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NSF DRL 1839656
STEM + C PI Summit; Arlington Virginia
September 19, 2019



“Integrating Environmental Restoration with Computer Science in New York Harbor with New York City Public Schools” BOP CCERS Phase III

Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE



THE RIVER PROJECT



Department of Education



University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE



Manhattan, New York – New York Harbor 2019

STEM + C in New York City and New York Harbor





Teacher Training



Student Curriculum



Digital Platform



After School Program



Community Exhibits

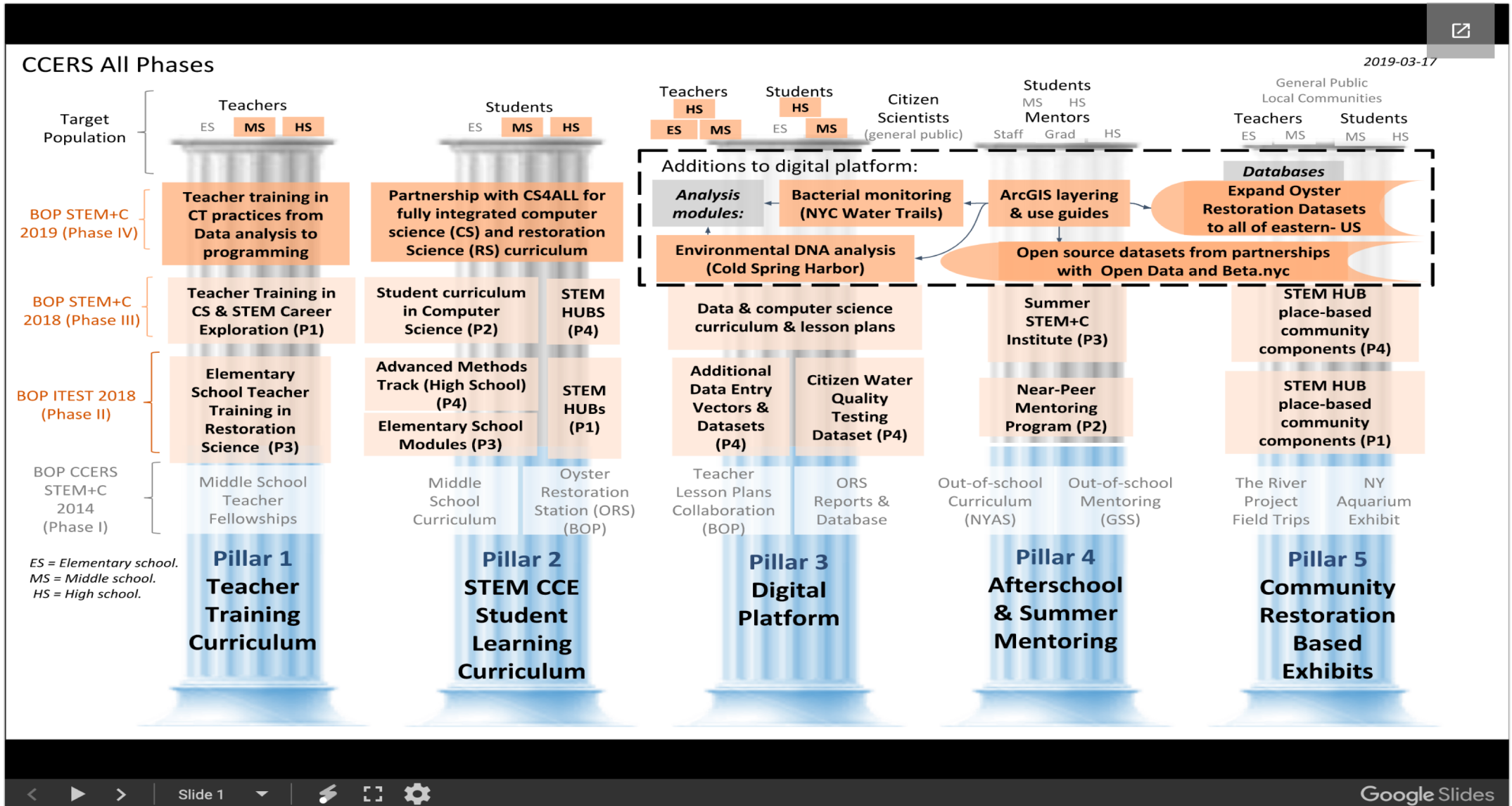


An Educational Model Incorporating Computational Thinking and Computer Science through Environmental Restoration with Student Field Research and Inquiry Learning

