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## Vegetation Communities and Flora of Dolliver State Park, Webster County, Iowa

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Dolliver State Park flora includes 408 species of vascular plants, several of which are uncommon for central Iowa. Sixteen vegetation types were identified including four new vegetation types: *Quercus macrocarpa* type, *Populus grandidentata* type, *Populus tremuloides* type and calcareous seep type. The flora and vegetation of Dolliver are found to be similar to Ledges State Park and Woodman Hollow State Preserve. Hill prairies and savanna-like areas are much more abundant in Dolliver than these other areas along the Des Moines River. INDEX DESCRIPTORS: Dolliver State Park, forest communities, Iowa vascular flora, hill prairies, savanna

The flora of Dolliver State Park has long been recognized as noteworthy by Iowa botanists (Pammel, 1925; King, 1925). However, unlike the Ledges State Park (Johnson-Groh, 1985; Johnson-Groh and Farrar, 1985) and Woodman Hollow State Preserve (Niemann and Landers, 1974; Peck, 1980) the vegetation of the park is poorly documented. Because of similar geology and topography, and its intermediate location on the Des Moines River, the flora of Dolliver might be expected to be similar to that of Ledges and Woodman Hollow. Pammel (1925) noted that "there is a remarkable repetition of plant life in all of these coal measure sandstone areas".

Dolliver State Park encompasses 229 hectares (572 acres) located in central Iowa along the west side of the Des Moines River, T88N R28W Sect 26, 34, 35; T87N R28W Sect 2, 3 in Webster County. Prairie Creek dissects the western portion of the park, draining into the Des Moines River. Several smaller drainages empty into Prairie Creek and into the Des Moines River creating a complex of steep wooded ravines and well-drained ridges which support small prairies. The local maximum relief within the park is 58 m (190 ft). Pennsylvanian sandstone cliffs are a prominent geological feature found throughout the park, as are the "Copperas beds" (deposits of iron sulphate found along Prairie Creek). The soils of Dolliver belong to the Storden-Hayden-Wadena association (Koppen, 1975).

The climate for central Iowa is continental, with hot humid summers and cold dry winters. Winter (December through February) average temperature is  $-6^{\circ}\text{C}$ , with an average daily minimum of  $-11^{\circ}\text{C}$ . Summer (June through August) average temperature is  $22^{\circ}\text{C}$ , and the average daily maximum is  $29^{\circ}\text{C}$ . The frost-free growing season averages 152 days, and the total annual precipitation is 762 mm, of which 70% falls as rain from April to September. The prevailing wind is from the northwest. Summer weather is characterized by thunderstorms often associated with high winds and occasional hailstorms and tornadoes (U.S. Department of Agriculture, 1941; Waite, 1967; Koppen, 1975; Anderson and Dideriksen, 1981).

Early historical descriptions of Dolliver concentrated on Boneyard Hollow due to the abundance of buffalo bones found there (Fuller, 1919; Blaskey, 1974). The park, named after Senator Jonathan Dolliver, was dedicated in 1925. Subsequently L.H. Pammel was one of the few botanists who published a report on the flora of Dolliver. Oleson and Somes (1906), in studying the Flora of Webster County, probably collected in the vicinity of Dolliver State Park but did not specifically note collections in the Dolliver area. Pammel (1925) noted that plants such as leatherwood (*Dirca palustris*), round-leaf dogwood (*Cornus rugosa*), juniper moss (*Polytrichum* sp.), and reindeer lichen (*Cladonia* sp.) could be found in the park. (Species authorities are given in the species list.) In regard to Boneyard Hollow he noted "With the exception of one species which is found in Woodman's Hollow, and the ostrich fern, all the ferns in central Iowa occur here."

The primary objectives of this study were to survey the flora and to map the vegetation communities of the park.

### METHODS

Field work was conducted during the growing seasons of 1985 and 1986. Voucher collections were made and deposited in the Iowa State University Herbarium (ISC), and portions of the herbarium were searched for Dolliver specimens. A list of native and naturalized species for the park was compiled. Scientific and common names follow Gleason and Cronquist (1963), Fernald (1963), or Barkley (1986).

A vegetation map of the park was constructed using the vegetation types of Johnson-Groh (1985) and others described for the first time in this paper. The vegetation types were mapped after visual inspections from a ground survey. Small areas of special interest, such as the hill prairies and the calcareous seep, were overmapped (i.e., these areas are not actually as large as indicated on the map).

### VEGETATION ANALYSIS

Four hundred-eight species of vascular plants have been identified for Dolliver State Park. Of these 66 are naturalized (Table 1). Species uncommon for central Iowa include *Dirca palustris*, *Ulmus thomasii*, *Cornus rugosa*, *Ribes americanum*, *Caliba palustris*, *Osmunda claytoniana*, and *Lycopodium lucidulum*. These are all northern species and may represent relicts of the northern forests which existed in Iowa following glaciation (Johnson-Groh and Farrar, 1985).

It is well documented that within a vegetation biome (given similar variety of habitat) species richness increases with area (Peet et al., 1983). This is demonstrated by the forest floras of Woodman Hollow, Ledges, and Dolliver along the Des Moines River in central Iowa. The flora of Dolliver (408 species in 229 hectares) is richer than Woodman Hollow (358 species in 32 hectares) but not as rich as that of Ledges (437 species in 447 hectares) (Table 2). (The total Ledges flora is 533 if Diehl's (1915) unvouchered specimens are included (Johnson-Groh, 1985).) Considering the geological similarity of Dolliver and Ledges and the ability of such northern and southern elements as *Galium boreale* and *Hybanthus concolor* to persist at the Ledges, it seems likely that the flora of Dolliver was not as rich as the flora of Ledges even before settlement. A possible reason for this is Dolliver's location on the west side of the Des Moines River (see discussion on fire).

