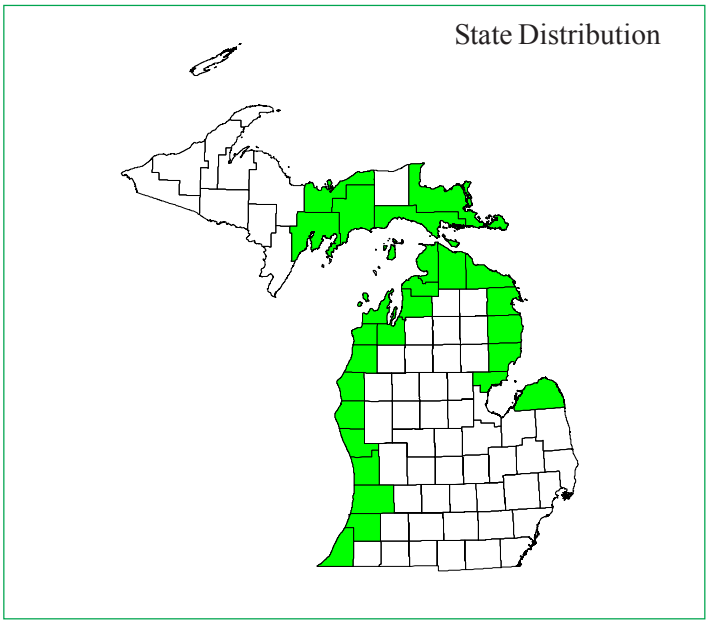
Cirsium pitcheri (Torrey and Gray) Pitcher's thistle

Photos by Sue Crispin



Status: State threatened, Federal threatened

Global and state rank: G3/S3

Other common names: Dune thistle

Family: Asteraceae (aster family)

Total range: The range of this Great Lakes endemic falls primarily within Michigan's borders, occuring along the entire shoreline of Lake Michigan, with localities along the more limited dunes of Lake Huron and a few sites along the extensive Grand Sable dunes of the Lake Superior shore. In Canada this species occurs in northern Lake Huron and at least one site on the north shore of Lake Superior. Several scattered sites occur along Lake Michigan in Wisconsin, and populations remain extant in Indiana within Indiana Dunes National Lakeshore. Historically, Pitcher's thistle was known from several localities in Illinois, where it was subsequently extirpated, but is now being reintroduced as part of the Federal Recovery Plan for the species.

State distribution: *Cirsium pitcheri* is most common in Michigan along the extensive dune systems on the northern and northeastern shores of Lake Michigan. It is scattered along the perimeters of southeastern Lake Michigan and northern Lake Huron. One major population and several relatively small occurrences are known along the southeastern shore of Lake Superior. The bulk of the occurrences, and those with the largest populations, are concentrated in the major dune landscapes in the northern Lake Michigan basin, especially in the Lower Peninsula counties of Emmet, Charlevoix, Leelanau, Benzie, Manistee, Mason, and Oceana.

Recognition: This stout, prickly, dune species may grow to ca. 1 m or more in height, though stunted individuals as small as 10 cm may flower. **The leaves and entire plant are blue-green in color and densely covered with white-woolly hairs.** The mature leaves are deeply divided into narrow, spine-tipped segments. **The prickly, spine-tipped flower heads are relatively large and strikingly cream-colored, though they may occasionally have a slightly pinkish tint,** yielding seeds with feathery bristles. Pitcher's thistle is unlikely to be easily confused with any other thistle species in Michigan, including both native and non-native species, all of which can be distinguished by their deep pink flower heads (with the rare exception of occasional albino flowers in other species). Although other thistles, particularly non-native ones, may inhabitat disturbed areas in dunes, they are unlikely to co-occur with Pitcher's thistle or persist in good quality, open dunes habitat. Vegetatively, all other thistles in Michigan lack the deep blue-green color of Pitcher's thistle and its usually dense covering of white woolly hairs.

Best survey time/phenology: *Cirsium pitcheri* is fairly easy to recognize as a seedling, but becomes more easily recognizable as it matures. Until one becomes familiar with the plant at all stages, it is best to survey for it during the principal flowering and fruiting period from late-June to early September.

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Habitat: Pitcher's thistle typically grows on open sand dunes and occasionally on lag gravel associated with shoreline dunes. All of its habitats are along the Great Lakes shores, or in very close proximity. Associated plants include such common dune species as *Ammophila breviligulata* (beach grass), *Andropogon scoparius* (little bluestem), *Elymus canadensis* (wild rye)*, Arabis lyrata* (lyre-leaved sand cress), *Arctostaphylos uva-ursi* (bearberry), *Calamovilfa longifolia* (sand reed grass), *Agropyron dasystachyum* (dune wheat grass), *Asclepias syriaca* (common milkweed), *Salix cordata* and *S. myricoides* (dune willows), *Hudsonia tomentosa* (beach heath; false heather), *Lithospermum caroliniense* (hairy puccoon), and many other characteristic species of the open dunes, including other rare taxa such as *Stellaria longipes* (stitchwort), *Orobanche fasciculata* (fascicled broomrape), and *Botrychium campestre* (prairie moonwort). Pitcher's thistle often occurs in association with the Great Lakes endemic *Solidago houghtonii* (Houghton's goldenrod) when interdunal wetlands are present within the dunes landscape.