The Story of New York City Public School Students STEM + C Computation Thinking through Environmental Restoration Sciences



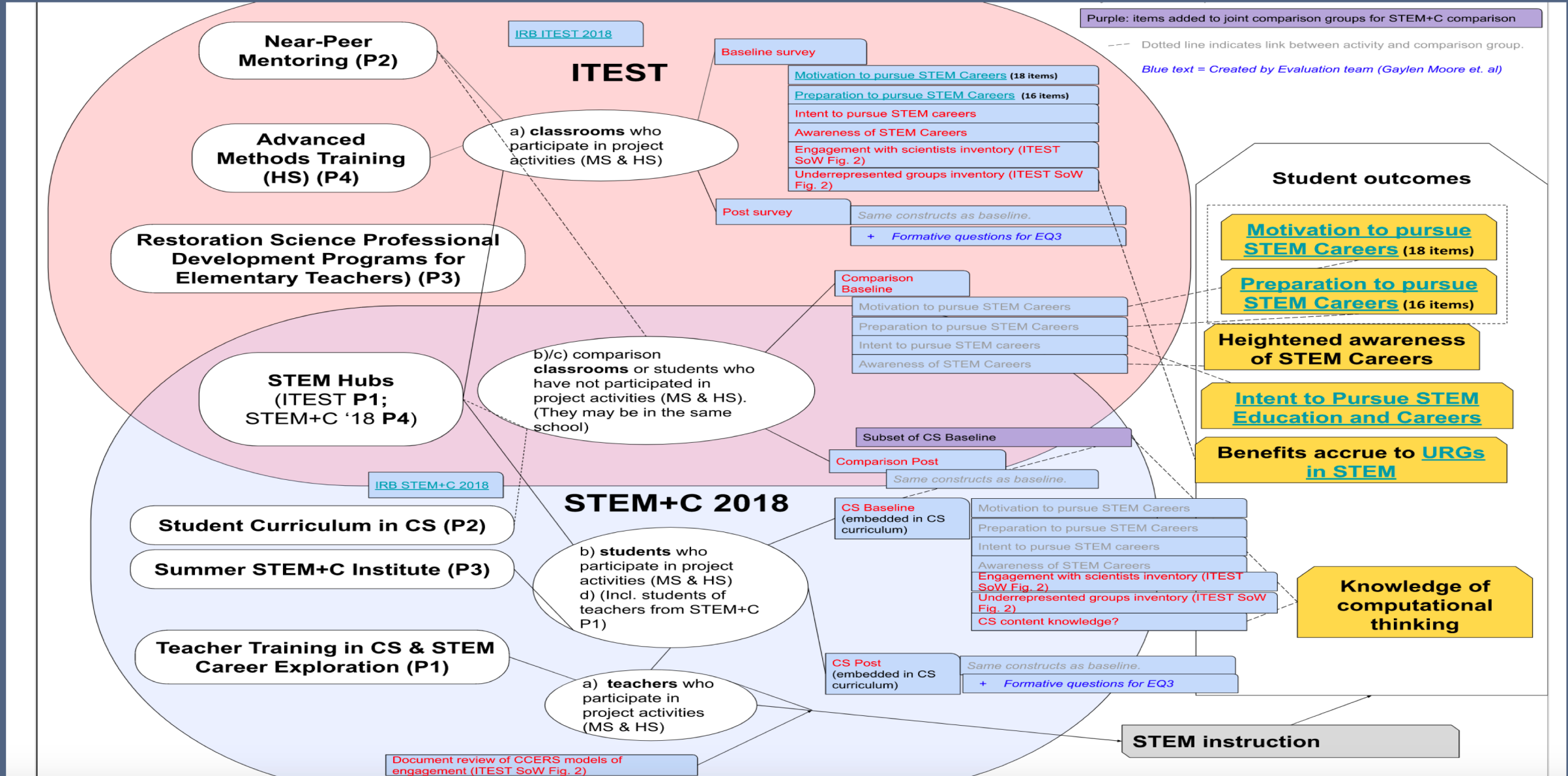
BOP CCERS Project Implementation Research and Design Framework