Dolliver supports a large flora as compared to the total flora of Webster County (Table 2) or to the flora of Allamakee County which has the greatest habitat and species diversity in the state (Oleson and Somes, 1906; Peck et al., 1980). Dolliver, Ledges, and Woodman Hollow are all fragments of what once was an extensive system of forests along the Des Moines River. Because of the discontinuity of sandstone canyon topography along the Des Moines River and the

**Table 1. Dolliver Flora Summary**

Taxon	Families	Genera	Species	
			Native	Naturalized
Pteridophyta	7	13	17	0
Spermatophyta				
Pinophyta	2	3	1	3
Magnoliophyta				
Liliatae	13	51	70	16
Magnoliatae	64	199	254	47
Total	86	262	342	66

sheltered habitat it provides, Dolliver, Woodman Hollow, and Ledges, are now essentially islands of forest vegetation which earlier covered central Iowa. The limited size of these fragments, as much as their more western location, may have limited their species richness relative to areas such as Allamakee County which are not so isolated.

The vegetation communities found at Dolliver include: *Quercus alba* (QA), *Quercus alba-Quercus rubra* (QAR), *Quercus rubra* (QR), *Quercus rubra-Tilia americana* (QRTA), *Tilia americana* (TA), slump forest (QARS), bottomland (JN), disturbed bottomland (JND), disturbed woods (DW), floodplain (FP), and hill prairie (P) (see centerfold map). The species composition is similar to the types described in Johnson-Groh (1985). Four additional communities, *Quercus macrocarpa* (QM), *Populus grandidentata* (PG), *Populus tremuloides* (PT), and calcareous seep (CS) are described below. *Quercus alba* (QA) and *Quercus macrocarpa* (QM) are the most xeric of the upland vegetation types; *Tilia americana* (TA) is the most mesic type.

The vegetation in Dolliver is more xerophytic than in Ledges and Woodman Hollow, as evidenced by the greater abundance of hill prairies and the greater importance of *Quercus macrocarpa*. The hill prairies in Dolliver are in varying degrees of encroachment by woody species, but some still support the major prairie grasses and forbs. Dolliver has or had hill prairies on almost every major south or west-facing slope, about 26 in total. These are similar in species composition to the large hill prairie of Woodman Hollow (Niemann and Landers, 1974). Ledges on the other hand has only 4 hill prairies, all of which are smaller and more densely covered with woody species than those in Dolliver.

The stronger xeric influence in Dolliver is also evidenced by the presence of *Quercus macrocarpa* in all communities. The vegetation types described for the Ledges contain virtually no *Q. macrocarpa*. The increased cover of *Q. macrocarpa* in Dolliver corresponds to a reduced cover of *Q. alba*. The relative abundance of other species in the vegetation types appears comparable to that of the Ledges.

In some areas (uplands in particular) *Q. macrocarpa* is dominant, almost to the exclusion of *Q. alba*, which is always present, but in low numbers. These areas have a diverse mixture of tree species including *Q. rubra*, *Populus grandidentata*, *Juglans nigra*, and *Tilia americana*, and often show evidence of disturbance due to grazing. These areas are mapped as a distinct vegetation type, *Quercus macrocarpa* (QM) in areas where QA or DW fail to accurately describe the high cover of *Q. macrocarpa*.

The high cover of *Quercus macrocarpa* suggests that a savanna-like forest may have occurred throughout much of the park prior to the cessation of fire and grazing. Indeed, in several areas large bur oak trees have an open-grown shape as in a savanna or pasture. In its location on the west side of the Des Moines River, Dolliver would have been in the path of prairie fires driven primarily by winds out of the west. Niemann and Landers (1974) also noted that there are a number of large low-branching *Q. macrocarpa* throughout Woodman Hollow preserve and likewise suggested fire as an important factor. The scarcity of *Q. macrocarpa* in the Ledges may be due to its more southern and eastern location, but more likely it is due to the position relative to the Des Moines River. Ledges is on the eastern side of the river

which may have served as a fire break. The fire frequency on the east side of a major fire break would logically be less (Shimek, 1915) allowing a forest of less fire resistant trees to develop. Dolliver probably had a high incidence of prairie fire which suppressed the more fire-susceptible species. The recent removal of fire and grazing in these areas has allowed a wide variety of species to become established, creating a forest of very mixed composition.

*Acer nigrum* appears to be slightly more abundant in all the vegetation types in Dolliver than at Ledges. Fire suppression has been shown to enhance maple reproduction and growth (Nigh et al., 1985). If fire was a greater factor in determining the forest composition at Dolliver, the impact of fire suppression likewise would have had a greater impact on the composition of forests at Dolliver than at the Ledges. Whether this accounts for the abundance of maples at Dolliver is unknown. Further study is necessary to quantify maple distribution and reproduction in Dolliver.

Throughout Dolliver, small areas of the slump forest type (QARS) can be found. This type, a rich mixture of tree species due to soil slumping and accompanying changes in canopy cover and soil moisture, is common on very large slopes at the Ledges. A similar diverse mixture of tree species, (*Fraxinus nigra*, *Tilia americana*, *Acer nigrum*, *Juglans nigra*, *Carya ovata*, *Carya cordiformis*, *Quercus rubra*) occurs on some slopes at Dolliver; however, soil slumping is not as obvious as at the Ledges and has not been documented geologically as it has at Ledges (Osolin, 1983).

Additional vegetation types found at Dolliver which are not described for Ledges are the solid stands of *Populus grandidentata* and *Populus tremuloides*. Stands of *Populus grandidentata* (PG) can be found throughout the park. They are primarily on flat uplands mixed with QA or QM types. Niemann and Landers (1974) state that such stands are probably present due to wind-throw of the more permanent members of the community. In Dolliver, upland areas where *P. grandidentata* occurs were more likely open or savanna-like prairie prior to settlement. Grazing may have allowed this species to establish fairly large solid stands. These are not currently reproducing and will probably be replaced by more shade tolerant species. *P. grandidentata* also occurs in small patches on all aspects, opened by wind-throw or some other canopy disturbance such as dutch elm disease or oak wilt.

