**Project Title:** Land-sea metabolic coupling in temperate eelgrass beds: The role of watershed connectivity and environmental gradients on carbon sequestration of seagrass meadows

**Fellow Name:** Elizabeth Elmstrom

**University:** University of Washington

**NOAA Award #:** NA20NOS4200121

**Award Period:** September 1, 2020 - August 31, 2023

**Reporting Period:** 03/01/2022 - 08/31/2022

**Workplan:** Download the current version of the Work Plan from [GitHub](https://github.com/eelmstrom/padilla_bay/blob/main/documents/Davidson%20Fellowship%20Work%20Plan_ElmstromMarch2021Updates.docx)

**Timeline:** Download the current version of the Timeline from [GitHub](https://github.com/eelmstrom/padilla_bay/blob/main/documents/Davidson%20Fellowship%20-%20timeline_ElmstromMarch2021Updates.xlsx)

### Accomplishments: March 1 – August 31st

**Research Accomplishments**

1. Tidying Padilla and Samish Bay metabolism database (data wrangling, R scripts)

This repository includes raw and corrected data (based on calibration equations), along with reproducible R scripts to be used for future data wrangling and sensor calibrations. The database continues to be updated as the project progresses. This includes updates to sensor calibration scripts (specifically during this time reporting period, updates to salinity calibration scripts), writing materials and individual site metabolism models (see below).

1. Estuarine ecosystem metabolism models (data cleaning, detiding, R scripts)

The analysis of oxygen data has made good progress. Oxygen data have been corrected and cleaned for time out of water. Oxygen data has also been “de-tided” using weighted linear regression methods, following Beck et al 2015. Ecosystem metabolism models for the May through June deployment have been run. R scripts for each of these steps are backed up to the GitHub repository. Next steps include finalizing the July through August deployment scripts, and statistical analysis of both spatial and temporal variation across both Samish and Padilla Bays.

1. Site comparison/Multivariate time series modeling (statistical analysis, R scripts)

Each time series of metabolic rates will be analyzed using the MARSS multivariate autoregressive state-space modeling framework. R scripts for these models are completed and are backed up to a GitHub repository. Preliminary results suggest that the metabolism time series do vary between sites. The data also suggest that a comparison of mean production, respiration, and net ecosystem metabolism across tidal cycles may provide interesting and novel information regarding spring and neap tides in the Padilla Bay subtidal zone. The spatial/temporal piece of the analysis will likely undergo updates as the project progresses.

**Engaging reserve sectors**

The de-tiding analysis and preliminary metabolism results were presented and discussed with the reserve mentor, S. Yang. During this feedback session, Elmstrom and Yang worked through the next steps of the analysis. A second scientific presentation to the research sector was roughly scheduled for winter or spring 2023.

**Professional Development**

Professional development trainings accomplished during this reporting period include the NOAA Facilitation Basics training. This training occurred in April and focused on the successful facilitation of virtual meetings.

Elmstrom also attended the Joint Aquatic Sciences Meeting in Grand Rapids, Michigan. Here she presented on her research, attended talks, and met with other Davidson fellows who attended the conference.

### Challenges / Delays

During this stage of the project, we have not experienced many challenges. Elmstrom continues to work with the dataset in preparation for a future manuscript.

### Budget

Remaining funds totaling $17,936 are allocated into the following categories:

* Graduate Student Stipend: $8,583
* Fringe Benefits: $1,828
* Travel: $544
* Materials and Supplies: $477
* Other: $6,504

During this period, the Fellow will conclude any remaining field sampling necessary, and complete the proposed modeling, statistical analysis, and associated writing.

**PERSONNEL**

A portion of the remaining funds will be used for three more months of Elmstrom’s stipend support (Winter 2023 quarter) estimated at $8,583 (at a stipend rate of $2861/mo).

**FRINGE BENEFITS**

A portion of the remaining funds will be used to support the apportioned value of fringe benefit based on the stipend request at a rate of 21.3% for University of Washington FY2023 – graduate students.

**TRAVEL**

A total of $544 of domestic travel funds will be allocated to support the Fellow’s travel. This includes vehicle travel with mileage reimbursed at $0.625 per mile for 870 miles (145/trip). This covers an estimate of 6 trips to complete field work, meetings, and lectures at the Padilla Bay NERR.

**SUPPLIES**

$477 will be allocated to support for field, laboratory, and computing work. This includes $265 to cover replacement sensor parts for 4 dissolved oxygen sensors, and $212 to cover misc. supplies.

**OTHER**

A portion of the remaining funds will be allocated to cover the cost of registration for the NERR Annual Meeting, located locally in Seattle at $600. Additionally, remaining funds will be used to support the Fellow’s tuition fees commensurate with the Fellow’s time which is for one academic quarter anticipated for AY 2022-23 (Winter) at a rate of $5,904.