CONNECTICUT SEA GRANT PROJECT REPORT

Please complete this progress or final report form and return by the date indicated in the emailed progress report request from the Connecticut Sea Grant College Program. Fill in the requested information using your word processor (i.e., Microsoft Word), and e-mail the completed form to Nancy Balcom <u>nancy.balcom@uconn.edu</u>, Associate Director, Connecticut Sea Grant College Program. Do NOT mail or fax hard copies. Please try to address the specific sections below. If applicable, you can attach files of electronic publications when you return the form. If you have questions, please call Nancy Balcom at (860) 405-9107.

Please fill out all of the following that apply to your specific research or development project. Pay particular attention to goals, accomplishments, benefits, impacts and publications, where applicable.

Name of Submitter: Penny Vlahos

Date of Report submission: July 5, 2023

Project #: LISS19009 Check one: [] Progress Report x Final report

Duration (dates) of entire project, including extensions: From [01-Mar-2021] to [28-Feb-2023].

Project Title or Topic: Alkalinity in Long Island Sound Embayments (ALISE)

Principal Investigator(s) and Affiliation(s):

1. Penny Vlahos, Department of Marine Sciences, University of Connecticut

2. Michael Whitney, Department of Marine Sciences, University of Connecticut

A. <u>COLLABORATORS AND PARTNERS</u>: (List any additional organizations or partners involved in the project.)

NA

B. PROJECT GOALS AND OBJECTIVES:

This project was revised from the original scope due to funding constraints. Within are the revised components:

The goals are based on the following hypotheses: Hypotheses: H1. LIS alkalinity varies significantly across its embayments. H2. Organic matter contributes a measurable amount of alkalinity and is a substantial component of ALISE. H3. ALISE decreases with urban land use patterns such as percent impervious surface wastewater effluents and population density. H4. High intensity storm events reduce ALISE.

Remaining Specific Aims: 1) To measure the four key carbonate system parameters in LIS embayments (TA, pCO₂, pH and DIC) over representative months in 2021-2022. 2) To measure important supporting variables at these sites including dissolved oxygen (DO), total nitrogen (TN), (organic and inorganic (NH₄ ⁺, NO₃, NO₂ ⁻)), phosphate (PO4 ³⁻), silicate, and dissolved and particulate organic carbon (DOC/POC) over representative

months in 2021-2022. These will help isolate total carbonate alkalinity from TA. 4) To develop maps of ALISE and Ω by combining observations and simulation results and to identify areas that are resilient or vulnerable to changes in pH across regions through engagement of stakeholder groups across the LIS coastline. 5) To identify aragonite saturation rates at these embayments to determine the occurrence of low saturation periods that are a risk to shellfish.

Remaining Expected Outputs and Outcomes The ALISE project has several tangible outcomes that include: 1) A series of observation-based and simulation-based maps that illustrate TA and Δ TA (the degree of difference between high and low tide) in embayments to identify areas that are i) vulnerable to large changes ii) vulnerable to undersaturation of aragonite (Ω). 2) Measurements on the impact of all the carbonate variables and organic matter on TA that will be compiled in a database and shared with the public at large. 3) A ranking of LIS embayments for TA and Ω vulnerability and water quality priority 6) *An assessment of which two of the four carbonate parameters are best suited to characterize* embayments in LIS for future monitoring. 7) Best estimates of TA and Ω to be used in future biogeochemical models and a tested framework for linking observations with simulations. 8) One additional year of a CT and NY Shell Day data to both expand on public participation and education regarding this important issue. 10) One manuscript in peer reviewed journals.

- **C. LISS CCMP IMPLEMENTATION ACTIONS:** (List the top 3 primary CCMP Implementation Actions that this project addresses. LISS CCMP Implementation Actions can be found at https://longislandsoundstudy.net/2021/01/ccmp-implementation-actions-supplemental-documents/)
 - a. <u>Clean Waters and Healthy Watersheds</u>
 - b. Thriving Habitats and Abundant Wildlife
 - c. Sustainable and Resilient Communities
- **D.** <u>**PROGRESS:**</u> (Summarize progress relative to project goals and objectives. Highlight outstanding accomplishments, outreach and education efforts; describe problems encountered and explain any delays.)

This project has created a training opportunity for one graduate students i) Mary McGuiness who completed her MS in November 2022.

Monthly surveys were conducted at 4 tributaries with a break in December and January and until October 2022.

All samples collected have been analyzed. We have clear trends across the tributaries and their embayments. Mary presented her results during her Masters presentation in the fall.

E. <u>PROJECT PUBLICATIONS, PRODUCTS, PRESENTATIONS AND PATENTS</u>: (Include published materials with complete references, as well as those which have been submitted but not yet published and those in press. Please attach electronic versions of any journal articles, reports, and abstracts not previously provided.)

