

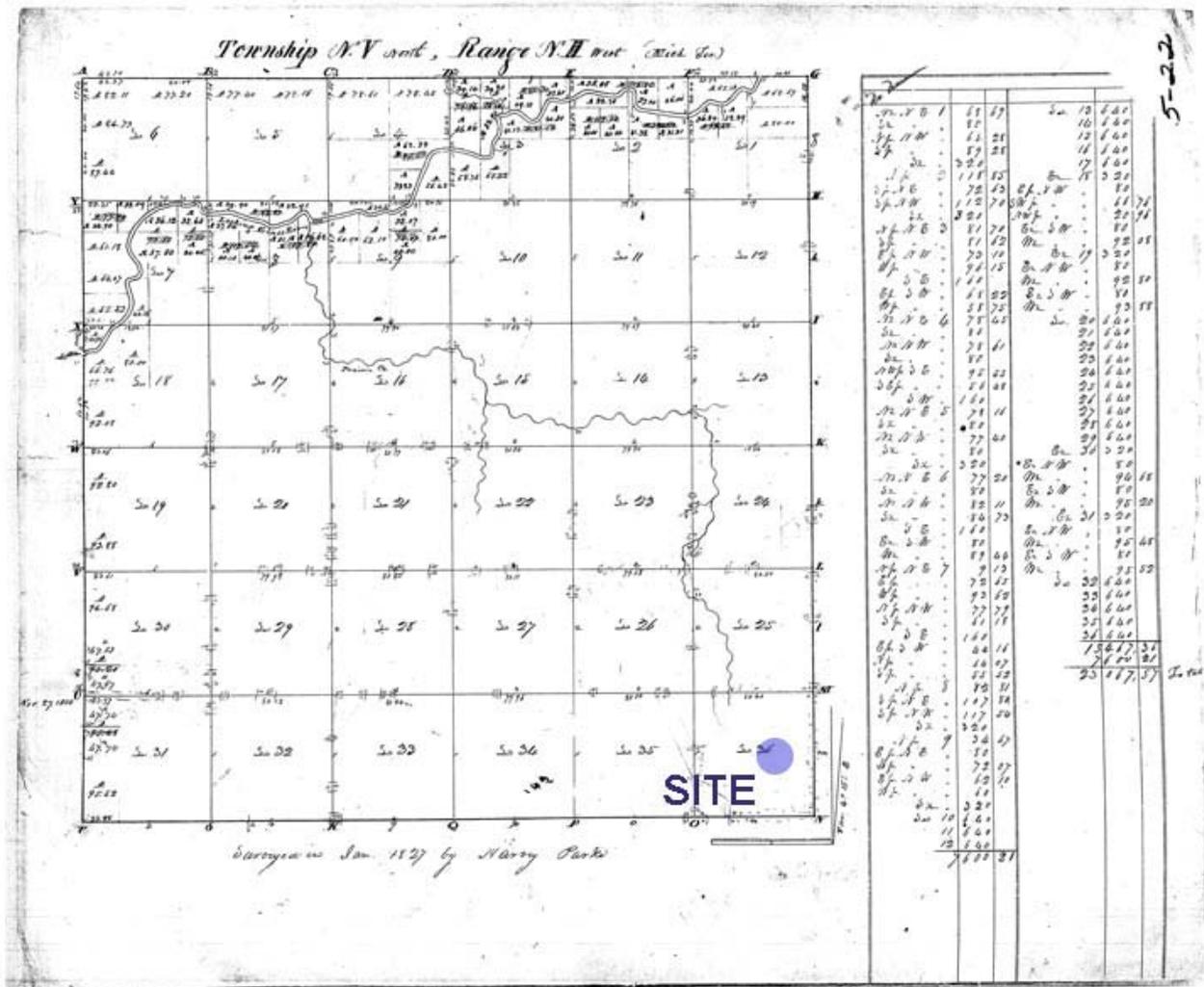
## **A Natural Systems Site Assessment and Native Landscape Potential for Hawk Nest Park, East Lansing, Michigan**

A Natural Systems Site Assessment was conducted by Conservation Design Forum for the City of East Lansing's Hawk Nest Park for landscape Architects and Planners, to evaluate current vegetative cover, historic land cover, and surface hydrology. The assessment and an evaluation are to identify the potentials for creating representative landscapes for the park's native habitat interpretative diversity program. The following are observations and findings based on a May 17<sup>th</sup> site visit, previous data collected by LAP (MNRTF Application Narrative and Wetland Assessment Report – KEBS, inc), and research at the State Archives of Michigan from records of the General Land Office.



