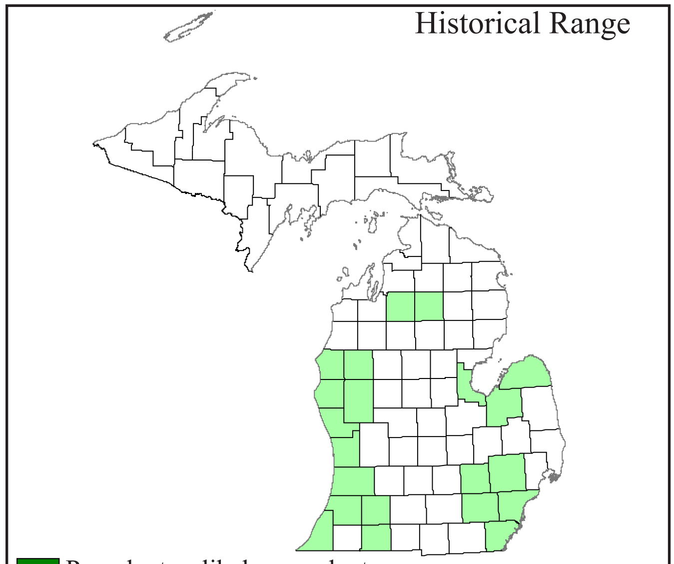
# Mesic Sand Prairie — Community Abstract

