ARTICLE 4L:

ARTICLE 4L: **- Marine & Environmental Affairs – Savery Pond Watershed Study**

RECOMMENDATION: Approval $28,977 (10-0-0) Unanimous

The Advisory & Finance Committee recommends Town Meeting approve this appropriation. This study will help evaluate causes and identify recommendations to improve water quality in the pond and its discharge into Ellisville Marsh and the ocean resulting from the toxic cyanobacteria blooms over the last few years. Funding will be from the Environalmental Affairs Fund. The study is $38,977 which will be reduced by a gift of $10,000 from the Savery Pond Association.

TOWN OF PLYMOUTH CAPITAL IMPROVEMENT PLAN REQUEST FORM
FY20 FALL ANNUAL TOWN MEETING REQUEST FORM

Department: Marine and Environmental Affairs		**5**
Project Title and Description: Savery Pond Watershed Study	**Total Project Cost:**	**$38,976.50**

Department/Division Head: David Gould

Cost estimate was developed: Internally ☐ Externally X

Basis of Estimated Costs (attach additional information if available)			**If project has impact on 5 Year Plan and future operating budgets, insert estimated amounts.**		
Capital:	**Cost**	**Comments**	**Fiscal Year:**	**Capital**	**O & M**
Planning and Design	**$28,976.50**		***FY20***		
Labor and Materials			***FY21***		
Administration			***FY22***		
Land Acquisition			***FY23***		
Equipment			***FY24***		
Other					
Contingency					
Total Capital	**$28,976.50**				

Possible sources and amounts of funding, if known: Environmental Affairs Fund and $10,000 from Savery Pond Association

Project Justification and Objective: Savery Pond has experienced several toxic cyanobacteria blooms in the past few years. This study will help evaluate causes and identify recommendations to improve water quality in the pond and its discharge into Ellisville Marsh and ocean.

Justification for Request at Fall Annual Town Meeting: With monies now available in the Environmental Affairs Fund it makes sense to begin the watershed study now in order to complete the work and identify and implement recommendations for water quality improvements rather than waiting unnecessarily.

For Capital Project Requests:
Will this project be phased over more than one fiscal year? If yes, enter it on the next 5 Year Plan Yes X No ☐
Can this project be phased over more than one fiscal year? Yes X No ☐

For Capital Equipment Requests:
☐ Check if equipment requested is replacement and enter the year, make & model, VIN and present condition of existing equipment

Attach additional information, estimates, or justification. Please see attached back-up materials.

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Scope of Work for Technical Services
Support of the Town of Plymouth Pond and Lake Stewardship

Project: **Savery Pond**
Water Quality Management Plan

Submitted by:

Brian L. Howes, Ph.D.
Ed Eichner, MS, MPA

Coastal Systems Program
School for Marine Science and Technology
University of Massachusetts Dartmouth

Overview: This Scope of Work is proposed to the Town of Plymouth for technical support and new data collection related to development of a water quality management plans for Savery Pond. Specifically, this Scope relates to follow-up on the Coastal Systems Program at the School for Marine Science and Technology, University of Massachusetts Dartmouth (CSP/SMAST) findings and associated recommendations during the preparation of the Plymouth Pond and Lake Atlas and the initial year of the Plymouth Pond and Lake Stewardship (PPALS) water quality snapshot during the 2014 summer.[1]

During the preparation of the Plymouth Pond and Lake Atlas, CSP/SMAST staff completed a brief overview of available past data collected by the Town and Association. Discussions with the Association and Town led to a preliminary strategy that would culminate with a pond management plan for the pond. The initial tasks to be completed for the management plan were: a) collect, review, and synthesize the available data within the two ponds, b) complete a watershed delineation and use existing land use and water information to develop initial water, nitrogen, and phosphorus budgets for each pond, and c) identify data gaps and recommendations for next steps. On a parallel track, the Town has also been assisting the homeowners and the Friends of Ellisville Marsh with data gap analysis, additional data collection, and expanded sampling through PPALS for Savery Pond. This effort has identified data gaps in sediment characteristics and nutrient

[1] Eichner, E.M., B.L. Howes, and S. Horvet. 2015. Town of Plymouth Pond and Lake Atlas. Town of Plymouth, Massachusetts. Coastal Systems Program, School for Marine Science and Technology, University of Massachusetts Dartmouth. New Bedford, MA. 138 pp.

contributions to the water column, watershed delineation, and development of nutrient budgets as initial tasks toward completion of a Savery Pond Management Plan.