### Historic Land Cover

The General Land Office (GLO), established by the federal government in 1785, methodically surveyed Michigan between 1816 and 1856 to develop plat maps which are derived from original surveyor notes of the State of Michigan. A GLO plat map provides a picture of the landscape prior to and at the time of European settlements. Specifically the maps provide a survey of water bodies, river and stream courses before certain farming practices of altering or channeling of for agricultural crops. A plat map of Clinton County (Fig. 1) recorded on January 1827 and survey notes of Section 36 in DeWitt Township recorded starting on November 18, 1826 provides useful information on the site's history.



(Figure 1) Plat Map of Clinton County ~ Jan 1827

Source: State Archives of Michigan

The GLO's detailed notes taken by the land surveyors have proven to be a useful source of information on Michigan's landscape as it appeared prior to wide-spread European settlement. Surveyors took detailed notes on the location, species, and diameter of each tree used to mark section lines and section corners. They commented on the locations of rivers, lakes, wetlands, the agricultural potential of soils and the general quality of timber along each section line as they were measured out. Biologists from the Michigan Natural Features Inventory developed a methodology to translate the notes of the GLO surveys into a digital map that can be used by researchers, land managers, and the general public. In Clinton County, where the park is located, 15 land cover types were identified; four of which are found in the immediate area of the site (Figure 2).