List of publications/presentations: *DG student lead author

Journal Articles (List URLs):

Conference Papers: NA

Proceedings or book chapters: NA

Web sites, Software, etc.:

Technical Reports/Other Publications: This report

Other Products (including popular articles): NA

Publications planned / in progress:

1. Planned publications: Alkalinity in Long Island Sound Embayments to be submitted to Estuaries and Coasts (planned for Fall 2023 submission with Mary as Lead author)

Patents: (List those awarded or pending as a result of this project.) NA

Presentations and Posters: (Include name and date of the conference or meeting, whether it was a talk or poster, if it was invited, and who the presenter was.)

McGuinness, M., Vlahos, P., Barrett, L. (March 2022). Alkalinity of Long Island Sound coastal embayments. ASLO/AGU Ocean Sciences Meeting 2022, Virtual. Oral Presentation

McGuinness, M., Vlahos, P., Barrett, L. (June 2022). Alkalinity of Long Island Sound coastal embayments. NACSETAC, June 2022. Oral Presentation

- **F.** <u>FUNDS LEVERAGED</u>: (If this Sea Grant funding facilitated the leveraging of additional funding for this or a related project, note the amount and source below.)
- **G.** <u>STUDENTS</u>: (Document the number and type of students supported by this project.) Note: "Supported" means supported by Sea Grant through financial or other means, such as Sea Grant federal, match, state and other leveraged funds. "<u>New"</u> students are those who have <u>not</u> worked on this project previously. "<u>Continuing</u>" students are those who have worked on this project previously. If a student volunteered time on this project, please use section G, below.

Total number of <u>new*</u> K-12 students who worked with you: 0 Total number of <u>new</u> undergraduates who worked with you: 2 Total number of <u>**new</u>** Masters degree candidates who worked with you: 2 Total number of <u>**new**</u> Ph.D. candidates who worked with you: 1</u>

Total number of <u>continuing**</u> K-12 students who worked with you: Total number of <u>continuing</u> undergraduates who worked with you: <u>(1) Rebha Raviraj</u> Total number of <u>continuing</u> Masters degree candidates who worked with you: (1) <u>Mary</u> <u>McGuinness</u>

Total number of continuing Ph.D. candidates who worked with you: (1) Lauren Barrett

Total number of volunteer hours:

(Note: *<u>New</u> students are those who have <u>not</u> worked on this project previously. **<u>Continuing</u> students are those who have worked on this project previously.)

In the case of graduate students, please list student names, degree pursued, and thesis or dissertation titles related to this project.

Student Name: <u>Mary McGuinness</u> Degree Sought: <u>MS</u> Thesis or Dissertation Title: <u>Alkalinity in Long Island Sound Embayments</u> Date of thesis <u>completion:</u> NA Expected date of graduation: <u>2022 (completed November 2022)</u>

H. VOLUNTEER HOURS:

(List the number of hours provided to the project by volunteers, i.e., individuals who were not compensated in any way or for whom involvement is not part of their paid occupation. This could be students or citizens. What was their contribution?)

- Graduate students (60 hours) year 1
- I. <u>PICTORIAL</u>: Please provide high resolution images/photos of personnel at work, in the field or laboratory, equipment being used, field sites, organism(s) of study. Attach images as separate files (do not embed). Include links to websites associated with the research project. Please include proper

photo credits and a caption with date, location, names of people, and activity. These images are useful to document your project in future CTSG publications, websites and presentations.

Figure 1: Lauren Barrett measuring continuous alkalinity on the Hydros FIA in LIS surface water

J. <u>HONORS AND AWARDS</u>: (List any honors or awards received during the reporting period, for anyone working on the project. This can be for best paper or poster, university awards, etc.) Specify: NA

a) Name of person or group receiving recognition: 1

- b) Name of award or honor: Best Platform presentation
- c) Group or individual bestowing the award or honor: NACSETAC
- d) What it was for: Mary McGuiness
- e) Date: June 2022
- K. <u>DATA MANAGEMENT PLANS:</u> Proposals funded in 2014-2016 and later cycles are required to have a data management plan in place. All environmental data and information collected and/or created must be made visible, accessible, and independently understandable to general users, free of charge or at minimal cost, in a timely manner (typically no later than two years after the data are collected or created). This is a reminder that your CTSG funded research data needs to be archived and accessible as outlined in the data management plan you submitted with your proposal. If there have been any modifications, adjustments or new information available regarding the location, timing, type, formatting and metadata standards, content, sharing, stewardship, archiving, accessibility, publication or security of the data produced please elaborate here.

No modifications