*Populus tremuloides* (PT) is much less common than *P. grandidentata* throughout the park and usually occurs in small patches on poorly drained uplands. Similar small stands also occur at the Ledges and Woodman Hollow (Johnson-Groh; 1985, Niemann and Landers, 1974) and occur commonly in poorly drained prairie remnants throughout northeastern Iowa.

Other tree species of interest include *Quercus muehlenbergii* which reaches its northwestern limit at Dolliver (pers. comm. P. van der Linden). *Q. muehlenbergii* is quite common at the Ledges, but at Dolliver only a few isolated individuals can be found. *Fraxinus nigra* and *Ulmus thomasii* also occur in north-facing mature forest communities and are about as common at Dolliver as at the Ledges.

**Table 2. Comparison of Dolliver Flora to Floras of Ledges (Johnson-Groh and Farrar, 1985), Woodman Hollow (Niemann and Landers, 1974), and Webster County (Oleson and Somes, 1906) in Central Iowa, and Allamakee County (Peck, et al., 1980) in Northeast Iowa.**

Location	Area (Hectares)	Families	Genera	Species
Dolliver State Park	229	86	263	408
Ledges State Park	447	89	270	437
Woodman Hollow State Preserve	32	77	234	358
Webster County	183,808	116	378	852
Allamakee County	163,584	124	444	1040

## SPECIES LIST

! Unvouchered

\* Reported in literature

(King, 1925; Pammel, 1925)

C Common

O Occasional

R Rare

P Planted

## LYCOPODIOPHYTA

LYCOPODIACEAE (Clubmoss Family)

*Lycopodium lucidulum* Michx. (Shining Clubmoss) R

## EQUISETOPHYTA

EQUISETACEAE (Horsetail Family)

*Equisetum arvense* L. (Field Horsetail) O*Equisetum hyemale* L. (Common Scouring-rush) C*Equisetum laevigatum* A. Braun (Smooth Scouring-rush) O

## POLYPODIOPHYTA

ADIANTACEAE (Maidenhair Fern Family)

*Adiantum pedatum* L. (Northern Maidenhair Fern) C\**Cryptogramma stelleri* (Gmel.) Prantl (Cliff Brake)

ASPLENIACEAE (Spleenwort Family)

*Athyrium filix-femina* (L.) Roth (Lady Fern) C*Campylosorus rhizophyllus* (L.) Link (Walking Fern) O*Cystopteris bulbifera* (L.) Bernh. (Bulblet Bladder Fern) C*Cystopteris fragilis* (L.) Bernh. (Fragile Fern) C\**Cystopteris protrusa* (Weath.) Blasdell (Creeping Fragile Fern) O*Dryopteris spinulosa* (O. F. Muell.) Watt (Spinulose Shield-fern) R*Matteuccia struthiopteris* (L.) Tod. (Ostrich Fern) R*Woodsia obtusa* (Spreng.) Torr. (Blunt-lobed Woodsia) O

OPHIOGLOSSACEAE (Adder's Tongue Family)

*Botrychium virginianum* (L.) Sw. (Rattlesnake Fern) O

OSMUNDACEAE (Royal Fern Family)

*Osmunda claytoniana* L. (Interrupted Fern) R

POLYPODIACEAE (Polypody Family)

*Polypodium virginianum* L. (Common Polypody) O

## PINOPHYTA

CUPRESSACEAE (Cypress Family)

*Juniperus virginiana* L. (Eastern Red Cedar) C

PINACEAE (Pine Family)

*Picea glauca* (Moench.) Voss (White Spruce) P*Pinus resinosa* Ait. (Norway Pine) P*Pinus strobus* L. (White Pine) P

## MAGNOLIOPHYTA: LILIATAE

ALISMACEAE (Water-plantain Family)

*Alisma plantago-aquatica* L. (Water-plantain) R*Sagittaria latifolia* Willd. (Arrow-head) R

AMARYLLIDACEAE (Amaryllis Family)

*Hypoxis hirsuta* (L.) Coville (Star-grass) O

ARACEAE (Arum Family)

*Arisaema triphyllum* (L.) Schott (Jack-in-the-pulpit) C

COMMELINACEAE (Spiderwort Family)

*Tradescantia bracteata* Sm. (Spiderwort) R

CYPERACEAE (Sedge Family)

*Carex alopecoidea* Tuckerm. (Sedge) O*Carex blanda* Dew. O*Carex eburnea* Boott. O*Carex hitchcockiana* Dew. O*Carex hystericina* Muhl. O*Carex interior* L.H. Bailey O*Carex lacustris* Willd. O*Carex lasiocarpa* Ehrh. O*Carex pennsylvanica* Lam. C*Carex projecta* Mackenz. O*Carex rosea* Schkuhr. O*Cyperus engelmannii* Steud. (Umbrella Sedge) O*Cyperus strigosus* L. C*Scirpus atrovirens* Willd. (Bulrush) C

DIOSCOREACEAE (Yam Family)

*Dioscorea villosa* L. (Wild Yam) O

IRIDACEAE (Iris Family)

*Sisyrinchium campense* Bickn. (Blue-eyed Grass) O

JUNCACEAE (Rush Family)

*Juncus tenuis* Willd. (Path Rush) C

LEMNACEAE (Duckweed Family)

*Lemna minor* L. (Duckweed) R

## LILIACEAE (Lily Family)

*Allium canadense* L. (Wild Onion) O*Allium tricoccum* Ait. (Wild Leek) O*Erythronium albidum* Nutt. (Dog-tooth Violet) C*Lilium canadense* L. (Turk's Cap Lily) O\**Maianthemum canadense* Desf. (Wild Lily-of-the-valley)

R

*Polygonatum biflorum* (Willd.) Ell. (Solomon's Seal) C*Smilacina racemosa* (L.) Desf. (False Spikenard) C*Smilacina stellata* (L.) Desf. (False Solomon's Seal) C*Smilax herbacea* L. (Carrion-flower) C*Smilax hispida* Muhl. (Greenbrier) C*Trillium nivale* Riddell (Snow Trillium) C*Uvularia grandiflora* Sm. (Bellwort) O

