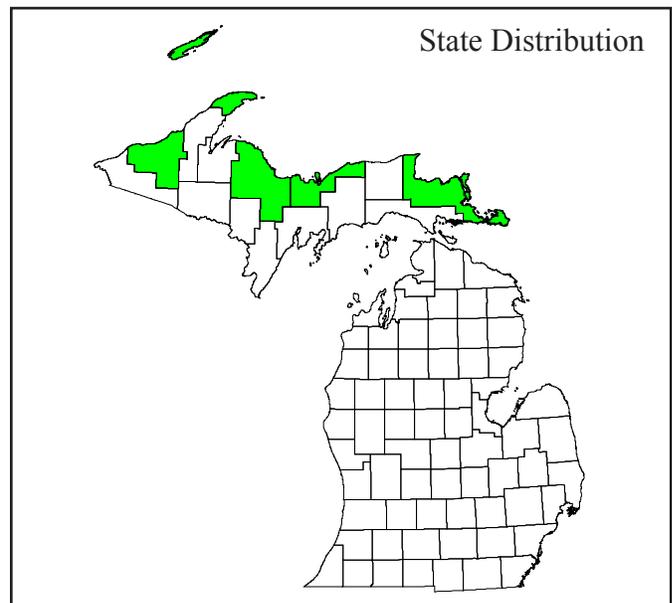
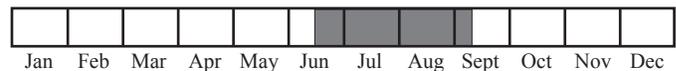




Photo by Susan R. Crispin



Best Survey Period



Status: State special concern

Global and state rank: G5/S2S3

Other common names: Spike trisetum, narrow false oats

Family: Poaceae (grass family); also known as the Gramineae

Taxonomy: According to Voss (1972), this circumboreal species is extremely variable. Michigan specimens with hairy glumes have been assigned to var. *polosiglume* Fern. Randall and Hilu (1987) studied the morphological diversity of this species using material from throughout North America. They concluded that owing to the high degree of natural variation within the species there is little merit in the recognition of any previously named varieties or the elevation of certain polyploids to full species rank. According to the Flora of North America (2007), several named varieties and subspecies based on minor variations in the panicle are not considered valid.

Range: Downy oat-grass ranges around the world at northern latitudes, occurring throughout Greenland, Asia, and Europe. In North America, this species occurs primarily in alpine meadows in the Arctic, ranging south to Connecticut, Pennsylvania, and

in the Great Lakes occurring south to the northern edges of Michigan, Wisconsin, and Minnesota. To the west, *Trisetum spicatum* ranges into the Pacific region and south through the Rocky Mountains to Colorado. It is considered rare in Nova Scotia, Pennsylvania, Saskatchewan, Virginia, and Wisconsin, and is considered to be extirpated in North Carolina (NatureServe 2006).

State distribution: Known from about 30 localities, *Trisetum spicatum* is restricted to the Upper Peninsula, occurring principally along the conglomerate bedrock shorelines of the Keweenaw Peninsula, with a single occurrence each in Alger, Chippewa, and Ontonagon counties, and a few locations in Marquette County. Of the 25 Keweenaw County localities, nine are in the northeastern portion of the Isle Royale National Park archipelago. The Chippewa County site consists of a locality on the dolomite bedrock of Drummond Island in the extreme eastern end of the Upper Peninsula (Voss 1972), significantly disjunct from all other mainland occurrences.

Recognition: This somewhat obscure grass usually occurs in scattered tufts of single to multiple stems, with flowering stems averaging approximately 10-20 cm in height, though they occasionally may be much taller, ranging up to 40-50 cm. The flowering stem, which bears a few, widely spaced cauline leaves with



retroresely hairy sheaths and usually 1-2 leaves along its length, is terminated by a **short, dense flowering spike, which is somewhat purplish-pink prior to flowering and fruiting. The lemmas in this species have a large, spreading dorsal awn. This awn arises from the middle of the back of the lemma and is flexuous (curving) and scabrous at the base.** The closely related *T. meilicoides*, which could potentially occur with *T. spicatum*, can be distinguished its awnless lemmas and drooping, open inflorescence. As suggested by the common name, downy oat-grass is characterized by the dense, velvet-like hairiness of the stem and flowering spike, though this pubescence is known to be highly variable.

Best survey time/phenology: The majority of Michigan records are recorded in July and August, with plants observed from about mid-June through early September over the state range.

FQI Coefficient and Wetland Category: 10, FAC-

Habitat: Downy oat-grass occurs primarily along bedrock shorelines of the western Upper Peninsula, where it is known from several different bedrock formation types. It is found principally in association with calcareous (alkaline) substrates, particularly on such bedrock types as Copper Harbor conglomerate and basaltic formations; occasionally this species also occurs on the somewhat acid substrates of various igneous and metamorphic bedrocks, including granite and gneiss. In the eastern Upper Peninsula, this species has been documented as occurring on dolomite (dolostone) bedrock referable to what is known as alvar (see community abstract for this type). Typically, this species occurs along the immediate shore, where it establishes in crevices and other small concavities in sparsely vegetated portions of bedrock, often well within or near the wave-splash zone, yet it also has another niche, occurring in sheltered, gravelly or sandy areas protected from wave action, as observed in some Isle Royale sites.