Environmental Science Teacher Trainings with Computer Science, Data Science and STEM Career Exploration Student Curriculum with Computer Science, Data Science and STEM Career Exploration, Pillar 3: Summer STEM Institute for Middle and High School Students at Pace University
Pillar 4: Community Based Restoration Science Hubs - "STEM Hubs"



BOP CCERS Phase II Research and Evaluation Plan



Pillar 1: Teacher Trainings with Computer Science, Data Science and STEM Career Exploration (NYCDOE, BOP, Pace University)



Pillar 1: Teacher Trainings with Computer Science, Data Science and STEM Career Exploration (NYCDOE, BOP, Pace) University



Pillar 2: Student Curriculum with Computer Science, Data Science and STEM Career Exploration



Pillar 2: Student Curriculum with Computer Science, Data Science and STEM Career Exploration



Pillar 3: Summer STEM Institute for Middle and High School Students at Pace University



The image shows a young man with short dark hair, wearing a grey hoodie and a name tag that says 'FILIPP', standing with his arms crossed next to a large science project display board. The board is titled 'HOW FAST DO OYSTERS FILTER? BY: HAILEY & FILIPP' and features three main sections: Introduction, Data Table, and Process. The Introduction section explains the purpose of the experiment, which is to see how quickly oysters can filter water in a tank over time. The Data Table section contains a table with columns for 'data', 'Turbidity before adding phytoplankton', and four time intervals: '1 hour after adding phytoplankton', '24 hours after adding phytoplankton', and '48 hours after adding phytoplankton'. The Process section lists five steps: 1. get a tank, 2. put some oysters in the tank, 3. put phytoplankton inside the tank with the oysters, 4. put a timer, and 5. keep track of the oysters. The young man is standing to the right of the board, and the background shows a bright, modern interior space.

HOW FAST DO OYSTERS FILTER? BY: HAILEY & FILIPP

Introduction

The purpose of this experiment is to see how quick or slow the oysters filter water in a certain amount of time. Our goal is to see how oysters filter water in a given amount of time and see what difference they can make in a tank. My overall question is how much can oysters filter in a given amount of time. The methods we are using are testing the tank at different times. For example turbidity after 1,3,24 and 48 hours

Data Table

| data | Turbidity before adding phytoplankton | 1 hour after adding phytoplankton | 24 hours after adding phytoplankton | 48 hours after adding phytoplankton |
|---------------|---------------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| June 4, 2018 | 35.2cm | 62.2cm | 59 cm | 74.3 cm |
| June 13, 2018 | 65cm | 61.2cm | 72.1cm | 67.1cm |
| June 14, 2018 | 61.2cm | 75.2cm | 55.2cm | 74.9cm |

Process

step1: get a tank
Step 2: put some oysters in the tank
Step 3: put phytoplankton inside the tank with the oysters
Step 4: put 1 hour timer
Step 5: keep track of the oysters

