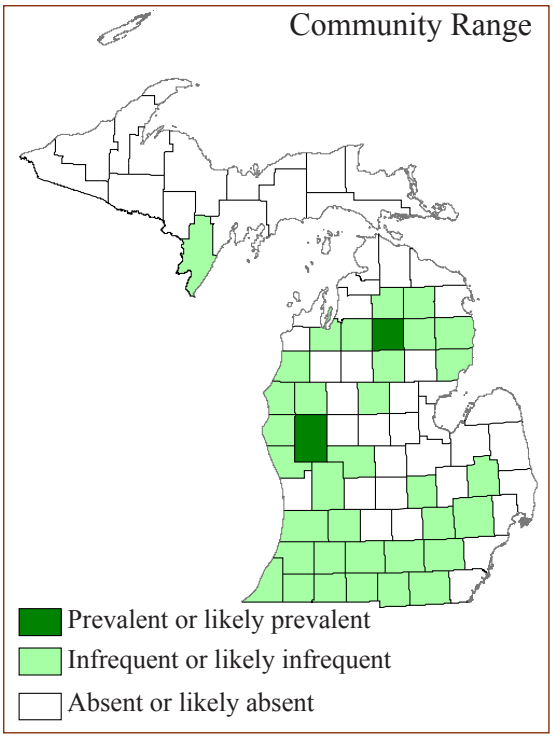
Dry Sand Prairie — Community Abstract

Photo by Michael A. Kost



Overview: Dry sand prairie is a native grassland community dominated by little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardii*) and Pennsylvania sedge (*Carex pensylvanica*) that occurs on loamy sands primarily on well drained to excessively well drained, sandy glacial outwash plains and lakebeds. Vegetation is typically short and patchy. Historically, dry sand prairie occurred in association with oak barrens, oak-pine barrens, and pine barrens. Areas dominated by native grasses with less than one mature tree per acre (0.4 ha) are considered prairie (Curtis 1959).

Global and State Rank: G3/S2

Range: Dry sand prairie occurs in IA, IL, IN, MI, MN, WI, and southern Ontario, Canada. Missouri also once supported dry sand prairie but the community has since been extirpated. In Michigan, the community occurs primarily north of the tension zone in northern Lower Michigan. Based on interpretations from the General Land Office surveyor notes, dry sand prairie occurred in following Michigan counties: Crawford, Iosco, Kalamazoo, Kent, Mecosta, Montcalm, Montmorency, Newaygo, and Otsego (Comer et al. 1995). Note that in the counties south of the tension zone the acreage of dry sand prairie in the 1800s was very limited. Today, small patches of dry sand prairie occur in Crawford, Lake, Muskegon, Newaygo, Oceana, and Oscoda counties.

Rank Justification: In northern Lower Michigan, grassland acreage, most of which was dry sand prairie, totaled more than 12,400 acres (5,000 ha) in the mid 1800s (Comer et al. 1995). Historically, the largest areas of dry sand prairie occurred in Crawford and Newaygo counties, with each supporting approximately 5,000 acres (2,000 ha) of dry grassland. Today, in northern Lower Michigan the community is known from 16 element occurrences that range in size from 6 to 77 acres (2.5 to 30 ha) and total 540 acres (220 ha). Thus, approximately 4% of the dry sand prairie originally thought to occur in northern Lower Michigan remains today.

In the early to mid 1800s, dry sand prairie occupied very limited acreage in southern Lower Michigan, as most excessively drained, sandy landscapes supported oak barrens or oak-pine barrens. One of the largest patches of dry sand prairie in southern Michigan may have been Coguaiack Prairie at Fort Custer Recreation Area in Kalamazoo County, which Chapman (1984) discusses in his study of prairies in Lower Michigan (see map by Holder et al. 1981). At present, southern Lower Michigan supports no element occurrences for dry sand prairie.

