



The Biodiversity of Invertebrates in the Beach Wrack of Oyster Bay and the Long Island Sound Beaches

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References

ABSTRACT

Beach wrack, the seaweed and organic material that washes up along shorelines, provides an important habitat for many insect species that help break down organic matter in coastal ecosystems. This study compared the insect communities found in beach wrack at two locations, Beekman Beach in Oyster Bay and Ransom Beach on the Long Island Sound. We hypothesized that the types and numbers of invertebrates would differ between the two beaches because of variations in wave action, beach exposure, and wrack composition. To test this hypothesis, invertebrates were collected from wrack samples at both beaches using nets. The samples were sorted, photographed, and analyzed through DNA extraction and sequencing to identify species and calculate biodiversity levels. Results showed that each beach contained one dominant species, causing the biodiversity of both beaches to be relatively similar despite environmental differences. These findings suggest that dominant invertebrate species may play a major role in shaping beach wrack ecosystems and maintaining similar biodiversity levels across different shoreline environments.

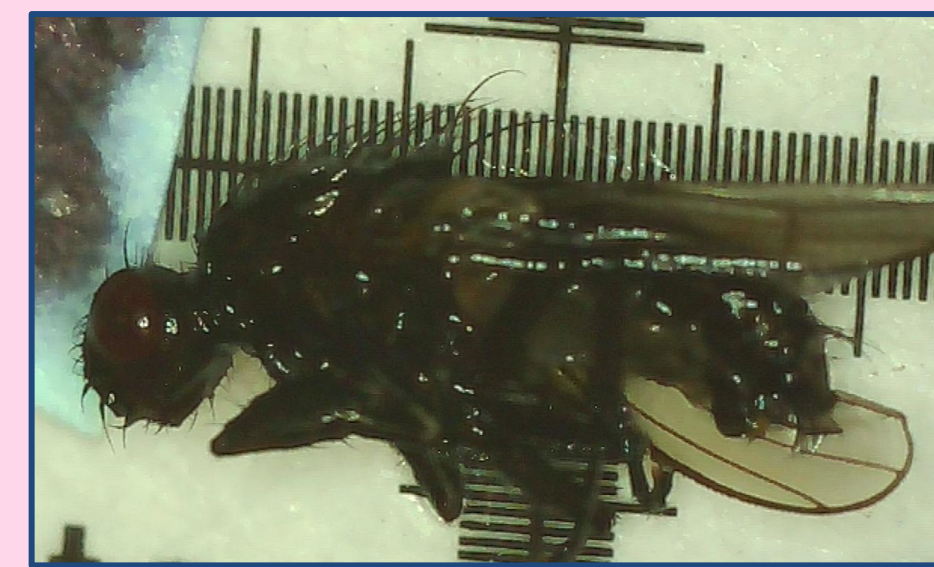


