

# Analysis of Management Techniques at North Beach Park Dune

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## ABSTRACT

A large parabolic dune in Ferrysburg, MI, specifically in North Beach Park, was studied on three separate occasions for the purpose of this research project. Movement of the dune toward the road in the past prompted the implication of various management techniques designed to limit human activity on the dune, therefore halting or slowing the dune's movement. Methods included the use of the Trimble to map various elements on the dune, and analysis of previous studies and photos. Results, including analysis of erosion pins, show that the migration of the dune has indeed diminished due to the management techniques, but the continued access to the dunes could cause further advancement.

## INTRODUCTION

North Beach Park Dune is a large parabolic dune located in Ottawa County, Michigan. Previous studies [1] have shown that the dune has been moving at an accelerated rate towards the only road accessing the Park. Numerous management techniques have been employed in an effort to slow or halt the migration of the dune; this study analyzes the effectiveness of these methods.

## OBJECTIVES

- To find the current North Beach Park Dune advancement rate.
- To compare the current dune advancement rate with the rate from 2004.
- To analyze the effectiveness of the stabilization efforts on the North Beach Park Dune.

## METHODS

GPS Trimble devices were used to map the location and area of the boardwalk, sand fences, bare sand, erosion posts, planted vegetation, and unmanaged trails. Photos were referenced regarding the presence of management techniques, sand fences, and bare sand coverage on the dune. Erosion post data and bare sand area was collected and compared from 2004 to present. Information regarding the timeline of management construction was obtained from the park authorities



Figure 1: Timeline of Management Techniques

## RESULTS AND DISCUSSION

### Planted Vegetation (Figure 2):

In 2004 the bare sand cover was 31%. In 2011 it was 5.3%.

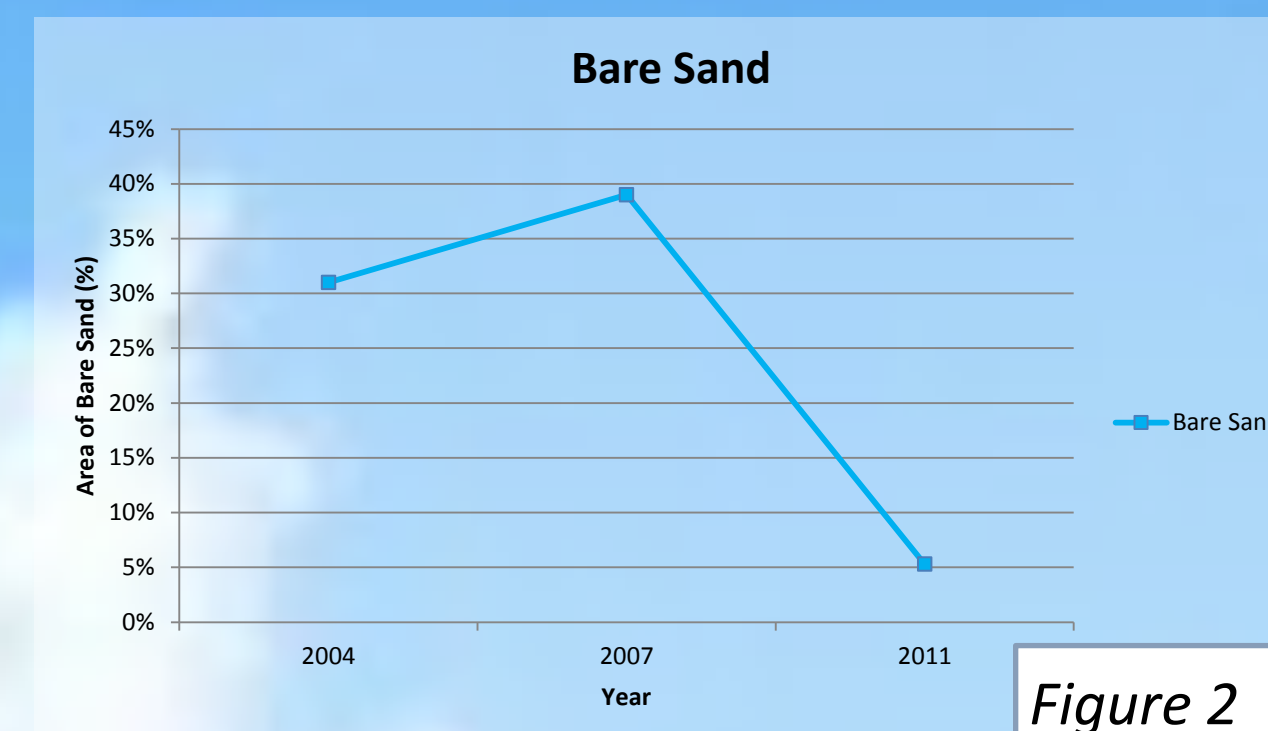


Figure 2

### Unmanaged trails:

In 2004, 9 unmanaged trails existed on the dune. This number remained consistent through 2005, 2006, and 2007, until 2008, where another unmanaged trail appeared following the implantation of sand fences, as seen in Figure 3.

