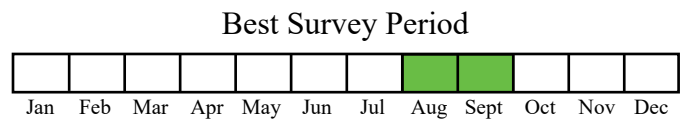
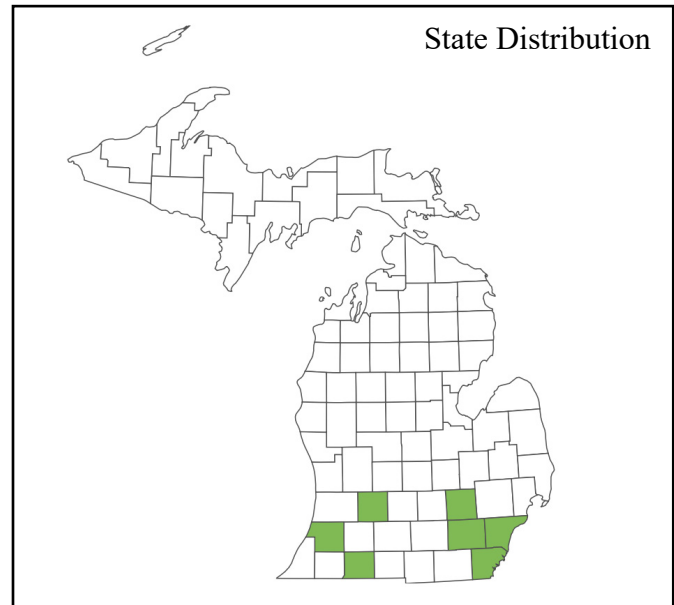




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Status: State Threatened

Global and state rank: G5 (Globally Secure) /S2 (State Imperiled)

Other common names: American water-willow, dense-flowered water-willow

Synonyms: *Dianthera americana* L.

Family: Acanthaceae (acanthus family)

Sub-family: Acanthoideae

Taxonomy: This is among just three Michigan species of Acanthaceae, a chiefly tropical family closely related to the Lamiaceae (mint family).

Total range: Water-willow is known from much of eastern North America, from Texas east to Florida, north to New Hampshire, and west to Nebraska (Kartesz 2015). Globally, it is ranked as secure (G5). At the state/provincial level, it is ranked as No Status Rank (SNR/SU/SNA) in Alabama, Arkansas, Florida, Illinois, Indiana, Mississippi, Missouri, Ohio, Oklahoma, Tennessee, Texas, and Wisconsin; Secure (S5) in Georgia, Kentucky, Pennsylvania, Virginia, and West Virginia; Apparently Secure (S4) in Nebraska, New Jersey,

New York, North Carolina, and South Carolina; Vulnerable (S3) in Louisiana; Imperiled (S2) in Michigan and Ontario; and Presumed Extirpated (SX) in New Hampshire (NatureServe 2024).

State distribution: In Michigan, water-willow is represented by 19 element occurrences (EOs). Of these EOs, five are ranked H (historic). The most recent observation date among the historic EOs was from 1959. However, some of these populations may be extant, as they have not been surveyed for recently. The other 14 EOs are believed extant. Eight are ranked as E (verified extant, viability not assessed), one as D (viability estimated as poor), one as C? (possibly poor), one as C (poor), one as BC (good or fair), one as B (good), and two as AB (excellent or good). The most recent observations among the 14 believed extant records include two from the 1980s, one from the 90s, two from the 2000s, six from the 10s, and three from the 20s (MNFI 2024a). These 14 records span the counties of Monroe, Washtenaw, and Wayne in the southeast and Barry, St. Joseph, and Van Buren in the southwest. The highest concentration of records is in Monroe, Washtenaw, and Wayne Counties along the Huron River, River Raisin, and nearby lakes



and streams. No populations were documented from southwestern Michigan until 1999, since which populations have been documented in two inland lakes and along the St. Joseph River. Additionally, a historical record is known from Livingston County in southeastern Michigan (MNFI 2024a, Reznicek et al. 2024). Though local, colonies are sometimes extensive. A population on the Huron River was estimated at tens of thousands of stems in 1981. A population in St. Joseph County was estimated at 11,000 stems in 2017. A second population on the Huron River was estimated at 75,000 stems in 2018. A third population on the Huron River was estimated at 25,000 stems in 2020 (MNFI 2024a).

Recognition: Like other members of the Lamiales, the corolla is bilabiate, so water-willow could on first impression be taken for a mint or a member of a related family. However, water-willow is recognizable by its generally large height (<3 dm in wet soil **to nearly 15 dm in the deepest water**), **long oppositely arranged leaves** on erect stems (8–20 cm long and **7–15 times longer than broad**), and habit (forming dense colonies via stoloniferous reproduction). Unlike members of the Lamiaceae, water-willow does not have a 4-lobed ovary, and its **fruits are capsules** not nutlets. More detailed information on morphology and habit is presented below, summarized from Penfound (1940), Gleason and Cronquist (1991), Crow and Hellequist (2000), Yatskievych (2006), and Reznicek et al. (2024).

Leaves on erect stems opposite, linear to lanceolate or narrowly oblong to elliptic, and completely **glabrous**. Leaves are also borne on stolons and rhizomes. **Stems glabrous**. Erect stem normally simple, its diameter grading from 3–20 mm along the length of the stem. Flowers perfect, borne in short (1–3 cm) dense axillary spikes on long (5–15 cm) peduncles near top of plant. **Calyx glabrous**, 4–8 mm long, nearly regular, with lanceolate lobes. **Corollas bilabiate**, white with at least one purple or purple-streaked lobe, **less than 1.5 cm long, the lobes about as long as the tube or longer**. **Stamens 2**, the two sacs of each anther separated and somewhat unequal; thus, each filament appears



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to support two anthers, hence the previously accepted generic name *Dianthera*. Capsules 8–13 mm long. Seeds 2.0–3.5 mm long. Roots adventitious with the ability to form at lower nodes. A study from the southeastern United States found a density of 108–237 erect stems per m² and 113 km of stolons per ha (Penfound 1940).