## ORCHIDACEAE (Orchid Family)

*Corallorhiza odoratior* (Willd.) Nutt. (Coral-root) R\**Cypripedium calceolus* L. (Yellow Lady-slipper)!*Habenaria viridis* (L.) R. Br. (Bracted Orchid) R\**Orchis spectabilis* L. (Showy Orchid)

## POACEAE (Grass Family)

*Agropyron repens* (L.) Beauv. (Quack Grass) C*Agrostis alba* L. (Redtop) C*Agrostis perennans* (Walt.) Tuckerm. (Upland Bentgrass)

O

*Andropogon gerardii* Vitman (Big Bluestem) C*Bouteloua curtipendula* (Michx.) Torr. (Side-oats Grama) C*Bromus inermis* Leys. (Smooth Brome) C*Bromus purgans* O. (Brome Grass) O*Cinna arundinacea* L. (Woodreed) R*Danthonia spicata* (L.) Beauv. (Poverty-grass) O*Digitaria ischaemum* (Schreb.) Muhl. (Smooth Crabgrass)

C

*Digitaria sanguinalis* (L.) Scop. (Hairy Crabgrass) C*Echinochloa crusgalli* (L.) Beauv. (Barnyard Grass) C*Eleusine indica* (L.) Gaertn. (Goose Grass) C*Elymus canadensis* L. (Canada Wild Rye) C*Elymus villosus* Muhl. (Slender Wild Rye) O*Elymus virginicus* L. (Virginia Wild Rye) C*Eragrostis capillaris* (L.) Nees (Lacegrass) O*Eragrostis hyponoides* (Lam.) BSP. (Lovegrass) C*Festuca obtusa* Biebler (Nodding Fescue) C*Hystrix patula* (L.) Moench. (Bottlebrush Grass) C*Koeleria cristata* (L.) Pers. (June Grass) R\**Leersia oryzoides* (L.) Sw. (Rice Cutgrass)*Leersia virginica* Willd. (Whitegrass) C*Muhlenbergia cuspidata* (Torr.) Rydb. (Plains Muhly Grass) O*Muhlenbergia frondosa* (Poir.) Fern. (Muhly Grass) C*Muhlenbergia mexicana* (L.) Trin. (Muhly Grass) C*Muhlenbergia schreberi* Gmel. (Nimblewill) O*Muhlenbergia sobolifera* (Muhl.) Trin. (Muhly Grass) O*Panicum capillare* L. (Witchgrass) C*Panicum dichotomiflorum* Michx. (Panic Grass) C*Panicum implicatum* Scribn. (Woolly Panic Grass) O*Panicum latifolium* L. (Broad-leaved Panic Grass) C*Panicum perlongum* Nash (Elongate Panicum) O*Panicum praeoccis* Hitchc. & Chase (Early Panicum) O*Panicum scribnerianum* Nash (Small Panic Grass) C*Panicum wilcoxianum* Vasey (Wilcox Panicum) O*Phalaris arundinacea* L. (Reed Canary Grass) C!*Phleum pratense* L. (Timothy) R*Poa annua* L. (Annual Bluegrass) C*Poa compressa* L. (Canada Bluegrass) C*Poa pratensis* L. (Kentucky Bluegrass) C*Schizachyrium scoparium* (Michx.) Nash (Little Bluestem)

C

*Setaria faberi* Herrm. (Nodding Foxtail) C*Setaria lutescens* (Weigel) F. T. Hubb. (Yellow Foxtail) C*Sorghastrum nutans* (L.) Nash (Indian Grass) C*Sphenopholis obtusata* (Michx.) Scribn. (Wedge Grass) O*Sporobolus heterolepis* Gray (Prairie Dropseed) O

## TYPHACEAE (Cat-tail Family)

*Typha angustifolia* L. (Narrow-leaved Cat-tail) O

## MAGNOLIOPHYTA: MAGNOLIATAE

ACERACEAE (Maple Family)

*Acer negundo* L. (Box Elder) C*Acer nigrum* Michx.f. (Black Maple) C*Acer rubrum* L. (Red Maple) C*Acer saccharinum* L. (Silver Maple) C

AMARANTHACEAE (Amaranth Family)

*Amaranthus albus* L. (Pigweed) C*Amaranthus retroflexus* L. (Pigweed) C

ANACARDIACEAE (Cashew Family)

*Rhus glabra* L. (Smooth Sumac) C*Rhus radicans* L. (Poison-ivy) C

APIACEAE (Parsley Family)

*Cryptotaenia canadensis* (L.) DC. (Honewort) C*Osmorhiza claytonii* (Michx.) C.B. Clarke (Sweet Cicely)

C

*Osmorhiza longistylis* (Torr.) DC. (Anise-root) C!*Pastinaca sativa* L. (Parsnip) O\**Polytaenia nuttallii* DC. (Polytaenia)*Sanicula canadensis* L. (Canadian Black Snakeroot) C*Sanicula gregaria* Bickn. (Common Snakeroot) C*Sanicula marilandica* L. (Black Snakeroot) C*Taenidia integerrima* (L.) Drude (Yellow Pimpernel) O*Thaspium barbinode* (Michx.) Nutt. (Meadow-parsnip) R*Zizia aurea* (L.) Koch (Golden Alexanders) C

APOCYNACEAE (Dogbane Family)

*Apocynum cannabinum* L. (Indian Hemp) O

ARALIACEAE (Ginseng Family)

*Aralia nudicaulis* L. (Wild Sarsaparilla) C*Aralia racemosa* L. (Spikenard) C!*Panax quinquefolium* L. (Ginseng) R

ARISTOLOCHACEAE (Birthwort Family)

*Asarum canadense* L. (Wild Ginger) C

ASCLEPIADACEAE (Milkweed Family)

