

# Blowouts and Unmanaged Trails in Hoffmaster State Park, MI

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## Abstract

Dune systems in public parks can be exposed to the pressures of high recreational use, but few studies have investigated the resulting changes to the dunes. Our study focused on human impacts at Hoffmaster State Park, MI by investigating the unmanaged trails and blowouts along a dune ridge. We mapped all trail segments with GPS, recorded their characteristics, and categorized each segment as either leading into a blowout, near a blowout, or not near a blowout. We mapped all blowouts with GPS including their deflation and deposition areas, recorded blowout characteristics and categorized each blowout as either saucer or trough. We analyzed the data to see if there were any relationships between the unmanaged trails and blowouts. Our study area contained 54 trail segments and 23 blowouts. Trail segments were mostly wide and bare of vegetation. The trails “not near” blowouts had a greater vegetation height than the trails near or through blowouts. Most blowouts were saucer-shaped and had at least one trail. Blowouts which contained one or more trail intersections tended to have larger deflation areas. Our results suggest that human disturbance along the dune ridge can cause larger amounts of instability on the dune surface.

## Introduction

An increase in recreational use has led to greater pressure on dune systems, making them more vulnerable to human impacts which can create networks of unmanaged trails (Fig. 1) and blowouts (Fig. 2) [1]. Some studies suggest that an increase in unmanaged trails increases the number of blowouts [2, 3]. This study investigates the relationship between unmanaged trails and blowouts at a Lake Michigan coastal dune site.



Figure 1: Unmanaged trails.



Figure 2: Blowouts.

## Research Objectives

1. Map unmanaged trails and blowouts
2. Measure and record characteristics of unmanaged trails and blowouts
3. Record any patterns between unmanaged trails and blowouts.

## Study Area

This study took place on a 1500m section of the dune ridge at P.J. Hoffmaster State Park (Fig. 3). This park contains 486ha (1200 acres) with approximately 4 kilometers of beach along the coast of Lake Michigan. The dune ridge is an established foredune which exists along the entire length of the park.

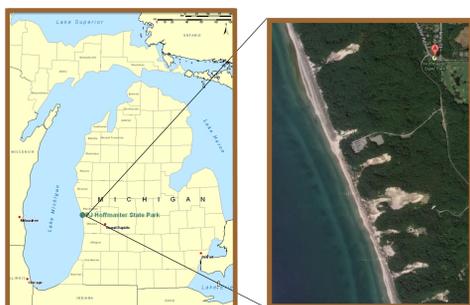


Figure 3: Location in Hoffmaster State Park, MI.

## Methods

We used GPS to map trail segments and blowouts. For each trail, we recorded width, vegetation density, condition, and height. For each blowout, we mapped the boundary and recorded blowout type and presence of trails (Fig. 4). We post-processed our GPS data using ArcGIS software.

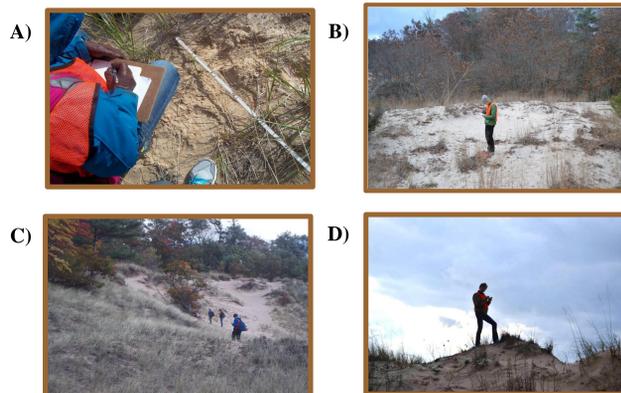


Figure 4: Methods included A) recording vegetation heights, B) recording blowout type, C) recording unmanaged trails along the dune ridge, and D) using GPS to record blowout locations.

## Results

### Blowouts:

There are 23 blowouts in our study area (Fig. 5). 74% of the blowouts have at least one trail going into the blowout.



Figure 5: Blowouts in study area.

Most blowouts are saucer shaped. Blowouts tend to have rounded, rather than elongated, shapes regardless of the number of trails running through them (Fig. 6).

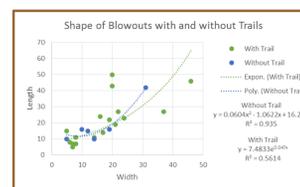


Figure 6: Shape of blowouts with and without trails.

### Trails:

There are 54 unmanaged trail segments along a 668m study area (Fig. 7). The total trail length is 1644m (~1mi). Trails run through six blowouts in our study area.



Figure 7: Trail segments with the combined blowout data.

Vegetation height is taller off trails than on trails. The average trail width is .97m. The widest trails are not near blowouts (Fig. 8).

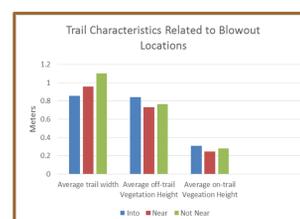


Figure 8: Trail characteristics with and without blowouts.

## Discussion

The intersection of most blowouts with trails suggests that blowouts may develop from trails. The transformation from trail to blowout goes through four stages: 1) vegetation trampling, 2) noticeable trail within vegetation, 3) trail widening, and 4) blowout emerging. We saw examples of all four stages in our study area (Fig. 9).

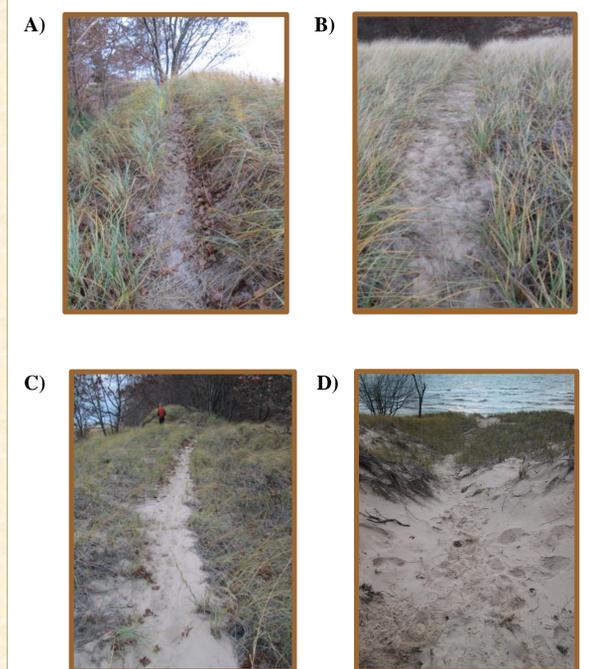


Figure 9: Examples of stages in transformation of trail to blowout: A) early vegetation trampling, B) clear path, C) trail widening, and D) blowout formation.

Our findings suggest that increased foot traffic could be playing a role in the formation of blowouts throughout Hoffmaster State Park. The close proximity of our study area to a parking lot may generate more foot traffic than at less accessible parts of the beach. A previous study links aggressive trampling with proximity to beach access [4]. We recommend further studies in this dune system in order to compare data and identify larger patterns.

## Conclusions

After mapping 23 blowouts and 54 trail segments, we conclude that there appears to be a relationship between the unmanaged trails and blowout formation. The proximity to public parking may be a factor in the amount of foot traffic throughout our mapped trail segments.

## Acknowledgements

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## References

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