Wet Prairie — Community Abstract

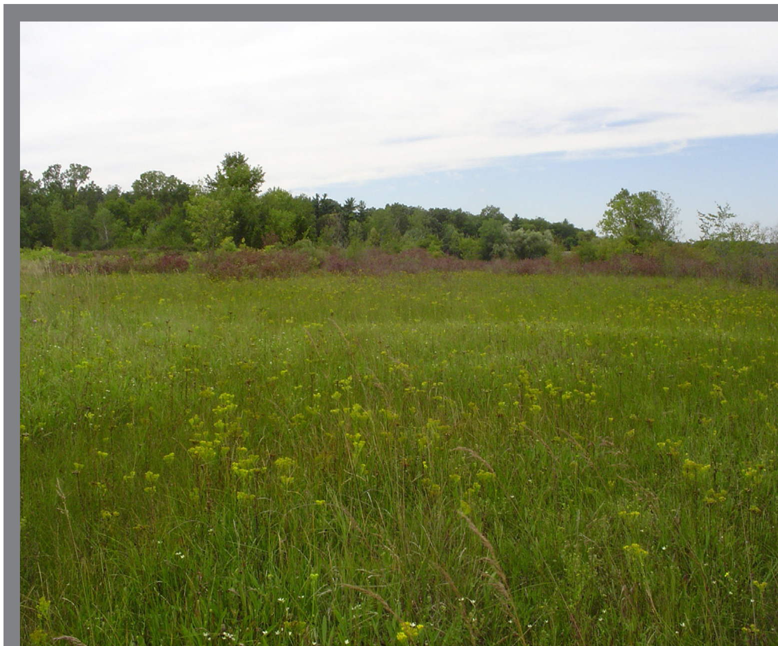
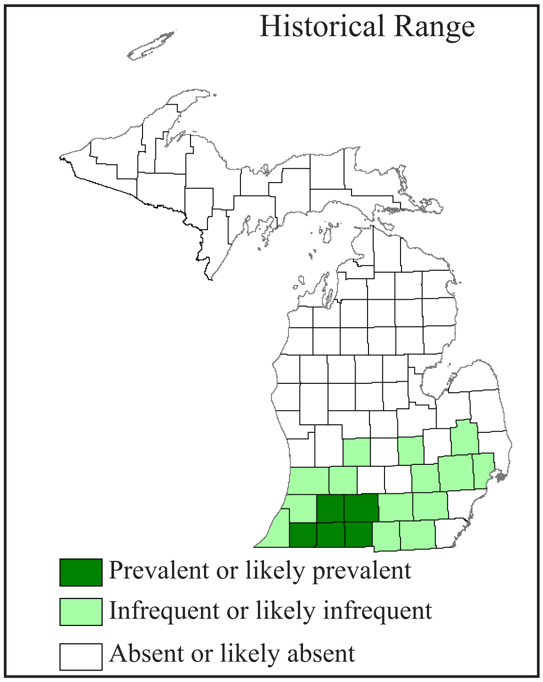


Photo by Adrienne L. Bozic



Overview: Wet prairie is native wetland grassland that occurs on frequently saturated, occasionally inundated soils on outwash plains and outwash channels and in depressions on ground moraines, end moraines, and ice-contact features. Soils range from loam to loamy sands and sandy clays, typically with neutral pH and high organic content. Cordgrass (*Spartina pectinata*) and bluejoint grass (*Calamagrostis canadensis*) are the dominant or subdominant grasses, often associated with several sedges (*Carex* spp.). Fluctuating water levels and fire are important natural disturbances.

Global and State Rank: G3/S2

Range: Wet prairie is broadly distributed throughout the central Midwestern United States and adjacent Canadian provinces, occurring in Montana, Manitoba, North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana, and Ohio (NatureServe 2009). Species composition and dominance patterns vary throughout this range. In Michigan, wet prairie occurs south of the climatic tension zone in the southern Lower Peninsula, where it was likely prevalent historically in subsection VI.2 (Kalamazoo Interlobate), and infrequent in subsections VI.1 (Washtenaw), VI.3 (Allegan), and VI.4 (Ionia) (Albert et al. 2008). Currently, high quality occurrences of wet prairie have been documented from all four subsections within which it was historically distributed (MNFI 2010). Wet prairie on the glacial lakeplain is classified as lakeplain wet prairie (Albert and Kost 1998a, Kost et al. 2007).

