Ecological Assessment of the Grand River Avenue Bus Rapid Transit Corridor

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Michigan Natural Features Inventory
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Michigan Natural Features Inventory

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1. Introduction

The proposed Bus Rapid Transit (BRT) corridor in northwest Ingham County provides a number of opportunities to positively impact the Greater Lansing area. Economically, the BRT has the potential to attract new businesses and residents to the area by providing a great transportation alternative between the capital and the connecting communities to the east. This in turn enhances existing businesses and property values. Socially, it provides an economical transportation choice for residents and visitors to get to a variety of institutions, entertainment venues, neighborhoods, and businesses.

Although transportation projects like the BRT typically are associated with potential negative impacts to the environment, this project will be retrofitted into the existing Michigan/Grand River Avenue corridor. As such, it is anticipated that the project should not have any major impacts to the surrounding natural features. However, there is potential for this project to have a negative impact indirectly on the surrounding natural lands, native plants, waterways, and wildlife populations by serving as an attractive transportation asset for future development. Based on that potential, the Federal Transit Administration (FTA) determined that an Environmental Assessment (EA) needed to be completed prior to development of the Michigan/Grand River Avenue BRT.

To help inform the EA, the Tri-County Regional Planning Commission contracted with the Michigan Natural Features Inventory (MNFI) to conduct targeted biological surveys at sites with potential for high ecological value. Using 1938 aerial photographs, potential conservation area assessment, current aerial imagery, the MNFI natural heritage database, and other data sources, MNFI staff conducted a spatial analysis to identify sites within the corridor with the highest potential for harboring rare plant species and/or high quality natural communities. Private landowners and public managers were contacted to determine which parcels were accessible for conducting surveys.

Based on this information, MNFI inventoried and assessed the highest priority sites within the corridor. The results of this study demonstrate that despite the highly urbanized and fragmented landscape found in northwest Ingham County, areas of moderate ecological value still exist within and adjacent to the BRT corridor. Ultimately, this information will be used to inform the EA of ecological condition within the corridor, identify high priority sites for protection, management and/or restoration, and potentially influence the final design for the BRT corridor.

2. Land Cover Change

Circa 1800 Vegetation for the Tri-County Region

At the time of the General Land Office surveys in the early 1800s, the Tri-County Region was heavily forested. The dominant natural cover was American beech and sugar maple forest, which accounted for 680,000 acres (280,000 hectares), or 62% of the total surface area of the region (Table 1). This mesic forest type was particularly characteristic of fine-textured loamy soils on the gently rolling ground moraine that characterizes much of the area. Oak-hickory forest, which occurred primarily on end moraines and sandy river bluffs, occupied approximately 180,000 ac (73,000 ha), or 16.5% of the region, concentrated in southeastern Clinton County and southeastern Ingham County. Other upland communities of lesser prevalence included mixed oak savanna, mixed oak forest, black oak barren, and white pine – mixed hardwood forest. Upland prairies were very small and local (Comer et. al.1995a, b).

Wetlands were extensive in the Tri-County Region circa 1800, occupying linear outwash channels, poorly drained depressions, and glacial kettles (Figure 1). Mixed conifer swamps characterized by tamarack occupied approximately 87,000 ac (35,000 ha), or 8% of the region. Mixed hardwood swamp (including floodplain forest) was also prevalent, occupying 58,000 ac (23,000 ha), or 5% of the region. Other wetland communities included shrub swamp/emergent marsh, wet prairie (including southern wet meadow and prairie fen), and black ash swamp. Acidic sphagnum bog and poor conifer swamp communities occurred locally in kettle depressions and lake basins (Comer et. al.1995a, b).

Table 1. Tri-County Region Vegetation Circa 1800 (acres)

Cover Type	Clinton	Eaton	Ingham	Total
Beech – Sugar Maple Forest	220,000	280,000	180,000	680,000
Oak – Hickory Forest	74,000	21,000	85,000	180,000
Mixed Conifer Swamp	17,000	35,000	35,000	87,000
Mixed Hardwood Swamp	24,000	18,000	16,000	58,000
Shrub Swamp/Emergent Marsh	9,600	4,800	18,000	32,000
Mixed Oak Savanna	4,600	5,000	5,500	15,000
Mixed Oak Forest	5,500	0	8,900	14,000
Wet Prairie	5,200	1,000	8,200	14,000
Lake/River	2,500	2,200	2,200	6,900
Black Oak Barren	440	450	2,600	3,500
Black Ash Swamp	450	1,200	370	2,000
White Pine – Mixed Hardwood Forest	1,300	0	0	1,300
Muskeg/Bog	180	150	17	350
Grassland	160	36	0	200
White Pine Forest	130	0	0	130
Exposed Bedrock	0	23	0	23

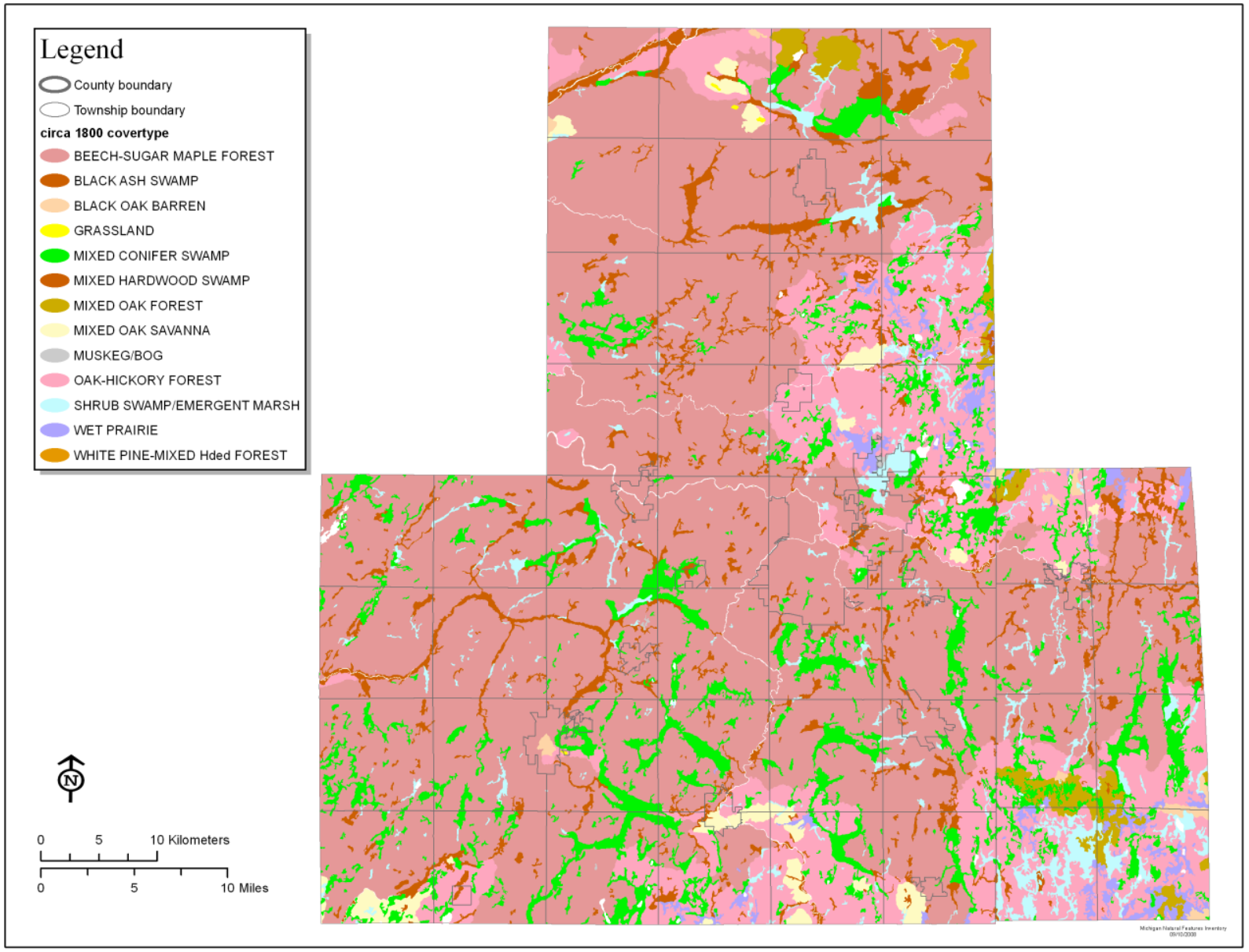

Figure 1. Circa 1800 Vegetation for the Tri-County Region.

Ingham County Land Cover Change

Frank Turner in An Account of Ingham County (1924) described Ingham County as covered by primeval forest that was difficult to traverse and very intimidating to settlers in the early 1800's. Because this territory was so densely wooded, Ingham County was one of the last counties in the region to be settled by Europeans. In the 1820s, most of the upland was beech-sugar maple-basswood forest (Comer 1996). Turner (1924) further explains that maple was highly valued in the county and was found in most all of the townships. Maple sugar during these times was a staple product that was used to pay taxes, buy groceries and to pay carriage on letters before postage stamps were used.

Turner (1924) notes that in the northwest part of the county there was a wide diversity of trees including oak, maple, beech, elm, basswood, black walnut, hickory, sycamore, dogwood, ash, ironwood, black cherry, cottonwood, poplar and hazel. The principal timber in the south and east part of the county was oak that grew in more open places, which the earlier settlers called "oak openings". Oak apparently was very abundant in Locke and Leroy townships, especially north of the Red Cedar River. Comer (1996) in his study of the General Land Office survey field notes, explains that oak-hickory forest, dry black oak-white oak forest and oak savanna were common on the drier outwash and end moraines across the southern townships of Ingham County, and that oak-hickory forest and oak savanna also occurred along the Red Cedar River and around Lake Lansing (Figure 2).

Oak timber was one of the most valuable assets of the county, with many lumbermen claiming the quality and quantity to be greater than that found in any other county in Michigan (Turner 1924). It is estimated that the amount of oak manufactured from the county ranged from four to eight million square feet. This is likely a very conservative estimate; given that there was close to a 50 percent loss of raw material during the manufacturing process. In 1872, a local botanist, Mr. Steward, told Frank Turner that he was asked by Asa Gray of Boston and Professor Beal of the Michigan Agricultural College (M.A.C., now Michigan State University) to travel through the woods of the county and make a collection of the different species of oak. When he was done he reported twenty seven different species (today many of these species designations have been combined), which the founders of M.A.C. preserved for future generations to enjoy (Turner 1924).

The marshes in the central and southern part of the county, which the early settlers relegated to the rattlesnakes and fur-bearing animals, were either covered by tamarack, spruce or open peat bogs that were later used for fuel. The open marshes covered by coarse grass were used by early settlers for hay and pasture for their livestock (Turner 1924). Mixed hardwood swamps were common in active river floodplains, and the sandy outwash deposits in the southern part of the county supported wet prairie, emergent marsh, tamarack swamp and buttonbush swamp. Based on historical map data, it is estimated that there were approximately 78,000 acres of wetland in the county. This represents roughly 22 percent of the total county acreage.

Most of the Tri-County Region was cleared for agriculture by the mid-1800s as the rich, fine-textured, loamy soils that supported beech-maple forests proved excellent for farming. Agricultural development was aided by extensive use of drain tiles and ditches, which reduced wetland acreage by nearly 50% in the region. These drained organic soils were used to produce mint and other specialty crops (Albert 1995).

In this analysis, current landcover in the tri-county region (Table 2 and Figure 3) is represented using the Integrated Forest Monitoring Assessement and Prescription data layer (hereafter referred to as IFMAP). IFMAP coverage is based upon landsat satellite imagery rather than aerial photography and provides a finer classification scheme than the updated 2005 MIRIS coverage, which is useful when cross walking Circa 1800 vegetation with current land cover.

Table 2. Tri County Land Cover Change: Circa 1800 Vegetation to 2006 Landcover (acres)

Cover Type	Ingham Circa 1800	Ingham 2006	Percent Change
Beech-Sugar Maple Forest	176,000	9,600	↓ 96%
Oak- Forest/ Oak Savanna & Black Oak Barren	102,300	11,400	↓ 98%
Mixed Conifer Swamp	35,300	600	↓ 98%
Mixed Hardwood Swamp/ Black Ash Swamp	16,800	23,700	↓ 32%
Shrub/ Emergent Wetland	26,100	19,200	↑ 10%
Lake/River	2,200	2,100	0%

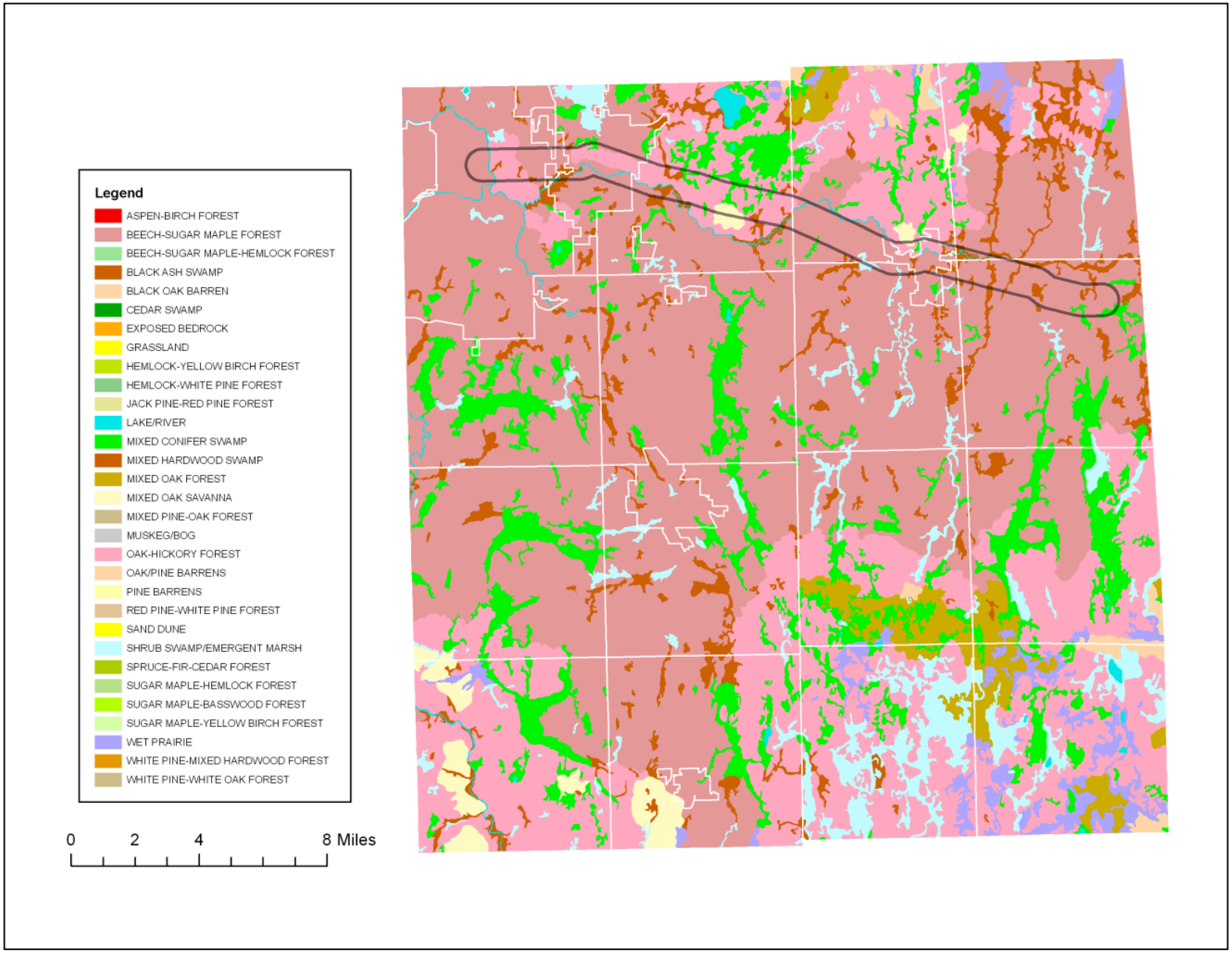

Figure 2. Circa 1800 vegetation of Ingham County.

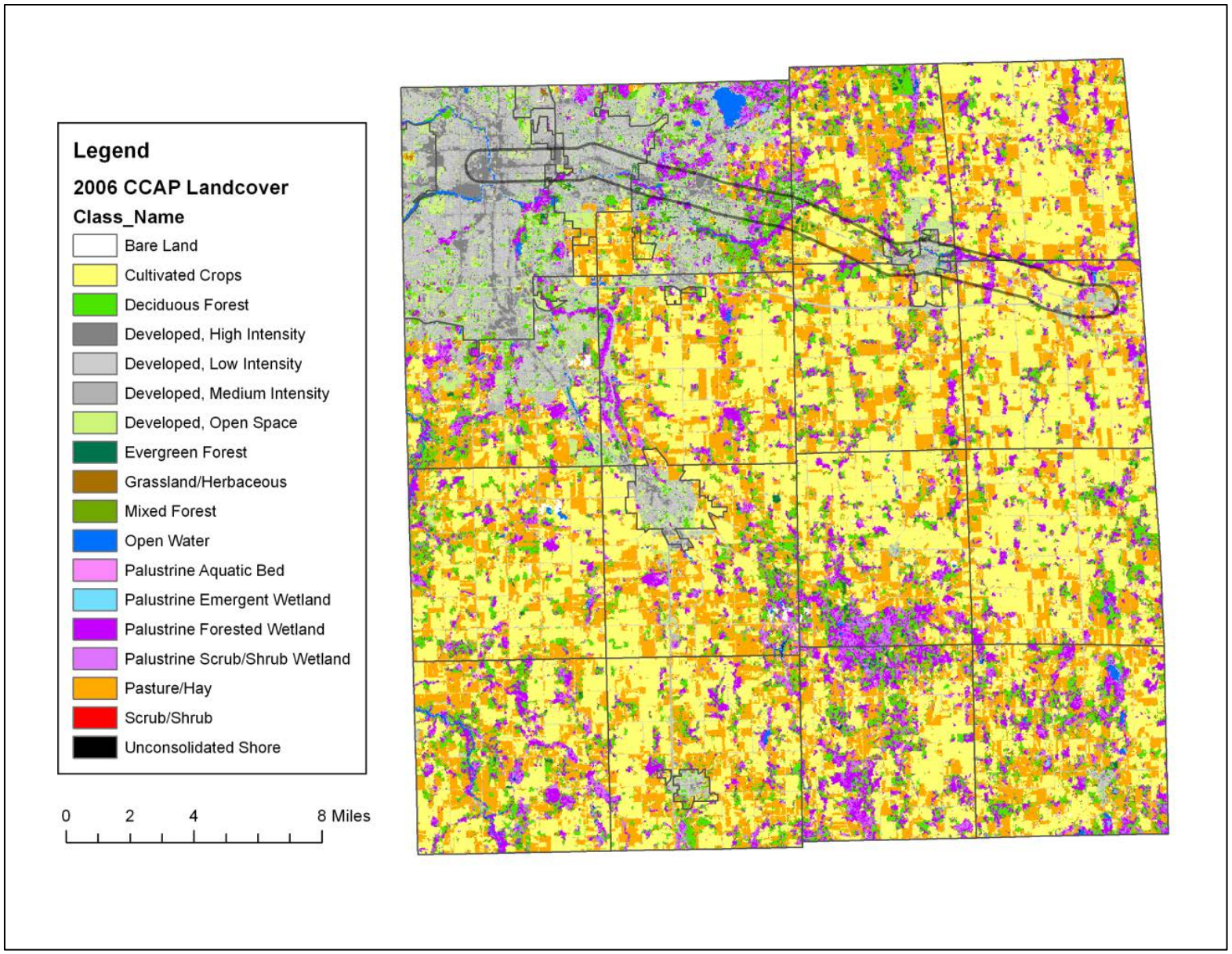

Figure 3. Circa 2006 Landcover of Ingham County.

BRT Corridor Land Cover Change

The BRT Corridor is approximately 13,446 acres in size running 20 miles from the Capitol on Michigan Avenue east to the town of Webberville. Similar to the Tri-County land cover change, the Corridor has undergone a tremendous amount of land use modification starting when the Europeans first settled the area in the mid-1800s. In fact, the Corridor runs along the area with the highest amount of urbanization in the entire Tri-County region.

Despite the high amount of urbanization that has occurred primarily since the 1950s, the corridor still contains a modest amount of natural habitat. As depicted in Table 3, beech-sugar maple forest was the most common cover type followed by oak forest. Wetlands, such as mixed conifer swamp, mixed hardwood swamp, and shrub/ emergent wetlands were found in scattered depressions in between the upland forests, and along the Red Cedar River floodplain.

The biggest losses of natural land cover in the corridor occurred in the upland forest types of beech-sugar maple forest and oak-forest, which lost 93% and 90% respectively (Table 3; Figures 4,5,and 6). These upland forests were first cleared for their superior timber value and later farmed, particularly the beech-sugar maple forests which had richer, more mesic soils. Mixed conifer swamp also experienced a steep decline, losing 92% of its original coverage from the mid 1800s (Figures 7,8, and 9).

Table 3. BRT corridor land cover change: Circa 1800 vegetation to 2006 land cover (acres)

Cover Type	BRT Corridor Circa 1800	BRT Corridor 2006	Percent Change
Beech-Sugar Maple Forest	7,575	566	↓ 93%
Oak- Forest/ Oak Savanna & Black Oak Barren	3,841	391	↓ 90%
Mixed Conifer Swamp	502	40	↓ 92%
Mixed Hardwood Swamp	1,167	800	↓ 32%
Shrub Swamp/ Emergent Wetland	70	760	↑ 1085%
Lake/River	290	244	↓ 16%

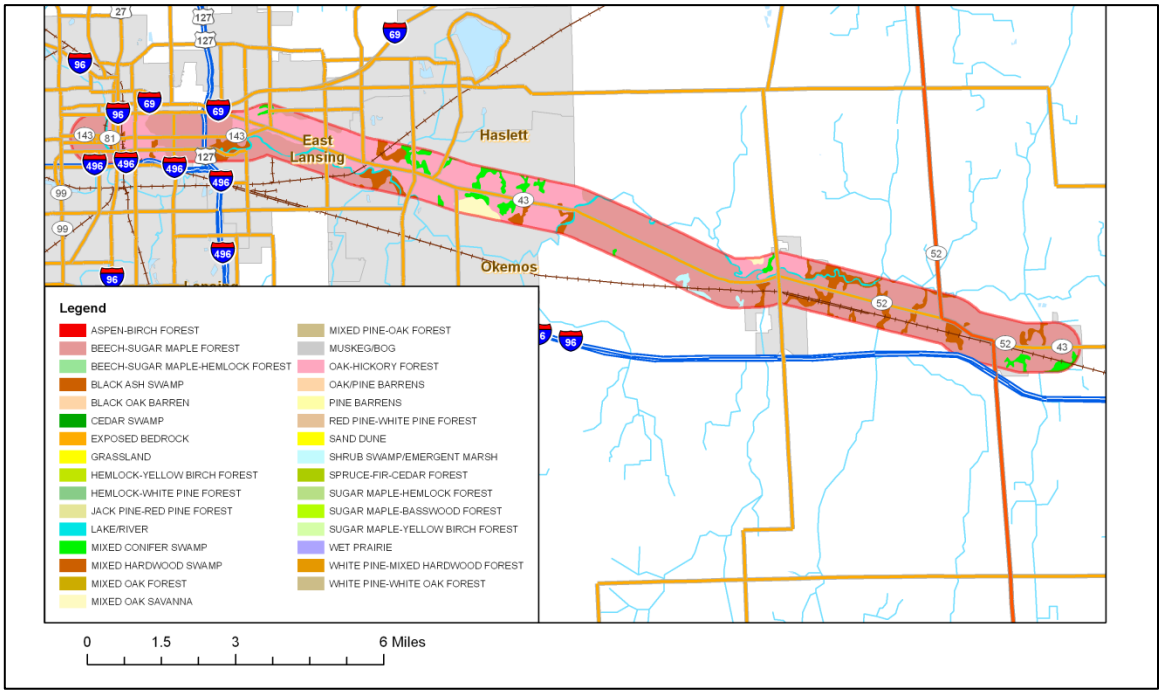

Figure 4. Circa 1800 Vegetation within the BRT Corridor.

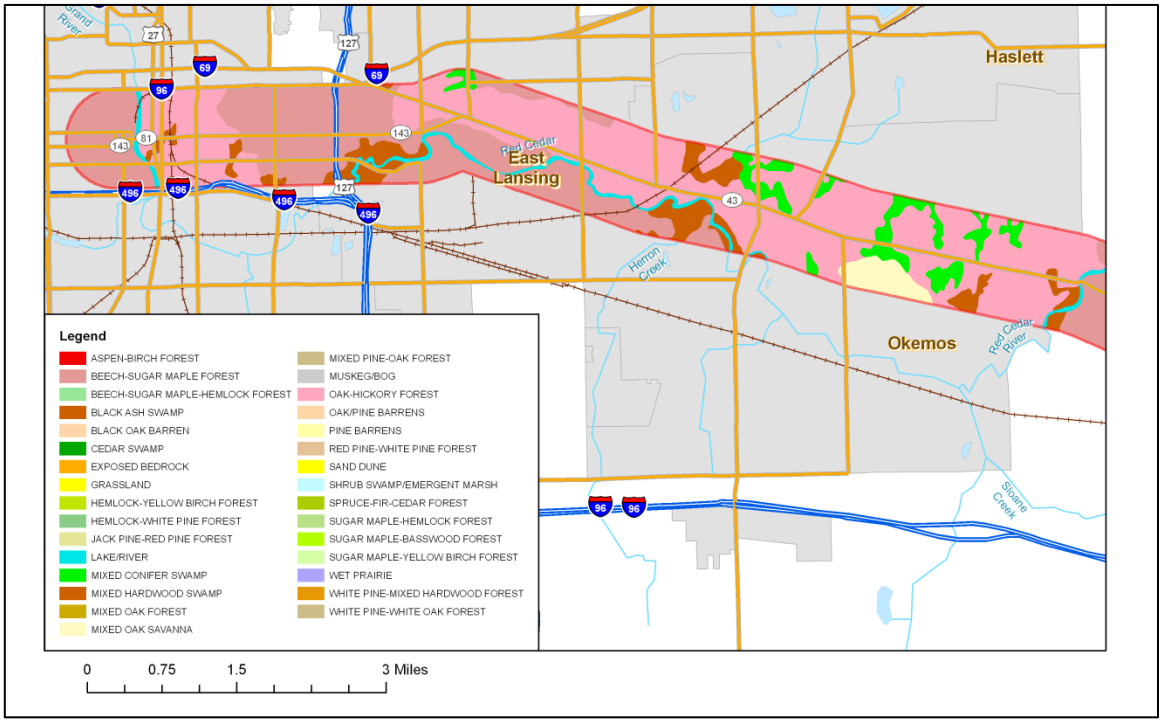

Figure 5. Circa 1800 Vegetation within the west portion of the BRT Corridor.

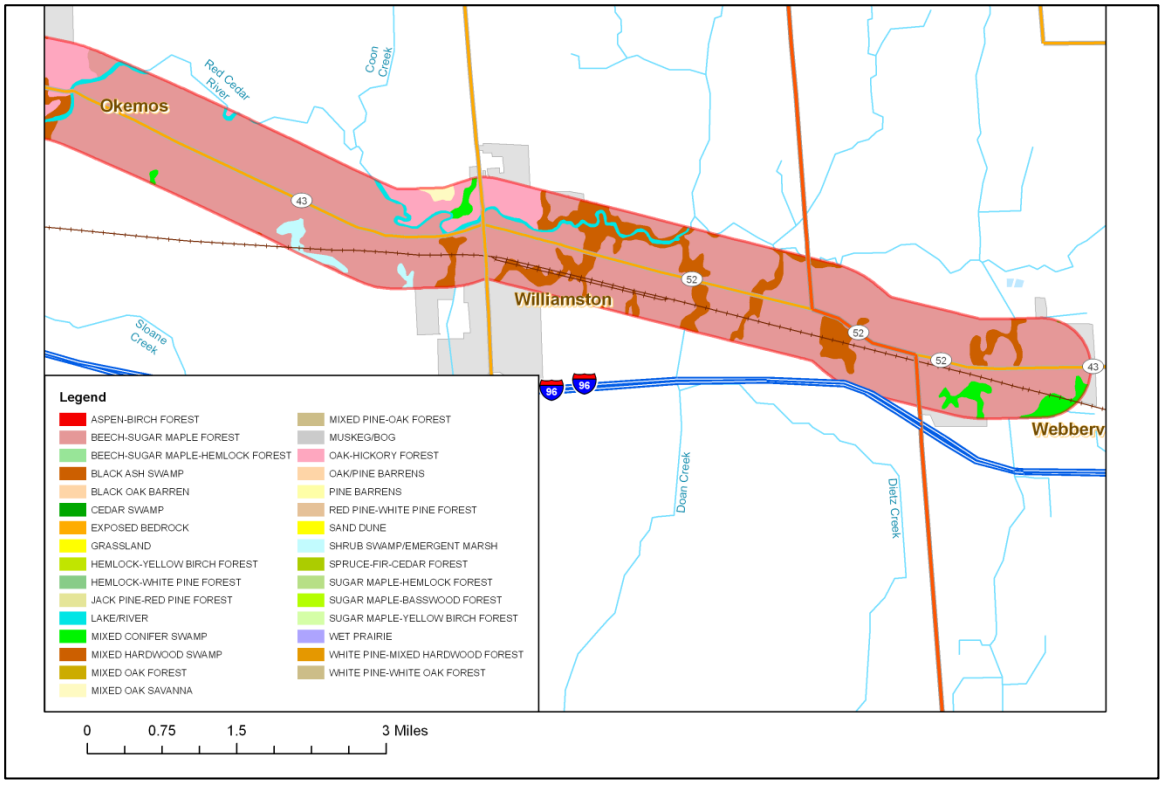

Figure 6. Circa 1800 Vegetation within the east portion of the BRT Corridor

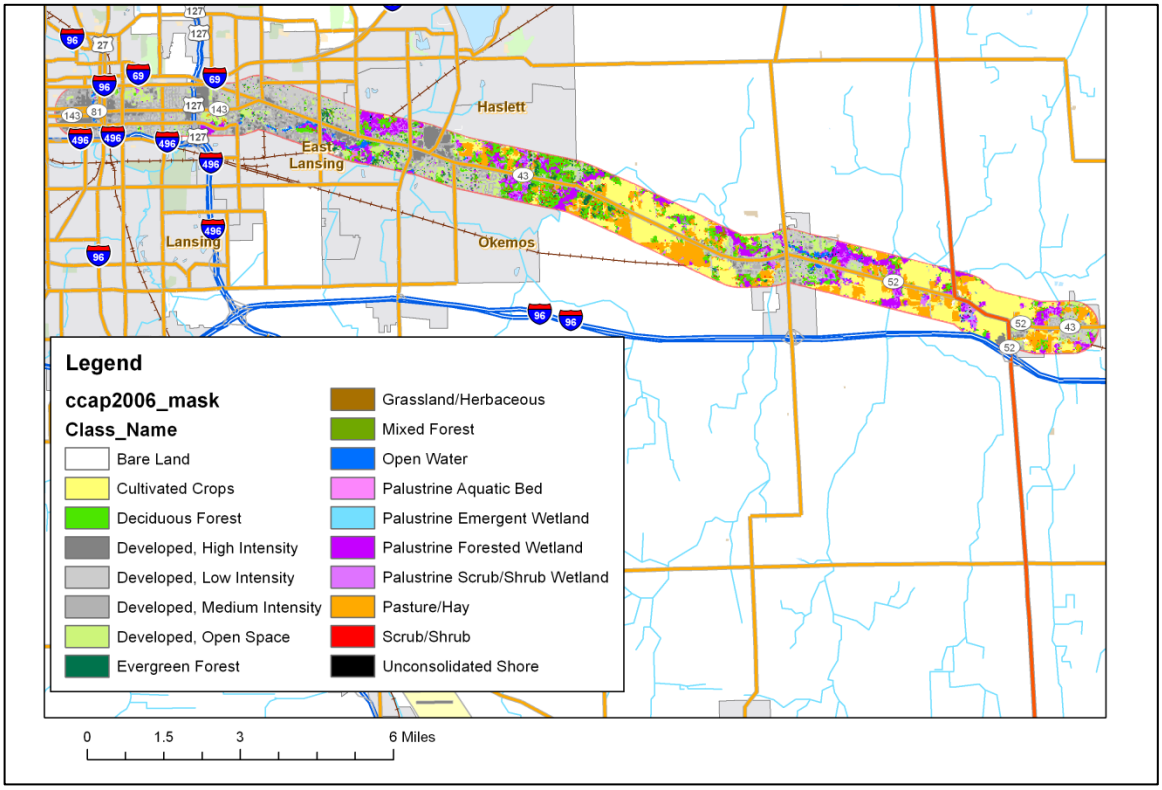

Figure 7. Circa 2006 Land Cover within the BRT Corridor.

