HICKORY HILL PARK PAST, PRESENT AND FUTURE: A VEGETATION ANALYSIS AND MANAGEMENT PLAN

by

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for graduation with Honors in the Department of Biological Sciences

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All requirements for graduation with Honors in the
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I. Acknowledgements

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II. Abstract

At approximately 185 acres, Hickory Hill Park is the largest park in Iowa City and is unique in its identity as a natural environment within an urban setting. The purpose of this research was to elucidate the past and present vegetation of the park, and to use those data as the basis for development of a management plan that can be a guide for the future. The historical assessment of the area the park currently occupies was based upon analyses of the original field notes from the first land survey in early post-European settlement times, and of USDA aerial photographs from 1937 through 1994. The survey showed the upper 2/3 of Hickory Hill Park originally consisted of prairie and open savanna habitat, with scattered White and Black Oaks throughout. The lower 1/3 of the park was covered by heavy timber. The aerial photographs indicated that as early as 1937, a majority of the parkland was open due to plowing and/or grazing. The progression of photographs shows evidence of tree encroachment into the open areas of the park. A vascular plant inventory was performed during the 2002-growing season. A total of 233 species, of 66 families were found in the park. The percentage of alien species was determined to be 27% (64 of 233 species). A management plan was created based upon the baseline data gathered in the inventory. It is suggested that the wooded areas with high species diversity and low alien species percentage be sustained through the removal of invasive shrub and herbaceous species. Prairie recreation is suggested as an option to improve the highly disturbed open grass areas.

III. Table of Contents

1. Introduction

Hickory Hill Park presently comprises 185.338 acres, roughly 1/3 of a section, and is located in northeastern Iowa City in Johnson County, Iowa in the southern half of Section 2 and the northern half of Section 11, Township 79 North and Range 6 West (Fig. 1). This part of the state is located in the Southern Iowa Drift Plain (Fig. 2), the largest of Iowa's landform regions (Prior 1991). Prior (1991) described this landform as consisting of steeply rolling hills interspersed by areas of level upland and level alluvial lowlands. She noted that hill-slopes are a major feature of the Southern Iowa Drift Plain landscape, especially for the south-central and east-central areas of Iowa, that is, the area containing Johnson County. Additionally, the land is highly dissected by streams.

Figure 1. USDA topographic map showing location of Hickory Hill Park.

These picturesque topographic features are well represented in Hickory Hill Park. It is comprised of a series of hills bisected from north to south by Ralston Creek and from east to west by several small tributaries that feed into the creek. Thus, there is a diversity of habitats within the park, including uplands, lowlands, and slopes with north, south, west, and east aspects.

In 1839, John Frierson of the General Land Office surveyed the land that is now Hickory Hill Park. His notes provide the first description of the land in early post-European settlement times. More recently, changes in the landscape of the park can be traced in USDA aerial photographs beginning in 1937 and subsequently taken in 1951, 1957, 1963, 1970, 1990, and 1994.

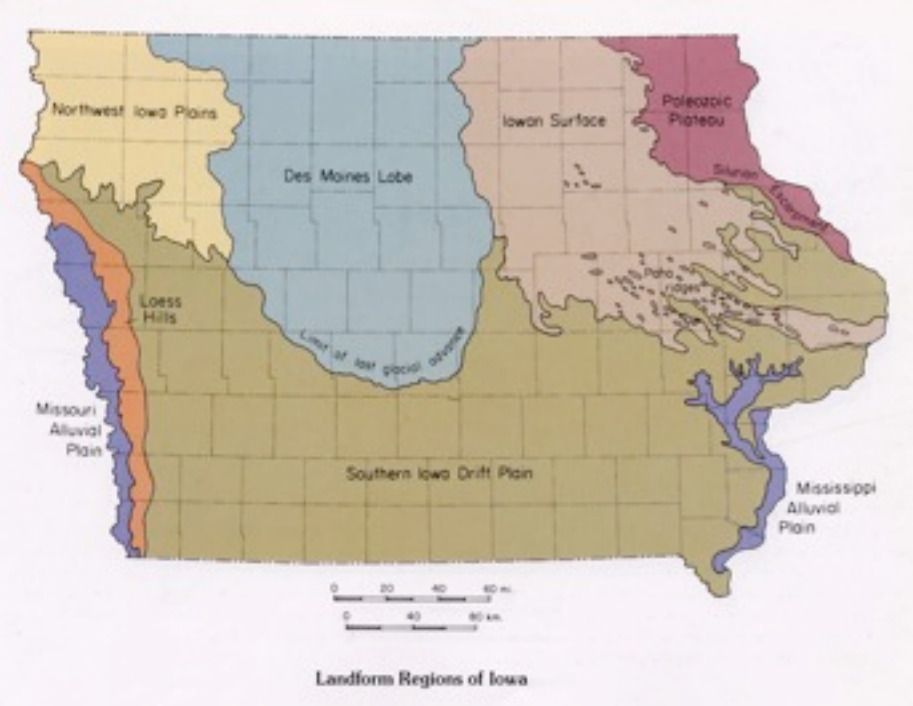

Figure 2. Landform Regions of Iowa, after Prior (1991).

The City of Iowa City established Hickory Hill Park (Fig. 3) in 1967 when 0.4 acres of land in the vicinity of the present-day Bloomington Street entrance, were dedicated. An additional, 17.928 acres in the same area were obtained with federal funds and dedicated in 1968. In 1980, 40 acres, in the vicinity of the Conklin Lane entrance, that had been acquired in 1951 using cemetery expansion bonds were dedicated as parkland. In 1981, 43.22 acres, located on the north edge of the park, were purchased and dedicated as parkland, and another 49 acres were acquired and dedicated on the east side of the park in 1982. These latter two tracts of land were originally intended for use by the city as a storm water retention center. In 2000, 32.79 acres that had been purchased in 1927 using cemetery expansion bonds were dedicated as parkland, while the remaining 7.04 acres were allocated to Oakland Cemetery for future expansion. Finally, two acres of land on the very eastern edge of the park, adjacent to 1st Avenue and Rochester Street

were bought by the city and dedicated as parkland in 2000 (pers. comm. Terryl Robinson, Parks and Recreation 2002).

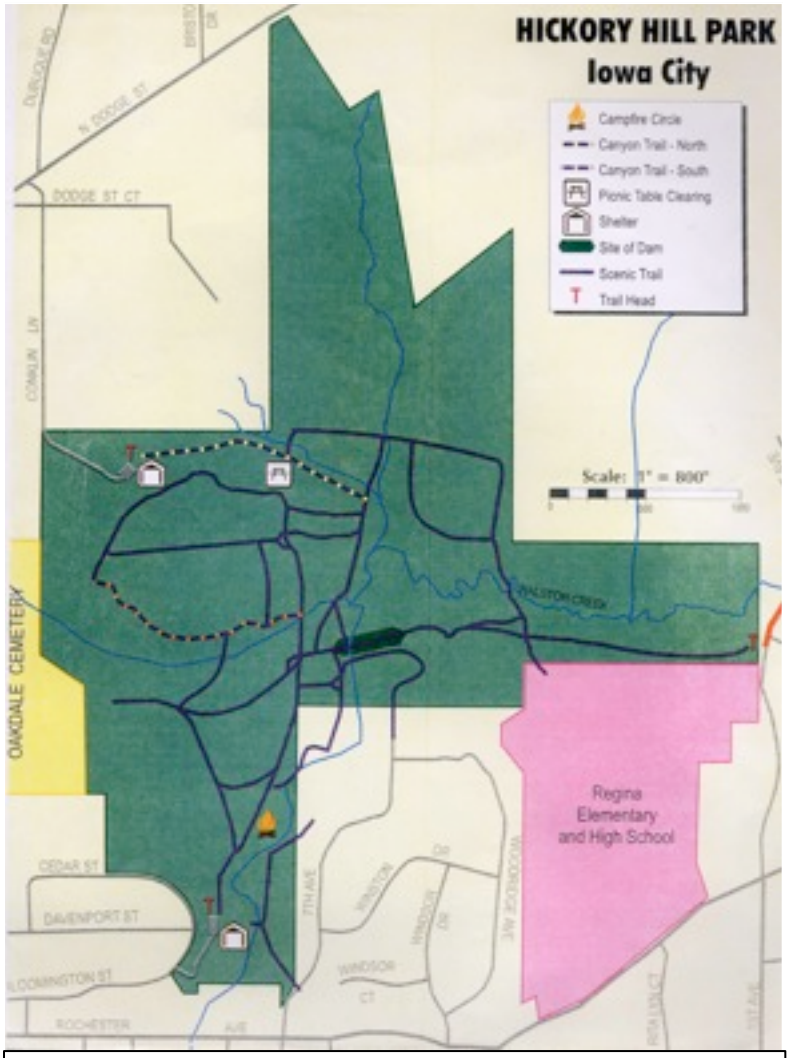

Figure 3. Map of Hickory Hill Park. Adapted from Parks and Recreation of Iowa City.

Based on information in public documents available from the Iowa City Parks and Recreation Department, the history of Hickory Hill Park is marked by controversy, particularly with respect to management. From the mid-70's, citizens have fought on behalf of the park to maintain it as a natural area within the urban environment. In addition, the park was threatened by the 1st Avenue road extension on the east side of the park; cattle were discovered illegally grazing in the park as late as 1992; and most recently (2000-present) there was controversy because the City approved a housing development directly adjacent to the park on the east side of the northern 43.22 acre parcel. The citizen response demonstrates that this park is valued by many in the Iowa City community.

The purpose of my Honor's Research is to provide a further "snapshot" of Hickory Hill Park by completing a thorough analysis of the vegetation, past and present, and developing a management plan for the future. My research includes:

1) **Historical Assessment—**including analyses of John Frierson's field notes and USDA aerial photographs.

2) **Vascular Plant Inventory—**including collection of voucher specimens for the University of Iowa Herbarium, quantitative assessment of relative abundance of each species, and also determining the proportion of native versus alien species.

3) **Management plan—**including site specific plans for different parts of the park and notations on alien species that should be targeted for control.

2. Material and Methods

Historical Assessment. Copies of the General Land Office survey of 1839 were obtained from microfilm in the State Historical Society of Iowa, 402 Iowa Avenue, Iowa City. Copies of USDA aerial photographs from 1937 through 1994 were obtained from the University of Iowa Map Collection.