Amidst an often diverse assemblage of lichens, associated plants typically include such species as *Danthonia spicata* (poverty grass), *Deschampsia flexuosa* (hair-grass), seedlings or depauperate individuals of *Thuja occidentalis* (northern white cedar), *Shepherdia canadensis* (buffaloberry), *Campanula rotundifolia* (harebell), *Potentilla tridentata* (three-toothed cinquefoil), and *Physocarpus opulifolius*

(ninebark), and sometimes such rarities as *Saxifraga tricuspidata* (encrusted saxifrage), and other low forbs and herbs. On the dolomite shore of Drummond Island, downy oat-grass was found associated with northern white cedar, *Abies balsamea* (balsam fir), *Prunus pumila* (sand cherry), *Juniperus communis* (ground juniper), *Shepherdia canadensis*, *Poa alpina* (Alpine bluegrass), *Carex scirpoidea* (bulrush sedge), *Cirsium hillii* (Hill's thistle), and *Eleocharis compressa* (flattened spike-rush).

Biology: Relatively little is known of the biology of downy oat-grass, although there have been some germination studies (Clebsch and Billings 1976, Amen 1966) and observations on the role of this species in ecological succession, such as plant recolonization of Mount St. Helens in Washington State (del Moral and Wood 1993, del Moral and Clampitt 1985). The ecological niche indicates that the cool microclimate along the immediate lakeshore, in addition to a lack of vascular plant competition, may be required in the southern or somewhat disjunct portion of its range in Michigan. This highly variable grass species is an apparently intricate complex with diploid, tetraploid, and hexaploid races (i.e. races with two, four, and six sets of chromosomes).

Conservation/management: As noted above, comparatively little is known of the natural history of this species. At present, the protection of the Lake Superior shoreline and its natural processes and regime is probably the best approach to conservation. Although tracked only as a special concern species within Michigan, this obscure grass can perhaps be regarded as an indicator of the environmental status and condition of the Lake Superior shoreline. Unregulated development and excessive use of the shoreline by recreationists is very likely to impact this and other plants of the distinctive bedrock flora.

Comments: Downy oat-grass is recognizable by approximately late June, with most collections of this species made in July.

Research needs: Studies of virtually any aspect of the natural history of this species would assist in conservation and management. Investigations related to seed dispersal and establishment would be particularly useful, in addition to understanding the genetic diversity within and between populations.



Related abstracts: Volcanic bedrock lakeshore, volcanic cobble shore, sandstone bedrock lakeshore, northern blue, alpine bluegrass, alpine bistort, black sedge, encrusted saxifrage, pearlwort, prickly saxifrage.

Selected references:

Amen, R.D. 1966. The extent and role of seed dormancy in alpine plants. *The Quarterly Review of Biology* 41: 271-278.

Clebsch, E.E.C. and W.D. Billings. 1976. Seed germination and vivipary from a latitudinal series of populations of the arctic-alpine grass *Trisetum spicatum*. *Arctic and Alpine research*. 8: 255-262.

Del Moral, R. and D.M. Wood. 1993. Early primary succession on the volcano Mount St. Helens. *Journal of Vegetation Science*. 4: 223-234.

Del Moral, R. and C.A. Clampitt. 1985. Growth of native plant species on recent volcanic substrates from Mount St. Helens. *Amer. Mid. Nat.* 114: 374-383.

Dore, W. G., and J. McNeill. 1980. *Grasses of Ontario*. Agriculture Canada, Res. Monogr. 26: 566 pp.

Flora of North America Editorial Committee. 2007. *Flora of North America, North of Mexico. Volume 24: Magnoliophyta: Commelinidae (in part): Poaceae, part 1*. Oxford Univ. Press. New York, NY. 908 pp.

Hultén, E. 1958. *The amphi-atlantic plants and their phytogeographical connections*. Almqvist & Wiksell, Stockholm.

NatureServe. 2006. NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: December 15, 2006).

Randall, J.L. and K.W. Hilu. 1986. Biosystematic studies of North American *Trisetum spicatum*

(Poaceae). *Syst. Bot.* 11: 567-578.

Scoggan, H. J. 1978. *The Flora of Canada*. Nat. Mus. Nat. Sci. Publ. Botany. 4 vol., 1711 pp.

Voss, E. G. 1972. Michigan Flora. Part I. Gymnosperms and Monocots. *Bull. Cranbrook Inst. Sci.* 55 and *Univ. of Michigan Herbarium*. xv + 488 pp.

Wager, H.G. 1938. Growth and survival of plants in the Arctic. *J. Ecol.* 26: 390-410.

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