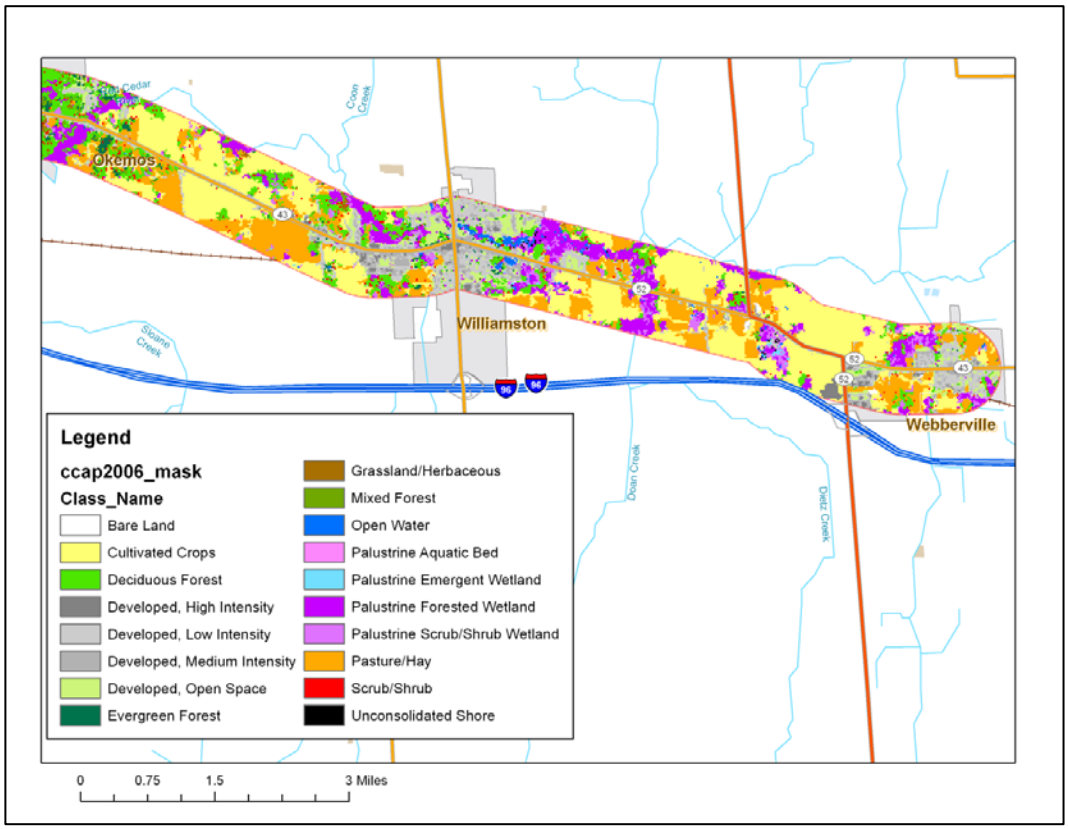

Figure 8. Circa 2006 Land Cover within the east portion of the BRT Corridor

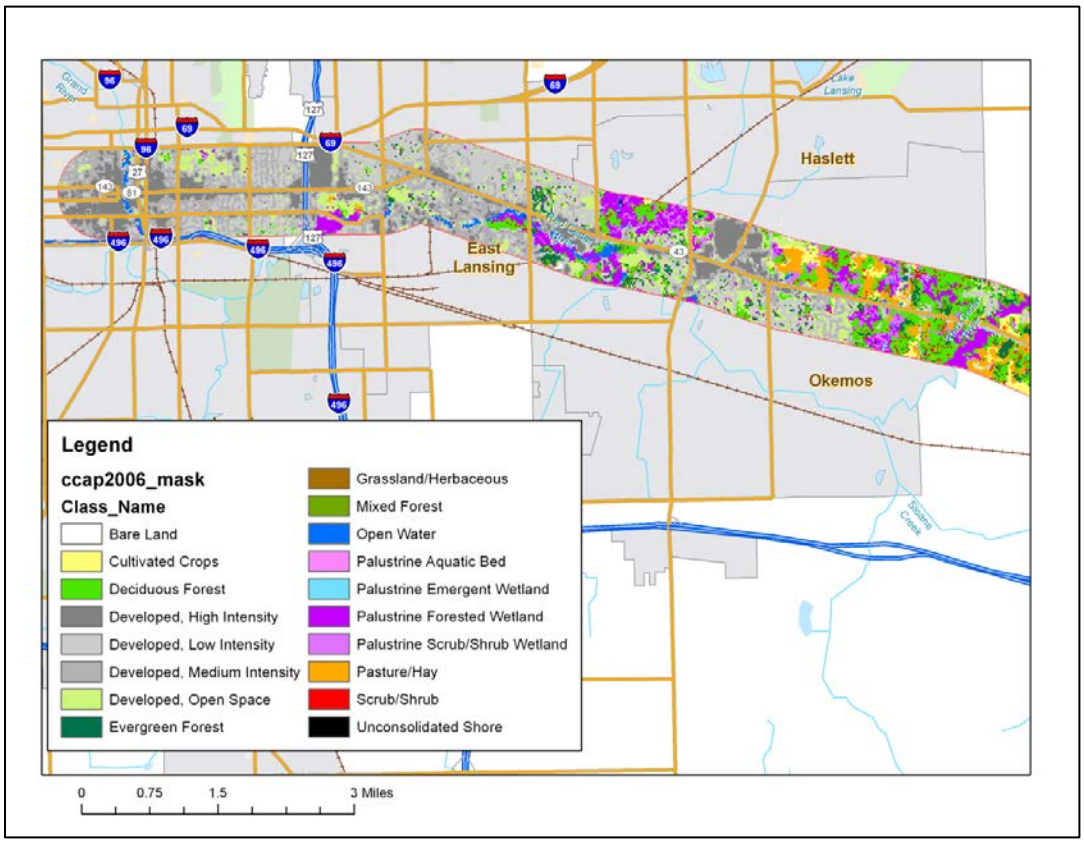

Figure 9. Circa 2006 Land Cover within the west portion of the BRT Corridor.

3. Plant and Natural Community Surveys

Introduction

Based on the land cover change results from the first chapter, it was apparent that the best opportunities for discovering and documenting high quality natural communities and/or rare plant species would occur in the two forest types with the most remaining acreage: beech-sugar maple forest (or mesic southern forest) in the uplands, and hardwood swamp forest in the lowlands, primarily along the Red Cedar floodplain. Although there is also a relatively high number of acres for shrub swamp, most of these areas likely developed after the forested wetlands were cleared and or drained. The best remaining remnants of mesic southern forest primarily occur near the floodplain of the Red Cedar River. Mixed hardwood swamp occurs in two different forms in the study area: southern hardwood swamp and southern floodplain forest. Based on our experience, the more intact of these two wetland types is typically southern floodplain forest in the southern portion of the Lower Peninsula. Pulling all of this information together, it was determined that mesic southern forest, southern hardwood swamp, and southern floodplain forest were our targeted natural community types for the two year survey effort (2013-2014). In particular, we targeted what appeared to be the most intact sites along the Red Cedar River corridor.

Methods

As a first step, we analyzed the Potential Conservation Areas (PCAs) identified in a previous effort by Paskus, et al. (2008). PCAs are based on remote sensed data and ecological principles to identify sites that have varying levels of potential for containing unique and/or high quality natural features. A total of 33 PCAs fell within the BRT Corridor and made the first cut for targeted floristic and natural community surveys. Of these, 10 occurred within or adjacent to the Red Cedar River floodplain, while 23 occurred in isolated wetland and upland pockets.

Since PCAs are primarily based on remote sensed data and the highest priority PCAs tend to be large in size, additional methods are employed to further discern where the best natural areas are within these PCAs. To help identify the most intact natural areas within these priority PCAs, digital circa 1938 aerial photographs were secured from Remote Sensing Geographic Information System (RSGIS), Michigan State University and reviewed onscreen. Areas over several acres in size with natural vegetation (forest or wetland) were digitized using ArcGIS version 10.2 software. A total of 41 polygons were identified totaling 1,026 acres. Surprisingly, the natural lands in 1938 within the 22 mile long BRT Corridor represented only 7.6% of the landscape (Figure 10). The vast majority of land was already converted to agriculture by 1938 with the remaining lands converted to urban use primarily along the Grand River Avenue corridor. Using this information, large to moderately sized natural areas with large tree canopies (signifying old mature trees) that were buffered by blocks of contemporary natural land cover within priority PCAs were highlighted for targeted plant and natural community surveys. In addition, natural community and plant species element occurrence records from the MNFI natural heritage database (2014) were reviewed to highlight old records in need of updating and to further guide our survey efforts.

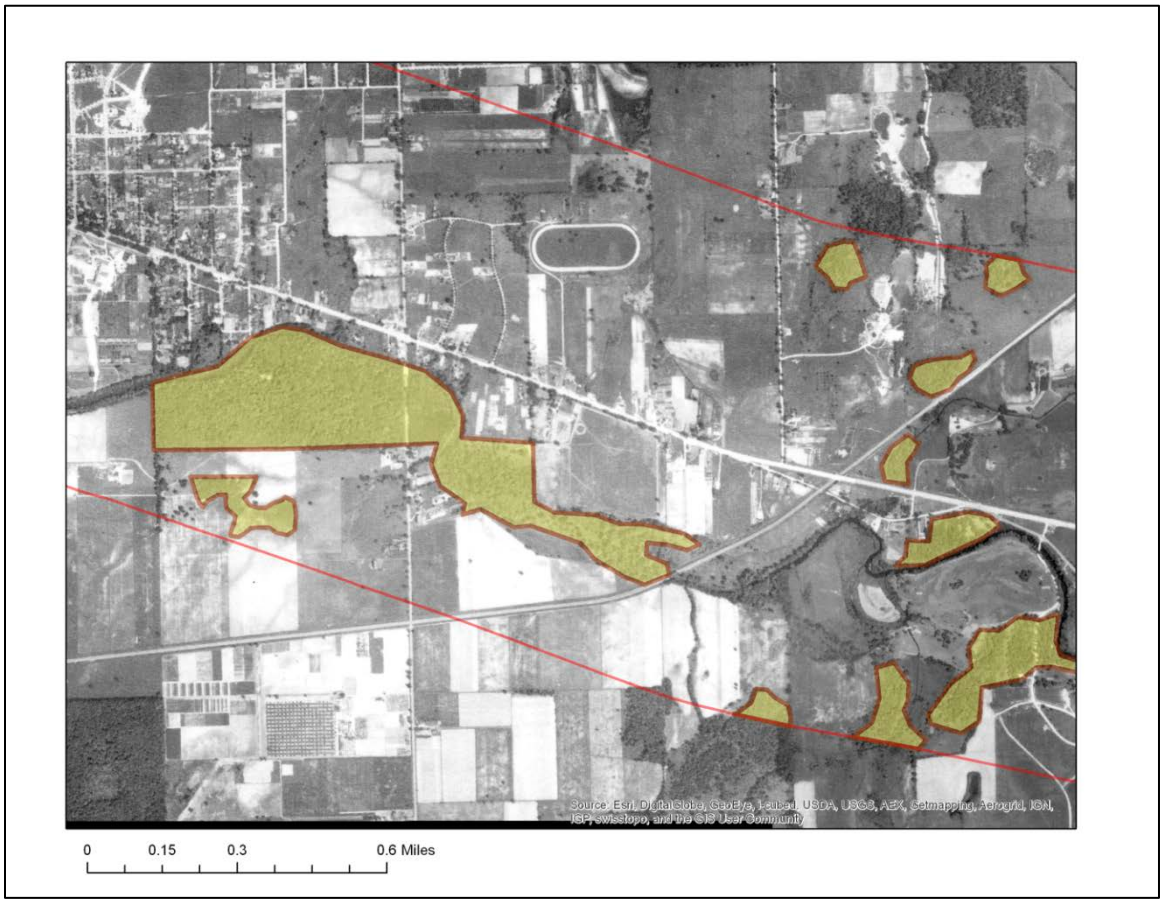

Figure 10. Example of circa 1938 natural land cover patches within the BRT Corridor.

Ecological Surveys

The BRT Corridor (and all associated natural lands) occurs on the Lansing Till Plain, a broad, gently rolling end moraine centered in the Lansing region. This vast ground moraine comprises the largest ecoregion in the southern Lower Peninsula (Albert 1995). It was created as the Wisconsinan glaciers advanced and retreated over the area numerous times, leaving behind a mixture of soil types and rocky debris called glacial till. The majority of the ground moraine in the Greater Lansing area is characterized by rich, loamy soils that have mostly been converted to agriculture. The Red Cedar River flows 51 miles in a westerly direction through the ground moraine, originating in southeastern Livingston County, and ending at the confluence of the Grand River in Lansing. Sites targeted for ecological surveys are primarily characterized by floodplain forest with associated patches of mesic southern forest and dry-mesic southern forest on the better drained soils. Sites with small end moraines within the till plain are hillier and support numerous ice block depressions such as the small bogs and southern wet meadows found in the Meridian Township portion of the corridor.

MNFI biologists conducted ecological surveys at nine of the targeted PCAs over the two year survey period from 2013-2014. Biologists conducted meander searches at each site to document native and non-native plant species during the growing season. Since the majority of plants associated with floodplain forests and mixed hardwood swamps are recognizable at the peak of

the growing season, surveys were conducted between early June and mid-September. GPS Points were taken for each population of a rare plant species encountered in the field. Natural community boundaries were delineated on aerial photographs while in the field. Animal surveys were not a part of this study and therefore no animal surveys of any kind were conducted.

Ecological information collected within these nine PCAs located within the BRT Corridor were organized into eight site ecological summaries: 1) Sanford Woods in East Lansing; 2) Ferguson Park in Meridian Township; 3) Van Atta Road Natural Area in Meridian Township; 4) Davis/Foster Preserve in Meridian Township; 5) Ted Black Woods in Meridian Township; 6) Williamston East in the city of Williamston, and Williamston, Locke, and Leroy Townships; 7) Dietz Rd. in Locke and Leroy Townships; and 8) Perry Rd. West in Locke and Leroy Townships (Figure 11). Ecological summaries for each of these eight sites are provided in this report.

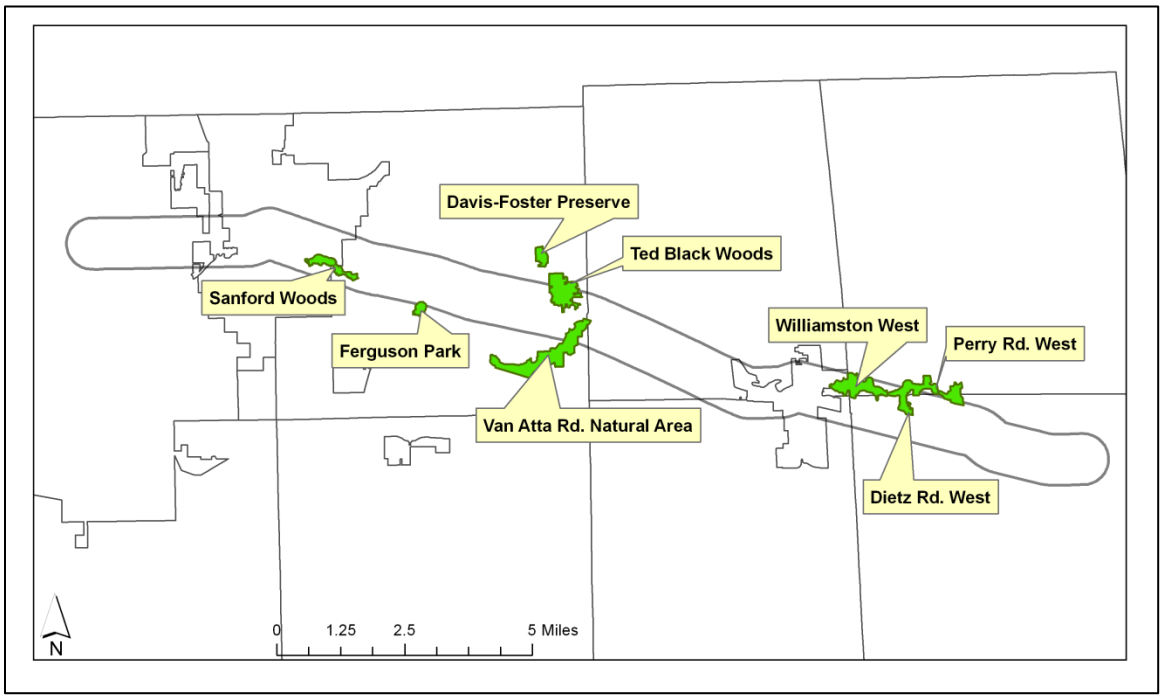

Figure 11. Sites surveyed for plants and natural communities within the BRT Corridor during the 2013 and 2014 growing seasons.

Site Ecological Summaries

The site ecological summaries following this section provide brief synopses of the natural characteristics of each of the eight sites with an emphasis on natural communities and their associated native and non-native plant species. Each summary begins with information about the size, location, ownership, and Potential Conservation Areas of each site. The written portion of the summary consists of several sections containing pertinent information about the site and its natural features: 1) Site Location with directions on how to reach the site, 2) General Site Description that includes information on natural communities, associated plants, and rare plant populations, 3) Ecological Significance, 4) Disturbance and Threats, and 5) Stewardship Considerations. A map of each site with natural community boundaries and several digital photographs of natural communities and rare plant species are also included.

Table 4. Rare plant species with extant element occurrence records in the Tri-County region. State status, global and state ranks, and number of element occurrences (EOs) are listed.

Common Name	Scientific name	State Status[2]	Global Rank[3]	State Rank[4]	No. EOs
Rock cress	*Boechera dentata*	T	G5	S1	1
Gray birch	*Betula populifolia*	SC	G5	S3	1
Davis's sedge	*Carex davisii*	SC	G4	S3	2
Cat-tail sedge	*Carex typhina*	T	G5	S1	2
American chestnut	*Castanea dentata*	E	G4	S1S2	2
Beak grass	*Diarrhena obovata*	T	G4G5	S2	5
Green violet	*Hybanthus concolor*	SC	G5	S3	1
Goldenseal	*Hydrastis canadensis*	T	G4	S2	3
Twinleaf	*Jeffersonia diphylla*	SC	G5	S3	4
Red mulberry	*Morus rubra*	T	G5	S3	1
Ginseng	*Panax quinquefolius*	T	G3G4	S2	3
Cup-plant	*Silphium perfoliatum*	T	G5	S2	1
Snow trillium	*Trillium nivale*	T	G4	S2	1

[2]E – endangered; T – threatened; and SC – special concern.
[3]G1-critically imperiled; G2-imperiled; G3-vulnerable; G4-apparently secure; G5-secure; GNR-not ranked.
[4]S1-critically imperiled; S2-imperiled; S3-vulnerable; S4-apparently secure; S5-demonstrably secure; SU-possibly in peril, but status uncertain.

Table 5. Historical and extirpated rare plant species in the Tri-County region.
State status, global and state ranks, and number of element occurrences (EOs) are listed.

Common Name	Scientific name	State Status[2]	Global Rank[3]	State Rank[4]	No. EOs
Raven's-foot sedge	*Carex crus-corvi*	E	G5	SH	1
False hop sedge	*Carex lupuliformis*	T	G3G4	S2	2
Hairy-fruited sedge	*Carex trichocarpa*	SC	G4	S2	2
Small-fruited panic-grass	*Dichanthelium microcarpon*	SC	G5T5	S2	1
Showy orchis	*Galearis spectabilis*	T	G5	S2	7
Whorled pogonia	*Isotria verticillata*	T	G2G3	S2	1
Broad-leaved puccoon	*Lithospermum latifolium*	SC	G4	S2	1
Virginia water-horehound	*Lycopus virginicus*	T	G5	S2	1
Virginia bluebells	*Mertensia virginica*	E	G5	S2	1
Heart-leaved plantain	*Plantago cordata*	E	G4	S1	1
Bog bluegrass	*Poa paludigena*	T	G3	S2	2
Goosefoot corn-salad	*Valerianella chenopodiifolia*	T	G5	S1	1

[2]E – endangered; T – threatened; and SC – special concern.
[3]G1-critically imperiled; G2-imperiled; G3-vulnerable; G4-apparently secure; G5-secure; GNR-not ranked.
[4]S1-critically imperiled; S2-imperiled; S3-vulnerable; S4-apparently secure; S5-demonstrably secure; SU-possibly in peril, but status uncertain.

Site Ecological Summary: Sanford Woods

Size:	86 acres
Location:	Ingham County, East Lansing
Ownership:	Michigan State University/partially private on east side of Hagadorn
PCA:	#1238, score 11, High; #1229, score = 8, Moderate

LOCATION OF SITE:
Sanford Woods is located along the Red Cedar River in East Lansing on the northeast corner of Michigan State University, just south of Grand River Avenue. Hagadorn Road runs north and south and bisects the site. Access points with public parking: Sanford Woods is open to the general public; however, there is no public parking at the site. A pathway that runs parallel to the Red Cedar River is located on the south side of the river and winds through a portion of the site. Public parking can be found at various locations in East Lansing and on campus.

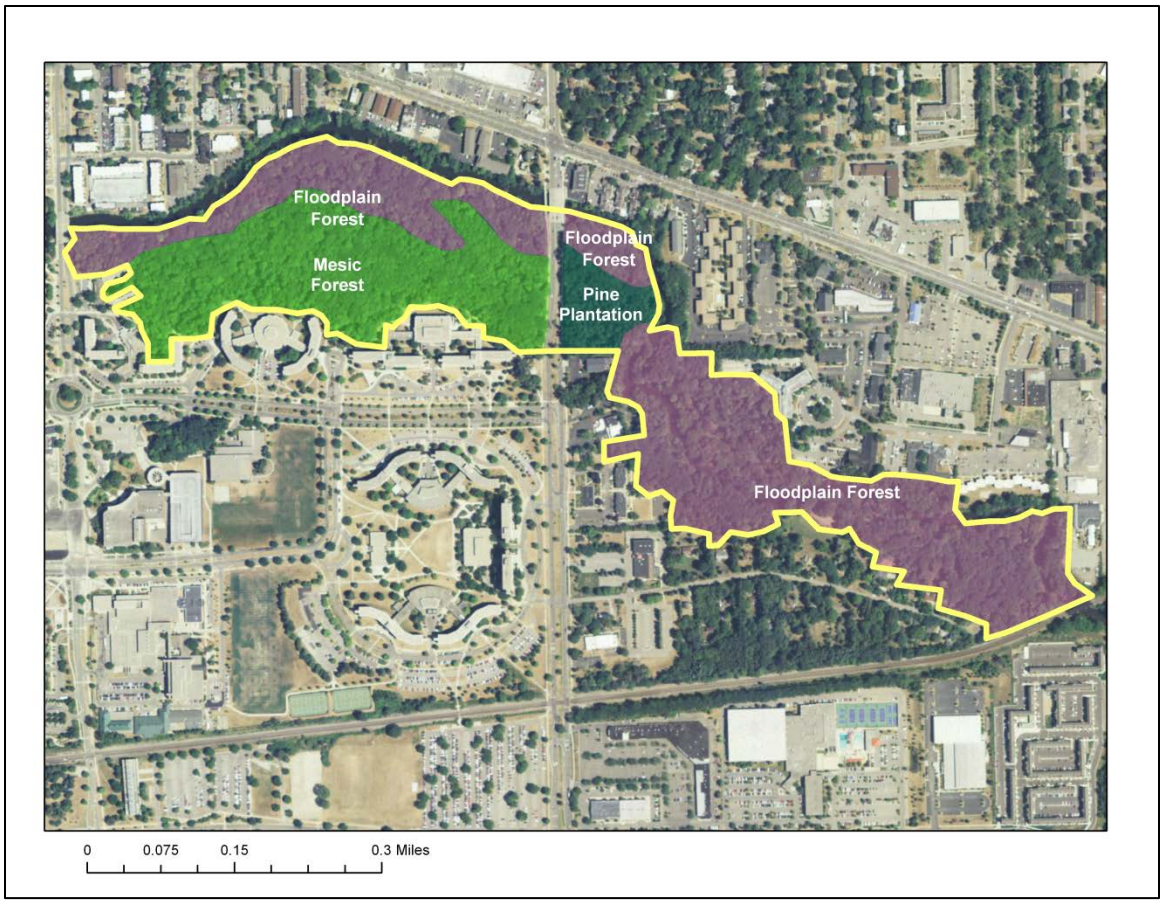

Figure 12. Site boundary and associated natural community patches.

GENERAL SITE DESCRIPTION:
Sanford Woods is located along a portion of the floodplain of the Red Cedar River. The site is bordered to the north by Grand River Avenue development and to the south by Michigan State University buildings and infrastructure.

Mesic Southern Forest
The vegetation of the site is primarily characterized by mature, locally disturbed mature southern forest (Beaman 1970a). The overstory of the mesic southern forest is strongly dominated by sugar maple (*Acer saccharum*), associated with American beech (Fagus grandifolia), basswood (Tilia americana), and red oak (Quercus rubra). Prior to the introduction of elm blight and emerald ash borer, American elm (*Ulmus americana*) and white ash (*Fraxinus americana*) were important canopy associates. Sugar maple saplings are common in the understory, which also supports red elderberry (*Sambucus racemosa*), choke cherry (*Prunus virginiana*), witch-hazel (*Hamamelis virginiana*), hop-hornbeam (*Ostrya virginiana*), and spicebush (*Lindera benzoin*). The diverse, dense ground layer is characterized by tree seedlings, especially sugar maple and white ash, Virginia creeper (*Parthenocissus quinquefolia*), blue cohosh (*Caulophyllum thalictroides*), Jack-in-the-pulpit (*Arisaema triphyllum*), false spikenard (*Maianthemum racemosum*), white baneberry (*Actaea pachypoda*), enchanter's-nightshade (*Circaea canadensis*), large white trillium (*Trillium grandiflorum*), bloodroot (*Sanguinaria canadensis*), bluestem goldenrod (*Solidago caesia*), and several sedges (*Carex* spp.).

Floodplain Forest
Downslope (north) towards the Red Cedar River, the mesic southern forest gradually gives way to floodplain forest in the immediate vicinity of the river. Black maple (*Acer nigrum*) is important in this area, associated with the aforementioned species, and a few individuals of bur oak (*Quercus macrocarpa*), white oak (*Q. alba*), and sycamore (*Platanus occidentalis*). Floodplain shrubs increase in importance in this zone, characterized especially by spicebush, bladdernut (*Staphylea trifolia*), and musclewood (*Carpinus caroliniana*). Common ground layer species, in addition to those listed above, include wild-ginger (*Asarum canadense*), honewort (*Cryptotaenia canadensis*), white bear sedge (*Carex albursina*), pretty sedge (*C. woodii*), green-stemmed Joe-pye-weed (*Eutrochium purpureum*), Virginia waterleaf (*Hydrophyllum virginianum*), black snakeroot (*Sanicula odorata*), and bottlebrush grass (*Elymus hystrix*).

Sanford Woodlot supports a limited first bottom, dominated by silver maple (*Acer saccharinum*), with spicebush and bladdernut in the understory. Characteristic ground layer species include lizard's-tail (*Saururus cernuus*), poison-ivy (*Toxicodendron radicans*), moneywort (*Lysimachia nummularia*), calico aster (*Symphyotrichum lateriflorum*), riverbank grape (*Vitis riparia*), sensitive fern (*Onoclea sensibilis*), white grass (*Leersia virginica*), and wood nettle (*Laportea canadensis*).

The forested area east of Hagadorn Road, directly adjacent to Sanford Woodlot, is significantly disturbed by historic land use (presumably including agriculture), adjacent infrastructure, and invasive species. The upper (southern) portion of this area is known as the Beal Pinetum, and consists primarily of a supercanopy of white pine (*Pinus strobus*) established in the late 1800s, with an understory of sugar maple and black cherry (*Prunus serotina*). The shrub layer and ground layer in this area is relatively bare, and supports several weedy species, including the pernicious black swallow-wort (*Vincetoxicum nigrum*). The broad lower floodplain is also characterized by a weedy shrub and ground flora, including common privet (*Ligustrum vulgare*), Amur honeysuckle (*Lonicera maackii*), common buckthorn (*Rhamnus cathartica*), ground-ivy (*Glechoma hederacea*), moneywort, and reed canary grass (*Phalaris arundinacea*).

Figure 13. View of Floodplain Forest.

Figure 14. Bugle weed (state threatened).

Figure 15. Goldenseal (state threatened).

Rare Plants
Sanford Woodlot is known to have supported six state-listed plant species. Three of these were redocumented in 2013. Beak grass (*Diarrhena obovata*) is a state-threatened grass found primarily in relatively undisturbed floodplain forests in southern Lower Michigan. Several small colonies on mesic terraces and levees on both sides of Hagadorn Road were documented during the 3 July 2013 survey. Bugle weed (*Lycopus virginicus*) is a state-threatened member of the mint family known from fewer than a dozen sites in Michigan. This species, previously documented in the 1960s, was documented in the first bottom in Sanford Woods and the floodplain east of Hagadorn Road on 5 September 2013. A small colony of the state-threatened goldenseal (*Hydrastis canadensis*), last documented from Sanford Woodlot in 1968, was also located on this date. Three additional species are known from historic records. The state special concern green violet (*Hybanthus concolor*) is known to persist in this forest but was not redocumented in 2013. The state threatened red mulberry (*Morus rubra*) and ginseng (*Panax quinquefolius*) have also been documented from Sanford Woodlot, but were not encountered during our surveys. However, there is a possibility these species remain extant, although they were apparently always rare and local within the forest (Beaman 1970b). Please refer to Appendix A for the floristic quality assessment and a full plant species list.

ECOLOGICAL SIGNIFICANCE:
Sanford Woods supports the highest quality mesic southern forest of all sites surveyed. This patch of forest is also one of the highest quality mesic southern forests in the tri-county region. Due to the vast extent of high density development in this portion of the Tri-County region, Sanford Woodlot is also critical for mitigating negative water quality impacts from non-point source runoff that occurs in other parts of the Red Cedar River. It is also an important site for numerous wildlife species and viewing opportunities, particularly for neo-tropical migratory songbirds during spring migration. Sanford Woodlot supports a species-rich, relatively intact flora (Beaman 1970b) that makes the site attractive for biological training and research.

DISTURBANCE & THREATS:
The most significant threat facing this site is invasive species and incompatible recreational impacts. Trampling along and near trails, disposal of refuse, and construction of tepees within the forest have locally degraded the site. White-tailed deer (*Odocoileus virginanus*) browse was also noted, especially within the floodplain. Several invasive shrubs are present at Sanford Woods, including Norway maple (*Acer platanoides*), Amur honeysuckle, common privet, common buckthorn, Japanese barberry (*Berberis thunbergii*), black swallow-wort, English ivy (*Hedera helix*), dame's rocket (*Hesperis matronalis*), garlic mustard (*Alliaria petiolata*), ground-ivy, and moneywort. Invasive species are particularly prevalent along the first bottom and levee of the Red Cedar River.

STEWARDSHIP CONSIDERATIONS:
Invasive Species Control: Treatment and monitoring of invasive plant species is the primary stewardship concern. Targeted removal of invasive species, particularly woody species that have altered vegetation structure and composition, should be implemented.

Habitat Protection: The majority of the site surveyed is a Category 1 MSU natural area and is protected from development, resource extraction, and other potentially damaging human activities. However, the majority of the site east of Hagadorn is in private ownership. These owners should be contacted to explore the possibility of placing a conservation easement on their natural lands within the Red Cedar floodplain.

Controlling Deer Herbivory: The impacts of white-tailed deer should be monitored to determine if browse and other activity is negatively impacting successional processes, reducing populations of browse-sensitive plant species, and facilitating the spread of non-native invasive plant species.

Site Ecological Summary: Ferguson Park

Size:	33 acres
Location:	Ingham County, Meridian Township
Ownership:	Meridian Township
PCA:	# 1188, score = 9 (Moderate)

LOCATION OF SITE:
Ferguson Park is located along the Red Cedar River in Meridian Township, south of Grand River Avenue and east of Okemos Road. Ferguson Park is open to the general public, and public parking is available on site. Several pathways have been created near the Red Cedar River on the south side of the river and wind through the majority of the site.

