

Bare Hill Pond Watershed Management Committee  
Town of Harvard  
Harvard, MA 01451

August 26, 2021

Conservation Commission  
Town of Harvard  
Town Hall  
Harvard, MA 01451

Re: 2020-21 Drawdown Report and Fall 2021 Drawdown Plans

Dear Commissioners:

On behalf of the Bare Hill Pond Watershed Management Committee, we are pleased to submit our 2021 annual report. The accompanying professional water quality assessment report and the invasive species monitoring survey was prepared by Wendy Gendron as in prior years. She completed her last data collection this past week. We have invited Ms. Gendron, to join us for the September 2, 2021 Commission Meeting. She has reviewed the monitoring activities over the past 10-15 years. As discussed last year, Ms. Gendron will be conducting additional testing of the pond sediment this year to help evaluate algal bloom control strategy as well conducting quality assessment of the storm water control rain gardens in September.

In summary, our observational data continues to provide us with useful information about the watershed to guide us protecting the watershed. This past winter we appear to have substantial invasive plant growth due to an aborted and less effective draw down than in prior years. We achieved the 6.5 foot level this year in November, however, the pump electrical controls failed at the end of November leading to an early refill of the Pond starting in December. This resulted in less water turnover and limited freezing and drying of the invasive species in the draw down zone. As a result, we experienced significantly more fanwort and milfoil growth, similar to the year in which the draw down was not held. The water clarity through June was normal (8-10 feet). With the significant rainfall in July, the Pond refilled to its typical early May high level (about 10 inches higher than the normal average height) and declined slowly to being 6 inches higher than normal average height in mid-August. There was significant inflow of spring fed water and storm water, and during late July and early August, the water clarity declined to about 5-5.5 feet in clarity. The oxygen levels dropped like last year but with the significant spring flows, we may have avoided the algal blooms experienced last year. The water clarity might be more related to fine sediment washing in from shorelines due to the higher water level and due to increased inflow of natural tannins from the evergreen forest floor that stains the water brown.

At the same time, Ms. Gendron observed increased phosphorous levels in the deeper water zones, along with continued low phosphorous levels in the surface zones. In last early

August, she again cautioned the Committee that we were at risk for an algal bloom as oxygen levels at the deeper zones has dropped off significantly.

Our rates of draw down and refill were normal this year due to regular rainfall last fall and in the winter and spring. The refill was slow and gradual and because it was early than normal and this limited the impact of the draw down on invasive plants this year. Attached as Exhibit A is the measurements of the draw down and refill.

The 100 feet shoreline photos and an arial photo of the draw down in November are attached as Exhibit B.

In addition to the professional monitoring, we continue our volunteer monitoring program of frogs, fish, mussels and invertebrates. The Committee, under Brian McClain's leadership, has carried out monitoring of seven frog species at three locations around Bare Hill Pond on 4 separate dates. The seven species monitored are the bull frog, green frog, wood frog, spring peeper, gray tree frog, American toad and pickerel frog. The three locations are Clapp's Brook, "tennis courts" a.k.a. beginning of Barba's Point Trail, and the end of Bowers Road (which had to be changed to Cove Drive). The four dates were 3/25/21, 5/2/21, 6/5/21 and 7/5/21. All species - except for American toads - were detected during monitoring. Brian believes the absence of American toad calls may be due to the timing of their mating relative to the count dates. They have been observed in their normal habitats at after the breeding season during the year. There were higher counts of the other species, such as the Bull Frogs, that were not counted in large numbers last year but this year were back in force. See Exhibit C for the data.

Morey Kraus plans to conduct his annual turtle count this week and I will furnish his data upon receipt. Informally, he has observed mostly North American Painted turtles sunning on rocks and branches and snapping turtles throughout the Pond.

Several fishing derbies registered with the Park and Recreation Commission this year and reported excellent results to us. We held a mussel count at the 5 foot stage to see if they are impacted and there continue to be many mussels as well as juveniles indicating their health.