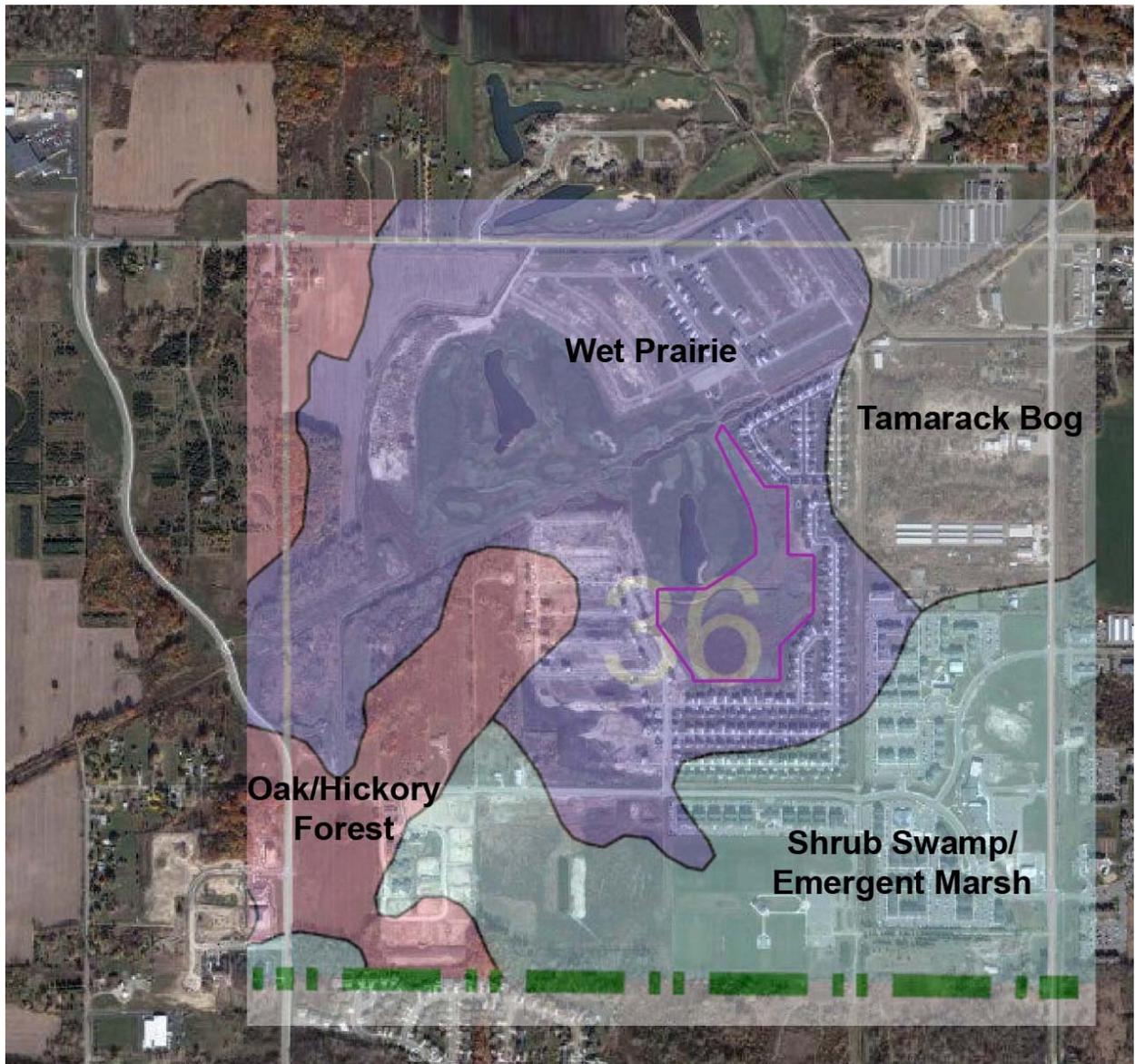


Figure 2.

Source: Vegetation of Michigan *circa* 1800 – MNFI

## HISTORIC

From research and review of reports, documents, GLO notes and maps, CDF has determined the site was likely a wet prairie complex surrounded by tamarack bogs, a cranberry marsh and open oak forest.

### General Land Survey of the Hawk Nest Park in the winter of 1826 and 1927 by Harley Parks

In the icy December of 1826, Deputy Surveyor, Harley Parks, along with 2 assistants struck off along the south side of Section 31 of Bath Township, heading west, boots crunching through a deep marsh, which they left after about 3/8 of a mile of slogging, and whereupon they encountered a small timber. There was a 15-inch red oak on the line. At the quarter section point, 40 chains along the way, they blazed a 5-inch aspen and a 7-inch ironwood as witness trees. About a quarter of a mile later, they encountered a 15-inch Black Oak, then they entered another marsh. At the section corner with Section 36 of Dewitt Township, they found only a single tamarack, 16-inches in diameter, which they blazed as a witness tree. They described the frozen mile as "rolling, 3<sup>rd</sup> rate," with mostly tamarack and "some oak."

Trudging north, along the same section, along its line with Section 32, they encountered only Tamarack trees and marsh; they used 2 as witness trees at the quarter section, and 2 at the junction with sections 29 and 30. Turning 90 degrees to the west, along the line between sections 30 and 31, the description was the same.

After a brief Christmas respite, along the south boundary of Section 36, of Dewitt Township, in January of 1827, they set out again. The first tree they noted was a single elm tree near the quarter section point. They described the mile-long distance as mostly treeless marshes and prairies. Along the eastern boundary there also was "no timber" aside from a 9-inch tamarack, which must have represented an open, wet, peaty prairie and cranberry marsh.

On the east boundary, heading north they left a marsh at 4.5 chains, and a quarter of a mile later they encountered a 12-inch White Ash tree, then enter a "wet prairie" about 75 feet later. The quarter section post they witnessed with a 16-inch Black Ash and an 8-inch White Ash, leaving the timber again about 350 feet farther north. At the 3/4 point they encountered a 24-inch Yellow Oak (Chinquelin). They witnessed the Section corner of sections 25, 26, 35, and 36 with a 40-inch White Oak and a 12-inch Yellow Oak, describing the land as "level, 3<sup>rd</sup> rate, with oak, ash, and aspen.