Photo by Bradford S. Slaughter



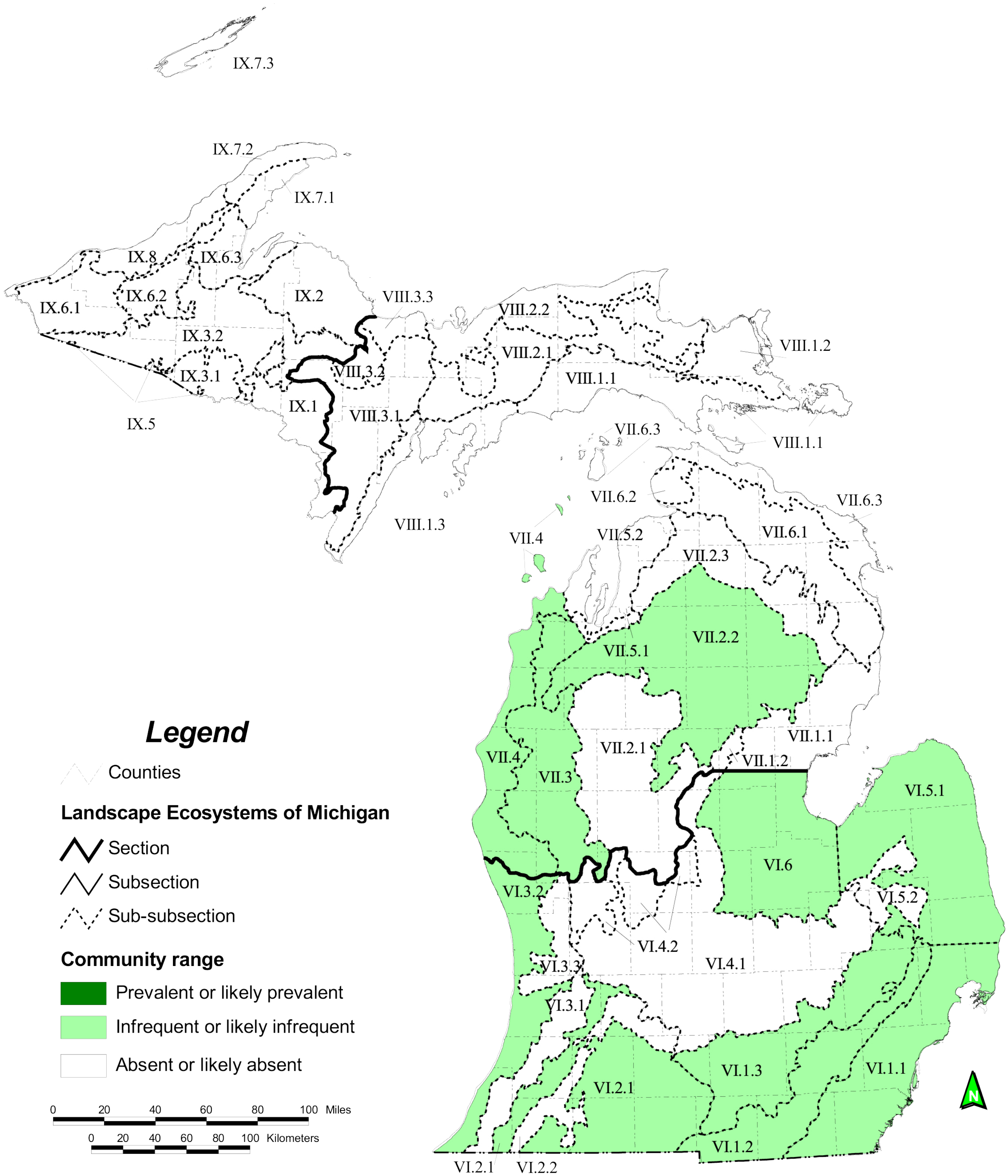

**Overview:** Mesic sand prairie is a native grassland community that is typically dominated by little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and/or prairie dropseed (*Sporobolus heterolepis*) and occurs on sandy loam, loamy sand, or sand soils on nearly level glacial outwash and glacial lakeplain. Sites that support mesic sand prairie have seasonally fluctuating water tables, characterized by moist to saturated conditions in the spring followed by drought conditions in late summer and fall. Thus, the community contains species from a broad range of moisture classes such as those more typically associated with wet-mesic prairie, mesic prairie, dry-mesic prairie, and dry sand prairie. Areas dominated by native grasses with less than one mature tree per acre are considered prairie (Curtis 1959).

**Global and State Rank:** G2/S1

**Range:** Mesic sand prairie occurs in IL, IN, MI, OH, WI, and southern Ontario (Faber-Langendoen 2001, NatureServe 2009). In Michigan, the community has been documented in both the southern and northern Lower Peninsula in Crawford, Kalamazoo, Kalkaska, Monroe, Oakland, Van Buren, Washtenaw, and Wayne Counties. Historically, the community likely occurred as small patches within fire prone landscapes on sandy soils with seasonally high water tables and as an ecotone between non-forested wetlands and savannas (e.g., oak openings, oak barrens, oak-pine barrens, bur oak plains, lakeplain oak openings).

**Rank Justification:** In the early to mid 1800s, the Lower Peninsula supported approximately 73,000 acres (29,500 ha) of upland prairie, which included pockets of mesic sand prairie, mesic prairie, dry-mesic prairie, dry sand prairie, and hillside prairie. The Michigan Natural Features Inventory database currently includes nine element occurrences of mesic sand prairie, which total 153 acres (62 ha) and range in size from 1 to 77 acres (0.4 to 31 ha). It is difficult to reliably determine the total acreage of mesic sand prairie in Michigan in the 1800s. However, based on comparisons of the total acreage of all upland prairie element occurrences in Lower Michigan today (1,463 acres, 592 ha) with that found in the early to mid 1800s (provided above), it appears that only 2% of the original upland prairie remains intact in all of Lower Michigan.

**Landscape and Abiotic Context:** Mesic sand prairie occurs on sandy glacial outwash, lakeplain, and abandoned lakebeds that experiences seasonal water table fluctuations, with the wettest conditions occurring in spring and driest periods in late summer and fall. Prolonged spring inundation may occur in the wettest portions of some mesic sand prairies.




Ecoregional map of Michigan (Albert 1995) depicting historical distribution of mesic sand prairie (Albert et al. 2008)

**Michigan Natural Features Inventory**
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Soils supporting mesic sand prairie are sandy loam or occasionally loamy sand, loamy fine sand, or fine sand, with pH ranging from 5.4 to 7.3 (ave. pH 5.5) and water retaining capacity ranging from 31 to 62% (ave. 43%) (Chapman 1984). The mesic condition of the sandy soils is facilitated by a high water table and, in some sites, by a relatively high organic content within the sand matrix, which increases the water holding capacity of soil.