Plant Inventory. Field surveys were carried out over the growing season in 2002. The park was divided into several sections based upon features of the land (Fig. 4), and surveys of some of these areas were carried out on the following dates: May 18, 19, 27 and 31; June 3, 5, 7, 8, 12, 14, 17, 19, 24 and 28; July 1, 2, 4, 8, 15, 17, 19, 23, 29 and 30; August 2, 19 and 21; September 12 (Table 1). For each species identified within an area, an associated number

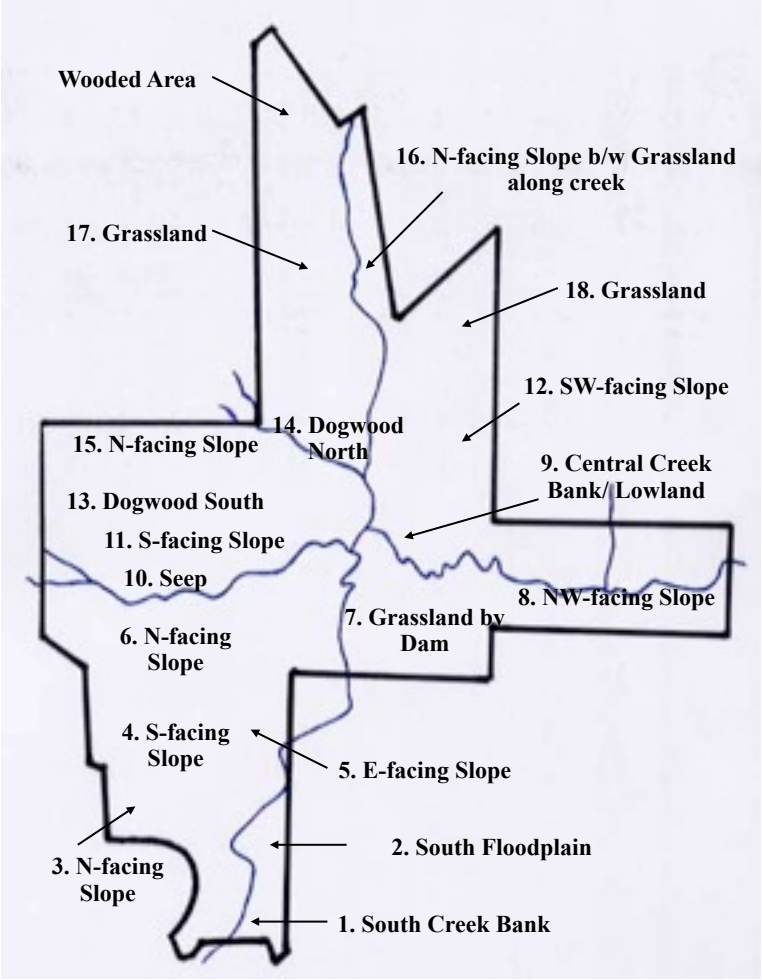

Figure 4. Location of the 18 areas inventoried within Hickory Hill Park.

(present, 1-4) representing relative ground or canopy cover was assigned. These numbers reflect the following estimations of abundance:

4: Common and abundant throughout

3: Frequent, but not abundant

2: Infrequent

1: Rare

P: One individual

Table 1. Inventory dates for each of the 18 areas within Hickory Hill Park

Area Inventoried	Dates Inventoried (2002)
1. South Creek Bank	May 19, July 1
2. South Floodplain	May 18, July 1
3. North-facing Slope Along the Southern Boarder of the Park	June 5, June 28
4. South-facing Slope South of East-West Tributary	May 27, June 24
5. East-facing Slope at Bloomington Street Entrance	June 7, July 4
6. North-facing Slope South of East-West Tributary	May 31, August 19
7. Grassland by Dam	July 2, August 2
8. Northwest-facing Slope at 1st Avenue Entrance	June 12, July 8
9. Central Creek Bank/Lowland	June 3, July 23
10. Seepage Area	June 3, July 23, July 29
11. South-facing Slope North of East-West Tributary	June 8, August 21
12. Southwest-facing Slope in Northeast Edge of Park	June 14, July 15
13. Dogwood Area South of Dodge Street Entrance	June 17, July 29
14. Dogwood Area North of Dodge Street Entrance	June 19, July 30
15. North-facing Slope North of Dodge Street Entrance	June 17
16. North-facing Slope Between North Grasslands	July 17
17. Grassland North of Dodge Street Entrance, West of Ralston Creek	July 2, July 19
18. Grassland North of Dodge Street Entrance, East of Ralston Creek	July 19

Voucher specimens of many species were collected and pressed. These specimens will be deposited in the University of Iowa Herbarium (IA) to serve as permanent documentation of this study. A quantitative analysis of the plant diversity within the park was performed. Proportions of native versus alien species were determined. Nomenclature for the species lists compiled follows Eilers and Roosa (1994).

3. Results and Discussion

Analysis of John Frierson's Field Notes

In 1839, John Frierson surveyed the township that presently contains Hickory Hill Park. He described this township (Township 79 N, Range 6 W) as "diversified by timber and prairie" with most of the land being "1st rate, generally undulating—though very little can be called broken." According to Frierson, at this time there were few permanent residents of the area, with only two or three rarely traveled and barely noticeable roads in existence. This survey provides the first description of the land surrounding and containing Hickory Hill Park (Fig. 5).

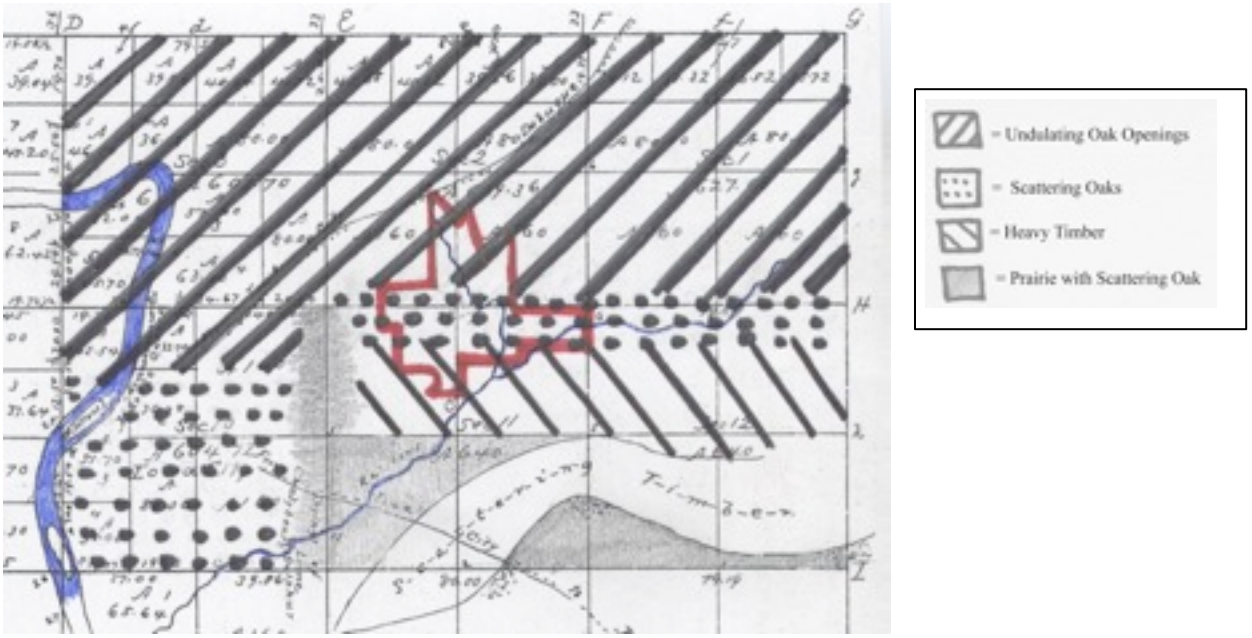

Figure 5. Sections 1, 2, 3, 10, 11 and 12 of the 1839 land survey conducted by John Frierson. Adapted from the original drawing.

More specifically within the township, sections 1, 2, 3, 10, 11, and 12 represent the land containing and immediately surrounding Hickory Hill Park. Starting from the land southwest of the park, along the line between sections 10 and 11, which at the time represented the eastern edge of Iowa City, Frierson noted the land was "1st rate prairie with a few scattering oaks." He noted two large black oaks as bearing trees (18 in. and 14 in. diameters, respectively) as well as two white oaks.

Moving east, along the line between sections 3 and 10, thereby entering the western-most edge of now Hickory Hill Park, the land was described as "1st quality" with "oak openings." Frierson noted as bearing trees in this area: a walnut tree (14 in. diameter), a white oak, two maples (10 in. and 8 in. diameters, respectively), a small ash (3 in. diameter), and a willow tree.

Along the southeastern edge of the park, between sections 11 and 12, Frierson's survey called the land "1st rate." He made note of "thick hazel underbrush and scattering oak" which became "heavy black and white oak timber" as he moved north. Bearing trees in this area included a small cherry tree (5 in. diameter), four large black oak trees and a very large white oak (3 ft. diameter). Along the line between sections 1 and 12, which forms the eastern-most edge of the park, now near Regina High school, was described as "rolling and good" with "scattering oaks."

The north half of the park and its surrounding areas, as surveyed along the line between sections 1 and 2, was described as being "2nd quality" with "undulating oak openings—white black and bur oak of excellent quality." Frierson called the central portion, along the line between sections 2 and 11, of the park "good" and characterized it as having "scattering oaks."

Analysis of Aerial Photographs

A century after Frierson's survey, the next image of the land of Hickory Hill Park comes from the first USDA aerial photographs taken in 1937. The template used to analyze the aerial photographs, and denoting fields discussed in the analysis is shown in Figure 6. Copies of the 1937-1994 aerial photographs used in this analysis are included in Appendix 1.

From the south end of the Park, what is now the Bloomington Street entrance, the land appeared relatively unchanged with respect to Frierson's notes. The area was open with a few scattered medium and large-sized trees. Large trees evenly covered the area east of this, along

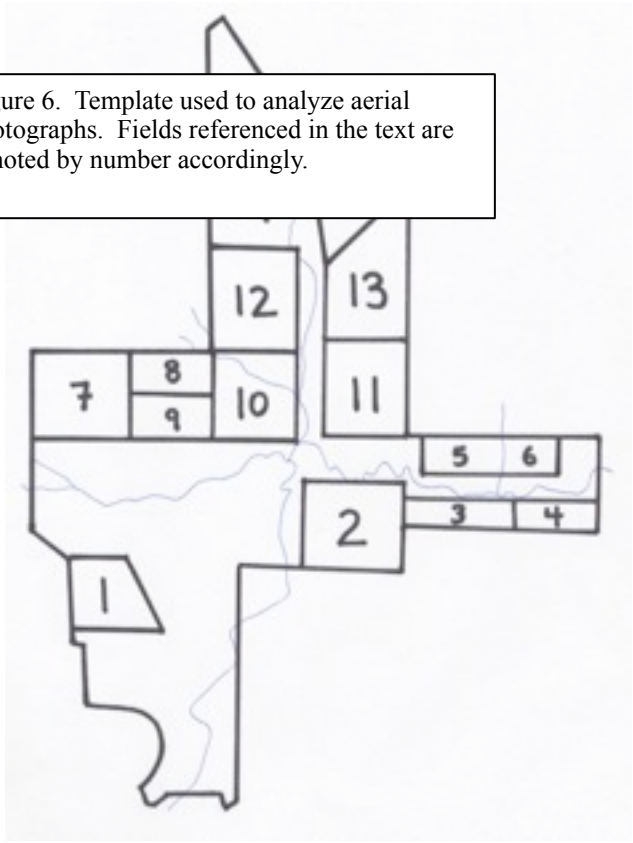

Figure 6. Template used to analyze aerial photographs. Fields referenced in the text are denoted by number accordingly.

Ralston Creek, which runs north-south. Progressing northward, an area heavily wooded by large trees is encountered. Therefore, in 1937 the section of park corresponding to the area including, and south of, the south-facing slope south of the east-west running tributary was largely unchanged.

The area north of the aforementioned south-facing slope shows marked change in the land, mostly through the presence of plowed and grazed fields. Just south of the east-west

running tributary on the west edge of the park is a clear area (Field #1). This field may have at some point been plowed; however, by 1937 it is difficult to tell if the field was still in use. Directly east of Field #1 is a section of land thoroughly covered by small, scrubby trees. The creek bank of the east-west tributary in this area is mostly clear. Both north and south of this clearing surrounding the creek bank contains a light covering of small trees.

Moving eastward across the park, but remaining south of the east-west tributary, are three fields (Field #2, #3, and #4). These fields show signs of current plowing in 1937. Fields #5 and #6, north of Fields #3 and #4, also showed signs of current plowing. The eastern edge of the park (now adjacent to Regina High School), in general then, was mostly clear with scattered large trees. Medium to large trees lined the east-west tributary bank in this eastern section of the park.

At the center of the park where north-south running Ralston Creek intersects with the east-west running tributary, the area was clear with a scattering of large trees. Large trees lined the creek banks.

