

# Characteristics of an Active Blowout in Rosy Mound Natural Area, Michigan

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## Abstract

We studied a previously unstudied blowout with the goal of identifying its characteristics and activity. Our study investigated physical characteristics and *Cirsium pitcheri* in the area. We used sand traps, erosion pins, stadia rod measurements, and GPS units to measure sand transport and physical characteristics, respectively. We also mapped all the *Cirsium pitcheri* we could find. Our data suggests that the now studied blowout is moderately active with plentiful amounts of *Cirsium pitcheri*. With this research we can better understand coastal blowouts, as well as aid Ottawa County Park staff in their management of Rosy Mound Natural Area.

## Introduction

Our research is focused on an unstudied blowout, a common landform on coastal dunes [1] which comes in a variety of shapes and sizes. Through different characteristics of this blowout, we want to determine its activity. Our study investigates the characteristics, and the presence of *Cirsium pitcheri*, of this blowout in the Rosy Mound Area.

### Study Objectives

- Map and measure the characteristics of blowout.
- Measure sand movement in the blowout.
- Observe and map *Cirsium pitcheri*.

## Study Area

We studied a blowout in a dune system at Rosy Mound Natural Area, near Grand Haven, Michigan (Fig. 1).

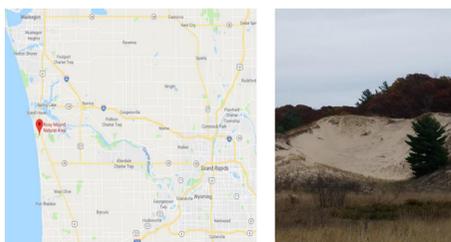


Fig.1: Study area map and photo

## Methods

For size and shape of the dune (Fig. 2), we took GPS measurements by walking around the whole outside of the blowout, and we took a stadia rod survey from base of the dune to crest.

For sand transport, we collected sand over time with Leatherman sand traps and measured erosion pins.

For vegetation we mapped the *Cirsium pitcheri* as GPS points and recorded their ages (Table 1).

| Age Category   | Visual Indicators                              |
|----------------|--|
| Seedling       | 4 leaves or less                               |
| Small Juvenile | More than 4 leaves, length less than 12 inches |
| Large Juvenile | More than 4 leaves, length more than 12 inches |
| Adult          | Flowering or dead                              |

Table 1: *Cirsium pitcheri* age properties (based on [2])



Fig. 2: View of blowout from the crest

## Results

### Dune Characteristics:

Using stadia rod measurements, we determined that the crest is 29.09m higher than the base of the dune, and that the dune is an active saucer-shaped blowout (Fig. 3).

### *Cirsium pitcheri*:

We recorded 216 instances of *C. pitcheri* (Fig. 3), but did not map every plant found due to time constraint. Most of the *C. pitcheri* were small juveniles at the blowout's base (Table 2).

| Age Category   | Number Found |
|----------------|--------------|
| Seedling       | 41           |
| Small Juvenile | 108          |
| Large Juvenile | 39           |
| Adult          | 28           |

Table 2: *Cirsium pitcheri* ages in the study area

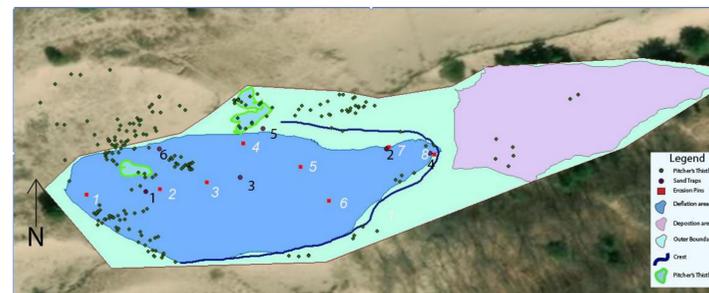


Fig.3: GIS map of all data and measurement locations (White number indicate erosion pins; black numbers indicate sand traps)

### Sand Transport:

Erosion Pin 1 experienced slight erosion throughout in between all readings, but every other pin experienced minor deposition between the first and second readings or were stable (Fig. 4). All pins experienced erosion across Week 2.

During both weeks the top middle sand trap and the sand trap on the middle of the left arm collected the most sand (Fig. 5). Week two collected significantly more sand than week one. Week two also showed significantly stronger winds than week one.



Fig.4: Surface changes at erosion pins for separate weeks

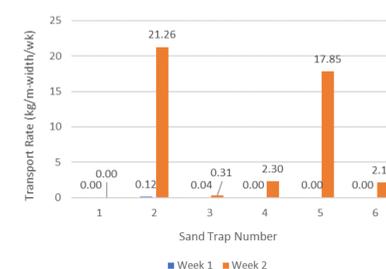


Fig.5 Sand transport rates from week 1 and week 2

## Discussion

The sand movement and surface changes measured across various points on the blowout indicate that it is moderately active overall.

*Cirsium pitcheri* (Fig. 6) is concentrated towards the bottom of the blowout signaling that this area of the blowout is moderately active. *C. pitcheri* is a stern indicator of activity due to only being able to handle a certain amount of activity; plants will not survive if there is too much or no activity.



Fig. 6: Example of *Cirsium pitcheri* (photo taken at Hoffmaster State Park)

## Conclusions

The blowout at the Rosy Mound Natural Area is a moderately active saucer-shaped blowout, 29 m high. The area near the blowout has large amounts of small juvenile *C. pitcheri* plants, and they seem to be thriving.

## Acknowledgments

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## References

- [1] Smyth, Thomas A.G., Derek W.T. Jackson, and Andrew G. Cooper. 2012. "High Resolution Measure and Modelled Three-Dimensional Airflow Over a Coast Bowl Blowout." *Geomorphology* 177-178:62-73.
- [2] USFWS. 2010. "Pitcher's thistle (*Cirsium pitcheri*) 5-Year Review: Summary and Evaluation." U.S Fish and Wildlife Service. Retrieved from [https://www.fws.gov/midwest/endangered/recovery.5yr\\_rev/pdf/PITH5YRReview.pdf](https://www.fws.gov/midwest/endangered/recovery.5yr_rev/pdf/PITH5YRReview.pdf).