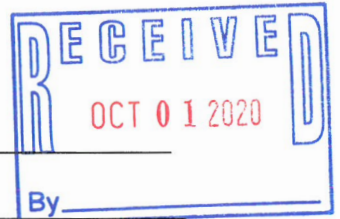


**GREAT BARRINGTON
COMMUNITY PRESERVATION COMMITTEE**

APPLICATION FOR CPA FUNDING – Step 1

Date Received (for office use only) _____



Applicant Name Town of Great Barrington

Project Name Water Quality Monitoring and Aquatic Vegetation Survey

Project Address Lake Mansfield

Contact Person Christopher Rembold Title: Assistant Town Manager

Phone No. 528-1619 x.7 Email crembold@townofgb.org

Brief Project Description (attach up to 1 additional page if necessary)

The town seeks funding for a three year water quality monitoring program and a study of lake vegetation survey including invasive weeds in Lake Mansfield. The work will update previous water quality and vegetation studies of Lake Mansfield, and provide current data to guide future resource preservation work in the watershed.

Amount of CPA funding you are seeking: \$ 75,000

When do you request the CPA funding be received by your project? FY22

Property Owner (if different from applicant)

Owner's Name _____

Owner's Address _____

Phone No. _____ Email: _____

If Owner is different from applicant, you must include a letter signed by the Owner giving permission to apply for funds for the specified project on the Owner's property.

In the following chart, mark the box(es) that best apply to your project.

Boxes with an X through them are not CPA eligible activities. Contact the Town Planner if you need more information.


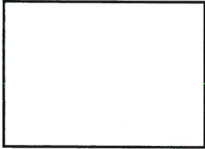
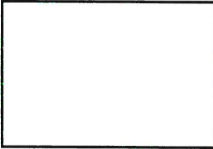
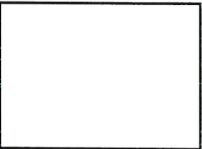
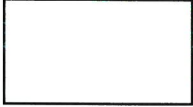
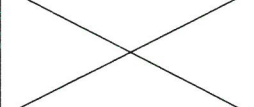
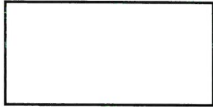
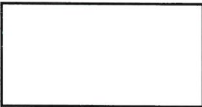


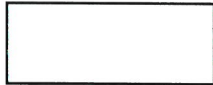
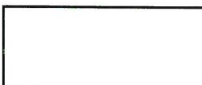
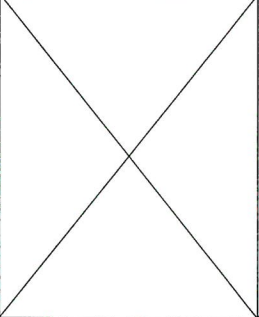
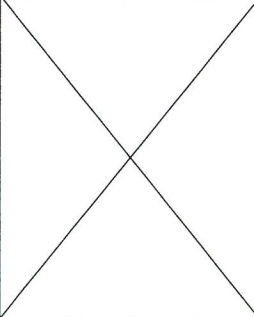
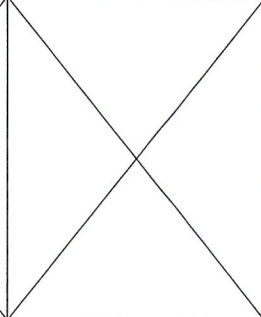
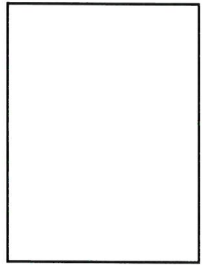
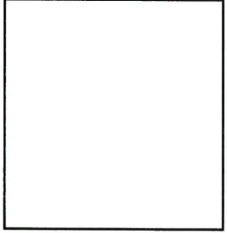
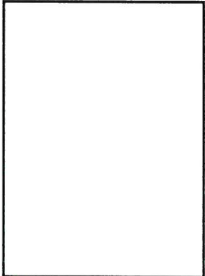
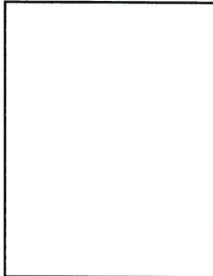

	OPEN SPACE	HISTORIC RESOURCES	RECREATIONAL LAND	COMMUNITY HOUSING
Activities (refer to Glossary for definitions)	Land to protect existing and future well fields, aquifers and recharge areas, watershed land, agricultural land, grasslands, fields, forest land, wetland, river, stream, lake and pond frontage, land to protect scenic vistas, land for wildlife or nature preserve, and land for recreation use.	Building, structure, vessel, real property, document or artifact listed on the state register of historic places or determined by the local historic preservation commission to be significant in the history, archeology, architecture or culture of the city or town.	Land for active or passive recreational use including, but not limited to, the use of land for community gardens, trails, and noncommercial youth and adult sports, and the use of land as a park, playground or athletic field. Does not include horse or dog racing or the use of land for a stadium, gymnasium or similar structure.	Housing for low and moderate income individuals and families, including low or moderate income seniors. Moderate income is less than 100%, and low income is less than 80%, of US HUD Area Wide Median Income.
ACQUISITION Obtain property interest by gift, purchase, devise, grant, rental, rental purchase, lease or otherwise. Only includes eminent domain taking as provided by G.L. c. 44B				
CREATION To bring into being or cause to exist. <i>Seideman v. City of Newton</i> , 452 Mass. 472 (2008)				
PRESERVATION Protect personal or real property from injury, harm or destruction				
SUPPORT Provide grants, loans, rental assistance, security deposits, interest-rate write downs or other forms of assistance directly to individuals and families who are eligible for community housing, or to entity that owns, operates or manages such housing, for the purpose of making housing affordable				
REHABILITATION AND/OR RESTORATION Make capital improvements, or extraordinary repairs to make assets functional for intended use, including improvements to comply with federal, state or local building or access codes or federal standards for rehabilitation of historic properties	Only applies if property was acquired or created with CPA funds 			Only applies if housing was acquired or created with CPA funds 

Chart adapted from "Recent Developments in Municipal Law", Massachusetts Department of Revenue, October 2012.

End of Step 1 application

GREAT BARRINGTON COMMUNITY PRESERVATION COMMITTEE

APPLICATION FOR CPA FUNDING – Step 2

Date Received (for office use only) _____

All applicants submitting Step 2 must include a copy of their Step 1 application.

All applicants must answer questions 1-11, and question 19. For question 12-18, only answer questions that are applicable to your CPA area. For example, if your project has to do with Historical Preservation but does not include Housing, then you may skip questions 12, 13 and 14, but you must answer all questions under the subheading "Historical Preservation Projects."

You may attach additional sheets as necessary to answer the numbered questions, up to a maximum of 8 additional pages of narrative. These additional pages must be formatted with a minimum 11 point font, 1 inch margins. If your project combines two or more CPA priorities, such as Community Housing AND Open Space, then you must answer ALL questions under both of those 2 subheadings and you may include up to 10 additional pages of narrative. (Please note Open Space and Recreation is considered one CPA priority.)

All pages must be numbered. Please number each attached Page 1 of 8, Page 2 of 8, etc. If your answers are on separate sheets, also number each answer so that it corresponds with the number of the question you are answering.

Applicant Name Town of Great Barrington

Project Name Water Quality Monitoring and Aquatic Vegetation Survey

Project Address Lake Mansfield Road

Assessor's Map _____ 10 _____ Lot _____ 43 _____

Property Deed Book / Page _____ 2180 _____ / _____ 93 _____

1.) Project Budget (list all sources and uses, including grants, fundraising, etc.)

