

HOW DOES PLANT BIODIVERSITY (NATIVE VS. NONNATIVE) VARY BETWEEN ISOLATED AND ACCESSIBLE AREAS IN BROOKLYN BRIDGE PARK?

Introduction

During the annual Macaulay BioBlitz at Brooklyn Bridge Park, two members of our group were assigned to explore the park's more isolated areas, including the salt marshes near Pier 1 and the restricted Bird Island Sanctuary. These areas were noticeably quieter, less manicured, and ecologically distinct from the highly accessible park regions (walkways, lawns, and recreational spaces). Observing these differences firsthand sparked our curiosity, making us question, "How does human accessibility influence plant biodiversity, especially the presence of native versus non-native species?" Urban parks are commonly known to intentionally plant native species and disturbance-tolerant invasive ones, but how this plays out within different microhabitats of the same park is less understood. Our project aims to explore these biodiversity variations and contribute to understanding how urban design and foot traffic shape ecological patterns.

Hypothesis

If we analyzed isolated areas in comparison to more accessible areas with higher foot traffic on walkways in Brooklyn Bridge Park, then it should reveal a higher concentration of native species than non-native species.

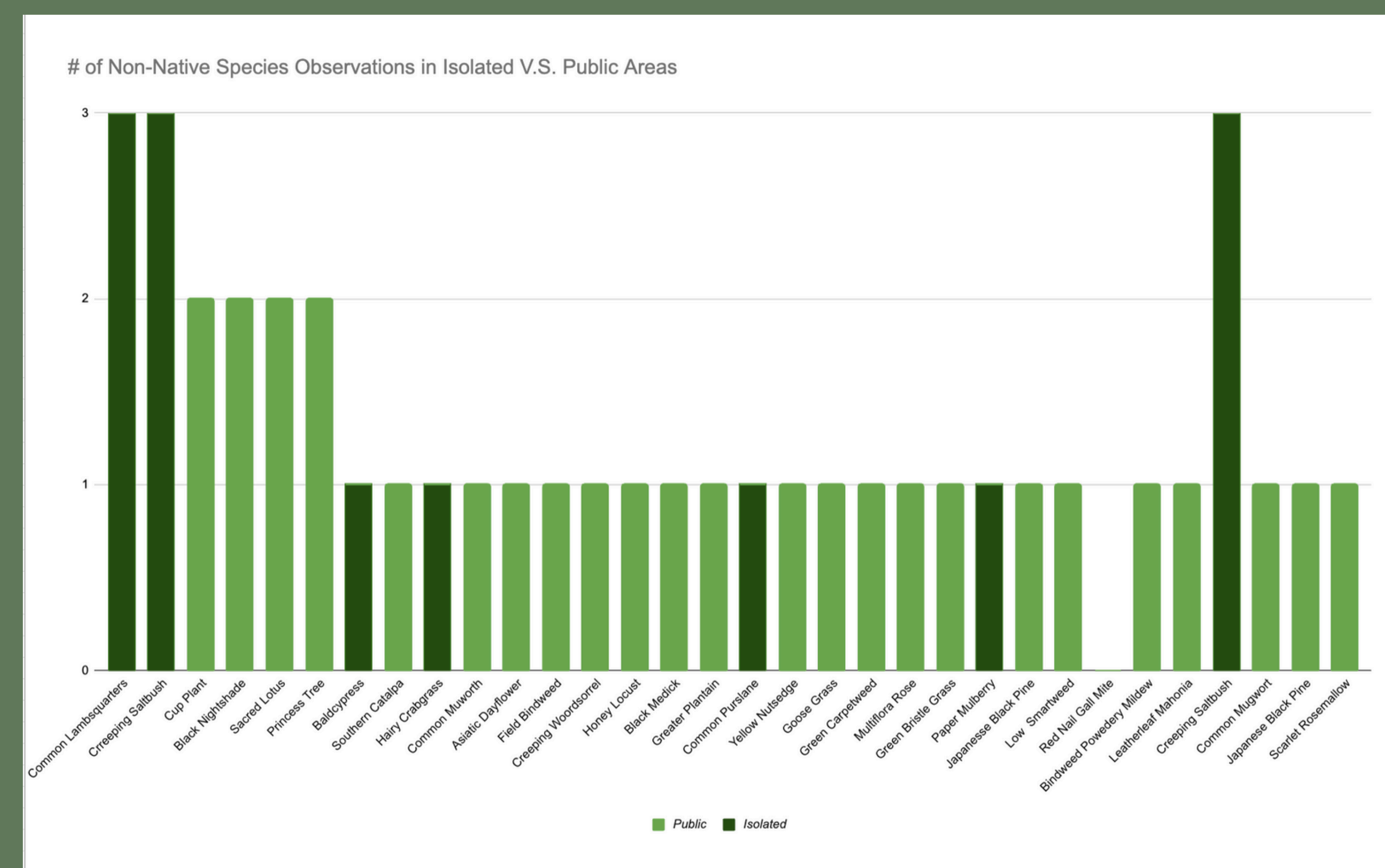
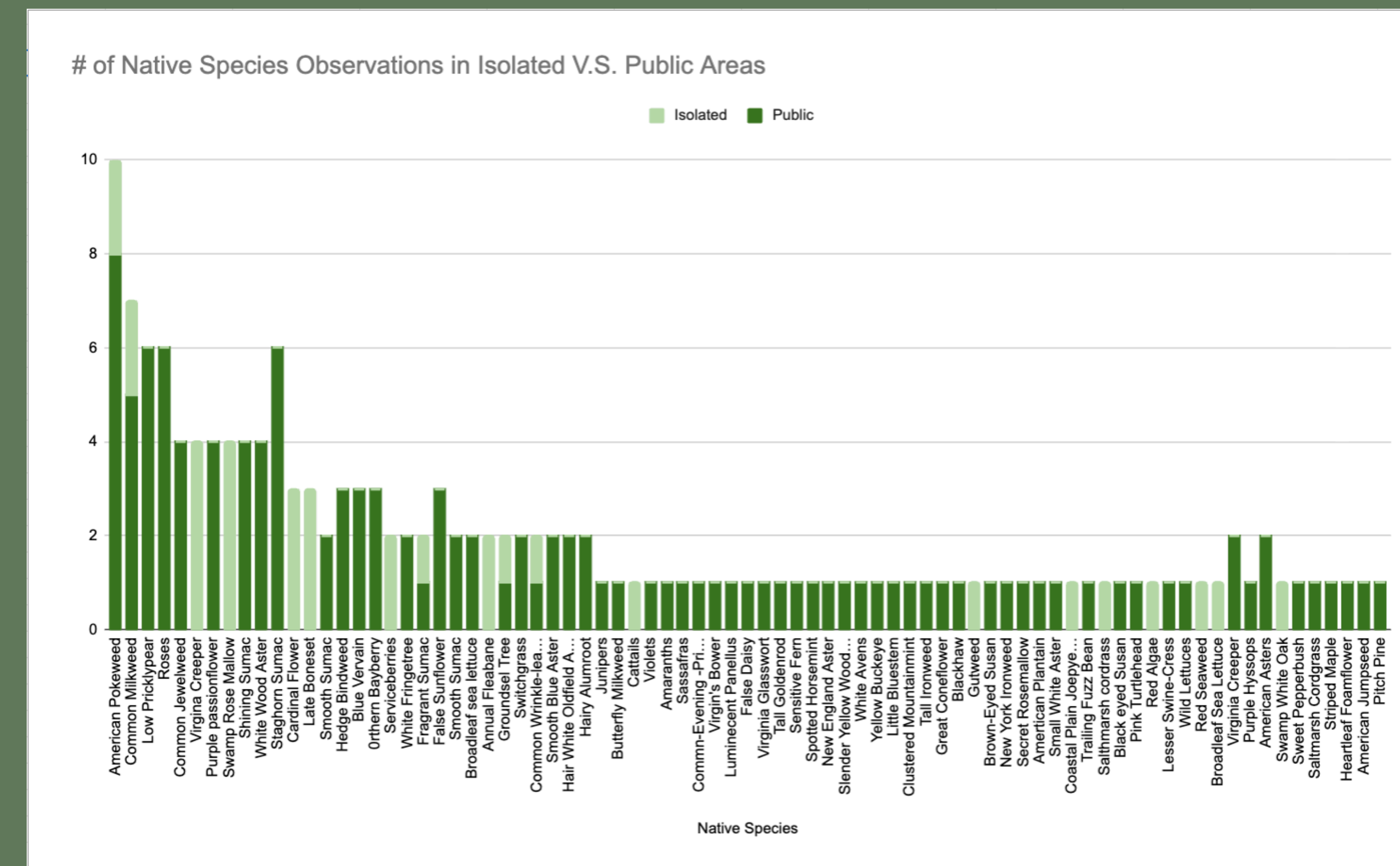
Methodology