Rick Dickson provided a report on water chestnut control to the Committee. He continues to monitor invasive water chestnut plants finding very small numbers (10's of them) which he and others pull. Due to his success over the past several years, he did not seek volunteer help for a weed pull, but just to encourage folks to pull them if they see them. The water chestnuts continue to be under control is low as reflected in how difficult it is to find them throughout the Pond.

### Draw Down Plan

Due to the interruption of last year's draw down, increased invasives this summer and the lower oxygen levels and resulting increase in phosphorous levels in the deeper zones, we

recommend a repeat of last year's draw down plan for a 6.5 foot draw down. A 6.5 foot draw down would appear to be what is needed to reduce the excessive growth experienced this year and reduce to phosphorous to help avoid or delay algal blooms.

Our draw down plan would be the same as last year and would stop the pumping at 6.5 feet. If we do not achieve the 6.5 foot level by the end of November, we will stop at the level achieved. We anticipate that absence unusual precipitation or a hard freeze, we will achieve 6.5 feet by the end of November as we did last year. We continue to receive outstanding support from DPW in operating the pump and assisting with maintenance. This allowed for better timing of pumping, and reduced power costs. Assuming that there is not excessive rainfall again, the current level of the Pond should allow for a gravity draw down during most of October and then running the pump when the Pond level declines to the level of water in the wetlands. The removal of boards and the running of the pump would only occur as needed to achieve the depth targets based on the following table. Depth target is the maximum actual drawdown as of that date.

<u>Date</u>	<u>Depth Target</u> <u>(Measured from the top surface of the dam)</u>			
	2014	2015-19 Drawdown Depth*	2020-21 and 2021-22 Drawdown Depth*	Actual Depth Target***
9/24	22"	22"	22"	0"
10/1	22"	34"	22"	0"
10/15	34"	46"	36"	14"
10/24	46"	52"	48"	26"
10/28	52"	56"	56"	34"
Nov 30 or freeze**	5.5' on pipe	6' on pipe	6.5' on pipe	6.5' on pipe

\* (measured from top surface of the Dam)

\*\* (measured on pipe marker)

\*\*\* (amount of water drawn down)

Pumping would begin only when needed to maintain the rate during October but be necessary after reaching approximately 3 feet. The rate would not exceed 2 inches per day per the Order of Conditions. We think this approach will preserve Pond levels in September and October for recreational use (including the rowing season) and still achieve the beneficial draw down effects. If we are unable to achieve the 6.5 foot draw down by November 30, 2021 or a freeze occurs, we will stop and discuss it with the Commission if we have an alternative recommendation.

As in prior years, we would initiate the refill of the Pond on or before February 1, 2022 following notice to the Commission and the abutters. Because snowmelt timing is variable, it is

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important to timely refilling of the Pond, our experience indicates that deferring the refill beyond February 1 is unwise to ensure the habitat is restored for amphibians, fish and reptiles.

We appreciate the time the Commission has taken, and the effort made to understand, and help manage the project. We look forward to the meeting on Thursday, September 2.

Sincerely,

A handwritten signature in blue ink, appearing to read 'B. Leicher', written in a cursive style.

Bruce A. Leicher

Chair, Bare Hill Pond Watershed Management Committee

Cc: Conservation Commission Members  
Bare Hill Pond Watershed Management Committee Members  
Board of Selectmen

Pond Draw Down and Refill Data Fall 2019 – Spring 2020

Note: 22” is average normal height of Pond (average range 16”- 28” from top surface of Dam); feet is draw down actual depth from pipe markers