Then, heading east, between sections 35 and 36, they encountered a wet prairie about an 8<sup>th</sup> of a mile along the way. Near the quarter-mile point they crossed a "sluggish stream" a little over 3 feet wide. Other than a 10-inch aspen near the quarter section point, they encountered no trees.

## PRESENT

On the May 17 site visit, CDF's botanist Gerould Wilhelm, conducted a plant inventory and using Michigan's Floristic Assessment tool in determining the Native Floristic Quality Index (or FQI, prepared by the Michigan Department of Natural Resources and accepted state-wide as an effective way by which to help measure the floristic quality of a site) for the site is 3.2 with a Native Mean C is 0.8; a very low finding, though hardly surprising given the site's prior disturbance from agricultural practices and dewatering from tiles and stream channel alterations. The attached species inventory (APPENDIX B) lists the 36 species identified in and around the site. Of the species present, approximately 47% are native to Michigan.

By comparison, the mean C value for the 9 plants noted for the area in the GLO survey notes is 4.9, which is about right for the whole system. This represents a system that was at least 10,000 times more complex than the one that is there today.



Wet Prairie

Note: Based upon recent tests of the FQA system in Michigan in a wide variety of habitats, certain patterns have emerged. The range of coefficients of conservatism (C) of the plant taxa found in most of our undeveloped lands is 0 - 2, whereas 85% of the total native flora has a C of 4 or greater. The entire native flora has a C of 6.5. This indicates the principal elements of our native systems are poorly represented in the landscape today. Most of the remaining undeveloped land registers floristic quality indices (FQI) of less than 20 and has minimal significance from a natural quality perspective. Areas with a FQI higher than 35 possess sufficient conservatism and richness that they are floristically important from a statewide perspective. Areas registering in the 50s and higher are extremely rare and represent a significant component of Michigan's native biodiversity and natural landscapes.



Wet Prairie



Tamarack Bog

**Cost**

**PROBABLE OPINION OF COSTS**

While a complete planting/seeding matrix has not been fully developed or a schematic planting plan, these preliminary opinion of costs are based on previous projects of similar size native systems installation and management. Costs below reflect phasing the installation annually in approximately 5-8 acres increments. Costs can be reduced slightly with larger phased acreage and/or reducing the number of plant seed species in the initial installation. Tilling is not necessary since mass grading of the site isn't planned for major portions of the native habitat re-creation.

Plant Preparation and Installation:

Herbicide Application (2 applications)	\$200/ac	5 ac x \$200	\$1,000
Seeding Installation	\$100/ac	5 ac x \$100	\$ 500
Seed Cost (based on approx. 20 species)	\$1800/ac	5 ac x \$1800	<u>\$9,000</u>
		<b>Total (5 acre)</b>	<b>\$10,500</b>

Native Plug Plants @ 5 ea. x 4,000

**Allowance                    \$20,000**

Tree and Shrub (30 native trees species @ 3" and 100 native shrub species @ 5 gal.)

**Allowance                    \$20,000**

Management and Stewardship:

Weeding, Selective Herbicide (first/second year, 3-4 visits)

	\$200/ac/yr	5 ac x \$200	\$1,000
	\$200/ac/yr	5 ac x \$200	<u>\$1,000</u>

First two years of Management/Stewardship                    **\$2,000**

Ecological Prescription Burning (third year/1 time annually)

\$600/ac/yr                    5 ac x \$600                    **\$3000**

\$225/ac/yr                    20 ac x \$225                    **\$4500**

## **Management and Stewardship**

### FIRST YEAR MANAGEMENT/STEWARDSHIP

A lot of you have made the decision to end the slave relationship with your lawn mower. The desire to decrease the need for mowing motivates many to consider planting a prairie where once there was water-hungry, drug-dependent lawn. But wait—don't put that mower out on the cub just yet! It just may be the most effective tool in managing your prairie. The importance of management in the first year of prairie establishment cannot be overemphasized—think about the time invested in the site preparation and the money invested in seed. Unfortunately, non-native weed seeds will find an opportunity to establish themselves on the site that you have so carefully prepared for native plant species. It's up to you, the manager of the site, to keep the undesirables at bay.