In the 1800s, mesic sand prairie in Michigan occurred as small patches of grassland within and between fire prone communities. The community occupied sandy sites with seasonally high water tables such as those occurring in shallow depressions within outwash plains and on old glacial lakebeds, abandoned stream channels, and river terraces. On the southeastern Lower Michigan lakeplain, mesic sand prairie occupied low sand ridges with a seasonally high water table and broad sand plains in Monroe and Wayne Counties (Chapman 1984). Mesic sand prairie also occurred as an ecotone between fire-dependent uplands and open wetlands (e.g., wet-mesic sand prairie, wet-mesic prairie, wet prairie, prairie fen, northern fen, southern wet meadow, northern wet meadow, intermittent wetland, coastal plain marsh, and emergent marsh) (Kost et al. 2007).

**Natural Processes:** A high water table in the spring followed by drought-like conditions in the late summer and fall creates conditions suitable for a diversity of plant species representing a broad range of moisture tolerances. In addition to seasonal water level fluctuations, longer term changes in the regional water table also influence the community composition.

As in other prairie and savanna communities, fire played a critical role in maintaining open conditions in mesic sand prairie. The frequency and intensity of fire depended on a variety of factors including the type and volume of fuel, topography, presence of natural firebreaks, and density of Native Americans (Chapman 1984). In general, the probability of wide-ranging fire increases in level topography such as large outwash plains (Chapman 1984). Carried by wind, fires moved across the outwash plains, through graminoid-dominated wetlands, and up slopes of end moraines and ground moraines.

While occasional lightning strikes resulted in fires that spread across the landscape, Native Americans were the main sources of ignition. There are many early accounts of Native Americans intentionally setting fires to accomplish specific objectives (see Day 1953, Curtis 1959, Thompson and Smith 1970, Chapman 1984, Denevan 1992, Kay 1995). Native Americans intentionally set fires in the fall to clear briars and brush and make the land more easily passable. Frequent fires kept the land open, increasing both short- and long-range visibility, which facilitated large game hunting and provided a measure of safety from surprise attacks by neighboring tribes. Fire was used to increase productivity of berry crops and agricultural fields. As a habitat management tool, fires were used to maintain high quality forage for deer, elk, woodland caribou, bison and other game species. It was also used as a hunting tool to both drive and encircle game. During warfare, fire was strategically employed to drive away advancing enemies, create cover for escape, and for waging attacks.

In addition to maintaining open conditions, fire plays a critical role in maintaining species diversity. A recensus of 54 prairie remnants in Wisconsin found that 8% to 60% of the original plant species recorded at the sites had been lost over time (32 to 52 years) even though the sites appeared relatively undisturbed (Leach and Givnish 1996). The authors suggest the decline in diversity was a result of taller vegetation outcompeting species with small stature, those with small seeds (e.g., orchids), and those that rely on nitrogen-fixing symbioses, such as members of the legume family (Fabaceae), including lupine (*Lupinus perennis*), wild indigo (*Baptisia* spp.), bush clover (*Lespedeza* spp.), and tick-trefoil (*Desmodium* spp.). Because fire maintains open conditions and burns off accumulated leaf litter, species that require open microsites for seedling establishment and growth are able to garner enough space and light to coexist with taller, denser vegetation. In the absence of frequent fires, small species are outcompeted by taller and denser vegetation. In addition, seedlings with low food reserves, such as those with small seeds, have difficulty growing through thick litter. The decline in species diversity is especially pronounced in mesic and wet community types where live biomass and leaf litter accumulate rapidly. Because fire volatilizes much of the nitrogen stored in combustible vegetation, frequent burning also favors species that form nitrogen-fixing symbioses (e.g., legumes and rhizobium bacteria) by providing a competitive edge not found in unburned sites (Leach and Givnish 1996).

Fire also helps maintain species diversity by facilitating expression of the soil seed bank and promoting seed germination and establishment. By consuming accumulated and standing leaf litter, fire increases light availability to the soil surface and increases diurnal temperature fluctuations, both of which trigger seed germination. Critical microsites for seed germination and seedling establishment are also created when litter levels are reduced by fire.

