

# Dune Environment Influences on a Rare Great Lakes Thistle

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## Abstract

Native to the Great Lakes dunes, *Cirsium pitcheri* is listed as threatened at both the state and federal level and is sensitive to changing environments. This study investigated the *C. pitcheri* population and its environmental conditions in Rosy Mound Natural Area on Lake Michigan's eastern shore. During the fall of 2013, we mapped selections of the population, unmanaged trails (both deer and human-caused), and the park's boardwalk using Trimble Juno GPS units. For each plant, we recorded surface conditions, longest leaf length, and whether deer trampling and/or grazing was evident. We also compared four plant population areas characterized by different features: the managed boardwalk, an unmanaged human trail, an unmanaged deer trail, and an open dune area. Significant deer evidences were visible around the 253 individual plants mapped. Despite the deer presence, few indications of damage to *C. pitcheri* from trampling or grazing were observed. The thistles' density was similar near the boardwalk and human-caused unmanaged trail, and greater around the deer trail and open dune areas. Our results suggest that the deer population is ideally sized to provide the disturbance required by *C. pitcheri* without exerting undue strain on the population.

## Introduction

The dynamic environment of the Great Lakes dunes creates a unique habitat and essential interactions for numerous vegetation species. The focus of this study was Rosy Mound Natural Area's resident *Cirsium pitcheri* (figure 1) population and its relation to environmental factors (i.e. trails, grazing, and trampling) shaping its habitat.



Figure 1:  
*Cirsium pitcheri* rosette.

### Research Objectives

- Map *C. pitcheri* and trails
- Observe plants for evidence of grazing or trampling
- Determine the relationship between *C. pitcheri* and disturbances such as trails, grazing, and trampling.

## Study Area

This study was conducted in Ottawa County Parks' Rosy Mound Natural Area, located on Lake Michigan's eastern shore, south of Grand Haven (figure 2).



Figure 2: Rosy Mound Natural Area, Ottawa County. (Images: Google Maps Imagery ©2014, Ottawa County Parks).

## Methods

- Thistle and trail locations were recorded by GPS and displayed with ArcGIS.
- Areas of *C. pitcheri* populations, defined by proximity to dune features, were studied to compare density.
- Thistles were studied for evidence of trampling, grazing, and other vegetation in their near vicinities.
- Likely causes of unmanaged trails were recorded.
- A partial sample was taken to determine the environs in the hummocky dunes and dune ridge areas.

## Results

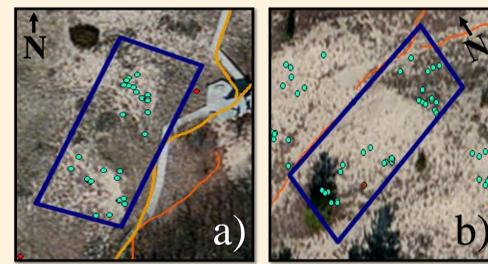
We mapped 253 *C. pitcheri* (figure 3) which appeared healthy, and noted the presence of more in the study site.



Figure 3: Observed *C. pitcheri*. Blue outlines indicate *C. pitcheri* were present, but not mapped. Turquoise points show individual thistles. Red perimeters mark areas that were analyzed for comparative density.

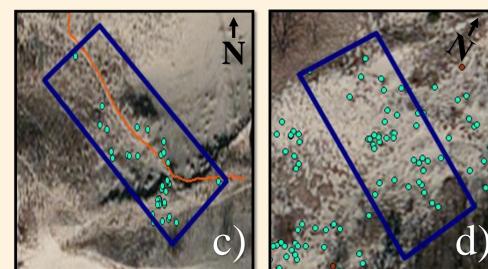
## Results (continued)

The populations in the 20x50m perimeters (figure 4) were compared based on location relative to certain features. There were numerous thistles in each of the areas observed.



Boardwalk proximity:  
30 thistles

Human unmanaged trail:  
32 thistles



Deer unmanaged trail:  
37 thistles

Open dune area:  
42 thistles

Figure 4: *C. pitcheri* population clusters adjacent to specific dune features (both managed and unmanaged trails, and an open dune area).

A majority of the observed *C. pitcheri* (83%) were growing in areas of early colonizer growth, with the remainder (17%) in bare sand areas. None were found in areas of dense vegetative growth.

There were unmanaged trails throughout the study area. Deer trails were mostly located in the northern part of the study area, especially along the north arm of the blowout (figure 5).

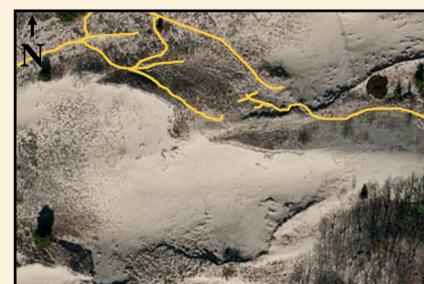


Figure 5: Unmanaged deer trails were clustered along the northern arm of the blowout.

There was almost no evidence of deer damaging the *C. pitcheri* in the study area. Only 0.08% of the thistles observed exhibited evidence of trampling, and none showed signs of being grazed.

## Discussion

*C. pitcheri* flourish in sparsely vegetated or non-vegetated dune areas such as blowouts [1]. While thistles were located near all the trails, none were found in thick foliage. This suggests the thistles are more influenced by a site's ecology than by the presence of unmanaged trails.

Our results are consistent with prior findings [2]: forbs such as *C. pitcheri* are resilient. This may explain why there was little divergence between the groups' densities.

The deer influence may have aided the *C. pitcheri* by causing moderate sand movement [3] but negligible damage.

## Conclusions

We studied a population of 253 *C. pitcheri*. The physical vegetation environment was a better indicator of *C. pitcheri* presence in the studied locations than was the presence or absence of unmanaged trails in Rosy Mound Natural Area. No grazing (and negligible trampling) instances affected the thistle population.

## References and Acknowledgements

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- [3] Girdler, E. B., and T. A. Radtke. 2006. "Conservation Implications of Individual Scale Spatial Pattern in the Threatened Dune Thistle, *Cirsium pitcheri*." *The American Midland Naturalist* 156 (2): 213-28.

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