

# Mapping the Ecological Succession of Submerged Structures on the Little Egg Artificial Reef as a Proxy for Biological Community Development on Wind Turbine Bases



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## Introduction

Artificial reefs are a long-established technology for enhancing structure-related fisheries primarily for recreational fishers. However, a major limitation of this work is the accurate inventory of reef/site-attached fishes as well as pelagic schooling species. The goal of this project was to utilize acoustic and video observation techniques to document the ecological succession of newly submerged structures and provide a living timeline for biological faunal development on wind turbine bases and monopile structures in New Jersey.

## Methods

An integrated side scan sonar (SSS), multibeam echosounder (MBES), and direct observation approach via remotely operated vehicle (ROV) was used to document the study sites and the ecological succession of newly submerged structures in three locations: a bare ground control site, an established control site (1997), and the new reef site (2021) which contains a sunken 140' barge, a 52' crew boat, and a 45' tugboat to serve as a foundation for developing reef structures. The design of this project allowed for the close monitoring of the ecological succession of the sites over a two-year period (roughly 3, 6, 12- and 24-months post-sinking) while developing and testing the effectiveness of water column data collection methods using ROV.

## Results

High resolution MBES maps and 3-D models of the new reef areas and control sites have been produced so far. Initial faunal surveys have been completed and video analysis of ROV footage is ongoing.

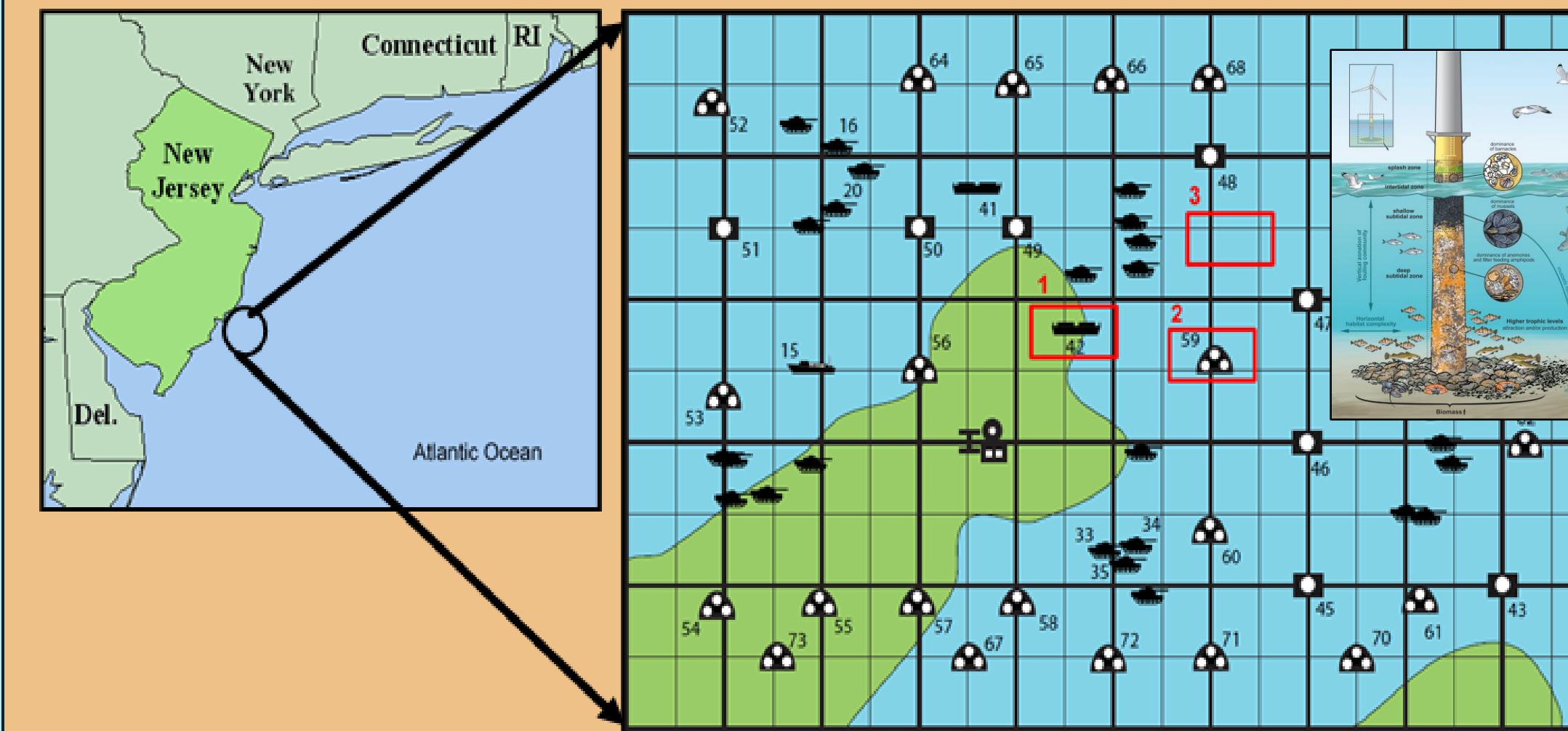
## Discussion

Currently, there are only five offshore wind turbines on Block Island and one in Virginia. All of these turbines, including those that are to come, are expected to develop biological communities. The results of this project will provide a baseline for comparison for both ongoing wind farm operations and once more offshore wind farms are constructed in NJ.