Our study examined how foot traffic influences plant biodiversity in Brooklyn Bridge Park by comparing isolated and accessible areas. Isolated areas such as Bird Island and the salt marshes receive minimal public attention, while accessible areas include open lawns and recreation spaces with significantly higher visitation. Using the iNaturalist observations from the BioBlitz, we recorded geotagged plant observations and identified species as native or non-native using iNaturalist filtering, the USDA PLANTS, and New York State invasive species databases. We then separated all observations by the location type and quantified species richness and the proportion of native versus non-native in each zone. Finally, we compared our findings to existing research on urban biodiversity, allowing us to evaluate how our data aligned with broader patterns documented in established journals.

Results

Our results revealed clear patterns in biodiversity across the two area types. Invasive species were far more common in accessible areas, supporting the idea that foot traffic, landscape maintenance, and soil disturbance promote non-native plant establishment. Examples include Black Nightshade and Creeping Spurge, both frequently observed along walkways and manicured lawns. Surprisingly, native species were also most frequently observed in accessible areas, contradicting our original ideas. Plants such as Wild Lettuce and Pitch Pine appeared most often in public spaces, while isolated areas like the salt marsh contained fewer overall species but included specialized native plants such as Cattail. Overall, accessible environments showed greater species richness (both native and invasive), while isolated areas had lower total diversity but more natural ecological conditions.

Data



Satellite images of the Pier 1 Salt Marsh and Bird Island display all recorded plant observations (green tags). As shown, isolated plants are located deeper within the salt marshes and on Bird Island, while more accessible species are found along the park's green spaces.

Discussion

We found that our results partially supported our hypothesis. Invasive plants appeared far more frequently in accessible areas, which was consistent with Aronson (2014) and Norton (2023), who found that urban disturbance and proximity to pathways increase non-native species presence. However, our second prediction was not supported. Surprisingly, accessible locations also contained more native species than isolated areas. Research helps explain this pattern. Clemants and McPherson (2008) note that many New York City parks, including Brooklyn Bridge Park, have engaged in large-scale restoration projects, intentionally planting native species in public, visible spaces, to promote pollinator health and local biodiversity. As a result, we discovered that accessible areas may artificially boost native counts. Although isolated regions maintain higher ecological integrity, they often have lower total species richness, a trend supported by Esbah et al. Our findings suggest that biodiversity patterns in the park reflect both human behavior and deliberate ecological design, emphasizing the need for continued restoration, invasive species management, and protection of isolated habitats.

Limitations

Our study had several limitations. Data came only from iNaturalist observations during the BioBlitz, providing a partial snapshot of the park's biodiversity, since many participants often uploaded just one or two images per species. Additionally, isolated areas, mainly along the waterfront, were harder to sample due to limited access. Uneven exploration and inconsistent reporting may have overrepresented some species while underreporting others. Environmental factors, such as weather, time, and tides, as well as technological issues with the geo-tagging or unclear photos, could also have affected species visibility and identification.

Conclusions

Our study shows that accessibility strongly influences the distribution of plant species in Brooklyn Bridge Park. Invasive species thrive in accessible, high-traffic areas, confirming that human disturbance does, in fact, support their spread. However, contrary to our hypothesis, accessible areas highlighted a strong native species presence, likely due to intentional planting and maintenance by park designers. Meanwhile, isolated areas contained fewer overall species but maintained natural ecological integrity, serving as important refuges for specialized native plants. These findings highlight the complex relationship between urban design, human behavior, and ecological patterns. They also emphasize the importance of restoration efforts, invasive species management, and the protection of isolated habitats in promoting urban biodiversity. Overall, our project contributes to understanding how city parks can support resilient plant communities.

References

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