*Asclepias incarnata* L. (Swamp Milkweed) O*Asclepias syriaca* L. (Common Milkweed) C*Asclepias tuberosa* L. (Butterfly-weed) R*Asclepias verticillata* L. (Whorled Milkweed) O

## ASTERACEAE (Aster Family)

*Achillea millefolium* L. (Common Yarrow) C*Ambrosia artemisiifolia* L. (Common Ragweed) C*Ambrosia psilostachya* DC. (Western Ragweed) O*Ambrosia trifida* L. (Great Ragweed) C*Antennaria neglecta* Greene (Field Pusssytoes) C*Antennaria cotula* L. (Stinking Chamomile) O*Arctium minus* Schk. (Common Burdock) C*Aster cordifolius* L. (Blue Wood Aster) C*Aster drummondii* Lindley (Drummond's Aster) C*Aster ericoides* L. (Heath Aster) C*Aster laevis* L. (Smooth Aster) C*Aster prenanthoides* Muhl. (Aster) C*Aster sericeus* Vent. (Silky Aster) O*Aster simplex* Willd. (Panicked Aster) C*Bidens cernua* L. (Stick-tight) C*Bidens frondosa* L. (Beggar-ticks) C*Cirsium discolor* (Muhl.) Spreng. (Field Thistle) C*Cirsium vulgare* (Savi) Tenore (Bull Thistle) C*Conyza canadensis* (L.) Cronq. (Horseweed) C*Coreopsis palmata* Nutt. (Stiff Tickseed) O*Echinacea pallida* Nutt. (Purple Coneflower) O*Erigeron annuus* (L.) Pers. (Daisy Fleabane) C*Erigeron philadelphicus* L. (Common Fleabane) C*Erigeron strigosus* Muhl. ex Willd. (Daisy Fleabane) C*Eupatorium purpureum* L. (Sweet Joe-pye-weed) C*Eupatorium rugosum* Houtt. (White Snakeroot) C\**Gnaphalium obtusifolium* L. (Everlasting)*Helianthus laetiflorus* Pers. (Prairie Sunflower) C*Helianthus tuberosus* L. (Jerusalem-artichoke) C*Kuhnia eupatorioides* L. (False Boneset) C*Lactuca biennis* (Moench.) Fern. (Blue Wood Lettuce) O*Lactuca canadensis* L. (Wild Lettuce) O*Lactuca ludoviciana* (Nutt.) Riddell (Louisiana Lettuce)

O

*Liatis aspera* Michx. (Rough Blazing Star) O*Matricaria matricarioides* (Less.) Porter (Pineapple-weed)

C

*Prenanthes alba* L. (White Lettuce) C*Rudbeckia laciniata* L. (Green-headed Coneflower) C*Rudbeckia subtomentosa* Pursh (Coneflower) C*Senecio congestus* (R. Br.) DC. (Swamp Ragwort) O*Solidago flexicaulis* L. (Zigzag Goldenrod) C*Solidago hispida* Muhl. (Hairy Goldenrod) C*Solidago missouriensis* Nutt. (Missouri Goldenrod) C*Solidago nemoralis* Ait. (Gray Goldenrod) C*Solidago ulmifolia* Muhl. (Elm-leaved Goldenrod) C*Taraxacum officinale* Webber (Common dandelion) C*Tragopogon dubius* Scop. (Goat's-beard) O