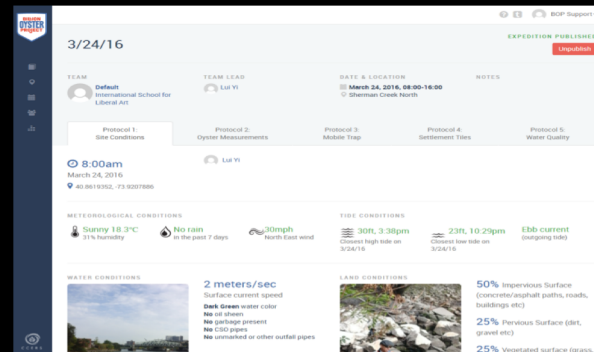
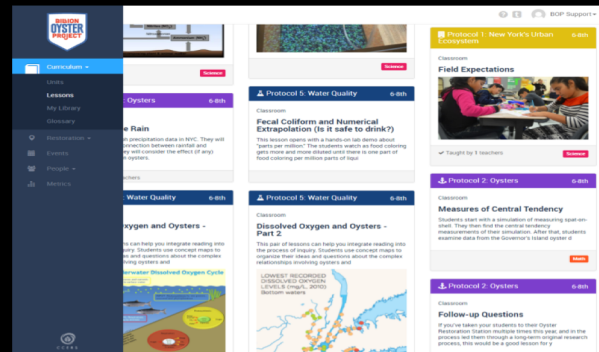
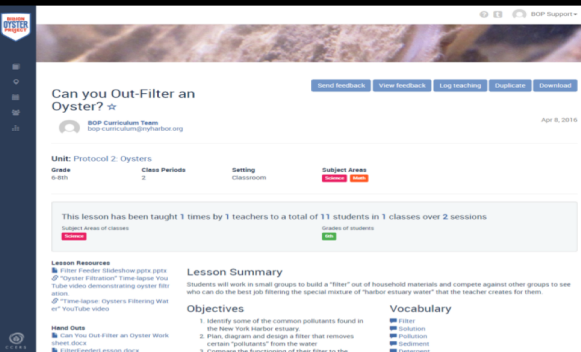
