

OFFICIAL ABSTRACT and CERTIFICATION

Marsh Restoration: Ribbed Mussels (*Geukensia demissa*) as a Revival Mechanism to Rebuild the Coastal Salt Marshes of Long Island, New York

Andrew Brinton

John F. Kennedy High School, Bellmore NY, United States of America

Hurricane severity and frequency have been exacerbated by 190 years of anthropogenic climate change. In 2012, Superstorm Sandy decimated Long Island, a 190-kilometer-long island in southeast New York, with up to 4 meters of saltwater inundation due to storm surge, resulting in the highest levels of destruction since the 1938 "Long Island Express". Sandy was the fifth most costly hurricane on record, after Katrina in 2005, and Harvey, Maria, and Irma in 2017.

Synthetic storm-surge barriers such as concrete-and-steel tidal gates are exorbitantly costly to construct, and decrease biodiversity by barring habitat expansion. Natural storm barriers, termed "living shorelines," have recently been suggested as an alternative, owing to their structurally resilient and regenerative properties. Coastal marshes, one type of natural barrier, are key to holding back storm surge; however, the contiguous United States lost coastal wetlands at 0.15 percent per year from 1998 through 2009, the final year for which the data were available.

This study investigated ribbed mussels (*Geukensia demissa*) as a potential regenerative component of living shorelines. Transects and environmental energetic measurements were applied to draw conclusions between mussel abundance and scarcity and coastline erosion in the waters off Freeport, Long Island. It was discerned that the current rate of marsh disintegration on Long Island is 6.5 to 20 times greater than the national rate, as last measured a decade ago, and certain Long Island regions are projected to lose all coastal wetlands by 2079.

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):

- ☐ human participants ☐ potentially hazardous biological agents
☐ vertebrate animals ☐ microorganisms ☐ rDNA ☐ tissue

2. I/we worked or used equipment in a regulated research institution or industrial setting: ☒ Yes ☐ No

3. This project is a continuation of previous research. ☐ Yes ☒ No

4. My display board includes non-published photographs/visual depictions of humans (other than myself): ☐ Yes ☒ No

5. This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only: ☒ Yes ☐ No

6. I/we hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work. ☒ Yes ☐ No

This stamp or embossed seal attests that this project is in compliance with all federal and state laws and regulations and that all appropriate reviews and approvals have been obtained including the final clearance by the Scientific Review Committee.

Category
Pick one only —
mark an "X" in box
at right

- ☐ Animal Sciences
☐ Behavioral & Social Sciences
☐ Biochemistry
☐ Biomedical & Health Sciences
☐ Biomedical Engineering
☐ Cellular & Molecular Biology
☐ Chemistry
☐ Computational Biology & Bioinformatics
☐ Earth & Environmental Sciences
☐ Embedded Systems
☐ Energy: Sustainable Materials and Design
☐ Engineering Mechanics
☐ Environmental Engineering
☐ Materials Science
☐ Mathematics
☐ Microbiology
☐ Physics & Astronomy
☐ Plant Sciences
☐ Robotics & Intelligent Machines
☐ Systems Software
☐ Translational Medical Sciences