FLORA OF DOLLIVER STATE PARK

- Xanthium strumarium* L. (Cocklebur) C  
**BALSAMINACEAE** (Touch-me-Nor Family)  
*Impatiens capensis* Meerb. (Spotted Touch-me-not) C  
*Impatiens pallida* Nutt. (Pale Touch-me-not) C  
**BERBERIDACEAE** (Barberry Family)  
*Caulophyllum thalictroides* (L.) Michx. (Blue Cohosh) O  
*Podophyllum peltatum* L. (May-apple) C  
**BETULACEAE** (Birch Family)  
*Carpinus caroliniana* Walt. (Blue-beech) C  
*Corylus americana* Walt. (Hazelnut) C  
*Ostrya virginiana* (Mill.) K. Koch (Hop Hornbeam) C  
**BIGNONIACEAE** (Trumpet creeper Family)  
*Catalpa speciosa* Warder (Cigar Tree) P  
**BORAGINACEAE** (Borage Family)  
*Cynoglossum officinale* L. (Common Hound's-tongue) O  
*Hackelia virginiana* (L.) I.M. Johnson (Stickseed) C  
*Lithospermum canescens* (Michx.) Lehm. (Hoary Puccoon) O  
*\*Mertensia virginica* (L.) Pers. (Lungwort)  
**BRASSICACEAE** (Mustard Family)  
*Arabis canadensis* L. (Sickle-pod) C  
*Arabis hirsuta* (L.) Scop. (Hairy Rock Cress) C  
*Brassica nigra* (L.) Koch (Black Mustard) C  
*Capsella bursa-pastoris* (L.) Medic. (Shepherd's-purse) C  
*Cardamine bulbosa* (Schreb.) BSP. (Spring Cress) O  
*Cardamine pennsylvanica* Muhl. (Bitter Cress) O  
*Dentaria laciniata* Muhl. ex Willd. (Toothwort) C  
*Erysimum cheiranthoides* L. (Wormseed Mustard) O  
*Thlaspi arvense* L. (Penny-cress) C  
**CAMPANULACEAE** (Bellbell Family)  
*Campanula americana* L. (Tall Bellflower) C  
*Lobelia siphilitica* L. (Great Lobelia) C  
**CANNABINACEAE** (Hemp Family)  
*Cannabis sativa* L. (Hemp) O  
**CAPRIFOLIACEAE** (Honeysuckle Family)  
*Diervilla lonicera* Miller (Bush-honeysuckle) R  
*Lonicera dioica* L. (Wild Honeysuckle) C  
*Lonicera tatarica* L. (Tartarian Honeysuckle) C  
*Sambucus canadensis* L. (Common Elder) C  
*Symphoricarpos occidentalis* Hook. (Wolfberry) C  
*Symphoricarpos orbiculatus* Moench. (Coralberry) O  
*Triosteum perfoliatum* L. (Tinker's-weed) O  
*Viburnum lentago* L. (Nannyberry) O  
*Viburnum opulus* L. (High-bush Cranberry) O  
*Viburnum rafinesquianum* Schult. (Downy Arrow-wood) C  
**CARYOPHYLLACEAE** (Pink Family)  
*Cerastium nutans* Raf. (Nodding Chickweed) C  
*Cerastium vulgatum* L. (Common Mouse-ear Chickweed) C  
*Saponaria officinalis* L. (Bouncing Bet) C  
*Silene stellata* (L.) Ait. f. (Starry Campion) O  
**CELASTRACEAE** (Staff-tree Family)  
*Celastrus scandens* L. (Bittersweet) O  
*Euonymus atropurpureus* Jacq. (Wahoo) C  
**CHENOPODIACEAE** (Goosefoot Family)  
*Chenopodium album* L. (Lamb's-quarters) C  
*Chenopodium standleyanum* Aellen (Standley's Goosefoot) C  
**CORNACEAE** (Dogwood Family)  
*Cornus alternifolia* L. f. (Alternate-leaved Dogwood) C  
*Cornus drummondii* C. A. Meyer (Hairy Dogwood) C  
*Cornus obliqua* Raf. (Silky Dogwood) C  
*Cornus rugosa* Lam. (Round-leaved Dogwood) R  
*Cornus stolonifera* Michx. (Red Dogwood) C  
**CUCURBITACEAE** (Gourd Family)  
*Sicyos angulatus* L. (Bur Cucumber) C  
**EUPHORBIACEAE** (Spurge Family)  
*Acalypha rhomboidea* Raf. (Three-seeded Mercury) C  
*Euphorbia corollata* L. (Flowering Spurge) C  
*Euphorbia esula* L. (Leafy Spurge) C  
*Euphorbia heterophylla* L. (Fire-on-the-mountain) O  
**FABACEAE** (Bean Family)  
*Amorpha canescens* Pursh (Leadplant) O  
*Amphicarpa bracteata* (L.) Fern. (Hog-peanut) C  
*\*Baptisia leucantha* T. & G. (White False Indigo)  
*Cassia fasciculata* Michx. (Partridge Pea) O  
*Cercis canadensis* L. (Redbud) O  
*Coronilla varia* L. (Crown Vetch) C  
*Desmodium canadense* (L.) DC. (Showy Tick Trefoil) C  
*Desmodium cuspidatum* (Willd.) Loud. (Tick Trefoil) C  
*Desmodium glutinosum* (Muhl.) Wood (Pointed Tick Trefoil) C  
*Gleditsia triacanthos* L. (Honey Locust) O  
*Gymnocladus dioica* (L.) K. Koch (Kentucky Coffee-tree) O  
*Lathyrus ochroleucus* Hook. (Pale Vetchling) O  
*Lespedeza capitata* Michx. (Bush Clover) O  
*Medicago lupulina* L. (Black Medick) C  
*Melilotus alba* Desr. (White Sweet Clover) C  
*Melilotus officinalis* (L.) Lam. (Yellow Sweet Clover) C  
*Petalostemum candidum* (Willd.) Michx. (White Prairie Clover) O  
*Petalostemum purpureum* (Vent.) Rydb. (Purple Prairie Clover) O  
*Pterocarya tenuiflora* Pursh (Scurfy Pea) O  
*Robinia pseudoacacia* L. (Black Locust) O  
*Trifolium campestre* Schreb. (Low Hop-clover) C  
*Trifolium repens* L. (White Clover) C  
*Vicia americana* Muhl. (Vetch) C  
**FAGACEAE** (Beech Family)  
*Quercus alba* L. (White Oak) C  
*Quercus macrocarpa* Michx. (Bur Oak) C  
*Quercus muehlenbergii* Englem. (Chinkapin Oak) R  
*Quercus rubra* L. (Red Oak) C  
*Quercus velutina* Lam. (Black Oak) R  
**FUMARIACEAE** (Fumitory Family)  
*Dicentra cucullaria* (L.) Bernh. (Dutchman's Breeches) C  
**GENTIANACEAE** (Gentian Family)  
*Gentiana flavida* Gray (Yellowish Gentian) O  
**HYDROPHYLLACEAE** (Waterleaf Family)  
*Ellisia nycetea* L. (Waterpod) C  
*Hydrophyllum appendiculatum* Michx. (Waterleaf) C  
*Hydrophyllum virginianum* L. (John's Cabbage) C  
**JUGLANDACEAE** (Walnut Family)  
*Carya cordiformis* (Wang.) K. Koch (Bitternut Hickory) C  
*Carya ovata* (Mill.) K. Koch (Shagbark Hickory) C  
*Juglans cinerea* L. (Butternut) C  
*Juglans nigra* L. (Black Walnut) C  
**LAMIACEAE** (Mint Family)  
*Agastache nepetoides* (L.) Ktze. (Giant Hyssop) C  
*Glechoma hederacea* L. (Ground-ivy) C  
*Hedoma pulegioides* (L.) Pers. (American Pennyroyal) O  
*Lamium amplexicaule* L. (Henbit) C  
*Leonurus cardiaca* L. (Common Motherwort) C  
*\*Lycopus americanus* Muhl. (Common Water Horehound) O  
*Mentha arvensis* L. (Field Mint) C  
*Monarda fistulosa* L. (Wild Bergamot) C  
*Nepeta cataria* L. (Catnip) C  
*Phystostegia virginiana* (L.) Benth. (False Dragonhead) C  
*Prunella vulgaris* L. (Heal-all) C  
*Scutellaria laterifolia* L. (Mad-dog Skullcap) C  
*Scutellaria leonardii* Epling (Small Skullcap) C  
*Stachys hispida* Pursh (Hedge-nettle) C  
*Teucrium canadense* L. (American Germander) C  
**MENISPERMACEAE** (Moonseed Family)  
*Menispermum canadense* L. (Moonseed) O  
**MONOTROPACEAE** (Indian-pipe Family)  
*Monotropa uniflora* L. (Indian-pipe) O  
**MORACEAE** (Mulberry Family)  
*Morus alba* L. (White Mulberry) O  
*Morus rubra* L. (Red Mulberry) O  
**OLEACEAE** (Olive Family)  
*Fraxinus americana* L. (White Ash) C  
*Fraxinus nigra* Marsh. (Black Ash) O  
*Fraxinus pennsylvanica* Marsh. (Green Ash) C  
**ONAGRACEAE** (Evening-primrose Family)  
*Circaea quadrifida* (Maxim.) Franch. & Sav. (Enchanter's Nightshade) C  
*Epilobium coloratum* Biehler (Cinnamon Willow Herb) O  
*Oenothera biennis* L. (Evening-primrose) C  
**OXALIDACEAE** (Wood-sorrel Family)  
*Oxalis stricta* L. (Yellow Wood-sorrel) C  
*Oxalis violacea* L. (Violet Wood-sorrel) O  
**PAPAVERACEAE** (Poppy Family)  
*Sanguinaria canadensis* L. (Bloodroot) C  
**PENTHORACEAE** (Ditch Stonecrop Family)  
*Penthorum sedoides* L. (Ditch Stonecrop) O  
**PHRYMACEAE** (Lopseed Family)  
*Phryma leptostachya* L. (Lopseed) C  
**PLANTAGINACEAE** (Plantain Family)  
*Plantago major* L. (Common Plantain) C  
*Plantago rugelii* Dcne. (Rugel Plantain) C  
**POLEMONIACEAE** (Polemonium Family)  
*Phlox divaricata* L. (Blue Phlox) C  
*Phlox pilosa* L. (Prairie Phlox) O  
*\*Polemonium reptans* L. (Jacob's Ladder) R  
**POLYGALACEAE** (Milkwort Family)  
*Polygala senega* L. (Seneca-snakeroot) O  
**POLYGONACEAE** (Buckwheat Family)  
*Polygonum aviculare* L. (Knorweed) C  
*Polygonum hydrophyper* L. (Common Smartweed) C  
*Polygonum lapathifolium* L. (Pale Smartweed) C  
*Polygonum pennsylvanicum* L. (Pinkweed) C  
*Polygonum persicaria* L. (Lady's-thumb) C  
*Polygonum scandens* L. (Climbing False Buckwheat) C  
*Polygonum virginianum* L. (Jumpseed) C  
*Rumex crispus* L. (Curly Dock) C  
*Rumex obtusifolius* L. (Bitter Dock) C  
**PORTULACACEAE** (Purslane Family)  
*Claytonia virginica* L. (Spring Beauty) C  
**PRIMULACEAE** (Primrose Family)  
*Lysimachia ciliata* L. (Fringed Loosestrife) C  
*Lysimachia thysiflora* L. (Tufted Loosestrife) R  
**RANUNCULACEAE** (Crowfoot Family)  
*Actaea alba* (L.) P. Mill. (White Baneberry) R  
*Actaea rubra* (Ait.) Willd. (Red Baneberry) O  
*Anemone canadensis* L. (Meadow Anemone) C  
*\*Anemone patens* L. (Pasque Flower)  
*Anemone quinquefolia* L. (Wood Anemone) C  
*Anemone virginiana* L. (Thimbleweed) C  
*Anemone thalictroides* (L.) Spach (Rue-anemone) O  
*Aquilegia canadensis* L. (Wild Columbine) C  
*Calitha palustris* L. (Marsh Marigold) R  
*Delphinium virescens* Nutt. (Prairie Larkspur) R  
*Hepatica acutiloba* DC. (Hepatica) C  
*Isopyrum biternatum* (Raf.) T. & G. (False Rue-anemone) C  
*Ranunculus abortivus* L. (Kidneyleaf Buttercup) C  
*Ranunculus recurvatus* Poir. (Hooked Buttercup) C  
*Ranunculus septentrionalis* Poir. (Swamp Buttercup) C  
*Thalictrum dioicum* L. (Early Meadow-rue) C  
**RHAMNACEAE** (Buckthorn Family)  
*\*Ceanothus americanus* L. (New Jersey Tea)  
*Ceanothus herbaceus* Raf. (New Jersey Tea) O  
*Rhamnus cathartica* L. (Common Buckthorn) C  
**ROSACEAE** (Rose Family)  
*Agrimonia pubescens* Wallr. (Downy Agrimony) C  
*Amelanchier arborea* (Michx. f.) Fern. (Serviceberry) C  
*Crataegus crus-galli* L. (Cocksbur Hawthorn) C  
*Crataegus punctata* Jacq. (Dotted Hawthorn) C  
*Fragaria vesca* L. (Woodland Strawberry) C  
*Fragaria virginiana* Dcne. (Wild Strawberry) O  
*Physocarpus opulifolius* (L.) Maxim. (Ninebark) O  
*Potentilla arguta* Pursh (Tall Cinquefoil) O  
*Potentilla norvegica* L. (Rough Cinquefoil) C  
*Potentilla simplex* Michx. (Old-field Cinquefoil) C  
*Prunus americana* Marsh. (Wild Plum) O  
*\*Prunus pennsylvanica* L. f. (Pin-cherry)  
*Prunus serotina* Ehrh. (Black Cherry) C  
*Prunus virginiana* L. (Choke Cherry) C  
*Pyrus ioensis* (Wood) Bailey (Prairie Crab) R  
*Rosa blanda* Ait. (Smooth Wild Rose) C  
*Rubus allegheniensis* Porter (Common Blackberry) C  
*Rubus occidentalis* L. (Black Raspberry) C  
**RUBIACEAE** (Madder Family)  
*Galium aparine* L. (Spring-cleavers) C  
*Galium circaezans* Michx. (Wild Licorice) C  
*Galium triflorum* Michx. (Sweet-scented Bedstraw) C  
**RUTACEAE** (Rue Family)  
*Zanthoxylum americanum* Mill. (Prickly-ash) C  
**SALICACEAE** (Willow Family)  
*Populus deltoides* Marsh. (Cottonwood) C  
*Populus grandidentata* Michx. (Big-toothed Aspen) C  
*Populus tremuloides* Michx. (Quaking Aspen) C  
*Salix bebbiana* Sarg. (Long-beaked Willow) O  
*Salix discolor* Muhl. (Large Pussy-willow) O  
*Salix eriocephala* Michx. (Willow) O  
*Salix interior* Rowlee (Sandbar Willow) C  
*Salix nigra* L. (Black Willow) C