One of the simplest ways to do this is to commit to a mowing regime for the first season post-seeding. In Michigan, this mowing regime would take place April through October. This means that each time vegetation growth reaches 10-12 inches; it should be mowed to 4-6 inches. For larger areas, cutting can be with a brush hog or flail mower; for medium-sized areas, a lawn mower set high; for small or steep sloped areas, a weed whip will do the work nicely. Depending upon the growing conditions of the season, 3-5 mowings can be anticipated. It is critical that this form of management be followed throughout the entire season, so that spring, summer, late summer and fall weeds can be controlled. Mowing a prairie as instructed can benefit the establishment of native forbs and grasses in several ways.

With timely cuttings, weeds such as barnyard grass, foxtail, pigweed, lambsquarters, ragweed, and mare's-tail are prevented from reseeding. Annual weeds can infest a planting with amazing speed. If these annual weeds are cut prior to seeding, they should not exist in the planting next season. (Note: Although cutting perennial weeds will prevent them from reseeding in most cases, the mother plant will still exist.) Some especially problematic perennial weeds are spotted knapweed, Canada thistle, purple loostrike, field bindweed, plantain, and quack grass.

Other methods must be used to control these plants. It is much easier to deal with problems early in the game, and this applies to plants too. Fire, herbicide and physical removal can be used for controlling perennial weeds. In many cases, once perennial native wildflowers have been mowed, their energy will focus on root development, making for a stronger plant next season. You may sacrifice some blooms of black-eyed Susan and bergamot the first season, but the weed control is worth it. Cutting taller competing growth allows sunlight and moisture to reach the soil and germinate desirable seedlings. Implementing a mowing regime in the first year also helps curb our desire to achieve instant results (something we seem to expect, even while knowing, intellectually, that establishing a planting requires three to five years). Disappointment is less likely in year one if we know that the site will be mowed all year.

**DRAFT 1**

Committing to a mowing regime in the first year of establishment is a simple and effective way to manage your planting.

#### LONG TERM MANAGEMENT/STEWARDSHIP

After the second year of a planting, management would include pulling weeds, cutting or spot spraying with herbicide. If desired, the entire planting can be mowed in late fall or early spring. If the site allows and is most desirable for a healthy and balanced ecosystem, burning every year or allowing alternating years in March or early April will help manage a successful meadow planting.

From  
Prairie Management: Cutting or Mowing as a Management Tool  
Esther Durnwald ~ Michigan Wildflower Farm



## APPENDIX A

### WET PRAIRIE COMMUNITIES

#### Wet Prairie

(Source: Michigan Natural Features Inventory)

**Global/State Rank:** G3/S2

#### Overview

Wet prairie is a native lowland grassland occurring on level, saturated and/or seasonally inundated stream and river floodplains, lake margins, and isolated depressions in southern Lower Michigan. It is typically found on outwash plains and channels near moraines. Soils are primarily loam or silt loam of neutral pH and have high organic content. Dominant species include bluejoint grass (*Calamagrostis canadensis*) and cordgrass (*Spartina pectinata*), with sedges (*Carex* spp.) often important subdominants.

#### Landscape Context

Wet prairie occurs on outwash plains and channels, typically near coarse-textured moraines, within stream or river floodplains, lake margins, and isolated depressions. It is associated with uplands characterized by dry and dry-mesic southern forests, and prior to European settlement, with savanna and prairie communities such as oak openings, oak barrens, mesic prairie, and drymesic prairie.

#### Soils

Soils are typically sandy loam or silt loam but can also be silty clay or clay. Soils are characterized by neutral pH, high organic content, and good water-retaining capacity. Organic deposits (muck) are absent or form only a thin layer over mineral soil.

