Today's date: January 29, 2015

Project number: M/D-1303

Project title: Development of a macroalgal monitoring protocol with pilot study for the Great Bay Estuary, N.H.

Project initiation date: 5/27/2013

Project completion date: 1/31/2014

Principal investigator: David Burdick

Affiliation: UNH – Dept. of Natural Resources and the Environment

Accomplishments during 2/1/14 – 1/31/15:

The primary accomplishment of this project was the development of a long-term macroalgal monitoring protocol for Great Bay Estuary, NH. The knowledge gained from monitoring macroalgae in Great Bay Estuary over the long-term will show the natural variability of primary production in the estuary through time and space as well as gains and losses in biodiversity. Such data can then be interpreted to determine the impacts of climate change and species invasions on the estuary. Overall, our data corroborate the earlier results in suggesting that macroalgae is more prevalent in Great Bay now than it was thirty years ago. Macroalgal monitoring data may also be used as a bioindicator to assess the water quality benefits of actions taken to manage wastewater, storm water, and other nonpoint sources of pollution. Therefore, our accomplishment is expected to provide societal and environmental impacts in the future.

Impacts during 2/1/14 – 1/31/15:
Societal impacts of the project include the learning opportunities provided to: 1) volunteers from the community who assisted with random point sampling between August 26 and September 13, 2013, and 2) undergraduate students who assisted with random point sampling between August 26 and September 13, 2013 and/or transect sampling between July 24 and August 1 or September 20-21, and learning about monitoring, especially with community involvement, for the graduate student. Data validating the impact of these learning opportunities were not collected due to the fact that providing learning opportunities was a secondary objective of the project. Environmental benefits and additional societal benefits of this project are long-term and therefore have not yet been realized (see “Accomplishments.”).

Economic benefits realized during 2/1/14 – 1/31/15:
Project supported four temporary part-time employment positions:
1. $3200 supported a graduate student researcher to lead field data collection, train paid assistants and volunteers, conduct laboratory work, and perform data analysis and reporting tasks.
2. $600 supported a staff scientist at the UNH Jackson Estuarine Laboratory to serve as a licensed boat driver for select field sampling days.
3. $200 supported two undergraduate students to assist with field sampling in July and September 2014.

Tools, technologies or information services resulting from this project that were developed or used during 2/1/14 – 1/31/15 to improve ecosystem-based management:
A protocol for monitoring the abundance and types of macroalgae present in Great Bay Estuary was developed based on permanent transects. The transect-based macroalgal monitoring protocol developed in 2013 was implemented in 2014 with minor modifications under the direction of the Piscataqua Region Estuaries Partnership.

Related grants and contracts (Other grants and contracts that funded this research or that were obtained as a result of this research.):
1. The Piscataqua Region Estuaries Partnership (PREP) provided $500 to cover the costs of operating a boat through the UNH Jackson Estuarine Laboratory.
2. The William R. Spaulding Marine Program Endowment provided $500 to cover costs associated with field sampling supplies, a GPS unit and waterproof camera, and isotopic analysis of algae tissue samples.
3. The Martha and Theodore Frizzell Fund provided $1,000 to cover expenses associated with the graduate student researcher’s academic program.
4. A grant was written to and funded by The Piscataqua Region Estuaries Partnership (PREP) to continue macroalgal monitoring and develop methodology to compare surveys over different years. ($25,000 in funding)

Publications to date received by N.H. Sea Grant:

Theses/Dissertations:
As above

Other communications products (non peer-reviewed pubs, manuals, tech reports, videos, etc.):
The Piscataqua Region Estuaries Partnership featured the project in its November 2013 newsletter:
http://archive.constantcontact.com/fs186/1108194123690/archive/1111350390754.html

Presentations during 2/1/14 – 1/31/15, with published abstract citation if applicable:

Students Supported (see next page) All fields are required
## Students Supported *All fields are required*

<table>
<thead>
<tr>
<th>Student Name</th>
<th>Institution</th>
<th>Where is he/she now?</th>
<th>Dates of support</th>
<th>Type of degree: Undergrad Master’s PhD</th>
<th>Year degree awarded</th>
<th>Title of thesis (if supported by N.H. Sea Grant)</th>
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<tbody>
<tr>
<td>Elisabeth Cianciola</td>
<td>UNH</td>
<td>Charles River Watershed Association, Weston MA</td>
<td>6/13 to 8/13</td>
<td>MS</td>
<td>2014</td>
<td>Evaluation of macroalgae and options for macroalgal monitoring in Great Bay Estuary, N.H.</td>
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<td>Devan George</td>
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<td>UNH</td>
<td>6/13 to 8/13</td>
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<td>Jeannine Louro</td>
<td>UNH</td>
<td>Unknown</td>
<td>6/13 to 8/13</td>
<td>Undergrad</td>
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