Rank Justification: Analysis of General Land Office (GLO) survey notes in Michigan reveals that graminoid-dominated wetlands, broadly classified as "inland wet prairie," covered approximately 220,000 acres (89,000 ha) circa 1800. Nearly all of this acreage occurred in southern Lower Michigan (Comer et al. 1995). Wet and wet-mesic prairie on glacial lakeplain covered an additional 160,000 ac (65,000 ha), and is described by Albert and Kost (1998a, 1998b) and Kost et al. (2007). Acreage mapped as "inland wet prairie" was comprised of several natural communities, including wet prairie, wet-mesic prairie, southern wet meadow, and prairie fen. The extent of wet prairie circa 1800 is difficult to determine because GLO notes do not contain sufficient detail to assign specific natural community types to acreage mapped broadly as "wet prairie." The majority of inland wet prairie acreage in southern Lower Michigan occurred in Jackson County (49,000 ac or 20,000 ha), representing over 10% of the county's land surface. Inland wet prairie was also common in Washtenaw (37,000 ac or 15,000 ha), Livingston (34,000 ac or 14,000 ha), Oakland (21,000 ac or 8,500 ha), Shiawassee (14,000 ac or 5,700 ha), Cass (11,000 ac or 4,500 ha), Lenawee (8,000 ac or 3,000 ha), Ingham (8,000 ac or 3,000 ha), Calhoun (8,000 ac or 3,000 ha), Hillsdale (7,000 ac or 3,000 ha), and Genesee (6,000 ac or 2,000 ha) counties (Comer et al. 1995).

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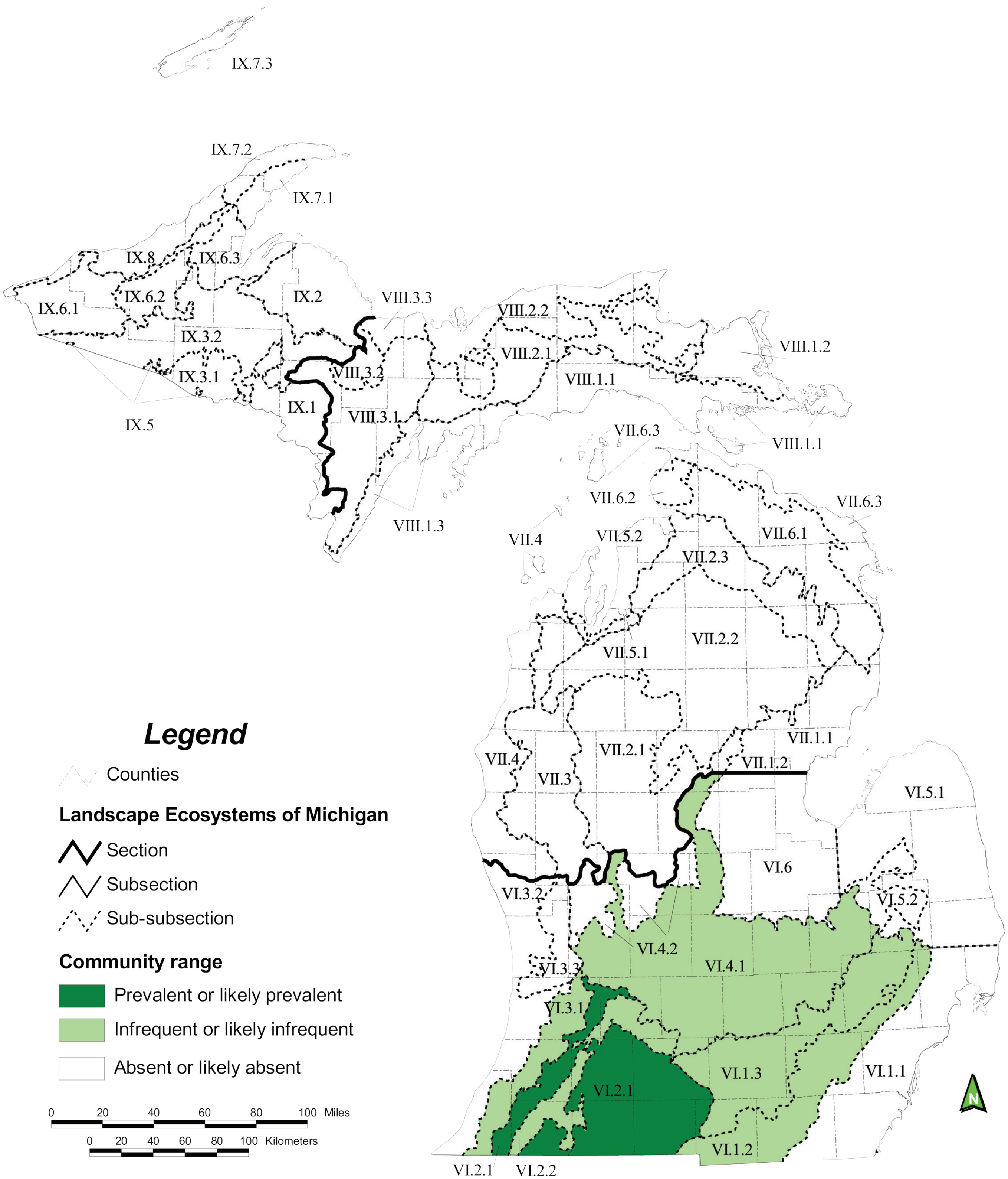

