

Planted *Ammophila Breviligulata* on North Beach Dune

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Abstract

On the North Beach dune, adjacent to North Beach Park in Michigan, vegetation was planted in order to stabilize the dune. It is known that planting dune grasses can alter topography, but the survivability and resilience of planted grass is less known.

To determine what relationship dune topography has with these variables, the plant health was determined by visual evaluation and species height was determined by measuring plants found in quadrats. Since the vegetation plantings in 2006 and 2013, plant health is now moderately healthy with some of the healthiest, tallest plants on the steeper slopes in our study area.

Introduction

Ammophila breviligulata is a commonly planted grass for the purposes of dune management and stabilization [1]. *A. breviligulata* is a hardy grass that is able to survive harsh conditions and burial [2]. When introduced to a coastal dune ecosystem, it begins to spread and affect the dune. *A. breviligulata* can cause changes in dune topography [3].

Study Area

Our study area was located on the top half of the windward slope of the North Beach Dune in Ferrysberg, Michigan in Ottawa County (Figure 1). The vegetation varied from dense grass cover to bare sand.



Figure 1

The group's study area on North Beach Dune. Ottawa county, MI, 2014

Objectives

The objectives of our project were:

1. To quantify plant health
2. To calculate the slope of the dune
3. To determine plant height



Figure 2

Researcher's hard at work collecting quadrat data. 2014

Methods

In this study a total station was used to gather the topographical data. A GPS was used to collect data including study area and zone designations. The data for vegetation was gathered using one meter square quadrats placed in areas designated by a random number generator.

Results

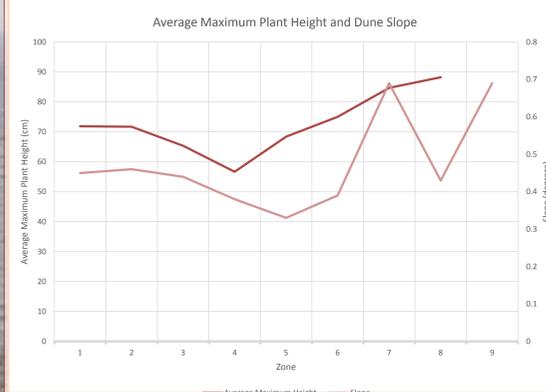


Figure 3

A line graph comparing maximum height of *A. breviligulata* and dune slope.

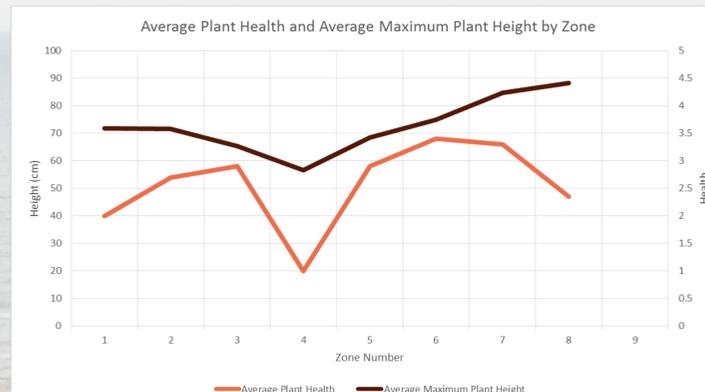


Figure 4

A line graph comparing plant health and average maximum height of *A. breviligulata*.

Our research indicated that plant health and height tended to be slightly higher near the bottom of the dune (Figure 3). We discovered that the dune was steeper in the bottom three zones (Figure 4). Figure 5 depicts the dune in 2004, while Figure 6 is from 2004. A clear increase in dune vegetation can be seen between those times.

2004

2014



Figure 5 North Beach Dune in 2004 and 2009

2009



Figure 6

Pictures taken in 2014 visually show *A. breviligulata* growth

2014

Discussion

Our data indicates that there may be a connection between plant health and plant height. The data from various zones provide evidence that connect the different variables.

Zone	Avg. Height (cm)	Avg. Health (out of 5)	Slope
1	71.85714286	2	0.45
2	71.71428571	2.7	0.46
3	65.33333333	2.9	0.44
4	56.66666667	1	0.38
5	68.4	2.9	0.33
6	75	3.4	0.39
7	84.66666667	3.3	0.69
8	88.23333333	2.35	0.43
9		1	0.69

Figure 7

A table comparing the different zones. 2014

A positive trend between plant health, plant height, and dune slope can be seen, especially between Zones #4 and #7 (Figure 7).

Conclusion

During our research, we recorded plant health, recorded dune slope, and determined average plant height. We also discovered a positive trend between plant health, plant height, and dune slope.

Acknowledgments

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References

- [1] Hertling, U M., and R A. Lubke. 1999. "Use of *Ammophila arenaria* for Dune Stabilization in South Africa and Its Current Distribution—Perceptions and Problems." *Environmental Management* 24, no. 4: 467-82
- [2] Maun, M A., and J Lapierre. 1984. "The Effects of Burial by Sand on *Ammophila Breviligulata*." *British Ecological Society* 72, no. 3: 827-39.
- [3] Hacker, Sally D., and Phoebe Zarnetske. 2012. "Subtle differences in two non-native congeneric beach grasses significantly affect their colonization, spread, and impact." *Oikos* 121, no. 1: 138-48.