It is likely that all remnants of dry sand prairie have experienced some form of degradation (Hauser 1953). Like other types of prairie in Lower Michigan, the treeless character of dry sand prairies made them

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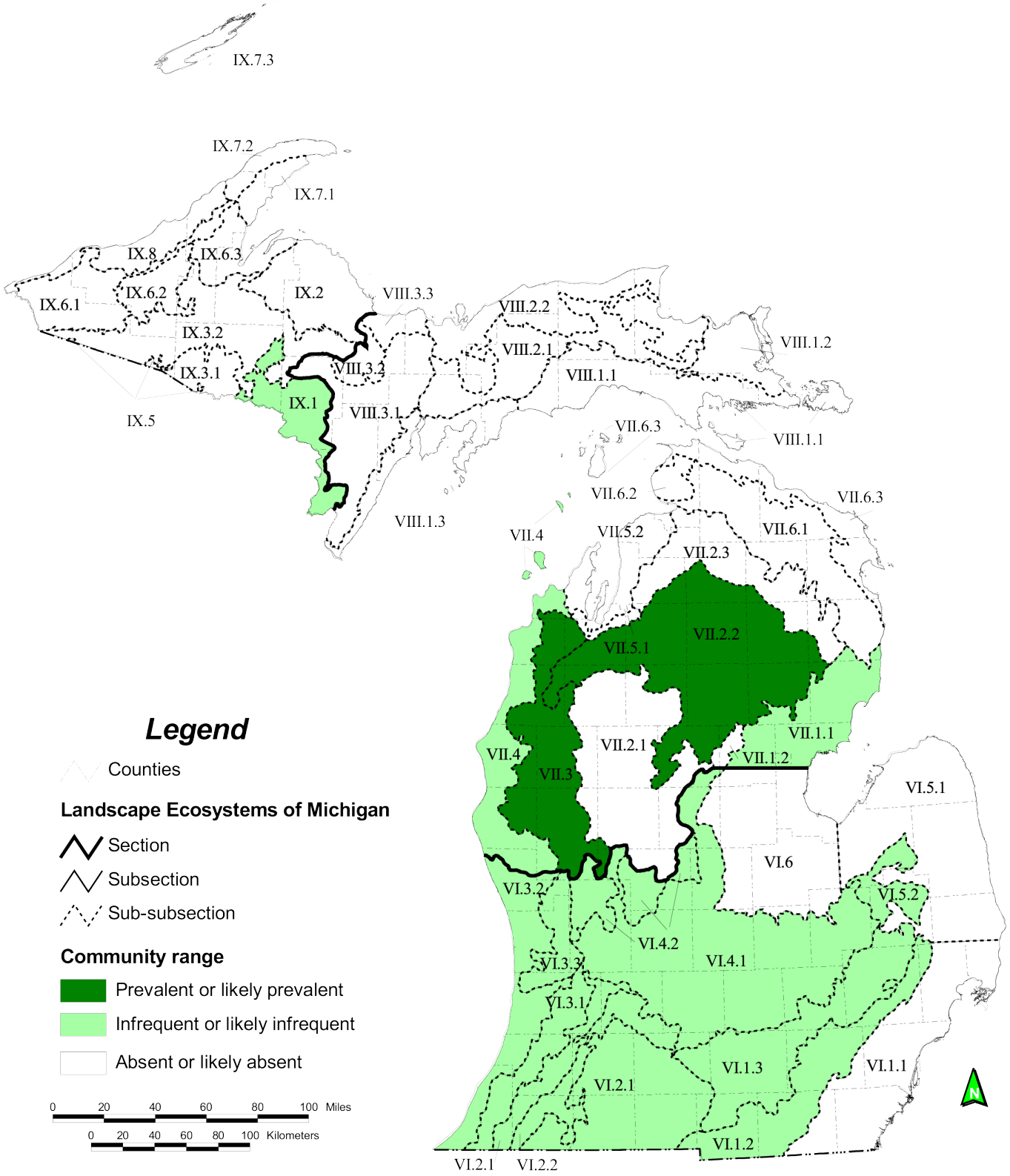

Ecoregional map of Michigan (Albert 1995) depicting distribution of dry sand prairie (Albert et al. 2008)

preferred sites for farming and homesteads. However, their droughty, low productivity soils made farming impracticable and most were abandoned by the late 1800s (Hauser 1953). Dry sand prairie remnants have also been converted to pine plantations throughout the mid and late 1900s (Hauser 1953).

