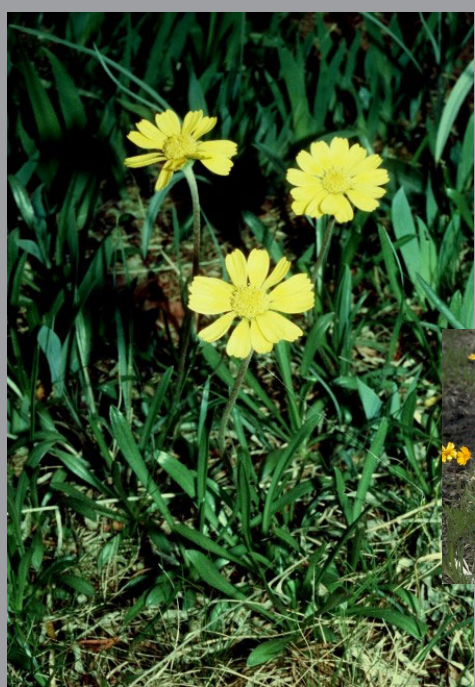
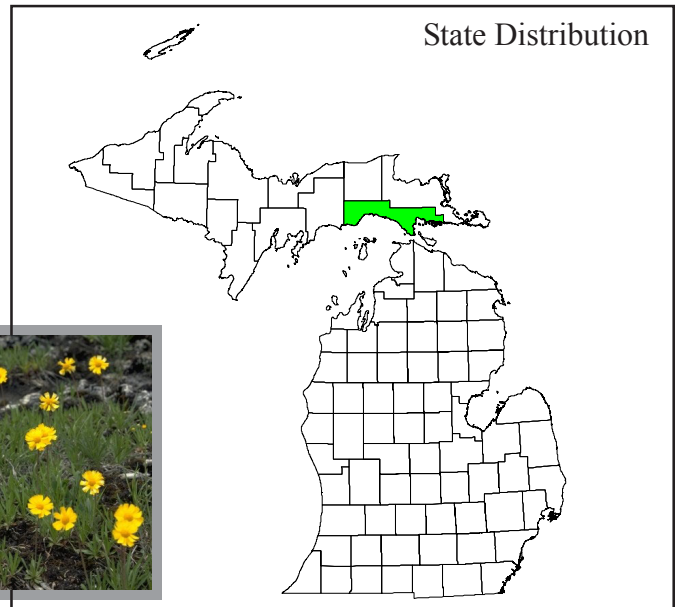




Photos by Michael Oldham, NHIC Archives



Best Survey Period



Status: Federal threatened, State endangered

Global and state rank: G2/S1

Other common names: Eastern four-nerved daisy, stemless four-nerved daisy

Family: Asteraceae (composite family)

Synonyms: *Hymenoxys acaulis* (Pursh) Parker var. *glabra* (A. Gray) Parker, *Tetraneuris herbacea* E.L. Green, *Actinea herbacea* (E.L. Greene) Robinson, *Actinea scaposa* (Pursh) Spreng. var. *glabra* (A. Gray) Cronquist, *Actinella scaposa* Nutt. var. *glabra* A. Gray (Cusick 1991).

Taxonomy: *Hymenoxys herbacea* was formerly considered a glabrous Midwestern variety of the wide-ranging *Hymenoxys acaulis* of the western Great Plains. Great Lakes populations are separated from this very similar species by 900-1400 km (559-870 mi) (Cusick 1991). Based on significant genetic and morphological data, and in view of the strong physical isolation from western *Hymenoxys* populations, Cusick (1991) classified the closely related plants of the Great Lakes as a distinct species. Our plants are now considered *H. herbacea*, which Cusick established as the nomenclaturally correct name. Morphologically,

Hymenoxys herbacea differs from *H. acaulis* primarily in its bright green leaves that lack pubescence, in contrast to the dull green and densely soft-hairy leaves of the latter.