<u>Date</u>	<u>Pond Level from Top of Dam</u>	<u>Wetlands Level</u>	<u>Notes</u>
9/5	28”	—	Pre-draw down (compared to 28” in 2019; 37” in 2016 drought year, 26” in 2017 and 22” in 2018)
9/12	29”	70”	Pre-draw down (first rain after Algal bloom)
9/26	31”	68”	Pre-draw down (no rain)
10/3	31”	71”	Normal rainfall 0.75” rain (first board removed but below the board height)
10/6	32”	60”	No rain
10/12	32”	60”	0.4 Inches rain
10/14	34”	58”	Some rain
10/15”	36”	54”	Normal flow
10/17	36”	53”	1.0 inches rain ended Algal bloom
10/24	50”	58”	0.25” rain
10/28	56”	57”	Pump started running
10/31	59”	54”	Pump
11/1	60”	67”	Pump stopped and restarted
11/5	67”	58”	Pumping
11/7	70”	60”	Pumping 4’ marker on pipe
11/10	76”	56”	Reduce speed on pump 24hz; restarted pump 11/11
11/14	5.00 feet	55”	
11/21	5.5 feet	55”	5.5 marker on pipe
11/22	5.75 feet	62”	
11/28	6.5 feet	69”	Pump stopped and could not be restarted more than briefly
12/1	6.5 feet	68”	Pump stopped and could not be restarted
12/2	6.5 feet	68”	Pump Stopped
12/3	6.25 feet	68”	Slowly refilling
12/7	6.00 feet	65”	Slowly refilling
12/11	5.25	67”	Slowly refilling
12/18	77”	68”	1” snow
12/26	66”	66”	Heavy rain in past week <b>Reduced drawdown depth to 4 feet, 8 inches</b>

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1/2	59"	64"	Some snow
1/10	54"	67"	Draw down depth at <b>2 feet 8 inches</b>
1/16	50"	64"	1" rain
1/23	46"	66"	
1/30	42"	63"	Draw down depth at <b>1 foot 8 inches</b>
2/6	40"	61"	18" snow
2/13	37"	66"	Snow and cold but drawdown at <b>1 foot</b>
2/21	35"	61"	snow
3/6	26"	64"	Freeze but only drawn down 4 inches
3/20	22"	64"	Pond Full
3/27	20"	66"	Full at spring levels
5/8	16"	56"	High levels after rain
5/31	14"	58"	3" rain very high level
7/3	18"	62"	
7/12/	12"	48"	Heavy July rains 3+ inches
7/17	15"	55"	
7/24	17"	58"	
8/2	19"	59"	