Total CPA funds requested: \$70,000

Fill in the chart below showing all project sources and uses, including requested CPA funds:

Source Name	Amount	% of total	Used for	Committed?
BCSR admin (match)	10,500	8%	BCSR Admin overhead charge	yes
Facilities and Equip (match)	45,000	36%	BCSR facilities use and equip	yes
Direct costs: QAPP \$2,000 Interns \$18,000 Field/Lab Super \$23,000 Test exp \$27,000	70,000	56%	Execution of the lake water quality survey and associated lab work	CPA Funds (Requested)

Total budget:		\$125,500	100%	

Attach additional budget sheets or project budget if necessary. Budget pages do not count towards the 8 page limit. Be sure to include project management, oversight, engineering, and administrative costs that may be incurred. Describe all funding that has been sought and/or is available for this project.

2.) Timing of Funds: Describe when CPA funds and other funding sources are to be received. Full funding is preferable in FY 2022 in order to ensure that we can execute the multi-year project in its entirety; however, incremental funding would also be acceptable.

3.) Existing use or deed restrictions, permanent easements, historic designations, special permits, etc. if any:

There are no deed restrictions; the lake is managed by the Conservation Commission. We will coordinate our work with the Commission.

4.) Proposed Use or Deed Restrictions after Project Completion (in accordance with CPA rules): The Lake is and always will remain open for public use. Thus, there are no proposed use or deed restrictions.

5.) Describe the project team, including project management personnel, design professionals, contractors, and other applicable consultants, their relevant experience, so forth. Attach additional pages/resumes as needed.

This proposal represents a partnership between the Town of Great Barrington (the Town) and Berkshire Environmental Research Center (BERC) of Bard College at Simon's Rock (BCSR). The Town will provide administrative project and grant oversight. BERC will conduct all aspects of the research, from research design to fieldwork and data analysis. BERC has conducted research on the lakes, rivers, and wetlands of the Berkshires for over 30 years. BCSR students will conduct field work and research in classes and internships, under the technical and scientific direction of BERC staff. BCSR will provide the use of laboratories, supplies, and field equipment. Student summer internships academic year jobs will help with field and lab work.

Students will be encouraged to use this research as a springboard for additional research on Lake Mansfield or in the region for their year-long senior thesis projects.

Additional Information:

Please see attached Project Summary, Resume, Photographs, Letters of Support, and a copy of the 2016 MET Report.

Funding Considerations

6.) Consistency: Describe how the proposed project is consistent with the Community Preservation Plan and with the Great Barrington Master Plan.

As open space and recreational land, preservation of Lake Mansfield is clearly identified as an area for funding consideration under the Community Preservation Act (CPA). In recent years, there have been two 319 culvert stormwater runoff projects, on Castle Hill and Knob Hill. This project would address concerns, specifically regarding non-point source pollution, through evaluation and monitoring.

As stated in the Town of Great Barrington's Community Preservation Plan:

The 2013 Master Plan and the 2013 Open Space and Recreation Plan identify the following needs and goals:³

- Serve the changing needs of our community, including an aging and less mobile population, as well as people who are seeking low impact and heart health exercise
- Connect neighborhoods and village centers to community resources
- Create additional greenways (walking and biking trails) and "blueways" (paddling trails)
- Create new open space and recreational resources
- Create access to, and increase recreational use of, the Housatonic River
- **Protect biodiversity, habitat, and natural resources**
- Conserve agricultural land and agricultural soil
- Support community gardens and community supported agriculture

To address these needs [from the Master Plan], the Committee's open space and recreation funding priorities for the coming year are to:

Support projects that preserve and rehabilitate/restore Town-owned open spaces, parks and recreational assets

Additionally, the document reads:

The Committee also strongly encourages open Space and recreation projects that:

- **Preserve and/or connect open space or recreation resources**

We believe that the proposed Lake Mansfield Water Quality Evaluation and Monitoring Project is consistent with the Community Preservation Plan and the 2013 Master Plan in the aforementioned ways.

7.) Town Projects: Is the proposed project for a town-owned asset?

Yes

If yes, please describe funding options. For example, what portion of the project budget is CPA funding? If CPA funds are not received, what are the alternative funding options, if any?
If CPA funds are not received, we would need to seek a budget appropriation from Town Meeting. We could seek another grant from the MET trust, however they are very competitive and are not annual. We applied again in 2017 to renew the project, which was unsuccessful.

8.) Public Benefits: Describe the public benefits of the project.

(Subsection of attached document)

A multi-year study is needed in order to judge the success of recent improvements in the watershed and to inform future work in the Lake Mansfield watershed, one of the most utilized open spaces in town. While there have been recent improvements in the Lake Mansfield watershed, there is a need of a study of the water quality or chemistry. This proposal to MET will establish a program to monitor the success of the recent 319 grant, to provide new information since the last water quality assessments (10 and 20 years past), and educate students and the public about the lake and its sensitive environment.

Past studies and photographic records demonstrate that nonpoint source pollution, delivering sediment and nutrients to the lake, is the primary pollutant of the lake. Sediment fills in sensitive areas along the shorelines and encourages the growth of nuisance plants. Sediment loading and the addition of nutrients through nonpoint source pollution are accelerating the eutrophication of the lake, also leading to nuisance plants and algae.

The recently completed 319 grants on Castle Hill Avenue and Knob Hill Avenues address the historically significant source of eutrophication in the lake, which this research will help to elucidate. In the past, stormwater from Castle Hill and Knob Hill was caught in a series of outdated and shallow catch basins. These basins were “in-line” with the main drain, and thus were flushed out by storms. The outfall of the storm system was via pipe directly into the lake. When the system overflowed in a moderate to heavy rain, one could stand at the lake end of the outfall pipe and see the sediment-filled water rushing out. The 319 grant utilized a combination of deep-sump catch basins (placed off-line from the main drain so they would not be flushed), and a large stormwater treatment unit to catch and separate out sediment and pollutants.

The 319 grants addressed issues highlighted in a series of water quality studies and weed assessments performed on Lake Mansfield by qualified independent experts in 1990, 2001, and 2005. A more recent town-funded weed assessment in 2012 showed that biological controls like weevils remain active (they were last stocked in 2000), but overall plant biomass has increased. *Because of budget limitations, the 2012 study did not include a water quality or water chemistry assessment.* As previously stated, a multi-year study is needed in order to judge the success of recent improvements in the watershed and to inform future work in the watershed.

While evaluating the impact of the two 319 restoration projects is central to continuing our understanding of the lake’s ecology, it is important to recognize that there is also baseline warming across all New England lakes. This warming, including the warming of the landscape in general, is enhancing the impacts of sedimentation and non-point source pollution and is likely a significant factor in increased eutrophication. In order to evaluate the respective drivers of eutrophication in the lake this project will continue the water quality analysis from the 2014 MET grant but will also include additional testing, including quantifying dissolved organic matter (DOM) both in the catchment basins outflow as well as along the shoreline. It is

recognized that DOM plays a key role in eutrophication including the increased incidents of cyanobacteria blooms.

9.) Leverage: Will the CPA funds be used to leverage or supplement other funding for this project? Please explain other sources and whether they have been committed.

CPA funds will be supplemented by in-kind support from BCSR in the form of administrative and teaching support, in addition to use of the facilities, and advanced laboratory equipment. This has been committed; however, CPA funding is needed to perform the analyses.

10.) Community Input and Support: Describe any community input, meetings and/or support that you have for your proposed project. Include support letters as applicable (they will not be counted towards the 4-page limit). Letters should be unique and not reproduced form letters. The Lake Mansfield Improvement Task Force is a public body made up of representatives from several Town Boards and Commissions and citizens, as well as Town staff. The Task Force holds public meetings monthly, and since March of this year has recognized the need to update past water quality studies. On October 14 the Task Force voted to support this application for CPA funds.

Additionally, we have attached letters of support from Bill Meier, a frequent lake-swimmer, John Weistein, Provost of BCSR, and the Great Barrington Land Conservancy.

11.) Permits: Describe permits that may be required, the status of those permits or applications, and/or when the applications will be submitted and permits received.

No permits are required for this project.

Open Space and Recreation Projects

17.) Open Space and Recreation: Clearly describe how the project meets the Open Space and Recreation goals of the Community Preservation Plan.