Ecoregional map of Michigan (Albert 1995) depicting historical distribution of wet prairie (Albert et al. 2008)

Wet prairie likely occurred throughout southern Lower Michigan as rings around lakes and wetlands, along rivers and streams, and as depressional wetlands, but may have not totaled a large number of acres relative to southern wet meadow and prairie fen.

Since the early 19th century, wet prairie has been significantly impacted by drainage and conversion for agriculture. Drainage networks lowered regional water tables and allowed extensive agricultural development, reducing wet prairie to small, isolated patches, often at the margins of unfarmed wetlands (MNFI 2010; see also Urban 2005 for a discussion of wet prairie settlement in Illinois). Currently, eight occurrences of wet prairie have been documented statewide, totaling approximately 160 ac (65 ha) (MNFI 2010). Only five of these occurrences are estimated to be of good (B-rank) viability, totaling just over 40 acres (16 ha). Seven of the eight wet prairie occurrences were last surveyed in or prior to 1990. Many extant occurrences of wet prairie show signs of past agricultural use (e.g., grazing, plowing), and are currently threatened by shrub and tree encroachment due to fire suppression, disturbed hydrology, invasive species, and development. Though it is difficult to assess the historical distribution and acreage of the community, it is clear that wet prairie has undergone a severe reduction in both total acreage and number of occurrences across its range.

Physiographic Context: The Michigan range of wet prairie is in southern Lower Michigan, south of the climatic tension zone. This region has a warm, temperate, rainy to cool, snow-forest climate with hot summers and no dry season. The daily maximum temperature in July ranges from 29° to 32° C (85° to 90° F), the daily minimum temperature in January ranges from -9° to -4° C (15° to 25° F), and the annual average temperature ranges from 8.2° to 9.4° C (47° to 49° F) (Albert et al. 1986, Barnes 1991). The mean number of freeze-free days is between 146 and 163, and the average number of days per year with snow cover of 2.5 cm (1 in) or more is between 10 and 60. The mean annual total precipitation for this region is 820 mm (32 in).

Wet prairie occurs on a variety of landforms, including poorly drained glacial clay and sand lakeplain (where it is classified as lakeplain wet prairie; see Albert and Kost 1998a, 1998b, Kost et al. 2007), poorly drained outwash channels and outwash plains, and depressions on ground moraine, end moraine, and ice-contact features. Historically, the largest areas of wet prairie may have occurred in association with extensive southern wet meadows, prairie fens, and forested wetlands in ice-contact terrain in the Jackson Interlobate (Sub-subsection VI.1.3) and Cassopolis Ice-Contact Ridges (Sub-subsection VI.2.2) (Albert 1995, Comer et al. 1995). Elsewhere in southern Lower Michigan, wet prairie was likely more limited in extent, occurring along stream headwaters, floodplains of larger streams and rivers, and lakeshores (NatureServe 2009).

Wet prairie occurs on mineral soils, ranging from loams and sandy loams to loamy sands and sandy clays (Sytsma and Pippen 1981, Chapman 1984, Kost et al. 2007). The top layer of the soil is often rich in organic matter derived from partially decomposed grass roots (Curtis 1959). Soils are typically circumneutral, with an average pH of 6.9 (range 5.5 to 7.7) documented for several Michigan wet and wet-mesic prairies (Chapman 1984). Wet prairie can develop where impermeable subsurface soil layers perch the water table, or where heavy precipitation events, snow melt, and over-the-bank flooding along streams cause periods of inundation (Curtis 1959). Despite these periods of inundation, the water table drops well below the ground surface over much of the growing season, permitting decomposition of organic matter (Curtis 1959). Thus, peat rarely accumulates in wet prairie. Although wet prairie occurs on a variety of soil textures and landforms, a relatively high water table is characteristic of all sites.