Landscape and Abiotic Context: Dry sand prairie occurs predominantly on sandy glacial outwash plains and lakebeds but may also occur on hilly, sandy deposits in ice contact outwash and coarse-textured end and ground moraines (Chapman 1984). Soils are loamy sand with pH ranging from 4.6 to 5.7. (ave. pH 5.1) and water retaining capacity 28 to 48% (ave. 38%) (Chapman 1984). In a study of dry sand prairie in Newaygo County, Hauser (1953) found that the community historically occurred on soils labeled Sparta Sandy Loam. These soils are loose, well drained, acid, unconsolidated and have very little organic matter content, which makes them a poor choice for agriculture (Hauser 1953).

Dry sand prairie historically occurred in association with oak barrens, oak-pine barrens, and pine barrens, with flatter and better drained sites tending toward open prairie rather than savanna (e.g., barrens) (Chapman 1984, Comer et al. 1995).

Natural Processes: Historically, dry sand prairies were maintained in an open condition as a result of frequent fires, droughty soils, and in north central Lower Michigan, by frequent growing season frosts. The excessively drained, sandy soils of dry sand prairie act to perpetuate open conditions by limiting tree establishment, especially during periodic droughts. Growing season frosts, which also limit tree establishment, especially hardwoods, are particularly common in the High Plains Subsection of northern Lower Michigan. In this region, dry sand prairie frequently occurs along with pine barrens in lower elevation, flat outwash plains known as frost pockets (Albert 1995).

Fire has played a critical role in maintaining open conditions in Michigan prairie and savanna ecosystems (e.g., oak barrens, oak-pine barrens, pine barrens). In the absence of frequent fires, which retarded woody growth prior to Euro-American settlement, Michigan's prairies and savannas were colonized by trees and shrubs and gradually converted to forest.

Fire frequency depended on a variety of factors including type and volume of fuel, topography, natural irebreaks, and density of Native Americans (Chapman 1984). In general, the probability for a wide-ranging fire increases in level topography like large outwash plains, which historically supported dry sand prairie and barrens ecosystems in parts of northern Lower Michigan (Chapman 1984). 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 also 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 that taller vegetation outcompeted species with small statures, small seeds (e.g., orchids), and nitrogen-fixing symbioses such as members of the legume family (Fabaceae) like lupine (*Lupinus perennis*), goat's rue (*Tephrosia virginiana*), bush clover (*Lespedeza* spp.), and tick-trefoil (*Desmodium* spp.). Because fire maintains open conditions and burns off standing and accumulated litter, small species and those with small seeds that require open microsites are able to garner enough space and light to remain viable. In the absence of frequent fires, small species are outcompeted by taller and denser types of vegetation. As 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) and thus provides these plants with a competitive edge not found in unburned sites (Leach and Givnish 1996). This effect is particularly pronounced on nutrient poor soils like those found in dry sand prairie.

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. In addition, the removal of litter by fire creates critical microsites for seed germination and fosters seedling establishment.

The removal of litter by fire also 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 (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 host plants for a variety of insects and the structure of open grasslands is critical to a wide variety of animal species, many of which are considered rare or declining today.

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 .5 m in height and over 1 m 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 soil mixing and aeration include moles, mice, skunks, and badgers (Curtis 1959).

Historically, large herbivores such as elk, and in southern Michigan, bison and woodland caribou, significantly influenced plant species diversity through selective foraging, wallowing and trampling. These activities 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 dry sand prairie was completed in Michigan before the community experienced significant alterations due to farming, fire suppression, and conversion to pine plantations. However, several important studies of the community were completed in the mid and late 1900s. Chapman (1984) completed a study of 66 prairie and savanna remnants in Lower Michigan, six of which he classified as dry sand prairie. Hauser (1953) conducted a study of prairie remnants in Newaygo County, all of which were dry sand prairie. In addition, Curtis (1959) collected detailed information on 17 dry prairies and 20 sand barrens in Wisconsin and some of this data is applicable to dry sand prairie in Michigan.

