 8 to approximately 10.0 acres each treatment. No alum applications were able to be scheduled during 2022.

In accordance with MassDEP File No. 48-3519, SWCA has presented the water quality data collected by NLC in 2019 and 2022. While data from both years are certainly valuable, with only two datasets, there is not much analysis possible at this time, as no alum applications have yet been conducted. SWCA will work with NCF to report on the continued water quality monitoring in 2023 in concert with the ongoing nutrient and algae management program.

SUMMARY OF 2022 WATER QUALITY

Water clarity and temperature within the waterbody was not significantly different between 2022 and 2023. Because an alum application did not occur in Gibbs Pond in 2022, there are no notable differences between nutrient trends during the 2022 season versus the 2019 season. These data are presented in Table 2 and will be used for comparison at the end of 2023 following the first alum application.

There were 21 different taxa of phytoplankton identified within Gibbs Pond in 2022, including 14 species of Cyanophytes (including *Microcystis* sp.). The average density of phytoplankton in Gibbs Pond was 4,429 units/mL and the vast majority of the phytoplankton community between Late July and mid-September are Cyanophytes. There was a decline in phytoplankton following both targeted algaecide applications, as would be expected. Future monitoring will take place during the 2023 season by NLB.

Table 1. Gibbs Pond Water Clarity Sampling Details¹

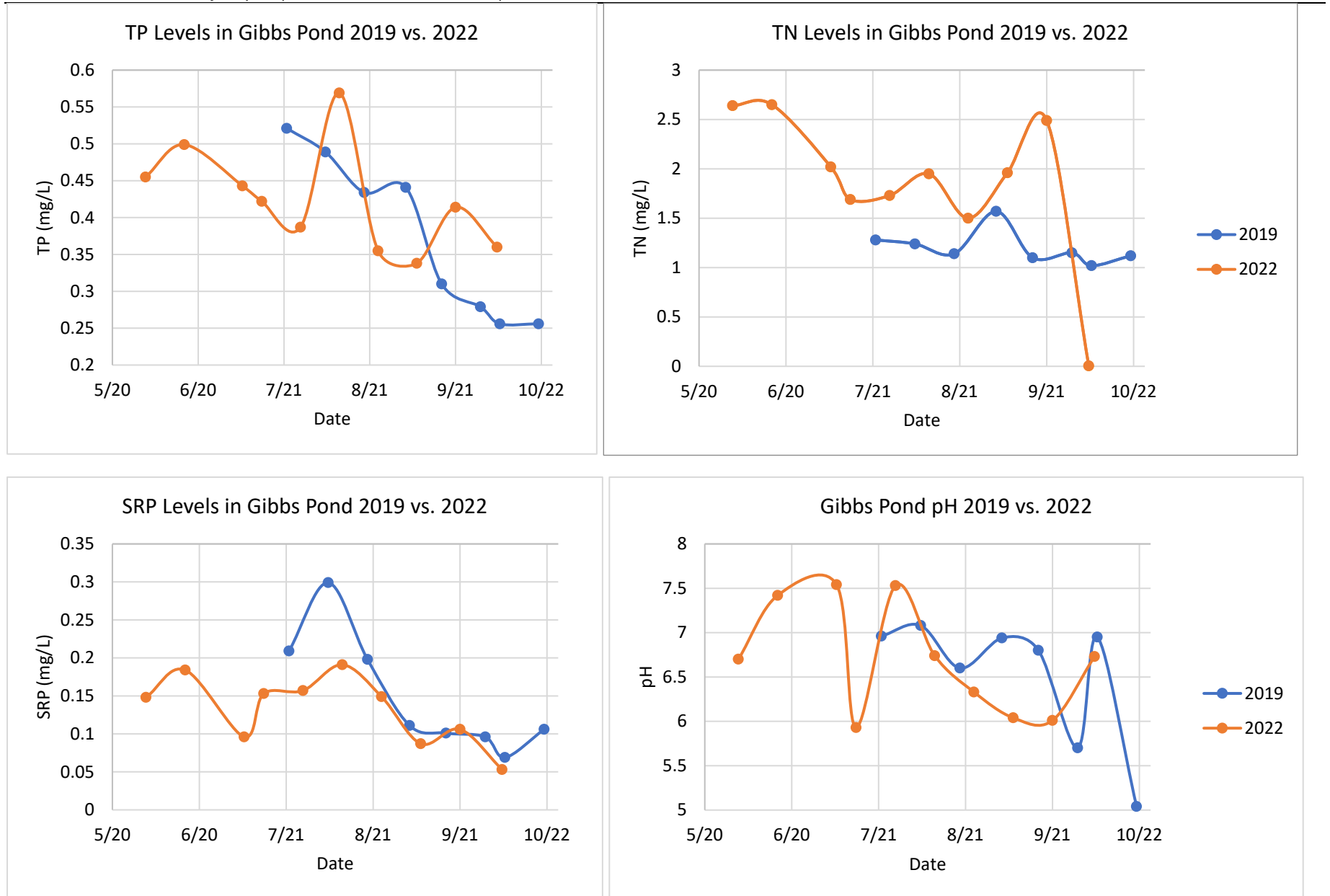
Month	Sampling Date		Total Depth (m)		Secchi Depth (m)		Avg Water Temp (°C)	
	2019	2022	2019	2022	2019	2022	2019	2022
June	-	6/1	-	5.3	-	0.33	-	20.1
	-	6/15	-	5	-	0.38	-	21.8
July	-	7/6	-	5.7	-	0.75	-	23.5
	-	7/13	-	5.3	-	0.5	-	24.5
	7/22	7/27	5.2	4.8	0.61	0.51	26.1	26.3
Aug	8/5	8/10	5.4	4.7	0.41	0.33	26	27.8
	8/19	8/24	4.7	4.2	0.36	0.33	24.5	24
Sep	9/3	9/7	5.1	5	0.33	0.25	23.2	22.7
	9/16	9/21	5.4	5	0.36	0.25	20.7	20.9
	9/30	-	5.3	-	0.33	-	20.3	-
Oct	10/7	10/6	5.1	5.3	0.43	0.33	16.8	15.1
	10/21	-	4.8	-	0.38	-	13	-

