Sand Prairie (Global Rank G2G3; State Rank S2)

Overview: Distribution, Abundance, Environmental Setting, Ecological Processes

Sand Prairie is a xeric grassland community occurring on level to rolling terrain south of the Tension Zone. Associated landforms include outwash terraces, glacial lakebeds, and ancient dune fields. Sand Prairie was historically common and extensive on some of the broader sand and gravel terraces flanking the larger rivers in southwestern Wisconsin, such as the Mississippi, Wisconsin, Chippewa, and Black. In the Driftless Area and in areas covered by old glacial drift a little farther north, these terraces occupy the dry, usually gentle terrain between the river floodplains and the steep bluffs farther inland.

Historic natural disturbances affecting Sand Prairie included periodic wildfire, drought, growing season frosts, and the actions of burrowing animals. The vegetation mosaic around Sand Prairie was historically composed primarily of dry oak-dominated forests, woodlands, and savannas, along with dry (bluff) and dry-mesic prairies. Stands on terraces adjoining the big river floodplains sometimes occurred in close proximity to wetland communities such as marsh, sedge meadow, wet prairie, shrub-carr, and lowland hardwood forest. Abrupt moisture gradients characterize some of these interfaces.

Sand Prairie is also known from a few areas close to but north of the Tension Zone, usually in association with oak barrens or pine barrens on landforms such as glacial lakebeds or outwash. In all cases, the well-drained, drought-prone soils and rolling or level topography facilitated the spread of fire, the disturbance dynamic that was most responsible for maintaining the community in a “treeless” condition over time.

Some past attempts to use sand prairies or barrens for agricultural purposes were unsuccessful owing to their low nutrient status, the coarse-textured and drought-prone soils, high erodibility, and, in areas such as central and northwestern Wisconsin, summer frosts.

“Sand Barrens” is the term we use to reference heavily disturbed Sand Prairie, i.e., stands that have been plowed, cropped, heavily grazed, overwhelmed by nonnative plants, or otherwise severely disturbed. Nevertheless, some of these seriously degraded sites have retained populations of sensitive native plants and animals and are worthy of conservation recognition. They may also complement efforts to conserve occurrences of Sand Prairie, many of which are seriously threatened.

Community Description: Composition and Structure

Sand Prairie is dominated by herbaceous plants. Woody cover (shrubs, saplings, trees) is low, usually less than 10% when prescribed fire or other regular disturbances are integral parts of a site management plan. The vegetation is sparse, with bare soil sometimes visible between individual plants.

The dominant grasses are short, usually well under one meter in height, when compared with the typically taller and denser vegetation of the mesic, wet-mesic, and dry-mesic tallgrass prairie communities.

Important grasses include little blue-stem (Schizachyrium scoparium), June grass (Koeleria macrantha), and needle grass (Stipa spartea). Additional graminoids associated with Sand Prairie are poverty-oat grass (Danthonia spicata), fall witch grass (Digitaria cognata), purple love grass (Eragrostis spectabilis), fork-tip three-awn grass (Aristida basiramea), hairy grama (Bouteloua hirsuta), western panic grass (Dicanthelium acuminatum), and other panic grasses (Dicanthelium spp.). Characteristic sedges are sand cyperus (Cyperus lupulinus), Schweinitz’s flat sedge (C. schweinitzii), running savanna sedge (Carex siccata), sand sedge (C. muhlenbergii), and Pennsylvania sedge (C. pensylvanica).

Representative Sand Prairie forbs are flowering spurge (Euphorbia corollata), hairy puccoon (Lithospermum caroliniense), western sunflower (Helianthus occidentalis), round-headed bush-clover (Lespedeza capitata), prairie-smoke (Geum triflorum), western ragweed (Ambrosia psilostachya), field wormwood (Artemisia campestris), wild lupine (Lupinus

Locations of Sand Prairie in Wisconsin. The deeper hues shading the ecological landscape polygons indicate geographic areas of greatest abundance. An absence of color indicates that the community has not (yet) been documented in that ecological landscape. The dots indicate locations where a significant occurrence of this community is present, has been documented, and the data incorporated into the Natural Heritage Inventory database.
perennis), long-branch frostweed (Helianthemum canadense), rough blazing-star (Liatria aspera), clapping milkweed (Asclepias amplexicaulis), butterfly-weed (A. tuberosa), whorled milkweed (Asclepias verticillata), goat’s-rue (Tephrosia virginiana), slender beard-tongue (Penstemon gracilis), fragrant cudweed (Gnaphalium obtusifolium), hairy hawkweed (Hieracium longipilum), gray goldenrod (Solidago nemoralis), showy goldenrod (S. speciosa), dotted horsemint (Monarda punctata), common spiderwort (Tradescantia ohiensis), bird’s-foot violet (Viola pedata), rough pennroyal (Hedeoma hispida), coastal joint-weed (Polygonella articulata), and clapping Venus’-looking-glass (Triodanis perfoliata).