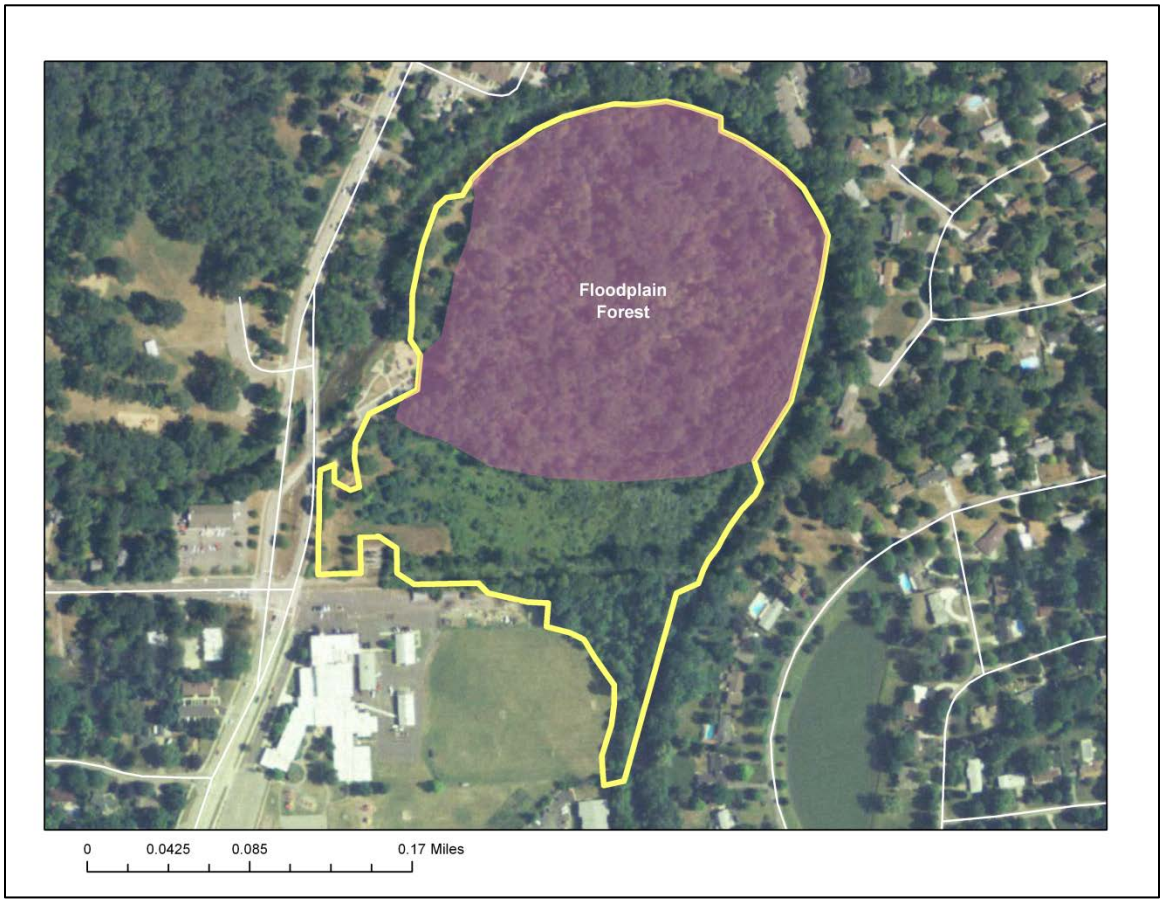

Figure 16. Site boundary with associated natural community patches.

GENERAL SITE DESCRIPTION:
Ferguson Park is located along a portion of the floodplain of the Red Cedar River. The site is bordered to the east, north, and west by the river. The south portion of the site is bordered by commercial and residential development.

Floodplain Forest
Ferguson Park proper is fully developed with a lawn and recreational facilities. The larger adjacent Sumbal Natural Area consists primarily of disturbed wet-mesic floodplain forest, with a large, central, seasonally inundated backswamp. The floodplain forest is dominated by silver maple (*Acer saccharinum*), associated with green ash (*Fraxinus pennsylvanica*; mostly dead due to emerald ash borer infestation), box-elder (*Acer negundo*), slippery elm (*Ulmus rubra*), cottonwood (*Populus deltoides*), and hackberry (*Celtis occidentalis*). The weedy shrub layer is dominated by Amur honeysuckle (*Lonicera maackii*) and common privet (*Ligustrum vulgare*), associated with several other native and non-native species, including poison-ivy (*Toxicodendron radicans*), riverbank grape (*Vitis riparia*), Morrow honeysuckle (*Lonicera morrowii*), multiflora rose (*Rosa multiflora*), common buckthorn (*Rhamnus cathartica*), and European highbush-cranberry (*Viburnum opulus*). The diverse, dense ground layer is characterized by wood nettle (*Laportea canadensis*), Gray's sedge (*Carex grayi*), Muskingum sedge (*C. muskingumensis*), hop sedge (*C. lupulina*), wild-rye (*Elymus* spp.), white avens (*Geum canadense*), fowl manna grass (*Glyceria striata*), and green dragon (*Arisaema dracontium*). The non-native invasive species moneywort (*Lysimachia nummularia*) and ground-ivy (*Glechoma hederacea*) are locally abundant. The large central backswamp area is sparsely vegetated.

The floodplain forest along and near the immediate riverbank is heavily disturbed by historic clearing and road construction, and now consists primarily of cottonwood, red oak (*Quercus rubra*), and a dense understory of Amur honeysuckle and common privet.

Rare Plants
During the 2013 surveys, populations of three state-listed plants were newly documented from Sumbal Natural Area. The state special concern Davis' sedge (*Carex davisii*) was an important ground layer species, forming dense colonies in open wet-mesic floodplain forest, including areas where emerald ash borer has killed canopy ashes. The state-threatened beak grass (*Diarrhena obovata*) was locally common in both open and closed-canopy floodplain forest, including degraded areas along the riverbank, sometimes in dense shade of Amur honeysuckle. The state-threatened bugle weed (*Lycopus virginicus*) was occasional in wet-mesic floodplain forest, particularly at the margins of the large central seasonally inundated backswamp. Please refer to Appendix B for the floristic quality assessment and a full plant species list.

ECOLOGICAL SIGNIFICANCE:
Due to the vast extent of high density development in this portion of the Tri-County region, Ferguson Park is critical for mitigating negative water quality impacts from non-point source runoff that occurs in other parts of the Red Cedar River. It is also potentially a valuable site for numerous wildlife species and viewing opportunities, particularly for neo-tropical migratory songbirds during spring migration. Although the natural area is small and surrounded by development, it retains a rich vascular flora, including populations of three state-listed species: bugle weed (state threatened), American beakgrass (state threatened), and Davis' sedge (state special concern)

Figure 17. View of Floodplain Forest.

Figure 18. Beak grass (state threatened).

Figure 19. Davis' sedge (state special concern).

DISTURBANCE & THREATS:

The site is small and surrounded by development, resulting in significant edge effects, including windthrow (exacerbated by the recent deaths of ash trees due to emerald ash borer) and the establishment and spread of invasive plant species. In addition, the riverbank was apparently cleared in the past, and remnants of an old road or two-track surround the core forested area. Unfortunately, invasive species are present and locally dominant at Ferguson Park, particularly Amur honeysuckle, Morrow honeysuckle, and common privet. Other invasive species noted during surveys include European highbush-cranberry, multiflora rose, Japanese barberry (*Berberis thunbergii*), common buckthorn, reed canary grass (*Phalaris arundinacea*), moneywort, and ground-ivy.

STEWARDSHIP CONSIDERATIONS:

Invasive Species Control: The primary stewardship need is the treatment and monitoring of invasive plant species, particularly Amur honeysuckle and common privet, which are most prevalent along and directly adjacent to the river.

Habitat Protection: The site surveyed is a Meridian Township park and natural area and is protected from development and resource extraction.

Controlling Deer Population: The impacts of white-tailed deer should be monitored to determine if browse and other activity is negatively impacting successional processes, reducing populations of browse-sensitive plant species, and facilitating the spread of non-native invasive plant species.

Site Ecological Summary: Van Atta Road Natural Area

Size:	356 acres
Location:	Ingham County, Meridian Township
Ownership:	Meridian Township/some private
PCA:	#1177, score = 12 (High); # 1182, score = 17 (Very high)

LOCATION OF SITE:
Van Atta Road Natural Area is located along the Red Cedar River in Meridian Township, south of Grand River Avenue. Van Atta Road runs north and south and bisects the site into the east and west PCAs. Access points with public parking include the Harris Nature Center east of Van Atta Road, Legg Park west of Van Atta Road, and Eastgate Park west of Meridian Road. The Van Atta Road Natural Area is found on both sides of Van Atta Rd. and consists of four different areas: Red Cedar Natural Area (Riverdowns N.A.) and Legg Park west of Van Atta Road, and Harris Nature Center and Eastgate Park east of Van Atta Road. All four areas are open to the general public. A pathway that runs parallel to the Red Cedar River is located on the south side of the river and winds through the majority of the site.

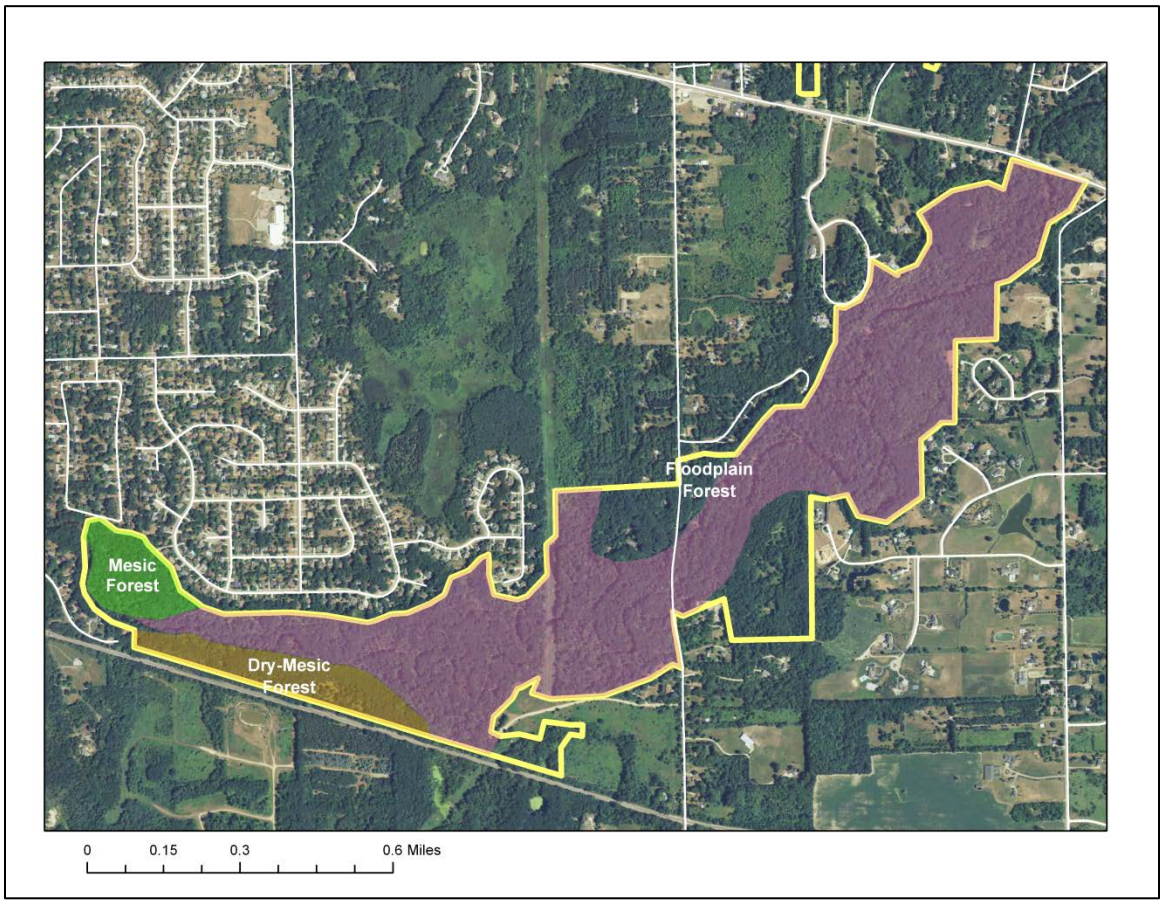

Figure 20. Site boundary with associated natural community patches.

GENERAL SITE DESCRIPTION:
The Van Atta Road Natural Area consists mostly of forested floodplain along the Red Cedar River, and includes adjacent uplands in several areas. The site is bordered to the north by medium density residential development and to the south by a railroad and additional medium density residential development.
Vegetation can be classified into three major natural community types: 1) floodplain forest; 2) mesic southern forest; and 3) dry mesic southern forest.

Floodplain Forest
The Van Atta Road Natural Area supports a diversity of fluvial landforms that support a variety of vegetative associations. Frequently (seasonally) flooded first bottoms, backswamps, and meander-scar swamps are dominated by silver maple (*Acer saccharinum*), associated with emerald ash borer-killed green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and box-elder (*Acer negundo*). These frequently inundated zones support a sparse understory and shrub cover. The ground layer ranges from sparse to dense, and supports species adapted to frequent floods such as poison-ivy (*Toxicodendron radicans*), lizard's-tail (*Saururus cernuus*), water dock (*Rumex verticillatus*), wood nettle (*Laportea canadensis*), green dragon (*Arisaema dracontium*), fringed loosestrife (*Lysimachia ciliata*), wild-rye (*Elymus* spp.), white grass (*Leersia virginica*), Gray's sedge (*Carex grayi*), hop sedge (*C. lupulina*), Muskingum sedge (*C. muskingumensis*), and wood gray sedge (*C. grisea*). Areas with persistent standing water support aquatic species such as southern water-plantain (*Alisma subcordatum*) and whorled loosestrife (*Decodon verticillatus*). Meander-scar swamps associated with abandoned river channels have seepage zones at their interface with terrace slopes, and support groundwater-dependent species such as skunk-cabbage (*Symplocarpus foetidus*) and lake sedge (*Carex lacustris*). Non-native invasive species such as moneywort (*Lysimachia nummularia*) and dame's-rocket (*Hesperis matronalis*) are locally abundant in first bottoms and backswamps.

Perhaps the most diverse forest assemblages occur in second bottoms that are less frequently or deeply inundated than the first bottoms and backswamps. These areas support a diverse array of canopy species, and are often dominated by black maple (*Acer nigrum*), associated with the aforementioned trees of the first bottoms in addition to basswood (*Tilia americana*), hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), bur oak (*Quercus macrocarpa*), swamp white oak (*Q. bicolor*), red oak (*Q. rubra*), and beech (*Fagus grandifolia*). American elm (*Ulmus americana*) and slippery elm (*U. rubra*) are commonly present in the understory. The shrub layer, which is denser and more diverse than in the first bottoms, supports bladdernut (*Staphylea trifolia*), spicebush (*Lindera benzoin*), musclewood (*Carpinus caroliniana*), choke cherry (*Prunus virginiana*), and a variety of non-native, invasive species, including common privet (*Ligustrum vulgare*), Amur honeysuckle (*Lonicera maackii*), common buckthorn (*Rhamnus cathartica*), and multiflora rose (*Rosa multiflora*). Vines are also common, represented by riverbank grape (*Vitis riparia*), poison-ivy, moonseed (*Menispermum canadense*), and Virginia creeper (*Parthenocissus quinquefolia*).

The herbaceous layer of the second bottoms is generally dense and diverse. Characteristic species including those listed above for the first bottom include wild-ginger (*Asarum canadense*), white avens (*Geum canadense*), jumpseed (*Persicaria virginica*), ostrich fern (*Matteucia struthiopteris*), purple meadow-rue (*Thalictrum dasycarpum*), large white trillium (*Trillium grandiflorum*), violets (*Viola* spp.), and Virginia waterleaf (*Hydrophyllum virginianum*).

Mesic Southern Forest and Dry-mesic Southern Forest
Abandoned terraces and terrace slopes that are no longer subject to fluvial erosion-and-deposition cycles generally support mesic southern forest dominated by sugar maple (*Acer saccharum*), beech, red oak, basswood, and black cherry (*Prunus serotina*). The understory supports beech and maple saplings, in addition to ironwood (*Ostrya virginiana*) and, especially on sandier soils, witch-hazel (*Hamamelis virginiana*). Common low shrubs include wild gooseberry (*Ribes cynosbati*) and running strawberry-bush (*Euonymus obovata*). The ground layer supports many of the species found on second bottoms, and also species more typical of uplands, such as false spikenard (*Maianthemum racemosum*), early meadow-rue (*Thalictrum dioicum*), downy Solomon seal (*Polygonatum pubescens*), and wild geranium (*Geranium maculatum*). Locally, such as at the western margin of Legg Park, upland risers and terraces approach dry-mesic southern forest, with greater importance of oaks and species of sandy soils, such as wild columbine (*Aquilegia canadensis*) and Canada mayflower (*Maianthemum canadense*).

Old Field
Portions of the Van Atta Road Natural Area support old fields primarily dominated by non-native species such as Kentucky bluegrass (*Poa pratensis*), quack grass (*Elymus repens*), timothy (*Phleum pratense*), smooth brome (*Bromus inermis*), Queen-Anne's-lace (*Daucus carota*), clovers (*Trifolium* spp.), black medick (*Medicago lupulina*), hoary alyssum (*Berteroa incana*), ox-eye daisy (*Leucanthemum vulgare*), and hawkweeds (*Hieracium* spp.). However, these open fields also support a diversity of native species, including tall goldenrod (*Solidago altissima*), ground-nut (*Apios americana*), grass-leaved goldenrod (*Euthamia graminifolia*), common milkweed (*Asclepias syriaca*), wild bergamot (*Monarda fistulosa*), and yellow avens (*Geum aleppicum*).

Rare Species
Of special note are several populations of three state-listed vascular plant species. Both the state-threatened beak grass (*Diarrhena obovata*) and state special concern Davis' sedge (*Carex davisii*) occur throughout the floodplain and are locally abundant or even co-dominant, the former primarily on shaded second bottoms and the latter in open, wet-mesic bottoms slightly elevated from the wettest areas. The Van Atta Road Natural Area populations are among the largest documented in the state. A third state-listed plant species, bugle weed (*Lycopus virginicus*), also occurs in scattered, sometimes large populations throughout the floodplain. Bugle weed is a state-threatened member of the mint family known from fewer than a dozen sites in Michigan. This species favors the margins of first bottoms and backswamps. The population(s) at Van Atta Road Natural Area is the most extensive one currently documented in the state. Please refer to Appendix C for a floristic quality assessment and a full plant species list.

Figure 21. View of Floodplain Forest.

Figure 22. Bugle weed (state threatened).

Figure 23. Beak grass (state threatened).

ECOLOGICAL SIGNIFICANCE:

Due to the vast extent of high density development in this portion of the Tri-County region, Van Atta Road Natural Area is critical for mitigating negative water quality impacts from non-point source runoff that occurs in other parts of the Red Cedar River. It is also an important site for numerous wildlife species and viewing opportunities, particularly for neo-tropical migratory songbirds during spring migration. Van Atta Road Natural Area supports one of the most contiguous and least-disturbed stretches of floodplain in the metropolitan Lansing area. The diversity of fluvial landforms provides habitat for a diverse array of vascular plants, including three state-listed species. This site was identified as one of 10 hubs as part of the Tri-County green infrastructure vision and is the most significant hub that falls within the half mile buffer of Grand River Avenue.

DISTURBANCE & THREATS:

The Van Atta Road Natural Area is subject to disturbances typical of natural areas in urban settings. The site is bisected by one major two-lane road (Van Atta Road) and a major powerline cut west of Van Atta Road. Railroad tracks that cross part of the floodplain south of Legg Park locally disturb hydrology. The immediate surrounding landscape is mostly developed with residential subdivisions. Natural cover in the western half of the site is restricted to a relatively narrow corridor along the Red Cedar River, whereas the eastern half of the area supports more interior forest due to the presence of broader first bottoms and backswamps. The impacts of this landscape fragmentation and development include locally altered hydrology, the establishment and spread of invasive plant species, and the concentration of deer in the natural areas, causing erosion and high levels of browse that appear to have reduced populations of several sensitive species. Most of the natural areas are also crisscrossed with trails; these trails facilitate the spread of invasive species and result in local areas of denuded vegetation when flooding covers the compacted surfaces and results in visitors trampling adjacent vegetated areas.

A diversity of non-native, invasive species has become established at Van Atta Road Natural Area. Invasive shrubs are widespread and locally common to dominant, primarily in the immediate vicinity of the Red Cedar River. The most widespread and abundant invasive shrubs are Amur honeysuckle, common privet, multiflora rose, and common buckthorn. Other invasive shrubs noted include European highbush-cranberry (*Viburnum opulus*), Japanese barberry (*Berberis thunbergii*), Morrow honeysuckle (*Lonicera morrowii*), and autumn-olive (*Elaeagnus umbellata*). Invasive herbaceous species are also common and locally abundant or dominant. Among these, moneywort and dame's-rocket are especially pernicious. Garlic mustard (*Alliaria petiolata*) is locally common. Gaps and powerline cuts support locally dense populations of reed canary grass (*Phalaris arundinacea*). Several other non-native herbaceous species of lesser concern are also present.

STEWARDSHIP CONSIDERATIONS:

Invasive Species Control: The primary stewardship need appears to be the control and management of invasive plant species. Efforts should primarily focus on controllable threats such as invasive shrubs (Amur honeysuckle, common privet, multiflora rose, and honeysuckle) and easy-to-treat herbaceous species such as garlic mustard and dame's-rocket. Moneywort is a well-established "carpet" species and likely cannot be eradicated without significant damage to the native flora.

Habitat Protection: The majority of the site surveyed is a Meridian Township natural area and park and is protected from development and resource extraction. However, small portions of the site are in private ownership primarily small parcels. Landowners within and adjacent to the site boundary should be contacted about the significance of the site and what they can do to help ensure the long-term health of this unique natural area along the Red Cedar River.

Controlling Deer Population: Managed hunts and monitoring of deer populations should continue in the Van Atta Road Natural Area. In addition to reducing or maintaining deer populations at ecologically sustainable levels, efforts should be undertaken to monitor the impacts of deer management on park vegetation and soil condition.

Site Ecological Summary: Davis/Foster Preserve

Size:	45 acres
Location:	Ingham County, Meridian Township
Ownership:	Public – Meridian Township; some private
PCA:	PCA # 1252; Score = 7, Moderate

LOCATION OF SITE:
The Davis/Foster Preserve occurs both east and west of Van Atta Road, just south of Tihart Road, in Meridian Township. Only the portion of the site west of the road was surveyed for this project.

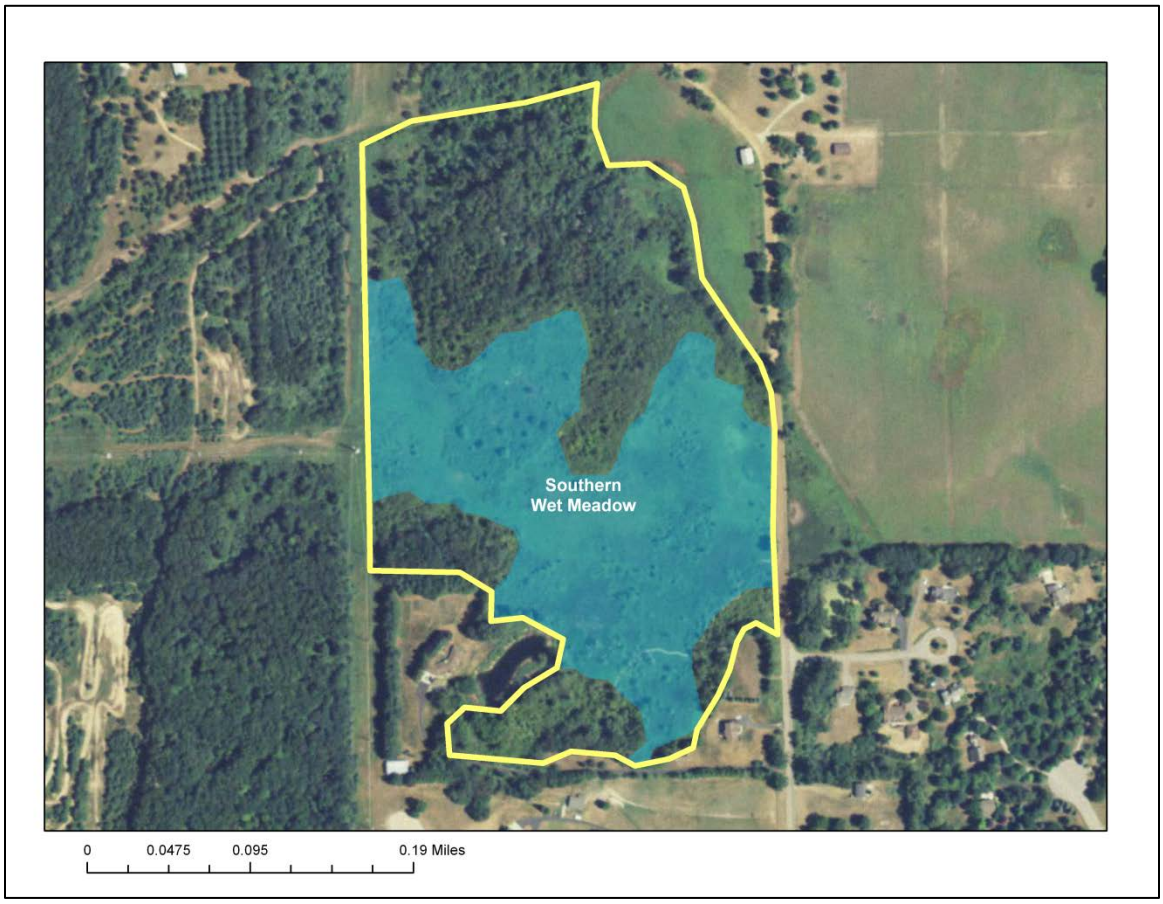

Figure 24. Site boundary and associated natural habitat patches.

GENERAL SITE DESCRIPTION:
The west tract of the Davis/Foster Preserve is isolated by Van Atta Rd. to the east, residential development and agriculture to the south, a power line corridor to the east, and more residential development to the north. The site consists of a shallow ice block depression that is now characterized by two wetland communities, southern wet meadow and southern shrub-carr. Both of these community types are somewhat common in southern Michigan, but are relatively rare in this region of the state, particularly in the Lansing area.

Southern Wet Meadow
The southern wet meadow is generally dominated by tussock sedge (*Carex stricta*), associated with woolly sedge (*C. pellita*), blue-joint (*Calamagrostis canadensis*), tall goldenrod (*Solidago altissima*), marsh fern (*Thelypteris palustris*), sensitive fern (*Onoclea sensibilis*), joe-pye-weed (*Eutrochium maculatum*), smooth swamp aster (*Symphyotrichum firmum*), grass-leaved goldenrod (*Euthamia graminifolia*), flat-topped white aster (*Doellingeria umbellata*), fringed brome (*Bromus ciliatus*), and common cat-tail (*Typha latifolia*). Reed canary grass (*Phalaris arundinacea*) is locally common near Van Atta Road. Among the shrubs, slender willow (*Salix petiolaris*), nannyberry (*Viburnum lentago*), red-osier (*Cornus sericea*), and the invasive glossy buckthorn (*Frangula alnus*) are common. Scattered trees are present throughout the wetland, mostly quaking aspen (*Populus tremuloides*) and American elm (*Ulmus americana*). A total of x plant species were documented from a single site visit in late June.

Created Prairie
The east tract of the Davis/Foster Preserve is an old agricultural field planted to native prairie grasses and forbs. It was not surveyed due to the lack of remnant habitat, but it is notable for providing breeding habitat for several state-listed grassland birds, including the state endangered Henslow's sparrow (*Ammodramus henslowii*), state special concern grasshopper sparrow (*A. savannarum*), and state special concern dickcissel (*Spiza americana*).

Rare Species
No rare plant species were noted at the Davis/Foster Preserve. Refer to Appendix D for the floristic quality assessment and a full plant species list.


Figure 25. Southern wet meadow at Davis/Foster Preserve.

ECOLOGICAL SIGNIFICANCE:
This site protects a relatively high quality southern wet meadow. Despite the disturbances to the site and presence of invasive species, the majority of the site is dominated by a native sedge matrix and supports several relatively conservative native plant species. Many of the other depressional wetlands in the area are more significantly degraded by historical land use and invasive plant species, often supporting monodominant stands of reed canary grass. The site also supports a population of the state special concern Blanding's turtle (*Emydoidea blandingii*) and presumably provides important habitat for other herptiles and marsh birds. Future animal surveys are definitely warranted to determine the presence of reptile, amphibian and bird species.

DISTURBANCE & THREATS:
The site has been impacted by attempts at drainage, roads (Van Atta Road passes through the wetland), utility construction and maintenance (powerline ROW at the west margin of the wetland), residential development and pond construction at the southwestern margin of the site, and invasive plant species. The site was likely historically grazed and possibly hayed, although the dominance by native species suggests it may have escaped direct seeding of forage grasses (e.g., reed canary grass). Reed canary grass and glossy buckthorn are the primary problems at this site. Reed canary grass is concentrated near Van Atta Road, and becomes much less prevalent away from the road in the core area of the wetland. Glossy buckthorn is common and locally abundant, especially at the margins of the central area of the wetland, where it is one of the dominant species of the southern shrub-carr community.

STEWARDSHIP CONSIDERATIONS:

Invasive Species Control: The primary stewardship need appears to be the control and management of invasive plant species, especially reed canary grass and glossy buckthorn. Given the isolated patches of these two species, successful eradication has a high probability.

Habitat Protection: The area is protected within the Meridian Township Davis/Foster Preserve. Efforts should be made to minimize any illegal encroachment onto the preserve from neighboring properties, and to encourage (or maintain) a natural buffer around the wetland complex.

Controlling Deer Population: Managed hunts and monitoring of deer populations should be considered throughout the area. In addition to reducing or maintaining deer populations at ecologically sustainable levels, efforts should be undertaken to monitor the impacts of deer management on vegetation and soil condition. The impacts of deer browse in the open wetlands at this site are less clear than browse impacts in the forested communities that were surveyed during this study.

Site Ecological Summary: Ted Black Woods

Size:	187 acres
Location:	Ingham County, Meridian Township
Ownership:	Public – Meridian Township; some private inholdings
PCA:	#1215, score = 8 (Moderate)

LOCATION OF SITE:
Ted Black Woods Park is north of Grand River Avenue, east of Van Atta Road near Okemos. There are two parking areas, one north of Grand River Ave. at the southern border of the park, and one east of Van Atta Road at the northwestern border.

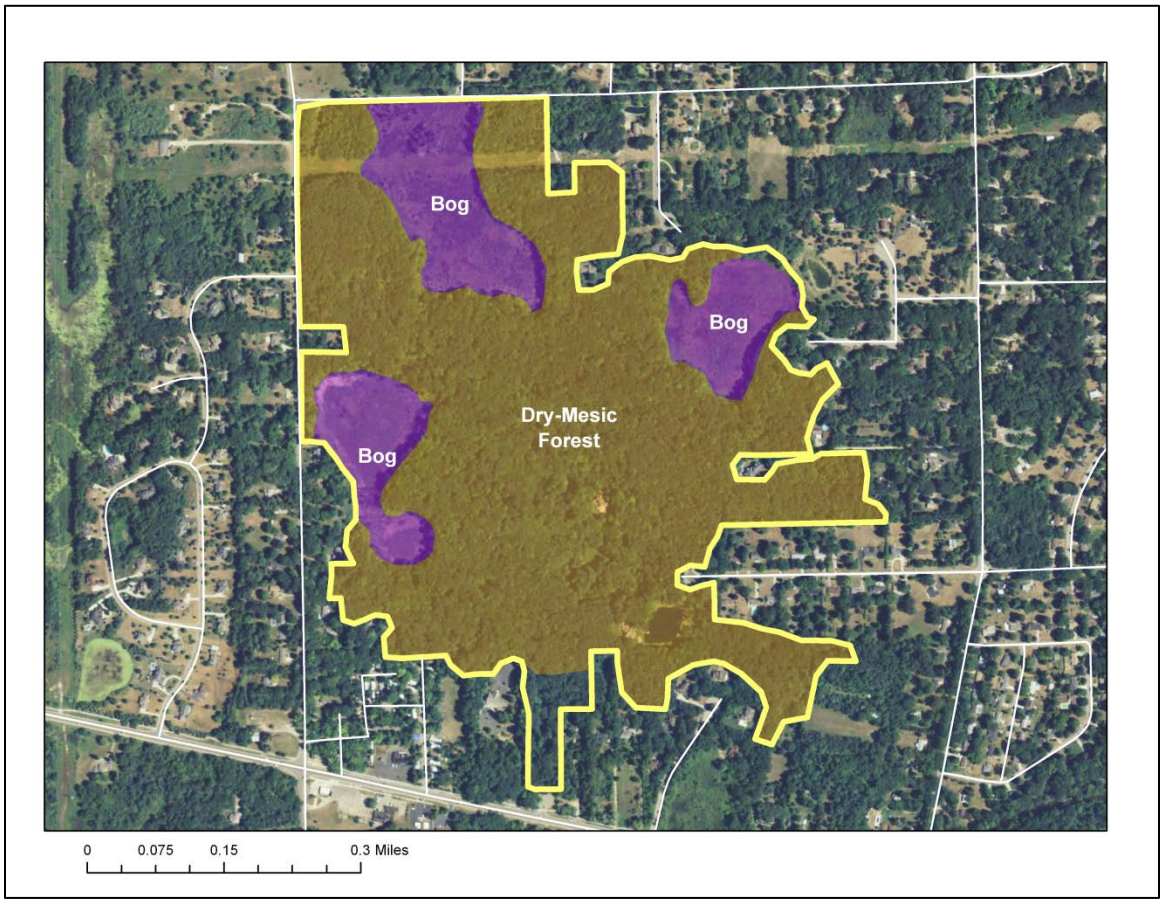

Figure 26. Ted Black Woods Park site boundary and natural community patches.

