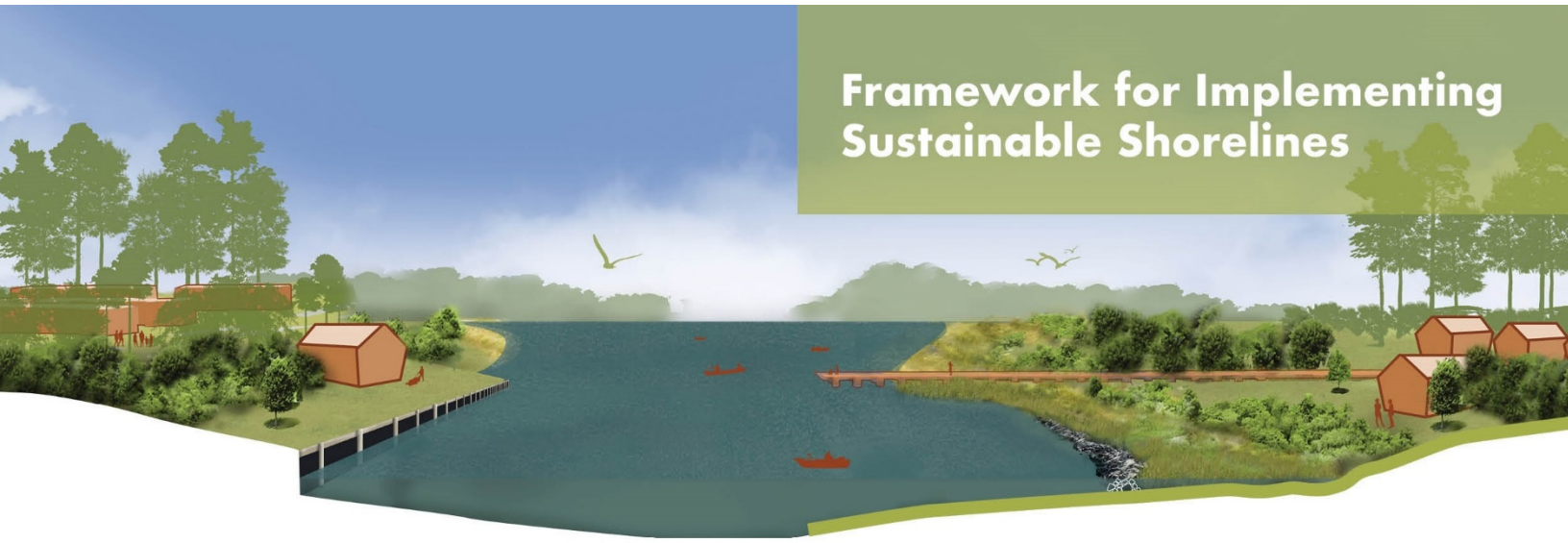

Summary of Natural Science Investigations:

Ecological Synthesis

Project Activity: Ecological Synthesis

Objective: Comparatively evaluate ecological metrics within living shorelines and reference marshes along a continuum of shorescape settings.

Methods: Ecological metrics were derived from field surveys of soils, plants, invertebrates, nekton, herons, and diamondback terrapin (Table 1). Site-level values of each metric were compared using a *Z*-score approach to assess the magnitude of the difference between a living shoreline and its paired reference marsh relative to the variation either within or among the pairs. Scores were considered substantially different if the *Z*-score exceeded ± 1. Overall scores (pair-level averages across all metrics) were compared to the age (time since construction) of the living shoreline to assess how long it takes for a living shoreline to achieve functional equivalence.

Progress to date: A preprint (https://doi.org/10.1101/2021.04.06.438648) detailing the findings is under peer review in the journal PeerJ. All data, documentation, and the manuscript are accessible at https://osf.io/7vzdp/.