The vegetation of dry sand prairie is typically low to medium in height and somewhat sparse with patches of bare soil common (Chapman 1984). The community is dominated by little bluestem, Pennsylvania sedge and big bluestem (Chapman 1984). Within Michigan, species composition varies across ecoregions. Dry sand prairie in the High Plains Subsection (Albert 1995) of north central Lower Michigan occurs in association with pine barrens and oak-pine barrens and differs somewhat in species composition from those occurring in southern and western Lower Michigan. Common species of dry sand prairie in the High Plains Subsection include the following: Pennsylvania sedge, poverty grass (*Danthonia spicata*), tufted hair grass (*Deschampsia flexuosa*), little bluestem, June grass (*Koeleria macrantha*), rough-leaved rice grass (*Oryzopsis asperifolia*), rice grass (*Oryzopsis pungens*), rough fescue (*Festuca scabrella*) (T), big bluestem, rough blazing star (*Liatris aspera*), harebell (*Campanula rotundifolia*), Hill's thistle (*Cirsium hillii*) (SC), pale agoseris (*Agoseris glauca*) (T), bearberry (*Arctostaphylos uva-ursi*), sand cherry (*Prunus pensylvanica*), sweet fern (*Comptonia peregrina*), northern dewberry (*Rubus flagellaris*), blueberry (*Vaccinium angustifolium*), jack pine (*Pinus banksiana*), red pine (*Pinus resinosa*) and Hill's oak (*Quercus ellipsoidalis*).

Oak grubs of white oak (*Quercus alba*), black oak (*Quercus velutina*), and Hill's oak can be abundant

in dry sand prairie and may also occur as widely scattered, open grown adults. Frequent fires and harsh growing conditions (e.g., droughty soils and growing season frosts) act to maintain these species in a shrub-like condition (e.g., grubs) for prolonged periods. In northern Michigan, white pine (*Pinus strobus*) and jack pine can occur in dry sand prairie as seedlings, saplings, and scattered adults. In the past, dry sand prairie typically transitioned to oak barrens in southern Michigan, oak-pine barrens in western Lower Michigan, and pine barrens or oak-pine barrens in north central Lower Michigan. Today, most of these former barrens communities have converted to forest as a result of fire suppression. Thus, dry sand prairies today are most commonly bordered by white oak-black oak forest (dry southern forest) in the south, white oak-black oak-white pine forest (dry-mesic northern forest) in western and northern Lower Michigan, or jack pine-red pine forest (dry northern forest) in north central Lower Michigan (for further descriptions of forest types see Cohen 2002a, 2002b and Kost et al. 2007).

The following table of dry sand prairie plants was compiled from prevalent native species recorded by Hauser (1953) and Chapman (1984) in their studies of dry sand prairie in Lower Michigan. Note that the table below does not include several of the species listed above for dry sand prairies of the High Plains Subsection (Albert 1995).

Photo by Michael A. Kost

Dry sand prairie, Newaygo County, Michigan.

SCIENTIFIC NAME	COMMON NAME
Grasses and Sedges	
Andropogon gerardii	big bluestem
Andropogon scoparius	little bluestem grass
Aristida purpurascens	three awned grass
Carex pensylvanica	Pennsylvania sedge
Cyperus filiculmis	slender sand sedge
Danthonia spicata	poverty grass
Koeleria macrantha	June grass
Panicum commonsianum	panic grass
Panicum depauperatum	panic grass
Panicum oligosanthes	panic grass
Sorghastrum nutans	Indian grass
Forbs	
Apocynum cannabinum	Indian hemp
Ambrosia artemisiifolia	common ragweed
Anemone cylindrica	thimbleweed
Antennaria parlinii	smooth pussytoes
Apocynum androsaemifolium	spreading dogbane
Artemisia campestris	wormwood
Asclepias syriaca	common milkweed
Asclepias tuberosa	butterfly weed
Asclepias verticillata	whorled milkweed
Aster oolentangiensis	prairie heart-leaved aster
Blephilia ciliata	Ohio horse mint
Comandra umbellata	bastard toadflax
Erigeron strigosus	daisy fleabane
Euphorbia corollata	flowering spurge
Fragaria virginiana	wild strawberry
Gnaphalium obtusifolium	old field balsam
Helianthemum canadense	common rockrose
Helianthus occidentalis	western sunflower
Hieracium longipilum	long-bearded hawkweed
Krigia virginica	dwarf dandelion
Lactuca canadensis	tall lettuce
Lespedeza capitata	round-headed bush clover
Liatris aspera	rough blazing star
Liatris cylindracea	cylindrical blazing star
Linaria canadensis	blue toadflax
Lithospermum caroliniense	plains puccoon
Lupinus perennis	wild lupine
Monarda fistulosa	wild bergamot
Monarda punctata	horsemint
Penstemon hirsutus	hairy beard tongue
Polygala polygama	racemed milkwort
Rudbeckia hirta	black-eyed Susan
Solidago juncea	early goldenrod
Solidago nemoralis	old field goldenrod
Solidago speciosa	showy goldenrod
Specularia perfoliata	Venus's looking glass
Tephrosia virginiana	goat's rue
Tradescantia ohiensis	common spiderwort
Viola pedata	birdfoot violet