Through burning accumulated litter and dead, standing vegetation, fire increases the availability of many important plant nutrients (e.g., N, P, K, Ca and Mg), which are thought to contribute to higher plant biomass, increased flowering and seed production, and greater palatability to herbivores following a burn (Vogl 1964, Daubenmire 1968, Viro 1974, Vogl 1974, Smith and Kadlec 1985, Abrams et al. 1986, Collins and Gibson 1990, Reich et al. 1990, Schmalzer and Hinkle 1992, Timmins 1992, Laubhan 1995, Warners 1997).

While this discussion has focused on plants it is important to note that these species serve as hosts for a variety of insects, and that the structure of open grasslands is critical to a wide variety of animal species, many of which are considered rare or declining today (see Other Noteworthy Species section).

Ants, particularly the genus *Formica*, play an important role in mixing and aerating prairie soils (Curtis 1959, Trager 1998). Large ant mounds, which may measure half a meter in height and over one meter wide and number 40 to 50 per acre are especially conspicuous following a prairie fire (Curtis 1959). Because of their abundance and frequent habit of abandoning old mounds and building new ones, ants overturn large portions of prairies in a relatively short time (Curtis 1959). Other important species contributing to the mixture and aeration of prairie soil include moles, voles, mice, skunks, ground hogs, ground squirrels, and badgers (Curtis 1959).

Historically, large herbivores such as bison significantly influenced plant species diversity in Michigan prairie and oak savanna ecosystems. The diet of bison consists of 90 to 95% grasses and sedges (Steuter 1997). As bison selectively forage on grasses and sedges, they reduce the dominance of graminoids and provide a competitive advantage to forb species. The activities of bison, which include wallowing and trampling, promote plant species diversity by creating microsites for seed germination and seedling establishment and reducing the dominance of robust perennials (Steuter 1997).

**Vegetation Description**: Unfortunately, no detailed ecological study of mesic sand prairie was completed in Michigan before the nearly total demise of the community. What information is available comes from a detailed study of prairie communities in Michigan by Chapman (1984) and data from Michigan Natural Features Inventory element occurrence records.

The vegetation of mesic sand prairie supports a sparse to moderately dense growth of low to medium height vegetation with patches of bare soil evident (Chapman 1984). The community is typically dominated by one or more of the following prairie grasses: little bluestem, big bluestem, Indian grass, and, locally, prairie dropseed. Pennsylvania sedge (*Carex pensylvanica*) may also be co-dominant where drought-like conditions in late summer and fall are a common occurrence. Within Michigan, species composition varies across ecoregions. The table below summarizes species commonly occurring in mesic sand prairie. Note that the list is comprised of species with a wide range of wetland coefficients (e.g., moisture tolerances), indicating that large fluctuations in local and regional water tables strongly influence community composition.

**Table 1. Plant species commonly occurring in Mesic Sand Prairie**

| Scientific name | Common name | Coefficient of wetness (*W*) |
|---|---|---|
| **Grasses, Sedges, and Rushes** | | |
| *Andropogon gerardii* | big bluestem | 1 |
| *Andropogon scoparius* | little bluestem grass | 3 |
| *Carex pensylvanica* | sedge | 5 |
| *Danthonia spicata* | poverty grass | 5 |
| *Eragrostis spectabilis* | purple love grass | 5 |
| *Juncus canadensis* | Canadian rush | -5 |
| *Juncus tenuis* | path rush | 0 |
| *Luzula multiflora* | common wood rush | 3 |
| *Sorghastrum nutans* | Indian grass | 2 |
| *Schoenoplectus tabernaemontani* | softstem bulrush | -5 |
| **Forbs** | | |
| *Achillea millefolium* | yarrow | 3 |
| *Aletris farinosa* | colic root | 0 |
| *Ambrosia artemisiifolia* | common ragweed | 3 |
| *Anemone cylindrica* | thimbleweed | 5 |
| *Antennaria parlinii* | smooth pussytoes | 5 |