GENERAL SITE DESCRIPTION:
Ted Black Woods Park and the surrounding natural landscape is one of the largest natural areas within the Grand River Avenue Corridor. The primary natural community at Ted Black Woods Park is a block of dry-mesic southern forest located on the upland portion of an ice contact formation in the center of the park. Small kettle wetlands, primarily adjacent to this block of upland forest, support emergent marsh, southern wet meadow and a bog (especially northeast of the park on private land). The extreme southern portion of the park (at the entrance) is heavily

disturbed and supports an interesting assemblage of cultivated ornamentals, including some that have escaped locally.

Dry-mesic Southern Forest

The primary natural community at Ted Black Woods Park is dry-mesic southern forest, characterized by red, white, and black oaks (*Quercus rubra*, *Q. alba*, and *Q. velutina*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*), large-toothed aspen (*Populus grandidentata*), sassafras (*Sassafras albidum*), and sugar maple (*Acer saccharum*). The abundance of red maple (*Acer rubrum*) in the understory indicates a trend towards plants that prefer more mesic conditions. Common small trees and shrubs in the interior forest include witch-hazel (*Hamamelis virginiana*), wild gooseberry (*Ribes cynosbati*), Amur honeysuckle (*Lonicera maackii*), multiflora rose (*Rosa multiflora*), and Japanese barberry (*Berberis thunbergii*). Vines such as poison-ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and riverbank grape (*Vitis riparia*) are common. Characteristic herbaceous species include enchanter's-nightshade (*Circaea canadensis*), jumpseed (*Persicaria virginiana*), wood nettle (*Laportea canadensis*), white avens (*Geum canadense*), mayapple (*Podophyllum peltatum*), white lettuce (*Prenanthes alba*), clustered-leaved tick-trefoil (*Hylodesmum glutinosum*), early meadow-rue (*Thalictrum dioicum*), cleavers (*Galium aparine*), and wild geranium (*Geranium maculatum*).

The scruffy, weedy southern portion of Ted Black Woods Park was previously planted to a variety of non-native trees (e.g., Norway spruce [*Picea abies*], and hemlock [*Tsuga canadensis*; not native to this area]) and shrubs, including an unusual assortment of ornamentals, some of which have escaped sparingly in this area. Among the escapees are a few species not commonly recorded (though increasing) in Michigan, such as avens (*Geum urbanum*) and jetbead (*Rhodotypos scandens*). Spreading clones of five-leaved aralia (*Eleutherococcus sieboldianus*), butterfly-dock (*Petasites hybridus*), and angelica tree (*Aralia elata*) are also present at the site.

Bog

Several kettle wetlands occur within and near Ted Black Woods Park. The large kettle wetland in the western part of the park is a degraded shallow bog now supporting a dense population of reed canary grass (*Phalaris arundinacea*), forming a monoculture in the southern part of the depression and a dominant band around the center of the northern part of the depression. Sphagnum mosses are still present in the center of the largest part of this depression, and native species such as blue-joint (*Calamagrostis canadensis*) and wool-grass (*Scirpus cyperinus*) are common. The kettle depressions north and northeast of the park support better developed bog communities ringed by Michigan holly (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), and, locally, glossy buckthorn (*Frangula alnus*). The largest bog northeast of the site supports a leatherleaf (*Chamaedaphne calyculata*) – tamarack (*Larix laricina*) community on a sphagnum mat, but was not surveyed due to its private ownership. Although isolated by a large moat, the bog appears to be relatively undisturbed and may contain a high number of undocumented plant species including some rarities.

Figure 27. Dry-mesic southern forest with somewhat intact ground flora.

Rare Species
No rare plant species were noted at Ted Black Woods Park. Please refer to Appendix E for the floristic quality assessment and a full plant species list.

ECOLOGICAL SIGNIFICANCE:
Ted Black Woods Park provides a relatively large, mostly unfragmented block of upland forest in a primarily suburban landscape with few similar features away from the immediate vicinity of the Red Cedar River floodplain. The site is likely utilized by a variety of wildlife species and by neo-tropical migratory songbirds for nesting as well as during spring and fall migration. Although invasive species are widespread and common, the site continues to support a significant assemblage of native species, including 141 taxa identified during these surveys. Among these are relatively conservative species such as leatherwood (*Dirca palustris*), richweed (*Collinsonia canadensis*), and four-leaved loosestrife (*Lysimachia quadrifolia*), in addition to species mostly restricted to bogs and other high quality wetlands. The isolated bog located on private land to the northeast of the Park appears to be high quality and is certainly a unique community type and feature in the Tri-County region. Ted Black Woods Park is perhaps most important as a significant accessible green space in a densely developed commercial and residential corridor.

Figure 28. Isolated bog in northeast portion of site that was inaccessible during the surveys.

DISTURBANCE & THREATS:

As mentioned above, this site has been impacted by a variety of human disturbances, including logging, grazing, and the introduction of emerald ash borer, invasive plants, and conditions favorable for ecologically unsustainable high deer densities. The planting of a variety of non-native ornamentals in the southern portion of the site has allowed the spread of some of these species into the forest. A significant percentage of the vascular plants at this site (19%, or 34 taxa) are not native to North America, and several species native to Michigan (e.g., hemlock) were introduced to the park. The southern portion of the park is infested with non-native species, including several ornamental species that have escaped such as jetbead. Invasive species more typical of the region are also prevalent at this site. Among these are common privet (*Ligustrum vulgare*), Amur honeysuckle, multiflora rose, glossy buckthorn, reed canary grass, and garlic mustard (*Alliaria petiolata*). Historical land use and the surrounding suburban landscape foster conditions favorable to the establishment and expansion of invasive plants at this site.

The combination of high deer densities and long-term fire suppression is particularly damaging to this remnant of dry-mesic southern forest, resulting in the reduction of light-dependent and fire-tolerant ground layer species, a lack of woody regeneration, and the continuing trend towards more mesic plants.

STEWARDSHIP CONSIDERATIONS:

Invasive Species Control: The primary stewardship need appears to be the control and management of invasive plant species, especially Amur honeysuckle, common privet, and garlic mustard that are found scattered throughout the forest, and multiflora rose and glossy buckthorn found in the isolated wetlands. The wetland in the western portion of the site, near Van Atta Road, is infested by the highly invasive reed canary grass and would likely be too costly and time-consuming to eradicate.

Habitat Protection: The area is largely protected within the Meridian Township Ted Black Woods Park. A relatively high quality bog northeast of the park is privately owned and not currently protected, and the large bog on the northside of the site is also in private ownership. These landowners should be contacted to explore interest in the long-term protection of these unique natural systems.

Controlling Deer Population: Managed hunts and monitoring of deer populations should be implemented throughout the area. In addition to reducing or maintaining deer populations at ecologically sustainable levels, efforts should be undertaken to monitor the impacts of deer management on vegetation and soil condition within the dry-mesic forest stand. The impacts of deer browse in the open wetlands at this site are less clear.

Prescribed Fire: Although surrounding development may make the application of prescribed fire intractable, the repeated application of fire, in combination with mechanical thinning of woody vegetation, would likely improve the condition of the dry-mesic southern forest and promote the recovery of the ground layer, which still remains species-rich in a few scattered places.

Site Ecological Summary: Williamston East

Size:	173 acres
Location:	Ingham County, city of Williamston and Williamston, Leroy and Locke Townships
Ownership:	Primarily Private; small portion in Public ownership (MNA preserve)
PCA:	#1123, score = 13 (High)

LOCATION OF SITE:
The Williamston East site is in suburban Williamston, extending along the Red Cedar River E from Williamston to approximately Douglas Street (S of the river). The entirety of this site is in private ownership, although a small parcel is owned by The Michigan Nature Association (MNA) and known as the Red Cedar River Plant Preserve.

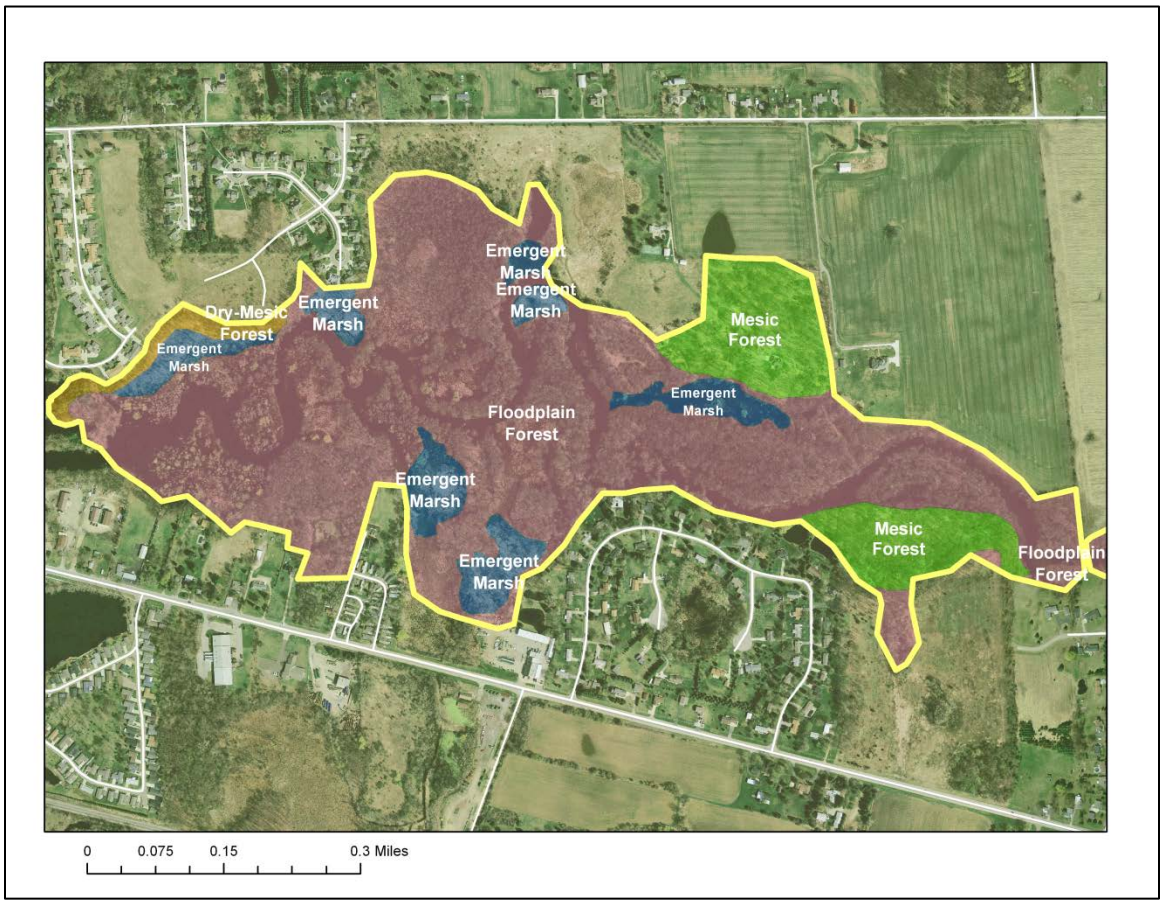

Figure 29. Site boundary and associated natural community patches.

GENERAL SITE DESCRIPTION:
This area supports dry-mesic and mesic southern forest on uplands and floodplain forest along and adjacent to the Red Cedar River floodplain. The surrounding landscape is primarily suburban in the immediate vicinity of the river and Williamston, with agriculture and rural residential development in the broader area.

Mesic Southern Forest
There are two patches of mesic southern forest at this site totaling 23 acres. The most significant area of mesic southern forest at this site occurs on a terrace above the floodplain northeast of Skyway Drive. This selectively cut woodlot supports large, mature beech (*Fagus grandifolia*) and mostly smaller diameter sugar maple (*Acer saccharum*), with some larger individuals immediately adjacent to the floodplain. Black cherry (*Prunus serotina*), red oak (*Quercus rubra*), and swamp white oak (*Q. bicolor*) are also common in this area. Small diameter sugar maple dominates the understory. The shrub and ground layers are depauperate and species-poor, perhaps the result of historic grazing, and exacerbated by high levels of deer browse. Sugar maple and white ash (*Fraxinus americana*) seedlings form a carpet over much of this area. Ground layer associates included bluestem goldenrod (*Solidago caesia*) and wild geranium (*Geranium maculatum*).

Dry-mesic Southern Forest
The only area of dry-mesic southern forest surveyed at this site is on a narrow, steep south-facing ridge overlooking the floodplain at the MNA Red Cedar River Plant Preserve 4 acres in size. Here, multi-trunked, large white oak (*Quercus alba*) and red oak are associated with basswood (*Tilia americana*), black cherry, and white ash. Witch-hazel (*Hamamelis virginiana*) is locally common in the understory. Common ground layer species include calico aster (*Symphyotrichum lateriflorum*), wild geranium, Virginia creeper (*Parthenocissus quinquefolia*), and jack-in-the-pulpit (*Arisaema triphyllum*).

Floodplain Forest
A significant portion of the river floodplain at this site was historically impounded by a dam in the city of Williamston. As a result, portions of it now support open marsh dominated by invasive native and non-native plants: cat-tails (*Typha angustifolia* and *T. latifolia*) and reed canary grass (*Phalaris arundinacea*). The eastern portion of the area however has escaped most of the impacts of the historic impoundment and supports floodplain forest more typical of the rest of the Red Cedar River corridor, dominated by silver maple (*Acer saccharinum*) and, until recently, green ash (*Fraxinus pennsylvanica*) which has been killed off by emerald ash borer. Low, wet meander scars support buttonbush (*Cephalanthus occidentalis*), water dock (*Rumex verticillatus*), moneywort (*Lysimachia nummularia*), Gray's sedge (*Carex grayi*), fringed sedge (*C. crinita*), Muskingum sedge (*C. muskingumensis*), clearweed (*Pilea pumila*), white grass (*Leersia virginica*), sensitive fern (*Onoclea sensibilis*), fringed loosestrife (*Lysimachia ciliata*), and mad-dog skullcap (*Scutellaria lateriflora*). Slightly elevated terraces between the meander scars support a dense tangle of vegetation, with multiflora rose (*Rosa multiflora*) locally dominant, associated with Morrow honeysuckle (*Lonicera morrowii*) and blackberries (*Rubus* spp.). Characteristic ground layer species include white avens (*Geum canadense*), jumpseed (*Persicaria virginiana*), enchanter's-nightshade (*Circaea canadensis*), wood nettle (*Laportea canadensis*), wood-sage (*Teucrium canadense*), Virginia wild-rye (*Elymus virginicus*), and ostrich fern (*Matteuccia struthiopteris*).

Significant areas of groundwater-fed open and forested wetlands occur at the base of the uplands in the western portion of the site, including in and near the MNA Red Cedar River Plant Preserve. These areas support yellow birch (*Betula alleghaniensis*), musclewood (*Carpinus caroliniana*), tag alder (*Alnus incana*), and spicebush (*Lindera benzoin*). The ground layer on the saturated muck soils is dominated by skunk-cabbage (*Symplocarpus foetidus*) at the base of the uplands and by sedges, primarily tussock sedge (*Carex stricta*) and lake sedge (*C. lacustris*) downslope. Reed canary grass has expanded into these areas from the river bottoms and is locally common. Other common ground layer species include Virginia creeper, spotted touch-me-not (*Impatiens capensis*), groundnut (*Apios americana*), marsh fern (*Thelypteris palustris*), rough-leaved

goldenrod (*Solidago patula*), fowl manna grass (*Glyceria striata*), joe-pye-weed (*Eutrochium maculatum*), and rough bedstraw (*Galium asprellum*).

Figure 30. Mesic southern forest with scattered mature beech (*Fagus grandifolia*) and an extremely bare ground layer.

Figure 31. Broad open areas of emergent marsh and wet meadow occur in the MNA Red Cedar River Plant Preserve.

Figure 32. Low, open floodplain forest dominated by silver maple (*Acer saccharinum*).

Rare Species
One state-listed vascular plant species, bugle weed (*Lycopus virginicus*), was documented from the wet, mucky floodplain forest at this site. The colonies here are part of a larger population that extends east along the Red Cedar River from the vicinity of Williamston for a total of 3.3 river miles. Please refer to Appendix F for the floristic quality assessment and full plant species list.

ECOLOGICAL SIGNIFICANCE:
The primary importance of this area is as a relatively large, relatively unfragmented block of forest in an otherwise heavily agricultural landscape. The site is likely utilized by a variety of wildlife species and by neo-tropical migratory songbirds for nesting as well as a stopover site during spring and fall migration. Although the site has been impacted by logging, grazing, emerald ash borer, invasive plants, high levels of deer browse, and an altered flood regime, the majority (88%) of the 199 vascular plant taxa identified during our surveys are native to the area, so the site provides an important refugium for these native plant species. In addition, a portion of one of the largest documented populations in Michigan of the state-threatened bugle weed occurs at this site.

DISTURBANCE & THREATS:
As mentioned above, this site has been impacted by a variety of human disturbances, including logging, grazing, altered flood regimes (due to the Williamston dam), the introduction of emerald ash borer and invasive plants, and conditions favorable for ecologically unsustainable high deer densities. Unfortunately, a diversity of non-native, invasive species have become established at the Williamston East site. Much of the river floodplain was formerly impounded, and with the water draw down now supports dense stands of two highly invasive species: reed canary grass and narrow-leaf cat-tail. Multiflora rose and Morrow honeysuckle are common and locally pernicious. Moneywort (*Lysimachia nummularia*) forms dense patches over much of the floodplain forest. The magnitude of the eventual impacts of emerald ash borer is not yet known, but continued die-off of canopy and subcanopy ashes is creating large areas of monodominant silver maple-dominated forest and permitting light-dependent invasive species such as reed canary grass to spread and increase in areas where green ash was once dominant.

STEWARDSHIP CONSIDERATIONS:
Invasive Species Control: The primary stewardship need appears to be the control and management of invasive plant species. Efforts should primarily focus on controllable threats such as invasive shrubs (especially Morrow honeysuckle and multiflora rose) and easy-to-treat herbaceous species such as garlic mustard and dame's-rocket. Control of the extensive populations of reed canary grass will be difficult, but more recently established individuals and patches should be treated and monitored. Moneywort is a well-established "carpet" species and likely cannot be eradicated without significant damage to the native flora.

Habitat Protection: One small ten-acre tract known as the Red Cedar River Plant Preserve is owned and managed by the Michigan Nature Association. The remainder of the area is in private ownership and is not protected. Large landowners who own property within the floodplain should be contacted about placing a conservation easement on their property with the goal of protecting as much of the Red Cedar floodplain and adjacent natural lands as possible.

Controlling Deer Population: Managed hunts and monitoring of deer populations should be established to control deer populations throughout the area. In addition to reducing or maintaining deer populations at ecologically sustainable levels, efforts should be undertaken to monitor the impacts of deer management on vegetation and soil condition particularly in the various forested systems still found at this site.

Site Ecological Summary: Dietz Road West

Size:	151 acres
Location:	Ingham County, Leroy and Locke Townships
Ownership:	100% Private
PCA:	#1123, score = 13 (High)

LOCATION OF SITE:
The Dietz Road West site consists of forested acreage along the Red Cedar River, Squaw Creek, and Doan Creek west of Dietz Road, east of Chula Vista Drive. The entirety of this site is in private ownership, including large parcels within the YMCA Camp Pa-Wa-Pi on the south side of the Red Cedar River.

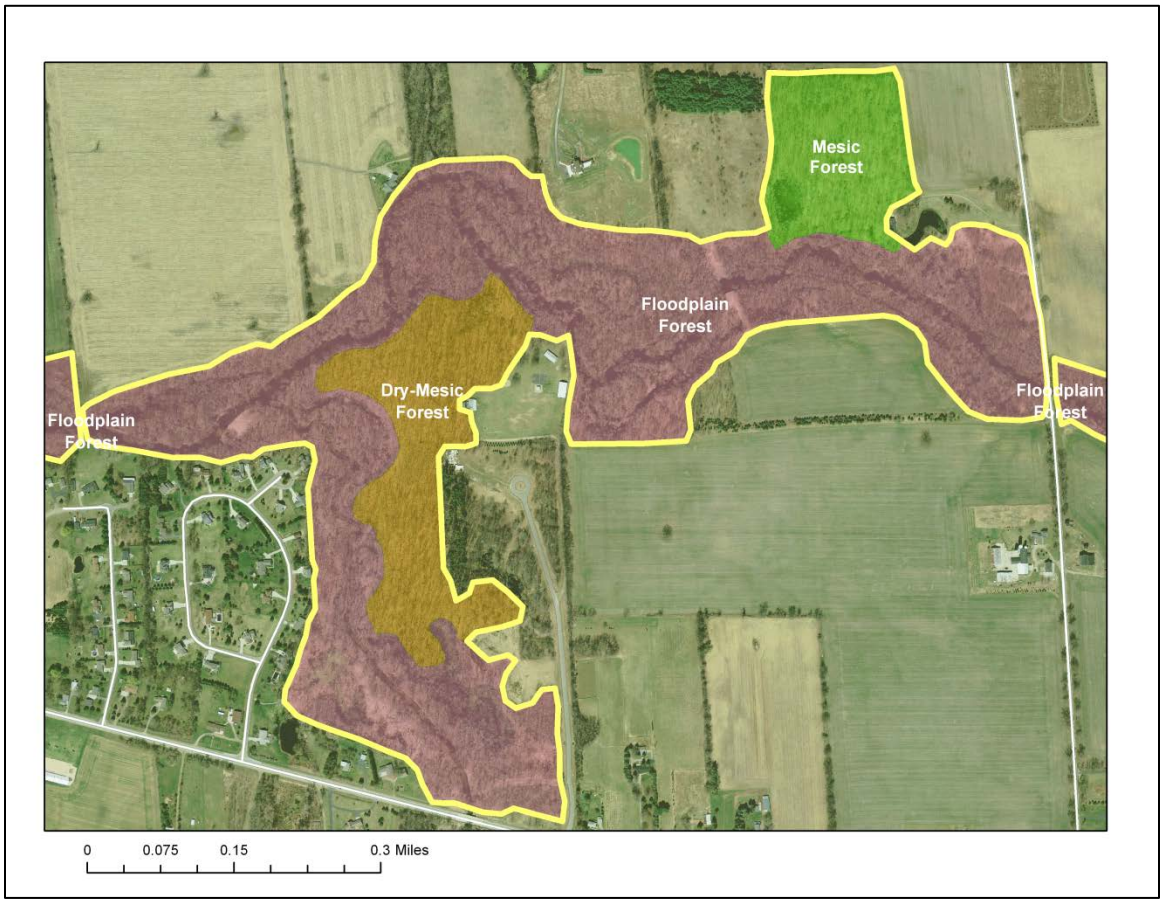

Figure 33. Site boundary with associated natural communities.

GENERAL SITE DESCRIPTION:
This area supports dry-mesic and mesic southern forest on uplands and floodplain forest along Red Cedar River, Squaw Creek, and Doan Creek. The surrounding landscape is primarily rural and agricultural, although suburban/exurban development is locally dense and increasing at the western margin of the site.

Mesic Southern Forest
A small woodlot approximately x acres supporting mesic southern forest occurs adjacent to the private residence southwest of the intersection of Rowley Road and Dietz Road. This woodlot has been degraded by logging and likely historical grazing, and now supports mostly small diameter (although scattered large, old trees in the 80-100 cm dbh size class are present) sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), and black cherry (*Prunus serotina*). The depauperate ground layer is dominated by a dense carpet of sugar maple seedlings, associated with mayapple (*Podophyllum peltatum*), garlic mustard (*Alliaria petiolata*), common blue violet (*Viola sororia*), enchanter's-nightshade (*Circaea canadensis*), jack-in-the-pulpit (*Arisaema triphyllum*), and a few other browse-tolerant herbs. Deer densities are apparently high, and are also likely a major factor in reducing ground layer richness, diversity and woody regeneration. The small, isolated wetland in the southwestern portion of the woodlot is vegetated by dense growth of Michigan holly (*Ilex verticillata*) and buttonbush (*Cephalanthus occidentalis*).

Dry-mesic Southern Forest
The upland immediately west of the developed areas of the YMCA camp, is approximately x acres in size and bordered by Doan Creek to the east, a mature pine plantation and old field to the east, and the Red Cedar floodplain forest to the north. This loamy sand knoll supports one of the few remaining dry-mesic southern forests in the region. The overstory is dominated primarily by large white oak (*Quercus alba*) and black oak (*Q. velutina*) trees, with scattered red oak (*Q. rubra*), black cherry, white ash (*Fraxinus americana*), and sugar maple (*Acer saccharum*) found throughout. Large-toothed aspen (*Populus grandidentata*) is locally dominant. The importance of sugar maple in the understory indicates a trend towards mesic species likely the result of long-term fire suppression. Common shrubs and vines include witch-hazel (*Hamamelis virginiana*), maple-leaved viburnum (*Viburnum acerifolium*), choke-cherry (*Prunus virginiana*), poison-ivy (*Toxicodendron radicans*), riverbank grape (*Vitis riparia*), and Virginia creeper (*Parthenocissus quinquefolia*). Characteristic ground layer species include Pennsylvania sedge (*Carex pensylvanica*), bluestem goldenrod (*Solidago caesia*), enchanter's-nightshade, clustered-leaved tick-trefoil (*Hylodesmum glutinosum*), jumpseed (*Persicaria virginica*), white avens (*Geum canadense*), and mayapple. The abundance of weedy forbs suggests that this area of the site was also historically grazed.

Floodplain Forest
The highest quality area of floodplain forest along this stretch of the Red Cedar River occurs on the north side of the river, just northeast of the YMCA Camp. In fact, this is the highest quality floodplain forest along the Red Cedar River that we surveyed between Williamston and Webberville. This stretch of floodplain is approximately x acres in size. Silver maple (*Acer saccharinum*) is dominant in the overstory, and is associated with green ash (*Fraxinus pennsylvanica*, mostly dead), bur oak (*Quercus macrocarpa*), cottonwood (*Populus deltoides*), and, to a lesser extent, basswood (*Tilia americana*), black maple (*Acer nigrum*), and American elm (*Ulmus americana*). The understory is open, with the exception of occasional to locally common musclewood (*Carpinus caroliniana*). The ground layer is dominated by lizard's-tail (*Saururus cernuus*) on the lowest, muckiest flats, and wood nettle (*Laportea canadensis*) and ostrich fern (*Matteuccia struthiopteris*) on slightly higher, narrow terraces and old river banks. Other characteristic ground layer species include white grass (*Leersia virginica*), moneywort (*Lysimachia nummularia*), fringed loosestrife (*L. ciliata*), cream violet (*Viola striata*), clearweed (*Pilea pumila*), late goldenrod (*Solidago gigantea*), green dragon (*Arisaema dracontium*), Gray's sedge (*Carex grayi*), and mad-dog skullcap (*Scutellaria lateriflora*). Reed canary grass (*Phalaris arundinacea*) is locally common or abundant, especially in open, degraded wet forest along the channelized portion of Doan Creek west of the YMCA camp. Skunk-cabbage (*Symplocarpus*

foetidus) is locally dominant in seeps at the base of the upland. Vines such as riverbank grape, poison-ivy, and Virginia creeper are also important. Buttonbush forms a band around some of the lowest, wettest meander scars.

Rare Species
One state-listed vascular plant species, bugle weed (*Lycopus virginicus*), was documented from the wet, mucky floodplain forest at this site. The colonies here are part of a larger population that extends east along the Red Cedar River from the vicinity of Williamston. In total, these colonies stretch for approximately 3.3 miles along the Red Cedar River. Please refer to Appendix G for the floristic quality assessment and full plant species list.

ECOLOGICAL SIGNIFICANCE:
The primary importance of this area is the relatively large, unfragmented block of forest (mesic, dry mesic, and floodplain) in the otherwise heavily agricultural landscape of Leroy and Locke Townships. The site is likely utilized by a variety of wildlife species and by neo-tropical migratory songbirds for nesting as well as a stopover site for spring and fall migration. Although the site has been impacted by logging, grazing, emerald ash borer, invasive plants, high levels of deer browse, and an altered flood regime, the majority (90%) of the approximately 233 vascular plant taxa identified during our surveys are native to the area, so the site provides an important refugium for these species in a highly fragmented and altered landscape. In addition, a significant portion of one of the largest documented populations of the state-threatened bugle weed occurs at this site.

DISTURBANCE & THREATS:
As mentioned above, this site has been impacted by a variety of human disturbances, including logging, grazing, altered flood regimes, and the introduction of emerald ash borer, invasive plants, and conditions favorable for ecologically unsustainable high deer densities. The magnitude of the eventual impacts of emerald ash borer is not yet known, but continued die-off of canopy and subcanopy ashes is creating large areas of silver maple-dominated forest and permitting light-dependent invasive species such as reed canary grass to spread and increase in areas where green ash was once dominant.

A diversity of non-native, invasive species have established at the Dietz Road West site, although the impacts here were lower than at some of the more fragmented and/or urbanized stretches of floodplain. Of particular significance are dense patches of reed canary grass (*Phalaris arundinacea*). Moneywort (*Lysimachia nummularia*) forms dense patches over much of the floodplain forest. Garlic mustard (*Alliaria petiolata*) was locally common, especially in disturbed areas in the mesic southern forest. Invasive shrubs were less important here than at many of the other sites surveyed along the Red Cedar River. Only four species were noted, Morrow honeysuckle (*Lonicera morrowii*), Japanese barberry (*Berberis thunbergii*), European-highbush-cranberry (*Viburnum opulus*) and multiflora rose (*Rosa multiflora*), although others may be present but in low numbers.

Figure 34. Lush floodplain ground layer dominated by wood nettle (*Laportea canadensis*).

Figure 35. A northern map turtle (*Graptemys geographica*) in the Red Cedar River floodplain.

Figure 36. Dense colonies of bugle weed (*Lycopus virginicus*), state threatened, occur scattered in the floodplain.

STEWARDSHIP CONSIDERATIONS:

Invasive Species Control: The primary stewardship need appears to be the control and management of invasive plant species. Efforts should primarily focus on controllable threats such as invasive shrubs (especially Morrow honeysuckle and multiflora rose) and easy-to-treat herbaceous species such as garlic mustard and dame's-rocket. Control of the locally extensive and well established populations of reed canary grass will be very difficult, but more recently established individuals and patches should be treated and monitored. Moneywort is a well-established "carpet" species and likely cannot be eradicated without significant damage to the native flora.

Habitat Protection: The area is entirely in private ownership and is not currently protected. One large tract is owned by YMCA Camp Pa-Wa-Pi, with the remaining parcels in the survey area split among four private landowners. Securing conservation easements with each of these five landowners should be a high priority.

Controlling Deer Population: Managed hunts and monitoring of deer populations should be considered throughout the area. In addition to reducing or maintaining deer populations at ecologically sustainable levels, efforts should be undertaken to monitor the impacts of deer management on vegetation and soil condition.

Site Ecological Summary: Perry Road West

Size:	69 acres
Location:	Ingham County, Leroy and Locke Townships
Ownership:	100% Private
PCA:	#1117, score = 12 (High)

LOCATION OF SITE:
The Perry Road West site consists of forested acreage along the Red Cedar River and Sullivan Creek west of Perry Road (M-52), and east of Dietz Road. The entirety of this site is in private ownership, with a single house surrounded by upland forest between the two streams.