SCIENTIFIC NAME	COMMON NAME
Shrubs	
Ceanothus americanus	New Jersey tea
Prunus virginiana	choke cherry
Rosa carolina	pasture rose
Rubus flagellaris	northern dewberry

Michigan Indicator Species: Chapman (1984) lists the following native species as good indicators of dry sand prairie: wormwood (*Artemisia campestris*), slender sand sedge (*Cyperus filiculmis*), rough blazing star (*Liatris aspera*), and wild lupine (*Lupinus perennis*).

Other Noteworthy Species: Rare plant species associated with dry 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; LE, Federally Endangered.

Scientific Name	Common Name	Status
Agoseris glauca	pale agoseris	T
Amorpha canescens	leadplant	SC
Androsace occidentalis	rock-jasmine	E
Aristida dichotoma	Shiner's three-awned grass	X
Aristida tuberculosa	beach three-awned grass	T
Aster drummondii	Drummond's aster	T
Aster sericeus	western silvery aster	T
Carex inops ssp. *heliophila*	sun sedge	SC
Carex gravida	sedge	X
Digitaria filiformis	slender finger-grass	X
Eryngium yuccifolium	rattlesnake-master	T
Geum triflorum	prairie-smoke	T
Liatris punctata	dotted blazing-star	X
Linum sulcatum	furrowed flax	SC
Lithospermum incisum	narrow-leaved puccoon	X
Panicum leibergii	Leiberg's panic-grass	T
Penstemon pallidus	pale beard-tongue	SC
Polygala incarnata	pink milkwort	X
Prunus alleghaniensis var. *davisii*	Alleghany plum	SC
Ruellia humilis	hairy ruellia	T
Scleria pauciflora	few-flowered nut-rush	E
Scleria triglomerata	tall nut-rush	SC
Solidago missouriensis	Missouri goldenrod	T
Tradescantia bracteata	long-bracted spiderwort	X
Tradescantia virginiana	Virginia spiderwort	SC
Trichostema brachiatum	false pennyroyal	T
Trichostema dichotomum	bastard pennyroyal	T
Triplasis purpurea	sand grass	SC
Vaccinium cespitosum	dwarf bilberry	T

Rare animal species associated with dry 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), migrant loggerhead shrike (*Lanius ludovicianus migrans*) (E), dickcissel (*Spiza americana*) (SC), western meadowlark (*Sturnella neglecta*) (SC), and barn owl (*Tyto alba*) (E).

Insects: secretive locust (*Appalachia arcana*) (SC), dusted skipper (*Atrytonopsis hianna*) (SC), Persius duskywing (*Erynnis p. persius*) (T), Ottoe skipper (*Hesperia ottoe*) (T), frosted elfin (*Incisalia irus*) (T), Great Plains spittlebug (*Lepyronia gibbosa*) (SC), Karner blue (*Lycaeides melissa samuelis*) (T, LE), blazing star borer (*Papaipema beeriana*) (SC), red-legged spittlebug (*Prosapia ignipectus*) (SC), Sprague's pygarctia (*Pygarctia spraguei*) (SC), grizzled skipper (*Pyrgus wyandot*) (SC), phlox moth (*Schinia indiana*) (E), and regal fritillary (*Speyeria idalia*) (E).