Further north on the west side of the park (now the Dodge Street entrance) was a large clearing (this area will be referred to as three sections for future reference, i.e. Field #7, #8, #9). This treeless area show definite signs of recent plowing, though there is evidence of a slight encroachment of medium-sized trees along the north-central boundary of this area.

Field #10, located in the center of the park north of the east-west running tributary, is clear and shows signs of plowing. However, the field may not have been in current use during 1937 as evident by the slight encroachment of medium-sized trees in the southeast corner of the field.

Just east of north-south running Ralston Creek is another clear area. Field #11 shows signs of current plowing and is completely treeless. Northward are Fields #12 and #13, which are also clear and evidently plowed. Fields #12 and #13 are separated by large trees lining the north-south running creek bank.

The remaining northern section of the park is mostly clear with scattered trees of varying sizes. There is no evidence of plowing; however, the land might have been grazed based upon the lack of dense foliage. This land also appears to be similar to Frierson's descriptions of the north half of the park 100 years earlier, at least in superficial appearance.

In summary, the first aerial photographs of the area containing Hickory Hill Park from 1937 shows very open land with scattered trees and a few small forested areas. These forested areas were not particularly dense and contained numerous large-sized trees. Significant portions of the area were being plowed for crops and/or being grazed.

The next set of aerial photographs from 1951 show little change in the land from 1937. Among the changes observed was the further encroachment of small trees into the north edge of Fields #7, #8 and #9 at the current Dodge Street entrance, as well as into the southeast corner of Field #10. Additionally, in the northern-most section of the park, a fence line becomes apparent creating Field #14 directly north of Field #12. However, even with the presence of the fence line, the northern-most section is uniformly clear with scattered medium to large-sized trees.

The 1957 aerial photographs show the first signs of major changes in the land leading to the current landscape of the park. The area around the Bloomington Street entrance was somewhat less clear than in 1951, with small and medium-sized trees encroaching upon the area. The heavily wooded area just north of the Bloomington Street entrance was more densely tree

covered and had numerous small trees intermixed with the large trees from the past. Field #1 on the western edge of the park no longer shows signs of grazing. Scrubby small trees and shrubs evenly fill the field. The creek bank of the east-west tributary remained fairly clear; however, the dense small trees to the north and to the south beyond the creek bank clearing show signs of extending their range toward the center of the park. Accordingly, the center of the park at the intersection of Ralston Creek with its east-west tributaries shows the beginning signs of small tree/shrub encroachment. At the current Dodge Street entrance, Field #7 appears to still support grazing, however, a cluster of several medium-size trees were present in the middle of the field. Field #8 no longer showed evidence of being plowed. The northwest third of the plot was covered with trees, and there are indications of more small trees encroaching upon the area. Small trees and/or shrubs began to invade the southern half of Field #10 providing support that this field was also no longer in use by 1957. The trees lining the north-south running creek bank between Fields #12 and #13 were much denser in number compared to previous years. North of the fence line in Field #14 showed evidence of more dense tree coverage, while south of the fence line remained clear with scattered trees. The remaining section of the park, north of Field #14, remained clear and appeared to yet be supporting grazing, however, a greater number of scattered trees were present relative to past years.

The encroachment of trees continued as observed through the 1963 aerial photographs. The area between the Bloomington Street entrance and Ralston Creek was densely tree covered. Field #1 was by this time completely covered with scrubby small trees, and the area east of Field #1 was densely covered by small to medium-sized trees. Between Fields #2 and #11, were large trees intermixed with smaller trees, thereby forming a denser canopy cover than in 1957. Field

#7 appeared to still be grazed; however, the northeast quarter of the field was covered with medium-sized trees. Field #8 was two-thirds covered with medium trees. Field #10 contained small and medium trees in the southern half of the field while the northern half remained clear. Field #13 remained clear though showed signs of encroachment from trees of the northeast corner. A dense aggregation of small trees lining the creek bank from the south-end of Fields #10 and #11 up through the north-end of Fields #12 and #13 appeared in 1963. Field #14 showed signs of denser tree cover in the southwest corner relative to past years. The north-most section of the park, north of Field #14, showed a definite increase in tree cover with the very north tip being densely covered with large trees.

By 1970, the Bloomington Street entrance parking lot had been built and the area surrounding the south entrance was no longer completely clear. Medium and large trees (possibly planted) were scattered throughout the vicinity. North of the Bloomington Street entrance, evidence of clearing of trees is present. The tree cover of medium to small trees was not as dense as in 1963. Field #1 was densely covered with small trees in the southern ¾; however, a clearing was present in the northern ¼ of the field. The east-west creek bank in the southern part of the park remained relatively clear though some further small tree encroachment was present. South of the east-west flowing tributary on the eastern part of the park, Field #2 remained mostly clear, though had small trees scattered throughout the area. Fields #5 and #6 also remained mostly clear but showed early signs of small tree encroachment from the western and eastern edges of the plots. Numerous small trees were crowded along the east-west running tributary in the eastern section of the park. These combined effects resulted in the eastern part of the park being much less clear than in the past. In Field #7, the Dodge Street entrance parking

lot was present by 1970. This area was mostly clear, with some trees (which may have been planted) in the northeast corner. Field #8 showed dense tree cover in the western half and scattered smaller trees in the eastern half. Field #13 remained largely unchanged being mostly clear with small trees encroaching from the northeast corner, but more tree encroachment along the northern boundary of the park was present. The fence line of Field #14 was still evident in 1970. There was also dense small tree cover in the southwest quarter of Field #14. Small patches of trees were present amongst the clearings in this area. Medium and large trees densely covered the northern-most section of the park, north of Field #14.

In 1979, the Bloomington Street entrance of the park remained largely unchanged. The area north of the south entrance contained fairly dense medium-sized tree cover with occasional clearings interspersed throughout. Field #1 and the area east of the field were very densely covered with mostly small trees, though a small clearing was present in the northern section of Field #1. The creek bed of the east-west tributary in the south was no longer clear, fairly dense small tree cover had, by this time, encroached upon the area. 1972 marked the termination of use of several fields in the area. Field #2, was evenly covered throughout by small trees. Field #5 also showed change as it became covered with small trees, though the northwest corner remained clear. Field #6 also changed from being a clear field to being evenly covered with small trees, with denser cover in its southeast corner. The center of the park at the intersection of the creeks was not densely tree covered, but contained an even spread of mostly small trees throughout the area. Field #7 at the Dodge Street entrance remained clear though medium sized trees were beginning to encroach from the northwest corner. Field #8 was densely tree covered by small and medium trees. The northern half of Field #10 remained clear though the southern half was

scattered with clumps of trees. Field #11 showed evidence of no longer being plowed as small trees evenly covered it.

There was little change in the southern end of the park between 1979 and 1990, though the tree cover perhaps was slightly denser. Field #2 in the east, which had previously been covered throughout by small trees was completely clear, most likely due to mowing. Fields #3 and #4 show the first signs of no longer being plowed as they were lightly tree covered. Two structural changes in the park include the softball field for Regina High School abutting the eastern park boundary. Also, the dam in the center of the park can be observed in the aerial photograph. There is a large clearing surrounding the dam and the intersection of the creeks in the center of the park extending into Field #2. No trees are evident. Field #10 in the northern half of the park is covered by more trees in the southern half; the northern half remains fairly clear though there are scattered small trees throughout. Field #14 contains a dense amount of medium-sized trees in the southwestern corner. There is a cluster of small and medium trees near the center of the field and clusters of medium trees lining the clearing of the creek bank. Trees, with the exception of a clearing along the north-south running creek bank, densely covered the section of land north of Field #14.

There were few changes present in the features of the land from the 1990 aerial photographs to the most current 1994 photographs. The cemetery parking lot and adjoining road on the west edge of the park in Field #1 is shown. Field # 2 remained clear though a clump of trees had developed along the southern edge. Fields #3 and #4 were evenly tree covered, though not particularly densely. Fields #5 and #6 were densely tree covered, except for a clearing surrounding the creek bank running north-south. Field #7 was evenly, but not densely, tree

covered. Dense canopy coverage existed over Field #8. Field #9 was mostly clear with scattered small trees throughout the area. Field #10 contained dense tree cover in the southern half and scattered trees in the northern half. Field #11 contained even tree cover throughout, though was not dense. Field #12 in 1994 remained completely clear of trees. Field #13 remained mostly clear, though trees lined the north boundary. Field #14 remained unchanged from 1990.

In summary, the aerial photographs ranging from 1937 through 1994 show a progression of tree encroachment throughout Hickory Hill Park. While much of the park in 1937 consisted of plowed or grazed fields, by 1994, these fields had become filled with mostly small, scrubby trees. In many respects, the increase in tree cover is a typical progression of the land, as natural grazing animals no longer keep the land clear of trees.

However, as evident beginning from the 1937 aerial photographs, Hickory Hill Park has clearly been near human habitation for many years. This is likely to impact the vegetation of the area, whether it is through the effects of perpetual plowing or over-grazing of the land or by plant species introduced by garden escapes.

Plant Inventory

The plant diversity within Hickory Hill Park reflects the urban nature of the park. This can be observed through the inventory of vascular plant species performed during the growing season of 2002. The species list for the entire park is included as Appendix 2. A total of 233 species of pteridophytes, gymnosperms, dicotyledons, and monocotyledons were documented. Additionally, separate species lists are included for each of the 18 subdivisions based upon landforms (see Material and Methods) are also included in Appendix 1. These 18 areas include

several habitat types indicative of the Southern Iowa Drift Plain: floodplains, creek banks, forested north-, south-, east-, west-facing slopes, seepage areas, and open grasslands. Figure 7 provides a general orientation of these areas within the park.

Starting from the south end of the park at the Bloomington Street Entrance, the first area is the bank of Ralston Creek. This habitat is a moist area, characterized by Spotted Touch-me-not (*Impatiens capensis)*, Honewort (*Cryptotaenia canadensis)* and Cleavers (*Galium aparine)*. The dominant trees in the area include Box Elder (*Acer negundo)*, Black Walnut (*Juglans nigra),* and Basswood (*Tilia americana*).

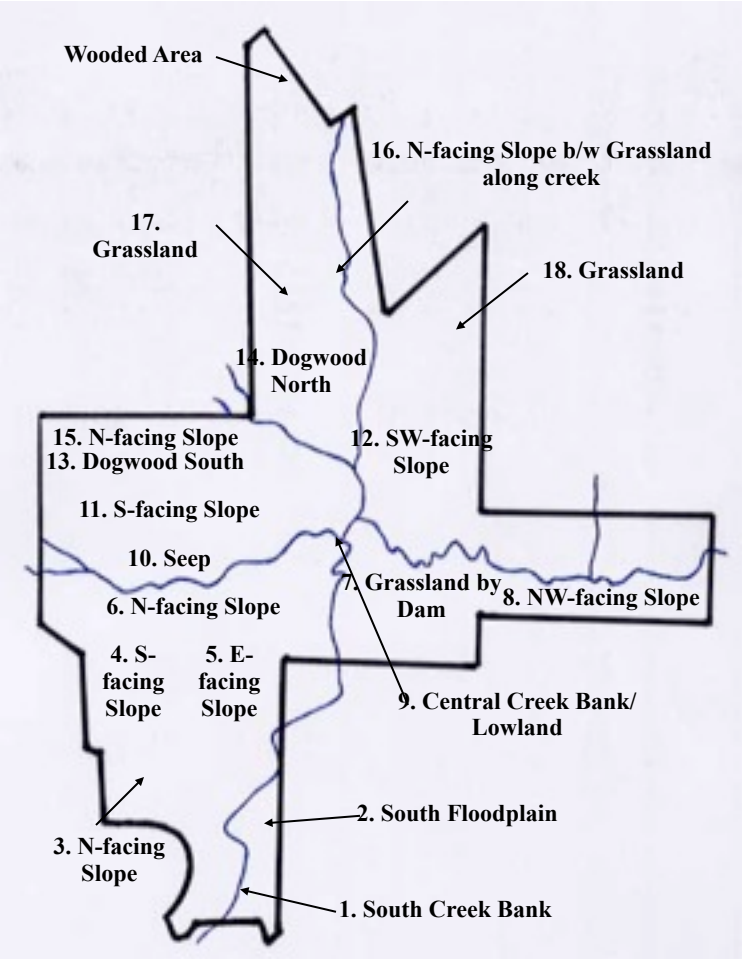

Figure 7. Locations of the 18 areas inventoried within Hickory Hill Park**.**

Also near the Bloomington Street entrance is a floodplain. Box Elder (*Acer negundo)* and Black Walnut (*Juglans nigra*) trees characterize this area, which is typical of a bottomland hardwood tree community. There is a significant amount of Elderberry shrubs (*Sambucus canadensis)* present. Herbaceous species in high frequency include Garlic Mustard (*Alliaria petiolata)*, White Avens (*Geum canadense)*, Spotted Touch-me-not (*Impatiens capensis)*, and Clearweed (*Pilea pumila)*.