Best survey time/phenology: In Michigan, the best survey time is considered to be the first week of August through fourth week of September (MNFI 2024b). However, it is known to flower as early as June and July (MNFI 2024a). More than a quarter of known herbarium specimens have been collected in June and July (Brad Ruhfel, University of Michigan, personal communication).

Habitat: In Michigan, water-willow grows in rivers, lakes and streams (Reznicek et al. 2024) and associated emergent marsh, floodplain forest, and Great Lakes marsh (MNFI 2024b). It is a highly conservative plant in Michigan, with a coefficient of conservatism of 9 (Reznicek et al. 2014). In the Chicago Region, it grows on submerged or exposed mudbars in streams, on muddy shores of streams, on islands, and in shallow water (Swink and Wilhelm 1994). It can grow in water up to 1.2 m deep (Penfound 1940).

Though it often grows without associated plants, it has been documented with the following native species in Michigan and the Chicago Region:



Alisma subcordatum (southern water-plantain), *Bidens cernua* (nodding beggar-ticks), *Carex* spp. (sedges), *Eleocharis* spp. (spike-rushes), *Leersia oryzoides* (cut grass), *Lindernia dubia* (false pimpernel), *Phyla lanceolata* (fog-fruit), *Rumex verticillatus* (water-dock), *Persicaria* spp. (smartweeds), *Sagittaria latifolia* (common arrowhead), *Schoenoplectus* spp. (bulrushes), *Sparganium eurycarpum* (common bur-reed), *Glyceria borealis* (northern manna grass), *Myriophyllum* spp. (water-milfoils), *Nasturtium officinale* (watercress), *Nuphar advena* (yellow pond-lily), *Nymphaea odorata* (sweet-scented waterlily), *Peltandra virginicum* (arrow-arum), *Pontederia cordata* (pickerel-weed), *Potamogeton* spp. (pondweeds), *Saururus cernuus* (lizard's-tail), *Spirodela polyrhiza* (greater duckweed), *Typha latifolia* (common cat-tail), and *Zizania* spp. (wild-rices) (Swink and Wilhelm 1994, MNFI 2024b).

Biology: This emergent perennial reproduces vegetatively by stolons and rhizomes and sexually by seed. Flooding can be an agent of long-distance dispersal via fragments. Seeds are ejected forcibly and audibly from capsules, and they land 0.3–1.2 m from the parent plant. Seeds can float one to several hours and germinate immediately on suitable substrate. Plants grow vegetatively in their first year and flower in their second (Penfound 1940). The dense stands stabilize streambed sediments, enhance deposition of fine sediment and organic matter, and provide habitat to fish and sedentary unionid mussels (Fritz et al. 2004, Strakosh et al. 2005). However, excessive proliferation of this plant can diminish habitat heterogeneity. Annual senescence is an important source of carbon but can also lead to pulses of excess phosphorous. In parts of its range, but not in Michigan, water-willow grows with extreme vigor and has dramatic effects on the communities in which it grows, including both positive and negative influences (Keating and Simmons 2014).

Conservation/management: This species is threatened by competition with invasive species, aquatic plant removal programs, and by landscaping, beachscaping, and residential



development along rivers, streams, and lakes. Leaky septic tanks, run-off, and stormwater drainage likely cause increased nutrient load and relatively warm water to enter the plant's habitat. However, erosion from adjacent land may paradoxically benefit this species by increasing mud load and creating mudbar habitats (Swink and Wilhelm 1994). If co-occurring with invasive species such as *Butomus umbellatus* (flowering rush), *Hydrocharis morsus-ranae* (European frog's-bit), *Lythrum salicaria* (purple loosestrife), *Phalaris arundinacea* (reed canary grass), *Phragmites australis* subsp. *australis* (common reed), or *Typha* spp. (cat-tails), control methods should be selected that will minimize harm to this species (Czarapata 2005).

Comments: This is a conspicuous plant that grows in habitats likely to be encountered by humans. One would not expect it to be significantly under-collected, yet it was not documented from southwestern Michigan until 1999. It is rare statewide yet can be locally abundant, potentially leading to the impression at local scales that it is of no conservation concern. The beautiful flowers could be tempting for gardeners and bouquet-seekers. Elsewhere in its range, it is planted to provide fish habitat (Strakosh et al. 2005). It has previously been considered indirectly hazardous to human health because dense stands served as breeding ground for malarial mosquitoes (Penfound 1940).

Research needs: This species has received



significant research attention due to the structure and habitat it provides to aquatic communities (Fritz et al. 2004, Strakosh et al. 2005, Touchette et al. 2011, Keating and Simmons 2014). Research has focused on greenhouse propagation, factors affecting growth in natural settings, and the effects of the species on its environment. In Michigan, a statewide status survey is warranted due to the dated nature of many EOs. New occurrences should also be sought in suitable habitat in the southern part of the state. The populations in Van Buren and Barry Counties need to be vouchered and deposited in herbaria. Michigan populations need to be phylogenetically studied to determine the relationship between southwestern and southeastern Michigan populations and investigate the possibility that southwestern populations are recent introductions.

Related abstracts: emergent marsh, floodplain forest, Great Lakes marsh, *Zizania aquatica* (southern wild-rice)

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