This proposal seeks CPA funds to develop plans to preserve the water quality, habitat, and access to the Lake Mansfield Recreation Area. This is clearly meets the CPA category of **Open Space** and the CPA activities of **Preservation** and **Creation**. *This project is also consistent with the following Open Space and Recreation goals of the CPA Plan (responses in italics below each goal).*

- Protect biodiversity, habitat, and natural resources
 - *By assessing stormwater treatment and nonpoint source pollution, this project will protect and preserve the biodiversity, habitat, and natural resources at Lake Mansfield. The lake area provides habitat for invertebrates, amphibians, fish, turtles, large mammals including bear and coyote, and birds including owls and eagles.*

The CPA Plan also states that Open Space projects should, to the extent possible, achieve certain objectives. This project is consistent with those objectives (responses in *italics* below):

- Preserve and/or connect open space or recreation resources

- *This project will preserve the open space and recreational resource by assessing the stormwater runoff problems (long documented as a major cause of the deterioration of the lake's health).*
- Protect resources that are identified as conservation priorities by local, regional, and state planning documents
 - *As stated previously, the Lake Mansfield recreation area is identified in the Town's Master Plan and Open Space and Recreation Plan as a high priority for preservation and protection.*
- Provide for a demonstrated community open space or recreational need and be accessible for a variety of ages and abilities
 - *Lake Mansfield is a favorite year-round spot which draws people from surrounding neighborhoods and towns to canoe, ice skate, hike, fish, and swim. Because of its location so close to the center of town, residents and tourists alike frequent the lake, especially the beach, during the summer months. There are playground facilities for younger children as well as picnic benches and cooking grills for family outings during the warmer season. In 2015 over 13,000 people visited the beach area during the summer months. These CPA funds will result in plans to preserve this area.*
- Protect and/or connect scenic views and resources
 - *Lake Mansfield is one of the few lakes in Berkshire County without structures like docks or boat houses on it. It is a scenic resource within walking distance of downtown and densely populated neighborhoods. Protecting and preserving the lake health and habitat areas will maintain this scenic resource for generations to come.*
- Provide vital ecosystem services such as water quality and floodplain protection
 - *Decades of research and previous studies show that the primary challenges to the health and water quality of Lake Mansfield are stormwater pollution, and the invasive weeds which thrive on it. This project will analyze various metrics with regards to stormwater runoff and provide a useful analysis with which further actions can be considered.*
- Provide an easement or other restriction to preserve natural resources
 - *The lake and conservation forest are already permanently protected by virtue of Town ownership. Conservation Commission and Mass DEP regulations also apply.*
- Protect and/or connect the special places and features of our community, such as historic treasures, natural resources, farms, and open space—all that contribute to Great Barrington's distinctive character
 - *This project will assist in the preservation of Lake Mansfield, a unique resource that connects downtown and adjacent neighborhoods to year-round outdoor recreation and natural habitat. The lake is a recreational and scenic resource for the entire Town.*
- Include public access where appropriate
 - *All of the Lake Mansfield recreation area is open to the public and will remain so.*

18.) Other Information: Describe any other relevant information about the project and the site. For example: Is the site zoned for the proposed use and if not what is the plan for zoning approvals? Does the project reuse a building or previously-developed site? Is the site or could the site be contaminated and if so what is the plan for remediation.

Zoning is not applicable. The lake is not contaminated and thus no remediation is necessary.

Certification

19.) This application was prepared, reviewed, and submitted by:

Name: _____

Ph: _____ Email _____

I hereby certify that all of the above and included information is true and correct to the best of my knowledge. [For non-municipal applicants only: I further declare my willingness to enter into a Contract with the Town of Great Barrington to govern the use and expenditure of CPA funds.]

Signature: _____

Date: _____

10 hard copies of the entire application package, and one PDF of the entire application package, are due prior to the 4:00 PM deadline.

Project Summary

The Lake Mansfield Water Quality Monitoring project will study the water quality of Lake Mansfield over a three-year period. This project will help the Town better understand the health of the lake and how it is impacted by nonpoint source runoff pollution and climate change. This project, coupled with ongoing stormwater improvements in the watershed, will improve water quality and reduce runoff pollution. It will develop an environmental education program through a partnership with local nonprofit organizations. It will leverage CPC funds on nearly a dollar-for-dollar basis. It will include outreach and education to students, residents and users of the lake recreation area.

The specific purposes of this project are: (1) to determine the lake's overall water quality and chemistry; (2) to judge the impacts of nonpoint source stormwater pollution on lake health; (3) to evaluate the impacts and benefits of the Town's two nonpoint source stormwater improvements (being implemented by a 319 nonpoint source pollution control grant); (4) to continue the development of the aquatic ecology program where students can learn about and participate in water quality analysis and environmental research; and, (5) to inform the community about this collaborative water stewardship effort by utilizing a variety of public outreach tools.

This proposal represents a partnership between the Town of Great Barrington (the Town), Bard College at Simon's Rock (BCSR), and the Lake Mansfield Alliance (LMA). The Town will provide administrative project and grant oversight. BCSR students will conduct field work and research in classes and internships, under the technical and scientific direction of BEREC, the environmental research center at BCSR, and which provides research opportunities for undergraduates. BEREC has conducted research on the lakes, rivers, and wetlands of the Berkshires for over 30 years, and is actively engaged in lake management projects across the

region. BERC will conduct all aspects of the research, from project design to fieldwork and data analysis. BCSR will provide the use of laboratories, supplies, and field equipment. Student internships will help with field and lab work, and students will be encouraged to use this research as a springboard for additional research on Lake Mansfield or in the region for their year-long senior thesis projects. LMA will provide outreach and publicity to the community.

The project will include water quality sampling at known areas of nonpoint source pollution, including the Castle Hill Avenue storm drain system outlet (subject of the 319 grant), as well as evaluation of the runoff from Lake Mansfield Road. Samples will also be taken along the western shore of the lake which is bordered by an 80-100 year old forest located on the property of BCSR, a relatively undisturbed drainage.

To reflect annual and seasonal variation, this project will take place over a three-year period and will include monthly sampling as well as storm event sampling, providing the Town with a robust analysis of the water quality of the lake, the nature of possible impairments, and the knowledge necessary for sound management under a wide range of environmental conditions.

We request \$70,000 from CPA to cover the direct costs of student internships, the costs of water quality testing, and project supervision as detailed in item #1 above.

.

Project Overview

The purpose of this project is to evaluate non-point runoff entering Lake Mansfield across several natural and human dominated landscapes over a three-year period. We will establish sampling stations at each of the following general locations: along the town park area and Lake Mansfield Road on the eastern side, in front of both 319 non-point project discharge areas on the south end, along the deciduous forest on the western edge of the lake, and in the pond which forms the lake outlet on the north end (Figure 1.3). The sampling stations will be those

established in the 2014-16 MET study (Fig. 1.3 and attached). Samples will also be taken at both 319 culverts, one above each catchment basin and one in the outflow from the catchment basin during each storm event. The parameters measured (Table 1) are based on the Massachusetts Surface Water Quality Standards (314 CMR 4.00), including: temperature, pH, dissolved oxygen (DO), total dissolved solids (TDS), total suspended solids (TSS), chloride (Cl), total nitrogen (TN), and total phosphate (TP). Temperature, pH, DO, and TDS will be recorded in the field and Cl, TSS, and TN will be collected in the field but determined in the BERC laboratory. TP and random TN samples (to confirm BERC lab testing results) will be sent to TestAmerica (Westfield, MA) or similar facility. Chloride levels will only be monitored during the winter. Modified from the work completed during the 2014-16 MET project we will be adding dissolved organic material and will not be testing for bacteria or VOCs, the latter two of which were not viewed as significantly useful relative to cost.

Parameter	location
Temperature	All sample sites
pH	All sample sites
Dissolved oxygen (DO)	All sample sites
Total dissolved solids (TDS)	All sample sites
Total suspended solids (TSS)	All sample sites
Chloride (Cl)	All sample sites
Total nitrogen (TN)	Four random sites
Total phosphorous (TP)	Four random sites
Dissolved organic material	Four random sites

Table 1. List of water quality parameters and locations.