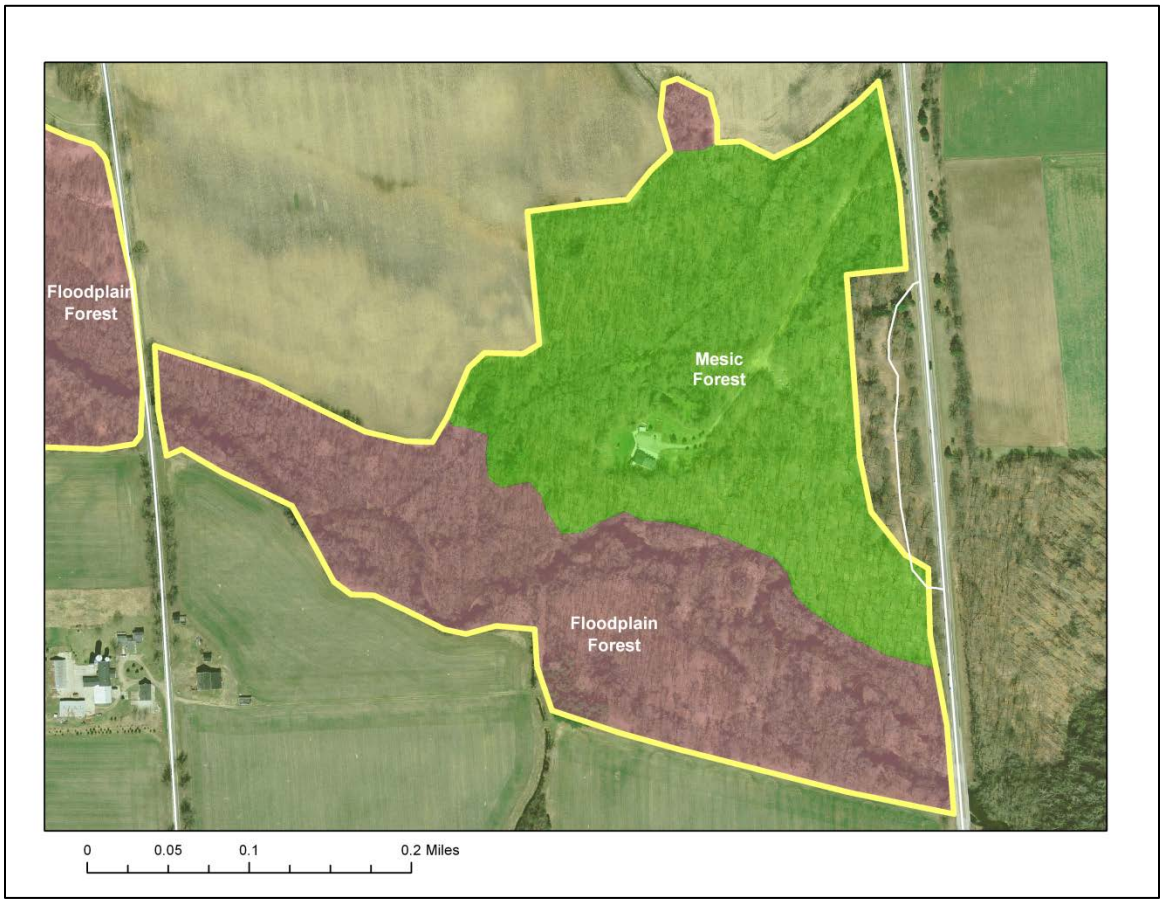

Figure 37. Site boundary and associated natural community patches.

GENERAL SITE DESCRIPTION:
This area supports several small tracts of mesic southern forest in the uplands, and a large contiguous floodplain forest along the Red Cedar River and (to a lesser extent) Sullivan Creek. The surrounding landscape is primarily agricultural, with rural residential development concentrated along the main roads.

Mesic Southern Forest
The uplands above the area of the current Red Cedar River floodplain support second-growth mesic southern forest dominated by American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*). Canopy associates include white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), and red oak (*Quercus rubra*). Large, mature trees (in the 70 – 100 cm dbh size class) are locally common throughout. At least portions of the mesic southern forest appear to have been historically grazed, and support very low species richness in the ground layer. Sugar maple seedlings were the dominant species in the herbaceous layer. Some areas of the mesic southern forest may not have been grazed historically and support a denser, richer herbaceous layer, including typical spring wildflowers such as large white trillium (*Trillium grandiflorum*) and false spikenard (*Maianthemum racemosum*). Deer densities are apparently high, and are also likely a major factor reducing ground layer richness and diversity and woody regeneration. The upland forest areas west and north of the single residence are younger and more disturbed than the area south and east of the dwelling.

Floodplain Forest
The floodplain forest at this site occurs as a relatively narrow band along the river near Perry Road, widening as the river approaches its confluence with Sullivan Creek. Nearly the entirety of this community is low, wet, mucky, frequently inundated forest dominated by silver maple (*Acer saccharinum*), formerly with green ash (*Fraxinus pennsylvanica*) as a codominant or local dominant, now having been mostly killed off by emerald ash borer (*Agrilus planipennis*). Basswood (*Tilia americana*), cottonwood (*Populus deltoides*), and black maple (*Acer nigrum*) are occasional. The understory is largely open. Characteristic small trees, shrubs and herbs include musclewood (*Carpinus caroliniana*), bladdernut (*Staphylea trifolia*), common elder (*Sambucus canadensis*), wild grape (*Vitis riparia*), poison-ivy (*Toxicodendron radicans*), lizard's-tail (*Saururus cernuus*), wood nettle (*Laportea canadensis*), late goldenrod (*Solidago gigantea*), water dock (*Rumex verticillatus*), southern blue flag (*Iris virginica*), clearweed (*Pilea pumila*), Virginia wild-rye (*Elymus virginicus*), white grass (*Leersia virginica*), Gray's sedge (*Carex grayi*), wood gray sedge (*Carex grisea*), and sensitive fern (*Onoclea sensibilis*).

Rare Species
One state-listed vascular plant species, bugle weed (*Lycopus virginicus*), was documented from the wet, mucky floodplain forest at this site. The colonies here are part of a larger population that extends along the Red Cedar River from the vicinity of Williamston east to M-52 – an area that extends roughly 3.3 miles. Please refer to Appendix G for the floristic quality assessment and a full plant species list.

Figure 38. Emerald ash borer is killing several ash species in the floodplain and opening up the canopy allowing high levels of light to reach the ground layer.

Figure 39. A central meander scar surrounded by slightly higher terraces.

Figure 40. State threatened Bugle weed (*Lycopus virginicus*) in late spring.

ECOLOGICAL SIGNIFICANCE:
The primary importance of this area is as a relatively large, relatively unfragmented block of forest in an otherwise heavily agricultural landscape. The site is likely utilized by a variety of wildlife species and by neo-tropical migratory songbirds for nesting and as a stopover site during spring and fall migration. The majority (89%) of the approximately 140 vascular plant taxa identified during our surveys are native to the area, so the site provides an important refugium for these species. In addition, a portion of one of the largest documented populations of the state-threatened bugle weed occurs at this site along the Red Cedar floodplain.

DISTURBANCE & THREATS:
This site has been impacted by a variety of human disturbances, including logging, grazing, altered flood regimes, and the introduction of emerald ash borer, invasive plants, and conditions favorable for ecologically unsustainable high deer densities.

Unfortunately, a diversity of non-native, invasive species have established at the Perry Road West site, although the impacts here were lower than at some of the more fragmented and/or urbanized stretches of floodplain at the other sites. Of particular significance are dense patches of reed canary grass (*Phalaris arundinacea*), especially along the river, but also present and possibly increasing in other areas of the floodplain forest, especially where emerald ash borer has killed ash trees and locally opened up the canopy. Moneywort (*Lysimachia nummularia*) forms dense patches over much of the floodplain forest. Garlic mustard (*Alliaria petiolata*) was locally common, especially in disturbed areas in the mesic southern forest. Invasive shrubs were less important here than at many of the other sites surveyed along the Red Cedar River. Only two species were noted, European-highbush-cranberry (*Viburnum opulus*) and multiflora rose (*Rosa multiflora*), although others may be present but in low numbers (and therefore undocumented during the floristic surveys).

The magnitude of the eventual impacts of emerald ash borer is not yet known, but continued die-off of canopy and subcanopy ashes is creating large areas of monodominant silver maple-dominated forest and permitting light-dependent invasive species such as reed canary grass to spread and increase in areas where green ash was once dominant.

STEWARDSHIP CONSIDERATIONS:

Invasive Species Control: The primary stewardship need appears to be the control and management of invasive plant species. Efforts should primarily focus on controllable threats such as invasive shrubs (especially multiflora rose) and easy-to-treat herbaceous species such as garlic mustard and dame's-rocket. Control of the locally extensive populations of reed canary grass will be difficult, but more recently established individuals and patches should be treated and monitored. Moneywort is a well-established "carpet" species and likely cannot be eradicated without significant damage to the native flora.

Habitat Protection: The area is entirely in private ownership and is not currently protected. The property immediately south of the Red Cedar River and west of M-52 is currently for sale.

Controlling Deer Population: Managed hunts and monitoring of deer populations should be considered throughout the area. In addition to reducing or maintaining deer populations at ecologically sustainable levels, efforts should be undertaken to monitor the impacts of deer management on vegetation and soil condition.

4. Summary of Survey Results

Introduction
The BRT Corridor is located within the highly modified, human dominated landscape of mid-Michigan. It varies from west to east, with high density urban development and impervious cover in Lansing and East Lansing, a mix of natural lands and moderate density urban development in Meridian Township, and a mix of low density development, rural, and natural lands between the towns of Williamston and Webberville. Based on historical aerial photographs, much of this corridor was already modified by 1930s, with only 7.6% of the corridor in natural condition. Over time, this percentage has increased as marginal farmland was allowed to succeed to a more natural condition. Today, 2,556 acres or 19% of the landscape is in natural condition based on 2006 CCAP land cover data.

In a previous study, Potential Conservation Areas (PCAs) were identified throughout the Tri-County region which included the BRT Corridor. Based on a variety of factors, we prioritized the PCAs for conducting ecological surveys, with the actual properties surveyed dependent on accessibility. Nine PCAs within the corridor were identified and private landowners were contacted to request permission to access their properties. A total of eight sites were surveyed for plants and natural communities during the 2013 and 2014 growing seasons. Sites ranged in size from 33 acres to 356 acres, for a total of 1,100 acres surveyed (Table 6). Ownership of these sites ranged from 100% private to 100% public.

Table 6. Summary of sites surveyed within the BRT Corridor.

Name of Survey Site	Acres
Williamston East	173
Dietz Rd. West	151
Perry Rd. West	69
Ted Black Woods	187
Davis-Foster Preserve	45
Van Atta Road Natural Area	356
Ferguson Park	33
Sanford Woods	86
Total	1100

Natural Communities
The only modestly disturbed site in the study corridor is the mature mesic southern forest protected within Sanford Natural Area on the campus of Michigan State University. This area, first added to the MNFI database of high quality natural community element occurrences in 1985, continues to support a high quality, mature mesic southern forest, although it is fragmented and isolated by adjacent university buildings and commercial development, in addition to being impacted by several non-native plant species.

The remainder of the Red Cedar River corridor supports three primary natural communities: floodplain forest, mesic southern forest, and dry-mesic southern forest. Floodplain forest is the

dominant natural community type, covering a total of 606 acres and making up 55% of the lands surveyed as part of this project. The highest quality stretch of floodplain forest occurs in Meridian Township, largely within the confines of four township parks (Riverdowns Natural Area, Legg Park, Harris Nature Center, and Eastgate Park). This extensive site supports a diversity of fluvial landforms and high native species richness, but is also significantly impacted by a variety of disturbances (in addition to historical land use) largely associated with the urbanization of the surrounding landscape. Among these are altered flood regimes, high levels of deer browse, and invasive plant and animal species. Outside of this area, relatively intact, mature floodplain forest is mostly limited to local areas of first bottoms that were too wet to clear.

Outside the Sanford Natural Area, the patches of mesic southern forest are generally highly disturbed by cutting, grazing, and invasive plant species. Perhaps the best example is a small terrace in the Harris Nature Center/Eastgate Park that supports mature beech-maple forest with a species-rich ground layer. Six mesic southern forest patches totaling 120 acres were surveyed. Dry-mesic southern forest is primarily limited to ravine slopes and crests immediately adjacent to the floodplain, with no high quality examples of significant size noted in the vicinity of the river. Four patches of dry-mesic southern forest totaling 199 acres were surveyed.

Away from the Red Cedar River, dry-mesic southern forest dominates the majority of Ted Black Woods Park (147 acres), although it is largely degraded. This site also supports several kettle wetlands, one of which (just outside the park on private land) supports what appears to be a fairly high quality bog community. Unfortunately we were unable to gain permission to survey this interesting wetland. The Davis-Foster Preserve supports a small example of southern wet meadow in a shallow kettle depression that was likely at least partially drained. This area, too, is disturbed, perhaps the primary threat being dense colonies of glossy buckthorn (*Frangula alnus*) in the center of the site. A summary of natural communities surveyed can be found in Table 7.

Table 7. Summary of Natural Communities surveyed during the 2013-2014 field seasons.

Natural Community Type	# of Occurrences	Total Acres
Bog	3	35
Dry-Mesic Southern Forest	4	199
Emergent Marsh	7	16
Floodplain Forest	8	606
Mesic Southern Forest	6	120
Pine Plantation	1	5
Southern Wet Meadow	1	22
Total	30	1003

Rare Plants

Three rare vascular plant species were locally common along the downstream stretch of the Red Cedar River between Lansing and Meridian Township. These were the state special concern Davis' sedge (*Carex davisii*), the state threatened beak grass (*Diarrhena obovata*), and the state threatened bugle weed (*Lycopus virginicus*). The occurrences along the Red Cedar River are among the most viable sites in the entire state for all three species. The upstream stretch of the Red Cedar River near and east of Williamston supported only one of these species, bugle weed. Again, this population of state threatened bugle weed is one of the most significant in the state,

found along a 3.3 mile stretch of the Red Cedar floodplain. A total of five new element occurrences and six updated occurrences were documented during field surveys in 2013 – 2014 (Table 8).

Three previously documented rare plant occurrences were not relocated during the 2013 – 2014 surveys (Table 9). These were the state threatened green violet (*Hybanthus concolor*), red mulberry (*Morus rubra*), and ginseng (*Panax quinquefolius*). All three of these species were previously known from Sanford Natural Area (Sanford Woods) on the campus of Michigan State University. Green violet was observed in 2007 and almost certainly persists at the site. Red mulberry and ginseng were always scarce, with only a few individuals of each species noted during the late 1960s. Both are presumed extirpated from the site, although additional targeted surveys are warranted.

Table 8. New and updated rare plant element occurrences.

Site	Species	Common name	Previous Last Observed	Current Last Observed
Dietz Rd. West	*Lycopus virginicus**	Bugle weed	New	2014-09-09
Perry Rd. West	*Lycopus virginicus**	Bugle weed	New	2014-09-09
Sanford Woods	*Diarrhena obovata*	Beak grass	2007-10-13	2013-07-05
Sanford Woods	*Hydrastis canadensis*	Goldenseal	1968	2013-09-05
Sanford Woods	*Lycopus virginicus*	Bugle weed	1962-09-30	2013-09-05
Sanford Woods (E)	*Carex davisii*	Davis' sedge	New	2013-07-05
Ferguson Park	*Carex davisii*	Davis' sedge	New	2013-07-05
Ferguson Park	*Diarrhena obovata*	Beak grass	New	2013-07-05
Ferguson Park	*Lycopus virginicus*	Bugle weed	New	2013-08-17
Van Atta Rd. NA	*Carex davisii*	Davis' sedge	1990-06-02	2013-08-14
Van Atta Rd. NA	*Diarrhena obovata*	Beak grass	1980	2013-08-14
Van Atta Rd. NA	*Lycopus virginicus*	Bugle weed	1952-09-20	2013-08-14
Williamston West	*Lycopus virginicus**	Bugle weed	New	2014-09-09

*Part of the same element occurrence

Table 9. Previously documented rare plant element occurrences not reconfirmed 2013 – 2014.

Site	Species	Common name	Previous Last Observed	Current Last Observed
Sanford Woods	*Hydrastis canadensis*	Green violet	2007-05-18	NA*
Sanford Woods	*Morus rubra*	Red mulberry	1969-10-07	NA
Sanford Woods	*Panax quinquefolius*	Ginseng	1964-09-07	NA

*Likely extant; very limited distribution.

Key Challenges

All sites surveyed in the Corridor are impacted to at least some degree by disturbances typical of natural areas in urban and suburban settings. The immediate surrounding landscape ranges from moderate density urban development in East Lansing to residential subdivisions in Meridian Township to agricultural row crops and low density residential development in the eastern portion

of the corridor. The impacts of this landscape fragmentation and adjacent development include: 1) altered hydrology; 2) the establishment and spread of invasive plant species; and 3) the concentration of deer in the natural areas causing erosion and high levels of browse that have reduced populations of native plant species. In addition, many of these sites support a variety of native ash trees. Unfortunately, the emerald ash borer has killed the vast majority of these ashes. This has created more openings in the canopy, allowing significant levels of light to reach the ground layer as well as increasing the water table. In the immediate term, these changes have provided additional habitat for invasive plant species such as reed canary grass to increase their dominance.

A diversity of non-native, invasive species has become established at all of the sites visited. Invasive shrubs are widespread and locally common to dominant. Invasive shrubs include Amur honeysuckle (*Lonicera maackii*), common privet (*Ligustrum vulgare*), multiflora rose (*Rosa multiflora*), common buckthorn *(Rhamnus cathartica*), European highbush-cranberry (*Viburnum opulus*), Japanese barberry (*Berberis thunbergii*), Morrow honeysuckle (*Lonicera morrowii*), and autumn-olive (*Elaeagnus umbellata*). Invasive herbaceous species are also common and locally abundant or dominant. Among these, moneywort (*Lysimachia nummularia*) and dame's-rocket (*Hesperis matronalis*) are especially pernicious in the floodplain. Garlic mustard (*Alliaria petiolata*) is locally common. Wet openings in the floodplain and some open wetlands support locally dense populations of reed canary grass (*Phalaris arundinacea*), a particularly difficult invasive species to eradicate and control.

Conservation Actions

Invasive Species Control: The primary stewardship need is the control and management of invasive plant species. Each site has its own unique set of invasive species to address. We recommend that efforts should primarily focus on controllable threats such as invasive shrubs (Amur honeysuckle, common privet, multiflora rose, and honeysuckle) and easy-to-treat herbaceous species such as garlic mustard and dame's-rocket.

Habitat Protection: Many of the sites surveyed have some land in public ownership and protected from disruptive activities such as extraction and development. Most sites also have small portions that are in private ownership and all are surrounded by a mix of private land uses. However, the three sites located between Williamston and Webberville are 100% privately owned. Private landowners within and adjacent to the site boundaries should be contacted about the significance of these sites and what they can do to help ensure the long-term health of these limited number of natural areas within the Corridor. Conservation opportunities could come in the form of conservation easements, fee acquisition, management agreements, and/or enrollment in farm bill programs. The Mid-Michigan Land Conservancy, located in Okemos, is a logical partner to work with these individual landowners on long-term conservation of their natural lands.

Controlling Deer Population: Managed hunts and monitoring of deer populations are both needed to reduce the impact of deer browse on native plant species. Every site visited showed signs of deer browse, with some areas displaying very little native ground flora diversity and density. Deer populations throughout the corridor and surrounding areas need to be reduced to ecologically sustainable levels. Meridian Township has already taken steps to reduce the impact of the local deer herd by establishing a managed deer hunting program on Meridian Township owned lands. Efforts should also be undertaken to monitor the impacts of deer management on site vegetation and soil condition to determine if various management efforts are working.

Conclusion

The BRT corridor is located within a highly modified, human dominated landscape of northwest Ingham County in mid-Michigan. It varies from west to east, with high density urban development and impervious cover in Lansing and East Lansing, a mix of natural and moderate density urban development in Meridian Township, and a mix of low density development, rural, and natural lands between the towns of Williamston and Webberville. Based on historical aerial photographs, much of this corridor was already modified by 1930s, with only 7.6% of the land in natural condition. Typical of an urbanized Midwestern landscape, only one of the sites visited and surveyed was of high quality (Sanford Woods), although several sites did contain rare plant populations and/or natural community remnants of moderate quality. The biggest challenges in the corridor are invasive plant species and the impacts of emerald ash borer, followed by deer herbivory in the understory. Habitat fragmentation is the largest underlying problem. The prospects of reversing the current levels of habitat fragmentation however are daunting and seemingly insurmountable given the high levels of urbanization, road density, and parcelization in the region.

Despite these obstacles, there are areas where it is feasible to improve habitat connectivity and condition. The Red Cedar floodplain from Meridian Township to Webberville is a large stretch that provides such an opportunity. The Van Atta Road Natural Area is the only hub that occurred in this stretch and is certainly one of the highest quality sites that was surveyed. The portion of the Red Cedar River north of Grand River Avenue is largely in an agricultural landscape. Farmland typically provides a better opportunity for habitat restoration, and there are still several large stretches of the floodplain and adjacent uplands in natural condition. This was particularly evident for the three sites surveyed between Williamston and Perry Rd. (M-52). Another stretch of the Red Cedar River floodplain, located where it crosses Grand River Avenue in Meridian Township east to Williamston, could also provide another good opportunity for ecological protection and restoration.

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Paskus, J.J. and H.D. Enander. 2008. Clinton, Eaton, and Ingham Counties Potential ConservationAreas: Providing Ecological Information for a Green Infrastructure Plan. Report to Tri-County RegionalPlanning Commission, Lansing, MI. Report number MNFI 2008-11, 21 pp. + appendices.

Appendix A:
Floristic Quality Assessment – Sanford Woods

Sanford Natural Area

	07/03/2013
Sanford NA	
East Lansing	
Ingham	
MI	
USA	
FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter
Latitude:	42.7283
Longitude:	-84.4664
Weather Notes:	
Duration Notes:	
Community Type Notes:	Mesic southern forest, floodplain forest
Other Notes:	Additional surveys 5 September 2013(Slaughter, J. Paskus, B. Norris); 6 May 2014 (B. Slaughter). Also noted: Dryopteris sp., Carex spp., Scrophularia sp., Crataegus sp.
Private/Public:	Public

Conservatism-Based Metrics:	
Total Mean C:	4
Native Mean C:	4.8
Total FQI:	53.1
Native FQI:	58.2
Adjusted FQI:	43.9
% C value 0:	19.3
% C value 1-3:	17
% C value 4-6:	46
% C value 7-10:	17.6
Native Tree Mean C:	4.5
Native Shrub Mean C:	5.1
Native Herbaceous Mean C:	4.8

Species Richness:		
Total Species:	176	
Native Species:	147	83.50%
Non-native Species:	29	16.50%
Species Wetness:		
Mean Wetness:	1.1	
Native Mean Wetness:	0.8	
Physiognomy Metrics:		
Tree:	34	19.30%
Shrub:	14	8%
Vine:	9	5.10%
Forb:	90	51.10%
Grass:	11	6.30%
Sedge:	13	7.40%
Rush:	0	0%
Fern:	5	2.80%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	5	2.80%
Perennial:	164	93.20%
Biennial:	7	4%
Native Annual:	4	2.30%
Native Perennial:	140	79.50%
Native Biennial:	3	1.70%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer campestre	Sapindaceae	ACECAM	non-native	0	5	tree	perennial	hedge maple
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer nigrum; a. saccharum	Sapindaceae	ACENIG	native	4	3	tree	perennial	black maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Actaea pachypoda	Ranunculaceae	ACTPAC	native	7	5	forb	perennial	dolls-eyes
Ageratina altissima; eupatorium rugosum	Asteraceae	AGEALT	native	4	3	forb	perennial	white snakeroot

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Agrostis perennans	Poaceae	AGRPER	native	5	3	grass	perennial	autumn bent
Alisma subcordatum; a. plantago-aquatica	Alismataceae	ALISUB	native	1	-5	forb	perennial	southern water-plantain
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Allium canadense	Alliaceae	ALLCAN	native	4	3	forb	perennial	wild garlic
Allium tricoccum	Alliaceae	ALLTRI	native	5	3	forb	perennial	wild leek
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock
Arisaema dracontium	Araceae	ARIDRA	native	8	-3	forb	perennial	green dragon
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asarum canadense	Aristolochiaceae	ASACAN	native	5	5	forb	perennial	wild-ginger
Asclepias incarnata	Apocynaceae	ASCINC	native	6	-5	forb	perennial	swamp milkweed
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Boechera laevigata; arabis l.	Brassicaceae	BOELAE	native	5	5	forb	biennial	smooth bank cress
Brachyelytrum erectum	Poaceae	BRAERE	native	7	5	grass	perennial	long-awned wood grass
Cardamine concatenata; dentaria laciniata	Brassicaceae	CARCON	native	5	3	forb	perennial	cut-leaved toothwort
Carex albursina	Cyperaceae	CXALBU	native	5	5	sedge	perennial	sedge
Carex blanda	Cyperaceae	CXBLAN	native	1	0	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex jamesii	Cyperaceae	CXJAME	native	8	5	sedge	perennial	james sedge
Carex laxiflora	Cyperaceae	CXLAXF	native	8	0	sedge	perennial	sedge
Carex pedunculata	Cyperaceae	CXPEDU	native	5	3	sedge	perennial	sedge
Carex plantaginea	Cyperaceae	CXPLAN	native	8	5	sedge	perennial	sedge
Carex sparganioides	Cyperaceae	CXSPAR	native	5	3	sedge	perennial	sedge
Carex stipata	Cyperaceae	CXSTIP	native	1	-5	sedge	perennial	sedge
Carex woodii	Cyperaceae	CXWOOD	native	8	3	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya cordiformis	Juglandaceae	CARCOR	native	5	0	tree	perennial	bitternut hickory
Catalpa speciosa	Bignoniaceae	CATSPE	non-native	0	3	tree	perennial	northern catalpa
Caulophyllum thalictroides	Berberidaceae	CAUTHA	native	5	5	forb	perennial	blue cohosh
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush
Cercis canadensis	Fabaceae	CERCAN	native	8	3	tree	perennial	redbud
Chelidonium majus	Papaveraceae	CHEMAJ	non-native	0	5	forb	biennial	celandine

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium vulgare	Asteraceae	CIRVUL	non-native	0	3	forb	biennial	bull thistle
Claytonia virginica	Montiaceae	CLAVIR	native	4	3	forb	perennial	spring-beauty
Collinsonia canadensis	Lamiaceae	COLCAN	native	8	0	forb	perennial	richweed
Convallaria majalis	Convallariaceae	CONMAJ	non-native	0	5	forb	perennial	lily-of-the-valley
Cornus alternifolia	Cornaceae	CORALT	native	5	3	tree	perennial	alternate-leaved dogwood
Cryptotaenia canadensis	Apiaceae	CRYCAN	native	2	0	forb	perennial	honewort
Diarrhena obovata; d. americana	Poaceae	DIAOBO	native	9	-3	grass	perennial	beak grass
Dicentra canadensis	Papaveraceae	DICCAN	native	7	5	forb	perennial	squirrel-corn
Dicentra cucullaria	Papaveraceae	DICCUC	native	7	5	forb	perennial	dutchmans-breeches
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus riparius	Poaceae	ELYRIP	native	8	-3	grass	perennial	riverbank wild-rye
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epipactis helleborine	Orchidaceae	EPIHEL	non-native	0	0	forb	perennial	helleborine
Eragrostis hypnoides	Poaceae	ERAHYP	native	8	-5	grass	annual	creeping love grass
Erythronium albidum	Liliaceae	ERYALB	native	7	3	forb	perennial	white trout lily
Erythronium americanum	Liliaceae	ERYAME	native	5	5	forb	perennial	yellow trout lily
Euonymus obovatus	Celastraceae	EUOOBO	native	5	3	shrub	perennial	running strawberry-bush
Eurybia macrophylla; aster m.	Asteraceae	EURMAC	native	4	5	forb	perennial	big-leaved aster
Eutrochium purpureum; eupatorium p.	Asteraceae	EUTPUR	native	5	0	forb	perennial	green-stemmed joe-pye-weed
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glechoma hederacea	Lamiaceae	GLEHED	non-native	0	3	forb	perennial	ground-ivy
Gleditsia triacanthos	Fabaceae	GLETRI	native	8	0	tree	perennial	honey locust
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel
Hedera helix	Araliaceae	HEDHEL	non-native	0	3	vine	perennial	english ivy
Hemerocallis fulva	Hemerocallidaceae	HEMFUL	non-native	0	5	forb	perennial	orange day-lily
Hepatica acutiloba	Ranunculaceae	HEPACU	native	8	5	forb	perennial	sharp-lobed hepatica
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Hydrastis canadensis	Ranunculaceae	HYDCAS	native	10	3	forb	perennial	goldenseal

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Hydrophyllum appendiculatum	Boraginaceae	HYDAPP	native	7	3	forb	biennial	great waterleaf
Hydrophyllum canadense	Boraginaceae	HYDCAE	native	7	0	forb	perennial	canada waterleaf
Hydrophyllum virginianum	Boraginaceae	HYDVIR	native	4	0	forb	perennial	virginia waterleaf
Hylodesmum glutinosum; desmodium g.	Fabaceae	HYLGLU	native	5	5	forb	perennial	clustered-leaved tick-trefoil
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Impatiens pallida	Balsaminaceae	IMPPAL	native	6	-3	forb	annual	pale touch-me-not
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lindera benzoin	Lauraceae	LINBEN	native	7	-3	shrub	perennial	spicebush
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lycopus rubellus	Lamiaceae	LYCRUB	native	8	-5	forb	perennial	stalked water horehound
Lycopus virginicus	Lamiaceae	LYCVIR	native	8	-5	forb	perennial	bugle weed
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia nummularia	Myrsinaceae	LYSNUM	non-native	0	-3	forb	perennial	moneywort
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Maianthemum stellatum; smilacina s.	Convallariaceae	MAISTE	native	5	0	forb	perennial	starry false solomon-seal
Matteuccia struthiopteris	Onocleaceae	MATSTR	native	3	0	fern	perennial	ostrich fern
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed
Mimulus ringens	Phrymaceae	MIMRIN	native	5	-5	forb	perennial	monkey-flower
Morus alba	Moraceae	MORALB	non-native	0	3	tree	perennial	white mulberry
Nepeta cataria	Lamiaceae	NEPCAT	non-native	0	3	forb	perennial	catnip
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Osmorhiza claytonii	Apiaceae	OSMCLI	native	4	3	forb	perennial	hairy sweet-cicely
Osmunda regalis	Osmundaceae	OSMREG	native	5	-5	fern	perennial	royal fern
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Penthorum sedoides	Penthoraceae	PENSED	native	3	-5	forb	perennial	ditch stonecrop
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Pinus strobus	Pinaceae	PINSTR	native	3	3	tree	perennial	white pine
Plantago rugelii	Plantaginaceae	PLARUG	native	0	0	forb	perennial	red-stalked plantain
Platanus occidentalis	Platanaceae	PLAOCC	native	7	-3	tree	perennial	sycamore
Poa alsodes	Poaceae	POAALS	native	9	0	grass	perennial	bluegrass
Poa pratensis	Poaceae	POAPRA	non-native	0	3	grass	perennial	kentucky bluegrass