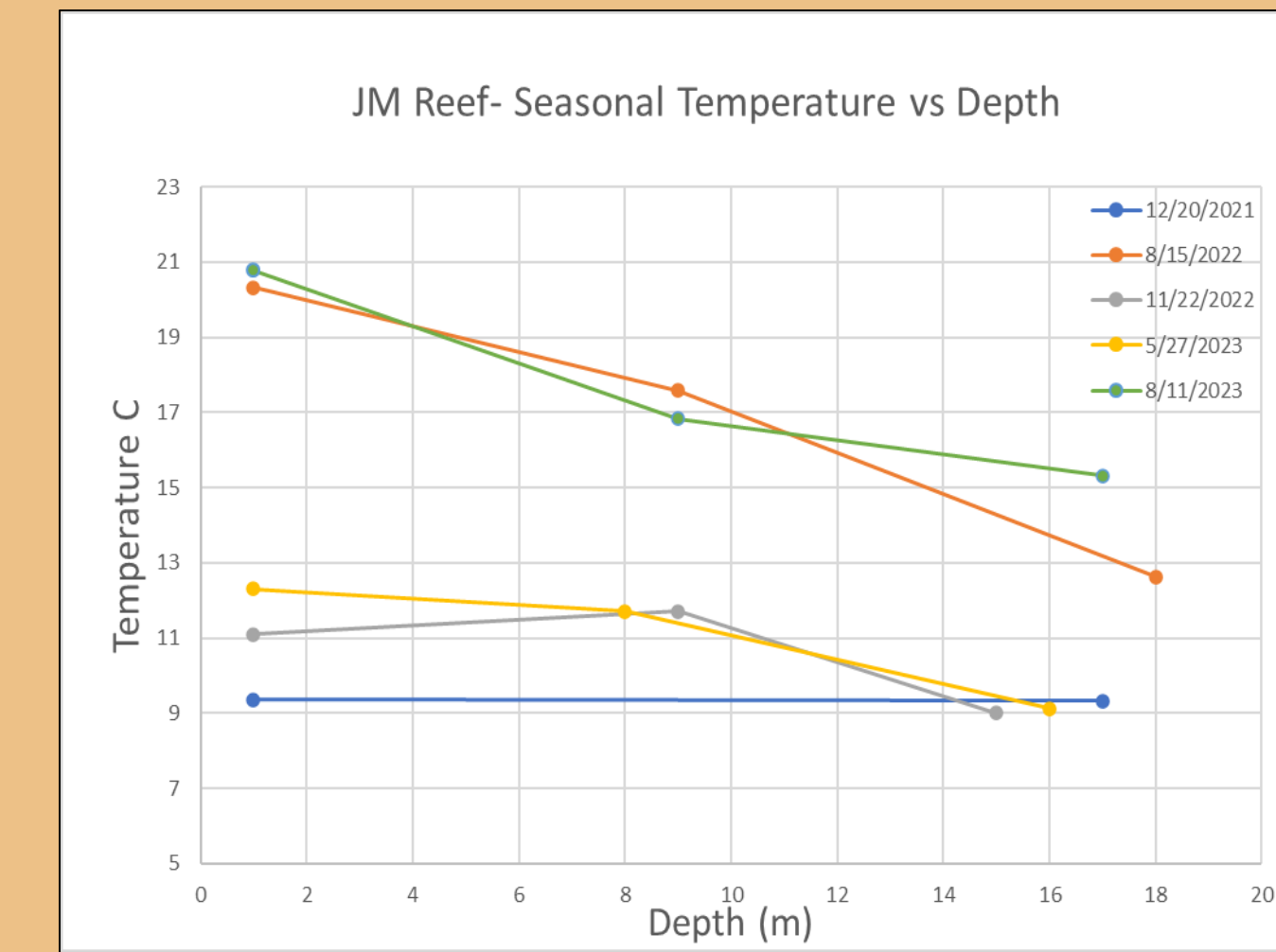
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**ACKNOWLEDGMENTS:** We would like to thank Stockton University and the NJEDA Wind Institute for funding this research along with the NJ Sea Grant, National Science Foundation, NOAA Coastal Zone Management Program, the Beach Haven Charter Fishermen Junior Mates, Atlantic Shores Offshore Wind and Orsted for funding parts of the project. We would also like to thank Dr. Mark Sullivan, Dr. Adam Aguiar, Dr. Tara Luke, Mr. Steven Evert, Mr. Nathan Robinson, Ms. Elizabeth Zimmermann, and Mr. Charles Renner for contributing to this study.