Biology: This monocarpic (once-flowering) plant produces a vigorous rosette that may mature for ca. 5-8 years or more before it flowers. Pitcher's thistle blooms from approximately late June to early September and is protandrous (the pollen maturing before stigmas are receptive on individual flowers), and at least partially self-compatible. Insect pollinators are relatively diverse, including halictid bees, bumblebees, megachilid bees, anthophorid bees, and skippers and butterflies (*Vanessa cardui, Danaus plexippus*). Moths may well be nocturnal pollinators (Loveless 1984). Microlepidopteran larvae, especially the artichoke plume moth (*Platyptilia carduidactyla*), are responsible for varying amounts of seed predation by eating developing ovules. Loveless (1984) found that seed set declines throughout the flowering season. Seeds are dispersed individually by wind or as entire flower heads blown across the sand, or possibly transported by water.

American goldfinches were observed by Loveless (1984) to consume as much as 50% of the seeds in a flower head. Thirteen-lined ground squirrels also prey upon undispersed seed, and other birds, especially sparrows, forage on unburied dispersed seeds. The fundamental dispersal unit is often the entire head of mature achenes, which remains attached to the withered stem of the mother plant. Seeds germinate in June, and most seedlings appear within 1-3 meters of parent plants (Loveless 1984; Keddy & Keddy 1984). Spittlebugs contribute to mortality of adult plants by ovipositing on the apical meristem and deforming embryonic leaves. The taproot of this thistle, which can reach up to 2 m in length, enhances its ability to survive the desiccating conditions of the dune habitat (Loveless 1984; Johnson and Iltis 1963). High rates of sand movement probably stresses plants through erosion and burial of growing stems, though sand movement is absolutely essential for maintaining the open dune habitat of this species. Extreme drought can also be a major stress, especially for seedlings and juvenile plants with poorly developed, shallow tap roots.

Conservation/management: Though Pitcher's thistle can be locally extirpated by destruction or major disturbance of its habitat (e.g. by shoreline development or intensive recreation), it is somewhat tolerant of disturbance from pedestrians and limited ORV traffic. This is especially true in the heart of its range where it is more abundant and seed sources are present to assist in replenishment. However, vehicular traffic and regular foot traffic tend to unduly destabilize dune sands by mechanically destroying vegetation; this increases erosion and stresses Pitcher's thistle plants, which also are often severely affected by direct impacts. An indirect effect of artificial disturbance is that it enables non-native species such as the invasive spotted knapweed (*Centaurea maculosa*) to invade dune habitats and displace native vegetation, resulting in further habitat degradation.

Because of the extreme development pressure along the Great Lakes shoreline, the potential cumulative impacts to Pitcher's thistle populations is high. Efforts should be made to create active dune zones where development is limited.

Two of the world's largest populations of *Cirsium pitcheri* lie within Sleeping Bear National Lakeshore and Ludington State Park/Manistee National Forest (Nordhouse Dunes). The species also occurs in at least two Michigan Nature Association Sanctuaries, several Nature Conservancy preserves, five state natural areas, and in Pictured Rocks National Lakeshore, as well as in several informally protected public and private tracts.

Comments: Loveless (1984) found *Cirsium pitcheri* to be very low in genetic diversity. She also discovered that populations around the Straits of Mackinac differed genetically from more northern and southern populations, suggesting that the former may have been genetically isolated at some point and have had gene flow primarily among themselves. Due to the genetic similarity between *C. pitcheri* and the Great Plains species *C. canescens*, Loveless postulates that they descended from a common parent in the west, which migrated east to the Great Lakes shores during the abrupt warming occurring during the hypsithermal period (ca. 11,000-8000 years B.P.) by colonizing local, transient dune systems created by glacial outwash and proglacial lakes. The genetically depleted and homogeneous founder population which reached and colonized the dunes along the Great Lakes was then isolated from its western counterpart by climatic changes, resulting in postglacial reforestation and the extinction of possible linking populations.

Research needs: The response of this species to disturbance would provide useful management information, as Pitcher's thistle occurs in many areas heavily used by recreationists.

Related abstracts: Open duens, dune cutworm, Lake Huron locust, piping plover, dunewort, fascicled broomrape, Houghton's goldenrod, Lake Huron tansy.

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