

Deer Impact on a Michigan Coastal Dune

Camilla J. Bjelland, Aidan N. Casillas, Samuel S. Jacobs, Alyssa J. Topping, and Klein D. VerHill

Abstract

Our study investigated the deer impact on Dune 2 within Hoffmaster State Park. We used a GPS to map deer scat, singular deer tracks, deer trails, and unmanaged trails. We also conducted a vegetation quality survey in six different areas along the dune each visit. After entering our data into ArcGIS, results show that the deer are most active on the foredune. There was little impact on any other area of the dune, which shows the deer come from the forest out to the dune to drink from Lake Michigan and eat the vegetation on the foredune. Vegetation quality of the study areas did not significantly change from visit to visit. This data will help park managers in their future decisions as they manage the overpopulation of the deer on the dunes.

Introduction

The deer are a natural feature in regards to the dune ecosystem, yet they still can have negative impacts when their numbers get out of control [1]. Where the impact is the greatest generally needs to be assessed on a deeper level. Our research team conducted a study in which we documented and studied the deer impact on Dune 2 of Hoffmaster State Park.

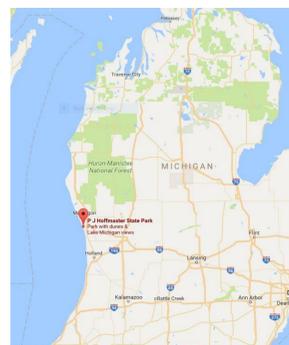
Our study objectives are to:

1. Determine where the deer had the most significant impact.
2. Assess deer travel patterns, along with vegetation quality and density affected by deer browsing

Study Area

Biologists have assessed P.J. Hoffmaster State Park's carrying capacity of deer to be 65, yet there is an estimated 3-4 times that many deer throughout the park, whose impacts can be studied by observing deer trails and other deer evidence [2]. We focused on six different areas on the dune system (Figure 1): the foredune, dune ridge, blowout, second dune ridge, north arm, and second trough.

Figure 1. View of the parabolic dune system in Hoffmaster State Park, Michigan



Methods

Using Trimble GPS units, evidence of deer (tracks, scat, trails, hair/antlers) were mapped in our six study areas.



Figure 2. The left photo shows an example of vegetation rated a 5 and the right photo rated a 1 on the vegetation scale.

In our study areas, quadrats were used in random 1.2 x 1.2 meter areas and the vegetation quality and deer evidence were determined using a scale of 1-5 (1=very damaged and 5=no damage, 1=no evidence of deer and 5=lots of deer evidence) (Figure 2). Areas that we observed as very important (3 or above on the scales) were marked with a flag to return to in the next visits.

Results

While there was scat found on the trough and many singular deer tracks found throughout the dune, most of the deer evidence was found on the foredune (Figures 3, 4, 5).



Figure 3. The locations of scat and singular deer prints.



Figure 4. Deer scat.



Figure 5. Singular deer print.

Results

Figure 6 shows that deer stay on unmanaged trails for as long as possible, until they must divert from the trail. Deer prefer to travel through the forested arms of the dune onto the foredune rather than using any other route to access the lake front, based on the data from our study areas.



Figure 6. Describes the study areas we visited, the unmanaged trails, the deer trails, and the quadrats we threw.

Deer quality of vegetation and deer presence did not change significantly over the 3 visits (Table 1).

Visit One Study Areas	Deer Scale	Vegetation Scale
Foredune:		
Area 1	3	3
Area 2	3	3
Slipface:		
Area 1	1	2
Blowout:		
Area 1	1	1
Arm:		
Area 1	1	1
1st Crest:		
Area 1	3	4
2nd Crest:		
Area 1	1	2
Visit Two Study Areas	Deer Scale	Vegetation Scale
Foredune:		
Area 1	4	3
Area 2	3	3
Arm:		
Area 1	1	1
1st Crest:		
Area 1	1	2
Visit Three Study Areas	Deer Scale	Vegetation Scale
Foredune:		
Area 1	2	2
Area 2	2	2
Arm:		
Area 1	3	1
1st Crest:		
Area 1	3	2
Ridge above trough	1	1
Crest of dune ridge	0	0

Table 1. Vegetation and deer impact score for each study area each visit.

Discussion

The study showed that the majority of deer evidence was found on the foredune and in the trough of the dune [Figure 3]. This suggests that deer prefer to travel directly from the forest to the lakefront using unmanaged trails when available [Figure 6].

Russell *et al.* (2001) study found that white-tail deer definitely have an impact on the dune system vegetation, however a specific plan for deer management was not developed [3]. Our study found enough evidence to conclude that deer have an effect on the vegetation on Dune 2 of Hoffmaster State Park, but not enough to suggest immediate actions by park managers in regards to dune stability.

Conclusions

Deer have the most significant presence on the foredune. Deer have been grazing and creating unmanaged trails around the foredune more abundantly compared to other areas of the dune. Therefore, the impact deer have on the stability of Dune 2 does not raise any concerns for the stability of the whole dune system.

Acknowledgements

We would like to thank P.J. Hoffmaster State Park for allowing us to conduct research on Dune 2. We would also like to thank our mentors Maddie Hughey and Jennifer McClellan for assisting us with our research. Next, we would like to thank the Department of Geology, Geography and Environmental Studies at Calvin College and any other FYRES donors. Lastly, we would like to give a big thank you to Professor Deanna van Dijk for all of her hard work in guiding us through our research.

Works Cited

- [1] Waller, Donald M., and William S. Alverson. 1997. "The white-tailed deer: a keystone herbivore." *Wildlife Society Bulletin* 25, no. 2: 217-26.
- [2] Brockwell-Tillman, E. 2017. "Interview with Park Naturalist" Interviewed by Camilla J. Bjelland. Calvin College. November 9, 2017.
- [3] Russell, F. Leland, David B. Zippin, and Norma L. Fowler. 2001. "Effects of White-Tailed Deer (*Odocoileus virginianus*) on Plants, Plant Populations and Communities: A Review." *The American Midland Naturalist* 146, no. 1: 1-26.