Though woody plant cover is typically low, characteristic species include shrubs such as lead-plant (Amorpha canescens), sand cherry (Prunus pumila), prairie willow (Salix humilis), common dewberry (Rubus flagellaris), and New Jersey tea (Ceanothus americanus). In managed sites, there may be root sprouts of drought and fire-adapted trees such as black oak (Quercus velutina), northern pin oak (Q. ellipsoidalis), white oak (Q. alba), and bur oak (Q. macrocarpa).

Plants of special conservation concern that are strongly associated with Sand Prairie include dwarf milkweed (Asclepias ovalifolia), clustered poppy mallow (Callirhoe triangulata), prairie fame-flower (Phemeranthus rugospermus), Carolina anemone (Anemone caroliniana), rough rattlesnake-root (Prenanthes aspera), large-flowered beard-tongue (Penstemon grandiflorus), plains larkspur (Delphinium carolinianum), eastern prickly-pear cactus (Opuntia humifusa), brittle prickly-pear (O. fragilis), Louisiana broom-rape (Orobanchus ludoviciana), prairie sagebrush (Artemisia frigida), and narrow-leaved dayflower (Commelina erecta var. deamiana).

Microhabitats within stands of Sand Prairie include sand blowouts (these are especially common in disturbed prairies and Sand Barrens but can also be the result of, or enlarged by, strong persistent winds), mounds created by the plains pocket gopher (Geomys bursarius), the odd symmetrical pit traps excavated by larval ant lions (Myrmeleon spp.), and burrows dug by mammals such as American badger (Taxidea taxus) and thirteen-lined ground squirrel (Spermophilus tridecemlineatus). These small scale unvegetated areas can support unusual assemblages of pioneering species such as false heather (Hudsonia tomentosa), certain graminoids (sedges, rushes, and grasses), annual plants, lichens, and fungi.

Crusts composed of mosses, lichens, algae, and cyanobacteria may develop on exposed patches of bare sand, and these represent the earliest stage of vegetation. Crust associations have been studied much more thoroughly in the arid parts of western North America but should be treated with care where they occur in Wisconsin, as they are fragile, subject to inadvertent destruction, and may play critically important roles in the recovery of disturbed areas of bare sand. These associations of pioneering specialists may include species that are of conservation significance in their own right (Anderson and Bowles 1999).

Among the rarer mammals inhabiting Sand Prairie are Franklin’s ground squirrel (Spermophilus franklinii), prairie vole (Microtus ochrogaster), and white-tailed jackrabbit (Lepus townsendii). Among the notable birds are Upland Sandpiper (Bartramia longicauda), Western Meadowlark (Sturnella neglecta), Grasshopper Sparrow (Ammodramus savannarum), Lark Sparrow (Chondestes grammacus), and Vesper Sparrow (Pooecetes gramineus). Rare and uncommon herptiles for which this community is important include ornate box turtle (Terrapene ornata), Blanding’s turtle (Emydoidea blandingii), eastern massasauga (Sistrurus catenatus catenatus), gophersnake (Pituophis catenifer), eastern hog-nosed snake (Heterodon platirhinos), and slender glass lizard (Ophisaurus attenuatus).

Many invertebrates of conservation interest have been documented in Sand Prairie, including the federally endangered Karner blue butterfly (Lycaeides melissa samuelis), the ottoe skipper (Hesperia ottoe), Leonard’s skipper (H. leonardus), phlox moth (Schinia indiana), Persius duskywing (Erynnis persius), and frosted elfin (Callophrys irus). Other rare
invertebrates associated with Sand Prairie are the leafhopper *Attenuipyga vanduzeei*, and, based on recent work by Kirk and Bomar (2005), the club-horned grasshopper (*Aeropedelarus clavatus*), yellow-winged grasshopper (*Arphia xanthoptera*), blue-legged grasshopper (*Melanoplus flavidus*), and large-headed grasshopper (*Phoetaliotes nebrascensis*).