PROJECT TASKS

In cooperation with the Town of Plymouth, the Herring Ponds Watershed Association (HPWA), Friends of Ellisville Marsh (FOEM) and other stakeholders around the ponds, Coastal Systems Program in the School for Marine Science and Technology, University of Massachusetts Dartmouth (CSP/SMAST) staff has been asked to develop water quality management plans for Great Herring Pond and Little Herring Pond. Development of the plans will include 1) gathering, organizing, and reviewing available historic data, 2) collection and incubation of sediment cores to quantify nutrient regeneration, 3) updating bathymetric maps with surveys of rooted plants, phytoplankton, and freshwater mussels, and 4) synthesis of all available data to review causes of impairments and assess management options to restore water quality. Final versions of the management plans will be developed through a series of public meetings and regular engagement of all stakeholders.

The overall project will be under the direction of Dr. Brian L. Howes, Manager of the Coastal Systems Program at SMAST-UMD. Day-to-day direction of tasks will be conducted by Ed Eichner. The University will serve as the prime contractor for this effort, although technical specialists with proven capabilities and experience within the region will be integrated into the project as required. CSP/SMAST staff will coordinate all tasks with the Town of Plymouth. Any amendments to the contract associated with this scope can be put in place by the designated Town of Plymouth Point of Contact, via an email to the UMD Office of Grants Administration (Michelle Plaud, mplaud@umassd.edu).

The project tasks are:

SAVERY POND

Task 1: Historic Data Review and Synthesis and preparation of QAPP for additional future sampling

CSP/SMAST staff with the assistance of Town of Plymouth staff will gather, review, and synthesize available historic data for Savery Pond and then prepare a Quality Assurance Project Plan (QAPP) for additional sampling to be completed in subsequent tasks. The QAPP will be submitted for MassDEP/EPA approval. Data review will include evaluation and comparison of data collection techniques and laboratory methods, as appropriate. CSP/SMAST staff will meet with HPWA and FOEM members to collect available data and review planned project activities.

Task 1 TOTAL Cost: $6,683.50
Deliverable: Spreadsheet with collected data (provided with respective management plans; synthesis/analysis also described in plans)

Task 2: Savery Pond Management Plan

Development of a management plan for Savery Pond will include collection of targeted data to address identified data gaps, synthesis of this data with historic data, and use of the subsequent

characterization of the pond ecosystem to develop management options and a recommended plan to restore pond water quality. The subtasks to complete the development of the management plan are described below.

Subtask 2a: Pond sediment assessment

CSP/SMAST staff will identify a minimum of 7 core locations in the pond. These locations will be based on underwater review of sediment characteristics and will likely be focused in the deepest portions of the pond and the inlet/outlets. GPS coordinates and depth will be collected for each location. Cores will be collected in April/May and preserved and incubated to evaluate phosphorus and nitrogen regeneration under a variety of oxidizing and reducing conditions according to procedures approved by the MassDEP. Accompanying water quality samples will be collected in three (3) runs, one each before, during and after the sediment core collection. These sampling runs will include collection of samples throughout the water column, dissolved oxygen and temperature profiles with readings collected every meter and Secchi clarity readings. Samples will be analyzed for standard freshwater pond constituents, including total phosphorus and total nitrogen, plus ortho-phosphorus and nitrogen component species (NH4, NO3+NO2, TDN, and PON). Data will be retrieved by CSP/SMAST staff in accordance with accepted quality control and quality assurance procedures. Volunteer boats for sampling and core collection and local incubation locations will be secured through coordination with the Town and FOEM members.

Subtask 2a Cost: COMPLETED
Deliverable: Nutrients released from sediments + water quality results (all described in Management Plan)

Subtask 2b: Aquatic Plant, Mussel, Bathymetric and Phytoplankton Surveys and WQ sampling

Working with the Town and FOEM members, CSP/SMAST staff will collect samples at 1 m increments throughout the water column over the deepest point monthly between May and October. At the same time, temperature and dissolved oxygen profiles and Secchi/clarity measurements will also be collected. Vertical phytoplankton tows will also be collected between June and September with samples quantitative analyzed for species count and biovolume. Water quality samples will be analyzed at the CSP/SMAST Analytical Facility for the following constituents: total phosphorus, total nitrogen, chlorophyll a, pheophytin a, pH, alkalinity, ortho-phosphate, and component nitrogen species.