The goal of this extensive sampling is to quantify how the different types of shorezones and structures may correlate with the measured parameters. This data, in conjunction with our

evolving understanding of climate change on lakes, will provide the town with an increased understanding of the system, informing management needs and the possibility for mitigation measures. The measurable outcome of this project will be a detailed analysis of the lake's water quality in general, addressing impacts of storm events and the functionality of the two 319 projects, and a better understanding of the system overall.

The research program will be directed through BERC and will utilize staff and facilities at BCSR. Equipment being provided by the college includes canoes, field equipment, laboratory equipment and supplies, and office space. BERC will complete the QAPP, oversee all aspects of the research, supervise the interns, and coordinate with the LMA to encourage public participation in the actual research.

Key Milestones

The timeline (Fig 1.1) for the project is straightforward, with monthly sampling taking place over the next three years, and regular reporting to the Town. Specifically, QAPP development and staff and intern training will take place in July and August 2021. Lake sampling will begin in September 2021 and continue through August 2024. Regular monthly samples will be taken on or around the 15th of each month and storm event sampling will take place within 24-48 hours. The main tasks of the project include completion of the QAPP by July 15th, 2021, the establishment of sampling stations by July 15th, 2021. Sampling will be completed by BERC staff and interns from the college. At a minimum BERC will provide reports each April and each September. At the end of the third year a full analysis of the data will be completed.

Timeline	Milestone
July-August 2021	QAPP completed/ Staff training
September 2021	Sampling begins

April 2022	Bi-annual report
July-August 2022	Staff training
September 2022	Bi-annual report

Fig 1.1 Timeline for the first year.

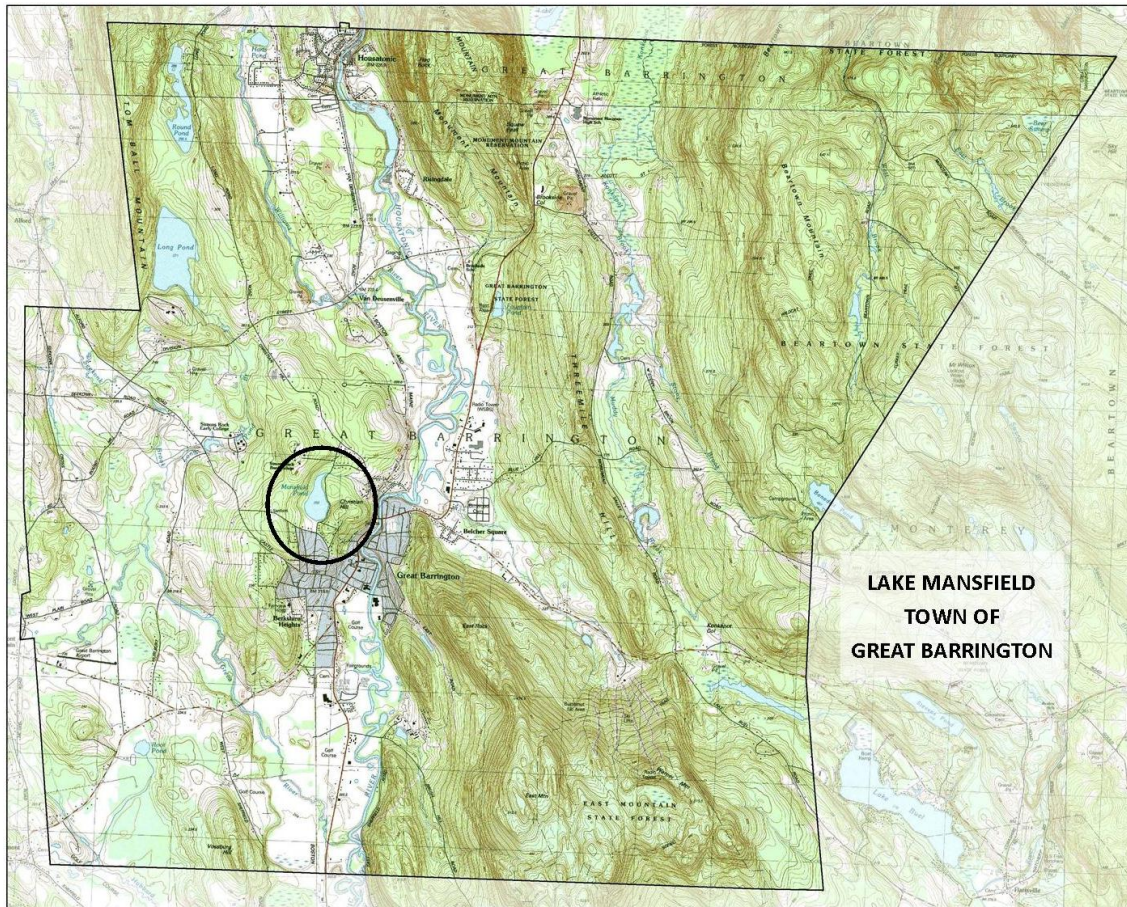


Fig 1.2 Map of Great Barrington, showing location of Lake Mansfield.



Fig 1.3 Map of Lake Mansfield.

Thomas W. Coote

PO Box 31, Southfield MA 01259
413-229-0312 (H) / 413-644-4509 (O)
tcoote@simons-rock.edu

EDUCATION

Doctor of Philosophy, Environmental Conservation, May 2011

University of Massachusetts at Amherst, Amherst, MA

Dissertation: The Phylogeography of *Marstonia lustrica*: Understanding the Relationship between Glaciation and the Evolution and Distribution of a Rare Snail.

ABD, Environmental Studies, 1999-2006

Antioch New England Graduate School, Keene, NH

Dissertation: Public Participation and Environmental Decision-making.

Master of Science in Environmental Studies, 1994

Bard College, Annandale-on-Hudson, NY

Thesis: Growth Rate of Yellow Perch (*Perca flavescens*) as a Function of Density within the Aquaculture Setting.

Bachelor of Arts in Environmental Studies, 1990

Simon's Rock College of Bard, Great Barrington, MA

Thesis: The World Oceans, Carbon Dioxide, and the Greenhouse Effect.

CURRENT EMPLOYMENT

Bard College at Simon's Rock

Visiting Faculty and Director of Sustainability, 2012-present

Director of Signature Program in Ecology and Sustainability in Montserrat, 2013-present

Berkshire Environmental Research Center, Associate Researcher and Director, Aug 2001-present

Adjunct Faculty Aug 2001-2011

TEACHING EXPERIENCE

Bard College at Simon's Rock, Gt. Barrington, MA 2001-current

Malacology Fall 2019

Introduction to Bioinformatics, Spring 2011, 2013, 2015, 2018

Introduction to Agroecology, Spring 2002, 2012, 2016, 2017, 2018, Fall 2011, 2012, 2017, 2018

Tropical Ecology in Montserrat, Fall Mod 2 2015, 2016

Introduction to Environmental Studies, Fall 2001, 2010, 2013, 2014, 2015

Principles of Environmental Management, Spring 2002, 2017, 2018

Intro to Life Sciences Lab (2 sections), Fall 2009, 2011, 2013, Spring 2011

Limnology, Fall 2010, 2012, 2018, Spring 2015

Limnology Lab, Fall 2003, 2005, 2008, 2012, 2015

Seminar in Marine Biology, Fall 2002

Topics in Modern Biology, Fall 2010

First Year Seminar, Fall 2012, 2013, 2016, 2017, 2018

Writing and Thinking Workshop, Fall 2012, 2013, 2014, 2015

California University of Pennsylvania, California, PA 1995-1998

Man and His Environment (1-2 sections per term)

Waynesburg College, Waynesburg, PA 1994-1998

Environmental Biology (1-2 sections & 2-3 labs per term)

CONSULTING

Marstonia lustrica Habitat Assessment and Survey, Stockbridge Bowl Lake Basin, Stockbridge Massachusetts. GZA GeoEnvironmental & Town of Stockbridge, MA 2016-current.