#### Natural Processes

Water level fluctuations and fire help maintain diversity and open conditions. Seasonal saturation or inundation through flooding, ponding, or high water tables restricts shrub and tree establishment. Beaver can reduce shrub and tree cover by causing flooding, raising local water tables, and through herbivory. Prior to European settlement in the early 1800s, fires of natural and anthropogenic origin limited encroachment by shrubs and trees that established despite the unfavorable hydrologic conditions. Fire helps maintain species diversity by facilitating seed germination, opening microsites for seedling establishment and growth of small species, and releasing important plant nutrients that bolster plant growth, flowering, and seed set.

#### Vegetation

Dominant grasses are bluejoint grass and cordgrass, with sedges (*Carex stricta* and *C. bebbii*) often important subdominants. Big bluestem (*Andropogon gerardii*) and Indian grass (*Sorghastrum nutans*) may appear in areas transitional to wet-mesic prairie. Other characteristic species include hog-peanut (*Amphicarpaea bracteata*), angelica (*Angelica atropurpurea*), groundnut (*Apios americana*), New England aster (*Aster novae-angliae*), fringed brome (*Bromus ciliatus*), marsh marigold (*Caltha palustris*), joe-pye-weed (*Eupatorium maculatum*), common boneset (*E. perfoliatum*), fowl manna grass (*Glyceria striata*), tall sunflower (*Helianthus giganteus*), star-grass (*Hypoxis hirsute*), marsh pea (*Lathyrus palustris*), Michigan lily (*Lilium*

*michiganense*), fringed loosestrife (*Lysimachia ciliata*), leafy satin grass (*Muhlenbergia mexicana*), cowbane (*Oxypolis rigidior*), Virginia mountain mint (*Pycnanthemum virginianum*), black-eyed Susan (*Rudbeckia hirta*), swamp saxifrage (*Saxifraga pensylvanica*), starry false Solomon's 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*), and broad-leaved cat-tail (*Typha latifolia*). Common shrubs include dogwoods (*Cornus* spp.), ninebark (*Physocarpus opulifolius*), and willows (*Salix* spp.); these may be dense due to fire suppression and/or hydrologic alteration. The invasive species, reed canary grass (*Phalaris arundinacea*), is common in some sites. Diversity varies, in part depending on duration of seasonal inundation, time since last fire, and abundance of invasive species.

### Noteworthy Animals

Beaver can cause flooding that substantially alters wetlands and results in conversion of southern shrub-carr and lowland forest systems to ponds, emergent marsh, southern wet meadow, wet prairie, or wet-mesic prairie, depending on landscape position, soils, and depth and duration of flooding.

### Rare Plants

*Dodecatheon meadia* (shooting star, state endangered)  
*Eryngium yuccifolium* (rattlesnake-master, state threatened)  
*Mimulus alatus* (wing-stemmed monkey-flower, presumed extirpated from Michigan)  
*Polemonium reptans* (Jacob's ladder, state threatened)  
*Pycnanthemum muticum* (broad-leaved mountain mint, state threatened)  
*Sanguisorba canadensis* (Canadian burnet, state threatened)  
*Silphium integrifolium* (rosinweed, state threatened)  
*Sisyrinchium farwellii* (Farwell's blue-eyed-grass, presumed extirpated from Michigan)

### Rare Animals

*Acris crepitans blanchardi* (Blanchard's cricket frog, state special concern)  
*Ambystoma texanum* (smallmouth salamander, state endangered)  
*Ammodramus savannarum* (grasshopper sparrow, state special concern)  
*Asio flammeus* (short-eared owl, state endangered)  
*Botaurus lentiginosus* (American bittern, state special concern)  
*Circus cyaneus* (northern harrier, state special concern)  
*Clemmys guttata* (spotted turtle, state threatened)  
*Clonophis kirtlandii* (Kirtland's snake, state endangered)  
*Dorydiella kansana* (leafhopper, state special concern)  
*Emydoidea blandingii* (Blanding's turtle, state special concern)  
*Flexamia reflexus* (leafhopper, state special concern)  
*Meropleon ambifusca* (Newman's brocade, state special concern)  
*Neoconocephalus lyristes* (bog conehead, state special concern)  
*Neoconocephalus retusus* (conehead grasshopper, state special concern)  
*Neonympha m. mitchellii* (Mitchell's satyr, federal/state endangered)  
*Orchelimum concinnum* (red-faced meadow katydid, state special concern)  
*Orphulella pelidna* (green desert grasshopper, state special concern)  
*Papaipema cerina* (golden borer, state special concern)  
*Papaipema maritima* (maritime sunflower borer, state special concern)  
*Papaipema speciosissima* (regal fern borer, state special concern)  
*Paroxya hoosieri* (Hoosier locust, state special concern)