Wet prairie is associated with a variety of natural community types. Adjacent uplands typically support fire-dependent systems, including oak barrens, oak openings, dry southern forest, and dry-mesic southern forest. In southwestern Lower Michigan, where upland prairies were common, wet prairie occasionally graded into adjacent upland prairie types such as mesic prairie, mesic sand prairie, and dry-mesic prairie. A variety of open or forested wetland communities occur in adjacent lowlands, including southern wet meadow, prairie fen, wet-mesic prairie, southern shrub-carr, rich tamarack swamp, and southern hardwood swamp. Historically, wet prairie on glacial lakeplain was associated with extensive tracts of emergent marsh, lakeplain wet-mesic prairie, lakeplain oak openings, and wet-mesic flatwoods (Comer et al. 1995, Albert and Kost 1998a, 1998b, Kost et al. 2007). The concentration of wet prairie in a savanna landscape, instead of a prairie landscape, may account for differences in soils and plant species composition between wet prairies in southern Michigan, where savanna was historically dominant, and those in the “prairie states” to the west (see Vegetation section below).

Natural Processes: The two primary natural disturbances integral to the development, structure, and stability of wet prairie are hydrologic fluctuation and fire. Wet prairie occurs in several hydrologic settings, including surface water depressions, surface water slopes, and groundwater slopes (Novitzki 1979, Brinson 1993). Surface water depressions occur above the water table, and receive most of their water from overland flow and precipitation. Water loss is through evapotranspiration. Surface water depressions occur on broad, flat landscapes, such as large outwash plains and glacial lakeplains, where impermeable subsurface clay layers occur above the water table and cause seasonal inundation and ponding. Species composition in surface water depressions is regulated by spring and summer saturation or inundation followed by soil desiccation in late summer and fall, when the water table drops well below the soil surface. Surface water slope wetlands are similar to surface water depression wetlands, but occur on a slope that allows outflow of precipitation and runoff, usually adjacent to lakes, streams, and other water bodies. Seasonal water level fluctuations in these water bodies cause periods of inundation in adjacent wetlands (Novitzki 1979, Brinson 1993). Groundwater slope wetlands are associated with hydrologic breaks, such as where outwash channels bisect moraines (Novitzki 1979, Brinson 1993, Amon et al. 2002). In these areas, groundwater seepages rich in calcium and magnesium carbonates develop as a result of movement of groundwater through base-rich glacial deposits. Wetlands supported by steady groundwater seepage typically experience fairly stable hydrologic conditions during the year. In all three settings (surface water depressions, surface water slopes, and groundwater slopes), wet prairies are characterized by greater periods of soil saturation and inundation than wet-mesic prairies, which impacts vegetative composition and dominance patterns (see Vegetation section below) (Slaughter and Kost 2009).

As in other prairie and savanna communities, fire played a critical role in maintaining open conditions in wet 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). Wet prairie associated with upland prairie on gently rolling outwash plains may have burned more frequently and/or more severely than small, isolated patches of wet prairie protected from fire by water bodies or topographic breaks. The frequency and intensity of fire was likely also affected by flooding and hydrologic dynamics. In the absence of fire, lowland grassland may succeed rapidly to savanna or forest due to favorable moisture conditions for the colonization and establishment of shrubs and trees (Curtis 1959, Faber-Langendoen and Maycock 1994).

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 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 a decline of 8% to 60% of the original plant species recorded at the sites in the span of 32 to 52 years, even though the sites appeared relatively undisturbed (Leach and Givnish 1996). The decline in diversity appeared to be the 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). Because fire maintains open conditions and burns off accumulated leaf litter, species that require open microsites for seedling establishment and growth are able to acquire 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, and seedlings with low nutrient reserves (i.e., species with small seeds) have difficulty growing through thick litter. The decline in species diversity is especially pronounced in mesic and wet community types where biomass accumulates 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 advantage absent 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. 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).