Ongoing project evaluating the lake basin for presence and habitat of the rare snail *M. lustrica*. This work is part of establishing baseline data in order to move forward with a \$4,000,000 dredging project and subsequent monitoring of the response of the snail to a 5' lake drawdown.

Trout Pond Dam and Impoundment Restoration. Ravine Falls Trust, New Marlborough, MA 2017-current.

Project involves permitting through ACE, MADEP, NHESP, and local Conservation Commission for impoundment drawdown, which includes threatened wood turtle habitat, in order to repair dam structure.

Upper and Lower Rhoda Lakes, and Long Pond Lake Management projects. Ancram and Copake, NY. 2015-current.

Lake management projects involving ecological surveys, invasive plant management and working with lake homeowner's associations to resolve competing interests and management goals.

ECOLOGICAL RESEARCH & PUBLICATIONS

Coote, T. 2019. The phylogeography of *Marstonia lustrica* across its range. *Northeastern Naturalist* 26(3):672

Coote, T., K. Schmidt, E. Schmidt, and E. McMullin. 2019. "Discovery of the Freshwater Limpet, *Ferrissia californica* (Rowell, 1863) (Gastropoda: Planorbidae), from the Streams of Montserrat, West Indies, a New Addition to the Caribbean Fauna," 36(2) Fauna.

Shoobs, N. and T. Coote. In prep. A Taxonomic Checklist of Freshwater Snails (Mollusca: Gastropoda) from Montserrat, Lesser Antilles, with notes on local extinctions and introductions following recent volcanic activity, and a brief history of previous malacological trips to the island.

Coote, T. 2015. New records of *Floridobia winkleyi* (Pilsbry) and *Valvata lewisi* (Currier) in the freshwater tidal Hudson River, New York. *American Malacological Bulletin*, 33(1):114-117.

Strayer, D., S. Findlay, D. Miller, H. Malcom, D. Fischer, and T. Coote. 2012. Biodiversity in Hudson River shore zones: influence of shoreline type and physical structure. *Aquatic Sciences* DOI: 10.1007/s00027-012-0252-9.

Coote, T. and D. Strayer. 2009. Gastropods of the Hudson River Shoreline: Subtidal, Intertidal, and Upland Communities. Section IV: 32 pp. In S.H. Fernald, D. Yazzo and H. Andreyko (eds.), *Final Reports of the Tibor T. Polgar Fellowship Program*, 2008. Hudson River Foundation.



MET Lake Mansfield Water Quality Monitoring Project

Final Report

June, 8, 2016

Berkshire Environmental Research Center
Bard College at Simon's Rock

Submitted by: Thomas W. Coote, PhD

Introduction

The role of the Berkshire Environmental Research Center (BERC) was to provide the MET Lake Mansfield Water Quality Monitoring Project with the expertise to quantify current water conditions within and flowing into the lake, to develop the monitoring project as an integral part of the educational program at Bard College at Simon's Rock (BCSR) going forward, and to assist the Town of Great Barrington in the dissemination of information to the greater lake community. Specifically this project was designed to: (1) determine the lake's overall water quality and chemistry; (2) to judge the impacts of nonpoint source stormwater pollution on lake health; (3) to objectively determine the impacts and benefits of the Town's nonpoint source stormwater improvements (recently implemented by a 319 nonpoint source pollution control grant); (4) to establish a new educational program where college students can learn about and participate in water quality analysis and environmental research; and, (5) to inform the community about this collaborative water stewardship effort by utilizing a variety of public outreach tools (MET FY15 proposal).

The project was successful with the establishment of seven sample sites within the lake (stations 1-6 and center) (Fig. 1), two stations on the 319 culvert drain system on Castle Hill (stations A & B), two stations in the BCSR forest (stations C & D) and the development of a wet lab at BCSR for the explicit purpose of water quality monitoring and research on Lake Mansfield and other regional lakes. Water quality results to date suggest that the lake is generally healthy with a few exceptions, all of which is discussed in detail below.

To date BERC has completed 17 months of water sampling and lake monitoring, incorporated the monitoring program into the regular aquatic ecology and limnology classes at BCSR, and has involved approximately 20 students in this ongoing monitoring effort. A total of five students have been formally trained in the field sampling protocols as well as in the wet lab analysis procedures and two graduates have been hired on a part time basis in the BERC lab. Despite the official close of this MET project BERC will continue to monitor the lake over the summer of 2016 and will continue monitoring on a more limited basis over the coming years as part of BCSR regular course offerings.

Results

The water quality parameters identified for monitoring (Table 1) were successfully analyzed over the course of the study. Temperature, pH, DO, TDS (conductivity), TSS, and Cl were measured throughout the study. Bacteria was measured throughout the first seven months, sand was measured once to investigate the rate of sand deposition along the road and at the boat launch, and VOC was sent out to Test America on three occasions. Total phosphate (TP) and total nitrogen (TN) were measured throughout but presented issues in terms of reliability. Total phosphate was measured regularly until it became clear that the results were questionable at which point periodic samples were sent out to Test America. Total nitrogen also resulted in some difficulties but was analyzed by the BERC lab throughout.

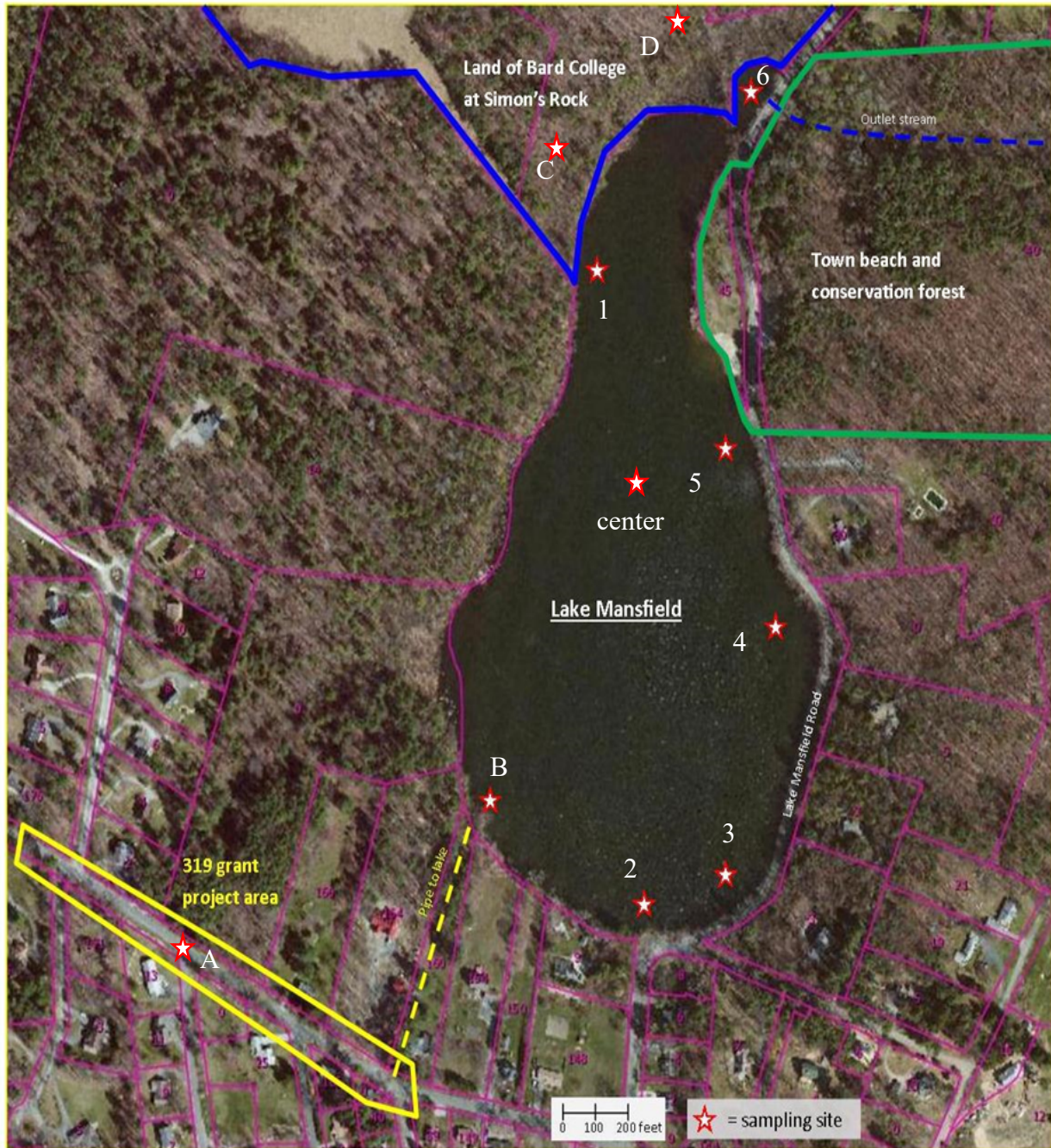


Figure 1. Map of Lake Mansfield with sample locations and the 319 project area. Adapted from MET FY15 proposal.

