**“Integrating Environmental Restoration with Computer Science in New York Harbor with New York City Public Schools” Billion Oyster Project Curriculum and Community Enterprise for Restoration Science (BOP-CCERS) STEM +C Phase III/ PI Lauren Birney**

As computing has become integral to the practice of science, technology, engineering and mathematics (STEM), the STEM + Computing program seeks to address emerging challenges in computational STEM areas through the applied integration of computational thinking and computing activities within STEM teaching and learning in early childhood education through high school (preK-12). This project is supported by the STEM+C program and advances its mission by integrating computational thinking, data literacy, and statistical concepts with a field- based STEM curriculum model for middle school students that focuses on science fields associated with habitat monitoring and restoration. This integration will be accomplished through: (1) Expansion and further development of Restoration Hubs in and near the water of New York harbor that support field science experiences; (2) Professional learning opportunities for teachers that feature integration of computational thinking with other STEM disciplines; (3) Development of curriculum units that promote learning of computer science and data science concepts and skills, and raise awareness of education pathways to careers in computing, data sciences, and habitat restoration sciences; and (4) A summer STEM Institute for computer science, digital media, environmental restoration sciences, and computing.

This project will augment a large-scale design and development project that is testing a model of community-based science education in an urban environment. The existing curriculum model focuses on key concepts in the geological, environmental, and biological sciences that are associated with monitoring environmental conditions and habitat restoration. This project will enhance the existing model by integrating data literacy, computational thinking and relevant statistical concepts and skills into the existing curriculum, enabling students to gain new skills and competencies associated with gathering and analyzing large amounts of field data associated with environmental monitoring and habitat restoration. Data to be analyzed range from basic water chemistry data to data associated with bacterial monitoring and environmental DNA sampling and analyses. The research associated with this project is guided by three hypotheses: (1) Teacher professional learning in data literacy, computer science, and STEM practices will positively influence student outcomes within their classrooms; (2) Teaching informed by teacher professional learning in data literacy, computer science, and science research practices, coupled with teacher and student engagement with scientists will positively influence student knowledge of computational thinking and perceptions of STEM fields and careers; and (3) The project's model of engagement, including problem-based learning, will enhance student awareness of and intent to pursue education pathways to STEM careers. A variety of measures will be used with teachers and students in treatment and comparison groups to test these hypotheses.