Figure 1 - *Fucellia tergina*
Shore Fly



Figure 2 - *Platorchestia* sp.
Sand flea

Dominant species at Ransom Beach

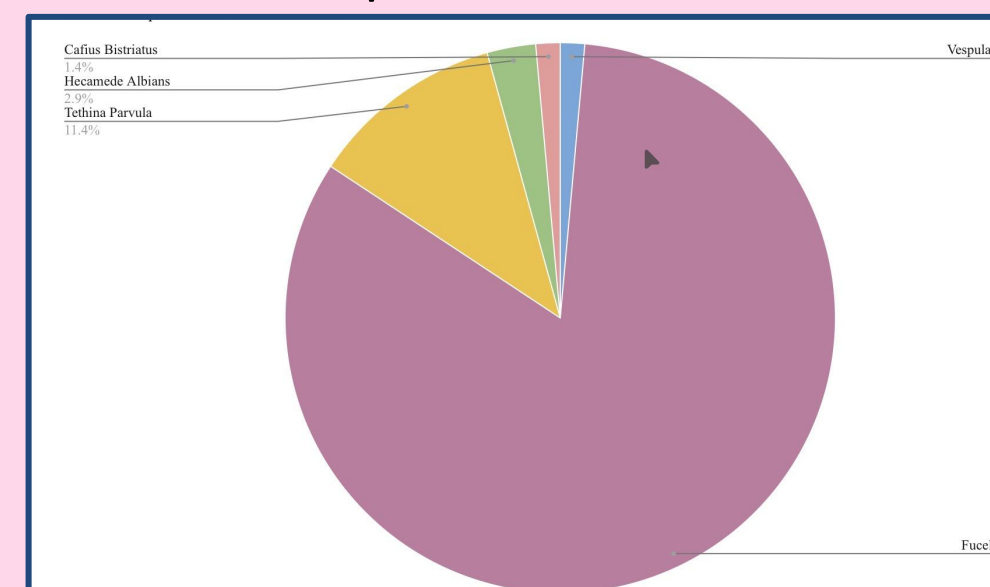


Figure 3 - Percent Abundance of Species at Ransom Beach

Dominant species at Beekman Beach

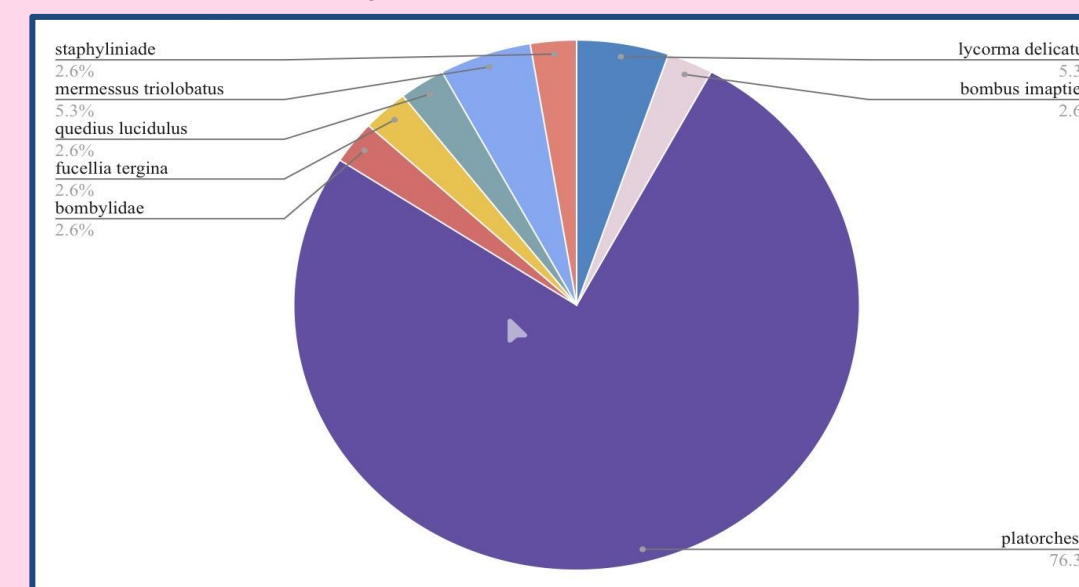


Figure 4 - Percent Abundance of Species at Beekman Beach

RESULTS

Seventy samples were collected from Ransom Beach (Long Island Sound) and thirty-eight from Beekman Beach (Oyster Bay). Five samples from Ransom were sequenced as well as eight samples from Beekman. From Ransom Beach, one specimen is *Vespa Germanica*, fifty-eight of the specimens are *Fucellia tergina* (Figure 1), eight of the specimens are *Tethina parvula*, two of the specimens are *Hecamede albians* and one of the specimens is *Cafius bistrictus*. From Beekman Beach, two of the specimens were *Lycorma delicatula*, one of the specimens is *Bombus impatiens*, twenty-nine of the specimens are *Platorchestia* (Figure 2), one of the specimens is *Bombyliidae*, one of the specimens is *Fucellia tergina*, one of the specimens is *Quedius lucidulus*, two of the specimens are *Mermessus trilobatus* and one of the specimens is *Staphylinidae*. From this information we calculated the biodiversity index and found Ransom Beach to be .413 and Beekman Beach to be .409