Table 1. List of Water Quality Parameters, Locations, and Sampling Frequency.

Parameter	Location	Frequency
Temperature	All sample sites	Monthly & Storm
pH	All sample sites	Monthly & Storm
DO	All sample sites	Monthly & Storm
Bacteria	All sample sites	Monthly & Storm
TDS	All sample sites	Monthly & Storm
TSS	All sample sites	Monthly & Storm
Cl	Lake only	Winter
TN	All sample sites	Monthly & Storm
TP	All sample sites	Monthly & Storm
VOC	Along road and 319 project	TBD
Sand	Along road	Once each summer

Temperature, pH, and DO

The average results for each sampling event for lake stations 1-6 and center indicate that the basic parameters of temperature, dissolved oxygen, and pH are all within expected ranges. There was a significant drop in DO from January into February and March in 2015, down to less than 3.0 ppm at several of the stations and less than 4.0 on average, sufficient enough to cause significant problems for fish (Fig 2). Correlated with the low DO is significantly lower pH readings relative to the rest of the year suggesting that the drop in DO is likely due to the breakdown of large amounts of organic material, consuming oxygen and producing organic acids. The thick ice and snow cover would inhibit photosynthesis causing plants to respire CO₂, contributing to the drop in DO and decreasing pH. A few dead fish were observed with ice out but there were reports from community members of larger numbers of dead fish with the 2014 ice out which was also a hard winter. Sampling in February and March 2016 indicate that the mild winter did not produce a similar profile as the ice came late, was relatively thin, and broke up frequently and early. In comparing these three parameters to an older study on Lake Mansfield by Baystate Environmental Consultants (Baystate) in 1990 (Table 2) it appears that the lake was relatively cool in 2015, increasing overall DO concentrations, while the pH has shifted upwards. The shift in temperature and DO is likely simple weather variation while the shift in pH, which was above 9.0 in May, June and July 2015 compared to a high in 1988-1989 of 8.1, is more interesting and may indicate an overall shift in the system.

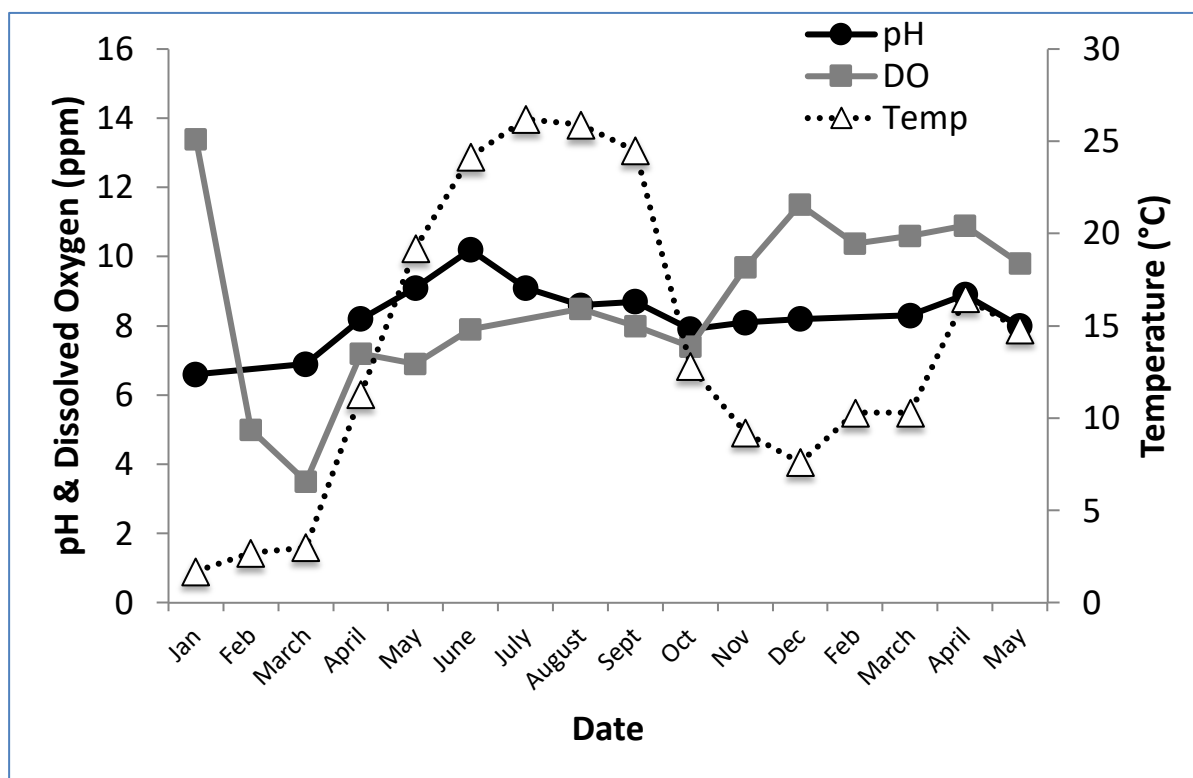


Figure 2. The pH, dissolved oxygen, and temperature over the course of the study from Jan 2015-May 2016.

Table 2. Summary of data reported by Baystate Environmental Consultants in 1990 and MET data. * Data for TSS does not include summer data points from either study.

parameter	1988-1989	2015-2016
Temperature C°	1.0-30.5	0.7-26.7
Dissolved oxygen (ppm)	3.1-10.5	1.5-14.9
pH	5.8-8.1	6.5-10.55
TSS (ppm)*	2-34 (\bar{x} = 14.0)	0-13 (\bar{x} = 3.0)
Conductivity (µs/cm)	36-550 (\bar{x} = 271)	389-753 (\bar{x} = 459)
Cl (ppm)	7.8-52.1 (\bar{x} = 24)	38.5-112.5 (\bar{x} =70.2)
TP (ppm)	0.03-0.28 (\bar{x} = 0.09)	ND-0.2 (\bar{x} = 0.12)
TN (ppm)	0.2-1.95 (\bar{x} = 0.76)	ND-1.2 (\bar{x} = 0.53)

TDS, TSS and Cl

Conductivity is used here as a surrogate for total dissolved solids (TDS). There is a loose relationship and generally multiplying $\mu\text{S}/\text{cm}$ by 0.5-0.7 equals ppm TDS. Cl plays a significant role in conductivity but can be measured independently. Both conductivity and Cl are consistent throughout the study within the lake and on average were well below the EPA secondary criteria for drinking water of 500 ppm TDS. The exception is the 319 culvert which is addressed separately and is considerably higher for both due to salt runoff (Fig. 3). Interestingly when compared to the 1990 report by Baystate it is clear that both conductivity and Cl levels have on average doubled or tripled in the lake (Table 2) which is of concern. Whether or not there is a connection between the shift in pH and the shift in these two parameters is uncertain.