Animals also contribute to the development and persistence of wet prairie. Ants, particularly *Formica* spp., play an important role in mixing and aerating prairie soils (Curtis 1959, Trager 1998). 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, Gibson 1989). Beaver, too, may have played an important role in maintaining wet prairies (Albert and Kost 1998a, 1998b). On the glacial lakeplain, lakeplain wet prairie occurred in a complex mosaic of other natural communities, including emergent marsh, lakeplain wet-mesic prairie, mesic sand prairie, lakeplain oak openings, wet-mesic flatwoods, and southern hardwood swamp. The interaction of fire, hydrology, and beaver activity resulted in dynamic flux among these community types on the poorly drained lakeplain landscape. Beaver also likely played an important role in maintaining inland wet prairie, in association with fire and hydrologic fluctuation. Following beaver flooding, graminoid and herb-dominated communities develop and sometimes persist for several decades (Terwilliger and Pastor 1999). The presence of numerous plant species typical of wet forests in lowland prairies, combined with their relatively rapid succession to shrubs and trees in the absence of frequent fires, suggests at least some occurrences of lowland prairie may result from flooding and/or catastrophic fire in wooded systems (Curtis 1959).

The role of grazing ungulates in lowland prairie, including wet prairie, is unclear (MNDNR 2005, Nelson 2005). Historically, large herbivores such as elk (wapiti) and, locally, 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). Wet and wet-mesic prairie may have been preferentially grazed during dry periods, when moisture conditions in lowlands were more favorable for forage growth (MNDNR 2005). As grazing ungulates 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). Bison were present in significant numbers for a relatively short time in Michigan and other states east of the Mississippi River, during the 17th and 18th centuries, and were quickly eliminated from the region by settlers in the early 1800s (Cochrane and Iltis 2000). In Michigan, bison appear to have been restricted to the extreme southern counties (Hornaday 1889; see accounts in Greenberg 2002).

Vegetation Description: Wet prairie is a grassland community generally dominated by a dense layer of dominant grasses 1-2 m in height (NatureServe 2009). Cordgrass (*Spartina pectinata*) and bluejoint (*Calamagrostis canadensis*) are the dominant or subdominant grasses, and are typically associated with sedges (including *Carex bebbii* and *C. stricta*) and numerous other grasses and forbs (Chapman 1984, Kost et al. 2007, NatureServe 2009). Big bluestem (*Andropogon gerardii*) and Indian grass (*Sorghastrum nutans*) occur in areas transitional to wet-mesic prairie. Other characteristic herbaceous species in Michigan include hog-peanut (*Amphicarpaea bracteata*), thimbleweed (*Anemone virginiana*), angelica (*Angelica atropurpurea*), spreading dogbane (*Apocynum androsaemifolium*), groundnut (*Apios americana*), swamp milkweed (*Asclepias incarnata*), common milkweed (*A. syriaca*), eastern lined aster (*Aster lanceolatus*), New England aster (*A. novae-angliae*), swamp aster (*A. puniceus*), fringed brome (*Bromus ciliatus*), marsh-marigold (*Caltha palustris*), marsh bellflower (*Campanula aparinoides*), hedge bindweed (*Calystegia sepium*), water hemlock (*Cicuta maculata*), swamp thistle (*Cirsium muticum*), tall coreopsis (*Coreopsis tripteris*), common boneset (*Eupatorium perfoliatum*), joe-pye-weed (*E. maculatum*), flowering spurge (*Euphorbia corollata*), grass-leaved goldenrod (*Euthamia graminifolia*), northern bedstraw (*Galium boreale*), fowl manna grass (*Glyceria striata*), tall sunflower (*Helianthus giganteus*), star-grass (*Hypoxis hirsuta*), southern blue flag (*Iris virginica*), marsh pea (*Lathyrus palustris*), common water horehound (*Lycopus americanus*), fringed loosestrife (*Lysimachia ciliata*), whorled loosestrife (*L. quadriflora*), Michigan lily (*Lilium michiganense*), wild bergamot (*Monarda fistulosa*), leafy satin grass (*Muhlenbergia mexicana*), sensitive fern (*Onoclea sensibilis*), cowbane (*Oxypolis rigidior*), grass-of-Parnassus (*Parnassia glauca*), swamp-betony (*Pedicularis lanceolata*), common mountain mint (*Pycnanthemum virginianum*), yellow coneflower (*Ratibida pinnata*), black-eyed susan (*Rudbeckia hirta*), swamp saxifrage (*Saxifraga pensylvanica*), prairie dock (*Silphium terebinthinaceum*), starry false Solomon-seal (*Smilacina stellata*), tall goldenrod (*Solidago altissima*), Canada goldenrod (*S. canadensis*), late goldenrod (*S. gigantea*), Riddell's goldenrod (*S. riddellii*), purple meadow-rue (*Thalictrum dasycarpum*), marsh fern (*Thelypteris palustris*), broad-leaved cattail (*Typha latifolia*), Missouri ironweed (*Vernonia missurica*), culver's root (*Veronicastrum virginicum*), and golden alexanders (*Zizia aurea*) (Chapman 1984, Kost et al. 2007, Chapman and Brewer 2008). Reed canary grass (*Phalaris arundinacea*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*T.* x*glauca*), and purple loosestrife (*Lythrum salicaria*) are common non-native species.

