



Threats to the Threatened Pitcher's Thistle

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Background

Pitcher's thistle (*Cirsium pitcheri*) is a monocarpic, perennial, herbaceous plant endemic to the Great Lakes region. Pitcher's thistle grows on open sand dunes and cobble shores with vegetative cover of 30% or less. Populations are found along the shores of Lakes Huron, Michigan, and Superior. After germination, the Pitcher's thistle remains in a non-flowering juvenile state for five to eight years, after which it suddenly matures and develops one or more flowering heads. Once seeds mature, they fall to the ground or are windblown less than one meter away. Since this plant is monocarpic, after blooming and dispersing seeds once, it dies.

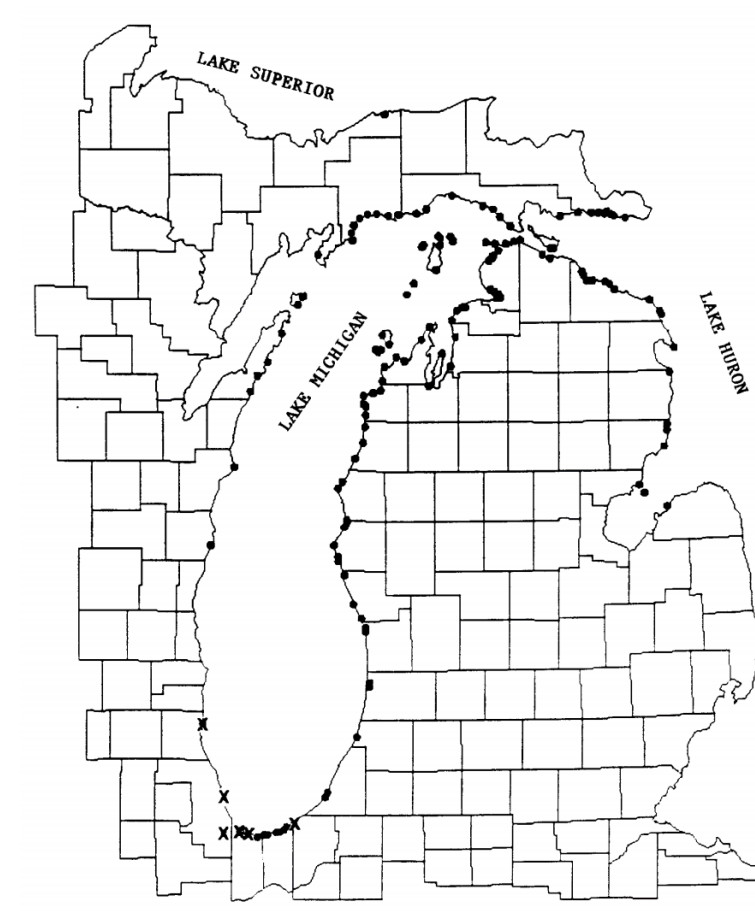


Figure 1: Distribution of *Cirsium Pitcheri* in the United States. X marks known extirpated populations.

Cirsium Pitcheri was added to the List of Endangered and Threatened Wildlife and Plants on July 18, 1988. Noel Pavlovic and Kathryn McEachern of United States Geological Survey have been studying populations of Pitcher's thistle at Indiana Dunes and other NPS locations for two decades. There are many factors contributing to the population decline including drought, trampling, inbreeding depression, native and non-native plant competition, and predispersal seed predation.



Figure 2: A juvenile Pitcher's thistle plant.



Figure 3: An adult, blooming Pitcher's thistle plant.

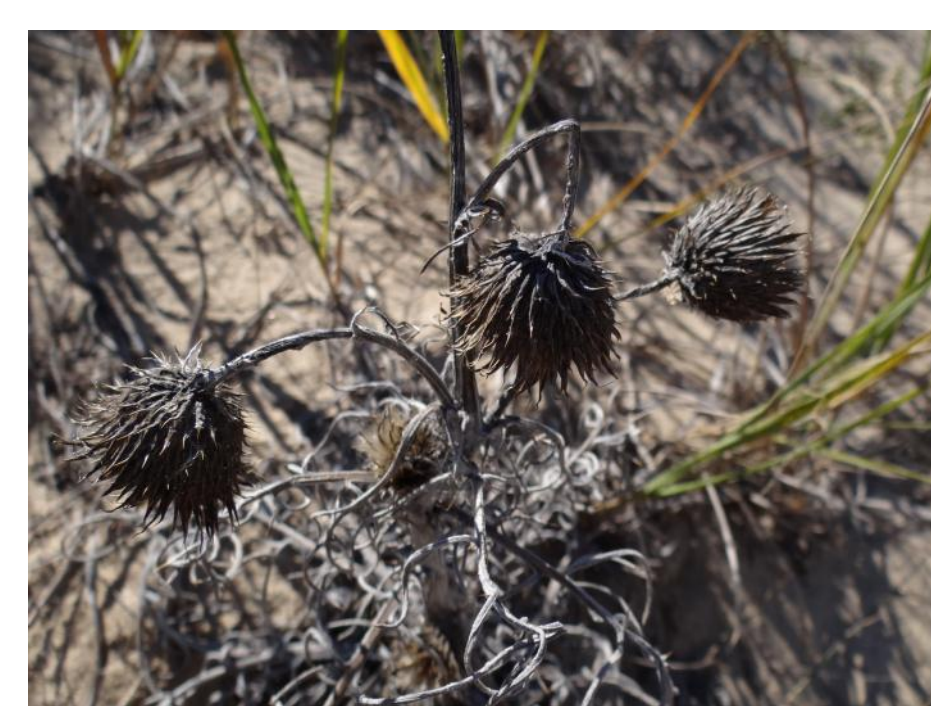


Figure 4: Dead, post-dispersal seed heads of Pitcher's thistle.