Upon entering the forested area of the southern edge of the park, the first landform is a somewhat steep north-facing slope along the southwestern-most corner of the park, abutting residential housing. Wild Black Cherry trees (*Prunus serotina)* compose the largest percentage of canopy cover amongst the trees within this area, though Bitternut Hickory (*Carya cordiformis),* and Red Elm (*Ulmus rubra)* are also well represented. Virginia Creeper (*Parthenocissus quinquefolia)* is very prevalent; and Garlic Mustard (*Alliaria petiolata)*, Enchanter's Nightshade (*Circaea lutetiana),* White Avens *(Geum canadense)*, and Clearweed (*Pilea pumila)* are all present in relatively high numbers within this area. These dominant representative plants are indicative of a moist forest habitat.

Continuing northward, the next area is a south-facing slope. This area contains the greatest number of species within it (101 species), which is an indication of high species diversity. Bitternut Hickory (*Carya cordiformis)*, Shagbark Hickory (*C. ovata)* and Wild Black Cherry (*Prunus serotina)* provide the majority of the canopy cover within this area. There are also several very large trees of White Oak (*Quercus alba)* and Bur Oak (*Quercus macrocarpa)*, native species characteristic of the historical composition of the land. Virginia Creeper (*Parthenocissus quinquefolia)* is abundant throughout this area. Several shrub species, including

Morrow's Honeysuckle (*Lonicera morrowi)*, Wild Gooseberry (*Ribes missouriense)*, and Multiflora Rose (*Rosa multiflora)* have established in high numbers. The herbaceous plant species on this south-facing slope are among the best of the park. There is a variety of species characteristic of native spring flora, including Spring Beauty (*Claytonia virginica)*, White Trout-lily (*Erythronium albidum)*, Mayapple (*Podophyllum peltatum)*, Jacob's Ladder (*Polemonium reptans)*, and a species of *Trillium*. Additionally, a patch of Green Dragon (*Arisaema dracontium)* was found in this area. Other species found frequently in this dry woodland area include Enchanter's Nightshade (*Circaea lutetiana)*, three different species of Bedstraw (*Galium)*, Wild Geranium (*Geranium maculatum)*, and White Avens (*Geum canadense)*.

Directly east of the southern-most south-facing slope is an east-facing slope. This slope contained the lowest percentage of alien species at 10%. The area is typical of a Hickory-Oak forest community with Wild Black Cherry (*Prunus serotina)* also present in high frequency. There are many fewer shrubs on this slope, as compared to the adjacent south-facing slope, creating a clearer under-story. Wild Geranium (*Geranium maculatum)* is the most prevalent herbaceous species within this area. Green Dragon (*Arisaema dracontium)* was also found on this slope.

North of the south-facing slope is a north-facing slope. Ninety-one different species were identified within this area. Therefore, this high species diversity, along with the low percentage of alien species (13%), makes this, arguably, the most stable environment of the entire park. Bitternut Hickory (*Carya cordiformis)*, Shagbark Hickory (*Carya ovata),* and Wild Black Cherry (*Prunus serotina)* again provide the primary canopy cover. There are fewer shrubs in this area than the south-facing slope, but more than is found on the east-facing slope. Notably, Privet

(*Ligustrum vulgare)* and Wild Gooseberry (*Ribes missouriense)* are highly present. A very rare species, Poke Milkweed (*Asclepia exaltata),* was found within this area implicating it as a historic forest remnant.

These three areas south of the east-west tributary (the south-facing slope, east-facing slope and north-facing slope) form an area with high species diversity and low alien species composition. Based upon data from the aerial photographs, it is apparent that this area has been less impacted by human presence than most other areas within the park. As far back as 1937 when the first aerial photographs were taken, this area was characterized as being heavily wooded. Though there was evidence of an old field on the western edge of the area (Field #1), by 1937 it appeared to no longer be in use.

The eastern section of the park, where the dam is currently located, contains a grassland area. The species prevalent in this area include Common Ragweed (*Ambrosia artemisiifolia)*, Partridge Pea (*Chamaecrista fasciculate)*, Queen Anne's Lace (*Daucus carota)*, and White Clover (*Trifolium repens)*. Several species of grasses, mostly non-native, such as Smooth Brome (*Bromus inermis)*, Reed Canary Grass (*Phalaris arundinacea)*, and Timothy (*Phleum pretense)* are also present.

Within this eastern area of grass, a small square section of prairie was planted in the fall of 2001 by Russ Bennet. Specifically within this area are several species of native prairie plants including Butterfly Weed (*Asclepias tuberosa)*, Tickseed (*Coreopsis palmate)*, Purple Coneflower (*Echinacea pallida)*, and Gray-headed Coneflower (*Ratibida pinnata)*. Common Mullein (*Verbascum thapsus)*, a non-native invasive species appears also to have been introduced with the prairie seed as it is present within the prairie area, though not present in the rest of the

grassland area. However, in general, this prairie area appeared to be doing well in its first summer and provides an example of attempting to create a healthier environment within a disturbed area.

East of the grassland area, abutting Regina High School and extending to the 1st Avenue entrance, is a wooded northwest-facing slope. The predominant trees in this area are Basswood (*Tilia Americana)* and Red Elm (*Ulmus americana)*. Dogwood (*Cornus)* and Morrow's Honeysuckle (*Lonicera morrowi)* occur frequently and are the most abundant shrubs. Violets (*Viola)*, three species of Bedstraw (*Galium),* and White Avens (*Geum canadense)* are the most prevalent herbaceous species in this area.

An east-west running tributary of Ralston Creek bisects the park in half. Following this creek bank and lowland area in the center of the park, there are fewer trees and shrubs present than in the wooded areas. Of these trees and shrubs, no one species stands out as being predominant over the others. The herbaceous species present are indicative of a moist habitat. These species include Spotted Touch-me-not (*Impatiens capensis)*, Moneywort (*Lysimachia nummularia)*, and Clearweed (*Pilea pumila)*.

Along the creek bank on the west edge of the park, there is a seepage area. This wetland is characterized by a lack of trees, which cannot survive in the waterlogged environment. Species in high frequency include Garlic Mustard (*Alliaria petiolata)*, Spotted Touch-me-not (*Impatiens capensis)*, Moneywort (*Lysimachia nummularia)*, and Clearweed (*Pilea pumila)*. Several individuals of Common Horsetail (*Equisetum arvense)*, one of the three species of pteridophytes within the park, are also observed.

North of the east-west tributary is a second forest-covered south-facing slope. This area contained 99 identified species, thus is another area with relatively high species diversity. Bitternut Hickory (*Carya cordiformis)* is the predominant tree species in the area. While there are many shrubs present, there is not a dense amount of shrub coverage. Of the shrubs present, Multiflora Rose (*Rosa multiflora)* is the most abundant. However, there are also numerous individuals of Hazelnut (*Corylus americana)*, a native shrub. Virginia Creeper (*Parthenocissus quinquefolia)* covers most, though not all of the ground. No herbaceous species is predominant in the area, though several common native species typical of a woodland environment, such as Mayapple (*Podophyllum peltatum)*, Wild Geranium (*Geranium maculatum)*, and 12 species of Sedge (*Carex)* were found. Some higher quality native species found within this area include Wild Onion (*Allium canadense)* and Blue-eyed Grass (*Sisyrinchium campestre)*.

East of this northern south-facing slope is a southwest-facing slope. Wild Black Cherry (*Prunus serotina)* is the most frequent tree in this wooded habitat. This area is heavily covered by shrubs, primarily Dogwood (*Cornus)* and Morrow's Honeysuckle (*Lonicera morrowi)*. Virginia Creeper (*Parthenocissus quinquefolia)* provides extensive ground cover. No one herbaceous species is dominant within this habitat. In general, any particular species, at most, was present only infrequently throughout the area. This may be, in part, a result of over-shading by the shrub species.

In the northwest corner of the park are two dry habitats with abundant amounts of Dogwood (*Cornus)*. One of these dry habitats is located just south of the Dodge Street entrance, while the other is located north of the entrance. These two areas are very similar in both species diversity and percentage of alien species (24% alien of 71 species in the southern area and 24%

alien of 70 species in the eastern area, respectively). Species typical of the dry, sandy soil present within these habitats were observed, including Tall Agrimony (*Agrimonia gryposepala)* and Poison Ivy (*Toxicodendron radicans)*.

There were some differences between the two Dogwood (*Cornus)* areas, however. The eastern area possessed a greater number of trees, including a few individuals of Wild Black Cherry (*Prunus serotina)*, Red Elm (*Ulmus americana),* and Red Cedar (*Juniperus virginiana)*, relative to the southern area. In the southern Dogwood area, Purple Milkweed (*Asclepias purpurascens)* and Twayblade (*Liparis liliifolia)*, two species infrequently found throughout Iowa were discovered. Finding these two species was somewhat surprising as the area is fairly disturbed. However, it again provides an example of why preservation of the park is important, as native remnant species persist in areas which have been historically abused.

North of the Dodge Street entrance is a wooded north-facing slope. Black Walnut (*Juglans nigra)* is the dominant tree species in this area, though several very large individuals of White Oak (*Quercus alba)* and Bur Oak (*Quercus macrocarpa)* are also present. Very large individuals of Ironwood (*Ostrya virginiana)*, a native under-story tree were also observed. Virginia Creeper (*Parthenocissus quinquefolia)* provides nearly complete coverage of the ground. Wild Gooseberry (*Ribes missouriense)* is frequent, especially along the southern edge of this area. Enchanter's Nightshade (*Circaea lutetiana)* and White Avens (*Geum canadense)* are the predominant herbaceous species. With just 14% alien species present, this area appears to have stabilized as a fairly healthy woodland habitat.

North of the north-facing forest slope is a grassland area, which is bisected by north-south running Ralston Creek. The grassland area west of the creek is very disturbed, with 35%

alien species. Multiflora Rose (*Rosa multiflora)* is scattered throughout this nearly treeless area. Non-native grasses, particularly Smooth Brome (*Bromus inermis)*, are the most characteristic species within this habitat. Two different species of Goldenrod (*Solidago)* are also very prevalent throughout this area. Though this represents a highly disturbed area, a rare species of sedge (*Carex bushii*) was also discovered.