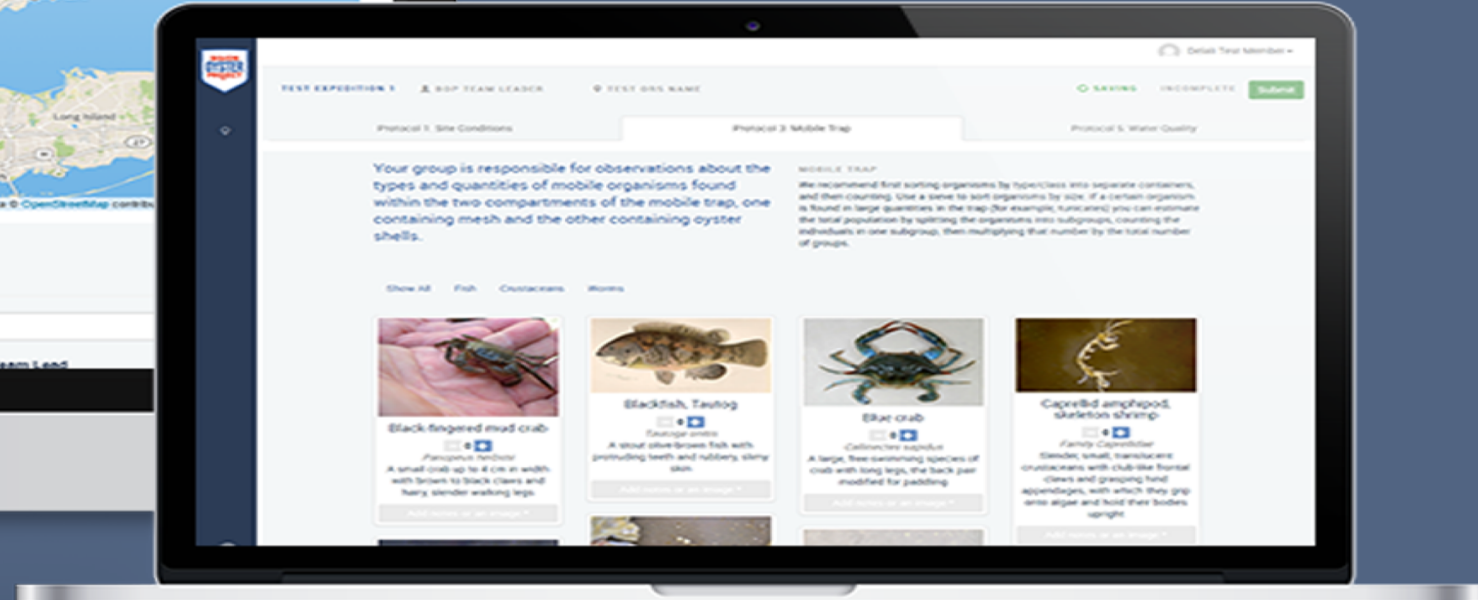
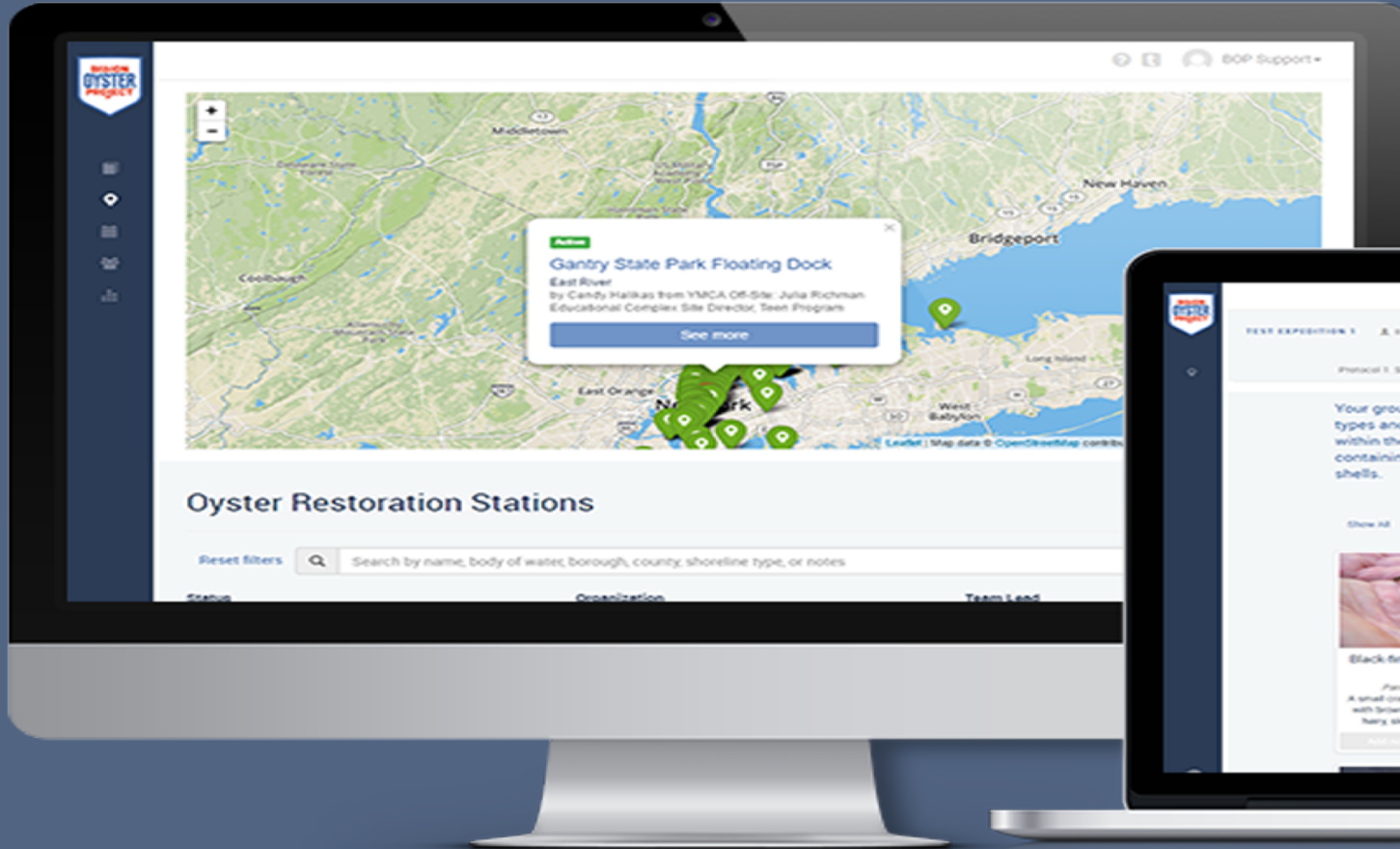
Conclusion