Findings: Across nearly all metrics assessed in this study, living shorelines were not functionally different from natural fringing marshes by two years post-construction (Figure 1). Nekton, invertebrates, plants, herons, and terrapin all occurred in living shorelines at levels similar to or greater than their natural fringing marsh counterparts. Only the soils in living shorelines received consistently lower scores than their natural marsh counterparts, but even soil composition is expected to achieve equivalence over time. These findings provide encouraging support that living shorelines are capable of providing the same ecosystem services that natural fringing marshes have provided historically. Living shorelines, specifically marsh sills, incorporate an engineered structure to reduce erosion and provide longer-term stability of the front edge of the marsh. This long-term stability coupled with net functional equivalence to natural fringing marshes suggests that living shorelines should be able to contribute to increased ecological resilience of a shorescape (defined here as the aquatic-terrestrial ecotone along a reach of shoreline, akin to landscape and seascape) to sea level rise. Further, we were unable to detect a difference in functional equivalence across the range of living shoreline ages (2 – 16 years) within our study. This may indicate that setting (the area surrounding the living shoreline) and design of the living shoreline are more import than age in determining the ecological functionality of a living shoreline project.

Visuals:

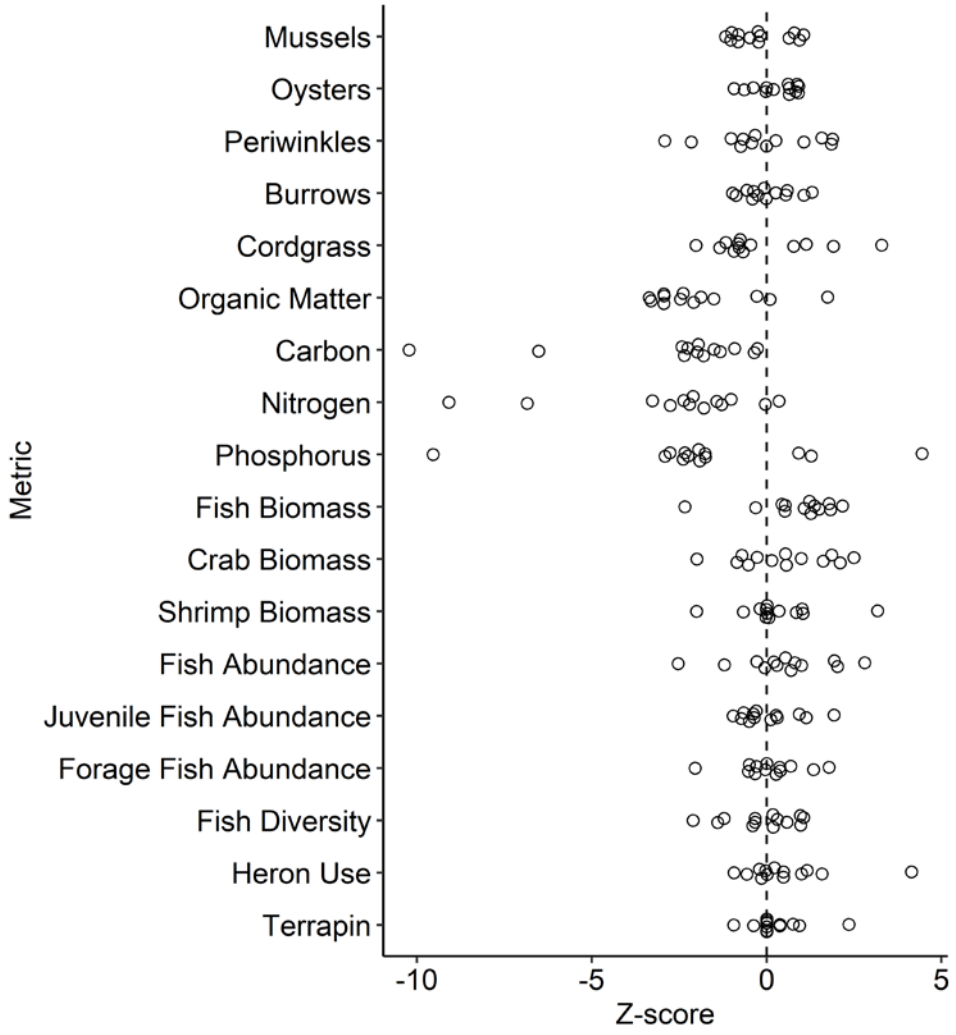

Figure 1 – *Z*-scores for ecological metrics. Most *Z*-scores are tightly clustered around zero (dashed vertical line) except for the soils, which display a generally negative grouping.

Figure 2 – Diamondback terrapin basking at a living shoreline. Two diamondback terrapin (circled) can be seen basking on the rock sill of the living shoreline.