

Analysis of a Managed Blowout in Kitchel-Lindquist-Hartger Dunes Preserve

Christopher H. Anderson, Katherine C. Benedict, Haleigh I. Bos, Kees VanDerAa, Lesley Vargas, April Volzer

Abstract

Moving dunes can pose a threat to human structures. In Kitchel-Lindquist-Hartger Dunes Preserve (KLH) on the coast of Lake Michigan, our study examined the south blowout which is close to a parking lot, an outdoor classroom and North Shore Marina. This study was conducted in the Fall of 2018. Methods included GPS mapping, total station surveying, vegetation surveying, erosion pin measurements, wind measurements, and a general dune characteristics survey. Results show that erosion is taking place in the lower part of the blowout, but above the sand fence evidence of deposition is present. Therefore, we have concluded that the sand fence is working. Because there is significant erosion taking place, we can conclude that the dune is active. We recommend placing sand fences on the blowout to slow erosion and encourage deposition, which will help vegetation growth. In conjunction, we would like to see further studies dealing with human impact on the dune.

Methods

We mapped and recorded dune characteristics (including vegetation), mapped dune topography, and measured activity in the blowout (Table 1.)

Vegetation	Topography	Dune Activity
- GPS Mapping - Quadrats - Identification	- Total Station Surveying	- GPS Mapping - Erosion Pins

Table 1: Research methods for selected variables

Discussion

Our erosion pin results indicate that the dune is active, and the presence of bare sand on the windward slope supports this conclusion. One previous study on blowouts asserted that vegetation is key to the rate of dune migration [2], and another study concluded that vegetation can prevent blowout expansion [3]. The sand fence has a demonstrated effect on stabilization (Figure 6) by providing a more suitable habitat for dune stabilizers such as *Ammophila breviligulata*. This suggests that sand fences or any material that would block some wind flow would increase the chances of dune stabilization.

Our total station map will provide a baseline for future studies and give better ideas on the rate and direction of the dune's movement. We recommend placing additional sand fences on the blowout to slow erosion and encourage deposition, which will help vegetation growth. Also, we support the managers' idea of placing woody debris on the windward side of the blowout.

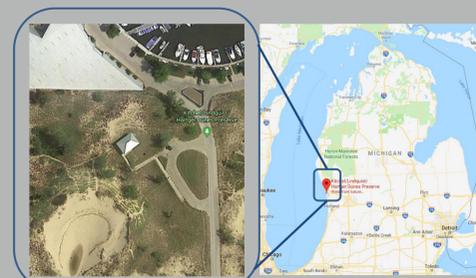
Introduction

Dune managers at the Kitchel-Lindquist-Hartger (KLH) Dunes Preserve are concerned that a blowout may be advancing towards a parking lot, outdoor classroom, and marina. Management must take into consideration both the need for conservation of dune systems, and the wishes of the public [1]. This study aims to gather base line data and evaluate current management effectiveness as well as to suggest management methods for the future.

Study Objectives



Study Area



This study was located in the south blowout of the Kitchel-Lindquist-Hartger Dunes Preserve in Grand Haven, MI (Fig. 1). The blowout is close to the preserve parking lot and an outdoor classroom, as well as North Shore Marina.

Figure 1: Location and surroundings of study area

Results

Topography:

The blowout is oriented southeast and has a height of 14.32 meters (Figure 2).

The slope of the slipface is steep as well as the slope on the rim of the blowout.

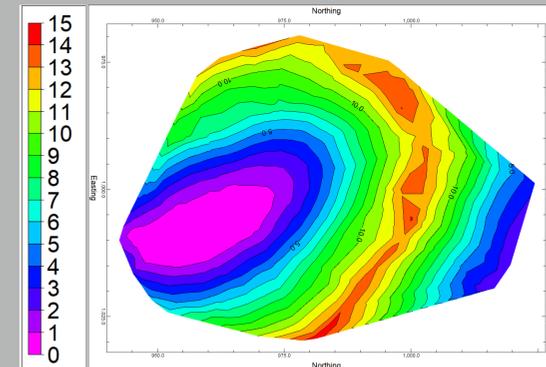


Figure 2: Topographic map of dune elevations (in meters)

Dune Features:

The windward slope consists of bare sand and *Ammophila*, with early succession vegetation along the crest (Figure 3). A wetland area and a sand fence are also present (Figure 4).



Figure 3: Vegetation on the crest and windward slope

Surface Changes:

There is a significant amount of erosion taking place on both the windward and leeward sides of the blowout, while deposition is occurring near the crest (Figure 5).

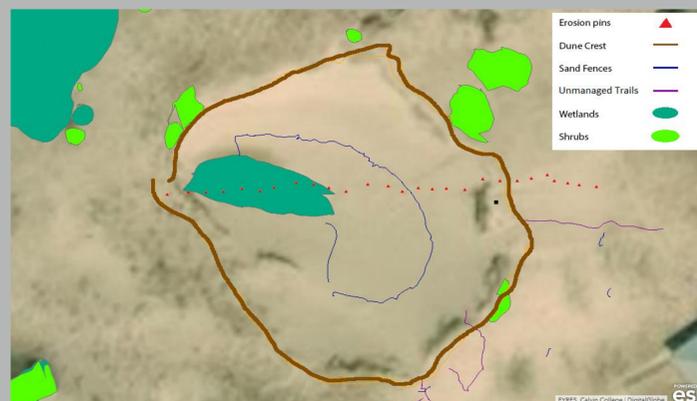


Figure 4: GPS map of dune characteristics and erosion pins

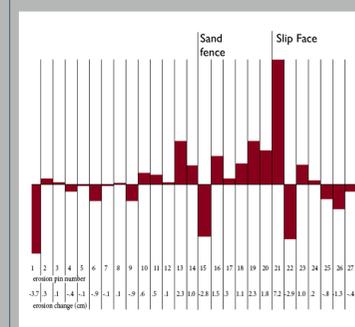


Figure 5: Erosion measured over 2 weeks



Figure 6: (Left) Location of sand fence on blowout and (Right) *Ammophila* downwind of the sand fence

Conclusion

Erosion and deposition are occurring in the blowout, meaning that it is active. The orientation and movement of this blowout are unlikely to pose a threat to structures in the near future; however, management is needed. Replacing and adding more sand fences would encourage stabilization.

Acknowledgements

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Works Cited

[1] Van Der Meulen, F., T.W.M. Bakker, and J.A. Houston. 2004. "The Costs of Our Coasts: Examples of Dynamic Dune Management from Western Europe." In *Coastal Dunes: Ecology and Conservation*. Ecological Studies, vol. 171, edited by M.L. Martinez and N.P. Psuty, 259-277.

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