East of this grassland area, along the creek bank, is a north-facing slope. Shagbark Hickory (*Carya ovata)*, Black Walnut (*Juglans nigra)*, Wild Black Cherry (*Prunus serotina)*, Northern Red Oak (*Quercus borealis)*, and Red Elm (*Ulmus rubra)* primarily create the canopy cover of this wooded area. Multiflora Rose (*Rosa multiflora)* is observed frequently throughout. Several species typical of woodland areas are also present in this area, including Sweet-scented Bedstraw (*Galium triflorum)*, Enchanter's Nightshade (*Circaea lutetiana)*, and Jumpseed (*Polygonum virginianum)*.

Finally, the last inventoried area in the park is the northern grassland located east of Ralston Creek. This is the most disturbed area within the park, with nearly half the species present being alien (48%). Similar to the grassland west of Ralston Creek, this area is predominated by Smooth Brome (*Bromus inermis)*. Species diversity, with only 42 species present, was also much lower in this area, as compared to the rest of the park. Interestingly, this area has been used by humans for the longest period of time within the park. From as early as the 1937 aerial photographs, evidence of grazing could be observed. This grazing continued until 1994, when there were reports of the area being used by a local cattle farmer, though the area had been officially dedicated as parkland in 1981. This suggests a correlation between long-term overgrazing of land with the presence of alien species and low species diversity.

Figure 8 provides a summary of the different habitat types within the park. One area recognized in the figure, the wooded area in the extreme north of the park, was not inventoried. The wooded habitat has been inferred from the 1994 aerial photographs. An old fence remaining from when the land was being used for grazing is still in place blocking entry into this area of the park. Multiflora Rose (*Rosa multiflora)* and Raspberry (*Rubus)* are abundant along the fence line and an opening could not be found. Therefore, this area was not inventoried.

A summary of the vascular plants of Hickory Hill Park is in Table 2. A total of 233 species were documented, providing evidence of the relatively high species diversity present within the park.

Of the 233 species present, however, not all were native species. The proportion of alien to native species within the park serves as an indication of the level of disturbance. Table 3 lists the 18 landform areas inventoried within the park, their habitat type and the proportion of alien species. As evident through the values of percentage of alien species, there is a range of disturbance within the park. The east-facing slope at the Bloomington Street entrance possesses

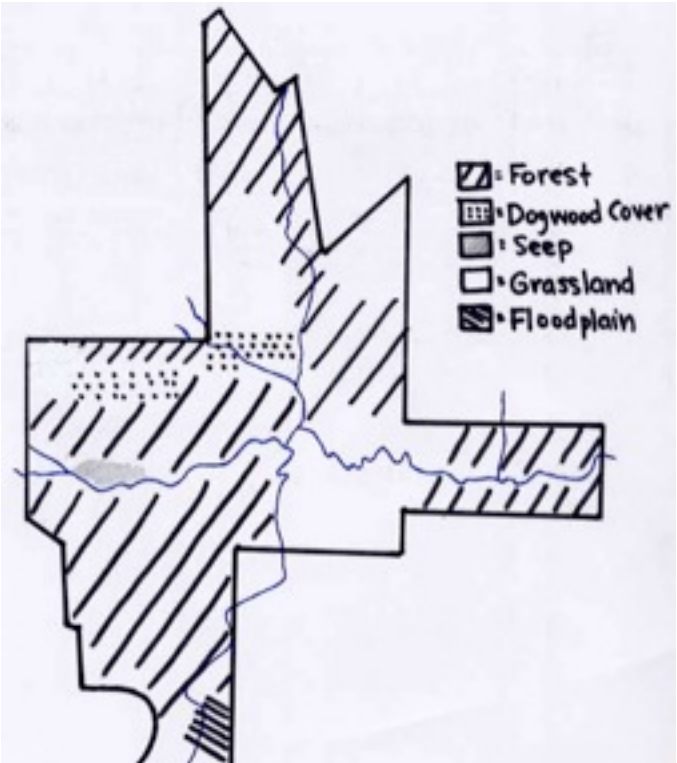

Figure 8. A Vegetation Map of Hickory Hill Park.

the lowest percentage of alien species at 10%, while the northern grassland areas possess the highest degree of alien species at 37% and 48%, respectively. The entire park contains 27% alien species (64 out of 233 species). In general, approximately 20% alien species is typical of areas within Iowa (pers. comm. Diana Horton, Associate Professor University of Iowa). Therefore, Hickory Hill Park is slightly more disturbed than most natural areas in Iowa.

On the other hand, despite the disturbances, some rare/uncommon native species of plants were found within the park. Among these were *Asclepias exaltata*, *Carex bushii*, and *Liparis liliifolia*. *Asclepias exaltata*, or Poke Milkweed, is a member of the family Asclepiadaceae. Based upon University of Iowa Herbarium records, *A. exaltata* has been recorded only twice

Table 2. Summary of Vascular Plant Composition within Hickory Hill Park.

Major Groups	Species	Genera	Families
Pteridophytes	3	3	2
Gymnosperms	2	2	2
Dicotyledons	174	128	53
Monocotyledons	54	30	9
Total	233	163	66

Table 3. Percentage of Alien Species within each Landform Area.

Area Inventoried	Habitat Type	Percentage of Alien Species
East-facing Slope at Bloomington Street Entrance	Forest	10% (6 of 59 species)
North-facing Slope South of East-West Tributary	Forest	13% (12 of 91 species)
North-facing Slope North of the Dodge Street Entrance	Forest	14% (11 of 79 species)
Central Creek Bank/Lowland	Wetland	16% (12 of 77 species)
Northwest-facing Slope at 1st Avenue Entrance	Forest	16% (13 of 81 species)
Seepage Area	Wetland	18% (5 of 28 species)
Southwest-facing Slope in Northeast Edge of Park	Forest	18% (14 of 80 species)
South-facing Slope North of East-West Tributary	Forest	19% (19 of 99 species)
North-facing Slope Between Northern Grasslands	Forest	19% (12 of 63 species)
Creek Bank at Bloomington Street Entrance	Wetland	20% (12 of 62 species)
South-facing Slope South of East-West Tributary	Forest	22% (22 of 101 species)
North-facing Slope Along the Southern Boarder of the Park	Forest	23% (14 of 60 species)
Dogwood Area South of Dodge Street Entrance	Dry Shrubby Area	24% (17 of 71 species)
Dogwood Area North of Dodge Street Entrance	Dry Shrubby Area	24% (17 of 70 species)
South Floodplain at Bloomington Street Entrance	Wetland	25% (18 of 73 species)
Grassland by Dam	Grassland	34% (32 of 93 species)
Grassland North of the Dodge Street Entrance, West of Ralston Creek	Grassland	37% (23 of 62 species)
Grassland North of the Dodge Street Entrance, East of Ralston Creek	Grassland	48% (20 of 42 species)

from Johnson County, once in 1903 by B. Shimek and once in 1955 by Thomas G. Hartley. Eilers and Roosa list *A. exaltata* as being frequent in the Paleozoic Plateau area and rare elsewhere.

Carex bushii is a sedge typically found in moist woods, prairies, and meadows. There is only one record of *Carex bushii* in the University of Iowa Herbarium from Johnson County, collected by Thomas F. Cady and Diana G. Horton in 1999. It is listed by Eilers and Roosa as being rare in southeast and southwest Iowa, and recorded in only four counties: Davis County in 1939, Lee County after 1950, Page County in 1939 and Wapello County in 1939.

Liparis liliifolia, or Twayblade, is a member of the family Orchidaceae. There are four records of *L. liliifolia* in the Herbarium from Johnson County, though all were collected prior to 1956. Eilers and Roosa list *L. liliifolia* as being infrequent in the eastern ¾ of the state.

In addition to these three species, there are several other examples of native species indicative of the historical composition of the land. These species include Bur Oak (*Quercus*

macrocarpa), Green Dragon (*Arisaema dracontium)*, Purple Milkweed (*Asclepias purpurascens)*, Butterfly Weed (*Asclepias tuberosa)*, as well as a nice variety of native spring flora species. Therefore, though Hickory Hill Park has been heavily impacted by human presence, many relatively rare native species have persisted. This knowledge, then, makes conservation of the area even more important.

Management Plan

The goal of this management plan is to create a healthy, sustainable natural environment within Hickory Hill Park. It is unreasonable to expect to return the land to its original pre-settlement condition, as the land has been used and abused by human presence for too long a period. However, as evident from the plant inventory, there is much worth working to preserve. Hickory Hill Park is unique in its identity as an urban park which has maintained a natural environment feel. Unlike grass lawn parks, Hickory Hill possesses components indicative of the historical composition of the land in southeastern Iowa. This management plan, therefore, intends to protect the native flora of the park through the active control of invasive alien species.

Many people of the Iowa City area are aware of the invasion of Garlic Mustard (*Alliaria petiolata*) into Hickory Hill Park. A campaign to eradicate it from the park through annual Garlic Mustard pulls has already been established and approximately 150 garbage bags have been removed in the last three years. However, while Garlic Mustard is a dominant problem species, it is not the only species threatening native flora throughout the park. Additional public education of which plants are desirable for a healthy natural environment, versus which plants are not, is also necessary. For example, Queen Anne's Lace (*Daucus carota*) is rampant

throughout the eastern grassland area near the dam. While it is pretty, it is also a highly invasive species and, unless removed, will threaten the native prairie species in the area. This management plan, therefore, is designed to provide information that allows interested citizens to become knowledgeable about what action to take that will best serve to create a healthy, natural parkland.

Each of the 18 areas inventoried possesses a unique vascular plant composition, and therefore possesses certain strengths and weaknesses. This management plan contains suggestions on how to create a stable environment working within the specific characteristics of each area.

The south creek bank by the Bloomington Street Entrance contains several large native trees. However, numerous smaller trees are beginning to encroach along the bank, which may eventually crowd out the older, larger ones. Mechanically removing some of these small trees will provide a more open environment and help maintain the health of the more established individuals. Multiflora Rose (*Rosa multiflora)* and Morrow's Honeysuckle (*Lonicera morrowi)* are the problem shrubs in this area; however, they not so established that they could not be eradicated relatively easily. Because of the close proximity to a creek bank, however, erosion is a possible concern. Therefore, replacing the removed shrubs with Hazelnut (*Corylus americana)*, a native shrub, is an option to reduce erosion.

In the south floodplain at the Bloomington Street entrance, the biggest problem is the Garlic Mustard (*Alliaria petiolata)* throughout the area. These can be removed mechanically to allow the native flora characteristic of the moist environment to thrive. Another alien species, Creeping Charlie (*Glechoma hederacea),* is also frequently present and an attempt could be

made to remove this creeping weed. Additionally, Common Burdock (*Arctium minus),* another alien, was found infrequently. Therefore, it is suggested that this plant be eradicated from this area before it has the opportunity to further establish itself.

The north-facing slope along the southern border of the park is typical of the moist forest habitat found in various other locations in the park. It possesses several common native woodland species such as Jack-in-the-pulpit (*Arisaema triphyllum)*, Northern Lady Fern (*Athyrium filix-femina)*, Enchanter's Nightshade (*Circaea lutetiana)*, and two different species of Avens (*Geum)*. The main problem in this area again is Garlic Mustard (*Alliaria petiolata)*, which is present frequently throughout. This area should be a focus of mechanical removal of Garlic Mustard, particularly because of its close proximity to the southern area of the park containing the exquisite native spring flora and other high quality native species, to prevent the spread of this invasive species.