This species likely originated from ancestors that colonized the Great Lakes region in the Xerothermic interval, a post-glacial warming period during which many drought-tolerant prairie and western cordillera (mountain range) plants migrated eastward (Cusick 1991). As climate subsequently changed again, becoming cooler, increasingly moist, and humid, *H. herbacea* persisted in favorable dry habitats (U.S. Fish and Wildlife Service 1990).

Total range: Lakeside daisy is an endemic restricted to the Great Lakes area, within which it is one of the region's rarest plants. In the United States it is known only from the Marblehead Peninsula area in northern Ohio, three restored populations in northern Illinois (where it was known historically from two sites), and a single, extremely small colony in Michigan's Upper Peninsula. In Ontario, Canada, where Lakeside daisy is most abundant, it occurs along much of the southern coast of Manitoulin Island and in several restricted areas near the tip of the Bruce Peninsula.

State distribution: This Great Lakes endemic is known from a single location in the eastern Upper Peninsula, where a small, extremely localized colony of



approximately 200 clumps occurs along a roadside in Mackinac County. The occurrence of this species was unknown to Michigan botanists until 1996, when members of the Ontario Federation of Naturalists (OFN) divulged this location to members of the State Technical Committee on plants.

Recognition: Lakeside daisy is a **clump-forming, herbaceous perennial** that produces **solitary, daisy-like flowers on stout, hairy stalks**. The leaves form **dense basal rosettes** that arise from a short, thick, branching base (caudex) with a similarly short, thick taproot. The **narrow, one-nerved, dark green leaves**, which may range to about 16 cm in length, are lanceolate (lance-shaped) to oblanceolate (narrower at the base), and in addition to being somewhat **thick in texture, are strongly punctate** (dotted with glands). **Flowers are borne solitarily** on relatively **stout, softly hairy peduncles** that elongate through the flowering period, ranging from about 10-40 cm in height when seeds are dispersed. The **bright yellow, daisy-like flower heads**, as in similar composites, are inflorescences composed of both disk (central) and ray (outer) florets, the ray florets **3-toothed** on the margin. The fruits are small, top-shaped, hairy achenes.

It is unlikely that flowering plants of Lakeside daisy would be confused with another species, particularly because there are very few early blooming composites and none that would even be superficially similar to this rarity.

Best survey time/phenology: *Hymenoxys herbacea* is an early blooming composite with a relatively narrow flowering period. Michigan's sole colony has flowered from the latter part of May to early June, the best period likely being the last week of May through the first week of June. This species is best sought during the blooming period, owing to its striking yellow flowers and clump-forming growth habit. Lakeside daisy can be recognized in sterile condition by experienced botanists, who may be able to conduct inventories based on knowledge of this species' growth habitat and specific habitat requirements. Plants may occasionally bloom in late summer, although it is not common.

Habitat: In the main portion of its range, such as Manitoulin Island in northern Lake Huron, lakeside daisy occurs primarily in the limestone pavement community known widely as alvar, although it also inhabits limestone or dolomite cliffs near the Lake Huron shore.

Alvars are globally rare natural communities (see limestone pavement lakeshore abstract), forming unique plant assemblages in which prairie grasses, sometimes mixed with boreal species, form thin turfs over porous limestone and dolomite, functioning much like karst (sinkhole) systems. Spring flooding in many sites is followed by summer drought, which impedes woody plant establishment and succession. Fire may also play a role in these systems. In Ontario, Lakeside daisy associates include such characteristic species as *Sporobolus heterolepis* (prairie dropseed), *Muhlenbergia richardsonis* (mat muhly), *Carex richardsonii* (Richardson's sedge), *C. scirpoidea* (bulrush sedge), *Solidago houghtonii* (Houghton's goldenrod), *Juniperus virginiana* (Eastern red cedar), *J. communis* (ground juniper), *Saxifraga virginensis* (early saxifrage), *Geum triflorum* (prairie smoke), *Bouteloua curtipendula* (side-oats grama grass), and *Cirsium hillii* (Hill's thistle).