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## 100' Shoreline Photos

Peninsula NE Side



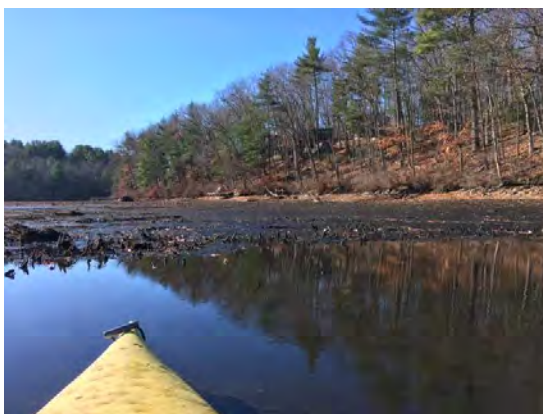
## Exhibit B

Peninsula SW Side



## 100' Shoreline Photos

West of Clinton Shore



## 100' Shoreline Photos

Clapps Brook



Clapps Brook Minister Island



## 100' Shoreline Photos

Four Acre Island



Four Acre Island





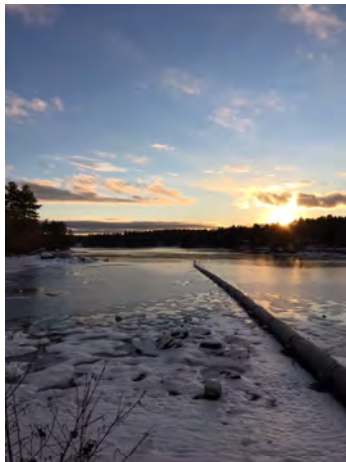
## 100' Shoreline Photos

Site at Point Opposite Sheep Island



## 100' Shoreline Photos

Drawdown at Pipe



## Aerial Shot Showing Draw Down



Credit: Sue Redich

## Exhibit C

date	location	bull	green	wood	spring peeper	gray tree	american toa	pickerel	comment	time
3/25/2021	tennis courts				chorus					6:34
3/25/2021	clapp's brook				200				(peeper chorus from i	7:01
3/25/2021	bowers rd(cove drive)				chorus (earsplitting)					7:30
5/2/2021	tennis courts				chorus					8:00
5/2/2021	clapp's brook				chorus				70	8:24
5/2/2021	bowers rd(cove drive)	n/d	n/d	n/d	n/d	n/d	n/d	n/d	not done/got lost	n/d
6/5/2021	tennis courts					87			warm	8:43
6/5/2021	clapp's brook	12	120			300			warm	9:04
6/5/2021	bowers rd(cove drive)		600			300			(hard to hear "deep w	9:34
7/5/2021	tennis courts								nada (but grey tree fr	8:53
7/5/2021	clapp's brook		18	55						9:16
7/5/2021	bowers rd(cove drive)		18	96						9:42

date	location	bull	green	wood	spring peeper	gray tree	american toad	pickerel	comment	time
3/27/2020	clapp's brook								nada - low water	6:50
3/27/2020	tennis courts				15	1				7:15
3/27/2020	bowers rd				chorus				low water	7:30
5/3/2020	clapp's brook				chorus			100		7:20
5/3/2020	tennis courts				chorus		30			7:49
5/3/2020	bowers rd				chorus			20		8:50
6/20/2020	clapp's brook		63			36				8:20
6/20/2020	tennis courts								nada	8:45
6/23/2020	bowers rd*(cove drive)	7	58							9:05
7/18/2020	clapp's brook			86						8:53
7/18/2020	tennis courts								nada	9:15
7/18/2020	bowers rd*(cove drive)			170						9:43

date	location	bull	green	wood	spring peeper	gray tree	american toad	pickerel	comment
4/3/2019	clapp's brook								nada
4/3/2019	tennis courts			17	chours				
4/3/2019	bowers rd			1/2 chorus == 900	chorus				
5/5/2019	clapp's brook							3	
5/5/2019	tennis courts				650				
5/5/2019	bowers rd			36	1000			180	
6/8/2019	clapp's brook	4	80						
6/8/2019	tennis courts		2						
6/8/2019	bowers rd	18	360						
7/13/2019	clapp's brook	15	156						
7/13/2019	tennis courts	39 (distant)				12 (towards school)			
7/13/2019	bowers rd	45	150						

date	location	bull	green	wood	spring peeper	gray tree	american toad	pickerel	comment		
4/22/2018	clapp's brook				chorus						
4/22/2018	tennis courts				chorus						
4/22/2018	bowers rd				chorus			16			
5/13/2018	clapp's brook								1 single call		
5/13/2018	tennis courts				~300						
5/13/2018	bowers rd			1	chorus		1		42		
6/10/2018	clapp's brook		29								
6/10/2018	tennis courts								no calls		
6/10/2018	bowers rd		93								
7/29/2018	clapp's brook			7					2 wks delayed		
7/29/2018	tennis courts								2 wks delayed - no calls - noisy BB game		
7/29/2018	bowers rd		1	32					2 wks delayed		

date	location	bull	green	wood	spring peeper	gray tree	american toad	pickerel	comment
4/23/2017	clapp's brook				chorus			36	
4/23/2017	tennis courts				chorus		4		
4/23/2017	bowers rd				chorus			116	
5/21/2017	clapp's brook					102		1	
5/21/2017	tennis courts								no calls
5/21/2017	bowers rd			6		15			
6/18/2017	clapp's brook	2	9						
6/18/2017	tennis courts					1			single call
6/18/2017	bowers rd		48			21			
7/16/2017	clapp's brook	xxx	xxx	xxx	xxx	xxx	xxx	xxx	not done
7/16/2017	tennis courts								no calls
7/16/2017	bowers rd			22					