The south-facing slope south of the east-west tributary is part of the higher quality southern area of the park. Its native spring flora is quite spectacular. Therefore, it is important to control species that will compete with, and ultimately shade out, these delicate native species. In particular, the shrubby species are a problem in this area. Morrow's Honeysuckle (*Lonicera morrowi)*, Wild Gooseberry (*Ribes missouriense)* and Multiflora Rose (*Rosa multiflora)* are all frequently present throughout. These species need to be mechanically removed, which admittedly is a large undertaking as many of these shrubs are very large in size. Wild Gooseberry is a native species with popular edible berries, and therefore should not be eradicated from the area. However, to avoid it shading out the herbaceous plants, a compromise is to cut down some, but not all, of these bushes. Morrow's Honeysuckle and Multiflora Rose, however,

are invasive, alien species. As these species are hardy, a local chemical treatment painted directly on the cut stumps may be necessary to prevent their regrowth after cutting. Garlic Mustard (*Alliaria petiolata)*, Common Burdock (*Arctium minus)*, and Creeping Charlie (*Glechoma hederacea)* are present infrequently or rarely. Removing these species before they are able to further spread will be helpful in controlling the herbaceous species potentially threatening the native flora.

The east-facing slope adjacent to the south-facing slope possesses the lowest percentage of alien species throughout the entire park. This area appears to have stabilized as a healthy forest community. Invasive species appear to be present, at most, infrequently throughout. This area should be monitored and alien species, including Morrow's Honeysuckle (*Lonicera morrowi)*, Multiflora Rose (*Rosa multiflora)*, Garlic Mustard (*Alliaria petiolata)*, and Creeping Charlie (*Glechoma hederacea)*, should be removed as necessary.

The third area composing the high quality southern area of the park is the north-facing slope north of the south-facing slope. The alien shrub Privet (*Ligustrum vulgare)* is present frequently throughout and should be mechanically removed. In general, though, this area is less shrub-covered than the adjacent south-facing slope, so monitoring of the shrub growth should be performed and alien shrubs should be removed as necessary. Garlic Mustard (*Alliaria petiolata)* is present infrequently throughout and will be easier to eradicate now before it can further establish. Other alien herbaceous species, which should also be removed before their further spread, include Common Burdock (*Arctium minus)*, Dame's Rocket (*Hesperis matronalis)*, and Motherwort (*Leonurus cardiaca)*.

It should be noted that Oakdale Cemetery lies directly west of the south- and north-facing slopes. In 2000, 7.04 acres were allotted for the Cemetery expansion from the parkland. As this southern area is unique in the park due to its high species diversity and low disturbance rates, careful consideration should be taken before any more land is removed from the park for further cemetery expansion. This area should also be monitored carefully, as alien species from the cemetery may enter into the parkland.

In the east of the park is the grassland by Regina High School. This is the third most disturbed area in the park, with few high quality native species. Eradication of as many alien grasses as possible, for example Smooth Brome (*Bromus inermis)* and Timothy (*Phleum pretense)*, is encouraged. Queen Anne's Lace (*Daucus carota)*, the most problematic species in this area, is well established and should be removed. Common Ragweed (*Ambrosia artemisiifolia)* is also very frequent throughout, and while native, is indicative of a disturbed area and should be controlled. Burning or mowing the area are two possible ways to control the problem species; however, higher quality species must be planted in replacement, otherwise the undesired species will simply grow back to original abundance. Another species that is dangerous in this area is Wild Parsnip (*Pastinaca sativa)* which causes a photo-induced allergic reaction on the skin of people who come into contact with any part of the plant whether it is dead or alive. Currently, it is present only infrequently throughout the area, but should be removed using gloves to prevent accidental contact.

As a result of the high level of disturbance, it is suggested that prairie be recreated in this area. The prairie started in the fall of 2001 is doing quite well and has reintroduced numerous native species back into the area. However, care should be taken when choosing the source of

the seed. In the current prairie area, two non-native species, Goat's-beard (*Tragopogon dubius*) and Common Mullein (*Verbascum thapsus*) have been introduced. Common Mullein, in particular, is an invasive species that will continue to spread if it is not removed. Removing Common Mullein from the prairie area should be a priority in managing the park.

East of the grassland area is the northwest-facing slope next to the 1st Avenue entrance. This dry woodland area contains frequent Dogwood (*Cornus)* and Morrow's Honeysuckle (*Lonicera morrowi)*. Many of these shrubs can be removed, in particular the Honeysuckle, to improve the area. Some alien herbaceous species, though not heavily established, that can be removed in this area include Common Burdock (*Arctium minus)*, Creeping Charlie (*Glechoma hederacea)*, Curly Dock (*Rumex crispus)*, and Red Clover (*Trifolium pretense)*. This will help allow native species such as Tall Anemone (*Anemone virginiana)*, Mayapple (*Podophyllum peltatum)* and Bloodroot (*Sanguinaria Canadensis)* to thrive.

The central creek bank of the east-west running tributary and its adjacent lowland areas appeared clear in the early aerial photographs. This area remains fairly clear of trees and shrubs. The main problem invasive herbaceous species is Moneywort (*Lysimachia nummularia)*, a species found in moist, disturbed soil. This species is frequent throughout the area and grows along runners, therefore may be difficult to eradicate completely. However some removal would be helpful. Garlic Mustard (*Alliaria petiolata)*, Common Burdock (*Arctium minus)*, Creeping Charlie (*Glechoma hederacea)*, and Dame's Rocket (*Hesperis matronalis)* are among the non-native species to monitor and remove as necessary.

The seepage area in the west of the park near the central stream bank is a unique wetland habitat within the park. The greatest threat to this area is the encroachment of Garlic Mustard

(*Alliaria petiolata)*, which is currently frequently present. If this species is allowed to further establish, it could become exceedingly difficult to eradicate completely. Due to this habitat being uncommon within the park, special attention should be paid to control the problem of Garlic Mustard in this area. Additionally, Dame's Rocket (*Hesperis matronalis)* and Moneywort (*Lysimachia nummularia)* should be removed to attempt to protect the Common Horsetail (*Equisetum arvense)*, Spotted Touch-me-not (*Impatiens capensis)*, and Clearweed (*Pilea pumila)*, which are native species indicative of a wetland environment.

The second south-facing slope, which is north of the east-west tributary, has very high species diversity. There are a wide variety of trees in this area, with Shagbark Hickory (*Carya ovata)* being predominant. Multiflora Rose (*Rosa multiflora)* is frequently present throughout and should be removed. Other shrub species to be monitored and removed as necessary include Privet (*Ligustrum vulgare)*, Wile Gooseberry (*Ribes missouriense)*, and Guelder Rose (*Viburnum opulus)*. There is no herbaceous species present more than infrequently, which accounts for the high species diversity overall. Some of the alien species to watch are Garlic Mustard (*Alliaria petiolata)*, Dame's Rocket (*Hesperis matronalis)*, and Moneywort (*Lysimachia nummularia)*.

The southwest-facing slope in the northeast edge of the park also contains a wide variety of tree species, though Wild Black Cherry (*Prunus serotina)* is predominant in this area. Dogwood (*Cornus)* is present throughout, as is Morrow's Honeysuckle (*Lonicera morrowi)*. These shrubs (Honeysuckle, more so than Dogwood) should be removed. Other shrub species to monitor include Glossy Buckthorn (*Rhamnus frangula)* and Multiflora Rose (*Rosa multiflora)*. This area contains fewer herbaceous species, none of which are present more than infrequently throughout. It is possible that the control of the shrub species may allow better growth of the

native herbaceous species in the area. The alien species present here are generally rare throughout. However, as shrubs are removed, species such as Garlic Mustard (*Alliaria petiolata)*, Common Burdock (*Arctium minus)*, Orchard Grass (*Dactylis glomerata)*, Dame's Rocket (*Hesperis matronalis)*, Red Clover (*Trifolium pretense)*, and White Clover (*T. repens)* should not be allowed to establish and crowd out the native flora.

The two Dogwood (*Cornus)* areas toward the north of the park are very similar in composition and can thus be managed similarly. The Dogwood is essentially continuous throughout the area, and while removing all of it is unrealistic and unnecessary, removing some to allow access to the area, as well as to prevent over-shading to herbaceous species, may be helpful. There are many large individuals of Blackberry (*Rubus allegheniensis)* and Black Raspberry (*Rubus occidentalis)*, for those people interested in collecting berries. However, *Toxicodendron radicans* is also very frequent throughout the area and should be avoided. The other plant capable of causing painful rashes is Wild Parsnip (*Pastinaca sativa)*, which is not common in this area, but should be removed to prevent unintentional contact.

These Dogwood areas are interesting in that they are very disturbed, yet contain many higher quality native plants such as Twayblade (*Liparis liliifolia)*, Purple Milkweed (*Asclepias purpurascens)*, and Hairy Mountain Mint (*Pycnanthemum pilosum)*. These areas appear not to have reached a point of stability, and this process may take many more years. Therefore, monitoring the amount of shade coverage by the Dogwood shrubs, as well as removing invasive species, such as Queen Anne's Lace (*Daucus carota)* and Kentucky Bluegrass (*Poa pratensis)*, encroaching upon the native flora will help preserve the desired species while allowing the land to progress in a natural way.

The north-facing slope north of the Dodge Street entrance is another notably nice woodland area within the park that appears to have stabilized into a healthy forest community. Wild Gooseberry (*Ribes missouriense)* is the most prevalent shrub in the area. Because it is native, again, it is not desirable to eradicate it completely. However, cutting back some of the individuals would help to control its spread. Morrow's Honeysuckle (*Lonicera morrori)* and Multiflora Rose (*Rosa multiflora)* should also be monitored in this area. There are few problematic alien species in this area. Garlic Mustard (*Alliaria petiolata)* is present only rarely, thus would be relatively easy to eradicate, as would Common Burdock (*Arctium minus)* and Orchard Grass (*Dactylis glomerata)*.

The north-facing slope along Ralston Creek and separating the two northern grasslands also contains a typical native woodland flora. Multiflora Rose (*Rosa multiflora)* is prevalent throughout and is the main problem of the area. This shrub should be removed by mechanical and local chemical means to prevent its spread. The alien species to be targeted for removal are Common Burdock (*Arctium minus)*, Queen Anne's Lace (*Daucus carota)*, Dame's Rocket (*Hesperis matronalis)*, Kentucky Bluegrass (*Poa pratensis)* and Yellow Foxtail (*Setaria glauca)*.

The two grasslands in the north of the park, though separated by Ralston Creek, are very similar in composition and in percentage of alien species. As the two most highly disturbed areas of the park, there is currently little present in terms of quality native prairie species. It is suggested that these areas be targeted first as good candidates for recreating prairie.

In terms of managing the area before prairie is put in, removal of the Multiflora Rose (*Rosa multiflora)* is the main component in controlling shrub growth in the area. Smooth Brome (*Bromus inermis)* is the main vascular plant throughout these areas. It would take massive effort

to control this species, as well as the other non-native grasses, without implementing strategies used in prairie reconstruction. The one species of particular quality found in the grassland area was a sedge (*Carex bushii)* in the area west of the creek. Due the historical prairie composition of the land in this northern area of the park, one possibility for prairie reconstruction is to perform burns for a few consecutive years to see what species present in the seedbank subsequently come up before treating the areas chemically. Dr. Richard S. Rhodes, who has performed prairie reconstruction in the Indiangrass Hills area, has had success through this method and should be consulted.

In terms of management of the park as a whole, several points should be kept in mind. First, the vascular plant composition present in the park presents much to be worked with. There are many different habitat types indicative of the southeastern Iowa area. Numerous high quality native plants were found throughout the park. Even though many areas within the park are highly disturbed, there are many actions individuals can take to make a difference and improve upon the health of the area. In terms of prioritizing, focusing on eradicating alien species in the southern section of the park is appropriate, as there is the most in that area to protect. However, other areas should not be neglected; as it is evident there are many ways to improve the entire park. A suggestion on how to address each area, acknowledging the limited time and resources available, would be to annually choose a few areas to focus on, and to switch the block of areas every year. Another possibility would be to annually choose one species to work on, in addition to the annual Garlic Mustard pulls, and to attempt to control species in this way.