- SANTALACEAE (Sandalwood Family)  
*Comandra umbellata* (L.) Nutt. (Bastard Toadflax) O
- SAXIFRAGACEAE (Saxifrage Family)  
*Heuchera richardsonii* R. Br. (Alum-root) R  
*Mitella diphylla* L. (Bishop's-cap) C  
*Ribes americanum* Mill. (Wild Black Currant) R  
*Ribes cynos-bati* L. (Prickly Gooseberry) C  
*Ribes missouriense* Nutt. (Missouri Gooseberry) C
- SCROPHULARIACEAE (Figwort Family)  
*Gerardia tenuifolia* Vahl. (Slender False Foxglove) R  
*Lindernia dubia* (L.) Pennell (False Pimpernel) C  
*Mimulus ringens* L. (Alleghany Monkey Flower) O  
*Pedicularis canadensis* L. (Common Lousewort) C  
*Scrophularia marilandica* L. (Late Figwort) C  
*Verbascum thapsus* L. (Common Mullein) C  
*Veronica arvensis* L. (Corn Speedwell) C  
*Veronica peregrina* L. (Purslane Speedwell) C
- Veronicastrum virginicum* (L.) Farw. (Culver's-root) O
- SOLANACEAE (Nightshade Family)  
*Solanum nigrum* L. (Black Nightshade) C
- STAPHYLEACEAE (Bladdernut Family)  
*Staphylea trifolia* L. (Bladdernut) O
- THYMELAEACEAE (Mezereum Family)  
*Dirca palustris* L. (Leatherwood) R
- TILIACEAE (Linden Family)  
*Tilia americana* L. (Basswood) C
- ULMACEAE (Elm Family)  
*Celtis occidentalis* L. (Hackberry) C  
*Ulmus americana* L. (American Elm) C  
*Ulmus rubra* Muhl. (Slippery Elm) C  
*Ulmus thomasii* Sarg. (Cork Elm) R
- URTICACEAE (Nettle Family)  
*Boehmeria cylindrica* (L.) Sw. (Bog-hemp) R  
*Laportea canadensis* (L.) Wedd. (Wood-nettle) C
- Parietaria pensylvanica* Muhl. (Pellitory) O  
*Pilea pumila* (L.) Gray (Clearweed) C  
*Urtica dioica* L. (Stinging Nettle) C
- VERBENACEAE (Verbain Family)  
*Phyla lanceolata* (Michx.) Greene (Fog-fruit) C  
*Verbena hastata* L. (Bracted Vervain) C  
*Verbena stricta* Vent. (Hoary Vervain) C  
*Verbena urticifolia* L. (White Vervain) C
- VIOLACEAE (Violet Family)  
\**Viola pedata* L. (Bird's-foot Violet)  
*Viola pubescens* Ait. (Downy Yellow Violet) C  
*Viola sororia* Willd. (Downy Blue Violet) C
- VITACEAE (Grape Family)  
*Parthenocissus quinquefolia* (L.) Planch. (Virginia Creeper) C  
*Parthenocissus vitacea* (Knerr) Hitchc. (Woodbine) O  
*Vitis riparia* Michx. (Forest Grape) C  
\**Vitis vulpina* L. (Fox Grape) C