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Polygonatum pubescens	Convallariaceae	POLPUB	native	5	5	forb	perennial	downy solomon seal
Polystichum acrostichoides	Dryopteridaceae	POLACR	native	6	3	fern	perennial	christmas fern
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Prunella vulgaris	Lamiaceae	PRUVUL	native	0	0	forb	perennial	self-heal
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Ranunculus abortivus	Ranunculaceae	RANABO	native	0	0	forb	perennial	small-flowered buttercup
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Ranunculus recurvatus	Ranunculaceae	RANREC	native	5	-3	forb	perennial	hooked crowfoot
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Ribes cynosbati	Grossulariaceae	RIBCYN	native	4	3	shrub	perennial	prickly or wild gooseberry
Robinia pseudoacacia	Fabaceae	ROBPSE	non-native	0	3	tree	perennial	black locust
Rudbeckia laciniata	Asteraceae	RUDLAC	native	6	-3	forb	perennial	cut-leaf coneflower
Rumex obtusifolius	Polygonaceae	RUMOBT	non-native	0	0	forb	perennial	bitter dock
Sambucus racemosa	Adoxaceae	SAMRAC	native	3	3	shrub	perennial	red-berried elder
Sanguinaria canadensis	Papaveraceae	SANCAA	native	5	3	forb	perennial	bloodroot
Sanicula odorata; s. gregaria	Apiaceae	SANODO	native	2	0	forb	perennial	black snakeroot
Sassafras albidum	Lauraceae	SASALB	native	5	3	tree	perennial	sassafras
Saururus cernuus	Saururaceae	SAUCER	native	9	-5	forb	perennial	lizards-tail
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Silene vulgaris	Caryophyllaceae	SILVUL	non-native	0	5	forb	perennial	bladder campion
Smilax ecirrata	Smilacaceae	SMIECI	native	6	5	forb	perennial	upright carrion-flower
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier
Smilax illinoensis	Smilacaceae	SMIILL	native	4	5	vine	perennial	carrion-flower
Solanum dulcamara	Solanaceae	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago caesia	Asteraceae	SOLCAE	native	6	3	forb	perennial	bluestem goldenrod
Solidago flexicaulis	Asteraceae	SOLFLE	native	6	3	forb	perennial	zigzag goldenrod
Sorbus aucuparia	Rosaceae	SORAUC	non-native	0	5	tree	perennial	european mountain-ash
Staphylea trifolia	Staphyleaceae	STATRI	native	9	0	shrub	perennial	bladdernut
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster
Symphyotrichum ontarionis; aster o.	Asteraceae	SYMONT	native	6	0	forb	perennial	lake ontario aster

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Thalictrum dioicum	Ranunculaceae	THADIO	native	6	3	forb	perennial	early meadow-rue
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Torilis japonica	Apiaceae	TORJAP	non-native	0	3	forb	annual	hedge-parsley
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Trillium erectum	Trilliaceae	TRIERE	native	7	3	forb	perennial	stinking benjamin; red trillium
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium
Tsuga canadensis	Pinaceae	TSUCAN	native	5	3	tree	perennial	hemlock
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Ulmus rubra	Ulmaceae	ULMRUB	native	2	0	tree	perennial	slippery elm
Uvularia grandiflora	Convallariaceae	UVUGRA	native	5	5	forb	perennial	bellwort
Veronicastrum virginicum	Plantaginaceae	VERVIR	native	8	0	forb	perennial	culvers-root
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Vincetoxicum nigrum	Apocynaceae	VINNIG	non-native	0	5	vine	perennial	black swallow-wort
Viola canadensis	Violaceae	VIOCAN	native	5	3	forb	perennial	canada violet
Viola pubescens	Violaceae	VIOPUB	native	4	3	forb	perennial	yellow violet
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Appendix B:
Floristic Quality Assessment – Ferguson Park

Sumbal Natural Area

07/05/2013

Red Cedar River

Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter
Latitude:	42.7147
Longitude:	-84.4271
Weather Notes:	
Duration Notes:	
Community Type Notes:	Floodplain forest
Other Notes:	Additional survey 17 August 2013.
Private/Public:	Private

Conservatism-Based Metrics:	
Total Mean C:	3
Native Mean C:	3.7
Total FQI:	28.6
Native FQI:	32
Adjusted FQI:	33.6
% C value 0:	26.4
% C value 1-3:	27.5
% C value 4-6:	36.3
% C value 7-10:	9.9
Native Tree Mean C:	3.8
Native Shrub Mean C:	4.5
Native Herbaceous Mean C:	3.6

Species Richness:		
Total Species:	91	
Native Species:	75	82.40%
Non-native Species:	16	17.60%
Species Wetness:		
Mean Wetness:	-0.5	
Native Mean Wetness:	-1.2	
Physiognomy Metrics:		
Tree:	15	16.50%
Shrub:	10	11%
Vine:	6	6.60%
Forb:	39	42.90%
Grass:	7	7.70%
Sedge:	11	12.10%
Rush:	0	0%
Fern:	3	3.30%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	4	4.40%
Perennial:	83	91.20%
Biennial:	4	4.40%
Native Annual:	4	4.40%
Native Perennial:	70	76.90%
Native Biennial:	1	1.10%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Allium canadense	Alliaceae	ALLCAN	native	4	3	forb	perennial	wild garlic
Ambrosia trifida	Asteraceae	AMBTRI	native	0	0	forb	annual	giant ragweed
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Arisaema dracontium	Araceae	ARIDRA	native	8	-3	forb	perennial	green dragon
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asarum canadense	Aristolochiaceae	ASACAN	native	5	5	forb	perennial	wild-ginger
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Carex crinita	Cyperaceae	CXCRIN	native	4	-5	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex davisii	Cyperaceae	CXDAVI	native	7	0	sedge	perennial	davis sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge
Carex radiata; c. rosea	Cyperaceae	CXRADI	native	2	0	sedge	perennial	straight-styled wood sedge
Carex scoparia	Cyperaceae	CXSCOP	native	4	-3	sedge	perennial	sedge
Carex stipata	Cyperaceae	CXSTIP	native	1	-5	sedge	perennial	sedge
Carex vulpinoidea	Cyperaceae	CXVULP	native	1	-5	sedge	perennial	sedge
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory
Catalpa speciosa	Bignoniaceae	CATSPE	non-native	0	3	tree	perennial	northern catalpa
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium arvense	Asteraceae	CIRARV	non-native	0	3	forb	perennial	canada thistle
Convallaria majalis	Convallariaceae	CONMAJ	non-native	0	5	forb	perennial	lily-of-the-valley
Crataegus mollis	Rosaceae	CRAMOL	native	2	0	tree	perennial	hawthorn
Diarrhena obovata; d. americana	Poaceae	DIAOBO	native	9	-3	grass	perennial	beak grass
Dichanthelium clandestinum; panicum c.	Poaceae	DICCLA	native	3	-3	grass	perennial	panic grass
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Dryopteris carthusiana	Dryopteridaceae	DRYCAR	native	5	-3	fern	perennial	spinulose woodfern
Echinocystis lobata	Cucurbitaceae	ECHLOB	native	2	-3	vine	annual	wild-cucumber
Elymus riparius	Poaceae	ELYRIP	native	8	-3	grass	perennial	riverbank wild-rye
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Equisetum arvense	Equisetaceae	EQUARV	native	0	0	fern	perennial	common horsetail
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium asprellum	Rubiaceae	GALASP	native	5	-5	vine	perennial	rough bedstraw
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glechoma hederacea	Lamiaceae	GLEHED	non-native	0	3	forb	perennial	ground-ivy
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Lemna minor	Araceae	LEMMIN	native	5	-5	forb	perennial	common duckweed
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Lycopus virginicus	Lamiaceae	LYCVIR	native	8	-5	forb	perennial	bugle weed
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia nummularia	Myrsinaceae	LYSNUM	non-native	0	-3	forb	perennial	moneywort
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Persicaria lapathifolia; polygonum l.	Polygonaceae	PERLAP	native	0	-3	forb	annual	nodding smartweed
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Prunella vulgaris	Lamiaceae	PRUVUL	native	0	0	forb	perennial	self-heal
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus palustris	Fagaceae	QUEPAL	native	8	-3	tree	perennial	pin oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod
Staphylea trifolia	Staphyleaceae	STATRI	native	9	0	shrub	perennial	bladdernut

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Ulmus rubra	Ulmaceae	ULMRUB	native	2	0	tree	perennial	slippery elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Verbascum thapsus	Scrophulariaceae	VERTHA	non-native	0	5	forb	biennial	common mullein
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Viola striata	Violaceae	VIOSTR	native	5	-3	forb	perennial	cream violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape

Appendix C:
Floristic Quality Assessment – Van Atta Road Natural Area

Red Cedar River - Riverdowns Natural Area, Legg Park, Harris Nature Center, Eastgate Park

06/28/2013

Red Cedar River

Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter
Latitude:	42.6967
Longitude:	-84.3786
Weather Notes:	
Duration Notes:	
Community Type Notes:	Primarily floodplain forest, with areas of mesic southern forest, dry-mesic southern forest, and old field.
Other Notes:	Additional surveys 27 June, 1 July, 14 August. Also noted: Carex spp., Prenanthes sp., Dichanthelium sp., Bidens sp., Muhlenbergia sp., Scrophularia sp., Bidens sp., Stellaria sp.
Private/Public:	Public

Conservatism-Based Metrics:

Total Mean C:	3.3
Native Mean C:	4.2
Total FQI:	54.4
Native FQI:	61.6
Adjusted FQI:	37.3
% C value 0:	24.3
% C value 1-3:	25
% C value 4-6:	40.1
% C value 7-10:	10.7
Native Tree Mean C:	4.2
Native Shrub Mean C:	4.2
Native Herbaceous Mean C:	4.2

Species Richness:

Total Species:	272	
Native Species:	215	79%
Non-native Species:	57	21%
Species Wetness:		
Mean Wetness:	1	
Native Mean Wetness:	0.5	
Physiognomy Metrics:		
Tree:	39	14.30%
Shrub:	30	11%
Vine:	11	4%
Forb:	143	52.60%
Grass:	23	8.50%
Sedge:	20	7.40%
Rush:	0	0%
Fern:	6	2.20%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	16	5.90%
Perennial:	240	88.20%
Biennial:	16	5.90%
Native Annual:	11	4%
Native Perennial:	199	73.20%
Native Biennial:	5	1.80%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer nigrum; a. saccharum	Sapindaceae	ACENIG	native	4	3	tree	perennial	black maple
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Achillea millefolium	Asteraceae	ACHMIL	native	1	3	forb	perennial	yarrow
Acorus calamus	Acoraceae	ACOCAL	non-native	0	-5	forb	perennial	calamus
Actaea pachypoda	Ranunculaceae	ACTPAC	native	7	5	forb	perennial	dolls-eyes
Agastache nepetoides	Lamiaceae	AGANEP	native	5	3	forb	perennial	yellow giant hyssop
Agrimonia gryposepala	Rosaceae	AGRGRY	native	2	3	forb	perennial	tall agrimony
Alisma subcordatum; a. plantago-aquatica	Alismataceae	ALISUB	native	1	-5	forb	perennial	southern water-plantain
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Allium tricoccum	Alliaceae	ALLTRI	native	5	3	forb	perennial	wild leek
Ambrosia artemisiifolia	Asteraceae	AMBART	native	0	3	forb	annual	common ragweed
Ambrosia trifida	Asteraceae	AMBTRI	native	0	0	forb	annual	giant ragweed
Amelanchier interior	Rosaceae	AMEINT	native	4	5	shrub	perennial	serviceberry
Amphicarpaea bracteata	Fabaceae	AMPBRA	native	5	0	vine	annual	hog-peanut
Anemone canadensis	Ranunculaceae	ANECAN	native	4	-3	forb	perennial	canada anemone
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone
Anemone virginiana	Ranunculaceae	ANEVIR	native	3	3	forb	perennial	thimbleweed
Antennaria parlinii	Asteraceae	ANTPAL	native	2	5	forb	perennial	smooth pussytoes
Apios americana	Fabaceae	APIAME	native	3	-3	vine	perennial	groundnut
Apocynum cannabinum; a. sibiricum	Apocynaceae	APOCAN	native	3	0	forb	perennial	indian-hemp
Aquilegia canadensis	Ranunculaceae	AQUCAN	native	5	3	forb	perennial	wild columbine
Arisaema dracontium	Araceae	ARIDRA	native	8	-3	forb	perennial	green dragon
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asarum canadense	Aristolochiaceae	ASACAN	native	5	5	forb	perennial	wild-ginger
Asclepias syriaca	Apocynaceae	ASCSYR	native	1	5	forb	perennial	common milkweed
Asplenium platyneuron	Aspleniaceae	ASPPLA	native	2	3	fern	perennial	ebony spleenwort
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Berteroa incana	Brassicaceae	BERINC	non-native	0	5	forb	annual	hoary alyssum
Blephilia hirsuta	Lamiaceae	BLEHIR	native	8	3	forb	perennial	wood mint
Boechera laevigata; arabis l.	Brassicaceae	BOELAE	native	5	5	forb	biennial	smooth bank cress
Brachyelytrum erectum	Poaceae	BRAERE	native	7	5	grass	perennial	long-awned wood grass
Bromus ciliatus	Poaceae	BROCIL	native	6	-3	grass	perennial	fringed brome
Bromus inermis	Poaceae	BROINE	non-native	0	5	grass	perennial	smooth brome
Campanulastrum americanum; campanula a.	Campanulaceae	CAMAME	native	8	0	forb	biennial	tall bellflower
Carex albursina	Cyperaceae	CXALBU	native	5	5	sedge	perennial	sedge
Carex blanda	Cyperaceae	CXBLAN	native	1	0	sedge	perennial	sedge
Carex cephalophora	Cyperaceae	CXCEPP	native	3	3	sedge	perennial	sedge
Carex crinita	Cyperaceae	CXCRIN	native	4	-5	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex davisii	Cyperaceae	CXDAVI	native	7	0	sedge	perennial	davis sedge
Carex frankii	Cyperaceae	CXFRAN	native	4	-5	sedge	perennial	franks sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex jamesii	Cyperaceae	CXJAME	native	8	5	sedge	perennial	james sedge
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge
Carex laxiflora	Cyperaceae	CXLAXF	native	8	0	sedge	perennial	sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge

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Carex pensylvanica	Cyperaceae	CXPENS	native	4	5	sedge	perennial	sedge
Carex rosea; c. convoluta	Cyperaceae	CXROSE	native	2	5	sedge	perennial	curly-styled wood sedge
Carex sparganioides	Cyperaceae	CXSPAR	native	5	3	sedge	perennial	sedge
Carex sprengelii	Cyperaceae	CXSPRE	native	5	0	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya cordiformis	Juglandaceae	CARCOR	native	5	0	tree	perennial	bitternut hickory
Carya glabra	Juglandaceae	CARGLA	native	5	3	tree	perennial	pignut hickory
Caulophyllum thalictroides	Berberidaceae	CAUTHA	native	5	5	forb	perennial	blue cohosh
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Centaurea stoebe; c. maculosa	Asteraceae	CENSTO	non-native	0	5	forb	biennial	spotted knapweed
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush
Chelidonium majus	Papaveraceae	CHEMAJ	non-native	0	5	forb	biennial	celandine
Cicuta maculata	Apiaceae	CICMAC	native	4	-5	forb	biennial	water hemlock
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium arvense	Asteraceae	CIRARV	non-native	0	3	forb	perennial	canada thistle
Cirsium vulgare	Asteraceae	CIRVUL	non-native	0	3	forb	biennial	bull thistle
Conium maculatum	Apiaceae	CONMAC	non-native	0	-3	forb	biennial	poison-hemlock
Cornus alternifolia	Cornaceae	CORALT	native	5	3	tree	perennial	alternate-leaved dogwood
Cornus florida	Cornaceae	CORFLO	native	8	3	tree	perennial	flowering dogwood
Cornus foemina	Cornaceae	CORFOE	native	1	0	shrub	perennial	gray dogwood
Crataegus mollis	Rosaceae	CRAMOL	native	2	0	tree	perennial	hawthorn
Crataegus punctata; c. nitidula	Rosaceae	CRAPUN	native	1	3	tree	perennial	dotted hawthorn
Cryptotaenia canadensis	Apiaceae	CRYCAN	native	2	0	forb	perennial	honewort
Cuscuta gronovii	Convolvulaceae	CUSGRO	native	3	-3	vine	annual	common dodder
Dactylis glomerata	Poaceae	DACGLO	non-native	0	3	grass	perennial	orchard grass
Danthonia spicata	Poaceae	DANSPI	native	4	5	grass	perennial	poverty grass; oatgrass
Daucus carota	Apiaceae	DAUCAR	non-native	0	5	forb	biennial	queen-annes-lace
Decodon verticillatus	Lythraceae	DECVER	native	7	-5	shrub	perennial	whorled or swamp loosestrife
Dianthus armeria	Caryophyllaceae	DIAARM	non-native	0	5	forb	annual	deptford pink
Diarrhena obovata; d. americana	Poaceae	DIAOBO	native	9	-3	grass	perennial	beak grass
Dichanthelium clandestinum; panicum c.	Poaceae	DICCLA	native	3	-3	grass	perennial	panic grass
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Dipsacus laciniatus	Dipsacaceae	DIPLAC	non-native	0	3	forb	biennial	cut-leaf teasel
Dryopteris intermedia	Dryopteridaceae	DRYINT	native	5	0	fern	perennial	evergreen woodfern
Echinocystis lobata	Cucurbitaceae	ECHLOB	native	2	-3	vine	annual	wild-cucumber
Elaeagnus umbellata	Elaeagnaceae	ELAUMB	non-native	0	3	shrub	perennial	autumn-olive
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus repens; agropyron r.	Poaceae	ELYREP	non-native	0	3	grass	perennial	quack grass
Elymus riparius	Poaceae	ELYRIP	native	8	-3	grass	perennial	riverbank wild-rye

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epifagus virginiana	Orobanchaceae	EPIVIR	native	10	5	forb	annual	beech-drops
Epipactis helleborine	Orchidaceae	EPIHEL	non-native	0	0	forb	perennial	helleborine
Equisetum hyemale	Equisetaceae	EQUHYE	native	2	0	fern	perennial	scouring rush
Eragrostis hypnoides	Poaceae	ERAHYP	native	8	-5	grass	annual	creeping love grass
Erigeron strigosus	Asteraceae	ERISTR	native	4	3	forb	perennial	daisy fleabane
Euonymus obovatus	Celastraceae	EUOOBO	native	5	3	shrub	perennial	running strawberry-bush
Eurybia macrophylla; aster m.	Asteraceae	EURMAC	native	4	5	forb	perennial	big-leaved aster
Euthamia graminifolia	Asteraceae	EUTGRA	native	3	0	forb	perennial	grass-leaved goldenrod
Eutrochium purpureum; eupatorium p.	Asteraceae	EUTPUR	native	5	0	forb	perennial	green-stemmed joe-pye-weed
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech
Festuca subverticillata; f. obtusa	Poaceae	FESSUB	native	5	3	grass	perennial	nodding fescue
Fragaria virginiana	Rosaceae	FRAVIR	native	2	3	forb	perennial	wild strawberry
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium circaezans	Rubiaceae	GALCIR	native	4	3	forb	perennial	white wild licorice
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Galium odoratum	Rubiaceae	GALODO	non-native	0	5	forb	perennial	sweet woodruff
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum aleppicum	Rosaceae	GEUALE	native	3	0	forb	perennial	yellow avens
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel
Hedera helix	Araliaceae	HEDHEL	non-native	0	3	vine	perennial	english ivy
Helianthus giganteus	Asteraceae	HELGIG	native	5	-3	forb	perennial	tall sunflower
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Hieracium caespitosum	Asteraceae	HIECAE	non-native	0	5	forb	perennial	king devil
Hydrophyllum virginianum	Boraginaceae	HYDVIR	native	4	0	forb	perennial	virginia waterleaf
Hylodesmum glutinosum; desmodium g.	Fabaceae	HYLGLU	native	5	5	forb	perennial	clustered-leaved tick-trefoil
Hylodesmum nudiflorum; desmodium n.	Fabaceae	HYLNUD	native	7	5	forb	perennial	naked tick-trefoil
Hypericum perforatum	Hypericaceae	HYPPER	non-native	0	5	forb	perennial	common st. johns-wort
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Impatiens pallida	Balsaminaceae	IMPPAL	native	6	-3	forb	annual	pale touch-me-not
Iris pseudacorus	Iridaceae	IRIPSE	non-native	0	-5	forb	perennial	yellow flag
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Juncus tenuis	Juncaceae	JUNTEN	native	1	0	forb	perennial	path rush

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Lactuca biennis	Asteraceae	LACBIE	native	2	0	forb	biennial	tall blue lettuce
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Lemna minor	Araceae	LEMMIN	native	5	-5	forb	perennial	common duckweed
Leonurus cardiaca	Lamiaceae	LEOCAR	non-native	0	5	forb	perennial	motherwort
Leucanthemum vulgare; chrysanthemum leucanthemum	Asteraceae	LEUVUL	non-native	0	5	forb	perennial	ox-eye daisy
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lindera benzoin	Lauraceae	LINBEN	native	7	-3	shrub	perennial	spicebush
Liriodendron tulipifera	Magnoliaceae	LIRTUL	native	9	3	tree	perennial	tulip tree
Lobelia cardinalis	Campanulaceae	LOBCAR	native	7	-5	forb	perennial	cardinal-flower
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Lonicera tatarica	Caprifoliaceae	LONTAT	non-native	0	3	shrub	perennial	tartarian honeysuckle
Luzula multiflora	Juncaceae	LUZMUL	native	5	3	forb	perennial	common wood rush
Lycopus rubellus	Lamiaceae	LYCRUB	native	8	-5	forb	perennial	stalked water horehound
Lycopus virginicus	Lamiaceae	LYCVIR	native	8	-5	forb	perennial	bugle weed
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia nummularia	Myrsinaceae	LYSNUM	non-native	0	-3	forb	perennial	moneywort
Maianthemum canadense	Convallariaceae	MAICAN	native	4	3	forb	perennial	canada mayflower
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Maianthemum stellatum; smilacina s.	Convallariaceae	MAISTE	native	5	0	forb	perennial	starry false solomon-seal
Malus pumila	Rosaceae	MALPUM	non-native	0	5	tree	perennial	apple
Matteuccia struthiopteris	Onocleaceae	MATSTR	native	3	0	fern	perennial	ostrich fern
Medicago lupulina	Fabaceae	MEDLUP	non-native	0	3	forb	annual	black medick
Melilotus officinalis	Fabaceae	MELLOF	non-native	0	3	forb	biennial	yellow sweet-clover
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed
Mimulus ringens	Phrymaceae	MIMRIN	native	5	-5	forb	perennial	monkey-flower
Monarda fistulosa	Lamiaceae	MONFIS	native	2	3	forb	perennial	wild-bergamot
Nepeta cataria	Lamiaceae	NEPCAT	non-native	0	3	forb	perennial	catnip
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Osmorhiza claytonii	Apiaceae	OSMCLI	native	4	3	forb	perennial	hairy sweet-cicely
Osmorhiza longistylis	Apiaceae	OSMLON	native	3	3	forb	perennial	smooth sweet-cicely
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Phleum pratense	Poaceae	PHLPRA	non-native	0	3	grass	perennial	timothy
Phlox divaricata	Polemoniaceae	PHLDIV	native	5	3	forb	perennial	wild blue phlox

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Phlox paniculata	Polemoniaceae	PHLPAN	non-native	0	3	forb	perennial	garden phlox
Phragmites australis var. americanus	Poaceae	PHRAUM	native	5	-3	grass	perennial	reed
Phryma leptostachya	Phrymaceae	PHRLEP	native	4	3	forb	perennial	lopseed
Phytolacca americana	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
Picea abies	Pinaceae	PICABI	non-native	0	5	tree	perennial	norway spruce
Picea glauca	Pinaceae	PICGLA	native	3	3	tree	perennial	white spruce
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Pinus strobus	Pinaceae	PINSTR	native	3	3	tree	perennial	white pine
Pinus sylvestris	Pinaceae	PINSYL	non-native	0	3	tree	perennial	scotch pine
Plantago lanceolata	Plantaginaceae	PLALAN	non-native	0	3	forb	perennial	english plantain
Plantago rugelii	Plantaginaceae	PLARUG	native	0	0	forb	perennial	red-stalked plantain
Platanus occidentalis	Platanaceae	PLAOCC	native	7	-3	tree	perennial	sycamore
Poa alsodes	Poaceae	POAALS	native	9	0	grass	perennial	bluegrass
Poa compressa	Poaceae	POACOM	non-native	0	3	grass	perennial	canada bluegrass
Poa pratensis	Poaceae	POAPRA	non-native	0	3	grass	perennial	kentucky bluegrass
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Polygonatum pubescens	Convallariaceae	POLPUB	native	5	5	forb	perennial	downy solomon seal
Polymnia canadensis	Asteraceae	POLCAN	native	6	3	forb	perennial	leaf-cup
Polystichum acrostichoides	Dryopteridaceae	POLACR	native	6	3	fern	perennial	christmas fern
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Potentilla recta	Rosaceae	POTREC	non-native	0	5	forb	perennial	rough-fruited cinquefoil
Potentilla simplex	Rosaceae	POTSIM	native	2	3	forb	perennial	old-field cinquefoil
Prunella vulgaris	Lamiaceae	PRUVUL	native	0	0	forb	perennial	self-heal
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry
Ptelea trifoliata	Rutaceae	PTETRI	native	4	3	shrub	perennial	hop-tree
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus muehlenbergii	Fagaceae	QUEMUE	native	5	3	tree	perennial	chinquapin oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Ranunculus abortivus	Ranunculaceae	RANABO	native	0	0	forb	perennial	small-flowered buttercup
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Ranunculus recurvatus	Ranunculaceae	RANREC	native	5	-3	forb	perennial	hooked crowfoot
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Rhus typhina	Anacardiaceae	RHUTYP	native	2	3	shrub	perennial	staghorn sumac
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Ribes cynosbati	Grossulariaceae	RIBCYN	native	4	3	shrub	perennial	prickly or wild gooseberry
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus allegheniensis	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry

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Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Rubus strigosus	Rosaceae	RUBSTR	native	2	0	shrub	perennial	wild red raspberry
Rudbeckia laciniata	Asteraceae	RUDLAC	native	6	-3	forb	perennial	cut-leaf coneflower
Rumex crispus	Polygonaceae	RUMCRI	non-native	0	0	forb	perennial	curly dock
Rumex obtusifolius	Polygonaceae	RUMOBT	non-native	0	0	forb	perennial	bitter dock
Rumex verticillatus	Polygonaceae	RUMVER	native	7	-5	forb	perennial	water dock
Sagittaria latifolia	Alismataceae	SAGLAT	native	4	-5	forb	perennial	common arrowhead
Salix nigra	Salicaceae	SALNIG	native	5	-5	tree	perennial	black willow
Sambucus canadensis	Adoxaceae	SAMCAN	native	3	-3	shrub	perennial	elderberry
Sambucus racemosa	Adoxaceae	SAMRAC	native	3	3	shrub	perennial	red-berried elder
Sanguinaria canadensis	Papaveraceae	SANCAA	native	5	3	forb	perennial	bloodroot
Sanicula odorata; s. gregaria	Apiaceae	SANODO	native	2	0	forb	perennial	black snakeroot
Sassafras albidum	Lauraceae	SASALB	native	5	3	tree	perennial	sassafras
Saururus cernuus	Saururaceae	SAUCER	native	9	-5	forb	perennial	lizards-tail
Scirpus pendulus	Cyperaceae	SCIPEN	native	3	-5	sedge	perennial	bulrush
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Silene vulgaris	Caryophyllaceae	SILVUL	non-native	0	5	forb	perennial	bladder campion
Sium suave	Apiaceae	SIUSUA	native	5	-5	forb	perennial	water-parsnip
Smilax ecirrata	Smilacaceae	SMIECI	native	6	5	forb	perennial	upright carrion-flower
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier
Solanum carolinense	Solanaceae	SOLCAR	non-native	0	3	forb	perennial	horse-nettle
Solidago altissima	Asteraceae	SOLALT	native	1	3	forb	perennial	tall goldenrod
Solidago caesia	Asteraceae	SOLCAE	native	6	3	forb	perennial	bluestem goldenrod
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod
Staphylea trifolia	Staphyleaceae	STATRI	native	9	0	shrub	perennial	bladdernut
Symphyotrichum cordifolium; aster c.	Asteraceae	SYMCOR	native	4	5	forb	perennial	heart-leaved aster
Symphyotrichum lanceolatum; aster l.	Asteraceae	SYMLAN	native	2	-3	forb	perennial	panicled aster
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster
Symphyotrichum urophyllum; aster sagittifolius	Asteraceae	SYMURO	native	2	5	forb	perennial	arrow-leaved aster
Symplocarpus foetidus	Araceae	SYMFOE	native	6	-5	forb	perennial	skunk-cabbage
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Thalictrum dioicum	Ranunculaceae	THADIO	native	6	3	forb	perennial	early meadow-rue
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Torilis japonica	Apiaceae	TORJAP	non-native	0	3	forb	annual	hedge-parsley
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Tragopogon dubius	Asteraceae	TRADUB	non-native	0	5	forb	biennial	goats beard
Trifolium repens	Fabaceae	TRIREP	non-native	0	3	forb	perennial	white clover
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Triosteum aurantiacum	Caprifoliaceae	TRIAUN	native	5	5	forb	perennial	horse-gentian
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Ulmus pumila	Ulmaceae	ULMPUM	non-native	0	3	tree	perennial	siberian elm
Ulmus rubra	Ulmaceae	ULMRUB	native	2	0	tree	perennial	slippery elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Uvularia grandiflora	Convallariaceae	UVUGRA	native	5	5	forb	perennial	bellwort
Verbascum blattaria	Scrophulariaceae	VERBLA	non-native	0	3	forb	biennial	moth mullein
Verbascum thapsus	Scrophulariaceae	VERTHA	non-native	0	5	forb	biennial	common mullein
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Veronicastrum virginicum	Plantaginaceae	VERVIR	native	8	0	forb	perennial	culvers-root
Viburnum acerifolium	Adoxaceae	VIBACE	native	6	5	shrub	perennial	maple-leaved viburnum
Viburnum dentatum	Adoxaceae	VIBDEN	native	6	0	shrub	perennial	arrow-wood
Viburnum lentago	Adoxaceae	VIBLEN	native	4	0	shrub	perennial	nannyberry
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Vicia hirsuta	Fabaceae	VICHIR	non-native	0	5	vine	annual	hairy vetch
Viola pubescens	Violaceae	VIOPUB	native	4	3	forb	perennial	yellow violet
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Viola striata	Violaceae	VIOSTR	native	5	-3	forb	perennial	cream violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Appendix D:
Floristic Quality Assessment – Davis-Foster Preserve

Davis/Foster Preserve

06/16/2014

Davis/Foster Preserve
Meridian Twp.
Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, John Paskus
Latitude:	42.7267
Longitude:	-84.379
Weather Notes:	
Duration Notes:	
Community Type Notes:	southern wet meadow, southern shrub-carr
Other Notes:	Species list was taken in wetland W of Van Atta Rd. Additional spp. added by B. Slaughter 9 September 2014.
Private/Public:	Public

Conservatism-Based Metrics:	
Total Mean C:	3.9
Native Mean C:	4.2
Total FQI:	29.2
Native FQI:	30.6
Adjusted FQI:	40.9
% C value 0:	7.1
% C value 1-3:	37.5
% C value 4-6:	41.1
% C value 7-10:	14.3
Native Tree Mean C:	1

Native Shrub Mean C:	4	
Native Herbaceous Mean C:	4.5	
Species Richness:		
Total Species:	56	
Native Species:	53	94.60%
Non-native Species:	3	5.40%
Species Wetness:		
Mean Wetness:	-3.1	
Native Mean Wetness:	-3.1	
Physiognomy Metrics:		
Tree:	3	5.40%
Shrub:	11	19.60%
Vine:	3	5.40%
Forb:	28	50%
Grass:	4	7.10%
Sedge:	5	8.90%
Rush:	0	0%
Fern:	2	3.60%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	1	1.80%
Perennial:	54	96.40%
Biennial:	1	1.80%
Native Annual:	1	1.80%
Native Perennial:	51	91.10%
Native Biennial:	1	1.80%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Asclepias incarnata	Apocynaceae	ASCINC	native	6	-5	forb	perennial	swamp milkweed
Betula pumila	Betulaceae	BETPUM	native	8	-5	shrub	perennial	bog birch