¹ 1 Sutherland, J., Turcotte, R. J.. Nantucket Island Ponds and 2022 Water Quality – Gibbs, Capaum, and Washing Ponds: A Summary of Physical, Chemical and Biological Monitoring. Unpublished data prepared for the Nantucket Land Council, Inc.

Table 2. Gibbs Pond Water Quality Sampling Details¹

Month	Sampling Date		Avg DO % saturation		TP (mg/L)		SRP (mg/L)		TN (mg/L)		NO3-N (mg/L)		spC (µS/cm)		TDS (ppm)		pH (s.u.)	
	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022
June	-	6/1	-	79.7	-	0.455	-	0.148	-	2.64	-	0.12	-	118	-	75	-	6.7
	-	6/15	-	104.5	-	0.499	-	0.184	-	2.65	-	0.12	-	116	-	74	-	7.42
July	-	7/6	-	108.6	-	0.443	-	0.096	-	2.02	-	0.21	-	110	-	69	-	7.54
	-	7/13	-	88.8	-	0.422	-	0.153	-	1.69	-	0.06	-	114	-	72	-	5.93
		7/22 7/27	65.2	103.4	0.521	0.387	0.209	0.157	1.28	1.73	0.005	0.04	96.5	118	61	75	6.96	7.53
Aug	8/5	8/10	72	88	0.489	0.569	0.299	0.191	1.24	1.95	0.005	0.005	128.3	120	82.1	76	7.08	6.74
	8/19	8/24	70.2	102.1	0.434	0.355	0.198	0.149	1.14	1.5	0.005	0.04	96.4	1342	62.3	933	6.6	6.33
Sep	9/3	9/7	83.2	88.8	0.441	0.338	0.111	0.087	1.57	1.96	0.005	0.03	97.1	196	62.7	128	6.94	6.04
	9/16	9/21	99	92.9	0.31	0.414	0.101	0.106	1.1	2.49	0.005	0.005	113.4	1610	74.5	1145	6.8	6.01
	9/30	-	95.9	-	0.279	-	0.096	-	1.15	-	0.02	-	378.3	-	260	-	5.7	-
Oct	10/7	10/6	103	94.1	0.256	0.36	0.069	0.053	1.02	0.005	0.005	2.21	237.3	122	150.2	78	6.95	6.73
	10/21	-	104	-	0.256	-	0.106	-	1.12	-	0.005	-	410.7	-	290.7	-	5.04	-
Average			86.6	95.1	0.373	0.424	0.149	0.132	1.20	1.86	0.007	0.284	194.8	397	130.4	273	6.51	6.70