Shrubs that occasionally occur within wet prairie include shrubby cinquefoil (*Potentilla fruticosa*), silky dogwood (*Cornus amomum*), gray dogwood (*C. foemina*), red-osier dogwood (*C. stolonifera*), sandbar willow (*Salix exigua*), meadowsweet (*Spiraea alba*), and poison sumac (*Toxicodendron vernix*). Quaking aspen (*Populus tremuloides*) and other trees sometimes occur. Woody species can increase in the absence of fire (NatureServe 2009).

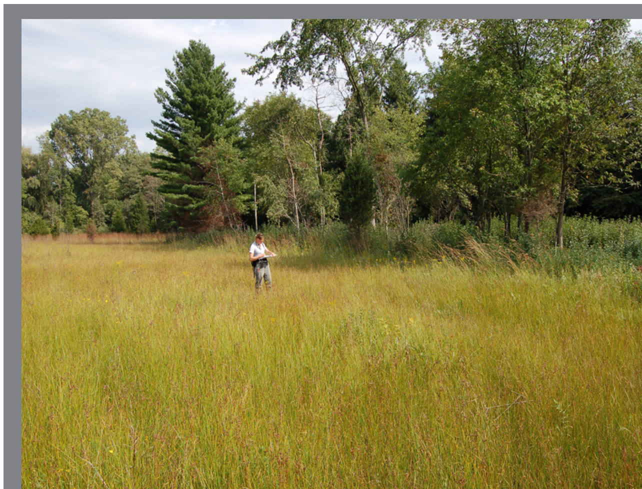

Photo by Ryan P. O'Connor

Wet prairie on alkaline, periodically inundated sands may be dominated by twig-rush (*Cladium mariscoides*). Tall, coarse prairie grasses are prevalent in drier soils upslope from these flats (background).

Because wet prairie occurs in a variety of landscape settings and in association with a variety of upland and wetland natural communities, species composition can vary significantly among sites. Many characteristic species of lowland prairie are of Alleghenian and/or Ozarkian origin, resulting in floristic dissimilarities to upland prairies, which have a higher concentration of species of Great Plains, Arco-Tertiary, and Cordilleran affinity (Curtis 1959, Cochrane and Iltis 2000). Michigan is situated at the eastern edge of the "Prairie Peninsula" (see Transeau 1935) and is strongly influenced by floristic elements originating in wet meadows in the eastern United States, as opposed to species originating in the prairies of the western United States (Curtis 1959). Thus, many lowland prairies in Michigan bear stronger resemblance to wet meadows than to lowland grasslands in Wisconsin and other states more extensively colonized by species of western affinity following glacial retreat (Cochrane and Iltis 2000, Chapman and Brewer 2008).

Noteworthy Animal Species: Ants can turn over large portions of prairies in a relatively short time through mound construction and abandonment, creating microsites for germination of small-seeded species (Curtis 1959, Trager 1998). Moles, voles, mice, skunks, ground hogs, ground squirrels, and badgers mix and aerate prairie soil. Beaver can cause flooding that substantially alters wetland community structure, converting lowland shrub and forest systems to pond, emergent marsh, wet meadow, wet prairie, wet-mesic prairie, and wet-mesic sand prairie, depending on landscape position, soils, and depth and duration of flooding (Terwilliger and Pastor 1999). Large ungulates may have affected regeneration and competitive interactions among plant species through grazing, browsing, and trampling activities.

Rare Species: Wet prairie provides potential habitat for eight rare plant species and 26 rare animal species. The drastic decline in number of sites and total acreage of wet prairie has likely contributed to the rarity of several plant species listed in the table below.

Rare Plants Associated with Wet Prairie (E, Endangered; T, Threatened; SC, species of special concern; X, presumed extirpated from Michigan).

Scientific Name	Common Name	State Status
Dodecatheon meadia	shooting star	E
Eryngium yuccifolium	rattlesnake-master	T
Mimulus alatus	wing monkey flower	X
Polemonium reptans	Jacob's ladder	T
Pycnanthemum muticum	broad-leaved mountain mint	T
Sanguisorba canadensis	Canadian burnet	E
Silphium integrifolium	rosinweed	T
Sisyrinchium fuscatum	Farwell's blue-eyed-grass	X

Rare Animals Associated with Wet Prairie (E, Endangered; T, Threatened; SC, species of special concern; LE, Federally Endangered).