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Boehmeria cylindrica	Urticaceae	BOECYL	native	5	-5	forb	perennial	false nettle
Bromus ciliatus	Poaceae	BROCIL	native	6	-3	grass	perennial	fringed brome
Calamagrostis canadensis	Poaceae	CALCAN	native	3	-5	grass	perennial	blue-joint
Caltha palustris	Ranunculaceae	CALPAR	native	6	-5	forb	perennial	marsh-marigold
Campanula aparinoides	Campanulaceae	CAMAPA	native	7	-5	forb	perennial	marsh bellflower
Carex aquatilis	Cyperaceae	CXAQUA	native	7	-5	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex diandra	Cyperaceae	CXDIAN	native	8	-5	sedge	perennial	sedge
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge
Carex stricta	Cyperaceae	CXSTRI	native	4	-5	sedge	perennial	sedge
Cicuta bulbifera	Apiaceae	CICBUL	native	5	-5	forb	perennial	water hemlock
Cirsium muticum	Asteraceae	CIRMUT	native	6	-5	forb	biennial	swamp thistle
Comarum palustre; potentilla p.	Rosaceae	COMPAL	native	7	-5	forb	perennial	marsh cinquefoil
Cornus amomum	Cornaceae	CORAMO	native	2	-3	shrub	perennial	silky dogwood
Cornus foemina	Cornaceae	CORFOE	native	1	0	shrub	perennial	gray dogwood
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Doellingeria umbellata; aster u.	Asteraceae	DOEUMB	native	5	-3	forb	perennial	flat-topped white aster
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb
Eupatorium perfoliatum	Asteraceae	EUPPER	native	4	-3	forb	perennial	boneset
Euthamia graminifolia	Asteraceae	EUTGRA	native	3	0	forb	perennial	grass-leaved goldenrod
Eutrochium maculatum; eupatorium m.	Asteraceae	EUTMAC	native	4	-5	forb	perennial	joe-pye-weed
Frangula alnus; rhamnus frangula	Rhamnaceae	FRAALN	non-native	0	0	shrub	perennial	glossy buckthorn
Galium asprellum	Rubiaceae	GALASP	native	5	-5	vine	perennial	rough bedstraw
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Lycopus americanus	Lamiaceae	LYCAME	native	2	-5	forb	perennial	common water horehound
Mentha spicata	Lamiaceae	MENSPI	non-native	0	-3	forb	perennial	spearmint
Muhlenbergia mexicana	Poaceae	MUHMEX	native	3	-3	grass	perennial	leafy satin grass
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Parthenocissus inserta	Vitaceae	PARINS	native	4	3	vine	perennial	thicket creeper
Pedicularis lanceolata	Orobanchaceae	PEDLAN	native	8	-3	forb	perennial	swamp-betony
Persicaria amphibia; polygonum a.	Polygonaceae	PERAMP	native	6	-5	forb	perennial	water smartweed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Physocarpus opulifolius	Rosaceae	PHYOPU	native	4	-3	shrub	perennial	ninebark
Populus tremuloides	Salicaceae	POPTRE	native	1	0	tree	perennial	quaking aspen
Rhamnus alnifolia	Rhamnaceae	RHAALN	native	8	-5	shrub	perennial	alder-leaved buckthorn

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Ribes hirtellum	Grossulariaceae	RIBHIR	native	6	-3	shrub	perennial	swamp gooseberry
Rubus strigosus	Rosaceae	RUBSTR	native	2	0	shrub	perennial	wild red raspberry
Rumex orbiculatus	Polygonaceae	RUMORB	native	9	-5	forb	perennial	great water dock
Salix petiolaris	Salicaceae	SALPET	native	1	-3	shrub	perennial	slender willow
Solidago altissima	Asteraceae	SOLALT	native	1	3	forb	perennial	tall goldenrod
Solidago patula	Asteraceae	SOLPAT	native	6	-5	forb	perennial	swamp goldenrod
Solidago rugosa	Asteraceae	SOLRUG	native	3	0	forb	perennial	rough-leaved goldenrod
Spiraea alba	Rosaceae	SPIALB	native	4	-3	shrub	perennial	meadowsweet
Symphyotrichum firmum; aster puniceus	Asteraceae	SYMFIR	native	4	-3	forb	perennial	smooth swamp aster
Symplocarpus foetidus	Araceae	SYMFOE	native	6	-5	forb	perennial	skunk-cabbage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Thelypteris palustris	Thelypteridaceae	THEPAL	native	2	-3	fern	perennial	marsh fern
Typha angustifolia	Typhaceae	TYPANG	non-native	0	-5	forb	perennial	narrow-leaved cat-tail
Typha latifolia	Typhaceae	TYPLAT	native	1	-5	forb	perennial	broad-leaved cat-tail
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Viburnum lentago	Adoxaceae	VIBLEN	native	4	0	shrub	perennial	nannyberry
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zizia aurea	Apiaceae	ZIZAUR	native	6	0	forb	perennial	golden alexanders

Appendix E:
Floristic Quality Assessment – Ted Black Woods

Ted Black Woods Park

06/16/2014

Ted Black Woods Park
Okemos
Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, John Paskus
Latitude:	42.7171
Longitude:	-84.3741
Weather Notes:	
Duration Notes:	
Community Type Notes:	Dry-mesic southern forest, bog
Other Notes:	Additional survey 9 September by B. Slaughter. Cercis can, Pinus res, Tsuga can planted. Also noted: Aesculus sp., Bidens sp., Carex sp., Cirsium sp., Crataegus sp.
Private/Public:	Public

Conservatism-Based Metrics:	
Total Mean C:	3.4
Native Mean C:	4.3
Total FQI:	45
Native FQI:	51.1
Adjusted FQI:	38.6
% C value 0:	22.3
% C value 1-3:	21.1
% C value 4-6:	47.4
% C value 7-10:	9.1
Native Tree Mean C:	4.7
Native Shrub Mean C:	4.6
Native Herbaceous Mean C:	4.1

Species Richness:		
Total Species:	175	
Native Species:	141	80.60%
Non-native Species:	34	19.40%
Species Wetness:		
Mean Wetness:	1.4	
Native Mean Wetness:	0.9	
Physiognomy Metrics:		
Tree:	29	16.60%
Shrub:	29	16.60%
Vine:	10	5.70%
Forb:	73	41.70%
Grass:	10	5.70%
Sedge:	17	9.70%
Rush:	0	0%
Fern:	7	4%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	10	5.70%
Perennial:	161	92%
Biennial:	4	2.30%
Native Annual:	8	4.60%
Native Perennial:	131	74.90%
Native Biennial:	2	1.10%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer platanoides	Sapindaceae	ACEPLA	non-native	0	5	tree	perennial	norway maple
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Actaea pachypoda	Ranunculaceae	ACTPAC	native	7	5	forb	perennial	dolls-eyes
Adiantum pedatum	Pteridaceae	ADIPED	native	6	3	fern	perennial	maidenhair fern
Ageratina altissima; eupatorium rugosum	Asteraceae	AGEALT	native	4	3	forb	perennial	white snakeroot

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Amelanchier arborea	Rosaceae	AMEARB	native	4	3	tree	perennial	juneberry
Amphicarpaea bracteata	Fabaceae	AMPBRA	native	5	0	vine	annual	hog-peanut
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone
Aralia nudicaulis	Araliaceae	ARANUD	native	5	3	forb	perennial	wild sarsaparilla
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asclepias exaltata	Apocynaceae	ASCEXA	native	6	5	forb	perennial	poke milkweed
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Bidens connata	Asteraceae	BIDCON	native	5	-3	forb	annual	purple-stemmed tickseed
Boehmeria cylindrica	Urticaceae	BOECYL	native	5	-5	forb	perennial	false nettle
Brachyelytrum erectum	Poaceae	BRAERE	native	7	5	grass	perennial	long-awned wood grass
Bromus pubescens	Poaceae	BROPUB	native	5	3	grass	perennial	canada brome
Calamagrostis canadensis	Poaceae	CALCAN	native	3	-5	grass	perennial	blue-joint
Cardamine hirsuta	Brassicaceae	CARHIR	non-native	0	3	forb	annual	hoary bitter cress
Cardamine pensylvanica	Brassicaceae	CARPEN	native	1	-3	forb	biennial	pennsylvania bitter cress
Carex blanda	Cyperaceae	CXBLAN	native	1	0	sedge	perennial	sedge
Carex canescens	Cyperaceae	CXCANE	native	8	-5	sedge	perennial	sedge
Carex cephalophora	Cyperaceae	CXCEPP	native	3	3	sedge	perennial	sedge
Carex crinita	Cyperaceae	CXCRIN	native	4	-5	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex digitalis	Cyperaceae	CXDIGI	native	5	5	sedge	perennial	sedge
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex jamesii	Cyperaceae	CXJAME	native	8	5	sedge	perennial	james sedge
Carex pensylvanica	Cyperaceae	CXPENS	native	4	5	sedge	perennial	sedge
Carex rosea; c. convoluta	Cyperaceae	CXROSE	native	2	5	sedge	perennial	curly-styled wood sedge
Carex stipata	Cyperaceae	CXSTIP	native	1	-5	sedge	perennial	sedge
Carex swanii	Cyperaceae	CXSWAN	native	4	3	sedge	perennial	sedge
Carex tribuloides	Cyperaceae	CXTRIB	native	3	-3	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory
Caulophyllum thalictroides	Berberidaceae	CAUTHA	native	5	5	forb	perennial	blue cohosh
Celastrus orbiculatus	Celastraceae	CELORB	non-native	0	5	vine	perennial	oriental bittersweet

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Cercis canadensis	Fabaceae	CERCAN	native	8	3	tree	perennial	redbud
Chamaedaphne calyculata	Ericaceae	CHACAL	native	8	-5	shrub	perennial	leatherleaf
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Collinsonia canadensis	Lamiaceae	COLCAN	native	8	0	forb	perennial	richweed
Conopholis americana	Orobanchaceae	CONAME	native	10	5	forb	perennial	squaw-root
Convallaria majalis	Convallariaceae	CONMAJ	non-native	0	5	forb	perennial	lily-of-the-valley
Cornus alternifolia	Cornaceae	CORALT	native	5	3	tree	perennial	alternate-leaved dogwood
Cornus florida	Cornaceae	CORFLO	native	8	3	tree	perennial	flowering dogwood
Corylus americana	Betulaceae	CORAMA	native	5	3	shrub	perennial	hazelnut
Decodon verticillatus	Lythraceae	DECVER	native	7	-5	shrub	perennial	whorled or swamp loosestrife
Dirca palustris	Thymelaeaceae	DIRPAL	native	8	0	shrub	perennial	leatherwood
Dryopteris carthusiana	Dryopteridaceae	DRYCAR	native	5	-3	fern	perennial	spinulose woodfern
Dryopteris goldiana	Dryopteridaceae	DRYGOL	native	10	0	fern	perennial	goldies woodfern
Dulichium arundinaceum	Cyperaceae	DULARU	native	8	-5	sedge	perennial	three-way sedge
Elaeagnus umbellata	Elaeagnaceae	ELAUMB	non-native	0	3	shrub	perennial	autumn-olive
Eleutherococcus sieboldianus	Araliaceae	ELESIE	non-native	0	5	shrub	perennial	five-leaved aralia
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Erechtites hieraciifolius	Asteraceae	EREHIE	native	2	3	forb	annual	fireweed
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Euonymus alatus	Celastraceae	EUOALA	non-native	0	5	shrub	perennial	winged euonymus
Euonymus fortunei	Celastraceae	EUOFOR	non-native	0	5	vine	perennial	wintercreeper
Eurybia macrophylla; aster m.	Asteraceae	EURMAC	native	4	5	forb	perennial	big-leaved aster
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech
Frangula alnus; rhamnus frangula	Rhamnaceae	FRAALN	non-native	0	0	shrub	perennial	glossy buckthorn
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium circaezans	Rubiaceae	GALCIR	native	4	3	forb	perennial	white wild licorice
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Galium odoratum	Rubiaceae	GALODO	non-native	0	5	forb	perennial	sweet woodruff
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Geum urbanum	Rosaceae	GEUURB	non-native	0	5	forb	perennial	avens
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel
Hedera helix	Araliaceae	HEDHEL	non-native	0	3	vine	perennial	english ivy
Helianthus divaricatus	Asteraceae	HELDIV	native	5	5	forb	perennial	woodland sunflower
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Hylodesmum glutinosum; desmodium g.	Fabaceae	HYLGLU	native	5	5	forb	perennial	clustered-leaved tick-trefoil
Ilex verticillata	Aquifoliaceae	ILEVER	native	5	-3	shrub	perennial	michigan holly
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juncus tenuis	Juncaceae	JUNTEN	native	1	0	forb	perennial	path rush
Kerria japonica	Rosaceae	KERJAP	non-native	0	5	shrub	perennial	japanese rose
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Larix laricina	Pinaceae	LARLAR	native	5	-3	tree	perennial	tamarack
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Lemna minor	Araceae	LEMMIN	native	5	-5	forb	perennial	common duckweed
Leonurus cardiaca	Lamiaceae	LEOCAR	non-native	0	5	forb	perennial	motherwort
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lonicera dioica	Caprifoliaceae	LONDIO	native	5	3	vine	perennial	red honeysuckle
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Lycopus uniflorus	Lamiaceae	LYCUNI	native	2	-5	forb	perennial	northern bugle weed
Lysimachia quadrifolia	Myrsinaceae	LYSQUL	native	8	3	forb	perennial	four-leaved loosestrife
Maianthemum canadense	Convallariaceae	MAICAN	native	4	3	forb	perennial	canada mayflower
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed
Muhlenbergia schreberi	Poaceae	MUHSCH	native	0	0	grass	perennial	nimblewill
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Persicaria sagittata; polygonum s.	Polygonaceae	PERSAG	native	5	-5	forb	annual	arrow-leaved tear-thumb
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Petasites hybridus	Asteraceae	PETHYB	non-native	0	-3	forb	perennial	butterfly-dock
Phryma leptostachya	Phrymaceae	PHRLEP	native	4	3	forb	perennial	lopseed

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Phytolacca americana	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
Picea abies	Pinaceae	PICABI	non-native	0	5	tree	perennial	norway spruce
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Pinus resinosa	Pinaceae	PINRES	native	6	3	tree	perennial	red pine
Pinus strobus	Pinaceae	PINSTR	native	3	3	tree	perennial	white pine
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Polygonatum pubescens	Convallariaceae	POLPUB	native	5	5	forb	perennial	downy solomon seal
Populus grandidentata	Salicaceae	POPGRA	native	4	3	tree	perennial	big-tooth aspen
Potentilla indica; duchesnea i.	Rosaceae	POTIND	non-native	0	3	forb	perennial	indian-strawberry
Potentilla simplex	Rosaceae	POTSIM	native	2	3	forb	perennial	old-field cinquefoil
Prenanthes alba	Asteraceae	PREALB	native	5	3	forb	perennial	white lettuce
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry
Pteridium aquilinum	Dennstaedtiaceae	PTEAQU	native	0	3	fern	perennial	bracken fern
Pyrola elliptica	Ericaceae	PYRELL	native	6	3	forb	perennial	large-leaved shinleaf
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Quercus velutina	Fagaceae	QUEVEL	native	6	5	tree	perennial	black oak
Ranunculus abortivus	Ranunculaceae	RANABO	native	0	0	forb	perennial	small-flowered buttercup
Ranunculus recurvatus	Ranunculaceae	RANREC	native	5	-3	forb	perennial	hooked crowfoot
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Rhodotypos scandens	Rosaceae	RHOSCA	non-native	0	5	shrub	perennial	jetbead
Ribes cynosbati	Grossulariaceae	RIBCYN	native	4	3	shrub	perennial	prickly or wild gooseberry
Robinia pseudoacacia	Fabaceae	ROBPSE	non-native	0	3	tree	perennial	black locust
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus allegheniensis	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry
Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Sambucus racemosa	Adoxaceae	SAMRAC	native	3	3	shrub	perennial	red-berried elder
Sanguinaria canadensis	Papaveraceae	SANCAA	native	5	3	forb	perennial	bloodroot
Sassafras albidum	Lauraceae	SASALB	native	5	3	tree	perennial	sassafras
Scirpus cyperinus	Cyperaceae	SCICYP	native	5	-5	sedge	perennial	wool-grass
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier
Solanum ptychanthum	Solanaceae	SOLPTY	native	1	3	forb	annual	black nightshade
Solidago caesia	Asteraceae	SOLCAE	native	6	3	forb	perennial	bluestem goldenrod
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod
Sorbaria sorbifolia	Rosaceae	SORSOR	non-native	0	5	shrub	perennial	false spiraea

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Symphyotrichum cordifolium; aster c.	Asteraceae	SYMCOR	native	4	5	forb	perennial	heart-leaved aster
Syringa vulgaris	Oleaceae	SYRVUL	non-native	0	5	shrub	perennial	common lilac
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Thalictrum dioicum	Ranunculaceae	THADIO	native	6	3	forb	perennial	early meadow-rue
Thelypteris palustris	Thelypteridaceae	THEPAL	native	2	-3	fern	perennial	marsh fern
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Torilis japonica	Apiaceae	TORJAP	non-native	0	3	forb	annual	hedge-parsley
Torreyochloa pallida; puccinellia p.	Poaceae	TORPAL	native	7	-5	grass	perennial	pale false mannagrass
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Triadenum fraseri	Hypericaceae	TRIFRA	native	6	-5	forb	perennial	marsh st. johns-wort
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium
Triosteum aurantiacum	Caprifoliaceae	TRIAUN	native	5	5	forb	perennial	horse-gentian
Tsuga canadensis	Pinaceae	TSUCAN	native	5	3	tree	perennial	hemlock
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Vaccinium angustifolium	Ericaceae	VACANG	native	4	3	shrub	perennial	low sweet blueberry
Vaccinium corymbosum	Ericaceae	VACCOR	native	6	-3	shrub	perennial	highbush blueberry
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Viburnum dentatum	Adoxaceae	VIBDEN	native	6	0	shrub	perennial	arrow-wood
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Vinca minor	Apocynaceae	VINMIN	non-native	0	5	shrub	perennial	periwinkle
Viola blanda	Violaceae	VIOBLA	native	5	-3	forb	perennial	sweet white violet
Viola pubescens	Violaceae	VIOPUB	native	4	3	forb	perennial	yellow violet
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape

Appendix F:
Floristic Quality Assessment – Williamston East

Red Cedar River - Williamston East

06/13/2014

Red Cedar River

Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, John Paskus
Latitude:	42.6888
Longitude:	-84.2591
Weather Notes:	
Duration Notes:	
Community Type Notes:	Floodplain forest, dry-mesic southern forest, mesic southern forest
Other Notes:	Includes MNA Red Cedar River Plant Preserve and private tracts. Additional surveys 15 August, 18 August by B. Slaughter. Also noted: Bidens sp., Cyperus sp., Hieracium sp., Persicaria sp., Scrophularia sp.
Private/Public:	Private

Conservatism-Based Metrics:	
Total Mean C:	3.6
Native Mean C:	4.1
Total FQI:	50.8
Native FQI:	54.2
Adjusted FQI:	38.4
% C value 0:	15.1
% C value 1-3:	28.1
% C value 4-6:	47.2
% C value 7-10:	9.5
Native Tree Mean C:	4.1

Native Shrub Mean C:	4.1	
Native Herbaceous Mean C:	4.2	
Species Richness:		
Total Species:	199	
Native Species:	175	87.90%
Non-native Species:	24	12.10%
Species Wetness:		
Mean Wetness:	-1	
Native Mean Wetness:	-1.2	
Physiognomy Metrics:		
Tree:	25	12.60%
Shrub:	23	11.60%
Vine:	15	7.50%
Forb:	102	51.30%
Grass:	10	5%
Sedge:	15	7.50%
Rush:	0	0%
Fern:	9	4.50%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	12	6%
Perennial:	181	91%
Biennial:	6	3%
Native Annual:	10	5%
Native Perennial:	162	81.40%
Native Biennial:	3	1.50%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acorus calamus	Acoraceae	ACOCAL	non-native	0	-5	forb	perennial	calamus
Agrimonia gryposepala	Rosaceae	AGRGRY	native	2	3	forb	perennial	tall agrimony
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Alnus incana; a. rugosa	Betulaceae	ALNINC	native	5	-3	shrub	perennial	speckled alder
Ambrosia artemisiifolia	Asteraceae	AMBART	native	0	3	forb	annual	common ragweed
Amphicarpaea bracteata	Fabaceae	AMPBRA	native	5	0	vine	annual	hog-peanut
Anemone canadensis	Ranunculaceae	ANECAN	native	4	-3	forb	perennial	canada anemone
Apios americana	Fabaceae	APIAME	native	3	-3	vine	perennial	groundnut
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock
Arisaema dracontium	Araceae	ARIDRA	native	8	-3	forb	perennial	green dragon
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asarum canadense	Aristolochiaceae	ASACAN	native	5	5	forb	perennial	wild-ginger
Asclepias incarnata	Apocynaceae	ASCINC	native	6	-5	forb	perennial	swamp milkweed
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Betula alleghaniensis	Betulaceae	BETALL	native	7	0	tree	perennial	yellow birch
Boehmeria cylindrica	Urticaceae	BOECYL	native	5	-5	forb	perennial	false nettle
Caltha palustris	Ranunculaceae	CALPAR	native	6	-5	forb	perennial	marsh-marigold
Calystegia sepium	Convolvulaceae	CALSEP	native	2	0	vine	perennial	hedge bindweed
Cardamine pensylvanica	Brassicaceae	CARPEN	native	1	-3	forb	biennial	pennsylvania bitter cress
Carex bromoides	Cyperaceae	CXBROM	native	6	-3	sedge	perennial	sedge
Carex crinita	Cyperaceae	CXCRIN	native	4	-5	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge
Carex pensylvanica	Cyperaceae	CXPENS	native	4	5	sedge	perennial	sedge
Carex retrorsa	Cyperaceae	CXRETS	native	3	-5	sedge	perennial	sedge
Carex stipata	Cyperaceae	CXSTIP	native	1	-5	sedge	perennial	sedge
Carex stricta	Cyperaceae	CXSTRI	native	4	-5	sedge	perennial	sedge
Carex tribuloides	Cyperaceae	CXTRIB	native	3	-3	sedge	perennial	sedge
Carex vulpinoidea	Cyperaceae	CXVULP	native	1	-5	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Carya cordiformis	Juglandaceae	CARCOR	native	5	0	tree	perennial	bitternut hickory
Celtis occidentalis	Cannabaceae	CELOCC	native	5	0	tree	perennial	hackberry
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush
Chelone glabra	Plantaginaceae	CHEGLB	native	7	-5	forb	perennial	turtlehead
Cicuta bulbifera	Apiaceae	CICBUL	native	5	-5	forb	perennial	water hemlock
Cicuta maculata	Apiaceae	CICMAC	native	4	-5	forb	biennial	water hemlock
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium vulgare	Asteraceae	CIRVUL	non-native	0	3	forb	biennial	bull thistle
Clematis virginiana	Ranunculaceae	CLEVIR	native	4	0	vine	perennial	virgins bower
Conyza canadensis	Asteraceae	CONCAN	native	0	3	forb	annual	horseweed
Cornus alternifolia	Cornaceae	CORALT	native	5	3	tree	perennial	alternate-leaved dogwood
Cornus foemina	Cornaceae	CORFOE	native	1	0	shrub	perennial	gray dogwood
Cornus sericea; c. stolonifera	Cornaceae	CORSER	native	2	-3	shrub	perennial	red-osier
Corylus americana	Betulaceae	CORAMA	native	5	3	shrub	perennial	hazelnut
Cuscuta gronovii	Convolvulaceae	CUSGRO	native	3	-3	vine	annual	common dodder
Deparia acrostichoides	Athyriaceae	DEPACR	native	6	0	fern	perennial	silvery spleenwort
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Dryopteris goldiana	Dryopteridaceae	DRYGOL	native	10	0	fern	perennial	goldies woodfern
Echinocystis lobata	Cucurbitaceae	ECHLOB	native	2	-3	vine	annual	wild-cucumber
Elymus hystrix; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass
Elymus riparius	Poaceae	ELYRIP	native	8	-3	grass	perennial	riverbank wild-rye
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb
Equisetum fluviatile	Equisetaceae	EQUFLU	native	7	-5	fern	perennial	water horsetail
Equisetum hyemale	Equisetaceae	EQUHYE	native	2	0	fern	perennial	scouring rush
Erechtites hieraciifolius	Asteraceae	EREHIE	native	2	3	forb	annual	fireweed
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Euonymus fortunei	Celastraceae	EUOFOR	non-native	0	5	vine	perennial	wintercreeper
Euonymus obovatus	Celastraceae	EUOOBO	native	5	3	shrub	perennial	running strawberry-bush
Eupatorium perfoliatum	Asteraceae	EUPPER	native	4	-3	forb	perennial	boneset
Eutrochium maculatum; eupatorium m.	Asteraceae	EUTMAC	native	4	-5	forb	perennial	joe-pye-weed
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech
Fragaria vesca	Rosaceae	FRAVES	native	2	3	forb	perennial	woodland strawberry
Fragaria virginiana	Rosaceae	FRAVIR	native	2	3	forb	perennial	wild strawberry
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Fraxinus nigra	Oleaceae	FRANIG	native	6	-3	tree	perennial	black ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium asprellum	Rubiaceae	GALASP	native	5	-5	vine	perennial	rough bedstraw
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glechoma hederacea	Lamiaceae	GLEHED	non-native	0	3	forb	perennial	ground-ivy
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel
Helianthus strumosus	Asteraceae	HELSTR	native	4	5	forb	perennial	pale-leaved sunflower
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Hypericum punctatum	Hypericaceae	HYPPUN	native	4	0	forb	perennial	spotted st. johns-wort
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Iris pseudacorus	Iridaceae	IRIPSE	non-native	0	-5	forb	perennial	yellow flag
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juglans nigra	Juglandaceae	JUGNIG	native	5	3	tree	perennial	black walnut
Juncus effusus	Juncaceae	JUNEFF	native	3	-5	forb	perennial	soft-stemmed rush
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Lemna minor	Araceae	LEMMIN	native	5	-5	forb	perennial	common duckweed
Lindera benzoin	Lauraceae	LINBEN	native	7	-3	shrub	perennial	spicebush
Lobelia cardinalis	Campanulaceae	LOBCAR	native	7	-5	forb	perennial	cardinal-flower
Lobelia siphilitica	Campanulaceae	LOBSIP	native	4	-3	forb	perennial	great blue lobelia
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Ludwigia palustris	Onagraceae	LUDPAL	native	4	-5	forb	perennial	water-purslane
Lycopus uniflorus	Lamiaceae	LYCUNI	native	2	-5	forb	perennial	northern bugle weed
Lycopus virginicus	Lamiaceae	LYCVIR	native	8	-5	forb	perennial	bugle weed
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia nummularia	Myrsinaceae	LYSNUM	non-native	0	-3	forb	perennial	moneywort
Lythrum salicaria	Lythraceae	LYTSAL	non-native	0	-5	forb	perennial	purple loosestrife
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Maianthemum stellatum; smilacina s.	Convallariaceae	MAISTE	native	5	0	forb	perennial	starry false solomon-seal

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Matteuccia struthiopteris	Onocleaceae	MATSTR	native	3	0	fern	perennial	ostrich fern
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed
Mentha spicata	Lamiaceae	MENSPI	non-native	0	-3	forb	perennial	spearmint
Micranthes pensylvanica; saxifraga p.	Saxifragaceae	MICPEN	native	10	-5	forb	perennial	swamp saxifrage
Mimulus ringens	Phrymaceae	MIMRIN	native	5	-5	forb	perennial	monkey-flower
Nuphar advena	Nymphaeaceae	NUPADV	native	8	-5	forb	perennial	yellow pond-lily
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Osmunda cinnamomea	Osmundaceae	OSMCIN	native	5	-3	fern	perennial	cinnamon fern
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Penthorum sedoides	Penthoraceae	PENSED	native	3	-5	forb	perennial	ditch stonecrop
Persicaria punctata; polygonum p.	Polygonaceae	PERPUN	native	5	-5	forb	annual	smartweed
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Physocarpus opulifolius	Rosaceae	PHYOPU	native	4	-3	shrub	perennial	ninebark
Phytolacca americana	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Poa compressa	Poaceae	POACOM	non-native	0	3	grass	perennial	canada bluegrass
Poa pratensis	Poaceae	POAPRA	non-native	0	3	grass	perennial	kentucky bluegrass
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Polygonatum pubescens	Convallariaceae	POLPUB	native	5	5	forb	perennial	downy solomon seal
Pontederia cordata	Pontederiaceae	PONCOR	native	8	-5	forb	perennial	pickerel-weed
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Potentilla simplex	Rosaceae	POTSIM	native	2	3	forb	perennial	old-field cinquefoil
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Ranunculus recurvatus	Ranunculaceae	RANREC	native	5	-3	forb	perennial	hooked crowfoot
Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0	tree	perennial	common buckthorn
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus allegheniensis	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Rudbeckia laciniata	Asteraceae	RUDLAC	native	6	-3	forb	perennial	cut-leaf coneflower
Rumex orbiculatus	Polygonaceae	RUMORB	native	9	-5	forb	perennial	great water dock
Rumex verticillatus	Polygonaceae	RUMVER	native	7	-5	forb	perennial	water dock
Sagittaria latifolia	Alismataceae	SAGLAT	native	4	-5	forb	perennial	common arrowhead
Salix nigra	Salicaceae	SALNIG	native	5	-5	tree	perennial	black willow
Salix petiolaris	Salicaceae	SALPET	native	1	-3	shrub	perennial	slender willow
Sambucus canadensis	Adoxaceae	SAMCAN	native	3	-3	shrub	perennial	elderberry
Samolus parviflorus	Theophrastaceae	SAMPAR	native	5	-5	forb	perennial	water-pimpernel
Sanguinaria canadensis	Papaveraceae	SANCAA	native	5	3	forb	perennial	bloodroot
Sanicula odorata; s. gregaria	Apiaceae	SANODO	native	2	0	forb	perennial	black snakeroot
Saururus cernuus	Saururaceae	SAUCER	native	9	-5	forb	perennial	lizards-tail
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Sium suave	Apiaceae	SIUSUA	native	5	-5	forb	perennial	water-parsnip
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier
Solanum dulcamara	Solanaceae	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago caesia	Asteraceae	SOLCAE	native	6	3	forb	perennial	bluestem goldenrod
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod
Solidago patula	Asteraceae	SOLPAT	native	6	-5	forb	perennial	swamp goldenrod
Stachys palustris	Lamiaceae	STAPAL	non-native	0	-5	forb	perennial	woundwort
Staphylea trifolia	Staphyleaceae	STATRI	native	9	0	shrub	perennial	bladdernut
Symphyotrichum firmum; aster puniceus	Asteraceae	SYMFIR	native	4	-3	forb	perennial	smooth swamp aster
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster
Symphyotrichum ontarionis; aster o.	Asteraceae	SYMONT	native	6	0	forb	perennial	lake ontario aster
Symplocarpus foetidus	Araceae	SYMFOE	native	6	-5	forb	perennial	skunk-cabbage
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Thalictrum dioicum	Ranunculaceae	THADIO	native	6	3	forb	perennial	early meadow-rue
Thelypteris palustris	Thelypteridaceae	THEPAL	native	2	-3	fern	perennial	marsh fern
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Torilis japonica	Apiaceae	TORJAP	non-native	0	3	forb	annual	hedge-parsley
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Toxicodendron vernix	Anacardiaceae	TOXVER	native	6	-5	shrub	perennial	poison sumac
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium
Triosteum aurantiacum	Caprifoliaceae	TRIAUN	native	5	5	forb	perennial	horse-gentian

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Typha angustifolia	Typhaceae	TYPANG	non-native	0	-5	forb	perennial	narrow-leaved cat-tail
Typha latifolia	Typhaceae	TYPLAT	native	1	-5	forb	perennial	broad-leaved cat-tail
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Ulmus rubra	Ulmaceae	ULMRUB	native	2	0	tree	perennial	slippery elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Verbena hastata	Verbenaceae	VERHAS	native	4	-3	forb	perennial	blue vervain
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Viburnum lentago	Adoxaceae	VIBLEN	native	4	0	shrub	perennial	nannyberry
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Viola striata	Violaceae	VIOSTR	native	5	-3	forb	perennial	cream violet
Vitis aestivalis	Vitaceae	VITAES	native	6	3	vine	perennial	summer grape
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Xanthium strumarium	Asteraceae	XANSTR	non-native	0	0	forb	annual	common cocklebur
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Appendix G:
Floristic Quality Assessment – Dietz Rd. West

Red Cedar River - Dietz Road W

06/12/2014

Red Cedar River

Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, John Paskus
Latitude:	42.6887
Longitude:	-84.2359
Weather Notes:	
Duration Notes:	
Community Type Notes:	floodplain forest, mesic southern forest
Other Notes:	North of Red Cedar River between Doan Creek (W) and Dietz Road (E), including YMCA Camp Pa-Wa-Pi and private tracts N of the river and E of the YMCA Camp. Additional surveys 13 June (Slaughter, Paskus), 15 August (B. Slaughter), 9 September (B. Slaughter). Also noted: Bidens sp., Carex sp., Mentha sp., Persicaria sp., Poa sp., Prenanthes sp., unknown grass.
Private/Public:	Public

Conservatism-Based Metrics:	
Total Mean C:	3.8
Native Mean C:	4.2
Total FQI:	58
Native FQI:	60.7
Adjusted FQI:	39.8
% C value 0:	12.9
% C value 1-3:	25.3
% C value 4-6:	53.6
% C value 7-10:	8.2