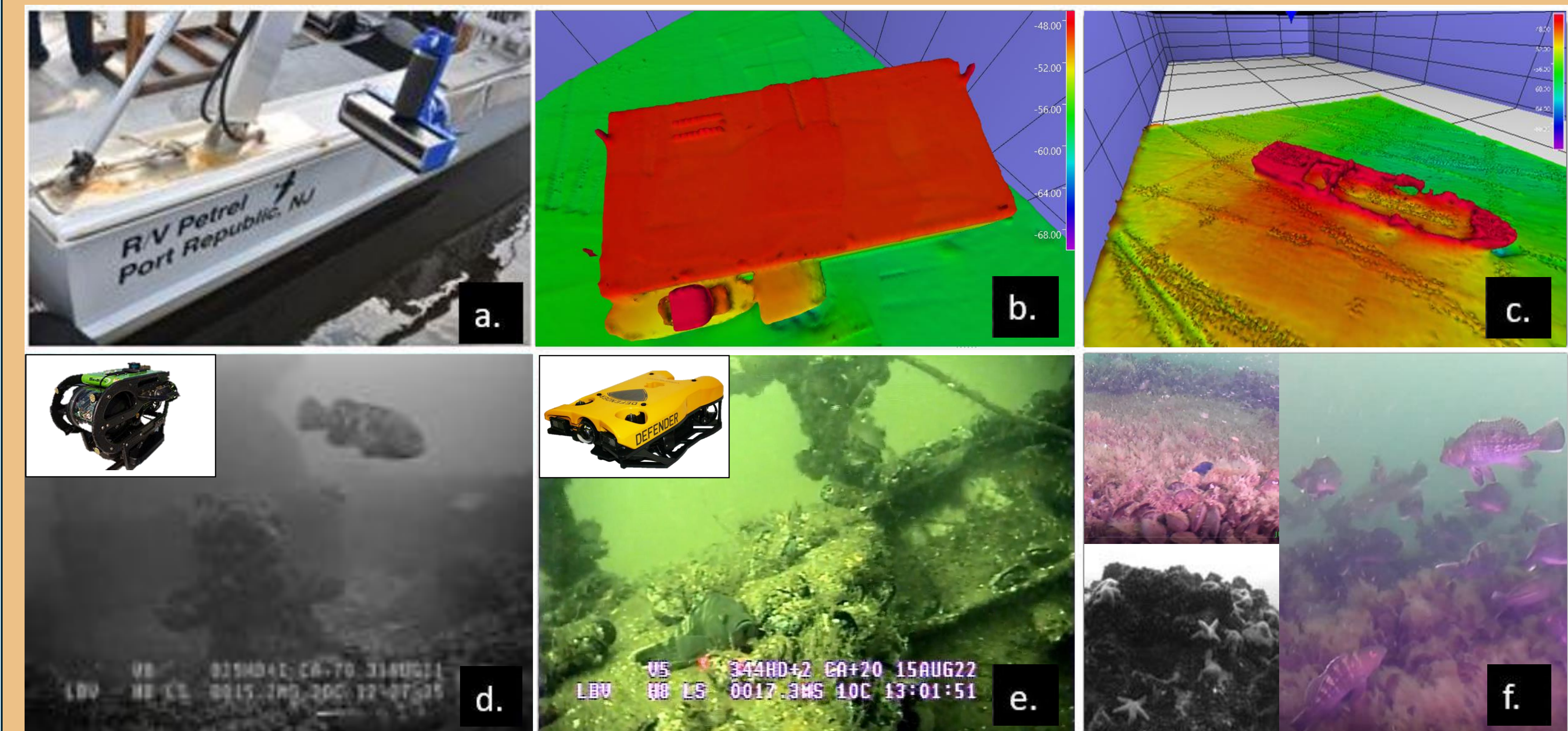
## Key Findings and Figures



**Figure 1.** Map of the Little Egg (LE) Reef study site with schematic of expected reef colonization on submerged structures.



**Figure 2.** Seasonal temperature regime at LE Reef study site.



**Figure 3.** (a) MBES aboard *R/V Petrel* (b) MBES image of sunken JM barge (c) MBES image of Jessie C crew boat (d) inspection-class ROV *Shearwater* video image of JM reef (e) new ROV *Defender* color video image of JM reef (f) ROV video images of fish and invertebrates observed on developing reefs.

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