Scientific Name	Common Name	State Status
Acris crepitans blanchardi	Blanchard's cricket frog	T
Ambystoma texanum	smallmouth salamander	E
Ammodramus savannarum	grasshopper sparrow	SC
Asio flammeus	short-eared owl	E
Botaurus lentiginosus	American bittern	SC
Circus cyaneus	northern harrier	SC
Clemmys guttata	spotted turtle	T
Clonophis kirtlandii	Kirtland's snake	E
Dorydiella kansana	leafhopper	SC
Emydoidea blandingii	Blanding's turtle	SC
Flexamia reflexus	leafhopper	SC
Meropleon ambifusca	Newman's brocade	SC
Neoconocephalus lyristes	bog conehead	SC
Neoconocephalus retusus	conehead grasshopper	SC
Neonympha m. mitchellii	Mitchell's satyr	E; LE
Orchelimum concinnum	red-faced meadow katydid	SC
Orphulella pelidna	green desert grasshopper	SC
Papaipema cerina	golden borer	SC
Papaipema maritima	Maritime sunflower borer	SC
Papaipema speciosissima	regal fern borer	SC
Paroxya hoosieri	Hoosier locust	SC
Phalaropus tricolor	Wilson's phalarope	SC
Sistrurus c. catenatus	eastern massasauga	SC
Spartiniphaga inops	spartina moth	SC
Spiza americana	dickcissel	SC
Tyto alba	barn owl	E

Conservation and Biodiversity Management: Wet prairie is imperiled in Michigan, and efforts should be taken to identify, protect, and manage intact remnants. Primary threats to wet prairie include fire suppression, hydrologic alteration, and invasive species. For specific management strategies and recommendations, see Packard and Mutel (1997) and O'Connor (2006).

Managing wet prairie requires frequent burning. Burn intervals longer than one to three years 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, in the absence of fire, outcompete light-dependent grasses and forbs. Long-term fire suppression is associated with local extinctions of plant species in otherwise intact prairie remnants (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 such as 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, prescribed burns should be conducted on a rotating schedule in which adjacent management units are burned in alternate years. Insect species that are restricted to prairie 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). Because fire is a landscape-scale natural process, burn plans for small wet prairie remnants should include, wherever possible, adjacent fire-dependent upland (e.g., oak barrens, dry-mesic southern forest) and lowland (e.g., prairie fen, southern wet meadow) systems.


Photo by MNFI staff

Prescribed fire is a critical component of wet prairie management and restoration. Burns implemented every one to three years restrict encroachment of woody species and create conditions suitable for the maintenance of plant species diversity.

Prairie ants (*Formica spp.*) 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 shifts 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, Lane and BassiriRad 2005).

Protection of groundwater and surface water hydrology is critical to maintaining the integrity of wet prairie. Agricultural development, including the installation of ditches and drain tiles and conversion of much of the land surface to row crops, has resulted in significant landscape-scale hydrologic alteration, including increased flooding and extended periods of water table drawdown (Chapman and Brewer 2008). Hydrologic disturbances, including altered water chemistry and water level fluctuations, have been shown to favor annuals and invasive perennials at the expense of native perennial species in wet meadows (Galatowitsch et al. 2000). Reed canary grass (*Phalaris arundinacea*), an aggressive invader of graminoid-dominated wetlands (including wet prairie), increases in importance following floods of high intensity or long duration (Kercher and Zedler 2004a). This species and cat-tails (*Typha* spp.) are highly flood tolerant and can be expected to increase in disturbed landscapes at the expense of flood intolerant species, which include several characteristic wet prairie species (e.g., fringed brome [*Bromus ciliatus*], bluejoint grass [*Calamagrostis canadensis*], joe-pye weed [*Eupatorium maculatum*], Riddell's goldenrod [*Solidago riddellii*], and cordgrass [*Spartina pectinata*]) (Galatowitsch et al. 2000, Kercher and Zedler 2004b). Nutrient enrichment and sedimentation are additional disturbance factors that favor the expansion of reed canary grass (Kercher and Zedler 2004a). The interaction of flooding, sedimentation, and nutrient enrichment can lead to significant mortality of native species and rapid growth and spread of reed canary grass (Kercher and Zedler 2004b, Kercher et al. 2007).