Throughout the management plan, it is stated that various species should be monitored. This can easily be done by anyone who frequents the park often if they know what to look for. There are really no additional resources necessary to perform this maintenance.

Finally, this brings about one of the most important points of this management plan, which is the education of the public. It is important for people to realize what plants are desirable and characteristic of a particular habitat. It is one of the hopes of this thesis for people to work with the baseline data provided to help understand how to improve upon what exists in the park. There are more problematic alien species than just Garlic Mustard to worry about. Several plants that seem "pretty" are in fact dangerous to the health and well-being of the native flora of the various habitats. While these species are present in various amounts it is important to recognize and act against all of these alien species before any one of them becomes out of control.

Hickory Hill Park is a unique and valuable asset to the Iowa City community. The land has undergone numerous abuses and changes throughout history. These changes are reflected in the vascular plant composition throughout the park. Hopefully, however, with this baseline data, the health of the park can be improved upon and maintained for future generations of Iowa City citizens to enjoy.

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5. Appendix 1: Aerial Photographs

7. Appendix 2: Complete Species Lists

HICKORY HILL PARK (Johnson Co., Iowa) PLANT LIST (by g

Compiled by Karla E. Hirokawa, University of Iowa, Iowa City

SPECIES, BY LIFEFORM	FAMILY	COMMON NAME	ORIGIN
ANGIOSPERMS, GYMNOSPERMS, FERNS			
Trees			
Acer negundo L.	Aceraceae	Box Elder	Native
Acer platanoides L.	Aceraceae	Norway Maple	Not Native
Acer saccharinum L.	Aceraceae	Silver Maple	Native
Acer saccharum Marsh.	Aceraceae	Sugar Maple	Native
Betula nigra L.	Betulaceae	River Birch	Native
Carya cordiformis (Wang.) K. Koch	Juglandaceae	Bitternut Hickory	Native
Carya ovata (Mill.) K. Koch	Juglandaceae	Shagbark Hickory	Native
Catalpa speciosa Warder	Bignoniaceae	Cigar Tree	Native of U.S., but not Iowa
Celtis occidentalis L.	Ulmaceae	Hackberry	Native
Crataegus sp.	Rosaceae	Hawthorn	Native
Fraxinus nigra Marsh.	Oleaceae	Black Ash	Native
Gleditsia triacanthos L.	Fabaceae	Honey Locust	Native
Juglans nigra L.	Juglandaceae	Black Walnut	Native
Juniperus virginiana L.	Cupressaceae	Red Cedar	Native
Malus ioensis (Wood) Britton [= M. coronaria (L.) P. Miller, misappl.; Pyrus ioensis (Wood) Carruth]	Rosaceae	Wild Crabapple	Native
Morus alba L.	Moraceae	Chinese Mulberry, White Mulberry	Not Native
Morus rubra L.	Moraceae	Red mulberry	Native
Ostrya virginiana (Mill.) K. Koch	Betulaceae	Ironwood, Hop Hornbeam	Native
Populus deltoides Bartram ex Marsh.	Salicaceae	Cottonwood	Native
Populus tremuloides Michx. [= P. tremula L. ssp. tremuloides (Michx.) Love & Love]	Salicaceae	Quaking Aspen	Native
Prunus serotina Ehrh.	Rosaceae	Wild Black Cherry	Native
Prunus virginiana L.	Rosaceae	Choke Cherry	Native
Quercus alba L.	Fagaceae	White Oak	Native
Quercus bicolor Willd.	Fagaceae	Swamp White Oak	Native
Quercus borealis Michx. F. var. maxima (Marsh.) Ashe [= Q. rubra L. nom. ambig.]	Fagaceae	Northern Red Oak	Native
Quercus macrocarpa Michx. var. macrocarpa	Fagaceae	Bur Oak	Native
Quercus velutina Lam.	Fagaceae	Black Oak	Native
Tilia americana L.	Tiliaceae	Basswood, American Linden	Native
Ulmus rubra Muhl. [= U. fulva Michx.]	Ulmaceae	Red Elm, Slippery Elm	Native
Shrubs/Vines			
Berberis thunbergii DC.	Berberidaceae	Japanese Barberry	Not Native
Calystegia sepium (L.) R. Br. [= Convolvulus sepium L.; Convolvulus americanus (Sims) Greene; Convolvulus repens L.; C. macounii (Greene) Brummitt]	Convolvulacea e	Morning Glory	Native

Campsis radicans (L.) Seem. ex Bureau	Bignoniaceae	Trumpet Creeper	Native of U.S., but not Iowa
Corylus americana Walter	Betulaceae	Hazelnut	Native
Dioscorea villosa L.	Dioscoreaceae	Wild Yam	Native
Elaeagnus umbellata Thunb.	Elaeagnaceae	Autumn Olive	Not Native
Euonymus atropurpureus Jacq.	Celastraceae	Wahoo, Burning Bush	Native
Ligustrum vulgare L.	Oleaceae	Privet	Not Native
Lonicera morrowi Gray	Caprifoliaceae	Morrow's Honeysuckle	Not Native
Lonicera tatarica L.	Caprifoliaceae	Tartarian Honeysuckle	Not Native
Menispermum canadense L.	Menispermaceae	Moonseed	Native
Parthenocissus quinquefolia (L.) Planchon	Vitaceae	Virginia Creeper	Native
Polygonum aviculare L. [= P. arenastrum Jordan ex Boreau]	Polygonaceae	Knotweed	Not Native
Rhamnus frangula L.	Rhamnaceae	Glossy Buckthorn	Not Native
Rhus sp.	Anacardiaceae	Sumac	Native
Ribes missouriense Nutt.ex T. & G.	Saxifragaceae	Wild Gooseberry	Native
Rosa multiflora Thunb. ex Murray	Rosaceae	Multiflora Rose	Not Native
Rubus allegheniensis Porter ex Bailey	Rosaceae	Blackberry	Native
Rubus occidentalis L.	Rosaceae	Black Raspberry	Native
Sambucus canadensis L.	Caprifoliaceae	Elderberry, Common Elder	Native
Smilax herbacea L. [= S. lasioneura Hooker]	Liliaceae	Carrion Flower	Native
Smilax hispida Muhl. [= S. rotundifolia L., misappl.; S. tamnoides L. var. hispida (Muhl.) Fern.]	Liliaceae	Greenbrier	Native
Toxicodendron radicans (L.) Kuntze ssp. negundo (Greene) Gillis [= Rhus radicans L.; Rhus toxicodendron L., misappl.]	Anacardiaceae	Poison Ivy	Native
Viburnum dentatum L.	Caprifoliaceae	Southern Arrowwood	Native
Viburnum opulus L.	Caprifoliaceae	Guelder Rose	Not Native
Viburnum lantana L.	Caprifoliaceae	Wayfaring Tree	Not Native
Vitis riparia Michx.	Vitaceae	Riverbank Grape	Native
Zanthoxylum americanum P. Miller	Rutaceae	Prickly Ash	Native
Cornus sp.	Cornaceae	Dogwood	Native
Amphicarpaea bracteata (L.) Fern.	Fabaceae	Hog Peanut	Native
Lonicera sp.	Caprifoliaceae	Round Leaves	
Herbs			
Abutilon theophrasti Medicus	Malvaceae	Velvet Leaf	Not Native
Achillea millefolium L. ssp. Lanulosa (Nutt.) Piper [= A. lanulosa Nutt.]	Asteraceae	Western Yarrow	Native
Agrimonia gryposepala Wallr.	Rosaceae	Tall Agrimony	Native
Agropyron repens (L.) Beauv.	Poaceae	Quack Grass	Not Native
Agrostis stolonifera L. var. palustris (Hudson) Farw. [= A. palustris Hudson; A. stolonifera L. var. compacta Hartman]	Poaceae	Creeping Bent	Not Native

Alliaria petiolata (Bieb.) Cavara & Grande [= A. officinalis Andrz. ex Bieb.]	Brassicaceae	Garlic Mustard	Not Native
Allium canadense L.	Liliaceae	Wild Onion	Native
Ambrosia artemisiifolia L.	Asteraceae	Common Ragweed	Native
Ambrosia trifida L.	Asteraceae	Giant Ragweed	Native
Andropogon gerardii Vitman [= A. furcatus Muhl.]	Poaceae	Big Bluestem	Native
Anemone virginiana L.	Ranunculaceae	Tall Anemone	Native
Antennaria neglecta Greene	Asteraceae	Pussytoes	Native
Apocynum sibiricum Jacq. [= A. cannabinum L. var. hypericifolium Gray]	Apocynaceae	Dogbane	Native
Arctium minus Bernh.	Asteraceae	Common Burdock	Not Native
Arisaema dracontium (L.) Schott	Araceae	Green Dragon	Native
Arisaema triphyllum (L.) Schott [= A. atrorubens (Aiton) Blume]	Araceae	Jack-in-the-pulpit	Native
Artemisia ludoviciana Nutt. [= A. gnaphalodes Nutt.]	Asteraceae	White Sage	Native
Asclepias exaltata L.	Asclepiadaceae	Poke Milkweed	Native
Asclepias incarnata L.	Asclepiadaceae	Swamp Milkweed	Native
Asclepias purpurascens L.	Asclepiadaceae	Purple Milkweed	Native
Asclepias syriaca L.	Asclepiadaceae	Common Milkweed	Native
Asclepias tuberosa L. ssp. Interior Woodson	Asclepiadaceae	Butterfly Weed	Native
Aster novae-angliae L.	Asteraceae	New England Aster	Native
Athyrium filix-femina (L.) Roth var. angustum (Willd.) Moore [= A. angustum (Willd.) Presl]	Aspleniaceae	Northern Lady Fern	Native
Barbarea vulgaris R. Br.	Brassicaceae	Yellow Rocket	Not Native
Bromus inermis Leysser	Poaceae	Smooth Brome	Not Native
Bromus japonicus Thunb. Ex Murray	Poaceae	Japanese Brome	Not Native
Bromus tectorum L.	Poaceae	Downy Chess	Not Native
Capsella bursa-pastoris (L.) Medic.	Brassicaceae	Shepard's Purse	Not Native
Carex amphibola Steudel var. turgida Fern. [= C. grisea Wahl.]	Cyperaceae	Sedge	Native
Carex blanda Dewey [= C. laxiflora Lam. var. blanda (Dewey) Boott]	Cyperaceae	Sedge	Native
Carex bushii Mack.	Cyperaceae	Sedge	Native
Carex cephaloidea (Dewey) Dewey [= C. sparganioides Willd. var. cephaloidea (Dewey) Carey]	Cyperaceae	Sedge	Native
Carex cephalophora Willd.	Cyperaceae	Sedge	Native
Carex conjuncta Boott	Cyperaceae	Sedge	Native