Native Tree Mean C:	4.3	
Native Shrub Mean C:	4.1	
Native Herbaceous Mean C:	4.2	
Species Richness:		
Total Species:	233	
Native Species:	209	89.70%
Non-native Species:	24	10.30%
Species Wetness:		
Mean Wetness:	-0.1	
Native Mean Wetness:	-0.3	
Physiognomy Metrics:		
Tree:	32	13.70%
Shrub:	26	11.20%
Vine:	10	4.30%
Forb:	121	51.90%
Grass:	13	5.60%
Sedge:	21	9%
Rush:	0	0%
Fern:	10	4.30%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	11	4.70%
Perennial:	214	91.80%
Biennial:	8	3.40%
Native Annual:	9	3.90%
Native Perennial:	196	84.10%
Native Biennial:	4	1.70%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer nigrum; a. saccharum	Sapindaceae	ACENIG	native	4	3	tree	perennial	black maple
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Acorus calamus	Acoraceae	ACOCAL	non-native	0	-5	forb	perennial	calamus
Actaea pachypoda	Ranunculaceae	ACTPAC	native	7	5	forb	perennial	dolls-eyes
Agrimonia gryposepala	Rosaceae	AGRGRY	native	2	3	forb	perennial	tall agrimony
Agrimonia pubescens	Rosaceae	AGRPUB	native	5	5	forb	perennial	soft agrimony
Agrostis perennans	Poaceae	AGRPER	native	5	3	grass	perennial	autumn bent
Alisma subcordatum; a. plantago-aquatica	Alismataceae	ALISUB	native	1	-5	forb	perennial	southern water-plantain
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Allium canadense	Alliaceae	ALLCAN	native	4	3	forb	perennial	wild garlic
Allium tricoccum	Alliaceae	ALLTRI	native	5	3	forb	perennial	wild leek
Ambrosia trifida	Asteraceae	AMBTRI	native	0	0	forb	annual	giant ragweed
Amelanchier arborea	Rosaceae	AMEARB	native	4	3	tree	perennial	juneberry
Amphicarpaea bracteata	Fabaceae	AMPBRA	native	5	0	vine	annual	hog-peanut
Anemone canadensis	Ranunculaceae	ANECAN	native	4	-3	forb	perennial	canada anemone
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone
Anemone virginiana	Ranunculaceae	ANEVIR	native	3	3	forb	perennial	thimbleweed
Apios americana	Fabaceae	APIAME	native	3	-3	vine	perennial	groundnut
Apocynum androsaemifolium	Apocynaceae	APOAND	native	3	5	forb	perennial	spreading dogbane
Apocynum cannabinum; a. sibiricum	Apocynaceae	APOCAN	native	3	0	forb	perennial	indian-hemp
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock
Arisaema dracontium	Araceae	ARIDRA	native	8	-3	forb	perennial	green dragon
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asarum canadense	Aristolochiaceae	ASACAN	native	5	5	forb	perennial	wild-ginger
Asclepias incarnata	Apocynaceae	ASCINC	native	6	-5	forb	perennial	swamp milkweed
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern
Berberis thunbergii	Berberidaceae	BERTHU	non-native	0	3	shrub	perennial	japanese barberry
Blephilia hirsuta	Lamiaceae	BLEHIR	native	8	3	forb	perennial	wood mint
Bromus pubescens	Poaceae	BROPUB	native	5	3	grass	perennial	canada brome
Caltha palustris	Ranunculaceae	CALPAR	native	6	-5	forb	perennial	marsh-marigold
Capnoides sempervirens; corydalis s.	Papaveraceae	CAPSEM	native	5	5	forb	biennial	pink or pale corydalis
Cardamine bulbosa	Brassicaceae	CARBUL	native	4	-5	forb	perennial	spring cress
Cardamine pensylvanica	Brassicaceae	CARPEN	native	1	-3	forb	biennial	pennsylvania bitter cress
Carex bromoides	Cyperaceae	CXBROM	native	6	-3	sedge	perennial	sedge
Carex cephaloidea	Cyperaceae	CXCEPD	native	5	3	sedge	perennial	sedge
Carex communis	Cyperaceae	CXCOMM	native	2	5	sedge	perennial	sedge
Carex crinita	Cyperaceae	CXCRIN	native	4	-5	sedge	perennial	sedge
Carex cristatella	Cyperaceae	CXCRIS	native	3	-3	sedge	perennial	sedge

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex granularis	Cyperaceae	CXGRAN	native	2	-3	sedge	perennial	sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex hystericina	Cyperaceae	CXHYST	native	2	-5	sedge	perennial	sedge
Carex lacustris	Cyperaceae	CXLACU	native	6	-5	sedge	perennial	sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex muskingumensis	Cyperaceae	CXMUSK	native	6	-5	sedge	perennial	sedge
Carex pedunculata	Cyperaceae	CXPEDU	native	5	3	sedge	perennial	sedge
Carex pensylvanica	Cyperaceae	CXPENS	native	4	5	sedge	perennial	sedge
Carex sparganioides	Cyperaceae	CXSPAR	native	5	3	sedge	perennial	sedge
Carex stipata	Cyperaceae	CXSTIP	native	1	-5	sedge	perennial	sedge
Carex swanii	Cyperaceae	CXSWAN	native	4	3	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya cordiformis	Juglandaceae	CARCOR	native	5	0	tree	perennial	bitternut hickory
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory
Caulophyllum thalictroides	Berberidaceae	CAUTHA	native	5	5	forb	perennial	blue cohosh
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush
Chelone glabra	Plantaginaceae	CHEGLB	native	7	-5	forb	perennial	turtlehead
Cicuta maculata	Apiaceae	CICMAC	native	4	-5	forb	biennial	water hemlock
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Conium maculatum	Apiaceae	CONMAC	non-native	0	-3	forb	biennial	poison-hemlock
Cornus alternifolia	Cornaceae	CORALT	native	5	3	tree	perennial	alternate-leaved dogwood
Cornus florida	Cornaceae	CORFLO	native	8	3	tree	perennial	flowering dogwood
Cornus foemina	Cornaceae	CORFOE	native	1	0	shrub	perennial	gray dogwood
Corylus americana	Betulaceae	CORAMA	native	5	3	shrub	perennial	hazelnut
Crataegus crus-galli; c. fontanesiana	Rosaceae	CRACRU	native	5	0	tree	perennial	cockspur thorn
Crataegus mollis	Rosaceae	CRAMOL	native	2	0	tree	perennial	hawthorn
Cryptotaenia canadensis	Apiaceae	CRYCAN	native	2	0	forb	perennial	honewort
Cuscuta gronovii	Convolvulaceae	CUSGRO	native	3	-3	vine	annual	common dodder
Dichanthelium clandestinum; panicum c.	Poaceae	DICCLA	native	3	-3	grass	perennial	panic grass
Dichanthelium latifolium; panicum l.	Poaceae	DICLAT	native	5	3	grass	perennial	broad-leaved panic grass
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Doellingeria umbellata; aster u.	Asteraceae	DOEUMB	native	5	-3	forb	perennial	flat-topped white aster
Dryopteris carthusiana	Dryopteridaceae	DRYCAR	native	5	-3	fern	perennial	spinulose woodfern

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Echinocystis lobata	Cucurbitaceae	ECHLOB	native	2	-3	vine	annual	wild-cucumber
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epifagus virginiana	Orobanchaceae	EPIVIR	native	10	5	forb	annual	beech-drops
Epilobium hirsutum	Onagraceae	EPIHIR	non-native	0	-3	forb	perennial	great hairy willow-herb
Equisetum hyemale	Equisetaceae	EQUHYE	native	2	0	fern	perennial	scouring rush
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Euonymus alatus	Celastraceae	EUOALA	non-native	0	5	shrub	perennial	winged euonymus
Euonymus obovatus	Celastraceae	EUOOBO	native	5	3	shrub	perennial	running strawberry-bush
Eupatorium perfoliatum	Asteraceae	EUPPER	native	4	-3	forb	perennial	boneset
Eurybia macrophylla; aster m.	Asteraceae	EURMAC	native	4	5	forb	perennial	big-leaved aster
Eutrochium maculatum; eupatorium m.	Asteraceae	EUTMAC	native	4	-5	forb	perennial	joe-pye-weed
Eutrochium purpureum; eupatorium p.	Asteraceae	EUTPUR	native	5	0	forb	perennial	green-stemmed joe-pye-weed
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech
Festuca subverticillata; f. obtusa	Poaceae	FESSUB	native	5	3	grass	perennial	nodding fescue
Fragaria virginiana	Rosaceae	FRAVIR	native	2	3	forb	perennial	wild strawberry
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glechoma hederacea	Lamiaceae	GLEHED	non-native	0	3	forb	perennial	ground-ivy
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Hylodesmum glutinosum; desmodium g.	Fabaceae	HYLGLU	native	5	5	forb	perennial	clustered-leaved tick-trefoil
Hypericum punctatum	Hypericaceae	HYPPUN	native	4	0	forb	perennial	spotted st. johns-wort
Ilex verticillata	Aquifoliaceae	ILEVER	native	5	-3	shrub	perennial	michigan holly
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juncus effusus	Juncaceae	JUNEFF	native	3	-5	forb	perennial	soft-stemmed rush
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Lemna minor	Araceae	LEMMIN	native	5	-5	forb	perennial	common duckweed

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Leonurus cardiaca	Lamiaceae	LEOCAR	non-native	0	5	forb	perennial	motherwort
Lilium michiganense	Liliaceae	LILMIC	native	5	-3	forb	perennial	michigan lily
Lobelia cardinalis	Campanulaceae	LOBCAR	native	7	-5	forb	perennial	cardinal-flower
Lobelia siphilitica	Campanulaceae	LOBSIP	native	4	-3	forb	perennial	great blue lobelia
Lonicera dioica	Caprifoliaceae	LONDIO	native	5	3	vine	perennial	red honeysuckle
Lonicera morrowii	Caprifoliaceae	LONMOR	non-native	0	3	shrub	perennial	morrow honeysuckle
Luzula acuminata	Juncaceae	LUZACU	native	5	3	forb	perennial	hairy wood rush
Lycopus rubellus	Lamiaceae	LYCRUB	native	8	-5	forb	perennial	stalked water horehound
Lycopus uniflorus	Lamiaceae	LYCUNI	native	2	-5	forb	perennial	northern bugle weed
Lycopus virginicus	Lamiaceae	LYCVIR	native	8	-5	forb	perennial	bugle weed
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia thyrsiflora	Myrsinaceae	LYSTHY	native	6	-5	forb	perennial	tufted loosestrife
Maianthemum canadense	Convallariaceae	MAICAN	native	4	3	forb	perennial	canada mayflower
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Maianthemum stellatum; smilacina s.	Convallariaceae	MAISTE	native	5	0	forb	perennial	starry false solomon-seal
Matteuccia struthiopteris	Onocleaceae	MATSTR	native	3	0	fern	perennial	ostrich fern
Mentha spicata	Lamiaceae	MENSPI	non-native	0	-3	forb	perennial	spearmint
Mimulus ringens	Phrymaceae	MIMRIN	native	5	-5	forb	perennial	monkey-flower
Mitchella repens	Rubiaceae	MITREP	native	5	3	forb	perennial	partridge-berry
Mitella diphylla	Saxifragaceae	MITDIP	native	8	3	forb	perennial	bishops-cap
Monotropa uniflora	Ericaceae	MONOUN	native	5	3	forb	perennial	indian-pipe
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Osmunda cinnamomea	Osmundaceae	OSMCIN	native	5	-3	fern	perennial	cinnamon fern
Osmunda regalis	Osmundaceae	OSMREG	native	5	-5	fern	perennial	royal fern
Ostrya virginiana	Betulaceae	OSTVIR	native	5	3	tree	perennial	ironwood; hop-hornbeam
Oxalis stricta; o. fontana	Oxalidaceae	OXASTR	native	0	3	forb	perennial	yellow wood-sorrel
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Pedicularis canadensis	Orobanchaceae	PEDCAN	native	10	3	forb	perennial	wood-betony
Pedicularis lanceolata	Orobanchaceae	PEDLAN	native	8	-3	forb	perennial	swamp-betony
Penthorum sedoides	Penthoraceae	PENSED	native	3	-5	forb	perennial	ditch stonecrop
Persicaria orientalis; polygonum o.	Polygonaceae	PERORI	non-native	0	5	forb	annual	kiss-me-over-the-garden-gate
Persicaria punctata; polygonum p.	Polygonaceae	PERPUN	native	5	-5	forb	annual	smartweed
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Phlox divaricata	Polemoniaceae	PHLDIV	native	5	3	forb	perennial	wild blue phlox
Phytolacca americana	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Pinus resinosa	Pinaceae	PINRES	native	6	3	tree	perennial	red pine
Plantago major	Plantaginaceae	PLAMAJ	non-native	0	3	forb	perennial	common plantain
Platanus occidentalis	Platanaceae	PLAOCC	native	7	-3	tree	perennial	sycamore
Poa compressa	Poaceae	POACOM	non-native	0	3	grass	perennial	canada bluegrass
Poa pratensis	Poaceae	POAPRA	non-native	0	3	grass	perennial	kentucky bluegrass
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Polygonatum biflorum	Convallariaceae	POLBIF	native	4	3	forb	perennial	solomon-seal
Polystichum acrostichoides	Dryopteridaceae	POLACR	native	6	3	fern	perennial	christmas fern
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Populus grandidentata	Salicaceae	POPGRA	native	4	3	tree	perennial	big-tooth aspen
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Prunus virginiana	Rosaceae	PRUVIR	native	2	3	shrub	perennial	choke cherry
Ptelea trifoliata	Rutaceae	PTETRI	native	4	3	shrub	perennial	hop-tree
Quercus alba	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
Quercus bicolor	Fagaceae	QUEBIC	native	8	-3	tree	perennial	swamp white oak
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Quercus velutina	Fagaceae	QUEVEL	native	6	5	tree	perennial	black oak
Ranunculus abortivus	Ranunculaceae	RANABO	native	0	0	forb	perennial	small-flowered buttercup
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Ribes cynosbati	Grossulariaceae	RIBCYN	native	4	3	shrub	perennial	prickly or wild gooseberry
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rosa palustris	Rosaceae	ROSPAL	native	5	-5	shrub	perennial	swamp rose
Rubus allegheniensis	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry
Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Rumex obtusifolius	Polygonaceae	RUMOBT	non-native	0	0	forb	perennial	bitter dock
Rumex verticillatus	Polygonaceae	RUMVER	native	7	-5	forb	perennial	water dock
Sagittaria latifolia	Alismataceae	SAGLAT	native	4	-5	forb	perennial	common arrowhead
Salix amygdaloides	Salicaceae	SALAMY	native	3	-3	tree	perennial	peach-leaved willow
Salix nigra	Salicaceae	SALNIG	native	5	-5	tree	perennial	black willow
Salix petiolaris	Salicaceae	SALPET	native	1	-3	shrub	perennial	slender willow
Sambucus canadensis	Adoxaceae	SAMCAN	native	3	-3	shrub	perennial	elderberry
Samolus parviflorus	Theophrastaceae	SAMPAR	native	5	-5	forb	perennial	water-pimpernel
Sanguinaria canadensis	Papaveraceae	SANCAA	native	5	3	forb	perennial	bloodroot
Sanicula odorata; s. gregaria	Apiaceae	SANODO	native	2	0	forb	perennial	black snakeroot
Sassafras albidum	Lauraceae	SASALB	native	5	3	tree	perennial	sassafras

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Saururus cernuus	Saururaceae	SAUCER	native	9	-5	forb	perennial	lizards-tail
Scirpus atrovirens	Cyperaceae	SCIATV	native	3	-5	sedge	perennial	bulrush
Scirpus pendulus	Cyperaceae	SCIPEN	native	3	-5	sedge	perennial	bulrush
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Sium suave	Apiaceae	SIUSUA	native	5	-5	forb	perennial	water-parsnip
Smilax ecirrata	Smilacaceae	SMIECI	native	6	5	forb	perennial	upright carrion-flower
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier
Solanum dulcamara	Solanaceae	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago caesia	Asteraceae	SOLCAE	native	6	3	forb	perennial	bluestem goldenrod
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod
Solidago patula	Asteraceae	SOLPAT	native	6	-5	forb	perennial	swamp goldenrod
Solidago rugosa	Asteraceae	SOLRUG	native	3	0	forb	perennial	rough-leaved goldenrod
Stachys palustris	Lamiaceae	STAPAL	non-native	0	-5	forb	perennial	woundwort
Staphylea trifolia	Staphyleaceae	STATRI	native	9	0	shrub	perennial	bladdernut
Stellaria longifolia	Caryophyllaceae	STELOF	native	5	-3	forb	perennial	long-leaved chickweed
Symphyotrichum firmum; aster puniceus	Asteraceae	SYMFIR	native	4	-3	forb	perennial	smooth swamp aster
Symphyotrichum lateriflorum; aster l.	Asteraceae	SYMLAT	native	2	0	forb	perennial	calico aster
Symphyotrichum ontarionis; aster o.	Asteraceae	SYMONT	native	6	0	forb	perennial	lake ontario aster
Symplocarpus foetidus	Araceae	SYMFOE	native	6	-5	forb	perennial	skunk-cabbage
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Thalictrum dioicum	Ranunculaceae	THADIO	native	6	3	forb	perennial	early meadow-rue
Thelypteris noveboracensis	Thelypteridaceae	THENOV	native	5	0	fern	perennial	new york fern
Thelypteris palustris	Thelypteridaceae	THEPAL	native	2	-3	fern	perennial	marsh fern
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Vaccinium angustifolium	Ericaceae	VACANG	native	4	3	shrub	perennial	low sweet blueberry
Verbascum thapsus	Scrophulariaceae	VERTHA	non-native	0	5	forb	biennial	common mullein
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Viburnum acerifolium	Adoxaceae	VIBACE	native	6	5	shrub	perennial	maple-leaved viburnum
Viburnum dentatum	Adoxaceae	VIBDEN	native	6	0	shrub	perennial	arrow-wood
Viburnum lentago	Adoxaceae	VIBLEN	native	4	0	shrub	perennial	nannyberry
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Viola blanda	Violaceae	VIOBLA	native	5	-3	forb	perennial	sweet white violet
Viola pubescens	Violaceae	VIOPUB	native	4	3	forb	perennial	yellow violet
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Viola striata	Violaceae	VIOSTR	native	5	-3	forb	perennial	cream violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Xanthium strumarium	Asteraceae	XANSTR	non-native	0	0	forb	annual	common cocklebur
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash

Appendix H:
Floristic Quality Assessment – Perry Rd. West

Red Cedar River - M-52 (Perry Rd.) W

06/12/2014

Red Cedar River

Ingham
MI
USA

FQA DB Region:	Michigan
FQA DB Publication Year:	2014
FQA DB Description:	Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net
Practitioner:	Brad Slaughter, John Paskus
Latitude:	42.6861
Longitude:	-84.222
Weather Notes:	
Duration Notes:	
Community Type Notes:	Mesic southern forest, floodplain forest
Other Notes:	Additional survey conducted 9 September (B. Slaughter). Also noted: Cyperus sp., Carex spp., Prenanthes sp., Stachys sp.
Private/Public:	Private

Conservatism-Based Metrics:	
Total Mean C:	3.6
Native Mean C:	4.1
Total FQI:	42.6
Native FQI:	45.8
Adjusted FQI:	38.7
% C value 0:	13.6
% C value 1-3:	30
% C value 4-6:	48.6
% C value 7-10:	7.9
Native Tree Mean C:	3.6
Native Shrub Mean C:	4.6
Native Herbaceous Mean C:	4.1

Species Richness:

Total Species:	140	
Native Species:	125	89.30%
Non-native Species:	15	10.70%
Species Wetness:		
Mean Wetness:	0	
Native Mean Wetness:	-0.2	
Physiognomy Metrics:		
Tree:	21	15%
Shrub:	12	8.60%
Vine:	6	4.30%
Forb:	75	53.60%
Grass:	10	7.10%
Sedge:	10	7.10%
Rush:	0	0%
Fern:	6	4.30%
Bryophyte:	0	0%
Duration Metrics:		
Annual:	11	7.90%
Perennial:	122	87.10%
Biennial:	7	5%
Native Annual:	7	5%
Native Perennial:	114	81.40%
Native Biennial:	4	2.90%

Species:

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	box-elder
Acer nigrum; a. saccharum	Sapindaceae	ACENIG	native	4	3	tree	perennial	black maple
Acer saccharinum	Sapindaceae	ACESAI	native	2	-3	tree	perennial	silver maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Actaea pachypoda	Ranunculaceae	ACTPAC	native	7	5	forb	perennial	dolls-eyes
Alisma subcordatum; a. plantago-aquatica	Alismataceae	ALISUB	native	1	-5	forb	perennial	southern water-plantain
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Anemone canadensis	Ranunculaceae	ANECAN	native	4	-3	forb	perennial	canada anemone
Anemone quinquefolia	Ranunculaceae	ANEQUI	native	5	3	forb	perennial	wood anemone

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Arisaema dracontium	Araceae	ARIDRA	native	8	-3	forb	perennial	green dragon
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit
Asarum canadense	Aristolochiaceae	ASACAN	native	5	5	forb	perennial	wild-ginger
Asclepias incarnata	Apocynaceae	ASCINC	native	6	-5	forb	perennial	swamp milkweed
Asplenium platyneuron	Aspleniaceae	ASPPLA	native	2	3	fern	perennial	ebony spleenwort
Athyrium filix-femina	Athyriaceae	ATHFIL	native	4	0	fern	perennial	lady fern
Caltha palustris	Ranunculaceae	CALPAR	native	6	-5	forb	perennial	marsh-marigold
Cardamine concatenata; dentaria laciniata	Brassicaceae	CARCON	native	5	3	forb	perennial	cut-leaved toothwort
Carex bromoides	Cyperaceae	CXBROM	native	6	-3	sedge	perennial	sedge
Carex cephalophora	Cyperaceae	CXCEPP	native	3	3	sedge	perennial	sedge
Carex gracillima	Cyperaceae	CXGRAA	native	4	3	sedge	perennial	sedge
Carex grayi	Cyperaceae	CXGRAY	native	6	-3	sedge	perennial	sedge
Carex grisea; c. amphibola	Cyperaceae	CXGRIS	native	3	0	sedge	perennial	sedge
Carex hirtifolia	Cyperaceae	CXHIRI	native	5	3	sedge	perennial	sedge
Carex intumescens	Cyperaceae	CXINTU	native	3	-3	sedge	perennial	sedge
Carex lupulina	Cyperaceae	CXLUPA	native	4	-5	sedge	perennial	sedge
Carex rosea; c. convoluta	Cyperaceae	CXROSE	native	2	5	sedge	perennial	curly-styled wood sedge
Carex sparganioides	Cyperaceae	CXSPAR	native	5	3	sedge	perennial	sedge
Carpinus caroliniana	Betulaceae	CARCAO	native	6	0	tree	perennial	blue-beech
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory
Caulophyllum thalictroides	Berberidaceae	CAUTHA	native	5	5	forb	perennial	blue cohosh
Cephalanthus occidentalis	Rubiaceae	CEPOCC	native	7	-5	shrub	perennial	buttonbush
Chelone glabra	Plantaginaceae	CHEGLB	native	7	-5	forb	perennial	turtlehead
Chenopodium album	Amaranthaceae	CHEALB	non-native	0	3	forb	annual	lambs-quarters
Cicuta maculata	Apiaceae	CICMAC	native	4	-5	forb	biennial	water hemlock
Cinna arundinacea	Poaceae	CINARU	native	7	-3	grass	perennial	wood reedgrass
Circaea canadensis; c. lutetiana	Onagraceae	CIRCAN	native	2	3	forb	perennial	enchanters-nightshade
Cirsium vulgare	Asteraceae	CIRVUL	non-native	0	3	forb	biennial	bull thistle
Conium maculatum	Apiaceae	CONMAC	non-native	0	-3	forb	biennial	poison-hemlock
Conyza canadensis	Asteraceae	CONCAN	native	0	3	forb	annual	horseweed
Crataegus crus-galli; c. fontanesiana	Rosaceae	CRACRU	native	5	0	tree	perennial	cockspur thorn
Crataegus mollis	Rosaceae	CRAMOL	native	2	0	tree	perennial	hawthorn
Cryptotaenia canadensis	Apiaceae	CRYCAN	native	2	0	forb	perennial	honewort
Dactylis glomerata	Poaceae	DACGLO	non-native	0	3	grass	perennial	orchard grass
Digitaria sanguinalis	Poaceae	DIGSAN	non-native	0	3	grass	annual	hairy crab grass
Dioscorea villosa; dioscorea villosa	Dioscoreaceae	DIOVIL	native	4	0	forb	perennial	wild yam
Dryopteris carthusiana	Dryopteridaceae	DRYCAR	native	5	-3	fern	perennial	spinulose woodfern

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Elymus virginicus	Poaceae	ELYVIR	native	4	-3	grass	perennial	virginia wild-rye
Epifagus virginiana	Orobanchaceae	EPIVIR	native	10	5	forb	annual	beech-drops
Epilobium coloratum	Onagraceae	EPICOL	native	3	-5	forb	perennial	cinnamon willow-herb
Equisetum hyemale	Equisetaceae	EQUHYE	native	2	0	fern	perennial	scouring rush
Erechtites hieraciifolius	Asteraceae	EREHIE	native	2	3	forb	annual	fireweed
Erigeron philadelphicus	Asteraceae	ERIPHI	native	2	0	forb	perennial	philadelphia fleabane
Euonymus obovatus	Celastraceae	EUOOBO	native	5	3	shrub	perennial	running strawberry-bush
Eutrochium purpureum; eupatorium p.	Asteraceae	EUTPUR	native	5	0	forb	perennial	green-stemmed joe-pye-weed
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash
Fraxinus nigra	Oleaceae	FRANIG	native	6	-3	tree	perennial	black ash
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Galium aparine	Rubiaceae	GALAPA	native	0	3	forb	annual	annual bedstraw
Galium asprellum	Rubiaceae	GALASP	native	5	-5	vine	perennial	rough bedstraw
Galium obtusum	Rubiaceae	GALOBT	native	5	-3	forb	perennial	wild madder
Galium triflorum	Rubiaceae	GALTRR	native	4	3	forb	perennial	fragrant bedstraw
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens
Glyceria striata	Poaceae	GLYSTR	native	4	-5	grass	perennial	fowl manna grass
Hackelia virginiana	Boraginaceae	HACVIR	native	1	3	forb	biennial	beggars lice
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel
Impatiens capensis	Balsaminaceae	IMPCAP	native	2	-3	forb	annual	spotted touch-me-not
Iris virginica	Iridaceae	IRIVIR	native	5	-5	forb	perennial	southern blue flag
Juglans cinerea	Juglandaceae	JUGCIN	native	5	3	tree	perennial	butternut
Lactuca canadensis	Asteraceae	LACCAN	native	2	3	forb	biennial	tall lettuce
Laportea canadensis	Urticaceae	LAPCAN	native	4	-3	forb	perennial	wood nettle
Leersia oryzoides	Poaceae	LEEORY	native	3	-5	grass	perennial	cut grass
Leersia virginica	Poaceae	LEEVIR	native	5	-3	grass	perennial	white grass
Leonurus cardiaca	Lamiaceae	LEOCAR	non-native	0	5	forb	perennial	motherwort
Lobelia cardinalis	Campanulaceae	LOBCAR	native	7	-5	forb	perennial	cardinal-flower
Lobelia siphilitica	Campanulaceae	LOBSIP	native	4	-3	forb	perennial	great blue lobelia
Lycopus virginicus	Lamiaceae	LYCVIR	native	8	-5	forb	perennial	bugle weed
Lysimachia ciliata	Myrsinaceae	LYSCIL	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia nummularia	Myrsinaceae	LYSNUM	non-native	0	-3	forb	perennial	moneywort
Maianthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Matteuccia struthiopteris	Onocleaceae	MATSTR	native	3	0	fern	perennial	ostrich fern
Menispermum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Oenothera biennis	Onagraceae	OENBIE	native	2	3	forb	biennial	common evening-primrose
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	-3	fern	perennial	sensitive fern
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jumpseed
Phalaris arundinacea	Poaceae	PHAARU	native	0	-3	grass	perennial	reed canary grass
Phlox divaricata	Polemoniaceae	PHLDIV	native	5	3	forb	perennial	wild blue phlox
Phytolacca americana	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
Pilea pumila	Urticaceae	PILPUM	native	5	-3	forb	annual	clearweed
Poa trivialis	Poaceae	POATRI	non-native	0	-3	grass	perennial	bluegrass
Podophyllum peltatum	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Populus tremuloides	Salicaceae	POPTRE	native	1	0	tree	perennial	quaking aspen
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Quercus macrocarpa	Fagaceae	QUEMAC	native	5	3	tree	perennial	bur oak
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Ranunculus hispidus	Ranunculaceae	RANHIS	native	5	0	forb	perennial	swamp buttercup
Ranunculus recurvatus	Ranunculaceae	RANREC	native	5	-3	forb	perennial	hooked crowfoot
Ribes americanum	Grossulariaceae	RIBAME	native	6	-3	shrub	perennial	wild black currant
Ribes cynosbati	Grossulariaceae	RIBCYN	native	4	3	shrub	perennial	prickly or wild gooseberry
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus occidentalis	Rosaceae	RUBOCC	native	1	5	shrub	perennial	black raspberry
Rumex verticillatus	Polygonaceae	RUMVER	native	7	-5	forb	perennial	water dock
Sambucus canadensis	Adoxaceae	SAMCAN	native	3	-3	shrub	perennial	elderberry
Sambucus racemosa	Adoxaceae	SAMRAC	native	3	3	shrub	perennial	red-berried elder
Sanguinaria canadensis	Papaveraceae	SANCAA	native	5	3	forb	perennial	bloodroot
Sanicula odorata; s. gregaria	Apiaceae	SANODO	native	2	0	forb	perennial	black snakeroot
Saururus cernuus	Saururaceae	SAUCER	native	9	-5	forb	perennial	lizards-tail
Scutellaria lateriflora	Lamiaceae	SCULAT	native	5	-5	forb	perennial	mad-dog skullcap
Securigera varia; coronilla v.	Fabaceae	SECVAR	non-native	0	5	forb	perennial	crown-vetch
Setaria italica	Poaceae	SETITA	non-native	0	3	grass	annual	hungarian millet
Sisyrinchium angustifolium	Iridaceae	SISANG	native	4	0	forb	perennial	stout blue-eyed-grass
Sium suave	Apiaceae	SIUSUA	native	5	-5	forb	perennial	water-parsnip
Smilax ecirrata	Smilacaceae	SMIECI	native	6	5	forb	perennial	upright carrion-flower
Smilax hispida; s. tamnoides	Smilacaceae	SMIHIS	native	5	0	vine	perennial	bristly greenbrier
Solanum ptychanthum	Solanaceae	SOLPTY	native	1	3	forb	annual	black nightshade
Solidago caesia	Asteraceae	SOLCAE	native	6	3	forb	perennial	bluestem goldenrod
Solidago gigantea	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod

Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Staphylea trifolia	Staphyleaceae	STATRI	native	9	0	shrub	perennial	bladdernut
Symphyotrichum ontarionis; aster o.	Asteraceae	SYMONT	native	6	0	forb	perennial	lake ontario aster
Symplocarpus foetidus	Araceae	SYMFOE	native	6	-5	forb	perennial	skunk-cabbage
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3	forb	perennial	common dandelion
Teucrium canadense	Lamiaceae	TEUCAN	native	4	-3	forb	perennial	wood-sage
Thalictrum dasycarpum	Ranunculaceae	THADAS	native	3	-3	forb	perennial	purple meadow-rue
Thalictrum dioicum	Ranunculaceae	THADIO	native	6	3	forb	perennial	early meadow-rue
Tilia americana	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
Torilis japonica	Apiaceae	TORJAP	non-native	0	3	forb	annual	hedge-parsley
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
Trillium grandiflorum	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium
Ulmus americana	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
Ulmus rubra	Ulmaceae	ULMRUB	native	2	0	tree	perennial	slippery elm
Urtica dioica	Urticaceae	URTDIO	native	1	0	forb	perennial	stinging nettle
Verbena urticifolia	Verbenaceae	VERURT	native	4	0	forb	perennial	white vervain
Viburnum opulus	Adoxaceae	VIBOPU	non-native	0	-3	shrub	perennial	european highbush-cranberry
Viola sororia	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
Viola striata	Violaceae	VIOSTR	native	5	-3	forb	perennial	cream violet
Vitis riparia	Vitaceae	VITRIP	native	3	0	vine	perennial	river-bank grape
Zanthoxylum americanum	Rutaceae	ZANAME	native	3	3	shrub	perennial	prickly-ash