Invasive plant species are a significant threat to wet prairie. In addition to reed canary grass, species of particular concern include narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*T.* x*glauca*), common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), redtop (*Agrostis gigantea*), glossy buckthorn (*Rhamnus frangula*), common buckthorn (*R. cathartica*), multiflora rose (*Rosa multiflora*), and autumn olive (*Elaeagnus umbellata*). Fragmentation and isolation of wet prairie occurrences by residential, commercial, and industrial development threatens this natural community type by restricting dispersal of native species and increasing the spread of commonly planted non-native herbs, shrubs, and trees. Monitoring and removal of invasive species should focus on those species that threaten to alter community composition, structure, and function. Management activities should avoid soil and hydrologic disturbances that favor the spread of invasive plant species.

Research Needs: A systematic survey for wet prairie in Michigan, including the collection of plot data, is necessary to assess the statewide and ecoregional conservation status of this natural community type, and to assess variation in the community type across its range. Quantitative data on vegetative composition and structure will allow more precise classification of lowland grasslands, including wet prairie, wet-mesic prairie, and wet-mesic sand prairie.

Continued research on the interaction of anthropogenic and natural disturbances and invasion by native and non-native invasive species will promote the development of improved management and restoration techniques. Additional studies of the natural disturbances that shape and maintain wet prairie will lead to a better understanding of this community type in relation to other prairie and open wetland types. In particular, detailed studies of hydrologic dynamics could be conducted to elucidate differences between wet prairie and wet-mesic prairie.

Similar Communities: *Wet-mesic prairie* occupies a drier position on the moisture gradient and has higher importance of prairie grasses and forbs and lower importance of sedges (Slaughter and Kost 2010). *Lakeplain wet prairie* is the lakeplain variant of wet prairie (Albert and Kost 1998a). *Lakeplain wet-mesic prairie* is the lakeplain variant of wet-mesic prairie (Albert and Kost 1998b). *Wet-mesic sand prairie* occurs on deep, seasonally saturated sands associated with flat to gently rolling sandy outwash plains and lakeplain, concentrated in western Lower Michigan (Kost and Slaughter 2008). *Southern wet meadow* is a sedge-dominated wetland on peat soils with low importance of prairie grasses and forbs (Kost 2001). *Prairie fen* is a graminoid- and low shrub-dominated wetland on peat soils associated with inputs of carbonate-rich groundwater (Spieles et al. 1999).

Other Classifications:

Michigan Natural Features Inventory Land Cover Mapping Code: 6252 (Inland Wet Prairie)

MNFI circa 1800 Vegetation: Wet Prairie

Michigan Resource Information Systems (MIRIS) (MDNR 1978)**:** 625 (Wet Prairie)

Michigan Department of Natural Resources (MDNR): G – Grass

MDNR IFMAP (MDNR 2001): Emergent Wetland

NatureServe 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.j; *Spartina pectinata* Temporarily Flooded Herbaceous Alliance; *Spartina pectinata – Carex* spp. *– Calamagrostis canadensis – Lythrum alatum –* (*Oxypolis rigidior*) Herbaceous Vegetation; Central Cordgrass Wet Prairie

V.A.5.N.k; *Cladium mariscoides* Seasonally Flooded Herbaceous Alliance; *Cladium mariscoides –* (*Carex lasiocarpa*, *Hypericum kalmianum*, *Oligoneuron riddellii*, *Eleocharis elliptica*) Herbaceous Vegetation; Twig-rush Wet Prairie

Other states and Canadian provinces (natural community types with significant overlap with Michigan wet prairie indicated in *italics*):

MN: *Southern wet prairie*; Prairie wet meadow/carr (MNDNR 2005)
WI: *Wet prairie* (Epstein et al. 2002)
IL: *Wet prairie* (White and Madany 1978)
IN: *Wet prairie* (Jacquart et al. 2002)
ON: Tallgrass meadow marsh ecosite; Fresh-moist tallgrass prairie ecosite (Lee et al. 1998)
OH: *Slough grass – bluejoint prairie* (Anderson 1982)

Related Abstracts: bur oak plains, dry sand prairie, dry-mesic prairie, lakeplain oak openings, lakeplain wet prairie, lakeplain wet-mesic prairie, mesic prairie, mesic sand prairie, oak barrens, oak openings, prairie fen, southern wet meadow, wet-mesic prairie, wet-mesic sand prairie, Blanchard's cricket frog, short-eared owl, American bittern, northern harrier, spotted turtle, Blanding's turtle, Mitchell's satyr, regal fern borer, eastern massasauga, shooting star, wing-stemmed monkey-flower, Jacob's ladder.

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