| Scientific name | Common name | Coefficient of wetness (*W*) |
|---|---|---|
| *Apocynum androsaemifolium* | spreading dogbane | 5 |
| *Asclepias tuberosa* | butterfly weed | 5 |
| *Aster ericoides* | heath aster | 4 |
| *Aster laevis* | smooth aster | 5 |
| *Aster oolentangiensis* | prairie heart leaved aster | 5 |
| *Aster sagittifolius* | arrow leaved aster | 5 |
| *Castilleja coccinea* | Indian paintbrush | 0 |
| *Cirsium discolor* | pasture thistle | 5 |
| *Comandra umbellata* | bastard toadflax | 3 |
| *Conyza canadensis* | horseweed | 1 |
| *Coreopsis tripteris* | tall coreopsis | 0 |
| *Desmodium canadense* | showy tick trefoil | 1 |
| *Erigeron strigosus* | daisy fleabane | 1 |
| *Euphorbia corollata* | flowering spurge | 5 |
| *Euthamia graminifolia* | grass leaved goldenrod | -2 |
| *Fragaria virginiana* | wild strawberry | 1 |
| *Galium boreale* | northern bedstraw | 0 |
| *Gentiana andrewsii* | bottle gentian | -3 |
| *Helianthus divaricatus* | woodland sunflower | 5 |
| *Helianthus giganteus* | tall sunflower | -3 |
| *Heuchera americana* | alum root | 4 |
| *Krigia biflora* | false dandelion | 3 |
| *Krigia virginica* | dwarf dandelion | 5 |
| *Lespedeza capitata* | round headed bush clover | 3 |
| *Liatris scariosa* | northern blazing star | 5 |
| *Liatris spicata* | marsh blazing star | 0 |
| *Lilium michiganense* | Michigan lily | -1 |
| *Lithospermum caroliniense* | plains puccoon | 5 |
| *Lobelia spicata* | pale spiked lobelia | 0 |
| *Lupinus perennis* | wild lupine | 5 |
| *Monarda fistulosa* | wild bergamot | 3 |
| *Phlox pilosa* | prairie phlox | 1 |
| *Plantago rugelii* | red stalked plantain | 0 |
| *Polygala sanguinea* | field milkwort | 3 |
| *Potentilla simplex* | old field cinquefoil | 4 |
| *Pycnanthemum virginianum* | common mountain mint | -4 |
| *Rudbeckia hirta* | black eyed susan | 3 |
| *Sisyrinchium albidum* | common blue eyed grass | 3 |
| *Solidago juncea* | early goldenrod | 5 |
| *Solidago nemoralis* | old field goldenrod | 5 |
| *Solidago rigida* | stiff goldenrod | 4 |
| *Solidago speciosa* | showy goldenrod | 5 |
| *Vernonia missurica* | Missouri ironweed | -1 |
| *Viola sagittata* | arrow leaved violet | -2 |
| **Ferns and Fern Allies** | | |
| *Equisetum arvense* | common horsetail | 0 |
| *Equisetum laevigatum* | smooth scouring rush | -3 |
| *Osmunda regalis* | royal fern | -5 |
| *Pteridium aquilinum* | bracken fern | 3 |

| Scientific name | Common name | Coefficient of wetness (*W*) |
|---|---|---|
| **Trees, Shrubs, and Vines** | | |
| *Cornus stolonifera* | red osier dogwood | -3 |
| *Corylus americana* | hazelnut | 4 |
| *Gaylussacia baccata* | huckleberry | 3 |
| *Pinus strobus* | white pine | 3 |
| *Prunus serotina* | wild black cherry | 3 |
| *Populus tremuloides* | quaking aspen | 0 |
| *Rhus copallina* | winged sumac | 5 |
| *Rosa carolina* | pasture rose | 4 |
| *Rubus flagellaris* | northern dewberry | 4 |
| *Salix humilis* | prairie willow | 3 |
| *Smilax lasioneura* | carrion flower | 5 |
| *Spiraea alba* | meadowsweet | -4 |
| *Vaccinium angustifolium* | blueberry | 3 |

Depressions or zones transitional to wet-mesic prairie or wet-mesic sand prairie support several species in addition to those listed above, including bluejoint grass (*Calamagrostis canadensis*), cordgrass (*Spartina pectinata*), sedges (*Carex* spp.), rushes (*Juncus* spp.), and bulrushes (*Scirpus* spp.). Despite the presence of several wetland indicators, mesic sand prairie is characterized by species of upland affinity, with the majority of species having coefficients of wetness (*W*) between +1 and +5 (Herman et al. 2001). By contrast, wet-mesic sand prairie is characterized by species of wetland affinity, the majority having W values between -1 and -5. Mesic sand prairie and wet-mesic sand prairie may intergrade or occur as distinctive zones within a larger prairie, savanna, or wetland complex.