Figure 5: A male American goldfinch (*Carduelis tristis*).

The decline of Pitcher's thistle is due to many different factors, and its decline is exacerbated by high rates of seed predation by the **American goldfinch (*Carduelis tristis*)**. The American goldfinch is a granivorous bird that has evolved an adapted a conical beak and agile feet perfectly suited for the consumption of seed heads. Goldfinch abundance in North America appears to be increasing, very possibly improved by the presence of birdfeeders.

The predation of Pitcher's thistle seeds by goldfinches seems to have increased in recent years. As much as 95% of the total 2009 Pitcher's thistle seed production at Indiana Sites was consumed, mostly by birds such as the goldfinch. Such seed predation, if continued, could reduce thistle population growth rates by 10-12% per year over current levels. The entire population of Pitcher's thistle in Indiana faces extinction within 10-20 years if no action is taken to reverse declines.

One project has been implemented at USGS to determine goldfinch abundance and feeding behavior at Indiana dunes, quantify the magnitude of Pitcher's thistle seed predation and estimate effects on population growth.



Figure 6: American goldfinch (*Carduelis tristis*) feeding on the seeds of Pitcher's thistle (*Cirsium pitcheri*).

An additional threat to Pitcher's thistle is the **Larinus weevil (*Larinus planus*)**. The Larinus weevil is a Eurasian weevil which was introduced inadvertently into the United States. Later on, the weevil was released for biocontrol of weedy thistles. Studies at Whitefish Dunes State Park revealed that weevils were present in nearly half of collected seed heads, and seed heads containing weevils contained almost no viable seeds. Whitefish Dunes research indicates that weevils can reduce population growth by 10% and cut extinction time in half.



Figure 7: Larinus weevil (*Larinus planus*).

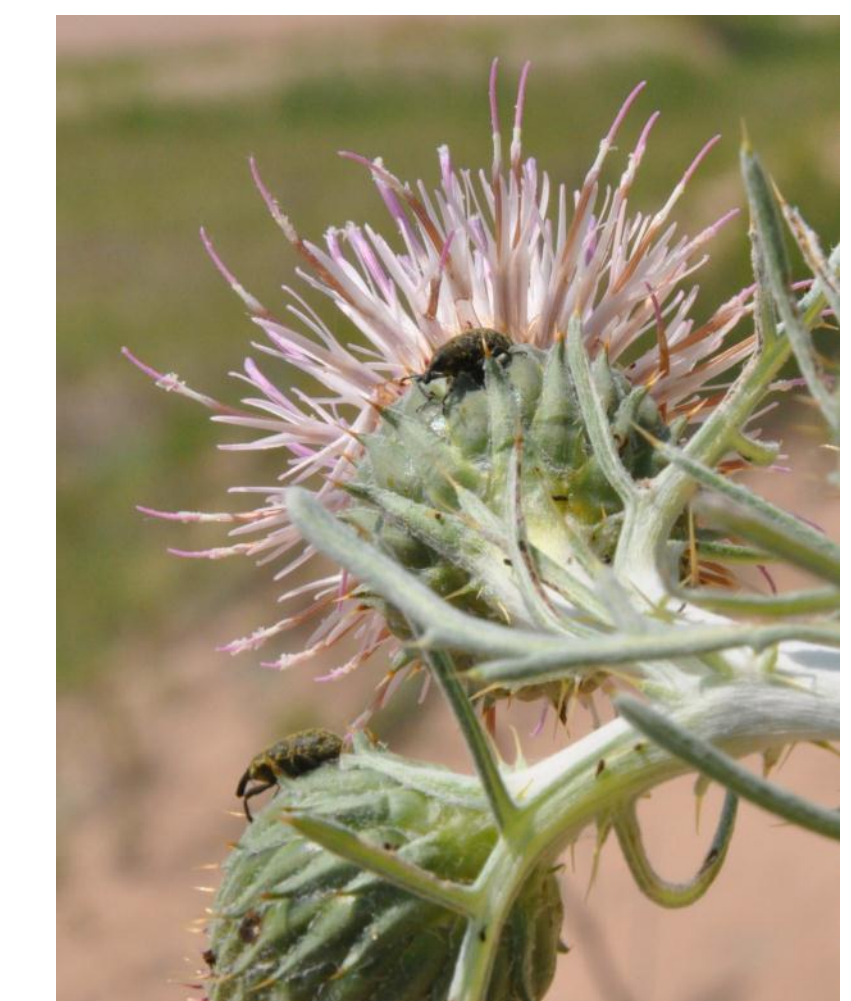


Figure 8: Larinus weevils present on Pitcher's thistle seed heads.

Recovery Efforts and Methods

During our time working with USGS, we assisted with the protection of Pitcher's thistle populations by conducting field surveys at Howe's Prairie, Miller Woods, West Beach, and Ogden Dunes. Field survey activities included observations of goldfinches feeding on Pitcher's thistle, measurements of seed heads, sifting sand at the base of plants to collect seeds, and the collection of seed heads for dissection.

Acknowledgements

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