*Phalaropus tricolor* (Wilson's phalarope, state special concern)  
*Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)  
*Spartiniphaga inops* (spartina moth, state special concern)  
*Spiza americana* (dickcissel, state special concern)  
*Tyto alba* (barn owl, state endangered)

### **Biodiversity Management Considerations**

The majority of wet prairie acreage was converted to agriculture following European settlement. Threats to remaining sites include hydrologic alteration, nutrient enrichment, siltation, fire suppression, shrub and tree encroachment, and destruction of upland buffers. Fire suppression and hydrologic alterations such as ditching and tiling promote shrub and tree invasion, which results in reduced cover of graminoids and the fine-fuels needed to carry a fire. Invasive plants are favored by nutrient enrichment, fire suppression, and hydrologic alteration. Invasive species that threaten the diversity and community structure of wet prairie include glossy buckthorn (*Rhamnus frangula*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*Typha xglauca*), and purple loosestrife (*Lythrum salicaria*). Prescribed fire, in conjunction with cutting and/or herbiciding of invasive species, can be used to maintain biodiversity of lowland grasslands. Some sites may require hydrologic restoration and efforts to restrict nutrient and sediment inputs. In addition, restoration of upland natural communities bordering wet prairie occurrences should be conducted to improve hydrology and provide refugia for flood-intolerant species during periods of high water.

### **Variation**

Species dominance varies among bluejoint, cordgrass, sedges, and native forbs. Some occurrences are associated with seasonal flooding, others apparently flood only rarely or not at all. Sites with big bluestem and/or Indian grass as dominants or subdominants may represent wetmesic prairie.

### **Similar Natural Communities**

Wet-mesic prairie, lakeplain wet prairie, lakeplain wet-mesic prairie, wet-mesic sand prairie, and southern wet meadow.

### **Relevant Literature**

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APPENDIX B

Site: Hawk Nest Park  
Locale: Section 36, DeWitt Township, Clinton County, MI  
Date: May 7, 2009  
By: Gerould Wilhelm, Conservation Design Forum

FLORISTIC QUALITY DATA		Native		Adventive			
17 NATIVE SPECIES		Tree	1	2.8%	Tree	1	2.8%
36 Total Species		Shrub	1	2.8%	Shrub	0	0.0%
0.8 NATIVE MEAN C		W-Vine	0	0.0%	W-Vine	0	0.0%
0.4 W/Adventives		H-Vine	0	0.0%	H-Vine	0	0.0%
3.2 NATIVE FQI		P-Forb	5	13.9%	P-Forb	6	16.7%
2.2 W/Adventives		B-Forb	2	5.6%	B-Forb	6	16.7%
-0.2 NATIVE MEAN W		A-Forb	6	16.7%	A-Forb	1	2.8%
1.0 W/Adventives		P-Grass	2	5.6%	P-Grass	5	13.9%
AVG: Faculative		A-Grass	0	0.0%	A-Grass	0	0.0%
		P-Sedge	0	0.0%	P-Sedge	0	0.0%
		A-Sedge	0	0.0%	A-Sedge	0	0.0%
		Fern	0	0.0%			