## Other Noteworthy Species:

Rare plant species associated with mesic sand prairie are listed below along with their status, which is indicated by the following abbreviations: X, extirpated from state; E, State Endangered; T, State Threatened; SC, State Species of Special Concern; LT, Federally Threatened; LE, Federally Endangered.

| Scientific Name | Common Name | Status |
|---|---|---|
| *Asclepias hirtella* | tall green milkweed | T |
| *Asclepias purpurascens* | purple milkweed | T |
| *Baptisia lactea* | white false indigo | SC |
| *Carex tincta* | tinged sedge | T |
| *Eryngium yuccifolium* | rattlesnake-master | T |
| *Helianthus mollis* | downy sunflower | T |
| *Juncus vaseyi* | Vasey’s rush | T |
| *Lactuca floridana* | woodland lettuce | T |
| *Oxalis violacea* | violet wood-sorrel | X |

| Scientific Name | Common Name | Status |
|---|---|---|
| *Scleria triglomerata* | tall nut-rush | SC |
| *Sisyrinchium fuscatum* | Farwell's blue-eyed-grass | X |
| *Sisyrinchium strictum* | blue-eyed-grass | SC |
| *Solidago houghtonii* | Houghton's goldenrod | T, LT |
| *Sporobolus heterolepis* | prairie dropseed | SC |
| *Strophostyles helvula* | trailing wild bean | SC |
| *Trichophorum clintonii* | Clinton's bulrush | SC |
| *Trichostema dichotomum* | bastard pennyroyal | T |
| *Viola novae-angliae* | New England violet | T |

Rare animal species associated with mesic sand prairie include the following:

**Grassland birds**: Henslow's sparrow (*Ammodramus henslowii*) (E), grasshopper sparrow (*Ammodramus savannarum*) (SC), short-eared owl (*Asio flammeus*) (E), long-eared owl (*Asio otus*) (T), northern harrier (*Circus cyaneus*) (SC), migrant loggerhead shrike (*Lanius ludovicianus migrans*) (E), dickcissel (*Spiza americana*) (SC), western meadowlark (*Sturnella neglecta*) (SC), and barn owl (*Tyto alba*) (E).

**Insects**: American burying beetle (*Nicrophorus americanus*) (X, LE), blazing star borer (*Papaipema beeriana*) (SC), Culver's root borer (*Papaipema sciata*) (SC), Silphium borer (*Papaipema silphii*) (T), red-legged spittlebug (*Prosapia ignipectus*) (SC), Sprague's pygarctia (*Pygarctia spraguei*) (SC), grizzled skipper (*Pyrgus wyandot*) (SC), phlox moth (*Schinia indiana*) (E), and Spartina moth (*Spartiniphaga inops*) (SC).

**Mammals**: prairie vole (*Microtus ochrogaster*) (E).

**Reptiles**: eastern massasauga (*Sistrurus c. catenatus*) (SC and Federal Candidate Species), Kirtland's snake (*Clonophis kirtlandii*) (E), and eastern box turtle (*Terrapene c. carolina*) (SC). Spotted turtle (*Clemmys guttata*) (T) and Blanding's turtle (*Emydoidea blandingii*) (SC) may nest in mesic sand prairies that occur adjacent to wetlands.

**Conservation and Management:** Efforts should be made to identify, protect, and manage remnants of mesic sand prairie. Several studies to identify prairie remnants in Michigan have been undertaken and most remnants are very small and/or occur as narrow strips adjacent to railroads (Hauser 1953, Scharrer 1972, Thompson 1970, 1975, and 1983, Chapman 1984). The small size and poor landscape context of most prairie remnants makes large-scale restoration of existing prairies nearly impossible.

Managing mesic sand prairie requires frequent burning, from annual to every two to three years. Longer burn intervals will result in tree and tall shrub encroachment. Prescribed burning is required to protect and enhance plant species diversity and prevent encroachment of trees and tall shrubs, which outcompete light demanding prairie plants. In prairie remnants where fire has been excluded for long periods (i.e., decades), local extinctions of plant species are common (Leach and Givnish 1996).