INTRODUCTION

Beach wrack is an important part of the ecosystem because it provides food and shelter for animals, helps beach plants grow, and builds natural barriers that protect the coast from storms and erosion. In our project, we studied beach wrack in two local areas: Oyster Bay and the Long Island Sound. Oyster Bay is smaller and more protected, with a mix of saltwater and freshwater that creates nutrient-rich habitats for many types of organisms. The Long Island Sound is bigger, deeper, and connected to the Atlantic Ocean, with stronger tides and currents that support different types of invertebrates. The salinity in the eastern Long Island Sound is about 35 parts per thousand, while Oyster Bay's salinity is lower, between 19.8 and 26.1 PPT. These differences in water movement, salt levels, and nutrients affect which insect species live in each area.

DISCUSSION

Our results show that there is almost equal biodiversity in both places. We hypothesized that the types and numbers of invertebrates will vary between both beaches, and we ultimately found that to be true. At both beaches we found a species that dominated which led to the biodiversity of each being relatively identical. At Ransom Beach, the community was dominated by *Fucellia tergina* (Figure 1), which accounted for fifty-eight out of seventy specimens collected. The high abundance of a single species likely lowered the overall biodiversity index because biodiversity depends not only on the number of species present, but also on how evenly individuals are distributed among those species. Similarly, Beekman Beach was heavily dominated by *Platorchestia* (Figure 2), which made up twenty-nine out of thirty-eight specimens. There were also several limitations to this investigation. Only a small portion of the collected specimens were sequenced, meaning some organisms may have been misidentified or unidentified. Seasonal variation and weather conditions at the time of collection may also have influenced which organisms were present. Future studies could improve accuracy by collecting larger sample sizes, sequencing more specimens, and sampling across multiple seasons to better understand changes in biodiversity over time.

ACKNOWLEDGMENTS

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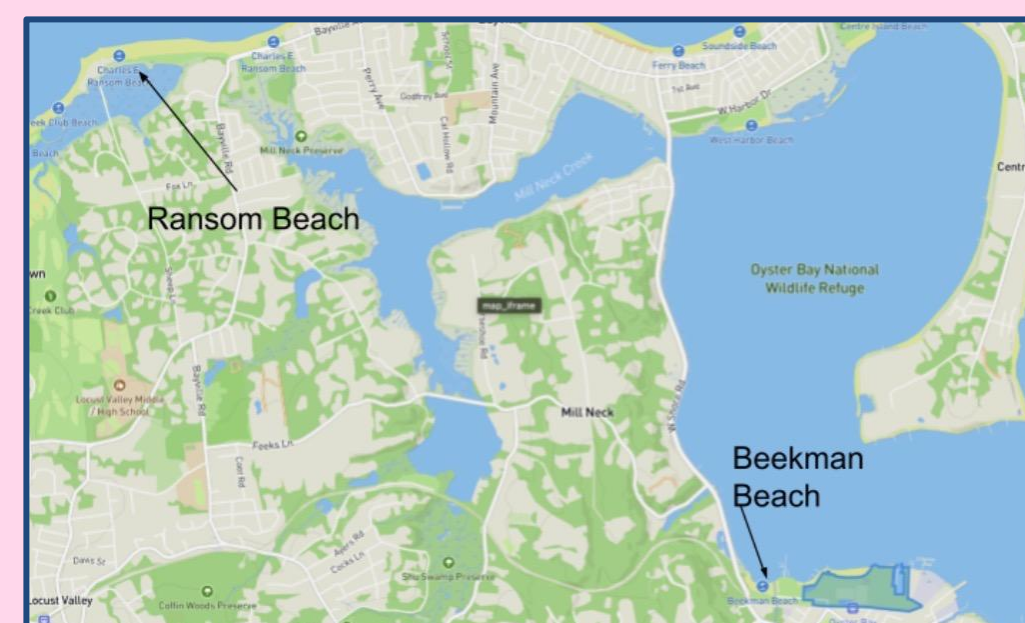