TSS limits are not set by the EPA for general surface waters but are regulated under the NPDES permit system which is used here for reference. For wastewater treatment plants the limit is a monthly average of 30 ppm, with levels of less than 20 ppm considered “clear”. TSS readings in Lake Mansfield were routinely less than 3 ppm and were frequently between 0-2 ppm. Unfortunately the data for the summer of 2015, when TSS should rise, were misplaced but we will be monitoring TSS throughout summer 2016 and will update this report accordingly. The highest TSS recorded was 13 ppm in the center of the lake. The TSS results are very interesting when compared to the Baystate report. Looking at only those months for which both reports covered, TSS has dropped significantly from an average in 1988-89 of 14.0 ppm down to an average now of 3.0 ppm. This may be related to a shift in the plant community and the shift in pH but the exact cause is unclear.

Total nitrogen and total phosphate

Two of the parameters, total phosphate (TP) and total nitrogen (TN) were problematic but did yield some reliable information. We are reporting here on only those samples sent out to Test America due to issues with our in-house analysis. In Table 2 the range of both parameters are reported and they are consistent with levels reported by Baystate. What is not evident is that of the 37 samples analyzed for TP in 2015-16 only 7 resulted in positive results with the remainder being non-detect (ND), or only 19% positive. In 1988-89 there were a total of 40 samples for the same time period with 26 positive hits or 65%, strongly suggesting that loading of phosphate into the system has dropped. Similarly of the 10 samples analyzed for TN in 2015-16 all came back below 1.2 ppm which is consistent with background rates. More work needs to be done in this area and BERC will continue to attempt to resolve the issues surrounding reliability and will periodically send out samples to Test America throughout summer 2016.

Bacteria

Total coliform levels were monitored from January through August 2015 and showed a typical seasonal shift in abundance with low levels in the winter (1/100ml) and climbing in late summer until they exceeded 1000/100ml in June. Beginning in July TC counts steadily declined into August. Samples were sent out in early July for confirmation of TC and to determine EC counts

by Test America which are reported here in Table 3. These results are consistent with expected levels of bacteria in surface waters. Because our established protocol was for TC only and it was decided EC counts were important we stopped testing for TC and began looking at ways to test for both simultaneously. We are continuing the bacterial testing and begin the new protocol this summer.

Table 3. Total coliform and E. coli counts from July 2015.

Site	TC	EC
2	579.4	3.1
4	1119.9	3.1
B	980.4	44.8

VOC

A concerning issue has been two positive results for VOC in the culvert discharge (Site B). Once in August 2015 and then again in October we detected (outsourced to Test America) levels of VOCs. In between these two events a third sample was non-detect indicating they were unrelated events. The results are below in Table 4. A confounding factor in these results is the fact that Site B stopped actively flowing in August 2015 and has not been observed to be flowing since. What this might mean for the positive VOC results is unclear but it seems reasonable to assume that the positive results recorded from the stagnant pool at Site B are not indicative of the actual level of contamination. In other words, are the results artificially low because the main flow out of the 319 project is going somewhere else (see discussion below) or are the results artificially high due to the compounds becoming concentrated in the pool? We will continue to monitor Site B for VOC throughout summer 2016.

Table 4. Results of VOC analysis on four different dates at three sites.

Location	8/12/15	10/01/15	10/22/15	2/17/16
Site B – culvert discharge	Acetone – 3.3 µg/l MTBE – 1.1 µg/l	ND	Acetone – 16.0 µg/l Toulene – 2.1 µg/l	ND
Site 3	–	ND	–	–
Site 6	–	–	–	ND

Sand

The core sampling of the shorezone along the boat ramp and the road was unsuccessful due to the instability of the sediments. While there was some layering of sand and organics most cores disintegrated upon removal from the water due to the unconsolidated sand and gravel. Site B was also sampled and in that case there was little if any sand or gravel and the core was entirely mud

but did not exhibit any layering. This is noteworthy because historically Site B was a significant source of sand from the Castel Hill culvert system.

319 Culvert Project

“The 319 grant utilizes a combination of deep-sump catch basins (placed off-line from the main drain so they would not be flushed), and a large stormwater treatment unit to catch and separate out sediment and pollutants. The system should result in a 90% reduction in total suspended solids from reaching the lake (MET FY15 proposal)”.

Although this project was designed largely to quantify the impact of the 319 project on the lake water quality the significant reduction in flow out of the culvert system makes this difficult. Through August 2015 flow out of the culvert system at Site B was low but consistent and the water was quite clear with TSS recordings ranging from 0-5 ppm from Jan-April. The first record of no flow was in August 2015. TDS readings at Site B were quite high from December 2014 through March 2015 ranging from 1386-2875 ppm. The first readings of Cl at Site B were in March 2015 with levels of 670 ppm at Site A and 750 ppm at Site B. As of April 2015 the levels of Cl had dropped to only 50 ppm at Site A and 160 ppm at Site B. The drop in Cl continues more gradually until it hits a low in October 2015 with Site A reading 5 ppm and Site B reading 47.5 ppm. By December 2015 it had risen back up to 17 ppm at Site A and 297.7 at Site B but then drops back down to only 46 ppm at Site A and 128 ppm at Site B. The correlation between Cl and TDS and the distinct drop in levels are shown in Figure 3. The fact that flow has been reduced significantly combined with the declining Cl and TDS levels strongly suggests a blockage or partial collapse of the culvert drain has developed.

During August 2015 the first indication that there might be VOCs in the discharge became apparent when the sample from the site smelled strongly of “gasoline” upon opening in the lab. It was confirmed at that time that the site was no longer flowing and it has not been observed flowing since. As of May 2016 the channel leaving the stagnant pool has begun to grow plants and approximately 300’ up-slope of Site B a pool of water was observed in the middle of a community member’s lawn directly in line along the culvert drain system. The stagnant pool continues to hold water and does not appear to be filling in with sediment or becoming overgrown with weeds. The suspected blockage of the culvert drain confounds our interpretation of VOCs as noted above. However, the fact that there were two samples containing VOCs suggests that water in the culvert system needs to be monitored closely going forward.

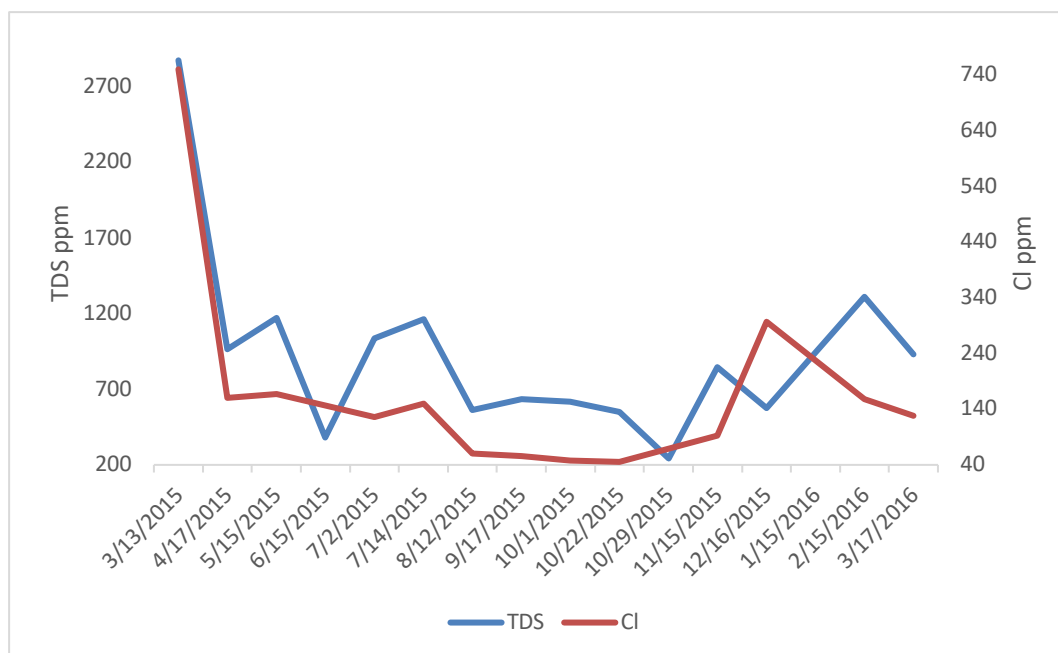


Figure 3. The relationship between TDS and Cl at Site B. The first record of Site B having no flow took place in August 2015. No flow through Site B has been recorded since suggesting that a collapse or partial filling of the 319 culvert system occurred in the spring of 2015. Low TDS and Cl levels from November 2015 to March 2015 may be due to a warm winter and or due to a lack of free flow through the culvert system to Site B.