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

Reptiles: eastern massasauga (*Sistrurus c. catenatus*) (SC and Federal Candidate Species), gray ratsnake (*Pantherophis spiloides*) (SC), and eastern box turtle (*Terrapene c. carolina*) (SC). Spotted turtle (*Clemmys guttata*) (T), wood turtle (*Glyptemys insculpta*) (SC), and Blanding's turtle (*Emydoidea blandingii*) (SC) may nest in dry sand prairie when it occurs adjacent to wetlands.

Conservation and Management: Efforts should be made to identify, protect, and manage remnants of dry sand prairie where they occur. 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).

Managing dry sand prairie requires frequent prescribed burning 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 (e.g., decades), local extinctions of plant species are common (Leach and Givnish 1996).

In addition to prescribed fire, brush cutting accompanied by stump application of herbicide is an

important component of prairie restoration. While fires frequently kill woody seedlings, long established trees and tall shrubs like black cherry (*Prunus serotina*) and dogwoods (*Cornus* spp.) typically resprout and can reach former levels of dominance within two to three years. Herbicide application to 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 open grasslands such as dry sand prairie. 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 as a mosaic of burned and unburned patches (Herkert et al. 1993).

Prairie ants (*Formica*) are an extremely important component of grassland communities and research indicates that 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* and *Aphaenogaster*) 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 dry 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). At present some of the most aggressive invasive species that threaten biodiversity dry sand prairie include spotted knapweed (*Centaurea maculosa*), common St. John's-wort (*Hypericum perforatum*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), common buckthorn (*Rhamnus cathartica*), Eurasian honeysuckles (*Lonicera maackii*, *L. morrowii*, *L. tatarica*, *L.* x *bella*.), and black locust (*Robinia pseudoacacia*). The following exotic species are frequently ubiquitous within dry sand prairie remnants and their impacts on overall species composition and diversity have not yet been studied: Canada bluegrass (*Poa compressa*), sheep sorrel (*Rumex acetosella*), orange hawkweed (*Hieracium aurantiacum*).

In addition to reestablishing ecological processes such as prescribed 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 Michigan genotypes (http://www.nohlc.org/MNPPA.htm).

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

Restoration and management of grasslands such as dry sand prairie 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 (E), grasshopper sparrow (SC), eastern meadowlark (*Sturnella magna*), western meadowlark (SC), sedge wren (*Cistothorus platensis*), sharp-tailed grouse (*Pedioecetes phasianellus*), upland sandpiper (*Bartramia longicauda*), 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 dry sand prairie need to be identified, protected, and managed. Further research on the historical plant species composition of dry sand prairie in Michigan would be useful for developing seed mixes for restoration. Genetic studies of the effects of small, isolated populations on plant species genetic diversity will provide information on managing remnants of dry sand prairie. Research on the utilization of restored and remnant prairies by grassland birds will provide useful information for understanding how dry 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 dry sand prairie. There is a need for further study of how ubiquitous exotic species in dry sand prairies such as Canada bluegrass (*Poa compressa*), sheep sorrel (*Rumex acetosella*), and orange hawkweed (*Hieracium aurantiacum*) impact species composition and diversity. Conservation and management efforts will benefit from further study of how species composition is influenced by fire frequency, intensity, and periodicity.

Similar Communities: dry-mesic prairie, hillside prairie, oak barrens, oak-pine barrens, pine barrens.

Other Classifications:
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 2004):

CODE; ALLIANCE; ASSOCIATION; COMMON NAME

V.A.5.N.c; *Schizachyrium scoparium* - (*Sporobolus cryptandrus*) Herbaceous Alliance; *Schizachyrium scoparium* - *Danthonia spicata* - *Carex pensylvanica* - (*Viola pedata*) Herbaceous Vegetation; Little Bluestem - Poverty Oatgrass - Pennsylvania Sedge - (Birdfoot Violet) Herbaceous Vegetation

Related Abstracts: oak barrens, oak-pine barrens, pine barrens, oak openings, bur oak plains, dry-mesic prairie, mesic prairie, Henslow's sparrow, migrant loggerhead shrike, short-eared owl, eastern box turtle, wood turtle, spotted turtle, Blanding's turtle, eastern massasauga, Karner blue, Ottoe skipper, blazing star borer moth, red-legged spittlebug, secretive locust, Alleghany plum, rough fescue, prairie smoke, pale agoseris, and Hill's thistle.

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