### Sand Fences:

On the windward side of the slope, there are a total of 15 sand fences (Figure 4), 6 of which were implemented for sand deposition. The remaining 8 were placed on previously existing unmanaged trails.

### Dune Migration (Figure 3):

The dune advance in 2004 was found to be 0.67 meters per year compared to -0.01 in 2011. Prior to 2004, four erosion posts had been measured, and in November of 2004 five new posts were installed, which are still in use. The trend in dune advance rate is a general decline after 2004. After the management techniques were implemented in 2005, there is an obvious decline in the advance rate leading to no present advance.

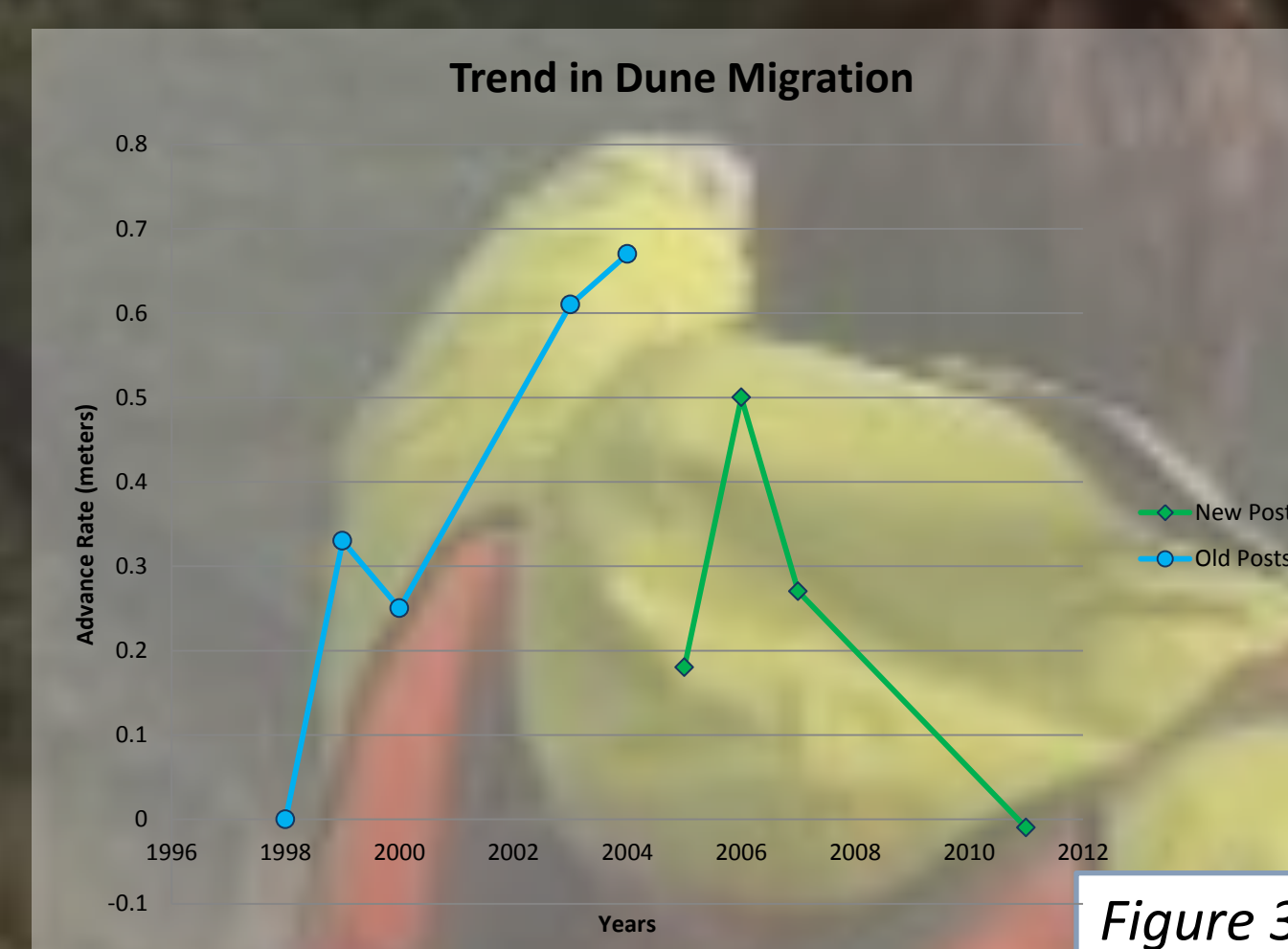


Figure 3



Figure 4



Figure 5



Figure 6: Mapped Management Techniques (2011)

## CONCLUSIONS

Outcomes of data collection and analysis show that (1) the difference of measurements of erosion posts have decreased over time; (2) planted vegetation is healthy and growing; (3) there are more unmanaged trails than before. Collectively, our results show that the stabilization efforts set in place by North Beach Park have succeeded in decreasing the advancement rate of the dune and thus reducing the threat of the only access road to residents on the shore being covered. Human modifications such as these can be seen in dune environments globally [2-3].

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## REFERENCES

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