Carex convoluta Mack. [= C. flaccidula Steudel; C. rosea Willd. var. pussilla Howe]	Cyperaceae	Sedge	Native
Carex davisii Schwein. & Torrey	Cyperaceae	Sedge	Native
Carex gracillima Schwein.	Cyperaceae	Sedge	Native
Carex granularis Muhl. Ex Willd. [= C. haleana Olney]	Cyperaceae	Sedge	Native
Carex gravida Bailey [= C. lunelliana Mack.]	Cyperaceae	Sedge	Native
Carex hirtifolia Mack.	Cyperaceae	Sedge	Native
Carex meadii Dewey [= C. tetanica Schkuhr var. meadii (Dewey) Bailey]	Cyperaceae	Sedge	Native
Carex molesta Mack. [= C. X molesta Mack. of authors]	Cyperaceae	Sedge	Native
Carex normalis Mack.	Cyperaceae	Sedge	Native
Carex rosea Schkuhr ex Willd. [= C. flaccidula Steudel in part; C. rosea Willd. var. radiata (Wahl.) Dewey; C. radiata (Wahl.) Small]	Cyperaceae	Sedge	Native
Carex vulpinoidea Michx.	Cyperaceae	Sedge	Native
Cerastium vulgatum L. [= C. fontanum Baumg.]	Caprifoliaceae	Mouse-ear Chickweed	Not Native
Chamaecrista fasciculata (Michx.) Greene [= Cassia fasciculata Michx.]	Fabaceae	Partridge Pea	Native
Circaea lutetiana L. ssp. canadensis (L.) Ascherson & Magnus [= C. quadrisulcata (Maxim.) Franch. & Sav. var. canadensis (L.) Hara]	Onagraceae	Enchanter's Nightshade	Native
Cirsium vulgare (Savi) Tenore [= C. lanceolatum Hill, misappl.]	Asteraceae	Bull Thistle	Not Native
Claytonia virginica L.	Portulacaceae	Spring Beauty	Native
Commelina communis L.	Commelinaceae	Day-flower	Not Native
Conyza canadensis (L.) Cronq. [= Erigeron canadensis L.]	Asteraceae	Horseweed, Muletail	Native
Conium maculatum L.	Apiaceae	Poison Hemlock	Not Native
Coreopsis palmata Nutt.	Asteraceae	Tickseed, Prairie Coreopsis	Native
Cryptotaenia canadensis (L.) DC.	Apiaceae	Honewort	Native
Cystopteris protrusa (Weath.) Blasdell [= C. fragilis (L.) Bernh. Var. protrusa Weath.]	Aspleniaceae	Creeping Fragile Fern	Native
Dactylis glomerata L.	Poaceae	Orchard Grass	Not Native
Daucus carota L.	Apiaceae	Queen Anne's Lace	Not Native
Echinacea pallida Nutt.	Asteraceae	Pale Coneflower	Native
Echinacea purpurea (L.) Moench	Asteraceae	Purple Coneflower	Native
Elymus canadensis L.	Poaceae	Canada Wild Rye	Native
Equisetum arvense L.	Equisetaceae	Common Horsetail	Native
Erigeron pulchellus Michx.	Asteraceae	Robin's Plantain	Native
Erigeron annuus (L.) Pers.	Asteraceae	Annual Fleabane	Native
Erigeron philadelphicus L.	Asteraceae	Fleabane	Native
Erigeron strigosus Muhl. ex Willd.	Asteraceae	Daisy Fleabane	Native

Erythronium albidum Nutt.	Liliaceae	White Trout-lily, White Dogtooth-violet	Native
Eupatorium perfoliatum L.	Asteraceae	Boneset	Native
Eupatorium purpureum L. [= Eupatoriadelphus purpureus (L.) King & H. Robinson	Asteraceae	Purple Joe-pye-weed	Native
Eupatorium rugosum Houtt.	Asteraceae	White Snakeroot	Native
Euphorbia corollata L.	Euphorbiaceae	Flowering Spurge	Native
Euphorbia cyparissias L.	Euphorbiaceae	Cypress Spurge	Not Native
Gaillardia pulchella Foug.	Asteraceae	Blanket Flower, Rose-Ring Gaillardia	Not Native
Galium aparine L.	Rubiaceae	Cleavers	Native
Galium concinnum T. & G.	Rubiaceae	Shining Bedstraw	Native
Galium triflorum Michx.	Rubiaceae	Sweet-scented Bedstraw	Native
Geranium maculatum L.	Geraniaceae	Wild Geranium	Native
Geum canadense Jacq.	Rosaceae	White Avens	Native
Geum vernum (Raf.) T. & G.	Rosaceae	Spring Avens	Native
Glechoma hederacea L.	Lamiaceae	Creeping Charlie	Not Native
Glyceria striata (Lam.) A.S. Hitchc.	Poaceae	Fowl Manna Grass	Native
Hackelia virginiana (L.) I. M. Johnston [= Lappula virginiana (L.) Greene]	Boraginaceae	Stickseed	Native
Helianthus rigidus (Cass.) Desf. [= H. laetiflorus Pers.]	Asteraceae	Prairie Sunflower	Native
Hesperis matronalis L.	Brassicaceae	Dame's Rocket	Not Native
Hordeum jubatum L.	Poaceae	Squirrel-tail Barley	Native
Hydrophyllum virginianum L.	Hydrophyllaceae	Virginia Waterleaf	Native
Hypericum perforatum L.	Hypericaceae	Common St. John's Wort	Not Native
Hystrix patula Moench [= Elymus hystrix L.]	Poaceae	Bottlebrush Grass	Native
Impatiens capensis Meerb. [= I. Biflora Walter]	Balsaminaceae	Spotted Touch-me-not	Native
Juncus tenuis Willd.	Juncaceae	Path Rush	Native
Liparis liliifolia (L.) L. C. Rich. ex Lindley	Orchidaceae	Twayblade	Native
Lobelia inflata L.	Campanulaceae	Indian Tobacco	Native
Lobelia siphilitica L.	Campanulaceae	Great Lobelia	Native
Lolium perenne L.	Poaceae	Perennial Rye Grass	Not Native
Lotus corniculatus L.	Fabaceae	Bird's-foot Trefoil	Not Native
Leonurus cardiaca L.	Lamiaceae	Motherwort	Not Native
Lysimachia nummularia L.	Primulaceae	Moneywort	Not Native
Medicago lupulina L.	Fabaceae	Black Medic	Not Native
Melilotus alba Medicus	Fabaceae	White Sweet Clover	Not Native
Monarda fistulosa L.	Lamiaceae	Wild Bergamot, Horsemint	Native
Nepeta cataria L.	Lamiaceae	Catnip	Not Native
Osmorhiza longistylis (Torrey) DC.	Apiaceae	Anise Root	Native
Oxalis dillenii Jacq. [O. stricta L., misappl.]	Oxalidaceae	Yellow Wood Sorrel	Native
Pastinaca sativa L.	Apiaceae	Wild Parsnip	Not Native
Phalaris arundinacea L.	Poaceae	Reed Canary Grass	Native
Phleum pratense L.	Poaceae	Timothy	Not Native

Phytolacca americana L.	Phytolaccaceae	Pokeweed	Native
Pilea pumila (L.) Gray	Urticaceae	Clearweed	Native
Plantago lanceolata L.	Plantaginaceae	Buckhorn Plantain	Not Native
Plantago rugelii Dcne.	Plantaginaceae	Common Plantain, Rugel's Plantain	Native
Poa nemoralis L.	Poaceae	Bluegrass	Not Native
Poa pratensis L.	Poaceae	Kentucky Bluegrass	Not Native
Poa trivialis L.	Poaceae	Meadow Grass	Not Native
Podophyllum peltatum L.	Berberidaceae	Mayapple	Native
Polemonium reptans L.	Polemoniaceae	Jacob's Ladder	Native
Polygonatum biflorum (Walter) Ell. [= P. canaliculatum (Muhl.) Pursh; P. commutatum (Schultes f.) A. Dietr.]	Liliaceae	Solomon's Seal	Native
Polygonum aviculare L. [= P. arenastrum Jordan ex Boreau]	Polygonaceae	Knotweed	Not Native
Polygonum virginianum L.	Polygonaceae	Jumpseed	Native
Potentilla norvegica L.	Rosaceae	Norwegian Cinquefoil	Native
Potentilla recta L.	Rosaceae	Sulphur Cinquefoil	Not Native
Potentilla simplex Michx.	Rosaceae	Common Cinquefoil	Native
Prunella vulgaris L. var. lanceolata (Bartram) Fern.	Lamiaceae	Self Heal	Native
Pycnanthemum pilosum Nutt.	Lamiaceae	Hairy Mountain Mint	Native
Pycnanthemum tenuifolium Schrader [= P. flexuosum (Walter) BSP., misappl.]	Lamiaceae	Slender Mountain Mint	Native
Ranunculus abortivus L.	Ranunculaceae	Small-flowered Crowfoot	Native
Ratibida pinnata (Vent.) Barnh.	Asteraceae	Gray-headed Coneflower	Native
Rudbeckia hirta L. [= R. serotina Nutt.]	Asteraceae	Black-eyed Susan	Native
Rumex crispus L.	Polygonaceae	Curly Dock	Not Native
Sanguinaria canadensis L.	Papaveraceae	Bloodroot	Native
Sanicula gregaria Bickn.	Apiaceae	Common Snakeroot	Native
Scirpus atrovirens Willd.	Cyperaceae	Dark Green Bulrush	Native
Scrophularia cf. marilandica L.	Scrophulariaceae	Figwort	Native
Senecio plattensis Nutt.	Asteraceae	Prairie Ragwort	Native
Setaria glauca (L.) Beauv. [= S. lutescens (Weigel) Hubb.	Poaceae	Yellow Foxtail	Not Native
Silphium integrifolium Michx.	Asteraceae	Rosinweed	Native
Sisyrinchium campestre Bickn.	Iridaceae	Blue-eyed Grass	Native
Smilacina racemosa (L.) Desf.	Liliaceae	False Solomon's Seal, False Spikenard	Native
Smilax ecirrhata (Engelm. ex Kunth) S. Watson	Liliaceae	Carrion Flower	Native
Solanum carolinense L.	Solanaceae	Horse Nettle	Native
Solidago canadensis L.	Asteraceae	Tall Goldenrod	Native
Solidago speciosa Nutt.	Asteraceae	Showy Goldenrod	Native
Sonchus oleraceus L.	Asteraceae	Common Sow Thistle	Not Native

Sorghastrum nutans (L.) Nash [= S. avenaceum (Michx.) Nash	Poaceae	Indian Grass	Native
Stachys palustris L.	Lamiaceae	Woundwort	Native
Stellaria graminea L.	Caryophyllaceae	Common Stitchwort	Not Native
Stellaria aquatica (L.) Scop.	Caryophyllaceae	Giant Chickweed	Not Native
Taraxacum officinale Weber	Asteraceae	Common Dandelion	Not Native
Teucrium canadense L.	Lamiaceae	American Germander	Native
Tragopogon dubius Scop. [= T. major Jacq.]	Asteraceae	Goat's-beard	Not Native
Trifolium pratense L.	Fabaceae	Red Clover	Not Native
Trifolium repens L.	Fabaceae	White Clover	Not Native
Urtica dioica L.	Urticaceae	Stinging Nettle	Native
Verbascum thapsus L.	Scrophulariaceae	Common Mullein	Not Native
Verbena hastata L.	Verbenaceae	Blue Vervain	Native
Verbena urticifolia L.	Verbenaceae	White Vervain	Native
Veronica officinalis L.	Scrophulariaceae	Common Speedwell	Not Native
Viola canadensis L. var. rugulosa (Greene) C.L. Hitchc. [= V. canadensis L. var. corymbosa Nutt. Ex T. & G.; V. rugulosa Greene]	Violaceae	Violet	Native
Viola pubescens Aiton [= V. eriocarpa Schwein.; V. pensylvanica Michx.; V. pubescens Aiton var. eriocarpa (Schwein.) Russell]	Violaceae	Downy Yellow Violet	Native
Xanthium strumarium L.	Asteraceae	Spiny Cocklebur	Not Native
Zizia aurea (L.) Koch	Apiaceae	Golden Alexanders	Native
Lactuca sp.	Asteraceae	Lettuce	
Agastache sp.	Lamiaceae	Giant-hyssop	Native
Scutellaria sp.	Lamiaceae	Skullcap	Native
Stachys tenuifolia Willd. [= S. hispida Pursh]	Lamiaceae	Hedge Nettle	Native
Trillium cf. erectum	Liliaceae	Purple Trillium	Native
Fragaria sp.	Rosaceae	Strawberry	
Trillium sp.	Liliaceae	Trillium	
Carex sp.	Cyperaceae	Sedge	