Investigating a Boardwalk’s Effects on a Lake Michigan Dune
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Abstract

Boardwalks are often used to prevent negative human impact in natural areas. However, the boardwalks themselves can also have an effect on the ecosystem. The “Dune Climb” stair portion of the boardwalk at P.J. Hoffmaster State Park has recently been rebuilt, offering the opportunity to study the effects of construction on the dune and provide data on the newly built section, as well as the current conditions of the old boardwalk. We measured health, height, and density of vegetation at various locations along the boardwalk. The boardwalk and unmanaged trails were mapped, and we interviewed the park naturalist to get more information on the boardwalk. Our results showed that while the boardwalk can have some negative impact, such as decreased vegetation growth and health next to the boardwalk and development of unmanaged trails, boardwalks are overall effective at their purpose in protecting vegetation and directing visitors to points of interest.

Methods

Study Area

Our research site is located at the boardwalk near the Visitor Center at P.J. Hoffmaster State Park in Muskegon, Michigan (Fig. 2). The boardwalk has undergone recent construction as the “Dune Climb” stair portion was rebuilt in 2015 (Fig. 3 and 4).

- Boardwalk Characteristics: The entire boardwalk was mapped using a Trimble Juno GPS. Additionally, unusual characteristics of the boardwalk, such as unmanaged trails stemming off it, boards left over from construction, and other evidence of human impacts were documented.
- Vegetation Characteristics: Transect lines and quadrats placed perpendicular to the boardwalk were used to gather vegetation data at intervals of 0m, 1m, and 5m along the transect lines. Examples of data collected at quadrat locations include:
  - health
  - height
  - percentage of plant cover
  - sand samples

Park Staff Interview: On November 10, 2016, we interviewed a park naturalist regarding her personal observations on characteristics related to the boardwalk, including observations on the effects of the construction on the boardwalk and the development of unmanaged trails.

Results

- Plant cover was mostly Ammophila breviligulata in Section 2 and forest in Section 3 (Fig. 7). Section 2 of the boardwalk is raised, allowing for sand movement which encourages growth of A. brev. Vegetation did not grow under the boardwalk (0m) but grew plentifully 1m away. The boardwalk perhaps provides shelter from the elements, explaining large growth 1m away, but less growth 5m away. Section 3 is forested; low vegetation levels are a result of leaf litter that covers the ground during autumn when the research was done. Additionally, Section 3 is closer to the ground, not allowing as much vegetation growth next to or under the boardwalk, thus, vegetation thrives further away from Section 3.

- Park Naturalist Observations: Our interview with the park naturalist revealed that during the construction, the crew was not careful and trampled much of the vegetation. They left many unused wood boards on the dune next to the boardwalk, which could be contributing to the loss of vegetation. She also discussed how several unmanaged trails were formed, mainly from dogs off their leashes and hiking groups.

Discussion

These results demonstrate that there is a decrease in the overall abundance of vegetation near or directly under the boardwalk. This suggests that the construction of the boardwalk and several unmanaged trails stemming off of the boardwalk have had some negative effect on the amount and health of the surrounding vegetation. One possible solution to decrease the boardwalk’s effect on vegetation would be to add spaces in between the boards of the boardwalk to allow light and water to reach vegetation under the boardwalk. Educational signs discussing how human traffic affects dune health also may help reduce unmanaged trails and other negative impacts such as litter.

Conclusion

Our research shows that boardwalks have minimal negative impacts. Vegetation growth and cover underneath and next to the boardwalk is less than vegetation growth and cover further away. Additionally, the boardwalk can provide an origin point for unmanaged trails, however, the effect on vegetation would be greater if the boardwalk was not present. Overall, the boardwalk is an effective management tool for protecting vegetation and encouraging visitor enjoyment of the park.

Acknowledgments and References

Acknowledgments:

We would like to thank P.J. Hoffmaster State Park, The Michigan Space Grant Consortium, and Calvin College for funding and providing access to study sites. We would also like to thank Alissa Paquette for mentoring this project along with the GEO Department of Calvin College and Prof. van Dijk for supporting this project.

References: