Investigating the Relationship Between Deer and Trails on Coastal Sand Dunes

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Abstract

Although scientists have studied the impacts of deer browsing and trampling on coastal dune vegetation, few studies have been done on the impacts of deer on trails. We investigated the relationship between deer presence and trail characteristics in North Ottawa Dunes, Michigan over a three-week study period. We first recorded deer evidence (i.e. tracks and scat) on both an open dune area and a wooded dune area. At the same sites, we mapped trails and documented their features including width, slope, direction, length and surface condition. In the open dune area, we identified numerous trail segments and evidence of deer, with most of the deer evidence concentrated on the lower windward slope. In the wooded area, we also recorded the most trails and deer evidence on the lower slopes although the observed amounts were much smaller because of the thick leaf litter. The spatial pattern of trails and deer evidence indicates a positive relationship between deer presence and trail location. Our results suggest that deer activity contributes to disturbances such as trails that affect coastal dune dynamics.

Introduction

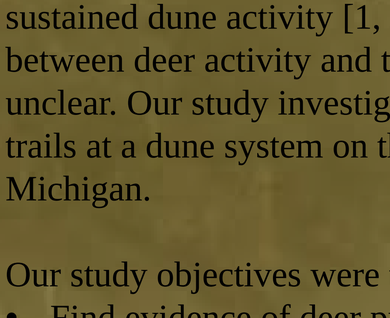
The impact of deer on dunes is not known, although some studies have shown that deer contribute to the lack of vegetation, which can lead to increased or sustained dune activity [1, 2]. The relationship between deer activity and trails on dunes remains unclear. Our study investigated deer evidence and trails at a dune system on the coast of Lake Michigan.

Our study objectives were to:

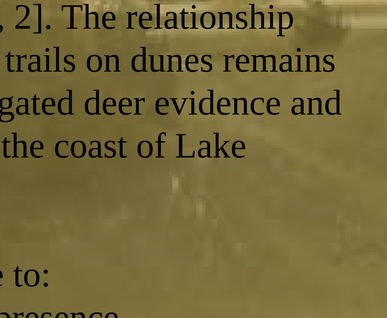
- Find evidence of deer presence.
- Record trail characteristics and observe trends.
- Identify trails that can be attributed to deer activity.

Study Area

The study took place at North Ottawa Dunes (Fig.1) and included two dune environments: forested and open (Fig.2). The county government believed that deer activity was too disruptive to the natural dune system and initiated a deer hunt at North Ottawa Dunes last year [3].



▲Fig.1 Our study site was located in Ottawa County in western Michigan.



▲Fig.2 The bare and grassy area of the open North Ottawa Beach parabolic dune.

Methods

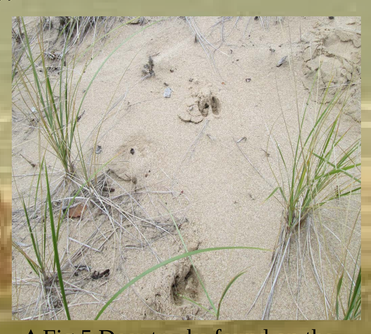
In the fall of 2013, we recorded evidence of deer including scat and tracks in both the open and forested areas using direct observation (Fig.3). We also recorded trail characteristics such as length, width, slope, and surface condition. To determine the use of trails, we looked for the tracks which were most evident: deer, human, other animal, or mixed. All data were recorded in GPS handheld devices and later analyzed and mapped in ArcGIS.