In addition to prescribed fire, brush cutting accompanied by herbicide application to cut stumps is an important component of prairie restoration. While fires frequently kill woody seedlings, long established trees and tall shrubs such as black cherry (*Prunus serotina*) and dogwoods (*Cornus* spp.) typically resprout and can reach former levels of dominance within two to three years. Applying herbicide to the cut stumps will prevent resprouting.

To reduce the impacts of management on fire-intolerant species it will be important to consider a rotating schedule of prescribed burning in which adjacent management units are burned in alternate years. This is especially important when planning burns in remnant prairies. Insect species that are restricted to these habitats have already experienced severe losses in the amount of available habitat due to forest succession brought on by years of fire suppression. By burning adjacent management units in alternate years, insect species from unburned units may be able to recolonize burned areas (Panzer et al. 1995). Avian species diversity is also thought to be enhanced by managing large areas of grassland as a mosaic of burned and unburned patches (Herkert et al. 1993).

Prairie ants (*Formica* spp.) are an extremely important component of grassland communities and research indicates they respond with population increases to restoration activities, especially prescribed fire (Trager 1998). Prescribed burning precipitates changes in the dominance of ant species from carpenter and woodland ants (*Camponotus* spp. and *Aphaenogaster* spp.) to prairie ants because it reduces woody vegetation and detritus used by the arboreal and litter- and twig-nesting species in favor of species restricted to grassland habitats (Trager 1998). Restorations involving prairie plantings near old fields or remnant prairies are typically colonized by several species of prairie ants within a few years (Trager 1990).

Controlling invasive species is a critical step in restoring and managing mesic sand prairie. By outcompeting native species, invasives alter vegetation structure, reduce species diversity, and upset delicately balanced ecological processes such as trophic relationships, interspecific competition, nutrient cycling, soil erosion, hydrologic balance, and solar insolation (Bratton 1982, Harty 1986). Invasive species that threaten the diversity and community structure of mesic sand prairie include glossy buckthorn (*Rhamnus frangula*), common buckthorn (*Rhamnus cathartica*), autumn olive (*Elaeagnus umbellata*), Eurasian honeysuckles (*Lonicera morrowii*, *L. japonica*, *L. maackii*, *L. sempervirens*, *L. tatarica*, *L.* x*bella*, and *L. xylosteum*), multiflora rose (*Rosa multiflora*), spotted knapweed (*Centaurea maculosa*), common St. John's-wort (*Hypericum perforatum*), ox-eye daisy (*Chrysanthemum leucanthemum*), hawkweeds (*Hieracium* spp.), white sweet-clover (*Melilotus alba*), yellow sweet clover (*M. officinalis*), Japanese knotweed (*Polygonum cuspidatum*), leafy spurge (*Euphorbia esula*), wild parsnip (*Pastinaca sativa*), bouncing bet (*Saponaria officinalis*), hoary alyssum (*Berteroa incana*), Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and timothy (*Phleum pratense*).

In addition to reestablishing ecological processes such as fire, most restoration sites will require the reintroduction of appropriate native species and genotypes. Plants can be reintroduced through both seeding and seedling transplants. Small, isolated prairie remnants may harbor plant populations that have suffered from reduced gene flow. Restoration efforts at isolated prairie remnants should consider introducing seeds collected from nearby stocks to augment and maintain genetic diversity of remnant plant populations. The Michigan Native Plant Producers Association may be a helpful resource for locating sources of prairie plants with Michigan genotypes (http://www.mnppa.org/).

Several helpful guides are available for restoring prairies and starting prairie plants from seed (Schulenberg 1972, Nuzzo 1976, Packard and Mutel 1997). See Packard and Mutel (1997) for a comprehensive treatment of the subject and additional references.

Restoration and management of grasslands such as mesic sand prairie are are critically important to grassland birds, which have suffered precipitous population declines due to habitat loss and changing agricultural practices (e.g., early mowing of hay fields). Detailed habitat management guidelines for grassland birds have been developed by Herkert et al. (1993) and Sample and Mossman (1997). Listed below are several of the recommendations suggested by Herkert et al. (1993) (see publication for complete list of management guidelines).