Figure 5 - Beach Collection Site Locations

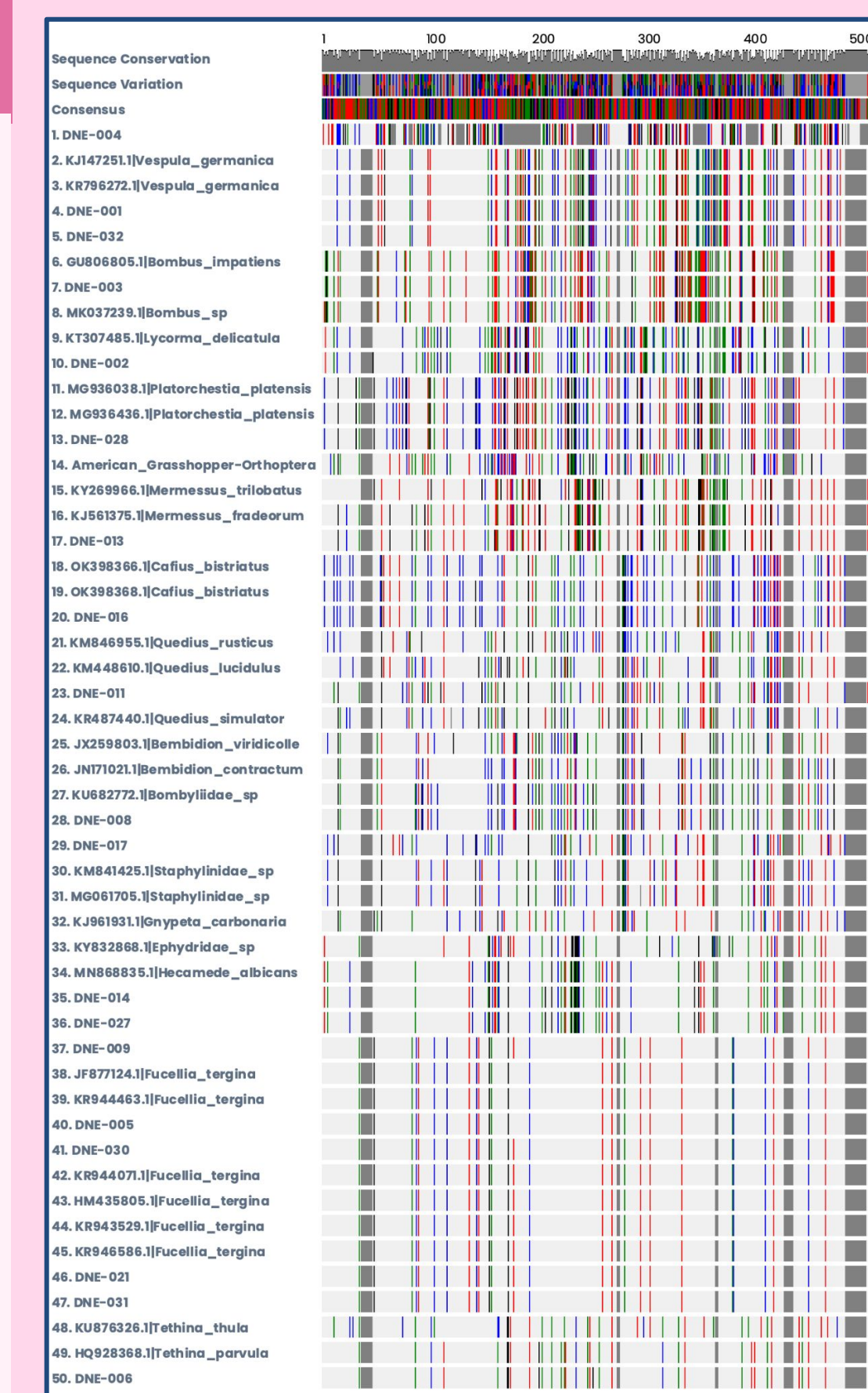


Figure 6 - MUSCLE Alignment of Specimens Sequenced



Figure 7 - Methods and Materials