Fig.3 A researcher is looking for deer evidence on the open dune site. ►

Results

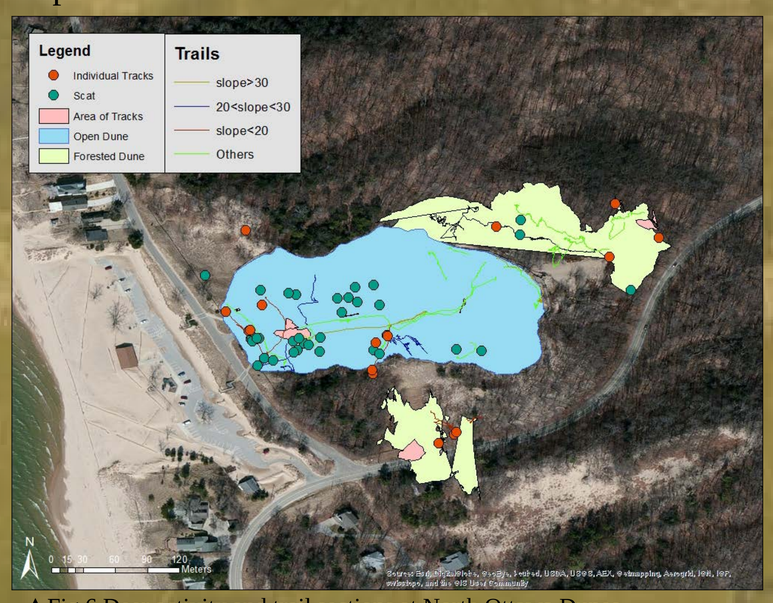
We recorded 17 individual deer tracks (Fig.4), 35 clusters of deer scat (Fig.5), and 29 trail sections.

▲Fig.4 Deer scat found.



▲Fig.5 Deer tracks found on the bare area.

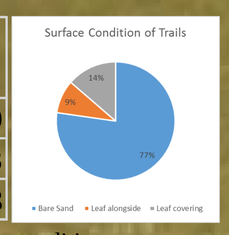
Most deer tracks were concentrated in the lower part of the open dune area where we also found a number of trail sections with relatively low slope angles (Fig.6). In addition, we found three zones of dense deer tracks which we did not individually map.



▲Fig.6 Deer activity and trail sections at North Ottawa Dunes

Trail characteristics varied (Fig.7), especially in the open area where we found 24 trail sections out of the 29 total.

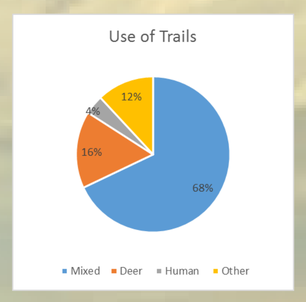
	Trails Counted	Avg.	Min.	Max.
Length (m)	29	82	15	199
Width (cm)	17	58	25	83
Slope (degree)	14	21	4	68



▲Fig.7 Trail section characteristics including surface condition

Results (cont'd)

Less than 20% of trails were used by deer alone, and nearly 70% were used by deer and humans (Fig.9). For most trails, the surface condition was primarily bare sand or bare sand with grass (Fig.8). In the wooded area, we recorded the most trails and deer evidence on the lower slopes although much fewer were observed because of the thick leaf litter.



▲ Fig.8 Use of trails.

▲ Fig.9 A trail located on the southern side of the dune.

Discussion

Our map results indicate a positive relationship between deer evidence and unmanaged trails particularly in the lower open dune area which is relatively flat, sandy, and proximate to water. Although mostly covered by thick leaf litter, we did find sporadic deer tracks and indistinct trails in the forested area, but a relationship between deer tracks and trails is hard to determine. Our results suggest that deer activity contributes to disturbances such as trails that affect coastal dune dynamics.

Conclusions

We found a significant amount of deer evidence and trail sections in North Ottawa Dunes. Based on our study, a positive relationship between them is most distinct in the lower open dune site, while patterns are harder to distinguish in the forested area.

Acknowledgements

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References

[1] Schaefer, Joe and Martin B. M. 1997. "White-tailed deer of Florida." Wildlife Ecology and Conservation Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida WEC133.

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[3] Chandler, G. "16 deer taken in first hunt at North Ottawa Dunes Park in Spring Lake." *Grand Rapids Press*, December 17, 2012. Accessed November 1, 2013.