CSP/SMAST staff will also deploy an autonomous underwater vehicle (AUV) or equivalent to develop density maps of freshwater mussels and submerged aquatic rooted plants and a bathymetric map. The AUV is GPS-enabled device that can follow a programmed path while collecting underwater video. Collected data will be assessed and analyzed by SMAST staff to produce maps of the mussel distribution and aquatic rooted plant coverages, as well as updating the 1970's-era bathymetric map.

Subtask 2b Cost: $11,900

Deliverable: Bathymetry, aquatic plant, and freshwater coverage maps; Water quality data results (all described in Management Plan)

Subtask 2c: Savery Outflow Measurement and WQ sampling

Savery Pond has an outflow structure that periodically has surface water outflow from the pond. Since surface outflows are usually the path of least resistance for water moving downgradient/downstream in this ecoregion, measurement of streamflow is an important consideration in the water and nutrient budgets for Savery Pond. However the intermittent nature means continuous monitoring will likely not result in reliable results. Working together, Town and CSP/SMAST staff will visit the outflow structure on at least a monthly basis for one hydroyear and collect flow readings and water quality samples if flow is occurring. Once flow begins, an autonomous recording stream gauge will be deployed to determine periods of flow-no flow and quantify flow readings between monthly staff visits. Collected water quality samples will be analyzed at the CSP/SMAST Analytical Facility for the following constituents: total phosphorus, total nitrogen, chlorophyll a, pheophytin a, pH, alkalinity, ortho-phosphate, and component nitrogen species.

Subtask 2c Cost: $3,658
Deliverable: Annual outflow estimate; Water quality data results (all described in Management Plan)

Subtask 2d: Savery Pond Management Plan

CSP/SMAST staff will develop a draft Savery Pond Management Plan. The draft will include a watershed delineation based on existing USGS groundwater modeling and use the delineation and the data collected through Task 1 and Subtasks 3a, 3b, and 3c to develop a preliminary water budget, nitrogen budget, and phosphorus budget. Development of the nitrogen and phosphorus budgets will include review and synthesis of land uses and estimation of nutrient sources within the watersheds using established techniques. These budgets will account for the balance between all nutrient and water inputs to the pond system and their outputs or removal from the pond system.

CSP/SMAST staff will use the developed budgets to evaluate various management alternatives to address water quality impairments in Savery Pond. Alternative management strategies to achieve for pond restoration will include both watershed and in-pond restoration approaches and estimated costs for the proposed strategies. The draft Management Plan will include a recommended set of strategies based on a review of the cost and efficacy of the alternatives.

Working with the Town and FOEM members, the draft Management Plan will be distributed among all stakeholders. The draft Plan will be publicly presented by CSP/SMAST staff at a mutually-convenient meeting with the Town and FOEM members. The Town will post the draft Plan and a meeting notice on the Town's pond website. A final Plan, including finalization of a recommended set of strategies, will be developed by CSP/SMAST working with the Town and the stakeholders. The final plan will be prepared after a one month comment period following the

draft report presentation. The draft and final Plans will be submitted to the Town in electronic versions for appropriate distribution.

Task 2d Cost: $16,735
Deliverable: Savery Pond Management Plan

Savery Pond
TOTAL Cost: $38,976.50

Listed costs are based on combined mobilization for all Tasks; separation of tasks will require slightly higher costs to account for multiple mobilizations.

Additional Management and Scientific Support

If the Town of Plymouth requires additional management and scientific support as its pond and lake management efforts proceed, any amendments including additions to the present contract can be put in place by the City of New Bedford through an email from Kim Tower, Town Point Of Contact (Plymouth-POC) to the UMD Office of Grants Administration (Michelle Plaud, mplaud@umassd.edu). The email needs to specify the additional work to be performed and the additional funds to be allocated.

Costs for additional support efforts will be negotiated through the UMD P.I. (Dr. B. Howes). The specific effort and cost will be prepared in writing by UMD, forwarded to Plymouth-POC for the Town's written approval and to be sent email to the UMD grants office (Michelle Plaud) as an amendment to the contract associated with this scope.

All technical support will be provided on a not-to-exceed basis. Depending on the nature of the request, Coastal Systems Scientists will summarize additional work completed in the form of a Technical Memorandum or a Project Report.