ACRONYM	C SCIENTIFIC NAME	W WETNESS	PHYSIOGNOMY	COMMON NAME
AGRGIG	0 AGROSTIS GIGANTEA	0 FAC	Ad P-Grass	REDTOP
AMBART	0 Ambrosia artemisiifolia	3 FACU	Nt A-Forb	COMMON RAGWEED
AMBTRI	0 Ambrosia trifida	-1 FAC+	Nt A-Forb	GIANT RAGWEED
ARCMIN	0 ARCTIUM MINUS	5 UPL	Ad B-Forb	COMMON BURDOCK
ASTPIL	1 Aster pilosus	2 FACU+	Nt P-Forb	HAIRY ASTER
BARVUL	0 BARBAREA VULGARIS	0 FAC	Ad B-Forb	YELLOW ROCKET
CIRARV	0 CIRSIUM ARVENSE	3 FACU	Ad P-Forb	CANADIAN THISTLE
CONCAN	0 Conyza canadensis	1 FAC-	Nt A-Forb	HORSEWEED
DACGLO	0 DACTYLIS GLOMERATA	3 FACU	Ad P-Grass	ORCHARD GRASS
DAUCAR	0 DAUCUS CAROTA	5 UPL	Ad B-Forb	QUEEN ANNE'S LACE
ERIANN	0 Erigeron annuus	1 FAC-	Nt B-Forb	ANNUAL FLEABANE
EUTGRA	3 Euthamia graminifolia	-2 FACW-	Nt P-Forb	GRASS-LEAVED GOLDENROD
FESARU	0 FESTUCA ARUNDINACEA	2 FACU+	Ad P-Grass	TALL FESCUE
LACSER	0 LACTUCA SERRIOLA	0 FAC	Ad B-Forb	PRICKLY LETTUCE
LAMPUR	0 LAMIUM PURPUREUM	5 UPL	Ad A-Forb	PURPLE DEAD NETTLE
LEPCAM	0 LEPIDIUM CAMPESTRE	5 UPL	Ad B-Forb	FIELD CRESS
LEPVIR	0 Lepidium virginicum	4 FACU-	Nt A-Forb	COMMON PEPPERGRASS
MELLOF	0 MELILOTUS OFFICINALIS	3 FACU	Ad B-Forb	YELLOW SWEET CLOVER
OENBIE	2 Oenothera biennis	3 FACU	Nt B-Forb	COMMON EVENING PRIMROSE
PHAARU	0 Phalaris arundinacea	-4 FACW+	Nt P-Grass	REED CANARY GRASS
PHRAUS	0 Phragmites australis	-4 FACW+	Nt P-Grass	REED
PLALAN	0 PLANTAGO LANCEOLATA	0 FAC	Ad P-Forb	ENGLISH PLANTAIN
PLARUG	0 Plantago rugelii	0 FAC	Nt A-Forb	RED STALKED PLANTAIN
POACOM	0 POA COMPRESSA	2 FACU+	Ad P-Grass	CANADA BLUEGRASS
POAPRA	0 POA PRATENSIS	1 FAC-	Ad P-Grass	KENTUCKY BLUEGRASS
POPDEL	1 Populus deltoides	-1 FAC+	Nt Tree	COTTONWOOD
POTNOR	0 Potentilla norvegica	0 FAC	Nt A-Forb	ROUGH CINQUEFOIL
RHACAT	0 RHAMNUS CATHARTICA	3 FACU	Ad Tree	COMMON BUCKTHORN
RUMCRI	0 RUMEX CRISPUS	-1 FAC+	Ad P-Forb	CURLY DOCK
SALEXI	1 Salix exigua	-5 OBL	Nt Shrub	SANDBAR WILLOW
SOLALT	1 Solidago altissima	3 FACU	Nt P-Forb	TALL GOLDENROD
SOLGIG	3 Solidago gigantea	-3 FACW	Nt P-Forb	LATE GOLDENROD
SONULI	0 SONCHUS ULIGINOSUS	-2 FACW-	Ad P-Forb	SWAMP SOW THISTLE
TAROFF	0 TARAXACUM OFFICINALE	3 FACU	Ad P-Forb	COMMON DANDELION
TRIREF	0 TRIFOLIUM REPENS	2 FACU+	Ad P-Forb	WHITE CLOVER
URTDIO	1 Urtica dioica	-1 FAC+	Nt P-Forb	NETTLE