1. Avoid fragmentation of existing grasslands.
2. Grassland restorations aimed at supporting populations of the most area-sensitive grassland birds should be at least 125 acres and preferably more than 250 acres in size. Area sensitive species requiring large patches of grassland (>100 acres) include northern harrier (SC), bobolink (*Dolichonyx oryzivorus*), savannah sparrow (*Passerculus sandwichensis*), Henslow's sparrow (SC), short-eared owl (E), and barn owl (E) (Herkert et al. 1993, Sample and Mossman 1997). Patches of grassland less than 50 acres will benefit the least area-sensitive grassland birds such as northern bobwhite (*Colinus virginianus*), red-winged black bird (*Agelaius phoeniceus*), American goldfinch (*Carduelis tristis*), Vesper sparrow (*Pooecetes gramineus*), field sparrow (*Spizella pusilla*), song sparrow (*Melospiza melodia*), dickcissel (SC), and common yellowthroat (*Geothlypis trichas*) (Herkert et al. 1993).
3. Maximize interior grassland habitat by establishing circular (best) or square grassland plantings and avoiding long, narrow plantings, which increase edge habitat.
4. Where grassland habitats border forests, strive to create a feathered edge by allowing prescribed fires to burn through adjacent forests as opposed to installing firebreaks along the forest edge. Grasslands with feathered edges experience lower rates of nest predation than those with sharply contrasting edges (Ratti and Reese 1988).

**Research Needs:**
Remaining remnants of mesic sand prairie need to be identified, protected, and managed. Further research on the historical plant species composition of mesic sand prairie in Michigan would be useful for developing seed mixes for restoration. Studies designed to compare plant species composition and abiotic factors (soils, landscape position, etc.) among prairie types in Michigan are needed to improve community classification. In particular, further research is needed to elucidate differences between mesic sand prairie and wet-mesic sand prairie. Studies aimed at understanding the effects of small, isolated populations on plant species genetic diversity will provide important information on managing prairie remnants. Research on the utilization of restored and remnant prairies by grassland birds and insects will provide useful information for understanding how mesic sand prairies contribute to biodiversity. Studies on methods of prairie establishment and management, including controlling invasive species, will benefit both ongoing and new efforts to restore mesic sand prairie. Conservation and management efforts will benefit from further study of how species composition is influenced by fire frequency, intensity, and periodicity.

**Similar Communities:**
wet-mesic sand prairie, wet-mesic prairie, lakeplain wet-mesic prairie, mesic prairie, dry-mesic prairie, dry sand prairie, bur oak plains, oak openings, lakeplain oak openings, and oak barrens.

**Other classification**s:
Michigan Natural Features Inventory circa 1800s Vegetation (MNFI): Grassland

Michigan Department of Natural Resources (MDNR): **G**

**The Nature Conservancy U.S. National Vegetation Classification and International Classification of Ecological Communities** (Faber-Langendoen 2001, NatureServe 2009):
CODE; ALLIANCE; ASSOCIATION; COMMON NAME:

V.A.5.N.a; *Andropogon gerardii* – (*Sorghastrum nutan*s) Herbaceous Alliance; V.A.5.N.a; *Andropogon gerardii – Sorghastrum nutans – Schizachyrium scoparium – Aletris farinosa* Herbaceous Vegetation; Mesic Sand Tallgrass Prairie

V.A.5.N.a; *Schizachyrium scoparium - Sorghastrum nutans* Herbaceous Alliance; *Schizachyrium scoparium - Sorghastrum nutans - Andropogon gerardii - Lespedeza capitata* Sand Herbaceous Vegetation; Midwest Dry-Mesic Sand Prairie

**Related Abstracts**: bur oak plains, dry sand prairie, dry-mesic prairie, lakeplain oak openings, lakeplain wet-mesic prairie, mesic prairie, oak barrens, oak openings, wet-mesic sand prairie, Culver's root borer, eastern box turtle, eastern massasauga, Henslow's sparrow, migrant loggerhead shrike, northern harrier, short-eared owl, blazing star borer, Culver's root borer, Silphium borer, red-legged spittlebug, grizzled skipper, prairie dropseed, Houghton's goldenrod, tall green milkweed, purple milkweed, and bastard pennyroyal.

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