In conclusion, that oysters filter water in a certain amount of time in a tank. This is important now we can use this to see what was difference between test.

Pillar 3: Summer STEM Institute for Middle and High School Students at Pace University



Center Tech HUB The BOP CCERS Digital Platform



Pillar 4: Restoration Science Training Hubs in New York Harbor



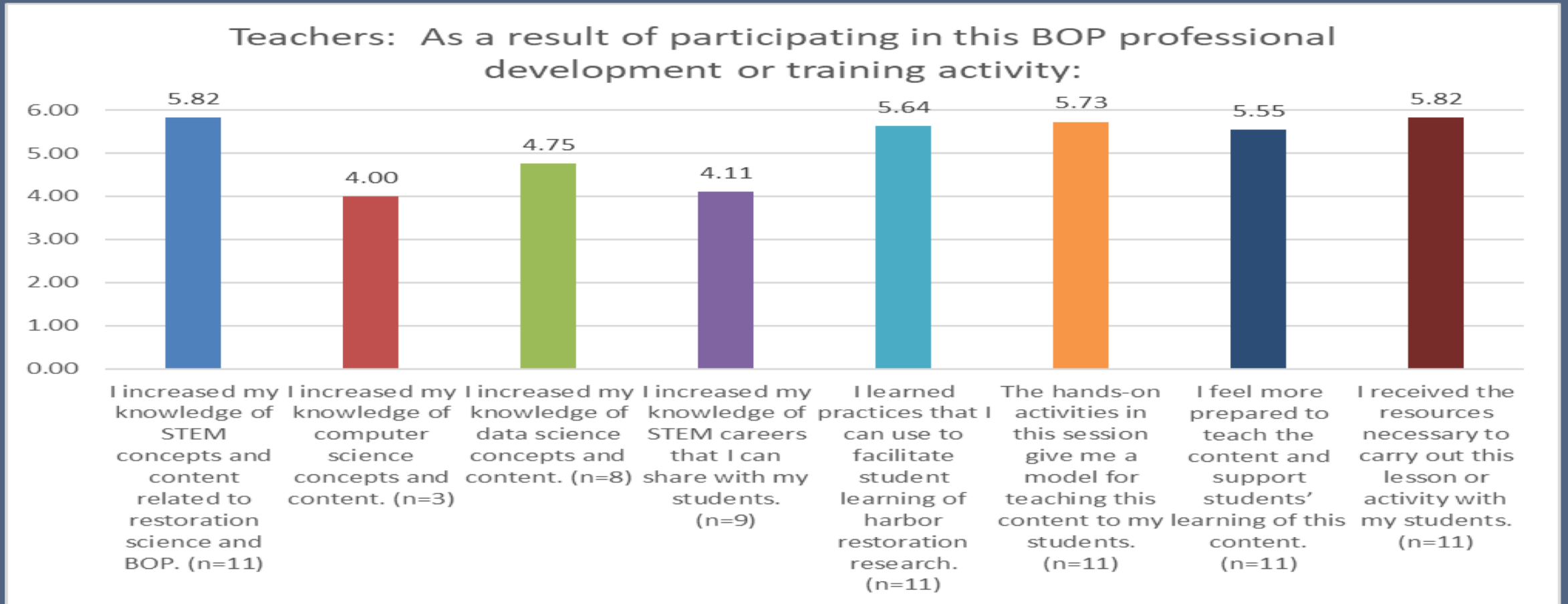
Ben Von Wong

Pillar 4: Restoration Science Training Hubs in New York Harbor

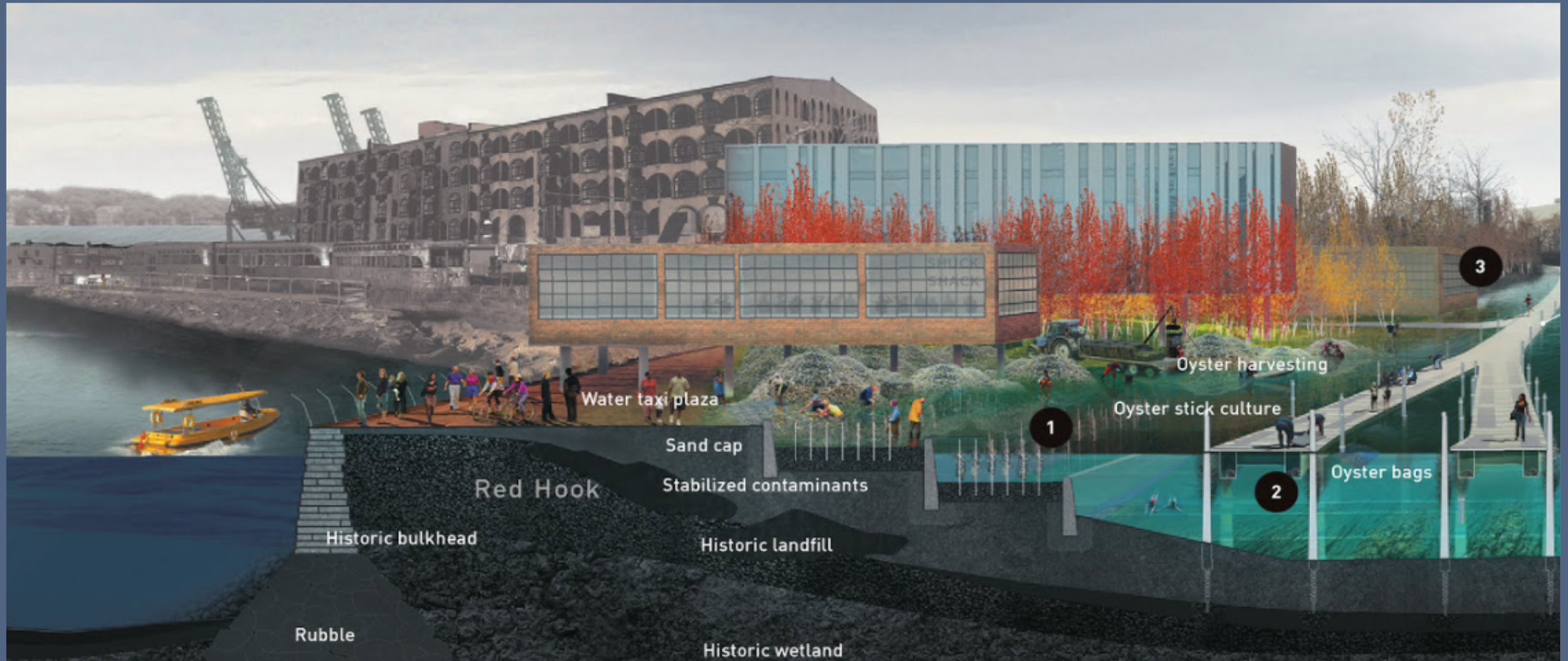


STEM+C OYSTER RESEARCH STATION (ORS) BASIC TRAINING

BOP STEM+C conducted Oyster Research Station (ORS) professional learning sessions on Governors Island for teachers, museum educators, citizen scientists and community volunteers to learn how to set up an oyster research station anywhere in the New York Harbor.



Potential STEM Learning Center and Oyster Park



Community Impact Factors New York City

DOE CEERS Engagement, 2015-2017

78 Public Middle Schools

5600 Students

118 Waterfront field locations

citizen scientist volunteers
110

127 Teachers

Digital platform

Partner schools Fellowship schools

Inquiry-based curriculum

Regular in person events

Student led research

Citizen science

Active Oyster Restoration Stations

168 environmental datasets collected by

Establishing a Project Footprint BOP CCERS Project Deliverables and Project Outcomes

Broadening Participation and Intellectual Merit

- Curriculum for Middle School Teachers
- Field Science Manual for New York Harbor
- Project White Paper
- Scholarly Publications and Articles
- Presentations, Symposia and Colloquia
- Videos and Film Productions
- Digital Monitoring Platform (Big Data)
- Permanent Displays and Exhibits at Institutions
- STEM Teacher Training Model Education
- STEM Mentoring Model
- Restoration Based Community Science Model
- Mobile Applications/Computer Science



Computational Thinking and Computer Science through Environmental Restoration Sciences



Current Impact I: Global and Community Partnerships; Citizen and Community Science through Computational Thinking and Environmental Restoration New York Harbor, New York