A prominent calcareous seep (CS) adjacent to the southwest corner of the park contains several interesting species including the calcareous fen bryophytes *Aneura penguis* and *Brachythecium rivulare*, and marsh marigold, *Caltha palustris*. This habitat is highly unusual for central Iowa.

There are several north-slope communities in the park which contain interesting northern species, such as *Maianthemum canadense* and *Lycopodium lucidulum*. (*L. lucidulum* was collected from this slope in 1977, but could not be relocated during this study.) A north slope community of particular interest contains the largest population of a northern moss, *Pleurozium schreberi*, currently known in central Iowa. In this area, large plush mats of *Pleurozium* and *Cladonia* spp. greatly resemble those of northern Minnesota habitats. (*Pleurozium* occurs elsewhere in the park but is not as well developed.) *Osmunda claytoniana* and *Dirca palustris*, uncommon in central Iowa, also are present in this community.

Dolliver State Park provides valuable insight into the patterns of forest development in central Iowa. It is fortunate that Pammel and others had the foresight to recommend the preservation of the park. Its importance as an ecological preserve should continue to be recognized and its ecological integrity maintained.

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# VEGETATION TYPES

## DOLLIVER STATE PARK, WEBSTER COUNTY, IOWA

SCALE:



### LEGEND

- QA QUERCUS ALBA
- QAR QUERCUS ALBA-QUERCUS RUBRA
- QARS SLUMP FOREST
- QR QUERCUS RUBRA
- QRTA QUERCUS RUBRA-TILIA AMERICANA
- TA TILIA AMERICANA
- TAN TILIA AMERICANA-ACER NIGRUM
- JN BOTTOMLAND
- JND DISTURBED BOTTOMLAND
- DW DISTURBED WOODS
- P HILL PRAIRIE
- FP FLOODPLAIN
- QM QUERCUS MACROCARPA
- PG POPULUS GRANDIDENTATA
- PT POPULUS TREMULOIDES
- CS CALCAREOUS SEEP

DOLLIVER MEMORIAL STATE PARK