Storm Events

Storm events do not appear to correlate with any changes in the system. The main effect of rain events appears to be causing some flow through the 319 culvert system as indicated by rising levels of Cl and TDS, not by observing flow. There was no discernable increase or decrease due to rain events with the system appearing to be quite stable. The forest samplers did not perform well, frequently filling with sediment or debris, sometimes not filling at all, and on two occasions being completely buried. We have been reconstructing those runoff traps and will be continuing to monitor them. At this time the little bit of data we were able to collect is fully consistent with the readings from the lake.

Final Observations

In addition to the possibly shifting system discussed above a significant blue green algae bloom was observed in July 2015, which seems inconsistent with the high number of ND levels for TP. However the one site that did have a positive reading for TP was Site 1 and the N:P ratio there was 6.3, indicating phosphate was no longer limiting in that area. It was also observed that there is a significant wetland along the shore bordering BCSR at Site 1 which is likely contributing the higher level of phosphate through natural decomposition of plant material.

Significant woody debris was observed blocking the outlet at Site 6 which clearly raises the water level in the lake. The installation of a draw down mechanism at Site 6 would help to control potential flooding of the road, help control weeds, and possibly help to reduce Cl levels in the lake by flushing the system each winter.

Trout stocking was observed on the lake in the Spring of 2016 and it is our opinion that such activity is inappropriate for such a relatively warm system and suspect that many of the fish stocked likely die adding nutrients to the pond. If fisheries enhancement is desired then a fisheries assessment of the existing fauna could be conducted including age class analysis and recommendations for enhancing the development of a robust sport fishery.

Finally, our observations of restricted flow out of the 319 culvert system combined with the positive results for VOCs and high levels of Cl suggest that some action needs to be taken to determine where the water is flowing and to monitor that flow to get a better sense of the impact of these pollutants.



November 5, 2020

To Whom It May Concern:

I am pleased to have this opportunity to write to the Great Barrington Community Preservation Committee in support of our application, project name: Lake Mansfield Water Quality Evaluation and Monitoring. On behalf of Bard College at Simon's Rock, I agree to provide lab space and staff support as described in the grant application.

The Lake Mansfield Water Quality Evaluation and Monitoring Project at Simon's Rock is part of a larger initiative at the College to develop our environmental sustainability programming.

I will administer any funds directed to the College in my role as Director of Finance and Administration, and Tom Coote, the Director of the Berkshire Environmental Research Center (BERC) and lead researcher on our campus for this project, will provide the support, management, and oversight of the project operations as detailed in the grant proposal.

I give the College's full endorsement of the grant application and would be happy to respond to any questions or concerns you may have.

Sincerely,

Philip B. Morrison
Director of Finance and Administration
pmorrison@simons-rock.edu
(413) 528-7204

Chris Rembold

From: Tate Coleman <tcoleman20@simons-rock.edu>
Sent: Friday, November 6, 2020 12:27 PM
To: Chris Rembold
Subject: Fwd: Letter of Support: Lake Mansfield Grant Application

Hi Chris,

Here's Bill's letter.

Best,
Tate

Begin forwarded message:

From: billm <billm@simons-rock.edu>
Subject: Re: Letter of Support: Lake Mansfield Grant Application
Date: November 6, 2020 at 12:25:38 PM EST
To: Tate Coleman <tcoleman20@simons-rock.edu>
Reply-To: billm@simons-rock.edu

To Whom It May Concern -

I have been lucky enough to live less than one mile from Lake Mansfield for the past twenty years. As a lifelong swimmer who enjoys partaking of that activity in the many lakes in this area in the warmer months, I have to say that I consider Lake Mansfield "my lake!" Although I am not in the lake every day, there have been periods when I have swum from the beach to the boat launch at least 5 times in a week. I am usually in by April and have done a 1/2 mile in November. I have swum the circumference more times than I can count, have been caught in the middle of weed mats, bummed into snapping turtles, and cut through mirror flat water in the fog.

As a member of the Great Barrington Parks Commission, I am also very involved with making the beach and its surroundings as welcoming as possible. The fact that we have taken Federal funds to improve the lake means that access is not restricted and the park is open to anyone. I personally love this about Lake Mansfield because access is restricted to many of the nicest lakes in our region. Over the years, I have seen the park and its offerings improve in many ways and usage numbers reflect this.

But in the end, it is the lake and the water that draws us to the park.

In 2019, I must admit I did not swim in Lake Mansfield very much because the water was too warm, turbid and the weeds made most routes impassable. At the time I talked to a number of people involved with town government or with maintaining the lake and expressed my concern. I even advocated for the purchase or lease of a weed machine that would collect the weeds mechanically. I was not optimistic about the future of our lake and the word eutrofication (sp?)

was often used by those who understood the process of a dying lake.

What a difference a year has made, though. This year, the water was incredibly clear with many days seeing 15 to 25 foot visibility. Beyond that, the weeds were limited to a few small areas and amazingly, I could swim around the perimeter of the lake through the summer. There were none of the traditional end of season mats of weeds that would drift around the lake and swimming to the boat launch was possible till October.

It really felt like the lake had taken a turn for the healthier this past summer and I hope we can do everything in our power to find the reason for this and try to do more to continue this trend.

If I can help this process in any other way, please let me know.

Thank you for your efforts -

Bill

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Eurasian milfoil and other weeds at Lake Mansfield



Lake Celebration and Cleanup Day, 2019



Students from Simon's Rock learning about Lake Mansfield (2015 –2016 water quality study)





GREAT BARRINGTON LAND CONSERVANCY
PO Box 987, GREAT BARRINGTON, MA 01230

Community Preservation Committee
34 Main Street
Great Barrington MA 01230

November 6, 2020

Dear Community Preservation Committee Members,

The Great Barrington Land Conservancy (GBLC) strongly supports the Town's application for construction grant funding for a three-year water quality monitoring program and a study of lake vegetation survey including invasive weeds in Lake Mansfield. The work will update previous water quality and vegetation studies of Lake Mansfield, and provide current data to guide future resource preservation work in the watershed.

GBLC is dedicated to conservation and stewardship of our community's natural resources and special places. We work to protect open space for ecological, recreational, agricultural, and scenic purposes. We organize community volunteers on behalf of land conservation and stewardship. We partner with local, regional, and national land trust organizations. We support sustainable agriculture as a means of preserving our farming heritage. We support neighborhood initiatives that align with our mission. Through our stewardship projects we engage the community in the understanding, appreciation, and care of our natural resource areas. Much of the work we do is supported through collaboration with other conservancy organizations and the town.

Through our project, Lake Mansfield Alliance, we have engaged the community in the care of Lake Mansfield since 2005 with the goal of preserving, protecting and enhancing Lake Mansfield as a vital habitat and community resource. We have supported the town in its efforts to accomplish water quality improvement projects. The Water Quality and Vegetation Studies will allow the town to demonstrate the success of recent storm water mitigation projects and will strengthen our ability to seek grants for the next improvement planning at Lake Mansfield.

We urge the Community Preservation Committee to support this request for funding as a vital step for the ecological improvements that the town is systematically accomplishing for our community in the preservation of Lake Mansfield.

Christine Ward, project director

A handwritten signature in black ink that reads "Christine B. Ward".

Janice Kabel, GBLC President

A handwritten signature in blue ink that reads "Janice Kabel".