**Conservation and Management Considerations**

The reintroduction and use of prescribed fire warrants due caution because of limited stand size, stand isolation, and the need to plan for the conservation of fire-sensitive invertebrates inhabiting a given stand over the long term. Sparsely vegetated stands with patches of biotic crust may need to be treated with extra care, as their maintenance and recovery potential following the introduction of controlled fire into the system is unknown and most studies on this unusual assemblage of organisms comes from desert regions—far from the Upper Midwest. At the very least, monitoring is needed for the crusts across the range of the community, including in both managed and unmanaged stands. Additional data on past land use impacts on Sand Prairie are needed, including disturbance type, intensity, timing, and time frame. This information will help us better assess recovery potential.

Many of the terraces along southwestern Wisconsin’s larger rivers have been heavily developed and are now used for residential and agricultural purposes and occur where various transportation rights-of-way have been sited. The spread of center pivot irrigation has led to the conversion and loss of even some of the driest, most nutrient-poor stands of Sand Prairies, and intact examples are now very rare and often isolated. Sites on which cultivation had been attempted and failed were sometimes grazed, then converted to monotypic tree plantations, most often to red pine (*Pinus resinosa*). Conversion of Sand Prairie to plantation-grown pine has been most common in the sandy portions of southwestern, west central, northwestern, and central Wisconsin. Black locust (*Robinia pseudoacacia*), a highly invasive tree not native to but now naturalized in parts of Wisconsin, was sometimes planted in disturbed areas experiencing soil erosion.

Invasive plants are serious problems, especially on sites in which the soil has been disturbed and exposed by activities such as plowing, disking, furrowing, grazing, or use of off-road recreational vehicles. Among the more problematic invasive plants are leafy spurge (*Euphorbia esula*), cypress spurge (*E. cyparissias*), spotted knapweed (*Centaurea biebersteinii*), orange hawkweed (*Hieracium aurantiacum*), sheep sorrel (*Rumex acetosella*), hoary-alyssum (*Berteroa incana*), common St. John’s-wort (*Hypericum perforatum*), and the aforementioned black locust. Black locust can form dense shady thickets, even forests, and its control and eradication have proven to be difficult and expensive. Where there has been thatch build-up due to the lack of fire, and the development of dense sods of clonal sedges, the diversity of native plants and some of the associated and dependent animal species may be seriously reduced.

In recent years, residential development has been increasing on some of the larger river terraces, especially along the Mississippi, lower Wisconsin, and Chippewa rivers. The mining of sand can disrupt, disturb, or destroy existing or restorable Sand Prairie sites. Increased use of center pivot irrigation on sites with doughty sandy soils has led to the replacement of open grasslands and barrens with row crops such as corn and soybeans.

Sand Prairie supports a wealth of rare birds, herptiles, invertebrates, and plants, and many of its associated species have special adaptations to the environmental conditions associated with this increasingly isolated and rapidly disappearing natural community. The maintenance of habitat provided by Sand Prairie is critical for the persistence of some of
the more specialized native plants and animals in Wisconsin. For many of these, few or no alternative habitats are available. Large patches of Sand Prairie exceeding more than a few tens of acres now persist at only a few locations, such as Trempealeau and Necedah National Wildlife Refuges, Fort McCoy Military Reservation, and at a few state wildlife areas in western Wisconsin. All of the larger sites are in need of active restoration and management.

Conservationists and others involved in Sand Prairie management should search for opportunities to enlarge and connect existing remnants, and where possible and appropriate, to manage vegetation in surrounding areas in ways that will maintain, enhance, or otherwise complement community viability over time. Some of the best restoration opportunities occur on the terraces bordering the floodplains of southwestern Wisconsin's large rivers, where the community is also highly threatened by various developments.

Additional Information

For information on similar vegetation see the natural community descriptions for Dry-mesic Prairie, Dry Prairie, Oak Barrens, Pine Barrens, and Southern Dry Forest. Also, in the “Selected Habitats” section, see Sand Barrens. The U.S. National Vegetation Classification community types most similar to Sand Prairie are CEGL002318 “Midwest Sand Prairie,” Little Bluestem - Poverty Oatgrass - Pennsylvania Sedge - (Birdfoot Violet) Herbaceous Vegetation and CEGL005099 “Midwest Sand Barrens,” Little Bluestem - Parachute Sedge - Muhlenberg's Sedge - Plains Puccoon - Eastern Prickly Pear Herbaceous Vegetation (Faber-Langendoen 2001). At this time it is unclear whether or not CEGL005099 Midwest Sand Barrens represents examples of CEGL002318 Midwest Sand Prairie that were subjected to previous anthropogenic disturbance and are now in various stages of recovery or warrants recognition as a distinct natural community.

Also see:
Thomson (1940)


For a list of terms used, please visit the Glossary.

For a reference list, please see the Literature Cited.