¹ 1 Sutherland, J., Turcotte, R. J.. Nantucket Island Ponds and 2022 Water Quality – Gibbs, Capaum, and Washing Ponds: A Summary of Physical, Chemical and Biological Monitoring. Unpublished data prepared for the Nantucket Land Council, Inc.



Figures 1-4. Water quality measurements in Gibbs Pond in 2019 (blue) and 2022 (orange).

CONCLUSION AND 2023 MANAGEMENT PLAN

While 2022 marked the first year of algaecide application within Gibbs Pond, and that did impact the active blooms of HABs, no alum applications were able to be scheduled during the 2022 season. NCF has contracted a management company to conduct a subsurface injection of alum in April 2023 at a rate of 3 parts per million (ppm). The injection will be conducted via a specially designed spray boat equipped with a calibrated pumping system just below the surface of the water and into the prop wash of the outboard engine. This application method will provide flash mixing of the alum product.

NLC will continue to monitor water quality and clarity as well as phytoplankton communities in the same manner presented in this report. A similar report will be submitted following the 2023 management season. The 2023 year-end report will look to draw more conclusions regarding the management program within Gibbs Pond, and SWCA anticipates there to be a decrease in both SRP and total phosphorus after the 2023 application. As Gibbs Pond is a very large waterbody, and it is difficult to transport large quantities of alum to the island, this will likely not be a very dramatic reduction, but should be notable in the 2023 water quality analyses. Additional follow-up treatments will likely be needed in future years.


Attachment A

Pesticide Use Report

Pesticide Application- Daily Use Report

Date: 6-13-22 & 6/14/2022


Time: 10:30am -2:30 pm & 7:30-10:30 am

Applicator(s):		Matt Lewis						
License #(s):		34406						
Job #:		65332						
Client:		Nantucket Conservation Foundation						
Location:		Nantucket MA				Weather:	sunny, warm	
Product	EPA Reg.#	Total Product Used	Application Rate	Total Solution Used (product + water)	Method: 1= Foliar 2=Cut-Stem 3= Aquatic 4= Injection	Amount treated & location (acreage/sq.ft.)	Target Species	Comments:
Captain XTR	67690-9	25.0 gal	5.40 gal/ac max.	60	3	~10. ac	planktonic algae	perimeter & shallow 1/2
								
Signature(s):								

Pesticide Application- Daily Use Report

Date: 8-8-2-22

Time: 9:30am -12:30 pm

Applicator(s):		Matt Lewis						
License #(s):		34406						
Job #:		65332						
Client:		Nantucket Conservation Foundation						
Location:		Nantucket MA				Weather:	sunny, warm	
Product	EPA Reg.#	Total Product Used	Application Rate	Total Solution Used (product + water)	Method: 1= Foliar 2=Cut-Stem 3= Aquatic 4= Injection	Amount treated & location (acreage/sq.ft.)	Target Species	Comments:
Captain XTR	67690-9	20.0 gal	5.40 gal/ac max.	60	3	~10. ac	planktonic algae	northeastern 1/3
								
Signature(s):								