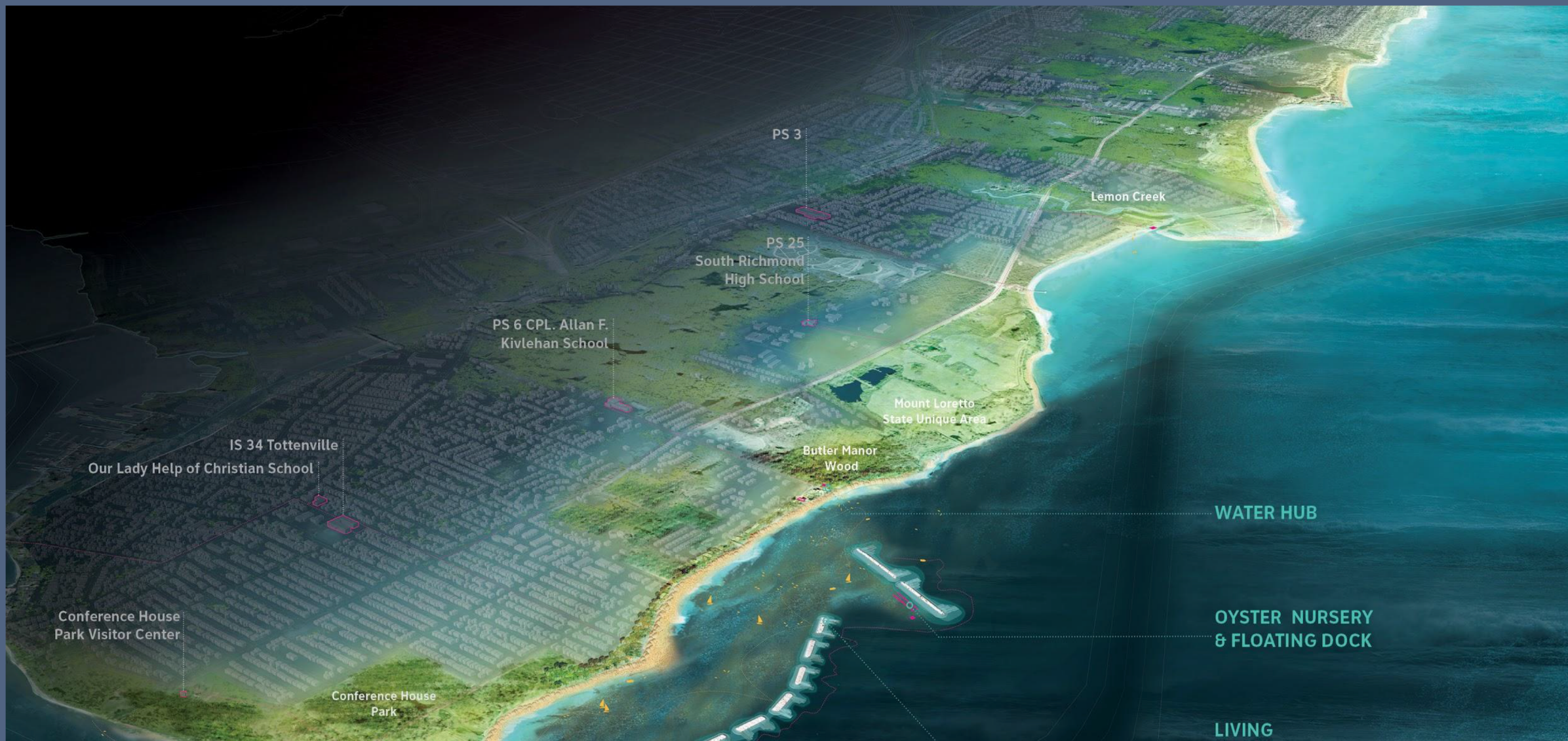
Current Impact II: Engaging The Community of New York City In Environmental Restoration Research Community Exhibit and Training Facility at The New York Aquarium



Current Impact III: STEM Career Technical Training and Preparation for New York City Public School Students



Living Breakwaters – Staten Island, New York



Computational Thinking through Computer Science through Environmental Restoration Science New York Harbor, New York



Future Impact I: New York Harbor Landscape New York Harbor 2022 (Design by Scape)



Future Impact II: The Living Breakwaters, Staten Island, New York 2024 (Designed by Scape)



Future Impact III: Partnerships CCERS Collaborative Research Model

The Collaborative Model

Intricate Details and Workings of our
Living Ecosystem;
Creating a Balance

- Communication between Partners (Monthly Meetings)
- Communication within each Pillar (Monthly Meetings)
- Permanent Project Impacts
- Sustainability of the Project
- Project Website and Logo
- Committed Project Personnel/Trainings/Team Building



STEM + C “Integrating Environmental Restoration with Computer Science in New York Harbor with New York City Public Schools” BOP CCERS Phase III



The STEM Collaboratory NYC®
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(Photo Credits; Scape, Pete Malinowski , BOP and Artistic Staff and Benjamin Von Wong)