In Michigan, Lakeside daisy does not occur in an alvar community, but its setting, albeit on a roadside, is unique and similar in many ways to alvar habitat. The colony occurs on a thin mat of vegetation underlain by a thick tufa deposit, a rock formation created via the precipitation of calcium from alkaline groundwater seeps and springs. In terms of landscape setting, the micro-habitat lies in the upland transition zone of an extensive northern fen complex to the south. Characteristic associated plants include *Thuja occidentalis* (northern white cedar), *Juniperus horizontalis* (creeping juniper), *Selaginella selaginoides* (spikemoss), *Tofieldia glutinosa* (false asphodel), *Carex flava* (sedge), *Carex crawei* (sedge), *Zigadenus glaucus* (white camas), *Parnassia glauca* (grass-of-Parnassus), *Eleocharis rostellata* (spike-rush), and *Senecio paupercula* (ragwort). Among the several rare associates are Houghton's goldenrod, bulrush sedge, Richardson's sedge, *Pinguicula vulgaris* (butterwort), and *Erigeron hyssopifolius* (hyssop-leaved fleabane). Interestingly, several notable alvar species are included among the aforementioned Michigan associates.

Biology: Lakeside daisy is a perennial herb. Clumps of genetic individuals can expand by producing additional rosettes at the tip of the caudex. As plants age over the years, the older rosettes in the middle senesce and die back as new ones are added on the periphery, resulting in a "donut"-shaped form. Lakeside daisy is a self-incompatible species, with pollination achieved by bumble bees and small carpenter or halictid bees,



although wind pollination may also occur. An extensive overview of Lakeside daisy reproductive biology is provided in the Federal Recovery Plan (U.S. Fish and Wildlife Service 1990) and by DeMauro (1993).

Conservation/management: As a Federally listed species, the conservation of Lakeside daisy in the United States is guided by an approved Recovery Plan. The plan provides goals and objectives for recovery actions, as well as criteria with which to measure progress toward recovery. Although the Michigan locality was discovered several years after the approval of the Federal Plan, useful information is provided within it, and any subsequent plan revisions should also incorporate information and recovery actions for the Michigan occurrence. At the present time, the primary need is protection for the highly fragile, remnant Michigan colony. The population occurs on private land, although it is still uncertain if the colony falls partially within the road right-of-way (ROW). The county road commission has been alerted concerning this location, and a special sign has been placed to warn maintenance crews. Timber cutting activities were recently observed in the vicinity of the population, prompting concern and suggestions to translocate at least a portion of the colony to suitable habitat on public land where it can be actively managed and monitored. Suggestions have also been provided by Lakeside daisy experts from Ohio for managing habitat immediately around the colony, such as the careful removal of encroaching cedar trees to enhance the opening. Such management has not yet been implemented, but may occur in the near future if cooperation is obtained from the private landowner.

Lakeside daisy may have been much more common in the area of the Michigan locality prior to large-scale logging, farming, and other land settlement activities. Discovery of this colony indicates that inventory is warranted for additional remnant colonies in the eastern Upper Peninsula, since previous surveys for Lakeside daisy in Michigan were logically focused on the extensive alvar plains of Drummond Island.

Research needs: Considerable work has been conducted on this species, including genetic investigations providing evidence for the current taxonomic standing. A rangewide allozyme genetic study coordinated by the Ohio Department of Natural Resources is ongoing, and should provide important findings, including those that help explain the relationship and origins of the

widely disparate populations in the Great Lakes region. Research regarding management techniques is also desirable to determine how to best maintain and perpetuate this rare Great Lakes endemic.

Related Abstracts: Limestone pavement lakeshore, prairie Indian-plantain, English sundew, prairie smoke, dwarf lake iris, mat muhly, Houghton's goldenrod, prairie dropseed, Hine's emerald dragonfly, incurvate emerald dragonfly.

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Abstract citation:

- M.R. Penskar and P.J. Higman. 2002. Special Plant Abstract for *Hymenoxys herbacea* (Lakeside daisy). Michigan Natural Features Inventory. Lansing, MI. 3 pp.

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